



Programmable Controller

MELSEC **Q** series

MELSEC-Q
QD75M Positioning Module
User's Manual (Details)

-QD75M1
-QD75M2
-QD75M4

● SAFETY INSTRUCTIONS ●

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable logic controller system, please read the CPU module User's Manual.


In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Instructions]

DANGER

- Provide a safety circuit outside the programmable logic controller so that the entire system will operate safely even when an external power supply error or PLC fault occurs.
Failure to observe this could lead to accidents for incorrect outputs or malfunctioning.
 - (1) Configure an emergency stop circuit and interlock circuit such as a positioning upper limit/lower limit to prevent mechanical damage outside the PLC.
 - (2) The machine OPR operation is controlled by the OPR direction and OPR speed data. Deceleration starts when the near-point dog turns ON. Thus, if the OPR direction is incorrectly set, deceleration will not start and the machine will continue to travel. Configure an interlock circuit to prevent mechanical damage outside the PLC.
 - (3) When the module detects an error, normally deceleration stop or sudden stop will take place according to the parameter stop group settings. Set the parameters to the positioning system specifications.
Make sure that the OPR parameter and positioning data are within the parameter setting values.

[Design Instructions]

CAUTION

- Do not bundle or adjacently lay the control wire or communication cable with the main circuit or power wire.
Separate these by 100mm (3.94in.) or more.
Failure to observe this could lead to malfunctioning caused by noise.

[Mounting Instructions]

CAUTION

- Use the PLC within the general specifications environment given in this manual.
Using the PLC outside the general specification range environment could lead to electric shocks, fires, malfunctioning, product damage or deterioration.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Then, securely mount the module with the fixing hole as a supporting point.
Incorrect loading of the module can cause a malfunction, failure or drop.
When using the module in the environment of much vibration, tighten the module with a screw.
Tighten the screws within the specified torque range.
Undertightening can cause a drop, short circuit or malfunction.
Overtightening can cause a drop, short circuit or malfunction due to damage to the screws or module.
- Completely turn off the externally supplied power used in the system before installing or removing the module. Not doing so may damage the product.
- Do not directly touch the module's conductive parts and electronic components of the module.
Touching the conductive parts and electronic components of the module could cause an operation failure or give damage to the module.
- Make sure that the connectors for the servo amplifier and peripheral devices have been securely installed until a click is heard.
Not doing so could lead to a poor connection, resulting in erroneous input and output.
- When the servo amplifier is not installed, install the connector cover without fail.
Failure to observe this could lead to a malfunction.

[Wiring Instructions]

DANGER

- Always confirm the terminal layout before connecting the wires to the module.

[Startup/Maintenance Instructions]

CAUTION

- Completely turn off the externally supplied power used in the system before clearing or tightening the screws.
Not doing so may cause electric shocks.
- Never disassemble or modify the module.
Failure to observe this could lead to trouble, malfunctioning, injuries or fires.
- Completely turn off the externally supplied power used in the system before installing or removing the module.
Not doing so may cause an operation failure or damage to the module.
- Before starting test operation, set the parameter speed limit value to the slowest value, and make sure that operation can be stopped immediately if a hazardous state occurs.
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
Failure to do so may cause a failure or malfunctions of the module.

[Precautions for use]

CAUTION

- Note that when the reference axis speed is designated for interpolation operation, the speed of the partner axis (2nd axis, 3rd axis and 4th axis) may be larger than the set speed (larger than the speed limit value).

[Disposal Instructions]

CAUTION

- When disposing of the product, handle it as industrial waste.

REVISIONS

* The manual number is given on the bottom left of the back cover.

| Print Date | * Manual Number | Revision |
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Japanese Manual Version IB-0300030

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INTRODUCTION

Thank you for purchasing the Mitsubishi general-purpose programmable logic controller MELSEC-Q Series. Always read through this manual, and fully comprehend the functions and performance of the Q Series PLC before starting use to ensure correct usage of this product.

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About Manuals

The following manuals are also related to this product.
In necessary, order them by quoting the details in the tables below.

Related Manuals

| Manual Name | Manual Number (Model Code) |
|---|-------------------------------|
| Type QD75M Positioning Module User's Manual (Hardware) Describes the performance, specifications, Input interface, component names, and startup procedure of the respective positioning modules: Type QD75M (The manual is supplied with the module.) | IB-0300031 (1XB750) |
| GX Configurator-QP Operating Manual Describes how to use GX Configurator-QP for the following and other purposes: creating data (parameters, positioning data, etc.), sending the data to the module, monitoring the positioning operations, and testing. (The manual is supplied with the software.) | SH-080172 (13JU19) |

Using This Manual

■ The symbols used in this manual are shown below.

- | | | |
|-------|-------|---|
| Pr. * | | Symbol indicating positioning parameter and OPR parameter item. |
| Da. * | | Symbol indicating positioning data, block start data and condition data item. |
| Md. * | | Symbol indicating monitor data item. |
| Cd. * | | Symbol indicating control data item. |

(A serial No. is inserted in the * mark.)

Conformation to the EMC Directive

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

To make this product conform to the EMC directive and low voltage instruction, please refer to section 4.3.1 "Precautions for wiring" of the chapter 4 "Installation, Wiring and Maintenance of the Product" and the EMC Installation Guidelines (IB(NA)67339).

■ Representation of numerical values used in this manual.

- Buffer memory addresses, error codes and warning codes are represented in decimal.
- X/Y devices are represented in hexadecimal.
- Setting data and monitor data are represented in decimal or hexadecimal. Data ended by "H" or "h" are represented in hexadecimal.
(Example) 10.....Decimal
10HHexadecimal

Generic Terms and Abbreviations

Unless specially noted, the following generic terms and abbreviations are used in this manual.

| Generic term/abbreviation | Details of generic term/abbreviation |
|-----------------------------------|---|
| PLC CPU | Generic term for PLC CPU on which QD75 can be mounted. |
| QD75 | Generic term for positioning module QD75M1, QD75M2 and QD75M4. The module type is described to indicate a specific module. |
| MR-H-BN | Servo amplifier: Abbreviation for MR-H-BN/MR-H□B. |
| MR-J2-Jr | Servo amplifier: Abbreviation for MR-J2-03B5. |
| MR-J2□-B | Servo amplifier: Abbreviation for MR-J2-□B/MR-J2S-□B/MR-J2-Jr/MR-J2M-B. |
| Peripheral device | Generic term for DOS/V personal computer that can run the following "GX Developer" and "GX Configurator-QP". |
| GX Developer | Abbreviation for GX Developer (SW4D5C-GPPW-E or later). |
| GX Configurator-QP | Abbreviation for GX Configurator-QP (SW2D5C-QD75P-E or later). |
| Servo amplifier (drive unit) | Abbreviation for SSCNET compatible servo amplifier (drive unit). |
| Manual pulse generator | Abbreviation for manual pulse generator (MR-HDP01) (prepared by user). |
| DOS/V personal computer | IBM PC/AT [®] and compatible DOS/V compliant personal computer. |
| Personal computer | Generic term for DOS/V personal computer. |
| Workpiece | Generic term for moving body such as workpiece and tool, and for various control targets. |
| Axis 1, axis 2, axis 3, axis 4 | Indicates each axis connected to QD75. |
| 1-axis, 2-axis, 3-axis, 4-axis | Indicates the number of axes. (Example: 2-axis = Indicates two axes such as axis 1 and axis 2, axis 2 and axis 3, and axis 3 and axis 1.) |
| OPR | Generic term for "Home position return". |
| OP | Generic term for "Home position". |
| SSCNET ^(Note) | High speed synchronous communication network between QD75 and servo amplifier. |

(Note): SSCNET: Servo System Controller NETwork

Component List

The table below shows the component included in respective positioning modules:

| Module name | Quantity | | |
|---------------------------|----------|--------|--------|
| | QD75M1 | QD75M2 | QD75M4 |
| QD75M1 positioning module | 1 | | |
| QD75M2 positioning module | | 1 | |
| QD75M4 positioning module | | | 1 |

Section 1 Product Specifications and Handling

Section 1 is configured for the following purposes (1) to (5).

- (1) To understand the outline of positioning control, and the QD75 specifications and functions
- (2) To carry out actual work such as installation and wiring
- (3) To set parameters and data required for positioning control
- (4) To create a PLC program required for positioning control
- (5) To understand the memory configuration and data transmission process

When diverting any of the program examples introduced in this manual to the actual system, fully verify that there are no problems in the controllability of the target system.

Read "Section 2" for details on each control.

| | | |
|-----------|---|---------------|
| Chapter 1 | Product outline | 1- 1 to 1- 28 |
| Chapter 2 | System configuration | 2- 1 to 2- 8 |
| Chapter 3 | Specifications and Functions | 3- 1 to 3- 22 |
| Chapter 4 | Installation, Wiring and Maintenance of the Product | 4- 1 to 4- 16 |
| Chapter 5 | Data Used for Positioning Control | 5- 1 to 5-162 |
| Chapter 6 | PLC Program Used for Positioning Control | 6- 1 to 6- 72 |
| Chapter 7 | Memory Configuration and Data Process | 7- 1 to 7- 20 |

Chapter 1 Product Outline

The purpose and outline of positioning control using QD75 are explained in this chapter. Reading this chapter will help you understand what can be done using the positioning system and which procedure to use for a specific purpose.

By understanding "What can be done", and "Which procedure to use" beforehand, the positioning system can be structured smoothly.

- 1.1 Positioning control 1- 2
 - 1.1.1 Features of QD75 1- 2
 - 1.1.2 Purpose and applications of positioning control 1- 5
 - 1.1.3 Mechanism of positioning control 1- 7
 - 1.1.4 Overview of positioning control functions 1- 8
 - 1.1.5 Outline design of positioning system 1- 18
 - 1.1.6 Communicating signals between QD75 and each module 1- 19
- 1.2 Flow of system operation 1- 22
 - 1.2.1 Flow of all processes 1- 22
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 - 1.2.4 Outline for restarting 1- 27

1.1 Positioning control

1.1.1 Features of QD75

The features of the QD75 are shown below.

(1) Availability of one, two, and four axis modules

- (a) One, two and four axis positioning modules are available.

They can be selected according to the PLC CPU type and the number of required control axes. (Refer to Section 2.2.)

- (b) For connecting any of the QD75 modules to the base unit, a single slot and 32 dedicated I/O channels are required.

Within the limit imposed by the maximum number of inputs and outputs supported by the PLC CPU, up to 64 modules can be used. (Refer to Section 2.3.)

(2) Wide variety of positioning control functions

- (a) A wide variety of positioning control functions essential to any positioning system are supported: positioning to an arbitrary position, fixed-feed control, equal-speed control, and so on. (Refer to Section 5.3 and 9.2.)

- 1) Up to 600 positioning data items, including such information as positioning addresses, control systems, and operation patterns, can be prepared for each axis.

Using the prepared positioning data, the positioning control is performed independently for each axis. (In addition, such controls as interpolation involving two to four axes and simultaneous startup of multiple axes are possible.)

- 2) Independent control of each axis can be achieved in linear control mode (executable simultaneously over four axes).

Such control can either be the independent positioning control using a single positioning data or the continuous positioning control enabled by the continuous processing of multiple positioning data.

- 3) Coordinated control over multiple axes can take the form of either the linear interpolation through the speed or position control of two to four axes or the circular interpolation involving two axes.

Such control can either be the independent positioning control using a single positioning data or the continuous positioning control enabled by the continuous processing of multiple positioning data.

- (b) For each positioning data, the user can specify any of the following control systems: position control, speed control, speed-position switching control, position-speed switching control, and so on. (Refer to Section 5.3 and 9.2.)

- (c) Continuous positioning control using multiple positioning data can be executed in accordance with the operation patterns the user assigned to the positioning data. (Refer to Section 5.3 and 9.1.2.)
Continuous positioning control can be executed over multiple blocks, where each block consists of multiple positioning data. (Refer to Section 10.3.2.)
 - (d) OPR control is given additional features (Refer to Section 8.2.)
Four different machine OPR methods are provided: the near point dog method, two count methods, and the data set method.
 - (e) Two acceleration/deceleration control methods are provided: automatic trapezoidal acceleration/deceleration and S-pattern acceleration/deceleration. (Refer to Section 12.7.7.)
- (3) Quick startup (Refer to Section 3.1.)
A positioning operation starts up quickly taking as little as 6 ms to 7.
When operation using simultaneous start function or interpolation operation is executed, the axes start without delay.
(Example) Axis 1 and Axis 3 are started by the simultaneous start function : No delay in Axis 1 and Axis 3 start
Axis 2 and Axis 4 are started by the interpolation operation : No delay in Axis 2 and Axis 4 start
- (4) SSCNET makes the connection to the servo amplifier possible
- (a) The QD75 can be directly connected to the servo amplifier using the MELSERVO (Mitsubishi's servo amplifier: MR-H-BN, MR-H-BN4, MR-J2-B, MR-J2S-B, MR-J2-Jr, MR-J2M-B) and SSCNET.
 - (b) Because the SSCNET cable is used to connect the QD75 and the servo amplifier, or servo amplifiers, saving wiring can be realized. The cable between the QD75 and servo amplifier or servo amplifiers can be extended up to 30m.
 - (c) The servo parameters can be set on the QD75 side to write or read them to/from the servo amplifier using the SSCNET.
 - (d) The actual current value and error description contained in the servo can be checked by the buffer memory of the QD75.
- (5) Easy application to the absolute position system
- (a) The absolute position-corresponding servo amplifier is connected to have an application to the absolute position system.
 - (b) Once the OP have been established, the OPR operation can also be made unnecessary when the power is supplied.
 - (c) With the absolute position system, the data set method OPR is used to establish the OP.
 - (d) When the setting unit is "degree", the absolute position system with unlimited length feed can be configured.

- (6) **Control can be realized with the mechanical system input**
The external inputs, such as external start, stop, and speed/position switching is used to perform the positioning control without using the PLC program.
- (7) **Easy maintenance**
Each QD75 positioning module incorporates the following improvements in maintainability:
 - (a) Data such as the positioning data and parameters can be stored on a flash ROM inside the QD75, eliminating the need of a battery for retaining data. (Refer to Section 7.1.1.)
 - (b) Error messages are classified in more detail to facilitate the initial troubleshooting procedure. (Refer to Section 15.1.)
 - (c) The module retains 16 error messages and 16 warning messages recently output, offering more complete error and warning histories. (Refer to Section 5.6.1.)
- (8) **Support of intelligent function module dedicated instructions**
Dedicated instructions such as the positioning start instruction, and teaching instruction are provided.
The use of such dedicated instruction simplifies PLC programs.(Refer to Chapter 14.)
- (9) **Setups, monitoring, and testing through GX Configurator-QP**
Using GX Configurator-QP, the user can control the QD75 parameters and positioning data without having to be conscious of the buffer memory addresses. Moreover, GX Configurator-QP has a test function which allows the user to check the wiring before creating a PLC program for positioning control, or test operation the QD75 using created parameters and positioning data for checking their integrity.
The control monitor function of GX Configurator-QP allows the user to debug programs efficiently.

1.1.2 Purpose and applications of positioning control

"Positioning" refers to moving a moving body, such as a workpiece or tool (hereinafter, generically called "workpiece") at a designated speed, and accurately stopping it at the target position. The main application examples are shown below.

■ Punch press (X, Y feed positioning)

- To punch insulation material or leather, etc., as the same shape at a high yield, positioning is carried out with the X axis and Y axis servos.
- After positioning the table with the X axis servo, the press head is positioned with the Y axis servo, and is then punched with the press.
- When the material type or shape changes, the press head die is changed, and the positioning pattern is changed.

■ Palletizer

- Using the servo for one axis, the palletizer is positioned at a high accuracy.
- The amount to lower the palletizer according to the material thickness is saved.

■ Compact machining center (ATC magazine positioning)

Rotation direction for calling 11, 12, 1, 2 or 3

Rotation direction for calling 17 to 20, 1 to 5

Rotation direction for calling 5, 6, 7, 8, 9 or 10

Rotation direction for calling 7 to 16

<No. of tools: 12> <No. of tools: 20>

- The ATC tool magazine for a compact machining center is positioned.
- The relation of the magazine's current value and target value is calculated, and positioning is carried out with forward run or reverse run to achieve the shortest access time.

■ Lifter (Storage of Braun tubes onto aging rack)

- During the aging process of Braun tubes, storage onto the rack is carried out by positioning with the AC servo.
- The up/down positioning of the lifter is carried out with the 1-axis servo, and the horizontal position of the aging rack is positioned with the 2-axis servo.

■ Index table (High-accuracy indexing of angle)

- The index table is positioned at a high accuracy using the 1-axis servo.

■ Inner surface grinder

(Fix the grinding stone, feed the workpiece, and grind.)

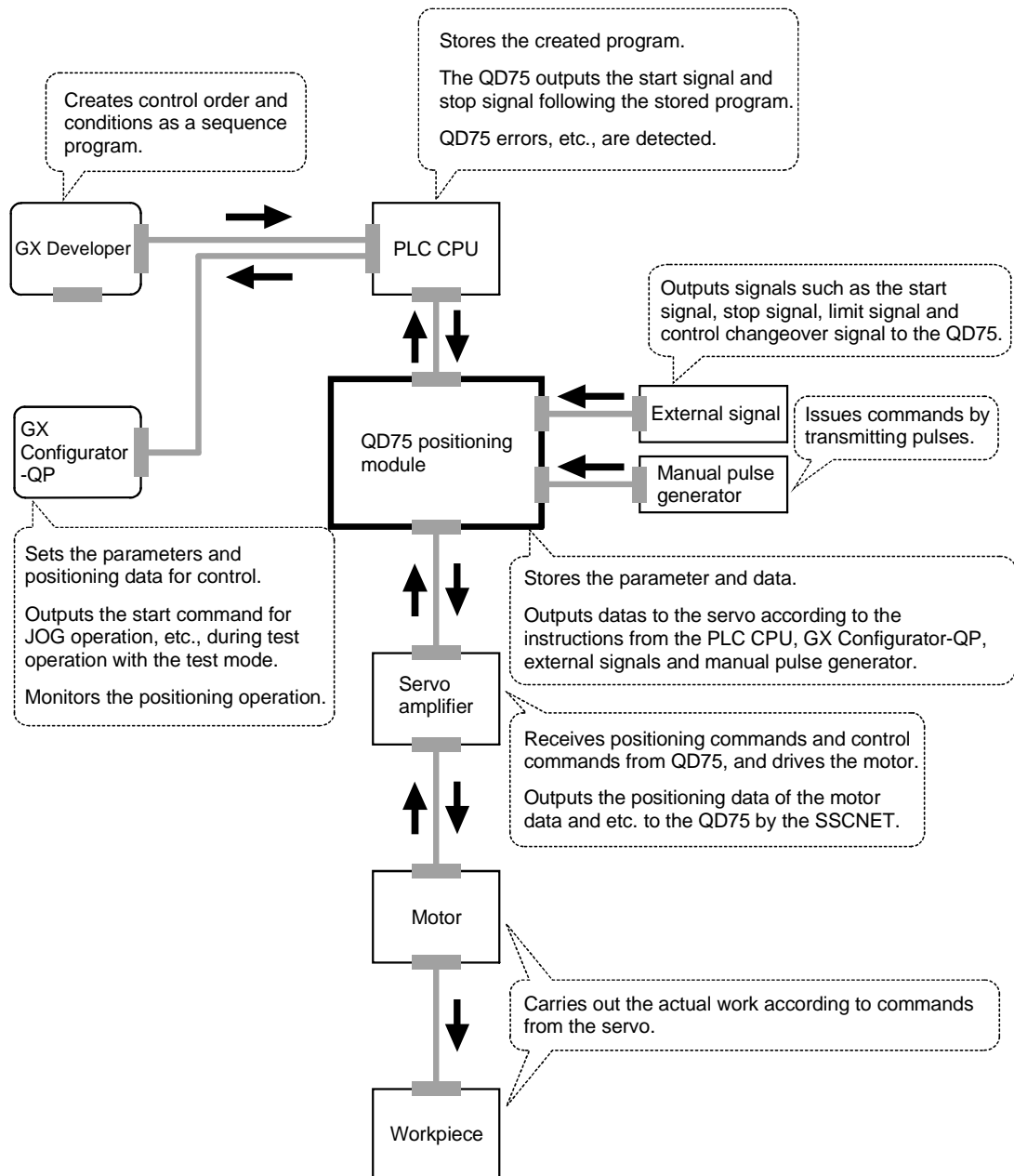
Operation panel

- a. Total feed amount (μm)
- b. Finishing feed amount (μm)
- c. Compensation amount (μm)
- d. Rough grinding speed ($\mu\text{m/s}$)
- e. Fine grinding speed ($\mu\text{m/s}$)

- The grinding of the workpiece's inner surface is controlled with the servo and inverter.
- The rotation of the workpiece is controlled with the 1-axis inverter, and the rotation of the grinding stone is controlled with the 2-axis inverter. The workpiece is fed and ground with the 3-axis servo.

1.1.3 Mechanism of positioning control

In the positioning system using the QD75, various software and devices are used for the following roles. The QD75 realizes complicated positioning control when it reads in various signals, parameters and data and is controlled with the PLC CPU.



(Note): For QD75M1, 2 and 4, use SW2D5C-QD75P or later of the GX Configurator.

1.1.4 Overview of positioning control functions

The outline of the "overview of positioning control" and "overview of individual positioning control and continuous positioning control", "overview of block positioning control" and "overview of acceleration/deceleration processing control" is shown below.

■ Positioning control

An overview of positioning using positioning data described below.

(1) Linear control

(a) 1-axis linear control

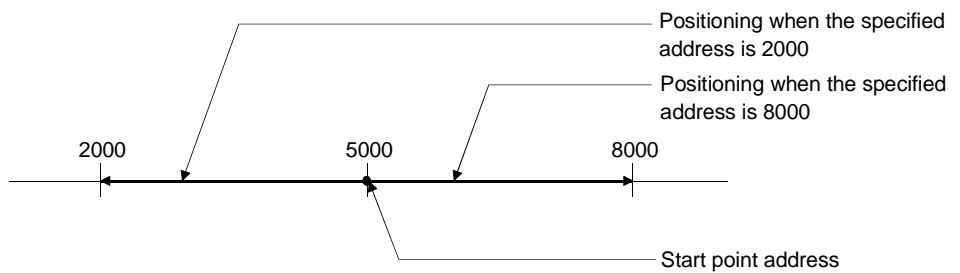
This performs positioning from the start point address (location the axis is presently stopped) defined on the specified axis to the specified position.

[Control using the absolute system]

- 1) This performs positioning from the start point address to the specified position.
- 2) The start point address and the specified address determine the movement direction.

[Example]

The following figure shows the operations when the start point address is 5000 and the positioning address are 2000 and 8000:

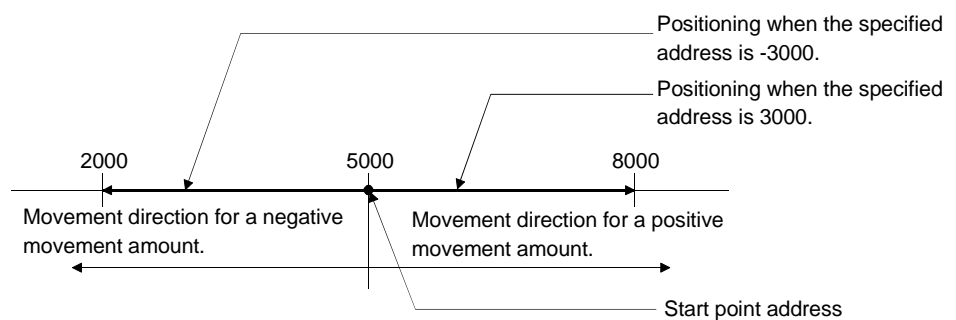


[Control using the increment system]

- 1) This performs positioning from the specified increment of travel from the start point address.
- 2) The sign of the travel increment determines the direction of travel.
 - For positive travel increment.....Positioning in the positive direction (direction of address increase)
 - For negative travel increment.....Positioning in the negative direction (direction of address decrease)

[Example]

The following figure shows the operations when the start point address is 5000 and the travel increments are 3000 and -3000:



(b) 2-axis linear interpolation control ^(Note)

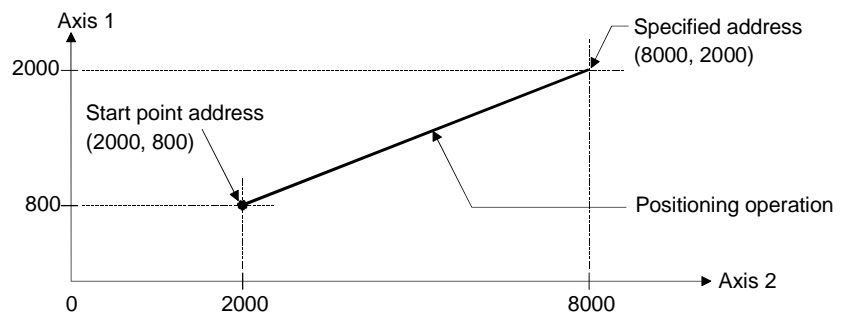
This controls interpolation along a linear locus from the start point address (current stop position) defined by two axes.

[Control using the absolute system]

- 1) This performs linear interpolation using two axes from the start point address to the endpoint address.
- 2) The start point address and the specified address determine the direction of travel.

[Example]

The operation when the start point address is 800 for axis 1 and 2000 for axis 2 and the positioning address specified to 2000 for axis 1 and 8000 for axis 2, is shown below.

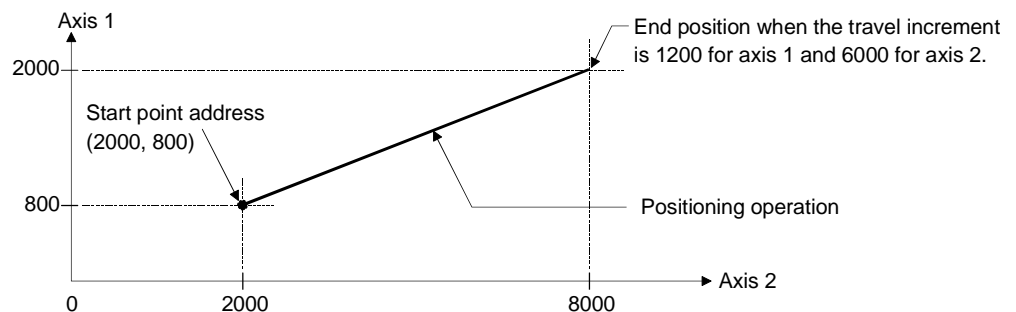


[Control using the increment system]

- 1) This performs positioning from the specified increment of travel from the start point address.
- 2) The sign of the travel increment determines the direction of travel.
 - For positive travel increment.....Positioning in the positive direction (direction of address increase)
 - For negative travel increment.....Positioning in the negative direction (direction of address decrease)

[Example]

The operation when the start point address is 800 for axis 1 and 2000 for axis 2 and the positioning address specified to 1200 for axis 1 and 6000 for axis 2, is shown below.



REMARK

(Note): The interpolation speed during linear interpolation control can be selected from "synthesized axis" and "reference-axis speed" using the detailed parameter 1. (Refer to the Section 5.2.3 information about setting "Pr.20 Interpolation speed designation method" of the detailed parameter 1.)

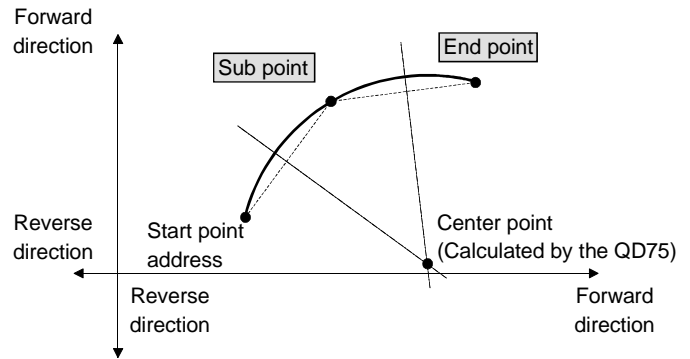
(2) Circular interpolation control ^(Note)

There are two types of circular interpolation controls: circular interpolation with a specified sub point and circular interpolation with the specified center point.

(a) Circular interpolation with a specified sub point

Circular interpolation is performed using the specified endpoint address and sub point (passing point) address.

Two methods are available: absolute system and increment system.

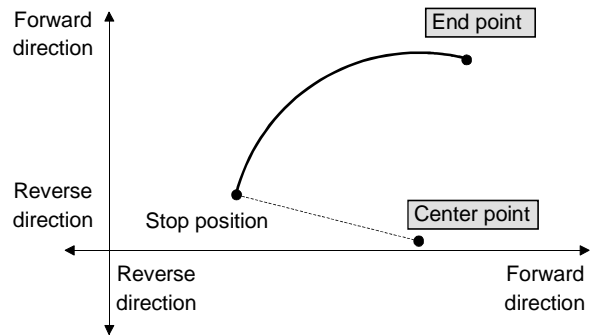


(b) Circular interpolation with the specified center point

Circular interpolation is performed using the specified endpoint address and center point address.

Two methods are available: absolute system and increment system.

Also, the direction of movement can be selected from clockwise or counterclockwise.

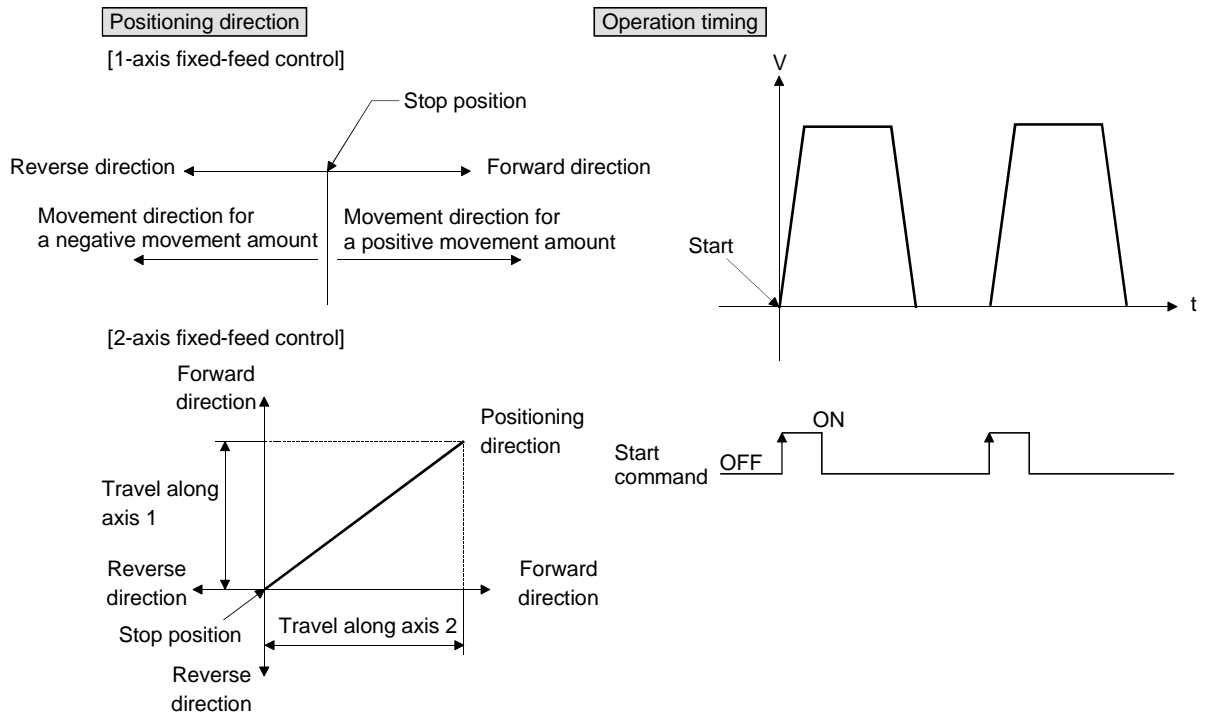


REMARK

(Note): The interpolation speed during circular interpolation control may only be set to "synthesized speed" for the interpolation speed of the detailed parameter 1. (Refer to the Section 5.2.3 information about setting "Pr.20 Interpolation speed designation method" of the detailed parameter 1.)

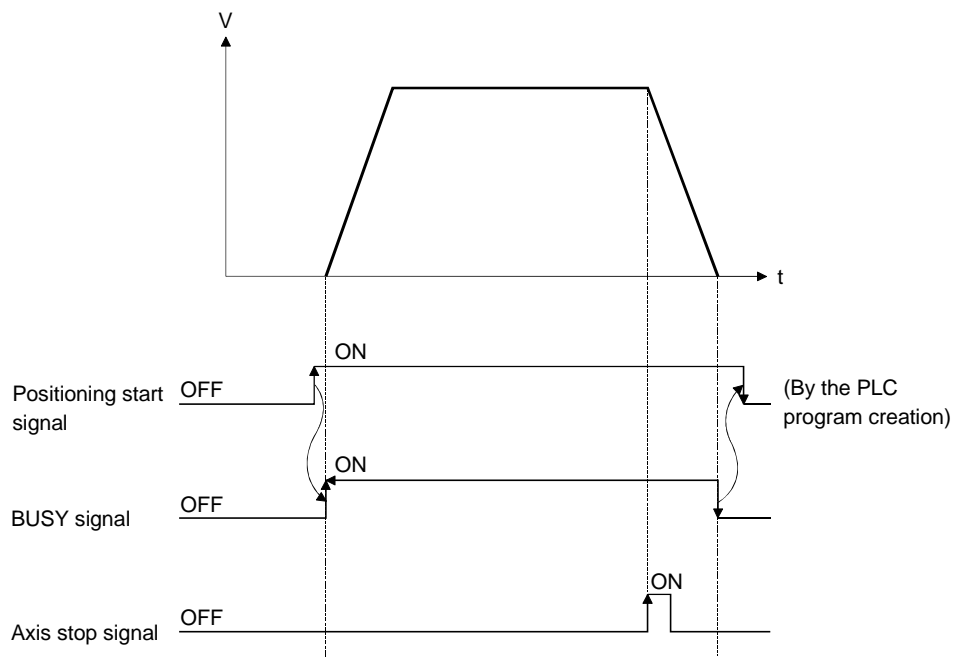
(3) Fixed-feed control

This performs positioning for the specified increment of travel. The fixed-feed control includes 1-axis control and 2-axis control through linear interpolation using the specified two axes.



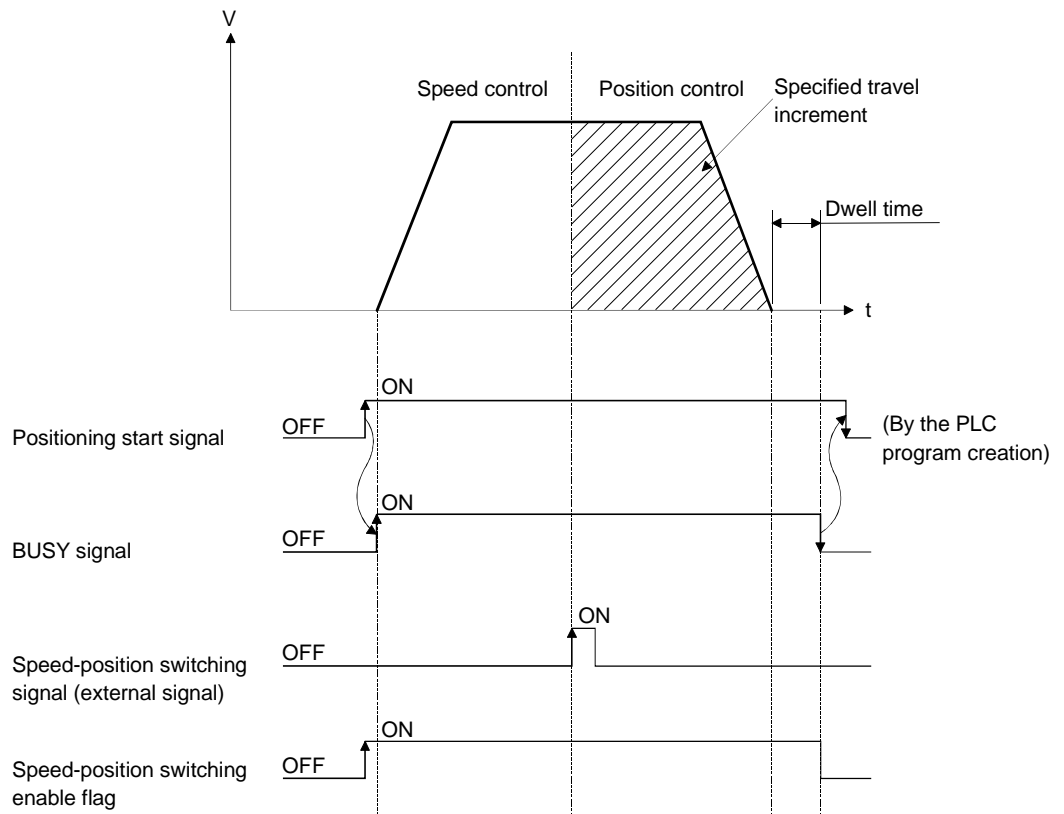
(4) Speed control

After command is executed, control continues with the command speed until the stop command is input.



(5) Speed-position switching control

This starts positioning under speed control, and switches to position control according to the input of the QD75 speed-position switching signal and perform positioning for the specified increment of travel.



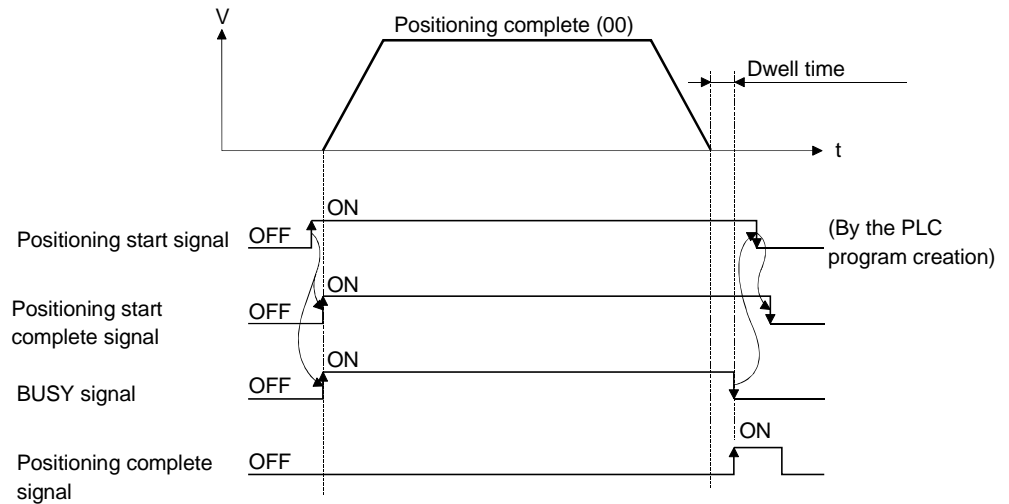
■ Individual positioning control and continuous positioning control

The QD75 performs positioning according to the user-set positioning data, which is a set of information comprised of the control method (position control, speed control, speed-position switching control), positioning address, operation pattern, and so on. Up to 600 of positioning data are assigned respectively to positioning data Nos. 1 to 600 per axis and registered to the QD75.

The operation pattern set in each positioning data by the user determines whether to perform positioning operation with one positioning data item or to perform continuous positioning operation with multiple positioning data items.

(1) Independent positioning control (operation pattern = 00: positioning complete)

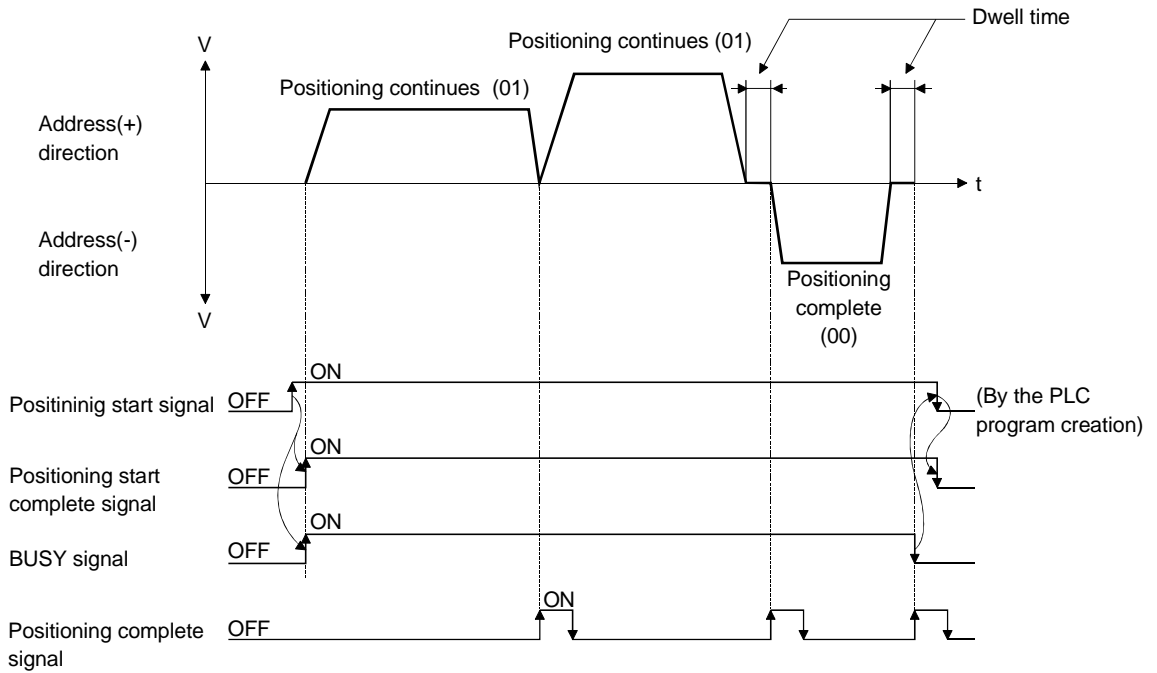
The operation completed upon completion of positioning for the specified positioning data. The positioning completion of this operation pattern is also used as the operation pattern for the last positioning data of continuous positioning and continuous-locus positioning.



(2) Continuous positioning control (operation pattern = 01: positioning continues)

The operation stops temporarily upon the completion of positioning for the specified positioning data, and then continues with the next positioning data number.

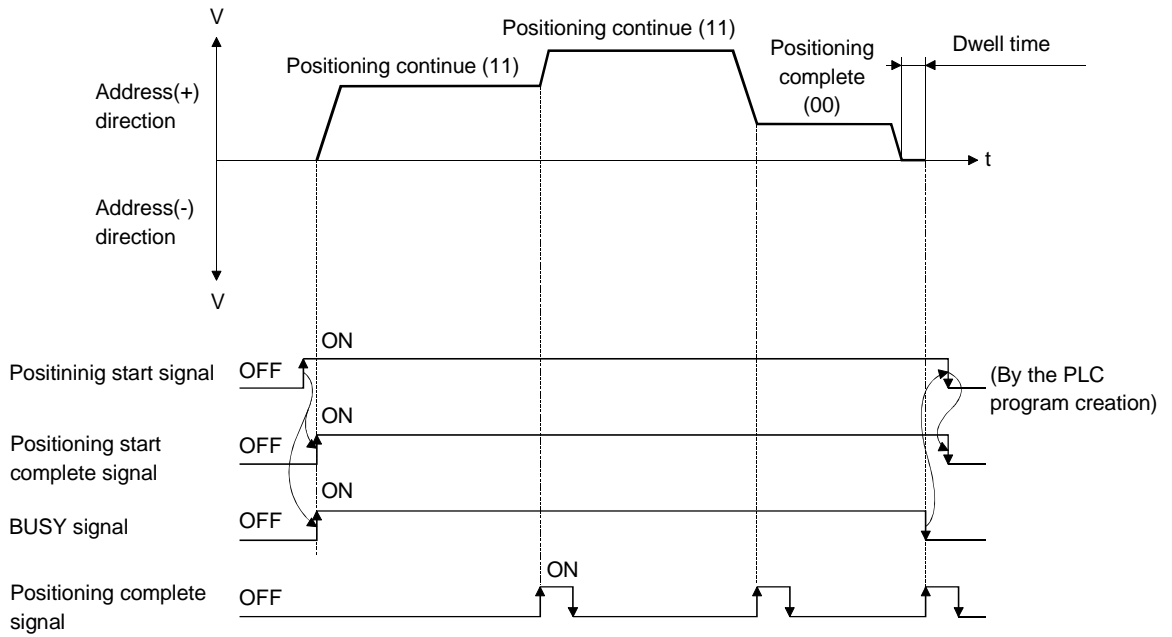
This is specified when performing positioning in which the direction changes because of multiple positioning data items having consecutive positioning data numbers.



(3) Continuous path control (operation pattern = 11: positioning continue)

After executing positioning using the specified positioning data, the operation changes its speed to that of the next positioning data number and continues positioning.

This is specified when continuously executing multiple positioning data items having consecutive positioning data numbers at a specified speed.

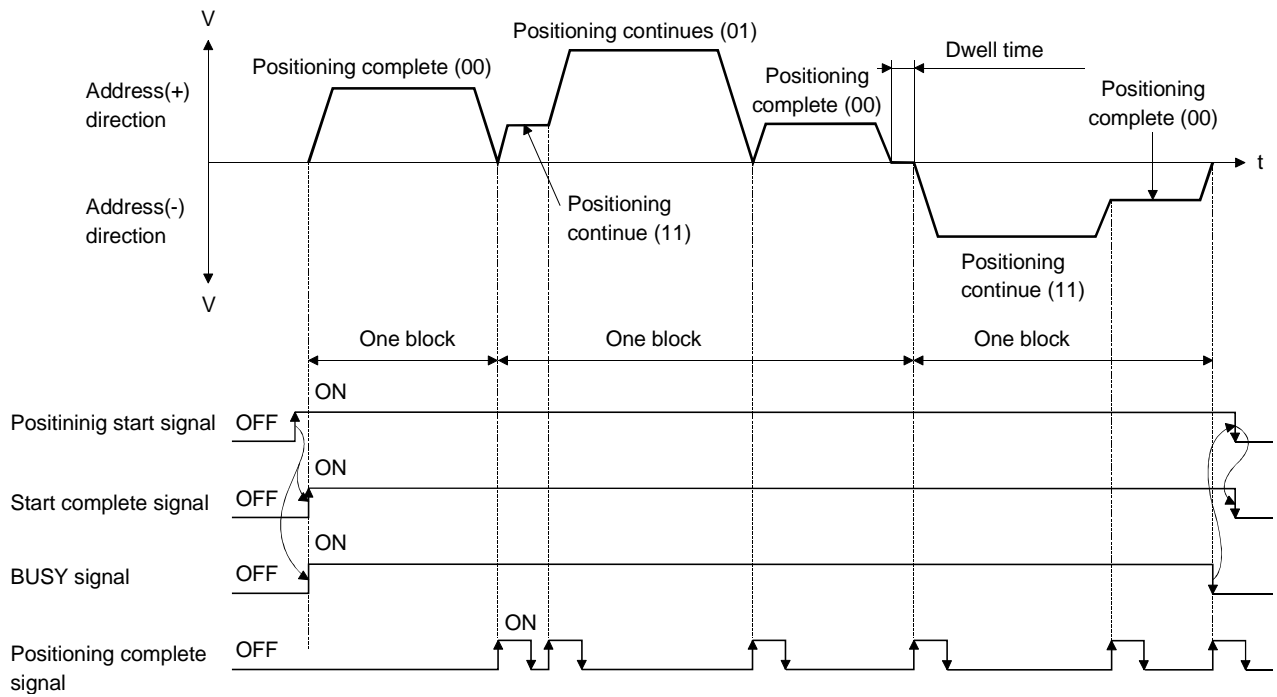


■ Block positioning control

Block positioning is a control that continuously executes the positioning of specified blocks. One block equivalent to a series of positioning data up to the completion of positioning (operation pattern = 00) by Independent or continuous positioning control. A maximum of 50 blocks per axis can be specified.

Using a one-time start command from the QCPU or external, complex positioning control can be performed.

The block positioning control can be performed by specifying the positioning start number and positioning start information in the buffer memory.



■ Overview of acceleration/deceleration processing control

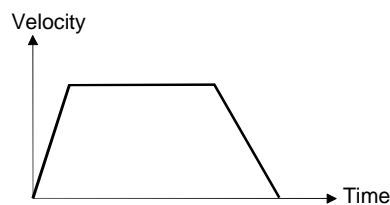
Acceleration/deceleration processing for the positioning processing, manual pulse-generator processing, OPR processing and JOG processing is performed using the user-specified method, acceleration time and deceleration time.

(1) Acceleration/deceleration method

There are two types of acceleration and deceleration processing: the automatic trapezoidal acceleration/deceleration processing method and S-pattern acceleration/deceleration processing method. A detailed parameter is used to set which method is used. The specified acceleration/deceleration method is applied to all accelerations and decelerations when starting and completing positioning processing, OPR processing and JOG processing, as well as when changing the speed.

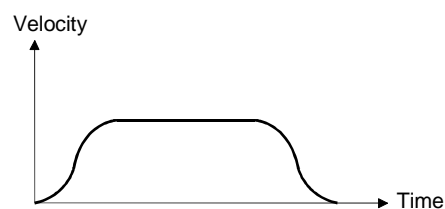
(a) Automatic trapezoidal acceleration/deceleration processing method

This is a method in which linear acceleration/deceleration is carried out based on the acceleration time, deceleration time, and speed limit value set by the user.



(b) S-pattern acceleration/deceleration processing method

This method reduces the load on the motor when starting and stopping. This is a method in which acceleration/deceleration is carried out gradually, based on the acceleration time, deceleration time, speed limit value, and "Pr.35 S-pattern proportion" (1 to 100%) set by the user.



(2) Acceleration time, deceleration time, sudden-stop deceleration time

(a) For types each of the acceleration time and deceleration time for positioning control can be set using basic parameters 2 and detailed parameters 2.

- Acceleration time.....The time elapses before the speed of 0 reaches the limit value.
- Deceleration time.....The time elapses before the speed at the limit value reaches 0.

(b) The sudden-stop deceleration time (1 to 8388608 ms) is set using the acceleration time/deceleration time setting size selection of detailed parameters 2.

1.1.5 Outline design of positioning system

The outline of the positioning system operation and design, using the QD75, is shown below.

(1) Positioning system using QD75

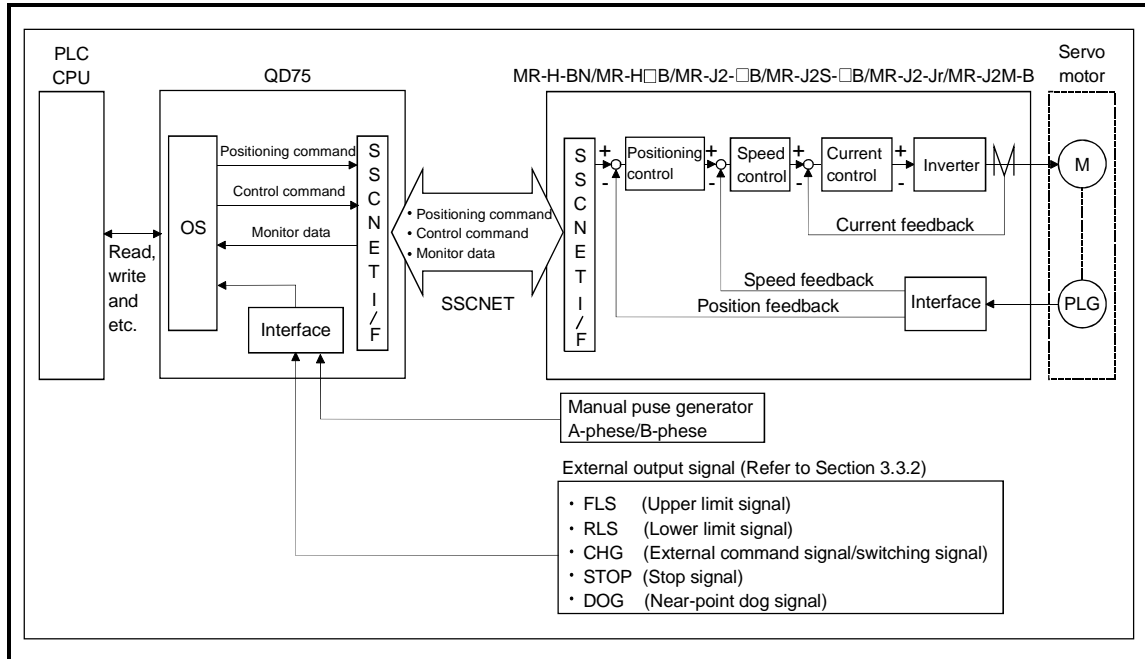
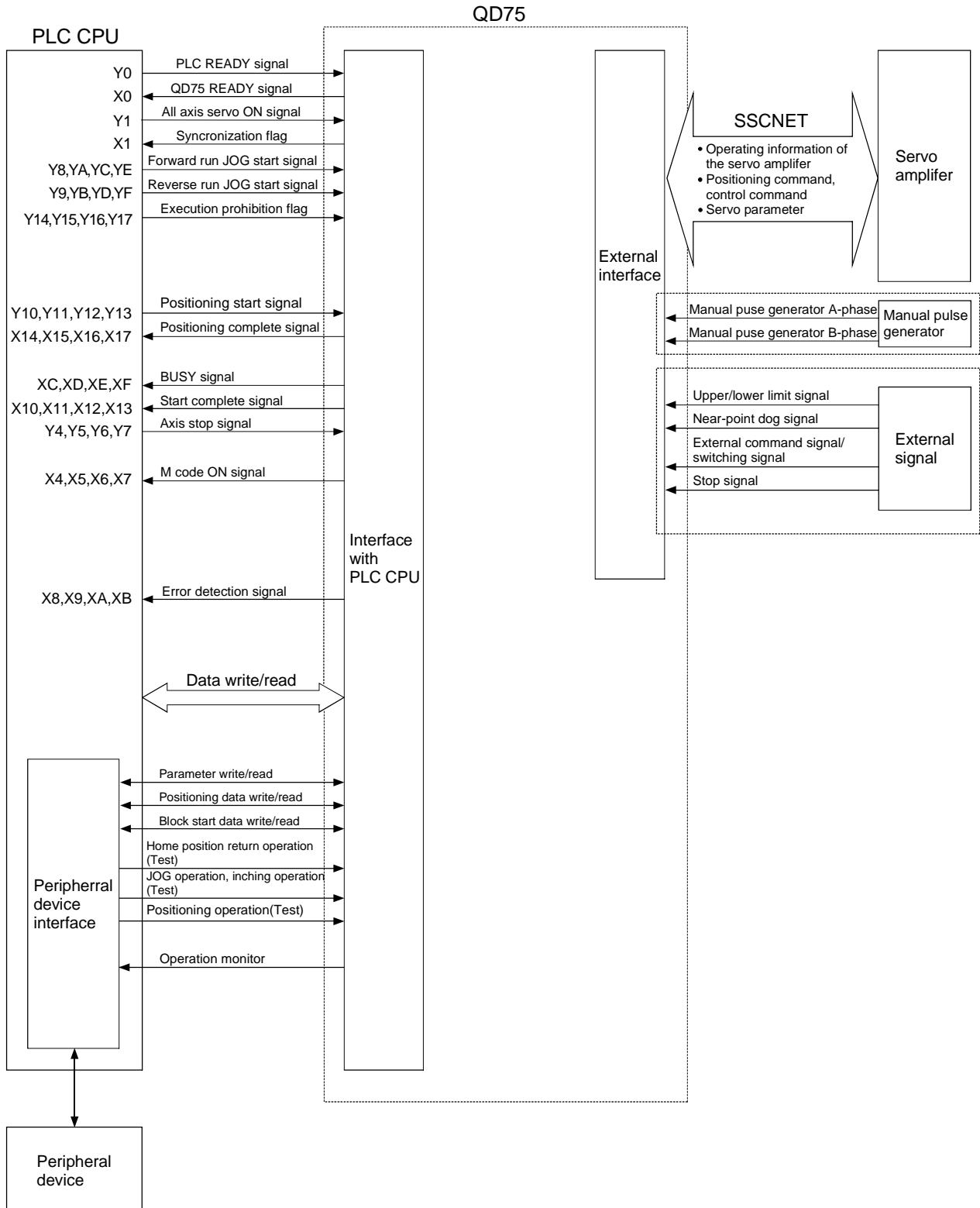


Fig. 1.2 Outline of the operation of positioning system using QD75

1.1.6 Communicating signals between QD75 and each module

The outline of the signal communication between the QD75 (positioning module) and PLC CPU, peripheral device and servo amplifier, etc., is shown below.
 (A peripheral device communicates with the QD75 via the PLC CPU to which it is connected)



■ QD75 ↔ PLC CPU

The QD75 and PLC CPU communicate the following data via the base unit.

| Direction Communication | QD75 → PLC CPU | PLC CPU → QD75 |
|----------------------------|---|---|
| Control signal * | Signal indicating QD75 state • QD75 READY signal • BUSY signal and etc. | Signal related to commands • PLC READY signal • Various start signals • Stop signals • All axis servo ON signal and etc. |
| Data (read/write) | • Parameter • Positioning data • Block start data • Control data • Monitor data | • Parameter • Positioning data • Block start data • Control data |

* Refer to Section 3.3 "Specifications of input/output signals with PLC CPU" for details.

■ QD75 ↔ Peripheral device

The QD75 and peripheral device communicate the following data via the PLC CPU:

| Direction Communication | QD75 → Peripheral device | Peripheral device → QD75 |
|----------------------------|-----------------------------------|---|
| Data (read/write) | • Parameter • Positioning data | • Parameter • Positioning data |
| Test operation | — | • OPR control start command • Positioning control start command • JOG/Inching operation start command • Teaching start command • Manual pulse generator operation enable/disable command |
| Operation monitor | • Monitor data | — |

■ QD75 ↔ Servo amplifier

The QD75 and servo amplifier communicate the following data via the SSCNET.

| Direction Communication | QD75 → Servo amplifier | Servo amplifier → QD75 |
|----------------------------|---|--|
| SSCNET | • Positioning commands • Control commands • Servo parameter | • Operating information of the servo amplifier • Servo parameter |

■ QD75 ↔ Manual pulse generator

The QD75 and manual pulse generator communicate the following data via the external device connection connector.

(The manual pulse generator should be connected to an external device connection connector for axis 1 or for axes 1 and 2.)

| Direction Communication | QD75 → Manual pulse generator | Manual pulse generator → QD75 |
|----------------------------|-------------------------------|--|
| Pulse signal | – | <ul style="list-style-type: none"> • Manual pulse generator A-phase • Manual pulse generator B-phase |

■ QD75 ↔ External signal

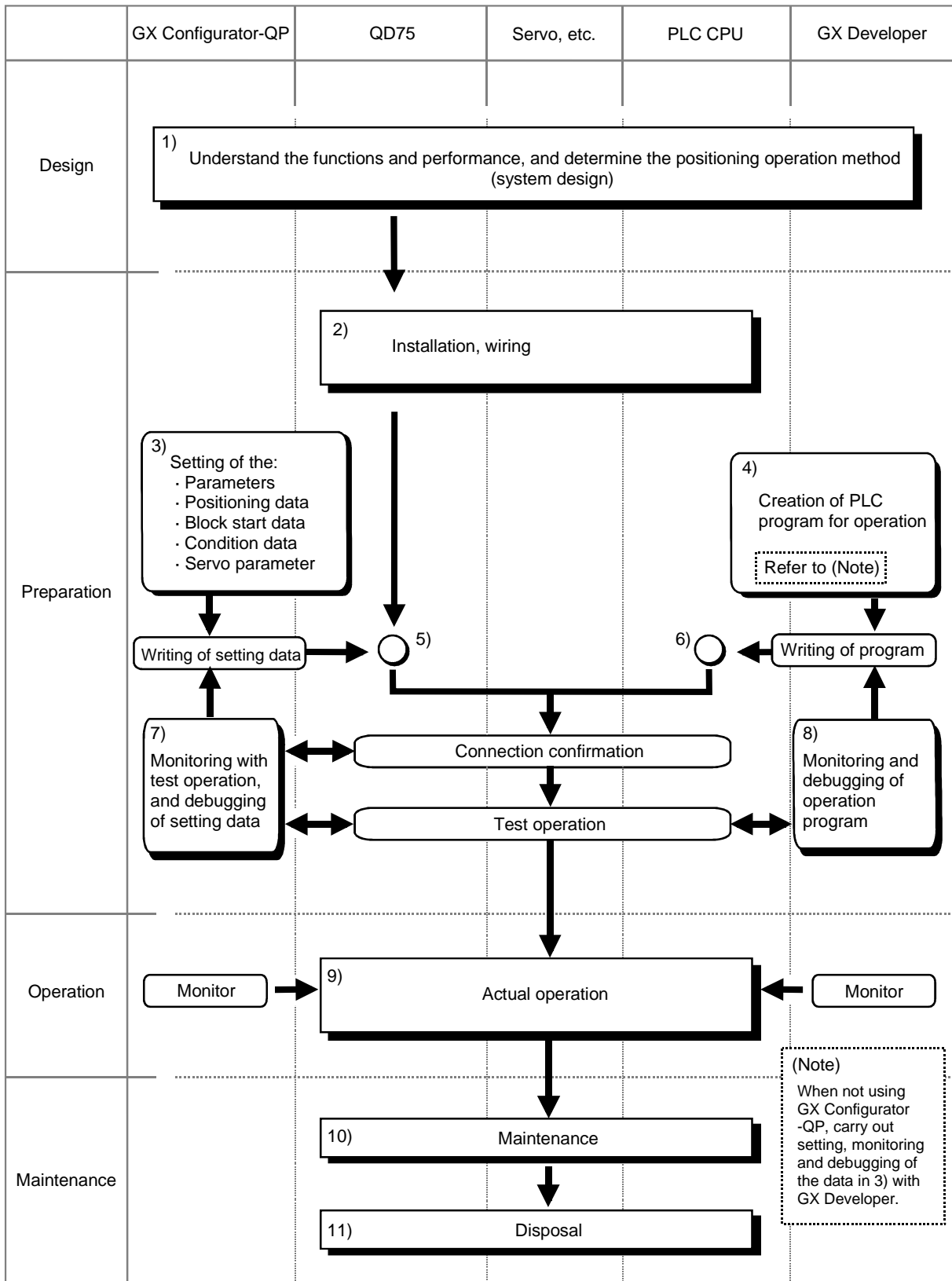
The QD75 and external signal communicate the following data via the external device connection connector.

| Direction Communication | QD75 → External signal | External signal → QD75 |
|----------------------------|------------------------|--|
| Control signal | – | <ul style="list-style-type: none"> • Upper/lower limit signal • External command signal/switching signal • Stop signal • Near-point dog signal |

1.2 Flow of system operation

1.2.1 Flow of all processes

The positioning control processes, using the QD75, are shown below.



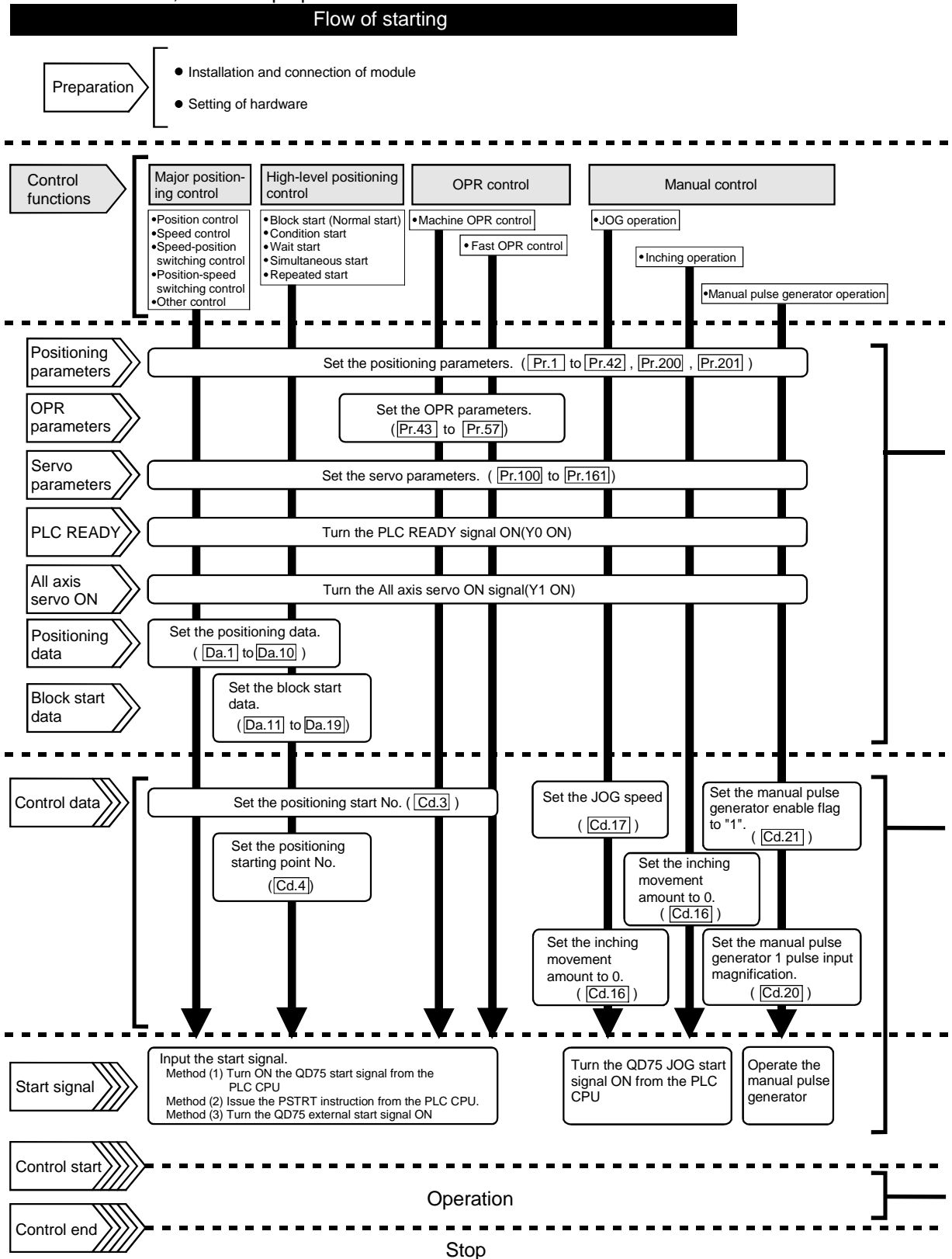
The following work is carried out with the processes shown on the previous page.

| | Details | Reference |
|-----|---|---|
| 1) | Understand the product functions and usage methods, the configuration devices and specifications required for positioning control, and design the system. | <ul style="list-style-type: none"> • Chapter 1 • Chapter 2 • Chapter 3 • Chapter 8 to Chapter 13 |
| 2) | Install the QD75 onto the base unit, wire the QD75 and external connection devices (drive unit, etc.). | <ul style="list-style-type: none"> • Chapter 4 |
| 3) | Using GX Configurator-QP, set the parameter, servo parameters, positioning data, block start data and condition data required for the positioning control to be executed. | <ul style="list-style-type: none"> • Chapter 5 • Chapter 8 to Chapter 13 • GX Configurator-QP Operating Manual |
| 4) | Using GX Developer, create the PLC program required for positioning operation. (When not using GX Configurator-QP, also create the PLC program for setting data.) | <ul style="list-style-type: none"> • Chapter 6 • GX Developer Operating Manual |
| 5) | Write the parameters and positioning data, etc., created with GX Configurator-QP into the QD75. | <ul style="list-style-type: none"> • Chapter 7 • GX Configurator-QP Operating Manual |
| 6) | Using GX Developer, write the created PLC program into the PLC CPU. (When not using GX Configurator-QP, also write in the PLC program for setting data.) | <ul style="list-style-type: none"> • Chapter 7 • GX Developer Operating Manual |
| 7) | Carry out test operation and adjustments in the test mode to check the connection with the QD75 and external connection device, and to confirm that the designated positioning operation is executed correctly. (Debug the set "parameters" and "positioning data", etc.) | <ul style="list-style-type: none"> • GX Configurator-QP Operating Manual • Chapter 13 • GX Developer Operating Manual |
| 8) | Carry out test operation and adjustment to confirm that the designated positioning operation is executed correctly. (Debug the created PLC program. When not using GX Configurator-QP, also debug the set data.) | <ul style="list-style-type: none"> • GX Developer Operating Manual |
| 9) | Actually operate the positioning operation. At this time, monitor the operation state as required. If an error or warning occurs, remedy. | <ul style="list-style-type: none"> • Chapter 5 • Chapter 15 • GX Configurator-QP Operating Manual • GX Developer Operating Manual |
| 10) | Service the QD75 as required. | <ul style="list-style-type: none"> • Chapter 4 |
| 11) | Dispose of the QD75. | <ul style="list-style-type: none"> • Chapter 4 |


1.2.2 Outline of starting

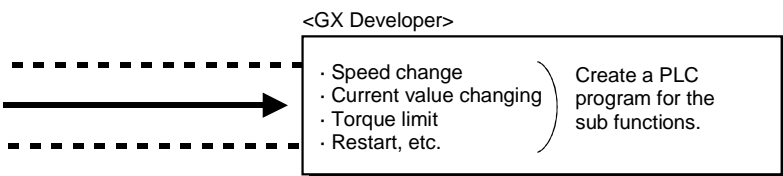
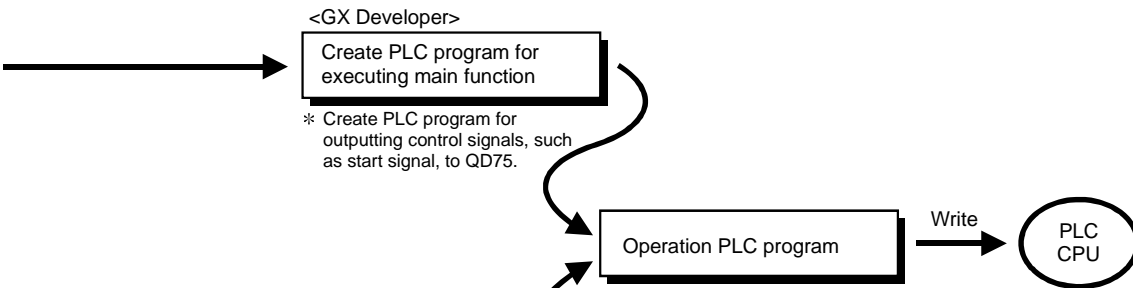
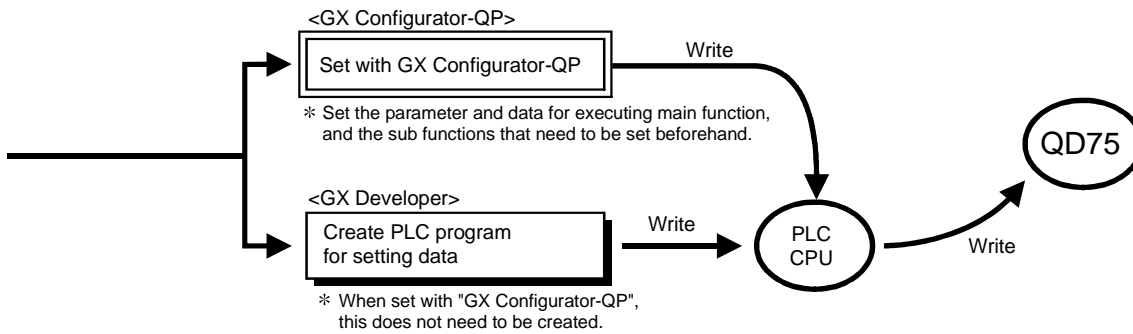
The outline for starting each control is shown with the following flowchart.

*It is assumed that each module is installed, and the required system configuration, etc., has been prepared.



Setting method

 : Indicates the PLC program that must be created.



1.2.3 Outline of stopping

Each control is stopped in the following cases.

- (1) When each control is completed normally.
- (2) When the Servo READY signal is turned OFF.
- (3) When a PLC CPU error occurs.
- (4) When the PLC READY signal is turned OFF.
- (5) When an error occurs in the QD75.
- (6) When control is intentionally stopped (Stop signal from PLC CPU turned ON, stop signal from an external device, etc.).

The outline for the stopping process in these cases is shown below. (Excluding (1) for normal stopping.)

| Stop cause | | Stop axis | M code ON signal after stop | Axis operation status after stopping (Md.26) | Stop process | | | | | |
|--|--|-----------|-----------------------------|---|---|------------------|---------------------------|--------------------------------|-----------------------|----------------------------------|
| | | | | | OPR control | | Major positioning control | High-level positioning control | Manual control | |
| | | | | | Machine OPR control | Fast OPR control | | | JOG/Inching operation | Manual pulse generator operation |
| Forced stop | Servo READY OFF | Each axis | No change | During error | Servo OFF or free run (The operation stops with dynamic brake or electromagnetic brake.) | | | | | |
| | <ul style="list-style-type: none"> • Servo amplifier power supply OFF • Servo alarm • Emergency stop to the servo amplifier | | | | | | | | | |
| Fatal stop (Stop group 1) | Hardware stroke limit upper/lower limit error occurrence | Each axis | No change | During error | Deceleration stop/sudden stop (Select with "Pr.37 Sudden stop group1 sudden stop selection") | | | | | |
| Emergency stop (Stop group 2) | Error occurs in PLC CPU | All axes | No change | During error | Deceleration stop/sudden stop (Select with "Pr.38 Sudden stop group2 sudden stop selection") | | | | | |
| | PLC READY signal OFF | | Turns OFF | | | | | | | |
| | Error in test mode | | No change | | | | | | | |
| Relatively safe stop (Stop group 3) | Axis error detection (Error other than stop group 1 or 2) | Each axis | No change | During error | Deceleration stop/sudden stop (Select with "Pr.39 Sudden stop group3 sudden stop selection") | | | | | |
| | "Stop signal" from peripheral device | | | | | | | | | |
| Intentional stop (Stop group 3) | "Stop signal" ON from external device | Each axis | No change | When stopped (While waiting) | | | | | | |
| | "Axis stop signal" ON from PLC CPU | | | | | | | | | |

■ Reference

Provide the emergency stop circuits external to the servo system to prevent cases where danger may result from abnormal operation of the overall in the event of a power supply fault or servo system failure.

1.2.4 Outline for restarting

When a stop cause has occurred during operation with position control causing the axis to stop, positioning to the end point of the positioning data can be restarted from the stopped position by using the "Cd.6 Restart command".

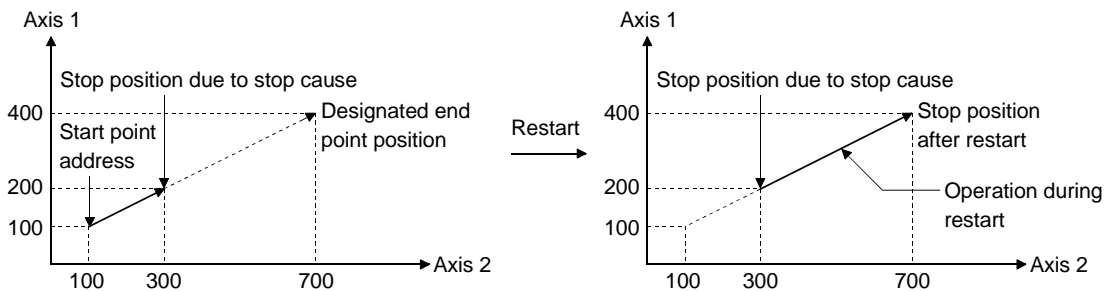
If issued during a continuous positioning or continuous path control operation, the restart command will cause the positioning to be re-executed using the current position (pointed by the positioning data No. associated with the moment when the movement was interrupted) as the start point.

■ When "Cd.6 Restart command" is ON

- (1) If the "Md.26 Axis operation status" is stopped, positioning to the end point of the positioning data will be restarted from the stopped position regardless of the absolute system or incremental system.
- (2) When "Md.26 Axis operation status" is not stopped, the warning "Restart not possible" (warning code: 104) will be applied, and the restart command will be ignored.

[Example for incremental system]

- (a) The restart operation when the axis 1 movement amount is 300, and the axis 2 movement amount is 600 is shown below.

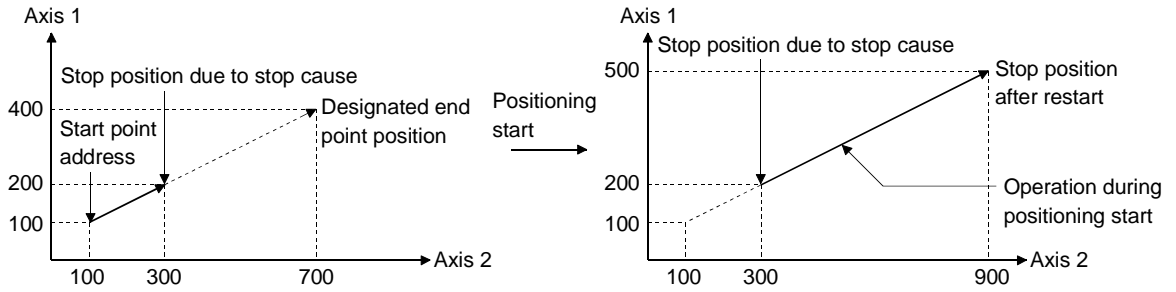


■ Reference

If the positioning start signal [Y10 to Y13]/external command signal* is turned ON while the "Md.26 Axis operation status" is waiting or stopped, positioning will be restarted from the start of the positioning start data regardless of the absolute system or incremental system. (*: When the external command signal is set to "External positioning start")
 (Same as normal positioning.)

[Example for incremental system]

(a) The positioning start operation when the axis 1 movement amount is 300 and the axis 2 movement amount is 600 is shown below.



Chapter 2 System Configuration

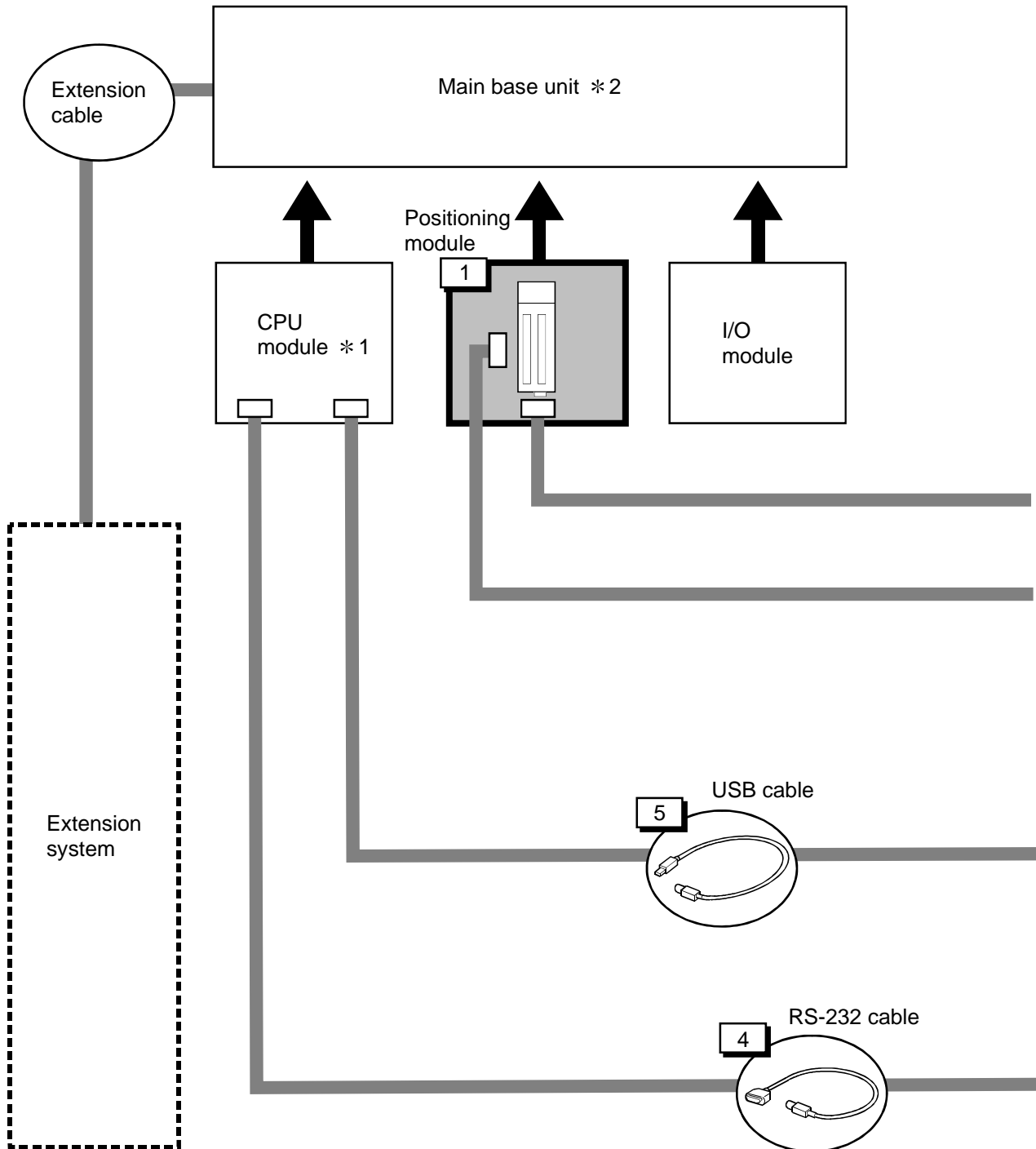
In this chapter, the general image of the system configuration of the positioning control using QD75, the configuration devices, applicable CPU and the precautions of configuring the system are explained.
Prepare the required configuration devices to match the positioning control system.

- 2.1 General image of system2- 2
- 2.2 Component list.....2- 4
- 2.3 Applicable system.....2- 6
- 2.4 How to check the function version and SERIAL No.2- 8

2.1 General image of system

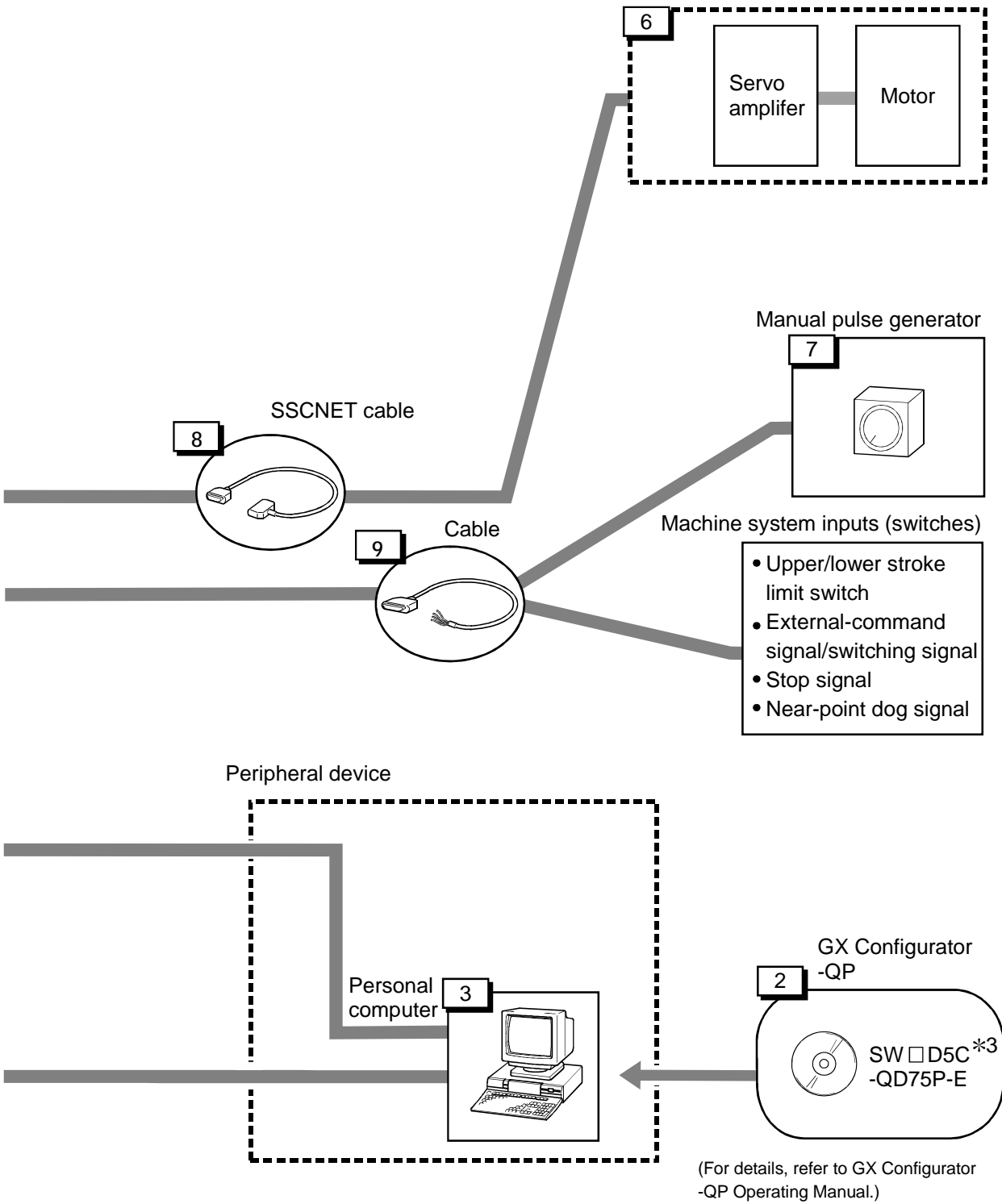
The general image of the system, including the QD75, PLC CPU and peripheral devices is shown below.

(The Nos. in the illustration refer to the "No." in Section 2.2 "Component list".



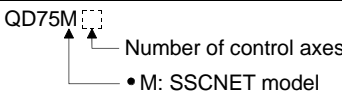
REMARK

- *1 Refer to Section "2.3 Applicable system" for the CPU modules that can be used.
- *2 Refer to the CPU module User's Manual for the base units that can be used.
- *3 For the items with □, use the software package of "2" or later.



2.2 Component list

The positioning system using the QD75 is configured of the following devices.

| No. | Part name | Type | Remarks |
|-----|--|----------------------------|---|
| 1 | Positioning module | QD75M1 QD75M2 QD75M4 |  |
| 2 | GX Configurator-QP | SW-D5C-QD75P-E | Refer to GX Configurator-QP Operating Manual for details. |
| 3 | Personal computer | DOS/V personal computer | (Prepared by user) Refer to GX Configurator-QP Operating Manual for details. |
| 4 | RS-232 cable | QC30R2 | (Prepared by user) An RS-232 cable is needed for connecting the CPU module with a personal computer (DOS/V). For details, refer to GX Configurator-QP Operating Manual. |
| 5 | USB cable | — | (Prepared by user) A USB cable is needed for connecting the CPU module with a personal computer (DOS/V). For details, refer to GX Configurator-QP Operating Manual. |
| 6 | Servo amplifier | — | (Prepared by user) |
| 7 | Manual pulse generator | — | (Prepared by user) Recommended: MR-HDP01 (Mitsubishi Electric) |
| 8 | SSCNET cable *1 (For connecting between the QD75 and the servo amplifier) | — | (Prepared by user) Cables are needed to connect the QD75 with the servo amplifier. |
| 9 | Cable *1 (For connecting between the QD75 and the external device) | — | (Prepared by user) Cables are needed to connect the QD75 with the external device. (Prepare them referring to the manuals for the connected devices and information given in 3.4.2 of this manual.) |

*1: The SSCNET cable connecting the QD75 and servo amplifier, external device connection connector has been prepared. Refer to the below table.

| Part name | Type | Remarks |
|----------------------|--|---|
| SSCNET cable | MR-J2HBUS□□ * | <ul style="list-style-type: none"> • Connection between QD75M□ and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) • Connection between (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B). (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-J2CN1: connector set (sold separately) |
| | MR-J2HBUS□□-A * | <ul style="list-style-type: none"> • Connection between QD75M□/MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B and MR-H-BN/MR-H-BN4. (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-J2CN1-A: connector set (sold separately) |
| | MR-HBUS□□ * | <ul style="list-style-type: none"> • Connection between MR-H-BN/MR-H-BN4 and MR-H-BN/MR-H-BN4 (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-HBCNS: connector set (sold separately) |
| Applicable connector | A6CON1, A6CON2, A6CON3, A6CON4 (sold separately) | |
| Applicable wire size | 0.3 mm ² (when A6CON1 and A6CON4 are used), AWG#24 to 28 (when A6CON2 is used), AWG#28 (twisted)/AWG#30 (single wire) (when A6CON3 is used) | |

*: □ = Cable length (05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 5: 5m (16.40ft.))

(Note): The overall extension of the SSCNET cable is up to 30m.

■ Specifications of recommended manual pulse generator

| Item | Specification |
|---------------------------|--|
| Model name | MR-HDP01 |
| Pulse resolution | 25PLS/rev (100 PLS/rev after magnification by 4) |
| Output method | Voltage-output (power supply voltage -1V or more), Output current Max. 20mA |
| Power supply voltage | 4.5 to 13.2VDC |
| Current consumption | 60mA |
| Life time | 1000000 revolutions (at 200r/min) |
| Permitted axial loads | Radial load: Max. 19.6N |
| | Thrust load: Max. 9.8N |
| Operation temperature | -10 to 60°C (14 to 140°F) |
| Weight | 0.4 (0.88) [kg(lb)] |
| Number of max. revolution | Instantaneous Max. 600r/min. normal 200r/min |
| Pulse signal status | 2 signals: A phase, B: phase, 90° phase difference |
| Friction torque | 0.1N/m (at 20°C (68°F)) |

2.3 Applicable system

The QD75 can be used in the following system.

(1) Applicable modules and the number of installable modules

The following table indicates the CPU modules and network modules (for remote I/O station) usable with the QD75 and the number of installable modules.

| Applicable modules | | Number of installable modules | Remarks |
|--------------------|--|-------------------------------|--|
| CPU module | Q00JCPU | Max. 8 modules | (*1) |
| | Q00CPU Q01CPU | Max. 24 modules | |
| | Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU | Max. 64 modules | Installable in the Q mode only (*1) |
| | Q12PHCPU Q25PHCPU | Max. 64 modules | (*1) |
| Network module | QJ72LP25-25 QJ72BR15 QJ72LP25G QJ72LP25GE | Max. 64 modules | MELSECNET/H remote I/O station (*2) |

*1 Refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection) of the CPU module used.

*2 Refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

(2) Usable base unit

The QD75 can be installed in any of the I/O slots (*3) of a base unit.

When installing the QD75, always consider the power supply capacity since a shortage of the power supply capacity may occur depending on the combination with the other installed module and the number of installed module.

*3 Within the I/O point range of the CPU module and network module (for remote I/O station).

(3) Compatibility with Multiple PLC system

When using the QD75 in a Multiple PLC system, first refer to the QCPU (Q mode) User's Manual (Multiple CPU system).

(4) Supported software packages

The following table lists the compatibility between the systems using the QD75 and the software packages. GX Developer is required for use of the QD75.

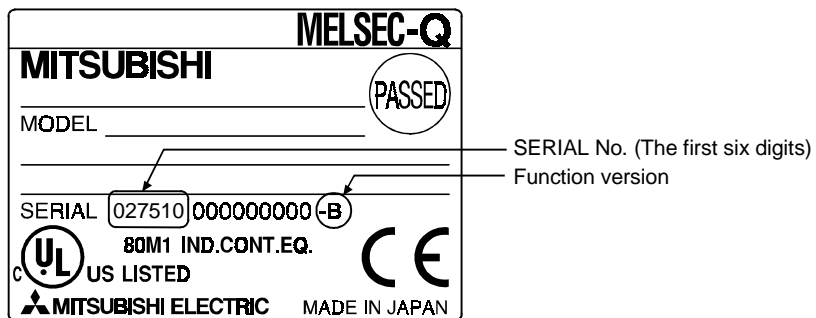
| | | Software version | |
|---|---------------------|-----------------------|-----------------------|
| | | GX Developer | GX Configurator-QP |
| Q00J/Q00/Q01CPU | Single PLC system | Version 7 or more | Version 2.10L or more |
| | Multiple PLC system | Version 8 or more | |
| Q02/Q02H/Q06H/ Q12H/Q25HCPU | Single PLC system | Version 4 or more | |
| | Multiple PLC system | Version 6 or more | |
| Q12PH/Q25PHCPU | Single PLC system | Version 7.10L or more | Version 2.13P or more |
| | Multiple PLC system | | |
| For use on MELSECNET/H remote I/O station | | Version 6 or more | Version 2.10L or more |

2.4 How to check the function version and SERIAL No.

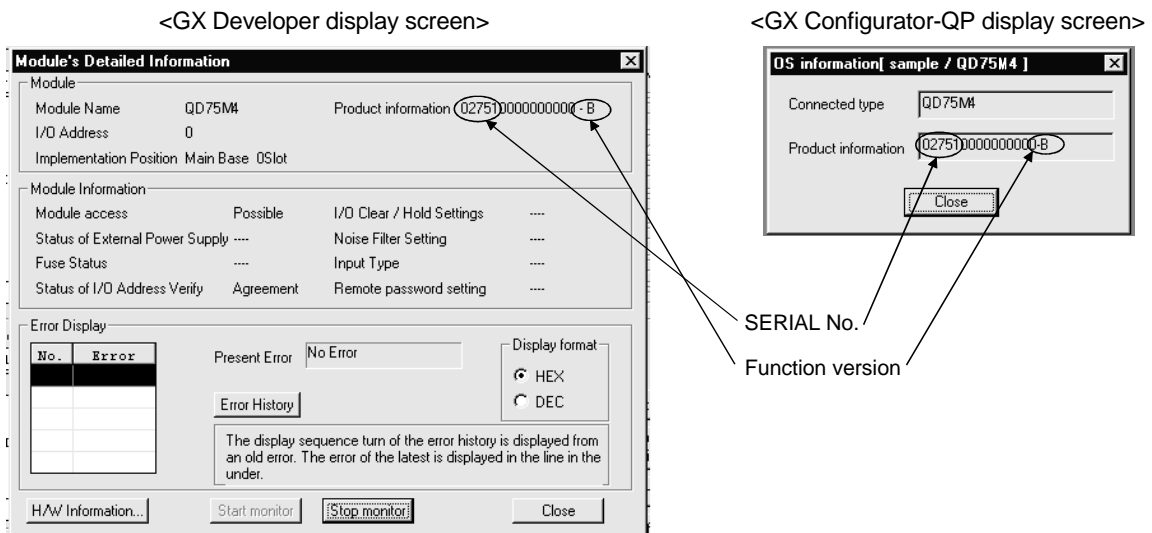
The function version and the SERIAL No. of the QD75 can be checked in the following methods.

- [1] Method using the rated plate on the module side face
- [2] Method using the software

[1] Method using the rated plate on the module side face
Check the alphabet of "SERIAL".



[2] Method using the software
Check the alphabet at the end of "Product information" displayed on System monitor "Module's Detailed Information" of GX Developer *1 or on "OS information" of GX Configurator-QP *2.



*1: This check can be made using the version of SW4D5C-GPPW-E or more. For details, refer to GX Developer Operating Manual.

*2: For details, refer to GX Configurator-QP Operating Manual.

Chapter 3 Specifications and Functions

The various specifications of the QD75 are explained in this chapter.

The "General specifications", "Performance specifications", "List of functions", "Specifications of input/output signals with PLC CPU", and the "Specifications of input/output interfaces with external devices", etc., are described as information required when designing the positioning system.

Confirm each specification before designing the positioning system.

- 3.1 Performance specifications 3- 2
- 3.2 List of functions 3- 4
 - 3.2.1 QD75 control functions 3- 4
 - 3.2.2 QD75 main functions 3- 6
 - 3.2.3 QD75 sub functions and common functions 3- 8
 - 3.2.4 Combination of QD75 main functions and sub functions 3- 12
- 3.3 Specifications of input/output signals with PLC CPU 3- 14
 - 3.3.1 List of input/output signals with PLC CPU 3- 14
 - 3.3.2 Details of input signals (QD75 → PLC CPU) 3- 15
 - 3.3.3 Details of output signals (PLC CPU → QD75) 3- 17
- 3.4 Specifications of input/output interfaces with external devices 3- 18
 - 3.4.1 Electrical specifications of input signals 3- 18
 - 3.4.2 Signal layout for external device connection connector 3- 19
 - 3.4.3 List of input signal details 3- 20
 - 3.4.4 Interface internal circuit 3- 21
- 3.5 External circuit design 3- 22

3.1 Performance specifications

| Item \ Model | | QD75M1 | QD75M2 | QD75M4 |
|------------------------|------------------------------------|--|--|---|
| No. of control axes | | 1 axis | 2 axes | 4 axes |
| Interpolation function | | None | 2-axis linear interpolation 2-axis circular interpolation | 2-, 3-, or 4-axis linear interpolation 2-axis circular interpolation |
| Control system | | PTP (Point To Point) control, path control (both linear and arc can be set), speed control, speed-position switching control, position-speed switching control | | |
| Control unit | | mm, inch, degree, PLS | | |
| Positioning data | | 600 data (positioning data Nos. 1 to 600)/axis (Can be set with peripheral device or PLC program.) | | |
| Backup | | Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup) | | |
| Positioning | Positioning system | PTP control: Incremental system/absolute system Speed-position switching control: Incremental system/absolute system *1 Position-speed switching control: Incremental system Path control: Incremental system/absolute system | | |
| | Positioning range | <div style="border: 1px solid black; padding: 2px;">In absolute system</div> <ul style="list-style-type: none"> • -214748364.8 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • 0 to 359.99999 (degree) • -2147483648 to 2147483647 (PLS) <div style="border: 1px solid black; padding: 2px;">In incremental system</div> <ul style="list-style-type: none"> • -214748364.8 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • -21474.83648 to 21474.83647 (degree) • -2147483648 to 2147483647 (PLS) <div style="border: 1px solid black; padding: 2px;">In speed-position switching control (INC mode) / position-speed switching control</div> <ul style="list-style-type: none"> • 0 to 214748364.7 (μm) • 0 to 21474.83647 (inch) • 0 to 21474.83647 (degree) • 0 to 2147483647 (PLS) <div style="border: 1px solid black; padding: 2px;">In speed-position switching control (ABS mode) *1</div> <ul style="list-style-type: none"> • 0 to 359.99999 (degree) | | |
| | Speed command | 0.01 to 20000000.00 (mm/min) 0.001 to 2000000.000 (inch/min) 0.001 to 2000000.000 (degree/min) 1 to 10000000 (PLS/s) | | |
| | Acceleration/ deceleration process | Automatic trapezoidal acceleration/deceleration, S-pattern acceleration/deceleration | | |
| | Acceleration/ deceleration time | 1 to 8388608 (ms) Four patterns can be set for each of acceleration time and deceleration time | | |
| | Sudden stop deceleration time | 1 to 8388608 (ms) | | |

*1: In speed-position switching control (ABS mode), the control unit available is "degree" only. (For details, refer to "Section 9.2.17 Speed-position switching control (ABS mode)".)

| Item | Model | QD75M1 | QD75M2 | QD75M4 |
|--|----------------------|--|---------------|--|
| Starting time (ms) *2 | | 1-axis linear control | 6 | Factors in starting time extension The following times will be added to the starting time in the described conditions: • S-pattern acceleration/ deceleration is selected: 0.5 • Other axis is in operation: 1.5 • During continuous positioning control: 0.2 • During continuous path control: 1.0 |
| | | 1-axis speed control | 6 | |
| | | 2-axis linear interpolation control (Composite speed) | 7 | |
| | | 2-axis linear interpolation control (Reference axis speed) | 7 | |
| | | 2-axis circular interpolation control | 7 | |
| | | 2-axis speed control | 6 | |
| | | 3-axis linear interpolation control (Composite speed) | 7 | |
| | | 3-axis linear interpolation control (Reference axis speed) | 7 | |
| | | 3-axis speed control | 6 | |
| | | 4-axis linear interpolation control | 7 | |
| | 4-axis speed control | 7 | | |
| External wiring connection system | | 40-pin connector | | |
| Applicable wire size | | 0.3 mm ² (when A6CON1 and A6CON4 are used), AWG#24 to 28 (when A6CON2 is used), AWG#28 (twisted)/AWG#30 (single wire) (when A6CON3 is used) | | |
| Applicable connector for external device | | A6CON1, A6CON2, A6CON3, A6CON4 (sold separately) | | |
| SSCNET cable | MR-HBUS□ *3 | • Connection between MR-H-BN/MR-H-BN4 and MR-H-BN/MR-H-BN4 (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-HBCNS: connector set (sold separately) | | |
| | MR-J2HBUS□ *3 | • Connection between QD75M□ and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) • Connection between (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B). (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-J2CN1: connector set (sold separately) | | |
| | MR-J2HBUS□M-A *3 | • Connection between QD75M□/MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B and MR-H-BN/MR-H-BN4. (0.5m(1.64ft.), 1m(3.28ft.), 5m(16.4ft.)) • MR-J2CN1-A: connector set (sold separately) | | |
| SSCNET cable over all length (m) | | 30 | | |
| Internal current consumption (5VDC) | | QD75M1 :0.40A | QD75M2 :0.40A | QD75M4 :0.40A |
| Flash ROM write count | | Max. 100000 times | | |
| No. of occupied I/O points (points) | | 32 (I/O assignment: 32 points for intelligent function module) | | |
| Outline dimensions (mm(inch)) | | 98 (3.86) (H) × 27.4 (1.08) (W) × 90 (3.54) (D) | | |
| Weight (kg) | | 0.15 | 0.15 | 0.16 |

*2: Using the "Pre-reading start function", the virtual start time can be shortened. (For details, refer to "Section 12.7.8 Pre-reading start function".

*3: □ = Cable length (05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 5: 5m (16.40ft.))

3.2 List of functions

3.2.1 QD75 control functions

The QD75 has several functions. In this manual, the QD75 functions are categorized and explained as follows.

■ Main functions

(1) OPR control

"OPR control" is a function that established the start point for carrying out positioning control, and carries out positioning toward that start point. This is used to return a workpiece, located at a position other than the OP when the power is turned ON or after positioning stop, to the OP. The "OPR control" is preregistered in the QD75 as the "Positioning start data No. 9001 (Machine OPR)", and "Positioning start data No. 9002 (Fast OPR)". (Refer to Chapter 8 "OPR Control".)

(2) Major positioning control

This control is carried out using the "Positioning data" stored in the QD75. Positioning control, such as position control and speed control, is executed by setting the required items in this "positioning data" and starting that positioning data. An "operation pattern" can be set in this "positioning data", and with this whether to carry out control with continuous positioning data (ex.: positioning data No. 1, No. 2, No. 3, ...) can be set. (Refer to Chapter 9 "Major Positioning Control".)

(3) High-level positioning control

This control executes the "positioning data" stored in the QD75 using the "block start data". The following types of applied positioning control can be carried out.

- Random blocks, handling several continuing positioning data items as "blocks", can be executed in the designated order.
- "Condition judgment" can be added to position control and speed control.
- The operation of the designated positioning data No. that is set for multiple axes can be started simultaneously. (Pulses are output simultaneously to multiple servos.)
- The designated positioning data can be executed repeatedly, etc., (Refer to Chapter 10 "High-level Positioning Control".)

(4) Manual control

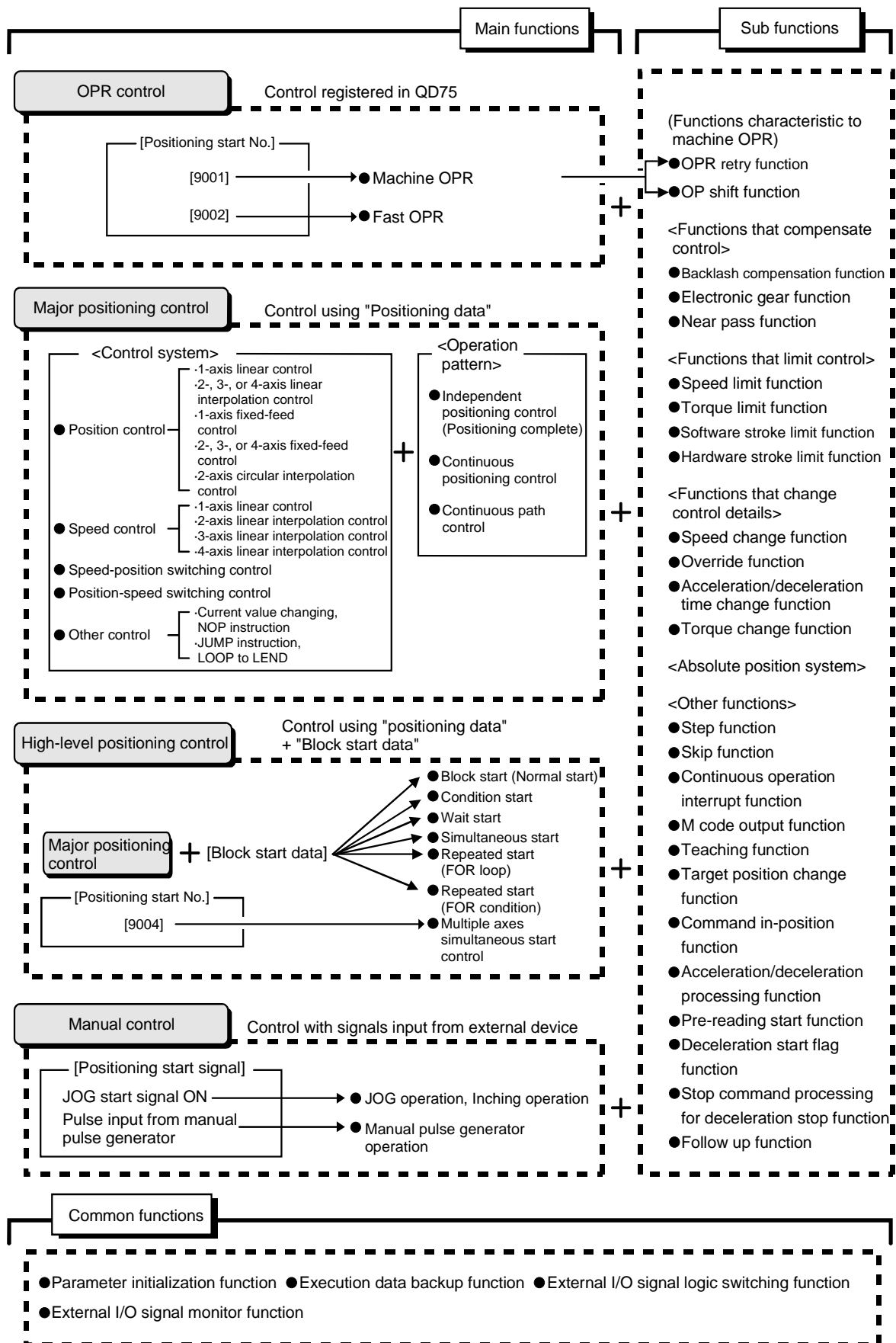
By inputting a signal into the QD75 from an external device, the QD75 will output a random pulse train and carry out control. Use this manual control to move the workpiece to a random position (JOG operation), and to finely adjust the positioning (inching operation, manual pulse generator operation), etc. (Refer to Chapter 11 "Manual Control".)

■ Sub functions

When executing the main functions, control compensation, limits and functions can be added. (Refer to Chapter 12 "Control Sub Functions".)

■ Common functions

Common control using the QD75 for "parameter initialization" or "backup of execution data" can be carried out. (Refer to Chapter 13 "Common Functions".)



3.2.2 QD75 main functions

The outline of the main functions for positioning control with the QD75 is described below. (Refer to "Section 2" for details on each function.)

| Main functions | | Details | Reference section |
|---------------------------|----------------------------------|--|--------------------------------------|
| OPR control | Machine OPR control | Mechanically establishes the positioning start point using a near-point dog or stopper. (Positioning start No. 9001) | 8.2 |
| | Fast OPR control | Positions a target to the OP address (Md.21 Machine feed value) stored in the QD75 using machine OPR. (Positioning start No. 9002) | 8.3 |
| Major positioning control | Position control | Linear control (1-axis linear control) (2-axis linear interpolation control) (3-axis linear interpolation control) (4-axis linear interpolation control) | 9.2.2 9.2.3 9.2.4 9.2.5 |
| | | Fixed-feed control (1-axis fixed-feed control) (2-axis fixed-feed control) (3-axis fixed-feed control) (4-axis fixed-feed control) | 9.2.6 9.2.7 9.2.8 9.2.9 |
| | | 2-axis circular interpolation control | 9.2.10 9.2.11 |
| | Speed control | Linear control (1-axis linear control) (2-axis linear interpolation control) (3-axis linear interpolation control) (4-axis linear interpolation control) | 9.2.12 9.2.13 9.2.14 9.2.15 |
| | | Speed-position switching control | 9.2.16 9.2.17 |
| | Position-speed switching control | 9.2.18 | |
| | Other control | Current value changing | 9.2.19 |
| | | NOP instruction | 9.2.20 |
| | | JUMP instruction | 9.2.21 |
| | | LOOP | 9.2.22 |
| | | LEND | 9.2.23 |

| Main functions | | Details | Reference section |
|--------------------------------|--|--|-------------------|
| High-level positioning control | Block start (Normal start) | With one start, executes the positioning data in a random block with the set order. | 10.3.2 |
| | Condition start | Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". When the condition is established, the "block start data" is executed. When not established, that "block start data" is ignored, and the next point's "block start data" is executed. | 10.3.3 |
| | Wait start | Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". When the condition is established, the "block start data" is executed. When not established, stops the control until the condition is established. (Waits.) | 10.3.4 |
| | Simultaneous start | Simultaneously executes the positioning data having the No. for the axis designated with the "condition data". (Outputs pulses at the same timing.) | 10.3.5 |
| | Repeated start (FOR loop) | Repeats the program from the block start data set with the "FOR loop" to the block start data set in "NEXT" for the designated No. of times. | 10.3.6 |
| | Repeated start (FOR condition) | Repeats the program from the block start data set with the "FOR condition" to the block start data set in "NEXT" until the conditions set in the "condition data" are established. | 10.3.7 |
| | Multiple axes simultaneous start control | Starts the operation of multiple axes simultaneously according to the pulse output level. (Positioning start No. 9004, same as the "simultaneous start" above) | 10.5 |
| Manual control | JOG operation | Outputs a pulse to servo amplifier while the JOG start signal is ON. | 11.2 |
| | Inching operation | Outputs pulses corresponding to minute movement amount by manual operation to servo amplifier. (Performs fine adjustment with the JOG start signal.) | 11.3 |
| | Manual pulse generator operation | Outputs pulses commanded with the manual pulse generator to servo amplifier. (Carry out fine adjustment, etc., at the pulse level.) | 11.4 |

With the "major positioning control" ("high-level positioning control"), whether or not to continuously execute the positioning data can be set with the "operation pattern".

Outlines of the "operation patterns" are given below.

| Da.1 Operation pattern | Details | Reference section |
|--|---|-------------------|
| Independent positioning control (positioning complete) | When "independent positioning control" is set for the operation pattern of the started positioning data, only the designated positioning data will be executed, and then the positioning will end. | 9.1.2 |
| Continuous positioning control | When "continuous positioning control" is set for the operation pattern of the started positioning data, after the designated positioning data is executed, the program will stop once, and then the next following positioning data will be executed. | |
| Continuous path control | When "continuous path control" is set for the operation pattern of the started positioning data, the designated positioning data will be executed, and then without decelerating, the next following positioning data will be executed. | |

3.2.3 QD75 sub functions and common functions

■ Sub functions

The functions that assist positioning control using the QD75 are described below.
(Refer to Section 2 for details on each function.)

| Sub function | | Details | Reference section |
|---|--|---|-------------------|
| Functions characteristic to machine OPR | OPR retry function | This function retries the machine OPR with the upper/lower limit switches during OPR. This allows machine OPR to be carried out even if the axis is not returned to before the near-point dog with JOG operation, etc. | 12.2.1 |
| | OP shift function | After returning to the machine OP, this function compensates the position by the designated distance from the machine OP position and sets that position as the OP address. | 12.2.2 |
| Functions that compensate control | Backlash compensation function | This function compensates the mechanical backlash. Feed pulses equivalent to the set backlash amount are output each time the movement direction changes. | 12.3.1 |
| | Electronic gear function | By setting the movement amount per pulse, this function can freely change the machine movement amount per commanded pulse. When the movement amount per pulse is set, a flexible positioning system that matches the machine system can be structured. | 12.3.2 |
| | Near pass function *1 | This function suppresses the machine vibration when the speed changes during continuous path control in the interpolation control. | 12.3.3 |
| Functions that limit control | Speed limit function | If the command speed exceeds " [Pr.8] Speed limit value" during control, this function limits the commanded speed to within the " [Pr.8] Speed limit value" setting range. | 12.4.1 |
| | Torque limit function | If the torque generated by the servomotor exceeds " [Pr.17] Torque limit setting value" during control, this function limits the generated torque to within the " [Pr.17] Torque limit setting value" setting range. | 12.4.2 |
| | Software stroke limit function | If a command outside of the upper/lower limit stroke limit setting range, set in the parameters, is issued, this function will not execute positioning for that command. | 12.4.3 |
| | Hardware stroke limit function | This function carries out deceleration stop with the limit switch connected to the QD75 external device connector. | 12.4.4 |
| Functions that change control details | Speed change function | This function changes the speed during positioning. Set the new speed in the speed change buffer memory ([Cd.14] New speed value), and change the speed with the Speed change request ([Cd.15]). | 12.5.1 |
| | Override function | This function changes the speed within a percentage of 1 to 300% during positioning. This is executed using " [Cd.13] Positioning operation speed override". | 12.5.2 |
| | Acceleration/deceleration time change function | This function changes the acceleration/deceleration time during speed change. | 12.5.3 |
| | Torque change function | This function changes the "torque limit value" during control. | 12.5.4 |
| Absolute position system | | This function restores the absolute position. | 12.6 |

*1: The near pass function is featured as standard and is valid only for position control. It cannot be set to be invalid with parameters.

| Sub function | Details | Reference section | |
|--------------------|--|--|---------|
| Other functions | Step function | This function temporarily stops the operation to confirm the positioning operation during debugging, etc. The operation can be stopped at each "automatic deceleration" or "positioning data". | 12.7.1 |
| | Skip function | This function stops (decelerates to a stop) the positioning being executed when the skip signal is input, and carries out the next positioning. | 12.7.2 |
| | M code output function | This function issues a command for a sub work (clamp or drill stop, tool change, etc.) corresponding to the M code No. (0 to 65535) that can be set for each positioning data. | 12.7.3 |
| | Teaching function | This function stores the address positioned with manual control into the positioning address having the designated positioning data No. ([Cd.39]). | 12.7.4 |
| | Target position change function | This function changes the target position during positioning. Position and speed can be changed simultaneously. | 12.7.5 |
| | Command in-position function | At each automatic deceleration, this function calculates the remaining distance for the QD75 to reach the positioning stop position. When the value is less than the set value, the "command in-position flag" is set to "1". When using another auxiliary work before ending the control, use this function as a trigger for the sub work. | 12.7.6 |
| | Acceleration/deceleration process function | This function adjusts the control acceleration/deceleration. | 12.7.7 |
| | Continuous operation interrupt function | This function interrupts continuous operation. When this request is accepted, the operation stops when the execution of the current positioning data is completed. | 6.5.4 |
| | Pre-reading start function | This function shortens the virtual start time. | 12.7.8 |
| | Deceleration start flag function | Function that turns ON the flag when the constant speed status or acceleration status switches to the deceleration status during position control, whose operation pattern is "Positioning complete", to make the stop timing known. | 12.7.9 |
| | Stop command processing for deceleration stop function | Function that selects a deceleration curve when a stop cause occurs during deceleration stop processing to speed 0. | 12.7.10 |
| Follow up function | This function monitors the motor rotation amount with the servo turned OFF, and reflects it on the current feed value. | 12.8.2 | |

■ Common functions

The outline of the functions executed as necessary are described below.
(Refer to Section 2 for details on each function.)

| Common functions | Details | Reference section |
|--|--|-------------------|
| Parameter initialization function | This function returns the "parameters" stored in the QD75 buffer memory and flash ROM to the default values. The following two methods can be used. 1) Method using PLC program 2) Method using GX Configurator-QP | 13.2 |
| Execution data backup function | This functions stores the "setting data", currently being executed, into the flash ROM. 1) Method using PLC program 2) Method using GX Configurator-QP | 13.3 |
| External I/O signal logic switching function | This function switches I/O signal logic according to externally connected devices. This function enables the use of the system that does not use b (N.C.)-contact signals, such as Upper/lower limit signal, by setting parameters to positive logic. | 13.4 |
| External I/O signal monitor function | This function monitors the external I/O signal monitor information in the module's detailed information which can be displayed on the system monitor of GX Developer* 1. | 13.5 |

* 1: Usable on GX Developer (SW6D5C-GPPW-E or later).

MEMO

3.2.4 Combination of QD75 main functions and sub functions

With positioning control using the QD75, the main functions and sub functions can be combined and used as necessary. A list of the main function and sub function combinations is given below.

| Main functions | | Sub functions | Functions characteristic to machine OPR | | |
|---------------------------|----------------------------------|--|---|-------------------|---|
| | | | OPR retry function | OP shift function | |
| | | Combination with operation pattern. *1 | | | |
| OPR control | Machine OPR control | | × | ○ | ○ |
| | Fast OPR control | | × | × | × |
| Major positioning control | Position control | 1-axis linear control | ○ | × | × |
| | | 2-, 3-, or 4-axis linear interpolation control | ○ | × | × |
| | | 1-axis fixed-feed control | △ (Continuous path control cannot be set) | × | × |
| | | 2-, 3-, or 4-axis fixed-feed control (interpolation) | △ (Continuous path control cannot be set) | × | × |
| | | 2-axis circular interpolation control | ○ | × | × |
| | Speed control (1- to 4-axis) | △ (Only independent positioning control can be set) | × | × | |
| | Speed-position switching control | △ (Continuous path control cannot be set) | × | × | |
| | Position-speed switching control | △ (Only independent positioning control can be set) | | | |
| | Other control | Current value changing | △ (Continuous path control cannot be set) | × | × |
| | | NOP instruction | × | | |
| | | JUMP instruction | × | | |
| LOOP to LEND | | × | | | |
| Manual control | JOG operation, inching operation | × | × | × | |
| | Manual pulse generator operation | × | × | × | |

◎: Always combine, ○: Combination possible, △: Combination limited, ×: Combination not possible

*1 The operation pattern is one of the "positioning data" setting items.

*2 The near pass function is featured as standard and is valid only for setting continuous path control for position control.

*3 Invalid during creep speed.

*4 Invalid during continuous path control.

*5 Inching operation does not perform acceleration/deceleration processing.

*6 Valid for the reference axis only.

*7 Valid for only the case where a deceleration start is made during position control.

*8 Disabled for a start of positioning start No. 9003.

| | Functions that compensate control | | | Functions that limit control | | | | Functions that change control details | | | | Other functions | | | | | | | | |
|--|-----------------------------------|--------------------------|--------------------|------------------------------|-----------------------|--------------------------------|--------------------------------|---------------------------------------|-------------------|---|------------------------|-----------------|---------------|------------------------|-------------------|---------------------------------|------------------------------|---|----------------------------|----------------------------------|
| | Backlash compensation function | Electronic gear function | Near pass function | Speed limit function | Torque limit function | Software stroke limit function | Hardware stroke limit function | Speed change function | Override function | Acceleration/ deceleration time change function | Torque change function | Step function | Skip function | M code output function | Teaching function | Target position change function | Command in-position function | Acceleration/ deceleration process function | Pre-reading start function | Deceleration start flag function |
| | ○ | ○ | | ○ | ○ | × | ⊙ | △*3 | △*3 | × | ○ | × | × | × | × | × | ○ | × | × | ○ |
| | ○ | ○ | | ○ | ○ | × | ⊙ | ○ | ○ | × | ○ | × | × | × | × | × | ○ | × | × | ○ |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | × | △*4 | ○ | ○ | ○ | ○ |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | × | × | ○ | ○ | ○ | △*6 |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | × | × | ○ | ○ | ○ | ○ |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | × | × | ○ | ○ | ○ | △*6 |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | ○ | ○ | × | × | ○ | ○ | ○ | × | ○ |
| | ○ | ○ | *2 | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | × | × | ○ | × | × | ○ | ○ | × | ○ |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | ○ | ○ | × | ○ | × | × | ○ | ○ | ○ | ○ | △*7 |
| | × | × | | × | × | × | ⊙ | × | × | × | × | ○ | × | △*8 | × | × | × | × | × | × |
| | × | × | | × | × | × | ⊙ | × | × | × | × | × | × | × | × | × | × | × | × | × |
| | ○ | ○ | | ○ | ○ | ○ | ⊙ | ○ | ○ | × | ○ | × | × | × | × | × | × | × | × | × |
| | ○ | ○ | | × | ○ | ○ | ⊙ | × | × | × | × | × | × | ○ | × | × | × | × | × | × |

REMARK

- The "common functions" are functions executed as necessary. (These are not combined with the control.)
- "High-level positioning control" is a control used in combination with the "major positioning control". For combinations with the sub functions, refer to the combinations of the "major positioning control" and sub functions.

3.3 Specifications of input/output signals with PLC CPU

3.3.1 List of input/output signals with PLC CPU

The QD75 uses 32 input points and 32 output points for exchanging data with the PLC CPU.

The input/output signals when the QD75 is mounted in slot No. 0 of the main base unit are shown below.

Device X refers to the signals input from the QD75 to the PLC CPU, and device Y refers to the signals output from the PLC CPU to the QD75.

| Signal direction: QD75 → PLC CPU | | | Signal direction: PLC CPU → QD75 | | |
|----------------------------------|----------------------|----------------------|----------------------------------|-------------------|----------------------------|
| Device No. | Signal name | | Device No. | Signal name | |
| X0 | QD75 READY | | Y0 | PLC READY | |
| X1 | Synchronization flag | | Y1 | All axis servo ON | |
| X2 | Use prohibited | | Y2 | Use prohibited | |
| X3 | | | Y3 | | |
| X4 | Axis 1 | M code ON | Y4 | Axis 1 | Axis stop |
| X5 | Axis 2 | | Y5 | Axis 2 | |
| X6 | Axis 3 | | Y6 | Axis 3 | |
| X7 | Axis 4 | | Y7 | Axis 4 | |
| X8 | Axis 1 | Error detection | Y8 | Axis 1 | Forward run JOG start |
| X9 | Axis 2 | | Y9 | Axis 1 | Reverse run JOG start |
| XA | Axis 3 | | YA | Axis 2 | Forward run JOG start |
| XB | Axis 4 | | YB | Axis 2 | Reverse run JOG start |
| XC | Axis 1 | BUSY | YC | Axis 3 | Forward run JOG start |
| XD | Axis 2 | | YD | Axis 3 | Reverse run JOG start |
| XE | Axis 3 | | YE | Axis 4 | Forward run JOG start |
| XF | Axis 4 | | YF | Axis 4 | Reverse run JOG start |
| X10 | Axis 1 | Start complete | Y10 | Axis 1 | Positioning start |
| X11 | Axis 2 | | Y11 | Axis 2 | |
| X12 | Axis 3 | | Y12 | Axis 3 | |
| X13 | Axis 4 | | Y13 | Axis 4 | |
| X14 | Axis 1 | Positioning complete | Y14 | Axis 1 | Execution prohibition flag |
| X15 | Axis 2 | | Y15 | Axis 2 | |
| X16 | Axis 3 | | Y16 | Axis 3 | |
| X17 | Axis 4 | | Y17 | Axis 4 | |
| X18 | Use prohibited | | Y18 | Use prohibited | |
| X19 | | | | | |
| X1A | | | | | |
| X1B | | | | | |
| X1C | | | | | |
| X1D | | | | | |
| X1E | | | | | |
| X1F | | | | | |

Important
 [Y2 to Y3], [Y18 to Y1F], [X2, X3], and [X18 to X1F] are used by the system, and cannot be used by the user.
 If these devices are used, the operation of the QD75 will not be guaranteed.

3.3.2 Details of input signals (QD75 → PLC CPU)

The ON/OFF timing and conditions of the input signals are shown below.

| Device No. | Signal name | | Details |
|--------------------------|--------------------------------------|-------------------------|--|
| X0 | QD75 READY | | <p>ON: READY OFF: Not READY/ Watch dog timer error</p> <ul style="list-style-type: none"> When the PLC READY signal [Y0] turns from OFF to ON, the parameter setting range is checked. If no error is found, this signal turns ON. When the PLC READY signal [Y0] turns OFF, this signal turns OFF. When watch dog timer error occurs, this signal turns OFF. This signal is used for interlock in a PLC program, etc. |
| X1 | Synchronization flag | | <p>OFF: Module access disabled ON: Module access enabled</p> <ul style="list-style-type: none"> After the PLC is turned ON or the CPU module is reset, this signal turns ON if the access from the CPU module to the QD75 is possible. When "Asynchronous" is selected in the module synchronization setting of the CPU module, this signal can be used as interlock for the access from a PLC program to the QD75. |
| X4 X5 X6 X7 | Axis 1 Axis 2 Axis 3 Axis 4 | M code ON | <p>OFF: M code is not set ON: M code is set</p> <ul style="list-style-type: none"> In the WITH mode, this signal turns ON when the positioning data operation is started. In the AFTER mode, this signal turns ON when the positioning data operation is completed. This signal turns OFF with the "Cd.7 M code OFF request". When M code is not designated (when "Da.10 M code" is "0"), this signal will remain OFF. With using continuous path control for the positioning operation, the positioning will continue even when this signal does not turn OFF. However, a warning will occur. (Warning code: 503) When the PLC READY signal [Y0] turns OFF, the M code ON signal will also turn OFF. If operation is started while the M code is ON, an error will occur. |
| X8 X9 XA XB | Axis 1 Axis 2 Axis 3 Axis 4 | Error detection | <p>OFF: No error ON: Error occurrence</p> <ul style="list-style-type: none"> This signal turns ON when an error listed in Section 15.1 occurs, and turns OFF when the error is reset on "Cd.5 Axis error rest". |
| XC XD XE XF | Axis 1 Axis 2 Axis 3 Axis 4 | BUSY *1 | <p>OFF: Not BUSY ON: BUSY</p> <ul style="list-style-type: none"> This signal turns ON at the start of positioning, OPR or JOG operation. It turns OFF when the "Da.9 Dwell time" has passed after positioning stops. (This signal remains ON during positioning.) This signal turns OFF when the positioning is stopped with step operation. During manual pulse generator operation, this signal turns ON while the "Cd.21 Manual pulse generator enable flag" is ON. This signal turns OFF at error completion or positioning stop. |
| X10 X11 X12 X13 | Axis 1 Axis 2 Axis 3 Axis 4 | Start complete | <p>OFF: Start incomplete ON: Start complete</p> <ul style="list-style-type: none"> This signal turns ON when the positioning start signal turns ON and the QD75 starts the positioning process. (The start complete signal also turns ON during OPR control.) |
| X14 X15 X16 X17 | Axis 1 Axis 2 Axis 3 Axis 4 | Positioning complete *2 | <p>OFF: Positioning incomplete ON: Positioning complete *</p> <ul style="list-style-type: none"> This signal turns ON for the time set in "Pr.40 Positioning complete signal output time" from the instant when the positioning control for each positioning data No. is completed. (It does not turn ON when "Pr.40 Positioning complete signal output time" is "0".) If positioning (including OPR), JOG/Inching operation, or manual pulse generator operation is started while this signal is ON, the signal will turn OFF. This signal will not turn ON when speed control or positioning is canceled midway. |

| Important |
|--|
| <p>*1: The BUSY signal turns ON even when position control of movement amount 0 is executed. However, since the ON time is short, the ON status may not to be detected in the PLC program.</p> <p>*2: "Positioning complete" of the QD75 refers to the point when the pulse output from QD75 is completed. Thus, even if the QD75's positioning complete signal turns ON, the system may continue operation.</p> |

3.3.3 Detail of output signals (PLC CPU → QD75)

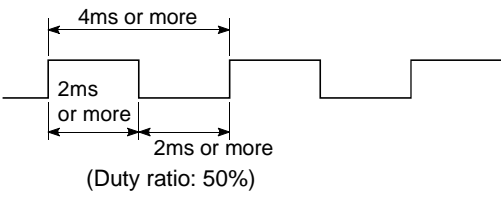
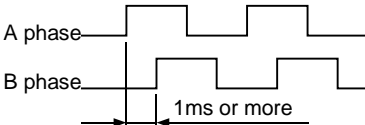
The ON/OFF timing and conditions of the output signals are shown below.

| Device No. | Signal name | | Details |
|--|--|--|--|
| Y0 | PLC READY | | <p>OFF: PLC READY OFF</p> <p>ON: PLC READY ON</p> <p>(a) This signal notifies the QD75 that the PLC CPU is normal.</p> <ul style="list-style-type: none"> It is turned ON/OFF with the PLC program. The PLC READY signal is turned ON during positioning control, OPR control, JOG operation, inching operation, and manual pulse generator operation, unless the system is in the peripheral device test mode. <p>(b) When the data (parameter etc.) are changed, the PLC READY signal is turned OFF depending on the parameter (Refer to Chapter 7.).</p> <p>(c) The following processes are carried out when the PLC READY signal turns from OFF to ON.</p> <ul style="list-style-type: none"> The parameter setting range is checked. The QD75 READY signal [X0] turns ON. <p>(d) The following processes are carried out when the PLC READY signal turns from ON to OFF.</p> <p>In these cases, the OFF time should be set to 100ms or more.</p> <ul style="list-style-type: none"> The QD75 READY signal [X0] turns OFF. The operating axis stops. The M code ON signal [X4 to X7] for each axis turns OFF, and "0" is stored in "Md.25" Valid M code". <p>(e) When parameters or positioning data (No. 1 to 600) are written from the peripheral device or PLC CPU to the flash ROM, the PLC READY signal will turn OFF.</p> |
| Y1 | All axis servo ON | | <p>OFF: Servo OFF</p> <p>ON: Servo ON</p> <ul style="list-style-type: none"> The servo for all the servo amplifiers connected to the QD75 is turned ON or OFF. |
| Y4 Y5 Y6 Y7 | Axis 1 Axis 2 Axis 3 Axis 4 | Axis stop | <p>OFF: Axis stop not requested</p> <p>ON: Axis stop requested</p> <ul style="list-style-type: none"> When the axis stop signal turns ON, the OPR control, positioning control, JOG operation, inching operation and manual pulse generator operation will stop. By turning the axis stop signal ON during positioning operation, the positioning operation will be "stopped". Whether to decelerate or suddenly stop can be selected with "Pr.39" Stop group 3 sudden stop selection". During interpolation control of the positioning operation, if the axis stop signal of any axis turns ON, all axes in the interpolation control will decelerate and stop. |
| Y8 Y9 YA YB YC YD YE YF | Axis 1 Axis 1 Axis 2 Axis 2 Axis 3 Axis 3 Axis 4 Axis 4 | Forward run JOG start Reverse run JOG start Forward run JOG start Reverse run JOG start Forward run JOG start Reverse run JOG start Forward run JOG start Reverse run JOG start | <p>OFF: JOG not started</p> <p>ON: JOG started</p> <ul style="list-style-type: none"> When the JOG start signal is ON, JOG operation will be carried out at the "Cd.17" JOG speed". When the JOG start signal turns OFF, the operation will decelerate and stop. When inching movement amount is set, the designated movement amount is output for one control cycle and then the operation stops. |
| Y10 Y11 Y12 Y13 | Axis 1 Axis 2 Axis 3 Axis 4 | Positioning start | <p>OFF: Positioning start not requested</p> <p>ON: Positioning start requested</p> <ul style="list-style-type: none"> OPR operation or positioning operation is started. The positioning start signal is valid at the rising edge, and the operation is started. When the positioning start signal turns ON during BUSY, the operation starting warning will occur (warning code: 100). |
| Y14 Y15 Y16 Y17 | Axis 1 Axis 2 Axis 3 Axis 4 | Execution prohibition flag | <p>OFF: Not during execution prohibition</p> <p>ON: During execution prohibition</p> <ul style="list-style-type: none"> If the execution prohibition flag is ON when the positioning start signal turns ON, positioning control does not start until the execution prohibition flag turns OFF. Used with the "Pre-reading start function". (Refer to Section 12.7.8) |

3.4 Specifications of interfaces with external devices

3.4.1 Electrical specifications of input signals

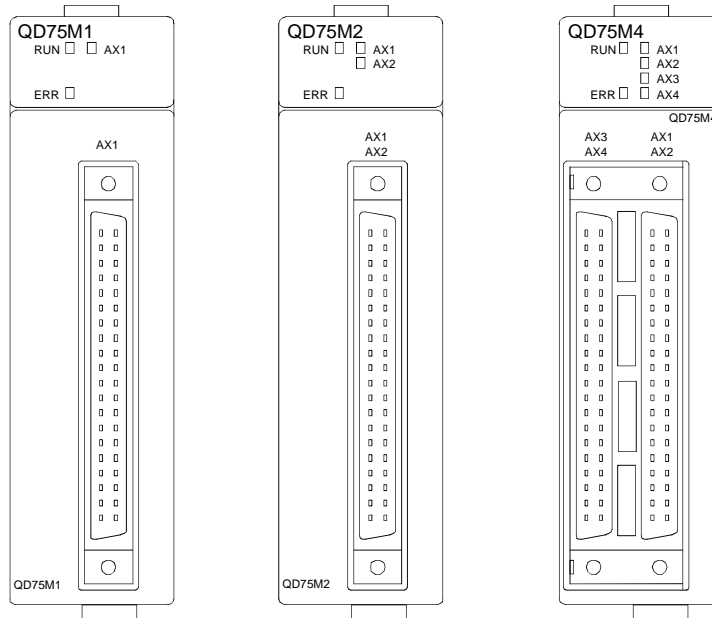
■ Input specifications

| Signal name | Rated input voltage/current | Working voltage range | ON voltage/current | OFF voltage/current | Input resistance | Response time |
|--|---|-----------------------|-----------------------------------|--------------------------------|------------------|---------------|
| Stop signal (STOP) Upper limit signal (FLS) Lower limit signal (RLS) | 24VDC/5mA | 19.2 to 26.4VDC | 17.5VDC or more/ 3.5mA or more | 7VDC or less/ 1.0mA or less | Approx. 6.8kΩ | 4ms or less |
| Manual pulse generator A phase (PULSE GENERATOR A) Manual pulse generator B phase (PULSE GENERATOR B) | 5VDC/5mA | 4.5 to 6.1VDC | 2.5VDC or more/ 1mA or more | 1VDC or less/ 0.1mA or less | Approx. 1.2kΩ | 1ms or less |
| | <p>① Pulse width</p>  <p>(Duty ratio: 50%)</p> <p>② Phase difference</p>  <p>When the A phase leads the B phase, the positioning address (current value) increases.</p> | | | | | |
| Near-point dog signal (DOG) External command signal (CHG) | 24VDC/5mA | 19.2 to 26.4VDC | 17.5VDC or more/ 3.5mA or more | 7VDC or less/ 1.0mA or less | Approx. 6.8kΩ | 1ms or less |

3.4.2 Signal layout for external device connection connector

The specifications of the connector section, which is the input/output interface for the QD75 and external device, are shown below.

The signal layout for the QD75 external device connection connector is shown.



| Pin layout | Axis 4 (AX4) | | Axis 3 (AX3) | | Axis 2 (AX2) | | Axis 1 (AX1) | |
|--|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
| | Pin No. | Signal name | Pin No. | Signal name | Pin No. | Signal name | Pin No. | Signal name |
| <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">B20</div><div style="margin-right: 5px;">B19</div><div style="margin-right: 5px;">B18</div><div style="margin-right: 5px;">B17</div><div style="margin-right: 5px;">B16</div><div style="margin-right: 5px;">B15</div><div style="margin-right: 5px;">B14</div><div style="margin-right: 5px;">B13</div><div style="margin-right: 5px;">B12</div><div style="margin-right: 5px;">B11</div><div style="margin-right: 5px;">B10</div><div style="margin-right: 5px;">B9</div><div style="margin-right: 5px;">B8</div><div style="margin-right: 5px;">B7</div><div style="margin-right: 5px;">B6</div><div style="margin-right: 5px;">B5</div><div style="margin-right: 5px;">B4</div><div style="margin-right: 5px;">B3</div><div style="margin-right: 5px;">B2</div><div style="margin-right: 5px;">B1</div> <div style="margin-right: 10px;"> <div style="border: 1px solid black; padding: 2px; display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> <div style="margin-bottom: 2px;">○ ○</div> </div> <div style="margin-right: 5px;">A20</div><div style="margin-right: 5px;">A19</div><div style="margin-right: 5px;">A18</div><div style="margin-right: 5px;">A17</div><div style="margin-right: 5px;">A16</div><div style="margin-right: 5px;">A15</div><div style="margin-right: 5px;">A14</div><div style="margin-right: 5px;">A13</div><div style="margin-right: 5px;">A12</div><div style="margin-right: 5px;">A11</div><div style="margin-right: 5px;">A10</div><div style="margin-right: 5px;">A9</div><div style="margin-right: 5px;">A8</div><div style="margin-right: 5px;">A7</div><div style="margin-right: 5px;">A6</div><div style="margin-right: 5px;">A5</div><div style="margin-right: 5px;">A4</div><div style="margin-right: 5px;">A3</div><div style="margin-right: 5px;">A2</div><div style="margin-right: 5px;">A1</div> </div> </div> | 2B20 | No connect | 2A20 | No connect | 1B20 | PULSER B- | 1A20 | PULSER B+ |
| | 2B19 | No connect | 2A19 | No connect | 1B19 | PULSER A- | 1A19 | PULSER A+ |
| | 2B18 | No connect | 2A18 | No connect | 1B18 | No connect | 1A18 | No connect |
| | 2B17 | No connect | 2A17 | No connect | 1B17 | No connect | 1A17 | No connect |
| | 2B16 | No connect | 2A16 | No connect | 1B16 | No connect | 1A16 | No connect |
| | 2B15 | No connect | 2A15 | No connect | 1B15 | No connect | 1A15 | No connect |
| | 2B14 | No connect | 2A14 | No connect | 1B14 | No connect | 1A14 | No connect |
| | 2B13 | No connect | 2A13 | No connect | 1B13 | No connect | 1A13 | No connect |
| | 2B12 | No connect | 2A12 | No connect | 1B12 | No connect | 1A12 | No connect |
| | 2B11 | No connect | 2A11 | No connect | 1B11 | No connect | 1A11 | No connect |
| | 2B10 | No connect | 2A10 | No connect | 1B10 | No connect | 1A10 | No connect |
| | 2B9 | No connect | 2A9 | No connect | 1B9 | No connect | 1A9 | No connect |
| | 2B8 | No connect | 2A8 | No connect | 1B8 | No connect | 1A8 | No connect |
| | 2B7 | COM | 2A7 | COM | 1B7 | COM | 1A7 | COM |
| | 2B6 | COM | 2A6 | COM | 1B6 | COM | 1A6 | COM |
| | 2B5 | CHG | 2A5 | CHG | 1B5 | CHG | 1A5 | CHG |
| | 2B4 | STOP | 2A4 | STOP | 1B4 | STOP | 1A4 | STOP |
| | 2B3 | DOG | 2A3 | DOG | 1B3 | DOG | 1A3 | DOG |
| | 2B2 | RLS | 2A2 | RLS | 1B2 | RLS | 1A2 | RLS |
| 2B1 | FLS | 2A1 | FLS | 1B1 | FLS | 1A1 | FLS | |

*1: Pin No. "1□□□" indicates the pin No. for the right connector. Pin No. "2□□□" indicates the pin No. for the left connector.

*2: When a 1-axis module is used, pin Nos. 1B1 to 1B18 are "No connect".

*3: For 1-axis module and 2-axis module do not have AX3 and AX4 connector of the left side.

3.4.3 List of input signal details

The details of each QD75 external device connection connector are shown below:

| Signal name | Pin No. | | | | Signal details (Negative logic is selected by external input signal logic selection) |
|--|------------|------------|------------|------------|---|
| | AX1 | AX2 | AX3 | AX4 | |
| Manual pulse generator A phase Manual pulse generator B phase | 1A19 | 1A20 | — | | <ul style="list-style-type: none"> Input the pulse signal from the manual pulse generator A phase and B phase. If the A phase leads the B phase, the positioning address will increase at the rising and falling edges of each phase. If the B phase leads the A phase, the positioning address will decrease at the rising and falling edges of each phase. |
| Manual pulse generator A common Manual pulse generator B common | 1B19 | 1B20 | — | | <p>[When increased] [When decreased]</p> <p>Positioning address +1+1+1+1+1+1+1 Positioning address -1 -1 -1 -1 -1 -1 -1</p> |
| Upper limit signal | 1A1 | 1B1 | 2A1 | 2B1 | <ul style="list-style-type: none"> This signal is input from the limit switch installed at the upper limit position of the stroke. Positioning will stop when this signal turns OFF. When OPR retry function is valid, this will be the upper limit for finding the near-point dog signal. |
| Lower limit signal | 1A2 | 1B2 | 2A2 | 2B2 | <ul style="list-style-type: none"> This signal is input from the limit switch installed at the lower limit position of the stroke. Positioning will stop when this signal turns OFF. When OPR retry function is valid, this will be the lower limit for finding the near-point dog signal. |
| Near-point dog signal | 1A3 | 1B3 | 2A3 | 2B3 | <ul style="list-style-type: none"> This signal is used for detecting the near-point dog during OPR. The near-point dog OFF → ON is detected at the rising edge. The near-point dog ON → OFF is detected at the falling edge. |
| Stop signal | 1A4 | 1B4 | 2A4 | 2B4 | <ul style="list-style-type: none"> Input this signal to stop positioning. When this signal turns ON, the QD75 will stop the positioning being executed. <p>After that, even if this signal is turned from ON to OFF, the system will not start.</p> |
| External command signal/ switching signal | 1A5 | 1B5 | 2A5 | 2B5 | <ul style="list-style-type: none"> Input a control switching signal during speed-position or position-speed switching control. Use this signal as the input signal of positioning start, speed change request, and skip request from an external device. <p>Set the function to use this signal in " [Pr.42] External command function selection".</p> |
| Common | 1A6 1A7 | 1B6 1B7 | 2A6 2A7 | 2B6 2B7 | <ul style="list-style-type: none"> Common for upper/lower limit, near-point dog, stop, and external command signal/switching signals. |

3.4.4 Interface internal circuit

The outline diagrams of the internal circuits for the QD75M1 external device connection interface are shown below.

(1) Input

| External wiring | Pin No. | Internal circuit | Signal name | Need for wiring *1 | |
|-----------------|----------|--|--|--------------------|---|
| | 1A1 | | Upper-limit LS signal | FLS | ○ |
| | 1A2 | | Lower-limit LS signal | RLS | ○ |
| | 1A3 | | Near-point dog signal | DOG | △ |
| | 1A4 | | Stop signal | STOP | △ |
| | 1A5 | | External command signal/switching signal | CHG | △ |
| | 1A6 | | Common | COM | ○ |
| | 1A7 | | Manual pulse generator A phase PULSER A+ PULSER A- | △ | |
| | (+) 1A19 | Manual pulse generator B phase PULSER B+ PULSER B- | | | |
| | (-) 1B19 | | | | |
| | (+) 1A20 | Manual pulse generator B phase PULSER B+ PULSER B- | | | |
| | (-) 1B20 | | | | |
| | 1A11 | | — | — | — |
| | 1A12 | | — | — | — |
| | 1A8 | | — | — | — |
| 1A9 | | — | — | — | |
| 1A10 | | — | — | — | |

*1: The symbols in Need for wiring column indicate the following meanings:

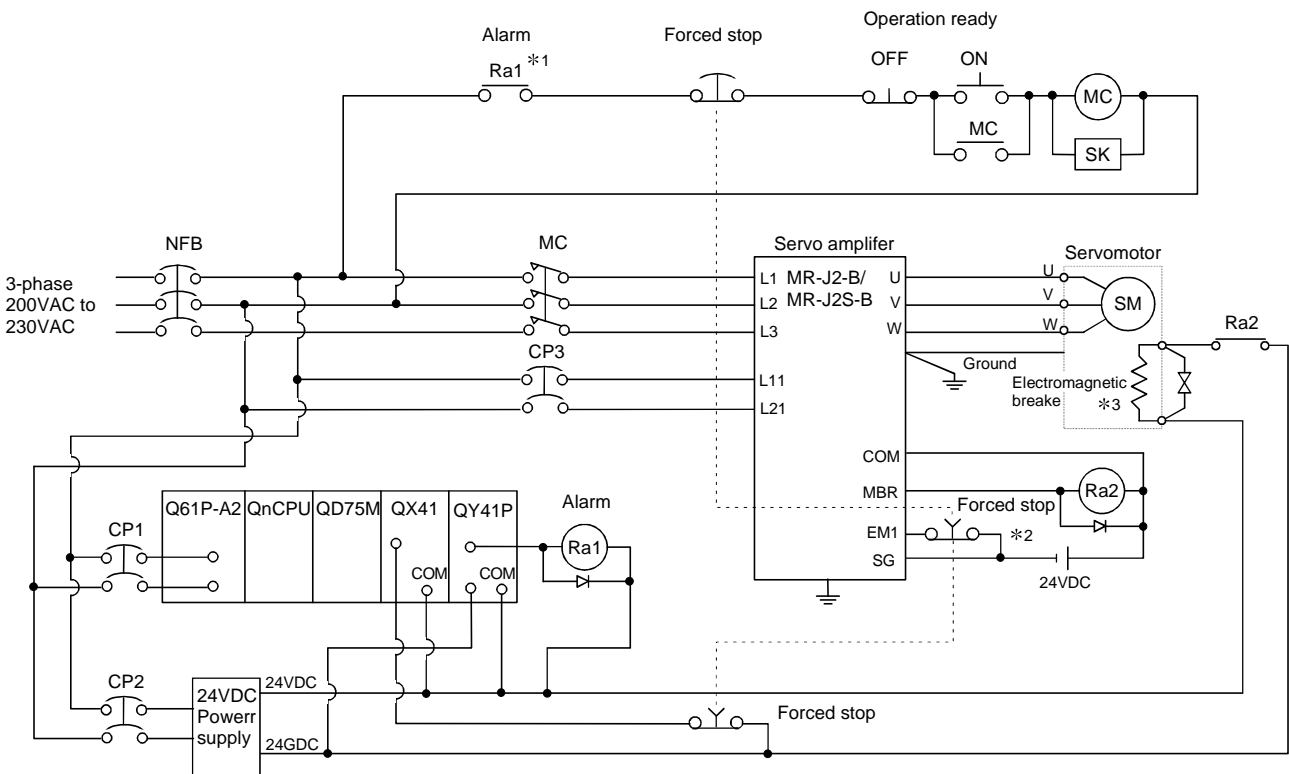
- ○ : Wiring is necessary for positioning.
- △ : Wiring is necessary depending on the situation.

*2: Either polarity can be connected to the common (COM).

3.5 External circuit design

The outline diagrams of the internal circuits for the QD75M1 external device connection interface are shown below.

(1) Example when using the MR-J2-B/MR-J2S-B



*1: Configure up the power supply circuit which switch off the electromagnetic contactor (MC) after detection alarm occurrence on the PLC CPU.

*2: The dynamic brake is operated, and servomotor occurs to the free run when EM1 (forced stop) of servo amplifier turn OFF. At the time, the display shows the servo forced stop warning (E6). During ordinary operation, do not used forced stop signal to alternate stop and run. The service life of the servo amplifier may be shortened.

*3: Power supply for the electromagnetic brake is possible to use a full wave rectified power supply.

Chapter 4 Installation, Wiring and Maintenance of the Product

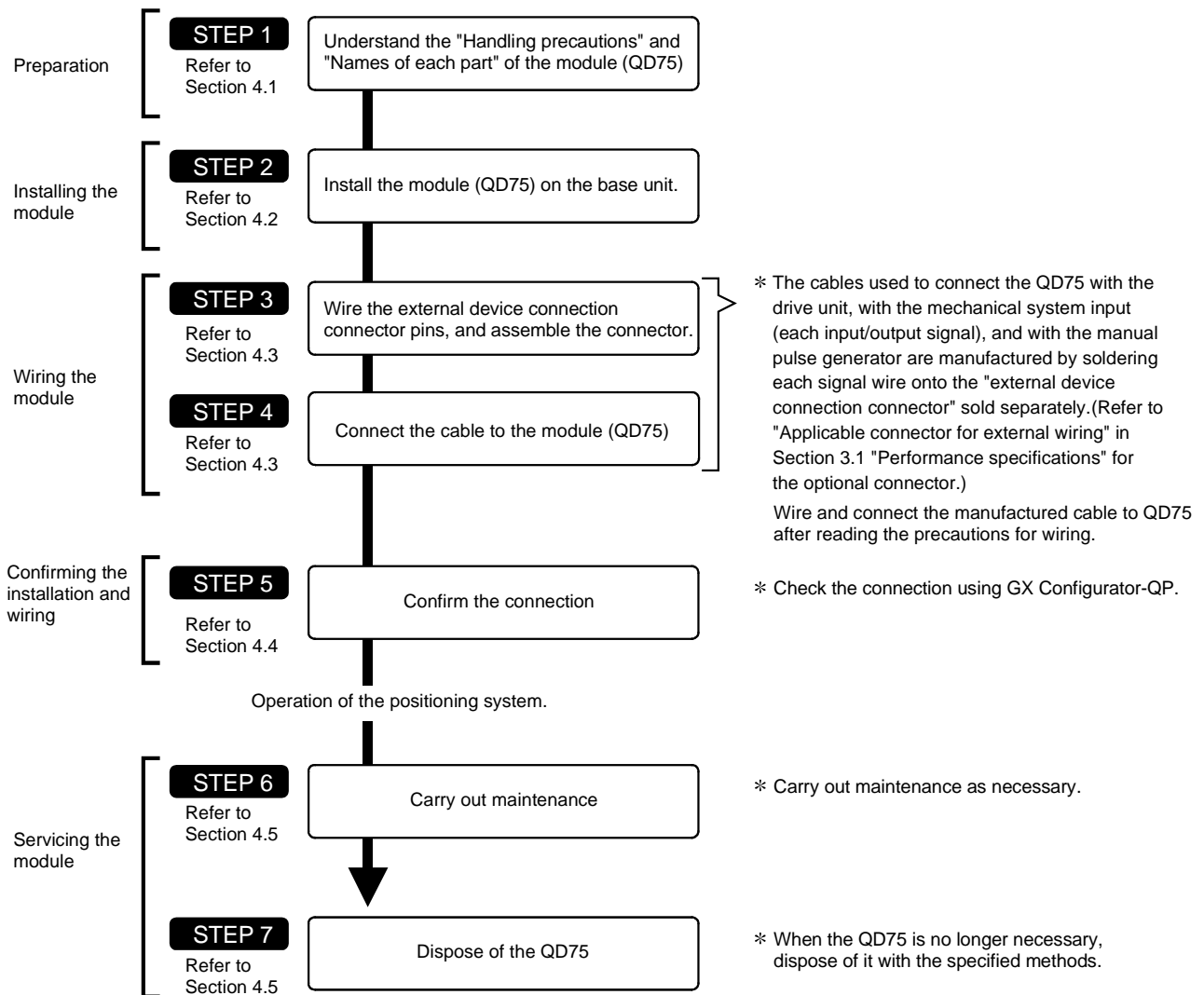
The installation, wiring and maintenance of the QD75 are explained in this chapter. Important information such as precautions to prevent malfunctioning of the QD75, accidents and injuries as well as the proper work methods are described. Read this chapter thoroughly before starting installation, wiring or maintenance, and always following the precautions.

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 - 4.1.1 Installation, wiring and maintenance procedures4- 2
 - 4.1.2 Names of each part4- 3
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 - 4.2.1 Precautions for installation4- 7
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4.1 Outline of installation, wiring and maintenance

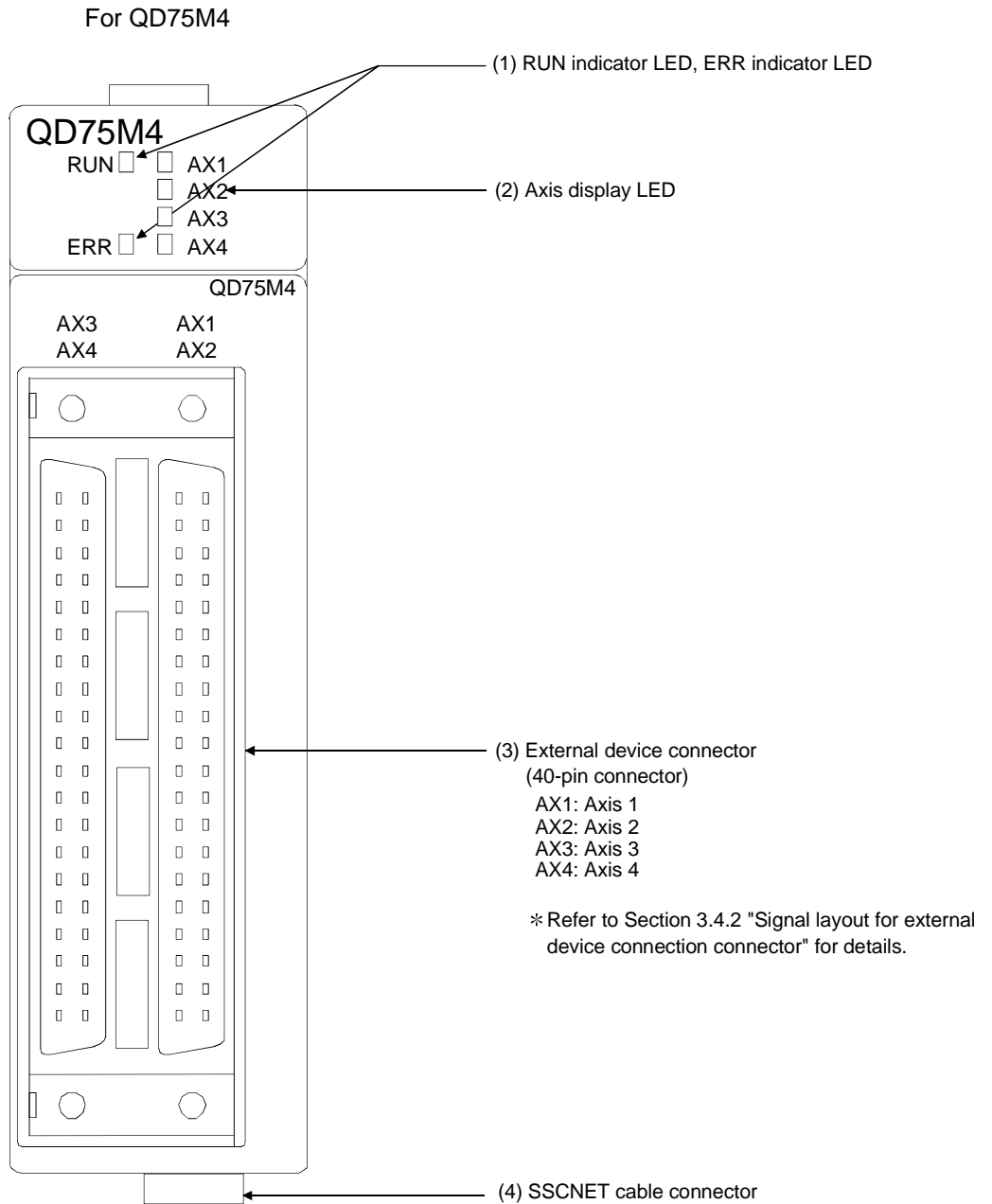
4.1.1 Installation, wiring and maintenance procedures

The outline and procedures for QD75 installation, wiring and maintenance are shown below.



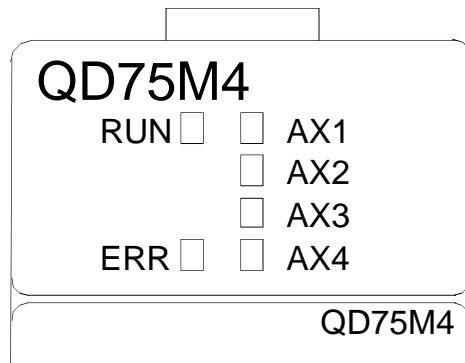
4.1.2 Names of each part

(1) The part names of the QD75 are shown below:



| No. | Name | Details |
|-----|--------------------------------------|--|
| (1) | RUN indicator LED, ERR indicator LED | Refer to the next page. |
| (2) | Axis display LED (AX1 to AX4) | |
| (3) | External device connector | A connector connected with a drive unit, mechanical system input, or manual pulse generator. |
| (4) | SSCNET cable connector | A connector connected with servo amplifier. |

(2) The LED display indicates the following operation statuses of the QD75 and axes.

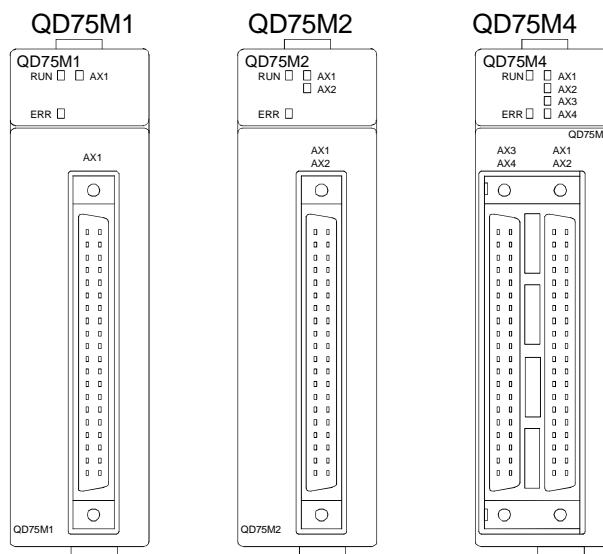


| Display | Attention point | Description | Display | Attention point | Description |
|--|------------------------------|---|---|---|--|
| RUN <input type="checkbox"/> <input type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 ERR <input type="checkbox"/> <input type="checkbox"/> AX4 | RUN is OFF. | Hardware failure, watch dog timer error | RUN <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 <input type="checkbox"/> AX4 ERR <input type="checkbox"/> <input type="checkbox"/> AX4 | AX1 (or other axis) illuminates. | The corresponding axis is in operation. |
| RUN <input checked="" type="checkbox"/> <input type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 ERR <input type="checkbox"/> <input type="checkbox"/> AX4 | RUN illuminates. ERR is OFF. | The module operates normally. | RUN <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 <input checked="" type="checkbox"/> AX4 ERR <input checked="" type="checkbox"/> <input type="checkbox"/> AX4 | ERR flashes. AX1 (or other axis) flashes. | An error occurs on the corresponding axis. |
| RUN <input checked="" type="checkbox"/> <input type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 ERR <input checked="" type="checkbox"/> <input type="checkbox"/> AX4 | ERR illuminates. | System error | RUN <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> AX1 <input checked="" type="checkbox"/> AX2 <input checked="" type="checkbox"/> AX3 <input checked="" type="checkbox"/> AX4 ERR <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> AX4 | All LEDs illuminate. | Hardware failure |
| RUN <input checked="" type="checkbox"/> <input type="checkbox"/> AX1 <input type="checkbox"/> AX2 <input type="checkbox"/> AX3 ERR <input type="checkbox"/> <input type="checkbox"/> AX4 | AX1 to AX4 are OFF. | The axes are stopped or on standby. | | | |

The symbols in the Display column indicate the following statuses:

: Turns OFF. : Illuminates. : Flashes.

(3) The interface for each QD75 is shown below:



4.1.3 Handling precautions

Handle the QD75 and cable while observing the following precautions.

[1] Handling precautions

CAUTION

- Use the PLC within the general specifications environment given in this manual.
Using the PLC outside the general specification range environment could lead to electric shocks, fires, malfunctioning, product damage or deterioration.
- Do not directly touch the conductive section and electronic parts of the module.
Failure to observe this could lead to module malfunctioning or trouble.
- Make sure that foreign matter, such as cutting chips or wire scraps, do not enter the module.
Failure to observe this could lead to fires, trouble or malfunctioning.
- Never disassemble or modify the module.
Failure to observe this could lead to trouble, malfunctioning, injuries or fires.
- Completely turn off all lines of power supply externally before loading or unloading the module. Not doing so could result in electric shock or damage to the product.
- Because the connector has its orientation, check it before attaching or detaching the connector straight from the front.
Unless it is properly installed, a poor contact may occur, resulting in erroneous input and output.
- Do not directly touch the module's conductive parts and electronic components of the module.
Touching the conductive parts and electronic components of the module could cause an operation failure or give damage to the module.

[2] Other precautions

(1) Main body

- The main body case is made of plastic. Take care not to drop or apply strong impacts onto the case.
- Do not remove the QD75 PCB from the case. Failure to observe this could lead to faults.

(2) Cable

- Do not press on the cable with a sharp object.
- Do not twist the cable with force.
- Do not forcibly pull on the cable.
- Do not step on the cable.
- Do not place objects on the cable.
- Do not damage the cable sheath.

(3) Installation environment

Do not install the module in the following type of environment.

- Where the ambient temperature exceeds the 0 to 55°C range.
- Where the ambient humidity exceeds the 5 to 95%RH range.
- Where there is sudden temperature changes, or where dew condenses.
- Where there is corrosive gas or flammable gas.
- Where there are high levels of dust, conductive powder, such as iron chips, oil mist, salt or organic solvents.
- Where the module will be subject to direct sunlight.
- Where there are strong electric fields or magnetic fields.
- Where vibration or impact could be directly applied onto the main body.

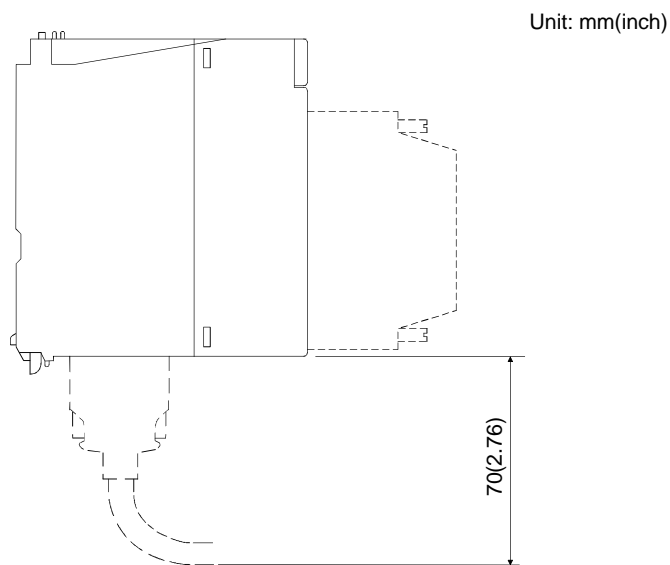
4.2 Installation

4.2.1 Precautions for installation

The precautions for installing the QD75 are given below. Refer to this section as well as "4.1.3 Handling precautions" when carrying out the work.

[1] Precautions for SSCNET cable wiring

If the duct is below the bottom of the module, leave sufficient clearance to eliminate effects on the SSCNET cable, limit the space height to 70 mm (2.76 inch) MIN.



[2] Precautions for installation

 **DANGER**

- Completely turn off the externally supplied power used in the system before clearing or tightening the screws.
Not doing so may cause electric shocks.

 **CAUTION**

- Never disassemble or modify the module.
Failure to observe this could lead to trouble, malfunctioning, injuries or fires.
- Completely turn off the externally supplied power used in the system before installing or removing the module.
Not doing so may cause an operation failure or damage to the module.
- Use the PLC within the general specifications environment given in CPU module User's manual.
Using the PLC outside the general specification range environment could lead to electric shocks, fires, malfunctioning, product damage or deterioration.
- Don't directly touch the conductive area or electronic components of the module.
Failure to observe this could lead to trouble or malfunctioning.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Then, securely mount the module with the fixing hole as a supporting point.
Incorrect loading of the module can cause a malfunction, failure or drop.
When using the module in the environment of much vibration, tighten the module with a screw.
Tighten the screw within the range of the specified tightening torque.
Insufficient tightening may lead to dropping, short-circuit, or malfunctioning.
Excessive tightening may damage the screw or module, leading to dropping, short-circuit, or malfunctioning.

4.3 Wiring

The precautions for wiring the QD75 are given below. Refer to this section as well as "4.1.3 Handling precautions" when carrying out the work.

4.3.1 Precautions for wiring

DANGER

- Switch all phases of the external power supply off when installing or placing wiring. Not doing so may cause electric shock or damage to the product.

CAUTION

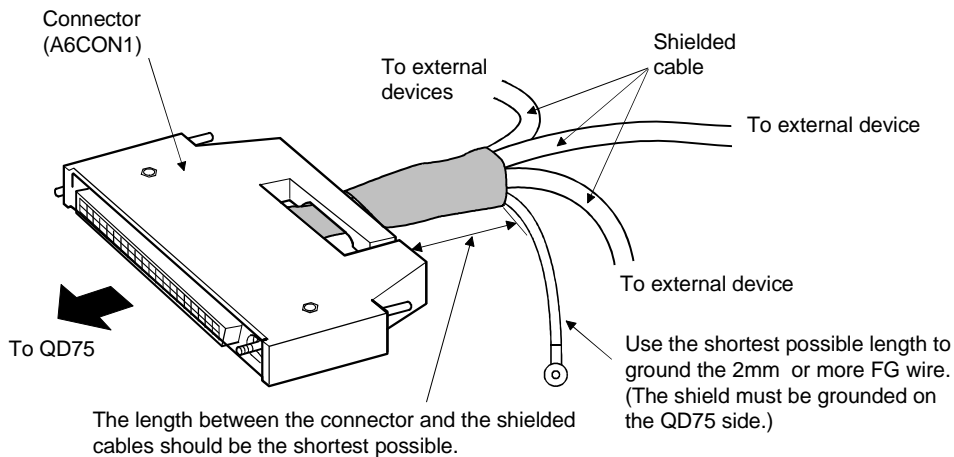
- Check the layout of the terminals and then properly route the wires to the module.
- Solder connector for external input signal cable and SSCNET cable device properly. Insufficient soldering may cause malfunction.
- Be careful not to let foreign matter such as sawdust or wire chips get inside the module. These may cause fires, failure or malfunction.
- The top surface of the module is covered with protective films to prevent foreign objects such as cable off cuts from entering the module when wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate ventilation.
- Securely connect the connector for the SSCNET cable to the bottom connector on the module.
- When removing the cable or power supply cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module. Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.
- The cable used for connecting the QD75 external input signal cable and SSCNET cable should not be routed near or bundled with the main circuit cable, power cable and/or other such load – carrying cables other than those for the PLC. These cables should be separated by at least 100 mm (3.94 inch) They can cause electrical interference, surges and inductance that can lead to mis-operation.
- The cable for connecting QD75 can be secured in duct or bundle fixing. If the shielded cable is not secured, unevenness or movement of the shielded cable or careless pulling on it could result in damage to the QD75 or servo amplifier or shielded cable or defective cable connections could cause mis-operation of the unit.

[1] Precautions for wiring

- (1) Use separate cables for connecting to the QD75 and for the power cable that create surge and inductance.
- (2) The shielded cable for connecting QD75 can be secured in place. If the shielded cable is not secured, unevenness or movement of the shielded cable or careless pulling on it could result in damage to the QD75 or drive unit or shielded cable or defective cable connections could cause mis-operation of the unit.
- (3) If a duct is being used and cables to connect to QD75 are separated from the power line duct, use metal piping. Ground the pipes securely after metal piping.
- (4) The cable is to use the twisted pair shielded cable (wire size 0.3 mm^2). The shielded must be grounded on the QD75 side.

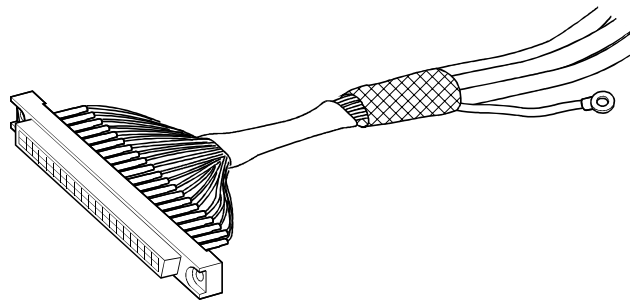
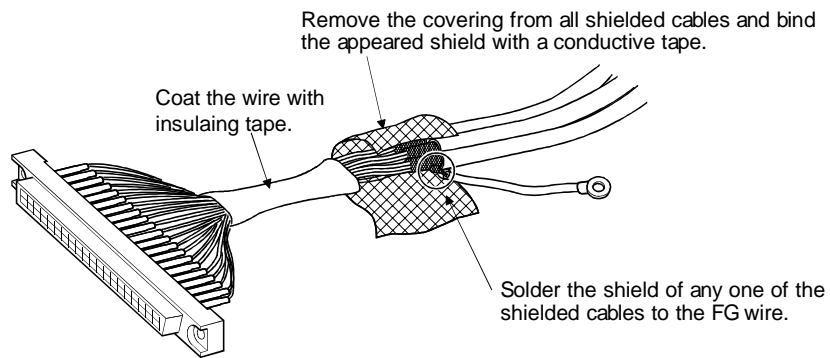
[Wiring example of shielded cable]

The following shows a wiring example for noise reduction in the case where the connector A6CON1 is used.

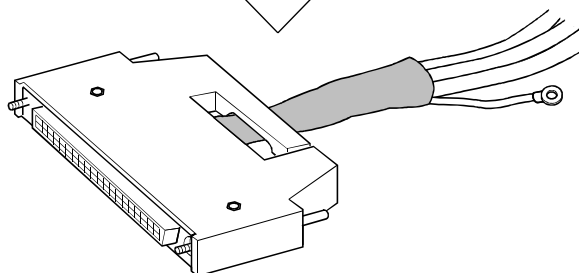
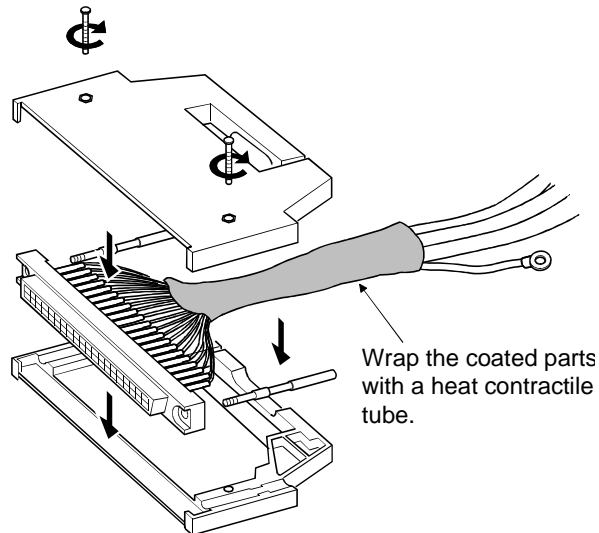


[Processing example of shielded cables]

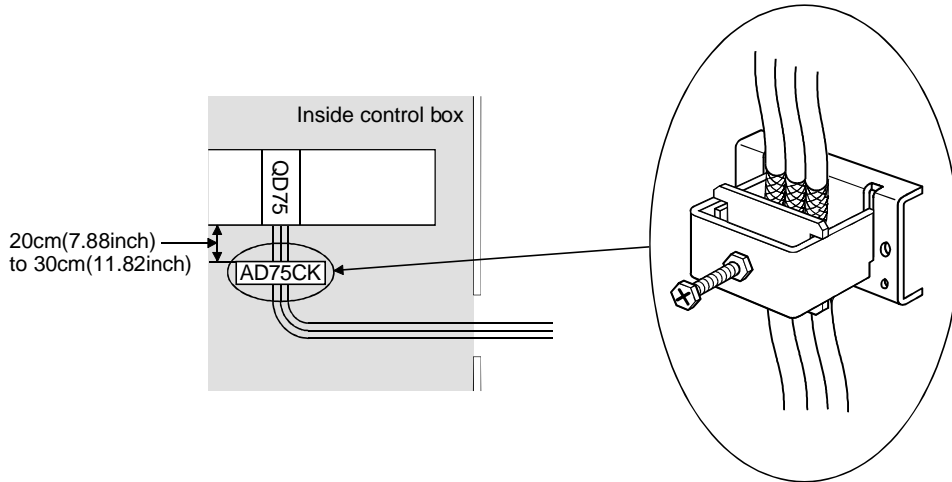
Connections of FG wire and each shielded cable



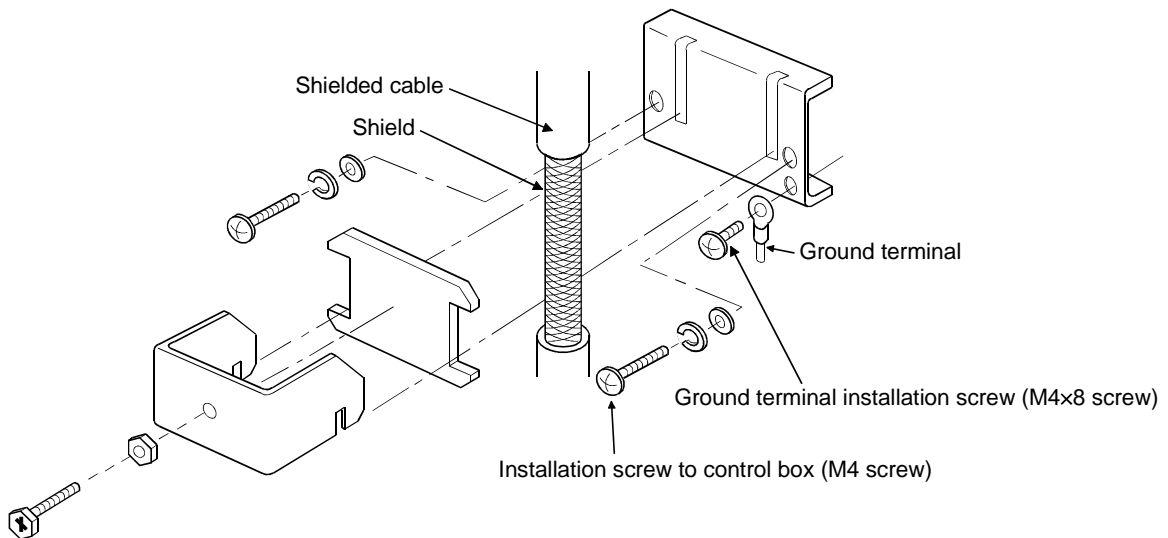
Assembling of connector (A6CON1)



- (5) To make this product conform to the EMC directive and low voltage instruction, be sure to use of a AD75CK type cable clamp (manufactured by Mitsubishi Electric) for grounding connected to the control box and the shielded cable/ the SSCNET cable.

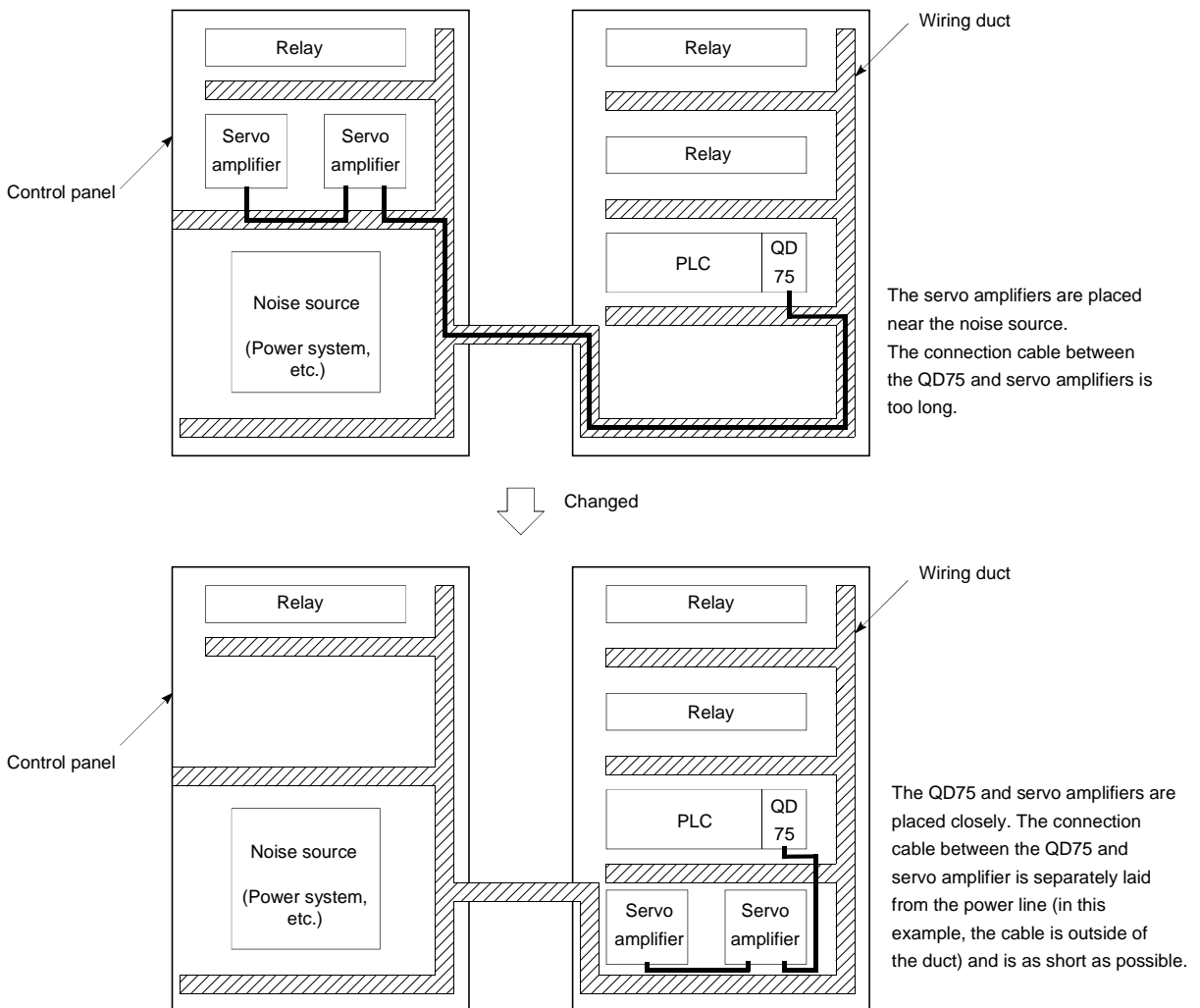


[How to ground shielded cable using AD75CK]



Using the AD75CK, you can tie four cables of about 7mm outside diameter together for grounding.

[Wiring examples using duct (incorrect example and corrected example)]



POINTS

(1) The noise reduction techniques might be decreased the noise by installing ferrite core in the cable connected with QD75.
Refer to this manual and the servo amplifier manual for the noise reduction technique related to the connection of servo amplifier and QD75.

(2) The influence of the noise is decreased by constructing the system configuration which can suit EMC directive even when the agreement of EMC directive is unnecessary.
To make this product conform to the EMC directive, please refer to chapter 3. "EMC AND LOW-VOLTAGE DIRECTIVES" of the using PLC CPU module User's Manual (Hardware).

4.4 Confirming the installation and wiring

4.4.1 Items to confirm when installation and wiring are completed

Check the following points when completed with the QD75 installation and wiring.

- Is the module correctly wired? ... "Connection confirmation"

With "connection confirmation", the following three points are confirmed using GX Configurator-QP's connection confirmation function. (GX Configurator-QP is required for this "connection confirmation".)

- Are the QD75 and servo amplifier correctly connected?
- Are the servo amplifier and servomotor correctly connected?
- Are the QD75 and external device (input/output signal) correctly connected?

With this "connection confirmation", "whether the direction that the QD75 recognizes as forward run matches the address increment direction in the actual positioning work", and "whether the QD75 recognizes the external input/output signals such as the near-point dog signal and stop signal" can be checked.

Refer to GX Configurator-QP Operating Manual for details on "Connection confirmation".

Note that GX Developer may also be used to "confirm the connection between the QD75 and external device (I/O signals).

For details, refer to Section 13.5 "External I/O signal monitor function" and GX Developer Operating Manual (SW6D5C-GPPW-E or later).

| |
|------------------|
| Important |
|------------------|

| |
|---|
| <p>If the QD75 is faulty, or when the required signals such as the near-point dog signal and stop signal are not recognized, unexpected accidents such as "not decelerating at the near-point dog during machine OPR and colliding with the stopper", or "not being able to stop with the stop signal" may occur. The "connection confirmation" must be carried out not only when structuring the positioning system, but also when the system has been changed with module replacement or rewiring, etc.</p> |
|---|

4.5 Maintenance

4.5.1 Precautions for maintenance

The precautions for servicing the QD75 are given below. Refer to this section as well as "4.1.3 Handling precautions" when carrying out the work.

DANGER

- Completely turn off the externally supplied power used in the system before clearing or tightening screws.
Not doing so may cause electric shocks.

CAUTION

- Never disassemble or modify the module.
Failure to observe this could lead to trouble, malfunctioning, injuries or fires.
- Completely turn off the externally supplied power used in the system before installing or removing the module.
Not doing so may cause an operation failure or damage to the module.

4.5.2 Disposal instructions

CAUTION

- When disposing of the product, handle it as industrial waste.

Chapter 5 Data Used for Positioning Control

The parameters and data used to carry out positioning control with the QD75 are explained in this chapter.

With the positioning system using the QD75, the various parameters and data explained in this chapter are used for control. The parameters and data include parameters set according to the device configuration, such as the system configuration, and parameters and data set according to each control. Read this section thoroughly and make settings according to each control or application.

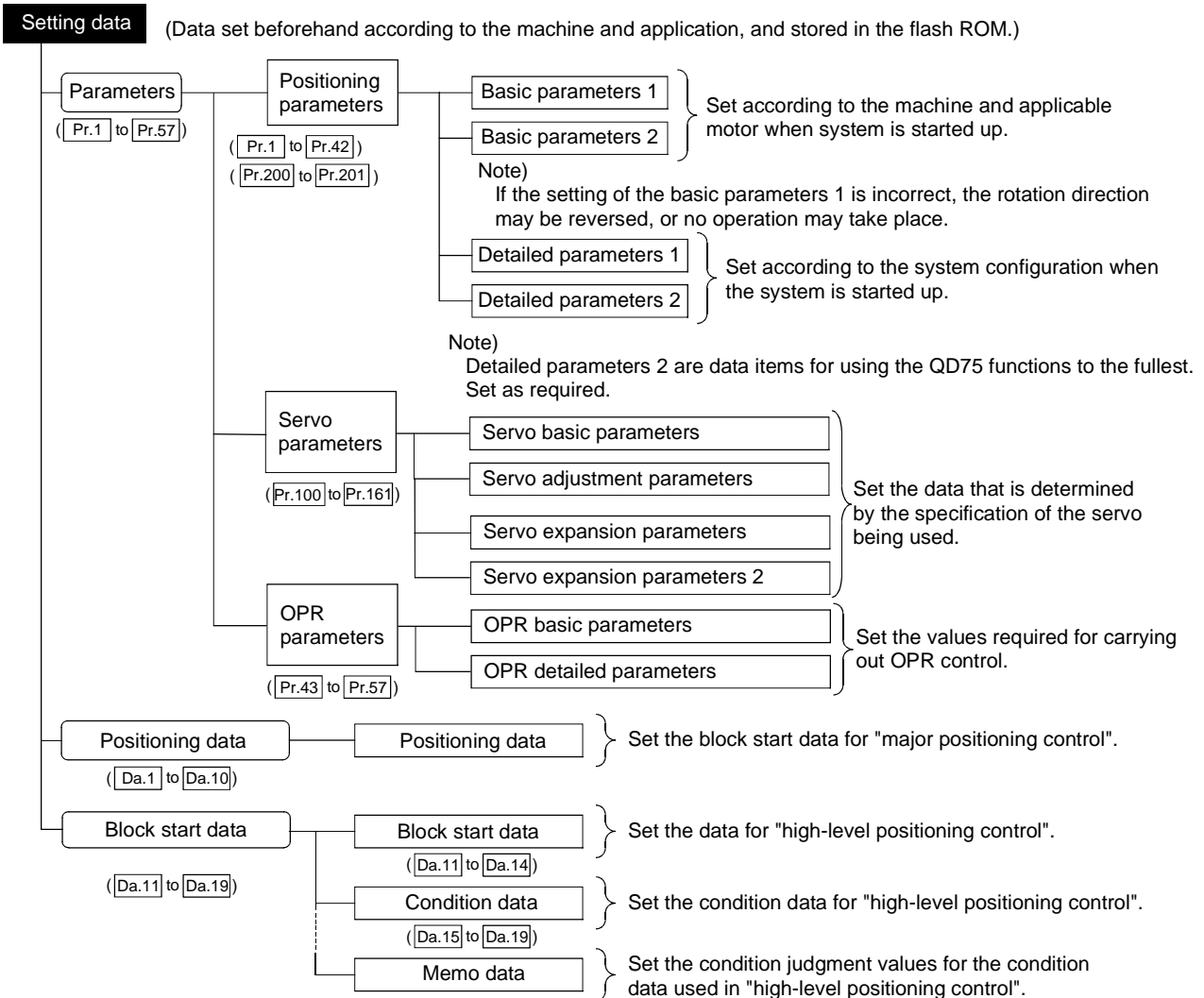
*Refer to Section 2 for details on each control.

| | | |
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5.1 Types of data

5.1.1 Parameters and data required for control

The parameters and data required to carry out control with the QD75 include the "setting data", "monitor data" and "control data" shown below.



- ◇ The data is set with the PLC program or peripheral device.
In this chapter, the method using the peripheral device will be explained.
(Refer to "Point" on the next page.)
- ◇ The basic parameters 1, detailed parameters 1, and OPR parameters become valid when the PLC READY signal [Y0] turns from OFF to ON.
- ◇ The basic parameters 2 and detailed parameters 2 become valid immediately when they are written to the buffer memory, regardless of the state of the PLC READY signal [Y0].
- ◇ Even when the PLC READY signal [Y0] is ON, the values or contents of the following can be changed: basic parameters 2, detailed parameters 2, positioning data, and block start data.

- ◇ The servo parameter is transmitted from QD75 to the servo amplifier when the initialized communication carried out after the power supply is turned ON or the PLC CPU is reset.

The power supply is turned ON or the PLC CPU is reset after writing servo parameter in flash ROM of QD75 if the servo parameter is transmitted to the servo amplifier.

The following servo parameter in the buffer memory is transmitted to the servo amplifier when the PLC READY [Y0] turns from OFF to ON.

- Pr.108 Auto tuning (Servo basic parameter)
- Pr.112 Load inertia ratio (Servo adjustment parameter)
- Pr.113 Position loop gain 1 (Servo adjustment parameter)
- Pr.115 Position loop gain 2 (Servo adjustment parameter)
- Pr.114 Speed loop gain 1 (Servo adjustment parameter)
- Pr.116 Speed loop gain 2 (Servo adjustment parameter)
- Pr.117 Speed integral compensation (Servo adjustment parameter)
- Pr.119 Feed forward gain (Servo adjustment parameter)

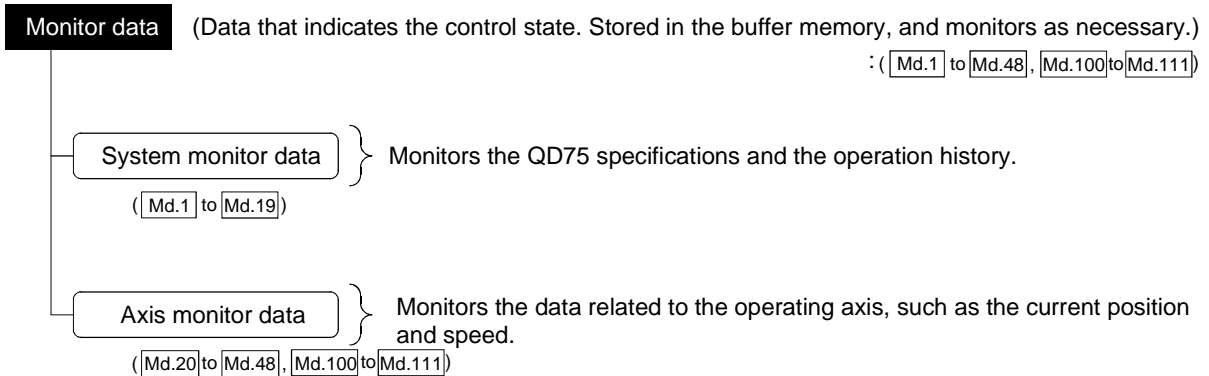
- ◇ The only valid data assigned to these parameters are the data read at the moment when a positioning or JOG operation is started. Once the operation has started, any modification to the data is ignored.

Exceptionally, however, modifications to the following are valid even when they are made during a positioning operation: acceleration time 0 to 3, deceleration time 0 to 3, and external start command.

- Acceleration time 0 to 3 and deceleration time 0 to 3:

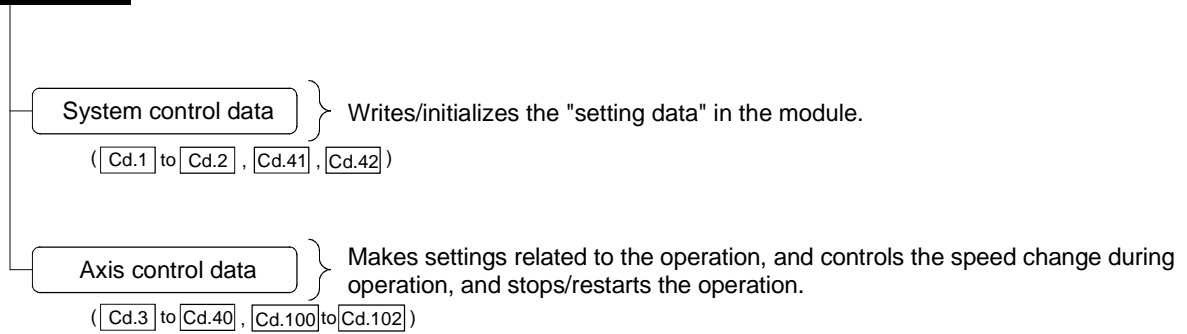
Positioning data are pre-read and pre-analyzed. Modifications to the data four or more steps after the current step are valid.

- External command function selection: The value at the time of detection is valid.



- ◇ The data is monitored with the PLC program or peripheral device. In this chapter, the method using the peripheral device will be explained.

Control data (Data for user to control positioning system.) : (Cd.1 to Cd.42, Cd.100 to Cd.102)



◇ Control using the control data is carried out with the PLC program.
Cd.41 "Deceleration start flag valid" is valid for only the value at the time when the PLC READY signal [Y0] turns from OFF to ON.

POINT

- (1) The "setting data" is created for each axis.
- (2) The "setting data" parameters have determined default values, and are set to the default values before shipment from the factory. (Parameters related to axes that are not used are left at the default value.)
- (3) The "setting data" can be initialized with GX Configurator-QP or the PLC program.
- (4) It is recommended to set the "setting data" with GX Configurator-QP. When executed with the PLC program, many PLC programs and devices must be used. This will not only complicate the program, but will also increase the scan time.

5.1.2 Setting items for positioning parameters

The table below lists items set to the positioning parameters. Setting of positioning parameters is similarly done for individual axes for all controls achieved by the QD75. For details of controls, refer to Section 2. For details of setting items, refer to "5.2 List of parameters".

| Control | | | Major positioning control | | | | | | | | | Manual control | | Related sub function |
|-----------------------|--|--|---------------------------|--|--|---------------------------------------|---------------------------|--|------------------------|--|----------------------------------|------------------------------------|--------|----------------------|
| | | | OPR control | Position control | | | | Speed-position or position-speed control | Other control | | Manual pulse generator operation | JOG operation Inching operation | | |
| | | | | 1-axis linear control 2/3/4-axis linear interpolation control | 1-axis fixed-feed control 2/3/4-axis fixed-feed control | 2-axis circular interpolation control | 1 to 4 axis speed control | | Current value changing | JUMP instruction, NOP instruction, LOOP to LEND | | | | |
| Positioning parameter | | | | | | | | | | | | | | |
| Basic parameters 1 | Pr.1 | Unit setting | ⊙ | ⊙ | ⊙ | △ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | |
| | Pr.2 | No. of pulses per rotation (AP) (Unit: PLS) | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | 12.3.2 | |
| | Pr.3 | Movement amount per rotation (AL) | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | |
| | Pr.4 | Unit magnification (AM) | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | | |
| | Pr.7 | Bias speed at start | × | × | × | × | × | × | × | × | × | × | - | |
| Basic parameters 2 | Pr.8 | Speed limit value | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | - | - | ⊙ | 12.4.1 | |
| | Pr.9 | Acceleration time 0 | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | - | - | ⊙ | 12.7.7 | |
| | Pr.10 | Deceleration time 0 | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | - | - | ⊙ | | |
| Detailed parameters 1 | Pr.11 | Back compensation amount | ○ | ○ | ○ | ○ | ○ | ○ | - | - | ○ | ○ | 12.3.1 | |
| | Pr.12 | Software stroke limit upper limit value | - | ○ | ○ | ○ | ○ | ○ | - | - | ○ | ○ | 12.4.3 | |
| | Pr.13 | Software stroke limit lower limit value | - | ○ | ○ | ○ | ○ | ○ | - | - | ○ | ○ | | |
| | Pr.14 | Software stroke limit selection | - | ○ | ○ | ○ | ○ | ○ | - | - | ○ | ○ | | |
| | Pr.15 | Software stroke limit valid/invalid selection | - | - | - | - | - | - | ○ | ○ | ○ | ○ | | |
| | Pr.16 | Command in-position width | - | ○ | ○ | ○ | - | ○ | - | - | - | - | 12.7.6 | |
| | Pr.17 | Torque limit setting value | △ | ○ | ○ | ○ | ○ | ○ | - | - | △ | △ | 12.4.2 | |
| | Pr.18 | M code ON signal output timing | - | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | 12.7.3 | |
| | Pr.19 | Speed switching mode | - | ○ | ○ | ○ | - | ○ | - | - | - | - | - | |
| | Pr.20 | Interpolation speed designation method | - | △ | △ | △ | △ | - | - | - | - | - | - | |
| | Pr.21 | Current feed value during speed control | - | - | - | - | ○ | ○ | - | - | - | - | - | |
| Pr.22 | Input signal logic selection | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | | |
| Pr.24 | Manual pulse generator input selection | - | - | - | - | - | - | - | - | ⊙ | - | - | | |
| Pr.200 | Speed-position function selection | - | - | - | - | - | ⊙ | - | - | - | - | - | | |

- ⊙ : Always set
- : Set as required (Read "-" when not required.)
- ×
- △ : Setting restricted
- : Setting not required. (This is an irrelevant item, so the set value will be ignored. If the value is the default value or within the setting range, there is no problem.)

| Positioning parameter | | Control | OPR control | Major positioning control | | | | | | | Manual control | | Related sub function |
|-----------------------|--------|--|-------------|--|--|---------------------------------------|--|---------------|----------------------------------|------------------------------------|---------------------------|------------------------|----------------------|
| | | | | Position control | | | Speed-position or position-speed control | Other control | Manual pulse generator operation | JOG operation Inching operation | | | |
| | | | | 1-axis linear control 2/3/4-axis linear interpolation control | 1-axis fixed-feed control 2/3/4-axis fixed-feed control | 2-axis circular interpolation control | | | | | 1 to 4 axis speed control | Current value changing | |
| | | | | | | | | | | | | | |
| Detailed parameters 2 | Pr.25 | Acceleration time 1 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | 12.7.7 |
| | Pr.26 | Acceleration time 2 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.27 | Acceleration time 3 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.28 | Deceleration time 1 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.29 | Deceleration time 2 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.30 | Deceleration time 3 | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.31 | JOG speed limit value | - | - | - | - | - | - | - | - | - | ⊙ | 12.4.1 |
| | Pr.32 | JOG operation acceleration time selection | - | - | - | - | - | - | - | - | - | ⊙ | - |
| | Pr.33 | JOG operation deceleration time selection | - | - | - | - | - | - | - | - | - | ⊙ | - |
| | Pr.34 | Acceleration/deceleration process selection | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | 12.7.7 |
| | Pr.35 | S-pattern proportion | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.36 | Sudden stop deceleration time | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.37 | Stop group 1 sudden stop selection | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | |
| | Pr.38 | Stop group 2 sudden stop selection | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | - |
| | Pr.39 | Stop group 3 sudden stop selection | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | ○ | - |
| | Pr.40 | Positioning complete signal output time | ○ | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - |
| | Pr.41 | Allowable circular interpolation error width | - | - | - | ○ | - | - | - | - | - | - | - |
| | Pr.42 | External command function selection | ○ | ○ | ○ | ○ | ○ | ⊙ | ○ | - | - | ○ | 12.5.1 12.7.2 |
| | Pr.201 | Restart allowable range when servo OFF to ON | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | 5.2.4 |

- ⊙: Always set
- : Set as required ("-" when not set)
- : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

■ Checking the positioning parameters

Pr.1 to Pr.42 are checked with the following timing.

