FANUC Series 0*i*-MODEL D
FANUC Series 0*i* Mate-MODEL D

PARAMETER MANUAL

B-64310EN/01

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In this manual we have tried as much as possible to describe all the various matters.
However, we cannot describe all the matters which must not be done, or which cannot be done, because there are so many possibilities.
Therefore, matters which are not especially described as possible in this manual should be regarded as "impossible".

DEFINITION OF WARNING, CAUTION, AND NOTE

This manual includes safety precautions for protecting the user and preventing damage to the machine. Precautions are classified into Warning and Caution according to their bearing on safety. Also, supplementary information is described as a Note. Read the Warning, Caution, and Note thoroughly before attempting to use the machine.

> ⚠ **WARNING**
> Applied when there is a danger of the user being injured or when there is a danger of both the user being injured and the equipment being damaged if the approved procedure is not observed.

> ⚠ **CAUTION**
> Applied when there is a danger of the equipment being damaged, if the approved procedure is not observed.

> **NOTE**
> The Note is used to indicate supplementary information other than Warning and Caution.

- Read this manual carefully, and store it in a safe place.

PREFACE

Applicable models

The models covered by this manual, and their abbreviations are :

Model name	Abbreviation		
FANUC Series 0*i* -TD	0*i* -TD	Series 0*i* -D	0*i* -D
FANUC Series 0*i* -MD	0*i* -MD		
FANUC Series 0*i* Mate -TD	0*i* Mate -TD	Series 0*i* Mate -D	0*i* Mate -D
FANUC Series 0*i* Mate -MD	0*i* Mate -MD		

NOTE

1. For an explanatory purpose, the following descriptions may be used according to the types of path control used:
   - T series: 0*i* -TD / 0*i* Mate -TD
   - M series: 0*i* -MD / 0*i* Mate -MD
2. Some functions described in this manual may not be applied to some products.
   For details, refer to the DESCRIPTIONS (B-64302EN).
3. The 0*i* -D / 0*i* Mate -D requires setting of parameters to enable part of basic functions. For the parameters to be set, see Section 4.51, "PARAMETERS OF 0*i* -D / 0*i* Mate -D BASIC FUNCTIONS".

Related manuals of Series 0*i* -D,Series 0*i* Mate -D

The following table lists the manuals related to Series 0*i* -D,Series 0*i* Mate -D. This manual is indicated by an asterisk(*).

Table 1 Related manuals

Manual name	Specification number	
DESCRIPTIONS	B-64302EN	
CONNECTION MANUAL (HARDWARE)	B-64303EN	
CONNECTION MANUAL (FUNCTION)	B-64303EN-1	
USER'S MANUAL (Common to Lathe System/Machining Center System)	B-64304EN	
USER'S MANUAL (For Lathe System)	B-64304EN-1	
USER'S MANUAL (For Machining Center System)	B-64304EN-2	
MAINTENANCE MANUAL	B-64305EN	
PARAMETER MANUAL	B-64310EN	*
START-UP MANUAL	B-64304EN-3	
Programming		
Macro Compiler / Macro Executor PROGRAMMING MANUAL	B-64303EN-2	
Macro Compiler OPERATOR'S MANUAL	B-64304EN-5	
C Language PROGRAMMING MANUAL	B-64303EN-3	
PMC		
PMCPROGRAMMING MANUAL	B-63983EN	
Network		
PROFIBUS-DP Board OPERATOR'S MANUAL	B-64404EN	
Fast Ethernet / Fast Data Server OPERATOR'S MANUAL	B-64414EN	
Operation guidance function		
MANUAL GUIDE *i* (Common to Lathe System/Machining Center System) OPERATOR'S MANUAL	B-63874EN	
MANUAL GUIDE *i* (For Machining Center System) OPERATOR'S MANUAL	B-63874EN-2	
MANUAL GUIDE *i* (Set-up Guidance Functions) OPERATOR'S MANUAL	B-63874EN−1	
MANUAL GUIDE 0*i* OPERATOR'S MANUAL	B-64434EN	
TURN MATE *i* OPERATOR'S MANUAL	B-64254EN	

Related manuals of SERVO MOTOR α*i*/β*i* series

The following table lists the manuals related to SERVO MOTOR α*i*/β*i* series

Table 2 Related manuals

Manual name	Specification number
FANUC AC SERVO MOTOR α*i* series DESCRIPTIONS	B-65262EN
FANUC AC SPINDLE MOTOR α*i* series DESCRIPTIONS	B-65272EN
FANUC AC SERVO MOTOR β*i* series DESCRIPTIONS	B-65302EN
FANUC AC SPINDLE MOTOR β*i* series DESCRIPTIONS	B-65312EN
FANUC SERVO AMPLIFIER α*i* series DESCRIPTIONS	B-65282EN
FANUC SERVO AMPLIFIER β*i* series DESCRIPTIONS	B-65322EN
FANUC SERVO MOTOR α*i*s series FANUC SERVO MOTOR α*i* series FANUC AC SPINDLE MOTOR α*i* series FANUC SERVO AMPLIFIER α*i* series MAINTENANCE MANUAL	B-65285EN
FANUC SERVO MOTOR β*i*s series FANUC AC SPINDLE MOTOR β*i* series FANUC SERVO AMPLIFIER β*i* series MAINTENANCE MANUAL	B-65325EN
FANUC AC SERVO MOTOR α*i*/β*i* series, FANUC LINEAR MOTOR L*i*S series FANUC SYNCHRONOUS BUILT-IN SERVO MOTOR D*i*S series PARAMETER MANUAL	B-65270EN
FANUC AC SPINDLE MOTOR α*i*/β*i* series, BUILT-IN SPINDLE MOTOR B*i* series PARAMETER MANUAL	B-65280EN

This manual mainly assumes that the FANUC SERVO MOTOR α*i* series of servo motor is used. For servo motor and spindle information, refer to the manuals for the servo motor and spindle that are actually connected.

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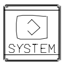
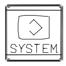
APPENDIX

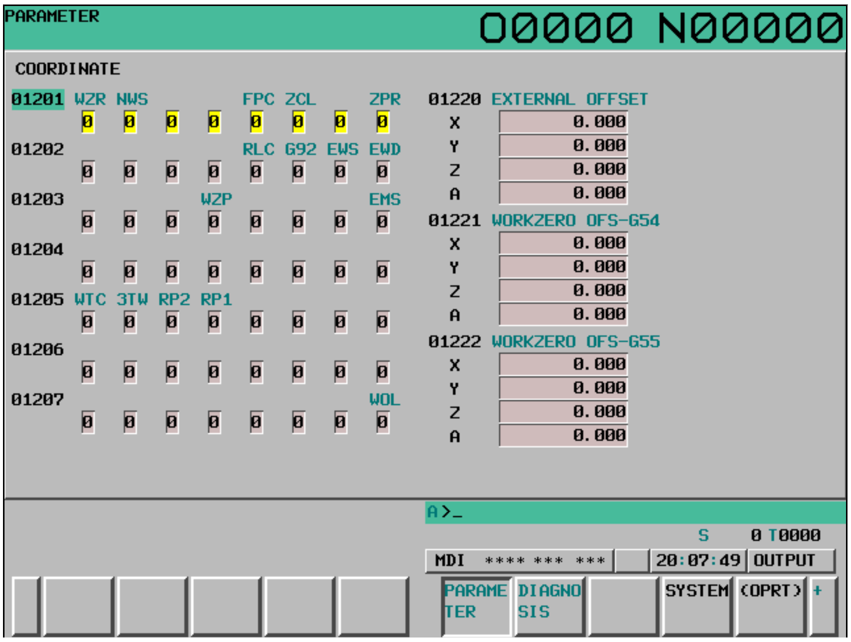
1 DISPLAYING PARAMETERS

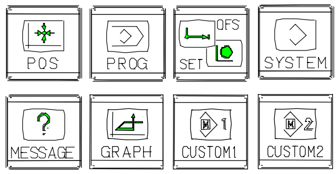
Follow the procedure below to display parameters.

1 Press the 

function key on the MDI as many times as required, or alternatively, press the 

function key once, then the PARAM section display soft key. The parameter screen is then selected.



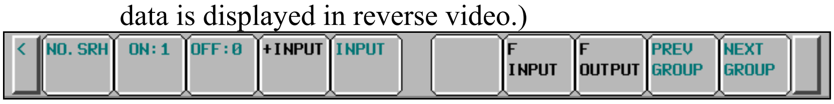


Function keys

2 The parameter screen consists of multiple pages. Use step (a) or (b) to display the page that contains the parameter you want to display.

(a) Use the page select key or the cursor move keys to display the desired page.

(b) Enter the data number of the parameter you want to display from the keyboard, then press the [NO.SRH] soft key. The parameter page containing the specified data number appears with the cursor positioned at the data number. (The data is displayed in reverse video.)



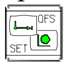
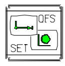
> **NOTE**
> If key entry is started with the section select soft keys displayed, they are replaced automatically by operation select soft keys including [NO.SRH]. Pressing the [(OPRT)] soft key can also cause the operation select keys to be displayed.

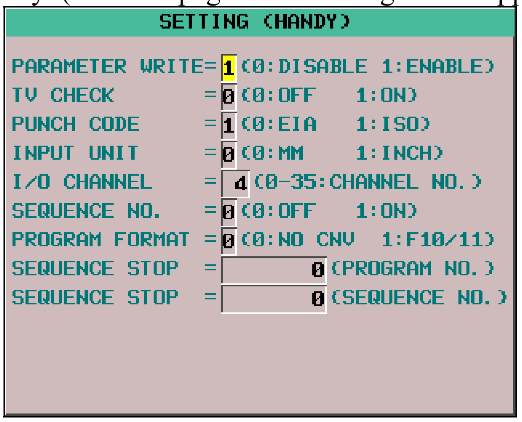
2 SETTING PARAMETERS FROM MDI

Follow the procedure below to set parameters.

1 Place the NC in the MDI mode or the emergency stop state.

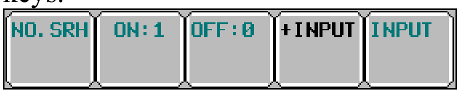
2 Follow the substeps below to enable writing of parameters.

2-1 To display the setting screen, press the  function key as many times as required, or alternatively press the  function key once, then the [SETTING] section select soft key. (The first page of the setting screen appears.)

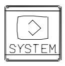
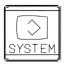


2-2 Position the cursor on "PARAMETER WRITE" using the cursor move keys.

2-3 Press the [(OPRT)] soft key to display operation select soft keys.

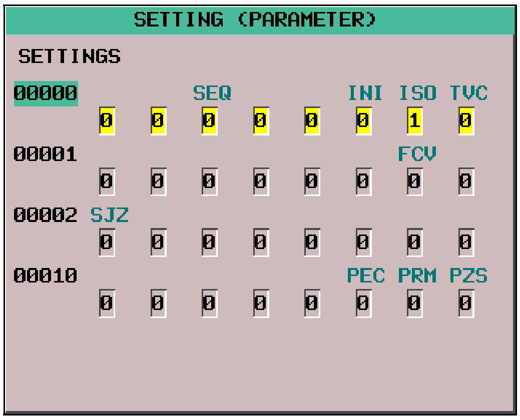


2-4 To set "PARAMETER WRITE=" to 1, press the [ON:1] soft key, or alternatively enter 1 and press the [INPUT] soft key. From now on, the parameters can be set. At the same time an alarm condition (SW0100 PARAMETER WRITE ENABLE) occurs in the CNC.

3 To display the parameter screen, press the  function key as many times as required, or alternatively press the  function key once, then the PARAM section select soft key. (See Chapter 1, "DISPLAYING PARAMETERS.")

4 Display the page containing the parameter you want to set, and position the cursor on the parameter. (See Chapter 1, "DISPLAYING PARAMETERS.")

5 Enter data, then press the [INPUT] soft key. The parameter indicated by the cursor is set to the entered data.



Data can be entered continuously for parameters, starting at the selected parameter, by separating each data item with a semicolon (;).

[Example] Entering 10;20;30;40 and pressing the INPUT key assigns values 10, 20, 30, and 40 to parameters in order starting at the parameter indicated by the cursor.

6 Repeat steps (4) and (5) as required.

7 If parameter setting is complete, set "PARAMETER WRITE=" to 0 on the setting screen to disable further parameter setting.

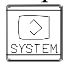
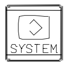
8 Reset the NC to release the alarm condition (SW0100).
If an alarm condition (PW0000 PLEASE TURN OFF POWER) occurs in the NC, turn it off before continuing operation.

3 INPUTTING AND OUTPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

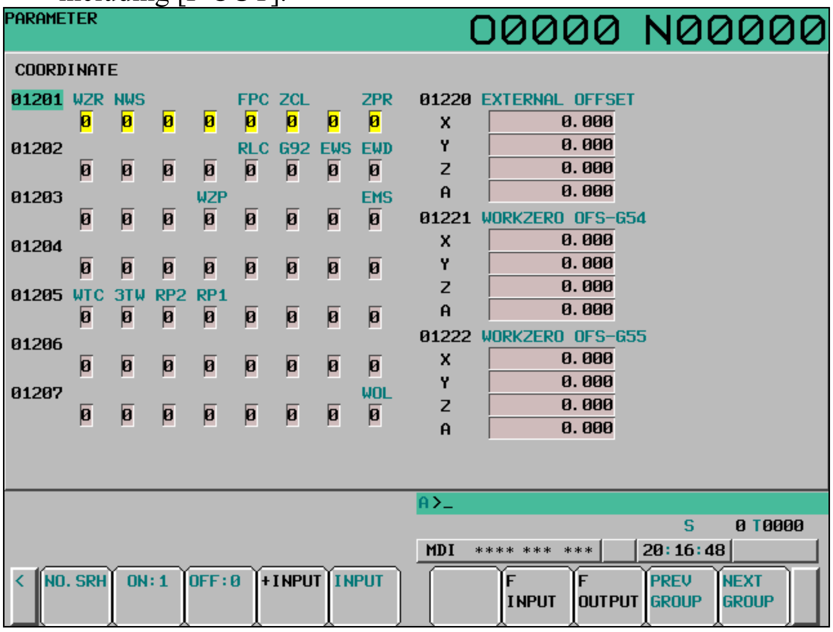
This section explains the parameter input/output procedures for input/output devices connected to the reader/puncher interface.
The following description assumes the input/output devices are ready for input/output. It also assumes parameters peculiar to the input/output devices, such as the baud rate and the number of stop bits, have been set in advance. (See Section 4.5, "PARAMETERS OF READER/PUNCHER INTERFACE.")

3.1 OUTPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

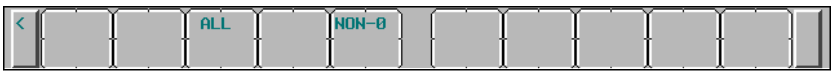
1 Select the EDIT mode or set to Emergency stop.

2 To select the parameter screen, press the  function key as many times as required, or alternatively press the  function key once, then the PARAM section select soft key.

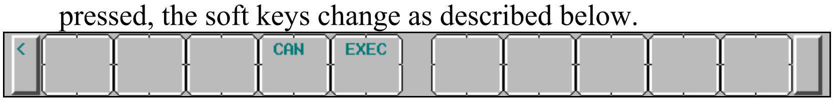
3 Press the [(OPRT)] soft key to display operation select soft keys, then press the forward menu key located at the right-hand side of the soft keys to display another set of operation select keys including [F OUT].



4 Pressing the [F OUT] soft key changes the soft key display as shown below:



5 The [NON-0] soft key selects outputting of the parameters with a non-zero value. The [ALL] soft key selects outputting of all parameters. When the [NON-0] soft key or [ALL] soft key is pressed, the soft keys change as described below.



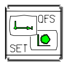
6 Press the [EXEC] soft key to start parameter output. When parameters are being output, "OUTPUT" blinks in the state display field on the lower part of the screen.

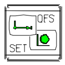
7 When parameter output terminates, "OUTPUT" stops blinking. Press the  key to interrupt parameter output.

3.2 INPUTTING PARAMETERS THROUGH THE READER/PUNCHER INTERFACE

1 Place the NC in the emergency stop state.

2 Enable parameter writing.

2-1 To display the setting screen, press the 

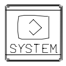
function key as many times as required, or alternatively press the 

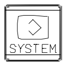
function key once, then the [SETING] section select soft key. The first page of the setting screen appears.

2-2 Position the cursor on "PARAMETER WRITE" using the cursor move keys.

2-3 Press the [(OPRT)] soft key to display operation select soft keys.

2-4 To set "PARAMETER WRITE=" to 1, press the [ON:1] soft key, or alternatively enter 1, then press the [INPUT] soft key. From now on, parameters can be set.
At the same time an alarm condition (SW0100 PARAMETER WRITE ENABLE) occurs in the NC.

3 To select the parameter screen, press the 

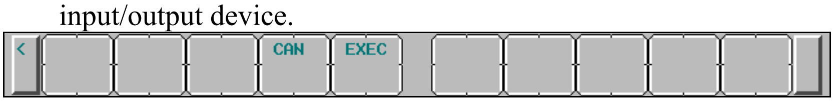
function key as many times as required, or alternatively press the 

key once, then [PARAM] soft key.

4 Press the [(OPRT)] soft key to display operation select keys, then press the forward menu key located at the right-hand side of the soft keys to display another set of operation select soft keys including [F IN].

5 Pressing the [F IN] soft key changes the soft key display as shown below:

6 Press the [EXEC] soft key to start inputting parameters from the input/output device.



When parameters are being input, "INPUT" blinks in the state display field on the lower part of the screen. Press the 

key to interrupt parameter input.

7 When parameter read terminates, "INPUT" stops blinking, and an alarm condition (PW0100) occurs in the NC. Turn it off before continuing operation.

3.3 I/O FORMATS

This section describes the I/O formats of parameters.
Parameters are classified by data format as follows:

Data format	Remarks
Bit	Data of these formats is represented by an 8-digit binary number, with each digit corresponding to a bit.
Bit machine group	
Bit path	
Bit axis	
Bit spindle	
Byte	The setting range of data varies from one parameter to another. For details, refer to the description of each parameter.
Byte machine group	
Byte path	
Byte axis	
Byte spindle	
Word	
Word machine group	
Word path	
Word axis	
Word spindle	
2-word	
2-word machine group	
2-word path	
2-word axis	
2-word spindle	
Real	
Real machine group	
Real path	
Real axis	
Real spindle	

3.3.1 Keywords

The alphabetic characters listed below are used as keywords.
A numeric value after each keyword has the following meaning:

Keyword	Meaning of a numeric value that follows
N	Parameter number
Q	Data identifier (1: Parameter data, 0: Pitch error compensation data)
T	Machine group number (1) of a machine group type parameter
L	Path number (1 to number of controlled paths) of a path type parameter
A	Controlled axis number (1 to number of controlled axes) of an axis type parameter
S	Spindle number (1 to number of controlled spindles) of a spindle type parameter
P	Value of a parameter independent of inch/metric switching
M	Metric input value of a parameter dependent on inch/metric switching
I	Inch input value of a parameter dependent on inch/metric switching

3.3.2 Inch/Metric Switching

For parameters dependent on inch/metric switching such as those for length and feedrate, whether data is inch data or metric data is specified by the input mode in the case of input from the MDI panel, or by the keyword I or M prefixed to the data in the case of input from an external I/O device. The keyword I or M is added also when data is output from an external I/O device.
If the input mode or keyword differs from the actually used mode as in a case where data input in the inch mode is used in the metric mode, the CNC performs automatic data conversion. So, data need not be converted according to a mode change. Moreover, when parameter data is displayed, the data is converted according to the display mode. However, when data is output from an external I/O device, the original data is output according to the original keyword.

3.3.3 Bit Format

N	*****	Q1	P	********	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
An 8-digit binary number after P represents the bit values (0/1) of a parameter, with the first digit corresponding to bit 0 and the eighth digit corresponding to bit 7.
Leading zeros may not be omitted.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N00010Q1P00000001;
Parameter No. 10
Parameter value
Bit 0 is set to 1, and the other bits are set to 0.

3.3.4 Bit Machine Group Format

N	*****	Q1	T1	P	********	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
T1 indicates the 1st machine group (for the 0*i*-D/0*i* Mate-D, the 1st machine group is always assumed).
The 8-digit binary number that follows P includes the bit values (0 or 1) of the parameter in the 1st machine group; the first bit corresponds to bit 0 and the eighth bit to bit 7.
Leading zeros may not be omitted.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01005Q1T1P10000001;
Parameter No. 1005
Parameter value
1st machine group:
Bits 0 and 7 are set to 1, and the other bits are set to 0.

3.3.5 Bit Path Format

N	*****	Q1	L	*	P	********	L	*	P	********	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after L represents a path number (1 to number of controlled paths).
An 8-digit binary number after P represents the bit values (0/1) of a parameter for each path, with the first digit corresponding to bit 0 and the eighth digit corresponding to bit 7.
Leading zeros may not be omitted.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example

N01005Q1L1P10000001L2P10000001;
Parameter No. 1005
Parameter value
Path 1: Bits 0 and 7 are set to 1, and the other bits are set to 0.
Path 2: Bits 0 and 7 are set to 1, and the other bits are set to 0.

3.3.6 Bit Axis Format

N	*****	Q1	A	*	P	********	A	*	P	********	· · ·	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after A represents a controlled axis number (1 to number of controlled axes).
An 8-digit binary number after P represents the bit values (0/1) of a parameter for each controlled axis, with the first digit corresponding to bit 0 and the eighth digit corresponding to bit 7.
Leading zeros may not be omitted.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example

N01005Q1A1P10000001A2P10000001A3P10000001.......;
Parameter No. 1005
Parameter value
1st axis:
Bits 0 and 7 are set to 1, and the other bits are set to 0.
2nd axis:
Bits 0 and 7 are set to 1, and the other bits are set to 0.
3rd axis:
Bits 0 and 7 are set to 1, and the other bits are set to 0.
▪

3.3.7 Bit Spindle Format

N	*****	Q1	S	*	P	********	S	*	P	********	・ ・ ・	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after S represents a spindle number (1 to number of controlled spindles).
An 8-digit binary number after P represents the bit values (0/1) of a parameter for each spindle, with the first digit corresponding to bit 0 and the eighth digit corresponding to bit 7.
Leading zeros may not be omitted.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example

N05603Q1S1P00001000S2P00001000S3P00000000;
Parameter No. 5603
Parameter value
1st spindle:
Bit 3 is set to 1, and the other bits are set to 0.
2nd spindle:
Bit 3 is set to 1, and the other bits are set to 0.
3rd spindle:
All bits are set to 0.

3.3.8 Byte/Word/Two-Word Format

N	*****	Q1	P	********	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after P represents a parameter value (integer).
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N00100Q1P31515;
Parameter No. 100
Parameter value 31515

3.3.9 Byte/Word/Two-Word Machine Group Format

N	*****	Q1	T1	P	******	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
T1 indicates the 1st machine group (for the 0*i*-D/0*i* Mate-D, the 1st machine group is always assumed).
The value that follows P indicates the value (integer) of the parameter in 1st machine group.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01020Q1T1P88;
Parameter No. 1020
Parameter value 1st machine group: 88

3.3.10 Byte/Word/Two-Word Path Format

N	*****	Q1	L	*	P	******	L	*	P	******	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after L represents a path number (1 to number of controlled paths).
A numeric value after P represents the value (integer) of a parameter for each path.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01020Q1L1P88L2P89;
Parameter No. 1020
Parameter value Path 1: 88
Path 2: 89

3.3.11 Byte/Word/Two-Word Axis Format

N	*****	Q1	A	*	P	******	A	*	P	******	·	· ·	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after A represents a controlled axis number (1 to number of controlled axes).
A numeric value after P represents the value (integer) of a parameter for each controlled axis.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01020Q1A1P88A2P89A3P90A4P66......;
Parameter No. 1020
Parameter value 1st axis: 88
2nd axis: 89
3rd axis: 90
4th axis: 66
▪

3.3.12 Byte/Word/Two-Word Spindle Format

N	*****	Q1	S	*	P	******	S	*	P	******	· · ·	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after S represents a spindle number (1 and up).
A numeric value after P represents the value (integer) of a parameter for each spindle.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N05680Q1S1P19S2P19S3P0;

Parameter No.	5680
Parameter value	1st spindle: 19
	2nd spindle: 19
	3rd spindle: 0

3.3.13 Real Number Format

N	*****	Q1	P	******	;

N	*****	Q1	M	******	;

N	*****	Q1	I	******	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after each of P, M, and I represents the value (real number) of a parameter.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01451Q1P5000.0;
Parameter No. 1451
Parameter value 5000.0

3.3.14 Real Number Machine Group Format

N	*****	Q1	T1	P	******	;

N	*****	Q1	T1	M	******	;

N	*****	Q1	T1	I	******	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
T1 indicates the 1st machine group (for the 0*i*-D/0*i* Mate-D, the 1st machine group is always assumed).
The value that follows P, M, or I indicates the value (real number) of the parameter in 1st machine group.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01220Q1T1M50.0;
Parameter No. 1220
Parameter value 1st machine group: 50.0

3.3.15 Real Number Path Format

N	*****	Q1	L	*	P	******	L	*	P	******	;

N	*****	Q1	L	*	M	******	L	*	M	******	;

N	*****	Q1	L	*	I	******	L	*	I	******	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after L represents a path number (1 to number of controlled paths).
A numeric value after each of P, M, and I represents the value (real number) of a parameter for each path.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01220Q1L1M50.0L2M60.0;
Parameter No. 1220
Parameter value Path 1: 50.0
Path 2: 60.0

3.3.16 Real Number Axis Format

N	*****	Q1	A	*	P	******	A	*	P	******	· · ·	;

N	*****	Q1	A	*	M	******	A	*	M	******	· · ·	;

N	*****	Q1	A	*	I	******	A	*	I	******	· · ·	;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after A represents a controlled axis number (1 to number of controlled axes).
A numeric value after each of P, M, and I represents the value (real number) of a parameter for each controlled axis.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example
N01220Q1A1M50.0A2M60.0A3M70.0A4M0.0A5M0
.0 ....;
Parameter No. 1220
Parameter value 1st axis: 50.0
2nd axis: 60.0
3rd axis: 70.0
4th axis: 0.0
5th axis: 0.0

3.3.17 Real Number Spindle Format

N	*****	Q1	S	*	P	******	S	*	P	******	· · · ;

N	*****	Q1	S	*	M	******	S	*	M	******	· · · ;

N	*****	Q1	S	*	I	******	S	*	I	******	· · · ;

A numeric value after N represents a parameter number.
Q1 indicates that the data is parameter data.
A numeric value after S represents a spindle number (1 to number of controlled spindles).
A numeric value after each of P, M, and I represents the value (real number) of a parameter for each spindle.
A semicolon (;) marks the end of a block. (LF is used for the ISO code, and CR is used for the EIA code.)

Example

N05898Q1S1P30.0S2P30.0S3P0.0;
Parameter No. 5898
Parameter value 1st spindle: 30.0
2nd spindle: 30.0
3rd spindle: 0.0

3.3.18 Start and End of a Record

A parameter record starts with "%" and ends with "%".

Example

```
%;          ..........................................Start of record
N00000Q1P00001100;
N00002Q1P00000000;
▪
▪
N09162Q1P00000000;
N09163Q1P00000000;
%           ...........................................End of record
```

When parameters and pitch error compensation data are included in a single file, the file starts with "%" and ends with "%".

4 DESCRIPTION OF PARAMETERS

4.1 DATA TYPE

Parameters are classified by data type as follows:

Data type	Valid data range	Remarks
Bit Bit machine group Bit path Bit axis Bit spindle	0 or 1	
Byte Byte machine group Byte path Byte axis Byte spindle	-128 to 127 0 to 255	Some parameters handle these types of data as unsigned data.
Word Word machine group Word path Word axis Word spindle	-32768 to 32767 0 to 65535	Some parameters handle these types of data as unsigned data.
2-word 2-word machine group 2-word path 2-word axis 2-word spindle	0 to ±999999999	Some parameters handle these types of data as unsigned data.
Real Real machine group Real path Real axis Real spindle	See the Standard Parameter Setting Tables.	

NOTE

1. Each of the parameters of the bit, bit machine group, bit path, bit axis, and bit spindle types consists of 8 bits for one data number (parameters with eight different meanings).
2. For machine group types, the parameters corresponding to the maximum number of machine groups are present, so that independent data can be set for each machine group. For the 0*i* -D/0*i* Mate-D, the maximum number of machine groups is always 1.
3. For path types, parameters corresponding to the maximum number of paths are present, so that independent data can be set for each path.
4. For axis types, parameters corresponding to the maximum number of control axes are present, so that independent data can be set for each control axis.
5. For spindle types, parameters corresponding to the maximum number of spindles are present, so that independent data can be set for each spindle axis.
6. The valid data range for each data type indicates a general range. The range varies according to the parameters. For the valid data range of a specific parameter, see the explanation of the parameter.

4.2 REPRESENTATION OF PARAMETERS

Parameters of the bit type, bit machine group type, bit path type, bit axis type, and bit spindle type

	#7	#6	#5	#4	#3	#2	#1	#0
0000				EIA	NCR	ISP	CTV	TVC

Data No. — Data (Data #0 to #7 are bit positions.)

Parameters other than the bit-type parameters above

1023	Number of the servo axis for each axis

Data No. — Data

NOTE

1 There are bits that are indicated as a blank or parameters whose numbers are displayed on the screen but not shown in the list in Chapter 4. "DESCRIPTION OF PARAMETERS". Basically, set these parameters to 0.

2 Parameters that are valid only for either the lathe system (T series) or the machining center system (M series) are indicated in two rows as shown in the following examples. When a row is blank, the parameter is not usable with the corresponding series. Basically, set these parameters to 0.

[Example 1]

Parameter HTG is a parameter common to the M and T series, but Parameters RTV and ROC are parameters valid only for the T series.

	#7	#6	#5	#4	#3	#2	#1	#0	
1403	RTV		HTG	ROC					T series
			HTG						M series

[Example 2]

The following parameter is provided only for the M series.

1411		T series
	Cutting feedrate	M series

3 When "to" is inserted between two parameter numbers, there are parameters with successive numbers between the two starting and ending parameter numbers, but those intermediate parameter numbers are omitted for convenience.

4 The lower-case letter "x" or "s" following the name of a bit-type parameter indicates the following:

- "□□□x" : Bit axis type parameters
- "○○○s" : Bit spindle type parameters

4.3 STANDARD PARAMETER SETTING TABLES

Overview

This section defines the standard minimum data units and valid data ranges of the CNC parameters of the real type, real machine group type, real path type, real axis type, and real spindle type. The data type and unit of data of each parameter conform to the specifications of each function.

Explanation

(A) Length and angle parameters (type 1)

Unit of data	Increment system	Minimum data unit	Valid data range
mm deg.	IS-A	0.01	-999999.99 to +999999.99
	IS-B	0.001	-999999.999 to +999999.999
	IS-C	0.0001	-99999.9999 to +99999.9999
inch	IS-A	0.001	-99999.999 to +99999.999
	IS-B	0.0001	-99999.9999 to +99999.9999
	IS-C	0.00001	-9999.99999 to +9999.99999

(B) Length and angle parameters (type 2)

Unit of data	Increment system	Minimum data unit	Valid data range
mm deg.	IS-A	0.01	0.00 to +999999.99
	IS-B	0.001	0.000 to +999999.999
	IS-C	0.0001	0.0000 to +99999.9999
inch	IS-A	0.001	0.000 to +99999.999
	IS-B	0.0001	0.0000 to +99999.9999
	IS-C	0.00001	0.00000 to +9999.99999

(C) Velocity and angular velocity parameters

Unit of data	Increment system	Minimum data unit	Valid data range
mm/min degree/min	IS-A	0.01	0.0 to +999000.00
	IS-B	0.001	0.0 to +999000.000
	IS-C	0.0001	0.0 to +99999.9999
inch/min	IS-A	0.001	0.0 to +96000.000
	IS-B	0.0001	0.0 to +9600.0000
	IS-C	0.00001	0.0 to +4000.00000

If bit 7 (IESP) of parameter No. 1013 is set to 1, the valid data ranges for IS-C are extended as follows:

Unit of data	Increment system	Minimum data unit	Valid data range
mm/min degree/min	IS-C	0.001	0.000 to +999000.000
inch/min	IS-C	0.0001	0.0000 to +9600.0000

(D)Acceleration and angular acceleration parameters

Unit of data	Increment system	Minimum data unit	Valid data range
mm/sec^2 $deg./sec^2$	IS-A	0.01	0.00 to +999999.99
	IS-B	0.001	0.000 to +999999.999
	IS-C	0.0001	0.0000 to +99999.9999
$inch/sec^2$	IS-A	0.001	0.000 to +99999.999
	IS-B	0.0001	0.0000 to +99999.9999
	IS-C	0.00001	0.00000 to +9999.99999

If bit 7 (IESP) of parameter No. 1013 is set to 1, the valid data ranges for IS-C are extended as follows:

Unit of data	Increment system	Minimum data unit	Valid data range
mm/min degree/min	IS-C	0.001	0.000 to +999999.999
inch/min	IS-C	0.0001	0.0000 to +99999.9999

Notes

(1) Values are rounded up or down to the nearest multiples of the minimum data unit.
(2) A valid data range means data input limits, and may differ from values representing actual performance.
(3) For information on the ranges of commands to the CNC, refer to Appendix D, "LIST OF COMMAND RANGES," in the "USER'S MANUAL" (B-64304EN).

4.4 PARAMETERS OF SETTING

	#7	#6	#5	#4	#3	#2	#1	#0
0000			SEQ			INI	ISO	TVC

[Input type] Setting input
[Data type] Bit path

 # 0 TVC TV check
0: Not performed
1: Performed

 # 1 ISO Code used for data output
0: EIA code
1: ISO code

NOTE
1 The I/O setting of a memory card is made by bit 0 (ISO) of parameter No. 0139.
2 The I/O setting of data server is made by bit 0 (ISO) of parameter No. 0908.

 # 2 INI Unit of input
0: In metrics
1: In inches

 # 5 SEQ Automatic insertion of sequence numbers
0: Not performed
1: Performed

	#7	#6	#5	#4	#3	#2	#1	#0
0001							FCV	

[Input type] Setting input
[Data type] Bit path

 # 1 FCV Program format
0: Series 0 standard format
(This format is compliant with the Series 0*i*-C.)
1: Series 10/11 format

NOTE
1 Programs created in the Series 10/11 program format can be used for operation on the following functions:
  1 Subprogram call M98,M198
  2 Thread cutting with equal leads G32 (T series)
  3 Canned cycle G90, G92, G94 (T series)
  4 Multiple repetitive canned cycle G71 to G76 (T series)
  5 Drilling canned cycle
    G80 to G89 (T series)
    G73, G74, G76, G80 to G89(M series)
2 When the program format used in the Series 10/11 is used for this CNC, some limits may add. Refer to the User's Manual.

	#7	#6	#5	#4	#3	#2	#1	#0
0002	SJZ							

[Input type] Setting input
[Data type] Bit

 # 7 SJZ On an axis for which bit 3 (HJZx) of parameter No. 1005 is set:
0: If a reference position is not established yet, reference position return is performed with deceleration dogs.
If a reference position is already established, reference position return is performed at a parameter-set feedrate without using deceleration dogs.
1: Reference position return is performed with deceleration dogs at all times.

NOTE
SJZ is valid for an axis for which bit 3 (HJZx) of parameter No. 1005 is set to 1. When bit 1 (DLZx) of parameter No. 1005 is set to 1, however, manual reference position return after a reference position is set is performed at a parameter-set feedrate, regardless of the setting of SJZ.

	#7	#6	#5	#4	#3	#2	#1	#0
0010						PEC	PRM	PZS

[Input type] Setting input
[Data type] Bit path

 # 0 PZS When a part program is punched out, the O number is:
0: Not zero-suppressed.
1: Zero-suppressed.

 # 1 PRM When parameters are output, the parameters whose values are 0 are:
0: Output.
1: Not output.

 # 2 PEC When pitch error compensation data is output, the data whose value is 0 is:
0: Output.
1: Not output.

	#7	#6	#5	#4	#3	#2	#1	#0
0012	RMVx							MIRx

[Input type] Setting input
[Data type] Bit axis

 # 0 MIRx Mirror image for each axis
0: Mirror image is off. (Normal)
1: Mirror image is on. (Mirror)

 # 7 RMVx Releasing the assignment of the control axis for each axis
0: Not released
1: Released
(Equivalent to the control axis detachment signals DTCH1, DTCH2, and so forth)

> **NOTE**
> RMVx is valid when bit 7 (RMBx) of parameter No. 1005 is set to 1.

4.5 PARAMETERS OF READER/PUNCHER INTERFACE

To transfer data (programs, parameters, and so forth) to and from an external input/output device through the I/O device interface (RS-232-C serial interface), the parameters described below need to be set.
The input/output device connected to a channel (such as RS-232-C serial port 1 and RS-232-C serial port 2) can be selected by setting I/O CHANNEL (parameter No. 0020). The specifications (input/output specification number, baud rate, and the number of stop bits) of an input/output device connected to each channel must be set in the parameters corresponding to each channel beforehand.
For channel 1, two combinations of parameters to specify the input/output device data are provided.
The following shows the interrelation between the input/output device interface parameters for the channels.

0020 I/O CHANNEL or foreground input

Set channels to be used for data input/output.

I/O CHANNEL (0 to 9)
=0 : Channel 1
=1 : Channel 1
=2 : Channel 2
=3 : Channel 3
:
:
:

Input/output to and from the memory card interface, etc. is also possible.

When IO4 is set

0021 Foreground output

0022 Background input

0023 Background input

The channel setting is the same as No.0020.

Input/output channel number (parameter No.0020)

↓

I/O CHANNEL=0 (Channel 1)
- 0101 Stop bit and other data
- 0102 Number specified for the input/output device
- 0103 Baud rate

I/O CHANNEL=1 (Channel 1)
- 0111 Stop bit and other data
- 0112 Number specified for the input/output device
- 0113 Baud rate

I/O CHANNEL=2 (Channel 2)
- 0121 Stop bit and other data
- 0122 Number specified for the input/output device
- 0123 Baud rate

:
:
:

I/O CHANNEL=9

4.5.1 Parameters Common to All Channels

0020	**I/O CHANNEL : Input/output device selection, or interface number for a foreground input device**

0021	**Foreground output device setting**

0022	**Background input device setting**

0023	**Background output device setting**

[Input type] Setting input
[Data type] Byte
[Valid data range] 0 to 9

The CNC has the following interfaces for transferring data to and from an external input/output device and the host computer:

Input/output device interface (RS-232-C serial ports 1 and 2)
Memory card interface
Data server interface
Embedded Ethernet interface

By setting bit 0 (IO4) of parameter No. 0110, data input/output can be controlled separately. When IO4 is not set, data input/output is performed using the channel set in parameter No. 0020. When IO4 is set, a channel can be assigned to each of foreground input, foreground output, background input, and background output.
In these parameters, specify the interface connected to each input/output device to and from which data is to be transferred. See the table below for these settings.
To execute the DNC operation or M198 command with FOCAS2/Ethernet, set this parameter to 6.

Correspondence between settings and input/output devices

Setting	Description
0,1	RS-232-C serial port 1
2	RS-232-C serial port 2
4	Memory card interface
5	Data server interface
6	Execution of the DNC operation or M198 command with FOCAS2/Ethernet
9	Embedded Ethernet interface

0024	Setting of communication with the ladder development tool (FANUC LADDER-III, ladder editing package)

[Input type] Setting input
[Data type] Word
[Valid data range] 0 to 255

This parameter is used to enable or disable the PMC online connection function.
By specifying this parameter, the PMC online connection function can be enabled or disabled without displaying the PMC online setting screen.

Setting	RS-232-C	High-speed interface
0	The setting on the PMC online setting screen is not altered.	
1	To be used (channel 1)	Not to be used
2	To be used (channel 2)	Not to be used
10	Not to be used	To be used
11	To be used (channel 1)	To be used
12	To be used (channel 2)	To be used
255	Communication is terminated forcibly (as with the [FORCED STOP] soft key).	

NOTE
1. The setting of this parameter becomes valid when the power is turned on or this parameter is modified. After this parameter is set, the power need not be turned off then back on.
2. A setting modification made on the PMC online setting screen is not reflected in this parameter.
3. The communication settings of a baud rate and so forth for using RS-232-C made on the PMC online setting screen are valid. When no modification is ever made to the settings on the PMC online setting screen, the baud rate is 9600, parity is not used, and the number of stops bits is 2.

	#7	#6	#5	#4	#3	#2	#1	#0
0100	ENS	IOP			NCR	CRF	CTV	

[Input type] Setting input
[Data type] Bit

 # 1 CTV Character counting for TV check in the comment section of a program.
0: Performed
1: Not performed

 # 2 CRF Output of the end of block (EOB) in ISO code
0: Depends on the setting of bit 3 (NCR) of parameter No. 0100.
1: CR, LF are output.

 # 3 NCR Output of the end of block (EOB) in ISO code
0: LF, CR, CR are output.
1: Only LF is output.

 # 6 IOP Stopping a program output or input operation by a reset is:
0: Enabled
1: Disabled
(Stopping a program input/output operation with the [STOP] soft key is enabled at all times.)

 # 7 ENS Action taken when a NULL code is found during read of EIA code
0: An alarm is generated.
1: The NULL code is ignored.

	#7	#6	#5	#4	#3	#2	#1	#0
0110								IO4

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 IO4 Separate control of I/O channel numbers is:
0: Not performed.
1: Performed.
If the I/O channels are not separately controlled, set the input/output device in parameter No. 0020.
If the I/O channels are separately controlled, set the input device and output device in the foreground and the input device and output device in the background in parameters No. 0020 to No. 0023 respectively.
Separate control of I/O channels makes it possible to perform background editing, program input/output, and the like during the DNC operation.

	#7	#6	#5	#4	#3	#2	#1	#0
0138	MNC		SCH					MDP
	MNC		SCH					

[Input type] Parameter input
[Data type] Bit

 # 0 MDP To the extensions of input/output files, a path number is:
0: Not added.
1: Added.

> **NOTE**
> If a file name is specified by setting F, this parameter is ignored, and a path number is not added to the extension.

 # 5 **SCH** The schedule operation function is:
0: Disabled.
1: Enabled.

 # 7 **MNC** DNC operation from the memory card and external device subprogram call from the memory card are:
0: Not performed.
1: Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
0139								ISO

[Input type] Setting input
[Data type] Bit

 # 0 **ISO** When a memory card is selected as an I/O device, data input/output is performed using
0: ASCII codes
1: ISO codes

> ⚠ **WARNING**
> 1 Unless data is input using ASCII codes, set this parameter to 1 to input or output data using ISO codes.
> 2 Data input/output with ASCII codes is dangerous because parity information is not included and a data error during the data input/output is not detected.

4.5.2 Parameters of Channel 1 (I/O CHANNEL=0)

	#7	#6	#5	#4	#3	#2	#1	#0
0101	NFD				ASI			SB2

[Input type] Parameter input
[Data type] Bit

 # 0 **SB2** The number of stop bits
0: 1
1: 2

 # 3 **ASI** The codes used during data input/output is:

0: EIA or ISO codes (input: automatic detection, output: setting of bit 1 (ISO) of parameter No. 0000)

1: ASCII codes during input and output

> **NOTE**
> To use ASCII codes for data input/output (by setting ASI to 1), set bit 1 (ISO) of parameter No. 0000 to 1.

 # 7 **NFD** Feed before and after the data at data output

0: Output

1: Not output

When input/output devices other than the FANUC PPR are used, set NFD to 1.

0102	Number specified for the input/output device (when the I/O CHANNEL is set to 0)

[Input type] Parameter input

[Data type] Byte

[Valid data range] 0 to 6

Set the specification number of the input/output device corresponding to I/O CHANNEL=0.

The following table lists the specification numbers and corresponding input/output device specifications.

Specification numbers and corresponding input/output device specifications

Specification number	Input/output device specification
0	RS-232-C (control codes DC1 to DC4 are used)
1	FANUC CASSETTE ADAPTOR 1(FANUC CASSETTE B1/B2)
2	FANUC CASSETTE ADAPTOR 3(FANUC CASSETTE F1)
3	FANUC PROGRAM FILE Mate、FANUC FA Card Adaptor, FANUC FLOPPY CASSETTE ADAPTOR, FANUC Handy File FANUC SYSTEM P-MODEL H
4	RS-232-C (control codes DC1 to DC4 are not used)
5	Portable tape reader
6	FANUC PPR FANUC SYSTEM P-MODEL G, FANUC SYSTEM P-MODEL H

0103	Baud rate (when I/O CHNNEL is set to 0)

[Input type] Parameter input
[Data type] Byte
[Valid data range] 1 to 12

Set the baud rate of the input/output device corresponding to I/O CHANNEL=0.
When setting this parameter, see the following table:

Baud rates and corresponding settings

Setting	Baud rate (bps)	Setting	Baud rate (bps)
1	50	8	1200
3	110	9	2400
4	150	10	4800
6	300	11	9600
7	600	12	19200

4.5.3 Parameters of Channel 1 (I/O CHANNEL=1)

	#7	#6	#5	#4	#3	#2	#1	#0
0111	NFD				ASI			SB2

[Input type] Parameter input
[Data type] Bit

 # 0 SB2 The number of stop bits
0: 1
1: 2

 # 3 ASI The codes used during data input/output is:
0: EIA or ISO codes (input: automatic detection, output: setting of bit 1 (ISO) of parameter No. 0000)
1: ASCII codes during input and output

NOTE
To use ASCII codes for data input/output (by setting ASI to 1), set bit 1 (ISO) of parameter No. 0000 to 1.

 # 7 NFD Feed before and after the data at data output
0: Output
1: Not output
When input/output devices other than the FANUC PPR are used, set NFD to 1.

0112	Number specified for the input/output device (when the I/O CHANNEL is set to 1)

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 6

Set the specification number of the input/output device corresponding to I/O CHANNEL=1.

0113	Baud rate (when I/O CHNNEL is set to 1)

[Input type] Parameter input
[Data type] Byte
[Valid data range] 1 to 12

Set the baud rate of the input/output device corresponding to I/O CHANNEL=1.

4.5.4 Parameters of Channel 2 (I/O CHANNEL=2)

	#7	#6	#5	#4	#3	#2	#1	#0
0121	NFD				ASI			SB2

[Input type] Parameter input
[Data type] Bit

 # 0 SB2 The number of stop bits
0: 1
1: 2

 # 3 ASI The codes used during data input/output is:
0: EIA or ISO codes (input: automatic detection, output: setting of bit 1 (ISO) of parameter No. 0000)
1: ASCII codes during input and output

> **NOTE**
> To use ASCII codes for data input/output (by setting ASI to 1), set bit 1 (ISO) of parameter No. 0000 to 1.

 # 7 NFD Feed before and after the data at data output
0: Output
1: Not output

0122	Number specified for the input/output device (when the I/O CHANNEL is set to 2)

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 6

Set the specification number of the input/output device corresponding to I/O CHANNEL=2.

0123	Baud rate (when I/O CHNNEL is set to 2)

[Input type] Parameter input
[Data type] Byte
[Valid data range] 1 to 12

Set the baud rate of the input/output device corresponding to I/O CHANNEL=2.

4.6 PARAMETERS OF CNC SCREEN DISPLAY FUNCTIONS

	#7	#6	#5	#4	#3	#2	#1	#0
0300								PCM

[Input type] Setting input
[Data type] Bit

 # 0 PCM If the CNC screen display function is enabled, when a memory card interface is provided on the NC side,
0: The memory card interface on the NC side is used.
1: The memory card interface on the PC side is used.

4.7 PARAMETERS OF ETHERNET/DATA SERVER FUNCTIONS

	#7	#6	#5	#4	#3	#2	#1	#0
0901							EFT	

[Input type] Setting input
[Data type] Bit

 # 1 EFT The FTP file transfer function by the Ethernet function is:
0: Not used.
1: Used.

> **NOTE**
> In a 2-path system, the setting of the parameter for path 1 is used throughout the system.

	#7	#6	#5	#4	#3	#2	#1	#0
0904	LCH	DHC	DNS	UNM	D1E			

[Input type] Setting input
[Data type] Bit

 # 3 D1E When the DHCP function is used:
0: Default parameters for the FOCAS2/Ethernet functions are set.
Port number (TCP) 8193
Port number (UDP) 0
Time interval 0
1: Default parameters for CIMPLICITY ***i***CELL communication are set.
Port number (TCP) 8193
Port number (UDP) 8192
Time interval 50

 # 4 UNM The CNC Unsolicited Messaging function is:
0: Not used.
1: Used.

 # 5 DNS The DNS client function is:
0: Not used.
1: Used.

 # 6 DHC The DHCP client function is:
0: Not used.
1: Used.

 # 7 LCH In the LIST-GET service of the Data Server function, when a list file specifies 1025 or more files:
0: A check for duplicated file names is performed.
1: A check for duplicated file names is not performed.

	#7	#6	#5	#4	#3	#2	#1	#0
0905				UNS	DSF		PCH	DNE

[Input type] Setting input
[Data type] Bit

 # 0 DNE During DNC operation using the FOCAS2/Ethernet functions, the termination of DNC operation is:
0: Waited.
1: Not waited.

 # 1 PCH At the start of communication of the Data Server function, FTP file transfer function, or machine remote diagnosis function, checking for the presence of the server using PING is:
0: Performed.
1: Not performed.

> **NOTE**
> Usually, set 0.
> If 1 is set not to check the presence of the server by using PING, it may take several tens of seconds to recognize an error when the server is not present in the network.
> For mainly security reasons, a personal computer may be set so that it does not respond to the PING command. To communicate with such a personal computer, set 1.

 # 3 DSF When an NC program is stored on the memory card of the Data Server:
0: The file name takes priority.
1: The program name in the NC program takes priority.

> **NOTE**
> Even when this parameter is set to 1, an NC program is stored with a file name, then the name is changed to a program name in the NC program. Therefore, if the same file name is already present on the memory card of the Data Server, an error occurs.

 # 4 UNS In the CNC Unsolicited Messaging function, when the end of the function is requested by other than the CNC Unsolicited Messaging server currently connected:
0: The request for the end of the function is rejected.
1: The request for the end of the function is accepted.

	#7	#6	#5	#4	#3	#2	#1	#0
0908								ISO

[Input type] Setting input
[Data type] Bit

 # 0 ISO When the data server is selected as an I/O device, data is input or output using:
0: ASCII codes
1: ISO codes

0921	Selects the host computer 1 OS.
0922	Selects the host computer 2 OS.
0923	Selects the host computer 3 OS.

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 2
0: Windows95/98/Me/2000/XP/Vista.
1: UNIX, VMS.
2: Linux.

> **NOTE**
> Some FTP server software products do not depend on the OS. So, even when the above parameters are set, it is sometimes impossible to display a list of files properly.

0924	FOCAS2/Ethernet waiting time setting

[Input type] Parameter input
[Data type] Word
[Unit of data] millisecond
[Valid data range] 0 to 32767

When the FOCAS2/Ethernet and Data Server functions are used simultaneously, this parameter sets the FOCAS2/Ethernet function waiting time in milliseconds.
When a value of 0 is set, the functions operate with assuming that 1 millisecond is specified.

0929	File attribute specification during FTP server operation

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 2

This parameter sets whether to give priority to the file attribute specified in a TYPE command of FTP during operation as an FTP server.

0: Priority is given to the file attribute specified in a TYPE command from an FTP client.
1: Text files are always assumed.
2: Binary files are always assumed.

0930	Maximum number of files that can be registered to the memory card of the Data Server and maximum size per file that can be registered

[Input type] Parameter input
[Data type] Word
[Valid data range] 0, 10 to 15

No.930	Maximum number of files	Maximum size per file
0	2047	512MB
10	511	2048MB
11	1023	1024MB
12	2047	512MB
13	4095	256MB
14	8191	128MB
15	16383	64MB

NOTE
1 When the memory card is formatted after this parameter is set, the maximum number of files and maximum size per file are changed.
2 Each folder is counted as one file.

4.8 PARAMETERS OF POWER MATE CNC

	#7	#6	#5	#4	#3	#2	#1	#0
0960				PPE	PMN	MD2	MD1	

[Input type] Parameter input
[Data type] Bit path

 # 1, 2 MD1,MD2 These parameters set a slave parameter input/output destination.

Parameter MD2	Parameter MD1	I/O destination
0	0	Program memory
0	1	Memory card

> **NOTE**
> The output destination depends on the setting for path 1.

 # 3 PMN The Power Mate CNC manager function is:
0: Enabled.
1: Disabled.
When priority is to be given to commands to slaves by a ladder (communication by the Power Mate CNC manager function is to be stopped) after necessary data setting and checking for each of the connected slaves are completed, set this bit to 1 for every path.

 # 4 PPE
0: The Power Mate CNC manager can set slave parameters at all times.
1: Slave parameter setting by the Power Mate CNC manager follows the setting of PWE for the host CNC. When PWE = 0, the setting of the I/O LINK β parameter is prohibited.

	#7	#6	#5	#4	#3	#2	#1	#0
0961					PMO			

[Input type] Parameter input
[Data type] Bit

 # 3 PMO The O number of a program for saving and restoring the I/O LINK β parameter is set based on:
0: Group number and channel number
1: Group number only

4.9 PARAMETERS OF SYSTEM CONFIGURATION

0980	Machine group number to which each path belongs

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1

Set the machine group number to which each path belongs.
For the 0*i*-D/0*i* Mate-D, be sure to set this parameter to 1.

NOTE
If this parameter is set to 0, a setting of 1 is assumed.

0981	Absolute path number to which each axis belongs

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 1, 2

Set the path to which each axis belongs.

NOTE
1 When 0 is set for all axes, the parameter is automatically set according to the number of controlled axes of each path.
2 When the setting falls outside the range, the axis is assumed to belong to the first path.

0982	Absolute path number to which each spindle belongs

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 1, 2
Set the path to which each spindle belongs.

NOTE
1 When 0 is set for all axes, the parameter is automatically set according to the number of controlled axes of each path.
2 When the setting falls outside the range, the axis is assumed to belong to the first path.
3 When spindle control with servo motor is enabled, the servo motor used as the spindle controlled axis is treated as a spindle. Therefore, it is necessary to set the path to which the axis subject to spindle control with servo motor.

0983	Path control type of each path

NOTE
1 When this parameter is set, the power must be turned off before operation is continued.
2 For the 0*i* -D/0*i* Mate-D, this parameter does not need to be set because it is set automatically.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 1
Set the path control type of each path.
The following two path control types are available:
T series (lathe system) : 0
M series (machining system) : 1

4.10 PARAMETERS OF AXIS CONTROL/INCREMENT SYSTEM

	#7	#6	#5	#4	#3	#2	#1	#0
1001								INM

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 INM Least command increment on the linear axis
0: In mm (metric system machine)
1: In inches (inch system machine)

	#7	#6	#5	#4	#3	#2	#1	#0
1002	IDG			XIK	AZR			JAX

[Input type] Parameter input
[Data type] Bit path

 # 0 JAX Number of axes controlled simultaneously in jog feed, manual rapid traverse and manual reference position return
0: 1 axis
1: 3 axes

 # 3 AZR When no reference position is set, the G28 command causes:
0: Reference position return using deceleration dogs (as during manual reference position return) to be executed.
1: Alarm (PS0304) "G28 was specified when no reference position is set" to be displayed.

> **NOTE**
> When reference position return without dogs is specified, (when bit 1 (DLZ) of parameter No.1005 is set to 1) the G28 command specified before a reference position is set causes an alarm PS0304 to be issued, regardless of the setting of AZR.

 # 4 XIK When bit 1 (LRP) of parameter No.1401, is set to 0, namely, when positioning is performed using non-linear type positioning, if an interlock is applied to the machine along one of axes in positioning,
0: The machine stops moving along the axis for which the interlock is applied and continues to move along the other axes.
1: The machine stops moving along all the axes.

 # 7 IDG When the reference position is set without dogs, automatic setting of bit 0 (IDGx) of parameter No.1012 to prevent the reference position from being set again is:
0: Not performed.
1: Performed.

> **NOTE**
> When this parameter is set to 0, bit 0 (IDGx) of parameter No. 1012 is invalid.

	#7	#6	#5	#4	#3	#2	#1	#0
1004	IPR							

[Input type] Parameter input
[Data type] Bit path

 # 7 IPR When a number with no decimal point is specified, the least input increment of each axis is:
0: Not 10 times greater than the least command increment
1: 10 times greater than the least command increment
When the increment system is IS-A, and bit 0 (DPI) of parameter No. 3401 is set to 1 (pocket calculator type decimal point programming), the least input increment cannot be 10 times greater than the least command increment.

	#7	#6	#5	#4	#3	#2	#1	#0
1005	RMBx	MCCx	EDMx	EDPx	HJZx		DLZx	ZRNx

[Input type] Parameter input
[Data type] Bit axis

 # 0 ZRNx If a move command other than G28 is specified by automatic operation when no reference position return is performed yet after the power is turned on:
0: The alarm (PS0224) "PERFORM REFERENCE POSITION RETURN." is issued.
1: Operation is performed without issuing an alarm.

> **NOTE**
> 1 The state in which a reference position has not been established refers to the following state:
> - When an absolute position detector is not used and reference position return has not been performed even once after power-up
> - When an absolute position detector is used and the association of the machine position with the position detected with the absolute position detector has not been completed (See the description of bit 4 (APZx) of parameter No. 1815.)
>
> 2 When the Cs axis coordinates are to be set up, set ZRN to 0.

 # 1 DLZx Function for setting the reference position without dogs
0: Disabled
1: Enabled

 # 3 HJZx When a reference position is already set:
0: Manual reference position return is performed with deceleration dogs.
1: Manual reference position return is performed using rapid traverse without deceleration dogs, or manual reference position return is performed with deceleration dogs, depending on the setting of bit 7 (SJZ) of parameter No.0002.

When the function for setting the reference position without dogs (see the description of bit 1 (DLZx) of parameter No. 1005) is used, manual reference position return after a reference position is set is always performed at a parameter-set feedrate, regardless of the setting of HJZx.

 # 4 EDPx In cutting feed, an external deceleration signal in the + direction for each axis is:
0: Invalid
1: Valid

 # 5 EDMx In cutting feed, an external deceleration signal in the - direction for each axis is:
0: Invalid
1: Valid

 # 6 MCCx If a multi-axis amplifier is used, and another axis of the same amplifier is placed in the control axis detach state, the MCC signal of the servo amplifier is:
0: Turned off.
1: Not turned off.

NOTE
This parameter can be set for a control axis.

⚠ **WARNING**
1 When this parameter is set to 1, the dynamic brake does not operate during removal of an axis. Therefore, if a failure occurs in the mechanical brake, driving circuit, or sequence, a vertical axis may fall freely in a significant manner. Since an excess error check cannot also be performed during removal of an axis, set this parameter to 0 for a vertical axis.
2 When the servo motor of a controlled axis to be detached is connected to a multi-axis amplifier such as a two-axis amplifier, placing the axis in the control axis detach state causes the activating current in the amplifier to drop. As a result, alarm (SV0401) "V READY OFF" is issued in the other axes. This alarm can be suppressed by setting this parameter bit.
With this method, however, the target axis for the control axis detach operation is placed in the servo off state (the amplifier remains on, but no current flows through the motor). The torque of the target axis becomes 0, so care should be taken. Even when a controlled axis has been detached, detaching a cable (a command cable or feedback cable) of the axis causes an alarm.
In such applications, it is impossible to perform a control axis detach operation with a multi-axis amplifier by setting this parameter bit. (Prepare a single-axis amplifier.)

 # 7 RMBx The control axis detachment signal for each axis and the setting input RMV (bit 7 of parameter No. 0012) are:
0: Invalid
1: Valid

	#7	#6	#5	#4	#3	#2	#1	#0
1006			ZMIx		DIAx		ROSx	ROTx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 ROTx Setting linear or rotation axis.
 # 1 ROSx Setting linear or rotation axis.

ROSx	ROTx	Meaning
0	0	Linear axis (1)Inch/metric conversion is done. (2)All coordinate values are linear axis type. (Is not rounded in 0 to 360°) (3)Stored pitch error compensation is linear axis type (Refer to parameter No.3624)
0	1	Rotation axis (A type) (1)Inch/metric conversion is not done. Machine coordinate values are rounded in 0 to 360°. Absolute coordinate values are rounded or not rounded by parameter No.1008#0(ROAx) and #2(RRLx). (2)Stored pitch error compensation is the rotation type. (Refer to parameter No.3624) (3)Automatic reference position return (G28, G30) is done in the reference position return direction and the move amount does not exceed one rotation.
1	1	Rotation axis (B type) (1)Inch/metric conversion, absolute coordinate values and relative coordinate values are not done. (2)Machine coordinate values, absolute coordinate values and relative coordinate values are linear axis type. (Is not rounded in 0 to 360°). (3)Stored pitch error compensation is linear axis type (Refer to parameter No.3624) (4)Cannot be used with the rotation axis roll over function and the index table indexing function (M series)
Except for the above.		Setting is invalid (unused)

 # 3 DIAx The move command for each axis is based on:
0: Radius specification
1: Diameter specification

NOTE
For the FS0*i*-C, one of the following changes is required besides setting bit 3 (DIAx) of parameter No. 1006 so that the axis based on diameter specification achieves the specified amount of movement.
- Halve the command multiplication (the detection unit is not changed).
- Halve the detection unit and double the flexible feed gear (DMR).

For the FS0*i*-D, only if bit 3 (DIAx) of parameter No. 1006 is set, the CNC halves the specified pulse. Accordingly, the above changes are not required (when the detection unit is not changed). To halve the detection unit, double both CMR and DMR.

 # 5 ZMIx The direction of manual reference position return is:
0: + direction
1: - direction

	#7	#6	#5	#4	#3	#2	#1	#0
1007				GRDx			ALZx	RTLx

[Input type] Parameter input
[Data type] Bit axis

 # 0 RTLx When manual reference position return is performed on a rotation axis (A type) with the deceleration dog pressed before a reference position is established:
0: A movement is made at the reference position return feedrate FL.
1: Until a servo motor grid is established, a movement is not made at the reference position return feedrate FL even if the deceleration dog is pressed, but a movement is made at the rapid traverse rate.

If the deceleration dog is released after a movement at the rapid traverse rate and the deceleration dog is then pressed again and released after the rotation axis makes one revolution, reference position return operation is completed.
When this parameter is set to 0, the alarm (PS0090) "REFERENCE POSITION RETURN FAILURE" is issued if the deceleration dog is released before a servo motor grid is established.
If this alarm is issued, start manual reference position return at a position sufficiently far away from the reference position.

 # 1 ALZx In automatic reference position return (G28):

0: Reference position return is performed by positioning (rapid traverse).
If no reference position return is performed after the power is turned on, however, reference position return is performed using the same sequence as for manual reference position return.

1: Reference position return is performed using the same sequence as for manual reference position return.

> **NOTE**
> 1 There is no effect on the axis for reference position return without dogs.
> 2 When this parameter is 1, the settings of bit 3 (HJZx) of parameter No. 1005 and bit 7 (SJZ) of parameter No. 0002 determine which reference position return without deceleration dogs using rapid traverse or reference position return with deceleration dogs is used.

 # 4 GRDx When absolute position detection is performed for an axis and the correspondence between the machine position and the position on the absolute-position detector has not yet been established for the axis, reference position setting without digs is:

0: Not performed more than once.

1: Performed more than once.

	#7	#6	#5	#4	#3	#2	#1	#0
1008			RMCx	SFDx		RRLx	RABx	ROAx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 ROAx The roll-over function of a rotation axis is

0: Invalid

1: Valid

> **NOTE**
> ROAx specifies the function only for a rotation axis (for which bit 0 (ROTx) of parameter No.1006, is set to 1)

 # 1 RABx In the absolute commands, the axis rotates in the direction
0: In which the distance to the target is shorter.
1: Specified by the sign of command value.

> **NOTE**
> RABx is valid only when ROAx is 1.

 # 2 RRLx Relative coordinates are
0: Not rounded by the amount of the shift per one rotation
1: Rounded by the amount of the shift per one rotation

> **NOTE**
> 1 RRLx is valid only when ROAx is 1.
> 2 Assign the amount of the shift per one rotation in parameter No.1260.

 # 4 SFDx In reference position return based on the grid method, the reference position shift function is:
0: Disabled
1: Enabled

 # 5 RMCx When machine coordinate system selection (G53) is specified, bit 1 (RABx) of parameter No. 1008 for determining the rotation direction of an absolute command for the roll-over function of a rotation axis is:
0: Invalid
1: Valid

	#7	#6	#5	#4	#3	#2	#1	#0
1012								IDGx

[Input type] Parameter input
[Data type] Bit axis

 # 0 IDGx The function for setting the reference position again, without dogs, is:
0: Not inhibited.
1: Inhibited.
(The alarm (PS0301) is issued.)

NOTE

IDGx is enabled when the IDG parameter (bit 7 of parameter No.1002) is 1.

If the function for setting the reference position without dogs is used, and the reference position is lost in absolute position detection for a cause, the alarm (DS0300) is issued when the power is turned on again.

If the operator performs reference position return, as a result of mistakenly identifying the alarm as that requesting the operator to perform a normal reference position return, an invalid reference position may be set. To prevent such an operator error, the IDGx parameter is provided to prevent the reference position from being set again without dogs.

(1) If the IDG parameter (bit 7 of parameter No.1002) is set to 1, the IDGx parameter (bit 0 of parameter No.1012) is automatically set to 1 when the reference position is set using the function for setting the reference position without dogs. This prevents the reference position from being set again without dogs.
(2) Once the reference position is prevented from being set for an axis again, without dogs, any attempt to set the reference position for the axis without dogs results in the output of an alarm (PS0301).
(3) When the reference position must be set again without dogs, set IDGx (bit 0 of parameter No.1012) to 0 before setting the reference position.

	#7	#6	#5	#4	#3	#2	#1	#0
1013	IESPx						ISCx	ISAx

[Input type] Parameter input
[Data type] Bit axis

NOTE
When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 ISA
 # 1 ISC Increment system of each axis

Increment system	#1 ISCx	#0 ISAx
IS-A	0	1
IS-B	0	0
IS-C	1	0

 # 7 IESP When the least input increment is C (IS-C), the function to allow to set the larger value to the parameter of the speed and the acceleration:
0: Not used.
1: Used.

As for the axis which set this parameter when the least input increment is C (IS-C), the larger value can be set to the parameter of the speed and the acceleration.
The valid data ranges of these parameters are indicated in the table of velocity and angular velocity parameters in (C) of the standard parameter setting tables and the table of acceleration and angular acceleration parameters in (D).
When this function is made effective, the digit number below the decimal point of the parameter on input screen is changed. The digit number below the decimal point decreases by one digit in case of the least input increment C (IS-C).

	#7	#6	#5	#4	#3	#2	#1	#0
1014	CDMx							

[Input type] Parameter input
[Data type] Bit axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

 # 7 CDMx The Cs contour control axis is:
0: Not a virtual Cs axis
1: Virtual Cs axis

	#7	#6	#5	#4	#3	#2	#1	#0
1015	DWT	WIC		ZRL				

[Input type] Parameter input
[Data type] Bit path

 # 4 ZRL When a reference position is established, the tool path from the middle point to the reference position and machine coordinate positioning (G53) in automatic reference position return (G28) are based on:
0: Positioning of nonlinear interpolation type
1: Positioning of linear interpolation type

> **NOTE**
> This parameter is valid when bit 1 (LRP) of parameter No. 1401 is set to 1.

 # 6 WIC Workpiece origin offset measurement value direct input is:
0: (M series) Performed without considering the external workpiece origin offset value.
(T series) Valid only in the currently selected workpiece coordinate system.
1: (M series) Performed considering the external workpiece origin offset value.
(T series) Valid in all coordinate systems.

> **NOTE**
> In the T series, if this parameter bit is set to 0, workpiece origin offset measurement value direct input is enabled only in the currently selected workpiece coordinate system or an external workpiece coordinate system. If an attempt is made to perform workpiece origin offset measurement value direct input in a workpiece coordinate system other than these workpiece coordinate systems, warning "WRITE PROTECTED" is displayed.

 # 7 DWT When time for dwell per second is specified by P, the increment system:
0: Depends on the increment system
1: Does not depend on the increment system (1 ms)

1020	Program axis name for each axis

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 65 to 67,85 to 90

An axis name (parameter No. 1020) can be arbitrarily selected from 'A', 'B', 'C', 'U', 'V', 'W', 'X', 'Y', and 'Z'. (When G code system A is used with the T series, however, 'U', 'V', and 'W' are not selectable.)

(Tip) ASCII code

Axis name	X	Y	Z	A	B	C	U	V	W
Setting	88	89	90	65	66	67	85	86	87

For the axes with axis names of 'X', 'Y', 'Z', and 'C' in G code system A of the T series, the 'U', 'V', 'W', and 'H' commands are the incremental commands of these axes.

NOTE

1 When G code system A is used in the T series, U, V, or W cannot be used as an axis name.
2 The same axis name cannot be set for multiple axes.
3 When the second auxiliary function is provided (when bit 2 (BCD) of parameter No. 8132 is 1), if the address (parameter No. 3460) that specifies the second auxiliary function is used as an axis name, the second auxiliary function is disabled.
4 When address C or A is used during chamfering/corner rounding or direct drawing dimension programming (when bit 4 (CCR) of parameter No. 3405 is 1) in the T series, address C or A cannot be used as an axis name.
5 When the multiple repetitive turning canned cycle (T series) is used, only 'X', 'Y', and 'Z' can be used for the address of the target axis.

1022	Setting of each axis in the basic coordinate system

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 7

To determine a plane for circular interpolation, tool radius/tool nose radius compensation, and so forth (G17: Xp-Yp plane, G18: Zp-Xp plane, G19: Yp-Zp plane), specify which of the basic three axes (X, Y, and Z) is used for each control axis, or a parallel axis of which basic axis is used for each control axis.
A basic axis (X, Y, or Z) can be specified only for one control axis.
Two or more control axes can be set as parallel axes for the same basic axis.

Setting	Meaning
0	Rotation axis (Neither the basic three axes nor a parallel axis)
1	X axis of the basic three axes
2	Y axis of the basic three axes
3	Z axis of the basic three axes
5	Axis parallel to the X axis
6	Axis parallel to the Y axis
7	Axis parallel to the Z axis

In general, the increment system and diameter/radius specification of an axis set as a parallel axis are to be set in the same way as for the basic three axes.

1023	Number of the servo axis for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to Number of controlled axes

Set the servo axis for each control axis.
Usually set to same number as the control axis number.
The control axis number is the order number that is used for setting the axis-type parameters or axis-type machine signals

- With an axis for which Cs contour control/spindle positioning is to be performed, set -(spindle number) as the servo axis number.
  Example)
  When exercising Cs contour control on the fourth controlled axis by using the first spindle, set -1.
- For tandem controlled axes or electronic gear box (EGB) controlled axes, two axes need to be specified as one pair. So, make a setting as described below.
  Tandem axis:
  For a master axis, set an odd (1, 3, 5, 7, ...) servo axis number. For a slave axis to be paired, set a value obtained by adding 1 to the value set for the master axis.
  EGB axis:
  For a slave axis, set an odd (1, 3, 5, 7, ...) servo axis number. For a dummy axis to be paired, set a value obtained by adding 1 to the value set for the slave axis.

1031	Reference axis

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to Number of controlled axes

The unit of some parameters common to all axes such as those for dry run feedrate and one-digit F code feed may vary according to the increment system. An increment system can be selected by a parameter on an axis-by-axis basis. So, the unit of those parameters is to match the increment system of a reference axis. Set which axis to use as a reference axis.
Among the basic three axes, the axis with the finest increment system is generally selected as a reference axis.

4.11 PARAMETERS OF COORDINATES

	#7	#6	#5	#4	#3	#2	#1	#0
1201	WZR	NWS				ZCL		ZPR
	WZR					ZCL		ZPR

[Input type] Parameter input
[Data type] Bit path

 # 0 ZPR Automatic setting of a coordinate system when the manual reference position return is performed
0: Not set automatically
1: Set automatically

> **NOTE**
> ZPR is valid when the workpiece coordinate system is not used (when bit 0 (NWZ) of parameter No. 8136 is 1). When the workpiece coordinate system is used, the workpiece coordinate system is established based on the workpiece origin offset (parameters No. 1220 to 1226) during a manual reference position return, regardless of the setting of this parameter.

 # 2 ZCL Local coordinate system when the manual reference position return is performed
0: The local coordinate system is not canceled.
1: The local coordinate system is canceled.

> **NOTE**
> ZCL is valid when the workpiece coordinate system is used (when bit 0 (NWZ) of parameter No. 8136 is 0). To use the local coordinate system (G52), set bit 0 (NWZ) of parameter No. 8136 to 0.

 # 6 NWS The workpiece coordinate system shift amount setting screen is:
0: Displayed
1: Not displayed

> **NOTE**
> When the workpiece coordinate shift amount setting screen is not displayed, a workpiece coordinate system shift amount modification using G10P0 cannot be made.

 # 7 WZR If the CNC is reset by the reset key on the MDI panel, external reset signal, reset and rewind signal, or emergency stop signal when bit 6 (CLR) of parameter No. 3402 is set to 0, the G code of group number 14 (workpiece coordinate system) is:

0: Placed in the reset state

1: Not placed in the reset state

> **NOTE**
> When bit 6 (CLR) of parameter No. 3402 is set to 1, whether to place the G code in the reset state depends on bit 6 (C14) of parameter No. 3407.

	#7	#6	#5	#4	#3	#2	#1	#0
1202					RLC	G92	EWS	EWD
					RLC	G92		EWD

[Input type] Parameter input

[Data type] Bit path

 # 0 EWD The shift direction of the workpiece coordinate system is:

0: The direction specified by the external workpiece zero point offset value

1: In the opposite direction to that specified by the external workpiece zero point offset value

 # 1 EWS The external workpiece zero point offset is made:

0: Valid

1: Invalid

> **NOTE**
> When the external workpiece zero point offset is made invalid, the following operation results:
> 1 As the external workpiece zero point offset on the workpiece zero point offset setting screen, a workpiece coordinate system shift amount is displayed.
> 2 Data keyed through the MDI panel for the workpiece coordinate system shift amount and external workpiece zero point offset is loaded into the memory for the workpiece coordinate system shift amount.
> 3 A write to or read from the workpiece coordinate system shift amount and external workpiece zero point offset with a macro variable is performed using the respective memory.
> 4 A write to or read from the workpiece coordinate system shift amount and external workpiece zero point offset with the window function is performed using the respective memory.

 # 2 G92 When the workpiece coordinate system is used (when bit 0 (NWZ) of parameter No. 8136 is 0), if the G code (M series: G92, T series: G50) for coordinate system setting is specified:
0: G command is executed and no alarm is issued.
1: G command is not executed and an alarm (PS0010) is issued.

 # 3 RLC Local coordinate system is
0: Not cancelled by reset
1: Cancelled by reset

> **NOTE**
> 1 When bit 6 (CLR) of parameter No. 3402 is set to 0, and bit 7 (WZR) of parameter No. 1201 is set to 1, the local coordinate system is cancelled, regardless of the setting of this parameter.
> 2 When bit 6 (CLR) of parameter No. 3402 is set to 1, and bit 6 (C14) of parameter No. 3407 is set to 0, the local coordinate system is cancelled, regardless of the setting of this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
1203								EMS

[Input type] Parameter input
[Data type] Bit path

 # 0 EMS The extended external machine zero point shift function is:
0: Disabled.
1: Enabled.

> **NOTE**
> When the extended external machine zero point shift function is enabled, the conventional external machine zero point shift function is disabled.

	#7	#6	#5	#4	#3	#2	#1	#0
1205			R2O	R1O				
	WTC		R2O	R1O				

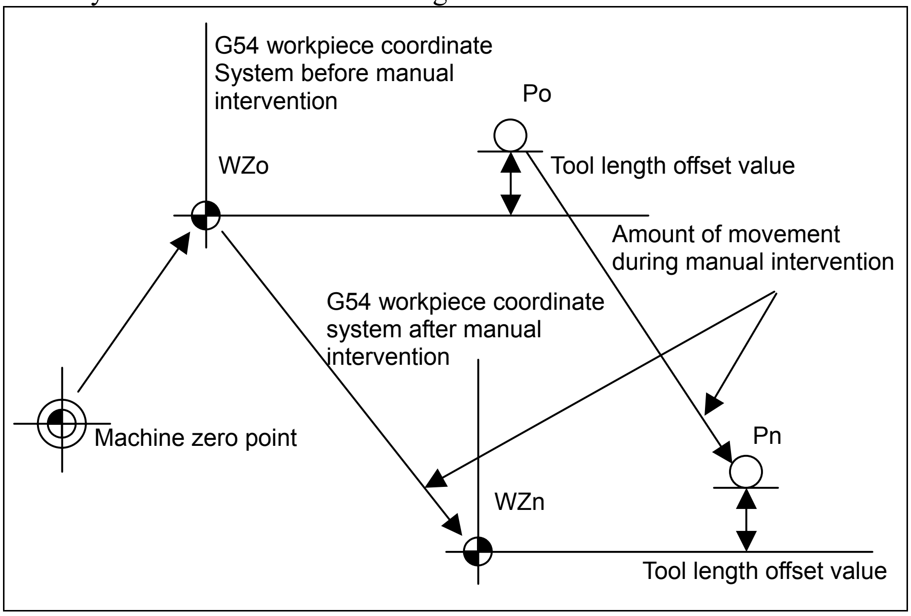
[Input type] Parameter input
[Data type] Bit path

 # 4 R1O The output of the signal for the reference position is:
0: Disabled.
1: Enabled.

 # 5 R2O The output of the signal for the second reference position is:
0: Disabled.
1: Enabled.

#7 WTC When workpiece coordinate system preset is done, actual tool length offset is:
0: Not considered.
1: Considered..

When this parameter is set “1”, it is possible to preset the workpiece coordinate system by G-code, MDI operation or the workpiece coordinate system preset signal without canceling the tool length compensation modes.
The compensation vector is kept as the below figure when the workpiece coordinate system preset is done to the coordinate shifted by amount of movement during manual intervention.



	#7	#6	#5	#4	#3	#2	#1	#0
1206							HZP	

[Input type] Parameter input
[Data type] Bit path

 # 1 HZP When a high-speed reference position return is performed, the coordinate system is:
0: Preset.
1: Not preset (FS0*i*-C-compatible specification).

NOTE
This parameter is valid when the workpiece coordinate system is not used (when bit 0 (NWZ) of parameter No. 8136 is 1) and bit 0 (ZPR) of parameter No. 1201 is 0.

	#7	#6	#5	#4	#3	#2	#1	#0
1207								
								WOL

[Input type] Parameter input
[Data type] Bit path

 # 0 WOL The calculation method for workpiece origin offset measurement value direct input is as follows:

0: In a machine that requires that the difference from the reference tool be set as the tool length compensation amount, the workpiece origin offset is measured and set with the reference tool mounted on the machine.
(The tool length of the reference tool is assumed to be 0.)

1: In a machine that requires that the tool length itself be set as the tool length compensation amount, the workpiece origin offset is measured and set considering the tool length when the tool length compensation for the mounted tool is enabled.

NOTE
The setting of this parameter is valid only when the system used is the M series and bit 6 (DAL) of parameter No. 3104 is set to 1. If this parameter is set to 1 in other than the above conditions, the system operates as if this parameter bit were set to 0.

1220	External workpiece zero point offset value in each axis

[Input type] Setting input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This is one of the parameters that give the position of the zero point of workpiece coordinate system (G54 to G59). It gives an offset of the workpiece zero point common to all workpiece coordinate systems. In general, the offset varies depending on the workpiece coordinate systems. The value can be set from the PMC using the external data input function.

1221	Workpiece zero point offset value in workpiece coordinate system 1 (G54)
1222	Workpiece zero point offset value in workpiece coordinate system 2(G55)
1223	Workpiece zero point offset value in workpiece coordinate system 3(G56)
1224	Workpiece zero point offset value in workpiece coordinate system 4 (G57)
1225	Workpiece zero point offset value in workpiece coordinate system 5 (G58)
1226	Workpiece zero point offset value in workpiece coordinate system 6 (G59)

[Input type] Setting input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

The workpiece zero point offset values in workpiece coordinate systems 1 to 6 (G54 to G59) are set.

1240	Coordinate value of the reference position in the machine coordinate system

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the coordinate values of the reference position in the machine coordinate system.

1241	Coordinate value of the second reference position in the machine coordinate system

1242	Coordinate value of the third reference position in the machine coordinate system

1243	Coordinate value of the fourth reference position in the machine coordinate system

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
Set the coordinate values of the second to fourth reference positions in the machine coordinate system.

1250	Coordinate system of the reference position used when automatic coordinate system setting is performed

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
Set the coordinate system of the reference position on each axis to be used for setting a coordinate system automatically.

1260	The shift amount per one rotation of a rotation axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real axis
[Unit of data] Degree
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the shift amount per one rotation of a rotation axis.
For the rotation axis used for cylindrical interpolation, set the standard value.

1280	Start address of signals used with the extended external machine zero point shift function

[Input type] Parameter input
[Data type] Word path
[Valid data range] Even number from 0 to 32767

Set the start address of signals used with the extended external machine zero point shift function. If a nonexistent address value is specified, this function is disabled.
If 100 is set, for example, this function uses R100 and up. The last R address to be used depends on the number of controlled axes. When five controlled axes are used, R100 to R109 are used.

NOTE
1 If a nonexistent R address or an address in the system area is set, this function is disabled.
2 This parameter must be set to an even value.

1290	Distance between two opposite tool posts in mirror image

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

Set the distance between two opposite tool posts in mirror image.

4.12 PARAMETERS OF STORED STROKE CHECK

	#7	#6	#5	#4	#3	#2	#1	#0
1300	BFA	LZR	RL3			LMS	NAL	OUT

[Input type] Setting input
[Data type] Bit path

 # 0 OUT The area inside or outside of the stored stroke check 2 is set as an inhibition area
0: Inside
1: Outside

 # 1 NAL If the tool enters the inhibition area of stored stroke limit 1 during manual operation:
0: An alarm is issued and the tool is stopped.
1: An alarm is not issued, the stroke limit reach signal is output to the PMC, and the tool is stopped.

NOTE
When the tool enters the inhibition area of stored stroke limit 1 due to the move command issued during automatic operation, even if this parameter is set to 1, an alarm is issued and the tool is stopped. Even in this case, the stroke limit reach signal is output to the PMC.

 # 2 LMS The EXLM signal for switching stored stroke check
0: Disabled
1: Enabled
When bit 0 (DLM) of parameter No. 1301 is set to 1, the stored stroke check 1 switch signal EXLM <G007.6> is made invalid.

 # 5 RL3 Stored stroke check 3 release signal RLSOT3 is
0: Disabled
1: Enabled

 # 6 LZR When the stored stroke limit check immediately after power-on is enabled (bit 0 (DOT) of parameter No. 1311 is set to 1), the stored stroke check is:
0: Performed even before a manual reference position return is made.
1: Not performed until a manual reference position return is made.

 # 7 BFA When the stored stroke check 1, 2, or 3 alarm is issued, an interference alarm is issued with the inter-path interference check function (T series), or a chuck/tail stock barrier (T series) alarm is issued:
0: The tool stops after entering the prohibited area.
1: The tool stops before the prohibited area.

	#7	#6	#5	#4	#3	#2	#1	#0
1301	PLC	OTS		OF1		NPC		DLM

[Input type] Setting input
[Data type] Bit path

 # 0 DLM The stored stroke limit switching signals +EXLx and -EXLx for each axial direction are:
0: Disabled.
1: Enabled.
When this parameter is set to 1, the stored stroke check 1 switch signal EXLM <G007.6> is made invalid.

 # 2 NPC As part of the stroke limit check performed before movement, the movement specified in G31 (skip) and G37 (automatic tool length measurement (M series) or automatic tool compensation (T series)) blocks is:
0: Checked
1: Not checked

 # 4 OF1 If the tool is moved into the range allowed on the axis after an alarm is raised by stored stroke check 1,
0: The alarm is not canceled before a reset is made.
1: The OT alarm is immediately canceled.

> **NOTE**
> In the cases below, the automatic release function is disabled. To release an alarm, a reset operation is required.
> 1 When a setting is made to issue an alarm before a stored stroke limit is exceeded (bit 7 (BFA) of parameter No. 1300 is set to 1)
> 2 When an another overtravel alarm (such as stored stroke check 2, stored stroke check 3, and interference check) is already issued

 # 6 OTS When the overtravel alarm is issued:
0: The overtravel alarm signal is not output to the PMC.
1: The overtravel alarm signal is output to the PMC.

 # 7 PLC Stroke check before movement is:
0: Not performed
1: Performed

	#7	#6	#5	#4	#3	#2	#1	#0
1310							OT3x	OT2x

[Input type] Setting input
[Data type] Bit axis

 # 0 OT2x Stored stroke check 2 for each axis is :
0: Disabled
1: Enabled

 # 1 OT3x Stored stroke check 3 for each axis is :
0: Disabled
1: Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
1311								DOTx

[Input type] Parameter input
[Data type] Bit axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

 # 0 DOTx Stored stroke limit check immediately after power-on is:
0: Disabled.
1: Enabled.

If the stored stroke limit check is enabled, the machine coordinate value present immediately before the power is turned off is stored.
The machine coordinate value is set immediately after the power is turned on.
Based on the machine coordinate value, absolute coordinate and relative coordinate values are set.

NOTE
Because this function uses software to store machine coordinates, the function puts an extra load on the system. So, this function should not be set for axes that do not require this function. The amount of a movement made while the power is off is not reflected in machine coordinates immediately after the power is turned on.

1320	Coordinate value I of stored stroke check 1 in the positive direction on each axis

1321	Coordinate value I of stored stroke check 1 in the negative direction on each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the coordinate value of stored stroke check 1 on each axis in the + or - direction in the machine coordinate system.

NOTE
1 Specify diameter values for any axes for which diameter programming is specified.
2 The area outside the area set by parameter No. 1320 and No. 1321 is a prohibited area.

1322	Coordinate value of stored stroke check 2 in the positive direction on each axis

1323	Coordinate value of stored stroke check 2 in the negative direction on each axis

[Input type] Setting input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the coordinate value of stored stroke check 2 on each axis in the + or - direction in the machine coordinate system.

NOTE
1 Specify diameter values for any axes for which diameter programming is specified.
2 Whether the inside area or outside area is a prohibited area is set using bit 0 (OUT) of parameter No. 1300.

1324	Coordinate value of stored stroke check 3 in the positive direction on each axis

1325	Coordinate value of stored stroke check 3 in the negative direction on each axis

[Input type] Setting input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
Set the coordinate value of stored stroke check 3 on each axis in the + or - direction in the machine coordinate system.

> **NOTE**
> 1 Specify diameter values for any axes for which diameter programming is specified.
> 2 The area inside the area set by parameter No. 1324 and No. 1325 is a prohibited area.

1326	Coordinate value II of stored stroke check 1 in the negative direction on each axis

1327	Coordinate value II of stored stroke check 1 in the negative direction on each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
Set the coordinate value of stored stroke check 1 on each axis in the + or - direction in the machine coordinate system.
When the stored stroke check switch signal EXLM is set to 1, or the stored stroke check switch signal for each axis direction +EXLx is set to 1, parameter No. 1326 and No. 1327 are used for stroke check instead of parameter No.1320 and No. 1321.

