KEYENCE

MO508GB

Laser Marker Communication Interface

User's Manual

ML -Z9500 Series
MD -V9900 Series
MD -S9900 Series
MD -F3000 Series
MD -F3100 Series
MD -F5100 Series
MD -T1000 Series
MD -X1000 Series
MD -X1500 Series

Read this manual before using the system in order to achieve maximum performance.
Keep this manual in a safe place for future reference.

Introduction

The ML-Z9500 Series (CO_2 laser), the MD-V9900/MD-S9900/MD-T1000/MD-X1000/MD-X1500 Series (YVO_4 laser) and the MD-F3000/3100/5100 Series (fiber laser) laser markers offer a very high quality marking on a variety of target surfaces. This User's Manual describes the operation and setting procedures when connecting a PC or other devices to the ML-Z9500, MD-V9900/MD-S9900/MD-T1000/MD-X1000/MD-X1500 or MD-F3000/3100/5100 Series via the RS-232/Ethernet interface. The setting ranges used in this manual are for the ML-Z9510 model marking head. The setting range of certain parameters will vary depending on the actual marking head being used. Please refer to Appendix-1 (page A-2) for the input value ranges for each marking head type.
Always keep this manual in a safe place for future reference.

Symbols

The following symbols alert you to matters concerning the prevention of human injury, product damage or other product references throughout the manual.

⚠ Warning

Failure to follow the instructions may lead to injury.

⚠ Caution

Indicates that property could be damaged (such as product malfunction) if the system is improperly operated or this precaution is not followed.

Important Provides information on precautions and limitations that must be met during operations.

Note Provides additional information on proper operations that can be easily mistaken.

Reference Provides advanced and useful information for operation.

📖 Provides reference pages in this manual and other related manuals.

General cautions

- At startup and during operation, be sure to monitor the functions and performance of the ML-Z9500 Series and MD-V/MD-S9900 Series.
- We recommend that you take substantial safety measures to avoid any damage in the event of a problem occurring.
- Do not attempt to modify the ML-Z9500 Series and MD-V/MD-S9900 Series, or use it in any way other than described in the specifications.
- When the ML-Z9500 Series and MD-V/MD-S9900 Series is used in combination with other devices, functions and performance may be degraded, depending on the operating conditions and surrounding environment.
- Do not use the ML-Z9500 Series and MD-V/MD-S9900 Series for the purpose of protecting the human body.
- Do not allow the temperature to change sharply around the ML-Z9500 Series and MD-V/MD-S9900 Series, including the accessories. Failure to do so may result in condensation.

Registered trademarks

Company names and product names that are mentioned in this manual are registered trademarks or trademark of respective companies.

Laser Safety Precautions

Tips on Correct Use

■ Cautions regarding usage

⚠ Caution

- Do not remove the case cover or attempt to modify the ML-Z9500 Series or MD-V/MD-S9900 Series.
- Do not cause any impact or apply excessive pressure to the case or display. Doing so could result in damage to the unit.
- Do not attempt to clean the dirt on the display with thinner or organic solvent. Doing so could cause clouding or staining of the display. When wiping the display, use a soft cloth moistened with a mild detergent.
- Do not use a sharply pointed object such as a needle to press the display. Doing so could result in damage or failure.

■ Cautions regarding installation

⚠ Warning

- Before connecting the controller, be sure to turn the power OFF. Failure to do so could result in product damage or electric shock.
- Do not install the ML-Z9500 Series or MD-V/MD-S9900 Series in a place where water may splash on it or where it would be close to any flammable objects. If water enters the unit, it may cause an electric shock or fire.
- The cable should have a bending radius (R) of 20 mm or more.

⚠ Caution

- To prevent the occurrence of noise-induced malfunctions, the cables should never be bundled with other power lines.
- Use this unit in an environment that is free from sudden temperature change, vibration, and impact.
- Avoid using this unit in an environment exposed to powder dust and/or oil mist.
- Maintain the ambient temperature and humidity within the following range:

  Ambient operating temperature: 0 to 40°C
  Ambient operating humidity: 30 to 85% RH (no condensation)
  Ambient storage temperature: -10 to 60°C (no condensation, no freezing)

Cautions Regarding the Laser Marker Unit

The console is used exclusively for connecting to the laser marker ML-Z9500/MD-V9900/MD-S9900/MD-F3000/MD-T1000/MD-F3100/MD-F5100/MD-X1000/MD-X1500 Series controller. Refer to the user's manual for the laser marker for information and safety measures for lasers, and for cautions and operation procedures for the Laser Marker unit.

Identification Code Table

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MEMO

Manual Structure

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Chapter 2	Communication Specifications	This chapter describes the communication protocol.
Chapter 3	Troubleshooting	This chapter describes the type of errors that can occur and how to release the error condition.
Chapter 4	Registering, Requesting, and Deleting the Program	This chapter describes the procedures to register, request and delete the program contents of the controller.
Chapter 5	Frequently-used Change Commands and Request Commands	This chapter describes the frequently-used commands such as the commands to change character strings or marking conditions.
Chapter 6	Environmental Settings	This chapter describes the setting and requesting of environmental setting parameters.
Chapter 7	Operation	This chapter describes the commands that are used to operate the system.
Chapter 8	External camera control command (Exclusive use for MD-T1000)	This chapter describes the external camera control command.
Appendices	Appendices	The appendices contain the ASCII code table, the shift-JIS code table, and the index.

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Chapter 1

System Configuration and Connection

This chapter describes the system configuration and settings required for connecting a PC or other external device to the RS-232C/RS-422A interface. The controller is capable of communicating RS-232 or RS-422A depending on the cable connection to the external device.

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1-1 RS-232C Interface

This section describes the connection to external device such as a computer or PLC, setting of the transmission format and the RS-232C interface specifications.

Connection to External Device

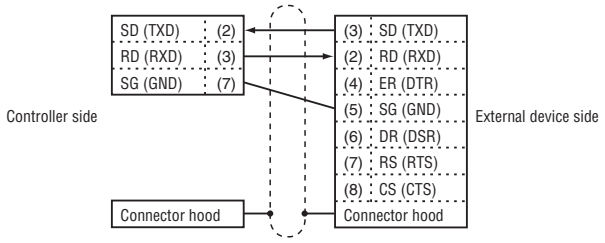
The external device that is connected to the controller using RS-232C interface should be capable that the setting shown in "Communication Settings of External Device" can be implemented in accordance with the specification specified. Communication programs for the external device must be set up by the user.

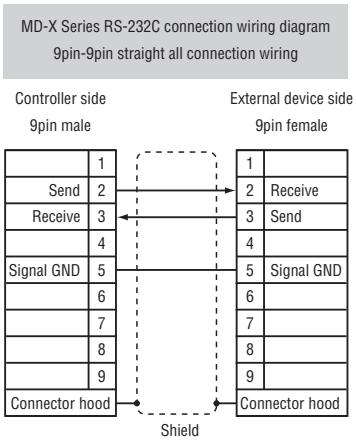
"1-4 Communication Settings of External Device" (Page 1- 5)

Use the D-sub 25-pin (socket) connector of the controller. Connect the controller to external device using an RS-232C straight cable. The wiring on the controller side and the external device side are shown below.

Note MD-X Series: D-sub 9-pin male type

■ Cable connection diagram





⚠ Caution

Only pins-2, -3 and -7 on the controller side are used. Do not make any connection to pins-14 and -15 on the controller side when communication is to be done using the RS-232C interface. Any connection made to these pins by mistake may damage the controller.

Note
- Pins-4 and -6, and pins-7 and -8 on external device side need to be shorted depending on the specifications of the external device to be connected. Confirm details with Instruction Manual of external device.
- Use the screws of M2.6 for securing the cables on the controller side.
- Use a shielded cable for connecting devices.
- Turn on the third terminal "232/422 switching input" of the MIL connecter (pin 40).

Specifications for RS-232C Connector Signal Line

The table below shows the pin assignment and signal specifications for the RS-232C connector signal lines on the controller side.

■ Connector pin assignment table

Pin No. on the controller	Signal name	Description	Signal direction
2	SD (TXD)	Data input from external device	Controller (input) ← External device
3	RD (RXD)	Data output from controller	Controller (output) → External device
7	SG (GND)	Signal ground	-
14	-	Used in RS-422A	Do not make any connection
15	-	Used in RS-422A	Do not make any connection

1-2 RS-422A Interface

This section describes the connection to external device such as a PLC, setting of the transmission format and the RS-422A interface specifications.

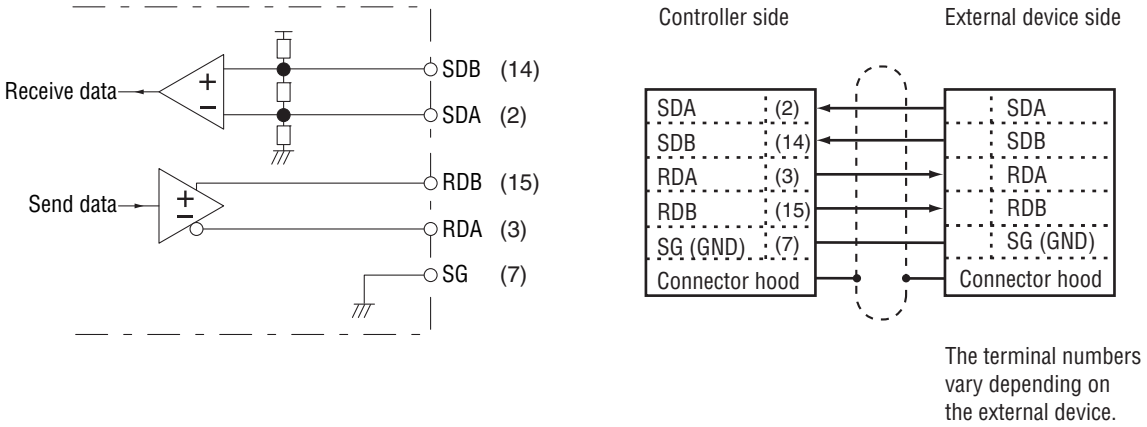
Connection to External Device

Any external device can be connected to the controller, provided that communication with the RS-422A interface is supported in accordance with the specifications described in chapter 1-3 "Communication Settings of External Device". Communication programs for the external device must be set up by the user.

"1-4 Communication Settings of External Device" (Page 1- 5)

Use the D-sub 25-pin (socket) connector of the controller. The wiring on the controller side and the external device side are shown below.
Confirm the connector and pin assignment on the external device side with Instruction Manual of external device.

■ Cable connection diagram



Note

- Only pins-2, -3, -7, -14 and -15 on the controller side are used.
- Communication using RS-422A interface is supported, but the multi-drop connection is not supported.
- Use the screws of M2.6 for securing the cables on the controller side.
- Use a shielded cable for connecting devices.
- Turn off the third terminal "232/422 switching input" of the MIL connecter (pin 40).
- MD-X Series: RS-422A interface is not equipped.

Specifications for RS-422A Signal Lines

The table below shows the pin assignment and signal specifications for the RS-422A connector signal lines on the controller side.

■ Connector pin assignment table

Pin No. on the controller	Signal name	Description	Signal direction
2	SDA	Data input from external device	Controller (input) ← External device
3	RDA	Data output from controller	Controller (output) → External device
7	SG (GND)	Signal ground	-
14	SDB	Data input from external device	Controller (input) ← External device
15	RDB	Data output from controller	Controller (output) → External device

1-3 Ethernet interface

This section describes the connection to an external device such as PLC, setting of the transmission format and the Ethernet interface specifications. Only MD-T1000/MD-F3100/MD-F5100/MD-X1000/MD-X1500 Series is equipped with the Ethernet interface.

Connection to External Device

To connect via the Ethernet interface, the external device must be Ethernet compatible.

Ethernet connection cable

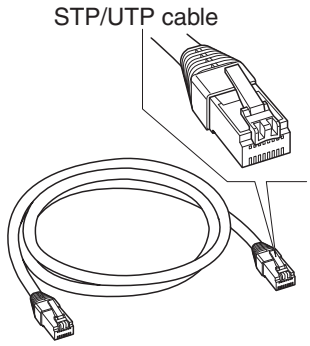
This section explains the cable used for Ethernet connection. Note that usable cables differ for Ethernet established with 10BASE-T and Ethernet established with 100BASE-TX.

■ When established with 10BASE-T

Use a shielded twist pair (hereinafter referred to as STP) cable or an unshielded twist pair (hereinafter referred to as UTP) cable with category 3 or more.

■ When established with 100BASE-TX

Use the STP cable or UTP cable with category 5 or more.

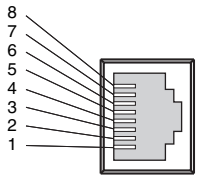


Note To connect to a hub, use the STP/UTP straight cable.
The STP/UTP cross cable has a similar appearance to the STP/UTP straight cable. Make sure to use the correct cable.

Reference
- When directly connecting the laser marker to a PC, use the STP/UTP cross cable.
- MD-X Series: Automatically recognizes Cross/Straight.
- When Ethernet is established with standards such as 10BASE-2 or 10BASE-5 other than 10BASE-T or 100BASE-TX, use a hub equipped with AUI, MAU, connector or BNC connector, or use a media converter such as 10BASE5, 10BASE-T or 10BASE2, 10BASE-T.

Ethernet interface connector

The Ethernet connector is the RJ-45, 8-pole modular connector (ISO 8877 compliant) used with 10BASE-T and 100BASE-TX, and is compliant with IEEE802.3.
The signal assignment for the RJ-45 modular connector is as follows.



RJ-45 modular connector

Pin number	MDI signal	Signal function
1	TD +	Sent data (+)
2	TD -	Sent data (-)
3	RD +	Receive data (+)
4	–	–
5	–	–
6	RD -	Receive data (-)
7	–	–
8	–	–

Note When connecting the STP/UTP cable to the Ethernet connector, avoid load on the connector.

1-4 Communication Settings of External Device

Communication settings of the controller are shown below.
Establish the communication settings on external device side such as a PC or PLC to match those on the controller side.

RS-232C and RS-422A communication settings

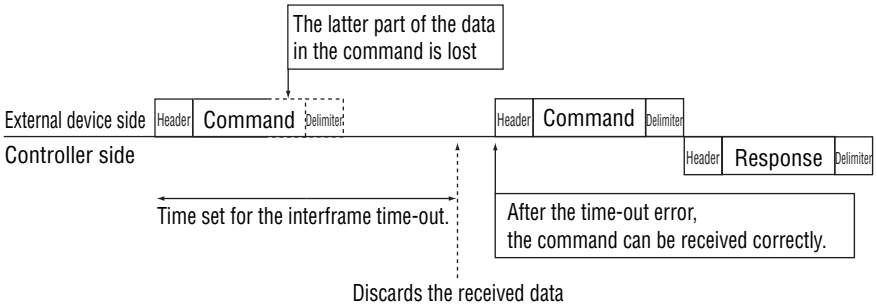
Set up the communication parameters on the controller side to match those on the external device side. Set up the communication parameters on the controller side by using either the Laser Marker Setup Software "MARKING BUILDER 2" or from the touch panel (option).
For MD-X Series, use "MARKING BUILDER 3" or the console for setup.

Item	Description	Default value
Baud rate	2400/4800/9600/19200/38400/57600/115200	38400
Parity check	None/odd/even	None
Stop bit	1 bit/2 bits	1 bit
Delimiter	ETX/CR	CR
Checksum	None or given	None
Interframe time-out error (x10 ms)	1 to 30000	300

- Conforming to RS-232C standard of EIA (Electronic Industries Association)
- Data length is 8 bits (fixed).
- The baud rate [57600] and [115200] are displayed only for the MD-T1000/MD-F3100/MD-F5100/MD-X1000/MD-X1500 Series.
- MD-X Series: Automatically selects EXT/CR for Delimiter. This item cannot be set.
  Interframe time-out is fixed and cannot be set.
  Character code setting contents: Unicode(UTF-8)/Shift-JIS/Latin-1, Default: Unicode(UTF-8)

Interframe Time-out Error

The interframe time-out function issues the time-out error when a controller does not receive the delimiter indicating the end of the command within a specified time.
Controller can set the time of the interframe time-out error so that the controller can terminate the communication forcibly if the controller does not receive the delimiter within the set time during reception mode in order to return the controller to the idle state and ready to receive a new command. (Controller does not return the response to external device during the above period.) Interframe time-out can be set within a range of 10 ms to maximum 300 s.
The control program of external device should be set to a longer time-out time than that of the controller side before starting communication.



Ethernet communication settings

To communicate via the Ethernet interface, set the communication conditions for the controller beforehand. Set the communication conditions for the controller using the laser marker setting software "MARKING BUILDER2" or the console.
For MD-X Series, use "MARKING BUILDER 3" or the console for setup.
The delimiter and checksum for the communication conditions are fixed to "CR" and "None" respectively.
"MARKING BUILDER 2 (MB-H2D3) User's Manual" - "9-4 Unit Setup : Ethernet Settings"
"MARKING BUILDER 3 User's Manual" - "5-3 Unit Setup: Ethernet Settings"

1-5 Communication Priority

This section describes the communication priority.

Communication Priority

The following four control terminals can be connected to the controller at the same time.

- PC in which Laser Marker Setup Software "MARKING BUILDER 2" or "MARKING BUILDER 3" is installed.
- Touch panel
- External device to which a controller is connected via RS-232C/RS-422A.
- External device connected via Ethernet

If these terminals try to change the controller settings at the same time, the consistency will not be maintained. Because of this, if one terminal edits the settings in the controller of this system, or executes the test marking or sample marking, that terminal will have the "Communication priority right" and other terminals cannot send commands other than the request command that confirms status.

A terminal shall have the communication priority privilege when it is in the following status.

For Laser Marker Setup Software "MARKING BUILDER 2" or "MARKING BUILDER 3"

- When saving or changing the program contents
- When restoring the saved file containing all settings
- When test marking screen is being displayed
- When sample marking screen is being displayed
- When terminal block simulation screen is being displayed
- When operating the finder (MD-T/MD-X Series)
- When operating the laser inspection screen/power monitor inspection screen
- Auto focus adjustment screen ("MARKING BUILDER 3" only)

For touch panel

- When saving or changing the program contents
- When restoring the saved file containing all settings
- When test marking screen is being displayed
- When sample marking screen is being displayed
- When terminal block simulation screen is being displayed
- When operating the finder (MD-T/MD-X Series)
- When operating the laser inspection screen/power monitor inspection screen

For external device

- During the period after the program start command (XS, XT, XU) is sent until the setup save operation is completed by sending the end command (YE) or the stop command (XI).
- During the period until a controller returns a response after various setting commands are sent.
- When operating the finder (MD-T/MD-X Series)
- When operating the laser inspection screen/power monitor inspection screen

If a command is sent while a terminal other than the external device that has acquired the communication priority, it may be possible that the controller sends the "priority error" as the response.

Chapter 2

Communication Specifications

This chapter describes the communication protocol.

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2-3 Variable Length Parameter 2-5

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2-1 Communication Protocol

This section describes the data format and data structure of the communication protocol.

Types of Header and Delimiter

The controller can be set to have one of the following types header/delimiter formats. Select the appropriate format in accordance with the data format of the PC or PLC (programmable controller) that is connected.

■ Format 1

Header: None, Delimiter: CR (0Dh)

Command/Response Data 1 to 4092 Bytes	,	Checksum	CR

■ Format 2

Header: STX (02h), Delimiter: ETX (03h)

STX	Command/Response Data 1 to 4092 Bytes	,	Checksum	ETX

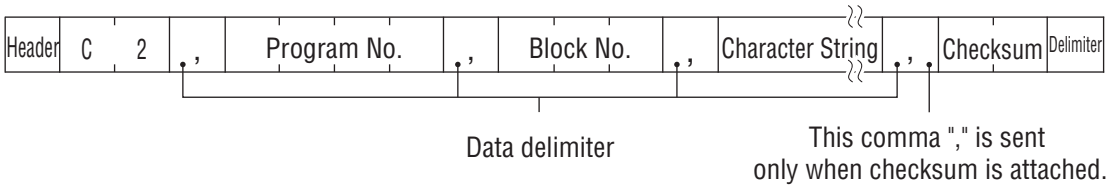
Note Ethernet supports Format 1 only.

Data Structure

The command that is sent from external device side and the response that is sent from the controller have the data structure as shown below.

Example

Character string data setting command



The sent data contains the identification code and various parameters sequentially in between the header and delimiter, and a comma "," is inserted between the items. The checksum can be added at the end of a data.

"2-1 Communication Protocol" - " Checksum" (Page 2- 3)

Note Ethernet does not support Checksum.

Most commands and response data is sent in the ASCII code (1-byte) but there can be a case that the marking character string is sent in the shift JIS code (2-byte).

Checksum

■ Absence/presence of checksum

Use of the checksum enables you to check absence/presence of a data error.
To detect errors using checksum, add a comma "," and the checksum data (2 bytes) determined by the checksum data calculation method described below, at the end of the sent data. Absence/presence of checksum in the data (response) to be sent from controller to external device should be set using "Communication settings" of "MARKING BUILDER 2" or "MARKING BUILDER 3", or using the console.

For information on the communication settings of the controller side, refer to "9-4 Unit Setup" of "MARKING BUILDER 2 (MB-H2D3) User's Manual".

"MARKING BUILDER 3 User's Manual" - "5-3 Unit Setup: Ethernet Settings"

Note

- Communication with "checksum present" is recommended to ensure data sending and receiving reliability.
- Note that normal communication cannot be established if the checksum absence/presence setting is not the same in the controller and the external device.
- Ethernet does not support Checksum.

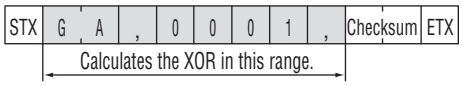
■ Checksum calculation method

Checksum data is created by converting XOR (exclusive OR logic) result (1 byte) starting from the character immediately after the header (or from the first character when header is absent) to the final character of the communication data, into the two ASCII codes.

Example

The checksum calculation example below shows the case for program No. switching command (GA).

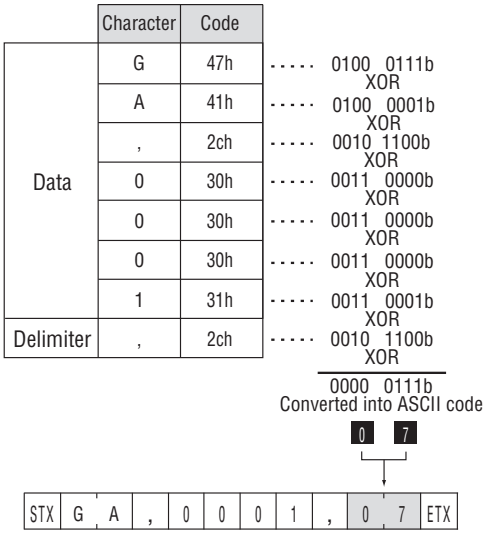
The sent data (Protocol 2) has the data structure as shown below.



1 XOR starting from "GA" up to "," is calculated.

2 The XOR result is converted into ASCII code (two codes).

3 The calculated result is added as the checksum data.



The numerical value marked by an "h" at the end indicates that the value is hexadecimal number.
The numerical value marked by a "b" at the end indicates that the value is binary number.

2-2 How to Read the Data Structure Table

Each command and response is described in subsequent chapters showing the sent data format and detailed data table. This section describes how to read the data structure and detailed data table.

■ Command

Cumulative number of bytes calculated excluding header is shown.
The value is not shown for the data that may not be added in specific cases.

Data structure

1		4		12		20			
Header	T K	,	Installation Position Correction (X)	,	Installation Position Correction (Y)	,	Installation Angle Correction (θ)	,	Checksum	Delimiter

Detailed data table

Item	Parameter	Number of bytes	Remarks
Identification Code	TK	2	Fixed
Installation position correction (X)	-55.000 ~ 055.000	7	○ Variable length parameter of 7 bytes or less Unit: mm
Installation position correction (Y)	-55.000 ~ 055.000	7	
Installation angle correction (θ)	000.00 ~ 359.99	6	○ Variable length parameter of 6 bytes or less Unit: °
Total number of bytes		26 (22)	

Name of each data item to be sent.

The parameter value or range of parameter values for the data to be sent is shown.

Number of bytes of each item.

Detailed description of each item

The total number of bytes indicates the sum of data in terms of number of bytes, excluding header, delimiter, checksum and comma "," immediately before the checksum. Value in parenthesis ( ) indicates the total number of bytes of each item excluding comma ",". (Total number of bytes is calculated using the maximum number of bytes even when variable length parameter is used.)

Header	T K	,		,	Checksum	Delimiter

Total bytes (including commas)

Note The parameter shows the range of settings for ML-Z9510 (standard character model). If other models have different ranges of settings, the differences are shown in "List of Input Values for Each Machine Type" (Page A- 2).

■ Response

1		4				
Header	T K	,	0	,	Checksum	Delimiter

Only responses during the normal operation are shown.
For the responses when an error occurs, refer to "3-1 Error Response" (Page 3- 2).

Note The detailed data table is omitted from certain basic commands and response if the identification code and error status is the only data sent.

2-3 Variable Length Parameter

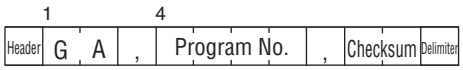
This section describes the variable length parameters.

Among the parameters contained in the commands, there are parameters that can be reduced with regard to the number of bytes to be sent. These parameters are shown as the "variable length parameters" and are indicated in the remarks column in the detailed data table as shown in the following example.

Example

Program No. switching command "GA"

■ Command



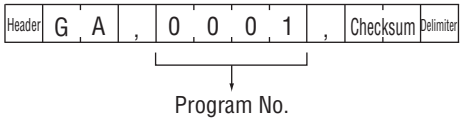
Item	Parameter	Number of bytes	Remarks
Identification Code	GA	2	Fixed
Program No.	0000 to 1999	4	○ Variable length parameter of 4 bytes or less

When the above indication is shown, the data can be sent with variable length data.
The white round mark indicates that the data is variable length parameter.
The black round mark indicates that the data is fixed length parameter.

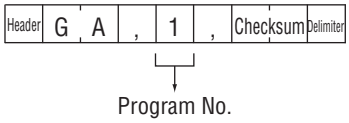
Note The respective parameters of the responses that are sent from the controller are of the fixed length data.

The variable length parameter can be sent using the data format as shown below.

When you want to change the program No. to "0001", the parameter can be sent using the four digit data as shown below.

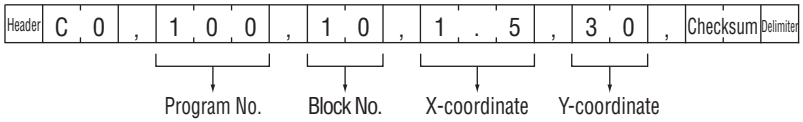


In the "GA" command, the program No. is the variable length data. It is not necessary to send the preceding zeros in the program number, in this example, only the "1" is sent.



Example

Block coordinates change command "C0"
When you want to change the block start X- and Y-coordinates of the program No. "0100" and block No. "010", to (X, Y) = (1.5, 30.0), you can send data as shown below.



Note that the following transmission rule is imposed on the variable length parameter. For example, to send 5 mm, the following rule should be observed.

Correct	Wrong	Description
5	5.	When decimal point character is added, the digit more than one digit past the decimal point is required.
05	_5 ("_" means a space.)	You cannot replace a "0" with a "space".
05.0	_5.0	

2-4 Communication Compatibility with the Previous Models

This section describes the compatibility with the ML-G9300/MD-V9600/MD-H9800 series.
The communication compatibility of the communication commands for the ML-G9300 series (referred to as "ML-G") and ML-Z9500 series (referred as ML-Z) is described as an example.

■ Communication specifications

The specifications for RS-232C and RS-422A interfaces, communication settings, and communication protocol for ML-Z are same as ML-G.

Important The compatibility of communication commands ensures compatibility of communication between ML-G and ML-Z, but does not provide operation compatibility such as processing time.
The internal processing such as change of data and the operations of I/O terminals conform to the specifications of ML-Z.
For the external controls such as I/O terminals, modification may be necessary in some cases.

■ Available communication commands

Commands used with ML-G can also be used with ML-Z
(a subset of ML-G commands is used with ML-Z).
However, you may need to make changes to the control program, since the following changes have been made to the commands.

- ML-Z does not have the common block (block numbers 256 to 260) which existed in ML-G. Thus, sending a command that set the marking content or make request for a block number in the common block results in an error.
- The same set of error codes for ML-G is used for ML-Z, but new error codes are also added. Address these new error codes as required.
  "ML-Z error code list" (Page 3-3, Page 3-6)
- Receiving data with a request command that has an input range exceeding the range of ML-G changes the data length for some parameters.
- Receiving data with a request command that has an input range exceeding the range of ML-G changes the data length for some parameters.
  The data lengths for X- and Y-coordinates of request block conditions command "F3" change as follows.

  When coordinates (15, -5) are requested:

  "F3,.....,015.000,–005.000,....."
  (015.000: 7 bytes, –005.000: 7 bytes)

  When coordinates (-100, 5) are requested in ML-Z9520 (wide area model):

  "F3,..... ,–100.000,005.000,....."
  (–100.000: 8 bytes, 005.000: 7 bytes)

  The command is sent according to the specified coordinates and number of bytes changes accordingly.

- You cannot set values exceeding the setting range of ML-G by using the ML-G setting commands.
- For "fixed point" machinery operation with ML-G, "fixed point irradiation time" cannot be set by sending a value with "G0" command. When using "fixed point" 2D machinery operation with ML-Z, modify the control program to set the "fixed point irradiation time" with "K0" and "K2" commands.

■ Communication compatibility among MD-H9800, MD-V9900, MD-S9900, MD-F3000/3100/5100/MD-T1000 and MD-X1000/1500

Communication compatibility is maintained among MD-H9800 Series, MD-V9900/MD-S9900, MD-F3000/3100/5100/MD-T1000 and MD-X1000/1500 Series as well as between ML-G and ML-Z previously described.

* Do not enter values beyond the setting range.

■ Communication compatibility among MD-V9600, MD-V9900, MD-S9900, MD-F3000/3100/5100/MD-T1000 and MD-X1000/1500

Communication compatibility except for the block condition communication is maintained among MD-V9600 Series, MD-V9900/MD-S9900, MD-F3000/3100/5100/MD-T1000 and MD-X1000/1500 Series as well as between ML-G and ML-Z previously described.

* Do not enter values beyond the setting range.

Chapter 3

Troubleshooting

This chapter describes the type of errors that can occur and how to release the error condition.

3-1 Error Response 3-2

3-2 Time-out Error 3-4

3-3 Requesting and Resetting the Error Contents 3-5

3-1 Error Response

This section describes the causes of communication errors and the responses when an error occurs.

Types of Errors

There are two types of communication errors as shown below in the ML-Z9500/MD-V9900/MD-S9900/MD-F3000/MD-F3100/MD-F5100/MD-T1000/MD-X1000/MD-X1500 Series.

(1) Error when the sent data is illegal or when abnormality occurs in the unit.

When the data command is received correctly up to the delimiter, but the command contents contains an error or when the unit has an internal abnormality in which the command cannot be executed, the result is added to the respective responses and returned.

(2) Time-out error

The time-out error is issued if delimiter is not received within the time-out period even after data reception has started successfully.

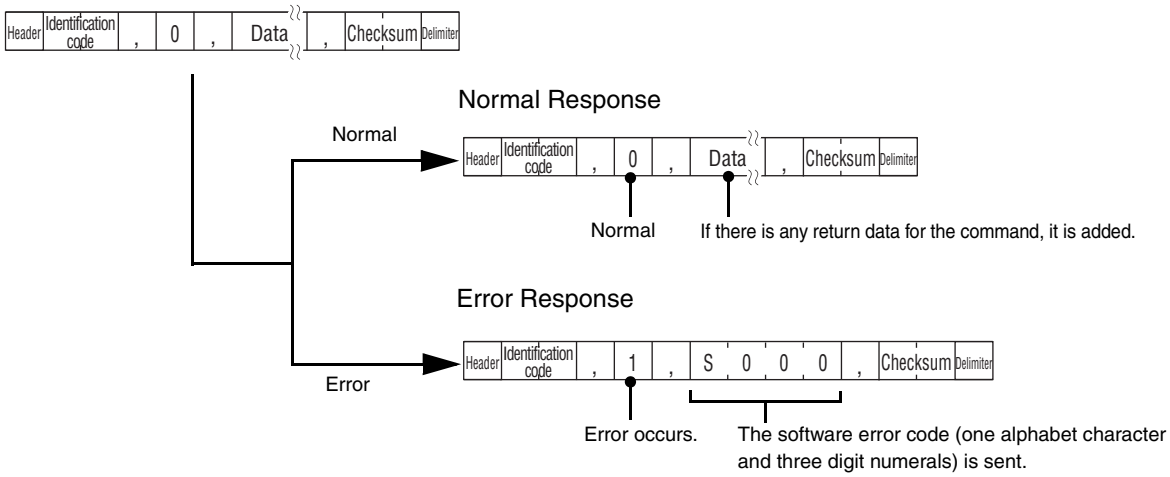
"3-2 Time-out Error" (Page 3- 4)

Error Response

When the controller receives the data sent from external device up to delimiter and the received command is executed normally, the controller returns the normal response. If the received data is illegal or if the received data cannot be executed correctly, the controller returns an error response.

The responses for the respective commands are returned in the following formats.

• Sent command



Reference Only the normal response is shown in the description of respective commands.

A single error status byte that is used to check whether an error occurred is added to the response.
You can check if the command is executed correctly or not by checking this error status byte. If an error occurred, the code of the error which prevents the command from being executed is added to the response.
The error codes that are added to the normal communication commands are shown below.

For details on the errors, refer to "Error Messages" in the User's Manual for each model.

Error code	Error contents
S000	Program Incorrect Error
S001	Program Memory Full Error
S002	Built-in Memory Card Full Error
S003	External Memory Card Full Error
S004	External Memory Card Not Inserted Error
S005	External Memory Card Unrecognizable Error
S006	Priority Error
S008	No-File Error
S009	Busy Error
S010	No Marking Block Error
S011	Logo/Custom Character Number Exceed Error
S012	Incorrect Optimization Error
S014	Current Program Operation Error
S015	Logo/Custom Character File Operation Error
S016	Test Mark Unexecutable Error
SO18	Barcode/2D Code Program Incorrect Error
S019	All-Setup Restoration Error
S020	Data Length Error
S021	Program Number Not Registered Error
S022	Block Number Not Registered Error
S024	Illegal Command Error
S025	Checksum Error
S026	Format Error
S027	Command Unrecognizable Error
S028	Response Data Length Error
S029	Mark Data Request Error
S030	Group Number Not Registered Error
S050	Quick Change of Character Setup Error
S051	Sample Marking Unexecutable Error
S052	Laser Inspection Unexecutable Error

Error code	Error contents
S060	Block Type Program Incorrect Error
S061	Block Position Program Incorrect Error
S062	Character Size Program Incorrect Error
S063	Character Layout Program Incorrect Error
S064	Character Details Program Incorrect Error
S065	Marking Parameters Program Incorrect Error
S066	Barcode/2D Code Condition Program Incorrect Error
S067	Continuous Marking Program Incorrect Error
S068	Movement/Marking Direction Program Incorrect Error
S069	Line Settings Program Incorrect Error
S070	Palette Information Program Incorrect Error
S071	Palette Workpiece Information Program Incorrect Error
S072	String Program Incorrect Error
S073	Individual Counter Program Incorrect Error
S074	Common Counter Program Incorrect Error
S075	Preset Information Program Incorrect Error
S076	System Information Program Incorrect Error
S077	Font Replacement Information Program Incorrect Error
S078	Font Scaling Information Program Incorrect Error
S079	Font Skip Cross Width Information Program Incorrect Error
S080	Logo/Custom Character Buffer Information Program Incorrect Error
S081	Current Value Information Program Incorrect Error
S082	3D System Information Program Incorrect Error
S083	3D Information Program Incorrect Error
S084	Operation Limit Error
S086	Wobble Incorrect Setting Error
S090	Registration Barcode Error
S091	Barcode and 2D Code Link Setting Error
S092	Barcode Registration Incorrect Error

Note

- Use the error contents request command "EX" when you want to check an error that has occurred inside the controller and not caused by the communication process.

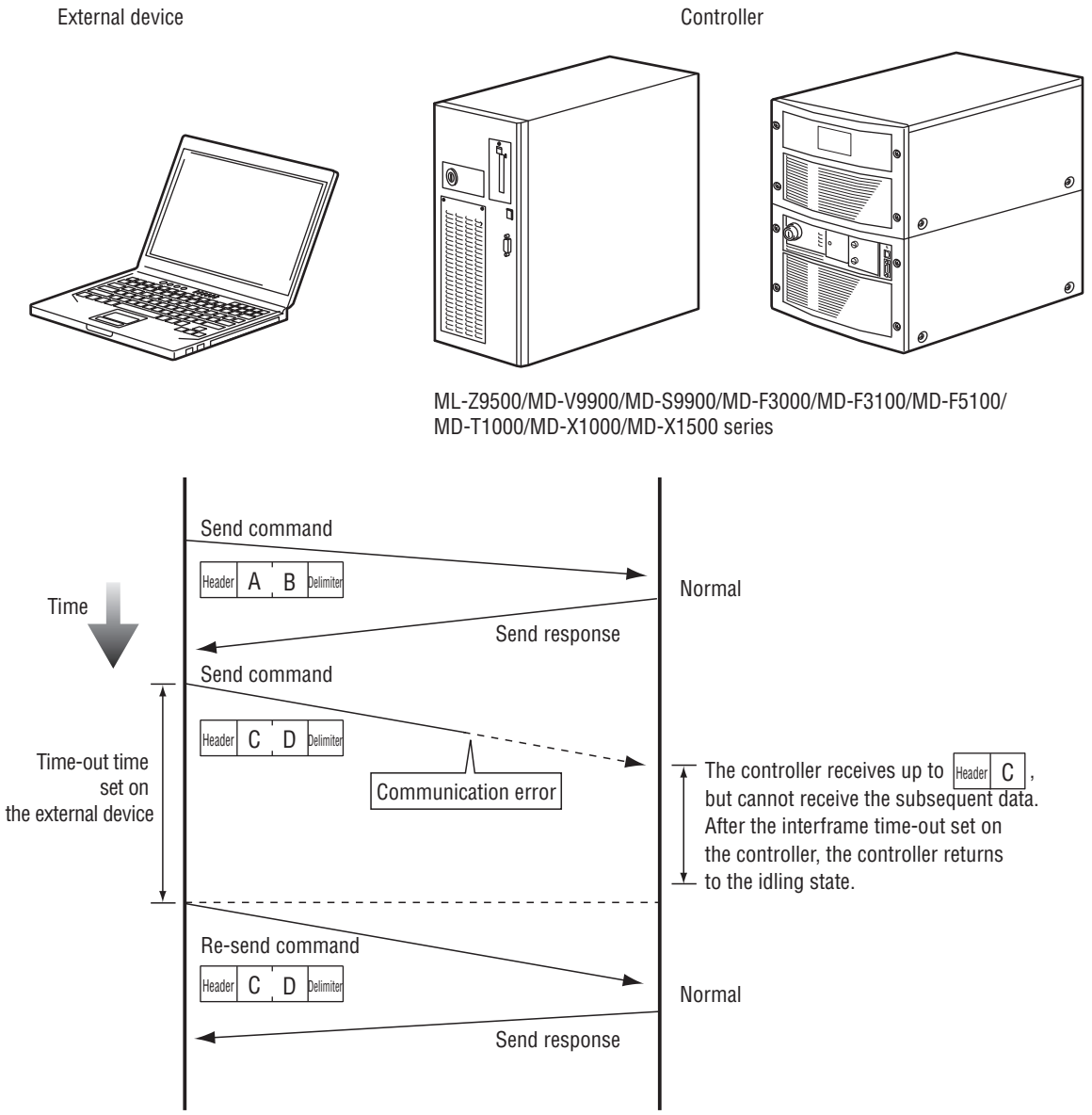
  "3-3 Requesting and Resetting the Error Contents" (Page 3- 5)
- Among the various commands, the "Program No. switching command GA" and the "Marking Start NT" command may be returned with the error response from controller indicating the error that occurred. For the error codes that have occurred inside the controller, refer to pages Page 3-6 and Page 3-7.

3-2 Time-out Error

This section explains remedies when the timeout error occurs during the RS232C and RS422A communication.

When the controller detects that time-out has occurred, the controller discards the data that it has received up to that moment, and returns the communication status to the idle state. When time-out occurs, the controller does not return any response.
External device should set an appropriate time-out time during which external device waits for a response after sending a command.
If external device does not receive a response within the time-out time, it becomes ready again to receive the normal response from the controller by re-sending the command.
The time-out time should be designed and set as described below.

- Time-out time on external device side must be greater than the time-out time on controller side



3-3 Requesting and Resetting the Error Contents

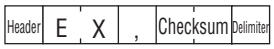
This section describes the procedure to check the error contents when an error occurs, and the procedure to reset the error.

Use the error contents request command (EX) to issue a request for cause of the error that is occurring at the moment. When an error occurs, remove the cause of the error. After removal, use the error reset command (FY) to reset the error.

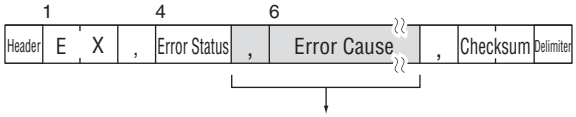
Requesting error contents (EX)

Use this command to inquire about the contents of an error. When an error occurs inside the controller, the corresponding error code is added to the response that is sent. When no error occurs, only the error status is sent. When two or more errors occur simultaneously, all error codes that are occurring at the moment are sent.

■ Command



■ Response



All the errors occurring are sent as Error Cause.
This is not attached when no error has occurred.

Item	Parameter	Number of bytes	Remarks
Identification Code	EX	2	Fixed
Error Status	0/1	1	0: Normal operation 1: Error occurred
Error Cause	Error code	-	• It is added only when the error status is "1". • A single error cause is indicated using a single alphabet and three numerical digits. • All of the errors that have occurred are returned. For error causes, refer to pages Page 3-6 and Page 3-7.
Total number of bytes		-	

When two or more errors occur, response is returned in the following format.

Example

■ Error

When an error occurs, the following error code is added to the response and returned.
To restore the system from error status, use the error reset command (FY) to reset the error, and return the controller to the ready state.

Error code	Error contents
E000	Laser Reflecting Wave Error
E001	Laser High-Temperature Error
E002	Laser Excess Voltage Error
E003	Marking Unit Communication Error
E004	Scanner Error
E005	Shutter Error (out of order)
E006	Marking Unit Not Connected Error
E007	Marking Unit Model Error
E008	Controller FPGA Version Error
E009	Marking Unit FPGA Version Error
E010	No Marking Block Error
E011	Built-in Memory Card Unrecognizable Error
E012	Marking Unit Data Error
E013	Expansion Memory Full Error
E014	Mark Memory Full Error
E015	No Program Error
E016	Not Optimized Error
E017	No Font File Error
E018	Encoder Marking Over-Speed Error
E019	Mark Trigger Error
E020	Expansion Memory Full Error 2
E021	Sensor Timeout Error
E022	Over-Area Error
E023	Movement Marking Over-Area Error
E025	Logo File Error
E026	Custom Character File Error
E027	Encoding Disabled Error
E028	Switching Program Unexecutable Error
E029	Scanner Error 2
E030	Limit Setting Error
E031	Restart Error
E032	Logo/Custom Character Enlargement Error
E033	Skip Cross Error
E034	Encoding Disabled Error
E035	Quick Change of Character Setup Error
E037	Machinery Oval Setting Error
E038	Logo/Custom Char. Buffer Full Error
E039	Wobble/Scratch incorrect setting error
E040	Link Block Error

Error code	Error contents
E041	3D Position Incorrect Error
E042	Marking Omission Detection Error
E043	Error Emission Detection Error
E044	Z Over-Area Error
E045	Barcode Not Registered Error
E046	Warm Up Setting Error
E047	3D Block Size Error
E048	Z-MAP File Error
E049	No Font Error
E050	Marking Data Generation Error
E051 to E069	System Error 2 to 20
E090	Internal Clock Not Set Error
E091	Ethernet Version Error
E100	LD High-Temperature Error
E101	LD Low-Temperature Error
E102	Oscillator High-Temperature Error
E103	Oscillator Low-Temperature Error
E104	Q Switch Disabled Error
E106	Q Switch Control Error
E107	Q Switch Operation Check Error
E110	Laser Power Auto Calibration Error
E120	Oscillator High-Temperature Error 2
E121	Oscillator Low-Temperature Error 2
E122	Unconnected Temperature Control Cable Error
E123	Oscillator Power Error
E130 to E143	System Error 21 to 33
E145	Trimming Incorrect Setting Error
E146	Trimming Over-Area Error
E204	Marking Unit Control Cable Not Connected Error
E220 to E235	System Error 34 to 49
E250	Head Cover Open Error
E251	Shutter Error 2
E252 to 255	Scanner Error 3 to 6
E256	Head High-Temperature Error 1
E257	Head High-Temperature Error 2
E258	Head High-Temperature Error 3
E259	Head High-Temperature Error 4
E260	Head High-Temperature Error 5
E261	Head Low-Temperature Error 1

Error code	Error contents
E262	Head Low-Temperature Error 2
E263	Head Low-Temperature Error 3
E264	Head Low-Temperature Error 4

Error code	Error contents
E265	Head Low-Temperature Error 5
E266	LD Under-Current Error
E300 to E319	Memory Check Error 1 to 20

■ Warning

Error code	Error contents
W000	Battery Life Warning
W001	Laser Temperature Warning
W100	LD Temperature Control Warning
W101	Head Temperature Control Warning
W110	Laser Power Output Low Error
W111	Marking Energy Shortage Error
W112	Excess Marking Energy Alarm
W120	LD Current Alarm
W121	Laser Unit Temperature Warning 1
W122	Laser Unit Temperature Warning 2
W123	Reflection Light Warning
W124	LD Life Warning
W125	Voltage drop warning
W130	Head High-Temperature Warning 1

Error code	Error contents
W131	Head High-Temperature Warning 2
W132	Head High-Temperature Warning 3
W133	Head High-Temperature Warning 4
W134	Head High-Temperature Warning 5
W135	Head Low-Temperature Warning 1
W136	Head Low-Temperature Warning 2
W137	Head Low-Temperature Warning 3
W138	Head Low-Temperature Warning 4
W139	Head Low-Temperature Warning 5
W140	Laser Resonator High-Temperature Warning
W141	Laser Resonator Low-Temperature Warning
W142	Laser Resonator High-Temperature Warning
W143	Laser Resonator Low-Temperature Warning

■ Terminal block control status

These error codes are sent when the terminal block on the rear of the controller is being controlled.

Error code	Error contents
T000	Emergency Stop/Remote interlock in use
T001	Controlling Shutter
T002	Trigger Inhibited
T003	Marking Laser Disabled
T004	Machinery Operation Mode Disabled
T005	Distance Pointer ON
T006	Laser Not Excited
T007	LD temperature being adjusted/Laser unit waiting to start up
T008	Warming Up
T009	Auto-calibrating Laser

Error code	Error contents
T010	Oscillator temperature being adjusted
T011	Contactor input OFF

■ Communication errors

These error codes are sent when a software-related error occurs.

Error code	Error contents
S025	Checksum Error
S026	Format Error
S027	Command Unrecognizable Error

Resetting error (FY)

When an error occurs, remove the cause of the error. After removal, use the error reset command to reset the error. Unless the error is reset, the controller does not return to the ready state.

■ Command

Header	F	Y	,	Checksum	Delimiter

■ Response

	1			4			
Header	F	Y	,	Error Status	,	Checksum	Delimiter

Reference How to reset error when an error occurs

In addition to the method of using the error reset (FY) command, an error can be reset by using the following methods.

■ When the controller is used as a standalone equipment:

After cause of error is removed, perform the following operations.

- Short-circuit the error reset input terminal (pin-7) and the COM IN B terminal of the controller.
- Turn the key switch to either "POWER ON" or "OFF" once and then turn it back to "POWER ON" again.

■ When the laser marker setup software "MARKING BUILDER 2" or "MARKING BUILDER 3", or the touch panel console "MC-P1" is connected:

"MARKING BUILDER 2"

- Click on the [Error Reset] button on the main menu.
- Click on the [Error Reset] button on the operation monitoring menu.
- Click on the [Error Reset] button in the [Test marking] dialog box.
- Click on the [Error Reset] button in the [Check] dialog box.

"MARKING BUILDER 3"

- Click on the [Error Reset] button on the error display screen for the Laser marker/Marking tab.
- Click on the [Error Reset] button on the operation monitor screen.

"Touch panel"

- Press the [Error Reset] button on the error check menu.
- Press the [Error Reset] button on the test marking menu.

■ When using a monitor and mouse with the MD-V9900/MD-S9900/MD-F3000/MD-T1000/MD-F3100/MD-F5100/MD-X1000/MD-X1500 Series:

- Press the [Error Reset] button on the error check menu.
- Press the [Error Reset] button on the test marking menu.

Chapter 4

Registering, Requesting, and Deleting the Program

This chapter describes the procedures to register, request and delete the program contents of the controller.

4-1 Overview 4-2

4-2 Setting Various Conditions 4-7

4-3 Deleting Program Contents..... 4-59

Note The range of settings shown in this manual is for the ML-Z series ML-Z9510 (standard character model).
If other models have different ranges of settings, these ranges are shown in "List of Input Values for Each Machine Type" (Page A- 2).

4-1 Overview

This section describes the structure of each program No. and the operation flow when setting the marking contents and various conditions.

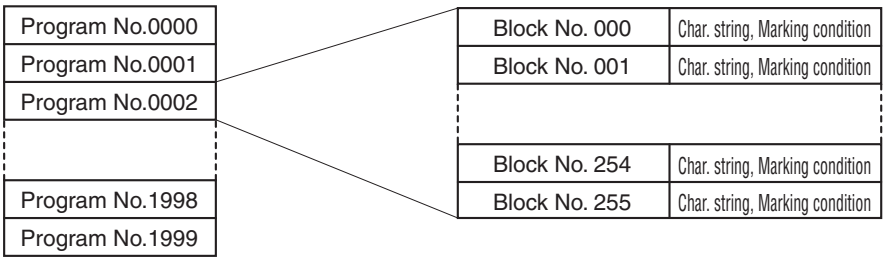
Program No. and Block Structure

A single program No. consists of multiple block Nos. and is saved as a single file. If you want to mark the character string under multiple conditions within a single program No., use separate blocks to specify the different conditions.