- (1) When the "PLC READY signal [Y0]" output from the PLC CPU to the QD75 changes from OFF to ON
- (2) When the test operation button is turned ON in the test mode using GX Configurator-QP
- (3) When an error check is carried out with GX Configurator-QP

REMARK

- "High-level positioning control" is carried out in combination with the "major positioning control". Refer to the "major positioning control" parameter settings for details on the parameters required for "high-level positioning control".

5.1.3 Setting items for OPR parameters

When carrying out "OPR control", the "OPR parameters" must be set. The setting items for the "OPR parameters" are shown below.

The "OPR parameters" are set commonly for each axis.

Refer to Chapter 8 "OPR control" for details on the "OPR control", and to Section 5.2 "List of parameters" for details on each setting item.

| OPR parameters | | OPR control | | | | Machine OPR control | | Fast OPR control |
|-------------------------|-------|---|-----------------|-----------------|-----------------|---------------------|--|------------------|
| | | Near-point dog method | Count method 1) | Count method 2) | Data set method | | | |
| OPR basic parameters | Pr.43 | OPR method | | | | | | ○ |
| | Pr.44 | OPR direction | ◎ | ◎ | ◎ | ◎ | | |
| | Pr.45 | OP address | ◎ | ◎ | ◎ | ◎ | | |
| | Pr.46 | OPR speed | ◎ | ◎ | ◎ | - | | |
| | Pr.47 | Creep speed | ◎ | ◎ | ◎ | - | | |
| | Pr.48 | OPR retry | R | R | R | - | | |
| OPR detailed parameters | Pr.49 | OPR dwell time | - | - | - | - | | |
| | Pr.50 | Setting for the movement amount after near-point dog ON | - | ◎ | ◎ | - | | |
| | Pr.51 | OPR acceleration time selection | ◎ | ◎ | ◎ | - | | |
| | Pr.52 | OPR deceleration time selection | ◎ | ◎ | ◎ | - | | |
| | Pr.53 | OP shift amount | S | S | S | - | | |
| | Pr.54 | OPR torque limit value | - | - | - | - | | |
| | Pr.56 | Speed designation during OP shift | S | S | S | - | | |
| | Pr.57 | Dwell time during OPR retry | R | R | R | - | | |

◎ : Always set

○ : Preset parameters are used for machine OPR control.

- : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

R : Set when using the "12.2.1 OPR retry function". ("-" when not set.)

S : Set when using the "12.2.2 OP shift function". ("-" when not set.)

■ Checking the OPR parameters.

Pr.43 to Pr.57 are checked with the following timing.

- (1) When the "PLC READY signal [Y0]" output from the PLC CPU to the QD75 changes from OFF to ON
- (2) When the test operation button is turned ON in the test mode using GX Configurator-QP
- (3) When an error check is carried out with GX Configurator-QP

5.1.4 Setting items for servo parameters

The servo parameters are used to control the servomotor and the data that is determined by the specification of the servo being used.

The table below lists items set to the servo parameters.

| | | Servo amplifier | | | | | | | Remark |
|-----------------------------|--------|---|----------|---------|----------|----------|----------|---|----------------------------|
| | | MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | |
| Servo parameters | | | | | | | | | |
| Servo basic parameters | Pr.100 | Servo series | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | Refer to the section 5.2.7 |
| | Pr.101 | Amplifier setting | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | |
| | Pr.102 | Regenerative brake resistor | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | |
| | Pr.103 | Motor type | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.104 | Motor capacity | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | |
| | Pr.105 | Servo motor speed | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.106 | Feed back pulse | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | |
| | Pr.107 | Rotation direction selection | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | |
| | Pr.108 | Auto tuning | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.109 | Servo response | ○ | ○ | ○ | ○ | ○ | ○ | |
| Servo adjustment parameters | Pr.112 | Load inertia ratio | △ | △ | △ | △ | △ | △ | |
| | Pr.113 | Position loop gain 1 | △ | △ | △ | △ | △ | △ | |
| | Pr.114 | Speed loop gain 1 | △ | △ | △ | △ | △ | △ | |
| | Pr.115 | Position loop gain 2 | △ | △ | △ | △ | △ | △ | |
| | Pr.116 | Speed loop gain 2 | △ | △ | △ | △ | △ | △ | |
| | Pr.117 | Speed integral compensation | △ | △ | △ | △ | △ | △ | |
| | Pr.118 | Machine resonance suppression filter | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.119 | Feed forward gain | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.120 | In-position range | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.121 | Electromagnetic brake sequence output | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.122 | Analog monitor output | ○ | ○ | ○ | ○ | - | ○ | |
| | Pr.123 | Optional function 1 | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.124 | Optional function 2 | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.125 | Adaptive vibration suppression control/ low pass filter | - | - | - | ○ | - | ○ | |

- ⊙: Always set
- : Set as required ("-" when not set)
- △: Setting restricted
- : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

| Servo amplifier | | MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | Remark | |
|------------------------------|--|---|----------|---------|----------|----------|----------|--------|----------------------------|
| | | | | | | | | | |
| Servo parameters | | | | | | | | | |
| Servo expansion parameters 1 | Pr.127 | Monitor output 1 offset | ○ | ○ | ○ | ○ | - | ○ | |
| | Pr.128 | Monitor output 2 offset | ○ | ○ | ○ | ○ | - | ○ | |
| | Pr.129 | Pre-alarm data selection | ○ | ○ | - | - | - | - | |
| | Pr.130 | Zero speed | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.131 | Error excessive alarm level | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.132 | Optional function 5 | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.133 | Optional function 6 | - | - | - | ○ | - | ○ | |
| | Pr.134 | PI-PID control switch-over position droop | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.136 | Speed differential compensation | ○ | ○ | ○ | ○ | ○ | ○ | |
| | Pr.138 | Encoder output pulses | - | - | - | ○ | - | ○ | |
| Servo expansion parameters 2 | Pr.143 | Slight vibration suppression control selection 1 | - | - | - | ○ | - | ○ | Refer to the section 5.2.7 |
| | Pr.144 | Slight vibration suppression control selection 2 | - | - | - | ○ | - | ○ | |
| | Pr.145 | Induction voltage compensation | - | - | - | ○ | - | ○ | |
| | Pr.149 | Gain changing selection | - | - | - | ○ | - | ○ | |
| | Pr.150 | Gain changing condition | - | - | - | ○ | - | ○ | |
| | Pr.151 | Gain changing time constant | - | - | - | ○ | - | ○ | |
| | Pr.152 | Ratio of load inertia moment to servomotor inertia moment 2 | - | - | - | ○ | - | ○ | |
| | Pr.153 | Position loop gain 2 changing ratio | - | - | - | ○ | - | ○ | |
| | Pr.154 | Speed loop gain 2 changing ratio | - | - | - | ○ | - | ○ | |
| | Pr.155 | Speed integral compensation changing ratio | - | - | - | ○ | - | ○ | |
| Pr.160 | Optional function C | - | - | - | ○ | - | ○ | | |
| Pr.161 | Machine resonance suppression filter 2 | - | - | - | ○ | - | ○ | | |

- ◎: Always set
- : Set as required ("-" when not set)
- △: Setting restricted
- : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

5.1.5 Setting items for positioning data

Positioning data must be set for carrying out any "major positioning control". The table below lists the items to be set for producing the positioning data.

One to 600 positioning data items can be set for each axis.

For details of the major positioning controls, refer to Chapter 9 "Major Positioning Control". For details of the individual setting items, refer to Section 5.3 "List of positioning data".

| Major positioning control | | | Position control | | | | | Other control | | | | | |
|---------------------------|--|---|---|--|--|--|--|-------------------------------------|------------------------|--|---------------------------------|------|------|
| | | | 1-axis linear control 2/3/4-axis linear interpolation control | 1-axis fixed-feed control 2/3/4-axis fixed-feed control | 2-axis circular interpolation control | 1 to 4 axis speed control | Speed-position switching control | Position-speed switching control | NOP instruction | Current value changing | JUMP instruction | LOOP | LEND |
| Positioning data | | | | | | | | | | | | | |
| Da.1 | Operation pattern | Independent positioning control | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | ⊙ | - | - | - |
| | | Continuous positioning control | ⊙ | ⊙ | ⊙ | × | ⊙ | × | - | ⊙ | - | - | - |
| | | Continuous path control | ⊙ | × | ⊙ | × | × | × | - | × | - | - | - |
| Da.2 | Control system | Linear 1 Linear 2 Linear 3 Linear 4 * | Fixed-feed 1 Fixed-feed 2 Fixed-feed 3 Fixed-feed 4 | Circular sub Circular right Circular left * | Forward run speed 1 Reverse run speed 1 Forward run speed 2 Reverse run speed 2 Forward run speed 3 Reverse run speed 3 Forward run speed 4 Reverse run speed 4 | Forward run speed/ position Reverse run speed/ position | Forward run position/ speed Reverse run position/ speed | NOP instruction | Current value changing | JUMP instruction | LOOP | LEND | |
| Da.3 | Acceleration time No. | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | |
| Da.4 | Deceleration time No. | ○ | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - | |
| Da.6 | Positioning address/ movement amount | ⊙ | ⊙ | ⊙ | - | ⊙ | ⊙ | - | New address | - | - | - | |
| Da.7 | Arc address | - | - | ⊙ | - | - | - | - | - | - | - | - | |
| Da.8 | Command speed | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | - | - | - | - | - | |
| Da.9 | Dwell time (JUMP destination positioning data No.) | ○ | ○ | ○ | ○ | ○ | ○ | - | - | JUMP destination positioning data No. | - | - | |
| Da.10 | M code (JUMP condition data No.) | ○ | ○ | ○ | ○ | ○ | ○ | - | ○ | JUMP condition data No. | No. of LOOP to LEND repetitions | - | |

- ⊙ : Always set
- : Set as required (Read "-" when not required.)
- ×
- : Setting not possible.
- : Setting not required.
(This is an irrelevant item, so the set value will be ignored. If the value is the default value or within the setting range, there is no problem.)
- * : Two control systems are available: the absolute (ABS) system and incremental (INC) system.

■ Checking the positioning data

The items Da.1 to Da.10 are checked at the following timings:

- (1) Startup of a positioning operation
- (2) Error check performed by GX Configurator-QP

5.1.6 Setting items for block start data

The "block start data" must be set when carrying out "high-level positioning control".
 The setting items for the " block start data" are shown below.
 Up to 50 points of " block start data" can be set for each axis.
 Refer to Chapter 10 "High-level Positioning Control" for details on the "high-level positioning control", and to Section 5.4 "List of block start data" for details on each setting item.

| High-level positioning control | | Block start (Normal start) | Condition start | Wait start | Simultaneous start | Repeated start (FOR loop) | Repeated start (FOR condition) |
|--------------------------------|---------------------------|----------------------------|-----------------|------------|--------------------|---------------------------|--------------------------------|
| Block start data | | | | | | | |
| Da.11 | Shape (end/continue) | ○ | ○ | ○ | ○ | ○ | ○ |
| Da.12 | Start data No. | ○ | ○ | ○ | ○ | ○ | ○ |
| Da.13 | Special start instruction | — | ○ | ○ | ○ | ○ | ○ |
| Da.14 | Parameter | — | ○ | ○ | ○ | ○ | ○ |

- : Set as required ("—" when not set)
- : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

■ Checking the block start data

Da.11 to Da.14 are checked with the following timing.

- (1) When the "Block start data" starts
- (2) When an error check is carried out with GX Configurator-QP

5.1.7 Setting items for condition data

When carrying out "high-level positioning control" or using the JUMP instruction in the "major positioning control", the "condition data" must be set as required. The setting items for the "condition data" are shown below.

Up to 10 "condition data" items can be set for each axis.

Refer to Chapter 10 "High-level Positioning Control" for details on the "high-level positioning control", and to Section 5.5 "List of condition data" for details on each setting item.

| Control | | Major positioning control | | High-level positioning control | | | | | |
|---------|--------------------|-----------------------------|------------------|--------------------------------|-----------------|------------|--------------------|---------------------------|--------------------------------|
| | | Other than JUMP instruction | JUMP instruction | Block start (Normal start) | Condition start | Wait start | Simultaneous start | Repeated start (FOR loop) | Repeated start (FOR condition) |
| Da.15 | Condition target | – | ○ | – | ○ | ○ | ○ | – | ○ |
| Da.16 | Condition operator | – | ○ | – | ○ | ○ | ○ | – | ○ |
| Da.17 | Address | – | △ | – | △ | △ | – | – | △ |
| Da.18 | Parameter 1 | – | ○ | – | ○ | ○ | △ | – | ○ |
| Da.19 | Parameter 2 | – | △ | – | △ | △ | △ | – | △ |

○ : Set as required ("–" when not set)

△ : Setting limited

– : Setting not required (This is an irrelevant item, so the setting value will be ignored. If the value is the default value or within the setting range, there is no problem.)

■ Checking the condition data

Da.15 to Da.19 are checked with the following timing.

- (1) When the "Block start data" starts
- (2) When "JUMP instruction" starts
- (3) When an error check is carried out with GX Configurator-QP

5.1.8 Types and roles of monitor data

The monitor data area in the buffer memory stores data relating to the operating state of the positioning system, which are monitored as required while the positioning system is operating.

The following data are available for monitoring.

- System monitoring:

Monitoring of the QD75 configuration and operation history (through the system monitor data [Md.1](#) through [Md.19](#))

- Axis operation monitoring:

Monitoring of the current position and speed, and other data related to the movements of axes (through the axis monitor data [Md.20](#) through [Md.48](#))

* The axis monitor data are refreshed every 3.5 ms. Note that "[Md.21](#) Machine feed value", "[Md.22](#) Feedrate", "[Md.28](#) Axis feedrate" and "[Md.30](#) External input signal" are refreshed every 56.8ms. Also, "[Md.23](#) Valid M code", is updated when the "M code ON signal [X4, X5, X6, X7]" turns ON.

[1] Monitoring the system

■ Monitoring the positioning system operation history

| Monitoring details | | Corresponding item | | |
|--|---------------------------------------|-----------------------|------------------------------------|---|
| Whether the system is in the test mode or not | | Md.1 | In test mode flag | |
| History of data that started an operation | Start information | Md.3 | Start information | |
| | Start No. | Md.4 | Start No. | |
| | Start | Hour | Md.5 | Start (Hour) |
| | | Minute:second | Md.6 | Start (Minute:second) |
| | Error upon starting | Md.7 | Error judgment | |
| | Latest pointer No. | Md.8 | Start history pointer | |
| History of all errors | Axis in which the error occurred | Md.9 | Axis in which the error occurred | |
| | Axis error No. | Md.10 | Axis error No. | |
| | Axis error occurrence | Hour | Md.11 | Axis error occurrence (Hour) |
| | | Minute:second | Md.12 | Axis error occurrence (Minute:second) |
| | Latest pointer No. | Md.13 | Error history pointer | |
| History of all warnings | Axis in which the warning occurred | Md.14 | Axis in which the warning occurred | |
| | Axis warning No. | Md.15 | Axis warning No. | |
| | Axis warning occurrence | Hour | Md.16 | Axis warning occurrence (Hour) |
| | | Minute:second | Md.17 | Axis warning occurrence (Minute:second) |
| | Latest pointer No. | Md.18 | Warning history pointer | |
| Number of write accesses to the flash ROM after the power is switched ON | Number of write accesses to flash ROM | Md.19 | No. of write accesses to flash ROM | |

[2] Monitoring the axis operation state

■ Monitoring the position

| Monitor details | Corresponding item |
|--|--|
| Monitor the current machine feed value | Md.21 Machine feed value |
| Monitor the current "current feed value" | Md.20 Current feed value |
| Monitor the current target value | Md.32 Target value |

■ Monitoring the speed

| Monitor details | | Corresponding item | |
|----------------------------------|---|---|---|
| Monitor the current speed | During independent axis control | Indicates the speed of each axis | |
| | During interpolation control | When "0: Composite speed" is set for " Pr.20 Interpolation speed designation method" | Indicates the composite speed Md.22 Feedrate |
| | | When "1: Reference axis speed" is set for " Pr.20 Interpolation speed designation method" | Indicates the reference axis speed |
| | Constantly indicates the speed of each axis | | Md.28 Axis feedrate |
| Monitor the current target speed | | Md.33 Target speed | |

■ Monitoring the state

| Monitor details | Corresponding item |
|--|--|
| Monitor the axis operation state | Md.26 Axis operation status |
| Monitor the latest error code that occurred with the axis | Md.23 Axis error No. |
| Monitor the latest warning code that occurred with the axis | Md.24 Axis warning No. |
| Monitor the external input/output signal and flag | Md.30 External input/output signal Md.31 Status |
| Monitor the valid M codes | Md.25 Valid M code |
| Monitor whether the speed is being limited | Md.39 In speed control flag |
| Monitor whether the speed is being changed | Md.40 In speed change processing flag |
| Monitor the "start data" point currently being executed | Md.43 Start data pointer being executed |
| Monitor the "positioning data No." currently being executed | Md.44 Positioning data No. being executed |
| Monitor the remaining No. of repetitions (special start) | Md.41 Special start repetition counter |
| Monitor the remaining No. of repetitions (control system) | Md.42 Control system repetition counter |
| Monitor the block No. | Md.45 Block No. being executed |
| Monitor the current torque limit value | Md.35 Torque limit stored value |
| Monitor the "instruction code" of the special start data when using special start | Md.36 Special start data instruction code setting value |
| Monitor the "instruction parameter" of the special start data when using special start | Md.37 Special start data instruction parameter setting value |
| Monitor the "start data No." of the special start data when using special start | Md.38 Start positioning data No. setting value |
| Monitor the "positioning data No." executed last | Md.46 Last executed positioning data No. |
| Monitor the positioning data currently being executed | Md.47 Positioning data being executed |
| Monitor the movement amount after the current position control switching when using "speed-position switching control (INC mode)". | Md.29 Speed-position switching control positioning amount |
| Monitor switching from the constant speed status or acceleration status to the deceleration status during position control whose operation pattern is "Positioning complete" | Md.48 Deceleration start flag |

5.1.9 Types and roles of control data

Operation of the positioning system is achieved through the execution of necessary controls. (Data required for controls are given through the default values when the power is switched ON, which can be modified as required by the PLC program.) Controls are performed over system data or machine operation.

- Controlling the system data :

Setting and resetting QD75 setting data (through the system control data Cd.1 , Cd.2)

- Controlling the operation :

Setting operation parameters, changing speed during operation, interrupting or restarting operation (through the axis control data Cd.3 to Cd.42)

[1] Controlling the system data

■ Setting and resetting the setting data

| Control details | Controlled data item |
|---|---|
| Write setting data from buffer memory to flash ROM. | Cd.1 Flash ROM write request |
| Reset (initialize) parameters. | Cd.2 Parameter initialization request |

[2] Controlling the operation

■ Controlling the operation

| Control details | Corresponding item |
|---|---|
| Set which positioning to execute (start No.). | Cd.3 Positioning start No. |
| Clear (reset) the axis error (Md.23) and warning (Md.24). | Cd.5 Axis error reset |
| Issue instruction to restart (When axis operation is stopped). | Cd.6 Restart command |
| End current positioning (deceleration stop), and start next positioning. | Cd.37 Skip command |
| Set start point No. for executing block start. | Cd.4 Positioning starting point No. |
| Stop continuous control. | Cd.18 Interrupt request during continuous operation |
| Set start data Nos. for axes that start up simultaneously. | Cd.30 Simultaneous starting axis start data No. (axis 1 start data No.) |
| | Cd.31 Simultaneous starting axis start data No. (axis 2 start data No.) |
| | Cd.32 Simultaneous starting axis start data No. (axis 3 start data No.) |
| | Cd.33 Simultaneous starting axis start data No. (axis 4 start data No.) |
| Specify write destination for teaching results. | Cd.38 Teaching data selection |
| Specify data to be taught. | Cd.39 Teaching positioning data No. |

■ Controlling operation per step

| Control details | Corresponding item |
|---|--|
| Stop positioning operation after each operation. | Cd.35 Step valid flag |
| Set unit to carry out step. | Cd.34 Step mode |
| Issue instruction to continuous operation or restart from stopped step. | Cd.36 Step start information |

■ Controlling the speed


| Control details | Corresponding item |
|---|---|
| Set new speed when changing speed during operation. | Cd.14 New speed value |
| Issue instruction to change speed in operation to Cd.14 value. (Only during positioning operation and JOG operation). | Cd.15 Speed change request |
| Change positioning operation speed between 1 and 300% range. | Cd.13 Positioning operation speed override |
| Set inching movement amount. | Cd.16 Inching movement amount |
| Set JOG speed. | Cd.17 JOG speed |
| When changing acceleration time during speed change, set new acceleration time. | Cd.10 New acceleration time value |
| When changing deceleration time during speed change, set new deceleration time. | Cd.11 New deceleration time value |
| Set acceleration/deceleration time validity during speed change. | Cd.12 Acceleration/deceleration time change during speed change, enable/disable selection |

■ Making settings related to operation

| Control details | Corresponding item |
|---|--|
| Turn M code ON signal OFF. | Cd.7 M code OFF request |
| Set new value when changing current value. | Cd.9 New current value |
| Validate speed-position switching signal from external source. | Cd.24 Speed-position switching enable flag |
| Change movement amount for position control during speed-position switching control (INC mode). | Cd.23 Speed-position switching control movement amount change register |
| Validate external position-speed switching signal. | Cd.26 Position-speed switching enable flag |
| Change speed for speed control during position-speed switching control. | Cd.25 Position-speed switching control speed change register |
| Set up a flag when target position is changed during positioning. | Cd.29 Target position change request flag |
| Set new positioning address when changing target position during positioning. | Cd.27 Target position change value(new address) |
| Set new speed when changing target position during positioning. | Cd.28 Target position change value(new speed) |
| Set absolute (ABS) moving direction in degrees. | Cd.40 ABS direction in degrees |
| Set manual pulse generator operation validity. | Cd.21 Manual pulse generator enable flag |
| Set scale per pulse of No. of input pulses from manual pulse generator. | Cd.20 Manual pulse generator 1 pulse input magnification |
| Change OPR request flag from "ON to OFF". | Cd.19 OPR request flag OFF request |
| Validate external command signal. | Cd.8 External command valid |
| Change Md.35 Torque limit stored value. | Cd.22 New torque value |
| Set whether " Md.48 Deceleration start flag" is valid or invalid | Cd.41 Deceleration start flag valid |
| Set the stop command processing for deceleration stop function (deceleration curve re-processing/deceleration curve continuation) | Cd.42 Stop command processing for deceleration stop selection |
| Turn Servo ON/OFF command ON by the buffer memory ON. | Cd.100 Servo OFF command |
| Set torque limit value | Cd.101 Torque output setting |

5.2 List of parameters

5.2.1 Basic parameters 1

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | | |
|------------------------------------|--|---|------------------------|-------------------------------------|------------|------------|------------|-----|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Pr.1 Unit setting | 0 : mm 1 : inch 2 : degree 3 : PLS | 0 1 2 3 | 3 | 0 | 150 | 300 | 450 | |
| Movement amount per pulse | Pr.2 No. of pulses per rotation (AP) (Unit : PLS) | 1 to 200000000 | 20000 | 2 3 | 152 153 | 302 303 | 452 453 | * |
| | Pr.3 Movement amount per rotation (AL) | The setting value range differs according to the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set.  | 20000 | 4 5 | 154 155 | 304 305 | 454 455 | * |
| | Pr.4 Unit magnification (AM) | 1 : 1 times 10 : 10 times 100 : 100 times 1000 : 1000 times | 1 10 100 1000 | 1 | 1 | 151 | 301 | 451 |
| Pr.7 Bias speed at start | Not used | | 0 | 6 7 | 156 157 | 306 307 | 456 457 | |

*: This buffer memory address in QD75M is different from QD75P.

Pr.1 Unit setting

Set the unit used for defining positioning operations. Choose from the following units depending on the type of the control target: mm, inch, degree, or PLS. Different units can be defined for different axes (axis 1 to 4).

(Example) Different units (mm, inch, degree, and PLS) are applicable to different systems:

- mm or inch X-Y table, conveyor (Select mm or inch depending on the machine specifications.)
- degree Rotating body (360 degrees/rotation)
- PLS..... X-Y table, conveyor

- When you change the unit, note that the values of other parameters and data will not be changed automatically.
After changing the unit, check if the parameter and data values are within the allowable range.
Set "degree" to exercise speed-position switching control (ABS mode).

Pr.2 to **Pr.4** Electronic gear

Mechanical system value used when the QD75 performs positioning control.

The settings are made using **Pr.2** to **Pr.4**.

The electronic gear is expressed by the following equation.

$$\text{Electronic gear} = \frac{\text{No. of pulses per rotation (AP)}}{\text{Movement amount per rotation (AL)} \times \text{Unit magnification (AM)}}$$

- When positioning has been performed, an error (mechanical system error) may be produced between the specified movement amount and the actual movement amount. (Refer to Section 12.3.2 "Electronic gear function".)

Pr.2 No. of pulses per rotation (AP)

Set the number of pulses required for a complete rotation of the motor shaft.

If you are using the Mitsubishi servo amplifier MR-H-BN/MR-J2-B/MR-J2S-B/MR-J2-03B5 set the value given as the "resolution per servomotor rotation" in the speed/position detector specifications.

$$\text{No. of pulses per rotation (AP)} = \text{Resolution per servomotor rotation}$$

[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) * 1 |
|---------------------------|---|---|
| 0 : mm | 0.1 to 2000000.0 (μm) | 1 to 200000000 (×10 ⁻¹ μm) |
| 1 : inch | 0.00001 to 2000.00000 (inch) | 1 to 200000000 (×10 ⁻⁵ inch) |
| 2 : degree | 0.00001 to 2000.00000 (degree) | 1 to 200000000 (×10 ⁻⁵ degree) |
| 3 : PLS | 1 to 200000000 (PLS) | 1 to 200000000 (PLS) |

Pr.3 Movement amount per rotation (AL), **Pr.4** Unit magnification (AM)

The amount how the workpiece moves with one motor rotation is determined by the mechanical structure.

If the worm gear lead (μm/rev) is PB and the deceleration rate is 1/n, then

$$\text{Movement amount per rotation (AL)} = \text{PB} \times 1/n$$

However, the maximum value that can be set for this "movement amount per rotation (AL)" parameter is 20000000.0 μ m (20m). Set the "movement amount per rotation (AL)" as shown below so that the "movement amount per rotation (AL)" does not exceed this maximum value.

$$\begin{aligned} \text{Movement amount per rotation (AL)} \\ &= \text{PB} \times 1/n \\ &= \text{Movement amount per rotation (AL)} \times \text{Unit magnification (AM)} \end{aligned}$$


Note) The unit magnification (AM) is a value of 1, 10, 100 or 1000. If the "PB \times 1/n" value exceeds 20000000.0 μ m (20m), adjust with the unit magnification so that the "movement amount per rotation (AL)" does not exceed 20000000.0 μ m (20m).

*1: Refer to the section 12.3.2 Electric gear function information about electric gear.

Pr.7 Bias speed at start

Do not set other than the default value "0".

5.2.2 Basic parameters 2

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--------------------------------|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Pr.8] Speed limit value | The setting range differs depending on the " [Pr.1] Unit setting". Here, the value within the [Table 1] range is set.  | | 200000 | 10 11 | 160 161 | 310 311 | 460 461 |
| [Pr.9] Acceleration time 0 | 1 to 8388608 (ms) | 1 to 8388608 (ms) | 1000 | 12 13 | 162 163 | 312 313 | 462 463 |
| [Pr.10] Deceleration time 0 | 1 to 8388608 (ms) | 1 to 8388608 (ms) | 1000 | 14 15 | 164 165 | 314 315 | 464 465 |

[Table 1]

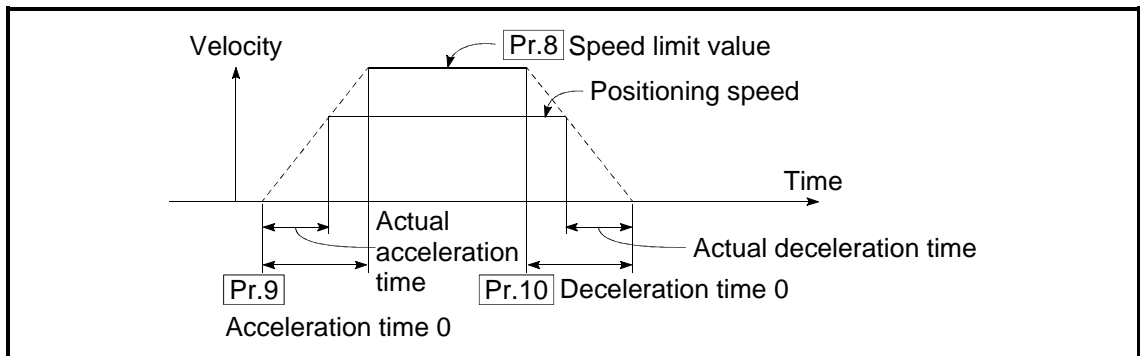
| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0.01 to 20000000.00 (mm/min) | 1 to 2000000000 ($\times 10^{-2}$ mm/min) |
| 1 : inch | 0.001 to 2000000.000 (inch/min) | 1 to 2000000000 ($\times 10^{-3}$ inch/min) |
| 2 : degree | 0.001 to 2000000.000 (degree/min) | 1 to 2000000000 ($\times 10^{-3}$ degree/min) |
| 3 : PLS | 1 to 10000000 (PLS/s) | 1 to 10000000 (PLS/s) |

Pr.8 Speed limit value

Set the maximum speed during positioning and OPR operations.
 The maximum speed during positioning control has to be limited in consideration of the drive unit and control target specifications.
 Take account of the following when determining the speed limit value:
 1) Motor speed
 2) Workpiece movement speed



Pr.9 Acceleration time 0, **Pr.10** Deceleration time 0

"Pr.9 Acceleration time 0" specifies the time for the speed to increase from zero to the speed limit value (Pr.8).
 "Pr.10 Deceleration time 0" specifies the time for the speed to decrease from the speed limit value (Pr.8) to zero.



- 1) If the positioning speed is set lower than the parameter-defined speed limit value, the actual acceleration/deceleration time will be relatively short. Thus, set the maximum positioning speed equal to or only a little lower than the parameter-defined speed limit value.
- 2) These settings are valid for OPR, positioning and JOG operations.
- 3) When the positioning involves interpolation, the acceleration/deceleration time defined for the reference axis is valid.

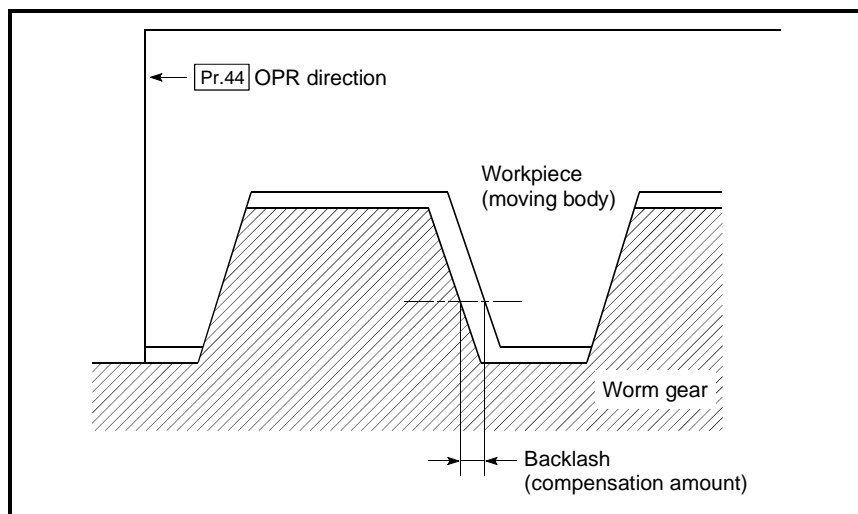
5.2.3 Detailed parameters 1

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.11 Backlash compensation amount  [Table 1] on right page | The setting value range differs according to the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set. | | 0 | 17 | 167 | 317 | 467 |
| Pr.12 Software stroke limit upper limit value | The setting value range differs according to the " Pr.1 Unit setting". Here, the value within the [Table 2] range is set. | | 2147483647 | 18 19 | 168 169 | 318 319 | 468 469 |
| Pr.13 Software stroke limit lower limit value  [Table 2] on right page | | | -2147483648 | 20 21 | 170 171 | 320 321 | 470 471 |
| Pr.14 Software stroke limit selection | 0 : Apply software stroke limit on current feed value 1 : Apply software stroke limit on machine feed value | 0 1 | 0 | 22 | 172 | 322 | 472 |
| Pr.15 Software stroke limit valid/invalid setting | 0 : Software stroke limit valid during JOG operation, inching operation and manual pulse generator operation 1 : Software stroke limit invalid during JOG operation, inching operation and manual pulse generator operation | 0 1 | 0 | 23 | 173 | 323 | 473 |

Pr.11 Backlash compensation amount

The error that occurs due to backlash when moving the machine via gears can be compensated.

When the backlash compensation amount is set, pulses equivalent to the compensation amount will be output each time the direction changes during positioning.



- 1) The backlash compensation is valid after machine OPR. Thus, if the backlash compensation amount is set or changed, always carry out machine OPR once.
- 2) " **Pr.2** No. of pulses per rotation", " **Pr.3** Movement amount per pulse" and " **Pr.11** Backlash compensation amount" which satisfies the following (1) can be set up.

$$0 \leq \frac{(\text{Pr.11 Backlash compensation amount}) \times (\text{Pr.2 No. of pulses per rotation})}{(\text{Pr.3 Movement amount per pulse})} (= A) \leq 65535 \text{ (PLS) } \dots(1)$$

An error (error code: 920) occurs when " Pr.2 No. of pulses per rotation", " Pr.3 Movement amount per pulse" and " Pr.11 Backlash compensation amount" setting range is 0 to 65535. (the calculation result of the following (1)) A servo alarm (error code: 2032, 2035 etc.) may be made to occur by kinds of servo amplifier (servomotor), load inertia and the amount of command of a cycle time (QD75) is set so that the calculation result of the following (1) may satisfy " Pr.2 No. of pulses per rotation", " Pr.3 Movement amount per pulse" and " Pr.11 Backlash compensation amount" setting range is 65536 and lower 0.

$$A \leq \frac{(\text{Maximum motor speed (r/min)}) \times 1.2 \times (\text{Encoder resolution (PLS/r)}) \times 3.5 \text{ (ms)}}{60\text{(s)} \times 1000 \text{ (ms)}} \text{ (PLS) } \dots(2)$$

[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) * |
|--------------------|---|---------------------------------------|
| 0 : mm | 0 to 6553.5 (μm) | 0 to 65535 (×10 ⁻¹ μm) |
| 1 : inch | 0 to 0.65535 (inch) | 0 to 65535 (×10 ⁻⁵ inch) |
| 2 : degree | 0 to 0.65535 (degree) | 0 to 65535 (×10 ⁻⁵ degree) |
| 3 : PLS | 0 to 65535 (PLS) | 0 to 65535 (PLS) |

* 1 to 32767 : Set as a decimal
 32768 to 65535 : Convert into hexadecimal and set

[Table 2]

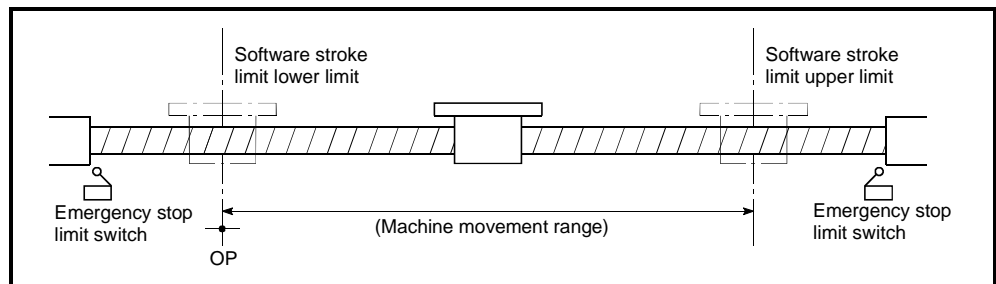
| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | -214748364.8 to 214748364.7 (μm) | -2147483648 to 2147483647 (×10 ⁻¹ μm) |
| 1 : inch | -21474.83648 to 21474.83647(inch) | -2147483648 to 2147483647 (×10 ⁻⁵ inch) |
| 2 : degree | 0 to 359.99999 (degree) | 0 to 35999999 (×10 ⁻⁵ degree) |
| 3 : PLS | -2147483648 to 2147483647(PLS) | -2147483648 to 2147483647 (PLS) |

Pr.12 Software stroke limit upper limit value

Set the upper limit for the machine's movement range during positioning control.

Pr.13 Software stroke limit lower limit value

Set the lower limit for the machine's movement range during positioning control.



- 1) Generally, the OP is set at the lower limit or upper limit of the stroke limit.
- 2) By setting the upper limit value or lower limit value of the software stroke limit, overrun can be prevented in the software. However, an emergency stop limit switch must be installed nearby outside the range.
 To invalidate the software stroke limit, set the setting value to "upper limit value = lower limit value". (The setting value can be anything.)
 When the unit is "degree", the software stroke limit check is invalid during speed control (including speed-position switching control, position-speed switching control) or during manual control.


Pr.14 Software stroke limit selection

Set whether to apply the software stroke limit on the "current feed value" or the "machine feed value". The software stroke limit will be validated according to the set value.

To invalidate the software stroke limit, set the setting value to "current feed value".

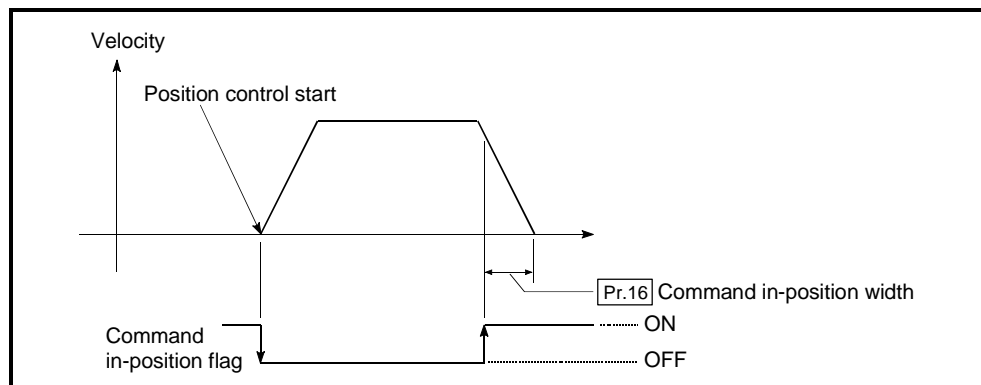
Pr.15 Software stroke limit valid/invalid setting

Set whether to validate the software stroke limit during JOG/Inching operation and manual pulse generator operation.

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--|---|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.16 Command in-position width | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set.  | | 100 | 24 25 | 174 175 | 324 325 | 474 475 |
| Pr.17 Torque limit setting value | 1 to 500 (%) | 1 to 500 (%) | 300 | 26 | 176 | 326 | 476 |
| Pr.18 M code ON signal output timing | 0 : WITH mode | 0 | 0 | 27 | 177 | 327 | 477 |
| | 1 : AFTER mode | 1 | | | | | |

Pr.16 Command in-position width

Set the remaining distance that turns the command in-position ON. The command in-position signal is used as a front-loading signal of the positioning complete signal. When positioning control is started, the "command in-position flag" (3rd flag from right) in " **Md.31** Status" turns OFF, and the "command in-position flag" turns ON at the set position of the command in-position signal.



Pr.17 Torque limit setting value

Set the maximum value of the torque generated by the servomotor as a percentage between 1 and 500%.

* The torque limit function limits the torque generated by the servomotor within the set range.

If the torque required for control exceeds the torque limit value, it is controlled with the set torque limit value.

(Refer to "12.4.2 Torque limit function ".)

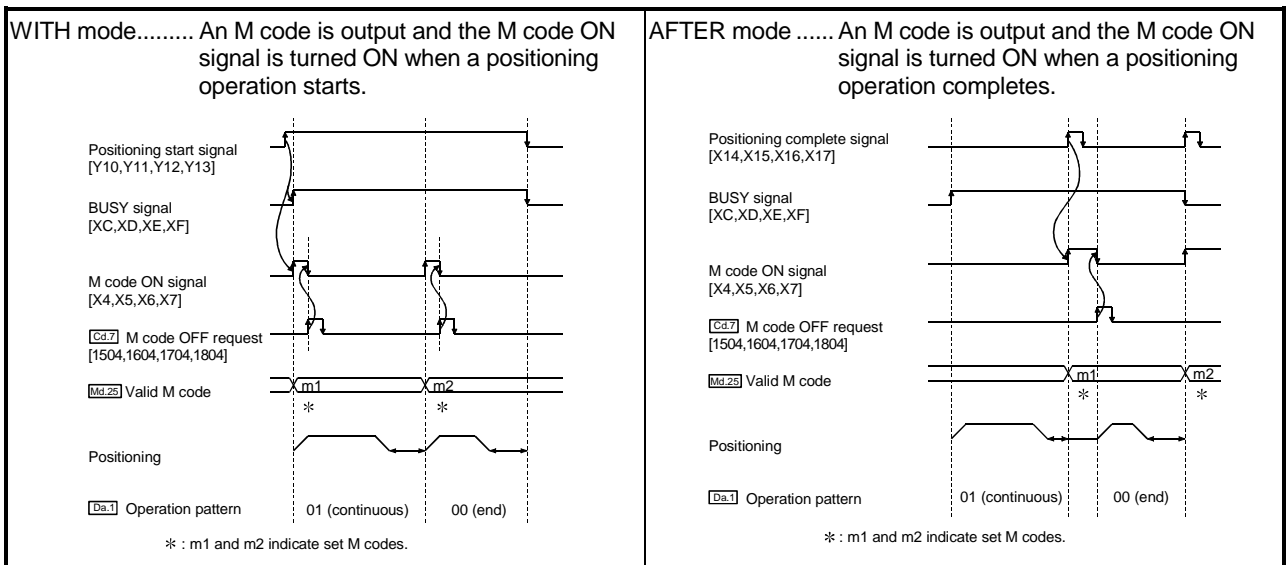
[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0.1 to 214748364.7 (μm) | 1 to 2147483647 (×10 ⁻¹ μm) |
| 1 : inch | 0.00001 to 21474.83647 (inch) | 1 to 2147483647 (×10 ⁻⁵ inch) |
| 2 : degree | 0.00001 to 21474.83647 (degree) | 1 to 2147483647 (×10 ⁻⁵ degree) |
| 3 : PLS | 1 to 2147483647 (PLS) | 1 to 2147483647 (PLS) |

Pr.18 M code ON signal output timing

This parameter sets the M code ON signal output timing.

Choose either WITH mode or AFTER mode as the M code ON signal output timing.

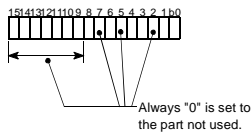


Note: If AFTER mode is used with speed control, an M code will not be output and the M code ON signal will not be turned ON.

An M code is a number between 0 and 65535 that can be assigned to each positioning data ([Da.10]).

The sequence program can be coded to read an M code from the buffer memory address specified by " [Md.25] Valid M code" whenever the M code ON signal [X4, X5, X6, X7] turns ON so that a command for the sub work (e.g. clamping, drilling, tool change) associated with the M code can be issued.

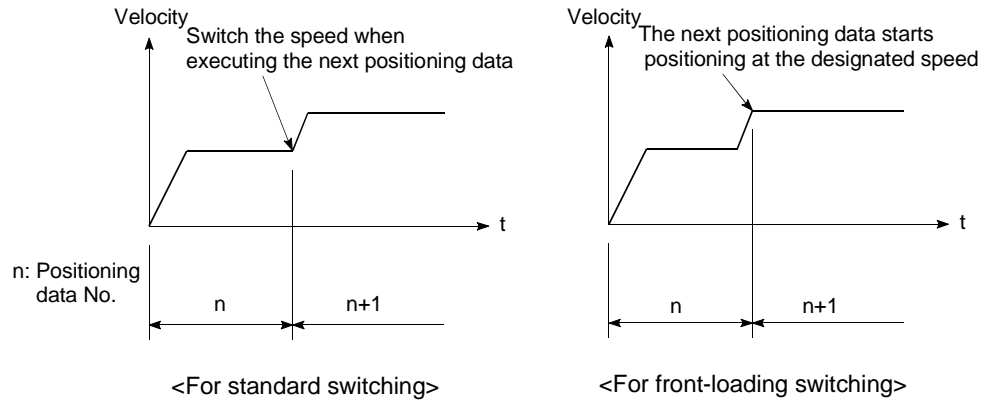
| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--|--|--|---------------|-------------------------------------|--------|--------|--------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.19 Speed switching mode | 0 : Standard speed switching mode | 0 | 0 | 28 | 178 | 328 | 478 |
| | 1 : Front-loading speed switching mode | 1 | | | | | |
| Pr.20 Interpolation speed designation method | 0 : Composite speed | 0 | 0 | 29 | 179 | 329 | 479 |
| | 1 : Reference axis speed | 1 | | | | | |
| Pr.21 Current feed value during speed control | 0 : Do not update current feed value | 0 | 0 | 30 | 180 | 330 | 480 |
| | 1 : Update current feed value | 1 | | | | | |
| | 2 : Clear current feed value to zero | 2 | | | | | |
| Pr.22 Input signal logic selection | b0 Lower limit | 0: Negative logic 1: Positive logic | 0 | 31 | 181 | 331 | 481 |
| | b1 Upper limit | | | | | | |
| | b2 Not used | | | | | | |
| | b3 Stop signal | | | | | | |
| | b4 External command/switching signal | | | | | | |
| | b5 Not used | | | | | | |
| | b6 Near-point dog signal | | | | | | |
| | b7 Not used | | | | | | |
| | b8 Manual pulse generator input | | | | | | |
| | b9 to b15 Not used | | | | | | |
| Pr.24 Manual pulse generator input selection | 0: A-phase/B-phase multiplied by 4 | 0 | 0 | 33 | - | - | - |
| | 1: A-phase/B-phase multiplied by 2 | 1 | | | | | |
| | 2: A-phase/B-phase multiplied by 1 | 2 | | | | | |
| | 3: PLS/SIGN | 3 | | | | | |
| Pr.200 Speed-position function selection | 0: Speed-position switching control (INC mode) | 0 | 0 | 34 | 184 | 334 | 484 |
| | 2: Speed-position switching control (ABS mode) | 2 | | | | | |



Pr.19 Speed switching mode

Set whether to switch the speed switching mode with the standard switching or front-loading switching mode.

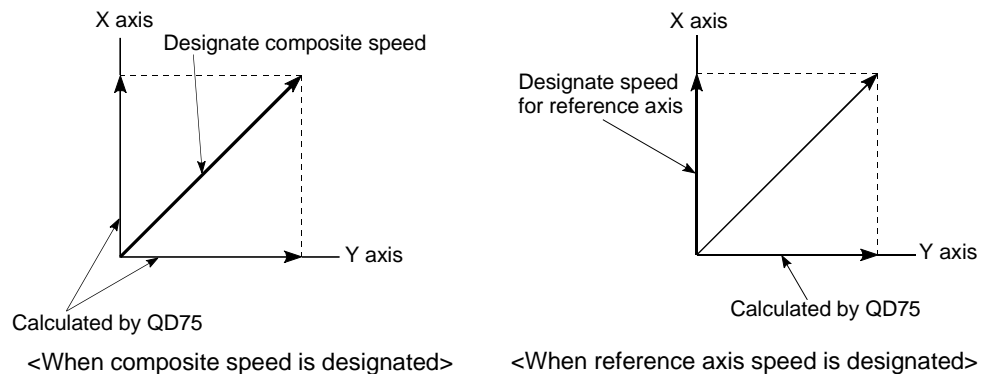
- 0 : Standard switching..... Switch the speed when executing the next positioning data.
- 1 : Front-loading switching..... The speed switches at the end of the positioning data currently being executed.



Pr.20 Interpolation speed designation method

When carrying out linear interpolation/circular interpolation, set whether to designate the composite speed or reference axis speed.

- 0: Composite speed The movement speed for the control target is designated, and the speed for each axis is calculated by the QD75.
- 1: Reference axis speed The axis speed set for the reference axis is designated, and the speed for the other axis carrying out interpolation is calculated by the QD75.



Note: Always specify the reference axis speed if the 4-axis linear interpolation or 2 to 4 axis speed control has to be performed.
 If you specify the composite speed for a positioning operation that involves the 4-axis linear interpolation or 2 to 4 axis speed control, the error code 523 "interpolation mode error" will be output when the positioning operation is attempted.
 For a positioning operation that involves the circular interpolation, specify the composite speed always.

Pr.21 Current feed value during speed control

Specify whether you wish to enable or disable the update of " **Md.20** Current feed value" while operations are performed under the speed control (including the speed-position and position-speed switching control).

0: The update of the current feed value is disabled

The current feed value will not change.

(The value at the beginning of the speed control will be kept.)

1: The update of the current feed value is enabled

The current feed value will be updated.

(The current feed value will change from the initial.)

2: The current feed value is cleared to zero

The current feed will be set initially to zero and change from zero while the speed control is in effect.

Note1: When the speed control is performed over two to four axes, the choice between enabling and disabling the update of " **Md.20** Current feed value" depends on how the reference axis is set.

Note2: Set "1" to exercise speed-position switching control (ABS mode).

Pr.22 Input signal logic selection

Set the input signal logic that matches the signaling specification of the connected external device.

Negative logic

(1) When the input signal contact is not flowed with the current.

(a) FLS, RLS → ON (Limit signal turn ON)

(b) DOG, STOP, CHG → OFF

(2) When the input signal contact is flowed with the current.

(a) FLS, RLS → OFF (Limit signal turn OFF)

(b) DOG, STOP, CHG → ON

Positive logic

Opposite the concept of negative logic.

Note1: A mismatch in the signal logic will disable normal operation. Be careful of this when you change from the default value.

Note2: Set the manual pulse generator input logic selection (b8) to axis 1. (Setting of any of axes 2 to 4 is invalid.)

Pr.24 Manual pulse generator input selection

Set the manual pulse generator input pulse mode. (Only the value specified against the axis 1 is valid.)

- 0: A-phase/B-phase; multiplied by 4
- 1: A-phase/B-phase; multiplied by 2
- 2: A-phase/B-phase; multiplied by 1
- 3: PLS/SIGN


Pr.200 Speed-position function selection

Select the mode of speed-position switching control.

- 0: INC mode
- 2: ABS mode

Note1: If the setting is other than 0 and 2, operation is performed in the INC mode with the setting regarded as 0.

5.2.4 Detailed parameters 2

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|---|---|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.25 Acceleration time 1 | 1 to 8388608 (ms) | 1 to 8388608 (ms) | 1000 | 36 | 186 | 336 | 486 |
| Pr.26 Acceleration time 2 | | | | 37 | 187 | 337 | 487 |
| Pr.27 Acceleration time 3 | | | | 38 | 188 | 338 | 488 |
| Pr.28 Deceleration time 1 | | | | 39 | 189 | 339 | 489 |
| Pr.29 Deceleration time 2 | | | | 40 | 190 | 340 | 490 |
| Pr.30 Deceleration time 3 | | | | 41 | 191 | 341 | 491 |
| | | | | 42 | 192 | 342 | 492 |
| | 43 | 193 | 343 | 493 | | | |
| | 44 | 194 | 344 | 494 | | | |
| | 45 | 195 | 345 | 495 | | | |
| | 46 | 196 | 346 | 496 | | | |
| | 47 | 197 | 347 | 497 | | | |
| Pr.31 JOG speed limit value | The setting range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set.  | | 20000 | 48 49 | 198 199 | 348 349 | 498 499 |
| Pr.32 JOG operation acceleration time selection | 0: Pr.9 Acceleration time 0 | 0 | 0 | 50 | 200 | 350 | 500 |
| | 1: Pr.25 Acceleration time 1 | 1 | | | | | |
| | 2: Pr.26 Acceleration time 2 | 2 | | | | | |
| | 3: Pr.27 Acceleration time 3 | 3 | | | | | |
| Pr.33 JOG operation deceleration time selection | 0: Pr.10 Deceleration time 0 | 0 | 0 | 51 | 201 | 351 | 501 |
| | 1: Pr.28 Deceleration time 1 | 1 | | | | | |
| | 2: Pr.29 Deceleration time 2 | 2 | | | | | |
| | 3: Pr.30 Deceleration time 3 | 3 | | | | | |

Pr.25 Acceleration time 1 to **Pr.27** Acceleration time 3

These parameters set the time for the speed to increase from zero to the speed limit value (**Pr.8**) during a positioning operation.

Pr.28 Deceleration time 1 to **Pr.30** Deceleration time 3

These parameters set the time for the speed to decrease from the speed limit value (**Pr.8**) to zero during a positioning operation.

[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0.01 to 20000000.00 (mm/min) | 1 to 2000000000 ($\times 10^{-2}$ mm/min) |
| 1 : inch | 0.001 to 2000000.000 (inch/min) | 1 to 2000000000 ($\times 10^{-3}$ inch/min) |
| 2 : degree | 0.001 to 2000000.000 (degree/min) | 1 to 2000000000 ($\times 10^{-3}$ degree/min) |
| 3 : PLS | 1 to 10000000 (PLS/s) | 1 to 10000000 (PLS/s) |

*1: For Select type, refer to GX Configurator-QP Operating Manual.

Pr.31 JOG speed limit value

Set the maximum speed for JOG operation.

Note) • Set the "JOG speed limit value" to less than " Pr.8 Speed limit value".
If the "speed limit value" is exceeded, the "JOG speed limit value error" (error code: 956) will occur.

Pr.32 JOG operation acceleration time selection

Set which of "acceleration time 0 to 3" to use for the acceleration time during JOG operation.

0 : Use value set in " Pr.9 Acceleration time 0".

1 : Use value set in " Pr.25 Acceleration time 1".

2 : Use value set in " Pr.26 Acceleration time 2".

3 : Use value set in " Pr.27 Acceleration time 3".

Pr.33 JOG operation deceleration time selection

Set which of "deceleration time 0 to 3" to use for the deceleration time during JOG operation.

0 : Use value set in " Pr.10 Deceleration time 0".

1 : Use value set in " Pr.28 Deceleration time 1".

2 : Use value set in " Pr.29 Deceleration time 2".

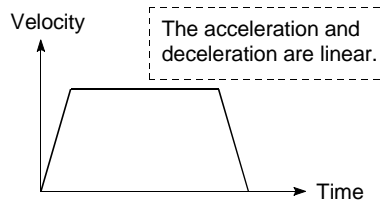
3 : Use value set in " Pr.30 Deceleration time 3".

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.34 Acceleration/deceleration process selection | 0 : Automatic trapezoid acceleration/deceleration process 1 : S-pattern acceleration/deceleration process | 0 1 | 0 | 52 | 202 | 352 | 502 |
| Pr.35 S-pattern ratio | 1 to 100 (%) | 1 to 100 (%) | 100 | 53 | 203 | 353 | 503 |
| Pr.36 Sudden stop deceleration time | 1 to 8388608 (ms) | 1 to 8388608 (ms) | 1000 | 54 55 | 204 205 | 354 355 | 504 505 |
| Pr.37 Stop group 1 sudden stop selection | 0 : Normal deceleration stop 1 : Sudden stop | 0 1 | 0 | 56 | 206 | 356 | 506 |
| Pr.38 Stop group 2 sudden stop selection | | | | 57 | 207 | 357 | 507 |
| Pr.39 Stop group 3 sudden stop selection | | | | 58 | 208 | 358 | 508 |

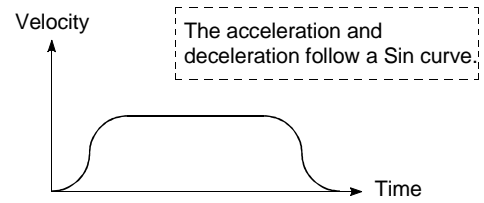
Pr.34 Acceleration/deceleration process selection

Set whether to use automatic trapezoid acceleration/deceleration or S-pattern acceleration/deceleration for the acceleration/deceleration process.

Note) Refer to Section 12.7.7 "Acceleration/deceleration process function" for details.



<Automatic trapezoid acceleration/deceleration>

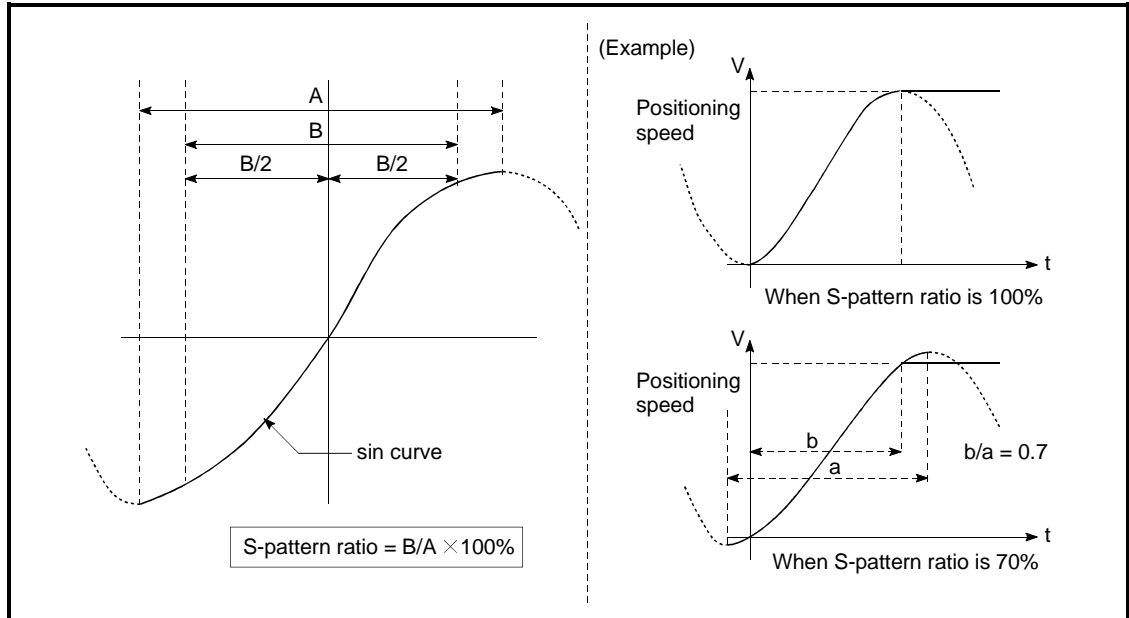


<S-pattern acceleration/deceleration>

Pr.35 S-pattern ratio

Set the S-pattern ratio (1 to 100%) for carrying out the S-pattern acceleration/deceleration process.

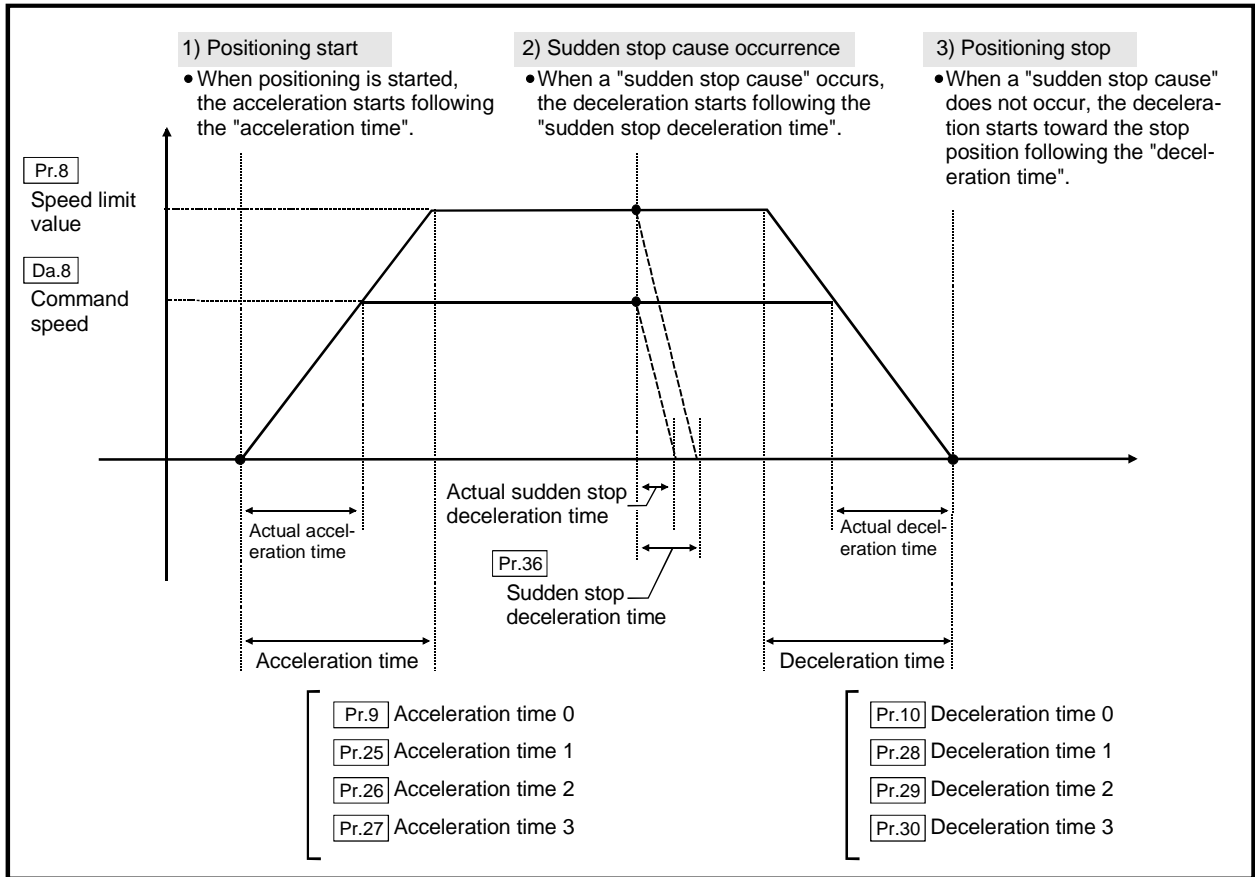
The S-pattern ratio indicates where to draw the acceleration/deceleration curve using the Sin curve as shown below.



Pr.36 Sudden stop deceleration time

Set the time to reach speed 0 from " **Pr.8** Speed limit value" during the sudden stop.

The illustration below shows the relationships with other parameters.



Pr.37 Stop group 1 sudden stop selection

to

Pr.39 Stop group 3 sudden stop selection

Set the method to stop when the stop causes in the following stop groups occur.

- Stop group 1 Stop with hardware stroke limit
- Stop group 2 Error occurrence of the PLC CPU, PLC READY signal [Y0] OFF, Fault in test mode
- Stop group 3 External stop signal
Stop signal from PLC CPU
Stop signal from peripheral device
Error occurrence (excludes errors in stop groups 1 and 2: includes only the software stroke limit errors during JOG operation, speed control, speed-position switching control, and position-speed switching control)
Stop made when the near-point dog signal turns from OFF to ON in counter method machine OPR

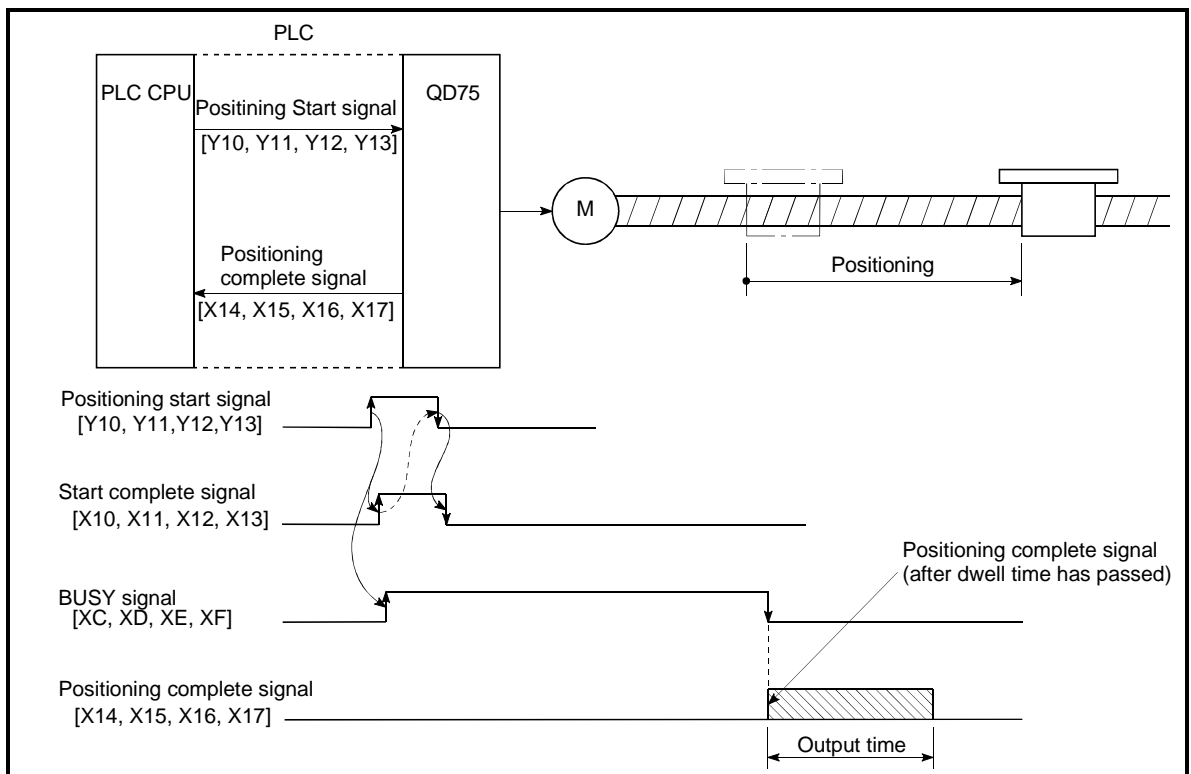
The methods of stopping include "0: Normal deceleration stop" and "1: Sudden stop".

If "1: Sudden stop" is selected, the axis will suddenly decelerate to a stop when the stop signal is input.

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|---|---|---|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.40 Positioning complete signal output time | 0 to 65535 (ms) | 0 to 65535 (ms) 0 to 32767 : Set as a decimal 32768 to 65535: Convert into hexadecimal and set | 300 | 59 | 209 | 359 | 509 |
| Pr.41 Allowable circular interpolation error width | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set. | | 100 | 60 61 | 210 211 | 360 361 | 510 511 |
| Pr.42 External command function selection | 0: External positioning start | 0 | 0 | 62 | 212 | 362 | 512 |
| | 1: External speed change request | 1 | | | | | |
| | 2: Speed-position, position-speed switching request | 2 | | | | | |
| | 3: Skip request | 3 | | | | | |
| Pr.201 Restart allowable range when servo OFF to ON | 0, 1 to 163840 [PLS] 0: restart not allowed | | 0 | 64 65 | 214 215 | 364 365 | 514 515 |

Pr.40 Positioning complete signal output time

Set the output time of the positioning complete signal [X14, X15, X16, X17] output from the QD75.
 A positioning completes when the specified dwell time has passed after the QD75 had terminated the output.



Positioning complete signal output time

[Table 1]

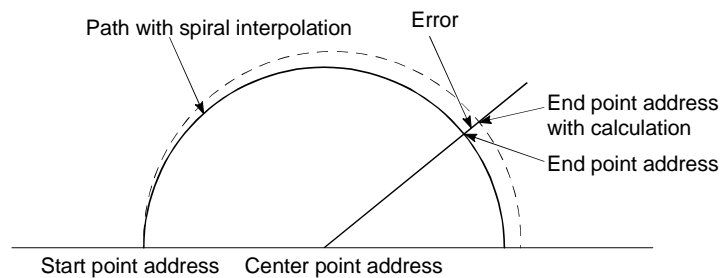
| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|---|
| 0 : mm | 0 to 10000.0 (μm) | 0 to 100000 ($\times 10^{-1}\mu\text{m}$) |
| 1 : inch | 0 to 1.00000 (inch) | 0 to 100000 ($\times 10^{-5}\text{inch}$) |
| 2 : degree | 0 to 1.00000 (degree) | 0 to 100000 ($\times 10^{-5}\text{degree}$) |
| 3 : PLS | 0 to 100000 (PLS) | 0 to 100000 (PLS) |

Pr.41 Allowable circular interpolation error width

With the "allowable circular interpolation error width", the allowable error range of the calculated arc path and end point address is set. If the error of the calculated arc path and end point address is within the set range, circular interpolation will be carried out to the set end point address while compensating the error with spiral interpolation.

The allowable circular interpolation error width is set in the following axis buffer memory addresses.

- If axis 1 is the reference axis, set in the axis 1 buffer memory address [60, 61].
- If axis 2 is the reference axis, set in the axis 2 buffer memory address [210, 211].
- If axis 3 is the reference axis, set in the axis 3 buffer memory address [360, 361].
- If axis 4 is the reference axis, set in the axis 4 buffer memory address [510, 511].



* With circular interpolation control using the center point designation, the arc path calculated with the start point address and center point address and the end point address may deviate.

Pr.42 External command function selection

Select a command with which the external command signal should be associated.

0: External positioning start

The external command signal input is used to start a positioning operation.

1: External speed change request

The external command signal input is used to change the speed in the current positioning operation. The new speed should be set in the " **Cd.14** Speed change value"

2: Speed-position, position-speed switching request

The external command signal input is used to switch from the speed control to the position control while in the speed-position switching control mode, or from the position control to the speed control while in the position-speed switching control mode.

To enable the speed-position switching control, set the " **Cd.24** Speed-position switching enable flag" to "1".

To enable the position-speed switching control, set the " **Cd.26** Position-speed switching enable flag" to "1".

3: Skip request

The external command signal input is used skip the current positioning operation.

POINT

To enable the external command signal, set the " **Cd.8** External command enable" to "1".

Pr.201 Restart allowable range when servo OFF to ON

(1) What is the restart function when servo OFF to ON ?

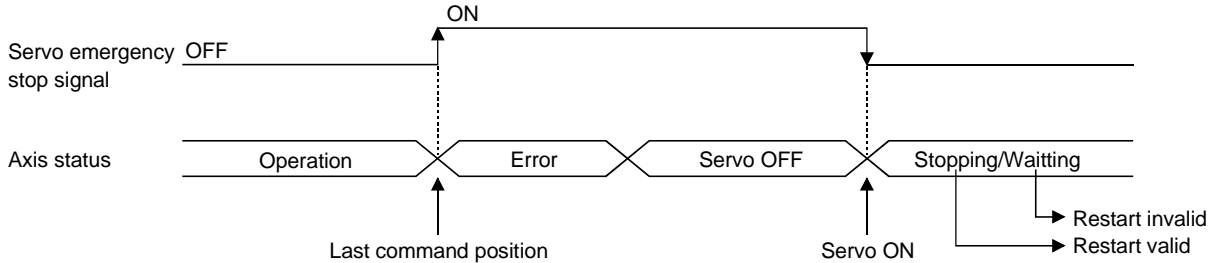
The QD75 restart function when servo OFF changes to ON, performs continuous positioning operation (positioning start, restart) when the servo is switched from OFF to ON in the stopped state (including servo emergency stop).

Restart when servo OFF changes to ON can be performed when the difference between the last command position for the QD75 when it stopped and the present value when servo OFF changed to ON, is less than the value set in the buffer memory for the restart allowable range setting.

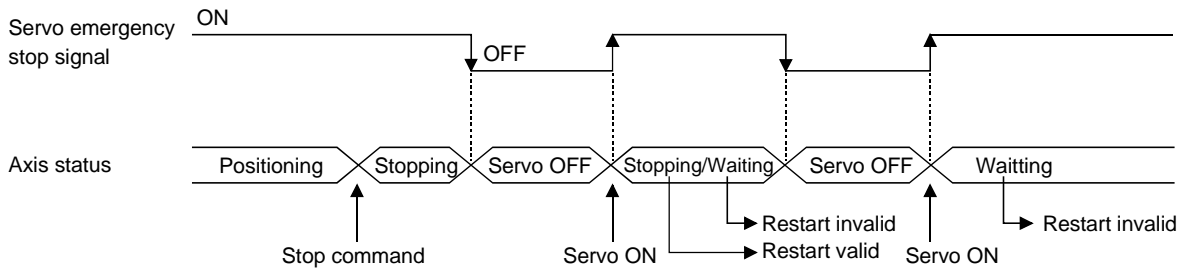
(a) Servo emergency stop processing

- 1) For stop caused by a servo emergency stop signal, positioning operation is judged as stopped and can be restarted if the difference between the last command position for the QD75 when the servo stop signal turned ON and present value at the time the servo stop signal turned OFF is lower than the value set in the buffer memory for the restart allowable range setting.

- 2) When the difference between the last command position of the QD75 at the time the servo stop signal turned ON and the present value at the time the servo stop signal turned OFF is greater than the value set in the buffer memory for the restart allowable range setting, the positioning operation is judged as on-standby and cannot be restarted.



- (b) Processing when the servo ON signal changes from OFF to ON.
 - 1) The positioning operation is stopped and restart can be performed when the difference between the last command position of the QD75 when the servo ON signal went from OFF to ON is lower than the value set in the buffer memory for restart allowable range setting.
 - 2) When the difference between the last command position of the QD75 at the time the servo ON signal when from ON to OFF and the present value at the time the servo ON signal went from OFF to ON is greater than the value set in the buffer memory for the restart allowable range setting, the positioning operation is judged as on-standby and cannot be restarted.



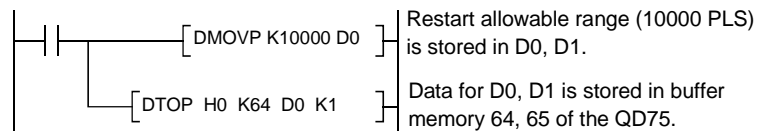
(2) Setting method

When performing restart at the time servo OFF changes to ON, set the restart allowable range in the following buffer memory.

| Setting value buffer memory address | | | | Item | Setting range | Default value |
|-------------------------------------|------------|------------|------------|---|--|---------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 64 65 | 214 215 | 364 365 | 514 515 | Pr.201 Restart allowable range setting when servo OFF changes to ON | 0, 1 to 163840 (PLS) 0: restart not allowed | 0 |

[Setting example]

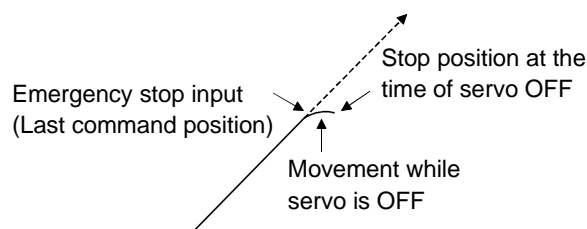
A program in which the restart allowable range for axis 1 is set to 10000 PLS is shown below.



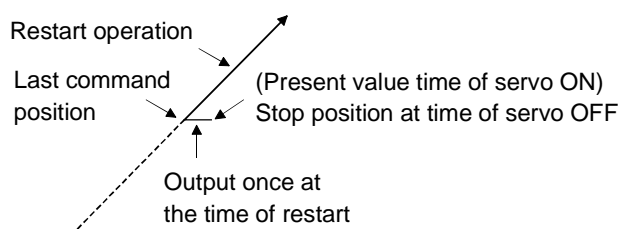
(3) Precautionary notes

- (a) The difference between the last command position when the servo turned OFF and the present value when the servo turned ON, is output at the first operation of restart. If the restart allowable range is large at this time, an overload may occur on the servo side.
Set the "restart allowable range when servo OFF changes to ON" to a value where the mechanical system will not be affected by a signal output.
- (b) The restart servo OFF changes to ON is valid only for the first time servo OFF changes to ON. From the second time servo OFF changes to ON, the setting for restart allowable range when servo OFF changes to ON is disregarded.
- (c) Execute servo OFF when the mechanical system is in complete stop state. The restart when servo OFF changes to ON cannot be applied to a system in which the mechanical system operated by external pressure or other force while the servo is OFF.
- (d) Restart can only be executed while the operating status of the axis is "stop". Restart cannot be executed when the operation status of the axis is other than "stop".
- (e) Do not restart while a stop command is ON.
If restart is executed while stopped, an error (error code 106: Started during stop command ON) is generated, and the operating status of the axis becomes "ERR".
Therefore, restart cannot be performed even if the error is reset.
- (f) Restart can also be executed while the positioning starts signal is ON.
However do not set the positioning start signal from OFF to ON while stopped.
If the positioning start signal switches ON from OFF, positioning is performed from the positioning data number set in the buffer memory at 1500 or from the positioning data number of the specified point.
- (g) If positioning is terminated by a continuous-operation interrupt request, restart cannot be performed.
If a restart request is made, a warning (warning code 104: Restart disabled) is generated.

[Operation at the time an emergency stop is input]



[Operation when a restart is performed]



5.2.5 OPR basic parameters

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|---------------------|----------------------------------|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.43 OPR method | 0 : Near-point dog method | 0 | 0 | 70 | 220 | 370 | 520 |
| | 4 : Count method 1) | 4 | | | | | |
| | 5 : Count method 2) | 5 | | | | | |
| | 6 : Data set method | 6 | | | | | |

Pr.43 OPR method

Set the "OPR method" for carrying out machine OPR.

- 0 : Near-point dog method After decelerating at the near-point dog ON, stop at the zero signal and complete the machine OPR.
- 4 : Count method 1) After decelerating at the near-point dog ON, move the designated distance, and complete the machine OPR with the zero signal.
- 5 : Count method 2) After decelerating at the near-point dog ON, move the designated distance, and complete the machine OPR.
- 6 : Data set method..... The position where the machine OPR has been made will be the OP.

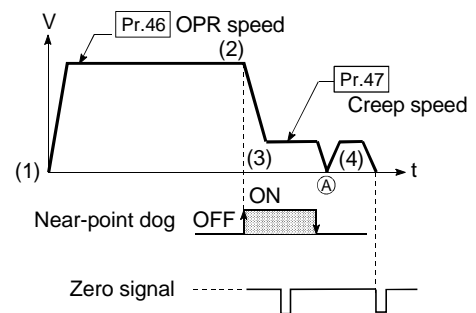
Note) Refer to Section 8.2.2 "Machine OPR method" for details on the OPR methods.

OPR method

0 : Near-point dog method

- (1) Start machine OPR.
(Start movement at the " Pr.46 OPR speed" in the " Pr.44 OPR direction".)
- (2) Detect the near-point dog ON, and start deceleration.
- (3) Decelerate to " Pr.47 Creep speed", and move with the creep speed.
(At this time, the near-point dog must be ON. If the near-point dog is OFF, the axis will decelerate to a stop.)
- (4) At the first zero signal after the near-point dog turned OFF, machine OPR is completed.

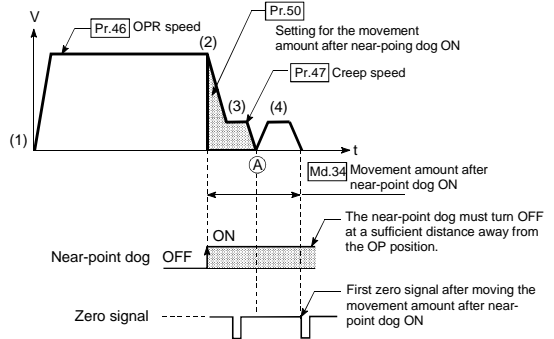
Note) After the servo amplifier turned on, the zero point of the encoder must be passed at least once before point A is reached.



4 : Count method 1)

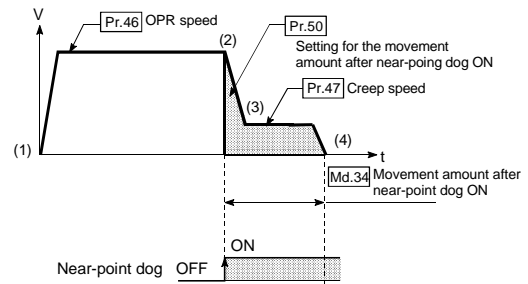
- (1) Start machine OPR.
(Start movement at the " Pr.46 OPR speed" in the " Pr.44 OPR direction".)
- (2) Detect the near-point dog ON, and start deceleration.
- (3) Decelerate to " Pr.47 Creep speed", and move with the creep speed.
- (4) After the near-point dog turns ON and the movement amount set in " Pr.50 Setting for the movement amount after near-point dog ON" has passed, the QD75 stops with the first zero signal, and the machine OPR is completed.

Note) After the servo amplifier turned on, the zero point of the encoder must be passed at least once before point A is reached.




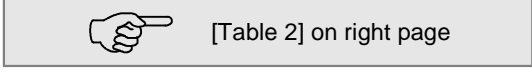
5 : Count method 2)

- (1) Start machine OPR.
(Start movement at the " Pr.46 OPR speed" in the " Pr.44 OPR direction".)
- (2) Detect the near-point dog ON, and start deceleration.
- (3) Decelerate to " Pr.47 Creep speed", and move with the creep speed.
- (4) After the near-point dog turns ON and the movement amount set in " Pr.50 Setting for the movement amount after near-point dog ON" has passed, machine OPR is completed.



6 : Data set method

The position where the machine OPR has been made will be the OP.
(Perform after the servo amplifier has been turned ON and the servomotor has been rotated at least once using the JOG or similar operation.)

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|------------------------|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.44 OPR direction | 0 : Positive direction (address increment direction) 1 : Negative direction (address decrement direction) | 0 1 | 0 | 71 | 221 | 371 | 521 |
| Pr.45 OP address | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set.  | | 0 | 72 73 | 222 223 | 372 373 | 522 523 |
| Pr.46 OPR speed | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 2] range is set.  | | 1 | 74 75 | 224 225 | 374 375 | 524 525 |

Pr.44 OPR direction

Set the direction to start movement when starting machine OPR.

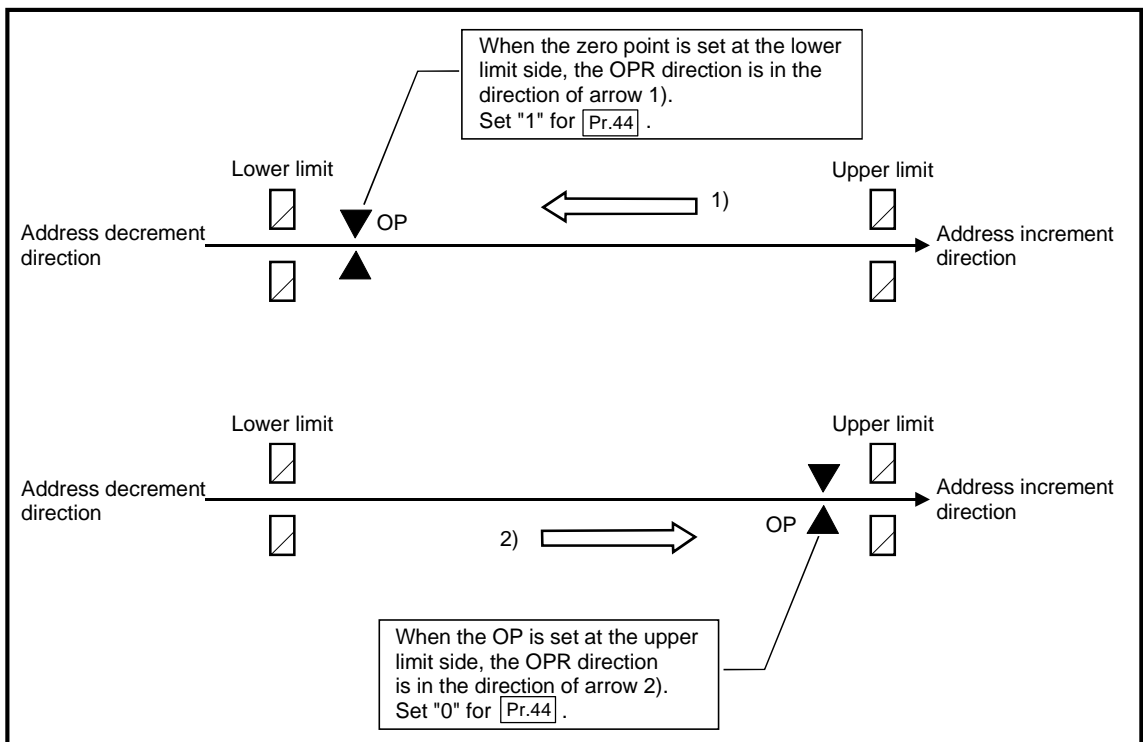
0: Positive direction (address increment direction)

Moves in the direction that the address increments. (Arrow 2))

1: Negative direction (address decrement direction)

Moves in the direction that the address decrements. (Arrow 1))

Normally, the OP is set near the lower limit or the upper limit, so " Pr.44 OPR direction" is set as shown below.



[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|---|
| 0 : mm | -214748364.8 to 214748364.7 (μm) | -2147483648 to 2147483647 ($\times 10^{-1}\mu\text{m}$) |
| 1 : inch | -21474.83648 to 21474.83647 (inch) | -2147483648 to 2147483647 ($\times 10^{-5}\text{inch}$) |
| 2 : degree | 0 to 359.99999 (degree) | 0 to 35999999 ($\times 10^{-5}\text{degree}$) |
| 3 : PLS | -2147483648 to 2147483647 (PLS) | -2147483648 to 2147483647 (PLS) |

[Table 2]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0.01 to 20000000.00 (mm/min) | 1 to 200000000 ($\times 10^{-2}\text{mm/min}$) |
| 1 : inch | 0.001 to 2000000.000 (inch/min) | 1 to 200000000 ($\times 10^{-3}\text{inch/min}$) |
| 2 : degree | 0.001 to 2000000.000 (degree/min) | 1 to 200000000 ($\times 10^{-3}\text{degree/min}$) |
| 3 : PLS | 1 to 10000000 (PLS/s) | 1 to 10000000 (PLS/s) |

Pr.45 OP address

Set the address used as the reference point for positioning control (ABS system). (When the machine OPR is completed, the stop position address is changed to the address set in "Pr.45 OP address". At the same time, the "Pr.45 OP address" is stored in "Md.20 Current feed value" and "Md.21 Machine feed value".)

Pr.46 OPR speed

Set the speed for OPR.

Note) Set the "OPR speed" to less than "Pr.8 Speed limit value". If the "speed limit value" is exceeded, the "OPR speed" will be limited by "Pr.8 Speed limit value".

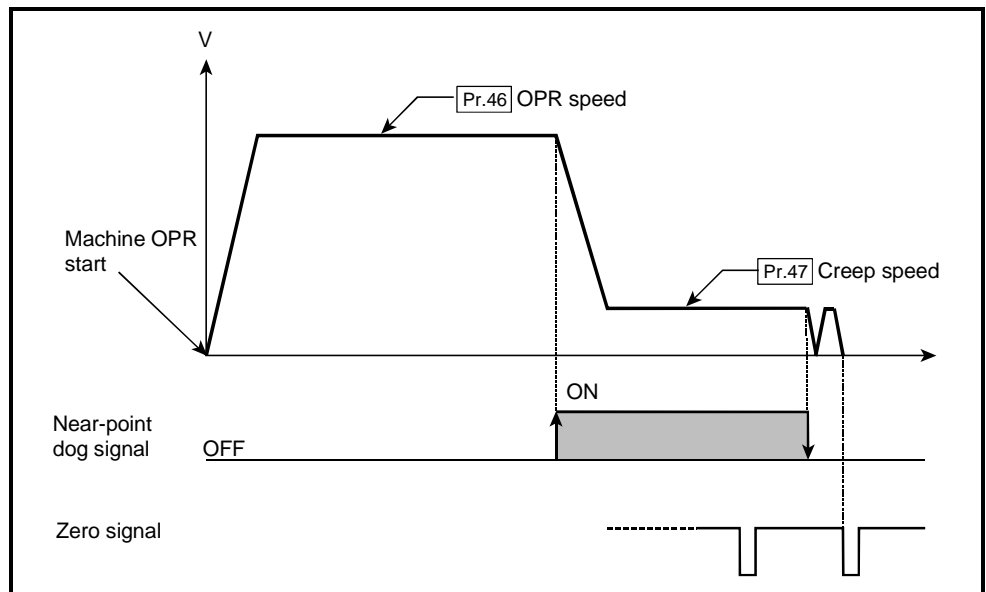
The "OPR speed" should be equal to or faster than the "Pr.7 Bias speed at start" and "Pr.47 Creep speed".

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|------------------------|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Pr.47] Creep speed | The setting value range differs depending on the " [Pr.1] Unit setting". Here, the value within the [Table 1] range is set. <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;"> [Table 1] on right page </div> | | 1 | 76 77 | 226 227 | 376 377 | 526 527 |
| [Pr.48] OPR retry | 0 : Do not retry OPR with limit switch | 0 | 0 | 78 | 228 | 378 | 528 |
| | 1 : Retry OPR with limit switch | 1 | | | | | |

[Pr.47] Creep speed

Set the creep speed after near-point dog ON (the low speed just before stopping after decelerating from the OPR speed).
 The creep speed is set within the following range.

$$(\text{[Pr.46] OPR speed}) \geq (\text{[Pr.47] Creep speed})$$



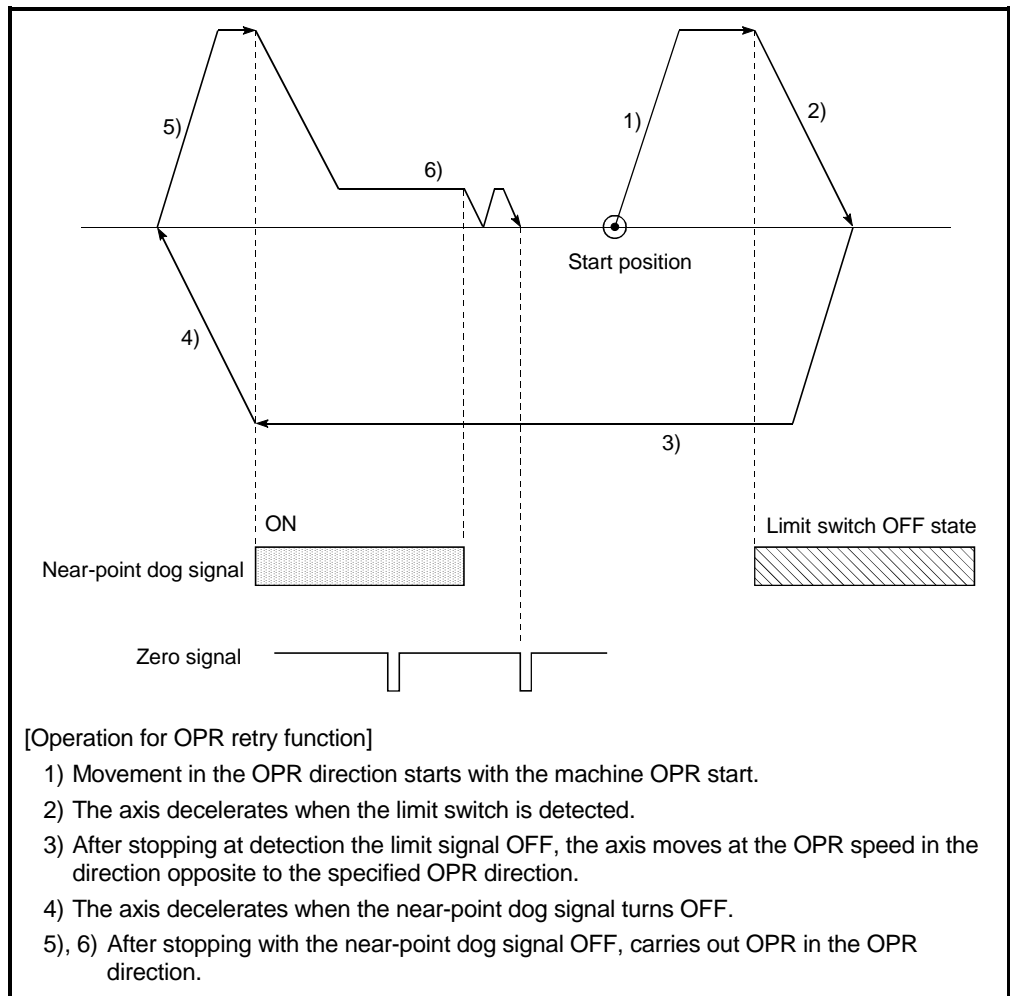
[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0.01 to 20000000.00 (mm/min) | 1 to 2000000000 ($\times 10^{-2}$ mm/min) |
| 1 : inch | 0.001 to 2000000.000 (inch/min) | 1 to 2000000000 ($\times 10^{-3}$ inch/min) |
| 2 : degree | 0.001 to 2000000.000 (degree/min) | 1 to 2000000000 ($\times 10^{-3}$ degree/min) |
| 3 : PLS | 1 to 10000000 (PLS/s) | 1 to 10000000 (PLS/s) |


Pr.48 OPR retry

Set whether to carry out OPR retry.

When the OPR retry function is validated and the machine OPR is started, first the axis will move in the OPR direction (1)). If the upper/lower limit signal turns OFF before the near-point dog signal ON is detected (2)), the axis will decelerate to a stop, and then will move in the direction opposite the OPR direction (3)). If the following edge of the near-point dog signal is detected during movement in the opposite direction, the axis will decelerate to a stop (4)), and then will carry out machine OPR again (5), 6)).



5.2.6 OPR detailed parameters

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|---|--|----------------------------|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.50 Setting for the movement amount after near-point dog ON | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set. <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">  [Table 1] on right page </div> | | 0 | 80 81 | 230 231 | 380 381 | 530 531 |
| Pr.51 OPR acceleration time selection | 0 : Pr.9 Acceleration time 0 | 0 | 0 | 82 | 232 | 382 | 532 |
| | 1 : Pr.25 Acceleration time 1 | 1 | | | | | |
| | 2 : Pr.26 Acceleration time 2 | 2 | | | | | |
| | 3 : Pr.27 Acceleration time 3 | 3 | | | | | |
| Pr.52 OPR deceleration time selection | 0 : Pr.10 Deceleration time 0 | 0 | 0 | 83 | 233 | 383 | 533 |
| | 1 : Pr.28 Deceleration time 1 | 1 | | | | | |
| | 2 : Pr.29 Deceleration time 2 | 2 | | | | | |
| | 3 : Pr.30 Deceleration time 3 | 3 | | | | | |

Pr.50 Setting for the movement amount after near-point dog ON

When using the count method 1) or 2), set the movement amount to the OP after the near-point dog signal turns ON.

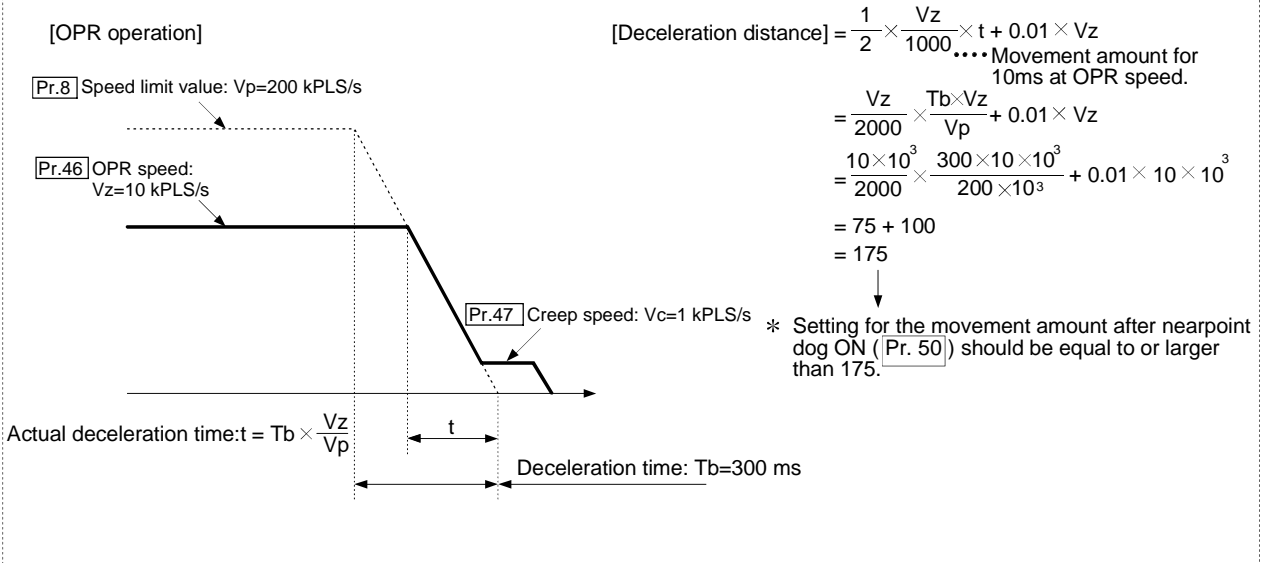
(The movement amount after near-point dog ON should be equal to or greater than the sum of the "distance covered by the deceleration from the OPR speed to the creep speed" and "distance of movement in 10 ms at the OPR speed".)

[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|--|
| 0 : mm | 0 to 214748364.7 (μm) | 0 to 2147483647 (×10 ⁻¹ μm) |
| 1 : inch | 0 to 21474.83647 (inch) | 0 to 2147483647 (×10 ⁻⁵ inch) |
| 2 : degree | 0 to 21474.83647 (degree) | 0 to 2147483647 (×10 ⁻⁵ degree) |
| 3 : PLS | 0 to 2147483647 (PLS) | 0 to 2147483647 (PLS) |

Example of setting for "Pr. 50 Setting for the movement amount after near-point dog ON"

Assuming that the "Pr. 8 Speed limit value" is set to 200 kPLS/s, "Pr. 46 OPR speed" to 10 kPLS/s, "Pr. 47 Creep speed" to 1 kPLS/s, and deceleration time to 300 ms, the minimum value of "Pr. 50 Setting for the Movement amount after near-point dog ON" is calculated as follows:



Pr.51 OPR acceleration time selection

Set which of "acceleration time 0 to 3" to use for the acceleration time during OPR.

- 0 : Use the value set in " Pr.9 Acceleration time 0".
- 1 : Use the value set in " Pr.25 Acceleration time 1".
- 2 : Use the value set in " Pr.26 Acceleration time 2".
- 3 : Use the value set in " Pr.27 Acceleration time 3".

Pr.52 OPR deceleration time selection

Set which of "deceleration time 0 to 3" to use for the deceleration time during OPR.

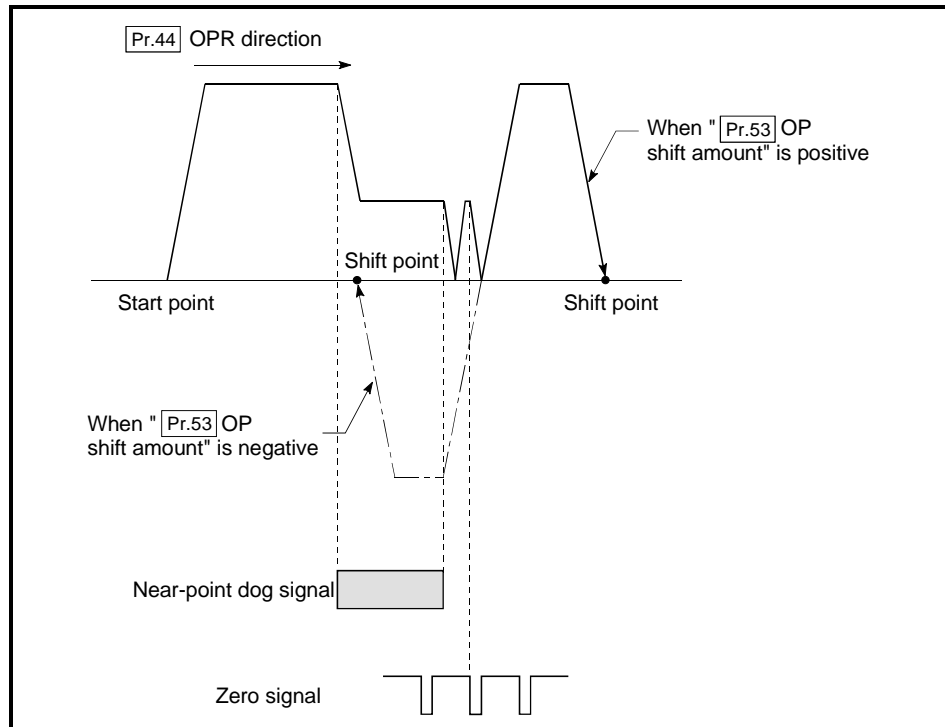
- 0 : Use the value set in " Pr.10 Deceleration time 0".
- 1 : Use the value set in " Pr.28 Deceleration time 1".
- 2 : Use the value set in " Pr.29 Deceleration time 2".
- 3 : Use the value set in " Pr.30 Deceleration time 3".

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|---|--|---|---------------|-------------------------------------|------------|------------|------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.53 OP shift amount | The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set. <div style="border: 1px solid gray; padding: 5px; display: inline-block; margin-top: 10px;"> [Table 1] on right page </div> | | 0 | 84 85 | 234 235 | 384 385 | 534 535 |
| Pr.54 OPR torque limit value | 1 to 300 (%) | 1 to 300 (%) | 300 | 86 | 236 | 386 | 536 |
| Pr.56 Speed designation during OP shift | 0 : OPR speed | 0 | 0 | 88 | 238 | 388 | 538 |
| | 1 : Creep speed | 1 | | | | | |
| Pr.57 Dwell time during OPR retry | 0 to 65535 (ms) | 0 to 65535 (ms) 0 to 32767 : Set as a decimal 32768 to 65535 : Convert into hexadecimal and set | 0 | 89 | 239 | 389 | 539 |

Pr.53 OP shift amount

Set the amount to shift (move) from the position stopped at with machine OPR.
 * The OP shift function is used to compensate the OP position stopped at with machine OPR.

If there is a physical limit to the OP position, due to the relation of the near-point dog installation position, use this function to compensate the OP to an optimum position.



[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|--------------------|---|---|
| 0 : mm | -214748364.8 to 214748364.7 (μm) | -2147483648 to 2147483647 ($\times 10^{-1}\mu\text{m}$) |
| 1 : inch | -21474.83648 to 21474.83647 (inch) | -2147483648 to 2147483647 ($\times 10^{-5}\text{inch}$) |
| 2 : degree | -21474.83648 to 21474.83647 (degree) | -2147483648 to 2147483647 ($\times 10^{-5}\text{degree}$) |
| 3 : PLS | -2147483648 to 2147483647 (PLS) | -2147483648 to 2147483647 (PLS) |

Pr.54 OPR torque limit value

Set the value to limit the servomotor torque after reaching the creep speed during machine OPR.

Refer to Section 12.4.2 "Torque limit function" for details on the torque limits.

Pr.56 Speed designation during OP shift

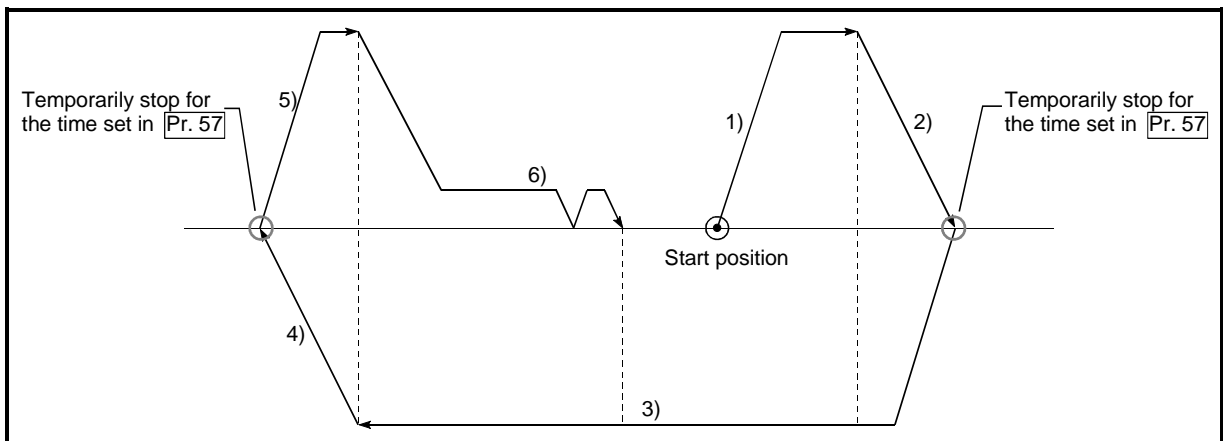
Set the operation speed for when a value other than "0" is set for "Pr.53 OP shift amount". Select the setting from "Pr.46 OPR speed" or "Pr.47 Creep speed".

0 : Designate "Pr.46 OPR speed" as the setting value.

1 : Designate "Pr.47 Creep speed" as the setting value.

Pr.57 Dwell time during OPR retry



When OPR retry is validated (when "1" is set for Pr.48), set the stop time after decelerating in 2) and 4) in the following drawing.



5.2.7 Servo basic parameters

The **Pr.101** correspond with "parameter No.1 of the servo amplifier". The following parameter correspond with "servo amplifier parameters No." in the same way.

| Item | | Setting details | Setting value *1 |
|------------------------|---------------------|---|---|
| Servo basic parameters | Pr.100 | Servo series | Used to select the servo amplifier series, which is connected to the QD75. Example) For used MR-J2-B Set up "2: MR-J2-B". |
| | Pr.101 *2 | Amplifier setting | Used to select the absolute position detection system. When used to the incremental: "0: invalid" When used to the absolute position detection system: "1: valid" POINT When absolute position detection selection invalid is selected with incremental encoder, a parameter error occurs. |
| | Pr.102 *2 | Regenerative brake resistor Regenerative selection brake option Select the external dynamic brake | Used to select the regenerative selection brake option and external dynamic brake. |
| | | | 0: MR-H-BN 1: MR-H-BN4 2: MR-J2-B 3: MR-J2S-B/MR-J2M-B 4: MR-J2-Jr |
| | | | Absolute position detection selection 0: Invalid 1: Valid |
| | | | 00: Not used 01: FR-RC, FR-BU 02: MR-RB013 03: MR-RB033 05: MR-RB32 06: MR-RB34 07: MR-RB54 08: MR-RB30 09: MR-RB50 0B: MR-RB31 0C: MR-RB51 0E: Standard + fan 10: MR-RB032 11: MR-RB12 12: MR-RB14 80: MR-RB3H-4 81: MR-RB5H-4 82: MR-RB3G-4 83: MR-RB5G-4 84: MR-RB34-4 85: MR-RB54-4 86: MR-RB1L-4 87: MR-RB3M-4 0: Invalid 1: Valid |

| Item | | Setting details | Setting value *1 |
|------------------------|--------------|---|---|
| Servo basic parameters | Pr.103 | Motor type Used to select the motor type. Use it "0080H: Automatic setting" usually. POINT Set up a motor type in "FFH" with PLC program when servo amplifier is MR-J2B-A15 (Motor: HC-KF). | 00: HA-SH Standard 01: HA-LH Low inertia 02: HA-UH Flat 03: HA-FH/HA-FF 05: HA-MH 07: HC-SF 08: HC-RF 09: HC-UF 0A: HA-FF 0B: HC-MF 0C: HA-LF(400V[Class]) 0E: HA-LF(200V[Class]) 10: HA-LF□IM(400V[Class]) 13: HA-LF□IM(200V[Class]) 80: Automatic setting |
| | Pr.104 | Motor capacity Used to select 100 times of the output capacity (kW) of the motor by the number of hexadecimal. Refer to the instruction manual of servo amplifier to use for the output capacity of the motor. Example 1) For used motor capacity is 50W $0.05(\text{kW}) \times 100 = 5$ Set up "5H". Example 2) For used motor capacity is 22kW $22(\text{kW}) \times 100 = 2200$ Set up "2200H". POINT Be sure to set up motor capacity. Communication with servo amplifier isn't started by the initial value "0" in default value. (The LED indication of servo amplifier indicates "Ab".) | 0000 to FFFF |
| | Pr.105 | Servo motor speed Used to select the rated speed[r/min] of the servomotor. Refer to the instruction manual of servomotor to use for the rated rotation speed of servomotor. | 1: 1000[r/min] 2: 2000[r/min] 3: 3000[r/min] |
| | Pr.106 *2 | Feed back pulse Used to select the feed back pulse. (The servomotor resolution of a per rotation) | 000: 16384[PLS] 001: 8192[PLS] 006: 32768[PLS] 007: 131072[PLS] 255: Depending on the number of motor resolution pulses. |
| | Pr.107 *2 | Rotation direction selection Used to set the rotation direction of the servomotor. | 0: Forward rotation (CCW) with the increase of the positioning address.  1: Reverse rotation (CW) with the increase of the positioning address.  |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|---|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | — | — | — | — | — | 0 0 H ↑ Motor type selection * 1: is used to set up the setting value. (Hexadecimal) | 80H | 30103 | 30203 | 30303 | 30403 | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | — | — | — | — | — | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0000 to FFFF | 0000H | 30104 | 30204 | 30304 | 30404 | |
| ○ | ○ | ○ | ○ | ○ | ○ | 1 to 3 | 1 | 30105 | 30205 | 30305 | 30405 | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 ↑ Feedback pulse number * 1: is used to set up the setting value. (Hexadecimal) | 0255 | 30106 | 30206 | 30306 | 30406 | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 to 1 | 0 | 30107 | 30207 | 30307 | 30407 | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

| Item | | Setting details | Setting value *1 |
|------------------------|--------|-----------------|---|
| | | | |
| Servo basic parameters | Pr.108 | Auto tuning | Used to select the auto tuning. |
| | Pr.109 | Servo response | Used to set the response of auto tuning. (When "Pr.108 Auto tuning" is valid) Optimum response can be selected according to the rigidity of the machine. As machine rigidity is higher, faster response can be set to improve tracking performance in response to a command and to reduce setting time. |
| | | | 0: Auto tuning selected for use of interpolation axis control, etc. in position |
| | | | 1: Auto tuning for ordinary operation. |
| | | | 2: Invalid (No auto tuning) |
| | | | 0: Interpolation mode |
| | | | 1: Auto tuning mode 1 |
| | | | 2: Manual mode 2 |
| | | | 3: Auto tuning mode 2 |
| | | | 4: Manual mode 1 |
| | | | 1: Normal mode |
| | | | 2: Normal mode |
| | | | 3: Normal mode |
| | | | 4: Normal mode |
| | | | 5: Normal mode |
| | | | 8: Large friction mode |
| | | | 9: Large friction mode |
| | | | A: Large friction mode |
| | | | B: Large friction mode |
| | | | C: Large friction mode |
| | | | 1: Low response (15Hz) |
| | | | 2: Low response (20Hz) |
| | | | 3: Low response (25Hz) |
| | | | 4: Low response (30Hz) |
| | | | 5: Low response (35Hz) |
| | | | 6: Low response (45Hz) |
| | | | 7: Low response (55Hz) |
| | | | 8: Middle response (70Hz) |
| | | | 9: High response (85Hz) |
| | | | A: High response (105Hz) |
| | | | B: High response (130Hz) |
| | | | C: High response (160Hz) |
| | | | D: High response (200Hz) |
| | | | E: High response (240Hz) |
| | | | F: High response (300Hz) |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|----------------|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, - : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 0 to 2 | 1 | 30108 | 30208 | 30308 | 30408 | |
| - | - | - | ○ | - | ○ | 0 to 4 | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 1 to 5, 8 to C | 5H | 30109 | 30209 | 30309 | 30409 | |
| - | - | - | ○ | - | ○ | 1 to F | | | | | | |

5.2.8 Servo adjustment parameters

| Item | | Setting details | Setting value *1 | |
|-----------------------------|--------|-----------------------------|--|--|
| | | | | |
| Servo adjustment parameters | Pr.112 | Load inertia ratio | <p>Used to set the ratio of the load inertia to the inertia moment of the servomotor.</p> <p>When auto tuning is selected, the result of auto tuning is automatically used.</p> <p>POINT</p> <p>Pr.112 Load inertia ratio to Pr.117 Speed integral compensation is transferred to servo amplifier in PLC CPU power on, reset and PLC READY signal (Y0) on. When auto tuning is executed, it is changed to the optimum value inside servo amplifier.</p> <p>The result of auto tuning is transferred to QD75 at this time.</p> <p>When auto tuning is invalid and wants to keep gain adjustment result by "GX Configurator-QP", a reading stock is executed by Cd.102 Servo amplifier read to QD75.</p> <p>After that, execute Cd.1 Flash ROM write request, and keep it in the flash ROM.</p> | <p>0 to 100.0[times]</p> <p>0 to 300.0[times]</p> |
| | Pr.113 | Position loop gain 1 | <p>Used to set the gain of position loop 1. Increase the gain to improve trackability performance in response to the position command.</p> | <p>4 to 1000[rad/s]</p> <p>4 to 2000[rad/s]</p> |
| | Pr.114 | Speed loop gain 1 | <p>Normally this parameter setting need not be changed. Higher setting increases the response level but is liable to generate vibration and/or noise.</p> | <p>20 to 5000[rad/s]</p> <p>20 to 8000[rad/s]</p> |
| | Pr.115 | Position loop gain 2 | <p>Used to set the gain of the position loop.</p> <p>Set this parameter to increase position response to load disturbance.</p> <p>Higher setting increases the response level but is liable to generate vibration and/or noise.</p> | <p>1 to 500[rad/s]</p> <p>1 to 1000[rad/s]</p> |
| | Pr.116 | Speed loop gain 2 | <p>Set this parameter when vibration occurs on machines of lowrigidity or large backlash.</p> <p>Higher setting increases the response level but is liable to generate vibration and/or noise.</p> | <p>20 to 8000[rad/s]</p> <p>20 to 20000[rad/s]</p> |
| | Pr.117 | Speed integral compensation | <p>Used to set the constant of integral compensation.</p> | <p>1 to 1000[ms]</p> |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|-------------|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, - : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 0 to 1000 | 70 | 30112 | 30212 | 30312 | 30412 | |
| - | - | - | ○ | - | ○ | 0 to 3000 | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 4 to 1000 | 35 | 30113 | 30213 | 30313 | 30413 | |
| - | - | - | ○ | - | ○ | 4 to 2000 | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 20 to 5000 | 177 | 30114 | 30214 | 30314 | 30414 | |
| - | - | - | ○ | - | ○ | 20 to 8000 | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 1 to 500 | 35 | 30115 | 30215 | 30315 | 30415 | |
| - | - | - | ○ | - | ○ | 1 to 1000 | | | | | | |
| ○ | ○ | ○ | - | ○ | - | 20 to 8000 | 817 | 30116 | 30216 | 30316 | 30416 | |
| - | - | - | ○ | - | ○ | 20 to 20000 | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | 1 to 1000 | 20 | 30117 | 30217 | 30317 | 30417 | |

| Item | | Setting details | Setting value * 1 |
|-----------------------------|-----------------------|--|--|
| Servo adjustment parameters | Pr.118 | Machine resonance suppression filter | 00: Not used 01: 1125[Hz] 02: 563[Hz] 03: 375[Hz] 04: 282[Hz] 05: 225[Hz] 06: 188[Hz] 07: 161[Hz] |
| | | Notch filter selection | 00: Invalid 08: 141[Hz] 01: 1125[Hz] 09: 125[Hz] 02: 563[Hz] 10: 113[Hz] 03: 375[Hz] 11: 102[Hz] 04: 282[Hz] 12: 94[Hz] 05: 563[Hz] 13: 87[Hz] 06: 375[Hz] 14: 80[Hz] 07: 282[Hz] 15: 75[Hz] |
| | Notch depth selection | Used to set the notch frequency to match the response frequency of the mechanical system. | 00: Invalid 10: 281.3[Hz] 01: 4500[Hz] 11: 264.7[Hz] 02: 2250[Hz] 12: 250[Hz] 03: 1500[Hz] 13: 236.8[Hz] 04: 1125[Hz] 14: 225[Hz] 05: 900[Hz] 15: 214.3[Hz] 06: 750[Hz] 16: 204.5[Hz] 07: 642.9[Hz] 17: 195.7[Hz] 08: 562.5[Hz] 18: 187.5[Hz] 09: 500[Hz] 19: 180[Hz] 0A: 450[Hz] 1A: 173.1[Hz] 0B: 409.1[Hz] 1B: 166.7[Hz] 0C: 375[Hz] 1C: 160.1[Hz] 0D: 346.2[Hz] 1D: 155.2[Hz] 0E: 321.4[Hz] 1E: 150[Hz] 0F: 300[Hz] 1F: 145.2[Hz] |
| Pr.119 | Feed forward gain | Used to set the feed forward gain for position control. Set "100" to nearly zero the droop pulse value when operation is performed at constant speed. Note that sudden acceleration/deceleration will increase overshoot. POINT Be sure to set up this parameter "2: Invalid (No auto tuning) when you set up Pr.108 Auto tuning. | 0 to 100[%] |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|---|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, - : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | - | ○ | - | ○ | - | | | | | | | |
| - | ○ | - | - | - | - | | | | | | | |
| | | | | | | 0 <input type="text"/> <input type="text"/> <input type="text"/> H ↖ Notch depth selection ↗ Notch filter selection * 1: <input type="text"/> is used to set up the setting value. (Hexadecimal) | 0000H | 30118 | 30218 | 30318 | 30418 | |
| - | - | - | ○ | - | ○ | | | | | | | |
| - | - | - | ○ | - | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 to 100 | 0 | 30119 | 30219 | 30319 | 30419 | |

| Item | | Setting details | Setting value *1 | |
|-----------------------------|--------|---|--|---|
| | | | | |
| Servo adjustment parameters | Pr.120 | In-position range | Used to set the droop pulse range in which the in-position signal will be output to the servo system controller. POINT Only MR-J2S-B sets up "Pr.106 Feed back pulse" in the feed back pulse unit. | 0 to 50000[PLS] |
| | Pr.121 | Electromagnetic brake sequence output | Used to set a time delay from when the electromagnetic brake interlock signal (MBR) turns off until the base circuit is shut off. | 0 to 1000[ms] |
| | Pr.122 | Analog monitor output Monitor output mode selection (ch1, ch2) | Used to set the output signal from analog monitor ch1 and ch2 of the servo amplifier. | 0: Speed (± output) 1: Torque (± output) 2: Speed (± output) 3: Torque (+ output) 4: Current command (± output) 5: Command speed (± output) 6: Droop pulses 1/1 (± output) 7: Droop pulses 1/4 (± output) 8: Droop pulses 1/16 (± output) 9: Droop pulses 1/32 (± output) A: Droop pulses 1/64 (± output) |
| | | | | 0: Speed (± output) 1: Torque (± output) 2: Speed (± output) 3: Torque (+ output) 4: Current command (± output) 5: Command speed (± output) 6: Droop pulses 1/1 (± output) 7: Droop pulses 1/16 (± output) 8: Droop pulses 1/64 (± output) 9: Droop pulses 1/256 (± output) A: Droop pulses 1/1024 (± output) |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|--|---|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | 0 to 50000 | 100 | 30120 | 30220 | 30320 | 30420 |
| ○ | ○ | ○ | ○ | ○ | ○ | | 0 to 1000 | 0 | 30121 | 30221 | 30321 | 30421 |
| ○ | ○ | — | — | — | — | | | | | | | |
| — | — | ○ | — | — | — | | 0 <input type="text"/> 0 <input type="text"/> H ↑ Monitor 1 output setting ↑ Monitor 2 output setting * 1: <input type="text"/> is used to set up the setting value. (Hexadecimal) | 0001H | 30122 | 30222 | 30322 | 30422 |

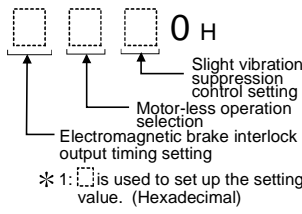
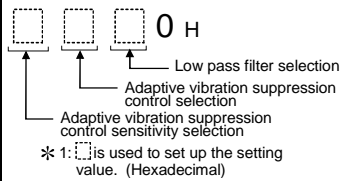
| | | Item | Setting details | Setting value*1 | |
|-----------------------------|--------------|-----------------------|--|---|--|
| Servo adjustment parameters | Pr.122 | Analog monitor output | Monitor output mode selection (ch1, ch2) | Used to set the output signal from analog monitor ch1 and ch2 of the servo amplifier. | 0: Servo motor speed (± 8V/max. speed) 1: Generated torque (± 8V/max. torque) 2: Motor speed (+ 8V/max. speed) 3: Generated torque (+ 8V/max. torque) 4: Current command (± 8V/max. current command) 5: Command speed (± 8V/max. command speed) 6: Droop pulses (± 10V/128 pulses) 7: Droop pulses (± 10V/2048 pulses) 8: Droop pulses (± 10V/8192 pulses) 9: Droop pulses (± 10V/32768 pulses) A: Droop pulses (± 10V/131072 pulses) B: Bus voltage (servo amplifier of 100V/200V: + 8V/400V, servo amplifier of 400V: + 8V/800V) |
| | Pr.123 *2 | Optional function 1 | Servo forced stop selection | Used to set the optional function 1 (Carrier frequency (Low acoustic noise mode selection)) • Carrier frequency (Low acoustic noise mode selection) | 0: Valid (Use the forced stop signal.) 1: Invalid (Do not use the forced stop signal.) |
| | | | Low acoustic noise mode selection | 20[dB] can decrease the electromagnetic noise which occurs from servomotor when "1: 9.0[KHz]" is selection. | 0: 2.25[KHz] 2: 6.375[KHz] 3: 9.0[KHz] |
| | | | Serial encoder cable | • Used to set serial encoder cable selection. | 0: 2-wire 1: 4-wire (Supports long distance cables) |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|--|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| — | — | — | ○ | — | —*3 | 0 <input type="text"/> 0 <input type="text"/> H ↑ ↑ Monitor 1 Monitor 2 output setting output setting * 1: <input type="text"/> is used to set up the setting value. (Hexadecimal) | 0001H | 30122 | 30222 | 30322 | 30422 | |
| — | — | ○ | ○ | ○ | ○ | 0 <input type="text"/> <input type="text"/> <input type="text"/> H ↑ ↑ ↑ Serial encoder Servo forced Low acoustic cable setting stop selection noise mode selection * 1: <input type="text"/> is used to set up the setting value. (Hexadecimal) | 0000H | 30123 | 30223 | 30323 | 30423 | |
| ○ | — | — | — | — | — | | | | | | | |
| — | ○ | — | — | — | — | | | | | | | |
| ○ | ○ | — | — | — | — | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

*3: Don't change setting value "0001H" by any means.

| | | Item | Setting details | Setting value *1 | |
|-----------------------------|--------------|---|--|--|--|
| Servo adjustment parameters | Pr.124 *2 | Optional function 2 | Slight vibration suppression control selection | 0: Invalid 1: Valid (Gain adjustment mode: Manual mode Pr.108 is set up "2") | |
| | | | Motor-less operation selection | 0: Invalid 1: Valid | |
| | | | Electromagnetic brake interlock output timing | Used to set the optional function 2. • Motor operation-less When the motor operation-less is made effective, without connecting servomotor, a signal is outputted, condition indication can be executed. | 0: There are no relations in motor rotation speed, and it is outputted under the next condition. 1) Servo OFF 2) Alarm occurs 3) Emergency stop input turn off (Valid) 1: Output is executed when status of 1) to 3) and rotation speed of the servomotor are less than Pr.130 . |
| | Pr.125 | Adaptive vibration suppression control/ low pass filter | Low pass filter selection | Used to set the low pass filter and the adaptive vibration suppression control. | 0: Valid (Automatic adjustment) 1: Invalid (But, the selection of manual low pass filter frequency is effective.) |
| | | | Adaptive vibration suppression control selection | | 0: Invalid 1: Valid (Machine resonance frequency is always detected and the filter is generated in response to resonance to suppress machine vibration. 2: Held (The characteristics of the filter generated so far are held, and detection of machine resonance is stopped. |
| | | | Adaptive vibration suppression control sensitivity | | 0: Normal 1: Large sensitivity |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|--|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, - : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| - | - | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | |
| ○ | ○ | - | - | - | - |  | 0000H | 30124 | 30224 | 30224 | 30424 | |
| - | - | - | ○ | - | ○ | | | | | | | |
| - | - | - | ○ | - | ○ |  | 0000H | 30125 | 30225 | 30325 | 30425 | |
| - | - | - | ○ | - | ○ | | | | | | | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

5.2.9 Servo expansion parameters

| Item | | Setting details | Setting value *1 | |
|----------------------------|--------|---|--|---|
| Servo expansion parameters | Pr.127 | Monitor output 1 offset (Analog monitor 1 offset) | Used to set the offset voltage for monitor output 1. -9999 to 9999 -999 to 999 | |
| | Pr.128 | Monitor output 2 offset (Analog monitor 2 offset) | Used to set the offset voltage for monitor output 2. -9999 to 9999 -999 to 999 | |
| | Pr.129 | Pre-alarm data selection 1 | Used to set the pre-alarm data selection. | 0: Speed 1: Torque 2: Speed (+) 3: Torque (+) 4: Current command output 5: Command (F△T) 6: Droop pulses 1/1 7: Droop pulses 1/4 8: Droop pulses 1/16 9: Droop pulses 1/32 A: Droop pulses 1/64 |
| | | Pre-alarm data selection 2 | | |
| | | Pre-alarm data sampling time selection | | 0: 1.77[ms] 1: 3.55[ms] 2: 7.11[ms] 3: 14.22[ms] 4: 28.44[ms] |
| | Pr.130 | Zero speed | Used to set the output range of the Zero speed signal (ZSP). 0 to 10000[r/min] | |
| | Pr.131 | Error excessive alarm level | Used to set the output range of the error excessive alarm. 0 to 1000[PLS] 0.1 to 100.0[0.25rev] *6 | |
| | Pr.132 | Optional function 5 PI-PID control switch-over | Used to select the PI-PID control switch-over. | 0: PI control is always valid. 1: Switched to PI control when the droop value is reached or exceeded. 2: PID control is always valid. |
| | | Servo reading character (Servo retrieve character) *5 | Use to read the reason after the amplifier 0400H why it doesn't rotate, data, parameter item and alarm item. | 0: Japanese 1: English |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|--|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, - : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| ○ | ○ | - | - | - | - | -9999 to 9999 | 0000 | 30127 | 30227 | 30327 | 30427 | |
| - | - | ○ | ○ | - | - *3 | -999 to 999 | | | | | | |
| ○ | ○ | - | - | - | - | -9999 to 9999 | 0000 | 30128 | 30228 | 30328 | 30428 | |
| - | - | ○ | ○ | - | - *3 | -999 to 999 | | | | | | |
| ○ | ○ | - | - | - | - | <div style="display: flex; align-items: center;"> 0 <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; gap: 10px;"> <div style="border: 1px dashed black; padding: 2px;"> </div> <div style="border: 1px dashed black; padding: 2px;"> </div> <div style="border: 1px dashed black; padding: 2px;"> </div> </div> <div style="margin-top: 5px;">H</div> </div> <div style="margin-left: 10px; font-size: 0.8em;"> <p>Pre-alarm data selection 2</p> <p>Pre-alarm data selection 1</p> <p>Pre-alarm data sampling time selection</p> <p>* 1: is used to set up the setting value. (Hexadecimal)</p> </div> </div> | 0001H | 30129 | 30229 | 30329 | 30429 | |
| ○ | ○ | - | - | - | - | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 to 10000 | 50 | 30130 | 30230 | 30330 | 30430 | |
| ○ | ○ | ○ | - | ○ | - | 1 to 1000 | 80 | 30131 | 30231 | 30331 | 30431 | |
| - | - | - | ○ | - | ○ | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | <div style="display: flex; align-items: center;"> <div style="border: 1px dashed black; padding: 2px;"> </div> 00 <div style="border: 1px dashed black; padding: 2px;"> </div> H </div> <div style="margin-left: 10px; font-size: 0.8em;"> <p>PI-PID control switch over selection</p> <p>Servo reading character selection</p> <p>* 1: is used to set up the setting value. (Hexadecimal)</p> </div> | 0000H | 30132 | 30232 | 30332 | 30432 | |
| ○ | ○ | - | - | - | - | | | | | | | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

*3: Don't change setting value "0000H".

*4: You cannot change parameter "Serial communication response delay time setting" and "Serial communication baud rate setting".

*5: Don't use to the parameter (normal). Don't change setting value "Default value" by any means.

*6: The unit setting differs according to the software version of the servo amplifier. Refer to the "Servo Amplifier Instruction Manual".

| | | Item | Setting details | Setting value *1 |
|----------------------------|---------------------------------|---|--|--|
| Servo expansion parameters | Optional function 6 | Serial communication baud rate selection | A communication baud rate selection and communication answer delay time and encoder output pulse setup selection. | 0: 9600[bps] 2: 38400[bps] 1: 19200[bps] 3: 57600[bps] |
| | | Serial communication response delay time selection | | 0: Invalid 1: Valid (It answer after delay time of more than 888µs) |
| | | Pr.133 *2 Encoder output pulse setting selection | | 0: Output pulse setting selection 1: Divided perimeter ratio |
| | | OPR set condition selection (Zeroing condition setting selection) | | 0: It is necessary to pass through the Z phase after the power on. 1: It is not necessary to pass through the Z phase after the power on. |
| | Pr.134 | PI-PID control switch-over position droop | Used to select the position droop value (Number of pulse) which PI control is switched over to PID control. Pr.132 becomes effective when a parameter is made "0001H". | 0 to 50000[PLS] |
| Pr.136 | Speed differential compensation | Used to select the differential compensation value. Setting speed integral compensation value to 1000 in PI (proportionally integral) control specifies the ordinary P (proportional) control range, setting the value to less than 1000 increase the P control range. | 0 to 1000 | |
| Pr.138 *2 | Encoder output pulses | Used to set the encoder pulse (A-phase, B-phase) output by the servo amplifier. (after the 4 times) You can use Pr.133 to choose the output pulse setting or output division ratio setting. The number of A-phase and B-phase pulse actually output 1/4 times greater than the present number of pulse. The maximum output frequency is 1.3Mpps (after multiplication by 4). Use this parameter within this range. | 0 to 65535 | |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|------------|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| — | — | — | ○ | — | ○ *4 | | 0000H | 30133 | 30233 | 30333 | 30433 | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 to 50000 | 0 | 30134 | 30234 | 30334 | 30434 | |
| ○ | ○ | ○ | ○ | ○ | ○ | 0 to 1000 | 980 | 30136 | 30236 | 30336 | 30436 | |
| — | — | — | ○ | — | ○ | 0 to 65535 | 4000 | 30138 | 30238 | 30338 | 30438 | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

*4: You cannot change parameter "Serial communication response delay time setting" and "Serial communication baud rate setting".

5.2.10 Servo expansion parameters 2

| Item | | Setting details | Setting value *1 | |
|------------------------------|--|---|---|--|
| Servo expansion parameters 2 | Pr.143 *3 Slight vibration suppression control selection 1 | Position gain 2 shift value | Used to set each of the gain shift value which the slight vibration suppression control selected. 0: 1.0[times] 1: 0.75[times] 2: 0.5[times] 3: 0.25[times] | |
| | | Speed gain 2 shift value | | |
| | | Speed integral compensation shift value | | |
| | Pr.144 *3 | Slight vibration suppression control selection 2 | Used to set the time after in-position completion gain shift value which the slight vibration suppression control selected. | 0 to 1000[ms] |
| | Pr.145 *3 | Induction voltage compensation | Use to set the induction voltage compensation range. | 0 to 100[%] |
| | Pr.149 *2 | Gain changing selection | Used to set the gain changing selection. The gain changing function becomes effective when the gain adjustment mode is used manual mode 2. (Pr.108 is set "2"). | 0: Invalid 2: (Effective in more than) Command frequency [KPPS] 3: (Effective in more than) Droop pulse [PLS] 4: (Effective in more than) Model speed [r/min] |
| | Pr.150 | Gain changing condition | Used to set the ratio of changing Pr.152 to Pr.155 when gain changing is valid. Used to set Pr.149 when command frequency, droop pulse or model speed is selection. | 0 to 9999 |
| | Pr.151 | Gain changing time constant | Used to set the time constant at which the gains will change in response to the conditions set in Pr.149 and Pr.150. | 0 to 100[ms] |
| | Pr.152 | Ratio of load inertia moment to servomotor inertia moment 2 (Load moment of inertia ratio 2) | Used to set the ratio of load inertia moment to servo motor inertia moment when gain changing is valid. Made valid when auto tuning is invalid. | 0 to 300.0[times] |
| | Pr.153 | Position loop gain 2 changing ratio | Used to set the ratio of changing the position loop gain 2 when gain changing is valid. Made valid when auto tuning is invalid. | 10 to 200[%] |
| Pr.154 | Speed loop gain 2 changing ratio | Used to set the ratio of changing the speed loop gain 2 when gain changing is valid. Made valid when auto tuning is invalid. | 10 to 200[%] | |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|--|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | | | | |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| — | — | — | ○ | — | ○ | <p>0 H</p> <p>Position gain 2 shift value</p> <p>Speed gain 2 shift value</p> <p>Speed integral compensation shift value</p> <p>* 1: is used to set up the setting value. (Hexadecimal)</p> | 0111H | 30143 | 30243 | 30343 | 30443 | |
| — | — | — | ○ | — | ○ | 0 to 1000 | 20 | 30144 | 30244 | 30344 | 30444 | |
| — | — | — | ○ | — | ○ | 0 to 100 | 50 | 30145 | 30245 | 30345 | 30445 | |
| — | — | — | ○ | — | ○ | 0, 2 to 4H | 0000H | 30149 | 30249 | 30349 | 30449 | |
| — | — | — | ○ | — | ○ | 0 to 9999 | 10 | 30150 | 30250 | 30350 | 30450 | |
| — | — | — | ○ | — | ○ | 0 to 100 | 1 | 30151 | 30251 | 30351 | 30451 | |
| — | — | — | ○ | — | ○ | 0 to 3000 | 70 | 30152 | 30252 | 30352 | 30452 | |
| — | — | — | ○ | — | ○ | 10 to 200 | 100 | 30153 | 30253 | 30353 | 30453 | |
| — | — | — | ○ | — | ○ | 10 to 200 | 100 | 30154 | 30254 | 30354 | 30454 | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

*3: Don't use to the parameter (normal). Don't change setting value "Default value" by any means.

| Item | | Setting details | Setting value * 1 |
|------------------------------|--------------|--|---|
| Servo expansion parameters 2 | Pr.155 | Speed integral compensation changing ratio (VEL. INTGRL. COMPS. Gain 2 change ratio.) | Used to set the ratio of changing the speed integral compensation when gain changing is valid. Made valid when auto tuning is invalid. 50 to 1000[%] |
| | Pr.160 *2 | Optional function C Encoder output pulse direction | Used to set the encoder output pulse direction 0: CCW progress to A phases 90° 1: CW progress to A phases 90° |
| | Pr.161 | Machine resonance suppression filter 2 Notch filter frequency selection | Used to set the machine resonance suppression filter. About adaptive vibration suppression control, "Valid" or when it is set as "Held" (Pr.125: □1 □□ or □2□□), a Machine resonance suppression filter becomes invalid. |
| | | Notch depth selection | 00: Invalid 10: 281.3[Hz] 01: 4500[Hz] 11: 264.7[Hz] 02: 2250[Hz] 12: 250[Hz] 03: 1500[Hz] 13: 236.8[Hz] 04: 1125[Hz] 14: 225[Hz] 05: 900[Hz] 15: 214.3[Hz] 06: 750[Hz] 16: 204.5[Hz] 07: 642.9[Hz] 17: 195.7[Hz] 08: 562.5[Hz] 18: 187.5[Hz] 09: 500[Hz] 19: 180[Hz] 0A: 450[Hz] 1A: 173.1[Hz] 0B: 409.1[Hz] 1B: 166.7[Hz] 0C: 375[Hz] 1C: 160.1[Hz] 0D: 346.2[Hz] 1D: 155.2[Hz] 0E: 321.4[Hz] 1E: 150[Hz] 0F: 300[Hz] 1F: 145.2[Hz] |
| | | | 0: Deep (-40db) 1: ↑ (-14db) 2: ↓ (-8db) 3: Shallow (-4db) |

| Setting Value, setting range | | | | | | | Value set with PLC program | Default value | Setting value buffer memory address | | | |
|--|----------|---------|----------|----------|----------|---|----------------------------|---------------|-------------------------------------|--------|--------|--------|
| Value set with peripheral device | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Servo amplifier setting invalid (○ : Invalid, — : Valid) | | | | | | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| MR-H-BN | MR-H-BN4 | MR-J2-B | MR-J2S-B | MR-J2-Jr | MR-J2M-B | | | | | | | |
| — | — | — | ○ | — | ○ | 50 to 1000 | 100 | 30155 | 30255 | 30355 | 30455 | |
| — | — | — | ○ | — | ○ | 0 <input type="checkbox"/> 0 0 H ↑ Encoder output pulse direction selection * 1: <input type="checkbox"/> is used to set up the setting value. (Hexadecimal) | 0000H | 30160 | 30260 | 30360 | 30460 | |
| — | — | — | ○ | — | ○ | 0 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> H ↑ Notch filter frequency selection ↑ Notch depth selection * 1: <input type="checkbox"/> is used to set up the setting value. (Hexadecimal) | 0000H | 30161 | 30261 | 30361 | 30461 | |

*2: Set the parameter value and switch power off once (The parameter is transferred to servo amplifier from QD75), then switch it on again to make that parameter setting valid.

5.3 List of positioning data

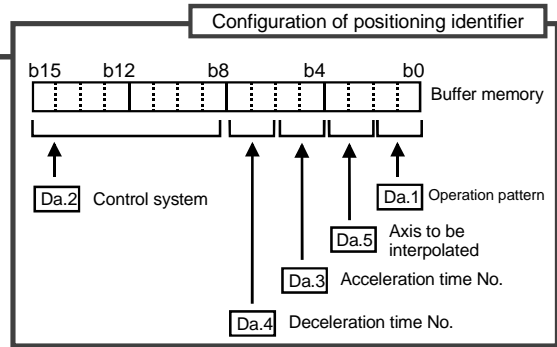
Before explaining the positioning data setting items **Da.1** to **Da.10**, the configuration of the positioning data will be shown below.

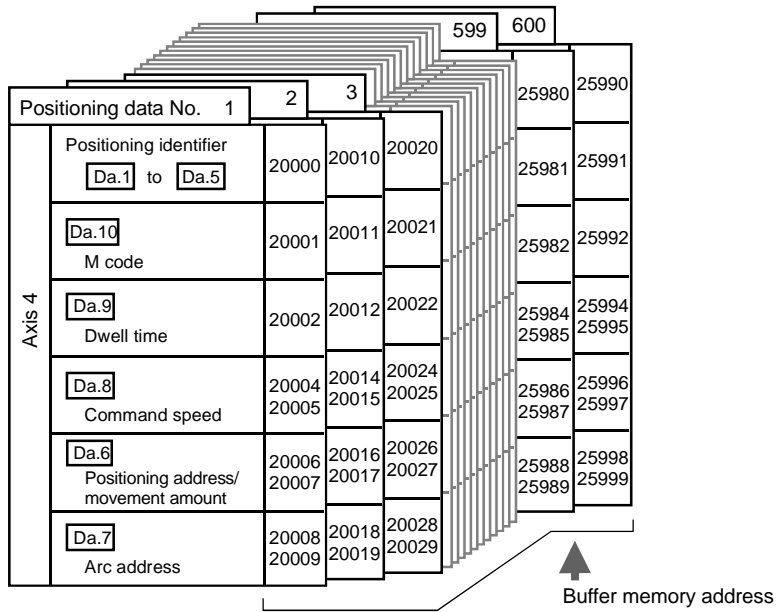
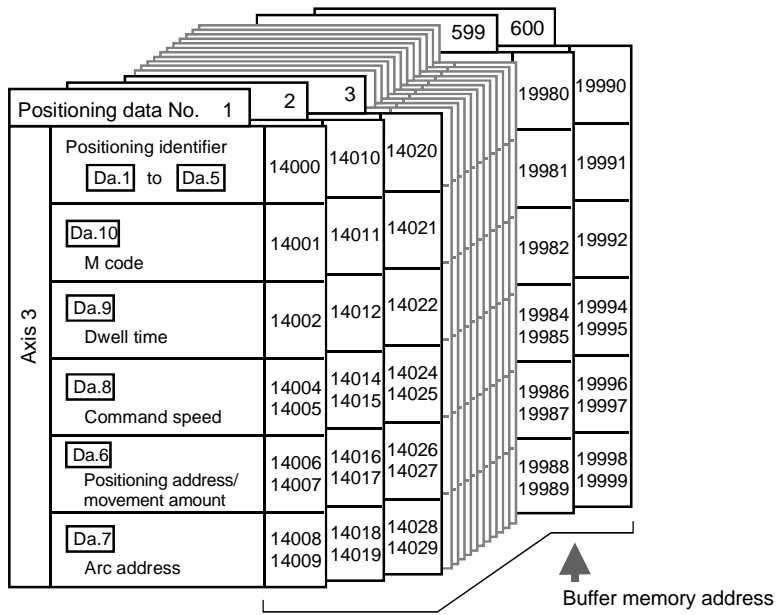
The positioning data stored in the QD75 buffer memory has the following type of configuration.

| Positioning data No. | | 1 | 2 | 3 | ... | 599 | 600 |
|----------------------|--|--------------|--------------|--------------|-----|--------------|--------------|
| Axis 1 | Positioning identifier Da.1 to Da.5 | 2000 | 2010 | 2020 | ... | 7980 | 7990 |
| | Da.10 M code | 2001 | 2011 | 2021 | ... | 7981 | 7991 |
| | Da.9 Dwell time | 2002 | 2012 | 2022 | ... | 7982 | 7992 |
| | Da.8 Command speed | 2004 2005 | 2014 2015 | 2024 2025 | ... | 7984 7985 | 7994 7995 |
| | Da.6 Positioning address/ movement amount | 2006 2007 | 2016 2017 | 2026 2027 | ... | 7986 7987 | 7996 7997 |
| | Da.7 Arc address | 2008 2009 | 2018 2019 | 2028 2029 | ... | 7988 7989 | 7998 7999 |

- Up to 600 positioning data items can be set (stored) for each axis in the buffer memory address shown on the left. This data is controlled as positioning data No. 1 to 600 for each axis.
- One positioning data item is configured of the items shown in the bold box.

| Positioning data No. | | 1 | 2 | 3 | ... | 599 | 600 |
|----------------------|--|--------------|--------------|--------------|-----|----------------|----------------|
| Axis 2 | Positioning identifier Da.1 to Da.5 | 8000 | 8010 | 8020 | ... | 13980 | 13990 |
| | Da.10 M code | 8001 | 8011 | 8021 | ... | 13981 | 13991 |
| | Da.9 Dwell time | 8002 | 8012 | 8022 | ... | 13982 | 13992 |
| | Da.8 Command speed | 8004 8005 | 8014 8015 | 8024 8025 | ... | 13984 13985 | 13994 13995 |
| | Da.6 Positioning address/ movement amount | 8006 8007 | 8016 8017 | 8026 8027 | ... | 13986 13987 | 13996 13997 |
| | Da.7 Arc address | 8008 8009 | 8018 8019 | 8028 8029 | ... | 13988 13989 | 13998 13999 |





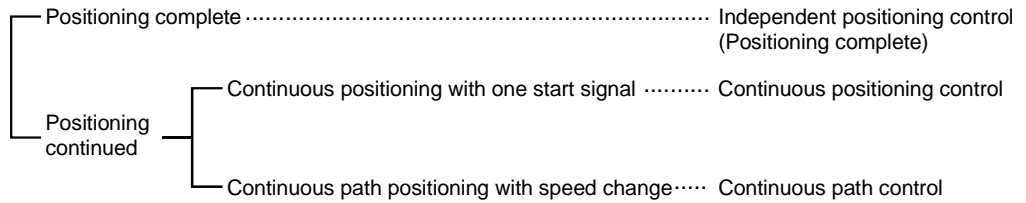
The descriptions that follow relate to the positioning data set items Da.1 to Da.10 .
 (The buffer memory addresses shown are those of the "positioning data No. 1" for the axes 1 to 4.)

| Item | Setting value | | Default value | Setting value buffer memory address | | | | |
|---|---|----------------------------|---------------|-------------------------------------|--------|--------|--------|--|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Da.1 Operation pattern Da.2 Control system Positioning identifier | 00: Positioning complete | 00 | | | | | | |
| | 01: Continuous positioning control | 01 | | | | | | |
| | 11: Continuous path control | 11 | | | | | | |
| | ABS1 : 1-axis linear control (ABS) | 01H | | | | | | |
| | INC1 : 1-axis linear control (INC) | 02H | | | | | | |
| | FEED1: 1-axis fixed-feed control | 03H | | | | | | |
| | VF1 : 1-axis speed control (forward run) | 04H | | | | | | |
| | VR1 : 1-axis speed control (reverse run) | 05H | | | | | | |
| | VPF : Speed-position switching control (forward run) | 06H | | | | | | |
| | VPR : Speed-position switching control (reverse run) | 07H | | | | | | |
| | PVF : Position-speed switching control (forward run) | 08H | | | | | | |
| | PVR : Position-speed switching control (reverse run) | 09H | | | | | | |
| | ABS2 : 2-axis linear interpolation control (ABS) | 0AH | | | | | | |
| | INC2 : 2-axis linear interpolation control (INC) | 0BH | | | | | | |
| | FEED2: Fixed-feed control by 2-axis linear interpolation | 0CH | | | | | | |
| | ABS ~ : Circular interpolation control with sub point specified (ABS) | 0DH | | | | | | |
| | INC ~ : Circular interpolation control with sub point specified (INC) | 0EH | | | | | | |
| | ABS . : Circular interpolation control with center point specified (ABS, CW) | 0FH | | | | | | |
| | ABS . : Circular interpolation control with center point specified (ABS, CCW) | 10H | | | | | | |
| | INC . : Circular interpolation control with center point specified (INC, CW) | 11H | | | | | | |
| | INC . : Circular interpolation control with center point specified (INC, CCW) | 12H | | | | | | |
| | VF2 : 2-axis speed control (forward run) | 13H | | | | | | |
| | VR2 : 2-axis speed control (reverse run) | 14H | | | | | | |
| | ABS3 : 3-axis linear interpolation control (ABS) | 15H | | | | | | |
| | INC3 : 3-axis linear interpolation control (INC) | 16H | | | | | | |
| | FEED3: Fixed-feed control by 3-axis linear interpolation control | 17H | | | | | | |
| | VF3 : 3-axis speed control (forward run) | 18H | | | | | | |
| | VR3 : 3-axis speed control (reverse run) | 19H | | | | | | |
| | ABS4 : 4-axis linear interpolation control (ABS) | 1AH | | | | | | |
| | INC4 : 4-axis linear interpolation control (INC) | 1BH | | | | | | |
| | FEED4: Fixed-feed control by 4-axis linear interpolation control | 1CH | | | | | | |
| | VF4 : 4-axis speed control (forward run) | 1DH | | | | | | |
| | VR4 : 4-axis speed control (reverse run) | 1EH | | | | | | |
| | NOP : NOP instruction | 80H | | | | | | |
| POS : Current value changing | 81H | | | | | | | |
| JUMP : JUMP instruction | 82H | | | | | | | |
| LOOP : Declares the beginning of LOOP to LEND section | 83H | | | | | | | |
| LEND : Declares the end of LOOP to LEND section | 84H | | | | | | | |
| Da.3 Acceleration time No. | 0: [Pr.9] Acceleration time 0 | 00 | | | | | | |
| | 1: [Pr.25] Acceleration time 1 | 01 | | | | | | |
| | 2: [Pr.26] Acceleration time 2 | 10 | | | | | | |
| | 3: [Pr.27] Acceleration time 3 | 11 | | | | | | |
| Da.4 Deceleration time No. | 0: [Pr.10] Deceleration time 0 | 00 | | | | | | |
| | 1: [Pr.28] Deceleration time 1 | 01 | | | | | | |
| | 2: [Pr.29] Deceleration time 2 | 10 | | | | | | |
| | 3: [Pr.30] Deceleration time 3 | 11 | | | | | | |
| Da.5 Axis to be interpolated | 0: Axis1 | 00 | | | | | | |
| | 1: Axis 2 | 01 | | | | | | |
| | 2: Axis 3 | 10 | | | | | | |
| | 3: Axis 4 | 11 | | | | | | |

Da.1 Operation pattern

The operation pattern designates whether positioning of a certain data No. is to be ended with just that data, or whether the positioning for the next data No. is to be carried out in succession.

[Operation pattern]



- 1) Positioning complete..... Set to execute positioning to the designated address, and then complete positioning.
- 2) Continuous positioning control Positioning is carried out successively in order of data Nos. with one start signal. The operation halts at each position indicated by a positioning data.
- 3) Continuous path control..... Positioning is carried out successively in order of data Nos. with one start signal. The operation does not stop at each positioning data.

Da.2 Control system

Set the "control system" for carrying out positioning control.

- Note)
- When "JUMP instruction" is set for the control system, the " **Da.9** Dwell time" and " **Da.10** M code" setting details will differ.
 - In case you selected "LOOP" as the control system, the " **Da.10** M code" should be set differently from other cases.
 - Refer to Chapter 9 "Major positioning control" for details on the control systems.
 - If "degree" is set for " **Pr.1** Unit setting", circular interpolation control cannot be carried out. (The "Circular interpolation not possible error" will occur when executed (error code: 535).)

Da.3 Acceleration time No.

Set which of "acceleration time 0 to 3" to use for the acceleration time during positioning.

- 0 : Use the value set in " **Pr.9** Acceleration time 0".
- 1 : Use the value set in " **Pr.25** Acceleration time 1".
- 2 : Use the value set in " **Pr.26** Acceleration time 2".
- 3 : Use the value set in " **Pr.27** Acceleration time 3".

Da.4 Deceleration time No.

Set which of "deceleration time 0 to 3" to use for the deceleration time during positioning.

- 0 : Use the value set in " **Pr.10** Deceleration time 0".
- 1 : Use the value set in " **Pr.28** Deceleration time 1".
- 2 : Use the value set in " **Pr.29** Deceleration time 2".
- 3 : Use the value set in " **Pr.30** Deceleration time 3".


Da.5 Axis to be interpolated

Set the target axis (partner axis) for operations under the 2-axis interpolation control.

- 0 : Selects the axis 1 as the target axis (partner axis).
- 1 : Selects the axis 2 as the target axis (partner axis).
- 2 : Selects the axis 3 as the target axis (partner axis).
- 3 : Selects the axis 4 as the target axis (partner axis).

Note)

- Do not specify the own axis number or any number except the above. (If you do, the "Illegal interpolation description command error" will occur during the program execution (error code: 521).)
- This item does not need to be set in case 3 or 4-axis interpolation is selected.

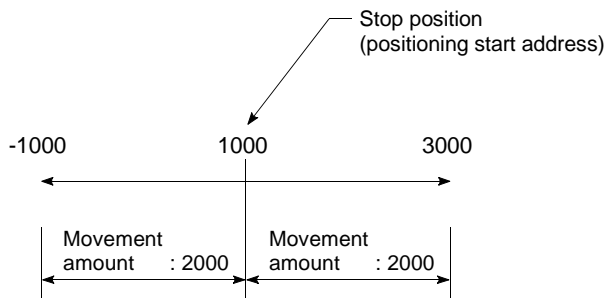
| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|--|--|----------------------------|---------------|-------------------------------------|--------------|----------------|----------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Da.6 Positioning address/ movement amount | The setting value range differs according to the " Da.2 Control system". Here, the value within the following range of [Table 1] range is set.  | | 0 | 2006 2007 | 8006 8007 | 14006 14007 | 20006 20007 |

Da.6 Positioning address/movement amount

Set the address to be used as the target value for positioning control.
The setting value range differs according to the " **Da.2** Control system".
((1) to (4))

(1) Absolute (ABS) system, current value changing

- The setting value (positioning address) for the ABS system and current value changing is set with an absolute address (address from OP).

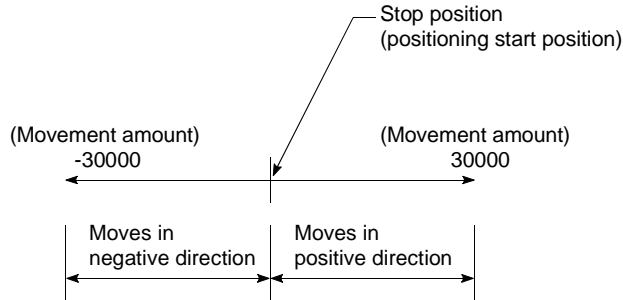


(2) Incremental (INC) system, fixed-feed 1, fixed-feed 2, fixed-feed 3, fixed-feed 4

- The setting value (movement amount) for the INC system is set as a movement amount with sign.

When movement amount is positive: Moves in the positive direction (address increment direction)

When movement amount is negative: Moves in the negative direction (address decrement direction)



[Table 1]

■ When " [Pr.1] Unit Setting" is "mm"

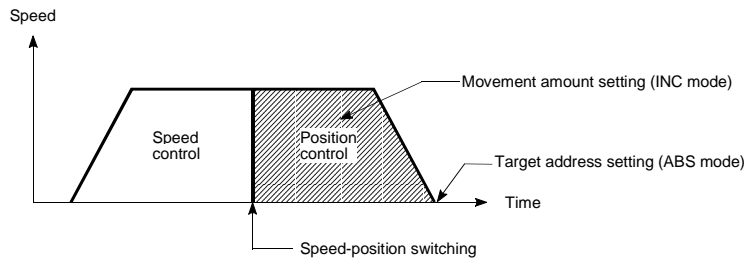
The table below lists the control systems that require the setting of the positioning address or movement amount and the associated setting ranges.
(With any control system excluded from the table below, neither the positioning address nor the movement amount needs to be set.)

| [Da.2] setting value | Value set with peripheral device (μm) | Value set with PLC program *1 (×10 ⁻¹ μm) |
|--|--|--|
| ABS Linear 1 : 01H ABS Linear 2 : 0AH ABS Linear 3 : 15H ABS Linear 4 : 1AH Current value changing : 81H | ◇ Set the address -214748364.8 to 214748364.7 | ◇ Set the address -2147483648 to 2147483647 |
| INC Linear 1 : 02H INC Linear 2 : 0BH INC Linear 3 : 16H INC Linear 4 : 1BH Fixed-feed 1 : 03H Fixed-feed 2 : 0CH Fixed-feed 3 : 17H Fixed-feed 4 : 1CH | ◇ Set the movement amount -214748364.8 to 214748364.7 | ◇ Set the movement amount -2147483648 to 2147483647 |
| Forward run speed/position : 06H Reverse run speed/position : 07H Forward run position/speed : 08H Reverse run position/speed : 09H | ◇ Set the movement amount 0 to 214748364.7 | ◇ Set the movement amount 0 to 2147483647 |
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -214748364.8 to 214748364.7 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -214748364.8 to 214748364.7 | ◇ Set the movement amount -2147483648 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions.
(The value will be converted properly within the system.)

(3) Speed-position switching control

- INC mode:
Set the amount of movement after the switching from speed control to position control.
- ABS mode:
Set the absolute address which will be the target value after speed control is switched to position control. (The unit is "degree" only)



(4) Position-speed switching control

- Set the amount of movement before the switching from position control to speed control.

■ When "Pr.1 Unit Setting" is "degree"

The table below lists the control systems that require the setting of the positioning address or movement amount and the associated setting ranges. (With any control system excluded from the table below, neither the positioning address nor the movement amount needs to be set.)

| Da.2 setting value | Value set with peripheral device (degree) | Value set with PLC program *1 (×10 ⁻⁵ degree) |
|--|--|--|
| ABS Linear 1 : 01H ABS Linear 2 : 0AH ABS Linear 3 : 15H ABS Linear 4 : 1AH Current value changing : 81H | ◇ Set the address 0 to 359.99999 | ◇ Set the address 0 to 35999999 |
| INC Linear 1 : 02H INC Linear 2 : 0BH INC Linear 3 : 16H INC Linear 4 : 1BH Fixed-feed 1 : 03H Fixed-feed 2 : 0CH Fixed-feed 3 : 17H Fixed-feed 4 : 1CH | ◇ Set the movement amount -21474.83648 to 21474.83647 | ◇ Set the movement amount -2147483648 to 2147483647 |
| Forward run speed/position: 06H Reverse run speed/position: 07H | In INC mode ◇ Set the movement amount 0 to 21474.83647 In ABS mode ◇ Set the address 0 to 359.99999 | In INC mode ◇ Set the movement amount 0 to 2147483647 In ABS mode ◇ Set the address 0 to 35999999 |
| Forward run position/speed: 08H Reverse run position/speed: 09H | ◇ Set the movement amount 0 to 21474.83647 | ◇ Set the movement amount 0 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions. (The value will be converted properly within the system.)

■ When " [Pr.1] Unit Setting" is "PLS"

The table below lists the control systems that require the setting of the positioning address or movement amount and the associated setting ranges.

(With any control system excluded from the table below, neither the positioning address nor the movement amount needs to be set.)

| [Da.2] setting value | Value set with peripheral device (PLS) | Value set with PLC program *1 (PLS) |
|--|--|--|
| ABS Linear 1 : 01H ABS Linear 2 : 0AH ABS Linear 3 : 15H ABS Linear 4 : 1AH Current value changing : 81H | ◇ Set the address -2147483648 to 2147483647 | ◇ Set the address -2147483648 to 2147483647 |
| INC Linear 1 : 02H INC Linear 2 : 0BH INC Linear 3 : 16H INC Linear 4 : 1BH Fixed-feed 1 : 03H Fixed-feed 2 : 0CH Fixed-feed 3 : 17H Fixed-feed 4 : 1CH | ◇ Set the movement amount -2147483648 to 2147483647 | ◇ Set the movement amount -2147483648 to 2147483647 |
| Forward run speed/position : 06H Reverse run speed/position : 07H Forward run position/speed : 08H Reverse run position/speed : 09H | ◇ Set the movement amount 0 to 2147483647 | ◇ Set the movement amount 0 to 2147483647 |
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -2147483648 to 2147483647 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -2147483648 to 2147483647 | ◇ Set the movement amount -2147483648 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions.
(The value will be converted properly within the system.)

■ When " [Pr.1] Unit Setting" is "inch"

The table below lists the control systems that require the setting of the positioning address or movement amount and the associated setting ranges.
 (With any control system excluded from the table below, neither the positioning address nor the movement amount needs to be set.)

| [Da.2] setting value | Value set with peripheral device (inch) | Value set with PLC program *1 ($\times 10^{-5}$ inch) |
|--|--|--|
| ABS Linear 1 : 01H ABS Linear 2 : 0AH ABS Linear 3 : 15H ABS Linear 4 : 1AH Current value changing : 81H | ◇ Set the address -21474.83648 to 21474.83647 | ◇ Set the address -2147483648 to 2147483647 |
| INC Linear 1 : 02H INC Linear 2 : 0BH INC Linear 3 : 16H INC Linear 4 : 1BH Fixed-feed 1 : 03H Fixed-feed 2 : 0CH Fixed-feed 3 : 17H Fixed-feed 4 : 1CH | ◇ Set the movement amount -21474.83648 to 21474.83647 | ◇ Set the movement amount -2147483648 to 2147483647 |
| Forward run speed/position : 06H Reverse run speed/position : 07H Forward run position/speed : 08H Reverse run position/speed : 09H | ◇ Set the movement amount 0 to 21474.83647 | ◇ Set the movement amount 0 to 2147483647 |
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -21474.83648 to 21474.83647 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -21474.83648 to 21474.83647 | ◇ Set the movement amount -2147483648 to 2147483647 |

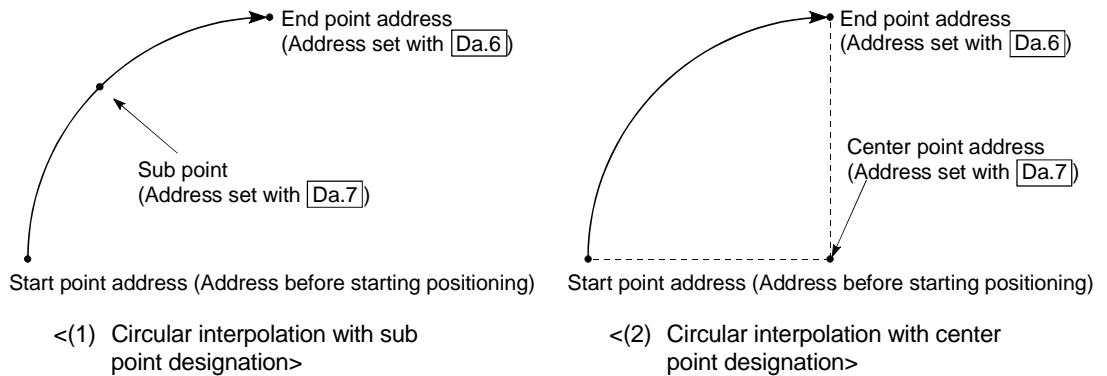
*1: Set an integer because the PLC program cannot handle fractions.
 (The value will be converted properly within the system.)

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | |
|----------------------------|---|----------------------------|---------------|-------------------------------------|--------------|----------------|----------------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Da.7 Arc address | The setting value range differs according to the " Da.2 Control system". Here, the value within the [Table 1] range is set. | | 0 | 2008 2009 | 8008 8009 | 14008 14009 | 20008 20009 |

Da.7 Arc address

The arc address is data required only when carrying out circular interpolation control.

- (1) When carrying out circular interpolation with sub point designation, set the sub point (passing point) address as the arc address.
- (2) When carrying out circular interpolation with center point designation, set the center point address of the arc as the arc address.



When not carrying out circular interpolation control, the value set in " **Da.7** Arc address" will be invalid.

[Table 1]

■ When " [Pr.1] Unit Setting" is "mm"

The table below lists the control systems that require the setting of the arc address and shows the setting range.

(With any control system excluded from the table below, the arc address does not need to be set.)

| [Da.2] setting value | Value set with peripheral device (μm) | Value set with PLC program *1 ($\times 10^{-1} \mu\text{m}$) |
|---|--|---|
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -214748364.8 to 214748364.7 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -214748364.8 to 214748364.7 | ◇ Set the movement amount -2147483648 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions.
(The value will be converted properly within the system.)

■ When " [Pr.1] Unit Setting" is "degree"

No control system requires the setting of the arc address by "degree".

■ When " [Pr.1] Unit Setting" is "PLS"

The table below lists the control systems that require the setting of the arc address and shows the setting range.

(With any control system excluded from the table below, the arc address does not need to be set.)

| [Da.2] setting value | Value set with peripheral device (PLS) | Value set with PLC program *1 (PLS) |
|---|--|--|
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -2147483648 to 2147483647 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -2147483648 to 2147483647 | ◇ Set the movement amount -2147483648 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions.
(The value will be converted properly within the system.)




■ When " [Pr.1] Unit Setting" is "inch"

The table below lists the control systems that require the setting of the arc address and shows the setting range.

(With any control system excluded from the table below, the arc address does not need to be set.)

| [Da.2] setting value | Value set with peripheral device (inch) | Value set with PLC program *1 ($\times 10^{-5}$ inch) |
|---|--|---|
| ABS circular sub : 0DH ABS circular right : 0FH ABS circular left : 10H | ◇ Set the address -21474.83648 to 21474.83647 | ◇ Set the address -2147483648 to 2147483647 |
| INC circular sub : 0EH INC circular right : 11H INC circular left : 12H | ◇ Set the movement amount -21474.83648 to 21474.83647 | ◇ Set the movement amount -2147483648 to 2147483647 |

*1: Set an integer because the PLC program cannot handle fractions.
(The value will be converted properly within the system.)

| Item | Setting value, setting range | | Default value | Setting value buffer memory address | | | | |
|--|---|---|---------------|-------------------------------------|--------------|----------------|----------------|-------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| <p>Da.8</p> <p>Command speed</p> | <p>The setting value range differs depending on the " Pr.1 Unit setting". Here, the value within the [Table 1] range is set.</p> <p> [Table 1] on right page</p> <hr/> <p>-1: Current speed (Speed set for previous positioning data No.)</p> | | 0 | 2004 2005 | 8004 8005 | 14004 14005 | 20004 20005 | |
| <p>Da.9</p> <p>Dwell time/ JUMP destination positioning data No.</p> | <p>Dwell time</p> | <p>The setting value range differs according to the " Da.2 Control system". Here, the value within the [Table 2] range is set.</p> <p> [Table 2] on right page</p> | | 0 | 2002 | 8002 | 14002 | 20002 |
| <p>Da.10</p> <p>M code</p> | <p>M code</p> <p>Condition data No.</p> <p>No. of LOOP to LEND repetitions</p> | <p>The setting value range differs according to the " Da.2 Control system". Here, the value within the [Table 3] range is set.</p> <p> [Table 3] on right page</p> | | 0 | 2001 | 8001 | 14001 | 20001 |

Da.8 Command speed

Set the command speed for positioning.

- (1) If the set command speed exceeds " Pr.8 Speed limit value", positioning will be carried out at the speed limit value.
- (2) If "-1" is set for the command speed, the current speed (speed set for previous positioning data No.) will be used for positioning control. Use the current speed for uniform speed control, etc. If "-1" is set for continuing positioning data, and the speed is changed, the following speed will also change.

(Note that when starting positioning, if the "-1" speed is set for the positioning data that carries out positioning control first, the error "Command speed is not set"(error code: 503) will occur, and the positioning will not start. Refer to Section 15.2 "List of errors" for details on the errors.)

Da.10 M code (or condition data No./No. of LOOP to LEND repetitions)

Set an "M code", a "condition data No. ", or the "number of LOOP to LEND repetitions" depending on how the " **Da.2** Control system" is set.

- If a method other than "JUMP instruction" and "LOOP" is selected as the " **Da.2** Control system"

..... Set an "M code".
 If no "M code" needs to be output, set "0" (default value).

- If "JUMP instruction" or "LOOP" is selected as the " **Da.2** Control system"

..... Set the "condition data No." for JUMP.
 0 : Unconditional JUMP to the positioning data specified by **Da.9** .

1 to 10 : JUMP performed according to the condition data No. specified (a number between 1 and 10).

Make sure that you specify the number of LOOP to LEND repetitions by a number other than "0". The "Control system LOOP setting error" will occur if you specify "0". (error code: 545)

* The condition data specifies the condition for the JUMP instruction to be executed.

(A JUMP will take place when the condition is satisfied.)

[Table 1]

| Pr.1 setting value | Value set with peripheral device (unit) | Value set with PLC program (unit) |
|---------------------------|---|--|
| 0 : mm | 0.01 to 20000000.00 (mm/min) | 1 to 2000000000 ($\times 10^{-2}$ mm/min) |
| 1 : inch | 0.001 to 2000000.000 (inch/min) | 1 to 2000000000 ($\times 10^{-3}$ inch/min) |
| 2 : degree | 0.001 to 2000000.000 (degree/min) | 1 to 2000000000 ($\times 10^{-3}$ degree/min) |
| 3 : PLS | 1 to 10000000 (PLS/s) | 1 to 10000000 (PLS/s) |

[Table 2]

| Da.2 setting value | Setting item | Value set with peripheral device | Value set with PLC program |
|-----------------------------|----------------------|----------------------------------|----------------------------|
| JUMP instruction: 82H | Positioning data No. | 1 to 600 | 1 to 600 |
| Other than JUMP instruction | Dwell time | 0 to 65535 (ms) | 0 to 65535 (ms) |

[Table 3]

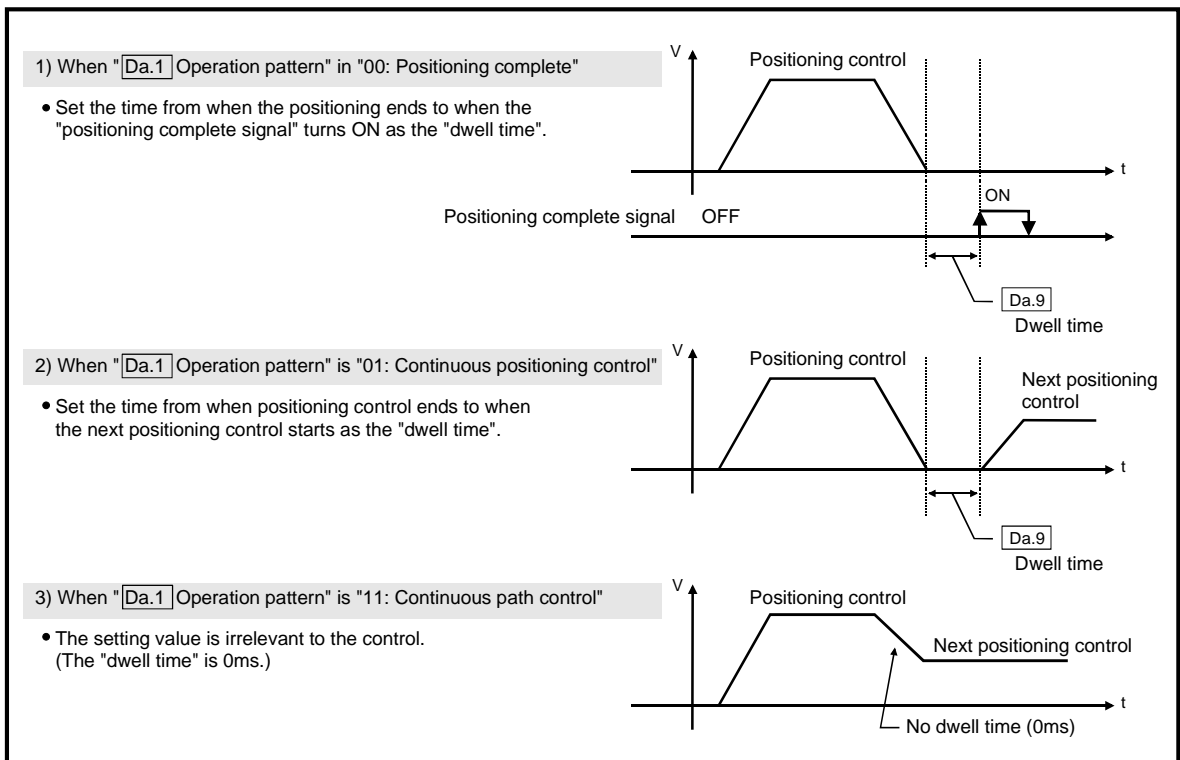
| Da.2 setting value | Setting item | Value set with peripheral device | Value set with PLC program |
|-----------------------------|--------------------|----------------------------------|----------------------------|
| JUMP instruction: 82H | Condition data No. | 0 to 10 | 0 to 10 |
| Other than JUMP instruction | M code | 0 to 65535 | 0 to 65535 |
| LOOP: 83H | Repetition count | 1 to 65535 | 1 to 65535 |

Da.9 Dwell time/JUMP designation positioning data No.

Set the "dwell time" or "positioning data No." corresponding to the "**Da.2** Control system".

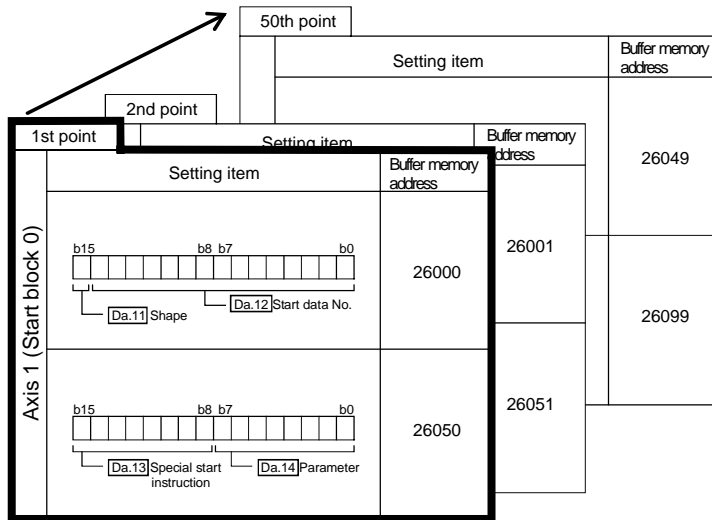
- When a method other than "JUMP instruction" is set for "**Da.2** Control system"
 - Set the "dwell time".
- When "JUMP instruction" is set for "**Da.2** Control system"
 - Set the "positioning data No." for the JUMP destination.

When the "dwell time" is set, the setting details of the "dwell time" will be as follows according to "**Da.1** Operation pattern".



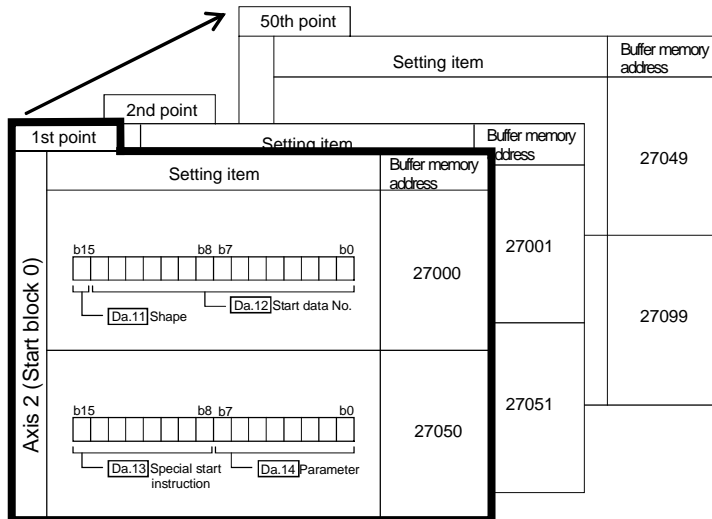
5.4 List of block start data

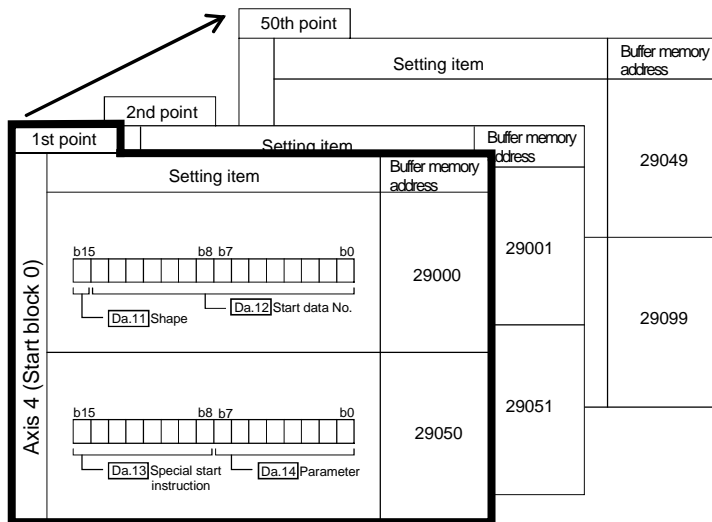
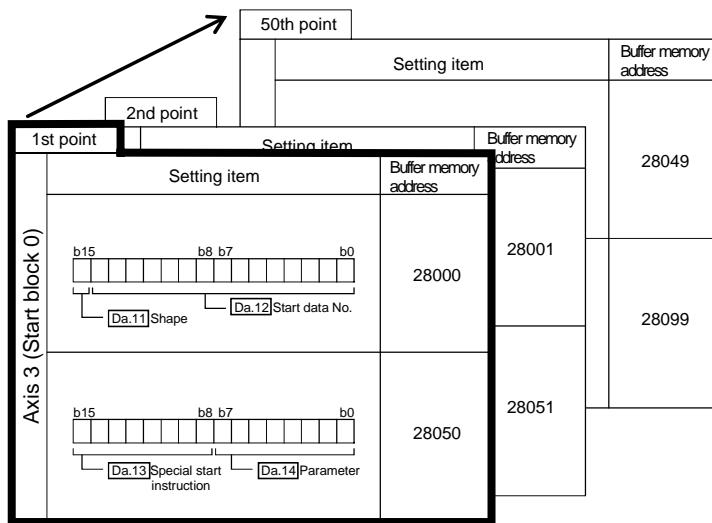
The illustrations below show the organization of the block start data stored in the QD75 buffer memory. The block start data setting items [Da.11] to [Da.14] are explained in the pages that follow.



- Up to 50 block start data points can be set (stored) for each axis in the buffer memory addresses shown on the left.
- Items in a single unit of block start data are shown included in a bold frame. **■**
- Each axis has five start blocks (block Nos. 0 to 4).

* For information on the organization of the buffer memory addresses assigned to the start blocks 1 to 4, refer to Appendix 7 "List of buffer memory addresses".





The pages that follow explain the block start data setting items ([Da.11] to [Da.14]).
 (The buffer memory addresses shown are those of the "1st point block start data (block No. 7000)" for the axes 1 to 4.)

REMARK

To perform a high-level positioning control using block start data, set a number between 7000 and 7004 to the " [Cd.3] Positioning start No." and use the " [Cd.4] Positioning starting point No." to specify a point number between 1 and 50, a position counted from the beginning of the block.

The number between 7000 and 7004 specified here is called the "block No.". With the QD75, up to 50 "block start data" points and up to 10 "condition data" items can be assigned to each "block No.".

| Block No. * | Axis | Block start data | Condition | Buffer memory | GX Configurator-QP |
|-------------|--------|------------------|--------------------------|-----------------------|-----------------------|
| 7000 | Axis 1 | Start block 0 | Condition data (1 to 10) | Supports the settings | Supports the settings |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7001 | Axis 1 | Start block 1 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7002 | Axis 1 | Start block 2 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7003 | Axis 1 | Start block 3 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7004 | Axis 1 | Start block 4 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |

*: Setting cannot be made when the "Pre-reading start function" is used. If you set any of Nos. 7000 to 7004 and perform the Pre-reading start function, "Outside start No. range error (error code: 543)" will occur. (For details, refer to Section 12.7.8 "Pre-reading start function".)

| Item | Setting value | | Default value | Setting value buffer memory address | | | | |
|------------------------------------|--|---|---------------|-------------------------------------|--------|--------|--------|-------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Da.11 Shape | 0 : End ----- 1 : Continue | 0 ----- 1 | | 0000H | 26000 | 27000 | 28000 | 29000 |
| Da.12 Start data No. | Positioning data No.: 1 to 600 (01H to 258H) | 01H to 258H | | | | | | |
| Da.13 Special start instruction | 0 : Block start (normal start) ----- 1 : Condition start ----- 2 : Wait start ----- 3 : Simultaneous start ----- 4 : FOR loop ----- 5 : FOR condition ----- 6 : NEXT start | 00H ----- 01H ----- 02H ----- 03H ----- 04H ----- 05H ----- 06H | | 0000H | 26050 | 27050 | 28050 | 29050 |
| Da.14 Parameter | Condition data No.: 1 to 10 (01H to 0AH) No. of repetitions: 0 to 255 (00H to FFH) | 00H to FFH | | | | | | |

Da.11 Shape

Set whether to carry out only the local "block start data" and then end control, or to execute the "block start data" set in the next point.

| Setting value | Setting details |
|---------------|---|
| 0 : End | Execute the designated point's "block start data", and then complete the control. |
| 1 : Continue | Execute the designated point's "block start data", and after completing control, execute the next point's "block start data". |

Da.12 Start data No.

Set the "positioning data No." designated with the "block start data".

Da.13 Special start instruction

Set the "special start instruction " for using "high-level positioning control". (Set how to start the positioning data set in " **Da.12** Start data No.".)

| Setting value | Setting details |
|--------------------------------------|--|
| 00H : Block start (Normal start) | Execute the random block positioning data in the set order with one start. |
| 01H : Condition start | Carry out the condition judgment set in "condition data" for the designated positioning data, and when the conditions are established, execute the "block start data". If not established, ignore that "block start data", and then execute the next point's "block start data". |
| 02H : Wait start | Carry out the condition judgment set in "condition data" for the designated positioning data, and when the conditions are established, execute the "block start data". If not established, stop the control (wait) until the conditions are established. |
| 03H : Simultaneous start | Simultaneous execute (output pulses at same timing) the positioning data with the No. designated for the axis designated in the "condition data". Up to four axes can start simultaneously. |
| 04H : Repeated start (FOR loop) | Repeat the program from the block start data with the "FOR loop" to the block start data with "NEXT" for the designated No. of times. |
| 05H : Repeated start (FOR condition) | Repeat the program from the block start data with the "FOR condition" to the block start data with "NEXT" until the conditions set in the "condition data" are established. |
| 06H : NEXT start | Set the end of the repetition when "05H: Repetition start (FOR loop)" or "06H: Repetition start (FOR condition)" is set. |

Refer to Chapter 10 "High-level Positioning Control" for details on the control.

Da.14 Parameter

Set the value as required for " **Da.13** Special start instruction ".

| Da.13 Special start instruction | Setting value | Setting details |
|--|---------------|---|
| Block start (Normal start) | — | Not used. (There is no need to set.) |
| Condition start | 1 to 10 | Set the condition data No. (Data No. of "condition data" is set up for the condition judgment.) |
| Wait start | | |
| Simultaneous start | | |
| Repeated start (FOR loop) | 0 to 255 | Set the No. of repetitions. |
| Repeated start (FOR condition) | 1 to 10 | Set the condition data No. (Data No. of "condition data" is set up for the condition judgment.) |

5.5 List of condition data

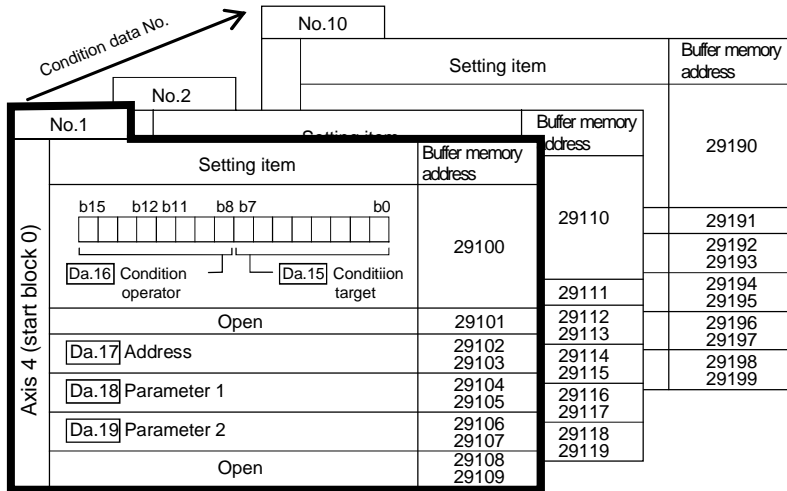
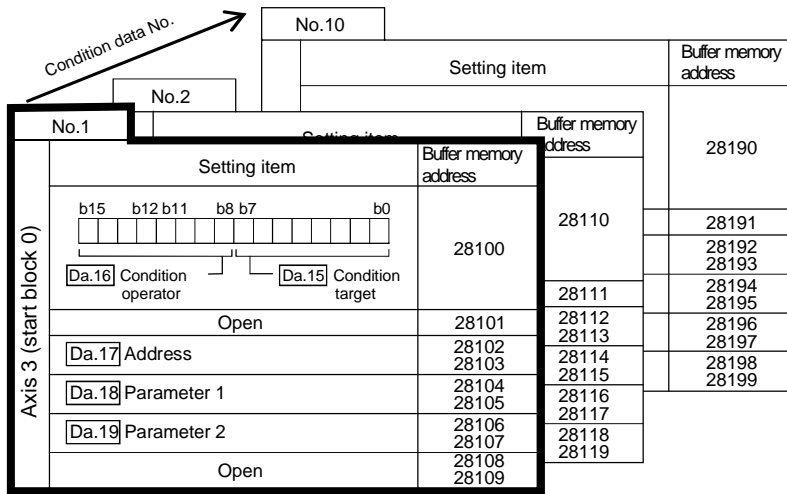
The illustrations below show the organization of the condition data stored in the QD75 buffer memory. The condition data setting items [Da.15] to [Da.19] are explained in the pages that follow.

| Condition data No. | | Setting item | | Buffer memory address |
|----------------------------|--------------------------|-----------------------|-------|-----------------------|
| No.1 | No.2 | | | 26190 |
| Setting item | | Buffer memory address | | |
| b15 b12 b11 b8 b7 b0 | | 26100 | | 26110 |
| [Da.16] Condition operator | [Da.15] Condition target | | | 26111 |
| Open | | 26101 | 26112 | 26191 |
| [Da.17] Address | | 26102 | 26113 | 26192 |
| [Da.18] Parameter 1 | | 26103 | 26114 | 26193 |
| [Da.19] Parameter 2 | | 26104 | 26115 | 26194 |
| | | 26105 | 26116 | 26195 |
| | | 26106 | 26117 | 26196 |
| | | 26107 | 26118 | 26197 |
| Open | | 26108 | 26119 | 26198 |
| | | 26109 | | 26199 |

- Up to 10 block start data points can be set (stored) for each axis in the buffer memory addresses shown on the left.
- Items in a single unit of condition data are shown included in a bold frame.
- Each axis has five start blocks (block Nos. 0 to 4).

* For information on the organization of the buffer memory addresses assigned to the start blocks 1 to 4, refer to Appendix 7 "List of buffer memory addresses".

| Condition data No. | | Setting item | | Buffer memory address |
|----------------------------|--------------------------|-----------------------|-------|-----------------------|
| No.1 | No.2 | | | 27190 |
| Setting item | | Buffer memory address | | |
| b15 b12 b11 b8 b7 b0 | | 27100 | | 27110 |
| [Da.16] Condition operator | [Da.15] Condition target | | | 27111 |
| Open | | 27101 | 27112 | 27191 |
| [Da.17] Address | | 27102 | 27113 | 27192 |
| [Da.18] Parameter 1 | | 27103 | 27114 | 27193 |
| [Da.19] Parameter 2 | | 27104 | 27115 | 27194 |
| | | 27105 | 27116 | 27195 |
| | | 27106 | 27117 | 27196 |
| | | 27107 | 27118 | 27197 |
| Open | | 27108 | 27119 | 27198 |
| | | 27109 | | 27199 |



The pages that follow explain the condition data setting items (Da.15 to Da.19).

(The buffer memory addresses shown are those of the "condition data No. 1 (block No. 7000)" for the axes 1 to 4.)

REMARK

To perform a high-level positioning control using block start data, set a number between 7000 and 7004 to the " [Cd.3] Positioning start No." and use the " [Cd.4] Positioning starting point No." to specify a point number between 1 and 50, a position counted from the beginning of the block.