> **NOTE**
> 1 Specify diameter values for any axes for which diameter programming is specified.
> 2 The area outside the area set by parameter No. 1326 and No. 1327 is a prohibited area.
> 3 The EXLM signal is valid only when bit 2 (LMS) of parameter No. 1300 is set to 1.
> 4 The +EXLx signal is valid only when bit 0 (DLM) of parameter No. 1301 is set to 1.

4.13 PARAMETERS OF THE CHUCK AND TAIL STOCK BARRIER (T SERIES)

1330	Profile of a chuck

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 1

Select a chuck figure.
0 : Chuck which holds a workpiece on the inner surface
1 : Chuck which holds a workpiece on the outer surface

1331	Dimensions of the claw of a chuck (L)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

Set the length (L) of the claw of the chuck.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1332	Dimensions of the claw of a chuck (W)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

Set the width (W) of the claw of the chuck.

> **NOTE**
> Specify this parameter by using a radius value at all times.

1333	Dimensions of the claw of a chuck (L1)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the length (L1) of the claw of the chuck.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1334	Dimensions of the claw of a chuck (W1)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the width (W1) of the claw of the chuck.

> **NOTE**
> Specify this parameter by using a radius value at all times.

1335	X coordinate of a chuck (CX)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the chuck position (X coordinate) in the workpiece coordinate system.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1336	Z coordinate of a chuck (CZ)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the chuck position (Z coordinate) in the workpiece coordinate system.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1341	Length of a tail stock (L)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

Set the length (L) of the tail stock.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1342	Diameter of a tail stock (D)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

Set the diameter (D) of the tail stock.

> **NOTE**
> Specify this parameter by using a diameter value at all times.

1343	Length of a tail stock (L1)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the length (L1) of the tail stock.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1344	Diameter of a tail stock (D1)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the diameter (D1) of the tail stock.

> **NOTE**
> Specify this parameter by using a diameter value at all times.

1345	Length of a tail stock (L2)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the length (L2) of the tail stock.

> **NOTE**
> Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

1346	Diameter of a tail stock (D2)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the diameter (D2) of the tail stock.

> **NOTE**
> Specify this parameter by using a diameter value at all times.

1347	Diameter of the hole of a tail stock (D3)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
Set the diameter (D3) of the tail stock.

> **NOTE**
> Specify this parameter by using a diameter value at all times.

1348	Z coordinate of a tail stock (TZ)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the tail stock position (Z coordinate) in the workpiece coordinate system.

NOTE
Whether to specify this parameter by using a diameter value or radius value depends on whether the corresponding axis is based on diameter specification or radius specification.

4.14 PARAMETERS OF FEEDRATE

	#7	#6	#5	#4	#3	#2	#1	#0
1401		RDR	TDR	RF0		JZR	LRP	RPD

[Input type] Parameter input
[Data type] Bit path

 # 0 RPD Manual rapid traverse during the period from power-on time to the completion of the reference position return.
0: Disabled (Jog feed is performed.)
1: Enabled

 # 1 LRP Positioning (G00)
0: Positioning is performed with non-linear type positioning so that the tool moves along each axis independently at rapid traverse.
1: Positioning is performed with linear interpolation so that the tool moves in a straight line.

 # 2 JZR The manual reference position return at JOG feedrate
0: Not performed
1: Performed

 # 4 RF0 When cutting feedrate override is 0% during rapid traverse,
0: The machine tool does not stop moving.
1: The machine tool stops moving.

 # 5 TDR Dry run during threading or tapping (tapping cycle G74 or G84, rigid tapping)
0: Enabled
1: Disabled

 # 6 RDR Dry run for rapid traverse command
0: Disabled
1: Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
1402				JRV			JOV	NPC

[Input type] Parameter input
[Data type] Bit path

 # 0 NPC Feed per revolution without the position coder (function for converting feed per revolution F to feed per minute F in the feed per revolution mode (G95)) is:
0: Not used
1: Used

> **NOTE**
> When using the position coder, set this parameter to 0.

 # 1 JOV Jog override is:
0: Enabled
1: Disabled (tied to 100%)

 # 4 JRV Jog feed or incremental feed is
0: Performed at feed per minute.
1: Performed at feed per rotation.

> **NOTE**
> Specify a feedrate in parameter No.1423.

	#7	#6	#5	#4	#3	#2	#1	#0
1403	RTV		HTG	ROC				
			HTG					

[Input type] Parameter input
[Data type] Bit path

 # 4 ROC In the threading cycles G92 and G76, rapid traverse override for retraction after threading is finished is:
0: Effective
1: Not effective (Override of 100%)

 # 5 HTG The feedrate for helical interpolation is:
0: Specified using the feedrate along the tangent to an arc
1: Specified using the feedrate along axes including a linear axis

 # 7 RTV Rapid traverse override while the tool is retracting in threading
0: Rapid traverse override is effective.
1: Rapid traverse override is not effective.

	#7	#6	#5	#4	#3	#2	#1	#0
1404	FC0					FM3	DLF	
	FC0						DLF	

[Input type] Parameter input
[Data type] Bit path

 # 1 DLF After a reference position is set, manual reference position return performed at:
0: Rapid traverse rate (parameter No.1420)
1: Manual rapid traverse rate (parameter No.1424)

> **NOTE**
> This parameter selects a feedrate for reference position return performed without dogs. This parameter also selects a feedrate when manual reference position return is performed according to bit 7 (SJZ) of parameter No.0002 using rapid traverse without deceleration dogs after a reference position is set.

 # 2 FM3 The increment system of an F command without a decimal point in feed per minute is:
0: 1 mm/min (0.01 inch/min for inch input)
1: 0.001 mm/min (0.00001 inch/min for inch input)

 # 7 FC0 Specifies the behavior of the machine tool when a block (G01, G02, G03, etc.) containing a feedrate command (F command) that is 0 is issued during automatic operation, as follows:
0: PS0011 alarm occurs.
1: PS0011 alarm does not occur, and the block is executed.

> **NOTE**
> This parameter is disable when the inverse time feed mode (G93) is available.
> This parameter is set from 1 to 0 , if a parameter CLR (No.3402#6) is 1 , please reset the CNC. Or if CLR is 0, please turn off and on the CNC.

	#7	#6	#5	#4	#3	#2	#1	#0
1405			EDR			PCL		
			EDR			PCL	FR3	

[Input type] Parameter input
[Data type] Bit path

 # 1 FR3 The increment system of an F command without a decimal point in feed per revolution is:
0: 0.01 mm/rev (0.0001 inch/rev for inch input)
1: 0.001 mm/rev (0.00001 inch/rev for inch input)

 # 2 **PCL** The function for constant surface speed control without the position coder is:
0: Not used.
1: Used.

> **NOTE**
> 1 Enable constant surface speed control (set bit 0 (SSC) of parameter No. 8133 to 1).
> 2 When setting this parameter to 1, set bit 0 (NPC) of parameter No. 1402 to 0.

 # 5 **EDR** As the external deceleration rate for positioning of linear interpolation type:
0: The external deceleration rate for cutting feed is used.
1: The external deceleration rate for the first axis in rapid traverse is used.
Let us use external deceleration 1 as an example.
When this parameter bit is set to 0, the value of parameter No. 1426 is used as the external deceleration rate for external deceleration 1.
When this parameter bit is set to 1, the value of axis 1 of parameter No. 1427 is used as the external deceleration rate for external deceleration 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1406							EX3	EX2
	F1O						EX3	EX2

[Input type] Parameter input
[Data type] Bit path

 # 0 **EX2** External deceleration function setting 2 is:
0: Invalid
1: Valid

 # 1 **EX3** External deceleration function setting 3 is:
0: Invalid
1: Valid

 # 7 **F1O** For the cutting feedrate specified by a single-digit F code (F1 to F9), feedrate override, and override cancellation are:
0: Disabled.
1: Enabled.

> **NOTE**
> For the F0 feedrate, rapid traverse override is enabled regardless of the setting of this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
1408					IRCx			RFDx

[Input type] Parameter input
[Data type] Bit axis

 # 0 RFDx Feedrate control on a rotation axis is exercised using:
0: Conventional method
1: Method that specifies a feedrate on the virtual circle of the rotation axis

 # 3 IRCx The least input increment of the maximum cutting feedrates set in parameter Nos. 1430 and 1432 is:
0: Not multiplied by ten.
1: Multiplied by ten.
Set this parameter for the following axes, which are operated by the following functions:

- Spindle control with servo motor
- Tool rotation axis in the polygon turning function

To a rotation speed of 1000 (1/min) (=360000 (deg/min)) is to be used when this parameter is set to 1, set 36000.0 in parameter No. 1430/1432.

1410	Dry run rate

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set the dry run rate at the 100% position on the jog feedrate specification dial. The unit of data depends on the increment system of the reference axis.

1411	Cutting feedrate

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Setting input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

When the machine doesn’t need to change cutting feedrate frequently during cutting, a cutting feedrate can be specified in the parameter. This eliminates the need to specify a cutting feedrate (F command) in the NC program.

The feedrate set in this parameter is valid from when the CNC enters the clear state (when bit 6 (CLR) of parameter No. 3402 is 1) due to power-on or a reset to when the feedrate is specified by a program command (F command). After the feedrate is specified by a program command (F command), the feedrate is valid. For details on the clear state, refer to Appendix in the User's Manual (B-64304EN).

1420	Rapid traverse rate for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the rapid traverse rate when the rapid traverse override is 100% for each axis.

1421	F0 rate of rapid traverse override for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the F0 rate of the rapid traverse override for each axis.

1423	Feedrate in manual continuous feed (jog feed) for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

(1) When JRV, bit 4 of parameter No.1402, is set to 0 (feed per minute), specify a jog feedrate (feed per minute) under an override of 100%.
(2) When JRV, bit 4 of parameter No.1402, is set to 1 (feed per revolution), specify a jog feedrate (feed per revolution) under an override of 100%.

NOTE
This parameter is clamped to the axis-by-axis manual rapid traverse rate (parameter No. 1424).

1424	Manual rapid traverse rate for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set the rate of manual rapid traverse when the manual rapid traverse override is 100% for each axis.

NOTE
1 If 0 is set, the rate set in parameter 1420 (rapid traverse rate for each axis) is assumed.
2 When manual rapid traverse is selected (bit 0 (RPD) of parameter No. 1401 is set to 1), manual feed is performed at the feedrate set in this parameter, regardless of the setting of bit 4 (JRV) of parameter No. 1402.

1425	FL rate of the reference position return for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set feedrate (FL rate) after deceleration when the reference position return is performed for each axis.

1426	External deceleration rate of cutting feed

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set an external deceleration rate for cutting feed or positioning of linear interpolation type (G00).

1427	External deceleration rate of rapid traverse for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the external deceleration rate of rapid traverse for each axis.

1428	Reference position return feedrate for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets a rapid traverse rate for reference position return operation using deceleration dogs, or for reference position return operation before a reference position is set.
This parameter is also used to set a feedrate for the rapid traverse command (G00) in automatic operation before a reference position is set.

NOTE

1 To this feedrate setting (100%), a rapid traverse override (F0, 25, 50, or 100%) is applicable.
2 For automatic return after completion of reference position return and machine coordinate system establishment, the normal rapid traverse rate is used.
3 As a manual rapid traverse rate before machine coordinate system establishment by reference position return, the jog feedrate or manual rapid traverse rate can be selected with bit 0 (RPD) of parameter No. 1401.

	Before coordinate system establishment	After coordinate system establishment
Automatic reference position return (G28)	No.1428	No.1420
Automatic rapid traverse (G00)	No.1428	No.1420
Manual reference position return *1	No.1428	No.1428 *3
Manual rapid traverse	No.1423 *2	No.1424

4 When parameter No. 1428 is set to 0, the following parameter-set feedrates are applied.

	Before coordinate system establishment	After coordinate system establishment
Automatic reference position return (G28)	No.1420	No.1420
Automatic rapid traverse (G00)	No.1420	No.1420
Manual reference position return *1	No.1424	No.1424 *3
Manual rapid traverse	No.1423 *2	No.1424

1420: rapid traverse rate
1423: Jog feedrate
1424: Manual rapid traverse rate
*1 : By using bit 2 (JZR) of parameter No. 1401, the jog feedrate can be used for manual reference position return at all times.
*2 : When bit 0 (RPD) of parameter No. 1401 is set to 1, the setting of parameter No. 1424 is used.
*3 : When rapid traverse is used for reference position return without dogs or manual reference position return after reference position establishment, regardless of the deceleration dog, the feedrate for manual reference position return based on these functions is used (the setting of bit 1 (DLF) of parameter No. 1404 is followed).

1430	Maximum cutting feedrate for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Specify the maximum cutting feedrate for each axis.

1432	Maximum cutting feedrate for all axes in the acceleration/deceleration before interpolation

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set a maximum cutting feedrate for each axis in the acceleration/deceleration before interpolation mode such as advanced preview control, AI advanced preview control, or AI contour control. When the acceleration/deceleration before interpolation mode is not set, the maximum cutting feedrate set in parameter No. 1430 is used.

1434	Maximum manual handle feedrate for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set a maximum manual handle feedrate for each axis in case of maximum manual handle feedrate switch signal HNDLF<Gn023.3>=1.

1440	External deceleration rate setting 2 in cutting feed

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
Set external deceleration rate 2 for cutting feed or positioning of linear interpolation type (G00).

1441	External deceleration rate setting 2 for each axis in rapid traverse

[Input type]	Parameter input
[Data type]	Real axis
[Unit of data]	mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	Refer to the standard parameter setting table (C) (When the increment system is IS-B, 0.0 to +999000.0)

Set external deceleration rate 2 for each axis in rapid traverse.

1442	Maximum manual handle feedrate setting 2 for each axis

[Input type]	Parameter input
[Data type]	Real axis
[Unit of data]	mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	Refer to the standard parameter setting table (C) (When the increment system is IS-B, 0.0 to +999000.0)

Set a maximum manual handle feedrate 2 for each axis.

1443	External deceleration rate setting 3 in cutting feed

[Input type]	Parameter input
[Data type]	Real path
[Unit of data]	mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data]	Depend on the increment system of the reference axis
[Valid data range]	Refer to the standard parameter setting table (C) (When the increment system is IS-B, 0.0 to +999000.0)

Set external deceleration rate 3 for cutting feed or positioning of linear interpolation type (G00).

1444	External deceleration rate setting 3 for each axis in rapid traverse

[Input type]	Parameter input
[Data type]	Real axis
[Unit of data]	mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	Refer to the standard parameter setting table (C) (When the increment system is IS-B, 0.0 to +999000.0)

Set external deceleration rate 3 for each axis in rapid traverse.

1445	Maximum manual handle feedrate setting 3 for each axis

[Input type]	Parameter input
[Data type]	Real axis
[Unit of data]	mm/min, inch/min (machine unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	Refer to the standard parameter setting table (C) (When the increment system is IS-B, 0.0 to +999000.0)

Set a maximum manual handle feedrate 3 for each axis.

1450	Change of feedrate for one graduation on the manual pulse generator during one-digit F feed code

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to 127

Set the constant that determines the change in feedrate as the manual pulse generator is rotated one graduation during one-digit F feed code.

$$\Delta F = \frac{F\max i}{100n} \quad \text{(where, i=1 or 2)}$$

In the above equation, set n. That is, the number of revolutions of the manual pulse generator, required to reach feedrate Fmaxi is obtained. Fmaxi refers to the upper limit of the feedrate for a one-digit F code feed command, and set it in parameters No. 1460 or No. 1461.
Fmax1: Upper limit of the feedrate for F1 to F4 (parameter No. 1460)
Fmax2: Upper limit of the feedrate for F5 to F9 (parameter No. 1461)

1451	Feedrate for F1
to	to
1459	Feedrate for F9

[Input type] Setting input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

These parameters set the feedrates for one-digit F code feed commands F1 to F9. When a one-digit F code feed command is specified, and the feedrate is changed by turning the manual pulse generator, the parameter-set value also changes accordingly.

1460	Upper limit of feedrate for F1 to F4

1461	Upper limit of feedrate for F5 to F9

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the upper limit of feedrate for the one-digit F code feed command.
As the feedrate increases by turning the manual pulse generator, the feedrate is clamped when it reaches the upper limit set. If a one-digit F feed command F1 to F4 is executed, the upper limit is that set in parameter No. 1460. If a one-digit F code feed command F5 to F9 is executed, the upper limit is that set in parameter No. 1461.

1465	Radius of a virtual circle when a feedrate is specified on the virtual circle of a rotation axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (B)

Set the radius of a virtual circle when a feedrate on the virtual circle of a rotation axis is specified.
If 0 is set for a rotation axis, the axis is excluded from feedrate calculation.
If the input unit is the inch, enter a value in inches.
The data is then converted to a millimeter value and displayed.

NOTE

1. This parameter is valid when bit 0 (ROTx) of parameter No. 1006 and bit 0 (RFDx) of parameter No. 1408 are 1.
2. Be careful to set bit 0 (RFDx) of parameter No. 1408 and parameter No. 1465 for the virtual radius. If the virtual radius is set to a small value and a feedrate on the virtual circle of the rotation axis is specified, the movement of the axis becomes faster.

1466	Feedrate for retraction in threading cycle G92, G76 or G76.7

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

When threading cycle G92, G76 or G76.7 is specified, retraction is performed after threading. Set a feedrate for this retraction.

NOTE
When this parameter is set to 0 or bit 1 (CFR) of parameter No. 1611 is set to 1, the rapid traverse rate set in parameter No. 1420 is used.

4.15 PARAMETERS OF ACCELERATION/DECELERATION CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
1601			NCI	RTO				

[Input type] Parameter input
[Data type] Bit path

 # 4 RTO Block overlap in rapid traverse
0: Blocks are not overlapped in rapid traverse.
1: Blocks are overlapped in rapid traverse.

 # 5 NCI An in-position check:
0: Confirms that the specified feedrate becomes 0 (the acceleration/deceleration delay becomes 0) at deceleration time and that the machine position has reached a specified position (the servo positional deviation is within the in-position width set by parameter No. 1826).
1: Confirms only that the specified feedrate becomes 0 (the acceleration/deceleration delay becomes 0) at deceleration time.

	#7	#6	#5	#4	#3	#2	#1	#0
1602		LS2			BS2			

[Input type] Parameter input
[Data type] Bit path

 # 3 BS2 Acceleration/deceleration in a mode of acceleration/deceleration before look-ahead interpolation such as the advanced preview control, AI advanced preview control, or AI contour control mode:
0: Exponential acceleration/deceleration or linear acceleration/ deceleration is used.
(The setting of bit 6 (LS2) of parameter No. 1602 is followed.)
1: Bell-shaped acceleration/deceleration is used.

 # 6 LS2 Acceleration/deceleration in a mode of acceleration/deceleration before interpolation such as the advanced preview control, AI advanced preview control, or AI contour control mode:
0: Exponential acceleration/deceleration is used.
1: Linear acceleration/deceleration is used.

BS2	LS2	Acceleration/deceleration
0	0	Exponential acceleration/deceleration after interpolation
0	1	Linear acceleration/deceleration after interpolation
1	0	Bell-shaped acceleration/deceleration after interpolation (The bell-shaped acceleration/deceleration after cutting feed interpolation option is required.)

	#7	#6	#5	#4	#3	#2	#1	#0
1603				PRT				

[Input type] Parameter input
[Data type] Bit path

 # 4 PRT For positioning of linear interpolation type:
0: Acceleration/deceleration of acceleration fixed type is used.
1: Acceleration/deceleration of time fixed type is used.

	#7	#6	#5	#4	#3	#2	#1	#0
1606								MNJx

[Input type] Parameter input
[Data type] Bit axis

 # 0 MNJx In manual handle interrupt :
0: Only cutting feed acceleration/deceleration is enabled, and jog feed acceleration/deceleration is disabled.
1: Both cutting feed acceleration/deceleration and jog feed acceleration/deceleration are applied.

	#7	#6	#5	#4	#3	#2	#1	#0
1610			THLx	JGLx			CTBx	CTLx
				JGLx			CTBx	CTLx

[Input type] Parameter input
[Data type] Bit axis

 # 0 CTLx Acceleration/deceleration in cutting feed or dry run
0: Exponential acceleration/deceleration is applied.
1: Linear acceleration/deceleration after interpolation is applied.

NOTE
When using bell-shaped acceleration/deceleration after interpolation, set this parameter to 0 and set bit 1 (CTBx) of parameter No. 1610 to select bell-shaped acceleration/deceleration after interpolation.

Parameter		Acceleration/deceleration
CTBx	CTLx	
0	0	Exponential acceleration/deceleration after interpolation
0	1	Linear acceleration/deceleration after interpolation
1	0	Bell-shaped acceleration/deceleration after interpolation

 # 1 CTBx Acceleration/deceleration in cutting feed or dry run

0: Exponential acceleration/deceleration or linear acceleration/deceleration is applied.
(depending on the setting in CTLx, bit 0 of parameter No.1610)

1: Bell-shaped acceleration/deceleration is applied.

> **NOTE**
> This parameter is valid only when the bell-shaped acceleration/deceleration after cutting feed interpolation function is used. When this function is not used, the acceleration/deceleration is determined according to bit 0 (CTLx) of parameter No. 1610 regardless of the setting of this parameter.

 # 4 JGLx Acceleration/deceleration in jog feed

0: Exponential acceleration/deceleration is applied.

1: The same acceleration/deceleration as for cutting feedrate is applied.
(Depending on the settings of bits 1 (CTBx) and 0 (CTLx) of parameter No. 1610)

 # 5 THLx Acceleration/deceleration in threading cycles

0: Exponential acceleration/deceleration is applied.

1: The same acceleration/deceleration as for cutting feedrate is applied.
(Depending on the settings of bits 1 (CTBx) and 0 (CTLx) of parameter No. 1610)
As the time constant and FL feedrate, however, the settings of parameter Nos. 1626 and 1627 for threading cycles are used.

	#7	#6	#5	#4	#3	#2	#1	#0
1611						AOFF		CFR
						AOFF		

[Input type] Parameter input
[Data type] Bit path

 # 0 CFR For retraction after threading in the threading cycles G92, G76 and G76.7:
0: The type of acceleration/deceleration after interpolation for threading is used together with the threading time constant (parameter No. 1626) and FL feedrate (parameter No. 1627).
1: The type of acceleration/deceleration after interpolation for rapid traverse is used together with the rapid traverse time constant.

NOTE
If this parameter is set to 1, a check is made before a retraction to see that the specified feedrate has become 0 (the delay in acceleration/deceleration has become 0). For retraction, the rapid traverse rate (parameter No. 1420) is used, regardless of the setting of parameter No. 1466. When this parameter is set to 0, parameter No. 1466 is used as the feedrate for retraction. As acceleration/deceleration used for retraction, only acceleration/deceleration after interpolation is used. Rapid traverse before look-ahead interpolation is disabled.

 # 2 AOFF If the advanced preview feed forward function is enabled by parameter setting when the advanced preview control, AI advanced preview control, or AI contour control mode is not set, the advanced preview feed forward function is:
0: Enabled.
1: Disabled.

	#7	#6	#5	#4	#3	#2	#1	#0
1612							AIR	

[Input type] Parameter input
[Data type] Bit path

 # 1 AIR During rapid-traverse, the mode signals and status display in the advanced preview control, AI advanced preview control, or AI contour control mode are:
0: Invalid.
1: Valid.
When this parameter is set to 1, mode blink display, AI advanced preview control/AI contour control mode signal AICC<Fn062.0> (M series), and advanced preview control signal G08MD<Fn066.0> (T series) are valid.

NOTE
In addition to the setting of this parameter, the following settings are required. In a rapid traverse command, the above items are valid when conditions 1 to 3 below are satisfied. In the G28, G30, and G53 commands, the above items are valid when conditions 1 to 5 below are satisfied.
1 Bit 1 (LRP) of parameter No. 1401 is 1 (interpolation type positioning is enabled).
2 Parameter No.1671 (maximum acceleration during rapid traverse) is set.
3 Bit 5 (FRP) of parameter No. 19501 is 1 (acceleration/deceleration before interpolation is enabled for rapid traverse).
4 Bit 4 (ZRL) of parameter No. 1015 is 1 (the G28, G30, and G53 commands are of interpolation type).
5 Bit 1 (AMP) of parameter No. 11240 is 1 (acceleration/deceleration before interpolation is enabled for the G28, G30, and G53 commands in the advanced preview control, AI advanced preview control, or AI contour control mode.)

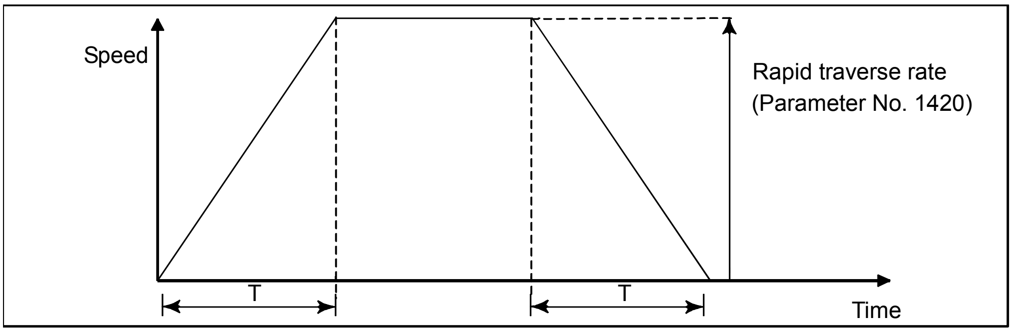
1620	Time constant T or T_1 used for linear acceleration/deceleration or bell-shaped acceleration/deceleration in rapid traverse for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

Specify a time constant used for acceleration/deceleration in rapid traverse.

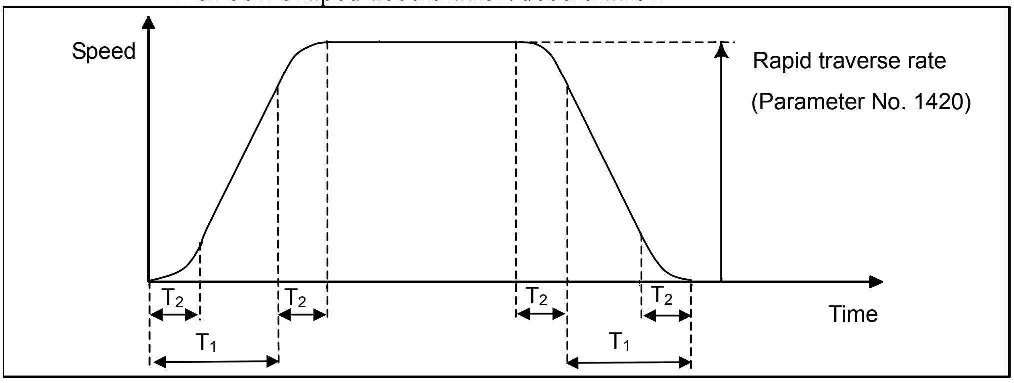
[Example]

For linear acceleration/deceleration



T : Setting of parameter No. 1620

For bell-shaped acceleration/deceleration



T_1 : Setting of parameter No. 1620
T_2 : Setting of parameter No. 1621
(However, $T_1 \geq T_2$ must be satisfied.)

Total acceleration (deceleration) time : $T_1 + T_2$
Time for linear portion : $T_1 - T_2$
Time for curve portion : $T_2 \times 2$

1621	Time constant T_2 used for bell-shaped acceleration/deceleration in rapid traverse for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 1000

Specify time constant T_2 used for bell-shaped acceleration/deceleration in rapid traverse for each axis.

1622	Time constant of acceleration/deceleration in cutting feed for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

Set the time constant used for exponential acceleration/deceleration in cutting feed, bell-shaped acceleration/deceleration after interpolation or linear acceleration/deceleration after interpolation in cutting feed for each axis. Which type to use is selected with bits 1(CTBx) and 0(CTLx) of parameter No.1610. Except for special applications, the same time constant must be set for all axes in this parameter. If the time constants set for the axes differ from each other, proper straight lines and arcs cannot be obtained.

1623	FL rate of exponential acceleration/deceleration in cutting feed for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the lower limit (FL rate) of exponential acceleration/deceleration in cutting feed for each axis.

NOTE
Except for special applications, set 0 for all axes in this parameter. Otherwise, the correct straight line or arc shape cannot be obtained.

1624	Time constant of acceleration/deceleration in jog feed for each axis.

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

Set the time constant used for acceleration/deceleration in jog feed for each axis.

1625	FL rate of exponential acceleration/deceleration in jog feed for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set the FL rate of exponential acceleration/deceleration in cutting feed for each axis.
This parameter allows only the exponential type.

1626	Acceleration/deceleration time constant in threading cycles for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

Set a time constant for acceleration/deceleration after interpolation in the threading cycles G92 and G76 for each axis.

1627	FL rate for acceleration/deceleration in threading cycles for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set an FL feedrate for acceleration/deceleration after interpolation in the threading cycles G92 and G76 for each axis. Set 0 at all times except in a special case.

1660	Maximum allowable acceleration rate in acceleration/deceleration before interpolation for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec^2, inch/sec^2, degree/sec^2 (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0.)

Set a maximum allowable acceleration rate in acceleration/ deceleration before interpolation for each axis.
If a value greater than 100000.0 is set, the value is clamped to 100000.0.
If 0 is set, the specification of 100000.0 is assumed. If 0 is set for all axes, however, acceleration/deceleration before interpolation is not performed.

If a maximum allowable acceleration rate set for one axis is greater than a maximum allowable acceleration rate set for another axis by a factor or 2 or more, the feedrate at a corner where the direction of travel abruptly changes can decrease temporarily.

1671	Maximum allowable acceleration rate in acceleration/deceleration before interpolation for linear rapid traverse for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec^2, inch/sec^2, degree/sec^2 (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0.)

Set a maximum allowable acceleration rate in acceleration/deceleration before interpolation for linear rapid traverse.
If a value greater than 100000.0, the value is clamped to 100000.0.
If 0 is set, the specification of the following is assumed:

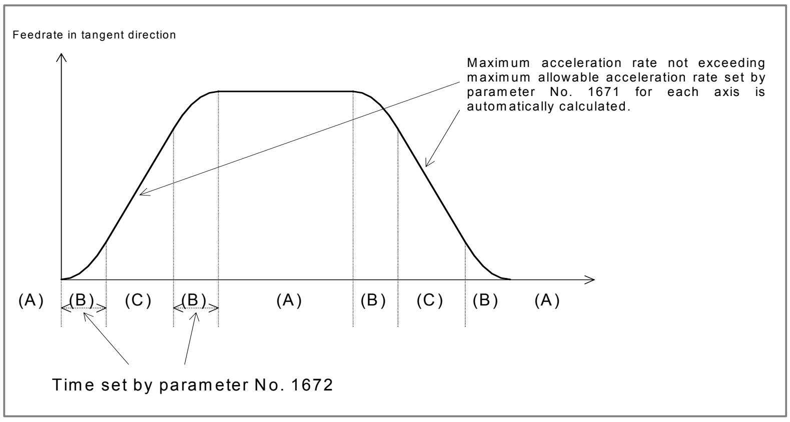
1000.0 mm/sec^2
100.0 inch/sec^2
100.0 degrees/sec^2

If 0 is specified for all axes, however, acceleration/deceleration before interpolation is not performed.

1672	Acceleration change time of bell-shaped acceleration/deceleration before interpolation for linear rapid traverse

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 200

Set an acceleration change time of bell-shaped acceleration/ deceleration for linear rapid traverse (time for changing from the state of constant feedrate (A) to the state of constant acceleration/deceleration (C) at the acceleration rate calculated from the acceleration rate set in parameter No. 1671: time of (B) in the figure below).



1710	Minimum deceleration ratio (MDR) for inner circular cutting feedrate change by automatic corner override

[Input type] Parameter input
[Data type] Byte path
[Unit of data] %
[Valid data range] 0 to 100

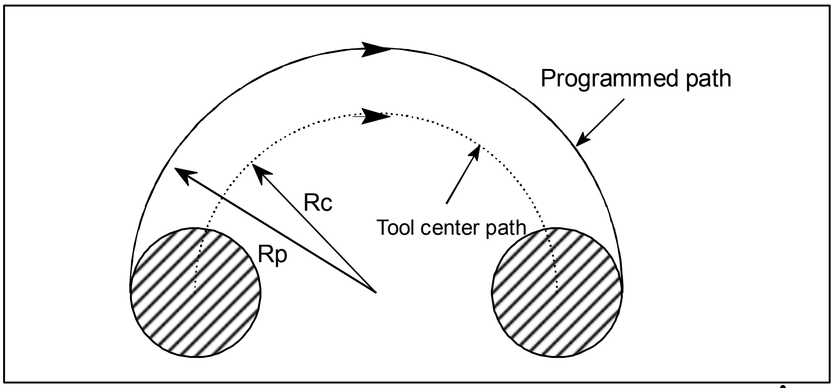
Set a minimum deceleration ratio (MDR) for an inner circular cutting feedrate change by automatic corner override.

In the case of circular cutting offset inward, the actual feedrate is determined by a specified feedrate (F) as follows:

$$F \times \frac{Rc}{Rp}$$

(Rc:Radius of tool center path
Rp:Programmed radius)

Thus, the feedrate along the programmed path satisfies the specified value of F.



However, if Rc is too small when compared with Rp, Rc/Rp $\fallingdotseq$ 0 results to stop the tool. So, a minimum deceleration ratio (MDR) is set, and the feedrate of the tool is set to F×(MDR) when Rc/Rp ≤ MDR.

NOTE
When this parameter is set to 0, the minimum deceleration ratio (MDR) is 100%.

1711	Inner determination angle (θp) for inner corner override

[Input type] Parameter input
[Data type] Real path
[Unit of data] deg
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 2 to 178

Set an inner determination angle for inner corner override in automatic corner overriding.

1712	
	Override value for inner corner override

[Input type] Parameter input
[Data type] Byte path
[Unit of data] %
[Valid data range] 1 to 100

Set an inner corner override value in automatic corner overriding.

1713	
	Start distance (Le) for inner corner override

[Input type] Setting input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

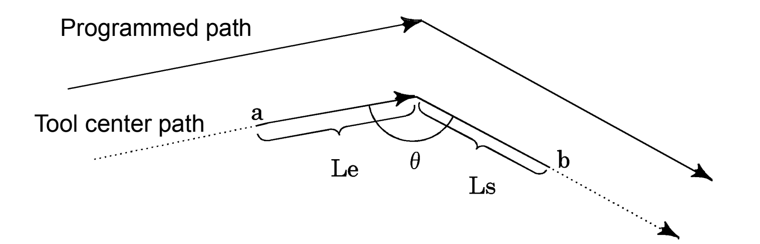
Set a start distance for inner corner override in automatic corner overriding.

1714	End distance (Ls) for inner corner override

[Input type] Setting input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set an end distance for inner corner override in automatic corner overriding.

When θ ≤ θp, an inner corner is assumed. (Parameter No. 1711 is used to set θp.)
When a corner is determined to be an inner corner, an override is applied to the feedrate in the range of Le in the previous block from the intersection of the corner and in the range of Ls in the next block from the intersection of the corner.
Distances Le and Ls represent linear distances from the intersection of a corner to points on the tool center path.
Le and Ls are set in parameter No. 1713 and No. 1714.



An override is applied to the range from point a to point b.

1722	Rapid traverse feedrate reduction ratio for overlapping rapid traverse blocks

[Input type] Parameter input
[Data type] Byte axis
[Unit of data] %
[Valid data range] 0 to 100

This parameter is used when rapid traverse blocks are arranged successively, or when a rapid traverse block is followed by a block that does not cause, movement. When the feedrate for each axis of a block is reduced to the ratio set in this parameter, the execution of the next block is started.

NOTE
The parameter No.1722 is effective when parameter No.1601 #4 (RTO) is set to 1.

1732	Minimum allowable feedrate for the deceleration function based on acceleration in circular interpolation

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

With the deceleration function based on acceleration in circular interpolation, an optimum feedrate is automatically calculated so that acceleration produced by changing the move direction in circular interpolation does not exceed the maximum allowable acceleration rate specified in parameter No. 1735.

If the radius of an arc is very small, a calculated feedrate may become too low.

In such a case, the feedrate is prevented from decreasing below the value specified in this parameter.

1735	Maximum allowable acceleration rate for the deceleration function based on acceleration in circular interpolation for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec^2, inch/sec^2, degree/sec^2 (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0.)

Set a maximum allowable acceleration rate for the deceleration function based on acceleration in circular interpolation.

Feedrate is controlled so that acceleration produced by changing the move direction in circular interpolation does not exceed the value specified in this parameter.

For an axis with 0 set in this parameter, the deceleration function based on acceleration is disabled.

If a different value is set in this parameter for each axis, a feedrate is determined from the smaller of the acceleration rates specified for the two circular axes.

1737	Maximum allowable acceleration rate for the deceleration function based on acceleration in AI contour control for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec^2, inch/sec^2, degree/sec^2 (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0.)

Set a maximum allowable acceleration rate produced by changing the tool move direction.

For an axis with 0 set in this parameter, the deceleration function based on acceleration is disabled. If 0 is set for all axes, the deceleration function based on acceleration is not performed.

In circular interpolation, however, the deceleration function based on feedrate control using acceleration in circular interpolation (parameter No. 1735) is enabled.

1738	Minimum allowable feedrate for the deceleration function based on acceleration in AI contour control

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

With the deceleration function based on acceleration in AI advanced preview control or AI contour control, a feedrate most suitable for a desired figure is automatically calculated.

Depending on the figure, however, the calculated feedrate may become too low.

In such a case, the feedrate is prevented from decreasing below the value specified in this parameter.

1763	FL rate for acceleration/deceleration after cutting feed interpolation for each axis in the acceleration/deceleration before interpolation mode

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Set a minimum allowable feedrate (FL feedrate) for acceleration/ deceleration after cutting feed interpolation in acceleration/ deceleration before interpolation as in advanced preview control, AI advanced preview control, or AI contour control.

1769	Time constant for acceleration/deceleration after cutting feed interpolation in the acceleration/deceleration before interpolation mode

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

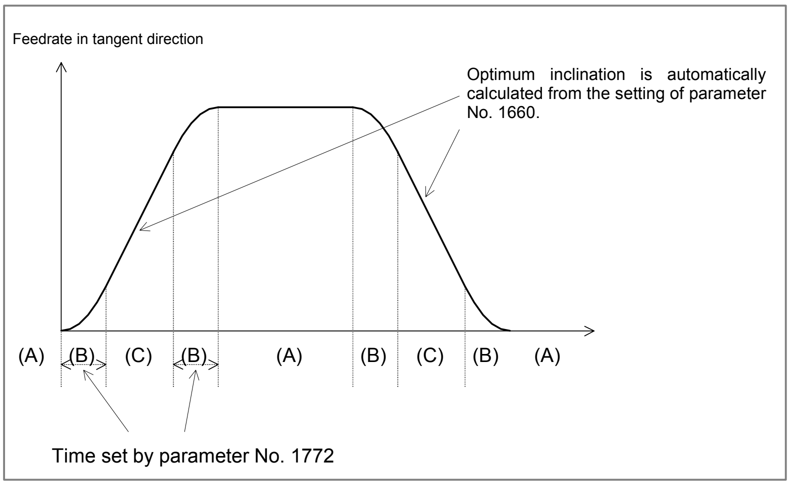
In the acceleration/deceleration before interpolation mode as in advanced preview control, AI advanced preview control, or AI contour control, not the ordinary time constant (parameter No. 1622) but the value of this parameter is used.

Be sure to specify the same time constant value for all axes except for a special application. If different values are set, correct linear and circular figures cannot be obtained.

1772	Acceleration change time of bell-shaped acceleration/deceleration before interpolation

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 200

Set an acceleration change time of bell-shaped acceleration/ deceleration before interpolation (time for changing from the state of constant feedrate (A) to the state of constant acceleration/deceleration (C) at the acceleration rate calculated from the acceleration rate set in parameter No. 1660: time of (B) in the figure below).



NOTE

The option of bell-shaped acceleration/deceleration before look-ahead interpolation is required. This parameter is valid only in the AI contour control mode.

1783	Maximum allowable feedrate difference for feedrate determination based on corner feedrate difference

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

If a feedrate component change for each axis exceeding the value set in this parameter occurs at the joint of blocks, the feedrate determination function based on corner feedrate difference finds a feedrate not exceeding the set value and performs deceleration by using acceleration/deceleration before interpolation. Thus, a shock to the machine and machining error at a corner can be reduced.

4.16 PARAMETERS OF SERVO

	#7	#6	#5	#4	#3	#2	#1	#0
1800				RBK	FFR		CVR	

[Input type] Parameter input
[Data type] Bit path

 # 1 CVR When velocity control ready signal VRDY is set ON before position control ready signal PRDY comes ON
0: A servo alarm is generated.
1: A servo alarm is not generated.

 # 3 FFR Feed-forward control in rapid traverse is:
0: Disabled
1: Enabled
Feed-forward is enabled only in normal cutting feed. When this parameter is set to 1, feed-forward is enabled in rapid traverse as well. This capability reduces the servo positional deviation, thus reducing the time required to enter the in-position width at the time of positioning.

 # 4 RBK Backlash compensation applied separately for cutting feed and rapid traverse
0: Not performed
1: Performed

	#7	#6	#5	#4	#3	#2	#1	#0
1801			CIN	CCI				

[Input type] Parameter input
[Data type] Bit path

 # 4 CCI As the in-position width for cutting feed:
0: The parameter (No. 1826) applicable to rapid traverse as well is used.
1: The parameter (No. 1827) dedicated to cutting feed is used.
This parameter enables the in-position width for cutting feed (parameter No. 1827) to be set instead of the in-position width for rapid traverse (parameter No. 1826).
By setting bit 4 (CCI) of parameter No. 1801, choose whether to use this function or the conventional in-position check function.
This function, when specified, is enabled for all axes. So, for an axis that does not require this function, set the same data in parameter No. 1826 and No. 1827.

 # 5 CIN When CCI is set to 1, the dedicated parameter for specifying an in-position width for cutting feed is used:

0: Only when the next block specifies cutting feed.
1: Regardless of the next block.

The table below indicates the relationships between the parameters for cutting feed and rapid traverse.

		Parameter CIN(No.1801 #5)			
		0		1	
Parameter CCI (No.1801 #4)	0	Rapid traverse → Rapid traverse	No.1826	Rapid traverse → Rapid traverse	No.1826
		Rapid traverse → Cutting feed	No.1826	Rapid traverse → Cutting feed	No.1826
		Cutting feed → Cutting feed	No.1826	Cutting feed → Cutting feed	No.1826
		Cutting feed → Rapid traverse	No.1826	Cutting feed → Rapid traverse	No.1826
	1	Rapid traverse → Rapid traverse	No.1826	Rapid traverse → Rapid traverse	No.1826
		Rapid traverse → Cutting feed	No.1826	Rapid traverse → Cutting feed	No.1826
		Cutting feed → Cutting feed	No.1827	Cutting feed → Cutting feed	No.1827
		Cutting feed → Rapid traverse	No.1826	Cutting feed → Rapid traverse	No.1827

The parameters CCI and CIN can also be applied to a Cs axis.

	#7	#6	#5	#4	#3	#2	#1	#0
1802				BKL15x		DC2x	DC4x	

[Input type] Parameter input
[Data type] Bit axis

 # 1 DC4x When the reference position is established on the linear scale with reference marks:

0: An absolute position is established by detecting three reference marks.
1: An absolute position is established by detecting four reference marks.

 # 2 DC2x Reference position establishment operation for a linear scale with reference marks is performed as follows:

0: The setting of bit 1 (DC4) of parameter No. 1802 is followed.
1: An absolute position is established by detecting two reference marks.

NOTE
1 When this parameter is set to 1, specify the direction of the scale zero point by setting bit 4 (SCP) of parameter No. 1817.
2 When a rotary encoder with absolute address reference marks is used, this parameter is invalid. Even when this parameter is set to 1, the setting of bit 1 (DC4) of parameter No. 1802 is followed.

 # 4 BKL15x When the direction of a movement is determined in backlash compensation:
0: The compensation amount is not considered.
1: The compensation amount (pitch error, simple straightness, external machine coordinate system shift, etc.) is considered.

	#7	#6	#5	#4	#3	#2	#1	#0
1803				TQF			TQA	TQI

[Input type] Parameter input
[Data type] Bit path

 # 0 TQI Within a torque limit, an in-position check is:
0: Made.
1: Not made.

 # 1 TQA Within a torque limit, an excessive stop-time/move-time error is:
0: Checked.
1: Not checked.

 # 4 TQF When torque control is performed by the PMC axis control, follow-up operation is:
0: Not performed.
1: Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
1804		SAK	ANA	IVO				

[Input type] Parameter input
[Data type] Bit path

 # 4 IVO When an attempt is made to release an emergency stop while the VRDY OFF alarm ignore signal is 1:
0: The emergency stop state is not released until the VRDY OFF alarm ignore signal is set to 0.
1: The emergency stop state is released.

NOTE
When a reset is issued while the VRDY OFF alarm ignore signal is set to 1 and the motor activating current is low, the reset state can also be released, provided this parameter is set to 1.

 # 5 ANA When an abnormal load is detected for an axis:

0: Movement along all axes is stopped, and a servo alarm is output. (Abnormal load detection alarm function)

1: No servo alarm is output, and movement along only the axes of the group containing the axis with the abnormal load is stopped in interlock mode. (Abnormal load detection group function) (The group number of each axis is set in parameter No.1881.)

> ⚠ **WARNING**
> The abnormal load detection group function uses the servo-off state in which the motor is de-energized and the dynamic brake does not operate. Accordingly, the servo motor enters the free running state and no braking force is applied. Therefore, for a vertical axis, if a failure occurs in the mechanical brake, driving circuit, or sequence, the axis may fall freely in a significant manner. When applying abnormal load detection to a vertical axis, use the abnormal load detection function.

 # 6 SAK When the VRDY OFF alarm ignore signal IGNVRY is 1, or when the VRDY OFF alarm ignore signals IGNVRYn are 1:

0: Servo ready signal SA is set to 0.

1: Servo ready signal SA remains set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1805				TSM	TSA		TRE	

[Input type] Parameter input
[Data type] Bit path

 # 1 TRE When bit 4 (TQF) of parameter No. 1803 is set to 0 (not to perform follow-up operation with a torque control command in PMC axis control), the servo error counter is:

0: Updated.
When the error count exceeds the maximum allowable cumulative travel value (parameter No. 1885), the alarm (SV0423) is issued.

1: Not updated.
No errors are accumulated, so that the alarm (SV0423) is not issued. When the maximum allowable feedrate is exceeded, however, the alarm (SV0422) is issued.

To return to position control when this parameter bit is set to 1, a reference position return operation needs to be performed.

 # 3 TSA As the abnormal load detection level during dwell, M code execution, and automatic operation halt state:
0: The threshold value for rapid traverse is used. (parameter No.2142)
1: The threshold value for cutting feed is used. (parameter No.2104)
This parameter is valid when bit 3 (ABG0) of parameter No. 2200 is set to 1.

 # 4 TSM As the abnormal load detection level in the jog feed mode (excluding manual rapid traverse) and manual handle feed mode:
0: The threshold value for rapid traverse is used. (parameter No.2142)
1: The threshold value for cutting feed is used. (parameter No.2104)
This parameter is valid when bit 3 (ABG0) of parameter No. 2200 is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1814	ALGx							

[Input type] Parameter input
[Data type] Bit axis

 # 7 ALGx The servo axis loop gain in the Cs contour control mode is:
0: Not matched with the Cs contour control loop gain.
1: Matched with the Cs contour control loop gain.

		#7	#6	#5	#4	#3	#2	#1	#0
1815			RONx	APCx	APZx	DCRx	DCLx	OPTx	RVSx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 RVSx Specifies to save rotary data by CNC, as for an axis whose movable is over one rotation and its rotary scale which has no rotary data:
0: Not to save.
1: To save.

> **NOTE**
> 1 In the case of a rotary axis B type whose movable range is over one rotation, a rotary scale with rotary data had better be used.
> 2 This parameter is available for only the rotary axis B type with an absolute position detector (absolute pulse coder) or a rotary scale with distance-coded reference marks (serial).This function cannot be used for distance coded rotary scale interface (phase A/B).
> 3 If this parameter is available, the machine coordinate value just before CNC turns off is saved. In the case of moving over 180 degree during turning off, a machine coordinate value may get out over a rotation because CNC saves a machine coordinate value just before CNC turns off and in following turning on get from the value.
> 4 When this parameter is set, machine position and position on absolute position detector become uncorresponding. Consequently, the parameter APZ (No. 1815#4: indicating that the correspondence is established) is set to 0, alarm DS0300. Why the parameter APZ (No. 1815#4) is set to 0 can be checked using diagnostic data No. 310#0.
> 5 Absolute coordinate value is set by machine coordinate value. However, after CNC turns on, the workpiece offset such as G92 and G52 executed before CNC turns off is not set.
> 6 This function cannot be used together with the parameter SCRx (No.1817#3) that convert scale data.
> 7 In the case that the amount of one rotation of rotary axis is 360, the parameter No.1869 is set to 0. Moreover, set the parameter No.1240 to 0.
> 8 If it is necessary to set an amount of one rotation of rotary axis arbitrarily, the parameter No.1869 is set to the amount of one rotation. Moreover, set the parameter No.1240 to 0.

 # 1 OPTx Position detector
0: A separate pulse coder is not used.
1: A separate pulse coder is used.

> **NOTE**
> Set this parameter to 1 when using a linear scale with reference marks or a linear scale with an absolute address zero point (full-closed system).

 # 2 DCLx As a separate position detector, a linear scale with reference marks or a linear scale with an absolute address zero point is:
0: Not used.
1: Used.

 # 3 DCRx As a scale with absolute address reference marks:
0: A rotary encoder with absolute address reference marks is not used.
1: A rotary encoder with absolute address reference marks is used.

> **NOTE**
> When using a rotary encoder with absolute address reference marks, set also bit 2 (DCLx) of parameter No. 1815 to 1.

 # 4 APZx Machine position and position on absolute position detector when the absolute position detector is used
0: Not corresponding
1: Corresponding
When an absolute position detector is used, after primary adjustment is performed or after the absolute position detector is replaced, this parameter must be set to 0, power must be turned off and on, then manual reference position return must be performed. This completes the positional correspondence between the machine position and the position on the absolute position detector, and sets this parameter to 1 automatically.

 # 5 APCx Position detector
0: Other than absolute position detector
1: Absolute position detector (absolute pulse coder)

 # 6 RONx With a rotation axis A type, an absolute position detector (absolute pulse coder) using a scale without rotary data is:

0: Not used.

1: Used.

NOTE

1 This parameter is available for only the rotary axis A type with an absolute position detector (absolute pulse coder).This function cannot be used for a rotary scale with distance-coded reference marks (serial) or for a distance coded rotary scale interface (phase A/B).

2 Set it to a rotary axis A type using a scale without rotary data.

3 Do not set it to a rotary axis A type using a scale with rotary data.

4 When this parameter is set, machine position and position on absolute position detector become uncorresponding. Consequently, the parameter APZ (No. 1815#4: indicating that the correspondence is established) is set to 0, alarm DS0300. Why the parameter APZ (No. 1815#4) is set to 0 can be checked using diagnostic data No. 310#0.

	#7	#6	#5	#4	#3	#2	#1	#0
1816		DM3x	DM2x	DM1x				

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

#4 DM1x
#5 DM2x
#6 DM3x

By using DM1x, DM2x, and DM3x, a detection multiplication factor (DMR) is set.
This parameter is valid when a separate position detector (AB phase) is used and parameter No. 2084 and No. 2085 are not set.

DM3x	DM2x	DM1x	DMR
0	0	0	1/2
0	0	1	1
0	1	0	3/2
0	1	1	2
1	0	0	5/2
1	0	1	3
1	1	0	7/2
1	1	1	4

> **NOTE**
> For the FS0*i*-C, one of the following changes is required besides setting bit 3 (DIAx) of parameter No. 1006 so that the axis based on diameter specification achieves the specified amount of movement.
> - Halve the command multiplication (the detection unit is not changed).
> - Halve the detection unit and double the flexible feed gear (DMR).
>
> For the FS0*i*-D, only if bit 3 (DIAx) of parameter No. 1006 is set, the CNC halves the specified pulse. Accordingly, the above changes are not required (when the detection unit is not changed). To halve the detection unit, double both CMR and DMR.

	#7	#6	#5	#4	#3	#2	#1	#0
1817		TANx		SCPx	SCRx	SBLx		

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

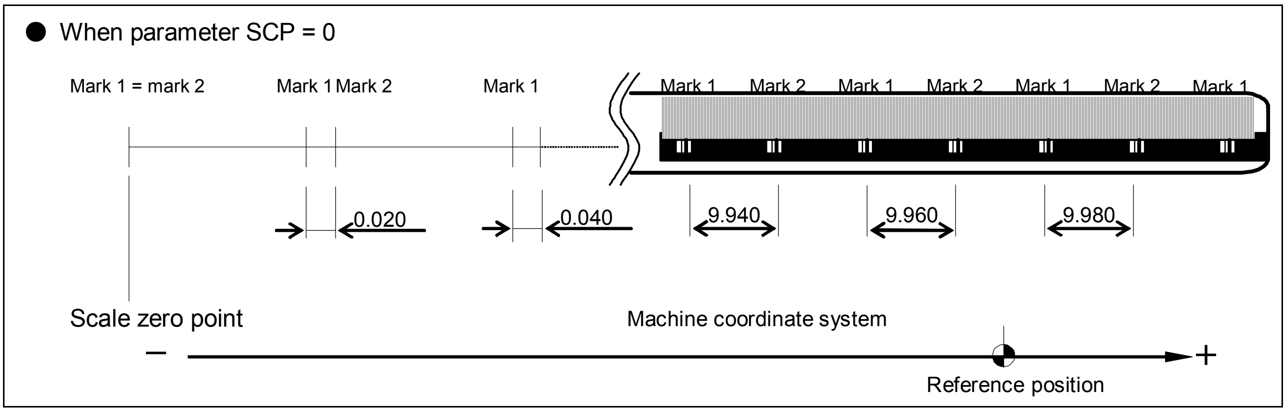
 # 2 SBLx Smooth backlash compensation is :
0: Disabled.
1: Enabled.

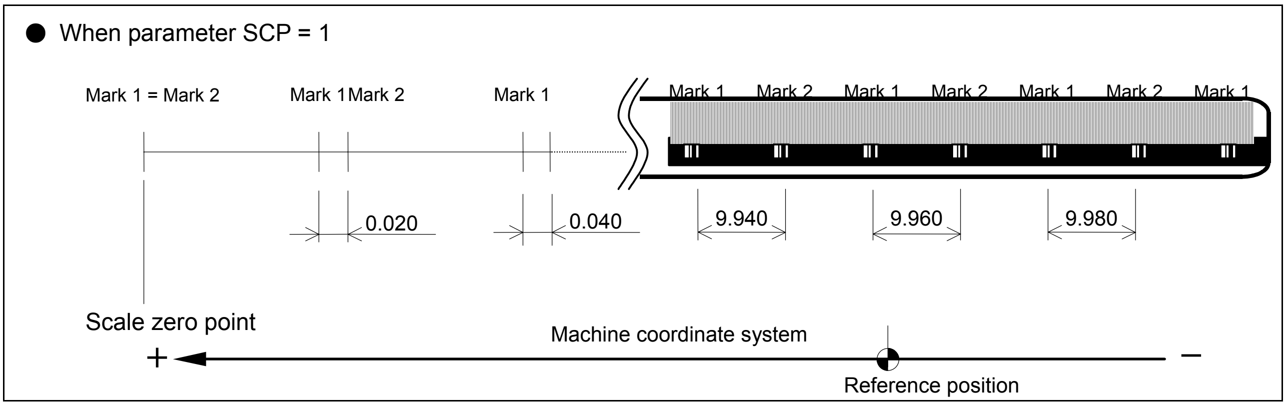
 # 3 SCRx Specifies whether to convert scale data by using threshold position (parameter No.1868) so that rotary axis B type is available, in the case of the axis B type that use a rotary scale without data (the number of rotation), whose movable range is under one rotation:
0 : Not to convert.
1 : To convert.

> **NOTE**
> 1 This parameter is available for only the rotary axis B type with an absolute position detector (absolute pulse coder) or a rotary scale with distance-coded reference marks (serial).
> 2 This function cannot be used for distance coded rotary scale interface (phase A/B).
> 3 Don't set this parameter in the case of no uncontinuous point within movable range of rotary axis even if the rotary axis B type.
> 4 When this parameter is set, machine position and position on absolute position detector become uncorresponding. Consequently, the parameter APZ (No. 1815#4: indicating that the correspondence is established) is set to 0, alarm DS0300. Why the parameter APZ (No. 1815#4) is set to 0 can be checked using diagnostic data No. 310#0.
> 5 This function cannot be used together with the parameter RVSx (No.1815#0) that save rotary data by CNC, in the case of a rotary axis B type whose movable range is over one rotation.
> 6 In this function, the amount of one rotation of rotary axis assumes 360, and the machine position 0 assumes the reference position. It is not possible to apply to a rotary axis other than the above-mentioned setting.
> 7 Set the parameter No.1240 to 0.

 # 4 SCPx For two-point measurement (when bit 2 (DC2) of parameter No. 1802 is set to 1), the scale zero point direction is:
0: On the minus side. (The reference position is located in the plus direction when viewed from the scale zero point.)
1: On the plus side. (The reference position is located in the minus direction when viewed from the scale zero point.)

NOTE
1 This parameter is valid when bit 2 (DC2) of parameter No. 1802 is set to 1.
2 If this parameter is set to an incorrect value, an incorrect coordinate system is established. In such a case, reverse the setting then perform reference position establishment operation again.





 # 6 TANx Tandem control
0: Not used
1: Used

NOTE
Set this parameter to both master axis and slave axis.

	#7	#6	#5	#4	#3	#2	#1	#0
1818					SDCx	DG0x	RF2x	RFSx

[Input type] Parameter input
[Data type] Bit axis

 # 0 RFSx If G28 is specified for an axis for which a reference position is not established (ZRF = 0) when a linear scale with an absolute address zero point or a linear scale with absolute address reference marks is used:
0: A movement is made to the reference position after reference position establishment operation.
1: No movement is made after reference position establishment operation, but the operation is completed.

> **NOTE**
> This parameter disables movement based on the G28 command to a reference position. So, use this parameter only in special cases.

 # 1 RF2x If G28 is specified for an axis for which a reference position is already established (ZRF = 1) when a linear scale with an absolute address zero point or a linear scale with absolute address reference marks is used:
0: A movement is made to the reference position.
1: No movement is made to the intermediate position and reference position, but the operation is completed.

> **NOTE**
> This parameter disables movement based on the G28 command to a reference position. So, use this parameter only in special cases.

 # 2 DG0x When the linear scale function with absolute address reference marks is used, reference position establishment operation based on the G00 command and jog feed is:
0: Disabled.
1: Enabled.

 # 3 SDCx A linear scale with an absolute address zero point is:
0: Not used.
1: Used.

> **NOTE**
> 1 After setting parameter SDCx, be sure to turn the power off and back on again. Note that the power-off alarm (PW0000) is not issued.
> 2 For the full-closed system, set bit 1 (OPTx) of parameter No. 1815 to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
1819	NAHx					DATx	CRFx	FUPx

[Input type] Parameter input
[Data type] Bit axis

 # 0 FUPx To perform follow-up when the servo is off is set for each axis.
0: The follow-up signal, *FLWU, determines whether follow-up is performed or not.
When *FLWU is 0, follow-up is performed.
When *FLWU is 1, follow-up is not performed.
1: Follow-up is not performed.

> **NOTE**
> When using the index table indexing function (M series), set FUPx to 1 for a control axis subject to index table indexing.

 # 1 CRFx When the servo alarm SV0445 (soft disconnection), SV0447 (hard disconnection (separate)), or SV0421 (dual position feedback excessive error) is issued:
0: The reference position established state is not affected.
1: The reference position unestablished state is assumed. (Bit 4 (APZ) of parameter No. 1815 is set to 0.)

 # 2 DATx When a linear scale with an absolute address zero point or a linear scale with absolute address reference marks is used, the automatic setting of parameter No. 1883 and No. 1884 at manual reference position return time is:
0: Not performed.
1: Performed.

The automatic setting procedure is as follows:
<1> Set an appropriate value in parameter No. 1815, No. 1821, and No. 1882.
<2> Position the machine at the reference position by manual operation.
<3> Set this parameter to 1.
<4> Perform a manual reference position return operation. Upon completion of manual reference position return operation, parameter No. 1883 and No. 1884 are set, and this parameter is automatically set to 0.

 # 7 NAHx In the advanced preview control mode, advanced preview feed-forward is:
0: Used
1: Not used

1820	Command multiplier for each axis (CMR)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] See below :

Set a command multiplier indicating the ratio of the least command increment to the detection unit for each axis.
Least command increment = detection unit × command multiplier

Relationship between the increment system and the least command increment

(1) T series

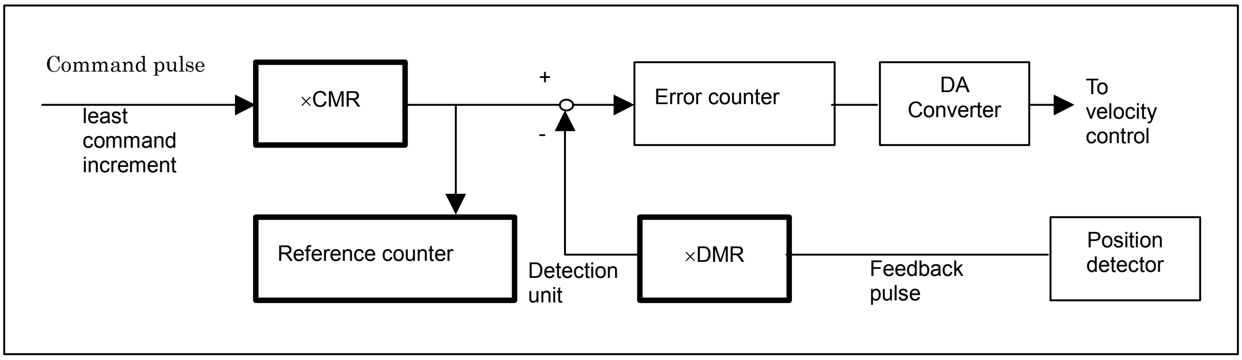
			Least input increment	Least command increment
IS-B	Millimeter machine	Millimeter input	0.001 mm (diameter specification)	0.0005 mm
			0.001 mm (radius specification)	0.001 mm
		Inch input	0.0001 inch (diameter specification)	0.0005 mm
			0.0001 inch (radius specification)	0.001 mm
	Inch machine	Millimeter input	0.001 mm (diameter specification)	0.00005 inch
			0.001 mm (radius specification)	0.0001 inch
		Inch input	0.0001 inch (diameter specification)	0.00005 inch
			0.0001 inch (radius specification)	0.0001 inch
	Rotation axis		0.001 deg	0.001 deg

			Least input increment	Least command increment
IS-C	Millimeter machine	Millimeter input	0.0001 mm (diameter specification)	0.00005 mm
			0.0001 mm (radius specification)	0.0001 mm
		Inch input	0.00001 inch (diameter specification)	0.00005 mm
			0.00001 inch (radius specification)	0.0001 mm
	Inch machine	Millimeter input	0.0001 mm (diameter specification)	0.000005 inch
			0.0001 mm (radius specification)	0.00001 inch
		Inch input	0.00001 inch (diameter specification)	0.000005 inch
			0.00001 inch (radius specification)	0.00001 inch
	Rotation axis		0.0001 deg	0.0001 deg

(2) M series

Increment system	Least input increment and least command increment			
	IS-A	IS-B	IS-C	Unit
Millimeter machine	0.01	0.001	0.0001	mm
Millimeter input	0.001	0.0001	0.00001	inch
Rotation axis	0.01	0.001	0.0001	deg

Setting command multiply (CMR), detection multiply (DMR), and the capacity of the reference counter



Set CMR and DMR so that the pulse weight of + input (command from the CNC) into the error counter matches the pulse weight of -input (feedback from the position detector).

[Least command increment]/CMR=[Detection unit]=
[Feedback pulse unit]/DMR

[Least command increment]:
Minimum unit of commands issued from the CNC to the machine

[Detection unit]: Minimum unit for machine position detection

The unit of feedback pulses varies, depending on the type of detector.
[Feedback pulse unit]=[Amount of travel per rotation of the pulse coder]/[Number of pulses per rotation of the pulse coder]

As the size of the reference counter, specify the grid interval for the reference position return in the grid method.
[Size of the reference counter]=[Grid interval]/[Detection unit]
[Grid interval]=[Amount of travel per rotation of the pulse coder]

The setting of a command multiplier is as follows:

(1) When command multiplier is 1 to 1/27
Set value = 1 / command multiplier + 100
Valid data range : 101 to 127

(2) When command multiply is 0.5 to 48
Set value = 2 × command multiplier
Valid data range : 1 to 96

NOTE

1. If a feedrate exceeding the feedrate found by the expression below is used, an incorrect travel amount may result or a servo alarm may be issued. Be sure to use a feedrate not exceeding the feedrate found by the following expression:
   Fmax[mm/min] = 196602 $\times$ 10^4 $\times$ least command increment / CMR
2. For the FS0*i*-C, one of the following changes is required besides setting bit 3 (DIAx) of parameter No. 1006 so that the axis based on diameter specification achieves the specified amount of movement.
   - Halve the command multiplication (the detection unit is not changed).
   - Halve the detection unit and double the flexible feed gear (DMR).

   For the FS0*i*-D, only if bit 3 (DIAx) of parameter No. 1006 is set, the CNC halves the specified pulse. Accordingly, the above changes are not required (when the detection unit is not changed). To halve the detection unit, double both CMR and DMR.

1821	Reference counter size for each axis

NOTE

When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999

Set a reference counter size.
As a reference counter size, specify a grid interval for reference position return based on the grid method.
When a value less than 0 is set, the specification of 10000 is assumed.
When a linear scale with absolute address reference marks is used, set the interval of mark 1.

1825	Servo loop gain for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] 0.01/sec
[Valid data range] 1 to 9999

Set the loop gain for position control for each axis.
When the machine performs linear and circular interpolation (cutting), the same value must be set for all axes. When the machine requires positioning only, the values set for the axes may differ from one another. As the loop gain increases, the response by position control is improved. A too large loop gain, however, makes the servo system unstable.
The relationship between the positioning deviation (the number of pulses counted by the error counter) and the feedrate is expressed as follows:

Positioning deviation = Feedrate / (60 × Loop gain)
Unit : Positioning deviation mm, inch or deg
Feedrate mm/min, inch/min, or deg/min
Loop gain 1/sec

1826	In-position width for each axis

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

The in-position width is set for each axis.
When the deviation of the machine position from the specified position (the absolute value of the positioning deviation) is smaller than the in-position width, the machine is assumed to have reached the specified position. (The machine is in the in-position state.)

1827	In-position width in cutting feed for each axis

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

Set an in-position width for each axis in cutting feed. This parameter is used when bit 4 (CCI) of parameter No.1801=1.

1828	Positioning deviation limit for each axis in movement

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

Set the positioning deviation limit in movement for each axis.
If the positioning deviation exceeds the positioning deviation limit during movement, a servo alarm (SV0411) is generated, and operation is stopped immediately (as in emergency stop).
Generally, set the positioning deviation for rapid traverse plus some margin in this parameter.

1829	Positioning deviation limit for each axis in the stopped state

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

Set the positioning deviation limit in the stopped state for each axis.
If, in the stopped state, the positioning deviation exceeds the positioning deviation limit set for stopped state, a servo alarm (SV0410) is generated, and operation is stopped immediately (as in emergency stop).

1830	Axis-by-axis positional deviation limit at servo-off time

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter is used to set a positional deviation limit at servo-off time, on an axis-by-axis basis.
If the value specified with this parameter is exceeded at servo-off time, a servo alarm is issued to cause an immediate stop (same as an emergency stop). Usually, set the same value as a positional deviation at stop time.

NOTE
When this parameter is set to 0, no positional deviation limit check is made at servo-off time.

1836	Servo error amount where reference position return is possible

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

This parameter sets a servo error used to enable reference position return.
In general, set this parameter to 0. (When 0 is set, 128 is assumed as the default.)
If, during reference position return, such a feedrate as exceeding a set value is not reached even once before the limit switch for deceleration is released (the deceleration signal (*DEC) is set to 1 again), the alarm (PS0090) "REFERENCE POSITION RETURN FAILURE" is issued.
If, during reference position return, such a feedrate as exceeding a set servo error amount is not reached even once before the limit switch for deceleration is released (the deceleration signal is set to 1 again), the alarm (PS0090) "REFERENCE POSITION RETURN FAILURE" is issued.

NOTE

When bit 0 (PLC0) of parameter No. 2000 is 1, a check is performed with a value 10 times as large as the parameter setting.
(Example)
When bit 0 (PLC0) of parameter No. 2000 is 1 and the setting is 10, if the number of servo errors is 100 or more, a reference position return is enabled.

1844	Distance to the first grid point when the reference position shift amount in the reference position shift function is 0 or when a reference position return is made by grid shift

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] -999999999 to 999999999

(1) When the reference position shift function is enabled (when bit 4 (SFDx) of parameter No. 1008 is set to 1)
Set the distance (detection unit) to the first grid point from a point at which the deceleration dog is released when the reference position shift (parameter No. 1850) is set to 0.
(2) When a reference position return is made by grid shift with a setting not to use reference position setting without dogs (when bit 4 (SFDx) of parameter No. 1008 is set to 0, and bit 1 (DLZx) of parameter No. 1005 is set to 0)
Set the distance to the first grid point from a point at which the deceleration dog is released. (Detection unit)
(3) When a reference position return is made by grid shift with a setting to use reference position setting without dogs (when bit 4 (SFDx) of parameter No. 1008 is set to 0, and bit 1 (DLZx) of parameter No. 1005 is set to 1)
Set the distance from the start position for reference position setting without dogs to the first grid point. (Detection unit)

NOTE
1 When the reference position shift function is enabled (when bit 4 (SFDx) of parameter No. 1008 is set to 1)
When bit 4 (SFDx) of parameter No. 1008 is set to 1, the distance from a point at which the deceleration dog is released to the first grid point (parameter No. 1844) is set to 0, and reference position shift (parameter No. 1850) is set to 0, a manual reference position return allows this parameter to be set automatically. Do not change an automatically set value.
2 When a reference position return is made by grid shift with a setting not to use reference position setting without dogs (when bit 4 (SFDx) of parameter No. 1008 is set to 0, and bit 1 (DLZx) of parameter No. 1005 is set to 0)
When a manual reference position return using deceleration dogs is made, this parameter is set automatically.
3 When a reference position return is made by grid shift with a setting to use reference position setting without dogs (when bit 4 (SFDx) of parameter No. 1008 is set to 0, and bit 1 (DLZx) of parameter No. 1005 is set to 1)
When a reference position setting without dogs is made, this parameter is set automatically.

1846	Distance for starting the second stage of smooth backlash compensation

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999

For each axis, set the distance from the point where the axis movement direction is reversed to the point where the second stage of smooth backlash compensation is started.

Smooth backlash compensation is disabled unless the following conditions are satisfied.

Setting of parameter No. 1846 ≥ 0
Setting of parameter No. 1846 < Setting of parameter No. 1847

1847	Distance for ending the second stage of smooth backlash compensation

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999

For each axis, set the distance from the point where the axis movement direction is reversed to the point where the second stage of smooth backlash compensation is ended.

Smooth backlash compensation is disabled unless the following conditions are satisfied.

Setting of parameter No. 1846 ≥ 0
Setting of parameter No. 1846 < Setting of parameter No. 1847

1848	Value of the first stage of smooth backlash compensation

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] -9999 to 9999

Set the value of the first stage of smooth backlash compensation for each axis.

If the setting of this parameter is greater than the total amount of backlash compensation, smooth backlash compensation is not performed.

If the backlash compensating value (No. 1851) for each axis is negative, set this parameter to a negative value. If the sign of the backlash compensating value (No. 1851) for each axis is different, perform compensation with the value of the first stage of smooth backlash compensation assumed to be 0.

1850	Grid shift and reference position shift for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] -99999999 to 99999999

To shift the reference position, the grid can be shifted by the amount set in this parameter. Up to the maximum value counted by the reference counter can be specified as the grid shift.
In case of parameter SFDx(No.1008#4) is 0: Grid shift
In case of parameter SFDx(No.1008#4) is 1: Reference point shift

> **NOTE**
> For setting the reference position without dogs, only the grid shift function can be used.
> (The reference position shift function cannot be used.)

1851	Backlash compensating value for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] -9999 to 9999

Set the backlash compensating value for each axis.
When the machine moves in a direction opposite to the reference position return direction after the power is turned on, the first backlash compensation is performed.

1852	Backlash compensating value used for rapid traverse for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] -9999 to 9999

Set the backlash compensating value used in rapid traverse for each axis. (This parameter is valid when RBK, #4 of parameter 1800, is set to 1.) More precise machining can be performed by changing the backlash compensating value depending on the feedrate, the cutting feed or the rapid traverse positioning. Let the measured backlash at cutting feed be A and the measured backlash at rapid traverse be B. The backlash compensating value is shown below depending on the change of feedrate (cutting feed or rapid traverse) and the change of the direction of movement.

Change of feedrate / Change of direction of movement	Cutting feed to cutting feed	Rapid traverse to rapid traverse	Rapid traverse to cutting feed	Cutting feed to rapid traverse
Same direction	0	0	$\pm\alpha$	$\pm(-\alpha)$
Opposite direction	$\pm$A	$\pm$B	$\pm(B+\alpha)$	$\pm(B+\alpha)$

NOTE

1 $\alpha=(A-B)/2$
2 The positive or negative direction for compensating values is the direction of movement.

NOTE

1 Jog feed is regarded as cutting feed.
2 The backlash compensation depending on a rapid traverse and a cutting feed is not performed until the first reference position return is completed after the power is turned on. The normal backlash compensation is performed according to the value specified in parameter No.1851 irrespective of a rapid traverse and a cutting feed.
3 The backlash compensation depending on a rapid traverse and a cutting feed is performed only when bit 4 (RBK) of parameter No.1800 is set to 1. When RBK is set to 0, the normal backlash is performed.

1868	Threshold position for converting scale data (each axis)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (Refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to ++999999.999)

In the case that scale data of a rotary scale without rotary data is larger than the scale data of the threshold position (this parameter value), it is converted to be continuous data in movable range by subtracting one rotary data. The position out of movable range (angle from an uncontinuous point) must be set as threshold position. As for the axis with this parameter is set to 0, conversion of scale data is not performed.

NOTE

1. When this parameter is set, the power must be turned off before operation is continued.
2. This parameter is available for only the rotary axis B type with an absolute position detector (absolute pulse coder) or a rotary scale with distance-coded reference marks (serial), as for the parameter SCRx(No.1817#3) is set to 1.
3. This function cannot be used for distance coded rotary scale interface (phase A/B).
4. Don't set this parameter in the case of no uncontinuous point within movable range of rotary axis even if the rotary axis B type.
5. When this parameter is set, machine position and position on absolute position detector become uncorresponding. Consequently, the parameter APZ (No. 1815#4: indicating that the correspondence is established) is set to 0, alarm DS0300. Why the parameter APZ (No. 1815#4) is set to 0 can be checked using diagnostic data No. 310#0.

1869	The amount of one rotation of rotary axis B type (each axis)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (Refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to ++999999.999)

Normally, the amount of one rotation of rotary axis is 360, and the machine position 0 is the reference position.
In this case, this parameter is set to 0.

For instance, when this parameter is set to 523.000, the amount of one rotation become 523.000 (in the case of IS-B), if it is necessary to set it arbitrarily.

NOTE
1 When this parameter is set, the power must be turned off before operation is continued.
2 This parameter is available for only the rotary axis B type with an absolute position detector (absolute pulse coder) or a rotary scale with distance-coded reference marks (serial), as for the parameter SCRx(No.1817#3) is set to 1 or the parameter SCRx(No.1815#0) is set to 1.
3 In the case that the amount of one rotation of rotary axis is 360, this parameter is set to 0.If it is necessary to set an amount of one rotation of rotary axis arbitrarily, this parameter is set to the amount of one rotation.
4 When this parameter is set, machine position and position on absolute position detector become uncorresponding. Consequently, the parameter APZ (No. 1815#4: indicating that the correspondence is established) is set to 0, alarm DS0300. Why the parameter APZ (No. 1815#4) is set to 0 can be checked using diagnostic data No. 310#0.
5 This parameter No.1869 is common in movable range that is under one rotation (the parameter SCRx (No.1817#3) is set to 1) and movable range that is over one rotation (the parameter RVS (No.1815#0) is set to 1).

1874	Numerator of the flexible feed gear for the built-in position detector

1875	Denominator of the flexible feed gear for the built-in position detector

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 1 to 32767

When using temporary absolute coordinate setting, set the flexible feed gear for the built-in position detector on each axis. The settings are as follows:

$$\frac{\text{No.1874}}{\text{No.1875}} = \frac{\text{Number of position feedback pulses per motor revolution}}{1{,}000{,}000}$$

1880	Abnormal load detection alarm timer

[Input type] Parameter input
[Data type] Word path
[Unit of data] msec
[Valid data range] 0 to 32767
This parameter sets the time from the detection of an abnormal load until a servo alarm is issued.
When 0 is set, however, the specification of 200 msec is assumed.

1881	Group number when an abnormal load is detected

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to Number of controlled axes

Set the group number on each axis when an abnormal load is detected. When an abnormal load is detected on an axis, only the movements on those axes that belong to the same group as the axis are stopped.
If 0 is set for an axis, the movement on the axis is stopped when an abnormal load is detected on any other axis.
This parameter is valid when bit 5 (ANA) of parameter No. 1804 is set to 1.

[Example]

When the settings indicated below are made, and an abnormal load is detected on the 3rd axis, the movements on the 1st axis, 2nd axis, 3rd axis, and 4th axis are stopped. When an abnormal load is detected on the 4th axis, the movements on the 2nd axis and the 4th axis are stopped.

Parameter No. 1881	Setting value
(1st axis)	1
(2nd axis)	0
(3rd axis)	1
(4th axis)	0
(5th axis)	2

1882	Interval of mark 2 of a linear scale with absolute address reference marks

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999

Set the interval of mark 2 of a linear scale with absolute address reference marks.

1883	Distance 1 from the scale zero point to reference position (linear scale with absolute address reference marks) or distance 1 from the base point to reference position (linear scale with an absolute address zero point)

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] -999999999 to 999999999

1884	Distance 2 from the scale zero point to reference position (linear scale with absolute address reference marks) or distance 2 from the base point to reference position (linear scale with an absolute address zero point)

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

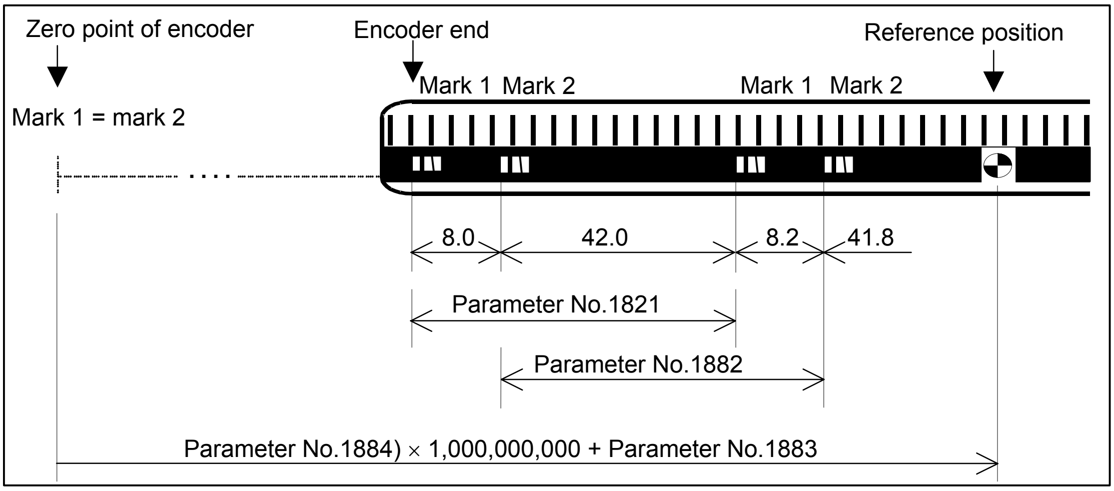
[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] -999 to 999

When a linear scale with absolute address reference marks is used, set the distance from the scale zero point to reference position in parameter Nos. 1883 and 1884).

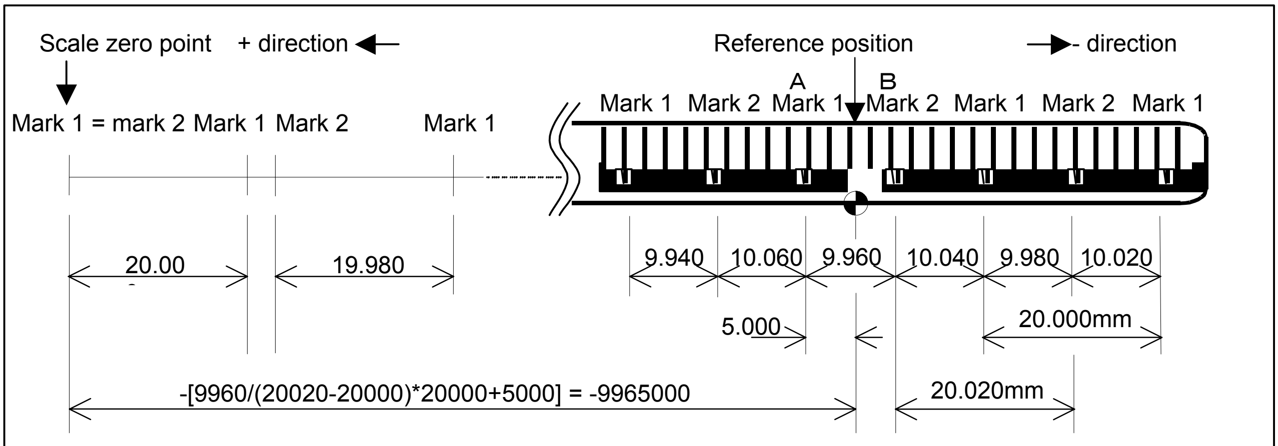
Distance from the zero point to the reference position of a linear scale
= No. 1884 × 1,000,000,000 + No. 1883

The scale zero point represents a point where mark 1 and mark 2 match. Usually, this point is a virtual point that does not physically exist on the scale. (See the figure below.)

If the reference position is placed in the + direction when viewed from the scale zero point, set a positive value. If the reference position is placed in the - direction when viewed from the scale zero point, set a negative value.



[Example of parameter settings] When an encoder as shown below is used with an IS-B, millimeter machine:



Parameters No.1821 (interval of mark 1) = 20000
No.1882 (interval of mark 2) = 20020
No.1883 (reference position) = position of point A + 5.000
= distance between A and B/(mark 2 - mark 1) × mark 1+ 5000
= 9960/ (20020 - 20000) × 20000＋5000
= 9965000
= -9965000 (the reference position is on the negative side)

[Setting parameter No. 1883]

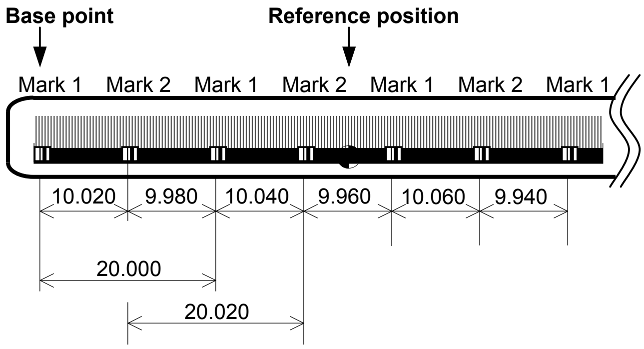
When it is difficult to measure the distance from the scale zero point to the reference position (parameter No. 1883), the method described below can be used to find the distance.

<1> Set parameter No. 1815 to enable this function.
Set an appropriate value in parameter No. 1821 and No. 1882.
Set 0 in parameter No. 1240.
Set 0 in parameter No. 1883 and No. 1884.

<2> At an appropriate position, establish a reference position.
(As a result, the machine coordinate represents the distance from the scale zero point to the current position.)

<3> By jog feed or handle feed, place the machine at the accurate reference position.
<4> In parameter No. 1883, set the machine coordinate of that time converted to the detection unit (machine coordinate × CMR).
<5> If necessary, set parameter No. 1240.

When a linear scale with an absolute address zero point is used, set the distance from the base point to the reference position in parameter Nos. 1883 and 1884. The base point is a point at a scale end as shown below.



If the reference position is located in the positive direction when viewed from the base point, set a positive value; if the reference position is located in the negative direction, set a negative value. Set the value by following the steps explained below.
<1> Set bit 1 (OPT) of parameter No. 1815 , bit 2 (DCL) of parameter No. 1815, and bit 3 (SDC) of parameter No. 1818 to enable this function.
Set 0 in parameter No. 1240.
Set 0 in parameter No. 1883 and No. 1884.
<2> At an appropriate position, establish a reference position.
(Consequently, the machine coordinate value indicates the distance from the base point to current position.)
<3> By jog feed or handle feed, place the machine at the accurate reference position.
<4> In parameters Nos. 1883 and 1884, set the machine coordinate of that time converted to the detection unit (machine coordinate × CMR).
If necessary, set parameter No. 1240.

NOTE

1 Set parameter Nos. 1883 and 1884 so that the distance from the scale zero point (for a linear scale with absolute address reference marks) or the base point (for a linear scale with an absolute address zero point) to the reference position is within the range from -999,999,999,999 to +999,999,999,999. If a value beyond this range is set, an alarm (PS 5325) is issued.

2 The scale area on the scale cannot be extended across the scale zero point or base point. Make parameter settings not to cause the scale area to extend beyond the scale zero point or base point.

1885	Maximum allowable value for total travel during torque control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

For the axis subjected to be torque control by the axis control command of the PCM axis control function, set the maximum allowable value of the total travel value (error counter value) during torque control. If the movement integration value exceeds this setting during torque control, a servo alarm (SV0423) occurs.

NOTE

This parameter is enabled when the parameter TQF (bit 4 of No.1803) is 0 (follow-up is not performed during torque control).

1886	Positional deviation when torque control is canceled

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 1 to 32767

For the axis subjected to be torque control by the axis control command of the PCM axis control function, set the positional deviation below which torque control is canceled and switching to positional control is performed. If the positional deviation is equal to or less than the setting of this parameter, switching to positional control is performed.

NOTE

This parameter is enabled when the parameter TQF (bit 4 of No.1803) is 0 (follow-up is not performed during torque control).

1895	Servo motor axis number used for a milling tool

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes

This parameter sets the servo motor axis number used for displaying the speed of a milling tool that incorporates a servo motor.