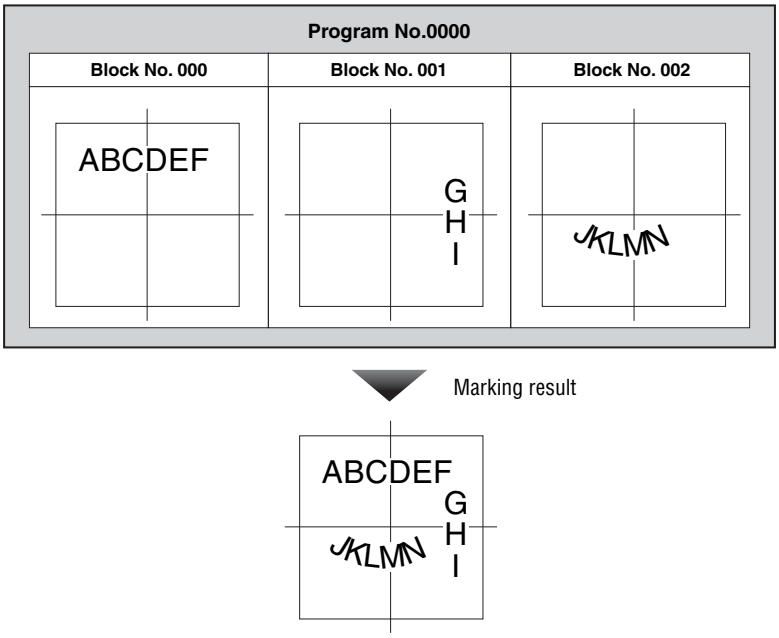
■ Number of programs and registrations

- A maximum of 2000 programs (0000 to 1999) can be registered in the controller.
- A maximum of 256 blocks (0 to 255) can be registered in a single program No.
- A maximum of 128 characters can be registered in a single block No.
- Every program No. can have a title (maximum of 13 2-byte characters).
- A single line of character string and its marking conditions can be set to each block independently.

■ Program No. and block No. structure



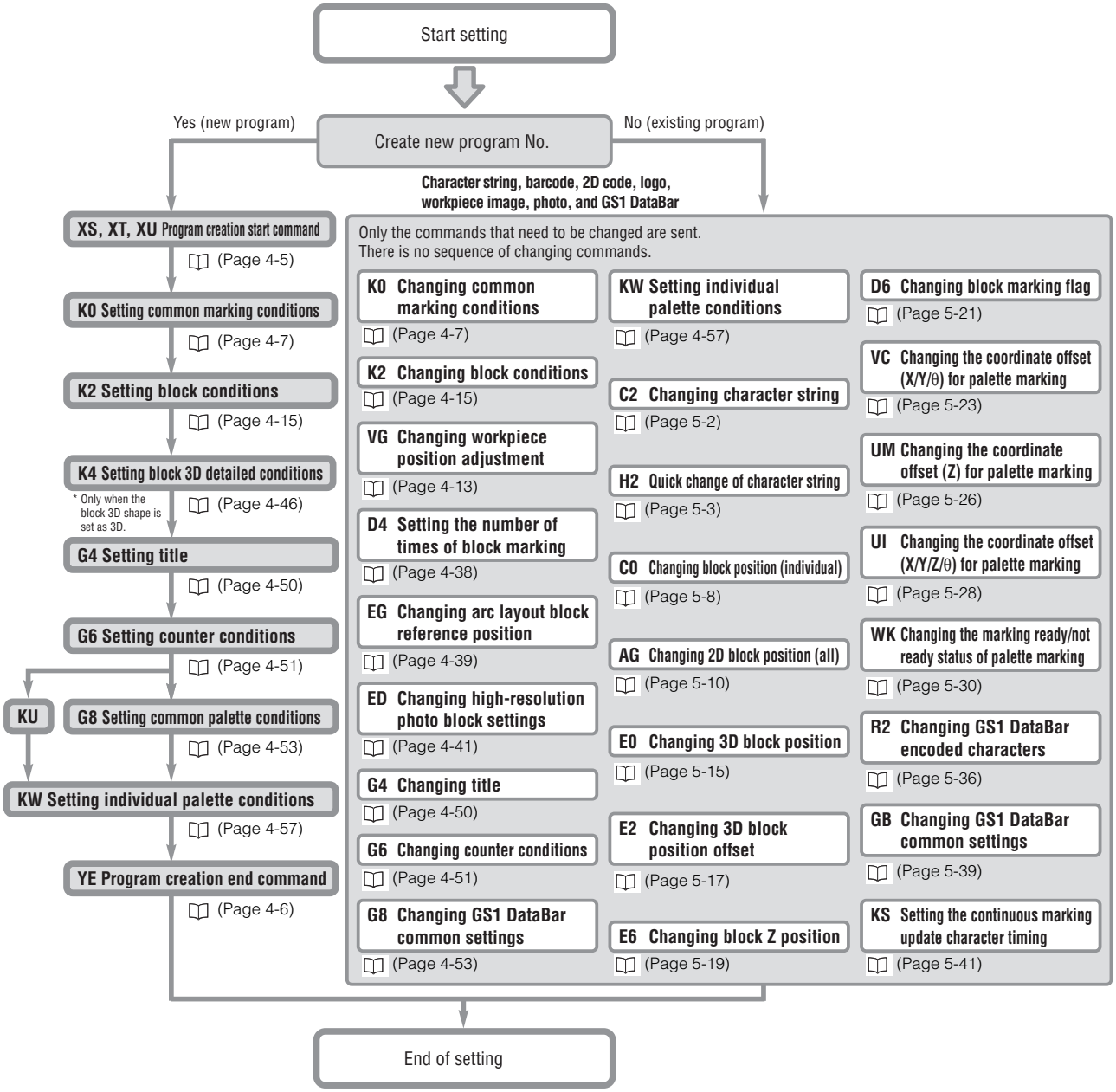
For example, when the block Nos. 000, 001 and 002 are set in the program No. 0000, the characters are marked as shown below.



Operation Flow of Setting the Marking Contents and Conditions

The operation procedure for setting the marking contents for a new program No. and for modifying an existing program No. are different. Operation flow of setting is shown below. Operation flow of setting is shown below.

Operation flow of setting (character string, barcode, 2D code, logo, workpiece image, photo, and GS1 DataBar)

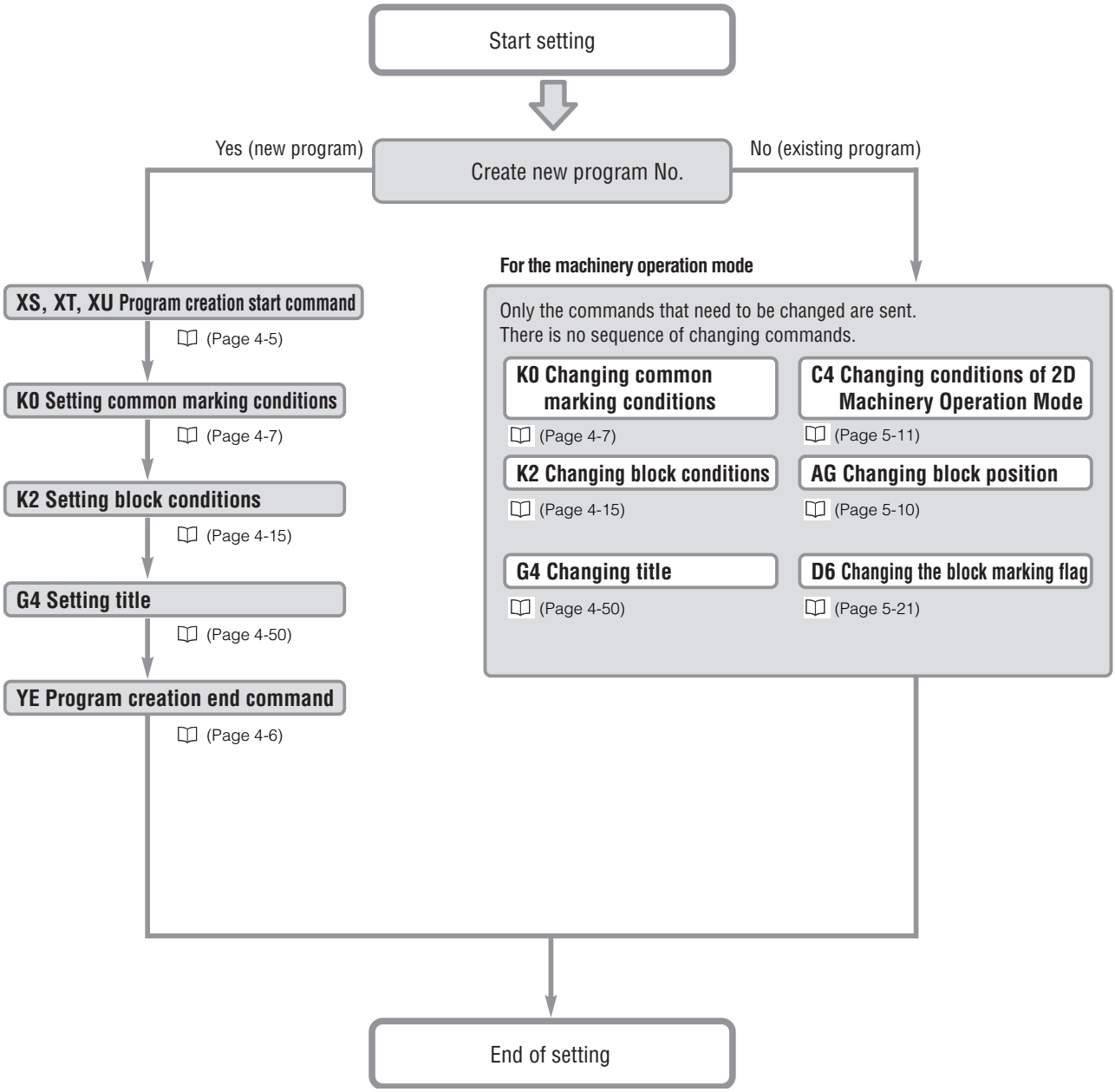


Note

- To create a new program No., the commands starting with the Program creation command (XS, XT, XU) through the Setting title command, as well as the Program creation end command (YE) are required. If the Setting title command (G4) is not sent, the title is automatically set to "DEFAULT****" (* means the program No.).
- The Setting counter conditions command (G6) and the Setting palette conditions commands (G8 and KW) do not need to be sent unless they are necessary.

Reference To change the marking contents of a program No. that has been created before, and to execute consecutively multiple changing commands shown in the right column in the diagram above, you can shorten the communication time by executing and sending the commands in the order of the Program creation start command (XS, XT, XU), executing multiple changing commands, and Program creation end command (YE).

Operation flow of setting (Machinery Operation Mode)



Note

- Movement marking function is not supported in the machinery operation mode.
- To create a new program No. for the machinery operation mode, sending the commands starting from the Program creation start command (XS, XT, XU) up to the Program creation end command (YE) is required.

Reference

- To change the marking contents of a program No. that has been created before, and to execute consecutively multiple changing commands shown in the right column in the diagram above, you can shorten the communication time by executing and sending the commands in order starting from the Program creation start command (XS, XT, XU), executing multiple changing commands, Program creation end command (YE).
- The machinery operation block can be mixed with laser marker operation block to be operated under conditions of other block types. To mix the machinery operation block with blocks of other types as described above, select the required setting commands for the desired operation.

Creating a New Program No.

Program creation start command (XS, XT, XU)

To create a new program No., you must define a new program by using a Program creation start command (XS), (XT) or (XU). When the controller receives a Program creation start command, the subsequent program data is tentatively stored. When the controller receives the Program creation end command (YE), the program is finally stored in the controller. When the controller receives the Program creation stop command (XI), the program data that is stored tentatively is discarded and the program creation is terminated.
There are three types of Program creation start commands.
Use the XS command under normal conditions.

- XS command: Saves only the changes, which have been made to the settings before the Program creation end command (YE) is sent.
- XT command: Deletes all the previous settings first, and saves the settings that have been made before the Program creation end command (YE) is sent. To use this command, all the settings required for marking, such as common marking conditions, should be sent.
- XU command: Deletes only the block conditions from the previous settings first, and save the settings that have been made before the Program creation end command (YE) is sent.

Program creation start command (XS)
[Changes and saves the specified settings]

■ Command

1		4				
Header	X S	,	Program No.	,	Checksum	Delimiter

■ Response

1		4				
Header	X S	,	0	,	Checksum	Delimiter

Program creation start command (XT)
[Changes and saves all the settings]

■ Command

1		4				
Header	X T	,	Program No.	,	Checksum	Delimiter

■ Response

1		4				
Header	X T	,	0	,	Checksum	Delimiter

Program creation start command (XU)
[Changes and saves only the block conditions]

■ Command

1		4				
Header	X U	,	Program No.	,	Checksum	Delimiter

■ Response

1		4				
Header	X U	,	0	,	Checksum	Delimiter

Reference To change the marking contents of a program No. that has been created before, and to execute consecutively multiple changing commands, you can shorten the communication time by executing and sending the commands in the order of the Program creation start command (XS, XT, XU), executing multiple changing commands, and Program creation end command (YE).

Program creation end command (YE)

Use this command to confirm the end of creating a new program No. The controller validates the program data when it receives this command.

■ Command

Header	Y	E	,	Checksum	Delimiter

■ Response

	1			4			
Header	Y	E	,	0	,	Checksum	Delimiter

Program creation stop command (XI)

Use this command to stop creation of a new program No. The controller discards the program data when it receives this command.

■ Command

Header	X	I	,	Checksum	Delimiter

■ Response

	1			4			
Header	X	I	,	0	,	Checksum	Delimiter

4-2 Setting Various Conditions

This section describes the procedure for setting and requesting the various functions that make up a specific program No.

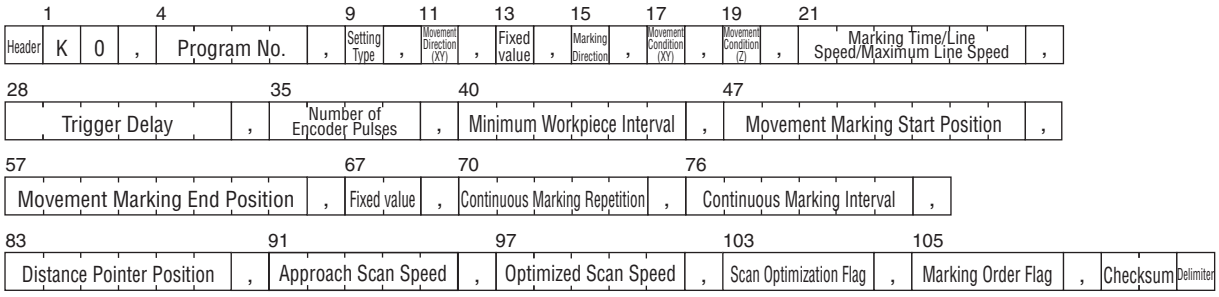
Setting and Requesting Common Marking Conditions

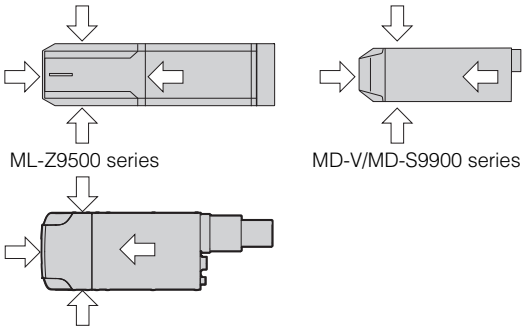
Setting common marking conditions (K0)

Use this command to set the marking conditions that apply commonly to all block Nos. in a single program No. Values of some items will become invalid due to the Movement Conditions. However, be sure to send all items when sending the command string.

Note MD-X Series: Ver.1 does not support movement marking.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	K0	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Setting Type	0 to 4	1	0: 2D marking 1: 3D marking 4: Fixed point while trigger is ON For the MD-T1000 Series, "0" and "4" can only be set.
Movement Direction (XY)	0 to 4	1	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition (XY).  ML-Z9500 series MD-V/MD-S9900 series MD-F3000/3100/5100 series 0: ↓, 1: →, 2: ↑, 3: ← Fixed to "0" for the MD-T1000 Series.
Fixed value	0	1	Fixed to 0
Marking Direction	0 to 7	1	"Supplementary description of parameters" (Page 4- 9)
Movement Condition (XY)	0 to 3	1	0: Stationary, 1: Equal speed, 2: Encoder Fixed to "0" for the MD-T1000 and MD-X Series.
Movement Condition (Z)	0 to 5	1	0: Stationary, 3: Selection, 4: Analog, 5: Strobe Fixed to "0" for the MD-T1000 Series. MD-X Series: 0: Fixed, 5: External displacement sensor, 6: Auto focus

Item	Parameter	Number of bytes	Remarks
Marking Time/Line Speed/ Maximum Line Speed	Marking Time 000.01 to 300.00	6	To be selected in accordance with Movement Condition (XY) and Movement Condition (Z). O Variable length parameter of 6 bytes or less "Supplementary description of parameters" (Page 4- 9) Unit for Marking Time: s Unit for Line Speed/Maximum Line Speed: mm/s
	Line Speed/ Maximum Line Speed 0001.0 to 4000.0 *1		
Trigger Delay	Time 0000.0 to 0009.9	6	To be selected in accordance with Movement Condition (XY) and Movement Condition (Z). OVariable length parameter of 6 bytes or less "Supplementary description of parameters" (Page 4- 9) Unit for Time: s Unit for Interval: mm
	Interval 0010.0 to 1200.0		
Number of Encoder Pulses	0010 to 2000	4	This item is valid when "Encoder" is selected as Movement Condition (XY). Otherwise, it is fixed to "0". OVariable length parameter of 4 bytes or less Unit: pulses/10 mm Fixed to "0" for the MD-T1000 Series.
Minimum Workpiece Interval	0000.1 to 6500.0	6	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition (XY). Otherwise, it is fixed to "0". OVariable length parameter of 6 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series.
Movement Marking Start Position	-060.000 to 0060.000*1	8	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition (XY) or Movement Condition (Z). OVariable length parameter of 8 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series.
Movement Marking End Position	-060.000 to 0060.000*1	8	
Fixed value	00	2	●Data length is fixed to 2 bytes. The value is fixed to "00".
ContMarkRept	00000 to 65535	5	Set to "1" if continuous marking is not selected. Set to "0" if you select "Marking while trigger is ON" in the movement marking setting. OVariable length parameter of 5 bytes or less
ContMarkInterval	Time 0000.0 to 0009.9	6	To be selected in accordance with Movement Condition (XY) and Movement Condition (Z). This setting is invalid if continuous marking is not selected (i.e. if ContMarkRept is 1). OVariable length parameter of 6 bytes or less "Supplementary description of parameters" (Page 4- 9) Unit for Time: s Unit for Interval: mm
	Interval 0000.1 to 1200.0		
Distance Pointer Position	-021.0 to 0021.0*1	6	Specify the irradiation position of the distance pointer in terms of the distance from the installation position correction plane. OVariable length parameter of 6 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series.
Approach Scan Speed	00000, 00001 to 04000*1	5	0 : Uses the scan speed specified with block conditions for approach scan speed. Values other than 0:Scans the approach at the specified speed. OVariable length parameter of 5 bytes or less Unit: mm/s
Optimized Scan Speed	00000 (fixed)	5	●Data length is fixed to 5 bytes. *2 The scan optimization cannot be executed by using the communication command.
Scan Optimization Flag	2 (fixed)	1	*3 The scan optimization cannot be executed by using the communication command.

Item	Parameter	Number of bytes	Remarks
Marking Order Flag	0/1/2/3	1	For stationary marking: 0: Block order — Marking is executed in the order of block Nos. (no sorting). 1: Per block — Marking is executed after order of markings is optimized for each block. 2: Per character — Marking is executed after order of markings is optimized for each character. 3: User-specified order MD-X Series: 0: Group order or block order 1: Auto For movement marking: 1: Fixed
Total number of bytes		102 (81)	

*1: "List of Input Values for Each Machine Type" (Page A- 2)
*2: When a program No. that was set using the MARKING BUILDER 2 or from the remote control console is requested, it may be possible that a value other than "00000" (00001 to 12000) is sent.
*3: When a program No. that was set using the MARKING BUILDER 2 or from the remote control console is requested, it may be possible that "0" or "1" is sent.

■ Response

	1		4			
Header	K	0	,	0	,	Checksum	Delimiter

■ Supplementary description of parameters

- **Selecting parameters for Marking Time/Line Speed/Maximum Line Speed and Trigger Delay**
  The parameters used for Marking Time/Line Speed/Maximum Line Speed and Trigger Delay change according to the options selected for Movement Condition (XY) and Movement Condition (Z) as shown in the following table.

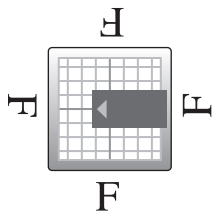
Movement Condition (XY)	Movement Condition (Z)					
	Stationary	Constant	Encoder	Selection	Analog	Strobe
Stationary	T	S/D	S/D	T	T	T
Constant	S/D	S/D	S/D	S/D	S/D	S/D
Encoder	S/D	S/D	S/D	S/D	S/D	S/D

For Marking Time/Line Speed/Maximum Line Speed
T : Specify marking time
S/D : Specify line speed or maximum line speed

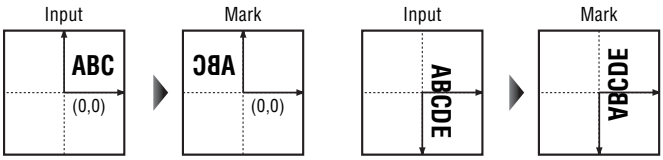
For Trigger Delay
T : Specify time
S/D : Specify interval

- Marking Direction and parameters
  Marking direction against the marker position (when viewing the marker head from the top) is set as shown below.

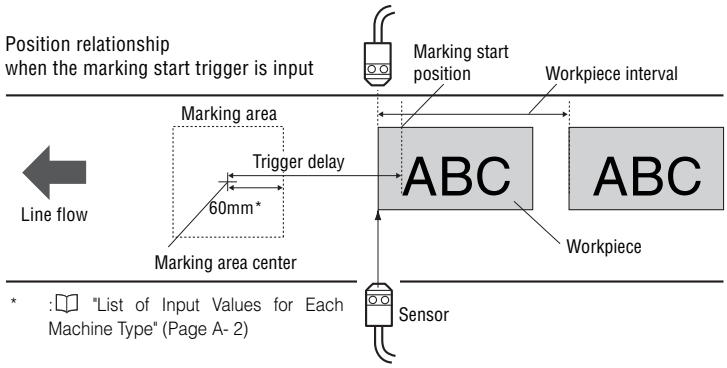
Marking direction		No.0	No.1	No.2	No.3
Coordinate axes		X, Y, ABC	Y, X, ABC	Y, X, ABC	X, Y, ABC
Set value	Normal	3	6	0	5
	Mirrored	2	4	1	7



When "Mirror image: Yes" is selected, the marking as shown below is made.



- Trigger Delay and Minimum Workpiece Interval
  Trigger Delay determines the distance from the center of the marking area to the marking start position on the next workpiece when the marking start trigger signal is issued. For Minimum Workpiece Interval, specify the minimum distance from one workpiece to the next.



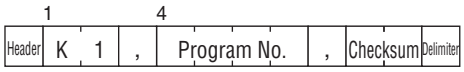
* : "List of Input Values for Each Machine Type" (Page A- 2)

Requesting common marking conditions (K1)

Use this command to request the marking conditions that apply commonly to all block Nos. in a single program No. Parameters for the items after the Identification Code and Error Status are identical to those of the Setting common marking conditions command (K0).

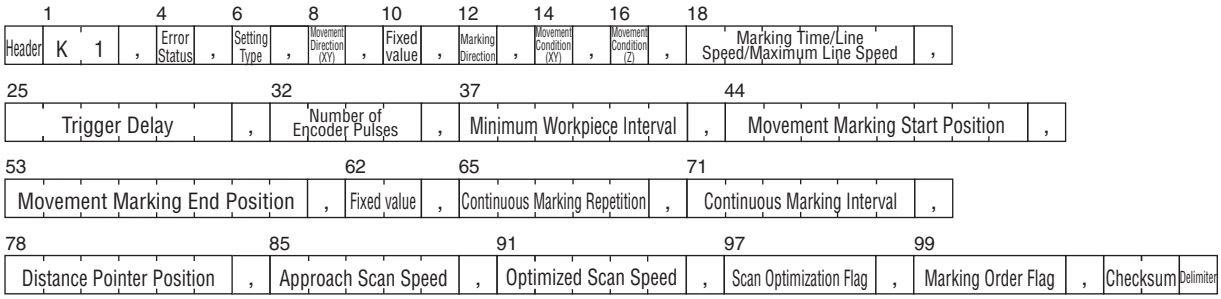
Note MD-X Series: Ver.1 does not support movement marking.

■ Command

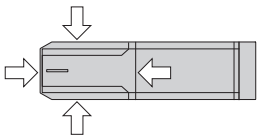
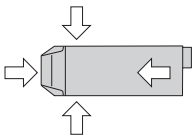
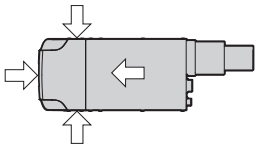


Item	Parameter	Number of bytes	Remarks
Identification Code	K1	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	K1	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Setting Type	0 to 4	1	0: 2D marking 1: 3D marking 4: Fixed point while trigger is ON

Item	Parameter	Number of bytes	Remarks
Movement Direction (XY)	0 to 4	1	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition.  ML-Z9500 series  MD-V/MD-S9900 series  MD-F3000/3100/5100 series 0: ↓, 1: →, 2: ↑, 3: ← Fixed to "0" for the MD-T1000 Series.
Fixed value	0	1	Fixed to 0
Marking Direction	0 to 7	1	"Supplementary description of parameters" (Page 4- 9)
Movement Condition (XY)	0 to 3	1	0: Stationary, 1: Equal speed, 2: Encoder Fixed to "0" for the MD-T1000 Series.
Movement Condition (Z)	0 to 5	1	0: Stationary, 3: Selection, 4: Analog, 5: Strobe Fixed to "0" for the MD-T1000 Series.
Marking Time/Line Speed/ Maximum Line Speed	Marking Time 000.01 to 300.00	6	The content varies depending on Movement Condition (XY) and Movement Condition (Z). ● Data length is fixed to 6 bytes. For information on whether the Marking Time or Line Speed/Maximum Line Speed is sent, refer to "Supplementary description of parameters (Refer to page 4-9.). Unit for Marking Time: s Unit for Line Speed/Maximum Line Speed: mm/s
	Line Speed/ Maximum Line Speed 0001.0 to 4000.0*1		
Trigger Delay	Time 0000.0 to 0009.9	6	The content varies depending on Movement Condition (XY) and Movement Condition (Z). ● Data length is fixed to 6 bytes. For information on whether the Time or the Interval is sent, refer to "Supplementary description of parameters (Refer to page 4-9.). Unit for Time: s Unit for Interval: mm
	Interval 0010.0 to 1200.0		
Number of Encoder Pulses	0010 to 2000	4	This item is valid when "Encoder" is selected as Movement Condition (XY). ● Data length is fixed to 4 bytes. Unit: pulses/10 mm Fixed to "0" for the MD-T1000 Series.
Minimum Workpiece Interval	0000.1 to 6500.0	6	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition (XY). Otherwise, it is fixed to "0". ● Data length is fixed to 6 bytes. Unit: mm Fixed to "0" for the MD-T1000 Series.
Movement Marking Start Position	-060.000 to 0060.000*1	8	This item is valid when "Equal speed" or "Encoder" is selected as Movement Condition (XY) or Movement Condition (Z). ● Data length is fixed to 8 bytes. Unit: mm Fixed to "0" for the MD-T1000 Series.
Movement Marking End Position	-060.000 to 0060.000*1	8	
Fixed value	00	2	● Data length is fixed to 2 bytes. The value is fixed to "00".
ContMarkRept	00000 to 65535	5	Set to "1" if continuous marking is not selected. Set to "0" if you select "Marking while trigger is ON" in the movement marking setting ● Data length is fixed to 5 bytes.

Item	Parameter	Number of bytes	Remarks
ContMarkInterval	Time 0000.0 to 0009.9 Interval 0000.1 to 1200.0	6	The content varies depending on Movement Condition (XY) and Movement Condition (Z). This setting is invalid if continuous marking is not selected (i.e. if ContMarkRept is 1). ● Data length is fixed to 6 bytes. 📖 For information on whether the Time or the Interval is sent, refer to "Supplementary description of parameters (Refer to page 4-9.). Unit for Time: s Unit for Interval: mm
Distance Pointer Position	-021.0 to 0021.0*1	6	The irradiation position of the distance pointer in terms of the distance from the installation position correction plane is sent. ● Data length is fixed to 6 bytes. Unit: mm Fixed to "0" for the MD-T1000 Series.
Approach Scan Speed	00000, 00001 to 04000*1	5	0: Uses the scan speed specified with block conditions for approach scan speed. Values other than 0:Scans the approach at the specified speed. ● Data length is fixed to 5 bytes. Unit: mm/s
Optimized Scan Speed	00000 (fixed)	5	● Data length is fixed to 5 bytes. *2 The scan optimization cannot be executed by using the communication command.
Scan Optimization Flag	2 (fixed)	1	*3 The scan optimization cannot be executed by using the communication command.
Marking Order Flag	0/1/2/3	1	For stationary marking: 0: Block order — Marking is executed in the order of block Nos. (no sorting). 1: Per block — Marking is executed after order of markings is optimized for each block. 2: Per character — Marking is executed after order of markings is optimized for each character. 3: User-specified order For movement marking: 1: Fixed
Total number of bytes		99 (78)	

*1: 📖 "List of Input Values for Each Machine Type" (Page A- 2)
*2: When a program No. that was set using the MARKING BUILDER 2 or from the remote control console is requested, it may be possible that a value other than "00000" (00001 to 12000) is sent.
*3: When a program No. that was set using the MARKING BUILDER 2 or from the remote control console is requested, it may be possible that "0" or "1" is sent.

Changing workpiece position adjustment (VG)

Use this command to adjust the workpiece position in the stationary marking setting.

■ Command

1	4			9			18		
Header	V G	,	Program No.	,	Movement Reference Point (X)	,	Movement Reference Point (Y)	,	

26		35		44				
Correction Amount (X)	,	Correction Amount (Y)	,	Correction Amount (θ angle)	,	Checksum	Delimiter	

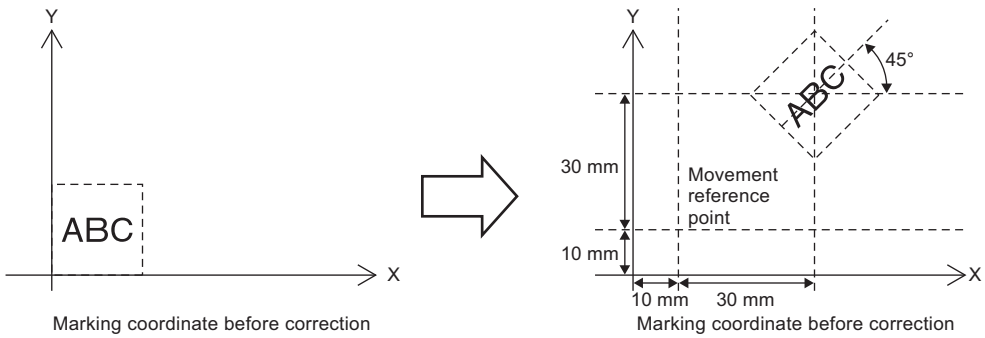
Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	VG	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Movement Reference Point (X)	-060.000 to 0060.000 *	7	O Variable length parameter of 7 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Movement Reference Point (Y)	-060.000 to 0060.000 *	7	
Correction Amount (X)	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Correction Amount (Y)	-120.000 to 0120.000 *	8	
Correction Amount (θ angle)	-180.00 to 0180.00	7	O Variable length parameter of 7 bytes or less Unit: °
Total number of bytes		49 (43)	

* : "List of Input Values for Each Machine Type" (Page A- 2)

■ Response

1	4						
Header	V G	,	0	,	Checksum	Delimiter	

Reference The following is the example when corrected with movement reference point X/Y of 10 mm and correction amount of 30 mm and 45°.



Requesting workpiece position adjustment (VH)

Use this command to request the setting value for the workpiece position adjustment.

■ Command

1		4					
Header	V H	,	Program No.	,	Checksum	Delimiter

Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	VH	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response

1		4		6		15		
Header	V H	,	0	,	Movement Reference Point (X).	,	Movement Reference Point (Y)	,

23		32		41			
Correction Amount (X)	,	Correction Amount (Y)	,	Correction Amount (θ angle)	,	Checksum	Delimiter

Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	VG	2	Fixed
Error status	0/1	1	"1" means error.
Movement Reference Point (X)	-60.000 to 060.000 *	7	● Fixed to 7 bytes Unit: mm See Appendices for response values for MD-X Series.
Movement Reference Point (Y)	-60.000 to 060.000 *	7	
Correction Amount (X)	-120.000 to 0120.000 *	8	● Fixed to 8 bytes Unit: mm See Appendices for response values for MD-X Series.
Correction Amount (Y)	-120.000 to 0120.000 *	8	
Correction Amount (θ angle)	-180.00 to 0180.00	7	● Fixed to 7 bytes Unit: °
Total number of bytes		47 (40)	

* :"List of Input Values for Each Machine Type" (Page A- 2)

Setting and Requesting Block Conditions

This section describes the various commands that are used for setting and requesting block 3D shape, block type, position Information, speed information, size information and character string information.

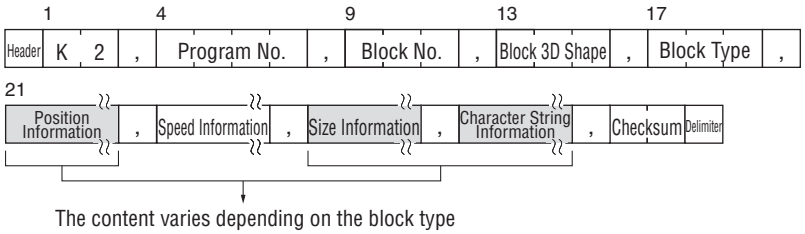
Setting block conditions (K2)

Use this command to set the 3D shape, block type, position information, speed information, size information and character string information for each block.
The position information, speed information, size information and character string information will have different setting contents (format) depending on the 3D shape block type settings that are selected.

Note

- For a single block number, only one setting can be selected for each item (3D shape, block type, position, speed, size and character string information).
- In the 2D processing with the block type of "004" to "008" and "032" to "034", the size information and character string information are not set.
  Also, do not set size information for Logo (block type "-01"), Workpiece image logo ("-02"), Photo ("-03"), and Hatch logo ("-04").
- When the movement marking is selected in the common marking conditions, the 2D processing with the block type of "004" to "008" and "032" to "034" cannot be set.
- Some block types cannot be specified for certain block 3D shapes.
  "Restricted Combinations for Different Block 3D Shapes and Block Types" (Page 4- 22)

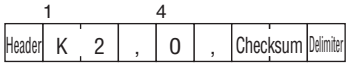
■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	K2	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Block 3D Shape	000 to 099, -01	3	For 2D setting: 099: 2D setting For 3D setting: 000: Plane (Slope) 001: Cylinder Inner surface 002: Cylinder Outer surface 003: (Inverted) Cone Inner surface 004: (Inverted) Cone Outer surface 005: Sphere Inner surface 006: Sphere Outer surface -01: Z-MAP O Variable length parameter of 3 bytes or less Fixed to "099" for the MD-T1000 Series.

Item	Parameter	Number of bytes	Remarks
Block Type	000 to 020, 030 to 034, -01, -02, -03, -04	3	For 2D setting: 000: Character Horizontal marking 001: Character Vertical marking 002: Character Outer circumference of arc 003: Character Inner circumference of arc 004: 2D Machinery Operation Mode Fixed point 005: 2D Machinery Operation Mode Straight line 006: 2D Machinery Operation Mode Dashed line 007: 2D Machinery Operation Mode Counterclockwise Oval/ Oval arc/Arc/Circle 008: 2D Machinery Operation Mode Clockwise Oval/Oval arc/Arc/Circle 009: Barcode, 2D code 020: GS1 DataBar & CC 030: Dot character 031: Dot 2D code 032: Processing straight line (Specify dot pitch) 033: Processing straight line (Specify the number of dots) MD-X Series: Does not support Processing straight line. 034: Processing fixed point (Specify the number of dots) -01: Logo -02: Workpiece image logo -03: Photo -04: Hatch logo For 3D setting: 000: Character Horizontal marking 001: Character Vertical marking 002: Character Outer circumference of arc 003: Character Inner circumference of arc 009: Barcode, 2D code 020: GS1 DataBar & CC -01: Logo -02: Workpiece image logo -03: Photo -04: Hatch logo O Variable length parameter of 3 bytes or less
Position Information	-	-	For the format of Position Information, refer to Page 4-17.
Speed Information	-	-	For the format of Speed Information, refer to Page 4-23.
Size Information	-	-	This is not set in the 2D processing with the block type of "004" to "008" and "032" to "034", logo of "-01", workpiece image of "-02", photo of "-03" and hatch logo of "-04". For the format of size information, refer to Page 4-26.
Character String Information	Shift JIS/ASCII	-	For the format of Character String Information, refer to Page 4-32.
Total number of bytes		-	

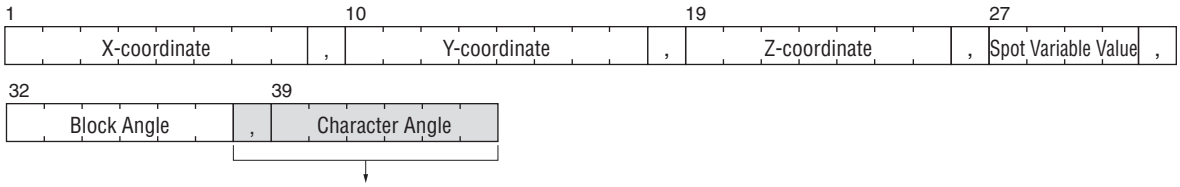
■ Response



[Position Information] of block condition setting command (K2)

There are seven different patterns of position information depending on the block types. Select an appropriate format suited to each block type.

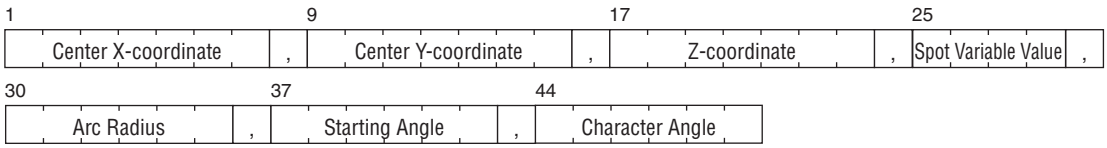
(1) Block types "000" (Horizontal marking), "001" (Vertical marking), "009" (Barcode, 2D code), "020" (GS1 DataBar & CC), "30" (Dot character), "31" (Dot 2D code)



Item	Parameter	Number of bytes	Remarks
X-coordinate (2D)	-060.000 to 060.000 *	8	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Y-coordinate (2D)	-060.000 to 060.000 *	8	
Z-coordinate (2D)	-021.00 to 0021.00 *	7	O Variable length parameter of 7 bytes or less For blocks with deep dig amounts set, the lower limit of the input range will become narrow for that amount. Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Spot variable value	-210 to 0210 *	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Block Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Character Angle (Horizontal marking and vertical marking only)	000.00 to 359.99, 360.00	6	Set this when the block type is "000" (Horizontal character), "001" (Vertical character) or "030" (Dot character). Set to "360.00" when you want to align the angle to the block angle. O Variable length parameter of 6 bytes or less Unit: °

* :"List of Input Values for Each Machine Type" (Page A- 2)

(2) Block types "002" (Outer circumference of arc) and "003" (Inner circumference of arc)



Item	Parameter	Number of bytes	Remarks
Center X-coordinate (2D)	-999.99 to 0999.99	7	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 7 bytes or less Unit: mm The Z coordinate is fixed to "0" for the MD-T1000 Series. For controllers compatible with MARKING BUILDER2 Ver 7.0 or later versions, the center X/Y coordinates support variable length parameters of 8 bytes or less (-9999.99 to 9999.99). When requesting with the request command in K3 block conditions, if the data is 7 bytes or less in size, the response is returned with 7 bytes. If the data is 8 bytes in size, the response is returned with 8 bytes. For blocks with deep dig amounts set, the lower limit of the input range will become narrow for that amount. See Appendices for setting values for MD-X Series.
Center Y-coordinate (2D)	-999.99 to 0999.99	7	
Z-coordinate (2D)	-021.00 to 0021.00 *	7	
Spot variable value	-210 to 0210 *	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Arc radius	001.00 to 999.99	6	O Variable length parameter of 6 bytes or less For controllers compatible with MARKING BUILDER2 Ver 7.0 or later versions, the arc diameter supports variable length parameters of 7 bytes or less (0001.00 to 9999.99). When requesting with the request command in K3 block conditions, if the data is 6 bytes or less in size, the response is returned with 6 bytes. If the data is 7 bytes in size, the response is returned with 7 bytes. Unit: mm
Starting Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Character Angle	000.00 to 359.99, 360.00	6	Set to "360.00" when you want to align the angle to the arc layout. O Variable length parameter of 6 bytes or less Unit: °

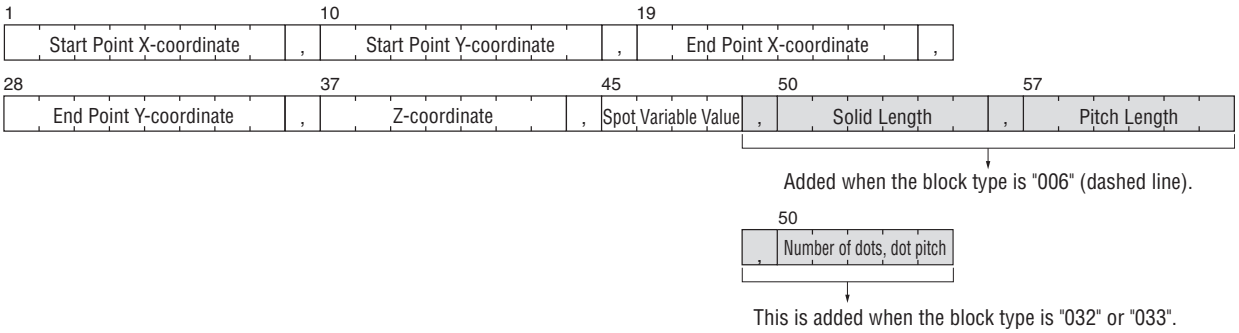
* :"List of Input Values for Each Machine Type" (Page A- 2)

(3) Block type "004" (Fixed point), "034" (Specify the number of dots at fixed point)

Item	Parameter	Number of bytes	Remarks
Fixed Point X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Fixed Point Y-coordinate	-060.000 to 0060.000 *	8	
Z-coordinate	-021.00 to 0021.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Spot variable value	-210 to 0210 *	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm

* :"List of Input Values for Each Machine Type" (Page A- 2)

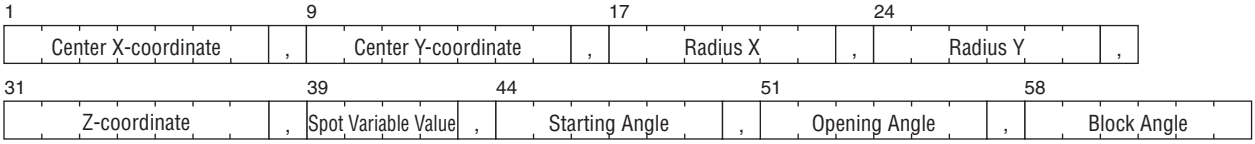
(4) Block types"005" (Straight line) and "006" (Dashed line), "032" (Specify straight line dot pitch), "033" (Specify the number of dots at straight line)



Item	Parameter	Number of bytes	Remarks
Start Point X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm
Start Point Y-coordinate	-060.000 to 0060.000 *	8	
End Point X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm
End Point Y-coordinate	-060.000 to 0060.000 *	8	
Z-coordinate	-021.00 to 0021.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series.
Spot variable value	-210 to 0210 *	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Solid Length (dashed line only)	00.100 to 60.000 *	6	This item is sent only when the dashed line is going to be set. O Variable length parameter of 6 bytes or less Unit: mm
Pitch Length (dashed line only)	00.100 to 60.000 *	6	
Number of dots, dot pitch	00002 to 40000	5	This is sent only when setting "Specify the number of dots" or "Specify dot pitch". O Variable length parameter of 5 bytes or less Unit Number of dots: units Dot pitch: μm * Set the dot pitch with an even number.

* :"List of Input Values for Each Machine Type" (Page A- 2)

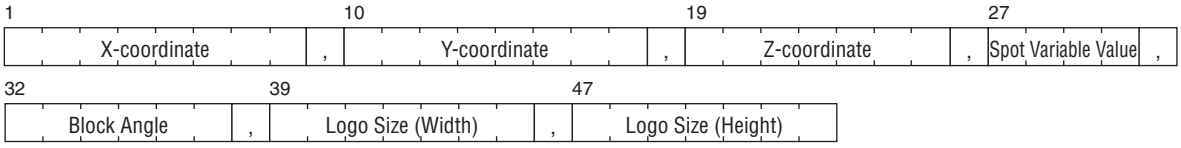
(5) Block types "007" (Counterclockwise circle, Oval, Arc, Oval arc) and "008" (Clockwise circle, Oval, Arc, Oval arc)



Item	Parameter	Number of bytes	Remarks
Center X-coordinate	-240.00 to 0240.00*	7	O Variable length parameter of 7 bytes or less Unit: mm
Center Y-coordinate	-240.00 to 0240.00*	7	
Radius X	001.00 to 240.00*	6	O Variable length parameter of 6 bytes or less Unit: mm
Radius Y	001.00 to 240.00*	6	
Z-coordinate	-021.00 to 0021.00*	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series.
Spot variable value	-210 to 0210*	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Starting Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Opening Angle	000.01 to 360.00	6	When you select circle or oval, set the angle to 360.00 O Variable length parameter of 6 bytes or less Unit: °
Block Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °

* :"List of Input Values for Each Machine Type" (Page A- 2)

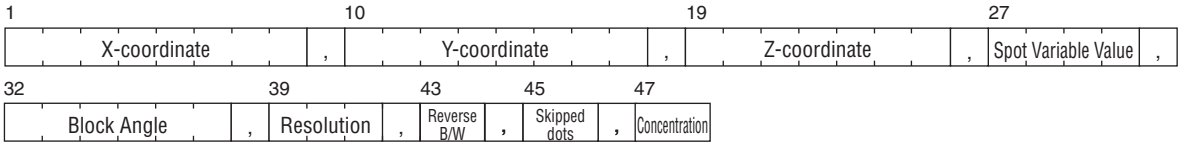
(6) Block types "-01" (Logo), "-02" (Workpiece image logo), and "-04" (Hatch logo)



Item	Parameter	Number of bytes	Remarks
X-coordinate (2D)	-060.000 to 0060.000*	8	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Y-coordinate (2D)	-060.000 to 0060.000*	8	
Z-coordinate (2D)	-021.00 to 0021.00*	7	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 7 bytes or less For blocks with deep dig amounts set, the lower limit of the input range will become narrow for that amount. Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Spot variable value	-210 to 0210*	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Block Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: mm
Logo Size (Width)	000.200 to 120.000*	7	O Variable length parameter of 7 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Logo Size (Height)	000.200 to 120.000*	7	

* :"List of Input Values for Each Machine Type" (Page A- 2)

(7) Block type "-03" (Photo)



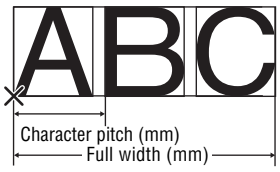
Item	Parameter	Number of bytes	Remarks
X-coordinate (2D)	-060.000 to 0060.000 *	8	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 8 bytes or less Unit: mm
Y-coordinate (2D)	-060.000 to 0060.000 *	8	
Z-coordinate (2D)	-021.00 to 0021.00 *	7	Valid when 2D setting "099" is selected as the block 3D shape. O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Spot variable value	-210 to 0210 *	4	O Variable length parameter of 4 bytes or less Unit: Value of 1 equals 0.1 mm
Block Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Resolution	050 to 2400 (For MD-T1000) 050 to 800 (For models other than MD-T1000)	3/4	Variable length parameter of 4 bytes or less for the MD-T1000 Series . Variable length parameter of 3 bytes or less for models other than the MD-T1000 Series. Unit: dpi (dots per inch)
Reverse B/W	0 / 1	1	0: Reverse black and white is not implemented. 1: Reverse black and white is implemented.
Skipped dots	0 to 8	1	This is only available for gray-scale photos. It is fixed to "0" for photo files and high-resolution photo files.
Concentration	0 to 8	1	This is only available for gray-scale photos. It is fixed to "0" for photo files and high-resolution photo files.

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Supplementary description of parameters

The parameters for each block type are shown below. The X mark shows the marking start position.

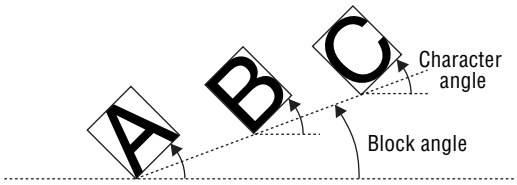
- Horizontal
  Lays out the characters horizontally.



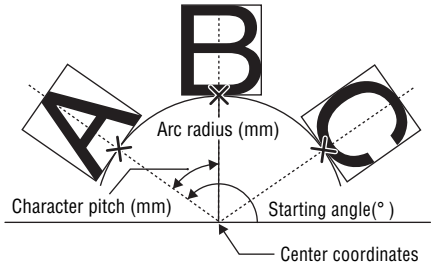
- Vertical
  Lays out the characters vertically.

- Block angle and character angle
  Sets the rotation angle of the character string. A character string rotates counterclockwise with the lower left corner of the entire character string as the origin.
  - Range of setting: 0.00 to 359.99°

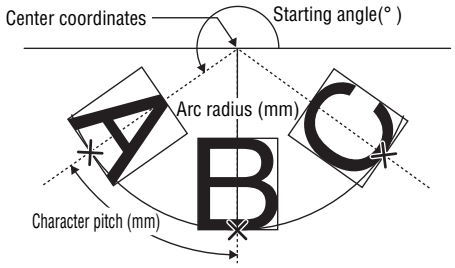
Reference
- Character angle can be specified for a block as well as a block angle.
- The block angle can only be set for horizontal marking, vertical marking, logo, workpiece image logo, hatch logo, and certain Machinery Operation Mode block types.
- When changing the reference positions of horizontal marking character and dot character, use "EG command" (Page 4-39).



- Outer circumference of arc
  Places the characters clockwise along the outer circumference of an arc.



- Inner circumference of arc
  Places the characters counterclockwise along the inner circumference of an arc.