The number between 7000 and 7004 specified here is called the "block No.". With the QD75, up to 50 "block start data" points and up to 10 "condition data" items can be assigned to each "block No.".

| Block No. * | Axis | Block start data | Condition | Buffer memory | GX Configurator-QP |
|-------------|--------|------------------|--------------------------|-----------------------|-----------------------|
| 7000 | Axis 1 | Start block 0 | Condition data (1 to 10) | Supports the settings | Supports the settings |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7001 | Axis 1 | Start block 1 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7002 | Axis 1 | Start block 2 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7003 | Axis 1 | Start block 3 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |
| 7004 | Axis 1 | Start block 4 | Condition data (1 to 10) | | |
| | Axis 2 | | Condition data (1 to 10) | | |
| | Axis 3 | | Condition data (1 to 10) | | |
| | Axis 4 | | Condition data (1 to 10) | | |

*: Setting cannot be made when the "Pre-reading start function" is used. If you set any of Nos. 7000 to 7004 and perform the Pre-reading start function, "Outside start No. range error (error code: 543)" will occur.
(For details, refer to Section "12.7.8 Pre-reading start function".)

| Item | Setting value | | Default value | Setting value buffer memory address | | | | | |
|--------------------------------|----------------------------------|--------------------------------|---------------|-------------------------------------|----------------|----------------|----------------|-------|-------|
| | Value set with peripheral device | Value set with PLC program | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Condition identifier | Da.15 Condition target | 01 : Device X | 01H | | 0000H | 26100 | 27100 | 28100 | 29100 |
| | | 02 : Device Y | 02H | | | | | | |
| | | 03 : Buffer memory (1-word) | 03H | | | | | | |
| | | 04 : Buffer memory (2-word) | 04H | | | | | | |
| | | 05 : Positioning data No. | 05H | | | | | | |
| | Da.16 Condition operator | 01 : **=P1 | 01H | | | | | | |
| | | 02 : **≠P1 | 02H | | | | | | |
| | | 03 : **≤P1 | 03H | | | | | | |
| | | 04 : **≥P1 | 04H | | | | | | |
| | | 05 : P1≤**≤P2 | 05H | | | | | | |
| | | 06 : **≤P1, P2≤** | 06H | | | | | | |
| | | 07 : DEV=ON | 07H | | | | | | |
| | | 08 : DEV=OFF | 08H | | | | | | |
| | | 10 : Axis 1 selected | 10H | | | | | | |
| | | 20 : Axis 2 selected | 20H | | | | | | |
| | | 30 : Axes 1 and 2 selected | 30H | | | | | | |
| | | 40 : Axis 3 selected | 40H | | | | | | |
| | | 50 : Axes 1 and 3 selected | 50H | | | | | | |
| | | 60 : Axes 2 and 3 selected | 60H | | | | | | |
| | | 70 : Axes 1, 2, and 3 selected | 70H | | | | | | |
| 80 : Axis 4 selected | 80H | | | | | | | | |
| 90 : Axes 1 and 4 selected | 90H | | | | | | | | |
| A0 : Axes 2 and 4 selected | A0H | | | | | | | | |
| B0 : Axes 1, 2, and 4 selected | B0H | | | | | | | | |
| C0 : Axes 3 and 4 selected | C0H | | | | | | | | |
| D0 : Axes 1, 3, and 4 selected | D0H | | | | | | | | |
| E0 : Axes 2, 3, and 4 selected | E0H | | | | | | | | |
| Da.17 Address | Buffer memory address | Example) | 0000H | 26102 26103 | 27102 27103 | 28102 28103 | 29102 29103 | | |
| Da.18 Parameter 1 | Value | Example) | 0000H | 26104 26105 | 27104 27105 | 28104 28105 | 29104 29105 | | |
| Da.19 Parameter 2 | Value | Example) | 0000H | 26106 26107 | 27106 27107 | 28106 28107 | 29106 29107 | | |

Da.15 Condition target

Set the condition target as required for each control.

| Setting value | Setting details |
|------------------------------|---|
| 01H : Device X | Set the input/output signal ON/OFF as the conditions. |
| 02H : Device Y | |
| 03H : Buffer memory (1-word) | Set the value stored in the buffer memory as the condition. 03H: The target buffer memory is "1-word (16 bits)" 04H: The target buffer memory is "2-word (32 bits)" |
| 04H : Buffer memory (2-word) | |
| 05H : Positioning data No. | Select only for "simultaneous start". |

Da.16 Condition operator

Set the condition operator as required for the " **Da.15** Condition target".

| Da.15 Condition target | Setting value | Setting details |
|--|--|---|
| 01H: Device X 02H: Device Y | 07H : DEV=ON 08H : DEV=OFF | The state (ON/OFF) of an I/O signal is defined as the condition. Select ON or OFF as the trigger. |
| 03H: Buffer memory (1-word) 04H: Buffer memory (2-word) | 01H : **=P1 02H : **≠P1 03H : **≤P1 04H : **≥P1 05H : P1≤**≤P2 06H : **≤P1, P2≤** | Select how to use the value (**) in the buffer memory as a part of the condition. |
| 05H: Positioning data No. | 10H : Axis 1 selected 20H : Axis 2 selected 30H : Axes 1 and 2 selected 40H : Axis 3 selected 50H : Axes 1 and 3 selected 60H : Axes 2 and 3 selected 70H : Axes 1, 2, and 3 selected 80H : Axis 4 selected 90H : Axes 1 and 4 selected A0H : Axes 2 and 4 selected B0H : Axes 1, 2, and 4 selected C0H : Axes 3 and 4 selected D0H : Axes 1, 3, and 4 selected E0H : Axes 2, 3, and 4 selected | If "simultaneous start" is specified, select the axis (or axes) that should start simultaneously. |

Da.17 Address

Set the address as required for the " **Da.15** Condition target".

| Da.15 Condition target | Setting value | Setting details |
|--|----------------------------------|---|
| 01H : Device X 02H : Device Y | — | Not used. (There is no need to set.) |
| 03H : Buffer memory (1-word) 04H : Buffer memory (2-word) | Value (Buffer memory address) | Set the target "buffer memory address". (For 2 word, set the low-order buffer memory address.) |
| 05H : Positioning data No. | — | Not used. (There is no need to set.) |

Da.18 Parameter 1

Set the parameters as required for the " Da.16 Condition operator".

| Da.16 Condition operator | Setting value | Setting details |
|---------------------------------|---------------------------------|--|
| 01H : **=P1 | Value | The value of P1 should be equal to or smaller than the value of P2. ($P1 \leq P2$) If P1 is greater than P2 ($P1 > P2$), the "condition data error" (error code 533) will occur. |
| 02H : **≠P1 | | |
| 03H : **≤P1 | | |
| 04H : **≥P1 | | |
| 05H : $P1 \leq ** \leq P2$ | | |
| 06H : **≤P1, $P2 \leq **$ | | |
| 07H : DEV=ON | Value (bit No.) | Set the device bit No. X: 0H to 1H, 4H to 17H Y: 0, 4H to 17H |
| 08H : DEV=OFF | | |
| 10H : Axis 1 selected | Value (positioning data No.) | Set the positioning data No. for starting axis 1 and/or axis 2. Low-order 16-bit : Axis 1 positioning data No. 1 to 600 (01H to 258H) High-order 16-bit : Axis 2 positioning data No. 1 to 600 (01H to 258H) |
| ↓ | | |
| E0H : Axes 2, 3, and 4 selected | | |

Da.19 Parameter 2

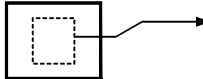
Set the parameters as required for the " Da.16 Condition operator".

| Da.16 Condition operator | Setting value | Setting details |
|---------------------------------|---------------------------------|--|
| 01H : **=P1 | — | Not used. (No need to be set.) |
| 02H : **≠P1 | | |
| 03H : **≤P1 | | |
| 04H : **≥P1 | | |
| 05H : $P1 \leq ** \leq P2$ | Value | The value of P2 should be equal to or greater than the value of P1. ($P1 \leq P2$) If P1 is greater than P2 ($P1 > P2$), the "condition data error" (error code 533) will occur. |
| 06H : **≤P1, $P2 \leq **$ | | |
| 07H : DEV=ON | — | Not used. (No need to be set.) |
| 08H : DEV=OFF | | |
| 10H : Axis 1 selected | | |
| 20H : Axis 2 selected | | |
| 30H : Axes 1 and 2 selected | | |
| 40H : Axis 3 selected | | |
| 50H : Axes 1 and 3 selected | Value (positioning data No.) | Set the positioning data No. for starting axis 3 and/or axis 4. Low-order 16-bit : Axis 3 positioning data No. 1 to 600 (01H to 258H) High-order 16-bit : Axis 4 positioning data No. 1 to 600 (01H to 258H) |
| 60H : Axes 2 and 3 selected | | |
| 70H : Axes 1, 2, and 3 selected | | |
| 80H : Axis 4 selected | | |
| 90H : Axes 1 and 4 selected | | |
| A0H : Axes 2 and 4 selected | | |
| B0H : Axes 1, 2, and 4 selected | | |
| C0H : Axes 3 and 4 selected | | |
| D0H : Axes 1, 3, and 4 selected | | |
| E0H : Axes 2, 3, and 4 selected | | |

5.6 List of monitor data

5.6.1 System monitor data

| Storage item | Storage details | |
|------------------------|---|--|
| Md.1 In test mode flag | Whether the mode is the test mode from the peripheral device or not is stored. <ul style="list-style-type: none">• When not in test mode : OFF• When in test mode : ON | |

| | Reading the monitor value | Default value | Storage buffer memory address (common for axis 1 to axis 4) |
|--|---|---------------|---|
| <p>■ Monitoring is carried out with a decimal.</p> | <p>Monitor value </p> <p>● Storage value 0: Not in test mode 1: In test mode</p> | 0 | 1200 |

(Unless noted in particular, the monitor value is saved as binary data.)

| Storage item | Storage details | Reading the monitor value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|-----------------|---------------|---------------------|---|-----------------|---------------------|-----------------|---------------|---------|----|-----------------------|----|-------------------|----|-----------------|---------------|--------|----|--------|---|--------|---|--------|---|---|---|---|-----|--|---|---|---|---|------|--|---|---|---|---|------|--|---|---|---|---|------|--|---|---|---|---|------|--|---|---|---|---|------|---------------|---|---|---|---|------|------------------------|---|---|---|---|------|-------------|---|---|---|---|------|----------|---|---|---|---|------|------------------------|---|---|---|---|------|--------------------|---|---|---|---|------|
| Starting history (Up to 16 records can be stored) | <p>Md.3</p> <p>Start information</p> | <p>[Storage details]</p> <p>This area stores the start information (restart flag, start origin, and start axis):</p> <ul style="list-style-type: none"> Restart flag: Indicates whether the operation has or has not been halted and restarted. Start origin : Indicates the source of the start signal. Start axis : Indicates the started axis. <p>[Reading the monitor value] ■ Monitoring is carried out with a hexadecimal display.</p> <table border="1"> <thead> <tr> <th>Stored contents</th> <th>Storage value</th> </tr> </thead> <tbody> <tr> <td>Restart flag OFF</td> <td>0</td> </tr> <tr> <td>Restart flag ON</td> <td>1</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Stored contents</th> <th>Storage value</th> </tr> </thead> <tbody> <tr> <td>PLC CPU</td> <td>00</td> </tr> <tr> <td>External signal</td> <td>01</td> </tr> <tr> <td>Peripheral device</td> <td>10</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Stored contents</th> <th>Storage value</th> </tr> </thead> <tbody> <tr> <td>Axis 1</td> <td>1</td> </tr> <tr> <td>Axis 2</td> <td>2</td> </tr> <tr> <td>Axis 3</td> <td>3</td> </tr> <tr> <td>Axis 4</td> <td>4</td> </tr> </tbody> </table> | Stored contents | Storage value | Restart flag OFF | 0 | Restart flag ON | 1 | Stored contents | Storage value | PLC CPU | 00 | External signal | 01 | Peripheral device | 10 | Stored contents | Storage value | Axis 1 | 1 | Axis 2 | 2 | Axis 3 | 3 | Axis 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Stored contents | Storage value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Restart flag OFF | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Restart flag ON | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stored contents | Storage value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLC CPU | 00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| External signal | 01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Peripheral device | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stored contents | Storage value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Axis 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Axis 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Axis 3 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Axis 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.4</p> <p>Start No.</p> | <p>The starting No. is stored.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <table border="1"> <thead> <tr> <th rowspan="2">Stored contents</th> <th colspan="4">Storage value</th> <th rowspan="2">Reference (Decimal)</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>Positioning operation</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>001</td> </tr> <tr> <td></td> <td colspan="4" style="text-align: center;">to</td> <td></td> </tr> <tr> <td></td> <td>0</td> <td>2</td> <td>5</td> <td>8</td> <td>600</td> </tr> <tr> <td></td> <td>1</td> <td>B</td> <td>5</td> <td>8</td> <td>7000</td> </tr> <tr> <td></td> <td>1</td> <td>B</td> <td>5</td> <td>9</td> <td>7001</td> </tr> <tr> <td></td> <td>1</td> <td>B</td> <td>5</td> <td>A</td> <td>7002</td> </tr> <tr> <td></td> <td>1</td> <td>B</td> <td>5</td> <td>B</td> <td>7003</td> </tr> <tr> <td></td> <td>1</td> <td>B</td> <td>5</td> <td>C</td> <td>7004</td> </tr> <tr> <td>JOG operation</td> <td>2</td> <td>3</td> <td>3</td> <td>2</td> <td>9010</td> </tr> <tr> <td>Manual pulse generator</td> <td>2</td> <td>3</td> <td>3</td> <td>3</td> <td>9011</td> </tr> <tr> <td>Machine OPR</td> <td>2</td> <td>3</td> <td>2</td> <td>9</td> <td>9001</td> </tr> <tr> <td>Fast OPR</td> <td>2</td> <td>3</td> <td>2</td> <td>A</td> <td>9002</td> </tr> <tr> <td>Current value changing</td> <td>2</td> <td>3</td> <td>2</td> <td>B</td> <td>9003</td> </tr> <tr> <td>Simultaneous start</td> <td>2</td> <td>3</td> <td>2</td> <td>C</td> <td>9004</td> </tr> </tbody> </table> | Stored contents | Storage value | | | | Reference (Decimal) | A | B | C | D | Positioning operation | 0 | 0 | 0 | 1 | 001 | | to | | | | | | 0 | 2 | 5 | 8 | 600 | | 1 | B | 5 | 8 | 7000 | | 1 | B | 5 | 9 | 7001 | | 1 | B | 5 | A | 7002 | | 1 | B | 5 | B | 7003 | | 1 | B | 5 | C | 7004 | JOG operation | 2 | 3 | 3 | 2 | 9010 | Manual pulse generator | 2 | 3 | 3 | 3 | 9011 | Machine OPR | 2 | 3 | 2 | 9 | 9001 | Fast OPR | 2 | 3 | 2 | A | 9002 | Current value changing | 2 | 3 | 2 | B | 9003 | Simultaneous start | 2 | 3 | 2 | C | 9004 |
| Stored contents | Storage value | | | | Reference (Decimal) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | A | B | C | D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Positioning operation | 0 | 0 | 0 | 1 | 001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | to | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | 2 | 5 | 8 | 600 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | B | 5 | 8 | 7000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | B | 5 | 9 | 7001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | B | 5 | A | 7002 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | B | 5 | B | 7003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | B | 5 | C | 7004 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JOG operation | 2 | 3 | 3 | 2 | 9010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manual pulse generator | 2 | 3 | 3 | 3 | 9011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Machine OPR | 2 | 3 | 2 | 9 | 9001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fast OPR | 2 | 3 | 2 | A | 9002 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current value changing | 2 | 3 | 2 | B | 9003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Simultaneous start | 2 | 3 | 2 | C | 9004 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.5</p> <p>Start Hour</p> | <p>The starting time is stored.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <p>00 to 23 (hour)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.6</p> <p>Start Minute: second</p> | <p>The starting time is stored.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <p>00 to 59 (minute) 00 to 59 (second)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |




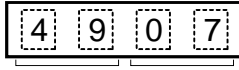
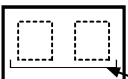
Note: If a start signal is issued against an operating axis, a record relating to this event may be output before a record relating to an earlier start signal is output.

| Default value | Storage buffer memory address (common to axes 1 to 4) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|---|-------------------|------|------|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|------------------|------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0000H | <div style="text-align: center;"> <table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">Md.8</td> <td style="padding: 5px;">1292</td> </tr> <tr> <td style="padding: 5px;">Start history pointer</td> <td></td> </tr> </table> <p style="text-align: center;">↑ Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing starting history records.</p> </div> | | Md.8 | 1292 | Start history pointer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.8 | 1292 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start history pointer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000H | <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Pointer No.</p> <p>↓</p> </div> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10px;"></td> <td style="width: 10px;">0</td><td style="width: 10px;">1</td><td style="width: 10px;">2</td><td style="width: 10px;">3</td><td style="width: 10px;">4</td><td style="width: 10px;">5</td><td style="width: 10px;">6</td><td style="width: 10px;">7</td><td style="width: 10px;">8</td><td style="width: 10px;">9</td><td style="width: 10px;">10</td><td style="width: 10px;">11</td><td style="width: 10px;">12</td><td style="width: 10px;">13</td><td style="width: 10px;">14</td><td style="width: 10px;">15</td> </tr> <tr> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Starting history</td> <td style="border: none;">Md.3</td> <td style="border: none;">Start information</td> <td>1212</td><td>1217</td><td>1222</td><td>1227</td><td>1232</td><td>1237</td><td>1242</td><td>1247</td><td>1252</td><td>1257</td><td>1262</td><td>1267</td><td>1272</td><td>1277</td><td>1282</td><td>1287</td> </tr> <tr> <td style="border: none;">Md.4</td> <td style="border: none;">Start No.</td> <td>1213</td><td>1218</td><td>1223</td><td>1228</td><td>1233</td><td>1238</td><td>1243</td><td>1248</td><td>1253</td><td>1258</td><td>1263</td><td>1268</td><td>1273</td><td>1278</td><td>1283</td><td>1288</td> </tr> <tr> <td style="border: none;">Md.5</td> <td style="border: none;">Start hour</td> <td>1214</td><td>1219</td><td>1224</td><td>1229</td><td>1234</td><td>1239</td><td>1244</td><td>1249</td><td>1254</td><td>1259</td><td>1264</td><td>1269</td><td>1274</td><td>1279</td><td>1284</td><td>1289</td> </tr> <tr> <td style="border: none;">Md.6</td> <td style="border: none;">Start min: sec</td> <td>1215</td><td>1220</td><td>1225</td><td>1230</td><td>1235</td><td>1240</td><td>1245</td><td>1250</td><td>1255</td><td>1260</td><td>1265</td><td>1270</td><td>1275</td><td>1280</td><td>1285</td><td>1290</td> </tr> <tr> <td style="border: none;">Md.7</td> <td style="border: none;">Error judgement</td> <td>1216</td><td>1221</td><td>1226</td><td>1231</td><td>1236</td><td>1241</td><td>1246</td><td>1251</td><td>1256</td><td>1261</td><td>1266</td><td>1271</td><td>1276</td><td>1281</td><td>1286</td><td>1291</td> </tr> </table> <div style="margin-left: 20px;"> <p>↑ Item</p> <p>↑ Buffer memory address</p> </div> </div> | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | Starting history | Md.3 | Start information | 1212 | 1217 | 1222 | 1227 | 1232 | 1237 | 1242 | 1247 | 1252 | 1257 | 1262 | 1267 | 1272 | 1277 | 1282 | 1287 | Md.4 | Start No. | 1213 | 1218 | 1223 | 1228 | 1233 | 1238 | 1243 | 1248 | 1253 | 1258 | 1263 | 1268 | 1273 | 1278 | 1283 | 1288 | Md.5 | Start hour | 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | Md.6 | Start min: sec | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | Md.7 | Error judgement | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Starting history | Md.3 | Start information | 1212 | 1217 | 1222 | 1227 | 1232 | 1237 | 1242 | 1247 | 1252 | 1257 | 1262 | 1267 | 1272 | 1277 | 1282 | 1287 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.4 | Start No. | 1213 | 1218 | 1223 | 1228 | 1233 | 1238 | 1243 | 1248 | 1253 | 1258 | 1263 | 1268 | 1273 | 1278 | 1283 | 1288 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.5 | Start hour | 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.6 | Start min: sec | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.7 | Error judgement | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | <ul style="list-style-type: none"> • Each group of buffer memory addresses storing a complete starting history record is assigned a pointer No. Example: Pointer No. 0 = Buffer memory addresses 1212 to 1216 <li style="padding-left: 20px;">Pointer No. 1 = Buffer memory addresses 1217 to 1221 <li style="padding-left: 20px;">Pointer No. 2 = Buffer memory addresses 1222 to 1226 <li style="padding-left: 20px;">⋮ <li style="padding-left: 20px;">Pointer No. 15 = Buffer memory addresses 1287 to 1291 • Each history record is assigned a pointer No. in the range between 0 and 15. If the pointer No. 15 has been assigned to a new record, the next record will be assigned the pointer number 0. (A new record replaces an older record when a pointer No. is reassigned.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Storage item | Storage details | Reading the monitor value |
|--|---|---|
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Starting history (Up to 16 records can be stored)</p> <p>Md.7 Error judgment</p> | <p>[Storage details]</p> <p>This area stores the following results of the error judgment performed upon starting:</p> <ul style="list-style-type: none"> • BUSY start warning flag • Error flag • Error No. <p>[Reading the monitor value] ■ Monitoring is carried out with a hexadecimal display.</p> | |
| <p>Md.8 Start history pointer</p> | <p>Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing starting history records.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value ● Storage value (Pointer number) 0 to 15</p> |




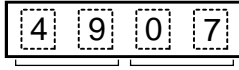
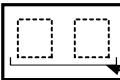

| Default value | Storage buffer memory address (common to axes 1 to 4) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|---|------|------|------|-----------------------|------|-------------|------|------|------|------|------|------|------|------|------|------|----|----|----|----|----|----|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0000H | <div style="text-align: center; margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">Md.8</td> <td style="padding: 2px;">1292</td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Start history pointer</td> </tr> </table> </div> <p style="text-align: center; margin-bottom: 10px;">↑ Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing starting history records.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Pointer No. ↓</p> </div> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 100px;">Pointer No.</td> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td> </tr> <tr> <td rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Starting history</td> <td style="border: none;">Md.3</td> <td style="border: none;">1212</td><td style="border: none;">1217</td><td style="border: none;">1222</td><td style="border: none;">1227</td><td style="border: none;">1232</td><td style="border: none;">1237</td><td style="border: none;">1242</td><td style="border: none;">1247</td><td style="border: none;">1252</td><td style="border: none;">1257</td><td style="border: none;">1262</td><td style="border: none;">1267</td><td style="border: none;">1272</td><td style="border: none;">1277</td><td style="border: none;">1282</td><td style="border: none;">1287</td> </tr> <tr> <td style="border: none;">Start information</td> <td style="border: none;">1212</td><td style="border: none;">1217</td><td style="border: none;">1222</td><td style="border: none;">1227</td><td style="border: none;">1232</td><td style="border: none;">1237</td><td style="border: none;">1242</td><td style="border: none;">1247</td><td style="border: none;">1252</td><td 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none;">1216</td><td style="border: none;">1221</td><td style="border: none;">1226</td><td style="border: none;">1231</td><td style="border: none;">1236</td><td style="border: none;">1241</td><td style="border: none;">1246</td><td style="border: none;">1251</td><td style="border: none;">1256</td><td style="border: none;">1261</td><td style="border: none;">1266</td><td style="border: none;">1271</td><td style="border: none;">1276</td><td style="border: none;">1281</td><td style="border: none;">1286</td><td style="border: none;">1291</td> </tr> <tr> <td style="border: none;">Error judgement</td> <td style="border: none;">1216</td><td style="border: none;">1221</td><td style="border: none;">1226</td><td style="border: none;">1231</td><td style="border: none;">1236</td><td style="border: none;">1241</td><td style="border: none;">1246</td><td style="border: none;">1251</td><td style="border: none;">1256</td><td style="border: none;">1261</td><td style="border: none;">1266</td><td 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1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | Start hour | 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | Md.6 | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | Start min: sec | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | Md.7 | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 | Error judgement | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 |
| Md.8 | 1292 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start history pointer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pointer No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Starting history | Md.3 | 1212 | 1217 | 1222 | 1227 | 1232 | 1237 | 1242 | 1247 | 1252 | 1257 | 1262 | 1267 | 1272 | 1277 | 1282 | 1287 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Start information | 1212 | 1217 | 1222 | 1227 | 1232 | 1237 | 1242 | 1247 | 1252 | 1257 | 1262 | 1267 | 1272 | 1277 | 1282 | 1287 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.4 | 1213 | 1218 | 1223 | 1228 | 1233 | 1238 | 1243 | 1248 | 1253 | 1258 | 1263 | 1268 | 1273 | 1278 | 1283 | 1288 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Start No. | 1213 | 1218 | 1223 | 1228 | 1233 | 1238 | 1243 | 1248 | 1253 | 1258 | 1263 | 1268 | 1273 | 1278 | 1283 | 1288 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.5 | 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start hour | 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.6 | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Start min: sec | 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.7 | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Error judgement | 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1292 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- Each group of buffer memory addresses storing a complete starting history record is assigned a pointer No.
 Example: Pointer No. 0 = Buffer memory addresses 1212 to 1216
 Pointer No. 1 = Buffer memory addresses 1217 to 1221
 Pointer No. 2 = Buffer memory addresses 1222 to 1226
 ⋮
 Pointer No. 15 = Buffer memory addresses 1287 to 1291
- Each history record is assigned a pointer No. in the range between 0 and 15.
 If the pointer No. 15 has been assigned to a new record, the next record will be assigned the pointer number 0.
 (A new record replaces an older record when a pointer No. is reassigned.)

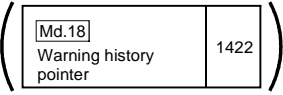
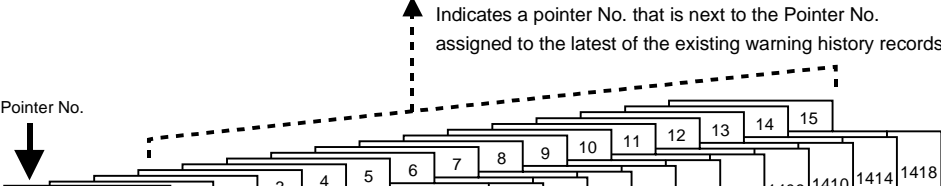
| Storage item | Storage details | Reading the monitor value | | | | | | | | | | | | | | | | |
|--|--|---|---------|---|---|---|-----|-----|----|----|---------|---------|---------|---------|----------|--------|--------|--------|
| <p>Md.9 Axis in which the error occurred</p> | <p>Stores a number (Axis No.) that indicates the axis that encountered an error.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Storage value 1: Axis 1 2: Axis 2 3: Axis 3 4: Axis 4</p> | | | | | | | | | | | | | | | | |
| <p>Md.10 Axis error No.</p> | <p>Stores an axis error No.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Error No. For details on the error Nos. (Error codes), refer to Section 15.2 "List of errors".</p> | | | | | | | | | | | | | | | | |
| <p>Md.11 Axis error occurrence (Hour)</p> | <p>Stores the time at which an axis error was detected.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <table border="1"> <tr> <td>0</td> <td>0</td> <td>1</td> <td>5</td> </tr> <tr> <td>b15</td> <td>b12</td> <td>b8</td> <td>b4</td> </tr> <tr> <td>0:1:0:0</td> <td>0:0:0:0</td> <td>0:0:0:1</td> <td>0:1:0:1</td> </tr> <tr> <td colspan="2">Not used</td> <td>0 to 2</td> <td>0 to 3</td> </tr> </table> <p>→ Monitor value  00 to 23 (hour)</p> | 0 | 0 | 1 | 5 | b15 | b12 | b8 | b4 | 0:1:0:0 | 0:0:0:0 | 0:0:0:1 | 0:1:0:1 | Not used | | 0 to 2 | 0 to 3 |
| 0 | 0 | 1 | 5 | | | | | | | | | | | | | | | |
| b15 | b12 | b8 | b4 | | | | | | | | | | | | | | | |
| 0:1:0:0 | 0:0:0:0 | 0:0:0:1 | 0:1:0:1 | | | | | | | | | | | | | | | |
| Not used | | 0 to 2 | 0 to 3 | | | | | | | | | | | | | | | |
| <p>Md.12 Axis error occurrence (Minute: second)</p> | <p>Stores the time at which an axis error was detected.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <table border="1"> <tr> <td>4</td> <td>9</td> <td>0</td> <td>7</td> </tr> <tr> <td>b15</td> <td>b12</td> <td>b8</td> <td>b4</td> </tr> <tr> <td>0:1:0:0</td> <td>1:0:0:1</td> <td>0:0:0:0</td> <td>0:1:1:1</td> </tr> <tr> <td>0 to 5</td> <td>0 to 9</td> <td>0 to 5</td> <td>0 to 9</td> </tr> </table> <p>→ Monitor value  00 to 59 (minute) 00 to 59 (second)</p> | 4 | 9 | 0 | 7 | b15 | b12 | b8 | b4 | 0:1:0:0 | 1:0:0:1 | 0:0:0:0 | 0:1:1:1 | 0 to 5 | 0 to 9 | 0 to 5 | 0 to 9 |
| 4 | 9 | 0 | 7 | | | | | | | | | | | | | | | |
| b15 | b12 | b8 | b4 | | | | | | | | | | | | | | | |
| 0:1:0:0 | 1:0:0:1 | 0:0:0:0 | 0:1:1:1 | | | | | | | | | | | | | | | |
| 0 to 5 | 0 to 9 | 0 to 5 | 0 to 9 | | | | | | | | | | | | | | | |
| <p>Md.13 Error history pointer</p> | <p>Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing records.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Storage value (Pointer number) 0 to 15</p> | | | | | | | | | | | | | | | | |

Error history (Up to 16 records can be stored)

| Default value | Storage buffer memory address (common to axes 1 to 4) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|--|------|-------|------|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | <div style="text-align: center;"> <table border="1" style="margin: auto;"> <tr> <td style="padding: 2px;">Md.13</td> <td style="padding: 2px;">1357</td> </tr> <tr> <td style="padding: 2px;">Error history pointer</td> <td></td> </tr> </table> </div> | | Md.13 | 1357 | Error history pointer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.13 | 1357 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Error history pointer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | <p style="text-align: center;">↑ Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing error history records.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | <table border="1" style="margin: auto;"> <tr> <td style="padding: 2px;">Md.9</td> <td style="padding: 2px;">1293</td> <td style="padding: 2px;">1297</td> <td style="padding: 2px;">1301</td> <td style="padding: 2px;">1305</td> <td style="padding: 2px;">1309</td> <td style="padding: 2px;">1313</td> <td style="padding: 2px;">1317</td> <td style="padding: 2px;">1321</td> <td style="padding: 2px;">1325</td> <td style="padding: 2px;">1329</td> <td style="padding: 2px;">1333</td> <td style="padding: 2px;">1337</td> <td style="padding: 2px;">1341</td> <td style="padding: 2px;">1345</td> <td style="padding: 2px;">1349</td> <td style="padding: 2px;">1353</td> </tr> <tr> <td style="padding: 2px;">Md.10</td> <td style="padding: 2px;">1294</td> <td style="padding: 2px;">1298</td> <td style="padding: 2px;">1302</td> <td style="padding: 2px;">1306</td> <td style="padding: 2px;">1310</td> <td style="padding: 2px;">1314</td> <td style="padding: 2px;">1318</td> <td style="padding: 2px;">1322</td> <td style="padding: 2px;">1326</td> <td style="padding: 2px;">1330</td> <td style="padding: 2px;">1334</td> <td style="padding: 2px;">1338</td> <td style="padding: 2px;">1342</td> <td style="padding: 2px;">1346</td> <td style="padding: 2px;">1350</td> <td style="padding: 2px;">1354</td> </tr> <tr> <td style="padding: 2px;">Md.11</td> <td style="padding: 2px;">1295</td> <td style="padding: 2px;">1299</td> <td style="padding: 2px;">1303</td> <td style="padding: 2px;">1307</td> <td style="padding: 2px;">1311</td> <td style="padding: 2px;">1315</td> <td style="padding: 2px;">1319</td> <td style="padding: 2px;">1323</td> <td style="padding: 2px;">1327</td> <td style="padding: 2px;">1331</td> <td style="padding: 2px;">1335</td> <td style="padding: 2px;">1339</td> <td style="padding: 2px;">1343</td> <td style="padding: 2px;">1347</td> <td style="padding: 2px;">1351</td> <td style="padding: 2px;">1355</td> </tr> <tr> <td style="padding: 2px;">Md.12</td> <td style="padding: 2px;">1296</td> <td style="padding: 2px;">1300</td> <td style="padding: 2px;">1304</td> <td style="padding: 2px;">1308</td> <td style="padding: 2px;">1312</td> <td style="padding: 2px;">1316</td> <td style="padding: 2px;">1320</td> <td style="padding: 2px;">1324</td> <td style="padding: 2px;">1328</td> <td style="padding: 2px;">1332</td> <td style="padding: 2px;">1336</td> <td style="padding: 2px;">1340</td> <td style="padding: 2px;">1344</td> <td style="padding: 2px;">1348</td> <td style="padding: 2px;">1352</td> <td style="padding: 2px;">1356</td> </tr> </table> <p style="text-align: center;">↑ ↑ Item Buffer memory address</p> | | Md.9 | 1293 | 1297 | 1301 | 1305 | 1309 | 1313 | 1317 | 1321 | 1325 | 1329 | 1333 | 1337 | 1341 | 1345 | 1349 | 1353 | Md.10 | 1294 | 1298 | 1302 | 1306 | 1310 | 1314 | 1318 | 1322 | 1326 | 1330 | 1334 | 1338 | 1342 | 1346 | 1350 | 1354 | Md.11 | 1295 | 1299 | 1303 | 1307 | 1311 | 1315 | 1319 | 1323 | 1327 | 1331 | 1335 | 1339 | 1343 | 1347 | 1351 | 1355 | Md.12 | 1296 | 1300 | 1304 | 1308 | 1312 | 1316 | 1320 | 1324 | 1328 | 1332 | 1336 | 1340 | 1344 | 1348 | 1352 | 1356 |
| Md.9 | 1293 | 1297 | 1301 | 1305 | 1309 | 1313 | 1317 | 1321 | 1325 | 1329 | 1333 | 1337 | 1341 | 1345 | 1349 | 1353 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.10 | 1294 | 1298 | 1302 | 1306 | 1310 | 1314 | 1318 | 1322 | 1326 | 1330 | 1334 | 1338 | 1342 | 1346 | 1350 | 1354 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.11 | 1295 | 1299 | 1303 | 1307 | 1311 | 1315 | 1319 | 1323 | 1327 | 1331 | 1335 | 1339 | 1343 | 1347 | 1351 | 1355 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Md.12 | 1296 | 1300 | 1304 | 1308 | 1312 | 1316 | 1320 | 1324 | 1328 | 1332 | 1336 | 1340 | 1344 | 1348 | 1352 | 1356 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | <ul style="list-style-type: none"> • Each group of buffer memory addresses storing a complete error history record is assigned a pointer No. Example: Pointer No. 0 = Buffer memory addresses 1293 to 1296 <li style="padding-left: 20px;">Pointer No. 1 = Buffer memory addresses 1297 to 1300 <li style="padding-left: 20px;">Pointer No. 2 = Buffer memory addresses 1301 to 1304 <li style="padding-left: 20px;">⋮ <li style="padding-left: 20px;">Pointer No. 15 = Buffer memory addresses 1353 to 1356 • Each history record is assigned a pointer No. in the range between 0 and 15. If the pointer No. 15 has been assigned to a new record, the next record will be assigned the pointer number 0. (A new record replaces an older record when a pointer No. is reassigned.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1357 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

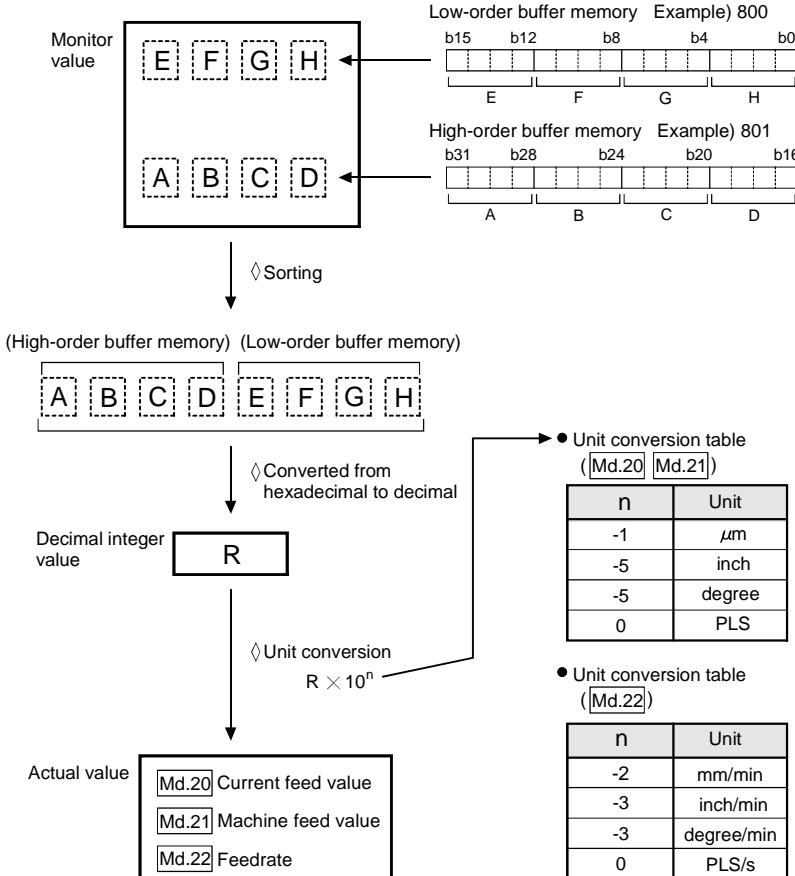
| Storage item | Storage details | Reading the monitor value | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--------|--------|---|--------|-----|-----|----|----|----|---|---|---|---|---|---|---|---|---|----------|---|--------|--------|--------|--|--------|--|--------|--|
| <p>Md.14 Axis in which the warning occurred</p> | <p>Stores a number (Axis No.) that indicates the axis that encountered a warning.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Storage value 1: Axis 1 2: Axis 2 3: Axis 3 4: Axis 4</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.15 Axis warning No.</p> | <p>Stores an axis warning No.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Warning No. For details of warning Nos. (warning codes), refer to Section 15.3 "List of warnings".</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.16 Axis warning occurrence (Hour)</p> | <p>Stores the time at which an axis warning was detected.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <table border="1"> <tr> <td>0</td><td>0</td><td>1</td><td>5</td> </tr> <tr> <td>b15</td><td>b12</td><td>b8</td><td>b4</td><td>b0</td> </tr> <tr> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td> </tr> <tr> <td colspan="2">Not used</td><td>0 to 2</td><td>0 to 3</td> </tr> </table> <p>→ Monitor value  00 to 23 (hour)</p> | 0 | 0 | 1 | 5 | b15 | b12 | b8 | b4 | b0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Not used | | 0 to 2 | 0 to 3 | | | | | | |
| 0 | 0 | 1 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b15 | b12 | b8 | b4 | b0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Not used | | 0 to 2 | 0 to 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.17 Axis warning occurrence (Minute: second)</p> | <p>Stores the time at which an axis warning was detected.</p> | <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Buffer memory (stored with BCD code)</p> <table border="1"> <tr> <td>4</td><td>9</td><td>0</td><td>7</td> </tr> <tr> <td>b15</td><td>b12</td><td>b8</td><td>b4</td><td>b0</td> </tr> <tr> <td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td> </tr> <tr> <td colspan="2">0 to 5</td><td colspan="2">0 to 9</td><td colspan="2">0 to 5</td><td colspan="2">0 to 9</td> </tr> </table> <p>→ Monitor value  00 to 59 (minute) 00 to 59 (second)</p> | 4 | 9 | 0 | 7 | b15 | b12 | b8 | b4 | b0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 to 5 | | 0 to 9 | | 0 to 5 | | 0 to 9 | |
| 4 | 9 | 0 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b15 | b12 | b8 | b4 | b0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| 0 to 5 | | 0 to 9 | | 0 to 5 | | 0 to 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.18 Warning history pointer</p> | <p>Indicates a pointer No. that is next to the Pointer No. assigned to the latest of the existing records.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Storage value (Pointer number) 0 to 15</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Md.19 No. of write accesses to flash ROM</p> | <p>Stores the number of write accesses to the flash ROM after the power is switched ON. The count is cleared to "0" when the number of write accesses reach 26 and an error reset operation is performed.</p> | <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  → ● Storage value 0 to 25</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Warning history (Up to 16 records can be stored)



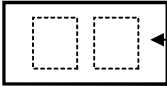

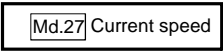
| Default value | Storage buffer memory address (common to axes 1 to 4) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|------|------|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|-----------------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | <div style="text-align: center;">  </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | <div style="text-align: center;">  </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 10%;">Pointer No.</th> <th style="width: 10%;">0</th> <th style="width: 10%;">1</th> <th style="width: 10%;">2</th> <th style="width: 10%;">3</th> <th style="width: 10%;">4</th> <th style="width: 10%;">5</th> <th style="width: 10%;">6</th> <th style="width: 10%;">7</th> <th style="width: 10%;">8</th> <th style="width: 10%;">9</th> <th style="width: 10%;">10</th> <th style="width: 10%;">11</th> <th style="width: 10%;">12</th> <th style="width: 10%;">13</th> <th style="width: 10%;">14</th> <th style="width: 10%;">15</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">Warning history</td> <td>Md.14 Axis in which the warning occurred</td> <td>1358</td><td>1362</td><td>1366</td><td>1370</td><td>1374</td><td>1378</td><td>1382</td><td>1386</td><td>1390</td><td>1394</td><td>1398</td><td>1402</td><td>1406</td><td>1410</td><td>1414</td><td>1418</td> </tr> <tr> <td>Md.15 Axis warning No.</td> <td>1359</td><td>1363</td><td>1367</td><td>1371</td><td>1375</td><td>1379</td><td>1383</td><td>1387</td><td>1391</td><td>1395</td><td>1399</td><td>1403</td><td>1407</td><td>1411</td><td>1415</td><td>1419</td> </tr> <tr> <td>Md.16 Axis warning occurrence hour</td> <td>1360</td><td>1364</td><td>1368</td><td>1372</td><td>1376</td><td>1380</td><td>1384</td><td>1388</td><td>1392</td><td>1396</td><td>1400</td><td>1404</td><td>1408</td><td>1412</td><td>1416</td><td>1420</td> </tr> <tr> <td>Md.17 Axis warning occurrence min: sec</td> <td>1361</td><td>1365</td><td>1369</td><td>1373</td><td>1377</td><td>1381</td><td>1385</td><td>1389</td><td>1393</td><td>1397</td><td>1401</td><td>1405</td><td>1409</td><td>1413</td><td>1417</td><td>1421</td> </tr> </tbody> </table> <p style="margin-left: 20px;"> ↑ Item ↑ Buffer memory address </p> <ul style="list-style-type: none"> • Each group of buffer memory addresses storing a complete warning history record is assigned a pointer No. Example: Pointer No. 0 = Buffer memory addresses 1358 to 1361 Pointer No. 1 = Buffer memory addresses 1362 to 1365 Pointer No. 2 = Buffer memory addresses 1366 to 1369 ⋮ Pointer No. 15 = Buffer memory addresses 1418 to 1421 • Each history record is assigned a pointer No. in the range between 0 and 15. If the pointer No. 15 has been assigned to a new record, the next record will be assigned the pointer number 0. (A new record replaces an older record when a pointer No. is reassigned.) | | | Pointer No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | Warning history | Md.14 Axis in which the warning occurred | 1358 | 1362 | 1366 | 1370 | 1374 | 1378 | 1382 | 1386 | 1390 | 1394 | 1398 | 1402 | 1406 | 1410 | 1414 | 1418 | Md.15 Axis warning No. | 1359 | 1363 | 1367 | 1371 | 1375 | 1379 | 1383 | 1387 | 1391 | 1395 | 1399 | 1403 | 1407 | 1411 | 1415 | 1419 | Md.16 Axis warning occurrence hour | 1360 | 1364 | 1368 | 1372 | 1376 | 1380 | 1384 | 1388 | 1392 | 1396 | 1400 | 1404 | 1408 | 1412 | 1416 | 1420 | Md.17 Axis warning occurrence min: sec | 1361 | 1365 | 1369 | 1373 | 1377 | 1381 | 1385 | 1389 | 1393 | 1397 | 1401 | 1405 | 1409 | 1413 | 1417 | 1421 |
| | Pointer No. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Warning history | Md.14 Axis in which the warning occurred | 1358 | 1362 | 1366 | 1370 | 1374 | 1378 | 1382 | 1386 | 1390 | 1394 | 1398 | 1402 | 1406 | 1410 | 1414 | 1418 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.15 Axis warning No. | 1359 | 1363 | 1367 | 1371 | 1375 | 1379 | 1383 | 1387 | 1391 | 1395 | 1399 | 1403 | 1407 | 1411 | 1415 | 1419 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.16 Axis warning occurrence hour | 1360 | 1364 | 1368 | 1372 | 1376 | 1380 | 1384 | 1388 | 1392 | 1396 | 1400 | 1404 | 1408 | 1412 | 1416 | 1420 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Md.17 Axis warning occurrence min: sec | 1361 | 1365 | 1369 | 1373 | 1377 | 1381 | 1385 | 1389 | 1393 | 1397 | 1401 | 1405 | 1409 | 1413 | 1417 | 1421 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0000 | <p style="text-align: center;">0000</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1422 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 1424 1425 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.6.2 Axis monitor data

| Storage item | Storage details |
|--------------------------|--|
| Md.20 Current feed value | <p>The currently commanded address is stored. (Different from the actual motor position during operation)</p> <p>The current position address is stored.</p> <p>If "degree" is selected as the unit, the addresses will have a ring structure for values between 0 and 359.9999 degrees.</p> <ul style="list-style-type: none"> • Update timing : 3.5ms • The OP address is stored when the machine OPR is completed. • When the current value is changed with the current value changing function, the changed value is stored. |
| Md.21 Machine feed value | <p>The address of the current position according to the machine coordinates will be stored. (Different from the actual motor position during operation)</p> <p>Note that the current value changing function will not change the machine feed value.</p> <p>Under the speed control mode, the machine feed value is constantly updated always, irrespective of the parameter setting.</p> <p>The value will not be cleared to "0" at the beginning of fixed-feed control.</p> <p>Even if "degree" is selected as the unit, the addresses will not have a ring structure for values between 0 and 359.99999 degrees.</p> <ul style="list-style-type: none"> • Machine coordinates: Characteristic coordinates determined with machine • Update timing: 56.8ms |
| Md.22 Feedrate | <p>The speed of the operating workpiece is stored. (May be different from the actual motor speed during operation)</p> <ul style="list-style-type: none"> • During interpolation operation, the speed is stored in the following manner. Reference axis : Composite speed or reference axis speed (Set with Pr.20) Interpolation axis : 0 • Update timing: 56.8ms <p>POINT</p> <p>In case of the single axis operation, Md.22 Feedrate and Md.28 Axis feedrate are identical.</p> <p>In the composite mode of the interpolation operation, Md.22 Feedrate is a speed in a composite direction and Md.28 Axis feedrate is that in each axial direction.</p> |
| Md.23 Axis error No. | <p>When an axis error is detected, the error code corresponding to the error details is stored.</p> <ul style="list-style-type: none"> • The latest error code is always stored. (When a new axis error occurs, the error code is overwritten.) • When " Cd.5 Axis error reset" (axis control data) turns ON, the axis error No. is cleared (set to 0). |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------------|-------------------------------|------------|--------------|--------------|------|----|--------|---|-----|---|------|----|--------|----|----------|----|------------|---|-------|-------|------------|------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal.</p>  <p>Low-order buffer memory Example) 800 b15 b12 b8 b4 b0 E F G H</p> <p>High-order buffer memory Example) 801 b31 b28 b24 b20 b16 A B C D</p> <p>Monitor value E F G H A B C D</p> <p>◇ Sorting</p> <p>(High-order buffer memory) (Low-order buffer memory) A B C D E F G H</p> <p>◇ Converted from hexadecimal to decimal</p> <p>Decimal integer value R</p> <p>◇ Unit conversion $R \times 10^n$</p> <p>Actual value Md.20 Current feed value Md.21 Machine feed value Md.22 Feedrate</p> <p>• Unit conversion table (Md.20 Md.21)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> <p>• Unit conversion table (Md.22)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0000H | 800 801 | 900 901 | 1000 1001 | 1100 1101 |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0000H | 802 803 | 902 903 | 1002 1003 | 1102 1103 | | | | | | | | | | | | | | | | | | | | |
| | 0000H | 804 805 | 904 905 | 1004 1005 | 1104 1105 | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal.</p> <p>Monitor value [] [] [] [] [] []</p> <p>• Error code Refer to Section 15.2 "List of errors" for details on the error Nos. (error codes).</p> | 0 | 806 | 906 | 1006 | 1106 | | | | | | | | | | | | | | | | | | | | |

| Storage item | Storage details |
|-----------------------------|--|
| Md.24 Axis warning No. | <p>Whenever an axis warning is reported, a related warning code is stored.</p> <ul style="list-style-type: none"> • This area stores the latest warning code always. (Whenever an axis warning is reported, a new warning code replaces the stored warning code.) • When the " Cd.5 Axis error reset" (axis control data) is set to ON, the axis warning No. is cleared to "0". |
| Md.25 Valid M code | <p>This area stores an M code that is currently active (i.e. set to the positioning data relating to the current operation).</p> <ul style="list-style-type: none"> • Update timing : turning ON of the M code ON signal <p>When the PLC READY signal (Y0) goes OFF, the value is set to "0".</p> |
| Md.26 Axis operation status | <p>This area stores the axis operation status.</p> |
| Md.27 Current speed | <p>The " Da.8 Command speed" used by the positioning data currently being executed is stored. (Stores "0" under the speed control.)</p> <ul style="list-style-type: none"> • If " Da.8 Command speed" is set to "-1", this area stores the command speed set by the positioning data used one step earlier. • If " Da.8 Command speed" is set to a value other than "-1", this area stores the command speed set by the current positioning data. • When speed change function is executed, this area stores " Cd.14 New speed value". (For details of change speed function, refer to section 12.5.1.) |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | |
|--|---------------|-------------------------------|--------|--------|--------|----------|----|------------|---|-------|---|------------|------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Warning No. For details of warning Nos. (warning codes), refer to Section 15.3 "List of warnings".</p> | 0 | 807 | 907 | 1007 | 1107 | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● M code No. (0 to 65535)</p> | 0 | 808 | 908 | 1008 | 1108 | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Axis operation status</p> <ul style="list-style-type: none"> -2: Step standby -1: Error 0: Standby 1: Stopped 2: Interpolation 3: JOG operation 4: Manual pulse generator operation 5: Analyzing 6: Special start standby 7: OPR 8: Position control 9: Speed control 10: Speed control in speed-position switching control 11: Position control in speed-position switching control 12: Position control in position-speed switching control 13: Speed control in position-speed switching control 20: Servo amplifier has not been connected/ servo amplifier power OFF 21: Servo OFF | 0 | 809 | 909 | 1009 | 1109 | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  (Decimal integer value)</p> <p>↓ Unit conversion $R \times 10^n$</p> <p>Actual value </p> <p>● Unit conversion table (Md.27)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0 | 810 811 | 910 911 | 1010 1011 | 1110 1111 |
| n | Unit | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | |

| Storage item | Storage details | |
|---|---|--|
| <p>Md.28 Axis feedrate</p> | <ul style="list-style-type: none"> • The speed which is actually output as a command at that time in each axis is stored. (May be different from the actual motor speed) "0" is stored when the axis is at a stop. Update timing: 56.8ms <p>POINT</p> <p>Refer to Md.22 Feedrate</p> | |
| <p>Md.29 Speed-position switching control positioning amount</p> | <ul style="list-style-type: none"> • The value set as the movement amount for the position control to end after changing to position control with the speed-position switching control (INC mode) is stored. | |
| <p>Md.30 External input signal</p> | <p>The ON/OFF state of the external input/output signal is stored. The following items are stored.</p> <ul style="list-style-type: none"> • Upper limit signal • Lower limit signal • Stop signal • External command signal/switching signal • Near-point dog signal | |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------|-------------------------------|---------|-----------------------|--------|-----------------|-----------------------|------------|-------------|-------|----------------|------|---|---------|-------------|------|--------------------------|--------|-------------|-----|-------------|------------|------------|--------------|--------------|------|------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal.</p> <p>Low-order buffer memory Example) 812 b15 b12 b8 b4 b0 E F G H</p> <p>High-order buffer memory Example) 813 b31 b28 b24 b20 b16 A B C D</p> <p>Monitor value: E F G H (High-order) and A B C D (Low-order)</p> <p>↓ ◇Sorting</p> <p>(High-order buffer memory) (Low-order buffer memory) A B C D E F G H</p> <p>↓ ◇Converted from hexadecimal to decimal</p> <p>Decimal integer value: R</p> <p>↓ ◇Unit conversion $R \times 10^n$</p> <p>Actual value: Md.28 Axis feedrate, Md.29 Speed-position switching control positioning amount</p> <p>• Unit conversion table (Md.28)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> <p>• Unit conversion table (Md.29)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | n | Unit | -1 | μ m | -5 | inch | -5 | degree | 0 | PLS | 0000H | 812 813 | 912 913 | 1012 1013 | 1112 1113 | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -1 | μ m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal.</p> <p>Monitor value: 0 0 0 0</p> <p>Buffer memory: b15 b12 b8 b4 b0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</p> <p>Not used: b15, b12, b8, b4</p> <table border="1"> <thead> <tr> <th>Stored items</th> <th>Default value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>b0 Lower limit signal</td> <td>0</td> <td rowspan="8">0: OFF 1: ON</td> </tr> <tr> <td>b1 Upper limit signal</td> <td>0</td> </tr> <tr> <td>b2 Not used</td> <td>0</td> </tr> <tr> <td>b3 Stop signal</td> <td>0</td> </tr> <tr> <td>b4 External command signal/ switching signal</td> <td>0</td> </tr> <tr> <td>b5 Not used</td> <td>0</td> </tr> <tr> <td>b6 Near-point dog signal</td> <td>0</td> </tr> <tr> <td>b7 Not used</td> <td>0</td> </tr> <tr> <td>b8 Not used</td> <td>0</td> </tr> </tbody> </table> | Stored items | Default value | Meaning | b0 Lower limit signal | 0 | 0: OFF 1: ON | b1 Upper limit signal | 0 | b2 Not used | 0 | b3 Stop signal | 0 | b4 External command signal/ switching signal | 0 | b5 Not used | 0 | b6 Near-point dog signal | 0 | b7 Not used | 0 | b8 Not used | 0 | 0000H | 816 | 916 | 1016 | 1116 |
| Stored items | Default value | Meaning | | | | | | | | | | | | | | | | | | | | | | | | | |
| b0 Lower limit signal | 0 | 0: OFF 1: ON | | | | | | | | | | | | | | | | | | | | | | | | | |
| b1 Upper limit signal | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b2 Not used | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b3 Stop signal | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b4 External command signal/ switching signal | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b5 Not used | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b6 Near-point dog signal | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b7 Not used | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b8 Not used | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |

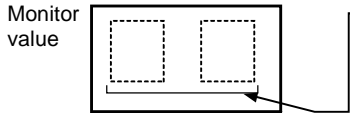
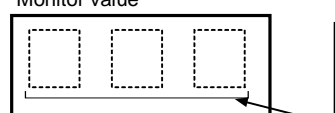
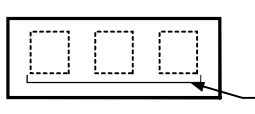
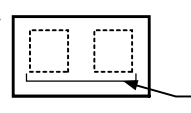
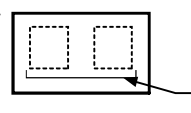
| Storage item | Storage details | |
|------------------------------------|---|--|
| <p>[Md.31] Status</p> | <p>This area stores the states (ON/OFF) of various flags. Information on the following flags is stored.</p> <ul style="list-style-type: none"> ● In speed control flag: This signal that comes ON under the speed control can be used to judge whether the operation is performed under the speed control or position control. The signal goes OFF when the power is switched ON, under the position control, and during JOG operation or manual pulse generator operation. During the speed-position or position-speed switching control, this signal comes ON only when the speed control is in effect. During the speed-position switching control, this signal goes OFF when the speed-position switching signal executes a switching over from speed control to position control. During the position-speed switching control, this signal comes ON when the position-speed switching signal executes a switching over from position control to speed control. ● Speed-position switching latch flag: This signal is used during the speed-position switching control (INC mode) for interlocking the movement amount change function. During the speed-position switching control (INC mode), this signal comes ON when position control takes over. This signal goes OFF when the next positioning data is processed, and during JOG operation or manual pulse generator operation. ● Command in-position flag: This signal is ON when the remaining distance is equal to or less than the command in-position range (set by a detailed parameter). This signal remains OFF with data that specify the continuous path control (P11) as the operation pattern. The state of this signal is monitored every 3.5 ms except when the monitoring is canceled under the speed control or while the speed control is in effect during the speed-position or position-speed switching control. While operations are performed with interpolation, this signal comes ON only in respect of the starting axis. (This signal goes OFF in respect of all axes upon starting.) ● OPR request flag: This signal comes ON when the power is switched ON, when the absolute system has not been set, when the machine OPR has not been executed at the absolute position system, when the PLC READY signal goes ON, when a machine OPR operation starts. This signal goes OFF when a machine OPR operation completes. ● OPR complete flag: This signal comes ON when a machine OPR operation completes normally. This signal goes OFF when the operation start. ● Position-speed switching latch flag: This signal is used during the position-speed switching control for interlocking the command speed change function. During the position-speed switching control, this signal comes ON when speed control takes over. This signal goes OFF when the next positioning data is processed, and during JOG operation or manual pulse generator operation. ● Axis warning detection flag: This signal comes On when an axis warning is reported and goes OFF when the axis error reset signal comes ON. ● Speed change 0 flag: This signal comes ON when a speed change request that specifies 0 as the new speed value is issued. This signal comes ON when a speed change request that specifies a new speed value other than 0 is issued. | |
| <p>[Md.32] Target value</p> | <p>This area stores the target value ([Da.6] Positioning address/movement amount) for a positioning operation.</p> <ul style="list-style-type: none"> • At the beginning of positioning control: Stores the value of " [Da.6] Positioning address/movement amount". • At other times : Stores "0". | |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------------|-------------------------------|---------|--------|--------|-----------------|------|----|--------|---|-----|---|------------|------------|--------------|--------------|----|---|-----|---|-------|-----|-----|------|------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal display.</p> <table border="1"> <thead> <tr> <th>Stored items</th> <th>Default value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>b0</td> <td>0</td> <td rowspan="9">0: OFF 1: ON</td> </tr> <tr> <td>b1</td> <td>0</td> </tr> <tr> <td>b2</td> <td>0</td> </tr> <tr> <td>b3</td> <td>0</td> </tr> <tr> <td>b4</td> <td>0</td> </tr> <tr> <td>b5</td> <td>0</td> </tr> <tr> <td>b9</td> <td>0</td> </tr> <tr> <td>b10</td> <td>0</td> </tr> </tbody> </table> | Stored items | Default value | Meaning | b0 | 0 | 0: OFF 1: ON | b1 | 0 | b2 | 0 | b3 | 0 | b4 | 0 | b5 | 0 | b9 | 0 | b10 | 0 | 0000H | 817 | 917 | 1017 | 1117 |
| Stored items | Default value | Meaning | | | | | | | | | | | | | | | | | | | | | | | |
| b0 | 0 | 0: OFF 1: ON | | | | | | | | | | | | | | | | | | | | | | | |
| b1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b4 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b9 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| b10 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> | n | | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | 0 | 818 819 | 918 919 | 1018 1019 | 1118 1119 | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | | | |


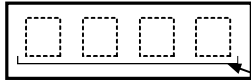
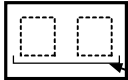



| Storage item | Storage details | |
|---|---|--|
| <p>Md.33 Target speed</p> | <ul style="list-style-type: none"> • During operation with positioning data : The actual target speed, considering the override and speed limit value, etc., is stored. "0" is stored when positioning is completed. • During interpolation : The composite speed or reference axis speed is stored in the reference axis address, and "0" is stored in the interpolation axis address. • During JOG operation : The actual target speed, considering the JOG speed limit value for the JOG speed, is stored. • During manual pulse generator operation : "0" is stored. <p>POINT</p> <p>The target speed is when an override is made to the command speed. When the speed limit value is overridden, the target speed is restricted to the speed limit value. The target speed changes every time data is switched, but does not change in an acceleration/deceleration state inside each piece of data (changes with the speed change because the target speed changes.)</p> | |
| <p>Md.34 Movement amount after near-point dog ON</p> | <ul style="list-style-type: none"> • "0" is stored when machine OPR starts. • After machine OPR starts, the movement amount from the near-point dog ON to the machine OPR completion is stored. (Movement amount: Movement amount to machine OPR completion using near-point dog ON as "0".) • "0" is always stored when not using the near-point dog. | |
| <p>Md.35 Torque limit stored value</p> | <p>The " Pr.17 Torque limit setting value", " Cd.101 Torque output setting value" or " Cd.22 New torque value", " Pr.54 OPR torque limit value" is stored.</p> <ul style="list-style-type: none"> • During positioning start, JOG operation start, manual pulse generator operation ...The " Pr.17 Torque limit setting value" or " Cd.101 Torque output setting value" is stored. • When value is changed to " Cd.22 New torque value" during operation ...The " Cd.22 New torque value" is stored. • When OPR ...The " Pr.17 Torque limit setting value" or " Cd.101 Torque output setting value" is stored. But " Pr.54 OPR torque limit value" is stored after the " Pr.47 Creep speed" completion. | |

| | Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | |
|--|---------------------------|---------------|-------------------------------|--------|--------|----------|----|------------|---|-------|---|------|----|---------------|----|------|----|--------|---|-----|-------|------------|------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Low-order buffer memory Example) 820 b15 b12 b8 b4 b0 E F G H</p> <p>High-order buffer memory Example) 821 b31 b28 b24 b20 b16 A B C D</p> <p>Monitor value E F G H A B C D</p> <p>◇Sorting</p> <p>(High-order buffer memory) (Low-order buffer memory) A B C D E F G H</p> <p>◇Converted from hexadecimal to decimal</p> <p>Decimal integer value R</p> <p>◇Unit conversion $R \times 10^n$</p> <p>Actual value Md.33 Target speed Md.34 Movement amount after near-point dog ON</p> <p>• Unit conversion table (Md.33)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> <p>• Unit conversion table (Md.34)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | 0000H | 820 821 | 920 921 | 1020 1021 | 1120 1121 |
| | n | Unit | | | | | | | | | | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value 000</p> <p>Storage value 1 to 500 (%)</p> | 300 | 826 | 926 | 1026 | 1126 | | | | | | | | | | | | | | | | | | | | |

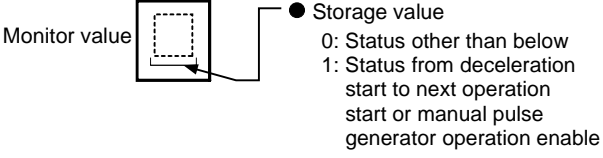
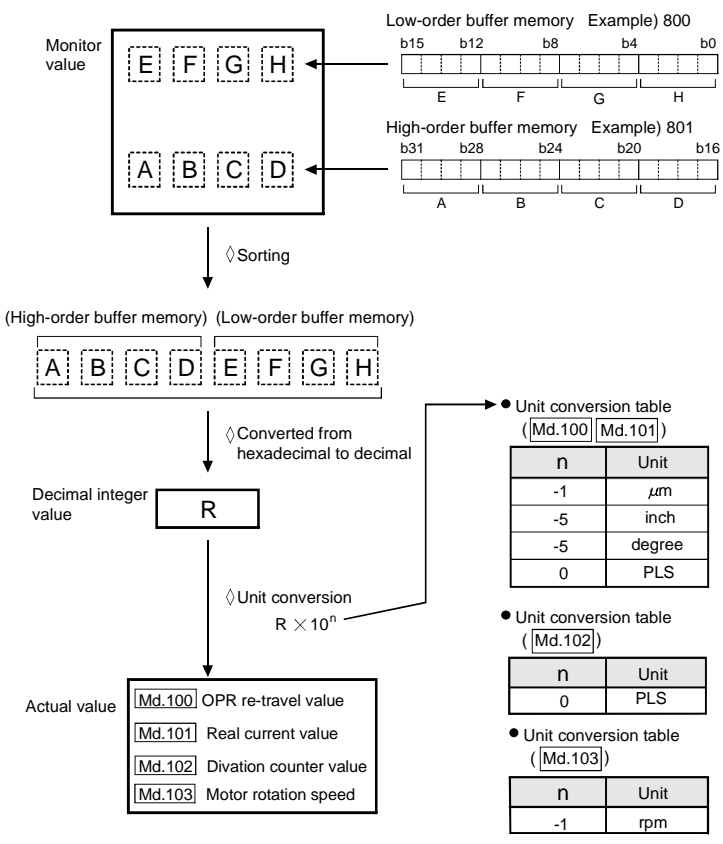
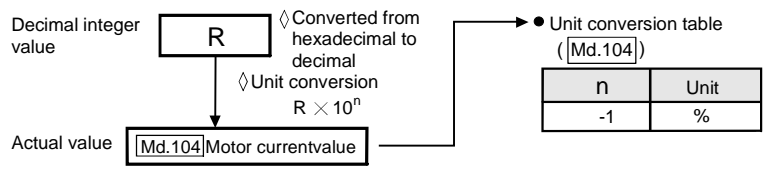
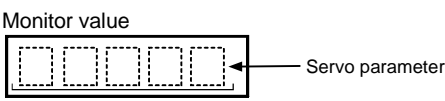
| Storage item | Storage details | |
|--|---|--|
| <p>[Md.36] Special start data instruction code setting value</p> | <ul style="list-style-type: none"> The "instruction code" used with special start and indicated by the start data pointer currently being executed is stored. | |
| <p>[Md.37] Special start data instruction parameter setting value</p> | <p>The "instruction parameter" used with special start and indicated by the start data pointer currently being executed is stored.</p> <p>The stored value differs according to the value set for [Md.36] .</p> | |
| <p>[Md.38] Start positioning data No. setting value</p> | <ul style="list-style-type: none"> The "positioning data No." indicated by the start data pointer currently being executed is stored. | |
| <p>[Md.39] In speed limit flag</p> | <ul style="list-style-type: none"> If the speed exceeds the "[Pr.8] Speed limit value" due to a speed change or override, the speed limit functions, and the in speed limit flag turns ON. When the speed drops to less than "[Pr.8] Speed limit value", or when the axis stops, the in speed limit flag turns OFF. | |
| <p>[Md.40] In speed change processing flag</p> | <ul style="list-style-type: none"> The speed change process flag turns ON when the speed is changed during positioning control. After the speed change process is completed or when deceleration starts with the stop signal during the speed change process, the in speed change process flag turns OFF. | |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | |
|---|---------------------|-------------------------------|---------------|----------|--------|------|----------------------|--------------------|---------|----|--------------------|----------|---|-----|-----|------|------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>● Storage value 00: Block start (Normal start) 01: Condition start 02: Wait start 03: Simultaneous start 04: FOR loop 05: FOR condition 06: NEXT</p> | 0 | 827 | 927 | 1027 | 1127 | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <table border="1"> <thead> <tr> <th>Md.36 setting value</th> <th>Stored contents</th> <th>Storage value</th> </tr> </thead> <tbody> <tr> <td>00 06</td> <td>None</td> <td>None</td> </tr> <tr> <td>01 02 03 05</td> <td>Condition data No.</td> <td>1 to 10</td> </tr> <tr> <td>04</td> <td>No. of repetitions</td> <td>0 to 255</td> </tr> </tbody> </table> | Md.36 setting value | Stored contents | Storage value | 00 06 | None | None | 01 02 03 05 | Condition data No. | 1 to 10 | 04 | No. of repetitions | 0 to 255 | 0 | 828 | 928 | 1028 | 1128 |
| Md.36 setting value | Stored contents | Storage value | | | | | | | | | | | | | | | |
| 00 06 | None | None | | | | | | | | | | | | | | | |
| 01 02 03 05 | Condition data No. | 1 to 10 | | | | | | | | | | | | | | | |
| 04 | No. of repetitions | 0 to 255 | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>● Storage value 1 to 600</p> | 0 | 829 | 929 | 1029 | 1129 | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>● Storage value 0: Not in speed limit (OFF) 1: In speed limit (ON)</p> | 0 | 830 | 930 | 1030 | 1130 | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>● Storage value 0: Not in speed change (OFF) 1: In speed change (ON)</p> | 0 | 831 | 931 | 1031 | 1131 | | | | | | | | | | | | |

| Storage item | Storage details | |
|---|--|--|
| Md.41 Special start repetition counter | <ul style="list-style-type: none"> • This area stores the remaining number of repetitions during "repetitions" specific to special starting. • The count is decremented by one (-1) at the loop end. • The control comes out of the loop when the count reaches "0". • This area stores "0" within an infinite loop. | |
| Md.42 Control system repetition counter | <ul style="list-style-type: none"> • This area stores the remaining number of repetitions during "repetitions" specific to control system. • The count is decremented by one (-1) at the loop end. • The control comes out of the loop when the count reaches "0". • This area stores "0" within an infinite loop. | |
| Md.43 Start data pointer being executed | <ul style="list-style-type: none"> • This area stores a point No. (1 to 50) attached to the start data currently being executed. • This area stores "0" after completion of a positioning operation. | |
| Md.44 Positioning data No. being executed | <ul style="list-style-type: none"> • This area stores a positioning data No. attached to the positioning data currently being executed. | |
| Md.45 Block No. being executed | <ul style="list-style-type: none"> • When the operation is controlled by "block start data", this area stores a block number (7000 to 7004) attached to the block currently being executed. • At other times, this area stores "0". | |
| Md.46 Last executed positioning data No. | <ul style="list-style-type: none"> • This area stores the positioning data No. attached to the positioning data that was executed last time. • The value is retained until a new positioning operation is executed. | |
| Md.47 Positioning data being executed | <ul style="list-style-type: none"> • The addresses shown to the right store details of the positioning data currently being executed (positioning data No. given by Md.44). | |

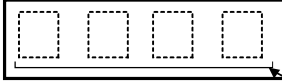
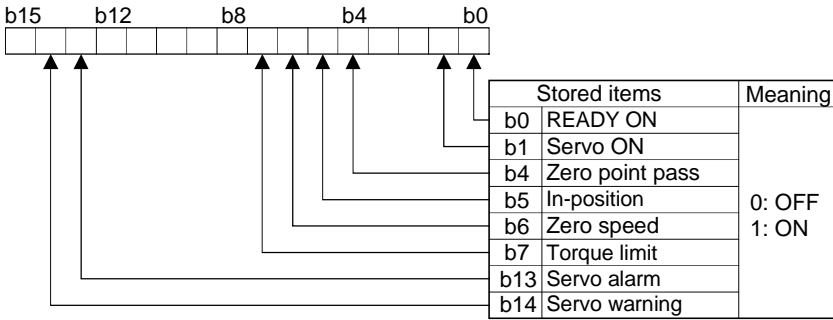
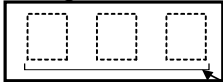
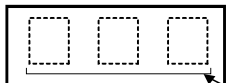
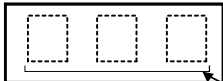
| | Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------------------|--------------------------------|-------------------------------|------------------------|--------------|-------------|-----------|-------|-------|-------|-------|-----|-----|------|------|------------------------|--------------|-----|-----|------|------|--------|-------|-----|-----|------|------|------------|------|-----|-----|------|------|------|---|-----|-----|------|------|---------------|------|-----|-----|------|------|-----|-----|------|------|---------------------|------|-----|-----|------|------|-----|-----|------|------|-------------|------|-----|-----|------|------|---|------------|------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Storage value 0 to 255</p> | 0 | 832 | 932 | 1032 | 1132 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal display.</p> <p>Monitor value  ● Storage value 0 to FFFF</p> | 0000H | 833 | 933 | 1033 | 1133 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Storage value 1 to 50</p> | 0 | 834 | 934 | 1034 | 1134 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Storage value 1 to 600</p> | 0 | 835 | 935 | 1035 | 1135 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Storage value 1 to 50</p> | 0 | 836 | 936 | 1036 | 1136 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value  ● Storage value 1 to 600</p> | 0 | 837 | 937 | 1037 | 1137 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Information is stored in the following addresses:</p> <table border="1"> <thead> <tr> <th colspan="4">Stored address (Monitor value)</th> <th rowspan="2">Stored item</th> <th rowspan="2">Reference</th> </tr> <tr> <th>Axis1</th> <th>Axis2</th> <th>Axis3</th> <th>Axis4</th> </tr> </thead> <tbody> <tr> <td>838</td> <td>938</td> <td>1038</td> <td>1138</td> <td>Positioning identifier</td> <td>Da.1 to Da.5</td> </tr> <tr> <td>839</td> <td>939</td> <td>1039</td> <td>1139</td> <td>M code</td> <td>Da.10</td> </tr> <tr> <td>840</td> <td>940</td> <td>1040</td> <td>1140</td> <td>Dwell time</td> <td>Da.9</td> </tr> <tr> <td>841</td> <td>941</td> <td>1041</td> <td>1141</td> <td>Open</td> <td>—</td> </tr> <tr> <td>842</td> <td>942</td> <td>1042</td> <td>1142</td> <td rowspan="2">Command speed</td> <td rowspan="2">Da.8</td> </tr> <tr> <td>843</td> <td>943</td> <td>1043</td> <td>1143</td> </tr> <tr> <td>844</td> <td>944</td> <td>1044</td> <td>1144</td> <td rowspan="2">Positioning address</td> <td rowspan="2">Da.6</td> </tr> <tr> <td>845</td> <td>945</td> <td>1045</td> <td>1145</td> </tr> <tr> <td>846</td> <td>946</td> <td>1046</td> <td>1146</td> <td rowspan="2">Arc address</td> <td rowspan="2">Da.7</td> </tr> <tr> <td>847</td> <td>947</td> <td>1047</td> <td>1147</td> </tr> </tbody> </table> | | Stored address (Monitor value) | | | | Stored item | Reference | Axis1 | Axis2 | Axis3 | Axis4 | 838 | 938 | 1038 | 1138 | Positioning identifier | Da.1 to Da.5 | 839 | 939 | 1039 | 1139 | M code | Da.10 | 840 | 940 | 1040 | 1140 | Dwell time | Da.9 | 841 | 941 | 1041 | 1141 | Open | — | 842 | 942 | 1042 | 1142 | Command speed | Da.8 | 843 | 943 | 1043 | 1143 | 844 | 944 | 1044 | 1144 | Positioning address | Da.6 | 845 | 945 | 1045 | 1145 | 846 | 946 | 1046 | 1146 | Arc address | Da.7 | 847 | 947 | 1047 | 1147 | 0 | 838 to 847 | 938 to 947 | 1038 to 1047 | 1138 to 1147 |
| Stored address (Monitor value) | | | | Stored item | Reference | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Axis1 | Axis2 | Axis3 | Axis4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 838 | 938 | 1038 | 1138 | Positioning identifier | Da.1 to Da.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 839 | 939 | 1039 | 1139 | M code | Da.10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 840 | 940 | 1040 | 1140 | Dwell time | Da.9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 841 | 941 | 1041 | 1141 | Open | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 842 | 942 | 1042 | 1142 | Command speed | Da.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 843 | 943 | 1043 | 1143 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 844 | 944 | 1044 | 1144 | Positioning address | Da.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 845 | 945 | 1045 | 1145 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 846 | 946 | 1046 | 1146 | Arc address | Da.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 847 | 947 | 1047 | 1147 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Storage item | Storage details | | | | | | | | |
|--|--|---|-------------|--|------------------------------|---------------------------|------------------------------|---------------------------|----------------------------------|
| <p>Md.48 Deceleration start flag *</p> | <ul style="list-style-type: none"> "1" is stored when the constant speed status or acceleration status switches to the deceleration status during position control whose operation pattern is "Positioning complete". "0" is stored at the next operation start or manual pulse generator operation enable. <p>POINT</p> <p>This parameter is possible to monitor when " Cd.41 Deceleration start flag valid " is valid.</p> | | | | | | | | |
| <p>Md.100 OPR re-travel value</p> | <ul style="list-style-type: none"> This area stores the travel distance during the OPR travel to the zero point that was executed last time. <p>For setting units Example) mm (Buffer memory × 0.1) μm</p> | | | | | | | | |
| <p>Md.101 Real current value</p> | <ul style="list-style-type: none"> This area stores the present value (feed present value – deviation counter droop pulses). Update timing: 3.5ms <p>Example) mm (Buffer memory × 0.1) μm</p> | | | | | | | | |
| <p>Md.102 Deviation counter value</p> | <ul style="list-style-type: none"> This area stores the difference between the feed present and the actual present value. <p>(Buffer memory details) PLS</p> <ul style="list-style-type: none"> Update timing: 3.5ms | | | | | | | | |
| <p>Md.103 Motor rotation speed</p> | <ul style="list-style-type: none"> This area stores the present rotation speed of the servomotor. <p>(Buffer memory × 0.1) rpm</p> <ul style="list-style-type: none"> Update timing: 3.5ms | | | | | | | | |
| <p>Md.104 Motor current value</p> | <ul style="list-style-type: none"> This area stores the present motor current value of the motor. <p>(Buffer memory × 0.1) %</p> <ul style="list-style-type: none"> Update timing: 3.5ms | | | | | | | | |
| <p>Md.105 Servo parameter</p> | <ul style="list-style-type: none"> This area stores the parameter currently used by the servo amplifier. | <table border="1"> <tr> <td>Auto tuning</td> </tr> <tr> <td>Load inertia ratio (Buffer memory details × 0.1)</td> </tr> <tr> <td>Position loop gain 1 [rad/s]</td> </tr> <tr> <td>Speed loop gain 1 [rad/s]</td> </tr> <tr> <td>Position loop gain 2 [rad/s]</td> </tr> <tr> <td>Speed loop gain 2 [rad/s]</td> </tr> <tr> <td>Speed integral compensation [ms]</td> </tr> </table> | Auto tuning | Load inertia ratio (Buffer memory details × 0.1) | Position loop gain 1 [rad/s] | Speed loop gain 1 [rad/s] | Position loop gain 2 [rad/s] | Speed loop gain 2 [rad/s] | Speed integral compensation [ms] |
| Auto tuning | | | | | | | | | |
| Load inertia ratio (Buffer memory details × 0.1) | | | | | | | | | |
| Position loop gain 1 [rad/s] | | | | | | | | | |
| Speed loop gain 1 [rad/s] | | | | | | | | | |
| Position loop gain 2 [rad/s] | | | | | | | | | |
| Speed loop gain 2 [rad/s] | | | | | | | | | |
| Speed integral compensation [ms] | | | | | | | | | |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | |
|---|---------------|-------------------------------|--------------|--------------|--------|------|-----|--------|------|-----|---|------|---|-----|---|------|----|-----|-------|------------|------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>● Storage value 0: Status other than below 1: Status from deceleration start to next operation start or manual pulse generator operation enable</p> | 0 | 899 | 999 | 1099 | 1199 | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal display.</p>  <p>Low-order buffer memory Example) 800 b15 b12 b8 b4 b0 E F G H</p> <p>High-order buffer memory Example) 801 b31 b28 b24 b20 b16 A B C D</p> <p>◇ Sorting (High-order buffer memory) (Low-order buffer memory) A B C D E F G H</p> <p>◇ Converted from hexadecimal to decimal Decimal integer value R</p> <p>◇ Unit conversion $R \times 10^n$</p> <p>Actual value [Md.100] OPR re-travel value [Md.101] Real current value [Md.102] Divation counter value [Md.103] Motor rotation speed</p> <p>● Unit conversion table ([Md.100][Md.101])</p> <table border="1"> <tr><th>n</th><th>Unit</th></tr> <tr><td>-1</td><td>μm</td></tr> <tr><td>-5</td><td>inch</td></tr> <tr><td>-5</td><td>degree</td></tr> <tr><td>0</td><td>PLS</td></tr> </table> <p>● Unit conversion table ([Md.102])</p> <table border="1"> <tr><th>n</th><th>Unit</th></tr> <tr><td>0</td><td>PLS</td></tr> </table> <p>● Unit conversion table ([Md.103])</p> <table border="1"> <tr><th>n</th><th>Unit</th></tr> <tr><td>-1</td><td>rpm</td></tr> </table> | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | n | Unit | 0 | PLS | n | Unit | -1 | rpm | 0000H | 848 849 | 948 949 | 1048 1049 | 1148 1149 |
| | n | Unit | | | | | | | | | | | | | | | | | | | | | |
| | -1 | μm | | | | | | | | | | | | | | | | | | | | | |
| | -5 | inch | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | |
| -1 | rpm | | | | | | | | | | | | | | | | | | | | | | |
| 0000H | 850 851 | 950 951 | 1050 1051 | 1150 1151 | | | | | | | | | | | | | | | | | | | |
| 0000H | 852 853 | 952 953 | 1052 1053 | 1152 1153 | | | | | | | | | | | | | | | | | | | |
| 0000H | 854 855 | 954 955 | 1054 1055 | 1154 1155 | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a hexadecimal display.</p>  <p>Decimal integer value R</p> <p>◇ Converted from hexadecimal to decimal</p> <p>◇ Unit conversion $R \times 10^n$</p> <p>Actual value [Md.104] Motor current value</p> <p>● Unit conversion table ([Md.104])</p> <table border="1"> <tr><th>n</th><th>Unit</th></tr> <tr><td>-1</td><td>%</td></tr> </table> | n | Unit | -1 | % | 0 | 856 | 956 | 1056 | 1156 | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | |
| -1 | % | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>Monitor value</p> <p>← Servo parameter</p> | 0 | 857 | 957 | 1057 | 1157 | | | | | | | | | | | | | | | | | | |
| | | 858 | 958 | 1058 | 1158 | | | | | | | | | | | | | | | | | | |
| | | 859 | 959 | 1059 | 1159 | | | | | | | | | | | | | | | | | | |
| | | 860 | 960 | 1060 | 1160 | | | | | | | | | | | | | | | | | | |
| | | 861 | 961 | 1061 | 1161 | | | | | | | | | | | | | | | | | | |
| | | 862 | 962 | 1062 | 1162 | | | | | | | | | | | | | | | | | | |
| | | 863 | 963 | 1063 | 1163 | | | | | | | | | | | | | | | | | | |

*: Usable with the module whose first six digits of SERIAL No. are 050224" or later.

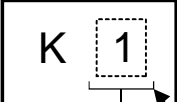



| Storage item | Storage details | | | | | | | | | |
|-------------------------------------|---|--|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|----------|----------|--|
| Md.106 Servo amplifier Software No. | <ul style="list-style-type: none"> This area stores the Software No. of the servo amplifier used. | | | | | | | | | |
| Md.107 Parameter error No. | <ul style="list-style-type: none"> When a servo parameter error occurs, the bit that corresponds to the parameter number affected by the error comes ON. | <table border="1"> <tr><td>Parameter error (No.1 to 15)</td></tr> <tr><td>Parameter error (No.16 to 31)</td></tr> <tr><td>Parameter error (No.32 to 47)</td></tr> <tr><td>Parameter error (No.48 to 63)</td></tr> <tr><td>Parameter error (No.64 to 75)</td></tr> <tr><td>Not used</td></tr> <tr><td>Not used</td></tr> </table> | Parameter error (No.1 to 15) | Parameter error (No.16 to 31) | Parameter error (No.32 to 47) | Parameter error (No.48 to 63) | Parameter error (No.64 to 75) | Not used | Not used | |
| Parameter error (No.1 to 15) | | | | | | | | | | |
| Parameter error (No.16 to 31) | | | | | | | | | | |
| Parameter error (No.32 to 47) | | | | | | | | | | |
| Parameter error (No.48 to 63) | | | | | | | | | | |
| Parameter error (No.64 to 75) | | | | | | | | | | |
| Not used | | | | | | | | | | |
| Not used | | | | | | | | | | |
| Md.108 Servo status | <ul style="list-style-type: none"> This area stores the servo status. READY ON Indicates the ready ON/OFF. Servo ON Indicates the servo ON/OFF. Zero point pass Turns ON if the zero point of the encoder has been passed even once. In-position The dwell pulse turns ON within the servo parameter "in-position." Zero speed Turns ON when the motor speed is lower than the servo parameter "zero speed." Torque limit Turns ON when the servo amplifier is having the torque restricted. Servo alarm Turn ON during the servo alarm. Servo warning Turn ON during the servo warning. | | | | | | | | | |
| Md.109 Regenerative load ratio | <ul style="list-style-type: none"> The rate of regenerative power to the allowable regenerative power is indicated as a percentage. When the regenerative option is used, the rate to the allowable regenerative power of the option is indicated. (Buffer memory) % Update timing: 1 s | | | | | | | | | |
| Md.110 Effective load torque | <ul style="list-style-type: none"> The continuous effective load torque is indicated. The average value of the load rates for the past 15 seconds to the rated torque is stored as a percentage, rated torque being 100%. (Buffer memory) % Update timing: 1s | | | | | | | | | |
| Md.111 Peak torque ratio | <ul style="list-style-type: none"> The maximum torque is indicated. (Holding value) The peak values for the past 15 seconds are indicated, rated torque being 100%. (Buffer memory) % Update timing: 1s | | | | | | | | | |

| Reading the monitor value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------------|-------------------------------|---------------|---------------|--------------|--------------|------|-----|--|-----|------|-----|--|-----|------|-----|--|-----|------|-----|--|-----|------|-----|--|-----|------|-----------|--|------------|------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value</p>  <p>The monitor value is character code (JIS 8 unit code).</p> <p>Example) B20W200-A4</p> <table border="1"> <thead> <tr> <th>Software No.</th> <th>Address</th> <th>Monitor value</th> <th>Storing value</th> </tr> </thead> <tbody> <tr> <td></td> <td>864</td> <td>3242</td> <td>2 B</td> </tr> <tr> <td></td> <td>865</td> <td>5730</td> <td>W 0</td> </tr> <tr> <td></td> <td>866</td> <td>3032</td> <td>0 2</td> </tr> <tr> <td></td> <td>867</td> <td>2D32</td> <td>- 0</td> </tr> <tr> <td></td> <td>868</td> <td>3441</td> <td>4 A</td> </tr> <tr> <td></td> <td>869</td> <td>0020</td> <td>NUL SPACE</td> </tr> </tbody> </table> | Software No. | Address | Monitor value | Storing value | | 864 | 3242 | 2 B | | 865 | 5730 | W 0 | | 866 | 3032 | 0 2 | | 867 | 2D32 | - 0 | | 868 | 3441 | 4 A | | 869 | 0020 | NUL SPACE | | 864 to 869 | 964 to 969 | 1064 to 1069 | 1164 to 1169 |
| Software No. | Address | Monitor value | Storing value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 864 | 3242 | 2 B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 865 | 5730 | W 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 866 | 3032 | 0 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 867 | 2D32 | - 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 868 | 3441 | 4 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 869 | 0020 | NUL SPACE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> | | | 870 to 876 | 970 to 976 | 1070 to 1076 | 1170 to 1176 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p>  <p>POINT</p> <p>When the servo forced stop occurs, the "b13: servo alarm" and the "b14: servo warning" is turned ON. When the servo forced stop is reset, the "b13: servo alarm" and the "b14: servo warning" is turned OFF.</p> | 0 | 877 | 977 | 1077 | 1177 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value</p>  <p>Regenerative load ratio</p> | 0 | 878 | 978 | 1078 | 1178 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value</p>  <p>Effective load torque</p> | 0 | 879 | 979 | 1079 | 1179 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Monitoring is carried out with a decimal display.</p> <p>Monitor value</p>  <p>Peek torque ratio</p> | 0 | 880 | 980 | 1080 | 1180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

5.7 List of control data

5.7.1 System control data

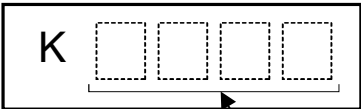
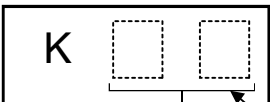
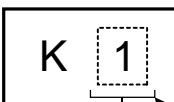

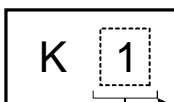
| Setting item | Setting details | | | |
|---|---|---|---------------------------------|-------------------------------------|
| <p>Cd.1 Flash ROM write request</p> | <ul style="list-style-type: none"> Requests writing of data (parameters, positioning data, and block start data) from the buffer memory to the flash ROM. <p>POINT</p> <p>(1) Do not turn the power OFF or reset the PLC CPU while writing to the flash ROM. If the power is turned OFF or the PLC CPU is reset to forcibly end the process, the data backed up in the flash ROM will be lost.</p> <p>(2) Do not write the data to the buffer memory before writing to the flash ROM is completed.</p> <p>(3) The number of writes to the flash ROM with the PLC program is 25 max. while the power is turned ON. Writing to the flash ROM beyond 25 times will cause an error (error code: 805). Refer to Section 15.2 "List of errors" for details.</p> <p>(4) Monitoring is the number of writes to the flash ROM by the " Md.19 No. of write accesses to flash ROM".</p> | | | |
| <p>Cd.2 Parameter initialization request</p> | <ul style="list-style-type: none"> Requests initialization of setting data. <p>Initialization: Resetting of setting data to default values</p> <p>Note: After completing the initialization of setting data, reset the PLC CPU or reboot the PLC power.</p> <p>Initialized setting data</p> <table border="1"> <tr> <td>Parameters (Pr.1 to Pr.57 , Pr.100 to Pr.161, Pr.200, Pr.201)</td> </tr> <tr> <td>Positioning data (No. 1 to 600)</td> </tr> <tr> <td>Block start data (No. 7000 to 7004)</td> </tr> </table> | Parameters (Pr.1 to Pr.57 , Pr.100 to Pr.161 , Pr.200 , Pr.201) | Positioning data (No. 1 to 600) | Block start data (No. 7000 to 7004) |
| Parameters (Pr.1 to Pr.57 , Pr.100 to Pr.161 , Pr.200 , Pr.201) | | | | |
| Positioning data (No. 1 to 600) | | | | |
| Block start data (No. 7000 to 7004) | | | | |
| <p>Cd.41 Deceleration start flag valid *</p> | <ul style="list-style-type: none"> Set whether " Md.48 Deceleration start flag" is made valid or invalid. <p>POINT</p> <p>The " Cd.41 Deceleration start flag valid" become valid when the PLC READY signal [Y0] turns from OFF to ON.</p> | | | |
| <p>Cd.42 Stop command processing for deceleration stop selection *</p> | <ul style="list-style-type: none"> Set the stop command processing for deceleration stop function (deceleration curve re-processing/deceleration curve continuation). | | | |

| | Setting value | Default value | Storage buffer memory address (common to axes 1 to 4) |
|--|---|---------------|---|
| | <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Flash ROM write request 1: Requests write access to flash ROM.</p> <p>The QD75 resets the value to "0" automatically when the write access completes. (This indicates the completion of write operation.)</p> | 0 | 1900 |
| | <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Parameter initialization request 1: Requests parameter initialization.</p> <p>The QD75 resets the value to "0" automatically when the initialization completes. (This indicates the completion of parameter initialization.)</p> | 0 | 1901 |
| | <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Deceleration start flag valid 0: Deceleration start flag invalid 1: Deceleration start flag valid</p> | 0 | 1905 |
| | <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Stop command processing for deceleration stop selection 0: Deceleration curve re-processing 1: Deceleration curve continuation</p> | 0 | 1907 |


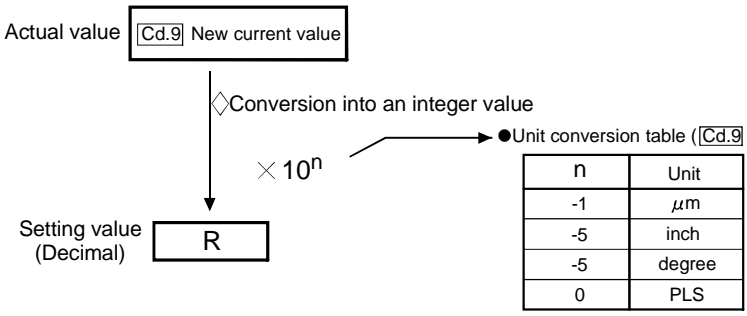
*: Usable with the module whose first six digits of SERIAL No. are 050224" or later.

5.7.2 Axis control data

| Setting item | Setting details | |
|--|--|--|
| <p>Cd.3 Positioning start No.</p> | <ul style="list-style-type: none"> • Set the positioning start No. (Only 1 to 600 for the Pre-reading start function. For details, refer to Section 12.7.8 "Pre-reading start function".) | |
| <p>Cd.4 Positioning starting point No.</p> | <ul style="list-style-type: none"> • Set a " starting point No." (1 to 50) if block start data is used for positioning. (Handled as "1" if the value of other than 1 to 50 is set.) | |
| <p>Cd.5 Axis error reset</p> | <ul style="list-style-type: none"> • Clears the axis error detection, axis error No., axis warning detection and axis warning No. • When the QD75 axis operation state is "in error occurrence", the error is cleared and the QD75 is returned to the "waiting" state. | |
| <p>Cd.6 Restart command</p> | <ul style="list-style-type: none"> • When positioning is stopped for any reason (when axis operation state is "stopped"), set "1" in Cd.6 . Positioning will be carried out again from the stopped position to the end point of the stopped positioning data. | |
| <p>Cd.7 M code OFF request</p> | <ul style="list-style-type: none"> • The M code ON signal turns OFF. | |

| Setting value | Default value | Storage buffer memory address | | | |
|--|---------------|-------------------------------|--------|--------|--------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Positioning data No. <ul style="list-style-type: none"> • 1 to 600 : Positioning data No. • 7000 to 7004 : Block start designation • 9001 : Machine OPR • 9002 : Fast-OPR • 9003 : Current value changing • 9004 : Simultaneous starting of multiple axes | 0 | 1500 | 1600 | 1700 | 1800 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Positioning starting point No. 1 to 50 <p>The value is set to "0" by the QD75 automatically when the continuous operation is interrupted.</p> | 0 | 1501 | 1601 | 1701 | 1801 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Error reset request 1: Axis error is reset. <p>After the axis error reset is completed, "0" is stored by the QD75 automatically. (Indicates that the axis error reset is completed.)</p> | 0 | 1502 | 1602 | 1702 | 1802 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Restart command 1: Restarts <p>After restart acceptance is completed, "0" is stored by the QD75 automatically. (Indicates that the restart acceptance is completed.)</p> | 0 | 1503 | 1603 | 1703 | 1803 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● M code OFF request 1: M code ON signal turns OFF <p>After the M code ON signal turns OFF, "0" is stored by the QD75 automatically. (Indicates that the OFF request is completed.)</p> | 0 | 1504 | 1604 | 1704 | 1804 |

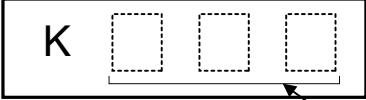
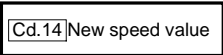
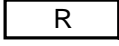
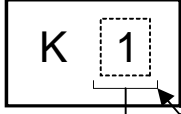
| Setting item | Setting details | | | | | | | | | | |
|---|--|----------------------------------|--|----------------------------------|--------------------------------------|--------------|---------------|----------------------------------|----------------------------------|---------------|----------------------------------|
| <p>Cd.8 External command valid</p> | <ul style="list-style-type: none"> Validates or in validates external command signals. | | | | | | | | | | |
| <p>Cd.9 New current value</p> | <ul style="list-style-type: none"> When changing the "current feed value" using the start No. "9003", use this data item to specify a new feed value. Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-1} \mu\text{m}$)</th> <th>inch ($\times 10^{-5}$ inch)</th> <th>degree ($\times 10^{-5}$ degree)</th> <th>PLS (PLS)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>-2147483648 to +2147483647</td> <td>-2147483648 to +2147483647</td> <td>0 to 35999999</td> <td>-2147483648 to +2147483647</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5}$ inch) | degree ($\times 10^{-5}$ degree) | PLS (PLS) | Setting range | -2147483648 to +2147483647 | -2147483648 to +2147483647 | 0 to 35999999 | -2147483648 to +2147483647 |
| Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5}$ inch) | degree ($\times 10^{-5}$ degree) | PLS (PLS) | | | | | | | |
| Setting range | -2147483648 to +2147483647 | -2147483648 to +2147483647 | 0 to 35999999 | -2147483648 to +2147483647 | | | | | | | |

| | Setting value | Default value | Storage buffer memory address | | | | | | | | | | | | |
|---|---------------|---------------|-------------------------------|--------|--------|--------|----|--------|---|-----|---|--------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  <p>● External command valid 0: Invalidates an external command. 1: Validates an external command.</p> | 0 | 1505 | 1605 | 1705 | 1805 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value</p>  <p>◇ Conversion into an integer value</p> <p>× 10ⁿ</p> <p>● Unit conversion table ([Cd.9])</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> <p>Setting value (Decimal)</p> <p>R</p> | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | 0 | 1506 1507 | 1606 1607 | 1706 1707 | 1806 1807 |
| n | Unit | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | |

| Setting item | Setting details | | | |
|--|---|--|-------------------|--|
| <p>Cd.10 New acceleration time value</p> | <ul style="list-style-type: none"> • When changing the acceleration time during a speed change, use this data item to specify a new acceleration time. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Cd.10 setting range (unit)</td> </tr> <tr> <td style="text-align: center;">0 to 8388608 (ms)</td> </tr> </table> | Cd.10 setting range (unit) | 0 to 8388608 (ms) | |
| Cd.10 setting range (unit) | | | | |
| 0 to 8388608 (ms) | | | | |
| <p>Cd.11 New deceleration time value</p> | <ul style="list-style-type: none"> • When changing the deceleration time during a speed change, use this data item to specify a new deceleration time. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Cd.11 setting range (unit)</td> </tr> <tr> <td style="text-align: center;">0 to 8388608 (ms)</td> </tr> </table> | Cd.11 setting range (unit) | 0 to 8388608 (ms) | |
| Cd.11 setting range (unit) | | | | |
| 0 to 8388608 (ms) | | | | |
| <p>Cd.12 Acceleration/deceleration time change during speed change, enable/disable selection</p> | <ul style="list-style-type: none"> • Enables or disables modifications to the acceleration/deceleration time during a speed change. | | | |

| Setting value | Default value | Storage buffer memory address | | | |
|--|---------------|-------------------------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <p>■ Set with a decimal.</p> <p>Setting value Cd.10 New acceleration time value Cd.11 New deceleration time value</p> | 0 | 1508 1509 | 1608 1609 | 1708 1709 | 1808 1809 |
| <p>Example: When the "Cd. 10 New acceleration time value" is set as "60000 ms", the buffer memory stores "60000".</p> | 0 | 1510 1511 | 1610 1611 | 1710 1711 | 1810 1811 |
| <p>■ Set with a decimal.</p> <p>Setting value K </p> <ul style="list-style-type: none"> ● Acceleration/deceleration time change during speed change, enable/disable selection 1 : Enables modifications to acceleration/deceleration time Other than 1: Disables modifications to acceleration/deceleration time | 0 | 1512 | 1612 | 1712 | 1812 |

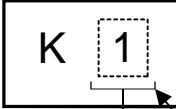
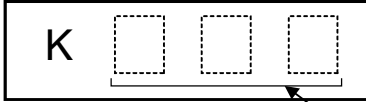

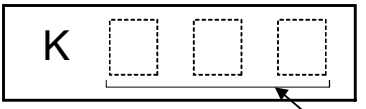
| Setting item | Setting details | | | | | | | | | | |
|--|--|--------------------------------------|--|--------------------------------------|--|----------------|---------------|--------------------|--------------------|--------------------|---------------|
| <p>Cd.13 Positioning operation speed override</p> | <ul style="list-style-type: none"> To use the positioning operation speed override function, use this data item to specify an "override" value. * For details of the override function, refer to Section 12.5.2 "Override function". <p>If the speed resulting from a small override value (e.g. 1%) includes fractions below the minimum unit, the speed is raised to make a complete unit and the warning No. 110 is output.</p> | | | | | | | | | | |
| <p>Cd.14 New speed value</p> | <ul style="list-style-type: none"> When changing the speed, use this data item to specify a new speed. The operation halts if you specify "0". Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-2}$ mm/min)</th> <th>inch ($\times 10^{-3}$ inch/min)</th> <th>degree ($\times 10^{-3}$ degree/min)</th> <th>PLS (PLS/s)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 10000000</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-2}$ mm/min) | inch ($\times 10^{-3}$ inch/min) | degree ($\times 10^{-3}$ degree/min) | PLS (PLS/s) | Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 |
| Pr.1 | mm ($\times 10^{-2}$ mm/min) | inch ($\times 10^{-3}$ inch/min) | degree ($\times 10^{-3}$ degree/min) | PLS (PLS/s) | | | | | | | |
| Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 | | | | | | | |
| <p>Cd.15 Speed change request</p> | <ul style="list-style-type: none"> After setting the "Cd.14 New speed value", set this data item to "1" to execute the speed change (through validating the new speed value). | | | | | | | | | | |

| Setting value | Default value | Storage buffer memory address | | | | | | | | | | | | | |
|--|---------------|-------------------------------|--------|--------|--------|----------|----|------------|---|-------|---|--------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Override value (%) 1 to 300</p> | 100 | 1513 | 1613 | 1713 | 1813 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value </p> <p>◇ Conversion into an integer value $\times 10^n$</p> <p>● Unit conversion table (Cd.14)</p> <table border="1"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> <p>Setting value (Decimal) </p> <p>Example: When the "Cd. 14" New speed value" is set as "20000.00mm/min", the buffer memory stores "2000000".</p> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0 | 1514 1515 | 1614 1615 | 1714 1715 | 1814 1815 |
| n | Unit | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Speed change request 1: Executes speed change.</p> <p>The QD75 resets the value to "0" automatically when the speed change request has been processed. (This indicates the completion of speed change request.)</p> | 0 | 1516 | 1616 | 1716 | 1816 | | | | | | | | | | |

| Setting item | Setting details | | | | | | | | | | |
|--|---|--|--|--|--|----------------|---------------|-----------------|-----------------|-----------------|---------------|
| <p>Cd.16 Inching movement amount</p> | <ul style="list-style-type: none"> • Use this data item to set the amount of movement by inching. • The machine performs a JOG operation if "0" is set. • Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-1} \mu\text{m}$)</th> <th>inch ($\times 10^{-5} \text{inch}$)</th> <th>degree ($\times 10^{-5} \text{degree}$)</th> <th>PLS (PLS)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 65535</td> <td>0 to 65535</td> <td>0 to 65535</td> <td>0 to 65535</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | Setting range | 0 to 65535 | 0 to 65535 | 0 to 65535 | 0 to 65535 |
| Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | | | | | | | |
| Setting range | 0 to 65535 | 0 to 65535 | 0 to 65535 | 0 to 65535 | | | | | | | |
| <p>Cd.17 JOG speed</p> | <ul style="list-style-type: none"> • Use this data item to set the JOG speed. • Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-2} \text{mm/min}$)</th> <th>inch ($\times 10^{-3} \text{inch/min}$)</th> <th>degree ($\times 10^{-3} \text{degree/min}$)</th> <th>PLS (PLS/s)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 10000000</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 |
| Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | | | | | | | |
| Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 | | | | | | | |
| <p>Cd.18 Interruption request during continuous operation</p> | <ul style="list-style-type: none"> • To interrupt a continuous operation, set "1" to this data item. • After processing the interruption request ("1"), the QD75 automatically resets the value to "0". | | | | | | | | | | |

| Setting value | Default value | Storage buffer memory address | | | | | | | | | | | | | |
|---|---------------|-------------------------------|--------|--------|--------|----------|----|------------|---|-------|---|--------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value Cd.16 Inching movement amount</p> <p style="text-align: center;">↓ Conversion into an integer value</p> <p>Setting value (Decimal) R</p> <p style="text-align: center;">× 10ⁿ</p> <p>● Unit conversion table (Cd.16)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> <p style="border: 1px dashed black; padding: 5px; margin-top: 10px;">Example: When the "Cd. 16" Inching movement amount" is set as "1.0 μm", the buffer memory stores "10".</p> | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | 0 | 1517 | 1617 | 1717 | 1817 |
| n | Unit | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value Cd.17 JOG speed</p> <p style="text-align: center;">↓ Conversion into an integer value</p> <p>Setting value (Decimal) R</p> <p style="text-align: center;">× 10ⁿ</p> <p>● Unit conversion table (Cd.17)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> <p style="border: 1px dashed black; padding: 5px; margin-top: 10px;">Example: When the "Cd. 17" JOG speed" is set as "20000.00mm/min", the buffer memory stores "2000000".</p> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0 | 1518 1519 | 1618 1619 | 1718 1719 | 1818 1819 |
| n | Unit | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value K 1</p> <p>● Interruption request continuous operation 1: Interrupts continuous operation control or continuous path control.</p> <p style="margin-top: 10px;">The QD75 resets the value to "0" automatically when the continuous control interruption request is processed. (This indicates the completion of continuous operation interruption request.)</p> | 0 | 1520 | 1620 | 1720 | 1820 | | | | | | | | | | |


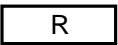
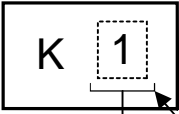
| Setting item | Setting details | |
|--|--|--|
| <p>Cd.19 OPR request flag OFF request</p> | <ul style="list-style-type: none"> • The PLC program can use this data item to forcibly turn the OPR request flag from ON to OFF. | |
| <p>Cd.20 Manual pulse generator 1 pulse input magnification</p> | <ul style="list-style-type: none"> • This data item determines the factor by which the number of pulses from the manual pulse generator is magnified. • Value "0" : read as "1". • Value "101" or less: read as "100". | |
| <p>Cd.21 Manual pulse generator enable flag</p> | <ul style="list-style-type: none"> • This data item enables or disables operations using a manual pulse generator. | |
| <p>Cd.22 New torque value</p> | <ul style="list-style-type: none"> • When changing the " Md.35 Torque limit stored value", use this data item to specify a new torque limit stored value. • Set a value within the allowable range of the " Pr.17 Torque limit setting value". | |

| Setting value | Default value | Storage buffer memory address | | | |
|---|---------------|-------------------------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● OPR request flag OFF request 1: Turns the "OPR request flag" from ON to OFF.</p> <p>The QD75 resets the value to "0" automatically when the OPR request flag is turned OFF. (This indicates the completion of OPR request flag OFF request.)</p> | 0 | 1521 | 1621 | 1721 | 1821 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Manul pulse generator 1 pulse input magnification 1 to 100</p> | 1 | 1522 1523 | 1622 1623 | 1722 1723 | 1822 1823 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Manual pulse generator enable flag 0: Disable manual pulse generator operation. 1: Enable manual pulse generator operation.</p> | 0 | 1524 | 1624 | 1724 | 1824 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <p>● Torque change value 1 to <u>Pr.17</u> Torque limit setting value</p> | 0 | 1525 | 1625 | 1725 | 1825 |

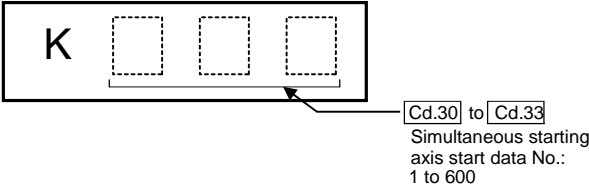
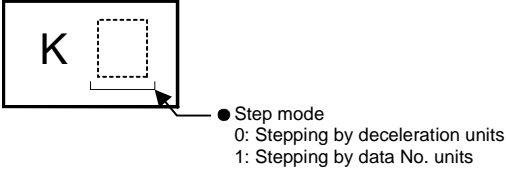
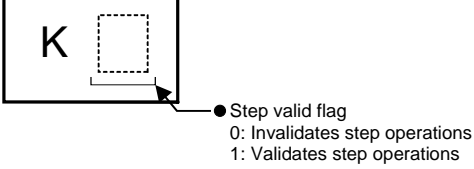
| Setting item | Setting details | | | | | | | | | | |
|--|---|--|--|--|--|----------------|---------------|--------------------|--------------------|--------------------|--------------------|
| <p>Cd.23 Speed-position switching control movement amount change register</p> | <ul style="list-style-type: none"> • During the speed control stage of the speed-position switching control (INC mode), it is possible to change the specification of the movement amount during the position control stage. For that, use this data item to specify a new movement amount. • The new movement amount has to be set during the speed control stage of the speed-position switching control (INC mode). • The value is reset to "0" when the next operation starts. • Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-1} \mu\text{m}$)</th> <th>inch ($\times 10^{-5} \text{inch}$)</th> <th>degree ($\times 10^{-5} \text{degree}$)</th> <th>PLS (PLS)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 2147483647</td> <td>0 to 2147483647</td> <td>0 to 2147483647</td> <td>0 to 2147483647</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | Setting range | 0 to 2147483647 | 0 to 2147483647 | 0 to 2147483647 | 0 to 2147483647 |
| Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | | | | | | | |
| Setting range | 0 to 2147483647 | 0 to 2147483647 | 0 to 2147483647 | 0 to 2147483647 | | | | | | | |
| <p>Cd.24 Speed-position switching enable flag</p> | <ul style="list-style-type: none"> • Set whether the external control signal (external command signal [CHG]: "speed-position, position-speed switching request" is selected) is enabled or not. | | | | | | | | | | |
| <p>Cd.25 Position-speed switching control speed change register</p> | <ul style="list-style-type: none"> • During the position control stage of the position-speed switching control, it is possible to change the specification of the speed during the speed control stage. For that, use this data item to specify a new speed. • The new speed has to be set during the position control stage of the position-speed switching control. • The value is reset to "0" when the next operation starts. • Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-2} \text{mm/min}$)</th> <th>inch ($\times 10^{-3} \text{inch/min}$)</th> <th>degree ($\times 10^{-3} \text{degree/min}$)</th> <th>PLS (PLS/s)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 2000000000</td> <td>0 to 10000000</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 |
| Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | | | | | | | |
| Setting range | 0 to 2000000000 | 0 to 2000000000 | 0 to 2000000000 | 0 to 10000000 | | | | | | | |

| Setting value | Default value | Storage buffer memory address | | | | | | | | | | | | | |
|--|---------------|-------------------------------|--------|--------|--------|----------|----|------------|---|-------|---|--------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value Cd.23 Speed-position switching control movement amount change register</p> <p style="text-align: center;">⇩ Conversion into an integer value</p> <p style="text-align: center;">$\times 10^n$</p> <p>Setting value (Decimal) R</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>● Unit conversion table (Cd.23)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>μm</td> </tr> <tr> <td>-5</td> <td>inch</td> </tr> <tr> <td>-5</td> <td>degree</td> </tr> <tr> <td>0</td> <td>PLS</td> </tr> </tbody> </table> </div> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Example: If "Cd. 23 Speed-position switching control movement amount change register" is set as "20000.0 μm", the buffer memory stores "200000".</p> </div> | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | 0 | 1526 1527 | 1626 1627 | 1726 1727 | 1826 1827 |
| n | Unit | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value K </p> <p>● Speed-position switching enable flag</p> <p>0: Speed control will not be taken over by position control even when the external command signal comes ON.</p> <p>1: Speed control will be taken over by position control when the external command signal comes ON.</p> | 0 | 1528 | 1628 | 1728 | 1828 | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value Cd.25 Position-speed switching control speed change register</p> <p style="text-align: center;">⇩ Conversion into an integer value</p> <p style="text-align: center;">$\times 10^n$</p> <p>Setting value (Decimal) R</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>● Unit conversion table (Cd.25)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>n</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>-2</td> <td>mm/min</td> </tr> <tr> <td>-3</td> <td>inch/min</td> </tr> <tr> <td>-3</td> <td>degree/min</td> </tr> <tr> <td>0</td> <td>PLS/s</td> </tr> </tbody> </table> </div> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>Example: If "Cd. 25 Position-speed switching control speed change register" is set as "2000.00 mm/min", the buffer memory stores "200000".</p> </div> | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0 | 1530 1531 | 1630 1631 | 1730 1731 | 1830 1831 |
| n | Unit | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | |

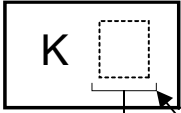
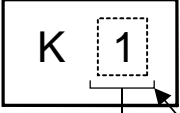
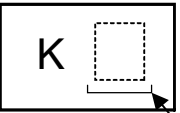
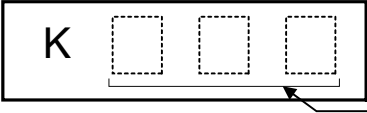
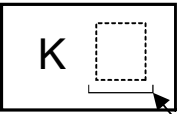
| Setting item | Setting details | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|----------------|---------------|----------------------------------|----------------------------------|-------------------|----------------------------------|-----|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <p>Cd.26 Position-speed switching control enable flag</p> | <ul style="list-style-type: none"> Set whether the external control signal (external command signal [CHG]: "speed-position, position-speed switching request" is selected) is enabled or not. | | | | | | | | | | | | | | | |
| <p>Cd.27 Target position change value (New address)</p> | <ul style="list-style-type: none"> When changing the target position during a positioning operation, use this data item to specify a new positioning address. Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-1} \mu\text{m}$)</th> <th>inch ($\times 10^{-5} \text{inch}$)</th> <th>degree ($\times 10^{-5} \text{degree}$)</th> <th>PLS (PLS)</th> </tr> </thead> <tbody> <tr> <td>ABS</td> <td>-2147483648 to +2147483647</td> <td>-2147483648 to +2147483647</td> <td>0 to 35999999</td> <td>-2147483648 to +2147483647</td> </tr> <tr> <td>INC</td> <td>-2147483648 to +2147483647</td> <td>-2147483648 to +2147483647</td> <td>-2147483648 to +2147483647</td> <td>-2147483648 to +2147483647</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | ABS | -2147483648 to +2147483647 | -2147483648 to +2147483647 | 0 to 35999999 | -2147483648 to +2147483647 | INC | -2147483648 to +2147483647 | -2147483648 to +2147483647 | -2147483648 to +2147483647 | -2147483648 to +2147483647 |
| Pr.1 | mm ($\times 10^{-1} \mu\text{m}$) | inch ($\times 10^{-5} \text{inch}$) | degree ($\times 10^{-5} \text{degree}$) | PLS (PLS) | | | | | | | | | | | | |
| ABS | -2147483648 to +2147483647 | -2147483648 to +2147483647 | 0 to 35999999 | -2147483648 to +2147483647 | | | | | | | | | | | | |
| INC | -2147483648 to +2147483647 | -2147483648 to +2147483647 | -2147483648 to +2147483647 | -2147483648 to +2147483647 | | | | | | | | | | | | |
| <p>Cd.28 Target position change value (New speed)</p> | <ul style="list-style-type: none"> When changing the target position during a positioning operation, use this data item to specify a new speed. The speed will not change if "0" is set. Set a value within the following range: <table border="1"> <thead> <tr> <th>Pr.1</th> <th>mm ($\times 10^{-2} \text{mm/min}$)</th> <th>inch ($\times 10^{-3} \text{inch/min}$)</th> <th>degree ($\times 10^{-3} \text{degree/min}$)</th> <th>PLS (PLS/s)</th> </tr> </thead> <tbody> <tr> <td>Setting range</td> <td>0 to 200000000</td> <td>0 to 200000000</td> <td>0 to 200000000</td> <td>0 to 10000000</td> </tr> </tbody> </table> | Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | Setting range | 0 to 200000000 | 0 to 200000000 | 0 to 200000000 | 0 to 10000000 | | | | | |
| Pr.1 | mm ($\times 10^{-2} \text{mm/min}$) | inch ($\times 10^{-3} \text{inch/min}$) | degree ($\times 10^{-3} \text{degree/min}$) | PLS (PLS/s) | | | | | | | | | | | | |
| Setting range | 0 to 200000000 | 0 to 200000000 | 0 to 200000000 | 0 to 10000000 | | | | | | | | | | | | |
| <p>Cd.29 Target position change request flag</p> | <ul style="list-style-type: none"> Requests a change in the target position during a positioning operation. | | | | | | | | | | | | | | | |

| Setting value | Default value | Storage buffer memory address | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|--------|--------------------------------------|--------|------|----|----|----|------|----|--------|---|-----|---|------|----|--------|----|----------|----|------------|---|-------|---|--------------|--------------|--------------|--------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Position-speed switching enable flag 0: Position control will not be taken over by speed control even when the external command signal comes ON. 1: Position control will be taken over by speed control when the external command signal comes ON. | 0 | 1532 | 1632 | 1732 | 1832 | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Actual value <table border="1"> <tr><td>Cd. 27</td><td>Target position change value (address)</td></tr> <tr><td>Cd. 28</td><td>Target position change value (speed)</td></tr> </table></p> <p>↓ Conversion into an integer value</p> <p>Setting value (Decimal) </p> <p>$\times 10^n$</p> <ul style="list-style-type: none"> ● Unit conversion table (Cd.27) <table border="1"> <thead> <tr><th>n</th><th>Unit</th></tr> </thead> <tbody> <tr><td>-1</td><td>μm</td></tr> <tr><td>-5</td><td>inch</td></tr> <tr><td>-5</td><td>degree</td></tr> <tr><td>0</td><td>PLS</td></tr> </tbody> </table> <p>Example: If "Cd. 28 Target position change value (speed) is set as "10000.00 mm/min", the buffer memory stores "1000000".</p> <ul style="list-style-type: none"> ● Unit conversion table (Cd.28) <table border="1"> <thead> <tr><th>n</th><th>Unit</th></tr> </thead> <tbody> <tr><td>-2</td><td>mm/min</td></tr> <tr><td>-3</td><td>inch/min</td></tr> <tr><td>-3</td><td>degree/min</td></tr> <tr><td>0</td><td>PLS/s</td></tr> </tbody> </table> | Cd. 27 | Target position change value (address) | Cd. 28 | Target position change value (speed) | n | Unit | -1 | μm | -5 | inch | -5 | degree | 0 | PLS | n | Unit | -2 | mm/min | -3 | inch/min | -3 | degree/min | 0 | PLS/s | 0 | 1534 1535 | 1634 1635 | 1734 1735 | 1834 1835 |
| Cd. 27 | Target position change value (address) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cd. 28 | Target position change value (speed) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -1 | μm | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | inch | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -5 | degree | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| n | Unit | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -2 | mm/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | inch/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -3 | degree/min | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | PLS/s | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Target position change request flag 1: Requests a change in the target position <p>The QD75 resets the value to "0" automatically when the new target position value has been written. (This indicates the completion of write operation.)</p> | 0 | 1538 | 1638 | 1738 | 1838 | | | | | | | | | | | | | | | | | | | | | | | | |


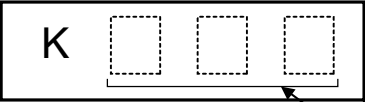

| Setting item | Setting details | | |
|---|---|--|--|
| Cd.30 Simultaneous starting axis start data No. (axis 1 start data No.) | <ul style="list-style-type: none"> • Use these data items to specify a start data No. for each axis that has to start simultaneously. • Set "0" to any axis that should not start simultaneously. | | |
| Cd.31 Simultaneous starting axis start data No. (axis 2 start data No.) | | | |
| Cd.32 Simultaneous starting axis start data No. (axis 3 start data No.) | | | |
| Cd.33 Simultaneous starting axis start data No. (axis 4 start data No.) | | | |
| Cd.34 Step mode | <ul style="list-style-type: none"> • To perform a step operation, use this data item to specify the units by which the stepping should be performed. | | |
| Cd.35 Step valid flag | <ul style="list-style-type: none"> • This data item validates or invalidates step operations. | | |

| Setting value | Default value | Storage buffer memory address | | | |
|---|---------------|-------------------------------|--------|--------|--------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| | 0 | 1540 | 1640 | 1740 | 1840 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  | 0 | 1541 | 1641 | 1741 | 1841 |
| | 0 | 1542 | 1642 | 1742 | 1842 |
| | 0 | 1543 | 1643 | 1743 | 1843 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  | 0 | 1544 | 1644 | 1744 | 1844 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  | 0 | 1545 | 1645 | 1745 | 1845 |

| Setting item | Setting details | |
|-------------------------------------|--|--|
| Cd.36 Step start information | <ul style="list-style-type: none"> • During a step operation, this data item determines whether the operation is continued or restarted. | |
| Cd.37 Skip command | <ul style="list-style-type: none"> • To skip the current positioning operation, set "1" in this data item. | |
| Cd.38 Teaching data selection | <ul style="list-style-type: none"> • This data item specifies the teaching result write destination. | |
| Cd.39 Teaching positioning data No. | <ul style="list-style-type: none"> • This data item specifies data to be produced by teaching. • If a value between 1 and 600 is set, a teaching operation is done. • The value is cleared to "0" when the QD75 is initialized, when a teaching operation completes, and when a illegal value (601 or higher) is entered. | |
| Cd.40 ABS direction in degrees | <ul style="list-style-type: none"> • This data item specifies the ABS moving direction carrying out the position control when "degree" is selected as the unit. | |

| Setting value | Default value | Storage buffer memory address | | | |
|--|---------------|-------------------------------|--------|--------|--------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Step start information <ol style="list-style-type: none"> 1: Continues step operation 2: Restarts operation <p>The QD75 resets the value to "0" automatically when processing of the step start request completes.</p> | 0 | 1546 | 1646 | 1746 | 1846 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Skip request <ol style="list-style-type: none"> 1: Issues a skip request to have the machine decelerate, stop, and then start the next positioning operation. <p>The QD75 resets the value to "0" automatically when processing of the skip request completes.</p> | 0 | 1547 | 1647 | 1747 | 1847 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Teaching data selection <ol style="list-style-type: none"> 0: Takes the current feed value as a positioning address. 1: Takes the current feed value as an arc data. | 0 | 1548 | 1648 | 1748 | 1848 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● Teaching positioning data No. <ol style="list-style-type: none"> 1 to 600 | 0 | 1549 | 1649 | 1749 | 1849 |
| <p>■ Set with a decimal.</p> <p>Setting value </p> <ul style="list-style-type: none"> ● ABS direction in degrees <ol style="list-style-type: none"> 0: Takes a shortcut. (Specified direction ignored.) 1: ABS circular right 2: ABS circular left | 0 | 1550 | 1650 | 1750 | 1850 |

| Setting item | Setting details | |
|------------------------------------|--|--|
| Cd.100 Servo OFF command | <ul style="list-style-type: none"> • Turns OFF each axis servo. <p>POINT</p> <p>When you want to turn ON the servo for two to four axes with only the servo for one axis turned OFF, write "1" to storage buffer memory address 1551 and then turn ON all axis servo ON (Y1) signal.</p> | |
| Cd.101 Torque output setting value | <ul style="list-style-type: none"> • Sets the torque output value. <p>POINT</p> <ul style="list-style-type: none"> • If the " Cd.101 Torque output setting value" is "0", the " Pr.17 Torque limit setting value" will be its value. • If a value beside "0" is set in the " Cd.101 Torque output setting value", the torque generated by the servomotor will be limited by that value. • The " Pr.17 Torque limit setting value" of the servo adjustment parameter torque output setting value becomes effective at the PLC ready signal rising edge. • The " Cd.101 Torque output setting value" (refer to the start) axis control data can be changed at all times. Therefore in the " Cd.101 Torque output setting value" is used when you must change. (Refer to Section 12.5.4 "Torque change function ".) | |
| Cd.102 Servo amplifier data read | <ul style="list-style-type: none"> • Reads a servo parameter from the servo amplifier to the buffer memory. (Load inertia ratio/Positional control gain 1, 2/Speed control gain 1, 2/Speed integration compensation) | |

| Setting value | Default value | Storage buffer memory address | | | |
|---|---------------|-------------------------------|--------|--------|--------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  <ul style="list-style-type: none"> • Servo OFF command 0: Servo ON 1: Servo OFF <p>When all axis servo ON is valid.</p> | 0 | 1551 | 1651 | 1751 | 1851 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  <ul style="list-style-type: none"> • Torque output setting 0 to 500 | 0 | 1552 | 1652 | 1752 | 1852 |
| <p>■ Set with a decimal.</p> <p>Setting value</p>  <ul style="list-style-type: none"> • Servo amplifier read request 0: Servo amplifier read complete 1: Servo amplifier read request | 0 | 1553 | 1653 | 1753 | 1853 |

Chapter 6 PLC Program Used for Positioning Control

The programs required to carry out positioning control with the QD75 are explained in this chapter.

The PLC program required for control is created allowing for the "start conditions", "start time chart", "device settings" and general control configuration. (The parameters, positioning data, block start data and condition data, etc., must be set in the QD75 according to the control to be executed, and program for setting the control data or a program for starting the various control must be created.)

The first half of this chapter explains the program configuration of general control, and the latter half explains the program details. Create the required program while referring to the various control details explained in Section 2, and to Chapter 5 "Data used for positioning control".

- 6.1 Precautions for creating program6- 2
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6.1 Precautions for creating program

The common precautions to be taken when writing data from the PLC CPU to the QD75 buffer memory are described below.

When diverting any of the program examples introduced in this manual to the actual system, fully verify that there are no problems in the controllability of the target system.

(1) Reading/writing the data

Setting the data explained in this chapter (various parameters, positioning data, block start data) should be set using GX Configurator-QP.

When set with the PLC program, many PLC programs and devices must be used. This will not only complicate the program, but will also increase the scan time.

When rewriting the positioning data during continuous path control or continuous positioning control, rewrite the data four positioning data items before the actual execution. If the positioning data is not rewritten before the positioning data four items earlier is executed, the process will be carried out as if the data was not rewritten.

(2) Restrictions to speed change execution interval

Provide an interval of 100ms or more when changing the speed with the QD75.

(3) Process during overrun

Overrun is prevented by the setting of the upper and lower stroke limits with the detail parameter 1.

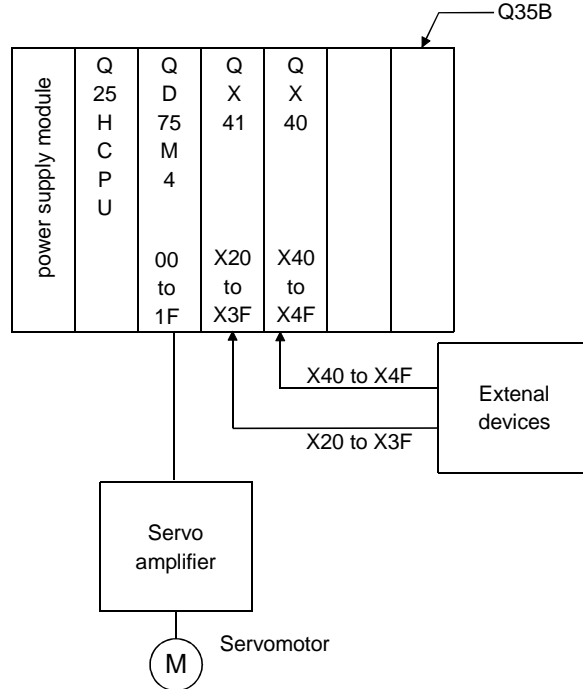
However, this applies only when the QD75 is operating correctly.

It is recommended to create an external circuit including a boundary limit switch to ensure the whole system safety as follows: the external circuit powers OFF the motor when the boundary limit switch operates.

(4) System configuration

Unless particularly designated, the PLC program for the following system is shown in this chapter and subsequent.

Refer to Section 6.2 for the application of the devices to be used.



(5) Control unit

In the program, the unit of "0 (mm), 2 (degree)" is set for the basic parameter 1.

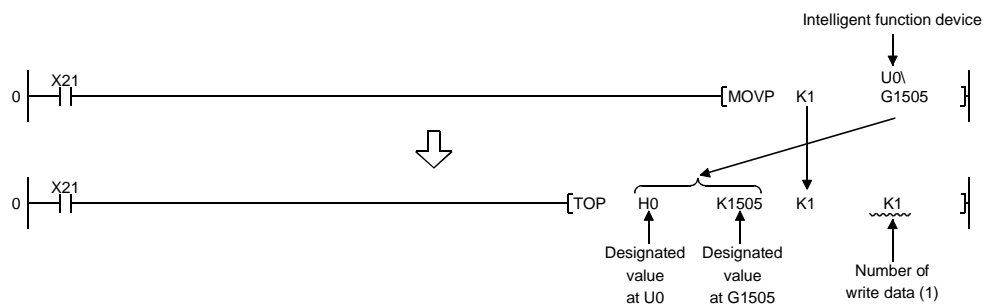
(6) Communication with QD75

There are two methods for communication with QD75 using the PLC program: a method using an "intelligent function device" and a method using a FROM/TO command.

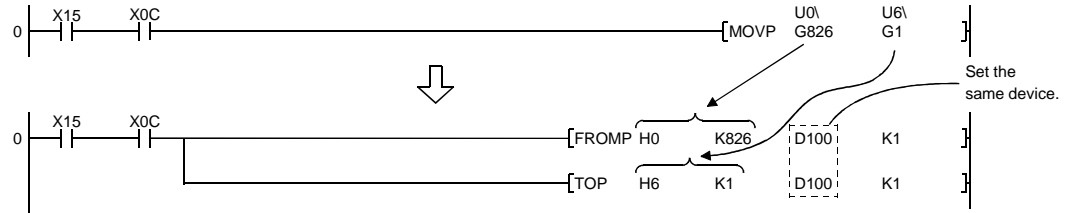
In the PLC program in this chapter and subsequent, the program example using the "intelligent function device" is shown without using an FROM/TO command for communication with QD75.

When using the FROM/TO command for communication with QD75, change the circuit incorporating the "intelligent function device" as follows.

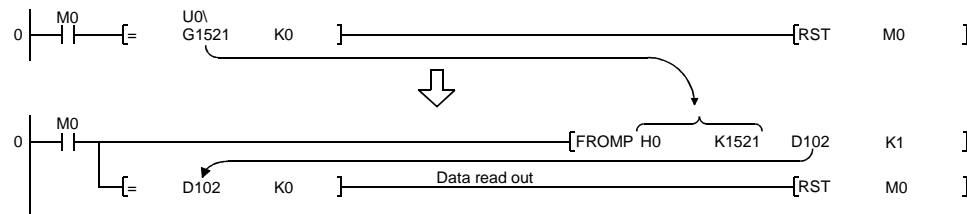
- (a) When the circuit uses the "intelligent function device" on the destination (D) side of a MOV command, change the command to a TO command.



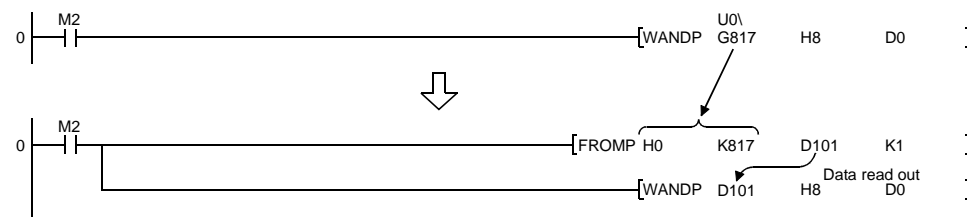
(b) When the circuit uses the "intelligent function device" on the source(s) side and the destination (D) side of a MOV command, change the command to a FROM command and a TO command.



(c) When the circuit uses the "intelligent function device" for a COMPARISON command, change the command to a FROM command and a COMPARISON command.



(d) When the circuit uses the "intelligent function device" for a WAND command, change the command to a FROM command and a WAND command.



REMARK

Refer to QCPU User's Manual (Functions and Programs Basic Part) for the intelligent function devices.
 Refer to QCPU (Q mode/ QnA CPU) Programming Manual (Common Commands Part) for detail commands used in those programs shown in this chapter and subsequent.

6.2 List of devices used

In the PLC programs shown in this chapter and subsequent, the application of the devices used are as follows.

The I/O numbers for QD75 indicate those when QD75 is mounted in the 0-slot of the main base.

If it is mounted in the slot other than the 0-slot of the main base, change the I/O number to that for the position where QD75 was installed.

In addition, change the external inputs, external outputs, internal relays, data registers, and timers according to the system used.

(1) Inputs/outputs, external inputs/external outputs, and internal relays of QD75

| Device name | Device | | | | Application | Details when ON | |
|----------------------------------|-------------|--------|--------|--------|---|--|-------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Inputs/ outputs of QD75 | Input | X0 | | | | QD75 READY signal | Preparation completed |
| | | X1 | | | | Synchronization flag | QD75 buffer memory accessible |
| | | X4 | X5 | X6 | X7 | M code ON signal | M code outputting |
| | | X8 | X9 | XA | XB | Error detection signal | Error detected |
| | | XC | XD | XE | XF | BUSY signal | BUSY (operating) |
| | | X10 | X11 | X12 | X13 | Start complete signal | Start completed |
| | | X14 | X15 | X16 | X17 | Positioning complete signal | Positioning completed |
| | Out- put | Y0 | | | | PLC READY signal | PLC CPU preparation completed |
| | | Y1 | | | | All axis servo ON signal | All axis servo ON signal |
| | | Y4 | Y5 | Y6 | Y7 | Axis stop signal | Requesting stop |
| | | Y8 | YA | YC | YE | Forward run JOG start signal | Starting forward run JOG |
| | | Y9 | YB | YD | YF | Reverse run JOG start signal | Starting reverse run JOG |
| | | Y10 | Y11 | Y12 | Y13 | Positioning start signal | Requesting start |
| | | Y14 | Y15 | Y16 | Y17 | Execution prohibition request | Execution prohibition |
| External input (command) | X20 | — | | | OPR request OFF command | Commanding OPR request OFF | |
| | X21 | | | | External command valid command | Commanding external command valid setting | |
| | X22 | | | | External command invalid command | Commanding external command invalid | |
| | X23 | | | | Machine OPR command | Commanding machine OPR | |
| | X24 | | | | Fast OPR command | Commanding fast OPR | |
| | X25 | | | | Positioning start command | Commanding positioning start | |
| | X26 | | | | Speed-position switching operation command | Commanding speed-position switching operation | |
| | X27 | | | | Speed-position switching enable command | Commanding speed-position switching enable command | |
| | X28 | | | | Speed-position switching prohibit command | Commanding speed-position switching prohibit | |
| | X29 | | | | Movement amount change command | Commanding movement amount change | |
| | X2A | | | | High-level positioning control start command | Commanding high-level positioning control start | |
| | X2B | | | | Positioning start command (dedicated instruction) | Commanding positioning start | |

| Device name | Device | | | | Application | Details when ON | |
|--------------------------|-------------------------------------|---------------------------------------|--------|--------|---|--|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| External input (command) | X2C | — | — | — | M code OFF command | Commanding M code OFF | |
| | X2D | | | | JOG operation speed setting command | Commanding JOG operation speed setting | |
| | X2E | | | | Forward run JOG/inching command | Commanding forward run JOG/inching operation | |
| | X2F | | | | Reverse run JOG/inching command | Commanding reverse run JOG/inching operation | |
| | X30 | | | | Manual pulse generator operation enable command | Commanding manual pulse generator operation enable | |
| | X31 | | | | Manual pulse generator operation disable command | Commanding manual pulse generator operation disable | |
| | X32 | | | | Speed change command | Commanding speed change | |
| | X33 | | | | Override command | Commanding override | |
| | X34 | | | | Acceleration/deceleration time change command | Commanding acceleration/deceleration time change | |
| | X35 | | | | Acceleration/deceleration time change disable command | Commanding acceleration/deceleration time change disable | |
| | X36 | | | | Torque change command | Commanding torque change | |
| | X37 | | | | Step operation command | Commanding step operation | |
| | X38 | | | | Skip operation command | Commanding skip operation | |
| | X39 | | | | Teaching command | Commanding teaching | |
| | X3A | | | | Continuous operation interrupt command | Commanding continuous operation interrupt command | |
| | X3B | | | | Restart command | Commanding restart | |
| | X3C | | | | Parameter initialization command | Commanding parameter initialization | |
| | X3D | | | | Flash ROM write command | Commanding flash ROM write | |
| | X3E | | | | Error reset command | Commanding error reset | |
| | X3F | | | | Stop command | Commanding stop | |
| | X40 | | | | Position-speed switching operation command | Position-speed switching operation command | |
| | X41 | | | | Position-speed switching enable command | Position-speed switching enable command | |
| | X42 | | | | Position-speed switching prohibit command | Position-speed switching prohibit command | |
| | X43 | | | | Speed change command | Speed change command | |
| | X44 | | | | Inching movement amount setting command | Inching movement amount setting command | |
| | X45 | | | | Target position change command | Target position change command | |
| | X46 | | | | Step start information command | Step start information command | |
| | X47 | | | | Positioning start command k10 | Positioning start command k10 | |
| | X48 | | | | Override initialization value command | Override initialization value command | |
| | X49 | | | | Servo parameter read | Servo parameter read | |
| | X4A | | | | Servo parameter write | Servo parameter write | |
| | X4B | | | | PLC READY ON | PLC READY ON | |
| X4D | For unit (degree) | For unit (degree) | | | | | |
| X4E | Positioning start command (Y start) | Positioning start command being given | | | | | |
| X4F | All axis servo ON command | All axis servo ON command | | | | | |

| Device name | Device | | | | Application | Details when ON | | | |
|----------------|--------|---|-----------------------------------|--------|--|---|---------------------------------------|--|-------------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | |
| Internal relay | M0 | — | — | — | OPR request OFF command | Commanding OPR request OFF | | | |
| | M1 | | | | OPR request OFF command pulse | OPR request OFF commanded | | | |
| | M2 | | | | OPR request OFF command storage | OPR request OFF command held | | | |
| | M3 | | | | Fast OPR command | Commanding fast OPR | | | |
| | M4 | | | | Fast OPR command storage | Fast OPR command held | | | |
| | M5 | | | | Positioning start command pulse | Positioning start commanded | | | |
| | M6 | | | | Positioning start command storage | Positioning start command held | | | |
| | M7 | | | | In-JOG/Inching operation flag | In-JOG/Inching operation flag | | | |
| | M8 | | | | Manual pulse generator operation enable command | Commanding manual pulse generator operation enable | | | |
| | M9 | | | | Manual pulse generator operating flag | Manual pulse generator operating flag | | | |
| | M10 | | | | Manual pulse generator operation disable command | Commanding manual pulse generator operation disable | | | |
| | M11 | | | | Speed change command pulse | Speed change commanded | | | |
| | M12 | | | | Speed change command storage | Speed change command held | | | |
| | M13 | | | | Override command | Requesting override | | | |
| | M14 | | | | Acceleration/deceleration time change command | Requesting acceleration/deceleration time change | | | |
| | M15 | | | | Torque change command | Requesting torque change | | | |
| | M16 | | | | Step operation command pulse | Step operation commanded | | | |
| | M17 | | | | Skip command pulse | Skip commanded | | | |
| | M18 | | | | Skip command storage | Skip command held | | | |
| | M19 | | | | Teaching command pulse | Teaching commanded | | | |
| | M20 | | | | Teaching command storage | Teaching command held | | | |
| | M21 | | | | Continuous operation interrupt command | Requesting continuous operation interrupt | | | |
| | M22 | | | | Restart command | Requesting restart | | | |
| | M23 | | | | Restart command storage | Restart command held | | | |
| | | | | | M24 | Parameter initialization command pulse | Parameter initialization commanded | | |
| | | | | | M25 | Parameter initialization command storage | Parameter initialization command held | | |
| | | | | | M26 | Flash ROM write command pulse | Flash ROM write commanded | | |
| | | | | | M27 | Flash ROM write command storage | Flash ROM write command held | | |
| | | | | | M28 | — | — | Error reset | Error reset completed |
| | | | | | M29 | | | Stop command pulse | Stop commanded |
| | | | | | M30 | | | Target position change command pulse | Target position change commanded |
| | | | | | M31 | | | Target position change command storage | Target position change command held |
| | | | | | M32 | | | PSTR1 instruction complete device | PSTR1 instruction completed |
| | M33 | PSTR1 instruction error complete device | PSTR1 instruction error completed | | | | | | |

| Device name | Device | | | | Application | Details when ON |
|----------------|--------|--------|--------|--------|--|------------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Internal relay | M34 | — | — | — | TEACH1 instruction complete device | TEACH1 instruction completed |
| | M35 | | | | TEACH1 instruction error complete device | TEACH1 instruction error completed |
| | M36 | | | | PINIT instruction complete device | PINIT instruction completed |
| | M37 | | | | PINIT instruction error complete device | PINIT instruction error completed |
| | M38 | | | | PFWRT instruction complete device | PFWRT instruction completed |
| | M39 | | | | PFWRT instruction error complete device | PFWRT instruction error completed |
| | M40 | | | | Override initialization value | Override initialization value |
| | M41 | | | | Servo parameter read | Servo parameter read |
| | M42 | | | | Unused | — |
| | M50 | | | | Parameter setting complete device | Parameter setting completed |
| | M54 | | | | ERRD complete device | ERRD completed |
| | M56 | | | | ERRCLR complete device | ERRCLR completed |

(2) Data registers and timers

| Device name | Device | | | | Application | Details of storage |
|---------------|--------|--------|--------|--------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Data register | D0 | — | — | — | OPR request flag | ([Md.31] Status: b3) |
| | D1 | | | | Speed (low-order 16 bits) | ([Cd.25] Position-speed switching control speed change resistor) |
| | D2 | | | | Speed (high-order 16 bits) | ([Cd.23] Speed-position switching control movement amount change resistor) |
| | D3 | | | | Movement amount (low-order 16 bits) | ([Cd.23] Speed-position switching control movement amount change resistor) |
| | D4 | | | | Movement amount (high-order 16 bits) | ([Cd.16] Inching movement amount) |
| | D5 | | | | Inching movement amount | ([Cd.16] Inching movement amount) |
| | D6 | | | | JOG operation speed (low-order 16 bits) | ([Cd.17] JOG operation speed) |
| | D7 | | | | JOG operation speed (high-order 16 bits) | ([Cd.17] JOG operation speed) |
| | D8 | | | | Manual pulse generator 1 pulse input magnification (low-order) | ([Cd.20] Manual pulse generator 1 pulse input magnification) |
| | D9 | | | | Manual pulse generator 1 pulse input magnification (high-order) | ([Cd.20] Manual pulse generator 1 pulse input magnification) |
| | D10 | | | | Manual pulse generator operation enable | ([Cd.21] Manual pulse generator enable flag) |
| | D11 | | | | Speed change value (low-order 16 bits) | ([Cd.14] New speed value) |
| | D12 | | | | Speed change value (high-order 16 bits) | ([Cd.14] New speed value) |
| | D13 | | | | Speed change request | ([Cd.15] Speed change request) |
| | D14 | | | | Override value | ([Cd.13] Positioning operation speed override value) |

| Device name | Device | | | | Application | Details of storage |
|---------------|--------|--------|--------|--------|--|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Data register | D15 | — | — | — | Acceleration time setting (low-order 16 bits) | ([Cd.10] New acceleration time value) |
| | D16 | | | | Acceleration time setting (high-order 16 bits) | |
| | D17 | | | | Deceleration time setting (low-order 16 bits) | ([Cd.11] New deceleration time value) |
| | D18 | | | | Deceleration time setting (high-order 16 bits) | |
| | D19 | | | | Acceleration/deceleration time change enable | ([Cd.12] Acceleration/deceleration time change enable/disable selection in speed change) |
| | D20 | | | | Step valid flag | ([Cd.35] Step valid flag) |
| | D21 | | | | Step mode | ([Cd.34] Step mode) |
| | D22 | | | | Step start information | — |
| | D23 | | | | Target position (low-order 16 bits) | ([Cd.27] New target position value (address)) |
| | D24 | | | | Target position (high-order 16 bits) | |
| | D25 | | | | Target speed (low-order 16 bits) | ([Cd.28] New target position value (speed)) |
| | D26 | | | | Target speed (high-order 16 bits) | |
| | D27 | | | | Target position change request | ([Cd.29] New target position change value flag) |
| | D28 | | | | Unused | — |
| | D29 | | | | Unused | — |
| | D30 | | | | PSTRT1 instruction control data | — |
| | D31 | | | | Completion status | — |
| | D32 | | | | Start number | — |
| | D33 | | | | TEACH1 instruction control data | — |
| | D34 | | | | Completion status | — |
| | D35 | | | | Teaching data | — |
| | D36 | | | | Positioning data No. | — |
| | D37 | | | | PINIT instruction control data | — |
| | D38 | | | | Completion status | — |
| | D39 | | | | PFWRT instruction control data | — |
| | D40 | | | | Completion status | — |
| | D50 | | | | Unit setting | ([Pr.1] Unit setting) |
| | D51 | | | | Unit magnification | ([Pr.4] Unit magnification) |

| Device name | Device | | | | Application | Details of storage | |
|---------------|--------|--------|--------|--------|---|---|--------------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Data register | D52 | — | — | — | No. of pulses per rotation (low-order 16 bits) | ([Pr.2] No. of pulses per rotation) | |
| | D53 | | | | No. of pulses per rotation (high-order 16 bits) | | |
| | D54 | | | | Movement amount per rotation (low-order 16 bits) | ([Pr.3] Movement amount per rotation) | |
| | D55 | | | | Movement amount per rotation (high-order 16 bits) | | |
| | D56 | | | | Bias speed at start (low-order 16 bits) | ([Pr.7] Bias speed at start) | |
| | D57 | | | | Bias speed at start (high-order 16 bits) | | |
| | D68 | | | | Block start data (Block 0) | Point 1 (shape, start No.) | ([Da.11] Shape) |
| | D69 | | | | | Point 2 (shape, start No.) | |
| | D70 | | | | | Point 3 (shape, start No.) | |
| | D71 | | | | | Point 4 (shape, start No.) | |
| | D72 | | | | | Point 5 (shape, start No.) | |
| | D73 | | | | | Point 1 (special start instruction) | ([Da.13] Special start instruction) |
| | D74 | | | | | Point 2 (special start instruction) | ([Da.14] Parameter) |
| | D75 | | | | | Point 3 (special start instruction) | |
| | D76 | | | | | Point 4 (special start instruction) | |
| | D77 | | | | | Point 5 (special start instruction) | |
| | D78 | | | | Torque change value | — | |
| | D79 | | | | Error code | ([Md.23] Axis error No.) | |
| | D80 | | | | Servo series | ([Pr.100] Servo series) | |
| | D81 | | | | Absolute position system valid/invalid | ([Pr.101] Amplifier setting) | |
| | D82 | | | | Motor capacity | ([Pr.104] Motor capacity) | |
| | D85 | | | | Return home position method | ([Pr.43] OPR method) | |
| | D100 | | | | Positioning identifier | Data No.1 | |
| | D101 | | | | M code | ([Da.1] Operation pattern) | |
| | D102 | | | | Dwell time | ([Da.2] Control system) | |
| | D103 | | | | Unused | ([Da.3] Acceleration time No.) | |
| | D104 | | | | Command speed (low-order 16 bits) | ([Da.4] Deceleration time No.) | |
| | D105 | | | | Command speed (high-order 16 bits) | ([Da.5] Axis to be interpolated) | |
| | D106 | | | | Positioning address (low-order 16 bits) | ([Da.6] Positioning address/movement amount) | |

| Device name | Device | | | | Application | Details of storage |
|---------------|---|---------------------------------------|--------|--------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Data register | D107 | — | — | — | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D108 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| | D109 | | | | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) |
| | D110 | | | | Positioning identifier | Data No.2 |
| | D111 | | | | M code | (Da.1 Operation pattern) |
| | D112 | | | | Dwell time | (Da.2 Control system) |
| | D113 | | | | Unused | (Da.3 Acceleration time No.) |
| | D114 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D115 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D116 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D117 | | | | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D118 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| | D119 | | | | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) |
| | D120 | | | | Positioning identifier | Data No.3 |
| | D121 | | | | M code | (Da.1 Operation pattern) |
| | D122 | | | | Dwell time | (Da.2 Control system) |
| | D123 | | | | Unused | (Da.3 Acceleration time No.) |
| | D124 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D125 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D126 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D127 | | | | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D128 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| | D129 | | | | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) |
| | D130 | | | | Positioning identifier | Data No.4 |
| | D131 | | | | M code | (Da.1 Operation pattern) |
| | D132 | | | | Dwell time | (Da.2 Control system) |
| | D133 | | | | Unused | (Da.3 Acceleration time No.) |
| | D134 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D135 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D136 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D137 | | | | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D138 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| D139 | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) | | | | |
| D140 | Positioning identifier | Data No.5 | | | | |
| D141 | M code | (Da.1 Operation pattern) | | | | |
| D142 | Dwell time | (Da.2 Control system) | | | | |
| D143 | Unused | (Da.3 Acceleration time No.) | | | | |

| Device name | Device | | | | Application | Details of storage |
|---------------|---|--|--------|--------|---|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Data register | D144 | — | — | — | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D145 | | | | Command speed (low-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D146 | | | | Positioning address (low-order 16 bits) | (Da.7 Circular interpolation address) |
| | D147 | | | | Positioning address (high-order 16 bits) | (Da.8 Command speed) |
| | D148 | | | | Circular interpolation address (low-order 16 bits) | (Da.9 Dwell time) |
| | D149 | | | | Circular interpolation address (high-order 16 bits) | (Da.10 M code) |
| | D150 | | | | Positioning identifier | Data No.6 |
| | D151 | | | | M code | (Da.1 Operation pattern) |
| | D152 | | | | Dwell time | (Da.2 Control system) |
| | D153 | | | | Unused | (Da.3 Acceleration time No.) |
| | D154 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D155 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D156 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D157 | | | | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D158 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| | D159 | | | | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) |
| | D190 | | | | Positioning identifier | Data No.10 |
| | D191 | | | | M code | (Da.1 Operation pattern) |
| | D192 | | | | Dwell time | (Da.2 Control system) |
| | D193 | | | | Unused | (Da.3 Acceleration time No.) |
| | D194 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D195 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D196 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D197 | | | | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) |
| | D198 | | | | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) |
| | D199 | | | | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) |
| | D200 | | | | Positioning identifier | Data No.11 |
| | D201 | | | | M code | (Da.1 Operation pattern) |
| | D202 | | | | Dwell time | (Da.2 Control system) |
| | D203 | | | | Unused | (Da.3 Acceleration time No.) |
| D204 | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) | | | | |
| D205 | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) | | | | |
| D206 | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) | | | | |
| D207 | Positioning address (high-order 16 bits) | (Da.7 Circular interpolation address) | | | | |
| D208 | Circular interpolation address (low-order 16 bits) | (Da.8 Command speed) | | | | |
| D209 | Circular interpolation address (high-order 16 bits) | (Da.9 Dwell time) (Da.10 M code) | | | | |

| Device name | Device | | | | Application | Details of storage |
|---------------|--------|---------------------|--------|-----------------------------------|--|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Data register | D240 | — | — | — | Positioning identifier | Data No.15 |
| | D241 | | | | M code | (Da.1 Operation pattern) |
| | D242 | | | | Dwell time | (Da.2 Control system) |
| | D243 | | | | Unused | (Da.3 Acceleration time No.) |
| | D244 | | | | Command speed (low-order 16 bits) | (Da.4 Deceleration time No.) |
| | D245 | | | | Command speed (high-order 16 bits) | (Da.5 Axis to be interpolated) |
| | D246 | | | | Positioning address (low-order 16 bits) | (Da.6 Positioning address/ movement amount) |
| | D247 | | | | Positioning address (high-order 16 bits) | |
| | D248 | | | | Circular interpolation address (low-order 16 bits) | (Da.7 Circular interpolation address) |
| | D249 | | | | Circular interpolation address (high-order 16 bits) | (Da.8 Command speed) |
| | | | | | | (Da.9 Dwell time) |
| | | | | | | (Da.10 M code) |
| SD1026 | | Day, hour data | — | | | |
| SD1026 | | Minute, second data | — | | | |
| Timer | T0 | — | — | PLC READY signal OFF confirmation | PLC READY signal OFF | |
| | T1 | | | PLC READY signal OFF confirmation | | |

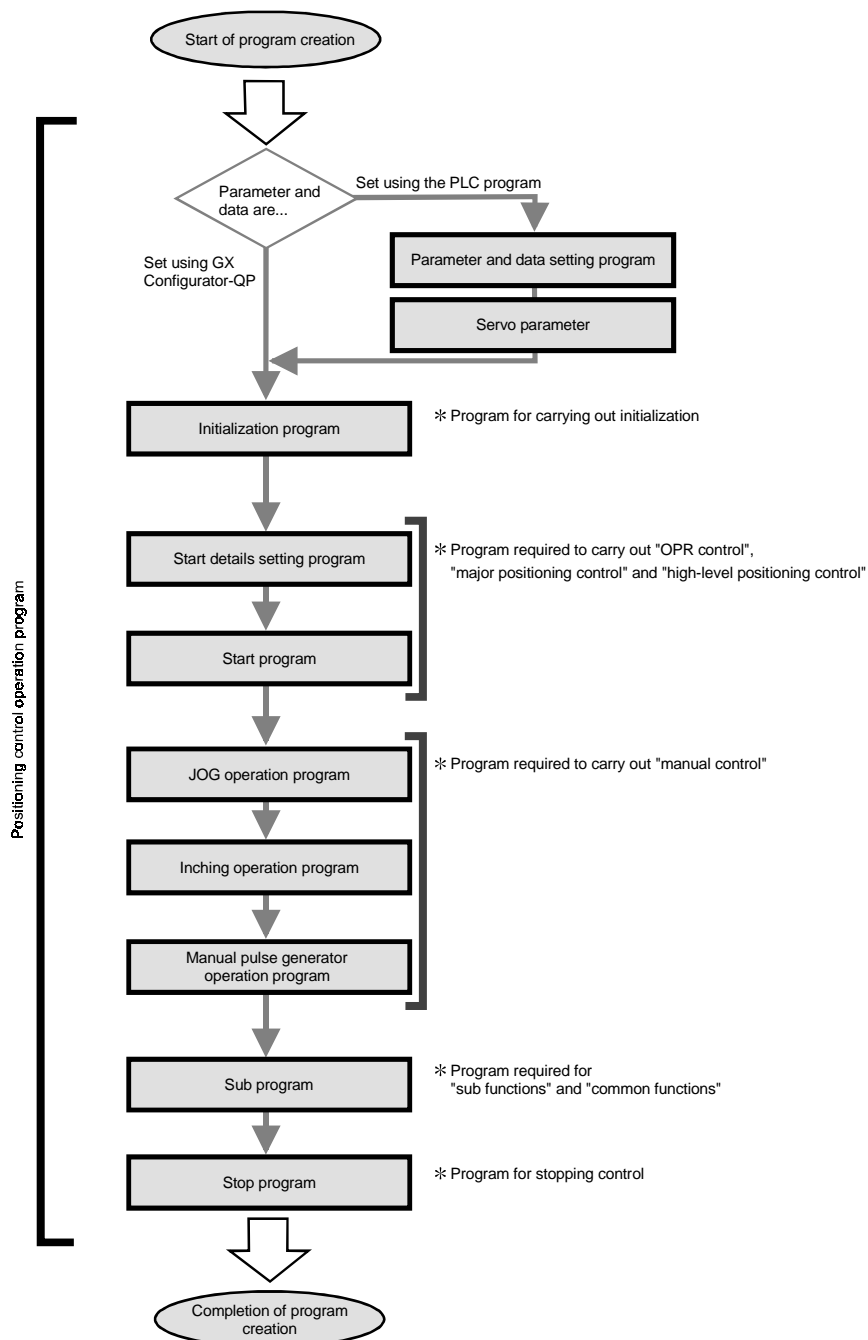
| Device name | Device | Application | Details of storage |
|-------------|--------------|--|---|
| Code | U0\G806 | Error code | ([Md.23] Axis error No.) |
| | U0\G809 | Axis operation status | ([Md.26] Axis operation status) |
| | U0\G817 | Status | ([Md.31] Status) |
| | U0\G1500 | Positioning start No. | ([Cd.3] Positioning start No.) |
| | U0\G1502 | Axis error reset | ([Cd.5] Axis error reset) |
| | U0\G1503 | Restart command | ([Cd.6] Restart command) |
| | U0\G1504 | M code OFF request (Buffer memory) | ([Cd.7] M code OFF request) |
| | U0\G1505 | External command valid | ([Cd.8] External command valid) |
| | U0\G1513 | Positioning operation speed override | ([Cd.13] Positioning operation speed override) |
| | U0\G1516 | Speed change request | ([Cd.15] Speed change request) |
| | U0\G1517 | Inching movement amount | ([Cd.16] Inching movement amount) |
| | U0\G1520 | Interruption request during continuous operation | ([Cd.18] Interruption request during continuous operation) |
| | U0\G1521 | OPR request flag OFF request | ([Cd.19] OPR request flag OFF request) |
| | U0\G1524 | Manual pulse generator enable flag | ([Cd.21] Manual pulse generator enable flag) |
| | U0\G1526 | Speed-position switching control movement amount change register | ([Cd.23] Speed-position switching control movement amount change register) |
| | U0\G1528 | Speed-position switching control enable flag | ([Cd.24] Speed-position switching control enable flag) |
| | U0\G1530 | Position-speed switching control speed change register | ([Cd.25] Position-speed switching control speed change register) |
| | U0\G1532 | Position-speed switching control enable flag | ([Cd.26] Position-speed switching control enable flag) |
| | U0\G1538 | Target position change request flag | ([Cd.29] Target position change request flag) |
| | U0\G1545 | Step valid flag | ([Cd.35] Step valid flag) |
| U0\G1547 | Skip command | ([Cd.37] Skip command) | |

6.3 Creating a program

The "positioning control operation program" actually used is explained in this chapter. The functions and programs explained in Section 2 are assembled into the "positioning control operation program" explained here. (To monitor the control, add the required monitor program that matches the system. Refer to Section 5.6 "List of monitor data" for details on the monitor items.)

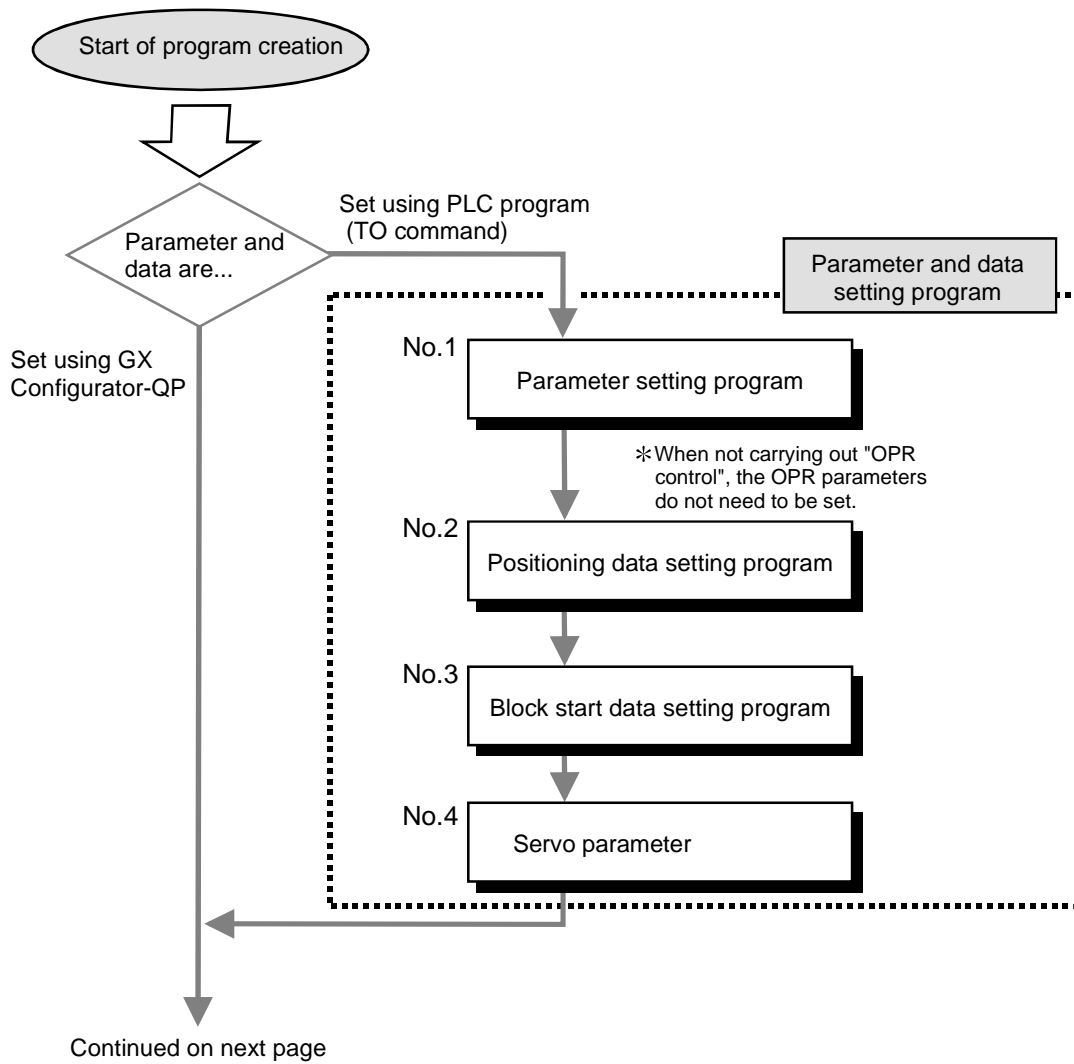
6.3.1 General configuration of program

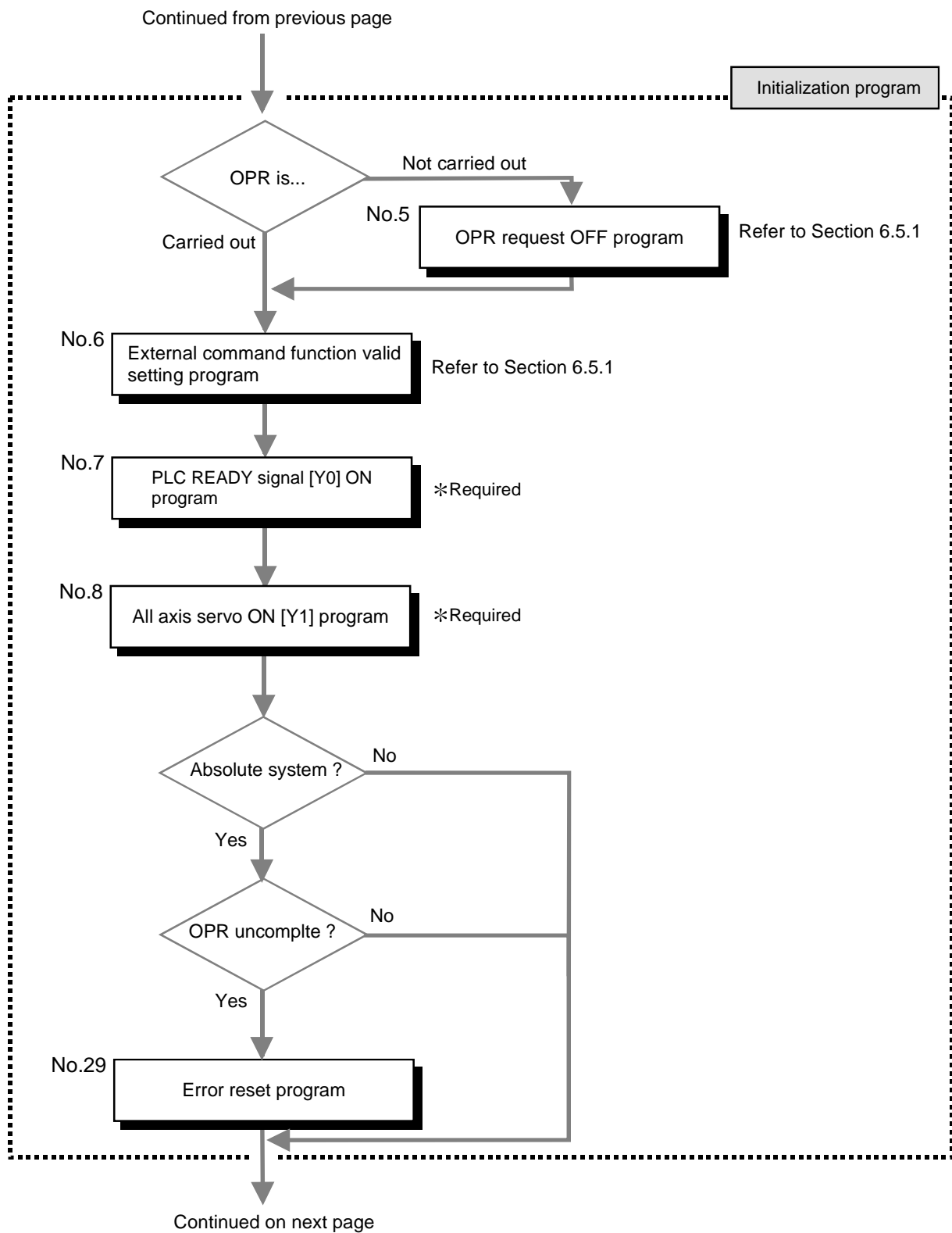
The general configuration of the "positioning control operation program" is shown below.



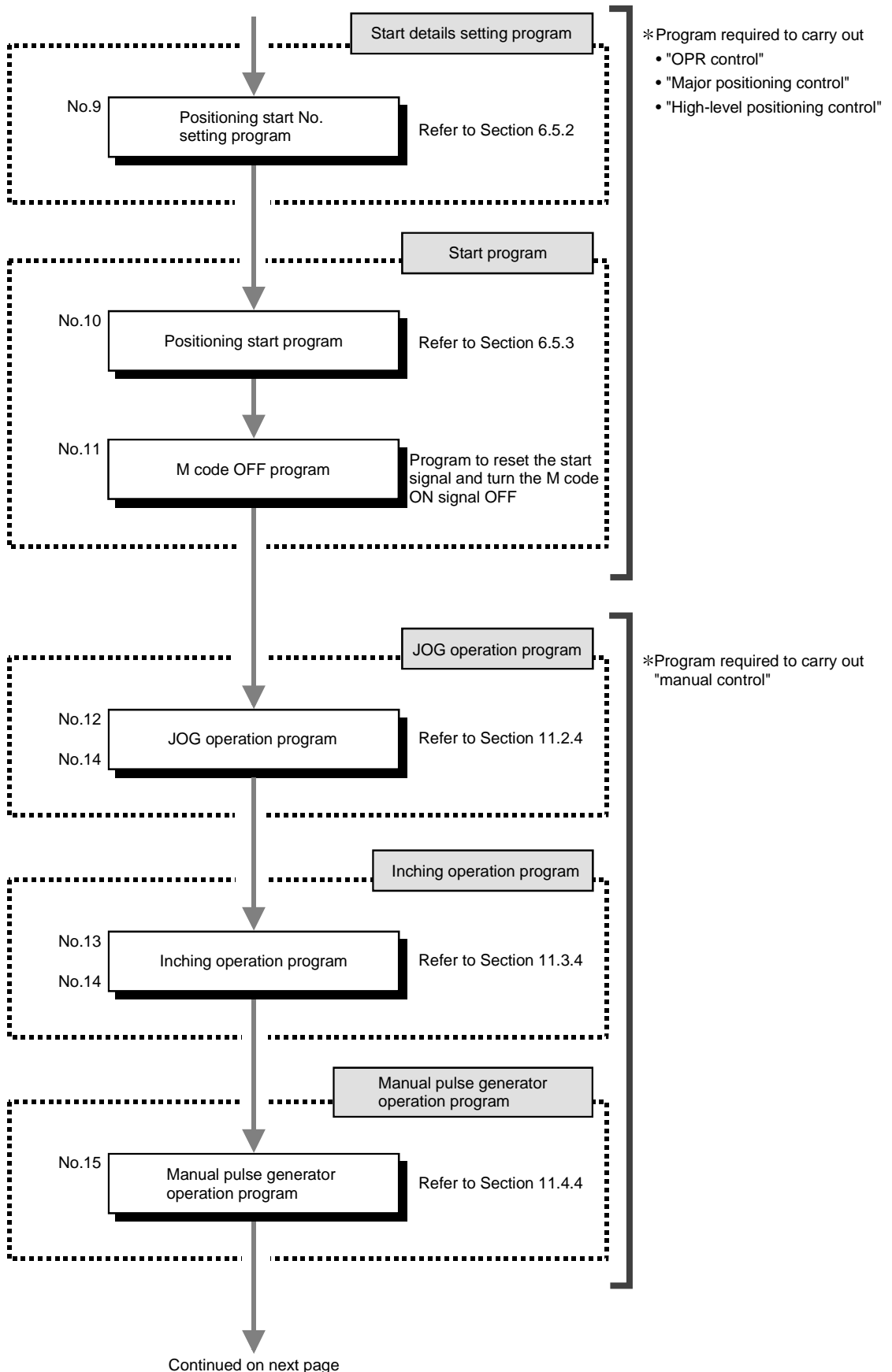
6.3.2 Positioning control operation program

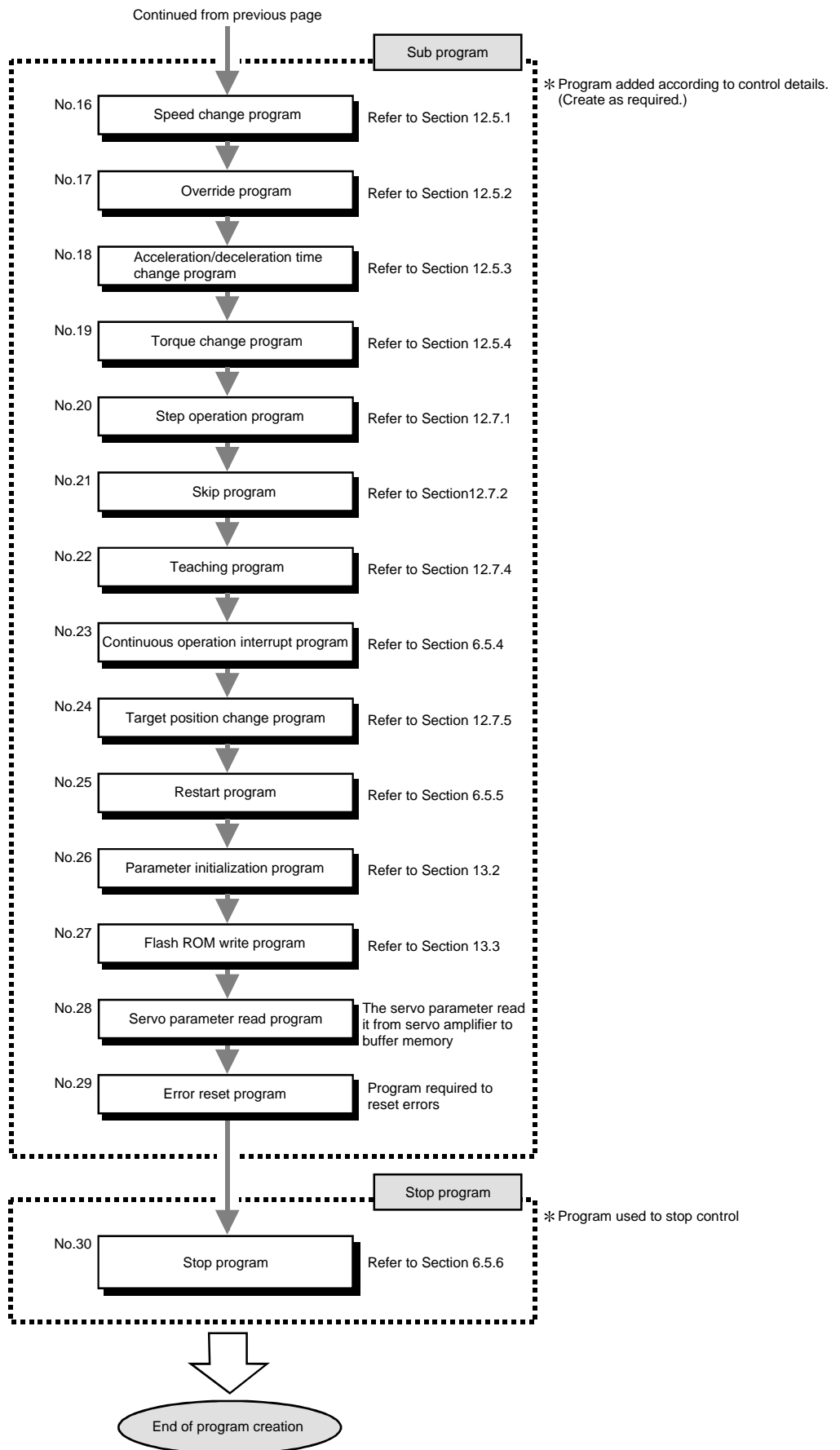
The various programs that configure the "positioning control operation program" are shown below. When creating the program, refer to the explanation of each program and Section 6.4 "Positioning program examples", and create an operation program that matches the positioning system. (Numbers are assigned to the following programs. Configuring the program in the order of these numbers is recommended.)





Continued from previous page

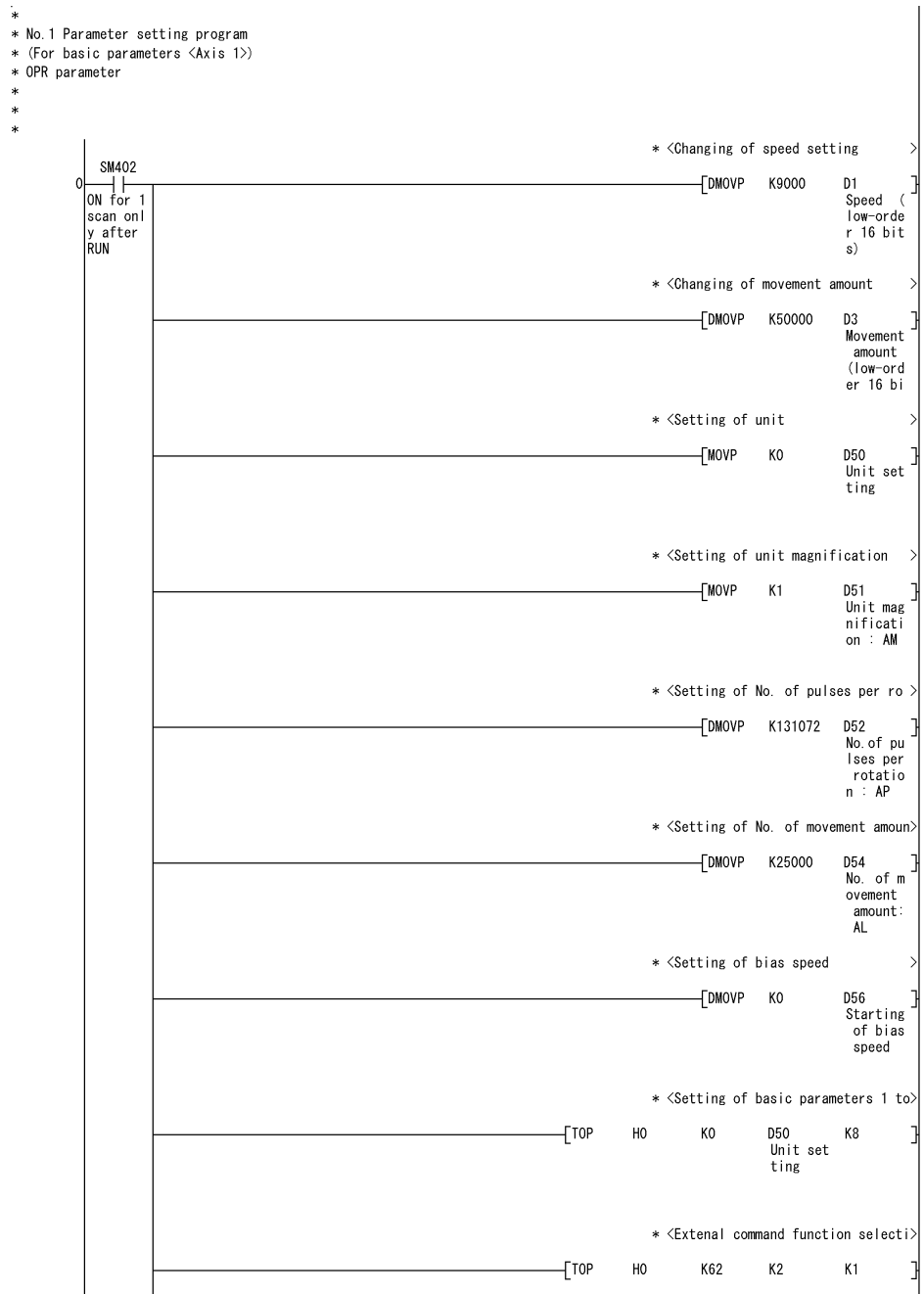


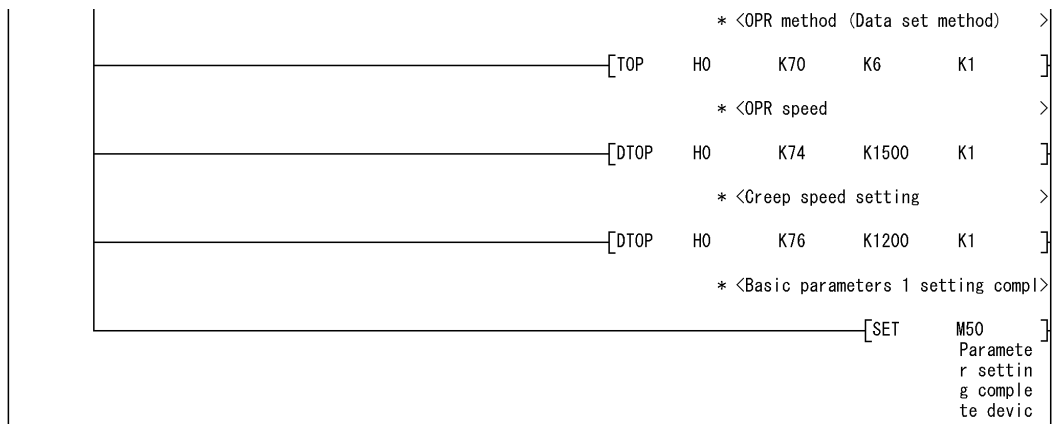


6.4 Positioning program examples

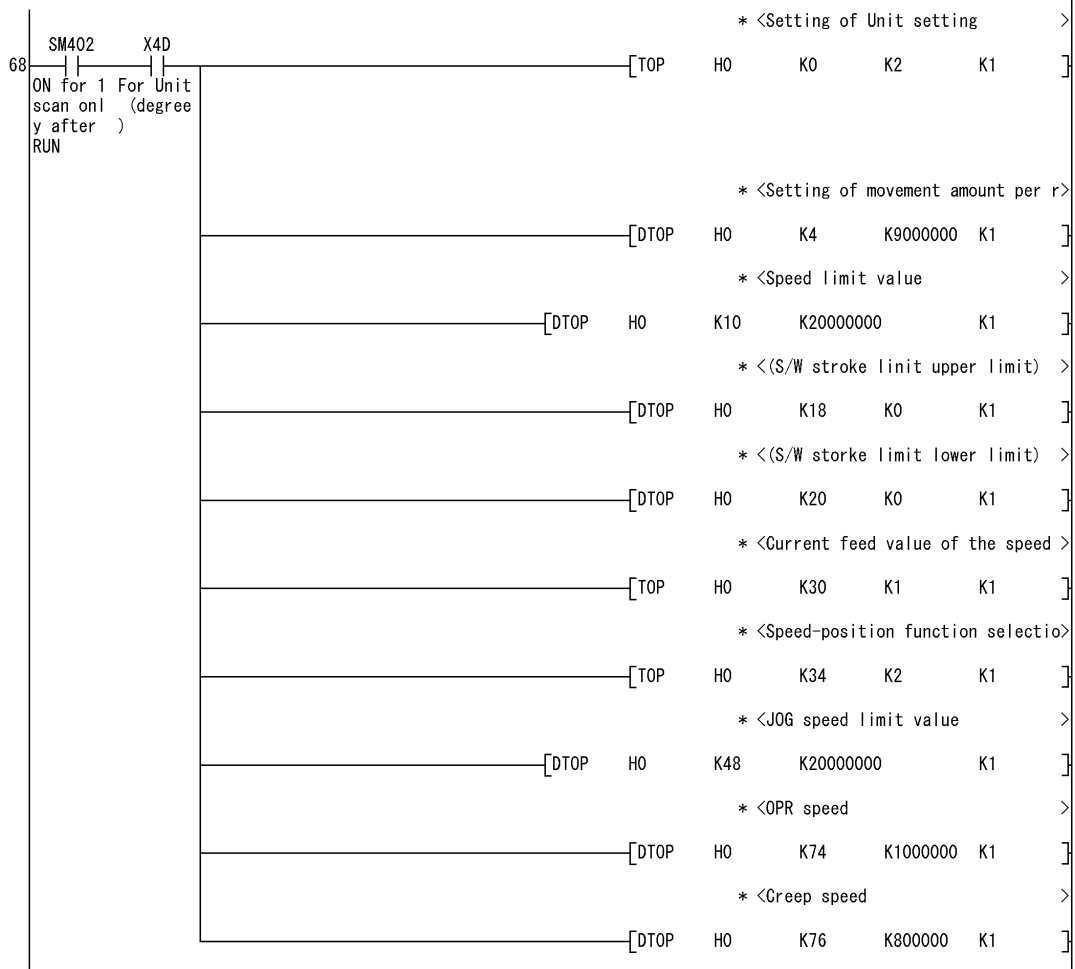
An example of the "Axis 1" positioning program is given in this section.

----- [No. 1] to [No. 3] parameter and data setting program -----
*When setting the parameters or data with the PLC program, set them in the QD75 using the TO command from the PLC CPU. (Carry out the settings while the PLC READY signal [Y0] is OFF.)
*When setting the parameters or data with GX Configurator-QP, the [No. 1] to [No. 3] program is not necessary.