1898	Number of gear teeth on the servo motor axis side

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 1 to 9999

This parameter sets the number of servo motor axis gear teeth used for displaying the speed of a milling tool that incorporates a servo motor.

> **NOTE**
> This parameter is valid when a non-zero value is set in parameter No. 1895.

1899	Number of gear teeth on the milling axis side

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 1 to 9999

This parameter sets the number of milling axis gear teeth used for displaying the speed of a milling tool that incorporates a servo motor.

> **NOTE**
> This parameter is valid when a non-zero value is set in parameter No. 1895.

	#7	#6	#5	#4	#3	#2	#1	#0
1902							ASE	FMD

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 FMD The FSSB setting mode is:
0: Automatic setting mode.
(When bit 0 (DFS) of parameter No. 14476 is 0:
If the relationship between the axis and the amplifier and the like are defined on the FSSB setting screen, parameters No. 1023, No. 1905, Nos. 1936 and 1937, Nos. 14340 to 14349, and Nos. 14376 to 14391 are automatically set.)
(When bit 0 (DFS) of parameter No. 14476 is 1:
If the relationship between the axis and the amplifier and the like are defined on the FSSB setting screen, parameters No. 1023, No. 1905, Nos. 1910 to 1919, and Nos. 1936 and 1937 are automatically set.)
1: Manual setting 2 mode.
(When bit 0 (DFS) of parameter No. 14476 is 0:
Manually set parameters No.1023, No.1905, Nos.1936 and 1937, Nos.14340 to 14349, and Nos.14376 to 14391.)
(When bit 0 (DFS) of parameter No. 14476 is 1:
Manually set parameters No.1023, No.1905, Nos.1910 to 1919, and Nos. 1936 and 1937.)

 # 1 ASE When automatic setting mode is selected for FSSB setting (when the FMD parameter (bit 0 of parameter No.1902) is set to 0), automatic setting is:
0: Not completed.
1: Completed.
This bit is automatically set to 1 upon the completion of automatic setting.

	#7	#6	#5	#4	#3	#2	#1	#0
1904								DSPx

[Input type] Parameter input
[Data type] Bit axis

 # 0 DSPx One DSP is used by:
0: Two axes.
1: One axis exclusively.
Since this parameter is set on the FSSB setting screen, do not set it directly. In the manual setting 2 mode, this parameter does not need to be set.

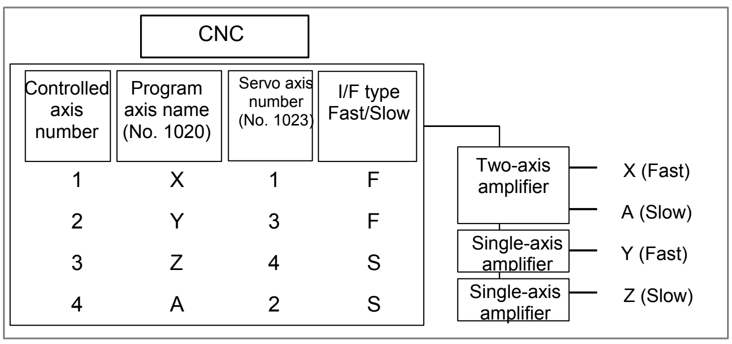
	#7	#6	#5	#4	#3	#2	#1	#0
1905	PM2x	PM1x						FSLx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 FSLx The type of interface used between the servo amplifier and servo software is:
0 : Fast type.
1 : Slow type.
The user can choose between two interface types for servo data transfer: fast type or slow type. Set this parameter so that the following conditions are satisfied:

- When a one-axis amplifier is used, either the fast type or slow type interface can be used.
- When a two-axis amplifier is used, the use of the fast type for both axes is not allowed. The slow type can be used for both axes.
- When a three-axis amplifier is used, the requirement for a two-axes amplifier described above applies to the first and second axes, and the requirement for a one-axis amplifier, again described above, applies to the third axis.
- When an odd number is specified for parameter No.1023, the fast type interface must be used. However, the slow type may be used for high-speed current loop axis and high-speed interface axis.
- When an even number is specified for parameter No.1023, only the slow type interface can be used. (The FSL bit must always be set to 1.)



 # 6 PM1x The first separate detector interface unit is:
0: Not used.
1: Used.

 # 7 **PM2x** The second separate detector interface unit is:
0: Not used.
1: Used.

> **NOTE**
> When automatic setting mode is selected for FSSB setting (when the parameter FMD (No.1902#0) is set to 0), this parameter is automatically set when input is performed with the FSSB setting screen. When manual setting 2 mode is selected for FSSB setting (when the parameter FMD (No.1902#0) is set to 1), this parameter must be set directly. When a separate detector interface unit is used, a connector number must be set in the corresponding parameter (No.1936 or No.1937).

1910	**Address conversion table value for slave 1 (ATR)**
1911	**Address conversion table value for slave 2 (ATR)**
1912	**Address conversion table value for slave 3 (ATR)**
1913	**Address conversion table value for slave 4 (ATR)**
1914	**Address conversion table value for slave 5 (ATR)**
1915	**Address conversion table value for slave 6 (ATR)**
1916	**Address conversion table value for slave 7 (ATR)**
1917	**Address conversion table value for slave 8 (ATR)**
1918	**Address conversion table value for slave 9 (ATR)**
1919	**Address conversion table value for slave 10 (ATR)**

> **NOTE**
> When these parameters are set, the power must be turned off before operation is continued.

[Input type] Byte
[Valid data range] 0 to 3, 16, 40, 48

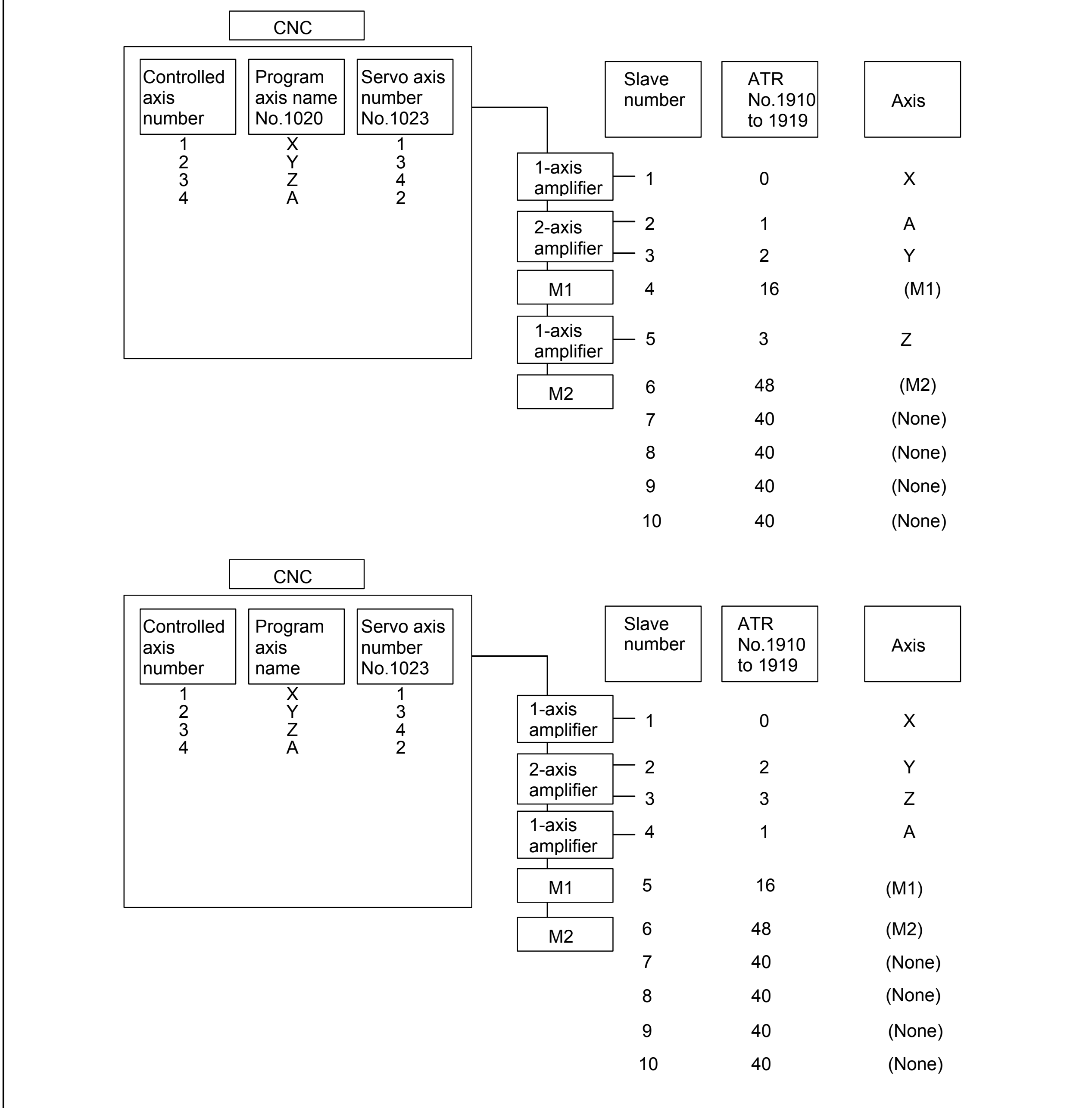
These parameters set address conversion table values for slaves 1 to 10.

A slave is the generic name given to a device such as a servo amplifier or separate detector interface unit, connected to the CNC via an FSSB optical cable. Smaller numbers, starting from 1 are assigned to slaves closer to the CNC; the maximum number that can be assigned is 10. A two-axis amplifier has two slaves, while a three-axis amplifier has three slaves. Set each parameter as described below, depending on whether the slave is an amplifier or separate detector interface unit, or when no slave exists.

- When the slave is an amplifier:
  Set the value obtained by subtracting 1 from the setting of parameter No.1023 for the axis to which the amplifier is assigned.
- When the slave is a separate detector interface unit:
  Set 16 for the first separate detector interface unit (closest to the CNC).
  Set 48 for the second separate detector interface unit (furthest from the CNC).
- When no slave exists
  Set 40.

> **NOTE**
> 1 When using the simple electric gear box (EGB) function
> The EGB axis (axis set with parameter No.7771) does not actually require an amplifier. So, assume that the EGB axis is connected to a dummy amplifier. Accordingly, as the address conversion table value for a nonexistent slave, set the value obtained by subtracting 1 from the setting made for parameter No.1023 for the EGB axis, instead of setting 40.
> 2 When automatic setting mode is selected for FSSB setting (when bit 0 (FMD) of parameter No.1902 is set to 0), parameters No.1910 to No.1919 are automatically set when input is performed with the FSSB setting screen. When manual setting 2 mode is selected for FSSB setting (when bit 0 (FMD) of parameter No.1902 is set to 1), parameter No.1910 to No.1919 must be directly set.

- Examples of axis configurations and parameter settings



M1/M2: First separate detector interface unit/second separate detector interface unit

1936	Connector number of the first separate detector interface unit

1937	Connector number of the second separate detector interface unit

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 7

This parameter sets the connector number corresponding to the connector connected when using the separator detector interface unit set by bits 6 and 7 of parameter No. 1905 minus 1. That is, set 0 to 7 for connector numbers 1 to 8, respectively. Set 0 for the axis for which the separator detector interface unit is not used.
Use successive numbers for one separator detector interface unit. Do not omit a intermediate number.

Example)

Controlled axis	Connector number for the first separate detector interface unit	Connector number for the second separate detector interface unit	No.1936	No.1937	PM2x, PM1x (No.1905#7, #6)
X	1	Not used	0	0	0, 1
Y	Not used	2	0	1	1, 0
Z	Not used	1	0	0	1, 0
A	Not used	Not used	0	0	0, 0

NOTE
When automatic setting mode is selected for FSSB setting (when the parameter FMD (No.1902#0) is set to 0), these parameters are automatically set when input is performed with the FSSB setting screen.
When manual setting 2 mode is selected for FSSB setting (when the parameter FMD (No.1902#0) is set to 1), these parameters must be set directly.

Parameters No.2000 to 2999 are for digital servo, The following parameters are not explained in this manual. Refer to FANUC AC SERVO MOTOR α*i* series PARAMETER MANUAL (B-65270EN)

No.	Data type	Contents							
2000	Bit axis				PGEX			DGPR	PLC0
2001	Bit axis		AMR6	AMR5	AMR4	AMR3	AMR2	AMR1	AMR0
2002	Bit axis					PFSE			
2003	Bit axis	VOFS	OVSC	BLEN	NPSP	PIEN	OBEN	TGAL	
2004	Bit axis					TRW1	TRW0	TIB0	TIA0
2005	Bit axis	SFCM	BRKC					FEED	
2006	Bit axis								FCBL
2007	Bit axis	FRCA						IGNV	ESP2
2008	Bit axis	LAXD					VFBA	TNDM	
2009	Bit axis	BLST	BLCU						SERD
2010	Bit axis	POLE		HBBL	HBPE	BLTE	LINE		
2011	Bit axis			RCCA				FFAL	EGB
2012	Bit axis	STNG						MSFE	
2013	Bit axis	APTG							HRV3
2014	Bit axis								
2015	Bit axis	BZNG	BLAT					SSG1	PGTW
2016	Bit axis					PK2VDN			ABNT
2017	Bit axis	PK2V25			HTNG				DBST
2018	Bit axis	PFBCPY					OVR8	MOVOBS	RVRSE
2019	Bit axis	DPFB	SLEN	INVSYS		LBUFEX		TANDMP	
2020	Word axis	Motor number							
2021	Word axis	Load inertia ratio							
2022	Word axis	Direction of motor rotation							
2023	Word axis	Number of velocity pulses							
2024	Word axis	Number of position pulses							
2028	Word axis	Position gain switching speed							
2029	Word axis	Effective speed for integral acceleration at low speed							
2030	Word axis	Effective speed for integral deceleration at low speed							
2031	Word axis	Torque command difference threshold of torque difference alarm							
2033	Word axis	Number of position feedback pulses for damping control							
2034	Word axis	Damping control gain							
2036	Word axis	Damping compensation gain (main axis) and damping compensation phase coefficient (sub-axis) for tandem control							
2039	Word axis	Second-stage acceleration for two-stage backlash acceleration							
2040	Word axis	Current loop integral gain (PK1)							
2041	Word axis	Current loop proportional gain (PK2)							
2042	Word axis	Current loop gain (PK3)							
2043	Word axis	Velocity loop integral gain (PK1V)							
2044	Word axis	Velocity loop proportional gain (PK2V)							
2045	Word axis	Velocity loop incomplete integral gain (PK3V)							
2046	Word axis	Velocity loop gain (PK4V)							
2047	Word axis	Observer parameter (POA1)							
2048	Word axis	Backlash acceleration							
2049	Word axis	Maximum amplitude for dual position feedback							
2050	Word axis	Observer parameter (POK1)							
2051	Word axis	Observer parameter (POK2)							
2053	Word axis	Current dead-band compensation (PPMAX)							
2054	Word axis	Current dead-band compensation (PDDP)							

No.	Data type	Contents
2055	Word axis	Current dead-band compensation (PHYST)
2056	Word axis	Variable current gain during deceleration
2057	Word axis	Phase-D current at high speed
2058	Word axis	Phase-D current limit at high speed
2060	Word axis	Torque limit
2062	Word axis	Overload protection coefficient (OVC1)
2063	Word axis	Overload protection coefficient (OVC2)
2064	Word axis	Soft disconnection alarm level
2065	Word axis	Overload protection coefficient (OVCLMT)
2066	Word axis	Acceleration feedback gain
2067	Word axis	Torque command filter
2068	Word axis	Feed forward coefficient
2069	Word axis	Velocity feed forward coefficient
2070	Word axis	Backlash acceleration timing
2071	Word axis	Backlash acceleration effective duration, number of times static friction compensation is performed
2072	Word axis	Static friction compensation
2073	Word axis	Parameter for determining stop of static friction compensation
2074	Word axis	Current-dependent current loop gain
2077	Word axis	Overshoot compensation counter
2078	Word axis	Conversion coefficient for dual position feedback (numerator)
2079	Word axis	Conversion coefficient for dual position feedback (denominator)
2080	Word axis	First-order lag time constant for dual position feedback
2081	Word axis	Zero width for dual position feedback
2082	Word axis	Backlash acceleration stop amount
2083	Word axis	Brake control timer (ms)
2084	Word axis	Flexible feed gear (numerator)
2085	Word axis	Flexible feed gear (denominator)
2086	Word axis	Rated current parameter
2087	Word axis	Torque offset
2088	Word axis	Machine velocity feedback coefficient gain
2089	Word axis	Second-stage end magnification for two-stage backlash acceleration
2092	Word axis	Advanced preview feed forward coefficient
2094	Word axis	Single-direction backlash acceleration amount
2095	Word axis	Feed-forward timing adjustment coefficient
2097	Word axis	Static friction compensation stop parameter
2099	Word axis	N-pulse suppression level
2101	Word axis	Overshoot compensation effective level
2102	Word axis	Final clamp value for actual current limit
2103	Word axis	Amount of track back upon detection of unexpected disturbance torque
2104	Word axis	Unexpected dusturbance torque detection alarm level (for cutting when switching is used)
2105	Word axis	Torque constant for torque control
2107	Word axis	Velocity loop gain override during cutting
2110	Word axis	Magnetic saturation compensation (base/coefficient)
2111	Word axis	Deceleration torque limit (base/coefficient)
2112	Word axis	AMR conversion coefficient 1
2113	Word axis	Resonance elimination filter 1 : Attenuation center frequency
2114	Word axis	Acceleration amount override for backlash acceleration
2116	Word axis	Unexpected disturbance torque detection, dynamic friction compensation value
2118	Word axis	Excessive error level between semi-closed and closed loops for dual position feedback
2119	Word axis	Stop level with variable proportional gain
2126	Word axis	Tandem control, time constant for switching position feedback
2127	Word axis	Non-interacting control coefficient

No.	Data type	Contents							
2128	Word axis	Weak magnetic flux compensation (coefficient)							
2129	Word axis	Weak magnetic flux compensation (base/limit)							
2130	Word axis	Two smooth compensations per magnetic pole pair							
2131	Word axis	Four smooth compensations per magnetic pole pair							
2132	Word axis	Six smooth compensations per magnetic pole pair							
2133	Word axis	Deceleration phase delay compensation coefficient (PHDLY1)							
2134	Word axis	Deceleration phase delay compensation coefficient (PHDLY2)							
2137	Word axis	Stage 1 acceleration amount override for two-stage backlash acceleration							
2138	Word axis	AMR conversion coefficient 2							
2139	Word axis	AMR offset							
2142	Word axis	Alarm level for detecting abnormal load during rapid traverse							
2144	Word axis	Position feed forward coefficient for cutting							
2145	Word axis	Velocity feed forward coefficient for cutting							
2146	Word axis	Two-stage backlash acceleration end timer							
2156	Word axis	Torque command filter (during rapid traverse)							
2161	Word axis	OVC magnification at stop time (OVCSTP)							
2162	Word axis	Second overload protection coefficient (POVC21)							
2163	Word axis	Second overload protection coefficient (POVC22)							
2164	Word axis	Second overload protection coefficient (POVCLMT2)							
2165	Word axis	Maximum amplifier current							
2167	Word axis	Stage 2 acceleration amount offset for two-stage backlash acceleration							
2177	Word axis	Resonance elimination filter 1 : Attenuation band width							
2179	Word axis	Reference counter capacity (denominator)							
2185	Word axis	Position pulse conversion coefficient							
2200	Bit axis		P2EX			ABGO	IQOB		OVSP
2201	Bit axis		CPEE					RNLV	CROF
2202	Bit axis				DUAL	OVS1	PIAL	VGCCR	
2203	Bit axis				FRC2AX2		CRPI		
2204	Bit axis	DBS2		PGTWN2				HSTP10	
2205	Bit axis				HDIS	HD2O	FULDMY		
2206	Bit axis						HBSF		
2207	Bit axis					PK2D50			
2210	Bit axis		ESPTM1	ESPTM0			PK12S2		
2211	Bit axis							PHCP	
2212	Bit axis	QVCK							
2213	Bit axis	MGPOS							
2214	Bit axis				FFCHG				
2215	Bit axis	ABT2					TCPCLR		
2220	Bit axis								DECAMR
2223	Bit axis	BLCUT2							DISOBS
2226	Bit axis	MEMCLR	PRFCLR						QUCKST
2227	Bit axis			ANGLNG	ANGREF		GOKAN	ERRCHK	PARTLN
2229	Bit axis	TAWAMI	STPRED						ABSEN
2270	Bit axis	DSTIN	DSTTAN	DSTWAV		ACREF			AMR60
2271	Bit axis						RETR2		
2273	Bit axis	DBTLIM	EGBFFG	EGBEX	POA1NG			WSVCPY	
2274	Bit axis								HP2048
2275	Bit axis							RCNCLR	800PLS
2282	Bit axis					ISE64			
2283	Bit axis								NOG54
2300	Bit axis	CKLNOH					DD		HRVEN
2318	Word axis	Gain of disturbance elimination filter							

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<tr><td>2320</td><td>Word axis</td><td colspan="8">Inverse function gain of disturbance elimination filter</td></tr>
<tr><td>2321</td><td>Word axis</td><td colspan="8">Filter time constant of disturbance elimination filter</td></tr>
<tr><td>2322</td><td>Word axis</td><td colspan="8">Acceleration feedback limit of disturbance elimination filter</td></tr>
<tr><td>2323</td><td>Word axis</td><td colspan="8">Variable current PI ratio</td></tr>
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<tr><td>2326</td><td>Word axis</td><td colspan="8">Disturbance input gain</td></tr>
<tr><td>2327</td><td>Word axis</td><td colspan="8">Start frequency of disturbance input</td></tr>
<tr><td>2328</td><td>Word axis</td><td colspan="8">End frequency of disturbance input</td></tr>
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<tr><td>2333</td><td>Word axis</td><td colspan="8">Incomplete integral gain (main axis) for tandem camping control</td></tr>
<tr><td>2334</td><td>Word axis</td><td colspan="8">Current loop gain magnification (valid only during high-speed HRV current control)</td></tr>
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<tr><td>2338</td><td>Word axis</td><td colspan="8">Limit of acceleration amount for backlash acceleration
Second-stage acceleration limit for two-stage backlash acceleration</td></tr>
<tr><td>2339</td><td>Word axis</td><td colspan="8">Second-stage acceleration amount (single direction) for two-stage backlash acceleration</td></tr>
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Second-stage acceleration override (single direction) for two-stage backlash acceleration</td></tr>
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Second-stage acceleration limit (single direction) for two-stage backlash acceleration</td></tr>
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<tr><td>2362</td><td>Word axis</td><td colspan="8">Resonance elimination filter 2 : Damping</td></tr>
<tr><td>2363</td><td>Word axis</td><td colspan="8">Resonance elimination filter 3 : Attenuation center frequency</td></tr>
<tr><td>2364</td><td>Word axis</td><td colspan="8">Resonance elimination filter 3 : Attenuation band width</td></tr>
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<tr><td>2367</td><td>Word axis</td><td colspan="8">Resonance elimination filter 4 : Attenuation band width</td></tr>
<tr><td>2368</td><td>Word axis</td><td colspan="8">Resonance elimination filter 4 : Damping</td></tr>
<tr><td>2369</td><td>Word axis</td><td colspan="8">Two smooth compensations per magnetic pole pair (single direction)</td></tr>
<tr><td>2370</td><td>Word axis</td><td colspan="8">Four smooth compensations per magnetic pole pair (single direction)</td></tr>
<tr><td>2371</td><td>Word axis</td><td colspan="8">Six smooth compensations per magnetic pole pair (single direction)</td></tr>
<tr><td>2373</td><td>Word axis</td><td colspan="8">Pull-up amount for vertical axis pull-up function for emergency stop</td></tr>
<tr><td>2374</td><td>Word axis</td><td colspan="8">Pull-up time for vertical axis pull-up function for emergency stop</td></tr>
<tr><td>2375</td><td>Word axis</td><td colspan="8">Torque limit magnification during brake control</td></tr>
<tr><td>2394</td><td>Word axis</td><td colspan="8">Number of data mask digits</td></tr>
<tr><td>2415</td><td>Bit axis</td><td></td><td></td><td></td><td></td><td></td><td></td><td>IAHDON</td><td></td></tr>
<tr><td>2455</td><td>Word axis</td><td colspan="8">Integral part (α) of the number of pulses for one rotation</td></tr>
<tr><td>2456</td><td>Word axis</td><td colspan="8">Exponential part (β) of the number of pulses for one rotation</td></tr>
</table>

	#7	#6	#5	#4	#3	#2	#1	#0
2008						VFAx	TNDMx	

[Input type] Parameter input
[Data type] Bit axis

 # 1 TDMx This bit is automatically set to 1 when bit 6 (tandem axis) of parameter No. 1817 is set to 1.
This bit cannot be directly set.

 # 2 VFAx In tandem control, the feedrate feedback average function is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
2011	XIAx							SYNx

[Input type] Parameter input
[Data type] Bit axis

 # 0 SYNx When the electronic gear box function (EGB) (M series) is used, this bit sets the axis to be synchronized.
0: Axis not synchronized by EGB
1: Axis synchronized by EGB
Set 1 for both of the slave and dummy axes of EGB.

NOTE
The setting of this parameter becomes valid after the power is turned off then back on.

 # 7 XIAx Temporary absolute coordinate setting is:
0: Not used.
1: Used.

NOTE
1 When temporary absolute coordinate setting is used, bit 1 (OPTx) of parameter No. 1815, bit 5 (APCx) of parameter No. 1815, parameter No. 1874, and parameter No. 1875 must be set.
2 The setting of this parameter becomes effective after the power is turned off then back on.

2021	Load inertia ratio

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 32767

(Load inertia)/(motor inertia) × 256

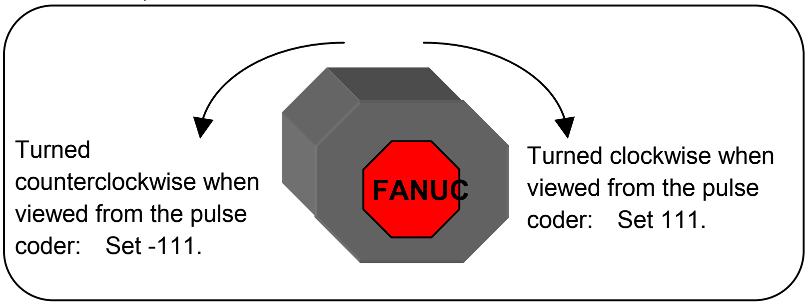
For tandem control:
(Load inertia)/(motor inertia) × 256/2
Set the same value for the master axis and slave axis.

2022	Direction of motor rotation

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] -111,111

Set the direction of motor rotation.
If the motor turns clockwise when viewed from the pulse coder side, set 111. If the motor turns counterclockwise when viewed from the pulse coder side, set -111.



2031	Torque command difference threshold of torque difference alarm

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 14564

If the absolute value of the torque command difference between two axes exceeds the value set in this parameter, an alarm is issued.
Set the same value for two axes that are placed under axis synchronous control.
The servo axis numbers of the synchronized master axis and slave axis must be assigned so that an odd number is assigned to the master axis and the next axis number is assigned to the slave axis. Examples are (1,2) and (3,4).

2087	Preload value for each axis (Tcmd offset)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] (Ampere limit)/7282
[Valid data range] -1821 to 1821

An offset is applied to a torque command to suppress backlash.
Set a value much greater than the friction.
As a guideline, specify a value that is about one-third of the rated torque.

[Example]
To set a torque equivalent to 3 A in the opposite directions:
When the ampere limit is 40 A
3/(40/7282) = 546
Master side = 546
Slave side = -546

	#7	#6	#5	#4	#3	#2	#1	#0
2282					ISE64x			

[Input type] Parameter input
[Data type] Bit axis

 # 3 ISE64x To feed forward (bit 1 (FEED) of parameter No. 2005 is set to 1):
0: Normal feedrate limits are applied.
1: Extended feedrate limits are applied.

When feed forward is enabled, bit 7 of parameter No. 1013 is set to 1, and this parameter is set for an axis, feedrate limits for the axis are extended as follows if the increment system is IS-C, IS-D, or IS-E:

[Normal position control]

Functions used when Normal position control is used		Permissible feedrate	
High-speed, high-precision	Feed forward	Detection unit: 1μm	Detection unit: 0.1μm
None	Not used/used (advanced preview type)	IS-B:999m/min IS-C:999m/min	IS-B:196m/min IS-C:999m/min
advanced preview control AI advanced preview control AI contour control	Not used/used (advanced preview type)		
Electric gear box	Used (conventional type)	IS-B:240m/min IS-C:100m/min	24m/min

[When spindle control with servo motor is used]

<table>
<tr><th colspan="2">Functions used when Normal position control is used</th><th colspan="2">Permissible feedrate</th></tr>
<tr><th>Extended permissible feedrate</th><th>Feedrate limit multiplied by 10</th><th>Detection unit: 1/1000deg</th><th>Detection unit: 1/10000deg</th></tr>
<tr><td rowspan="2">Disabled
(No.1013#7=0)</td><td>Disabled
(No.1408#3=0)</td><td>IS-B:2777min^{-1}
IS-C: 277min^{-1}</td><td>IS-B:2777min^{-1}
IS-C: 277min^{-1}</td></tr>
<tr><td>Enabled
(No.1408#3=1)</td><td>IS-B:27777min^{-1}
IS-C: 2777min^{-1}</td><td>IS-B:27777min^{-1}
IS-C: 2777min^{-1}</td></tr>
<tr><td rowspan="2">Enabled
(No.1013#7=1)
(No.2282#3=1)</td><td>Disabled
(No.1408#3=0)</td><td>IS-B:2777min^{-1}
IS-C: 277min^{-1}</td><td>IS-B:2777min^{-1}
IS-C: 277min^{-1}</td></tr>
<tr><td>Enabled
(No.1408#3=1)</td><td>IS-B:27777min^{-1}
IS-C: 27777min^{-1}</td><td>IS-B:27777min^{-1}
IS-C: 2777min^{-1}</td></tr>
</table>

(*1) The values enclosed by a rectangle in the table are limits imposed by internal processing of the servo software. As CMR is increased to make the detection unit smaller, the permissible feedrate limited by the internal processing of the servo software lowers in proportion to the detection unit (when a detection unit of 0.1 μm is changed to 0.05μm, the permissible feedrate is halved).

(*2) In a semi-closed loop system using a high-resolution detector (a rotary motor or linear motor), use of nano interpolation allows the maximum resolution of the detector to be used for position control without using a smaller detection unit.

(*3) Even when a large detection unit is to be used because the feedrate is limited by detection unit as mentioned above, feedrate feedback data that significantly affects velocity loop control is controlled by using a maximum resolution of the detector.

4.17 PARAMETERS OF DI/DO (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
3001	MHI					RWM		

[Input type] Parameter input
[Data type] Bit path

 # 2 RWM While a program in the program memory is being searched for, the rewind signal (RWD) is:
0: Not output.
1: Output.

 # 7 MHI Exchange of strobe and completion signals for the M, S, T, and B
0: Normal
1: High-speed

	#7	#6	#5	#4	#3	#2	#1	#0
3002				IOV		MFD		

[Input type] Parameter input
[Data type] Bit path

 # 2 MFD When the high-speed M/S/T/B interface is used, if a block specifying an M, S, T, or B code does not contain a move command or dwell command, the distribution end signal (DEN) and the strobe signal (MF, SF, TF, or BF) for the function are:
0: Output conventionally (the output of the distribution end signal is delayed).
1: Output at the same time.

 # 4 IOV Override-related signal logic is:
0: Used without modification
(A signal of negative logic is used as a negative logic signal, and a signal of positive logic is used as a positive logic signal.)
1: Inverted
(A signal of negative logic is used as a positive logic signal, and a signal of positive logic is used as a negative logic signal.)
The signals indicated below are affected.
Signal of negative logic:
- Feedrate override signals *FV0 to *FV7<G0012>
- Feedrate override signals (for PMC axis control)
*EFOV0g to *EFOV7g<G0151/G0163/G0175/G0187>
- Software operator's panel signals *FV0O to *FV7O<F0078>

Signals of positive logic:
- Rapid traverse override signals ROV1,ROV2<G0014.0, 1>
- Software operator's panel signals ROV1O,ROV2O<F0076.4, >
- Rapid traverse override signals (for PMC axis control)
EROV1g,EROV2g<G0150.0, 1, G0162.0, 1, G0174.0, 1, G0186.0, 1>

	#7	#6	#5	#4	#3	#2	#1	#0
3003	MVG		DEC	DAU	DIT	ITX		ITL
			DEC		DIT	ITX		ITL

[Input type] Parameter input
[Data type] Bit path

 # 0 ITL Interlock signal for all axes
0: Enabled
1: Disabled

 # 2 ITX Interlock signals for each axis
0: Enabled
1: Disabled

 # 3 DIT The interlock signal for each axis direction is:
0: Valid.
1: Invalid.

 # 4 DAU When bit 3 (DIT) of parameter No. 3003 is set to 0, the interlock signal for each axis direction is:
0: Valid only in manual operation, and invalid in automatic operation.
1: Valid in either manual operation or automatic operation.

 # 5 DEC Deceleration signal (*DEC1 to *DEC5) for reference position return
0: Deceleration is applied when the signal is 0.
1: Deceleration is applied when the signal is 1.

#7 MVG During drawing with the dynamic graphic display function, the axis movement signal is:
0: Output.
1: Not output.

	#7	#6	#5	#4	#3	#2	#1	#0
3004			OTH				BCY	BSL

[Input type] Parameter input
[Data type] Bit path

 # 0 BSL The block start interlock signal (*BSL) and cutting block start interlock signal (*CSL) are:
0: Disabled.
1: Enabled.

 # 1 BCY When more than one operation is performed by one block command such as a canned cycle, the block start interlock signal (*BSL) is:
0: Checked only at the beginning of the first cycle.
1: Checked at the beginning of every cycle.

 # 5 OTH The overtravel limit signal is:
0: Checked
1: Not checked

⚠ **WARNING**
For safety, usually set 0 to check the overtravel limit signal.

	#7	#6	#5	#4	#3	#2	#1	#0
3006		WPS			EP2	EPS	EPN	GDC

[Input type] Parameter input
[Data type] Bit

 # 0 GDC As the deceleration signal for reference position return:
0: X0009 is used.
1: G0196 is used. (X0009 is disabled.)

 # 1 EPN In external workpiece number search, signals for workpiece number specification are selected.
The following signal selections are made by combining this parameter with bit 3 (EP2) of parameter No. 3006:

EPN	Signals
0	The external workpiece search signals (PN1 to PN16) are used. (A number from 1 to 31 can be specified.)
1	The extended external workpiece number search signals (EPN0 to EPN13) are used. (A number from 1 to 9999 can be specified.)

 # 2 EPS As the signal for starting external workpiece number search:
0: The automatic operation start signal ST is used. When automatic operation (memory operation) is started, a search is made.
1: The external workpiece number search start signal EPNS is used. ST does not start a search.

 # 6 WPS Each axis workpiece coordinate system preset signal:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3008						XSG		

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

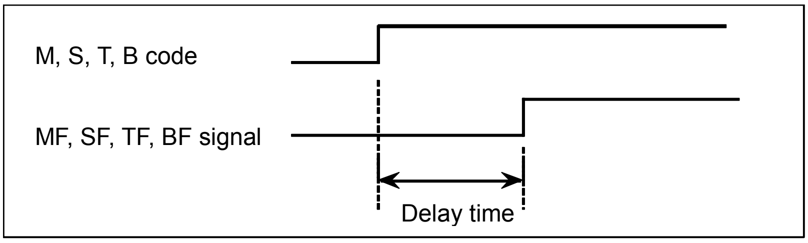
 # 2 XSG A signal assigned to an X address is:
0: Fixed at the address.
1: Able to be reassigned to an arbitrary X address.

> **NOTE**
> When this parameter is set to 1, set parameter No. 3013, No. 3014, No. 3012, and No. 3019. If parameter No. 3013 and No. 3014 are not set, the deceleration signal for reference position return is assigned to bit 0 of X0000. If parameter No. 3012 and No. 3019 are not set, the skip signal, the PMC axis control skip signal, the measurement position arrival signal, the interlock signal for each axis direction, and the tool compensation value write signal are assigned to X0000.

3010	Time lag in strobe signals MF, SF, TF, and BF

[Input type] Parameter input
[Data type] Word path
[Unit of data] msec
[Valid data range] 0 to 32767

The time required to send strobe signals MF, SF, TF, and BF after the M, S, T, and B codes are sent, respectively.



NOTE

The time is counted in units of 8 ms. If the set value is not a multiple of four, it is raised to the next multiple of four

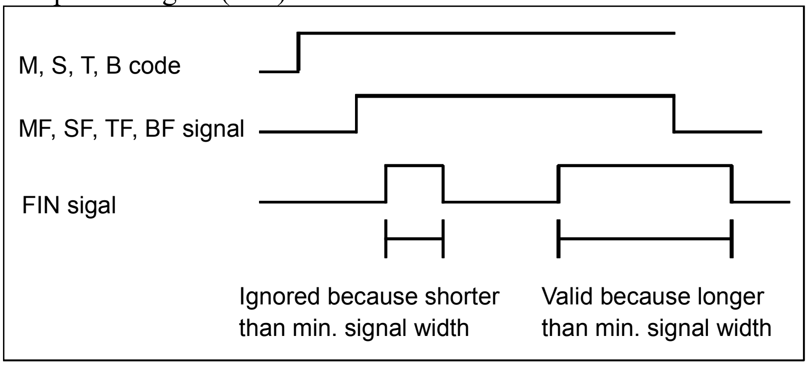
Example

When 30 is set, 32 ms is assumed.
When 0 is set, 8 ms is assumed.

3011	Acceptable width of M, S, T, and B function completion signal (FIN)

[Input type] Parameter input
[Data type] Word path
[Unit of data] msec
[Valid data range] 0 to 32767

Set the minimum signal width of the valid M, S, T, and B function completion signal (FIN).



> **NOTE**
> The time is counted in units of 8 ms. If the set value is not a multiple of four, it is raised to the next multiple of four
> Example
> When 30 is set, 32 ms is assumed.
> When 0 is set, 8 ms is assumed.

3012	Skip signal assignment address

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 327

Set an X address to which the skip signal (SKIPn) is to be assigned.

> **NOTE**
> This parameter is valid when bit 2 (XSG) of parameter No. 3008 is set to 1.
> The X addresses that can be actually used are shown below, but they depend on the configuration of I/O Link point count expansion options.
> X0 to X127, X200 to X327

3013	X address to which the deceleration signal for reference position return is assigned

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 327

Set an address to which the deceleration signal (*DECn) for reference position return for each axis is to be assigned.

> **NOTE**
> This parameter is valid when bit 2 (XSG) of parameter No. 3008 is set to 1.
> The X addresses that can be actually used are shown below, but they depend on the configuration of I/O Link point count expansion options.
> X0 to X127, X200 to X327

3014	Bit position of an X address to which the deceleration signal for reference position return is assigned

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 7

Set a bit position to which the deceleration signal for reference position return (*DECn) for each axis is to be assigned.

> **NOTE**
> This parameter is valid when bit 2 (XSG) of parameter No. 3008 is set to 1.

3017	Output time of reset signal RST

[Input type] Parameter input
[Data type] Word path
[Unit of data] 16msec
[Valid data range] 0 to 255

When the output time of the reset signal RST is to be extended, set an extended time.

(RST signal output time) =
(Time required for reset processing) + (Parameter setting) × 16 msec

3019	Address to which the PMC axis control skip signal and the measurement position arrival signal are assigned

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 327

Sets addresses to which X address PMC axis control skip signal ESKIP, measurement position arrival signals (XAE1, XAE2, and XAE3 (M series); XAE1 and XAE2 (T series)), and tool compensation write signals (±MIT1 and ±MIT2 (T series)) are allocated.

Example 1. When No.3012 is set to 5 and No.3019 is set to 6

When XSG (bit 2 of parameter No. 3008) is 1, the PMC axis control skip signal, and measurement position arrival signal are allocated to X0006 and the skip signal is allocated to X0005.

	#7	#6	#5	#4	#3	#2	#1	#0	
X005	SKIP	SKIP6	SKIP5	SKIP4	SKIP3	SKIP2	SKIP8	SKIP7	(T series)
	SKIP	SKIP6	SKIP5	SKIP4	SKIP3	SKIP2	SKIP8	SKIP7	(M series)

	#7	#6	#5	#4	#3	#2	#1	#0	
X006		ESKIP	-MIT2	+MIT2	-MIT1	+MIT1	XAE2	XAE1	(T series)
		ESKIP				XAE3	XAE2	XAE1	(M series)

Example 2. When No.3012 is set to 5 and No.3019 is set to 5

When XSG (bit 2 of parameter No. 3008) is 1, the PMC axis control skip signal, measurement position arrival signal, and skip signal are allocated to X0005.

	#7	#6	#5	#4	#3	#2	#1	#0	
X005	SKIP	ESKIP SKIP6	-MIT2 SKIP5	+MIT2 SKIP4	-MIT1 SKIP3	+MIT1 SKIP2	XAE2 SKIP8	XAE1 SKIP7	(T series)

#7	#6	#5	#4	#3	#2	#1	#0	
SKIP	ESKIP SKIP6	SKIP5	SKIP4	SKIP3	XAE3 SKIP2	XAE2 SKIP8	XAE1 SKIP7	(M series)

NOTE
This parameter is valid when bit 2 (XSG) of parameter No. 3008 is set to 1.
The X addresses that can be actually used are shown below, but they depend on the configuration of I/O Link point count expansion options.
X0 to X127, X200 to X327

3030	Allowable number of digits for the M code
3031	Allowable number of digits for the S code
3032	Allowable number of digits for the T code

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to 8

Set the allowable numbers of digits for the M, S, and T codes.
When 0 is set, the allowable number of digits is assumed to be 8.

NOTE
Up to 5 digits can be specified in the S code.

3033	Allowable number of digits for the B code (second auxiliary function)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to 8

Set the allowable number of digits for the second auxiliary function.
When 0 is set, the allowable number of digits is assumed to be 8.
To enable a decimal point to be specified, bit 0 (AUP) of parameter No. 3450 must be set to 1. In this case, the allowable number of digits set in this parameter includes the number of decimal places.
If a value exceeding the allowable number of digits is specified, the alarm (PS0003) is issued.

4.18 PARAMETERS OF DISPLAY AND EDIT (1 OF 5)

	#7	#6	#5	#4	#3	#2	#1	#0
3100							CEM	

[Input type] Parameter input
[Data type] Bit

 # 1 CEM On the help and operation history screens, CE-marked MDI keys are displayed with:
0: Key names.
1: Symbols.

	#7	#6	#5	#4	#3	#2	#1	#0
3101	SBA						KBF	
							KBF	

[Input type] Parameter input
[Data type] Bit

 # 1 KBF When the screen or mode is changed, the contents of the key-in buffer are:
0: Cleared.
1: Not cleared.

 # 7 SBA In 2-path control, the current position display order on the current position display screen is:
0: Path 1 followed by path 2.
1: Path 2 followed by path 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3103							DIP	

[Input type] Parameter input
[Data type] Bit

 # 1 DIP In 2-path control, the current position display screen displays:
0: Two paths regardless of path selection signal HEAD<G0063.0>.
1: The path selected by path selection signal HEAD<G0063.0>.

	#7	#6	#5	#4	#3	#2	#1	#0
3104	DAC		DRC		PPD			MCN
	DAC	DAL	DRC	DRL	PPD			MCN

[Input type] Parameter input
[Data type] Bit path

 # 0 MCN Machine position
- 0: Regardless of whether input is made in mm or inches, the machine position is displayed in mm for millimeter machines, or in inches for inch machines.
- 1: When input is made in mm, the machine position is displayed in mm, and when input is made in inches, the machine position is displayed in inches accordingly.

 # 3 PPD Relative position display when a coordinate system is set
- 0: Not preset
- 1: Preset

> **NOTE**
> If any of the following is executed when PPD is set to 1, the relative position display is preset to the same value as the absolute position display:
> (1) Manual reference position return
> (2) Coordinate system setting based on G92 (G50 for G code system A on the lathe system)
> (3) Workpiece coordinate system presetting based on G92.1 (G50.3 for G code system A on the lath system)
> (4) When a T code for the T series is specified.

 # 4 DRL Relative position
- 0: The actual position displayed takes into account tool length offset.
- 1: The programmed position displayed does not take into account tool length offset.

> **NOTE**
> In the T series, whether to exclude a tool offset when displaying the relative position is determined by the setting of bit 0 (DRP) of parameter No. 3129.

 # 5 DRC When relative positions are displayed:
- 0: Values not excluding the amount of travel based on cutter compensation and tool nose radius compensation are displayed.
- 1: Values excluding the amount of travel based on cutter compensation and tool nose radius compensation (programmed positions) are displayed.

 # 6 DAL Absolute position

0: The actual position displayed takes into account tool length offset.

1: The programmed position displayed does not take into account tool length offset.

> **NOTE**
> In T series, whether to exclude a tool offset when displaying the absolute position is determined by the setting of bit 1 (DAP) of parameter No. 3129.

 # 7 DAC When an absolute position are displayed:

0: Values not excluding the amount of travel based on cutter compensation and tool nose radius compensation are displayed.

1: Values excluding the amount of travel based on cutter compensation and tool nose radius compensation (programmed positions) are displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3105						DPS	PCF	DPF

[Input type] Parameter input
[Data type] Bit path

 # 0 DPF The actual speed is:

0: Not displayed

1: Displayed

 # 1 PCF Addition of the movement of the PMC-controlled axes to the actual speed display

0: Added

1: Not added

 # 2 DPS The actual spindle speed and T code are:

0: Not displayed

1: Displayed

	#7	#6	#5	#4	#3	#2	#1	#0
3106			SOV	OPH				

[Input type] Setting input
[Data type] Bit

 # 4 OPH The operation history screen is:

0: Not displayed.

1: Displayed.

 # 5 SOV A spindle override value is:
0: Not displayed.
1: Displayed.

> **NOTE**
> This parameter is valid only when bit 2 (DPS) of parameter No. 3105 is set o 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3107				SOR	GSC			

[Input type] Setting input
[Data type] Bit path

 # 3 GSC The feedrate to be displayed is:
0: Feedrate per minute.
1: Determined by bit 5 (FSS) of parameter No. 3191.

 # 4 SOR Display of the program directory
0: Programs are listed in the order of registration.
1: Programs are listed in the order of name.

	#7	#6	#5	#4	#3	#2	#1	#0
3108	JSP	SLM		WCI		PCT		

[Input type] Parameter input
[Data type] Bit path

 # 2 PCT For modal T display on the program check screen:
0: A specified T value is displayed.
1: HD.T and NX.T are displayed.

 # 4 WCI On the workpiece coordinate system screen, a counter input is:
0: Disabled.
1: Enabled.

 # 6 SLM The spindle load meter is:
0: Not displayed.
1: Displayed.

> **NOTE**
> 1 This parameter is valid only when bit 2 (DPS) of parameter No. 3105 is set to 1.
> 2 This parameter is valid only for serial spindles.

 # 7 JSP On the current position display screen and program check screen, jog feed is:
0: Not displayed.
1: Displayed.
In manual operation mode, the jog feedrate is displayed. In automatic operation mode, the dry run feedrate is displayed. In each case, the feedrate to which a manual feedrate override has been applied is displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3109						IKY	DWT	

[Input type] Parameter input
[Data type] Bit path

 # 1 DWT Characters G and W in the display of tool wear/geometry compensation amount
0: The characters are displayed at the left of each number.
1: The characters are not displayed.

 # 2 IKY On the tool offset screen and workpiece shift screen (T series), soft key [INPUT] is:
0: Displayed.
1: Not displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3111	NPA	OPS	OPM			SVP	SPS	SVS

[Input type] Setting input
[Data type] Bit path

 # 0 SVS The soft key for displaying the servo setting screen is:
0: Not displayed.
1: Displayed.

 # 1 SPS The soft key for displaying the spindle setting screen is:
0: Not displayed.
1: Displayed.

 # 2 SVP Spindle synchronization errors displayed on the spindle tuning screen
0: Instantaneous values are displayed.
1: Peak-hold values are displayed.
Spindle synchronization errors are displayed on the side of the spindle that functions as a slave axis in spindle synchronization control.

 # 5 OPM Operating monitor
0: Not displayed
1: Displayed

 # 6 OPS The speedometer on the operating monitor screen indicates:
0: Spindle motor speed
1: Spindle speed

 # 7 NPA Action taken when an alarm is generated or when an operator message is entered
0: The display shifts to the alarm or message screen.
1: The display does not shift to the alarm or message screen.

> **NOTE**
> When MANUAL GUIDE *i* is provided, bit 7 (NPA) of parameter No. 3111 must be set to 0. (If this bit is set to 1, a warning message is issued at power-on.)

	#7	#6	#5	#4	#3	#2	#1	#0
3112					EAH	OMH		

[Input type] Parameter input
[Data type] Bit

 # 2 OMH The external operator message history screen is:
0: Not displayed.
1: Displayed.

 # 3 EAH Messages of the external alarm/macro alarm in alarm or operation history:
0: Not recorded
1: Recorded

> **NOTE**
> This parameter is valid when bit 7 (HAL) of parameter No. 3196 is set to 0.

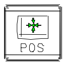
	#7	#6	#5	#4	#3	#2	#1	#0
3113			DCL					

[Input type] Parameter input
[Data type] Bit

 # 5 DCL The touch panel compensation screen is:
0: Disabled.
1: Enabled.
Set this parameter to 0 usually. Touch panel compensation becomes necessary only when the panel is replaced or memory all clear operation is performed. Set this parameter to 1 only when performing touch panel compensation. Upon completion of compensation, set this parameter to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
3114		ICU	IGR	IMS	ISY	IOF	IPR	IPO

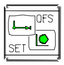
[Input type] Parameter input
[Data type] Bit

 # 0 IPO When the 

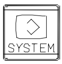
function key is pressed while the position display screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

 # 1 IPR When the 

function key is pressed while the program screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

 # 2 IOF When the 

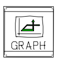
function key is pressed while the offset/setting screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

 # 3 ISY When the 

function key is pressed while the system screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

 # 4 IMS When the 

function key is pressed while the message screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

 # 5 IGR When the 

function key is pressed while the custom or graphic screen is displayed:
0: The screen is changed.
1: The screen is not changed.

 # 6 ICU When the 

function key is pressed while the custom screen is being displayed:
0: The screen is changed.
1: The screen is not changed.

	#7	#6	#5	#4	#3	#2	#1	#0
3115					NDFx		NDAx	NDPx

[Input type] Parameter input
[Data type] Bit axis

 # 0 NDPx The current position is:
0: Displayed.
1: Not displayed.

> **NOTE**
> When using the electric gear box (EGB) function (M series), set 1 for the EGB dummy axis to disable current position display.

 # 1 NDAx The current position and the amount of the movement to be made in absolute and relative coordinates are:
0: Displayed.
1: Not displayed.

 # 3 NDFx In calculation for actual cutting feedrate display, the feedrate of a selected axis is:
0: Considered.
1: Not considered.

	#7	#6	#5	#4	#3	#2	#1	#0
3116	MDC	T8D				PWR		

[Input type] Setting input
[Data type] Bit path

 # 2 PWR Alarm SW0100 (parameter write enabled), which is issued when bit 0 (PWE) of setting parameter No. 8900 is set to 1, is cleared by:
0: "CAN" + "RESET".
1: "RESET" or turning on the external reset.

 # 6 T8D The number of digits of a T code is:
0: 4.
1: 8.

 # 7 MDC Maintenance information data:
0: Cannot be erased entirely.
1: Can be erased entirely.

	#7	#6	#5	#4	#3	#2	#1	#0
3117							SPP	SMS

[Input type] Parameter input
[Data type] Bit path

 # 0 SMS On the program check screen of the 8.4-inch display unit, the function for displaying the spindle load meter and spindle speed meter in the remaining movement amount display position and modal information display position is:
0: Disabled.
1: Enabled.

 # 1 SPP When a serial spindle is used, the position coder signal pulse data based on the one-rotation signal is:
0: Not displayed on diagnosis screen No. 445.
1: Displayed on diagnosis screen No. 445.

NOTE
1 For a spindle not connected, 0 is indicated.
2 To display this data, the following conditions must be met:
<1>FANUC's α spindle amplifier and serial spindle are used.
<2>The serial spindle detects the one-rotation signal.

To detect the one-rotation signal accurately, spindle orientation must be performed. This operation must be performed just once after the power is turned on and is not needed subsequently.
To determine whether the one-rotation signal has been detected or not, check the serial spindle status signals (PC1DEA to PC1DED).

	#7	#6	#5	#4	#3	#2	#1	#0
3119					TPA	DDS		

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 2 DDS The touch panel is:
0: Enabled.
1: Disabled.
Set this parameter to 1 when disabling the touch panel temporarily, for example, at start-up time.

 # 3 TPA When the option for the external touch panel interface is selected, the external touch panel interface connection is:
0: Valid.
1: Invalid.

For an external touch panel (called ETP hereinafter), the RS-232C serial port 2 ((JD36A or JD54) on the main board of the CNC is used.
When using ETP, set bit 3 (TPA) of parameter No. 3119 to 0.
By this setting, JD36A or JD54 is used for ETP, regardless of the setting of I/O CHANNEL（I/O device selection）of the existing parameters Nos. 0021 through 0023.
For other I/O devices, use JD56A and so forth.
By the setting above, the settings of the existing parameters Nos. 0100 and 0121 through 0123 become invalid for channel 2 (JD36A or JD54), and the following settings are applied at all times:
- Baud rate : 19200 bps
- Stop bit : 1 bit
- Parity check : Even parity

3122	Time interval used to record time data in operation history

[Input type] Parameter input
[Data type] Word path
[Unit of data] min
[Valid data range] 0 to 1440
When history data is recorded within a set time period, the time for each set time period is recorded in the history data.
When 0 is set, the specification of a time period of 10 minutes is assumed.

3123	Time required before a screen saver is activated

[Input type] Setting input
[Data type] Byte path
[Unit of data] min
[Valid data range] 0 to 127

After a time (in minutes) set in parameter No. 3123 passes without key operation, the NC screen is erased automatically. Pressing a key causes the NC screen to reappear.

NOTE
1 Setting 0 disables automatic screen erasure.
2 This function cannot be used together with manual screen erasure. If 1 or a larger value is set in this parameter, manual screen erasure is disabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3124	D08	D07	D06	D05	D04	D03	D02	D01

	#7	#6	#5	#4	#3	#2	#1	#0
3125	D16	D15	D14	D13	D12	D11	D10	D09

	#7	#6	#5	#4	#3	#2	#1	#0
3126	D24	D23	D22	D21	D20	D19	D18	D17

	#7	#6	#5	#4	#3	#2	#1	#0
3127	D32	D31	D30	D29	D28	D27	D26	D25

[Input type] Parameter input
[Data type] Bit path

D01 to D32

Set a group of G codes to be displayed on the program check screen.
The table below indicates the correspondence between bits and G code groups.
The setting of a bit has the following meaning:
0: Displays the G code group corresponding to a bit.
1: Does not display the G code group corresponding to a bit.

Parameter	G code group
D01	01
D02	02
D03	03
:	:
D32	32

3128	Retracement time for deleting alarm data from the alarm history

[Input type] Parameter input
[Data type] Word path
[Unit of data] sec
[Valid data range] 0 to 255

From the alarm history, the alarm data that occurred during a set period of time back from the power-off time is deleted.
When 0 is set, a retracement time of 1 second is assumed to be specified.

	#7	#6	#5	#4	#3	#2	#1	#0
3129						MRE	DAP	DRP
						MRE		

[Input type] Parameter input
[Data type] Bit path

 # 0 DRP For relative position display:
0: The actual position considering a tool offset (tool movement) is displayed.
1: The programmed position excluding a tool offset (tool movement) is displayed.

> **NOTE**
> In the M series, whether to exclude tool length compensation when displaying the relative position is determined by bit 4 (DRL) of parameter No. 3104.

 # 1 DAP For absolute position display:
0: The actual position considering a tool offset (tool movement) is displayed.
1: The programmed position excluding a tool offset (tool movement) is displayed.

> **NOTE**
> In M series, whether to exclude the tool length offset when displaying the absolute position is determined according to the setting of bit 6 (DAL) of parameter No. 3104.

 # 2 MRE When mirror image is used, relative coordinates are:
0: Updated with respect to the machine coordinates.
1: Updated with respect to the absolute coordinates.

Set this parameter to 1 when handling relative coordinates in the same way as for the T series of the FS0*i*-C.

3130	Axis display order for current position display screens

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to Number of controlled axes

Set the order in which axes are displayed on current position display screens (absolute, relative overall, and handle interrupt screens).

3131	Subscript of axis name

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 9, 32, 65 to 90

In order to distinguish axes under parallel operation, synchronization control, and tandem control, specify a subscript for each axis name.

Setting value	Meaning
0	Each axis is set as an axis other than a synchronization control axis and tandem control axis.
1 to 9	A set value is used as a subscript.
65 to 90	A set letter (ASCII code) is used as a subscript.

Example)

When the axis name is X, a subscript is added as indicated below.

Setting value	Axis name displayed on a screen such as the position display screen
0	X
1	X1
77	XM
83	XS

When the subscription of an axis name is not set in a 2-path system, the subscription of an axis name is automatically set to the path number. To hide the subscription of an axis name, set the parameter of the subscription of an axis name to the ASCII code (32) of a space.

3132	Axis name (absolute coordinate) for current position display

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 255

These parameters set the axis name for current position display.
When G code system B or C is used, the axis name set in parameter No.3132 is used for both absolute and relative coordinate axes.
The values set in these parameters are used only for display.
When 0 is set in this parameter, the setting of parameter No. 1020 is used.

3133	Axis name (relative coordinate) for current position display

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 255

These parameters set the axis name for current position display.
When G code system B or C is used, the axis name set in parameter No.3132 is used for both absolute and relative coordinate axes.
The values set in these parameters are used only for display.
When 0 is set in this parameter, the setting of parameter No. 1020 is used.

3134	Data display order of each axis on the workpiece coordinate system setting screen and workpiece coordinate system shift amount setting screen

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to Number of controlled axes

Set the data display order of each axis on the workpiece coordinate system setting screen (M series/T series) and workpiece coordinate system shift amount setting screen (T series).
No data is displayed for an axis with 0 set in this parameter.

3135	Number of decimal places in actual feedrate display

[Input type] Setting input
[Data type] Byte path
[Valid data range] 0 to 3

Set the number of decimal places in actual feedrate display.
In the case of inch input, the number of decimal places is a set value plus 2.

Setting value

0 :	Metric input	Displayed without a decimal point
	Inch input	Displayed using the second decimal place
1 :	Metric input	Displayed using the first decimal place
	Inch input	Displayed using the third decimal place
2 :	Metric input	Displayed using the second decimal place
	Inch input	Displayed using the fourth decimal place
3 :	Metric input	Displayed using the third decimal place
	Inch input	Displayed using the fifth decimal place

3141	Path name (1st character)
3142	Path name (2nd character)
3143	Path name (3rd character)
3144	Path name (4th character)
3145	Path name (5th character)
3146	Path name (6th character)
3147	Path name (7th character)

[Input type] Parameter input
[Data type] Word path
[Valid data range] See the character-code correspondence table.

Specify a path name with codes.

Any character string consisting of alphanumeric characters, katakana characters, and special characters with a maximum length of seven characters can be displayed as a series name.

NOTE

1. For characters and codes, see Appendix A, “CHARACTER CODE LIST”.
2. When 0 is set in parameter No. 3141, PATH1(,PATH2...) are displayed as path names.
3. In the enlarged display of an arbitrary path name (bit 2 (PNE) of parameter No. 11350 is 1), only alphanumeric characters can be displayed. If other characters are set, spaces are displayed instead.

3160	Setting of MDI unit type

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 4

Set the type of an MDI unit when the type of an MDI unit is not automatically identified.

Setting value	Type
0	Depends on the system type and indicator type.
1	Standard MDI unit for the T series (lathe system)
2	Standard MDI unit for the M series (machining center system)
3	Small MDI unit for the T series (lathe system)
4	Small MDI unit for the M series (machining center system)

When 0 is set in this parameter, the type of a MDI unit is determined as follows:

Type of path control	Type of indicator	Type
T series	Type of 12 horizontal soft keys	Standard MDI unit for the T series (lathe system)
	Type of 7 horizontal soft keys	Small MDI unit for the T series (lathe system)
M series	Type of 12 horizontal soft keys	Standard MDI unit for the M series (machining center system)
	Type of 7 horizontal soft keys	Small MDI unit for the M series (machining center system)

	#7	#6	#5	#4	#3	#2	#1	#0
3191			FSS		SSF			
			FSS		SSF	WSI		

[Input type] Parameter input
[Data type] Bit path

 # 2 WSI On the workpiece zero point offset screen, the soft key [INPUT] is:
0: Displayed.
1: Not displayed.

 # 3 SSF On the setting screen, the soft key for confirming data input is:
0: Not displayed.
1: Displayed.

 # 5 FSS Feedrate per minute and feedrate per revolution are:
0: Switched depends on the operation state.
1: Not switched depending on the operation state and feedrate per revolution is always used.

> **NOTE**
> This parameter is valid when bit 3 (GSC) of parameter No. 3107 is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3192	PLD					TRA	T2P	
						TRA	T2P	

[Input type] Parameter input
[Data type] Bit

 # 1 T2P When more than one point is pressed on the touch panel:
0: The position at the center of gravity is obtained.
1: The point pressed first is obtained.

> **NOTE**
> 1 Even when bit parameter T2P is set to 1, the position at the center of gravity is assumed to be pressed if two or more points are pressed within a scan period (32 ms) of the touch panel.
> 2 If a C executer application or the like has a touch panel drag (move in pressed state) function, set parameter T2P to 0.

 # 2 TRA If a point on the touch panel is kept pressed for a time specified in parameter No. 3197 or longer,
0: An alarm is not raised.
1: An alarm (SR5303) is raised.

> **NOTE**
> If an C executer application or the like has a touch panel repeat (continue pressing) function, set parameter TRA to 0.

 # 7 PLD On the screen of the 10.4-inch display unit where positional display is performed on the left half, the function for displaying the servo axis load meter and spindle load meter is:
0: Disabled.
1: Enabled.
Parameters No.13140 and 13141 can be used to display up to two characters for the name of each spindle. If this parameter is not set (this parameter is 0), the following names are used.
First spindle: S1
Second spindle: S2
Third spindle: S3

	#7	#6	#5	#4	#3	#2	#1	#0
3193						DOP		

[Input type] Parameter input
[Data type] Bit

 # 2 DOP In 2-path control, on the POSITION screen (absolute, relative, all, manual handle interruption), PROGRAM CHECK screen, and ALARM screen, two paths' information is:
0: Displayed at the same time.
1: Not displayed at the same time.

	#7	#6	#5	#4	#3	#2	#1	#0
3195	EKE	HDE	HKE			CPR		

[Input type] Parameter input
[Data type] Common to the bit system

 # 2 CPR Displaying of the parameter setting support screen by function key [SYSTEM] is:
0: Performed.
1: Not performed.

 # 5 HKE A key operation history is:
0: Recorded.
1: Not recorded.

 # 6 HDE A DI/DO history is:
0: Recorded.
1: Not recorded.

 # 7 EKE The [ALL CLEAR] soft key for clearing all history data is:
0: Not displayed.
1: Displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
3196	HAL	HOM			HMV	HPM	HWO	HTO

[Input type] Parameter input
[Data type] Bit

 # 0 HTO A modification history of tool offset data is:
0: Not recorded.
1: Recorded.

 # 1 HWO A modification history of workpiece offset data/extended workpiece offset data/workpiece shift (T series) is:
0: Not recorded.
1: Recorded.

 # 2 HPM A modification history of parameters is:
0: Not recorded.
1: Recorded.

 # 3 HMV A modification history of custom macro common variables is:
0: Not recorded.
1: Recorded.

 # 6 HOM The operation history is:
0: Recorded.
1: Not recorded.

 # 7 HAL When an alarm is issued, additional information (modal data, absolute coordinates, and machine coordinates present at the issuance of the alarm) is:
0: Recorded in the operation history and alarm history.
1: Not recorded in the operation history and alarm history.

To record as many alarm history items as possible, rather than detailed alarm information, set 1.

3197	Detection time of continuous pressing on touch panel

[Input type] Parameter input
[Data type] Word
[Unit of data] sec
[Valid data range] 0 to 255

Set a period of continuous pressing on the touch panel which causes alarm to be raised. When 0 is set, it is equivalent to 20.

> **NOTE**
> This parameter is valid when bit 2 (TRA) of parameter No. 3192 is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
3201		NPE	N99			REP	RAL	RDL

[Input type] Parameter input
[Data type] Bit path

 # 0 RDL When a program is registered by input/output device external control
0: The new program is registered following the programs already registered.
1: All registered programs are deleted, then the new program is registered. Note that programs which are protected from being edited are not deleted.

> **NOTE**
> Registered programs are placed in the background default folder set in the program list screen. Before manipulating this signal, set the default folder in the background correctly.

 # 1 RAL When programs are registered by external I/O device control:
0: All programs are registered.
1: Only one program is registered.

> **NOTE**
> Registered programs are placed in the background default folder set in the program list screen. Before manipulating this signal, set the default folder in the background correctly.

 # 2 REP Action in response to an attempt to register a program whose number is the same as that of an existing program
0: An alarm is generated.
1: The existing program is deleted, then the new program is registered. Note that if the existing program is protected from being edited, it is not deleted, and an alarm is generated.

 # 5 N99 With an M99 block, when bit 6 (NPE) of parameter No.3201 = 0, program registration is assumed to be:
0: Completed
1: Not completed

 # 6 NPE With an M02, M30, or M99 block, program registration is assumed to be:
0: Completed
1: Not completed

	#7	#6	#5	#4	#3	#2	#1	#0
3202		PSR		NE9	OSR			NE8

[Input type] Parameter input
[Data type] Bit path

 # 0 NE8 Editing of subprograms with program numbers 8000 to 8999
0: Not inhibited
1: Inhibited
When this parameter is set to 1, the following editing operations are disabled:
(1) Program deletion (Even when deletion of all programs is specified, programs with program numbers 8000 to 8999 are not deleted.)
(2) Program output (Even when outputting all programs is specified, programs with program numbers 8000 to 8999 are not output.)
(3) Program number search
(4) Program editing of registered programs
(5) Program registration
(6) Program collation
(7) Displaying programs

> **NOTE**
> This parameter setting does not affect the following programs:
> (1) Programs on the Data Server
> (2) Programs for running and editing memory card programs on a memory card

 # 3 OSR Pressing the [O SEARCH] soft key without entering a program number with keys in a program number search:
0: Searches for the next program number (order of registration).
1: Disables the search.

 # 4 NE9 Editing of subprograms with program numbers 9000 to 9999
0: Not inhibited
1: Inhibited
When this parameter is set to 1, the following editing operations are disabled:
(1) Program deletion (Even when deletion of all programs is specified, programs with program numbers 9000 to 9999 are not deleted.)
(2) Program output (Even when outputting all programs is specified, programs with program numbers 9000 to 9999 are not output.)
(3) Program number search
(4) Program editing of registered programs
(5) Program registration
(6) Program collation
(7) Displaying programs

> **NOTE**
> This parameter setting does not affect the following programs:
> (1) Programs on the Data Server
> (2) Programs for running and editing memory card programs on a memory card

 # 6 PSR Search for the program number of a protected program
0: Disabled
1: Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
3203	MCL	MER	MZE					

[Input type] Parameter input
[Data type] Bit path

 # 5 MZE After MDI operation is started, program editing during operation is:
0: Enabled
1: Disabled

 # 6 MER When the last block of a program has been executed at single block operation in the MDI mode, the executed block is:
0: Not deleted
1: Deleted

> **NOTE**
> When MER is set to 0, the program is deleted if the end-of-record mark (%) is read and executed. (The mark % is automatically inserted at the end of a program.)

 # 7 MCL Whether a program prepared in the MDI mode is cleared by reset
0: Not deleted
1: Deleted

	#7	#6	#5	#4	#3	#2	#1	#0
3204		MKP						PAR

[Input type] Parameter input
[Data type] Bit path

 # 0 PAR When a small MDI unit is used, characters "[" and "]" are:
0: Used as "[" and "]".
1: Used as "(" and ")".

> **NOTE**
> When a 2-path system is used, the setting for path 1 is followed.

 # 6 MKP When M02, M30, or EOR(%) is executed during MDI operation, the created MDI program is:
0: Erased automatically.
1: Not erased automatically.

> **NOTE**
> If the bit 6 (MER) of parameter No. 3203 is 1, executing the last block provides a choice of whether to automatically erase a created program.

	#7	#6	#5	#4	#3	#2	#1	#0
3205				OSC	PNS	TOK		

[Input type] Parameter input
[Data type] Bit

 # 2 TOK A copy operation or cut operation on the program screen:
0: Is performed as usual.
1: Can also be performed on a record-by-record basis from a program to the key-in buffer.

 # 3 PNS On the program screen, a search with the cursor keys is:
0: Performed.
1: Not performed.

 # 4 OSC On the offset screen, offset value erasure by a soft key is:
0: Enabled.
1: Disabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3206	NS2		S2K				MIF	

[Input type] Parameter input
[Data type] Bit

 # 1 MIF Editing of the maintenance information screen is:
0: Not prohibited.
1: Prohibited.

 # 5 S2K In CNC screen dual display function,
0: Key control is selected by DI signal <G295.7>.
1: Key control is selected by pushing at left upper corner on the screen. (Touch panel only)

 # 7 NS2 CNC screen dual display function is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3207		TPP	VRN					

[Input type] Parameter input
[Data type] Bit

 # 5 VRN On the custom macro variable screen, the variable names of common variables #500 to #549 are:
0: Not displayed.
1: Displayed.

 # 6 TPP When a virtual MDI key is pressed, signal TPPRS<F006.0> is
0: Not output.
1: Output

	#7	#6	#5	#4	#3	#2	#1	#0
3208			PSC					SKY
								SKY

[Input type] Setting input
[Data type] Bit

 # 0 SKY The function key  on the MDI panel is:

0: Enabled.

1: Disabled.

 # 5 PSC When the path is switched based on the path switch signal:
0: The screen display is switched to the last selected screen of the path.
1: The same screen as for the path before switching is displayed.

3210	Program protection

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to 99999999

This parameter sets a password for protecting program Nos. 9000 to 9999. When a value other than zero is set in this parameter and this value differs from the keyword set in parameter No.3211, bit 4 (NE9) of parameter No.3202 for protecting program Nos. 9000 to 9999 is automatically set to 1.
This disables the editing of program Nos. 9000 to 9999. Until the value set as the password is set as a keyword, NE9 cannot be set to 0 and the password cannot be modified.

NOTE
1 The state where password ≠ 0 and password ≠ keyword is referred to as the locked state. When an attempt is made to modify the password by MDI input operation in this state, the warning message "WRITE PROTECTED" is displayed to indicate that the password cannot be modified. When an attempt is made to modify the password with G10 (programmable parameter input), alarm (PS0231) is issued.
2 When the value of the password is not 0, the parameter screen does not display the password. Care must be taken in setting a password.

3211	Program protection key

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to 99999999

When the value set as the password (set in parameter No.3210) is set in this parameter, the locked state is released and the user can now modify the password and the value set in bit 4 (NE9) of parameter No.3202.

NOTE
The value set in this parameter is not displayed. When the power is turned off, this parameter is set to 0.

3216	Increment in sequence numbers inserted automatically

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 9999

Set the increment for sequence numbers for automatic sequence number insertion (when bit 5 (SEQ) of parameter No. 0000, is set to 1.)

3241	Character blinking in the AI advanced preview control/AI contour control mode (first character)

3242	Character blinking in the AI advanced preview control/AI contour control mode (second character)

3243	Character blinking in the AI advanced preview control/AI contour control mode (third character)

3244	Character blinking in the AI advanced preview control/AI contour control mode (fourth character)

3245	Character blinking in the AI advanced preview control/AI contour control mode (fifth character)

3246	Character blinking in the AI advanced preview control/AI contour control mode (sixth character)

3247	Character blinking in the AI advanced preview control/AI contour control mode (seventh character)

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0, 32 to 95

Set the first to seventh blinking characters in the AI advanced preview control/AI contour control mode by using ASCII codes represented as decimal numbers.

When all parameters are set to 0, "AI APC" blinks for AI advanced preview control or "AICC" blinks for AI contour control.

Code numbers 032 to 095 in the Appendix A, "CHARACTER CODE LIST" can be set.

3251	Character blinking in the advanced preview control mode (first character)

3252	Character blinking in the advanced preview control mode (second character)

3253	Character blinking in the advanced preview control mode (third character)

3254	Character blinking in the advanced preview control mode (fourth character)

3255	Character blinking in the advanced preview control mode (fifth character)

3256	Character blinking in the advanced preview control mode (sixth character)

3257	Character blinking in the advanced preview control mode (seventh character)

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0, 32 to 95

Set the first to seventh blinking characters in the advanced preview control mode by using ASCII codes represented as decimal numbers.
When 0 is set in all of these parameters, "APC" blinks.
Code numbers 032 to 095 in the Appendix A, "CHARACTER CODE LIST" can be set.

	#7	#6	#5	#4	#3	#2	#1	#0
3280								NLC

[Input type] Parameter input
[Data type] Bit

 # 0 NLC Dynamic display language switching is:
0: Enabled.
1: Disabled.
When dynamic display language switching is disabled, the language setting screen is not displayed. In this case, change the setting of parameter No. 3281 on the parameter screen then turn on the power again to switch the display language.

3281	Display language

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 17

Select a display language from the following:
0 : English
1 : Japanese
2 : German
3 : French
4 : Chinese(traditional characters)
5 : Italian
6 : Korean
7 : Spanish
8 : Dutch
9 : Danish
10 : Portuguese
11 : Polish
12 : Hungarian
13 : Swedish
14 : Czech
15 : Chinese(simplified characters)
16 : Russian
17 : Turkish
If a number not indicated above is set, English is selected.

	#7	#6	#5	#4	#3	#2	#1	#0
3290	KEY	MCM		IWZ	WZO		GOF	WOF

[Input type] Parameter input
[Data type] Bit path

 # 0 WOF Setting the tool offset value (tool wear offset) by MDI key input is:
0: Not disabled.
1: Disabled. (With parameter No.3294 and No.3295, set the offset number range in which updating the setting is to be disabled.)

> **NOTE**
> When tool offset memory A is selected with the M series, the tool offset set in the parameter WOF is followed even if geometric compensation and wear compensation are not specified with the T series.

 # 1 GOF Setting the tool geometry offset value by MDI key input is:
0: Not disabled.
1: Disabled. (With parameter No.3294 and No.3295, set the offset number range in which updating the setting is to be disabled.)

 # 3 WZO Setting a workpiece zero point offset value and workpiece shift value (T series) by MDI key input is:
0: Not disabled.
1: Disabled.

 # 4 IWZ Setting a workpiece zero point offset value or workpiece shift value (T series) by MDI key input in the automatic operation activation or halt state is:
0: Not disabled.
1: Disabled.

 # 6 MCM Setting a custom macro variable by MDI key input is:
0: Enabled in any mode.
1: Enabled only in the MDI mode.

 # 7 KEY For memory protection keys:
0: The KEY1, KEY2, KEY3, and KEY4 signals are used.
1: Only the KEY1 signal is used.

NOTE
1 The functions of the signals depend on whether KEY=0 or KEY=1.
When KEY = 0:
- KEY1: Enables a tool offset value, workpiece zero point offset value, and workpiece shift value (T series) to be input.
- KEY2: Enables setting data, macro variables, and tool life management value to be input.
- KEY3: Enables program registration and editing.
- KEY4: Enables PMC data (counter and data table) to be input.
When KEY = 1:
- KEY1: Enables program registration and editing, and enables PMC parameter input.
- KEY2 to KEY4: Not used
2 When a 2-path system is used, the setting for path 1 is followed.

	#7	#6	#5	#4	#3	#2	#1	#0
3291								WPT

[Input type] Parameter input
[Data type] Bit path

 # 0 WPT The input of the tool wear compensation amount is:
0: Enabled according to memory protection key signal KEY1.
1: Enabled, regardless of the memory protection key signal KEY1.

3294	Start number of tool offset values whose input by MDI is disabled
3295	Number of tool offset values (from the start number) whose input by MDI is disabled

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to Tool compensation count - 1

When the modification of tool offset values by MDI key input is to be disabled using bit 0 (WOF) of parameter No.3290 and bit 1 (GOF) of parameter No.3290, parameter Nos.3294 and 3295 are used to set the range where such modification is disabled. In parameter No.3294, set the offset number of the start of tool offset values whose modification is disabled. In parameter No.3295, set the number of such values. In the following cases, however, none of the tool offset values may be modified:

- When 0 or a negative value is set in parameter No.3294
- When 0 or a negative value is set in parameter No.3295
- When a value greater than the maximum tool offset number is set in parameter No.3294

In the following case, a modification to the values ranging from the value set in parameter No.3294 to the maximum tool offset number is disabled:

When the value of parameter No.3294 added to the value of parameter No.3295 exceeds the maximum tool offset number

When the offset value of a prohibited number is input through the MDI panel, the warning "WRITE PROTECT" is issued.

[Example]

When the following parameter settings are made, modifications to both of the tool geometry offset values and tool wear offset values corresponding to offset numbers 51 to 60 are disabled:

- Bit 1 (GOF) of parameter No.3290 = 1 (to disable tool geometry offset value modification)
- Bit 0 (WOF) of parameter No.3290 = 1 (to disable tool wear offset value modification)
- Parameter No.3294 = 51
- Parameter No.3295 = 10

If the setting of bit 0 (WOF) of parameter No.3290 is set to 0 without modifying the other parameter settings above, tool geometry offset value modification only is disabled, and tool wear offset value modification is enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3299								PKY

[Input type] Setting input
[Data type] Bit

 # 0 PKY "Parameter write enable" is:
0: Set on the setting screen (bit 0 (PWE) of setting parameter No.8900).
1: Set by the memory protection signal KEYP<G046.0>.

	#7	#6	#5	#4	#3	#2	#1	#0
3301	HDC							H16

[Input type] Parameter input
[Data type] Bit path

 # 0 H16 Bit map data of screen hard copies uses:
0: 256 colors.
1: 16 colors.

 # 7 HDC A screen hard copy function is:
0: Disabled.
1: Enabled.

4.19 PARAMETERS OF PROGRAMS (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
3400		SMX		UVW				
		SMX						

[Input type] Parameter input
[Data type] Bit path

 # 4 UVW When G code system B or C is selected:
0: The U, V, W, and H commands are the incremental commands of the X-, Y- , Z-, and C-axes.
1: The U, V, W, and H commands are not the incremental commands of the X-, Y- , Z-, and C-axes.

> **NOTE**
> 1 When U-, V-, and W-axes are present, the U, V, and W commands are assumed to be the commands for these axes. That is, they are not the incremental commands of the X-, Y-, and Z-axes.
> 2 If this parameter is set to 1, it is impossible to use U, V, or W as the specified address (parameter No. 3460) of the second auxiliary function for G code system B or C.
> 3 If this parameter is set to 1, the same operation as that of the FS0*i*-TC is assumed.

 # 6 SMX An S code specified in a block that specifies G92 (G50 with G code system A of the T series) is:
0: Regarded as a maximum spindle speed command.
1: Not regarded as a maximum spindle speed command (but regarded as a spindle speed command).

	#7	#6	#5	#4	#3	#2	#1	#0
3401	GSC	GSB	ABS	MAB				DPI
			ABS	MAB				DPI

[Input type] Parameter input
[Data type] Bit path

 # 0 DPI When a decimal point is omitted in an address that can include a decimal point
0: The least input increment is assumed. (Normal decimal point input)
1: The unit of mm, inches, degree, or second is assumed. (Pocket calculator type decimal point input)

 # 4 MAB Switching between the absolute and incremental commands in MDI operation
0: Performed by G90 or G91
1: Depending on the setting of bit 5 (ABS) of parameter No.3401

> **NOTE**
> When G code system A of the T series is used, this parameter is invalid.

 # 5 ABS Program command in MDI operation
0: Assumed as an incremental command
1: Assumed as an absolute command

> **NOTE**
> ABS is valid when bit 4 (MAB) of parameter No.3401 is set to 1. When G code system A of the T series is used, this parameter is invalid.

 # 6 GSB The G code system is set.
 # 7 GSC

GSC	GSB	G code
0	0	G code system A
0	1	G code system B
1	0	G code system C

	#7	#6	#5	#4	#3	#2	#1	#0
3402	G23	CLR		FPM	G91			G01
	G23	CLR	G70		G91	G19	G18	G01

[Input type] Parameter input
[Data type] Bit path

 # 0 G01 G01 Mode entered when the power is turned on or when the control is cleared
0: G00 mode (positioning)
1: G01 mode (linear interpolation)

 # 1 G18 Plane selected when power is turned on or when the control is cleared
0: G17 mode (plane XY)
1: G18 mode (plane ZX)

 # 2 G19 Plane selected when power is turned on or when the control is cleared
0: The setting of bit 1 (G18) of parameter No.3402 is followed.
1: G19 mode (plane YZ)
When this bit is set to 1, set bit 1 (G18) of parameter No.3402 to 0.

G19	G18	G17, G18, or G19 mode
0	0	G17 mode (X-Y plane)
0	1	G18 mode (Z-X plane)
1	0	G19 mode (Y-Z plane)

 # 3 G91 When the power is turned on or when the control is cleared
0: G90 mode (absolute command)
1: G91 mode (incremental command)

 # 4 FPM At power-on time or in the cleared state:
0: G99 or G95 mode (feed per revolution) is set.
1: G98 or G94 mode (feed per minute) is set.

 # 5 G70 The commands for inch input and metric input are:
0: G20 (inch input) and G21 (metric input).
1: G70 (inch input) and G71 (metric input).

 # 6 CLR Reset button on the MDI panel, external reset signal, reset and rewind signal, and emergency stop signal
0: Cause reset state.
1: Cause clear state.
For the reset and clear states, refer to Appendix in the User's Manual.

 # 7 G23 When the power is turned on
0: G22 mode (stored stroke check on)
1: G23 mode (stored stroke check off)

	#7	#6	#5	#4	#3	#2	#1	#0
3403			CIR					

[Input type] Parameter input
[Data type] Bit path

 # 5 CIR When neither the distance (I, J, K) from a start point to the center nor an arc radius (R) is specified in circular interpolation (G02, G03) or helical interpolation (G02, G03):
0: The tool moves to an end point by linear interpolation.
1: An alarm PS0022 is issued.

	#7	#6	#5	#4	#3	#2	#1	#0
3404	M3B		M02	M30		SBP		NOB

[Input type] Parameter input
[Data type] Bit path

 # 0 NOB When a program is executed, a block consisting of an O, N, or EOB is:
0: Not ignored.
1: Ignored.

 # 2 SBP In an external device subprogram call (M198), the address P format is based on:
0: File number specification
1: Program number specification

NOTE
In memory card operation, the program number specification format is used, regardless of the setting of this parameter.

 # 4 M30 When M30 is specified in a memory operation:
0: M30 is sent to the machine, and the head of the program is automatically searched for. So, when the ready signal FIN is returned and a reset or reset and rewind operation is not performed, the program is executed, starting from the beginning.
1: M30 is sent to the machine, but the head of the program is not searched for. (The head of the program is searched for by the reset and rewind signal.)

 # 5 M02 When M02 is specified in memory operation
0: M02 is sent to the machine, and the head of the program is automatically searched for. So, when the end signal FIN is returned and a reset or reset and rewind operation is not performed, the program is executed, starting from the beginning.
1: M02 is sent to the machine, but the head of the program is not searched for. (The head of the program is searched for by the reset and rewind signal.)

 # 7 M3B The number of M codes that can be specified in one block
0: One
1: Up to three

	#7	#6	#5	#4	#3	#2	#1	#0
3405			DDP	CCR			DWL	AUX
							DWL	AUX

[Input type] Parameter input
[Data type] Bit path

 # 0 AUX When the second auxiliary function is specified in the calculator-type decimal point input format or with a decimal point, the multiplication factor for a value output (onto the code signal) relative to a specified value is such that:

0: The same multiplication factor is used for both of metric input and inch input.
1: A multiplication factor used for inch input is 10 times greater than that used for metric input.

When the second auxiliary function is specified in the calculator-type decimal point input format or with a decimal point, the value output onto the code signal is a specified value multiplied by a value indicated below.

Increment system		Parameter AUX=0	Parameter AUX=1
Metric input system	IS-A for reference axis	100 times	100 times
	IS-B for reference axis	1000 times	1000 times
	IS-C for reference axis	10000 times	10000 times
Inch input system	IS-A for reference axis	100 times	1000 times
	IS-B for reference axis	1000 times	10000 times
	IS-C for reference axis	10000 times	100000 times

 # 1 DWL The dwell time (G04) is:

0: Always dwell per second.
1: Dwell per second in the feed per minute mode, or dwell per rotation in the feed per rotation mode.

 # 4 CCR Addresses used for chamfering

0: Address is “I”, “J”, or “K”.
In direct drawing dimension programming, addresses ",C", ",R", and ",A" (with comma) are used in stead of "C", "R", and "A".
1: Address is “C”.
Addresses used for direct drawing dimension programming are "C", "R", and "A" without comma.

NOTE

If this bit (CCR) is set to 0, the function for changing the compensation direction by specifying I, J, or K in a G01 block in the tool nose radius compensation mode cannot be used.
If this bit (CCR) is set to 1 when address C is used as an axis name, the chamfer function cannot be used.

 # 5 DDP Angle commands by direct drawing dimension programming
0: Normal specification
1: A supplementary angle is given.

	#7	#6	#5	#4	#3	#2	#1	#0
3406	**C07**	**C06**	**C05**	**C04**	**C03**	**C02**	**C01**	
3407	**C15**	**C14**	**C13**	**C12**	**C11**	**C10**	**C09**	**C08**
3408	**C23**	**C22**	**C21**	**C20**	**C19**	**C18**	**C17**	**C16**
3409	**CFH**	**C30**	**C29**	**C28**	**C27**	**C26**	**C25**	**C24**

[Input type] Parameter input
[Data type] Bit

C01 to C30 If bit 6 (CLR) of parameter No.3402 is set to 1, set a group of G codes to be placed in the cleared state when the CNC is reset by the 

key of the MDI panel, the external reset signal, the reset & rewind signal, or the emergency stop signal.
The table below indicates the correspondence between bits and G code groups
The setting of a bit has the following meaning:
0: Places the G code group in the cleared state.
1: Does not place G code group in the cleared state.

Parameter	G code group
C01	01
C02	02
C03	03
:	:
C30	30

 # 7 CFH When bit 6 (CLR) of parameter No.3402 is 1, the 

key on the MDI panel, the external reset signal, the reset and rewind signal, or emergency stop will,
0: Clear F codes, H codes (for the M series), D codes (for the M series), and T codes (for the T series).
1: Not clear F codes, H codes (for the M series), D codes (for the M series), and T codes (for the T series).

3410	Tolerance of arc radius

[Input type] Setting input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
When a circular interpolation command is executed, the tolerance for the radius between the start point and the end point is set.