Center coordinates
Specify the X/Y coordinates for the center of the arc.
• Range of setting: -9999.99 to 9999.99 mm*

Arc radius
Specify the radius of the arc.
• Range of setting: 1.00 to 9999.99 mm*

Starting Angle
Specify the angle formed by the starting point of the arc and the X-axis.
• Range of setting: 0.00 to 359.99 °
* : "List of Input Values for Each Machine Type" (Page A- 2)

Reference To change the reference position, use the "EG command" (Page 4-39)

- 2D Machinery Operation Mode
  "5-5 Changing and Requesting Conditions of 2D Machinery Operation Mode" (Page 5- 11)

■ Restricted Combinations for Different Block 3D Shapes and Block Types

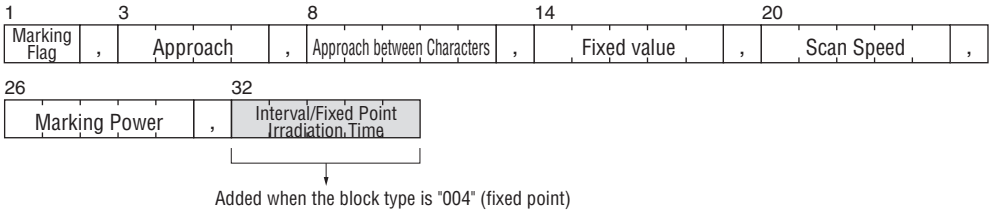
Certain combinations of block 3D shapes and block types are not allowed.
You cannot select the combinations marked with "No" in the following table.

Block Type		Block 3D Shape								
		099 2D setting	000 Plane (Slope)	001 Cylinder Inner surface	002 Cylinder Outer surface	003 (Inverted) Cone Inner surface	004 (Inverted) Cone Outer surface	005 Sphere Inner surface	006 Sphere Outer surface	-01 Z-MAP
000	Horizontal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
001	Vertical	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
002	Inner circumference of arc	Yes	Yes	No	No	No	No	No	No	Yes
003	Outer circumference of arc	Yes	Yes	No	No	No	No	No	No	Yes
004	2D Machinery Operation Mode Fixed point	Yes	No	No	No	No	No	No	No	No
005	2D Machinery Operation Mode Straight line	Yes	No	No	No	No	No	No	No	No
006	2D Machinery Operation Mode Dashed line	Yes	No	No	No	No	No	No	No	No
007	2D Machinery Operation Mode Counterclockwise Oval/Oval arc/Arc/Circle	Yes	No	No	No	No	No	No	No	No
008	2D Machinery Operation Mode Clockwise Oval/ Oval arc/Arc/Circle	Yes	No	No	No	No	No	No	No	No
009	Barcode, 2D code	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
020	GS1 DataBar & CC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
030	Dot character	Yes	No	No	No	No	No	No	No	No
031	Dot 2D code	Yes	No	No	No	No	No	No	No	No
-01	Logo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
-02	Workpiece image logo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
-03	Photo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
-04	Hatch logo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[Speed Information] of block condition setting command (K2)

The speed information is a common format applying to all block types. However, for the Workpiece image logo (block type "-2"), parameter values for Marking Flag, Scan Speed and Marking Power are invalid.

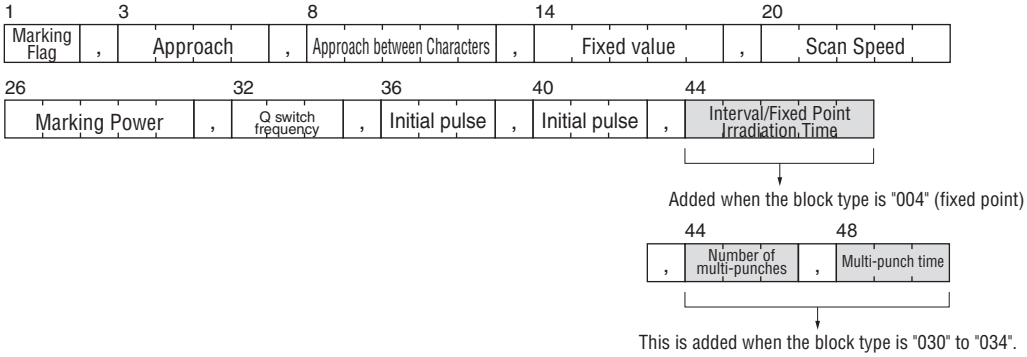
■ For the ML-Z9500 Series



Item	Parameter	Number of bytes	Remarks
Marking Flag	0/1	1	0: Marking is not executed. 1: Marking is executed.
Approach	0.00 to 5.00 *	4	O Variable length parameter of 4 bytes or less Photo is fixed to 0.00. Unit: mm
Approach between Characters	0.016 to 5.000 *	5	O Variable length parameter of 5 bytes or less Unit: mm
Fixed value	00000	5	O Variable length parameter of 5 bytes or less Fixed to 0
Scan Speed	00001 to 12000 *	5	O Variable length parameter of 5 bytes or less Unit: mm/s
Marking Power	000.0 to 100.0	5	O Variable length parameter of 5 bytes or less Unit: %

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ For the MD-V9900/MD-S9900/MD-F3000/MD-F3100/MD-F5100/MD-T1000/MD-X1000/MD-X1500 Series



Item	Parameter	Number of bytes	Remarks
Marking Flag	0/1	1	0: Marking is not executed. 1: Marking is executed.
Approach	0.00 to 5.00 *	4	O Variable length parameter of 4 bytes or less Photo is fixed to 0.00. Unit: mm
Approach between Characters	0.016 to 5.000 *	5	O Variable length parameter of 5 bytes or less Unit: mm
Fixed value	00000	5	O Variable length parameter of 5 bytes or less Fixed to 0
Scan Speed	00000, 00001 to 12000 *	5	O Variable length parameter of 5 bytes or less When "0" is sent, the scan speed [Auto] is set. "0" is enabled only when the block type is as follows. • Dot character • Dot 2D code • Processing "straight line" (Specify dot pitch, Specify the number of dots) • Processing fixed point (Specify the number of dots) * Fixed to "0" Unit: mm/s
Marking Power	000.0 to 100.0	5	O Variable length parameter of 5 bytes or less Unit: %
Q switch frequency (Frequency)	000 to 400 (60 to 120)	3	Variable length parameter of 3 bytes or less 0: Continuous (CW) "0" cannot be set for MD-T1000. When the block type is "030" to "034", set somewhere between 020 and 400. Unit: kHz
Initial pulse application value (Edge point ON control)	000 to 099, 101 to 105 (000 to 200, 255)	3	Variable length parameter of 3 bytes or less Initial pulse (MD-V9900/MD-S9900/MD-T1000/MD-X1000/MD-X1500 Series) 000: Optimal 001 to 099: Optional 101 to 105: FPS level 1 to 5 Set from "101" to "103" for MD-T1000. MD-X Series: Cannot set FPS level. Edge point control (ML-Z9500/MD-F3000/MD-F3100/MD-F5100 Series) 000 to 200: Optional 255: Optimal Values and operating times should generally both be set to zero for operation in the "Optimal" state. Optimal operation allows each block to be printed automatically with the optimal values for Q switch frequency and laser power settings for that block. When values other than "Optimal" are set, application values (Edge point ON control) and operating time (Edge point OFF control) must be set to arbitrary values.
Initial pulse application time (Edge point OFF control)		3	

Item	Parameter	Number of bytes	Remarks
Number of multi-punches	0 to 511	3	This is sent only when setting "Specify the number of dots" . O Variable length parameter of 3 bytes or less 0: Multi-punch disabled 1 to 511: Multi-punch is performed for the set number of times. Unit: count
Multi-punch time	0 to 65535	5	This is sent only when setting "Specify the number of dots" . O Variable length parameter of 5 bytes or less Fixed to "0" for the Multi-punch disabled setting. Unit: μs

* :"List of Input Values for Each Machine Type" (Page A- 2)

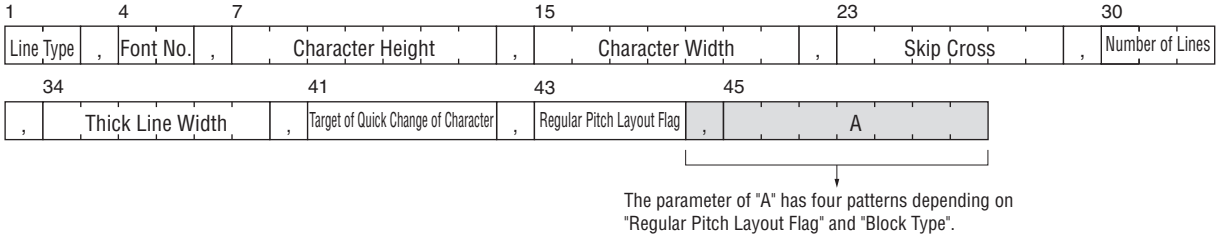
[Size Information] of block condition setting command (K2)

There are three different patterns of size information depending on the block types. Select an appropriate format suited to each block type.

Note

- The size information is not set in the 2D processing with the block type of "004" to "008" and "032" to "034", logo with "-01", workpiece image with "-02", photo with "-03" and hatch logo with "-04".
- You can set the Marking Flag for all of the block Nos. to be used to [0] (Marking is not executed).
  In this case, READY output from the control outputs is turned ON. Marking output and Marking Complete output are not turned ON after SENSOR input is received, but the READY output is turned OFF momentarily.

(1) Block types "000" (Horizontal marking), "001" (Vertical marking), "002" (Outer circumference of arc) and "003" (Inner circumference of arc)

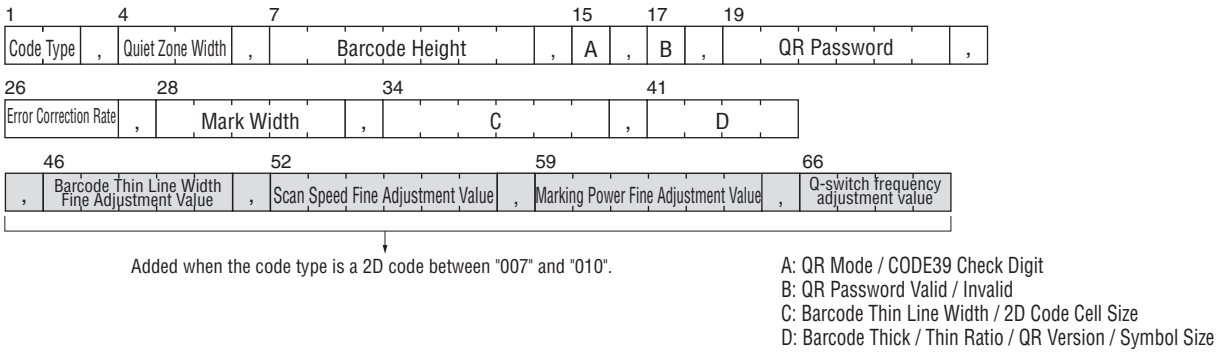


Item	Parameter	Number of bytes	Remarks
Line Type	00/01	2	O Variable length parameter of 2 bytes or less 00: Thin line 01: Thick line 02: Wobble
Font No.	00 to 11	2	O Variable length parameter of 2 bytes or less 00: Keyence Standard 01: Keyence Small 02 to 11: User font (User fonts are not registered by default when shipped from the factory.)
Character Height	000.200 to 120.000 *	7	Character height can be set within the range of 20% to 500% of the ratio of character height to character width. O Variable length parameter of 7 bytes or less When the line type is set to "02" Wobble, set 0.5 mm or more. Unit: mm See Appendices for setting values for MD-X Series.
Character Width	000.200 to 120.000 *	7	
Skip Cross	00.000 to 10.000	6	O Variable length parameter of 6 bytes or less Unit: mm
Number of Lines / Overlap Rate	000, 002 to 100, 750 to 980	3	When the line type "01" (multiple lines) is selected, set the number of lines within "002 to 100". When you want to execute automatic calculation of line numbers, set to "0". When the line type is set to "02" Wobble, set the overlap rate within 750 (75.0%) to 980 (98.0%). Exclude decimal point when setting. When "00" Thin line is selected as Line Type, this parameter is fixed to "0". O Variable length parameter of 3 bytes or less Unit: line(s)
Thick Line Width	00.000, 00.010 to 05.000 *	6	The maximum settable value is 20% of character height or width whichever smaller under the upper limit of the setting value. (It is fixed to "0" for Thin line.) When the line type "02" Wobble is selected, the minimum value of 0.1 mm or more is required. O Variable length parameter of 5 bytes or less Unit: mm

Item	Parameter	Number of bytes	Remarks
Target of Quick Change of Character	0/1	1	This item specifies whether the character string will become the target block of the character quick change command "H2" or not. 0: Off target 1: On target
Regular Pitch Layout Flag	0/1	1	0: Regular pitch layout is not applied 1: Regular pitch layout is applied
Character Pitch Full Length Pitch Angle Opening Angle	Character Pitch 000.000 to 180.000 *	7	This item should be set when "Horizontal marking" or "Vertical marking" is selected as the block type in case that "Regular pitch layout is not applied" is selected. O Variable length parameter of 7 bytes or less Unit: mm
	Full Length 000.000 to 180.000 *		This item should be set when "Horizontal marking" or "Vertical marking" is selected as the block type in case that "Regular pitch layout is applied" is selected. O Variable length parameter of 7 bytes or less Unit: mm
	Pitch Angle 0000.00 to 0359.99		This item should be set when "Outer circumference of arc" or "Inner circumference of arc" is selected as the block type in case that "Regular pitch layout is applied" is selected. O Variable length parameter of 7 bytes or less Unit: °
	Opening Angle 0000.00 to 0359.99		This item should be set when "Outer circumference of arc" or "Inner circumference of arc" is selected as the block type in case that "Regular pitch layout is applied" is selected. O Variable length parameter of 7 bytes or less Unit: °

* :"List of Input Values for Each Machine Type" (Page A- 2)

(1)Block type "009" (Barcode, 2D code)

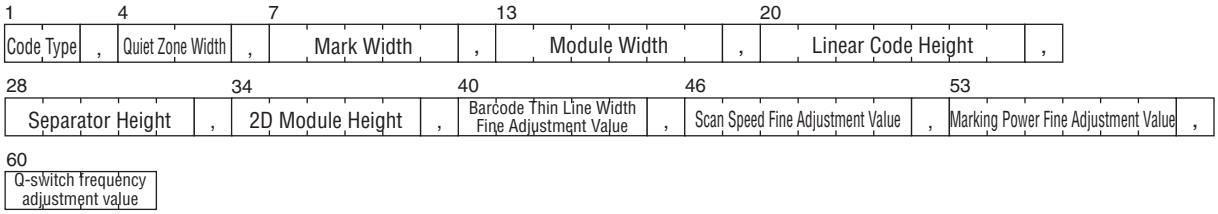


Item	Parameter	Number of bytes	Remarks
Code Type	01 / 02 / 03 / 04 / 05 / 06 / 07/ 08 / 09 / 10 / 17	2	01: CODE39 02: ITF 03: 2of5 04: NW7 05: JAN 06: CODE128 07: QR model 1 08: QR model 2 09: Micro QR 10: DataMatrix 17: GS1 DataMatrix
Quiet Zone Width	Barcode 00, 01 to 99 2D code 00, 01 to 05	2	O Variable length parameter of 2 bytes or less Set to "00" if you do not want B/W reversal. Unit: number of times (for Barcode) cells (for 2D code)
Barcode Height	000.200 to 120.000 *	7	This item is valid only when Barcode is selected In case of 2D code, input any value within the proper range. O Variable length parameter of 7 bytes or less Unit: mm See Appendices for setting values for MD-X Series.

Item	Parameter	Number of bytes	Remarks
QR Mode / Check digit	0/1	1	When QR code 1 or 2 is selected: 0: Manual 1: Auto When CODE39, ITF, or NW7 is selected: 0: Check digit off 1: Check digit on Otherwise, set to "0" (fixed).
QR Password Valid/ Invalid	0/1	1	This item is valid only when QR code 1 or 2 is selected. 0:Invalid 1:Valid Otherwise, set to "0" (fixed).
QR Password	000000 to FFFFFF (hexadecimal number)	6	O Variable length parameter of 6 bytes or less This item is valid only when QR code 1 or 2 is selected. Set to "000000" if password is not used or when the code type is other than QR code 1 or 2. Set a password in hexadecimal notation. MD-X Series: Does not support this item. Set 000000 when sending.
Error Correction Rate	0 / 1 / 2 / 3	1	This item is valid only when the QR code 1 or 2 is selected, or when micro QR is selected. Otherwise, input any value within the proper range. 3: H (30%) 2: Q (25%) 1: M (15%) 0: L (7%)
Mark Width	0.010 to 1.000	5	O Variable length parameter of 5 bytes or less Unit: mm
Barcode Thin Line Width / 2D Code Cell Size	Thin Line Width 00.010 to 10.000 Cell Size 00.010 to 05.000	6	Specify the Thin Line Width when Barcode is selected and the Cell Size when 2D Code is selected. O Variable length parameter of 6 bytes or less Unit: mm
Barcode Thick / Thin Ratio / QR Version/ Symbol Size	Thick/Thin Ratio 2.00 to 4.00 QR Version 0001 to 0005 Symbol Size 0001 to 0020	4	O Variable length parameter of 4 bytes or less When Barcode is selected, specify the thick/thin ratio to be set. However, this item is invalid when JAN or CODE128 is selected. Input any value within the proper range when JAN or CODE128 is selected. When QR code 1 or 2, or when micro QR is selected, the parameter indicates the QR version. QR Version is not a parameter that you can set. It is a parameter that you can only confirm using the Requesting block conditions command (K3) after it is registered with the controller. A value of "0" can be set in this parameter. When DataMatrix is selected, set a value in the range of 0001 to 0020 as Symbol Size. Symbol Size table is shown below. 1 : 10 x 10 2 : 12 x 12 3 : 14 x 14 4 : 16 x 16 5 : 18 x 18 6 : 20 x 20 7 : 22 x 22 8 : 24 x 24 9 : 26 x 26 10 : 32 x 32 11 : 36 x 36 12 : 40 x 40 13 : 44 x 44 14 : 48 x 48 15 : 8 x 18 16 : 8 x 32 17 : 12 x 26 18 : 12 x 36 19 : 16 x 36 20 : 16 x 48
Cell fine adjustment value (Narrow width fine adjustment value) Fine Adjustment Value	0.010 to 0.500	5	O Variable length parameter of 5 bytes or less Unit: mm
Scan Speed Fine Adjustment Value	-12000 to 012000	6	This item is valid only when 2D codes or CODE39 other than DataMatrix are selected. O Variable length parameter of 6 bytes or less Unit: mm/s
Marking Power Fine Adjustment Value	-100.0 to 0100.0	6	This item is valid only when 2D codes or CODE39 other than DataMatrix are selected. O Variable length parameter of 6 bytes or less Unit: %
Q-switch frequency adjustment value (Frequency adjustment value)	-400 to 0400 (-060 to 0060)	4	This item is valid only when 2D codes or CODE39 other than DataMatrix are selected. This is omitted for the ML-Z9500 Series. O Variable length parameter of 4 bytes or less Unit: kHz

* :"List of Input Values for Each Machine Type" (Page A- 2)

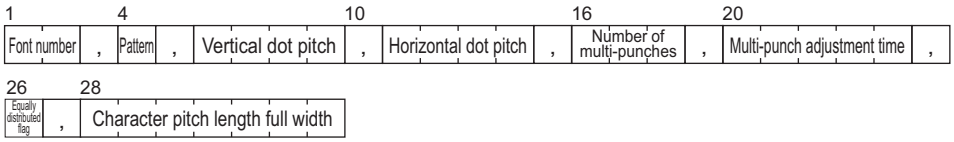
(3) Block type "20" (GS1 DataBar & CC)



Item	Parameter	Number of bytes	Remarks
Code Type	11 to 16	2	O Variable length parameter of 2 bytes or less 11: GS1 DataBar Truncated 12: GS1 DataBar Truncated CC-A 13: GS1 DataBar Stacked 14: GS1 DataBar Stacked CC-A 15: GS1 DataBar Limited 16: GS1 DataBar Limited CC-A
Quiet Zone Width	00, 01 to 50	2	O Variable length parameter of 2 bytes or less Set to "00" if you do not want B/W reversal. Unit: multiples
Mark Width	0.010 to 1.000	5	O Variable length parameter of 5 bytes or less Unit: mm
Module Width	00.010 to 10.000	6	O Variable length parameter of 6 bytes or less Unit: mm
Linear Code Height	000.200 to 120.000 *	7	O Variable length parameter of 7 bytes or less Unit: mm
Separator Height	0.010 to 5.000	5	O Variable length parameter of 5 bytes or less Unit: mm This item is valid only when using a code type other than GS1 DataBar Truncated or GS1 DataBar Limited. For GS1 DataBar Truncated or GS1 DataBar Limited, it is set to "D" (fixed).
2D Module Height	0.010 to 5.000	5	O Variable length parameter of 5 bytes or less Unit: mm This item is valid only when using a code type other than GS1 DataBar Truncated or GS1 DataBar Limited. For GS1 DataBar Truncated or GS1 DataBar Limited, it is set to "D" (fixed).
Cell Fine Adjustment Value	0.010 to 0.500	5	O Variable length parameter of 5 bytes or less Unit: mm
Scan Speed Fine Adjustment Value	-12000 to 012000	6	This item is valid only when Composite code is selected. O Variable length parameter of 6 bytes or less Unit: mm/s
Marking Power Fine Adjustment Value	-100.0 to 0100.0	6	This item is valid only when Composite code is selected. O Variable length parameter of 6 bytes or less Unit: %
Q-switch frequency adjustment value (Frequency adjustment value)	-400 to 0400 (-060 to 0060)	4	This item is valid only when Composite code is selected. O Variable length parameter of 4 bytes or less Unit: kHz

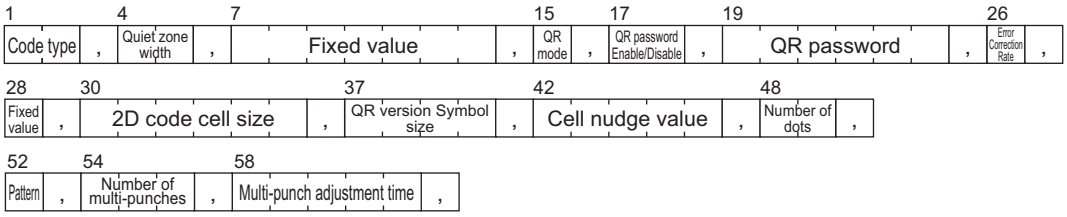
* : "List of Input Values for Each Machine Type" (Page A- 2)

(4) Block type "030" (Dot character)



Item	Parameter (ASCII)	Number of bytes	Remarks
Font number	00/01	2	00: SEMI Single density 01: SEMI Double density
Pattern	0/1	1	0: Unidirectional 1: Alternate
Vertical dot pitch	10 to 5000	4	O Variable length parameter of 4 bytes or less Set with an even number. Unit: μm
Horizontal dot pitch	10 to 5000	4	O Variable length parameter of 4 bytes or less Set with an even number. Unit: μm
Number of multi-punches	0 to 511	3	O Variable length parameter of 3 bytes or less 0: Multi-punch disabled 1 to 511: Multi-punch is performed for the set number of times. Unit: count
Multi-punch adjustment time	0 to 65535	5	O Variable length parameter of 5 bytes or less Fixed to "0" for the Multi-punch disabled setting. Unit: μs
Equally distributed flag	0/1	1	0: Not distribute 1: Distribute
Character pitch length full width	000.000 to 120.000	7	O Variable length parameter of 7 bytes or less Unit: mm

(5) Block type "031" (Dot 2D code)



Item	Parameter (ASCII)	Number of bytes	Remarks
Code type	01/02/03/04/05/06/ 07/08/09/10/17	2	01: CODE39 02: ITF 03: 2of5 04: NW7 05: JAN 06: CODE128 07: QR model 1 08: QR model 2 09: Micro QR 10: DataMatrix 17: GS1 DataMatrix
Quiet zone width	00, 01 to 05	2	O Variable length parameter of 2 bytes or less "00" is set when not reversing Black/White. Unit: cell
Fixed value	0000000	7	Fixed to "0"
QR mode	0/1	1	When QR code 1 or 2 is selected 0: Manual 1: Automatic Fixed to "0" for codes other than the above.
QR password Enable/Disable	0/1	1	Enabled only when QR code 1 or 2 is selected 0: Disable 1: Enable Fixed to "0" for codes other than the above.

Item	Parameter (ASCII)	Number of bytes	Remarks
QR password	000000 to FFFFFF (Hexadecimal)	6	O Variable length parameter of 6 bytes or less Enabled only when QR code 1 is selected "000000" is set when the password is not used or the code types other than QR code 1 or 2 are used. Set the password in hexadecimal.
Error Correction Rate	0/1/2/3	1	Enabled only when QR code 1 or 2, or the Micro QR is selected For code types other than the above, set a dummy value within the range. 3: H (30%) 2: Q (25%) 1: M (15%) 0: L (7%)
Fixed value	0	1	Fixed to "0"
2D code cell size	00.010 to 05.000	6	O Variable length parameter of 6 bytes or less Unit: mm
QR version Symbol size	QR version 0000 Symbol size 0001 to 0020	4	O Variable length parameter of 4 bytes or less This parameter is set to QR version when QR code 1 or 2, or the Micro QR is selected QR version is determined based on the number of characters and sent with "0" fixed. When DataMatrix is selected, set the symbol size The symbol size is as follows. 1 : 10 × 10 2 : 12 × 12 3 : 14 × 14 4 : 16 × 16 5 : 18 × 18 6 : 20 × 20 7 : 22 × 22 8 : 24 × 24 9 : 26 × 26 10 : 32 × 32 11 : 36 × 36 12 : 40 × 40 13 : 44 × 44 14 : 48 × 48 15 : 8 × 18 16 : 8 × 32 17 : 12 × 26 18 : 12 × 36 19 : 16 × 36 20 : 16 × 48
Cell nudge value	0.010 to 0.500	5	O Variable length parameter of 5 bytes or less Unit: mm
Number of dots	00 to 09	2	00: 1×1 01: 2×2 02: 3×3 03: 4×4 04: 5×5 05: 6×6 06: 7×7 07: 8×8 08: 9×9 09: 10×10
Pattern	0/1	1	0: Unidirectional 1: Alternate
Number of multi-punches	0 to 511	3	O Variable length parameter of 3 bytes or less 0: Multi-punch disabled 1 to 511: Multi-punch is performed for the set number of times. Unit: count
Multi-punch adjustment time	0 to 65535	5	O Variable length parameter of 5 bytes or less Fixed to "0" for the Multi-punch disabled setting. Unit: μs

[Character String Information] of block condition setting command (K2)

■ Setting character string

Specify a character string using ASCII code or shift JIS code immediately after the [Size information] within the "K2" command. Specify the update characters, logos and custom characters using ASCII code (single-byte) by referring to "Update character, logo and custom character setting code and the control code in CODE128 and DataMatrix". Implement the setting while noting the following points.

- The character strings except for update character, logo and custom character are saved in the form of shift JIS code (double-byte character) inside the controller even if they are sent in the ASCII code (single-byte character).
- If 2D code is specified as the block type, the character strings that are set using ASCII code are saved as ASCII code.
- The maximum number of characters that can be set in a single block is 127 double-byte characters. (If different ASCII code types such as update character, logo or custom character are mixed, the maximum number of characters is 255 bytes in terms of data size.)
- Use the code "%044A" to differentiate a comma to be printed in a character string from a comma used to delimit data in the command code.
- When specifying "%" using ASCII code (single-byte), enter it as "%%". When specifying "%" using shift JIS code (double-byte), enter it as "% (double-byte single character)".

Note In the 2D processing with the block type of "004" to "008" and "032" to "034", the character string information is not set.
MD-X Series: Distinguishes 2-byte and 1-byte according to the character code setting. The maximum character string length of block is 510 characters.

■ Update character, logo and custom character setting code and the control code in CODE128 and DataMatrix

Update characters

As the update character, the setting codes as listed in the following table are sent in ASCII code.

Type	Replacement preset	Zero suppression not applied		Zero suppression applied		Remarks
		Limit preset		Limit preset		
		None	Yes	None	Yes	
Year 4	None	%4Y	%4T■Y	-	-	
Year 2	None	%2Y	%2T■Y	-	-	
Year 1	None Yes	%1Y %1P●Y	%1T■Y %1P●T■Y	- -	- -	
Era Name	None	%02G	%02T■G	Right align %2G Left align % - 2G	Right align %2T■G Left align % - 2T■G	
Month	None	%02M	%02T■M	Right align %2M Left align % - 2M	Right align %2T■M Left align % - 2T■M	
	Yes	%2P●M	%2P●T■M	-	-	
Day	None	%02D	%02TvD	Right align %2D Left align % - 2D	Right align %2T■D Left align % - 2T■D	
	Yes	%2P●D	%2P●T■D	-	-	
Hour	None	%02h	%02T■h	Right align %2h Left align % - 2h	Right align %2T■h Left align % - 2T■h	
	Yes	%2P●h	%2P●T■h	-	-	
Minute	None	%02m	%02T■m	Right align %2m Left align % - 2m	Right align %2T■m Left align % - 2T■m	
	Yes	%2P●m	%2P●T■m	-	-	
Second	None	%02s	-	Right align %2s Left align % - 2s	-	
365 days	None	%03X	%03T■X	Right align %3X Left align % - 3X	Right align %3T■X Left align % - 3T■X	
	Yes	%3P●X	%3P●T■X	-	-	

Type	Replacement preset	Zero suppression not applied		Zero suppression applied		Remarks
		Limit preset		Limit preset		
		None	Yes	None	Yes	
Day of A Week	None	%1B	%1T■B	-	-	If replacement preset is set to "None", the days of the week from Sunday to Saturday are marked by the numbers 0 to 6.
	Yes	%1P●B	%1P●T■B			
Week	Yes	%2P●W	%2P●T■W			
Shift Code	Yes	%P●S	-		-	
Rank	None	%1R	-	-		
	Yes	%1P●R	-			

* The preset No. indicated by a black dot is a number in the range of 0 to 9 (in the case of the 365 days type, the preset No. is in the range of 0 to 3). The limit preset No. indicated by a black square is a number in the range of 0 to 9.

Type	Zero suppression	Flush digits	Align digits	Replacement		Remarks
				None	Yes	
The counter Nos. A to J are the common counters.	None	-	-	%0kC■C	%0kP●C■C	The counter Nos. 0 to 9 shown in the black square ■ are the individual counters. The counter Nos. A to J are the common counters. The counter Nos. 0 to 9 shown in the black dot ● are the preset Nos. 0 to 9.
	Yes	Automatic	-	%C■C	%P●C■C	
		Specify digits	Right align	%kC■C	%kP●C■C	
		Specify digits	Left align	% - kC■C	% - kP●C■C	

* k indicates the number of digits in the range of 0 to 9 and A.

Type	Code	Remarks
Logo	%L<Filename>	Enter a filename not exceeding 13 2-byte characters or 26 1-byte characters.
Custom character	%F<Filename>	
Workpiece image logo	%K<Filename>	
Hatch logo	%T<Filename>	
Gray-scale photo	%I<Filename>	
Photo	%Z<Filename>	
High-resolution	%X<File name>	

* Only a logo, workpiece image, hatch logo, photo, gray-scale photo, or high-resolution photo can be registered in each block respectively.

Encoded character string for barcode and 2D code

The encoded characters that can be used for various barcodes are shown below.

Barcode type	Useable characters
CODE39	Numerals (0 to 9), characters (A to Z), symbols (-, ., Space, $, /, +, %) * The start/stop character (*) is added automatically. You can select whether to add check digits (modulus 43) automatically.
ITF	Numerals (0 to 9) Only an even number of digits should be entered. * You can select whether to add check digits (modulus 3/10) automatically.
2of5	Numerals (0 to 9)
NW7	Numerals (0 to 9), symbols (-, ., $, /, +, :), start/stop characters (A to D) * Enter the start/stop characters at the top and at the end of variables. * Check digits (modulus 16) are added automatically.
JAN/EAN/UPC	JAN: (0 to 9) Characters are 13 digits for the standard type, and 8 digits for the abbreviated type (including one check digit.) UPC: Numerals (0 to 9) UPC-A includes 12 digits and UPC-E includes 8 digits (including a one-digit check digit). * The check digit is added automatically.
CODE128	All the 128 ASCII characters (numerals, alphabets (upper and lower cases), symbols, control codes) can be converted into barcodes. All the characters that can be entered from a PC keyboard (except for Kanji, Hiragana, and Katakana) can be expressed. * Check digits (modulus 103) are added automatically.

The encode characters that can be used in each 2D code are all character strings of 1-byte (ASCII) and 2-byte (Shift-JIS) characters.

Note
- DataMatrix supports control codes.
- GS1DataMatrix supports FNC1.

CODE128 and DataMatrix

CODE128 and DataMatrix can use all of the 128 ASCII code characters. The control codes such as [ESC], [STX], [ETX], [CR] and [LF] are set in the ASCII code after converting them to the program codes as shown in the table below. CODE128 uses three types of start characters: "CODE-A", "CODE-B" and "CODE-C". In the ML-Z9500 series, the start character to be used in accordance with the input variable is determined automatically and is inserted. The start character doesn't need to be inserted separately. Set the desired character that you want to input directly.

Control code list

Control code	Program code	Control code	Program code	Control code	Program code
NUL	%000A	CR	%013A	SUB	%026A
SOH	%001A	SO	%014A	ESC	%027A
STX	%002A	SI	%015A	FS	%028A
ETX	%003A	DLE	%016A	GS	%029A
EOT	%004A	DC1	%017A	RS	%030A
ENQ	%005A	DC2	%018A	US	%031A
ACK	%006A	DC3	%019A	DEL	%127A
BEL	%007A	DC4	%020A	FNC1	%901A
BS	%008A	NAK	%021A	FNC2	%902A
HT	%009A	SYN	%022A	FNC3	%903A
LF	%010A	ETB	%023A	FNC4	%904A
VT	%011A	CAN	%024A		
FF	%012A	EM	%025A		

"Setting GS1 DataBar encoded characters" (Page 5- 35)

HR (Human Readable) characters

For blocks with the block type of "000" to "003" and "030", barcodes and encode character strings for 2D code can be set as HR (Human Readable) character.

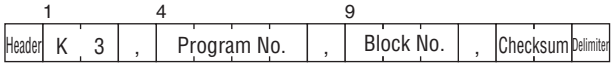
Note
- When setting HR characters, barcodes or 2D codes of the link targets are necessary.
- Other characters cannot be set to the blocks to which HR characters are set.

Reference code	character strings to refer or reference condition	Cord	Remarks
GS1 DataBar linear code • GS1 DataBar Truncated • GS1 DataBar Stacked • GS1 DataBar Limited	Linear code	%H<●●●1>	●●● means the block number 000 to 255. Set the setting code with 1-byte characters. ▲▲ means the AI number. Use 2 digits in 1-byte character to set what number of AI is referred.
GS1 DataBar composite code • GS1 DataBar Truncated CC-A • GS1 DataBar Stacked CC-A • GS1 DataBar Limited CC-A	Linear code	%H<●●●1>	
	2D Code	%H<●●●2>	
Barcode • CODE39 • ITF • 2 of 5 • NW7	Check digit Enable	%H<●●●C>	
	Start/Stop character Enable	%H<●●●*>	
	Check digit and Start/ Stop character Enable	%H<●●●C*>	
2D Code QR code model 1 QR code model 2 Micro QR code DataMatrix ECC200	2D Code	%H<●●●>	
GS1 DataMatrix	Whole encode character strings	%H<●●●00A>	
	AI number setting (AI display Enable)	%H<●●●▲▲A>	
	AI number setting (AI display Disable)	%H<●●●▲▲>	

Requesting block conditions (K3)

Use this command to request the 3D shape, block type, position information, speed information, size information and character string information for each block. The position information, speed information, size information and character string information will have different setting contents (format) depending on the block type.

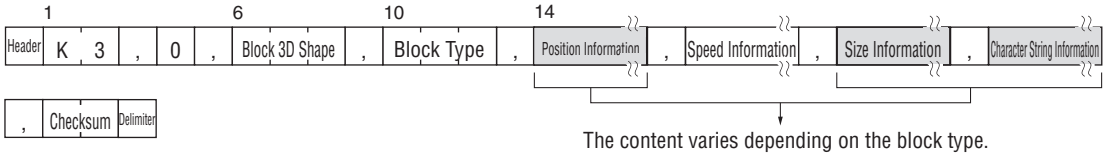
■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	K3	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Total number of bytes		11 (9)	

■ Response

Parameters after the error status bit are identical to those of the Setting block conditions command (K2).



Item	Parameter	Number of bytes	Remarks
Identification Code	K3	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Block 3D Shape	000 to 099, -01	3	For 2D setting: 099: 2D setting For 3D setting: 000: Plane (Slope) 001: Cylinder Inner surface 002: Cylinder Outer surface 003: (Inverted) Cone Inner surface 004: (Inverted) Cone Outer surface 005: Sphere Inner surface 006: Sphere Outer surface -01: Z-MAP ●Data length is fixed to 3 bytes. Fixed to "099" for the MD-T1000 Series.

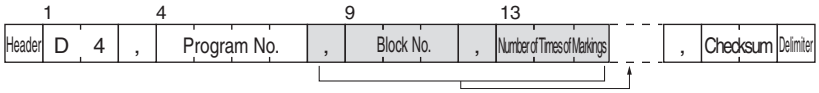
Item	Parameter	Number of bytes	Remarks
Block Type	000 to 020, 030 to 034, -01, -02, -03, -04	3	For 2D setting: 000: Character Horizontal marking 001: Character Vertical marking 002: Character Outer circumference of arc 003: Character Inner circumference of arc 004: 2D Machinery Operation Mode Fixed point 005: 2D Machinery Operation Mode Straight line 006: 2D Machinery Operation Mode Dashed line 007: 2D Machinery Operation Mode Counterclockwise Oval/ Oval arc/Arc/Circle 008: 2D Machinery Operation Mode Clockwise Oval/Oval arc/Arc/Circle 009: Barcode, 2D code 020: GS1 DataBar & CC 030: Dot character 031: Dot 2D code 032: Processing straight line (Specify dot pitch) 033: Processing straight line (Specify the number of dots) 034: Processing fixed point (Specify the number of dots) -01: Logo -02: Workpiece image logo -03: Photo -04: Hatch logo For 3D setting: 000: Character Horizontal marking 001: Character Vertical marking 002: Character Outer circumference of arc 003: Character Inner circumference of arc 009: Barcode, 2D code 020: GS1 DataBar & CC -01: Logo -02: Workpiece image logo -03: Photo -04: Hatch logo ●Data length is fixed to 3 bytes.
Position Information	-	-	For the format of Position Information, refer to Page 4-17. ●All of the respective parameters are sent in fixed bytes.
Speed Information	-	-	For the format of Speed Information, refer to Page 4-23. ●All of the respective parameters are sent in fixed bytes.
Size Information	-	-	This is not sent in the processing with the block type of "004" to "008" and "032" to "034", logo with "-01", workpiece image with "-02", photo with "-03" and hatch logo with "-04". For the format of size information, refer to Page 4-26. ●All of the respective parameters are sent in fixed bytes.
Character String Information	Shift JIS/ASCII	-	This is not sent in the processing with the block type of "004" to "008" and "032" to "034". For the format of Character String Information, refer to Page 4-32. ●All of the respective parameters are sent in fixed bytes.
Total number of bytes		-	

Setting the Number of Times of Block Markings (D4)

Use this command to set the number of times each block is marked.
After a block has been marked the set number of times, the next block is marked.

Note If the marking repetition of the block with the deep dig amount set is set to "1", the setting value for the deep dig amount will become "0". However, for hatch logo block, when both the fill marking repetition and block marking repetition become "1", the setting value for deep dig amount will become "0".

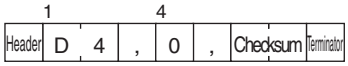
■ Command



The required number of blocks are sent if multiple block numbers are set.

Item	Parameter	Number of bytes	Remarks
Identification Code	D4	2	Fixed
Program No.	0000 to 1999	4	Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	Variable length parameter of 3 bytes or less
Number of Times of Markings	001 to 100	3	Variable length parameter of 3 or less
・ ・ ・	・ ・ ・	-	The required number of block numbers and mark counts are sent when setting mark counts for multiple block numbers.
Total number of bytes		-	

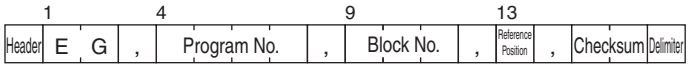
■ Response



Standard position setting (EG)

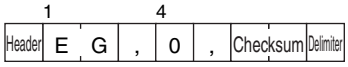
This command is effective only when the block shape is set with vertical writing and dot character, or set at the inner and outer periphery of circular arc.
The standard position for character strings can be changed to the left end, right end or center.

■ Command



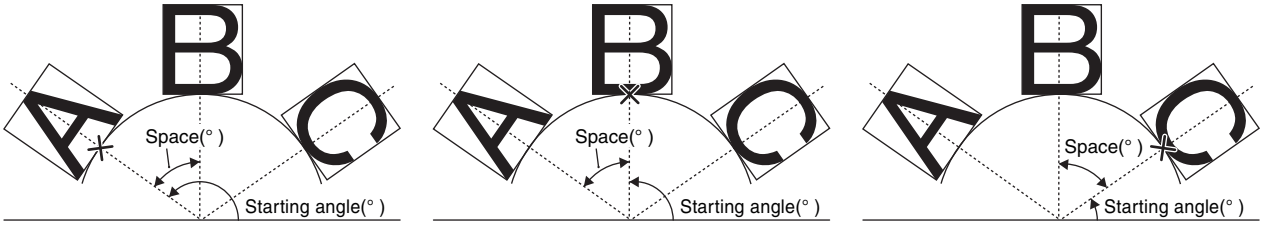
Item	Parameter	Number of bytes	Remarks
Identification Code	EG	2	Fixed
Program No.	0000 to 1999	4	When the program No. is not set, the reference position for the program No. currently running will be changed.
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Reference position	0, 1, 2	1	0: Left 1: Right 2: Center MD-X Series: 0: Bottom left 1: Bottom right 2: Bottom
Total number of bytes		13 (10)	

■ Response



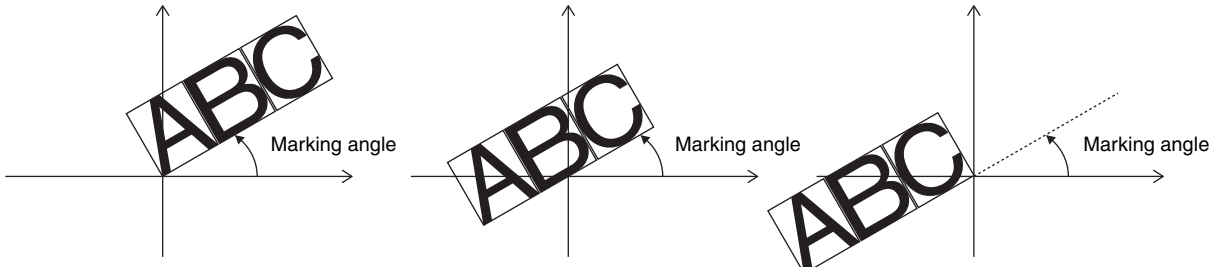
■ Supplementary description of parameters

- For circular arc arrangement



Reference position: Left　　Reference position: Center　　Reference position: Right

- For vertical writing and dot character

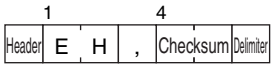


Reference position: Left　　Reference position: Center　　Reference position: Right

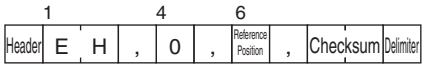
Standard position request (EH)

This command is used only when the block shape is set with vertical writing or dot character, or set at the inner and outer periphery of circular arc.
This requests the standard position of the block.

■ Command



■ Response

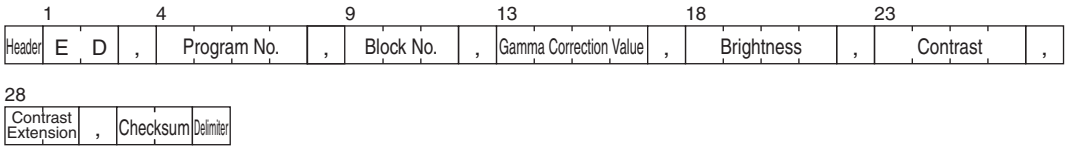


Item	Parameter	Number of bytes	Remarks
Identification Code	EH	2	Fixed
Error Status	0/1	1	"1" indicates an error "3-1 Error Response" (Page 3- 2)
Reference position	0, 1, 2	1	0: Left 1: Right 2: Center
Total number of bytes		6 (4)	

Setting Conditions of a High-resolution Photo File (ED)

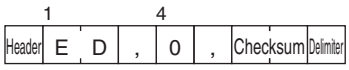
This command is effective only for a block where a high-resolution photo file is inserted.
Parameters specific to the high-resolution photo file can be changed.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	ED	2	Fixed
Program No.	0000 to 1999	4	When the program No. is not set, conditions for the program No. currently running will be changed.
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Gamma Correction Value	0.01 to 9.99	4	O Variable length parameter of 4 bytes or less
Brightness	-128 to 0127	4	O Variable length parameter of 4 bytes or less
Contrast	-128 to 0127	4	O Variable length parameter of 4 bytes or less
Contrast Extension	0/1	1	0: Contrast extension not applied 1: Contrast extension applied
Total number of bytes		28 (22)	

■ Response



Requesting Conditions of a High-resolution Photo File (EF)

This command is effective only for blocks where a high-resolution photo file is inserted.
This command requests parameters specific to the high-resolution photo file.

■ Command

1			4		
Header	E	F	,	Checksum	Delimiter

■ Response

1			4	6		11		16		21			
Header	E	F	,	0	,	Gamma Correction Value	,	Brightness	,	Contrast	,	Contrast Extension	,	Checksum	Delimiter

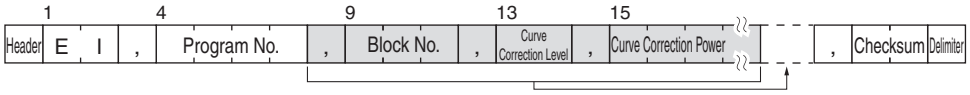
Item	Parameter	Number of bytes	Remarks
Identification Code	EF	2	Fixed
Error Status	0/1	1	"1" indicates an error "3-1 Error Response" (Page 3- 2)
Gamma Correction Value	0.01 to 9.99	4	O Data length is fixed to 4 bytes.
Brightness	-128 to 0127	4	O Data length is fixed to 4 bytes.
Contrast	-128 to 0127	4	O Data length is fixed to 4 bytes.
Contrast Extension	0/1	1	0: Contrast extension not applied 1: Contrast extension applied
Total number of bytes		21 (16)	

Changing the Curve Corrections (EI)

This command changes the value for the curve correction level and the curve correction power in the [Adv Option] of the block.
This command cannot be set for photo marking and machinery operations (excluding the oval)

Note MD-X Series: Does not support the curve correction function.

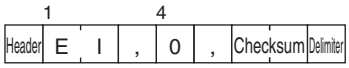
■ Command



When changing the curve correction for multiple blocks, multiple strings of block data can be appended after the first string.

Item	Parameter	Number of bytes	Remarks
Identification Code	EI	2	Fixed
Program No.	0000 to 1999	4	When the program No. is not set, the curve correction for the program No. currently running will be changed.
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Curve Correction Level	0 to 5	1	O Data length is fixed to 1 byte.
Curve Correction Power	-15 to 015	3	O Variable length parameter of 3 bytes or less
・ ・ ・	・ ・ ・	-	When changing the curve correction values for multiple block Nos., send the necessary number of block Nos. and curve correction values.
Total number of bytes		Variable	

■ Response

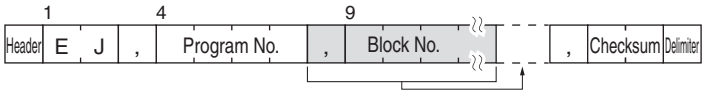


Requesting the Curve Corrections (EJ)

This command requests the value for the curve correction level and the curve correction power in the [Adv Option] of the block.

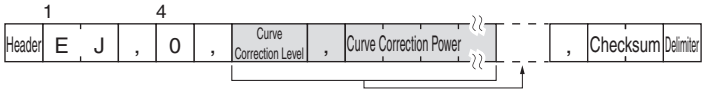
Note MD-X Series: Does not support the curve correction function.

■ Command



When requesting the curve correction vales for multiple blocks, multiple strings of block data can be appended after the first string.

■ Response



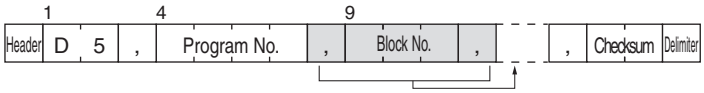
When the curve correction values for multiple blocks are requested, the curve corrections for the necessary number will be sent.

Item	Parameter	Number of bytes	Remarks
Identification Code	EJ	2	Fixed
Error Status	0/1	1	"1" indicates an error "3-1 Error Response" (Page 3- 2)
Curve Correction Level	0 to 5	1	O Data length is fixed to 1 byte.
Curve Correction Power	-15 to 015	3	O Data length is fixed to 3 bytes.
・ ・ ・	・ ・ ・	-	When requesting the curve correction values for multiple block Nos., send the necessary number of curve correction values.
Total number of bytes		Variable	

Requesting the Number of Times of Block Markings (D5)

Use this command to request the mark count for each block.

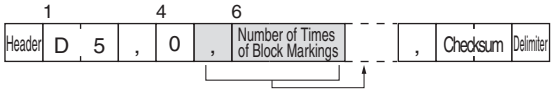
■ Command



The required number of blocks are sent if multiple block numbers are requested.

Item	Parameter	Number of bytes	Remarks
Identification Code	D5	2	Fixed
Program No.	0000 to 1999	4	Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	Variable length parameter of 3 bytes or less
・ ・ ・	・ ・ ・	-	The required number of block numbers are sent when requesting mark counts for multiple block numbers.
Total number of bytes		-	

■ Response



The required number of mark counts are sent.

Item	Parameter	Number of bytes	Remarks
Identification Code	D5	2	Fixed
Error status	0/1	1	"1" indicates an error. "3-1 Error Responses" (page 3-2)
Number of Times of Block Markings	001 to 100	3	Data length is fixed to 3 bytes Sent the value in decimal notation.
・ ・ ・	・ ・ ・	-	The requested number of times of markings are returned when multiple mark counts have been requested.
Total number of bytes		-	

Note The D4/D5 commands are compatible with the ML-Z Series for controller versions 02.01.00 and later.