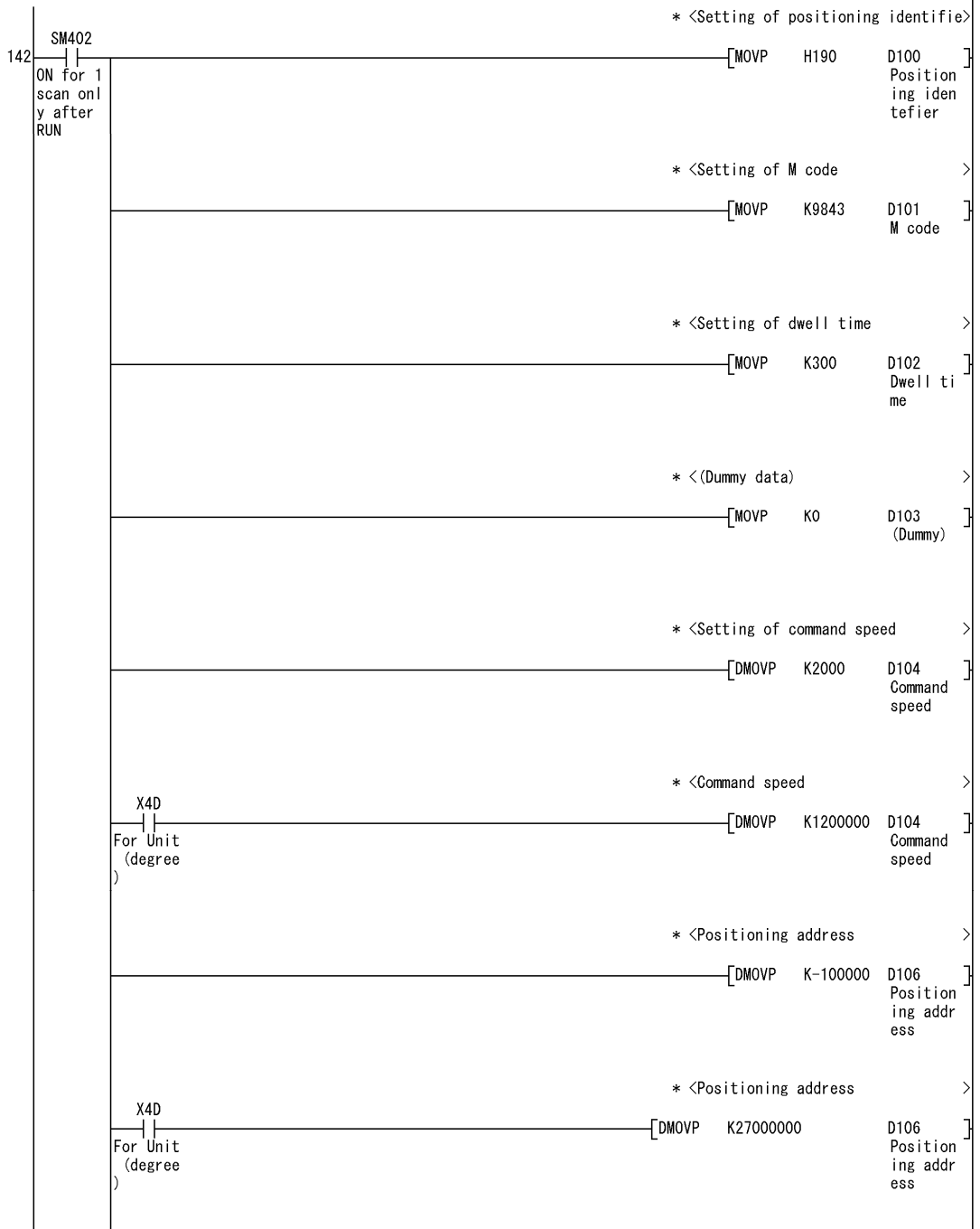


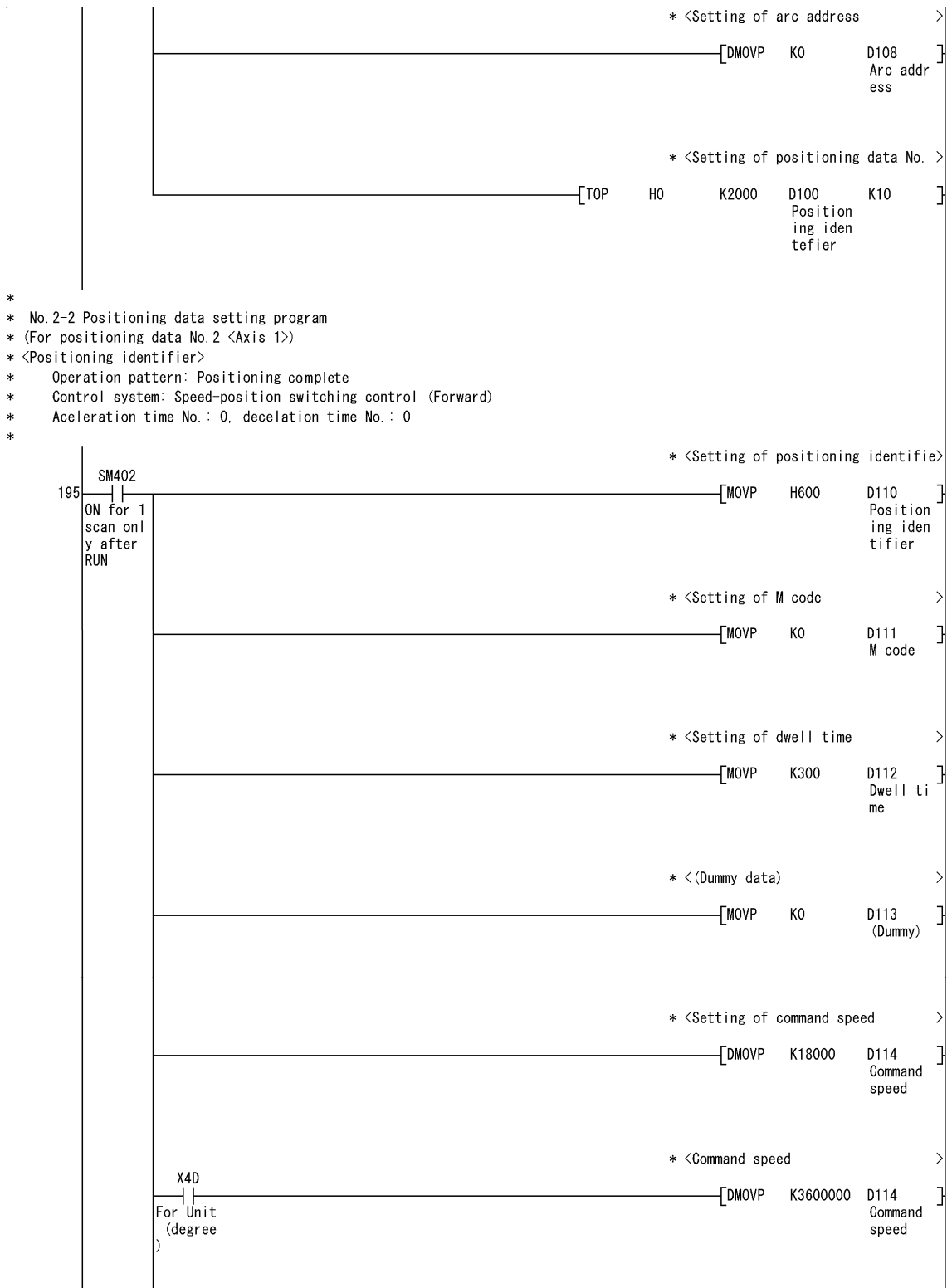


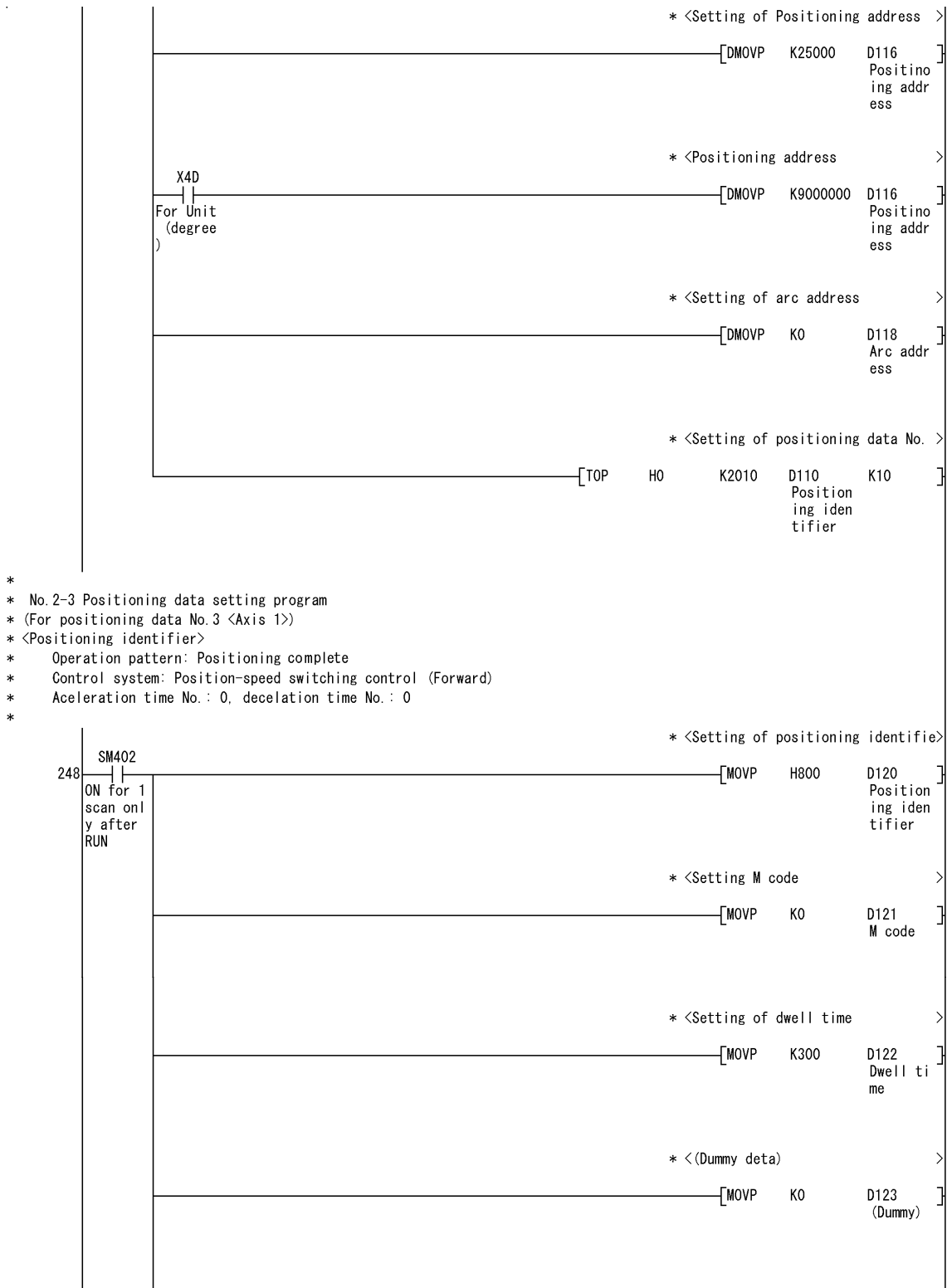
* Unit "Degree" setting program
 * <For axis 1>
 * Speed-position change control (ABS mode) execution and etc.
 * <X4D turns ON before startup>
 *

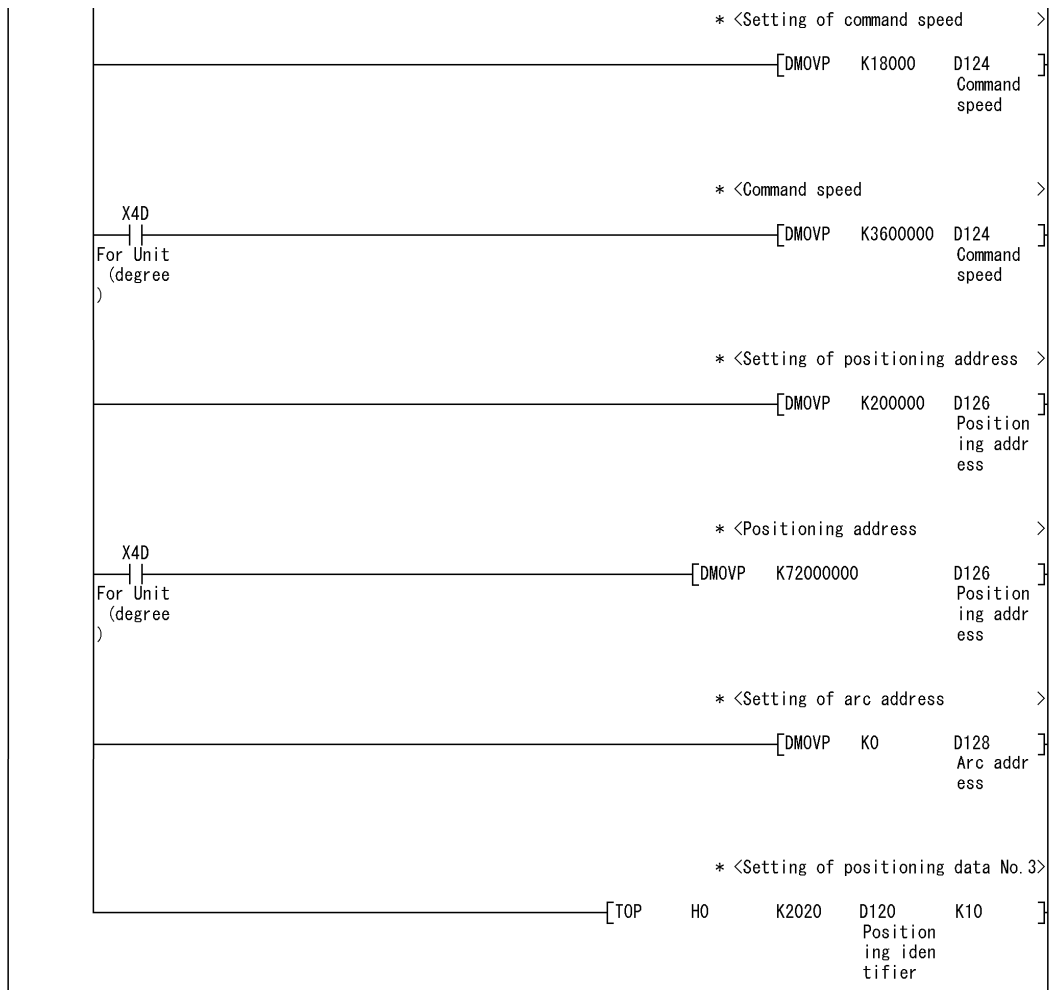


*
 * No.2-1 Positioning data setting program
 * (FOR positioning data No.1 <Axis 1>)
 * <Positioning identifier>
 * Operation pattern: Positioning complete
 * Control system: 1 axis linear control (ABS)
 * Acceleration time No.: 1, decelation time No.:2
 *

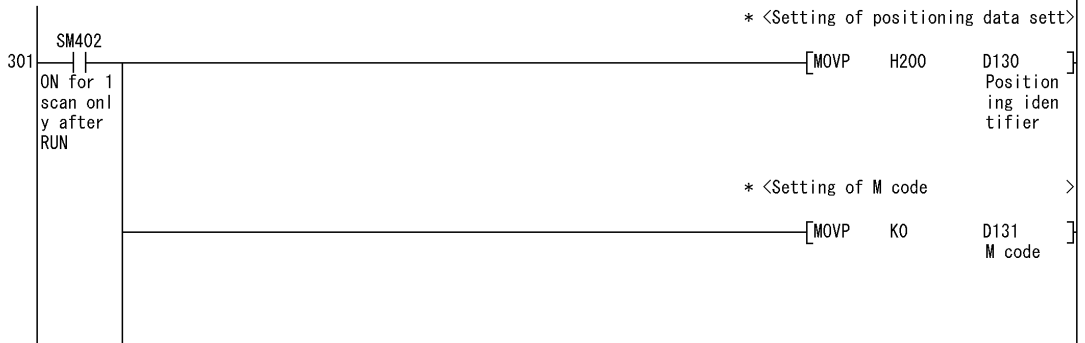


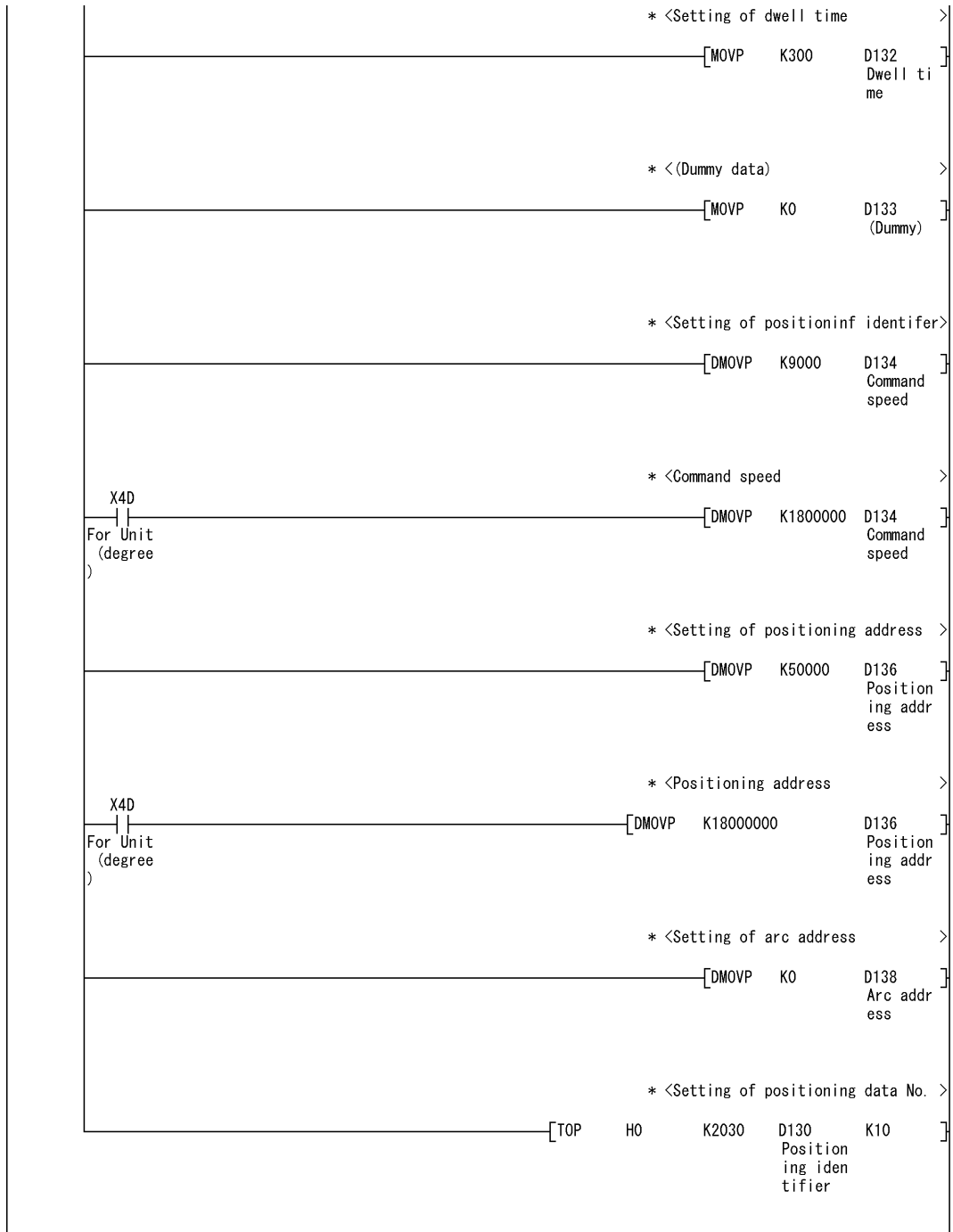




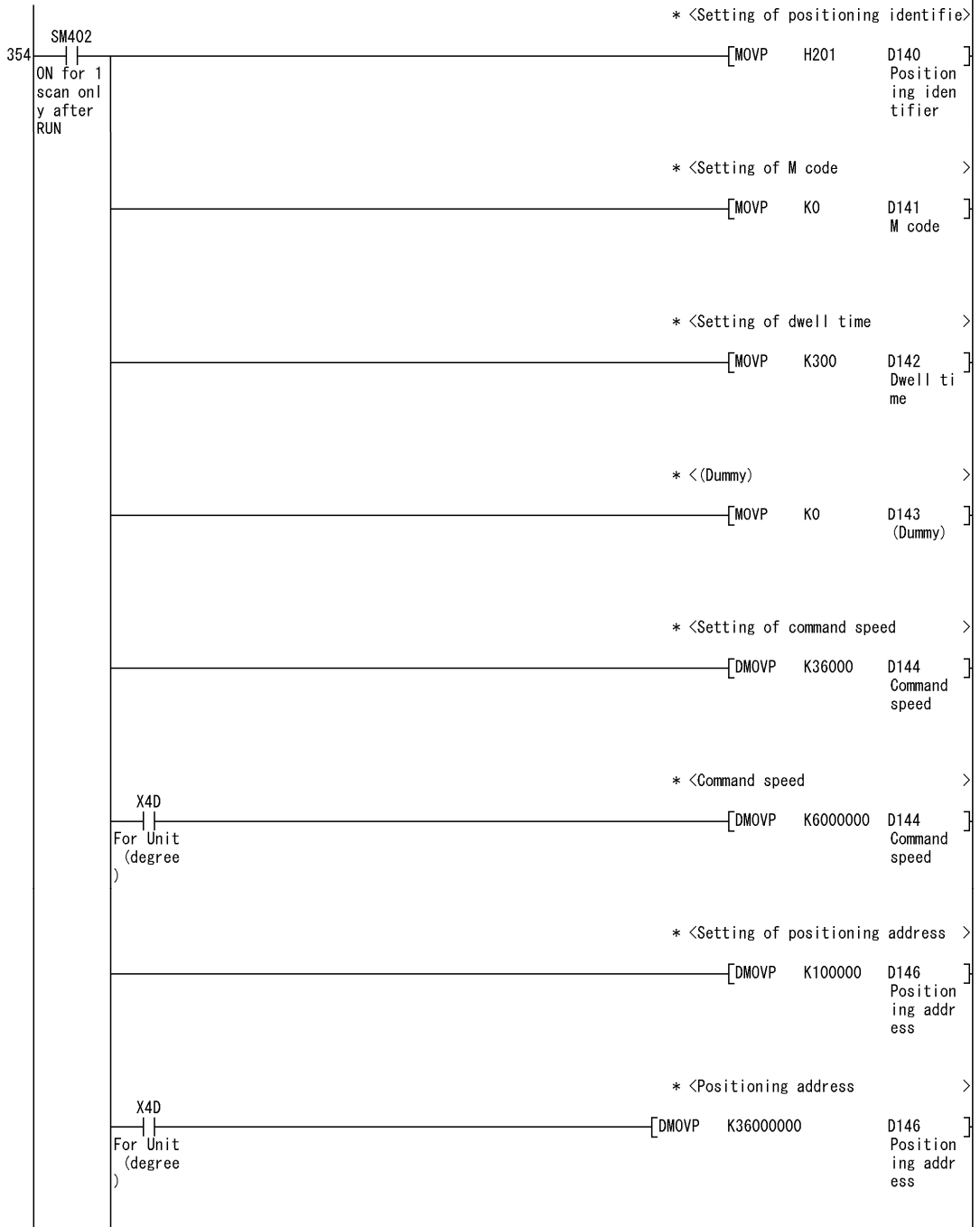


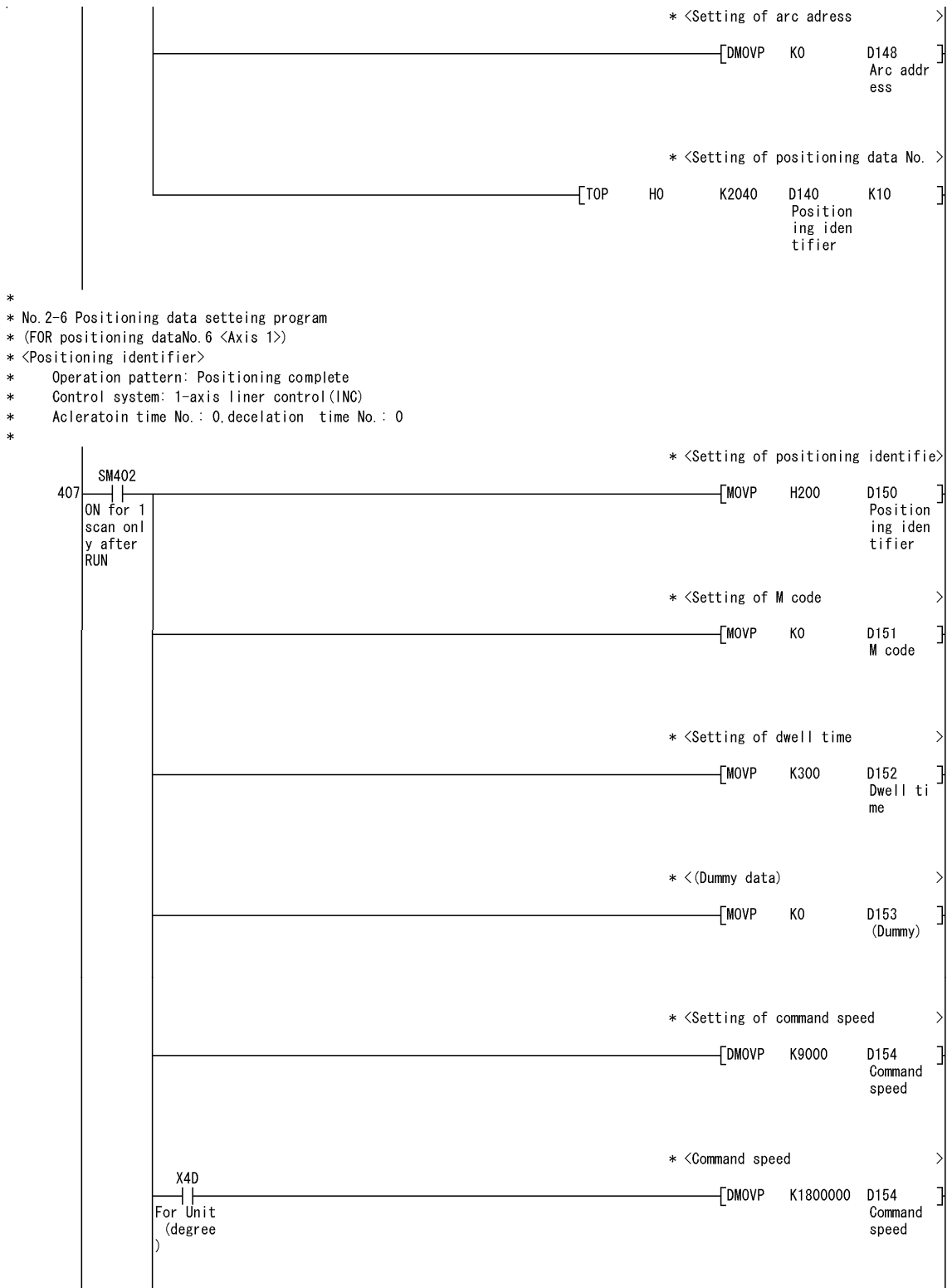
*
 * No.2-4 Positioning data setting program
 * (FOR positioning data No.4 <axis1>)
 * <Positioning identifier>
 * Operation pattern: Positioning complete
 * Control system: 1-axis linear control (INC)
 * Acceleration time No.: 0 , decelation time No.: 0
 *

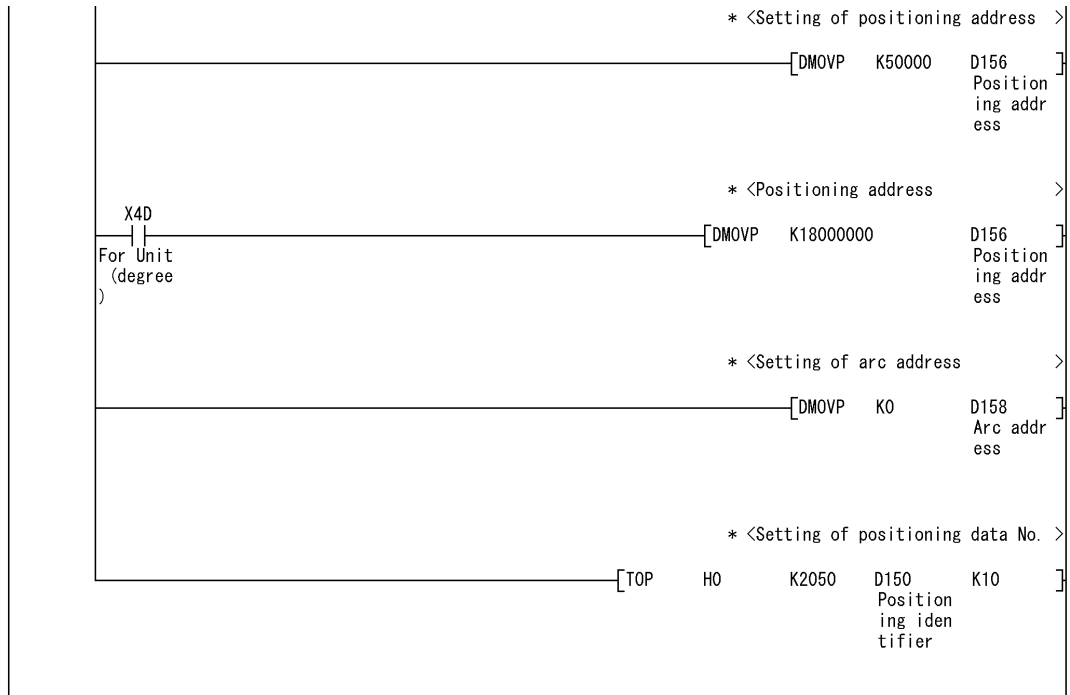




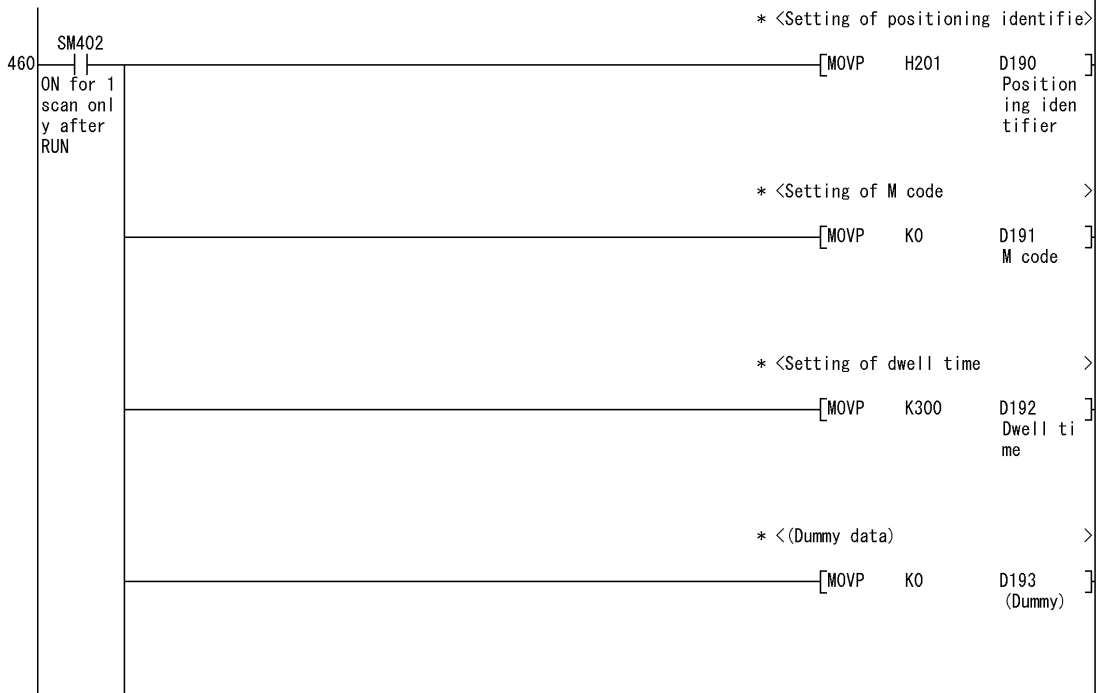
*
 * No.2-5 Positioning data setting program
 * (FOR positioning dataNo.5 <Axis 1>)
 * <Positioning identifier>
 * Operation pattern: Positioning complete
 * Control system: 1-axis linear control (INC)
 * Acceleration time No.: 0, deceleration time No.: 0
 *

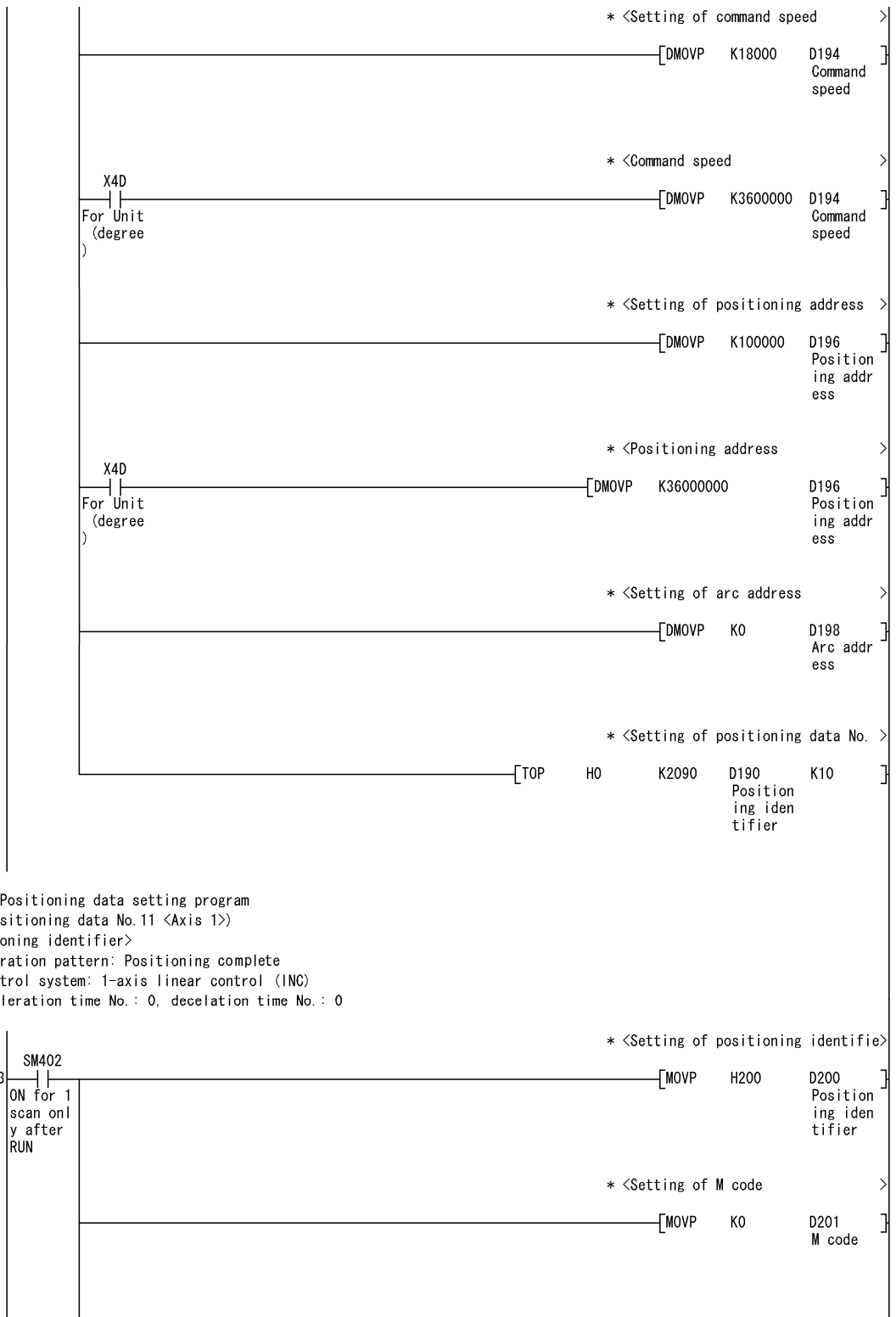




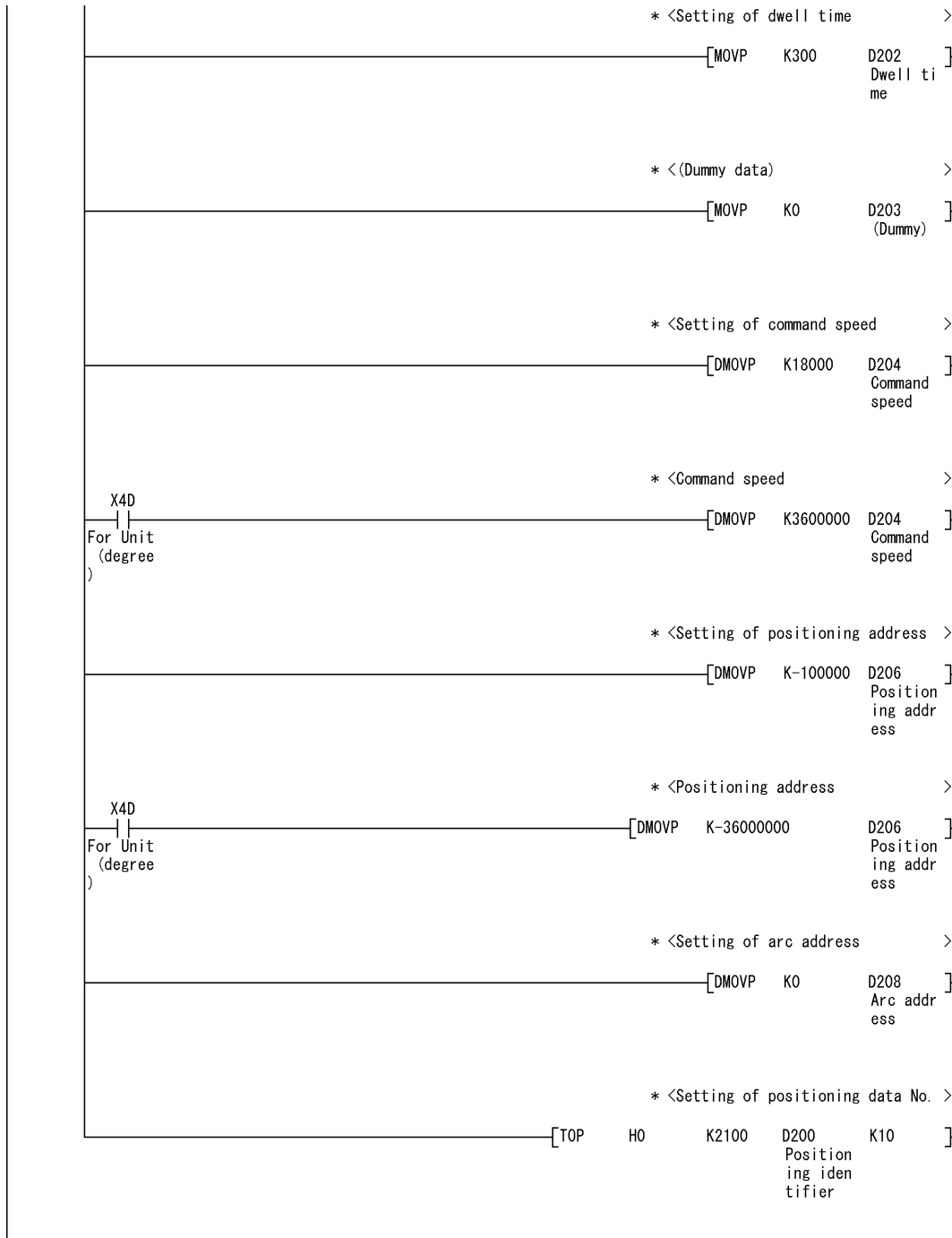


- *
- * No. 2-7 Positioning data setting program
- * (For positioning data No. 10 <Axis 1>)
- * <Positioning identifier>
- * Operation pattern: Continuous positioning control
- * Control system: 1-axis linear control (INC)
- * Acceleration time No.: 0, deceleration time No.: 0
- *

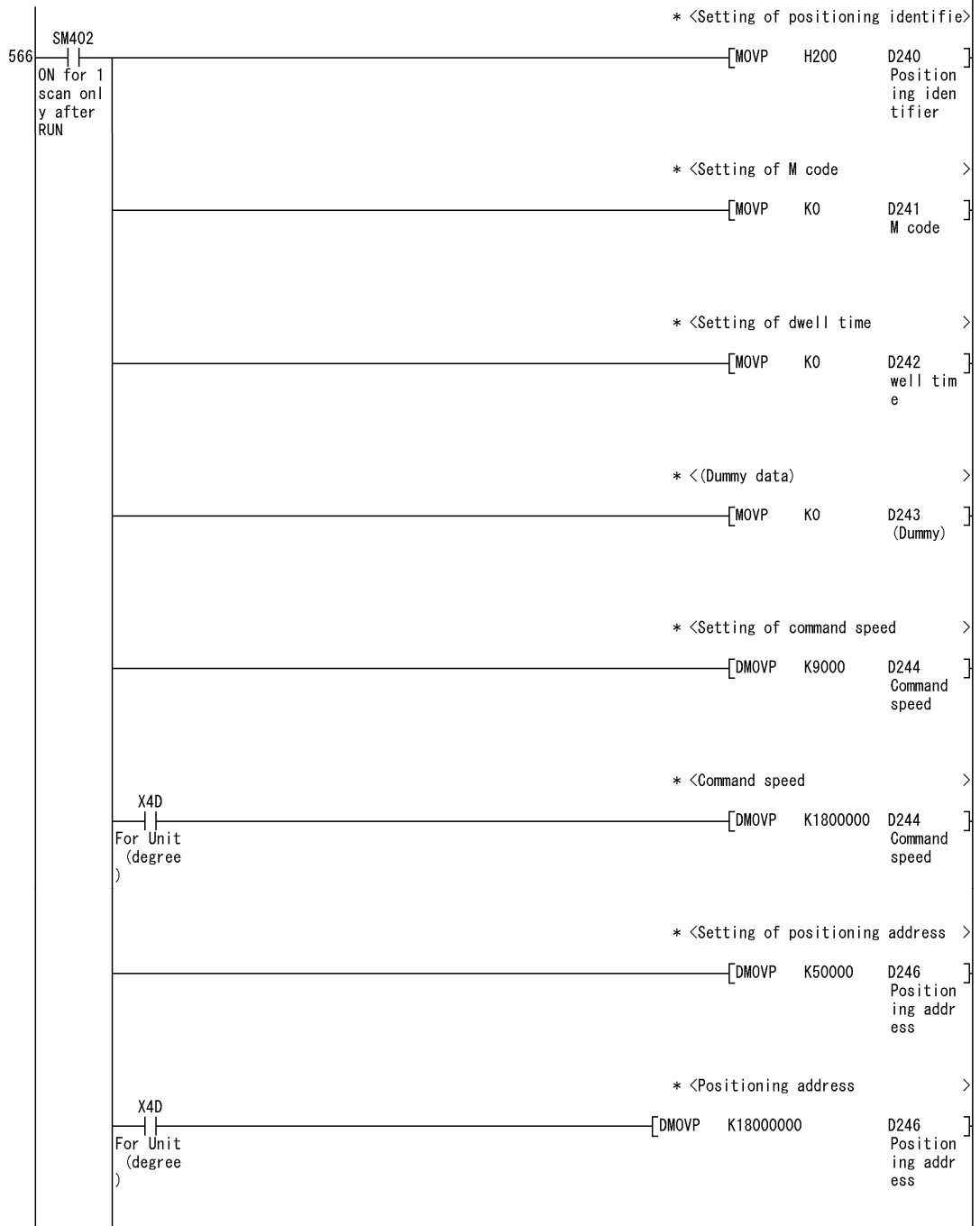


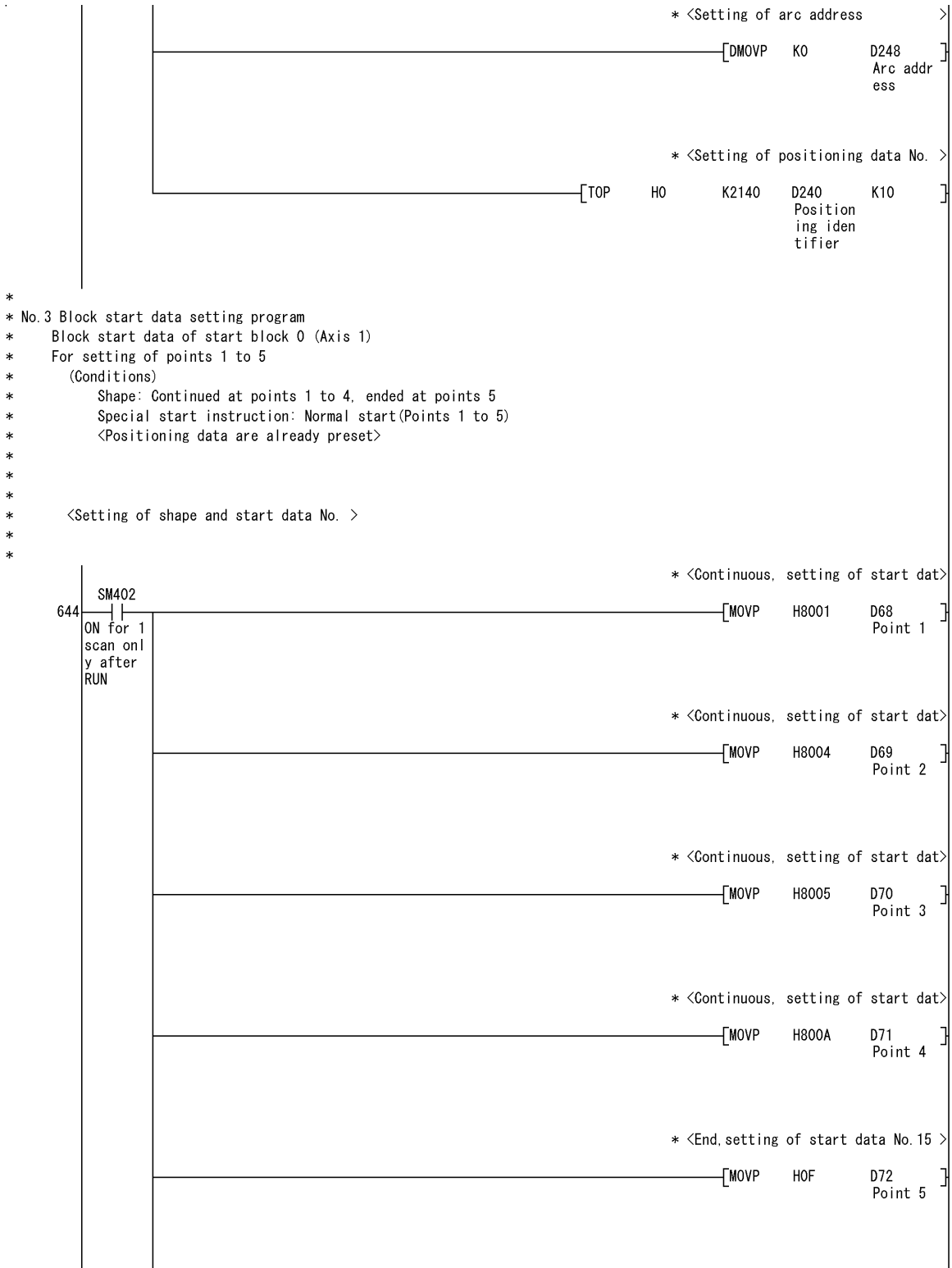


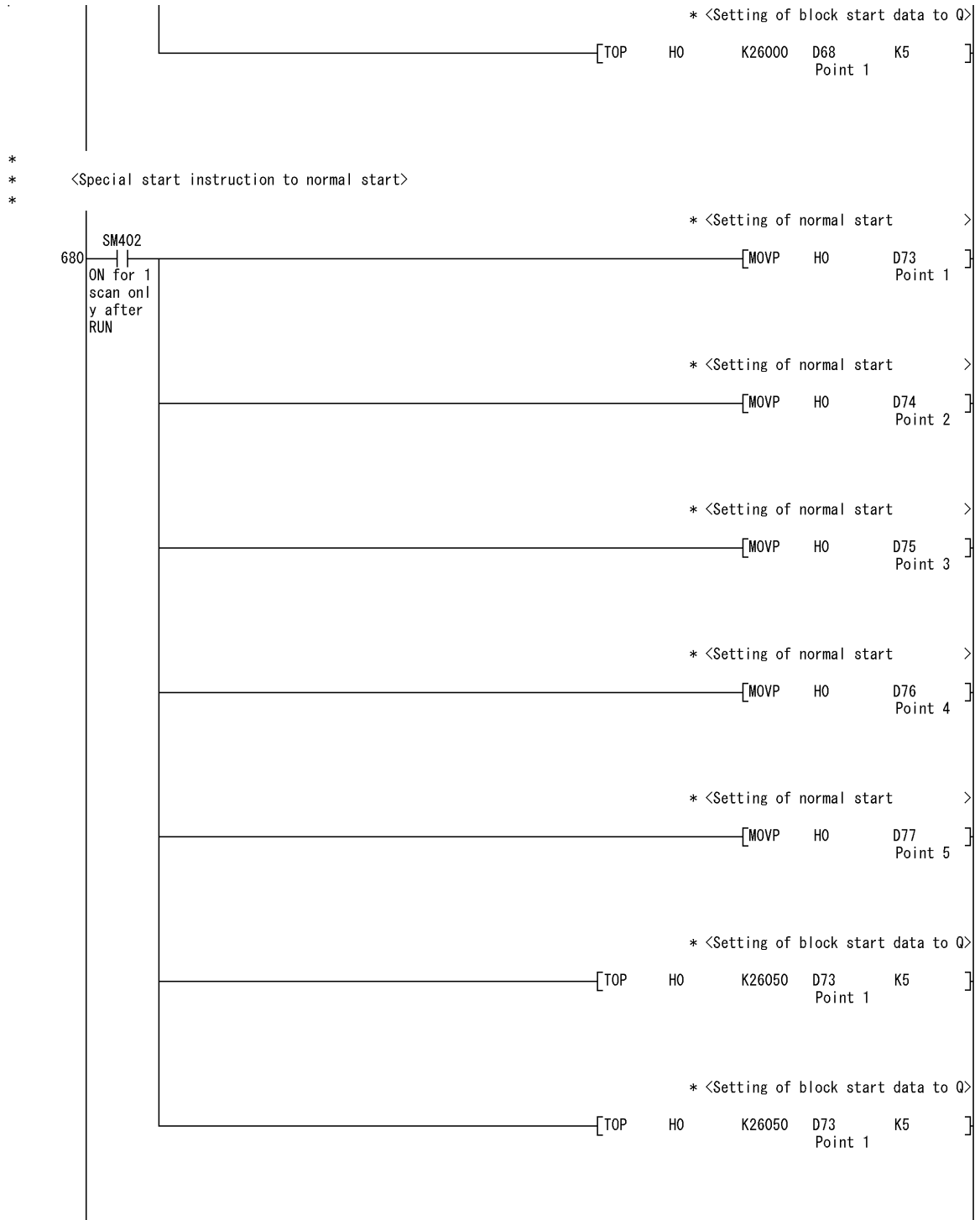
*
 * No.2-8 Positioning data setting program
 * (For positioning data No.11 <Axis 1>)
 * <Positioning identifier>
 * Operation pattern: Positioning complete
 * Control system: 1-axis linear control (INC)
 * Acceleration time No.: 0, deceleration time No.: 0
 *

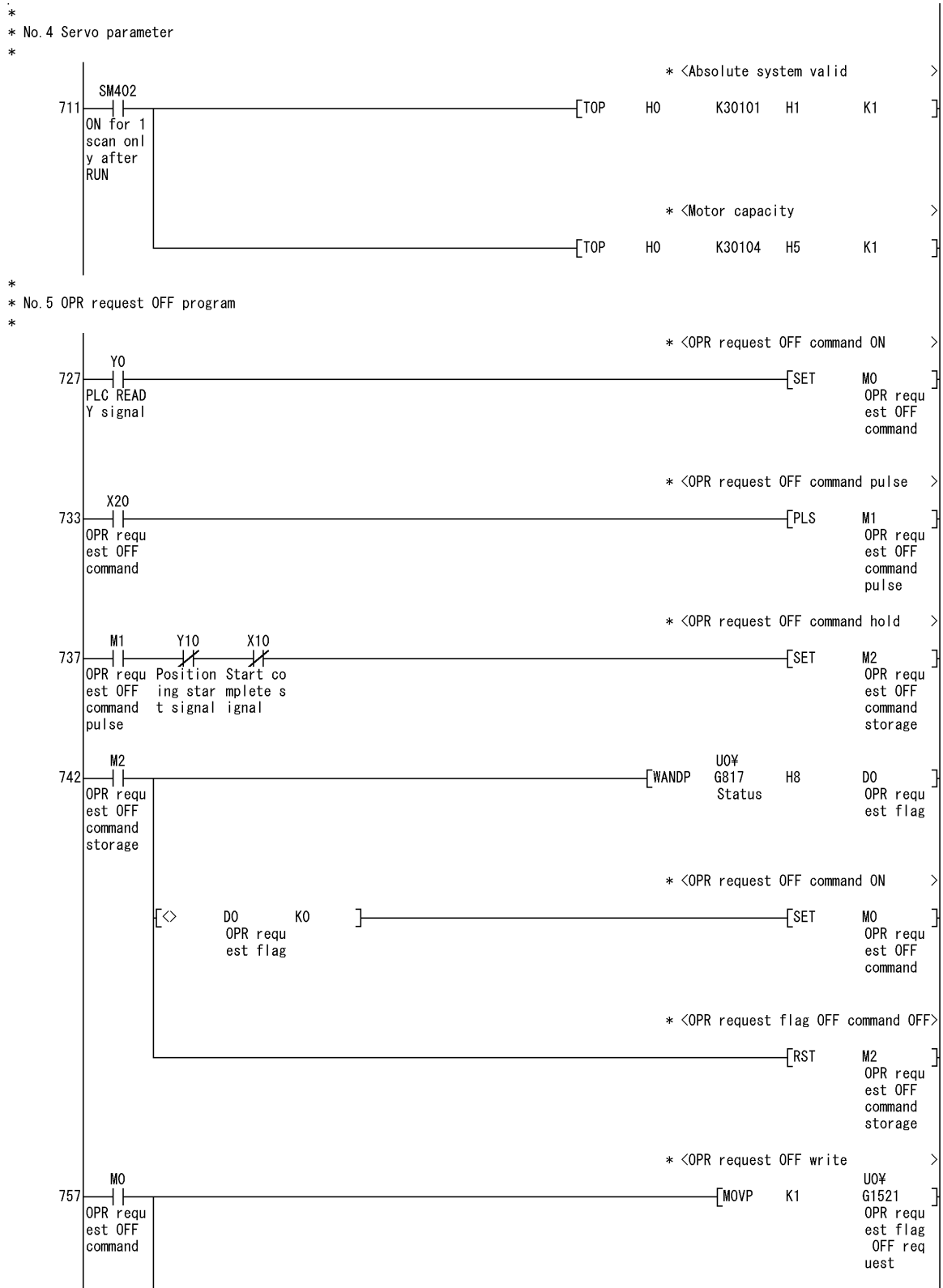


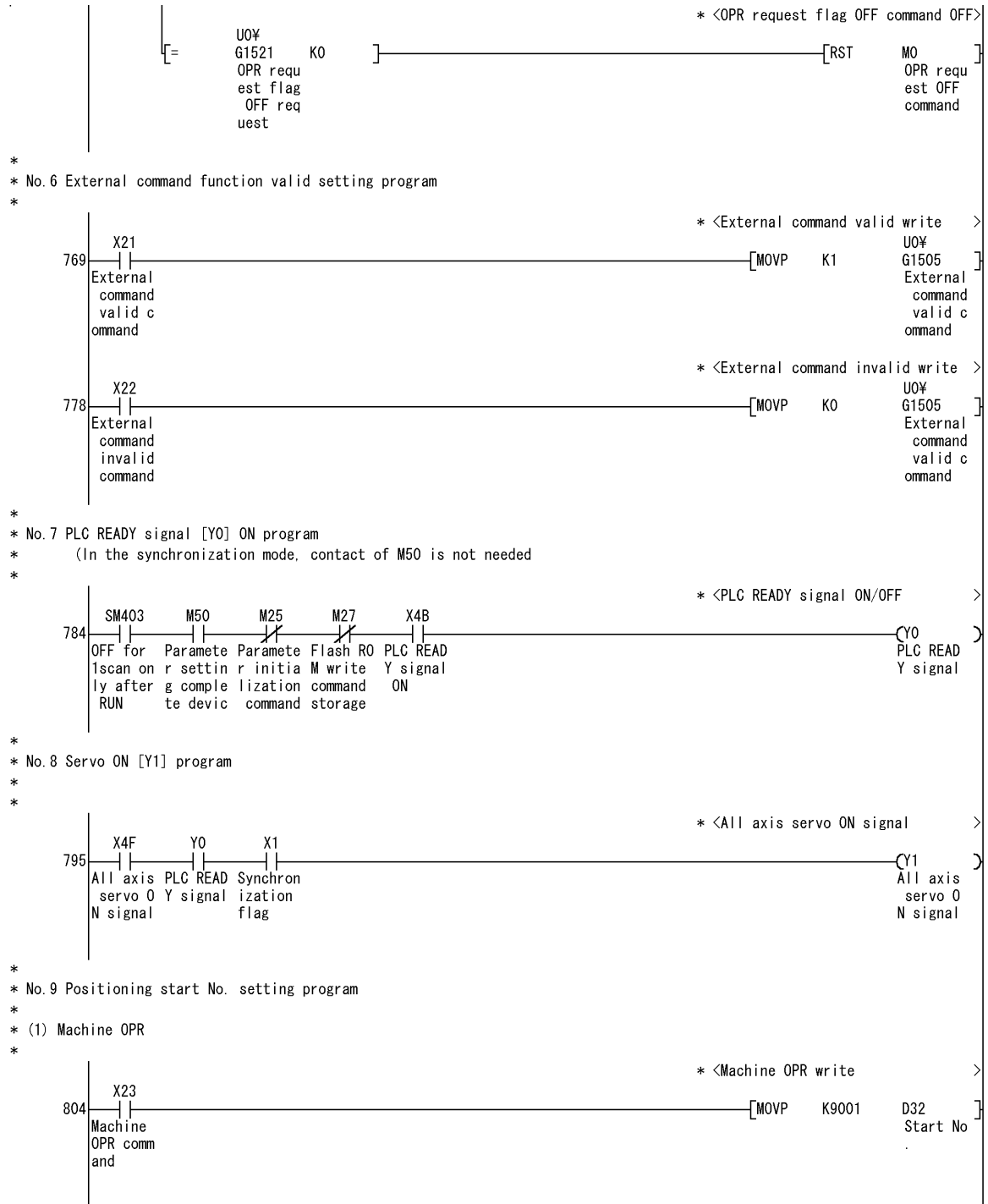
*
 * No.2-9 Positioning data setting program
 * (For positioning data No.15 <Axis 1>)
 * <Positioning identifier>
 * Operation pattern: Positioning complete
 * Control system: 1-axis linear control (INC)
 * Acceleration time No.: 0, decelation time No.: 0
 *

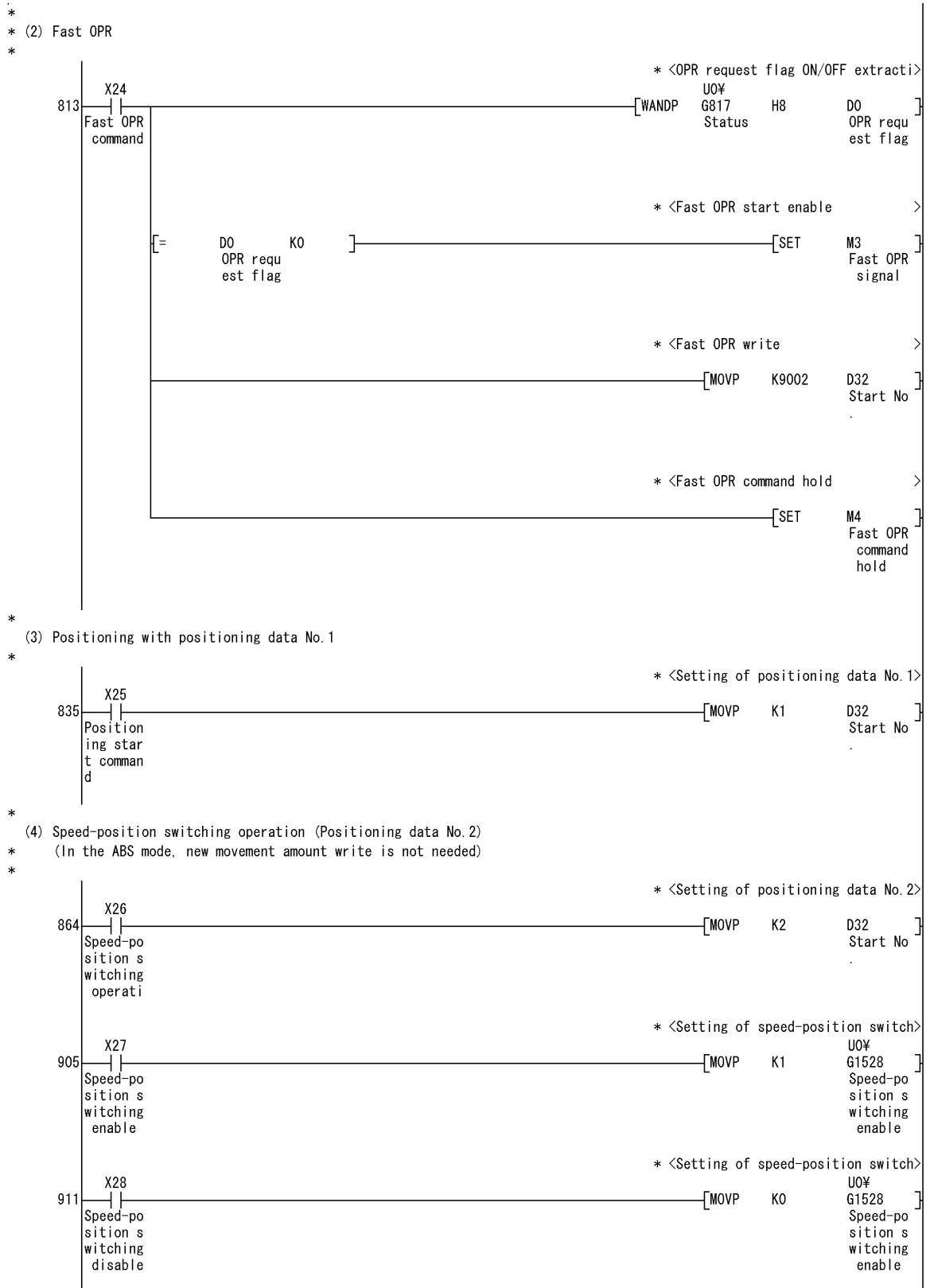


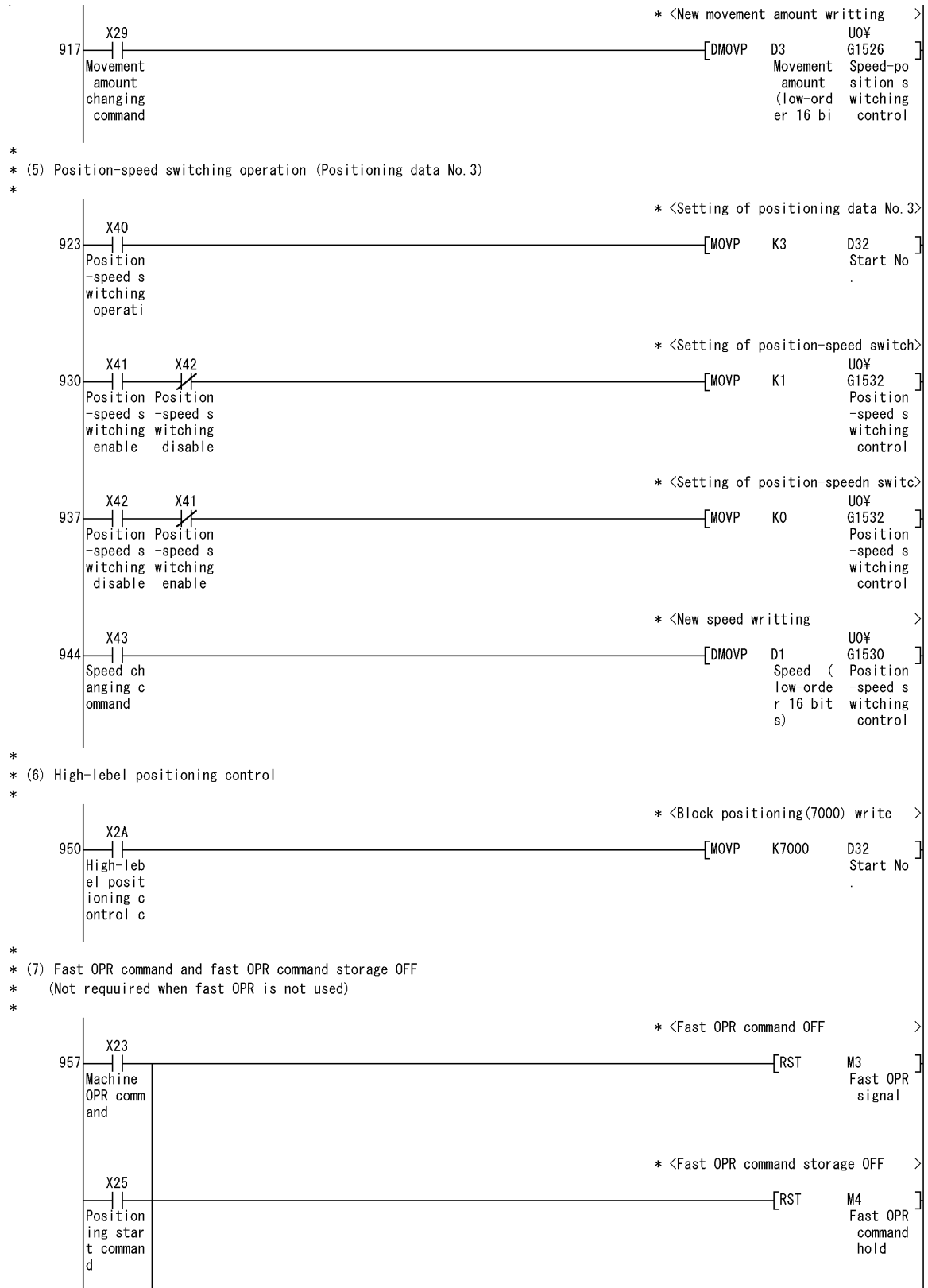


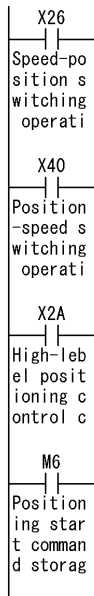




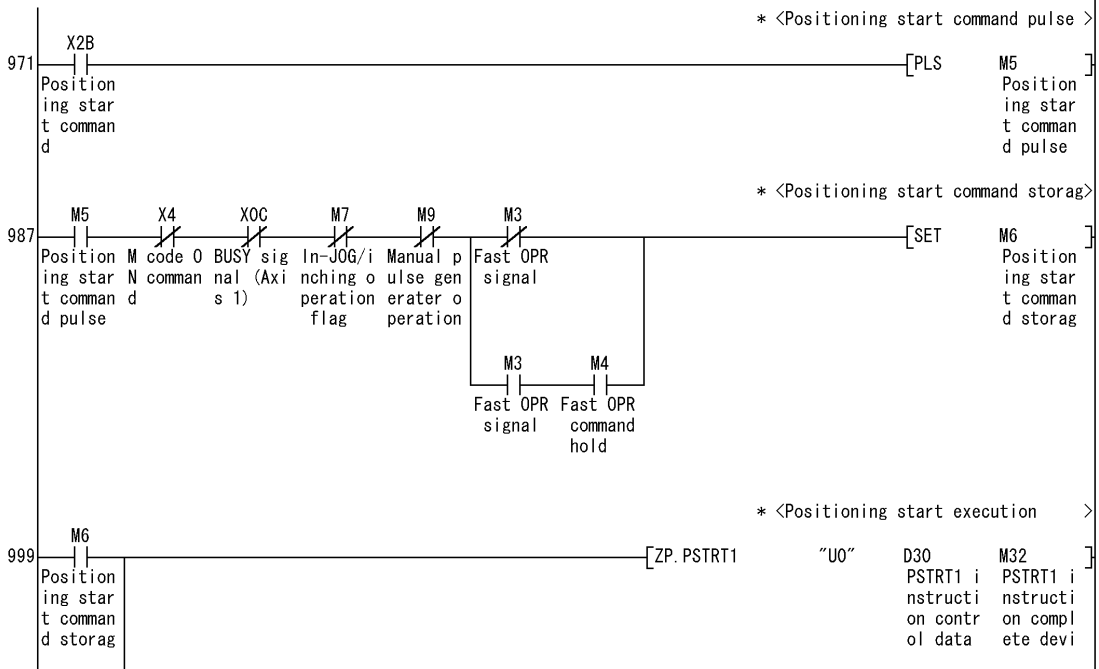


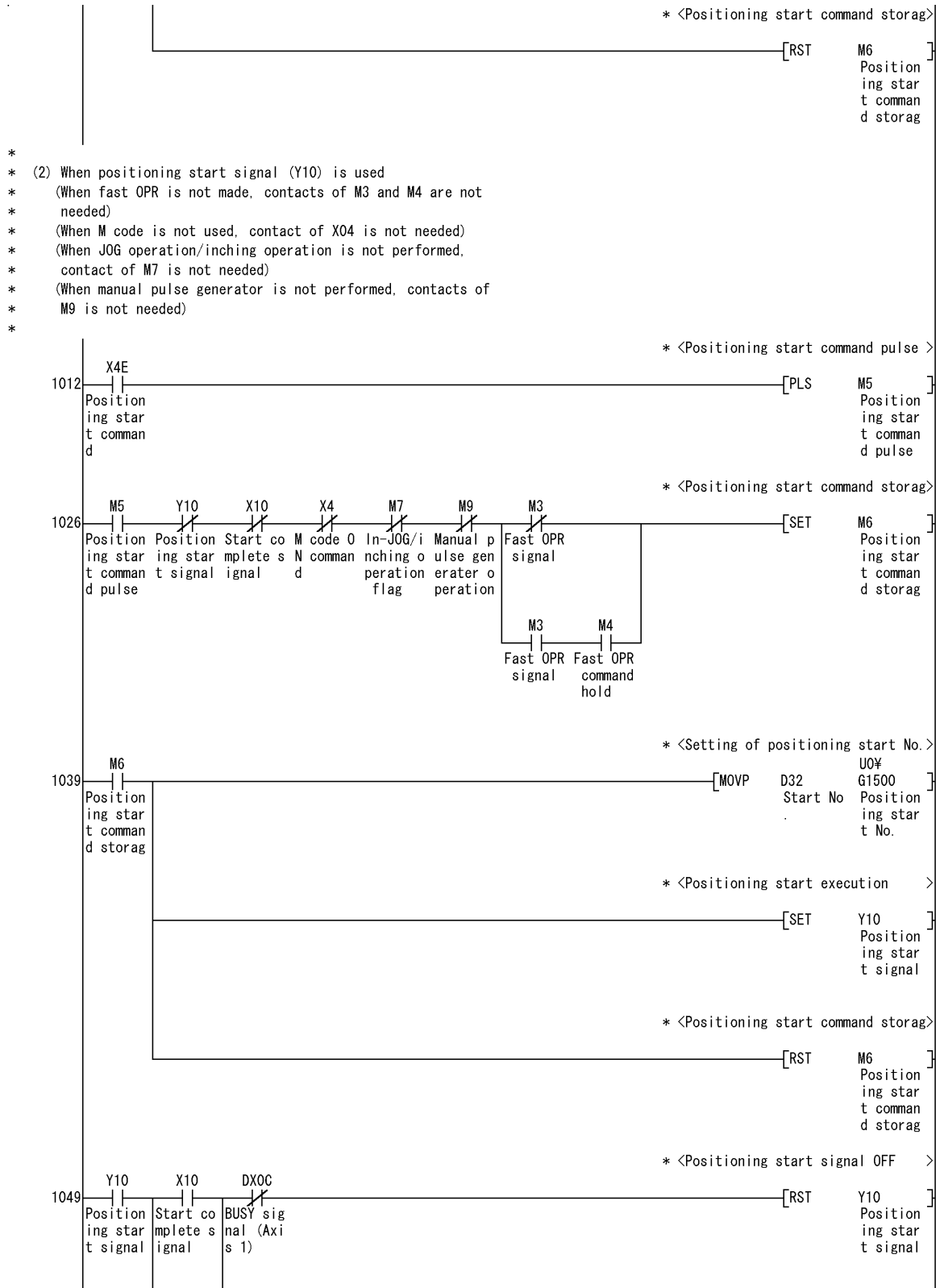




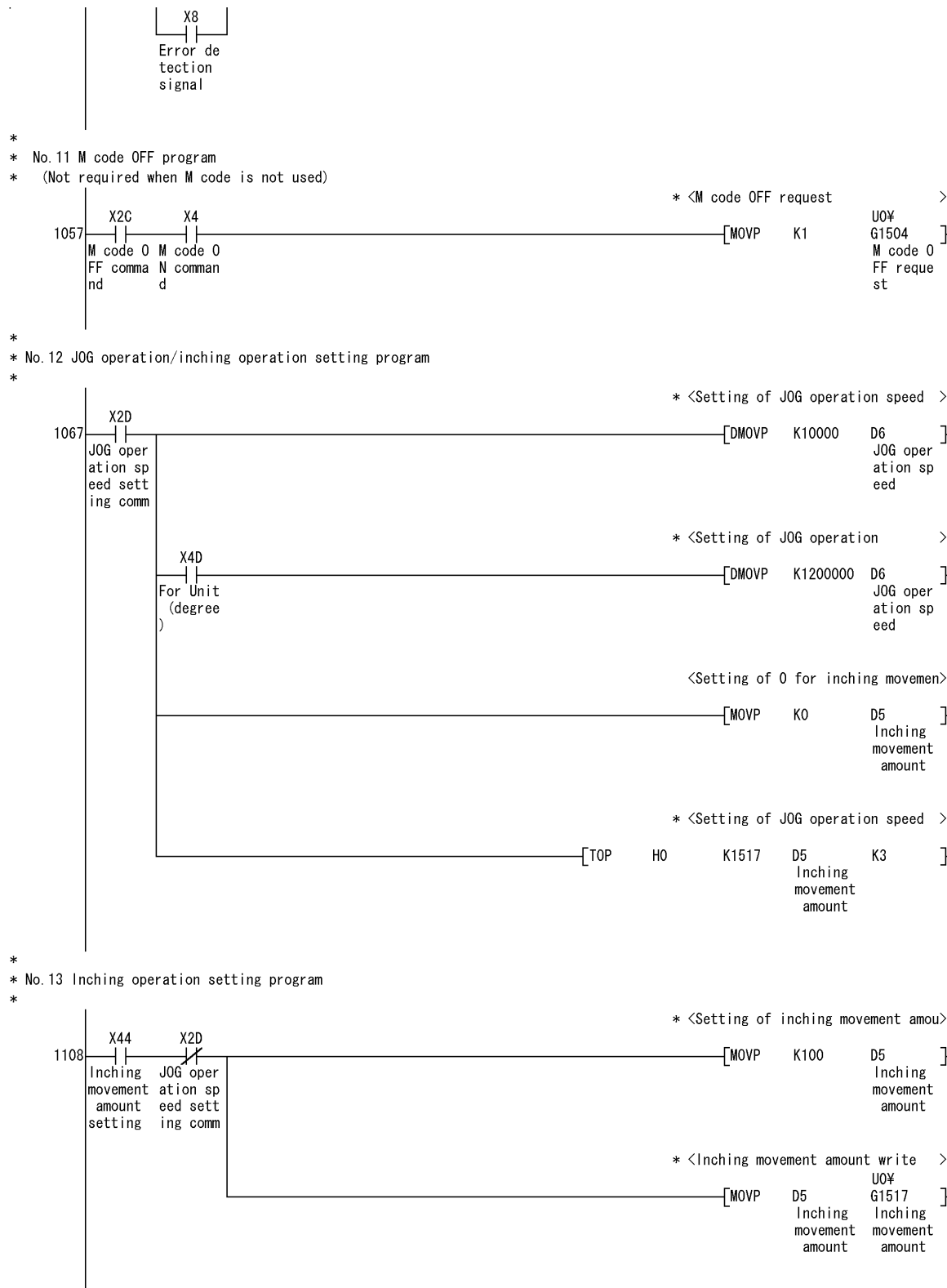


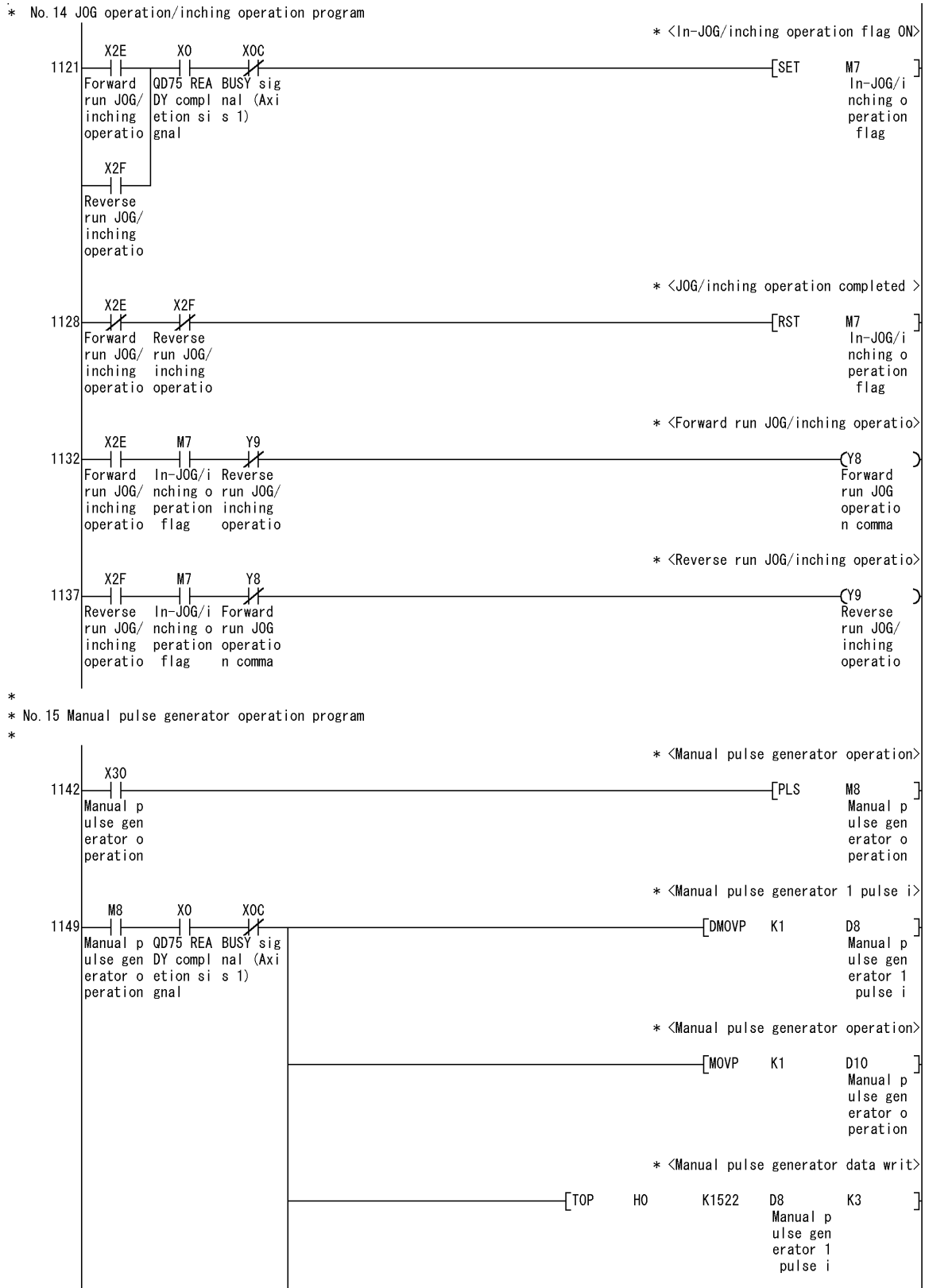
- * No. 10 Positioning start program
- * (1) When dedicated instruction (PSTRT1) is used
- * (When fast OPR is not made, contacts of M3 and M4 are not needed)
- * (When M code is not used, contact of X04 is not needed)
- * (When JOG operation/inching operation is not performed, contact of M7 is not needed)
- * (When manual pulse generator is not performed, contacts of M9 is not needed)

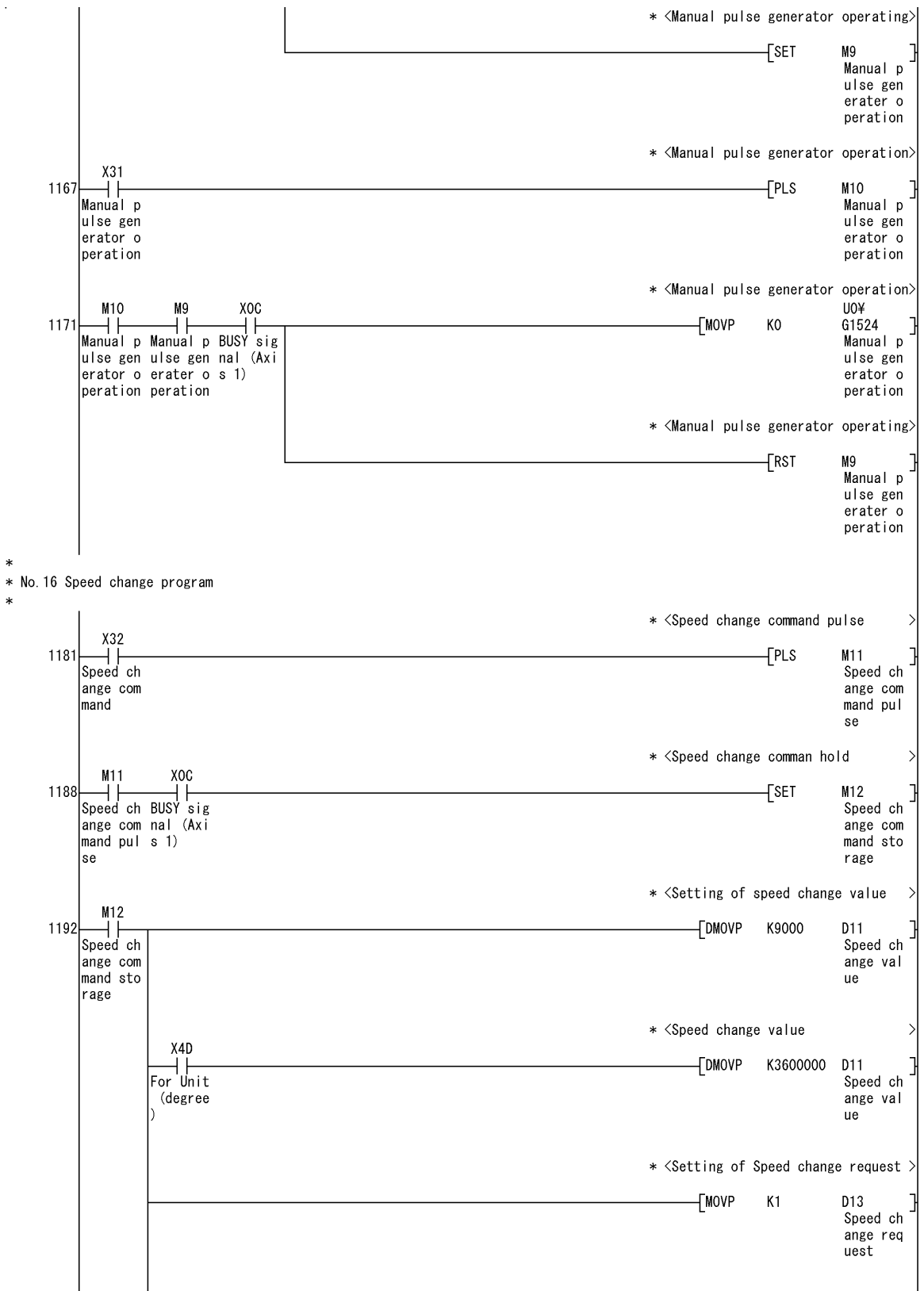


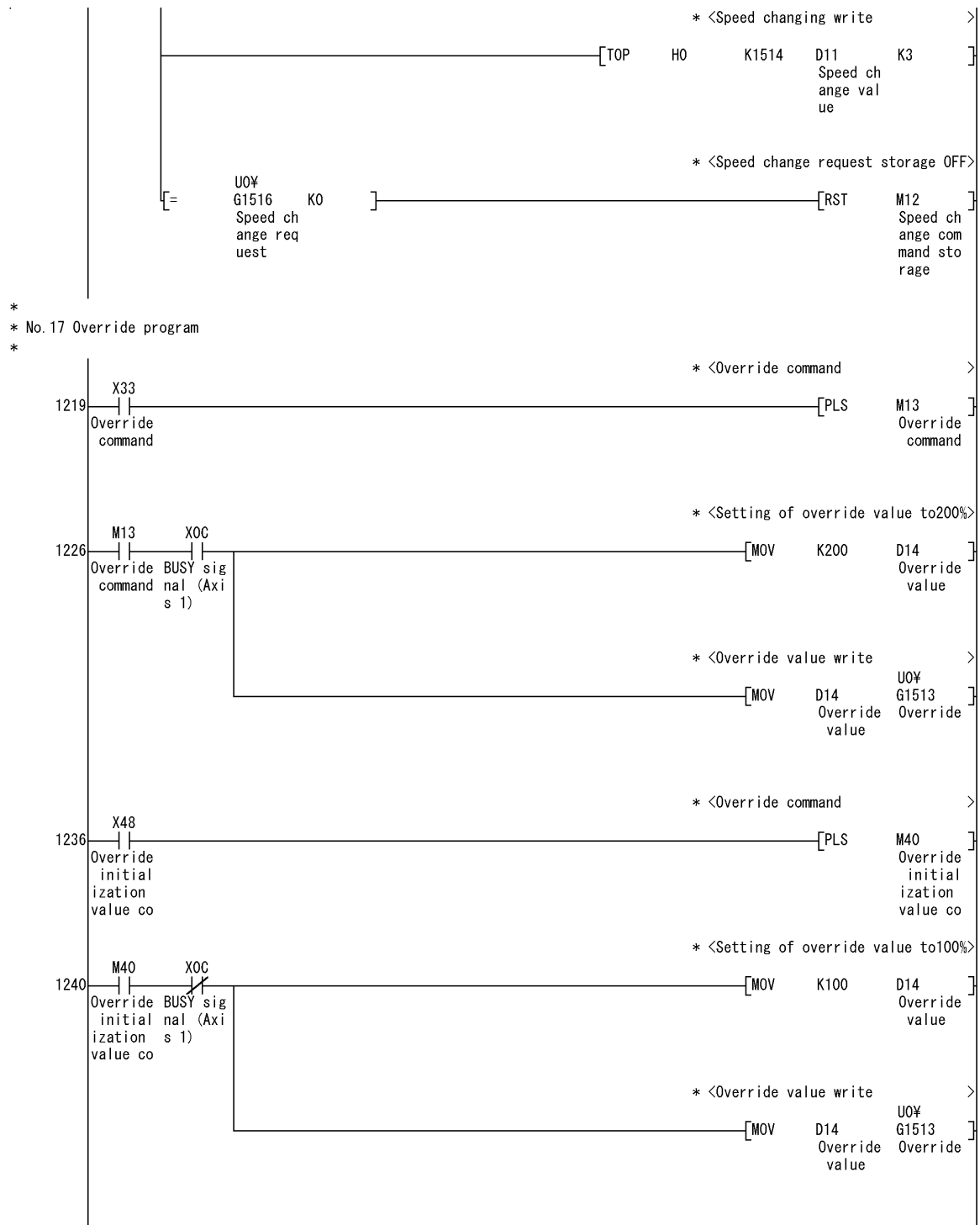


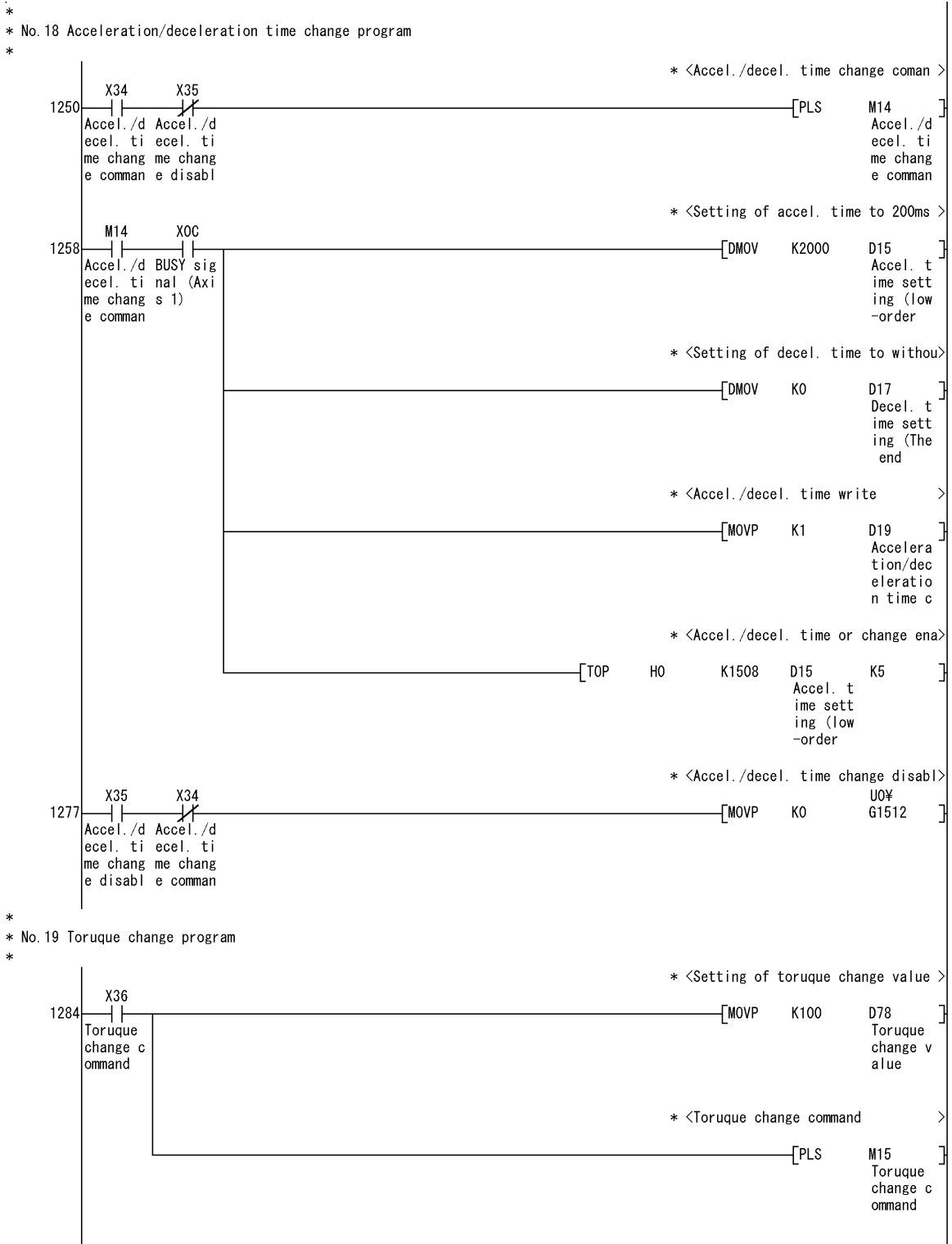
*
 * (2) When positioning start signal (Y10) is used
 * (When fast OPR is not made, contacts of M3 and M4 are not needed)
 * (When M code is not used, contact of X04 is not needed)
 * (When JOG operation/inching operation is not performed, contact of M7 is not needed)
 * (When manual pulse generator is not performed, contacts of M9 is not needed)
 *
 *

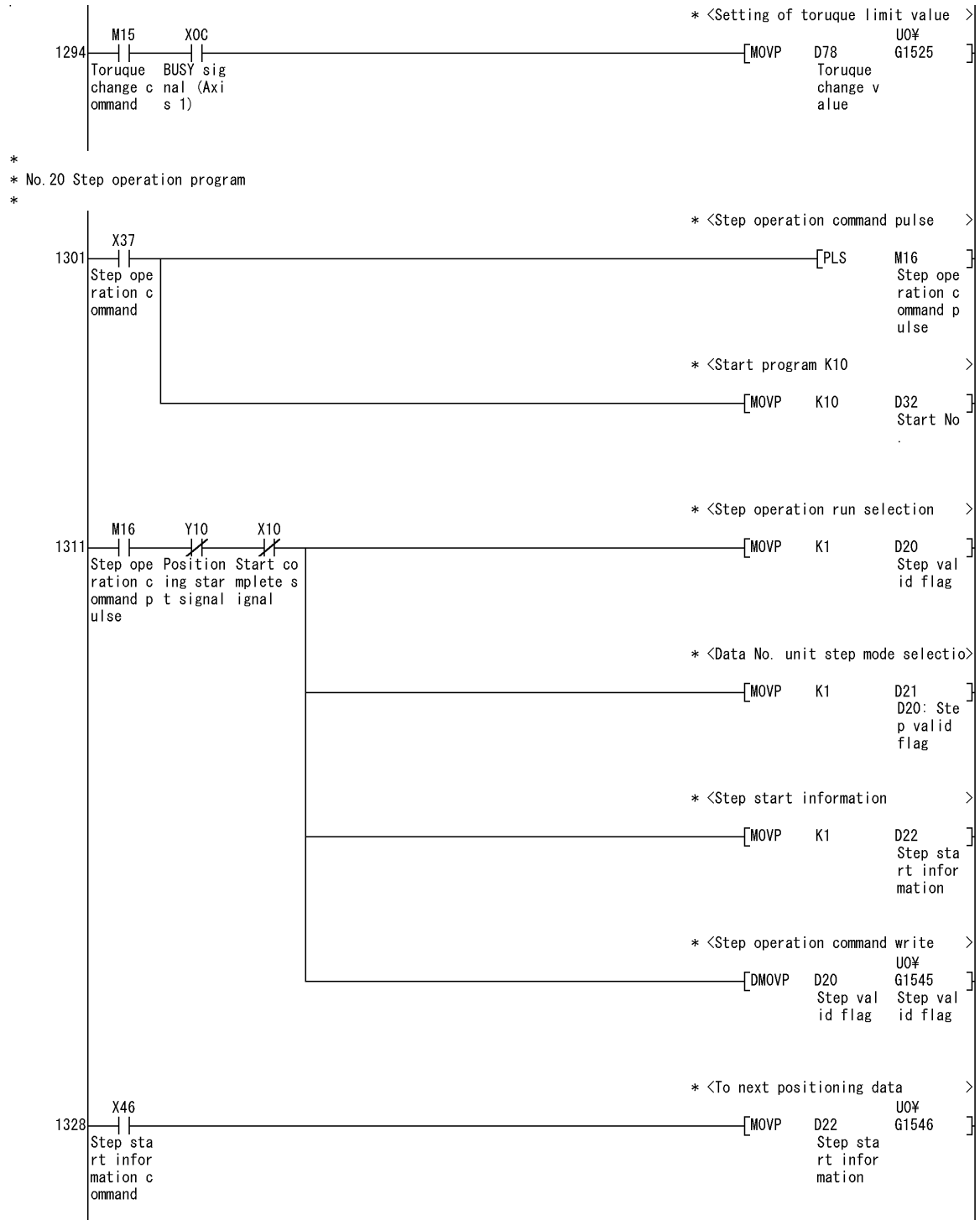


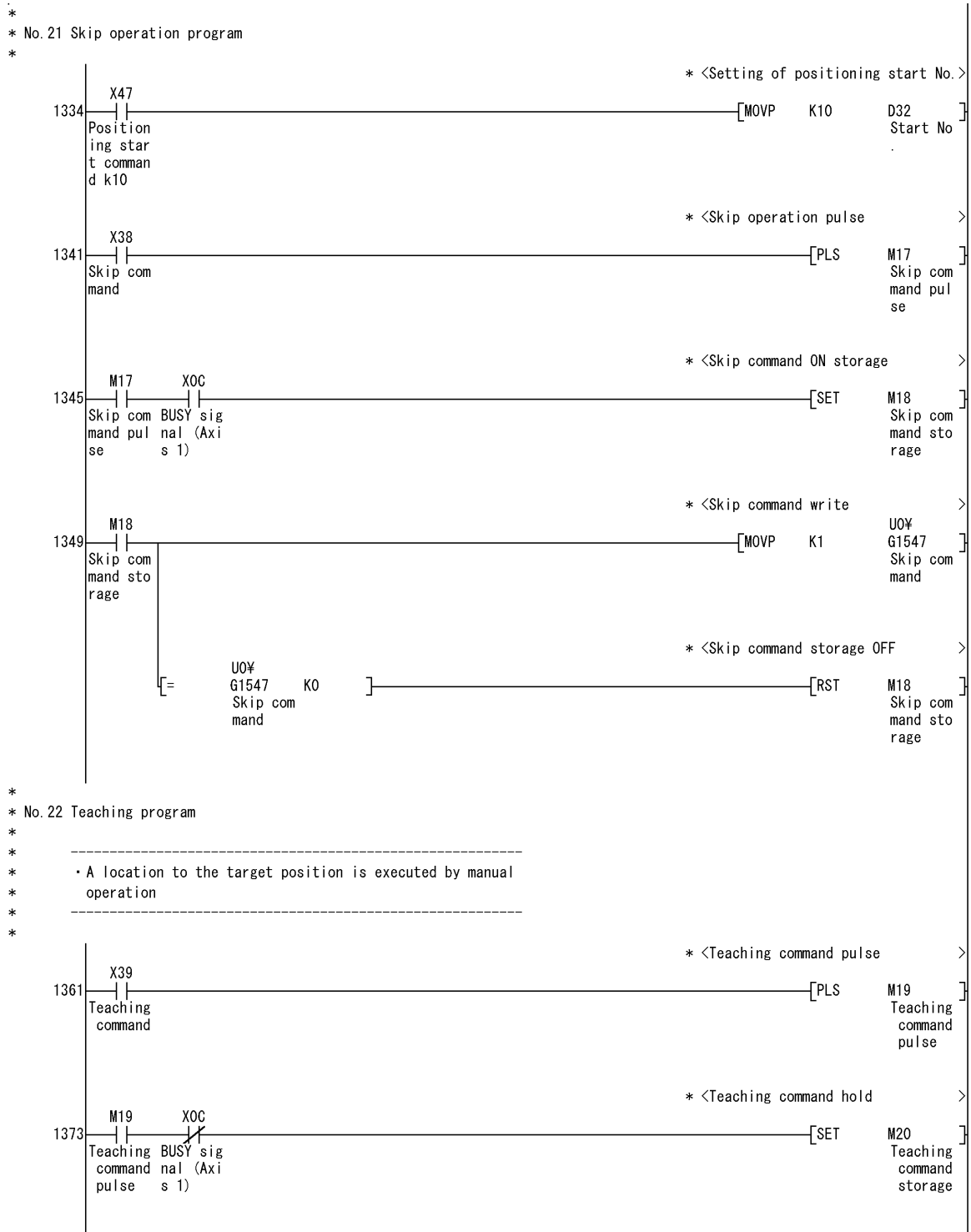


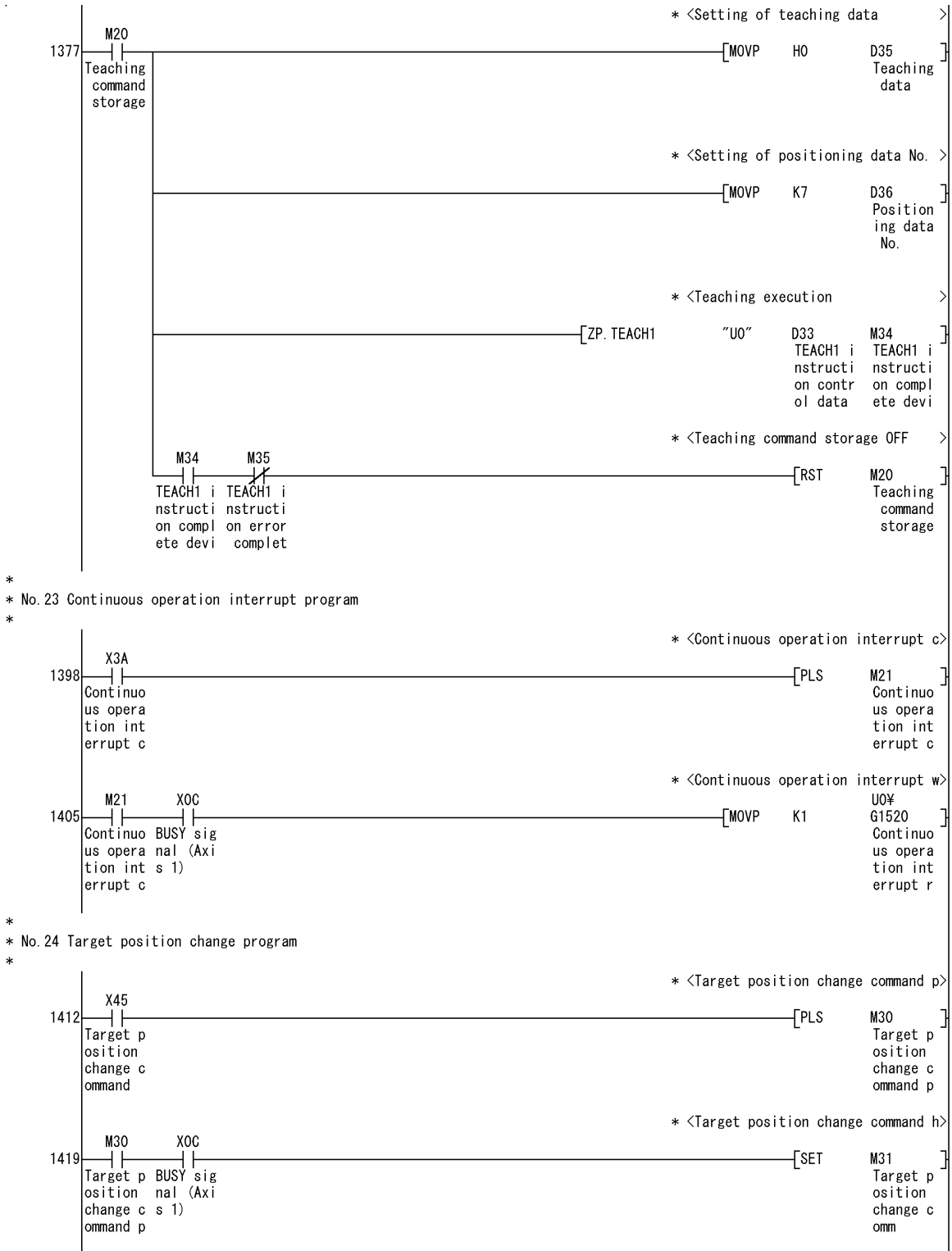


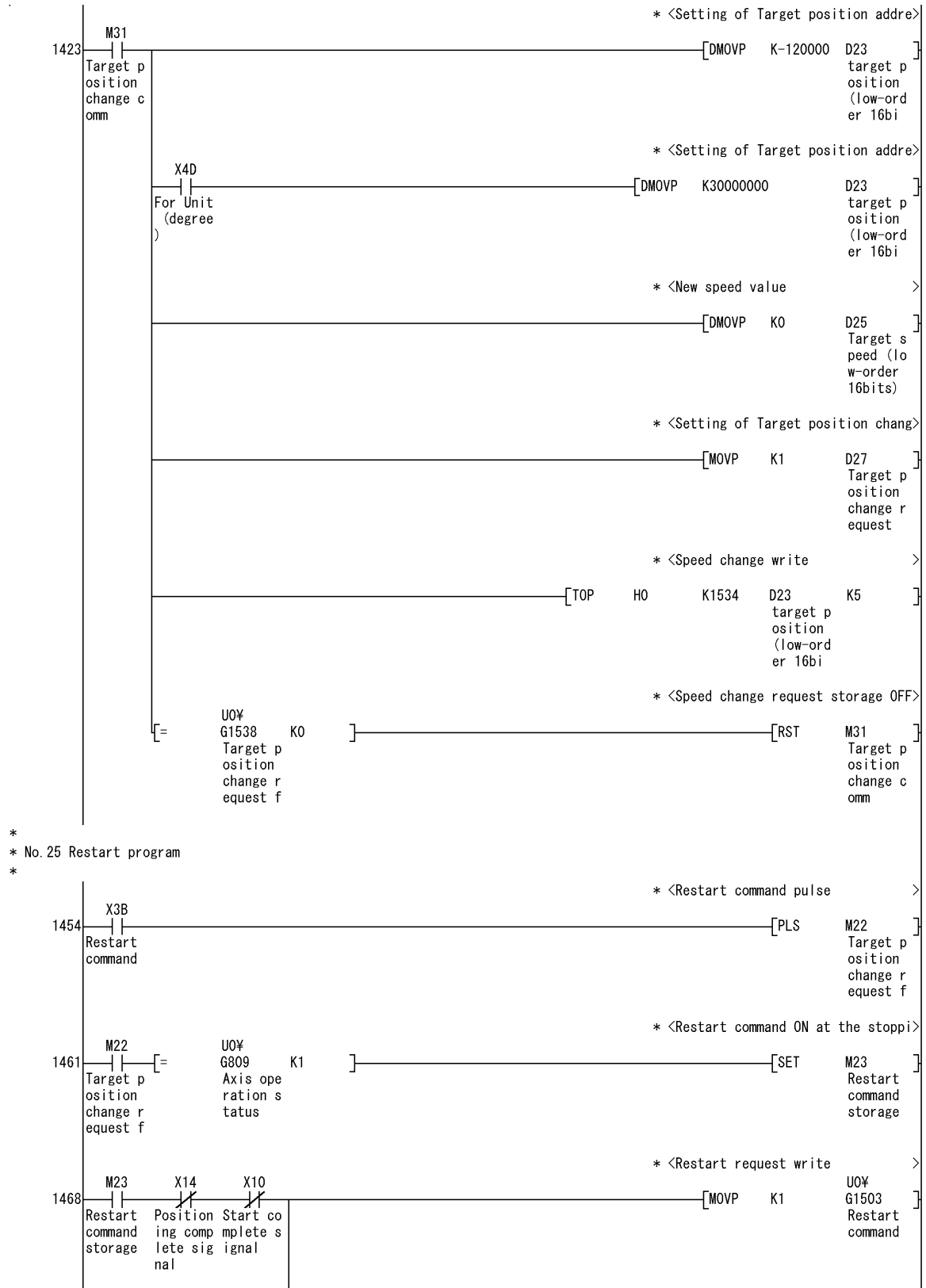


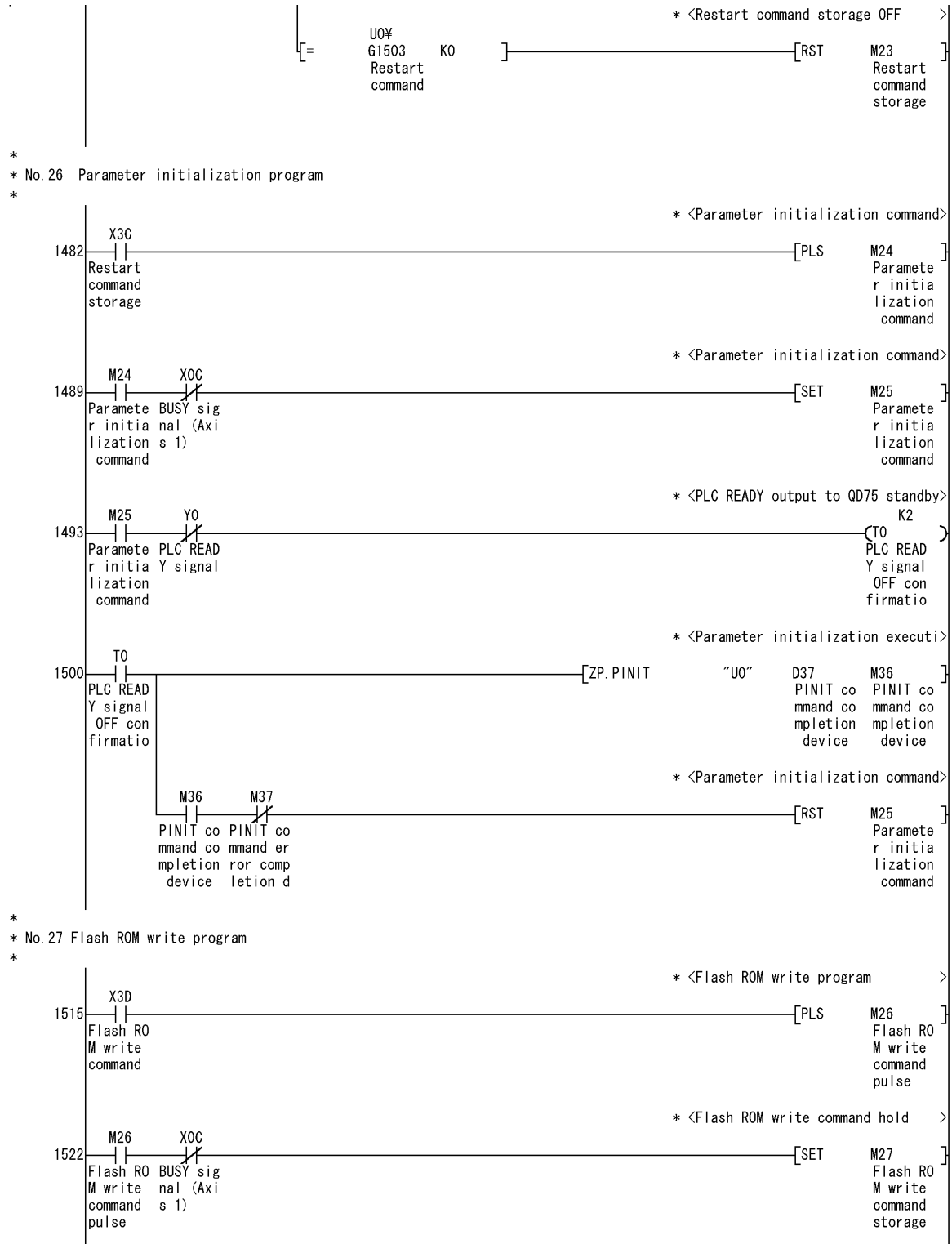


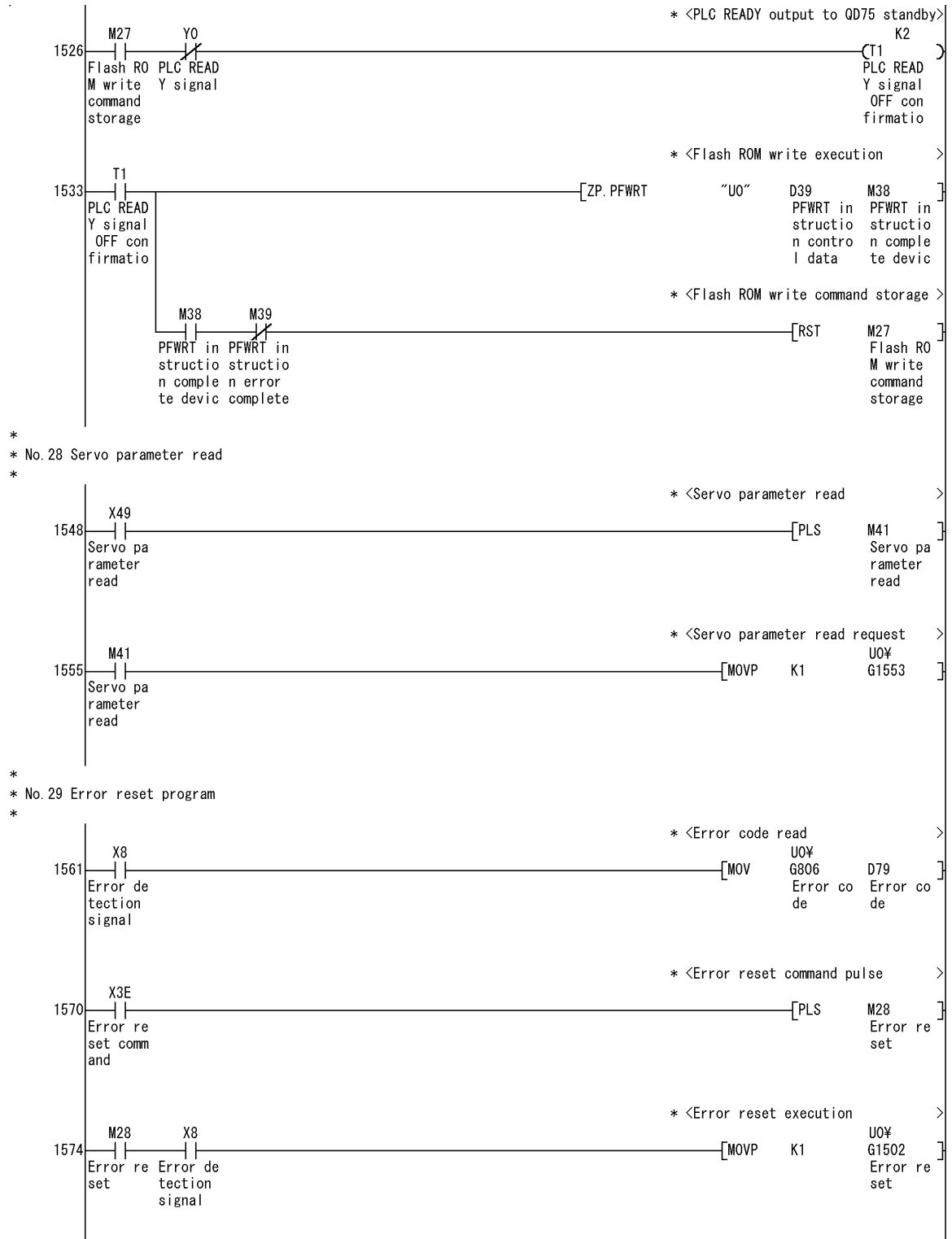














6.5 Program details

6.5.1 Initialization program

[1] OPR request OFF program

This program forcibly turns OFF the "OPR request flag" ([Md.31] Status: b3) which is ON.

When using a system that does not require OPR, assemble the program to cancel the "OPR request" made by the QD75 when the power is turned ON, etc.

■ Data requiring setting

Set the following data to use the OPR request flag OFF request.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Cd.19] OPR request flag OFF request | 1 | Set to "1: Turn OPR request flag OFF". | 1521 | 1621 | 1721 | 1821 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

■ Time chart for OPR OFF request

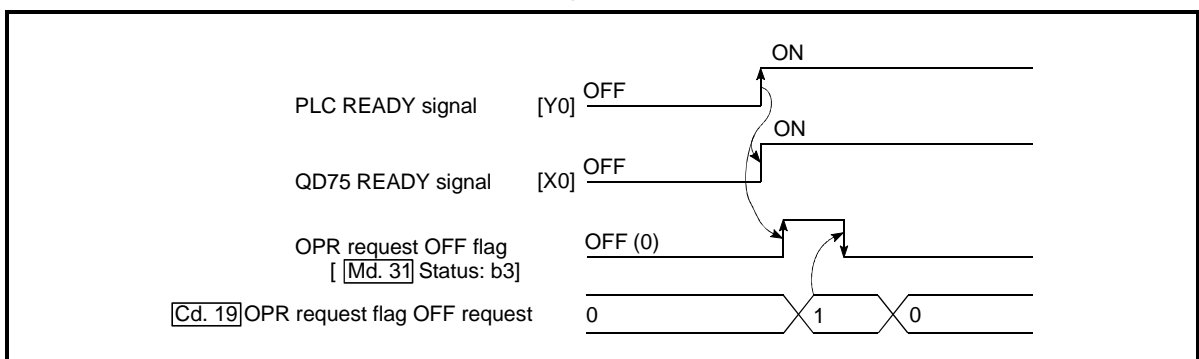


Fig. 6.1 Time chart for OPR OFF request

[2] External command function valid setting program

This program is used to validate the "external command signal" beforehand when using the external command functions (external start, speed change, speed-position switching, position-speed switching, skip). (Set which function to use beforehand in " [Pr.42] External command function selection".)

Set the following data to validate the "external command signal".

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|-------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Cd.8] External command valid | 1 | Set to "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

6.5.2 Start details setting program

This program sets which control, out of "OPR", "major positioning control" or "high-level positioning control" to execute. For "high-level positioning control", "fast OPR", "speed-position switching control" and "position-speed switching control", add the respectively required PLC program.

(Refer to "Chapter 10" for details on starting the "high-level positioning control.")

■ Procedures for setting the starting details

- (1) Set the "positioning start No." corresponding to the control to be started in "Cd.3" Positioning start No."

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------|---------------|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.3 | → | 1 to 600 : Positioning data No. 9001 : Machine OPR 9002 : Fast OPR 9003 : Current value changing 9004 : Simultaneous start 7000 to 7004 : Block No. (For "high-level positioning control") | 1500 | 1600 | 1700 | 1800 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

- (2) For "high-level positioning control", set the "positioning start point No." of the block to be started in "Cd.4" Positioning start point No."

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.4 | → | 1 to 50 : Point No. of block start data | 1501 | 1601 | 1701 | 1801 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

- (3) Set the following control data for "speed-position switching control (INC mode)".

(Set "Cd.23" Speed-position switching control movement amount change register as required". Setting is not required in the ABS mode.)

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------|---------------|--|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.23 | → | Set the new value when the position control's movement amount is to be changed during speed control. | 1526 1527 | 1626 1627 | 1726 1727 | 1826 1827 |
| Cd.24 | 1 | When "1" is set, the speed-position switching signal will be validated. | 1528 | 1628 | 1728 | 1828 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

- (4) For "position-speed switching control", set the control data shown below.
 (As required, set the " Cd.25 Position-speed switching control speed change resistor".)

| Setting item | | Setting value | Setting details | Buffer memory address | | | |
|---|--|---------------|---|-----------------------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.25 | Position-speed switching control speed change resistor | → | Used to set a new value when speed is changed during positioning control. | 1530 | 1630 | 1730 | 1830 |
| | | | | 1531 | 1631 | 1731 | 1831 |
| Cd.26 | Position-speed switching enable flag | 1 | To validate position-speed switching signal, this is set to 1. | 1532 | 1632 | 1732 | 1832 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

6.5.3 Start program

This program is used to start the control with start commands.

The control can be started with the following two methods.

- [1] Starting by inputting positioning start signal [Y10, Y11, Y12, Y13]
- [2] Starting by inputting external command signal

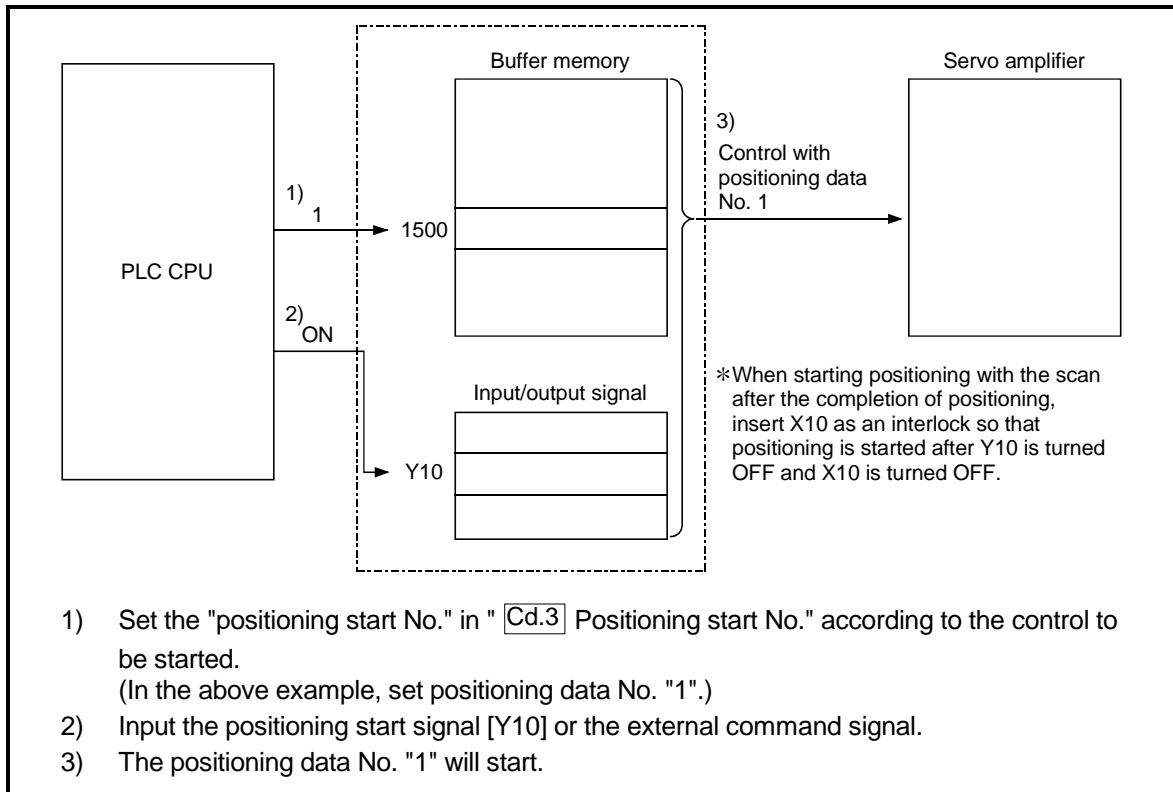


Fig. 6.2 Procedures for starting control (for axis 1)

■ Servo ON conditions

Setting of servo parameter



PLC READY signal Y0 ON



All axis servo ON Y1 ON

■ Starting conditions

To start the control, the following conditions must be satisfied.

The necessary start conditions must be incorporated in the PLC program so that the control is not started when the conditions are not satisfied.

| Signal name | | Signal state | | Device | | | |
|---------------------|------------------------|--------------|-------------------------------|--------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | X0 | | | |
| | All axis servo ON | ON | All axis servo is ON | Y1 | | | |
| | Synchronization flag * | ON | QD75 buffer memory Accessible | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF. | Y4 | Y5 | Y6 | Y7 |
| | M code ON signal | OFF | M code ON signal is OFF. | X4 | X5 | X6 | X7 |
| | Error detection signal | OFF | No error is present. | X8 | X9 | XA | XB |
| | BUSY signal | OFF | BUSY signal is OFF. | XC | XD | XE | XF |
| | Start complete signal | OFF | Start complete signal is OFF. | X10 | X11 | X12 | X13 |
| External signal | Stop signal | OFF | Stop signal is OFF. | - | | | |
| | Upper limit (FLS) | ON | Within limit range | - | | | |
| | Lower limit (RLS) | ON | Within limit range | - | | | |

※: When the synchronous setting of the PLC CPU is made in the nonsynchronous mode, this must be provided as an interlock.
When it is made in the synchronous mode, no interlock must be provided in the program because the flag is turned ON when calculation is run on the PLC CPU.

[1] Starting by inputting positioning start signal

■ Operation when starting

- (1) When the positioning start signal turns ON, the start complete signal and BUSY signal turn ON, and the positioning operation starts.
It can be seen that the axis is operating when the BUSY signal is ON.
- (2) When the positioning start signal turns OFF, the start complete signal also turns OFF.
If the positioning start signal is ON even after positioning is completed, the start complete signal will remain ON.
- (3) If the positioning start signal turns ON again while the BUSY signal is ON, the warning "operating start (warning code: 100)" will occur.
- (4) The process taken when positioning is completed will differ according to case (a) and (b) below.
 - (a) When next positioning is not to be carried out
 - If a dwell time is set, the system will wait for the set time to pass, and then positioning will be completed.
 - When positioning is completed, the BUSY signal will turn OFF and the positioning complete signal will turn ON. However, when using speed control or when the positioning complete signal ON time is "0", the signal will not turn ON.
 - When the positioning complete signal ON time is passed, the positioning complete signal will turn OFF.
 - (b) When next positioning is to be carried out
 - If a dwell time is set, the system will wait for the set time to pass.
 - When the set dwell time is passed, the next positioning will start.

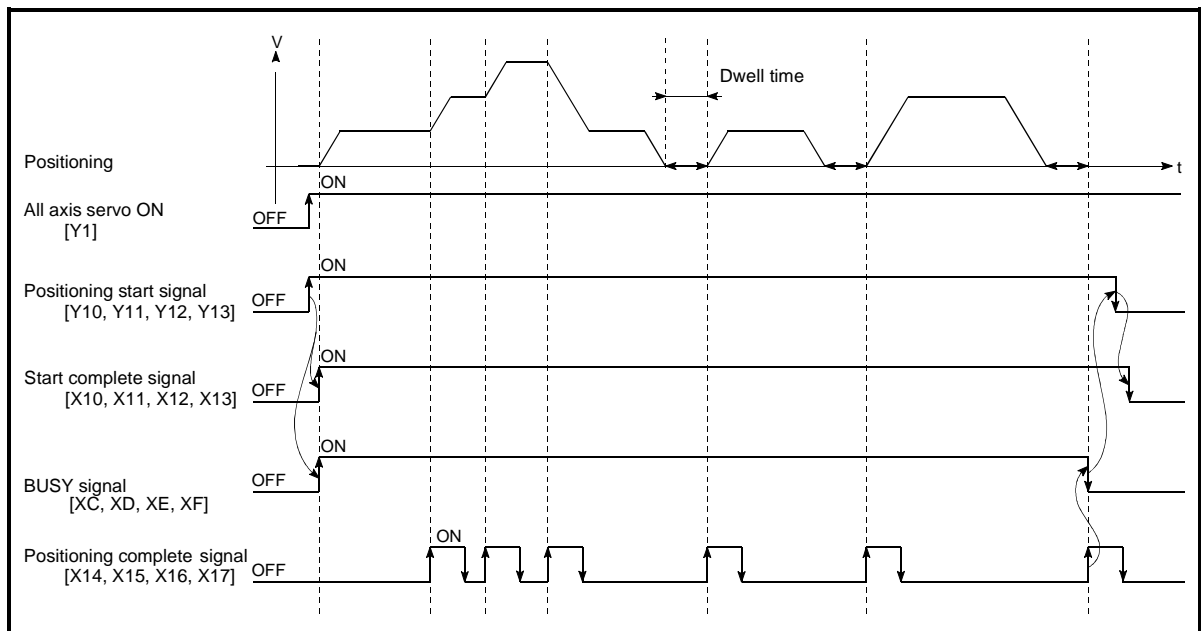


Fig. 6.3 ON/OFF timing of each signal at start of positioning

POINT
 The BUSY signal [XC, XD, XE, XF] turns ON even when position control of movement amount 0 is executed. However, since the ON time is short, the ON status may not be detected in the PLC program.
 (The ON status of the start complete signal [X10, X11, X12, X13], positioning complete signal [X14, X15, X16, X17] and M code ON signal [X4, X5, X6, X7] can be detected in the PLC program.)

■ Starting time chart

The time chart for starting each control is shown below.

(1) Time chart for starting "machine OPR"

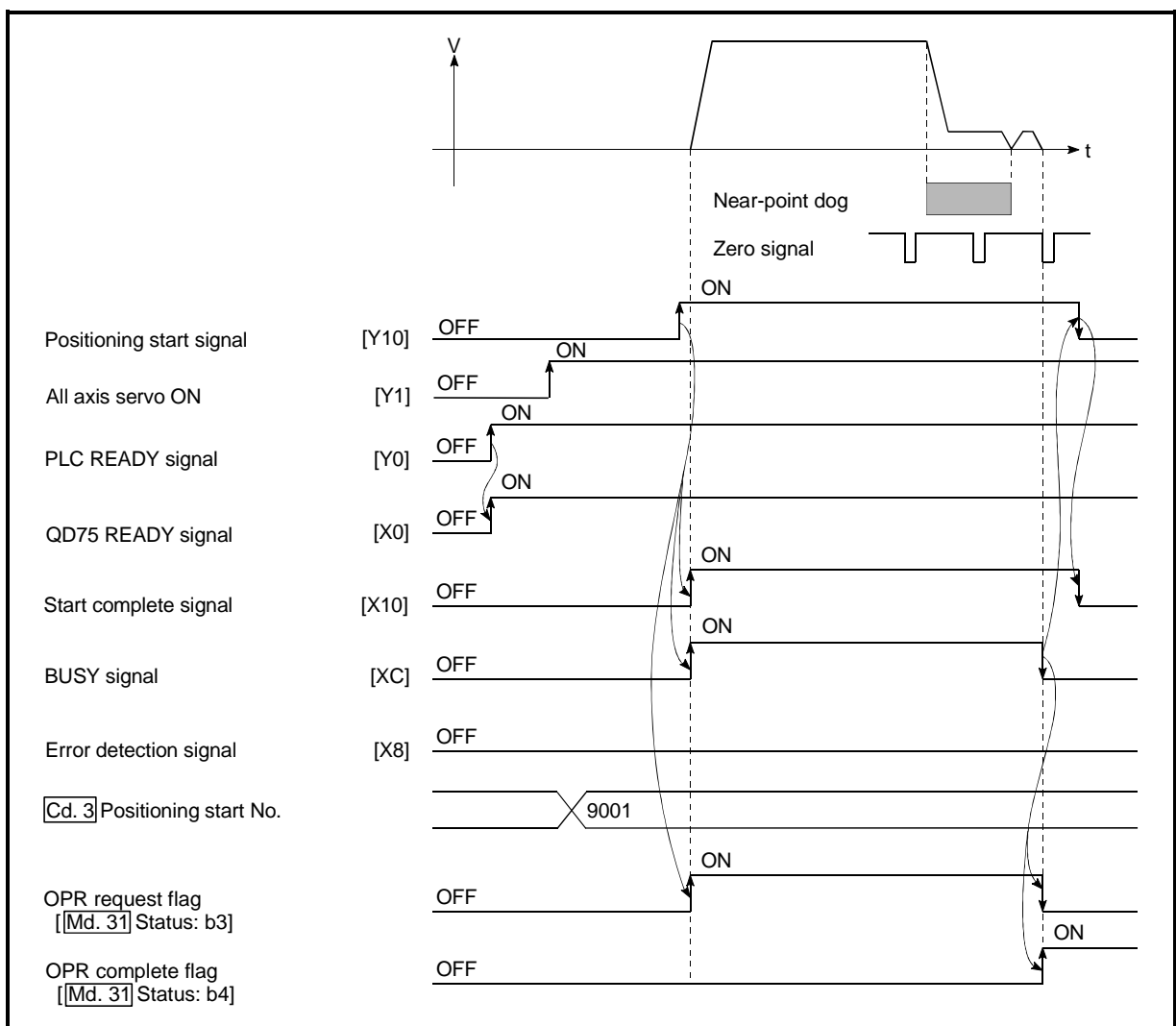


Fig. 6.4 Time chart for starting "machine OPR"

(2) Time chart for starting "fast OPR"

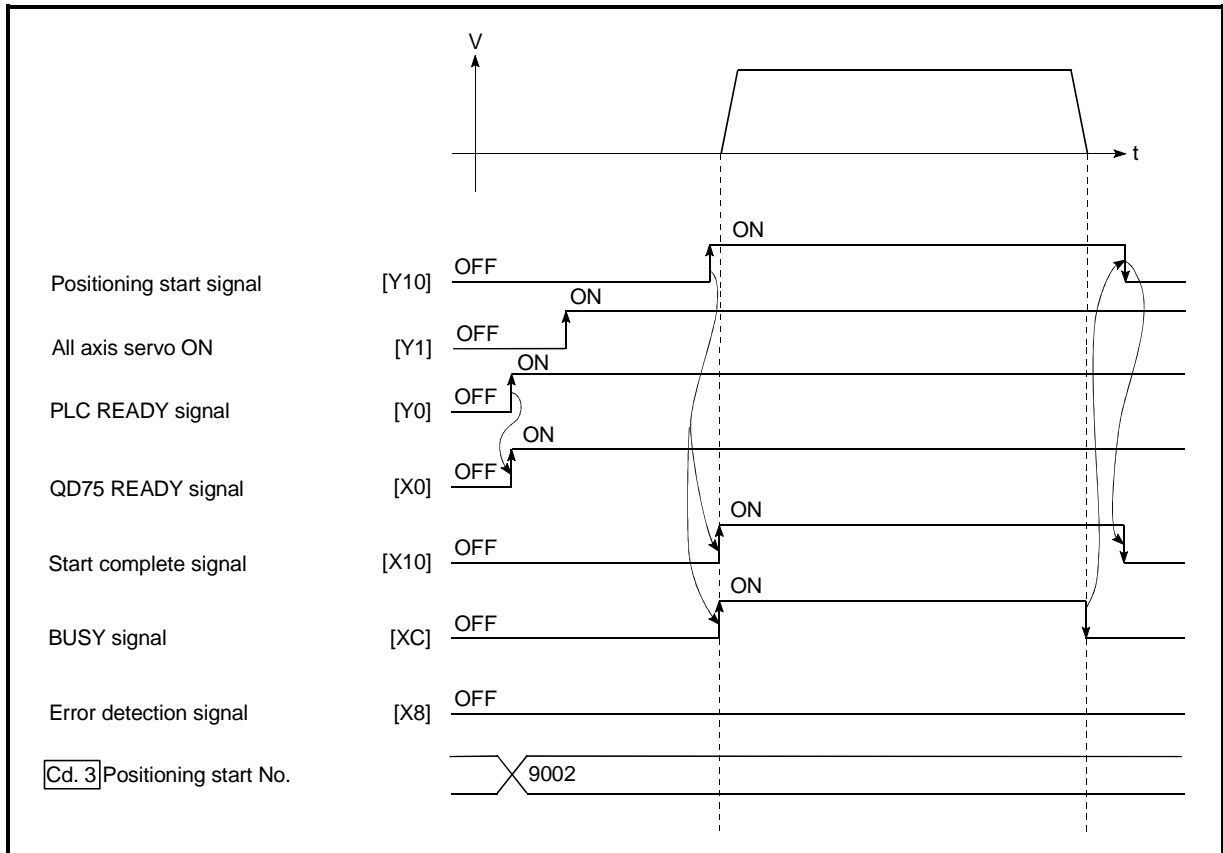


Fig. 6.5 Time chart for starting "fast OPR"

(3) Time chart for starting "major positioning control"

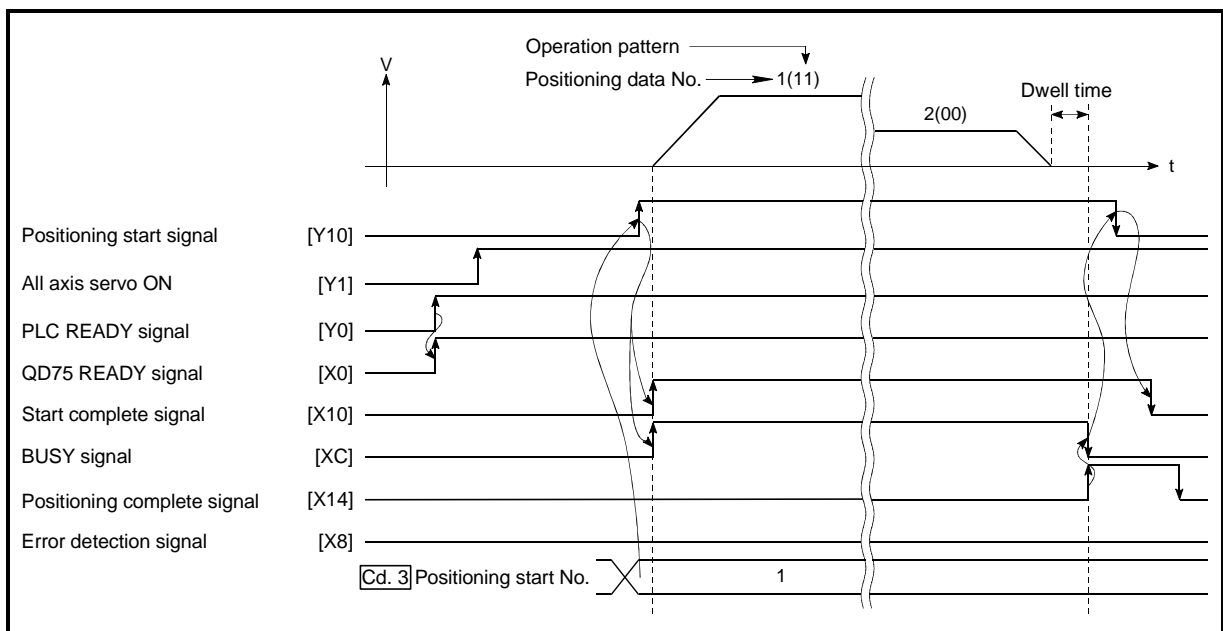


Fig. 6.6 Time chart for starting "major positioning control"

(4) Time chart for starting "speed-position switching control"

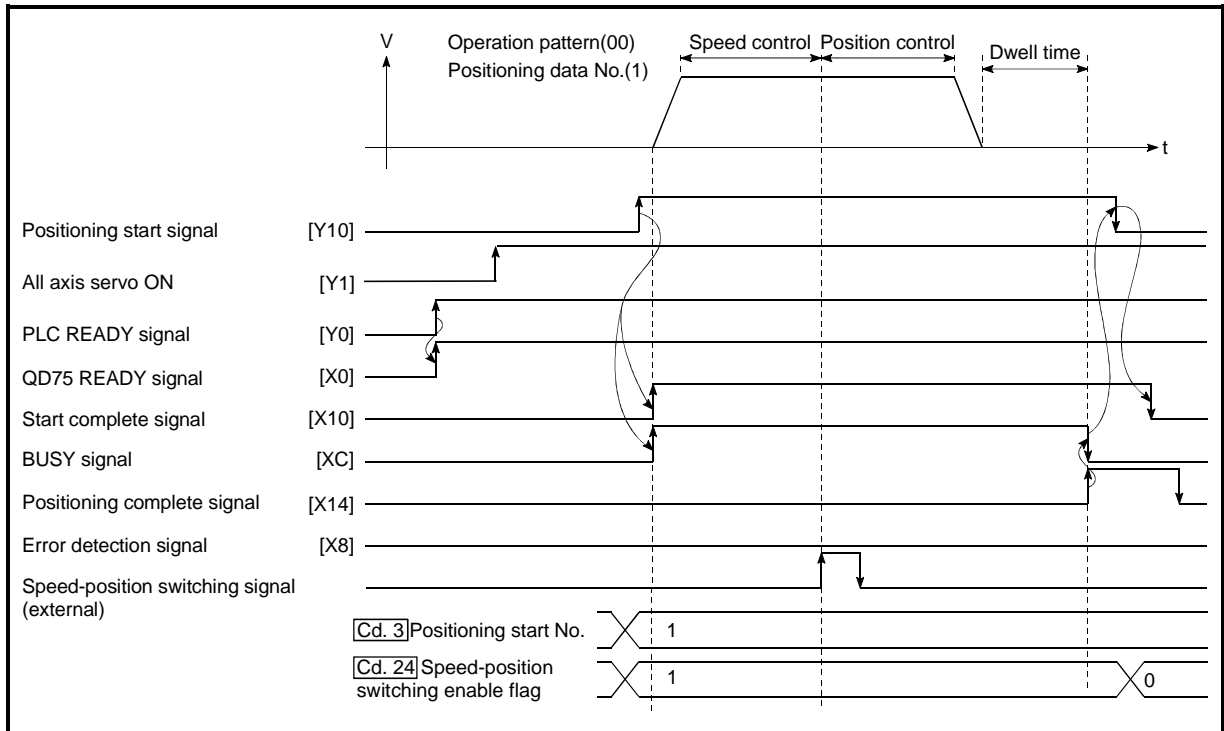


Fig. 6.7 Time chart for starting "speed-position switching control"

(5) Time chart for starting "position-speed switching control"

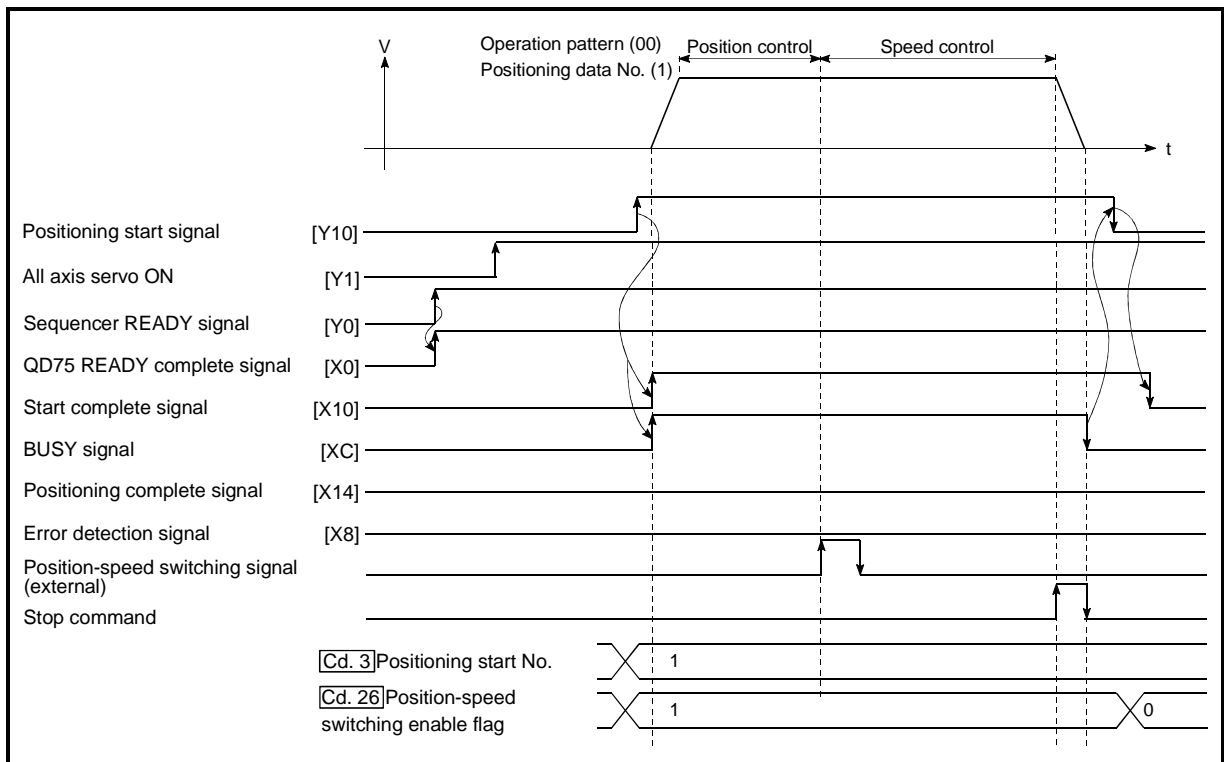


Fig. 6.8 Time chart for starting "position-speed switching control"

■ Machine OPR operation timing and process time

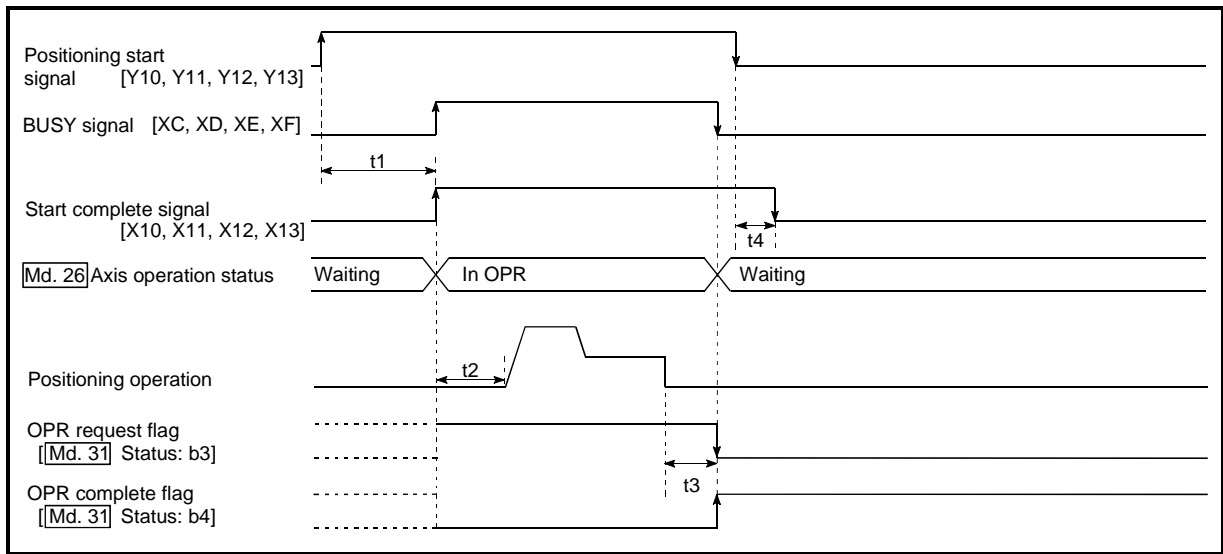


Fig. 6.9 Machine OPR operation timing and process time

Normal timing time

Unit: ms

| t1 | t2 | t3 | t4 |
|------------|------------|----------|----------|
| 1.0 to 1.4 | 5.5 to 7.9 | 0 to 3.5 | 0 to 3.5 |

- The t1 timing time could be delayed depending on the operating conditions of the other axis.

■ Position control operation timing and process time

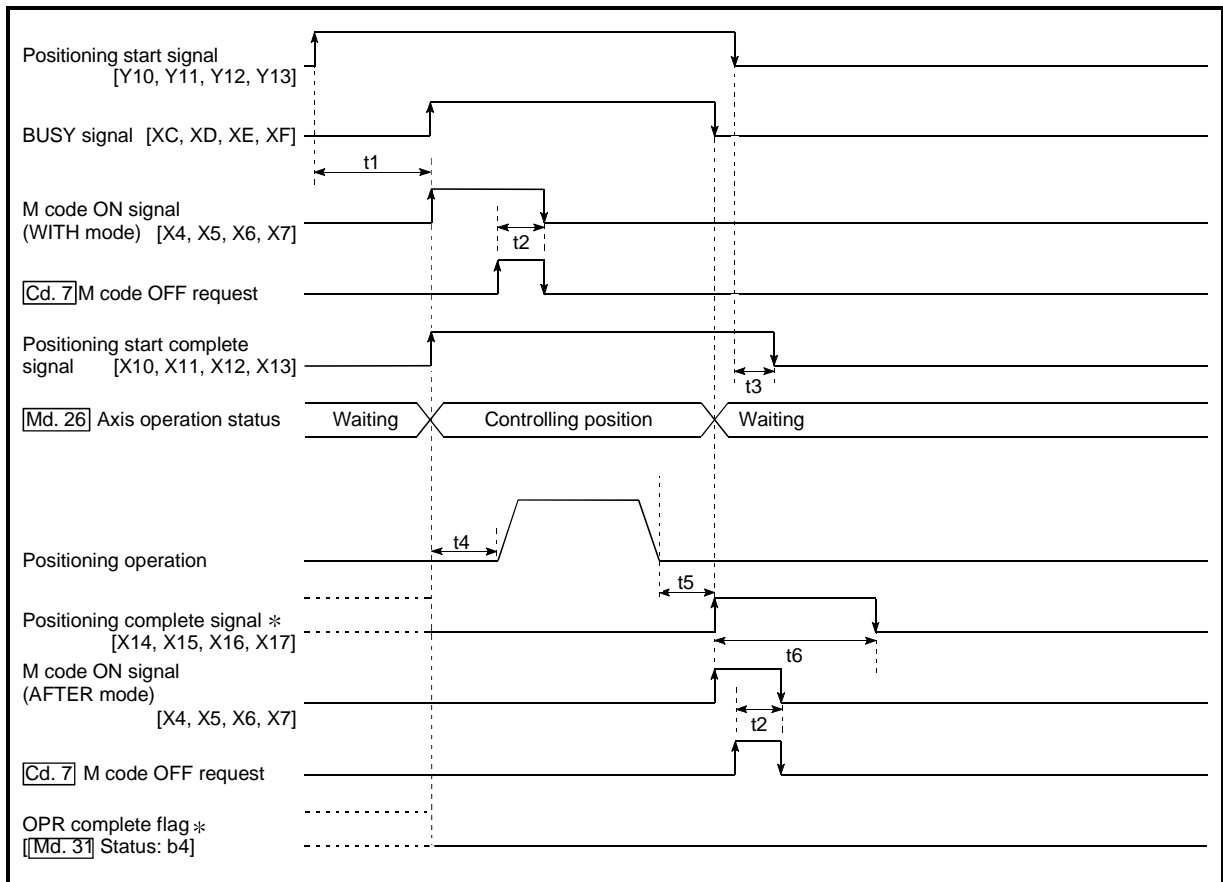


Fig. 6.10 Position control operation timing and process time

- When the positioning start signal turns ON, if all signals marked with an asterisk (*) are already ON, the signals marked with an asterisk (*) will turn OFF when the positioning start signal turns ON.

Normal timing time

Unit: ms

| t1 | t2 | t3 | t4 | t5 | t6 |
|------------|----------|----------|------------|----------|--------------------|
| 1.2 to 2.3 | 0 to 3.5 | 0 to 3.5 | 5.5 to 7.9 | 0 to 3.5 | Follows parameters |

- The t1 timing time could be delayed depending on the operating conditions of the other axis.

[2] Starting by inputting external command signal

When starting positioning control by inputting the external command signal, the start command can be directly input into the QD75. This allows the variation time equivalent to one scan time of the PLC CPU to be eliminated. This is an effective procedure when operation is to be started as quickly as possible with the start command or when the starting variation time is to be suppressed. To start positioning control by inputting the external command signal, set the "data required to be set" and then turn ON the external command signal.

■ Restrictions

When starting by inputting the external command signal, the start complete signal [X10, X11, X12, X13] will not turn ON.

■ Data required to be set

To execute positioning start with the external command signal, set parameter ([Pr.42]) beforehand, and validate the "external command signal" with the "external command signal validity setting program (program No. 5).

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Pr.42] External command function selection | 0 | Set to "0: External positioning start". | 62 | 212 | 362 | 512 |
| [Cd.8] External command valid | 1 | Set to "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Chapter 5 "Data Used for Positioning Control" for details on the setting details.

■ Starting time chart

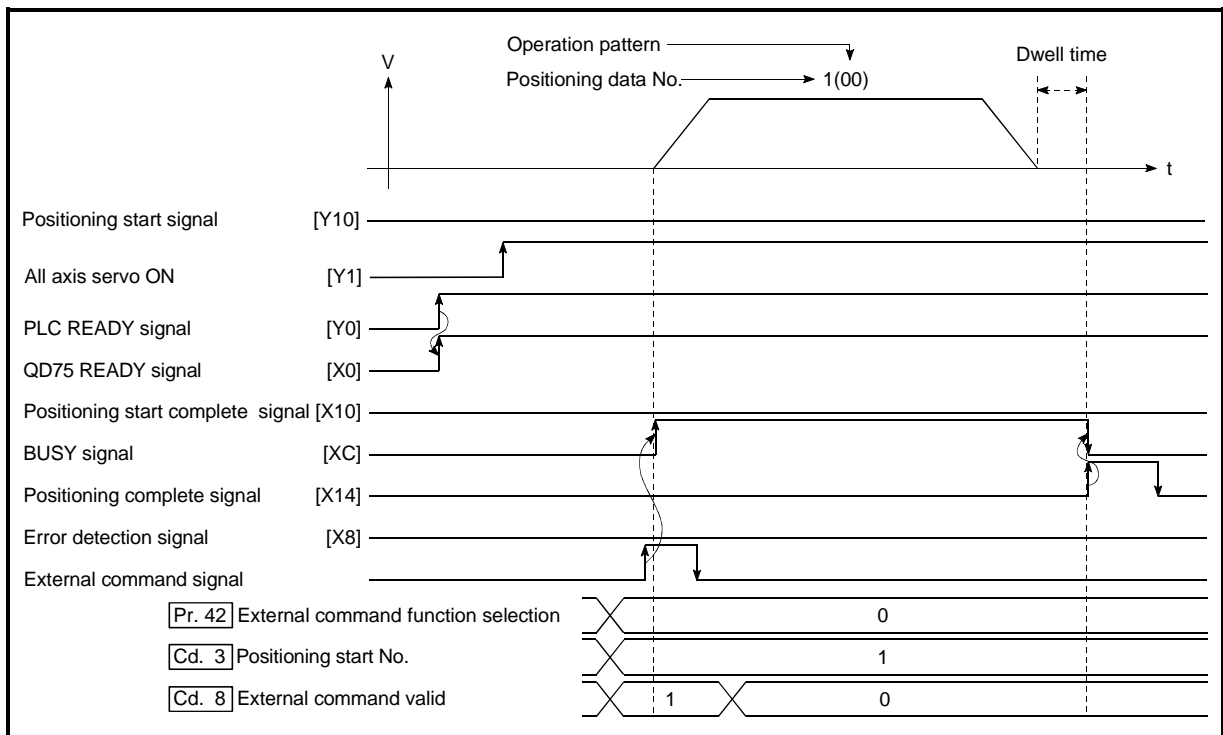


Fig. 6.11 Time chart for starting with external start signal

6.5.4 Continuous operation interrupt program

During positioning control, the control can be interrupted during continuous positioning control and continuous path control (continuous operation interrupt function). When "continuous operation interruption" is execution, the control will stop when the operation of the positioning data being executed ends. To execute continuous operation interruption, set "1: Continuous operation interrupt request" for " Cd.18 Interrupt request during continuous operation".

[1] Operation during continuous operation interruption

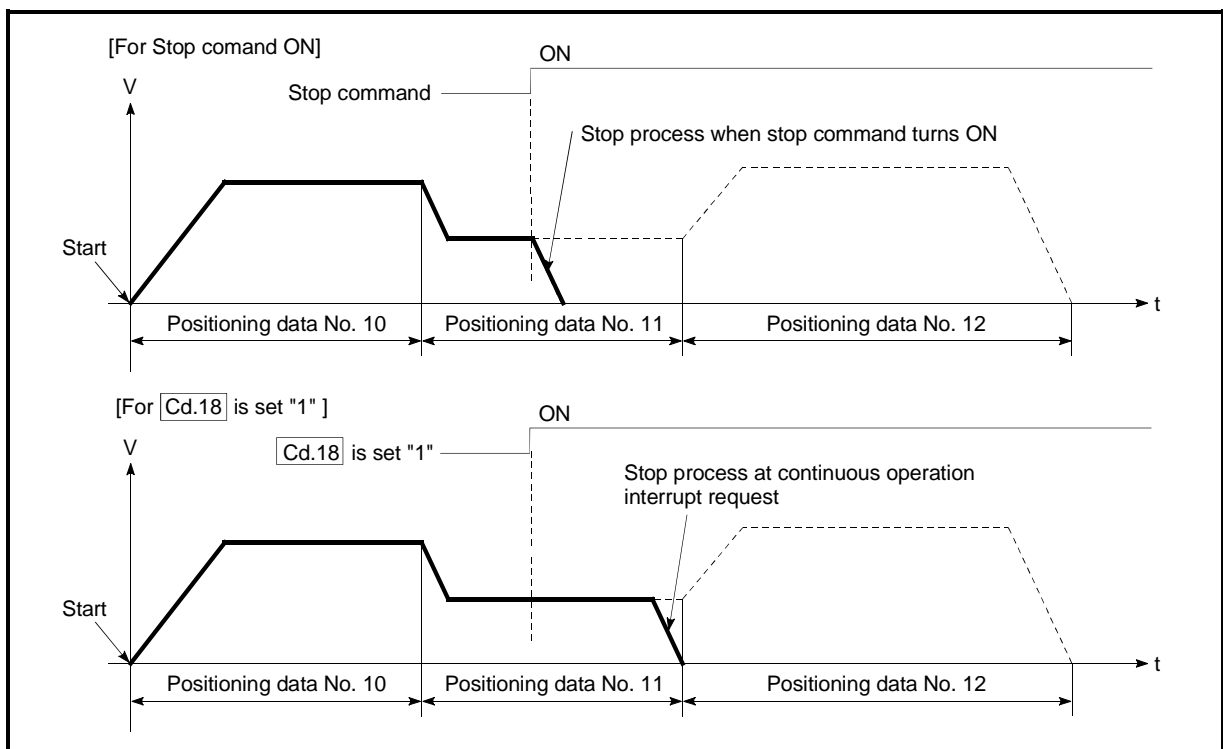


Fig. 6.12 Operation during continuous operation interruption

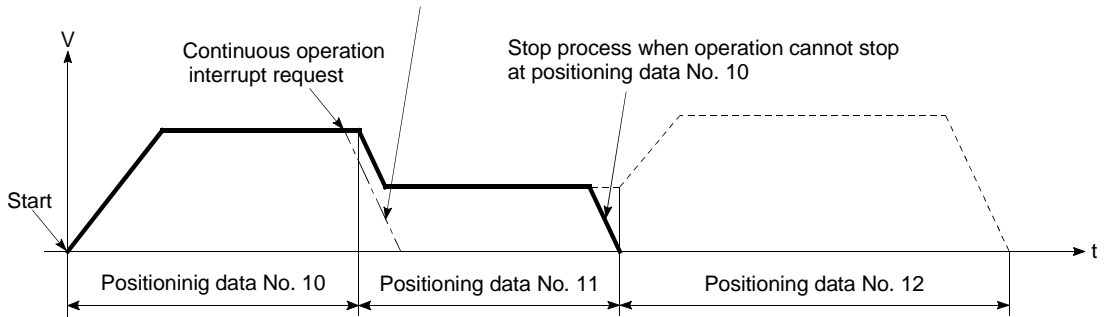
[2] Restrictions

- (1) When the "continuous operation interrupt request" is executed, the positioning will end.
Thus, after stopping, the operation cannot be "restarted".
When " Cd.6 Restart command" is issued, a warning "Restart not possible" (warning code: 104) will occur.
- (2) Even if the stop command is turned ON after executing the "continuous operation interrupt request", the "continuous operation interrupt request" cannot be canceled.
Thus, if "restart" is executed after stopping by turning the stop command ON, the operation will stop when the positioning data No. where "continuous operation interrupt request" was executed is completed.

(3) If the operation cannot be decelerated to a stop because the remaining distance is insufficient when "continuous operation interrupt request" is executed with continuous path control, the interruption of the continuous operation will be postponed until the positioning data shown below.

- Positioning data No. have sufficient remaining distance
- Positioning data No. for positioning complete (pattern: 00)
- Positioning data No. for continuous positioning control (pattern: 01)

Even when the continuous operation interrupt is requested, the remaining distance is insufficient, and thus, the operation cannot stop at the positioning No. being executed.



(4) When operation is not performed (BUSY signal [XC, XD, XE, XF] is OFF), the interrupt request during continuous operation is not accepted. It is cleared to 0 at a start or restart.

[3] Control data requiring settings

Set the following data to interrupt continuous operation.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.18 Interrupt request during continuous operation | 1 | Set "1: Interrupt request during continuous operation". | 1520 | 1620 | 1720 | 1820 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

6.5.5 Restart program

When a stop factor occurs during position control and the operation stops, the positioning can be restarted from the stopped position to the position control end point by using the "restart command" ([Cd.6](#) Restart command).

("Restarting" is not possible when "continuous operation is interrupted.")

[1] Restart operation

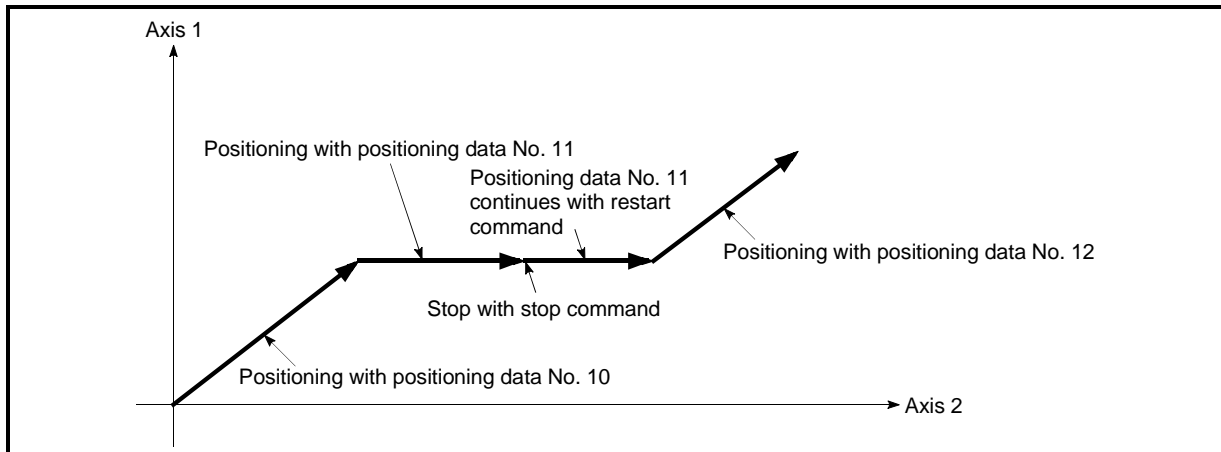


Fig. 6.13 Restart operation

[2] Restrictions

- (1) Restarting can be executed only when the " [Md.26](#) Axis operation status" is "stopped".
If the axis operation is not "stopped", restarting is not possible.
- (2) Do not execute restart while the stop command is ON.
If restart is executed while stopped, an error "Stop signal ON at start" (error code: 106) will occur, and the " [Md.26](#) Axis operation status" will change to "error occurring".
Thus, even if the error is reset, the operation cannot be restarted.
- (3) Restarting can be executed even while the positioning start signal is ON.
However, make sure that the positioning start signal does not change from OFF to ON while stopped.
If the positioning start signal changes from OFF to ON, positioning will start from the positioning data No. of designated point's positioning data No. set in " [Cd.3](#) Positioning start No.".
- (4) If positioning is ended with the continuous operation interrupt request, the operation cannot be restarted.
If restart is requested, a warning "Restart not possible" (warning code: 104) will occur.
- (5) When stopped with interpolation operation, write "1: Restarts" into " [Cd.6](#) Restart command" for the reference axis, and then restart.
- (6) If the " [Md.26](#) Axis operation status" is not "stopped" when restarting, a warning "Restart not possible" (warning code: 104) will occur, and the process at that time will be continued.

REMARK

Restarting after stopping is possible even for the following control.

- Incremental system position control
- Continuous positioning control
- Continuous path control
- Block start

[3] Control data requiring setting

Set the following data to execute restart.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|----------------------|---------------|--------------------|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.6 Restart command | 1 | Set "1: Restarts". | 1503 | 1603 | 1703 | 1803 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

[4] Restarting conditions

The following conditions must be satisfied when restarting. (Assemble the required conditions into the PLC program as an interlock.)

(1) Operation state

* "Md.26 Axis operation status" is "1: Stopped"

(2) Signal state

| Signal name | Signal state | Device | | | | | | | |
|-------------------|------------------------|--------------------|-------------------------------|--------|--------|-----|-----|-----|-----|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | | | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | | | X0 | | | |
| | All axis servo ON | ON | All axis servo ON | | | Y1 | | | |
| | Synchronization flag * | ON | QD75 buffer memory Accessible | | | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF | | | Y4 | Y5 | Y6 | Y7 |
| | M code ON signal | OFF | M code ON signal is OFF | | | X4 | X5 | X6 | X7 |
| | Error detection signal | OFF | No error is present | | | X8 | X9 | XA | XB |
| | BUSY signal | OFF | BUSY signal is OFF | | | XC | XD | XE | XF |
| External signal | Start complete signal | OFF | Start complete signal is OFF | | | X10 | X11 | X12 | X13 |
| | Stop signal | OFF | Stop signal is OFF | | | - | | | |
| | Upper limit (FLS) | ON | Within limit range | | | - | | | |
| Lower limit (RLS) | ON | Within limit range | | | - | | | | |

*: When the synchronous setting of the PLC CPU is made in the nonsynchronous mode, this must be provided as an interlock.

When it is made in the synchronous mode, no interlock must be provided in the program because the flag is turned ON when calculation is run on the PLC CPU.

(5) Time chart for restarting

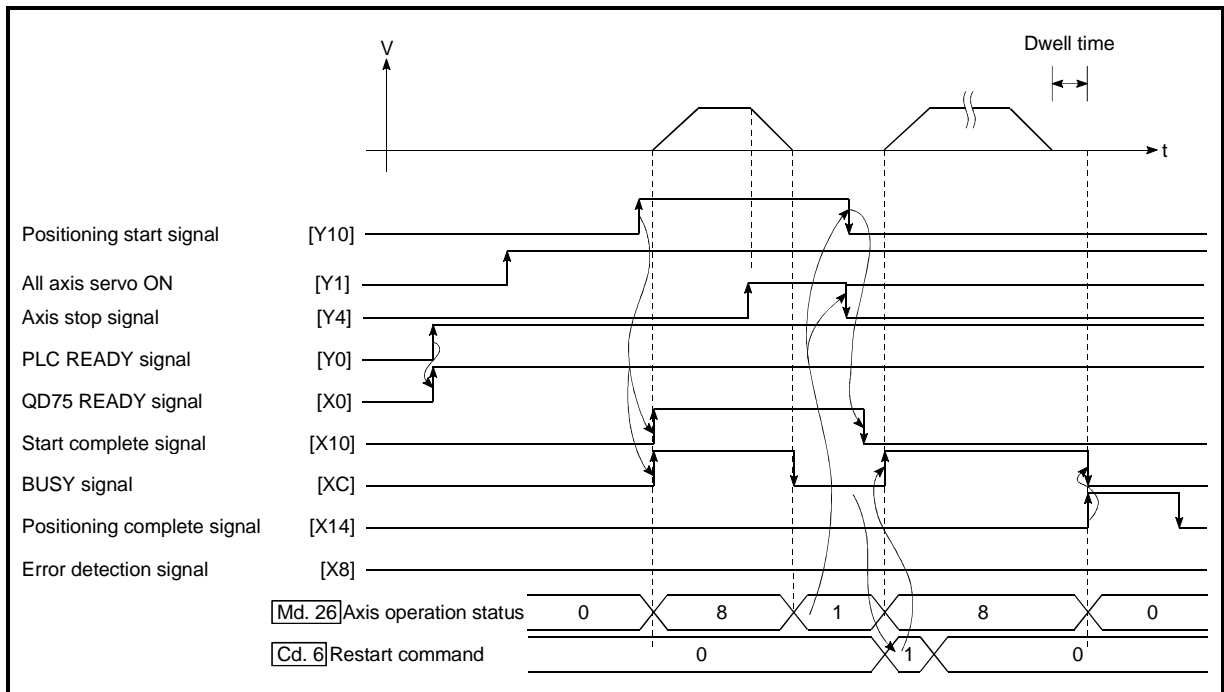


Fig. 6.14 Time chart for restarting

6.5.6 Stop program

The axis stop signal [Y4, Y5, Y6, Y7] or a stop signal from an external device is used to stop the control.

Create a program to turn ON the axis stop signal [Y4, Y5, Y6, Y7] as the stop program.

The process for stopping control is explained below.

Each control is stopped in the following cases.

- (1) When each control is completed normally.
- (2) When the Servo READY signal is turned OFF.
- (3) When a PLC CPU error occurs.
- (4) When the PLC READY signal is turned OFF.
- (5) When an error occurs in QD75.
- (6) When control is intentionally stopped
(Stop signal from PLC CPU turned ON, stop signal from peripheral devices)

The stop process for the above cases is shown below.

(Excluding item (1) above "When each control is completed normally".)

[1] Stop process

| Stop cause | | Stop axis | M code ON signal after stop | Axis operation status ([Md.26]) after stopping | Stop process | | | | | |
|-------------------------------------|---|-----------|-----------------------------|--|---|------------------|---------------------------|--------------------------------|------------------------|----------------------------------|
| | | | | | OPR control | | Major positioning control | High-level positioning control | Manual control | |
| | | | | | Machine OPR control | Fast OPR control | | | JOG/ Inching operation | Manual pulse generator operation |
| Forced stop | Servo READY OFF • Servo amplifier power supply OFF • Servo alarm • Emergency stop of PLC CPU | Each axis | No change | During error | Servo OFF or free run | | | | | |
| Fatal stop (Stop group 1) | Hardware stroke limit upper/lower limit error occurrence | Each axis | No change | During error | Deceleration stop/sudden stop (Select with " [Pr.37] Sudden stop group 1 sudden stop selection".) | | | | Deceleration stop | |
| Emergency stop (Stop group 2) | Error occurs in PLC CPU | All axes | No change | During error | Delegation stop/sudden stop (Select with " [Pr.38] Sudden stop group 2 sudden stop selection".) | | | | Deceleration stop | |
| | PLC READY signal OFF | | Turns OFF | | | | | | | |
| | Error in test mode | | No change | | | | | | | |
| Relatively safe stop (Stop group 3) | Axis error detection (Error other than stop group 1 or 2) "Stop" input from peripheral device | Each axis | No change | During error | Deceleration stop/sudden stop (Select with " [Pr.39] Sudden stop group 3 sudden stop selection".) | | | | Deceleration stop | |
| Intentional stop (Stop group 3) | "Stop signal" ON from external device "Axis stop signal" ON from PLC CPU | Each axis | No change | During stop (during standing by) | | | | | | |

[2] Types of stop processes

The operation can be stopped with deceleration stop, sudden stop or immediate stop.

(1) Deceleration stop *1

The operation stops with "deceleration time 0 to 3" (Pr.10 , Pr.28 , Pr.29 , Pr.30).

Which time from "deceleration time 0 to 3" to use for control is set in positioning data (Da.4).

(2) Sudden stop

The operation stops with " Pr.36 Sudden stop deceleration time".

(3) Servo OFF or free run (The operation stops with dynamic brake or electromagnetic brake.)

The operation does not decelerate.

The QD75 immediately stops the command, but the operation will coast for the droop pulses accumulated in the servo amplifier deviation counter.

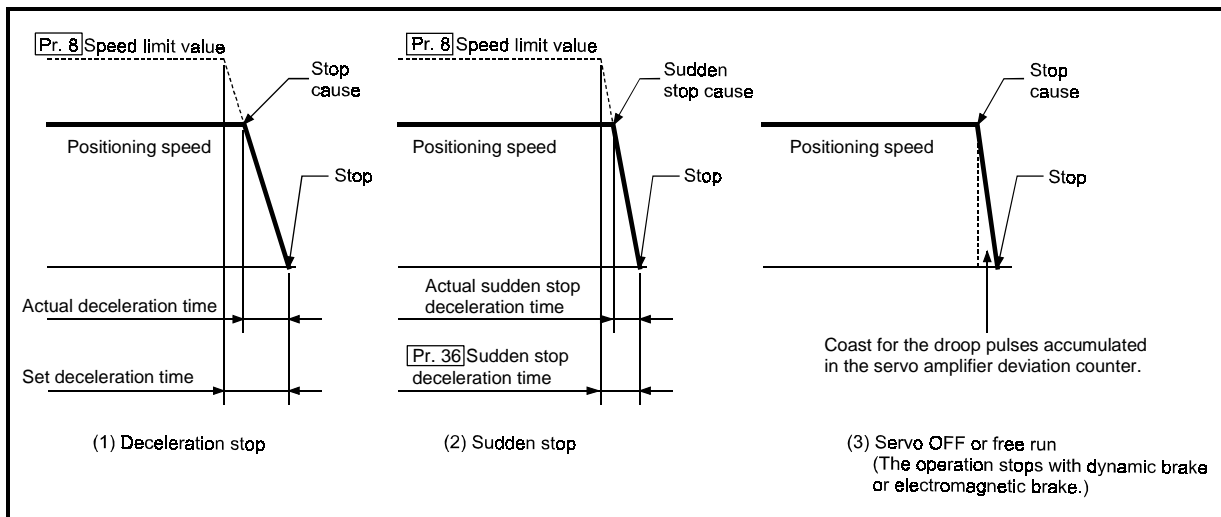


Fig. 6.15 Types of stop processes

REMARK

*1 "Deceleration stop" and "sudden stop" are selected with the details parameter 2 "stop group 1 to 3 sudden stop selection". (The default setting is "deceleration stop".)

[3] Order of priority for stop process

The order of priority for the QD75 stop process is as follows.

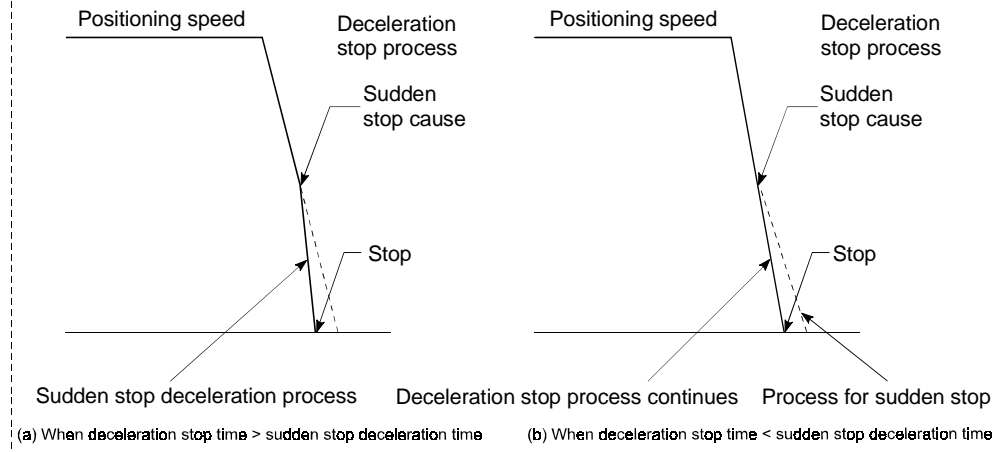
Deceleration stop < Sudden stop < Servo OFF

- (1) If the deceleration stop command ON (stop signal ON) or deceleration stop cause occurs during deceleration to speed 0 (including automatic deceleration), operation changes depending on the setting of "Cd.42 Stop command processing for deceleration stop selection".
 - (a) Manual control

Independently of the Cd.42 setting, a deceleration curve is re-processed from the speed at stop cause occurrence.
 - (b) OPR control, positioning control
 - When Cd.42 = 0 (deceleration curve re-processing):
A deceleration curve is re-processed from the speed at stop cause occurrence.
 - When Cd.42 = 1 (deceleration curve continuation):
The current deceleration curve is continued after stop cause occurrence. (For details, refer to Section 12.7.10 "Stop command processing for deceleration stop function".)
- (2) If the stop signal designated for sudden stop turns ON or a stop cause occurs during deceleration, the sudden stop process will start from that point. However, if the sudden stop deceleration time is longer than the deceleration time, the deceleration stop process will be continued even if a sudden stop cause occurs during the deceleration stop process.

Example

The process when a sudden stop cause occurs during deceleration stop is shown below.



[4] Inputting the stop signal during deceleration

- (1) Even if stop is input during deceleration (including automatic deceleration), the operation will stop at that deceleration speed.
- (2) If stop is input during deceleration for OPR, the operation will stop at that deceleration speed. If input at the creep speed, the operation will stop immediately.
- (3) If a stop cause, designated for sudden stop, occurs during deceleration, the sudden stop process will start from that point. The sudden stop process during deceleration is carried out only when the sudden stop time is shorter than the deceleration stop time.

Chapter 7 Memory Configuration and Data Process

The QD75 memory configuration and data transmission are explained in this chapter.

The QD75 is configured of two memories. By understanding the configuration and roles of two memories, the QD75 internal data transmission process, such as "when the power is turned ON" or "when the PLC READY signal changes from OFF to ON" can be easily understood. This also allows the transmission process to be carried out correctly when saving or changing the data.

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 - 7.1.1 Configuration and roles of QD75 memory 7- 2
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7.1 Configuration and roles of QD75 memory

7.1.1 Configuration and roles of QD75 memory

The QD75 is configured of the following two memories.

| Memory configuration | Role | Area configuration | | | | | | | Backup | |
|----------------------|---|--------------------|-------------------|-------------------|---|--|-------------------|----------------------|--------|--------------|
| | | Parameter area | Monitor data area | Control data area | Positioning data area (No. 1 to 600) | Block start data area (No.7000 to 7004) | PLC CPU memo area | Servo parameter area | | |
| • Buffer memory | Area that can be directly accessed with PLC program from PLC CPU. | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Not possible |
| • Flash ROM | Area for backing up data required for positioning. | ○ | — | — | ○ | ○ | — | ○ | ○ | Possible |

○ : Setting and storage area provided, Not possible: Data is lost when power is turned OFF

— : Setting and storage area not provided, Possible: Data is held even when power is turned OFF

■ Details of areas

- Parameter area
Area where parameters, such as positioning parameters and OPR parameters, required for positioning control are set and stored.
(Set the items indicated with Pr.1 to Pr.57 , Pr.200 to Pr.201 for each axis.)

- Monitor data area
Area where positioning system or QD75 operation state is stored.
(Set the items indicated with Md.1 to Md.48 , Md.100 to Md.111 .)

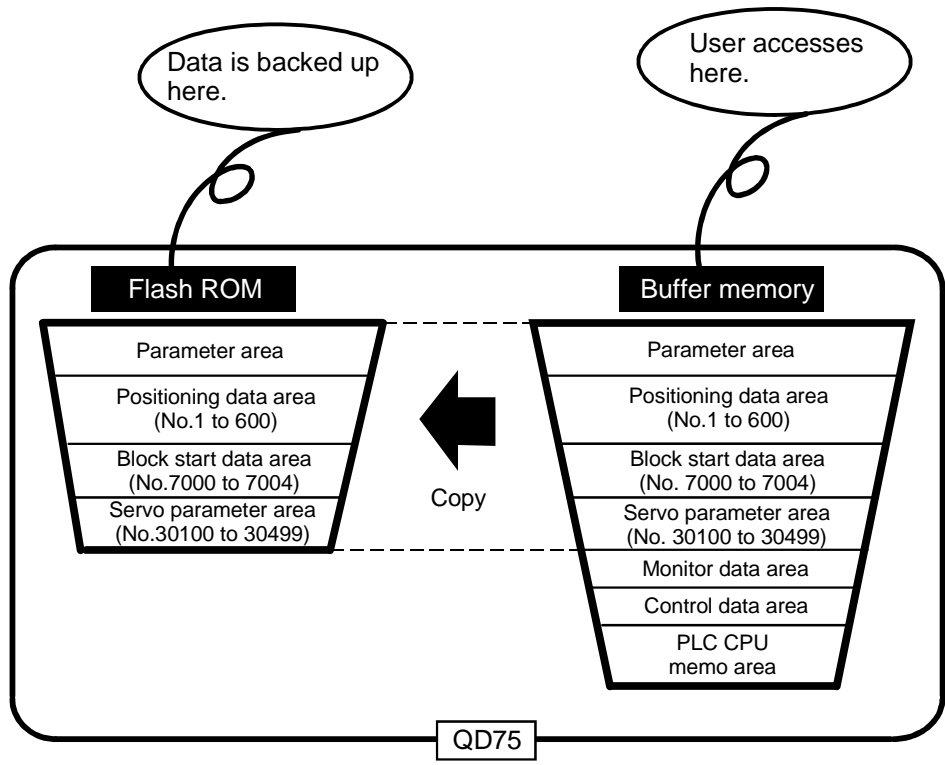
- Control data area
Area where data for operating and controlling positioning system is set and stored. (Set the items indicated with Cd.1 to Cd.42 , Cd.100 to Cd.102 .)

- Positioning data area (No.1 to 600)
Area where positioning data No.1 to 600 is set and stored.
(Set the items indicated with Da.1 to Da.10 for each positioning data.)

- Block start data area (No.7000 to 7004)
Area where information required only when carrying out block No. 7000 to 7004 high-level positioning is set and stored. (Set the items indicated with Da.11 to Da.19 .)

- PLC CPU memo area
Area where condition judgment values required for special positioning, etc., are set and stored.

- Servo parameter area
Area where parameters, such as servo parameters, required for positioning control on servo amplifier are set and stored.
(Set the items indicated with Pr.100 to Pr.161 for each axis.)



7.1.2 Buffer memory area configuration

The QD75 buffer memory is configured of the following types of areas.

| Buffer memory area configuration | | Buffer memory address | | | | Writing possibility |
|-------------------------------------|-----------------------------|-----------------------|----------------|----------------|----------------|---------------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Parameter area | Basic parameter area | 0 to 15 | 150 to 165 | 300 to 315 | 450 to 465 | Possible |
| | Detailed parameter area | 17 to 69 | 167 to 219 | 317 to 369 | 467 to 519 | |
| | OPR basic parameter area | 70 to 78 | 220 to 228 | 370 to 378 | 520 to 528 | |
| | OPR detailed parameter area | 79 to 89 | 229 to 239 | 379 to 389 | 529 to 539 | |
| Monitor data area | System monitor area | 1200 to 1499 | | | | Not possible |
| | Axis monitor area | 800 to 899 | 900 to 999 | 1000 to 1099 | 1100 to 1199 | |
| Control data area | System control data area | 1900 to 1999 | | | | Possible |
| | Axis control data area | 1500 to 1599 | 1600 to 1699 | 1700 to 1799 | 1800 to 1899 | |
| Positioning data area (No.1 to 600) | Positioning data area | 2000 to 7999 | 8000 to 13999 | 14000 to 19999 | 20000 to 25999 | Possible |
| Block start data area (No.7000) | Block start data area | 26000 to 26049 | 27000 to 27049 | 28000 to 28049 | 29000 to 29049 | |
| | | 26050 to 26099 | 27050 to 27099 | 28050 to 28099 | 29050 to 29099 | |
| | Condition data area | 26100 to 26199 | 27100 to 27199 | 28100 to 28199 | 29100 to 29199 | |
| Block start data area (No.7001) | Block start data area | 26200 to 26249 | 27200 to 27249 | 28200 to 28249 | 29200 to 29249 | |
| | | 26250 to 26299 | 27250 to 27299 | 28250 to 28299 | 29250 to 29299 | |
| | Condition data area | 26300 to 26399 | 27300 to 27399 | 28300 to 28399 | 29300 to 29399 | |
| Block start data area (No.7002) | Block start data area | 26400 to 26449 | 27400 to 27449 | 28400 to 28449 | 29400 to 29449 | |
| | | 26450 to 26499 | 27450 to 27499 | 28450 to 28499 | 29450 to 29499 | |
| | Condition data area | 26500 to 26599 | 27500 to 27599 | 28500 to 28599 | 29500 to 29599 | |
| Block start data area (No.7003) | Block start data area | 26600 to 26649 | 27600 to 27649 | 28600 to 28649 | 29600 to 29649 | |
| | | 26650 to 26699 | 27650 to 27699 | 28650 to 28699 | 29650 to 29699 | |
| | Condition data area | 26700 to 26799 | 27700 to 27799 | 28700 to 28799 | 29700 to 29799 | |
| Block start data area (No.7004) | Block start data area | 26800 to 26849 | 27800 to 27849 | 28800 to 28849 | 29800 to 29849 | |
| | | 26850 to 26899 | 27850 to 27899 | 28850 to 28899 | 29850 to 29899 | |
| | Condition data area | 26900 to 26999 | 27900 to 27999 | 28900 to 28999 | 29900 to 29999 | |
| PLC CPU memo area | PLC CPU memo area | 30000 to 30099 | | | | Possible |

| Buffer memory area configuration | | Buffer memory address | | | | Writing possibility |
|----------------------------------|----------------------------------|-----------------------|-------------------|-------------------|-------------------|---------------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Servo parameter area | Servo basic parameter area | 30100 to 30111 | 30200 to 30211 | 30300 to 30311 | 30400 to 30411 | Possible |
| | Servo adjustment parameter area | 30112 to 30126 | 30212 to 30226 | 30312 to 30326 | 30412 to 30426 | |
| | Servo expansion parameter area | 30127 to 30149 | 30227 to 30249 | 30327 to 30349 | 30427 to 30449 | |
| | Servo expansion parameter area 2 | 30150 to 30199 | 30250 to 30299 | 30350 to 30399 | 30450 to 30499 | |

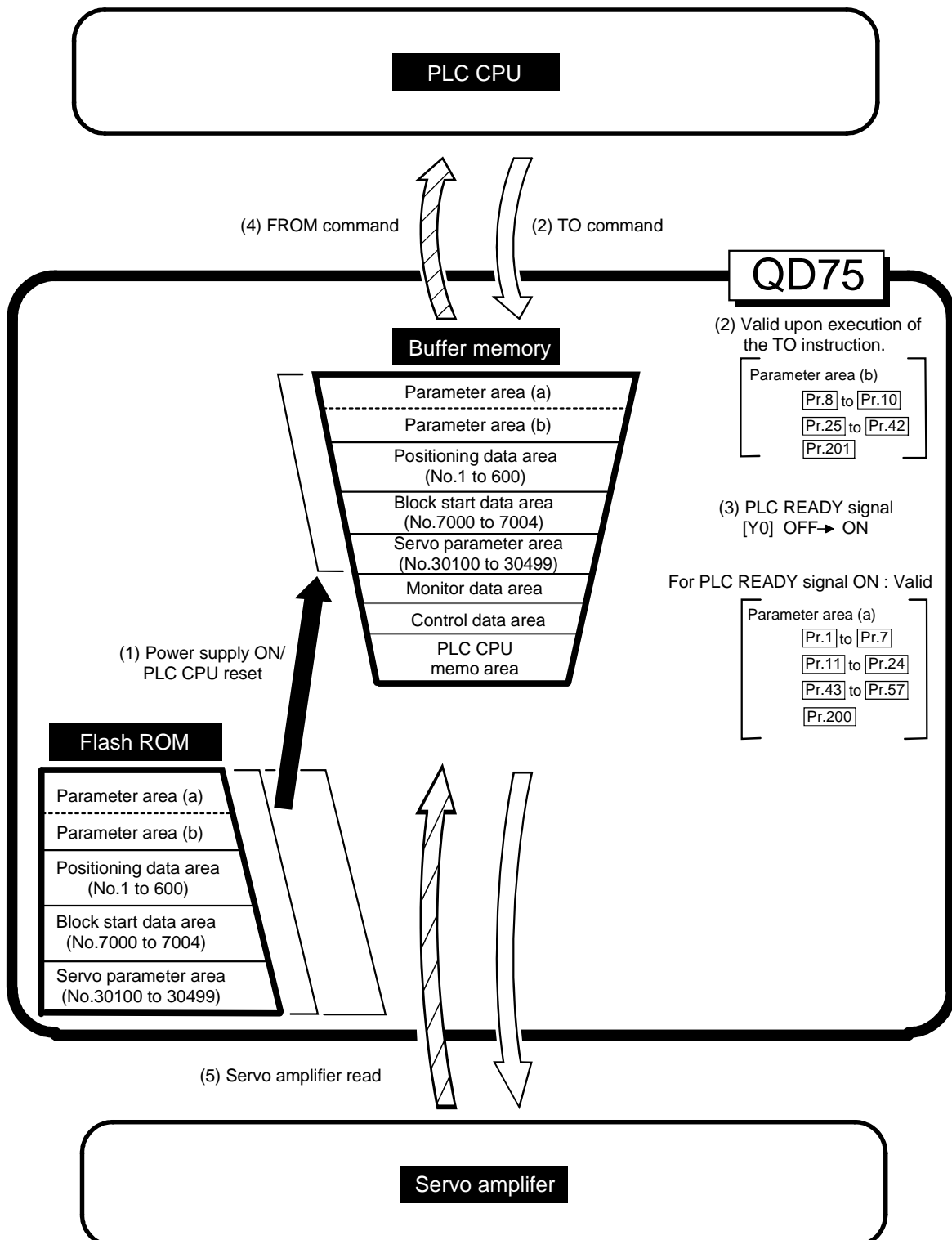
* Use of address Nos. skipped above is prohibited. If used, the system may not operate correctly.


MEMO

7.2 Data transmission process

The data is transmitted between the QD75 memories with steps (1) to (10) shown below.

*The data transmission patterns numbered (1) to (10) on the right page correspond to the numbers (1) to (10) on the left page.



- (1) Transmitting data when power is turned ON or PLC CPU is reset
()

When the power is turned ON or the PLC CPU is reset, the "parameters", "positioning data" and "block start data" stored (backed up) in the flash ROM is transmitted to the buffer memory.

- (2) Transmitting data with TO command from PLC CPU ()

The parameters or data is written from the PLC CPU to the buffer memory using the TO command. At this time, when the "parameter area (b) *1", "positioning data (No. 1 to 600)", "block start data (No. 7000 to 7004)", "control data" and "PLC CPU memo area" are written into the buffer memory with the TO command, it is simultaneously valid.

*1 Parameter area (b) Parameters validated simultaneously with the writing to the buffer memory with the TO command.

(Pr.8 to Pr.10 , Pr.25 to Pr.42 , Pr.201)

| POINT |
|---|
| <p>When a value other than "0" has been set to the motor capacity of servo parameter Pr.104 inside the flash ROM, the power is turned ON or PLC CPU is reset to transmit the servo parameter inside the flash ROM to the servo amplifier (servo amplifier LED indicates "b□").</p> <p>After that, the TO instruction writes the servo parameter from the PLC CPU to the buffer memory so that the servo parameter in the buffer memory is not transmitted to the servo amplifier even if the PLC READY signal [Y0] is turned OFF then ON.</p> <p>Change the servo parameter with the above method, after setting the motor capacity of servo parameter Pr.104 inside the flash ROM, to "0".</p> |

- (3) Validate parameters when PLC READY signal [Y0] changes from OFF to ON

When the PLC READY signal [Y0] changes from OFF to ON, the data stored in the buffer memory's "parameter area (a) *2" is validated.

*2: Parameter area (a) Parameters validated when PLC READY signal [Y0] changes from OFF to ON.


([Pr.1] to [Pr.7] , [Pr.11] to [Pr.24] , [Pr.43]
to [Pr.57] , [Pr.200])

When the motor capacity of servo parameter [Pr.104] inside the flash ROM is set to 0 and a value other than 0 is set to [Pr.104] in the above step (2), the servo parameter data is transmitted to the servo amplifier.

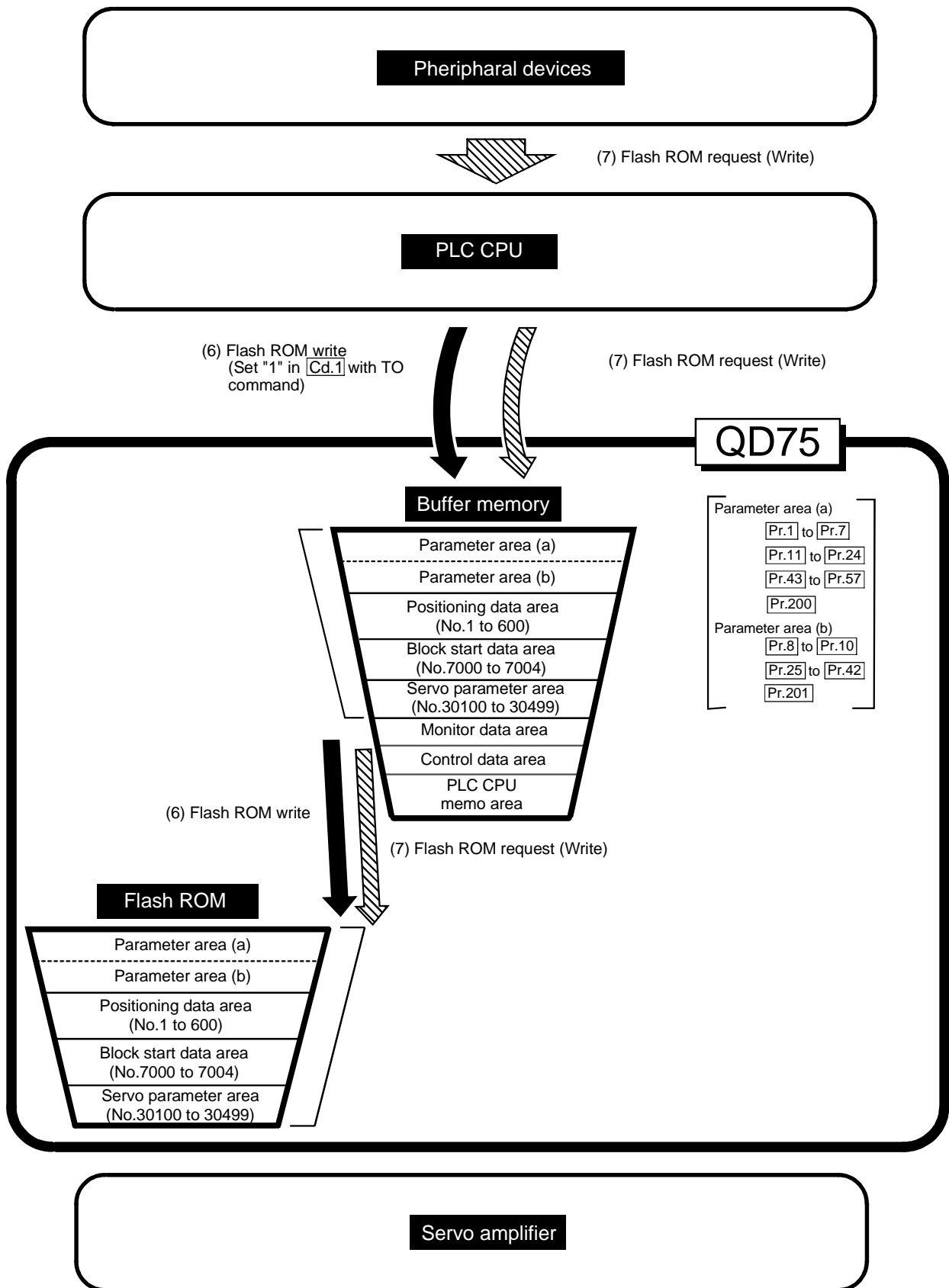
| POINT |
|--|
| <p>The setting values of the parameters that correspond to parameter area (b) are valid when written into the buffer memory with the TO command. However, the setting values of the parameters that correspond to parameter area (a) are not validated until the PLC READY signal [Y0] changes from OFF to ON.</p> |


- (4) Accessing with FROM command from PLC CPU ()

The data is read from the buffer memory to the PLC CPU using the FROM command.

- (5) Reading the servo parameter from the servo amplifier ()

When 1 is written to [Cd.102], the servo parameter is read from the servo amplifier to the buffer memory.



(6) Writing the flash ROM by a PLC CPU request ()

The following transmission process is carried out by setting "1" in " Cd.1 Flash ROM write request" (buffer memory [1900]).

- 1) The "parameters", "positioning data (No. 1 to 600)", "block start data (No. 7000 to 7004)" and "servo parameter" in the buffer memory area are transmitted to the flash ROM.

The writing to the flash ROM may also be carried out using a dedicated instruction "PFWRT". (Refer to Chapter 14 "Dedicated instructions" for details.)

(7) Writing the flash ROM by a peripheral device request ()

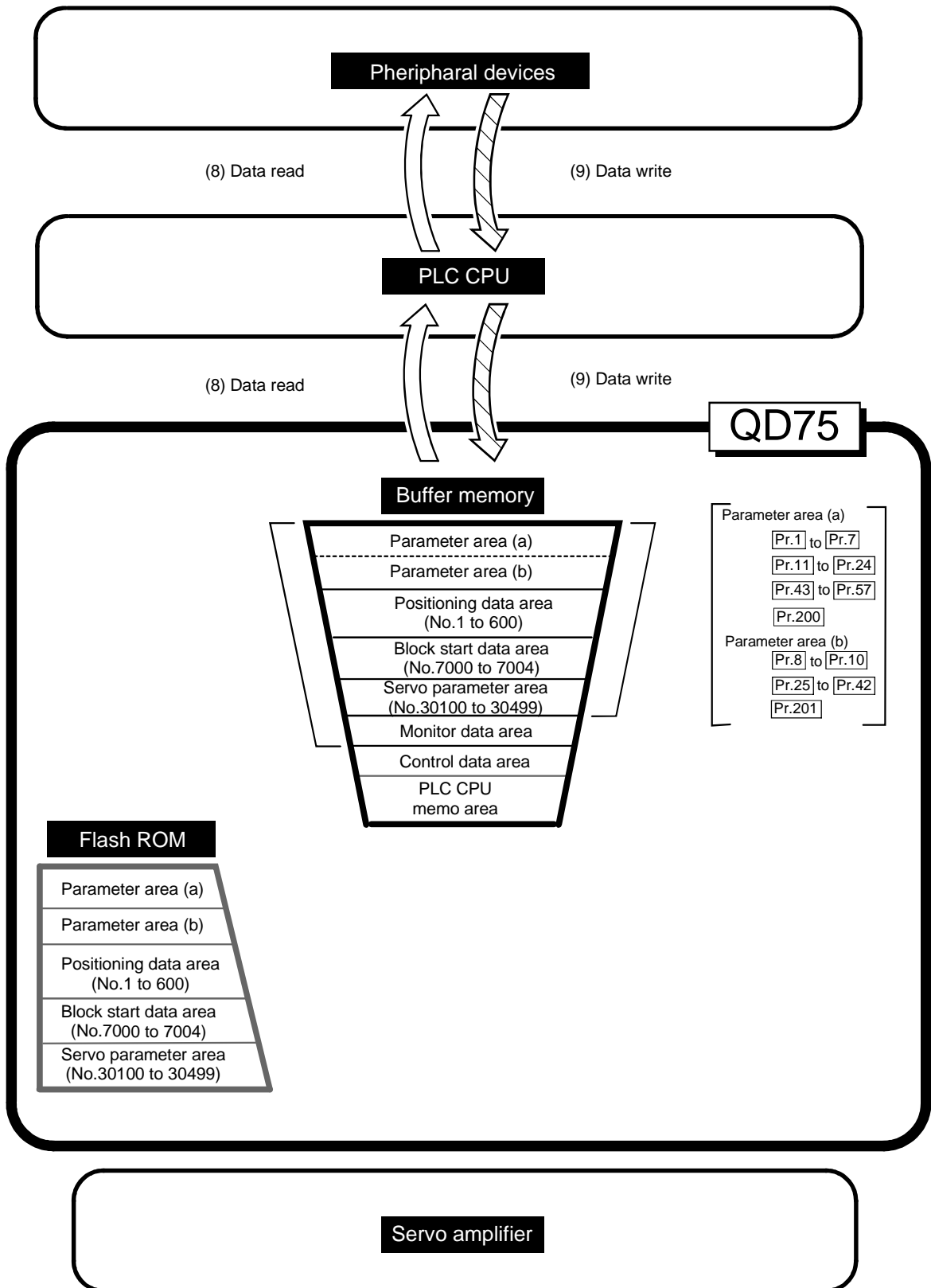
The following transmission processes are carried out with the [flash ROM request] (write) from the peripheral device.


- 1) The "parameters", "positioning data (No. 1 to 600)", "block start data (No. 7000 to 7004)" and "servo parameter" in the buffer memory area are transmitted to the flash ROM.

Note) This transmission process is the same as (7) above.

IMPORTANT

- (1) Do not turn the power OFF or reset the PLC CPU while writing to the flash ROM. If the power is turned OFF or the PLC CPU is reset to forcibly end the process, the data backed up in the flash ROM will be lost.
- (2) Do not write the data to the buffer memory before writing to the flash ROM is completed.
- (3) The number of writes to the flash ROM with the PLC program is 25 max. while the power is turned ON.
Writing to the flash ROM beyond 25 times will cause an error (error code: 805). Refer to Section 15.2 "List of errors" for details.
- (4) Monitoring is the number of writes to the flash ROM by the " Md.19 No. of write accesses to flash ROM".



(8) Reading data from buffer memory to peripheral device ()

The following transmission processes are carried out with the [Read from module] from the peripheral device.

- 1) The "parameters", "positioning data (No. 1 to 600)" and "block start data (No. 7000 to 7004)" in the buffer memory area are transmitted to the peripheral device via the PLC CPU.

The following transmission processes are carried out with the [monitor] from the peripheral device.

- 2) The "monitor data" in the buffer memory area is transmitted to the peripheral device via the PLC CPU.

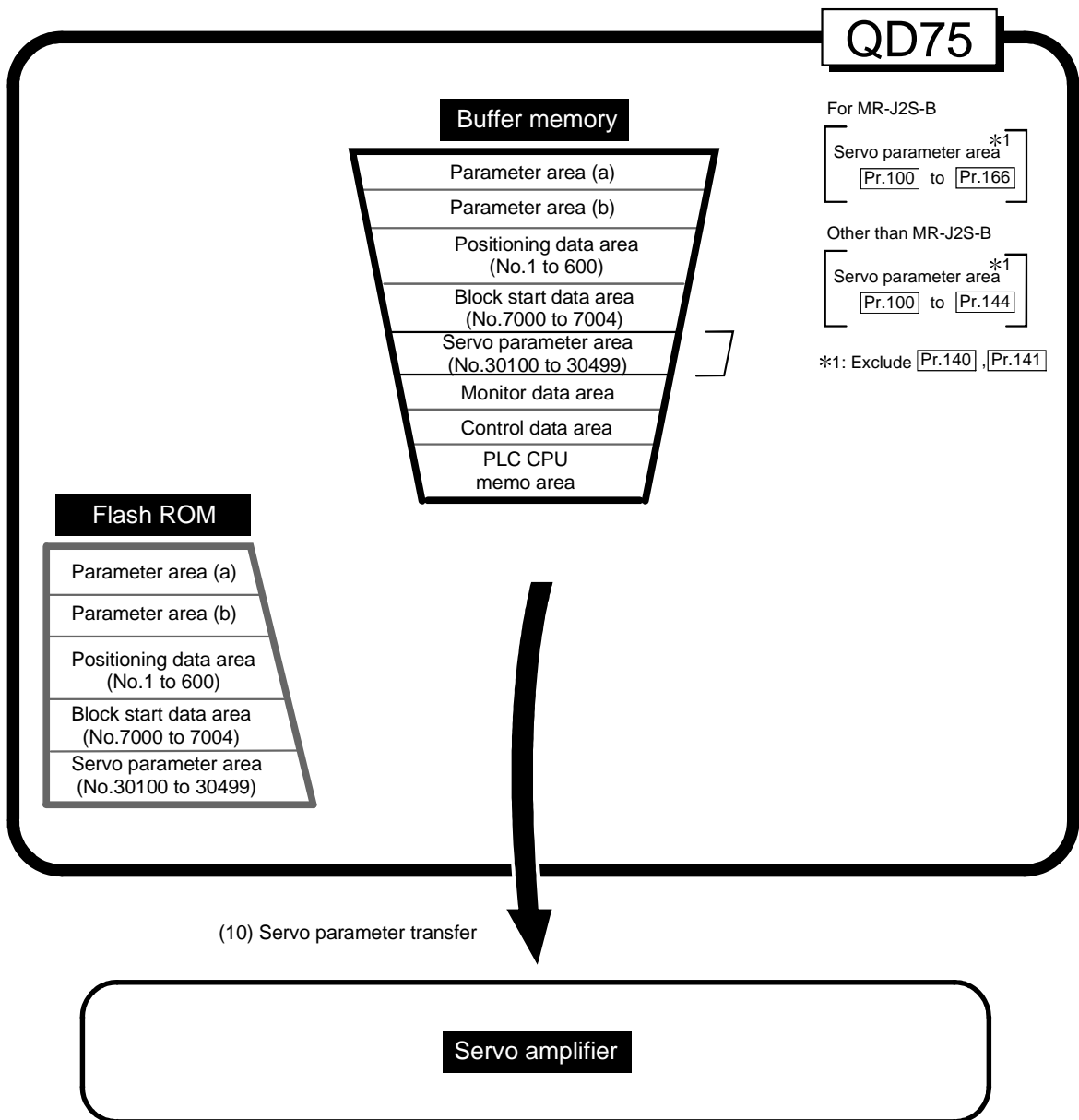
(9) Writing data from peripheral device to buffer memory ()

The following transmission processes are carried out with the [Write to module] from the peripheral device.

- 1) The "parameters", "positioning data (No. 1 to 600)" and "block start data (No. 7000 to 7004)" in the peripheral device area transmitted to the buffer memory via the PLC CPU.

At this time, when [Flash ROM automatic write] is set with the peripheral device, the transmission processes indicated with the following are carried out.

- (7) Flash ROM write



(10) Transmitting servo parameter from the buffer memory area to servo amplifier (⇨)

The servo parameter in the buffer memory area is transmitted to the servo amplifier by the following timing.

- 1) The servo parameter transmitted to the servo amplifier when communications with servo amplifier start.
The servo parameter in the buffer memory area is transmitted to the servo amplifier.
- 2) The following servo parameter in the buffer memory area carried out to the servo amplifier when the PLC READY signal [Y0] turns from OFF to ON.
 - [Pr.108](#) Auto tuning (Servo basic parameter)
 - [Pr.112](#) Load inertia ratio (Servo adjustment parameter)
 - [Pr.113](#) Position loop gain 1 (Servo adjustment parameter)
 - [Pr.115](#) Position loop gain 2 (Servo adjustment parameter)
 - [Pr.114](#) Speed loop gain 1 (Servo adjustment parameter)
 - [Pr.116](#) Speed loop gain 2 (Servo adjustment parameter)
 - [Pr.117](#) Speed integral compensation (Servo adjustment parameter)
 - [Pr.119](#) Feed forward gain (Servo adjustment parameter)

■ About the communication start with servo amplifier

Communication with servo amplifier is valid when following condition is realized together.

- 1) The power of QD75 and servo amplifier is turned ON.
- 2) When the motor capacity of servo parameter [Pr.104](#) inside the buffer memory area is set to the value other than "0" in QD75.

When the power is turned ON or the PLC CPU is reset, the data stored in the flash ROM is transmitted to the buffer memory.

Therefore the motor capacity of servo parameter [Pr.104](#) inside the flash ROM is stored to the value other than "0", and communication with servo amplifier is started when the power is turn ON in order of the servo amplifier, QD75.

After the servo parameter stored in the flash ROM is transmitted to the servo amplifier.

■ How to transfer the servo parameter setup from PLC program to the servo amplifier

The motor capacity of servo parameter [Pr.104](#) inside the flash ROM set to "0".
(Initial value: "0")

The setting values of the parameters that correspond to the motor capacity of servo parameter [Pr.104](#) inside the flash ROM are not started when the power is turned ON or the PLC CPU is reset, after the communication with servo amplifier is not started.

■ How to transfer the servo parameter which wrote it in the flash ROM to servo amplifier

Flash ROM writing carried out after the servo parameter is set up in the buffer memory.

After that, when the power is turned ON or the PLC CPU is reset, the servo parameters stored in the flash ROM is transmitted to the buffer memory.

When the servo parameter is written in the flash ROM, it is unnecessary to use a setup from the PLC program.

■ Servo parameter of the buffer memory

The following shows details about the operation timing and details the servo parameter transfer of the buffer memory.

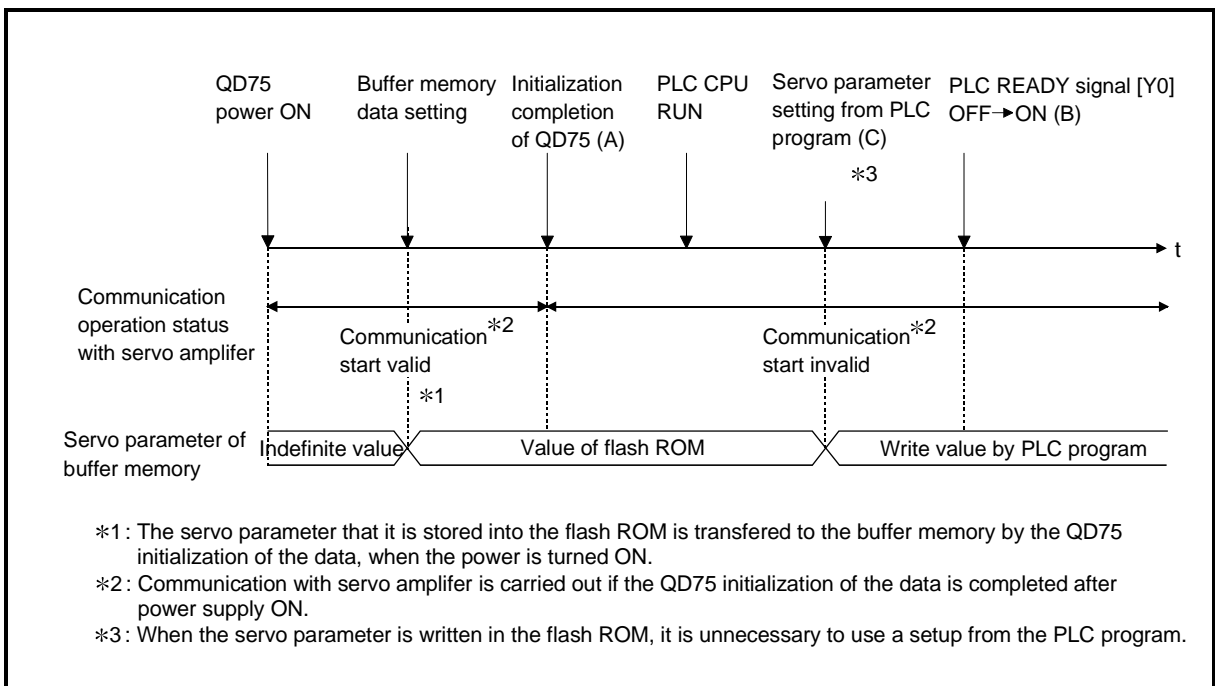


Fig. 7.1 Operation timing in the servo parameter transfer of the buffer memory

■ Operation details

(1) Servo parameter transfers when servo amplifier had started and the power supply of QD75 is turned ON.

(a) When the servo parameter "Pr.104 motor capacity" ≠ "0" is stored flash ROM.

Communication start timing to the servo amplifier: Initialization completion (Fig. 7.1 A)

Transfer the servo parameter : The data stored (backed up) in the flash ROM.

(b) When the servo parameter "Pr.104 motor capacity"="0" is stored flash ROM.

Communication start timing to the servo amplifier: The data written from PLC program before the PLC READY signal [Y0] ON (Fig. 7.1 B).

Transfer the servo parameter : The data written from PLC program before the PLC READY signal [Y0] ON (Fig. 7.1 C).

(2) Servo parameter transfers when servo amplifier had started after the PLC READY signal [Y0] is turned OFF to ON (Fig. 7.1 B)

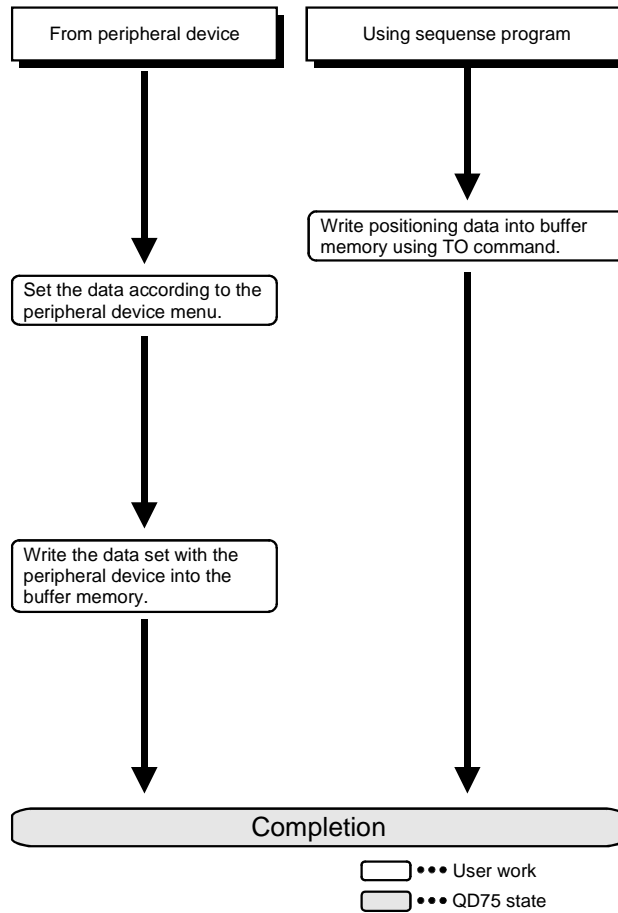
Communication start timing to the servo amplifier: when servo amplifier had started

Transfer the servo parameter : The data written from PLC program before the PLC READY signal [Y0] ON (Fig. 7.1 C).

The data transmission is carried out as shown in the previous pages, but the main method of using this data process is shown below.

(Ex.) Setting the positioning data

The following methods can be used to set the positioning data.



Section 2 Control Details and Setting

Section 2 is configured for the following purposes shown in (1) to (3).

- (1) Understanding of the operation and restrictions of each control.
- (2) Carrying out the required settings in each control
- (3) Dealing with errors

The required settings in each control include parameter setting, positioning data setting, control data setting by a PLC program, etc.

Carry out these settings while referring to "Chapter 5 Data used for positioning".

Also refer to "Chapter 6 PLC programs used in positioning control" when creating the PLC programs required in each control, and consider the entire control program configuration when creating each program.

| | | |
|------------|--------------------------------------|-----------------|
| Chapter 8 | OPR Control..... | 8- 1 to 8- 14 |
| Chapter 9 | Major Positioning Control..... | 9- 1 to 9-116 |
| Chapter 10 | High-Level Positioning Control | 10- 1 to 10- 26 |
| Chapter 11 | Manual Control..... | 11- 1 to 11- 36 |
| Chapter 12 | Control Sub Functions | 12- 1 to 12- 98 |
| Chapter 13 | Common Functions..... | 13- 1 to 13- 8 |
| Chapter 14 | Dedicated instructions..... | 14- 1 to 14- 18 |
| Chapter 15 | Troubleshooting | 15- 1 to 15-106 |

Chapter 8 OPR Control

The details and usage of "OPR control" are explained in this chapter.

OPR control includes "machine OPR" that establish a machine OP without using address data, and "fast OPR" that store the coordinates established by the machine OPR, and carry out positioning to that position.

OPR carried out by PLC programs from the PLC CPU are explained in this chapter. Refer to GX Configurator-QP Operating Manual for details on OPR using the peripheral device.

| | | |
|-------|--|------|
| 8.1 | Outline of OPR control | 8- 2 |
| 8.1.1 | Two types of OPR control..... | 8- 2 |
| 8.2 | Machine OPR | 8- 4 |
| 8.2.1 | Outline of the machine OPR operation | 8- 4 |
| 8.2.2 | Machine OPR method | 8- 5 |
| 8.2.3 | OPR method (1): Near-point dog method..... | 8- 6 |
| 8.2.4 | OPR method (2): Count method 1) | 8- 8 |
| 8.2.5 | OPR method (3): Count method 2) | 8-10 |
| 8.2.6 | OPR method (4): Data set method | 8-12 |
| 8.3 | Fast OPR | 8-13 |
| 8.3.1 | Outline of the fast OPR operation | 8-13 |

8.1 Outline of OPR control

8.1.1 Two types of OPR control

In "OPR control" a position is established as the starting point (or "OP") when carrying out positioning control, and positioning is carried out toward that starting point.

It is used to return a machine system at any position other than the OP to the OP when the QD75 issues a "OPR request"* with the power turned ON or others, or after a positioning stop.

In the QD75, the two types of controls shown below are defined as "OPR control", following the flow of the OPR work.

These two types of OPR control can be executed by setting the "OPR parameters", setting "Positioning start No. 9001" and "positioning start No. 9002" prepared beforehand in the QD75 to "[Cd.3] Positioning start No.", and turning ON the positioning start signal.

The PSTRT start numbers of the dedicated instruction can also be set to 9001 or 9002 to execute the OPR control. (For details, refer to Chapter 14 "Dedicated instructions".)

- (1) Establish a positioning control OP
 - "Machine OPR" (positioning start No. 9001)
- (2) Carry out positioning toward the OP
 - "Fast OPR" (positioning start No. 9002).

* The "machine OPR" in (1) above must always be carried out before executing the "fast OPR" in (2).

CAUTION

- In the case of the absolute position system, use the PLC program to check the OPR request before performing the positioning operation.
Failure to observe this could lead to an accident such as a collision.

REMARK

OPR request *

The "OPR request flag" ([Md.31] Status: b3) must be turned ON in the QD75, and a machine OPR must be executed in the following cases.

- When the power is turned ON (in the case of the absolute position system, however, the "OPR request flag" is not established.)
- When the OPR is not performed in the absolute position system
- When the Machine OPR starts

The address information stored in the QD75 cannot be guaranteed while the "OPR request flag" is ON.

The "OPR request flag" turns OFF and the "OPR complete flag" ([Md.31] Status: b4) turns ON if the machine OPR is executed and is completed normally.

■ OPR sub functions

Refer to Section 3.2.4 "Combination of QD75 main functions and sub functions" for details on "sub functions" that can be combined with OPR control. Also refer to Chapter 12 "Control sub functions" for details on each sub function.