> **NOTE**
> When the setting is 0, the difference between the arc radius values is not checked.

3411	M code preventing buffering 1

3412	M code preventing buffering 2

:

3420	M code preventing buffering 10

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999
Set M codes that prevent buffering the following blocks. If processing directed by an M code must be performed by the machine without buffering the following block, specify the M code.
M00, M01, M02, and M30 always prevent buffering even when they are not specified in these parameters.

3421	Range specification 1 of M codes that do not perform buffering (lower limit)
3422	Range specification 1 of M codes that do not perform buffering (upper limit)
3423	Range specification 2 of M codes that do not perform buffering (lower limit)
3424	Range specification 2 of M codes that do not perform buffering (upper limit)
3425	Range specification 3 of M codes that do not perform buffering (lower limit)
3426	Range specification 3 of M codes that do not perform buffering (upper limit)
3427	Range specification 4 of M codes that do not perform buffering (lower limit)
3428	Range specification 4 of M codes that do not perform buffering (upper limit)
3429	Range specification 5 of M codes that do not perform buffering (lower limit)
3430	Range specification 5 of M codes that do not perform buffering (upper limit)
3431	Range specification 6 of M codes that do not perform buffering (lower limit)
3432	Range specification 6 of M codes that do not perform buffering (upper limit)

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999

When a specified M code is within the range specified with parameter Nos.3421 and 3422, 3423 and 3424, 3425 and 3426, 3427 and 3428, 3429 and 3430, or 3431 and 3432, buffering for the next block is not performed until the execution of the block is completed.

NOTE

1. M00, M01, M02, and M30 are M codes that do not perform buffering, regardless of parameter setting. M98, M99, M codes for calling subprograms, and M codes for calling custom macros are M codes that performs buffering, regardless of parameter setting.
2. If the minimum value is greater than the maximum value, the setting is invalid.
3. If there is only one data item, the minimum value must be equal to the maximum value.

	#7	#6	#5	#4	#3	#2	#1	#0
3450	BDX							AUP

[Input type] Parameter input
[Data type] Bit path

 # 0 AUP The second auxiliary function specified in the calculator-type decimal point input format, with a decimal point, or with a negative value is:
0: Disabled.
1: Enabled.
If the second auxiliary function is specified after setting this bit to 0, the following operation results:
1. When a value is specified without a decimal point
   A specified value is output onto the code signal without modification, regardless of the setting of the calculator-type decimal point input format (with bit 0 (DPI) of parameter No. 3401).
2. When a value is specified with a decimal point
   The alarm (PS0007) is issued.
3. When a negative value is specified
   The alarm (PS0006) is issued.

 # 7 BDX This parameter prevents the unit of the argument from depending on the setting of bit 2 (BCD) of parameter No. 8132 when a subprogram call by an ASCII code is performed with the address (specified by parameter No. 3460) of the second auxiliary function.
0: When bit 0 (AUP) of parameter No. 3450 is 1, the unit of the argument depends on the setting of bit 2 (BCD) of parameter No. 3450.
1: The same unit of the argument is used. The unit when bit 2 (BCD) of parameter No. 8132 is 1 is specified.
[Example]
A setting is made so that address B is used to call O9004, and the program O1 below is executed with parameter No.3460 = 66.

O1	O9004
B2	#500 = #146
M30	M99

When the increment system is IS-B, and metric input is used, #500 assumes a value indicated in the table below.

Parameter DPI (No.3401#0)	Parameter AUP (No.3450#0)	BDX=0		BDX=1
		Parameter BCD(No.8132#2)=0	Parameter BCD(No.8132#2)=1	
0	0	2.000	2.000	2.000
	1	2.000	0.002	0.002
1	0	2.000	2.000	2.000
	1	2.000	2.000	2.000

	#7	#6	#5	#4	#3	#2	#1	#0
3451				NBN				
				NBN				GQS

[Input type] Parameter input
[Data type] Bit path

 # 0 GQS When threading is specified, the threading start angle shift function (Q) is:
0: Disabled.
1: Enabled.

 # 4 NBN If bit 0 (NOB) of parameter No.3404 is set to 1, a block including just N is:
0: Ignored.
1: Not ignored but handled as a single block.
(For a block containing only N, bit 0 (NOB) of parameter No.3404 is ignored.)

	#7	#6	#5	#4	#3	#2	#1	#0
3452	EAP							

[Input type] Parameter input
[Data type] Bit path

 # 7 EAP When bit 0 (ADX) of parameter No.3455 is set to 1, calculator-type decimal point input at a macro calling argument address is:
0: Enabled.
1: Disabled.

NOTE
This parameter is valid when bit 0 (DPI) of parameter No.3401 is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
3453								CRD

[Input type] Setting input
[Data type] Bit path

 # 0 CRD If the functions of chamfering or corner R and direct drawing dimension programming are both enabled,
0: Chamfering or corner R is enabled.
1: Direct drawing dimension programming is enabled.
Specify which function is used when both the chamfering/corner R function and the drawing dimension programming function are enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3455								AXDx

[Input type] Parameter input
[Data type] Bit axis

 # 0 AXDx If a decimal point is omitted for an axis address with which a decimal point can be used, the value is determined:

0: In accordance with the least input increment. (Normal decimal point input)
1: In millimeters, inches, or seconds. (calculator-type decimal point input)

NOTE
This parameter specifies the calculator-type decimal point input function for each axis.
For the same axis name, be sure to make the same setting.

3460	Second auxiliary function specification address

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 65to67, 85to87

Specify which of A, B, C, U, V, and W is to be used as the address for specifying the second auxiliary function. If an address used as an axis name is specified, the second auxiliary function is disabled.

Name	A	B	C	U	V	W
Setting value	65	66	67	85	86	87

Address B is assumed when a value other than the above is set.
However, the name U, V, or W can be used with the T series only when G code system B or C is used. When a value from 85 to 87 is specified with G code system A, the specification address for the second auxiliary function is B.

4.20 PARAMETERS OF PITCH ERROR COMPENSATION

	#7	#6	#5	#4	#3	#2	#1	#0
3601								
							EPC	

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 1 EPC The pitch error compensation on an axis of Cs contour control on the slave spindle side during simple synchronous spindle control (M series) is:
0: The same as that on the master spindle.
1: Just for the slave spindle.

	#7	#6	#5	#4	#3	#2	#1	#0
3605								BDPx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 BDPx Both-direction pitch error compensation is:
0: Not used.
1: Used.

> **NOTE**
> The both-direction pitch error compensation option is required.

3620	Number of the pitch error compensation position for the reference position for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 1023
Set the number of the pitch error compensation position for the reference position for each axis.

3621	Number of the pitch error compensation position at extremely negative position for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 1023

Set the number of the pitch error compensation position at the extremely negative position for each axis.

3622	Number of the pitch error compensation position at extremely positive position for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 1023

Set the number of the pitch error compensation position at the extremely positive position for each axis.
This value must be larger than set value of parameter (No.3620).

3623	Magnification for pitch error compensation for each axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 100

Set the magnification for pitch error compensation for each axis.
If the magnification is set to 1, the same unit as the detection unit is used for the compensation data.
If 0 is set, compensation is not performed.

3624	Interval between pitch error compensation positions for each axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] See the description below.

The pitch error compensation positions are arranged with equal spacing. The space between two adjacent positions is set for each axis.
The minimum interval between pitch error compensation positions is limited and obtained from the following equation:
Minimum interval between pitch error compensation positions = maximum feedrate/7500
Unit : Minimum interval between pitch error compensation positions: mm, inch, deg
Maximum feedrate: mm/min, inch/min, deg/min
Example:
When the maximum feedrate is 15000 mm/min, the minimum interval between pitch error compensation positions is 2 mm.

3625	Travel distance per revolution in pitch error compensation of rotation axis type

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] See the description below.

If the pitch error compensation of rotation axis type is performed (bit 1 (ROSx) of parameter No.1006 is set to 0 and bit 0 (ROTx) of parameter No.1006 is set to 1), set the travel distance per revolution. The travel distance per revolution does not have to be 360 degrees, and a cycle of pitch error compensation of rotation axis type can be set.
However, the travel distance per revolution, compensation interval, and number of compensation points must satisfy the following condition:
(Travel distance per revolution)
= (Compensation interval) × (Number of compensation points)
The compensation at each compensation point must be set so that the total compensation per revolution equals 0.

NOTE
If 0 is set, the travel distance per revolution becomes 360 degrees.

3626	Number of the both-direction pitch error compensation position at extremely negative position (for movement in the negative direction)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 1023, 3000 to 4023

When using both-direction pitch error compensation, set the number of compensation point at the farthest end in the negative direction for a movement in the negative direction.

NOTE
1 For a movement in the positive direction, set the compensation point number at the farthest end in the negative direction in parameter No.3621.
2 A set of compensation data items for a single axis should not be set to lie astride 1023 to 3000.

3627	Pitch error compensation at reference position when a movement to the reference position is made from the direction opposite to the direction of reference position return

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] -32768 to 32767

Set the absolute value of pitch error compensation at reference position when a movement to the reference position is made from the negative direction if the direction of reference position return (bit 5 (ZMI) of parameter No.1006) is positive or from the positive direction if the direction of reference position return is negative.

3661	Number of a pitch error compensation position for the reference position for each slave axis when independent pitch error compensation is performed under simple spindle synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 1023

Set the number of a pitch error compensation position for the reference position.

NOTE
This parameter is valid if pitch error compensation on an axis of Cs contour control on the salve side during simple synchronous spindle control (M series) is carried out just for the slave axis (bit 1 (EPC) of parameter No.3601 is set to 1).

3666	Number of the pitch error compensation position at extremely negative position for each slave axis when independent pitch error compensation is performed under simple spindle synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 1023

Set the compensation position number at the farthest end in the negative direction.

NOTE
1. This parameter is valid if pitch error compensation on an axis of Cs contour control on the salve side during simple synchronous spindle control (M series) is carried out just for the slave axis (bit 1 (EPC) of parameter No.3601 is set to 1).
2. When using the both-direction pitch error compensation function, set a compensation position number for a movement in the positive direction.

3671	Number of the pitch error compensation position at extremely positive position for each slave axis when independent pitch error compensation is performed under simple spindle synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 1023

Set the compensation position number at the farthest end in the positive direction.

NOTE
1. This parameter is valid if pitch error compensation on an axis of Cs contour control on the salve side during simple synchronous spindle control (M series) is carried out just for the slave axis (bit 1 (EPC) of parameter No.3601 is set to 1).
2. When using the both-direction pitch error compensation function, set a compensation position number for a movement in the positive direction.

3676	Number of the pitch error compensation position at extremely negative position for each slave axis when independent both-direction pitch error compensation is performed under simple spindle synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 1023

When using both-direction pitch error compensation, set the compensation position number at the farthest end in the negative direction for a movement in the negative direction.

NOTE
This parameter is valid if pitch error compensation on an axis of Cs contour control on the salve side during simple synchronous spindle control (M series) is carried out just for the slave axis (bit 1 (EPC) of parameter No.3601 is set to 1).

3681	
	Pitch error compensation value at the reference position when a movement is made to the reference position in the direction opposite to the reference position return direction for each slave axis in the case where independent both-direction pitch error compensation is performed under simple spindle synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] -32768 to 32767

By using an absolute value, set a pitch error compensation value at the reference position when a movement is made in the negative direction if the reference position return direction (bit 5 (ZMI) of parameter No. 1006) is positive or when a movement is made in the positive direction if the reference position return direction (bit 5 (ZMI) of parameter No.1006) is negative.

NOTE
This parameter is valid if pitch error compensation on an axis of Cs contour control on the salve side during simple synchronous spindle control (M series) is carried out just for the slave axis (bit 1 (EPC) of parameter No. 3601 is set to 1).

4.21 PARAMETERS OF SPINDLE CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
3700							NRF	

[Input type] Parameter input
[Data type] Bit path

 # 1 NRF With the first move command (G00) after switching the serial spindle to Cs contour control axis:
0: A reference position return operation is once performed then positioning is performed.
1: A normal positioning operation is performed.

> **NOTE**
> 1 When using the Cs axis establishment function, this parameter is recommended to be set to 1.
> 2 The setting of this parameter is valid for G00. The first rapid traverse of a canned cycle is normal positioning regardless of the setting of this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
3701				SS2			ISI	

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 1 ISI
 # 4 SS2 Set the number of spindles in a path.

SS2	ISI	Number of spindles in a path
0	1	0
1	1	0
0	0	1
1	0	2

> **NOTE**
> This parameter is valid when spindle serial output is enabled (bit 5 (SSN) of parameter No. 8133 is 0).

	#7	#6	#5	#4	#3	#2	#1	#0
3702							EMS	

[Input type] Parameter input
[Data type] Bit path

 # 1 EMS The multi-spindle control function is:
0: Used.
1: Not used.

> **NOTE**
> Make the setting on the side of the path in which multi-spindle control is unnecessary in 2-path control.

	#7	#6	#5	#4	#3	#2	#1	#0
3703				SPR	MPP			2P2
					MPP			

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 2P2 When a 2-path system is used, inter-path spindle control allows:
0: Configuration where the spindle that belongs to one path only is shared between path 1 and path 2.
1: Configuration where the spindles that belong to path 1 and 2 are shared between the two paths.

 # 3 MPP In multi-spindle control, a spindle selection using a programmed command instead of using the signals (SWS1 to SWS2<G027.0, 1>) is:
0: Not made.
1: Made.

> **NOTE**
> When this parameter is set to 1, set parameter No. 3781 at the same time.

 # 4 SPR Rigid tapping with spindle of another path function is:
0: Not available.
1: Available.

	#7	#6	#5	#4	#3	#2	#1	#0
3704	CSS			SSS				
	CSS		SSY	SSS				

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 4 SSS Synchronous spindle control by each spindle is:
0: Not performed.
1: Performed.
The master axis and slave axis of synchronous spindle control can be selected from the arbitrary spindles.
The target spindle of synchronous spindle control is specified in parameter No.4831.
In addition, the following signals affect the control.
In addition, the following signals affect the control.
- Synchronous spindle signals of each spindle SPSYCs
- Signals of synchronous control of the spindle phase for each spindle SPPHSs

 # 5 SSY Simple synchronous spindle control (M series) by each spindle is:
0: Not performed.
1: Performed.
The master axis and slave axis of simple synchronous spindle control (M series) can be selected from the arbitrary spindles.
The target spindle of simple synchronous spindle control (M series) is set in parameter No.4821.
In addition, the following signals affect the control.
- Signals of simple synchronous control of each spindle ESSYCs
- Parking signals of simple synchronous control of each spindle PKESEs

 # 7 CSS On the second spindle in the path, Cs contour control is:
0: Not performed.
1: Performed.

	#7	#6	#5	#4	#3	#2	#1	#0
3705		SFA		EVS	SGT	SGB		ESF
		SFA	NSF		SGT	SGB	GST	ESF

[Input type] Parameter input
[Data type] Bit path

 # 0 ESF When constant surface speed control is selected (bit 0 (SSC) of parameter No. 8133 is 1) or bit 4 (GTT) of parameter No. 3706 is 1:

0: S codes and SF are output for all S commands.
1: For the T series:
S codes and SF are not output for an S command in the constant surface speed control (G96) mode and a command for maximum spindle speed clamping (G92S-- - ; (G50 for G code system A)).
For the M series:
S codes and SF are not output for an S command in the constant surface speed control (G96) mode.

> **NOTE**
> The operation of this parameter varies between the T series and M series.
> For the T series: This parameter is valid when bit 4 (EVS) of parameter No. 3705 is set to 1.
> For the M series: For an S command for maximum spindle speed clamping (G92S-- - ;), SF is not output, regardless of the setting of this parameter.

 # 1 GST The SOR signal is used for:

0: Spindle orientation
1: Gear shift

 # 2 SGB Gear switching method

0: Method A (Parameters 3741 to 3743 for the maximum spindle speed at each gear are used for gear selection.)
1: Method B (Parameters 3751 and 3752 for the spindle speed at the gear switching point are used for gear selection.)

 # 3 SGT Gear switching method during tapping cycle (G84 and G74)

0: Method A (Same as the normal gear switching method)
1: Method B (Gears are switched during tapping cycle according to the spindle speed set in parameters 3761 and 3762).

 # 4 EVS S codes and SF are:
0: Not output for an S command.
1: Output for an S command.
The output of S codes and SF for an S command in constant surface speed control mode (G96), or for an S command used to specify maximum spindle speed clamping (G50S---;) depends on the setting of bit 0 (ESF) of parameter No.3705.

 # 5 NSF For the M series, if T type gear is selected (bit 4 (GTT) of parameter No. 3706 is 1 or constant surface speed control is enabled (bit 0 (SSC) of parameter No. 8133 is 1)), when an S code is specified:
0: SF is output.
1: SF is not output.

NOTE
This parameter does not affect S code output. For an S command for maximum spindle speed clamping (G92S-- - ;), SF is not output, regardless of the setting of this parameter.

 # 6 SFA The SF signal is output:
0: When gears are switched.
1: Irrespective of whether gears are switched.

	#7	#6	#5	#4	#3	#2	#1	#0
3706	TCW	CWM	ORM		PCS	MPA		
	TCW	CWM	ORM	GTT		MPA		

[Input type] Parameter input
[Data type] Bit path

 # 2 MPA If a spindle is to be selected using a P command (with bit 3 (MPP) of parameter No. 3703 set to 1) in multi-spindle control, and a P command is not specified together with an S command:
0: The alarm (PS5305) is issued.
1: The last P specified by S_ P_; (by S_ P_; specified for the path in case of a 2-path system) is used. If P is not specified even once after power-up, the value of parameter No. 3775 is used.

NOTE
This parameter is valid only when bit 3 (MPP) of parameter No. 3703 is set to 1.

 # 3 PCS When multi-spindle control is enabled in each path of 2-path system, position coder selection signal (PC2SLC<Gn028.7>) is:
0: The signal on the side of the path selected by the inter-path spindle feedback signal is used.
1: The signal on the side of the local path is used.

 # 4 GTT Selection of a spindle gear selection method
0: Type M.
1: Type T.

> **NOTE**
> 1 M type
> The gear selection signal is not input. The CNC selects a gear based on the speed range of each gear set by a parameter beforehand according to S codes, and the selected gear is posted by outputting the gear selection signal. Moreover, the spindle speed matching the gear selected by the output gear selection signal is output.
> T type
> The gear selection signal is input. The spindle speed matching the gear selected by this signal is output.
> 2 When constant surface speed control is selected (bit 0 (SSC) of parameter No. 8133 is 1), the T type is assumed regardless of the setting of this parameter.
> 3 When type T spindle gear switching is selected, the following parameters have no effect:
> No.3705#2(SGB), No.3751, No.3752, No.3705#1(GST), No.3705#3(SGT), No.3761, No.3762, No.3705#6(SFA), No.3735, No.3736
> On the other hand, parameter No. 3744 becomes usable.

 # 5 ORM Voltage polarity during spindle orientation
0: Positive
1: Negative

 # 6 CWM
 # 7 TCW Voltage polarity when the spindle speed voltage is output

TCW	CWM	Voltage polarity
0	0	Both M03 and M04 positive
0	1	Both M03 and M04 negative
1	0	M03 positive, M04 negative
1	1	M03 negative, M04 positive

	#7	#6	#5	#4	#3	#2	#1	#0
3708		TSO	SOC				SAT	SAR
		TSO	SOC					SAR

[Input type] Parameter input
[Data type] Bit path

 # 0 SAR The spindle speed arrival signal (SAR) is:
0: Not checked
1: Checked

 # 1 SAT Check of the spindle speed arrival signal (SAR) at the start of executing the thread cutting block
0: The signal is checked only when SAR, #0 of parameter 3708, is set.
1: The signal is always checked irrespective of whether SAR is set.

> **NOTE**
> When thread cutting blocks are consecutive, the spindle speed arrival signal is not checked for the second and subsequent thread cutting blocks.

 # 5 SOC During constant surface speed control (G96 mode), the speed clamp by the maximum spindle speed clamp command (M series: G92 S_; T series: G50 S_;) is carried out:
0: Before spindle speed override.
1: After spindle speed override.
If this parameter is set to 0, the spindle speed may exceed the maximum spindle speed (numeric value following S in G92 S_; (M series) or G50 S_; (T series)).
If this parameter is set to 1, the spindle speed is limited to the maximum spindle speed.
The spindle speed is limited to the upper limit of spindle speed specified in parameter No. 3772, irrespective of the setting of this parameter.

 # 6 TSO During a threading or tapping cycle, the spindle override is:
0: Disabled (tied to 100%).
1: Enabled.

> **NOTE**
> During rigid tapping, the override is tied to 100%, irrespective of the setting of this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
3709					MRS	MSI	RSC	SAM

[Input type] Parameter input
[Data type] Bit path

 # 0 SAM The sampling frequency to obtain the average spindle speed
0: 4 (Normally, set to 0.)
1: 1

 # 1 RSC In the constant surface speed control mode, the surface speed of a rapid traverse block is calculated:
0: In accordance with the coordinates of the end point.
1: In accordance with the current value, as in cutting feed.

 # 2 MSI In multi-spindle control, the SIND signal is valid
0: Only when the first spindle is valid (SIND signal for the 2nd, 3rd spindle becomes ineffective) (TYPE-A)
1: For each spindle irrespective of whether the spindle is selected (Each spindle has its own SIND signal). (TYPE-B)

 # 3 MRS When the actual spindle speed signals and S 12-bit code signals are output in multi-spindle control:
0: The signals common to the first spindle and second spindle are used, and the signals for the spindle selected by the spindle selection signal are output.
1: The signals for the first spindle and the signals for the second spindle are output separately.

> **NOTE**
> This parameter requires multi-spindle control (bit 3 (MSP) of parameter No. 8133 is 1) and spindle serial output (bit 5 (SSN) of parameter No. 8133 is 0).

	#7	#6	#5	#4	#3	#2	#1	#0
3712						CSF		

[Input type] Parameter input
[Data type] Bit

 # 2 CSF In the Cs contour control mode, the function for setting machine coordinates and absolute coordinates based on the machine position of the spindle if the reference position is already set up is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
3713		MPC		EOV	MSC			

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 3 MSC Multi-spindle control TYPE-C is:
0: Not used.
1: Used.

> **NOTE**
> If parameter MSC and MSI (bit 2 of parameter No. 3709 for multi-spindle control TYPE-B) are set to 1 at the same time, multi-spindle control TYPE-C is enabled.

 # 4 EOV Each spindle speed override is:
0: Not used.
1: Used.

 # 6 MPC When a spindle is selected with address P in a program during multi-spindle control (bit 3 (MPP) of parameter No. 3703 is set to 1), position coder feedback used for thread cutting, feed per revolution, and so forth is:
0: Not changed automatically according to the selected spindle.
1: Changed automatically according to the selected spindle.

> **NOTE**
> Setting this parameter produces the same effects as when position coder select signals PC2SLC<Gn028.7>, inter-path spindle feedback signals SLPCA<Gn064.2>, and SLPCB<Gn064.3> are set.
> At this time, even when an attempt to set these signals is made by a PMC ladder, these signal operations are ignored.

	#7	#6	#5	#4	#3	#2	#1	#0
3715								NSAx

[Input type] Parameter input
[Data type] Bit axis

 # 0 NSAx When a move command is executed for an axis, the spindle speed arrival signal SAR is:

0: Checked.
1: Not checked.
Set an axis for which the spindle speed arrival signal SAR need not be checked when a move command is executed for the axis. When a move command is specified only for an axis with this parameter set to 1, the spindle speed arrival signal SAR is not checked.

	#7	#6	#5	#4	#3	#2	#1	#0
3716								A/Ss

[Input type] Parameter input
[Data type] Bit spindle

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 A/Ss Spindle motor type is :
0: Analog spindle.
1: Serial spindle.

> **NOTE**
> 1 To use a serial spindle, set bit 5 (SSN) of parameter No. 8133 to 0.
> 2 A maximum of one analog spindle can be controlled.
> 3 When using an analog spindle, set it at the end of the spindle configuration.

3717	Motor number to each spindle

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to Maximum number of controlled axes

Set a spindle amplifier number to be assigned to each spindle.

0: No spindle amplifier is connected.
1: Spindle motor connected to amplifier number 1 is used.
2: Spindle motor connected to amplifier number 2 is used.
3: Spindle motor connected to amplifier number 3 is used.

> **NOTE**
> When using an analog spindle, set it at the end of the spindle configuration.
> (Example)
> When there are three spindles in an entire system (two serial spindles and one analog spindle), set the spindle amplifier number (this parameter) of the analog spindle to 3.

3718	Subscript for display of a serial spindle or analog spindle

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to 122

Set a subscript to be added to spindle speed display on a screen such as the position display screen.

3720	Number of position coder pulses

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] Detection unit
[Valid data range] 1 to 32767

Set the number of position coder pulses.

3721	Number of gear teeth on the position coder side

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 9999

Set the number of gear teeth on the position coder side in speed control (such as feed per revolution and threading).

3722	Number of gear teeth on the spindle side

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 9999

Set the number of gear teeth on the spindle side in speed control (such as feed per revolution and threading).

	#7	#6	#5	#4	#3	#2	#1	#0
3729	CSCs				NCSs	CSNs	FPRs	ORTs

[Input type] Parameter input
[Data type] Bit spindle

 # 0 ORTs When a serial spindle is used, the spindle orientation function of stop position external setting type based on the position coder is:
0: Not performed.
1: Performed.

 # 1 FPRs Feed per revolution (without a position coder) is:
0: Not used for a spindle.
1: Used for a spindle.

In a machine that does not use a position coder, when bit 1 (FPR) of parameter No. 3729 is set to 1 for each axis, feed per revolution can be performed with a spindle command. A feed per revolution is specified with G95 (G99 for T series) in the same way as for normal operation.

When multispindle control is performed, the target spindle for feed per revolution is selected with a position coder select signal (PC2SLC<Gn028.7>).

> **NOTE**
> Enable constant surface speed control (bit 0 (SSC) of parameter No. 8133 is 1).

 # 2 CSNs When the Cs contour control mode is turned off, an in-position check is:
0: Performed.
1: Not performed.

> **NOTE**
> If this parameter is set to 1, the same operation as in FS0*i*-C is assumed.

 # 3 **NCSs** When the Cs contour control mode is set:

0: Switching to Cs contour control is completed when the spindle activating current is on (the spindle amplifier is ready for operation in the Cs contour control mode).

1: Switching to Cs contour control is completed even when the spindle activating current is off (the spindle amplifier is not ready for operation in the Cs contour control mode).

If this parameter is set to 1, the Cs contour control switch end signal is output without waiting for the spindle to decelerate to a stop.

 # 7 **CSCs** The increment system of the Cs contour control axis is:

0: IS-B.

1: IS-C.

3730	Data used for adjusting the gain of the analog output of spindle speed

[Input type] Parameter input

[Data type] Word spindle

[Unit of data] 0.1%

[Valid data range] 700 to 1250

Set data used for adjusting the gain of the analog output of spindle speed.

[Adjustment method] <1> Assign standard value 1000 to the parameter.

<2> Specify the spindle speed so that the analog output of the spindle speed is the maximum voltage (10 V).

<3> Measure the output voltage.

<4> Assign the value obtained by the following equation to parameter No.3730.

Setting value = (10 (V) / Measured data (V)) × 1000

<5> After setting the parameter, specify the spindle speed so that the analog output of the spindle speed is the maximum voltage. Confirm that the output voltage is 10V.

> **NOTE**
> This parameter needs not to be set for serial spindles.

3731	Compensation value for the offset voltage of spindle speed analog output

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Velo
[Valid data range] -1024 to 1024

Set a compensation value for the offset voltage of spindle speed analog output.
Setting = -8191 × offset voltage (V)/12.5

[Adjustment method]
<1> Assign standard value 0 to the parameter.
<2> Specify the spindle speed so that the analog output of the spindle speed is 0.
<3> Measure the output voltage.
<4> Assign the value obtained by the following equation to parameter No.3731.
Setting value = (-8191 × Offset voltage (V)) / 12.5
<5> After setting the parameter, specify the spindle speed so that the analog output of the spindle speed is 0. Confirm that the output voltage is 0V.

NOTE
This parameter needs not to be set for serial spindles.

3732	The spindle speed during spindle orientation or the spindle motor speed during spindle gear shift

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 20000

Set the spindle speed during spindle orientation or the spindle motor speed during gear shift.
When bit 1 (GST) of parameter No.3705 is set to 0, set the spindle speed during spindle orientation in min^{-1}.
When bit 1 (GST) of parameter No.3705 is set to 1, set the spindle motor speed during spindle gear shift calculated from the following formula.

For a serial spindle
Setting value =
(Spindle motor speed during spindle gear shift / Maximum spindle motor speed) × 16383

For an analog spindle
Setting value =
(Spindle motor speed during spindle gear shift / Maximum spindle motor speed) × 4095

3735	
	Minimum clamp speed of the spindle motor

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 4095

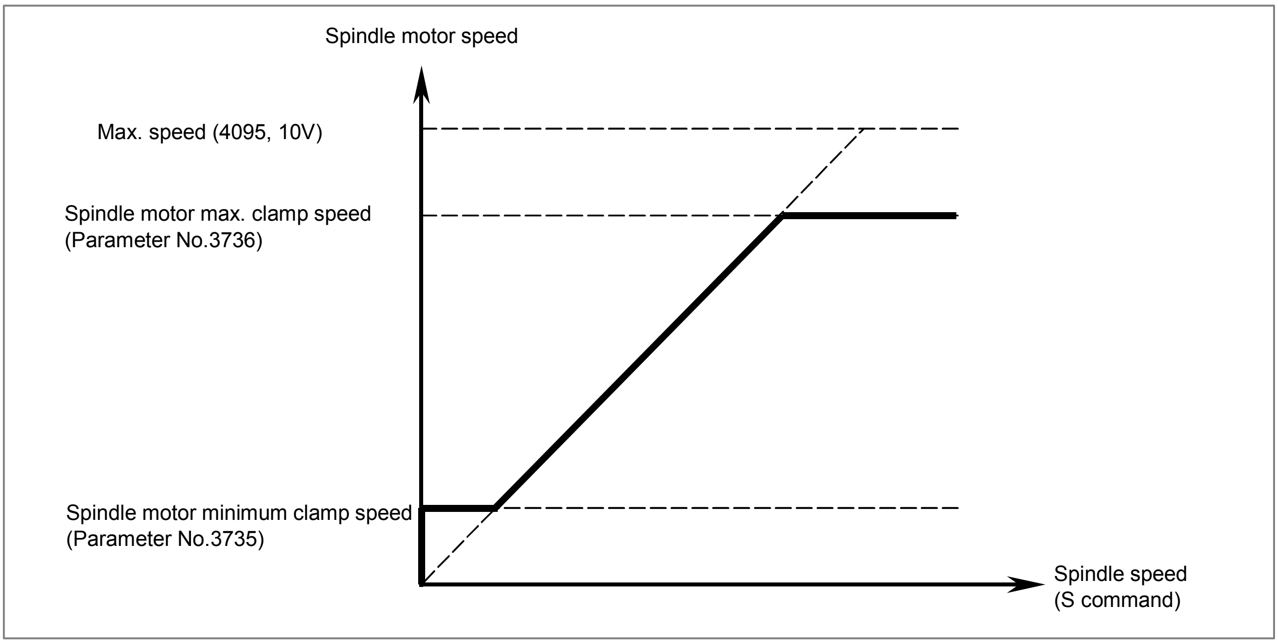
Set the minimum clamp speed of the spindle motor.
Setting value =
(Minimum clamp speed of the spindle motor / Maximum spindle motor speed) × 4095

3736	
	Maximum clamp speed of the spindle motor

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 4095

Set the maximum clamp speed of the spindle motor.
Setting value =
(Maximum clamp speed of the spindle motor / Maximum spindle motor speed) × 4095

NOTE
When constant surface speed control (bit 0 (SSC) of parameter No. 8133 is 1) or bit 4 of parameter No. 3706 is set, this parameter is invalid. In this case, the maximum clamp speed of the spindle motor can be set, but the maximum spindle motor speed can be set by parameter No. 3772.



3740	Time elapsed prior to checking the spindle speed arrival signal

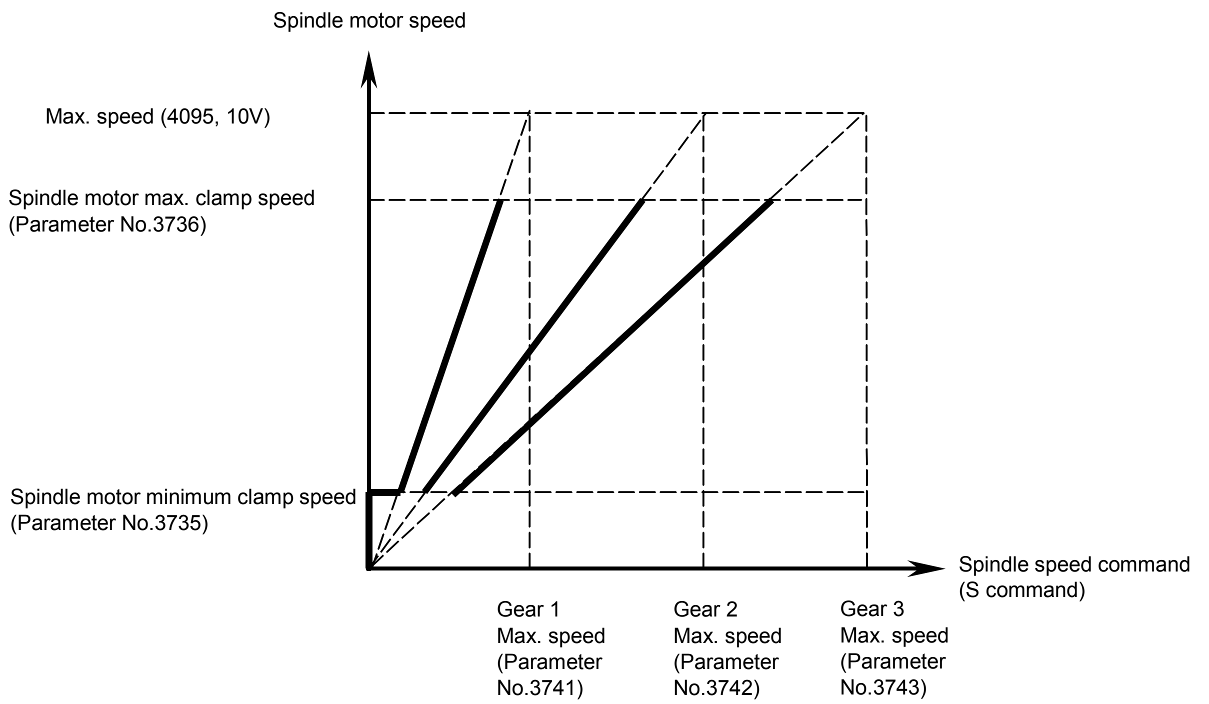
[Input type] Parameter input
[Data type] Word path
[Unit of data] msec
[Valid data range] 0 to 32767

Set the time elapsed from the execution of the S function up to the checking of the spindle speed arrival signal.

3741	Maximum spindle speed for gear 1
3742	Maximum spindle speed for gear 2
3743	Maximum spindle speed for gear 3
3744	Maximum spindle speed for gear 4 (Note)

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

Set the maximum spindle speed corresponding to each gear.



NOTE

If a type-T gear shift scheme is selected for the M series (with the constant surface speed control option installed or bit 4 (GTT) of parameter No. 3706 = 1), parameter No. 3744 is usable also in the M series.

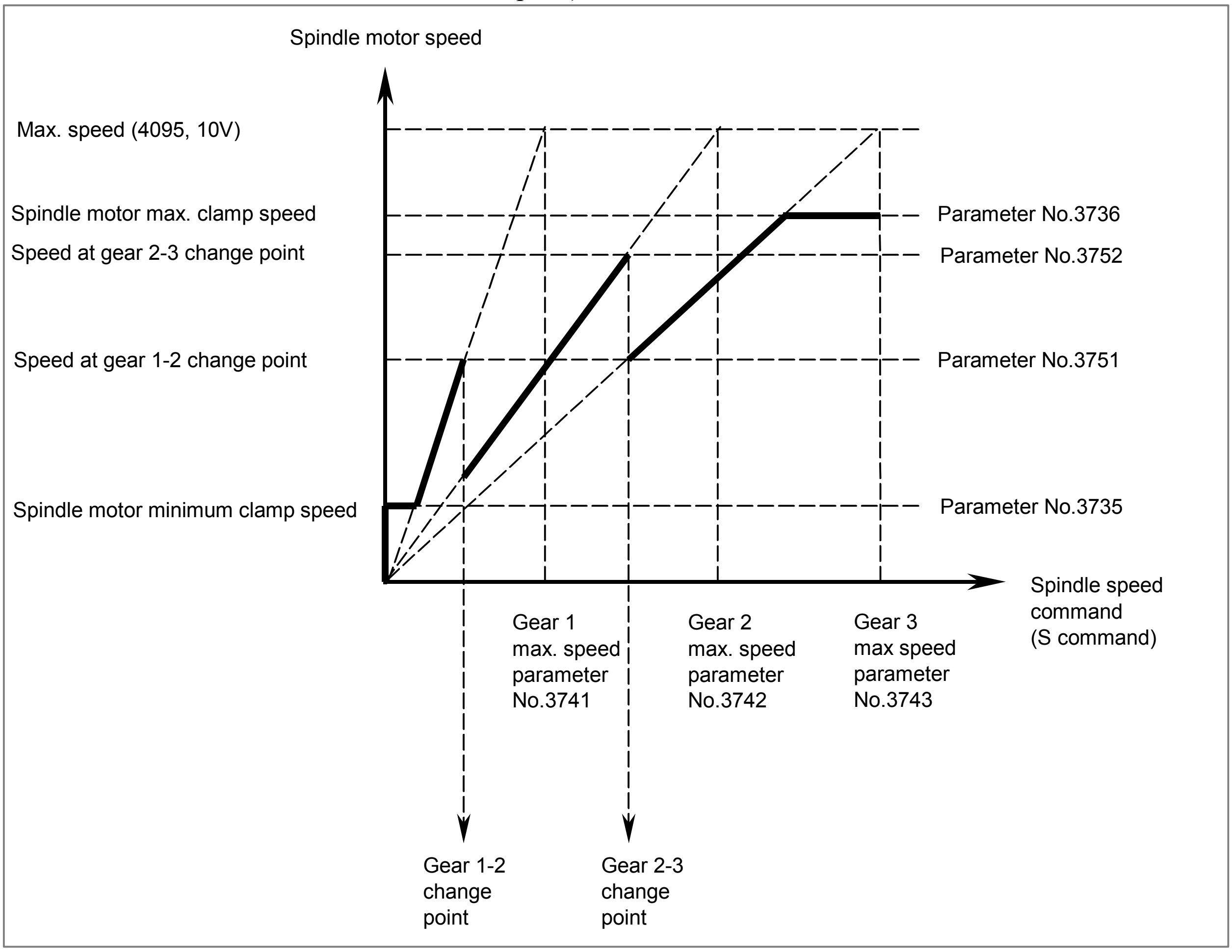
Note, however, that, even in this case, only up to three main gear stages are usable for rigid tapping.

3751	Spindle motor speed when switching from gear 1 to gear 2
3752	Spindle motor speed when switching from gear 2 to gear 3

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 4095

For gear switching method B, set the spindle motor speed when the gears are switched.

Setting value =
(Spindle motor speed when the gears are switched / Maximum spindle motor speed) × 4095

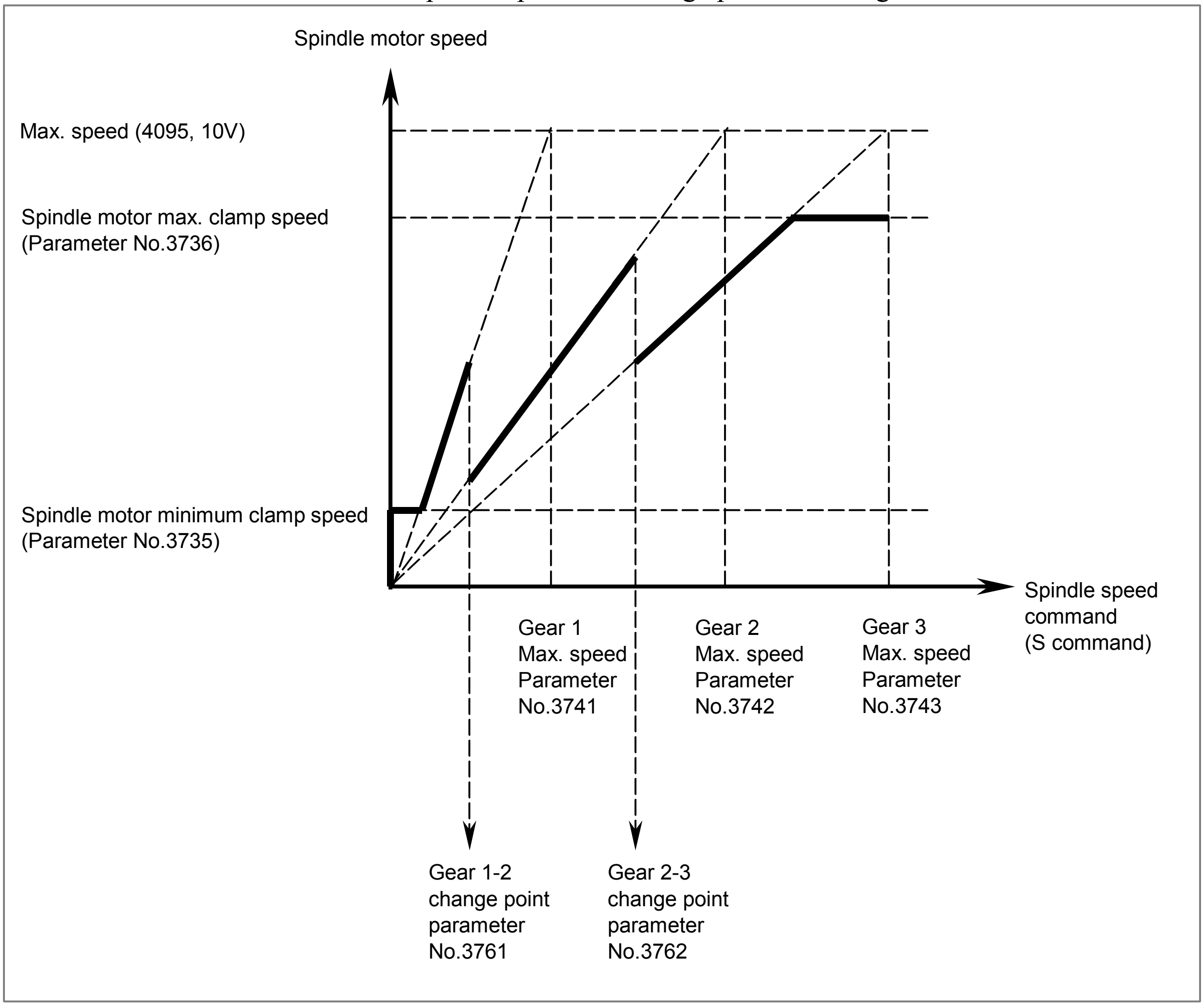


3761	Spindle speed when switching from gear 1 to gear 2 during tapping

3762	Spindle speed when switching from gear 2 to gear 3 during tapping

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

When method B is selected as the gear change method in the tapping cycle (when bit 3 (SGT) of parameter No. 3705 is set to 1), set the spindle speed at a change point of each gear.



3770	Axis as the calculation reference in constant surface speed control

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the axis as the calculation reference in constant surface speed control.

> **NOTE**
> When 0 is set, constant surface speed control is always applied to the X-axis. In this case, specifying P in a G96 block has no effect on the constant surface speed control.

3771	Minimum spindle speed in constant surface speed control mode (G96)

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] min^{-1}
[Valid data range] 0 to 32767

Set the minimum spindle speed in the constant surface speed control mode (G96).
The spindle speed in constant surface speed control is clamped to the speed given by parameter 3771.

3772	Maximum spindle speed

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

This parameter sets the maximum spindle speed.
When a command specifying a speed exceeding the maximum speed of the spindle is specified , or the speed of the spindle exceeds the maximum speed because of the spindle speed override function, the spindle speed is clamped at the maximum speed set in the parameter.

> ⚠ **CAUTION**
> 1 When 0 is set in this parameter, the speed of the spindle is not clamped.
> 2 When spindle speed command control is applied using the PMC, this parameter has no effect, and the spindle speed is not clamped.

> **NOTE**
> 1 For the M series, this parameter is valid when constant surface speed control is selected (bit 0 (SSC) of parameter No. 8133 is 1).
> 2 When the constant surface speed control is selected, the spindle speed is clamped at the maximum speed, regardless of whether the G96 mode or G97 mode is specified.

3775	Default P command value for spindle selection in multi-spindle control

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 32767

When bit 3 (MPP) of parameter No. 3703 is set to 1 and bit 2 (MPA) of parameter No. 3706 is set to 1 in multi-spindle control, set a default P command value applicable if S_P_ is not specified even once after power-up.

3781	P code for selecting the spindle in multi-spindle control

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 0 to 32767

If bit 3 (MPP) of parameter No. 3703 is set to 1, set the P code to select each spindle under multi-spindle control. Specify the P code in a block containing the S command.

Example)
If the P code value for selecting the second spindle is set to 3,
S1000 P3;
causes the second spindle to rotate at S1000.

NOTE
1 This parameter is valid if bit 3 (MPP) of parameter No. 3703 is set to 1.
2 If this parameter is set to 0, the corresponding spindle cannot be selected by a P code.
3 Under 2-path control, the P code specified here is valid for each path.
For instance, if the P code to select the first spindle of path 2 is set to 21, specifying S1000 P21; in path 1 causes the first spindle of path 2 to be rotated at S1000.
4 Identical P code values cannot be used for different spindles. (Identical P code values cannot be used even if the paths are different.)
5 When this parameter is used (when bit 3 (MPP) of parameter No. 3703 is set to 1), the spindle command selection signal is invalid.
6 To use this parameter, enable multi-spindle control (bit 3 (MSP) of parameter No. 8133 is 1).

	#7	#6	#5	#4	#3	#2	#1	#0
3798								ALM

[Input type] Parameter input
[Data type] Bit

 # 0 ALM The spindle alarm (SP****) for all spindles is:
0: Enabled.
1: Ignored.
When this parameter is set to 1, the spindle-related alarms are ignored. So, be sure to set this parameter to 0 at all times except for special cases such as maintenance.

	#7	#6	#5	#4	#3	#2	#1	#0
3799			SSHs		SVPs	ASDs	NDPs	NALs

[Input type] Parameter input
[Data type] Bit spindle

 # 0 NALs An alarm detected on the spindle amplifier side is:
0: Displayed.
1: Not displayed.
(This parameter is valid when bit 0 (ALM) of parameter No. 3798 is set to 0.)
When this parameter is set to 1, an alarm detected on the spindle amplifier side is ignored. So, be sure to set this parameter to 0 at all times except for special cases such as maintenance.

 # 1 NDPs When an analog spindle is used, a position coder disconnection check is:
0: Made.
1: Not made.
(This parameter is valid when bit 0 (NAL) of parameter No. 3799 is set to 0.)
When no position coder is used with an analog spindle, set this parameter to 1.

 # 2 ASDs When a serial spindle is used, a spindle speed is calculated based on:
0: Feedback pulses from the position coder.
1: Speed monitor.

 # 3 SVPs As synchronization errors displayed on the spindle screen:
0: Monitor values are displayed.
1: Peak-hold values are displayed,
Spindle synchronization errors are displayed on the side of the spindle that functions as a slave axis in spindle synchronization control.

 # 5 SSHs Displaying of total spindle speed data on the diagnosis screen is:
0: Disabled.
1: Enabled.

Parameters for Control of Serial Interface Spindle Cs Contouring Control Axis

Number	Data format	Description	
3900	Byte path	First group	Number of the servo axis whose loop gain is to be changed according to the set values of parameters 3901 to 3904 when the Cs contouring axis is controlled
3901	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 1 selection
3902	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 2 selection
3903	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 3 selection
3904	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 4 selection

Number	Data format	Description	
3910	Byte path	Second group	Number of the servo axis whose loop gain is to be changed according to the set values of parameters 3911 to 3914 when the Cs contouring axis is controlled
3911	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 1 selection
3912	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 2 selection
3913	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 3 selection
3914	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 4 selection
3920	Byte path	Third group	Number of the servo axis whose loop gain is to be changed according to the set values of parameters 3921 to 3924 when the Cs contouring axis is controlled
3921	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 1 selection
3922	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 2 selection
3923	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 3 selection
3924	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 4 selection
3930	Byte path	Fourth group	Number of the servo axis whose loop gain is to be changed according to the set values of parameters 3931 to 3934 when the Cs contouring axis is controlled
3931	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 1 selection
3932	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 2 selection
3933	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 3 selection
3934	Word path		Loop gain for the servo axis when the Cs contouring axis is controlled for spindle gear 4 selection

<Setting method>

First, select servo axes which perform interpolation with the Cs contouring axis. (Up to four axes can be selected.)

When there is no servo axis for interpolation with the Cs contouring axis, set the parameters 3900, 3910, 3920, and 3930 to 0 to terminate parameter setting.

When there are servo axes for interpolation with the Cs contouring axis, the parameters must be set according to the procedure below for each axis.

(1) Set the number of a servo axis (1 to maximum number of controlled axes) for interpolation with the Cs contouring axis in parameters 39n0 (n = 0, 1, 2, and 3).

(2) Set loop gain values of the servo axis specified in (1) above which is used when the Cs contouring axis is controlled in parameters 39n1, 39n2, 39n3, and 39n4. (There are four stages for main gears used.)

(3) When the number of specified servo axes is less than 4, set the remaining parameters (39n0) to 0 to terminate parameter setting.

When the number of a Cs contouring axis is set to parameter 39n0, the parameter is assumed to be set to 0.

NOTE

1. In general, it is difficult to set a high loop gain for a spindle motor axis when compared with a servo axis. These parameters are provided so that, by changing the loop gain of a servo axis that requires interpolation with the Cs contour axis, interpolation control can be exercised correctly between the Cs axis and servo axis while the spindle exercises Cs contour control.
2. The loop gain of the servo axis is changed using the parameter settings made for a spindle gear selected at the time of conversion from the spindle mode to the Cs contour control mode.
   In normal use, it is unlikely that the gear of the spindle is switched during Cs contour control. However, note that if the gear of the spindle is changed during Cs contour control, the loop gain of the servo axis is not changed.
3. Even when multiple Cs axes are used with one path (bit 7 (CSS) of parameter No. 3704 = 1), these parameters are shared.

Parameters for Serial interface spindle or spindle

Parameters Nos. 4000 to 4799 below are basically used with the serial spindle amplifier. For details of these parameters, refer to either of the following manuals and other related documents, depending on the spindle that is actually connected.

- FANUC AC SPINDLE MOTOR αi series Parameter Manual (B-65280EN)

	#7	#6	#5	#4	#3	#2	#1	#0
4000								
to	to							
4015	(No user setting allowed = Note 1)							
to	to							
4019	(Note 2)							

[Input type] Parameter input
[Data type] Bit spindle

4020	
to	to
4133	

[Input type] Parameter input
[Data type] Word spindle

4134	

4135	

[Input type] Parameter input
[Data type] 2-word spindle

4136	
to	to
4175	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4352								

	#7	#6	#5	#4	#3	#2	#1	#0
4353								

[Input type] Parameter input
[Data type] Bit spindle

4354	
to	to
4371	(No user setting allowed = Note 1)

4372	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4373								
4374								

[Input type] Parameter input
[Data type] Bit spindle

4375	
to	to
4393	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4394								
to	to							
4403								

[Input type] Parameter input
[Data type] Bit spindle

4404	
to	to
4466	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4467								
to	to							
4476								

[Input type] Parameter input
[Data type] Bit spindle

4477	
to	to
4539	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4540								
to	to							
4549								

[Input type] Parameter input
[Data type] Bit spindle

4550	
to	to
4669	

[Input type] Parameter input
[Data type] Word spindle

	#7	#6	#5	#4	#3	#2	#1	#0
4670								
to				to				
4679								

[Input type] Parameter input
[Data type] Bit spindle

4680	
to	to
4799	

[Input type] Parameter input
[Data type] Word spindle

NOTE

1 Among the parameters of the spindle amplifier with the serial interface, parameters No. 4015 cannot be changed by the users.
These parameters require to assign optional software to the CNC and are automatically set depending on the type of the software.
The setting of parameter No. 4371 is also unchangeable by the user.

2 To set the parameters of the spindle amplifier with the serial interface automatically, set #7 of parameter No.4019 to 1, assign the model code of the motor to be used to parameter No.4133, turn off the power of the CNC and spindle amplifier, and restart the CNC and spindle amplifier.

3 Parameters No.4000 to No.4799 are used in the processing on the spindle amplifier. For details of these parameters, refer to either of the following manuals, depending on the serial spindle that is actually used.
- FANUC AC SPINDLE MOTOR αi series Parameter Manual (B-65280EN)

4 The CNC can control up to three spindle amplifiers with the serial interface.

NOTE

5 The CNC stores the parameters of the spindle amplifier with the serial interface. The CNC sends them to the spindle amplifier at the system power on and they are used in the unit.
These parameters are sent from the CNC to the spindle amplifier in a batch when:
- The CNC is switched on.

If these parameters are rewritten, they are sent from the CNC to the spindle amplifier sequentially when:
- The parameters have been entered from the MDI.
- The parameters have been entered as programmable (G10).
- The parameters have been entered via the reader/punch interface.

To set parameters automatically, upload parameters corresponding to the motor model from the spindle amplifier to the CNC prior to the procedure specified above.
The parameters of the spindle amplifier with serial interface can be changed after the system starts. Changing the parameters (No.4000 to No.4799 "S1" to "S8") in the CNC sends them to the spindle amplifier at an appropriate time and the parameters in the unit are updated.
(Be careful not to change parameters incorrectly.)

	#7	#6	#5	#4	#3	#2	#1	#0
4800			SCB	SYM				
		EPZ	SCB	SYM				

[Input type] Parameter input
[Data type] Bit

NOTE

When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 4 SYM As the maximum spindle speed in spindle synchronization control:

0: The maximum spindle speed of the master spindle is used.

1: The maximum spindle speed of the master spindle or slave spindle, whichever lower, is used.

 # 5 **SCB** The combination of a master spindle and slave spindle for spindle synchronization depends on:

0: Setting of bit 4 (SSS) of parameter No. 3704.
When bit 4 (SSS) of parameter No. 3704 is set to 0
The first spindle and second spindle of each path can be selected as the master spindle and slave spindle, respectively, for spindle synchronization.
When bit 4 (SSS) of parameter No. 3704 is set to 1
A combination of arbitrary spindles of each path can be selected for spindle synchronization.
Set a master spindle for each slave spindle in parameter No. 4831. Set a spindle number of each path.
By setting a spindle number common to the system in parameter No. 4832, an arbitrary spindle that belongs to a different path can be selected as a master spindle for spindle synchronization. Set a spindle number common to the system. Set parameter No. 4831 to 0. Spindle synchronization based on arbitrary spindles must be enabled for the path to which a slave spindle belongs and for the path to which a master spindle belongs.

1: 0*i*-TTC system compatible specifications.
The first spindle of path 1 and the first spindle of path 2 can be selected as the master spindle and slave spindle, respectively, for spindle synchronization.
As control signals, the signal interface of the 0*i*-TTC system compatible specifications can be used.

 # 6 **EPZ** When the parking signal is switched in the reference position established state during Cs contour control exercised using simple spindle synchronous control (M series):

0: Reference position established state is continued.
1: Reference position established state is canceled.

If this parameter is set, the same reference position return operation as manual reference position return is performed with the G28 command immediately after the parking signal is switched.
The G00 command performs a positioning operation including reference position return (when bit 1 (NRF) of parameter No. 3700 is set to 0).

	#7	#6	#5	#4	#3	#2	#1	#0
4801								SNDs

[Input type] Parameter input
[Data type] Bit spindle

NOTE
When this parameter is set, the power must be turned off before operation is continued.

 # 0 **SNDs** During spindle synchronization control, the rotation direction of each spindle motor is:

0: Same as the specified sign.
1: Opposite to the specified sign.

4810	Error pulse between two spindles when synchronizing phases in the spindle synchronization control mode

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 255

Set an allowable error pulse value between two spindles at phase synchronization time in the spindle synchronization control mode.
This parameter is used to check the completion of phase synchronization performed in the spindle synchronization control mode and to check the phase difference during spindle synchronization control.
When the error pulse value between two spindles become equal to or less than the value set in this parameter, the spindle phase synchronization control completion signals FSPPH<F044.3> and FSPPH1, 2<F289.0, 1> are set to 1.

4811	Allowable error count for the error pulses between two spindles in the spindle synchronization control mode

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 32767

Set the allowable error count for the error pulses between two spindles in the spindle synchronization control mode.
This parameter is used to check a spindle synchronization error phase difference.
When a spindle synchronization error equal to or greater than the value set in this parameter is detected, the phase error monitor signals SYCAL<F044.4> and SYCAL1, 2<F043.0, 1> are set to 1.

4821	Master axis of each slave spindle under simple synchronous spindle control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to Maximum number of controlled spindle axes

When a spindle is set as a slave spindle in simple spindle synchronous control (M series) on each spindle, set which spindle (master spindle) the slave spindle is to be synchronized with.

Examples of parameter setting)

- If the master spindle is the first spindle and the slave spindle is the second spindle:
  No.4821(1)=0
  No.4821(2)=1

NOTE
1 This parameter is valid if bit 5 (SSY) of parameter No. 3704 is set to 1.
2 Be sure to set 0 for a spindle that is to function as a master spindle.

4826	Allowable error count for the error pulses between two spindles in the simple synchronization spindle control mode

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 32767

Set the allowable error count for the error pulses between two spindles in the simple synchronization spindle control (M series) mode.
This parameter is used to check a spindle synchronization error phase difference.
When a spindle synchronization error equal to or greater than the value set in this parameter is detected, the spindle phase error monitor signals SYCAL<Fn044.4> and SYCALs are set to 1.

NOTE
1 The detection unit per pulse depends on the spindle control mode (Cs contour control or rigid tapping).
2 Set this parameter for a spindle that is to function as a slave spindle. Set 0 for the master spindle.
3 In the spindle rotation control mode, synchronization error detection is not performed.

4831	Master axis of each slave spindle under spindle synchronous control

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to Maximum number of controlled spindle axes (within a path)

When a spindle is set as a slave spindle in spindle synchronization control on each spindle, set which spindle (master spindle) the slave spindle is to be synchronized with.

Examples of parameter setting)

- When spindle synchronization control is exercised with the first spindle selected as a master spindle and the second spindle selected as a slave spindle
  No.4831(1)=0
  No.4831(2)=1

> **NOTE**
> 1 This parameter is valid if bit 4 (SSS) of parameter No. 3704 is set to 1.
> 2 The setting of a slave spindle as a master spindle is invalid. Be sure to set 0 for a spindle that is to function as a master spindle.
> 3 In this parameter, set a spindle number within the same path. When a spindle not belonging to the local path is to be selected as a master spindle for spindle synchronization, set a spindle number common to the system in parameter No. 4832. In such a case, set 0 in this parameter.

4832	Master spindle of each slave spindle under spindle synchronization control (spindle number common to the system)

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to Maximum number of controlled spindle axes (common to the system)

When a spindle is set as a slave spindle in spindle synchronization control on each spindle, set which spindle (master spindle) the slave spindle is to be synchronized with.

NOTE
1 This parameter is valid if bit 4 (SSS) of parameter No. 3704 is set to 1.
Bit 4 (SSS) of parameter No. 3704 must be set to 1 (to enable spindle synchronization based on arbitrary spindles) for the path to which a slave spindle belongs and for the path to which a master spindle belongs.
2 The setting of a slave spindle as a master spindle is invalid. Be sure to set 0 for a spindle that is to function as a master spindle.
3 In this parameter, set a spindle number common to the system. When this parameter is used, parameter No. 4831 is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
4900								FLRs

[Input type] Parameter input
[Data type] Bit spindle

 # 0 FLRs When the spindle speed fluctuation detection function (T series) is used, the unit of an allowable ratio (q) and fluctuation ratio (r) set by parameter No. 4911 and No. 4912 is:
0: 1%
1: 0.1%

4911	Allowable speed ratio (q) used to assume that the spindle has reached a specified speed

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] 1%, 0.1%
[Valid data range] 1 to 100, 1 to 1000

When the spindle speed fluctuation detection function is used, set an allowable speed ratio (q) used to assume that the spindle has reached a specified speed.

NOTE
The unit of data is determined by bit 0 (FLR) of parameter No. 4900.

4912	Spindle variation ratio (r) for not issuing a spindle speed fluctuation detection alarm

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] 1%, 0.1%
[Valid data range] 1 to 100, 1 to 1000

When the spindle speed fluctuation detection function is used, set a spindle fluctuation ratio (r) for not issuing an alarm.

NOTE
The unit of data is determined by bit 0 (FLR) of parameter No. 4900.

4913	Spindle speed fluctuation width (i) for not issuing a spindle speed fluctuation detection alarm

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] min^{-1}
[Valid data range] 0 to 99999

When the spindle speed fluctuation detection function is used, set an allowable fluctuation width (i) for not issuing an alarm.

4914	Time (p) from the change of a specified speed until spindle speed fluctuation detection is started

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] msec
[Valid data range] 0 to 999999

When the spindle speed fluctuation detection function is used, set a time (p) from the change of a specified speed until spindle speed fluctuation detection is started. In other words, spindle speed fluctuation detection is not performed until a set time has elapsed after a specified speed is changed. However, when the actual spindle speed is assumed to have reached a specified value within a set time (p), spindle speed fluctuation detection is started.

	#7	#6	#5	#4	#3	#2	#1	#0
4950	IMBs	ESIs	TRVs			ISZs	IDMs	IORs

[Input type] Parameter input
[Data type] Bit spindle

 # 0 IORs Resetting the system in the spindle positioning mode
0: Does not release the mode.
1: Releases the mode

 # 1 IDMs The direction of spindle positioning (half-fixed angle positioning based on M codes) is:
0: Plus direction.
1: Minus direction.

 # 2 ISZs When an M code for spindle orientation is specified in spindle positioning:
0: The spindle is switched to the spindle positioning mode, and spindle orientation operation is performed.
1: Only the switching of the spindle to the spindle positioning mode is performed. (Spindle orientation operation is not performed.)

 # 5 TRVs The rotation direction for spindle positioning is:
0: Same as the specified sign.
1: Opposite to the specified sign.

> **NOTE**
> When a serial spindle is used, this parameter is invalid for the specification of a rotation direction for the orientation command.

 # 6 ESIs The unit of rapid traverse rate on the spindle positioning axis is:
0: Not increased by a factor of 10.
1: Increased by a factor of 10.

 # 7 IMBs When the spindle positioning function is used, half-fixed angle positioning based on M codes uses:

0: Specification A
1: Specification B

In the case of half-fixed angle positioning based on M codes, three types of spindle positioning operations can occur:

(1) The spindle rotation mode is cleared, then the mode is switched to the spindle positioning mode. (After switching to the spindle positioning mode, spindle orientation operation is also performed.)
(2) Spindle positioning is performed in the spindle positioning mode.
(3) The spindle positioning mode is cleared, then the mode is switched to the spindle rotation mode.

- In the case of specification A:
  Operations (1) to (3) are specified using separate M codes.
  (1) Specified using an M code for switching to the spindle positioning mode.
  (See parameter No.4960)
  (2) Specified using M codes for specifying a spindle positioning angle.
  (See parameter No.4962)
  (3) Specified using M codes for clearing spindle positioning operation.
  (See parameter No.4961.)
- In the case of specification B:
  When M codes for specifying a spindle positioning angle are specified, operations (1) to (3) are performed successively. (See parameter No.4962.) (However, spindle orientation operation of (1) is not performed.)

	#7	#6	#5	#4	#3	#2	#1	#0
4959								DMDx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 DMDx A machine coordinate on the spindle positioning axis is displayed in:

0: Degrees.
1: Pulses.

4960	M code specifying the spindle orientation

[Input type] Parameter input
[Data type] 2-word spindle
[Valid data range] 6 to 97

Set an M code for switching to the spindle positioning mode.

> **NOTE**
> 1 Do not set an M code that duplicates other M codes used for spindle positioning.
> 2 Do not set an M code used with other functions (such as M00-05, 30, 98, and 99, and M codes for calling subprograms).

4961	M code releasing the spindle positioning mode

[Input type] Parameter input
[Data type] 2-word spindle
[Valid data range] 6 to 97

Set an M code for canceling the spindle positioning mode on the spindle positioning axis.

> **NOTE**
> 1 Do not set an M code that duplicates other M codes used for spindle positioning.
> 2 Do not set an M code used with other functions (such as M00-05, 30, 98, and 99, and M codes for calling subprograms).

4962	M code for specifying a spindle positioning angle

[Input type] Parameter input
[Data type] 2-word spindle
[Valid data range] 6 to 9999999

Two methods are available for specifying spindle positioning. One method uses axis address for arbitrary-angle positioning. The other use an M code for half-fixed angle positioning. This parameter sets an M code for the latter method.

In this parameter, set an M code to be used for half-fixed angle positioning based on M codes.

Six M code from Mα to M(α+5) are used for half-fixed angle positioning, when α is the value of this parameter.

- When the number of M codes is set in parameter No. 4964, let α be the value set in parameter No. 4962, and let β be the value set in parameter No. 4964. Then, β M codes from Mα to M(α+β-1) are used as M codes for half-fixed angle positioning based on M codes.

The table below indicates the relationship between the M codes and positioning angles.

M code	Positioning angle	Example: Positioning angle when θ = 30°
Mα	θ	30°
M(α+1)	2θ	60°
M(α+2)	3θ	90°
M(α+3)	4θ	120°
M(α+4)	5θ	150°
M(α+5)	6θ	180°
:	:	:
M(α+β-1)	$\beta\times\theta$	$\beta\times$30°

β represents the number of M codes set in parameter No. 4964.
(When parameter No. 4964 is set to 0, β = 6.)
θ represents the basic angular displacement set in parameter No.4963.

NOTE

1 Do not set an M code that duplicates other M codes used for spindle positioning.
2 Do not set an M code used with other functions (such as M00-05, 30, 98, and 99, and M codes for calling subprograms).

4963	Basic angle for half-fixed angle positioning

[Input type] Parameter input
[Data type] Real spindle
[Unit of data] Degree
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 to 60

This parameter sets a basic angular displacement used for half-fixed angle positioning using M codes.

4964	Number of M codes for specifying a spindle positioning angle

[Input type] Parameter input
[Data type] 2-word spindle
[Valid data range] 0 to 255

This parameter sets the number of M codes used for Half-fixed angle positioning using M codes.

As many M codes as the number specified in this parameter, starting with the M code specified in parameter No.4962, are used to specify half-fixed angle positioning.

Let α be the value of parameter No.4962, and let β be the value of parameter No.4964. That is, M codes from Mα to M(α+β-1) are used for half-fixed angle positioning.

Setting this parameter to 0 has the same effect as setting 6. That is, M code from Mα to M(α+5) are used for half-fixed angle positioning.

NOTE

1. Make sure that M codes from Mα to M (α+β-1) do not duplicate other M codes.
2. Do not set an M code that duplicates other M codes used for spindle positioning.
3. Do not set an M code used with other functions (such as M00-05, 30, 98, and 99, and M codes for calling subprograms).

4970	Position gain

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] 0.01/sec
[Valid data range] 1 to 9999

Set the position gain of the analog spindle in the spindle positioning mode.

4971	Position gain multiplier (first stage)

4972	Position gain multiplier (second stage)

4973	Position gain multiplier (third stage)

4974	Position gain multiplier (fourth stage)

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 1 to 32767

Set a position gain multiplier for an analog spindle in spindle positioning.

Position gain multiplier GC is obtained from the following equation:

$$GC = \frac{2048000 \times 360 \times PC \times E}{PLS \times SP \times L}$$

PLS Number of pulses output from the position coder (pulses/rev)
SP Number of gear teeth on the spindle side
PC Number of gear teeth on the position coder side
E Specified voltage (V) for turning the spindle motor at 1000 min^{-1}
L Angular displacement of the spindle (degrees) per spindle motor rotation

Example: For the spindle motor and gear ratio given below, GC is calculated as follows:

PLS = 4096 pulse/rev
SP = 1
PC = 1
E = 2.2 V
L = 360 deg

$$GC = \frac{2048000 \times 360 \times 1 \times 2.2}{4096 \times 1 \times 360} = 1100$$

NOTE

On the assumption that the spindle motor used turns at 4500 min^{-1} at 10 V, 2.2 V is required to turn the spindle motor at 1000 min^{-1}

4.22 PARAMETERS OF TOOL COMPENSATION (1 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
5000								SBK
							MOF	SBK

[Input type] Setting input
[Data type] Bit path

 # 0 SBK With a block created internally for cutter compensation or tool nose radius compensation:
0: A single block stop is not performed.
1: A single block stop is performed.
This parameter is used to check a program including cutter compensation/tool nose radius compensation.

 # 1 MOF When the tool length compensation shift type (bit 6 (TOS) of parameter No. 5006 is set to 1) is used, if the tool length compensation amount is changed(NOTE 2) in the tool length compensation mode when look-ahead blocks are present(NOTE 1):
0: Compensation is performed for the change in compensation amount as the movement type.
1: Compensation is not performed for the change until a tool length compensation command (offset number) and an absolute command for the compensation axis are specified.

NOTE

1 "When look-ahead blocks are present" means as follows:
- The modal G code of the G codes (such as tool nose radius compensation) of group 07 is other than G40.

One look-ahead block during automatic operation and multiple look-ahead blocks in the AI advanced preview control/AI contour control mode are not included in the state "when look-ahead blocks are present".

2 Changes in tool length compensation amount are as follows:
- When the tool length compensation number is changed by H code
- When G43 or G44 is specified to change the direction of tool length compensation
- When the tool length compensation amount is changed using the offset screen, G10 command, system variable, PMC window, and so forth during automatic operation if bit 1 (EVO) of parameter No. 5001 is set to 1.
- When a tool length compensation vector canceled temporarily during tool length compensation by G53, G28, or G30 is recovered

	#7	#6	#5	#4	#3	#2	#1	#0
5001								
		EVO	TPH	EVR	TAL	OFH	TLB	TLC

[Input type] Parameter input
[Data type] Bit path

 # 0 TLC
 # 1 TLB These bits are used to select a tool length compensation type.

Type	TLB	TLC
Tool length compensation A	0	0
Tool length compensation B	1	0
Tool length compensation C	-	1

The axis to which cutter compensation is applied varies from type to type as described below.
Tool length compensation A :
Z-axis at all times
Tool length compensation B :
Axis perpendicular to a specified plane (G17/G18/G19)
Tool length compensation C :
Axis specified in a block that specifies G43/G44

 # 2 OFH In cutter compensation (G40, G41, or G42), the address used to specify a compensation number is:
0: Address D.
1: Address H.

NOTE
When this parameter is 1, if tool length compensation and cutter compensation are specified in the same block, cutter compensation is prioritized.

 # 3 TAL Tool length compensation C
0: Generates an alarm when two or more axes are offset
1: Not generate an alarm even if two or more axes are offset

 # 4 EVR When a tool compensation value is changed in cutter compensation mode:
0: Enables the change, starting from that block where the next D or H code is specified.
1: Enables the change, starting from that block where buffering is next performed.

 # 5 TPH In tool offsets (G45, G46, G47, or G48), the address used to specify a compensation number is:
0: Address D.
1: Address H.

> **NOTE**
> This parameter is valid when bit 2 (OFH) of parameter No. 5001 is 0.

 # 6 EVO If a tool compensation value modification is made for tool length compensation A or tool length compensation B in the offset mode (G43 or G44):
0: The new value becomes valid in a block where G43, G44, or an H code is specified next.
1: The new value becomes valid in a block where buffering is performed next.

	#7	#6	#5	#4	#3	#2	#1	#0
5002	WNP	LWM	LGC	LGT		LWT	LGN	

[Input type] Parameter input
[Data type] Bit path

 # 1 LGN Geometry offset number of tool offset
0: Is the same as wear offset number
1: Specifies the geometry offset number by the tool selection number

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

 # 2 LWT Tool wear compensation is performed by:
0: Moving the tool.
1: Shifting the coordinate system.

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

 # 4 LGT Tool geometry compensation
0: Compensated by the shift of the coordinate system
1: Compensated by the tool movement

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

 # 5 LGC When tool geometry compensation is based on coordinate shifting, the tool geometry offset is:
0: Not canceled by a command with offset number 0.
1: Canceled by a command with offset number 0.

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

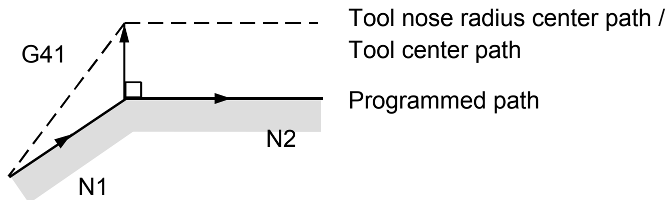
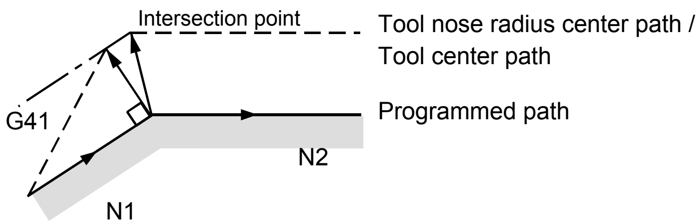
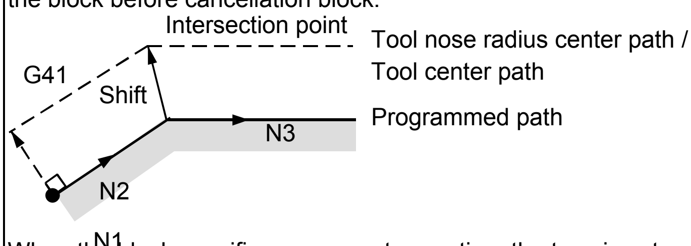
 # 6 LWM Tool offset operation based on tool movement is performed:
0: In a block where a T code is specified.
1: Together with a command for movement along an axis.

 # 7 WNP Imaginary tool tip number used for tool nose radius compensation, when the geometry/wear compensation function is equipped (bit 6 (NGW) of parameter No. 8136 is 0), is the number specified by:
0: Geometry offset number
1: Wear offset number

	#7	#6	#5	#4	#3	#2	#1	#0
5003	TGC	LVK					SUV	SUP
		LVK					SUV	SUP

[Input type] Parameter input
[Data type] Bit path

 # 0 SUP
 # 1 SUV These bits are used to specify the type of startup/cancellation of cutter compensation or tool nose radius compensation.

SUV	SUP	Type	Operation
0	0	Type A	A compensation vector perpendicular to the block next to the startup block or the block preceding the cancellation block is output. 
0	1	Type B	A compensation vector perpendicular to the startup block or cancellation block and an intersection vector are output. 
1	0 1	Type C	When the startup block or cancellation block specifies no movement operation, the tool is shifted by the cutter compensation amount in a direction perpendicular to the block next to the startup or the block before cancellation block.  When the block specifies movement operation, the type is set according to the SUP setting; if SUP is 0, type A is set, and if SUP is 1, type B is set.

> **NOTE**
> When SUV,SUP = 0,1 (type B), an operation equivalent to that of FS0*i*-TC is performed.

 # 6 LVK Tool length compensation vector
0: Cleared by reset
1: Not cleared, but held by reset

 # 7 TGC A tool geometry offset based on a coordinate shift is:
0: Not canceled by reset.
1: Canceled by reset.

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

	#7	#6	#5	#4	#3	#2	#1	#0
5004					TS1		ORC	
						ODI		

[Input type] Parameter input
[Data type] Bit path

 # 1 ORC The setting of a tool offset value is corrected as:
0: Diameter value
1: Radius value

> **NOTE**
> This parameter is valid only for an axis based on diameter specification. For an axis based on radius specification, specify a radius value, regardless of the setting of this parameter.

 # 2 ODI The setting of a cutter compensation value is corrected as:
0: Radius value
1: Diameter value

 # 3 TS1 For touch sensor contact detection with the function for direct input of offset value measured B (T series):
0: Four-contact input is used.
1: One-contact input is used.

	#7	#6	#5	#4	#3	#2	#1	#0
5005			QNI			PRC		CNI
			QNI					

[Input type] Parameter input
[Data type] Bit path

 # 0 CNI On the offset screen, Y-axis offset screen, and macro screen, the [INP.C] soft key is:
0: Used.
1: Not used. (The [INP.C] soft key is not displayed.)

 # 2 PRC For direct input of a tool offset value or workpiece coordinate system shift amount:
0: The PRC signal is not used.
1: The PRC signal is used.

 # 5 QNI With the tool length measurement function (M series) or the function for direct input of offset value measured B (T series), a tool compensation number is selected by:
0: Operation through the MDI panel by the operator (selection based on cursor operation).
1: Signal input from the PMC.

	#7	#6	#5	#4	#3	#2	#1	#0
5006					LVC		TGC	GSC
		TOS						

[Input type] Parameter input
[Data type] Bit

 # 0 GSC When the function for direct input of offset value measured B (T series) is used, an offset write input signal is input from:
0: Machine side
1: PMC side
When the interlock function for each axis direction is enabled (when bit 3 (DIT) of parameter No. 3003 is set to 0), switching can also be made between input from the machine side and input from PMC side for the interlock function for each axis direction.

 # 1 TGC If a T code is specified in a block where G50, G04, or G10 is specified:
0: No alarm is issued.
1: The alarm (PS0245) is issued.

 # 3 LVC A tool offset (geometry/wear) based on a tool movement and wear offset based on a coordinate shift are:
0: Not canceled by reset.
1: Canceled by reset.

 # 6 TOS Set a tool length compensation operation.
0: Tool length compensation is performed by an axis movement.
1: Tool length compensation is performed by shifting the coordinate system.

	#7	#6	#5	#4	#3	#2	#1	#0
5008				MCR	CNV		CNC	
		GCS		MCR	CNV		CNC	

[Input type] Parameter input
[Data type] Bit path

 # 1 CNC
 # 3 CNV These bits are used to select an interference check method in the cutter compensation or tool nose radius compensation mode.

CNV	CNC	Operation
0	0	Interference check is enabled. The direction and the angle of an arc are checked.
0	1	Interference check is enabled. Only the angle of an arc is checked.
1	-	Interference check is disabled.

For the operation taken when the interference check shows the occurrence of an reference (overcutting) , see the description of bit 5 (CAV) of parameter No. 19607.

> **NOTE**
> Checking of only the direction cannot be set.

 # 4 MCR If G41/G42 (cutter compensation or tool nose radius compensation) is specified in the MDI mode, an alarm is:
0: Not raised.
1: Raised. (alarm PS5257)

 # 6 GCS When G49 (G code for canceling tool length compensation) and G40 (G code for canceling cutter compensation) are specified in the same block:
0: Tool length compensation is canceled in the next block.
1: Tool length compensation is canceled in the specified block.

> **NOTE**
> This parameter is valid only when bit 2 (OFH) of parameter No. 5001 is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
5009				TSD				GSC
			TIP					

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 GSC When the function for direct input of offset value measured B (T series) is used, an offset write input signal is input from:
0: Machine side
1: PMC side
When the interlock function for each axis direction is enabled (when bit 3 (DIT) of parameter No. 3003 is set to 0), switching can also be made between input from the machine side and input from PMC side for the interlock function for each axis direction.

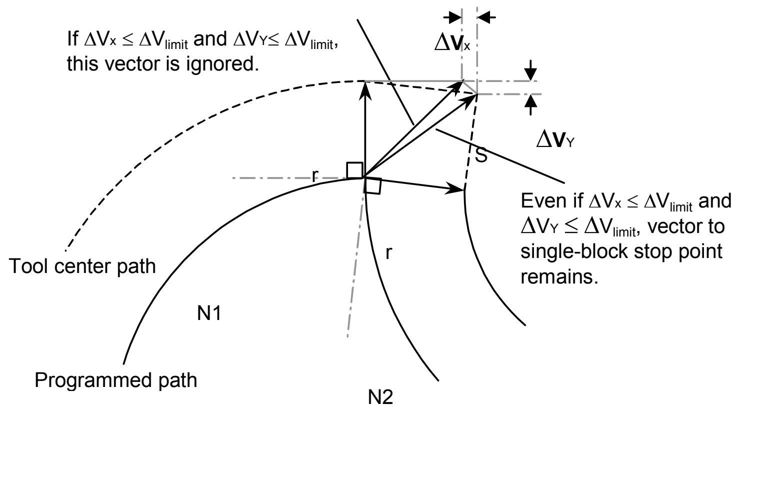
 # 4 TSD In the function for direct input of offset value measured B (T series), the movement direction determination specifications:
0: Do not apply.
1: Apply.
This parameter is valid when four-contact input is used (bit 3 (TS1) of parameter No. 5004 is set to 0).

 # 5 TIP In cutter compensation, the virtual tool tip direction is:
0: Not used.
1: Used.

5010	Limit for ignoring the small movement resulting from cutter or tool nose radius compensation

[Input type] Setting input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

When the tool moves around a corner in cutter compensation or tool nose radius compensation mode, the limit for ignoring the small travel amount resulting from compensation is set. This limit eliminates the interruption of buffering caused by the small travel amount generated at the corner and any change in feedrate due to the interruption.



ΔV_{limit} is determined depending on the setting in parameter No. 5010.

5013	Maximum value of tool wear compensation

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (offset unit)
[Minimum unit of data] The increment system of a tool offset value is followed.
[Valid data range] The settings of bits 1 and 0 (OFC and OFA) of parameter No. 5042 are followed.

For metric input

OFC	OFA	Valid data range
0	1	0 to 9999.99mm
0	0	0 to 9999.999mm
1	0	0 to 9999.9999mm

For inch input

OFC	OFA	Valid data range
0	1	0 to 999.999inch
0	0	0 to 999.9999inch
1	0	0 to 999.99999inch

This parameter sets the maximum allowable tool wear compensation value. If an attempt is made to set a tool wear compensation value, the absolute value of which exceeds the value set in this parameter, the following alarm or warning is output:

Input from MDI	Warning: Too many digits
Input by G10	Alarm PS0032: ILLEGAL OFFSET VALUE IN G10.

When 0 or a negative value is set, no maximum allowable value is applied.

[Example]
When 30.000 is set
As a tool offset value, a value from -30.000 to +30.000 can be input.

5014	Maximum value of incremental input for tool wear compensation

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (offset unit)
[Minimum unit of data] The increment system of a tool offset value is followed.
[Valid data range] The settings of bits 1 and 0 (OFC and OFA) of parameter No. 5042 are followed.

For metric input

OFC	OFA	Valid data range
0	1	0 to 9999.99mm
0	0	0 to 9999.999mm
1	0	0 to 9999.9999mm

For inch input

OFC	OFA	Valid data range
0	1	0 to 999.999inch
0	0	0 to 999.9999inch
1	0	0 to 999.99999inch

Set the maximum allowable value for the tool wear compensation value, input as an incremental value. If the incremental input value (absolute value) exceeds the set value, the following alarm or warning message is output:

Input from MDI	Warning: Too many digits
Input by G10	Alarm PS0032: ILLEGAL OFFSET VALUE IN G10.

When 0 or a negative value is set, no maximum allowable value is applied.

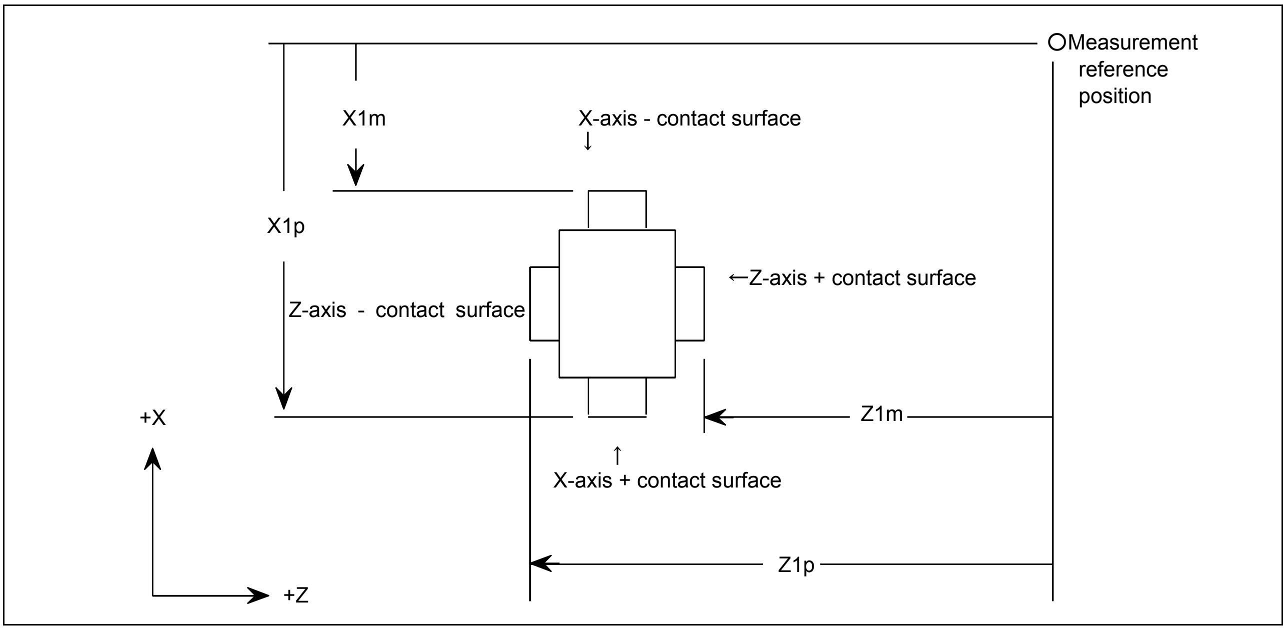
5015	**Distance to X-axis + contact surface of touch sensor 1 (X1P)**
5016	**Distance to X-axis - contact surface of touch sensor 1 (X1M)**
5017	**Distance to Z-axis + contact surface of touch sensor 1 (Z1P)**
5018	**Distance to Z-axis - contact surface of touch sensor 1 (Z1M)**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999.)

This parameter is related to the function for direct input of offset value measured B (T series).

Set the distance (signed) from a measurement reference position to each contact surface of a sensor. For a diameter specification axis, set a diameter value.

When arbitrary angular axis control is performed, set the distance in the Cartesian coordinate system.



5020	Tool offset number used with the function for direct input of offset value measured B

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to number of tool compensation values

Set a tool offset number used with the function for direct input of offset value measured B (T series) (when a workpiece coordinate system shift amount is set). (Set the tool offset number corresponding to a tool under measurement beforehand.) This parameter is valid when automatic tool offset number selection is not performed (when bit 5 (QNI) of parameter No. 5005 is set to 0).

5021	Number of interpolation cycles of pulses stored until the tool is about to touch the touch sensor

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 8

When a touch sensor of one-point input is used with the function for direct input of offset value measured B (T series), set the number of interpolation cycles of pulses stored until the manually operated tool is about to touch the touch sensor. When 0 is set, the specification of the maximum value 8 is assumed.