Setting and Requesting Block 3D Detailed Conditions

Setting block 3D detailed conditions (K4)

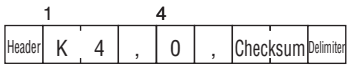
Use this command to set 3D detailed conditions for blocks that have 3D settings (block 3D shapes "000" to "006") specified. The 3D detailed conditions will have different setting contents (format) depending on the selected block 3D shape.
For the "K4" command, you must specify 22 parameters including the program No. and the block No.
Some of the parameters will have fixed values depending on the selected block 3D shape, but be sure to specify all of them.

Note Do not specify 3D detailed conditions when 2D setting "099" is selected as the block 3D shape.

■ Command

Item	Parameter	Number of bytes	Remarks
Identification Code	K4	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Parameter 1	-	1	●All of the respective parameters are sent in fixed bytes.
Parameter 2	-	1	
Parameter 3	-	1	
Parameter 4	-	8	
Parameter 5	-	8	
Parameter 6	-	8	
Parameter 7	-	8	
Parameter 8	-	8	
Parameter 9	-	7	
Parameter 10	-	6	
Parameter 11	-	6	
Parameter 12	-	6	
Parameter 13	-	6	
Parameter 14	-	6	
Parameter 15	-	1	
Parameter 16	-	8	
Parameter 17	-	7	
Parameter 18	-	6	
Total number of bytes		131 (111)	

■ Response



Parameter setting contents for block 3D detailed conditions

The parameter setting contents (format) for the "K4" command vary according to the selected block 3D shape. Select an appropriate format suited to each block 3D shape.

(1) Block 3D shapes "000" (Plane (Slope)), "005" (Sphere Inner surface), "006" (Sphere Outer surface)

Item	Parameter	Number of bytes	Remarks
Fixed value	0	1	Fixed to 0
Fixed value	0	1	Fixed to 0
Fixed value	0	1	Fixed to 0
Diameter	Plane 0000.000	8	Fixed to 0 when the block 3D shape is "000". O Variable length parameter of 7 bytes or less Unit: mm
	Sphere 0000.200 to 0480.000 *		
X-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	Fixed to 0 when the block 3D shape is "005" or "006", and the block type is outer or inner circumference of arc. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
Y-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	Fixed to 0 when the block 3D shape is "005" or "006", and the block type is outer or inner circumference of arc. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
X-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
Y-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
Z-coordinate (3D)	Plane -081.00 to 0081.00 *	7	O Variable length parameter of 7 bytes or less For blocks with deep dig amounts set, the lower limit of the input range will become narrow for that amount. Unit: mm
	Sphere -261.00 to 0261.00 *		
Fixed value	000.00	6	O Variable length parameter of 6 bytes or less Fixed to 0
Fixed value	000.00	6	O Variable length parameter of 6 bytes or less Fixed to 0
X Rotation Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Y Rotation Angle	Sphere 000.00	6	Fixed to 0 when the block 3D shape is "005" or "006". O Variable length parameter of 6 bytes or less Unit: °
	Plane 000.00 to 359.99		
Z Rotation Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Fixed value	0	1	Fixed to 0
Fixed value	0000.000	8	O Variable length parameter of 8 bytes or less Fixed to 0
Fixed value	000.000	7	O Variable length parameter of 7 bytes or less Fixed to 0
Fixed value	000.00	6	O Variable length parameter of 6 bytes or less Fixed to 0

* : "List of Input Values for Each Machine Type" (Page A- 2)

(2) Block 3D shapes "001" (Cylinder Inner surface), "002" (Cylinder Outer surface), "003" ((Inverted) Cone Inner surface), "004" ((Inverted) Cone Outer surface)

Item	Parameter	Number of bytes	Remarks
Fixed value	0	1	Fixed to 0
Pasting Method	Cylinder 0 (Inverted) Cone 0/1	1	Fixed to 0 when the block 3D shape is "001" or "002". Pasting methods are: 0 : Isometric pasting 1 : Conformal pasting
Fixed value	0	1	Fixed to 0
Diameter	Cylinder/(Inverted) Cone 0000.200 to 0480.000 *	8	O Variable length parameter of 7 bytes or less Unit: mm
Starting Angle	Cylinder/(Inverted) Cone -0180.00 to 00180.00 *	8	O Variable length parameter of 8 bytes or less Unit: °
Y-axis Offset	Cylinder -060.000 to 0060.000 * (Inverted) Cone 0000.000 to 0060.000 *	8	Fixed to 0 when the block type is outer or inner circumference of arc O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
X-coordinate (3D)	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Y-coordinate (3D)	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Z-coordinate (3D)	-261.00 to 0261.00 *	7	O Variable length parameter of 7 bytes or less For blocks with deep dig amounts set, the lower limit of the input range will become narrow for that amount. Unit: mm
Pitch Angle	Cylinder 000.00 (Inverted) Cone 000.00 to 180.00	6	Fixed to 0 when block 3D shape is "001" or "002". O Variable length parameter of 6 bytes or less Unit: °
Character Full Width Angle	Cylinder 000.00 (Inverted) Cone 000.00 to 180.00	6	Fixed to 0 when the block 3D shape is "001" or "002". O Variable length parameter of 6 bytes or less Unit: °
X Rotation Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Y Rotation Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Z Rotation Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Bus Angle Specification	0/1	1	Specify this item only for block 3D shapes "003" and "004". Otherwise, it is fixed to 0. Parameters for the bus angle specification are: 0 : Do not specify the bus angle 1 : Specify the bus angle
(Inverted) Conical Surface Radius	0000.200 to 0480.000 *	8	Specify this item when the bus angle is not specified. Otherwise, it is fixed to 0. O Variable length parameter of 8 bytes or less Unit: mm
(Inverted) Cone Height	000.100 to 120.000 *	7	Specify this item when the bus angle is not specified. Otherwise, it is fixed to 0. O Variable length parameter of 7 bytes or less Unit: mm
(Inverted) Cone Angle	-85.00 to 085.00	6	Specify this item when the bus angle is specified. Otherwise, it is fixed to 0. O Variable length parameter of 6 bytes or less Unit: °

* : "List of Input Values for Each Machine Type" (Page A- 2)

Requesting block 3D detailed conditions (K5)

Use this command to request 3D detailed conditions for blocks that have 3D settings (block 3D shapes "000" to "006") specified. The 3D detailed conditions will have different setting contents (format) depending on the selected block 3D shape.

Note Sending the "K5" command for a block which has the 2D setting (block 3D shape "099") specified will result in an error.

■ Command

1	4	9				
Header	K 5	,	Program No.	,	Block No.	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	K5	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Total number of bytes		11 (9)	

■ Response

Parameters after the error status bit are identical to those of the Setting block 3D detailed conditions command (K4).

1	4	6												
Header	K 5	,	0	,	Parameter 1	,	Parameter 2		,	Parameter 18	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	K5	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Parameter 1	-	1	The format of each parameter varies depending on the selected block 3D shape. Refer to Page 4-47 ●All of the respective parameters are sent in fixed bytes.
Parameter 2	-	1	
Parameter 3	-	1	
Parameter 4	-	8	
Parameter 5	-	8	
Parameter 6	-	8	
Parameter 7	-	8	
Parameter 8	-	8	
Parameter 9	-	7	
Parameter 10	-	6	
Parameter 11	-	6	
Parameter 12	-	6	
Parameter 13	-	6	
Parameter 14	-	6	
Parameter 15	-	1	
Parameter 16	-	8	
Parameter 17	-	7	
Parameter 18	-	6	
Total number of bytes		124 (105)	

Setting and Requesting Title

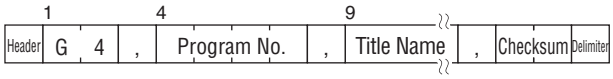
Setting title (G4)

Use this command to set a title for a program No.

Note

- You must specify a title when creating a new program No. If you do not specify a title, it is automatically set to "DEFAULT****" (* means the program No.).
- The following characters cannot be used in a title:
  Single-byte characters: \ / : * ? < > | ' .(period) ,(comma) (space)
  Double-byte character:'" "(space)
- MD-X Series:
  Up to 100 characters can be input. No restriction for usable characters.
  Set comma using "%044A" code to distinguish from delimiter code.

■ Command



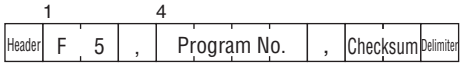
Item	Parameter	Number of bytes	Remarks
Identification Code	G4	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Title Name	-	26	O Variable length parameter of 26 bytes or less Enter the title name not exceeding 13 2-byte characters (shift JIS code) or 26 1-byte characters (ASCII code). If the 2-byte and 1-byte characters are mixed, a maximum 26 bytes can be used.
Total number of bytes		34 (32)	

■ Response

Requesting title (F5)

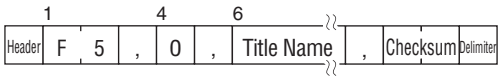
Use this command to request the title that is set for a program No.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	F5	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response



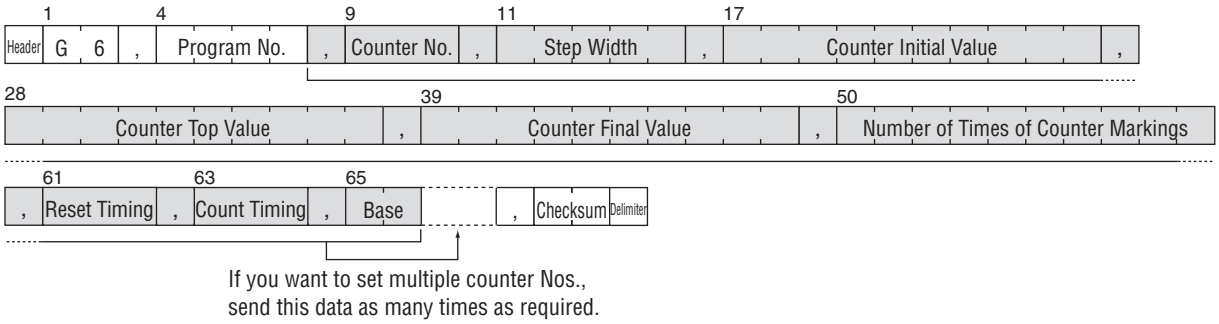
Item	Parameter	Number of bytes	Remarks
Identification Code	F5	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Title Name	-	26	O Variable length parameter of 26 bytes or less Up to 13 2-byte characters (shift JIS code) or 26 1-byte characters (ASCII code) are sent as the title name. If the 2-byte and 1-byte characters are mixed, a maximum 26 bytes are sent.
Total number of bytes		-	

Setting and Requesting Counter Conditions

Setting counter conditions (G6)

Use this command to specify a counter No. and set its counter conditions.

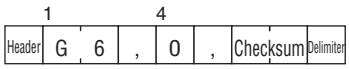
■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	G6	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9 A to J	1	Individual counter Nos. are 0 to 9. Common counter Nos. are A to J.
Step Width	00000 to 10000	5	O Variable length parameter of 5 bytes or less
Counter Initial Value	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less
Counter Top Value	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less
Counter Final Value	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less
Number of Times of Counter Markings	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less
Reset Timing	0/1/2/3/4	1	This item sets the conditions to reset the counter value. 0: Sensor 1: Forcibly only 2: In the event of turning on the power 3: In the event of switching the programs 4: At the increment of "Daily" (incrementing the daily counter)
Count Timing	0/1	1	This item sets the conditions to count-up. 0: Sensor 1: For each marking
Base	02 to 36	2	O Variable length parameter of 2 bytes or less
・ ・ ・	・ ・ ・	-	If you want to set two or more counter Nos., specify the parameters starting from the Counter No. up to the Base as many times as required.
Total number of bytes		Variable	

Reference In the case that base number is 11 or more, alphabets are marked as shown below.
10: A, 11: B, ... 34: Y, 35: Z

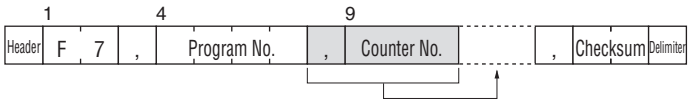
■ Response



Requesting counter conditions (F7)

Use this command to specify a counter No., and request its counter conditions. You can issue the request for conditions of the multiple counter Nos. at one time.

■ Command

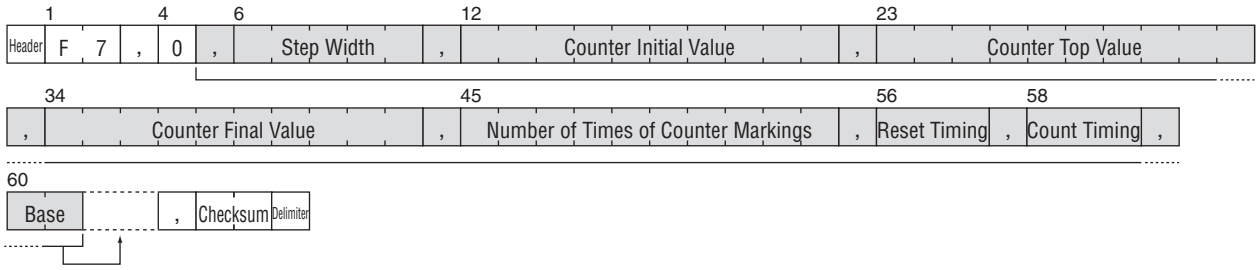


If you want to request multiple counter Nos., send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification Code	F7	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9, A to J	1	Individual counter Nos. are 0 to 9. Common counter Nos. are A to J.
・ ・ ・	・ ・ ・	-	If you need to request more than one counter No. at one time, specify each of the counter Nos.
Total number of bytes		Variable	

■ Response

Parameters after the error status bit are identical to those of the Setting counter conditions command (G6).



When multiple counter Nos. are requested, this data is returned as many times as the number of the counter Nos.

Item	Parameter	Number of bytes	Remarks
Identification Code	F7	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Step Width	00000 to 10000	5	●Data length is fixed to 5 bytes.
Counter Initial Value	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes.
Counter Top Value	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes.
Counter Final Value	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes.
Number of Times of Counter Markings	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes.
Reset Timing	0/1/2/3	1	The conditions to reset the counter value are sent. 0: Sensor 1: Forcibly only 2: In the event of turning on the power 3: In the event of switching the programs 4: At the increment of "Daily" (incrementing the daily counter)
Count Timing	0/1	1	The conditions to count-up are sent. 0: Sensor 1: For each marking
Base	02 to 36	2	●Data length is fixed to 2 bytes.
・ ・ ・	・ ・ ・	-	If conditions for multiple counter Nos. are requested, the parameters starting from Step Width up to Base are sent as many times as required.
Total number of bytes		Variable	

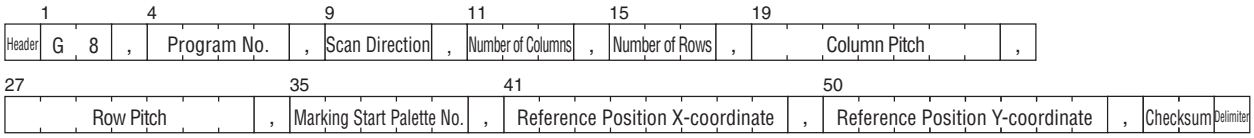
Setting and Requesting Common Palette Conditions

If you want to set a new palette marking, send the Setting common palette conditions command (G8). Issue the Setting individual palette conditions command (KW) immediately after the Setting common palette conditions command (G8) only when you require a coordinate offset for each workpiece or the Scan Direction is set to "3: Specify order".

Setting common palette conditions (G8)

Use this command to set the common conditions for palette marking.

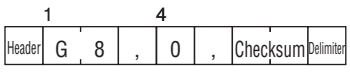
■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	G8	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Scan Direction	0/1/2/3/4/5	1	0: No palette marking 1: Row direction 2: Column direction 3: Specify order 4: Row direction (alternately) 5: Column direction (alternately) Only 0/1/2 is effective in the trimming editing mode. MD-X Series: Does not support "0: No palette marking and 3: Specify order".
Number of Columns	001 to 255	3	The maximum number of workpieces that can be set is "rows" multiplied by "columns" = 65025 workpieces. O Variable length parameter of 3 bytes or less Unit: workpieces * The maximum number of workpieces for the ML-Z9500 series is 10000.
Number of Rows	001 to 255	3	
Column Pitch	000.000 to 120.000 *	7	O Variable length parameter of 7 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Row Pitch	000.000 to 120.000 *	7	
Marking Start Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	This item sets the palette No. that is executed first. If either X-direction or Y-direction has priority as the scan direction, set to "0001". If "Specify order" is selected as the scan direction, set an arbitrary palette No. O Variable length parameter of 5 bytes or less MD-X Series: Does not support this item. Set any 5-digit value.
Reference Position X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Reference Position Y-coordinate	-060.000 to 0060.000 *	8	
Total number of bytes		57 (48)	

* :"List of Input Values for Each Machine Type" (Page A- 2)

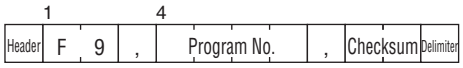
■ Response



Requesting common palette conditions (F9)

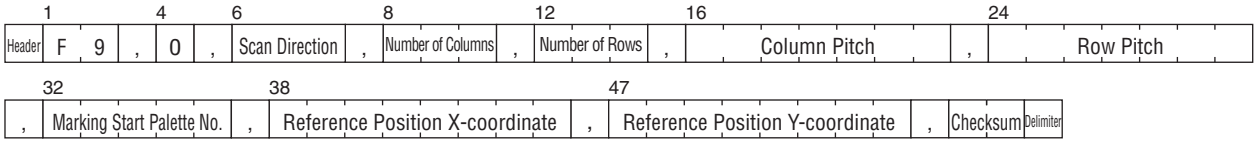
Use this command to request the common conditions for palette marking.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	F9	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	F9	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Scan Direction	0/1/2/3/4/5	1	0: No palette marking 1: Row direction 2: Column direction 3: Specify order 4: Row direction (alternately) 5: Column direction (alternately)
Number of Columns	001 to 255	3	If Number of Rows and Number of Columns are both "001", palette marking is not performed. ●Data length is fixed to 3 bytes. Unit: workpieces
Number of Rows	001 to 255	3	
Column Pitch	00.000 to 120.000 *	6 or 7	OData length is 6 or 7 bytes depending on the selected parameter. Unit: mm See Appendices for response values for MD-X Series.
Row Pitch	00.000 to 120.000 *	6 or 7	
Marking Start Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	This item sends the palette No. that is executed first. If either X-direction or Y-direction has priority as the scan direction, "0001" is sent. If "Specify order" is selected as the scan direction, an arbitrary palette No. is sent. ●Data length is fixed to 5 bytes.
Reference Position X-coordinate	-060.000 to 0060.000 *	7 or 8	OData length is 7 or 8 bytes depending on the selected parameter. Unit: mm See Appendices for response values for MD-X Series.
Reference Position Y-coordinate	-060.000 to 0060.000 *	7 or 8	
Total number of bytes		56 (46)	

* :"List of Input Values for Each Machine Type" (Page A- 2)

Setting and Requesting Conditions for Regular Pitch Layout in Palette

If you want to set a new regular pitch layout in palette, be sure to send the Setting conditions for regular pitch layout in palette command (KU). Issue the Setting individual palette conditions command (KW) immediately after the Setting common palette conditions command (G8) only when you require a coordinate offset for each workpiece or the Scan Direction is set to "3: Specify order".

Setting conditions for regular pitch layout in palette (KU)

Use this command to set the conditions for regular pitch layout in palette.

Note If Movement Marking is selected in the common marking conditions and Machinery Operation Mode is selected as the block type, palette marking cannot be executed.

■ Command

1	4		9		11		13		15		19		23	
Header	K U	,	Program No.	,	Scan Direction	,	Regular row pitch layout flag	,	Regular column pitch layout flag	,	Number of Columns	,	Number of Rows	,	Column Pitch	,

31		39		45		54			
Row Pitch	,	Marking Start Palette No.	,	Reference Position X-coordinate	,	Reference Position Y-coordinate	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	KU	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Scan Direction	0/1/2/3/4/5	1	0: No palette marking 1: Row direction 2: Column direction 3: Specify order 4: Row direction (alternately) 5: Column direction (alternately) Only 0/1/2 is effective in the trimming editing mode. MD-X Series: Does not support "0: No palette marking and 3: Specify order".
Regular row pitch layout flag	0/1/4/5	1	0: Regular pitch layout is not applied 1: Regular pitch layout is applied 4: Regular pitch layout is not applied with specifying all workpieces 5: Regular pitch layout is applied with specifying all workpieces
Regular column pitch layout flag	0/1	1	0: Regular pitch layout is not applied 1: Regular pitch layout is applied * If "Regular pitch layout is applied with specifying all workpieces" is selected only for the column pitch, set the regular row pitch layout flag to 4 and set the regular column pitch layout flag to 1.
Number of Columns	001 to 255	3	The maximum number of workpieces that can be set is "rows" multiplied by "columns" = 65025 workpieces. O Variable length parameter of 3 bytes or less Unit: workpieces * The maximum number of workpieces for the ML-Z9500 series is 10000.
Number of Rows	001 to 255	3	
Column Pitch	000.000 to 120.000 *	7	O Variable length parameter of 7 bytes or less Unit: mm If specifying all workpieces is set to Enable, set all widths/all heights here. See Appendices for setting values for MD-X Series.
Row Pitch	000.000 to 120.000 *	7	
Marking Start Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	This item sets the palette No. that is executed first. If either X-direction or Y-direction has priority as the scan direction, set to "0001". If "Specify order" is selected as the scan direction, set an arbitrary palette No. O Variable length parameter of 5 bytes or less
Reference Position X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Reference Position Y-coordinate	-060.000 to 0060.000 *	8	
Total number of bytes		61 (50)	

* : "List of Input Values for Each Machine Type" (Page A- 2)

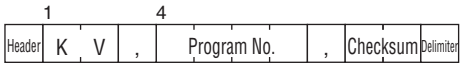
■ Response

1	4					
Header	K U	,	0	,	Checksum	Delimiter

Requesting conditions for regular pitch layout in palette (KV)

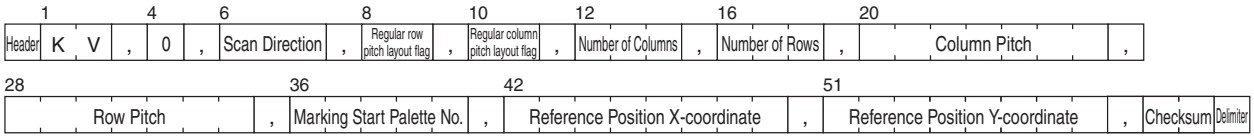
Use this command to request the conditions for regular pitch layout in palette.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	KV	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	KV	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. 📖 "3-1 Error Response" (Page 3- 2)
Scan Direction	0/1/2/3/4/5	1	0: No palette marking 1: Row direction 2: Column direction 3: Specify order 4: Row direction (alternately) 5: Column direction (alternately)
Regular row pitch layout flag	0/1/4/5	1	0: Regular pitch layout is not applied 1: Regular pitch layout is applied 4: Regular pitch layout is not applied with specifying all workpieces 5: Regular pitch layout is applied with specifying all workpieces
Regular column pitch layout flag	0/1	1	0: Regular pitch layout is not applied 1: Regular pitch layout is applied * If "Regular pitch layout is applied with specifying all workpieces" is set only for the column pitch, the regular row pitch layout flag is set to 4 and the regular column pitch layout flag is set to 1.
Number of Columns	001 to 255	3	If Number of Rows and Number of Columns are both "001", palette marking is not performed. ●Data length is fixed to 3 bytes. Unit: workpieces
Number of Rows	001 to 255	3	
Column Pitch	00.000 to 120.000 *	6 or 7	O Data length is 6 or 7 bytes depending on the selected parameter. Unit: mm * If specifying all workpieces is set to Enable, all widths/all heights values are set here.
Row Pitch	00.000 to 120.000 *	6 or 7	
Marking Start Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	This item sends the palette No. that is executed first. If either X-direction or Y-direction has priority as the scan direction, "0001" is sent. If "Specify order" is selected as the scan direction, an arbitrary palette No. is sent. ●Data length is fixed to 5 bytes.
Reference Position X-coordinate	-060.000 to 0060.000 *	7 or 8	O Data length is 7 or 8 bytes depending on the selected parameter. Unit: mm See Appendices for response values for MD-X Series.
Reference Position Y-coordinate	-060.000 to 0060.000 *	7 or 8	
Total number of bytes		58 (47)	

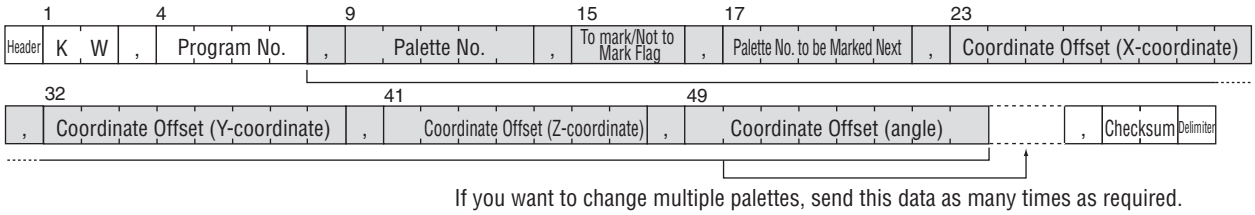
* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

Setting individual palette conditions (KW)

Use this command to set the coordinate offset and order of marking for individual workpieces in the palette marking.
"Setting individual palette conditions (KW)" cannot be sent to the program No. that is not set to palette.
Send "Setting common palette conditions (G8)" or "Setting regular pitch layout in palette conditions (KU)" in advance.

Note When movement marking is selected in the common marking conditions, the palette marking cannot be used.

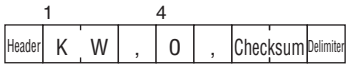
■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	KW	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	Specify a palette No. that you want set. O Variable length parameter of 5 bytes or less
To Mark/Not to Mark Flag	0/1	1	This item sets whether to execute marking or not for each palette. 0: Marking is not executed. 1: Marking is executed.
Palette No. to be Marked Next	-0001, 00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	Specify a palette No. in accordance with the setting specified for Scan Direction. When you set the palette No. that becomes the last palette to execute marking, specify "-1" as the Palette No. to be Marked Next. Note that the maximum number of palettes that can be sent at one time is 100. For details, refer to Reference on Page 5-24. O Variable length parameter of 5 bytes or less MD-X Series: Cannot specify. Set 00000.
Coordinate Offset (X-coordinate)	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Coordinate Offset (Y-coordinate)	-120.000 to 0120.000 *	8	
Coordinate Offset (Z-coordinate)	-042.00 to 0042.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Coordinate Offset (angle)	-180.00 to 0180.00	8	O Variable length parameter of 8 bytes or less Unit: mm
⋮	⋮	-	The parameters starting from the Palette No. up to the Coordinate Offset (angle) will be sent as many times as the number of columns multiplied by number of rows. Note that the maximum number of palettes that can be sent at one time is 100.
	Total number of bytes	Variable	

* : "List of Input Values for Each Machine Type" (Page A- 2)

■ Response

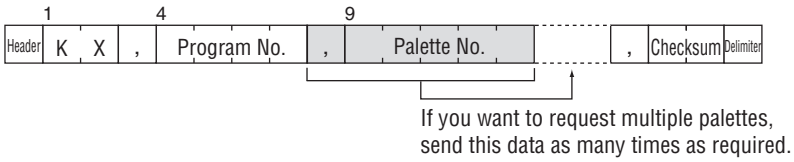


Note You can set the To Mark/Not to Mark Flag for all of the palette Nos. to be used to [0] (Marking is not executed).
In this case, READY output from the control outputs is turned ON. Marking output and Marking Complete output are not turned ON after SENSOR input is received though the READY output is turned OFF momentarily.

Requesting individual palette conditions (KX)

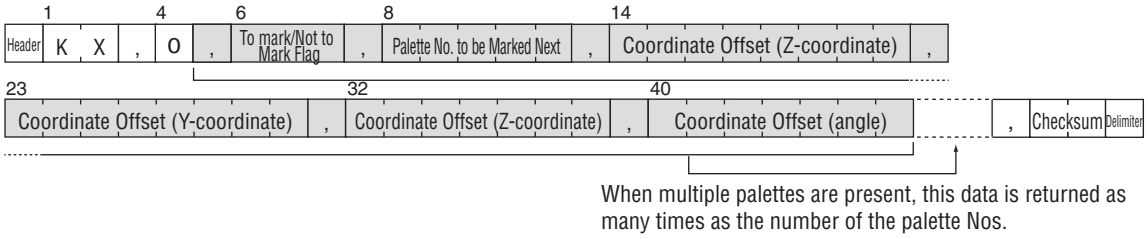
Use this command to request the palette marking conditions for each workpiece.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	KX	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	O Variable length parameter of 5 bytes or less
・ ・ ・	・ ・ ・	-	If you need conditions for multiple palette Nos., send the palette No. as many times as required. Note that the maximum number of palettes than can be requested at one time is 100.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	KX	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
To Mark/Not to Mark Flag	0/1	1	It sends whether the marking is executed or not for each palette. 0: Marking is not executed. 1: Marking is executed.
Palette No. to be Marked Next	-0001, 00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	The palette No. is sent in accordance with the setting specified for Scan Direction. For the palette No. that becomes the last palette to execute marking, "- 0001" is sent. For details, refer to Reference on Page 5-24. ●Data length is fixed to 5 bytes.
Coordinate Offset (X-coordinate)	-120.000 to 0120.000 *	8	●Data length is fixed to 8 bytes. Unit: mm See Appendices for response values for MD-X Series.
Coordinate Offset (Y-coordinate)	-120.000 to 0120.000 *	8	
Coordinate Offset (Z-coordinate)	-042.00 to 0042.00 *	7	●Data length is fixed to 7 bytes. Unit: mm Fixed to "0" for the MD-T1000 Series.
Coordinate Offset (angle)	-180.00 to 0180.00	7	●Data length is fixed to 7 bytes. Unit: °
・ ・ ・ ・	・ ・ ・ ・	-	The parameters starting from To Mark/Not to Mark Flag up to Coordinate Offset (angle) will be sent as many times as the requested number of palettes. Note that the maximum number of palettes that can be sent at one time is 100.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

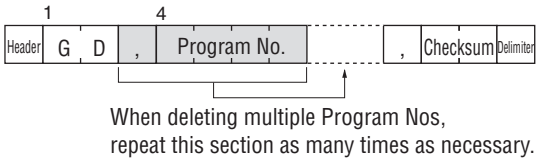
4-3 Deleting Program Contents

This section describes the procedure to delete the program contents that are set in a specified program No.

Deleting program contents (GD)

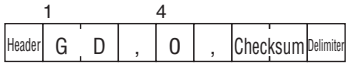
You can delete multiple program Nos. from the controller. If you specify "9999" for the program No., all program Nos. are deleted from the controller.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	GD	2	Fixed
Program No.	0000 to 1999, 9999	4	O Variable length parameter of 4 bytes or less If you specify "9999", all program Nos. can be deleted at once.
⋮	⋮	-	If you want to delete multiple program Nos. at once, send the program No. as many times as required.
Total number of bytes		Variable	

■ Response



MEMO

Chapter 5

Frequently-used Change Commands and Request Commands

This chapter describes the frequently used commands such as the commands to change character strings or marking conditions.

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5-2 Quick Change of Character String..... 5-3

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5-7 Changing and Requesting the Block Marking Flag..... 5-21

5-8 Changing and Requesting Conditions of Palette Marking 5-23

5-9 Setting GS1 DataBar..... 5-35

5-10 Other Commands 5-40

Note The range of settings shown in this manual is for the ML-Z series ML-Z9510 (standard character model).
If other models (ML-Z9520 (wide area model) or ML-Z9550 (super fine model)) have different ranges of settings, these ranges are shown in "List of Input Values for Each Machine Type" (Page A- 2).

5-1 Changing Character String

This section describes the procedure to change a character string that has already been set.

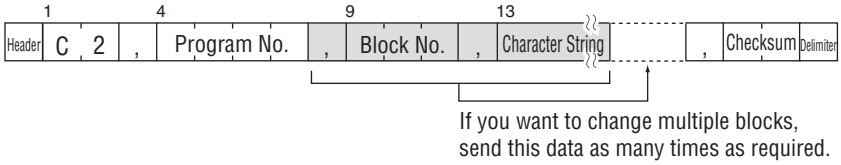
The following are the two types of change commands that can be used for changing the character string.

- "C2" command: This command enables you to change the character string of all types of blocks except for blocks using machinery operation mode.
- "H2" command : This command enables you to change the character string in a shorter time than the "C2" command. However, encoded characters such as update character, logo, custom characters and barcodes cannot be changed. Note that the "H2" command can only change the character string of the program that is currently running.

Changing character string (C2)

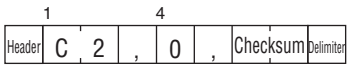
This command can be used to change the character string to be marked in the specified program. It can also change the character strings for multiple marking blocks with a program setting in a single command.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	C2	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the condition of the character string of the program that is running at present will be changed. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Character String	Shift JIS/ASCII	-	The specified character is sent either in Shift JIS code (double-byte) or ASCII code (single-byte). The maximum number of characters that can be specified are 127 characters of the shift JIS and ASCII code. However, up to 255 bytes of 2D codes (block type) can be sent. MD-X Series: Up to 510 characters can be set. For details of the character string such as update character to be specified, refer to "4-2 Setting Various Conditions" (Page 4- 7).
⋮	⋮	-	To specify the character string of multiple block numbers, send the block number and character string as many time as required.
Total number of bytes		Variable	

■ Response



Note

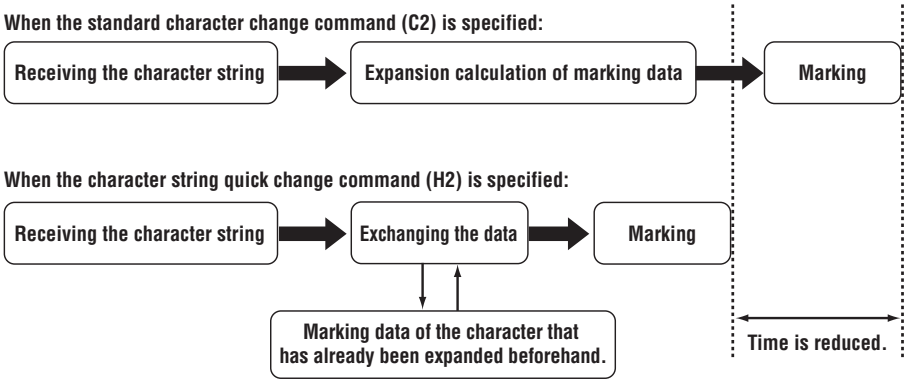
- When entering a comma, be sure to enter it using the shift-JIS code, or use "%044A (single-byte)" code so that the comma can be distinguished from the delimiting code.
- When specifying "%" using ASCII code (single-byte), enter it as "%% (single-byte)". For Shift JIS code (double-byte) enter "%" (one double-byte character).

5-2 Quick Change of Character String

When utilizing the quick character change command, the data expansion time that is required after changing the character string is reduced so that the character string can be changed in a short period of time.

During the normal character string change using the "character string changing command" (C2) command, there is a certain amount of calculation time that is needed upon the receipt of the "C2" command. This is known as expansion calculation and is required in order to create the marking data that is to be marked. Marking cannot proceed until the expansion calculation is complete.

The "character string quick change command" (H2) can be used to reduce the amount of time required to change the character string data. Using the "Registering the quick change character command" (IR), the expansion calculations on the target characters are perform beforehand so they do not need to be calculated at the time the change command is received (as with the "C2" command). Up to a maximum of 70 characters can be registered with the "IR" command. The "setting the target block of quick change command" (C8) is used to set the target block that will be changed with the "H2" command. Since the marking date is prepared ahead of time, the "H2" command can be used to quickly change the target character string to be marked.

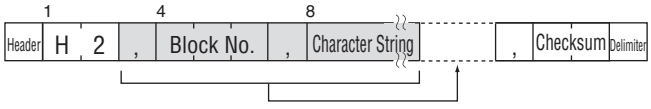


Quick change of character string (H2)

In order to utilize the "H2" command, you must first specify the block(s) that will be changed using the "C8" command. Then, you can specify the characters string information to execute the quick change. The characters can be changed using any of the characters that have been set with the "IR" command (up to 70 characters can be registered). Note that encoded characters such as update characters, logos, customer characters, barcode (block type), and 2D codes cannot be changed using the "H2" command. Also, the "H2" command can only be used to change a character string of the program that is currently running.

■ Command

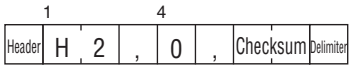
The maximum size of character strings in a single block is 256 bytes.



If you want to change multiple blocks, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	H2	2	Fixed
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Character string	Shift JIS/ASCII	-	It specifies the character using either the shift JIS code (double-byte) or ASCII code (single-byte). The maximum number of characters that can be specified are 127 characters of the shift JIS and ASCII code. MD-X Series: Up to 510 characters can be set.
⋮	⋮	-	To specify the character string of multiple block numbers, send the block number and character string data as many time as required.
Total number of bytes		Variable	

■ Response



Note

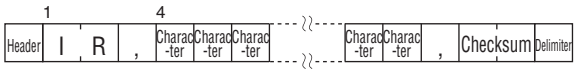
- When using the "H2" command, the character string cannot be changed to one that exceeds the number of characters of the block when it was registered beforehand with the "C8" command. If a string with fewer characters than registered beforehand is used, the remaining characters are filled with null spaces so the original number of characters is saved.
- When entering a comma, be sure to enter it using the shift-JIS code, or use "%044A (single-byte)" code so that the comma can be distinguished from the delimiting code.
- When specifying "%" using ASCII code (single-byte), enter it as "%% (single-byte)". For Shift JIS code (double-byte) enter "%" (one double-byte character).
- If you want to change the character string of the block number that is specified as the target of quick change of character, you can only use characters that have been registered with the "IR" command.
- If you send a character that is not registered, "Quick Change of Character Setup Error" is returned as the response.
- Dot character and 2D code are not supported.

Reference If you want to change encoded character strings such as update character, logo, custom character, barcode (block type) and 2D code, use the "C2" command.
"5-1 Changing Character String" (Page 5- 2)

Registering the quick change character (IR)

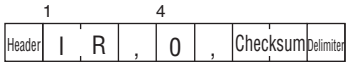
You can register up to 70 characters as the characters to be changed at a high speed.
By default setup, numerals, uppercase and lowercase letters have already been registered as the quick change characters.
The registered characters are overwritten whenever the "IR" command is sent.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	IR	2	Fixed
Quick Change Character	Shift JIS/ASCII	-	It specifies the character using either the shift JIS code (double-byte) or ASCII code (single-byte). A maximum of 70 characters can be registered excluding delimiting comma.
	Total number of bytes	Variable	

■ Response



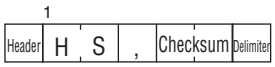
Note

- If characters need to be added or deleted from the ones that are already registered as quick-change characters, you need to send and register the characters that should remain registered as well as the additional characters. (All characters are overwritten each time the "IR" command is sent.)
- When entering a comma, be sure to enter it using the shift-JIS code, or use "%044A (single-byte)" code so that the comma can be distinguished from the delimiting code.
- When specifying "%" using ASCII code (single-byte), enter it as "%% (single-byte)". For Shift JIS code (double-byte) enter "%" (one double-byte character).

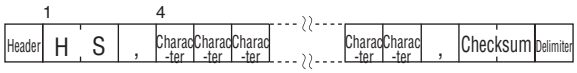
Requesting the quick change character string (HS)

This command requests the currently registered quick change characters.

■ Command

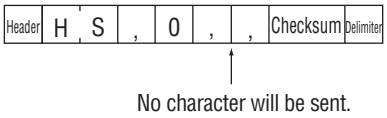


■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	HS	2	Fixed
Quick Change Character	Shift JIS	-	The registered characters are sent in the shift JIS (double-byte) code. A maximum of 70 registered characters excluding delimiting comma can be sent.
Total number of bytes		Variable	

Note If no characters are registered yet, the response shown below is returned and no quick change character will be sent.

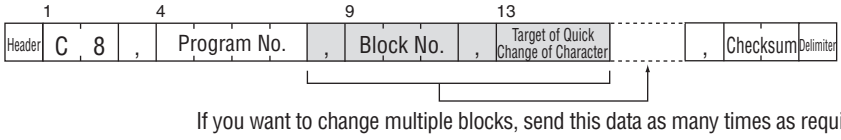


Setting the target block of quick change (C8)

You can specify whether a specific block becomes the target of quick change or not within a single program, when the character string quick change command (H2) is used. You can change the operating condition of any single block or of multiple blocks at one time.

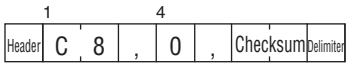
Note If a target of quick change of character has been registered once, it remains valid unless the program is deleted or overwritten by a new target using "MARKING BUILDER 2" or "MARKING BUILDER 3", or optional touch panel or with the communication command.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	C8	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the target of quick change of character of the program that is running at present is changed. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Target of Quick Change of Character	0/1	1	0: Off target 1: On target
⋮	⋮	-	If you want to change multiple blocks, you must send the data starting from the block number up to the target of quick change of character, as many times as required.
Total number of bytes		Variable	

■ Response



5-3 Requesting Character String

This section describes the procedure for requesting the registered character string of a program.

Requesting Character String

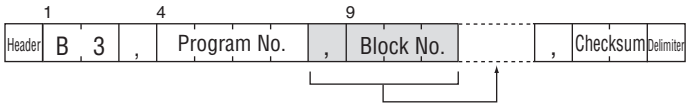
There are following two types of request command that can be used for requesting the character string.

- Command requesting the character string as originally set (B3):
  If you use the B3 command, you can get the character string as it was originally registered by the C2 command or the H2 command.
  You can get the update character, logo and custom character in the original data code (such as %4Y) as they were originally registered.
- Command requesting the character string as it is actually marked (UY):
  You can get the character string after it is actually marked. You can use the UY command for checking the marked contents upon completion of marking because the character string such as update character is supplied as it is actually marked.
  *The program number that is currently running is the target of this request.

Command requesting the character string as originally set (B3)

This command requests the character string as it is originally registered in each block. The update character, logo and custom characters are supplied as they are originally registered. You can request the character string of multiple blocks simultaneously.

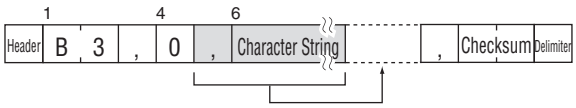
■ Command



If you request a character string of multiple blocks, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	B3	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the condition of the character string of the program that is running at present will be requested. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	To request a character string of multiple blocks, send the block number and character string as many times as required.
Total number of bytes		Variable	

■ Response



If you request a character string of multiple blocks, this data is sent as many times as the number of blocks.

Item	Parameter	Number of bytes	Remarks
Identification code	B3	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Character string	Shift JIS/ASCII	-	Sends the specified character string in shift JIS code (double-byte). (Sometimes the character string may also be sent in ASCII (single-byte) code.) "Note" (Page 5-7) A maximum number of characters that can be sent are 127 characters of the shift JIS and ASCII code. MD-X Series: Up to 510 characters can be set.
⋮	⋮	-	To request a character string of multiple blocks, send the block number and character string as many times as required.
Total number of bytes		Variable	

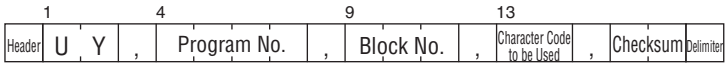
Note

- The requested character strings are sent in ASCII code (single-byte) for the following situations.
  Update character
  Program code for logo, workpiece image, hatch logo, custom character, photo file
  The encode character string whose block type is of the 2D code, and the encode character string that is set using the ASCII code (single-byte).
  Control code in CODE128 and DataMatrix.
- If the character string to be sent contains encoded characters such as update character, the maximum data length of character string becomes 255 bytes.
- If a request for a character string is issued to the blocks whose block type is 2D Machinery Operation Mode, an illegal command error is issued.
- If the data length of response exceeds 4096 bytes, the "Response data length error" is returned. In such a case, separate the request so that the response data length does not exceed 4096 bytes.

Command requesting the character string as it is actually marked (UY)

Use this command to request the character string as it is actually marked. The update characters are supplied not in the character code but as they are actually marked. You can specify the character string response to be received either in shift JIS code or ASCII code.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	UY	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Character Code to be used	0/1	1	It specifies the character code that shall be used when sending the character string. 0: Character string is sent in ASCII code. 1: Character string is sent in shift JIS code. 2: UTF-8 (MD-X Series only)
Total number of bytes		13(10)	

■ Response

Item	Parameter	Number of bytes	Remarks
Identification code	UY	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Marked character string	Shift JIS/ASCII	-	The actually marked character string is returned in the character code specified by the "Character code to be used" command.
Total number of bytes		Variable	

Note

- Be sure to send the request command (UY) for the marking character string upon completion of marking. If it is sent without marking, an error (S029 (Mark Data Request Error)) is returned.
- If a command requesting character string is sent to a block whose block type is 2D Machinery Operation Mode (straight line, dashed line, oval arc, fixed point) or logo (including workpiece image and hatch logo), no character string will be returned.
- Custom characters will be returned as a double byte space.
- If there exists a character that cannot be converted to the ASCII code when the "character code to be used" is specified as ASCII code, such a character will be replaced by a single-byte space and returned.
  MD-X Series: If some characters cannot be converted to the specified character code, those characters are all replaced with 1-byte space and sent.
- If ASCII code is specified as the "character code to be used", comma is returned as ",".
- If the data length of response exceeds 4096 bytes, the "Response data length error" is returned. In such a case, separate the request so that the response data length does not exceed 4096 bytes.
- If character string of palette marking is specified, the character string that was marked last will be returned.

5-4 Changing and Requesting 2D Block Position

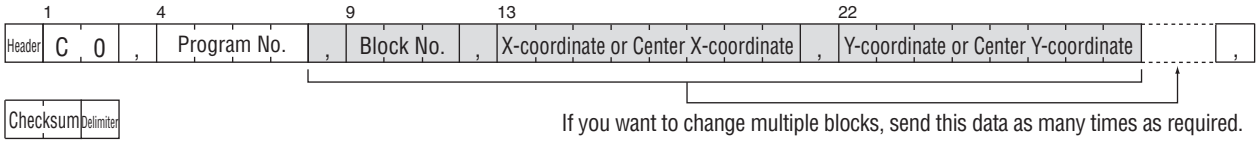
This section describes the procedure of changing the coordinate of a 2D block of an already registered program.

Changing and Requesting 2D Block Position

Changing 2D block position (individual) (C0)

Use this command to change the coordinate of each 2D block that has already been set in an existing program. You can change the parameter of any single block or of multiple blocks at one time.

■ Command

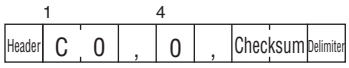


Item	Parameter	Number of bytes	Remarks
Identification code	C0	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the coordinate of the program that is running at present is changed. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
X-coordinate Center X-coordinate	X-coordinate -060.000 to 0060.000 *	8	When the Block Type is either "002" (Outer circumference of arc) or "003" (Inner circumference of arc), the center X coordinate and the center Y coordinate are set. For the Block Types other than "002" and "003" (at the same time excluding 2D Machinery Operation Mode "004" through "008"), the X coordinate and the Y coordinate are set. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	Center X-coordinate -9999.99 to 9999.99 *		
Y-coordinate Center Y-coordinate	Y-coordinate -060.000 to 0060.000 *	8	
	Center Y-coordinate -9999.99 to 9999.99 *		
⋮	⋮	-	If you want to change coordinates of multiple blocks at one time, data starting from the block number up to the Y-coordinate must be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

Note If the total data to be sent starting from header up to delimiter exceeds 4096 bytes, separate the command into two and send the separated commands one by one.

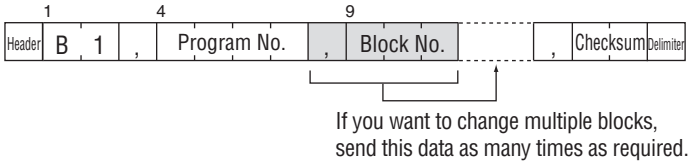
■ Response



Requesting 2D block position (individual) (B1)

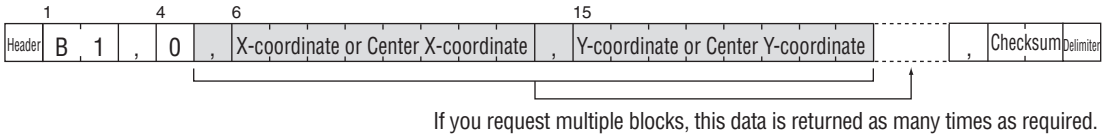
Use this command to request the coordinate of each 2D block that has already been set in an existing program. You can request the conditions of a single block or of several blocks at one time.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	B1	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the coordinates of the program that is running at present will be requested. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you request coordinates of multiple blocks at one time, you should send the required amount of block Nos. all together.
	Total number of bytes	Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	B1	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. 📖 "3-1 Error Response" (Page 3- 2)
X-coordinate Center X-coordinate	X-coordinate -060.000 to 0060.000 *	8	When the Block Type is either "002" (Outer circumference of arc) or "003" (Inner circumference of arc), the center X coordinate and the center Y coordinate are sent. For the Block Types other than "002" and "003" (at the same time excluding 2D Machinery Operation Mode "004" through "008"), the X coordinate and the Y coordinate are sent. ● Data length is 7 or 8 bytes depending on the selected parameter. Unit: mm See Appendices for response values for MD-X Series.
	Center X-coordinate -9999.99 to 9999.99 *		
Y-coordinate Center Y-coordinate	Y-coordinate -060.000 to 0060.000 *	8	
	Center Y-coordinate -9999.99 to 9999.99 *		
⋮	⋮	-	When coordinates of multiple blocks are requested at one time, the required amount of X-coordinate data and Y-coordinate data are returned repeatedly in the order of requested sequence.
Total number of bytes		Variable	

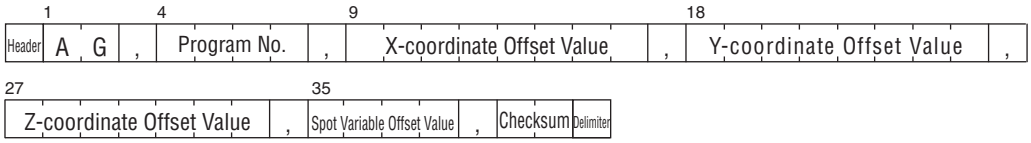
* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

Note If the data length of response exceeds 4096 bytes, the "Response data length error" is returned.
In such a case, separate the request so that the response data length does not exceed 4096 bytes.

Changing 2D block position (all) (AG)

An offset is given to the marking start coordinates of all 2D blocks within a single program globally.