[Remarks]

The following two sub functions are only related to machine OPR.

| Sub function name | Machine OPR | Fast OPR | Reference |
|--------------------|-------------|----------|----------------|
| OPR retry function | △ | × | Section 12.2.1 |
| OP shift function | ○ | × | Section 12.2.2 |

○ : Combination possible, △: Restricted, ×: Combination not possible

■ When an OPR is not required

Control can be carried out ignoring the "OPR request flag" (Md.31 Status: b3) in systems that do not require an OPR.

In this case, the "OPR parameters (Pr.43 to Pr.57)" must all be set to their initial values or a value at which an error does not occur.

■ OPR from peripheral devices

"Machine OPR" and "fast OPR" can be executed from the test mode of the peripheral device.

Refer to GX Configurator-QP Operating Manual for details on OPR from the peripheral device.

8.2 Machine OPR

8.2.1 Outline of the machine OPR operation

| | |
|------------------|---|
| Important | Use the OPR retry function when the OP position is not always in the same direction from the workpiece operation area (when the OP is not set near the upper or lower limit of the machine). * The machine OPR may not complete unless the OPR retry function is used. |
|------------------|---|

■ Machine OPR operation

In a machine OPR, OP is established.

None of the address information stored in the QD75, PLC CPU, or servo is used at this time. The position mechanically established after the machine OPR is regarded as the "OP" to be the starting point for positioning control.

The method for establishing an "OP" by a machine OPR differs according to the method set in " Pr.43 OPR method".

The following shows the operation when starting a machine OPR.

| | |
|----|--|
| 1) | The "machine OPR" is started. |
| 2) | The operation starts according to the speed and direction set in the OPR parameters (Pr.43 to Pr.57). |
| 3) | The "OP" is established by the method set in " Pr.43 OPR method", and the machine stops. (Refer to sections 8.2.2 to 8.2.8) |
| 4) | If "a" is set as " Pr.45 OP address", "a" will be stored as the current position in the " Md.20 Current feed value" and " Md.21 Machine feed value" which are monitoring the position. |
| 5) | The machine OPR is completed. |

* The " Pr.45 OP address" is a fixed value set by the user.

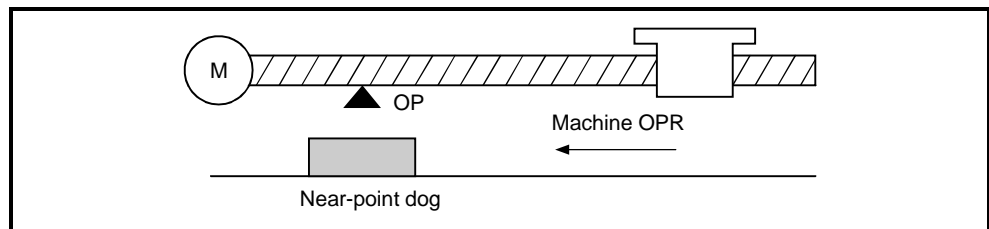


Fig. 8.1 Example of a machine OPR

8.2.2 Machine OPR method

The method by which the machine OP is established (method for judging the OP position and machine OPR completion) is designated in the machine OPR according to the configuration and application of the positioning method.

The following table shows the methods that can be used for this OPR method.

(The OPR method is one of the items set in the OPR parameters. It is set in " **Pr.43** OPR method" of the basic parameters for OPR.)

| Pr.43 OPR method | Operation details |
|-------------------------|---|
| Near-point dog method | Deceleration starts by the OFF → ON of the near-point dog. (Speed is reduced to " Pr.47 Creep speed".) The operation stops once after the near-point dog turns ON and then OFF. Later the operation restarts and then stops at the first zero signal to complete the OPR. |
| Count method 1) | The deceleration starts by the OFF → ON of the near-point dog, and the machine moves at the " Pr.47 Creep speed". The machine stops once after moving the distance set in the " Pr.50 Setting for the movement amount after near-point dog ON" from the OFF → ON position. Later the operation restarts and then stops at the first zero signal to complete the machine OPR. |
| Count method 2) | The deceleration starts by the OFF → ON of the near-point dog, and the machine moves at the " Pr.47 Creep speed". The machine moves the distance set in the " Pr.50 Setting for the movement amount after near-point dog ON" from the near-point dog OFF → ON position, and stops at that position. The machine OPR is then regarded as completed. |
| Data set method | The position where the machine OPR has been performed becomes an OP. The current feed value and feed machine value are overwritten to the OP address. |

REMARK

Creep speed

The stopping accuracy is poor when the machine suddenly stops from fast speeds. To improve the machine's stopping accuracy, its must change over to a slow speed before stopping. This speed is set in the " **Pr.47** Creep speed".

8.2.3 OPR method (1): Near-point dog method

The following shows an operation outline of the "near-point dog method" OPR method.

■ Operation chart

| | |
|----|---|
| 1) | The machine OPR is started. (The machine begins the acceleration designated in " Pr.51 OPR acceleration time selection", in the direction designated in " Pr.44 OPR direction". It then moves at the " Pr.46 OPR speed" when the acceleration is completed.) |
| 2) | The machine begins decelerating when the near-point dog ON is detected. |
| 3) | The machine decelerates to the " Pr.47 Creep speed", and subsequently moves at that speed. (At this time, the near-point dog must be ON. The workpiece will continue decelerating and stop if the near-point dog is OFF.) |
| 4) | After the near-point dog turns OFF, the machine stops. It then restarts and stops at the first zero point. |
| 5) | After a "deviation counter clear signal" is output to the drive unit, the OPR complete flag (Md.31 Status: b4) turns from OFF to ON and the OPR request flag (Md.31 status: b3) turns from ON to OFF. |

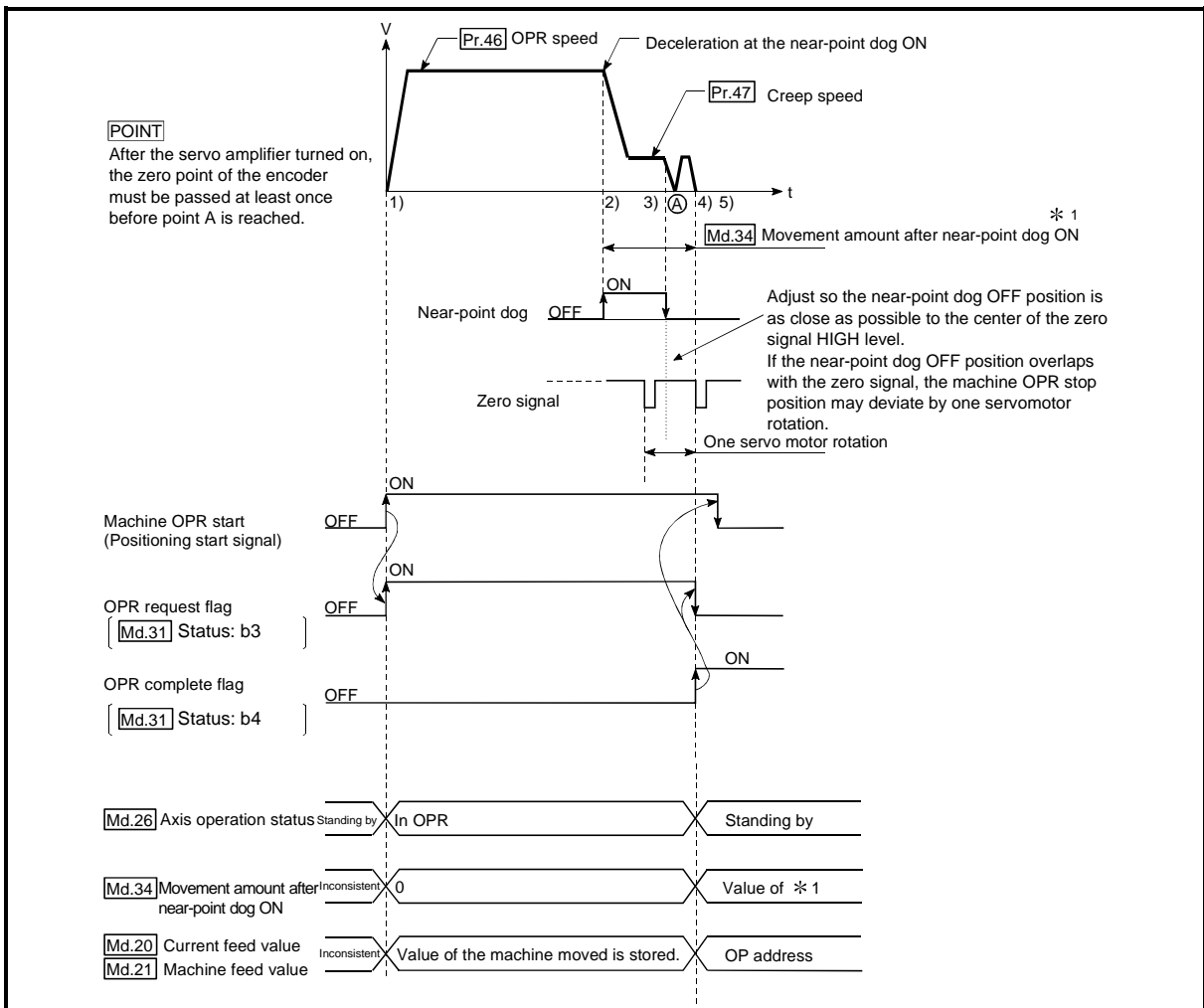


Fig. 8.2 Near-point dog method machine OPR

■ Precautions during operation

- (1) An error "Start at home position (OP) fault (error code: 201)" will occur if another machine OPR is attempted after a machine OPR completion when the OPR retry function is not set ("0" is set in " Pr.48 OPR retry").
 - (2) Machine OPR carried out from the near-point dog ON position will start at the " Pr.47 Creep speed".
 - (3) The near-point dog must be ON during deceleration from the OPR speed " Pr.47 Creep speed".
 - (4) When the stop signal stops the machine OPR, carry out the machine OPR again. When restart command is turned ON after the stop signal stops the OPR, the error "OPR restart impossible (error code: 209)" will occur.
 - (5) After the servo amplifier turned on, the zero point of the encoder must be passed at least once before point A is reached.
- * The workpiece will continue decelerating and stop if the near-point dog is turned OFF before it has decelerated to the creep speed, thus causing an error "Dog detection timing fault (error code: 203)".

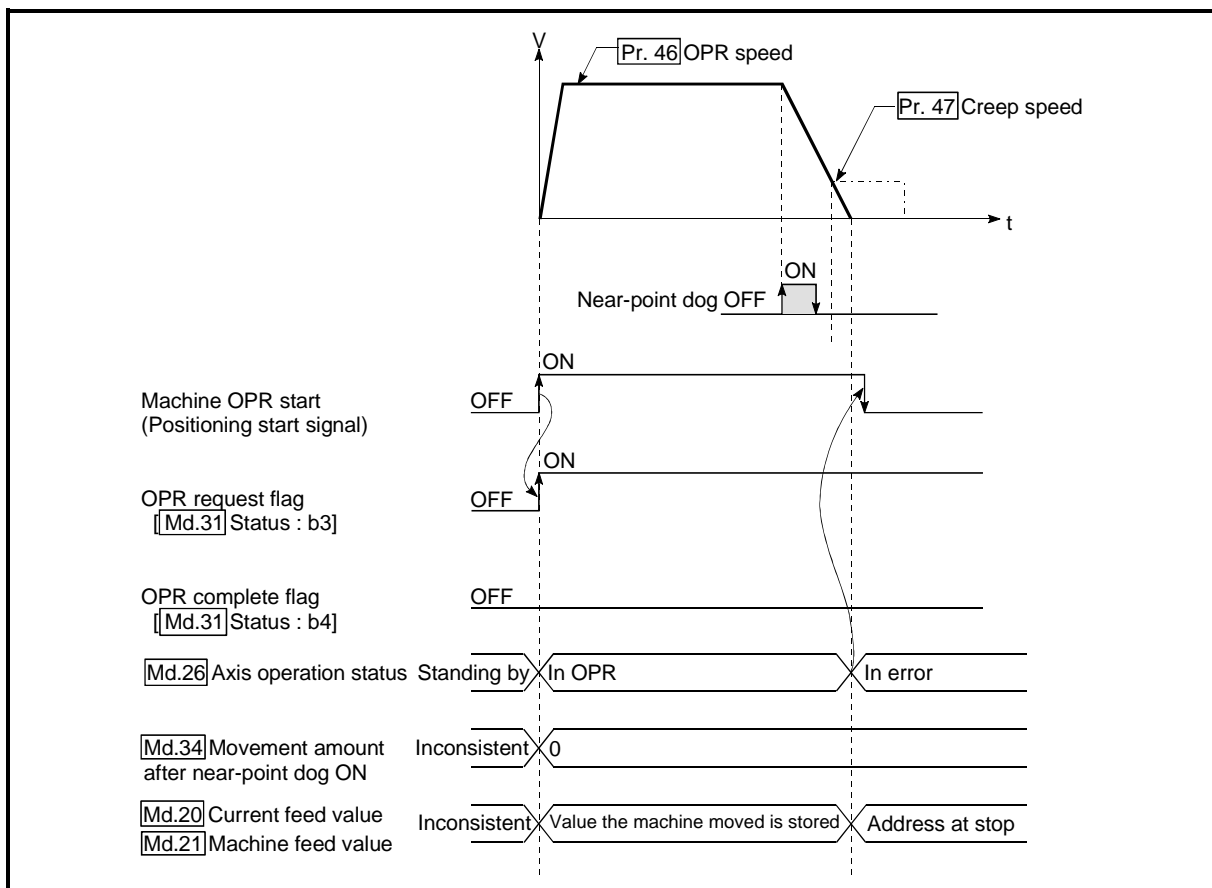


Fig. 8.3 Operation when the near-point dog is turned OFF before the creep speed is reached

8.2.4 OPR method (2): Count method 1)

The following shows an operation outline of the "count method 1)" OPR method. In the "count method 1)" OPR, the following can be performed:

- Machine OPR on near-point dog
- Second machine OPR after completion of first machine OPR

■ Operation chart

| | |
|----|---|
| 1) | The machine OPR is started. (The machine begins the acceleration designated in " [Pr.51] OPR acceleration time selection", in the direction designated in " [Pr.44] OPR direction". It then moves at the " [Pr.46] OPR speed" when the acceleration is completed.) |
| 2) | The machine begins decelerating when the near-point dog ON is detected. |
| 3) | The machine decelerates to the " [Pr.47] Creep speed", and subsequently moves at that speed. |
| 4) | The machine stops after the workpiece has been moved the amount set in the " [Pr.50] Setting for the movement amount after near-point dog ON" after the near-point dog turned ON. It then restarts and stops at the first zero point. |
| 5) | After a "deviation counter clear output" is output to the drive unit, the OPR complete flag [Md.31] Status: b4) turns from OFF to ON, and the OPR request flag ([Md.31] Status: b3) turns from ON to OFF. |

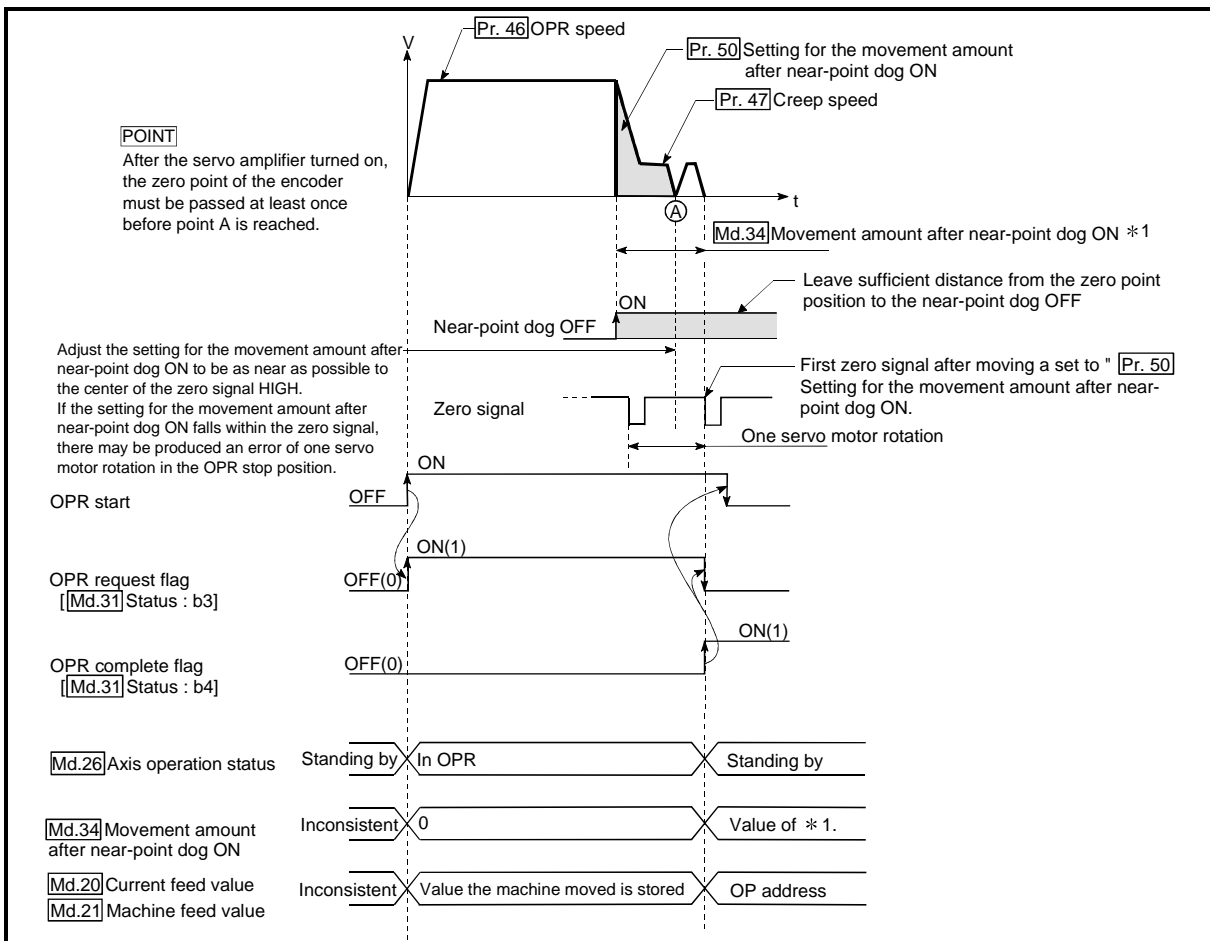


Fig. 8.12 Count method1) machine OPR

■ Precautions during operation

- (1) An error "Count method movement amount fault (error code: 206)" will occur and the operation will not start if the " [Pr.50] Setting for the movement amount after near-point dog ON" is smaller than the deceleration distance from the " [Pr.46] OPR speed" to " [Pr.47] Creep speed".

A deceleration stop will be carried out if the speed is changed during the operation and an error occurs.

- (2) The following shows the operation when a machine OPR is started while the near-point dog is ON.
- (3) When the stop signal stops the machine OPR, carry out the machine OPR again. When restart command is turned ON after the stop signal stops the OPR, the error "OPR restart impossible (error code: 209)" will occur.
- (4) After the servo amplifier turned on, the zero point of the encoder must be passed at least once before point A is reached.

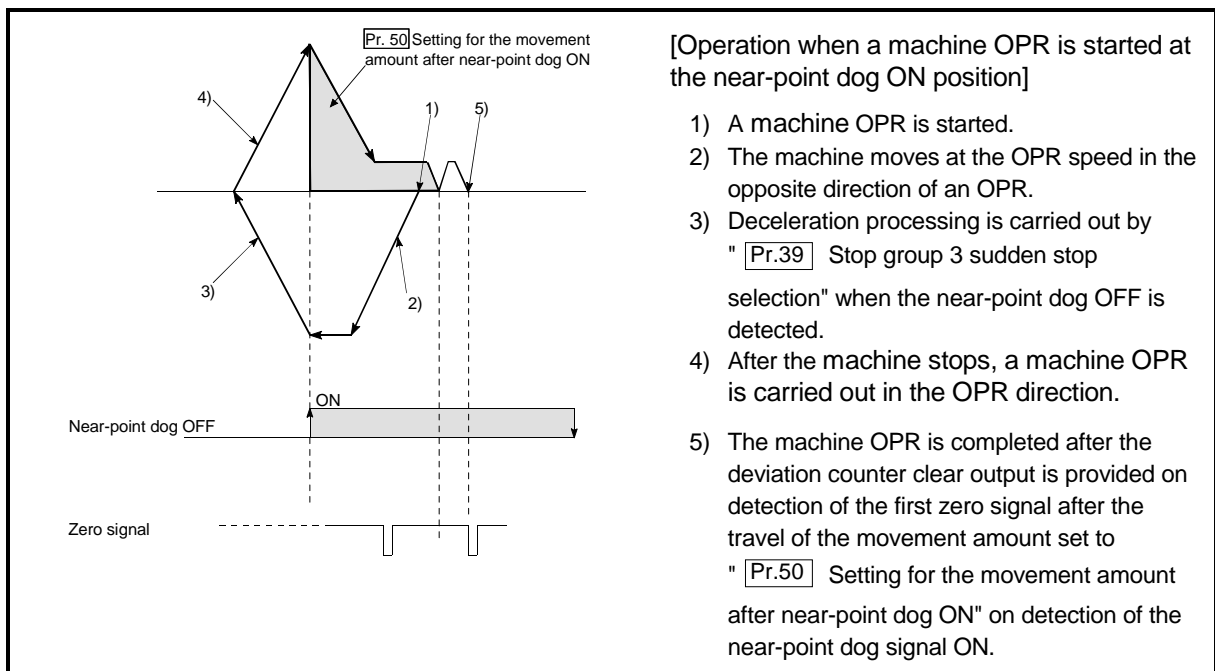


Fig. 8.13 Count method 1) machine OPR on the near-point dog ON position

8.2.5 OPR method (3): Count method 2)

The following shows an operation outline of the "method 2)" OPR method.
 The "count method 2)" method is effective when a "zero signal" cannot be received.
 (Note that compared to the "count method 1)" method, using this method will result in more deviation in the stop position during machine OPR.)

■ Operation chart

| | |
|----|---|
| 1) | The machine OPR is started. (The machine begins the acceleration designated in " Pr.51 OPR acceleration time selection", in the direction designated in " Pr.44 OPR direction". It then moves at the " Pr.46 OPR speed" when the acceleration is completed.) |
| 2) | The machine begins decelerating when the near-point dog ON is detected. |
| 3) | The machine decelerates to the " Pr.47 Creep speed", and subsequently moves at that speed. |
| 4) | The command from the QD75 will stop and the machine OPR will be completed when the machine moves the movement amount set in " Pr.50 Setting for the movement amount after near-point dog ON " from the near-point dog ON position. |

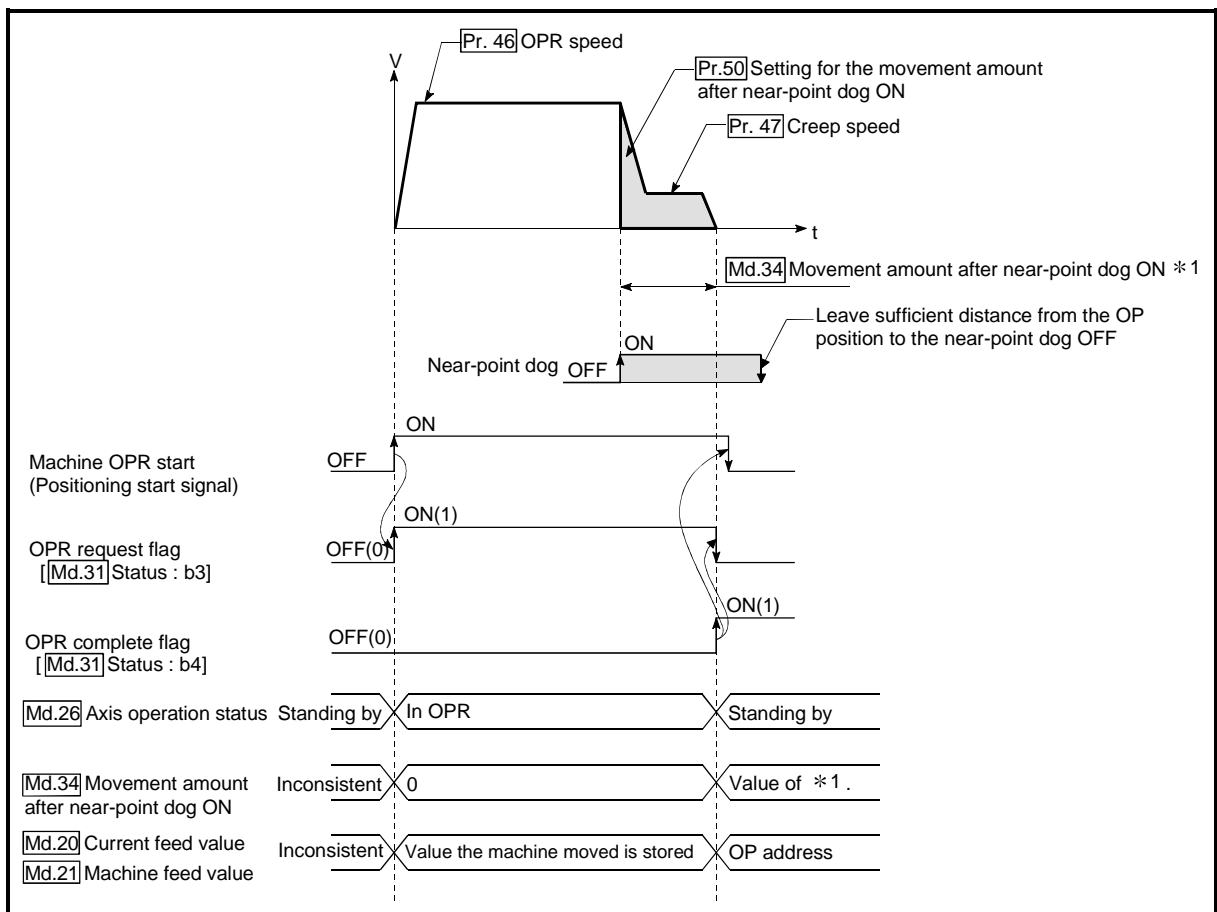


Fig. 8.14 Count method 2) machine OPR

■ Restrictions

When this method is used, a deviation will occur in the stop position (OP) compared to other OPR methods because an error of about 1 ms occurs in taking in the near-point dog ON.

■ Precautions during operation

- (1) An error "Count method movement amount fault (error code: 206)" will occur and the operation will not start if the " Pr.50 Setting for the movement amount after near-point dog ON" is smaller than the deceleration distance from the " Pr.46 OPR speed" to " Pr.47 Creep speed".

A deceleration stop will be carried out if the speed is changed during the operation and an error occurs.

- (2) The following shows the operation when a machine OPR is started while the near-point dog is ON.
- (3) When the stop signal stops the machine OPR, carry out the machine OPR again. When restart command is turned ON after the stop signal stops the OPR, the error "OPR restart impossible (error code: 209)" will occur.

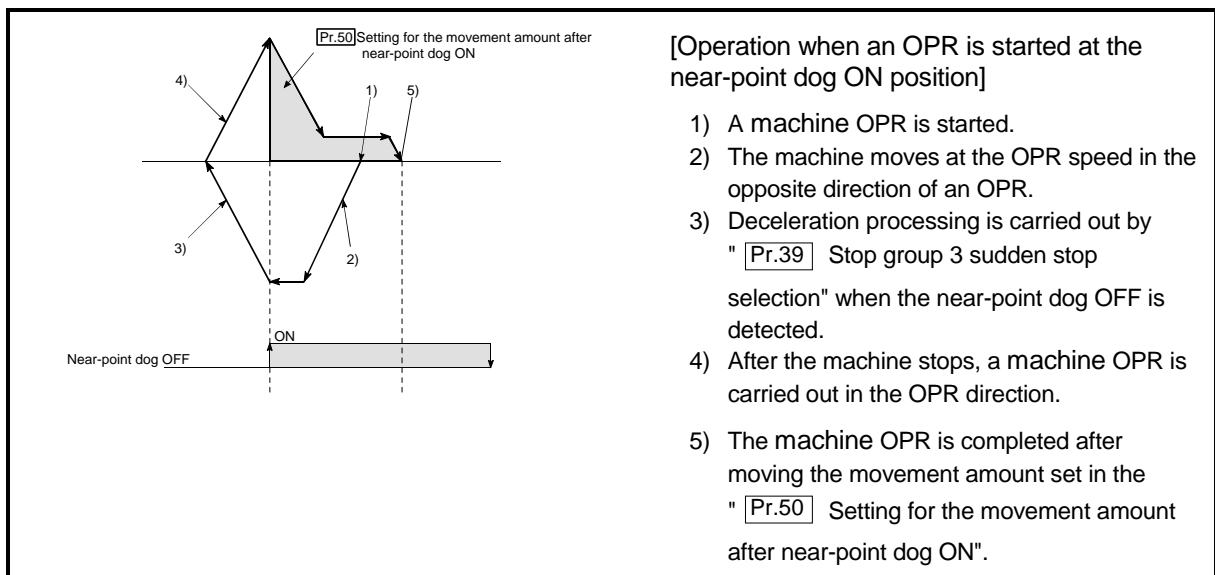


Fig. 8.15 Count method 2) machine OPR on the near-point dog ON position

8.2.6 OPR method (4): Data set method

The following shows an operation outline of the "Data set method" OPR method.

The "Data set method" method is effective when a "Near-point dog" does not used.

It can be used with absolute position system.

With the data set method OPR, the position where the machine OPR has been carried out, is registered into the QD75 as the OP, and the current feed value and feed machine value is overwritten to an OP address.

Use the JOG or manual pulse generator operation to move the OP.

■ Operation chart

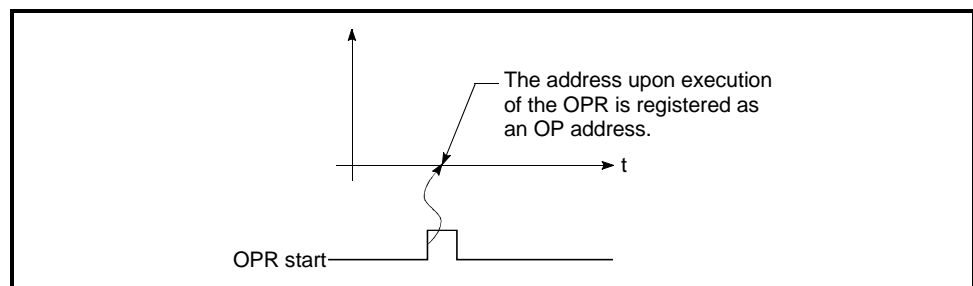


Fig. 8.16 Data set method OPR

■ Precautions during operation

- (1) The zero point must have been passed before the OPR is carried out after the power supply is turned ON. If the OPR is carried out without passing the zero point even once, the "OPR restart zero point not passed error" will occur. When the "Home positioning return (OPR) restart zero point not passed error" occurs, perform the JOG or similar operation so that the servomotor makes more than one revolution after an error reset, before carrying out the machine OPR again.
- (2) When it is not the case of the absolute position system, starting the data set method OPR will be identical to the function of the current value change.
- (3) The OPR data used for the data set method is the "OPR method" and "OP address".
The OPR data other than that for the OPR method and OP address is not used for the data set method OPR method, but if a value is set the outside the setting range, an error will occur when the PLC READY signal (Y0) is turned ON so that the preparation complete (X0) is not turned OFF.
With the OPR data other than that for the OPR method and OP address, set an arbitrary value (default value can be allowed) within each data setting range so that an error will not occur upon receiving the PLC READY signal ON.

8.3 Fast OPR

8.3.1 Outline of the fast OPR operation

■ Fast OPR operation

In a fast OPR, positioning is carried out by a machine OPR to the "Md.21 Machine feed value" stored in the QD75.

The following shows the operation during a basic fast OPR start.

- 1) The fast OPR is started.
- 2) Positioning control begins to the "Md.21 Machine feed value", begins at speed set in the OPR parameters (Pr.43 to Pr.57).
- 3) The fast OPR is completed.

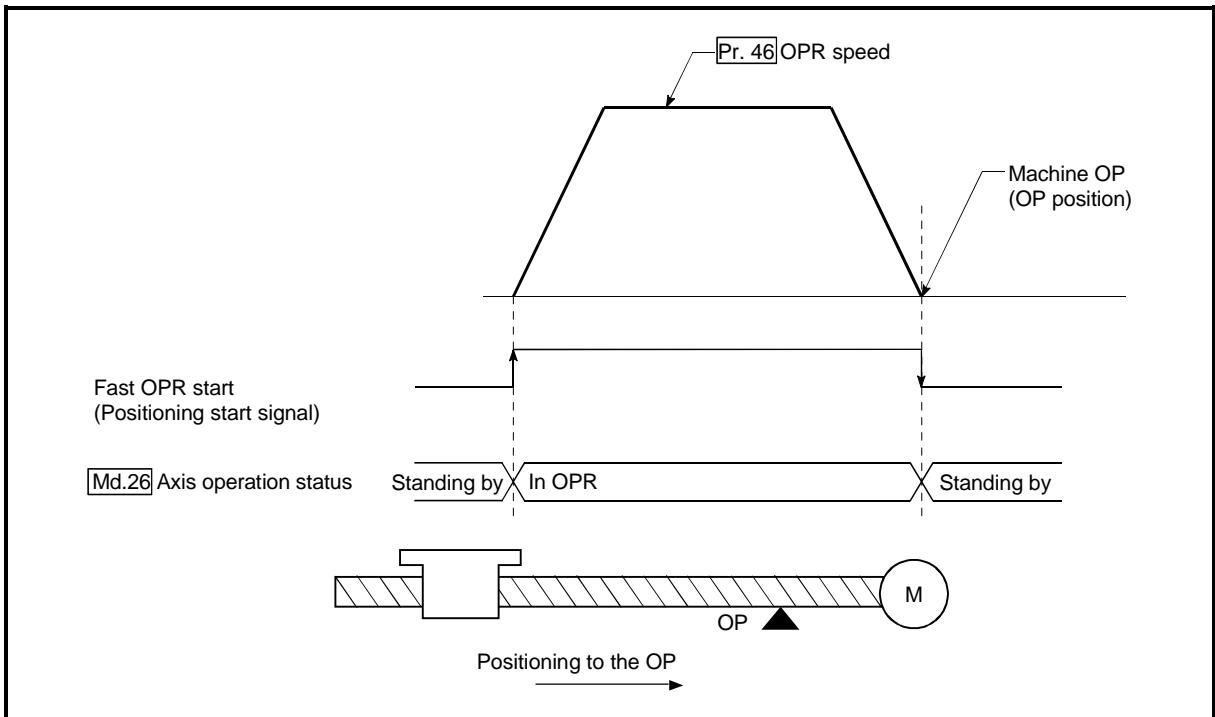


Fig. 8.17 Fast OPR

■ Operation timing and processing time of fast OPR

The following shows details about the operation timing and time during fast OPR.

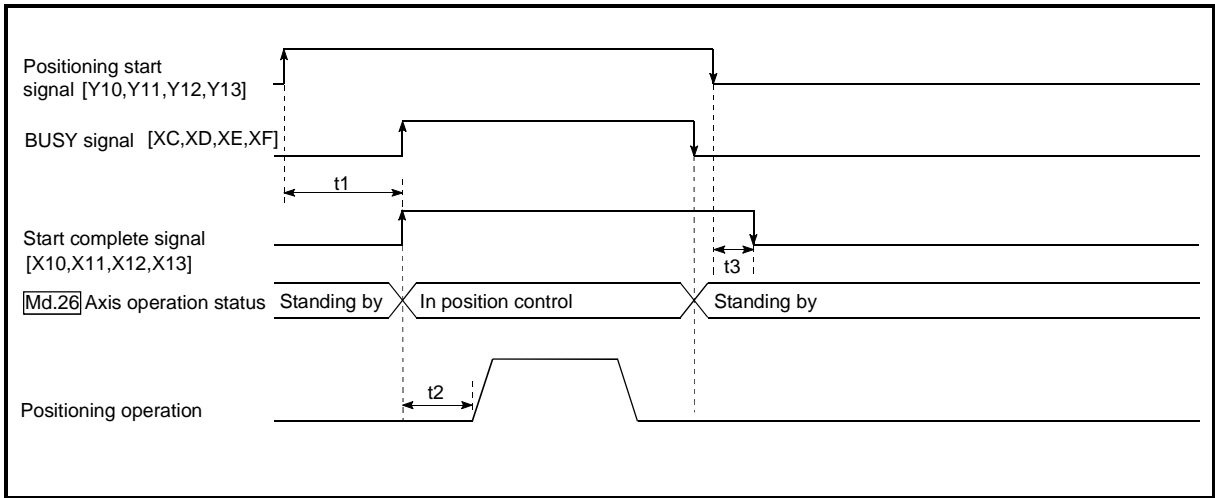


Fig. 8.18 Operation timing and processing time of fast OPR

Normal timing time

Unit: ms

| t1 | t2 | t3 |
|------------|------------|----------|
| 1.0 to 1.3 | 2.7 to 4.4 | 0 to 3.5 |

•The t1 timing time could be delayed by the operation state of other axes.

■ Operating restrictions

When the OPR complete flag ([Md.31] Status: b3) is ON, executing a fast OPR start will result in an "Home positioning return (OPR) request flag ON" error (error code: 207)".

Chapter 9 Major Positioning Control

The details and usage of the major positioning controls (control functions using the "positioning data") are explained in this chapter.

The major positioning controls include such controls as "positioning control" in which positioning is carried out to a designated position using the address information, "speed control" in which a rotating object is controlled at a constant speed, "speed-position switching control" in which the operation is shifted from "speed control" to "position control" and "position-speed switching control" in which the operation is shifted from "position control" to "speed control".

Carry out the required settings to match each control.

| | | |
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9.1 Outline of major positioning controls

"Major positioning controls" are carried out using the "positioning data" stored in the QD75.

The basic controls such as position control and speed control are executed by setting the required items in this "positioning data", and then starting that positioning data.

The control system for the "major positioning controls" is set in setting item "Da.2 Control system" of the positioning data.

Control defined as a "major positioning control" carries out the following types of control according to the "Da.2 Control system" setting.

| Major positioning control | | Da.2 Control system | Details | |
|---------------------------|---|--|--|---|
| Position control * | Linear control | 1-axis linear control | ABS Linear 1 INC Linear 1 | Positioning of a designated 1 axis is carried out from the start address (current stop position) to the designated position. |
| | | 2-axis linear interpolation control * | ABS Linear 2 INC Linear 2 | Using a designated 2 axes, linear interpolation control is carried out from the start address (current stop position) to the designated position. |
| | | 3-axis linear interpolation control * | ABS Linear 3 INC Linear 3 | Using a designated 3 axes, linear interpolation control is carried out from the start address (current stop position) to the designated position. |
| | | 4-axis linear interpolation control * | ABS Linear 4 INC Linear 4 | Using a designated 4 axes, linear interpolation control is carried out from the start address (current stop position) to the designated position. |
| | Fixed-feed control | 1-axis fixed-feed control | Fixed-feed 1 | Positioning of a designated 1 axis is carried out from the start address (current stop position). (The "Md.20 Current feed value" is set to "0" at the start.) |
| | | 2-axis fixed-feed control * | Fixed-feed 2 | Using a designated 2 axes, linear interpolation control is carried out from the start address (current stop position). (The "Md.20 Current feed value" is set to "0" at the start.) |
| | | 3-axis fixed-feed control * | Fixed-feed 3 | Using a designated 3 axes, linear interpolation control is carried out from the start address (current stop position). (The "Md.20 Current feed value" is set to "0" at the start.) |
| | | 4-axis fixed-feed control * | Fixed-feed 4 | Using a designated 4 axes, linear interpolation control is carried out from the start address (current stop position). (The "Md.20 Current feed value" is set to "0" at the start.) |
| | 2-axis circular interpolation control * | Sub point designation | ABS Circular sub INC Circular sub | The axis in which the interpolation control system is set is regarded as the reference axis. Positioning is carried out in an arc path to a designated position, while controlling the other axis (interpolation axis) to match the positioning data set in the reference axis. |
| | | Center point designation | ABS Circular right ABS Circular left INC Circular right INC Circular left | |
| Speed control * | 1-axis speed control | Forward run speed 1 Reverse run speed 1 | The speed control of the designated 1 axis is carried out. | |
| | 2-axis speed control * | Forward run speed 2 Reverse run speed 2 | The speed control of the designated 2 axes is carried out. | |
| | 3-axis speed control * | Forward run speed 3 Reverse run speed 3 | The speed control of the designated 3 axes is carried out. | |
| | 4-axis speed control * | Forward run speed 4 Reverse run speed 4 | The speed control of the 4 axes is carried out. | |

| Major positioning control | | Da.2 Control system | Details |
|----------------------------------|------------------------|--|--|
| Speed-position switching control | | Forward run speed/position Reverse run speed/position | The control is continued as position control (positioning for the designated address or movement amount) by turning ON the "speed-position switching signal" after first carrying out speed control. |
| Position-speed switching control | | Forward run position/speed Reverse run position/speed | The control is continued as speed control by turning ON the "position-speed switching signal" after first carrying out position control. |
| Other control | NOP instruction | NOP instruction | A nonexecutable control system. When this instruction is set, the operation is transferred to the next data operation, and the instruction is not executed. |
| | Current value changing | Current value changing | The current feed value (Md.20) is changed to an address set in the positioning data. This can be carried out by either of the following 2 methods. (The machine feed value cannot be changed.) <ul style="list-style-type: none"> • Current value changing using the control system • Current value changing using the current value changing start No. (No. 9003). |
| | JUMP instruction | JUMP instruction | An unconditional or conditional JUMP is carried out to a designated positioning data No. |
| | LOOP | LOOP | A repeat control is carried out by repeat LOOP to LEND. |
| | LEND | LEND | Control is returned to the top of the repeat control by repeat LOOP to LEND. After the repeat operation is completed specified times, the next positioning data is run. |

* In "2-axis linear interpolation control", "3-axis linear interpolation control", "4-axis linear interpolation control", "2-axis fixed-feed control", "3-axis fixed-feed control", "4-axis fixed-feed control", "2-axis circular interpolation control", "2-axis speed control", "3-axis speed control" and "4-axis speed control", control is carried out so that linear and arc paths are drawn using a motor set in two or more axes directions. This kind of control is called "interpolation control". (Refer to Section 9.1.6 "Interpolation control" for details.)

9.1.1 Data required for major positioning control

The following table shows an outline of the "positioning data" configuration and setting details required to carry out the "major positioning controls".

| Setting item | | Setting details | |
|------------------------|-------|-------------------------------------|---|
| Positioning data No. 1 | Da.1 | Operation pattern | Set the method by which the continuous positioning data (Ex: positioning data No. 1, No. 2, No. 3) will be controlled. (Refer to Section "9.1.2".) |
| | Da.2 | Control system | Set the control system defined as a "major positioning control". (Refer to Section "9.1".) |
| | Da.3 | Acceleration time No. | Select and set the acceleration time at control start. (Select one of the four values set in Pr.9 , Pr.25 , Pr.26 , and Pr.27 for the acceleration time.) |
| | Da.4 | Deceleration time No. | Select and set the deceleration time at control stop. (Select one of the four values set in Pr.10 , Pr.28 , Pr.29 , and Pr.30 for the deceleration time.) |
| | Da.5 | Axis to be interpolated | Set an axis to be interpolated (partner axis) during the 2-axis interpolation operation (Refer to Section 9.1.6). |
| | Da.6 | Positioning address/movement amount | Set the target value during position control. (Refer to Section "9.1.3".) |
| | Da.7 | Arc address | Set the sub point or center point address during circular interpolation control. |
| | Da.8 | Command speed | Set the speed during the control execution. |
| | Da.9 | Dwell time | Set the time the machine waits from the completion of the executed positioning control and the stopping of the workpiece until the judgment of the QD75 positioning completion. |
| | Da.10 | M code | Set this item when carrying out sub work (clamp and drill stops, tool replacement, etc.) corresponding to the code No. related to the positioning data execution. |

* The settings and setting requirement for the setting details of Da.1 to Da.10 differ according to the "Da.2 Control system". (Refer to Section 9.2 "Setting the positioning data".)

■ Major positioning control sub functions

Refer to Section 3.2.4 "Combination of QD75 major functions and sub functions" for details on "sub functions" that can be combined with the major positioning control.

Also refer to Chapter 12 "Control sub Functions" for details on each sub function.

■ Major positioning control from peripheral devices

"Major positioning control" can be executed from the peripheral device test mode. Refer to GX Configurator-QP Operating Manual for details on carrying out major positioning control from the peripheral device.

REMARK

- 600 positioning data (positioning data No. 1 to 600) items can be set per axis.

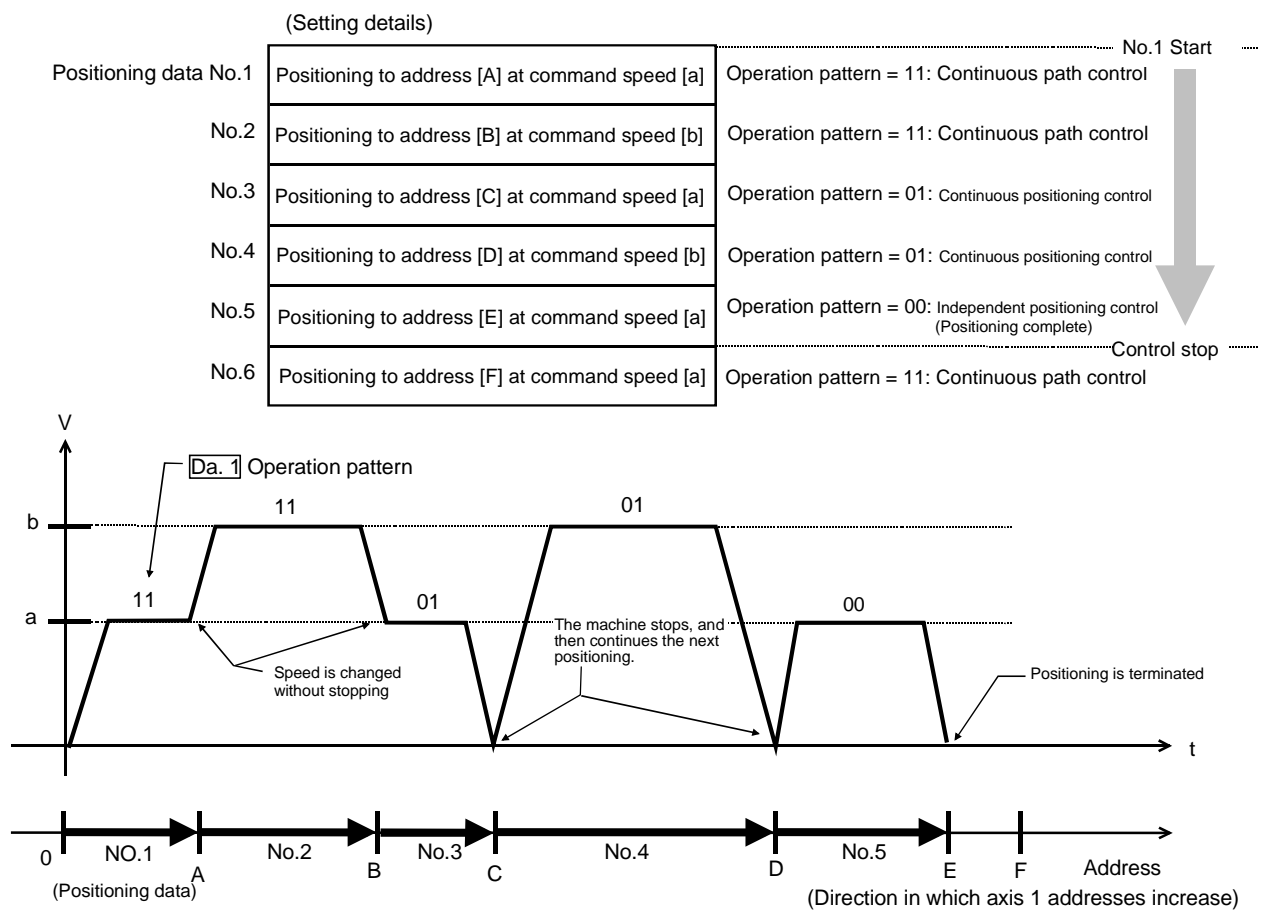
9.1.2 Operation patterns of major positioning controls

In "major positioning control" (high-level positioning control), "Da.1" Operation pattern" can be set to designate whether to continue executing positioning data after the started positioning data. The "operation pattern" includes the following 3 types.

- Positioning complete — (1) Independent positioning control (operation pattern: 00)
- Positioning continue — (2) Continuous positioning control (operation pattern: 01)
- (3) Continuous path control (operation pattern: 11)

The following shows examples of operation patterns when "1-axis linear control (ABS linear 1)" is set in positioning data No. 1 to No. 6 of axis 1. Details of each operation pattern are shown on the following pages.

< Operation example when "1-axis linear positioning" is set in the positioning data of axis 1 >



(One motor is driven, and positioning is carried out to an addresses designated in one direction.)

POINT

The BUSY signal [XC, XD, XE, XF] turns ON even when position control of movement amount 0 is executed. However, since the ON time is short, the ON status may not be detected in the PLC program.

[1] Independent positioning control (Positioning complete)

This control is set when executing only one designated data item of positioning. If a dwell time is designated, the positioning will complete after the designated time elapses.

This data (operation pattern [00] data) becomes the end of block data when carrying out block positioning. (The positioning stops after this data is executed.)

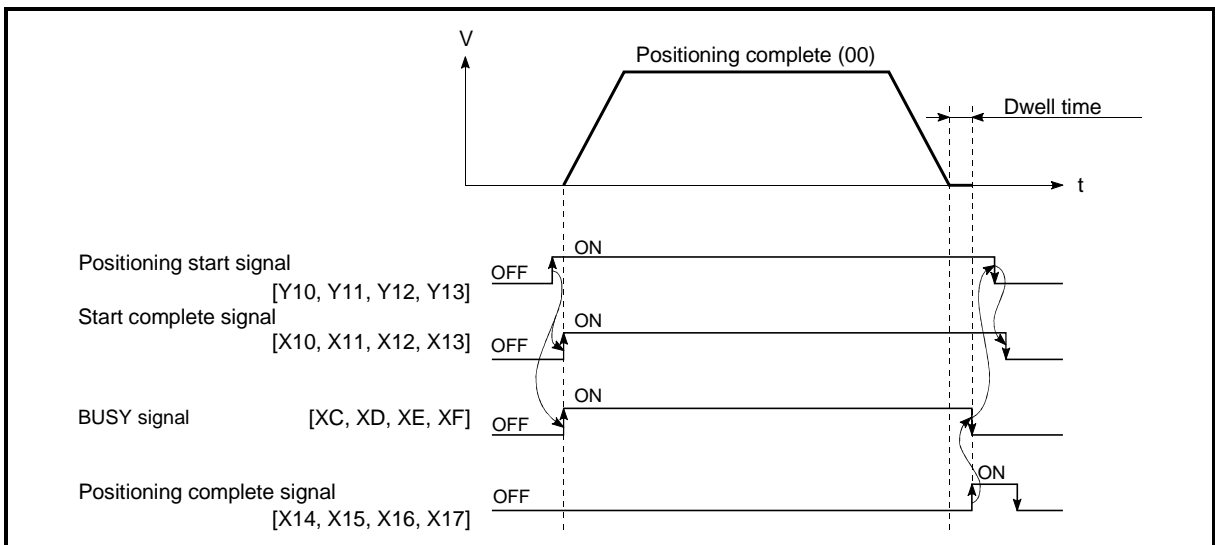


Fig. 9.1 Operation during independent positioning control

[2] Continuous positioning control

- (1) The machine always automatically decelerates each time the positioning is completed. Acceleration is then carried out after the QD75 command speed reaches 0 to carry out the next positioning data operation. If a dwell time is designated, the acceleration is carried out after the designated time elapses.
- (2) In operation by continuous positioning control (operation pattern "01"), the next positioning No. is automatically executed. Always set operation pattern "00" in the last positioning data to complete the positioning. If the operation pattern is set to positioning continue ("01" or "11"), the operation will continue until operation pattern "00" is found. If the operation pattern "00" cannot be found, the operation may be carried out until the positioning data No. 600. If the operation pattern of the positioning data No. 600 is not completed, the operation will be started again from the positioning data No. 1.

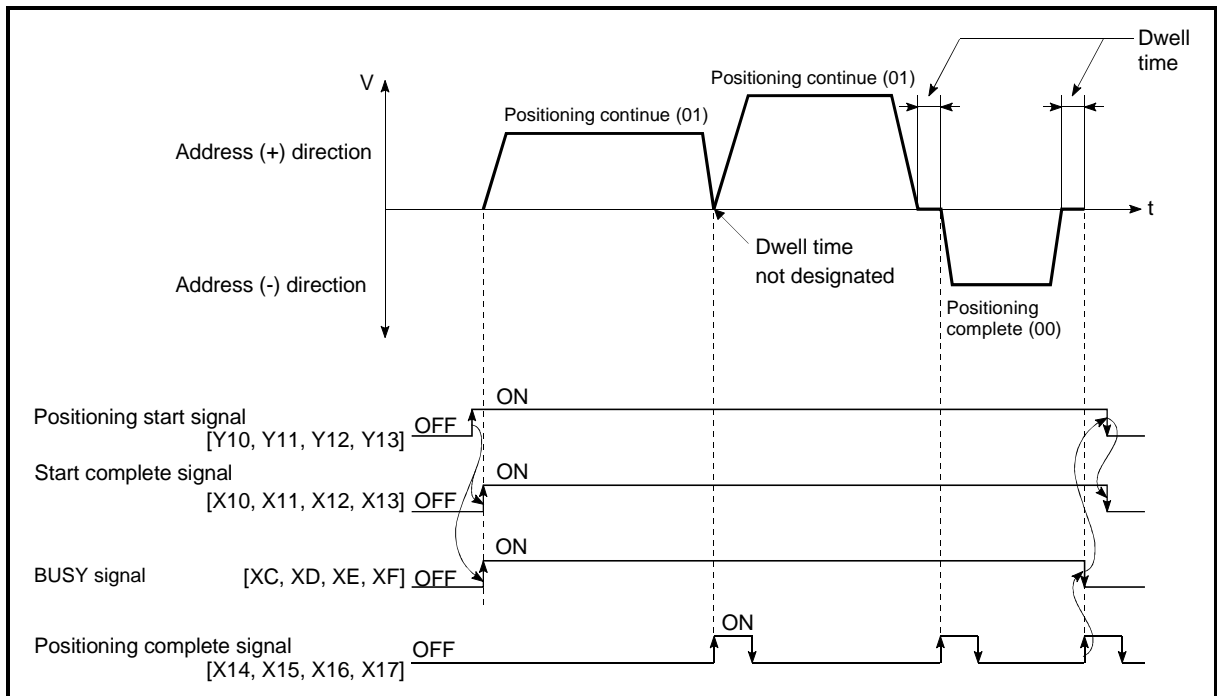


Fig. 9.2 Operation during continuous positioning control

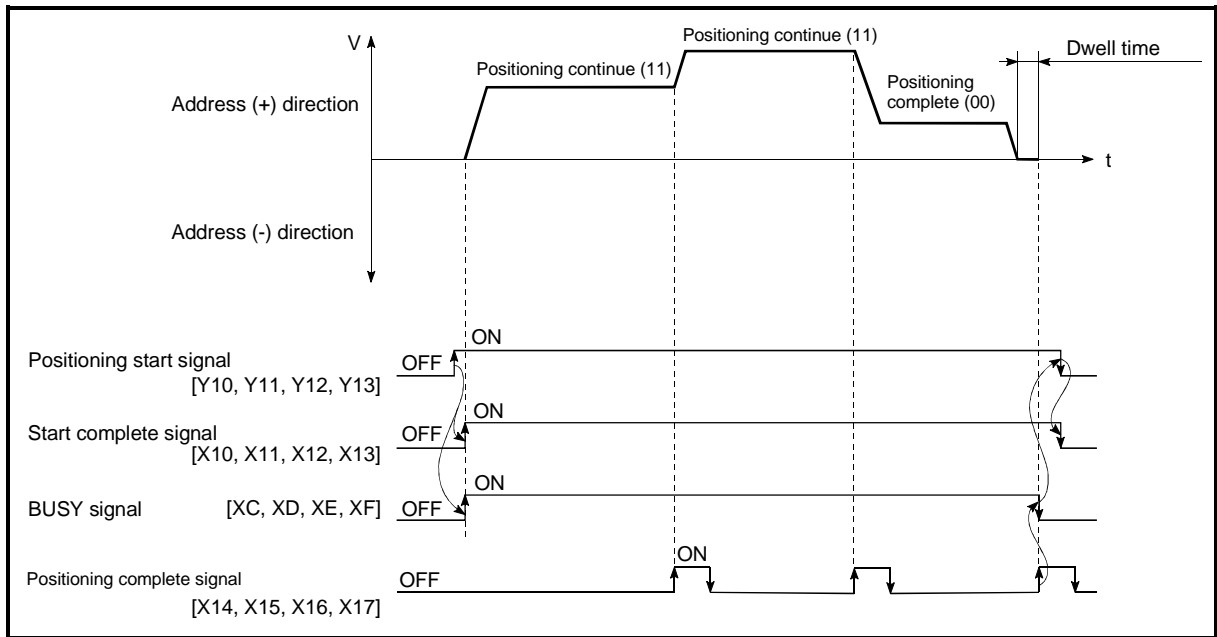


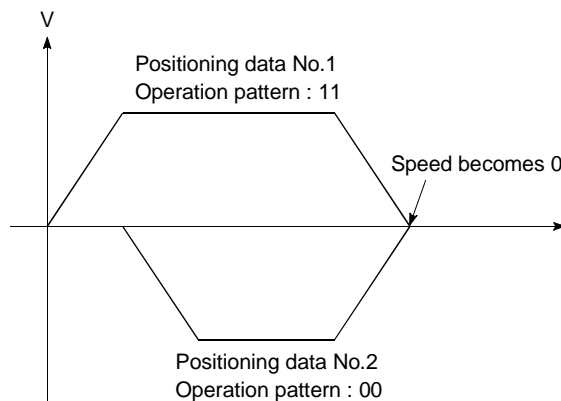
Fig. 9.3 Operation during continuous path control (Standard speed switching mode)

POINT

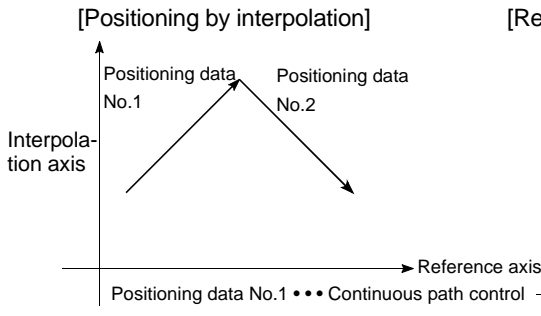
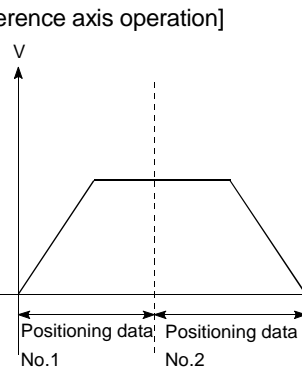
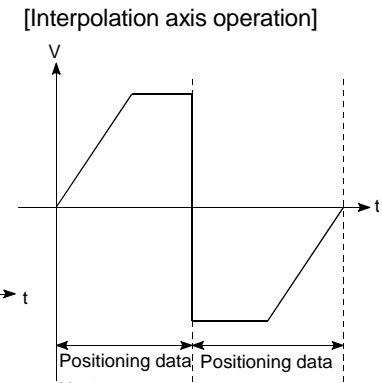
In the continuous path control, a speed variation will not occur using the near-pass function when the positioning data No. is switched (Refer to Section 12.3.3 "Near-pass function").

(2) Deceleration stop conditions during continuous path control
 Deceleration stops are not carried out in continuous path control, but the machine will carry out a deceleration stop to speed "0" in the following cases (a) to (d).

(a) When the operation pattern of the positioning data currently being executed is "continuous path control: 11", and the movement direction of the positioning data currently being executed differs from that of the next positioning data. (Only for 1-axis positioning control (Refer to the "Point" in the next page.))



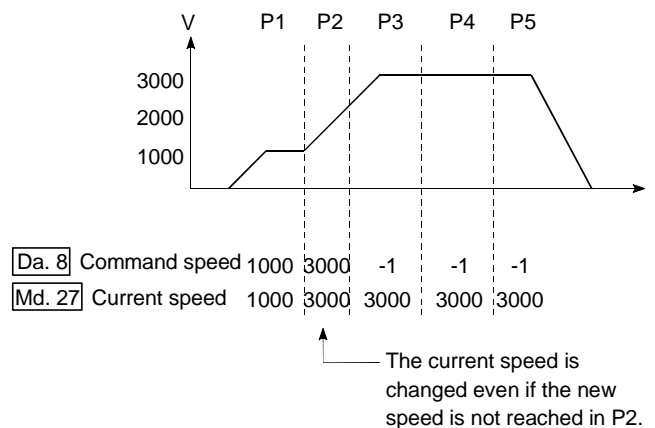
- (b) When the operation pattern of the positioning data currently being executed is "continuous path control: 11", and the movement amount of the next positioning data is "0".
- (c) During operation by step operation. (Refer to Section 12.7.1 "Step function".)
- (d) When there is an error in the positioning data to carry out the next operation.

| POINTS | | | |
|--|--|---|--|
| <p>(1) The movement direction is not checked during interpolation operations. Thus, automatic deceleration to a stop will not be carried out even if the movement direction is changed (See the figures below). Because of this, the interpolation axis may suddenly reverse direction. To avoid this sudden direction reversal in the interpolation axis, set the pass point to continuous positioning control "01" instead of setting it to continuous path control "11".</p> | <p>[Positioning by interpolation]</p>  | <p>[Reference axis operation]</p>  | <p>[Interpolation axis operation]</p>  |
| <p>(2) When a "0" is set in the " Da.6 Positioning address/movement amount" of the continuous path control positioning data, the command speed of about 2 ms is reduced to 0. When a "0" is set in the " Da.6 Positioning address/movement amount" to increase the number of speed change points in the future, change the " Da.2 Control system" to the "NOP instruction" to make the control nonexecutable. (Refer to Section 9.2.20 "NOP instruction".)</p> | | | |
| <p>(3) In the continuous path control positioning data, assure a movement distance so that the execution time with that data is 100 ms or longer, or lower the command speed.</p> | | | |

(3) Speed handling

- (a) Continuous path control command speeds are set with each positioning data.
The QD75 then carries out the positioning at the speed designated with each positioning data.
- (b) The command speed can be set to "-1" in continuous path control.
The control will be carried out at the speed used in the previous positioning data No. if the command speed is set to "-1".
(The "current speed" will be displayed in the command speed when the positioning data is set with a peripheral device. The current speed is the speed of the positioning control being executed currently.)
 - 1) The speed does not need to be set in each positioning data when carrying out uniform speed control if "-1" is set beforehand in the command speed.
 - 2) If the speed is changed in the previous positioning data when "-1" is set in the command speed, the operation can be continued at the new speed.
 - 3) An error "no command speed error (error code: 503)" occurs and positioning cannot be started if "-1" is set in the command speed of the first positioning data at start.

[Relation between the command speed and current speed]



POINTS

- (1) In the continuous path control, a speed variation will not occur using the near-pass function when the positioning data is switched (Refer to Section 12.3.3 "Near-pass function").
- (2) The QD75 holds the command speed set with the positioning data, and the latest value of the speed set with the speed change request as the "Md.27" Current speed". It controls the operation at the "current speed" when "-1" is set in the command speed.
(Depending on the relation between the movement amount and the changed speed, the feedrate may not reach the new speed value, but even then the current speed will be updated.)
- (3) When the address for speed change is identified beforehand, generate and execute the positioning data for speed change by the continuous path control to carry out the speed change without requesting the speed change with a PLC program.

(4) Speed switching

(Refer to " Pr.19 Speed switching mode".)

(a) Standard speed switching mode

- 1) If the respective command speeds differ in the "positioning data currently being executed" and the "positioning data to carry out the next operation", the machine will accelerate or decelerate after reaching the positioning point set in the "positioning data currently being executed" and the speed will change over to the speed set in the "positioning data to carry out the next operation".
- 2) The parameters used in acceleration/deceleration to the command speed set in the "positioning data to carry out the next operation" are those of the positioning data to carry out acceleration/deceleration.
Speed switching will not be carried out if the command speeds are the same.

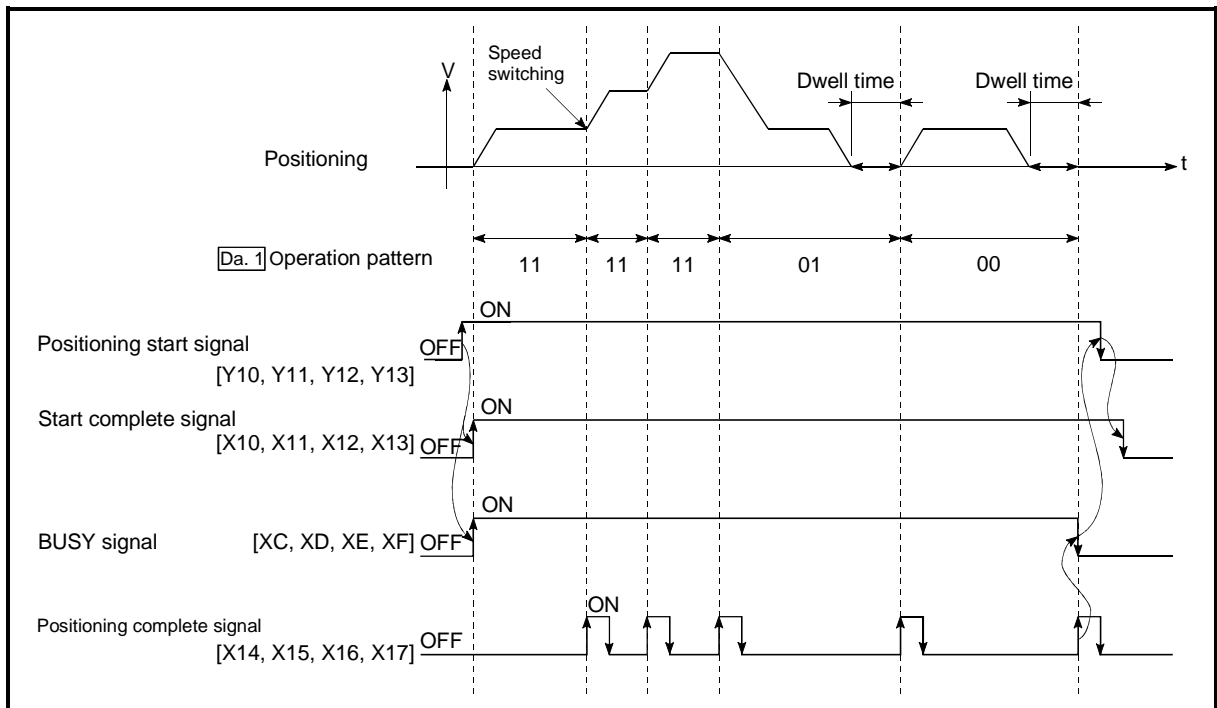
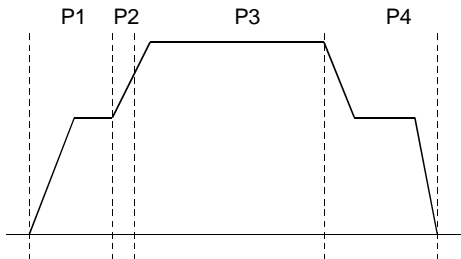


Fig. 9.4 Operation for the standard speed switching mode

3) Speed switching condition

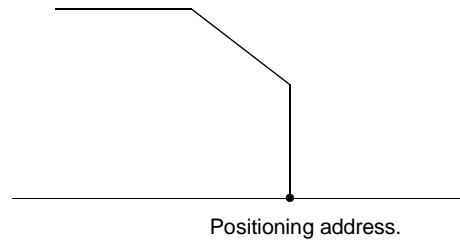
If the movement amount is small in regard to the target speed, the current speed may not reach the target speed even if acceleration/deceleration is carried out. In this case, the machine is accelerated/decelerated so that it nears the target speed. If the movement amount will be exceeded when automatic deceleration is required (Ex. Operation patterns "00", "01", etc.), the machine will immediately stop at the designated positioning address, and a "insufficient movement distance warning (warning code: 513)" will occur.

[When the speed cannot change over in P2]
 When the relation of the speeds is $P1 = P4, P2 = P3, P1 < P2$.



[When the movement amount is small during automatic deceleration]

The movement amount required to carry out the automatic deceleration cannot be secured, so the machine immediately stops in a speed $\neq 0$ status.



(b) Front-loading speed switching mode

- 1) If the respective command speeds differ in the "positioning data currently being executed" and the "positioning data to carry out the next operation", the speed will change over to the speed set in the "positioning data to carry out the next operation" at the end of the "positioning data currently being executed".
- 2) The parameters used in acceleration/deceleration to the command speed set in the "positioning data to carry out the next operation" are those of the positioning data to carry out acceleration/deceleration. Speed switching will not be carried out if the command speeds are the same.

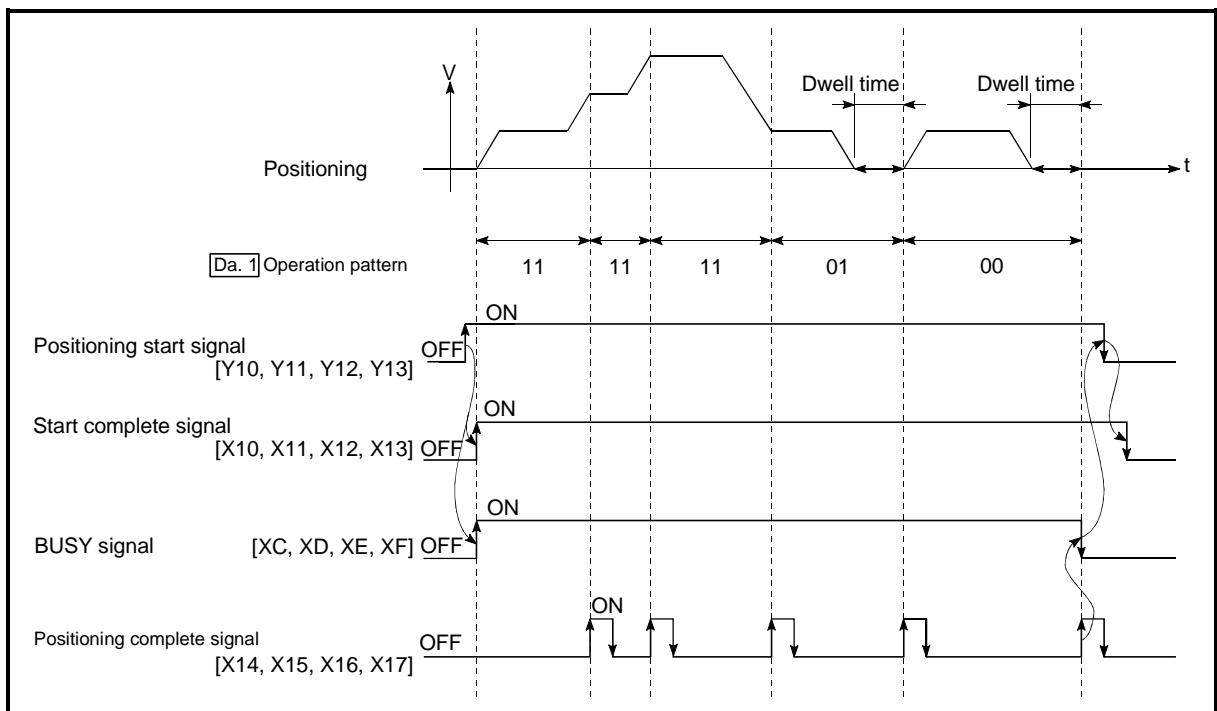


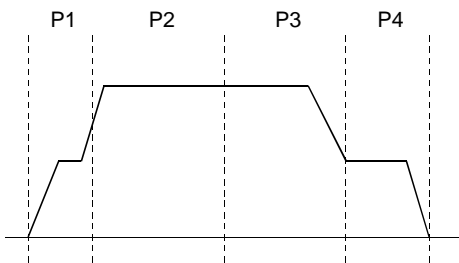
Fig. 9.5 Operation for the front-loading speed switching mode

3) Speed switching condition

If the movement amount is small in regard to the target speed, the current speed may not reach the target speed even if acceleration/deceleration is carried out. In this case, the machine is accelerated/decelerated so that it nears the target speed. If the movement amount will be exceeded when automatic deceleration is required (Ex. Operation patterns "00", "01", etc.), the machine will immediately stop at the designated positioning address, and a "insufficient movement distance warning (warning code: 513)" will occur.

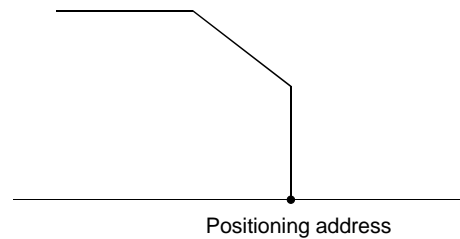
[When the speed cannot change over to the P2 speed in P1]

When the relation of the speeds is $P1 = P4, P2 = P3, P1 < P2$.



[When the movement amount is small during automatic deceleration]

The movement amount required to carry out the automatic deceleration cannot be secured, so the machine immediately stops in a speed $\neq 0$ status.



9.1.3 Designating the positioning address

The following shows the two methods for commanding the position in control using positioning data.

■ Absolute system

Positioning is carried out to a designated position (absolute address) having the OP as a reference. This address is regarded as the positioning address. (The start point can be anywhere.)

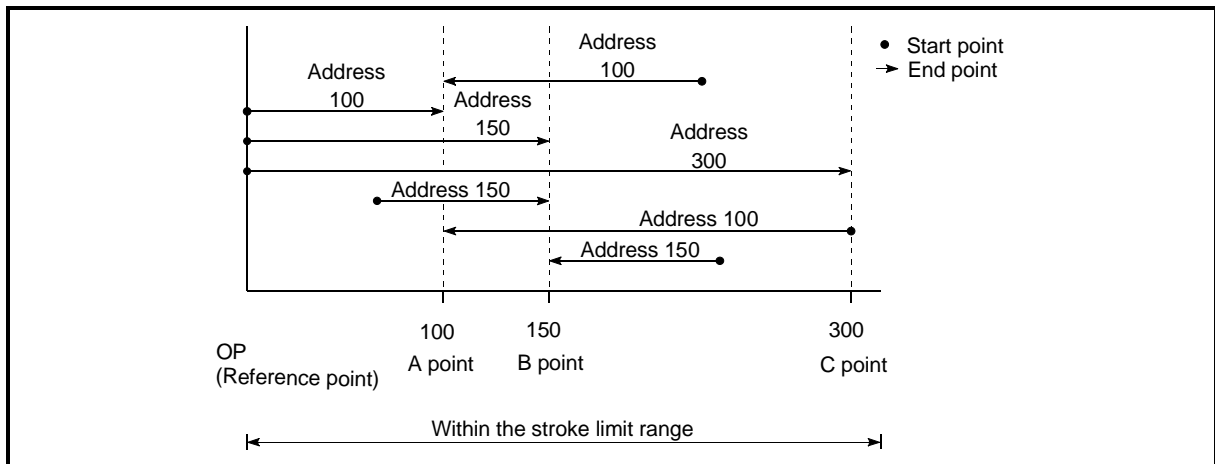


Fig. 9.6 Absolute system positioning

■ Incremental system

The position where the machine is currently stopped is regarded as the start point, and positioning is carried out for a designated movement amount in a designated movement direction.

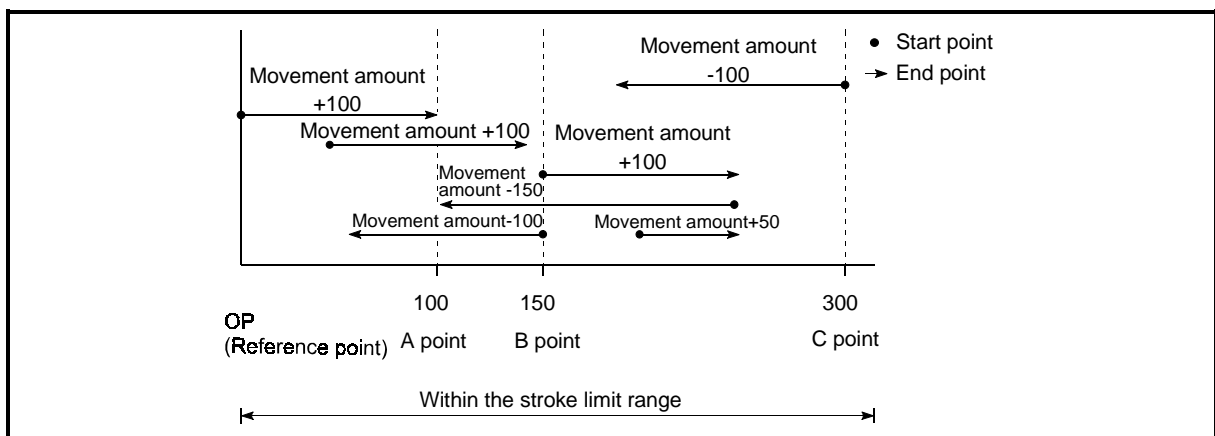


Fig. 9.7 Incremental system positioning

9.1.4 Confirming the current value

■ Values showing the current value

The following two types of addresses are used as values to show the position in the QD75.

These addresses ("current feed value" and "machine feed value") are stored in the monitor data area, and used in monitoring the current value display, etc.

| | |
|--------------------|---|
| Current feed value | <ul style="list-style-type: none"> • This is the value stored in "Md.20 Current feed value". • This value has an address established with a "machine OPR" as a reference, but the address can be changed by changing the current value to a new value. • This value is updated every 3.5ms. |
| Machine feed value | <ul style="list-style-type: none"> • This is the value stored in "Md.21 Machine feed value". • This value always has an address established with a "machine OPR" as a reference. The address cannot be changed, even if the current value is changed to a new value. • This value is updated every 56.8ms. |

The "current feed value" and "machine feed value" are used in monitoring the current value display, etc.

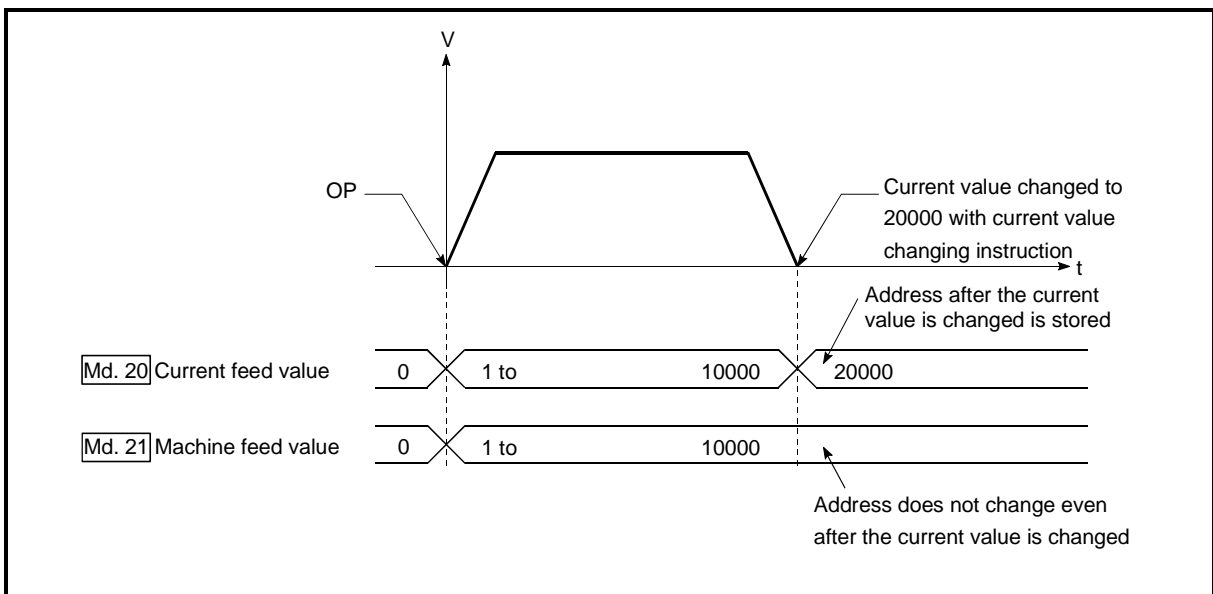


Fig. 9.8 Current feed value and machine feed value

■ Restrictions

- (1) A 3.5ms error will occur in the current value update timing when the stored "current feed value" is used in the control.
A 56.8ms error will occur in the current value update timing when the stored "machine feed value" is used in the control.
- (2) The "current feed value" and "machine feed value" may differ from the values set in "Da.6 Positioning address/movement amount" of the positioning data if the movement amount per pulse is not set to "1".

■ Monitoring the current value

The "current feed value" and "machine feed value" are stored in the following buffer memory addresses, and can be read using a "DFRO (P) command" from the PLC CPU.

| | Buffer memory addresses | | | |
|---------------------------------|-------------------------|----------|------------|------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Md.20 Current feed value | 800, 801 | 900, 901 | 1000, 1001 | 1100, 1101 |
| Md.21 Machine feed value | 802, 803 | 902, 903 | 1002, 1003 | 1102, 1103 |

Example

- * Program in which the axis 1 current feed value is read to D104 and D105
- *



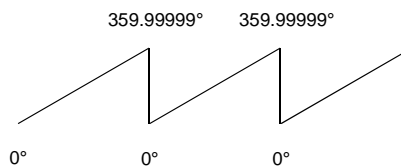
9.1.5 Control unit "degree" handling

When the control unit is set to "degree", the following items differ from when other control units are set.

[1] Current feed value and machine feed value addresses

The address of "Md.20" Current feed value" becomes a ring address from 0 to 359.99999°.

But the address of "Md.21" Machine feed value" doesn't become a ring address.

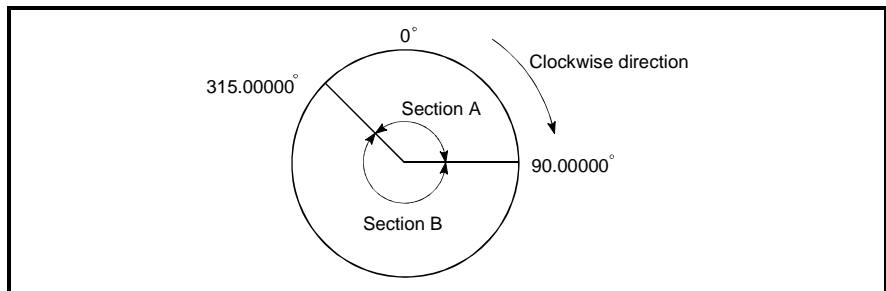


[2] Software stroke limit valid/invalid setting

With the control unit set to "degree", the software stroke limit upper and lower limit values are 0 to 359.99999.

(a) Setting to validate software stroke limit

To validate the software stroke limit, set the software stroke limit lower limit value and the upper limit value in a clockwise direction.



1) To set the movement range A, set as follows.

- Software stroke limit lower limit value.....315.00000°
- Software stroke limit upper limit value90.00000°

2) To set the movement range B, set as follows.

- Software stroke limit lower limit value.....90.00000°
- Software stroke limit upper limit value315.00000°

(b) Setting to invalidate software stroke limit

To invalidate the software stroke limit, set the software stroke limit lower limit value equal to the software stroke limit upper limit value.

The control can be carried out irrespective of the setting of the software stroke limit.

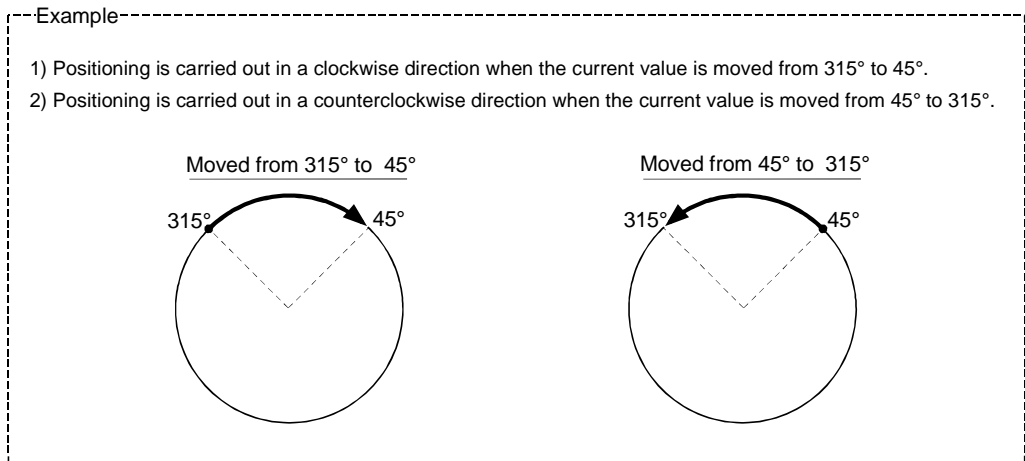
[3] Positioning control method when the control unit is set to "degree"

1) Absolute system

(a) When the software stroke limit is invalid

Positioning is carried out in the nearest direction to the designated address, using the current value as a reference.

(This is called "shortcut control".)



The shortcut control is invalidated and positioning in a designated direction is carried out by the "Cd.40 ABS direction in degrees".

This function can perform only when the software stroke limit is invalid. When the software stroke limit is valid, an error "ABS direction in degrees illegal" (error code: 546) occurs and positioning is not started.

To designate the movement direction in the ABS control, a "1" or "2" is written to the "Cd.40 ABS direction setting in the unit of degree" of the buffer memory (initial value: 0).

The value written to the "Cd.40 ABS direction in degrees" becomes valid only when the positioning control is started.

In the continuous positioning control and continuous path control, the operation is continued with the setting set at the time of start even if the setting is changed during the operation.

| Name | Function | Buffer memory address | | | | Initial value |
|--------------------------------|---|-----------------------|--------|--------|--------|---------------|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Cd.40 ABS direction in degrees | The ABS movement direction in the unit of degree is designated. 0: Shortcut (direction setting invalid) 1: ABS clockwise 2: ABS counterclockwise | 1550 | 1650 | 1750 | 1850 | 0 |

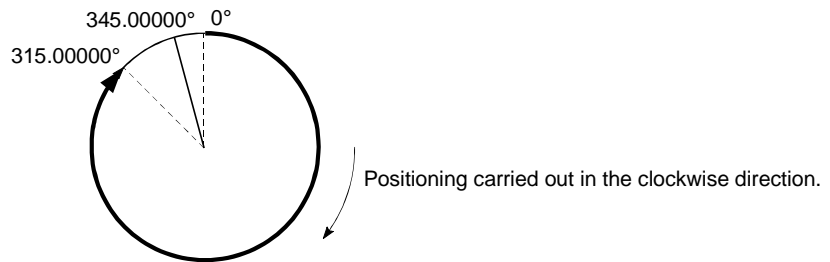
(b) When the software stroke limit is valid

The positioning is carried out in a clockwise/counterclockwise direction depending on the software stroke limit range setting method.

Because of this, positioning with "shortcut control" may not be possible.

Example

When the current value is moved from 0° to 315°, positioning is carried out in the clockwise direction if the software stroke limit lower limit value is 0° and the upper limit value is 345°.



POINT

Positioning addresses are within a range of 0° to 359.99999°.

Use the incremental system to carry out positioning of one rotation or more.

2) Incremental system

Positioning is carried out for a designated movement amount in a designated movement direction when in the incremental system of positioning.

The movement direction is determined by the sign (+, -) of the movement amount.

- For a positive (+) movement directionClockwise
- For a negative (-) movement directionCounterclockwise

POINT

Positioning of 360° or more can be carried out with the incremental system.

At this time, set as shown below to invalidate the software stroke limit.

[Software stroke limit upper limit value = Software stroke limit lower limit value]

9.1.6 Interpolation control

■ Meaning of interpolation control

In "2-axis linear interpolation control", "3-axis linear interpolation control", "4-axis linear interpolation control", "2-axis fixed-feed control", "3-axis fixed-feed control", "4-axis fixed-feed control", "2-axis speed control", "3-axis speed control", "4-axis speed control", and "2-axis circular interpolation control", control is carried out so that linear and arc paths are drawn using a motor set in two to four axis directions. This kind of control is called "interpolation control".

In interpolation control, the axis in which the control system is set is defined as the "reference axis", and the other axis is defined as the "interpolation axis".

The QD75 controls the "reference axis" following the positioning data set in the "reference axis", and controls the "interpolation axis" corresponding to the reference axis control so that a linear or arc path is drawn.

The following table shows the reference axis and interpolation axis combinations.

| Axis definition Axis set to interpolation control in "[Da.2] Control method" | Reference axis | Interpolation axis |
|---|----------------------------|---|
| 2-axis linear interpolation control, 2-axis fixed-feed control, 2-axis circular interpolation control, 2-axis speed control | Any of axes 1, 2, 3, and 4 | "Axes to be interpolated" set in reference axis |
| 3-axis linear interpolation control, 3-axis fixed-feed control, 3-axis speed control | Axis 1 | Axis 2, Axis 3 |
| | Axis 2 | Axis 3, Axis 4 |
| | Axis 3 | Axis 4, Axis 1 |
| | Axis 4 | Axis 1, Axis 2 |
| 4-axis linear interpolation control, 4-axis fixed-feed control, 4-axis speed control | Axis 1 | Axis 2, Axis 3, Axis 4 |
| | Axis 2 | Axis 3, Axis 4, Axis 1 |
| | Axis 3 | Axis 4, Axis 1, Axis 2 |
| | Axis 4 | Axis 1, Axis 2, Axis 3 |

■ Setting the positioning data during interpolation control

When carrying out interpolation control, the same positioning data Nos. are set for the "reference axis" and the "interpolation axis".

The following table shows the "positioning data" setting items for the reference axis and interpolation axis.

| Setting item | | Axis | Reference axis setting item | Interpolation axis setting item |
|---------------------------|-------|---|---|---|
| Same positioning data Nos | Da.1 | Operation pattern | ⊙ | — |
| | Da.2 | Control system | Linear 2, 3, 4, Fixed-feed 2, 3, 4, Circular sub, Circular right, Circular left Forward run speed 2, 3, 4 Reverse run speed 2, 3, 4 | — |
| | Da.3 | Acceleration time No. | ⊙ | — |
| | Da.4 | Deceleration time No. | ⊙ | — |
| | Da.5 | Axis to be interpolated. | ○ * | — |
| | Da.6 | Positioning address/ movement amount | △ Forward run speed 2, 3, and 4. Reverse run speed 2, 3, and 4 not required. | △ Forward run speed 2, 3, and 4. Reverse run speed 2, 3, and 4 not required. |
| | Da.7 | Arc address | △ (Only during circular sub, circular right, and circular left). | △ (Only during circular sub, circular right, and circular left). |
| | Da.8 | Command speed | ⊙ | △ Only during forward run speed 2, 3, 4 and reverse run speed 2, 3, 4. |
| | Da.9 | Dwell time | ○ | — |
| | Da.10 | M code | ○ | — |

⊙ : Setting always required

○ : Set according to requirements (Set to "—" when not used.)

△ : Setting restrictions exist

— : Setting not required (Unrelated setting item, so any setting value will be ignored. Use the initial value or a value within the setting range.)

* : For 2-axis interpolation, the partner axis is set. If the self-axis is set, an error "Illegal interpolation description command (error code: 521)" will occur. For 3- and 4-axis interpolation, the axis setting is not required.

* : Refer to Section 5.3 "List of positioning data" for information on the setting details.

■ Starting the interpolation control

The positioning data Nos. of the reference axis (axis in which interpolation control was set in "Da.2 Control system") are started when starting the interpolation control. (Starting of the interpolation axis is not required.)

The following errors or warnings will occur and the positioning will not start if both reference axis and the interpolation axis are started.

- Reference axis : Interpolation while interpolation axis BUSY (error code: 519)
- Interpolation axis : Control system setting error (error code: 524), start during operation (warning code: 100).

■ Interpolation control continuous positioning

When carrying out interpolation control in which "continuous positioning control" and "continuous path control" are designated in the operation pattern, the positioning method for all positioning data from the started positioning data to the positioning data in which "positioning complete" is set must be set to interpolation control.

The QD75 may malfunction if a control system other than interpolation control is set.

■ Speed during interpolation control

Either the "composite speed" or "reference axis speed" can be designated as the speed during interpolation control.

(Pr.20 Interpolation speed designation method.)

Only the "Reference axis speed" can be designated in the following interpolation control.

When a "composite speed" is set and positioning is started, the "Interpolation mode error (error code: 523)" occurs, and the system will not start.

- 4-axis linear interpolation
- 2-axis speed control
- 3-axis speed control
- 4-axis speed control

■ Cautions in interpolation control

(1) If either of the axes exceeds the "Pr.8 Speed limit value" in the 2- to 4-axes speed control, the axis which exceeded the speed limit value is controlled by the speed limit value.

For the other axes which perform interpolation, the speed can be suppressed by the ratio of a command speed.

If the reference axis exceeds "Pr.8 Speed limit value" during 2- to 4-axis linear interpolation control, 2- to 4-axis fixed-feed control or 2-axis circular interpolation control, the reference axis is controlled at the speed limit value. (The speed limit does not function on the interpolation axis side.)

(2) In 2-axis interpolation, you cannot change the combination of interpolated axes midway through operation.

| |
|---|
| POINT |
| <ul style="list-style-type: none"> When the "reference axis speed" is set during interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". |

■ Limits to interpolation control

There are limits to the interpolation control that can be executed and speed (**Pr.20** Interpolation speed designation method) that can be set, depending on the " **Pr.1** Unit setting" of the reference axis and interpolation axis. (For example, circular interpolation control cannot be executed if the reference axis and interpolation axis units differ.)

The following table shows the interpolation control and speed designation limits.

| " Da.2 Control system" interpolation control | " Pr.20 Interpolation speed designation method | " Pr.1 Unit setting *1 | |
|--|---|---|---|
| | | Reference axis and interpolation axis units are the same, or a combination of "mm" and "inch". *3 | Reference axis and interpolation axis units differ *3 |
| Linear 2 (ABS, INC) Fixed-feed 2 | Composite speed | ○ | × |
| | Reference axis speed | ○ | ○ |
| Circular sub (ABS, INC) Circular right (ABS, INC) Circular left (ABS, INC) | Composite speed | ○ *2 | × |
| | Reference axis speed | × | × |
| Linear 3 (ABS, INC) Fixed-feed 3 | Composite speed | ○ | × |
| | Reference axis speed | ○ | ○ |
| Linear 4 (ABS, INC) Fixed-feed 4 | Composite speed | × | × |
| | Reference axis speed | ○ | ○ |

○ : Setting possible, × : Setting not possible.

*1 "mm" and "inch" unit mix possible.

*2 "degree" setting not possible. A "Circular interpolation not possible (error code: 535)" will occur and the position cannot start if circular interpolation control is set when the unit is "degree". The machine will immediately stop if "degree" is set during positioning control.

*3 The unit set in the reference axis will be used for the speed unit during control if the units differ or if "mm" and "inch" are combined.

■ Axis operation status during interpolation control

"In interpolation" will be stored in the " **Md.26** Axis operation status" during interpolation control. "Standing by" will be stored when the interpolation operation is terminated. Both the reference axis and interpolation axis will carry out a deceleration stop if an error occurs during control, and "error occurring" will be stored in the operation status.

9.2 Setting the positioning data

9.2.1 Relation between each control and positioning data

The setting requirements and details for the setting items of the positioning data to be set differ according to the "Da.2] Control system".

The following table shows the positioning data setting items corresponding to the different types of control. Details and settings for the operation of each control are shown in Section 9.2.2 and subsequent sections.

(In this section, it is assumed that the positioning data setting is carried out using GX Configurator-QP.)

| Major positioning control | | Position control | | | Speed control | Speed-position switching control | Position-speed switching control | |
|--------------------------------|-------------------------------------|--|--|--|--|---|--|---|
| | | 1-axis linear control 2-axis linear interpolation control 3-axis linear interpolation control 4-axis linear interpolation control | 1-axis fixed-feed control 2-axis fixed-feed control 3-axis fixed-feed control 4-axis fixed-feed control | 2-axis circular interpolation control | 1-axis, 2-axis, 3-axis, 4-axis Speed control | | | |
| Positioning data setting items | | | | | | | | |
| Da.1 | Operation pattern | Independent positioning control (Positioning complete) | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ |
| | | Continuous positioning control | ◎ | ◎ | ◎ | × | ◎ | × |
| | | Continuous path control | ◎ | × | ◎ | × | × | × |
| Da.2 | Control system | Linear 1 Linear 2 Linear 3 Linear 4 * | Fixed-feed 1 Fixed-feed 2 Fixed-feed 3 Fixed-feed 4 | Circular sub Circular right Circular left * | Forward run speed 1 Reverse run speed 1 Forward run speed 2 Reverse run speed 2 Forward run speed 3 Reverse run speed 3 Forward run speed 4 Reverse run speed 4 | Forward run speed/position Reverse run speed/position * | Forward run position/speed Reverse run position/speed | |
| Da.3 | Acceleration time No. | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | |
| Da.4 | Deceleration time No. | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | |
| Da.5 | Axis to be interpolated | ◎: 2-axis - : 1, 3, 4-axis | | | | - | - | |
| Da.6 | Positioning address/movement amount | ◎ | ◎ | ◎ | - | ◎ | ◎ | |
| Da.7 | Arc address | - | - | ◎ | - | - | - | |
| Da.8 | Command speed | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | |
| Da.9 | Dwell time | ○ | ○ | ○ | ○ | ○ | ○ | |
| Da.10 | M code | ○ | ○ | ○ | ○ | ○ | ○ | |

◎ : Always set ○ : Set as required ("-" when not set)

× : Setting not possible (If setting is made, an error (error code: 516) will occur at a start.)

- : Setting not required (Setting value is invalid. Use the initial values or setting values within a range where no error occurs.)

* : The "ABS (absolute) system" or "INC (incremental) system" can be used for the control system.

REMARK

- It is recommended that the "positioning data" be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

| Major positioning control | | | Other control | | | | |
|--------------------------------|-------------------------------------|--|-----------------|----------------------------|---------------------------------------|-------------------|------------------|
| | | | NOP instruction | Current value changing | JUMP instruction | LOOP instruction | LEND instruction |
| Positioning data setting items | | | | | | | |
| Da.1 | Operation pattern | Independent positioning control (Positioning complete) | - | ⊙ | - | - | - |
| | | Continuous positioning control | - | ⊙ | - | - | - |
| | | Continuous path control | - | × | - | - | - |
| Da.2 | Control system | | NOP instruction | Current value changing | JUMP instruction | LOOP instruction | LEND instruction |
| Da.3 | Acceleration time No. | | - | - | - | - | - |
| Da.4 | Deceleration time No. | | - | - | - | - | - |
| Da.5 | Axis to be interpolated | | - | - | - | - | - |
| Da.6 | Positioning address/movement amount | | - | Change destination address | - | - | - |
| Da.7 | Arc address | | - | - | - | - | - |
| Da.8 | Command speed | | - | - | - | - | - |
| Da.9 | Dwell time | | - | - | JUMP destination-positioning data No. | - | - |
| Da.10 | M code | | - | ○ | Condition data No. at JUMP | No. of repetition | - |

- ⊙ : Always set ○ : Set as required ("-" when not set)
- × : Setting not possible (If setting is made, an error (error code: 515) will occur.)
- : Setting not required (Setting value is invalid. Use the initial values or setting values within a range where no error occurs.)

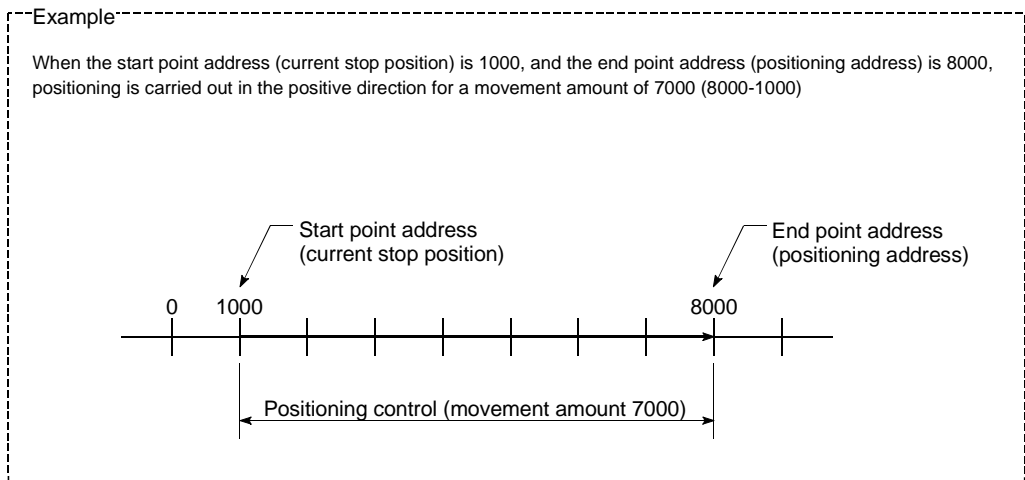
9.2.2 1-axis linear control

In "1-axis linear control" (" Da.2 Control system" = ABS linear 1, INC linear 1), one motor is used to carry out position control in a set axis direction.

[1] 1-axis linear control (ABS linear 1)

■ Operation chart

In absolute system 1-axis linear control, addresses established by a machine OPR are used. Positioning is carried out from the current stop position (start point address) to the address (end point address) set in " Da.6 Positioning address/movement amount".



■ Positioning data setting example

The following table shows setting examples when "1-axis linear control (ABS linear 1)" is set in positioning data No. 1 of axis 1.

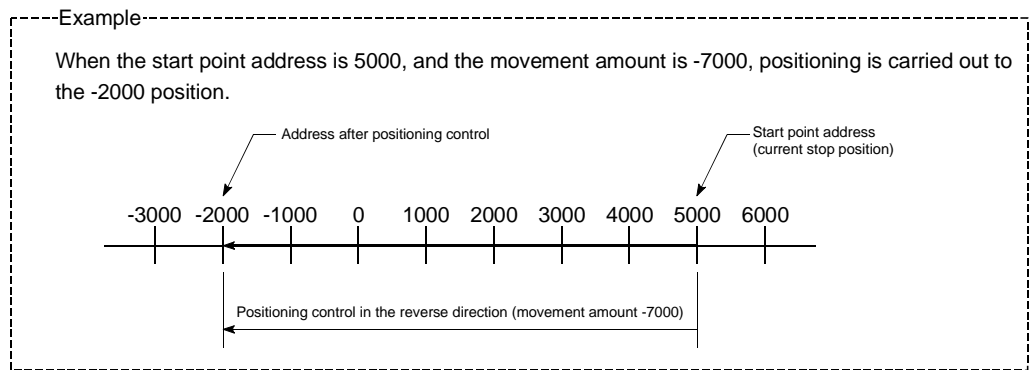
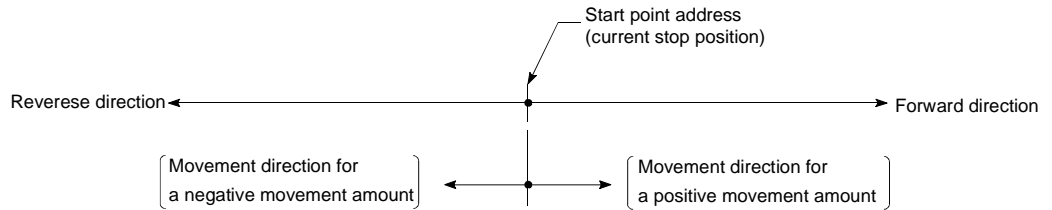
| | Setting item | Setting example | Setting details |
|-------------------------------|--------------|-------------------------------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | ABS linear 1 Set absolute system 1-axis linear control. |
| | Da.3 | Acceleration time No. | 1 Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - Setting not required (setting value will be ignored). |
| | Da.6 | Positioning address/movement amount | 8000.0 μm Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | - Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00mm/min Set the speed during movement to the positioning address. |
| | Da.9 | Dwell time | 500ms Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

[2] 1-axis linear control (INC linear 1)

■ Operation chart

In incremental system 1-axis linear control, addresses established by a machine OPR are used. Positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in "Da.6" Positioning address/movement amount". The movement direction is determined by the sign of the movement amount.



■ Positioning data setting example

The following table shows setting examples when "1-axis linear control (INC linear 1)" is set in positioning data No. 1 of axis 1.

| | Setting item | Setting example | Setting details |
|-------------------------------|--------------|-------------------------------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | INC linear 1 Set incremental system 1-axis linear control. |
| | Da.3 | Acceleration time No. | 1 Designate the value set in "Pr.25" Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 Designate the value set in "Pr.10" Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - Setting not required (setting value will be ignored). |
| | Da.6 | Positioning address/movement amount | -7000.0μm Set the movement amount. (Assuming "mm" is set in "Pr.1" Unit setting".) |
| | Da.7 | Arc address | - Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00mm/min Set the speed during movement. |
| | Da.9 | Dwell time | 500ms Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

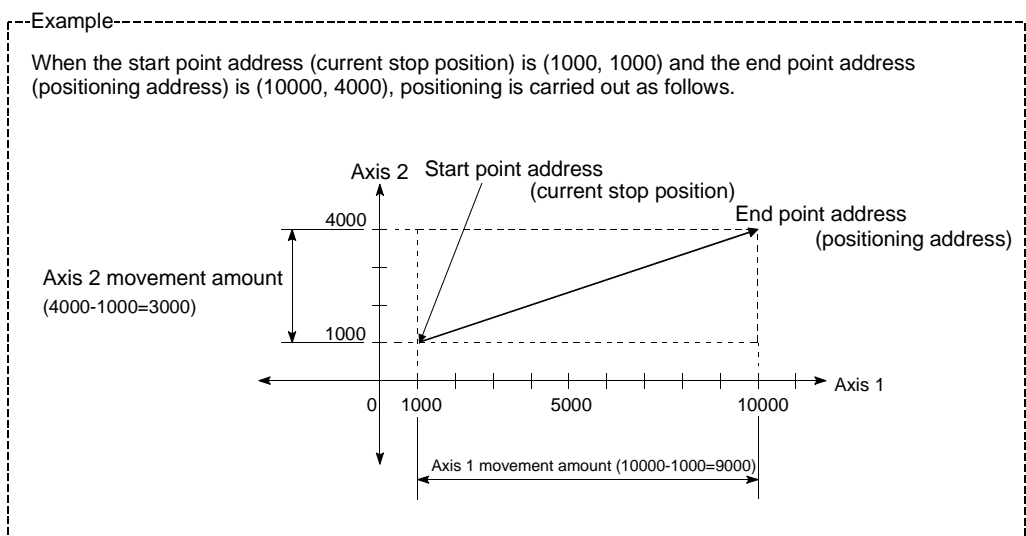
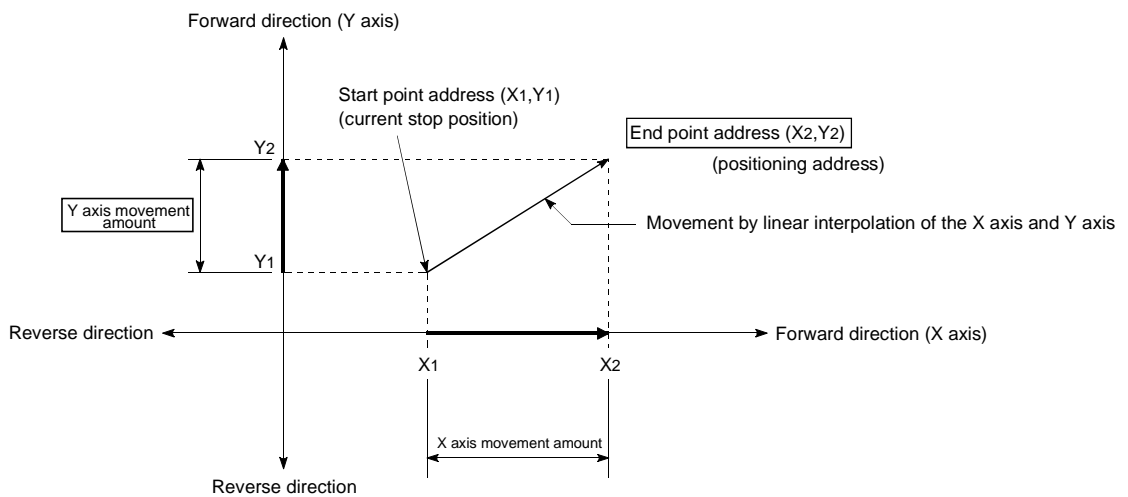
9.2.3 2-axis linear interpolation control

In "2-axis linear interpolation control" ("Da.2 Control system" = ABS linear 2, INC linear 2), two motors are used to carry out position control in a linear path while carrying out interpolation for the axis directions set in each axis.
 (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

[1] 2-axis linear interpolation control (ABS linear 2)

■ Operation chart

In absolute system 2-axis linear control, addresses established by a machine OPR on a 2-axis coordinate plane are used. Linear interpolation positioning is carried out from the current stop position (start point address) to the address (end point address) set in "Da.6 Positioning address/movement amount".



■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning control.

- If the movement amount of each axis exceeds "1073741824 (=2³⁰)" when "0: Composite speed" is set in " [Pr.20] Interpolation speed designation method" ... The "Outside linear movement amount range error (error code: 504)" occurs at a positioning start.

(The maximum movement amount that can be set in " [Da.6] Positioning address/movement amount" is "1073741824 (=2³⁰).")

■ Positioning data setting example

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis linear interpolation control (ABS linear 2)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | | Setting details |
|-------------------------------|--|--|--|--|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | |
| Axis 1 Positioning data No. 1 | [Da.1] Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | [Da.2] Control system | ABS linear 2 | – | Set absolute system 2-axis linear interpolation control. |
| | [Da.3] Acceleration time No. | 1 | – | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | [Da.4] Deceleration time No. | 0 | – | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | [Da.5] Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | [Da.6] Positioning address/movement amount | 10000.0 μm | 4000.0 μm | Set the end point address. (Assuming "mm" is set in " [Pr.1] Unit setting".) |
| | [Da.7] Arc address | – | – | Setting not required (setting value will be ignored). |
| | [Da.8] Command speed | 6000.00 mm/min | – | Set the speed during movement to the end point address. |
| | [Da.9] Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | [Da.10] M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

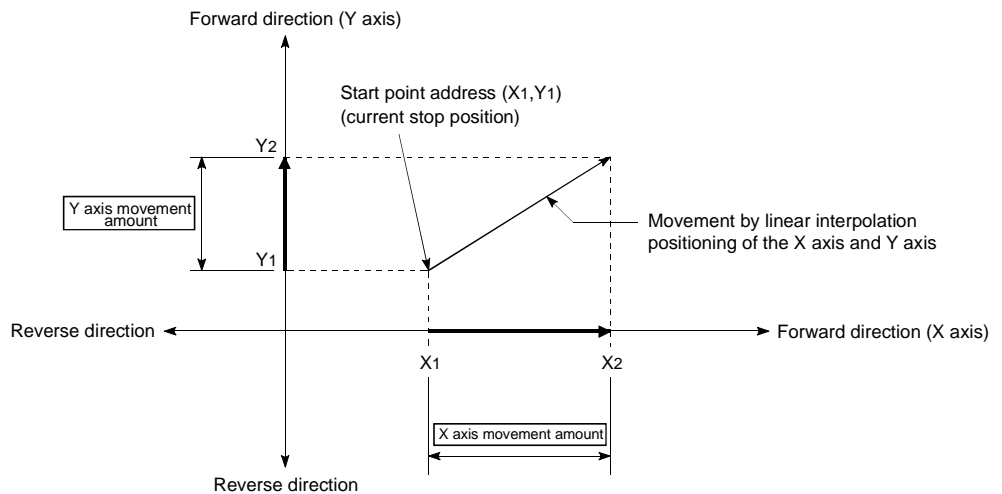
* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|--|
| POINT |
| <ul style="list-style-type: none"> • When the "reference axis speed" is set during 2-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " [Pr.8] Speed limit value". |

[2] 2-axis linear interpolation control (INC linear 2)

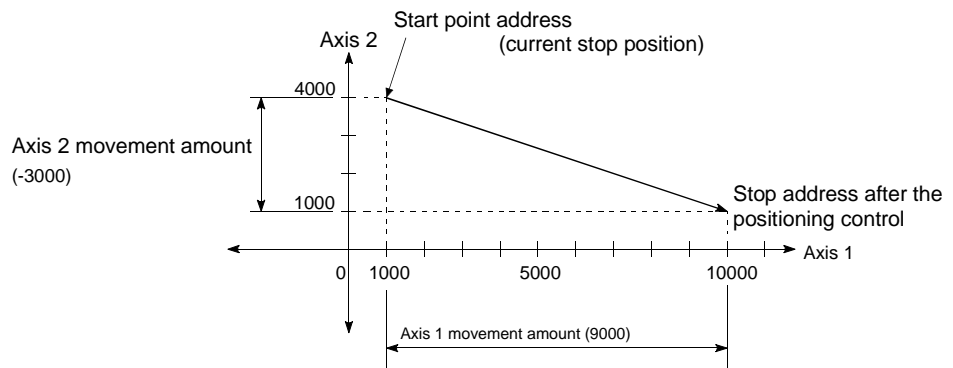
■ Operation chart

In incremental system 2-axis linear interpolation control, addresses established by a machine OPR on a 2-axis coordinate plane are used. Linear interpolation positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in "Da.6 Positioning address/movement amount". The movement direction is determined by the sign of the movement amount.



Example

When the axis 1 movement amount is 9000 and the axis 2 movement amount is -3000, positioning address (1000, 4000) is carried out as follows.



■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning operation.

- If the movement amount of each axis exceeds "1073741824 (=2³⁰)" when "0: Composite speed" is set in " Pr.20 Interpolation speed designation method" ... The "Outside linear movement amount range error (error code: 504)" occurs at a positioning start.

(The maximum movement amount that can be set in " Da.6 Positioning address/movement amount" is "1073741824 (=2³⁰)".)

■ Positioning data setting example

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis linear interpolation control (INC linear 2)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|---|---|--|
| | | | | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | INC linear 2 | – | Set incremental system 2-axis linear interpolation control. |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 9000.0 μm | -3000.0 μm | Set the movement amount. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | – | – | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed during movement. |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|--|
| POINT |
| <ul style="list-style-type: none"> • When the "reference axis speed" is set during 2-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". |

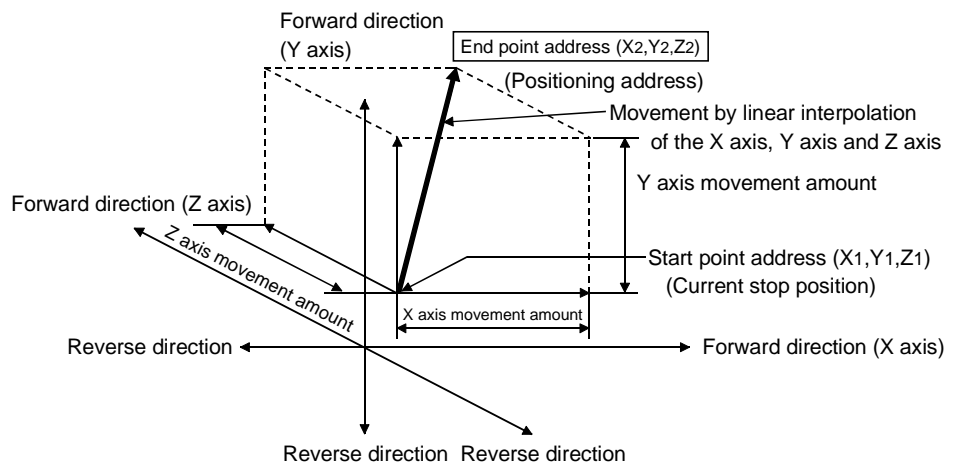
9.2.4 3-axis linear interpolation control

In "3-axis linear interpolation control" (" Da.2 Control system" = ABS linear 3, INC linear 3), three motors are used to carry out position control in a linear path while carrying out interpolation for the axis directions set in each axis.
 (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

[1] 3-axis linear interpolation control (ABS linear 3)

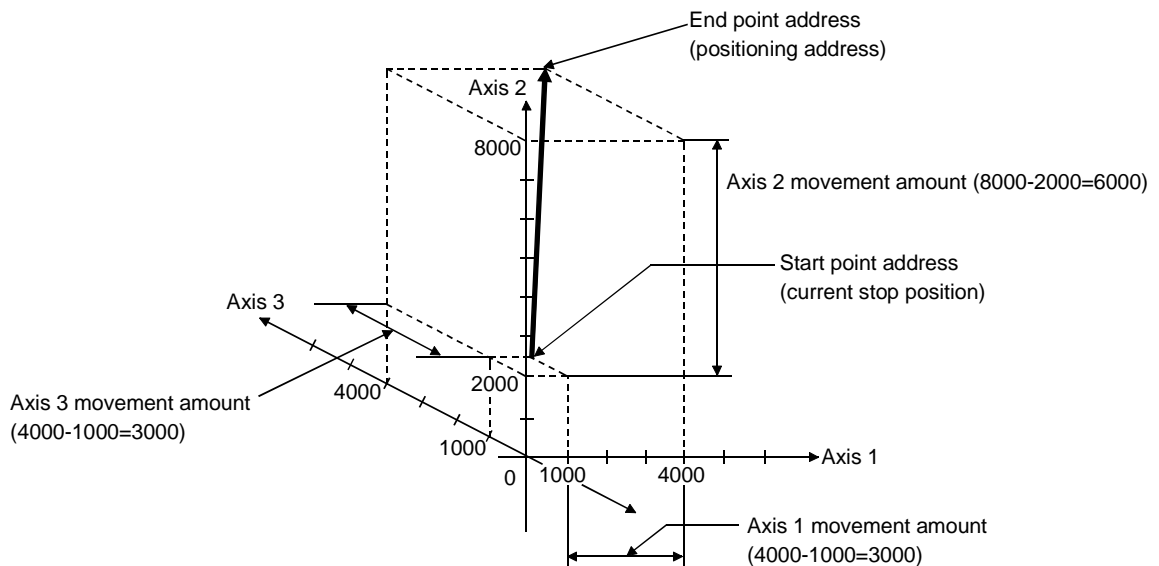
■ Operation chart

In the absolute system 3-axis linear control, using an address established by a machine OPR in the 3-axis coordinate space, a linear interpolation positioning is carried out from the current stop position (start point address) to the address (end point address) set in the " Da.6 Positioning address/movement amount".



Example

When the start point address (current stop position) is (1000, 2000, 1000) and the end point address (positioning address) is (4000, 8000, 4000), positioning is carried out as follows.



■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning control.

- If the movement amount of each axis exceeds "1073741824 (=2³⁰)" when "0: Composite speed" is set in " [Pr.20] Interpolation speed designation method" ... The "Outside linear movement amount range error (error code: 504)" occurs at a positioning start.

(The maximum movement amount that can be set in " [Da.6] Positioning address/movement amount" is "1073741824 (=2³⁰).")

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "3-axis linear interpolation control (ABS linear 3)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2 and axis 3.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Setting details |
|-------------------------------|--|------|---|---|---|--|
| | | | | | | |
| Axis 1 Positioning data No. 1 | [Da.1] Operation pattern | | Positioning complete | - | - | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | [Da.2] Control system | | ABS linear 3 | - | - | Set absolute system 3-axis linear interpolation control. |
| | [Da.3] Acceleration time No. | | 1 | - | - | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | [Da.4] Deceleration time No. | | 0 | - | - | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | [Da.5] Axis to be interpolated | | 2 | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2 and 3. |
| | [Da.6] Positioning address/movement amount | | 4000.0 μm | 8000.0 μm | 4000.0 μm | Set the end point address. (Assuming "mm" is set in " [Pr.1] Unit setting".) |
| | [Da.7] Arc address | | - | - | - | Setting not required (setting value will be ignored). |
| | [Da.8] Command speed | | 6000.00 mm/min | - | - | Set the speed during movement to the end point address. |
| | [Da.9] Dwell time | | 500ms | - | - | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | [Da.10] M code | | 10 | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

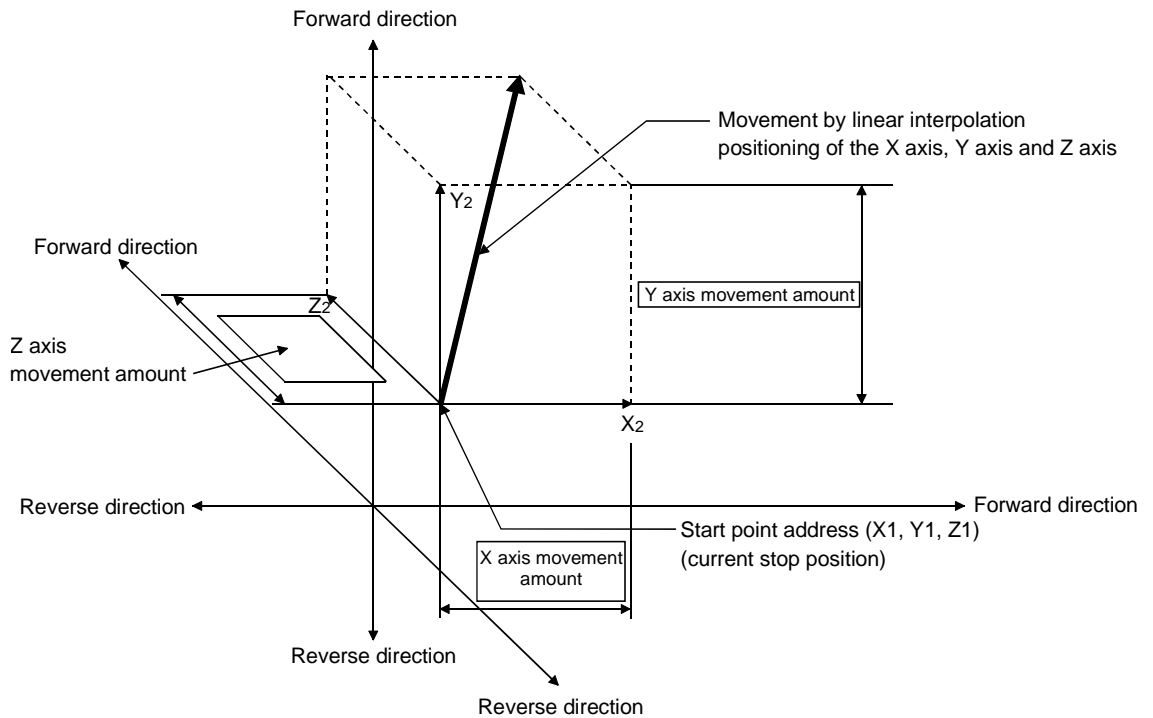
POINTS

- When the "reference axis speed" is set during 3-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " **Pr.8** Speed limit value".
- Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations.

[2] 3-axis linear interpolation control (INC linear 3)

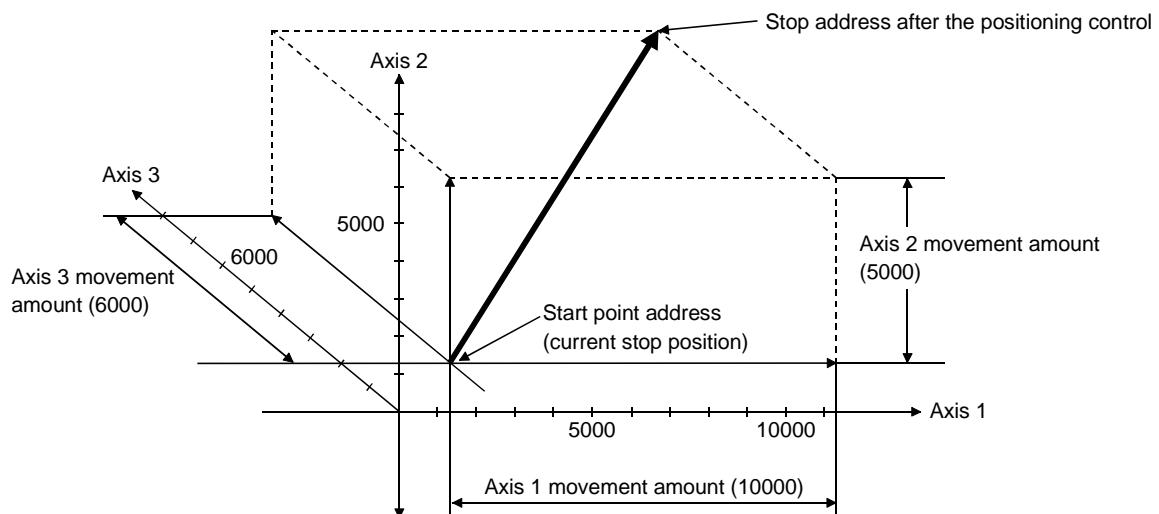
■ Operation chart

In the incremental system 3-axis linear interpolation control, using an address established by a machine OPR in the 3-axis coordinate space, a linear interpolation positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in the " Da.6 Positioning address/movement amount". The movement direction depends on the sign (+ or -) of the movement amount.



Example

When the axis 1 movement amount is 10000, the axis 2 movement amount is 5000 and the axis 3 movement amount is 6000, positioning is carried out as follows.



■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning operation.

- If the movement amount of each axis exceeds "1073741824 (=2³⁰)" when "0: Composite speed" is set in " [Pr.20] Interpolation speed designation method" ... The "Outside linear movement amount range error (error code: 504)" occurs at a positioning start.

(The maximum movement amount that can be set in " [Da.6] Positioning address/movement amount" is "1073741824 (=2³⁰)".)

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "3-axis linear interpolation control (INC linear 3)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2 and axis 3.)

| Setting item | | Axis | | | Setting details |
|-------------------------------|--|--|--|--|--|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | |
| Axis 1 Positioning data No. 1 | [Da.1] Operation pattern | Positioning complete | - | - | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | [Da.2] Control system | INC linear 3 | - | - | Set incremental system 3-axis linear interpolation control. |
| | [Da.3] Acceleration time No. | 1 | - | - | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | [Da.4] Deceleration time No. | 0 | - | - | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | [Da.5] Axis to be interpolated | - | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2 and 3. |
| | [Da.6] Positioning address/movement amount | 10000.0 μm | 5000.0 μm | 6000.0 μm | Set the movement amount. (Assuming "mm" is set in " [Pr.1] Unit setting".) |
| | [Da.7] Arc address | - | - | - | Setting not required (setting value will be ignored). |
| | [Da.8] Command speed | 6000.00 mm/min | - | - | Set the speed during movement. |
| | [Da.9] Dwell time | 500ms | - | - | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | [Da.10] M code | 10 | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

POINTS

- When the "reference axis speed" is set during 3-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " **Pr.8** Speed limit value".
- Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations.

9.2.5 4-axis linear interpolation control

In "4-axis linear interpolation control" ("Da.2 Control system" = ABS linear 4, INC linear 4), four motors are used to carry out position control in a linear path while carrying out interpolation for the axis directions set in each axis.
(Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

[1] 4-axis linear interpolation control (ABS linear 4)

In the absolute system 4-axis linear control, using an address established by a machine OPR in the 4-axis coordinate space, a linear interpolation positioning is carried out from the current stop position (start point address) to the address (end point address) set in the "Da.6 Positioning address/movement amount".

■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning control.

- When the movement amount for each axis exceeds "1073741824 (=2³⁰)"
An "outside linear movement amount range error (error code: 504)" will occur at the positioning start.

(The maximum movement amount that can be set in "Da.6 Positioning address/movement amount" is "1073741824 (=2³⁰).")

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "4-axis linear interpolation control (ABS linear 4)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2, axis 3 and axis 4.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Axis 4 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|--|--|--|--|---|
| | | | | | | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | - | - | - | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | ABS linear 4 | - | - | - | Set absolute system 4-axis linear interpolation control. |
| | Da.3 | Acceleration time No. | 1 | - | - | - | Designate the value set in " Pr.25 Acceleration time 1 " as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | - | - | - | Designate the value set in " Pr.10 Deceleration time 0 " as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - | - | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2, 3 and 4. |
| | Da.6 | Positioning address/movement amount | 4000.0 μm | 8000.0 μm | 4000.0 μm | 3000.0 μm | Set the end point address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | - | - | - | Set the speed during movement to the end point address. |
| | Da.9 | Dwell time | 500ms | - | - | - | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | - | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section "5.3 List of positioning data" for information on the setting details.

POINTS

- When the "reference axis speed" is set during 4-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " **Pr.8** Speed limit value".
- Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations.

[2] 4-axis linear interpolation control (INC linear 4)

■ Operation chart

In the incremental system 4-axis linear interpolation control, using an address established by a machine OPR in the 4-axis coordinate plane, a linear interpolation positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in the "Da.6 Positioning address/movement amount". The movement direction depends on the sign (+ or -) of the movement amount.

■ Restrictions

An error will occur and the positioning will not start in the following cases. The machine will immediately stop if the error is detected during a positioning operation.

- When the movement amount for each axis exceeds "1073741824 (=2³⁰)"
An "outside linear movement amount range error (error code: 504)" will occur at the positioning start.

(The maximum movement amount that can be set in "Da.6 Positioning address/movement amount" is "1073741824 (=2³⁰)".)

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "4-axis linear interpolation control (INC linear 4)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2, axis 3 and axis 4.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Axis 4 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|---|---|---|---|---|
| | | | | | | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | - | - | - | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | INC linear 4 | - | - | - | Set incremental system 4-axis linear interpolation control. |
| | Da.3 | Acceleration time No. | 1 | - | - | - | Designate the value set in " Pr.25 Acceleration time 1 " as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | - | - | - | Designate the value set in " Pr.10 Deceleration time 0 " as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - | - | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2, 3 and 4. |
| | Da.6 | Positioning address/movement amount | 4000.0 μm | 8000.0 μm | 4000.0 μm | 3000.0 μm | Set the movement amount. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | - | - | - | Set the speed during movement. |
| | Da.9 | Dwell time | 500ms | - | - | - | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | - | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| POINTS |
|--|
| <ul style="list-style-type: none"> • When the "reference axis speed" is set during 4-axis linear interpolation control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". • Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations. |

9.2.6 1-axis fixed-feed control

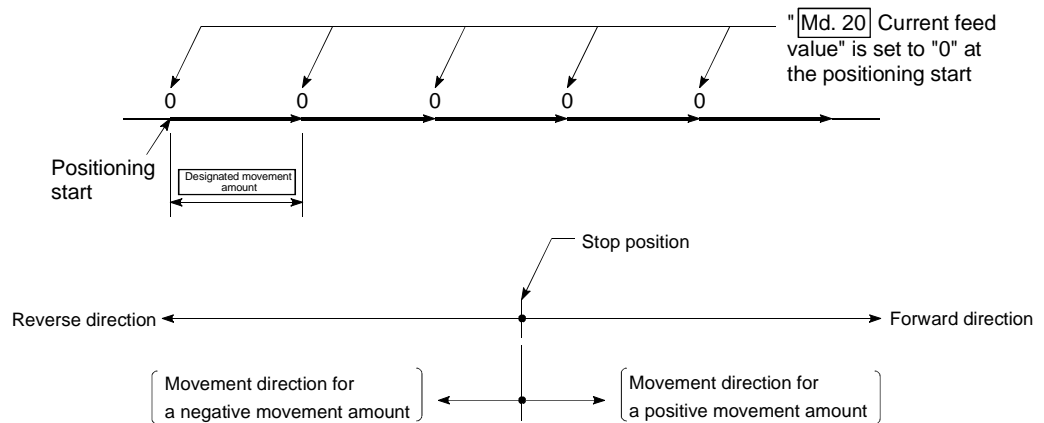
In "1-axis fixed-feed control" ("Da.2 Control system" = fixed-feed 1), one motor is used to carry out fixed-feed control in a set axis direction.

In fixed-feed control, any remainder of the movement amount designated in the positioning data is rounded down if less than that required for control accuracy to output the same amount of pulses. (The remainder of the movement amount with an accuracy below the control accuracy does not affect the regular controls.)

■ Operation chart

In 1-axis fixed-feed control, the address (Md.20 Current feed value) of the current stop position (start point address) is set to "0". Positioning is then carried out to a position at the end of the movement amount set in "Da.6 Positioning address/movement amount".

The movement direction is determined by the movement amount sign.



■ Restrictions

- (1) An axis error "Continuous path control invalid (error code: 516)" will occur and the operation cannot start if "continuous path control" is set in "Da.1 Operation pattern". ("Continuous path control" cannot be set in fixed-feed control.)
- (2) "Fixed-feed" cannot be set in "Da.2 Control system" in the positioning data when "continuous path control" has been set in "Da.1 Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", fixed-feed control cannot be set in positioning data No. 2.) An axis error "Continuous path control invalid (error code: 516)" will occur and the machine will carry out a deceleration stop if this type of setting is carried out.

■ Positioning data setting example

The following table shows setting examples when "1-axis fixed-feed control (fixed-feed 1)" is set in positioning data No. 1 of axis 1.

| Setting item | | Setting example | Setting details |
|-------------------------------|-------|-------------------------------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | Fixed-feed 1 Set 1-axis fixed-feed control. |
| | Da.3 | Acceleration time No. | 1 Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - Setting not required (setting value will be ignored). |
| | Da.6 | Positioning address/movement amount | 8000.0 μm Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | - Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00mm/min Set the speed during movement to the positioning address. |
| | Da.9 | Dwell time | 500ms Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

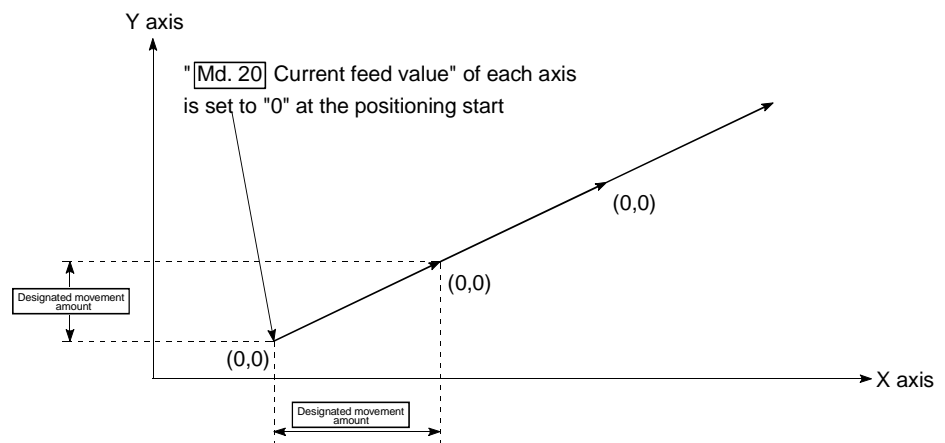
9.2.7 2-axis fixed-feed control (interpolation)

In "2-axis fixed-feed control" ("Da.2 Control system" = fixed-feed 2), two motors are used to carry out fixed-feed control in a linear path while carrying out interpolation for the axis directions set in each axis.

In fixed-feed control, any remainder of the movement amount designated in the positioning data is rounded down if less than that required for control accuracy to output the same amount of pulses. (The remainder of the movement amount with an accuracy below the control accuracy does not affect the regular controls.) (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

■ Operation chart

In incremental system 2-axis fixed-feed control, the addresses (Md.20 Current feed value) of the current stop position (start addresses) of both axes are set to "0". Linear interpolation positioning is then carried out from that position to a position at the end of the movement amount set in "Da.6 Positioning address/movement amount". The movement direction is determined by the sign of the movement amount.



■ Restrictions

- (1) An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous path control" is set in "Da.1 Operation pattern". ("Continuous path control" cannot be set in fixed-feed control.)
- (2) "Fixed-feed" cannot be set in "Da.2 Control system" in the positioning data when "continuous path control" has been set in "Da.1 Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", fixed-feed control cannot be set in positioning data No. 2.) An axis error "Continuous path control not possible (error code: 516)" will occur and the machine will carry out a deceleration stop if this type of setting is carried out.

■ Positioning data setting example

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis fixed-dimension feed control (fixed-feed 2)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | | Setting details | |
|-------------------------------|-------|--|--|-----------------|--|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control method | Fixed-feed 2 | – | Set 2-axis fixed-feed control. |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 8000.0 μm | 6000.0 μm | Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | – | – | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed during movement. (Designate the composite speed of reference axis speed in " Pr.20 Interpolation speed designation method".) |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|--|
| POINTS |
| <ul style="list-style-type: none"> When the "reference axis speed" is set during 2-axis fixed-feed control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". |

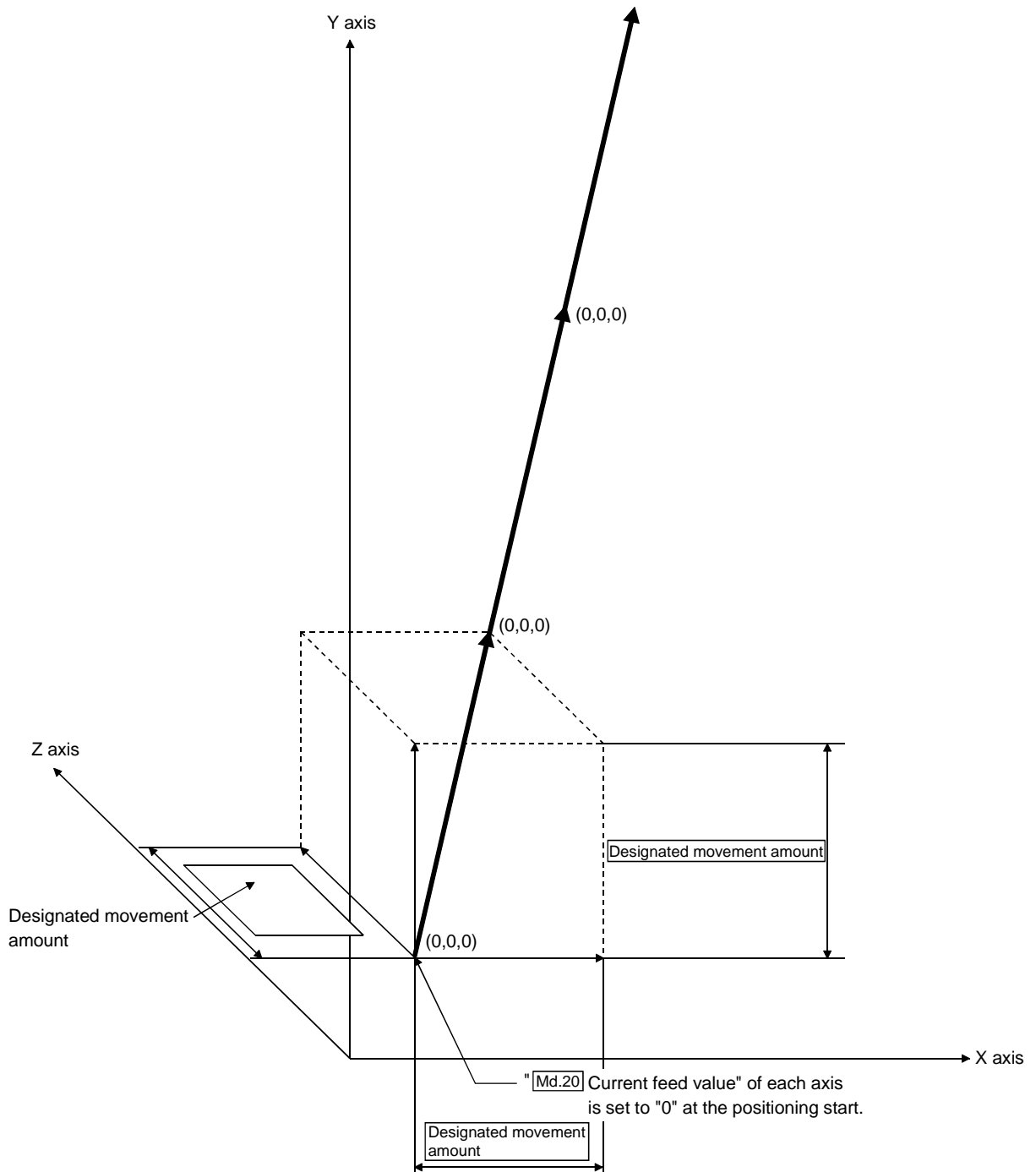
9.2.8 3-axis fixed-feed control (interpolation)

In "3-axis fixed-feed control" ("Da.2 Control system" = fixed-feed 3), three motors are used to carry out fixed-feed control in a linear path while carrying out interpolation for the axis directions set in each axis.

In fixed-feed control, any remainder of the movement amount designated in the positioning data is rounded down if less than that required for control accuracy to output the same amount of pulses. (The remainder of the movement amount with an accuracy below the control accuracy does not affect the regular controls.) (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

■ Operation chart

In incremental system 3-axis fixed-feed control, the addresses (**Md.20** Current feed value) of the current stop position (start addresses) of every axes are set to "0". Linear interpolation positioning is then carried out from that position to a position at the end of the movement amount set in " **Da.6** Positioning address/movement amount". The movement direction is determined by the sign of the movement amount.



■ Restrictions

- (1) An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous path control" is set in " **Da.1** Operation pattern". ("Continuous path control" cannot be set in fixed-feed control.)
- (2) "Fixed-feed" cannot be set in " **Da.2** Control system" in the positioning data when "continuous path control" has been set in " **Da.1** Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", fixed-feed control cannot be set in positioning data No. 2.) An axis error "Continuous path control not possible (error code: 516)" will occur and the machine will carry out a deceleration stop if this type of setting is carried out.

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "3-axis fixed-feed control (fixed-feed 3)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2 and axis 3.)

| Setting item | | Axis | | | Setting details | |
|-------------------------------|-------|--|--|--|-----------------|--|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control method | Fixed-feed 3 | – | – | Set 3-axis fixed-feed control. |
| | Da.3 | Acceleration time No. | 1 | – | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | – | – | – | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2 and 3. |
| | Da.6 | Positioning address/movement amount | 10000.0 μm | 5000.0 μm | 6000.0 μm | Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | – | – | – | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | – | – | Set the speed during movement. |
| | Da.9 | Dwell time | 500ms | – | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|--|
| POINTS |
| <ul style="list-style-type: none"> • When the "reference axis speed" is set during 3-axis fixed-feed control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". • Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations. |

9.2.9 4-axis fixed-feed control (interpolation)

In "4-axis fixed-feed control" ("Da.2 Control system" = fixed-feed 4), four motors are used to carry out fixed-feed control in a linear path while carrying out interpolation for the axis directions set in each axis.

In fixed-feed control, any remainder of the movement amount designated in the positioning data is rounded down if less than that required for control accuracy to output the same amount of pulses. (The remainder of the movement amount with an accuracy below the control accuracy does not affect the regular controls.) (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

■ Operation chart

In incremental system 4-axis fixed-feed control, the addresses (Md.20 Current feed value) of the current stop position (start addresses) of every axes are set to "0". Linear interpolation positioning is then carried out from that position to a position at the end of the movement amount set in "Da.6 Positioning address/movement amount". The movement direction is determined by the sign of the movement amount.

■ Restrictions

- (1) An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous path control" is set in "Da.1 Operation pattern". ("Continuous path control" cannot be set in fixed-feed control.)
- (2) "Fixed-feed" cannot be set in "Da.2 Control system" in the positioning data when "continuous path control" has been set in "Da.1 Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", fixed-feed control cannot be set in positioning data No. 2.) An axis error "Continuous path control not possible (error code: 516)" will occur and the machine will carry out a deceleration stop if this type of setting is carried out.

■ Positioning data setting example

[Reference axis is designated as axis 1.]

The following table shows setting examples when "4-axis fixed-feed control (fixed-feed 4)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2, axis 3 and axis 4.)

| Setting item | | Axis | | | | | Setting details |
|-------------------------------|-------|--|--|--|--|-----------|---|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Axis 4 (interpolation axis) setting example | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | - | - | - | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control method | Fixed-feed 4 | - | - | - | Set 4-axis fixed-feed control. |
| | Da.3 | Acceleration time No. | 1 | - | - | - | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | - | - | - | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - | - | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2, 3 and 4. |
| | Da.6 | Positioning address/movement amount | 4000.0 μm | 8000.0 μm | 4000.0 μm | 3000.0 μm | Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | - | - | - | Set the speed during movement. |
| | Da.9 | Dwell time | 500ms | - | - | - | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | - | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|--|
| POINTS |
| <ul style="list-style-type: none"> • When the "reference axis speed" is set during 4-axis fixed-feed control, set so the major axis side becomes the reference axis. If the minor axis side is set as the reference axis, the major axis side speed may exceed the " Pr.8 Speed limit value". • Refer to Section 9.1.6 "Interpolation control" for the reference axis and interpolation axis combinations. |

9.2.10 2-axis circular interpolation control with sub point designation

In "2-axis circular interpolation control" (" Da.2 Control system" = ABS circular sub, INC circular sub), two motors are used to carry out position control in an arc path passing through designated sub points, while carrying out interpolation for the axis directions set in each axis.

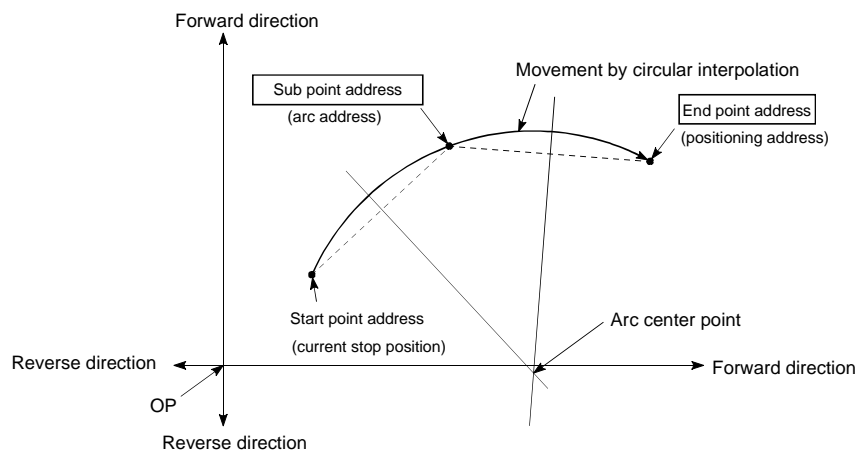
(Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

[1] 2-axis circular interpolation control with sub point designation (ABS circular sub)

■ Operation chart

In the absolute system, 2-axis circular interpolation control with sub point designation, addresses established by a machine OPR on a 2-axis coordinate plane are used. Positioning is carried out from the current stop position (start point address) to the address (end point address) set in " Da.6 Positioning address/movement amount", in an arc path that passes through the sub point address set in " Da.7 Arc address".

The resulting control path is an arc having as its center the intersection point of perpendicular bisectors of a straight line between the start point address (current stop position) and sub point address (arc address), and a straight line between the sub point address (arc address) and end point address (positioning address).



■ Restrictions

- (1) 2-axis circular interpolation control cannot be set in the following cases.
 - When "degree" is set in " Pr.1 Unit setting"
 - When the units set in " Pr.1 Unit setting" are different for the reference axis and interpolation axis. ("mm" and "inch" combinations are possible.)
 - When "reference axis speed" is set in " Pr.20 Interpolation speed designation method"
- (2) An error will occur and the positioning start will not be possible in the following cases. The machine will immediately stop if the error is detected during positioning control.
 - When the radius exceeds "536870912 ($=2^{29}$)". (The maximum radius for which circular interpolation control is possible is "536870912 ($=2^{29}$)"
... An error "Outside radius range (error code: 544)" will occur at positioning start.
 - When the center point address is outside the range of " $-2147483648 (-2^{31})$ to $2147483647 (2^{31}-1)$ "
... A "Sub point setting error" (error code: 525) will occur at positioning start.
 - When the start point address is the same as the end point address
... An "End point setting error" (error code: 526) will occur.
 - When the start point address is the same as the sub point address
... A "Sub point setting error" (error code: 525) will occur.
 - When the end point address is the same as the sub point address
... A "Sub point setting error" (error code: 525) will occur.
 - When the start point address, sub point address, and end point address are in a straight line
... A "Sub point setting error" (error code: 525) will occur.

■ Positioning data setting example

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis circular interpolation control with sub point designation (ABS circular sub)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|--|--|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | ABS circular sub | – | Set absolute system, 2-axis circular interpolation control with sub point designation. |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 8000.0 μm | 6000.0 μm | Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | 4000.0 μm | 3000.0 μm | Set the sub point address. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed when moving to the end point address. (Designate the composite speed in " Pr.20 Interpolation speed designation method".) |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|---|
| POINT |
| Set a value in " Da.8 Command speed" so that the speed of each axis does not exceed the " Pr.8 Speed limit value". (The speed limit does not function for the speed calculated by the QD75 during interpolation control.) |

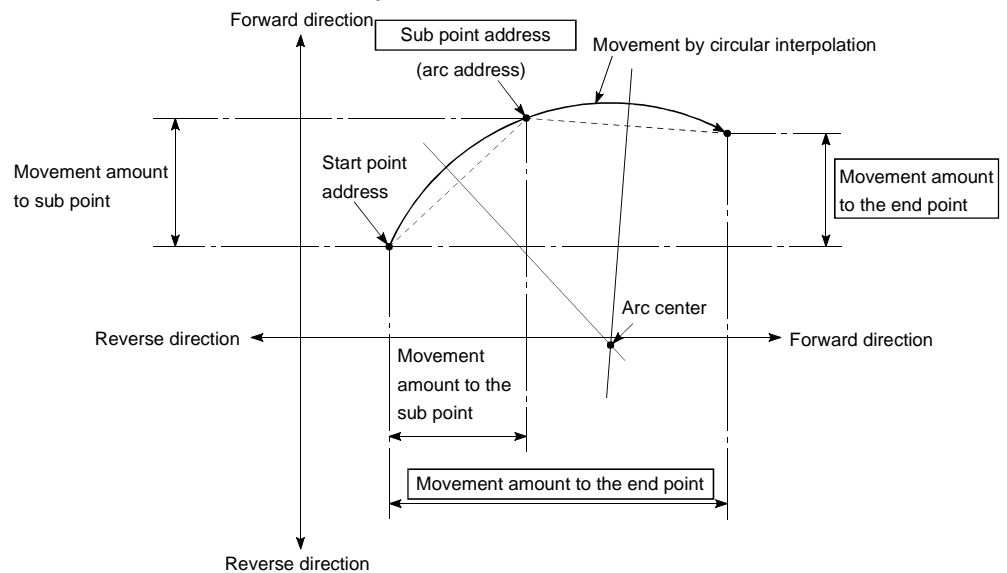
[2] 2-axis circular interpolation control with sub point designation (INC circular sub)

■ Operation chart

In the incremental system, 2-axis circular interpolation control with sub point designation, positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in " Da.6

Positioning address/movement amount" in an arc path that passes through the sub point address set in " Da.7 Arc address". The movement direction depends on the sign (+ or -) of the movement amount.

The resulting control path is an arc having as its center the intersection point of perpendicular bisectors of the straight line between the start point address (current stop position) and sub point address (arc address) calculated from the movement amount to the sub point, and a straight line between the sub point address (arc address) and end point address (positioning address) calculated from the movement amount to the end point.



■ Restrictions

- (1) 2-axis circular interpolation control cannot be set in the following cases.
 - When "degree" is set in " **Pr.1** Unit setting"
 - When the units set in " **Pr.1** Unit setting" are different for the reference axis and interpolation axis. ("mm" and "inch" combinations are possible.)
 - When "reference axis speed" is set in " **Pr.20** Interpolation speed designation method"
- (2) An error will occur and the positioning start will not be possible in the following cases. The machine will immediately stop if the error is detected during positioning control.
 - When the radius exceeds "536870912 ($=2^{29}$)". (The maximum radius for which circular interpolation control is possible is "536870912 ($=2^{29}$)"
 - ... An error "Outside radius range (error code: 544)" will occur at positioning start.
 - When the center point address is outside the range of " -2^{31} " to $2^{31}-1$ "
 - ... A "Sub point setting error" (error code: 525) will occur at positioning start.
 - When the start point address is the same as the end point address
 - ... An "End point setting error" (error code: 526) will occur.
 - When the start point address is the same as the sub point address
 - ... A "Sub point setting error" (error code: 525) will occur.
 - When the end point address is the same as the sub point address
 - ... A "Sub point setting error" (error code: 525) will occur.
 - When the start point address, sub point address, and end point address are in a straight line
 - ... A "Sub point setting error" (error code: 525) will occur.

■ Positioning data setting example

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis circular interpolation control with sub point designation (INC circular sub)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|---|---|--|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | INC circular sub | – | Set incremental system, 2-axis circular interpolation control with sub point designation. |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 8000.0 μm | 6000.0 μm | Set the movement amount. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.7 | Arc address | 4000.0 μm | 3000.0 μm | Set the sub point address. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed during movement. (Designate the composite speed in " Pr.20 Interpolation speed designation method".) |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|---|
| POINT |
| Set a value in " Da.8 Command speed" so that the speed of each axis does not exceed the " Pr.8 Speed limit value". (The speed limit does not function for the speed calculated by the QD75 during interpolation control.) |

9.2.11 2-axis circular interpolation control with center point designation

In "2-axis circular interpolation control" ("Da.2 Control system" = ABS circular right, INC circular right, ABS circular left, INC circular left), two motors are used to carry out position control in an arc path having a designated center point, while carrying out interpolation for the axis directions set in each axis.
 (Refer to Section 9.1.6 "Interpolation control" for details on interpolation control.)

The following table shows the rotation directions, arc center angles that can be controlled, and positioning paths for the different control systems.

| Control system | Rotation direction | Arc center angle that can be controlled | Positioning path |
|--------------------|--------------------|---|------------------|
| ABS circular right | Clockwise | $0^\circ < \theta \leq 360^\circ$ | |
| INC circular right | | | |
| ABS circular left | Counterclockwise | | |
| INC circular left | | | |

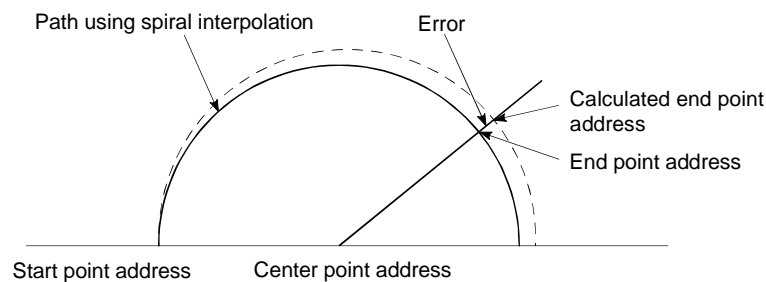
■ Circular interpolation error compensation

In circular interpolation control with center point designation, the arc path calculated from the start point address and arc address may deviate from the position of the end point address set in "Da.6 Positioning address/movement amount".

(Refer to "Pr.41 Allowable circular interpolation error width".)

(1) Calculated error < "Pr.41 Allowable circular interpolation error width"

Circular interpolation control to the set end point address is carried out while the error compensation is carried out. (This is called "spiral interpolation".)



In circular interpolation control with center point designation, an angular velocity is calculated on the assumption that operation is carried out at a command speed on the arc using the radius calculated from the start point address and center point address, and the radius is compensated in proportion to the angular velocity deviated from that at the start point.

Thus, when there is a difference (error) between a radius calculated from the start point address and center point address (start point radius) and a radius calculated from the end point address and center point address (end point radius), the composite speed differs from the command speed as follows.

- * Start point radius > End point radius: As compared with the speed without error, the speed becomes slower as end point address is reached.
- * Start point radius < End point radius: As compared with the speed without error, the speed becomes faster as end point address is reached.

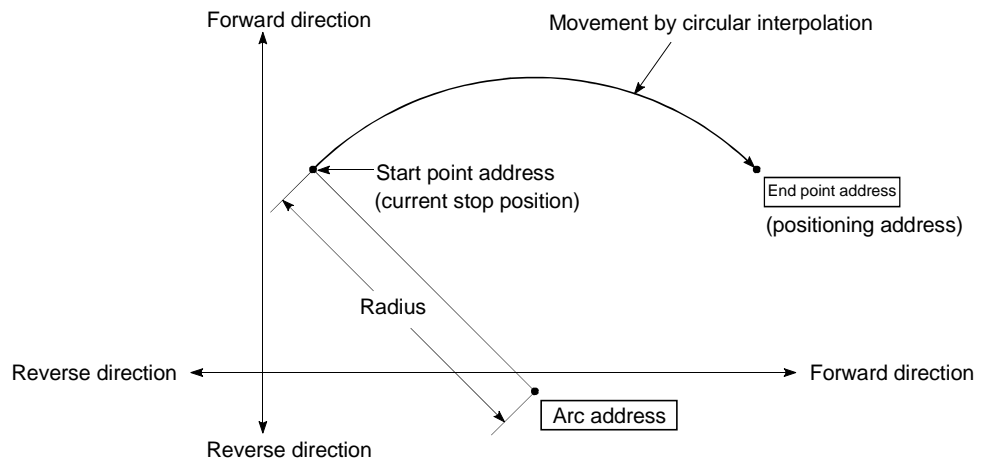
(2) Calculated error > "Pr.41 Allowable circular interpolation error width"

At the positioning start, an error "Outside circular interpolation error allowable limit" (error code: 506) will occur and the control will not start. The machine will immediately stop if the error is detected during positioning control.

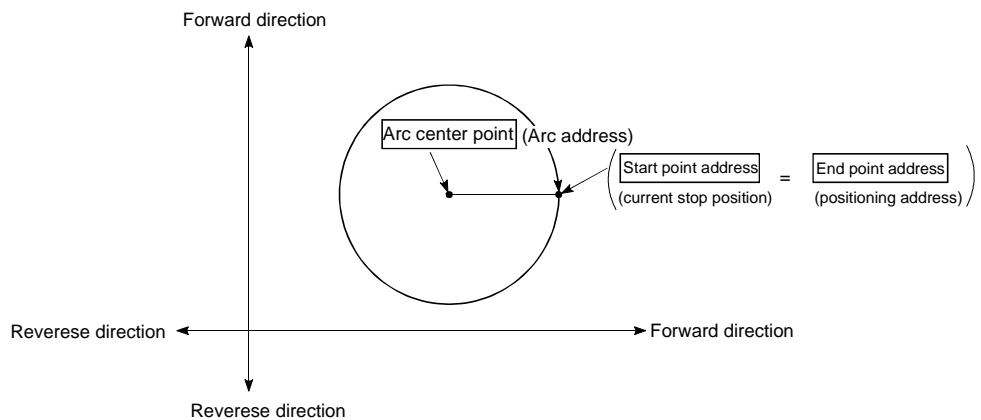
[1] 2-axis circular interpolation control with center point designation
(ABS circular right, ABS circular left)

■ Operation chart

In the absolute system, 2-axis circular interpolation control with center point designation, addresses established by a machine OPR on a 2-axis coordinate plane are used. Positioning is carried out from the current stop position (start point address) to the address (end point address) set in "Da.6 Positioning address/movement amount", in an arc path having as its center the address (arc address) of the center point set in "Da.7 Arc address".



Positioning of a complete round with a radius from the start point address to the arc center point can be carried out by setting the end point address (positioning address) to the same address as the start point address.



In circular interpolation control with center point designation, an angular velocity is calculated on the assumption that operation is carried out at a command speed on the arc using the radius calculated from the start point address and center point address, and the radius is compensated in proportion to the angular velocity deviated from that at the start point.

Thus, when there is a difference (error) between a radius calculated from the start point address and center point address (start point radius) and a radius calculated from the end point address and center point address (end point radius), the composite speed differs from the command speed as follows.

- * Start point radius > End point radius: As compared with the speed without error, the speed becomes slower as end point address is reached.
- * Start point radius < End point radius: As compared with the speed without error, the speed becomes faster as end point address is reached.

■ Restrictions

- (1) 2-axis circular interpolation control cannot be set in the following cases.
 - When "degree" is set in " Pr.1 Unit setting"
 - When the units set in " Pr.1 Unit setting" are different for the reference axis and interpolation axis. ("mm" and "inch" combinations are possible.)
 - When "reference axis speed" is set in " Pr.20 Interpolation speed designation method"
- (2) An error will occur and the positioning start will not be possible in the following cases. The machine will immediately stop if the error is detected during positioning control.
 - When the radius exceeds "536870912 (=2²⁹)". (The maximum radius for which circular interpolation control is possible is "536870912 (=2²⁹)"
... An error "Outside radius range" (error code: 544)" will occur at positioning start.
 - When the end point address is outside the range of -2³¹ to 2³¹-1
... An "End point setting error" (error code: 526)
 - When the start point address is the same as the center point address
... A "Center point setting error" (error code: 527) will occur.
 - When the end point address is the same as the center point address
... A "Center point setting error" (error code: 527) will occur.
 - When the center point address is outside the range of -2³¹ to 2³¹-1
... A "Center point setting error" (error code: 527) will occur.

■ Positioning data setting examples

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis circular interpolation control with center point designation (ABS right arc, ABS left arc)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|--|--|--|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | ABS circular right ABS circular left | – | Set absolute system, 2-axis circular interpolation control with center point designation. (Select clockwise or counterclockwise according to the control.) |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 8000.0 μm | 6000.0 μm | Set the positioning address. (Assuming "mm" is set in " Pr.1 Unit setting".) |
| | Da.7 | Arc address | 4000.0 μm | 3000.0 μm | Set the arc address. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed when moving to the end point address. (Designate the composite speed in " Pr.20 Interpolation speed designation method".) |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

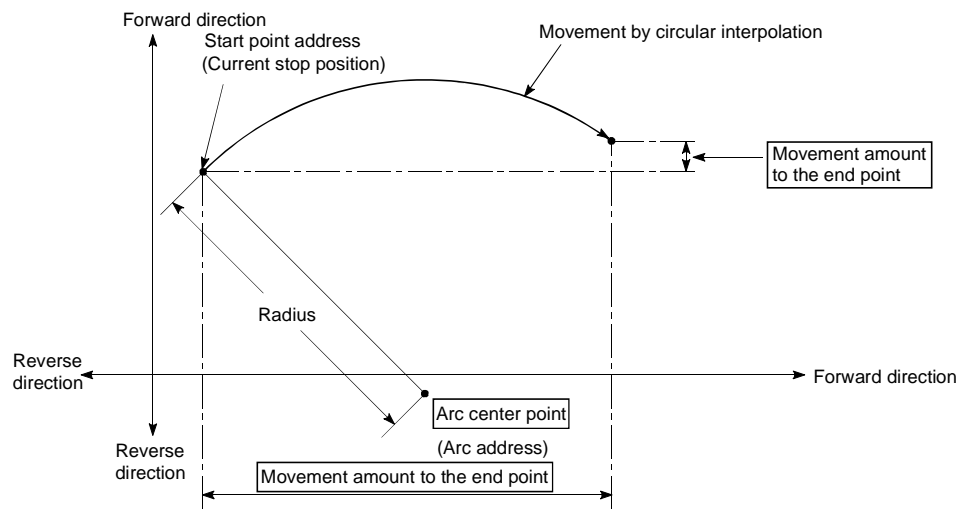
* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|---|
| POINT |
| Set a value in " Da.8 Command speed" so that the speed of each axis does not exceed the " Pr.8 Speed limit value". (The speed limit does not function for the speed calculated by the QD75 during interpolation control.) |

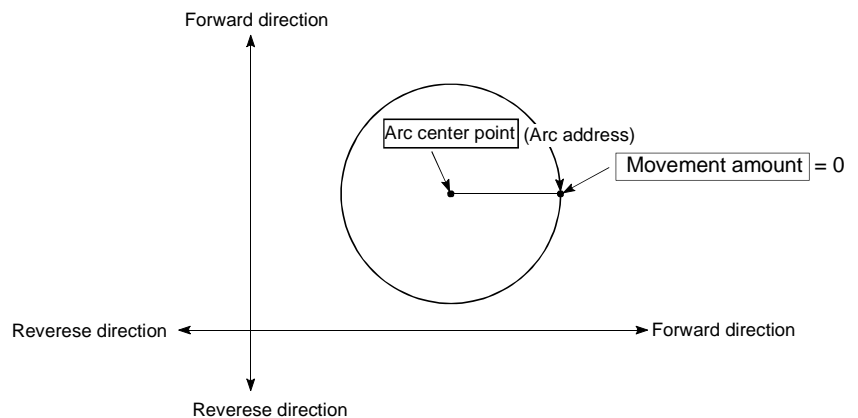
[2] 2-axis circular interpolation control with center point designation
(INC circular right, INC circular left)

■ Operation chart

In the incremental system, 2-axis circular interpolation control with center point designation, addresses established by a machine OPR on a 2-axis coordinate plane are used. Positioning is carried out from the current stop position (start point address) to a position at the end of the movement amount set in "Da.6" Positioning address/movement amount", in an arc path having as its center the address (arc address) of the center point set in "Da.7" Arc address".



Positioning of a complete round with a radius of the distance from the start point address to the arc center point can be carried out by setting the movement amount to "0".



In circular interpolation control with center point designation, an angular velocity is calculated on the assumption that operation is carried out at a command speed on the arc using the radius calculated from the start point address and center point address, and the radius is compensated in proportion to the angular velocity deviated from that at the start point.

Thus, when there is a difference (error) between a radius calculated from the start point address and center point address (start point radius) and a radius calculated from the end point address and center point address (end point radius), the composite speed differs from the command speed as follows.

- * Start point radius > End point radius: As compared with the speed without error, the speed becomes slower as end point address is reached.
- * Start point radius < End point radius: As compared with the speed without error, the speed becomes faster as end point address is reached.

■ Restrictions

- (1) 2-axis circular interpolation control cannot be set in the following cases.
 - When "degree" is set in " Pr.1 Unit setting"
 - When the units set in " Pr.1 Unit setting" are different for the reference axis and interpolation axis. ("mm" and "inch" combinations are possible.)
 - When "reference axis speed" is set in " Pr.20 Interpolation speed designation method"
- (2) An error will occur and the positioning start will not be possible in the following cases. The machine will immediately stop if the error is detected during positioning control.
 - When the radius exceeds "536870912 (=2²⁹)". (The maximum radius for which circular interpolation control is possible is "536870912 (=2²⁹)"
... An "Outside radius range error (error code: 544)" will occur at positioning start.
 - When the start point address is the same as the center point address
... A "Center point setting error" (error code: 527) will occur.
 - When the end point address is the same as the center point address
... A "Center point setting error" (error code: 527) will occur.
 - When the center point address is outside the range of -2³¹ to 2³¹-1
... A "Center point setting error" (error code: 527) will occur.

■ Positioning data setting examples

[Reference axis and interpolation axis are designated as axis 1 and axis 2, respectively.]

The following table shows setting examples when "2-axis circular interpolation control with center point designation (INC circular right, INC circular left)" is set in positioning data No. 1 of axis 1. (The required values are also set in positioning data No. 1 of axis 2.)

| Setting item | | Axis | | Setting details | |
|-------------------------------|-------|--|--|-----------------|---|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | Set "Positioning complete" assuming the next positioning data will not be executed. |
| | Da.2 | Control system | INC circular right INC circular left | – | Set incremental system, 2-axis circular interpolation control with center point designation. (Select clockwise or counterclockwise according to the control.) |
| | Da.3 | Acceleration time No. | 1 | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | Da.6 | Positioning address/movement amount | 8000.0 μm | 6000.0 μm | Set the movement amount. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.7 | Arc address | 4000.0 μm | 3000.0 μm | Set the center point address. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.8 | Command speed | 6000.00 mm/min | – | Set the speed when moving to the end point address. (Designate the composite speed in " Pr.20 Interpolation speed designation method".) |
| | Da.9 | Dwell time | 500ms | – | Set the time the machine dwells after the positioning stop (pulse output stop) to the output of the positioning complete signal. |
| | Da.10 | M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

| |
|---|
| POINT |
| Set a value in " Da.8 Command speed" so that the speed of each axis does not exceed the " Pr.8 Speed limit value". (The speed limit does not function for the speed calculated by the QD75 during interpolation control.) |

9.2.12 1-axis speed control

In "1-axis speed control" (" Da.2 Control system" = Forward run: speed 1, Reverse run: speed 1), control is carried out in the axis direction in which the positioning data has been set by continuously outputting pulses for the speed set in " Da.8 Command speed" until the input of a stop command.

The two types of 1-axis speed control are "Forward run: speed 1" in which the control starts in the forward run direction, and "Reverse run: speed 1" in which control starts in the reverse run direction.

■ Operation chart

The following chart shows the operation timing for 1-axis speed control with axis 1 as the reference axis.

The "in speed control" flag (Md.31 Status: b0) is turned ON during speed control.

The "Positioning complete signal" is not turned ON.

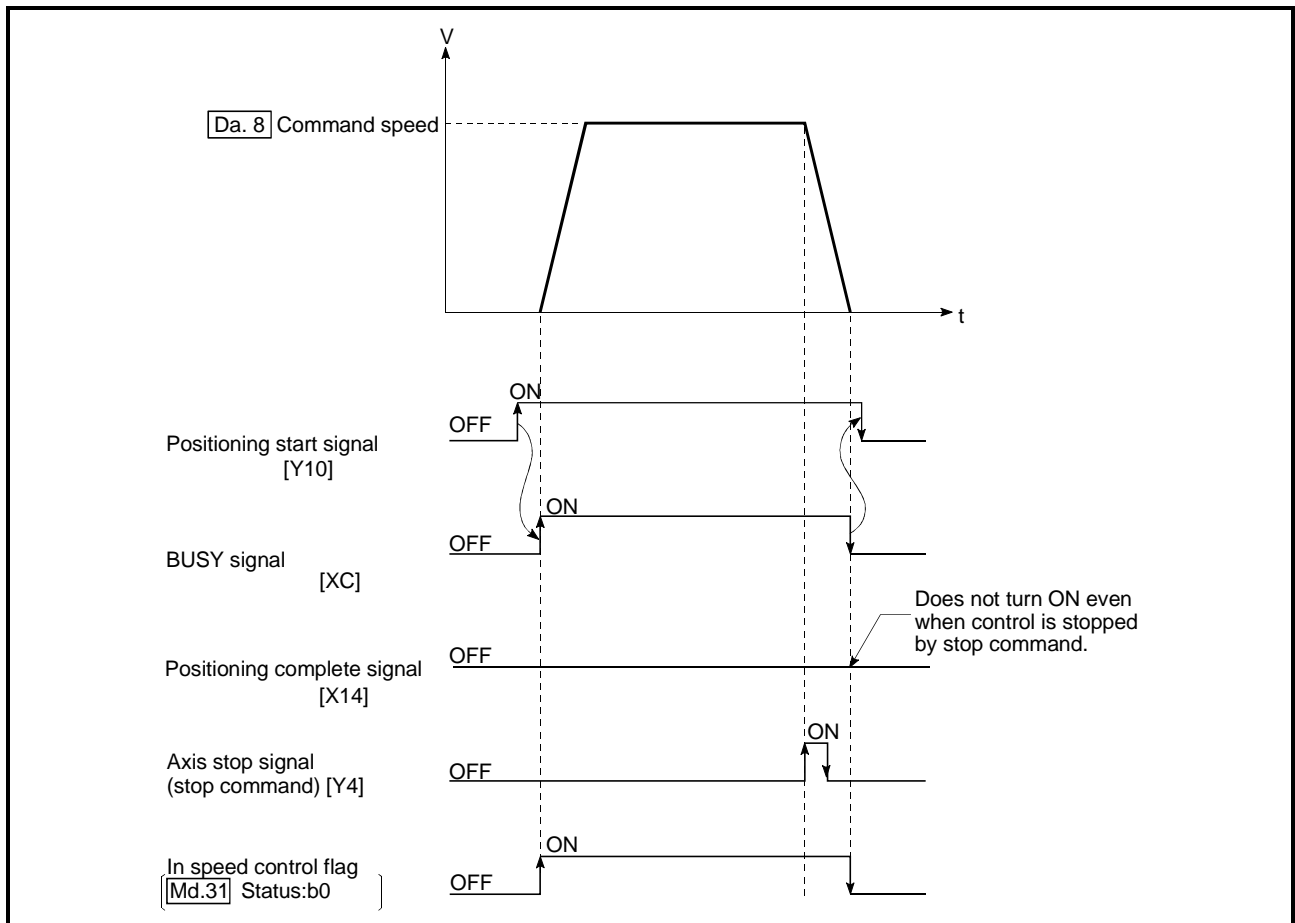
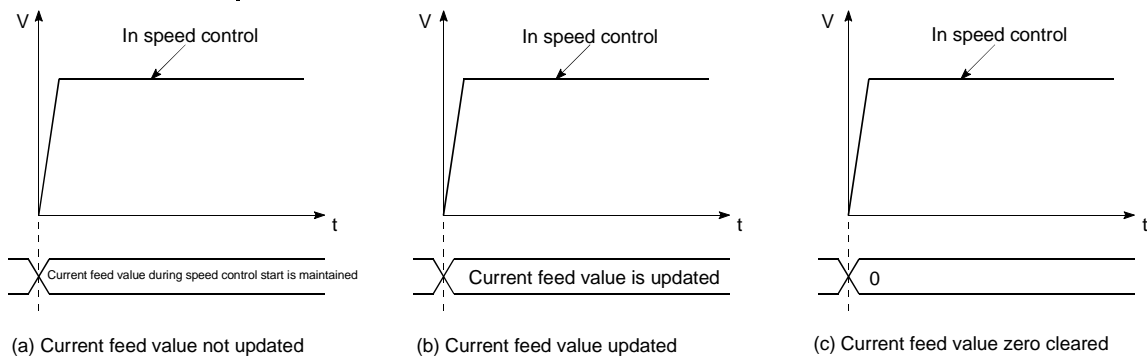


Fig.9.9 1-axis speed control operation timing

■ Current feed value during 1-axis speed control

The following table shows the "Md.20 Current feed value" during 1-axis speed control corresponding to the "Pr.21 Current feed value during speed control" settings.

| Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|--|--|
| 0: Do not update current feed value | The current feed value at speed control start is maintained. |
| 1: Update current feed value | The current feed value is updated. |
| 2: Zero clear current feed value | The current feed value is fixed at 0. |



■ Restrictions

- Set "Positioning complete" in "Da.1 Operation pattern". An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set in "Da.1 Operation pattern".
("Continuous positioning control" and "continuous path control" cannot be set in speed control.)
- Set the WITH mode in "Pr.18 M code ON signal output timing" when using an M code. The M code will not be output, and the M code ON signal will not turn ON if the AFTER mode is set.
- An error "No command speed (error code: 503)" will occur if the current speed (-1) is set in "Da.8 command speed".
- The software stroke limit check will not carried out if the control unit is set to "degree".

■ Positioning data setting examples

The following table shows the setting examples when "1-axis speed control (forward run: speed 1)" is set in the positioning data No. 1 of axis 1.

| Setting item | | Setting example | Setting details | |
|-------------------------------|-------|-------------------------------------|----------------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | Setting other than "Positioning complete" is not possible in speed control. |
| | Da.2 | Control system | Forward run speed 1 | Set 1-axis speed control. |
| | Da.3 | Acceleration time No. | 1 | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | – | Setting not required (setting value will be ignored). |
| | Da.6 | Positioning address/movement amount | – | Setting not required (setting value will be ignored). |
| | Da.7 | Arc address | – | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00mm/min | Set the speed to be commanded. |
| | Da.9 | Dwell time | – | Setting not required (setting value will be ignored). |
| | Da.10 | M code | 10 | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. (" Pr.18 M code ON signal output timing" setting only possible in the WITH mode.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.13 2-axis speed control

In "2-axis speed control" (" **Da.2** Control system" = Forward run: speed 2, Reverse run: speed 2), control is carried out in the 2-axis direction in which the positioning data has been set by continuously outputting pulses for the speed set in " **Da.8** Command speed" until the input of a stop command.

The two types of 2-axis speed control are "Forward run: speed 2" in which the control starts in the forward run direction, and "Reverse run: speed 2" in which control starts in the reverse run direction.

(Refer to Section 9.1.6 "Interpolation control" for the combination of the reference axis with the interpolation axis.)

■ Operation chart

The following chart shows the operation timing for 2-axis (axes 1 and 2) speed control with axis 1 as the reference axis. The "in speed control" flag (**Md.31** Status: b0) is turned ON during speed control.

The "positioning complete signal" is not turned ON.

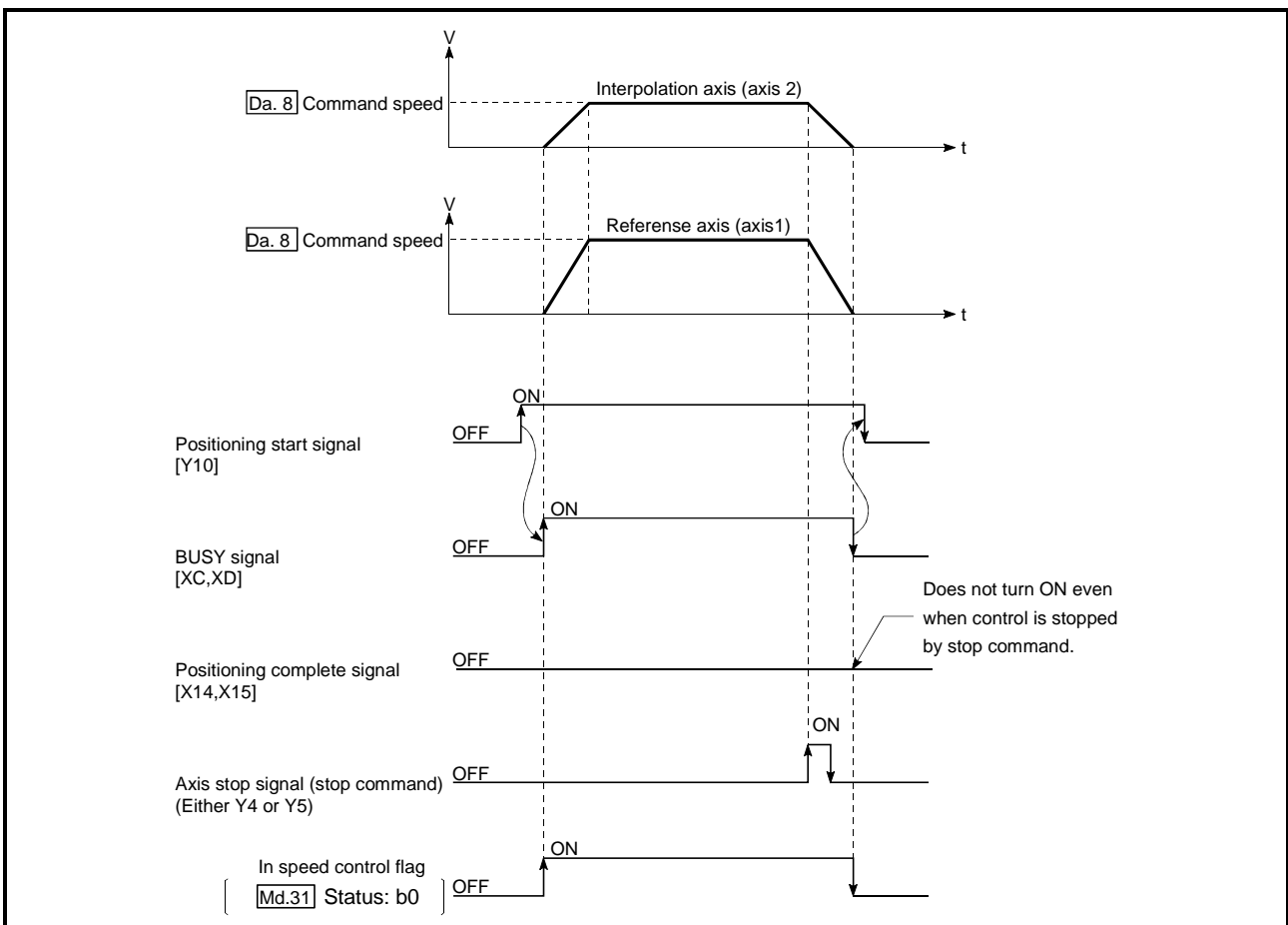
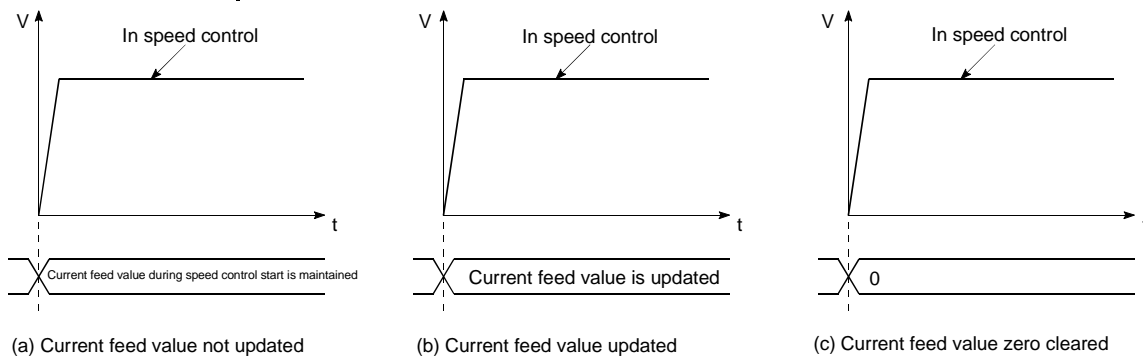


Fig. 9.10 2-axis speed control operation timing

■ Current feed value during 2-axis speed control

The following table shows the "Md.20 Current feed value" during 2-axis speed control corresponding to the "Pr.21 Current feed value during speed control" settings. (Note that the reference axis setting values are used for parameters.)

| "Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|---|--|
| 0: Do not update current feed value | The current feed value at speed control start is maintained. |
| 1: Update current feed value | The current feed value is updated. |
| 2: Zero clear current feed value | The current feed value is fixed at 0. |



■ Restrictions

- Set "Positioning complete" in "Da.1 Operation pattern". An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set. ("Continuous positioning control" and "continuous path control" cannot be set in speed control.)
- Set the WITH mode in "Pr.18 M code ON signal output timing" when using an M code. The M code will not be output, and the M code ON signal will not turn ON if the AFTER mode is set.
- Set the "reference axis speed" in "Pr.20 Interpolation speed designation method". An "Interpolation mode error (error code: 523)" will occur and the operation cannot start if a composite speed is set.
- When either of two axes exceeds the speed limit, that axis is controlled with the speed limit value. The speeds of the other axes are limited at the ratios of "Da.8 Command speed".

(Examples)

| Setting item | | Axis | |
|--------------|-------------------|----------------|----------------|
| | | Axis 1 setting | Axis 2 setting |
| Pr.8 | Speed limit value | 4000.00mm/min | 5000.00mm/min |
| Da.8 | Command speed | 8000.00mm/min | 6000.00mm/min |

With the settings shown above, the operation speed in speed control is as follows.

Axis 1: 4000.00 mm/min (Speed is limited by Pr.8).

Axis 2: 3000.00 mm/min (Speed is limited at an ratio of an axis 1 command speed to an axis 2 command speed).

- (5) An error "No command speed (error code: 503)" occurs if a current speed (-1) is set in " [Da.8] Command speed".
- (6) The software stroke limit check is not carried out when the control unit is set to "degree".

■ Positioning data setting examples

[Setting examples when the reference axis and interpolation axis are designated as axes 1 and 2, respectively.]

The following table shows the setting examples when "2-axis speed control (forward run: speed 2)" is set in the positioning data No. 1 of axis 1 (reference axis).

| Setting item | | Axis | | Setting details |
|-------------------------------|--|--|--|---|
| | | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | |
| Axis 1 Positioning data No. 1 | [Da.1] Operation pattern | Positioning complete | – | Setting other than "Positioning complete" is not possible in speed control. |
| | [Da.2] Control system | Forward run speed 2 | – | Set 2-axis speed control. |
| | [Da.3] Acceleration time No. | 1 | – | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | [Da.4] Deceleration time No. | 0 | – | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | [Da.5] Axis to be interpolated | 2 | – | Set the axis to be interpolated (partner axis). If the self-axis is set, an error will occur. |
| | [Da.6] Positioning address/movement amount | – | – | Setting not required (setting value will be ignored). |
| | [Da.7] Arc address | – | – | Setting not required (setting value will be ignored). |
| | [Da.8] Command speed | 6000.00 mm/min | 3000.00 mm/min | Set the speed to be commanded. |
| | [Da.9] Dwell time | – | – | Setting not required (setting value will be ignored). |
| | [Da.10] M code | 10 | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. (" [Pr.18] M code ON signal output timing" setting only possible in the WITH mode.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.14 3-axis speed control

In "3-axis speed control" (" **Da.2** Control system" = Forward run: speed 3, Reverse run: speed 3), control is carried out in the 3-axis direction in which the positioning data has been set by continuously outputting pulses for the speed set in " **Da.8** Command speed" until the input of a stop command.

The two types of 3-axis speed control are "Forward run: speed 3" in which the control starts in the forward run direction, and "Reverse run: speed 3" in which control starts in the reverse run direction.

(Refer to Section 9.1.6 "Interpolation control" for the combination of the reference axis with the interpolation axes.)

■ Operation chart

The following chart shows the operation timing for 3-axis (axes 1, 2, and 3) speed control with axis 1 as the reference axis.

The "in speed control" flag (**Md.31** Status: b0) is turned ON during speed control.

The "positioning complete signal" is not turned ON.

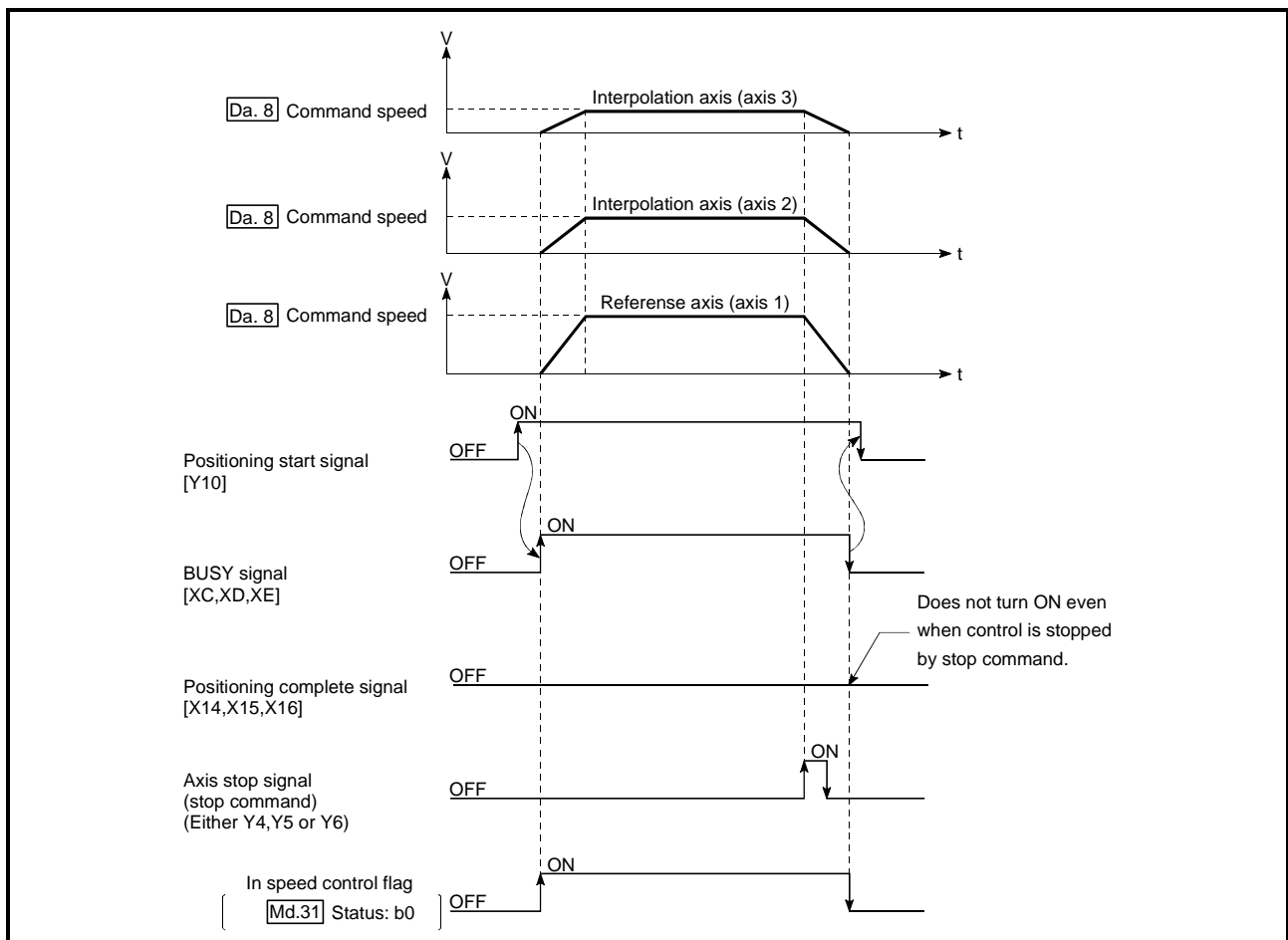
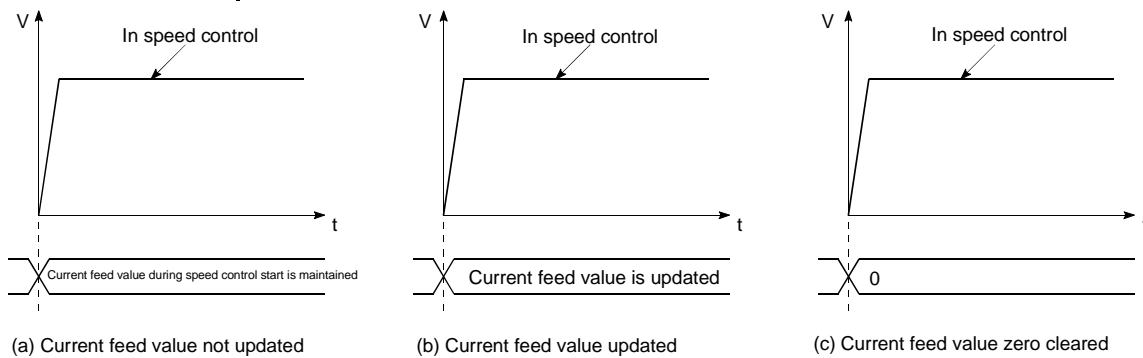


Fig. 9.11 3-axis speed control operation timing

■ Current feed value during 3-axis speed control

The following table shows the "Md.20 Current feed value" during 3-axis speed control corresponding to the "Pr.21 Current feed value during speed control" settings. (Note that the reference axis setting values are used for parameters.)

| Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|--|--|
| 0: Do not update current feed value | The current feed value at speed control start is maintained. |
| 1: Update current feed value | The current feed value is updated. |
| 2: Zero clear current feed value | The current feed value is fixed at 0. |



■ Restrictions

- (1) Set "Positioning complete" in "Da.1 Operation pattern". An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set. ("Continuous positioning control" and "continuous path control" cannot be set in speed control.)
- (2) Set the WITH mode in "Pr.18 M code ON signal output timing" when using an M code. The M code will not be output, and the M code ON signal will not turn ON if the AFTER mode is set.
- (3) Set the "reference axis speed" in "Pr.20 Interpolation speed designation method". An "Interpolation mode error (error code: 523)" will occur and the operation cannot start if a composite speed is set.

- (4) When either of three axes exceeds the speed limit, that axis is controlled with the speed limit value. The speeds of the other axes are limited at the ratios of "Da.8 Command speed".

(Examples)

| Setting item | | Axis | | |
|--------------|-------------------|----------------|----------------|----------------|
| | | Axis 1 setting | Axis 2 setting | Axis 3 setting |
| Pr.8 | Speed limit value | 4000.00mm/min | 5000.00mm/min | 6000.00mm/min |
| Da.8 | Command speed | 8000.00mm/min | 6000.00mm/min | 4000.00mm/min |

With the settings shown above, the operation speed in speed control is as follows.

Axis 1: 4000.00 mm/min (Speed is limited by Pr.8).

Axis 2: 3000.00 mm/min (Speed is limited at ratios in axes 1, 2, and 3 command speeds).

Axis 3: 2000.00 mm/min (Speed is limited at ratios in axes 1, 2, and 3 command speeds).

- (5) An error "No command speed (error code: 503)" will occur if a current speed (-1) is set in "Da.8 Command speed".
- (6) The software stroke limit check is not carried out when the control unit is set to "degree".

■ Positioning data setting examples

The following table shows the setting examples when "3-axis speed control (forward run: speed 3)" is set in the positioning data No. 1 of axis 1 (reference axis).

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|--|--|--|---|
| | | | | | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | – | – | Setting other than "Positioning complete" is not possible in speed control. |
| | Da.2 | Control system | Forward run speed 3 | – | – | Set 3-axis speed control. |
| | Da.3 | Acceleration time No. | 1 | – | – | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | – | – | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | – | – | – | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2 and 3. |
| | Da.6 | Positioning address/movement amount | – | – | – | Setting not required (setting value will be ignored). |
| | Da.7 | Arc address | – | – | – | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | 3000.00 mm/min | 2000.00 mm/min | Set the speed to be commanded. |
| | Da.9 | Dwell time | – | – | – | Setting not required (setting value will be ignored). |
| | Da.10 | M code | 10 | – | – | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. (" Pr.18 M code ON signal output timing" setting only possible in the WITH mode.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.15 4-axis speed control

In "4-axis speed control" ("Da.2 Control system" = Forward run: speed 4, Reverse run: speed 4), control is carried out in the 4-axis direction in which the positioning data has been set by continuously outputting pulses for the speed set in "Da.8 Command speed" until the input of a stop command.

The two types of 4-axis speed control are "Forward run: speed 4" in which the control starts in the forward run direction, and "Reverse run: speed 4" in which control starts in the reverse run direction.

(Refer to Section 9.1.6 "Interpolation control" for the combination of the reference axis with the interpolation axes.)

■ Operation chart

The following chart shows the operation timing for 4-axis speed control with axis 1 as the reference axis.

The "in speed control" flag ([Md.31] Status: b0) is turned ON during speed control.

The "positioning complete signal" is not turned ON.