NOTE
This parameter is valid when bit 3 (TS1) of parameter No. 5004 is set to 1.

5024	Number of tool compensation values

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to number of tool compensation values

Set the maximum allowable number of tool compensation values used for each path.
Ensure that the total number of values set in parameter No. 5024 for the individual paths is within the number of compensation values usable in the entire system.
If the total number of values set in parameter No. 5024 for the individual paths exceeds the number of compensation values usable in the entire system, or 0 is set in parameter No. 5024 for all paths, the number of compensation values usable for each path is a value obtained by dividing the number of compensation values usable in the entire system by the number of paths.
Tool compensation values as many as the number of compensation values used for each path are displayed on the screen. If tool compensation numbers more than the number of compensation values usable for each path are specified, an alarm is issued.
For example, 100 tool compensation sets are used, 120 sets may be allocated to path 1 and 80 sets to path 2. All of 200 sets need not be used.

5028	Number of digits of an offset number used with a T code command

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 3

Specify the number of digits of a T code portion that is used for a tool offset number (wear offset number when the tool geometry/wear compensation function is used).
When 0 is set, the number of digits is determined by the number of tool compensation values.
When the number of tool compensation values is 1 to 9: Lower 1 digit
When the number of tool compensation values is 10 to 99: Lower 2 digits
When the number of tool compensation values is 100 to 200: Lower 3 digits
Example :
When an offset number is specified using the lower 2 digits of a T code, set 2 in parameter No. 5028.
Txxxxxx yy
xxxxxx : Tool selection
yy : Tool offset number

NOTE
A value longer than the setting of parameter No. 3032 (allowable number of digits of a T code) cannot be set.

5029	Number of tool compensation value memories common to paths

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to number of tool compensation values

When using memories common to paths, set the number of common tool compensation values in this parameter.

Ensure that the setting of this parameter does not exceed the number of tool compensation values set for each path (parameter No. 5024).

[Example 1]

When parameter No. 5029 = 10, parameter No. 5024 (path 1) = 15, and parameter No. 5024 (path 2) = 30 in a 2-path system, tool compensation numbers 1 to 10 of all paths are made common.

[Example 2]

When parameter No. 5029 = 20 and the other conditions are the same as for Example 1, tool compensation numbers 1 to 15 are made common.

> **NOTE**
> 1 Ensure that the setting of parameter No. 5029 does not exceed the number of tool compensation values for each path (parameter No. 5024). If the setting of parameter No. 5029 exceeds the number of compensation values of a path, the least of the numbers of compensation values in all paths is made common.
> 2 When 0 or a negative value is set, memories common to paths are not used.

	#7	#6	#5	#4	#3	#2	#1	#0
5040								OWD

[Input type] Parameter input
[Data type] Bit path

 # 0 OWD In radius programming (bit 1 (ORC) of parameter No. 5004 is set to 1),
0: Tool offset values of both geometry compensation and wear compensation are specified by radius.
1: Tool offset value of geometry compensation is specified by radius and tool offset value of wear compensation is specified by diameter, for an axis of diameter programming.

> **NOTE**
> This parameter is valid when tool geometry/wear compensation is enabled (bit 6 (NGW) of parameter No. 8136 is 0).

	#7	#6	#5	#4	#3	#2	#1	#0
5042							OFC	OFA

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 OFA
 # 1 OFC These bits are used to specify the increment system and valid data range of a tool offset value.

For metric input

OFC	OFA	Unit	Valid data range
0	1	0.01mm	±9999.99mm
0	0	0.001mm	±9999.999mm
1	0	0.0001mm	±9999.9999mm

For inch input

OFC	OFA	Unit	Valid data range
0	1	0.001inch	±999.999inch
0	0	0.0001inch	±999.9999inch
1	0	0.00001inch	±999.99999inch

5043	Axis number for which Y-axis offset is used

[Input type] Parameter input

[Data type] Byte path

[Valid data range] 0 to Number of controlled axes

Set the number of an axis for which the tool offset is corrected.

If 0 or a value beyond the valid data range is set, the Y-axis offset is applied to the Y-axis of the basic three axes. If setting is made for the X- or Z-axis of the basic three axes, the standard tool offset for the X- or Z-axis is not used, and only the Y-axis offset is used.

4.23 PARAMETERS OF CANNED CYCLES

4.23.1 Parameters of Canned Cycle for Drilling (1 of 2)

	#7	#6	#5	#4	#3	#2	#1	#0
5101						RTR	EXC	FXY
	M5B						EXC	FXY

[Input type] Parameter input
[Data type] Bit path

 # 0 FXY The drilling axis in the drilling canned cycle, or cutting axis in the grinding canned cycle is:

0: In case of the Drilling canned cycle:
   Z-axis at all times.
   In case of the Grinding canned cycle:
   - For the T series
     Z-axis at all times.
   - For the M series
     G75,G77 command :Y-axis
     G78,G79 command :Z-axis

1: Axis selected by the program

NOTE
1 In the case of the T series, this parameter is valid only for the drilling canned cycle in the Series 10/11 format.
2 When this parameter is 1, the drilling axis determined by plane selection (G17/G18/G19) in the drilling canned cycle in the T series 10/11 format. Therefore, the Y-axis is required to specify G17/G19.

 # 1 EXC G81
0: Specifies a drilling canned cycle
1: Specifies an external operation command

 # 2 RTR G83 and G87
0: Specify a high-speed peck drilling cycle
1: Specify a peck drilling cycle

 # 7 M5B In drilling canned cycles G76 and G87:
0: Outputs M05 before an oriented spindle stops
1: Not output M05 before an oriented spindle stops

	#7	#6	#5	#4	#3	#2	#1	#0
5102	RDI	RAB			F0C	QSR		

[Input type] Parameter input
[Data type] Bit path

 # 2 QSR Before a multiple repetitive canned cycle (G70 to G73) (T series) is started, a check to see if the program contains a block that has the sequence number specified in address Q is:
0: Not made.
1: Made.
When 1 is set in this parameter and the sequence number specified in address Q is not found, the alarm (PS0063) is issued and the canned cycle is not executed.

 # 3 F0C When the Series 10/11 format is used (with bit 1 (FCV) of parameter No.0001 set to 1), a canned drilling cycle is specified using :
0: Series 10/11 format
1: Series 0 format. However, the number of repetitions is specified using address L.

 # 6 RAB When a canned drilling cycle using the Series 10/11 format is specified (with bit 1 (FCV) of parameter No. 0001 set to 1 and bit 3 (F0C) of parameter No. 5102 set to 0), address R specifies:
0: Increment command.
1: Absolute command with G code system A. With G code system B or C, G90 and G91 are followed.

 # 7 RDI When a canned drilling cycle using the Series 10/11 format is specified (with bit 1 (FCV) of parameter No. 0001 set to 1 and bit 3 (F0C) of parameter No. 5102 set to 0), address R is based on:
0: Radius specification.
1: Diameter/radius specification of the drilling axis.

	#7	#6	#5	#4	#3	#2	#1	#0
5103		TCZ			PNA	DCY		
		TCZ				DCY		SIJ

[Input type] Parameter input
[Data type] Bit path

 # 0 SIJ When the Series 10/11 program format is used (with bit 1 (FCV) of parameter No.0001 set to 1), a tool shift value for the drilling canned cycle G76 or G87 is specified by:
0: Address Q. Set a tool retraction direction in parameter No. 5148.
1: Address I, J, or K.

 # 2 DCY When an axis (to be used as a drilling axis) perpendicular to the positioning plane is specified in a drilling canned cycle:

0: The specified axis is used as a drilling axis.

1: The axis specified in the block where the G code for the drilling canned cycle is specified is used as a drilling axis. The specified axis is used as a positioning axis.

> **NOTE**
> This parameter is valid when bit 0 (FXY) of parameter No. 5101 is set to 1.

 # 3 PNA In a drilling canned cycle using the Series 10/11 format (with bit 1 (FCV) of parameter No. 0001 set to 1 and bit 3 (F0C) of parameter No. 5102 set to 0), when a plane where no axis is present is specified in the drilling canned cycle mode:

0: An alarm is issued.

1: No alarm is issued.

 # 6 TCZ In a tapping cycle (excluding rigid tapping), an accumulated zero check in the tapping step (forward, backward) is:

0: Not performed.

1: Performed.

Execute a tapping cycle (excluding rigid tapping) with the servo feed forward (bit 1 (FEED) of parameter No. 2005). If an impact is detected, set this parameter to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
5104		PCT				FCK		
		PCT						

[Input type] Parameter input

[Data type] Bit path

 # 2 FCK In a multiple repetitive canned cycle (G71/G72) (T series), the machining profile is:

0: Not checked.

1: Checked.

The target figure specified by G71 or G72 is checked for the following before machining operation:

- If the start point of the canned cycle is less than the maximum value of the machining profile even when the plus sign is specified for a finishing allowance, the alarm (PS0322) is issued.
- If the start point of the canned cycle is greater than the minimum value of the machining profile even when the minus sign is specified for a finishing allowance, the alarm (PS0322) is issued.
- If an unmonotonous command of type I is specified for the axis in the cutting direction, the alarm (PS0064 or PS0329) is issued.
- If an unmonotonous command is specified for the axis in the roughing direction, the alarm (PS0064 or PS0329) is issued.

- If the program does not include a block that has a sequence number specified by address Q, the alarm (PS0063) is issued. This check is made, regardless of bit 2 (QSR) of parameter No. 5102.
- If a command (G41/G42) on the blank side in tool nose radius compensation is inadequate, the alarm (PS0328) is issued.

 # 6 PCT A Q command in a tapping cycle is:
0: Disabled.
1: Enabled. ((High-speed) peck tapping cycle is assumed.)

When this parameter is set and the depth of cut for each time is specified with address Q in a tapping cycle command, a peck tapping cycle is assumed.
In a peck tapping cycle, either a high-speed peck tapping cycle or a peck tapping cycle can be selected by bit 5 (PCP) of parameter No. 5200.
Even when this parameter is set to 1, if Q is not specified or Q0 is specified, normal tapping is performed.

NOTE
1 Set also parameter No. 5213.
2 In rigid tapping, the Q command is valid regardless of the setting of this parameter.
3 For the M series, if this parameter is set to 1, the specification equivalent to the FS0*i*-C is assumed.

	#7	#6	#5	#4	#3	#2	#1	#0
5105				K0D	M5T	RF2	RF1	SBC
					M5T			SBC

[Input type] Parameter input
[Data type] Bit path

 # 0 SBC In each of a drilling canned cycle, chamfering/corner rounding cycle, and optional-angle chamfering/corner rounding (T series) cycle:
0: A single block stop is not carried out.
1: A single block stop is carried out.

 # 1 RF1 In a multiple repetitive canned cycle (G71/G72) (T series) of type I, roughing is:
0: Performed.
1: Not performed.

NOTE
When a roughing allowance (Δi/Δk) is specified using the Series 10/11 program format, roughing is performed, regardless of the setting of this parameter.

 # 2 RF2 In a multiple repetitive canned cycle (G71/G72) (T series) of type II, roughing is:
0: Performed.
1: Not performed.

> **NOTE**
> When a roughing allowance (Δi/Δk) is specified using the Series 10/11 program format, roughing is performed, regardless of the setting of this parameter.

 # 3 M5T When the rotation direction of the spindle is changed from forward rotation to reverse rotation or from reserve rotation to forward rotation in a tapping cycle (G84/G88 with the T series, or G84/G74 with the M series):
0: M05 is output before output of M04 or M03.
1: M05 is not output before output of M04 or M03.

> **NOTE**
> 1 This parameter is equivalent to bit 6 (M5T) of parameter No. 5101 of the FS0*i*-C.
> 2 For the T series, the logical level (0/1) is opposite to that of the FS0*i*-C.

 # 4 K0D When K0 is specified in a drilling canned cycle (G80 to G89):
0: Drilling operation is not performed, but drilling data only is stored.
1: One drilling operation is performed.

	#7	#6	#5	#4	#3	#2	#1	#0
5106								GFX

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 GFX When grinding canned cycle option is specified, the G71, G72, G73, or G74 command is:
0: A multiple repetitive canned cycle (T series) command.
1: A grinding canned cycle command.

5110	M code for C-axis clamping in a drilling canned cycle

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999998

This parameter sets an M code for C-axis clamping in a drilling canned cycle.

5111	Dwell time when C-axis unclamping is specified in drilling canned cycle

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 32767
[Unit of data]

Increment system	IS-A	IS-B	IS-C	Unit
	10	1	0.1	msec

(The increment system does not depend on whether inch input or metric input is used.)

This parameter sets the dwell time when C-axis unclamping is specified in a drilling canned cycle.

5112	Spindle forward-rotation M code in drilling canned cycle

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

This parameter sets the spindle forward-rotation M code in a drilling canned cycle.

NOTE
M03 is output when "0" is set.

5113	Spindle reverse-rotation M code in drilling canned cycle

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

This parameter sets the spindle reverse-rotation M code in a drilling canned cycle.

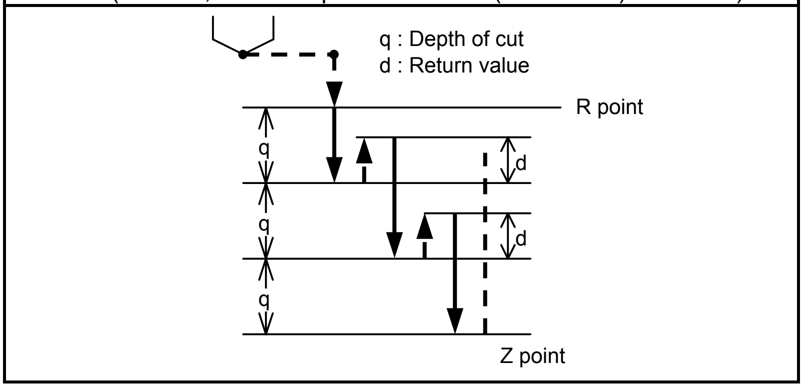
NOTE
M04 is output when "0" is set.

5114	Return value of high-speed peck drilling cycle

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the return value in high-speed peck drilling cycle.

G73 (M series)
G83 (T series, when the parameter RTR (No.5101#2) is set to 0)

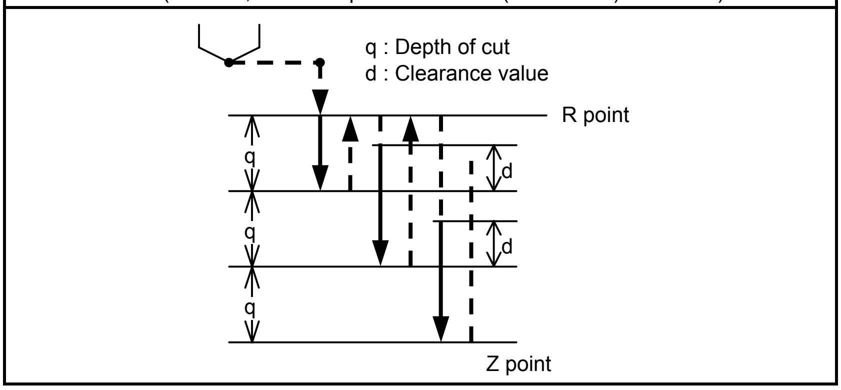


5115	Clearance value in a peck drilling cycle

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a clearance value in a peck drilling cycle.

G83 (M series)
G83 (T series, when the parameter RTR (No.5101#2) is set to 1)



4.23.2 Parameters of Thread Cutting Cycle (T Series)

5130	Cutting value (chamfering value) in thread cutting cycles G92 and G76

[Input type] Parameter input
[Data type] Byte path
[Unit of data] 0.1
[Valid data range] 0 to 127

This parameter sets a cutting value (chamfering value) in the thread cutting cycle (G76) of a multiple repetitive canned cycle (T series) and in the thread cutting cycle (G92) of a canned cycle.
Let L b a lead. Then, a cutting value range from 0.1L to 12.7L is allowed.
To specify a cutting value of 10.0L, for example, specify 100 in this parameter.

5131	Cutting angle in thread cutting cycles G92 and G76

[Input type] Parameter input
[Data type] Byte path
[Unit of data] Degree
[Valid data range] 1 to 89

This parameter sets the cutting angle in the thread cutting cycle (G76) of a multiple repetitive canned cycle (T series) and in the thread cutting cycle (G92) of a canned cycle.
When 0 is set, an angle of 45 degrees is specified.

4.23.3 Parameters of Multiple Repetitive Canned Cycle (T Series)

5132	Depth of cut in multiple repetitive canned cycles G71 and G72

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the depth of cut in multiple repetitive canned cycles G71 and G72 (T series).
This parameter is not used with the Series 10/11 program format.

> **NOTE**
> Specify a radius value at all times.

5133	Escape in multiple repetitive canned cycles G71 and G72

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the escape in multiple repetitive canned cycles G71 and G72 (T series).

> **NOTE**
> Specify a radius value at all times.

5134	Clearance value in multiple repetitive canned cycles G71 and G72

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets a clearance value up to the cutting feed start point in multiple repetitive canned cycles (G71/G72) (T series).

> **NOTE**
> Specify a radius value at all times.

5135	Retraction distance in the multiple repetitive canned cycle G73 (second axis on the plane)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a retraction distance along the second axis on the plane in the multiple repetitive canned cycle G73 (T series). This parameter is not used with the Series 10/11 program format.

> **NOTE**
> Specify a radius value at all times.

5136	Retraction distance in the multiple repetitive canned cycle G73 (first axis on the plane)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a retraction distance along the first axis on the plane in the multiple repetitive canned cycle G73 (T series). This parameter is not used with the Series 10/11 program format.

> **NOTE**
> Specify a radius value at all times.

5137	Number of divisions in the multiple repetitive canned cycle G73

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] Cycle
[Valid data range] 1 to 99999999

This parameter sets the number of divisions in the multiple repetitive canned cycle G73 (T series).
This parameter is not used with the Series 10/11 program format.

5139	Return in multiple repetitive canned cycles G74 and G75

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the return in multiple repetitive canned cycles G74 and G75 (T series).

> **NOTE**
> Specify a radius value at all times.

5140	Minimum depth of cut in the multiple repetitive canned cycle G76

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets a minimum depth of cut in the multiple repetitive canned cycle G76 (T series) so that the depth of cut does not become too small when the depth of cut is constant.

> **NOTE**
> Specify a radius value at all times.

5141	Finishing allowance in the multiple repetitive canned cycle G76

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the finishing allowance in multiple repetitive canned cycle G76 (T series).

> **NOTE**
> Specify a radius value at all times.

5142	Repetition count of final finishing in multiple repetitive canned cycle G76

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] Cycle
[Valid data range] 1 to 99999999

This parameter sets the number of final finishing cycle repeats in the multiple repetitive canned cycle G76 (T series).
When 0 is set, only one final finishing cycle is executed.

5143	Tool nose angle in multiple repetitive canned cycle G76

[Input type] Parameter input
[Data type] Byte path
[Unit of data] Degree
[Valid data range] 0, 29, 30, 55, 60, 80

This parameter sets the tool nose angle in multiple repetitive canned cycle G76 (T series).
This parameter is not used with the Series 10/11 program format.

5145	Allowable value 1 in multiple repetitive canned cycles G71 and G72

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

If a monotonous command of type I or II is not specified for the axis in the roughing direction, the alarm (PS0064 or PS0329) is issued. When a program is created automatically, a very small unmonotonous figure may be produced. Set an unsigned allowable value for such an unmonotonous figure. By doing so, G71 and G72 cycles can be executed even in a program including an unmonotonous figure.

Example)

Suppose that a G71 command where the direction of the cutting axis (X-axis) is minus and the direction of the roughing axis (Z-axis) is minus is specified. In such a case, when an unmonotonous command for moving 0.001 mm in the plus direction along the Z-axis is specified in a target figure program, roughing can be performed according to the programmed figure without an alarm by setting 0.001 mm in this parameter.

NOTE

A check for a monotonous figure is made at all times during G71 and G72 cycles. A figure (programmed path) is checked. When tool nose radius compensation is performed, a path after compensation is checked. When bit 2 (FCK) of parameter No. 5104 is set to 1, a check is made before G71or G72 cycle operation. In this case, not a path after tool nose radius compensation but a programmed path is checked.
Note that no alarm is issued when an allowable value is set.
Use a radius value to set this parameter at all times.

5146	Allowable value 2 in multiple repetitive canned cycles G71 and G72

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 to cut of depth

If a monotonous command of type I is not specified for the axis in the cutting direction, the alarm (PS0064 or PS0329) is issued. When a program is created automatically, a very small unmonotonous figure may be produced. Set an unsigned allowable value for such an unmonotonous figure. By doing so, G71 and G72 cycles can be executed even in a program including an unmonotonous figure.
The allowable value is clamped to the depth of cut specified by a multiple repetitive canned cycle.
Example)

Suppose that a G71 command where the direction of the cutting axis (X-axis) is minus and the direction of the roughing axis (Z-axis) is minus is specified. In such a case, when an unmonotonous command for moving 0.001 mm in the minus direction along the X-axis is specified in a target figure program for moving from the bottom of cutting to the end point, roughing can be performed according to the programmed figure without an alarm by setting 0.001 mm in this parameter.

NOTE

A check for a monotonous figure is made at all times during G71 and G72 cycles. A figure (programmed path) is checked. When tool nose radius compensation is performed, a path after compensation is checked. When bit 2 (FCK) of parameter No. 5104 is set to 1, a check is made before G71 or G72 cycle operation. In this case, not a path after tool nose radius compensation but a programmed path is checked.
Note that no alarm is issued when an allowable value is set.
Use a radius value to set this parameter at all times.

4.23.4 Parameters of Canned Cycle for Drilling (2 of 2)

5148	Tool retraction direction after orientation in a fine boring cycle or back boring cycle

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] -5 to 5

This parameter sets an axis and direction for tool retraction after spindle orientation in a fine boring cycle or back boring cycle. For each boring axis, an axis and direction for tool retraction after orientation can be set. Set a signed axis number.

Example)
Suppose that:
When the boring axis is the X-axis, the tool retraction direction after orientation is -Y.
When the boring axis is the Y-axis, the tool retraction direction after orientation is +Z.
When the boring axis is the Z-axis, the tool retraction direction after orientation is -X.
Then, set the following (assuming that the first, second, and third axes are the X-axis, Y-axis, and Z-axis, respectively):
Set -2 in the parameter for the first axis. (The tool retraction direction is -Y.)
Set 3 in the parameter for the second axis. (The tool retraction direction is -Y.)
Set -1 in the parameter for the third axis. (The tool retraction direction is -X.)
Set 0 for other axes.

5149	Override for retraction in a boring cycle (G85/G89)

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 0 to 2000

This parameter sets an override value for the feedrate of retraction in a boring cycle. The cutting feedrate override signal is valid, regardless of the setting of this parameter. The setting of this parameter is valid even when the override cancel signal is set to 1.
When 0 is set in this parameter, the following operation is performed:
For the T series
Operation performed when 200 is set in this parameter (The retraction feedrate is two times greater than the cutting feedrate.)
For the M series
Operation performed when 100 is set in this parameter (The retraction feedrate is the cutting feedrate.)

	#7	#6	#5	#4	#3	#2	#1	#0
5160					CYM			
				TSG	CYM	NOL	OLS	

[Input type] Parameter input
[Data type] Bit path

#1 OLS When an overload torque detection signal is received in a peck drilling cycle of a small diameter, the feedrate and spindle speed are:
0: Not changed.
1: Changed.

#2 NOL When the depth of cut per action is satisfied although no overload torque detection signal is received in a peck drilling cycle of a small diameter, the feedrate and spindle speed are:
0: Not changed.
1: Changed.

 # 3 CYM When a subprogram call is specified in a block specifying other commands in the canned cycle mode:
0: No alarm is issued. (When a command of address P is specified, the command is handled as both a command specifying a dwell time and a command specifying a subprogram number in a canned cycle.)
1: An alarm is issued.

#4 TSG A dependence of the overload torque detection signal in a peck drilling cycle (M series) on the parameter setting of the skip function:
0: Exists.
1: Does not exist.

> **NOTE**
> When this parameter is 1, even if the setting of the skip signal is disabled, the X address can be used as the overload torque detection signal. At this time, parameter No. 3012 and bit 1 (SK0) of parameter No. 6200 is valid.

5163	
	M code that specifies the peck drilling cycle mode of a small diameter

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 99999999
This parameter sets an M code that specifies the peck drilling cycle mode of a small diameter.

5164	Percentage of the spindle speed to be changed at the start of the next advancing after an overload torque detection signal is received

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 1 to 255

This parameter sets the percentage of the spindle speed to be changed at the start of the next advancing after the tool is retracted because the overload torque detection signal is received.

$S2 = S1 \times d1 \div 100$

S1: Spindle speed to be changed
S2: Spindle speed changed

Set d1 as a percentage.

NOTE
When 0 is set, the spindle speed is not changed.

5165	Percentage of the spindle speed to be changed at the start of the next advancing when no overload torque detection signal is received

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 1 to 255

This parameter sets the percentage of the spindle speed to be changed at the start of the next advancing after the tool is retracted without the overload torque detection signal received.

$S2 = S1 \times d2 \div 100$

S1: Spindle speed to be changed
S2: Spindle speed changed

Set d2 as a percentage.

NOTE
When 0 is set, the spindle speed is not changed.

5166	Percentage of the cutting feedrate to be changed at the start of the next cutting after an overload torque detection signal is received

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 1 to 255

This parameter sets the percentage of the cutting feedrate to be changed at the start of cutting after the tool is retracted and advances because the overload torque detection signal is received.

F2 = F1 × b1 ÷ 100

F1: Cutting feedrate to be changed
F2: Cutting feedrate changed

Set b1 as a percentage.

NOTE
When 0 is set, the cutting feedrate is not changed.

5167	Percentage of the cutting feedrate to be changed at the start of the next cutting when no overload torque detection signal is received

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 1 to 255

This parameter sets the percentage of the cutting feedrate to be changed at the start of cutting after the tool is retracted and advances without the overload torque detection signal received.

F2 = F1 × b2 ÷ 100

F1: Cutting feedrate to be changed
F2: Cutting feedrate changed

Set b2 as a percentage.

NOTE
When 0 is set, the cutting feedrate is not changed.

5168	Lower limit of the percentage of the cutting feedrate in a peck drilling cycle of a small diameter

[Input type] Parameter input
[Data type] Byte path
[Unit of data] %
[Valid data range] 1 to 255

This parameter sets the lower limit of the percentage of the cutting feedrate changed repeatedly to the specified cutting feedrate.

FL = F × b3 ÷ 100

F: Specified cutting feedrate
FL: Changed cutting feedrate

Set b3 as a percentage.

5170	Number of the macro variable to which to output the total number of retractions during cutting

[Input type] Parameter input
[Data type] Word path
[Valid data range] 100 to 149

This parameter sets the number of the custom macro common variable to which to output the total number of times the tool is retracted during cutting. The total number cannot be output to common variables #500 to #599.

5171	Number of the macro variable to which to output the total number of retractions because of the reception of an overload torque detection signal

[Input type] Parameter input
[Data type] Word path
[Valid data range] 100 to 149

This parameter sets the number of the custom macro common variable to which to output the total number of times the tool is retracted after the overload torque detection signal is received during cutting. The total number cannot be output to common variables #500 to #599.

5172	
	Feedrate of retraction to point R when no address I is specified

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
This parameter sets the feedrate of retraction to point R when no address I is specified.

5173	
	Feedrate of advancing to the position just before the bottom of a hole when no address I is specified

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
This parameter sets the feedrate of advancing to the position just before the bottom of a previously machined hole when no address I is specified.

5174	
	Clearance in a peck drilling cycle of a small diameter

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
This parameter sets the clearance in a peck drilling cycle of a small diameter.

4.23.5 Parameters of Canned Cycle for Grinding (for Grinding Machine)

5176	Grinding axis number in Traverse Grinding Cycle(G71)
	Grinding axis number in Plunge Grinding Cycle(G75)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

For the Lathe system:
Set the Grinding axis number of Traverse Grinding Cycle(G71).
For the Machining Center system:
Set the Grinding axis number of Plunge Grinding Cycle(G75).

NOTE
The axis number except for the cutting axis can be specified. When the axis number which is same to cutting axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0, PS0456 alarm is also issued.

5177	Grinding axis number of Traverse direct constant-size Grinding cycle(G72)
	Grinding axis number of Direct Constant Dimension Plunge Grinding Cycle(G77)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

For the Lathe system:
Set the Grinding axis number of Traverse direct constant-size Grinding cycle(G72).
For the Machining Center system:
Set the Grinding axis number of Direct Constant Dimension Plunge Grinding Cycle (G77).

NOTE
The axis number except for the cutting axis can be specified. When the axis number which is same to cutting axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0, PS0456 alarm is also issued.

5178	Grinding axis number of Oscillation Grinding Cycle(G73)
	Grinding axis number of Continuous feed surface grinding cycle(G78)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

For the Lathe system:
Set the Grinding axis number of Oscillation Grinding Cycle(G73).
For the Machining Center system:
Set the Grinding axis number of Continuous feed surface grinding cycle(G78).

NOTE
The axis number except for the cutting axis can be specified. When the axis number which is same to cutting axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0, PS0456 alarm is also issued.

5179	Grinding axis number of Oscillation Direct Fixed Dimension Grinding Cycle(G74)
	Grinding axis number of Intermittent feed surface grinding cycle(G79)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

For the Lathe system:
Set the Grinding axis number of Oscillation Direct Fixed Dimension Grinding Cycle(G74).
For the Machining Center system:
Set the Grinding axis number of Intermittent feed surface grinding cycle(G79).

NOTE
The axis number except for the cutting axis can be specified. When the axis number which is same to cutting axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0, PS0456 alarm is also issued.

5180	Axis number of dressing axis in Plunge grinding cycle(G75)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the axis number of dressing axis in Plunge grinding cycle(G75).

> **NOTE**
> The axis number except for the cutting axis or grinding axis can be specified. When the axis number which is same to cutting axis or grinding axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0 and address "L" is specified in NC program, the PS0456 alarm is also issued.

5181	Axis number of dressing axis in Direct constant dimension plunge grinding cycle(G75)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the axis number of dressing axis in Direct constant dimension plunge grinding cycle(G75).

> **NOTE**
> The axis number except for the cutting axis or grinding axis can be specified. When the axis number which is same to cutting axis or grinding axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0 and address "L" is specified in NC program, the PS0456 alarm is also issued.

5182	Axis number of dressing axis in Continuous feed surface grinding cycle(G78)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the axis number of dressing axis in Continuous feed surface grinding cycle(G78).

> **NOTE**
> The axis number except for the cutting axis or grinding axis can be specified. When the axis number which is same to cutting axis or grinding axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0 and address "L" is specified in NC program, the PS0456 alarm is also issued.

5183	Axis number of dressing axis in Intermittent feed surface grinding cycle(G79)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the axis number of dressing axis in Intermittent feed surface grinding cycle(G79).

> **NOTE**
> The axis number except for the cutting axis or grinding axis can be specified. When the axis number which is same to cutting axis or grinding axis is specified, PS0456 alarm is issued at the time of execution. The Grinding Cycle is executed when this parameter value is 0 and address "L" is specified in NC program, the PS0456 alarm is also issued.

4.24 PARAMETERS OF RIGID TAPPING (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
5200	SRS	FHD	PCP	DOV	SIG	CRG		G84
		FHD	PCP	DOV	SIG	CRG		G84

[Input type] Parameter input
[Data type] Bit path

 # 0 G84 Method for specifying rigid tapping:
0: An M code specifying the rigid tapping mode is specified prior to the issue of the G84 (or G74) command. (See parameter No.5210).
1: An M code specifying the rigid tapping mode is not used. (G84 cannot be used as a G code for the tapping cycle; G74 cannot be used for the reverse tapping cycle.)

 # 2 CRG Rigid mode when a rigid mode cancel command is specified (G80, G01 group G code, reset, etc.) :
0: Canceled after rigid tapping signal RGTAP is set to "0".
1: Canceled before rigid tapping signal RGTAP is set to "0".

 # 3 SIG When gears are changed for rigid tapping, the use of SINDs is:
0: Not permitted.
1: Permitted.

 # 4 DOV Override during extraction in rigid tapping:
0: Invalidated
1: Validated (The override value is set in parameter No.5211. However, set an override value for rigid tapping return (M series) in parameter No.5381.)

 # 5 PCP Address Q is specified in a tapping cycle/rigid tapping:
0: A high-speed peck tapping cycle is assumed.
1: A peck tapping cycle is assumed.

NOTE
In a tapping cycle, this parameter is valid when bit 6 (PCT) of parameter No. 5104 is 1. When bit 6 (PCT) of parameter No. 5104 is 0, a (high-speed) peck tapping cycle is not assumed.

 # 6 FHD Feed hold and single block in rigid tapping:
0: Invalidated
1: Validated

 # 7 SRS To select a spindle used for rigid tapping in multi-spindle control:
0: The spindle selection signals SWS1 and SWS2 are used. (These signals are used also for multi-spindle control.)
1: The rigid tapping spindle selection signals RGTSP1 and RGTSP2 are used. (These signals are provided expressly for rigid tapping.)

	#7	#6	#5	#4	#3	#2	#1	#0
5201				OV3	OVU	TDR		

[Input type] Parameter input
[Data type] Bit path

 # 2 TDR Cutting time constant in rigid tapping:
0: Uses a same parameter during cutting and extraction (Parameter Nos. 5261 through 5264)
1: Not use a same parameter during cutting and extraction
Parameter Nos. 5261 to 5264: Time constant during cutting
Parameter Nos. 5271 to 5274: Time constant during extraction

 # 3 OVU The increment unit of the override parameter (No.5211) for tool rigid tapping extraction is:
0: 1%
1: 10%

 # 4 OV3 A spindle speed for extraction is programmed, so override for extraction operation is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
5202		OVE		IRR				ORI
		OVE		IRR			RG3	ORI

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 ORI When rigid tapping is started:
0: Spindle orientation is not performed.
1: Spindle orientation is performed.
This parameter can be used only for a serial spindle.
This spindle orientation performs reference position return in the serial spindle/servo mode. The stop position can be changed using the serial spindle parameter No.4073.

 # 1 RG3 A rigid tapping return operation (M series) is specified:
0: With input signal RTNT <G062.6>.
1: With one-shot G code G30.

> **NOTE**
> To use this function, set bit 0 (G84) of parameter No. 5200 to 0.

 # 4 IRR As the in-position width at point R after movement from point I to point R in rigid tapping:
0: The in-position widths dedicated to rigid tapping (parameters Nos. 5300 and 5302) are selected.
1: The normal in-position width (parameter No.1826) is selected.

 # 6 OVE The specification range of extraction override command (address J) by rigid tapping program specification is:
0: 100% to 200%.
1: 100% to 2000%.

> **NOTE**
> 1 To enable the extraction override command (address J) by program specification, set bit 4 (OV3) of parameter No.5201 to 1.
> 2 When this parameter is set to 1, the operation equivalent to that of the FS0*i*-C is assumed.

	#7	#6	#5	#4	#3	#2	#1	#0
5203				OVS		RFF		
			RBL	OVS		RFF		

[Input type] Parameter input
[Data type] Bit path

 # 2 RFF In rigid tapping, feed forward is:
0: Disabled.
1: Enabled. (Recommended)

As the standard setting, set 1.
At the same time, set the parameter for the advanced preview feed forward coefficient for the tapping axis and the parameter for the advance preview feed forward coefficient for the spindle so that these values match.

- Advanced preview feed forward coefficient for the tapping axis: Parameter No.2092
  (or parameter No.2144 if the cutting/rapid traverse feed forward function is enabled (bit 4 of parameter No.2214 is set to 1))
- Advanced preview feed forward coefficient for the spindle: Parameter No.4344

> **NOTE**
> This parameter is valid when a serial spindle is used.

 # 4 OVS In rigid tapping, override by the feedrate override select signal and cancellation of override by the override cancel signal is:
0: Disabled.
1: Enabled.
When feedrate override is enabled, extraction override is disabled.
The spindle override is clamped to 100% during rigid tapping, regardless of the setting of this parameter.

 # 5 RBL As acceleration/deceleration for rigid tapping cutting feed:
0: Linear acceleration/deceleration is used.
1: Bell-shaped acceleration/deceleration is used.

> **NOTE**
> The rigid tapping bell-shaped acceleration/deceleration option is required.

	#7	#6	#5	#4	#3	#2	#1	#0
5209							RIP	RTX
							RIP	

[Input type] Parameter input
[Data type] Bit path

 # 0 RTX In rigid tapping in a T series, the tapping axis is:
0: Selected by selecting a plane.
1: Always assumed to be the Z-axis for G84 or the X-axis for G88.

> **NOTE**
> This parameter becomes invalid when bit 1 (FCV) of parameter No.0001 is set to 1, and rigid tapping is specified using the Series10/11 format.

 # 1 RIP When a movement from the initial point to point R is made, the in-position check is:
0: Dependent on the setting of bit 5 (NCI) of parameter No. 1601.
1: Performed.

> **NOTE**
> This parameter is valid when bit 5 (NCI) of parameter No.1601 is set to 1 and bit 4 (IRR) of parameter No.5202 is set to 0.
> If bit 5 (NCI) of parameter No.1601 is set to 0, the in-position check is performed regardless of the setting of this parameter.

5210	Rigid tapping mode specification M code

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 65535

This parameter sets an M code that specifies the rigid tapping mode.
The M code is judged to be 29 (M29) when 0 is set.

5211	Override value during rigid tapping extraction

[Input type] Parameter input
[Data type] Word path
[Unit of data] 1% or 10%
[Valid data range] 0 to 200

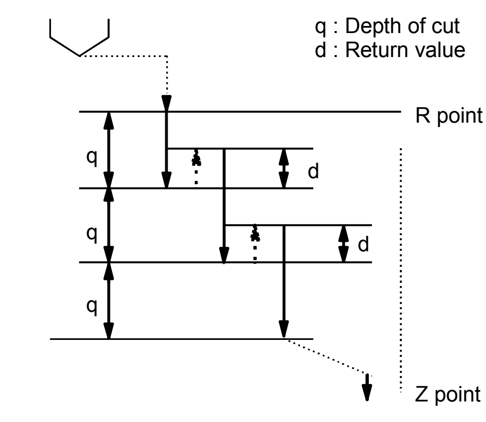
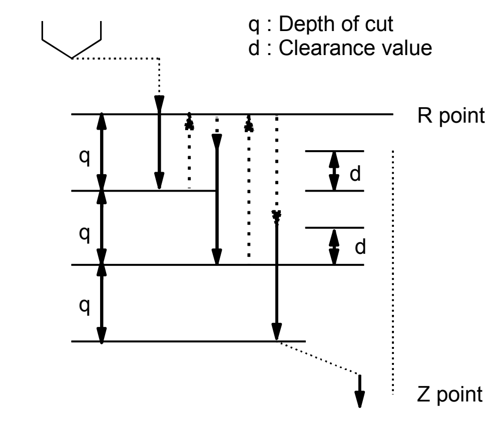
The parameter sets the override value during rigid tapping extraction.

NOTE
The override value is valid when bit 4 (DOV) of parameter No.5200 is set to 1. When bit 3 (OVU) of parameter No.5201 is set to 1, the unit of set data is 10%. An override of up to 200% can be applied to extraction.

5213	Return or clearance in peck tapping cycle

[Input type] Setting input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the drilling axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the escape value of a high-speed peck tapping cycle or the clearance value of a peck tapping cycle.

When the parameter PCP (bit 5 of No.5200) is set to 0.	When the parameter PCP (bit 5 of No.5200) is set to 1.
	

> **NOTE**
> 1 In a tapping cycle, this parameter is valid when bit 6 (PCT) of parameter No. 5104 is 1.
> 2 For the diameter axis, set this parameter using the diameter value.

5214	Setting of an allowable rigid tapping synchronization error range

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets an allowable synchronization error range in rigid tapping.

If a synchronous error range exceeding the setting of this parameter is detected, the alarm (SP0741) is issued. When 0 is set in this parameter, no synchronization error check is made.

5221	Number of gear teeth on the spindle side in rigid tapping (first gear)
5222	Number of gear teeth on the spindle side in rigid tapping (second gear)
5223	Number of gear teeth on the spindle side in rigid tapping (third gear)
5224	Number of gear teeth on the spindle side in rigid tapping (fourth gear)

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 1 to 32767

Each of these parameters is used to set the number of gear teeth on the spindle side for each gear in rigid tapping.

> **NOTE**
> When a position coder is attached to the spindle, set the same value for all of parameters No.5221 through No.5224.

5231	Number of gear teeth on the position coder side in rigid tapping (first gear)
5232	Number of gear teeth on the position coder side in rigid tapping (second gear)
5233	Number of gear teeth on the position coder side in rigid tapping (third gear)
5234	Number of gear teeth on the position coder side in rigid tapping (fourth gear)

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 1 to 32767

Each of these parameters is used to set the number of gear teeth on the position coder side for each gear in rigid tapping.

> **NOTE**
> When a position coder is attached to the spindle, set the same value for all of parameters No.5231 through No.5234.

5241	**Maximum spindle speed in rigid tapping (first gear)**
5242	**Maximum spindle speed in rigid tapping (second gear)**
5243	**Maximum spindle speed in rigid tapping (third gear)**
5244	**Maximum spindle speed in rigid tapping (fourth gear)**

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] min^{-1}
[Valid data range] 0 to 9999

Spindle position coder gear ratio
1 : 1 0 to 7400
1 : 2 0 to 9999
1 : 4 0 to 9999
1 : 8 0 to 9999

Each of these parameters is used to set a maximum spindle speed for each gear in rigid tapping.
Set the same value for both parameter No.5241 and parameter No.5243 for a one-stage gear system. For a two-stage gear system, set the same value as set in parameter No. 5242 in parameter No. 5243. Otherwise, alarm PS0200 will be issued. This applies to the M series.

5261	**Time constant for acceleration/deceleration in rigid tapping for each gear (first gear)**
5262	**Time constant for acceleration/deceleration in rigid tapping for each gear (second gear)**
5263	**Time constant for acceleration/deceleration in rigid tapping for each gear (third gear)**
5264	**Time constant for acceleration/deceleration in rigid tapping for each gear (fourth gear)**

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] msec
[Valid data range] 0 to 4000

Each of these parameters is used to set a linear acceleration/ deceleration time constant for the spindle of each gear and the tapping axis in rigid tapping.
Set the period required to reach each maximum spindle speed (parameters No.5241 to No.5244).
The set time constant, multiplied by the ratio of a specified S value to a maximum spindle speed, is actually used as a time constant.
For bell-shaped acceleration/deceleration, set a time constant for a linear portion.

5271	**Time constant for acceleration/deceleration in rigid tapping extraction (first gear)**
5272	**Time constant for acceleration/deceleration in rigid tapping extraction (second gear)**
5273	**Time constant for acceleration/deceleration in rigid tapping extraction (third gear)**
5274	**Time constant for acceleration/deceleration in rigid tapping extraction (fourth gear)**

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] msec
[Valid data range] 0 to 4000

Each of these parameters is used to set a linear acceleration/ deceleration time constant for the spindle of each gear and tapping axis in extraction operation during rigid tapping.
For bell-shaped acceleration/deceleration, set a time constant for a linear portion.

NOTE
These parameters are enabled when the parameter TDR (bit 2 of parameter No.5201) is set to 1.

5280	**Position control loop gain for the spindle and tapping axis in rigid tapping (common to gears)**
5281	**Position control loop gain for the spindle and tapping axis in rigid tapping (first gear)**
5282	**Position control loop gain for the spindle and tapping axis in rigid tapping (second gear)**
5283	**Position control loop gain for the spindle and tapping axis in rigid tapping (third gear)**
5284	**Position control loop gain for the spindle and tapping axis in rigid tapping (fourth gear)**

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] 0.01/sec
[Valid data range] 1 to 9999

Each of these parameters is used to set a position control loop gain for the spindle and tapping axis in rigid tapping. These parameters significantly affect the precision of threading. Conduct cutting tests, and make adjustments to obtain an optimum value. When performing threading with an analog spindle, also adjust the loop gain multipliers (parameter Nos. 5291 to 5294).

NOTE

To use a varied loop gain on a gear-by-gear basis, set parameter No.5280 to 0, and set a loop gain for each gear in parameters No.5281 to No.5284. The specification of a loop gain on a gear-by-gear basis is disabled if parameter No.5280 is set to a value other than 0. In such a case, the value set in parameter No.5280 is used as a loop gain that is common to all the gears.

5291	Loop gain multiplier for the spindle in rigid tapping (first gear)
5292	Loop gain multiplier for the spindle in rigid tapping (second gear)
5293	Loop gain multiplier for the spindle in rigid tapping (third gear)
5294	Loop gain multiplier for the spindle in rigid tapping (fourth gear)

[Input type] Parameter input
[Data type] Word spindle
[Valid data range] 1 to 32767

Each of these parameters is used to set a loop gain multiplier for the spindle in rigid tapping each gear.
These parameters significantly affect the precision of threading. Optimize these parameters as well as the loop gains by conducting a cutting test.
Loop gain multiplier GC is obtained from the following equation:

$$GC = \frac{2048000 \times 360 \times PC \times E}{PLS \times SP \times L}$$

PLS Number of pulses output from the position coder (pulses/rev)
SP Number of gear teeth on the spindle side
PC Number of gear teeth on the position coder side
E Specified voltage (V) for turning the spindle motor at 1000 min^{-1}
L Angular displacement of the spindle (degrees) per spindle motor rotation

Example:

For the spindle motor and gear ratio given below, GC is calculated as follows:

$$GC = \frac{2048000 \times 360 \times 1 \times 2.2}{4096 \times 1 \times 360} = 1100$$

PLS = 4096 pulse/rev
SP = 1
PC = 1
E = 2.2 V
L = 360 deg

NOTE
1 On the assumption that the spindle motor used turns at 4500 min^{-1} at 10 V, 2.2 V is required to turn the spindle motor at 1000 min^{-1}
2 These parameters are used for analog spindles.

5300	Tapping axis in-position width in rigid tapping (first spindle)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

This parameter sets a tapping axis in-position width when rigid tapping is performed using the first spindle.

> **NOTE**
> Set the following parameter for each spindle:
> First spindle No.5300
> Second spindle No.5302

5301	Spindle in-position width in rigid tapping

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 32767

These parameters are used to set spindle in-position widths in rigid tapping.

> **NOTE**
> If an excessively large value is specified, the threading precision will deteriorate.

5302	Tapping axis in-position width in rigid tapping (second spindle)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

This parameter sets a tapping axis in-position width when rigid tapping is performed using the second spindle.

5310	Positional deviation limit imposed during tapping axis movement in rigid tapping (first spindle)

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets a positional deviation limit imposed during tapping axis movement in rigid tapping using the first spindle.

> **NOTE**
> Set the following parameter for each spindle:
> First spindle No.5310
> Second spindle No.5350

5311	Limit value of spindle positioning deviation during movement in rigid tapping

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

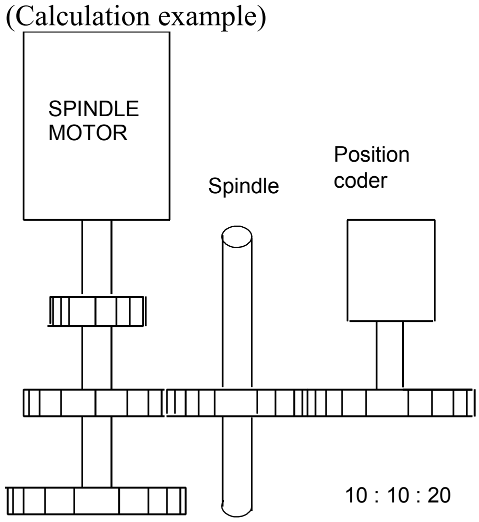
This parameter sets the limit value of a spindle positioning deviation during movement in rigid tapping.

Find a value to be set from the following expression:

$$Setting\ value = \frac{S \times PLS \times 100 \times SP \times C}{60 \times GP \times C}$$

S Maximum spindle speed in rigid tapping (min^{-1})
(Setting value of parameter Nos. 5241 and greater)
PLS Number of pulses output from the position coder (pulses/rev)
SP Number of gear teeth on the spindle side
PC Number of gear teeth on the position coder side
G Loop gain in the rigid tapping ($0.01sec^{-1}$)
(Setting value of parameter Nos. 5281 and greater)
C Coefficient 1.5

(Calculation example)



S = 3600
PLS = 4096
SP = 10
PC = 20
G = 3000
C = 1.5

$$Setting\ value = \frac{3600 \times 4096 \times 100 \times 10 \times 1.5}{60 \times 3000 \times 20} = 6144$$

5312	Positional deviation limit imposed while the tapping axis is stopped in rigid tapping (first spindle)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

This parameter sets a positional deviation limit imposed while the tapping axis is stopped in rigid tapping using the first spindle.

NOTE

Set the following parameter for each spindle:

First spindle	No.5312
Second spindle	No.5352

5313	Positional deviation limit imposed while the spindle is stopped in rigid tapping

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter is used to set a positional deviation limit imposed while the spindle is stopped in rigid tapping.

5321	Spindle backlash in rigid tapping (first-stage gear)

5322	Spindle backlash in rigid tapping (second-stage gear)

5323	Spindle backlash in rigid tapping (third-stage gear)

5324	Spindle backlash in rigid tapping (fourth-stage gear)

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] Detection unit
[Valid data range] -9999 to 9999

Each of these parameters is used to set a spindle backlash.

5350	Positional deviation limit imposed during tapping axis movement in rigid tapping (second spindle)

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets a positional deviation limit imposed during tapping axis movement in rigid tapping using the second spindle.

5352	Positional deviation limit imposed while the tapping axis is stopped in rigid tapping (second spindle)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] 0 to 32767

This parameter is used to set a positional deviation limit imposed while the tapping axis is stopped in rigid tapping using the second spindle.

5365	Bell-shaped acceleration/deceleration time constant in rigid tapping (first-stage gear)
5366	Bell-shaped acceleration/deceleration time constant in rigid tapping (second-stage gear)
5367	Bell-shaped acceleration/deceleration time constant in rigid tapping (third-stage gear)

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] msec
[Valid data range] 0 to 512

Each of these parameters is used to set a time constant for a curved portion when bell-shaped acceleration/deceleration is selected in rigid tapping. When 0 is set in this parameter, linear acceleration/deceleration is performed.

NOTE
This parameter is enabled when the parameter RBL (bit 5 of parameter No.5203) is set to 1.

5381	Override value during rigid tapping return

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 0 to 200

This parameter is used to set the override value during rigid tapping return (M series).
If the setting is 0, no override is applied.

> **NOTE**
> This parameter is valid when bit 4 (DOV) of parameter No. 5200 for enabling override at normal extraction time is set to 1.

5382	Amount of return for rigid tapping return

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the drilling axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter is used to set an extra amount of rigid tapping return (M series). The tool is retracted additionally near point R by the distance set in this parameter. If the tool has already been retracted from rigid tapping (M series), it will be retracted further only by the distance specified in this parameter.

4.25 PARAMETERS OF SCALING (M SERIES) /COORDINATE ROTATION (M SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
5400								
	SCR	XSC						RIN

[Input type] Parameter input
[Data type] Bit path

 # 0 RIN Coordinate rotation angle command (R) :
0: Specified by an absolute method
1: Specified by an absolute method (G90) or incremental method (G91)

 # 6 XSC The setting of a scaling magnification (axis-by-axis scaling) is:
0: Disabled.
1: Enabled.

 # 7 SCR Scaling (G51) magnification unit:
0: 0.00001 times (1/100,000)
1: 0.001 times

	#7	#6	#5	#4	#3	#2	#1	#0
5401								
								SCLx

[Input type] Parameter input
[Data type] Bit axis

 # 0 SCLx Scaling on this axis:
0: Invalidated
1: Validated

5410	Angular displacement used when no angular displacement is specified for coordinate system rotation

[Input type] Setting input
[Data type] 2-word path
[Unit of data] 0.001 degree
[Valid data range] -360000 to 360000

This parameter sets the angular displacement for coordinate system rotation. When the angular displacement for coordinate system rotation is not specified with address R in the block where G68 is specified, the setting of this parameter is used as the angular displacement for coordinate system rotation.

5411	
	Scaling (G51) magnification

[Input type] Setting input
[Data type] 2-word path
[Unit of data] 0.001 or 0.00001 times (Selected using SCR, #7 of parameter No.5400)
[Valid data range] 1to999999999

This parameter sets a scaling magnification when axis-by-axis scaling is disabled (with bit 6 (XSC) of parameter No. 5400 set to 0). If no scaling magnification (P) is specified in the program, the setting of this parameter is used as a scaling magnification.

> **NOTE**
> When bit 7 (SCR) of parameter No.5400 is set to 1, the valid data range is 1 to 9999999.

5421	
	Scaling magnification for each axis

[Input type] Setting input
[Data type] 2-word axis
[Unit of data] 0.001 or 0.00001 times (Selected using SCR, #7 of parameter No.5400)
[Valid data range] -999999999 to –1, 1 to 999999999

This parameter sets a scaling magnification for each axis when axis-by-axis scaling is enabled (with bit 6 (XSC) of parameter No. 5400 set to 1). For the first spindle to the third spindle (X-axis to Z-axis), the setting of this parameter is used as a scaling magnification if scaling magnifications (I, J, K) are not specified in the program.

> **NOTE**
> When bit 7 (SCR) of parameter No.5400 is set to 1, the valid data ranges are -9999999 to -1 and 1 to 9999999.

4.26 PARAMETERS OF SINGLE DIRECTIONAL POSITIONING (M SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
5431								
							PDI	MDL

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 MDL The G60 code (one-direction positioning) is:
0: One-shot G code (group 00).
1: Modal G code (group 01).

 # 1 PDI In the G60 mode, an in-position check at a stop position is:
0: Not made.
1: Made.

5440	Positioning direction and overrun distance in single directional positioning

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the positioning direction and overrun distance in single directional positioning (G60) for each axis. The positioning direction is specified using a setting data sign, and the overrun distance using a value set here.
Overrun distance>0: The positioning direction is positive (+).
Overrun distance<0: The positioning direction is negative (*).
Overrun distance=0: Single directional positioning is not performed.

4.27 PARAMETERS OF POLAR COORDINATE INTERPOLATION (T SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
5450						PLS		PDI

[Input type] Parameter input
[Data type] Bit path

 # 0 PDI When the second axis on the plane in the polar coordinate interpolation mode is based on radius specification:
0: Radius specification is used.
1: Diameter specification is used.

 # 2 PLS The polar coordinate interpolation shift function is:
0: Not used.
1: Used.
This enables machining using the workpiece coordinate system with a desired point which is not the center of the rotation axis set as the origin of the coordinate system in polar coordinate interpolation.

5460	Axis (linear axis) specification for polar coordinate interpolation

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes
This parameter sets control axis numbers of linear axis to execute polar interpolation.

5461	Axis (rotation axis) specification for polar coordinate interpolation

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes
This parameter sets control axis numbers of rotation axis to execute polar interpolation.

5463	Automatic override tolerance ratio for polar coordinate interpolation

[Input type] Parameter input
[Data type] Byte path
[Unit of data] %
[Valid data range] 0 to 100

Typical setting: 90% (treated as 90% when set to 0)
Set the tolerance ratio of the fastest cutting feedrate to the speed of the rotation axis during automatic override of polar coordinate interpolation.

5464	Compensation for error on hypothetical axis of polar coordinate interpolation

[Input type] Parameter input
[Data type] Byte path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(For IS-B, -999999.999 to +999999.999)

This parameter is used to set the error if the center of the rotation axis on which polar coordinate interpolation is performed is not on the X-axis.
If the setting of the parameter is 0, regular polar coordinate interpolation is performed.

4.28 PARAMETERS OF NORMAL DIRECTION CONTROL (M SERIES)

5480	Number of the axis for controlling the normal direction

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to the maximum controlled axis number

This parameter sets the controlled axis number of the axis for controlling the normal direction.

5481	Feedrate of rotation of the normal direction controlled axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] deg/min
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)

This parameter sets the feedrate of the movement along the normal direction controlled axis that is inserted at the start point of a block during normal direction control.

5482	Limit value used to determine whether to ignore the rotation insertion of the normal direction controlled axis

[Input type] Parameter input
[Data type] Real path
[Unit of data] Degree
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(For IS-B, -999999.999 to +999999.999)

The rotation block of the normal direction controlled axis is not inserted when the rotation insertion angle calculated during normal direction control does not exceed this setting.

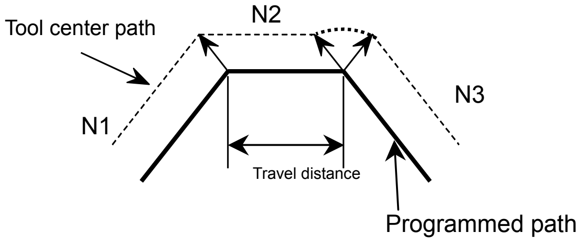
The ignored rotation angle is added to the next rotation insertion angle, and the block insertion is then judged.

NOTE

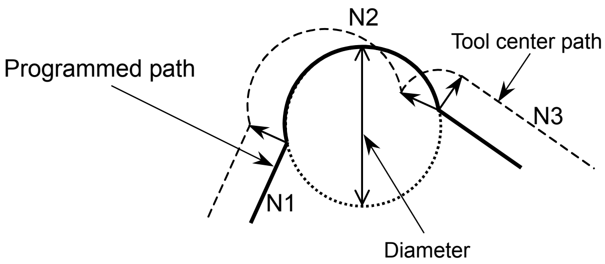
1. No rotation block is inserted when 360 or more degrees are set.
2. If 180 or more degrees are set, a rotation block is inserted only when the circular interpolation setting is 180 or more degrees.

5483	**Limit value of movement that is executed at the normal direction angle of a preceding block**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to standard parameter setting table (B)
(For IS-B, -999999.999 to +999999.999)



For straight line
When the travel distance of N2 in the figure on the left does not exceed the setting, block N2 is machined with the tool being normal to block N1.



For arc
When the arc diameter of N2 in the figure on the left does not exceed the setting, arc N2 is machined with the tool being normal to block N1. A normal direction axis is not controlled to move in the normal direction according to the arc mov

4.29 PARAMETERS OF INDEX TABLE INDEXING (M SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
5500								
	IDX	SIM		G90	INC	ABS	REL	DDP

[Input type] Parameter input
[Data type] Bit path

 # 0 DDP As the method for inputting a decimal point in a command for the index table indexing axis:
0: The conventional method is used. (Example IS-B: B1; = 0.001 deg)
1: The pocket calculator method is used. (Example IS-B: B1; = 1.000 deg)

 # 1 REL The position display of the index table indexing axis in the relative coordinate system is:
0: Not rounded by one rotation.
1: Rounded by one rotation.

 # 2 ABS The position display of the index table indexing axis in the absolute coordinate system is:
0: Not rounded by one rotation.
1: Rounded by one rotation.

 # 3 INC When the M code that specifies rotation in the negative direction (parameter No.5511) is not set, rotation in the G90 mode is:
0: Not set to the shorter way around the circumference.
1: Set to the shorter way around the circumference. (Set bit 2 (ABS) of parameter No.5500, to 1.)

 # 4 G90 A command for the index table indexing axis is:
0: Assumed to be an absolute or incremental command according to the mode.
1: Always assumed to be an absolute command.

 # 6 SIM When the same block includes a command for the index table indexing axis and a command for another controlled axis:
0: The setting of bit 0 (IXS) of parameter No.5502 is followed.
1: The commands are executed.

NOTE
Even when this parameter is set to 1, an alarm (PS1564) is issued if the block is neither G00, G28, nor G30 (or the G00 mode).

 # 7 IDX Operation sequence of the index table indexing axis:
0: Type A
1: Type B

	#7	#6	#5	#4	#3	#2	#1	#0
5501								
							ISP	ITI

[Input type] Parameter input
[Data type] Bit path

 # 0 ITI The index table indexing function is:
0: Enabled.
1: Disabled.

> **NOTE**
> To enable the index table indexing function, set bit 3 (IXC) of parameter No. 8132 to 1 in addition to this parameter. The index table indexing function is enabled only when both ITI and IXC are enabled.

 # 1 ISP Servo-off for an index axis at the completion of clamping is:
0: Processed by the CNC.
1: Not processed by the CNC. (The CNC follows the status of the servo-off signal <G0126> input from the PMC.)

	#7	#6	#5	#4	#3	#2	#1	#0
5502								
								IXSx

[Input type] Parameter input
[Data type] Bit axis

 # 0 IXSx When a command is specified in a block that contains a command for the index table indexing axis:
0 : An alarm (PS1564) is issued.
1 : The command is executed.

If bit 6 (SIM) of parameter No.5500 is set to 1, a simultaneous operation with all axes except the index table indexing axis can be performed regardless of the setting of this parameter.
To set an axis that allows simultaneous operation for each axis, set SIM to 0, and set this parameter.

> **NOTE**
> Even when this parameter is set to 1, an alarm (PS1564) is issued if the block is neither G00, G28, nor G30 (or the G00 mode).

5510	
	Controlled axis number of the index table indexing axis

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

This parameter sets the number of a controlled axis to be used as the index table indexing axis.
When 0 is set, the fourth axis is assumed.

5511	
	M code that specifies rotation in the negative direction for index table indexing

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

0: The rotation direction for the index table indexing axis is determined according to the setting of bit 3 (INC) of parameter No.5500 and a command.

1 to 99999999:
The rotation for the index table indexing axis is always performed in the positive direction. Rotation in the negative direction is performed only when the M code set in this parameter is specified together with a movement command.

NOTE
Be sure to set bit 2 (ABS) of parameter No.5500 to 1.

5512	Minimum positioning angle for the index table indexing axis

[Input type] Parameter input
[Data type] Real path
[Unit of data] deg
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the minimum positioning angle (travel distance) for the index table indexing axis. The travel distance specified in the positioning command must always be an integer multiple of this setting. When 0 is set, the travel distance is not checked.

The minimum positioning angle is checked not only for the command, but also for the coordinate system setting and workpiece origin offset.

NOTE
When the setting is 0, specification can be performed regardless of the minimum angle.

4.30 PARAMETERS OF SIMPLE STRAIGHTNESS COMPENSATION (M SERIES)

5711	Simple straightness compensation : Axis number of moving axis 1

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes

Set the axis number of a moving axis in simple straightness compensation.
When 0 is set, compensation is not performed.

5721	Simple straightness compensation : Axis number of compensation axis 1 for moving axis 1

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes

Set the axis number of a compensation axis in simple straightness compensation.
When 0 is set, compensation is not performed.

5731	Simple straightness compensation : Compensation point number a of moving axis 1
5732	Simple straightness compensation : Compensation point number b of moving axis 1
5733	Simple straightness compensation : Compensation point number c of moving axis 1
5734	Simple straightness compensation : Compensation point number d of moving axis 1

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Unit of data] Detection unit
[Valid data range] 0 to 1023

These parameters set compensation point numbers in stored pitch error compensation.
Set four compensation points for each moving axis.

5761	Compensation corresponding compensation point number a of moving axis 1
5762	Compensation corresponding compensation point number b of moving axis 1
5763	Compensation corresponding compensation point number c of moving axis 1
5764	Compensation corresponding compensation point number d of moving axis 1

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Unit of data] Detection unit
[Valid data range] -32767 to 32767

Each of these parameters sets a compensation value for each moving axis compensation point.

4.31 PARAMETERS OF INCLINATION COMPENSATION

5861	**Inclination compensation : Compensation point number a for each axis**
5862	**Inclination compensation : Compensation point number b for each axis**
5863	**Inclination compensation : Compensation point number c for each axis**
5864	**Inclination compensation : Compensation point number d for each axis**

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 1023

These parameters set the compensation points for inclination compensation. The points are set for the compensation point numbers for stored pitch error compensation.

5871	**Inclination compensation : Compensation α at compensation point number a for each axis**
5872	**Inclination compensation : Compensation β at compensation point number b for each axis**
5873	**Inclination compensation : Compensation γ at compensation point number c for each axis**
5874	**Inclination compensation : Compensation δ at compensation point number d for each axis**

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word axis
[Unit of data] Detection unit
[Valid data range] -32767 to 32767

Each of these parameters sets a compensation value for each axis compensation point.

4.32 PARAMETERS OF CUSTOM MACROS

	#7	#6	#5	#4	#3	#2	#1	#0
6000	SBV		SBM	HGO			MGO	G67
	SBV		SBM	HGO	V10		MGO	G67

[Input type] Parameter input
[Data type] Bit path

 # 0 G67 If the macro modal call cancel command (G67) is specified when the macro modal call mode (G66) is not set:
0: Alarm PS0122 is issued.
1: The specification of G67 is ignored.

 # 1 MGO When a GOTO statement for specifying custom macro control is executed, a high-speed branch to 20 sequence numbers executed from the start of the program is:
0: A high-speed branch is not caused to n sequence numbers from the start of the executed program.
1: A high-speed branch is caused to n sequence numbers from the start of the program.

 # 3 V10 As system variable numbers for tool offset:
0 : The standard system variable numbers for the Series 0 are used.
1 : The same system variable numbers as those used for the Series 10/11 are used.

The tables below indicate the system variables for tool offset numbers 1 to 400. The values for tool offset numbers 1 to 200 can be read from or assigned to the system variables in parentheses.

(1) Tool offset memory A

	System variable number	
	V10 = 0	V10 = 1
Wear offset value	#10001 to #10400 (#2001 to #2200)	#10001 to #10400 (#2001 to #2200)

(2) Tool offset memory C

		System variable number	
		V10 = 0	V10 = 1
Tool length offset	Wear offset value	#11001 to #11400 (#2201 to #2400)	#10001 to #10400 (#2001 to #2200)
	Geometry offset value	#10001 to #10400 (#2001 to #2200)	#11001 to #11400 (#2201 to #2400)
Tool radius offset	Wear offset value	#13001 to #13400	#12001 to #12400
	Geometry offset value	#12001 to #12400	#13001 to #13400

 # 4 HGO When a GOTO statement in a custom macro control command is executed, a high-speed branch to the 30 sequence numbers immediately before the executed statement is:
0: Not made.
1: Made.

 # 5 SBM Custom macro statement

0: Not stop the single block
1: Stops the single block

If you want to disable the single blocks in custom macro statements using system variable #3003, set this parameter to 0. If this parameter is set to 1, the single blocks in custom macro statements cannot be disabled using system variable #3003. To control single blocks in custom macro statements using system variable #3003, use bit 7 (SBV) of parameter No. 6000.

 # 7 SBV Custom macro statement

0: Not stop the single block
1: Enable/disable single block stop with system variable #3003

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="2">Parameter SBM (No.6000#5)</th></tr>
<tr><th>0</th><th>1</th></tr>
<tr><td rowspan="2">Parameter SBV (No.6000#7)</td><td>0</td><td>Disables single block stop.</td><td rowspan="2">Enables single block stop. (With variable #3003, single block stop cannot be enabled/disabled. Single block stop is enabled at all times.)</td></tr>
<tr><td>1</td><td>Enables single block stop. (With variable #3003, single block stop can be enabled/disabled.)</td></tr>
</table>

	#7	#6	#5	#4	#3	#2	#1	#0
6001		CCV	TCS	CRO	PV5		PRT	MIF

[Input type] Parameter input
[Data type] Bit path

 # 0 MIF The custom macro interface signals are based on:

0: Standard specification.
(The signals UI000 to UI015, UO000 to UO015, and UO100 to UO131 are used.)
1: Extended specification.
(The signals UI000 to UI031, UI100 to UI131, UI200 to UI231, UI300 to UI331, UO000 to UO031, UO100 to UO131, UO200 to UO231, and UO300 to UO331 are used.)

 # 1 PRT Reading zero when data is output using a DPRINT command

0: Outputs a space
1: Outputs no data

 # 3 PV5 Custom macro common variables:

0: #500 to #999 are output.
1: #100 to #199 and #500 to 999 are output.

 # 4 CRO ISO code in BPRWT or DPRNT command

0: Outputs only “LF” after data is output
1: Outputs “LF” and “CR” after data is output

 # 5 TCS Custom macro (subprogram)

0: Not called using a T code
1: Called using a T code

 # 6 **CCV** Common variables #100 to #199 cleared by power-off are:
- 0: Cleared to <null> by reset
- 1: Not cleared by reset

	#7	#6	#5	#4	#3	#2	#1	#0
6003	MUS		MSB	MPR	TSE	MIN	MSK	

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 1 **MSK** Absolute coordinates at that time during custom macro interrupt
- 0: Not set to the skip coordinates (system variables #5061 and later)
- 1: Set to the skip coordinates (system variables #5061 and later)

 # 2 **MIN** Custom macro interrupt
- 0: Performed by interrupting an in-execution block (Custom macro interrupt type I)
- 1: Performed after an in-execution block is completed (Custom macro interrupt type II)

 # 3 **TSE** Custom macro interrupt signal UINT
- 0: Edge trigger method (Rising edge)
- 1: Status trigger method

 # 4 **MPR** Custom macro interrupt valid/invalid M code
- 0: M96/M97
- 1: M code set using parameters (Nos. 6033 and 6034)

 # 5 **MSB** Interrupt program
- 0: Uses a dedicated local variable (Macro-type interrupt)
- 1: Uses the same local variable as in the main program (Subprogram- type interrupt)

 # 7 **MUS** Interrupt-type custom macro
- 0: Not used
- 1: Used

	#7	#6	#5	#4	#3	#2	#1	#0
6004						VHD		NAT
			D10					NAT

[Input type] Parameter input
[Data type] Bit path

 # 0 NAT The results of the custom macro functions ATAN (with 2 arguments) and ASIN are specified as follows:
0: The result of ATAN is 0 to 360.0.
The result of ASIN is 270.0 to 0 to 90.0.
1: The result of ATAN is -180.0 to 0 to 180.0.
The result of ASIN is -90.0 to 0 to 90.0.

 # 2 VHD With system variables #5121 to #5125:
0: The tool offset value (geometry offset value) in the block currently being executed is read. (This parameter is valid only when tool geometry/tool wear compensation memories are available (bit 6 (NGW) of parameter No. 8136 is 0)).
1: An interrupt travel distance based on manual handle interrupt is read.

 # 5 D10 When tool compensation memory C is used, for reading or writing tool offset values (for up to offset number 200) for D code (tool radius), the same system variables, #2401 through #2800, as Series 10/11 are:
0: Not used.
1: Used.
When bit 3 (V10) of parameter No. 6000 is set to 1

D code				
Compensation number	Geometry		Wear	
	Variable number	Variable name	Variable number	Variable name
1	#2401	[#_OFSDG[1]]	#2601	[#_OFSDW[1]]
2	#2402	[#_OFSDG[2]]	#2602	[#_OFSDW[2]]
3	#2403	[#_OFSDG[3]]	#2603	[#_OFSDW[3]]
:	:	:	:	:
199	#2599	[#_OFSDG[199]]	#2799	[#_OFSDW[199]]
200	#2600	[#_OFSDG[200]]	#2800	[#_OFSDW[200]]

	#7	#6	#5	#4	#3	#2	#1	#0
6005								SQC

[Input type] Parameter input
[Data type] Bit path

 # 0 SQC In the subprogram call function, a subprogram sequence number call is:
0: Not used.
1: Used.

	#7	#6	#5	#4	#3	#2	#1	#0
6007				CVA				

[Input type] Parameter input
[Data type] Bit path

 # 4 CVA The format for macro call arguments is specified as follows:
0: Arguments are passed in NC format without modifications.
1: Arguments are converted to macro format then passed.
Example)
When G65 P_ X10 ; is specified, the value in local variable #24 in the calling program is set as follows:

Command	CVA=0	CVA=1
#24	0.01	0.01
ADP[#24]	10.0	0.01

NOTE
External operations are the same unless the ADP function is used.

	#7	#6	#5	#4	#3	#2	#1	#0
6008	IJK	GMP	ADD	ISO	KOP	DSM	MCA	F0C

[Input type] Parameter input
[Data type] Bit path

 # 0 F0C The precision of operation is based on:
0: New specification.
1: FS0*i*-C compatible specification.

NOTE
For details, refer to the custom macro chapter in the user's manual (B-64304EN).

 # 1 MCA A macro alarm specification based on system variable #3000 is selected as follows:
0: An alarm number obtained by adding 3000 to a value assigned to variable #3000 and the corresponding message are displayed. (A value from 0 to 200 can be assigned to variable #3000.)
1: A value assigned to variable #3000 and the corresponding message are displayed. (A value from 0 to 4095 can be assigned to variable #3000.)
(Example)
Execution of #3000=1 (ALARM MESSAGE);
When bit 1 (MCA) of parameter No. 6008 is set to 0:
The alarm screen displays "MC 3001 ALARM MESSAGE".
When bit 1 (MCA) of parameter No. 6008 is set to 1:
The alarm screen displays "MC0001 ALARM MESSAGE".

 # 2 DSM On the custom macro screen, the rewriting of a system variable that can be specified (written) on the left side from the MDI panel is:
0: Disabled.
1: Enabled.

 # 3 KOP When the NC is reset in the state where the line is made open by POPEN:
0: Communication continues, and the line is left open.
1: Communication stops, and the line is closed.

 # 4 ISO
0: When the EIA code is used, the bit patterns of codes specified instead of [,], #, *, =, ?, @, &, and _ are set in parameter No. 6010 to No. 6018.
1: When the ISO/ASCII code is used, the bit patters of codes specified instead of [,], #, *, =, ?, @, &, and _ are set in parameter No. 6010 to No. 6018.

 # 5 ADD When the number of digits in the integer part, a, in the format specification [a,b] of the DPRNT statement is less than the number of digits in the integer part of an output variable value:
0: The specified number of digits only are output, with the unspecified digits discarded.
1: An alarm for excessive digits is issued.

 # 6 GMP The calling of M, T, or a particular code during the calling of a G code, and the calling of a G code during the calling of M, T, or particular code are:
0: Not allowed. (They are executed as an ordinary G, M, T, and NC address.)
1: Allowed.

#7 IJK For addresses I, J, and K specified as arguments:
0: Argument specification I or II is automatically determined.
1: Argument specification I is always used.

Example
When K_J_I_ is specified:
- When this parameter is set to 0:
  Argument specification II is used and K=#6, J=#8, and I=#10 are specified.
- When this parameter is set to1:
  Argument specification I is used and I=#4, J=#5, and K=#6 are specified regardless of the specification order.
  (Argument specification II cannot be used.)

	#7	#6	#5	#4	#3	#2	#1	#0
6010	*7	*6	*5	*4	*3	*2	*1	*0

	#7	#6	#5	#4	#3	#2	#1	#0
6011	=7	=6	=5	=4	=3	=2	=1	=0

	#7	#6	#5	#4	#3	#2	#1	#0
6012	#7	#6	#5	#4	#3	#2	#1	#0

	#7	#6	#5	#4	#3	#2	#1	#0
6013	[7	[6	[5	[4	[3	[2	[1	[0

	#7	#6	#5	#4	#3	#2	#1	#0
6014	]7	]6	]5	]4	]3	]2	]1	]0

	#7	#6	#5	#4	#3	#2	#1	#0
6015	?7	?6	?5	?4	?3	?2	?1	?0

	#7	#6	#5	#4	#3	#2	#1	#0
6016	@7	@6	@5	@4	@3	@2	@1	@0

	#7	#6	#5	#4	#3	#2	#1	#0
6017	&7	&6	&5	&4	&3	&2	&1	&0

	#7	#6	#5	#4	#3	#2	#1	#0
6018	_7	_6	_5	_4	_3	_2	_1	_0

[Input type] Parameter input
[Data type] Bit path

*0 to *7 : The bit pattern of the EIA or ISO/ASCII code indicating * is set.
=0 to =7 : The bit pattern of the EIA or ISO/ASCII code indicating = is set.
#0 to #7 : The bit pattern of the EIA or ISO/ASCII code indicating # is set.
[0 to [7 : The bit pattern of the EIA or ISO/ASCII code indicating [is set.
]0 to]7 : The bit pattern of the EIA or ISO/ASCII code indicating] is set.
?0 to ?7 : The bit pattern of the EIA or ISO/ASCII code indicating ? is set.
@0 to @7 : The bit pattern of the EIA or ISO/ASCII code indicating @ is set.
&0 to &7 : The bit pattern of the EIA or ISO/ASCII code indicating & is set.
_0 to _7 : The bit pattern of the EIA or ISO/ASCII code indicating _ is set.

0: A corresponding bit is 0.
1: A corresponding bit is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
6019						DPD		MCO
								MCO

[Input type] Parameter input
[Data type] Bit

#0 MCO When data is output, the decimal number value of the macro variable data is
0: Not output as a comment.
1: Output at the same time as a comment.

After the number, data, and the variable name of the macro variable are output when data output operation is performed the variable number and the value of the macro variable data in decimal number are output as a comment.

NOTE
1 Output data by this parameter is "Comment", and this is ignored at the time of reading.
2 Accuracy of the output data of the comment is up to 15 digits. The range of output data are nine digits above decimalpoint and eight digits below decimal point. "± OVER FLOW" is output instead of a value when the total digits number is more than 16 and the digit number above the decimal point is ten or more. When the number of digits below the decimal point becomes nine digits or more, the ninth place of the decimal point is rounded off and output. Moreover, the seventh place or the eighth place of the decimal point is rounded off and output when the total digits number is more than 16 and the digit number above decimal point is nine or eight.
3 The output becomes "EMPTY" when displayed, the macro variable data is "DATA EMPTY".

 # 2 DPD When no decimal point is specified for argument D of a macro call, the number of decimal places is:
0: 0.
Example) If G65 P_ D1 is specified, #7 = 1.000 is passed as an argument.
1: Determined by the set unit of reference axis.
Example) When the reference axis is IS-B, if G65 P_ D1 is specified, #7 = 0.001 is passed as an argument.

NOTE
When this parameter is set to 1, the operation equivalent to that of the FS0*i*-TC is assumed.

6030	M code to execute external device subprogram calls

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 99999999

Set the M code to execute external device subprogram calls. When 0 is set, M198 is used. M01, M02, M30, M98, and M99 cannot be used to execute external device subprogram calls. When a negative number, 1, 2, 30, 98, or 99 is set for this parameter, M198 is used to execute external device subprogram calls.

6031	Start number of common variables to be protected among the common variables (#500 to #999)

6032	End number of common variables to be protected among the common variables (#500 to #999)

[Input type] Parameter input
[Data type] Word path
[Valid data range] 500 to 999

Among the common variables (#500 to #999), the range of common variables specified by this parameter can be protected (by setting their attributes to read-only). If a write attempt (on the left side) is made, an alarm is issued.

NOTE
Set 0 in both parameter No. 6031 and No. 6032 not to protect common variables.

6033	M code that validates a custom macro interrupt

6034	M code that invalidates a custom macro interrupt

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999 (excluding 30, 98 and 99)

These parameters can be used when bit 4 (MPR) of parameter No.6003, is 1. M96 is used as a valid M code and M97 is used as an invalid M code when MPR is 0, irrespective of the state of this parameter.

6036	Number of custom macro variables common to tool path (for #100 to #199)

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 100

When the memory common to paths is used, this parameter sets the number of custom macro common variables to be shared (custom macro variables common to paths). Common variables #100 to #199 may be shared. Ensure that the maximum number of usable macro common variables is not exceeded.

Example
When 20 is set in parameter No. 6036
#100 to #119: Shared by all paths
#120 to #199: Used by each path independently

NOTE
When 0 or a negative value is set, the memory common to paths is not used.

6037	Number of custom macro variables common to tool path (for #500 to #999)

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 500

When the memory common to paths is used, this parameter sets the number of custom macro common variables to be shared (custom macro variables common to paths). Common variables #500 to #999 may be shared. Ensure that the maximum number of usable macro common variables is not exceeded.

Example
When 50 is set in parameter No. 6037
#500 to #549: Shared by all paths
#550 to #999: Used by each path independently

NOTE
When 0 or a negative value is set, the memory common to paths is not used.

6038	Start G code used to call a custom macro

[Input type] Parameter input
[Data type] Word path
[Valid data range] -9999 to 9999

6039	Start program number of a custom macro called by G code

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 9999

6040	Number of G codes used to call custom macros

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 255

Set this parameter to define multiple custom macro calls using G codes at a time. With G codes as many as the value set in parameter No. 6040 starting with the G code set in parameter No. 6038, the custom macros of program numbers as many as the value set in parameter No. 6040 starting with the program number set in parameter No. 6039 can be called. Set 0 in parameter No. 6040 to disable this mode of calling.

If a negative value is set in parameter No. 6038, the modal call mode is entered.

Example)

When parameter No. 6038 = 900, parameter No. 6039 = 1000, and parameter No. 6040 = 100 are set, a set of 100 custom macro calls (simple calls) is defined as follows:

G900 → O1000
G901 → O1001
G902 → O1002
:
G999 → O1099

When the setting of parameter No. 6038 is changed to -900, the same set of custom macro calls (modal calls) is defined.

NOTE

1 When the following conditions are satisfied, all calls using these parameters are disabled:
   1) When a value not within the specifiable range is set in each parameter
   2) (Value of parameter No.6039 + value of parameter No.6040 - 1) > 9999
2 The specification of a mixture of simple calls and modal calls is not allowed.
3 If a range of G codes set by these parameters duplicate G codes specified in parameter No.6050 to No.6059, the calls specified by parameter No.6050 to 6059 are made preferentially.

6044	Start M code used to call a subprogram

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999

6045	Start program number of a subprogram called by M code

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 9999

6046	Number of M codes used to call subprograms (number of subprograms called by M codes)

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 32767

Set this parameter to define multiple subprogram calls using M codes at a time. With M codes as many as the value set in parameter No. 6046 starting with the M code set in parameter No. 6044, the subprograms of program numbers as many as the value set in parameter No. 6046 starting with the program number set in 6045 can be called. Set 0 in parameter No. 6046 to disable this mode of calling.

Example)

When parameter No. 6044 = 80000000, parameter No. 6045 = 3000, and parameter No. 6046 = 100 are set, a set of 100 subprogram calls is defined as follows:

M80000000 → O3000
M80000001 → O3001
M80000002 → O3002
:
M80000099 → O3099

NOTE

1 When the following conditions are satisfied, all calls using these parameters are disabled:
   1) When a value not within the specifiable range is set in each parameter
   2) (Value of parameter No. 6045 + value of parameter No. 6046 - 1) > 9999
2 If a range of M codes set by these parameters duplicate M codes specified in parameter No. 6071 to No. 6079, the calls specified by parameter No. 6071 to 6079 are made preferentially.

6047	Start M code used to call a custom macro

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999

6048	Start program number of a custom macro called by M code

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 9999

6049	Number of M codes used to call custom macros (number of custom macros called by M codes)

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 32767

Set this parameter to define multiple custom macro calls using M codes at a time. With M codes as many as the value set in parameter No. 6049 starting with the M code set in parameter No. 6047, the custom macros of program numbers as many as the value set in parameter No. 6049 starting with the program number set in parameter No. 6048 can be called. Set 0 in parameter No. 6049 to disable this mode of calling.

Example)

When parameter No. 6047 = 90000000, parameter No. 6048 = 4000, and parameter No. 6049 = 100 are set, a set of 100 custom macro calls (simple calls) is defined as follows:

M90000000 → O4000
M90000001 → O4001
M90000002 → O4002
:
M90000099 → O4099

NOTE

1 When the following conditions are satisfied, all calls using these parameters are disabled:
   1) When a value not within the specifiable range is set in each parameter
   2) (Value of parameter No. 6048 + value of parameter No. 6049 - 1) > 9999

2 If a range of M codes set by these parameters duplicate M codes specified in parameter No. 6080 through No. 6089, the calls specified by parameter No. 6080 through 6089 are made preferentially.

6050	**G code that calls the custom macro of program number 9010**
6051	**G code that calls the custom macro of program number 9011**
6052	**G code that calls the custom macro of program number 9012**
6053	**G code that calls the custom macro of program number 9013**
6054	**G code that calls the custom macro of program number 9014**
6055	**G code that calls the custom macro of program number 9015**
6056	**G code that calls the custom macro of program number 9016**
6057	**G code that calls the custom macro of program number 9017**
6058	**G code that calls the custom macro of program number 9018**
6059	**G code that calls the custom macro of program number 9019**

[Input type] Parameter input
[Data type] Word path
[Valid data range] (-9999 to 9999 : excluding 0, 5, 65, 66 and 67)

Set the G codes used to call the custom macros of program numbers 9010 to 9019. However, note that when a negative value is set in this parameter, it becomes a modal call. For example, if this parameter is set to -11, the modal call mode is entered by G11.

6071	M code used to call the subprogram of program number 9001
6072	M code used to call the subprogram of program number 9002
6073	M code used to call the subprogram of program number 9003
6074	M code used to call the subprogram of program number 9004
6075	M code used to call the subprogram of program number 9005
6076	M code used to call the subprogram of program number 9006
6077	M code used to call the subprogram of program number 9007
6078	M code used to call the subprogram of program number 9008
6079	M code used to call the subprogram of program number 9009

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999 (excluding 30, 98 and 99)

These parameters set the M codes that call the subprograms of program numbers 9001 to 9009.

NOTE
If the same M code is set in these parameters, the younger number is called preferentially. For example, if 100 is set in parameter No. 6071 and 6072, and programs O9001 and O9002 both exist, O9001 is called when M100 is specified.

6080	**M code used to call the custom macro of program number 9020**
6081	**M code used to call the custom macro of program number 9021**
6082	**M code used to call the custom macro of program number 9022**
6083	**M code used to call the custom macro of program number 9023**
6084	**M code used to call the custom macro of program number 9024**
6085	**M code used to call the custom macro of program number 9025**
6086	**M code used to call the custom macro of program number 9026**
6087	**M code used to call the custom macro of program number 9027**
6088	**M code used to call the custom macro of program number 9028**
6089	**M code used to call the custom macro of program number 9029**

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 3 to 99999999 (excluding 30, 98 and 99)

Set the M codes used to call the custom macros of program numbers 9020 to 9029. The simple call mode is set.

NOTE

1 If the same M code is set in these parameters, the younger number is called preferentially. For example, if 200 is set in parameter No. 6081 and No. 6082, and programs O9021 and O9022 both exist, O9021 is called when M200 is specified.

2 If the same M code is set in a parameter (No. 6071 to No. 6079) used to call subprograms and in a parameter (No. 6080 to No. 6089) used to call custom macros, a custom macro is called preferentially. For example, if 300 is set in parameter No. 6071 and No. 6081, and programs O9001 and O9021 both exist, O9021 is called when M300 is specified.

6090	ASCII code that calls the subprogram of program number 9004

6091	ASCII code that calls the subprogram of program number 9005

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 65(A:41H) to 90(Z:5AH)

These parameters set the ASCII codes that call subprograms in decimal.
The settable addresses are indicated below.

Address	Parameter setting value	T series	M series
A	65	O	O
B	66	O	O
D	68	X	O
F	70	O	O
H	72	O	O
I	73	O	O
J	74	O	O
K	75	O	O
L	76	O	O
M	77	O	O
P	80	O	O
Q	81	O	O
R	82	O	O
S	83	O	O
T	84	O	O
V	86	X	O
X	88	X	O
Y	89	X	O
Z	90	X	O

NOTE
1 When address L is set, the number of repeats cannot be specified.
2 Set 0 when no subprogram is called.