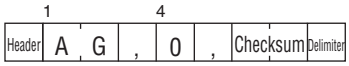
■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	AF	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
X-coordinate Offset Value	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Y-coordinate Offset Value	-120.000 to 0120.000 *	8	
Z-coordinate Offset Value	-042.00 to 0042.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Spot Variable Offset Value	-420 to 0420	4	O Variable length parameter of 4 bytes or less Unit: mm
	Total number of bytes	37 (33)	

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Response



5-5 Changing and Requesting Conditions of 2D Machinery Operation Mode

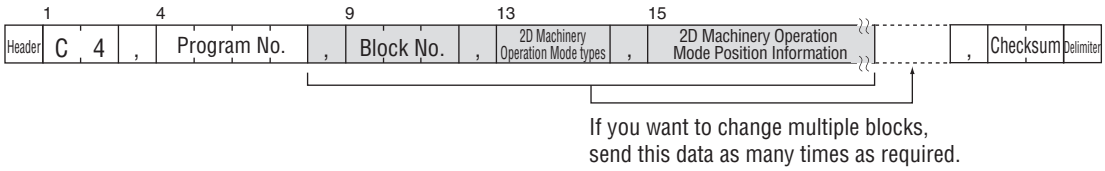
This section describes the procedure of changing and requesting the conditions of blocks that are set for Machinery Operation Mode.

2D Machinery Operation Conditions

Changing conditions of 2D Machinery Operation Mode (C4)

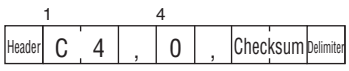
This command changes the conditions (position information under the operating condition) of the block that is set for the block type "004" through "008" 2D Machinery Operation Mode.
You can change the operating condition of any single block or multiple blocks at one time.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	C4	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the condition of the 2D Machinery Operation Mode of the program that is running at present will be changed. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
2D Machinery Operation Mode types	0 to 4	1	0: 2D Machinery Operation Mode Fixed point 1: 2D Machinery Operation Mode Straight line 2: 2D Machinery Operation Mode Dashed line 3: 2D Machinery Operation Mode Counterclockwise Oval/Oval arc/Arc/Circle 4: 2D Machinery Operation Mode Clockwise Oval/Oval arc/Arc/Circle MD-X Series: Supports "0: 2D Machinery Operation Mode Fixed point" only.
2D Machinery Operation Mode Position Information	-	-	For the format of 2D Machinery Operation Mode Position Information, refer to Page 5-12.
◆ ◆ ◆	◆ ◆ ◆	-	If you want to change the conditions of multiple blocks, you must send the data starting from the block number up to the position information of 2D Machinery Operation Mode, as many times as required.
Total number of bytes		Variable	

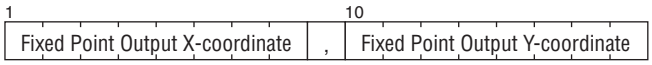
■ Response



[Position Information of the 2D Machinery Operation Mode]

There are three different patterns of position information of Machinery Operation Mode depending on the types of 2D Machinery Operation Mode. Select a format that suits the specified type of 2D Machinery Operation Mode.

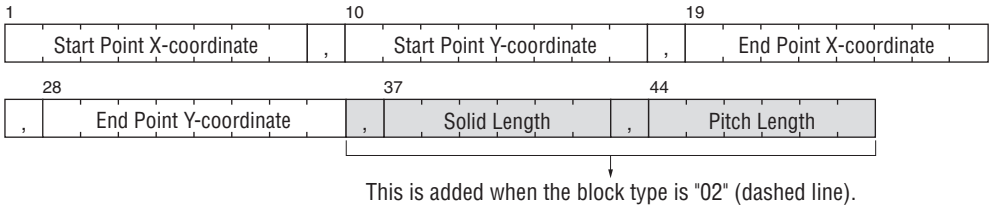
(1) Types of Machinery Operation Mode "0" (Fixed point)



Item	Parameter	Number of bytes	Remarks
Fixed Point Output X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm
Fixed Point Output Y-coordinate	-060.000 to 0060.000 *	8	

* :"List of Input Values for Each Machine Type" (Page A- 2)

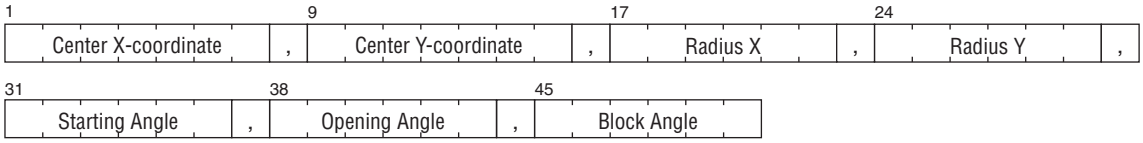
(2) Machinery Operation Mode type "1" (straight line) and "2" (dashed line)



Item	Parameter	Number of bytes	Remarks
Start Point X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm
Start Point Y-coordinate	-060.000 to 0060.000 *	8	
End Point X-coordinate	-060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm
End Point Y-coordinate	-060.000 to 0060.000 *	8	
Solid Length (dashed line only)	00.100 to 60.000 *	6	This data is sent only when setting the dashed line. O Variable length parameter of 6 bytes or less Unit: mm
Pitch Length (dashed line only)	00.100 to 60.000 *	6	

* :"List of Input Values for Each Machine Type" (Page A- 2)

(3) Types of 2D Machinery Operation Mode "3" (Counter clockwise circle/Oval/Arc/Oval arc) and "4" (Clockwise circle/Oval/Arc/Oval arc)



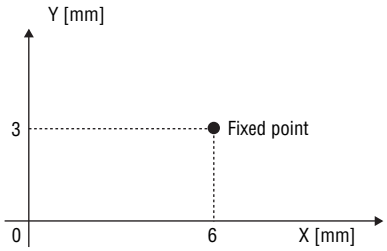
Item	Parameter	Number of bytes	Remarks
Center X-coordinate	-240.00 to 240.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm
Center Y-coordinate	-240.00 to 240.00 *	7	
Radius X	001.00 to 240.00 *	6	O Variable length parameter of 6 bytes or less Unit: mm
Radius Y	001.00 to 240.00 *	6	
Starting Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
Opening Angle	000.01 to 360.00	6	When you select circle or oval, set the angle to 360.00°. O Variable length parameter of 6 bytes or less Unit: °
Block Angle	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °

* :"List of Input Values for Each Machine Type" (Page A- 2)

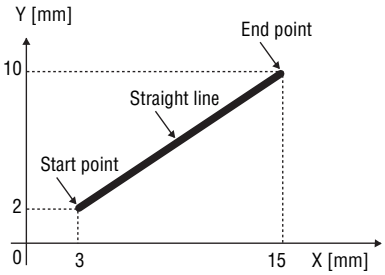
Reference If you set an identical value to both radius X and radius Y, you can get a circle or an arc.

■ Supplementary description of parameter

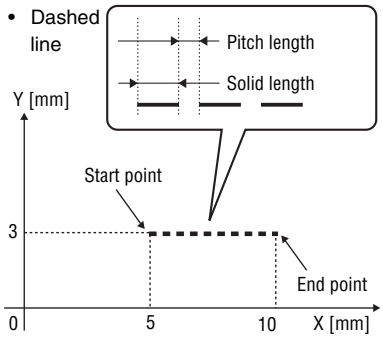
- Fixed point



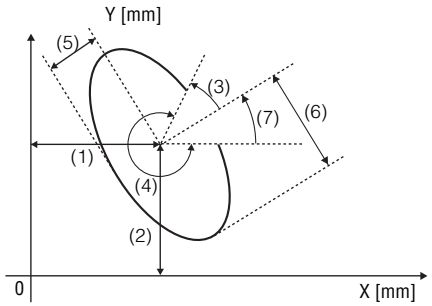
- Straight line



- Dashed line



- Circle/Arc/Oval/Oval arc

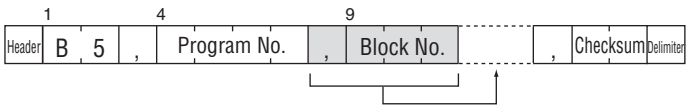


(1) : Center X-coordinate
(2) : Center Y-coordinate
(3) : Starting Angle
(4) : Opening Angle
(5) : Radius X
(6) : Radius Y
(7) : Block Angle

Requesting conditions of 2D Machinery operation Mode (B5)

This command requests the conditions (position information under the block condition) of the block that is set for the 2D Machinery Operation Mode.
You can request the conditions of a single block or of several blocks at one time.

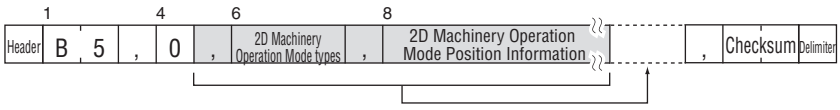
■ Command



If you want to request multiple blocks,
send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	B5	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the conditions of the 2D Machinery Operation Mode of the program that is running at present will be requested. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you want to request conditions of multiple blocks, you must send the block number as many times as required.
Total number of bytes		Variable	

■ Response



If you request multiple blocks,
this data is returned as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	B5	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. 📖 "3-1 Error Response" (Page 3- 2)
2D Machinery Operation Mode types	0 to 4	1	0: 2D Machinery Operation Mode Fixed point 1: 2D Machinery Operation Mode Straight line 2: 2D Machinery Operation Mode Dashed line 3: 2D Machinery Operation Mode Counterclockwise Oval/Oval arc/Arc/Circle 4: 2D Machinery Operation Mode Clockwise Oval/Oval arc/Arc/Circle
2D Machinery Operation Mode Position Information	-	-	For the format of 2D Machinery Operation Mode Position Information, refer to Page 5-12. ● Each parameter is returned containing the maximum number of bytes.*1
⋮	⋮	-	If you request the conditions of multiple blocks, the data starting from the type of processing 2D machinery operation position information of processing 2D machinery operation are returned as often as required in the requested order.
Total number of bytes		Variable	

*1: The fixed point output X/Y coordinates of the 2D Machinery Operation Mode fixed point, and the start point X/Y coordinates and the end point X/Y coordinates of the straight line and the dashed line are sent in 7 bytes if the parameters do not require the maximum number of bytes.

Note If the data length of response exceeds 4096 bytes, the "Response data length error" is returned.
In such a case, separate the request so that the response data length does not exceed 4096 bytes.

5-6 Changing and Requesting 3D Block Position

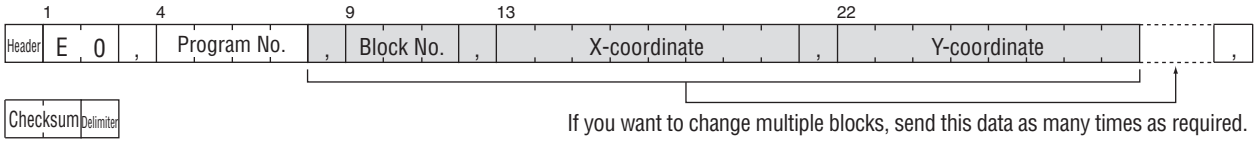
This section describes the procedure for changing the coordinate of a 3D block of an already registered program.

Changing 3D block position (E0)

Use this command to change the block coordinates (X/Y) for the block No. that has the block 3D shapes of Plane (Slope), Cylinder, (Inverted) Cone, and Sphere ("000" to "006") already specified.
You can change the operating condition of any single block or of multiple blocks at one time.

Note An error occurs if this command is sent to the block Nos. other than the above shapes.

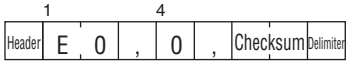
■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	E0	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
X-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
Y-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
⋮	⋮	-	If you want to change coordinates of multiple blocks at one time, data starting from the block number up to the Y-coordinate must be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Response

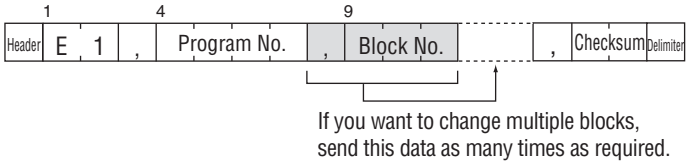


Requesting 3D block position (E1)

Use this command to request the block coordinates (X/Y) for the block No. that has the block 3D shapes of Plane (Slope), Cylinder, (Inverted) Cone, and Sphere ("000" to "006") already specified.
You can request the conditions of a single block or of several blocks at one time.

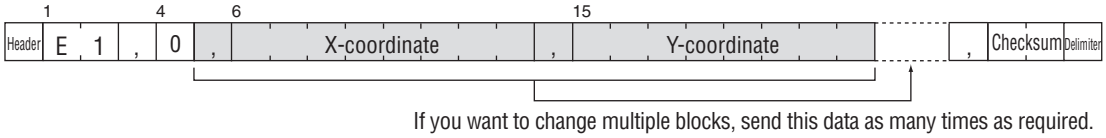
Note An error occurs if this command is sent to the block Nos. other than the above shapes.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	E1	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you request coordinates of multiple blocks at one time, you should send the required amount of block Nos. all together.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	E1	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. 📖 "3-1 Error Response" (Page 3- 2)
X-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	● Data length is fixed to 8 bytes. Unit: mm See Appendices for response values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
Y-coordinate (3D)	When the block type is other than outer or inner circumference of arc -120.000 to 0120.000 *	8	
	When the block type is outer or inner circumference of arc -9999.99 to 09999.99 *		
⋮	⋮	-	When coordinates of multiple blocks are requested at one time, the required amount of X-coordinate data and Y-coordinate data are returned repeatedly in the order of requested sequence.
Total number of bytes		Variable	

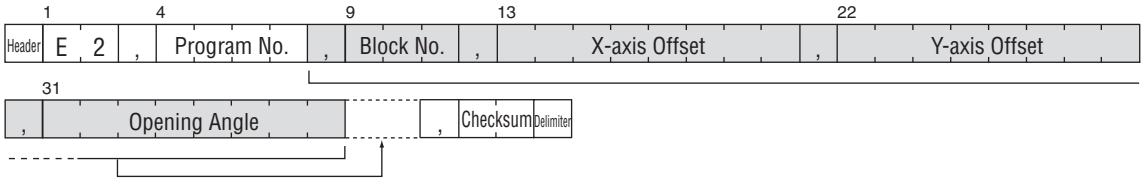
* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

Changing 3D block position offset (E2)

Use this command to change the block coordinate offsets (X-axis/Y-axis) and the start angle for the block No. that has the block 3D shapes of Plane (Slope), Cylinder, (Inverted) Cone, and Sphere ("000" to "006") already specified. You can change the operating condition of any single block or of multiple blocks at one time.

Note An error occurs if this command is sent to the block Nos. other than the above shapes.

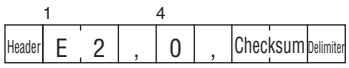
■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	E2	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
X-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 9999.99 *		
Y-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	When the block 3D shape is (Inverted) Cone, the lower limit of the parameter is 0. O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 9999.99 *		
Starting Angle	Plane/Cylinder 0000000	8	O Variable length parameter of 8 bytes or less Unit: °
	Cylinder/(Inverted) Cone -0180.00 to 00180.00		
◆ ◆ ◆	◆ ◆ ◆	-	If you want to change coordinates of multiple blocks at one time, data starting from the block number up to the start angle must be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Response

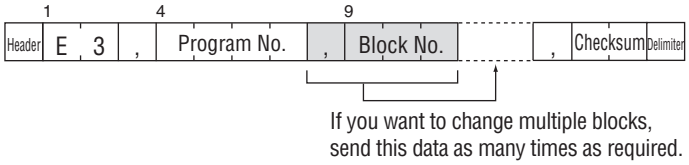


Requesting 3D block position offset (E3)

Use this command to request the block coordinate offsets (X-axis/Y-axis) and the start angle for the block No. that has the block 3D shapes of Plane (Slope), Cylinder, (Inverted) Cone, and Sphere ("000" to "006") already specified. You can request the conditions of a single block or of several blocks at one time.

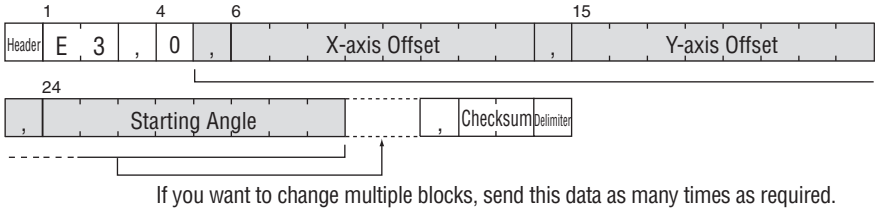
Note An error occurs if this command is sent to the block Nos. other than the above shapes.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	E3	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you request coordinates of multiple blocks at one time, you should send the required amount of block Nos. all together.
Total number of bytes		Variable	

■ Response



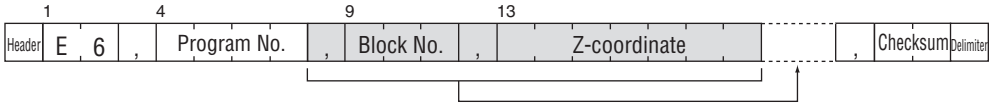
Item	Parameter	Number of bytes	Remarks
Identification code	E3	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
X-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	● Data length is fixed to 8 bytes. Unit: mm See Appendices for response values for MD-X Series.
	When the block type is outer or inner circumference of arc -9999.99 to 9999.99 *		
Y-axis Offset	When the block type is other than outer or inner circumference of arc -060.000 to 0060.000 *	8	
	When the block type is outer or inner circumference of arc -9999.99 to 9999.99 *		
Starting Angle	Plane/Cylinder 0000000	8	Fixed to 0 when the block 3D shape is "000", "005", or "006". ●Data length is fixed to 8 bytes. Unit: °
	Cylinder/(Inverted) Cone -0180.00 to 00180.00		
⋮	⋮	-	When coordinates of multiple blocks are requested at one time, the required amount of data between the X-coordinate and the start angle are returned repeatedly in the order of requested sequence.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

Changing block Z position (E6)

Use this command to change the Z coordinate of a block No. in an already registered program.
You can change the operating condition of any single block or of multiple blocks at one time.
This command can be used for all the blocks whose block 3D shape is set to 2D or 3D.

■ Command

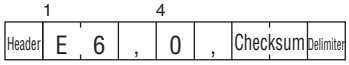


If you want to change multiple blocks, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	E6	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255, 999	3	If you specify "999", the Z coordinate of all the specified block numbers are changed to the same value. O Variable length parameter of 3 bytes or less
Z-coordinate	2D setting -021.00 to 0021.00 *	7	O Variable length parameter of 7 bytes or less Values less than -21 mm after the deep dig amount is subtracted from Z coordinate cannot be entered. Unit: mm See Appendices for setting values for MD-X Series.
	Plane -081.00 to 0081.00 *		
	Cylinder/(Inverted) Cone/Sphere -261.00 to 0261.00 *		
⋮	⋮	-	If you want to change coordinates of multiple blocks at one time, data starting from the block number up to the Z-coordinate must be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Response

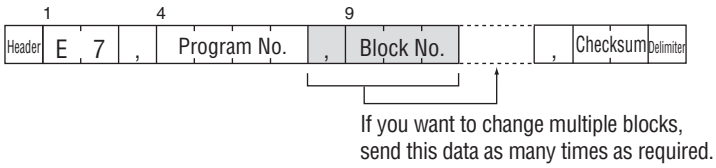


Note The MD-T1000 Series does not support E6 command.

Requesting block Z position (E7)

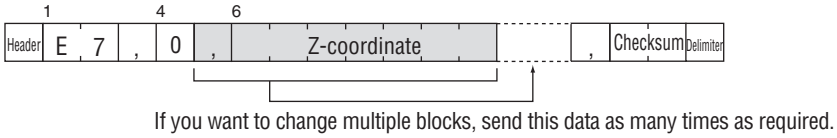
Use this command to request the Z coordinate of a block No. in an already registered program.
You can request the conditions of a single block or of several blocks at one time.
This command can be used for all the blocks whose block 3D shape is set to 2D or 3D.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	E7	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you request coordinates of multiple blocks at one time, you should send the required amount of block Nos. all together.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	E7	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. 📖 "3-1 Error Response" (Page 3- 2)
Z-coordinate	2D setting -021.00 to 0021.00 *	7	● Data length is fixed to 7 bytes. Unit: mm See Appendices for response values for MD-X Series.
	Plane -081.00 to 0081.00 *		
	Cylinder/(Inverted) Cone/Sphere -261.00 to 0261.00 *		
⋮	⋮	-	When coordinates of multiple blocks are requested at one time, the required amount of the Z-coordinate data is returned repeatedly in the order of requested sequence.
Total number of bytes		Variable	

* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

Note The MD-T1000 Series does not support E7 command.

5-7 Changing and Requesting the Block Marking Flag

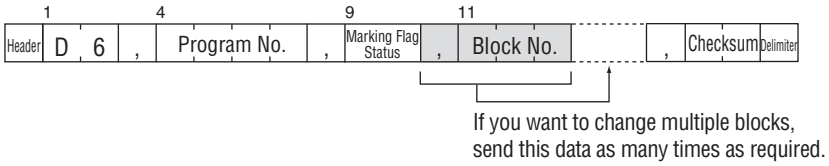
This section describes the procedure to change and request the marking flag that will determine if each marking block will be executed or not.

Changing and Requesting the Block Marking Flag

Changing the block marking flag [Specify at once] (D6)

You can specify whether marking shall be performed or not on each block within a single program No. This command resets the statuses of all flags previously set. You can make the setting to print or not print specified block numbers collectively. For example, if a marking flag for a block or set of blocks is turned ON with the D6 command, the marking flags for all other blocks within the program will be set to OFF (and vice versa). You can change the condition of any single block or multiple blocks within one command. You can also set the marking flags for all blocks within a program to OFF or ON all at once.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	D6	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the marking flag of the program that is running at present is changed. O Variable length parameter of 4 bytes or less
Marking flag status	0/1	1	0: Marking is not executed. 1: Marking is executed. However, if "999" is specified for the block No., the setting is reversed as follows: 0: Marking is executed. 1: Marking is not executed.
Block No.	000 to 255 999 (all)	3	If "999" is specified for the block number, all blocks will be set to the same marking flag status that is specified. O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you want to change conditions of multiple blocks, you must send the block number as many times as required.
Total number of bytes		Variable	

■ Response

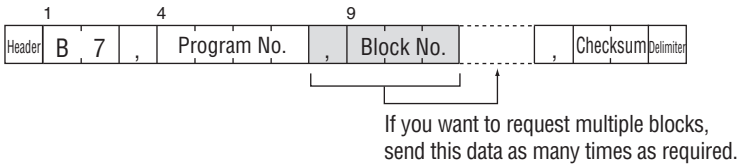
Note

- You can set the marking flag of all the block numbers to be used to [0] (Marking is not executed).
  In this case, READY output from the control outputs is turned ON. Marking output and Marking Complete output are not turned ON after SENSOR input is received though the READY output is turned OFF momentarily.
- This is invalid for the setting No. whose trimming mode is effective.

Requesting the block marking flag (B7)

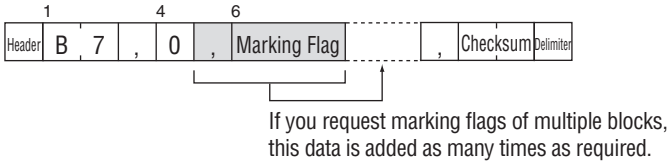
Use this command to request the marking flag of each block within a single program.
You can request the conditions of a single block or of several blocks at one time.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	B7	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the marking flag of the program that is running at present will be requested. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
⋮	⋮	-	If you want to request conditions of multiple blocks, you must send the block number as many times as required.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	B7	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
To mark/Not to mark flag	0/1	1	0: Marking is not executed. 1: Marking is executed.
⋮	⋮	-	If you request the marking flags of multiple blocks, marking flags as many as the number of blocks are returned in the requested sequence.
Total number of bytes		Variable	

5-8 Changing and Requesting Conditions of Palette Marking

This section describes the procedure of changing and requesting the conditions of palette marking.

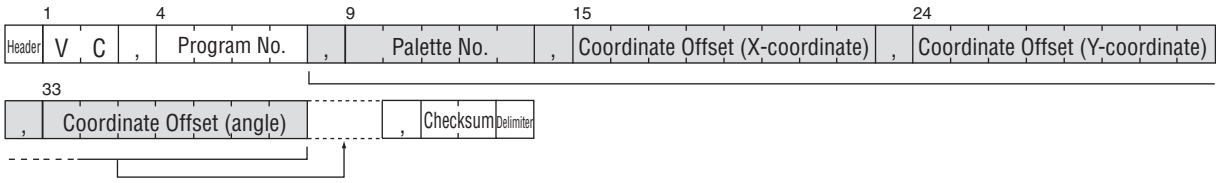
Changing and Requesting the Coordinate Offset for Palette Marking

Changing the coordinate offset (X/Y/θ) for palette marking [Palette No. designation] (VC)

Use this command to change the coordinate offset (X-coordinate, Y-coordinate and angle) for each palette number.
You can change the coordinate offset of any single block or of several blocks at one time.
Use the "UM" command to change the Z coordinate offset.(Page 5-26)

Note The offset value is not calculated.

■ Command



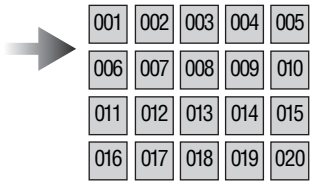
If you want to change the coordinate offsets of multiple palettes, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	VC	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	The palette numbers are assigned starting from the top left toward right in order. "Reference" (this page) O Variable length parameter of 5 bytes or less
Coordinate Offset (X-coordinate)	-120.000 to 0120.000 *	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Coordinate Offset (Y-coordinate)	-120.000 to 0120.000 *	8	
Coordinate Offset (angle)	-180.00 to 0180.00	7	O Variable length parameter of 7 bytes or less Unit: °
⋮	⋮	-	If you want to change the marking conditions of multiple palettes, the data starting from palette number up to the coordinate offset (angle) should be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

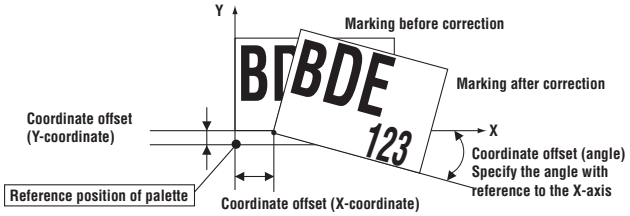
Reference

- Explanation of palette number
  The palette numbers are assigned starting from the top left toward right in order.
  The rule of assigning the palette numbers remains unchanged even if the scan direction does not agree with this rule.

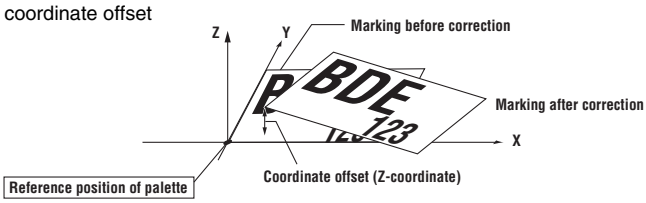


- Explanation of each parameter of coordinate offset

X/Y coordinate offset



Z coordinate offset



Note If the total data to be sent starting from header up to delimiter exceeds 4096 bytes, separate the command into two and send the separated commands one by one.

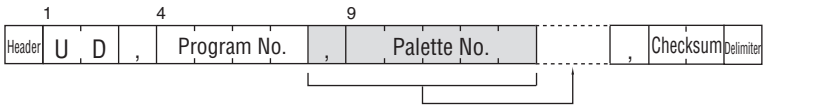
■ Response

	1			4			
Header	V	C	,	0	,	Checksum	Delimiter

Requesting the coordinate offset (X/Y/θ) for palette marking [Palette No. designation] (UD)

Use this command to request the coordinate offsets (X-coordinate, Y-coordinate and angle) of each palette number.
You can request the coordinate offsets of any single block or of several blocks at one time.
Use the "UM" command to request the Z coordinate offset. (Page 5-26)

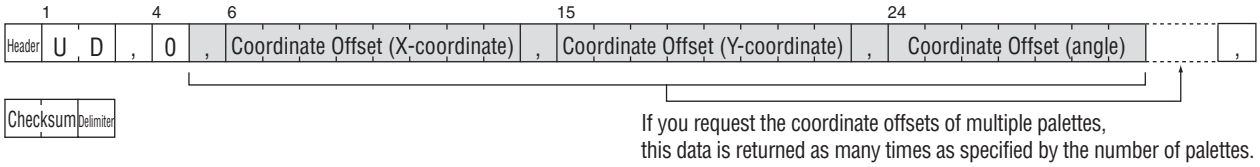
■ Command



If you want to change the coordinate offsets of multiple palettes, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	UD	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	The palette numbers are assigned starting from the top left toward right in order. "Reference" (Page 5-24) O Variable length parameter of 5 bytes or less
⋮	⋮	-	If you want to request coordinate offsets of multiple palettes, you must send the palette number as many times as required.
Total number of bytes		Variable	

■ Response



If you request the coordinate offsets of multiple palettes, this data is returned as many times as specified by the number of palettes.

Item	Parameter	Number of bytes	Remarks
Identification code	UD	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Coordinate Offset (X-coordinate)	-120.000 to 0120.000 *	7 or 8	OData length is 7 or 8 bytes depending on the selected parameter. Unit: mm See Appendices for response values for MD-X Series.
Coordinate Offset (Y-coordinate)	-120.000 to 0120.000 *	7 or 8	
Coordinate Offset (angle)	-180.00 to 0180.00	7	● Data length is fixed to 7 bytes. Unit: °
⋮	⋮	-	If you request the coordinate offsets of multiple blocks, the data starting from the palette number up to the coordinate offset (angle) are returned as many times as required, in the order of request.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

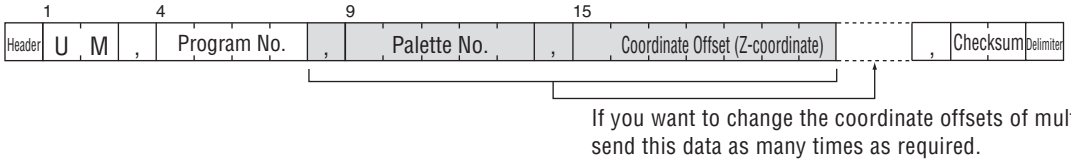
Note If the data length of response exceeds 4096 bytes, the "Response data length error" is returned.
In such a case, separate the request so that the response data length does not exceed 4096 bytes.

Changing the coordinate offset (Z) for palette marking [Palette No. designation] (UM)

Use this command to change the coordinate offset (Z-coordinate) for each palette number.
You can change the coordinate offset of any single block or of several blocks at one time.
Use the "VC" command to change the coordinate offset (X/Y coordinate or angle).(Page 5-23)

Note The offset value is not calculated.

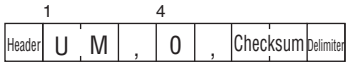
■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	UM	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	The palette numbers are assigned starting from the top left toward right in order. "Reference" (Page 5-24) O Variable length parameter of 5 bytes or less
Coordinate offset (Z-coordinate)	-042.00 to 0042.00 *	7	O Variable length parameter of 7 bytes or less Unit: mm
⋮	⋮	-	If you want to change the marking conditions of multiple palettes, the data starting from palette number up to the coordinate offset (Z coordinate) should be sent as many times as required.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

■ Response

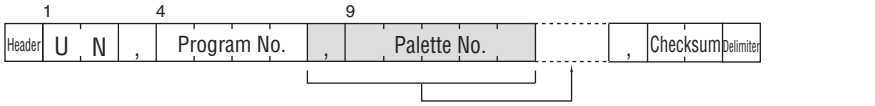


This is invalid for the MD-T1000 Series.

Changing and requesting the coordinate offset (Z) for palette marking [Palette No. designation] (UN)

Use this command to request the coordinate offset (Z-coordinate) for each palette number.
You can request the coordinate offsets of any single block or of several blocks at one time.
Use the "UD" command to request the coordinate offset (X/Y coordinate or angle).(Page 5-25)

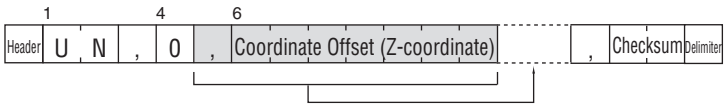
■ Command



If you want to change the coordinate offsets of multiple palettes, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	UN	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	The palette numbers are assigned starting from the top left toward right in order. "Reference" (Page 5-24) O Variable length parameter of 5 bytes or less
⋮	⋮	-	If you want to request coordinate offsets of multiple palettes, you must send the palette number as many times as required.
Total number of bytes		Variable	

■ Response



If you want to change multiple palette Nos., send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	UN	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Coordinate offset (Z-coordinate)	-042.00 to 0042.00 *	7	● Data length is fixed to 7 bytes. Unit: mm
⋮	⋮	-	If you request the coordinate offsets of multiple blocks, the data starting from the palette number up to the coordinate offset (Z coordinate) are returned as many times as required, in the order of request.
Total number of bytes		Variable	

* :"List of Input Values for Each Machine Type" (Page A- 2)

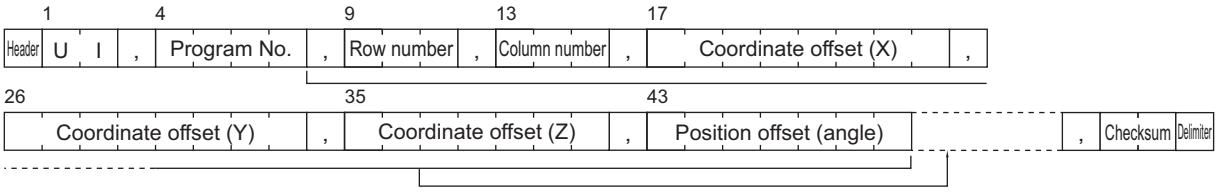
Note If the data length of response exceeds 4096 bytes, the "Response data length error" is returned.
In such a case, separate the request so that the response data length does not exceed 4096 bytes.

Changing the coordinate offset (X/Y/Z/θ) for palette marking [Row & column headers designation] (UI)

Use this command to change the coordinate offset (X/Y/Z/angle) for each palette by specifying row, column, or row and column. You can change one or multiple coordinate offsets at one time.

Note The offset value is not calculated.

■ Command

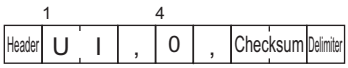


When changing multiple rows and columns, send this data as many times as required.

Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	UI	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Row number	0 to 255	3	O Variable length parameter of 3 bytes or less The row and column numbers to be set are specified. If either the row number or column number is "0", all the data of the corresponding row or column are specified. If both the low number and column number are "0", all palettes are specified.
Column number	0 to 255	3	
Coordinate offset (X)	-120.000 to 0120.000*	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Coordinate offset (Y)	-120.000 to 0120.000*	8	
Coordinate offset (Z)	-042.00 to 0042.00	7	O Variable length parameter of 7 bytes or less Unit: mm Fixed to 0000.00 for the MD-T1000 Series.
Position offset (angle)	-180.00 to 0180.00	7	O Variable length parameter of 7 bytes or less Unit: °
⋮	⋮	–	When specifying multiple rows and columns, send the data of the row number and column number as many times as required. Up to 4096 bytes of data can be sent at one time.
Total number of bytes		Variable	

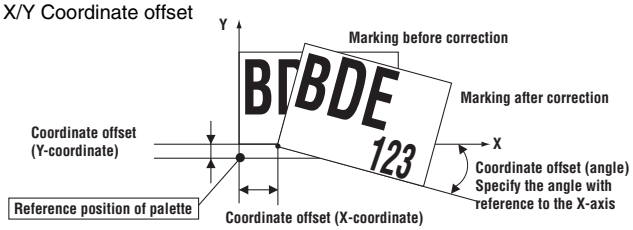
* : "List of Input Values for Each Machine Type" (Page A- 2)

■ Response

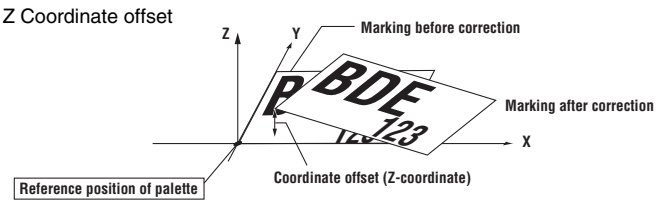


Reference Each parameter of the coordinate offset

X/Y Coordinate offset



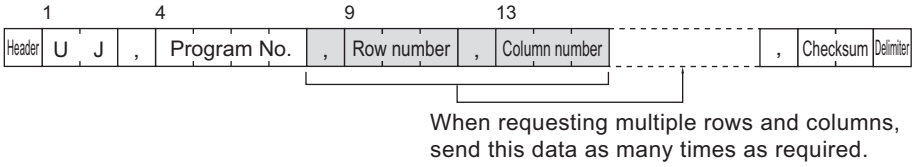
Z Coordinate offset



Requesting the coordinate offset (X/Y/Z/θ) for palette marking [Row & column headers designation] (UJ)

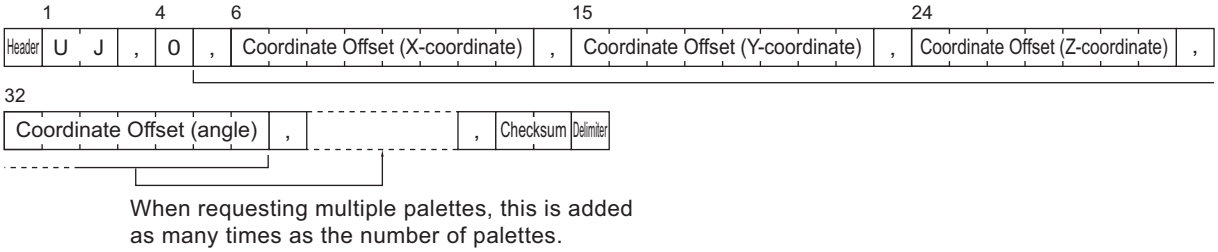
Use this command to request the coordinate offset (X/Y/Z/angle) for each palette by specifying row and column. You can request one or multiple coordinate offsets at one time.

■ Command



Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	UJ	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Row number	0 to 255	3	O Variable length parameter of 3 bytes or less The row and column numbers to be requested are specified.
Column number	0 to 255	3	
⋮	⋮	–	When requesting multiple rows and columns, send the data of the row number and column number as many times as required. Up to 4096 bytes of data can be sent at one time.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	UJ	2	Fixed
Error status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Coordinate Offset (X-coordinate)	-120.000 to 0120.000*	8	● Data length is fixed to 8 bytes. Unit: mm See Appendices for response values for MD-X Series.
Coordinate Offset (Y-coordinate)	-120.000 to 0120.000*	8	
Coordinate Offset (Z-coordinate)	-042.00 to 0042.00*	7	● Fixed to 7 bytes Unit: mm
Coordinate Offset (angle)	-180.00 to 0180.00	7	● Fixed to 7 bytes Unit: °
⋮	⋮	-	When requesting multiple palettes, the data from the coordinate offset (X) to the coordinate offset (angle) are sent in the requested order and requested times.
Total number of bytes		Variable	

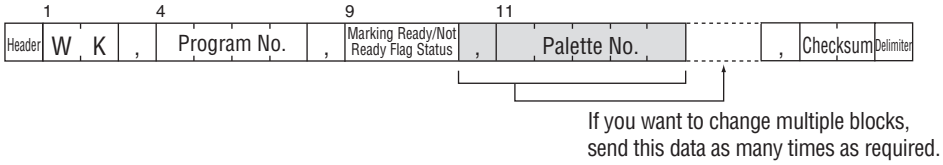
* :"List of Input Values for Each Machine Type" (Page A- 2)

Note If the response data length exceeds 4096 bytes, "Response data length error" is sent.
In this case, divide the setting contents and request so that the response data length does not exceed 4096 bytes.

Changing marking ready/not ready status of pallet marking (specify at once) [Palette No. designation] (WK)

Use this command to change the marking ready/not ready status for each pallet. This command resets all the marking ready/not ready statuses that have been specified just before the command is sent. For example, if you activate the marking ready status for a specific pallet number or multiple pallet numbers, all other pallets are set to not ready (no marking). You can change the condition of any single pallet or multiple pallets within one command. You can also set the marking status for all pallet numbers all at once.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	WK	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Marking ready/not ready flag status	0/1	1	0: Marking is not executed. 1: Marking is executed. However, if "00000" is specified for the palette number, the setting is reversed as follows: 0: Marking is executed. 1: Marking is not executed.
Palette No.	00000, 00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	It specifies the palette number for which the marking ready/not ready flag is set. If "00000" is specified for the pallet number, all of the pallet numbers are set to the marking flag status that is specified. "Reference" (Page 5-24) O Variable length parameter of 5 bytes or less
⋮	⋮	-	If you want to change multiple pallets, send this data number as many times as required.
	Total number of bytes	Variable	

■ Response

Note You can set the marking flag of all the palette numbers to be used to [0] (Marking is not executed).
In this case, READY output from the control outputs is turned ON. Marking output and Marking Complete output are not turned ON after SENSOR input is received though the READY output is turned OFF momentarily.

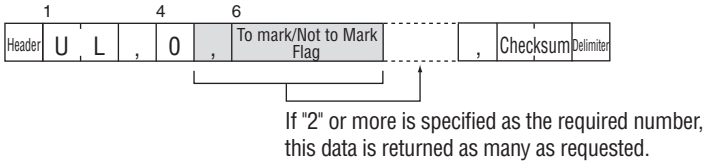
Requesting the marking ready/not ready status of palette marking (UL)

Use this command to request the marking ready/not ready status of each palette.
You can request the ready/not ready status of any single block or of several blocks at one time.

■ Command

Item	Parameter	Number of bytes	Remarks
Identification code	UL	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Top Palette No.	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	This specifies the palette number of the top palette that requests the marking ready/not ready flag. "Reference" (Page 5-24) O Variable length parameter of 5 bytes or less
Required Number	00001 to 65025 * For the ML-Z9500 Series, 00001 to 10000	5	O Variable length parameter of 5 bytes or less The marking ready/not ready status is sent in the response as many as required from the specified palettes.
Total number of bytes		19 (16)	

■ Response



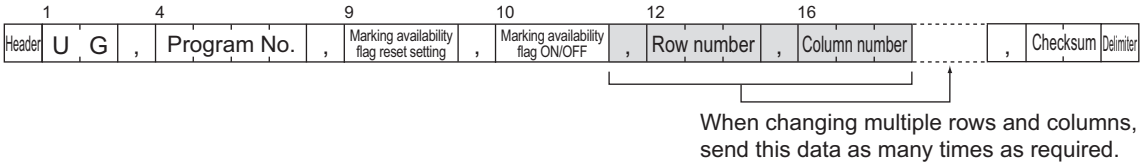
Item	Parameter	Number of bytes	Remarks
Identification code	UL	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
To mark/Not to mark flag	0/1	1	0: Marking is not executed. 1: Marking is executed.
◆	◆	-	The marking ready/not ready flag is sent as often as requested.
Total number of bytes		Variable	

Changing the marking availability status for palette marking [Row & column headers designation] (UG)

Use this command to change the marking availability by specifying row, column, or row and column. There are 4 patterns of setting method for this command.

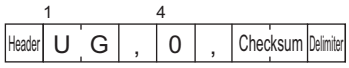
Marking availability flag reset setting	Marking availability flag ON/OFF	Explanation
OFF	OFF	Specify the palette to set the marking flag to OFF with the previous marking flag kept.
OFF	ON	Specify the palette to set the marking flag to ON with the previous marking flag kept.
ON	OFF	Specify the palette to set the marking flag to OFF after resetting the previous marking flag and setting all marking flags to ON.
ON	ON	Specify the palette to set the marking flag to ON after resetting the previous marking flag and setting all marking flags to OFF.

■ Command



Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	UG	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Marking availability flag reset setting	0/1	1	Specify whether to reset the previous marking flag or not. 0: Not reset 1: Reset
Marking availability flag ON/OFF	0/1	1	Set whether to set the marking flag of the specified row and column to ON or OFF. 0: Set the marking flag of the specified row and column to OFF (If the reset setting for the marking availability flag is ON, set all marking flags to ON beforehand). 1: Set the marking flag of the specified row and column to ON (If the reset setting for the marking availability flag is ON, set all marking flags to OFF beforehand).
Row number	0 to 255	3	O Variable length parameter of 3 bytes or less The row and column numbers to be set are specified. If either the row number or column number is "0", all the data of the corresponding row or column are specified. If both the low number and column number are "0", all palettes are specified.
Column number	0 to 255	3	
⋮	⋮	-	When specifying multiple rows and columns, send the data of the row number and column number as many times as required. Up to 4096 bytes of data can be sent at one time.
Total number of bytes		Variable	

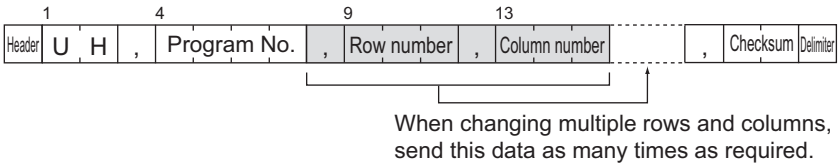
■ Response



Requesting the marking availability status for palette marking [Row & column headers designation] (UH)

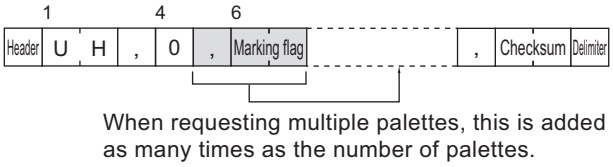
Use this command to request the marking availability flag status by specifying the row and column.
When specifying multiple rows and columns, return marking flags in the specified order.

■ Command



Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	UH	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Row number	000 to 255	3	O Variable length parameter of 3 bytes or less The row and column numbers to be set are specified. If either the row number or column number is "0", all the data of the corresponding row or column are specified. If both the low number and column number are "0", all palettes are specified.
Column number	000 to 255	3	
⋮	⋮	-	When requesting multiple rows and columns, send the data of the row number and column number as many times as required. Up to 4096 bytes of data can be sent at one time.
Total number of bytes		Variable	

■ Response

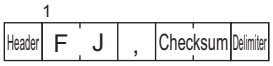


Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	UH	2	Fixed
Error status	0/1	1	"1" means error. "3-1 Error Response" (Page 3- 2)
Marking availability flag	0/1	1	0: Mark 1: Not mark
⋮	⋮	-	When specifying multiple palettes, send marking flags multiple times in the order of the specified row and column.
Total number of bytes		Variable	

Requesting the palette marking status (FJ)

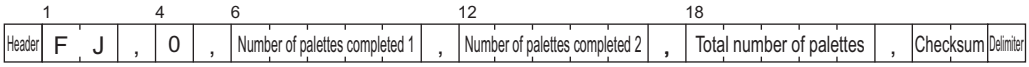
Use this command to send the request command while marking the palette and to confirm the marking progress. Also, use this command to confirm the number of markings properly done when palette marking is canceled.

■ Command



Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	FJ	2	Fixed
Total number of bytes		2 (2)	

■ Response



Item	Setting value (ASCII)	Number of bytes	Remarks
Identification Code	FJ	2	Fixed
Error status	0/1	1	This returns the number of palettes whose marking is complete, excluding the number of palettes whose marking flags are OFF. "3-1 Error Response" (Page 3- 2)
Number of palettes completed 1	0 to 65025	5	● Fixed to 5 bytes This returns the number of palettes whose marking is complete, excluding the number of palettes whose marking flags are OFF.
Number of palettes completed 2	0 to 65025	5	● Fixed to 5 bytes This returns the number of palettes whose marking is complete, including the number of palettes whose marking flags are OFF.
Total number of palettes	0 to 65025	5	● Fixed to 5 bytes This returns the total number of palettes regardless of the marking flags.
Total number of bytes		22 (18)	

5-9 Setting GS1 DataBar

This section describes how to set GS1 DataBar encoded character strings.

Setting GS1 DataBar encoded characters

This sets an encoded GS1 DataBar character string into the block specified with block type "020" (GS1 DataBar & CC) in block condition settings (K2).
The following characters can be used in the GS1 DataBar.

Code Type	Usable Characters	Remarks
GS1 DataBar Linear Code	Numbers (0 to 9) Application identification code (01) + GTIN 14 digits (including 1 check digit) * The check digit is added automatically.	Up to thirteen digits (0 to 1999999999999) can be input into GS1 DataBar Limited.
GS1 DataBar Composite Code	Numbers (0-9), Letters (A-Z, a-z), space (single-byte), 20 symbols (! " % & ' ( ) * + , - . / : ; < = > ? _), Function character (FNC1), Symbol separator character Max. no. of input characters: 56 (for numbers)	Attach the delimiter code "%n" in between the linear code and 2D code characters.

Send a character string using ASCII code or shift JIS code immediately after the [Size information] within the "K2" command.

" Setting block conditions (K2)" (Page 4- 15)

■ Setting GS1 DataBar linear code encoded characters

When entering the application identification code + GTNI 13 digits, the one check digit is automatically added and the string is encoded.
Example of input:(01) 1234567890123

■ Setting GS1 DataBar composite code encoded characters

For an GS1 DataBar composite code, input the delimiter code "%n" (single-byte) in between the GS1 DataBar linear code character string and the MicroPDF417 character string. Each character string in one block is connected and sent.
Example of input: (01) 1234567890123%nABCDE

■ Setting GS1 DataBar composite code special characters

"FNC1" and "Separator Characters" can be set into the GS1 DataBar composite code. Send each type using the following codes.

Code Type	Code	Remarks
FNC1	%901A	Set the code in single-byte characters.
Selector character	%905A	

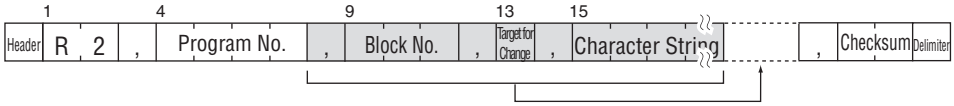
Note

- Character strings that do not include update characters or special characters will be saved in the controller entirely as Shift JIS code (double-byte characters), even when sent in ASCII code (single-byte characters).
  MD-X Series: Setting is made according to the specified type of character.
- Commas are used as delimiting marks. Use the code "%044A" to input a normal comma.
- To input an ASCII code (single-byte) "%", enter "%%". For Shift JIS code (double-byte) enter "%" (one double-byte character).

Changing GS1 DataBar encoded characters (R2)

Use this command to change the GS1 DataBar encoded character string. This command can change the character strings in multiple block numbers at once. You must specify whether to change linear code or 2D code character strings.

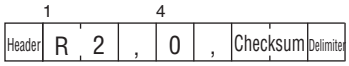
■ Command



If you want to change multiple blocks, send this data as many times as required.