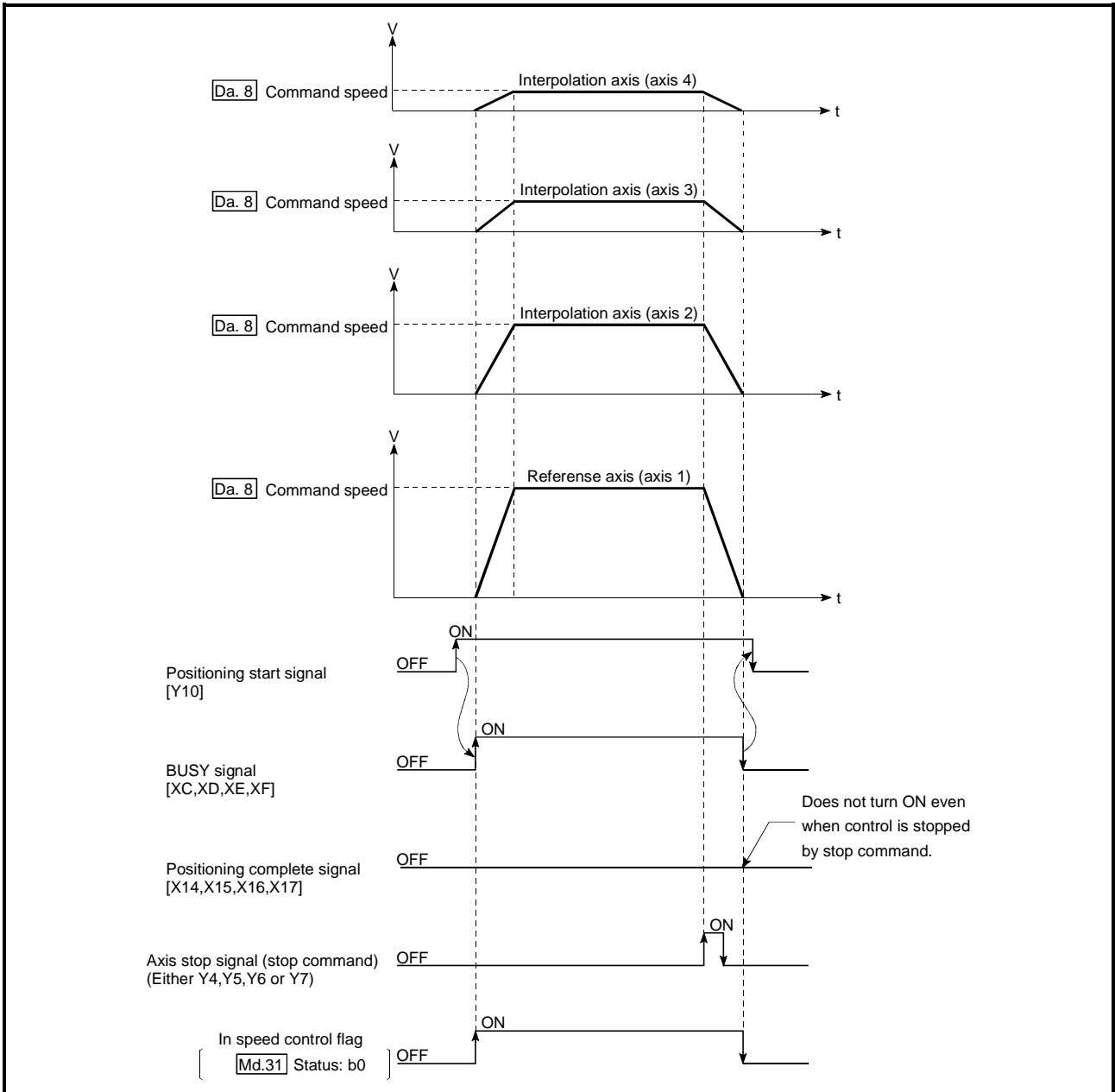
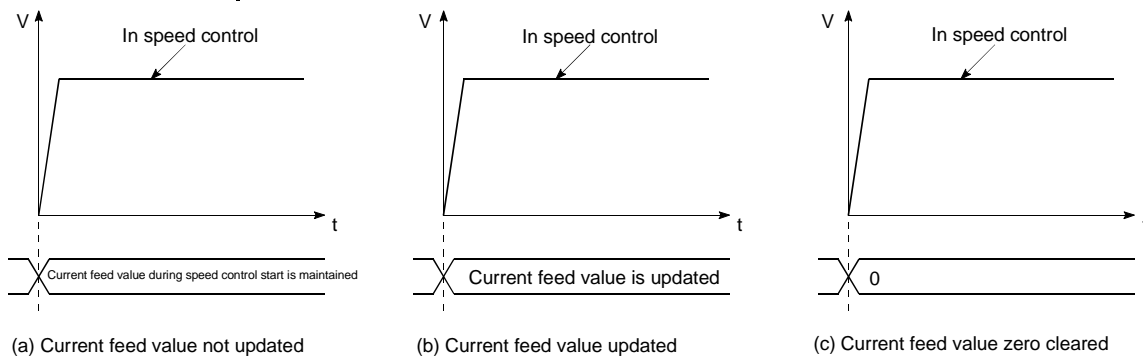


Fig. 9.12 4-axis speed control operation timing

■ Current feed value during 4-axis speed control

The following table shows the "Md.20 Current feed value" during 4-axis speed control corresponding to the "Pr.21 Current feed value during speed control" settings. (Note that the reference axis setting values are used for parameters.)

| Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|--|--|
| 0: Do not update current feed value | The current feed value at speed control start is maintained. |
| 1: Update current feed value | The current feed value is updated. |
| 2: Zero clear current feed value | The current feed value is fixed at 0. |



■ Restrictions

- (1) Set "Positioning complete" in "Da.1 Operation pattern". An axis error "Continuous path control not possible (error code: 516)" will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set. ("Continuous positioning control" and "continuous path control" cannot be set in speed control.)
- (2) Set the WITH mode in "Pr.18 M code ON signal output timing" when using an M code. The M code will not be output, and the M code ON signal will not turn ON if the AFTER mode is set.
- (3) Set the "reference axis speed" in "Pr.20 Interpolation speed designation method". An "Interpolation mode error (error code: 523)" will occur and the operation cannot start if a composite speed is set.

- (4) When either of four axes exceeds the speed limit, that axis is controlled with the speed limit value. The speeds of the other axes are limited at the ratios of "Da.8 Command speed".

(Examples)

| Setting item | | Axis | | | |
|--------------|-------------------|----------------|----------------|----------------|----------------|
| | | Axis 1 setting | Axis 2 setting | Axis 3 setting | Axis 4 setting |
| Pr.8 | Speed limit value | 4000.00mm/min | 5000.00mm/min | 6000.00mm/min | 8000.00mm/min |
| Da.8 | Command speed | 8000.00mm/min | 6000.00mm/min | 4000.00mm/min | 1500.00mm/min |

With the settings shown above, the operation speed in speed control is as follows.

Axis 1: 4000.00 mm/min (Speed is limited by Pr.8).

Axis 2: 3000.00 mm/min (Speed is limited at ratios in axes 1, 2, 3 and 4 command speeds).

Axis 3: 2000.00 mm/min (Speed is limited at ratios in axes 1, 2, 3 and 4 command speeds).

Axis 4: 750.00 mm/min (Speed is limited at ratios in axes 1, 2, 3 and 4 command speeds).

- (5) An error "No command speed (error code: 503)" will occur if a current speed (-1) is set in "Da.8 Command speed".
- (6) The software stroke limit check is not carried out when the control unit is set to "degree".

■ Positioning data setting examples

The following table shows the setting examples when "4-axis speed control (forward run: speed 4)" is set in the positioning data No. 1 of axis 1 (reference axis).

| Setting item | | Axis | Axis 1 (reference axis) setting example | Axis 2 (interpolation axis) setting example | Axis 3 (interpolation axis) setting example | Axis 4 (interpolation axis) setting example | Setting details |
|-------------------------------|-------|-------------------------------------|---|---|---|---|--|
| | | | | | | | |
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | - | - | - | Setting other than "Positioning complete" is not possible in speed control. |
| | Da.2 | Control system | Forward run speed 4 | - | - | - | Set 4-axis speed control. |
| | Da.3 | Acceleration time No. | 1 | - | - | - | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | - | - | - | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - | - | - | - | Setting not required (setting value will be ignored). When axis 1 is used as a reference axis, the interpolation axes are axes 2, 3 and 4. |
| | Da.6 | Positioning address/movement amount | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.7 | Arc address | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.8 | Command speed | 6000.00 mm/min | 3000.00 mm/min | 2000.00 mm/min | 1000.00 mm/min | Set the speed to be commanded. |
| | Da.9 | Dwell time | - | - | - | - | Setting not required (setting value will be ignored). |
| | Da.10 | M code | 10 | - | - | - | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. (" Pr.18 M code ON signal output timing" setting only possible in the WITH mode.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.16 Speed-position switching control (INC mode)

In "speed-position switching control (INC mode)" ("Da.2 Control system = Forward run: speed/position, Reverse run: speed/position), the pulses of the speed set in "Da.8 Command speed" are kept output on the axial direction set to the positioning data. When the "speed-position switching signal" is input, position control of the movement amount set in "Da.6 Positioning address/movement amount" is exercised.

"Speed-position switching control (INC mode)" is available in two different types: "forward run: speed/position" which starts the axis in the forward run direction and "reverse run: speed/position" which starts the axis in the reverse run direction.

Use the detailed parameter 1 "Pr.200 Speed-position function selection" with regard to the choice for "speed-position switching control (INC mode)".

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.200 Speed-position function selection | 0 | Speed-position switching control (INC mode) | 34 | 184 | 334 | 484 |

* If the set value is other than 0 and 2, it is regarded as 0 and operation is performed in the INC mode.

For details of the setting, refer to Sections 5.2 "List of parameters".

■ Switching over from speed control to position control

- (1) The control is switched over from speed control to position control by the external signal "speed-position switching signal".
- (2) Besides setting the positioning data, the "Cd.24 Speed-position switching enable flag" must also be turned ON to switch over from speed control to position control. (If the "Cd.24 Speed-position switching enable flag" turns ON after the speed-position switching signal turns ON, the control will continue as speed control without switching over to position control. Only position control will be carried out when the "Cd.24 Speed-position switching enable flag" and speed-position switching signal are ON at the operation start.)

■ Operation chart

The following chart (Fig.9.13) shows the operation timing for speed-position switching control (INC mode). The "in speed control flag" ([Md.31] Status: b0) is turned ON during speed control of speed-position switching control (INC mode).

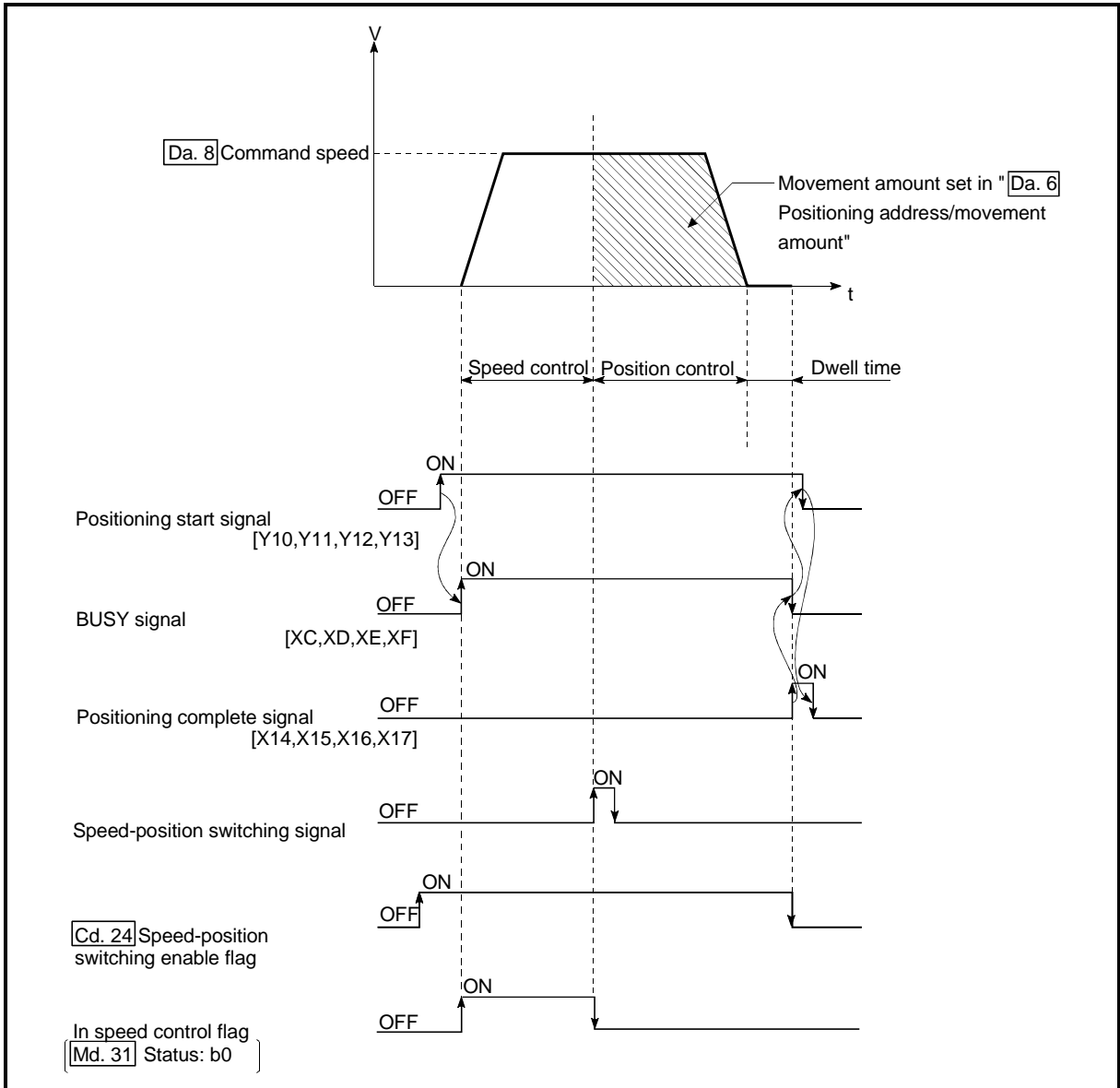
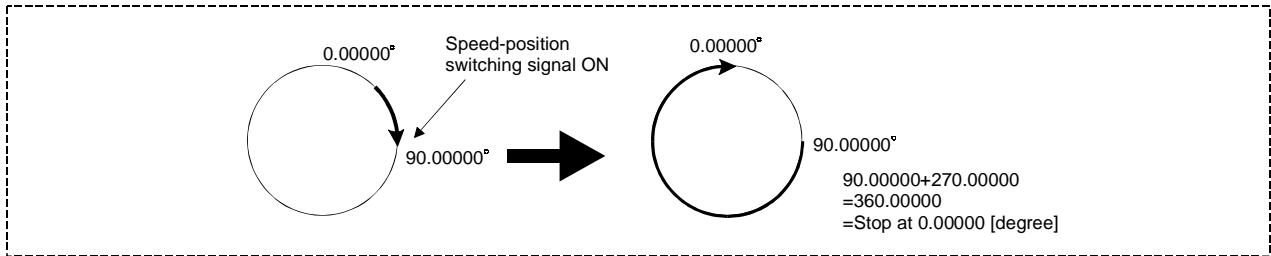


Fig. 9.13 Speed-position switching control (INC mode) operation timing

[Operation example]

The following operation assumes that the speed-position switching signal is input at the position of the current feed value of 90.00000 [degree] during execution of "Da.2 Control system" "Forward run: speed/position" at "Pr.1 Unit setting" of "2: degree" and "Pr.21 Current feed value during speed control" setting of "1: Update current feed value".

(The value set in "Da.6 Positioning address/movement amount" is 270.00000 [degree])



■ Operation timing and processing time during speed-position switching control (INC mode)

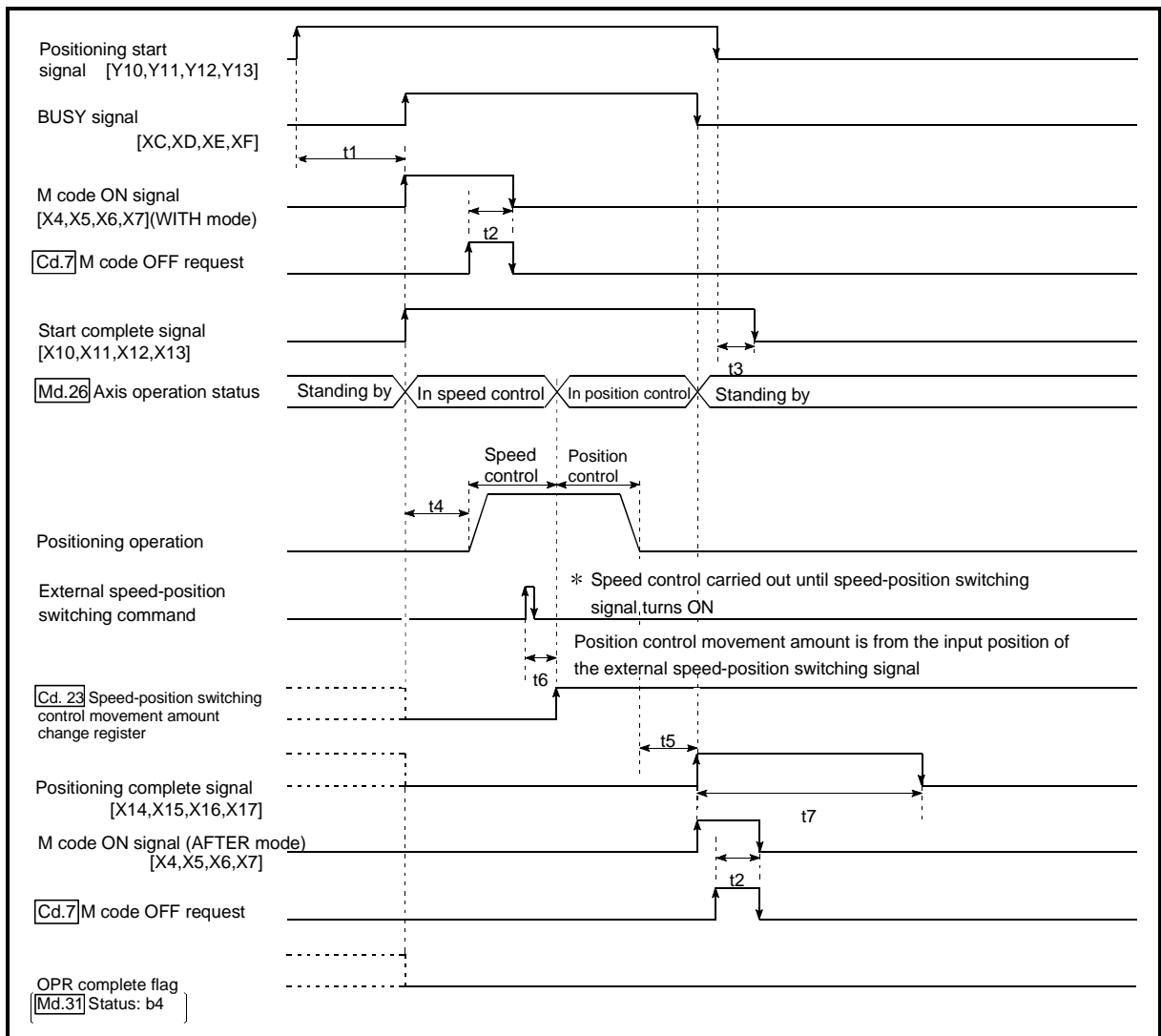


Fig. 9.14 Operation timing and processing time during speed-position switching control (INC mode)

Normal timing time

Unit: ms

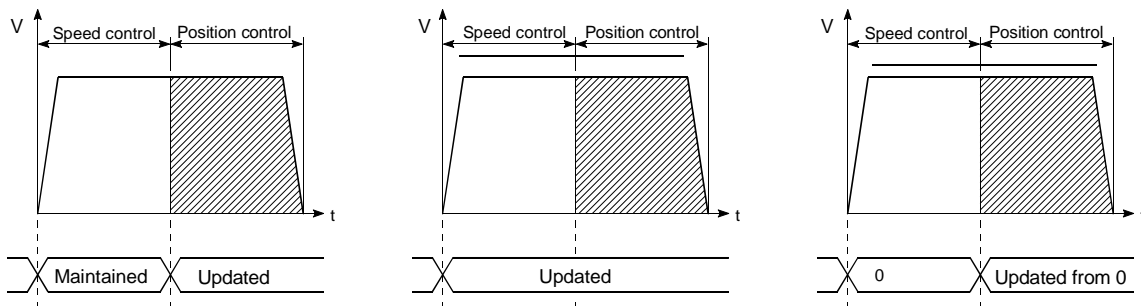
| t1 | t2 | t3 | t4 | t5 | t6 | t7 |
|-----|----------|----------|------------|----------|-----|--------------------|
| 1.1 | 0 to 3.5 | 0 to 3.5 | 5.5 to 7.9 | 0 to 3.5 | 1.0 | Follows parameters |

- The t1 timing time could be delayed by the operation state of other axes.

■ Current feed value during speed-position switching control (INC mode)

The following table shows the "Md.20 Current feed value" during speed-position switching control (INC mode) corresponding to the "Pr.21 Current feed value during speed control" settings.

| Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|--|---|
| 0: Do not update current feed value | The current feed value at control start is maintained during speed control, and updated from the switching to position control. |
| 1: Update current feed value | The current feed value is updated during speed control and position control. |
| 2: Zero clear current feed value | The current feed value is cleared (set to "0") at control start, and updated from the switching to position control. |



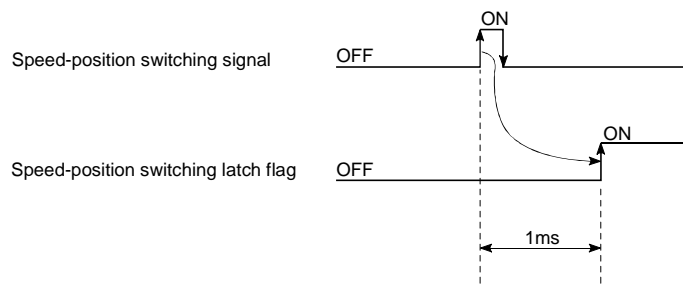
(a) Current feed value not updated

(b) Current feed value updated

(c) Current feed value zero cleared

■ Switching time from speed control to position control

There is 1ms from the time the speed-position switching signal is turned ON to the time the speed-position switching latch flag (Md.31 Status: b1) turns ON.



■ Speed-position switching signal setting

The following table shows the items that must be set to use the external command signals (CHG) as speed-position switching signals.

| Setting item | | Setting value | Setting details | Buffer memory address | | | |
|--------------|-------------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.42 | External command function selection | 2 | Set the "2: speed-position and position-speed switching requests". | 62 | 212 | 362 | 512 |
| Cd.8 | External command valid | 1 | Set "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Sections 5.2 "List of parameters" and Section 5.7 "List of control data" for information on the setting details.

■ Changing the position control movement amount

In "speed-position switching control (INC mode)", the position control movement amount can be changed during the speed control section.

- (1) The position control movement amount can be changed during the speed control section of speed-position switching control (INC mode).
A movement amount change request will be ignored unless issued during the speed control section of the speed-position switching control (INC mode).
- (2) The "new movement amount" is stored in "**Cd.23** Speed-position switching control movement amount change register" by the PLC program during speed control.
When the speed-position switching signal is turned ON, the movement amount for position control is stored in "**Cd.23** Speed-position switching control movement amount change register".
- (3) The movement amount is stored in the "**Md.29** Speed-position switching control positioning amount" of the axis monitor area from the point where the control changes to position control by the input of a speed-position switching signal from an external device.

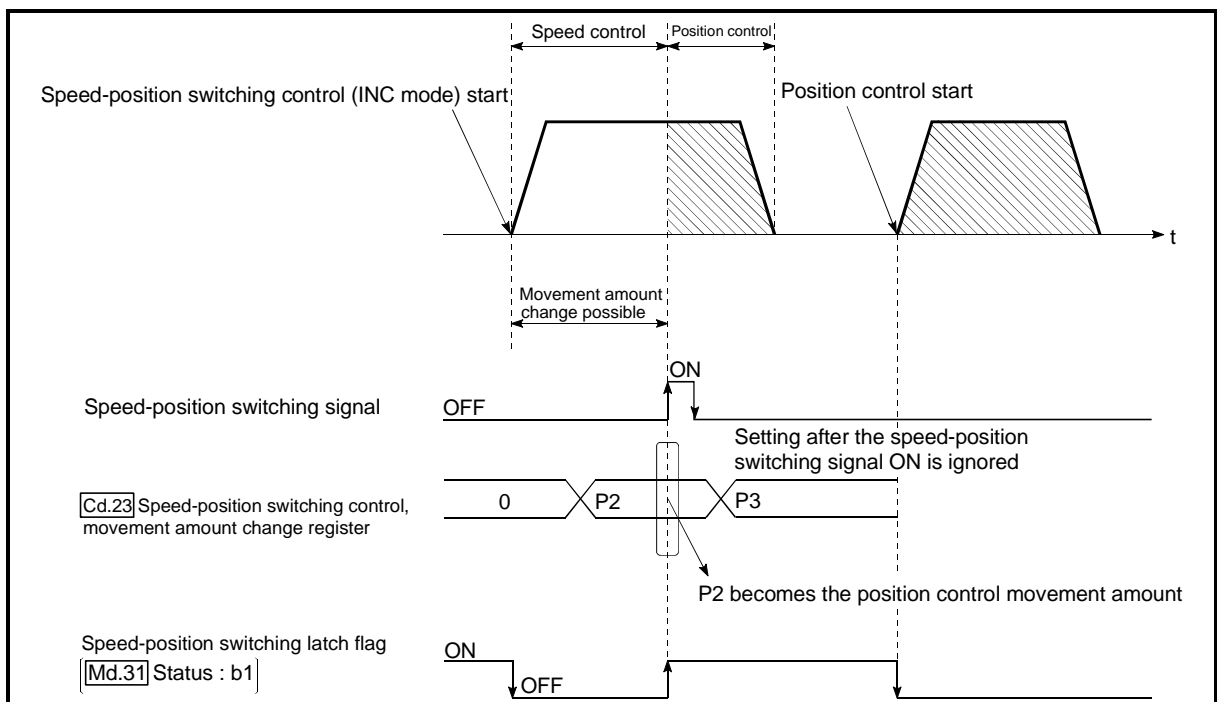


Fig. 9.15 Position control movement amount change timing

POINT

- The machine recognizes the presence of a movement amount change request when the data is written to " [Cd.23] Speed-position switching control movement amount change register" with the PLC program.
- The new movement amount is validated after execution of the speed-position switching control (INC mode), before the input of the speed-position switching signal.
- The movement amount change can be enable/disable with the interlock function in position control using the "speed-position switching latch flag" ([Md.31] Status : b1) of the axis monitor area.

■ Restrictions

- (1) An axis error (error code: 516) will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set in " [Da.1] Operation pattern".
- (2) "Speed-position switching control" cannot be set in " [Da.2] Control system" of the positioning data when "continuous path control" has been set in " [Da.1] Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", "speed-position switching control" cannot be set in positioning data No. 2.) An axis error (error code: 516) will occur and the machine will carry out a deceleration stop if this type of setting is carried out.
- (3) An error (error code: 503) will occur if "current speed (-1)" is set in " [Da.8] command speed".
- (4) The software stroke limit range check during speed control is made only when the following (a) and (b) are satisfied:
 - (a) " [Pr.21] Current feed value during speed control" is "1: Update current feed value".
If the movement amount exceeds the software stroke limit range during speed control in case of the setting of other than "1: Update current feed value", an error (error code: 507 or 508) will occur as soon as speed control is changed to position control and the axis will decelerate to a stop.
 - (b) When " [Pr.1] Unit setting" is other than "2: degree"
If the unit is "degree", the software stroke limit range check is not performed.
- (5) If the value set in " [Da.6] Positioning address/movement amount" is negative, an error (error code: 530) will occur.
- (6) Deceleration processing is carried out from the point where the speed-position switching signal is input if the position control movement amount set in " [Da.6] Positioning address/movement amount" is smaller than the deceleration distance from the " [Da.8] Command speed".
- (7) Turn ON the speed-position switching signal in the speed stabilization region (constant speed status). A warning (warning code: 508) will occur because of large deviation in the droop pulse amount if the signal is turned ON during acceleration.
During use of the servo motor, the actual movement amount after switching of speed control to position control is the "preset movement amount + droop pulse amount". If the signal is turned ON during acceleration/deceleration, the stop position will vary due to large variation of the droop pulse amount. Even though " [Md.29] Speed-position switching control positioning amount" is the same, the stop position will change due to a change in droop pulse amount when " [Da.8] Command speed" is different.

■ Positioning data setting examples

The following table shows setting examples when "speed-position switching control (INC mode) by forward run" is set in positioning data No. 1 of axis 1.

| | | Setting item | Setting example | Setting details |
|-------------------------------|-------|-------------------------------------|-----------------------------|--|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | Set "Positioning complete" assuming the next positioning data will not be executed. ("Continuous path control" cannot be set in "speed-position switching control (INC mode)".) |
| | Da.2 | Control system | Forward run: speed/position | Set speed-position switching control by forward run. |
| | Da.3 | Acceleration time No. | 1 | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | – | Setting not required. (Setting value is ignored.) |
| | Da.6 | Positioning address/movement amount | 10000.0μm | INC mode ([Pr.200] = 0) Set the movement amount after the switching to position control. (Assuming that the " [Pr.1] Unit setting" is set to "mm".) |
| | Da.7 | Arc address | – | Setting not required. (Setting value is ignored.) |
| | Da.8 | Command speed | 6000.00mm/min | Set the speed to be controlled. |
| | Da.9 | Dwell time | 500ms | Set a time from the positioning stop (pulse output stop) by position control until the positioning complete signal is output. When the system is stopped by speed control, ignore the setting value. |
| | Da.10 | M code | 10 | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.17 Speed-position switching control (ABS mode)

In case of "speed-position switching control (ABS mode)" ("Da.2 Control system = Forward run: speed/position, Reverse run: speed/position), the pulses of the speed set in "Da.8 Command speed" are kept output in the axial direction set to the positioning data. When the "speed-position switching signal" is input, position control to the address set in "Da.6 Positioning address/movement amount" is exercised.

"Speed-position switching control (ABS mode)" is available in two different types: "forward run: speed/position" which starts the axis in the forward run direction and "reverse run: speed/position" which starts the axis in the reverse run direction.

"Speed-position switching control (ABS mode)" is valid only when "Pr.1 Unit setting" is "2: degree".

| | | | | | |
|-----------------------------------|-------------------|----|------|--------|-----|
| Speed-position function selection | Pr.1 Unit setting | mm | inch | degree | PLS |
| | INC mode | ○ | ○ | ○ | ○ |
| | ABS mode | × | × | ○ | × |

○: Setting allowed,

×: Setting disallowed (If setting is made, an error (error code: 935) will occur when the PLC READY signal (Y0) turns ON.)

Use the detailed parameter 1 "Pr.200 Speed-position function selection" to choose "speed-position switching control (ABS mode)".

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.200 Speed-position function selection | 2 | Speed-position switching control (ABS mode) | 34 | 184 | 334 | 484 |

* If the set value is other than 0 and 2, it is regarded as 0 and operation is performed in the INC mode.

For details of the setting, refer to Sections 5.2 "List of parameters".

■ Switching over from speed control to position control

- (1) The control is switched over from speed control to position control by the external signal "speed-position switching signal".
- (2) Besides setting the positioning data, the "Cd.24 Speed-position switching enable flag" must also be turned ON to switch over from speed control to position control. (If the "Cd.24 Speed-position switching enable flag" turns ON after the speed-position switching signal turns ON, the control will continue as speed control without switching over to position control. Only position control will be carried out when the "Cd.24 Speed-position switching enable flag" and speed-position switching signal are ON at the operation start.)

■ Operation chart

The following chart (Fig.9.16) shows the operation timing for speed-position switching control (ABS mode). The "in speed control flag" ([Md.31] Status: b0) is turned ON during speed control of speed-position switching control (ABS mode).

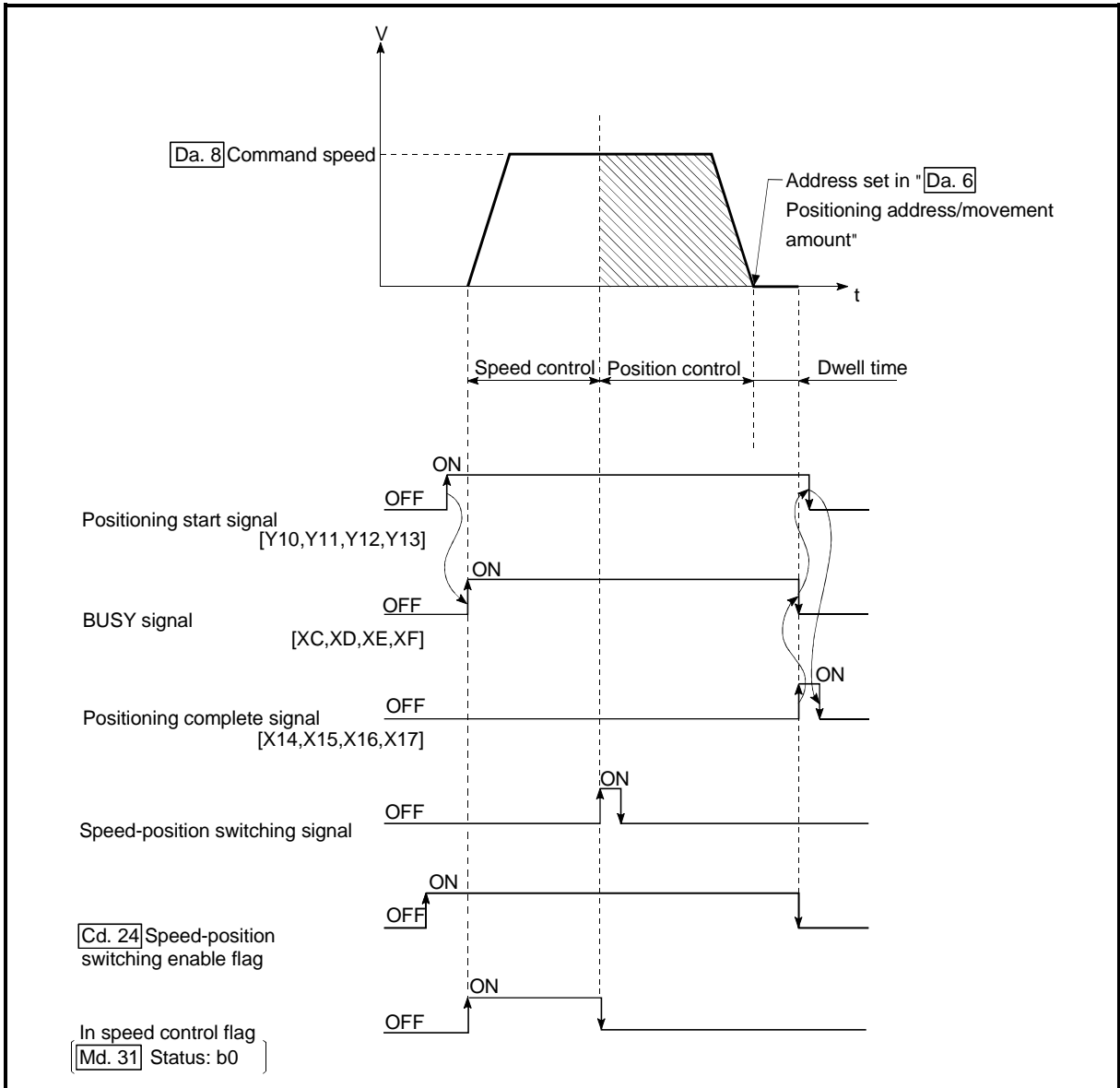
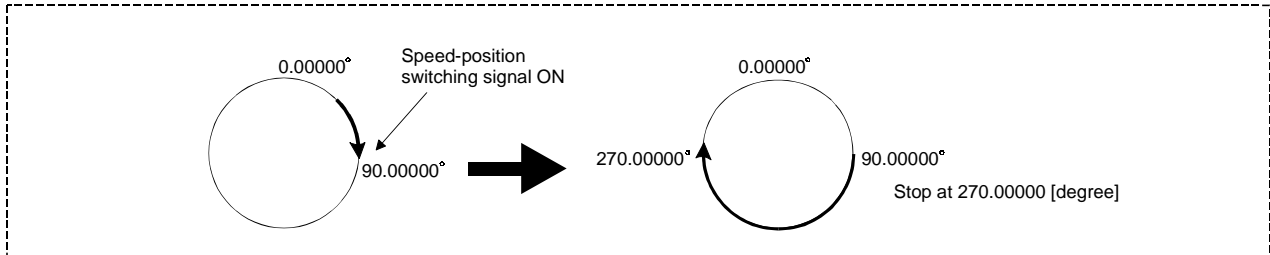


Fig. 9.16 Speed-position switching control (ABS mode) operation timing

[Operation example]

The following operation assumes that the speed-position switching signal is input at the position of the current feed value of 90.00000 [degree] during execution of "Da.2 Control system" "Forward run: speed/position" at "Pr.1 Unit setting" of "2: degree" and "Pr.21 Current feed value during speed control" setting of "1: Update current feed value".

(The value set in "Da.6 Positioning address/movement amount" is 270.00000 [degree])



■ Operation timing and processing time during speed-position switching control (ABS mode)

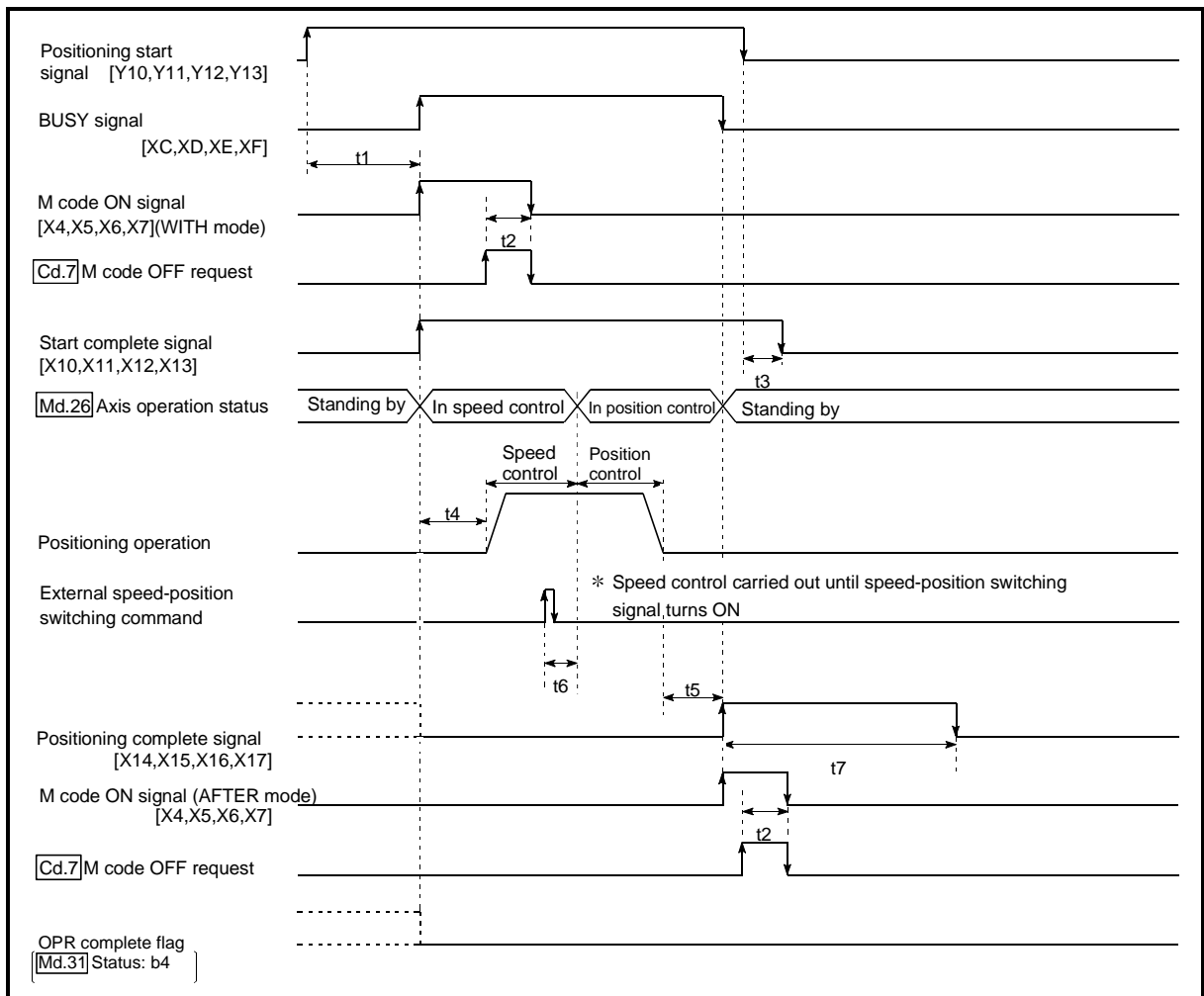


Fig. 9.17 Operation timing and processing time during speed-position switching control (ABS mode)

Normal timing time

Unit: ms

| t1 | t2 | t3 | t4 | t5 | t6 | t7 |
|-----|----------|----------|------------|----------|-----|--------------------|
| 1.1 | 0 to 3.5 | 0 to 3.5 | 5.5 to 7.9 | 0 to 3.5 | 1.0 | Follows parameters |

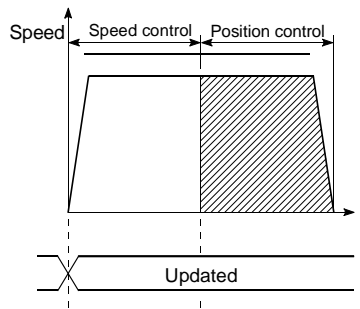
- The t1 timing time could be delayed by the operation state of other axes.

■ Current feed value during speed-position switching control (ABS mode)

The following table shows the "Md.20 Current feed value" during speed-position switching control (ABS mode) corresponding to the "Pr.21 Current feed value during speed control" settings.

| "Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|---|--|
| 1: Update current feed value | The current feed value is updated during speed control and position control. |

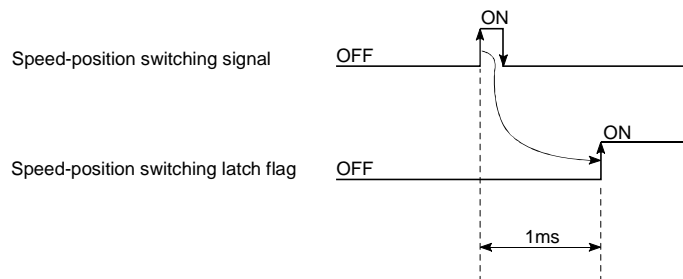
Only "1: Update current value" is valid for the setting of "Pr.21 Current feed value during speed control" in speed-position switching control (ABS mode).
 An error (error code: 935) will occur if the "Pr.21 Current feed value during speed control" setting is other than 1.



Current feed value updated

■ Switching time from speed control to position control

There is 1ms from the time the speed-position switching signal is turned ON to the time the speed-position switching latch flag (Md.31 Status: b1) turns ON.



■ Speed-position switching signal setting

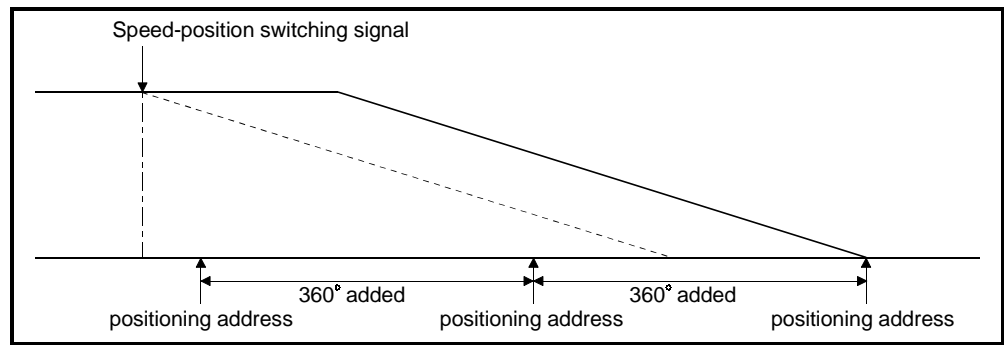
The following table shows the items that must be set to use the external command signals (CHG) as speed-position switching signals.

| Setting item | | Setting value | Setting details | Buffer memory address | | | |
|--------------|-------------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.42 | External command function selection | 2 | Set the "2: speed-position and position-speed switching requests". | 62 | 212 | 362 | 512 |
| Cd.8 | External command valid | 1 | Set "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Sections 5.2 "List of parameters" and Section 5.7 "List of control data" for information on the setting details.

■ Restrictions

- (1) An axis error (error code: 516) will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set in "Da.1" Operation pattern".
- (2) "Speed-position switching control" cannot be set in "Da.2" Control system" of the positioning data when "continuous path control" has been set in "Da.1" Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", "speed-position switching control" cannot be set in positioning data No. 2.) An axis error (error code: 516) will occur and the machine will carry out a deceleration stop if this type of setting is carried out.
- (3) An error (error code: 503) will occur if "current speed (-1)" is set in "Da.8" command speed".
- (4) If the value set in "Da.6" Positioning address/movement amount" is negative, an error (error code: 530) will occur.
- (5) Even though the axis control data "Cd.23" Speed-position switching control movement amount change register" was set in speed-position switching control (ABS mode), it would not function. The set value is ignored.
- (6) To exercise speed-position switching control (ABS mode), the following conditions must be satisfied:
 - (a) "Pr.1" Unit setting" is "2: degree"
 - (b) The software stroke limit function is invalid (upper limit value = lower limit value)
 - (c) "Pr.21" Current feed value during speed control" is "1: Update current feed value"
 - (d) The "Da.6" Positioning address/movement amount" setting range is 0 to 359.99999 (degree)
If the value is outside of the range 0 to 359.99999 (degree), an error (error code: 530) will occur at a start.
 - (e) The "Pr.200" Speed-position function selection" setting is "2: Speed-position switching control (ABS mode)".
- (7) If any of the conditions in (6)(a) to (6)(c) is not satisfied in the case of (6)(e), an error (error code: 935) will occur when the PLC READY signal [Y0] turns from OFF to ON.
- (8) If the axis reaches the positioning address midway through deceleration after automatic deceleration started at the input of the speed-position switching signal, the axis will not stop immediately at the positioning address. The axis will stop at the positioning address after N revolutions so that automatic deceleration can always be made. (N: Natural number)
In this case, make the movement amount after speed-position switching signal input within 21474.83647 (degree). If the movement amount exceeds 21474.83647 (degree), make the movement amount smaller by reducing the command speed or shortening the deceleration time, for example.
In the following example, since making deceleration in the path of dotted line will cause the axis to exceed the positioning addresses twice, the axis will decelerate to a stop at the third positioning address.



■ Positioning data setting examples

The following table shows setting examples when "speed-position switching control (ABS mode) by forward run" is set in positioning data No. 1 of axis 1.

| | | Setting item | Setting example | Setting details |
|-------------------------------|-------|-------------------------------------|-----------------------------|--|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | Set "Positioning complete" assuming the next positioning data will not be executed. ("Continuous path control" cannot be set in "speed-position switching control (ABS mode)".) |
| | Da.2 | Control system | Forward run: speed/position | Set speed-position switching control by forward run. |
| | Da.3 | Acceleration time No. | 1 | Designate the value set in " Pr.25 Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | Designate the value set in " Pr.10 Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | - | Setting not required. (Setting value is ignored.) |
| | Da.6 | Positioning address/movement amount | 270.00000 degree | ABS mode (Pr.200 = 2) Set the address after the switching to position control. (Assuming that the " Pr.1 Unit setting" is set to "mm".) |
| | Da.7 | Arc address | - | Setting not required. (Setting value is ignored.) |
| | Da.8 | Command speed | 6000.00mm/min | Set the speed to be controlled. |
| | Da.9 | Dwell time | 500ms | Set a time from the positioning stop (pulse output stop) by position control until the positioning complete signal is output. When the system is stopped by speed control, ignore the setting value. |
| | Da.10 | M code | 10 | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.18 Position-speed switching control

In "position-speed switching control" (" [Da.2] Control system" = Forward run: position/speed, Reverse run: position/speed), before the position-speed switching signal is input, position control is carried out for the movement amount set in " [Da.6] Positioning address/movement amount" in the axis direction in which the positioning data has been set. When the position-speed switching signal is input, the position control is carried out by continuously outputting the pulses for the speed set in " [Da.8] command speed" until the input of a stop command.

The two types of position-speed switching control are "Forward run: position/speed" in which the control starts in the forward run direction, and "Reverse run: position/speed" in which control starts in the reverse run direction.

■ Switching over from position control to speed control

- (1) The control is switched over from position control to speed control by the external signal "position-speed switching signal".
- (2) Besides setting the positioning data, the " [Cd.26] Position-speed switching enable flag" must also be turned ON to switch over from position control to speed control. (If the " [Cd.26] Position-speed switching enable flag" turns ON after the position-speed switching signal turns ON, the control will continue as position control without switching over to speed control. Only speed control will be carried out when the " [Cd.26] Position-speed switching enable flag" and position-speed switching signal are ON at the operation start.)

■ Operation chart

The following chart shows the operation timing for position-speed switching control.

The "in speed control" flag (**Md.31** Status: b0) is turned ON during speed control of position-speed switching control.

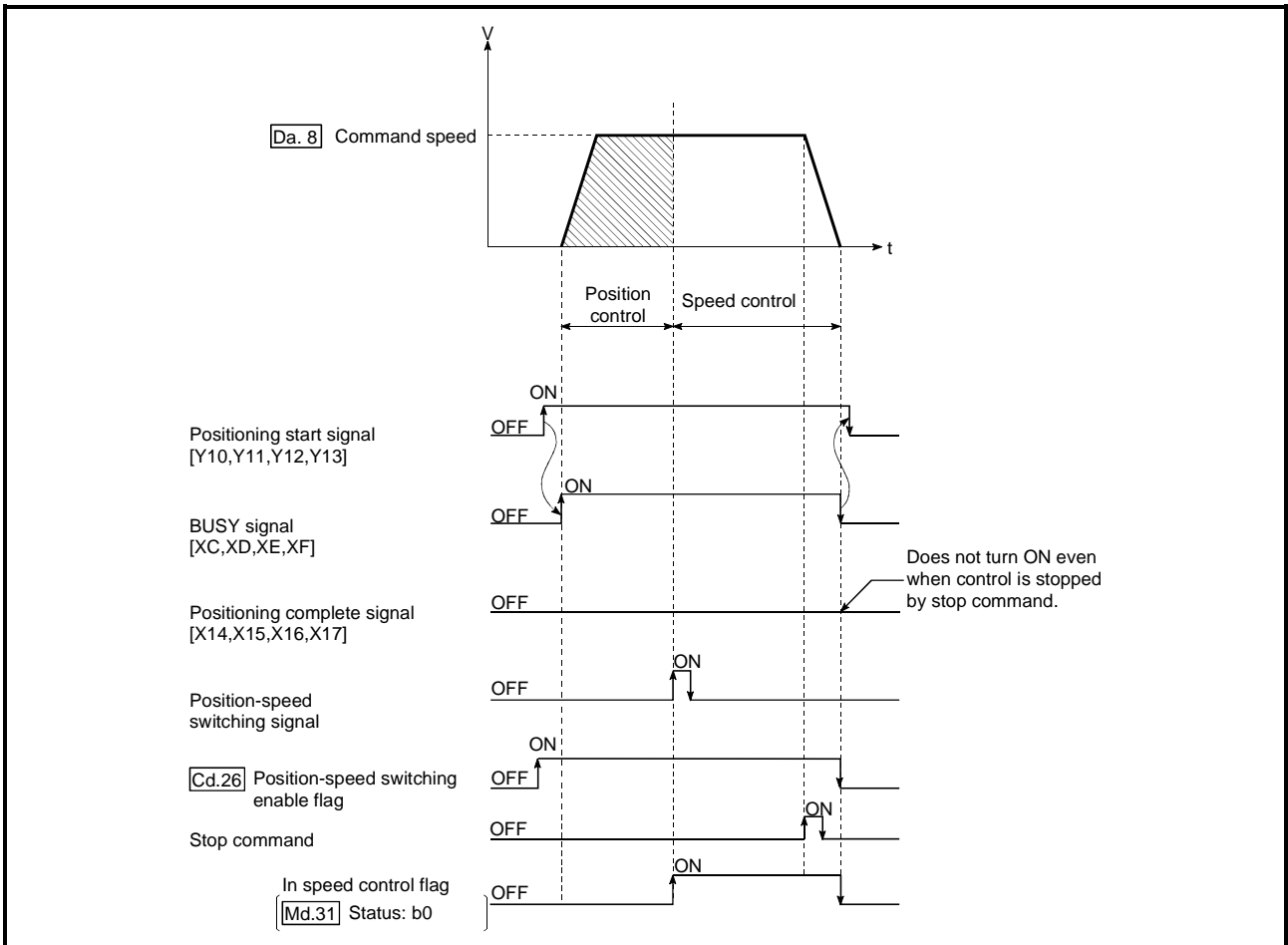


Fig. 9.18 Position-speed switching control operation timing

■ Operation timing and processing time during position-speed switching control

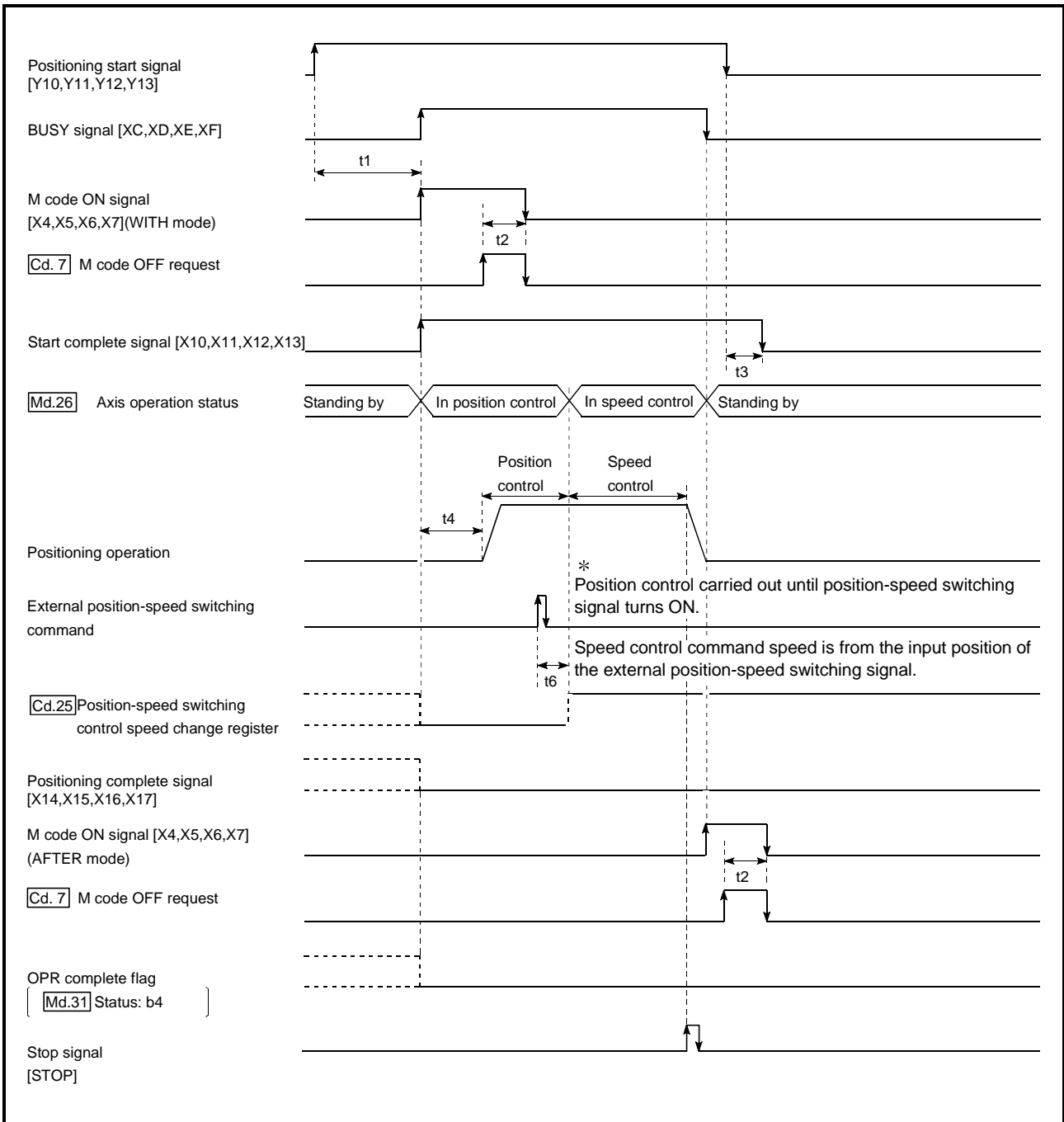


Fig. 9.19 Operation timing and processing time during position-speed switching control

Normal timing time

Unit: ms

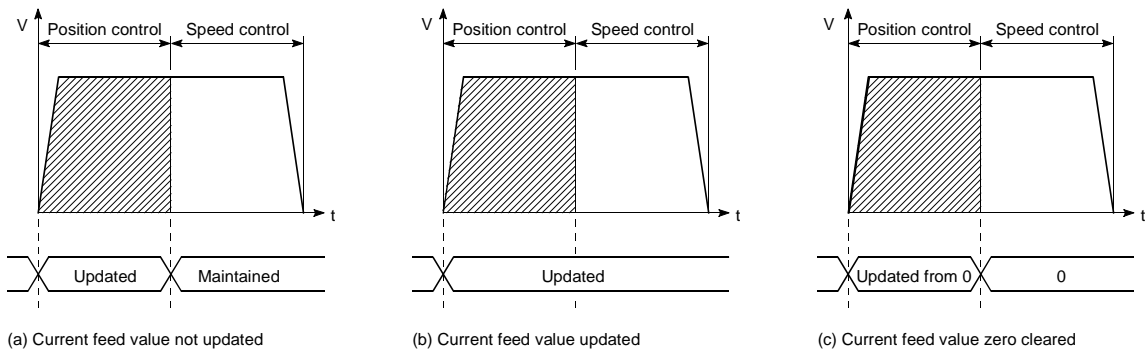
| t1 | t2 | t3 | t4 | t5 | t6 |
|------------|----------|----------|------------|----|-----|
| 1.0 to 1.4 | 0 to 3.5 | 0 to 3.5 | 5.5 to 7.9 | - | 1.0 |

- The t1 timing time could be delayed by the operation state of other axes.

■ Current feed value during position-speed switching control

The following table shows the "Md.20 Current feed value" during position-speed switching control corresponding to the "Pr.21 Current feed value during speed control" settings.

| "Pr.21 Current feed value during speed control" setting | Md.20 Current feed value |
|---|--|
| 0: Do not update current feed value | The current feed value is updated during position control, and the current feed value at the time of switching is maintained as soon as position control is switched to speed control. |
| 1: Update current feed value | The current feed value is updated during position control and speed control. |
| 2: Zero clear current feed value | The current feed value is updated from 0 at a control start, and the current feed value is cleared (to "0") as soon as position control is switched to speed control. |



■ Switching time from position control to speed control

There is 1ms from the time the position-speed switching signal is turned ON to the time the position-speed switching latch flag (Md.31 Status: b5) turns ON.



■ Position-speed switching signal setting

The following table shows the items that must be set to use the external command signals (CHG) as position-speed switching signals.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.42 External command function selection | 2 | Set the "2: speed-position and position-speed switching requests". | 62 | 212 | 362 | 512 |
| Cd.8 External command valid | 1 | Set "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Sections 5.2 "List of parameters" and Section 5.7 "List of control data" for information on the setting details.

■ Changing the speed control command speed

In "position-speed switching control", the speed control command speed can be changed during the position control.

- (1) The speed control command speed can be changed during the position control of position-speed switching control.
A command speed change request will be ignored unless issued during the position control of the position-speed switching control.
- (2) The "new command speed" is stored in " Cd.25 Position-speed switching control speed change register" by the PLC program during position control. This value then becomes the speed control command speed when the position-speed switching signal turns ON.

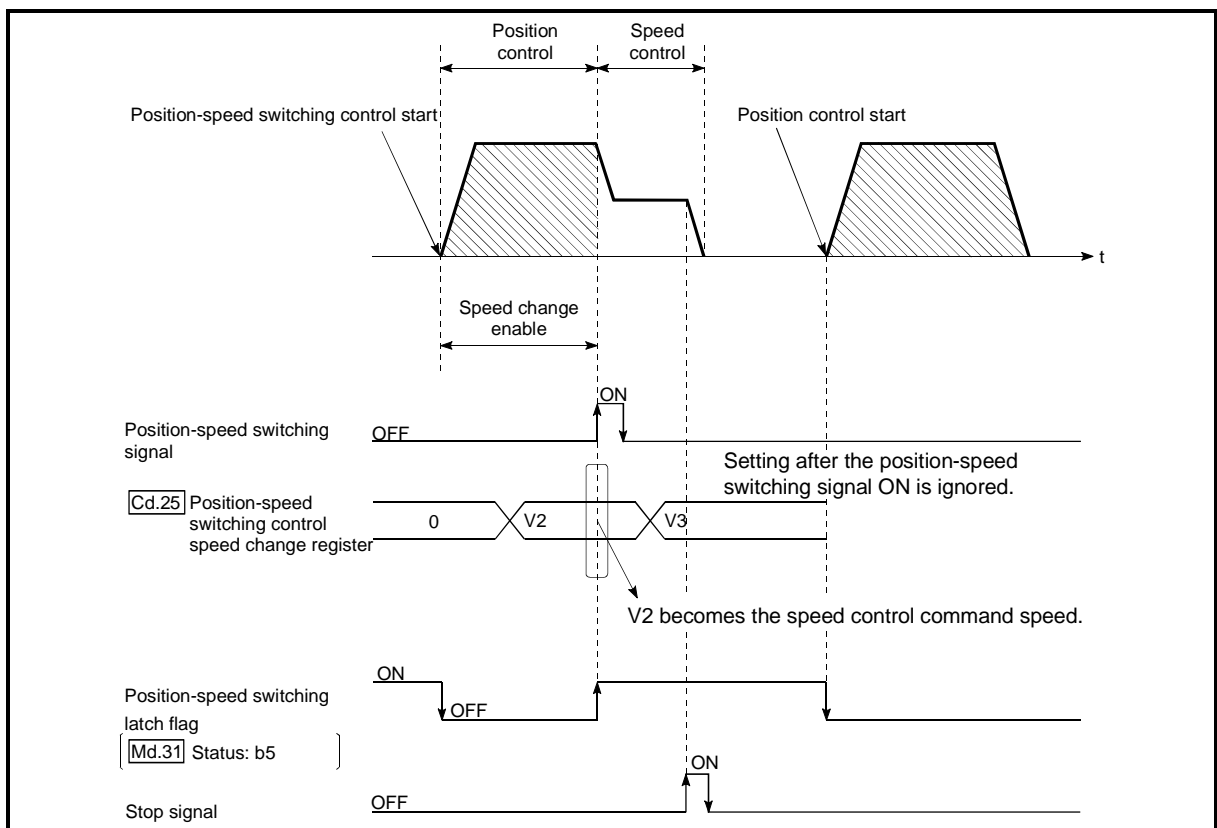


Fig. 9.20 Speed control speed change timing

POINTS

- The machine recognizes the presence of a command speed change request when the data is written to " [Cd.25] Position-speed switching control speed change register" with the PLC program.
- The new command speed is validated after execution of the position-speed switching control before the input of the position-speed switching signal.
- The command speed change can be enabled/disabled with the interlock function in speed control using the "position-speed switching latch flag" ([Md.31] Status: b5) of the axis monitor area.

■ Restrictions

- (1) An axis error (error code: 516) will occur and the operation cannot start if "continuous positioning control" or "continuous path control" is set in " [Da.1] Operation pattern".
- (2) "Position-speed switching control" cannot be set in " [Da.2] Control system" of the positioning data when "continuous path control" has been set in " [Da.1] Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", "position-speed switching control" cannot be set in positioning data No. 2.) An axis error (error code: 516) will occur and the machine will carry out a deceleration stop if this type of setting is carried out.
- (3) The software stroke limit range is only checked during speed control if the "1: Update current feed value" is set in " [Pr.21] Current feed value during speed control".
The software stroke limit range is not checked when the control unit is set to "degree".
- (4) An error (error code: 507 or 508) will occur and the operation cannot start if the start point address or end point address for position control exceeds the software stroke limit range.
- (5) Deceleration stop will be carried out if the position-speed switching signal is not input before the machine is moved by a specified movement amount.
When the position-speed switching signal is input during automatic deceleration by positioning control, acceleration is carried out again to the command speed to continue speed control.
When the position-speed switching signal is input during deceleration to a stop with the stop signal, the control is switched to the speed control to stop the machine.
Restart is carried out by speed control using the restart command.
- (6) A warning (warning code: 501) will occur and control is continued by " [Pr.8] Speed limit value" if a new speed exceeds " [Pr.8] Speed limit value" at the time of change of the command speed.
- (7) If the value set in " [Da.6] Positioning address/movement amount" is negative, an error (error code: 530) will occur.

■ Positioning data setting examples

The following table shows setting examples when "position-speed switching control (forward run: position/speed)" is set in positioning data No. 1 of axis 1.

| | | Setting item | Setting example | Setting details |
|-------------------------------|-------|-------------------------------------|-----------------------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | Positioning complete | Set "Positioning complete" assuming the next positioning data will not be executed. ("Continuous positioning control" and "Continuous path control" cannot be set in "position/speed changeover control".) |
| | Da.2 | Control system | Forward run: position/speed | Set position-speed switching control. |
| | Da.3 | Acceleration time No. | 1 | Designate the value set in " [Pr.25] Acceleration time 1" as the acceleration time at start. |
| | Da.4 | Deceleration time No. | 0 | Designate the value set in " [Pr.10] Deceleration time 0" as the deceleration time at deceleration. |
| | Da.5 | Axis to be interpolated | – | Setting not required. (Setting value is ignored.) |
| | Da.6 | Positioning address/movement amount | 10000.0μm | Set the movement amount at the time of position control before the switching to speed control. (Assuming that the " [Pr.1] Unit setting" is set to "mm".) |
| | Da.7 | Arc address | – | Setting not required. (Setting value is ignored.) |
| | Da.8 | Command speed | 6000.00mm/min | Set the speed to be controlled. |
| | Da.9 | Dwell time | 500ms | Set the time the machine dwells after the positioning stop (pulse output stop) by position control to the output of the positioning complete signal. If the machine is stopped by speed control, the setting value will be ignored. |
| | Da.10 | M code | 10 | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.19 Current value changing

When the current value is changed to a new value, control is carried out in which the "Md.20 Current feed value" of the stopped axis is changed to a random address set by the user. (The "Md.21 Machine feed value" is not changed when the current value is changed.)

The two methods for changing the current value are shown below.

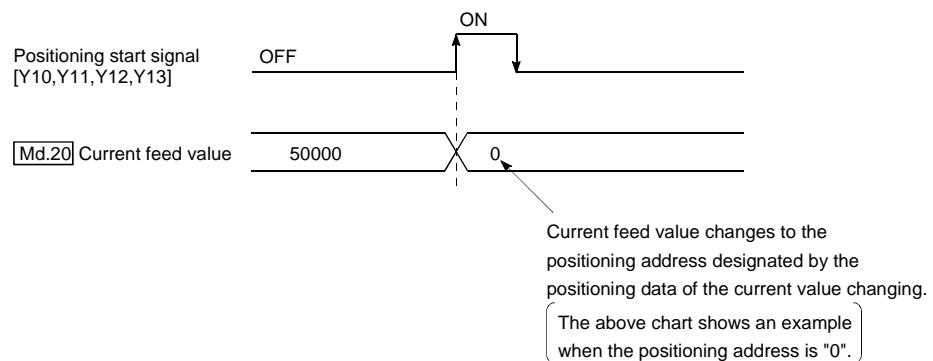
- [1] Changing to a new current value using the positioning data
- [2] Changing to a new current value using the start No. (No. 9003) for a current value changing

The current value changing using method [1] is used during continuous positioning of multiple blocks, etc.

[1] Changing to a new current value using the positioning data

■ Operation chart

The following chart shows the operation timing for a current value changing. The "Md.20 Current feed value" is changed to the value set in "Da.6 Positioning address/movement amount" when the positioning start signal turns ON.



■ Restrictions

- (1) An axis error "New current value not possible (error code: 515)" will occur and the operation cannot start if "continuous path control" is set in "Da.1 Operation pattern". ("Continuous path control" cannot be set in current value changing.)
- (2) "Current value changing" cannot be set in "Da.2 Control system" of the positioning data when "continuous path control" has been set in "Da.1 Operation pattern" of the immediately prior positioning data. (For example, if the operation pattern of positioning data No. 1 is "continuous path control", "current value changing" cannot be set in positioning data No. 2.) An axis error "New current value invalid (error code: 515)" will occur and the machine will carry out a deceleration stop if this type of setting is carried out.
- (3) An axis error "Outside new current value range (error code: 514)" will occur and the operation cannot start if "degree" is set in "Pr.1 Unit setting" and the value set in "Da.6 Positioning address/movement amount (0 to 359.99999 [degree])" is outside the setting range.

- (4) If the value set in " [Da.6] Positioning address/movement amount" is outside the software stroke limit ([Pr.12] , [Pr.13]) setting range, an error "Software stroke limit +, - (error code: 507 or 508)" will occur at the positioning start, and the operation will not start.
- (5) An error (error code: 507 or 508) will occur if the new current value is outside the software stroke limit range.

■ Positioning data setting examples

The following table shows the setting examples when " current value changing" is set in the positioning data No. 1 of axis 1.

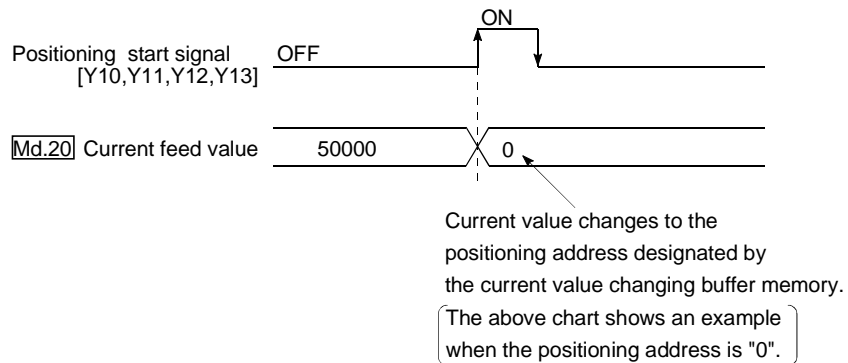
| Setting item | | Setting example | Setting details | |
|-------------------------------------|---------|-------------------------------------|------------------------|---|
| Axis 1 positioning data No. 1 | [Da.1] | Operation pattern | Positioning complete | Set "Positioning complete" assuming that the next positioning data will be executed. ("Continuous path control" cannot be set by current value change.) |
| | [Da.2] | Control system | Current value changing | Set the current value changing. |
| | [Da.3] | Acceleration time No. | - | Setting not required (Setting value is ignored.) |
| | [Da.4] | Deceleration time No. | - | Setting not required (Setting value is ignored.) |
| | [Da.5] | Axis to be interpolated | - | Setting not required (Setting value is ignored.) |
| | [Da.6] | Positioning address/movement amount | 10000.0 μ m | Set the address to which address change is desired. (Assuming that the " [Pr.1] Unit setting" is set to "mm".) |
| | [Da.7] | Arc address | - | Setting not required (Setting value is ignored.) |
| | [Da.8] | Command speed | - | Setting not required (Setting value is ignored.) |
| | [Da.9] | Dwell time | - | Setting not required (Setting value is ignored.) |
| | [Da.10] | M code | 10 | Set this when other sub operation commands are issued in combination with the No. 1 positioning data. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

[2] Changing to a new current value using the start No. (No. 9003) for a current value changing

■ Operation chart

The current value is changed by setting the new current value in the current value changing buffer memory "Cd.9 Current value changing", setting "9003" in the "Cd.3 Positioning start No.", and turning ON the positioning start signal.

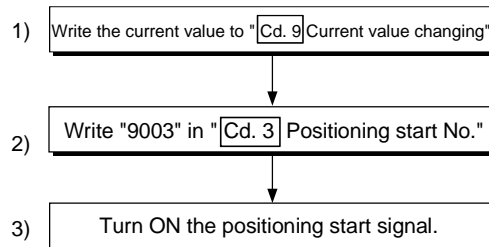


■ Restrictions

- (1) An axis error "Outside new current value range (error code: 514)" will occur if the designated value is outside the setting range when "degree" is set in "Unit setting".
- (2) An error "Software stroke limit +, - (error code: 507 or 508)" will occur if the designated value is outside the software stroke limit range.
- (3) The current value cannot be changed during stop commands and while the M code ON signal is ON.
- (4) The M code output function is made invalid.

■ Current value changing procedure

The following shows the procedure for changing the current value to a new value.



■ Setting method for the current value changing function

The following shows an example of a PLC program and data setting to change the current value to a new value with the positioning start signal. (The "Md.20" Current feed value is changed to "5000.0μm" in the example shown.)

- (1) Set the following data.
(Set with the PLC program shown in (3), while referring to the start time chart shown in (2).)

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------|------------------------|-----------------|---|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.3 | Positioning start No. | 9003 | Set the start No. "9003" for the new current value. | | | |
| Cd.9 | Current value changing | 50000 | Set the new "Md.20" Current feed value". | | | |
| | | | 1506 | 1606 | 1706 | 1806 |
| | | | 1507 | 1607 | 1707 | 1807 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

- (2) The following shows a start time chart.

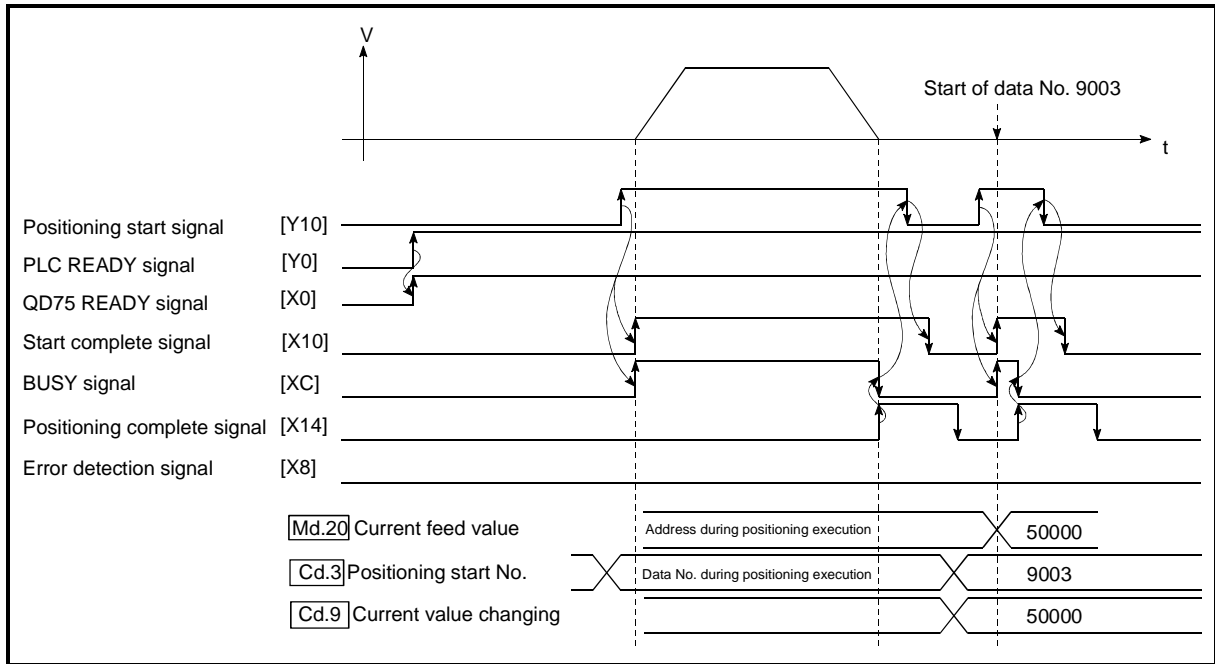
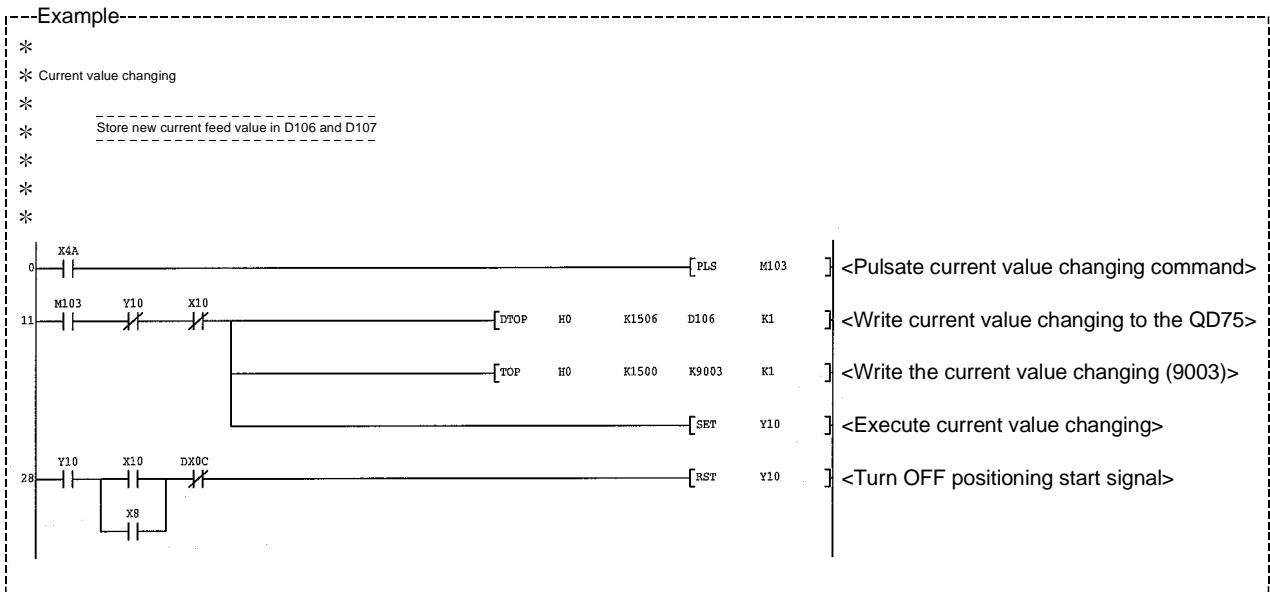


Fig. 9.21 Changing to a new current value using the start No. (No. 9003) for a current value changing

(3) Add the following PLC program to the control program, and write it to the PLC CPU.



9.2.20 NOP instruction

The NOP instruction is used for the nonexecutable control system.

■ Operation

The positioning data No. to which the NOP instruction is set transfers, without any processing, to the operation for the next positioning data No.

■ Positioning data setting examples

The following table shows the setting examples when "NOP instruction" is set in positioning data No. 1 of axis 1.

| Setting item | | Setting example | Setting details | |
|-------------------------------------|-------|-------------------------------------|-----------------|--|
| Axis 1 positioning data No. 1 | Da.1 | Operation pattern | - | Setting not required (Setting value is ignored.) |
| | Da.2 | Control system | NOP instruction | Set the NOP instruction |
| | Da.3 | Acceleration time No. | - | Setting not required (Setting value is ignored.) |
| | Da.4 | Deceleration time No. | - | Setting not required (Setting value is ignored.) |
| | Da.5 | Axis to be interpolated | - | Setting not required (Setting value is ignored.) |
| | Da.6 | Positioning address/movement amount | - | Setting not required (Setting value is ignored.) |
| | Da.7 | Arc address | - | Setting not required (Setting value is ignored.) |
| | Da.8 | Command speed | - | Setting not required (Setting value is ignored.) |
| | Da.9 | Dwell time | - | Setting not required (Setting value is ignored.) |
| | Da.10 | M code | - | Setting not required (Setting value is ignored.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

■ Restrictions

An error "Control system setting error (error code: 524)" will occur if the "NOP instruction" is set for the control system of the positioning data No. 600.

| |
|---|
| POINT |
| <p><Use example of NOP instruction></p> <p>If there is a possibility of speed switching or temporary stop (automatic deceleration) at a point between two points during positioning, that data can be reserved with the NOP instruction to change the data merely by the replacement of the identifier.</p> |

9.2.21 JUMP instruction

The JUMP instruction is used to control the operation so it jumps to a positioning data No. set in the positioning data during "continuous positioning control" or "continuous path control".

JUMP instruction include the following two types of JUMP.

(1) Unconditional JUMP

When no execution conditions are set for the JUMP instruction
(When "0" is set as the condition data No.)

(2) Conditional JUMP

When execution conditions are set for the JUMP instruction
(The conditions are set in the "condition data" used with "high-level positioning control".)

Using the JUMP instruction enables repeating of the same positioning control, or selection of positioning data by the execution conditions during "continuous positioning control" or "continuous path control".

■ Operation

(1) Unconditional JUMP

The JUMP instruction is unconditionally executed. The operation jumps to the positioning data No. set in "Da.9 Dwell time".

(2) Conditional JUMP

The block start condition data is used as the JUMP instruction execution conditions.

- When block positioning data No. 7000 to 7004 is started:
Each block condition data is used.
- When positioning data No. 1 to 600 is started:
Start block 0 condition data is used.
- When the execution conditions set in "Da.10 M code" of the JUMP instruction have been established:
the JUMP instruction is executed to jump the operation to the positioning data No. set in "Da.9 Dwell time".
- When the execution conditions set in "Da.10 M code" of the JUMP instruction have not been established:
the JUMP instruction is ignored, and the next positioning data No. is executed.

■ Restrictions

(1) When using a conditional JUMP instruction, establish the JUMP instruction execution conditions by the 4th positioning data No. before the JUMP instruction positioning data No..

If the JUMP instruction execution conditions are not established by the time the 4th positioning control is carried out before the JUMP instruction positioning data No., the operation will be processed as an operation without established JUMP instruction execution conditions.

(During execution of continuous path control/continuous positioning control, the QD75 calculates the positioning data of the positioning data No. four items ahead of the current positioning data.)

- (2) The operation pattern, if set, is ignored in the JUMP instruction.
- (3) Use unconditional JUMP instructions when setting JUMP instructions at the end of continuous path control/continuous positioning control.
When conditional JUMP instructions are set at the end of continuous path control/continuous positioning control, the positioning data of the next positioning data No. will be executed if the execution conditions have not been established.
- (4) Positioning control such as loops cannot be executed by conditional JUMP instructions alone until the conditions have been established.

■ Positioning data setting example

The following table shows setting examples when "JUMP instruction" is set in positioning data No. 1 of axis 1.

| | | Setting item | Setting example | Setting details |
|-------------------------------|-------|-------------------------------------|------------------|--|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | – | Setting not required. (Setting value is ignored.) |
| | Da.2 | Control system | JUMP instruction | Set the JUMP instruction. |
| | Da.3 | Acceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.4 | Deceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.5 | Axis to be interpolated | – | Setting not required. (Setting value is ignored.) |
| | Da.6 | Positioning address/movement amount | – | Setting not required. (Setting value is ignored.) |
| | Da.7 | Arc address | – | Setting not required. (Setting value is ignored.) |
| | Da.8 | Command speed | – | Setting not required. (Setting value is ignored.) |
| | Da.9 | Dwell time | 500 | Set the positioning data No. 1 to 600 for the JUMP destination. (The positioning data No. of the JUMP instruction cannot be set. Setting its own positioning data No. will result in an error "Illegal data No." (error code: 502).) |
| | Da.10 | M code | 1 | Set the JUMP instruction execution conditions with the condition data No. 0 : Unconditional JUMP 1 to 10 : Condition data No. ("Simultaneous start" condition data cannot be set.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

9.2.22 LOOP

The LOOP is used for loop control by the repetition of LOOP to LEND.

■ Operation

The LOOP to LEND loop is repeated by set repeat cycles.

■ Positioning data setting examples

The following table shows the setting examples when "LOOP" is set in positioning data No. 1 of axis 1.

| Setting item | | Setting example | Setting details | |
|-------------------------------|-------|---|-----------------|---|
| Axis 1 Positioning data No. 1 | Da.1 | Operation pattern | – | Setting not required. (Setting value is ignored.) |
| | Da.2 | Control system | LOOP | Set the LOOP. |
| | Da.3 | Acceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.4 | Deceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.5 | Axis to be interpolated | – | Setting not required. (Setting value is ignored.) |
| | Da.6 | Positioning address/ movement amount | – | Setting not required. (Setting value is ignored.) |
| | Da.7 | Arc address | – | Setting not required. (Setting value is ignored.) |
| | Da.8 | Command speed | – | Setting not required. (Setting value is ignored.) |
| | Da.9 | Dwell time | – | Setting not required. (Setting value is ignored.) |
| | Da.10 | M code | 5 | Set the LOOP to LEND repeat cycles. |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

■ Restrictions

- (1) An error "Control system LOOP setting error (error code: 545)" will occur if a "0" is set for the repeat cycles.
- (2) Even if LEND is absent after LOOP, no error will occur, but repeat processing will not be carried out.
- (3) Nesting is not allowed between LOOP-LEND's. If such setting is made, only the inner LOOP-LEND is processed repeatedly.

| |
|---|
| POINT |
| <p>The setting by this control system is easier than that by the special start "FOR loop" of "High-level Positioning Control" (refer to Chapter 10).</p> <p><Setting data></p> <ul style="list-style-type: none"> • For special start: Positioning start data, special start data, condition data, and positioning data • For control system : Positioning data <p>For the special start FOR to NEXT, the positioning data is required for each of FOR and NEXT points. For the control system, loop can be executed even only by one data.</p> <p>Also, nesting is enabled by using the control system LOOP to LEND in combination with the special start FOR to NEXT.</p> <p>However LOOP to LEND cannot be set across block. Always set LOOP to LEND so that the processing ends within one block.</p> <p>(For details of the "block", refer to Section 10.1 "Outline of high-level positioning control".)</p> |

9.2.23 LEND

The LEND is used to return the operation to the top of the repeat (LOOP to LEND) loop.

■ Operation

When the repeat cycle designated by the LOOP becomes 0, the loop is terminated, and the next positioning data No. processing is started. (The operation pattern, if set to "Positioning complete", will be ignored.)

When the operation is stopped after the repeat operation is executed by designated cycles, the dummy positioning data (for example, incremental positioning without movement amount) is set next to LEND.

| Positioning data No. | Operation pattern | Control system | Conditions | Operation |
|----------------------|-------------------------|----------------|--------------------------|--|
| 1 | Continuous control | ABS2 | | Executed in the order of the positioning data No. 1 → 2 → 3 → 4 → 5 → 2 → 3 → 4 → 5 → 6. (The operation patterns of the positioning data Nos. 2 and 5 are ignored.) |
| 2 | Positioning complete | LOOP | Number of loop cycles: 2 | |
| 3 | Continuous path control | ABS2 | | |
| 4 | Continuous control | ABS2 | | |
| 5 | Positioning complete | LEND | | |
| 6 | Positioning complete | ABS2 | | |

■ Positioning data setting examples

The following table shows the setting examples when "LEND" is set in positioning data No. 8 of axis 1.

| | Setting item | Setting example | Setting details |
|-------------------------------|--|-----------------|---|
| Axis 1 Positioning data No. 8 | Da.1 Operation pattern | – | Setting not required. (Setting value is ignored.) |
| | Da.2 Control system | LEND | Set the LEND. |
| | Da.3 Acceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.4 Deceleration time No. | – | Setting not required. (Setting value is ignored.) |
| | Da.5 Axis to be interpolated | – | Setting not required. (Setting value is ignored.) |
| | Da.6 Positioning address/movement amount | – | Setting not required. (Setting value is ignored.) |
| | Da.7 Arc address | – | Setting not required. (Setting value is ignored.) |
| | Da.8 Command speed | – | Setting not required. (Setting value is ignored.) |
| | Da.9 Dwell time | – | Setting not required. (Setting value is ignored.) |
| | Da.10 M code | – | Setting not required. (Setting value is ignored.) |

* Refer to Section 5.3 "List of positioning data" for information on the setting details.

■ Restrictions

- (1) Ignore the "LEND" before the "LOOP" is executed.

Chapter 10 High-Level Positioning Control

The details and usage of high-level positioning control (control functions using the "block start data") are explained in this chapter.

High-level positioning control is used to carry out applied control using the "positioning data". Examples of applied control are using conditional judgment to control "positioning data" set with the major positioning control, or simultaneously starting "positioning data" for several different axes.

Read the execution procedures and settings for each control, and set as required.

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 - 10.1.1 Data required for high-level positioning control..... 10- 3
 - 10.1.2 "Block start data" and "condition data" configuration 10- 4
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10.1 Outline of high-level positioning control

In "high-level positioning control" the execution order and execution conditions of the "positioning data" are set to carry out more applied positioning. (The execution order and execution conditions are set in the "block start data" and "condition data".) The following applied positioning controls can be carried out with "high-level positioning control".

| High-level positioning control | Details |
|--------------------------------|--|
| Block *1 start (Normal start) | With one start, executes the positioning data in a random block with the set order. |
| Condition start | Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". <ul style="list-style-type: none"> • When the condition is established, the "block start data" is executed. • When not established, that "block start data" is ignored, and the next point's "block start data" is executed. |
| Wait start | Carries out condition judgment set in the "condition data" for the designated positioning data, and then executes the "block start data". <ul style="list-style-type: none"> • When the condition is established, the "block start data" is executed. • When not established, stops the control until the condition is established. (Waits.) |
| Simultaneous start *2 | Simultaneously executes the positioning data having the No. for the axis designated with the "condition data". (Outputs pulses at the same timing.) |
| Repeated start (FOR loop) | Repeats the program from the "block start data" set with the "FOR loop" to the "block start data" set in "NEXT" for the designated No. of times. |
| Repeated start (FOR condition) | Repeats the program from the "block start data" set with the "FOR condition" to the "block start data" set in "NEXT" until the conditions set in the "condition data" are established. |

■ High-level positioning control sub functions

"High-level positioning control" uses the "positioning data" set with the "major positioning control". Refer to Section 3.2.4 "Combination of QD75 main functions and sub functions" for details on sub functions that can be combined with the major positioning control.

Note that the sub function Section 12.7.8 "Pre-reading start function" cannot be used together with "high-level positioning control".

■ High-level positioning control from peripheral devices

"High-level positioning control" (start of the "block start data") can be executed from GX Configurator-QP test mode.

Refer to GX Configurator-QP Operating Manual for details on starting of the "block start data" from GX Configurator-QP.

REMARK

Block *1:

"1 block" is defined as all the data continuing from the positioning data in which "continuous positioning control" or "continuous path control" is set in the operation pattern ([Da.1]) to the positioning data in which "independent positioning control (Positioning complete)" is set.

Simultaneous start *2:

Besides the simultaneous start of "block start data" system, the "simultaneous starts" include the "multiple axes simultaneous start control" of control system. Refer to Section 10.5 "Multiple axis simultaneous start control" for details.

10.1.1 Data required for high-level positioning control

"High-level positioning control" is executed by setting the required items in the "block start data" and "condition data", then starting that "block start data". Judgment about whether execution is possible, etc., is carried out at execution using the "condition data" designated in the "block start data".

"Block start data" can be set for each No. from 7000 to 7004 (called "block Nos."), and up to 50 points can be set for each axis. (This data is controlled with Nos. called "points" to distinguish it from the positioning data. For example, the 1st block start data item is called the "1st point block start data" or "point No. 1 block start data".)

"Condition data" can be set for each No. from 7000 to 7004 (called "block Nos."), and up to 10 data items can be set for each axis.

The "block start data" and "condition data" are set as 1 set for each block No.

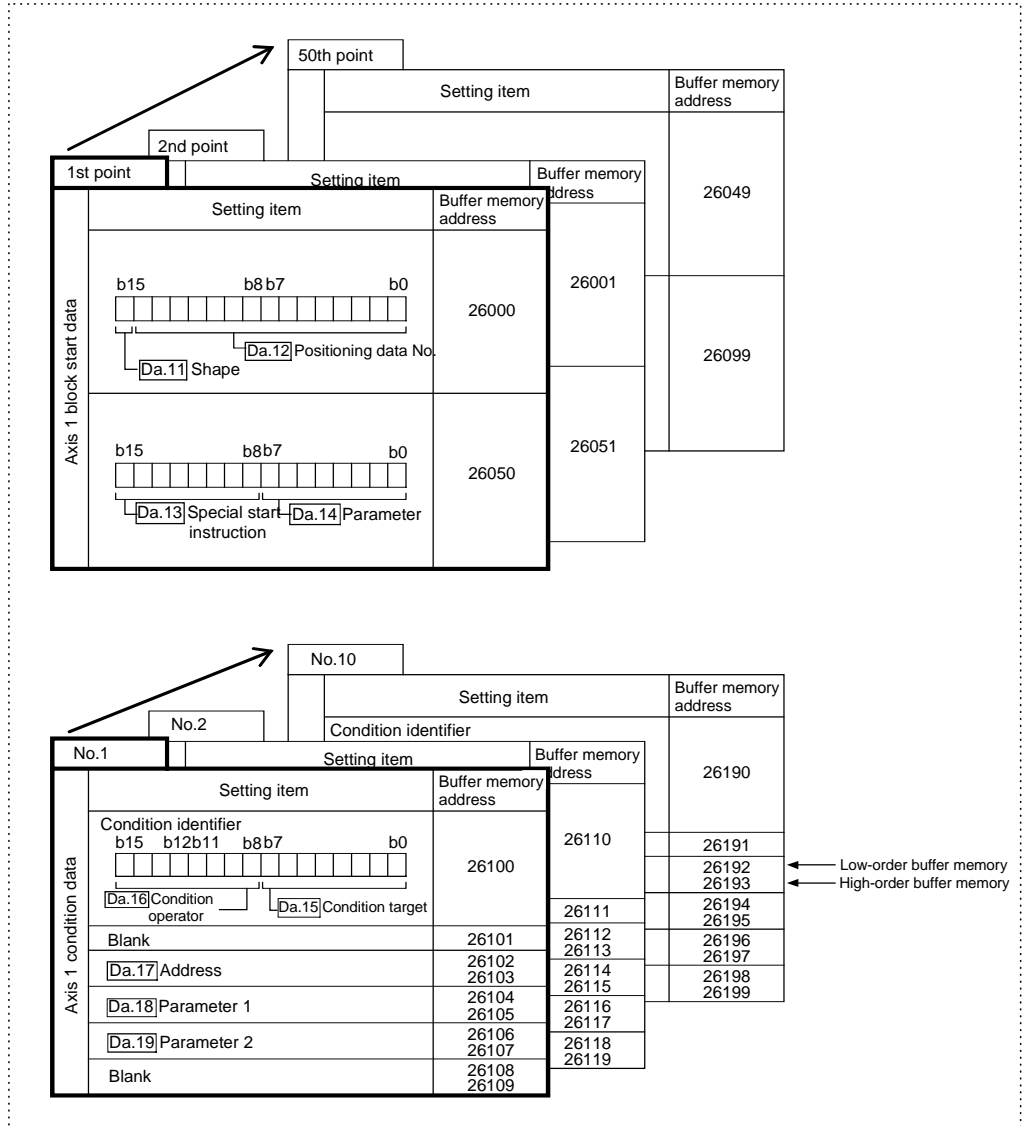
The following table shows an outline of the "block start data" and "condition data" stored in the QD75.

| Setting item | | Setting details | |
|------------------|-------|---------------------------|---|
| Block start data | Da.11 | Shape | Set whether to end the control after executing only the "block start data" of the shape itself, or continue executing the "block start data" set in the next point. |
| | Da.12 | Start data No. | Set the "positioning data No." to be executed. |
| | Da.13 | Special start instruction | Set the method by which the positioning data set in Da.12 will be started. |
| | Da.14 | Parameter | Set the conditions by which the start will be executed according to the commands set in Da.13. (Designate the "condition data No." and "No. of repetitions".) |

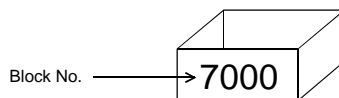
| Setting item | | Setting details | |
|----------------|-------|--------------------|--|
| Condition data | Da.15 | Condition target | Designate the "device", "buffer memory storage details", and "positioning data No." elements for which the conditions are set. |
| | Da.16 | Condition operator | Set the judgment method carried out for the target set in Da.15. |
| | Da.17 | Address | Set the buffer memory address in which condition judgment is carried out (only when the details set in Da.15 are "buffer memory storage details"). |
| | Da.18 | Parameter 1 | Set the required conditions according to the details set in Da.15 and Da.16. |
| | Da.19 | Parameter 2 | Set the required conditions according to the details set in Da.15 and Da.16. |

10.1.2 "Block start data" and "condition data" configuration

The "block start data" and "condition data" corresponding to "block No. 7000" can be stored in the buffer memory. (The following drawing shows an example for axis 1.)

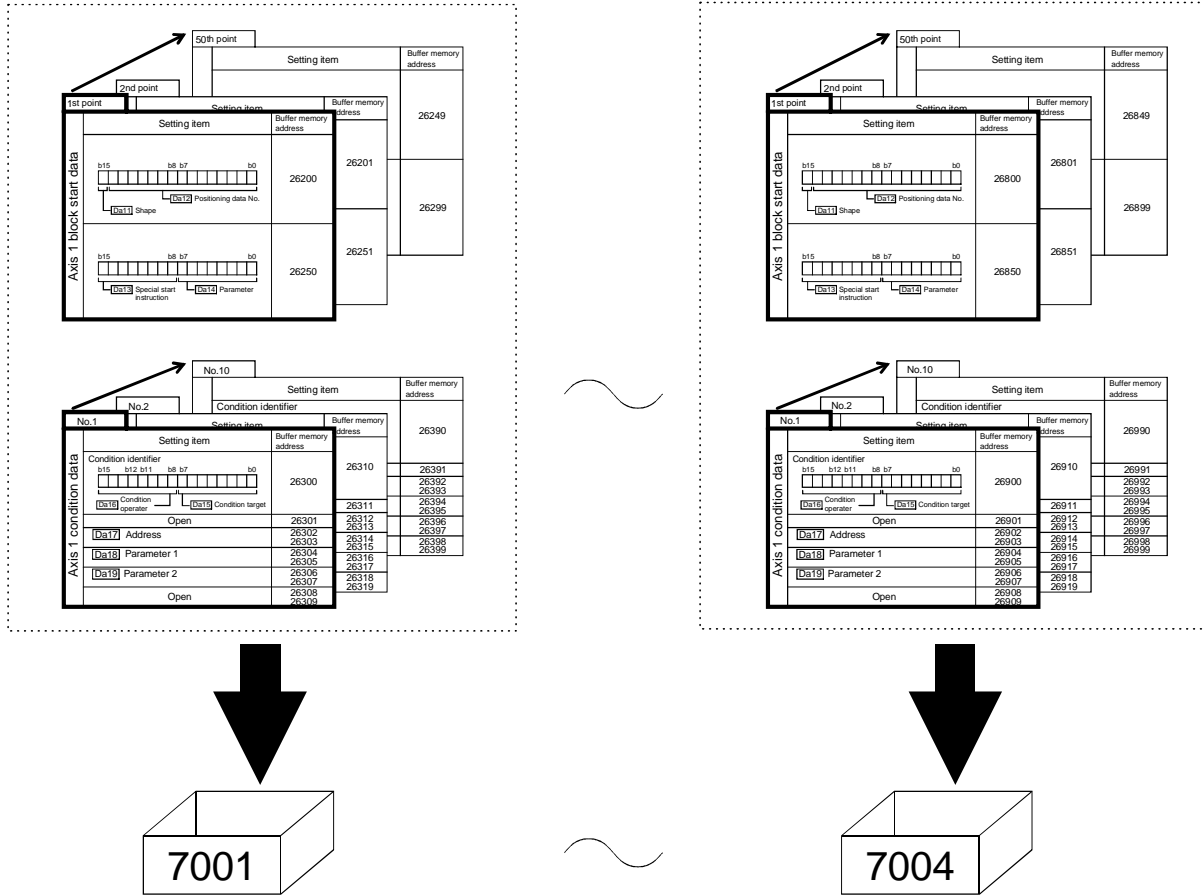


(Same for axis 2, axis 3 and axis 4.)



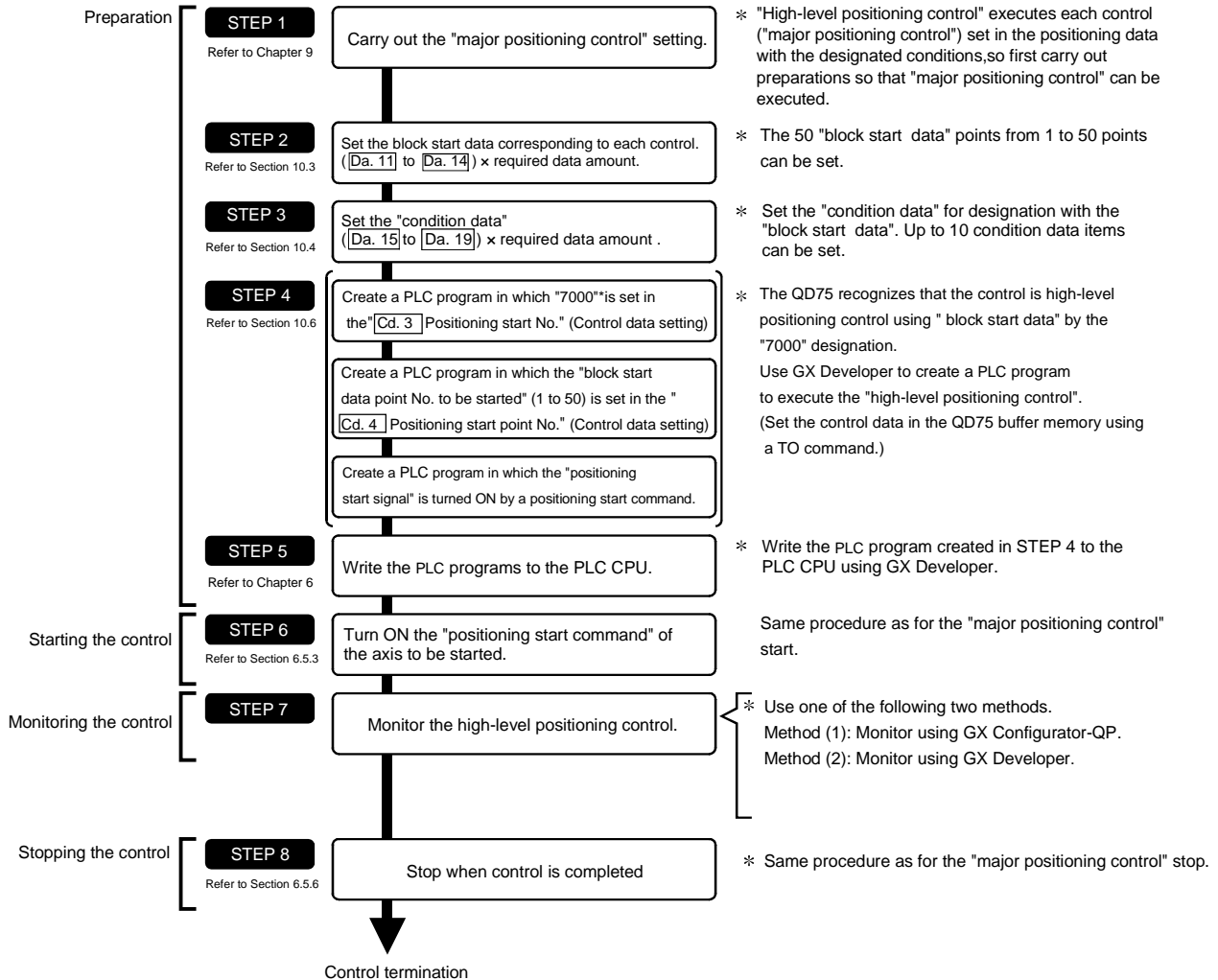
* Set in the QD75 with a PLC program or GX Configurator-QP.

Set in QD75 the "block start data" and "condition data" corresponding to the following "block Nos. 7001 to 7004" using GX Configurator-QP or the PLC program. (The following drawing shows an example for axis 1.)



10.2 High-level positioning control execution procedure

High-level positioning control is carried out using the following procedure.



REMARK

- * (1) Five sets of "block start data (50 points)" and "condition data (10 items)" corresponding to "7000" to "7004" are set with a PLC program.
- (2) Five sets of data from "7000" to "7004" can be set when GX Configurator-QP is used. If GX Configurator-QP is used to set the "block start data" and "condition data" corresponding to "7001" to "7004" and write the data to the QD75, "7001" to "7004" can be set in "Cd.3 Positioning start No." in STEP 4.

10.3 Setting the block start data

10.3.1 Relation between various controls and block start data

The " block start data" must be set to carry out "high-level positioning control". The setting requirements and details of each " block start data" item to be set differ according to the " Da.13 Special start instruction" setting.

The following shows the " block start data" setting items corresponding to various control systems. The operation details of each control type are explained starting in section 10.3.2. Also refer to section "10.4 Setting the condition data" for details on "condition data" with which control execution is judged.

(The " block start data" settings in this chapter are assumed to be carried out using GX Configurator-QP.)

| High-level positioning control | | Block start (Normal start) | Condition start | Wait start | Simultaneous start | Repeated start (FOR loop) | Repeated start (FOR condition) | NEXT start * |
|--------------------------------|---------------------------|----------------------------|--------------------|------------|--------------------|---------------------------|--------------------------------|--------------|
| Da.11 | Shape | 0 : End | ⊙ | ⊙ | ⊙ | × | × | ⊙ |
| | | 1 : Continue | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ | ⊙ |
| Da.12 | Start data No. | 1 to 600 | | | | | | |
| Da.13 | Special start instruction | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Da.14 | Parameter | – | Condition data No. | | | No. of repetitions | Condition data No. | – |

- ⊙ : One of the two setting items must be set.
- : Set when required (Set to " – " when not used.)
- × : Setting not possible
- : Setting not required (Setting value will be ignored. Use the initial value or a value within the setting range.)

* The "NEXT start" instruction is used in combination with "repeated start (FOR loop)" and "repeated start (FOR condition)". Control using only the "NEXT start" will not be carried out.

REMARK

It is recommended that the "block start data" be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

10.3.2 Block start (normal start)

In a "block start (normal start)", the positioning data groups of a block are continuously executed in a set PLC starting from the positioning data set in "Da.12 Start data No." by one start.

Section [2] shows a control example where the "block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | Da.11 Shape | Da.12 Start data No. | Da.13 Special start instruction | Da.14 Parameter |
|-------------------------|----------------|-------------------------|------------------------------------|--------------------|
| 1st point | 1: Continue | 1 | 0: Block start | — |
| 2nd point | 1: Continue | 2 | 0: Block start | — |
| 3rd point | 1: Continue | 5 | 0: Block start | — |
| 4th point | 1: Continue | 10 | 0: Block start | — |
| 5th point | 0: End | 15 | 0: Block start | — |
| • | | | | |
| • | | | | |

(2) Positioning data setting example

| Axis 1 positioning data No. | Da.1 Operation pattern | |
|-----------------------------|------------------------------------|-------------|
| 1 | 00: Positioning complete | |
| 2 | 11: Continuous path control | } 1 block * |
| 3 | 01: Continuous positioning control | |
| 4 | 00: Positioning complete | |
| 5 | 11: Continuous path control | } 1 block |
| 6 | 00: Positioning complete | |
| • | | |
| 10 | 00: Positioning complete | |
| • | | |
| 15 | 00: Positioning complete | |
| • | | |

REMARK

Block * :

"1 block" is defined as all the data continuing from the positioning data in which "continuous positioning control" or "continuous path control" is set in the operation pattern (Da.1) to the positioning data in which "independent positioning control (Positioning complete)" is set.

[2] Control examples

The following shows the control executed when the "block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

<1> The positioning data is executed in the following order before stopping.
 Axis 1 positioning data No. 1 → 2 → 3 → 4 → 5 → 6 → 10 → 15.

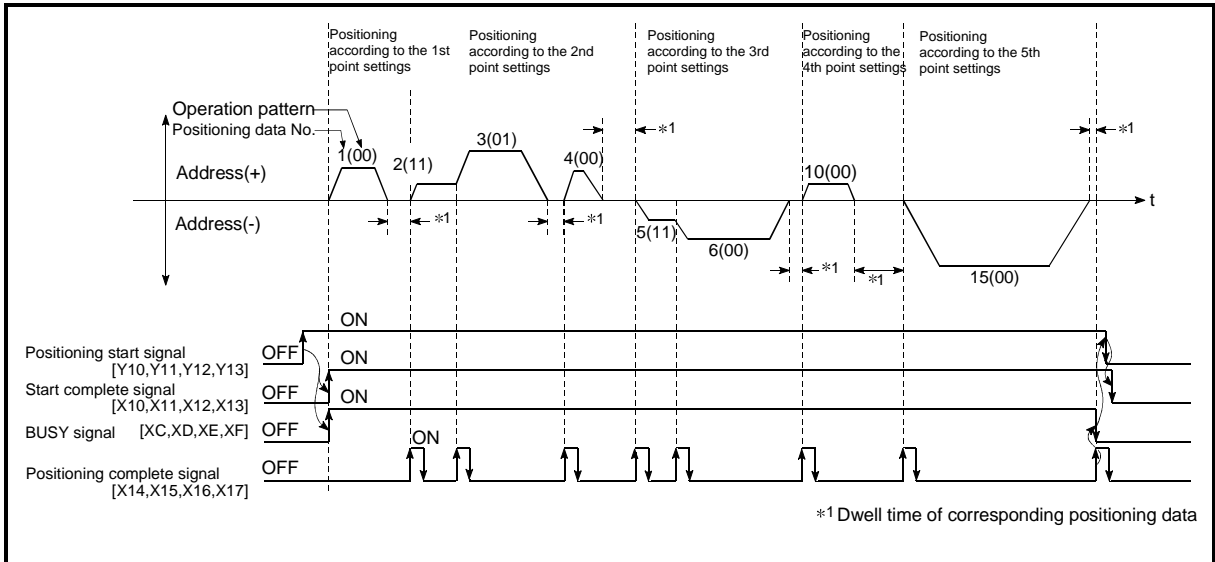


Fig. 10.1 Block start control example

10.3.3 Condition start

In a "condition start", the "condition data" conditional judgment designated in "[Da.14] Parameter" is carried out for the positioning data set in "[Da.12] Start data No.". If the conditions have been established, the "block start data" set in "1: condition start" is executed. If the conditions have not been established, that "block start data" will be ignored, and the "block start data" of the next point will be executed.

Section [2] shows a control example where the "block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | [Da.11] Shape | [Da.12] Start data No. | [Da.13] Special start instruction | [Da.14] Parameter |
|-------------------------|------------------|---------------------------|--------------------------------------|----------------------|
| 1st point | 1: Continue | 1 | 1: Condition start | 1 |
| 2nd point | 1: Continue | 10 | 1: Condition start | 2 |
| 3rd point | 0: End | 50 | 0: Block start | – |
| • | | | | |
| • | | | | |

* The "condition data Nos." have been set in "[Da.14] Parameter".

(2) Positioning data setting example

| Axis 1 positioning data No. | [Da.1] Operation pattern |
|-----------------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 01: Continuous positioning control |
| 3 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 11: Continuous path control |
| 12 | 00: Positioning complete |
| • | |
| 50 | 00: Positioning complete |
| • | |

[2] Control examples

The following shows the control executed when the "block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

<1> The conditional judgment set in "condition data No. 1" is carried out before execution of the axis 1 "positioning data No. 1".

- Conditions established → Execute positioning data No. 1, 2, and 3 → Go to <2>.
- Conditions not established → Go to <2>.

<2> The conditional judgment set in "condition data No. 2" is carried out before execution of the axis 1 "positioning data No. 10".

- Conditions established → Execute positioning data No. 10, 11, and 12 → Go to <3>.
- Conditions not established → Go to <3>.

<3> Execute axis 1 "positioning data No. 50" and stop the control.

10.3.4 Wait start

In a "wait start", the "condition data" conditional judgment designated in "[Da.14] Parameter" is carried out for the positioning data set in "[Da.12] Start data No.". If the conditions have been established, the "block start data" is executed. If the conditions have not been established, the control stops (waits) until the conditions are established.

Section [2] shows a control example where the "block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | [Da.11] Shape | [Da.12] Start data No. | [Da.13] Special start instruction | [Da.14] Parameter |
|-------------------------|------------------|---------------------------|--------------------------------------|----------------------|
| 1st point | 1: Continue | 1 | 2: Wait start | 3 |
| 2nd point | 1: Continue | 10 | 0: Block start | — |
| 3rd point | 0: End | 50 | 0: Block start | — |
| • | | | | |
| • | | | | |

* The "condition data Nos." have been set in "[Da.14] Parameter".

(2) Positioning data setting example

| Axis 1 positioning data No. | [Da.1] Operation pattern |
|-----------------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 01: Continuous positioning control |
| 3 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 11: Continuous path control |
| 12 | 00: Positioning complete |
| • | |
| 50 | 00: Positioning complete |
| • | |

[2] Control examples

The following shows the control executed when the "block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

<1> The conditional judgment set in "condition data No. 3" is carried out before execution of the axis 1 "positioning data No. 1".

→ Conditions established → Execute positioning data No. 1, 2, and 3 → Go to <2>.

→ Conditions not established → Control stops (waits) until conditions are established → Go to <1>.

<2> Execute the axis 1 "positioning data No. 10, 11, 12, and 50" and stop the control.

10.3.5 Simultaneous start

In a "simultaneous start", the positioning data set in the "Da.12 Start data No." and positioning data of other axes set in the "condition data" are simultaneously executed (pulses are output with the same timing).

(The "condition data" is designated with "Da.14 Parameter".)

Section [2] shows a control example where the "block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | Da.11 Shape | Da.12 Start data No. | Da.13 Special start instruction | Da.14 Parameter |
|-------------------------|-------------|----------------------|---------------------------------|-----------------|
| 1st point | 1: Continue | 1 | 3: Simultaneous start | 4 |
| 2nd point | 1: Continue | 10 | 3: Simultaneous start | 5 |
| 3rd point | 0: End | 50 | 3: Simultaneous start | 6 |
| • | | | | |
| • | | | | |

* It is assumed that the "axis 2 positioning data" for simultaneous starting is set in the "condition data" designated with "Da.14 Parameter".

(2) Positioning data setting example

| Axis 1 positioning data No. | Da.1 Operation pattern |
|-----------------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 01: Continuous positioning control |
| 3 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 11: Continuous path control |
| 12 | 00: Positioning complete |
| • | |
| 50 | 00: Positioning complete |
| • | |

[2] Control examples

The following shows the control executed when the "block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

- <1> Simultaneously start the axis 1 "positioning data No. 1" and axis 2 positioning data set in "condition data No. 4". After the execution of axis 1 "positioning data No. 1, 2, and 3" is completed, go to <2>.
- <2> Simultaneously start the axis 1 "positioning data No. 10" and axis 2 positioning data set in "condition data No. 5".
 - Standing by after completion of axis 2 positioning data simultaneously started in <1>. → Go to <3>.
 - Executing axis 2 positioning data simultaneously started in <1>. → "Error".
- <3> Simultaneously start the axis 1 "positioning data No. 50" and the axis 2 positioning data set in "condition data No. 6" after the completion of the execution of axis 1 "positioning data No. 10, 11, and 12".
 - Standing by after completion of axis 2 positioning data simultaneously started in <2>. → Go to <4>.
 - Executing axis 2 positioning data simultaneously started in <2>. → "Error".
- <4> After the execution of the axis 1 "positioning data No. 50" is completed, stop the control.

10.3.6 Repeated start (FOR loop)

In a "repeated start (FOR loop)", the data between the " block start data" in which "4: FOR loop" is set in " Da.13 Special start instruction" and the "block start data" in which "6: NEXT start" is set in " Da.13 Special start instruction " is repeatedly executed for the No. of times set in " Da.14 Parameter". An endless loop will result if the No. of repetitions is set to "0".
 (The No. of repetitions is set in " Da.14 Parameter" of the " block start data" in which "4: FOR loop" is set in " Da.13 Special start instruction".)

Section [2] shows a control example where the " block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | Da.11 Shape | Da.12 Start data No. | Da.13 Special start instruction | Da.14 Parameter |
|-------------------------|-------------|----------------------|---------------------------------|-----------------|
| 1st point | 1: Continue | 1 | 4: FOR loop | 2 |
| 2nd point | 1: Continue | 10 | 0: Block start | – |
| 3rd point | 0: End | 50 | 6: NEXT start | – |
| • | | | | |
| • | | | | |

* The "condition data Nos." have been set in " Da.14 Parameter".

(2) Positioning data setting example

| Axis 1 position- ing data No. | Da.1 Operation pattern |
|-------------------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 01: Continuous positioning control |
| 3 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 00: Positioning complete |
| • | |
| 50 | 01: Continuous positioning control |
| 51 | 00: Positioning complete |
| • | |

[2] Control examples

The following shows the control executed when the " block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

- <1> Execute the axis 1 "positioning data No. 1, 2, 3, 10, 11, 50, and 51".
- <2> Return to the axis 1 "1st point block start data". Again execute the axis 1 "positioning data No. 1, 2, 3, 10, 11, 50 and 51", and then stop the control.
 (Repeat for the No. of times (2 times) set in Da.14 .)

10.3.7 Repeated start (FOR condition)

In a "repeated start (FOR condition)", the data between the "block start data" in which "5: FOR condition" is set in "[Da.13] Special start instruction" and the "block start data" in which "6: NEXT start" is set in "[Da.13] Special start instruction" is repeatedly executed until the establishment of the conditions set in the "condition data". (The "condition data" designation is set in "[Da.14] Parameter" of the "block start data" in which "5: FOR condition" is set in "[Da.13] Special start instruction".)

Section [2] shows a control example where the "block start data" and "positioning data" are set as shown in section [1].

[1] Setting examples

(1) Block start data setting example

| Axis 1 block start data | [Da.11] Shape | [Da.12] Start data No. | [Da.13] Special start instruction | [Da.14] Parameter |
|-------------------------|------------------|---------------------------|--------------------------------------|----------------------|
| 1st point | 1: Continue | 1 | 5: FOR condition | 5 |
| 2nd point | 1: Continue | 10 | 0: Block start | — |
| 3rd point | 0: End | 50 | 6: NEXT start | — |
| • | | | | |
| • | | | | |

* The "condition data Nos." have been set in "[Da.14] Parameter".

(2) Positioning data setting example

| Axis 1 position- ing data No. | [Da.1] Operation pattern |
|----------------------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 01: Continuous positioning control |
| 3 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 00: Positioning complete |
| • | |
| 50 | 01: Continuous positioning control |
| 51 | 00: Positioning complete |
| • | |

[2] Control examples

The following shows the control executed when the "block start data" of the 1st point of axis 1 is set as shown in section [1] and started.

- <1> Carry out the conditional judgment set in "condition data No. 5" for the axis 1 "positioning data No. 1".
 - Conditions not established → Go to <2>.
 - Conditions established → Go to <3>.
- <2> Execute axis 1 "positioning data No. 1, 2, 3, 10, 11, 50, and 51", then go to <1>.
- <3> Execute axis 1 "positioning data No. 1, 2, 3, 10, 11, 50, and 51", then stop the control.

10.3.8 Restrictions when using the NEXT start

The "NEXT start" is a instruction indicating the end of the repetitions when executing Section 10.3.6 "Repeated start (FOR loop)" and Section 10.3.7 "Repeated start (FOR condition)".

The following shows the restrictions when setting "6: NEXT start" in the " block start data".

- (1) The processing when "6: NEXT start" is set before execution of "4: FOR loop" or "5: FOR condition" is the same as that for a "0: block start".
- (2) Repeated processing will not be carried out if there is no "6: NEXT start" instruction after the "4: FOR loop" or "5: FOR condition" instruction. (Note that an "error" will not occur.)
- (3) Nesting is not possible between "4: FOR loop" and "6: NEXT start", or between "5: FOR condition" and "6: NEXT start". A warning "FOR to NEXT nest construction (warning code: 506)" will occur if nesting is attempted.

| Block start data | Da.13 Special start instruction |
|------------------|------------------------------------|
| 1st point | Block start |
| 2nd point | FOR |
| 3rd point | Block start |
| 4th point | FOR |
| 5th point | Block start |
| 6th point | Block start |
| 7th point | NEXT |
| 8th point | Block start |
| 9th point | NEXT |
| • | |
| • | |

The JUMP destination of the NEXT designated with points 7 and 9 is the FOR of point 4. A warning will occur if the NEXT designated with point 9 is executed.

10.4 Setting the condition data

10.4.1 Relation between various controls and the condition data

"Condition data" is set in the following cases.

- (1) When setting conditions during execution of Section 9.2.21 "JUMP instruction" (major positioning control)
- (2) When setting conditions during execution of "high-level positioning control"

The "condition data" to be set includes the 5 setting items from [Da.15] to [Da.19], but the setting requirements and details differ according to the control system and setting conditions.

The following shows the "condition data [Da.15] Condition target" corresponding to the different types of control.

(The "condition data" settings in this chapter are assumed to be carried out using GX Configurator-QP.)

| Control type [Da.15] Setting item | High-level positioning control | | | | Major positioning control |
|---|--------------------------------|------------|--------------------|--------------------------------|---------------------------|
| | Block start | Wait start | Simultaneous start | Repeated start (For condition) | JUMP instruction |
| 01: Device X | ◎ | ◎ | × | ◎ | ◎ |
| 02: Device Y | ◎ | ◎ | × | ◎ | ◎ |
| 03: Buffer memory (1 word) | ◎ | ◎ | × | ◎ | ◎ |
| 04: Buffer memory (2 words) | ◎ | ◎ | × | ◎ | ◎ |
| 05: Positioning data No. | × | × | ◎ | × | × |

◎ : One of the setting items must be set.

× : Setting not possible

REMARK

It is recommended that the "condition data" be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

The setting requirements and details of the following "condition data" " Da.16 " to " Da.19 " setting items differ according to the " Da.15 Condition target" setting.

The following shows the " Da.16 " to " Da.19 " setting items corresponding to the " Da.15 Condition target".

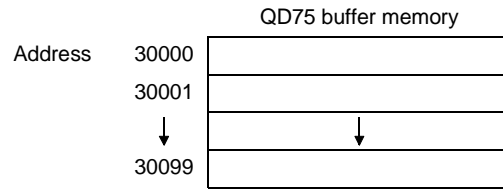
| Other setting item Da.15 Setting item | Da.16 Condition operator | Da.17 Address | Da.18 Parameter 1 | | Da.19 Parameter 2 | |
|--|--|-----------------------------|-----------------------|-----------------------------------|---|-----------------------------------|
| 01H: Device X | 07H : DEV=ON | - | 0 to 1FH (bit No.) | | - | |
| 02H: Device Y | 08H : DEV=OFF | | 0 to 1FH (bit No.) | | | |
| 03H: Buffer memory (1 word) | 01H : **≠P1 02H : **≠P1 | Buffer memory address | P1 (numeric value) | | P2 (numeric value) (Set only when " Da.16 " is [05H] or [06H].) | |
| 04H: Buffer memory (2 words) | 03H : **≤P1 04H : **≥P1 | | | | | |
| | 05H : P1≤**≤P2 | | | | | |
| | 06H : **≤P1, P2≤** | | | | | |
| 05H: Positioning data No. | 10H : Axis 1 designation | - | Low-order 16 bits | Axis 1 positioning data No. | Low-order 16 bits | Axis 3 positioning data No. |
| | 20H : Axis 2 designation | | | | | |
| | 30H : Axis 1 and axis 2 designation | | | | | |
| | 40H : Axis 3 designation | | | | | |
| | 50H : Axis 1 and axis 3 designation | | | | | |
| | 60H : Axis 2 and axis 3 designation | | | | | |
| | 70H : Axis 1, axis 2 and axis 3 designation | | | | | |
| | 80H : Axis 4 designation | | High-order 16 bits | Axis 2 positioning data No. | High-order 16 bits | Axis 4 positioning data No. |
| | 90H : Axis 1 and axis 4 designation | | | | | |
| | A0H : Axis 2 and axis 4 designation | | | | | |
| B0H : Axis 1, axis 2 and axis 4 designation | | | | | | |
| C0H : Axis 3 and axis 4 designation | | | | | | |
| D0H : Axis 1, axis 3 and axis 4 designation | | | | | | |
| E0H : Axis 2, axis 3 and axis 4 designation | | | | | | |

- : Setting not required (Setting value will be ignored. Use the initial value or a value within the setting range.)
- ** : Value stored in buffer memory designated in Da.17 .
- * : Refer to Section 5.5 "List of condition data" for the setting contents.

Judgment whether the condition operator is "=" or "≠" at the start of wait.
 Judgment on data is carried out for each control cycle of the QD75. Thus, in the judgment on the data such as current feed value which varies continuously, the operator "=" may not be detected. If this occurs, use a range operator.

REMARK

The "PLC CPU memo area" can be designated as the buffer memory address to be designated in [Da.17](#) . (Refer to Section 7.1.1 "Configuration and roles of QD75 memory".)



10.4.2 Condition data setting examples

The following shows setting examples for "condition data".

(1) Setting the device ON/OFF as a condition

[Condition] Device "X0" (=QD75 READY) is OFF

| Da.15 Condition target | Da.16 Condition operator | Da.17 Address | Da.18 Parameter 1 | Da.19 Parameter 2 |
|---------------------------|-----------------------------|------------------|----------------------|----------------------|
| 01H: Device X | 08H: DEV=OFF | – | 0 | – |

(2) Setting the numeric value stored in the "buffer memory" as a condition

[Condition]

The value stored in buffer memory addresses "800, 801" (= "Md.20 Current feed value") is "1000" or larger.

| Da.15 Condition target | Da.16 Condition operator | Da.17 Address | Da.18 Parameter 1 | Da.19 Parameter 2 |
|------------------------------|-----------------------------|------------------|----------------------|----------------------|
| 04H: Buffer memory (2 words) | 04H: * * ≥ P1 | 800 | 1000 | – |

(3) Designating the axis and positioning data No. to be simultaneously started in "simultaneous start"

[Condition]

Simultaneously starting "axis 2 positioning data No.3".

| Da.15 Condition target | Da.16 Condition operator | Da.17 Address | Da.18 Parameter 1 | Da.19 Parameter 2 |
|---------------------------|-----------------------------|------------------|----------------------------|----------------------|
| 05H: Positioning data No. | 20H: Axis 2 designation | – | High-order 16 bits "0003H" | – |

10.5 Multiple axes simultaneous start control

The "multiple axes simultaneous start control" starts and controls the multiple axes simultaneously by outputting pulses to the axis to be started at the same timing as the start axis.

The maximum of four axes can be started simultaneously.

[1] Control details

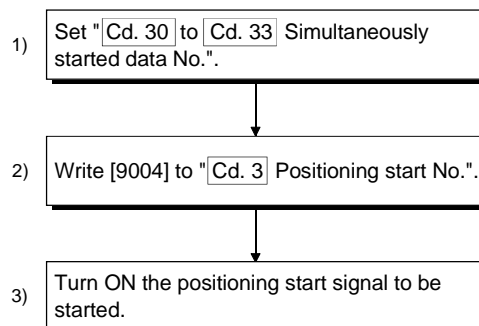
The multiple axes simultaneous start control is carried out by setting the simultaneous start an object axis start data No. (positioning data No. to start simultaneously for each axis) to the multiple axes simultaneous start control buffer memory "Cd.30 to Cd.33 Simultaneously starting axis start data No. (1 to 4 axis start data No.)" of the axis control data, and the "9004" to "Cd.3 Positioning start No." of the start axis, and then turning ON the positioning start signal.

[2] Restrictions

- (1) An error will occur and all simultaneously started axes will not start (error code: 501) if the simultaneously started axis start data No. is not set to the axis control data on the start axis or set outside the setting range.
- (2) An error will occur and all simultaneously started axes will not start (error code: 501) if either of the simultaneously started axes is BUSY.
- (3) An error will occur and all simultaneously started axes will not start (error code: 501) if an error occurs during the analysis of the positioning data on the simultaneously started axes.
- (4) No error or warning will occur if only the start axis is the simultaneously started axis.
- (5) This function cannot be used with the sub function Section 12.7.8 "Pre-reading start function".

[3] Multiple axes simultaneous start control procedure

The procedure for multiple axes simultaneous start control is as follows.



[4] Multiple axes simultaneous start control function setting method

The following shows the setting of the data used to execute the multiple axes simultaneous start control with positioning start signals (The axis control data on the start axis is set).

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|--|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| <u>Cd.3</u> Positioning start No. | 9004 | Set the multiple axes simultaneous start control start No. "9004". | 1500 | 1600 | 1700 | 1800 |
| <u>Cd.30</u> Simultaneous starting axis start data No. (Axis 1 start data No.) | Set the simultaneously started axis start data No. Set a "0" for the axis other than the simultaneously started axes. | | 1540 | 1640 | 1740 | 1840 |
| <u>Cd.31</u> Simultaneous starting axis start data No. (Axis 2 start data No.) | | | 1541 | 1641 | 1741 | 1841 |
| <u>Cd.32</u> Simultaneous starting axis start data No. (Axis 3 start data No.) | | | 1542 | 1642 | 1742 | 1842 |
| <u>Cd.33</u> Simultaneous starting axis start data No. (Axis 4 start data No.) | | | 1543 | 1643 | 1743 | 1843 |

* Refer to Section 5.7 "List of control data" for information on setting details.

[5] Setting examples

The following shows the setting examples in which the axis 1 is used as the start axis and the simultaneously started axes are used as the axes 2 and 4.

| Setting item | Setting value | Setting details | Buffer memory address (Axis 1) |
|--|---------------|---|-----------------------------------|
| <u>Cd.3</u> Positioning start No. | 9004 | Set the multiple axes simultaneous start control start No. "9004". | 1500 |
| <u>Cd.30</u> Simultaneous starting axis start data No. (Axis 1 start data No.) | 100 | The axis 1 starts the positioning data No. 100. | 1540 |
| <u>Cd.31</u> Simultaneous starting axis start data No. (Axis 2 start data No.) | 200 | Immediately after the start of the axis 1, the axis 2 starts the axis 2 positioning data No. 200. | 1541 |
| <u>Cd.32</u> Simultaneous starting axis start data No. (Axis 3 start data No.) | 0 | Will not start simultaneously. | 1542 |
| <u>Cd.33</u> Simultaneous starting axis start data No. (Axis 4 start data No.) | 300 | Immediately after the start of the axis 1, the axis 4 starts the axis 4 positioning data No. 300. | 1543 |

POINTS

- (1) The "multiple axes simultaneous start control" carries out an operation equivalent to the "simultaneous start" using the "block start data".
- (2) The setting of the "multiple axes simultaneous start control" is easier than that of the "simultaneous start" using the "block start data".
 - Setting items for "simultaneous start" using "block start data"
Positioning start data, block start data, condition data, and positioning data
 - Setting items for "multiple axes simultaneous start control"
Positioning data and axis control data

10.6 Start program for high-level positioning control

10.6.1 Starting high-level positioning control

To execute high-level positioning control, a PLC program must be created to start the control in the same method as for major positioning control.

The following shows the procedure for starting the "1st point block start data" (regarded as block No. 7000) set in axis 1.

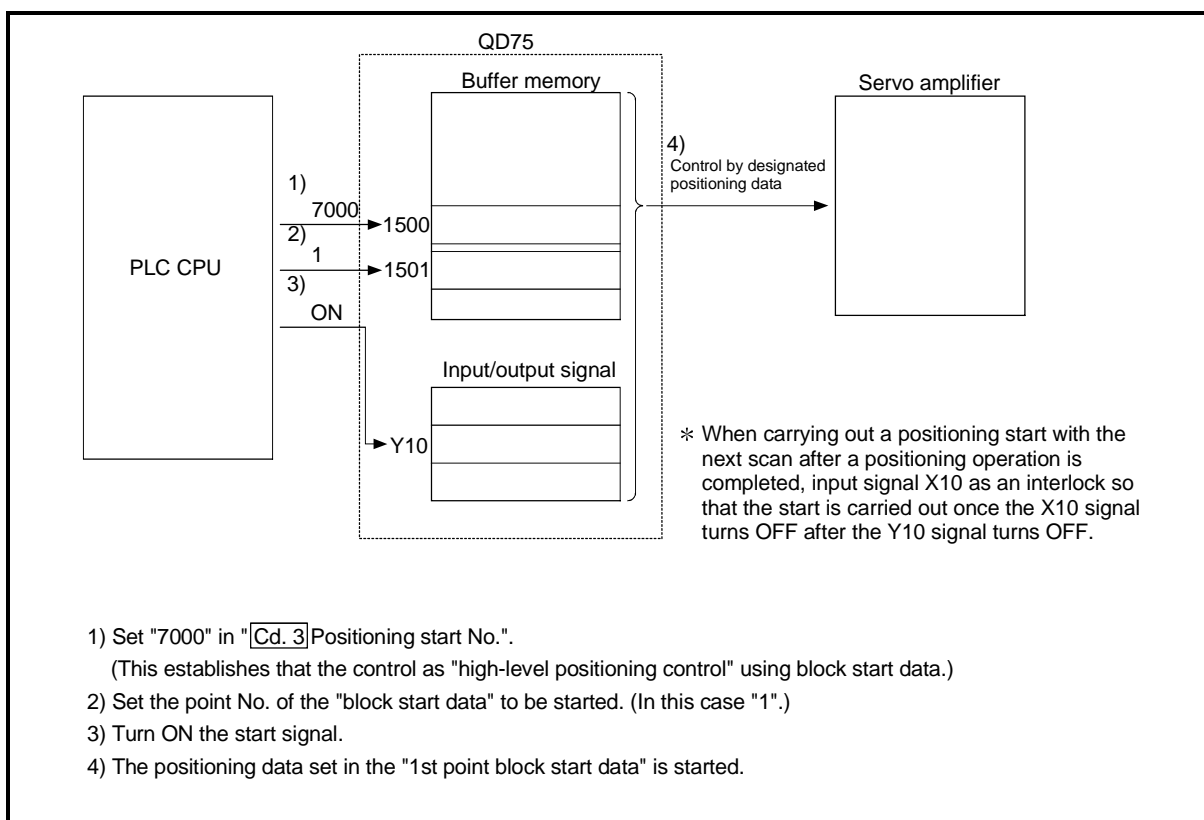


Fig. 10.2 High-level positioning control start procedure

10.6.2 Example of a start program for high-level positioning control

The following shows an example of a start program for high-level positioning control in which the 1st point "block start data" of axis 1 is started. (The block No. is regarded as "7000".)

■ Control data that require setting

The following control data must be set to execute high-level positioning control. The setting is carried out using a PLC program.

| Setting item | Setting value | Setting details | Buffer memory address | | | | |
|--------------|--------------------------------|-----------------|--|--------|--------|--------|------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Cd.3 | Positioning start No. | 7000 | Set "7000" to indicate control using "block start data". | 1500 | 1600 | 1700 | 1800 |
| Cd.4 | Positioning starting point No. | 1 | Set the point No. of the "block start data" to be started. | 1501 | 1601 | 1701 | 1801 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

■ Start conditions

The following conditions must be fulfilled when starting the control. The required conditions must also be integrated into the PLC program, and configured so the control does not start unless the conditions are fulfilled.

| Signal name | Signal state | Device | | | | | | | |
|------------------|------------------------|--------|---|--------|--------|-----|-----|-----|-----|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | | | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | | | X0 | | | |
| | All axis servo ON | ON | All axis servo ON | | | Y1 | | | |
| | Synchronization flag | ON | QD75 buffer memory The access is possible. | | | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF | | | Y4 | Y5 | Y6 | Y7 |
| | Start complete signal | OFF | Start complete signal is OFF | | | X10 | X11 | X12 | X13 |
| | BUSY signal | OFF | BUSY signal is OFF | | | XC | XD | XE | XF |
| | Error detection signal | OFF | There is no error | | | X8 | X9 | XA | XB |
| External signal | M code ON signal | OFF | M code ON signal is OFF | | | X4 | X5 | X6 | X7 |
| | Stop signal | OFF | Stop signal is OFF | | | - | | | |
| | Upper limit (FLS) | ON | Within limit range | | | - | | | |
| | Lower limit (RLS) | ON | Within limit range | | | - | | | |

■ Start time chart

The following chart shows a time chart in which the positioning data No. 1, 2, 10, 11, and 12 of axis 1 are continuously executed as an example.

(1) Block start data setting example

| Axis 1 block start data | Da.11 Shape | Da.12 Start data No. | Da.13 Special start instruction | Da.14 Parameter |
|-------------------------|----------------|-------------------------|------------------------------------|--------------------|
| 1st point | 1: Continue | 1 | 0: Block start | - |
| 2nd point | 0: End | 10 | 0: Block start | - |
| • | | | | |
| • | | | | |

(2) Positioning data setting example

| Axis 1 position- ing data No. | Da.1 Operation pattern |
|----------------------------------|-----------------------------|
| 1 | 11: Continuous path control |
| 2 | 00: Positioning complete |
| • | |
| 10 | 11: Continuous path control |
| 11 | 11: Continuous path control |
| 12 | 00: Positioning complete |
| • | |

(3) Start time chart

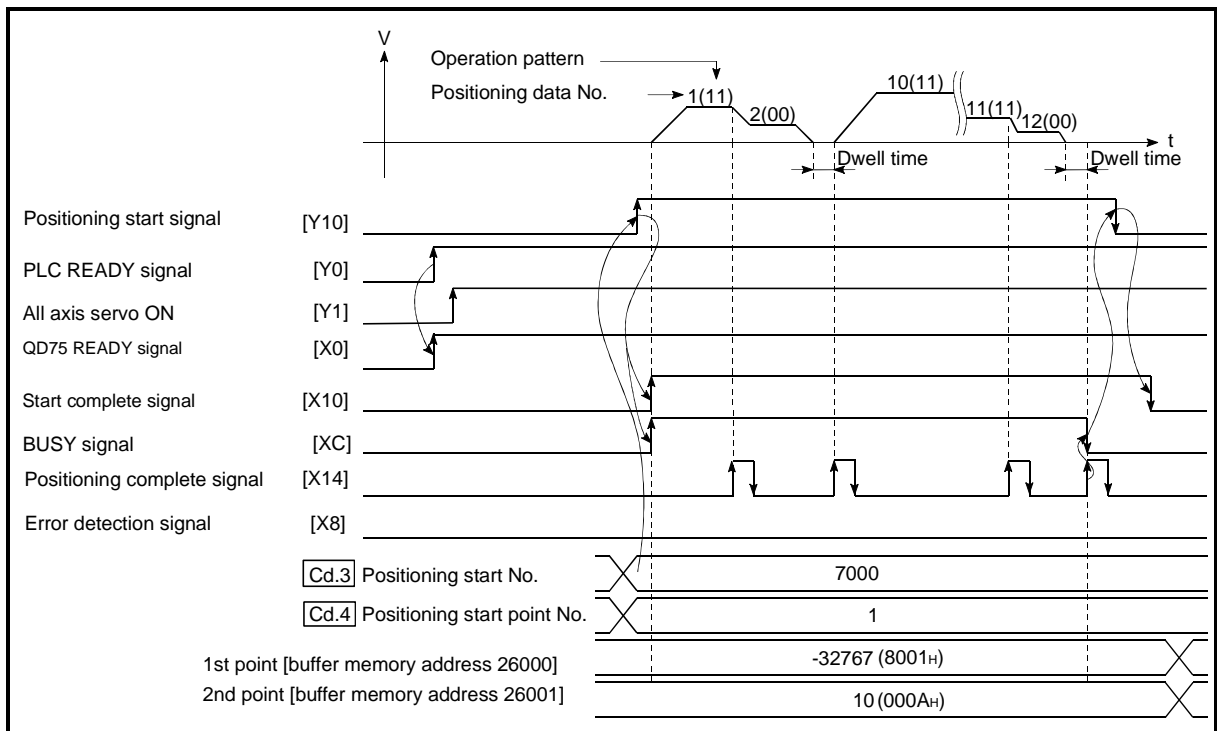
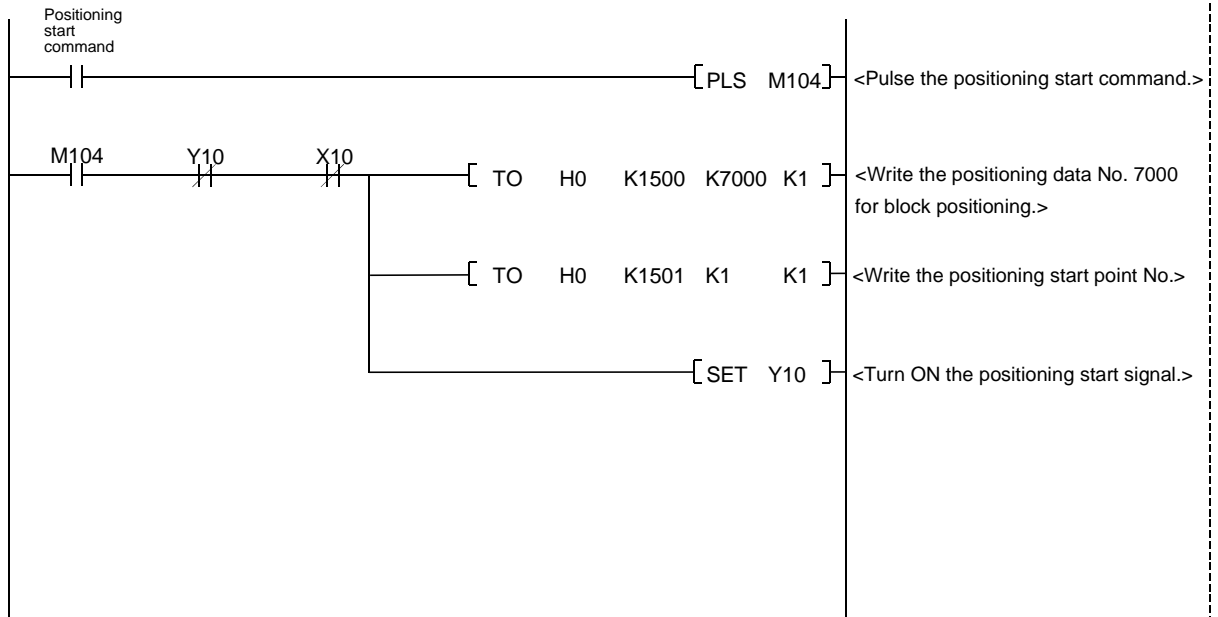


Fig. 10.3 Start time chart for high-level positioning control (block start)

■ Creating the program

Example

Set the block start data beforehand.



Y10: Positioning start signal
 X10: Start complete signal
 M104: Positioning start command pulse

Chapter 11 Manual Control

The details and usage of manual control are explained in this chapter. In manual control, pulse output commands are issued during a JOG operation and an inching operation executed by the turning ON of the JOG START signal, or from a manual pulse generator connected to the QD75. Manual control using a PLC program from the PLC CPU is explained in this chapter. Refer to GX Configurator-QP Operating Manual for an explanation of manual control (JOG operation, inching operation and manual pulse generator operation) using the peripheral devices.

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11.1 Outline of manual control

11.1.1 Three manual control methods

"Manual control" refers to control in which positioning data is not used, and a positioning operation is carried out in response to signal input from an external source. The three types of this "manual control" are explained below.

[1] JOG operation

"JOG operation" is a control method in which the machine is moved by only a movement amount (pulses are continuously transmitted while the JOG START signal is ON). This operation is used to move the workpiece in the direction in which the limit signal is ON, when the operation is stopped by turning the limit signal OFF to confirm the positioning system connection and obtain the positioning data address (refer to Section 12.7.4 "Teaching function").

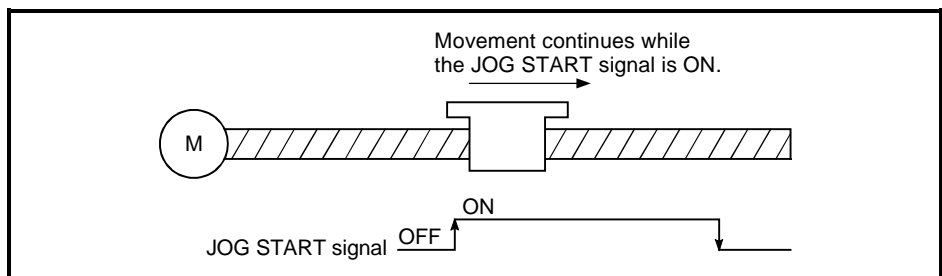


Fig. 11.1 JOG operation

[2] Inching operation

"Inching operation" is a control method in which a minute movement amount of pulses is output manually in one control cycle. When the "inching movement amount" of the axis control data is set by JOG operation, the workpiece is moved by a set movement amount. (When the "inching movement amount" is set to "0", the machine functions as JOG operation.)

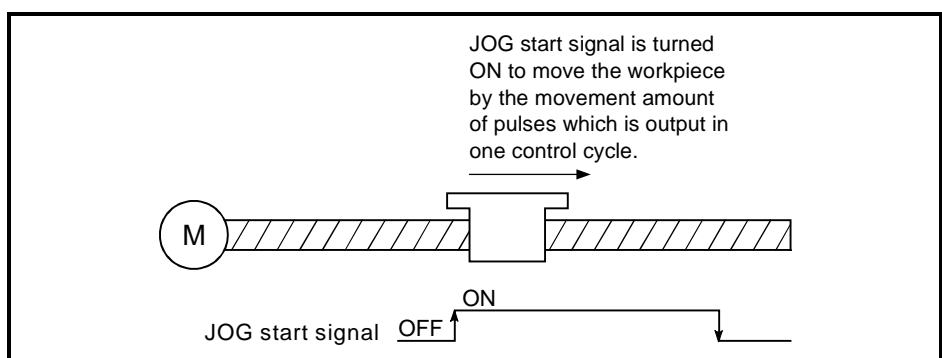


Fig. 11.2 Inching operation

[3] Manual pulse generator operation

"Manual pulse generator operation" is a control method in which positioning is carried out in response to the No. of pulses input from a manual pulse generator (the No. of input pulses is output). This operation is used for manual fine adjustment, etc., when carrying out accurate positioning to obtain the positioning address.

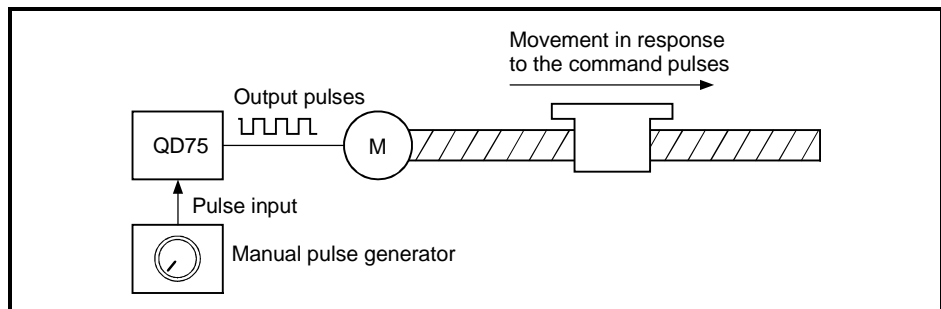


Fig. 11.3 Manual pulse generator control

■ Manual control sub functions

Refer to Section 3.2.4 "Combination of QD75 major functions and sub functions" for details on "sub functions" that can be combined with manual control. Also refer to Chapter 12 "Control sub functions" for details on each sub function.

■ Carrying out manual control from peripheral devices

"JOG operation", "Inching operation" and enabling/disabling of the "manual pulse generator operation" can be executed from GX Configurator-QP test mode. Refer to GX Configurator-QP Operating Manual for details on manual control from GX Configurator-QP.

■ Monitoring manual control

Refer to Section 5.6 "List of monitor data" when directly monitoring the buffer memory using GX Developer. Also refer to GX Configurator-QP Operating Manual when monitoring with the monitor functions of GX Configurator-QP.

11.2 JOG operation

11.2.1 Outline of JOG operation

Important

Use the hardware stroke limit function when carrying out JOG operation near the upper or lower limits. (Refer to Section "12.4.4").

* If the hardware stroke limit function is not used, the workpiece may exceed the moving range, causing an accident.

■ JOG operation

In JOG operation, the FORWARD run JOG start signal (Y8, YA, YC, YE) or REVERSE run JOG start signal (Y9, YB, YD, YF) turns ON, causing pulses to be output to the servo amplifier from the QD75 while the signal is ON. The workpiece is then moved in the designated direction.

The following shows examples of JOG operation.

| | |
|----|--|
| 1) | When the START signal turns ON, acceleration begins in the direction designated by the START signal, and continues for the acceleration time designated in " [Pr.32] JOG operation acceleration time selection". At this time, the BUSY signal changes from OFF to ON. |
| 2) | When the workpiece being accelerated reaches the speed set in " [Cd.17] JOG speed", the movement continues at this speed. The constant speed movement takes place at 2) and 3). |
| 3) | When the START signal is turned OFF, deceleration begins from the speed set in " [Cd.17] JOG speed", and continues for the deceleration time designated in " [Pr.33] JOG operation deceleration time selection". |
| 4) | The operation stops when the speed becomes "0". At this time, the BUSY signal changes from ON to OFF. |

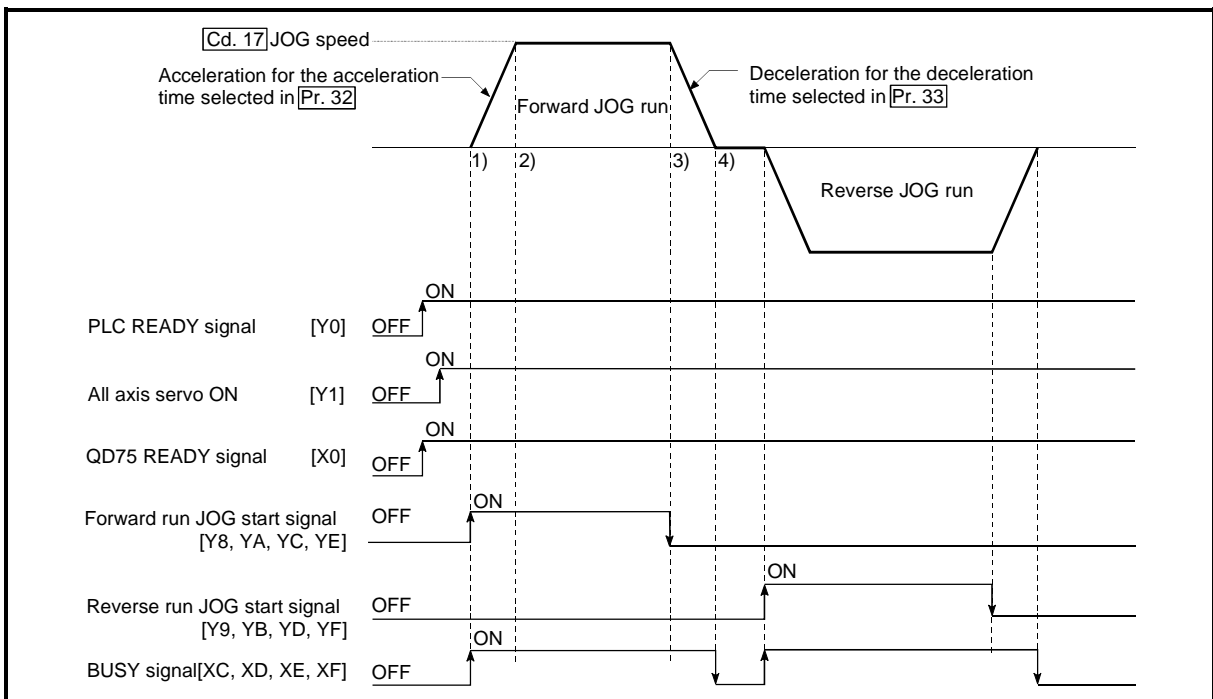


Fig. 11.4 JOG operation

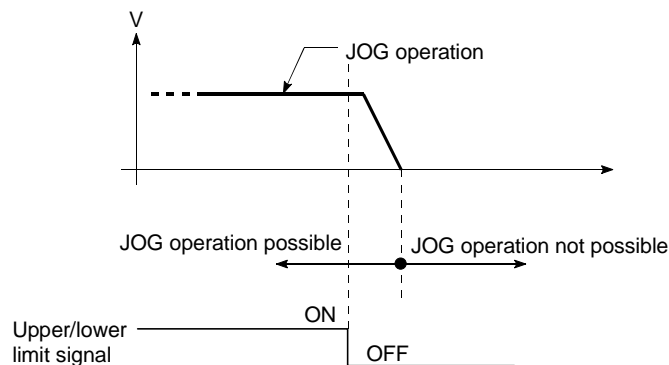
■ Precautions during operation

The following details must be understood before carrying out JOG operation.

- (1) For safety, first set "Cd.17 JOG speed" to a smaller value and check the movement. Then gradually increase the value.
- (2) An axis error will occur and the operation will not start (error code: 300) if the "JOG speed" is outside the setting range at the JOG start.
- (3) An axis error will occur and the operation will not start (error code: 956) if "Pr.31 JOG speed limit value" is set to a value larger than "Pr.8 speed limit value".
- (4) If "Cd.17 JOG speed" exceeds the speed set in "Pr.31 JOG speed limit value", the workpiece will move at the "Pr.31 JOG speed limit value" and an "Axis warning" will occur in the QD75 (warning code: 301).
- (5) The JOG operation can be continued even if an "Axis warning" has occurred.
- (6) A JOG start signal OFF → ON immediately after the stop signal ON → OFF (within 100ms) will be ignored. (The operation will not start.)
- (7) Set a "0" in "Cd.16 inching movement amount". If a value other than "0" is set, the operation will become an inching operation (Refer to section 11.3 "Inching operation").

■ Errors during operation

If the operation is stopped by the stroke limit (limit signal OFF), JOG operation can be performed out in the direction in which the limit signal turns ON after an error reset. (An error will occur again if the JOG start signals in the direction in which the limit signal turns OFF is turned ON.)



■ JOG operation timing and processing time

The following drawing shows details of the JOG operation timing and processing time.

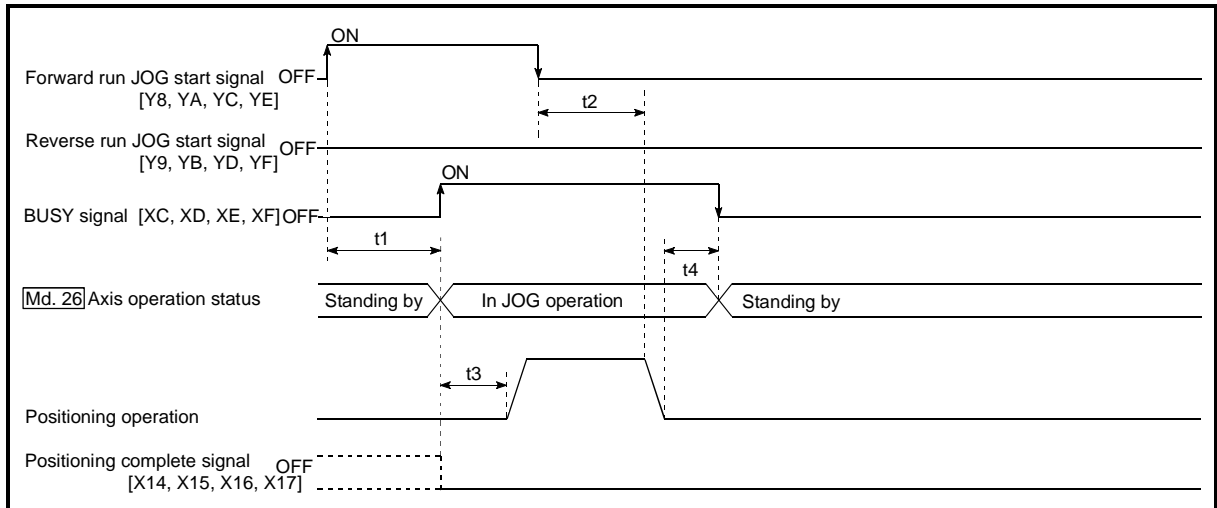


Fig. 11.5 JOG operation timing and processing times

Normal timing times

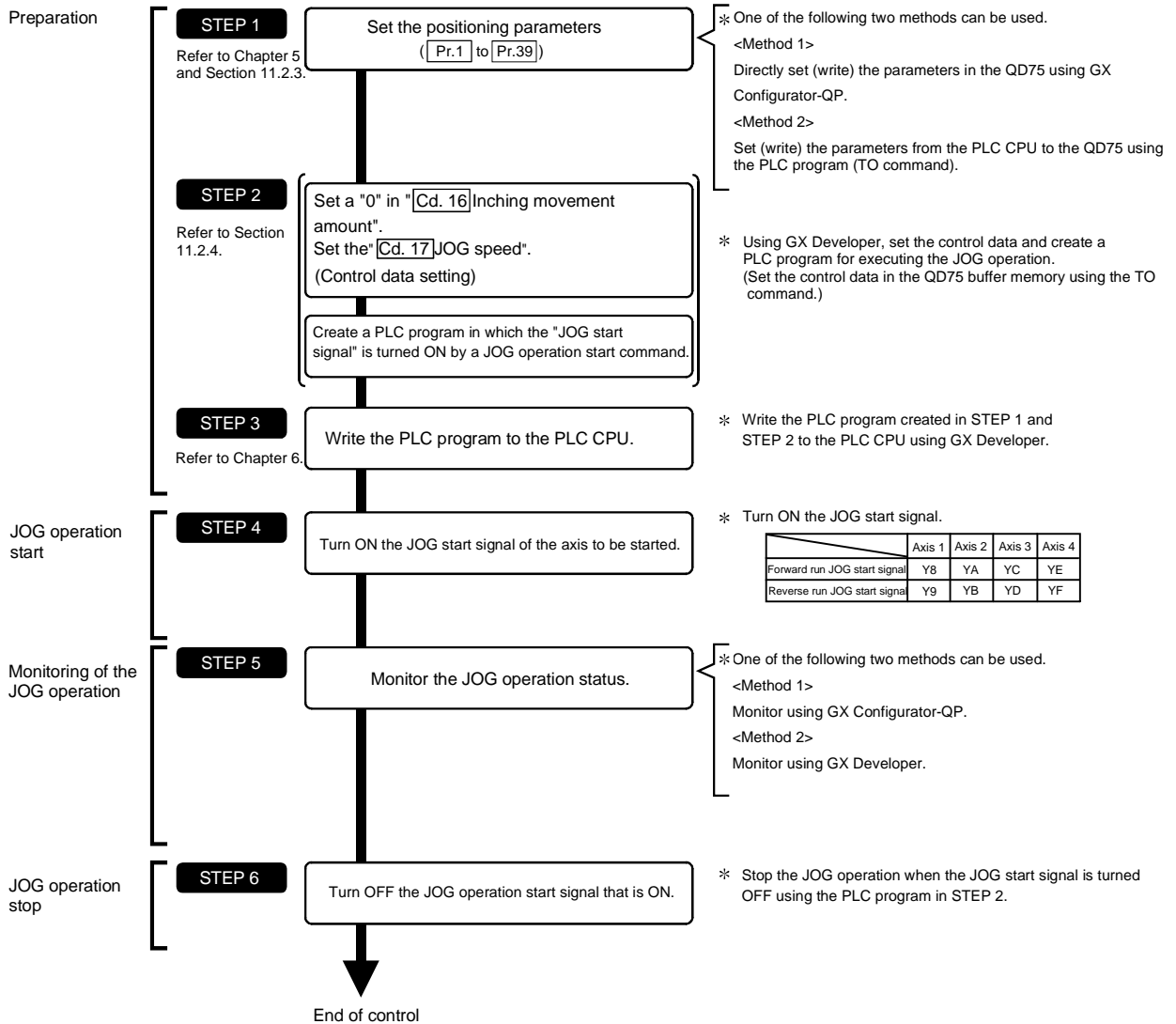
Unit: ms

| t1 | t2 | t3 | t4 |
|------------|----------|------------|----------|
| 1.0 to 4.0 | 0 to 3.5 | 5.5 to 7.9 | 0 to 3.5 |

- Delays may occur in the t1 timing time due to the operation status of other axes.

11.2.2 JOG operation execution procedure

The JOG operation is carried out by the following procedure.



REMARK

- Mechanical elements such as limit switches are considered as already installed.
- Positioning parameter settings work in common for all control using the QD75.

11.2.3 Setting the required parameters for JOG operation

The "Positioning parameters" must be set to carry out JOG operation.

The following table shows the setting items of the required parameters for carrying out JOG operation. When only JOG operation will be carried out, no parameters other than those shown below need to be set. (Use the initial values or setting values within a range where no error occurs for trouble-free operation.)

| Setting item | | Setting requirement | Factory-set initial value (setting details) | |
|------------------------|-------|---|--|------------------------|
| Positioning parameters | Pr.1 | Unit setting | ◎ | 3 (PLS) |
| | Pr.2 | No. of pulses per rotation (Ap) (Unit: PLS) | ◎ | 20000 |
| | Pr.3 | Movement amount per rotation (Al) (Unit: PLS) | ◎ | 20000 |
| | Pr.4 | Unit magnification (Am) | ◎ | 1 (1 times) |
| | Pr.7 | Bias speed at start (Unit: PLS/s) | ○ | 0 |
| | Pr.8 | Speed limit value (Unit: PLS/s) | ◎ | 200000 |
| | Pr.9 | Acceleration time 0 (Unit: PLS/s) | ◎ | 1000 |
| | Pr.10 | Deceleration time 0 (Unit: PLS/s) | ◎ | 1000 |
| | Pr.11 | Backlash compensation amount (Unit: PLS) | ○ | 0 |
| | Pr.12 | Software stroke limit upper limit value (Unit: PLS) | ○ | 2147483647 |
| | Pr.13 | Software stroke limit lower limit value (Unit: PLS) | ○ | -2147483648 |
| | Pr.14 | Software stroke limit selection | ○ | 0 (current feed value) |
| | Pr.15 | Software stroke limit valid/invalid setting | ○ | 0 (valid) |
| | Pr.17 | Torque limit setting value (Unit: %) | ○ | 300 |

◎ : Setting always required.

○ : Set according to requirements (Leave set to the initial value when not used.)

REMARK

- Positioning parameter settings work in common for all control using the QD75. When carrying out other control ("major positioning control", "high-level positioning control", "OPR positioning control"), the respective setting items must also be matched and set.
- Parameters are set for each axis.
- Refer to Chapter 5 "Data Used for Positioning Control" for setting details.

| Setting item | | Setting requirement | Factory-set initial value (setting details) | |
|------------------------|-------|---|--|--|
| Positioning parameters | Pr.25 | Acceleration time 1 (Unit: ms) | ○ | 1000 |
| | Pr.26 | Acceleration time 2 (Unit: ms) | ○ | 1000 |
| | Pr.27 | Acceleration time 3 (Unit: ms) | ○ | 1000 |
| | Pr.28 | Deceleration time 1 (Unit: ms) | ○ | 1000 |
| | Pr.29 | Deceleration time 2 (Unit: ms) | ○ | 1000 |
| | Pr.30 | Deceleration time 3 (Unit: ms) | ○ | 1000 |
| | Pr.31 | JOG speed limit value (Unit: PLS/s) | ◎ | 20000 |
| | Pr.32 | JOG operation acceleration time selection | ◎ | 0 (acceleration time 0) |
| | Pr.33 | JOG operation deceleration time selection | ◎ | 0 (deceleration time 0) |
| | Pr.34 | Acceleration/deceleration process selection | ○ | 0 (trapezoidal acceleration/ deceleration processing) |
| | Pr.35 | S-pattern proportion (Unit: %) | ○ | 100 |
| | Pr.36 | Sudden stop deceleration time (Unit: ms) | ○ | 1000 |
| | Pr.37 | Stop group 1 sudden stop selection | ○ | 0 (deceleration stop) |
| | Pr.38 | Stop group 2 sudden stop selection | ○ | 0 (deceleration stop) |
| | Pr.39 | Stop group 3 sudden stop selection | ○ | 0 (deceleration stop) |

◎ : Setting always required.

○ : Set according to requirements (Leave set to the initial value when not used.)

11.2.4 Creating start programs for JOG operation

A PLC program must be created to execute a JOG operation. Consider the "required control data setting", "start conditions" and "start time chart" when creating the program.

The following shows an example when a JOG operation is started for axis 1. ("Cd.17 JOG speed" is set to "100.00mm/min" in the example shown.)

■ Required control data setting

The control data shown below must be set to execute a JOG operation. The setting is carried out with the PLC program.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|-------------------------------|---------------|--|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.16 Inching movement amount | 0 | Set "0". | 1517 | 1617 | 1717 | 1817 |
| Cd.17 JOG speed | 10000 | Set a value equal to or below the "Pr.31 JOG speed limit value". | 1518 1519 | 1618 1619 | 1718 1719 | 1818 1819 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

■ Start conditions

The following conditions must be fulfilled when starting. The required conditions must also be assembled in the PLC program, and the PLC program must be configured so the operation will not start if the conditions are not fulfilled.

| Signal name | Signal state | Device | | | | | | | | |
|-------------------|------------------------|--------------------|---|--------|--------|---|-----|-----|-----|-----|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | | | | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | | | | X0 | | | |
| | All axis servo ON | ON | All axis servo ON | | | | Y1 | | | |
| | Synchronization flag * | ON | QD75 buffer memory The access is possible. | | | | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF | | | | Y4 | Y5 | Y6 | Y7 |
| | Start complete signal | OFF | Start complete signal is OFF | | | | X10 | X11 | X12 | X13 |
| | BUSY signal | OFF | QD75 is not operating | | | | XC | XD | XE | XF |
| | Error detection signal | OFF | There is no error | | | | X8 | X9 | XA | XB |
| External signal | M code ON signal | OFF | M code ON signal is OFF | | | | X4 | X5 | X6 | X7 |
| | Stop signal | OFF | Stop signal is OFF | | | | - | | | |
| | Upper limit (FLS) | ON | Within limit range | | | | - | | | |
| Lower limit (RLS) | ON | Within limit range | | | | - | | | | |

* If the PLC CPU is set to the asynchronous mode in the synchronization setting, this must be inserted in the program for interlocking. If it is set to the synchronous mode, it must not be inserted in the program for interlocking because it is turned ON when the PLC CPU executes calculation.

■ Start time chart

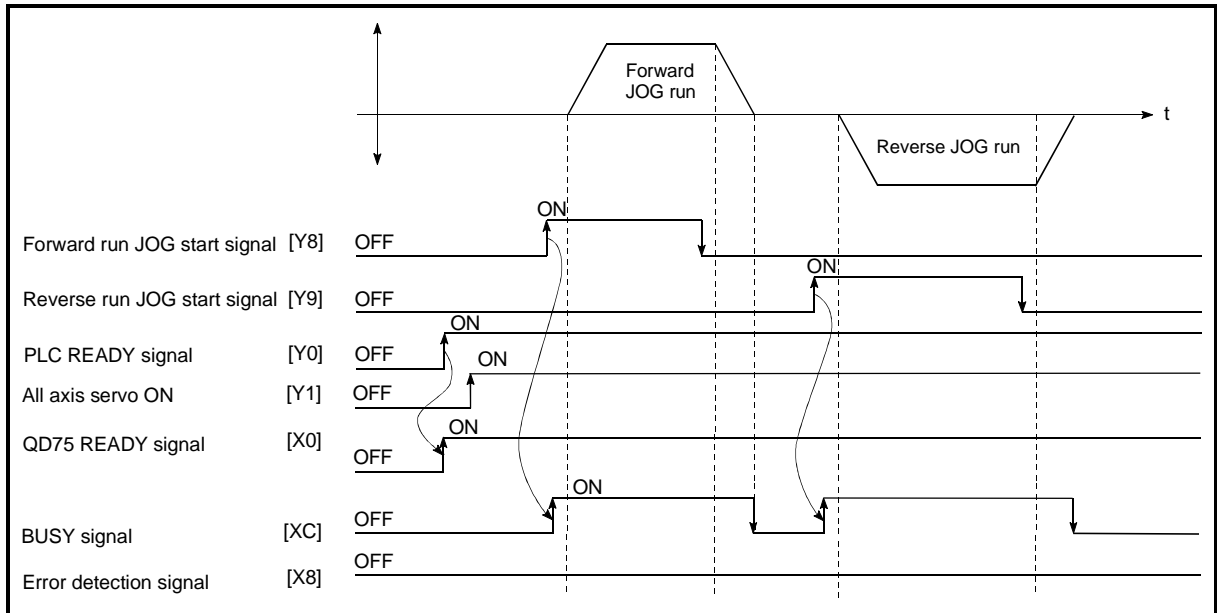
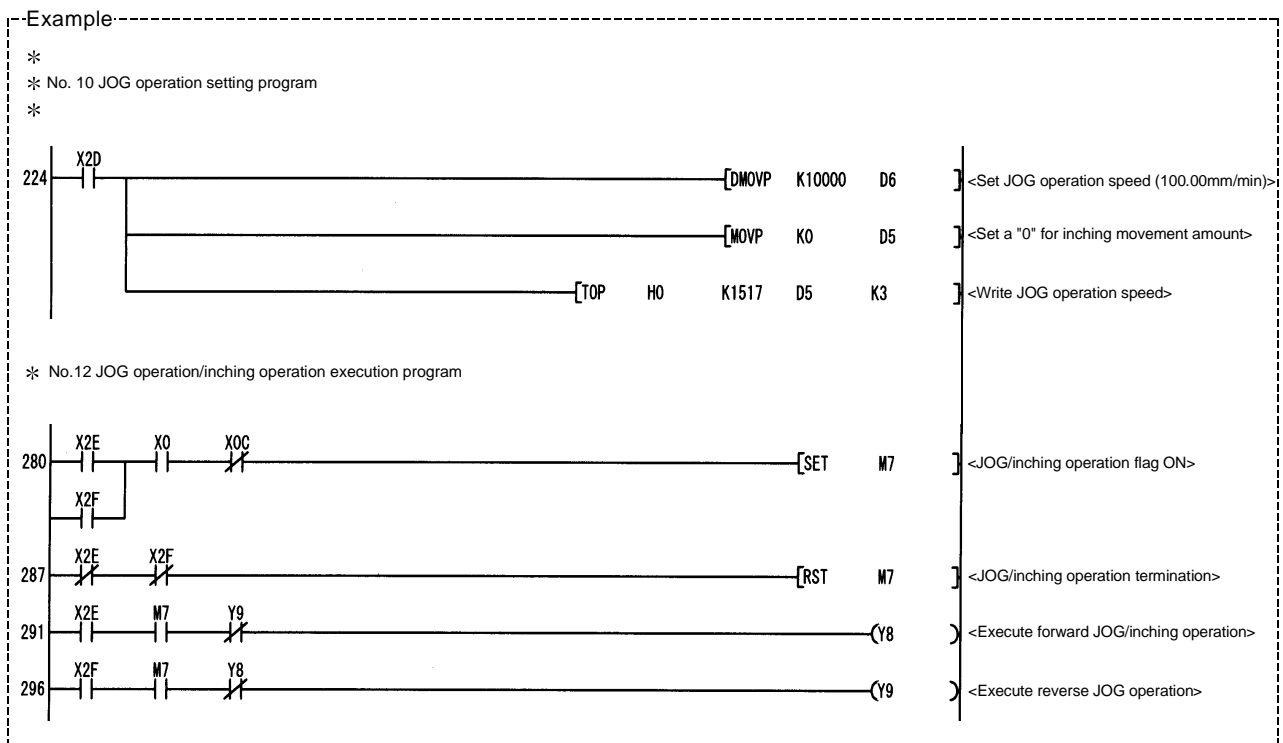


Fig. 11.6 JOG operation start time chart

■ Creating the program



11.2.5 JOG operation example

■ When the "stop signal" is turned ON during JOG operation

When the "stop signal" is turned ON during JOG operation, the JOG operation will stop by the "deceleration stop" method.
 JOG start signals will be ignored while the stop signal is ON.
 The operation can be started by turning the stop signal OFF, and turning the JOG start signal from OFF to ON again.

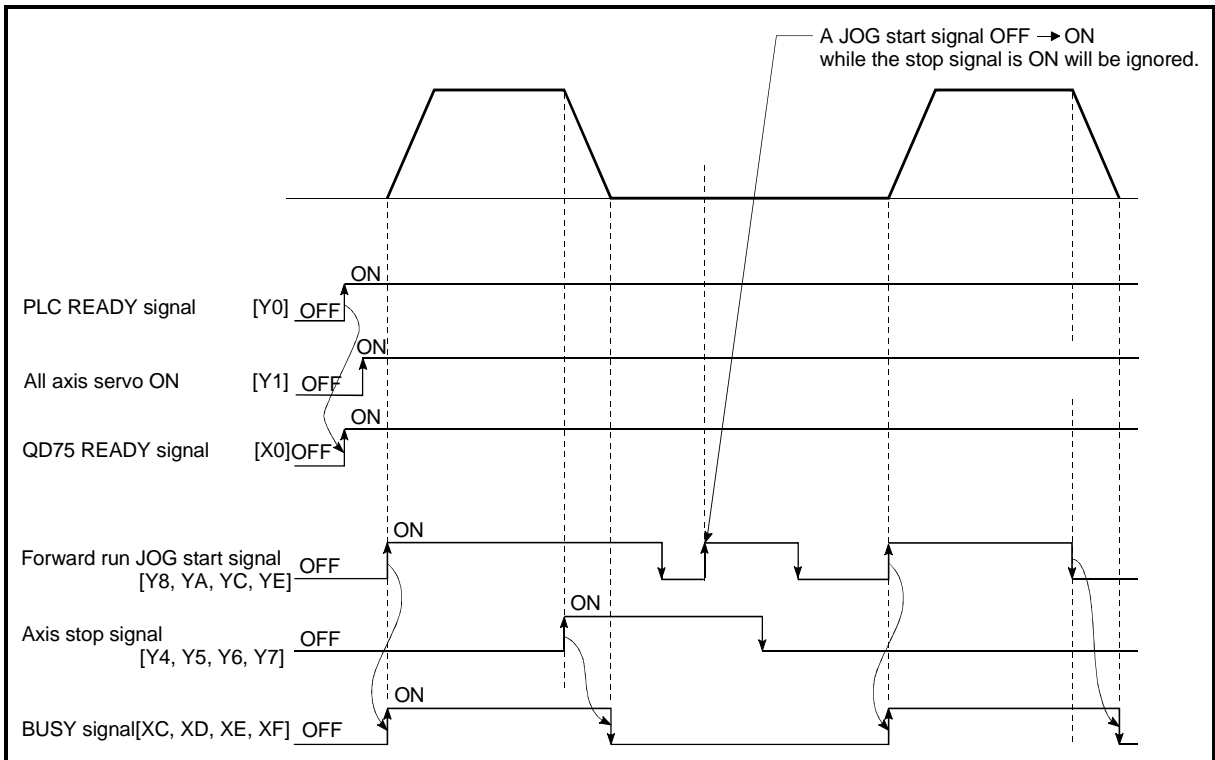


Fig. 11.7 Operation when the stop signal is turned ON during JOG operation

| |
|---|
| POINT |
| The QD75 will not receive a "JOG start signal" while the "stop signal" is ON. |

■ When both the "forward run JOG start signal" and "reverse run JOG start signal" are turned ON simultaneously for one axis

When both the "forward run JOG start signal" and "reverse run JOG start signal" are turned ON simultaneously for one axis, the "forward run JOG start signal" is given priority. In this case, the "reverse run JOG start signal" is validated when the QD75 BUSY signal is turned OFF.

If the forward run JOG operation is stopped due to stop or axis error by a stop signal, the reverse run JOG operation will not be executed even if the "reverse run JOG start signal" turns ON.

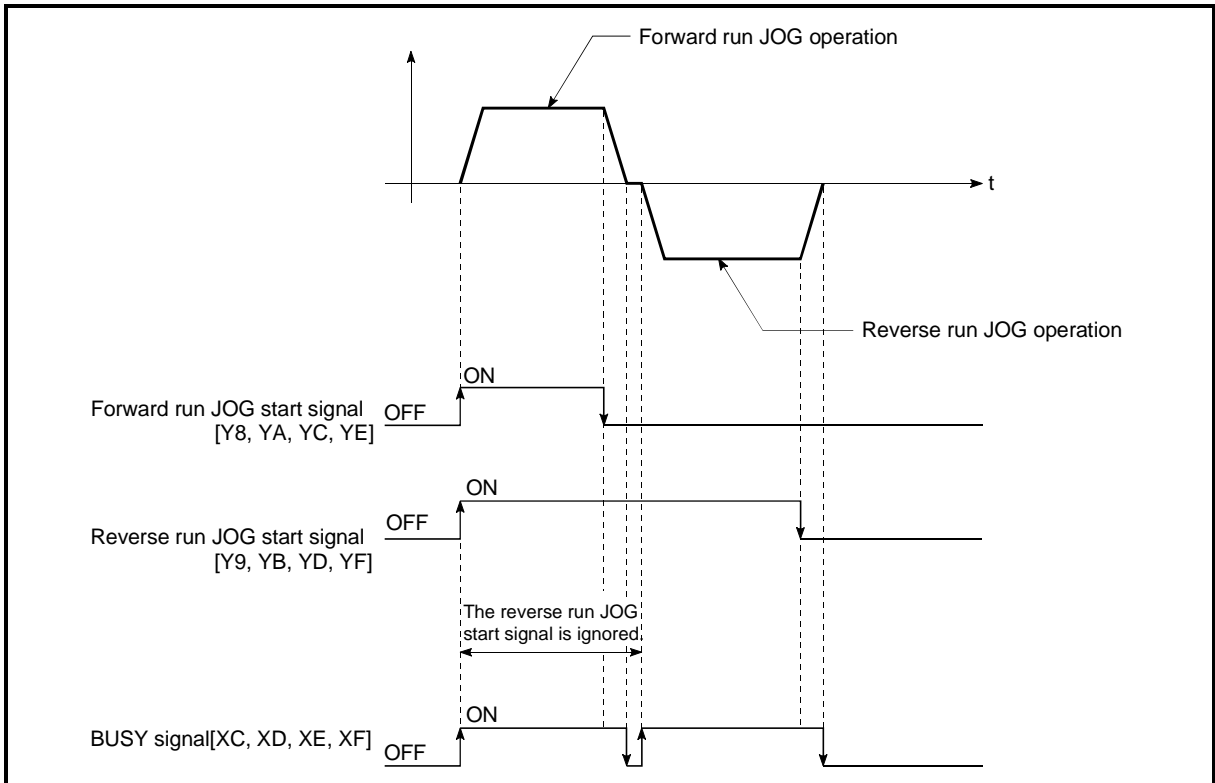


Fig. 11.8 Operation when both the forward run JOG start signal and reverse run JOG start signal are turned ON simultaneously

- When the "JOG start signal" is turned ON again during deceleration caused by the ON → OFF of the "JOG start signal"

When the "JOG start signal" is turned ON again during deceleration caused by the ON → OFF of the "JOG start signal", the JOG operation will be carried out from the time the "JOG start signal" is turned ON.

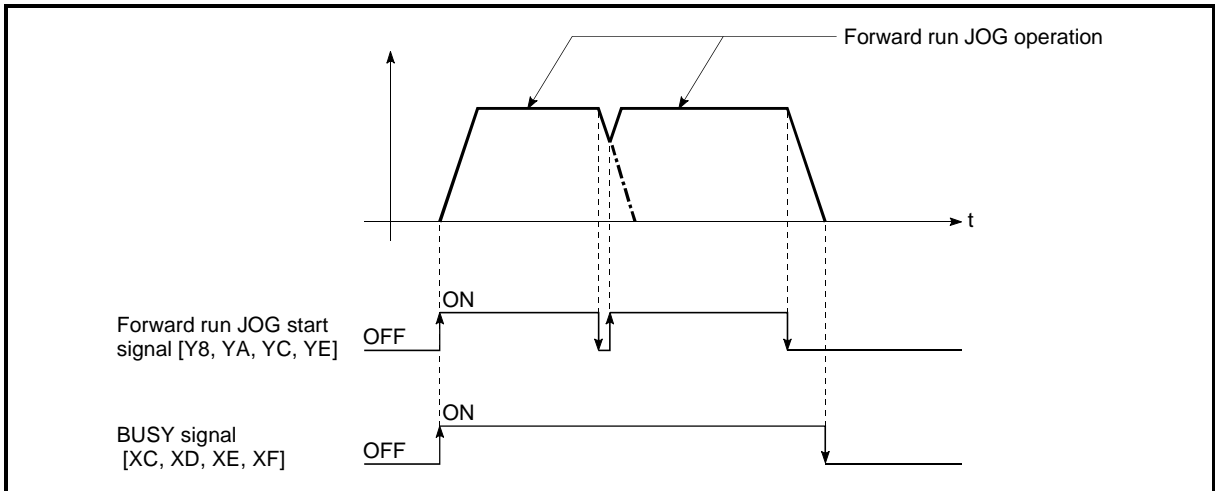


Fig. 11.9 Operation when the JOG start signal is turned ON during deceleration

- When the "JOG start signal" is turned ON during a peripheral device test mode

When the "JOG start signal" is turned ON during a peripheral device test mode, it will be ignored and the JOG operation will not be carried out.

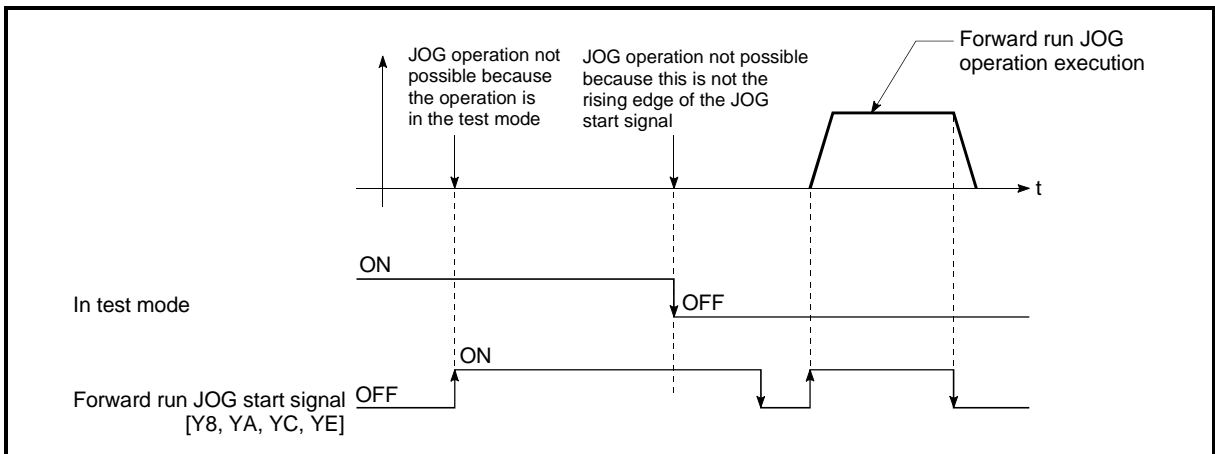


Fig. 11.10 Operation when the JOG start signal is turned ON during a test mode

- When the "JOG start signal" is turned ON immediately after the stop signal OFF (within 100ms)

When the "JOG start signal" is turned ON immediately after the stop signal OFF (within 100ms), it will be ignored and the JOG operation will not be carried out.

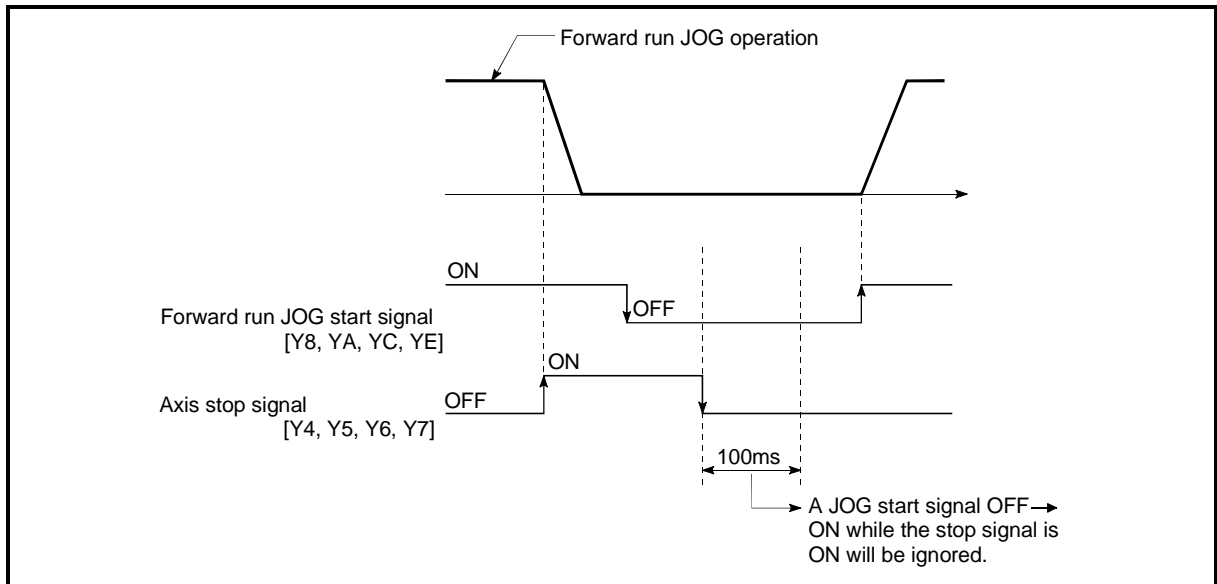


Fig. 11.11 Operation when the JOG start signal is turned ON immediately after the stop signal OFF

11.3 Inching operation

11.3.1 Outline of inching operation

Important

When the inching operation is carried out near the upper or lower limit, use the hardware stroke limit function (Refer to Section 12.4.4).

* If the hardware stroke limit function is not used, the workpiece may exceed the movement range, and an accident may result.

■ Inching operation

In inching operation, pulses are input to the servo amplifier at the first control cycle (3.5 ms) to move the workpiece by a designated movement amount after the forward run JOG start signal [Y8, YA, YC, YE] or reverse JOG start signal [Y9, YB, YD, YF] is turned ON.

The following shows the example of inching operation.

- | | |
|----|---|
| 1) | When the start signal is turned ON, inching operation is carried out in the direction designated by the start signal. In this case, BUSY signal is turned from OFF to ON. |
| 2) | The workpiece is moved by a movement amount set in " Cd.16 Inching movement amount". |
| 3) | The workpiece movement stops when the speed becomes "0". In this case, BUSY signal is turned from ON to OFF. The positioning complete signal is turned from OFF to ON. |
| 4) | The positioning complete signal is turned from ON to OFF after a time set in " Pr.40 Positioning complete signal output time" has elapsed. |

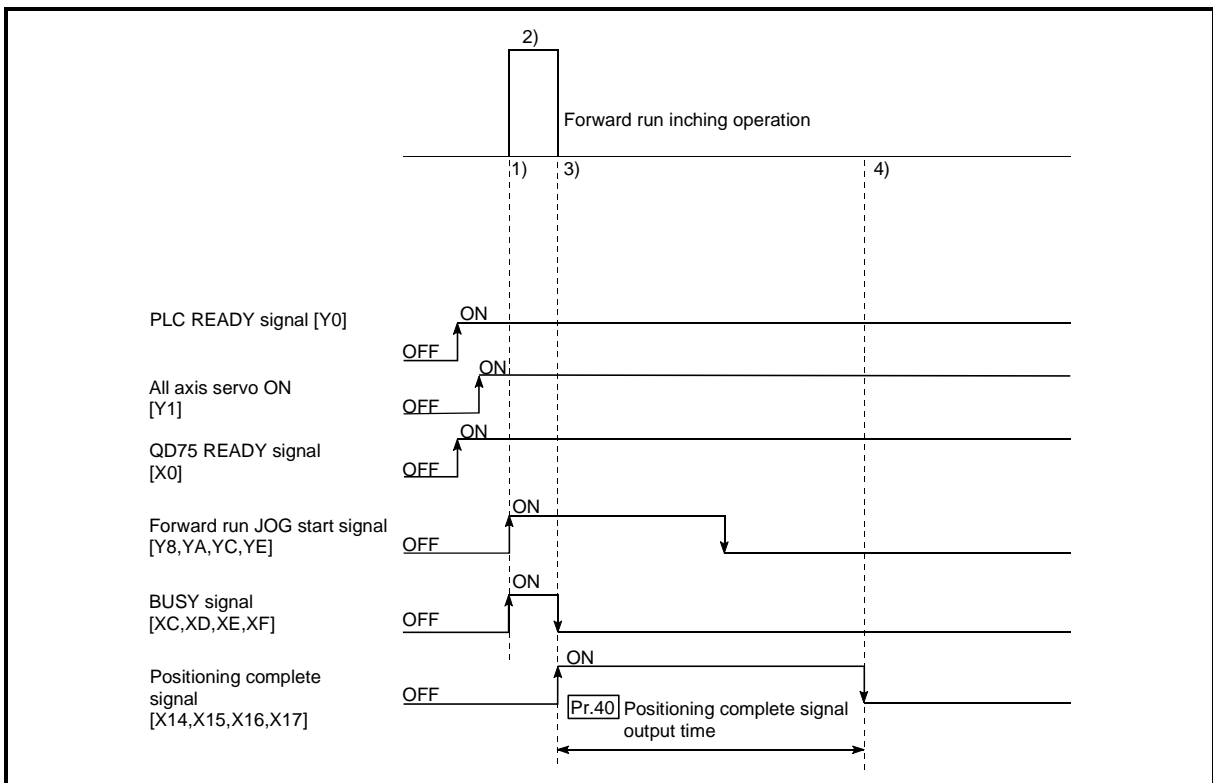


Fig. 11.12 Inching operation

■ Precautions during operation

The following details must be understood before inching operation is carried out.

- (1) Acceleration/deceleration processing is not carried out during inching operation.
 (Pulses corresponding to the designated inching movement amount are output at the first control cycle of the QD75 (3.5 ms). The movement direction of inching operation is reversed and, when a backlash compensation is carried out, first pulses corresponding to the backlash amount are output in the first control cycle of the QD75 and then pulses corresponding to the designated inching movement amount are output in the subsequent control cycles.)

The "Cd.17 JOG speed" is ignored even if it is set. An error will occur in the following cases (error code: 301).

$$(\text{Cd.16 Inching movement amount}) \times (A) > (\text{Pr.31 JOG speed limit value})$$

Where (A) is as follows.

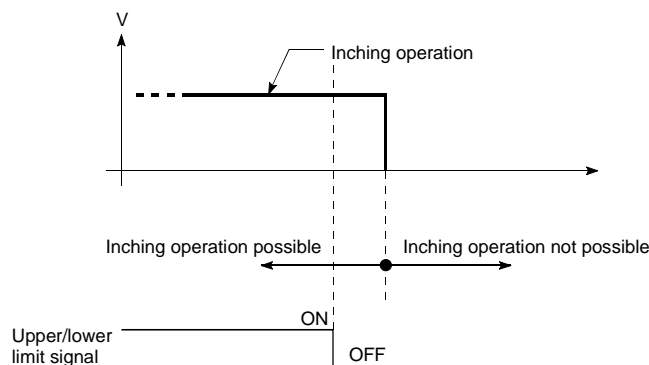
- When the unit is PLS: 281.25
- When the unit is other than PLS: 168.75

- (2) JOG start signal OFF → ON immediately after stop signal ON → OFF (within 100 ms) is ignored.
 (Operation will not start.)
- (3) Set a value other than a "0" in "Cd.16 Inching movement amount".
 If a "0" is set, the operation will become JOG operation (Refer to Section 11.2 "JOG operation").

■ Errors during operation

When the operation is stopped by the stroke limit (limit signal OFF), inching operation can be performed out in the direction in which the limit signal turns ON after an error reset.

(JOG start signals in the direction in which the limit signal turns OFF will be ignored.)



■ Inching operation timing and processing times

The following drawing shows the details of the inching operation timing and processing time.

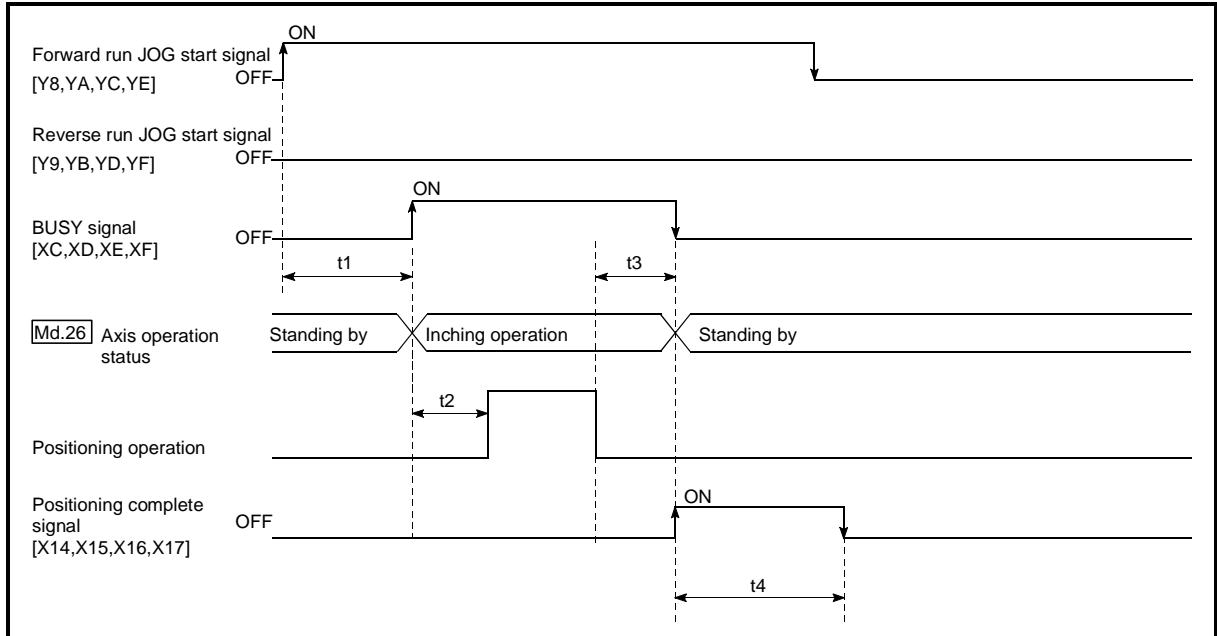


Fig. 11.13 Inching operation timing and processing times

Normal timing times

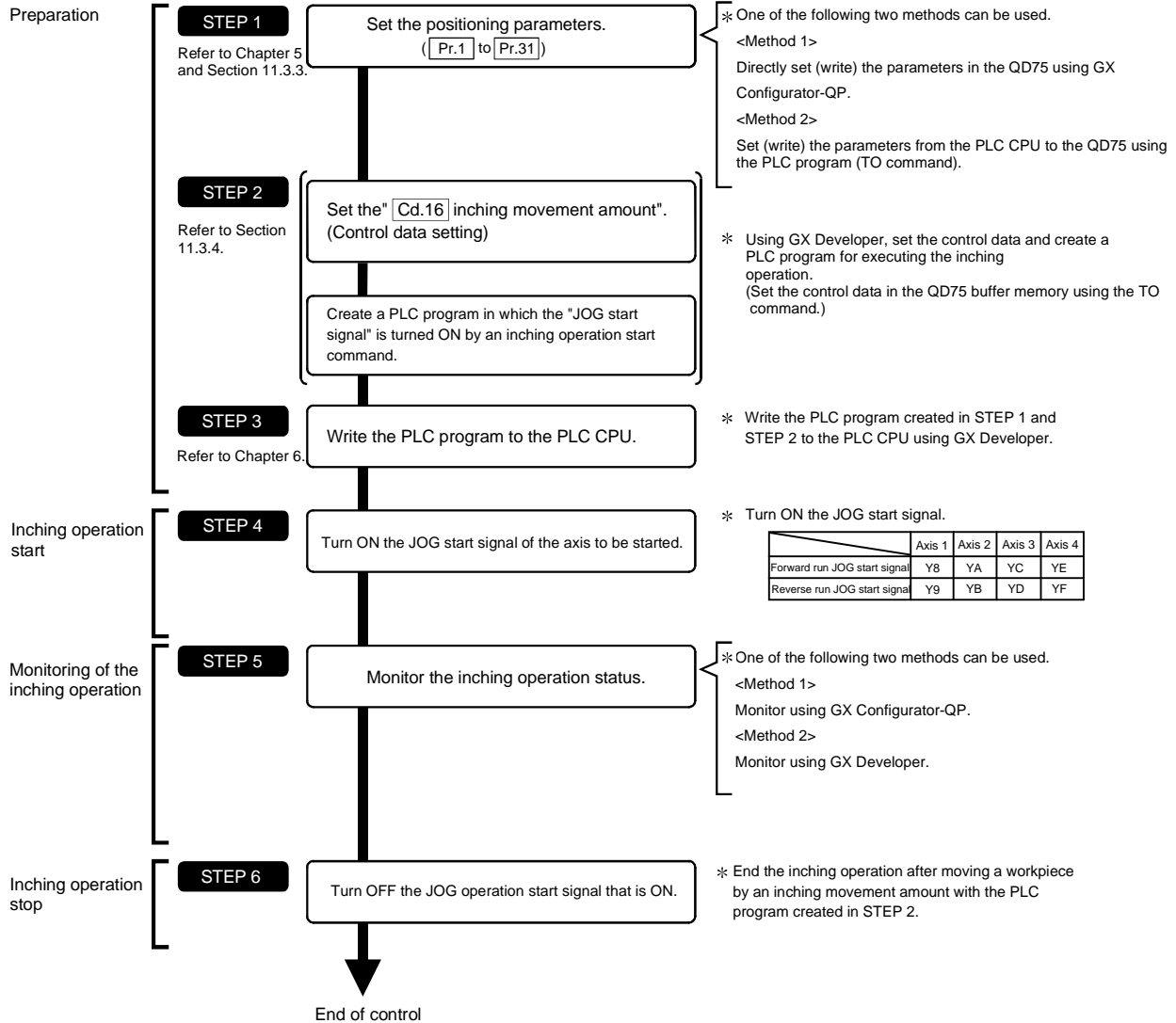
Unit : ms

| t1 | t2 | t3 | t4 |
|------------|------------|----------|-------------------------|
| 1.0 to 4.0 | 5.5 to 7.9 | 0 to 3.5 | Depending on parameters |

- Depending on the operating statuses of the other axes, delay may occur in the t1 timing time.