6095	Number of programs used by the one-touch macro call function

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 16

This parameter registers the number of programs used by the one-touch macro call function.
For example, when this parameter is set to 3, macro call start signals MCST1, MCST2, and MCST3 are enabled.
When this parameter is set to 0, the one-touch macro call function is disabled.

6096	Number of the first program in the program group used by the one-touch macro call function

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 9999

This parameter registers the number of the first program in the program group used by the one-touch macro call function.
For example, when this parameter is set to 9000, macro call start signals MCSTx and the programs started by the signals are given below.

MCST1 signal: Starts O9000. (when parameter No.6095 is 1 or more)
MCST2 signal: Starts O9001. (when parameter No.6095 is 2 or more)
: : :
MCST15 signal: Starts O9014. (when parameter No.6095 is 15 or more)
MCST16 signal: Starts O9015. (when parameter No.6095 is 16 or more)

4.33 PARAMETERS OF PATTERN DATA INPUT

6101	Macro variable number selected first when pattern menu 1 is selected
6102	Macro variable number selected first when pattern menu 2 is selected
6103	Macro variable number selected first when pattern menu 3 is selected
6104	Macro variable number selected first when pattern menu 4 is selected
6105	Macro variable number selected first when pattern menu 5 is selected
6106	Macro variable number selected first when pattern menu 6 is selected
6107	Macro variable number selected first when pattern menu 7 is selected
6108	Macro variable number selected first when pattern menu 8 is selected
6109	Macro variable number selected first when pattern menu 9 is selected
6110	Macro variable number selected first when pattern menu 10 is selected

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0,100 to 199,500 to 999

Set the macro variable number to be selected first when a pattern menu is selected on the custom macro screen.
If 0 is specified, 500 is assumed.
If a value beyond the above range is entered, 100 is assumed.

4.34 PARAMETERS OF SKIP FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
6200	SKF	SRE	SLS	HSS			SK0	GSK

[Input type] Parameter input
[Data type] Bit path

 # 0 GSK As a skip signal, the skip signal SKIPP is:
0: Invalid.
1: Valid.

 # 1 SK0 This parameter specifies whether the skip signal is made valid under the state of the skip signal SKIP and the multistage skip signals SKIP2 to SKIP8.
0: Skip signal is valid when these signals are 1.
1: Skip signal is valid when these signals are 0.

 # 4 HSS
0: The skip function does not use high-speed skip signals while skip signals are input. (The conventional skip signal is used.)
1: The step skip function uses high-speed skip signals while skip signals are input.

 # 5 SLS
0: The multi-step skip function does not use high-speed skip signals while skip signals are input. (The conventional skip signal is used.)
1: The multi-step skip function uses high-speed skip signals while skip signals are input.

NOTE
The skip signals (SKIP and SKIP2 to SKIP8) are valid regardless of the setting of this parameter. They can also be disabled using bit 4 (IGX) of parameter No. 6201.

 # 6 SRE When a high-speed skip signal is used:
0: The signal is assumed to be input on the rising edge (contact open → close).
1: The signal is assumed to be input on the falling edge (contact close → open).

 # 7 SKF Dry run, override, and automatic acceleration/deceleration for G31 skip command
0: Disabled
1: Enabled

	#7	#6	#5	#4	#3	#2	#1	#0
6201	SPE			IGX		TSE	SEB	

[Input type] Parameter input
[Data type] Bit path

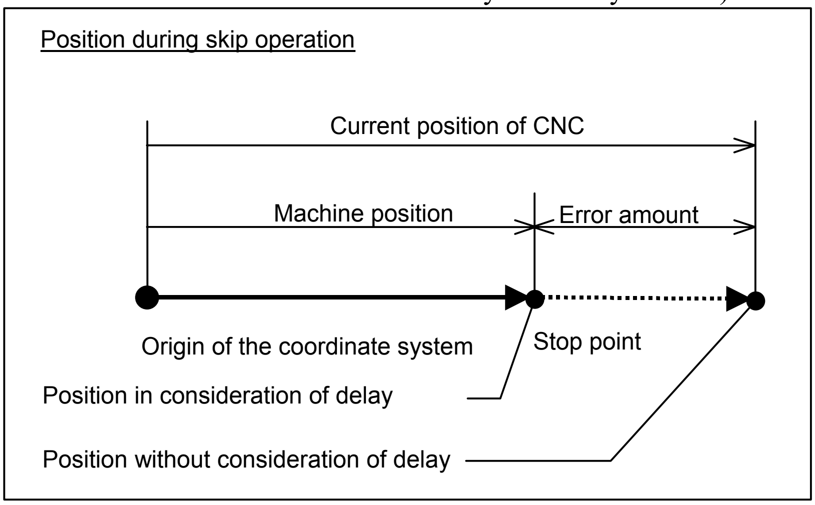
 # 1 SEB When a skip signal or measurement position arrival signal goes on while the skip function, or the automatic tool length measurement (M series) or automatic tool compensation (T series) is used, the accumulated pulses and positional deviation due to acceleration/deceleration are:

0: Ignored.
1: Considered and compensated.

The accumulated pulses and positional deviation due to actual acceleration/deceleration when the skip signal or measurement position arrival signal goes on are considered to obtain the position at which the signal is input.

 # 2 TSE In a skip by the torque limit skip command (G31P98/P99):

0: A servo delay amount (positional deviation) is considered (system variables #5061 to #5065 store positions corrected in consideration of the servo system delay amount).
1: A servo delay amount (positional deviation) is not considered (system variables #5061 to #5065 store positions corrected without consideration of the servo system delay amount).



 # 4 IGX When the high-speed skip function is used, SKIP, SKIPP, and SKIP2 to SKIP8 are:

0: Enabled as skip signals.
1: Disabled as skip signals.

 # 7 SPE For the skip function (G31), the skip signal SKIP is:
0: Enabled.
1: Disabled.

Whether the skip signals are enabled or disabled

Parameter	IGX (No.6201#4)	GSK (No.6200#0)	SPE (No.6201#7)	Skip signal SKIPP	Skip signal SKIP	Multistage skip signals SKIP2-SKIP8
Setting	0	0	0	Disabled	Enabled	Enabled
	0	1	0	Enabled	Enabled	Enabled
	0	0	1	Disabled	Disabled	Enabled
	0	1	1	Enabled	Disabled	Enabled
	1	0	0	Disabled	Disabled	Disabled
	1	1	0	Disabled	Disabled	Disabled
	1	0	1	Disabled	Disabled	Disabled
	1	1	1	Disabled	Disabled	Disabled

Bit 4 (IGX) of parameter No. 6201 is valid for the skip function using high-speed skip signals (when bit 4 (HSS) of parameter No. 6200 is set to 1) or for the multistage skip function using high-speed skip signals (when bit 5 (SLS) of parameter No. 6200 is set to 1).
To use multistage skip signals, the multistage skip function option is required.

	#7	#6	#5	#4	#3	#2	#1	#0
6202	1S8	1S7	1S6	1S5	1S4	1S3	1S2	1S1

[Input type] Parameter input
[Data type] Bit path

1S1 to 1S8 These parameters specify whether to enable or disable each high-speed skip signal when the G31 skip command is issued.
The following table shows the correspondence between the bits, input signals, and commands.
The settings of the bits have the following meaning :
0: The high-speed skip signal corresponding to a bit is disabled.
1: The high-speed skip signal corresponding to a bit is enabled.

Parameter	High-speed skip signals
1S1	HDI0
1S2	HDI1
1S3	HDI2
1S4	HDI3

NOTE
Do not specify the same signal simultaneously for different paths.

	#7	#6	#5	#4	#3	#2	#1	#0
6203	2S8	2S7	2S6	2S5	2S4	2S3	2S2	2S1
6204	3S8	3S7	3S6	3S5	3S4	3S3	3S2	3S1
6205	4S8	4S7	4S6	4S5	4S4	4S3	4S2	4S1
6206	DS8	DS7	DS6	DS5	DS4	DS3	DS2	DS1

[Input type] Parameter input
[Data type] Bit path

1S1to1S8, 2S1to2S8, 3S1to3S8, 4S1to4S8, DS1toDS8

Specify which skip signal is enabled when the skip command (G31, or G31P1 to G31P4) and the dwell command (G04, G04Q1 to G04Q4) are issued with the multi-step skip function.
The following table shows the correspondence between the bits, input signals, and commands.
The setting of the bits have the following meaning :
0: The skip signal corresponding to a bit is invalid.
1: The skip signal corresponding to a bit is enabled.

Multi-step skip function

Command / Input signal	G31 G31P1 G04Q1	G31P2 G04Q2	G31P3 G04Q3	G31P4 G04Q4	G04
SKIP/HDI0	1S1	2S1	3S1	4S1	DS1
SKIP2/HDI1	1S2	2S2	3S2	4S2	DS2
SKIP3/HDI2	1S3	2S3	3S3	4S3	DS3
SKIP4/HDI3	1S4	2S4	3S4	4S4	DS4
SKIP5	1S5	2S5	3S5	4S5	DS5
SKIP6	1S6	2S6	3S6	4S6	DS6
SKIP7	1S7	2S7	3S7	4S7	DS7
SKIP8	1S8	2S8	3S8	4S8	DS8

NOTE
HDI0 to HDI3 are high-speed skip signals. Do not specify the same signal simultaneously for different paths.

When bit 0 (GSK) of parameter No. 6200 is set to 1, commands to be skipped can be selected by setting the following parameter:

Commands skipped by SKIPP signal <G006.6>

Parameter	Command skipped
When bit 0 (1S1) of parameter No. 6202 is set to 1	G31P1,G04Q1
When bit 0 (2S1) of parameter No. 6203 is set to 1	G31P2,G04Q2
When bit 0 (3S1) of parameter No. 6204 is set to 1	G31P3,G04Q3
When bit 0 (4S1) of parameter No. 6205 is set to 1	G31P4,G04Q4
When bit 6 (DS1) of parameter No. 6206 is set to 1	G04,G04Q1,G04Q2,G04Q3,G04Q4

	#7	#6	#5	#4	#3	#2	#1	#0
6207						SFN	SFP	

[Input type] Parameter input
[Data type] Bit path

 # 1 SFP The feedrate used when the skip function (G31) is being executed is:
0: Feedrate of a programmed F code.
1: Feedrate set in parameter No. 6281.

> **NOTE**
> For the multi-stage skip function and high-speed skip, see the description of bit 2 (SFN) of parameter No. 6207.

 # 2 SFN The feedrate used when the skip function based on high-speed skip signals (with bit 4 (HSS) of parameter No. 6200 set to 1) or the multi-skip function is being executed is:
0: Feedrate of a programmed F code.
1: Feedrate set in a parameter from parameter No. 6282 to No. 6285.

> **NOTE**
> For not the multistage skip function, but the skip function using no high-speed skip signals (when bit 4 (HSS) of parameter No. 6200 is set to 0), see the description of bit 1 (SFP) of parameter No. 6207.

	#7	#6	#5	#4	#3	#2	#1	#0
6210		MDC		ASB	ASL			

[Input type] Parameter input
[Data type] Bit path

 # 3 ASL
 # 4 ASB

The ASB and ASL bits set the type and time constant of acceleration/deceleration after interpolation in the skip function as follows:

ASB	ASL	Type of acceleration/ deceleration	Parameter No. for time constant
0	1	Linear type	Parameter No. 6280
1	-	Bell-shaped	
0	0	This function is disabled(NOTE).	

When bell-shaped acceleration/deceleration is specified, T1=T/2 and T2=T/2 are obtained as with normal acceleration/deceleration after cutting feed interpolation, where T is the time constant. Therefore, the acceleration/deceleration type includes no linear part. To specify bell-shaped acceleration/deceleration, the option for bell-shaped acceleration/deceleration after cutting feed interpolation is required.

NOTE
In this case, the acceleration/deceleration type is set in bits 0 and 1 of parameter No. 1610, and the time constant is set in parameter No. 1622.

 # 6 MDC The measurement result of automatic tool length measurement (M series) or automatic tool compensation (T series) is:
0: Added to the current offset.
1: Subtracted from the current offset.

	#7	#6	#5	#4	#3	#2	#1	#0
6215								CSTx

[Input type] Parameter input
[Data type] Bit axis

 # 0 CSTx On a Cs contour control axis, torque limit skip operation is:
0: Not performed.
1: Performed.
Torque limit skip operation is performed using the torque limit command signal TLMH and the load detection signal LDT1 of the serial spindle.

NOTE
When setting this parameter to carry out a torque limit skip on a Cs contour control axis, keep the following in mind.
1 Set bit 4 of the serial spindle parameter of the Cs contour control axis (spindle) that uses the torque limit skip function to 1 so that the load detection signal is output during acceleration/deceleration.
2 If the load detection state is entered (LDT1 = "1") when the torque limit command is executed (TLMH1 = "1") in the Cs mode, the alarm detection level in the stop state is not checked on the axis.
3 If the load detection state is entered (LDT1 = "1") in the Cs mode, an in-position check is not performed on the axis.

6221	Torque limit dead zone time for a torque limit skip command

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] msec
[Valid data range] 0 to 65535
The torque limit skip arrival signal is ignored for a set period of time.
If G31P98 is specified, skip operation is not performed for a set period of time after the torque limit skip arrival signal is set to 1.
If G31P99 is specified, skip operation is not performed for a set period of time after the torque limit skip arrival signal is set to 1.
However, if a skip signal is input, skip operation is performed, regardless of the period of time set in this parameter.

	#7	#6	#5	#4	#3	#2	#1	#0
6240	IGA							AE0

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 AE0 Measurement position arrival is assumed when the automatic tool compensation signals XAE1 and XAE2 <X004.0, 1> (T series) or the automatic tool length measurement signals XAE1, XAE2, and XAE3 <X004.0, .1, .2> (M series) are:
0: 1.
1: 0.

 # 7 IGA Automatic tool length measurement (M series) or automatic tool compensation (T series) is:
0: Used.
1: Not used.

6241	Feedrate during measurement of automatic tool compensation (T series) (for the XAE1 and GAE1 signals)
	Feedrate during measurement of automatic tool length measurement (M series) (for the XAE1 and GAE1 signals)

6242	Feedrate during measurement of automatic tool compensation (T series) (for the XAE2 and GAE2 signals)
	Feedrate during measurement of automatic tool length measurement (M series) (for the XAE2 and GAE2 signals)

6243	
	Feedrate during measurement of automatic tool length measurement (M series) (for the XAE3 and GAE3 signals)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, deg/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
These parameters set the relevant feedrate during measurement of automatic tool compensation (T series) or automatic tool length measurement (M series).

> **NOTE**
> When the setting of parameter No. 6242 or 6243 is 0, the setting of parameter No. 6241 is used.

6251	γ value on the X axis during automatic tool compensation (T series)
	γ value during automatic tool length measurement (M series) (for the XAE1 and GAE1 signals)

6252	γ value on the Z axis during automatic tool compensation (T series)
	γ value during automatic tool length measurement (M series) (for the XAE2 and GAE2 signals)

6253	
	γ value during automatic tool length measurement (M series) (for the XAE3 and GAE3 signals)

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] mm, inch, deg (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the relevant γ value during automatic tool compensation (T series) or automatic tool length measurement (M series).

NOTE
1 For the M series, when the setting of parameter No. 6252 or 6253 is 0, the setting of parameter No. 6251 is used.
2 Set a radius value regardless of whether diameter or radius programming is specified.

6254	ε value on the X axis during automatic tool compensation (T series)
	ε value during automatic tool length measurement (M series) (for the XAE1 and GAE1 signals)

6255	ε value on the Z axis during automatic tool compensation (T series)
	ε value during automatic tool length measurement (M series) (for the XAE2 and GAE2 signals)

6256	
	ε value during automatic tool length measurement (M series) (for the XAE3 and GAE3 signals)

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] mm, inch, deg (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the relevant ε value during automatic tool compensation (T series) or automatic tool length measurement (M series).

NOTE
1 For the M series, when the setting of parameter No. 6252 or 6253 is 0, the setting of parameter No. 6251 is used.
2 Set a radius value regardless of whether diameter or radius programming is specified.

6280	Time constant for acceleration/deceleration after interpolation for the skip function for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 512

This parameter sets a time constant for acceleration/deceleration after interpolation for the skip function for each axis.
This parameter is valid when bit 3 (ASB) of parameter No. 6210 or bit 4 (ASL) of parameter No. 6210 is set to 1.

6281	Feedrate for the skip function (G31)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets a feedrate for the skip function (G31). This parameter is valid when bit 1 (SFP) of parameter No. 6207 is set to 1.

> **NOTE**
> For the multi-stage skip function and high-speed skip, see the description of parameter No. 6282 to No. 6285.

6282	Feedrate for the skip function (G31, G31 P1)
6283	Feedrate for the skip function (G31 P2)
6284	Feedrate for the skip function (G31 P3)
6285	Feedrate for the skip function (G31 P4)

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Each of these parameters sets a feedrate for each skip function G code. These parameters are valid when bit 2 (SFN) of parameter No. 6207 is set to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
6286								TQOx

[Input type] Parameter input
[Data type] Bit axis

 # 0 TQOx The torque limit override function is:
0: Disabled. (Override of 100%)
1: Enabled.

> **NOTE**
> Before the torque limit skip function can be used, this parameter must be set to 1.

6287	Positional deviation limit in torque limit skip

[Input type]	Parameter input
[Data type]	2-word axis
[Unit of data]	Detection unit
[Valid data range]	0 to 327670

This parameter sets a positional deviation limit for each axis imposed when torque limit skip is specified. When the actual positional deviation exceeds the positional deviation limit, the alarm (SV0004) is issued and an immediate stop takes place.

4.35 PARAMETERS OF EXTERNAL DATA INPUT/OUTPUT

	#7	#6	#5	#4	#3	#2	#1	#0
6300	EEX			ESR	ESC			

[Input type] Parameter input
[Data type] Bit path

 # 3 ESC When a reset is input between the input of the external data input read signal ESTB and the execution of a search, the external program number search function:
0: Performs a search.
1: Does not perform a search.

 # 4 ESR The external program number search function is:
0: Disabled.
1: Enabled.

 # 7 EEX PMC EXIN function
0: Conventional specifications
1: Extended specifications
If you want to use external machine coordinate system shift which handles ±10.000 or more shift unavailable with the PMC/EXIN command in the conventional specifications, set 1.
When this function is used for a 2-path system, the setting for path 1 is used.
For details of EXIN and how to change ladder software, refer to the PMC manuals.

	#7	#6	#5	#4	#3	#2	#1	#0
6301					EED	NNO	EXM	EXA

[Input type] Parameter input
[Data type] Bit machine group

 # 0 EXA This bit selects an external alarm message specification.
0: A message number from 0 to 999 can be sent. When displaying an alarm number, the CNC prefixes the character string "EX" to the alarm number obtained by adding 1000 to the message number.
1: A message number from 0 to 4095 can be sent. The CNC prefixes the character string "EX" to a alarm number for display.

 # 1 EXM This bit selects an external operator message specification.

0: A message number from 0 to 999 can be sent. The message of a message number from 0 to 99 is displayed together with its number. The CNC adds 2000 to a number for distinction. A message number from 100 to 999 is not displayed on the screen, but only the corresponding message is displayed on the screen.

1: A message number from 0 to 4095 can be sent. The message of a message number from 0 to 99 is displayed together with its number. The CNC prefixes the character string "EX" to a message number for display. A message number from 100 to 4095 is not displayed on the screen, but only the corresponding message is displayed on the screen.

 # 2 NNO When operator messages are set by external data input, a new line operation between one message set with a number and another message set with a different number is:

0: Performed.

1: Not performed.

 # 3 EED To specify data for external tool compensation and external workpiece coordinate system shift, use:

0: Signals ED15 to ED0.
(The value which can be specified for tool compensation and workpiece coordinate system shift is from 0 to ±7999.)

1: Signals ED31 to ED0.
(The value which can be specified for tool compensation and workpiece coordinate system shift is from 0 to ±79999999.)

6310	Setting for number addition to external operator messages

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input

[Data type] Word machine group

[Valid data range] 0 to 4095

This parameter sets the number of messages to which message numbers are to be prefixed in external operator message display.

When 0 is set, the same operation as when 100 is set is performed.

Example)

When 500 is set in this parameter, the messages of message numbers 0 to 499 are displayed together with their numbers on the screen. A message number of 500 and up is not displayed on the screen, but only the corresponding message is displayed on the screen.

4.36 PARAMETERS OF MANUAL HANDLE RETRACE (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
6400	MG4	MGO	RVN	HMP	MC8	MC5	FWD	RPO
	MG4	MGO	RVN		MC8	MC5	FWD	RPO

[Input type] Parameter input
[Data type] Bit path

 # 0 RPO With the manual handle retrace function, the rapid traverse rate is clamped, assuming that:
0: An override of 10% is used.
1: An override of 100% is used.

 # 1 FWD With the manual handle retrace function, program execution can be performed:
0: In both forward and backward directions.
1: In the forward direction only. Execution in the backward direction is not permitted.

 # 2 MC5
 # 3 MC8
These parameters set the number of M code groups and the number of M codes per group.
(See explanations of parameters Nos. 6411 to 6490.)

MC5	MC8	M code group setting
0	0	Standard (20 groups of four)
1	0	16 groups of five
0	1	10 groups of eight

When 16 groups of five are used, the meanings of parameters are changed as follows:
Group A No.6411(1) to No.6415(5)
Group B No.6416(1) to No.6420(5)
:
Group P No.6486(1) to No.6490(5)
When 10 groups of eight are used, they are changed as follows:
Group A No.6411(1) to No.6418(8)
Group B No.6419(1) to No.6426(8)
:
Group J No.6483(1) to No.6490(8)

 # 4 HMP When inversion or backward movement is inhibited in other paths:
0: Inversion or backward movement is not inhibited for the currently executed path.
1: Inversion or backward movement is inhibited also for the currently executed path.

 # 5 RVN When the manual handle retrace function is used, M codes other than grouped M codes:
0: Do not disable backward movement.
1: Disable backward movement.

When this parameter is set to 1, M codes other than grouped M codes disable backward movement in general. Exceptionally, however, the following M codes allow backward movement:
1. Subprogram call based on M98/M99
2. Subprogram call based on an M code
3. Macro call based on an M code
4. Waiting M code
5. M0

 # 6 MGO When the manual handle retrace function is used, handle pulses during execution of a G code related to measurement are:
0: Valid.
1: Invalid. A speed with an override of 100% is used for execution at all times.

 # 7 MG4 In the manual handle retrace function, for blocks for which multi-step skip G04 is enabled (when the multi-step skip software option is used, and the settings of parameter Nos. 6202 to 6206 are valid):
0: Backward movement is not prohibited.
1: Backward movement is prohibited.

	#7	#6	#5	#4	#3	#2	#1	#0
6401	STO	HST				CHS		

[Input type] Parameter input
[Data type] Bit path

 # 2 CHS In manual handle retrace:
0: The status is displayed if the following conditions are all satisfied:
(1) Bit 6 (HST) of parameter No. 6401, which specifies whether to enable or disable status display, is set to 1.
(2) Check mode output signal MMMOD<Fn091.3> is set to 1.
1: The status is displayed if the following conditions are all satisfied:
(1) Bit 6 (HST) of parameter No. 6401, which specifies whether to enable or disable status display, is set to 1.
(2) Cycle start lamp signal STL<Fn000.5> is set to 1.
(3) Check mode input signal MMOD<Gn067.2> is set to 1.
(4) Handle input signal MCHK<Gn067.3> is set to 1 in the check mode.

 # 6 HST When the manual handle retrace function is used, the time display field on the status display line of the CNC screen:
0: Does not display status.
1: Displays status.

 # 7 STO In the manual handle retrace function, the timing for outputting an S code and T code during backward movement is:
0: Different from the timing during forward movement:
1: The same as during forward movement.

	#7	#6	#5	#4	#3	#2	#1	#0
6402			MWR					

[Input type] Parameter input
[Data type] Bit path

 # 5 MWR When the manual handle retrace function is used, for a handle operation placed in the wait state by a wait M code during backward movement:
0: Inversion is prohibited.
1: Inversion is permitted.

6405	Override value (equivalence) for clamping the rapid traverse rate used with the manual handle retrace function

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 0 to 100

This parameter sets an override value (equivalence) for clamping the rapid traverse rate used with the manual handle retrace function. If a value greater than 100 is set in parameter (No.6405), the rapid traverse rate is clamped to an override of 100%. This function is invalid if 0 is set in parameter (No.6405). In this case, the setting of bit 0 (RPO) of parameter No. 6400 is used.

6410	Travel distance per pulse generated from the manual pulse generator

[Input type] Parameter input
[Data type] Word path
[Unit of data] %
[Valid data range] 0 to 100

Set the travel distance per pulse generated from the manual pulse generator in terms of the override value.
The distance traveled by the machine when the manual handle is actually turned can be found by the following expression:
[Specified speed] × [Handle magnification] × ([Setting of this parameter]/100) × (8/60000) (mm or inch)
[Example]
When a specified feedrate is 30mm/min, the manual handle magnification is 100, and parameter No. 6410 is set to 1, the travel distance per pulse generated from the manual pulse generator is calculated as follows:
[Travel distance per pulse]
=30[mm/min] × 100 × (1/100) × (8/60000)[min]= 0.004mm

6411	M code of group A in manual handle retrace (1)
to	
6414	M code of group A in manual handle retrace (4)

6415	M code of group B in manual handle retrace (1)
to	
6418	M code of group B in manual handle retrace (4)

6419	M code of group C in manual handle retrace (1)
to	
6422	M code of group C in manual handle retrace (4)

6423	M code of group D in manual handle retrace (1)
to	
6426	M code of group D in manual handle retrace (4)

6427	M code of group E in manual handle retrace (1)
to	
6430	M code of group E in manual handle retrace (4)

6431	M code of group F in manual handle retrace (1)
to	
6434	M code of group F in manual handle retrace (4)

6435	M code of group G in manual handle retrace (1)
to	
6438	M code of group G in manual handle retrace (4)

6439	M code of group H in manual handle retrace (1)
to	
6442	M code of group H in manual handle retrace (4)

6443	M code of group I in manual handle retrace (1)
to	
6446	M code of group I in manual handle retrace (4)

6447	M code of group J in manual handle retrace (1)
to	
6450	M code of group J in manual handle retrace (4)

6451	M code of group K in manual handle retrace (1)
to	
6454	M code of group K in manual handle retrace (4)

6455	M code of group L in manual handle retrace (1)
to	
6458	M code of group L in manual handle retrace (4)

6459	M code of group M in manual handle retrace (1)
to	
6462	M code of group M in manual handle retrace (4)

6463	M code of group N in manual handle retrace (1)
to	
6466	M code of group N in manual handle retrace (4)

6467	M code of group O in manual handle retrace (1)
to	
6470	M code of group O in manual handle retrace (4)

6471	M code of group P in manual handle retrace (1)
to	
6474	M code of group P in manual handle retrace (4)

6475	M code of group O in manual handle retrace (1)
to	
6478	M code of group Q in manual handle retrace (4)

6479	M code of group R in manual handle retrace (1)
to	
6482	M code of group R in manual handle retrace (4)

6483	M code of group S in manual handle retrace (1)
to	
6486	M code of group S in manual handle retrace (4)

6487	M code of group T in manual handle retrace (1)
to	
6490	M code of group T in manual handle retrace (4)

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 9999

Set a group of M codes output during backward movement.
For backward movement for an M code, the modal M code in the same group set by the parameter is output.
The first M code in each group is set as the default.
When the number of M codes in a group is 3 or less, set the parameter corresponding to an unused M code to 0.
For backward movement for "M0", "M0" is output regardless of which M code is set for the parameter. "0" set in the parameter is ignored.
For an M code which is not set in any group by any of the above parameters, the M code for forward movement is output.

With these parameters, an M code in the same group can be output in backward movement only when the M code is the first M code in each block. When a block contains two or more M codes, the same M codes as output in forward movement are output as a second M code and up.

NOTE
The above explanation of M code groups applies to the standard settings. The number of M codes in each group and the number of M code groups vary depending on the settings of bit 2 (MC5) and bit 3 (MC8) of parameter No. 6400.

4.37 PARAMETERS OF GRAPHIC DISPLAY (1 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
6500					DPA		SPC	

[Input type] Parameter input
[Data type] Bit

#1 SPC Graphic display in 2-path control includes:
0: Two spindles and two tool posts.
1: One spindle and two tool posts.

> **NOTE**
> This parameter is valid when two paths are displayed at the same time.

#3 DPA The current position display on the graphic display screen displays:
0: The actual position with tool-nose radius compensation considered.
1: The programmed position.

	#7	#6	#5	#4	#3	#2	#1	#0
6501			CSR					
			CSR			3PL		ORG

[Input type] Parameter input
[Data type] Bit path

#0 ORG When the coordinate system is changed during tool path drawing by the dynamic graphic display function, drawing is performed:
0: With the same coordinate system.
1: With the current drawing point assumed to be the current position set in the new coordinate system.

> **NOTE**
> This parameter is valid when bit 3 (BGM) of parameter No. 11329 is 0.

#2 3PL In animated simulation of the dynamic graphic display function, triplane drawing is drawn:
0: In third angle projection.
1: In first angle projection.

#5 CSR On the PATH GRAPHIC (CURRENT POSITION) screen, the shape of the cursor indicating the tool position is:
0: A square (■).
1: An x (×).

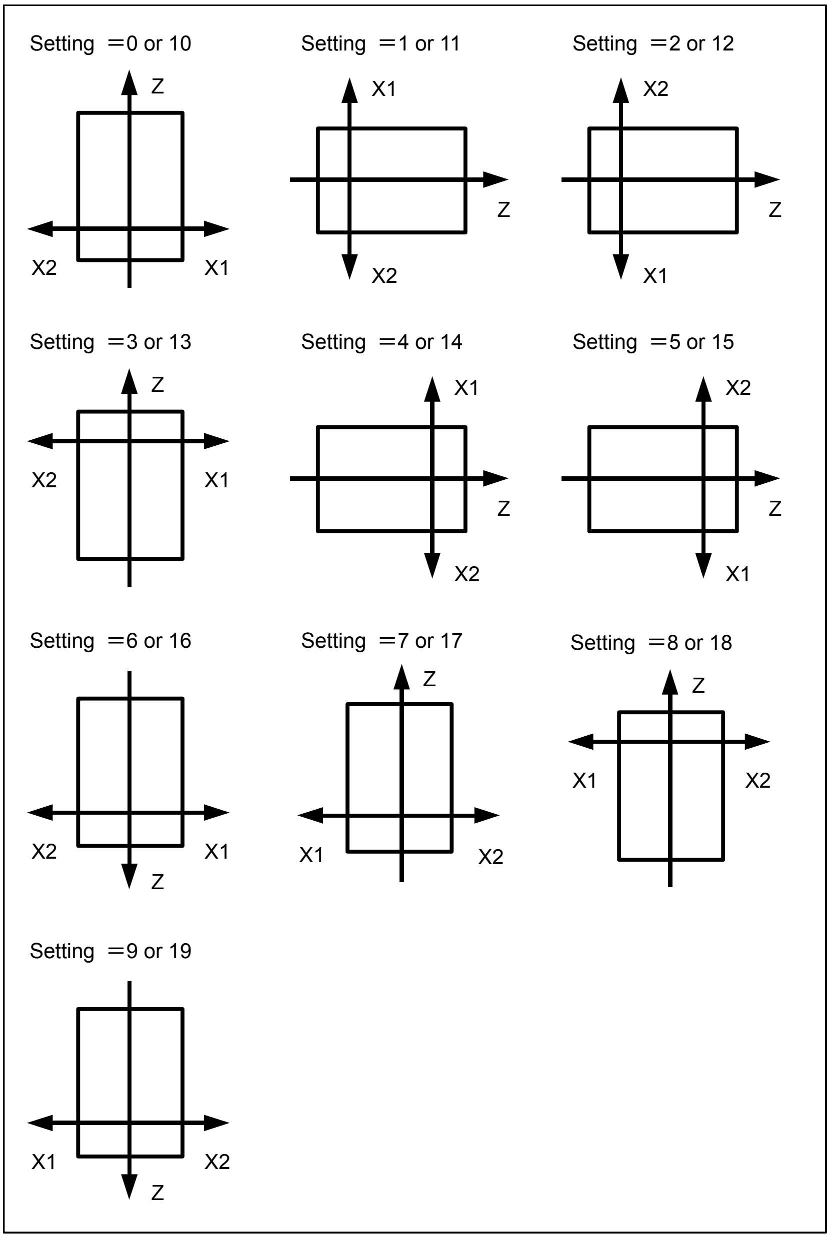
6509	Drawing coordinate system for one-spindle graphic (2-path control)

[Input type] Parameter input

[Data type] Byte

[Valid data range] 0 to 9, 10 to 19 (however, a setting of 0 to 9 is the same as that of 10 to 19, respectively.)

This parameter sets the drawing coordinate system for one-spindle graphic (bit 1 (SPC) of parameter No. 6500 is 1) in 2-path control.
The drawing coordinate system is set as shown below.

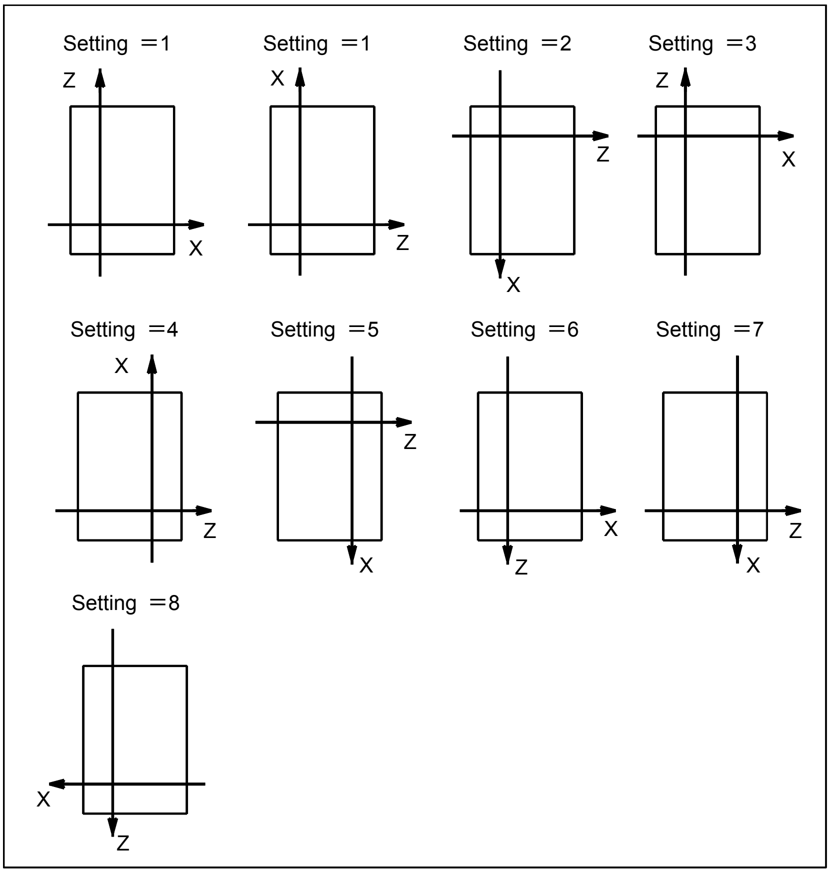


6510	Drawing coordinate system

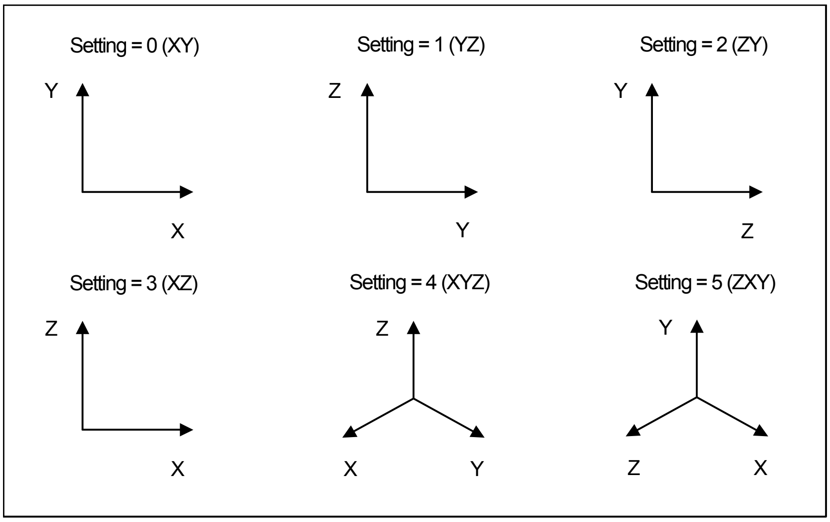
[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 8

This parameter sets the drawing coordinate system for the graphic display function.
The drawing coordinate system is set as shown below.

For T series:



For M series:



6515	Change in the cross-sectional position in a triplane drawing in dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Unit of data] Dot
[Valid data range] 0 to 10

This parameter sets changes in the cross-sectional position in a triplane drawing in dynamic graphic display, which are made when the soft key is pressed and held.
A setting of 0 is assumed to be 1.

4.38 PARAMETERS OF SCREEN DISPLAY COLORS (1 OF 2)

6581	RGB value of color palette 1
6582	RGB value of color palette 2
6583	RGB value of color palette 3
6584	RGB value of color palette 4
6585	RGB value of color palette 5
6586	RGB value of color palette 6
6587	RGB value of color palette 7
6588	RGB value of color palette 8
6589	RGB value of color palette 9
6590	RGB value of color palette 10
6591	RGB value of color palette 11
6592	RGB value of color palette 12
6593	RGB value of color palette 13
6594	RGB value of color palette 14
6595	RGB value of color palette 15

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to 151515

Each of these parameters sets the RGB value of each color palette by specifying a 6-digit number as described below.
rrggbb: 6-digit number (rr: red data, gg: green data, bb: blue data)
The valid data range of each color is 0 to 15 (same as the tone levels on the color setting screen). When a number equal to or greater than 16 is specified, the specification of 15 is assumed.
Example)
When the tone level of a color is: red:1 green:2, blue:3, set 10203 in the parameter.

4.39 PARAMETERS OF RUN HOUR AND PARTS COUNT DISPLAY

	#7	#6	#5	#4	#3	#2	#1	#0
6700							PRT	PCM

[Input type] Parameter input
[Data type] Bit path

 # 0 PCM M code that counts the total number of machined parts and the number of machined parts
0: M02, or M30, or an M code specified by parameter No.6710
1: Only M code specified by parameter No.6710

 # 1 PRT Upon reset, the required parts count arrival signal (PRTSF) is:
0: Set to "0".
1: Not set to "0".

6710	M code that counts the number of machined parts

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999
The total number of machined parts and the number of machined parts are counted (+1) when the M code set is executed.

> **NOTE**
> The setting of 0 is invalid (no count operation is performed with M00.) Moreover, M98, M99, M198 (external device subprogram calling), and M codes used for subprogram calling and macro calling cannot be set as M codes for count-up operation. (Even when such an M code is set, count-up operation is not performed, ignoring the M code.)

6711	Number of machined parts

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 999999999
The number of machined parts is counted (+1) together with the total number of machined parts when the M02, M30, or a M code specified by parameter No.6710 is executed.

> **NOTE**
> The number of parts is not counted for M02, M03, when bit 0 (PCM) of parameter No. 6700 is set to 1.

6712	Total number of machined parts

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 999999999

This parameter sets the total number of machined parts.
The total number of machined parts is counted (+1) when M02, M30, or an M code specified by parameter No.6710 is executed.

> **NOTE**
> The number of parts is not counted for M02, M30, when bit 0 (PCM) of parameter No. 6700 is set to 1.

6713	Number of required parts

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 999999999

This parameter sets the number of required machined parts.
Required parts finish signal PRTSF <F0062.7> is output to PMC when the number of machined parts reaches the number of required parts. The number of parts is regarded as infinity when the number of required parts is zero. The PRTSF signal is then not output.

6750	Integrated value of power-on period

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] min
[Valid data range] 0 to 999999999

This parameter displays the integrated value of power-on period.

6751	Operation time (integrated value of time during automatic operation) 1

[Input type] Setting input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 59999

For details, see the description of parameter No. 6752.

6752	Operation time (integrated value of time during automatic operation) 2

[Input type] Setting input
[Data type] 2-word path
[Unit of data] min
[Valid data range] 0 to 999999999

This parameter displays the integrated value of time during automatic operation (neither stop nor hold time included).
The actual time accumulated during operation is the sum of this parameter No. 6751 and parameter No. 6752.

6753	Integrated value of cutting time 1

[Input type] Setting input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 59999

For details, see the description of parameter No. 6754.

6754	Integrated value of cutting time 2

[Input type] Setting input
[Data type] 2-word path
[Unit of data] min
[Valid data range] 0 to 999999999

This parameter displays the integrated value of a cutting time that is performed in cutting feed such as linear interpolation (G01) and circular interpolation (G02 or G03).
The actual time accumulated during cutting is the sum of this parameter No. 6753 and parameter No. 6754.

6755	Integrated value of general-purpose integrating meter drive signal (TMRON) ON time 1

[Input type] Setting input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 59999

For details, see the description of parameter No. 6756.

6756	Integrated value of general-purpose integrating meter drive signal (TMRON) ON time 2

[Input type] Setting input
[Data type] 2-word path
[Unit of data] min
[Valid data range] 0 to 999999999

This parameter displays the integrated value of a time while input signal TMRON <G0053.0> from PMC is on.
The actual integrated time is the sum of this parameter No. 6755 and parameter No. 6756.

6757	Operation time (integrated value of one automatic operation time) 1

[Input type] Setting input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 59999

For details, see the description of parameter No. 6758.

6758	Operation time (integrated value of one automatic operation time) 2

[Input type] Setting input
[Data type] 2-word path
[Unit of data] min
[Valid data range] 0 to 999999999

This parameter displays the one automatic operation drive time (neither stop nor hold state included). The actual time accumulated during operating is the sum of this parameter No. 6757 and parameter No. 6758. The operation time is automatically preset to 0 during the power-on sequence and the cycle start from the reset state.

4.40 PARAMETERS OF TOOL LIFE MANAGEMENT (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
6800	M6T	IGI	SNG	GRS	SIG	LTM	GS2	GS1

[Input type] Parameter input
[Data type] Bit path

 # 0 GS1
 # 1 GS2 For the maximum number of groups set in parameter No. 6813, up to four tools can be registered per group. The combination of the number of registrable groups and the number of tools per group can be changed by setting GS1 and GS2.

GS2	GS1	Number of groups	Number of tools
0	0	1 to maximum number of groups (No. 6813)/8	1 to 16
0	1	1 to maximum number of groups (No. 6813)/4	1 to 8
1	0	1 to maximum number of groups (No. 6813)/2	1 to 4
1	1	1 to maximum number of groups (No. 6813)	1 to 2

NOTE
After changing these parameters, set data again by using G10 L3 ;(registration after deletion of data of all groups).

 # 2 LTM The tool life count is specified by:
0: Count.
1: Duration.

NOTE
After changing this parameter, set data again by using G10 L3 ;(registration after deletion of data of all groups).

 # 3 SIG When a tool is skipped by a signal, the group number is:
0: Not input by the tool group number selection signals.
1: Input by the tool group number selection signals.

NOTE
When this parameter is set to 0, a tool of the currently used group is skipped.

 # 4 GRS When the tool change reset signal (TLRST) is input:
0: If the life of the group specified by the tool group number selection signals has expired, the execution data of the group is cleared.
1: The execution data of all registered groups is cleared.
If this parameter is set to 1, the execution data of all registered groups is cleared also when the clear operation to clear execution data is performed on the tool life management list screen.

 # 5 SNG When the tool skip signal (TLSKP) is input while a tool not controlled by the tool life management function is being used:
0: A tool of the most recently used group or a specified group (bit 3 (SIG) of parameter No. 6800) is skipped.
1: The tool skip signal is ignored.

 # 6 IGI Tool back numbers are:
0: Not ignored.
1: Ignored.

 # 7 M6T A T code specified in the same block as M06 is:
0: Assumed to be a back number.
1: Assumed to be a command specifying the next tool group.

	#7	#6	#5	#4	#3	#2	#1	#0
6801	M6E				EMD	LVF	TSM	
	M6E				EMD	LVF		

[Input type] Parameter input
[Data type] Bit path

 # 1 TSM In the tool life management function, life counting is performed as follows when more than one offset is specified:
0: Counting is performed for each tool number.
1: Counting is performed for each tool.

 # 2 LVF When the life value is counted by duration in the tool life management function, tool life count override signals *TLV0 to *TLV9 <G049.0 to G050.1> are:
0: Not used.
1: Used.

 # 3 EMD In the tool life management function, the mark "*" indicating that the life has expired is displayed when:

0: The next tool is used.
1: The life has just expired.

> **NOTE**
> If this parameter is set to 0, the "@" mark (indicating that the tool is in use) is kept displayed unless the next tool whose life has not expired is used. If this parameter is set to 1, marks are displayed in different ways depending on the life count type.
> If the life count type is the duration specification type, the "*" mark (indicating that the life has expired) appears when the life has expired. If the life count type is the count specification type, one count is not assumed until the end of the program (M02, M30, and so on). Therefore, even when the life value and the tool life counter value match, the "*" mark (life has expired) does not appear. The "*" mark (life has expired) appears when the tool is used again by a tool group command (T code) or tool change command (M06) issued after the CNC is reset.

 # 7 M6E When a T code is specified in the same block as M06:

0: The T code is treated as a back number or the group number to be selected next.
   Which number is assumed depends on the setting of bit 7 (M6T) of parameter No. 6800.
1: Life counting for the tool group starts immediately.

	#7	#6	#5	#4	#3	#2	#1	#0
6802	RMT	TSK				E17	TCO	T99
	RMT	TSK				E17	TCO	T99

[Input type] Parameter input
[Data type] Bit path

 # 0 T99 When M99 of the main program is executed, and there is a the life was expired tool group:

0: The tool change signal is not output.
1: The tool change signal is output, and the automatic operation becomes a stopped state..

If the life count is specified by use count and this parameter 1, the tool change signal TLCH <Fn064.0> is output and the automatic operation becomes a stopped state if the life of at least one tool group has expired when the M99 command is specified.

If the life count type is the duration specification type, the automatic operation becomes a stopped state if the life of at least one tool group has expired when the M99 command is specified.

M

If the life count is specified by use count, after the M99 command is specified, a tool group command (T code) selects, from a specified group, a tool whose life has not expired, and the next tool change command (M06) increments the tool life counter by one.

T

If the life count is specified by use count, when a tool group command (T code) is specified after the M99 command is specified, a tool whose life has not expired is selected from a specified group, and the tool life counter is incremented by one.

#1 TCO
#2 E17

Specifies whether to allow the FOCAS2 or PMC window function to write tool information of a group being used or a group to be used next during automatic operation (the OP signal is set to "1").

Condition			6802#1(TCO)		
			0	1	
				6802#2(E17)	
				1	0
During automatic operation	Group being used or to be used next	Tool being used	×	□	○
		Tool not being used	×	○	○
	Group neither being used nor to be used next		○	○	○
Not during automatic operation			○	○	○

○: Tool information can be written from FOCAS2 and PMC window.
×: Tool information cannot be written from FOCAS2 and PMC window.
When an attempt is made to write tool information from PMC window, completion code 13 (REJECT ALARM) is returned.
□: Tool information cannot be cleared.

NOTE

When tool information of a tool being used (marked with "@") in the group being used or to be used next or tool information of the most recently used tool (marked with "@") in a group that is neither the group being used nor the group to be used next is cleared, the life counter is reset to 0.
It is possible to modify tool information of a tool in the group to be used next. However, because tool selection is already completed, the selected tool does not change even when the tool information is modified.
This parameter has no influence on modifications to tool information by edit operations from the tool life management screen.

 # 6 TSK If the count type in tool life management is the duration type, then when the last tool of a group is skipped by a signal:

0: The count value for the last tool equals the life value.

1: The count value for the last tool remains unchanged.

 # 7 RMT Tool life arrival notice signal TLCHB is turned on and off as follows:

0: The signal is turned on if the remaining life value (the life value minus the life counter value) is smaller than or equal to the remaining life setting. The signal is turned off if the remaining life value (the life value minus the life counter value) is greater than the remaining life setting.

1: The signal is turned on if the remaining life value (the life value minus the life counter value) is equal to the remaining life setting. The signal is turned off if the remaining life value (the life value minus the life counter value) is not equal to the remaining life setting.

> **NOTE**
> When using the life count override feature, set bit 7 (RMT) of parameter No. 6802 to 0. When the life count is specified by duration, the unit used for determining the result of comparison between the remaining life and the remaining life setting varies depending on the life count interval (bit 0 (FCO) of parameter No. 6805). If the life is counted every second, the comparison is made in units of 1 minute; if the life is counted every 0.1 second, the comparison is made in units of 0.1 minute.

	#7	#6	#5	#4	#3	#2	#1	#0
6804		LFI				ETE	TCI	

[Input type] Parameter input
[Data type] Bit path

 # 1 TCI During automatic operation (the OP signal is "1"), editing of tool life data is:

0: Disabled.

1: Enabled.

> **NOTE**
> When this parameter is set to 1, tool life data can be edited even during automatic operation (the OP signal is "1"). If the target group for editing is the group being used or the group to be used next, however, only presetting of the life counter is permitted, and other data cannot be modified.

 # 2 ETE In the tool life management screen, the mark of the tool at the life was expired of the final tool in the group :

0: depends on setting parameter EMD (No.6801#3).

1: is "*" mark.

If bit 2 (ETE) of parameter No. 6804 is set to 1, when the life counter of the final tool in the group becomes equal to the life value, display mark "*" in the final tool of the tool life management screen.

When tool change signal TLCH<Fn064.0> is "1", the state of the life was expired of the tool can be read by reading tool information on the final tool in FOCAS2 or the PMC window.

 # 6 LFI In tool life management, counting of the life of a selected tool is:

0: Enabled.

1: Enabled or disabled according to the status of tool life counting disable signal LFCIV<G048.2>.

	#7	#6	#5	#4	#3	#2	#1	#0
6805	TAD	TRU	TRS				FGL	FCO

[Input type] Parameter input
[Data type] Bit path

 # 0 FCO If the life count type is the duration specification type, the life is counted as follows:

0: Every second.

1: Every 0.1 second.

According to the setting of this parameter, the increment system of life values and tool life counter values displayed on the tool life management screen is set as follows:

Parameter FCO	0	1
Increment system for display and setting of life values and life counter values	1-minute increments	0.1-minute increments

> **NOTE**
> After changing the setting of this parameter, set data again by using G10L3;(registration after deletion of data of all groups).

 # 1 FGL If the life count type is the duration specification type, life data registered by G10 is:

0: In one-minute increments.

1: In 0.1-second increments.

 # 5 TRS Tool change reset signal TLRST is valid when reset signal RST is not "1" and:

0: The reset state (automatic operation signal OP is "0") is observed.

1: The reset state (automatic operation signal OP is "0"), automatic operation stop state (The STL and SPL signals are "0" and the OP signal is "1"), or the automatic operation pause state (the STL signal is "0" and the SPL signal is "1") is observed. The TLRST signal, however, is invalid when the automatic operation stop state, automatic operation pause state, and automatic operation start state (the STL signal is "1") is observed during execution of a data setting command (G10L3).

 # 6 TRU When the life count type is the duration specification type, and the life is counted every second (bit 0 (FCO) of parameter No. 6805 is set to 0):

0: Cutting time less than one second is discarded and is not counted.

1: Cutting time less than one second is rounded up and is counted as one second.

> **NOTE**
> If the life is counted every 0.1 second (bit 0 (FCO) of parameter No. 6805 is set to 1), cutting time less than 0.1 second is always rounded up and is counted as 0.1 second.

 # 7 TAD With tool change type D (bit 7 (M6E) of parameter No. 6801 is set to 1), when a block specifying M06 contains no T command:

0: An alarm PS0153 is issued.

1: No alarm is issued.

6810	Tool life management ignore number

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

This parameter sets the tool life management ignore number.

When the value specified in a T code exceeds the value set in this parameter, the value obtained by subtracting the parameter-set value from the T code value is assumed to be the tool group number for tool life management.

6811	Tool life count restart M code

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 127 (except 01, 02, 30, 98, and 99)

When 0 is specified, it is ignored.
When the life is specified by count, the tool change signal (TLCH) is output if the life of at least one tool group has expired when the tool life count restart M code is issued.
The T code (tool life management group command) specified after the tool life count restart M code selects a tool whose life has not expired from a specified group, and the next M06 command increments the tool life counter by one.
When the life is specified by duration, specifying the tool life count restart M code causes nothing. When 0 is set in this parameter, the tool life count restart M code is invalid. When the data of M code exceeds 127 values, set 0 in parameter No.6811, and set the value of M code in parameter No.13221. The data range of parameter No.13221 is from 0 to 255.

6813	Maximum number of groups in tool life management

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Unit of data] Group
[Valid data range] 0, 8, 16 to 128

This parameter sets the maximum number of groups to be used for each path. As the maximum number of groups, set a multiple of eight. When this parameter is 0, 128 groups are set. Up to 128 groups can be set for each path.

> **NOTE**
> If the power is turned on after this parameter is changed, all data in the tool life management file is initialized. Therefore, the life management data of all paths that use the tool life management function must be set.

6844	Remaining tool life (use count)

[Input type] Parameter input
[Data type] Word path
[Valid data range] This range is the same as the tool life range.

This parameter sets a remaining tool life (use count) used to output the tool life arrival notice signal when the tool life is specified by use count. If a value greater than the tool life value or 0 is set in this parameter, the tool life arrival notice signal is not output.

6845	Remaining tool life (use duration)

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] min
[Valid data range] Not greater than the tool life value

This parameter sets the remaining tool life (use duration) used to output the tool life arrival notice signal when the tool life is specified by use duration. If a value greater than the tool life value or 0 is specified in this parameter, the tool life arrival notice signal is not output.

> **NOTE**
> When the life is counted every 0.1 second (bit 0 (FCO) of parameter No. 6805 = 1), the parameter value is in 0.1-minute increments.

6846	Number of remaining group tools

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 127

This parameter sets the number of remaining group tools.
If the number of remaining tools in the group selected by the T code command is equal to or less than the setting of this parameter, tool remaining count notification signal TLAL is output. When this parameter is set to 0, tool remaining count notification signal TLAL is not output.

4.41 PARAMETERS OF POSITION SWITCH FUNCTIONS

	#7	#6	#5	#4	#3	#2	#1	#0
6901						PSA	EPW	

[Input type] Parameter input
[Data type] Bit path

 # 1 EPW The maximum number of points of the position switch is:
0: 10.
1: 16.

 # 2 PSA In determination of a position switch function operation range, a servo delay amount (positional deviation) and a delay amount in acceleration/deceleration control are:
0: Not considered.
1: Considered.

6910	Controlled axis for which the 1-st position switch function is performed
to	to
6925	Controlled axis for which the 16-th position switch function is performed

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

Set the controlled axis number corresponding to one of the first to sixteenth position switch functions. When the machine coordinate of the corresponding axis is within a parameter-set range, the corresponding position switch signal is output to the PMC.

NOTE
The setting of 0 means that the position switch function is not used.

6930	**Maximum value of the operating range of the 1-st position switch**
to	to
6945	**Maximum value of the operating range of the 16-th position switch**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the maximum value of the operating range of the first to sixteenth position switches.

NOTE
1 For a diameter-specified axis, use radius values to specify the parameters used to set the maximum and minimum values of an operating range.
2 The position switch function is enabled upon completion of reference position return.

6950	**Minimum value of the operating range of the 1-st position switch**
to	to
6965	**Minimum value of the operating range of the 16-th position switch**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Set the minimum value of the operating range of the first to sixteenth position switches.

NOTE
1 For a diameter-specified axis, use radius values to specify the parameters used to set the maximum and minimum values of an operating range.
2 The position switch function is enabled upon completion of reference position return.

4.42 PARAMETERS OF MANUAL OPERATION AND AUTOMATIC OPERATION

	#7	#6	#5	#4	#3	#2	#1	#0
7001							ABS	MIT

[Input type] Parameter input
[Data type] Bit path

 # 0 MIT The manual intervention and return function is:
0: Disabled.
1: Enabled.

 # 1 ABS For the move command after manual intervention in the manual absolute on state:
0: Different paths are used in the absolute (G90) and incremental (G91) modes.
1: The same path (path in the absolute mode) is used in the absolute (G90) and incremental (G91) modes.

	#7	#6	#5	#4	#3	#2	#1	#0
7055								
					BCG			

[Input type] Parameter input
[Data type] Bit path

 # 3 BCG The pre-interpolation bell-shaped acceleration/deceleration time constant change function in AI contour control mode is:
0: Disabled.
1: Enabled.

7066	Acceleration/deceleration reference speed for the time constant change function of bell-shaped acceleration/deceleration before interpolation

[Input type] Setting input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
This parameter sets the acceleration/deceleration reference speed of the time constant change function of the bell-shaped acceleration/deceleration before interpolation in AI contour control.

4.43 PARAMETERS OF MANUAL HANDLE FEED, HANDLE INTERRUPTION AND HANDLE FEED IN TOOL AXIAL DIRECTION

	#7	#6	#5	#4	#3	#2	#1	#0
7100			MPX		HCL		THD	JHD

[Input type] Parameter input
[Data type] Bit path

 # 0 JHD Manual handle feed in JOG feed mode or incremental feed in the manual handle feed
0: Invalid
1: Valid

	When JHD:=0		When JHD:=1	
	JOG feed mode	Manual handle feed mode	JOG feed mode	Manual handle feed mode
JOG feed	○	×	○	×
Manual handle feed	×	○	○	○
Incremental feed	×	×	×	○

 # 1 THD In the TEACH IN JOG mode, the manual pulse generator is:
0: Disabled.
1: Enabled.

 # 3 HCL The clearing of handle interruption amount display by soft key [CAN] operation is:
0: Disabled.
1: Enabled.

 # 5 MPX In Manual handle feed mode, manual handle feed amount selection signal is
0 : same for all manual pulse generator, and it is set by signals MP1 and MP2<Gn019.4,.5>.
1 : differ to each other manual pulse generator, and it's setting signal as follow:
1st. Manual Pulse Generator : MP1,MP2<Gn019.4,.5>
2nd. Manual Pulse Generator : MP21,MP22<Gn087.0,.1>
3rd. Manual Pulse Generator : MP31,MP32<Gn087.3,.4> (M series)

	#7	#6	#5	#4	#3	#2	#1	#0
7102							HNAx	HNGx

[Input type] Parameter input
[Data type] Bit axis

 # 0 HNGx Axis movement direction for rotation direction of manual pulse generator
0: Same in direction
1: Reverse in direction

 # 1 HNAx When manual handle feed direction inversion signal HDN<Gn0347.1> is set to “1”, the direction of movement is set for each axis with respect to the rotation direction of the manual pulse generator.
0: The axis movement direction is the same as the direction in which the manual pulse generator rotates.
1: The axis movement direction is opposite to the direction in which the manual pulse generator rotates.

When the rotation direction is reversed by manual handle feed direction inversion signal HDN<Gn0347.1>, the rotation axis direction obtained by the setting of bit 0 (HNGx) of parameter No. 7102 is reversed.

	#7	#6	#5	#4	#3	#2	#1	#0
7103					HIT	HNT	RTH	

[Input type] Parameter input
[Data type] Bit path

 # 1 RTH By a reset or emergency stop, the amount of manual handle interruption is:
0: Not canceled.
1: Canceled.

 # 2 HNT When compared with the travel distance magnification selected by the manual handle feed travel distance selection signals (incremental feed signals) (MP1, MP2), the travel distance magnification for incremental feed/manual handle feed is:
0: Same.
1: 10 times greater.

 # 3 HIT When compared with the travel distance magnification selected by the manual handle feed travel distance selection signals (incremental feed signals (MP1, MP2), the travel distance magnification for manual handle interrupt is:
0: Same.
1: 10 times greater.

	#7	#6	#5	#4	#3	#2	#1	#0
7105			LBH				HDX	

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 1 HDX Manual handle for I/O Link connection is:
0: Automatically set.
1: Manually set.

> **NOTE**
> In manual setting, parameters No.12300 to No.12302 must be set by manual to connect Manual Pulse Generator with I/O Link.

 # 5 LBH Manual handle feed for the I/O Link β using the I/O link manual pulse generator is:
0: Disabled.
1: Enabled.

7113	Manual handle feed magnification m

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 2000
This parameter sets the magnification m when manual handle feed movement selection signals MP1 and MP2 are set to 0 and 1.

7114	Manual handle feed magnification n

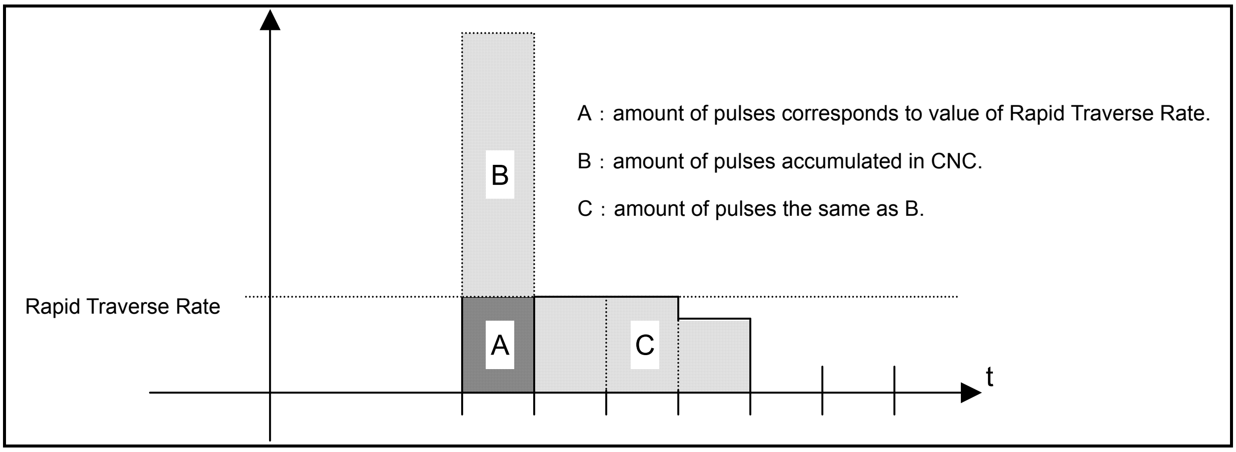
[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 2000
This parameter sets the magnification when manual handle feed movement selection signals MP1 and MP2 are set to 1.

7117	Allowable number of pulses that can be accumulated during manual handle feed

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] Pulse
[Valid data range] 0 to 999999999

This parameter sets the number of pulses from the manual pulse generator that exceed the rapid traverse rate and can be accumulated without being discarded if manual handle feed faster than the rapid traverse rate is specified.

The amount of pulses exceeding the rapid traverse rate can be saved by CNC as B. And amount of pulses B will be exported as pulses C.



Amount of pulses exported by CNC in Manual Handle Feed

Amount of pulses B is calculated in 2 cases as following:

In case of

1) Parameter No.7117 = 0
   The feedrate is clamped at the Rapid Traverse Rate and generated pulses exceeding the Rapid Traverse Rate are ignored (B=0)

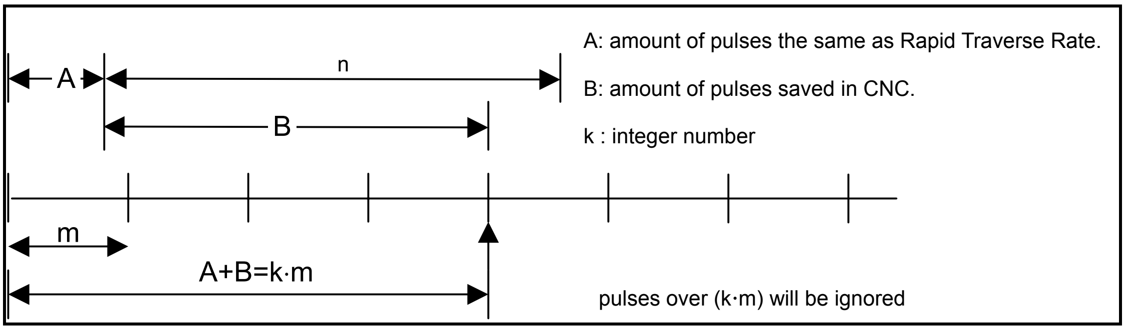
In case of

2) Parameter No.7117 > 0
   The feedrate is clamped as the Rapid Traverse Rate, but the pulses exceeding the Rapid Traverse Rate is not ignored. Amount of pulses accumulated in CNC is calculated as following. (Although stopping the rotation of manual pulse generator, if there is pulses accumulated in CNC, it will be exported and the tool will move as long as amount of it.)

   Magnification set by MP1, MP2<Gn019.4,.5> is m, value of parameter No.7117 is n.

   n < m: Clamping is set performed at value of parameter No.7117.

n ≥ m: Amount A+B, showed in figure, which's value is multiple of m and small than n. As a result, clamping is performed as an integral multiple of the selected magnification.



Amount of pulses exceeding the Rapid Traverse Rate (n ≥ m)

> **NOTE**
> Due to change of mode, clamping can be performed not as an integral multiple of the selected magnification.
> The distance the tool moves may not match the graduations on the manual pulse generator.

7131	Manual handle feed magnification m2 / 2nd. manual pulse generator
7132	Manual handle feed magnification n2 / 2nd. manual pulse generator
7133	Manual handle feed magnification m3 / 3rd. manual pulse generator
7134	Manual handle feed magnification n3 / 3rd. manual pulse generator

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 2000
The 'mx' is selected when MPx1 = 0, MPx2 = 1.
The 'nx' is selected when MPx1 =1, MPx2 = 1.

4.44 PARAMETERS OF REFERENCE POSITION WITH MECHANICAL STOPPER

7181	First withdrawal distance in reference position setting with mechanical stopper

7182	Second withdrawal distance in butt-type reference position setting with mechanical stopper

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a distance an axis in each cycle operation, along which withdrawal is performed after the mechanical stopper is hit (distance from the mechanical stopper to the withdrawal point).

> **NOTE**
> Set the same direction as that set in bit 5 (ZMIx) of parameter No. 1006. Cycle operation cannot be started if the opposite direction is set.

7183	First butting feedrate in reference position setting with mechanical stopper

7184	Second butting feedrate in reference position setting with mechanical stopper

7185	Withdrawal feedrate (common to the first and second butting operations) in reference position setting with mechanical stopper

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets a feedrate used to butt against the stopper along an axis in each cycle.

This parameter also sets a feedrate at which an axis is retracted when the axis makes contact with the machine stopper in each cycle.

7186	Torque limit value in butt-type reference position setting with mechanical stopper

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to 100

This parameter sets a torque limit value. A value from 0 to 100 corresponds to 0% to 39%. The torque limit value is obtained by multiplying the setting by 1/255. If more than 39% is to be set, use parameter No. 7187.

> **NOTE**
> When 0 is set in this parameter, 100% is assumed.

7187	Torque limit value in butt-type reference position setting with mechanical stopper

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 255

This parameter sets a torque limit value. A value from 0 to 255 corresponds to 0% to 100%.
When this parameter is set in butt-type reference position setting, parameter No. 7186 is ignored.

> **NOTE**
> 1 When 0 is set in this parameter, 100% is assumed
> 2 A converted setting must not exceed the rated torque.

4.45 PARAMETERS OF SOFTWARE OPERATOR'S PANEL

	#7	#6	#5	#4	#3	#2	#1	#0
7200		OP7	OP6	OP5	OP4	OP3	OP2	OP1

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 OP1 Mode selection on software operator's panel
0: Not performed
1: Performed

 # 1 OP2 JOG feed axis select and manual rapid traverse select on software operator's panel
0: Not performed
1: Performed

 # 2 OP3 Manual pulse generator's axis select and manual pulse generator's magnification select on software operator's panel
0: Not performed
1: Performed

 # 3 OP4 JOG feedrate override select, feedrate override select, and rapid traverse override select on software operator's panel
0: Not performed
1: Performed

 # 4 OP5 Optional block skip select, single block select, machine lock select, and dry run select on software operator's panel
0: Not performed
1: Performed

 # 5 OP6 Protect key on software operator's panel
0: Not performed
1: Performed

 # 6 OP7 Feed hold on software operator's panel
0: Not performed
1: Performed

	#7	#6	#5	#4	#3	#2	#1	#0
7201							GPS	JPC

[Input type] Parameter input
[Data type] Bit path

 # 0 JPC For the name of a general-purpose switch function on the software operator's panel, the use of full-size characters is:
0: Not allowed.
1: Allowed.

 # 1 GPS The maximum number of switches of the general-purpose switch function on the software operator's panel is:
0: 8.
1: 16.

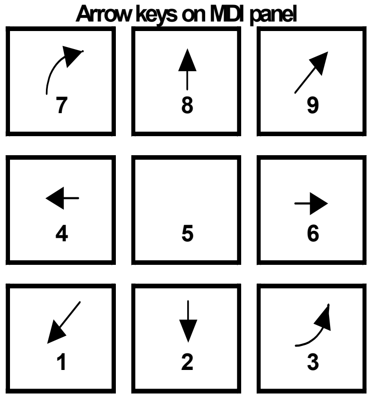
7210	**Jog-movement axis and its direction on software operator's panel "↑"**
7211	**Jog-movement axis and its direction on software operator's panel "↓"**
7212	**Jog-movement axis and its direction on software operator's panel "→"**
7213	**Jog-movement axis and its direction on software operator's panel "←"**
7214	**Jog-movement axis and its direction on software operator's panel "↙"**
7215	**Jog-movement axis and its direction on software operator's panel "↗"**
7216	**Jog-movement axis and its direction on software operator's panel "⤴"**
7217	**Jog-movement axis and its direction on software operator's panel "↱"**

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 8

On software operator's panel, set a feed axis corresponding to an arrow key on the MDI panel when jog feed is performed.

Setting value	Feed axis and direction
0	Not moved
1	First axis, positive direction
2	First axis, negative direction
3	Second axis, positive direction
4	Second axis, negative direction
5	Third axis, positive direction
6	Third axis, negative direction
7	Fourth axis, positive direction
8	Fourth axis, negative direction

Arrow keys on MDI panel



Example)

Under X, Y, and Z axis configuration, to set arrow keys to feed the axes in the direction specified as follows, set the parameters to the values given below. [8↑] to the positive direction of the Z axis, [2↓] to the negative direction of the Z axis, [6→] to the positive direction of the X axis [4←] to the negative direction of the X axis, [1↙] to the positive direction of the Y axis, [9↗] to the negative direction of the Y axis

Parameter No.7210 = 5 (Z axis, positive direction)
Parameter No.7211 = 6 (Z axis, negative direction)
Parameter No.7212 = 1 (X axis, positive direction)
Parameter No.7213 = 2 (X axis, negative direction)
Parameter No.7214 = 3 (Y axis, positive direction)
Parameter No.7215 = 4 (Y axis, negative direction)
Parameter No.7216 = 0 (Not used)
Parameter No.7217 = 0 (Not used)

7220	Name of general-purpose switch 1 on software operator's panel (first character)
to	to
7283	Name of general-purpose switch 8 on software operator's panel (eighth character)

7284	Name of general-purpose switch 9 on software operator's panel (first character)
to	to
7299	Name of general-purpose switch 10 on software operator's panel (eighth character)

7352	Name of general-purpose switch 11 on software operator's panel (first character)
to	to
7399	Name of general-purpose switch 16 on software operator's panel (eighth character)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] -128 to 127

Each of these parameters sets the name of a general-purpose switch on the software operator's panel with character codes indicated in the character-code correspondence table. A switch name consists of up to eight characters.

Parameter Nos. 7220 to 7227 : Name of general-purpose switch 1
Parameter Nos. 7228 to 7235 : Name of general-purpose switch 2
Parameter Nos. 7236 to 7243 : Name of general-purpose switch 3
Parameter Nos. 7244 to 7251 : Name of general-purpose switch 4
Parameter Nos. 7252 to 7259 : Name of general-purpose switch 5
Parameter Nos. 7260 to 7267 : Name of general-purpose switch 6
Parameter Nos. 7268 to 7275 : Name of general-purpose switch 7
Parameter Nos. 7276 to 7283 : Name of general-purpose switch 8
Parameter Nos. 7284 to 7291 : Name of general-purpose switch 9
Parameter Nos. 7292 to 7299 : Name of general-purpose switch 10
Parameter Nos. 7352 to 7359 : Name of general-purpose switch 11
Parameter Nos. 7360 to 7367 : Name of general-purpose switch 12
Parameter Nos. 7368 to 7375 : Name of general-purpose switch 13
Parameter Nos. 7376 to 7383 : Name of general-purpose switch 14
Parameter Nos. 7384 to 7391 : Name of general-purpose switch 15
Parameter Nos. 7392 to 7399 : Name of general-purpose switch 16

Character code list

Character	Code	Character	Code	Character	Code
A	65	Q	81	6	54
B	66	R	82	7	55
C	67	S	83	8	56
D	68	T	84	9	57
E	69	U	85		32
F	70	V	86	!	33
G	71	W	87	“	34
H	72	X	88	#	35
I	73	Y	89	$	36
J	74	Z	90	%	37
K	75	0	48	&	38
L	76	1	49	‘	39
M	77	2	50	(	40
N	78	3	51	)	41
O	79	4	52	*	42
P	80	5	53	+	43

4.46 PARAMETERS OF PROGRAM RESTART

	#7	#6	#5	#4	#3	#2	#1	#0
7300	MOU	MOA						

[Input type] Parameter input
[Data type] Bit path

 # 6 MOA In program restart operation, before movement to a machining restart point:
0: The last M, S, T, and B codes are output.
1: All M codes and the last S, T, and B codes are output.
This parameter is enabled when the MOU parameter is set to 1.

 # 7 MOU In program restart operation, before movement to a machining restart point after restart block search:
0: The M, S, T, and B codes are not output.
1: The last M, S, T, and B codes are output.

	#7	#6	#5	#4	#3	#2	#1	#0
7301								ROF

[Input type] Parameter input
[Data type] Bit path

 # 0 ROF When the coordinates for restarting are displayed on the program restart screen:
0: Tool length compensation (M series), tool position compensation (T series), cutter compensation (M series), and tool-nose radius compensation (T series) are considered.
1: Whether these compensation values are considered depends on the settings of bit 6 (DAL) of parameter No.3104, bit 7 (DAC) of parameter No.3104, and bit 1 (DAP) of parameter No.3129 (parameters for specifying whether to consider each compensation value).

7310	Ordinal number of an axis along which a movement is made in dry run after program restart

[Input type] Setting input
[Data type] Byte axis
[Valid data range] 1 to Number of controlled axes
This parameter sets the ordinal number of an axis along which a movement is made in dry run after the program is restarted.

4.47 PARAMETERS OF POLYGON TURNING (T SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
7600	PLZ							

[Input type] Parameter input
[Data type] Bit path

 # 7 PLZ Reference position return based on a G28 command on the tool rotation axis for polygon turning is:
0: Performed in the same sequence as manual reference position return.
1: Performed by positioning using the rapid traverse rate.
The synchronous axis returns to the reference position in the same sequence as the manual reference position return when no return-to-reference position is performed after the power is turned on.

	#7	#6	#5	#4	#3	#2	#1	#0
7602			COF	HST	HSL	HDR	SNG	MNG

[Input type] Parameter input
[Data type] Bit path

 # 0 MNG The rotational direction of the master axis in the spindle-spindle polygon turning mode is:
0: Not reversed.
1: Reversed.

 # 1 SNG The rotational direction of the polygon synchronization axis in the spindle-spindle polygon turning mode is:
0: Not reversed.
1: Reversed.

 # 2 HDR When phase control is exercised in spindle-spindle polygon turning mode (parameter COF(No.7602#5) is set to 0), the phase shift direction is:
0: Not reversed for phase synchronization.
1: Reversed for phase synchronization.

> **NOTE**
> The rotation directions and phase shift directions of the master axis and polygon synchronization axis in the spindle-spindle polygon turning mode can be reversed with a programmed command. MNG, SNG, and HDR are used to reverse an actual direction relative to the programmed command.

 # 3 HSL When phase control is exercised in spindle-spindle polygon turning mode (parameter COF(No.7602#5) is set to 0), this parameter selects the spindle that is subject to a phase shift operation for phase synchronization:

0: The polygon synchronization axis is selected.
1: The master axis is selected.

> **NOTE**
> 1 Select an axis to which a phase shift command is applied.
> 2 Spindle operation for phase synchronization is performed with both spindles.

 # 4 HST When phase control is applied in spindle-spindle polygon turning mode (parameter COF(No.7602#5) is set to 0), and spindle-spindle polygon turning mode is specified:

0: Spindle-spindle polygon turning mode is entered with the current spindle speed maintained.
1: Spindle-spindle polygon turning mode is entered after the spindle is stopped.

> **NOTE**
> This parameter can be used, for example, when single-rotation signal detection cannot be guaranteed at an arbitrary feedrate because a separate detector is installed to detect the spindle single-rotation signal, as when a built-in spindle is used. (When bit 7 (RFCHK3) of parameter No.4016 for the serial spindle is set to 1, together with this parameter, a single-rotation signal detection position in spindle-spindle polygon turning mode is guaranteed.)

 # 5 COF In spindle-spindle polygon turning mode, phase control is:

0: Enabled.
1: Disabled.

> **NOTE**
> When the use of phase control is not selected, the steady state is reached in a shorter time because phase synchronization control is not applied. Once steady rotation is achieved, however, polygon turning must be completed without changing the steady state. (If a spindle speed change including a spindle stop is made, a phase shift occurs, so that polygon turning is not performed normally.) Even when this parameter is set to 1, an R command (phase position command) in a block containing G51.2 is ignored ; no alarm is issued.

	#7	#6	#5	#4	#3	#2	#1	#0
7603	PST		RDG		PLR	SBR	QDR	RPL

[Input type] Parameter input
[Data type] Bit path

 # 0 RPL Upon reset, spindle-spindle polygon turning mode is:
0: Released.
1: Not released.

 # 1 QDR The rotational direction of the polygon synchronization axis:
0: Depends on the sign (+/-) of a specified value for Q.
1: Depends on the rotational direction of the first spindle.
If a negative value is specified for Q when QDR = 1, the alarm (PS0218) is issued.

 # 2 SBR For spindle synchronization, speed ratio control is:
0: Not used.
1: Used.

NOTE
1 This parameter sets the speed of the slave spindle to an integral multiple of the speed of the master spindle in the spindle synchronization control function.
2 There is no relation with the polygon machining function.
3 Spindle synchronization control needs to be enabled.
4 Parameters No.7635 and No.7636 need to be set.

 # 3 PLR The machine coordinates of a tool rotation axis for polygon turning are:
0: Rounded by the setting in parameter No.7620.
1: Rounded by 360° (or the setting in parameter No. 1260 when bit 0 (ROA) of parameter No. 1008 is set to 1).

 # 5 RDG On the diagnosis screen No.476, for spindle-spindle polygon phase command value (R), displays:
0: The specified value (in the increment system for the rotation axis).
1: The actual number of shift pulses.

> **NOTE**
> A phase command is specified in address R, in units of degrees. For control, the actual shift amount is converted to a number of pulses according to the conversion formula: 360 degrees = 4096 pulses. This parameter switches the display of a specified value to that of a converted value.

 # 7 PST The polygon spindle stop signal *PLSST <Gn038.0>is:
0: Not used.
1: Used.

7610	Control axis number of tool rotation axis for polygon turning

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to number of controlled axes

This parameter sets the control axis number of a rotation tool axis used for polygon turning.
However, when a G51.2 command is executed by setting 0 in this parameter, operation stops with the alarm (PS0314).

7620	Movement of tool rotation axis per revolution for polygon turning

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real path
[Unit of data] Degree
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the movement of a tool rotation axis per revolution.

7621	Maximum allowable speed for the tool rotation axis for polygon turning

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] min^{-1}
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
This parameter sets the maximum allowable speed of the tool rotation axis.

NOTE
If the speed of a tool rotation axis (polygon synchronization axis) exceeds the set upper limit during polygon machining, clamping is performed at the upper limit. When clamping is performed at the upper limit, the synchronization between the spindle and the tool rotation axis (polygon synchronization axis) deviates. If clamping is performed, an alarm (PS5018) occurs.

7631	Allowable spindle speed deviation level in spindle-spindle polygon turning

[Input type] Parameter input
[Data type] Word path
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999
This parameter sets the allowable level of deviation between the actual speed and specified speed of each spindle in spindle-spindle polygon turning. The value set with this parameter is used for both the master axis and polygon synchronization axis.
When 0 is set in this parameter, the specification of 8 [min^{-1}] is assumed.

7632	Steady state confirmation time duration in spindle polygon turning

[Input type] Parameter input
[Data type] Word path
[Unit of data] msec
[Valid data range] 0 to 32767

This parameter sets the duration required to confirm that both spindles have reached their specified speeds in spindle-spindle polygon turning.
If the state where the speed of each spindle is within the range set with parameter No.7631, and has lasted at least for the duration specified with parameter No.7632, the spindle polygon speed arrival signal PSAR <Fn063.2> is set to 1.
When 0 is set in this parameter, the specification of 64 [msec] is assumed.

7635	Ratio of slave spindle speed in spindle synchronization control

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to 9

This parameter sets the ratio of master spindle speed:slave spindle speed (1:n) in spindle synchronization control.

NOTE
1 This parameter sets the speed of the slave spindle to an integral multiple of the speed of the master spindle in the spindle synchronization control function.
2 There is no relation with the polygon machining function.
3 Spindle synchronization control needs to be enabled.
4 Bit 2 of parameters No.7603 and parameter No.7636 need to be set.

7636	Maximum allowable slave spindle speed in spindle synchronization control

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] min^{-1}
[Valid data range] 0 to 19999

The speed of the slave spindle under speed ratio control in spindle synchronization control is clamped so that the speed does not exceed the value set in this parameter.

NOTE

1. This parameter sets the speed of the slave spindle to an integral multiple of the speed of the master spindle in the spindle synchronization control function.
2. There is no relation with the polygon machining function.
3. Spindle synchronization control needs to be enabled.
4. Bit 2 of parameters No.7603 and parameter No.7635 need to be set.
5. When speed ratio control in spindle synchronization control is used, be sure to set this parameter. When 0 is set, the speed is clamped to 0, disabling rotation under spindle synchronization.

7640	Master axis in spindle-spindle polygon turning

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Maximum number of controlled axes (Within a path)

This parameter sets the master axis in spindle-spindle polygon turning.

NOTE

1. Spindle-spindle polygon turning is enabled only for serial spindles.
2. When any one of parameter No. 7640 and No. 7641 is set to 0, polygon turning is performed using the first spindle (master axis) and the second spindle (polygon synchronous axis) in the path to which the parameter belongs.
3. When an axis other than the first serial spindle is selected as the master axis, multi-spindle control is required to execute an S command for the master axis.
4. When the PMC window function or G10 command is used to rewrite this parameter, rewrite this parameter before the block specifying the spindle-spindle polygon command G51.2. When the PMC window function is used to rewrite this parameter in the block immediately before G51.2, specify the rewriting of this parameter by using an M code (parameter No. 3411 and up) without buffering.

7641	Polygon synchronous axis in spindle-spindle polygon turning

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Maximum number of controlled axes (Within a path)

This parameter sets the polygon synchronous (slave) axis in spindle-spindle polygon turning.

NOTE

1 Spindle-spindle polygon turning is enabled only for serial spindles.
2 When any one of parameter No. 7640 and No. 7641 is set to 0, polygon turning is performed using the first spindle (master axis) and the second spindle (polygon synchronous axis) in the path to which the parameter belongs.
3 When an axis other than the first serial spindle is selected as the master axis, multi-spindle control is required to execute an S command for the master axis.
4 When the PMC window function or G10 command is used to rewrite this parameter, rewrite this parameter before the block specifying the spindle-spindle polygon command G51.2. When the PMC window function is used to rewrite this parameter in the block immediately before G51.2, specify the rewriting of this parameter by using an M code (parameter No. 3411 and up) without buffering.

7642	Master axis in spindle-spindle polygon turning (spindle number common to the system)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Maximum number of controlled axes (Common to the system)

This parameter sets the master axis in spindle-spindle polygon turning.

NOTE
1. Spindle-spindle polygon turning is enabled only for serial spindles.
2. This parameter is invalid if either parameter No. 7642 or No.7643 is set to 0. In this case, the settings of parameter No. 7640 and No.7641 are valid.
3. When an axis other than the first serial spindle is selected as the master axis, multi-spindle control is required to execute an S command for the master axis.
4. When the PMC window function or G10 command is used to rewrite this parameter, rewrite this parameter before the block specifying the spindle-spindle polygon command G51.2. When the PMC window function is used to rewrite this parameter in the block immediately before G51.2, specify the rewriting of this parameter by using an M code (parameter No. 3411 and up) without buffering.
5. A spindle number common to the system is to be set in this parameter. When using this parameter, set 0 in parameter No. 7640 and No. 7641.

7643	Polygon synchronous axis in spindle-spindle polygon turning (spindle number common to the system)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Maximum number of controlled axes (Common to the system)

This parameter sets the polygon synchronous (slave) axis in spindle-spindle polygon turning.

NOTE

1 Spindle-spindle polygon turning is enabled only for serial spindles.
2 This parameter is invalid if either parameter No. 7642 or No.7643 is set to 0. In this case, the settings of parameter No. 7640 and No.7641 are valid.
3 When an axis other than the first serial spindle is selected as the master axis, multi-spindle control is required to execute an S command for the master axis.
4 When the PMC window function or G10 command is used to rewrite this parameter, rewrite this parameter before the block specifying the spindle-spindle polygon command G51.2. When the PMC window function is used to rewrite this parameter in the block immediately before G51.2, specify the rewriting of this parameter by using an M code (parameter No. 3411 and up) without buffering.
5 A spindle number common to the system is to be set in this parameter. When using this parameter, set 0 in parameter No. 7640 and No. 7641.