Item	Parameter	Number of bytes	Remarks
Identification code	R2	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the condition of the character string of the program that is running at present will be changed. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Target for change	1/2	1	Selects the target character string. 1: Linear code character string 2: 2D code character string
Character string	Shift JIS/ASCII	-	The specified character is sent either in Shift JIS code (double-byte) or ASCII code (single-byte). " Setting GS1 DataBar encoded characters" (Page 5- 35) MD-X Series: Setting is made according to the specified type of character.
⋮	⋮	-	To specify the character string of multiple block numbers, send the block number and character string data as many time as required.
Total number of bytes		Variable	

■ Command



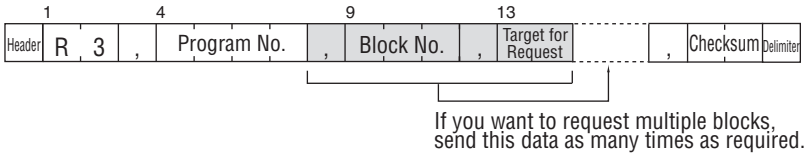
Note

- Character strings that do not include update characters or special characters will be saved in the controller entirely as Shift JIS code (double-byte characters), even when sent in ASCII code (single-byte characters).
  MD-X Series: Setting is made according to the specified type of character.
- To input an ASCII code (single-byte) "%", enter "%%". For Shift JIS code (double-byte) enter "%" (one double-byte character).

Requesting GS1 DataBar encoded characters (R3)

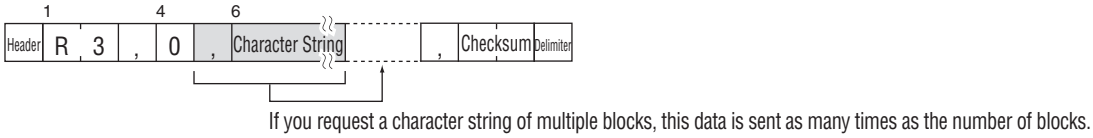
Use this command to request the GS1 DataBar encoded character string. This command can request the character strings in multiple block numbers at once. You must specify whether to request linear code or 2D code character strings.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	R3	2	Fixed
Program No.	0000 to 1999	4	If program No. is omitted, the condition of the character string of the program that is running at present will be requested. O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Target for request	1/2	1	Selects the target character string. 1: Linear code character string 2: 2D code character string
⋮	⋮	-	To specify the character string of multiple block numbers, send the block number and target for request as many time as required.
Total number of bytes		Variable	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	R3	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Block No.	000 to 255	3	● Data length is fixed to 3 bytes.
Character string	Shift JIS/ASCII	-	The character strings are sent in the shift JIS (double-byte) code. (They may be sent in the ASCII code (single-byte) in some cases.) MD-X Series: Response is made according to the specified character code.
⋮	⋮	-	To specify the character string of multiple block numbers, send the block number and character string data as many time as required.
Total number of bytes		Variable	

Note

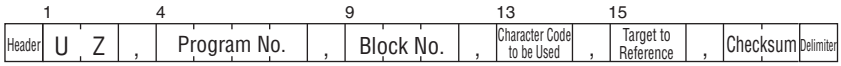
- The requested character strings are sent in ASCII code (single-byte) for the following situations.
  Update characters, special characters, delimiter codes
- If the data length of response exceeds 4096 bytes, the "Response data length error" is returned. In such a case, separate the request so that the response data length does not exceed 4096 bytes.

Requesting marked GS1 DataBar encoded characters (UZ)

After marking the GS1 DataBar, use this command to request the encoded character string of either the linear code or 2D code as it is actually marked. The update characters are supplied not in the character code but as they are actually marked. You can specify the character string response either in shift JIS code or ASCII code.

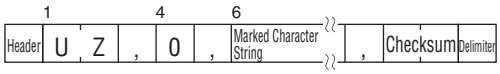
Reference Use the "Requesting the character string as it is actually marked (UY)" command when you want to request the encoded character string portions of linear code and 2D code in an GS1 DataBar composite code at the same time. The delimiter code (%n) is sent with the character string.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	UZ	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Character Code to be used	0/1	1	It specifies the character code that shall be used when sending the character string. 0: Character string is sent in ASCII code. 1: Character string is sent in shift JIS code. 2: UTF-8 (MD-X Series only)
Target to reference	1/2	1	Selects the target character string. 1: Linear code character string 2: 2D code character string
Total number of bytes		15 (11)	

■ Response



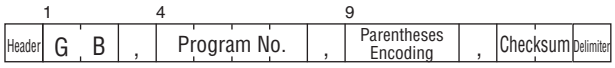
Item	Parameter	Number of bytes	Remarks
Identification code	UZ	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Marked character string	Shift JIS/ASCII	-	Sends the encoded character string sent when actually marking the GS1 DataBar, as specified by the usable character code.
Total number of bytes		Variable	

Note
- Be sure to send the request command (UZ) for the marked GS1 DataBar encoded character string upon completion of marking. If it is sent without marking, an error "S029 Mark Data Request Error" is returned.
- If there exists a character that cannot be converted to the ASCII code when the "character code to be used" is specified as ASCII code, such a character will be replaced by a single-byte space and returned.
  MD-X Series: If some characters cannot be converted to the specified character code that was used, those characters are all replaced with 1-byte space and sent.
- If ASCII code is specified as the "character code to be used", comma is returned as ",".
- If character string of palette marking is specified, the character string that was marked last will be returned.

Changing GS1 DataBar common settings (GB)

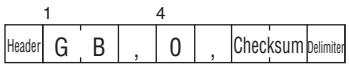
Use this command to change whether parentheses "(" and ")" are encoded as part of the character string in the GS1 DataBar composite code encoded character string. This setting is a common condition and one setting affects all of the GS1 DataBar in the program number.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	GB	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Parentheses encoding	0/1	1	Variable length parameter of 4 bytes or less Sets whether the parentheses "(" and ")" should be encoded in the character string. 0: Do not encode the parentheses 1: Encode the parentheses
Total number of bytes		9 (7)	

■ Response



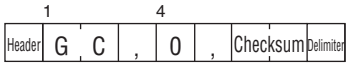
Requesting GS1 DataBar common settings (GC)

Use this command to request whether parentheses "(" and ")" are encoded as part of the character string in the GS1 DataBar composite code encoded character string.

■ Command

Item	Parameter	Number of bytes	Remarks
Identification code	GC	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	GC	2	Fixed
Error status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Parentheses encoding	0/1	1	Sets whether the parentheses "(" and ")" should be encoded in the character string. 0: Do not encode the parentheses 1: Encode the parentheses
Total number of bytes		6 (4)	

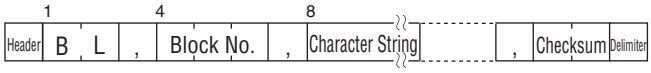
5-10 Other Commands

This section describes frequently used commands.

Changing the character string to be marked of the Program No. in operation (BL)

This command is used to change the character string that is to be marked for the program that is currently running. This command performs a similar function as the "C2" character string change command, but the "BL" command can only be used with the current program running and you can only change the string of one block at a time within a single command. This simplifies the command structure when performing character string changes with external devices such as a barcode reader.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	BL	2	Fixed
Block No.	000 to 255	3	O Variable length parameter of 3 bytes or less
Character string	Shift JIS/ASCII	-	The specified character is sent either in Shift JIS code (double-byte) or ASCII code (single-byte). The maximum number of characters that can be specified are 127 characters of the shift JIS and ASCII code. MD-X Series: Setting is made according to the specified type of character. Up to 510 characters can be set. For details of the character string such as update character to be specified, refer to "4-2 Setting Various Conditions" (Page 4- 7).
Total number of bytes		Variable	

■ Response

Note

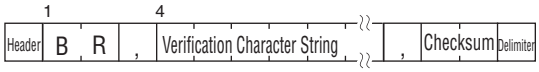
- When entering a comma, be sure to enter it using the shift-JIS code, or use "%044A (single-byte)" code so that the comma can be distinguished from the delimiting code.
- When specifying "%" using ASCII code (single-byte), enter it as "%% (single-byte)". For Shift JIS code (double-byte) enter "%" (one double-byte character).

Changing barcode verification setting/registering verification code (BR)

If this command is received during normal run operation, the running program will be changed to the program number that is associated to the registered verification code (Barcode Matching function). If this command is received while in the barcode matching code registration screen with MARKER BUILDER 2 or on the touch panel, the received character string is registered into the current matching code field. (Refer to page 9-39 for details on this).

"MARKING BUILDER 2 (MB-H2D3) User's Manual", "MARKING BUILDER 3 User's Manual", "ML-ZP1/P1C User's Manual"

■ Command



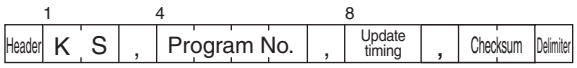
Item	Parameter (ASCII)	Number of bytes	Remarks
Identification code	BR	2	Fixed
Verification Code	Shift JIS/ASCII	-	It specifies the verification code using either the shift JIS code (double-byte) or ASCII code (single-byte) within 20 bytes. MD-X Series: Setting is made according to the specified character code. Up to 20 characters can be set.
Total number of bytes		Variable	

■ Response

Setting the continuous marking update character timing (KS)

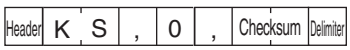
Use this command to set the update timing for update characters (date and time) in continuous markings.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	KS	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Update timing	0/1	1	0: Each sensor 1: Each marking
Total bytes		9 (7)	

■ Response



Requesting the continuous marking update character timing (KT)

Use this command to request the update timing for update characters (date and time) when using continuous markings.

■ Command

1		4				
Header	K T	,	Program No.	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification code	KT	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total bytes		6(7)	

■ Response

1		4		6			
Header	K T	,	0	,	Update timing	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification code	KT	2	Fixed
Error state	0/1	1	"1" indicates an error. "3-1 Error Responses" (page 3-2)
Update timing	0/1	1	0: Each sensor 1: Each marking
Total bytes		4(6)	

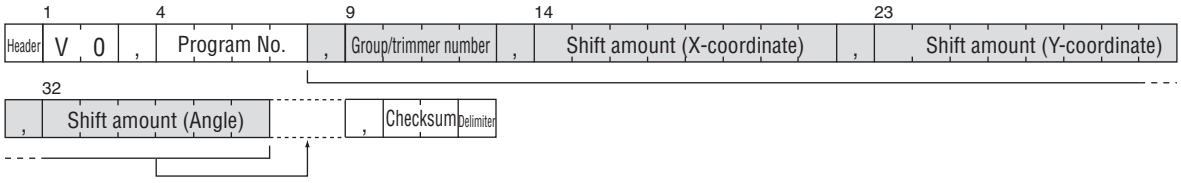
Note The KS/KT commands are compatible with the ML-Z Series for controller versions 02.01.00 and later.

Changing the amount of movement of the group and individual trimmer (V0)

This changes the amount of movement of the group and individual trimmer set with "MARKING BUILDER 2". Use "MARKING BUILDER 2" to set other setting conditions of the group and individual trimmer.

Note For MD-X Series, use "MARKING BUILDER 3" for setup.

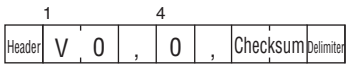
■ Command



When changing multiple group Nos., multiple strings of group data can be appended after the first string.

Item	Parameter	Number of bytes	Remarks
Identification code	V0	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Group No/trimmer number	000 to 255	3	O Variable length parameter of 3 bytes or less
Shift amount (X-coordinate)	-120.000 to 0120.000*	8	O Variable length parameter of 8 bytes or less Unit: mm See Appendices for setting values for MD-X Series.
Shift amount (Y-coordinate)	-120.000 to 0120.000*	8	
Shift amount (angle)	000.00 to 359.99	6	O Variable length parameter of 6 bytes or less Unit: °
・ ・ ・	・ ・ ・	-	When changing multiple group Nos., send the required number of data items from group No. to shift amount (angle). The maximum number of data that can be sent at once is 140.
Total bytes		Variable	

■ Response

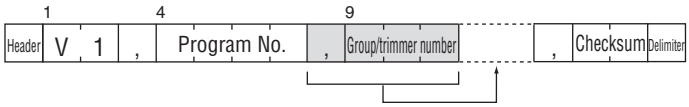


* :"List of Input Values for Each Machine Type" (Page A- 2)

Requesting the amount of movement of the group and individual trimmer (V1)

This requests the amount of movement of the group and individual trimmer that has already been set.

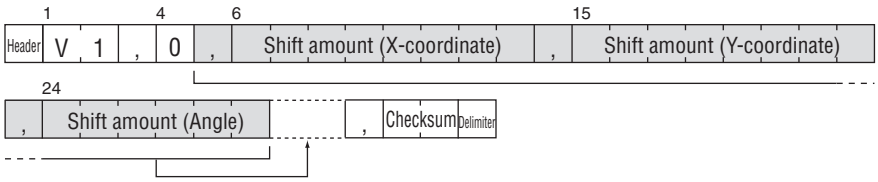
■ Command



When requesting multiple group No./trimmer number, this sends commands required times.

Item	Parameter	Number of bytes	Remarks
Identification code	V1	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
・ ・ ・	・ ・ ・	-	When requesting multiple group No./trimmer number, this sends group No./trimmer number required times. The maximum number of data that can be sent at once is 140.
Total bytes		Variable	

■ Response



When requesting multiple group No./trimmer number, this sends commands as many times as required group No/trimmer number

Item	Parameter	Number of bytes	Remarks
Identification code	V1	2	Fixed
Error State	0/1	1	"1" indicates an error. 📖 "3-1 Error Response" (Page 3- 2)
Shift amount (X-coordinate)	-120.000 to 0120.000*	8	● 8 bytes fixed. Unit: mm See Appendices for response values for MD-X Series.
Shift amount (Y-coordinate)	-120.000 to 0120.000*	8	
Shift amount (angle)	000.00 to 359.99	6	● 6 bytes fixed. Unit: °
・ ・ ・	・ ・ ・	-	When requesting multiple group No./trimmer number, the data from group No./trimmer number to the amount of movement (angle) are sent in the requested order and requested times.
Total bytes		Variable	

* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

Chapter 6

Environmental Settings

This chapter describes the setting and requesting of environmental setting parameters.

6-1 Internal Clock 6-2

6-2 Correcting the Installation Position 6-3

6-3 Laser Operating Hours 6-5

6-4 Cumulative Marking Repetition 6-6

6-5 Setting the Daily Counter Reset Time 6-7

6-6 Setting the Program Extraction Method 6-8

6-7 Power Offset 6-10

6-8 Warmup 6-11

Note The range of settings shown in this manual is for the ML-Z series ML-Z9510 (standard character model).
If other models have different ranges of settings, these ranges are shown in "List of Input Values for Each Machine Type" (Page A- 2).

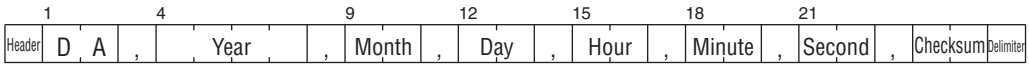
6-1 Internal Clock

This section describes the procedures to set and request the internal clock settings of the controller.

Setting date and time of internal clock (DA)

Use this command to set date and time of internal clock. Calendar of the internal clock is valid until January 17, 2099.

■ Command



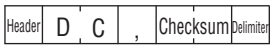
Item	Parameter	Number of bytes	Remarks
Identification code	DA	2	Fixed
Year	2000 to 2099	4	●Data length is fixed to 4 bytes.
Month	01 to 12	2	●Data length is fixed to 2 bytes.
Day	01 to 31	2	●Data length is fixed to 2 bytes.
Hour	00 to 23	2	●Data length is fixed to 2 bytes. It sets the time in 24 hours.
Minute	00 to 59	2	●Data length is fixed to 2 bytes.
Second	00 to 59	2	●Data length is fixed to 2 bytes.
Total number of bytes		22 (16)	

■ Response

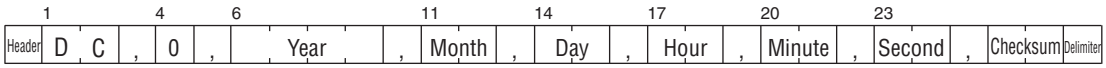
Requesting date and time of internal clock (DC)

Use this command to request date and time of the internal clock.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	DC	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Year	2000 to 2099	4	●Data length is fixed to 4 bytes.
Month	01 to 12	2	●Data length is fixed to 2 bytes.
Day	01 to 31	2	●Data length is fixed to 2 bytes.
Hour	00 to 23	2	●Data length is fixed to 2 bytes. It sets the time in 24 hours.
Minute	00 to 59	2	●Data length is fixed to 2 bytes.
Second	00 to 59	2	●Data length is fixed to 2 bytes.
Total number of bytes		24 (17)	

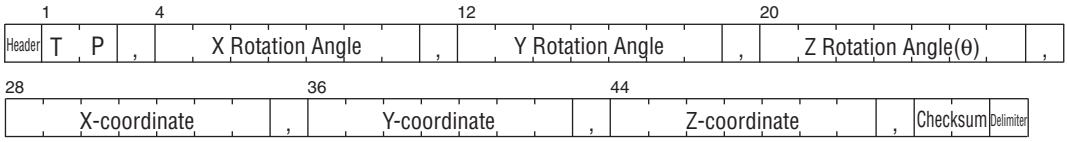
6-2 Correcting the Installation Position

This section describes the procedure for setting and requesting the installation position correction. This enables you to make fine adjustments to the position of the laser marker at the time of installation.

Setting the installation position correction (TP)

Use this command to set the correction values for the X/Y/Z rotation angle and coordinate values according to the final installation position.

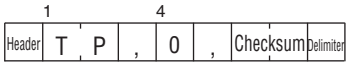
■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	TP	2	Fixed
X Rotation Angle	-090.00 to 0090.00	7	O Variable length parameter of 7 bytes or less Unit: ° Both the X rotation angle and Y rotation angle are fixed to "0" for the MD-T1000 Series.
Y Rotation Angle	-090.00 to 0090.00	7	
Z Rotation Angle (θ)	-180.00 to 0180.00	7	
X-coordinate	-32.500 to 032.500 *	7	O Variable length parameter of 7 bytes or less Unit: mm The Z coordinate is fixed to "0" for the MD-T1000 Series. See Appendices for setting values for MD-X Series.
Y-coordinate	-32.500 to 032.500 *	7	
Z-coordinate	-21.000 to 021.000 *	7	
Total number of bytes		50 (44)	

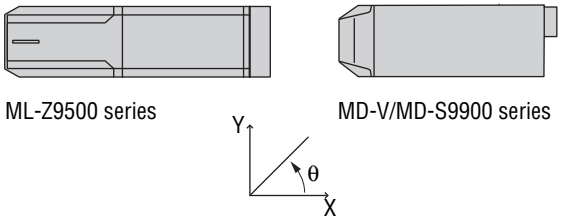
* :"List of Input Values for Each Machine Type" (Page A- 2)

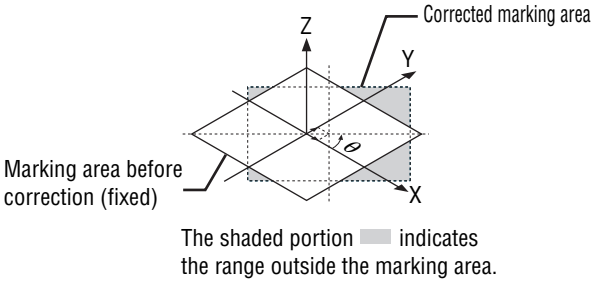
■ Response



Relationship between the marker installation direction, the correction of X/Y/Z-coordinates and the correction of angle (θ) is shown below. Be careful that no area outside the marking area is created where marking cannot be executed when correction is implemented.

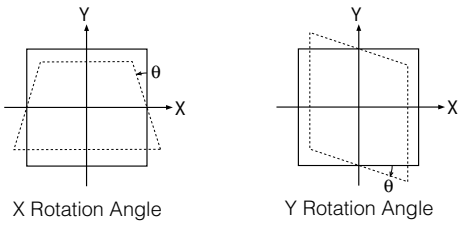
Coordinate axes are determined with reference to the marking unit facing the following direction.





Note

- If any part of a character exceeds the limit and goes outside the marking area as the result of implementation of coordinate correction, the marking program cannot start executing.
  Therefore, confirm the setting contents and implement the position correction so that no portion of character goes outside the marking area.
- Under movement marking settings, Z-direction rotation angle adjustment, movement direction, in addition to coaxial coordinate correction and rotation angle adjustment are disabled.
- Under settings that include basic figures other than Z-MAP and flat figures, rotation angle adjustment is disabled.
- Tilt adjusted value (X rotation angle, Y rotation angle) is not reflected in the 3D editing block marking.



Requesting the installation position correction (TQ)

Use this command to request the current correction values for the X/Y/Z rotation angle and coordinate values.

■ Command

Header	T	Q	,	Checksum	Delimiter

■ Response

1		4	6		14		22	
Header	T Q	,	0	,	X Rotation Angle	,	Y Rotation Angle	,	Z Rotation Angle(θ)	,

30		38		46			
X-coordinate	,	Y-coordinate	,	Z-coordinate	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification code	TQ	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. 📖 "3-1 Error Response" (Page 3- 2)
X Rotation Angle	-090.00 to 0090.00	7	●Data length is fixed to 7 bytes. Unit: ° Both the X rotation angle and Y rotation angle are fixed to "0" for the MD-T1000 Series.
Y Rotation Angle	-090.00 to 0090.00	7	
Z Rotation Angle (θ)	-180.00 to 0180.00	7	
X-coordinate	-32.500 to 032.500 *	7	●Data length is fixed to 7 bytes. Unit: mm The Z coordinate is fixed to "0" for the MD-T1000 Series. See Appendices for response values for MD-X Series.
Y-coordinate	-32.500 to 032.500 *	7	
Z-coordinate	-21.000 to 021.000 *	7	
	Total number of bytes	52 (45)	

* :📖 "List of Input Values for Each Machine Type" (Page A- 2)

6-3 Laser Operating Hours

This section describes the command for requesting the number of laser operating hours (on time).

Requesting the laser operating hours (SG)

Use this command to request the total number of cumulative operating hours of the marking laser (total time that the laser is energized, not just marking time).

■ Command

Header	S	G	,	Checksum	Delimiter

■ Response

	1		4		6			
Header	S	G	,	0	,	Laser Operating Hours	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification code	SG	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Laser Operating Hours	00000 to 83333	5	●Data length is fixed to 5 bytes. Unit: hour
Total number of bytes		10 (8)	

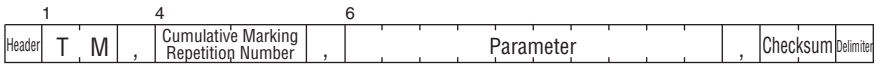
6-4 Cumulative Marking Repetition

This section describes the procedure of setting and requesting the cumulative marking repetition.

Setting the cumulative marking repetition (TM)

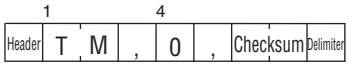
Use this command to change the present value of the cumulative marking repetition-1 and marking repetition-2 respectively.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	TM	2	Fixed
Cumulative marking repetition number	0/1	1	Use this command to set the cumulative marking repetition number. 0: Cumulative marking repetition number 1 1: Cumulative marking repetition number 2
Parameter	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less Unit: time
Total number of bytes		15 (13)	

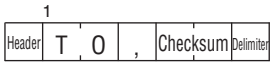
■ Response



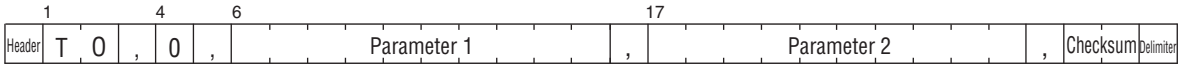
Requesting cumulative marking repetition (TO)

Use this command to request the present value of the cumulative marking repetition-1 and the cumulative marking repetition-2 respectively.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	TO	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Parameter 1	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes. Unit: time
Parameter 2	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes. Unit: time
Total number of bytes		26 (23)	

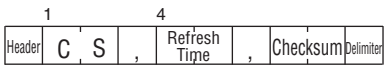
6-5 Setting the Daily Counter Reset Time

The section describes the command for setting and requesting the reset time for the daily incrementing counter. This setting is only used when the reset timing under the counter settings is set to "specified time".

Setting the "Daily" reset time (CS)

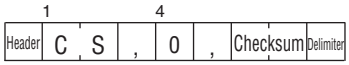
Use this command to set the "Daily" reset time. Set the time in 24 steps (in units of hour) in the range of 0 o'clock to 23 o'clock.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	CS	2	Fixed
Refresh time	00,01,02,03,04 05,06,07,08,09 10,11,12,13,14 15,16,17,18,19 20,21,22,23	2	O Variable length parameter of 2 bytes
Total number of bytes		Variable	

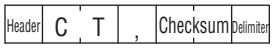
■ Response



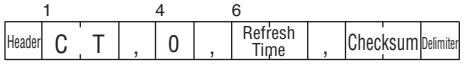
Requesting the "Daily" incrementing time (CT)

Use this command to request the "Daily" reset time.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	CT	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Refresh time	00,01,02,03,04 05,06,07,08,09 10,11,12,13,14 15,16,17,18,19 20,21,22,23	2	O Variable length parameter of 2 bytes
	Total number of bytes	Variable	

6-6 Setting the Program Extraction Method

This section describes the procedure for reducing the time to extract the program setting when making parameter changes or changing the block marking flag for a program number.

Changing the Program Setting Extraction Method (MS)

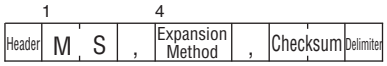
A certain amount of time is needed to extract the program setting upon the following operations:.

- When changing the Program No.
- When changing the marking contents using communication commands.

As a default, all the data of the block information registered in a Program No. are extracted during operation. When changing the program by using the communication command "D6" to manipulate the block marking flag in a Program No., you can reduce the time to switch the program by changing the method of extracting the program setting.

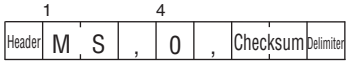
Note The program extraction method set by the communication command is saved in the "Backup" of "MARKING BUILDER 2" or "MARKING BUILDER 3", and in the "Save All" of the console.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	MS	2	Fixed
Expansion method	0/1/2	1	0: Expand all blocks. 1: When changing the program No. without using the index function, or when changing the marking content, all blocks will be expanded. But when only changing the marking flag using the "D6" command, no expansion time will be taken. 2: When changing a program No. or marking content, only the block with its marking flag set to "Mark" will be expanded. MD-X Series: Does not support "0: Expand all blocks". If "0" is sent, it is ignored. There is no error.
Total number of bytes		4 (3)	

■ Response



Note When "2" is selected for the expansion method, the contents of the block that are not to be marked are not displayed in the image display area of the operation monitor screen of the touch panel. (When "0" or "1" is selected, the contents are displayed in grayed-out form.)

Reference Select the extraction method according to applications. For example, it is convenient to select "1" as an extraction method when only one Program No. is used and operation is performed by only manipulating the marking flags for many blocks. The extraction method "2" is convenient where Program No. is changed frequently.

Requesting the program extraction method setting (MT)

Use this command to request the program extraction method status.

■ Command

1			4		
Header	M	T	,	Checksum	Delimiter

■ Response

1			4						
Header	M	T	,	0	,	Expansion Method	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification code	MT	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Expansion method	0/1/2	1	0: Expand all blocks. 1: When changing a program No. without using the index function, or when changing a marking content, all blocks will be expanded. But when only changing the marking flag using the "D6" command, no expansion time will be taken. 2: When changing a program No. or marking content, only the block with its marking flag set to "Mark" will be expanded.
Total number of bytes		5 (4)	

6-7 Power Offset

This section describes the procedure for setting and requesting the power offset.

Setting the power offset (VO)

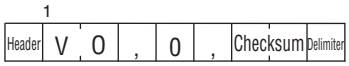
Use this command to set the offset to the marking power. The offset value set here will be reflected to all blocks in all program Nos. However, the marking power parameter of the blocks will not be affected.

Note When the power offset is set, the data of the program No. that is specified in the index function is changed, so it may take some time until the setting is reflected.

■ Command

Item	Parameter	Number of bytes	Remarks
Identification code	VO	2	Fixed
Offset value	-100.0 to 0100.0	6	O Variable length parameter of 6 bytes or less Unit: %
Total number of bytes		9 (8)	

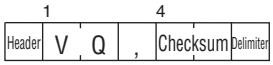
■ Response



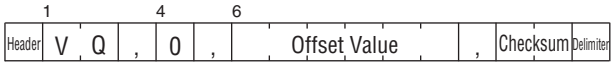
Requesting the power offset (VQ)

Use this command to request the value of the current power offset.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	VQ	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Offset value	-100.0 to 0100.0	6	●Data length is fixed to 6 bytes. Unit: %
Total number of bytes		10 (9)	

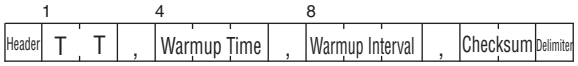
6-8 Warmup

This section describes the procedure for starting and stopping the warmup operation.

Forcefully starting warmup (TT)

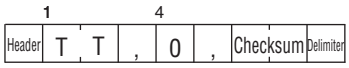
Send this command to start the warmup operation forcefully with the program registered in program No. 1999. Use this command to specify the interval between the warmup time and the onset of the program operation.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification code	TT	2	Fixed
Warmup time	001 to 120	3	O Variable length parameter of 3 bytes or less Unit: minute
Warmup interval	0.0 to 9.9	3	O Variable length parameter of 3 bytes or less Unit: second
Total number of bytes		10 (8)	

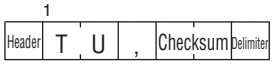
■ Response



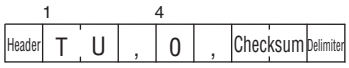
Stopping warmup (TU)

Send this command to stop the running warmup operation.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification code	TU	2	Fixed
Error Status	0/1	1	"1" is set when an error occurs. "3-1 Error Response" (Page 3- 2)
Total number of bytes		4 (3)	

MEMO

Chapter 7

Operation

This chapter describes the commands that are used to operate the system.

7-1 Flow of Operation 7-2
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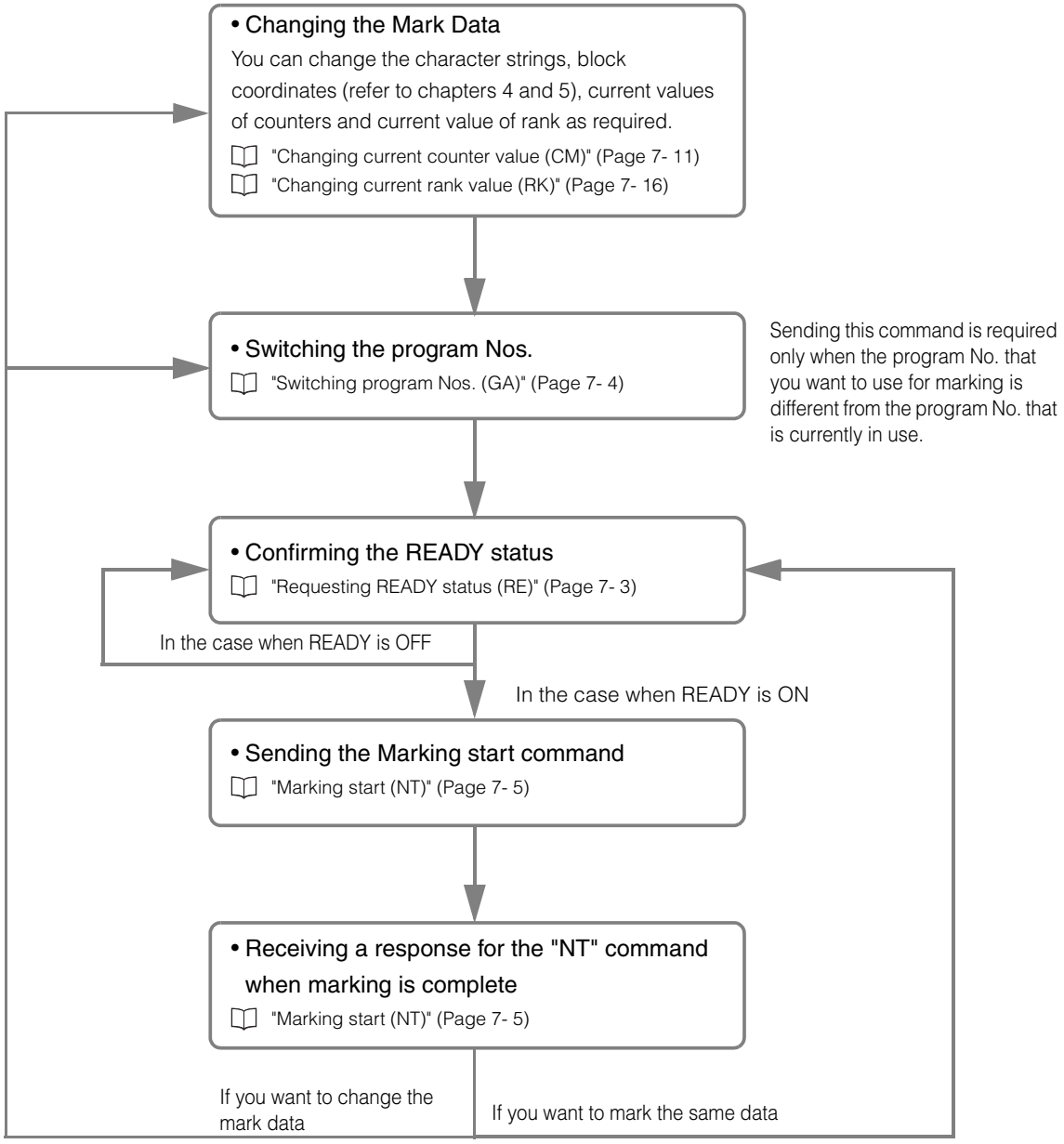
7-1 Flow of Operation

This section describes the outline of operations to run the system.

Flow of normal operation is shown below.
To run the laser marking system, send the appropriate commands for the functions you want to control.



Note Before sending the Marking start command "NT", be sure to confirm that the controller is in the READY ON state. If the controller is still in the READY OFF state, marking cannot be started.
Use the response message to the Requesting READY status command "RE" to obtain the cause of READY OFF state. If an error has occurred, remove the cause and reset the error.
* If no error has occurred when the normal response is returned, the READY ON state is established.

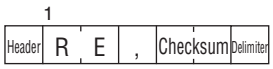
7-2 READY State check

This section describes the procedure to check the controller status (READY ON/OFF).

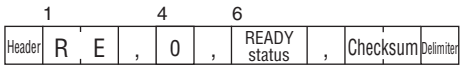
Requesting READY status (RE)

Use this command to confirm the READY status of the controller. The "READY ON" state is established when the controller is ready to start marking.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	RE	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
READY Status	0/1/2	1	●Data length is fixed to 1 bytes. 0: READY ON 1: READY OFF (An error has occurred or the controller is under control of terminal block) 2: READY OFF (Program expansion or marking is in progress)
Total number of bytes		6 (4)	

■ READY status

There are three types of response for the READY status.

READY status response	READY status	Description of contents
0	ON	The marker is in the marking possible state. You can send the Marking start command (NT).
1	OFF	The controller is in the marking not possible state because an error has occurred in the laser marker main unit, or the controller is under control of the input/output terminal block. After confirming the status using the Error check command (EX), take the necessary countermeasures.
2	OFF	The controller is in the marking not possible state because marking is in progress, or data expansion is in progress after the set contents of the program that is currently being used for marking or the program being registered in index has been changed. Send the Requesting READY status command (RE) again to confirm the READY ON status. After confirming the status, start marking.

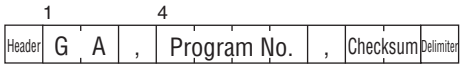
7-3 Switching Program Nos.

This section describes the procedure for switching and requesting the program number that is currently running in the controller.

Switching program Nos. (GA)

This command is used to switch the current active program number to run in the controller.
A maximum of 2000 programs (program Nos. 0000 to 1999) can be registered in the controller.

■ Command



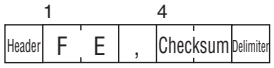
Item	Parameter	Number of bytes	Remarks
Identification Code	GA	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Total number of bytes		7 (6)	

■ Response

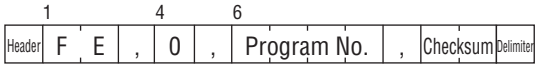
Requesting program No. (FE)

This command is used to request the current active program number that is running in the controller.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	FE	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. 📖 "3-1 Error Response" (Page 3- 2)
Program No.	0000 to 1999	4	●Data length is fixed to 4 bytes.
Total number of bytes		9 (7)	

7-4 Marking Start

This section describes the Marking start command.

Marking start (NT)

When the controller receives the Marking start command (NT), marking starts. When marking is complete, response is returned.

• Always wear protective goggles when running the laser marker.

⚠ Warning

- Do not look at or touch the direct laser beam or the beam reflected by specular or diffuse reflection. Doing so may result in eye or skin injury.
- There is a risk of the laser beam causing a fire. Be sure to terminate the path of the laser beam emitted from the ML-Z9500 Series and the MD-V9900 Series with an enclosure with appropriate reflectance and heat absorption characteristics.
- Pay attention to the path of the laser beam.
  If there is a danger that the operator may be exposed to the laser beam reflected by a specular or diffuse reflection, interrupt the beam by installing an enclosure.
  Install the ML-Z9500 Series and the MD-V9900 Series so that the path of the laser beam is not at the same level as that of the human eye during operation.

■ Command

Use this command to implement marking using the current program No. That is active in the controller.

	1			4	
Header	N	T	,	Checksum	Delimiter

■ Response

When marking is complete, the following response is returned.

	1			4			
Header	N	T	,	0	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	NT	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Total number of bytes		4 (3)	

Note

- Before sending the Marking start command (NT), confirm that the controller is in the READY ON state using the Requesting READY status command (RE). Marking cannot be started while the controller is in the READY OFF state.
  "Requesting READY status (RE)" (Page 7- 3)
- A response to the Marking start command (NT) will not be returned until marking is completed. Set the "Communication time-out" taking the time required for marking into consideration.

7-5 Selecting the Marking Laser and Guide Laser

This section describes the procedure to set the guide laser and marking laser to emit at the same time or individually.

Selecting the Marking Laser and Guide Laser

Only the marking laser is emitting during normal operation.
If you want to have the guide laser emitting tentatively for the purpose of adjusting the marking position, or if you want to have both the marking laser and guide laser emitting at the same time, perform the following procedure.

To have only the guide laser emitting tentatively

■ Enabling the guide laser

To have only the guide laser emitting, switching from the normal operating state in which only the marking laser is energized, follow the steps shown below.

1 Set the guide laser to "ON" using the Setting guide laser command (HN).

"Setting guide laser (HN)" (Page 7- 8)

Header	H	N	,	1	,	Checksum	Delimiter

2 Set the marking laser to the STOP state using the Stopping (resuming) marking laser command (LQ).

"Stopping (resuming) marking laser (LQ)" (Page 7- 9)

Header	L	Q	,	1	,	Checksum	Delimiter

3 Have only the guide laser emitting by using the Marking start command (NT).

"Marking start (NT)" (Page 7- 5)

Header	N	T	,	Checksum	Delimiter

Note MD-X Series: If the guide laser marking command (GX)<header>GX,1,<checksum><delimiter> is sent, the guide laser marking for the current program is performed.
The guide laser "ON" is not supported in operation.

■ Canceling the guide laser

To cancel the guide laser from the state in which only the guide laser is energized, and to have only the marking laser emitting, follow the steps shown below.

1 Cancel the marking laser inhibition using the Stopping (resuming) marking laser command (LQ).

"Stopping (resuming) marking laser (LQ)" (Page 7- 9)

Header	L	Q	,	0	,	Checksum	Delimiter

2 Set the guide laser to "OFF" using the Setting guide laser command (HN).

"Setting guide laser (HN)" (Page 7- 8)

Header	H	N	,	0	,	Checksum	Delimiter

3 Have only the marking laser emitting by using the Marking start command (NT).

"Marking start (NT)" (Page 7- 5)

Header	N	T	,	Checksum	Delimiter

To have both the marking laser and guide laser emitting at the same time

■ Enabling the guide laser

To energize the guide laser as well as the marking laser, switching from the operating state in which only the marking laser is emitting, follow the steps shown below.

1 Set the guide laser to "ON" using the Setting guide laser command (HN).

"Setting guide laser (HN)" (Page 7- 8)

Header	H	N	,	1	,	Checksum	Delimiter

2 Have both the marking laser and the guide laser emitting simultaneously by using the Marking start command (NT).

"Marking start (NT)" (Page 7- 5)

Header	N	T	,	Checksum	Delimiter

Note When only the guide laser is energized, the guide laser beam is emitted to the targeted mark position. However, when both the guide laser and the marking laser are emitted simultaneously, the guide laser beam reaches the target slightly off the mark position due to having a different wavelength of light.
MD-X Series: The guide laser "ON" is not supported in operation.

7-6 Guide Laser

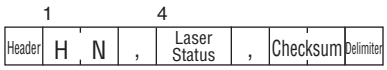
This section describes the procedure of setting the guide laser.

Setting guide laser (HN)

Use this command to turn the guide laser ON or OFF.
Guide laser provides the means to confirm the position of marking laser beforehand.

Note MD-X Series: Does not support HN command.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	HN	2	Fixed
Laser Status	0/1	1	0: Guide laser OFF 1: Guide laser ON
Total number of bytes		4 (3)	

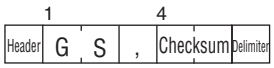
■ Response

Requesting guide laser status (GS)

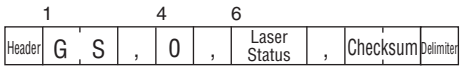
Use this command to request the guide laser status.

Note MD-X Series: Does not support GS command.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	GS	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Laser Status	0/1	1	0: Guide laser OFF 1: Guide laser ON
Total number of bytes		4 (3)	

7-7 Stopping the Marking Laser

This section describes the procedure to stop and resume the marking laser.

Stopping (resuming) marking laser (LQ)

Use this command to enter the marking laser into the stop state. Set the Control Flag to "1" and send the command. To cancel the stop state of the marking laser, set the Control Flag to "0" and send the command. While the marking laser is in the stop state, the marking laser cannot emit a laser beam, but the guide laser can.

■ Command

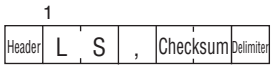
Item	Parameter	Number of bytes	Remarks
Identification Code	LQ	2	Fixed
Control Flag	0/1	1	0: Cancel 1: Stop
Total number of bytes		4 (3)	

■ Response

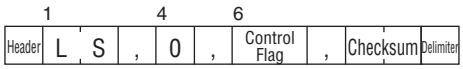
Requesting marking laser stop status (LS)

Use this command to request the stop status of the marking laser.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	LS	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Control Flag	0/1	1	0: Inhibition cancelled 1: Stopped
Total number of bytes		6 (4)	

7-8 Trigger Inhibited

This section describes the procedure to inhibit the marking start input (trigger) or to cancel it.

Setting (canceling) marking trigger inhibition (SO)

Use this command to set or cancel the trigger-inhibited state. When the controller enters the trigger-inhibited state, the marking start input (pin-38 on the rear terminal table of the controller) is disabled. At the same time, the Marking start command (NT) cannot be accepted. To enter the trigger-inhibited state, set the Control Flag to "1" and send the command. To cancel the trigger-inhibited state, set the Control Flag to "0" and send the command.

■ Command

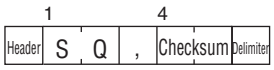
Item	Parameter	Number of bytes	Remarks
Identification Code	SO	2	Fixed
Control Flag	0/1	1	0: Cancel 1: Inhibit
Total number of bytes		4 (3)	

■ Response

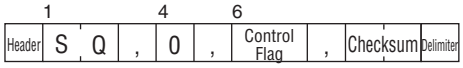
Requesting trigger-inhibited status (SQ)

Use this command to request the trigger-inhibited status.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	SQ	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Control Flag	0/1	1	0: Inhibition cancelled 1: Trigger inhibited
Total number of bytes		6 (4)	

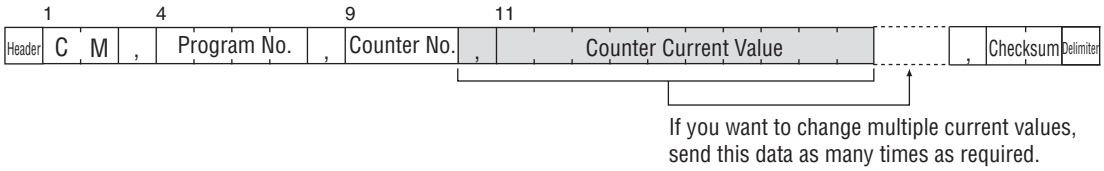
7-9 Current Value of a Counter

This section describes the procedure to set, request and reset the current value of a counter as well as to set and request the number of times of repetition marking for a counter.

Changing current counter value (CM)

Use this command to change the current value of a counter. You can change the current values of multiple counters simultaneously, starting from any specified counter No.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	CM	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9/A to J	1	Specify the top counter number from which the current value change starts. 0 to 9: Individual counters A to J: Common counters
Current Value of a Counter	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less Set the current value in decimal notation.
⋮	⋮	-	If you want to change current values of two or more counters, send the current values of the counters in order as many times as required.
Total number of bytes		Variable	

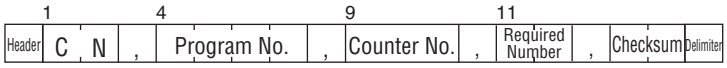
Note When you want to change current values of two or more counters, note that you can only change values of counters with consecutive counter Nos. (no jumping).

■ Response

Requesting the current counter value (CN)

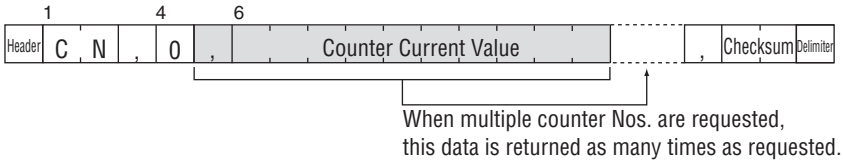
Use this command to request the current value of a counter. You can request current values for multiple consecutive counter Nos. starting from the specified counter No.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	CN	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9/A to J	1	Specify the top counter number from which the current value request starts. 0 to 9: Individual counters A to J: Common counters
Requested Number	01 to 20	2	O Variable length parameter of 2 bytes or less The former ten counters are the individual counters. The latter ten counters are the common counters.
Total number of bytes		12 (9)	

■ Response

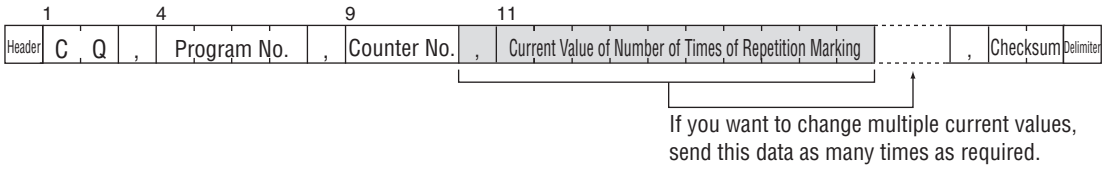


Item	Parameter	Number of bytes	Remarks
Identification Code	CN	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Current Value of a Counter	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes. The current value is sent in decimal notation.
⋮	⋮	-	If you request current values of two or more counters, the current values of counters are sent one value after another continuously as many times as required.
Total number of bytes		Variable	

Changing the current value of number of times of repetition marking for a counter (CQ)

Use this command to change the current value of number of times of repetition marking for a counter. You can change the values for multiple counters starting from the specified counter No.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	CQ	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9/A to J	1	Specify the top counter number from which changing of number of times of repetition marking starts. 0 to 9: Individual counters A to J: Common counters
Current Value of Number of Times of Repetition Marking	0000000000 to 4294967295	10	O Variable length parameter of 10 bytes or less Set the current value in decimal notation.
⋮	⋮	-	If you want to change current values of number of times of repetition marking of multiple counters, send this data as many times as required.
Total number of bytes		Variable	

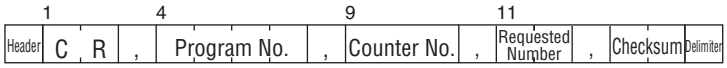
Note When you want to change current values of number of times of repetition marking for two or more counters, note that you can only change values of counters with consecutive counter Nos. (no jumping).

■ Response

Requesting the current value of number of times of repetition marking for a counter (CR)

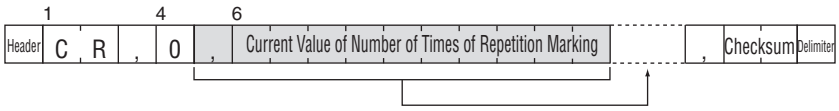
Use this command to request the current value of number of times of repetition marking for a counter. You can request current values of the number of times of repetition marking for multiple counters starting from the specified counter No.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	CR	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9/A to J	1	Specify the top counter number from which the request for the current value of number of repetition markings starts. 0 to 9: Individual counters A to J: Common counters
Requested Number	01 to 20	2	O Variable length parameter of 2 bytes or less The first ten counters (0-9) are individual counters; the second 10 counters (A-J) are common counters.
Total number of bytes		12 (9)	

■ Response



When multiple counter Nos. are requested,
this data is returned as many times as requested.

Item	Parameter	Number of bytes	Remarks
Identification Code	CR	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Current Value of Number of Times of Repetition Marking	0000000000 to 4294967295	10	●Data length is fixed to 10 bytes. The current value is sent in decimal notation.
⋮	⋮	-	If current values of the number of times of repetition marking for multiple counters are requested, this data is returned consecutively as many times as requested.
Total number of bytes		Variable	

Resetting the current values of a counter (CZ)

If both the current value of a counter and the current value of the number of times of repetition marking are reset, the current value of a counter returns to the top value (in case that the top value and initial value are different, it returns to initial value) and the current value of the number of times of repetition marking is reset to "0". You can reset both or either one of the these counter parameters.

■ Command

1	4		9		11			
Header	C Z	,	Program No.	,	Counter No.	,	Reset Conditions	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	CZ	2	Fixed
Program No.	0000 to 1999	4	O Variable length parameter of 4 bytes or less
Counter No.	0 to 9/A to J	1	Specify the target counter number to change. 0 to 9: Individual counters A to J: Common counters
Reset Conditions	0/1/2	1	0: Both the current value of a counter and the current value of number of times of repetition marking 1: Current value of a counter only 2: Current value of number of times of repetition marking only
Total number of bytes		11 (8)	

■ Response

1	4				
Header	C Z	,	0	,	Checksum	Delimiter

7-10 Current Value of Rank

This section describes the procedure for changing and requesting the current value of rank.

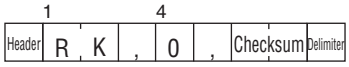
Changing current rank value (RK)

The rank is the function to classify the workpieces into a maximum of 36 different ranks and to implement the appropriate markings on the workpieces. Use this command to set the current value of the rank you want to mark.