11.3.2 Inching operation execution procedure

The inching operation is carried out by the following procedure.



| | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|------------------------------|--------|--------|--------|--------|
| Forward run JOG start signal | Y8 | YA | YC | YE |
| Reverse run JOG start signal | Y9 | YB | YD | YF |

REMARK

- Mechanical elements such as limit switches are considered as already installed.
- Positioning parameter settings work in common for all control using the QD75.

11.3.3 Setting the required parameters for inching operation

The "Positioning parameters" must be set to carry out inching operation.

The following table shows the setting items of the required parameters for carrying out inching operation. When only inching operation will be carried out, no parameters other than those shown below need to be set. (Use the initial values or setting values within a range where no error occurs for trouble-free operation.)

| Setting item | | Setting requirement | Factory-set initial value (setting details) | |
|------------------------|-------|---|--|------------------------|
| Positioning parameters | Pr.1 | Unit setting | ☉ | 3 (PLS) |
| | Pr.2 | No. of pulses per rotation (AP) (Unit: PLS) | ☉ | 20000 |
| | Pr.3 | Movement amount per rotation (AL) (Unit: PLS) | ☉ | 20000 |
| | Pr.4 | Unit magnification (AM) | ☉ | 1 (1 times) |
| | Pr.11 | Backlash compensation amount (Unit: PLS) | ○ | 0 |
| | Pr.12 | Software stroke limit upper limit value (Unit: PLS) | ○ | 2147483647 |
| | Pr.13 | Software stroke limit lower limit value (Unit: PLS) | ○ | -2147483648 |
| | Pr.14 | Software stroke limit selection | ○ | 0 (current feed value) |
| | Pr.15 | Software stroke limit valid/invalid setting | ○ | 0 (valid) |
| | Pr.17 | Torque limit setting value (Unit: %) | ○ | 300 |
| | Pr.31 | JOG speed limit value (Unit: PLS/s) | ☉ | 20000 |

☉ : Setting always required.

○ : Set according to requirements (Leave set to the initial value when not used.)

REMARK

- Positioning parameter settings work in common for all control using the QD75. When carrying out other controls ("major positioning control", "high-level positioning control", and "OPR positioning control"), the respective setting items must also be set.
- Parameters are set for each axis.
- Refer to Chapter 5 "Data Used for Positioning Control" for setting details.

11.3.4 Creating a program to enable/disable the inching operation

A PLC program must be created to execute an inching operation. Consider the "required control data setting", "start conditions", and "start time chart" when creating the program.

The following shows an example when an inching operation is started for axis 1. (The example shows the inching operation when a "10.0 μm " is set in "Cd.16 Inching movement amount".)

■ Required control data setting

The control data shown below must be set to execute an inching operation. The setting is carried out with the PLC program.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|-------------------------------|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.16 Inching movement amount | 100 | Set the setting value so that the JOG speed limit value is not increased larger than the maximum output pulse | 1517 | 1617 | 1717 | 1817 |

* Refer to Section 5.7 "List of control data" for information on setting details.

■ Start conditions

The following conditions must be fulfilled when starting. The required conditions must also be assembled in the PLC program, and the PLC program must be configured so the operation will not start if the conditions are not fulfilled.

| Signal name | Signal state | Device | | | | | | | | |
|------------------|-----------------------------|--------|------------------------------------|--------|--------|--|-----|-----|-----|-----|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | | | | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | | | | X0 | | | |
| | All axis servo ON | ON | All axis servo ON | | | | Y1 | | | |
| | Synchronization flag * | ON | Accessible to QD75 buffer memory | | | | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF | | | | Y4 | Y5 | Y6 | Y7 |
| | Start complete signal | OFF | Start complete signal is OFF | | | | X10 | X11 | X12 | X13 |
| | BUSY signal | OFF | QD75 is not operating | | | | XC | XD | XE | XF |
| | Positioning complete signal | OFF | Positioning complete signal is OFF | | | | X14 | X15 | X16 | X17 |
| | Error detection signal | OFF | There is no error | | | | X8 | X9 | XA | XB |
| External signal | M code ON signal | OFF | M code ON signal is OFF | | | | X4 | X5 | X6 | X7 |
| | Stop signal | OFF | Stop signal is OFF | | | | - | | | |
| | Upper limit (FLS) | ON | Within limit range | | | | - | | | |
| | Lower limit (RLS) | ON | Within limit range | | | | - | | | |

* If the PLC CPU is set to the asynchronous mode in the synchronization setting, this must be inserted in the program for interlocking. If it is set to the synchronous mode, it must not be inserted in the program for interlocking because it is turned ON when the PLC CPU executes calculation.

■ Start time chart

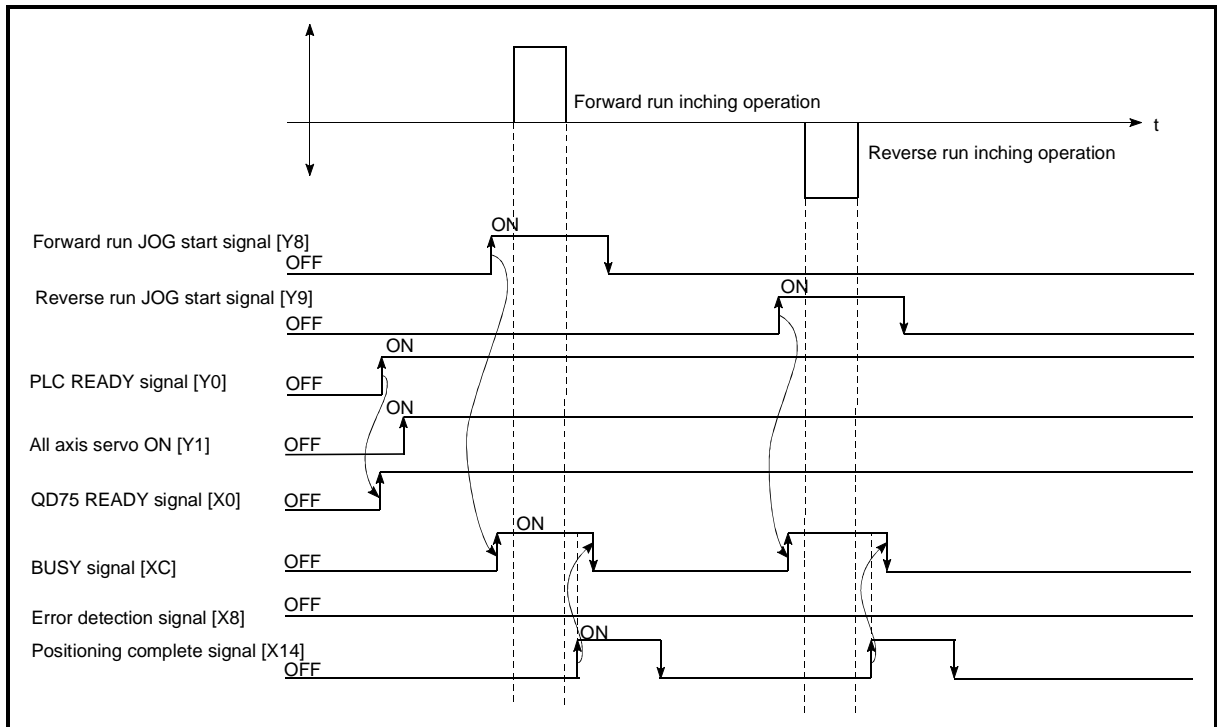
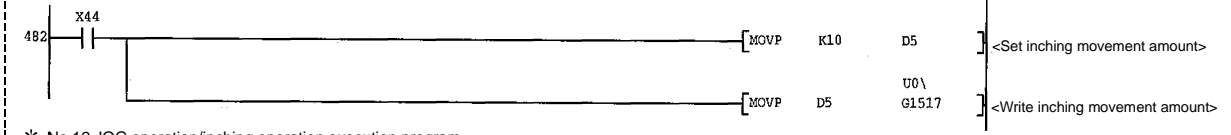


Fig. 11.14 Inching operation start time chart

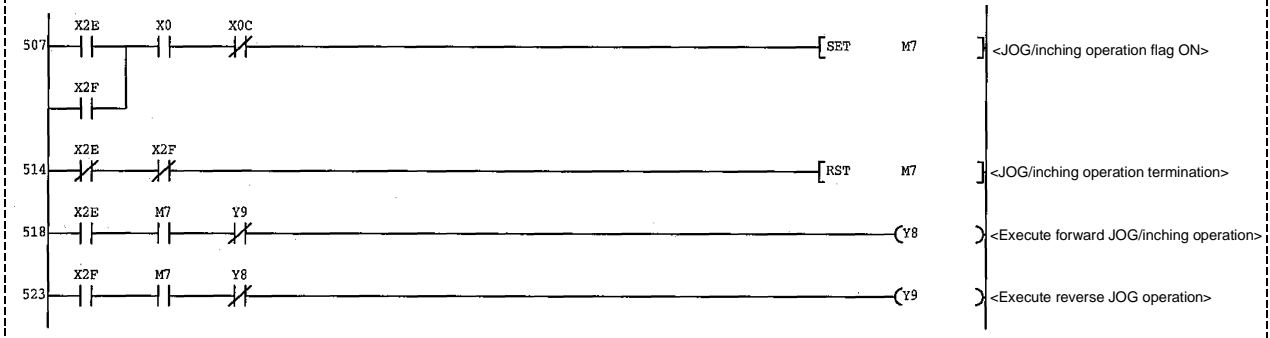
■ Creating the program

Example

*
 * No.11 Inching operation setting program
 *



* No.12 JOG operation/inching operation execution program



11.3.5 Inching operation example

■ When "stop signal" is turned ON during inching operation:

If "stop signal" is turned ON during inching operation, the inching operation will be stopped.
 While the stop signal is turned ON, the JOG start signal is ignored.
 The inching operation can be re-started when the stop signal is turned OFF and then re-turned ON.

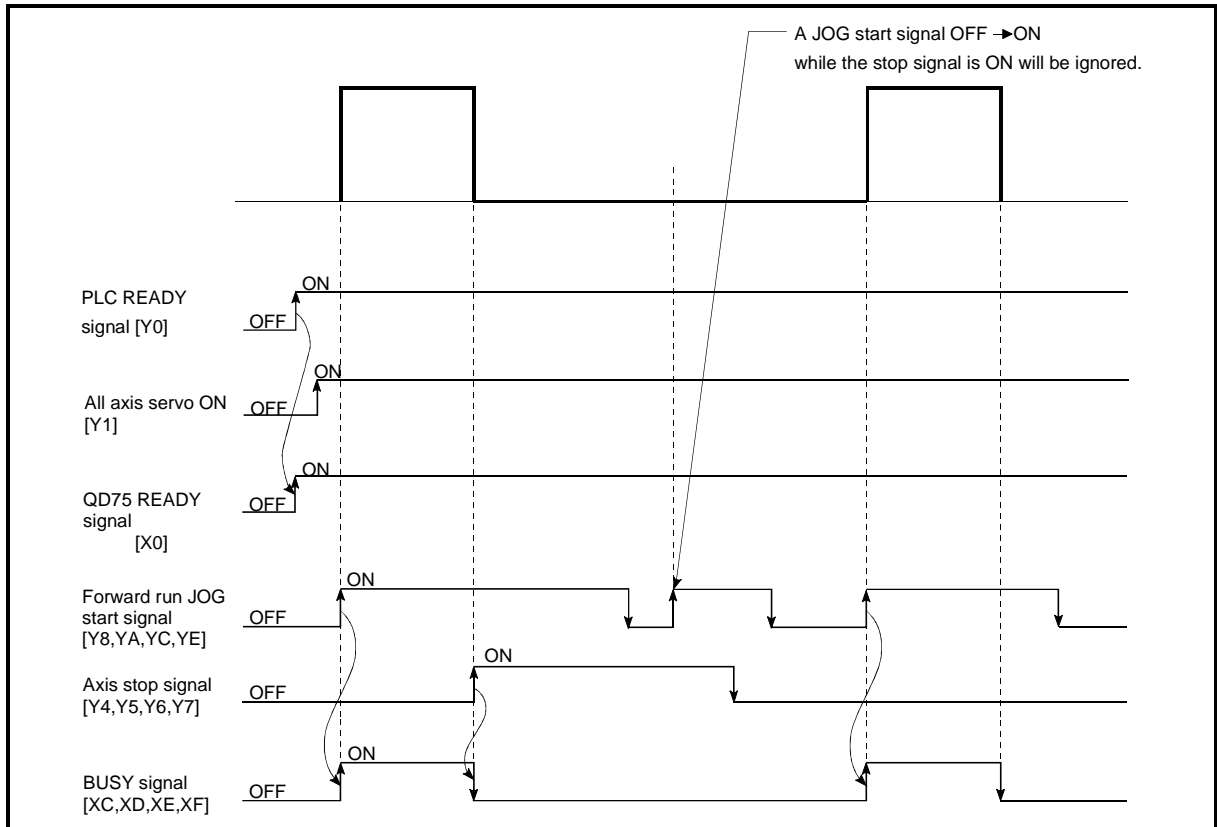


Fig. 11.15 Operation when stop signal is turned ON during inching operation

| |
|---|
| POINT |
| The QD75 will not accept "JOG start signal" while "stop signal" is turned ON. |

■ When "JOG start signal" is turned ON when peripheral devices are in the test mode:

If "JOG start signal" is turned ON when peripheral devices are in the test mode, the "JOG start signal" will be ignored and inching operation will not be carried out.

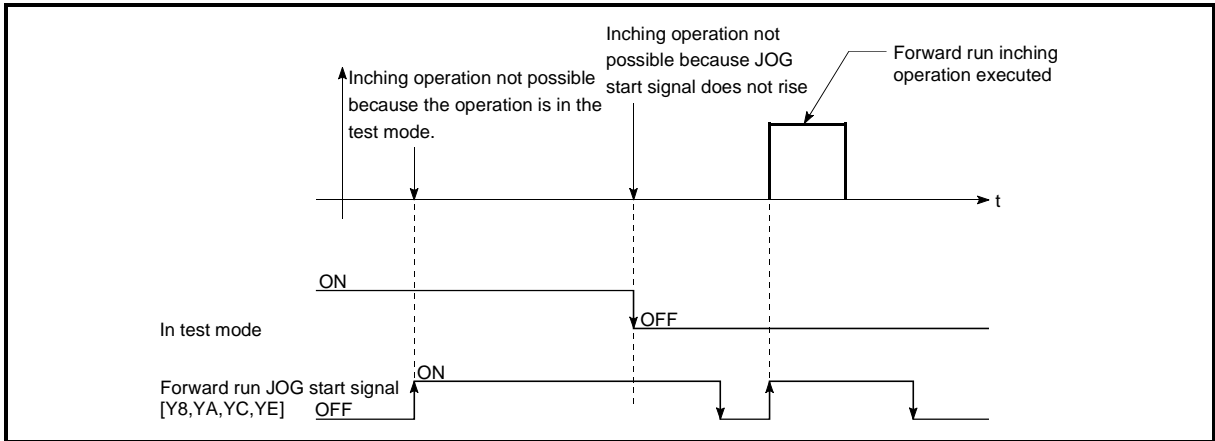


Fig. 11.16 Operation when JOG start signal is turned ON in test mode

■ When "JOG start signal" is turned ON immediately after stop signal OFF (within 100 ms):

If "JOG start signal" is turned ON immediately after the stop signal is turned OFF (within 100 ms), the "JOG start signal" will be ignored and inching operation will not be carried out.

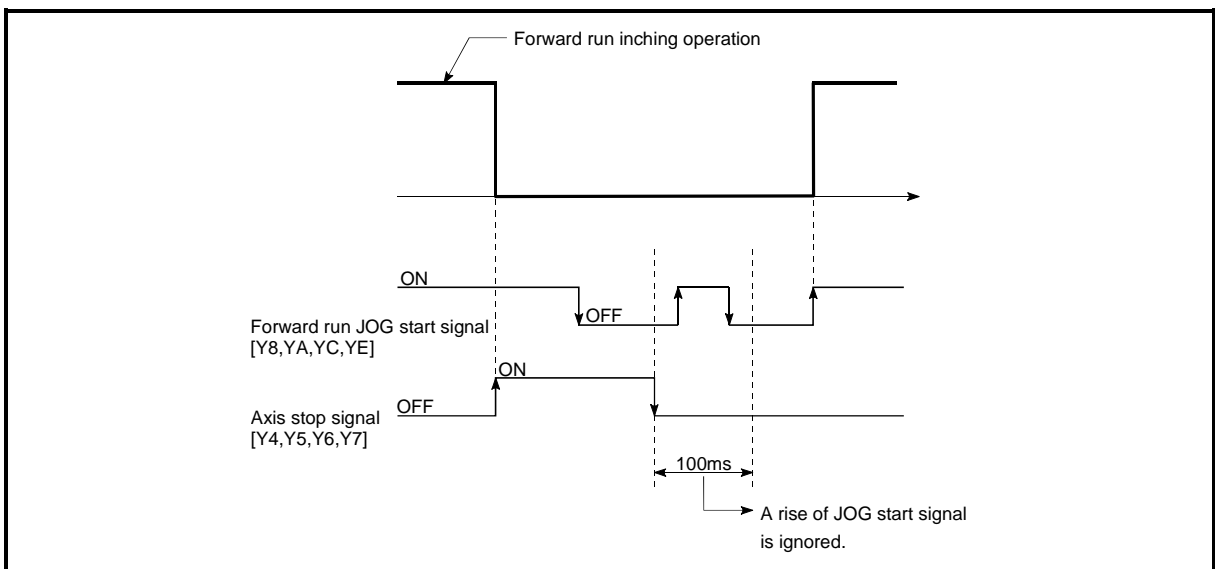


Fig. 11.17 Operation when JOG start signal is turned ON immediately after stop signal is turned OFF

11.4 Manual pulse generator operation

11.4.1 Outline of manual pulse generator operation

Important

Create the PLC program so that " [Cd.21] Manual pulse generator enable flag" is always set to "0" (disabled) when a manual pulse generator operation is not carried out.

* Mistakenly touching the manual pulse generator when the manual pulse generator enable flag is set to "1" (enable) can cause accidents or incorrect positioning.

■ Manual pulse generator operation

In manual pulse generator operations, pulses are input to the QD75 from the manual pulse generator. This causes the same No. of input pulses to be output from the QD75 to the servo amplifier, and the workpiece is moved in the designated direction.

The following shows an example of manual pulse generator operation.

- | | |
|----|---|
| 1) | When the " [Cd.21] Manual pulse generator enable flag" is set to "1", the BUSY signal turns ON and the manual pulse generator operation is enabled. |
| 2) | The workpiece is moved corresponding to the No. of pulses input from the manual pulse generator. |
| 3) | The workpiece movement stops when no more pulses are input from the manual pulse generator. |
| 4) | When the " [Cd.21] Manual pulse generator enable flag" is set to "0", the BUSY signal turns OFF and the manual pulse generator operation is disabled. |

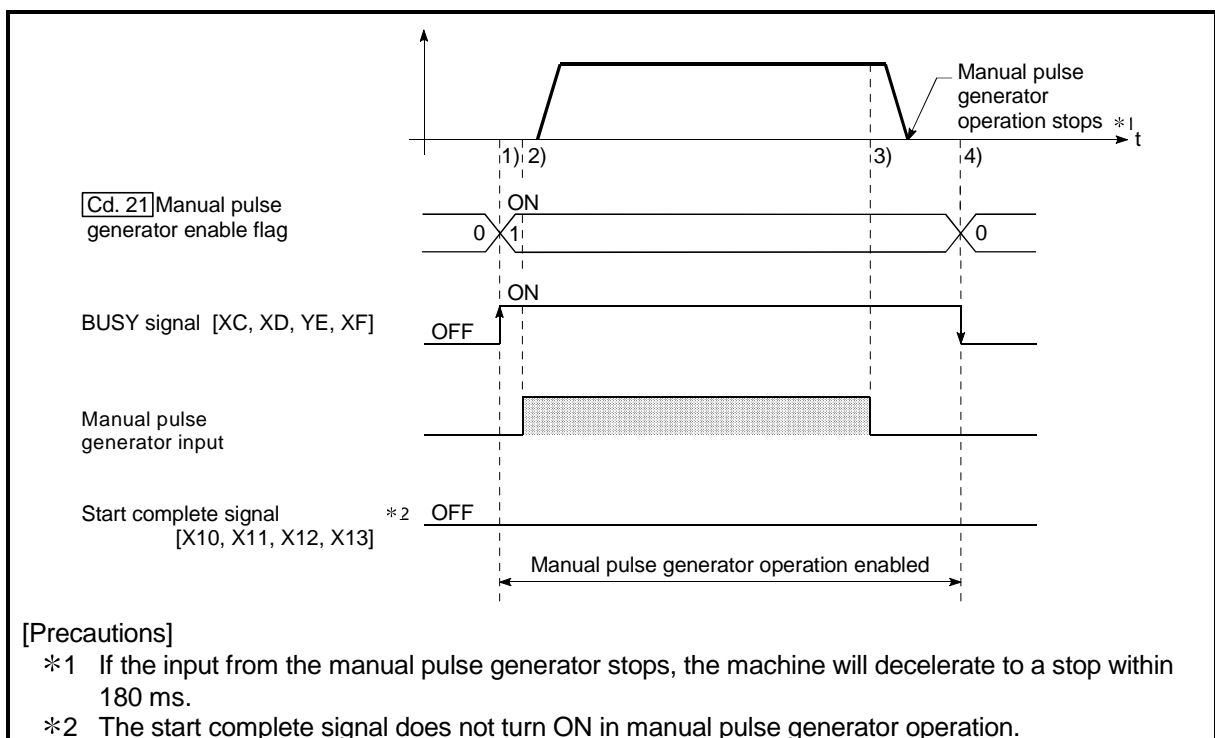


Fig. 11.18 Manual pulse generator operation

■ Restricted items

A manual pulse generator is required to carry out manual pulse generator operation.

■ Precautions during operation

The following details must be understood before carrying out manual pulse generator operation.

- (1) The speed during manual pulse generator operation is not limited by the " [Pr.8] Speed limit value".
- (2) If the " [Cd.21] Manual pulse generator enable flag" is turned ON while the QD75 is BUSY (BUSY signal ON), a warning will occur (warning code 100: start during operation).
- (3) If a stop factor occurs during manual pulse generator operation, the operation will stop, and the BUSY signal will turn OFF.
At this time, the " [Cd.21] Manual pulse generator enable flag" will be left ON, but manual pulse generator operation will not be possible. To carry out manual pulse generator operation again, measures must be carried out to eliminate the stop factor. Once eliminated, the operation can be carried out again by turning the " [Cd.21] Manual pulse generator enable flag" ON → OFF → ON.
- (4) Pulses will not be output if an error occurs when the manual pulse generator operation starts.

Important

When the speed command beyond the following calculated value is input into the positioning module using the manual pulse generator, the servo error "2035: data error" (detection of the alarm "35: command frequency error at the servo amplifier) may occur.

The following calculation formula is used to judge whether or not an error will occur.

Output pulse of manual pulse generator × Magnification × Electronic gear (number of pulses per revolution/movement amount per revolution) × Number of revolutions of manual pulse generator for one second = Speed command pps

When the speed command is larger than 2500000pps (2.5Mpps), an error may occur.

[Calculation example for setting]

$$100\text{pls} \times 50 \times 131072 / 500 \times 2 = 2621440\text{pps}$$

(Speed of two revolutions for one second) = 2.6Mpps

Occurrence of data error

With detection of an alarm at the servo amplifier, "2035: data error" will be given when the command from the positioning module is larger than 2.5Mpps.

Because the command is issued according to the pulse input irrelevant of the speed limit setting when the manual pulse generator is used for entry, "2035: data error" will occur if a speed command, which the servo amplifier cannot follow up, is input.

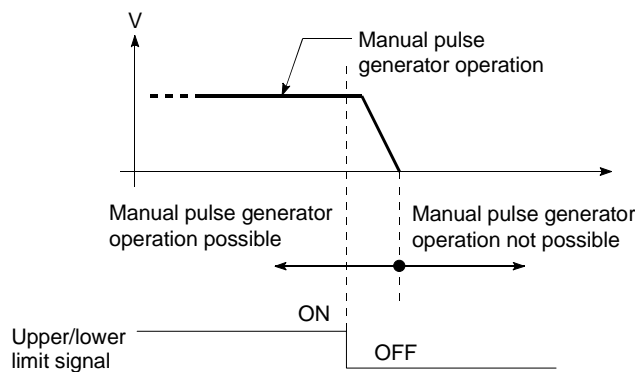
In the case of a high setting magnification, there is a high possibility of error occurrence. Therefore, perform the setting so that the setting magnification of the manual pulse generator decreases to the level where "2035: data error" will not occur.

REMARK

- One QD75 module can be connected to one manual pulse generator.
- The QD75 module can simultaneously command to the axis 1 to axis 4 servo amplifier by one manual pulse generator.
(axis 1 to axis 4 simultaneous operation is possible.)

Errors during operation

When the operation is stopped by the stroke limit (limit signal OFF), manual pulse generator operation can be performed in the direction in which the limit signal turns ON after an error reset. (An error will occur again if pulse input is provided in the direction in which the limit signal turns OFF is turned ON.)



Manual pulse generator operation timing and processing time

The following drawing shows details of the manual pulse generator operation timing and processing time.

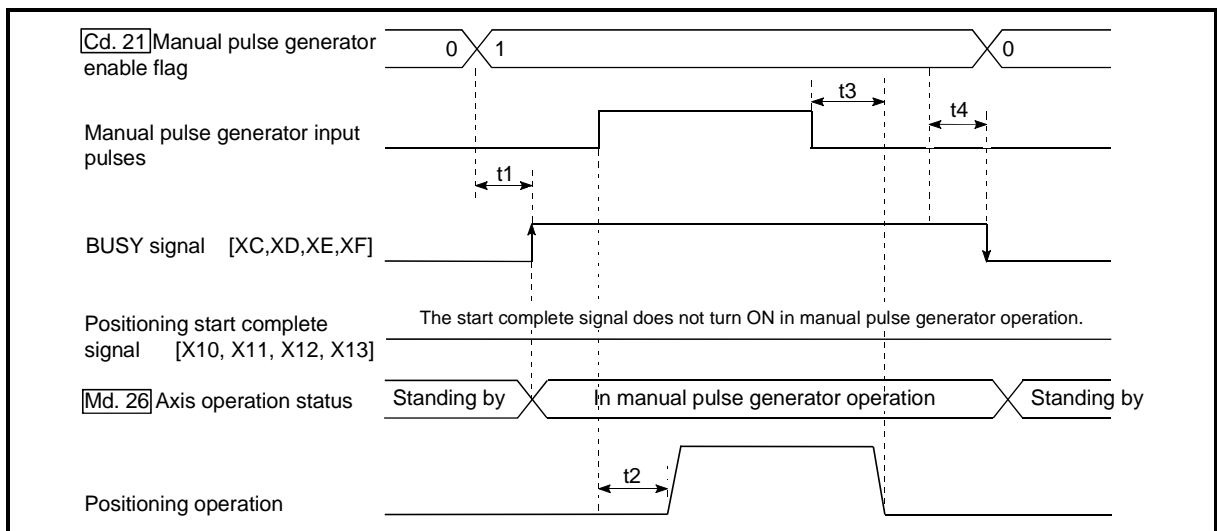


Fig. 11.19 Manual pulse generator operation timing and processing times

Normal timing times

Unit : ms

| t1 | t2 | t3 | t4 |
|-----|------|-------|-------|
| 3.6 | 56.8 | 170.7 | 113.8 |

- Delays may occur in the t1 timing time due to the operation status of other axes.

■ Position control by manual pulse generator operation

In manual pulse generator operation, the position is moved by a "manual pulse generator 1 pulse movement amount" per pulse.

The current feed value in the positioning control by manual pulse generator operation can be calculated using the expression shown below.

$$\text{Current feed value} = \text{Number of input pulses} \times \text{Cd.20 Manual pulse generator 1 pulse input magnification} \times \text{Manual pulse generator 1 pulse movement amount}$$

| | | | | |
|--|-------------|-------------|---------------|------|
| Pr.1 Unit setting | mm | inch | degree | PLS |
| Manual pulse generator 1 pulse movement amount | 0.1 μ m | 0.00001inch | 0.00001degree | 1PLS |

For example, when " Pr.1 Unit setting" is mm and " Cd.20 Manual pulse generator 1 pulse input magnification" is 2, and 100 pulses are input from the manual pulse generator, the current feed value is as follows.

$$100 \times 2 \times 0.1 = 20 [\mu\text{m}]$$

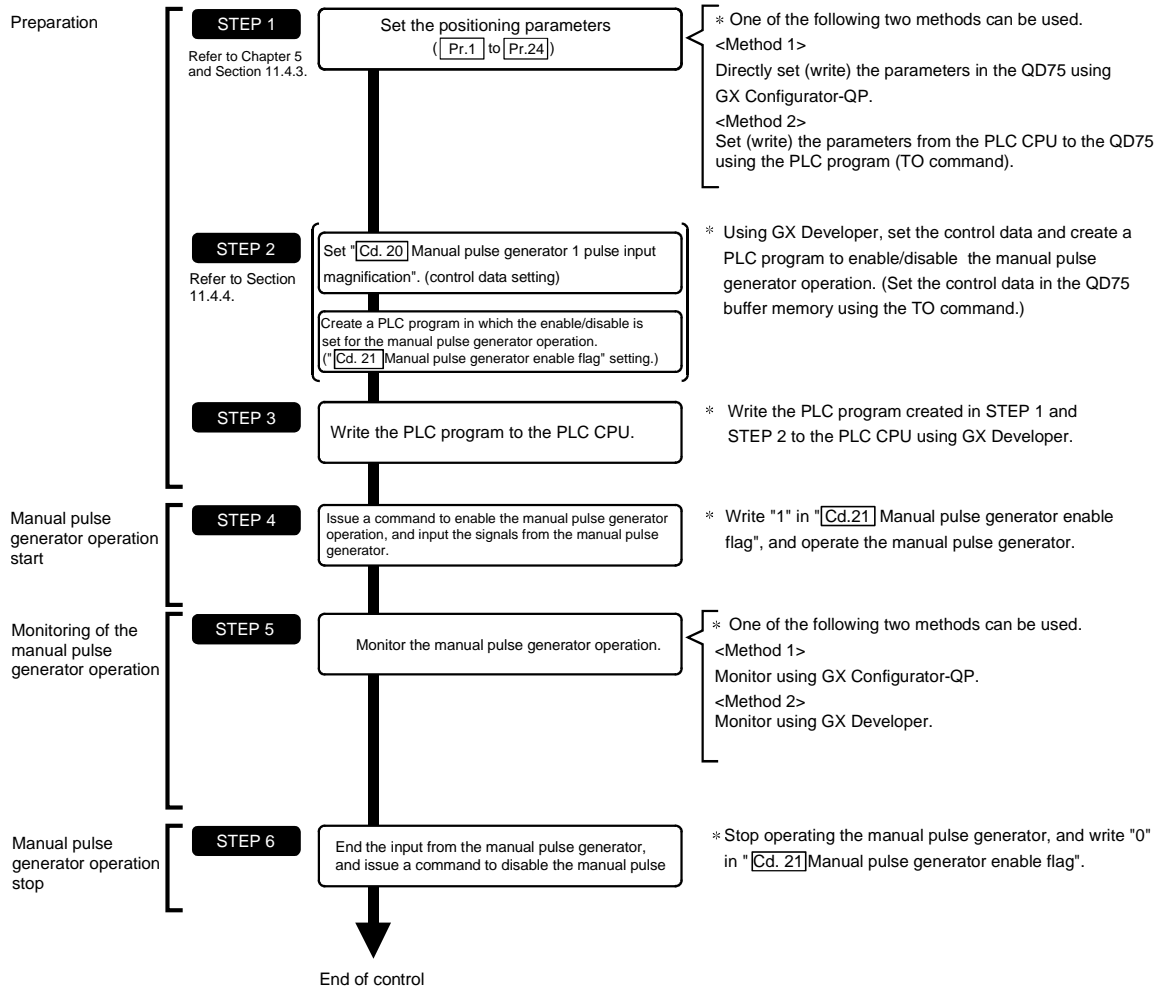
■ Speed control by manual pulse generation operation

The speed during positioning control by manual pulse generator operation is a speed corresponding to the No. of input pulses per unit time, and can be obtained using the following equation.

$$\text{Output command frequency} = \text{Input frequency} \times \text{Cd.20 Manual pulse generator 1 pulse input magnification}$$

11.4.2 Manual pulse generator operation execution procedure

The manual pulse generator operation is carried out by the following procedure.



REMARK

- Mechanical elements such as limit switches are considered as already installed.
- Positioning parameter settings work in common for all control using the QD75.

11.4.3 Setting the required parameters for manual pulse generator operation

The "Positioning parameters" must be set to carry out manual pulse generator operation.

The following table shows the setting items of the required parameters for carrying out manual pulse generator operation. When only manual pulse generator operation will be carried out, no parameters other than those shown below need to be set. (Use the initial values or setting values within a range where no error occurs for trouble-free operation.)

| Setting item | | Setting requirement | Factory-set initial value (setting details) | |
|------------------------|-------|---|--|---|
| Positioning parameters | Pr.1 | Unit setting | ◎ | 3 (PLS) |
| | Pr.2 | No. of pulses per rotation (AP) (Unit: PLS) | ◎ | 20000 |
| | Pr.3 | Movement amount per rotation (AL) (Unit: PLS) | ◎ | 20000 |
| | Pr.4 | Unit magnification (AM) | ◎ | 1 (1 times) |
| | Pr.8 | Speed limit value (Unit: PLS/s) | ◎ | 200000 |
| | Pr.11 | Backlash compensation amount (Unit: PLS) | ○ | 0 |
| | Pr.12 | Software stroke limit upper limit value (Unit: PLS) | ○ | 2147483647 |
| | Pr.13 | Software stroke limit lower limit value (Unit: PLS) | ○ | -2147483648 |
| | Pr.14 | Software stroke limit selection | ○ | 0 (current feed value) |
| | Pr.15 | Software stroke limit valid/invalid setting | ○ | 0 (valid) |
| | Pr.17 | Torque limit setting value (Unit: %) | ○ | 300 |
| | Pr.22 | Input signal logic selection | ○ | 0 (Manual pulse generator input is negative logic.) |
| | Pr.24 | Manual pulse generator input selection | ○ | 0 (4 times multiplication of A phase/B phase) |

◎ : Setting always required.

○ : Set according to requirements (Leave set to the initial value when not used.)

| |
|---------------|
| REMARK |
|---------------|

- Positioning parameter settings work in common for all control using the QD75. When carrying out other control ("major positioning control", "high-level positioning control", "OPR positioning control"), the respective setting items must also be matched and set.
- Parameters are set for each axis. But Pr.22 Manual pulse generator input logic (b8), Pr.24 is set only for axis 1. (The setting for axes 2,3, and 4 is ignored.)
- Refer to Chapter 5 "Data Used for Positioning Control" for setting details.

11.4.4 Creating a program to enable/disable the manual pulse generator operation

A PLC program must be created to execute a manual pulse generator operation. Consider the "required control data setting", "start conditions" and "start time chart" when creating the program.

The following shows an example when a manual pulse generator operation is started for axis 1.

■ Required control data setting

The control data shown below must be set to execute a manual pulse generator operation. The setting is carried out with the PLC program.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|--|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.20 Manual pulse generator 1 pulse input magnification | 1 | Set the manual pulse generator 1 pulse input magnification. | 1522 1523 | 1622 1623 | 1722 1723 | 1822 1823 |
| Cd.21 Manual pulse generator enable flag | 1 (0) | Set "1: Enable manual pulse generator operation". (Set "0: Disable manual pulse generator operation" when finished with the manual pulse generator operation.) | 1524 | 1624 | 1724 | 1824 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

■ Start conditions

The following conditions must be fulfilled when starting. The required conditions must also be assembled in the PLC program, and the PLC program must be configured so the operation will not start if the conditions are not fulfilled.

| Signal name | Signal state | Device | | | | | | | | |
|------------------|------------------------|-------------------------|---|--------|--------|----|-----|-----|-----|-----|
| | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | | |
| Interface signal | PLC READY signal | ON | PLC CPU preparation completed | | | | Y0 | | | |
| | QD75 READY signal | ON | QD75 preparation completed | | | | X0 | | | |
| | All axis servo ON | ON | All axis servo ON | | | | Y1 | | | |
| | Synchronization flag * | ON | QD75 buffer memory The access is possible. | | | | X1 | | | |
| | Axis stop signal | OFF | Axis stop signal is OFF | | | | Y4 | Y5 | Y6 | Y7 |
| | Start complete signal | OFF | Start complete signal is OFF | | | | X10 | X11 | X12 | X13 |
| | BUSY signal | OFF | QD75 is not operating | | | | XC | XD | XE | XF |
| | Error detection signal | OFF | There is no error | | | | X8 | X9 | XA | XB |
| M code ON signal | OFF | M code ON signal is OFF | | | | X4 | X5 | X6 | X7 | |
| External signal | Stop signal | OFF | Stop signal is OFF | | | | - | | | |
| | Upper limit (FLS) | ON | Within limit range | | | | - | | | |
| | Lower limit (RLS) | ON | Within limit range | | | | - | | | |

* If the PLC CPU is set to the asynchronous mode in the synchronization setting, this must be inserted in the program for interlocking. If it is set to the synchronous mode, it must not be inserted in the program for interlocking because it is turned ON when the PLC CPU executes calculation.

■ Start time chart

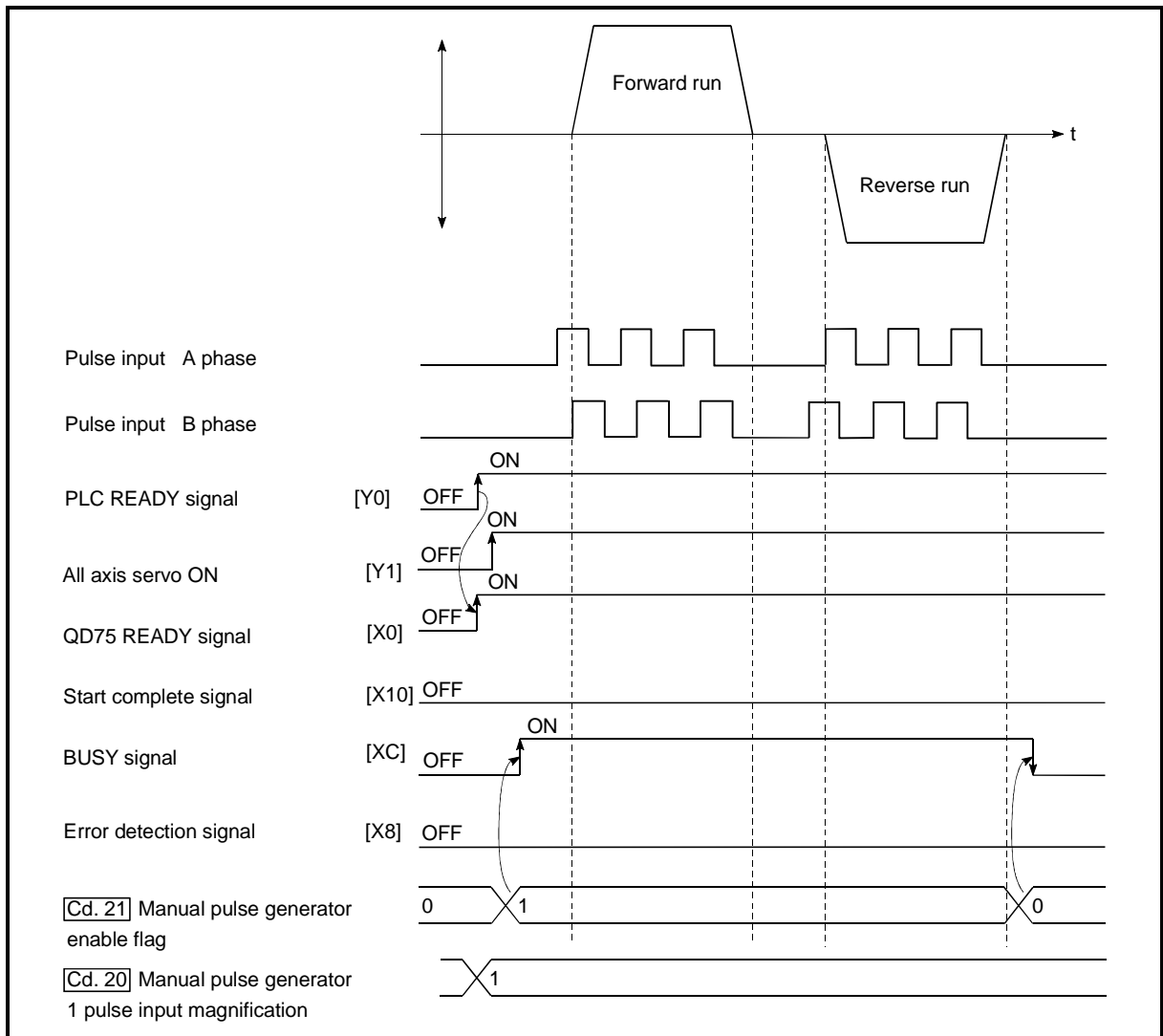
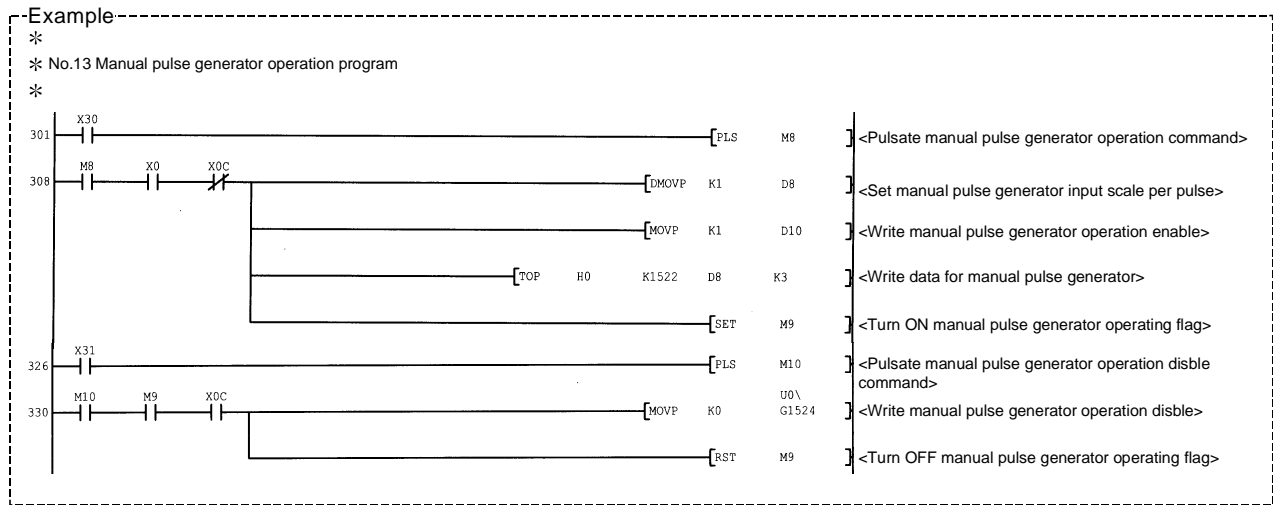


Fig. 11.20 Manual pulse generator operation start time chart

■ Creating the program



MEMO

Chapter 12 Control Sub Functions

The details and usage of the "sub functions" added and used in combination with the main functions are explained in this chapter.

A variety of sub functions are available, including functions specifically for machine OPR and generally related functions such as control compensation, etc. More appropriate, finer control can be carried out by using these sub functions. Each sub function is used together with a main function by creating matching parameter settings and PLC programs. Read the execution procedures and settings for each sub function, and set as required.

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12.1 Outline of sub functions

"Sub functions" are functions that compensate, limit, add functions, etc., to the control when the main functions are executed. These sub functions are executed by parameter settings, commands from GX Configurator-QP, sub function PLC programs, etc.

12.1.1 Outline of sub functions

The following table shows the types of sub functions available.

| Sub function | | Details |
|---|--|--|
| Functions characteristic to machine OPR | OPR retry function | This function retries the OPR with the upper/lower limit switches during machine OPR. This allows machine OPR to be carried out even if the axis is not returned to before the near-point dog with JOG operation, etc. |
| | OP shift function | After returning to the machine OP, this function offsets the position by the designated distance from the machine OP position and sets that position as the OP address. |
| Functions that compensate control | Backlash compensation function | This function compensates the mechanical backlash. Feed pulses equivalent to the set backlash amount are output each time the movement direction changes. |
| | Electronic gear function | By setting the movement amount per pulse, this function can freely change the machine movement amount per commanded pulse. When the movement amount per pulse is set, a flexible positioning system that matches the machine system can be structured. |
| | Near pass function *1 | This function suppresses the machine vibration when the speed changes during continuous path control in the interpolation control. |
| Functions that limit control | Speed limit function | If the command speed exceeds " [Pr.8] Speed limit value" during control, this function limits the commanded speed to within the " [Pr.8] Speed limit value" setting range. |
| | Torque limit function | If the torque generated by the servomotor exceeds " [Pr.17] Torque limit setting value" during control, this function limits the generated torque to within the " [Pr.17] Torque limit setting value" setting range. |
| | Software stroke limit function | If a command outside of the upper/lower limit stroke limit setting range, set in the parameters, is issued, this function will not execute positioning for that command. |
| | Hardware stroke limit function | This function carries out deceleration stop with the limit switch connected to the QD75 external device connector. |
| Functions that change control details | Speed change function | This function changes the speed during positioning. Set the changed speed in the speed change buffer memory ([Cd.14] New speed value), and change the speed with the speed change request ([Cd.15] Speed change request). |
| | Override function | This function changes the speed within a percentage of 1 to 300% during positioning. This is executed using " [Cd.13] Positioning operation speed override". |
| | Acceleration/deceleration time change function | This function changes the acceleration/deceleration time during speed change. |
| | Torque change function | This function changes the "torque limit value" during control. |

*1 The near pass function is validated only when the machine of the standard specification carries out the position control with the continuous path control mode.

It cannot be invalidated with parameters.

| Sub function | Details | |
|--|--|---|
| Absolute position system function | This function holds the current value. This function sets the absolute position coordinate in relation to the OP in the machine movement range, and prevent the OP from being lost even if the power supply is turned OFF to ON. | |
| Other functions | Step function | This function temporarily stops the operation to confirm the positioning operation during debugging, etc. The operation can be stopped at each "automatic deceleration" or "positioning data". |
| | Skip function | This function stops the positioning being executed (decelerates to a stop) when the skip signal is input, and carries out the next positioning. |
| | M code output function | This function issues a sub work (clamp or drill stop, tool change, etc.) according to the code No. (0 to 65535) set for each positioning data. |
| | Teaching function | This function stores the address positioned with manual control into the positioning address ([Da.6] Positioning address/movement amount) having the designated positioning data No. |
| | Target position change function | This function changes the target position during the execution of positioning. At the same time, this also can change the speed. |
| | Command in-position function | At each automatic deceleration, this function calculates the remaining distance for the QD75 to reach the positioning stop position, and when the value is less than the set value, sets the "command in-position flag". When using another sub work before ending the control, use this function as a trigger for the sub work. |
| | Acceleration/deceleration process function | This function adjusts the control acceleration/deceleration. |
| | Pre-reading start function | This function shortens the virtual start time. |
| Deceleration start flag function | Function that turns ON the flag when the constant speed status or acceleration status switches to the deceleration status during position control, whose operation pattern is "Positioning complete", to make the stop timing known. | |
| Stop command processing for deceleration stop function | Function that selects a deceleration curve when a stop cause occurs during deceleration stop processing to speed 0. | |

12.2 Sub functions specifically for machine OPR

The sub functions specifically for machine OPR include the "OPR retry function" and "OP shift function". Each function is executed by parameter setting.

12.2.1 OPR retry function

When the workpiece goes past the OP without stopping during positioning control, it may not move back in the direction of the OP although a machine OPR is commanded, depending on the workpiece position. This normally means the workpiece has to be moved to a position before the near-point dog by a JOG operation, etc., to start the machine OPR again. However, by using the OPR retry function, a machine OPR can be carried out regardless of the workpiece position.

The details shown below explain about the "OPR retry function".

- [1] Control details
- [2] Precautions during control
- [3] Setting the OPR retry function

[1] Control details

The following drawing shows the operation of the OPR retry function.

- (1) OPR retry point return retry operation when the workpiece is within the range between the upper and lower limits.

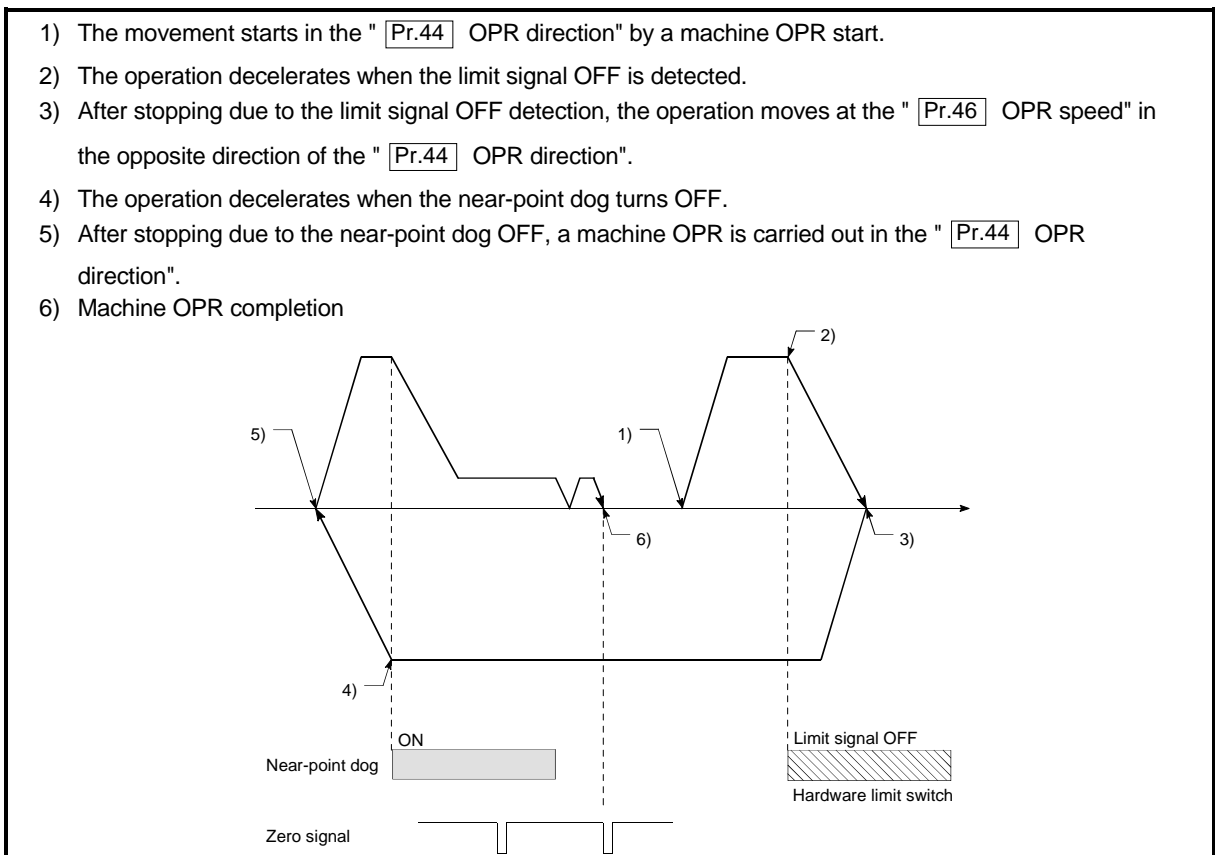
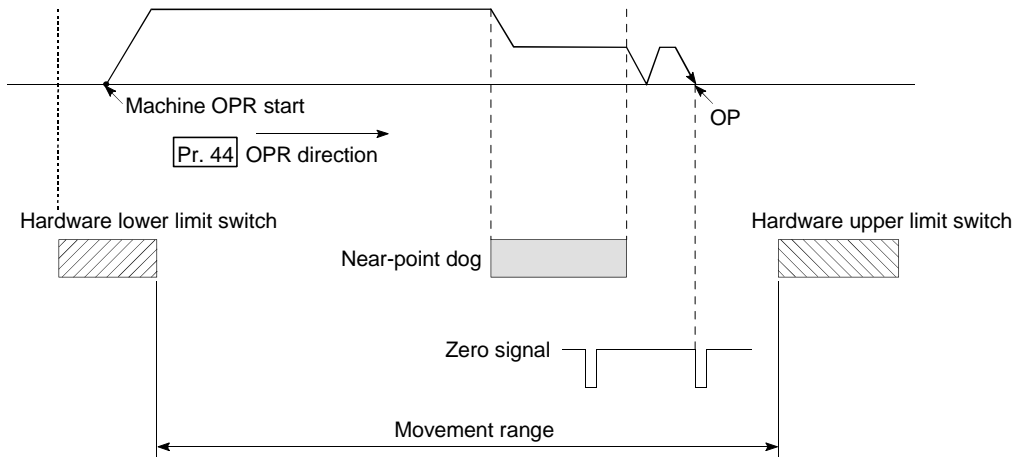


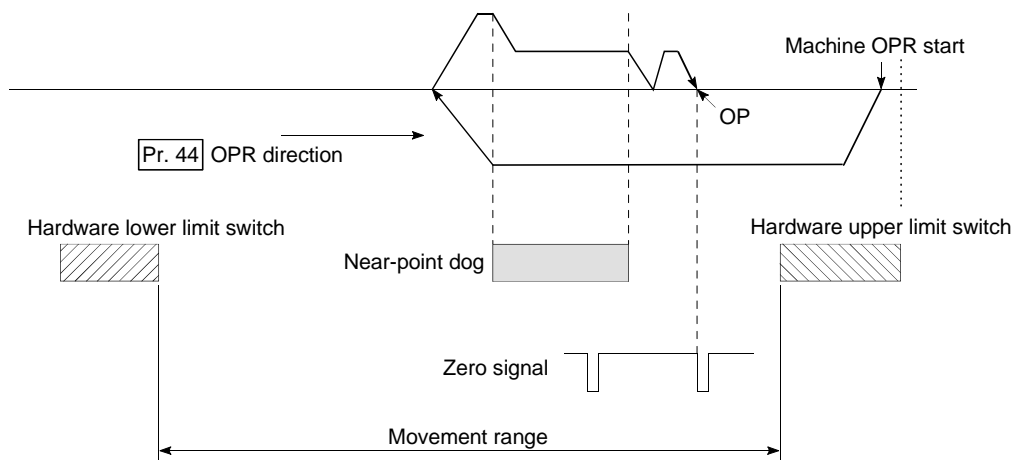
Fig. 12.1 OPR retry operation by limit signal detection

(2) OPR retry operation when the workpiece is outside the range between the upper and lower limits.

1) When the direction from the workpiece to the OP is the same as the "Pr.44 OPR direction", a normal machine OPR is carried out.



2) When the direction from the workpiece to the OP is the opposite direction from the "Pr.44 OPR direction", the operation carries out a deceleration stop when the near-point dog turns OFF, and then carries out a machine OPR in the direction set in "Pr.44 OPR direction".



* In the above example 1) and 2), "0: Positive direction" is set in "Pr.44 OPR direction"

REMARK

- When the "0: Positive direction" is selected in "Pr.44 OPR direction", the upper limit switch is set to the limit switch in the OPR direction.
- When the "1: Negative direction" is selected in "Pr.44 OPR direction", the lower limit switch is set to the limit switch in the OPR direction.
- If inverting the install positions of upper/lower limit switches, hardware stroke limit function cannot be operated properly.
If problem is found when "Pr.114 Rotation direction selection" and the wiring for the upper/lower limit switch are checked.

Fig. 12.2 OPR retry operation from on limit (limit signal OFF)

- (3) Setting the dwell time during an OPR retry
 The OPR retry function can perform such function as the dwell time using " Pr.57 Dwell time at OPR retry" when the reverse run operation is carried out due to detection by the limit signal for upper and lower limits and when the machine OPR is executed after the near point dog is turned OFF to stop the operation.
- " Pr.57 Dwell time during OPR " is validated when the operation stops at the "A" and "B" positions in the following drawing. (The dwell time is the same value at both positions "A" and "B".)

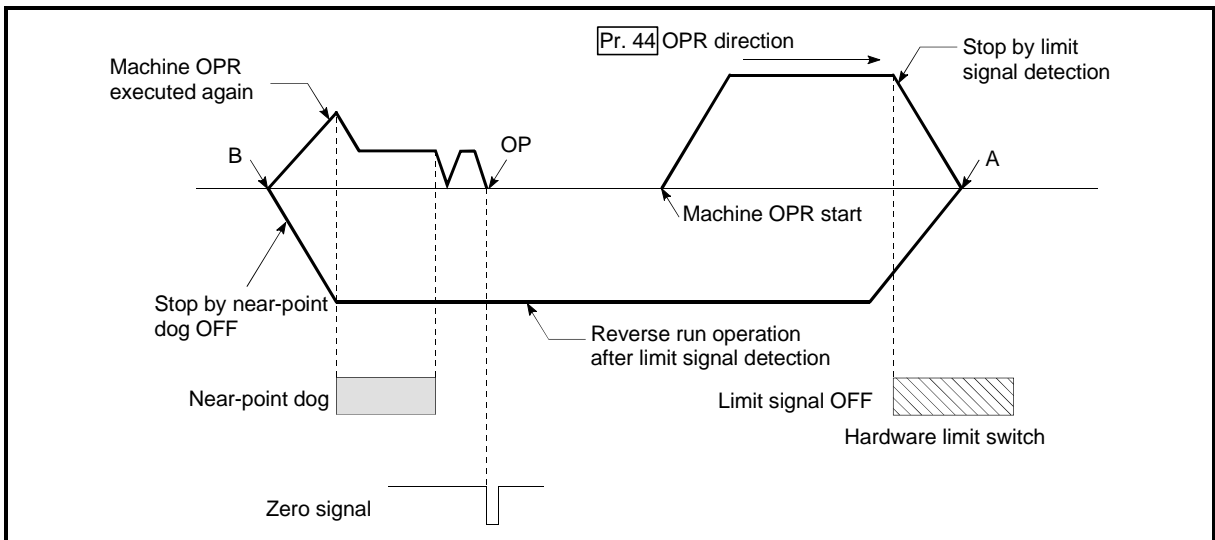


Fig. 12.3 Setting the dwell time during an OPR retry

[2] Precaution during control

(1) The following table shows whether the OPR retry function may be executed by the " [Pr.43] OPR method".

| [Pr.43] OPR method | Execution status of OPR retry function |
|-----------------------|--|
| Near-point dog method | ○ : Execution possible |
| Count method 1) | ○ : Execution possible |
| Count method 2) | ○ : Execution possible |
| Data set method | — : |

- (2) Always establish upper/lower limit switches at the upper/lower limit positions of the machine, and connect an QD75 module. If the OPR retry function is used without hardware stroke limit switches, the motor will continue rotation until a hardware stroke limit signal is detected.
- (3) Always wire QD75 upper/lower limit switches even when the OPR function is invalidated. Control cannot be carried out with the QD75 unless the wiring is carried out.
- (4) Do not carry out settings so that the servo amplifier power turns OFF by the upper/lower limit switches connected to the QD75. If the servo amplifier power is turned OFF, the OPR retry cannot be carried out.
- (5) The operation decelerates upon detection of the hardware limit signal, and the movement starts in the opposite direction. In this case, however, an error (104, 105) is not produced.

[3] Setting the OPR retry function

To use the "OPR retry function", set the required details in the parameters shown in the following table, and write them to the QD75.

When the parameters are set, the OPR retry function will be added to the machine OPR control. The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0). Set " [Pr.57] Dwell time during OPR retry" according to the user's requirements.

| Setting item | Setting value | Setting details | Factory-set initial value |
|-------------------------------------|---------------|--|---------------------------|
| [Pr.48] OPR retry | 1 | Set "1: Carry out OPR retry by limit switch". | 0 |
| [Pr.57] Dwell time during OPR retry | → | Set the deceleration stop time during OPR retry. (Random value between 0 and 65535 (ms)) | 0 |

* Refer to Section 5.2 "List of parameters" for setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.2.2 OP shift function

When a machine OPR is carried out, the OP is normally established using the near-point dog, stopper, and zero signal. However, by using the OP shift function, the machine can be moved a designated movement amount from the position where the zero signal was detected. A mechanically established OP can then be interpreted at that point.

The details shown below explain about the "OP shift function".

- [1] Control details
- [2] Setting range for the OP shift amount
- [3] Movement speed during OP shift
- [4] Precautions during control
- [5] Setting the OP shift function

[1] Control details

The following drawing shows the operation of the OP shift function.

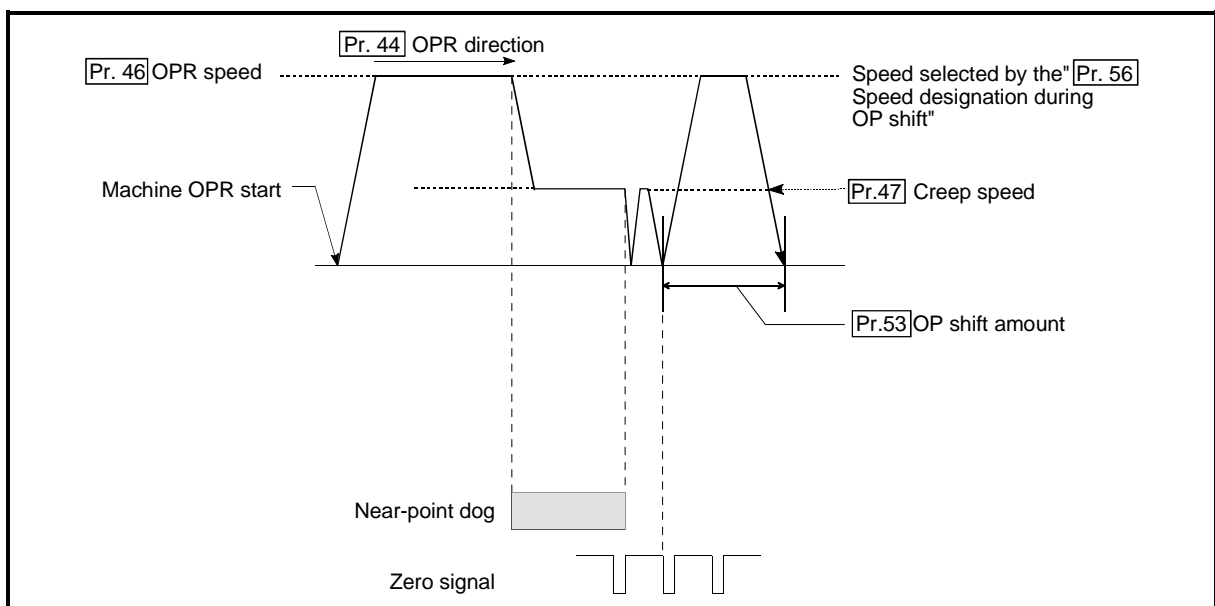


Fig. 12.4 OP shift operation

[2] Setting range for the OP shift amount

Set the OP shift amount within the range from the detected zero signal to the upper/lower limit switches.

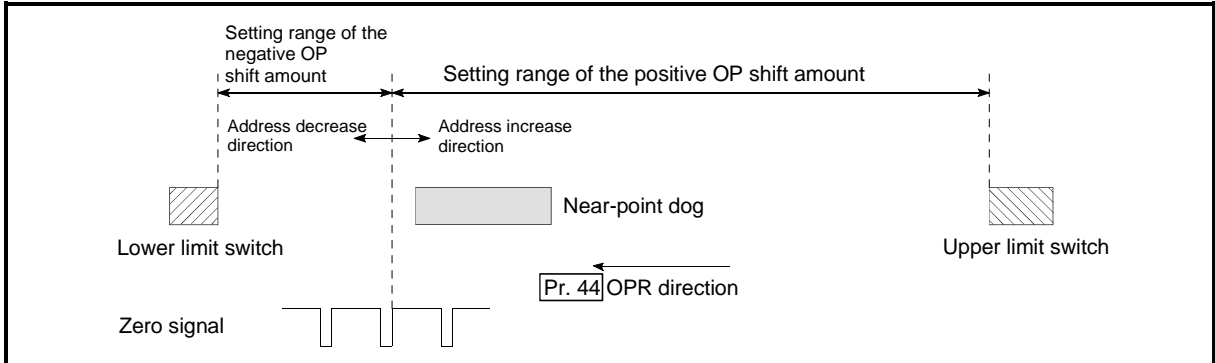


Fig. 12.5 Setting range for the OP shift amount

[3] Movement speed during OP shift

When using the OP shift function, the movement speed during the OP shift is set in "Pr.56 Speed designation during OP shift". The movement speed during the OP shift is selected from either the "Pr.46 OPR speed" or the "Pr.47 Creep speed".

The following drawings show the movement speed during the OP shift when a mechanical OPR is carried out by the near-point dog method.

(1) OP shift operation at the "Pr.46 OPR speed"

(When "Pr.56 speed designation during OP shift" is 0)

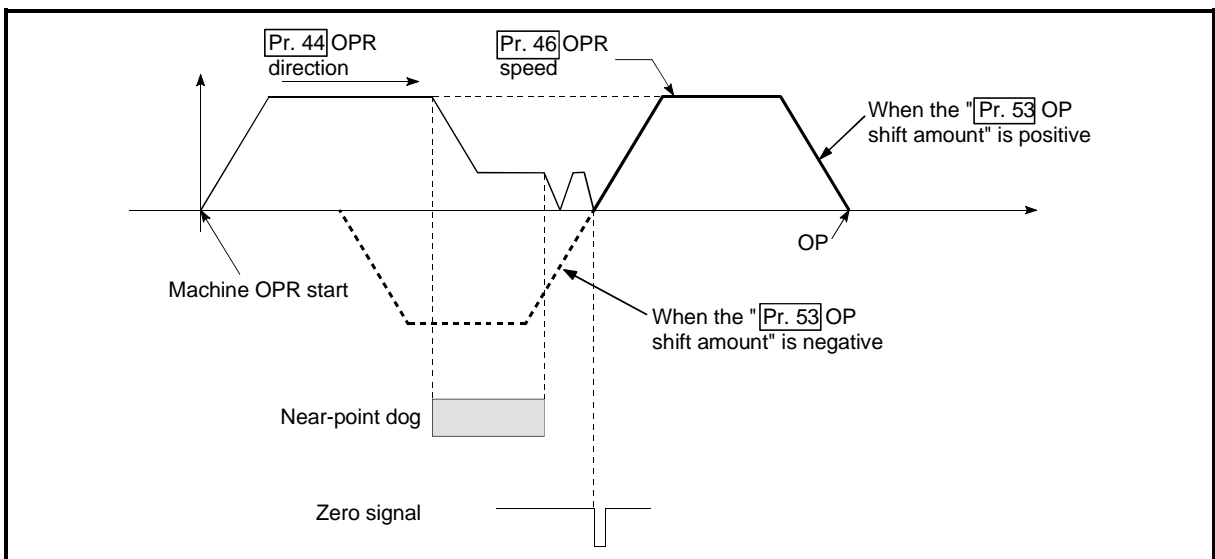


Fig. 12.6 OP shift operation at the OPR speed

- (2) OP shift operation at the " Pr.47 Creep speed"
 (When " Pr.56 Speed designation during OP shift" is 1)

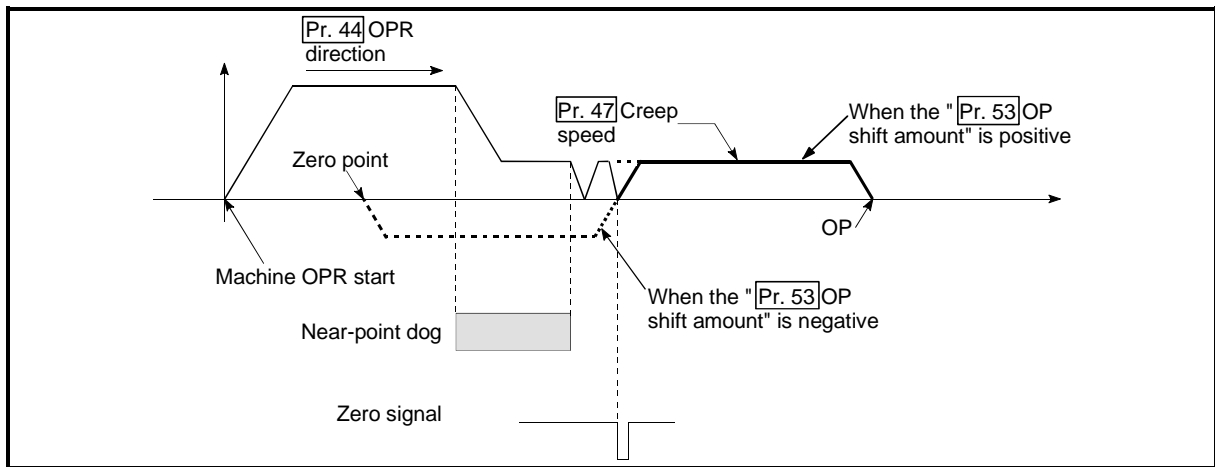


Fig. 12.7 OP shift operation at the creep speed

[4] Precautions during control

The following data are set after the OP shift amount is complete.

- OPR complete flag (Md.31 Status: b4)
- Md.20 Current feed value
- Md.21 Machine feed value
- Md.26 Axis operation status
- Md.34 Movement amount after near-point dog ON (" Pr.53 OP shift amount" is not added.)
- OPR request flag (Md.31 Status: b3) is reset after completion of the OP shift.

[5] Setting the OP shift function

To use the "OP shift function", set the required details in the parameters shown in the following table, and write them to the QD75.

When the parameters are set, the OP shift function will be added to the machine OPR control. The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | Setting value | Setting details | Factory-set initial value |
|---|---------------|--|---------------------------|
| Pr.53 OP shift amount | → | Set the shift amount during the OP shift. | 0 |
| Pr.56 Speed designation during OP shift | → | Select the speed during the OP shift 0: Pr.46 OPR speed 1: Pr.47 Creep speed | 0 |

* Refer to Section 5.2 "List of parameters" for setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.3 Functions for compensating the control

The sub functions for compensating the control include the "backlash compensation function", "electronic gear function", and "near pass function". Each function is executed by parameter setting or PLC program creation and writing.

12.3.1 Backlash compensation function

The "backlash compensation function" compensates the backlash amount in the mechanical system. When the backlash compensation amount is set, an extra amount of command equivalent to the set backlash amount is output every time the movement direction changes.

The details shown below explain about the "backlash compensation function".

- [1] Control details
- [2] Precautions during control
- [3] Setting the backlash compensation function

[1] Control details

The following drawing shows the operation of the backlash compensation function.

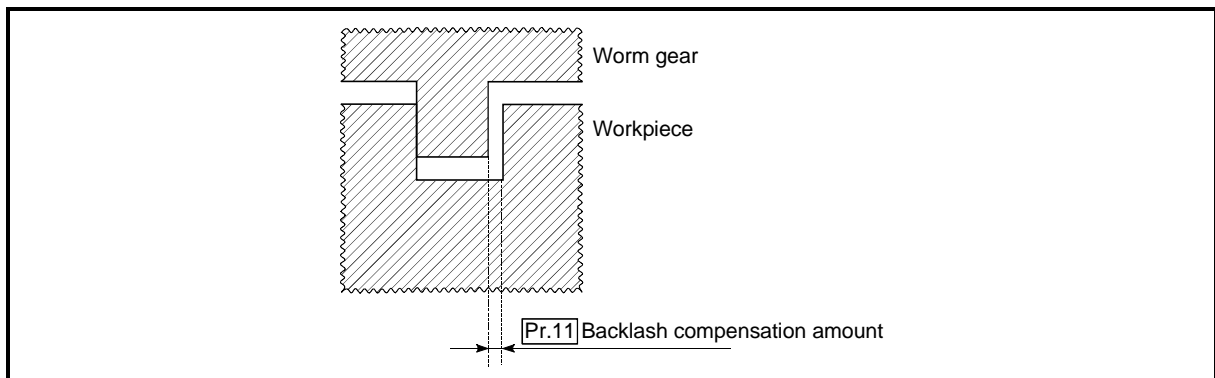


Fig. 12.8 Backlash compensation amount

[2] Precautions during control

- (1) The feed command of the backlash compensation amount are not added to the " **Md.20** Current feed value" or " **Md.21** Machine feed value".
- (2) Always carry out a machine OPR before starting the control when using the backlash compensation function (when " **Pr.11** Backlash compensation amount" is set). The backlash in the mechanical system cannot be correctly compensated if a machine OPR is not carried out.
- (3) Backlash compensation, which includes the movement amount and " **Pr.11** Backlash compensation amount", is output the moment at the moving direction changes.

[3] Setting the backlash compensation function

To use the "backlash compensation function", set the "backlash compensation amount" in the parameter shown in the following table, and write it to the QD75. The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | | Setting value | Setting details | Factory-set initial value |
|----------------|------------------------------|---------------|---------------------------------------|---------------------------|
| Pr.11 | Backlash compensation amount | → | Set the backlash compensation amount. | 0 |

* Refer to Section 5.2 "List of parameters" for setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.3.2 Electronic gear function

The "electronic gear function" adjusts the pulses calculated and output according to the parameters set in the QD75 with the actual machine movement amount.

The "electronic gear function" has the following three functions ([A] to [C]).

- [A] During machine movement, the function increments in the QD75 values less than one pulse that could not be pulse output, and outputs the incremented amount of pulses when the total incremented value reached one pulse or more.
- [B] When machine OPR is completed, current value changing is completed, speed control is started (except when current feed value change is present), or fixed-feed control is started, the function clears to "0" the cumulative values of less than one pulse which could not be output. (If the cumulative value is cleared, an error will occur by a cleared amount in the feed machine value. Control can be constantly carried out at the same machine movement amount, even when the fixed-feed control is continued.)
- [C] The function compensates the mechanical system error of the command movement amount and actual movement amount by adjusting the "electronic gear".
(The "movement amount per pulse" value is defined by " Pr.2 No. of pulses per rotation (AP)", " Pr.3 Movement amount per rotation (AL)" and " Pr.4 Unit magnification (AM)".)

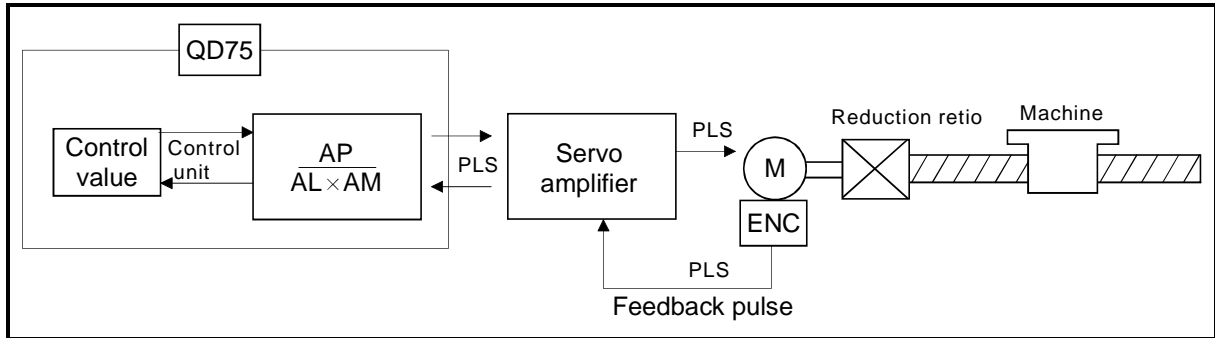
The QD75 automatically carries out the processing for [A] and [B].

The details shown below explain about the "electronic gear function", including the method for compensating the error in [C] above, etc.

- [1] Basic concept of the electronic gear
- [2] The method for compensating the error

[1] Basic concept of the electronic gear

The electronic gear is an item which determines how many rotations (rotations by how many pulses) the motor must make in order to move the machine according to the programmed movement amount.



The basic concept of the electronic gear is represented by the following expression.

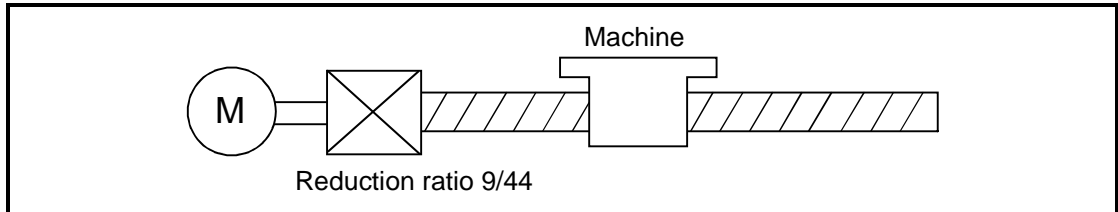
- Pr.2 (No. of pulses per rotation) = AP
- Pr.3 (Movement amount per rotation) = AL
- Pr.4 (Unit magnification) = AM
- Movement amount per pulse = ΔS

$$\text{Electronic gear} = \frac{AP}{\Delta S} = \frac{AP}{AL \times AM} \dots(1)$$

Set values for AP, AL and AM so that this related equation is established. However, because values to be set for AP, AL and AM have the settable range, values calculated (reduced) from the above related equation must be contained in the setting range for AP, AL and AM.

(1) For "Ball screw" + "Reduction gear"

When the ball screw pitch is 10mm, the motor is the HC-MF (8192 PLS/rev) and the reduction ratio of the reduction gear is 9/44.



First, find how many millimeters the load (machine) will travel (ΔS) when the motor turns one revolution (AP).

- AP(No. of pulses per rotation) = 8192
- ΔS (Machine travel value per motor revolution)
 - = Ball screw pitch \times Reduction ratio
 - = 10 [mm] \times 9/44
 - = 10000.0 [μ m] \times 9/44

Substitute this for the above expression (1).

At this time, make calculation with the reduction ratio 9/44 remaining as a fraction.

$$\begin{aligned} \frac{AP}{\Delta S} &= \frac{8192}{10000.0 [\mu\text{m}] \times 9/44} \\ &= \frac{8192 \times 44}{10000.0 \times 9} \\ &= \frac{360448}{90000.0} \\ &= \frac{45056}{11250.0} = \frac{45056 (AP)}{11250.0 (AL) \times 1 (AM)} \\ &= \frac{45056 (AP)}{1125.0 (AL) \times 10 (AM)} \end{aligned}$$

Thus, AP, AL and AM to be set are as follows.

$$\begin{aligned} AP &= 45056 \dots\dots \boxed{\text{Pr.2}} & AP &= 45056 \dots \boxed{\text{Pr.2}} \\ AL &= 11250.0 \dots \boxed{\text{Pr.3}} & \text{or} & AL &= 1125.0 \dots \boxed{\text{Pr.3}} \\ AM &= 1 \dots\dots\dots \boxed{\text{Pr.4}} & AM &= 10 \dots\dots\dots \boxed{\text{Pr.4}} \end{aligned}$$

Note): These two examples of settings are only examples. There are settings other than these examples.)

(2) When "PLS (pulse)" is set as the control unit

When using PLS (pulse) as the control unit, set the electronic gear as follows.

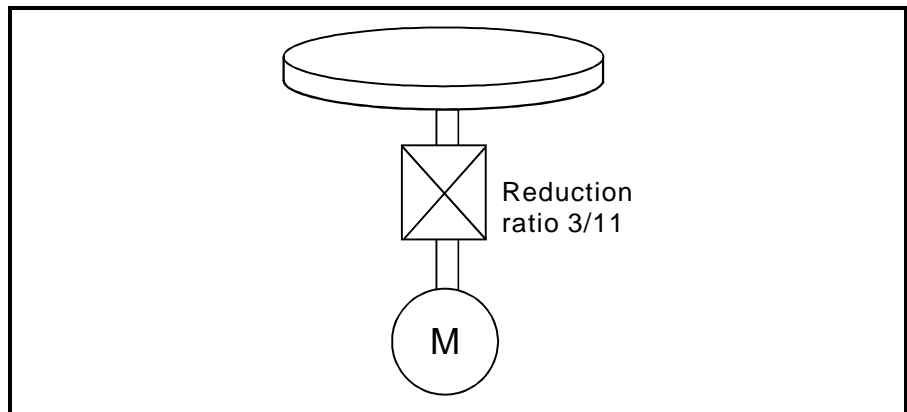
- AP = "No. of pulses per rotation"
- AL = "Movement amount per rotation"
- AM = 1

Example) When the motor is the HC-MF (8192PLS/rev)

- AP = 8192 Pr.2
- AL = 8192 Pr.3
- AM = 1 Pr.4

(3) When "degree" is set as the control unit for a rotary axis

When the rotary axis is used, the motor is HC-SF (16384PLS/rev) and the reduction ratio of the reduction gear is 3/11



First, find how many degrees the load (machine) will travel (ΔS) when the motor turns one revolution (AP).

- AP(No. of pulses per rotation) = 16384
- ΔS (Machine travel value per motor revolution)
 - = 360.00000 [degree] \times Reduction ratio
 - = 360.00000 \times 3/11

Substitute this for the above expression (1).

$$\begin{aligned} \frac{AP}{\Delta S} &= \frac{16384 \text{ [PLS]}}{360.00000 \text{ [degree]} \times 3/11} \\ &= \frac{16384 \text{ [PLS]} \times 11}{360.00000 \times 3} \\ &= \frac{180224}{1080.00000} \\ &= \frac{11264}{67.50000} &= \frac{11264 \text{ (AP)}}{67.50000(\text{AL}) \times 1 \text{ (AM)}} \\ &= \frac{11264 \text{ (AP)}}{0.06750 \text{ (AL)} \times 1000 \text{ (AM)}} \end{aligned}$$

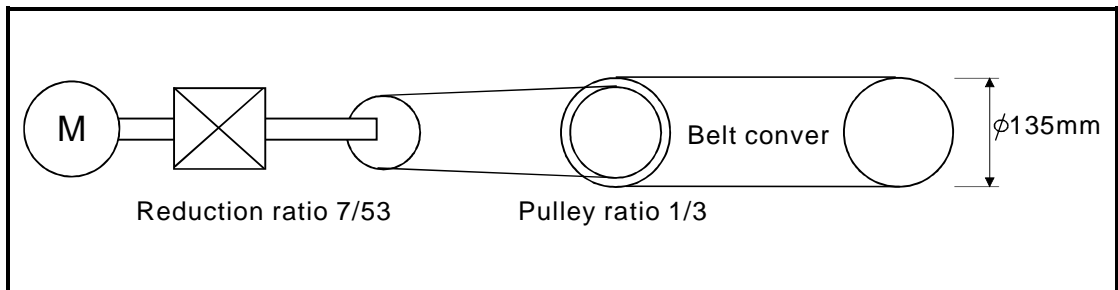
Thus, AP, AL and AM to be set are as follows.

$$\begin{array}{ll}
 AP = 11264 \dots\dots \boxed{\text{Pr.2}} & AP = 11264 \dots\dots \boxed{\text{Pr.2}} \\
 AL = 67.50000 \dots \boxed{\text{Pr.3}} & \text{or } AL = 0.06750 \dots \boxed{\text{Pr.3}} \\
 AM = 1 \dots\dots\dots \boxed{\text{Pr.4}} & AM = 1000 \dots\dots \boxed{\text{Pr.4}}
 \end{array}$$

Note): These two examples of settings are only examples. There are settings other than these examples.)

(4) When "mm" is set as the control unit for conveyor drive (calculation including π)

When the belt conveyor drive is used, the conveyor diameter is 135mm, the pulley ratio is 1/3, the motor is HC-SF (16384PLS/rev) and the reduction ratio of the reduction gear is 7/53.



As the travel value of the conveyor is used to exercise control, set "mm" as the control unit.

First, find how many millimeters the load (machine) will travel (ΔS) when the motor turns one revolution (AP).

- AP(No. of pulses per rotation) = 16384
- ΔS (Machine travel value per motor revolution)
 - = $135000.0 [\mu\text{m}] \times \pi \times \text{Reduction ratio}$
 - = $135000.0 [\mu\text{m}] \times \pi \times 7/53 \times 1/3$

Substitute this for the above expression (1).

At this time, make calculation with the reduction ratio $7/53 \times 1/3$ remaining as a fraction.

$$\begin{aligned}
 \frac{AP}{\Delta S} &= \frac{AP}{AL \times AM} = \frac{16384 \text{ [PLS]}}{135000.0 [\mu\text{m}] \times \pi \times 7/53 \times 1/3} \\
 &= \frac{16384 \times 53 \times 3}{135000.0 \times \pi \times 7}
 \end{aligned}$$

Here, make calculation on the assumption that π is equal to 3.141592654.

$$\frac{AP}{\Delta S} = \frac{AP}{AL \times AM} = \frac{2605056}{2968805.058}$$

AL has a significant number to first decimal place, round down numbers to two decimal places.

Reduce a fraction in the above result.

$$\frac{AP}{\Delta S} = \frac{AP}{AL \times AM} = \frac{2605056}{2968805.0} = \frac{2605056 (AP)}{2968805.0 (AL) \times 1 (AM)}$$

Thus, AP, AL and AM to be set are as follows.

$$AP = 2605056 \dots\dots \boxed{\text{Pr.2}}$$

$$AL = 2968805.0 \dots\dots \boxed{\text{Pr.3}}$$

$$AM = 1 \dots\dots\dots \boxed{\text{Pr.4}}$$

This setting will produce an error for the true machine value, but it cannot be helped. This error is as follows.

$$\left(\frac{29688050/2605056}{9450000 \pi / 2605056} - 1 \right) \times 100 = -1.94 \times 10^{-6} [\%]$$

It is equivalent to an about 19.4[μm] error in continuous 1km feed.

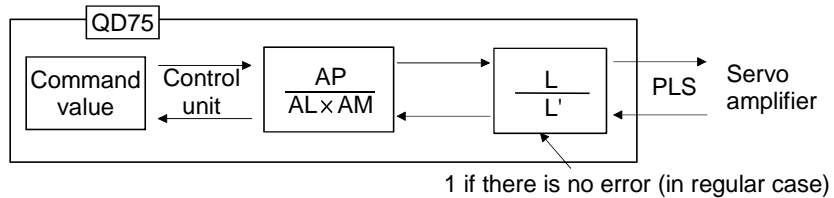
[2] The method for compensating the error

When the position control is carried out using the "Electronic gear" set in a parameter, this may produce an error between the command movement amount (L) and the actual movement amount (L'). With QD75, this error is compensated by adjusting the electronic gear. The "Error compensation amount", which is used for error compensation, is defined as follows:

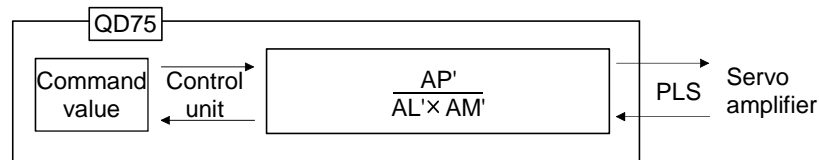
$$\text{Error compensation amount} = \frac{\text{Command movement amount (L)}}{\text{Actual movement amount (L')}} \dots(2)$$

The electronic gear including an error compensation amount is shown below.

$$\frac{AP}{AL \times AM} \times \frac{L}{L'} = \frac{AP'}{AL' \times AM'}$$



Electronic gear taking an error into consideration



--- Calculation example ---

(Conditions)

- Movement amount per pulse : 131072 [PLS]
- No. of pulses per rotation : 5000.0 [μm]
- Unit magnification : 1

(Positioning results)

- Command movement amount (L) : 100 [mm]
- Actual movement amount (L') : 101 [mm]

(Compensation)

$$\frac{AP}{AL \times AM} \times \frac{L}{L'} = \frac{131072}{5000.0 \times 1} \times \frac{100}{101} = \frac{131072 (AP')}{5050 (AL') \times 1 (AM')}$$

- Movement amount per pulse : 131072 ... Pr.2
- No. of pulses per rotation : 5050.0 Pr.3
- Unit magnification : 1 Pr.4

Set the post-compensation " Pr.2 No. of pulses per rotation (AP')", " Pr.3 Movement amount per rotation (AL')", and " Pr.4 Unit magnification (AM')" in the parameters, and write them to the QD75. The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

12.3.3 Near pass function

When continuous pass control is carried out using interpolation control, the near pass function is carried out.

The "near pass function" is a function to suppress the mechanical vibration occurring at the time of switching the positioning data when continuous pass control is carried out using interpolation control.

[Near pass function]

The extra movement amount occurring at the end of each positioning data unit being continuously executed is carried over to the next positioning data unit. Alignment is not carried out, and thus the output speed drops are eliminated, and the mechanical vibration occurring during speed changes can be suppressed. Because alignment is not carried out, the operation is controlled on a path that passes near the position set in "Da.6 Positioning address".

The details shown below explain about the "near pass function".

- [1] Control details
- [2] Precautions during control

[1] Control details

The following drawing shows the path of the continuous path control.

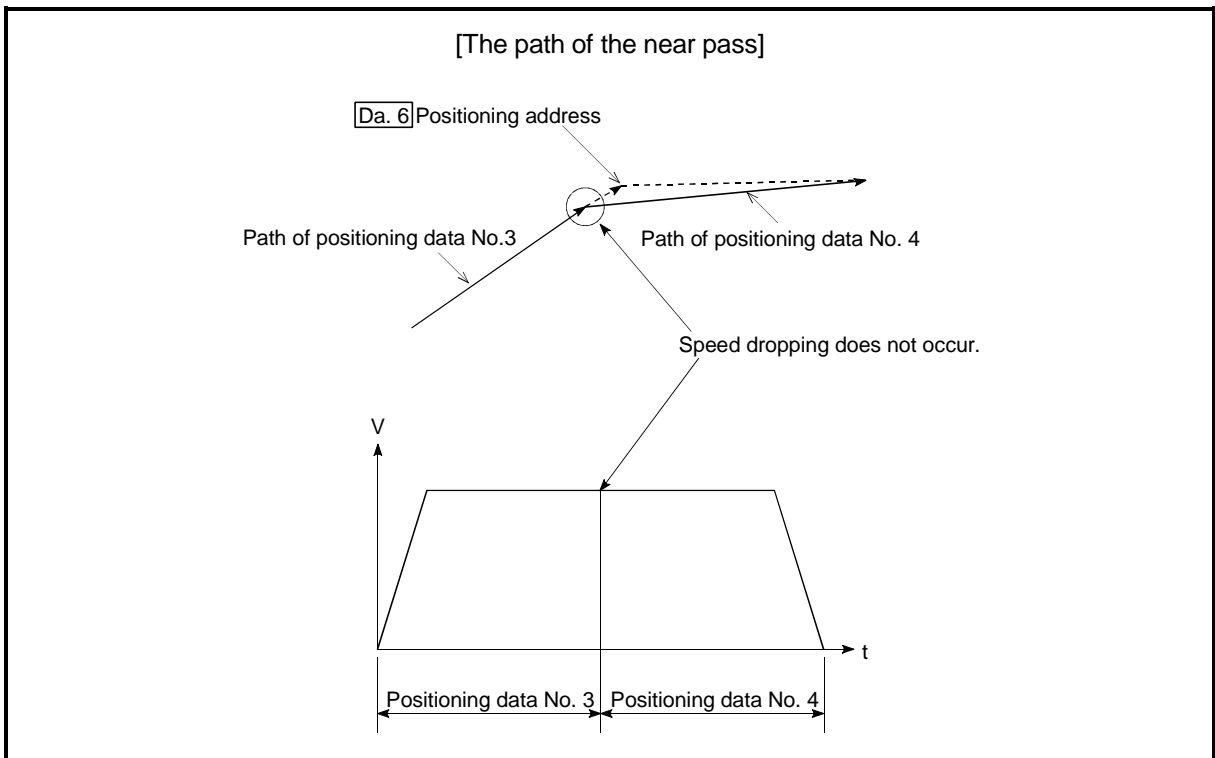


Fig. 12.9 The path of the continuous path control

[2] Precautions during control

- (1) If the movement amount designated by the positioning data is small when the continuous path control is executed, the output speed may not reach the designated speed.
- (2) If continuous path control is carried out, the output will suddenly reverse when the reference axis movement direction changes from the positioning data No. currently being executed to the next positioning data No. If the sudden output reversal affects the mechanical system, carry out control with continuous positioning control.

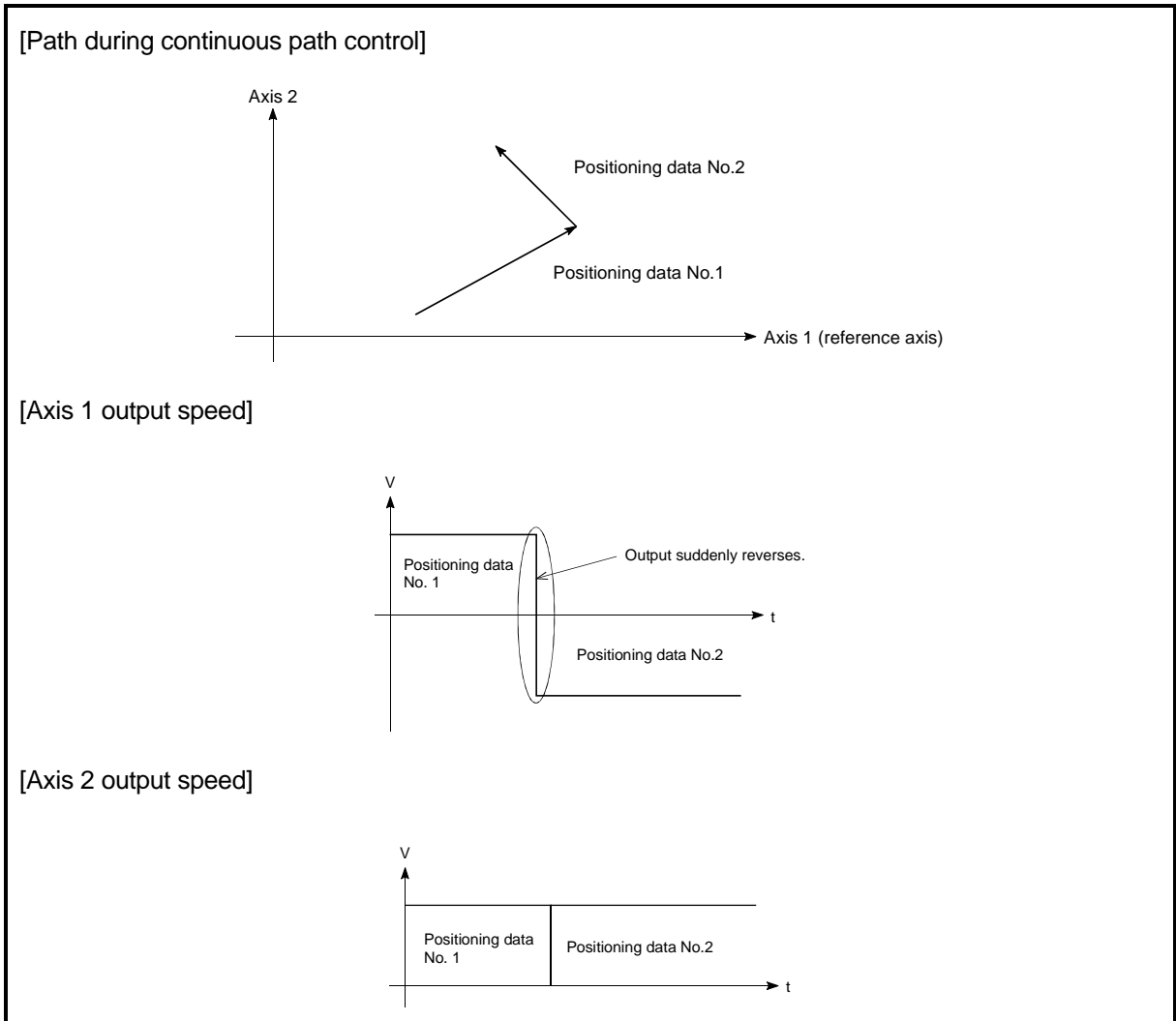


Fig. 12.10 Path and output speed of various axes when movement direction varies during continuous path control

- (3) When continuous path control of a circular interpolation is being carried out in the near pass, an address in which the extra movement amount is subtracted from the positioning address of the positioning data currently being executed is replaced by the starting point address of the next positioning data No. Because the starting point address will be replaced, a large arc error deviation (error code: 506) may occur.

In this case, adjust the " Pr.41 Allowable circular interpolation error width".

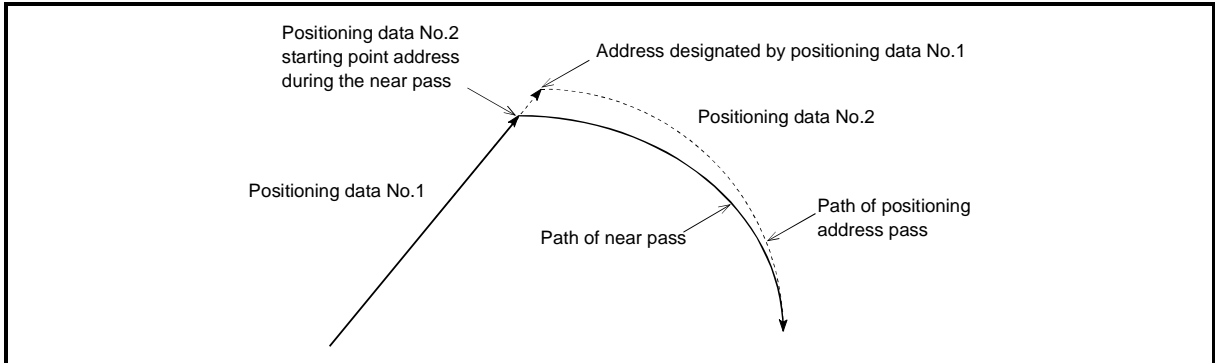
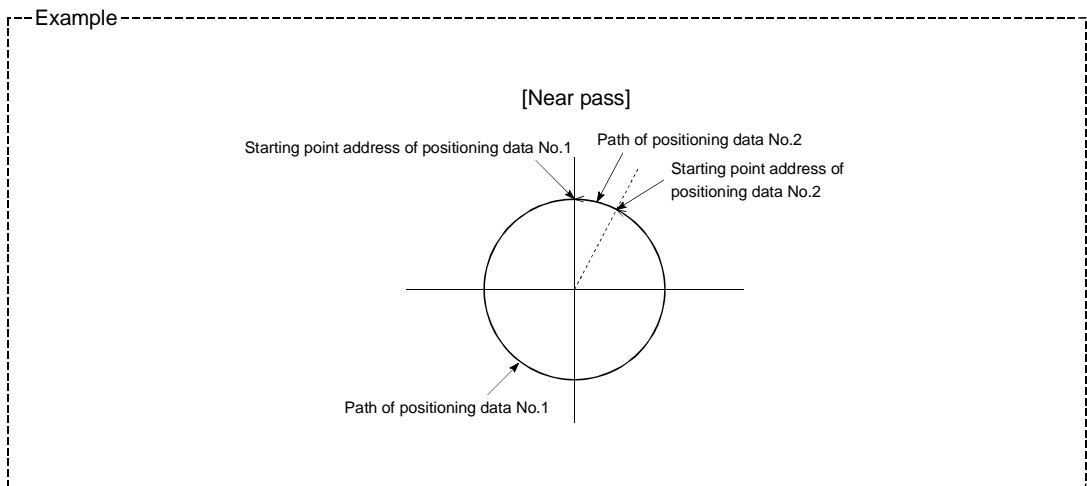


Fig. 12.11 Arc error during the near pass

- (4) When a circle center is designated to continuously designate the circular interpolation control by a continuous path designation in the near pass, and the positioning address and starting point address of that arc are the same address, the path will make one circle using the two data items. This is because the 2nd data starting point address is shifted by the extra amount of the movement amount occurring from the 1st data.



12.4 Functions to limit the control

Functions to limit the control include the "speed limit function", "torque limit function", "software stroke limit", and "hardware stroke limit". Each function is executed by parameter setting or PLC program creation and writing.

12.4.1 Speed limit function

The speed limit function limits the command speed to a value within the "speed limit value" setting range when the command speed during control exceeds the "speed limit value".

The details shown below explain about the "speed limit function".

[1] Relation between the speed limit function and various controls

[2] Precautions during control

[3] Setting the speed limit function

[1] Relation between the speed limit function and various controls

The following table shows the relation of the "speed limit function" and various controls.

| Control type | | Speed limit function | Speed limit value | |
|---------------------------|--|--|-----------------------------|-----------------------|
| OPR control | Machine OPR control | ◎ | Pr.8 Speed limit value | |
| | Fast OPR control | ◎ | | |
| Major positioning control | Position control | 1-axis linear control | | ◎ |
| | | 2 to 4-axes linear interpolation control | | ◎ |
| | | 1-axis fixed-feed control | | ◎ |
| | | 2 to 4-axes fixed-feed control (interpolation) | | ◎ |
| | | 2-axis circular interpolation control | | ◎ |
| | 1 to 4-axes Speed control | ◎ | | |
| | Speed-position switching control, Position-speed switching control | ◎ | | |
| Other control | Current value changing | — | | Setting value invalid |
| | JUMP instruction, NOP instruction, LOOP to LEND | — | | |
| Manual control | JOG operation, Inching operation | ◎ | Pr.31 JOG speed limit value | |
| | Manual pulse generator operation | — | Setting is invalid | |

◎ : Always set

— : Setting not required (Setting value is invalid. Use the initial values or setting values within a range where no error occurs.)

[2] Precautions during control

If any axis exceeds " [Pr.8] Speed limit value" during 2- to 4-axis speed control, the axis in excess of the speed limit value is controlled at the speed limit value. The speeds of the other axes interpolated are suppressed depending on their command speed ratios.

If the reference axis exceeds " [Pr.8] Speed limit value" during 2- to 4-axis linear interpolation control, 2- to 4-axis fixed-feed control or 2-axis circular interpolation control, the reference axis is controlled at the speed limit value (The speed limit does not function on the interpolation axis side.)

[3] Setting the speed limit function

To use the "speed limit function", set the "speed limit value" in the parameters shown in the following table, and write them to the QD75.

The set details are validated after they are written to the QD75.

| Setting item | Setting value | Setting details | Factory-set initial value |
|-------------------------------|---------------|--|---------------------------|
| [Pr.8] Speed limit value | → | Set the speed limit value (max. speed during control). | 200000 |
| [Pr.31] JOG speed limit value | → | Set the speed limit value during JOG operation (max. speed during control). (Note that [Pr.31] JOG speed limit value shall be less than or equal to [Pr.8] Speed limit value.) | 20000 |

* Refer to Section 5.2 "List of parameters" for setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.4.2 Torque limit function

The "torque limit function" limits the generated torque to a value within the "torque limit value" setting range when the torque generated in the servomotor exceeds the "torque limit value".

The "torque limit function" protects the deceleration function, limits the power of the operation pressing against the stopper, etc. It controls the operation so that unnecessary force is not applied to the load and machine.

The details shown below explain about the "torque limit function".

- [1] Relation between the torque limit function and various controls
- [2] Control details
- [3] Precautions during control
- [4] Setting the torque limit function

[1] Relation between the torque limit function and various controls

The following table shows the relation of the "torque limit function" and various controls.

| Control type | | Torque limit function | Torque limit value * |
|---------------------------|---|--|---|
| OPR control | Machine OPR control | ○ | " Pr.17 Torque limit setting value" or " Cd.101 Torque output setting value". * After the " Pr.47 Creep speed" is reached, this value becomes the " Pr.54 OPR torque limit value". |
| | Fast OPR control | ○ | |
| Major positioning control | Position control | 1-axis linear control | ○ |
| | | 2 to 4-axes linear interpolation control | ○ |
| | | 1-axis fixed-feed control | ○ |
| | | 2 to 4-axes fixed-feed control (interpolation) | ○ |
| | | 2-axis circular interpolation control | ○ |
| | 1 to 4-axes Speed control | ○ | " Pr.17 Torque limit setting value" or " Cd.101 Torque output setting value". |
| | Speed-position switching control | ○ | |
| | Position-speed switching control | ○ | |
| Other control | Current value changing | - | Setting value is invalid. |
| | JUMP instruction, NOP instruction, LOOP to LEND | - | |
| Manual control | JOG operation, Inching operation | ○ | " Pr.17 Torque limit setting value" or " Cd.101 Torque output setting value". |
| | Manual pulse generator operation | ○ | |

- : Set when required (Set to " - " when not used.)
- : Setting not required (Setting value is invalid. Use the initial values or setting values within a range where no error occurs.)
- * : Shows the torque limit value when " Cd.22 New torque value" is set to "0".

[2] Control details

The following drawing shows the operation of the torque limit function.

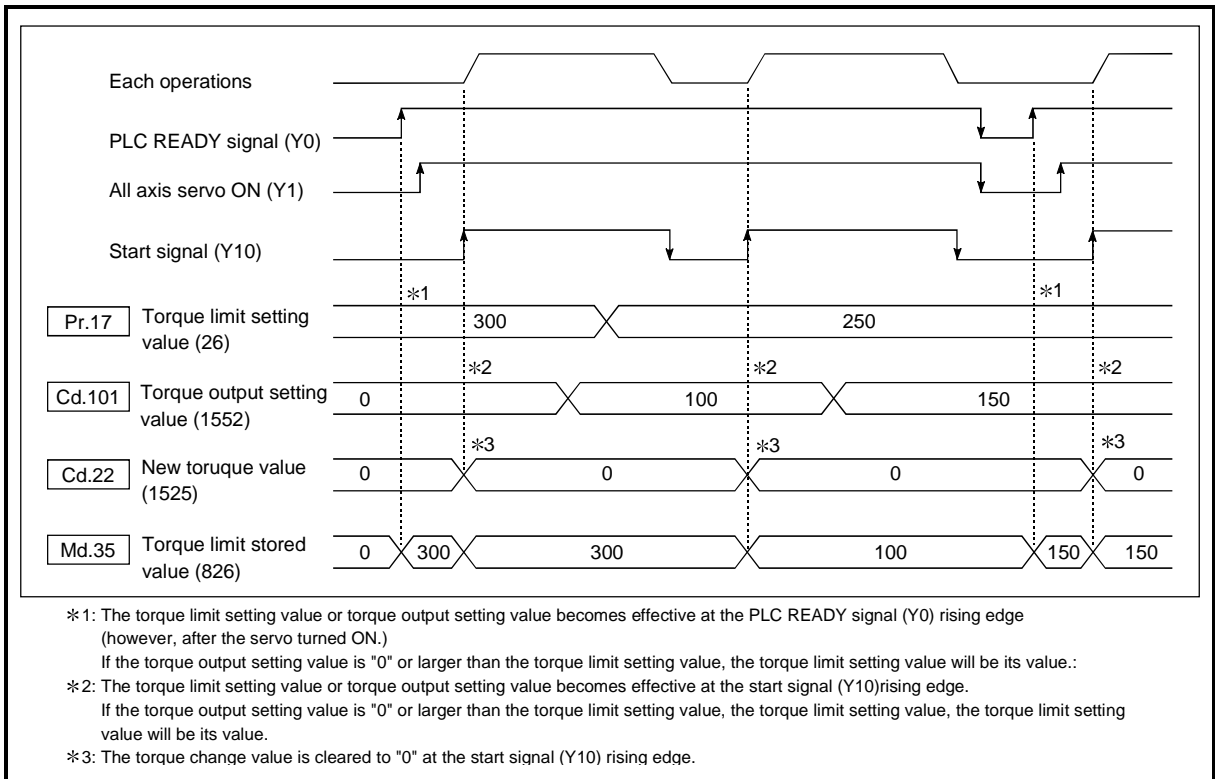


Fig. 12.12 Torque limit function operation

[3] Precautions during control

- (1) When limiting the torque at the " [Pr.17] Torque limit setting value", confirm that " [Cd.22] New torque value" is set to "0". If this parameter is set to a value besides "0", the " [Cd.22] New torque value" will be validated, and the torque will be limited at that value. (Refer to Section 12.5.4 "Torque change function" for details about the "new torque value".)
- (2) When the " [Pr.54] OPR torque limit value "exceeds the " [Pr.17] Torque limit setting value", an error occurs. (Error code: 995)
- (3) When the operation is stopped by torque limiting, the droop pulse will remain in the deviation counter. If the load torque is eliminated, operation for the amount of droop pulses will be carried out.

[4] Setting the torque limit function

(1) To use the "torque limit function", set the "torque limit value" in the parameters shown in the following table, and write them to the QD75.

a) The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | Setting value | Setting details | Factory-set initial value |
|----------------------------------|---------------|--|---------------------------|
| Pr.17 Torque limit setting value | → | Set the torque limit value as a percentage. | 300 |
| Pr.54 OPR torque limit value | → | Set the torque limit value after the " Pr.47 Creep speed" is reached. Set as a percentage. | 300 |

b) The set details are validated at the rising edge (OFF → ON) of the positioning start signal (Y10).

| Setting item | Setting value | Setting details | Factory-set initial value |
|------------------------------------|---------------|--|---------------------------|
| Cd.101 Torque output setting value | → | Set the torque output setting value as a percentage. | 0 |

- * Refer to Section 5.2 "List of parameters" for setting details.
- * Torque limit value: Will be an upper limit value of the torque change value. Even if a larger value has been mistakenly input for the torque change value, it is restricted within the torque limit setting values to prevent an erroneous entry. (Even if a value larger than the torque limit setting value has been input to the torque change value, the torque value is not changed.)
- * Torque output setting value: to be taken at the start of positioning, and used as a torque limit value. If the value is "0" or larger than the torque limit setting value, the parameter "torque limit setting value" is taken at the start.

(2) The "torque limit value" set in the QD75 is set in the " Md.35 Torque limit stored value".

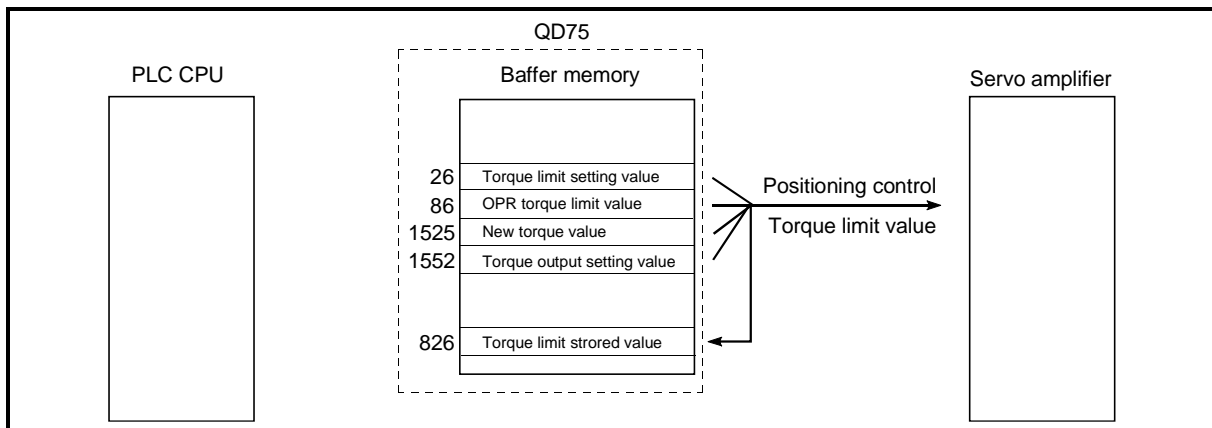


Fig. 12.13 Limiting the torque to the servo amplifier (Axis 1)

The following table shows the " Md.35 Torque limit stored value" of the buffer memory address.

| Monitor item | Monitor value | Storage details | Buffer memory address | | | | |
|---|---------------------------|-----------------|--|--------|--------|--------|------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Md.35 | Torque limit stored value | → | The "torque limit value" valid at that time is stored. (Pr.17 , Pr.54 , Cd.22 , or Cd.101) | 826 | 926 | 1026 | 1126 |

* Refer to Section 5.6 "List of monitor data" for information on the setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.4.3 Software stroke limit function

In the "software stroke limit function" the address established by a machine OPR is used to set the upper and lower limits of the moveable range of the workpiece. Movement commands issued to addresses outside that setting range will not be executed.

In the QD75, the "current feed value" and "machine feed value" are used as the addresses indicating the current position. However, in the "software stroke limit function", the address used to carry out the limit check is designated in the " Pr.14 Software stroke limit selection". (Refer to Section 9.1.4 "Confirming the current value" or details on the "current feed value" and "machine feed value".)

The upper and lower limits of the moveable range of the workpiece are set in " Pr.12 Software stroke limit upper limit value"/ " Pr.13 Software stroke limit lower limit value".

The details shown below explain about the "software stroke limit function".

- [1] Differences in the moveable range when "current feed value" and "machine feed value" are selected.
- [2] Software stroke limit check details
- [3] Relation between the software stroke limit function and various controls
- [4] Precautions during software stroke limit check
- [5] Setting the software stroke limit function
- [6] Invalidating the software stroke limit
- [7] Setting when the control unit is "degree"

[1] Differences in the moveable range when "current feed value" and "machine feed value" are selected.

The following drawing shows the moveable range of the workpiece when the software stroke limit function is used.

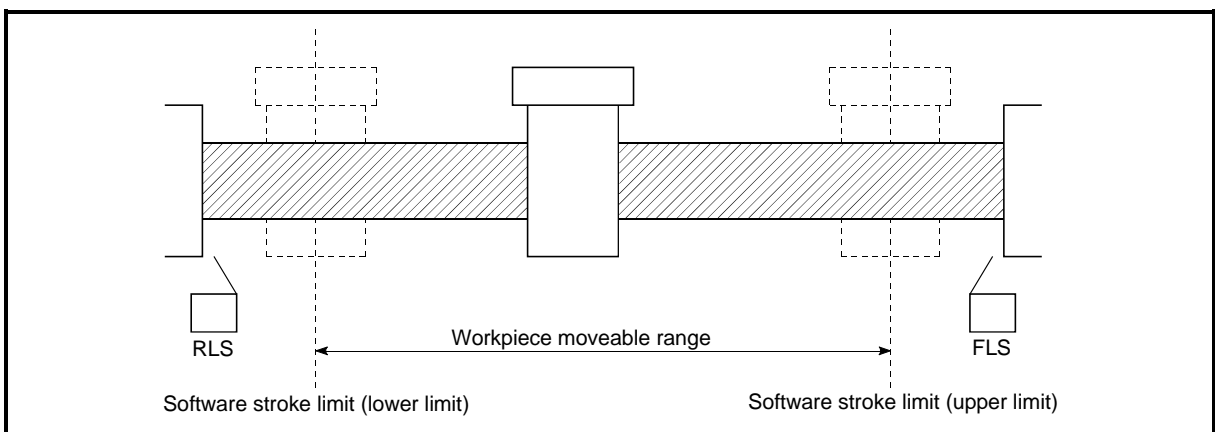


Fig. 12.14 Workpiece moveable range

The following drawing shows the differences in the operation when "Md.20 Current feed value" and "Md.21 Machine feed value" are used in the moveable range limit check.

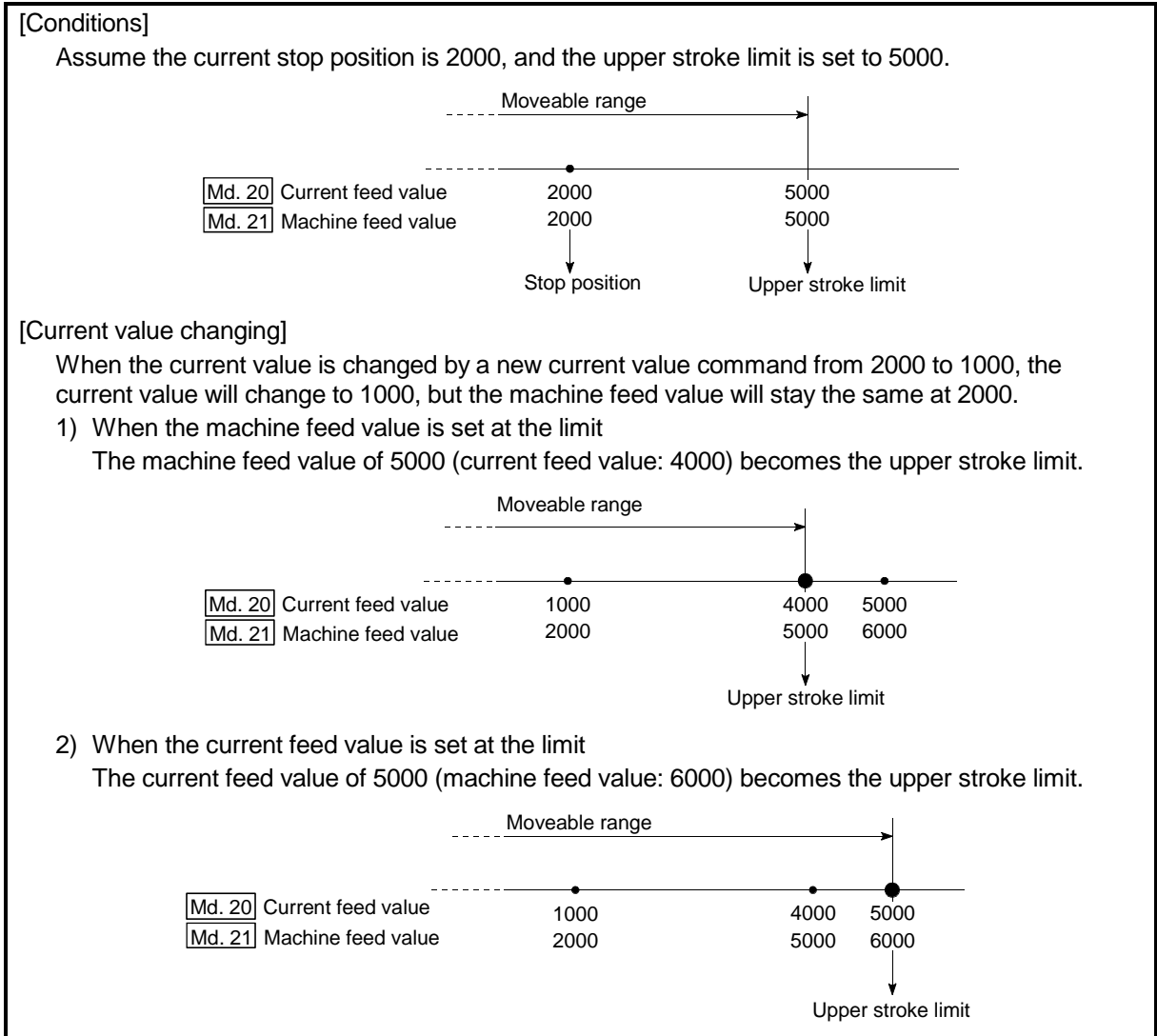


Fig. 12.15 Software stroke limits of the current feed value and machine feed value

POINT
When "machine feed value" is set in "Pr.14 Software stroke limit selection", the moveable range becomes an absolute range referenced on the OP. When "current feed value" is set, the moveable range is the relative range from the "current feed value".

[2] Software stroke limit check details

| Check details | | Processing when an error occurs |
|---------------|--|---|
| 1) | An error shall occur if the current value *1 is outside the software stroke limit range *2. (Check " Md.20 Current feed value" or " Md.21 Machine feed value".) | An "axis error" will occur (error code: 507, 508) |
| 2) | An error shall occur if the command address is outside the software stroke limit range. (Check " Da.6 Positioning address/movement amount".) | |

*1: Check whether the " Md.20 Current feed value" or " Md.21 Machine feed value" is set in " Pr.14 Software stroke limit selection".

*2: Moveable range from the " Pr.12 Software stroke limit upper limit value" to the " Pr.13 Software stroke limit lower limit value".

[3] Relation between the software stroke limit function and various controls

| Control type | | Limit check | Processing at check |
|---------------------------|--|--|---|
| OPR control | Machine OPR control | Data set method | ⊙ |
| | | Other than "Data set method" | — |
| | Fast OPR control | — | Check not carried out. |
| Major positioning control | Position control | 1-axis linear control | ⊙ |
| | | 2 to 4-axes axis linear interpolation control | ⊙ |
| | | 1-axis fixed-feed control | ⊙ |
| | | 2 to 4-axes fixed-feed control (interpolation) | ⊙ |
| | | 2-axis circular interpolation control | ⊙ |
| | 1 to 4-axes speed control | ○ *3, 4 | Checks 1) and 2) in the previous section [2] are carried out. For speed control: The axis decelerates to a stop when it exceeds the software stroke limit range. For position control: The axis comes to an immediate stop when it exceeds the software stroke limit range. |
| | Speed-position switching control Position-speed switching control | ○ *3, 4 | |
| Other control | Current value changing | ⊙ | The current value will not be changed if the new current value is outside the software stroke limit range. |
| | JUMP instruction, NOP instruction, LOOP to LEND | — | Check not carried out. |
| Manual control | JOG operation, Inching operation | △ *5 | Check 1) in the previous section [2] is carried out. The machine will carry out a deceleration stop when the software stroke limit range is exceeded. If the address is outside the software stroke limit range, the operation can only be started toward the moveable range. |
| | Manual pulse generator operation | △ *5 | |

⊙ : Check valid

○ : Check is not made when the current feed value is not updated (Refer to Pr.21) at the setting of " current feed value" in " Pr.14 Software stroke limit selection" during speed control.

— : Check not carried out (check invalid).

△ : Valid only when "1:valid" is set in the " Pr.15 Software stroke limit valid/invalid setting".

*3: The value in " Md.20 Current feed value" will differ according to the " Pr.21 Current feed value during speed control" setting.

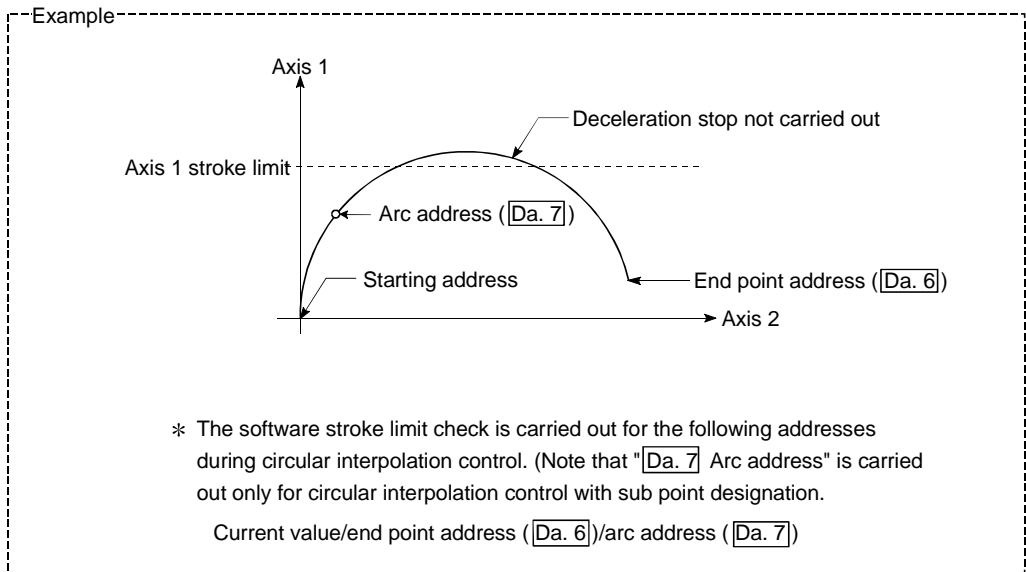
*4: When the unit is "degree", check is not made during speed control.

*5: When the unit is "degree", check is not carried out.

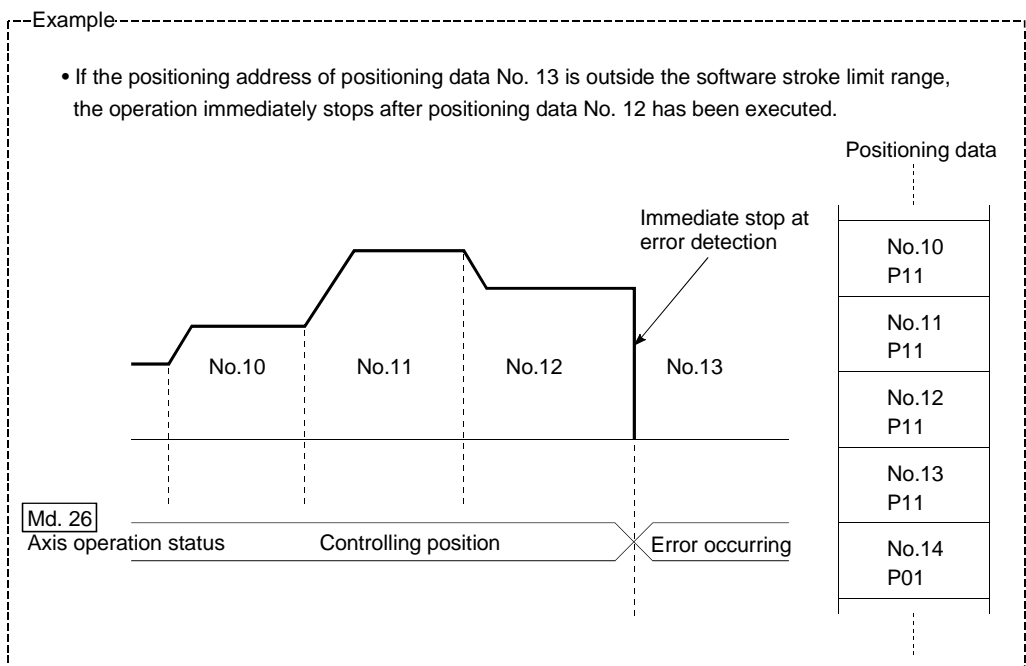
[4] Precautions during software stroke limit check

- (1) A machine OPR must be executed beforehand for the "software stroke limit function" to function properly.
- (2) During interpolation control, a stroke limit check is carried out for the every current value of both the reference axis and the interpolation axis. Every axis will not start if an error occurs, even if it only occurs in one axis.
- (3) During circular interpolation control, the " Pr.12 Software stroke limit upper limit value"/" Pr.13 Software stroke limit lower limit value" may be exceeded.

In this case, a deceleration stop will not be carried out even if the stroke limit is exceeded. Always install an external limit switch if there is a possibility the stroke limit will be exceeded.



- (4) If an error is detected during continuous path control, the axis stops immediately on completion of execution of the positioning data located right before the positioning data in error.



- (5) During simultaneous start, a stroke limit check is carried out for the current values of every axis to be started. Every axis will not start if an error occurs, even if it only occurs in one axis.

[5] Setting the software stroke limit function

To use the "software stroke limit function", set the required values in the parameters shown in the following table, and write them to the QD75.

The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | Setting value | Setting details | Factory-set initial value |
|---|---------------|---|---------------------------|
| Pr.12 Software stroke limit upper limit value | → | Set the upper limit value of the moveable range. | 2147483647 |
| Pr.13 Software stroke limit lower limit value | → | Set the lower limit value of the moveable range. | -2147483648 |
| Pr.14 Software stroke limit selection | → | Set whether to use the " Md.20 Current feed value" or " Md.21 Machine feed value" as the "current value". | 0: Current feed value |
| Pr.15 Software stroke limit valid/invalid setting | 0: Valid | Set whether the software stroke limit is validated or invalidated during manual control (JOG operation, Inching operation, manual pulse generator operation). | 0: valid |

* Refer to Section 5.2 "List of parameters" for setting details.

[6] Invalidating the software stroke limit

To invalidate the software stroke limit, set the following parameters as shown, and write them to the QD75.

| | | |
|---|---|---|
| Pr.12 Software stroke limit upper limit value | = | Pr.13 Software stroke limit lower limit value |
|---|---|---|

(For manual operation, set "0: software stroke limit invalid" in the " Pr.15 Software stroke limit valid/invalid setting".)

The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

When the unit is "degree", the software stroke limit check is not performed during speed control (including speed control in speed-position switching control or position-speed switching control) or during manual control, independently of the values set in Pr.12, Pr.13 and Pr.15.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

[7] Setting when the control unit is "degree"

■ Current value address

The "Md.20" Current feed value" address is a ring address between 0 and 359.99999° .

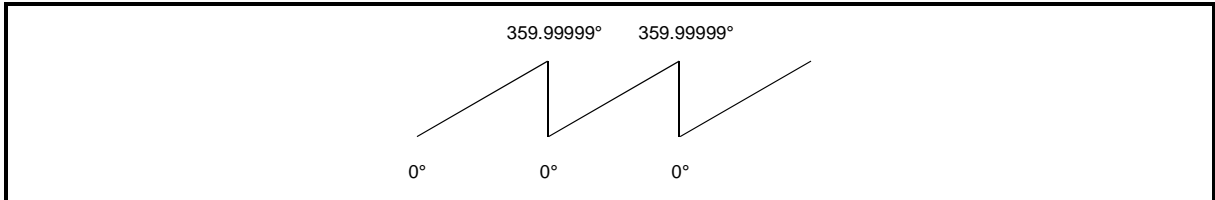


Fig. 12.16 Current value address when the control unit is "degree".

■ Setting the software stroke limit

The upper limit value/lower limit value of the software stroke limit is a value between 0 and 359.99999° .

(1) Setting when the software stroke limit is to be validated.

When the software stroke limit is to be validated, set the upper limit value in a clockwise direction from the lower limit value.

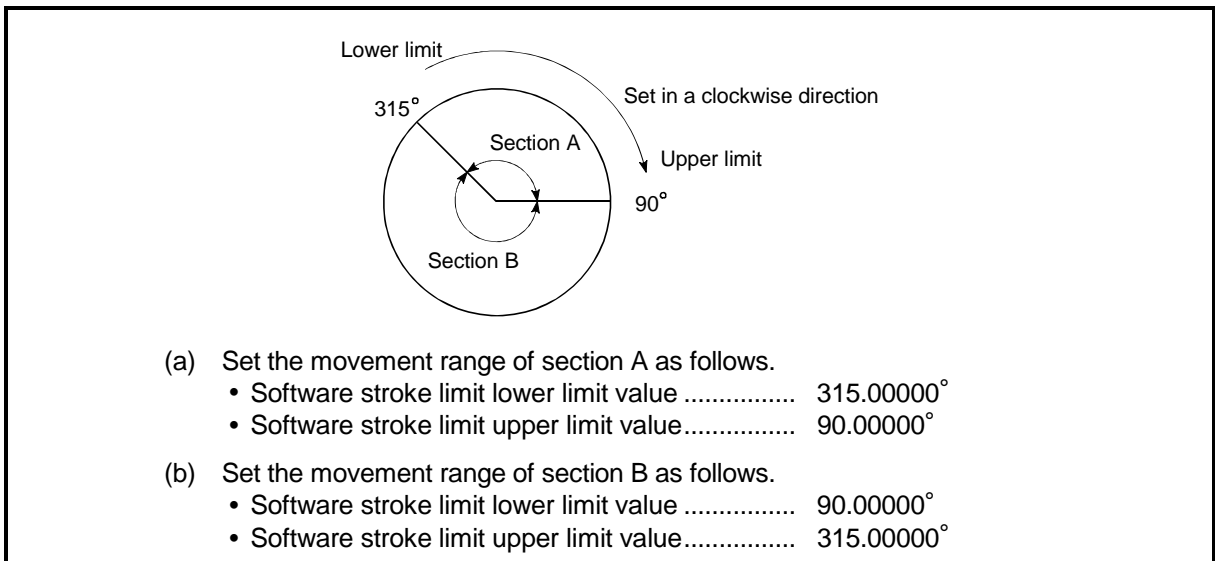


Fig. 12.17 Software stroke limit when the control unit is "degree"

12.4.4 Hardware stroke limit function

⚠ DANGER

When the hardware stroke limit is required to be wired, ensure to wire it in the negative logic using b-contact. If it is set in positive logic using a-contact, a serious accident may occur.

In the "hardware stroke limit function", limit switches are set at the upper/lower limit of the physical moveable range, and the control is stopped (by deceleration stop) by the input of a signal from the limit switch. Damage to the machine can be prevented by stopping the control before the upper/lower limit of the physical moveable range is reached.

The details shown below explain about the "hardware stroke limit function".

- [1] Control details
- [2] Wiring the hardware stroke limit
- [3] Precautions during control
- [4] When the hardware stroke limit is not used

[1] Control details

The following drawing shows the operation of the hardware stroke limit function.

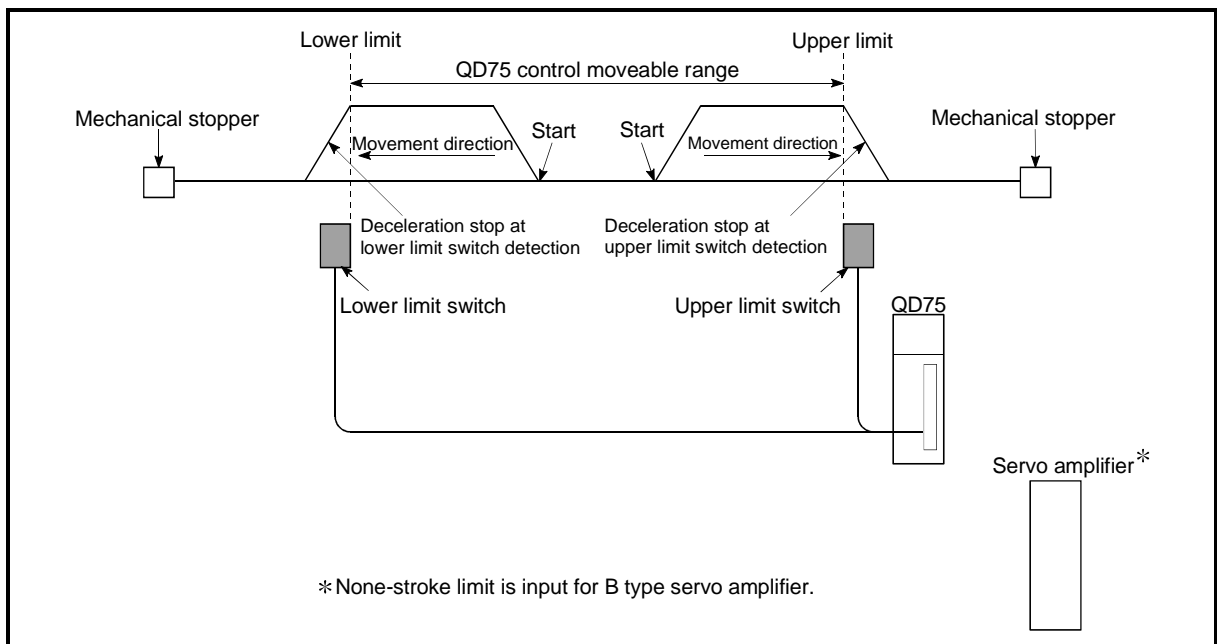


Fig. 12.18 Hardware stroke limit function operation

[2] Wiring the hardware stroke limit

When using the hardware stroke limit function, wire the terminals of the QD75 upper/lower limit stroke limit as shown in the following drawing.

(When " Pr.22 Input signal logic selection" is set to the initial value)

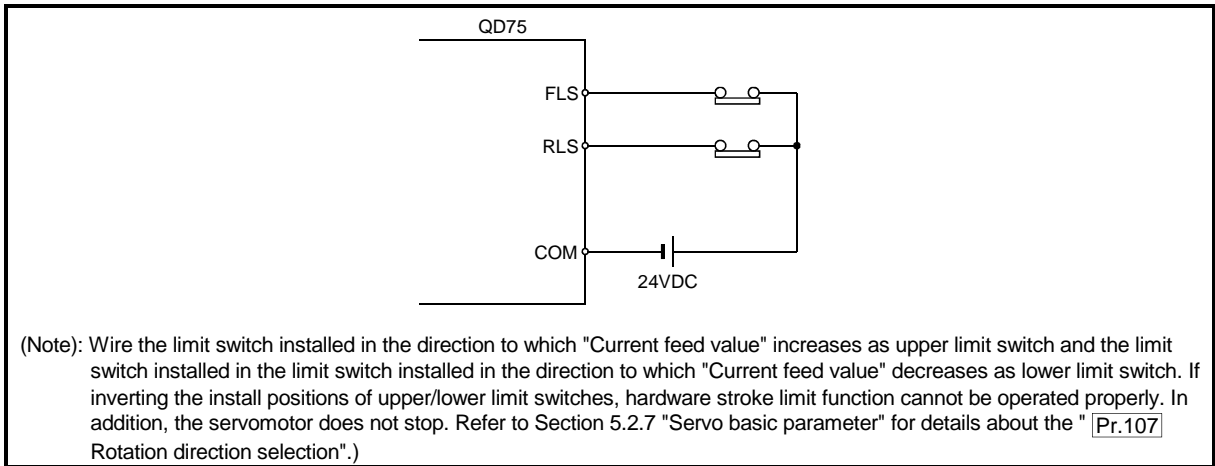


Fig. 12.19 Wiring when using the hardware stroke limit

[3] Precautions during control

- (1) If the machine is stopped outside the QD75 control range (outside the upper/lower limit switches), or if stopped by hardware stroke limit detection, the "OPR control", "major positioning control", and "high-level positioning control" cannot start. To carry out these types of control again, return the workpiece to the QD75 control range by a "JOG operation", "inching operation" or "manual pulse generator operation".
- (2) When " Pr.22 Input signal logic selection" is set to the initial value, the QD75 cannot carry out the positioning control if FLS (limit switch for upper limit) is separated from COM or RLS (limit switch for lower limit) is separated from COM (including when wiring is not carried out).

[4] When the hardware stroke limit function is not used

When not using the hardware stroke limit function, wire the terminals of the QD75 upper/lower limit stroke limit as shown in the following drawing.

When the logic of FLS and RLS is set to "positive logic" using " Pr.22 Input signal logic selection", positioning control can be carried out even if FLS and RLS are not wired. (For details, refer to Section 13.4 "External I/O signal logic switching function".)

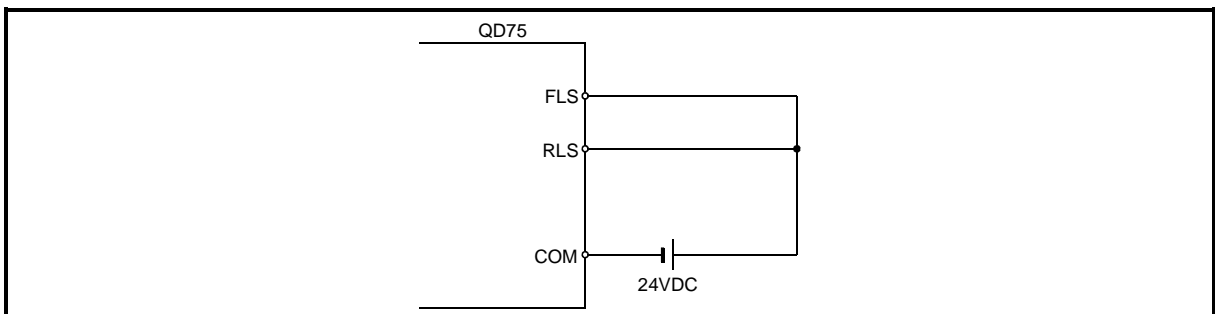


Fig. 12.20 Wiring when not using the hardware stroke limit function
(When " Pr.22 Input signal logic selection" is the initial value)

12.5 Functions to change the control details

Functions to change the control details include the "speed change function", "override function", "acceleration/deceleration time change function" and "torque change function". Each function is executed by parameter setting or PLC program creation and writing.

Both the "speed change function" or "override function" change the speed, but the differences between the functions are shown below. Use the function that corresponds to the application.

"Speed change function"

- The speed is changed at any time, only in the control being executed.
- The new speed is directly set.

| | |
|--------------|--|
| POINT | |
|--------------|--|

| | |
|---|--|
| The speed change function is available even during JOG operation. | |
|---|--|

"Override function"

- The speed is changed for all control to be executed. (Note that this excludes manual pulse generator operation.)
- The new speed is set as a percent (%) of the command speed.

| | |
|--------------|--|
| POINT | |
|--------------|--|

| | |
|---|--|
| The override function is available even during JOG operation. | |
|---|--|

12.5.1 Speed change function

The speed control function is used to change the speed during control to a newly designated speed at any time.

The new speed is directly set in the buffer memory, and the speed is changed by a speed change command ([Cd.15](#) Speed change request) or external command signal.

During the machine OPR, a speed change to the creep speed cannot be carried out after deceleration start because the near point dog ON is detected.

The details shown below explain about the "speed change function".

[1] Control details

[2] Precautions during control

[3] Setting the speed change function from the PLC CPU

[4] Setting the speed change function using an external command signal

[1] Control details

The following drawing shows the operation during a speed change.

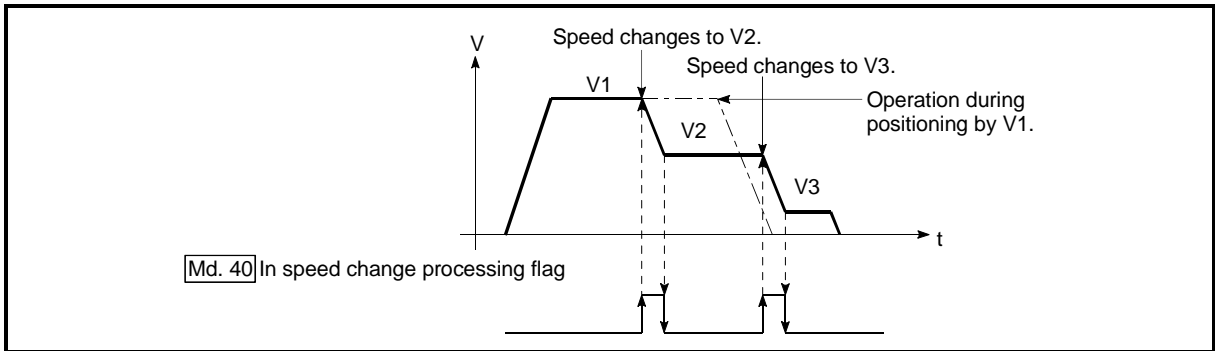


Fig. 12.21 Speed change operation

[2] Precautions during control

- (1) Control is carried out as follows at the speed change during continuous path control.
 - a) When no speed designation (current speed) is provided in the next positioning data:
 - The next positioning data is controlled at the " Cd.14 New speed value".
 - b) When a speed designation is provided in the next positioning data:
 - The next positioning data is controlled at its command speed (Da.8).

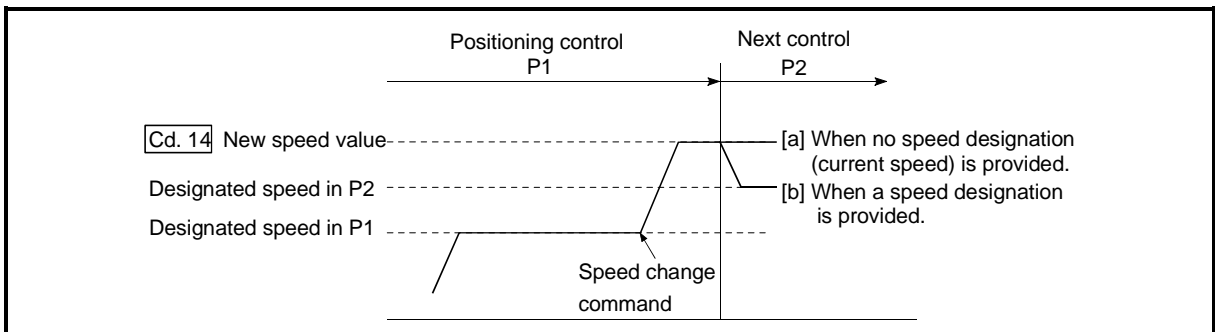


Fig. 12.22 Speed change during continuous path control

- (2) When changing the speed during continuous path control, the speed change will be ignored if there is not enough distance remaining to carry out the change.

- (3) When the stop command was given to make a stop after a speed change that had been made during position control, the restarting speed depends on the "Cd.14 New speed value".

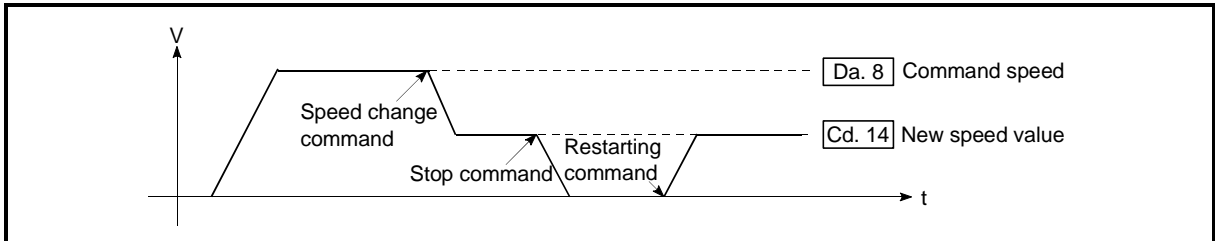


Fig. 12.23 Restarting speed after speed change made during position control

- (4) When the speed is changed by setting "Cd.14 New speed value" to "0", the operation is carried out as follows.
 - A deceleration stop is carried out, and the speed change 0 flag (Md.31 Status: b10) turns ON. (During interpolation control, the speed change 0 flag on the reference axis side turns ON.)
 - The axis stops, but "Md.26 Axis operation status" does not change, and the BUSY signal remains ON. (If a stop signal is input, the BUSY signal will turn OFF, and "Md.26 Axis operation status" will change to "stopped".)
- *In this case, setting the "Cd.14 New speed value" to a value besides "0" will turn OFF the speed change 0 flag (Md.31 Status: b10), and enable continued operation.

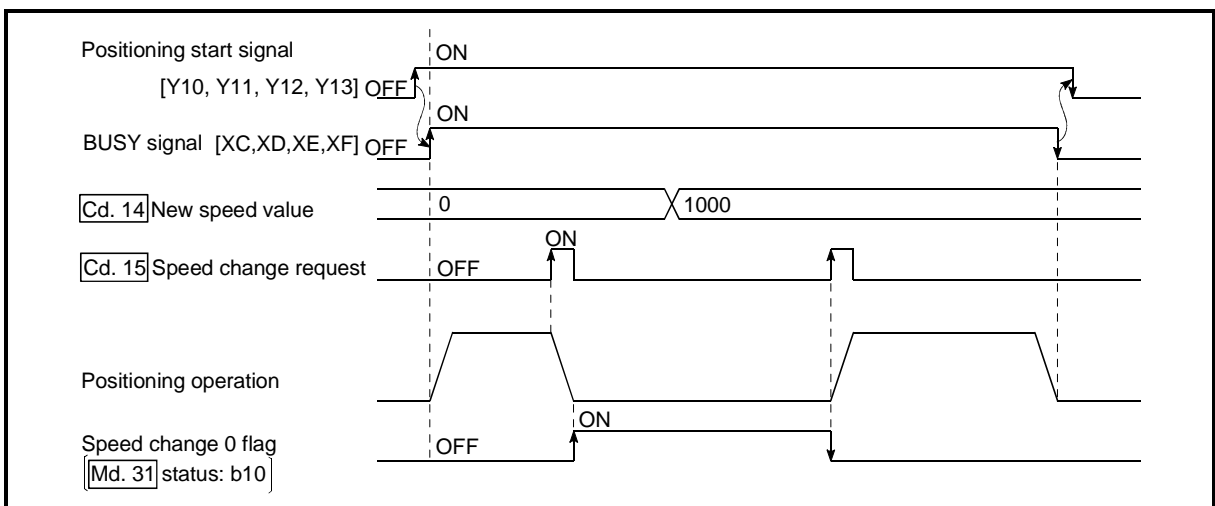


Fig. 12.24 Speed change at new speed value "0"

- (5) A warning "Deceleration/stop speed change (warning code: 500)" occurs and the speed cannot be changed in the following cases.
 - During deceleration by a stop command
 - During automatic deceleration during positioning control
- (6) A warning "Speed limit value over (warning code: 501)" occurs and the speed is controlled at the " **Pr.8** Speed limit value" when the value set in " **Cd.14** New speed value" is equal to or larger than the " **Pr.8** Speed limit value".
- (7) When the speed is changed during interpolation control, the required speed is set in the reference axis.
- (8) When carrying out consecutive speed changes, be sure there is an interval between the speed changes of 100ms or more.
(If the interval between speed changes is short, the QD75 will not be able to track, and it may become impossible to carry out commands correctly.)
- (9) When a speed change is requested simultaneously for multiple axes, change the speed in the ascending axis number order.
- (10) Speed change cannot be carried out during the machine OPR. A request for speed change is ignored.
- (11) When deceleration is started by the speed change function, the deceleration start flag does not turn ON.

[3] Setting the speed change function from the PLC CPU

The following shows the data settings and PLC program example for changing the control speed of axis 1 from the PLC CPU. (In this example, the control speed is changed to "20.00mm/min".)

- (1) Set the following data.
(Use the start time chart shown in section (2) below as a reference, and set using the PLC program shown in section (3).)

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|-----------------------------------|---------------|----------------------------|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.14 New speed value | 2000 | Set the new speed. | 1514 1515 | 1614 1615 | 1714 1715 | 1814 1815 |
| Cd.15 Speed change request | 1 | Set "1: Change the speed". | 1516 | 1616 | 1716 | 1816 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

(2) The following shows the speed change time chart.

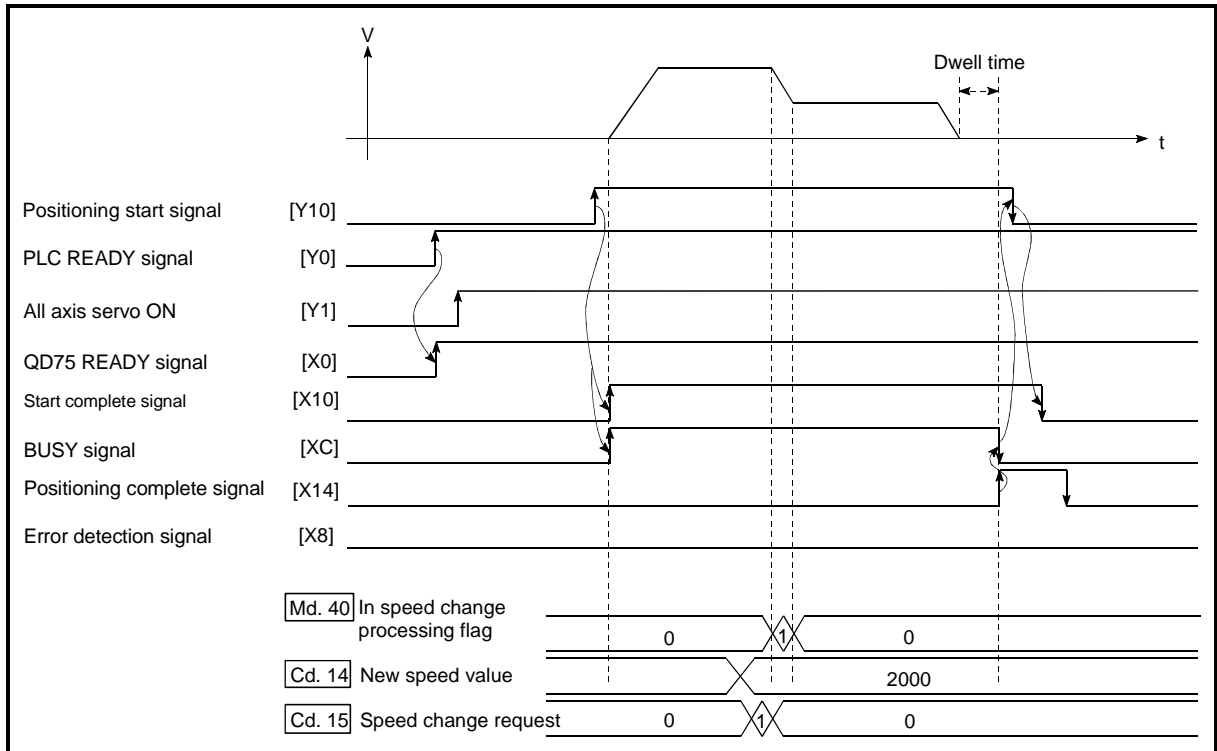
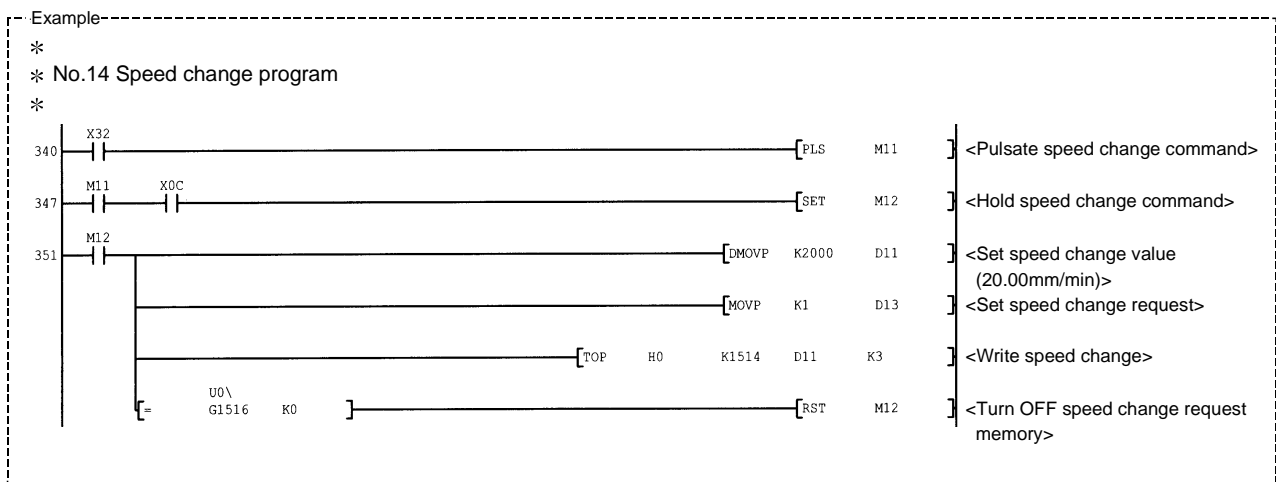


Fig. 12.25 Time chart for changing the speed from the PLC CPU

(3) Add the following PLC program to the control program, and write it to the PLC CPU.



[4] Setting the speed change function using an external command signal

The speed can also be changed using an "external command signal".

The following shows the data settings and PLC program example for changing the control speed of axis 1 using an "external command signal". (In this example, the control speed is changed to "10000.00mm/min".)

- (1) Set the following data to change the speed using an external command signal.

(Use the start time chart shown in section (2) below as a reference, and set using the PLC program shown in section (3).)

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|---|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Pr.42 External command function selection | 1 | Set "1: External speed change request". | 62 | 212 | 362 | 512 |
| Cd.8 External command valid | 1 | Set "1: Validate the external command". | 1505 | 1605 | 1705 | 1805 |
| Cd.14 New speed value | 1000000 | Set the new speed. | 1514 1515 | 1614 1615 | 1714 1715 | 1814 1815 |

* Refer to section "5.7 List of control data" for details on the setting details.

- (2) The following shows the speed change time chart.

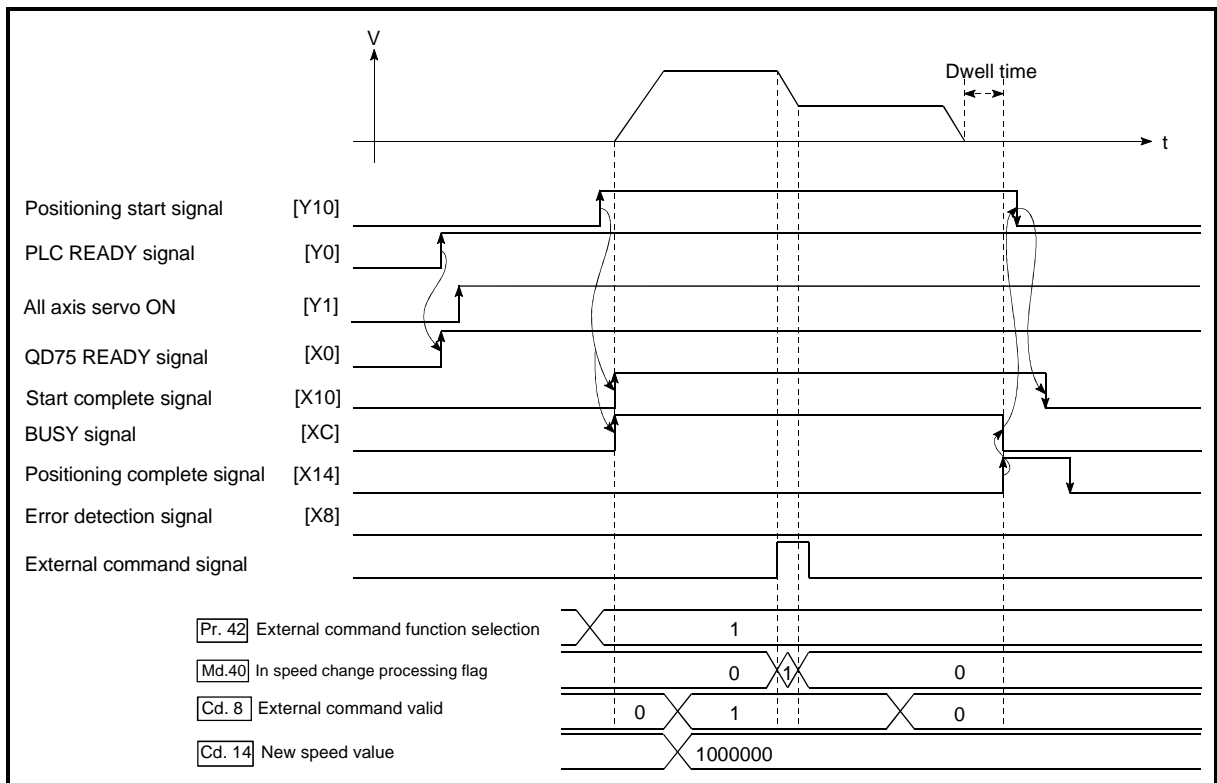
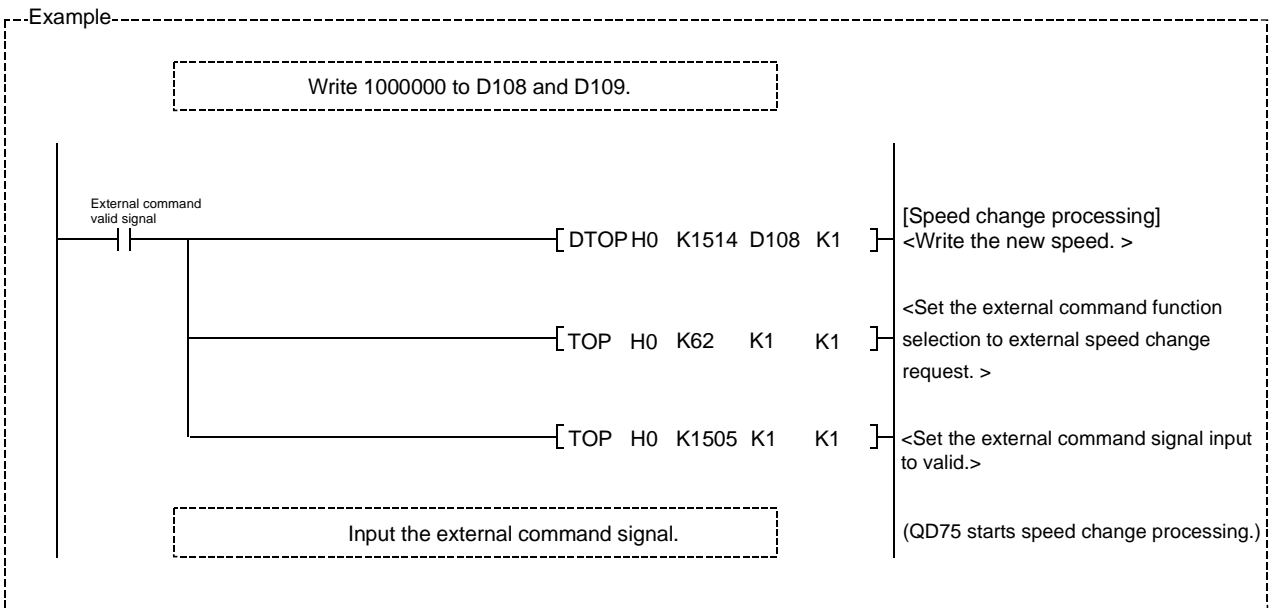


Fig. 12.26 Time chart for changing the speed using an external command signal

(3) Add the following PLC program to the control program, and write it to the PLC CPU.



12.5.2 Override function

The override function changes the command speed by a designated percentage (1 to 300%) for all control to be executed.

The speed can be changed by setting the percentage (%) by which the speed is changed in " Cd.13 Positioning operation speed override".

However, when a machine OPR is performed, an override cannot be made after a deceleration start to the creep speed following the detection of near-point dog ON.

- [1] Control details
- [2] Precautions during control
- [3] Setting the override function

[1] Control details

The following shows that operation of the override function.

- 1) A value changed by the override function is monitored by " Md.22 Feedrate".
- 2) If " Cd.13 Positioning operation speed override" is set to 100%, the speed will not change.
- 3) If " Cd.13 Positioning operation speed override" is set a value less than 100%, control will be carried out at speed unit "1" at the time " Md.22 Feedrate" becomes a value of "1" or less. (When Md.22 becomes "0", the warning "Less than minimum speed (warning code: 110)" is generated and the axis is controlled in the then speed unit of "1".)
- 4) If there is not enough remaining distance to change the speed when the speed is changed during the position control of speed-position switching control or position-speed switching control, the operation will be carried out at the speed that could be changed.
- 5) If the speed changed by the "override function" is greater than the " Pr.8 Speed limit value", a warning "Speed limit value over (warning code: 501)" will occur and the speed will be controlled at the " Pr.8 Speed limit value". The " Md.39 Speed limit flag" will turn ON.

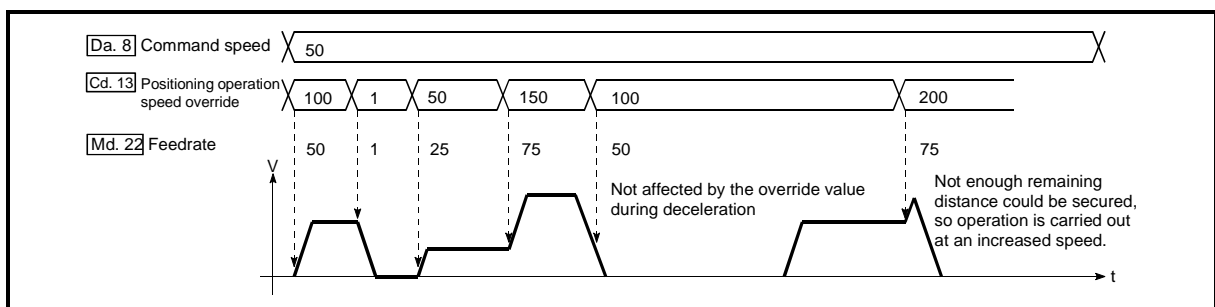


Fig. 12.27 Override function operation

[2] Precaution during control

- (1) When changing the speed during continuous path control, the speed change will be ignored if there is not enough distance remaining to carry out the change.
- (2) A warning "Deceleration/stop speed change (warning code: 500)" occurs and the speed cannot be changed in the following cases.
(The value set in " Cd.13 Positioning operation speed override" is validated after a deceleration stop.)
 - During deceleration by a stop command
 - During automatic deceleration during positioning control
- (3) When the speed is changed during interpolation control, the required speed is set in the reference axis.
- (4) When deceleration is started by the override function, the deceleration start flag does not turn ON.
- (5) When carrying out continuously override, be sure there is an interval between the override execution of 100ms or more.
(If the interval between override is short, the QD75 will not be able to track, and it may become impossible to carry out commands correctly.)

[3] Setting the override function

The following shows the data settings and PLC program example for setting the override value of axis 1 to "200%".

- (1) Set the following data. (Use the start time chart shown in section (2) below as a reference, and set using the PLC program shown in section (3).)

| Setting item | | Setting value | Setting details | Buffer memory address | | | |
|--------------|--------------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.13 | Positioning operation speed override | 200 | Set the new speed as a percentage (%). | 1513 | 1613 | 1713 | 1813 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

(2) The following shows a time chart for changing the speed using the override function.

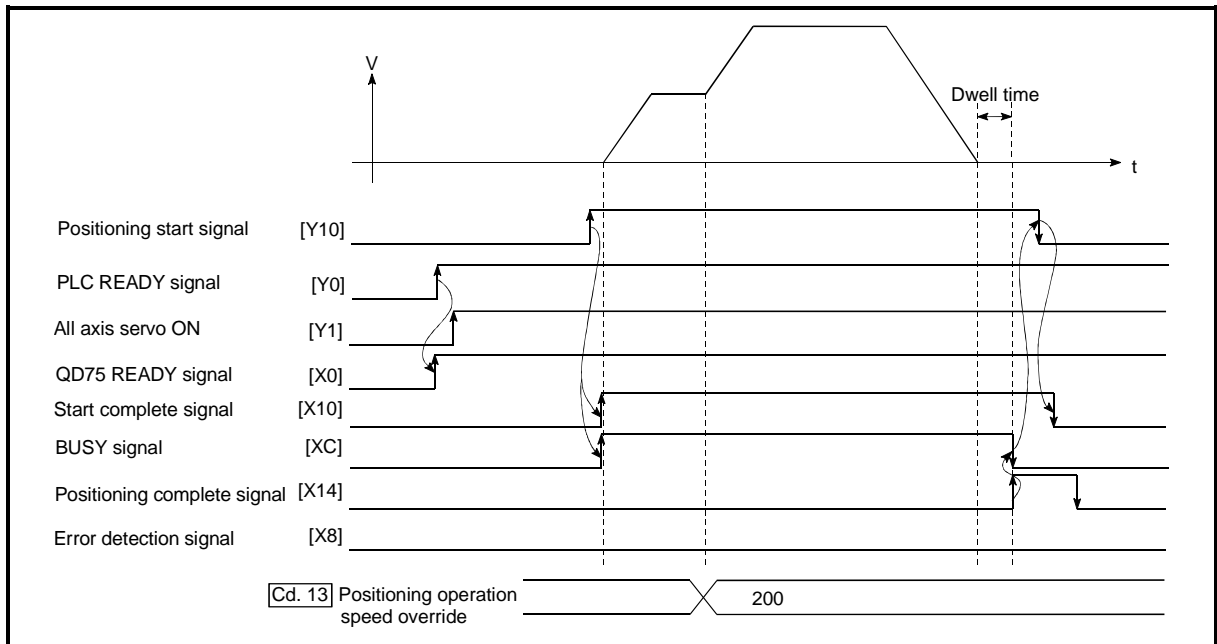
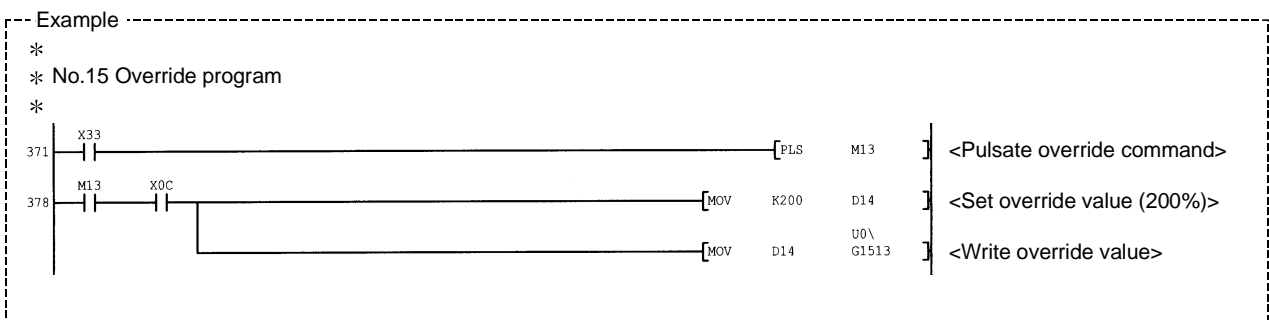


Fig. 12.28 Time chart for changing the speed using the override function

(3) Add the following PLC program to the control program, and write it to the PLC CPU.



12.5.3 Acceleration/deceleration time change function

The "acceleration/deceleration time change function" is used to change the acceleration/deceleration time during a speed change to a random value when carrying out the speed change indicated in Section 12.5.1 "Speed change function". In a normal speed change (when the acceleration/deceleration time is not changed), the acceleration/deceleration time previously set in the parameters ([Pr.9] , [Pr.10] , and [Pr.25] to [Pr.30] values) is set in the positioning parameter data items [Da.3] and [Da.4], and control is carried out with that acceleration/deceleration time. However, by setting the new acceleration/deceleration time ([Cd.10] , [Cd.11]) in the control data, and issuing an acceleration/deceleration time change enable command ([Cd.12] Acceleration/deceleration time change during speed change, enable/disable selection) to change the speed when the acceleration/deceleration time change is enabled, the speed will be changed with the new acceleration/deceleration time ([Cd.10] , [Cd.11]).

The details shown below explain about the "acceleration/deceleration time change function".

- [1] Control details
- [2] Precautions during control
- [3] Setting the acceleration/deceleration time change function

[1] Control details

The following drawing shows the operation during an acceleration/deceleration time change.

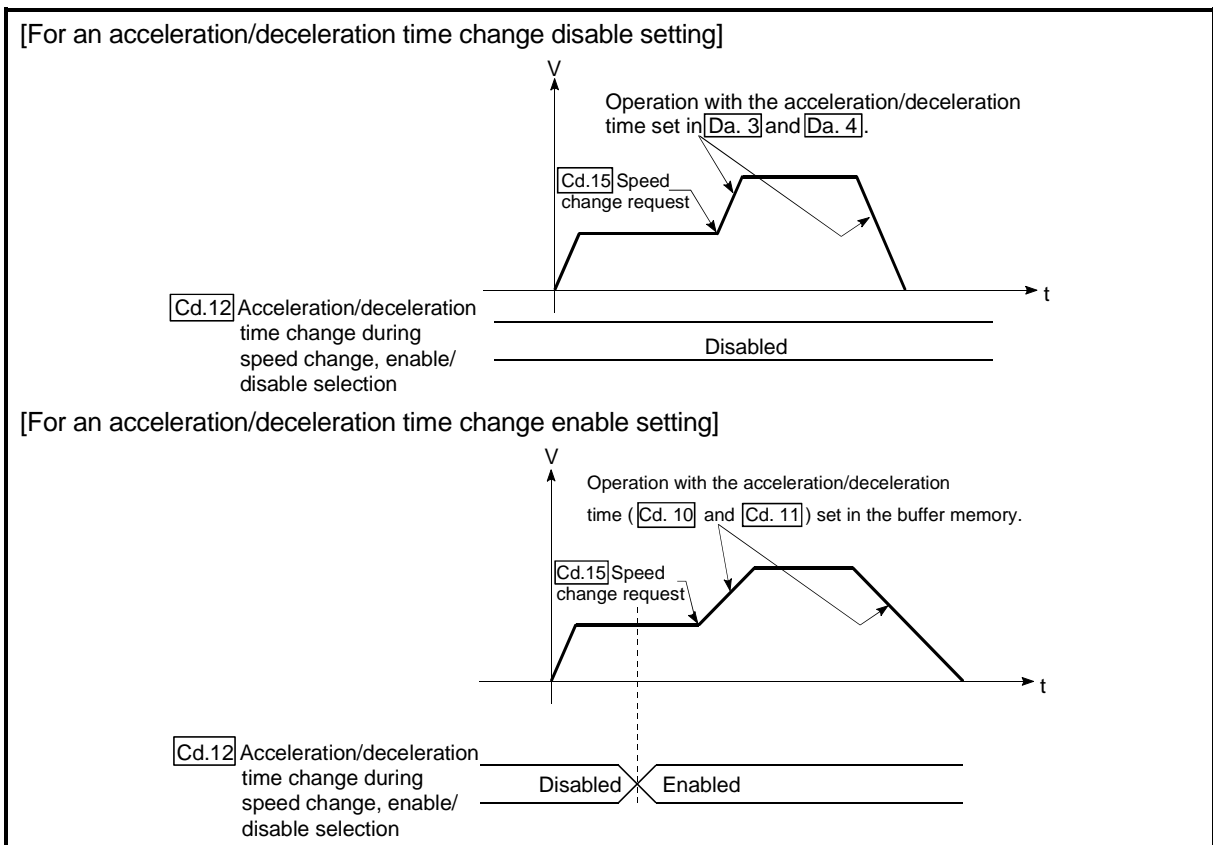
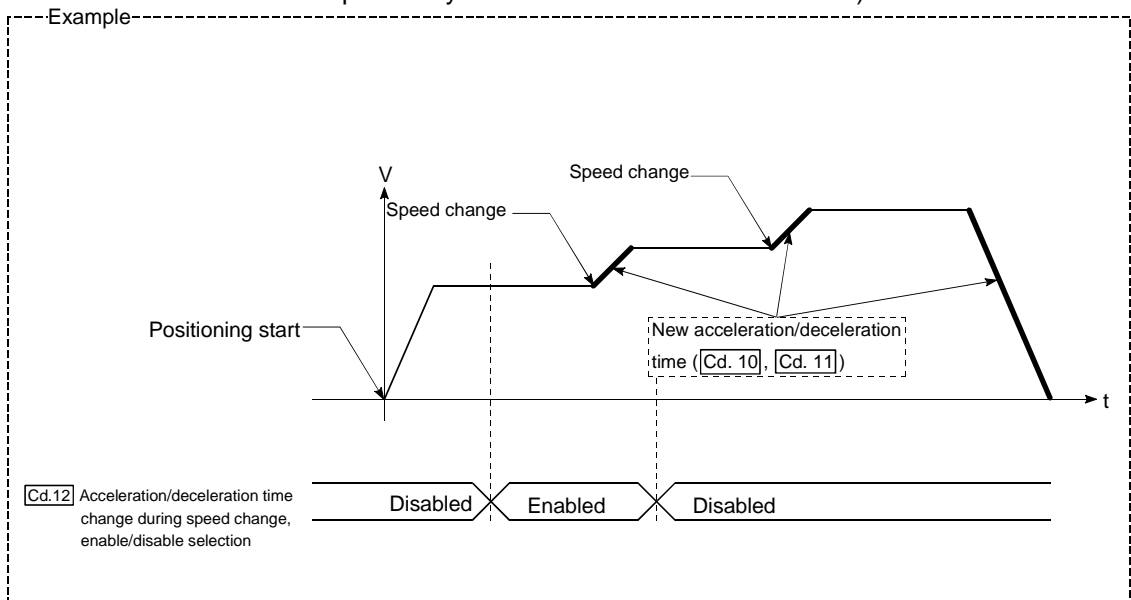


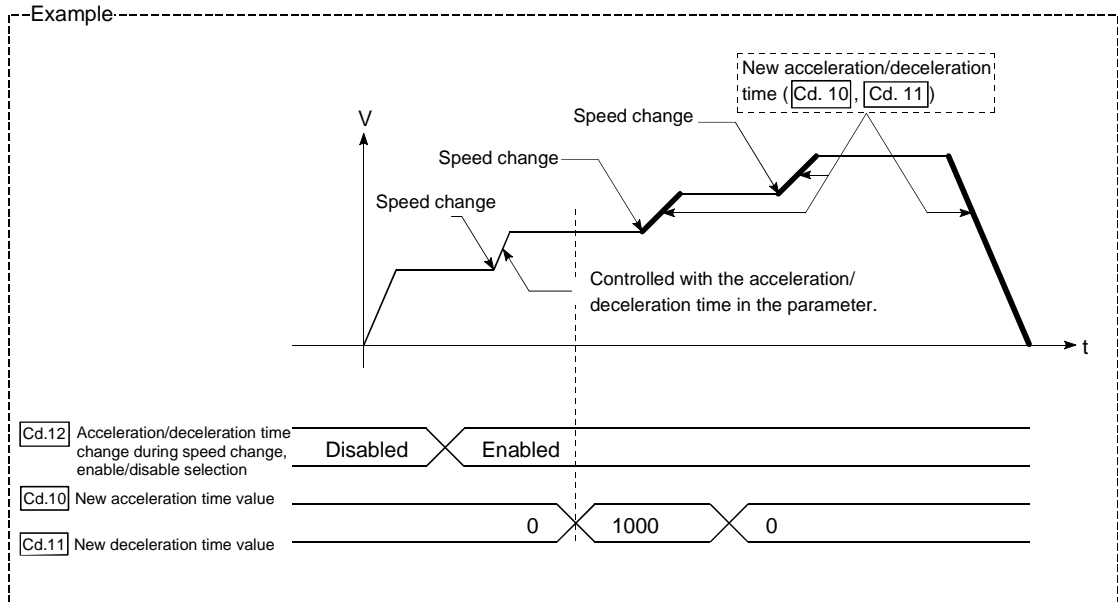
Fig. 12.29 Operation during an acceleration/deceleration time change

[2] Precautions during control

- (1) When "0" is set in "Cd.10 New acceleration time value" and "Cd.11 New deceleration time value", the acceleration/deceleration time will not be changed even if the speed is changed. In this case, the operation will be controlled at the acceleration/deceleration time previously set in the parameters.
- (2) The "new acceleration/deceleration time" is valid during execution of the positioning data for which the speed was changed. In continuous positioning control and continuous path control, the speed is changed and control is carried out with the previously set acceleration/deceleration time at the changeover to the next positioning data, even if the acceleration/deceleration time is changed to the "new acceleration/deceleration time (Cd.10, Cd.11)".
- (3) Even if the acceleration/deceleration time change is set to disable after the "new acceleration/deceleration time" is validated, the positioning data for which the "new acceleration/deceleration time" was validated will continue to be controlled with that value. (The next positioning data will be controlled with the previously set acceleration/deceleration time.)



- (4) If the "new acceleration/deceleration time" is set to "0" and the speed is changed after the "new acceleration/deceleration time" is validated, the operation will be controlled with the previous "new acceleration/deceleration time".



- (5) The acceleration/deceleration time change function is disabled for JOG operation and inching operation.

POINT

If the speed is changed when an acceleration/deceleration change is enabled, the "new acceleration/deceleration time" will become the acceleration/deceleration time of the positioning data being executed. The "new acceleration/deceleration time" remains valid until the changeover to the next positioning data. (The automatic deceleration processing at the completion of the positioning will also be controlled by the "new acceleration/deceleration time".)

[3] Setting the acceleration/deceleration time change function

To use the "acceleration/deceleration time change function", write the data shown in the following table to the QD75 using the PLC program.

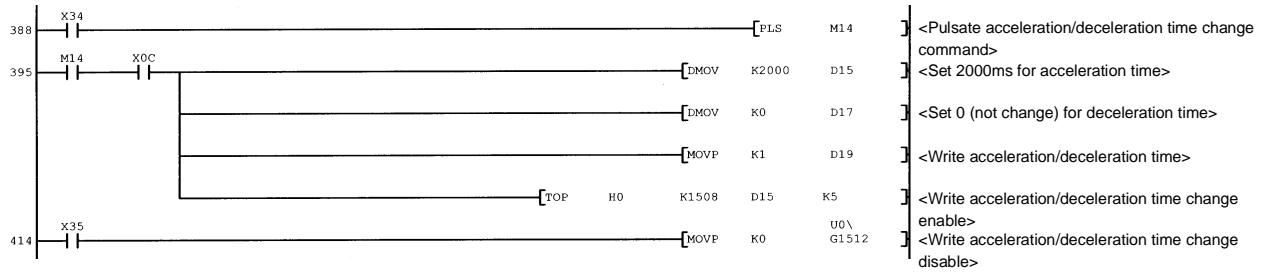
The set details are validated when a speed change is executed after the details are written to the QD75.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--------------|--|--|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.10 | New acceleration time value | → Set the new acceleration time. | 1508 1509 | 1608 1609 | 1708 1709 | 1808 1809 |
| Cd.11 | New deceleration time value | → Set the new deceleration time. | 1510 1511 | 1610 1611 | 1710 1711 | 1810 1811 |
| Cd.12 | Acceleration/ deceleration time change during speed change, enable/disable selection | 1 Set "1: Acceleration/deceleration time change enable". | 1512 | 1612 | 1712 | 1812 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

Example

*
 * No.16 Acceleration/deceleration time change program
 *



12.5.4 Torque change function

The "torque change function" is used to change the torque limit value during torque limiting.

The torque limit value during torque limiting is normally the value set in the " Pr.17

Torque limit setting value" or " Cd.101 Torque output setting value" that was previously set in the parameters. However, by setting the new torque limit value in the axis control data " Cd.22 New torque value", and writing it to the QD75, the torque generated by the servomotor during control can be limited with the new torque value. (The " Cd.22 New torque value" is validated when written to the QD75.)

The details shown below explain about the "torque change function".

- [1] Control details
- [2] Precautions during control
- [3] Setting the torque change function start signal

[1] Control details

The torque value of the axis control data can be changed at all times. The torque can be limited with a new torque value from the time the new torque value has been written to the QD75. (a torque change is made only during operation.)

(Note that the delay time until a torque control is executed is max. 56.4ms after torque change value was written.)

The torque limiting is not carried out from the time the power supply is turned ON to the time the PLC READY signal (Y0) is turned ON.

The torque setting range is from 0 to " Pr.17 Torque limit setting value".

When the new torque value is 0, a torque change is considered not to be carried out.

The torque change range is 1 to " Pr.17 Torque limit setting value".

The following drawing shows the torque change operation.

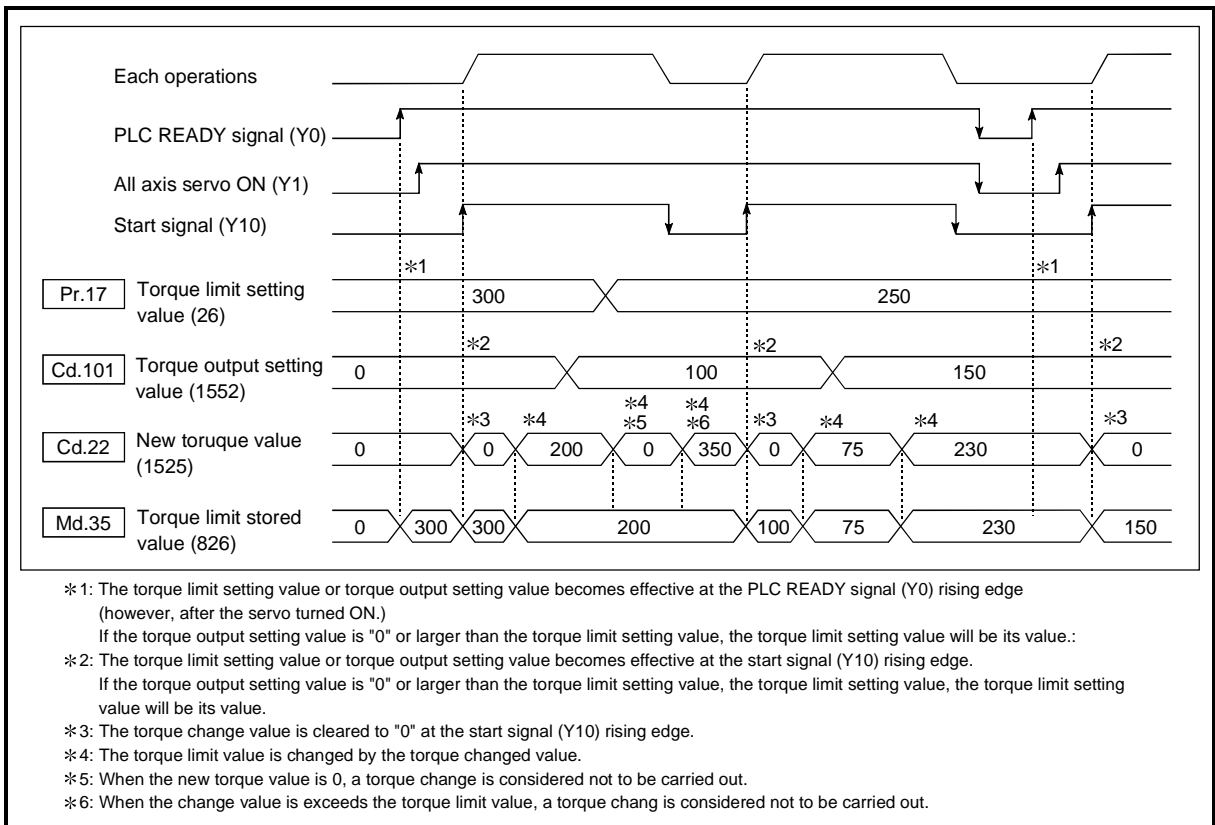


Fig. 12.30 Torque change operation

[2] Precautions during control

- (1) If a value besides "0" is set in the " **Cd.22** New torque value", the torque generated by the servomotor will be limited by that value. To limit the torque with the value set in " **Pr.17** Torque limit setting value" or " **Cd.101** Torque output setting value", set the " **Cd.22** New torque value" to "0".
- (2) The " **Cd.22** New torque value" is validated when written to the QD75.
(Note that it is not validated from the time the power supply is turned ON to the time the PLC READY signal (Y0) is turned ON.)
- (3) If the setting value is outside the setting range, an axis warning "Outside new torque value range" (warning code: 113) will occur and the torque will not be changed.
- (4) If the time to hold the new torque value is not more than 100ms, a torque change may not be executed.

[3] Setting the torque change function start signal

To use the "torque change function", write the data shown in the following table to the QD75 using the PLC program.

The set details are validated when written to the QD75.

| Setting item | Setting value | Setting details | Buffer memory address | | | | |
|--------------|------------------|-----------------|---------------------------------|--------|--------|--------|------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Cd.22 | New torque value | → | Set the new torque limit value. | 1525 | 1625 | 1725 | 1825 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

12.6 Absolute position system

The QD75 can construct an absolute position system by installing the absolute position system and connecting it through SSCNET.

The following describes precautions when constructing the absolute position system.

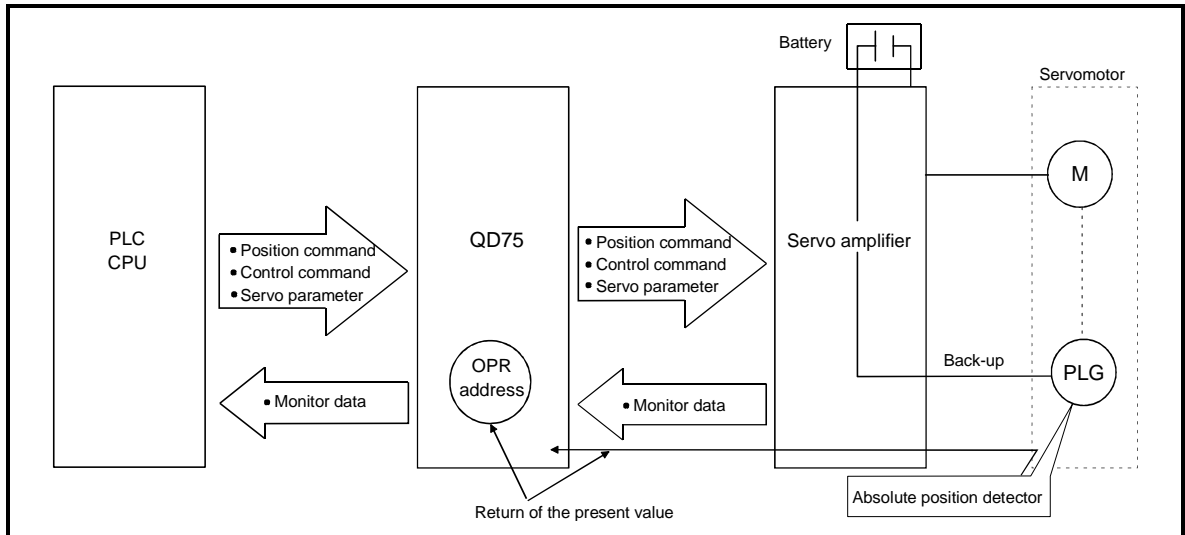


Fig. 12.31 Configuration of absolute position system

[1] Setting for absolute positions

When constructing an absolute position system, use a servomotor with absolute position detector.

It is also necessary to install a battery for retaining the location of the OPR in the servo amplifier. When an absolute position detector is installed, select "absolute value detector available" in the amplifier setting for the servo basic parameters.

| Axis No. | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
|---------------|--------|--------|--------|--------|
| Buffer memory | 30101 | 30201 | 30301 | 30401 |

[2] OPR

The absolute position system can establish the location of the OPR, using "Data set method", "Near-point dog" and "Count method" OPR method.

In the "Data set method" OPR method, the location to which the location of the OPR position is moved by manual operation (JOG operation/manual pulse generator operation) is treated as the OPR position.

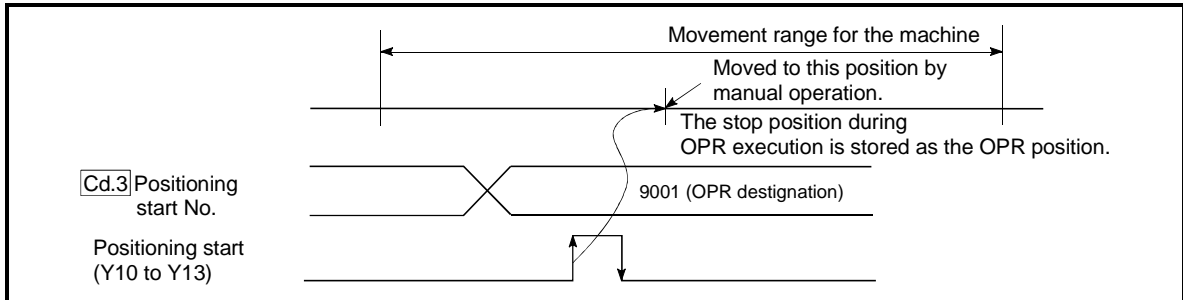


Fig. 12.32 Operation of the OPR execution

12.7 Other functions

Other functions include the "step function", "skip function", "M code output function", "teaching function", "target position change function", "command in-position function", "acceleration/deceleration processing function", "pre-reading start function", "deceleration start flag function" and "stop command processing for deceleration stop function" and "follow up processing function". Each function is executed by parameter setting or PLC program creation and writing.

12.7.1 Step function

The "step function" is used to confirm each operation of the positioning control one by one.

It is used in debugging work for major positioning control, etc.

A positioning operation in which a "step function" is used is called a "step operation". In step operations, the timing for stopping the control can be set. (This is called the "step mode".) Control stopped by a step operation can be continued by setting "step continue" (to continue the control) or restarted by setting "restart" in the "step start information".

The details shown below explain about the "step function".

- [1] Relation between the step function and various controls
- [2] Step mode
- [3] Step start information
- [4] Using the step operation
- [5] Control details
- [6] Precautions during control
- [7] Step function settings

[1] Relation between the step function and various controls

The following table shows the relation between the "step function" and various controls.

| Control type | | Step function | Step applicability | |
|---------------------------|--|---|-----------------------------|-----------------------------|
| OPR control | Machine OPR control | × | Step operation not possible | |
| | Fast OPR control | × | | |
| Major positioning control | Position control | 1-axis linear control | ○ | |
| | | 2 to 4-axes linear interpolation control | ○ | |
| | | 1-axis fixed-feed control | ○ | |
| | | 2 to 4- axes fixed-feed control (interpolation) | ○ | |
| | 2-axis circular interpolation control | ○ | Step operation possible | |
| | 1 to 4- axes Speed control | × | | Step operation not possible |
| | Speed-position switching control Position-speed switching control | ○ | | Step operation possible |
| Other control | Current value changing | ○ | Step operation not possible | |
| | JUMP instruction, NOP instruction, LOOP to LEND | × | | |
| Manual control | JOG operation, Inching operation | × | Step operation not possible | |
| | Manual pulse generator operation | × | | |

○ : Set when required. × : Setting not possible

[2] Step mode

In step operations, the timing for stopping the control can be set. This is called the "step mode". (The "step mode" is set in the control data " [Cd.34] Step mode".)

The following shows the two types of "step mode" functions.

(1) Deceleration unit step

The operation stops at positioning data requiring automatic deceleration. (A normal operation will be carried out until the positioning data requiring automatic deceleration is found. Once found, that positioning data will be executed, and the operation will then automatically decelerate and stop.)

(2) Data No. unit step

The operation automatically decelerates and stops for each positioning data. (Even in continuous path control, an automatic deceleration and stop will be forcibly carried out.)

[3] Step start information

Control stopped by a step operation can be continued by setting "step continue" (to continue the control) in the "step start information". (The "step start information" is set in the control data " [Cd.36] Step start information".)

The following table shows the results of starts using the "step start information" during step operation.

| Stop status in the step operation | [Md.26] Axis operation status | [Cd.36] Step start information | Step start results |
|--|-------------------------------|--------------------------------|--|
| 1 step of positioning stopped normally | Step standing by | 1: Step continue | The next positioning data is executed. |

The warnings "Step not possible (warning code: 511)" will occur if the " [Md.26] Axis operation status" is as shown below or the step valid flag is OFF when step start information is set.

| [Md.26] Axis operation status | Step start results |
|---|-------------------------------|
| Standing by | Step not continued by warning |
| Stopped | |
| In interpolation | |
| In JOG operation | |
| In manual pulse generator operation | |
| Analyzing | |
| Waiting for special start | |
| In OPR | |
| In position control | |
| In speed control | |
| In speed control of speed-position switching control | |
| In position control of speed-position switching control | |
| In speed control of position-speed switching control | |
| In position control of position-speed switching control | |

[4] Using the step operation

The following shows the procedure for checking positioning data using the step operation.