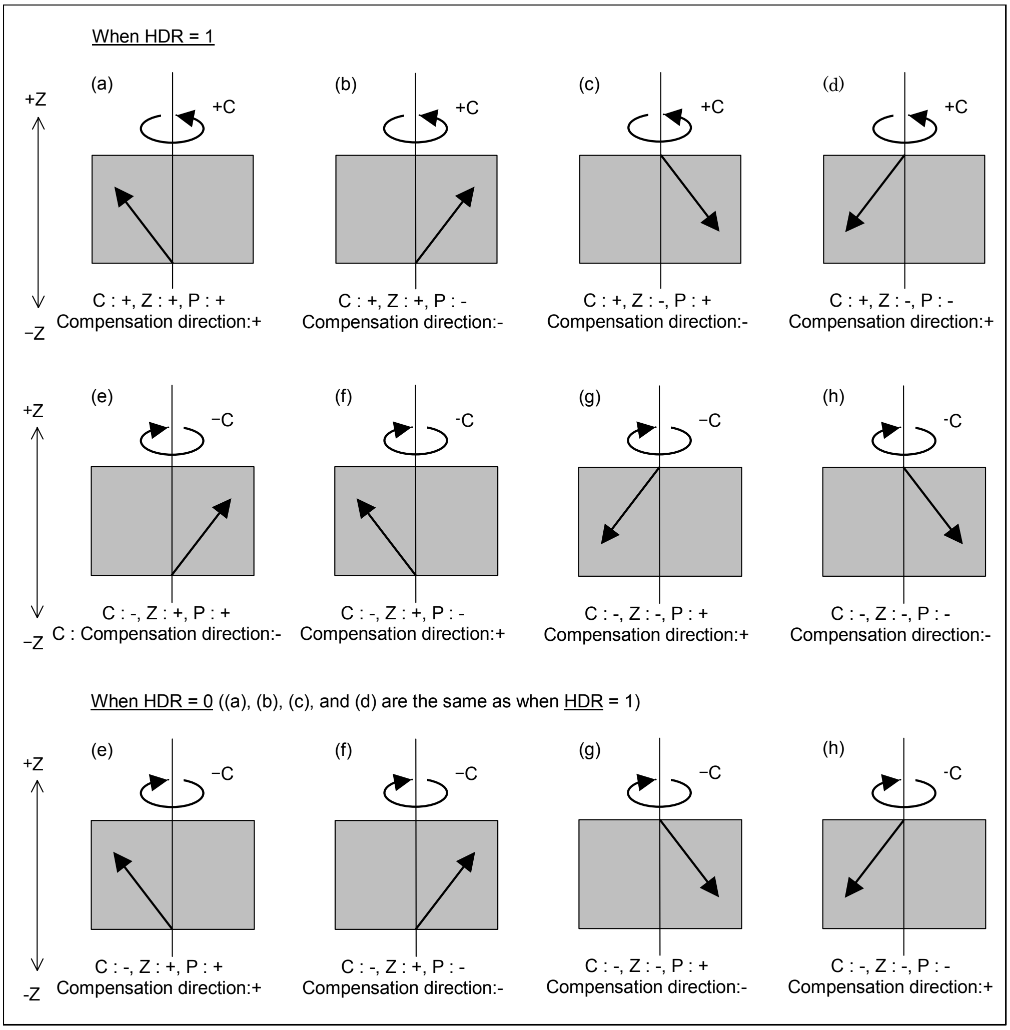
4.48 PARAMETERS OF THE ELECTRONIC GEAR BOX (EGB) (M SERIES) / GENERAL-PURPOSE RETRACTION

	#7	#6	#5	#4	#3	#2	#1	#0
7700								
						HDR		HBR

[Input type] Parameter input
[Data type] Bit path

 # 0 HBR When the electronic gear box (EGB) function is used, performing a reset:
0: Cancels the synchronous mode (G81).
1: Does not cancel the synchronous mode. The mode is canceled only by the G80 command.

 # 2 HDR Direction of helical gear compensation (usually, set 1.)
(Example) To cut a left-twisted herical gear when the direction of rotation about the C-axis is the negative (-) direction:
0: Set a negative (-) value in P.
1: Set a positive (+) value in P.



	#7	#6	#5	#4	#3	#2	#1	#0
7701								
					LZR			

[Input type] Parameter input
[Data type] Bit path

 # 3 LZR When L (number of hob threads) = 0 is specified at the start of EGB synchronization (G81):
0: Synchronization is started, assuming that L = 1 is specified.
1: Synchronization is not started, assuming that L = 0 is specified. However, helical gear compensation is performed.

	#7	#6	#5	#4	#3	#2	#1	#0
7702								
					ART			TDP

[Input type] Parameter input
[Data type] Bit path

 # 0 TDP The specifiable number of teeth, T, of the electronic gear box (G81) is:
0: 1 to 1000
1: 0.1 to 100 (1/10 of a specified value)

NOTE
In either case, a value from 1 to 1000 can be specified.

 # 3 ART The retract function executed when an alarm is issued is:
0: Disabled.
1: Enabled.
When an alarm is issued, a retract operation is performed with a set feedrate and travel distance (parameter Nos. 7740 and 7741).

NOTE
If a servo alarm is issued for other than the axis along which a retract operation is performed, the servo activating current is maintained until the retract operation is completed.

	#7	#6	#5	#4	#3	#2	#1	#0
7703								
						ARO	ARE	ERV

[Input type] Parameter input
[Data type] Bit path

 # 0 ERV During EGB synchronization (G81), feed per revolution is performed for:
0: Feedback pulses.
1: Pulses converted to the speed for the workpiece axis.

 # 1 ARE In the retract function by an alarm, retract operation is:
0: Performed during EGB synchronization or automatic operation (automatic operation signal = 1).
1: Determined by the setting of parameter ARO.

 # 2 ARO The retract function executed when an alarm is issued retracts the tool during:
0: EGB synchronization.
1: EGB synchronization and automatic operation (automatic operation signal OP = 1).

NOTE
This parameter is valid when bit 1 (ARE) of parameter No. 7703 is set to 1.

The following table lists the parameter settings and corresponding operation.

ARE	ARO	Operation
1	0	During EGB synchronization
1	1	During EGB synchronization and automatic operation
0	0	During EGB synchronization or automatic operation
0	1	

NOTE
Parameters ARE and ARO are valid when bit 3 (ART) of parameter No. 7702 is set to 1 (when the retract function executed when an alarm is issued).

	#7	#6	#5	#4	#3	#2	#1	#0
7704								ACR

[Input type] Parameter input
[Data type] Bit path

 # 0 ACR In the advanced preview control, AI advanced preview control, or AI contour control mode, general purpose retract operation is:
0: Not Used.
1: Used.

7709	Number of the axial feed axis for helical compensation

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to Number of controlled axes
This parameter sets the number of the axial feed axis for a helical gear.

> **NOTE**
> When this parameter is set to 0 or a value outside the set range, the Z-axis is selected as the axial feed axis.

	#7	#6	#5	#4	#3	#2	#1	#0
7731								
				RTS	ECN		EHF	EFX

[Input type] Parameter input
[Data type] Bit path

 # 0 EFX As the EGB command:
0: G80 and G81 are used.
1: G80.4 and G81.4 are used.

> **NOTE**
> When this parameter is set to 0, no drilling canned cycle can be used.

 # 1 EHF Feed-forward control for the axial feed axis for helical compensation is:
0: Enabled only during cutting.
1: Always enabled in the G81 synchronous mode.
Usually, set 0.
Feed-forward control is usually enabled in the cutting feed mode. When this parameter is set to 1, feed-forward control is always enabled for the axial feed axis for helical compensation during synchronization by the command (G81) for a hobbing machine.
When bit 3 (FFR) of parameter No. 1800 is set to 1, feed-forward control is always enabled regardless of the setting of this parameter.

 # 3 ECN During EGB synchronization:
0: G81 cannot be specified again. (An alarm (PS1595) occurs.)
1: G81 can be specified.

 # 4 RTS When an OT alarm or axis type malfunction protection alarm is issued during EGB retract operation:
0: Only the axis for which the alarm is issued is stopped.
1: All axes are stopped.

7740	Feedrate during retraction

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
This parameter sets the feedrate during retraction for each axis.

7741	Retracted distance

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
This parameter sets the retracted distance for each axis.

7745	Time constant for linear acceleration/deceleration in retract operation for each axis

[Input type] Parameter input
[Data type] word axis
[Unit of data] msec
[Valid data range] 0 to 1000
This parameter sets an acceleration rate for linear acceleration/deceleration in retract operation based on the general-purpose retract function. Set a time (Time constant) used to reach the federate set in parameter No.7740 for each axis.

> **NOTE**
> This parameter is valid when bit 0 (ACR) of parameter No. 7704 is set to 1 to perform a retract operation in the advanced preview control, AI advanced preview control, or AI contour control mode.

7772	Number of position detector pulses per rotation about the tool axis

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 999999999

This parameter sets the number of pulses per rotation about the tool axis (on the spindle side), for the position detector.
For an A/B phase detector, set this parameter with four pulses equaling one A/B phase cycle.

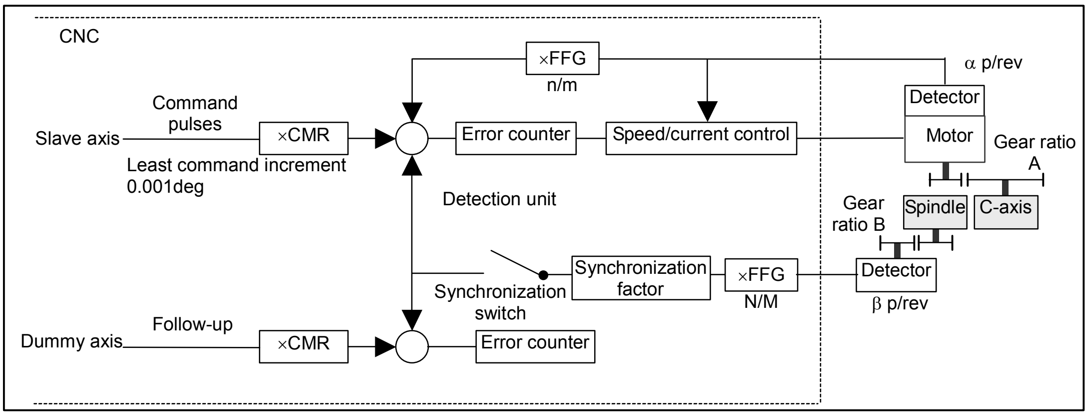
> **NOTE**
> Specify the number of feedback pulses per rotation about the tool axis for the position detector, considering the gear ratio with respect to the position coder.

7773	Number of position detector pulses per rotation about the workpiece axis

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 999999999

This parameter sets the number of pulses per rotation about the workpiece axis (on the slave side), for the position detector.
Set the number of pulses output by the detection unit.
Set parameters Nos. 7772 and 7773 when using the G81 EGB synchronization command.

[Example 1] When the EGB master axis is the spindle and the EGB slave axis is the C-axis



Gear ratio of the spindle to the detector B:
1/1 (The spindle and detector are directly connected to each other.)
Number of detector pulses per spindle rotation β: 80,000 pulses/rev
(Calculated for four pulses for one A/B phase cycle)
FFG N/M of the EGB dummy axis: 1/1

Gear ratio of the C-axis A: 1/36 (One rotation about the C-axis to 36 motor rotations)
Number of detector pulses per C-axis rotation α: 1,000,000 pulses/rev
C-axis CMR: 1
C-axis FFG n/m: 1/100

In this case, the number of pulses per spindle rotation is:
$80000 \times 1/1 = 80000$
Therefore, set 80000 for parameter No. 7772.
The number of pulses per C-axis rotation in the detection unit is:
$1000000 \div 1/36 \times 1/100 = 360000$
Therefore, set 360000 for parameter No. 7773.

[Example 2] When the gear ratio of the spindle to the detector B is 2/3 for the above example (When the detector rotates twice for three spindle rotations)
In this case, the number of pulses per spindle rotation is:

$$80000 \times \frac{2}{3} = \frac{160000}{3}$$

160000 cannot be divided by 3 without a remainder. In this case, change the setting of parameter No. 7773 so that the ratio of the settings of parameters Nos. 7772 and 7773 indicates the value you want to set.

$$\frac{\text{No.7772}}{\text{No.7773}} = \frac{160000/3}{360000} = \frac{160000}{360000 \times 3} = \frac{160000}{1080000}$$

Therefore, set 160000 for parameter No. 7772 and 1080000 for parameter No. 7773.
As described above, all the settings of parameters Nos. 7772 and 7773 have to do is to indicate the ratio correctly. So, you can reduce the fraction indicated by the settings. For example, you may set 16 for parameter No. 7772 and 108 for parameter No. 7773 for this case.

4.49 PARAMETERS OF AXIS CONTROL BY PMC (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
8001	SKE	AUX	NCC		RDE	OVE		MLE

[Input type] Parameter input
[Data type] Bit path

 # 0 MLE Whether all axis machine lock signal MLK is valid for PMC-controlled axes
0: Valid
1: Invalid
The axis-by-axis machine lock signal MLKx depends on the setting of bit 1 of parameter No. 8006.

 # 2 OVE Signals related to dry run and override used in PMC axis control
0: Same signals as those used for the CNC
1: Signals specific to the PMC
The signals used depend on the settings of these parameter bits as indicated below.

Signals	No.8001#2=0 (same signals as those used for the CNC)		No.8001#2=1 (signals specific to the PMC)	
Feedrate override signals	*FV0 to *FV7	G012	*EFOV0 to *EFOV7	G151
Override cancellation signal	OVC	G006.	EOVC	G150.5
Rapid traverse override signals	ROV1,2	G014.0, .1	EROV1,2	G150.0, .1
Dry run signal	DRN	G46.7	EDRN	G150.7
Rapid traverse selection signal	RT	G19.7	ERT	G150.6

(The signal addresses at PMC selection time are for the group A.)

 # 3 RDE Whether dry run is valid for rapid traverse in PMC axis control
0: Invalid
1: Valid

 # 5 NCC When the program specifies a move command for a PMC-controlled axis (with the controlled axis selection signal *EAX set to 1) not placed under PMC axis control:
0: CNC command is valid.
1: The alarm (PS0130) is issued.

 # 6 AUX In PMC axis control, the auxiliary function command (12H) output size is:
0: 1 byte (0 to 255)
1: 2 bytes (0 to 65535)

 # 7 SKE Skip signal during axis control by the PMC
0: Uses the same signal SKIP <X004.7 or X013.7> as CNC.
1: Uses dedicated axis control signal ESKIP <X004.6 or X013.6> used by the PMC.

	#7	#6	#5	#4	#3	#2	#1	#0
8002	FR2	FR1	PF2	PF1	F10		DWE	RPD

[Input type] Parameter input
[Data type] Bit path

 # 0 RPD Rapid traverse rate for PMC-controlled axes
0: Feedrate specified with parameter No.1420
1: Feedrate specified with the feedrate data in an axis control command by PMC

 # 1 DWE Minimum time which can be specified in a dwell command in PMC axis control when the increment system is IS-C
0: 1ms
1: 0.1ms

 # 3 F10 Least increment for the feedrate for cutting feed (per minute) in PMC axis control
The following settings are applied when bit 4 (PF1) of parameter No. 8002 is set to 0 and bit 5 (PF2) of parameter No. 8002 is set to 0.

	F10	IS-A	IS-B	IS-C
Millimeter input (mm/min)	0	10	1	0.1
	1	100	10	1
Inch input (inch/min)	0	0.1	0.01	0.001
	1	1	0.1	0.01

 # 4 PF1
 # 5 PF2 Set the feedrate unit of cutting feedrate (feed per minute) for an axis controlled by the PMC.

Bit 5 (PF2) of parameter No. 8002	Bit 4 (PF1) of parameter No. 8002	Feedrate unit
0	0	1 / 1
0	1	1 / 10
1	0	1 / 100
1	1	1 / 1000

 # 6 FR1
 # 7 FR2 Set the feedrate unit for cutting feedrate (feed per rotation) for an axis controlled by the PMC.

Bit 7 (FR2) of parameter No. 8002	Bit 6 (FR1) of parameter No. 8002	Millimeter input (mm/rev)	Inch input (inch/rev)
0	0	0.0001	0.000001
1	1		
0	1	0.001	0.00001
1	0	0.01	0.0001

	#7	#6	#5	#4	#3	#2	#1	#0
8003					FEXx			

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When this parameter bit is set, the power must be turned off before operation is continued.

 # 3 FEXx The maximum feedrate that can be achieved by the machine during cutting feed or continuous feed in PMC axis control is:

0: Not extended.
1: Extended.

Restrictions

- Parameters for setting the time constants for linear acceleration/deceleration after interpolation and bell-shaped acceleration/deceleration after interpolation
  When as the acceleration/deceleration type, linear acceleration/deceleration after interpolation or bell-shaped acceleration/deceleration after interpolation is used for each of rapid traverse, cutting feed, and manual feed, the maximum allowable time constant is a half of the maximum value that can be set conventionally.
  The time constant parameters used are as follows:

Parameter No.	Meaning
1620	Time constant (T) used for linear acceleration/deceleration in rapid traverse for each axis, or time constant (T1) used for bell-shaped acceleration/deceleration in rapid traverse for each axis
1621	Time constant (T2) used for bell-shaped acceleration/deceleration in rapid traverse for each axis
1622	Time constant for acceleration/deceleration in cutting feed for each axis
1624	Time constant for acceleration/deceleration in jog feed for each axis
1626	Time constant for acceleration/deceleration in threading cycles for each axis
1769	Time constant for acceleration/deceleration after cutting feed interpolation in the mode of acceleration/deceleration before interpolation
5271 to 5274	Time constant for acceleration/deceleration in rigid tapping extraction (first to fourth gears)
5365 to 5368	Time constant for bell-shaped acceleration/deceleration in rigid tapping (first to fourth gears)

- VCMD waveform display function
  As the feedrate increases, more data is acquired for VCMD waveform display, which can prevent waveforms from being displayed correctly.

> ⚠ **CAUTION**
> 1 When this function is enabled, the feedrate is extended to the maximum value that can be specified for cutting feed or continuous feed in PMC axis control if CMR is 1. If CMR is greater than 1, the feedrate is limited to a value smaller than the maximum value that can be specified.
> 2 Note that the maximum motor speed may be exceeded depending on the feedrate specified.

	#7	#6	#5	#4	#3	#2	#1	#0
8004		NCI	DSL			JFM		

[Input type] Parameter input
[Data type] Bit path

 # 2 JFM This parameter sets the units used to specify feedrate data when continuous feed is specified in axis control by the PMC.

Increment system	Bit 2 (JFM) of No. 8004	Millimeter input (mm/min)	Inch input (inch/min)	Rotation axis (min^{-1})
IS-B	0	1	0.01	0.00023
	1	200	2.00	0.046
IS-C	0	0.1	0.001	0.000023
	1	20	0.200	0.0046

 # 5 DSL If the selection of an axis is changed when PMC axis selection is disabled:
0: An alarm PS0139 is issued.
1: The change is valid, and no alarm is issued for an unspecified group.

 # 6 NCI In axis control by the PMC, a position check at the time of deceleration is:
0: Performed.
1: Not performed.

	#7	#6	#5	#4	#3	#2	#1	#0
8005			IFV	EVP	DRR	R10	CDI	EDC

[Input type] Setting input
[Data type] Bit path

 # 0 EDC In axis control by the PMC, an external deceleration function is:
0: Disabled.
1: Enabled.

 # 1 CDI In axis control by the PMC, when diameter programming is specified for a PMC-controlled axis:
0: The amount of travel and feedrate are each specified with a radius.
1: The amount of travel is specified with a diameter while the feedrate is specified with a radius.
This parameter is valid when bit 3 (DIA) of parameter No.1006 is set to 1 (A move command for each axis is based on diameter specification.)

 # 2 R10 When the parameter RPD (bit 0 of parameter No.8002) is set to 1, the unit for specifying a rapid traverse rate for the PMC axis is:
0: 1 mm/min.
1: 10mm/min.

 # 3 DRR For cutting feed per rotation in PMC axis control, the dry run function is:
0: Disabled.
1: Enabled.

 # 4 EVP Speed command in PMC axis control is executed by:
0: Velocity control.
1: Position control.
This bit is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1).

 # 5 IFV When bit 2 (OVE) of parameter No. 8001 is set to 1 in PMC axis control, the feedrate override signal *EFOVx and the override cancel signal EOVC are:
0: Used on a path-by-path basis. (The group A of each path are used.)
1: Used on a group-by-group basis.

	#7	#6	#5	#4	#3	#2	#1	#0
8006	EAL	EZR		EFD			MLS	

[Input type] Parameter input
[Data type] Bit path

 # 1 MLS When bit 0 (MLE) of parameter No. 8001 is set to 1 (to disable the all axis machine lock signal) in PMC axis control, axis-by-axis machine lock is:
0: Disabled.
1: Enabled.

 # 4 EFD When cutting feed (feed per minute) is used in PMC axis control, the specification unit of feedrate data is:
0: Unchanged (1 times).
1: 100 times greater.

> **NOTE**
> When this parameter is set to 1, bit 3 (F10) of parameter No. 8002 is invalid.

 # 6 EZR In PMC axis control, bit 0 (ZRNx) of parameter No. 1005 is:
0: Invalid.
With a PMC controlled axis, the alarm (PS0224) is not issued.
1: Valid.
A reference position return state check is made on a PMC controlled axis as with an NC axis according to the setting of bit 0 (ZRNx) of parameter No. 1005.

 # 7 EAL In PMC axis control, resetting the CNC:
0: Does not release an alarm on the PMC controlled axis
1: Releases an alarm on the PMC controlled axis
If an alarm on the PMC controlled axis is released, the PCM controlled axis alarm signal (EIALg) is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
8007					ESY	VCP		

[Input type] Parameter input
[Data type] Bit path

 # 2 VCP Speed command in PMC axis control is:
0: FS10/11 type.
1: FS0 type.

 # 3 ESY In PMC axis control, external pulse synchronization (serial spindle synchronization) is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
8008								EMRx

[Input type] Parameter input
[Data type] Bit axis

 # 0 EMRx When a PMC axis control command is issued in mirror image state, the mirror image is:
0: Not considered.
1: Considered.
This parameter is valid in the mirror image mode set with the mirror image signals MI1 to MI5 <G106.0 to 4> set to 1 or bit 0 (MIRx) of parameter No. 12 set to 1.
If a movement is made along the same axis by doubly specifying a command with the CNC and PMC axis control when this parameter is set to 0, and the mirror image mode is set, a coordinate shift can occur afterwards. So, do not attempt to make such a movement.

8010	Selection of the DI/DO group for each axis controlled by the PMC

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] T series: 1 to 4 (at 1-path control), 1 to 8 (at 2-path control)
M series: 1 to 4
Specify the DI/DO group to be used to specify a command for each PMC-controlled axis.

P8010	Description
1	Uses path 1 DI/DO group A (G142 to G153)
2	Uses path 1 DI/DO group B (G154 to G165)
3	Uses path 1 DI/DO group C (G166 to G177)
4	Uses path 1 DI/DO group D (G178 to G189)
5	Uses path 2 DI/DO group A (G1142 to G1153)
6	Uses path 2 DI/DO group B (G1154 to G1165)
7	Uses path 2 DI/DO group C (G1166 to G1177)
8	Uses path 2 DI/DO group D (G1178 to G1189)

NOTE
Use path 1 DI/DO (1 to 4) for the axes controlled by path 1.
Use path 2 DI/DO (5 to 8) for the axes controlled by path 2.

	#7	#6	#5	#4	#3	#2	#1	#0
8013					ROPx			

[Input type] Parameter input
[Data type] Bit axis

#3 ROPx When rotation axis rollover is enabled for an axis controlled in PMC axis control, the direction in which a movement (rotation) is performed to reach an end point by a reference position return command 07H to 0AH (equivalent to G28, G30P2/P3/P4) is:
0: Determined by the sign of the specified value.
1: The direction in the shortest path.

NOTE
ROPx is valid only when bit 0 (ROAx) of parameter No. 1008 is set to 1 and bit 1 (RABx) of parameter No. 1008 is set to 0.

	#7	#6	#5	#4	#3	#2	#1	#0
8019								EOS

[Input type] Parameter input
[Data type] Bit

 # 0 EOS In external pulse synchronization (serial spindle synchronization) in PMC axis control, the serial spindle to be synchronized is:
0: The first spindle of path 1.
1: Any spindle.

NOTE
If EOS is set to 0, only the servo axis of path 1 can be specified.

8020	FL feedrate for reference position return along each axis in PMC axis control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
For each axis, this parameter sets a feedrate (FL feedrate) after deceleration for reference position return in PMC axis control.

NOTE
If 0 is specified, the value of parameter No. 1425 is used.

8022	Upper limit rate of feed per revolution during PMC axis control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets the upper limit rate of feed per revolution during PMC axis control.

8028	Time for acceleration/deceleration calculation when a feedrate is specified under PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 32767

When a feedrate is specified under PMC axis control, acceleration/deceleration can be set for parameter No. 8032 or this parameter. When 0 is set in parameter No. 8032, the specification of 1000 min^{-1} is assumed. When 0 is set in this parameter, the acceleration/deceleration function for feedrate specification is disabled.

8030	Time constant for exponential acceleration/deceleration in cutting feed or continuous feed under PMC axis control

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] msec
[Valid data range] 0 to 4000

For each axis, this parameter sets a time constant for exponential acceleration/deceleration in cutting feed or continuous feed under PMC axis control.

NOTE

When 0 is set in this parameter, the value set in parameter No. 1622 is used.
The value set in parameter No. 1622 is used also for linear acceleration/deceleration after cutting interpolation.

8031	FL feedrate for exponential acceleration/deceleration in cutting feed or continuous feed under PMC axis control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

For each axis, this parameters sets a lower feedrate limit (FL feedrate) for exponential acceleration/deceleration in cutting feed or continuous feed under PMC axis control.

NOTE
When 0 is set in this parameter, the value set in parameter No. 1623 is used.
However, be sure to set 0 in this parameter and parameter No. 1623 for all axes at all times except for special purposes. If a value other than 0 is specified, correct linear or circular figures cannot be obtained.

8032	Feedrate for acceleration/deceleration calculation when a feedrate is specified under PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 32767

When a feedrate is specified under PMC axis control, acceleration/deceleration can be set for this parameter or parameter No. 8028. When 0 is set in this parameter, the specification of 1000 min^{-1} is assumed. When 0 is set in parameter No. 8028, the acceleration/deceleration function for feedrate specification is disabled.

8040	Amount of a shift per one rotation of a servo motor of least input increment when speed command in PMC axis control is velocity control

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] mm, inch, degree (machine unit)
[Valid data range] 1 to 99999999

Set the amount of a shift per one rotation of a servo motor of least input increment
when speed command in PMC axis control is velocity control.
This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and is executed by position control (parameter EVP (No.8005#4) is 1).

4.50 PARAMETERS OF 2-PATH CONTROL (T SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
8100		DSB					IAL	RST

[Input type] Parameter input
[Data type] Bit machine group

 # 0 RST The pressing of the reset key on the MDI panel is:
0: Valid for two paths.
1: Valid only for the path selected by the path selection signal.

 # 1 IAL Choice of an option concerning operation continuation when an alarm is issued, and choice of an option concerning the start of automatic operation in alarm state:
0: • When an alarm is issued, the operation is stopped with the other path(s) in same group placed in hold state.
• When the other path or paths in same group are placed in alarm state, automatic operation cannot be started.
1: • Even when an alarm is issued, the operation is continued without stopping the other path(s).
• Even when the other path or paths in same group are placed in alarm state, automatic operation can be started.

 # 6 DSB The inter-path single block check function is:
0: Disabled.
If one of the paths undergoes a single block stop, only the path undergoes a single block stop.
1: Enabled.
If one of the paths undergoes a single block stop, the other path undergoes a feed hold stop.

	#7	#6	#5	#4	#3	#2	#1	#0
8103								MWT

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 MWT As the signal interface for the waiting M code:
0: The path individual signal interface is used.
1: The path common signal interface is used.
This parameter can be selected only when 2-path control is used.

> **NOTE**
> When this parameter is set to 1, the operation equivalent to that of the FS0*i*-C is assumed.

8110	Waiting M code range (minimum value)

8111	Waiting M code range (maximum value)

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 ,100to99999999

A range of M code values can be set by specifying a minimum waiting M coder value (parameter No. 8110) and a maximum waiting M code value (parameter No. 8111).
(parameter No. 8110) ≤ (waiting M code) ≤ (parameter No. 8111)
Set 0 in these parameters when the waiting M code is not used.

4.51 PARAMETERS OF 0*i* -D / 0*i* Mate -D BASIC FUNCTIONS

8130	Number of controlled axes

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to Maximum number of controlled axes

This parameter sets the number of axes for each path.

> **NOTE**
> When spindle control with servo motor is enabled, set the number of axes including this axis for the axes with a spindle controlled axis with servo motor.

	#7	#6	#5	#4	#3	#2	#1	#0
8131				NLV		EDC		HPG
				NLV	AOV	EDC	F1D	HPG

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 HPG Manual handle feed is:
0: Not Used.
1: Used.

 # 1 F1D One-digit F code feed is:
0: Not Used.
1: Used.

 # 2 EDC External deceleration is:
0: Not Used.
1: Used.

 # 3 AOV Automatic corner override is:
0: Not Used.
1: Used.

 # 4 NLV 8-level data protection is:
0: Not Used.
1: Used.

> **NOTE**
> Setting this parameter to 0 disables 8-level data protection function. Therefore, when using the 8-level data protection function, be sure to set a protection level that prevents this parameter from being changed.

	#7	#6	#5	#4	#3	#2	#1	#0
8132						BCD	YOF	TLF
			SCL	SPK	IXC	BCD		TLF

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 TLF Tool life management is:
0: Not Used.
1: Used.

 # 1 YOF Y-axis offset is:
0: Not Used.
1: Used.

 # 2 BCD Second auxiliary function is:
0: Not Used.
1: Used.

 # 3 IXC Index table indexing is:
0: Not Used.
1: Used.

> **NOTE**
> When enabling the index table indexing function, set bit 0 (ITI) of parameter No. 5501 to 0 in addition to this parameter. The index table indexing function is enabled only when both ITI and IXC are enabled.

 # 4 SPK Small diameter peck drilling cycle is:
0: Not Used.
1: Used.

 # 5 SCL Scaling is:
0: Not Used.
1: Used.

> **NOTE**
> A small diameter peck drilling cycle and scaling cannot be used at the same time.

	#7	#6	#5	#4	#3	#2	#1	#0
8133			SSN	SYC	MSP	SCS	AXC	SSC
			SSN	SYC	MSP	SCS		SSC

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 SSC Constant surface speed control is:
0: Not Used.
1: Used.

 # 1 AXC Spindle positioning is:
0: Not Used.
1: Used.

 # 2 SCS Cs contour control is:
0: Not Used.
1: Used.

 # 3 MSP Multi-spindle is:
0: Not Used.
1: Used.

 # 4 SYC Spindle synchronization is:
0: Not Used.
1: Used.

 # 5 **SSN** Spindle serial output is:
0: Used.
1: Not Used.

Set this parameter as shown below depending on the spindle configuration.

Spindle configuration	Parameter SSN
When all spindles in the entire system are serial spindles	0
When serial spindles and analog spindles are mixed in the entire system	0
When all spindles in the entire system are analog spindles	1

> **NOTE**
> Spindle positioning and Cs contour control by the serial spindle cannot be used at the same time.

	#7	#6	#5	#4	#3	#2	#1	#0
8134	NCT	NBG			NGR	CCR	BAR	IAP
	NCT	NBG			NGR		BAR	IAP

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 **IAP** Conversational programming with graphic function is:
0: Not Used.
1: Used.

 # 1 **BAR** Chuck and tail stock barrier function (T series) is:
0: Not Used.
1: Used.

> **NOTE**
> 1 The chuck and tail stock barrier function is provided only for the T series.
> 2 When the chuck and tail stock barrier function is selected, stored stroke limits 2 and 3 cannot be used.

That is, this parameter also specifies whether to use stored stroke limits 2 and 3 as shown below.

BAR Stored stroke limits 2 and 3 are:
0: Used.
1: Not Used.

 # 2 CCR Chamfering / corner R is:
0: Not Used.
1: Used.

 # 3 NGR Graphic display is:
0: Used.
1: Not Used.

 # 6 NBG Background editing is:
0: Used.
1: Not Used.

 # 7 NCT Run hour and parts count display is:
0: Used.
1: Not Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8135	NPD	NCV	NMC	NOR	NRG	NSQ	NHI	NPE

NOTE
When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 NPE Stored pitch error compensation is:
0: Used.
1: Not Used.

 # 1 NHI Manual handle interruption is:
0: Used.
1: Not Used.

 # 2 NSQ Program restart is:
0: Used.
1: Not Used.

 # 3 NRG Rigid tapping is:
0: Used.
1: Not Used.

 # 4 NOR Spindle orientation is:
0: Used.
1: Not Used.

NOTE
This parameter is valid only when spindle serial output can be used.

 # 5 NMC Custom macro is:
0: Used.
1: Not Used.

 # 6 NCV Addition of custom macro common variables is:
0: Used.
1: Not Used.

 # 7 NPD Pattern data input is:
0: Used.
1: Not Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8136	NCR	NGW	NDO	NOW	NOP		NWC	NWZ
	NTL	NGW	NDO	NOW	NOP	NWN	NWC	NWZ

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 NWZ Workpiece coordinate system is:
0: Used.
1: Not Used.

 # 1 NWC Workpiece coordinate system preset is:
0: Used.
1: Not Used.

 # 2 NWN Addition of workpiece coordinate system pair (48 pairs) is:
0: Used.
1: Not Used.

 # 3 NOP Software operator's panel is:
0: Used.
1: Not Used.

 # 4 NOW Software operator's panel general purpose switch is:
0: Used.
1: Not Used.

 # 5 NDO Tool compensation count 400 (M series) or tool compensation count 99 (T series 1-path system) is:
0: Used.
1: Not Used.

 # 6 **NGW** Tool offset memory C (M series) or tool geometry/wear compensation (T series) is:
0: Used.
1: Not Used.

 # 7 **NTL** Tool length measurement is:
NCR Tool nose radius compensation is:
0: Used.
1: Not Used.

	#7	#6	#5	#4	#3	#2	#1	#0
8137								NVC

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 **NVC** Balance cutting is:
0: Used.
1: Not Used.

NOTE
When balance cutting is used (this parameter is 0), the mirror image of facing tool posts cannot be used. To use the mirror image of facing tool posts, set this parameter to 1.

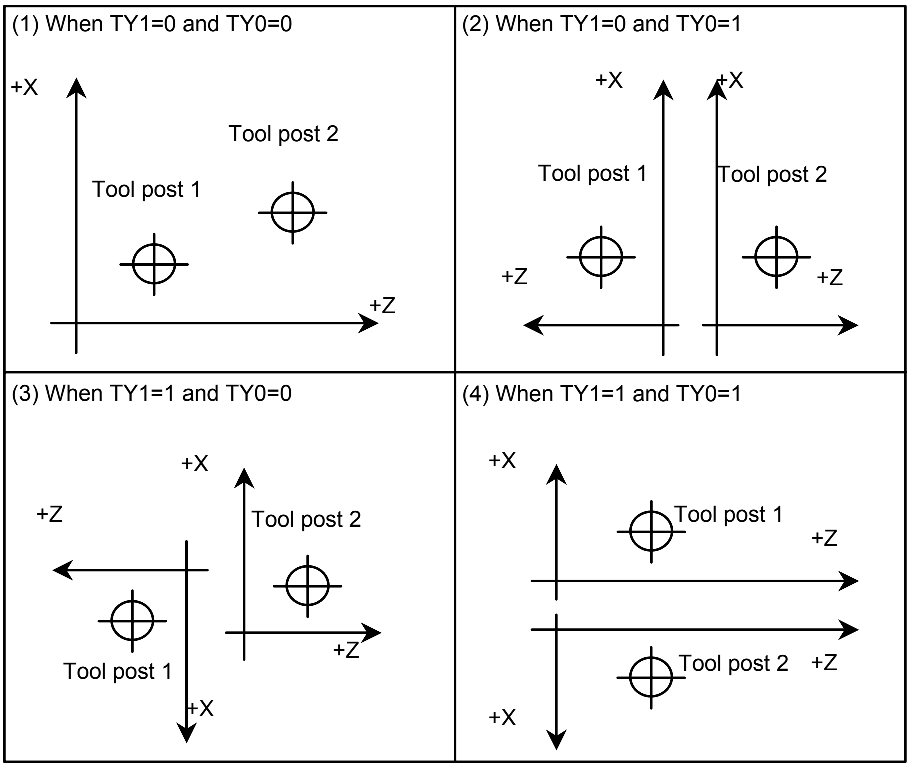
4.52 PARAMETERS OF INTERFERENCE CHECK BETWEEN PATHS (T SERIES) (2-PATH CONTROL)

	#7	#6	#5	#4	#3	#2	#1	#0
8140			ZCL	IFE	IFM	IT0	TY1	TY0

[Input type] Parameter input
[Data type] Bit

 # 0 TY0 This parameter sets the coordinate system relationship between two tool posts based on the tool post of path 1.

 # 1 TY1



 # 2 IT0 When offset number 0 is specified by the T code,
0: Checking interference between paths is stopped until an offset number other than 0 is specified by the next T code.
1: Checking interference between paths is continued according to the previously specified offset number.

 # 3 IFM In manual mode, a interference check between paths is:
0: Not performed.
1: Performed.

 # 4 IFE Interference check between paths is:
0: Performed.
1: Not performed.

 # 5 **ZCL** Specifies whether interference along the Z axis is checked while checking interference between paths.

0: Checked.

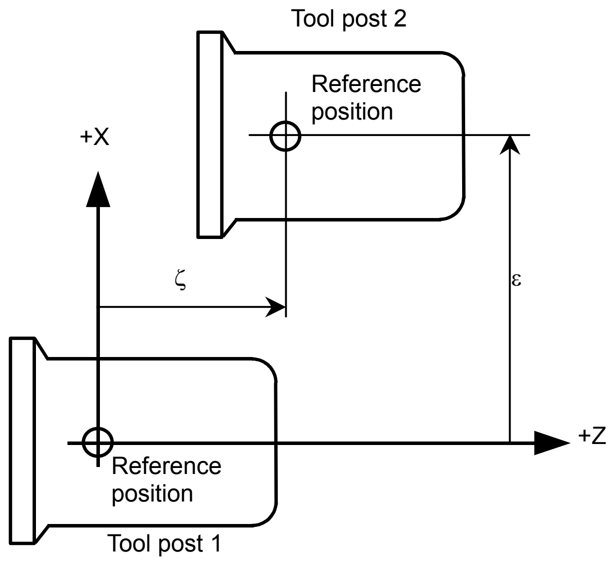
1: Not checked (Only interference along the X axis is checked.)

8151	**Distance along the X axis between the reference positions of tool posts 1 and 2**

8152	**Distance along the Z axis between the reference positions of tool posts 1 and 2**

[Input type]	Parameter input
[Data type]	Real
[Unit of data]	mm, inch (machine unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	9 digit of minimum unit of data (refer to standard parameter setting table (A)) (When the increment system is IS-B, -999999.999 to +999999.999)

Each of these parameters sets the distance between the tool posts of two paths.



In the Z-X plane coordinate system with its origin at the represent position of tool post 1, set the X component value ε of the reference position of tool post 2 in parameter No. 8151 and set the Z component value ξ in parameter No. 8152.

> ⚠ **WARNING**
> After modifying the parameter values, perform a manual reference position return operation for both tool posts. Otherwise, the internally stored positional relationships of the two tool posts are not updated to the newly set parameter values.

4.53 PARAMETERS OF SYNCHRONOUS/COMPOSITE CONTROL AND SUPERIMPOSED CONTROL (T SERIES) (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
8160	NRS	SPE	NCS	AXS				

[Input type] Parameter input
[Data type] Bit path

 # 4 AXS When the axis movement in-progress signal <Fn102> or the axis movement direction signal <Fn106> of the slave axis in superimposed control is output:
0: State output is performed according to the result of adding superimposed move pulses.
1: State output is performed according to the result of movement along each axis instead of superimposed move pulses.

 # 5 NCS If an overtravel alarm is issued for an axis under synchronous, composite, or superimposed control, synchronous, composite, or superimposed control is:
0: Released.
1: Not released.

> **NOTE**
> If one of these paths is 1, both paths are assumed to be 1.

 # 6 SPE The synchronization deviation is:
0: The difference between the positioning deviation of the master axis and that of the slave axis.
1: The difference between the positioning deviation of the master axis and that of the slave axis plus the acceleration/deceleration delay.

> **NOTE**
> 1 When the master and slave axes have different acceleration/deceleration time constants, set 1.
> 2 SPE is valid when bit 1 (SERx) of parameter No. 8162 is set to 1. SPE is used to find a synchronization deviation for comparison with parameter No. 8181.

 # 7 NRS When the system is reset, synchronous, composite, or superimposed control is:
0: Released.
1: Not released.

	#7	#6	#5	#4	#3	#2	#1	#0
8161	NSR		CRZ					NMR

[Input type] Parameter input
[Data type] Bit

 # 0 NMR When an axis subject to composite control is placed in servo-off state:
0: Composite control is stopped
1: Composite control is not stopped, provided bit 0 (FUP) of parameter No.1819 is set to 1 to disable follow-up for the axis.

 # 5 CRZ If the state of the composite control signal is switched in composite control on two axes under Cs contour control, the reference position establishment state of the two axes in composite control is:
0: Maintained. (The unestablished state is not assumed.)
1: Assumed to be unestablished.

 # 7 NSR When servo-off occurs with an axis in synchronous control:
0: Synchronous control is canceled.
1: Synchronous control is not canceled if follow-up operation is disabled for the axis (with bit 0 (FUPx) of parameter No. 1819 set to 1).

	#7	#6	#5	#4	#3	#2	#1	#0
8162	MUMx	MCDx	MPSx	MPMx	OMRx	PKUx	SERx	SMRx

[Input type] Parameter input
[Data type] Bit axis

 # 0 SMRx Synchronous mirror-image control is:
0: Not applied. (The master and slave axes move in the same direction.)
1: Applied. (The master and slave axes move in opposite directions.)

 # 1 SERx The synchronization deviation is:
0: Not detected.
1: Detected.

> **NOTE**
> When both master and slave axes move in synchronization, the positioning deviations of the corresponding axes are compared with each other. If the difference is greater than or equal to the value specified in parameter No.8181, an alarm occurs. When either axis is in the parking or machine-locked state, however, the synchronization deviation is not detected.

 # 2 PKUx In the parking state,

0: The absolute, relative, and machine coordinates are not updated.

1: The absolute and relative coordinates are updated. The machine coordinates are not updated.

> **NOTE**
>
> 1 With an axis for which polar coordinate interpolation is specified, set this parameter to 1. If this parameter is set to 0, a coordinate shift can occur when a single block stop or feed hold is performed in the polar coordinate interpolation mode.
>
> 2 With an axis that is set to function as a synchronous master axis and synchronous slave axis at the same time (with bit 1 (SYWx) of parameter No. 8167), set this parameter to 1.

 # 3 OMRx Superimposed mirror-image control is:

0: Not applied. (The superimposed pulse is simply added.)

1: Applied. (The inverted superimposed pulse is added.)

 # 4 MPMx When composite control is started, the workpiece coordinate system is:

0: Not set automatically.

1: Set automatically.

> **NOTE**
>
> When the workpiece coordinate system is automatically set at the start of composite control, it is calculated from the following: Current machine coordinates and the workpiece coordinates at the reference point of each axis (parameter No.8184). When the workpiece coordinate system is used (bit 0 (NWZ) of parameter No. 8136 is 0), however, instead of the coordinates obtained by the above calculation, the workpiece coordinates by the operation of workpiece coordinate system presetting (equivalent to G92.1 IP 0) in the machine coordinate system of the composite partner axis are set.

 # 5 MPSx When composite control is terminated, the workpiece coordinate system is:

0: Not set automatically.

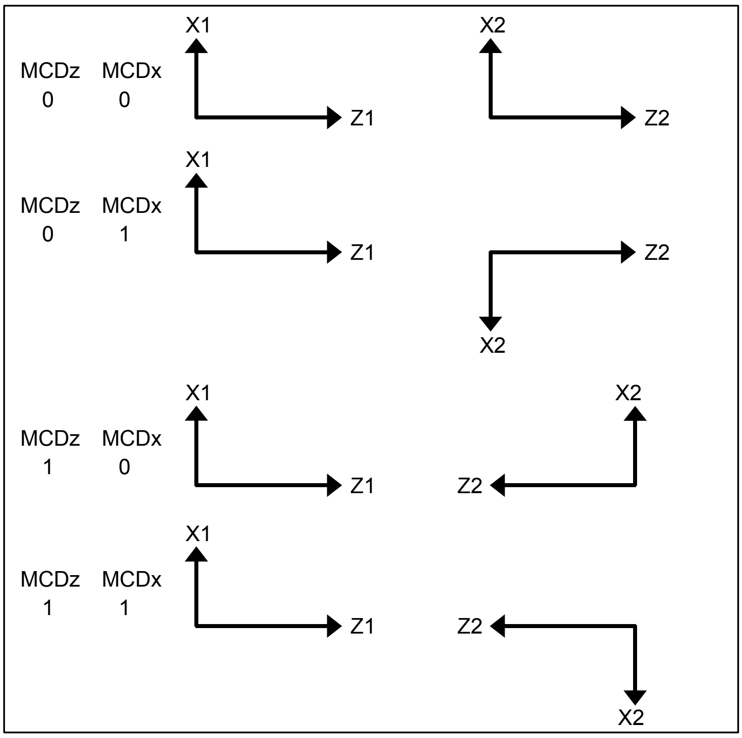
1: Set automatically.

> **NOTE**
> When the workpiece coordinate system is automatically set at the end of composite control, it is calculated from the following: Current machine coordinates and the workpiece coordinates at the reference point of each axis under composite control (parameter No.1250)
> When the workpiece coordinate system is used (bit 0 (NWZ) of parameter No. 8136 is 0), however, instead of the coordinates obtained by the above calculation, the workpiece coordinates by the operation of workpiece coordinate system presetting (equivalent to G92.1 IP 0) in the machine coordinate system of the local axis are set.

 # 6 MCDx The axes to be replaced with each other under composite control have the coordinate systems placed:

0: In the same direction. Simple composite control is applied. (A movement is made in the same direction along the corresponding axis.)

1: In opposite directions. Mirror-image composite control is applied. (A movement is made in the reverse direction along the corresponding axis.)



 # 7 MUMx In composite control, a move command for the axis:

0: Can be specified.

1: Cannot be specified.

NOTE

Upon the execution of a move command along an axis for which MUMx is set to 1 during mixed control, alarm PS0353 is issued. For example, when axis X1 and axis X2 are placed under composite control, and a command for axis X2 (motor for axis X1) is to be disabled, set MUMx for path 2 to 1.

	#7	#6	#5	#4	#3	#2	#1	#0
8163	NUMx	MMIx	SMIx	SCDx	SCMx	SPSx	SPMx	

[Input type] Parameter input
[Data type] Bit axis

 # 1 SPMx When synchronous control is started, automatic workpiece coordinate system setting for the master axis is
0: Not Performed.
1: Performed.

> **NOTE**
> When a workpiece coordinate system is automatically set at the start of synchronous control, the workpiece coordinate system is calculated from the current machine coordinates and the workpiece coordinates of each axis at the reference position set in parameter No.8185.

 # 2 SPSx When synchronous control terminates, automatic workpiece coordinate system setting for the master axis is:
0: Not performed.
1: Performed.

> **NOTE**
> When a workpiece coordinate system is automatically set at the end of synchronous control, the workpiece coordinate system is calculated from the current machine coordinates and the workpiece coordinates for each axis at the reference position set in parameter No.1250.

 # 3 SCMx When workpiece coordinates are calculated in synchronous control:
0: The workpiece coordinates are calculated from the machine coordinates of the slave axis.
1: The workpiece coordinates are calculated from the machine coordinates of the master axis and slave axis.

 # 4 SCDx The positive (+) directions of the master axis and slave axis in the coordinate system in synchronous control are:
0: Identical.
1: Opposite.
Set the parameters SPMx, SPSx, SCMx, and SCDx for the master axis. These settings are referenced during automatic workpiece coordinate setting for the master axis at the start of synchronous control.

 # 5 SMIx In synchronous control, the manual handle interruption amount for the master axis or the mirror image mode is:
0: Reflected in the slave axis.
1: Not reflected in the slave axis.

When this bit (SMIx) is set to 0
Manual handle interruption :
To the travel distance along the slave axis, the interruption amount of the master axis is also added.
Mirror image :
When mirror image is applied to the master axis, mirror image is also applied to the slave axis.

When this bit (SMIx) is set to 1
Manual handle interruption :
To the travel distance along the slave axis, the interruption amount of the master axis is not added.
Mirror image :
Even when mirror image is applied to the master axis, mirror image is not applied to the slave axis.

 # 6 MMIx For a composite control axis, manual handle interruption under composite control is:
0: Enabled.
1: Disabled.

 # 7 NUMx When neither synchronous control nor composite control is applied, a move command for the axis is:
0: Not disabled.
1: Disabled.

> **NOTE**
> If a move command is specified for an axis with NUMx set to 1 when neither synchronous control nor composite control is applied, alarm PS0353 is issued.

	#7	#6	#5	#4	#3	#2	#1	#0
8164		SOKx	OPSx		MCEx	MCSx	MWEx	MWSx

[Input type] Parameter input
[Data type] Bit axis

 # 0 MWSx In automatic workpiece coordinate system setting, performed when composite control is started, a workpiece shift and tool offset are:
0: Not considered.
1: Considered.

> **NOTE**
> MWSx is valid when bit 4 (MPMx) of parameter No. 8162 is 1 and the workpiece coordinate system is not used (bit 0 (NWZ) of parameter No. 8136 is 1).

 # 1 MWEx In automatic workpiece coordinate system setting, performed when composite control is canceled, a workpiece shift and tool offset are:
0: Not considered.
1: Considered.

> **NOTE**
> MWEx is valid when bit 5 (MPSx) of parameter No. 8162 is 1 and the workpiece coordinate system is not used (bit 0 (NWZ) of parameter No. 8136 is 1).

 # 2 MCSx In automatic workpiece coordinate system setting, performed when composite control is started:
0: A workpiece coordinate system is automatically set in the same way as normal.
1: The coordinate system of the other path subject to axis recomposition is used.

> **NOTE**
> MCSx is valid when bit 4 (MPMx) of parameter No. 8162 is 1 and the workpiece coordinate system is not used (bit 0 (NWZ) of parameter No. 8136 is 1).

 # 3 MCEx In automatic workpiece coordinate system setting, performed when composite control is canceled:
0: A workpiece coordinate system is automatically set in the same way as normal.
1: The coordinate system of the other path subject to axis recomposition is used.

> **NOTE**
> MCEx is valid when bit 5 (MPSx) of parameter No. 8162 is 1 and the workpiece coordinate system is not used (bit 0 (NWZ) of parameter No. 8136 is 1).

 # 5 OPSx When superimposed control is canceled, control in which an amount of movement along a master axis subject to superimposed control is added to the workpiece coordinate of a slave axis is:
0: Not applied.
1: Applied.

> **NOTE**
> When the workpiece coordinate system is enabled (bit 0 (NWZ) of parameter No. 8136 is 0), the coordinate system is set by workpiece coordinate system presetting (equivalent to G92.1 IP0).

 # 6 SOKx If a master axis subject to superimposed control is also subject to synchronous control:
0: An alarm is issued when superimposed control is started during synchronous control.
1: No alarm is issued when superimposed control is started during synchronous control.

	#7	#6	#5	#4	#3	#2	#1	#0
8166							MIX	

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 1 MIX Composite control uses:
0: A new 2-path interface. In this case, the composite partner axis is set in parameter No. 8183 and the signal of the axis set in parameter No. 8183 is used as the composite control axis selection signal.
1: The conventional 2-path interface. In this case, parameter No. 8183 is set on path 2 and the signal on path 1 is used as the composite control axis selection signal.

	#7	#6	#5	#4	#3	#2	#1	#0
8167		SPVx	SWSx	SWMx	SGSx	SGMx	SYWx	

[Input type] Parameter input
[Data type] Bit axis

 # 1 SYWx The axis is:
0: Not used as a master axis and slave axis at the same time.
1: Used as a master axis and slave axis at the same time.

 # 2 SGMx In automatic workpiece coordinate system setting at the start of synchronous control, a tool offset is:
0: Considered.
1: Not considered.

> **NOTE**
> SGMx is enabled when bit 1 (SPMx) of parameter No.8163 is set to 1.

 # 3 SGSx In automatic workpiece coordinate system setting at the end of synchronous control, a tool offset is:
0: Considered.
1: Not considered.

> **NOTE**
> SGSx is enabled when bit 2 (SPSx) of parameter No.8163 or bit 6 (SPVx) of parameter No.8167 is set to 1.

 # 4 SWMx In automatic workpiece coordinate system setting at the start of synchronous control, a workpiece shift is:
0: Not considered.
1: Considered.

> **NOTE**
> SWMx is enabled when bit 1 (SPMx) of parameter No.8163 is set to 1.

 # 5 SWSx In automatic workpiece coordinate system setting at the end of synchronous control, a workpiece shift is:
0: Not considered.
1: Considered.

> **NOTE**
> SWSx is enabled when bit 2 (SPSx) of parameter No.8163 or bit 6 (SPVx) of parameter No.8167 is set to 1.

 # 6 SPVx At the end of synchronous control, automatic workpiece coordinate system setting for the slave axis is:
0: Not performed.
1: Performed.

> **NOTE**
> When a workpiece coordinate system is automatically set at the end of synchronous control, the workpiece coordinate system is calculated from the current machine coordinates and the workpiece coordinates for each axis at the reference position set in parameter No.1250.

	#7	#6	#5	#4	#3	#2	#1	#0
8168		WST		MWR		SVF	MSO	MPA

[Input type] Parameter input
[Data type] Bit

 # 0 MPA When an alarm about synchronization/composite/superposition control is issued:
0: Both paths are set to the feed hold state.
1: Only the path that includes an axis related to synchronization/composite/superposition control is set to the feed hold state.
For example, in synchronization control within the same path, the path in which an alarm occurred is set to the feed hold state.

 # 1 MSO When one of the following events occurs in synchronous control or composite control:
- The emergency stop signal is turned off.
- The servo-off signal is turned on.
- A servo alarm is issued.

0: The synchronous or composite control mode is canceled and follow-up operation is not performed.
For the operation to be performed when the servo-off signal is turned on, however, the setting of bit 7 (NSR) of parameter No. 8161 is used in synchronous control or the setting of bit 0 (NMR) of parameter No. 8161 is used in composite control.
1: The synchronous or composite control mode is not canceled. The following operation is performed to perform follow-up operation:
When the emergency stop signal is turned off, if the other path is involved, the path operates so that the emergency stop signal is virtually turned off.
When the servo-off signal is turned on, the relevant axis is determined and operation is performed so that the servo-off signal is virtually turned on for the determined axis.
When a servo alarm is issued, the relevant axis is determined and the alarm SV0003, "CONTINUATION OF SYNCHRONOUS OR COMPOSITE CONTROL DISABLED" is issued for the determined axis to stop moving the tool along the axis. When bit 2 (SVF) of parameter No. 8168 is set to 1, this servo-off specification follows the SVF setting.

NOTE
This setting is valid also during operation. For all axes placed under synchronous or composite control, the emergency stop signal is turned off, the servo-off signal is turned on, or a servo alarm is issued.

 # 2 SVF When an axis under composite control is placed in the servo-off state:
0: Composite control is canceled.
1: Composite control is not canceled.

Follow-up specification follows the setting of bit 0 (FUPx) of parameter No. 1819.
When bit 2 (SVF) of parameter No. 8168 is set to 1, bit 0 (NMR) of parameter No. 8161 is invalid. Bit 1 (MSO) of parameter No. 8168, specification for servo-off, is also invalid.

> **NOTE**
> If a composite control axis is placed in the servo-off state when stopped, set this parameter to 1.

 # 4 MWR When the workpiece coordinate system is automatically set if synchronization/composite/superposition control is started or ended, the tool compensation number is:
0: Canceled.
1: Not canceled.

> **NOTE**
> This parameter is valid when the workpiece coordinate system is enabled (bit 0 (NWZ) of parameter No. 8136 is 0).

 # 6 WST When a workpiece coordinate system is automatically set up for a slave axis at the end of synchronous control, workpiece coordinate system presetting is:
0: Not performed.
1: Performed.

> **NOTE**
> This parameter is valid when the workpiece coordinate system is enabled (bit 0 (NWZ) of parameter No. 8136 is 0) and bit 6 (SPV) of parameter No. 8167 is 1.

	#7	#6	#5	#4	#3	#2	#1	#0
8169						MRFx	MVMx	MDMx

[Input type] Parameter input
[Data type] Bit axis

 # 0 MDMx As machine coordinates in composite control:
0: Coordinates for the local path are displayed.
1: Coordinates for the other path in composite control are displayed.

 # 1 MVMx In composite control, machine coordinates (#5021 and above) to be read are:
0: Machine coordinates of the local path.
1: Machine coordinates of the other path in composite control.

 # 2 MRFx In composite control, the rapid traverse rate is:
0: The rapid traverse rate for the specified axis.
1: The rapid traverse rate for the axis along which a movement is made.

8180	Master axis with which an axis is synchronized under synchronous control

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 101, 102, 103, . . . , (path number)*100+(intra-path relative axis number) (101, 102, 103, . . . , 201, 202, 203, . . .)

This parameter sets the path number and intra-path relative axis number of the master axis with which each axis is synchronized. When zero is specified, the axis does not become a slave axis and is not synchronized with another axis. When an identical number is specified in two or more parameters, one master axis has two or more slave axes.

8181	Synchronization error limit of each axis

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

When the synchronization deviation detected (bit 1 (SERx) of parameter No.8162 is set to 1), this parameter specifies the limit of the difference between the positioning deviation of the slave axis and that of the master axis. Set this parameter to the slave axis.

8183	Composite control axis of the other path in composite control for each axis

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 101, 102, 103, . . . , (path number)*100+(intra-path relative axis number) (101, 102, 103, . . . , 201, 202, 203, . . .)

This parameter sets with which axis each axis is to be placed under composite control. When zero is specified, control of the axis is not replaced under composite control. An identical number can be specified in two or more parameters, but composite control cannot be exercised for all of them at a time.

> **NOTE**
> When using the conventional 2-path interface (bit 1 (MIX) of parameter No. 8166 is 1, set this parameter on path 2. In this case, use the composite control axis selection signal on path 1.

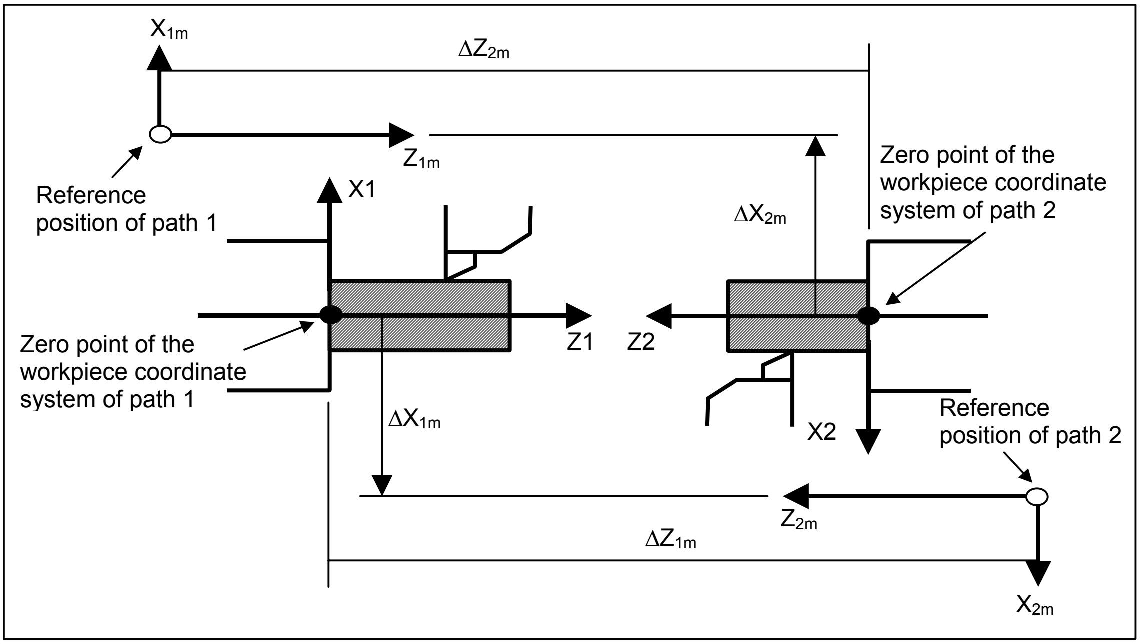
8184	Coordinates of the reference point of an axis on the coordinate system of another axis under composite control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter specifies the coordinates of the reference point of an axis on the coordinate system of another axis under composite control.
This parameter is valid when bit 4 (MPMx) of parameter No. 8162 is 1 and the workpiece coordinate system is not used (bit 0 (NWZ) of parameter No. 8136 is 1).

Example

Exercising composite control to replace the X1-axis with the X2-axis



(ΔX1m, ΔZ1m) are the coordinates of the reference point of path 2 on the workpiece coordinate system of path 1. (ΔX2m, ΔZ2m) are the coordinates of the reference point of path 1 on the workpiece coordinate system of path 2.
ΔX1m is specified for the parameter No. 8184x of path 1 and ΔX2m for the parameter No. 8184x of path 2.

If bit 4 (MPMx) of parameter No.8162 is set to 1 when composite control is started, the workpiece coordinate system satisfying the following conditions is specified:

X1 = (Value specified for the X-axis of path 1) ± (Machine coordinate of X2)

Plus when parameter MCDx (bit 6 of No.8162) of path 1 is set to 0

Minus when parameter MCDx (bit 6 of No.8162) of path 1 is set to 1

X2 = (Value specified for the X-axis of path 2) ± (Machine coordinate of X1)

Plus when parameter MCDx (bit 6 of No.8162) of path 2 is set to 0

Minus when parameter MCDx (bit 6 of No.8162) of path 2 is set to 1

If bit 5 of parameter No.8162 MPSx is set to 1 when composite control is terminated, the workpiece coordinate system satisfying the following conditions is specified:

X1 = (Parameter No.1250 of path 1) + (Machine coordinate of X1)

X2 = (Parameter No.1250 of path 2) + (Machine coordinate of X2)

8185	Workpiece coordinates on each axis at the reference position

[Input type]	Parameter input
[Data type]	Real axis
[Unit of data]	mm, inch, degree (input unit)
[Minimum unit of data]	Depend on the increment system of the applied axis
[Valid data range]	9 digit of minimum unit of data (refer to standard parameter setting table (A)) (When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the workpiece coordinates on each master axis, subject to synchronous control, when the master and slave axes are at the reference position. This parameter is enabled when bit 1 (SPMx) of parameter No.8163 is set to 1. Set this parameter for the master axis.

8186	Master axis under superimposed control

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 101, 102, 103, . . . , (path number)*100+(intra-path relative axis number) (101, 102, 103, . . . , 201, 202, 203, . . .)

This parameter sets the path number and intra-path relative axis number of a superimposed master axis for each axis when superimposed control is exercised. When zero is specified, the axis does not become a slave axis under superimposed control and the move pulse of another axis is not superimposed.

An identical number can be specified in two or more parameters to exercise superimposed control simultaneously. This means that superimposed control with one master axis and multiple slave axes is possible.

A slave axis may function as the master axis of another axis to allow three-generation superimposed control: parent (master axis) - child (slave axis/master axis) - grandchild (slave axis).

In this case, a movement along the child is made by its travel distance plus the travel distance of the parent, and a movement along the grandchild is made by its travel distance plus the travel distance of the child plus the travel distance of the parent.

Example of the relationship of parent (X1 of path 1) - child (X2 of path 2) - grandchild (U2 of path 2):
The travel distance of X1 is superimposed on X2, and the travel distances of X1 and X2 are further superimposed on U2.

Parameter No. 8186x of path 2 = 101
Parameter No. 8186u of path 2 = 201

8190	Rapid traverse rate of an axis under superimposed control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to standard parameter setting table (C)
(When the increment system is IS-B, 0 to +999000.0)

Set a rapid traverse rate for each of the axes when the rapid traverse override of the axes (master and slave axes) under superimposed control is 100%. The manual rapid traverse rate set in this parameter or the manual rapid traverse rate set in parameter No. 1424, whichever smaller, is used.

If this parameter is set to 0, the normal rapid traverse rate (parameter No. 1420) is used.

8191	F0 velocity of rapid traverse override of an axis under superimposed control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to standard parameter setting table (C)
(When the increment system is IS-B, 0 to +999000.0)

Set the F0 velocity of rapid traverse override of an axis under superimposed control (each of the master and slave axes).
If this parameter is set to 0, the F0 velocity of rapid traverse override in normal operation (parameter No. 1421) is used.

8192	Linear acceleration/deceleration time constant in rapid traverse of an axis under superimposed control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

This parameter specifies the linear acceleration/deceleration time constant in rapid traverse for each of the axes (master and slave axes) under superimposed control.

8194	Maximum cutting feedrate in superimposed control

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to standard parameter setting table (C)
(When the increment system is IS-B, 0 to +999000.0)

Set the maximum cutting feedrate that can be applied under superimposed control.
If this parameter is set to 0, the maximum cutting feedrate in normal operation (parameter No. 1430) is used.

4.54 PARAMETERS OF ANGULAR AXIS CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
8200						AZR		AAC

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 AAC

0: Does not perform angular axis control.
1: Performs inclined axis control.

 # 2 AZR

0: The machine tool is moved along the Cartesian axis during manual reference position return along the slanted axis under angular axis control.
1: The machine tool is not moved along the Cartesian axis during manual reference position return along the slanted axis under angular axis control.

	#7	#6	#5	#4	#3	#2	#1	#0
8201	ADG					AO3	AO2	AOT

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 AOT Stored stroke limit 1 under angular axis control is handled as:
0: Value in the slanted coordinate system.
1: Value in the Cartesian coordinate system.

 # 1 AO2 Stored stroke limit 2 under angular axis control is handled as:
0: Value in the slanted coordinate system.
1: Value in the Cartesian coordinate system.

 # 2 AO3 Stored stroke limit 3 under angular axis control is handled as:
0: Value in the slanted coordinate system.
1: Value in the Cartesian coordinate system.

 # 7 ADG The contents of diagnostic data Nos. 306 and 307 are:
- 0: Not swapped. The slanted axis and Cartesian axis are displayed in this order.
- 1: Swapped. The Cartesian axis and slanted axis are displayed in this order.

	#7	#6	#5	#4	#3	#2	#1	#0
8209								ARF

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter bit is set, the power must be turned off before operation is continued.

 # 0 ARF In angular axis control, a movement from an intermediate point to the reference position in the G28/G30 command is:
- 0: Made in the angular coordinate system.
- 1: Made in the Cartesian coordinate system.

8210	Slant angle of a slanted axis in angular axis control

[Input type] Parameter input
[Data type] Real path
[Unit of data] Degree
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] -180.000 to 180.000. However, angular axis control is disabled in the ranges -95.000 to -85.000 and 85.000 to 95.000 (in the case of IS-B).

8211	Axis number of a slanted axis subject to angular axis control

8212	Axis number of a Cartesian axis subject to slanted axis control

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to number of controlled axes

When angular axis control is to be applied to an arbitrary axis, these parameters set the axis numbers of a slanted axis and Cartesian axis. If 0 is set in either of the two parameters, the same number is set in the two parameters, or a number other than the controlled axis numbers is set in either of the two parameters, a slanted axis and Cartesian axis are selected as indicated in the following table:

	Slanted axis	Cartesian axis
M series	Y-axis (axis with 2 set in parameter No. 1022) of the basic three axes	Z-axis (axis with 3 set in parameter No. 1022) of the basic three axes
T series	X-axis (axis with 1 set in parameter No. 1022) of the basic three axes	Z-axis (axis with 3 set in parameter No. 1022) of the basic three axes

4.55 PARAMETERS OF AXIS SYNCHRONOUS CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
8301				SYA				

[Input type] Parameter input
[Data type] Bit path

 # 4 SYA In the servo-off state in axis synchronous control, the limit of the difference between the positioning deviation of the master axis and that of the slave axis is:
0: Checked.
1: Not checked.

	#7	#6	#5	#4	#3	#2	#1	#0
8302	SMA							

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 7 SMA When an absolute position detector is attached, and bit 4 (APZ) of parameter No. 1815 for an axis in synchronous operation is set to OFF, APZ of the pairing axis in synchronous operation is:
0: Not set to OFF.
1: Set to OFF.

	#7	#6	#5	#4	#3	#2	#1	#0
8303	SOFx			SYPx		SAFx	ATSx	ATEx

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 ATEx In axis synchronous control, automatic setting for grid positioning is:
0: Disabled
1: Enabled
Set this parameter with a slave axis.

 # 1 ATSx In axis synchronous control, automatic setting for grid positioning is:
0: Not started
1: Started
Set this parameter with a slave axis.

> **NOTE**
> When starting automatic setting for grid positioning, set ATS to 1. Upon the completion of setting, ATS is automatically set to 0.

 # 2 SAFx In axis synchronous control, a movement along a slave axis is:
0: Not added to actual feedrate display.
1: Added to actual feedrate display.
Set this parameter with a slave axis.

 # 4 SYPx In axis synchronous control, some parameters must be set to the same value for the master and slave axes. When a value is set in such a parameter for the master axis:
0: The same value is not automatically set in the parameter for the slave axis.
1: The same value is automatically set in the parameter for the slave axis.

> **NOTE**
> 1 For the parameters that can be set automatically, refer to Subsection 1.6.7, "Automatic Setting of Parameters for Slave Axes", in Connection Manual (Function) (B-64903EN-1).
> 2 Set this parameter for both the master and slave axes.

 # 7 SOFx In axis synchronous control, the synchronization establishment function based on machine coordinates is:
0: Disabled.
1: Enabled.
Set this parameter with a slave axis.
0.

		#7	#6	#5	#4	#3	#2	#1	#0
8304		SYEx		SCAx	MVBx		ADJx		SSAx

[Input type] Parameter input
[Data type] Bit axis

 # 0 SSAx When the one-direction synchronization establishment function under axis synchronous control is used:
0: The axis with a larger machine coordinate is used as the reference.
1: The axis with a smaller machine coordinate is used as the reference.

> **NOTE**
> 1 When at least one of these parameters is set, the power must be turned off before operation is continued.
> 2 Set this parameter (SSA) to the same value for both the master and slave axes.

 # 2 ADJx In axis synchronous control, this parameter specifies an axis along which a movement is made in the modification mode.
0: A movement is not made in the modification mode along the axis.
1: A movement is made in the modification mode along the axis.
When this parameter is set to 1, the modification mode is set.
Along an axis with this parameter set to 1, a movement is made by a move command for the master axis.
Set this parameter for one of the master and slave axes.
When there are multiple slave axes for one master axis, set this parameter to 1 for an axis with which a synchronization error excessive alarm is issued for recovery. If an alarm is issued with multiple axes, modify this parameter after recovery of one axis to recover another axis.

 # 4 MVBx In the modification mode, a move command in a direction that increases a synchronization error is:
0: Ignored.
1: Valid.
When there are multiple slave axes for one master axis, an attempt to reduce the synchronous error of a slave axis by a movement along the master axis can increase the synchronization error of another slave axis. If this parameter is set to 0 in such a case, a movement can be made in neither direction along the master axis. In this case, set bit 2 (ADJ) of parameter No. 8304 to make a movement along a slave axis to perform a corrective operation.

 # 5 SCAx In axis synchronous control:
0: Synchronous operation is performed when the axis synchronous control manual feed selection signal SYNCJ or the axis synchronous control selection signal SYNC for slave axes is set to 1.
1: Synchronous operation is performed at all times.
Set this parameter with a slave axis.

 # 7 SYEx When external machine coordinate system shift is specified by external data input/output for the master axis in synchronous control, the slave axis is:
0: Not shifted.
1: Shifted by the same amount as specified for the master axis.
Set this parameter for the slave axis.
This function is disabled during normal operation.

	#7	#6	#5	#4	#3	#2	#1	#0
8305						SRF	SSE	SSO

[Input type] Parameter input
[Data type] Bit path

 # 0 SSO The uni-directional synchronization function in axis synchronous control is:
0: Disabled.
1: Enabled.

 # 1 SSE After emergency stop, the uni-directional synchronization function in axis synchronous control is:
0: Disabled.
1: Enabled.

 # 2 SRF In axis synchronous control, G27, G28, G30, and G53:
0: Make the same movement along the slave axis as a movement along the master axis.
1: Make movements along the slave axis and master axis independently to specified positions.

8311	Axis number of master axis in axis synchronous control

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to Number of controlled axes

Select a master axis in axis synchronous control. In the parameter for the slave axis, set the axis number of the master axis.

Example 1)
When one set of axis synchronous control is used:
When the master axis is the first axis (X-axis), and the slave axis is the third axis (Z-axis), set parameter No. 8311 as follows:
Parameter No.8311 X (first axis) = 0
Parameter No.8311 Y (second axis) = 0
Parameter No.8311 Z (third axis) = 1
Parameter No.8311 A (fourth axis) = 0

Example 2)
When two sets of axis synchronous control is used:
When the master axes are the first axis and second axis, and the slave axes are the fourth axis and third axis, set parameter No. 8311 as follows:
Parameter No.8311 X (first axis) = 0
Parameter No.8311 Y (second axis) = 0
Parameter No.8311 Z (third axis) = 2
Parameter No.8311 A (fourth axis) = 1

8312	Enabling/disabling mirror image in axis synchronous control

[Input type] Parameter input
[Data type] Word axis
[Valid data range] -127 to 128

This parameter sets mirror image for the slave axis. When 100 or a more value is set with this parameter, the mirror image function is applied to synchronous control. Set this parameter to the slave axis.

Example)
For reverse synchronization with the master axis being the third axis and the slave axis being the fourth axis, set parameter No. 8312 as follows:
Parameter No.8312 X (first axis) = 0
Parameter No.8312 Y (second axis) = 0
Parameter No.8312 Z (third axis) = 0
Parameter No.8312 A (fourth axis) = 100

NOTE
In synchronous operation with mirror image applied, synchronization establishment, synchronization error checking, and modification mode cannot be used.

8314	Maximum allowable error in synchronization error check based on machine coordinates

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
This parameter sets a maximum allowable error in a synchronization error check based on machine coordinates. When the error between the master and slave axes in machine coordinates exceeds the value set in this parameter, the machine stops with the servo alarm (SV0005).
Set this parameter with a slave axis.

NOTE
Set 0 in this parameter when a synchronization error check is not made.

8323	Limit in positional deviation check in axis synchronous control

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999
This parameter sets the maximum allowable difference between the master axis and slave axis position deviations. When the absolute value of a positional deviation difference exceeds the value set in this parameter in axis synchronous control, the alarm (DS0001) is issued.
Set this parameter with a slave axis. If 0 is specified in this parameter, no position deviation difference check is made.

8325	Maximum compensation value in synchronization establishment based on machine coordinates

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)
This parameter sets the maximum compensation value for synchronization. When a compensation value exceeding the value set in this parameter is detected, the servo alarm (SV0001) is issued, and the synchronization establishment is not performed.
Specify a slave axis for this parameter. To enable this parameter, set the parameter SOF (bit 7 of parameter No.8303) to 1. When 0 is set in this parameter, synchronization establishment is not performed.

8326	Difference between master axis and slave axis reference counters

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 999999999

The difference between the master axis reference counter and slave axis reference counter (master axis and slave axis grid shift) is automatically set when automatic setting for grid positioning is performed. Then, the difference is transferred together with an ordinary grid shift value to the servo system when the power is turned on. This parameter is set with a slave axis.

8327	Torque difference alarm detection timer

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] msec
[Valid data range] 0 to 4000

This parameter sets a time from the servo preparation completion signal, SA <F000.6>, being set to 1 until torque difference alarm detection is started in axis synchronous control.
When 0 is set in this parameter, the specification of 512 msec is assumed.
Set this parameter with a slave axis.

8337	M code for turning off synchronization in axis synchronous control

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 99999999

This parameter specifies an M code for switching from synchronous operation to normal operation.
The M code set in this parameter is not buffered.

8338	M code for turning on synchronization in axis synchronous control

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 99999999

This parameter specifies an M code for switching from normal operation to synchronous operation.
The M code set in this parameter is not buffered.

4.56 PARAMETERS OF SEQUENCE NUMBER COMPARISON AND STOP

8341	Program number subject to comparison and stop

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 1 to 9999

This parameter sets the program number, including a sequence number, subject to sequence number comparison and stop. Parameter No.8342 is used to set a sequence number subject to check termination.

8342	Sequence number subject to comparison and stop

[Input type] Setting input
[Data type] 2-word path
[Valid data range] 0 to 99999

This parameter sets the sequence number subject to sequence number comparison and stop.
If the block containing the sequence number set with this parameter is executed while the program set with parameter No.8341 is being executed, a single block stop occurs after the block is executed. At this time, the setting is automatically set to -1.

NOTE
1 When -1 is set in parameter No. 8342, comparison and stop is disabled.
2 Comparison and stop cannot be performed using a sequence number contained in a block (such as a macro statement, M98, and M99) that is processed only inside the CNC.
3 When a match is found with the sequence number of a block (such as an L specification of a canned cycle) that specifies the number of repeats, operation stops after executing as many times as the number of repeats.
4 If the sequence number set in parameter No. 8342 appears more than once in the program, operation stops at the block where the first match is found in the order of execution.

4.57 PARAMETERS OF ADVANCED PREVIEW CONTROL / AI ADVANCED PREVIEW CONTROL / AI CONTOUR CONTROL (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
8459					OVR			

[Input type] Parameter input
[Data type] Bit path

 # 3 OVR In deceleration by speed difference in advance preview control/AI advance preview control/AI contour control, an override is:
0: Disabled.
1: Enabled.
An override is generally enabled for a specified speed and advance preview control/AI advance preview control/AI contour control is applied to the specified speed. When this parameter is set to 1, an override is applied to the speed managed by advance preview control/AI advance preview control/AI contour control.

8465	Upper limit of the speed of advance preview control/AI advance preview control/AI contour control

[Input type] Setting input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)
This parameter sets the upper limit of the speed of advance preview control/AI advance preview control/AI contour control.
If a speed higher than this parameter is specified in the advance preview control/AI advance preview control/AI contour control mode, clamping is performed at the speed specified by this parameter.
When this parameter is 0, clamping is not performed.

8466	Upper limit of the speed of advance preview control/AI advance preview control/AI contour control (when a rotation axis is specified independently)

[Input type] Setting input
[Data type] Real path
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets the upper limit of the speed of advance preview control/AI advance preview control/AI contour control during independent specification of a rotation axis.

If a speed higher that this parameter is specified in the advance preview control/AI advance preview control/AI contour control mode, clamping is performed at the speed specified by this parameter.

When this parameter is 0, clamping is performed at the value specified by parameter No. 8465.

4.58 OTHER PARAMETERS

	#7	#6	#5	#4	#3	#2	#1	#0
8650						EKY	CNA	RSK

[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 0 RSK When the  key is pressed, the key code is:

0: Not passed to the application.
1: Passed to the application.

 # 1 CNA If a CNC alarm is issued when the user screen for the C language executor is displayed:

0: Whether the screen display is automatically switched to the alarm screen depends on the setting of bit 7 (NPA) of parameter No. 3111.
1: The screen display is not switched to the alarm screen, regardless of the setting of bit 7 (NPA) of parameter No. 3111.

 # 2 EKY The extended portion of the MDI keys is:

0: Not read.
1: Read.

8661	Variable area size

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Unit of data] KByte
[Valid data range] 0 to 59

This parameter specifies the size of the static variable area that can be shared by tasks. Specify a value in 1K-byte units. The maximum size is 59K bytes. The total of the SRAM disk size and the value of this parameter should not exceed the available SRAM size minus 1K bytes (that is, 63K bytes).
When the setting of this parameter is changed, the variable area and SRAM disk are initialized.

8662	SRAM disk size

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word path
[Unit of data] KByte
[Valid data range] 4 to 63(255)

This parameter sets the size of the SRAM disk when the C language executor is used. Specify a value greater than or equal to 4K bytes in 1K-byte units. The maximum size is 63K bytes. The total of the variable area size and the value of this parameter should not exceed the available SRAM size minus 1K bytes (that is, 63K bytes).

8663	Time zone setting

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] sec
[Valid data range] -12x3600 to 12x3600

This parameter specifies the time-zone difference from Greenwich Mean Time in seconds. The difference for Japan is -9 hours. (The setting is -9×3600 = 32400 seconds)

8760	Program number of data input/output (Power Mate CNC manager)

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 9999

This parameter sets the program numbers of programs to be used for inputting and outputting slave data (parameters) when the Power Mate CNC manager function is used.

For a slave specified with I/O LINK channel m and group n, the following program number is used:

Setting + (m - 1) × 100 + n × 10

8781	DRAM size used for the C language executor

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Unit of data] 64KByte
[Valid data range] 16 to 64

This parameter sets the size of DRAM used for the C language executor. Specify a value greater than or equal to 1024K bytes in 64K-byte units. When a value not within the valid data range is set, the specification of 0 is assumed.
When 0 is set, the C language executor is not started.

> **NOTE**
> The actually usable size depends on the RAM capacity and option configuration.

	#7	#6	#5	#4	#3	#2	#1	#0
8801								

	#7	#6	#5	#4	#3	#2	#1	#0
8802								

[Input type] Parameter input
[Data type] Bit path

8811	

to

8813	

[Input type] Parameter input
[Data type] 2-word

Parameter Nos. 8801 to 8802 and Nos. 8811 to 8813 are designed specifically for use by the machine tool builder, and the usage of these parameters varies from machine to machine. For details, refer to the manual issued by the machine tool builder.

4.59 PARAMETERS OF MAINTENANCE

	#7	#6	#5	#4	#3	#2	#1	#0
8900								PWE

[Input type] Setting input
[Data type] Bit

 # 0 PWE The setting, from an external device and MDI panel, of those parameters that cannot be set by setting input is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
8901	MEN							

[Input type] Setting input
[Data type] Bit path

 # 7 MEN The periodic maintenance screen is:
0: Displayed.
1: Not displayed.

8911	Percentage for life warning display on the periodic maintenance screen

[Input type] Parameter input
[Data type] Byte path
[Unit of data] %
[Valid data range] 0 to 99
On the periodic maintenance screen, if the remaining time of an item falls to a value less than the percentage of the life specified in this parameter, the item name and remaining time is displayed in red as a warning.

8940	Initial screen title character code 1

to

8949	Initial screen title character code 10

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0, 32, 45, 46, 48 to 57, 65 to 90
This parameter sets the character codes of the character string to be displayed on the initial screen immediately after power-on.
If the number of characters to be displayed is less than 10, the parameters corresponding to the space exceeding the character length are set to 0.

> **NOTE**
> For character codes, see APPENDIX A, "CHARACTER CODE LIST".

	#7	#6	#5	#4	#3	#2	#1	#0
8950								MEM

[Input type] Parameter input
[Data type] Bit

 # 0 MEM The memory contents display screen is:
0: Not displayed.
1: Is displayed.

4.60 PARAMETERS OF THE INCORRECT OPERATION PREVENTION FUNCTION

10000	Lower limit 1 of tool offsets No.01
to	to
10019	Lower limit 1 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, without tool geometry/wear offsets, X-axis offset
- T series, with tool geometry/wear offsets, X-axis and geometry offsets
- M series, tool offset memory A offset
- M series, tool offset memory C, geometry, and length offsets

10020	Upper limit 1 of tool offsets No.01
to	to
10039	Lower limit 1 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, without tool geometry/wear offsets, X-axis offset
- T series, with tool geometry/wear offsets, X-axis and geometry offsets
- M series, tool offset memory A offset
- M series, tool offset memory C, geometry, and length offsets

10040	Lower limit 2 of tool offsets No.01
to	to
10059	Lower limit 1 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, without tool geometry/wear offsets, Z-axis offset
- T series, with tool geometry/wear offsets, Z-axis and geometry offsets
- M series, tool offset memory C, geometry, and radius offsets

10060	Upper limit 2 of tool offsets No.01
to	to
10079	Upper limit 2 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, without tool geometry/wear offsets, Z-axis offset
- T series, with tool geometry/wear offsets, Z-axis and geometry offsets
- M series, tool offset memory C, geometry, and radius offsets

10080	Lower limit 3 of tool offsets No.01
to	to
10099	Lower limit 3 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, without tool geometry/wear offsets, tool nose radius offset
- T series, with tool geometry/wear offsets, tool nose radius and geometry offsets

10100	Upper limit 3 of tool offsets No.01
to	to
10119	Upper limit 3 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, without tool geometry/wear offsets, tool nose radius offset
- T series, with tool geometry/wear offsets, tool nose radius and geometry offsets

10120	Lower limit 4 of tool offsets No.01
to	to
10139	Lower limit 4 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, with tool geometry/wear offsets, X-axis and wear offsets
- M series, tool offset memory C, wear, and length offsets

10140	**Upper limit 4 of tool offsets No.01**
to	**to**
10159	**Upper limit 4 of tool offsets No.20**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, with tool geometry/wear offsets, X-axis and wear offsets
- M series, tool offset memory C, wear, and length offsets

10160	**Lower limit 5 of tool offsets No.01**
to	**to**
10179	**Lower limit 5 of tool offsets No.20**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, with tool geometry/wear offsets, Z-axis and wear offsets
- M series, tool offset memory C, wear, and radius offsets

10180	**Upper limit 5 of tool offsets No.01**
to	**to**
10199	**Upper limit 5 of tool offsets No.20**

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, with tool geometry/wear offsets, Z-axis and wear offsets
- M series, tool offset memory C, wear, and radius offsets

10200	Lower limit 6 of tool offsets No.01
to	to
10219	Lower limit 6 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, with tool geometry/wear offsets, tool noise radius and wear offsets

10220	Upper limit 6 of tool offsets No.01
to	to
10239	Upper limit 6 of tool offsets No.20

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, with tool geometry/wear offsets, tool noise radius and wear offsets

10240	Lower limit 1 of a tool offset number range No.01
to	to
10259	Lower limit 1 of a tool offset number range No.20

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the lower limit of a tool offset number range.

These parameters correspond to the tool offset lower/upper limits set in parameter Nos. 10000 to 10239.

10260	Upper limit 1 of a tool offset number range No.01
to	to
10279	Upper limit 1 of a tool offset number range No.20

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the upper limit of a tool offset number range.
These parameters correspond to the tool offset lower/upper limits set in parameter Nos. 10000 to 10239.

10280	Lower limit 7 of tool offsets No.01
to	to
10283	Lower limit 7 of tool offsets No.04

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, without tool geometry/wear offsets, Y-axis offset
- T series, with tool geometry/wear offsets, Y-axis and geometry offsets

10284	Upper limit 7 of tool offsets No.01
to	to
10287	Upper limit 7 of tool offsets No.04

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, without tool geometry/wear offsets, Y-axis offset
- T series, with tool geometry/wear offsets, Y-axis and geometry offsets

10288	Lower limit 8 of tool offsets No.01
to	to
10291	Lower limit 8 of tool offsets No.04

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the lower limits of the following offset values:

- T series, with tool geometry/wear offsets, Y-axis and wear offsets

10292	Upper limit 8 of tool offsets No.01
to	to
10295	Upper limit 8 of tool offsets No.04

[Input type] Parameter input
[Data type] Real path
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

These parameters set the upper limits of the following offset values:

- T series, with tool geometry/wear offsets, Y-axis and wear offsets

10296	Lower limit 2 of a tool offset number range No.01
to	to
10299	Lower limit 2 of a tool offset number range No.04

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the lower limit of a tool offset number range.

These parameters correspond to the tool offset lower/upper limits set in parameter Nos. 10280 to 10295.

10300	**Upper limit 2 of a tool offset number range No.01**
to	**to**
10303	**Upper limit 2 of a tool offset number range No.04**

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the upper limit of a tool offset number range.