■ Command

Item	Parameter	Number of bytes	Remarks
Identification Code	RK	2	Fixed
Current Value of Rank	00 to 35	2	OVariable length parameter of 2 bytes or less
Total number of bytes		5 (4)	

■ Response

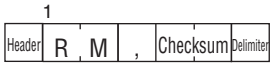


Note The rank values apply commonly to all programs Nos.

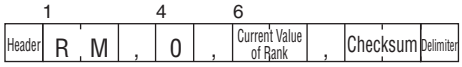
Requesting current rank value (RM)

Use this command to request the current value of rank.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	RM	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Current Value of Rank	00 to 35	2	●Data length is fixed to 2 bytes.
Total number of bytes		7 (5)	

7-11 Distance Pointer

This section describes the procedure for setting the distance pointer in run mode.

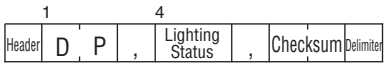
Setting distance pointer (DP)

Use this command to turn the distance pointer ON/OFF in run mode.

Note

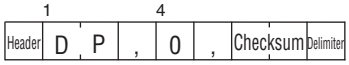
- Distance pointer cannot be lit when marking is in progress.
  If the unit is controlled by "MARKING BUILDER 2" or "MARKING BUILDER 3", or the touch panel while the distance pointer is lit, the distance pointer may be turned off.
- The MD-T1000 Series does not support this function.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	DP	2	Fixed
Lighting status	0/1	1	0: Distance pointer OFF 1: Distance pointer ON
Total number of bytes		4 (3)	

■ Response



7-12 Z Selection Value

This section describes the procedure for changing and requesting the Z selection value when performing Z movement marking.

Changing selection No. of Z selection value (ZE)

Z selection value is a parameter that you can specify with a program No. that has "Selection" selected for Movement Condition (Z). Specify the selection No. for the Z selection value you want to mark.

Note MD-X Series: Does not support ZE command.

■ Command

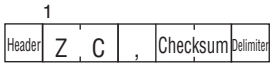
Item	Parameter	Number of bytes	Remarks
Identification Code	ZE	2	Fixed
Selection No.	000 to 499	3	OVariable length parameter of 3 bytes or less
Total number of bytes		6 (5)	

■ Response

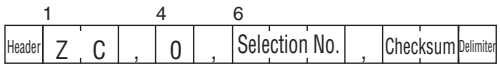
Requesting current value for selection No. of Z selection value (ZC)

Use this command to request the current value for selection No. of Z selection value.

■ Command



■ Response



Item	Parameter	Number of bytes	Remarks
Identification Code	ZC	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3- 2)
Selection No.	000 to 499	3	●Data length is fixed to 3 bytes.
Total number of bytes		8 (6)	

Chapter 8

External camera control command (Exclusive use for MD-T1000)

This chapter describes the external camera control command.

8-1 External camera control flow 8-2

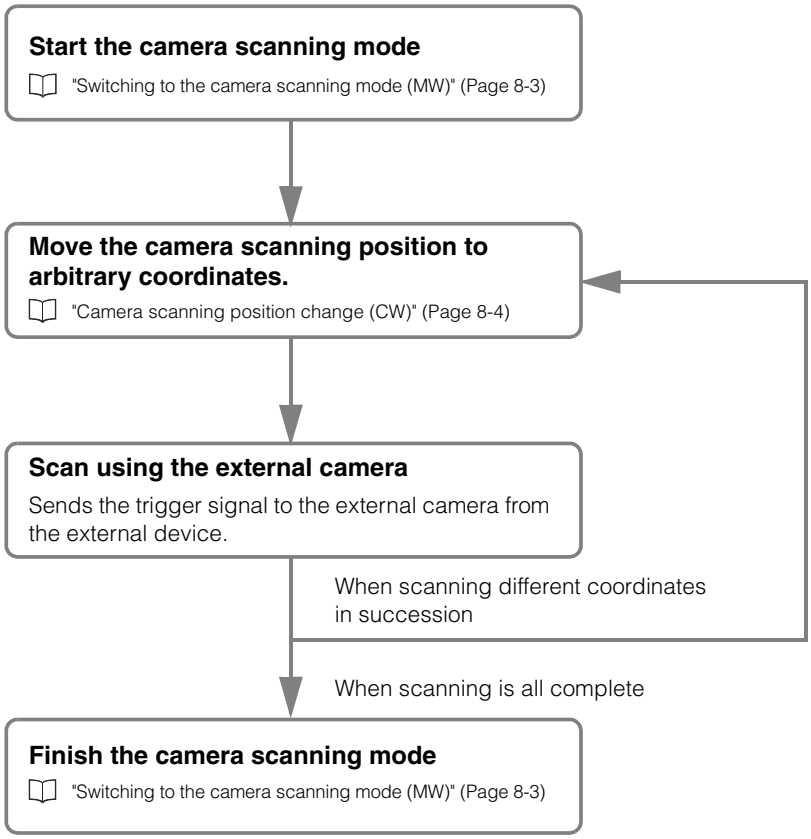
8-2 Switching to the camera scanning mode 8-3

8-3 Camera scanning position setting 8-4

8-1 External camera control flow

This section describes the overview of scanning position control by the external camera.

The control flow is as follows.



Note Confirm the controller is ready before starting the camera scanning mode.

8-2 Switching to the camera scanning mode

This switches to the mode that can change camera scanning positions.

Switching to the camera scanning mode (MW)

This switches to the mode that can change the camera scanning positions from operating state.
When the mode is changed to the camera scanning mode, the shutter for the camera is opened and the shutter for the laser is closed.

Note

- If the mode is switched to the camera scanning mode, marking is not possible.
- The scanning position is origin immediately after the mode is switched to the camera scanning mode.
- Mode switching takes approx. 400ms.
- MD-X Series: A shutter for camera is not equipped.

■ Command

1		4				
Header	M W	,	Mode	,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	MW	2	Fixed
Mode	0/1	1	0: Switched to the operating state. 1: Switched to the camera scanning mode
Total number of bytes		4 (3)	

■ Response

1		4				
Header	M W	,	0	,	Checksum	Delimiter

8-3 Camera scanning position setting

This section describes the changes and requests for camera scanning positions.

Camera scanning position change (CW)

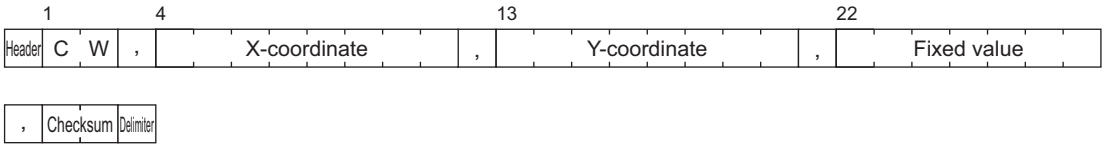
This changes the camera scanning position.
Attach the external camera to the MD-T1000 Series and send signals when changing the camera scanning positions.

Note

- Switch to the camera scanning mode beforehand.
- Changing the scanning position takes approx. 150ms.
- This will be affected by the head direction of the Program No. in current operation and workpiece position correction.
- This will be affected by the setting position correction for device setting.

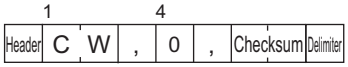
Reference If "CW" is changed to "UW", the coordinates can be specified without influence of workpiece position correction. The UW command parameter is the same as that of the CW command.

■ Command



Item	Parameter	Number of bytes	Remarks
Identification Code	CW	2	Fixed
X-coordinate	-040.000 to 0040.000	8	O Variable length parameter of 8 bytes or less Unit: mm
Y-coordinate	-040.000 to 0040.000	8	
Fixed value	0000.00	7	● Data length is fixed to 7 bytes.
Total number of bytes		28 (25)	

■ Response



Camera scanning position request (CY)

This requests the camera scanning position.

■ Command

1		4			
Header	C Y	,	Checksum	Delimiter

■ Response

1		4	6		15		24
Header	C Y	,	0	,	X-coordinate	,	Y-coordinate	,	Fixed value

,	Checksum	Delimiter

Item	Parameter	Number of bytes	Remarks
Identification Code	CY	2	Fixed
Error Status	0/1	1	"1" is set when an error occurred. "3-1 Error Response" (Page 3-2)
X-coordinate	-040.000 to 0040.000	8	● Data length is fixed to 8 bytes. Unit: mm
Y-coordinate	-040.000 to 0040.000	8	
Fixed value	0000.00	7	● Data length is fixed to 7 bytes.
Total number of bytes		30 (26)	

MEMO

Appendices

The appendices contain the ASCII code table, the shift-JIS code table, and the index.

1 List of Input Values for Each Machine Type A-2

2 ASCII Code Table A-10

3 Shift-JIS Code Table A-11

4 Latin-1 Code Table A-30

5 Index A-31

1 List of Input Values for Each Machine Type

■ Setting and requesting common marking conditions K0, K1 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Line Speed/ Maximum Line Speed	mm/s	0.1 to 4000.0	0.1 to 8000.0	0.1 to 2000.0	0000.0
Movement Marking Start Position	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	0000.000
Movement Marking End Position	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	0000.000
Distance Pointer Position	mm	-021.0 to 0021.0	-021.0 to 0021.0	ML-Z: -002.0 to 0002.0 MD-V: -015.0 to 0015.0	000.0
Approach Scan Speed	mm/s	00000, 00001 to 04000	00000, 00001 to 06000	00000, 00001 to 02000	00000, 00001 to 04000

■ Changing and requesting workpiece position adjustment: VG, VH command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Movement Reference Point (X)	mm	-60.000 to 060.000	-150.000 to 0150.000	-025.000 to 0025.000	-40.000 to 040.000
Movement Reference Point (Y)	mm	-60.000 to 060.000	-150.000 to 0150.000	-025.000 to 0025.000	-40.000 to 040.000
Correction Amount (X)	mm	-032.500 to 0032.500	-032.500 to 0032.500	-025.000 to 0025.000	-032.500 to 0032.500
Correction Amount (Y)	mm	-032.500 to 0032.500	-032.500 to 0032.500	-025.000 to 0025.000	-032.500 to 0032.500

■ Setting and requesting block conditions: K2, K3 command

Position Information

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-coordinate Fixed Point Output X-coordinate Start Point X-coordinate End Point X-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000
Y-coordinate Fixed Point Output Y-coordinate Start Point Y-coordinate End Point Y-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000
Z-coordinate	mm	-021.00 to 0021.00	-021.00 to 0021.00	ML-Z: -002.00 to 0002.00 MD-V: -015.00 to 0015.00	00000.0
Spot variable value	-	-210 to 0210	-210 to 0210	ML-Z: -020 to 0020 MD-V: -150 to 0150	-050 to 0050
Center X-coordinate	mm	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99
		2D Machinery Operation/ Oval/Arc/Oval arc -240.00 to 0240.00	2D Machinery Operation/ Oval/Arc/Oval arc -600.00 to 0600.00	2D Machinery Operation/ Oval/Arc/Oval arc -100.00 to 0100.00	2D Machinery Operation/ Oval/Arc/Oval arc -160.00 to 0160.00
Center Y-coordinate	mm	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99	Character Outer/Inner circumference of arc -9999.99 to 9999.99
		2D Machinery Operation/ Oval/Arc/Oval arc -240.00 to 0240.00	2D Machinery Operation/ Oval/Arc/Oval arc -600.00 to 0600.00	2D Machinery Operation/ Oval/Arc/Oval arc -100.00 to 0100.00	2D Machinery Operation/ Oval/Arc/Oval arc -160.00 to 0160.00
Solid Length (dashed line only)	mm	00.100 to 60.000	00.100 to 65.000	00.100 to 25.000	00.100 to 40.000
Pitch Length (dashed line only)	mm	00.100 to 60.000	00.100 to 65.000	00.100 to 25.000	00.100 to 40.000
Radius X	mm	0.01 to 240.00	0.01 to 600.00	0.01 to 100.00	0.01 to 40.000
Radius Y	mm	0.01 to 240.00	0.01 to 600.00	0.01 to 100.00	0.01 to 40.000
Logo Size (Width)	mm	000.200 to 120.000	000.300 to 300.000	000.100 to 050.000	0.002 to 080.000
Logo Size (Height)	mm	000.200 to 120.000	000.300 to 300.000	000.100 to 050.000	0.002 to 080.000

Speed Information

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Approach	mm	0.00 to 5.00	0.00 to 5.00	0.00 to 2.50	0.01 to 5.00
Approach between Characters	mm	0.016 to 5.000	0.040 to 5.000	0.008 to 2.500	0.001 to 5.000
Scan Speed	mm/s	00001 to 12000	00001 to 6000 0001 to 8000 (MD-V9920)	00001 to 06000	00001 to 12000

Size Information

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Character Height	mm	000.200 to 120.000	000.300 to 300.000	000.100 to 050.000	000.010 to 080.000
Barcode Height Linear Code Height	mm	000.200 to 120.000	000.300 to 300.000	000.100 to 050.000	000.200 to 80.000
Character Width	mm	000.200 to 120.000	000.300 to 300.000	000.100 to 050.000	000.010 to 80.000
Thick Line Width	mm	00.000, 00.010 to 05.000	00.000, 00.010 to 07.500	00.000, 00.010 to 02.500	00.000, 00.010 to 05.000
Character Pitch Full Length	mm	000.000 to 180.000	000.000 to 450.000	000.000 to 075.000	000.000 to 120.000

■ Setting and requesting block 3D detailed conditions: K4, K5 commands

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Diameter	mm	0000.200 to 0480.000	0000.200 to 1200.000	0000.200 to 0200.000	–
X-axis Offset	mm	The block type is other than outer or inner circumference of arc -060.000 to 0060.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	The block type is other than outer or inner circumference of arc -150.000 to 0150.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	The block type is other than outer or inner circumference of arc -025.000 to 0025.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	–
Y-axis Offset (Plane/Sphere)	mm	The block type is other than outer or inner circumference of arc -060.000 to 0060.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	The block type is other than outer or inner circumference of arc -150.000 to 0150.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	The block type is other than outer or inner circumference of arc -025.000 to 0025.000 The block type is outer or inner circumference of arc -9999.99 to 9999.99	–
Y-axis Offset (Cylinder/(Inverted) Cone)	mm	Cylinder -0060.00 to 00060.00 (Inverted) Cone 00000.00 to 00060.00	Cylinder -0150.00 to 00150.00 (Inverted) Cone 00000.00 to 00150.00	Cylinder -0025.00 to 00025.00 (Inverted) Cone 00000.00 to 00025.00	–
X-coordinate	mm	The block type is other than outer or inner circumference of arc -120.000 to 0120.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -300.000 to 0300.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -050.000 to 0050.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	–
Y-coordinate	mm	The block type is other than outer or inner circumference of arc -120.000 to 0120.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -300.000 to 0300.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -050.000 to 0050.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	–
Z-coordinate	mm	Plane -081.00 to 0081.00 Cylinder/(Inverted) Cone/ Sphere -261.00 to 0261.00	Plane -171.00 to 0171.00 Cylinder/(Inverted) Cone/ Sphere -261.00 to 0261.00	Plane ML-Z: -027.00 to 0027.00 MD-V: -040.00 to 0040.00 Cylinder/(Inverted) Cone/ Sphere ML-Z: -102.00 to 0102.00 MD-V: -115.00 to 0115.00	–
(Inverted) Conical Surface Radius	mm	0000.200 to 0480.000	0000.200 to 1200.000	0000.200 to 0200.000	–
(Inverted) Cone Height	mm	000.100 to 120.000	000.100 to 300.000	000.100 to 050.000	–

■ Setting and requesting (regular pitch layout)common palette conditions: G8, F9(KU/KV) command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Column Pitch	mm	000.000 to 120.000	000.000 to 300.000	000.000 to 050.000	000.000 to 080.000
Row Pitch	mm	000.000 to 120.000	000.000 to 300.000	000.000 to 050.000	000.000 to 080.000
Reference Position X-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000
Reference Position Y-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000

■ Setting and requesting individual palette conditions: KW, KX command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Coordinate Offset (X-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Coordinate Offset (Y-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Coordinate Offset (Z-coordinate)	mm	-042.00 to 0042.00	-042.00 to 0042.00	ML-Z: -004.00 to 0004.00 MD-V: -030.00 to 0030.00	0000.00

■ Changing and requesting 2D block position (individual): C0, B1 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-coordinate Center X-coordinate	mm	X-coordinate -060.000 to 0060.000 Center X-coordinate -9999.99 to 09999.99	X-coordinate -150.000 to 0150.000 Center X-coordinate -9999.99 to 09999.99	X-coordinate -025.000 to 0025.000 Center X-coordinate -9999.99 to 09999.99	X-coordinate -040.000 to 0040.000 Center X-coordinate -9999.99 to 09999.99
Y-coordinate Center Y-coordinate	mm	Y-coordinate -060.000 to 0060.000 Center Y-coordinate -9999.99 to 09999.99	Y-coordinate -150.000 to 0150.000 Center Y-coordinate -9999.99 to 09999.99	Y-coordinate -025.000 to 0025.000 Center Y-coordinate -9999.99 to 09999.99	Y-coordinate -040.000 to 0040.000 Center Y-coordinate -9999.99 to 09999.99

■ Changing 2D block position (all) AG command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-coordinate Offset Value	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Y-coordinate Offset Value	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Z-coordinate Offset Value	mm	-042.00 to 0042.00	-042.00 to 0042.00	ML-Z: -004.00 to 0004.00 MD-V: -030.00 to 0030.00	0000.00
Spot Variable Offset Value	-	-420 to 0420	-420 to 0420	ML-Z: -040 to 0040 MD-V: -300 to 0300	-100 to 0100

■ Changing and requesting 2D block position (individual): C4, B5 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Fixed Point Output X-coordinate Start Point X-coordinate End Point X-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000
Fixed Point Output Y-coordinate Start Point Y-coordinate End Point Y-coordinate	mm	-060.000 to 0060.000	-150.000 to 0150.000	-025.000 to 0025.000	-040.000 to 0040.000
Solid Length (dashed line only)	mm	00.100 to 60.000	00.100 to 65.000	00.100 to 25.000	00.100 to 40.000
Pitch Length (dashed line only)	mm	00.100 to 60.000	00.100 to 65.000	00.100 to 25.000	00.100 to 40.000
Center X-coordinate	mm	-240.00 to 0240.00	-600.00 to 0600.00	-100.00 to 0100.00	-160.00 to 0160.00
Center Y-coordinate	mm	-240.00 to 0240.00	-600.00 to 0600.00	-100.00 to 0100.00	-160.00 to 0160.00
Radius X	mm	0.01 to 240.00	0.01 to 600.00	0.01 to 100.00	000.01 to 160.00
Radius Y	mm	0.01 to 240.00	0.01 to 600.00	0.01 to 100.00	000.01 to 160.00

■ Changing and requesting 3D block position: E0, E1 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-coordinate	mm	The block type is other than outer or inner circumference of arc -120.000 to 0120.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -300.000 to 0300.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -050.000 to 0050.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -080.000 to 0080.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99
Y-coordinate	mm	The block type is other than outer or inner circumference of arc -120.000 to 0120.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -300.000 to 0300.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -050.000 to 0050.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99	The block type is other than outer or inner circumference of arc -080.000 to 0080.000 The block type is outer or inner circumference of arc -9999.99 to 09999.99

■ Changing and requesting 3D block position offset: E2, E3 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-axis Offset	mm	The block type is other than outer or inner circumference of arc -060.000 to 0060.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99	The block type is other than outer or inner circumference of arc -150.000 to 0150.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99	The block type is other than outer or inner circumference of arc -025.000 to 0025.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99	–
Y-axis Offset	mm	The block type is other than outer or inner circumference of arc -060.000 to 0060.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99 (Inverted) Cone 00000.00 to 00060.00	The block type is other than outer or inner circumference of arc -150.000 to 0150.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99 (Inverted) Cone 00000.00 to 00150.00	The block type is other than outer or inner circumference of arc -025.000 to 0025.000 The block type is outer or inner circumference of arc -0999.99 to 00999.99 (Inverted) Cone 00000.00 to 00025.00	–

■ Changing and requesting block Z-coordinate: E6, E7 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Z-coordinate	mm	2D setting -021.00 to 0021.00 Plane -081.00 to 0081.00 Cylinder/(Inverted) Cone/ Sphere -261.00 to 0261.00	2D setting -021.00 to 0021.00 Plane -171.00 to 0171.00 Cylinder/(Inverted) Cone/ Sphere -261.00 to 0261.00	2D setting ML-Z: -002.00 to 0002.00 MD-V: -015.00 to 0015.00 Plane ML-Z: -027.00 to 0027.00 MD-V: -040.00 to 0040.00 Cylinder/(Inverted) Cone/ Sphere ML-Z: -102.00 to 0102.00 MD-V: -115.00 to 0115.00	–

■ Changing and requesting the coordinate offset (X/Y/θ) for palette marking: VC, UD command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Coordinate Offset (X-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Coordinate Offset (Y-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000

■ Changing and requesting the coordinate offset (Z) for palette marking: UM, UN command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Coordinate offset (Z-coordinate)	mm	-042.00 to 0042.00	-042.00 to 0042.00	ML-Z: -004.00 to 0004.00 MD-V: -030.00 to 0030.00	–

Appendices

■ Setting and requesting installation position corrections: TP, TQ command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
X-coordinate	mm	-32.500 to 032.500	-32.500 to 032.500	-25.000 to 025.500	-32.500 to 032.500
Y-coordinate	mm	-32.500 to 032.500	-32.500 to 032.500	-25.000 to 025.500	-32.500 to 032.500
Z-coordinate	mm	-21.000 to 021.000	-21.000 to 021.000	ML-Z: -02.000 to 002.000 MD-V: -15.000 to 015.000	000.000

■ Changing and requesting the amount of movement of the group and individual trimmer: V0, V1 command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Shift amount (X-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Shift amount (Y-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000

■ Changing and requesting the coordinate offset (X/Y/Z/θ) for palette marking: UI, UJ command

Item	Unit	ML-Z9510/MD-V9900/ MD-V9910/MD-S9910/ MD-F3000/3100/5100	ML-Z9520/MD-V9920/ MD-S9920/ MD-F3020/3120/5120	ML-Z9550 MD-V9950	MD-T1010
Coordinate Offset (X-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Coordinate Offset (Y-coordinate)	mm	-120.000 to 0120.000	-300.000 to 0300.000	-050.000 to 0050.000	-080.000 to 0080.000
Coordinate Offset (Z-coordinate)	mm	-042.00 to 0042.00	-042.00 to 0042.00	ML-Z: -004.00 to 0004.00 MD-V: -030.00 to 0030.00	0000.00

MD-X Series

■ Changing and requesting workpiece position adjustment: VG, VH command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Movement reference point (X- and Y-coordinates)	mm	-62.500 to 062.500	-025.0 to 0025.0	-165.000 to 0165.000	-62.500 to 062.500	-165.000 to 0165.000
Correction amount (X- and Y-coordinates)	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000

■ Setting and requesting block condition: K2, K3 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-coordinate, Y-coordinate (2D) Fixed Point Output X- and Y-coordinates	mm	-62.500 to 062.500	-025.000 to 0025.000	-165.000 to 0165.000	-62.500 to 062.500	-165.000 to 0165.000
Z-coordinate (2D)	mm	-21.00 to 021.00	-15.00 to 015.00	-21.00 to 021.00	-21.00 to 021.00	-21.00 to 021.00
Center X-coordinate Center Y-coordinate	mm	Character Outer/ Inner circumference of arc -9999.99 to 9999.99	Character Outer/ Inner circumference of arc -9999.99 to 9999.99	Character Outer/ Inner circumference of arc -9999.99 to 9999.99	Character Outer/ Inner circumference of arc -9999.99 to 9999.99	Character Outer/ Inner circumference of arc -9999.99 to 9999.99
Logo size (width) Logo size (height)	mm	000.002 to 125.000	000.001 to 050.000	000.005 to 330.000	000.002 to 125.000	000.005 to 330.000

■ Size information

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Character height Character width	mm	000.100 to 125.000	000.100 to 050.000	000.100 to 330.000	000.100 to 125.000	000.100 to 330.000
Barcode height Linear code height	mm	000.200 to 125.000	000.100 to 050.000	000.300 to 330.000	000.200 to 125.000	000.300 to 330.000

■ Setting and requesting block 3D detailed conditions: K4, K5 commands

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-axis Offset Y-axis Offset	mm	Other than circular arc character string -62.500 to 062.500 Circular arc character -999.99 to 9999.99	Other than circular arc character -25.000 to 025.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -165.000 to 165.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -62.500 to 062.500 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -165.000 to 0165.000 Circular arc character string -999.99 to 9999.99
Y-axis Offset (Cylinder, (Inverted) Cone)	mm	Other than circular arc character string -62.500 to 062.500 Circular arc character string 00000.000 to 00062.500	Other than circular arc character string -25.000 to 025.000 Circular arc character string 00000.000 to 00025.000	Other than circular arc character string -165.000 to 165.000 Circular arc character string 00000.000 to 00165.000	Other than circular arc character string -62.500 to 062.500 Circular arc character string 00000.000 to 00062.500	Other than circular arc character string -165.000 to 0165.000 Circular arc character string 00000.000 to 00165.000
X-coordinate (3D) Y-coordinate (3D)	mm	Other than circular arc character string -125.000 to 0125.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -0050.000 to 0050.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -330.000 to 0330.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -125.000 to 0125.000 Circular arc character string -999.99 to 9999.99	Other than circular arc character string -330.000 to 0330.000 Circular arc character string -999.99 to 9999.99
Z-coordinate	mm	Cylinder, Cone, Sphere: -261.000 to 0261.000 Slant side shape: -083.500 to 0083.500	Cylinder, Cone, Sphere: -115.000 to 0115.000 Slant side shape: -040.000 to 0040.000	Cylinder, Cone, Sphere: -621.000 to 0621.000 Slant side shape: -0186.000 to 0186.000	Cylinder, Cone, Sphere: -261.000 to 0261.000 Slant side shape: -083.500 to 0083.500	Cylinder, Cone, Sphere: -621.000 to 0621.000 Slant side shape: -186.000 to 0186.000
(Inverted) Cone surface diameter	mm	0000.200 to 0480.000	0000.200 to 0200.000	0000.200 to 1200.000	0000.200 to 0480.000	0000.200 to 1200.000
(Inverted) Cone height	mm	000.100 to 125.000	000.100 to 050.000	000.100 to 330.000	000.100 to 125.000	000.100 to 330.000

■ Setting and requesting palette common condition/Equal distribution: G8, F9, KU, KV command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Column pitch	mm	000.000 to 125.000	000.000 to 050.000	000.000 to 330.000	000.000 to 125.000	000.000 to 330.000
Reference position X-coordinate Reference position Y-coordinate	mm	-062.500 to 0062.500	-025.000 to 0025.000	-165.000 to 0165.000	-062.500 to 0062.500	-165.000 to 0165.000

■ Setting and requesting individual palette conditions: KW, KX command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Coordinate Offset (X-coordinate) Coordinate Offset (Y-coordinate)	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000
Coordinate Offset (Z-coordinate)	mm	-042.00 to 0042.00	-030.00 to 0030.00	-042.00 to 0042.00	-042.00 to 0042.00	-042.00 to 0042.00
Coordinate Offset (Angle)	°	-180.000 to 0180.000	-180.000 to 0180.000	-180.000 to 0180.000	-180.000 to 0180.000	-180.000 to 0180.000

■ Changing and requesting 2D block position (individual): C0, B1 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-coordinate, Y-coordinate Center X-coordinate, Center Y-coordinate	mm	X-coordinate, Y-coordinate -062.500 to 062.500 Center X-coordinate, Center Y-coordinate -9999.99 to 9999.99	X-coordinate, Y-coordinate -025.000 to 025.000 Center X-coordinate, Center Y-coordinate -9999.99 to 9999.99	X-coordinate, Y-coordinate -165.000 to 165.000 Center X-coordinate, Center Y-coordinate -9999.99 to 9999.99	X-coordinate, Y-coordinate -062.500 to 062.500 Center X-coordinate, Center Y-coordinate -9999.99 to 9999.99	X-coordinate, Y-coordinate -165.000 to 165.000 Center X-coordinate, Center Y-coordinate -9999.99 to 9999.99

Appendices

■ Changing 2D block position (all): AG command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-coordinate Offset Value Y-coordinate Offset Value	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000
Z-coordinate Offset Value	mm	-042.00 to 0042.00	-030.00 to 0030.00	-042.00 to 0042.00	-042.00 to 0042.00	-042.00 to 0042.00

■ Changing and requesting 3D block position: E0, E1 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X- and Y-coordinates	mm	Other than circular arc character -125.000 to 0125.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -0050.000 to 0050.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -330.000 to 0330.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -125.000 to 0125.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -330.000 to 0330.000 Circular arc character string -9999.99 to 9999.99

■ Changing and requesting 3D block position offset: E2, E3 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-axis Offset Y-axis Offset	mm	Other than circular arc character -62.500 to 062.500 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -25.000 to 025.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -165.000 to 165.000 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -62.500 to 062.500 Circular arc character string -9999.99 to 9999.99	Other than circular arc character string -165.000 to 0165.000 Circular arc character string -9999.99 to 9999.99
Starting angle	°	Plane, Cylinder 0000000 Cylinder, (Inverted) Cone -180.000 to 0180.000	Plane, Cylinder 0000000 Cylinder, (Inverted) Cone -180.000 to 0180.000	Plane, Cylinder 0000000 Cylinder, (Inverted) Cone -180.000 to 0180.000	Plane, Cylinder 0000000 Cylinder, (Inverted) Cone -180.000 to 0180.000	Plane, Cylinder 0000000 Cylinder, (Inverted) Cone -180.000 to 0180.000

■ Changing and requesting block Z-coordinate: E6, E7 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Z-coordinate	mm	2D setting -021.00 to 0021.00 Plain -083.50 to 0083.50 Cylinder, (Inverted) Cone, Sphere -261.00 to 0261.00	2D setting -015.00 to 0015.00 Plain -040.00 to 0040.00 Cylinder, (Inverted) Cone, Sphere -115.00 to 0115.00	2D setting -021.00 to 0021.00 Plain -186.00 to 0186.00 Cylinder, (Inverted) Cone, Sphere -621.00 to 0621.00	2D setting -021.00 to 0021.00 Plain -083.50 to 0083.50 Cylinder, (Inverted) Cone, Sphere -261.00 to 0261.00	2D setting -021.00 to 0021.00 Plain -186.00 to 0186.00 Cylinder, (Inverted) Cone, Sphere -621.00 to 0621.00

■ Changing and requesting the coordinate offset (X/Y/θ) for palette marking: VC, UD command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Position offset (X- and Y-coordinates)	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000

■ Changing and requesting the amount of movement of the group and individual trimmer: V0, V1 command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Shift amount (X- and Y-coordinates)	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000

■ Changing and requesting the coordinate offset (X/Y/Z/θ) for palette marking: UI, UJ command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Position offset (X- and Y-coordinates)	mm	-125.000 to 0125.000	-050.000 to 0050.000	-330.000 to 0330.000	-125.000 to 0125.000	-330.000 to 0330.000

■ Requesting character string for marking: UY command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Character code to use		0: Character string is sent in ASCII code. 1: Character string is sent in Shift JIS code. 2: Character string is sent in UTF-8 code.				

■ Requesting end code character string of marked GS1 DataBar: UZ command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
Character code to use		0: Character string is sent in ASCII code. 1: Character string is sent in Shift JIS code. 2: Character string is sent in UTF-8 code.				

■ Setting and requesting installation position corrections: TP, TQ command

Item	Unit	MD-X1000 Standard	MD-X1050 Thin line	MD-X1020 Wide	MD-X1500 Standard	MD-X1520 Wide
X-coordinate, Y-coordinate	mm	-062.500 to 0062.500	-025.000 to 0025.000	-165.000 to 0165.000	-062.500 to 0062.500	-165.000 to 0165.000
Z-coordinate	mm	-21.000 to 021.000	-15.000 to 015.000	-21.000 to 021.000	-21.000 to 021.000	-21.000 to 021.000

2 ASCII Code Table

The table below shows the list of ASCII codes.

Low-order 4 bits \ High-order 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p				ー	タ	ミ		
1	SOH	DC1	!	1	A	Q	a	q			。	ア	チ	ム		
2	STX	DC2	”	2	B	R	b	r			「	イ	ツ	メ		
3	ETX	DC3	#	3	C	S	c	s			」	ウ	テ	モ		
4	EOT	DC4	$	4	D	T	d	t			、	エ	ト	ヤ		
5	ENQ	NAK	%	5	E	U	e	u			・	オ	ナ	ユ		
6	ACK	SYN	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
7	BEL	ETB	’	7	G	W	g	w			ァ	キ	ヌ	ラ		
8	BS	CAN	(	8	H	X	h	x			ィ	ク	ネ	リ		
9	HT	EM	)	9	I	Y	i	y			ゥ	ケ	ノ	ル		
A	LF	SUB	*	:	J	Z	j	z			ェ	コ	ハ	レ		
B	VT	ESC	+	;	K	[	k	{			ォ	サ	ヒ	ロ		
C	FF	FS	,	<	L	\	l	—			ャ	シ	フ	ワ		
D	CR	GS	−	=	M	]	m	}			ュ	ス	ヘ	ン		
E	SO	RS	.	>	N	^	n	~			ョ	セ	ホ	゛		
F	SI	US	／	?	O	_	o	DEL			ッ	ソ	マ	゜		

Appendices

3 Shift-JIS Code Table

The table below shows the list of Shift-JIS codes.

■ JIS level-1 kanji set

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Symbols	813F	2120		SP	、	。	,	.	・	:	;	?	!	゛	゜	´	｀	¨
	814F	2130	＾	￣	＿	ヽ	ヾ	ゝ	ゞ	〃	仝	々	〆	〇	―	—	-	／
	815F	2140	＼	～	‖	｜	…	‥	‘	’	“	”	（	）	〔	〕	［	］
	816F	2150	｛	｝	〈	〉	《	》	「	」	『	』	【	】	＋	－	±	×
	8180	2160	÷	＝	≠	＜	＞	≦	≧	∞	∴	♂	♀	°	′	″	℃	￥
	8190	2170	＄	￠	￡	％	＃	＆	＊	＠	§	☆	★	○	●	◎	◇	
	819E	2220		◆	□	■	△	▲	▽	▼	※	〒	→	←	↑	↓	〓	
	81AE	2230																
	81BE	2240																
	81CE	2250																
	81DE	2260																
	81EE	2270																
Numbers/Letters	823F	2320																
	824F	2330	０	１	２	３	４	５	６	７	８	９						
	825F	2340		Ａ	Ｂ	Ｃ	Ｄ	Ｅ	Ｆ	Ｇ	Ｈ	Ｉ	Ｊ	Ｋ	Ｌ	Ｍ	Ｎ	Ｏ
	826F	2350	Ｐ	Ｑ	Ｒ	Ｓ	Ｔ	Ｕ	Ｖ	Ｗ	Ｘ	Ｙ	Ｚ					
	8280	2360		ａ	ｂ	ｃ	ｄ	ｅ	ｆ	ｇ	ｈ	ｉ	ｊ	ｋ	ｌ	ｍ	ｎ	ｏ
	8290	2370	ｐ	ｑ	ｒ	ｓ	ｔ	ｕ	ｖ	ｗ	ｘ	ｙ	ｚ					
Hiragana	829E	2420		ぁ	あ	ぃ	い	ぅ	う	ぇ	え	ぉ	お	か	が	き	ぎ	く
	82AE	2430	ぐ	け	げ	こ	ご	さ	ざ	し	じ	す	ず	せ	ぜ	そ	ぞ	た
	82BE	2440	だ	ち	ぢ	っ	つ	づ	て	で	と	ど	な	に	ぬ	ね	の	は
	82CE	2450	ば	ぱ	ひ	び	ぴ	ふ	ぶ	ぷ	へ	べ	ぺ	ほ	ぼ	ぽ	ま	み
	82DE	2460	む	め	も	ゃ	や	ゅ	ゆ	ょ	よ	ら	り	る	れ	ろ	ゎ	わ
	82EE	2470	ゐ	ゑ	を	ん												
Katakana	833F	2520		ァ	ア	ィ	イ	ゥ	ウ	ェ	エ	ォ	オ	カ	ガ	キ	ギ	ク
	834F	2530	グ	ケ	ゲ	コ	ゴ	サ	ザ	シ	ジ	ス	ズ	セ	ゼ	ソ	ゾ	タ
	835F	2540	ダ	チ	ヂ	ッ	ツ	ヅ	テ	デ	ト	ド	ナ	ニ	ヌ	ネ	ノ	ハ
	836F	2550	バ	パ	ヒ	ビ	ピ	フ	ブ	プ	ヘ	ベ	ペ	ホ	ボ	ポ	マ	ミ
	8380	2560	ム	メ	モ	ャ	ヤ	ュ	ユ	ョ	ヨ	ラ	リ	ル	レ	ロ	ヮ	ワ
	8390	2570	ヰ	ヱ	ヲ	ン	ヴ	ヵ	ヶ									
Greek alphabet	839E	2620		Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο
	83AE	2630	Π	Ρ	Σ	Τ	Υ	Φ	Χ	Ψ	Ω							
	83BE	2640		α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
	83CE	2650	π	ρ	σ	τ	υ	φ	χ	ψ	ω							
	83DE	2660																
	83EE	2670																

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Russian alphabet	843F	2720		А	Б	В	Г	Д	Е	Ё	Ж	З	И	Й	К	Л	М	Н
	844F	2730	О	П	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э
	845F	2740	Ю	Я														
	846F	2750		а	б	в	г	д	е	ё	ж	з	и	й	к	л	м	н
	8480	2760	о	п	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э
	8490	2770	ю	я														
Other symbols	869E	2C20																
	86AE	2C30																
	86BE	2C40																
	86CE	2C50																
	86DE	2C60																
	86EE	2C70																
	873F	2D20		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
	874F	2D30	⑯	⑰	⑱	⑲	⑳	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	
	875F	2D40	ミリ	キロ	センチ	メートル	グラム	トン	アール	ヘクタール	リットル	ワット	カロリー	ドル	セント	パーセント	ミリバール	ページ
	876F	2D50	㎜	㎝	㎞	㎎	㎏	㏄	㎡									
	8780	2D60			№.	K.K.	TEL	㊤	㊥	㊦	㊧	㊨	㈱	㈲	㈹	明治	大正	昭和
	8790	2D70	≒	≡	∫	∮	Σ	√	⊥	∠	∟	⊿	∵	∩	∪			

Appendices

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ア	889E	3020		亜	唖	娃	阿	哀	愛	挨	姶	逢	葵	茜	穐	悪	握	渥
	88AE	3030	旭	葦	芦	鯵	梓	圧	斡	扱	宛	姐	虻	飴	絢	綾	鮎	或
	88BE	3040	粟	袷	安	庵	按	暗	案	闇	鞍	杏						
イ	88BE	3040											以	伊	位	依	偉	囲
	88CE	3050	夷	委	威	尉	惟	意	慰	易	椅	為	畏	異	移	維	緯	胃
	88DE	3060	萎	衣	謂	違	遺	医	井	亥	域	育	郁	磯	一	壱	溢	逸
	88EE	3070	稲	茨	芋	鰯	允	印	咽	員	因	姻	引	飲	淫	胤	蔭	
	893F	3120		院	陰	隠	韻	吋										
ウ	893F	3120							右	宇	烏	羽	迂	雨	卯	鵜	窺	丑
	894F	3130	碓	臼	渦	嘘	唄	欝	蔚	鰻	姥	厩	浦	瓜	閏	噂	云	運
	895F	3140	雲															
エ	895F	3140		荏	餌	叡	営	嬰	影	映	曳	栄	永	泳	洩	瑛	盈	穎
	896F	3150	頴	英	衛	詠	鋭	液	疫	益	駅	悦	謁	越	閲	榎	厭	円
	8980	3160	園	堰	奄	宴	延	怨	掩	援	沿	演	炎	焔	煙	燕	猿	縁
	8990	3170	艶	苑	薗	遠	鉛	鴛	塩									
オ	8990	3170								於	汚	甥	凹	央	奥	往	応	
	899E	3220		押	旺	横	欧	殴	王	翁	襖	鴬	鴎	黄	岡	沖	荻	億
	89AE	3230	屋	憶	臆	桶	牡	乙	俺	卸	恩	温	穏	音				
カ	89AE	3230													下	化	仮	何
	89BE	3240	伽	価	佳	加	可	嘉	夏	嫁	家	寡	科	暇	果	架	歌	河
	89CE	3250	火	珂	禍	禾	稼	箇	花	苛	茄	荷	華	菓	蝦	課	嘩	貨
	89DE	3260	迦	過	霞	蚊	俄	峨	我	牙	画	臥	芽	蛾	賀	雅	餓	駕
	89EE	3270	介	会	解	回	塊	壊	廻	快	怪	悔	恢	懐	戒	拐	改	
	8A3F	3320		魁	晦	械	海	灰	界	皆	絵	芥	蟹	開	階	貝	凱	劾
	8A4F	3330	外	咳	害	崖	慨	概	涯	碍	蓋	街	該	鎧	骸	浬	馨	蛙
	8A5F	3340	垣	柿	蛎	鈎	劃	嚇	各	廓	拡	撹	格	核	殻	獲	確	穫
	8A6F	3350	覚	角	赫	較	郭	閣	隔	革	学	岳	楽	額	顎	掛	笠	樫
	8A80	3360	橿	梶	鰍	潟	割	喝	恰	括	活	渇	滑	葛	褐	轄	且	鰹
	8A90	3370	叶	椛	樺	鞄	株	兜	竃	蒲	釜	鎌	噛	鴨	栢	茅	萱	
	8A9E	3420		粥	刈	苅	瓦	乾	侃	冠	寒	刊	勘	勧	巻	喚	堪	姦
	8AAE	3430	完	官	寛	干	幹	患	感	慣	憾	換	敢	柑	桓	棺	款	歓
	8ABE	3440	汗	漢	澗	潅	環	甘	監	看	竿	管	簡	緩	缶	翰	肝	艦
	8ACE	3450	莞	観	諫	貫	還	鑑	間	閑	関	陥	韓	館	舘	丸	含	岸
	8ADE	3460	巌	玩	癌	眼	岩	翫	贋	雁	頑	顔	願					

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
キ	8ADE	3460												企	伎	危	喜	器
	8AEE	3470	基	奇	嬉	寄	岐	希	幾	忌	揮	机	旗	既	期	棋	棄	
	8B3F	3520		機	帰	毅	気	汽	畿	祈	季	稀	紀	徽	規	記	貴	起
	8B4F	3530	軌	輝	飢	騎	鬼	亀	偽	儀	妓	宜	戯	技	擬	欺	犠	疑
	8B5F	3540	祇	義	蟻	誼	議	掬	菊	鞠	吉	吃	喫	桔	橘	詰	砧	杵
	8B6F	3550	黍	却	客	脚	虐	逆	丘	久	仇	休	及	吸	宮	弓	急	救
	8B80	3560	朽	求	汲	泣	灸	球	究	窮	笈	級	糾	給	旧	牛	去	居
	8B90	3570	巨	拒	拠	挙	渠	虚	許	距	鋸	漁	禦	魚	亨	享	京	
	8B9E	3620		供	侠	僑	兇	競	共	凶	協	匡	卿	叫	喬	境	峡	強
	8BAE	3630	彊	怯	恐	恭	挟	教	橋	況	狂	狭	矯	胸	脅	興	蕎	郷
	8BBE	3640	鏡	響	饗	驚	仰	凝	尭	暁	業	局	曲	極	玉	桐	粁	僅
	8BCE	3650	勤	均	巾	錦	斤	欣	欽	琴	禁	禽	筋	緊	芹	菌	衿	襟
	8BDE	3660	謹	近	金	吟	銀											
ク	8BDE	3660						九	倶	句	区	狗	玖	矩	苦	躯	駆	駈
	8BEE	3670	駒	具	愚	虞	喰	空	偶	寓	遇	隅	串	櫛	釧	屑	屈	
	8C3F	3720		掘	窟	沓	靴	轡	窪	熊	隈	粂	栗	繰	桑	鍬	勲	君
	8C4F	3730	薫	訓	群	軍	郡											
ケ	8C4F	3730						卦	袈	祁	係	傾	刑	兄	啓	圭	珪	型
	8C5F	3740	契	形	径	恵	慶	慧	憩	掲	携	敬	景	桂	渓	畦	稽	系
	8C6F	3750	経	継	繋	罫	茎	荊	蛍	計	詣	警	軽	頚	鶏	芸	迎	鯨
	8C80	3760	劇	戟	撃	激	隙	桁	傑	欠	決	潔	穴	結	血	訣	月	件
	8C90	3770	倹	倦	健	兼	券	剣	喧	圏	堅	嫌	建	憲	懸	拳	捲	
	8C9E	3820		検	権	牽	犬	献	研	硯	絹	県	肩	見	謙	賢	軒	遣
	8CAE	3830	鍵	険	顕	験	鹸	元	原	厳	幻	弦	減	源	玄	現	絃	舷
	8CBE	3840	言	諺	限													
コ	8CBE	3840				乎	個	古	呼	固	姑	孤	己	庫	弧	戸	故	枯
	8CCE	3850	湖	狐	糊	袴	股	胡	菰	虎	誇	跨	鈷	雇	顧	鼓	五	互
	8CDE	3860	伍	午	呉	吾	娯	後	御	悟	梧	檎	瑚	碁	語	誤	護	醐
	8CEE	3870	乞	鯉	交	佼	侯	候	倖	光	公	功	効	勾	厚	口	向	
	8D3F	3920		后	喉	坑	垢	好	孔	孝	宏	工	巧	巷	幸	広	庚	康
	8D4F	3930	弘	恒	慌	抗	拘	控	攻	昂	晃	更	杭	校	梗	構	江	洪
	8D5F	3940	浩	港	溝	甲	皇	硬	稿	糠	紅	紘	絞	綱	耕	考	肯	肱
	8D6F	3950	腔	膏	航	荒	行	衡	講	貢	購	郊	酵	鉱	砿	鋼	閤	降
	8D80	3960	項	香	高	鴻	剛	劫	号	合	壕	拷	濠	豪	轟	麹	克	刻
	8D90	3970	告	国	穀	酷	鵠	黒	獄	漉	腰	甑	忽	惚	骨	狛	込	
	8D9E	3A20		此	頃	今	困	坤	墾	婚	恨	懇	昏	昆	根	梱	混	痕
	8DAE	3A30	紺	艮	魂													

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
サ	8DAE	3A30				些	佐	叉	唆	嵯	左	差	査	沙	瑳	砂	詐	鎖
	8DBE	3A40	裟	坐	座	挫	債	催	再	最	哉	塞	妻	宰	彩	才	採	栽
	8DCE	3A50	歳	済	災	采	犀	砕	砦	祭	斎	細	菜	裁	載	際	剤	在
	8DDE	3A60	材	罪	財	冴	坂	阪	堺	榊	肴	咲	崎	埼	碕	鷺	作	削
	8DEE	3A70	咋	搾	昨	朔	柵	窄	策	索	錯	桜	鮭	笹	匙	冊	刷	
	8E3F	3B20		察	拶	撮	擦	札	殺	薩	雑	皐	鯖	捌	錆	鮫	皿	晒
	8E4F	3B30	三	傘	参	山	惨	撒	散	桟	燦	珊	産	算	纂	蚕	讃	賛
	8E5F	3B40	酸	餐	斬	暫	残											
シ	8E5F	3B40						仕	仔	伺	使	刺	司	史	嗣	四	士	始
	8E6F	3B50	姉	姿	子	屍	市	師	志	思	指	支	孜	斯	施	旨	枝	止
	8E80	3B60	死	氏	獅	祉	私	糸	紙	紫	肢	脂	至	視	詞	詩	試	誌
	8E90	3B70	諮	資	賜	雌	飼	歯	事	似	侍	児	字	寺	慈	持	時	
	8E9E	3C20		次	滋	治	爾	璽	痔	磁	示	而	耳	自	蒔	辞	汐	鹿
	8EAE	3C30	式	識	鴫	竺	軸	宍	雫	七	叱	執	失	嫉	室	悉	湿	漆
	8EBE	3C40	疾	質	実	蔀	篠	偲	柴	芝	屡	蕊	縞	舎	写	射	捨	赦
	8ECE	3C50	斜	煮	社	紗	者	謝	車	遮	蛇	邪	借	勺	尺	杓	灼	爵
	8EDE	3C60	酌	釈	錫	若	寂	弱	惹	主	取	守	手	朱	殊	狩	珠	種
	8EEE	3C70	腫	趣	酒	首	儒	受	呪	寿	授	樹	綬	需	囚	収	周	
	8F3F	3D20		宗	就	州	修	愁	拾	洲	秀	秋	終	繍	習	臭	舟	蒐
	8F4F	3D30	衆	襲	讐	蹴	輯	週	酋	酬	集	醜	什	住	充	十	従	戎
	8F5F	3D40	柔	汁	渋	獣	縦	重	銃	叔	夙	宿	淑	祝	縮	粛	塾	熟
	8F6F	3D50	出	術	述	俊	峻	春	瞬	竣	舜	駿	准	循	旬	楯	殉	淳
	8F80	3D60	準	潤	盾	純	巡	遵	醇	順	処	初	所	暑	曙	渚	庶	緒
	8F90	3D70	署	書	薯	藷	諸	助	叙	女	序	徐	恕	鋤	除	傷	償	
	8F9E	3E20		勝	匠	升	召	哨	商	唱	嘗	奨	妾	娼	宵	将	小	少
	8FAE	3E30	尚	庄	床	廠	彰	承	抄	招	掌	捷	昇	昌	昭	晶	松	梢
	8FBE	3E40	樟	樵	沼	消	渉	湘	焼	焦	照	症	省	硝	礁	祥	称	章
	8FCE	3E50	笑	粧	紹	肖	菖	蒋	蕉	衝	裳	訟	証	詔	詳	象	賞	醤
	8FDE	3E60	鉦	鍾	鐘	障	鞘	上	丈	丞	乗	冗	剰	城	場	壌	嬢	常
	8FEE	3E70	情	擾	条	杖	浄	状	畳	穣	蒸	譲	醸	錠	嘱	埴	飾	
	903F	3F20		拭	植	殖	燭	織	職	色	触	食	蝕	辱	尻	伸	信	侵
	904F	3F30	唇	娠	寝	審	心	慎	振	新	晋	森	榛	浸	深	申	疹	真
	905F	3F40	神	秦	紳	臣	芯	薪	親	診	身	辛	進	針	震	人	仁	刃
	906F	3F50	塵	壬	尋	甚	尽	腎	訊	迅	陣	靭						
ス	906F	3F50											笥	諏	須	酢	図	厨
	9080	3F60	逗	吹	垂	帥	推	水	炊	睡	粋	翠	衰	遂	酔	錐	錘	随
	9090	3F70	瑞	髄	崇	嵩	数	枢	趨	雛	据	杉	椙	菅	頗	雀	裾	
	909E	4020		澄	摺	寸												

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
セ	909E	4020					世	瀬	畝	是	凄	制	勢	姓	征	性	成	政
	90AE	4030	整	星	晴	棲	栖	正	清	牲	生	盛	精	聖	声	製	西	誠
	90BE	4040	誓	請	逝	醒	青	静	斉	税	脆	隻	席	惜	戚	斥	昔	析
	90CE	4050	石	積	籍	績	脊	責	赤	跡	蹟	碩	切	拙	接	摂	折	設
	90DE	4060	窃	節	説	雪	絶	舌	蝉	仙	先	千	占	宣	専	尖	川	戦
	90EE	4070	扇	撰	栓	栴	泉	浅	洗	染	潜	煎	煽	旋	穿	箭	線	
	913F	4120		繊	羨	腺	舛	船	薦	詮	賤	践	選	遷	銭	銑	閃	鮮
	914F	4130	前	善	漸	然	全	禅	繕	膳	糎							
ソ	914F	4130										噌	塑	岨	措	曾	曽	楚
	915F	4140	狙	疏	疎	礎	祖	租	粗	素	組	蘇	訴	阻	遡	鼠	僧	創
	916F	4150	双	叢	倉	喪	壮	奏	爽	宋	層	匝	惣	想	捜	掃	挿	掻
	9180	4160	操	早	曹	巣	槍	槽	漕	燥	争	痩	相	窓	糟	総	綜	聡
	9190	4170	草	荘	葬	蒼	藻	装	走	送	遭	鎗	霜	騒	像	増	憎	
	919E	4220		臓	蔵	贈	造	促	側	則	即	息	捉	束	測	足	速	俗
	91AE	4230	属	賊	族	続	卒	袖	其	揃	存	孫	尊	損	村	遜		
タ	91AE	4230															他	多
	91BE	4240	太	汰	詑	唾	堕	妥	惰	打	柁	舵	楕	陀	駄	騨	体	堆
	91CE	4250	対	耐	岱	帯	待	怠	態	戴	替	泰	滞	胎	腿	苔	袋	貸
	91DE	4260	退	逮	隊	黛	鯛	代	台	大	第	醍	題	鷹	滝	瀧	卓	啄
	91EE	4270	宅	托	択	拓	沢	濯	琢	託	鐸	濁	諾	茸	凧	蛸	只	
	923F	4320		叩	但	達	辰	奪	脱	巽	竪	辿	棚	谷	狸	鱈	樽	誰
	924F	4330	丹	単	嘆	坦	担	探	旦	歎	淡	湛	炭	短	端	箪	綻	耽
	925F	4340	胆	蛋	誕	鍛	団	壇	弾	断	暖	檀	段	男	談			
チ	925F	4340														値	知	地
	926F	4350	弛	恥	智	池	痴	稚	置	致	蜘	遅	馳	築	畜	竹	筑	蓄
	9280	4360	逐	秩	窒	茶	嫡	着	中	仲	宙	忠	抽	昼	柱	注	虫	衷
	9290	4370	註	酎	鋳	駐	樗	瀦	猪	苧	著	貯	丁	兆	凋	喋	寵	
	929E	4420		帖	帳	庁	弔	張	彫	徴	懲	挑	暢	朝	潮	牒	町	眺
	92AE	4430	聴	脹	腸	蝶	調	諜	超	跳	銚	長	頂	鳥	勅	捗	直	朕
	92BE	4440	沈	珍	賃	鎮	陳											
ツ	92BE	4440						津	墜	椎	槌	追	鎚	痛	通	塚	栂	掴
	92CE	4450	槻	佃	漬	柘	辻	蔦	綴	鍔	椿	潰	坪	壺	嬬	紬	爪	吊
	92DE	4460	釣	鶴														
テ	92DE	4460			亭	低	停	偵	剃	貞	呈	堤	定	帝	底	庭	廷	弟
	92EE	4470	悌	抵	挺	提	梯	汀	碇	禎	程	締	艇	訂	諦	蹄	逓	
	933F	4520		邸	鄭	釘	鼎	泥	摘	擢	敵	滴	的	笛	適	鏑	溺	哲
	934F	4530	徹	撤	轍	迭	鉄	典	填	天	展	店	添	纏	甜	貼	転	顛
	935F	4540	点	伝	殿	澱	田	電										

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ト	935F	4540							兎	吐	堵	塗	妬	屠	徒	斗	杜	渡
	936F	4550	登	菟	賭	途	都	鍍	砥	砺	努	度	土	奴	怒	倒	党	冬
	9380	4560	凍	刀	唐	塔	塘	套	宕	島	嶋	悼	投	搭	東	桃	梼	棟
	9390	4570	盗	淘	湯	涛	灯	燈	当	痘	祷	等	答	筒	糖	統	到	
	939E	4620		董	蕩	藤	討	謄	豆	踏	逃	透	鐙	陶	頭	騰	闘	働
	93AE	4630	動	同	堂	導	憧	撞	洞	瞳	童	胴	萄	道	銅	峠	鴇	匿
	93BE	4640	得	徳	涜	特	督	禿	篤	毒	独	読	栃	橡	凸	突	椴	届
	93CE	4650	鳶	苫	寅	酉	瀞	噸	屯	惇	敦	沌	豚	遁	頓	呑	曇	鈍
ナ	93DE	4660	奈	那	内	乍	凪	薙	謎	灘	捺	鍋	楢	馴	縄	畷	南	楠
	93EE	4670	軟	難	汝													
ニ	93EE	4670				二	尼	弐	迩	匂	賑	肉	虹	廿	日	乳	入	
	943F	4720		如	尿	韮	任	妊	忍	認								
ヌ	943F	4720									濡							
ネ	943F	4720										禰	祢	寧	葱	猫	熱	年
	944F	4730	念	捻	撚	燃	粘											
ノ	944F	4730						乃	廼	之	埜	嚢	悩	濃	納	能	脳	膿
	945F	4740	農	覗	蚤													
ハ	945F	4740				巴	把	播	覇	杷	波	派	琶	破	婆	罵	芭	馬
	946F	4750	俳	廃	拝	排	敗	杯	盃	牌	背	肺	輩	配	倍	培	媒	梅
	9480	4760	楳	煤	狽	買	売	賠	陪	這	蝿	秤	矧	萩	伯	剥	博	拍
	9490	4770	柏	泊	白	箔	粕	舶	薄	迫	曝	漠	爆	縛	莫	駁	麦	
	949E	4820		函	箱	硲	箸	肇	筈	櫨	幡	肌	畑	畠	八	鉢	溌	発
	94AE	4830	醗	髪	伐	罰	抜	筏	閥	鳩	噺	塙	蛤	隼	伴	判	半	反
	94BE	4840	叛	帆	搬	斑	板	氾	汎	版	犯	班	畔	繁	般	藩	販	範
	94CE	4850	釆	煩	頒	飯	挽	晩	番	盤	磐	蕃	蛮					
ヒ	94CE	4850												匪	卑	否	妃	庇
	94DE	4860	彼	悲	扉	批	披	斐	比	泌	疲	皮	碑	秘	緋	罷	肥	被
	94EE	4870	誹	費	避	非	飛	樋	簸	備	尾	微	枇	毘	琵	眉	美	
	953F	4920		鼻	柊	稗	匹	疋	髭	彦	膝	菱	肘	弼	必	畢	筆	逼
	954F	4930	桧	姫	媛	紐	百	謬	俵	彪	標	氷	漂	瓢	票	表	評	豹
	955F	4940	廟	描	病	秒	苗	錨	鋲	蒜	蛭	鰭	品	彬	斌	浜	瀕	貧
	956F	4950	賓	頻	敏	瓶												
フ	956F	4950					不	付	埠	夫	婦	富	冨	布	府	怖	扶	敷
	9580	4960	斧	普	浮	父	符	腐	膚	芙	譜	負	賦	赴	阜	附	侮	撫
	9590	4970	武	舞	葡	蕪	部	封	楓	風	葺	蕗	伏	副	復	幅	服	
	959E	4A20		福	腹	複	覆	淵	弗	払	沸	仏	物	鮒	分	吻	噴	墳
	95AE	4A30	憤	扮	焚	奮	粉	糞	紛	雰	文	聞						
ヘ	95AE	4A30											丙	併	兵	塀	幣	平
	95BE	4A40	弊	柄	並	蔽	閉	陛	米	頁	僻	壁	癖	碧	別	瞥	蔑	箆
	95CE	4A50	偏	変	片	篇	編	辺	返	遍	便	勉	娩	弁	鞭			

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ホ	95CE	4A50														保	舗	鋪
	95DE	4A60	圃	捕	歩	甫	補	輔	穂	募	墓	慕	戊	暮	母	簿	菩	倣
	95EE	4A70	俸	包	呆	報	奉	宝	峰	峯	崩	庖	抱	捧	放	方	朋	
	963F	4B20		法	泡	烹	砲	縫	胞	芳	萌	蓬	蜂	褒	訪	豊	邦	鋒
	964F	4B30	飽	鳳	鵬	乏	亡	傍	剖	坊	妨	帽	忘	忙	房	暴	望	某
	965F	4B40	棒	冒	紡	肪	膨	謀	貌	貿	鉾	防	吠	頬	北	僕	卜	墨
	966F	4B50	撲	朴	牧	睦	穆	釦	勃	没	殆	堀	幌	奔	本	翻	凡	盆
マ	9680	4B60	摩	磨	魔	麻	埋	妹	昧	枚	毎	哩	槙	幕	膜	枕	鮪	柾
	9690	4B70	鱒	桝	亦	俣	又	抹	末	沫	迄	侭	繭	麿	万	慢	満	
	969E	4C20		漫	蔓													
ミ	969E	4C20				味	未	魅	巳	箕	岬	密	蜜	湊	蓑	稔	脈	妙
	96AE	4C30	粍	民	眠													
ム	96AE	4C30				務	夢	無	牟	矛	霧	鵡	椋	婿	娘			
メ	96AE	4C30														冥	名	命
	96BE	4C40	明	盟	迷	銘	鳴	姪	牝	滅	免	棉	綿	緬	面	麺		
モ	96BE	4C40															摸	模
	96CE	4C50	茂	妄	孟	毛	猛	盲	網	耗	蒙	儲	木	黙	目	杢	勿	餅
	96DE	4C60	尤	戻	籾	貰	問	悶	紋	門	匁							
ヤ	96DE	4C60										也	冶	夜	爺	耶	野	弥
	96EE	4C70	矢	厄	役	約	薬	訳	躍	靖	柳	薮	鑓					
ユ	96EE	4C70												愉	愈	油	癒	
	973F	4D20		諭	輸	唯	佑	優	勇	友	宥	幽	悠	憂	揖	有	柚	湧
	974F	4D30	涌	猶	猷	由	祐	裕	誘	遊	邑	郵	雄	融	夕			
ヨ	974F	4D30														予	余	与
	975F	4D40	誉	輿	預	傭	幼	妖	容	庸	揚	揺	擁	曜	楊	様	洋	溶
	976F	4D50	熔	用	窯	羊	耀	葉	蓉	要	謡	踊	遥	陽	養	慾	抑	欲
	9780	4D60	沃	浴	翌	翼	淀											
ラ	9780	4D60						羅	螺	裸	来	莱	頼	雷	洛	絡	落	酪
	9790	4D70	乱	卵	嵐	欄	濫	藍	蘭	覧								
リ	9790	4D70									利	吏	履	李	梨	理	璃	
	979E	4E20		痢	裏	裡	里	離	陸	律	率	立	葎	掠	略	劉	流	溜
	97AE	4E30	琉	留	硫	粒	隆	竜	龍	侶	慮	旅	虜	了	亮	僚	両	凌
	97BE	4E40	寮	料	梁	涼	猟	療	瞭	稜	糧	良	諒	遼	量	陵	領	力
	97CE	4E50	緑	倫	厘	林	淋	燐	琳	臨	輪	隣	鱗	麟				
ル	97CE	4E50													瑠	塁	涙	累
	97DE	4E60	類															
レ	97DE	4E60		令	伶	例	冷	励	嶺	怜	玲	礼	苓	鈴	隷	零	霊	麗
	97EE	4E70	齢	暦	歴	列	劣	烈	裂	廉	恋	憐	漣	煉	簾	練	聯	
	983F	4F20		蓮	連	錬												
ロ	983F	4F20					呂	魯	櫓	炉	賂	路	露	労	婁	廊	弄	朗
	984F	4F30	楼	榔	浪	漏	牢	狼	篭	老	聾	蝋	郎	六	麓	禄	肋	録
	985F	4F40	論															

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ワ	985F	4F40		倭	和	話	歪	賄	脇	惑	枠	鷲	亙	亘	鰐	詫	藁	蕨
	986F	4F50	椀	湾	碗	腕												
	9880	4F60																
	9890	4F70																

■ JIS level-2 kanji set

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
一	989E	5020		弌	丐	丕												
丨	989E	5020					个	丱										
丶	989E	5020							丶	丼								
丿	989E	5020									丿	乂	乖	乘				
乙	989E	5020													亂			
亅	989E	5020														亅	豫	亊
	98AE	5030	舒															
二	98AE	5030		弍	于	亞	亟											
亠	98AE	5030						亠	亢	京	亳	亶						
人	98AE	5030											从	仍	仄	仆	仂	仗
	98BE	5040	仞	仭	仟	价	伉	佚	估	佛	佝	佗	佇	佶	侈	侏	侘	佻
	98CE	5050	佩	佰	侑	佯	來	侖	儘	俔	俟	俎	俘	俛	俑	俚	俐	俤
	98DE	5060	俥	倚	倨	倔	倪	倥	倅	伜	俶	倡	倩	倬	俾	俯	們	倆
	98EE	5070	偃	假	會	偕	偐	偈	做	偖	偬	偸	傀	傚	傅	傴	傲	
	993F	5120		僉	僊	傳	僂	僖	僞	僥	僭	僭	僮	價	僵	儉	儁	儂
	994F	5130	儖	儕	儔	儚	儡	儺	儷	儼	儻							
儿	994F	5130										儿	兀	兒	兌	兔	兢	競
入	995F	5140	兩	兪														
八	995F	5140			兮	冀												
冂	995F	5140					冂	囘	册	冉	冏	冑	冓	冕				
冖	995F	5140													冖	冤	冠	冢
	996F	5150	冩	冪														
冫	996F	5150			冫	决	冱	冲	冰	况	冽	凅	凉	凛				
几	996F	5150													几	處	凩	凭
	9980	5160	凰															
凵	9980	5160		凵	凾													
刀	9980	5160				刄	刋	刔	刎	刧	刪	刮	刳	刹	剏	剄	剋	剌
	9990	5170	剞	剔	剪	剴	剩	剳	剿	剽	劍	劔	劒	剱	劈	劑	辨	
	999E	5220		辨														
力	999E	5220			劬	劭	劼	劵	勁	勍	勗	勞	勣	勦	飭	勠	勳	勵
	99AE	5230	勸															
勹	99AE	5230		勹	匆	匈	甸	匍	匐	匏								
匕	99AE	5230									匕							
匚	99AE	5230										匚	匣	匯	匱	匳		
匸	99AE	5230															匸	區
十	99BE	5240	卆	卅	丗	卉	卍	凖										
卜	99BE	5240							卞									
卩	99BE	5240								卩	厄	夘	卻	卷				
厂	99BE	5240													厂	厖	厠	厦
	99CE	5250	厥	厮	厰													
厶	99CE	5250				厶	參	簒										
又	99CE	5250							雙	叟	曼	燮						

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	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
口	99CE	5250											叮	叨	叭	叺	吁	吽
	99DE	5260	呀	听	吭	吼	吮	吶	吩	吝	呎	咏	呵	咎	呟	呱	呻	咄
	99EE	5270	咒	呻	咀	呪	咄	咐	咆	哇	咢	咸	咥	咬	哄	哈	咨	
	9A3F	5320		咫	哂	咤	咾	咼	哘	哥	哦	唏	唔	哽	哮	哭	哺	哢
	9A4F	5330	唹	啀	啣	啌	售	啜	啅	啖	啗	唸	唳	啝	喙	喀	咯	喊
	9A5F	5340	喟	啻	啾	喘	喞	單	啼	喃	喻	喇	喨	嗚	嗅	嗟	嗄	嗜
	9A6F	5350	嗤	嗔	嘔	嗷	嘖	嗾	嗽	嘛	嗹	噎	噐	營	嘴	嘶	嘲	嘸
	9A80	5360	噫	噤	嘯	噬	噪	嚆	嚀	嚊	嚠	嚔	嚏	嚥	嚮	嚶	嚴	囂
	9A90	5370	嚼	囁	囃	囀	囈	囎	囑	囓								
口	9A90	5370									囗	囮	囹	圀	囿	圄	圉	
	9A9E	5420		圈	國	圍	圓	團	圖	嗇	圜							
土	9A9E	5420										圦	圷	圸	坎	圻	址	坏
	9AAE	5430	坩	埀	垈	坡	坿	埠	垓	垠	垳	垤	垪	垰	埃	埆	埔	垮
	9ABE	5440	埒	堊	埖	埣	堋	堙	堝	塲	堡	塢	塋	塗	毀	堺	堽	塹
	9ACE	5450	墅	墹	墟	墫	墺	壞	墻	墸	墮	壅	壓	壑	壗	壙	壘	壞
	9ADE	5460	壞	壤	壟													
士	9ADE	5460				壯	壺	壹	壻	壺	壽							
夕	9ADE	5460										夕						
夊	9ADE	5460											夊	夐				
夕	9ADE	5460													夛	梦	夥	
大	9ADE	5460																夬
	9AEE	5470	夭	夲	夸	夾	竒	奕	奐	奎	奚	奘	奢	奠	奧	奬	奩	
女	9B3F	5520		奸	妁	妝	佞	侫	妣	妲	姆	姨	姜	妍	姙	姚	娥	娟
	9B4F	5530	娑	娜	娉	娚	婀	婬	婉	娵	娶	婢	婪	媚	媼	媾	嫋	嫂
	9B5F	5540	媽	嫣	嫗	嫦	嫩	嫖	嫺	嫻	嬌	嬋	嬖	嬲	嫐	嬪	嬶	嬾
	9B6F	5550	孃	孅	孀													
子	9B6F	5550				孑	孕	孚	孛	孥	孩	孰	孳	孵	學	斈	孺	
宀	9B6F	5550																宀
	9B80	5560	它	宦	宸	寃	寇	寉	寔	寐	寤	實	寢	寞	寥	寫	寰	寶
	9B90	5570	寶															
寸	9B90	5570		尅	將	專	對											
小	9B90	5570						尕	尠									
尢	9B90	5570								尢	尨							
尸	9B90	5570										尸	尹	屁	屆	屎	屓	
	9B9E	5620		屐	屏	孱	屬											
屮	9B9E	5620						屮										
山	9B9E	5620							屹	屶	屹	岌	岑	岔	妛	岫	岻	岶
	9BAE	5630	岼	岷	峅	岾	峇	峙	峩	峽	峺	峭	嶌	峪	崋	崕	崗	嵜
	9BBE	5640	崟	崛	崑	崔	崢	崚	崙	崘	嵌	嵒	嵎	嵋	嵬	嵳	嶇	嶄
	9BCE	5650	嶄	嶂	嶢	嶝	嶬	嶮	嶽	嶐	嶷	嶼	嶲	巍	巔	巒	巖	
巛	9BCE	5650																巛
工	9BDE	5660	巫															
已	9BDE	5660		已	巵													

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
巾	9BDE	5660				帋	帚	帙	帑	帛	帶	帷	幄	幃	幀	幎	幗	幔
	9BEE	5670	幟	幢	幣	幇												
干	9BEE	5670					幵	并										
幺	9BEE	5670							幺	麼								
广	9BEE	5670									广	庠	廁	廂	廈	廐	廏	
	9C3F	5720		廖	廣	廝	廚	廛	廢	廡	廨	廩	廬	廱	廳	廳		
廴	9C3F	5720															廴	廸
廾	9C4F	5730	廾	弃	弉	彝	彜											
弋	9C4F	5730						弋	弑									
弓	9C4F	5730								弓	弩	弭	弸	彁	彈	彌	彎	弯
彑	9C5F	5740	彑	彖	彗	彙												
彡	9C5F	5740					彡	彭										
彳	9C5F	5740							彳	彷	徃	徂	彿	徊	很	徑	徇	從
	9C6F	5750	徙	徘	徠	徨	徭	徼										
心	9C6F	5750							忖	忻	忤	忸	忱	忝	悳	忿	怡	恠
	9C80	5760	怙	怐	怩	怎	怱	怛	怕	怫	怦	怏	怺	恚	恁	恪	恷	恟
	9C90	5770	恊	恆	恍	恣	恃	恤	恂	恬	恫	恙	悁	悍	惧	悃	悚	
	9C9E	5820		悄	悛	悖	悗	悒	悧	悋	惡	悸	惠	惓	悴	忰	悽	惆
	9CAE	5830	悵	惘	慍	愕	愆	惶	惷	愀	惴	惺	愃	愡	惻	惱	愍	愎
	9CBE	5840	慇	愾	愨	愧	慊	愿	愼	愬	愴	愽	慂	慄	慳	慷	慘	慙
	9CCE	5850	慚	慫	慴	慯	慥	慱	慟	慝	慓	慵	憙	憖	憇	憬	憔	憚
	9CDE	5860	憊	憑	憫	憮	懌	懊	應	懷	懈	懃	懆	憺	懋	罹	懷	懦
	9CEE	5870	懣	懶	懺	懴	懿	懽	懼	懾	戀							
戈	9CEE	5870										戈	戊	戍	戊	戔	戛	
	9D3F	5920		戞	戡	截	戮	戰	戲	戳								
戸	9D3F	5920									扁							
手	9D3F	5920										扎	扞	扣	扛	扠	扨	扼
	9D4F	5930	抂	抉	找	抒	抓	抖	拔	抃	抔	拗	甜	抻	拏	拿	拆	擔
	9D5F	5940	拈	拜	拌	拊	拂	拇	抛	拉	挌	拮	拱	挧	挂	挈	拯	拵
	9D6F	5950	捐	挾	捍	搜	捏	掖	掎	掀	掫	捶	掣	掏	掉	掟	掄	捫
	9D80	5960	捩	掾	揩	揀	揆	揣	揉	插	揶	揄	搖	搴	搆	搓	搦	搶
	9D90	5970	攝	搗	搨	搏	摧	摯	搶	摎	攪	撕	撓	撥	撩	撈	撼	
	9D9E	5A20		據	擒	擅	擇	撻	擘	擂	擱	擧	舉	擠	擡	抬	擣	擯
	9DAE	5A30	攬	擷	攘	攤	攝	攀	攀	攘	攜	攢	攤	攣	攫			
攴	9DAE	5A30														攴	攵	攷
	9DBE	5A40	收	攸	畋	效	敖	敕	敍	敘	敞	敝	敲	數	斂	斃	變	
斗	9DBE	5A40																斛
	9DCE	5A50	斟															
斤	9DCE	5A50		斫	斷													
方	9DCE	5A50				旃	旆	旁	旄	旌	旒	旛	旙					
无	9DCE	5A50												无	无			

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日	9DCE	5A50														旱	杲	昊
	9DDE	5A60	昃	旻	杳	昵	昶	昴	昜	晏	晄	晉	晁	晞	晝	晤	晧	晨
	9DEE	5A70	晟	晢	晰	暃	暈	暎	暉	暄	暘	暝	曁	暹	曉	暾	暼	
	9E3F	5B20		曄	暸	曖	曚	曠	昿	曦	曩							
曰	9E3F	5B20										曰	曳	曷				
月	9E3F	5B20													朏	朖	朞	朦
	9E4F	5B30	朧	霸														
木	9E4F	5B30			朮	朿	朶	杁	朸	朷	杆	杞	杠	杙	杣	杤	枉	杰
	9E5F	5B40	枩	杼	杪	枌	枋	枦	枡	枅	枷	柯	枴	柬	枳	柩	枸	柤
	9E6F	5B50	柞	柝	柢	柮	枹	柎	柆	柧	檜	栞	框	栩	桀	桍	栲	桎
	9E80	5B60	梳	栫	桙	档	桷	桿	梟	梏	梭	梔	條	梛	梃	檮	梹	桴
	9E90	5B70	梵	梠	梺	椏	梍	桾	椁	棊	椈	棘	椢	椦	棡	椩	棍	
	9E9E	5C20		楢	椋	椶	椒	椄	棗	棣	椥	棹	棠	棯	椨	椪	椚	椡
	9EAE	5C30	棟	椡	棆	楹	楷	楜	楸	楫	楔	楾	楮	椹	楴	椽	楙	椰
	9EBE	5C40	楡	楞	楝	榁	楪	榲	榮	槐	榿	槁	槓	榾	槎	寨	槊	槝
	9ECE	5C50	榻	槃	榧	樮	榑	榠	榜	榕	榴	槞	榨	樂	樛	槿	權	槹
	9EDE	5C60	槲	槧	樅	榱	樞	槭	樔	槫	樊	樒	櫁	樣	樓	橄	樌	橲
	9FEE	5C70	樶	橸	橇	橢	橙	橦	橈	樸	樢	檐	檍	檠	檄	檢	檣	
	9F3F	5D20		檗	蘗	檻	櫃	櫂	檸	檳	檬	櫞	櫑	櫟	檪	櫚	櫪	櫻
	9F4F	5D30	欅	蘖	櫺	欒	欖	鬱	欟									
欠	9F4F	5D30								欸	欷	盜	欹	飲	歇	歃	歉	歐
	9F5F	5D40	歙	歔	歛	歟	歡											
止	9F5F	5D40						歸										
歹	9F5F	5D40							歹	歿	殀	殄	殃	殍	殘	殕	殞	殤
	9F6F	5D50	殪	殫	殯	殲	殱											
殳	9F6F	5D50						殳	殷	殼	毆							
毋	9F6F	5D50										毋	毓					
毛	9F6F	5D50												毟	毬	毫	毳	毯
	9F80	5D60	麾	氈														
氏	9F80	5D60			氓													
气	9F80	5D60				气	氛	氤	氣									
水	9F80	5D60								汞	汕	汢	汪	沂	沍	沚	沁	沛
	9F90	5D70	汾	汨	汳	沒	沐	泄	泱	泓	沽	泗	泅	泝	沮	沱	沾	
	9F9E	5E20		沺	泛	泯	泙	泪	洟	衍	洶	洫	洽	洸	洙	洵	洳	洒
	9FAE	5E30	洌	浣	涓	浤	浚	浹	浙	涎	涕	濤	涅	淹	渕	渊	涵	淇
	9FBE	5E40	淦	涸	淆	淬	淞	淌	淨	淒	淅	淺	淙	淤	淥	淪	淮	渭
	9FCE	5E50	湮	渮	渙	湲	湟	渾	渣	湫	渫	湶	湍	渟	湃	渺	湎	渤
	9FDE	5E60	滿	渝	游	溂	溪	溘	滉	溷	滓	溽	溯	滄	溲	滔	滕	溏
	9FEE	5E70	溥	滂	溟	潁	漑	灌	滬	滸	滾	漿	滲	漱	滯	漲	滌	
	E03F	5F20		漾	漓	滷	澆	潺	潸	澁	澀	潯	潛	潛	潭	澂	潼	潘
	E04F	5F30	澎	澀	濂	潦	澳	澣	澡	澤	澹	濆	澪	濟	濕	濬	濔	濘
	E05F	5F40	濱	濮	濠	瀉	瀋	濺	瀑	瀁	瀏	濾	瀛	瀚	瀦	瀝	瀘	瀟
	E06F	5F50	瀰	瀾	瀲	灑	灣											

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火	E06F	5F50						炙	炒	炯	烱	炬	炸	炳	炮	烟	烋	烝
	E080	5F60	烙	焉	烽	焜	焙	煥	煕	熙	照	煢	煌	煖	煬	熏	燻	熄
	E090	5F70	熕	熨	熬	燗	熹	熾	燒	燉	燔	燎	燠	燬	燧	燵	燼	
	E09E	6020		燹	燿	爍	爐	爛	爨									
爪	E09E	6020								爭	爬	爰	爲					
爻	E09E	6020												爻	爼			
爿	E09E	6020														爿	牀	牆
片	E0AE	6030	牋	牘														
牛	E0AE	6030			牴	牾	犂	犁	犇	犒	犖	犢	犧					
犬	E0AE	6030												犹	犲	狃	狆	狄
	E0BE	6040	狎	狒	狢	狠	狡	狹	狷	倏	猗	猊	猜	猖	猝	猴	猯	猩
	E0CE	6050	猥	猾	獎	獏	默	獗	獪	獨	獰	獸	獵	獻	獺			
王	E0CE	6050														珈	玳	珎
	E0DE	6060	玻	珀	珥	珮	珞	璢	琅	瑯	琥	珸	琲	瑯	瑕	琿	瑟	瑙
	E0EE	6070	瑁	瑜	瑩	瑰	瑣	瑪	瑶	瑾	璋	璞	璧	瓊	瓏	瓔	珱	
瓜	E13F	6120		瓠	瓣													
瓦	E13F	6120				瓰	瓩	瓮	瓲	瓰	瓱	瓸	瓷	甄	甃	甅	甌	甎
	E14F	6130	甍	甕	甓													
甘	E14F	6130				甞												
生	E14F	6130					甦											
用	E14F	6130						甬										
田	E14F	6130							甲	甶	畋	畊	畉	畛	畝	畚	畩	畤
	E15F	6140	畧	畫	畭	畸	當	疆	疇	畴	疊	疊	疊					
疒	E15F	6140												疔	疚	疝	疥	疣
	E16F	6150	痂	疳	痃	疵	疽	疸	疼	疱	痍	痊	痒	痙	痣	痞	痾	痿
	E180	6160	痼	瘁	痰	痺	痲	痳	瘋	瘍	瘉	瘟	瘧	瘠	瘡	瘢	瘤	瘴
	E190	6170	瘻	瘻	癇	癈	癆	癜	癘	癡	癢	癨	癩	癪	癧	癬	癰	
	E19E	6220		癲														
癶	E19E	6220			癶	癸	發											
白	E19E	6220						皀	皃	皈	皋	皎	皖	皓	皙	皚		
皮	E19E	6220															皰	皺
	E1AE	6230	皸	皹	皺													
皿	E1AE	6230				盂	盍	盖	盒	盞	盡	盥	盧	盪	蘯			
目	E1AE	6230														盼	眈	眇
	E1BE	6240	眄	眩	眤	眞	眥	眦	眛	眷	眸	睇	睚	睨	睫	睛	睥	睿
	E1CE	6250	睾	睹	瞎	瞋	瞑	瞠	瞞	瞰	瞶	瞹	瞿	瞼	瞽	瞻	矇	矍
	E1DE	6260	矗	矚														
矛	E1DE	6260			矜													
矢	E1DE	6260				矣	矮											
石	E1DE	6260						矼	砌	砒	礦	砠	礪	硅	碎	硴	碆	硼
	E1EE	6270	碚	碌	碣	碵	碪	磯	磑	磆	磋	磔	碾	碼	磅	磊	磬	
	E23F	6320		磧	磚	磽	磴	礇	礒	礑	礙	礬	礫					
示	E23F	6320												祀	祠	祇	祟	祚
	E24F	6330	祕	祓	祺	祿	禊	禝	禧	齋	禪	禮	禳					

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禸	E24F	6330												禹	禺			
禾	E24F	6330														秉	秕	秧
	E25F	6340	秬	秡	秣	稈	稍	稘	稙	稠	稟	禀	稱	稻	稾	稷	穃	穗
	E26F	6350	穉	穡	穢	穩	龝	穰										
穴	E26F	6350							穹	窄	窈	窗	窕	窘	窖	窩	竈	窰
	E280	6360	窶	竅	竄	窿	邃	竇	竊									
立	E280	6360								竝	竏	竚	竵	站	竧	竝	竡	竢
	E290	6370	竦	竭	竰													
竹	E290	6370				笂	笏	笊	笆	笳	笘	笙	笞	笵	笨	笶	筐	
	E29E	6420		筐	笄	筍	笋	筌	笒	筵	筥	筴	筧	筰	筱	筬	筮	箝
	E2AE	6430	箘	箟	箍	箜	箚	箋	箒	箏	箏	箙	箧	篁	篌	篏	箴	篆
	E2BE	6440	篝	篩	簔	簑	篦	篥	籠	簀	簇	簓	篳	篷	簗	簍	篶	簀
	E2CE	6450	簧	簪	簟	簷	簫	簽	籌	籃	籔	籏	籀	籐	籘	籟	籤	籖
	E2DE	6460	籥	籬														
米	E2DE	6460			粁	粃	粐	粤	粭	粢	粫	粡	粨	粳	粲	粱	粮	粹
	E2EE	6470	粽	糀	糅	糂	糘	糒	糜	糢	鬻	糯	糲	糴	糶			
糸	E2EE	6470														糺	紆	
	E33F	6520		紂	紜	紕	紊	絅	紘	紮	紲	紿	紵	絆	絳	絖	絎	絲
	E34F	6530	絨	絮	絏	絣	經	綉	條	綏	絽	綛	綺	綮	綣	綵	緇	綽
	E35F	6540	綫	總	綢	綯	緜	綸	綟	綰	緘	緝	緤	緞	緻	緲	緡	縅
	E36F	6550	縊	縣	縡	縒	縱	縟	縉	縋	縢	繆	繦	縻	縵	縹	繃	縷
	E380	6560	縲	縺	繧	繝	繖	繞	繙	繚	繹	繪	繩	繼	繻	纜	缾	缶
	E390	6570	辮	纐	缬	纉	續	纏	纈	纓	纔	纖	纖	纛	纜			
缶	E390	6570														缸	缺	
	E39E	6620		罅	罌	罍	罎	罐										
网	E39E	6620							网	罕	罔	罘	罟	罠	罷	罩	罫	罰
	E3AE	6630	罷	罷	罹	羈	罸											
羊	E3AE	6630						羌	羔	羞	羝	羚	羣	羯	羲	羹	羮	羶
	E3BE	6640	羸	譱														
羽	E3BE	6640			翅	翠	翊	翕	翔	翡	翦	翩	翳	翹	飜			
老	E3BE	6640														耆	耄	耋
耒	E3CE	6650	耒	耘	耙	耜	耡	耨										
耳	E3CE	6650							耿	耻	聊	聆	聒	聘	聚	聖	聢	聯
	E3DE	6660	聳	聲	聰	聶	聾	聽										
聿	E3DE	6660							聿	肄	肆	肅						
肉	E3DE	6660											肛	肓	肚	肭	冐	肬
	E3EE	6670	胛	胥	胙	胝	胄	胚	胖	脉	胯	脛	脛	脩	脣	脯	腋	
	E43F	6720		隋	腆	脾	腓	腑	胼	腱	腮	腥	腦	腴	膃	膈	膊	膀
	E44F	6730	膂	膠	膕	膤	膣	腟	腸	膩	膰	膵	膾	膸	膽	臀	臂	膺
	E45F	6740	臉	臍	臑	臙	臘	膌	臚	臟	臺							
臣	E45F	6740										臧						
至	E45F	6740											臺	臻				
臼	E45F	6740													與	舁	舂	舅
	E46F	6750	與	舊														

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舌	E46F	6750			舎	舐	舗											
舟	E46F	6750						舩	舫	舸	舳	艀	艙	艘	艝	艚	艟	艤
	E480	6760	艢	艨	艪	艫	舮											
艮	E480	6760						艱										
色	E480	6760							艷									
艸	E480	6760								艸	艾	芍	芒	芫	芟	芻	芬	苡
	E490	6770	苣	苟	苒	苴	苳	苺	莓	范	苻	苹	苞	茆	苜	茉	苙	
	E49E	6820		茵	茴	茖	茲	茱	荀	茹	荐	荅	茯	茫	茗	茘	莅	莚
	E4AE	6830	莪	莟	莢	莖	茣	莎	莇	莊	荼	莵	荳	荵	莠	莉	莨	菴
	E4BE	6840	萓	菫	菎	菽	萃	菘	萋	菁	菷	萇	菠	菲	萍	蒚	蒲	桊
	E4CE	6850	萸	蔆	菻	葭	萪	萼	蕚	蒄	葷	葫	蒭	葮	蒂	葩	葆	萬
	E4DE	6860	葯	葹	萵	蓊	葢	蒹	蒿	蒟	蓙	蓍	蒻	蓚	蓐	蓁	蓆	蓖
	E4EE	6870	蒙	蔡	蓿	蓴	蔗	蔘	蔬	蔟	蔕	蔔	蓼	蕀	蕣	蕘	蕈	
	E53F	6920		蕁	蘂	蕋	蕕	薀	薤	薈	薑	蘰	蕘	蕭	薔	薛	藪	薇
	E54F	6930	薜	蕷	蕾	薐	藉	薺	藏	薹	藐	藕	藝	藥	藜	藹	蘊	蘓
	E55F	6940	蘋	蘋	蘭	蘆	蘢	蘚	蘰	蘿								
虍	E55F	6940									虍	乕	虔	號	虧			
虫	E55F	6940														虱	蚓	蚣
	E56F	6950	蚩	蚪	蚋	蚌	蚶	蚯	蛄	蛆	蚰	蛉	蠣	蚫	蛔	蛞	蛩	蛬
	E580	6960	蛟	蛛	蛯	蜒	蜆	蜈	蜀	蜃	蛻	蜑	蜉	蜍	蛹	蜊	蜴	蜿
	E590	6970	蜷	蜻	蜥	蜩	蜚	蝠	蝟	蝸	蝌	蝎	蝴	蝗	蝨	蝮	蝙	
	E59E	6A20		蝓	蝣	蝪	蠅	螢	螟	螂	螯	蟋	螽	蟀	蟐	雖	螫	蟄
	E5AE	6A30	螳	蟇	蟆	螻	蟯	蟲	蟠	蠏	蠍	蟾	蟶	蟷	蠎	蟒	蠑	蠖
	E5BE	6A40	蠕	蠢	蠡	蠱	蠶	蠹	蠧	蠻								
血	E5BE	6A40									衄	衂						
行	E5BE	6A40											衒	衙	衞	衢		
衣	E5BE	6A40															衫	袁
	E5CE	6A50	衾	袞	衵	衽	袵	衲	袂	袗	袒	袮	袙	袢	袍	袤	袰	袿
	E5DE	6A60	袱	裃	裄	裔	裘	裙	裝	裏	裝	裟	裳	裴	裲	裼	裨	裨
	E5EE	6A70	裨	裒	裕	補	裞	裟	裢	裟	裢	裟	裢	裟	裢	裟		
	E63F	6B20		襦	襤	襭	襪	襯	襴	襷								
襾	E63F	6B20									襾	覃	覈	覊				
見	E63F	6B20													覓	覘	覡	覩
	E64F	6B30	覦	覬	覯	覲	覺	覽	覿	觀								
角	E64F	6B30									觚	觜	觝	觧	觴	觸		
言	E64F	6B30															訃	訖
	E65F	6B40	訐	訌	訛	訝	訥	訶	詁	詛	詐	詆	訾	詠	詭	詬	詢	誅
	E66F	6B50	誅	誅	誨	誡	誑	誥	誦	誚	誣	諄	諍	諂	諚	諫	諳	諧
	E680	6B60	諤	諱	謔	諠	諢	諷	諞	諛	謌	謇	謚	諡	謖	謐	謗	謠
	E690	6B70	謳	鞫	謦	謫	謾	謨	譁	譌	譏	譎	證	譖	譖	譚	譫	
	E69E	6C20		譟	譬	譯	譴	譽	讀	讌	讎	讒	讓	讖	讙	讚		
谷	E69E	6C20															谺	豁
	E6AE	6C30	谿															
豆	E6AE	6C30		豈	豌	豎	豐											

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
豕	E6AE	6C30						豕	豢	豬								
豸	E6AE	6C30									豸	豺	貂	貉	貅	貊	貍	貌
	E6BE	6C40	貔	貘	貚													
貝	E6BE	6C40				貶	貭	貪	貽	貲	貳	貳	貶	賈	賁	賤	賣	賚
	E6CE	6C50	賽	賺	賻	贄	贅	贊	贇	贏	贈	贐	齎	贓	賍	贔	贖	
赤	E6CE	6C50																赧
	E6DE	6C60	赭															
走	E6DE	6C60		赱	赳	趁	趙											
足	E6DE	6C60						跂	趾	趺	跏	跚	跖	跌	跛	跋	跪	跫
	E6EE	6C70	跟	跣	跼	跡	跟	跬	跟	跼	踐	跏	蹂	踵	踰	踴	蹊	
	E73F	6D20		蹇	蹉	蹌	蹐	蹈	蹙	蹤	蹠	蹤	蹣	蹕	蹶	蹲	蹼	躁
	E74F	6D30	躇	躅	躄	躋	躊	躓	躑	躔	躙	躪	躡					
身	E74F	6D30												躬	躰	體	躾	躾
	E75F	6D40	軀	軈														
車	E75F	6D40			軋	軛	軣	軼	軻	軫	軾	較	輅	輕	輒	輙	輓	輜
	E76F	6D50	輟	輛	輌	輦	輳	輻	輹	轅	轂	輾	轌	轉	轆	轎	轗	轜
	E780	6D60	轢	轣	轤													
辛	E780	6D60				辜	辟	辣	辭	辯								
辶	E780	6D60									辶	迚	迥	迢	迪	迯	邇	迴
	E790	6D70	逅	迹	迺	逑	逕	逡	逍	逞	逖	逋	逧	逶	逵	逹	迸	
	E79E	6E20		遏	遐	遑	遒	逎	遉	逾	遖	遘	遞	遨	遯	遶	隨	遲
	E7AE	6E30	邂	遽	邁	邀	邊	邉	邏									
邑	E7AE	6E30								邨	邯	邱	邵	郢	郤	扈	郛	鄂
	E7BE	6E40	鄒	鄙	鄲	鄰												
酉	E7BE	6E40					酊	酖	酘	酣	酥	酩	酳	酲	醋	醉	醂	醢
	E7CE	6E50	醫	醯	醪	醵	醴	醺	釀	釁								
釆	E7CE	6E50									釉	釋						
里	E7CE	6E50											釐					
金	E7CE	6E50												釖	釟	釜	釛	釼
	E7DE	6E60	釵	釶	鈞	釿	鈔	鈬	鈕	鈑	鉞	鉗	鉅	鉉	鉤	鉈	銕	鈿
	E7EE	6E70	鉋	鉐	銜	銖	銓	銛	鉚	鋏	銹	銷	鋩	錏	鋺	鍄	錮	
	E83F	6F20		錙	錢	錚	錣	錺	錵	錻	鍜	鍠	鍼	鍮	鍖	鎰	鎬	鎭
	E84F	6F30	鎔	鏹	鏗	鏨	鏥	鏘	鏝	鏐	鏝	鏐	鏈	鏤	鐚	鐔	鐓	鐃
	E85F	6F40	鐇	鐐	鐶	鐫	鐵	鐵	鐺	鑁	鑒	鑄	鑛	鑠	鑢	鑞	鑪	鈩
	E86F	6F50	鑰	鑵	鑷	鑽	鑚	鑼	鑾	钁	鑿							
門	E86F	6F50										門	閇	閊	閔	閖	閘	閙
	E880	6F60	閏	閏	閧	閭	閼	閻	閹	閾	闊	濶	闃	闍	闌	闕	闔	闖
	E890	6F70	關	闡	闥	闢												
阜	E890	6F70					阡	阨	阮	阯	陂	陌	陏	陋	陷	陜	陞	
	E89E	7020		陝	陟	陦	陲	陬	隍	隘	隕	隗	險	隧	隱	隲	隰	隴
隶	E8AE	7030	隶	隸														
隹	E8AE	7030			隹	雎	雋	雉	雍	襍	雜	霍	雕					
雨	E8AE	7030												雹	霄	霆	霈	霓
	E8BE	7040	霎	霑	霏	霖	霙	霤	霪	霰	霹	霽	霾	靄	靆	靈	靂	靉

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
青	E8CE	7050	靜															
非	E8CE	7050		靠														
面	E8CE	7050			靤	靦	靨											
革	E8CE	7050						勒	靫	靱	靷	鞅	靼	鞁	靺	鞆	鞋	鞏
	E8DE	7060	鞐	鞜	鞨	鞦	鞣	鞩	鞴	韃	韆	韈						
韋	E8DE	7060											韋	韜				
韭	E8DE	7060													韭	音	韲	
音	E8DE	7060																竟
	E8EE	7070	韻	韵														
頁	E8EE	7070			頏	頌	頸	頤	頡	頷	頽	顆	顏	顋	顫	顯	顰	
	E93F	7120		顱	顴	顳												
風	E93F	7120					颪	颯	颱	颶	飄	飃	飆					
食	E93F	7120												飩	飫	餃	餉	餒
	E94F	7130	餔	餘	餡	餝	餞	餤	餠	餬	餮	餽	餾	饂	饉	饅	饐	饋
	E95F	7140	饑	饒	饌	饗												
首	E95F	7140					馗	馘										
香	E95F	7140							馥									
馬	E95F	7140								馭	馮	馼	駟	駛	駝	駘	駑	駭
	E96F	7150	駮	駱	駲	駻	駸	騁	騏	騅	駢	騙	騫	騷	驅	驂	驀	驃
	E980	7160	騾	驕	驍	驛	驗	驟	驢	驥	驤	驩	驫	驪				
骨	E980	7160													骭	骰	骼	髀
	E990	7170	髏	髑	髓	體												
高	E990	7170					髞											
髟	E990	7170						髟	髢	髣	髴	髯	髮	髯	髱	髱	髱	
	E99E	7220		髻	鬆	鬘	鬚	鬟	鬢	鬣								
鬥	E99E	7220									鬥	鬧	鬨	鬩	鬪	鬮		
鬯	E99E	7220															鬯	
鬲	E99E	7220																鬲
鬼	E9AE	7230	魄	魃	魏	魍	魎	魑	魘									
魚	E9AE	7230								魴	鮓	鮃	鮑	鮖	鮗	鮟	鮠	鮨
	E9BE	7240	鮴	鯀	鯊	鮹	鯆	鯏	鯑	鯒	鯣	鯢	鯤	鯔	鯡	鰺	鯲	鯱
	E9CE	7250	鯰	鰕	鰔	鰉	鰓	鰌	鰆	鰈	鰒	鰊	鰄	鰮	鰛	鰥	鰤	鰡
	E9DE	7260	鰰	鱇	鰳	鱗	鰾	鱈	鱉	鱔	鱖	鱸						
鳥	E9DE	7260											鳧	鳬	鳩	鳲	鴈	鴈
	E9EE	7270	鴃	鴆	鴪	鴦	鶯	鶴	鴟	鴈	鴕	鴒	鴛	鴿	鴾	鵆	鵈	
	EA3F	7320		鵝	鵞	鵤	鵑	鵐	鵙	鵲	鶉	鶇	鶫	鵯	鵺	鶚	鶤	鶩
	EA4F	7330	鶲	鷄	鷁	鶻	鶸	鶺	鷆	鷏	鷂	鷙	鷓	鷸	鷦	鷭	鷯	鷽
	EA5F	7340	鸚	鸛	鸞													
鹵	EA5F	7340				鹵	鹹	鹽										
鹿	EA5F	7340							麁	麈	麋	麌	麒	麕	麖	麝		
麥	EA5F	7340															麥	麩
	EA6F	7350	麸	麪	麭													
麻	EA6F	7350				靡												
黄	EA6F	7350					黌											

	Shift-JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
黎	EA6F	7350						黎	黏	黐								
黒	EA6F	7350									黔	黜	點	黝	黠	黙	黨	黯
	EA80	7360	黴	黶	黷													
黹	EA80	7360				黹	黻	黼										
黽	EA80	7360							黽	鼇	鼈							
皷	EA80	7360										皷	鼕					
鼠	EA80	7360												鼡	鼬			
鼻	EA80	7360														鼾		
齊	EA80	7360															齊	
齒	EA80	7360																齒
	EA90	7370	齔	齣	齟	齠	齡	齦	齧	齬	齪	齷	齲	齶				
龍	EA90	7370													龕			
龜	EA90	7370														龜		
龠	EA90	7370															龠	

4 Latin-1 Code Table

191 characters that are coded according to ISO/IEC 8859-1 can be entered.

ISO/IEC 8859-1																
	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x	Not used															
1x																
2x	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3x	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4x	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5x	P	Q	R	S	T	U	V	W	X	Y	Z	[	¥	]	^	_
6x	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7x	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
8x	Not used															
9x																
Ax	NBSP	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	SHY	®	¯
Bx	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
Cx	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
Dx	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
Ex	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
Fx	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

5 Index

The following index provides a list of terms used in this manual in alphabetical order.

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Revision History

Date of printing	Version	Revision contents
September 2009	Official release	MD-F3000 Series is added.
August 2010	First revision	MARKING BUILDER2 Ver. 5.1 compatible
November 2010	Second revision	
January 2011	Third revision	
July 2011	Second revision, first edition	MARKING BUILDER2 Ver.6.0 compatible
December 2011	Second revision, second edition	
September 2012	Third revision, first edition	MARKING BUILDER2 Ver.7.0 compatible
September 2014	Fourth revision, first edition	MD-X1000/1500 Series is added, MARKING BUILDER 3 compatible

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KEYENCE CORPORATION

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan PHONE: +81-6-6379-2211

www.keyence.com

AUSTRIA
Phone: +43 22 36-3782 66-0

BELGIUM
Phone: +32 1 528 1222

BRAZIL
Phone: +55-11-3045-4011

CANADA
Phone: +1-905-366-7655

CHINA
Phone: +86-21-68757500

CZECH REPUBLIC
Phone: +420 222 191 483

FRANCE
Phone: +33 1 56 37 78 00

GERMANY
Phone: +49 6102 36 89-0

HONG KONG
Phone: +852-3104-1010

HUNGARY
Phone: +36 1 802 73 60

INDIA
Phone: +91-44-4299-4192

INDONESIA
Phone: +62-21-2939-8766

ITALY
Phone: +39-02-6688220

KOREA
Phone: +82-31-789-4300

MALAYSIA
Phone: +60-3-2092-2211

MEXICO
Phone: +52-81-8220-7900

NETHERLANDS
Phone: +31 40 20 66 100

POLAND
Phone: +48 71 36861 60

ROMANIA
Phone: +40 269-232-808

SINGAPORE
Phone: +65-6392-1011

SLOVAKIA
Phone: +421 2 5939 6461

SLOVENIA
Phone: +386 1-4701-666

SWITZERLAND
Phone: +41 43-45577 30

TAIWAN
Phone: +886-2-2718-8700

THAILAND
Phone: +66-2-369-2777

UK & IRELAND
Phone: +44-1908-696900

USA
Phone: +1-201-930-0100

VIETNAM
Phone: +84-4-3760-6214

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