These parameters correspond to the tool offset lower/upper limits set in parameter Nos. 10280 to 10295.

10304	**Lower limit of workpiece zero point offsets No.01**
to	**to**
10309	**Lower limit of workpiece zero point offsets No.06**

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Each of these parameters sets the lower limit of workpiece zero point offset values.

10310	**Upper limit of workpiece zero point offsets No.01**
to	**to**
10315	**Upper limit of workpiece zero point offsets No.06**

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

Each of these parameters sets the upper limit of workpiece zero point offset values.

10316	Lower limit of a workpiece zero point offset range No.01
to	to
10321	Lower limit of a workpiece zero point offset range No.06

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the lower limit of a workpiece zero point offset range. For an additional workpiece coordinate system, set a value after adding 1000.
These parameters correspond to the workpiece zero point offset lower/upper limits set in parameter Nos. 10304 to 10315.

10322	Upper limit of a workpiece zero point offset range No.01
to	to
10327	Upper limit of a workpiece zero point offset range No.06

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to maximum number of offset sets

Each of these parameters sets the upper limit of a workpiece zero point offset range. For an additional workpiece coordinate system, set a value after adding 1000.
These parameters correspond to the workpiece zero point offset lower/upper limits set in parameter Nos. 10304 to 10315.

10328	Lower limit of workpiece shifts

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a workpiece shift lower limit.

10329	Upper limit of workpiece shifts

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch, degree (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets a workpiece shift upper limit.

		#7	#6	#5	#4	#3	#2	#1	#0
10330			ASD	EBC	MID	HSC	ADC	PDC	IIC

[Input type] Parameter input
[Data type] Bit

 # 0 IIC At the time of incremental input, a confirmation message is:
0: Displayed.
1: Not displayed.

 # 1 PDC At the time of program deletion, a confirmation message is:
0: Displayed.
1: Not displayed.

 # 2 ADC At the time of deletion of all data, a confirmation message is:
0: Displayed.
1: Not displayed.

 # 3 HSC When a cycle start is executed halfway in the program, a confirmation message is:
0: Displayed.
1: Not displayed.

 # 4 MID Updated modal information is:
0: Highlighted.
1: Not highlighted.

 # 5 EBC Program sum checking is:
0: Disabled.
1: Enabled.

 # 6 ASD Axis state display is:
0: Enabled.
1: Disabled.

10331	Lower limit of external workpiece zero point offsets

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
This parameter sets the lower limit of external workpiece zero point offsets.

10332	Upper limit of external workpiece zero point offsets

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm, inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the upper limit of external workpiece zero point offsets.

	#7	#6	#5	#4	#3	#2	#1	#0
10334								MDW

[Input type] Parameter input
[Data type] Bit

 # 0 MDW When a reset occurs during program operation, a message saying "MODAL DATA IS CHANGED BY BLOCK STOP" is:
0: Displayed.
1: Not displayed.

> **NOTE**
> This parameter is valid only when bit 6 (CLR) of parameter No. 3402 is 0.

4.61 PARAMETERS OF AUTOMATIC DATA BACKUP

	#7	#6	#5	#4	#3	#2	#1	#0
10340	EEB	EIB				AAP	ABI	ABP

[Input type] Parameter input
[Data type] Bit

 # 0 ABP Automatic data backup at power-on is:
0: Disabled.
1: Enabled.

 # 1 ABI Overwrite-protected backup data is:
0: Regarded as invalid.
1: Regarded as valid.

 # 2 AAP Backup of NC programs in FROM is:
0: Disabled.
1: Enabled.

 # 6 EIB When the CNC is turned on next, overwrite-protected backup data is:
0: Not updated.
1: Updated.

> **NOTE**
> This parameter is valid when 2 or a greater value is set in parameter No. 10342, and bit 1 (ABI) of parameter No. 10340 is set to 1.

 # 7 EEB When an emergency stop occurs, a backup operation is:
0: Not performed.
1: Performed.

> **NOTE**
> This parameter is valid when 1 or a greater value is set in parameter No. 10342.

10341	Interval at which automatic data backup is performed periodically

[Input type] Parameter input
[Data type] Word
[Unit of data] No unit
[Valid data range] 0 to 365

When automatic data backup is performed periodically, this parameter sets the interval as the number of days. When the power is turned on after a set number of days has passed from the date of the previous backup, a backup operation is performed. If 0 is set in this parameter, this function is disabled.

10342	Number of backup data items

[Input type] Parameter input
[Data type] Byte
[Unit of data] No unit
[Valid data range] 0 to 3

This parameter sets the number of backup data items. If 0 is specified, backup is not performed.

4.62 PARAMETERS OF SCREEN DISPLAY COLORS (2 OF 2)

10421	RGB value of color palette 1 for text for color set 2
10422	RGB value of color palette 2 for text for color set 2
	:
10435	RGB value of color palette 15 for text for color set 2

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to 151515

Each of these parameters sets the RGB value of each color palette for text by specifying a 6-digit number as described below.
rrggbb: 6-digit number (rr: red data, gg: green data, bb: blue data)
The valid data range of each color is 0 to 15 (same as the tone levels on the color setting screen). When a number equal to or greater than 16 is specified, the specification of 15 is assumed.
Example)
When the tone level of a color is: red:1 green:2, blue:3, set 10203 in the parameter.

10461	RGB value of color palette 1 for text for color set 3
10462	RGB value of color palette 2 for text for color set 3
	:
10475	RGB value of color palette 15 for text for color set 3

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to 151515

Each of these parameters sets the RGB value of each color palette for text by specifying a 6-digit number as described below.
rrggbb: 6-digit number (rr: red data, gg: green data, bb: blue data)
The valid data range of each color is 0 to 15 (same as the tone levels on the color setting screen). When a number equal to or greater than 16 is specified, the specification of 15 is assumed.
Example)
When the tone level of a color is: red:1 green:2, blue:3, set 10203 in the parameter.

4.63 PARAMETERS OF WAVEFORM DIAGNOSIS

Parameter Nos. 10600 to 10719 shown below hold initial values and values set through screen manipulations during waveform diagnosis.
These parameters are set by the CNC. So, never input values from the parameter screen.

	#7	#6	#5	#4	#3	#2	#1	#0
10600								

[Input type] Parameter input
[Data type] Bit

10601	
to	
10719	

[Input type] Parameter input
[Data type] Byte / 2-word

4.64 PARAMETERS OF SPINDLE CONTROL WITH SERVO MOTOR (T SERIES)

	#7	#6	#5	#4	#3	#2	#1	#0
11000	SRVx							

[Input type] Parameter input
[Data type] Bit axis

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 7 SRVx In spindle control with servo motor:
0: Use as the servo motor spindle is not performed.
1: Use as the servo motor spindle is performed.

> **NOTE**
> For the axes that use spindle control with servo motor, set also parameter No. 11010.

	#7	#6	#5	#4	#3	#2	#1	#0
11001							TCRx	SRBx

[Input type] Parameter input
[Data type] Bit axis

 # 0 SRBx Acceleration/deceleration after interpolation in cutting feed during rigid tapping with servo motor is:
0: Linear acceleration/deceleration.
1: Bell-shaped acceleration/deceleration.

 # 1 TCRx When the speed is controlled under spindle control with servo motor, acceleration/deceleration after interpolation:
0: Enables parameter No. 1622 (time constant of cutting feed acceleration/deceleration for each axis)
1: Enables parameter No.11016 (time constant specific to speed control)
Set the parameter for the axis subject to spindle control with servo motor.

	#7	#6	#5	#4	#3	#2	#1	#0
11005								SIC

[Input type] Parameter input
[Data type] Bit

 # 0 SIC Spindle indexing is:
0: Performed based on absolute coordinates.
1: Performed based on machine coordinates.

	#7	#6	#5	#4	#3	#2	#1	#0
11006								PCE

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 PCE Positional control under spindle control with servo motor is:
0: Disabled.
1: Enabled.

11010	Number of an axis subject to spindle control with servo motor

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte axis
[Valid data range] 0 to maximum number of controlled spindles

This parameter sets a spindle number for a servo axis subject to spindle control with servo motor.

> **NOTE**
> Set a spindle number for the axis set by bit 7 of parameter No. 1100. Set 0 for an axis not subject to spindle control with servo motor.

11011	Movement of spindle control with servo motor axis per revolution

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Real axis
[Unit of data] degree
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.0 to +999999.999)

This parameter sets the amount of movement per revolution of the servo motor spindle in spindle control with servo motor.

11012	Spindle indexing speed for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}

If 0 is set, the spindle indexing speed is assumed to be the setting of parameter No. 11020 (speed (S_0) for switching acceleration/ deceleration for each axis).

11013	Positioning deviation limit for each axis in movement

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets the positioning deviation limit during movement for each axis in spindle control with servo motor.

11014	Positioning deviation limit for each axis in the stopped state

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets the positioning deviation limit during a stop for each axis in spindle control with servo motor.

11015	Maximum motor speed

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

This parameter sets the maximum motor speed in spindle control with servo motor.

11016	Time constant of acceleration/deceleration in SV speed control mode for each axis

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

This parameter sets acceleration/deceleration after interpolation during speed control in spindle control with servo motor. Set this parameter for the axis subject to spindle control with servo motor. Set the time constant used for exponential acceleration/ deceleration in cutting feed, bell-shaped acceleration/deceleration after interpolation or linear acceleration/deceleration after interpolation in cutting feed for each axis. Type of acceleration/deceleration is applied by parameter CTLx, CTBx (No.1610#0, #1).

11017	FL rate of exponential acceleration/deceleration in SV speed control mode for each axis

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets the lower limit speed (FL speed) of exponential acceleration/deceleration during speed control in spindle control with servo motor.
Set this parameter for the target axis for spindle control with servo motor.

11020	Acceleration/deceleration switching speed (1st) for each axis

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

This parameter sets the speed at which acceleration/deceleration is switched during rotation control in spindle control with servo motor. (First step)

11021	Acceleration/deceleration switching speed (2nd) for each axis

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 99999999

This parameter sets the speed at which acceleration/deceleration is switched during rotation control in spindle control with servo motor. (Second step)

11030	Individual acceleration / deceleration 1 (Leg 1)

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}/s
[Valid data range] 0 to 100000

This parameter sets the acceleration/deceleration used during rotation control in spindle control with servo motor. When the speed ranges from 0 to acceleration switching speed 1, acceleration/deceleration 1 is applied. Acceleration switching speed 1 is the speed set in parameter No. 11020.

11031	Individual acceleration / deceleration 2 (Leg 2)

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}/s
[Valid data range] 0 to 100000

This parameter sets the acceleration/deceleration used during rotation control in spindle control with servo motor. When the speed ranges from acceleration switching speed 1 to acceleration switching speed 2, acceleration/ deceleration 2 is applied. Acceleration switching speed 1 and acceleration switching speed 2 are the speeds set in parameter Nos. 11020 and 11021, respectively.

11032	Individual acceleration / deceleration 3 (Leg 3)

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] min^{-1}/s
[Valid data range] 0 to 100000

This parameter sets the acceleration/deceleration used during rotation control in spindle control with servo motor. The speed is acceleration/deceleration 3 in the range from acceleration switching speed 2 to the maximum speed. Acceleration switching speed 2 is the speed set in parameter No. 11021.

11050	Maximum allowable acceleration rate in acceleration/deceleration before interpolation for each axis in rigid tapping

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec^2, inch/sec^2, degree/sec^2 (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, 0.0 to +10000.0)

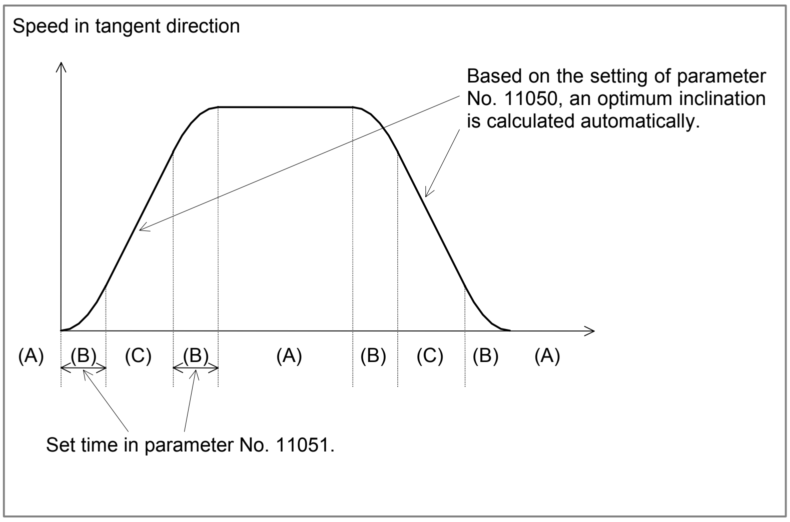
Set a maximum allowable acceleration rate in acceleration/ deceleration before interpolation for each axis.

If a value greater than 100000.0 is set, the value is clamped to 100000.0. If 0 is set, the specification of 100000.0 is assumed. If 0 is set for all axes, however, acceleration/deceleration before interpolation is not performed.

11051	Acceleration change time of bell-shaped acceleration/deceleration before interpolation in rigid tapping

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 200

Set an acceleration change time of bell-shaped acceleration/ deceleration before interpolation (time for changing from the state of constant federate (A) to the state of constant acceleration/deceleration (C) at the acceleration rate calculated from the acceleration rate set in parameter No. 11050: time of (B) in the figure below).



11052	**Time constant for acceleration/deceleration after cutting feed interpolation in the acceleration/deceleration before interpolation mode in rigid tapping**

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

In the acceleration/deceleration before interpolation mode as in advanced preview control, not the ordinary time constant (parameter No. 1622) but the value of this parameter is used.

Be sure to specify the same time constant value for all axes except for a special application.

If different values are set, correct linear and circular figures cannot be obtained.

11060	**Time constant for acceleration/deceleration after cutting feed interpolation in rigid tapping (first gear)**

11061	**Time constant for acceleration/deceleration after cutting feed interpolation in rigid tapping (second gear)**

11062	**Time constant for acceleration/deceleration after cutting feed interpolation in rigid tapping (third gear)**

11063	**Time constant for acceleration/deceleration after cutting feed interpolation in rigid tapping (fourth gear)**

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

Set the time constant of rigid tapping with servo motor in these parameters (Nos. 11060 to 11063).

Set these parameters with the servo motor spindle in rigid tapping.

11065	Time constant for acceleration/deceleration deceleration after cutting feed interpolation in rigid tapping extraction (first gear)

11066	Time constant for acceleration/deceleration deceleration after cutting feed interpolation in rigid tapping extraction (second gear)

11067	Time constant for acceleration/deceleration deceleration after cutting feed interpolation in rigid tapping extraction (third gear)

11068	Time constant for acceleration/deceleration deceleration after cutting feed interpolation in rigid tapping extraction (fourth gear)

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 0 to 4000

When bit 2 (TDR) of parameter No. 5201 is set to 1, time constants for extraction of rigid tapping with servo motor can be set in these parameters (Nos. 11065 to 11068).
Set these parameters with the servo motor spindle in rigid tapping.

11090	Path number with which the rotation of each spindle is specified

[Input type] Parameter input
[Data type] Byte spindle
[Valid data range] 0 to 2

When a path is specified for spindle commands, this parameter sets a path number with which the rotation of a spindle can be specified.
0: Spindle commands can be issued from both paths.
1 to 2: Spindle commands can be issued from a set path.

NOTE
1 This parameter is valid when SPSP<Gn536.7> is set to 1.
2 If the setting is illegal, an alarm (PS5305) is issued when a spindle command is issued from any one of the paths.
3 This setting does not apply to spindle commands using the spindle select signals (SWS1 and SWS2<Gn027.0 and 1>).

4.65 PARAMETERS OF INCH/METRIC CONVERSION AND DIAMETER/RADIUS SWITCHING (1 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
11222							CIM	NIM

[Input type] Parameter input
[Data type] Bit path

 # 0 NIM Automatic conversion of a coordinate system by an inch/metric conversion command (G20 or G21) is:
0: Not performed.
1: Performed.

 # 1 CIM When an inch/metric conversion command (G20 or G21) is specified, if the workpiece coordinate system is shifted by the shift amount as described below:
0: An alarm (PS1298) is issued.
1: Clearing is performed.

This parameter is valid when bit 0 (NIM) of parameter No. 11222 is 1 or bit 2 (IRF) of parameter No. 14000 is 1 and clears the following items.:

- Manual intervention made when the manual absolute signal is off
- Issuance of a move command with the machine locked
- Movement by handle interrupt
- Operation with a mirror image
- Shifting of a workpiece coordinate system when a local coordinate system or workpiece coordinate system is set up

4.66 PARAMETERS OF DI/DO (2 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
11223						OPS	TRS	
						OPS		

[Input type] Parameter input
[Data type] Bit path

 # 1 TRS In threading cycle retraction, when a block that specifies return to the start point of the threading cycle is executed, threading signal THRD is:
0: Set to 0.
1: Set to 1.

 # 2 OPS In the MEM mode, when a sequence number search operation ([N SEARCH]) is performed, automatic operation signal OP<F000.7> is:
0: Kept 0.
1: Set to 1.

4.67 PARAMETERS OF FEEDRATE CONTROL AND ACCELERATION/DECELERATION CONTROL

	#7	#6	#5	#4	#3	#2	#1	#0
11240							AMP	

[Input type] Parameter input
[Data type] Bit path

 # 1 AMP Movement from the midpoint to the reference position by the G28 or G30 command or movement by the G53 command in the advance preview control/AI advance preview control/AI contour control mode uses:
0: Acceleration/deceleration after interpolation.
1: Acceleration/deceleration before interpolation.

> **NOTE**
> The setting of this parameter is valid when the following conditions are met.
> 1 Bit 4 (ZRL) of parameter No. 1015 is 1 (G28, G30, and G53 must be interpolation commands).
> 2 Bit 1 (LRP) of parameter No. 1401 is 1 (interpolation positioning is enabled).
> 3 Parameter No. 1671 (maximum acceleration during rapid traverse) is set.
> 4 Bit 5 (FRP) of parameter No. 19501 is 1 (acceleration/deceleration before interpolation is valid for rapid traverse).
>
> To enable blinking display and signal output indicating the advance preview control/AI advance preview control/AI contour control mode even when G28, G30, or G53 is specified, set bit 1 (AIR) of parameter No. 1612 to 1 in addition to the above settings.

4.68 PARAMETERS OF COORDINATE SYSTEM

11275	The top number of M code used to turn on each axis workpiece coordinate system preset signal

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 99999999

Specify the top number of M code for turning “1” each axis workpiece coordinate system preset signal (Gn358) during automatic operation.
When the specified M codes are within the range specified with this parameter and parameter No.11276, each axis workpiece coordinate system preset signal is checked and preset workpiece coordinate system for axis that the signal is turned “1”.
The specified M codes prevent buffering.

NOTE
When each axis workpiece coordinate system preset signals are turned “1” more than two signals by an M code, please turn “1” the signals of all axis at the same timing. If the timing is different, only the axis of the first signal turned “1” is preset.
If you want to turn “1” the signals at the different timing, please specify M code separately.

11276	The number of M code used to turn on each axis workpiece coordinate system preset signal

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 999

Specify the number of M code for turning “1” each axis workpiece coordinate system preset signal (Gn358) during automatic operation.
For example, when parameter No.11275 = 100 and parameter No.11276 = 10 are set, From M100 to M109 are used for turning “1” each axis workpiece coordinate system preset signal.
When 0 is set, the number of M code is assumed to be 1.

NOTE
Set only M code that is not used for another function.
(M00 to 05,30,98,99, 198 M code used to call the subprogram, etc.)

	#7	#6	#5	#4	#3	#2	#1	#0
11277								WPA

[Input type] Parameter input
[Data type] Bit path

 # 0 WPA When an M code for turning on the workpiece coordinate system preset signal for an axis is specified, but the signal is not turned on, or an auxiliary function lock is provided:
0: An alarm (PS1820) is issued.
1: An alarm is not issued.

4.69 PARAMETERS OF DISPLAY AND EDIT (2 OF 5)

	#7	#6	#5	#4	#3	#2	#1	#0
11300	MUC	ATH	MPH		ASH			

[Input type] Parameter input
[Data type] Bit

 # 3 ASH When the actual feedrate is read with FOCAS2 and the PMC window:
0: Data that has been updated at conventional intervals (approximately 32 ms) is read.
1: Data that has been updated at short intervals is read.
If this parameter is set to 1, the machine coordinates of the machine unit with the delay in acceleration/deceleration and the servo delay considered are read for all axes, regardless of the setting of bit 7 (EMP) of parameter No. 11313.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

 # 5 MPH When the machine coordinates of the machine unit with the delay in acceleration/deceleration and the servo delay not considered are read with FOCAS2 and the PMC window:
0: Data that has been updated at conventional intervals (approximately 32 ms) is read.
1: Data that has been updated at short intervals is read.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

 # 6 ATH When the disturbance load torque data are read with FOCAS2 and the PMC window:
0: Data that has been updated at conventional intervals (approximately 32 ms) is read.
1: Data that has been updated at short intervals is read.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

 # 7 MUC When the modal data are read with FOCAS2 and the PMC window:
0: Data that has been updated at conventional intervals (approximately 32 ms) is read.
1: Data that has been updated at short intervals is read.

NOTE
When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

	#7	#6	#5	#4	#3	#2	#1	#0
11302	CPG		PES	ADC	SMD	SDG	SPR	SPG

[Input type] Parameter input
[Data type] Bit

 # 0 SPG Initially, the program screen is:
0: Displayed full-screen.
1: Displayed in a window.

 # 1 SPR Initially, the parameter screen is:
0: Displayed full-screen.
1: Displayed in a window.

 # 2 SDG Initially, the diagnosis screen is:
0: Displayed full-screen.
1: Displayed in a window.

 # 3 SMD The MDI program screen is:
0: Displayed according to the setting of bit 0 (SPG) of parameter No. 11302.
1: Displayed in a window.

If this parameter is set to 0, the first display mode entered after the power is turned on is determined according to the setting of bit 0 (SPG) of parameter No. 11302. Depending on the display mode, the MDI program screen is displayed full-screen or in a window. Also, the screen display can be dynamically switched between the full-screen mode and the window mode by interacting with the program screen in another mode.

If this parameter is set to 1, the MDI program screen is always displayed in a window, and it is impossible to switch between the full-screen mode and the window mode by operations.

 # 4 ADC When all alarms have been eliminated, or the message key is pressed on the alarm screen:
0: The screen display does not change.
1: The screen display changes to the screen displayed before the alarm screen.

 # 5 PES After a program search operation is performed on the program list screen:
0: The cursor moves to a program on the list screen.
1: A specified program is selected as the main program, and the screen display changes to the edit screen.

 # 7 CPG PROG function screen selection is:
0: Not changed according to the CNC mode.
1: Changed according to the CNC mode.

	#7	#6	#5	#4	#3	#2	#1	#0
11303			ISQ	DPM	BDP			LDP

[Input type] Parameter input
[Data type] Bit

 # 0 LDP The servo load meter axis display:
0: Interacts with the axis display of coordinate values.
1: Does not interact with the axis display of coordinate values.

 # 3 BDP When a single-block stop occurs, on the program screen and program check screen:
0: The block next to the block that has been executed is displayed at the beginning.
1: The block that has been executed is displayed at the beginning.

> **NOTE**
> Only MEM operation is enabled.

 # 4 DPM During MDI program execution, blocks that call an execution macro are:
0: Not displayed.
1: Displayed.

 # 5 ISQ During MDI editing, automatic sequence number insertion is:
0: Disabled.
1: Enabled.

	#7	#6	#5	#4	#3	#2	#1	#0
11304							GGD	

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 1 GGD The G code guidance screen is:
0: Not displayed.
1: Displayed.

11307	Display sequence of the coordinates in current position display

NOTE
When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 5

This parameter sets the display sequence of the coordinates of a position displayed on the following screens:

10.4- inch display units
- Total position display screen
- Total position display on each screen

8.4-inch display units
- Total position display screen

The display sequence of coordinates corresponds to the parameter setting as follows:

Setting \ Display sequence of coordinates	1	2	3	4
0	Relative coordinates	Absolute coordinates	Machine coordinates	Remaining travel distance
1	Relative coordinates	Machine coordinates	Absolute coordinates	Remaining travel distance
2	Relative coordinates	Remaining travel distance	Absolute coordinates	Machine coordinates
3	Absolute coordinates	Machine coordinates	Relative coordinates	Remaining travel distance
4	Absolute coordinates	Remaining travel distance	Relative coordinates	Machine coordinates
5	Machine coordinates	Remaining travel distance	Relative coordinates	Absolute coordinates

If the setting is beyond the valid data range, 0 is assumed.
When the 2-path simultaneous display function is enabled (parameter No. 13131 is set to a nonzero value, and parameter No. 13132 is set to 1 or a greater value), this parameter becomes invalid.

	#7	#6	#5	#4	#3	#2	#1	#0
11308	DGH	ABH	SPH	PGS	FPD		COW	DOP
	DGH	ABH	SPH	PGS	FPD		COW	

[Input type] parameter input
[Data type] Bit

 # 0 DOP If an alarm is issued in a path not being displayed:
0: The screen display does not change to the alarm screen.
1: The screen display changes to the alarm screen.

#1 COW When the file of specified name already exists on memory card,

0: It is not overwritten
Alarm (SR1973 FILE ALREADY EXIST) is generated.

1: It is overwritten.
Because the confirmation message is displayed before overwriting even if COW is 1, overwriting can be canceled.

> **NOTE**
> When the overwritten file is read only attribute, it is not possible to overwrite even if parameter COW (No.11308#1)=1.

 # 3 FPD On the program screen and program check screen, blocks already executed are:

0: Not displayed.

1: Displayed.

 # 4 PGS In program search operation:

0: A specified program name is searched for.

1: An O number program is searched for with "O" omitted.

 # 5 SPH When the spindle speed data are read with FOCAS2 or the PMC window:

0: Data that has been updated at conventional intervals (approximately 32 ms) is read.

1: Data that has been updated at short intervals is read.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

 # 6 ABH When the absolute coordinates data are read with FOCAS2 or the PMC window:

0: Data that has been updated at conventional intervals (approximately 32 ms) is read.

1: Data that has been updated at short intervals is read.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

 # 7 DGH When the Remaining travel distance data are read with FOCAS2 or the PMC window:

0: Data that has been updated at conventional intervals (approximately 32 ms) is read.

1: Data that has been updated at short intervals is read.

> **NOTE**
> When quick response is not required in particular for display operation and so on, normally set this parameter to 0 to reduce the load on the CNC.

11309	Menu number selected on the pattern menu screen

[Input type] Parameter input

[Data type] Byte path

[Valid data range] -128 to 127

This parameter displays the menu number selected on the pattern menu screen.

This value is the same as that of system variable #5900.

4.70 PARAMETERS OF DISPLAY AND EDIT (3 OF 5)

	#7	#6	#5	#4	#3	#2	#1	#0
11318		RTC					MLD	

[Input type] Parameter input
[Data type] Bit

#1 MLD On the program list screen, division of the screen display is:
0: Disabled.
1: Enabled.

> **NOTE**
> This parameter is valid when a 10.4-inch display unit is used.

#6 RTC On the program list screen, a file selected by a selection operation:
0: Can be copied repeatedly.
1: Cannot be copied repeatedly.

	#7	#6	#5	#4	#3	#2	#1	#0
11320								DHN

[Data type] Bit path

 # 0 DHN On the program check screen, HD.T and NX.T, and a T number are:
0: Not displayed at the same time.
1: Displayed at the same time.
If DHN is set to 1, HD.T, NX.T, and T are displayed regardless of the setting of parameter PCT(No. 3108#2).

11321	**Spindle tool name (1st character)**
11322	**Spindle tool name (2nd character)**
11323	**Spindle tool name (3rd character)**
11324	**Spindle tool name (4th character)**

[Input type] Parameter input
[Data type] Byte path
[Valid data range] See the character-code correspondence table.

The name of the spindle tool (HD.T) displayed on the program check screen can be changed.

Any character string consisting of numeric characters, alphabetical characters, katakana characters, and symbols with a maximum length of four characters can be displayed.

> **NOTE**
> For characters and codes, see Appendix A, "CHARACTER-CODE CORRESPONDENCE TABLE".
> If the first character is 0 or an illegal character code, "HD.T" is displayed.

11325	**Next machining tool name (1st character)**
11326	**Next machining tool name (2nd character)**
11327	**Next machining tool name (3rd character)**
11328	**Next machining tool name (4th character)**

[Input type] Parameter input
[Data type] Byte path
[Valid data range] See the character-code correspondence table.

The name of the next machining tool (NX.T) displayed on the program check screen can be changed.

Any character string consisting of numeric characters, alphabetical characters, katakana characters, and symbols with a maximum length of four characters can be displayed.

> **NOTE**
> For characters and codes, see Appendix A, "CHARACTER-CODE CORRESPONDENCE TABLE".
> If the first character is 0 or an illegal character code, "NX.T" is displayed.

4.71 PARAMETERS OF GRAPHIC DISPLAY (2 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
11329								
	GST	ACT	AER	GTF	BGM	GTL	DPC	

[Input type] Parameter input
[Data type] Bit path

#1 DPC The current corrdinates displayed on each screen of the dynamic graphic display function are:
0: Absolute coordinates.
1: Machine coordinates.

#2 GTL When animated simulation is performed with the dynamic graphic display function, drawing at positions with tool length compensation considered is:
0: Not performed.
1: Performed.

#3 BGM Coordinates used by the dynamic graphic display function are:
0: Absolute coordinates.
1: Machine coordinates.

#4 GTF In tool path drawing with the dynamic graphic display function, drawing at in a position where tool compensation (tool length compensation, cutter compensation) is considered is:
0: Performed.
1: Not performed.

#5 AER When the tool path is drawn with the dynamic graphic display function, automatic erasure at the start of drawing is:
0: Not performed.
1: Performed.

#6 ACT In tool path drawing with the dynamic graphic display function, the drawing color of a tool path is:
0: Not changed automatically.
1: Changed automatically.

#7 GST When drawing cannot be performed for a command with the dynamic graphic display function:
0: The command is ignored, and drawing continues without stopping drawing.
1: Drawing stops.

11330	Magnification of drawing in dynamic graphic display

[Input type] Parameter input
[Data type] Word path
[Unit of data] 0.01
[Valid data range] 1 to 10000

This parameter sets the magnification of the drawing range in the dynamic graphic display function.

11331	Screen center coordinate value in the drawing range in dynamic graphic display

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the coordinate value of the center of the drawing range in the dynamic graphic display function.

> **NOTE**
> If bit 3 (BGM) of parameter No. 11329 is set to 1, set the coordinate value on each axis in the machine coordinate system.

11332	Drawing range of tool path drawing in dynamic graphic display (maximum value)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the maximum coordinates in the drawing range in tool path drawing with dynamic graphic display function.

11333	Drawing range of tool path drawing in dynamic graphic display (minimum value)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)
This parameter sets the minimum coordinates in the drawing range in tool path drawing with dynamic graphic display function.

11334	Rotation angle of the drawing coordinate system in dynamic graphic display (vertical direction)

[Input type] Parameter input
[Data type] Word path
[Unit of data] degree
[Valid data range] -360 to 360
This parameter sets the rotation angle (vertical direction) of the drawing coordinate system in the dynamic graphic display function.

11335	Rotation angle of the drawing coordinate system in dynamic graphic display (horizontal direction)

[Input type] Parameter input
[Data type] Word path
[Unit of data] degree
[Valid data range] -360 to 360
This parameter sets the rotation angle of the drawing coordinate system in the dynamic graphic display function (the angle of rotation about the vertical axis on the screen, that passes the center position of the blank).

11336	Drawing color of the tool path in tool path drawing in dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 6
This parameter sets the color in which the tool path is drawn with the dynamic graphic display function.

11337	
	Color of the cursor indicating the tool position on the PATH GRAPHIC (TOOL POSITION) screen of dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 6

This parameter sets the color of the cursor indicating the tool position on the PATH GRAPHIC (TOOL POSITION) screen of the dynamic graphic display function.

11339	
	Drawing start sequence number in dynamic graphic display

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

This parameter sets the sequence number at which drawing is started by the dynamic graphic display function.

11340	
	Drawing end sequence number in dynamic graphic display

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 99999999

This parameter sets the sequence number at which drawing is ended by the dynamic graphic display function.

11341	
	Drawing color of a blank figure in dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 6

This parameter sets the color in which a blank figure is drawn with the dynamic graphic display function.

11342	
	Rotation angle of the drawing coordinate system of dynamic graphic display (screen center)

[Input type] Parameter input
[Data type] Word path
[Unit of data] degree
[Valid data range] -360 to 360

This parameter sets the rotation angle of the drawing coordinate system in dynamic graphic display function (the angle of rotation about the vertical axis on the screen plane, that passes the center position of the blank).

11343	Blank figure in dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 1

This parameter sets the type of a blank figure in dynamic graphic display function.

Setting	Figure
0	Cylinder or hollow cylinder (parallel to the Z-axis)
1	Rectangular parallelepiped

11344	Blank reference position in dynamic graphic display

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] 9 digit of minimum unit of data (refer to standard parameter setting table (A))
(When the increment system is IS-B, -999999.999 to +999999.999)

This parameter sets the reference position of a blank in the dynamic graphic display function by using coordinate values in the workpiece coordinate system.

NOTE
If bit 3 (BGM) of parameter No. 11329 is set to 1, set coordinate values in the machine coordinate system.

11345	Blank dimension I in dynamic graphic display

11346	Blank dimension J in dynamic graphic display

11347	Blank dimension K in dynamic graphic display

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.000 to +999999.999)

These parameters set the dimensions of a blank in the dynamic graphic display function according to the blank figure as follows:

Blank figure	Address I	Address J	Address K
Rectangular parallelepiped	Length in the X-axis direction	Length in the Y-axis direction	Length in the Z-axis direction
Cylinder	Radius of a cylinder	0	Length of a cylinder
Barrel	Radius of the outer circule of a barrel	Radius of the inner circule of a barrel	Length of a barrel

11348	Drawing color of a tool in animated simulation in dynamic graphic display

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 6

This parameter sets the color in which a tool is drawn during animated simulation in the dynamic graphic display function.

	#7	#6	#5	#4	#3	#2	#1	#0
11349	PDM							
	PDM					GSP	ABC	

[Input type] Parameter input
[Data type] Bit

 # 1 ABC In animated simulation in the dynamic graphic display function, when a fine boring cycle or back boring cycle, which is a hole machining canned cycle, is performed, the movement for a shift at the hole bottom is:
0: Not drawn.
1: Drawn.

 # 2 **GSP** In tool path drawing in the dynamic graphic display function, the drawing start position is:

0: The end position of a block that makes a movement for the first time.

1: The current position.

> **NOTE**
> When G92, G52, or G92.1 is specified at the beginning of a program to be drawn, the position specified in this G code is assumed to be the drawing start position.

 # 7 **PDM** When the pattern data input function is enabled (bit 7 (NPD) of parameter No. 8135 is 0), displaying of the variable name and comment on the custom macro screen is:

0: Performed only during menu selection.

1: Always performed.

4.72 PARAMETERS OF DISPLAY AND EDIT (4 OF 5)

	#7	#6	#5	#4	#3	#2	#1	#0
11350				9DE				

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

#4 9DE The number of axes that can be displayed on one screen of the 8.4-inch monitor is:
0: Up to 4.
1: Up to 5.

	#7	#6	#5	#4	#3	#2	#1	#0
11353								SEK

[Input type] Parameter input
[Data type] Bit

#0 SEK When the power is turned on, or when the clear state is present, sequence numbers are:
0: Not maintained.
1: Maintained.

> **NOTE**
> During a subprogram call, the sequence number of the subprogram is maintained.

11363	Radius of a tool figure in dynamic graphic display

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm,inch (input unit)
[Minimum unit of data] Depend on the increment system of the reference axis
[Valid data range] 0 or positive 9 digit of minimum unit of data (refer to the standard parameter setting table (B))
(When the increment system is IS-B, 0.000 to +999999.999)
This parameter sets the radius of a tool figure in animated simulation with the dynamic graphic display function.

4.73 PARAMETERS OF TOOL COMPENSATION (2 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
11400								M8D

[Input type] Parameter input
[Data type] Bit path

 # 0 M8D The number of digits of a T code used to change tool compensation automatically is:

0: 4. (Existing DI signals G68 and G69 are used.)
1: 8. (DI signals G525 to G528 are used.)

4.74 PARAMETERS OF RIGID TAPPING (2 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
11420								RAU

[Input type] Parameter input
[Data type] Bit path

 # 0 RAU The rigid tapping optimum acceleration/deceleration function is:
0: Disabled.
1: Enabled.

11421	Maximum acceleration of rigid tapping optimum acceleration/deceleration (1st gear)
11422	Maximum acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)
11423	Maximum acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)
11424	Maximum acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

[Input type] Parameter input
[Data type] 2-word spindle
[Unit of data] rev/sec ^{2}
[Valid data range] 0 to 10000.0
This parameter sets the maximum acceleration.

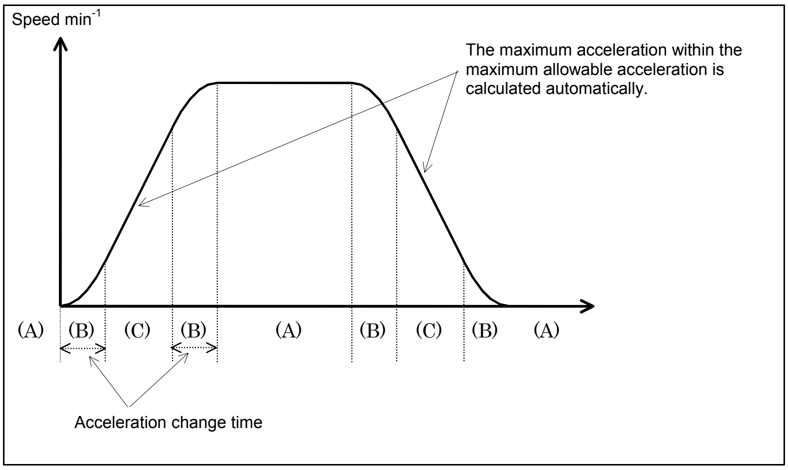
11425	Acceleration change time of bell-shaped acceleration/deceleration in rigid tapping optimum acceleration/deceleration (1st gear)

11426	Acceleration change time of bell-shaped acceleration/deceleration in rigid tapping optimum acceleration/deceleration (2nd gear)

11427	Acceleration change time of bell-shaped acceleration/deceleration in rigid tapping optimum acceleration/deceleration (3rd gear)

[Input type] Parameter input
[Data type] Word spindle
[Unit of data] msec
[Valid data range] 0~200

This parameter sets the acceleration change time (time required to change from constant speed state (A) to acceleration/deceleration state (C) at the acceleration calculated from rigid tapping optimum acceleration/deceleration (indicated by (B) below)) of bell-shaped acceleration/deceleration in rigid tapping optimum acceleration/deceleration.



11429	P1 spindle speed of rigid tapping optimum acceleration/deceleration (1st gear)

11430	P2 spindle speed of rigid tapping optimum acceleration/deceleration (1st gear)

11431	P3 spindle speed of rigid tapping optimum acceleration/deceleration (1st gear)

11432	P1 spindle speed of rigid tapping optimum acceleration/deceleration (2nd gear)

11433	**P2 spindle speed of rigid tapping optimum acceleration/deceleration (2nd gear)**

11434	**P3 spindle speed of rigid tapping optimum acceleration/deceleration (2nd gear)**

11435	**P1 spindle speed of rigid tapping optimum acceleration/deceleration (3rd gear)**

11436	**P2 spindle speed of rigid tapping optimum acceleration/deceleration (3rd gear)**

11437	**P3 spindle speed of rigid tapping optimum acceleration/deceleration (3rd gear)**

11438	**P1 spindle speed of rigid tapping optimum acceleration/deceleration (4th gear)**

11439	**P2 spindle speed of rigid tapping optimum acceleration/deceleration (4th gear)**

11440	**P3 spindle speed of rigid tapping optimum acceleration/deceleration (4th gear)**

[Input type] Parameter input
[Data type] Byte spindle
[Unit of data] %
[Valid data range] 0 to 100

This parameter sets the ratio of the spindle speed at acceleration setting points P1 to P3 of P0 to P4 to the maximum spindle speed (parameters Nos. 5241 to 5244). The spindle speed at P0 is 0 and the spindle speed at P4 is the maximum spindle speed. The acceleration setting point at which 0 is set is skipped.

11441	**P0 allowable acceleration of rigid tapping optimum acceleration/deceleration (1st gear)**

11442	**P1 allowable acceleration of rigid tapping optimum acceleration/deceleration (1st gear)**

11443	**P2 allowable acceleration of rigid tapping optimum acceleration/deceleration (1st gear)**

11444	**P3 allowable acceleration of rigid tapping optimum acceleration/deceleration (1st gear)**

11445	P4 allowable acceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11446	P0 allowable acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11447	P1 allowable acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11448	P2 allowable acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11449	P3 allowable acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11450	P4 allowable acceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11451	P0 allowable acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11452	P1 allowable acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11453	P2 allowable acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11454	P3 allowable acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11455	P4 allowable acceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11456	P0 allowable acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

11457	P1 allowable acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

11458	P2 allowable acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

11459	P3 allowable acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

11460	P4 allowable acceleration of rigid tapping optimum acceleration/deceleration (4th gear)

[Input type] Parameter input
[Data type] Byte spindle
[Unit of data] %
[Valid data range] 0 to 100

This parameter sets the ratio of the allowable acceleration at acceleration setting points P0 to P4 to the maximum acceleration (parameters Nos. 11421 to 11424). The rate of the acceleration setting point at which 0 is set is assumed to be 100%.

11461	P0 allowable deceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11462	P1 allowable deceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11463	P2 allowable deceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11464	P3 allowable deceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11465	P4 allowable deceleration of rigid tapping optimum acceleration/deceleration (1st gear)

11466	P0 allowable deceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11467	P1 allowable deceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11468	P2 allowable deceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11469	P3 allowable deceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11470	P4 allowable deceleration of rigid tapping optimum acceleration/deceleration (2nd gear)

11471	P0 allowable deceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11472	P1 allowable deceleration of rigid tapping optimum acceleration/deceleration (3rd gear)

11473	**P2 allowable deceleration of rigid tapping optimum acceleration/deceleration (3rd gear)**

11474	**P3 allowable deceleration of rigid tapping optimum acceleration/deceleration (3rd gear)**

11475	**P4 allowable deceleration of rigid tapping optimum acceleration/deceleration (3rd gear)**

11476	**P0 allowable deceleration of rigid tapping optimum acceleration/deceleration (4th gear)**

11477	**P1 allowable deceleration of rigid tapping optimum acceleration/deceleration (4th gear)**

11478	**P2 allowable deceleration of rigid tapping optimum acceleration/deceleration (4th gear)**

11479	**P3 allowable deceleration of rigid tapping optimum acceleration/deceleration (4th gear)**

11480	**P4 allowable deceleration of rigid tapping optimum acceleration/deceleration (4th gear)**

[Input type] Parameter input
[Data type] Byte spindle
[Unit of data] %
[Valid data range] 0 to 100

This parameter sets the ratio of the allowable deceleration at acceleration setting points P0 to P4 to the maximum acceleration (parameters Nos. 11421 to 11424). The rate of the acceleration setting point at which 0 is set is assumed to be 100%.

4.75 PARAMETERS OF PROGRAMS (2 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
11630							MDE	
							MDE	FRD

[Input type] Parameter input
[Data type] Bit path

 # 0 FRD The minimum command unit of the rotation angles of coordinate rotation is:
0: 0.001 degree.
1: 0.00001 degree. (1/100,000)

 # 1 MDE An external device subprogram call (M198 command) in the MDI mode is:
0: Disabled.
1: Enabled.

4.76 PARAMETERS OF AXIS CONTROL BY PMC (2 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
11850								CMI

[Input type] Parameter input
[Data type] Bit path

 # 0 CMI In PMC axis control, when the rapid traverse rate is specified by the axis control block data signal with bit 0 (RPD) of parameter No. 8002 assumed to be 1, the rapid traverse rate:
0: Always represented in millimeters.
1: Is determined by bit 0 (INM) of parameter No. 1001.

4.77 PARAMETERS OF PMC

	#7	#6	#5	#4	#3	#2	#1	#0
11931							M16	

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 1 M16 In the external data input and external messages, the maximum number of external alarm messages and external operator messages that can be displayed is:
0: 4.
1: 16.

4.78 PARAMETERS OF MALFUNCTION PROTECTION

12255	Maximum servo motor speed

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

This parameter sets a maximum servo motor speed. When the value set in this parameter is exceeded, the servo motor stops with the alarm (DS0004). When 0 is set in this parameter, the specification of a maximum allowable value (999000 for IS-B) is assumed.

12256	Maximum servo motor acceleration rate

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec/sec, inch/sec/sec, degree/sec/sec (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0)

This parameter sets a maximum servo motor acceleration rate. When the value set in this parameter is exceeded, the servo motor stops with the alarm (DS0005). When 0 is set in this parameter, alarm check is not performed.

4.79 PARAMETERS OF MANUAL HANDLE

12300	X address of the 1st. manual pulse generator
12301	X address of the 2nd. manual pulse generator
12302	X address of the 3rd. manual pulse generator

> **NOTE**
> When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Word
[Valid data range] -1, 0 to 127, 200 to 327

To set X address of manual pulse generator connected with I/O Link in PMC.

When the manual pulse generator is not connected, set -1 to this parameter.

> **NOTE**
> Set these parameters when bit 1 (HDX) of parameter No. 7105 is set to 1. When HDX = 0, these parameters are automatically set. If a manual handle is not connected when HDX = 0, -1 is set automatically.

	#7	#6	#5	#4	#3	#2	#1	#0
12330	G17	G16	G15	G14	G13	G12	G11	G10

	#7	#6	#5	#4	#3	#2	#1	#0
12331	G1F	G1E	G1D	G1C	G1B	G1A	G19	G18

	#7	#6	#5	#4	#3	#2	#1	#0
12332	G27	G26	G25	G24	G23	G22	G21	G20

	#7	#6	#5	#4	#3	#2	#1	#0
12333	G2F	G2E	G2D	G2C	G2B	G2A	G29	G28

[Input type] Parameter input
[Data type] Bit

NOTE
When at least one of these parameters is set, the power must be turned off before operation is continued.

G10 to G2F When the Power Mate or I/O Link β is connected to the I/O Link, these bits set whether to transfer pulses from manual pulse generators connected to the I/O Link to the Power Mate or I/O Link β.

The setting of each bit has the following meaning:
0: Pulses are transferred.
1: Pulses are not transferred.

The bits and the corresponding I/O Link channel numbers and group numbers are listed below:

Parameter	Channel number	Group number
G10	1	0
G11	1	1
G12	1	2
:	:	:
G1F	1	15
:	:	:
G4F	4	15

12350	Manual handle feed magnification m in each axis

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 2000
For each axis, this parameter sets the magnification m when manual handle feed movement selection signals MP1 = 0, MP2 = 1.

NOTE
When value is set to 0 for this parameter, the parameter No. 7113 is valid.

12351	Manual handle feed magnification n in each axis

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0 to 2000

For each axis, this parameter sets the magnification when manual handle feed movement selection signals MP1 = 1, MP2 = 1.

NOTE
When value is set to 0 for this parameter, the parameter No. 7114 is valid.

4.80 PARAMETERS OF SYNCHRONOUS/COMPOSITE CONTROL AND SUPERIMPOSED CONTROL (T SERIES) (2 OF 2)

12600	Identification Number for synchronous, composite and superimposed control with program command

[Input type] Parameter input
[Data type] Word axis
[Valid data range] 0,1 to 32767

Set identification numbers that can be specified with P,Q addresses.
The axis whose identification number is "0" cannot become under synchronous /composite /superimposed control by CNC program.
The same identification number cannot be set to two or more axes through all paths.
When the same identification number is set, PS alarm (PS5339) occurs at G50.4/G50.5/G50.6/G51.4/G51.5/G51.6 block.

4.81 PARAMETERS OF AXIS CONTROL BY PMC (3 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
12730								PTC

[Input type] Parameter input
[Data type] Bit path

 # 0 PTC Linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is:
0: Normal.
1: Extended.
This bit is available when speed command in PMC axis control is FS16 type (parameter VCP (No.8007#2) is 1).

12731	2nd time constant of linear acceleration/deceleration of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec/1000min^{-1}
[Valid data range] 0 to 32767

When this parameter is set 0, 2nd time constant data is not available, and then acceleration / deceleration of speed command is not available in from 1st feedrate to 2nd feedrate.
This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12732	3rd time constant of linear acceleration/deceleration of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec/1000min^{-1}
[Valid data range] 0 to 32767

When this parameter is set 0, 3rd time constant data is not available, and then acceleration / deceleration of speed command is not available in from 2nd feedrate to 3rd feedrate.
This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12733	4th time constant of linear acceleration/deceleration of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec/1000min^{-1}
[Valid data range] 0 to 32767

When this parameter is set 0, 4th time constant data is not available, and then acceleration / deceleration of speed command is not available in from 3rd feedrate to 4th feedrate.
This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12734	5th time constant of linear acceleration/deceleration of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec/1000min^{-1}
[Valid data range] 0 to 32767

When this parameter is set 0, 5th time constant data is not available, and then acceleration / deceleration of speed command is not available in from 4th feedrate to 5th feedrate.
This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12735	1st feedrate for changing time constant of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 32767

Set feedrate parameters as following.

No.12735 < No.12736 < No.12737 < No.12738.

This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12736	2nd feedrate for changing time constant of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 32767

Set feedrate parameters as following.

No.12735 < No.12736 < No.12737 < No.12738.

This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12737	3rd feedrate for changing time constant of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}
[Valid data range]

Set feedrate parameters as following.

No.12735 < No.12736 < No.12737 < No.12738.

This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

12738	4th feedrate for changing time constant of continuous feed operation based on a speed command in PMC axis control

[Input type] Parameter input
[Data type] Word axis
[Unit of data] min^{-1}
[Valid data range] 0 to 32767

Set feedrate parameters as following.

No.12735 < No.12736 < No.12737 < No.12738.

This parameter is available when speed command in PMC axis control is FS0 type (parameter VCP (No.8007#2) is 1) and linear acceleration/deceleration time constant of continuous feed operation based on a speed command in PMC axis control is extended (parameter PTC (No.12730#0) is 1).

4.82 PARAMETERS OF DISPLAY AND EDIT (5 OF 5)

	#7	#6	#5	#4	#3	#2	#1	#0
13101			CSC				TPB	

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 1 TPB Baud rate used with the external touch panel
0: 19200 bps is always used.
1: The baud rate with the baud rate number set in parameter No. 0123 for channel 2 is used.

As mentioned in the description of bit 3 (TPA) of parameter No. 3119, when TPA is set to 0, the baud rate is always set to 19200 bps.
To allow the baud rate to be changed, set bit 1 (TPB) of parameter No. 13101 to 1.
This allows the baud rate number set in parameter No. 0123 for channel 2 to be used.

> **NOTE**
> Baud rates that can be set may vary depending on the ETP used.

 # 5 CSC
0: On the monochrome LCD, the character color at the cursor position is white, and the background color is black.
When the character edit screen is displayed on the monochrome LCD, the background of update blocks except the cursor is displayed in white.
1: On the monochrome LCD, the character color at the cursor position is black, and the background color is gray.
When the character edit screen is displayed on the monochrome LCD, the background of the update block except the cursor is displayed in gray.

	#7	#6	#5	#4	#3	#2	#1	#0
13102	EDT	BGI	BGD				TAD	

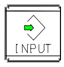
[Input type] Parameter input
[Data type] Bit path

> **NOTE**
> When at least one of these parameters is set, the power must be turned off before operation is continued.

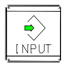
 # 0 TAD When current position display is disabled (bit 0 (NDPx) of parameter No. 3115 is 1), the current position display section of the axis for which display position specification (parameter No. 3130) is performed is:
0: Embedded with spaces.
1: Displayed with top-alignment by the axis for which the current position is displayed.

 # 5 BGD When background editing is enabled (bit 6 (NBG) of parameter No. 8134 is 0), background editing on the CNC program editing screen is:
0: Enabled.
1: Disabled.

When MANUAL GUIDE *i* is used, set this parameter to 1 to disable background editing on the CNC program edit screen.

 # 6 BGI When the cursor is placed at a program, and the 

key is pressed on the program list screen:
0: Background editing starts.
1: Background editing does not start.

If this parameter is set to 0, pressing the 

key on the program list screen automatically changes the screen display to the background edit screen, allowing editing of a selected program. If the parameter is set to 1, the screen display does not change, and background editing does not start.

 # 7 EDT During memory operation, program editing is:
0: Enabled.
1: Disabled.

> **NOTE**
> 1 When 0 is set, during memory operation, you can stop the program by a single block stop or feed hold, select the EDIT mode, and edit the program.
> When the main program is running:
> - The same edit functions as used for ordinary editing can be used.
>
> When a subprogram is running:
> - Only the word-unit edit function can be used.
> - Any program called from DNC or MDI operation cannot be edited.
> - Only the subprogram can be edited.
>
> 2 Before restarting memory operation, take extreme caution to return the cursor to the position before stopping the program. If you want to execute the program from other than the cursor position when stopped, be sure to reset the machine before executing the program.

	#7	#6	#5	#4	#3	#2	#1	#0
13112						SPI	SVI	IDW

[Input type] Parameter input
[Data type] Bit path

 # 0 IDW Editing on the servo or spindle information screen is:
0: Prohibited.
1: Not prohibited.

 # 1 SVI The servo information screen is:
0: Displayed.
1: Not displayed.

 # 2 SPI The spindle information screen is:
0: Displayed.
1: Not displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
13115		KBC	SI2	SI1				

[Input type] Parameter input
[Data type] Bit

 # 4 SI1 Soft key input of the characters shown below is:
0: Disabled.
1: Enabled.
< > ¥ % $! ~ : " '

 # 5 SI2 Soft key input of the characters shown below and switching between the uppercase and lowercase input modes by a soft key are:
0: Disabled.
1: Enabled.
( ) ? * & @ _

 # 6 KBC With the standard ONGP-MDI unit, in the lowercase input mode, "[" and "]" are:
0: Not converted to "<" and ">", respectively.
1: Converted to "<" and ">", respectively.

When this parameter is set, the power must be turned off then back on to make the setting of this parameter valid.

	#7	#6	#5	#4	#3	#2	#1	#0
13117						SVO		

[Input type] Parameter input
[Data type] Bit

 # 2 SVO On the servo setting screen:
0: Both the machine constant input screen and the parameter input screen are displayed.
1: Only the parameter input screen is displayed.

	#7	#6	#5	#4	#3	#2	#1	#0
13118						SDO		

[Input type] Parameter input
[Data type] Bit

 # 2 SDO On the initial screen of the spindle setting screen:
0: Both the machine constant input screen and the parameter input screen are displayed.
1: Only the parameter input screen is displayed.

13131	Group number for simultaneous display of two paths

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to 1

This parameter sets a group for simultaneous display on one screen in a multi-path system.
The paths defined to belong to the same group are displayed on one screen.
When 0 is set in this parameter, one screen displays one path.
When 1 is set for both paths, two paths are displayed on one screen.

> **NOTE**
> When specifying groups, specify group numbers not less than 1 successively.
> On 8.4-inch display units, simultaneous 2-path display cannot be specified.

13132	Simultaneous 2-path display order number

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to 2

This parameter sets the display order of a path defined to belong to a simultaneous 2-path display group.
For display in an arbitrary path order, the order number is changed.

Example)
Setting of simultaneous display group numbers and simultaneous display order numbers

Number of paths of CNC	Path	Display group number	Intra-group display order number	Screen display (Numbers represent displayed path numbers.)
One path	Path 1	1	1	1
Two path	Path 1	1	1	1 2
	Path 2	1	2	
	Path 1	1	1	1 ⇨ 2
	Path 2	2	1	
	Path 1	1	2	2 1
	Path 2	1	1	

> **NOTE**
> Specify successive order numbers not less than 1 for the paths defined to belong to a group.

13140	First character in spindle load meter display

13141	Second character in spindle load meter display

[Input type] Setting input

[Data type] Byte spindle

[Valid data range] This parameter sets the name of each spindle using the corresponding character code in spindle load meter display on the screen displayed on the left half of the 10.4-inch display unit. Any character string consisting of numeric characters, alphabetical characters, katakana characters, and symbols with a maximum length of two characters can be displayed as a spindle name.

If 0 is set, the following is displayed:

1st spindle	S1
2nd spindle	S2
3rd spindle	S3

4.83 PARAMETERS OF TOOL LIFE MANAGEMENT (2 OF 2)

13221	M code for tool life count restart

[Input type] Parameter input
[Data type] Word path
[Valid data range] 0 to 255 (not including 01, 02, 30, 98, and 99)

When 0 is set, this parameter is ignored.
For the operation of an M code for tool life count restart, see the description of parameter No. 6811.
This parameter is used when an M code for tool life count restart exceeds 127.
Set parameter No. 6811 to 0, and set the value of an M code in this parameter.

13265	H code for using the tool length offset in tool life management

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 9999

Setting this parameter to H99 generally validates the compensation for the tool currently being used. By setting any H code in this parameter, the H code instead of H99 can be used. If 0 is specified, H99 is assumed.
A value ranging from 0 to 9999 can be set.

13266	D code for enabling cutter compensation in tool life management

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 0 to 9999

Setting this parameter to D99 generally validates the compensation for the tool currently being used. By setting any D code in this parameter, the D code instead of D99 can be used. If 0 is set, D99 is assumed.

4.84 PARAMETERS OF THE MACHINING CONDITION SELECTION FUNCTION

	#7	#6	#5	#4	#3	#2	#1	#0
13600								MCR
	MSA							MCR

[Input type] Parameter input
[Data type] Bit path

 # 0 MCR When an allowable acceleration rate adjustment is made with the machining condition selection function (machining parameter adjustment screen, precision level selection screen), parameter No. 1735 for the deceleration function based on acceleration in circular interpolation is:
0: Modified.
1: Not modified.

 # 7 MSA When the machining condition selection function is used, the acceleration rate change time (bell-shaped) (LV1, LV10) is:
0: Set using parameter Nos. 13612 and 13613.
1: Set using parameter Nos. 13662 and 13663.

	#7	#6	#5	#4	#3	#2	#1	#0
13601								MPR

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

 # 0 MPR The machining parameter adjustment screen is:
0: Displayed.
1: Not displayed.
Even when this parameter is set to 1, the precision level selection screen is displayed.

13610	Acceleration rate for acceleration/deceleration before look-ahead interpolation in advanced preview control/AI advanced preview control/AI contour control (precision level 1)

13611	Acceleration rate for acceleration/deceleration before look-ahead interpolation in advanced preview control/AI advanced preview control/AI contour control (precision level 10)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec/sec, inch/sec/sec, degree/sec/sec (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0)

Each of these parameters sets an acceleration rate for acceleration/ deceleration before interpolation in advanced preview control/AI advanced preview control/AI contour control. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13612	
	Acceleration rate change time (bell-shaped) when AI contour control is used (precision level 1)

13613	
	Acceleration rate change time (bell-shaped) when AI contour control is used (precision level 10)

[Input type] Parameter input
[Data type] Byte path
[Unit of data] msec
[Valid data range] 0 to 127

Each of these parameters sets an acceleration rate change time (bell-shaped) in AI contour control. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13620	**Allowable acceleration rate when advanced preview control/AI advanced preview control/AI contour control is used (precision level 1)**

13621	**Allowable acceleration rate when advanced preview control/AI advanced preview control/AI contour control is used (precision level 10)**

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/sec/sec, inch/sec/sec, degree/sec/sec (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (D)
(When the machine system is metric system, 0.0 to +100000.0. When the machine system is inch system, machine, 0.0 to +10000.0)

Each of these parameters sets an allowable acceleration rate in advanced preview control/AI advanced preview control/AI contour control. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13622	**Time constant for acceleration/deceleration after interpolation when advanced preview control/AI advanced preview control/AI contour control is used (precision level 1)**

13623	**Time constant for acceleration/deceleration after interpolation when advanced preview control/AI advanced preview control/AI contour control is used (precision level 10)**

[Input type] Parameter input
[Data type] Word axis
[Unit of data] msec
[Valid data range] 1 to 512

Each of these parameters sets a time constant for acceleration/ deceleration after interpolation when advanced preview control/AI advanced preview control/AI contour control is used. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13624	**Corner speed difference when advanced preview control/AI advanced preview control/AI contour control is used (precision level 1)**

13625	**Corner speed difference when advanced preview control/AI advanced preview control/AI contour control is used (precision level 10)**

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Each of these parameters sets an allowable speed difference for speed determination based on corner speed difference in advanced preview control/AI advanced preview control/AI contour control. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13626	Maximum cutting speed when advanced preview control/AI advanced preview control/AI contour control is used (precision level 1)

13627	Maximum cutting speed when advanced preview control/AI advanced preview control/AI contour control is used (precision level 10)

[Input type] Parameter input
[Data type] Real axis
[Unit of data] mm/min, inch/min, degree/min (machine unit)
[Minimum unit of data] Depend on the increment system of the applied axis
[Valid data range] Refer to the standard parameter setting table (C)
(When the increment system is IS-B, 0.0 to +999000.0)

Each of these parameters sets a maximum cutting speed in advanced preview control/AI advanced preview control/AI contour control. Set a value (precision level 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

13628	Parameter number corresponding to arbitrary item 1 when advanced preview control/AI advanced preview control/AI contour control is used

13629	Parameter number corresponding to arbitrary item 2 when advanced preview control/AI advanced preview control/AI contour control is used

NOTE
When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] 2-word path
[Valid data range] 1 to 65535

These parameters set the parameter numbers corresponding to arbitrary items 1 and 2.

NOTE
The parameter numbers corresponding to the following cannot be specified:
- Bit parameters
- Spindle parameters (No. 4000 to No. 4799)
- Parameters of real number type
- Parameters that require power-off (for which the alarm (PW0000) is issued)
- Nonexistent parameters

13630	**Value with emphasis on speed (precision level 1) of the parameter corresponding to arbitrary item 1 when advanced preview control/AI advanced preview control/AI contour control is used**

13631	**Value with emphasis on speed (precision level 1) of the parameter corresponding to arbitrary item 2 when advanced preview control/AI advanced preview control/AI contour control is used**

13632	**Value with emphasis on speed (precision level 10) of the parameter corresponding to arbitrary item 1 when advanced preview control/AI advanced preview control/AI contour control is used**

13633	**Value with emphasis on speed (precision level 10) of the parameter corresponding to arbitrary item 2 when advanced preview control/AI advanced preview control/AI contour control is used**

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Depend on the type of parameter for an arbitrary item
[Valid data range] Depend on the type of parameter for an arbitrary item

Each of these parameters sets a value with emphasis placed on speed or precision for a parameter.

13634	**Precision level currently selected when advanced preview control/AI advanced preview control/AI contour control is used**

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 1 to 10

This parameter sets the level currently selected.

13662	**Acceleration rate change time (bell-shaped) when AI contour control is used (precision level 1), range extended**

13663	**Acceleration rate change time (bell-shaped) when AI contour control is used (precision level 10), range extended**

[Input type] Parameter input
[Data type] 2-word path
[Unit of data] msec
[Valid data range] 0 to 200

Each of these parameters sets an acceleration rate change time (bell-shaped) in AI contour control. Set a value (precision 1) with emphasis placed on speed, and a value (precision level 10) with emphasis on precision.

4.85 PARAMETERS OF PARAMETER CHECK SUM

	#7	#6	#5	#4	#3	#2	#1	#0
13730	CSR							CKS

[Input type] Parameter input
[Data type] Bit axis

 # 0 CKS During power-on, a checksum of parameters is:
0: Not checked.
1: Checked.

 # 7 CSR Alarm DS5340 parameter checksum error is:
0: Cleared by the "CAN" + "RESET" operation.
1: Cleared by the "RESET" operation.

13731	NC parameter checksum exclusion number 01
~	~
13750	NC parameter checksum exclusion number 20

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to Maximum parameter number

This parameter sets the numbers of parameters to be excluded from a checksum performed by the prameter checksum function.

13751	NC parameter checksum exclusion range start number 01
13752	NC parameter checksum exclusion range end number 01
~	~
13769	NC parameter checksum exclusion range start number 10
13770	NC parameter checksum exclusion range end number 10

[Input type] Parameter input
[Data type] 2-word
[Valid data range] 0 to Maximum parameter number

This parameter specifies the range of the numbers of parameters to be excluded from a checksum performed by the parameter checksum function. The parameters included in the range is excluded from a checksum.

NOTE

1. The start number and end number are included in the exclusion range.
2. If the start number is greater than the end number (start number > end number), the checksum exclusion number setting is invalid.
3. If the start number is equal to the end number (start number = end number), only the number is excluded.

4.86 PARAMETERS OF INCH/METRIC CONVERSION AND DIAMETER/RADIUS SWITCHING (2 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
14000	IMAx					IRFx		

[Input type] Parameter input
[Data type] Bit axis

NOTE
When at least one of these parameters is set, the power must be turned off before operation is continued.

 # 2 IRFx An inch-metric switch command (G20, G21) at the reference position is:
0: Disabled.
1: Enabled.

When this function is enabled for an axis, if an attempt to switch between the inch and metric unit is made although the tool is not at the reference position on that axis, an alarm (PS5362) is issued, and switching between the inch and metric unit is canceled.
Be sure to move the tool to the reference position by, for example, specifying G28 before switching between the inch and metric unit.

NOTE
1 This function enables the inch/metric switching commands (G20 and G21) at the reference position. It does not enable the switching of the setting input unit (bit 2 (INI) of parameter No. 0000).
2 Swithching between inch and metric by setting the setting input unit (bit 2 (INI) of parameter No. 0000) is enabled only when the machine coordinate of the first reference position is 0 (parameter No. 1240 is 0) and presence on the first reference position is assumed.
For a system in which the machine coordinate of the first reference position is not 0, set this parameter to 1 and specify G20/G21 in the first reference position to switch between inch and metric.

 # 7 **IMAx** When switching between inch and millimeter was performed in a position other than the reference position:

0: An alarm occurs.

1: No alarm occurs.

> **NOTE**
> Set this parameter to 1 for the rotation axis or other axes not related to inch/millimeter switching.

4.87 PARAMETERS OF LINEAR SCALE WITH ABSOLUTE ADDRESS REFERENCE POSITION

14010	Maximum allowable travel distance when the reference position is established for a linear scale with an absolute address reference position

[Input type] Parameter input
[Data type] 2-word axis
[Unit of data] Detection unit
[Valid data range] 0 to 99999999

This parameter sets the maximum allowable travel distance at the FL feedrate when the reference position is established for a linear scale with an absolute address reference position. When the travel distance exceeds the setting of this parameter, the alarm (DS0017) (SCALE WITH REFERENCE POSITION: REFERENCE POSITION ESTABLISHMENT FAILED) is issued. When this parameter is set to 0, the maximum allowable travel distance is not checked.

4.88 PARAMETERS OF FSSB

14340	ATR value corresponding to slave 01 on FSSB
to	to
14349	ATR value corresponding to slave 10 on FSSB

> **NOTE**
> When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 7,64,-56,-96

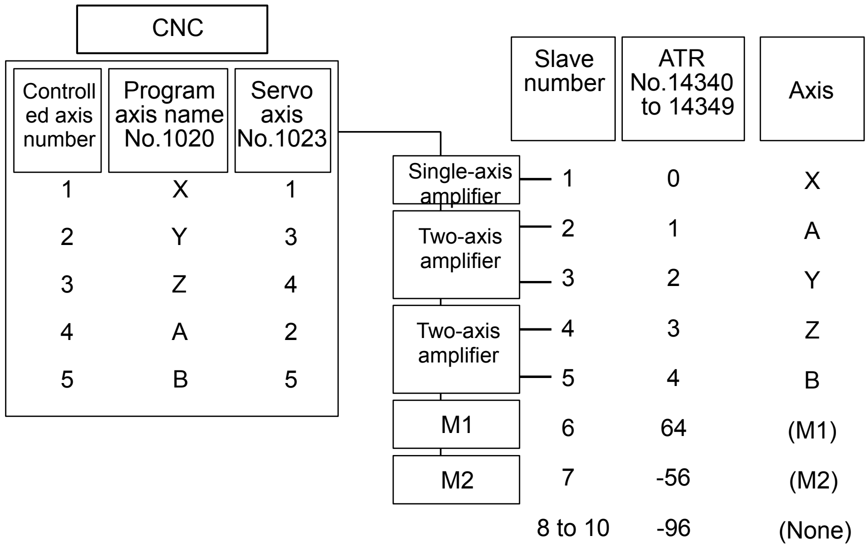
Each of these parameters sets the value (ATR value) of the address translation table corresponding to each of slave 1 to slave 10 on FSSB.
The slave is a generic term for servo amplifiers and separate detector interface units connected via an FSSB optical cable to the CNC. Numbers 1 to 10 are assigned to slaves, with younger numbers sequentially assigned to slaves closer to the CNC.
A 2-axis amplifier consists of two slaves, and a 3-axis amplifier consists of three slaves. In each of these parameters, set a value as described below, depending on whether the slave is an amplifier, separate detector, or nonexistent.

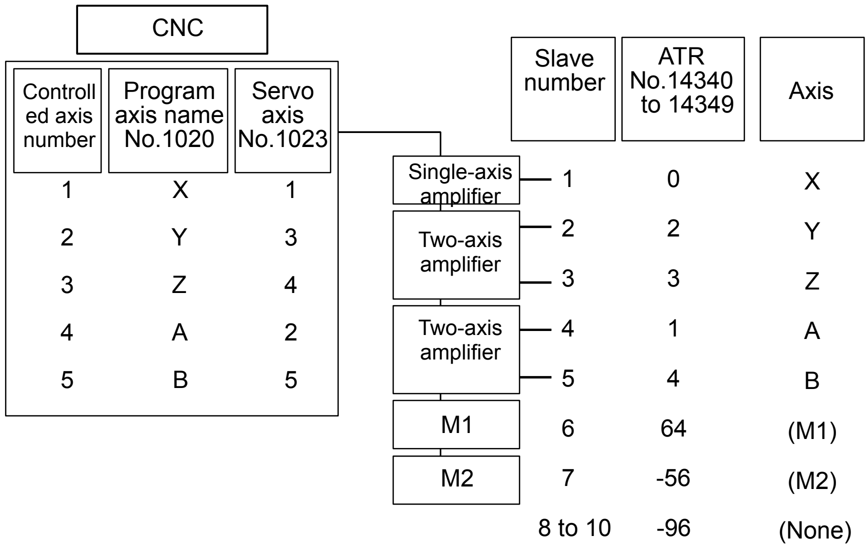
- When the slave is an amplifier:
  Set a value obtained by subtracting 1 from the setting of parameter No. 1023 for the axis to which the amplifier is assigned.
- When the slave is a separate detector interface unit:
  Set 64 for the first separate detector interface unit (connected near the CNC), and set -56 for the second separate detector interface unit (connected far from the CNC).
- When the slave is nonexistent:
  Set -96.

> **NOTE**
> 1 When the electric gear box (EGB) function is used
> Although an amplifier is not actually required for an EGB dummy axis, set this parameter with assuming that a dummy amplifier is connected. That is, as the address conversion table value for a nonexistent slave, set the value obtained by subtracting 1 from the setting of parameter No. 1023 for the EGB dummy axis, instead of -96.
> 2 When the FSSB is set to the automatic setting mode (when the parameter FMD (No.1902#0) is set to 0), parameter Nos. 14340 to 14349 are automatically set as data is input on the FSSB setting screen. When the manual setting 2 mode is set (when the parameter FMD (No.1902#0) is set to 1), be sure to directly set values in parameter Nos. 14340 to 14357.

Example of axis configuration and parameter settings

- Example 1

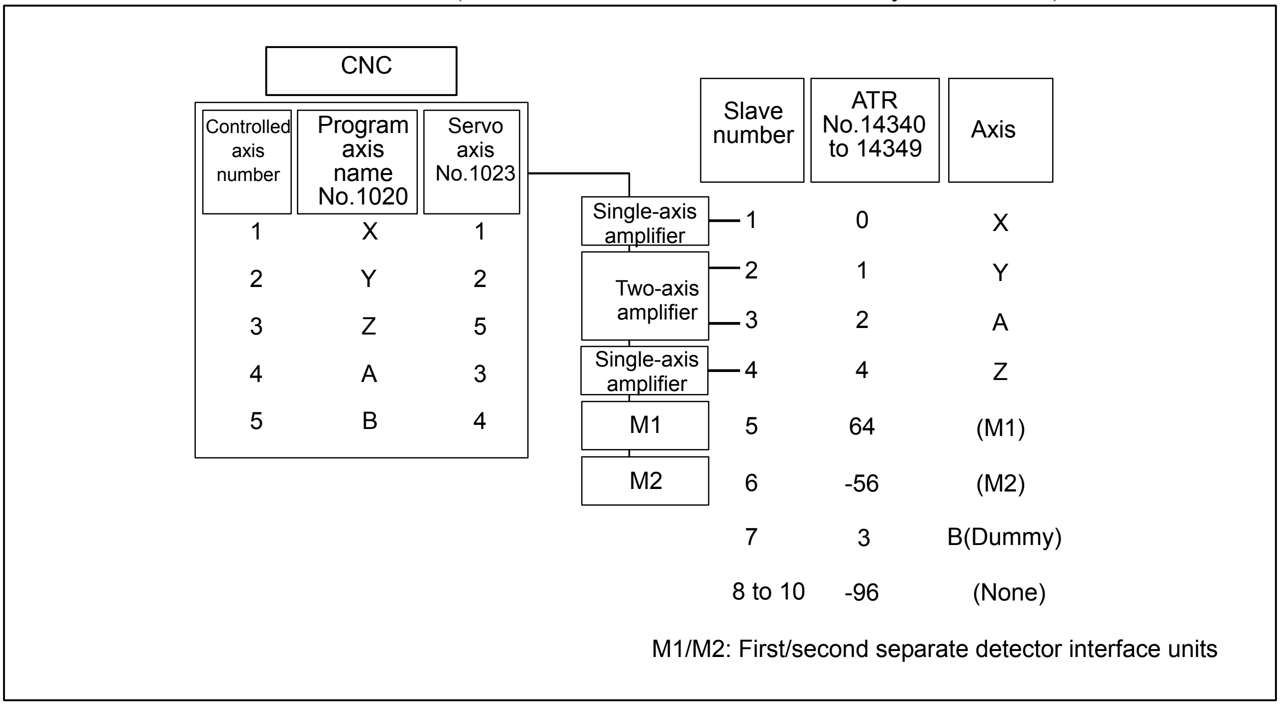




M1/M2: First/second separate detector interface units

- Example 2

Example of axis configuration and parameter settings when the electronic gear box (EGB) function is used
(EGB slave axis: A-axis, EGB dummy axis: B-axis)



14376	ATR value corresponding to connector 1 on the first separate detector interface unit
to	to
14383	ATR value corresponding to connector 8 on the first separate detector interface unit

14384	ATR value corresponding to connector 1 on the second separate detector interface unit
to	to
14391	ATR value corresponding to connector 8 on the third separate detector interface unit

NOTE

When these parameters are set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Byte
[Valid data range] 0 to 7, 32

Each of these parameters sets the value (ATR value) of the address translation table corresponding to each connector on a separate detector interface unit.

In each of these parameters, set a value obtained by subtracting 1 from the setting of parameter No. 1023 for the axis connected to a connector on a separate detector interface unit.

When there are axes for which settings are made to use a separate detector interface unit (bit 6 (PM1x) of parameter No. 1905 is set to 1 or bit 7 (PM2x) of parameter No. 1905 is set to 1, set 32 for connectors not used.

NOTE

When the FSSB is set to the automatic setting mode (when the parameter FMD (No.1902#0) is set to 0), parameter Nos. 14376 to 14391 are automatically set as data is input on the FSSB setting screen. When the manual setting 2 mode is set (when the parameter FMD (No.1902#0) is set to 1), be sure to directly set values in parameter Nos. 14376 to 14407.

	#7	#6	#5	#4	#3	#2	#1	#0
14476								DFS

> **NOTE**
> When this parameter is set, the power must be turned off before operation is continued.

[Input type] Parameter input
[Data type] Bit

 # 0 DFS The FSSB enters:
0: The FS0*i*-D-specific mode.
1: The FS0*i*-C-compatible mode.

4.89 PARAMETERS OF GRAPHIC DISPLAY (3 OF 3)

14713	Unit of magnification by which enlargement and reduction is performed with the dynamic graphic display function

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 255

This parameter sets the unit of magnification by which enlargement and reduction is performed with the dynamic graphic display function.
Unit of magnification = 64 / setting
If 0 is set, 64 is assumed.

14714	Unit of horizontal movement when a movement is made with the dynamic graphic display function

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 255

This parameter sets the unit of horizontal movement (in dots) applied when a movement is made with the dynamic graphic display function.
If 0 is set, 64 is assumed.

14715	Unit of vertical movement when a movement is made with the dynamic graphic display function

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 255

This parameter sets the unit of vertical movement (in dots) applied when a movement is made with the dynamic graphic display function.
If 0 is set, 35 is assumed.

14716	Unit of rotation angle when rotation is performed with the dynamic graphic display function

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 255

This parameter sets the unit (in degrees) of a rotation angle by which the drawing coordinate system is rotated with the dynamic graphic display function.
If 0 is set, 10 is assumed.

14717	Axis number of the C-axis in simulation (specific to MANUAL GUIDE i)

[Input type] Parameter input
[Data type] Byte path
[Valid data range] 0 to Number of controlled axes

This parameter sets the axis number of the C-axis in simulation.
For details, refer to the FANUC MANUAL GUIDE *i* Common to Lathe System/Machining Center System OPERATOR'S MANUAL (B-63874EN).

4.90 PARAMETERS OF EMBEDDED ETHERNET

	#7	#6	#5	#4	#3	#2	#1	#0
14880		DHC	DNS		D1E		PCH	ETH

[Input type] Setting input
[Data type] Bit

 # 0 ETH The embedded Ethernet function (a built-in port or PCMCIA LAN card) is:
0: Used.
1: Not used.

 # 1 PCH At the start of communication of the FTP file transfer function for built-in port, checking for the presence of the server using PING is:
0: Performed.
1: Not performed.

> **NOTE**
> Usually, set 0.
> If 1 is set not to check the presence of the server by using PING, it may take several tens of seconds to recognize an error when the server is not present in the network.
> For mainly security reasons, a personal computer may be set so that it does not respond to the PING command. To communicate with such a personal computer, set 1.

 # 3 D1E When the DHCP function on a built-in port is used:
0: Default parameters for the FOCAS2/Ethernet function are set.
PORT NUMBER (TCP) : 8193
PORT NUMBER (UDP) : 0
TIME INTERVAL : 0
1: Default parameters for CIMPLICITY *i*CELL communication are set.
PORT NUMBER (TCP) : 8193
PORT NUMBER (UDP) : 8192
TIME INTERVAL : 50

 # 5 DNS With a built-in port, the DNS client function is:
0: Not used.
1: Used.

 # 6 DHC With a built-in port, the DHCP client function is:
0: Not used.
1: Used.

14890	Selects the host computer 1 OS.
14891	Selects the host computer 2 OS.
14892	Selects the host computer 3 OS.

[Input type] Parameter input
[Data type] Word
[Valid data range] 0 to 2

0: Windows95/98/Me/2000/XP/Vista.
1: UNIX, VMS.
2: Linux.

NOTE
Some FTP server software products do not depend on the OS. So, even when the above parameters are set, it is sometimes impossible to display a list of files properly.

4.91 PARAMETERS OF MANUAL HANDLE RETRACE (2 OF 2)

18060	Backward movement prohibition M code that outputs no M code

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 999

When an M code that prohibits backward movement is specified during backward movement, backward movement of blocks before the M code is prohibited. In this case, backward movement prohibition signal MRVSP<Fn091.2> is output.

This backward movement prohibition M code is not output to the PMC as an M code. Set an M code that is not used by an auxiliary function or macro as the backward movement prohibition M code.

18065	Backward movement prohibition M code 1 that outputs an M code

18066	Backward movement prohibition M code 2 that outputs an M code

[Input type] Parameter input
[Data type] Word path
[Valid data range] 1 to 999

When an M code that prohibits backward movement is specified during backward movement, backward movement of blocks before the M code is prohibited. In this case, backward movement prohibition signal MRVSP<Fn091.2> is output.

These backward movement prohibition M codes are output to the PMC as M codes. Set M codes that are not used by an auxiliary function or macro as the backward movement prohibition M codes.

4.92 PARAMETERS OF ADVANCED PREVIEW CONTROL/AI ADVANCED PREVIEW CONTROL/AI CONTOUR CONTROL (2 OF 2)

	#7	#6	#5	#4	#3	#2	#1	#0
19500	FCC	FNW						

[Input type] Parameter input
[Data type] Bit path

 # 6 FNW In the speed determination method by the speed difference of advanced preview control/AI advance preview control/AI contour control and the speed determination method by the acceleration of advanced preview control/AI contour control:

0: The maximum speed that does not exceed the allowable speed difference or allowable acceleration is selected.

1: The feedrate is determined so that the allowable speed difference and allowable acceleration of each axis are not exceeded and that the deceleration speed is constant regardless of the movement direction if the shape is the same.

 # 7 FCC When there is an axis that requires one or more seconds for acceleration in acceleration/deceleration before look-ahead interpolation:

0: Emphasis is placed on precision, so that the specified feedrate may not be reached.

1: Emphasis is placed on speed, so that the specified feedrate is produced.

When this parameter is set to 1, the precision of curved interpolation such as circular interpolation may decrease.

	#7	#6	#5	#4	#3	#2	#1	#0
19501			FRP					

[Input type] Parameter input
[Data type] Bit path

 # 5 FRP linear-shaped rapid traverse in the advanced preview control/AI advance preview control/AI contour control mode is:
0: Acceleration/deceleration after interpolation.
1: Acceleration/deceleration before interpolation.
Set a maximum allowable acceleration rate for each axis in parameter No. 1671.
When using bell-shaped acceleration/deceleration before interpolation, set an acceleration rate change time in parameter No. 1672.

When this parameter is set to 1, acceleration/deceleration before interpolation is also applied to rapid traverse if all conditions below are satisfied. At this time, acceleration/deceleration after interpolation is not applied.

- Bit 1 (LRP) of parameter No. 1401 is set to 1: Linear interpolation type positioning
- A value other than 0 is set in parameter No. 1671 for an axis.

If all of these conditions are not satisfied, acceleration/deceleration after interpolation is applied.

NOTE
To enable blinking display and signal output indicating the advance preview control/AI advance preview control/AI contour control mode even when rapid traverse command is specified, set bit 1 (AIR) of parameter No. 1612 to 1 in addition to the above settings.

	#7	#6	#5	#4	#3	#2	#1	#0
19515								BEX

[Input type] Parameter input
[Data type] Bit path

 # 0 BEX When the tapping mode (G63) or a canned cycle is specified, the mode for acceleration/deceleration before look-ahead interpolation is:
0: Turned off.
1: Not turned off.

4.93 PARAMETERS OF TOOL COMPENSATION (3 OF 3)

	#7	#6	#5	#4	#3	#2	#1	#0
19607	NAG	NAA	CAV			CCC		
	NAG	NAA	CAV			CCC		

[Input type] Parameter input
[Data type] Bit path

 # 2 CCC In the cutter compensation/tool nose radius compensation mode, the outer corner connection method is based on:
0: Linear connection type.
1: Circular connection type.

 # 5 CAV When an interference check finds that interference (overcutting) occurred:
0: Machining stops with the alarm (PS0041).
(Interference check alarm function)
1: Machining is continued by changing the tool path to prevent interference (overcutting) from occurring. (Interference check avoidance function)

For the interference check method, see the descriptions of bit 1 (CNC) of parameter No. 5008 and bit 3 (CNV) of parameter No. 5008.

 # 6 NAA When the interference check avoidance function considers that an avoidance operation is dangerous or that a further interference to the interference avoidance vector occurs:
0: An alarm is issued.
When an avoidance operation is considered to be dangerous, the alarm (PS5447) is issued.
When a further interference to the interference avoidance vector is considered to occur, the alarm (PS5448) is issued.
1: No alarm is issued, and the avoidance operation is continued.

> ⚠ **CAUTION**
> When this parameter is set to 1, the path may be shifted largely. Therefore, set this parameter to 0 unless special reasons are present.

 # 7 NAG If the gap vector length is 0 when the interference check avoidance function for cutter compensation/tool nose radius compensation is used:
0: Avoidance operation is performed.
1: Avoidance operation is not performed.

	#7	#6	#5	#4	#3	#2	#1	#0
19609							CCT	

[Input type] Parameter input
[Data type] Bit path

 # 1 CCT The cancellation of the G codes in group 08 is:
0: Specified by G49.
1: Able to be specified by G49.1 as well.
If G49 is specified when cancellation using G49.1 is set, the G codes of group 08 are canceled.

19625	Number of blocks to be read in the cutter compensation/tool nose radius compensation mode

[Input type] Setting input
[Data type] Byte path
[Valid data range] 3 to 8

This parameter sets the number of blocks to be read in the cutter compensation/tool nose radius compensation mode. When a value less than 3 is set, the specification of 3 is assumed. When a value greater than 8 is set, the specification of 8 is assumed. As a greater number of blocks are read, an overcutting (interference) forecast can be made with a command farther ahead. However, the number of blocks read and analyzed increases, so that a longer block processing time becomes necessary.

Even if the setting of this parameter is modified in the MDI mode by stopping in the cutter compensation/tool nose radius compensation mode, the setting does not become valid immediately. Before the new setting of this parameter can become valid, the cutter compensation/tool noise radius compensation mode must be canceled, then the mode must be entered again.

APPENDIX

A CHARACTER CODE LIST

Character	Code	Comment	Character	Code	Comment
A	065		6	054	
B	066		7	055	
C	067		8	056	
D	068		9	057	
E	069			032	Space
F	070		!	033	Exclamation mark
G	071		”	034	Quotation marks
H	072		#	035	Sharp
I	073		$	036	Dollar mark
J	074		%	037	Percent
K	075		&	038	Ampersand
L	076		’	039	Apostrophe
M	077		(	040	Left parenthesis
N	078		)	041	Right parenthesis
O	079		*	042	Asterisk
P	080		+	043	Positive sign
Q	081		,	044	Comma
R	082		-	045	Negative sign
S	083		.	046	Period
T	084		/	047	Slash
U	085		:	058	Colon
V	086		;	059	Semicolon
W	087		<	060	Left angle bracket
X	088		=	061	Equal sign
Y	089		>	062	Right angle bracket
Z	090		?	063	Question mark
0	048		@	064	Commercial at mark
1	049		[	091	Left square bracket
2	050			094	
3	051		¥	092	Yen mark
4	052		]	093	Right square bracket
5	053		_	095	Underline

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<W>

Revision Record

FANUC Series 0*i*-MODEL D, Series 0*i* Mate-MODEL D PARAMETER MANUAL (B-64310EN)

Edition	Date	Contents	Edition	Date	Contents
01	Apr., 2008				