- (1) Turn ON the step valid flag before starting the positioning data.
(Write "1" (carry out step operation) in " [Cd.35](#) Step valid flag".)
- (2) Set the step mode before starting the positioning data.
(Set in " [Cd.34](#) Step mode".)
- (3) Turn ON the positioning start signal, and check that the positioning control starts normally.
- (4) The control will stop for the following reasons.
 - a) One step of positioning stopped normally. → Go to step (6).
 - b) Control stopped by a stop signal. → Take appropriate measures, go to step (5).
 - c) An error occurred and the control stopped. → Take appropriate measures, go to step (3).
- (5) Write "1" (restart) to " [Cd.6](#) Restart command", and check that the positioning data where the control stopped operates normally. → Go to step (4).
- (6) Write "1" (step continue) to " [Cd.36](#) Step start information", and check that the next positioning data operates normally.
 - a) One step of positioning stopped normally. → Go to step (6).
 - b) Control stopped by a stop signal. → Take appropriate measures, go to step (5).
 - c) An error occurred and the control stopped. → Take appropriate measures, go to step (3).
 - d) All positioning data operated normally. → Go to step (7).
- (7) Turn OFF the step valid flag, and quit the "step function".
(Write "0" (do not carry out step operation) in " [Cd.35](#) Step valid flag".)

[5] Control details

(1) The following drawing shows a step operation during a "deceleration unit step".

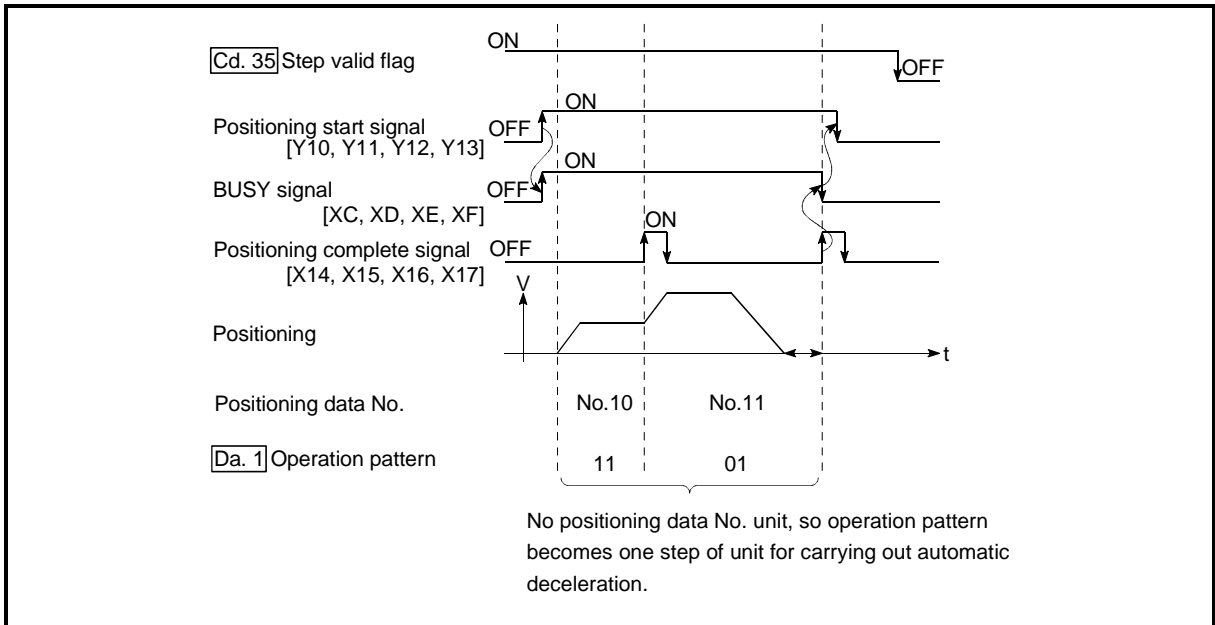


Fig. 12.33 Operation during step execution by deceleration unit step

(2) The following drawing shows a step operation during a "data No. unit step".

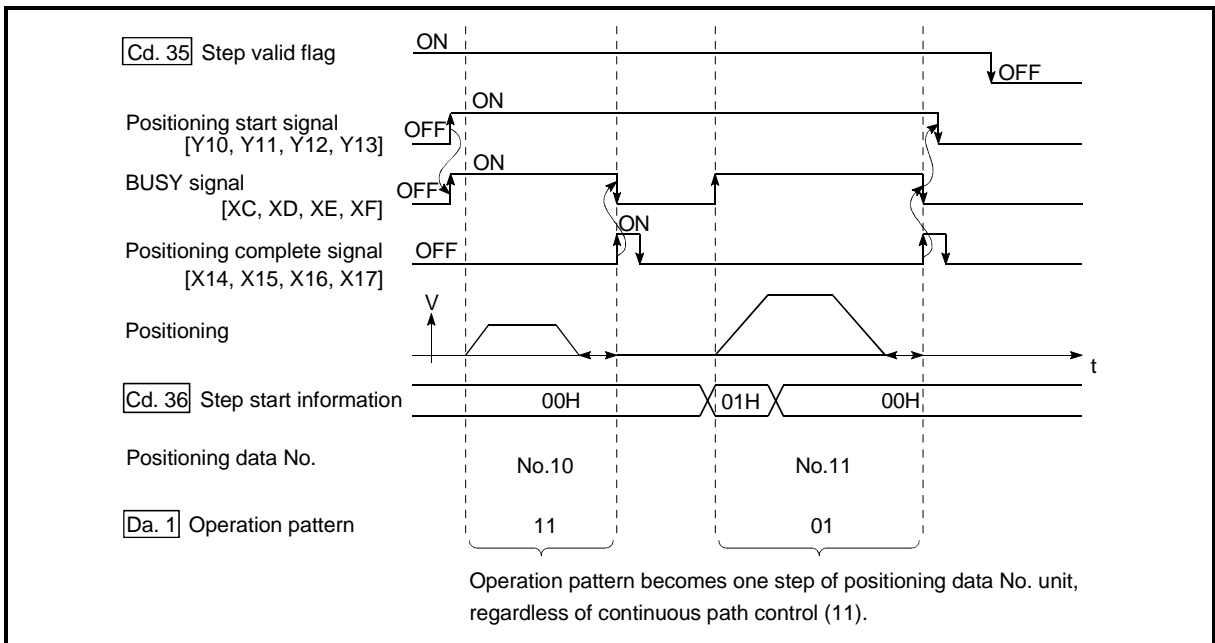


Fig. 12.34 Operation during step execution positioning data No. unit step

[6] Precautions during control

- (1) When step operation is carried out using interpolation control positioning data, the step function settings are carried out for the reference axis.
- (2) When the step valid flag is ON, the step operation will start from the beginning if the positioning start signal is turned ON while "Md.26 Axis operation status" is "step standing by". (The step operation will be carried out from the positioning data set in "Cd.3 Positioning start No.".)

[7] Step function settings

To use the "step function", write the data shown in the following table to the QD75 using the PLC program. Refer to section [4] "Using the step operation" for the timing of the settings.

The set details are validated when written to the QD75.

| Setting item | | Setting value | Setting details | Buffer memory address | | | |
|--------------|------------------------|---------------|---|-----------------------|--------|--------|--------|
| | | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.34 | Step mode | → | Set "0: Deceleration unit step" or "1: Data No. unit step". | 1544 | 1644 | 1744 | 1844 |
| Cd.35 | Step valid flag | 1 | Set "1: Carry out step operation". | 1545 | 1645 | 1745 | 1845 |
| Cd.36 | Step start information | → | Set "1: Step continue", depending on the stop status. | 1546 | 1646 | 1746 | 1846 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

12.7.2 Skip function

The "skip function" is used to stop (deceleration stop) the control of the positioning data being executed at the time of the skip signal input, and execute the next positioning data.

A skip is executed by a skip command ([Cd.37] Skip command) or external command signal.

The "skip function" can be used during control in which positioning data is used.

The details shown below explain about the "skip function".

[1] Control details

[2] Precautions during control

[3] Setting the skip function from the PLC CPU

[4] Setting the skip function using an external command signal

[1] Control details

The following drawing shows the skip function operation.

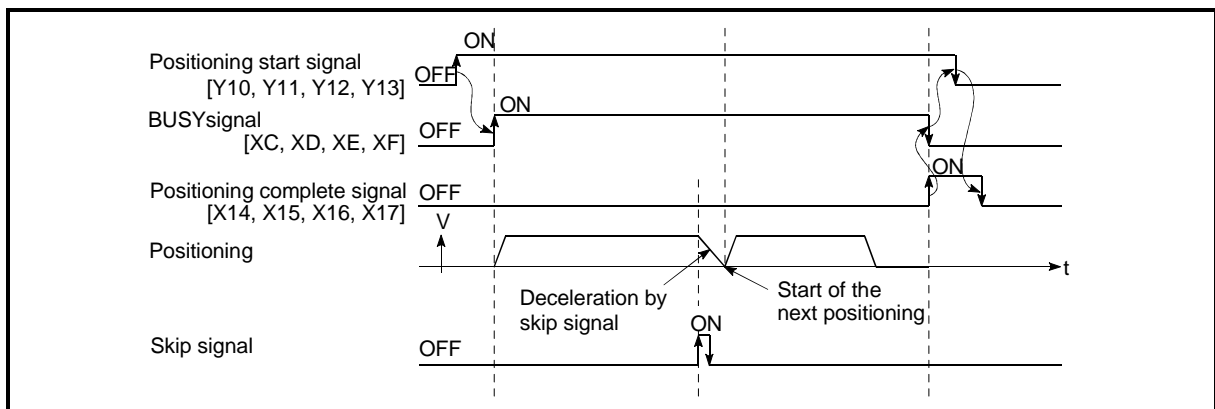


Fig. 12.35 Operation when a skip signal is input during positioning control

[2] Precautions during control

- (1) If the skip signal is turned ON at the last of an operation, a deceleration stop will occur and the operation will be terminated.
- (2) When a control is skipped (when the skip signal is turned ON during a control), the positioning complete signals (X14, X15, X16, X17) will not turn ON.
- (3) When the skip signal is turned ON during the dwell time, the remaining dwell time will be ignored, and the next positioning data will be executed.
- (4) When a control is skipped during interpolation control, the reference axis skip signal is turned ON. When the reference axis skip signal is turned ON, a deceleration stop will be carried out for every axis, and the next reference axis positioning data will be executed.
- (5) The M code ON signals (X4, X5, X6, X7) will not turn ON when the M code output is set to the AFTER mode (when "1: AFTER mode" is set in [Pr.18] M code ON signal output timing").
(In this case, the M code will not be stored in [Md.25] Valid M code".)
- (6) The skip cannot be carried out by the speed-position and position-speed switching control. It is processed in the same manner as in the speed control.

[3] Setting the skip function from the PLC CPU

The following shows the settings and PLC program example for skipping the control being executed in axis 1 with a command from the PLC CPU.

- (1) Set the following data.
(The setting is carried out using the PLC program shown below in section (2)).

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|------------------------|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.37 Skip command | 1 | Set "1: Skip request". | 1547 | 1647 | 1747 | 1847 |

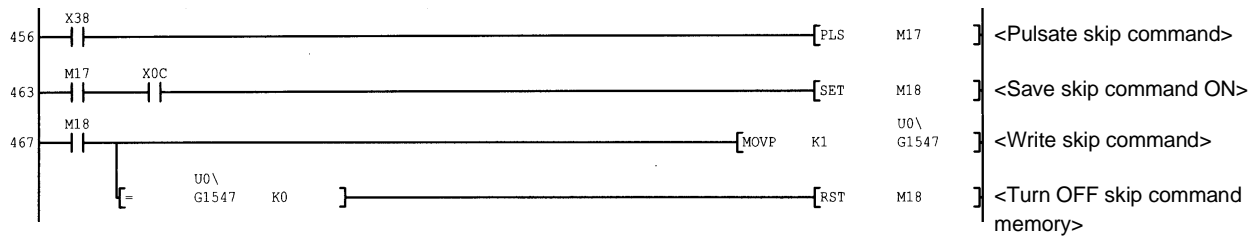
* Refer to Section "5.7 List of control data" for details on the setting details.

- (2) Add the following PLC program to the control program, and write it to the PLC CPU.

- 1) When the "skip command" is input, the value "1" (skip request) set in "Cd.37 Skip command" is written to the QD75 buffer memory (1547).

Example

*
* No.19 Skip program
*



[4] Setting the skip function using an external command signal

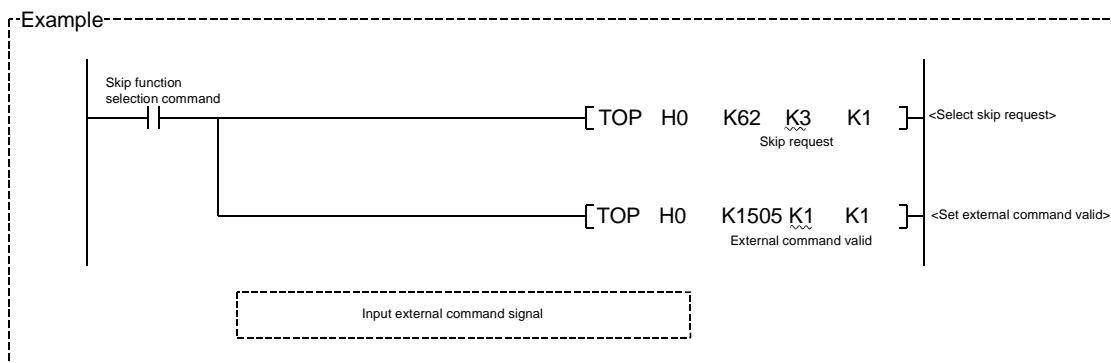
The skip function can also be executed using an "external command signal". The following shows the settings and PLC program example for skipping the control being executed in axis 1 using an "external command signal".

- (1) Set the following data to execute the skip function using an external command signal.
(The setting is carried out using the PLC program shown below in section (2)).

| Setting item | Setting value | Setting details | Buffer memory address | | | | |
|--------------|-------------------------------------|-----------------|-------------------------------------|--------|--------|--------|------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| Pr.42 | External command function selection | 3 | Set "3: Skip request". | 62 | 212 | 362 | 512 |
| Cd.8 | External command valid | 1 | Set "1: Validate external command". | 1505 | 1605 | 1705 | 1805 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

- (2) Add the following PLC program to the control program, and write it to the PLC CPU.



12.7.3 M code output function

The "M code output function" is used to command sub work (clamping, drill rotation, tool replacement, etc.) related to the positioning data being executed.

When the M code ON signal (X4, X5, X6, X7) is turned ON during positioning execution, a No. called the M code is stored in "Md.25 Valid M code".

These "Md.25 Valid M code" are read from the PLC CPU, and used to command auxiliary work. M codes can be set for each positioning data. (Set in setting item "Da.10 M code" of the positioning data.)

The timing for outputting (storing) the M codes can also be set in the "M code output function".

The details shown below explain about the "M code output function".

- [1] M code ON signal output timing
- [2] M code OFF request
- [3] Precautions during control
- [4] Setting the M code output function
- [5] Reading M codes

[1] M code ON signal output timing

The timing for outputting (storing) the M codes can be set in the "M code output function". (The M code is stored in "Md.25 Valid M code" when the M code ON signal is turned ON.)

The following shows the two types of timing for outputting M codes: the "WITH mode" and the "AFTER mode".

(1) WITH mode

The M code ON signal (X4, X5, X6, X7) is turned ON at the positioning start, and the M code is stored in "Md.25 Valid M code".

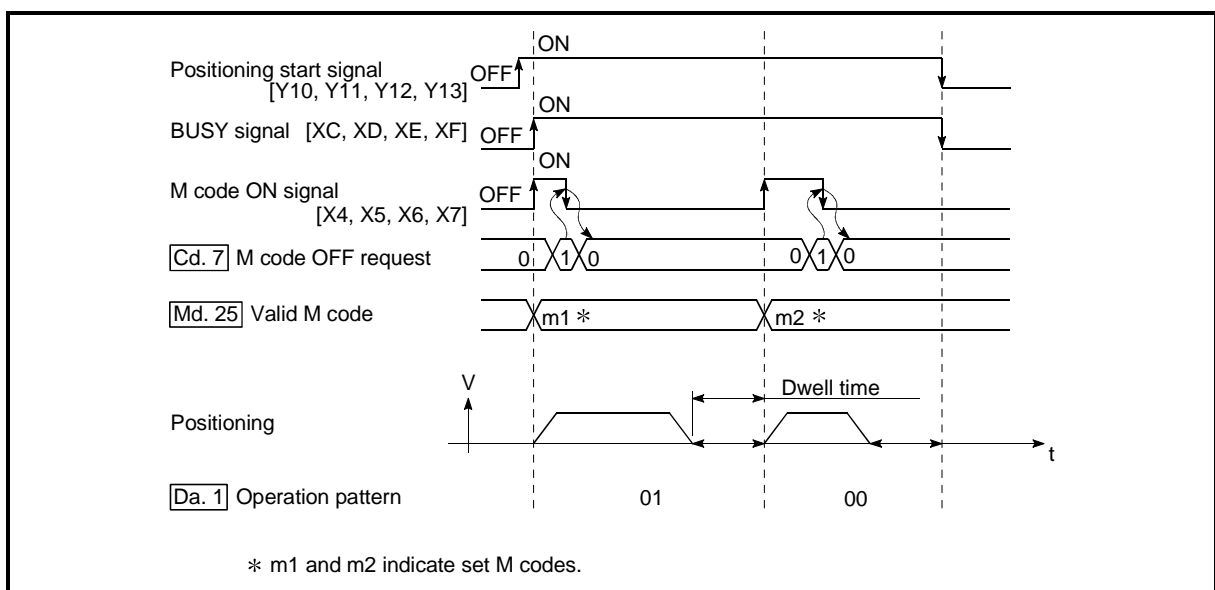


Fig. 12.36 M code ON/OFF timing (WITH mode)

(2) AFTER mode

The M code ON signal (X4, X5, X6, X7) is turned ON at the positioning completion, and the M code is stored in "Md.25 Valid M code".

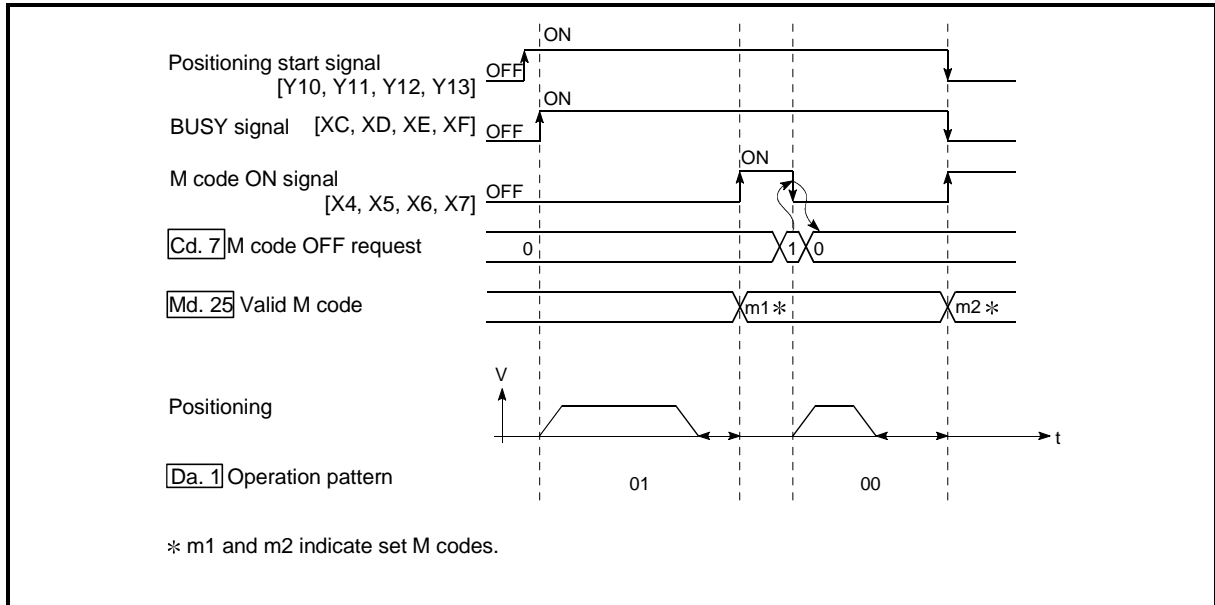


Fig. 12.37 M code ON/OFF timing (AFTER mode)

[2] M code OFF request

When the M code ON signal (X4, X5, X6, X7) is ON, it must be turned OFF by the PLC program.

To turn OFF the M code ON signal, set "1" (turn OFF the M code signal) in "Cd.7 M code OFF request".

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|-------------------------|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.7 M code OFF request | 1 | Set "1: Turn OFF the M code ON signal". | 1504 | 1604 | 1704 | 1804 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

The next positioning data will be processed as follows if the M code ON signal is not turned OFF. (The processing differs according to the Da.1 Operation pattern.)

| Da.1 Operation pattern | Processing |
|--|---|
| 00 Independent positioning control (Positioning control) | The next positioning data will not be executed until the M code ON signal is turned OFF. |
| 01 Continuous positioning control | |
| 11 Continuous path control | The next positioning data will be executed, but a warning "M code ON signal ON start" (warning code: 503) will occur. |

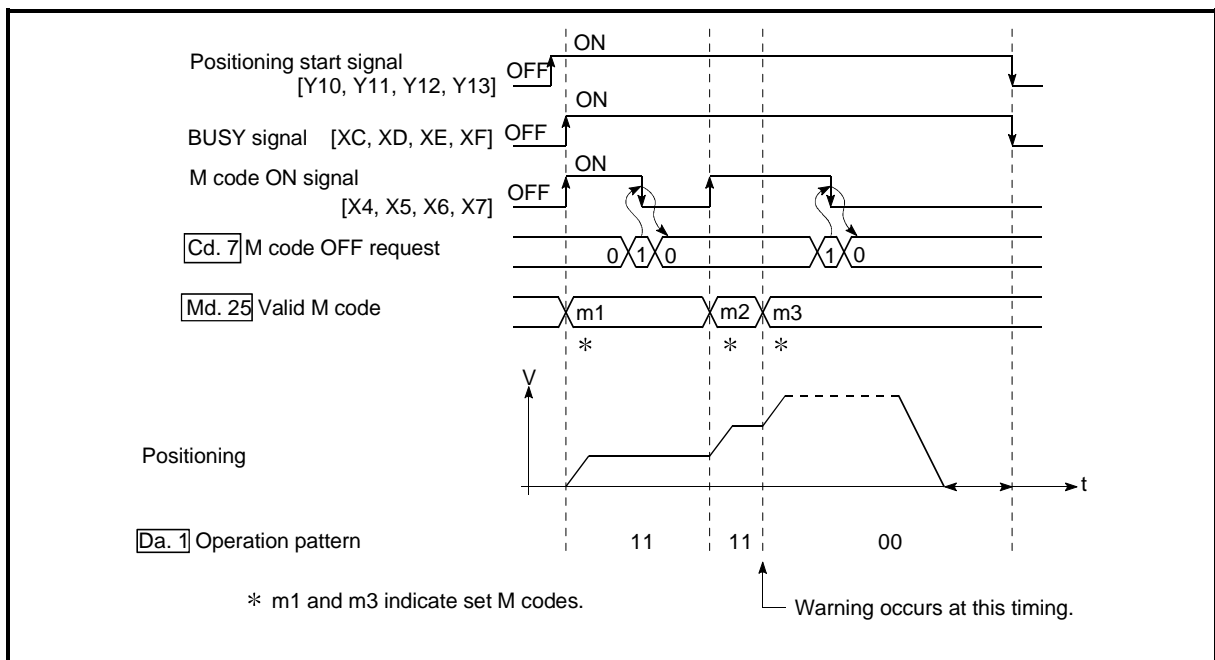


Fig. 12.38 Warning due to an M code ON signal during continuous path control

| |
|--|
| POINT |
| If the M code output function is not required, set a "0" in setting item " Da.10 M code" of the positioning data. |

[3] Precautions during control

- (1) During interpolation control, the reference axis M code ON signal is turned ON.
- (2) The M code ON signal will not turn ON if "0" is set in "**Da.10** M code". (The M code will not be output, and the previously output value will be held in "**Md.25** Valid M code".)
- (3) If the M code ON signal is ON at the positioning start, an error "M code signal ON at positioning start (error code: 536)" will occur, and the positioning will not start.
- (4) If the PLC READY signal (Y0) is turned OFF, the M code ON signal will turn OFF and "0" will be stored in "**Md.25** Valid M code".
- (5) If the positioning operation time is short during continuous path control, there will not be enough time to turn OFF the M code ON signal, and a warning "M code signal ON (error code: 503)" may occur. In this case, set a "0" in the "**Da.10** M code" of that section's positioning data.
- (6) In the AFTER mode during speed control, the M code is not output and the M code ON signal does not turn ON.
- (7) If current value changing where "9003" has been set to "**Cd.3** Positioning start No." is performed, the M code output function is made invalid.

[4] Setting the M code output function

The following shows the settings to use the "M code output function".

- (1) Set the M code No. in the positioning data " [Da.10] M code".
- (2) Set the timing to output the M code ON signal (X4, X5, X6, X7).

Set the required value in the following parameter, and write it to the QD75.

The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Pr.18] M code ON signal output timing | → | Set the timing to output the M code ON signal. 0: WITH mode 1: AFTER mode | 27 | 177 | 327 | 477 |

* Refer to Section 5.2 "List of parameters" for setting details.

[5] Reading M codes

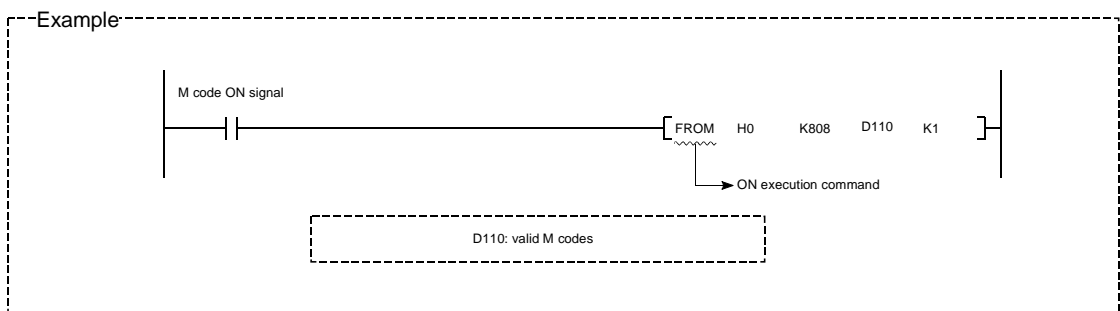
"M codes" are stored in the following buffer memory when the M code ON signal turns ON.

| Monitor item | Monitor value | Storage details | Buffer memory address | | | |
|----------------------|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Md.25] Valid M code | → | The M code No. ([Da.10] M code) set in the positioning data is stored. | 808 | 908 | 1008 | 1108 |

* Refer to Section 5.6 "List of monitor data" for information on the storage details.

The following shows a PLC program example for reading the " [Md.25] Valid M code" to the PLC CPU data register (D110). (The read value is used to command the sub work.)

Read M codes not as "rising edge commands", but as "ON execution commands".



12.7.4 Teaching function

The "teaching function" is used to set addresses aligned using the manual control (JOG operation, inching operation manual pulse generator operation) in the positioning data addresses ("Da.6 Positioning address/movement amount", "Da.7 Arc address").

The details shown below explain about the "teaching function".

- [1] Control details
- [2] Precautions during control
- [3] Data used in teaching
- [4] Teaching procedure
- [5] Teaching program example

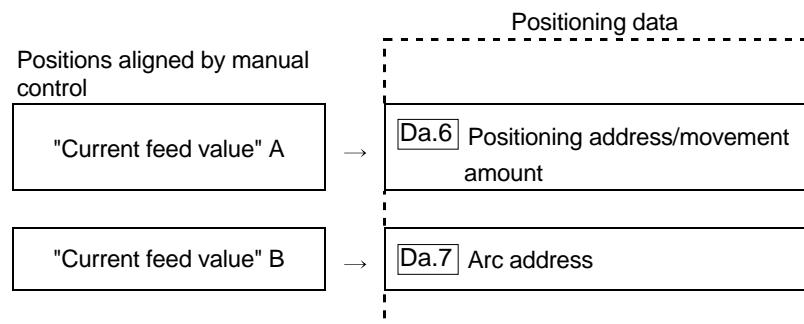
[1] Control details

(1) Teaching timing

Teaching is executed using the PLC program when the BUSY signal (XC, XD, XE, XF) is OFF. (During manual control, teaching can be carried out as long as the axis is not BUSY, even when an error or warning has occurred.)

(2) Addresses for which teaching is possible

The addresses for which teaching is possible are "current feed values" (Md.20 Current feed value) having the OP as a reference. The settings of the "movement amount" used in incremental system positioning cannot be used. In the teaching function, these "current feed values" are set in the "Da.6 Positioning address/movement amount" or "Da.7 Arc address".



(3) Dedicated instructions "TEACH 1, TEACH 2, TEACH 3, TEACH 4, PFWRT"

When the dedicated instructions "TEACH 1, TEACH 2, TEACH 3, TEACH 4, PFWRT" are used to execute the teaching function, the programming becomes easier. Refer to Chapter 14 "Dedicated instructions" for details.

[2] Precautions during control

- (1) Before teaching, a "machine OPR" must be carried out to establish the OP. (When a current value changing, etc., is carried out, " [Md.20] Current feed value" may not show absolute addresses having the OP as a reference.)
- (2) Teaching cannot be carried out for positions to which movement cannot be executed by manual control (positions to which the workpiece cannot physically move). (During center point designation circular interpolation control, etc., teaching of " [Da.7] Arc address" cannot be carried out if the center point of the arc is not within the moveable range of the workpiece.)
- (3) Writing to the flash ROM can be executed up to 100,000 times. If writing to the flash ROM exceeds 100,000 times, the writing may become impossible (assured value is up to 100,000 times). If an error (error code: 805) occurs when writing to the flash ROM has been completed, check whether or not the program is created so as to write continuously to the flash ROM.

[3] Data used in teaching

The following control data is used in teaching.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---------------------------------------|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| [Cd.1] Flash ROM write request | 1 | Write the set details to the flash ROM (backup the changed data). | 1900 | | | |
| [Cd.38] Teaching data selection | → | Sets to which "current feed value" is written. 0: Written to " [Da.6] Positioning address/ movement amount". 1: Written to " [Da.7] Arc address". | 1548 | 1648 | 1748 | 1848 |
| [Cd.39] Teaching positioning data No. | → | Designates the data to be taught. (Teaching is carried out when the setting value is 1 to 600.) When teaching has been completed, the QD75 is zero cleared in the initial stage. | 1549 | 1649 | 1749 | 1849 |

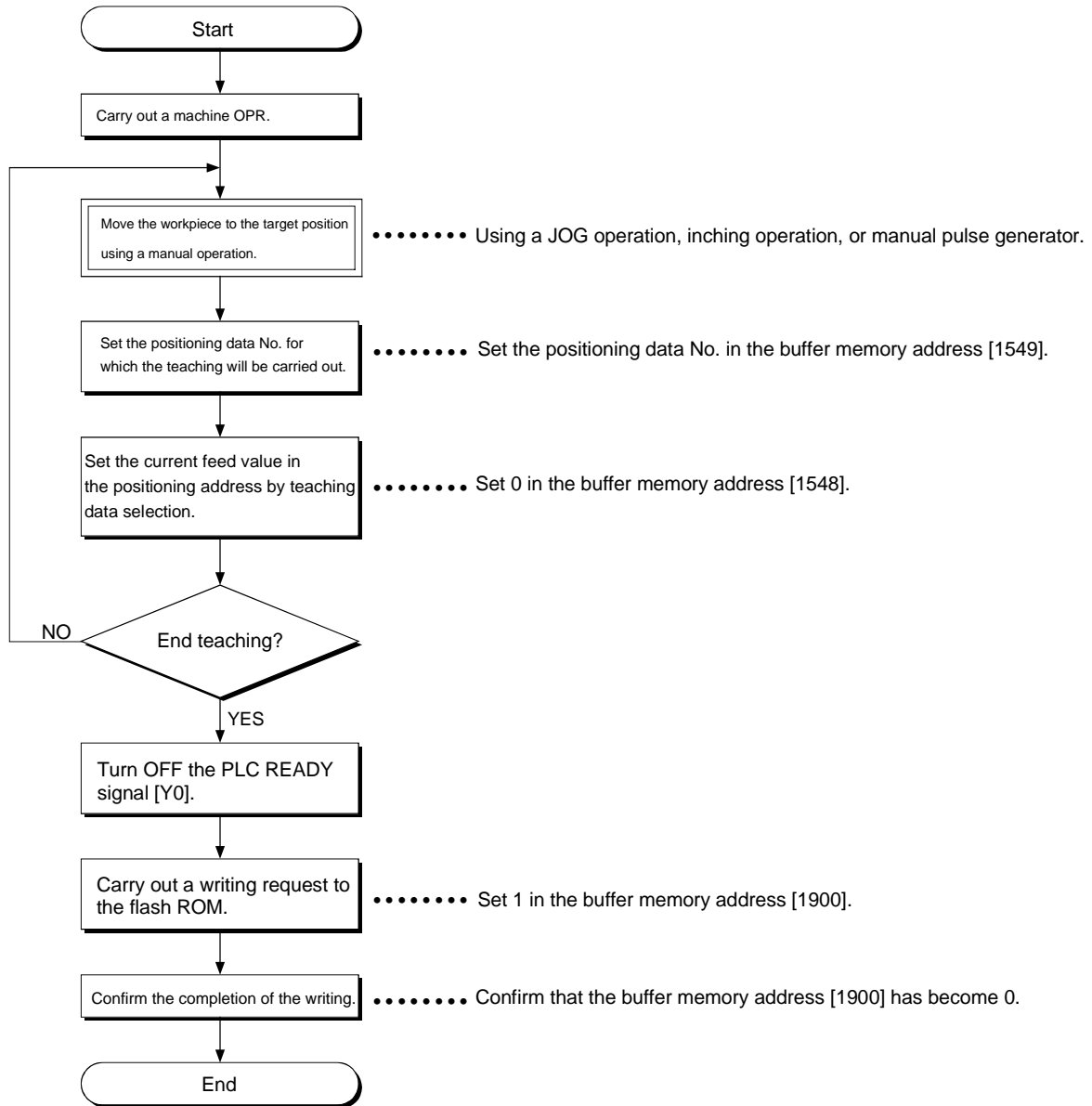
* Refer to Section 5.7 "List of control data" for details on the setting details.

[4] Teaching procedure

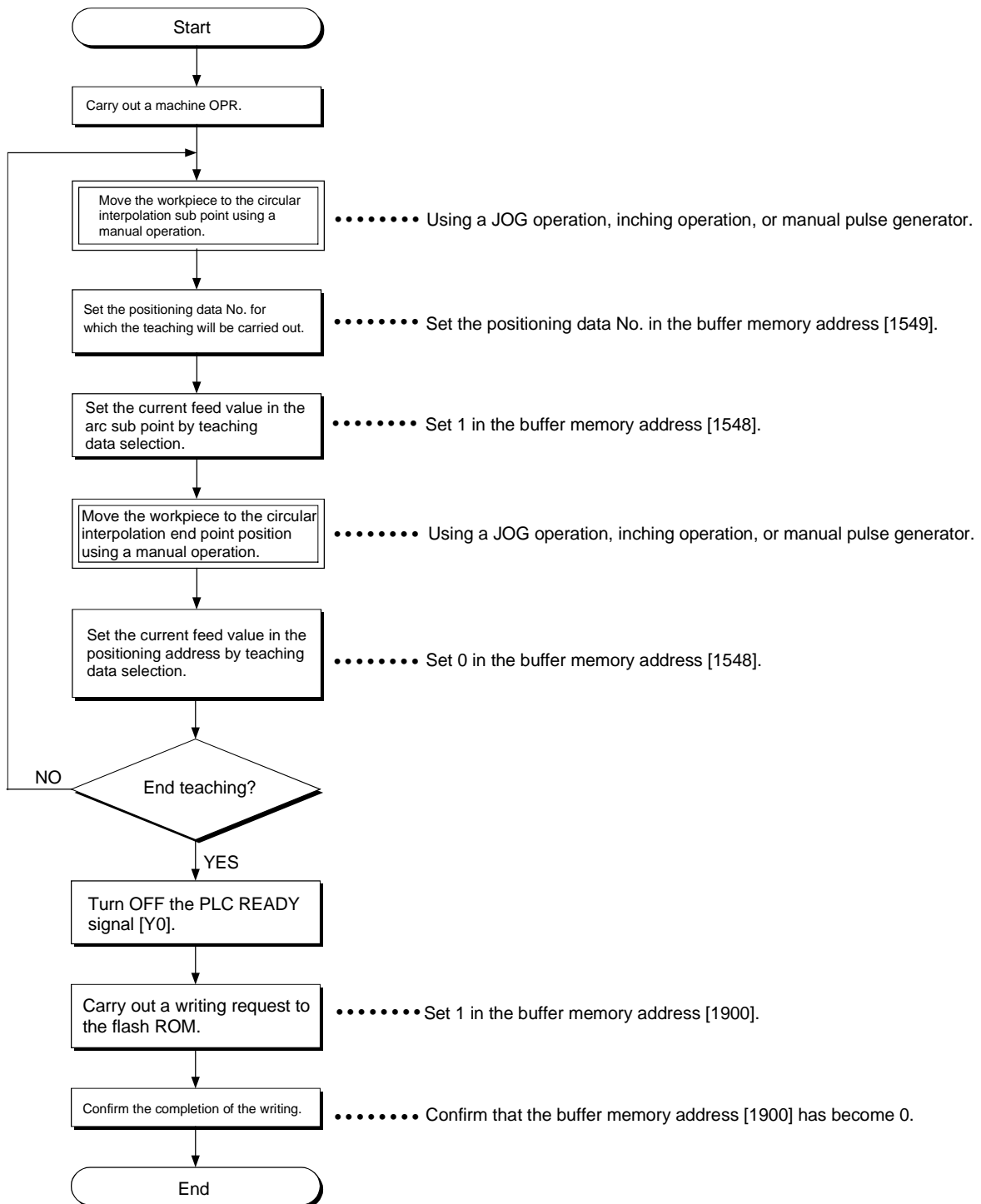
The following shows the procedure for a teaching operation.

(Interpolation operation with axis 1 as a reference)

(1) When teaching to the " Da.6 Positioning address/movement amount"



(2) When teaching to the " Da.7 Arc address", then teaching to the " Da.6 Positioning address/movement amount"



[5] Teaching program example

The following shows a PLC program example for setting (writing) the positioning data obtained with the teaching function to the QD75.

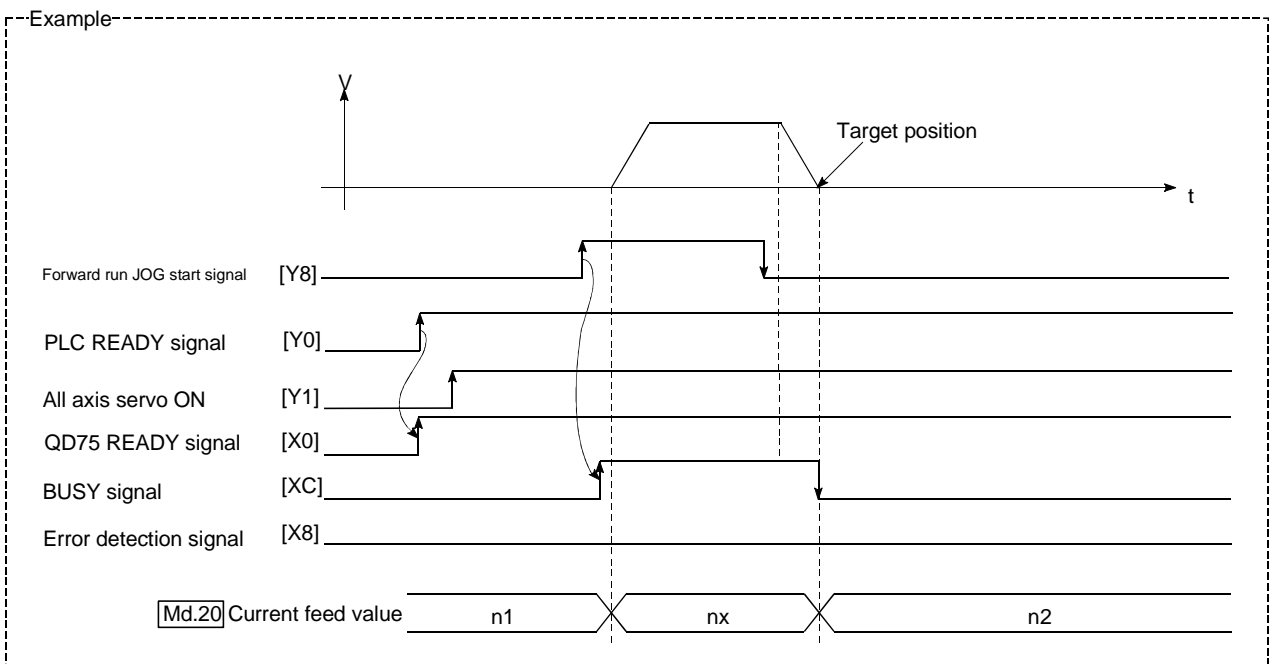
(1) Setting conditions

- When setting the current feed value as the positioning address, write it when the BUSY signal is OFF.

(2) Program example

- The following example shows a program to carry out the teaching of axis 1 by the dedicated instruction "TEACH 1".

- 1) Move the workpiece to the target position using a JOG operation (or an inching operation, a manual pulse generator operation).



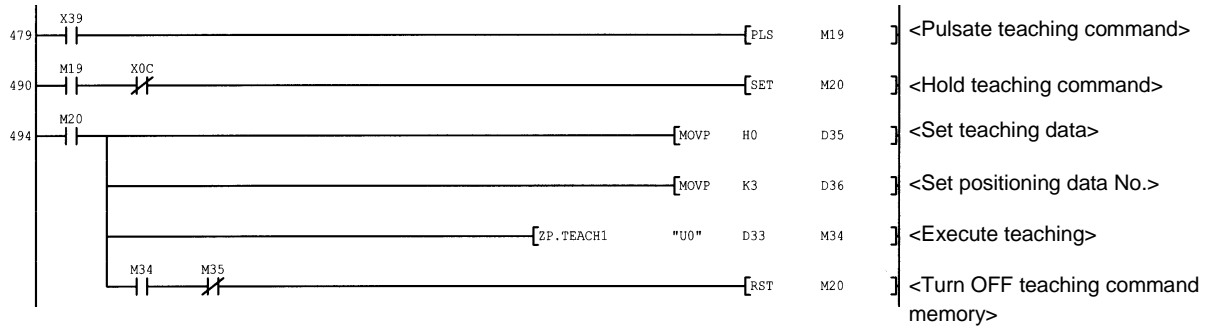
2) Carry out the teaching operation with the following program.

Example

```

*
* No.20 Teaching program
*
* -----
* •Position to the target position with manual operation.
* -----
*
*

```



POINT

- (1) Confirm the teaching function and teaching procedure before setting the positioning data.
- (2) The positioning addresses that are written are absolute address (ABS) values.
- (3) If the positioning operation is correctly completed with the written positioning data, it is recommended that the positioning data be registered in the QD75 flash ROM.

12.7.5 Target position change function

The "target position change function" is a function to change a target position to a newly designated target position at any timing during the position control (1-axis linear control). A command speed can also be changed simultaneously. The target position and command speed changed are set directly in the buffer memory, and the target position change is executed by "Cd.29 Target position change request flag".

The following shows the details of the "target position change function".

[1] Details of control

[2] Precaution during operation

[3] Method of setting target position change function from PLC CPU

[1] Details of control

The following charts show the details of control of the target position change function.

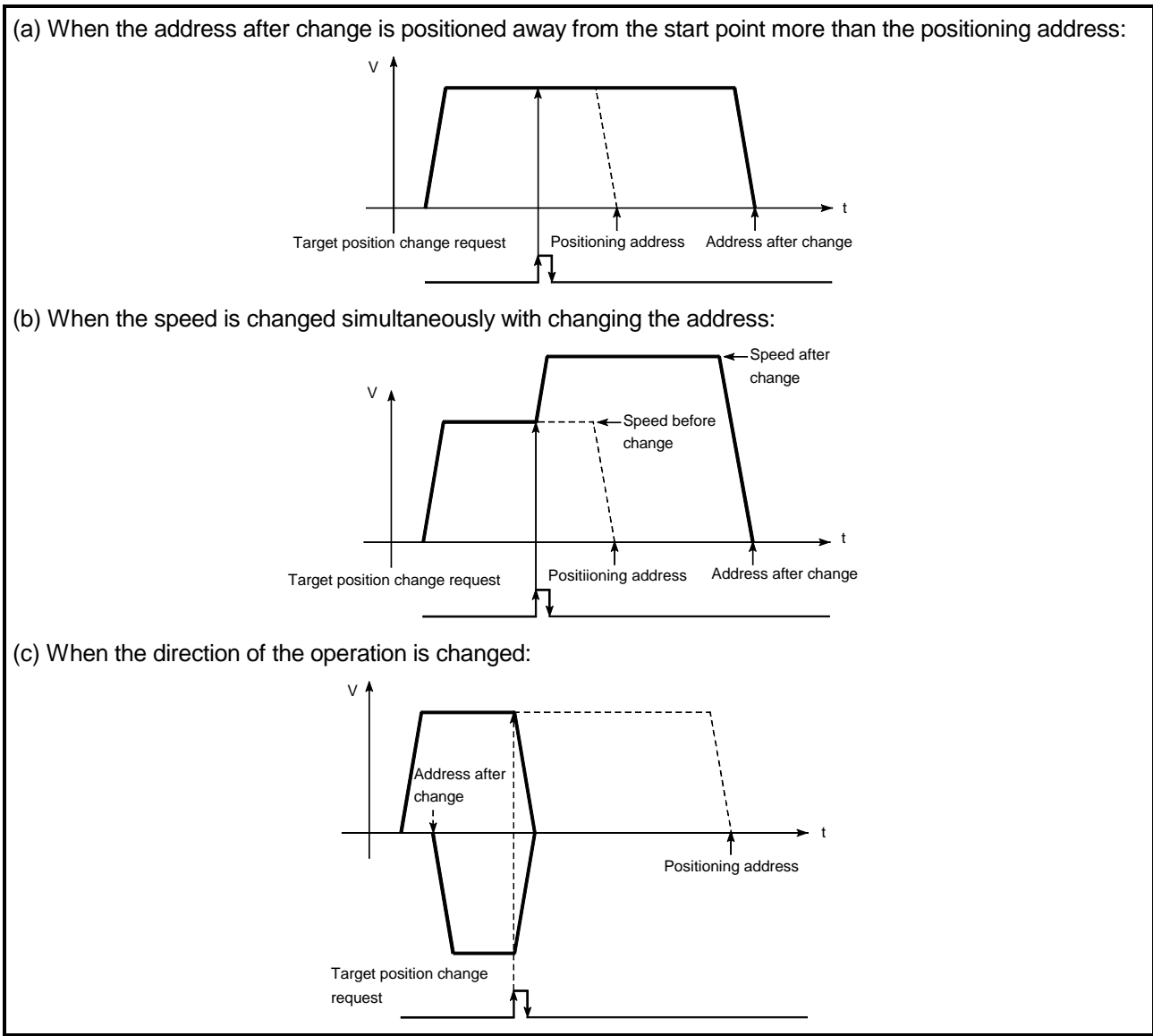


Fig. 12.39 Target position change operation

[2] Precautions during operation

- (1) If the positioning movement direction from the stop position to a new target position is reversed, stop the operation once and then position to the new target position. (Refer to Fig. 12.39 (c).)
- (2) If a command speed exceeding the speed limit value is set to change the command speed, a warning will be given, and the new command speed will be the speed limit value (warning code: 501).
Also, if the command speed change disables the remaining distance to the target value from being assured, a warning will be given (warning code: 509).
- (3) During interpolation control, a target position change request given is ignored and a warning (warning code: 518) occurs if a new target position value (address) is outside the software stroke limit range, if the axis is decelerating to a stop, or if the operation pattern is continuous path control.
- (4) When a command speed is changed, the current speed is also changed. When the next positioning speed uses the current speed in the continuous positioning, the next positioning operation is carried out at the new speed value. When the speed is set with the next positioning data, that speed becomes the current speed and the operation is carried out at the current speed.
- (5) When a target position change request is given during automatic deceleration in position control, positioning control to a new position is exercised after the axis has stopped once if the moving direction is reversed. If the moving direction is not reversed, the axis is accelerated to the command speed again and positioned to the new position.
- (6) If the constant speed status is regained or the output is reversed by a target position change made while "Md.48 Deceleration start flag" is ON, the deceleration start flag remains ON. (For details, refer to Section 12.7.9.)

| |
|--------------|
| POINT |
|--------------|

| |
|---|
| When carrying out the target position change continuously, take an interval of 100 ms or longer between the times of the target position changes. Also, take an interval of 100 ms or longer when the speed change is carried out after changing the target position or the target position change is carried out after the speed change. |
|---|

[3] Method of setting target position change function from PLC CPU

The following table and chart show the example of a data setting and PLC program used to change the target position of the axis 1 by the command from the PLC CPU, respectively. (example in which the target position value and command speed are changed to a new target position of "300.0 μm" and a new command speed of "10000.00 mm/min".)

(1) The following data is set.

(Referring to the starting time chart shown in item (2) below, carry out the setting with the PLC program shown in item (3).)

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|----------------------------------|-----------------------|--------------|--------------|--------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.27 Target position Value (new address) | 3000 | Set the new address. | 1534 1535 | 1634 1635 | 1734 1735 | 1834 1835 |
| Cd.28 Target position value (new speed) | 1000000 | Set the new speed. | 1536 1537 | 1636 1637 | 1736 1737 | 1836 1837 |
| Cd.29 Target position change request flag | 1 | Set "1: Carry out speed change". | 1538 | 1638 | 1738 | 1838 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

(2) The following shows the time chart for target position change.

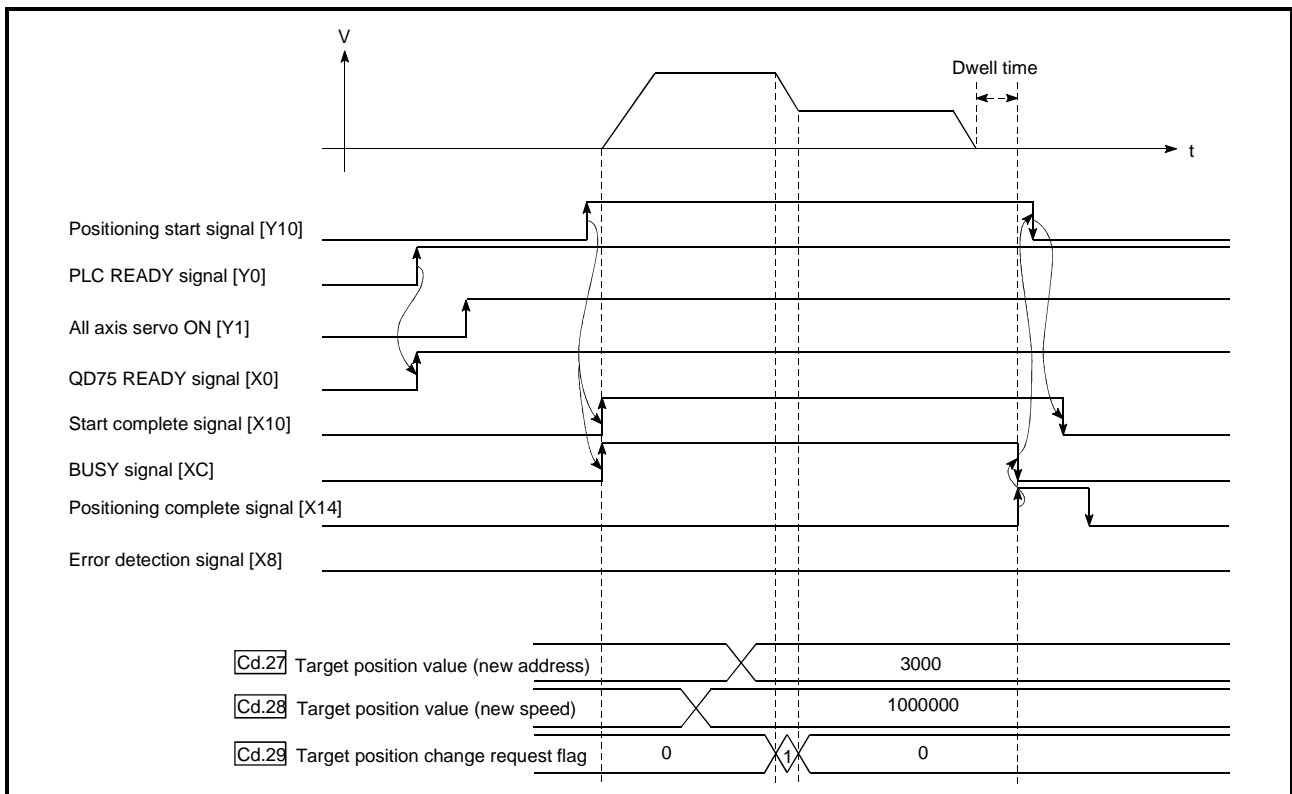
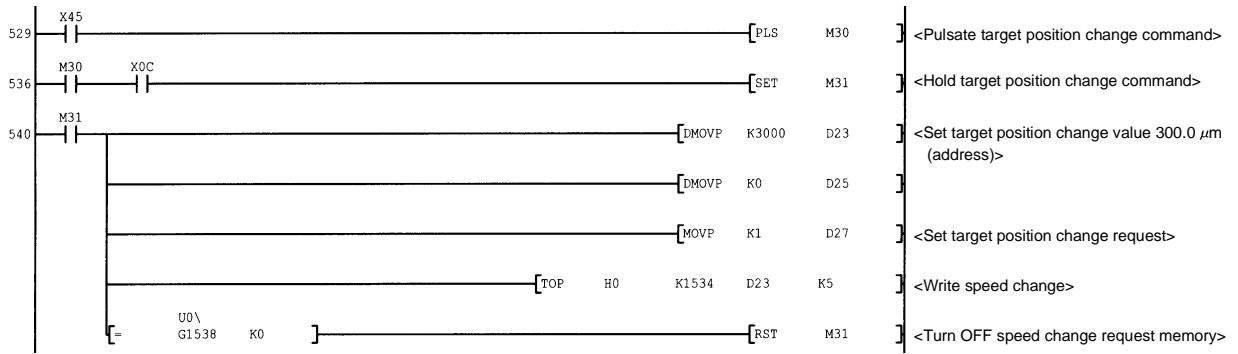


Fig. 12.40 Time chart for target position change from PLC CPU

(3) The following PLC program is added to the control program, and written to the PLC CPU.

Example

*
 * No.22 Target position change program
 *



12.7.6 Command in-position function

The "command in-position function" checks the remaining distance to the stop position during the automatic deceleration of positioning control, and sets "1". This flag is called the "command in-position flag". The command in-position flag is used as a front-loading signal indicating beforehand the completion of the position control.

The details shown below explain about the "command in-position function".

- [1] Control details
- [2] Precautions during control
- [3] Setting the command in-position function
- [4] Confirming the command in-position flag

[1] Control details

The following shows control details of the command in-position function.

- (1) When the remaining distance to the stop position during the automatic deceleration of positioning control becomes equal to or less than the value set in " Pr.16 Command in-position width", "1" is stored in the command in-position flag (Md.31 Status: b2).

(Command in-position width check)

$$\text{Remaining distance} \leq \text{" Pr.16 Command in-position width" setting value}$$

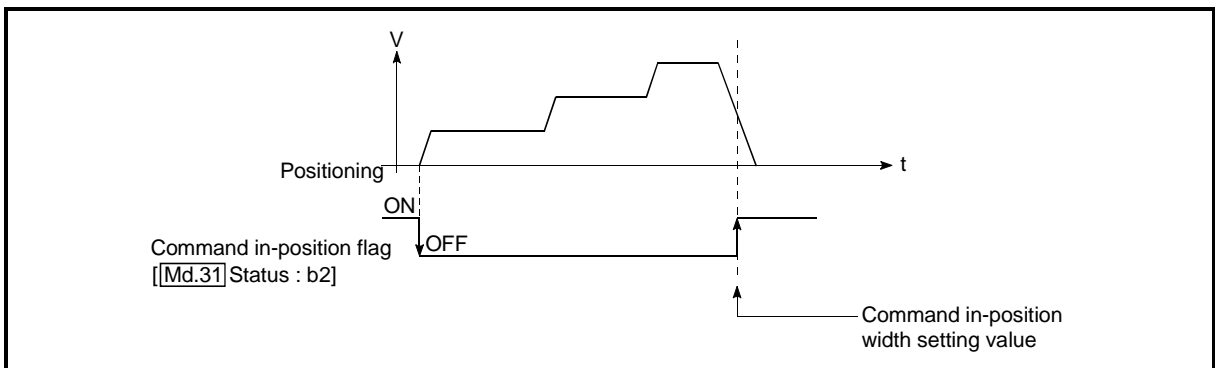


Fig. 12.41 Command in-position operation

- (2) A command in-position width check is carried out every 3.5ms.

[2] Precautions during control

- (1) A command in-position width check will not be carried out in the following cases.
- During deceleration by a stop command or sudden stop command.
 - During position control, the operation pattern is "continuous path control"
 - During speed control, or during the speed control of speed-position switching or position-speed switching control.

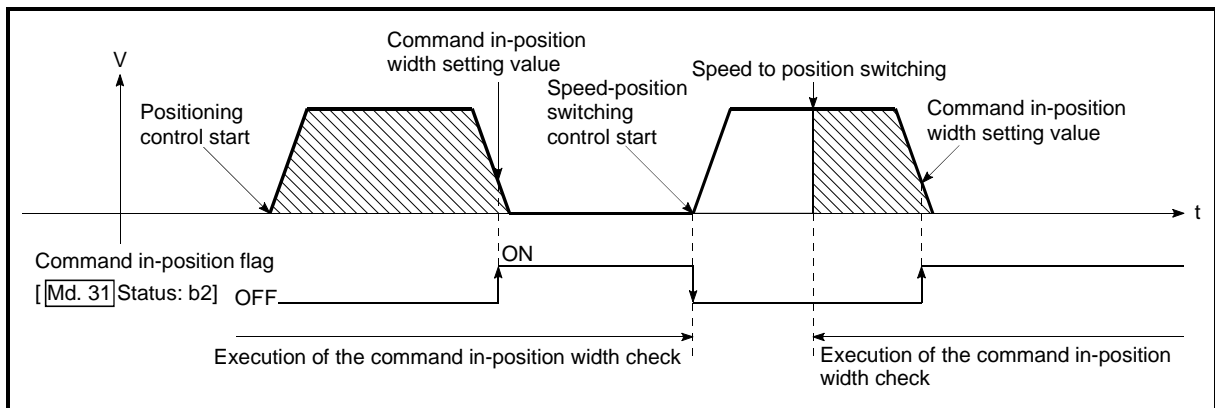


Fig. 12.42 Command in-position width check

- (2) The command in-position flag will be turned OFF in the following cases. ("0" will be stored in " [Md.31] Status: b2".)
- At the positioning control start
 - At the speed control start
 - At the speed-position switching control, position-speed switching control start
 - At the OPR control start
 - At the JOG operation start
 - At the inching operation start
 - When the manual pulse generator operation is enabled.
- (3) The " [Pr.16] Command in-position width" and command in-position flag ([Md.31] Status: b2) of the reference axis are used during interpolation control.

[3] Setting the command in-position function

To use the "command in-position function", set the required value in the parameter shown in the following table, and write it to the QD75.

The set details are validated at the rising edge (OFF → ON) of the PLC READY signal (Y0).

| Setting item | | Setting value | Setting details | Factory-set initial value |
|--------------|---------------------------|---------------|--|---------------------------|
| Pr.16 | Command in-position width | → | Turn ON the command in-position flag, and set the remaining distance to the stop position of the position control. | 100 |

* Refer to Section 5.2 "List of parameters" for setting details.

[4] Confirming the command in-position flag

The "command in-position flag" is stored in the following buffer memory.

| Monitor item | Monitor value | Storage details | Buffer memory address | | | |
|--------------|---------------|-----------------|--|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Md.31 | Status | → | The command in-position flag is stored in the "b2" position. | | | |
| | | | 817 | 917 | 1017 | 1117 |

* Refer to Section 5.6 "List of monitor data" for information on the storage details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.7.7 Acceleration/deceleration processing function

The "acceleration/deceleration processing function" adjusts the acceleration/deceleration when each control is executed.

Adjusting the acceleration/deceleration processing to match the control enables more precise control to be carried out.

There are two acceleration/deceleration adjustment items that can be set: "Acceleration/deceleration time 0 to 3", and "acceleration/deceleration method setting".

The details shown below explain about the "acceleration/deceleration processing function".

[1] "Acceleration/deceleration time 0 to 3" control details and setting

[2] "Acceleration/deceleration method setting" control details and setting

[1] "Acceleration/deceleration time 0 to 3" control details and setting

In the QD75, four types each of acceleration time and deceleration time can be set. By using separate acceleration/deceleration times, control can be carried out with different acceleration/deceleration times for positioning control, JOG operation, OPR, etc.

Set the required values for the acceleration/deceleration time in the parameters shown in the following table, and write them to the QD75.

The set details are validated when written to the QD75.

| Setting item | Setting value | Setting details | Factory-set initial value |
|--------------|---------------------|-----------------|---------------------------|
| Pr.9 | Acceleration time 0 | → | 1000 |
| Pr.25 | Acceleration time 1 | → | 1000 |
| Pr.26 | Acceleration time 2 | → | 1000 |
| Pr.27 | Acceleration time 3 | → | 1000 |
| Pr.10 | Deceleration time 0 | → | 1000 |
| Pr.28 | Deceleration time 1 | → | 1000 |
| Pr.29 | Deceleration time 2 | → | 1000 |
| Pr.30 | Deceleration time 3 | → | 1000 |

* Refer to Section 5.2 "List of parameters" for setting details.

[2] "Acceleration/deceleration method setting" control details and setting

In the "acceleration/deceleration method setting", the acceleration/deceleration processing method is selected and set. The set acceleration/deceleration processing is applied to all acceleration/deceleration.

The two types of "acceleration/deceleration method setting" are shown below.

(1) Automatic trapezoidal acceleration/deceleration processing method

This is a method in which linear acceleration/deceleration is carried out based on the acceleration time, deceleration time, and speed limit value set by the user.

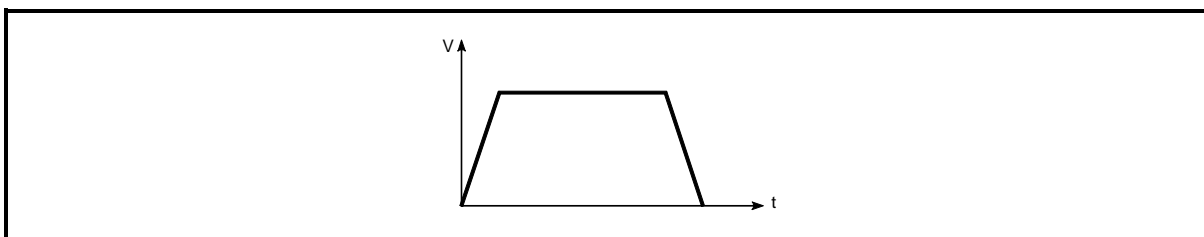


Fig. 12.43 Automatic trapezoidal acceleration/deceleration processing method

(2) S-pattern acceleration/deceleration processing method

In this method, the motor burden is reduced during starting and stopping. This is a method in which acceleration/deceleration is carried out gradually, based on the acceleration time, deceleration time, speed limit value, and "Pr.35 S-pattern proportion" (1 to 100%) set by the user.

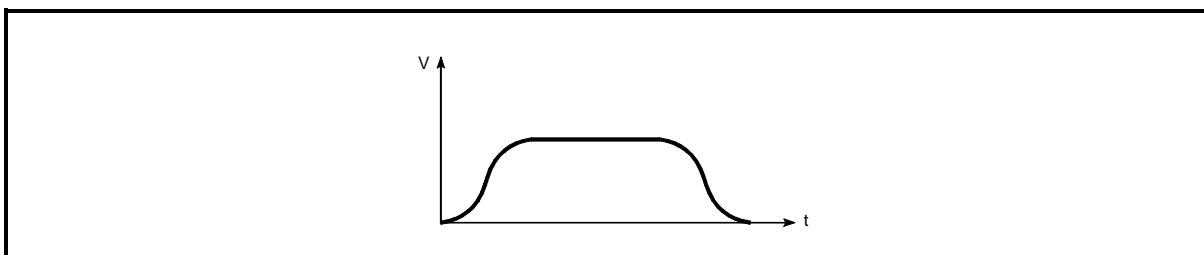


Fig. 12.44 S-pattern acceleration/deceleration processing method

When a speed change request is given during S-pattern acceleration/ deceleration processing, S-pattern acceleration/deceleration processing begins at a speed change request start.

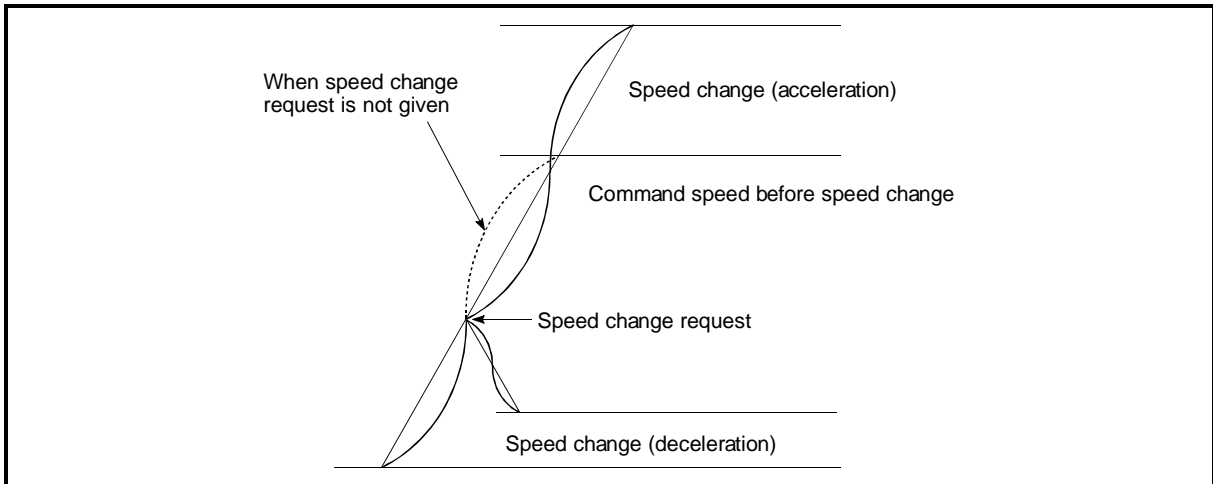


Fig. 12.45 Speed change during S-pattern acceleration/deceleration processing

Set the required values for the "acceleration/deceleration method setting" in the parameters shown in the following table, and write them to the QD75. The set details are validated when written to the QD75.

| Setting item | Setting value | Setting details | Factory-set initial value |
|--|---------------|---|---------------------------|
| Pr.34 Acceleration/ deceleration process selection | → | Set the acceleration/deceleration method. 0: Automatic trapezoidal acceleration/deceleration processing 1: S-pattern acceleration/deceleration processing | 0 |
| Pr.35 S-pattern proportion | → | Set the acceleration/deceleration curve when "1" is set in " Pr.34 Acceleration/deceleration processing selection". | 100 |

* Refer to Section 5.2 "List of parameters" for setting details.

REMARK

- Parameters are set for each axis.
- It is recommended that the parameters be set whenever possible with GX Configurator-QP. Execution by PLC program uses many PLC programs and devices. The execution becomes complicated, and the scan times will increase.

12.7.8 Pre-reading start function

The "pre-reading start function" does not output pulses while the execution prohibition flag is ON if a positioning start request is given with the execution prohibition flag ON, and starts servo within 3ms after OFF of the execution prohibition flag is detected. The positioning start request is given when the axis is in a standby status, and the execution prohibition flag is turned OFF at the axis operating timing. This shortens the virtual start time. The QD75 normally takes 6 to 7ms from when it receives a positioning start request until it starts servo (start time). Some systems often need the start time to be shortened. This "pre-reading start function" can improve the tact time of the system.

The "pre-reading start function" will be explained below.

- [1] Controls
- [2] Precautions during control
- [3] Program examples

[1] Controls

The pre-reading start function is performed by turning ON the positioning start signal [Y10, Y11, Y12, Y13] with the execution prohibition flag [Y14, Y15, Y16, Y17] ON, or by executing the dedicated instruction (PSTRT1, PSTRT2, PSTRT3, PSTRT4). However, if positioning is started with the execution prohibition flag ON, the positioning data is analyzed but servo start is not provided. While the execution prohibition flag is ON, "Md.26 Axis operation status" remains unchanged from "5: Analyzing". Pulse output starts within 3ms after the execution prohibition flag [Y14, Y15, Y16, Y17] has turned OFF, and "Md.26 Axis operation status" changes to the status (e.g. during position control, during speed control) that matches the control system. (Refer to Fig. 12.46)

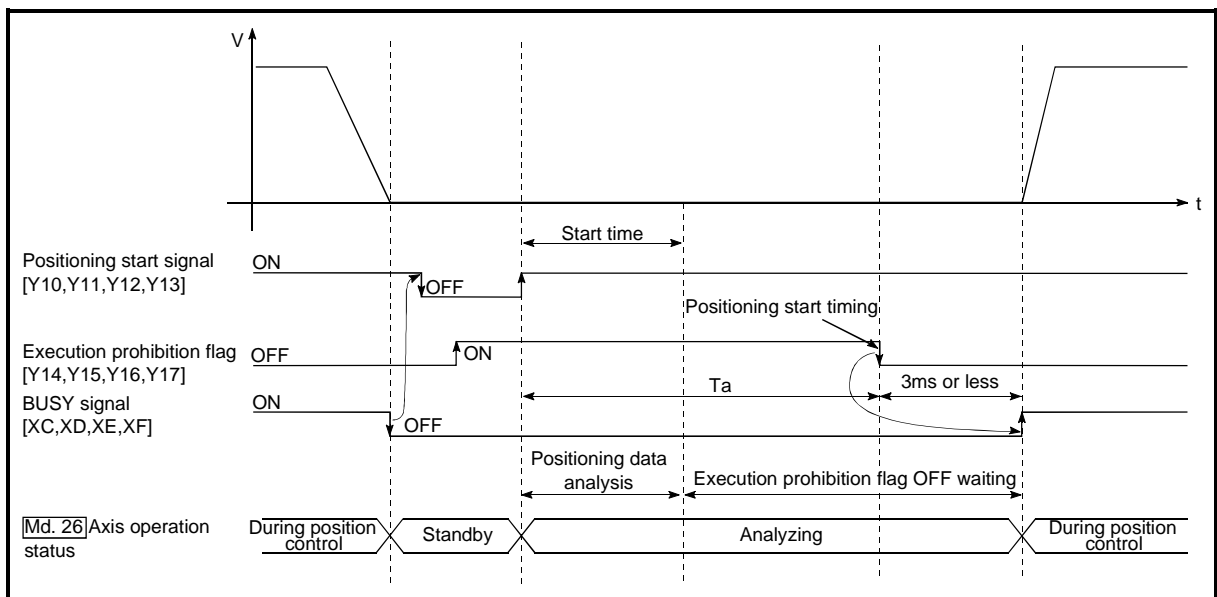


Fig. 12.46 Operations of pre-reading start function

The pre-reading start function is effective for the system as shown below.

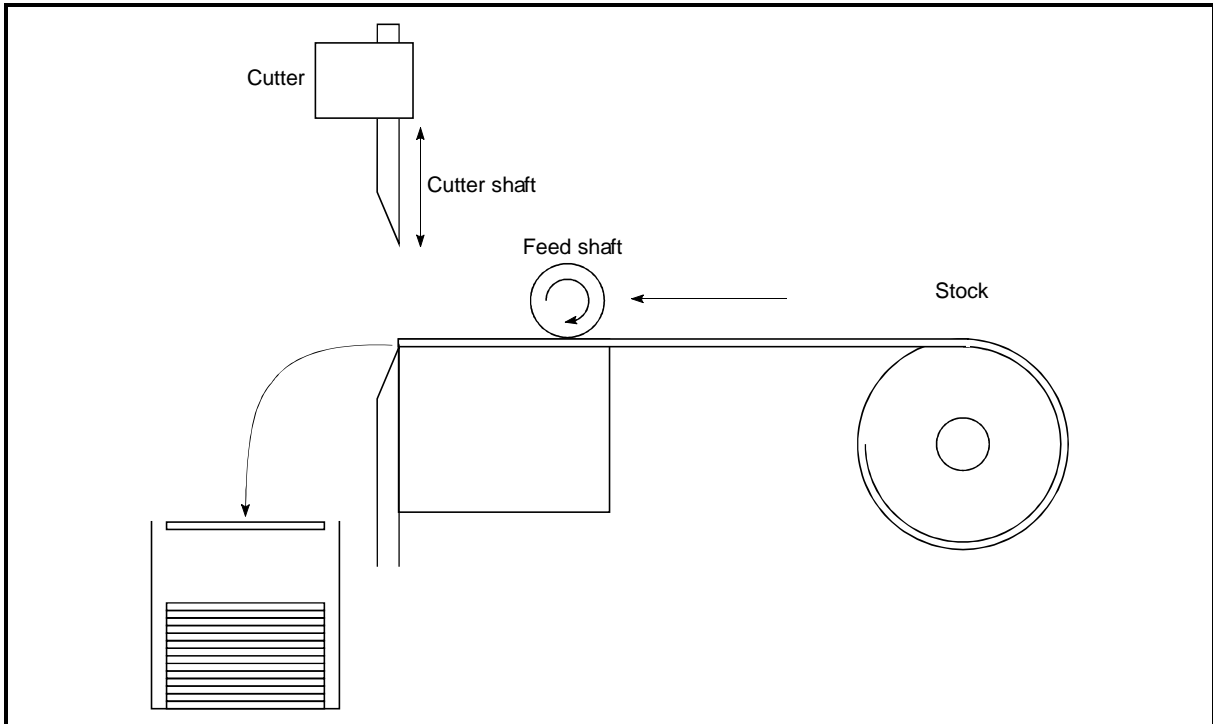


Fig. 12.47 System example using pre-reading start function

Fig. 12.47 shows a system example which repeats:

- 1) Feeding a stock with a feed shaft; and
- 2) Cutting it with a cutter

to cut the stock to fixed size. The operations of the feed shaft and cutter shaft are represented as shown in Fig. 12.48.

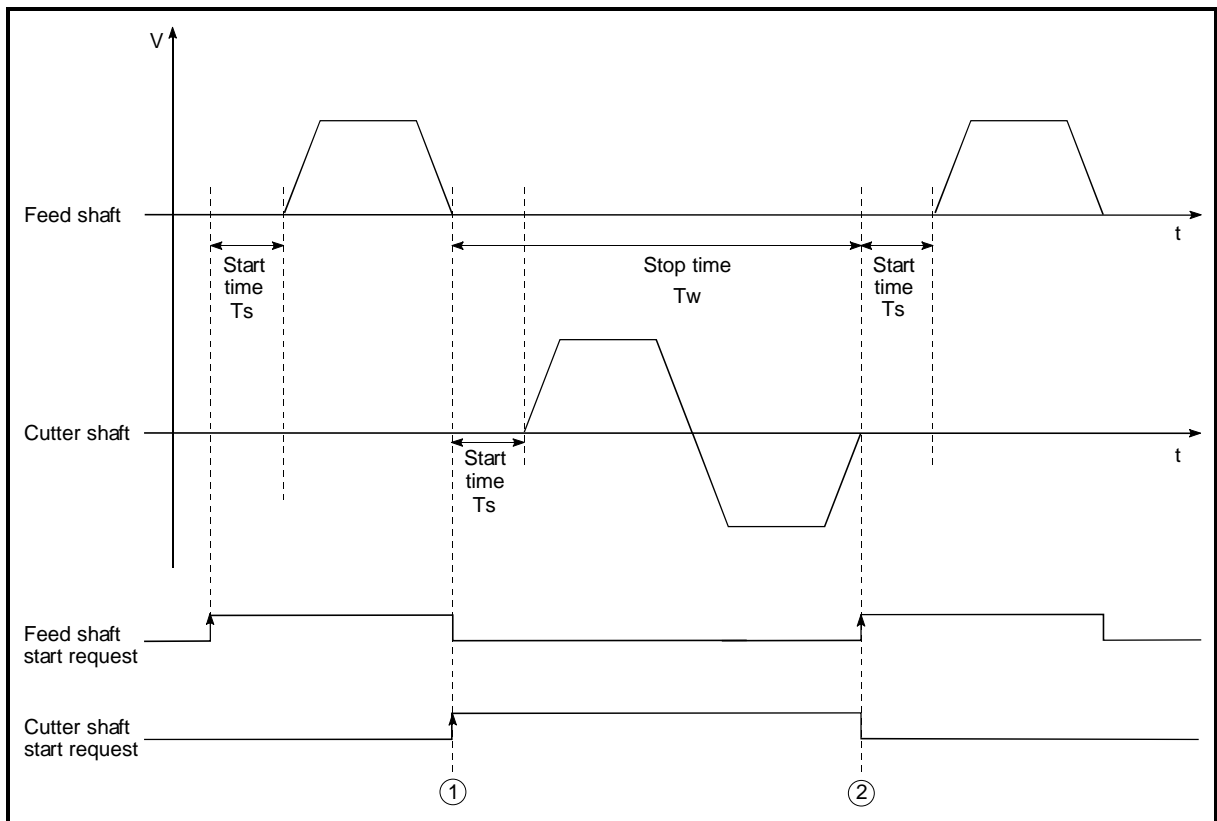


Fig. 12.48 Operation timings of system example

The cutter shaft starts from the moment the feed shaft has completed feeding the stock "①", and the feed shaft starts from the moment the cutter shaft has returned to the standby position "②". Actually, however, there is a delay of start time T_s (6 to 7ms) from when the QD75 receives a start request until it servo start. The system's tact time can be reduced by the shortening of this delay with the Pre-reading start function.

In Fig. 12.48, the feed shaft stands by during the stop time T_w .

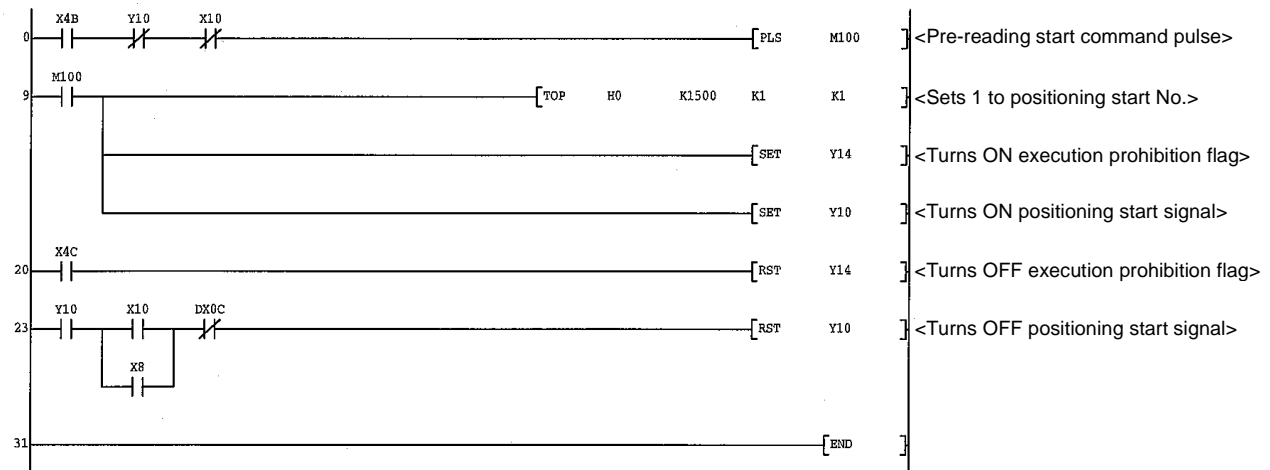
Hence, pre-reading of the next data starts during the stop time T_w . If T_w is a certain period of time, the analysis of the next data is completed during that period, and the system is placed in an execution prohibition flag OFF waiting status. Therefore, replacing the positioning start timing at ② with the execution prohibition flag OFF allows the time from when the axis operation request turns ON until pulse output starts to be reduced to within 3ms in the PLC program. (Refer to Fig. 12.46)

[2] Precautions during control

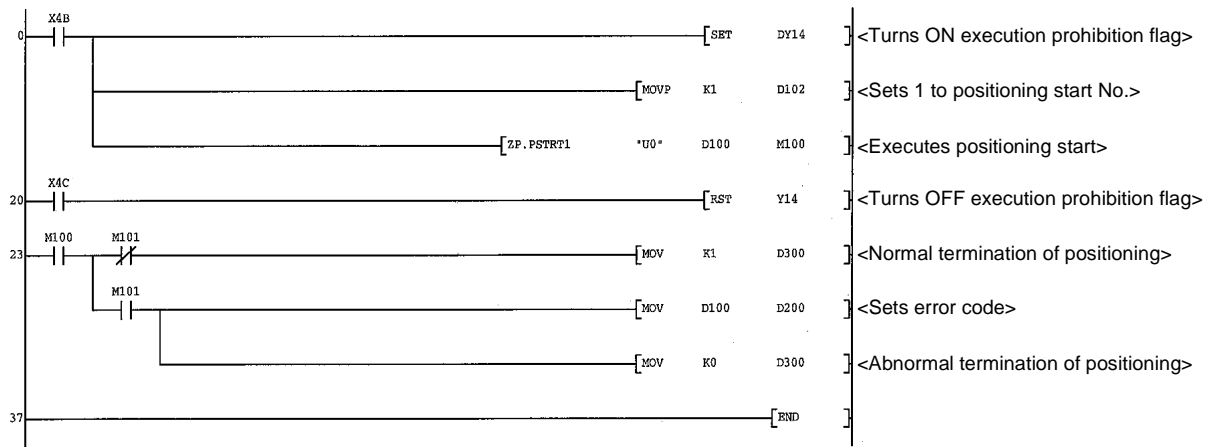
- (1) The time required to analyze the positioning data is up to 7ms.
- (2) After positioning data analysis, the system is put in an execution prohibition flag OFF waiting status. Any change made to the positioning data in the execution prohibition flag OFF waiting status is not reflected on the positioning data. Change the positioning data before turning ON the positioning start signal.
- (3) The pre-reading start function is invalid if the execution prohibition flag is turned OFF between when the positioning start signal has turned ON and when positioning data analysis is completed (Ta < start time, Ta: Refer to Fig. 12.48).
- (4) The data No. which can be executed positioning start using "Cd.3 Positioning start No." with the pre-reading start function are No. 1 to 600 only. Performing the pre-reading start function at the setting of No. 7000 to 7004 or 9001 to 9004 will result in an outside start No. range error (Error code: 543).
- (5) Always turn ON the execution prohibition flag at the same time or before turning ON the positioning start signal. Pre-reading may not be started if the execution prohibition flag is turned ON during Ta after the positioning start signal is turned ON. The pre-reading start function is invalid if the execution prohibition flag is turned ON after positioning start (pulse output) with the execution prohibition flag OFF. (It is made valid at the next positioning start.)

[3] Program examples

*
 * Pre-reading start function (when positioning start signal Y10 is used)
 *



*
 * Pre-reading start function (when dedicated instruction PSTRT1 is used)
 *



12.7.9 Deceleration start flag function *

The "deceleration start flag function" turns ON the flag when the constant speed status or acceleration status switches to the deceleration status during position control whose operation pattern is "Positioning complete". This function can be used as a signal to start the operation to be performed by other equipment at each end of position control or to perform preparatory operation, etc. for the next position control.

For the "deceleration start flag function", the following will be explained.

- [1] Control details
- [2] Precautions during control
- [3] Deceleration start flag function setting method
- [4] Checking of deceleration start flag

*: Usable with the module whose first six digits of SERIAL No. are "050224" or later.

[1] Control details

When deceleration for a stop is started in the position control whose operation pattern is "Positioning complete", "1" is stored into "Md.48 Deceleration start flag". When the next operation start is made or the manual pulse generator operation enable status is gained, "0" is stored. (Refer to Fig. 12.49.)

(1) Start made with positioning data No. specified

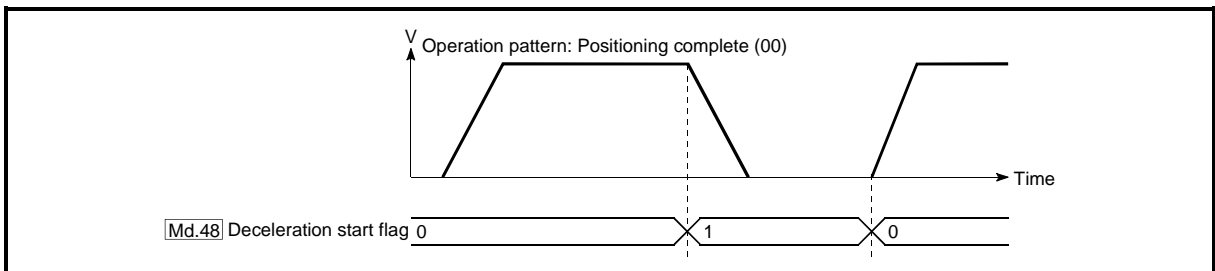


Fig. 12.49 Operation of deceleration start flag

(2) Block start

At a block start, this function is valid for only the position control whose operation pattern is "Positioning complete" at the point whose shape has been set to "End". (Refer to Fig. 12.50.)

The following table indicates the operation of the deceleration start flag in the case of the following block start data and positioning data.

| Block start data | Da.11 Shape | Da.12 Start data No. | Da.13 Special start instruction |
|------------------|----------------|-------------------------|------------------------------------|
| 1st point | 1: Continue | 1 | 0: Block start |
| 2nd point | 1: Continue | 3 | 0: Block start |
| 3rd point | 0: End | 4 | 0: Block start |
| • | | | |
| • | | | |

| Positioning Data No. | Da.1 Operation pattern |
|----------------------|------------------------------------|
| 1 | 01: Continuous positioning control |
| 2 | 00: Positioning complete |
| 3 | 00: Positioning complete |
| 4 | 11: Continuous path control |
| 5 | 00: Positioning complete |
| • | |
| • | |

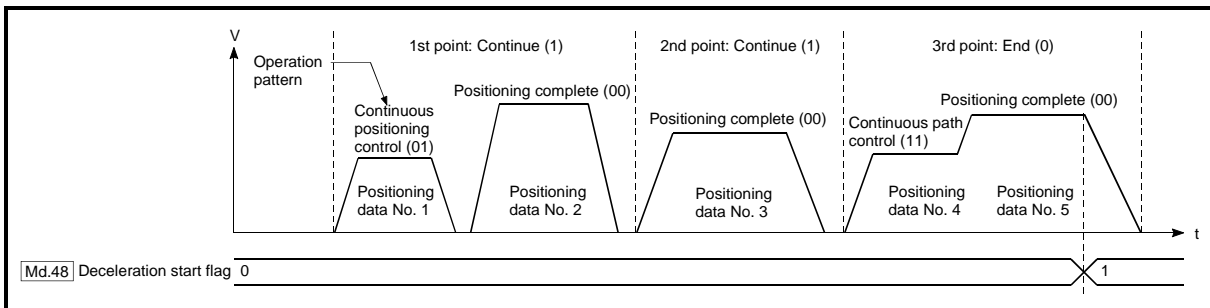
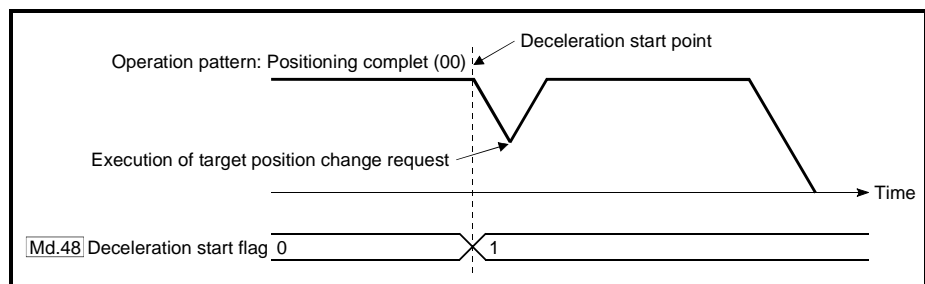


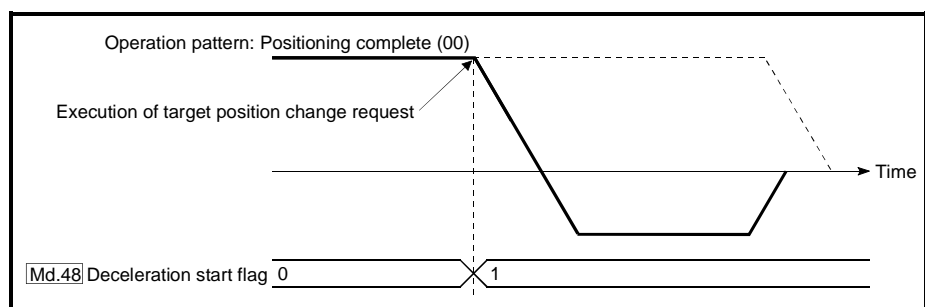
Fig. 12.50 Operation of deceleration start flag at block start

[2] Precautions during control

- (1) The deceleration start flag function is valid for the control system of "1-axis linear control", "2-axis linear interpolation control", "3-axis linear interpolation control", "4-axis linear interpolation control", "speed-position switching control" or "position-speed switching control". (In the case of linear interpolation control, the function is valid for only the reference axis.) Refer to Section 3.2.4 "Combination of QD75 main functions and sub functions".
- (2) The deceleration start flag does not turn ON when the operation pattern is "continuous positioning control" or "continuous path control".
- (3) The deceleration start flag function is invalid for an OPR, JOG operation, inching operation, manual pulse generator operation, and deceleration made with a stop signal.
- (4) The deceleration start flag does not turn ON when a speed change or override is used to make deceleration.
- (5) If a target position change is made while the deceleration start flag is ON, the deceleration start flag remains ON.



- (6) When the movement direction is reversed by a target position change, the deceleration start flag turns ON.



- (7) During position control of position-speed switching control, the deceleration start flag is turned ON by automatic deceleration. The deceleration start flag remains ON if position control is switched to speed control by the position-speed switching signal after the deceleration start flag has turned ON.
- (8) During skip operation, the deceleration start flag is valid for only the positioning data whose operation pattern is "Positioning complete".
- (9) If the condition start of a block start is not made since the condition is not satisfied, the deceleration start flag turns ON when the shape is "End".
- (10) When an interrupt request during continuous operation is issued, the deceleration start flag turns ON at a start of deceleration in the positioning data being executed.

[3] Deceleration start flag function setting method

To use the "deceleration start flag function", set "1" to the following control data using a PLC program.

The set data is made valid on the rising edge (OFF to ON) of the PLC READY signal [Y0].

| Setting item | Setting value | Setting details | Buffer memory address |
|--|---------------|--|-----------------------|
| Cd.41 Deceleration start flag valid | → | Set whether the deceleration start flag function is made valid or invalid. 0: Deceleration start flag invalid 1: Deceleration start flag valid | 1905 |

* Refer to Section 5.7 "List of control data" for details on the setting details.

[4] Checking of deceleration start flag

The "deceleration start flag" is stored into the following buffer memory addresses.

| Monitor item | Monitor value | Storage details | Buffer memory address | | | |
|----------------------------------|---------------|--|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Md.48 Deceleration start flag | → | 0: Status other than below 1: Status from deceleration start to next operation start or manual pulse generator operation enable | 899 | 999 | 1099 | 1199 |

* Refer to Section 5.6 "List of monitor data" for information on the storage details.

12.7.10 Stop command processing for deceleration stop function

The "stop command processing for deceleration stop function" is provided to set the deceleration curve if a stop cause occurs during deceleration stop processing (including automatic deceleration).

This function is valid for both automatic trapezoidal and S-pattern acceleration/deceleration processing methods.

(For the stop cause, refer to Section 1.2.3 Outline of stopping.)

The "stop command processing for deceleration stop function" performs the following two operations:

- (1) **Deceleration curve re-processing**
Re-processes a deceleration curve starting from the speed at stop cause occurrence to stop, according to the preset deceleration time.
- (2) **Deceleration curve continuation**
Continues the current deceleration curve after a stop cause has occurred.

This section explains the "stop command processing for deceleration stop function" as follows:

- [1] Control
- [2] Precautions for control
- [3] Setting method

[1] Control

The operation of "stop command processing for deceleration stop function" is explained below.

(1) Deceleration curve re-processing

A deceleration curve is re-processed starting from the speed at stop cause occurrence to stop, according to the preset deceleration time.

If a stop cause occurs during automatic deceleration of position control, the deceleration stop processing stops as soon as the target has reached the positioning address specified in the positioning data that is currently executed.

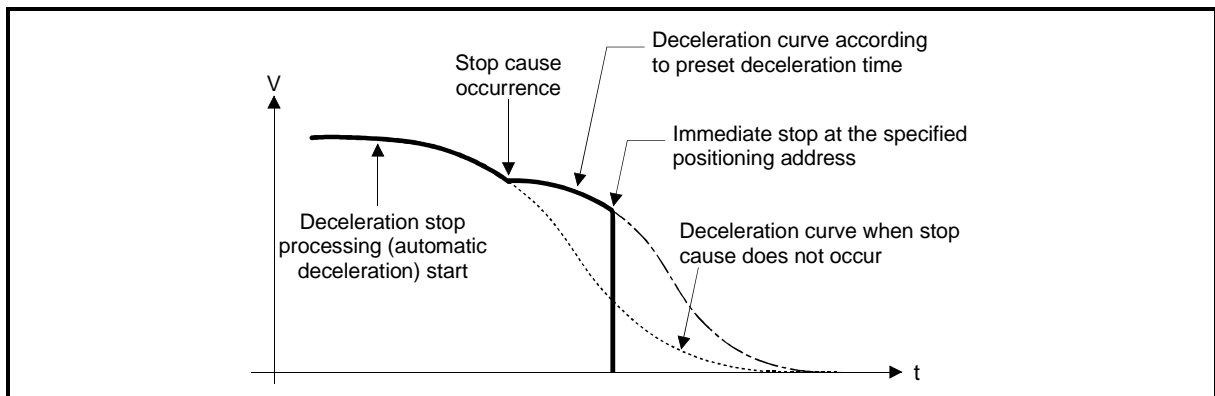


Fig. 12.51 Deceleration curve re-processing operation (for position control or S-pattern acceleration/deceleration processing)

(2) Deceleration curve continuation

The current deceleration curve is continued after a stop cause has occurred.

If a stop cause occurs during automatic deceleration of position control, the deceleration stop processing may be complete before the target has reached the positioning address specified in the positioning data that is currently executed.

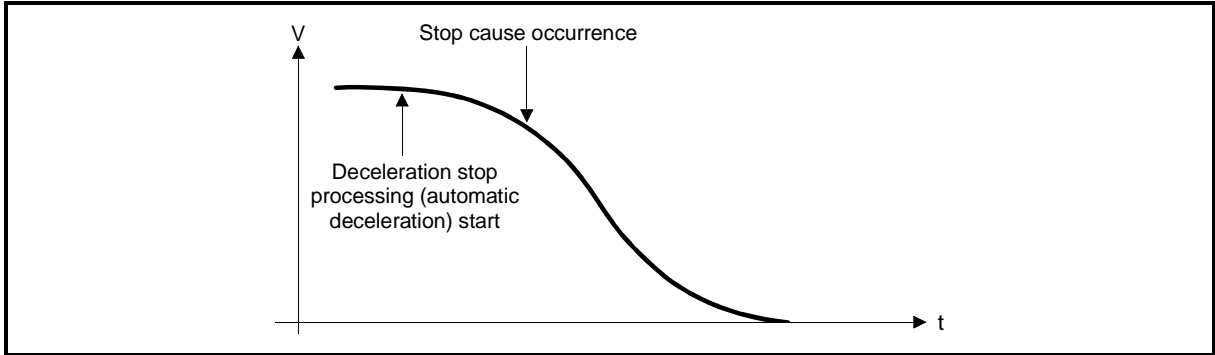


Fig. 12.52 Deceleration curve continuation operation (for position control or S-pattern acceleration/deceleration processing)

[2] Precautions for control

- (1) In manual control (JOG operation, inching operation, manual pulse generator operation), the stop command processing for deceleration stop function is invalid.
- (2) The stop command processing for deceleration stop function is valid when "0: Normal deceleration stop" is set in " [Pr.37] Stop group 1 sudden stop selection" to " [Pr.39] Stop group 3 sudden stop selection" as the stopping method for stop cause occurrence.
- (3) The stop command processing for deceleration stop function is invalid when "1: Sudden stop" is set in " [Pr.37] Stop group 1 sudden stop selection" to " [Pr.39] Stop group 3 sudden stop selection". (A deceleration curve is re-processed, according to the " [Pr.36] Sudden stop deceleration time" (starting from the speed at stop cause occurrence to a stop))
 In the position control (including position control of speed/position changeover control or position/speed changeover control) mode, positioning may stop immediately depending on the stop cause occurrence timing and " [Pr.36] Sudden stop deceleration time" setting.

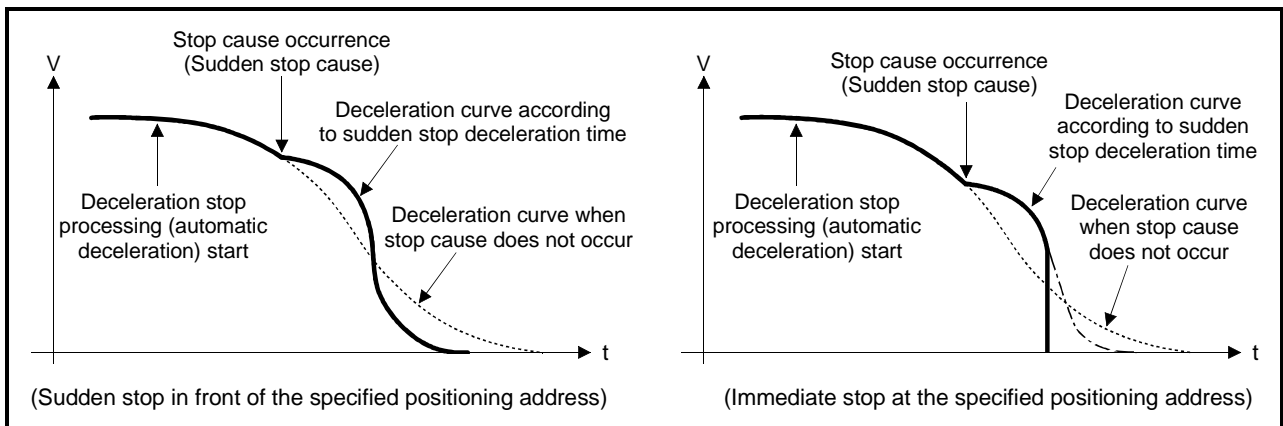


Fig. 12.53 Sudden stop operation (for position control or S-pattern acceleration/deceleration processing)

[3] Setting method

To use the "stop command processing for deceleration stop function", set the following control data in a PLC program.

The set data are made valid as soon as they are written to the buffer memory.

The PLC ready signal [Y0] is irrelevant.

| | Setting item | Setting value | Setting details | Buffer memory address |
|-------|---|---------------|--|-----------------------|
| Cd.42 | Stop command processing for deceleration stop selection | → | Set the stop command processing for deceleration stop function. 0: Deceleration curve re-processing 1: Deceleration curve continuation | 1907 |

* For details of the setting details, refer to Section 5.7 "Control data list".

12.8 Servo ON/OFF

12.8.1 Servo ON/OFF

The servo amplifiers connected to the QD75 is executed servo ON or OFF.
 By establishing the servo ON status with the servo ON command, servo motor operation is enabled.

The following two types of servo ON or OFF can be used.

- All axis servo ON [Y1]
- [Cd.100]Each axis servo OFF (Buffer memory addresses: 1551, 1651, 1751, 1851)

A list of the "All axis servo ON [Y1]" and "[Cd.100]Each axis servo OFF" is given below.

| | | [Cd.100]Each axis servo OFF | |
|-----------------------|-----|-----------------------------|-------------------|
| | | Setting value "0" | Setting value "1" |
| All axis servo ON: Y1 | OFF | × | × |
| | ON | ○ | × |

○: Servo ON (Servo operation enabled) , ×: Servo OFF (Servo operation disabled)

[1] Servo ON (Servo operation enabled)

The following shows the procedure for servo ON.

- (1) Make sure that the servo LED indicates "b□".
 (The initial value for "All axis servo ON [Y1]" is "OFF".)
- (2) Set "0" for "[Cd.100]Each axis servo OFF" (Buffer memory: 1551, 1651, 1751, 1851).
- (3) Turn ON "All axis servo ON [Y1]".
 Now the servo amplifier turns ON the servo (servo operation enabled state).
 (The servo LED indicates "d□".)

[2] Servo OFF (Servo operation disabled)

The following shows the procedure for servo OFF.

- (1) Set "1" for "[Cd.100]Each axis servo OFF" (Buffer memory: 1551, 1651, 1751, 1851). (The servo LED indicates "c□".)
 (If the "[Cd.100]Each axis servo OFF" set "0" again, after the servo operation enabled.)
- (2) Turn OFF "All axis servo ON [Y1]".
 (The servo LED indicates "b□".)

| POINT |
|---|
| <ul style="list-style-type: none"> • If the servomotor is rotated by external force during the servo OFF status, follow up processing is performed. • Change between servo ON or OFF status while operation is stopped. The servo OFF command of during operation will be ignored. • When the servo OFF is given to all axes, "All axis servo ON [Y1]" is applied even if all axis servo ON command is turned ON to OFF with "[Cd.100]Each axis servo OFF" set "0". |

12.8.2 Follow up function

(1) Follow up function

The follow up function monitors the number of motor rotations (actual present value) with the servo OFF and reflects the value in the present feed value. Therefore, even if the servomotor rotates while the servo OFF, the servomotor will not just rotate for the quantify of droop pulses the next time the servo turns ON but positioning can be performed from the stop position.

(2) Execution follow up

Follow up function is executed continually during the servo OFF status.

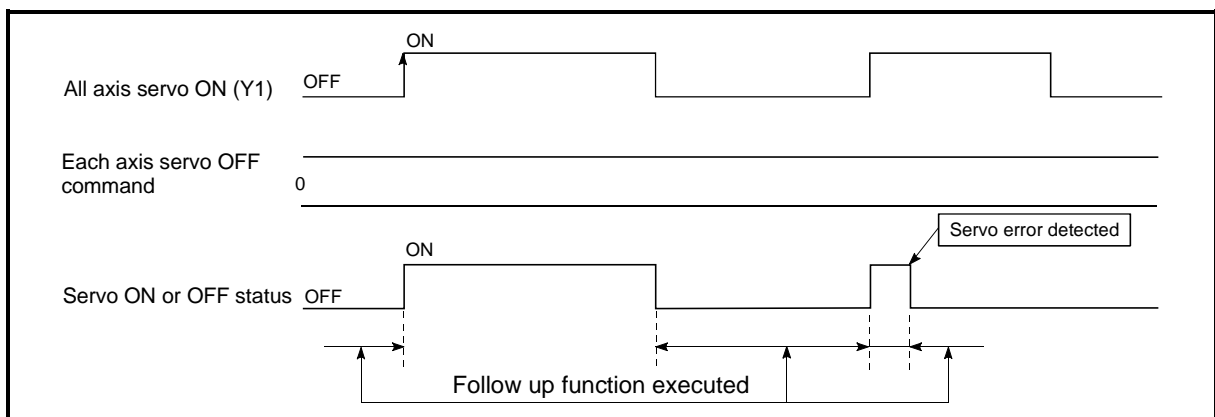


Fig. 12.54 Operation timings of follow up function

POINT

- The follow-up function performs the process if the QD75 and the servo is turned ON (servo LED indicates "b□", or "c□".) regardless of the presence of the absolute position system.

12.9 Precautions for MR-J2M-B connection

[1] Servo parameters

- (1) " Pr.100 Servo series" is to choose "3: MR-J2S-B/MR-J2M-B".
- (2) Write the setting value "0□12" of the " Pr.102 Regenerative brake resistor" inside buffer memory with PLC program when you use "MR-RB14".
- (3) There are two kinds of parameters of DRU (drive unit) and IFU (interface unit) in MR-J2M-B. The servo parameters set the only DRU parameters. Don't set (change) IFU parameters from QD75. The IFU parameters set (change) "the unit operation section pushbutton switches of the MR-J2M-B interface unit" or "setup software".
- (4) Don't change setting value " Pr.122 Analog monitor output: 0001 (initial value)", " Pr.127 Monitor output 1 offset: 0000 (initial value)" and " Pr.128 Monitor output 2 offset: 0000 (initial value)". Set up IFU parameters " Pr.3 to Pr.8 " when you use analog monitor.
- (5) You cannot change parameter "serial communication response delay time setting" and "serial communication baud rate setting" of " Pr.133 Optional function 6".

Chapter 13 Common Functions

The details and usage of the "common functions" executed according to the user's requirements are explained in this chapter.

Common functions include functions required when using the QD75, such as parameter initialization and execution data backup.

Read the setting and execution procedures for each common function indicated in this chapter thoroughly, and execute the appropriate function where required.

| | | |
|------|---|-------|
| 13.1 | Outline of common functions..... | 13- 2 |
| 13.2 | Parameter initialization function | 13- 3 |
| 13.3 | Execution data backup function | 13- 5 |
| 13.4 | External I/O signal logic switching function..... | 13- 7 |
| 13.5 | External I/O signal monitor function | 13- 8 |

13.1 Outline of common functions

"Common functions" are executed according to the user's requirements, regardless of the control system, etc. These common functions are executed by peripheral devices or using PLC programs.

The following table shows the functions included in the "common functions".

| Common function | Details | Means | |
|-------------------------------------|--|-------------|--------------------|
| | | PLC program | Peripheral devices |
| Parameter initialization | This function returns the parameter stored in the QD75 buffer memory and flash ROM to the factory-set initial value. | ○ | ○ |
| Execution data backup | This function writes the "execution data", currently being used for control, to the flash ROM. | ○ | ○ |
| External I/O signal logic switching | This function switches I/O signal logic according to the equipment connected to the QD75. For the system in which with b-contact, upper limit switch, and lower limit switch are not used, the parameter logic setting can be controlled without wiring if it is changed to a "positive logic". | ○ | ○ |
| External I/O signal monitor | This function monitors the external I/O signal monitor information in the module's detailed information which can be displayed on the system monitor of GX Developer*. | — | — |

* Usable on GX Developer (SW6D5C-GPPW-E or later).

13.2 Parameter initialization function

"The parameter initialization function" is used to return the setting data set in the QD75 buffer memory and flash ROM to their factory-set initial values.

The details shown below explain about the "parameter initialization function".

- [1] Parameter initialization means
- [2] Control details
- [3] Precautions during control
- [4] Parameter initialization method

[1] Parameter initialization means

- Initialization is executed with a PLC program.
- Initialization is executed by peripheral device.

Refer to GX Configurator-QP Operating Manual for the execution method by peripheral device.

[2] Control details

The following table shows the setting data initialized by the "parameter initialization function".

(The data initialized are "buffer memory" and " flash ROM " setting data.)

| Setting data |
|--|
| Basic parameters (Pr.1 to Pr.10) |
| Detailed parameters (Pr.11 to Pr.42 , Pr.200, Pr.201) |
| OPR basic parameters (Pr.43 to Pr.48) |
| OPR detailed parameters (Pr.49 to Pr.57) |
| Servo parameters (Pr.100 to Pr.161) |
| Positioning data (No.1 to 600) |
| Block start data (No.7000 to 7004) |

[3] Precautions during control

- (1) Parameter initialization is only executed when the positioning control is not carried out (when the PLC READY signal (Y0) is OFF).
A warning "In PLC READY (warning code: 111)" will occur if executed when the PLC READY signal (Y0) is ON.
- (2) A writing to the flash ROM is up to 100,000 times. If writing to the flash ROM exceeds 100,000 times, the writing may become impossible, and a flash ROM writing error (error code: 801) will occur.
- (3) A "PLC CPU reset" or "PLC power restart" must be carried out after the parameters are initialized.
- (4) If an error occurs on the parameter set in the QD75 when the PLC READY signal [Y0] is turned ON, the QD75 READY signal [X0] will not be turned ON and the control cannot be carried out.

| Important |
|---|
| Parameter initialization takes about 10 seconds. (Up to 30 seconds are sometimes required.) Do not turn the power ON/OFF; reset the PLC CPU, etc., during parameter initialization. The flash ROM data may be corrupted. |

[4] Parameter initialization method

(1) Parameter initialization is carried out using the dedicated instruction "PINIT".
(Refer to Chapter 14 "Dedicated instructions" for details.)

(2) Parameter initialization can also be carried out by the writing of the data shown in the table below to the buffer memory using the TO command/intelligent function device.

The initialization of the parameter is executed at the time point the data is written to the QD75 buffer memory.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|---|---------------|---|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.2 Parameter initialization request | 1 | Set "1" (parameter initialization request). | 1901 | | | |

* Refer to Section 5.7 "List of control data" for details on the setting details.

When the initialization is complete, "0" will be set in "Cd.2 Parameter initialization request" by the QD75 automatically.

13.3 Execution data backup function

When the QD75 buffer memory data is rewritten from the PLC CPU, "the data backed up in the QD75 flash ROM" may differ from "the data (buffer memory data) for which control is being executed".

In cases like these, the data being executed will be lost when the PLC power is turned OFF. (Refer to Chapter 7.)

In cases like these, the "execution data backup function" backs up the data being executed by writing it to the flash ROM. The data that was backed up is then written to the buffer memory when the power is turned ON next.

The details shown below explain about the "execution data backup function".

- [1] Execution data backup means
- [2] Control details
- [3] Precautions during control
- [4] Execution data backup method

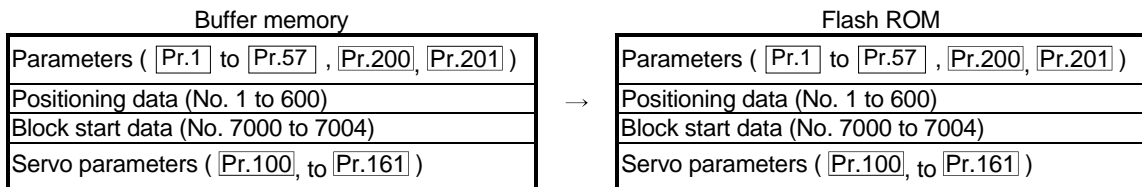
[1] Execution data backup (written to flash ROM) means

- The backup is executed with a PLC program.
- The backup is executed by peripheral device.

Refer to GX Configurator-QP Operating Manual for execution data backup method by peripheral device.

[2] Control details

The following shows the data that can be written to the flash ROM using the "execution data backup function".



[3] Precautions during control

- (1) Data can only be written to the flash ROM when the positioning control is not carried out (when the PLC READY signal (Y0) is OFF).
- (2) Writing to the flash ROM can be executed up to 100,000 times.
If writing to the flash ROM exceeds 100,000 times, the writing may become impossible, and a "flash ROM writing error (error code: 801)" will occur.
- (3) After one power ON/PLC CPU reset operation, writing to the flash ROM using a PLC program is limited to up to 25 times.
If the 26th writing is executed, a "flash ROM write number error (error code: 805)" will occur. If this error occurs, carry out the power OFF→ON/PLC CPU reset operation again.

Refer to [Md.19] of Section 5.1.7 "Types and roles of monitor data" for details.

Important
Do not turn the power ON/OFF, reset the PLC CPU, during writing to the flash ROM. The flash ROM data may be corrupted.

[4] Execution data backup method

- (1) Execution data backup (writing to the flash ROM) is carried out using the dedicated instruction "PFWRT". (Refer to "Chapter 14 Dedicated instructions" for details.)
- (2) Refer to Section 7.2 "Data transmission process" for the data transmission processing at the backup of the execution data.
- (3) Execution data backup can also be carried out by the writing of the data shown in the table below to the QD75 buffer memory using the TO command/intelligent function device.

The writing to the flash ROM is executed at the time point the data is written to the QD75 buffer memory.

| Setting item | Setting value | Setting details | Buffer memory address | | | |
|--|---------------|------------------------------------|-----------------------|--------|--------|--------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 |
| Cd.1 Flash ROM write request | 1 | Set "1" (flash ROM write request). | 1900 | | | |

* Refer to Section 5.7 "List of control data" for details on the setting details.

When the writing to the flash ROM is complete, "0" will be set in "Cd.1 Flash ROM write request" by the QD75 automatically.

13.4 External I/O signal logic switching function

This function switches the signal logic according to the external equipment connected to the QD75.

For the system in which b-contact, upper limit switch, and lower limit switch are not used, the parameter logic setting can be controlled without wiring if it is changed to a "positive logic".

When the upper limit switch, and lower limit switch are used, ensure to use them with b-contact.

The details shown below explain about the "External I/O signal logic switching function".

[1] Parameter setting details

[2] Precautions on parameter setting

[1] Parameter setting details

To use the "External I/O signal logic switching function", set the parameters shown in the following table.

| Setting item | Setting details | Factory-set initial value | Buffer memory address | | | | |
|--------------------------------------|--|---------------------------|-----------------------|--------|--------|--------|--------------------------------------|
| | | | Axis 1 | Axis 2 | Axis 3 | Axis 4 | |
| [Pr.22] Input signal logic selection | • Selection of logic of signals input from external source to QD75 | 0 | 31 | 181 | 331 | 481 | |
| | b0 Lower limit | | | | | | 0: Negative logic, 1: Positive logic |
| | b1 Upper limit | | | | | | 0: Negative logic, 1: Positive logic |
| | b2 Not used | | | | | | Set "0". |
| | b3 Stop signal | | | | | | 0: Negative logic, 1: Positive logic |
| | b4 External command/switching signal | | | | | | 0: Negative logic, 1: Positive logic |
| | b5 Not used | | | | | | Set "0". |
| | b6 Near-point dog signal | | | | | | 0: Negative logic, 1: Positive logic |
| | b7 Not used | | | | | | Set "0". |
| | b8 Manual pulse generator input | | | | | | 0: Negative logic, 1: Positive logic |
| | b9 to b15 Not used | | | | | | Set "0". |

* Refer to Section 5.2 "List of parameters" for the information on detail settings.

[2] Precautions on parameter setting

(1) The external I/O signal logic switching parameters are validated when the PLC READY signal [Y0] is turned OFF to ON. (The logic is negative right after power-on.)

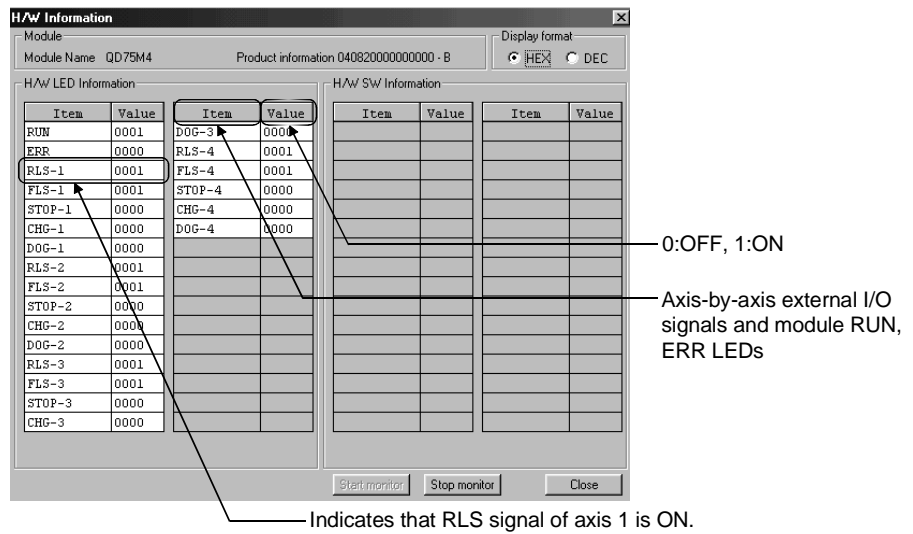
(2) If each signal logic is set erroneously, the operation may not be carried out correctly.

Before setting, check the specifications of the equipment to be used.

13.5 External I/O signal monitor function

The "External I/O signal monitor function" monitors the module's information and external I/O signal monitor information in the module's detailed information which can be displayed on the system monitor of GX Developer*.

The information that can be monitored are the module's information (same as the QD75 front "RUN", "ERR" LED indicators) and the following external I/O signals. (Set the logic of the external I/O signals in " Pr.22 Input signal logic selection" and " Pr.23 Output signal logic selection".)



*: Use GX Developer of version 6.05F or later. Refer to GX Developer Operating Manual for the system monitor of GX Developer.

Chapter 14 Dedicated Instructions

The QD75 dedicated instructions are explained in this chapter.

These instructions are used to facilitate the programming for the use of the functions of the intelligent function module.

Using the dedicated instructions, the programming can be carried out without being aware of the QD75 buffer memory address and interlock signal.

| | | |
|------|---|--------|
| 14.1 | List of dedicated instructions | 14- 2 |
| 14.2 | Interlock during dedicated instruction is executed..... | 14- 2 |
| 14.3 | PSTR1, PSTR2, PSTR3, PSTR4 | 14- 3 |
| 14.4 | TEACH1, TEACH2, TEACH3, TEACH4..... | 14- 7 |
| 14.5 | PFWRT | 14- 11 |
| 14.6 | PINIT | 14- 15 |

14.1 List of dedicated instructions

The dedicated instructions explained in this Chapter are listed in Table 14.1.

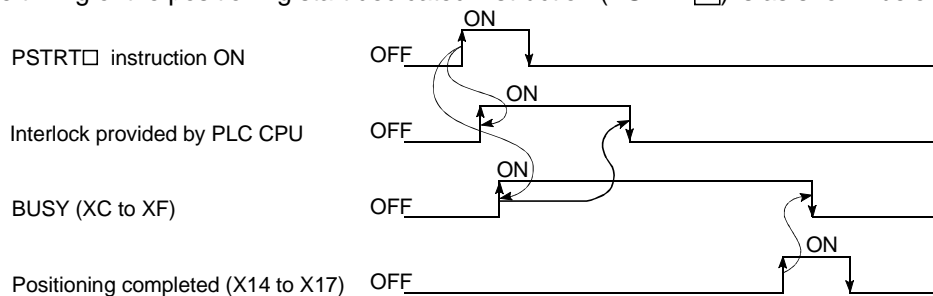
Table 14.1 List of dedicated instructions

| Application | Dedicated instruction | Outline of functions | Reference |
|--------------------------|-----------------------|--|--------------|
| Positioning start | PSTRT1 | This function starts the positioning control of the designated axis of the QD75. | Section 14.4 |
| | PSTRT2 | | |
| | PSTRT3 | | |
| | PSTRT4 | | |
| Teaching | TEACH1 | This function carries out teaching the designated axis of the QD75. | Section 14.5 |
| | TEACH2 | | |
| | TEACH3 | | |
| | TEACH4 | | |
| Writing to flash ROM | PFWRT | This function writes the buffer memory parameters, positioning data and block start data to the flash ROM. | Section 14.6 |
| Parameter initialization | PINIT | This function initializes the buffer memory and flash ROM setting data to the factory-set data (initial values). | Section 14.7 |

14.2 Interlock during dedicated instruction is executed

The positioning start instruction (PSTRT□) and teaching instruction (TEACH□) cannot be executed simultaneously in each axis. If they are executed at the same time, the second and later instructions are ignored by an internal interlock (no error will occur).

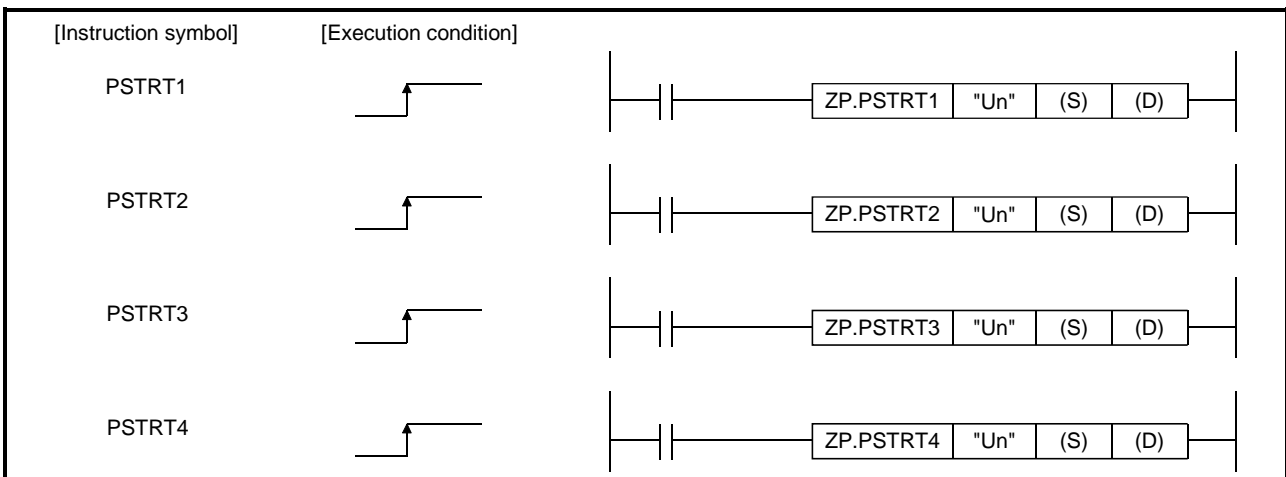
The timing of the positioning start dedicated instruction (PSTRT□) is as shown below.



14.3 PSTRT1, PSTRT2, PSTRT3, PSTRT4

These dedicated instructions are used to start the positioning of the designated axis.

| Setting data | Usable device | | | | | | | | |
|--------------|-----------------|------|---------------|-------------------------|------|---------------------|-------------------|-------------------|--------|
| | Internal device | | File register | MELSECNET/10 direct J□□ | | Special module U□G□ | Index register Zn | Constant K, H, \$ | Others |
| | Bit | Word | | Bit | Word | | | | |
| (S) | - | ○ | - | - | - | - | - | - | |
| (D) | ○ | ○ | - | - | - | - | - | - | |



When PSTRT1, PSTRT2, PSTRT3, and PSTRT4 are common to each other, they are designated as "PSTRT□".

[Setting data]

| Setting data | Setting details | Setting side (*1) | Data type |
|--------------|---|-------------------|-------------|
| "Un" | QD75 head I/O number (00 to FE: High-order two digits of I/O number expressed in three digits) | User | BIN 16 bits |
| (S) | Head number of a device in which control data is stored | - | Device |
| (D) | Head number of a bit device which turns ON the operation by one scan at the time of completion of the instruction. If the instruction is completed abnormally, ((D) + 1) will also be turned ON. | System | Bit |

Note) The file register of each of the local device and the program cannot be used as a device for setting data.

[Control data]

| Device | Item | Setting data | Setting range | Setting side (*1) |
|--------|-----------------|---|--|-------------------|
| (S)+0 | System area | – | – | – |
| (S)+1 | Complete status | The state at the time of completion is stored. <ul style="list-style-type: none"> • 0 : Normal completion • Other than 0: Abnormal completion (error code)(*2) | – | System |
| (S)+2 | Start No. | The following data Nos. to be started by the PSTRT□ instruction are designated. <ul style="list-style-type: none"> • Positioning data No. : 1 to 600 • Block start : 7000 to 7004 • Machine OPR : 9001 • Fast OPR : 9002 • Current value changing : 9003 • Multiple axes simultaneous start : 9004 | 1 to 600 7000 to 7004 9000 to 9004 | User |

*1: The data on the setting side is as follows.

- User : Data before the execution of dedicated instructions is stored by user.
- System: Data after the execution of dedicated instruction is stored by PLC CPU.

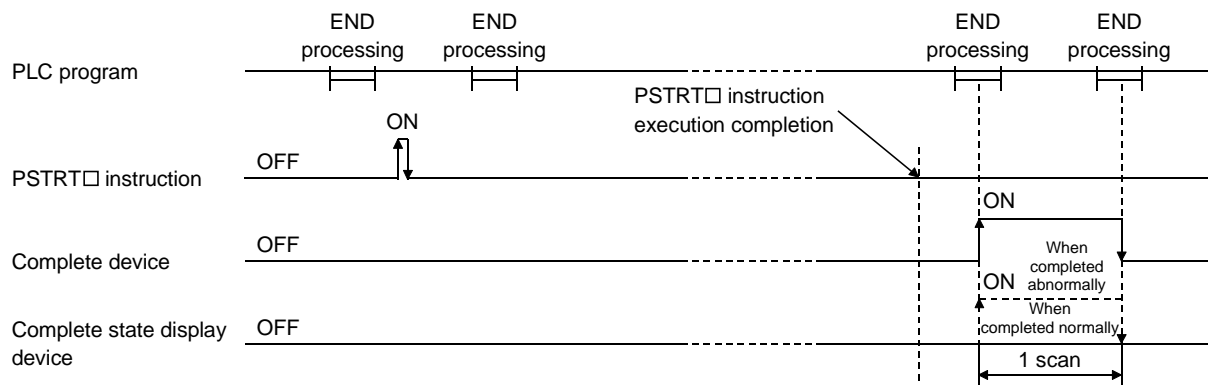
*2: Refer to Section 15.2 for error codes at abnormal completion.

[Functions]

- (1) The positioning start of the axes to be processed (See below) is carried out.
 - PSTRT1: Axis 1
 - PSTRT2: Axis 2
 - PSTRT3: Axis 3
 - PSTRT4: Axis 4

- (2) The block start, OPR start, current value changing, and multiple axes simultaneous start can be carried out by the setting of "start number" 7000 to 7004/9001 to 9004 in ((S)+2).

- (3) The PSTRT□ instruction completion can be confirmed using the complete devices ((D)+0) and ((D)+1).
 - (a) Complete device ((D)+0)
This device is turned ON by the END processing of the scan for which PSTRT□ instruction is completed, and turned OFF by the next END processing.
 - (b) Complete state display device ((D)+1)
This device is turned ON and OFF according to the state in which PSTRT□ instruction is completed.
 - When completed normally :Kept unchanged at OFF.
 - When completed abnormally: This device is turned ON by the END processing of the scan for which PSTRT□ instruction is completed, and turned OFF by the next END processing. (same ON/OFF operation as complete device).



[Errors]

- (1) When an PSTRT□ instruction is completed abnormally, the error complete signal ((D)+1) is turned ON, and the error code is stored in the complete status ((S)+1). Check and take a measure against the error referring to Section 15.2 "List of error codes".

[Precautions]

- (1) If the positioning is started by the PSTRT□ instruction, the positioning start signals (Y10 to Y13) will not turn ON.
Confirm the operation during the positioning control using the PSTRT□ start instruction and busy signals (XC to XF).
- (2) If the stop instruction is input before completion of the positioning which has been started by the PSTRT□ instruction, the completion device (D) turns the 1-scan ON to complete execution of the PSTRT□ instruction.
- (3) The following dedicated instructions cannot be executed simultaneously for the same axis.
(Can be executed simultaneously for different axes.)
 - Positioning start instructions (PSTRT1 to PSTRT4)
 - Teaching instructions (TEACH1 to TEACH4)
- (4) The PSTRT□ instruction can only be executed when the QD75 READY signal (X0) is turned ON.
Even if the PSTRT□ instruction execution request is given when the QD75 READY signal is turned OFF, the PSTRT□ instruction will not be executed. (not processed.)
Before executing the PSTRT□ instruction, turn ON the PLC READY signal (Y0), and turn ON the QD75 READY signal (X0).
- (5) When the remote I/O station* (Q Corresponding MELSECNET/H network remote I/O module) is used, the dedicated instruction (PSTRT□) is unusable.

*: For details of the remote I/O station, refer to Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

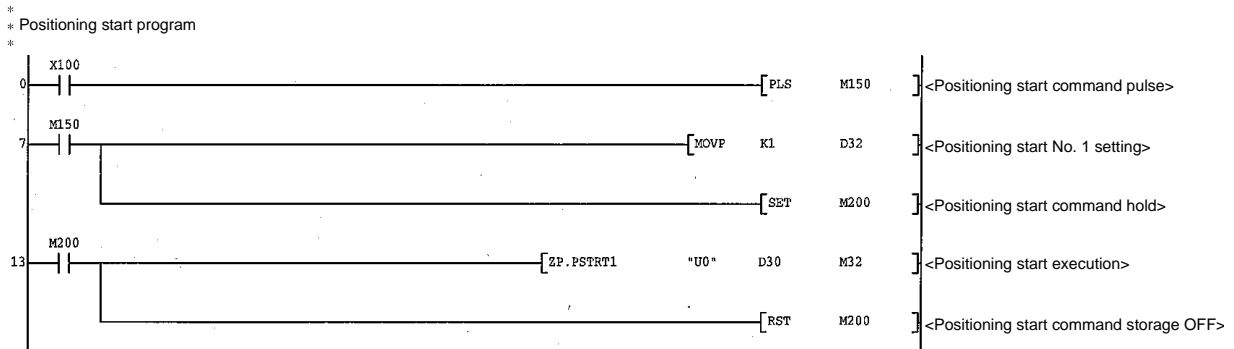
(6) If the PSTRT□ instruction is executed in either of the following cases, an error "Dedicated instruction error" (error code: 804) will occur and positioning cannot be started.

- Any value other than 1 to 600, 7000 to 7004, and 9001 to 9004 is set to "Starting number" (device: (S)+2) of the control data.
- The instruction for a non-existent axis is specified.

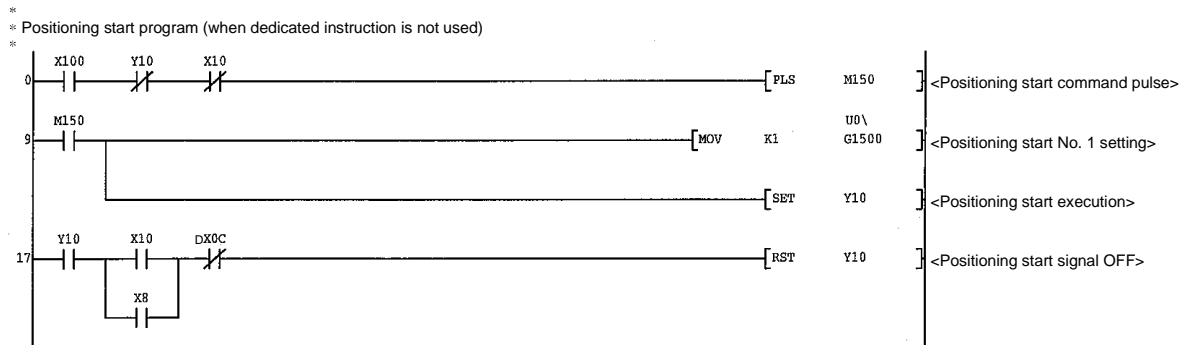
(Example: The PSTRT2 instruction is specified when the QD75M1 is used.)

[Program examples]

- The following program executes the positioning start of positioning data No. 1 when X100 turns ON. Use D30 to D32 as the control data devices of positioning data No. 1, and M32 and M33 as the completion devices.



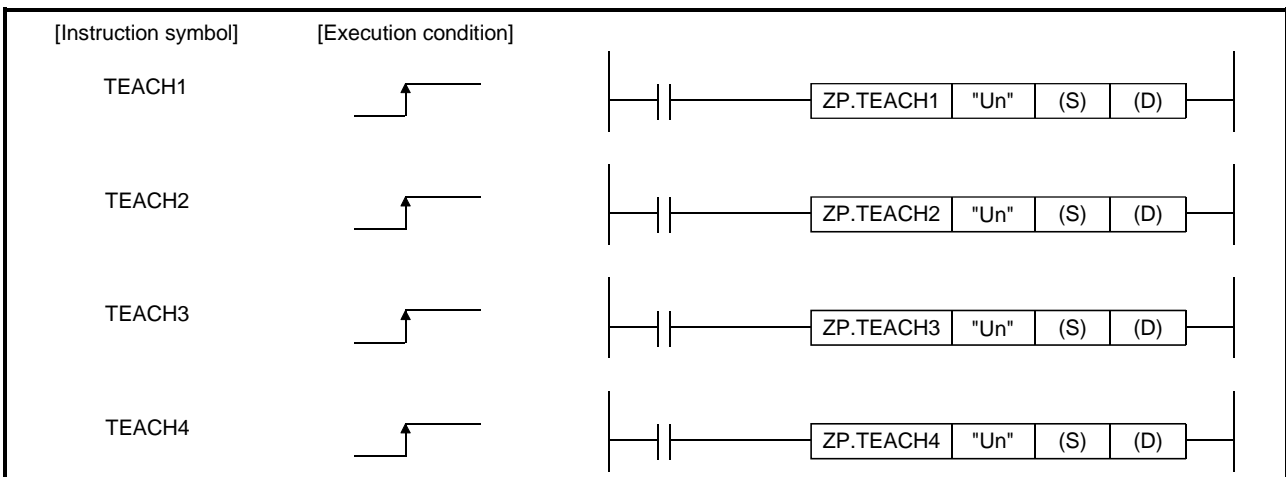
[Program example for use when dedicated instruction is not used]



14.4 TEACH1, TEACH2, TEACH3, TEACH4

These dedicated instructions are used to teach the designated axis.

| Setting data | Usable device | | | | | | | | |
|--------------|-----------------|------|---------------|--------------------------|------|----------------------|-------------------|-------------------|--------|
| | Internal device | | File register | MELSECNET/10 direct J□□□ | | Special module U□□G□ | Index register Zn | Constant K, H, \$ | Others |
| | Bit | Word | | Bit | Word | | | | |
| (S) | - | ○ | - | - | - | - | - | - | |
| (D) | ○ | ○ | - | - | - | - | - | - | |



When TEACH1, TEACH2, TEACH3, and TEACH4 are common to each other, they are designated as "TEACH□".

[Setting data]

| Setting data | Setting details | Setting side (*1) | Data type |
|--------------|---|-------------------|-------------|
| "Un" | QD75 head I/O number (00 to FE: High-order two digits of I/O number expressed in three digits) | User | BIN 16 bits |
| (S) | Head number of a device in which control data is stored | - | Device |
| (D) | Head number of a bit device which turns ON the operation by one scan at the time of completion of the instruction. If the instruction is completed abnormally, ((D) + 1) will also be turned ON. | System | Bit |

Note) The file register of each of the local device and the program cannot be used as a device for setting data.

[Control data]

| Device | Item | Setting data | Setting range | Setting side (*1) |
|--------|-------------------------|--|---------------|-------------------|
| (S)+0 | System area | – | – | – |
| (S)+1 | Complete status | The state at the time of completion is stored. 0 : Normal completion Other than 0: Abnormal completion (error code)(*2) | – | System |
| (S)+2 | Teaching data selection | The address (positioning address/arc address) to which the current feed value is written is set. 0: Current feed value is written to positioning address. 1: Current feed value is written to arc address. | 0, 1 | User |
| (S)+3 | Positioning data No. | The positioning data No. for which teaching is carried out is set. | 1 to 600 | User |

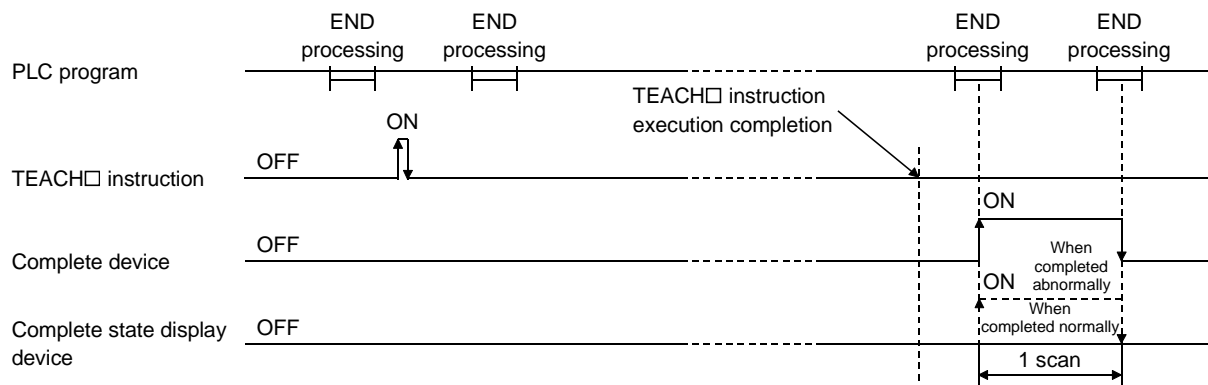
*1: The data on the setting side is as follows.

- User : Data before the execution of dedicated instructions is stored by user.
- System: Data after the execution of dedicated instruction is stored by PLC CPU.

*2: Refer to Section 15.2 for error codes at abnormal completion.

[Functions]

- (1) The "current feed value" of the axes to be set (See below) is set in the positioning address or arc address.
The positioning data other than the positioning addresses and arc addresses are set by peripheral device or using a PLC program.
 - TEACH1: Axis 1
 - TEACH2: Axis 2
 - TEACH3: Axis 3
 - TEACH4: Axis 4
- (2) Teaching can be carried out for the positioning data No. 1 to 600.
- (3) The movement of the machine to the address (position) set in the positioning address/arc address of the positioning data is carried out by the JOG operation, inching operation, or manual pulse generator operation.
- (4) The TEACH□ instruction completion can be confirmed using the complete devices ((D)+0) and ((D)+1).
 - (a) Complete device ((D)+0)
This device is turned ON by the END processing of the scan for which TEACH□ instruction is completed, and turned OFF by the next END processing.
 - (b) Complete state display device ((D)+1)
This device is turned ON and OFF according to the state in which TEACH□ instruction is completed.
 - When completed normally :Kept unchanged at OFF.
 - When completed abnormally: This device is turned ON by the END processing of the scan for which TEACH□ instruction is completed, and turned OFF by the next END processing. (same ON/OFF operation as complete device).



[Errors]

- (1) When a TEACH instruction is completed abnormally, the error complete signal ((D)+1) is turned ON, and the error code is stored in the complete status (S)+1. Check and take a measure against the error referring to section 15.2 "List of error codes".

[Precautions]

- (1) The following dedicated instructions cannot be executed simultaneously for the same axis.
(Can be executed simultaneously for different axes.)
 - Positioning start instructions (PSTRT1 to PSTRT4)
 - Teaching instructions (TEACH1 to TEACH4)
- (2) The TEACH instruction can only be executed when the BUSY signal (XC, XD, XE, XF) is turned OFF.
When the BUSY signal is turned ON, the TEACH instruction will not be executed. (not processed.)
Before executing the PFWRT instruction, make sure that the BUSY signal for the axis to be processed is turned OFF.

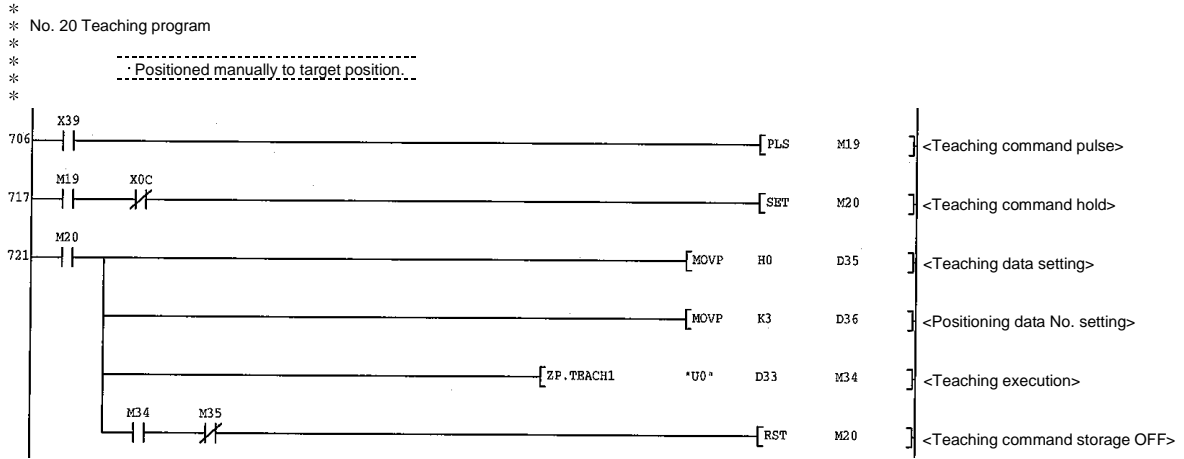
- (3) When the remote I/O station* (Q Corresponding MELSECNET/H network remote I/O module) is used, the dedicated instruction (TEACH) is unusable.

*: For details of the remote I/O station, refer to Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

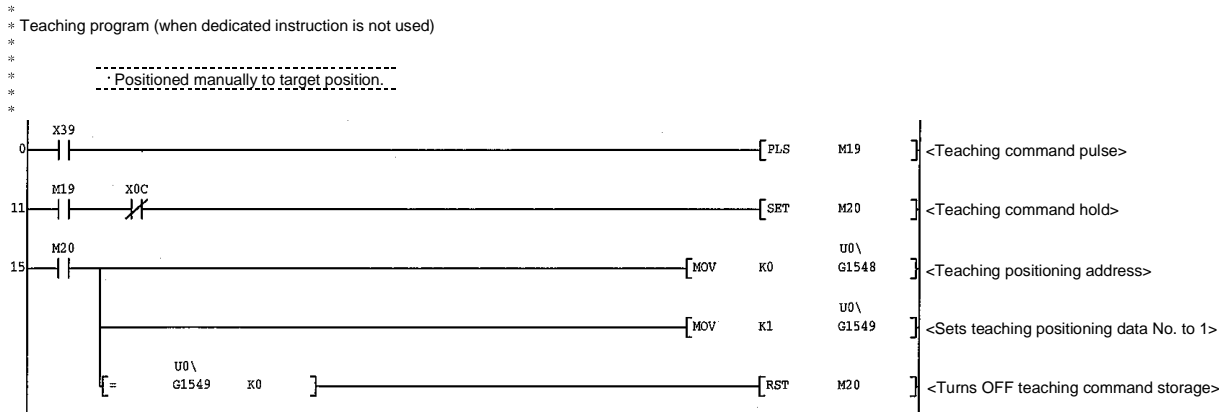
- (4) If the TEACH instruction is executed in any of the following cases, an error "Dedicated instruction error" (error code: 804) will occur and teaching cannot be performed.
 - Any value other than 0 and 1 is set to "Teaching selection" (device: (S)+2) of the control data.
 - Any value other than 1 to 600 is set to "Positioning No." (device: (S)+3) of the control data.
 - The instruction for a non-existent axis is specified.
(Example: The TEACH2 instruction is specified when the QD75M1 is used.)

[Program example]

Program to execute the teaching of the positioning data No. 3 of the axis 1 when X39 is turned ON.



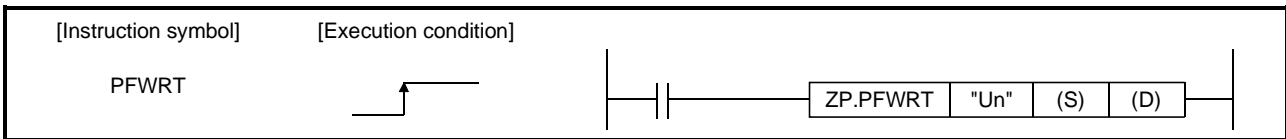
[Program example for use when dedicated instruction is not used]



14.5 PFWRT

These dedicated instructions are used to write the QD75 parameters, positioning data and block start data to the flash ROM.

| Setting data | Usable device | | | | | | | | |
|--------------|-----------------|------|---------------|--------------------------|------|----------------------|-------------------|-------------------|--------|
| | Internal device | | File register | MELSECNET/10 direct J□□□ | | Special module U□□G□ | Index register Zn | Constant K, H, \$ | Others |
| | Bit | Word | | Bit | Word | | | | |
| (S) | - | ○ | - | - | - | - | - | - | |
| (D) | ○ | ○ | - | - | - | - | - | - | |



[Setting data]

| Setting data | Setting details | Setting side (*1) | Data type |
|--------------|---|-------------------|-------------|
| "Un" | QD75 head I/O number (00 to FE: High-order two digits of I/O number expressed in three digits) | User | BIN 16 bits |
| (S) | Head number of a device in which control data is stored | - | Device |
| (D) | Head number of a bit device which turns ON the operation by one scan at the time of completion of the instruction. If the instruction is completed abnormally, ((D) + 1) will also be turned ON. | System | Bit |

Note) The file register of each of the local device and the program cannot be used as a device for setting data.

[Control data]

| Device | Item | Setting data | Setting Range | Setting side (*1) |
|--------|-----------------|--|---------------|-------------------|
| (S)+0 | System area | - | - | - |
| (S)+1 | Complete status | The state at the time of completion is stored. 0 : Normal completion Other than 0 : Abnormal completion (error code)(*2) | - | System |

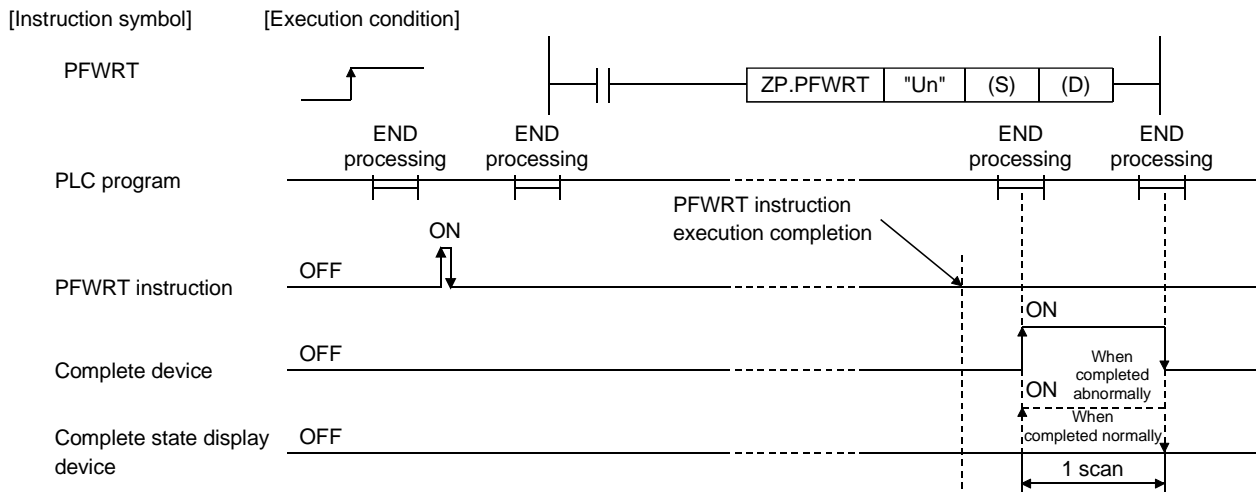
*1: The data on the setting side is as follows.

- User : Data before the execution of dedicated instructions is stored by user.
- System: Data after the execution of dedicated instruction is stored by PLC CPU.

*2: Refer to Section 15.2 for error codes at abnormal completion.

[Functions]

- (1) The PFWRT instruction completion can be confirmed using the complete devices ((D)+0) and ((D)+1).
 - (a) Complete device ((D)+0)
 This device is turned ON by the END processing of the scan for which PFWRT instruction is completed, and turned OFF by the next END processing.
 - (b) Complete state display device ((D)+1)
 This device is turned ON and OFF according to the state in which PFWRT instruction is completed.
 - When completed normally : Kept unchanged at OFF.
 - When completed abnormally : This device is turned ON by the END processing of the scan for which PFWRT instruction is completed, and turned OFF by the next END processing. (same ON/OFF operation as complete device).



[Errors]

- (1) When a dedicated instruction is completed abnormally, the error complete signal ((D)+1) is turned ON, and the error code is stored in the complete status ((S)+1). Check and take measures against the error referring to Section 15.2 List of error codes.

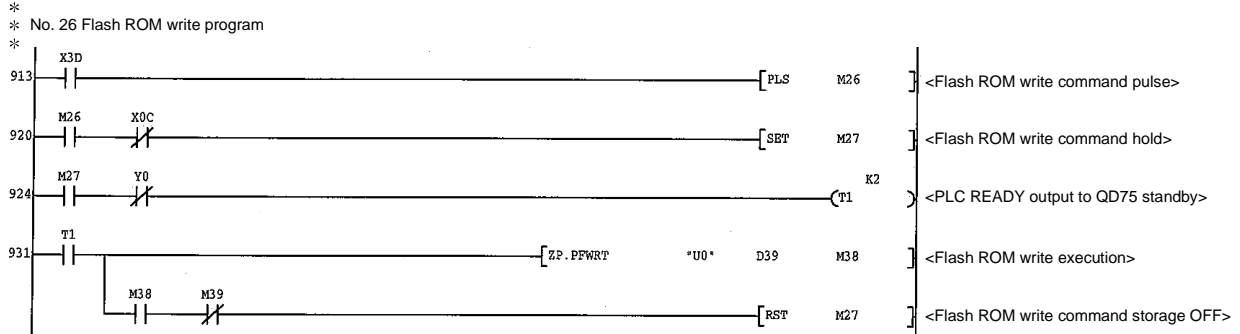
[Precautions]

- (1) Do not turn ON the power and reset the PLC CPU while parameters, positioning data and block start data are written to the flash ROM using the PFWRT instruction.
A parameter error will occur or normal positioning start will become impossible because the parameters, positioning data and block start data are not written normally to the flash ROM.
If this occurs, restart the operation by the method shown below.
 - For GX Configurator-QP, write the parameters, positioning data and block start data again to the flash ROM.
 - For a PLC program, write the parameters, positioning data and block start data to the QD75 after initializing the parameters (PINIT instruction execution and others).
Then execute the PFWRT instruction again.
- (2) A writing to the flash ROM is up to 100,000 times.
If writing to the flash ROM exceeds 100,000 times, the writing to the flash ROM will become impossible.
- (3) After the power ON and PLC CPU reset operation, writing to the flash ROM using a PLC program is limited to up to 25 times. (Not limited to up to 25 times when writing to the flash ROM is carried out by peripheral device.)
If the 26th or more writing is requested after the power ON/PLC CPU reset operation, a flash ROM exceed writing error (error code: 805) will occur, and the writing will be disabled. If a flash ROM write error occurs by one writing to the flash ROM, check and correct the flash ROM writing program. Then reset the error or turn ON the power and reset the PLC CPU again.
- (4) The PFWRT instruction can only be executed when the QD75 READY signal (X0) is turned OFF.
When the QD75 READY signal is turned ON, the PFWRT instruction cannot be executed.
Before executing the PFWRT instruction, turn OFF the PLC READY signal (Y0) and then turn OFF the QD75 READY signal.
- (5) When the remote I/O station* (Q Corresponding MELSECNET/H network remote I/O module) is used, the dedicated instruction (PFWRT) is unusable.

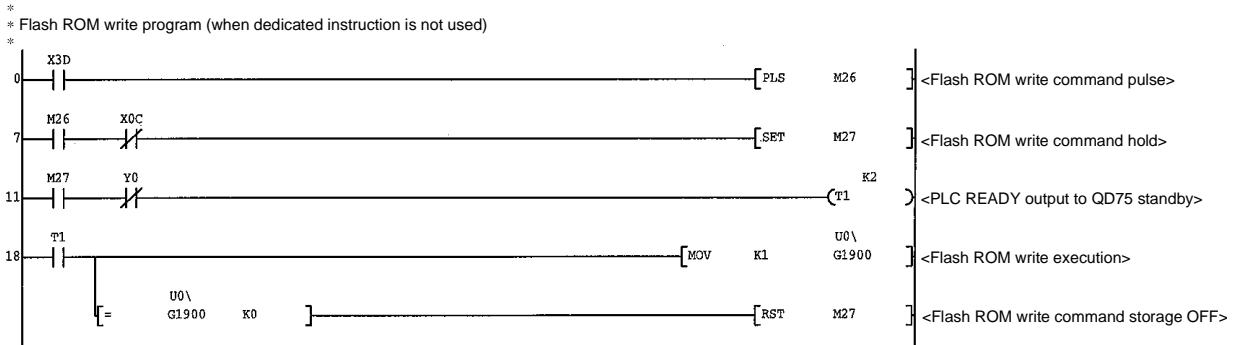
*: For details of the remote I/O station, refer to Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).
- (6) When the PLC READY signal (Y0) is turned ON, an error (error code: 1204) occurs, " [Pr.107] Rotation direction selection" is changed by PLC program or the GX Configurator-QP after the servo parameter is transmitted to servo amplifier (LED of the servo amplifier is indicated b□, C□, or d□). Execute the axis error reset ([Cd.5] Axis error reset) after the error occurrence.

[Program example]

Program used to write the parameters and positioning data stored in the buffer memory to the flash ROM when X3D is turned ON.



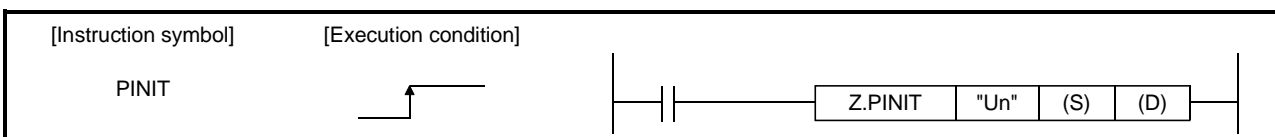
[Program example for use when dedicated instruction is not used]



14.6 PINIT

This dedicated instruction is used to initialize the setting data of the QD75.

| Setting data | Usable device | | | | | | | | |
|--------------|-----------------|------|---------------|--------------------------|------|-----------------------|-------------------|-------------------|--------|
| | Internal device | | File register | MELSECNET/10 direct J□□□ | | Special module U□□G□□ | Index register Zn | Constant K, H, \$ | Others |
| | Bit | Word | | Bit | Word | | | | |
| (S) | — | ○ | — | — | — | — | — | — | |
| (D) | ○ | ○ | — | — | — | — | — | — | |



[Setting data]

| Setting data | Setting details | Setting side (*1) | Data type |
|--------------|---|-------------------|-------------|
| "Un" | QD75 head I/O number (00 to FE: High-order two digits of I/O number expressed in three digits) | User | BIN 16 bits |
| (S) | Head number of a device in which control data is stored | — | Device |
| (D) | Head number of a bit device which turns ON the operation by one scan at the time of completion of the instruction. If the instruction is completed abnormally, ((D) + 1) will also be turned ON. | System | Bit |

Note) The file register of each of the local device and the program cannot be used as a device for setting data.

[Control data]

| Device | Item | Setting data | Setting range | Setting side (*1) |
|--------|-----------------|---|---------------|-------------------|
| (S)+0 | System area | — | — | — |
| (S)+1 | Complete status | The state at the time of completion is stored. 0 : Normal completion Other than 0: Abnormal completion (error code)(*2) | — | System |

*1: The data on the setting side is as follows.

- User : Data before the execution of dedicated instructions is stored by user.
- System: Data after the execution of dedicated instruction is stored by PLC CPU.

*2: Refer to Section 15.2 for error codes at abnormal completion.

[Functions]

- (1) This dedicated instruction is used to return the setting data set in the QD75 buffer memory and flash ROM to their factory-set data (initial values).

| Setting data |
|--|
| Basic parameters (Pr.1 to Pr.10) |
| Detailed parameters (Pr.11 to Pr.42 , Pr.200, Pr.201) |
| OPR basic parameters (Pr.43 to Pr.48) |
| OPR detailed parameters (Pr.49 to Pr.57) |
| Servo parameters (Pr.100 to Pr.161) |
| Positioning data (No.1 to 600) |
| Block start data (No.7000 to 7004) |

- (2) The PINIT instruction completion can be confirmed using the complete devices ((D)+0) and ((D)+1).

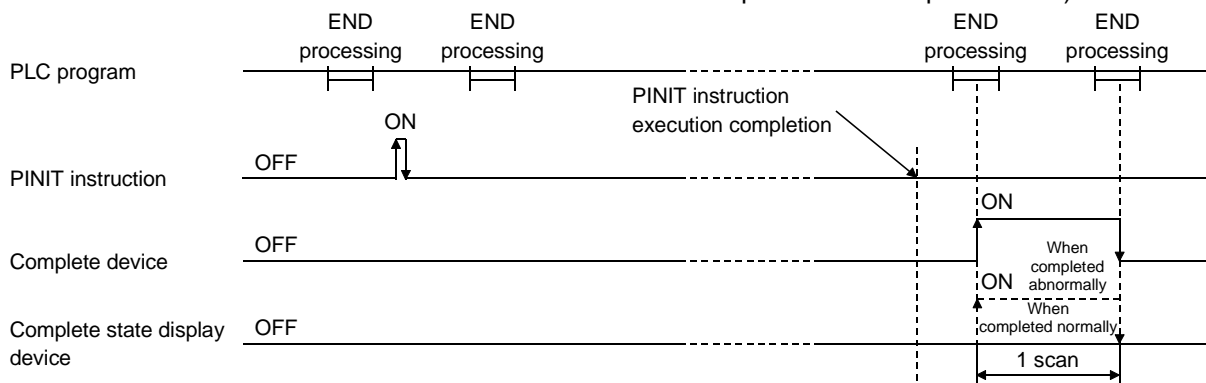
- (a) Complete device ((D)+0)

This device is turned ON by the END processing of the scan for which PINIT instruction is completed, and turned OFF by the next END processing.

- (b) Complete state display device ((D)+1)

This device is turned ON and OFF according to the state in which PINIT instruction is completed.

- When completed normally : Kept unchanged at OFF.
- When completed abnormally : This device is turned ON by the END processing of the scan for which PINIT instruction is completed, and turned OFF by the next END processing. (same ON/OFF operation as complete device).



[Errors]

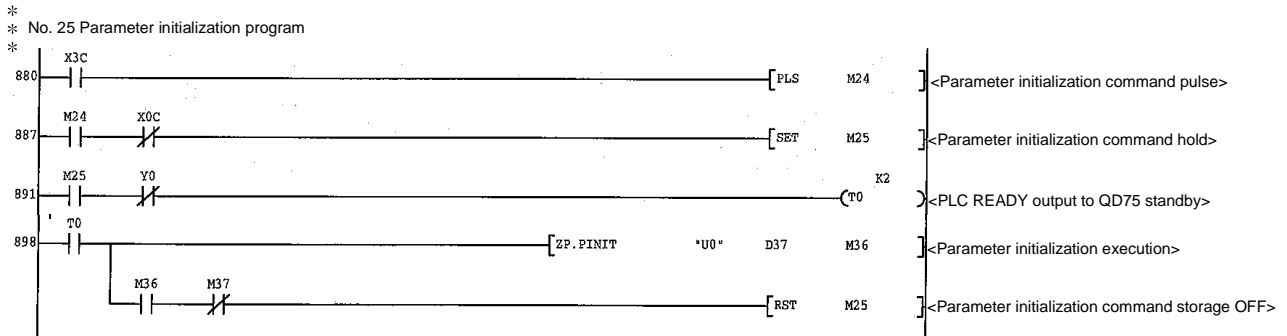
- (1) When a dedicated instruction is completed abnormally, the error complete signal ((D)+1) is turned ON, and the error code is stored in the complete status ((S)+1). Check and take measures against the error referring to section 15.2 List of error codes.

[Precautions]

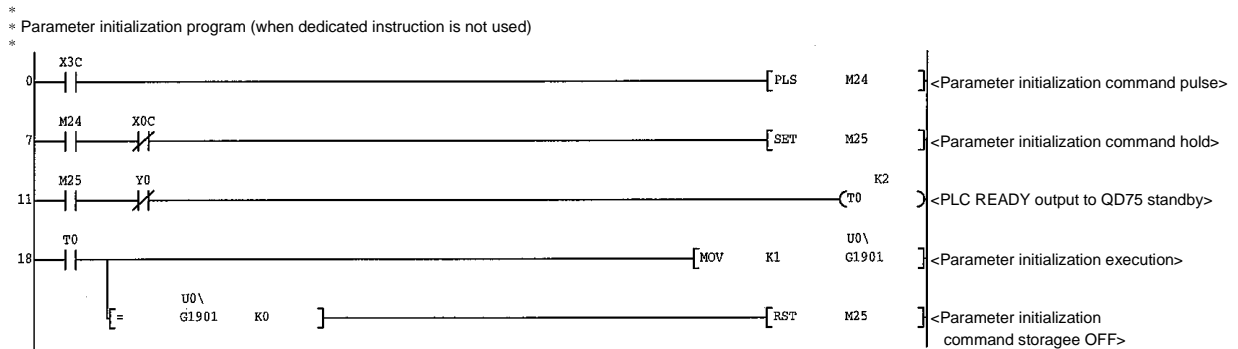
- (1) The PINIT instruction can only be executed when the QD75 READY signal (X0) is turned OFF.
 When the QD75 READY signal is turned ON, the PINIT instruction cannot be executed.
 Before executing the PINIT instruction, turn OFF the PLC READY signal (Y0) and then turn OFF the QD75 READY signal.
- (2) When the remote I/O station* (Q Corresponding MELSECNET/H network remote I/O module) is used, the dedicated instruction (PINIT) is unusable.
 *: For details of the remote I/O station, refer to Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O Network).

[Program example]

The following program initializes the parameters in buffer memory and flash ROM when X3C turns ON.



[Program example for use when dedicated instruction is not used]



Chapter 15 Troubleshooting

The "errors" and "warnings" detected by the QD75 are explained in this chapter.

Errors can be confirmed with the QD75 LED display and peripheral devices.
When an error or warning is detected, confirm the detection details and carry out the required measures.

| | | | |
|--------|----------------------------------|-----|-----|
| 15.1 | Error and warning details..... | 15- | 2 |
| 15.2 | List of errors | 15- | 6 |
| 15.2.1 | QD75 detection error | 15- | 6 |
| 15.2.2 | MR-H-BN detection error | 15- | 34 |
| 15.2.3 | MR-J2-B detection error..... | 15- | 46 |
| 15.2.4 | MR-J2S-B detection error | 15- | 56 |
| 15.2.5 | MR-J2-Jr detection error..... | 15- | 66 |
| 15.2.6 | MR-J2M-B detection error | 15- | 76 |
| 15.3 | List of warnings | 15- | 90 |
| 15.3.1 | QD75 detection warning | 15- | 90 |
| 15.3.2 | MR-H-BN detection warning..... | 15- | 96 |
| 15.3.3 | MR-J2-B detection warning | 15- | 98 |
| 15.3.4 | MR-J2S-B detection warning..... | 15- | 100 |
| 15.3.5 | MR-J2-Jr detection warning..... | 15- | 102 |
| 15.3.6 | MR-J2M-B detection warning | 15- | 104 |
| 15.4 | LED display functions | 15- | 106 |

15.1 Error and warning details

[1] Errors

■ Types of errors

Errors detected by the QD75 include parameter setting range errors, errors at the operation start or during operation and errors detected by servo amplifier.

- (1) Errors detected by the QD75 include parameter setting range errors
 The parameters are checked when the power is turned ON and at the rising edge (OFF → ON) of the PLC READY signal [Y0]. An error will occur if there is a mistake in the parameter setting details at that time.
 When this kind of error occurs, the QD75 READY signal does not turn ON.
 To cancel this kind of error, set the correct value in the parameter for which the error occurred, and then turn ON the PLC READY signal [Y0].

POINT

Execute the re-setup of the parameter after you execute the initialization (refer to the Section 13.2) of the parameter when the error (error code: 900 to 997) occurs in many and QD75 doesn't start.

- (2) Errors at the operation start or during operation (QD75 detection errors)
 These are errors that occur at the operation start or during operation when the positioning control, JOG operation, or inching operation is used. If an axis error occurs during interpolation operation, the error No. will be stored in both the reference axis and the interpolation axis.
 Note that, in the following cases (a) and (b), the axis error No. will be stored only in the reference axis during analysis of the positioning data set in each point of the positioning start data table.
 (a) When the interpolation axis is BUSY.
 (b) When the error occurred in positioning data or parameters unrelated to interpolation control.
- If the error occurred at the simultaneous start of a positioning operation, the axis error storage details will differ depending on whether the error occurred before or after the simultaneous start.
- If the error occurred before the simultaneous start (illegal axis No., other axis BUSY, etc.), an "error before simultaneous start" will occur.
 - If the error occurred after the simultaneous start (positioning data error, software stroke limit error, etc.), an error code corresponding to the axis in which the error occurred will be stored. Because a simultaneous start cannot be carried out due to this, a "simultaneous start not possible error" error code will be stored in all axes in which an error has not occurred.
- The axis operation status will be displayed as "error occurring" for axes in which an error occurred.
- If an error occurs during operation, any moving axes will deceleration stop, and their operation status will be displayed as "error occurring".
 All axes will decelerate to a stop during interpolation operations, even if the error occurs in only one axis.
- (3) Servo amplifier detection errors
 These are errors that occur at the hardware error such as servo amplifier and servomotor or the servo parameter error.
 Servo is turned off at the error occurrence, and axis stop. If you remove an error factor, reset the servo amplifier.

(4) Types of error codes

| Error code | Classification of errors |
|--------------|---|
| 001 to 009 | Fatal errors |
| 100 to 199 | Common errors |
| 200 to 299 | OPR or absolute position restoration errors |
| 300 to 399 | JOG operation or inching operation errors |
| 500 to 599 | Positioning operation errors |
| 800 to 899 | I/F (Interface) errors |
| 900 to 999 | Parameter setting range errors |
| 1201 to 1209 | Encoder errors |
| 2000 to 2099 | Servo amplifier errors |

■ Error storage

When an error occurs, the error detection signal turns ON, and the error code corresponding to the error details is stored in the following buffer memory address ([Md.23] Axis error No.) for axis error No. storage. Note that there is a delay of up to 3.5 ms after the error detection signal turns ON until the error code is stored.

| Axis No. | Error detection signal | Buffer memory address |
|----------|------------------------|-----------------------|
| 1 | X8 | 806 |
| 2 | X9 | 906 |
| 3 | XA | 1006 |
| 4 | XB | 1106 |

A new error code is stored in the buffer memory address ([Md.23] Axis error No.) for axis error storage every time an error occurs.

[2] Warnings

■ Types of warnings

Warnings detected by the QD75 include system warnings, axis warnings and warnings detected by servo amplifier.

(1) Warnings include system warnings.

The types of system warnings are shown below.

- System control data setting warnings
An axis warning for axis 1 will occur.
- Positioning data setting warnings
An axis warning for each axis will occur.
Note that a warning will occur for the reference axis when an interpolation designation or axis setting warning occurs.

(2) Warnings include axis warnings.

- Axis warnings occur due to setting warnings from operations such as positioning operations, JOG operations or manual pulse generator operations.
- Axis warnings occur due to system warnings.
The axis operation status does not change even if an axis warning occurs.

(3) Servo amplifier detection warnings

These are warning that occur at the hardware error such as servo amplifier and servomotor or the inapplicable servo parameters. Error or normality operation can't be executed by warning when warning is left as it is though servo off isn't executed. If you remove a warning factor, reset the servo amplifier.

(4) Types of warning codes

| Warning code | Classification of warnings |
|--------------|---|
| 001 to 199 | Common warnings |
| 300 to 399 | JOG operation warnings |
| 400 to 499 | Manual pulse generator operation warnings |
| 500 to 599 | Positioning operation warnings |
| 900 to 999 | System control data setting range check warnings |
| 2090 to 2999 | Servo amplifier warnings (The contents of a vary in the model of servo amplifier.) |

■ Warning storage

(1) When an axis warning occurs, the warning code corresponding to the warning details is stored in the following buffer memory (Md.24 Axis warning No.) for axis warning No. storage.

| Axis No. | Buffer memory address |
|----------|-----------------------|
| 1 | 807 |
| 2 | 907 |
| 3 | 1007 |
| 4 | 1107 |

(2) When an axis warning occurs in a positioning operation, etc., "1" is set in bit 9 (b9) of the following buffer memory (Md.31 Status) for axis status storage.

| Axis No. | Buffer memory address |
|----------|-----------------------|
| 1 | 817 |
| 2 | 917 |
| 3 | 1017 |
| 4 | 1117 |

[3] Resetting errors and warnings

An error or warning state is canceled after the following processing has been carried out by setting a "1" in the address [1502 (for axis 1)], [1602 (for axis 2)], [1702 (for axis 3)], and [1802 (for axis 4)] of the buffer memory for axis error resetting (Cd.5 Axis error reset).

- Axis error detection signal turned OFF
- "Md.23 Axis error No." cleared
- "Md.24 Axis warning No." cleared
- Changing of "Md.26 operation status" from "Error" to "Standby".
- "Md.31 Axis warning detection (b9)" turned OFF

[4] Invalid operations

For the following operations, the setting details will be invalidated, and an error or warning will not occur.

- Speed change during machine OPR
- Speed change before operation
(Speed override change, skip command, continuous operation interruption request, target position change request)
- Axis stop during axis stop
- Axis sudden stop during axis stop
- Axis stop before axis operation
- Axis sudden stop before axis operation
- Writing to the buffer memory monitoring area

[5] Confirming the error and warning definitions

The error and warning definitions can be confirmed with the error and warning codes. Confirming them requires GX Developer or GX Configurator-QP. For details, refer to GX Developer Operating Manual or GX Configurator-QP Operating Manual. (Refer to Section 15.2 and Section 15.3 for details of the error and warning codes.)

15.2 List of errors

The following table shows the error details and remedies to be taken when an error occurs.

15.2.1 QD75 detection error

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--------------------------|------------|---|--|--|
| — | 000 | (Normal status) | — | — |
| Fatal errors | 001 | Fault | Hardware fault. | The system stops. |
| | 002 | Internal circuit fault | | |
| Common errors | 101 | PLC READY signal OFF during operation | The PLC READY signal (Y0) is turned OFF during operation. | The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 2). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 102 | Servo READY signal OFF during operation | The Servo READY signal is turned OFF during operation. | The system stops immediately. |
| | 103 | Test mode faults during operation | The personal computer cannot communicate with the CPU unit. | The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 2). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 104 | Hardware stroke limit (+) | The hardware stroke limit (upper limit signal FLS) is input turned OFF. | The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 1). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 105 | Hardware stroke limit (-) | The hardware stroke limit (lower limit signal RLS) is input turned OFF. | |
| | 106 | Stop signal ON at start | Start is requested when a stop signal is turned ON. | The system does not start positioning. |
| | 107 | READY OFF → ON during BUSY signal | The PLC READY signal is turned from OFF to ON when BUSY signal is turned ON. | • The QD75 READY signal (X0) is not turned ON. |
| | 108 | Impossible to start | Start is requested when start is not possible in the axis operation state. | The system does not start positioning. |

| | Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|-------------------------------|--------|--------|--------|---|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | — | — |
| | — | — | — | — | — | <ul style="list-style-type: none"> • Check that there is no influence from noise. • Check hardware for possibility of fault. |
| | — | — | — | — | — | <ul style="list-style-type: none"> • Review the PLC program which turns ON/OFF PLC READY signal (Y0). • Cancel the error with an axis error reset. (Refer to Section 15.1[3]) |
| | — | — | — | — | — | Check the servo amplifier power, wiring with the servo amplifier, and connection of connectors, and cancel the error with an axis error reset. (Refer to Section 15.1[3]) |
| | — | — | — | — | — | <ul style="list-style-type: none"> • Check that there is no error on the personal computer side I/F to which a cable is connected. • Change the transmission speed (serial communication baud rate selection) between the personal computer and the QD75. (Refer to Section 5.2.9 [Pr.133]) |
| | — | — | — | — | — | After making an axis error reset (refer to [3] in Section 15.1), perform manual control operation (refer to Chapter 11) to move the axis to the other position in order that the upper limit signal (FLS) will turn ON. |
| | — | — | — | — | — | After making an axis error reset (refer to [3] in Section 15.1), perform manual control operation (refer to Chapter 11) to move the axis to the other position in order that the lower limit signal (RLS) will turn ON. |
| | — | — | — | — | — | <p>Check whether the stop commands (output signals/external inputs to QD75) are turned ON or OFF. Turn OFF the ON commands.</p> <ul style="list-style-type: none"> • Output signals to QD75 Axis 1: Y4, Axis 2: Y5, Axis 3: Y6, Axis 4: Y7 • External input Connectors for external device connection: Stop signals (STOP) <p>After confirming the stop command status, cancel the error with an axis error reset. Then turn ON a start signal. (Refer to Section 15.1[3])</p> |
| | — | — | — | — | — | The PLC READY signal (Y0) is turned from OFF to ON when all BUSY signal is turned OFF. |
| | — | — | — | — | — | Do not request the start when the axis operation state is other than "standby", "stop", and "step standby". |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--|-----------------------|--|--|--|
| Home position return (OPR) or absolute position restoration errors | 201 | Start at home position (OP) fault | When the machine home position return (OPR) retry invalid is set, the near-point dog home position return (OPR) is started with the home position return (OPR) complete flag turned ON. | The machine home position return (OPR) is not started. |
| | 203 | Dog detection timing fault | The near-point dog signal is turned OFF during the deceleration from a home position return (OPR) speed to a creep speed by the near-point dog home position return (OPR). | The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 3). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 204 | Home position (OP) detection timing fault | The zero signal is turned OFF during the deceleration from a home position return (OPR) speed to a creep speed by the stopper method 2) - home position return (OPR). | |
| | 205 | Dwell time fault | A dwell time is passed during the deceleration from a creep speed to a home position return (OPR) speed by the stopper method 1) - home position return (OPR). | |
| | 206 | Count method movement amount fault | In the count method 1) and 2) – machine home position return (OPR), a parameter "Setting of movement amount after near-point dog ON" is smaller than a distance necessary for deceleration stop from a home position return (OPR) speed. | At start: The system will not operate. During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 3). |
| | 207 | Home position return (OPR) request flag ON | The OPR request flag is turned ON when a fast - home position return (OPR) is started (positioning start No. 9002). | The fast - home position return (OPR) is not started. |
| | 209 | Home position return (OPR) restart not possible | The restart command is turned ON after the machine home position return (OPR) is stopped using a stop signal. | The restart is not carried out. |
| | 210 | Home position return (OPR) restart zero point not passed | The zero point is not passed when the dog or count method home position return (OPR) is re-started, or data set method home position return (OPR) is made. | The home position return (OPR) is not completed. |
| | 211 | ZCT read error | The data is not loaded from the servo amplifier properly upon the home position return (OPR). | |
| | 212 | ABS reference point read error | The data is not loaded from the servo amplifier properly upon the home position return (OPR). | The absolute position restoration is not carried out. |
| 213 | ABS transmission time | Communication cannot be carried out with the servo-amplifier using an absolute position restoration instruction. | | |
| 214 | ABS transmission SUM | | | |

| | Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|-------------------------------|------------|------------|------------|--|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | 78 | 228 | 378 | 528 | <OPR retry> 0, 1 | <ul style="list-style-type: none"> • Validate the home position return (OPR) retry function (set value: 1). (Refer to Section 12.2.1) • Move the workpiece from the current position (on home position (OP)) using the manual control operation (refer to chapter 11), then carry out an home position return again. |
| | 74 75 | 224 225 | 374 375 | 524 525 | <OPR speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | <ul style="list-style-type: none"> • Lower the home position return (OPR) speed. • Increase the dog signal input time. (Refer to Section 8.2.3) |
| | 74 75 | 224 225 | 374 375 | 524 525 | | <ul style="list-style-type: none"> • Lower the home position return (OPR) speed. • Input external zero signals during the movement at a creep speed. (Refer to Section 8.2.5) |
| | 74 75 | 224 225 | 374 375 | 524 525 | | <ul style="list-style-type: none"> • Lower the home position return (OPR) speed. |
| | 79 | 229 | 379 | 529 | <OPR dwell time> 0 to 65535 | <ul style="list-style-type: none"> • Increase the OPR dwell time. (Refer to Section 8.2.4) |
| | 80 81 | 230 231 | 380 381 | 530 531 | <Movement amount setting after near-point dog ON> 0 to 2147483647 | <ul style="list-style-type: none"> • Calculate the movement distance using a speed limit, home position return (OPR) speed, and deceleration time, and set the movement amount after near-point dog ON so that the distance becomes a deceleration distance or longer. • Lower the home position return (OPR) speed. • Adjust the near-point dog position so that the movement amount after near-point dog ON becomes longer. (Refer to Section 8.2.4, 8.2.5) |
| | 74 75 | 224 225 | 374 375 | 524 525 | <OPR speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min] | |
| | 1500 | 1600 | 1700 | 1800 | <Positioning start No.> 1 to 600 7000 to 7004 9001 to 9004 | Execute the machine home position return (OPR) (positioning start No. 9001). (Refer to Section 8.2) |
| | 1500 | 1600 | 1700 | 1800 | <Positioning start No.> 1 to 600 7000 to 7004 9001 to 9004 | Start the machine home position return (OPR) (positioning start No. 9001) again. (Refer to Section 8.2) |
| | — | — | — | — | — | Turn the motor more than one revolution using JOG or positioning operation. |
| | — | — | — | — | — | Execute the home position return (OPR) again. |
| | — | — | — | — | — | Execute the home position return (OPR) again. |
| | — | — | — | — | — | <ul style="list-style-type: none"> • Review the wiring. (Refer to Section 12.6) • Review the PLC program. |
| | — | — | — | — | — | <ul style="list-style-type: none"> • Review the wiring. (Refer to Section 12.6) • Review the PLC program. • Review the dedicated instruction parameters. (Refer to Section 14.3) |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|---|------------|---------------------------------|--|---|
| JOG operation or inching operation errors | 300 | Outside JOG speed range | At the time of JOG starting, the JOG speed comes out of a specified range. | The JOG operation is not carried out when the JOG speed is outside the setting range at the time of JOG start. |
| | 301 | Inching movement amount error | The inching movement amount exceeds the JOG speed limit. | The inching operation is not carried out when the inching movement amount exceeds a JOG speed limit at the time of inching start. |
| Positioning operation errors | 500 | Illegal condition data No. | The condition data No. is outside the setting range when a block using the condition data is started by a special starting (conditional start, wait start, simultaneous start, FOR (condition)). ($1 \leq \text{Condition data No.} \leq 10$) | The operation is terminated. |
| | 501 | Error before simultaneous start | <p><When blocks are started simultaneously></p> <ul style="list-style-type: none"> The partner axis for simultaneous start is BUSY. <p>-----</p> <p><When multiple axes are started and controlled simultaneously></p> <ul style="list-style-type: none"> The partner axis for simultaneous start is BUSY. The "Simultaneous start axis start data No." of the start axis is 0 or is outside the setting range. The "Simultaneous start axis start data No." of those axes other than the start axis is outside the setting range. | <p>At start: The system will not operate.</p> <p>During operation: The system stops immediately.</p> |
| | 502 | Illegal data No. | <ul style="list-style-type: none"> The positioning data No. tried to be executed is outside the ranges of 1 to 600, 7000 to 7004, and 9001 to 9004. The designation of a JUMP destination is executed currently. The designation of a JUMP destination is outside the ranges of 1 to 600. | The positioning data is not executed. |
| | 503 | Command speed is not set | <ul style="list-style-type: none"> At the start of positioning, a current speed (-1) is set for the command speed of the positioning data to be initially executed. The current speed is set by speed control. The current speed is set for speed-position switching control. | At the start of positioning, operation does not start. |

| Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|--------------|--------------|--------------|--|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| 1518 1519 | 1618 1619 | 1718 1719 | 1818 1819 | <JOG speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | Bring JOG speed into the setting range. (Refer to Section 11.2) |
| 1517 | 1617 | 1717 | 1817 | <Inching movement amount> 0 to 65535 | Reduce the inching movement amount. (Refer to Section 11.3) |
| Refer to Section 5.4 "List of block start data" | | | | <Condition data No.> 1 to 10 | Review the condition data No. (Refer to Section 5.4 Da.14) |
| Refer to Section 5.5 "List of condition data" | | | | <Condition operators> Axis designation: 10H, 20H, 30H, 40H, 50H, 60H, 70H, 80H, 90H, A0H, B0H, C0H, D0H, E0H | Review the simultaneous start axis start data No. . (Refer to Section 5.5 Da.16) |
| 1540 | 1640 | 1740 | 1840 | Axis 1 start data No. | Simultaneous start axis start data No. 0 to 600 Review the simultaneous start axis start data No. to correct value. (Refer to Section 10.5) |
| 1541 | 1641 | 1741 | 1841 | Axis 2 start data No. | |
| 1542 | 1642 | 1742 | 1842 | Axis 3 start data No. | |
| 1543 | 1643 | 1743 | 1843 | Axis 4 start data No. | |
| 1500 | 1600 | 1700 | 1800 | <Positioning start No.> 1 to 600, 7000 to 7004, 9001 to 9004 | Review the positioning start No., positioning start data (in block start), and positioning data (in JUMP instruction) to correct value. |
| Refer to Section 5.3 "List of positioning data" | | | | <JUMP destination> 1 to 600 | |
| Refer to Section 5.3 "List of positioning data" | | | | <Command speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | Review the positioning data to correct value. |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|------------------------------|------------|--|--|--|
| Positioning operation errors | 504 | Outside linear movement amount range | <ul style="list-style-type: none"> • When the parameter "interpolation speed designation method" performs a linear interpolation in setting a "composite speed", the axis movement amount for each positioning data exceeds 1073741824(2³⁰). • The positioning address is -360.00000 or less or 360.00000 or more using INC instruction, where the control unit is set to "degree" and software stroke limit upper limit is not equal to the software stroke limit lower limit. | <p>At start: The system will not operate.</p> <p>During operation: The system stops immediately.</p> |
| | 506 | Outside circular interpolation error allowable limit | When an arc is interpolated by the designation of the center point, a difference between a radius of start point-center point and a radius of end point-center point exceeds the parameter "Circular interpolation error allowable limit". | <p>At start: The circular interpolation control by center point designation is not executed.</p> <p>During operation : The system will stop immediately.</p> |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|--|------------|------------|------------|--|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Refer to Section 5.3 "List of positioning data" | | | | | <Positioning address/movement amount> • ABS unit [mm] [PLS] [inch] -2147483648 to 2147483647 Unit [degree] 0 to 35999999 • INC (When software stroke limits are valid) Unit [degree]: -35999999 to 35999999 Unit [mm], [PLS], [inch]: -2147483648 to 2147483647 (When software stroke limits are invalid) -2147483648 to 2147483647 • Speed-position switching INC mode: 0 to 2147483647 ABS mode: 0 to 35999999 • Position-speed switching 0 to 2147483647 <Arc address> -2147483648 to 2147483647 | Review the positioning address. |
| | | | | | | • Center point address (positioning address) } • End address (arc address) } Correct. |
| 60 61 | 210 211 | 360 361 | 510 511 | <Circular interpolation error allowable limit> 0 to 1000000 | Correct the circular interpolation error allowable limit value. | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|------------------------------|------------|---------------------------------|---|---|
| Positioning operation errors | 507 | Software stroke limit+ | <ul style="list-style-type: none"> Positioning is carried out at a position beyond the software stroke limit upper limit. The positioning address and new current value exceed the software stroke limit upper limit. In the circular interpolation by the designation of the sub points, the sub points exceed the software stroke limit upper limit. | At start: The system will not operate. In the analysis of new current value: Current value is not changed. During operation: <ul style="list-style-type: none"> The system stops immediately when the positioning address during position control (including position control in speed-position switching control or position-speed switching control) is switched to the data outside the software stroke limit range. The system makes a stop at the setting (normal deceleration stop only) of sudden stop selection (stop group 3) in the detailed parameter 2 when the current feed value or machine feed value during speed control (including speed control in speed-position switching control or position-speed switching control) or during manual control falls outside the software stroke limit range. |
| | 508 | Software stroke limit- | <ul style="list-style-type: none"> Positioning is carried out at a position beyond the software stroke limit lower limit. The positioning address and new current value exceed the software stroke limit lower limit. In the circular interpolation by the designation of the sub points, the sub points exceed the software stroke limit lower limit. | |
| | 514 | Outside new current value range | The new current address is outside the ranges of 0 to 359.99999, where the control unit is set to "degree". | The current value is not changed. |
| | 515 | New current value invalid | <ul style="list-style-type: none"> The control system sets an operation pattern (continuous path control) using new current positioning data. The operation pattern sets a "new current value" in the control system using the data following the "continuous path control" positioning data. | |
| | 516 | Continuous path control invalid | <ul style="list-style-type: none"> The continuous path control is designated using a control system which is not allowed to use for continuous path control such as speed control, speed-position switching control, position-speed switching control, and fixed-feed. The previous data such as those on speed control, speed-position switching control, position-speed switching control, and fixed-feed shows a continuous path control. The continuous positioning control is designated for speed control or position-speed switching control. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|--|--------------|--------------|--------------|---|---|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| New current value | | | | | <New current value> <Software stroke upper and lower limits> | At start: Bring the current feed value into the software stroke limit using the manual control operation. (Refer to Chapter 11) Correct the positioning address (Also check the arc address in circular interpolation with sub points designated). |
| 1506 1507 | 1606 1607 | 1706 1707 | 1806 1807 | | | |
| Software stroke limit upper limit | | | | | | |
| 18 19 | 168 169 | 318 319 | 468 469 | • [mm] [inch] [PLS] -2147483648 to 2147483647 • [degree] 0 to 35999999 | New current value: Bring the new current value into the software stroke limit. (Refer to Section 9.2.19) During operation: Correct the positioning address. (For the positioning and arc addresses, refer to Da.6 and Da.7 in Section 5.3.) | |
| Software stroke limit lower limit | | | | | | |
| 20 21 | 170 171 | 320 321 | 470 471 | | | |
| 1506 1507 | 1606 1607 | 1706 1707 | 1806 1807 | <New current value> [degree] 0 to 35999999 | Bring the new current value into the setting range. (Refer to Section 9.2.19) | |
| Refer to Section 5.3 "List of positioning data" | | | | | <Control system> 01H to 1EH, 80H to 84H • 03H, 0CH, 17H, 1CH: 1 to 4 axis fixed-feed control • 04H, 05H, 13H, 14H, 18H, 19H, 1DH, 1EH: 1 to 4 axis speed control • 81H: current value changing • Speed-position switching control: 06H, 07H • Position-speed switching control: 08H, 09H <Operation pattern> 00, 01, 11 • 01: Continuous positioning control • 11: Continuous path control | <ul style="list-style-type: none"> Do not designate a current value changing using the positioning data following the continuous path control. Do not designate a "current value changing" using the positioning data following the continuous path control. (Refer to Section 9.2.19) |
| | | | | | <ul style="list-style-type: none"> Do not designate a speed control, fixed-feed, speed-position switching control, and position-speed switching control using the positioning data following the continuous path control data. Do not carry out the fixed-feed, speed control, speed-position switching control, and position-speed switching control using the continuous path control operation pattern. Do not carry out the speed control and position-speed switching control using the continuous path control operation pattern. (Refer to Chapter 9) | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|------------------------------|------------|---|---|--|
| Positioning operation errors | 518 | Outside operation pattern range | <ul style="list-style-type: none"> The operation pattern set value is 2. A target position change is requested on those control systems other than ABS1 and INC1. A target position change is carried out in continuous path control. A changed address is outside the software stroke limit. A target position change is carried out during deceleration stop. | <p>At start: The system will not operate.</p> <p>During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 3).</p> <p>(Note that the deceleration stop only occurs during the manual pulse generator operation.)</p> |
| | 519 | Interpolation while interpolation axis BUSY | Interpolation is started during the operation of the interpolation axis. | |
| | 520 | Unit group unmatched | The reference and interpolation axis units are different at the parameter "interpolation speed designation method" setting of "composite speed". | |
| | 521 | Illegal interpolation description command | <ul style="list-style-type: none"> The number of axes necessary for interpolation operation is not present in the unit. In 2-axis interpolation, the axis to be interpolated is the self axis or an axis not present. | |
| | 522 | Command speed setting error | <p>The command speed is outside the setting range.</p> <p>Linear interpolation, circular interpolation: Reference axis is outside the setting range.</p> <p>Speed control interpolation: Either of reference axis and interpolation axis is outside the speed range.</p> | |
| | 523 | Interpolation mode error | <ul style="list-style-type: none"> For starting, a composite speed is designated in the reference axis parameter "Interpolation speed designation method" using the speed interpolation control or 4-axis linear interpolation control. For starting, a reference axis speed is designated in the reference axis parameter "Interpolation speed designation method" using the circular interpolation control. | |

| Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|--------|--------|--------|---|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Same as error codes 515 to 516 | | | | | Correct the operation pattern. (Refer to Section 5.3 Da.1) |
| Same as error codes 515 to 516 | | | | | Correct the control system. (Refer to Section 5.3 Da.2) |
| 0 | 150 | 300 | 450 | <Unit setting> 0, 1, 2, 3 | Correct the positioning data or change the parameter "Unit setting" of the axis to be interpolated. (Refer to Section 9.1.6) |
| Same as error codes 515 to 516 | | | | | <ul style="list-style-type: none"> • Correct the control system. (Refer to Section 5.3 Da.2) • Correct the axis to be interpolated. (Refer to Section 5.3 Da.5) |
| Command speed storage addresses of positioning data No. 1 to 600 | | | | <Command speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | Correct the command speed. (Refer to Section 5.3 Da.8) |
| 29 | 179 | 329 | 479 | <Interpolation speed designation method> 0: Composite speed 1: Reference axis speed | Set the "Interpolation speed designation method" correctly. (Refer to Section 9.1.6) |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|------------------------------|------------|---------------------------------|---|--|
| Positioning operation errors | 524 | Control system setting error | <ul style="list-style-type: none"> The control system setting value is outside the specified limit. The number of control axes differs from the previous data when continuous positioning control or continuous path control is to be exercised for continuously. Machine OPR, fast OPR, or speed-position or position-speed switching control was performed in the wiring-less mode. The NOP instruction was set to the control system of positioning data No. 600. Any value other than 0 was set at buffer memory address 1906 (use prohibited area). | <p>At start: The system will not operate.</p> <p>During operation: The system stops with the setting (deceleration stop/sudden stop) of the detail parameter 2 Sudden stop selection (stop group 3).</p> <p>(Note that the deceleration stop only occurs during the manual pulse generator operation.)</p> |
| | 525 | Sub point setting error | <p>Either of the following applies in the circular interpolation with sub points designated.</p> <ul style="list-style-type: none"> Start point = sub point End point = sub point Start point, end point, and sub point are in line with each other. Sub point and center point are outside the range of -2147483648 to 2147483647. | <p>At start: The system will not operate.</p> <p>During operation: The system stops immediately.</p> |
| | 526 | End point setting error | <ul style="list-style-type: none"> Start point is equal to end point in the circular interpolation with sub points designated. End point address is outside the range of -2147483648 to 2147483647. | |
| | 527 | Center point setting error | <p>In an arc with designated center point, either of the following applies.</p> <ul style="list-style-type: none"> Start point = Center point End point = Center point Center point address is outside the range of -2147483648 to 2147483647. | <p>At start: The system will not operate.</p> <p>During operation: The system stops immediately.</p> |
| | 530 | Outside address range | <ul style="list-style-type: none"> In the speed-position switching control and the position-speed switching control, the setting value of a positioning address is negative. In ABS1, ABS2, ABS3 and ABS4, the setting value of a positioning address is outside the range of 0 to 359.99999 degrees. | <p>At start: The system will not operate.</p> <p>During operation: The system stops immediately with the setting (deceleration stop/sudden stop) of the detailed parameter 2 sudden stop selection (stop group 3).</p> <p>(Note that the deceleration stop only occurs during the manual pulse generator operation.)</p> |
| | 532 | Simultaneous start not possible | <p>Among the axes to be started simultaneously, there is an axis on which an error other than this error occurs.</p> | |

| Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|--------|--------|--------|--|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Same as error codes 515 to 516 | | | | | <ul style="list-style-type: none"> • Correct the control system or parameter. (Refer to section 9.1.6, 9.2.20) • Do not make setting at buffer memory address 1906 (use prohibited area). |
| Refer to Section 5.3 "List of positioning data" | | | | <Positioning address/movement amount> • unit [mm] [PLS] [inch] -2147483648 to 2147483647 (Unit [degree]) cannot be set. <Arc address> -2147483648 to 2147483647 | Correct the sub address (arc address). (Refer to Section 9.2.10) |
| | | | | | Correct the end address (positioning address). (Refer to Section 9.2.10) |
| Same as in error codes 525 to 526. | | | | | Correct the center point address (arc address). (Refer to Section 9.2.11) |
| Same as in error codes 504, 506. | | | | | Correct the positioning address. (Refer to Section 9.2.16, 9.2.17, 9.2.18) |
| Refer to Section 5.3 "List of positioning data" and Section 5.4 "Block start data" | | | | — | In the error history, check the axis where the error other than this error occurred, and remove the error factor. Correct the block start data and positioning data. |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence | |
|------------------------------|------------|---|--|--|--|
| Positioning operation errors | 533 | Condition data error | <ul style="list-style-type: none"> The condition setting values are not set or outside the setting range. The condition operator setting values are not set or outside the setting range. The condition operator is a bit operator, and the parameter 1 is 32 or more. An unusable condition operator is set for the set condition. The conditional operator is the range operator and parameter 1 is greater than parameter 2. | The operation is terminated. | |
| | 534 | Special start instruction error | <ul style="list-style-type: none"> The partner axis designation for simultaneous start includes the self-axis. No applicable special start instruction is present. | | |
| | 535 | Circular interpolation not possible | Circular interpolation is carried out on an axis in the unit of degree. | | |
| | 536 | M code signal ON at positioning start | The positioning start is carried out when an M code ON signal (X4 to X7) is turned ON. | At start, the system will not operate. | |
| | 537 | PLC READY signal OFF at positioning start | The positioning start is carried out when the PLC READY signal (Y0) is turned OFF. | | |
| | 538 | READY signal OFF at positioning start | The positioning start is carried out when the QD75 READY signal (X0) is turned OFF. | | |
| | 543 | Outside start No. range | <ul style="list-style-type: none"> At the start of positioning, the setting value of the "positioning start No." of the axis control data is outside the ranges of 1 to 600, 7000 to 7004, and 9000 to 9004. At a Pre-reading start, the "positioning start No." setting of the axis control data is other than 1 to 600. | | |
| | 544 | Outside radius range | The arc radius exceeds 536870912. | | At start: The system will not operate. During operation: The system stops immediately. |
| | 545 | Control system LOOP setting error | A "0" is set in the control system "LOOP". | The operation is terminated. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|--|------|------|------|---|--|---|
| | | | | | | |
| Refer to Section 5.4 "Block start data" | | | | | — | Normalize the block start data. |
| | | | | | <Special start instruction> 00H to 06H | Correct the instruction code of the special start data. (Refer to Section 5.4 [Da.13]) |
| Refer to Section 5.3 "List of positioning data" | | | | | — | Correct the control system. (Refer to Section 5.3 [Da.2]) |
| 1504 | 1604 | 1704 | 1804 | <M code OFF request> 1: M code ON signal is turned OFF | After turning OFF the M code ON signal, start the system. (Refer to Section 12.7.3) | |
| — | — | — | — | — | Check the PLC program which turns ON/OFF the PLC READY signal (Y0), and turn ON the PLC READY signal. Then start the system. | |
| — | — | — | — | — | Check the QD75 READY ON signal, and then start the system. (Refer to Section 3.3.2) | |
| 1500 | 1600 | 1700 | 1800 | <Positioning start No.> 1 to 600, 7000 to 7004, 9001 to 9004 | Review the positioning start No. to correct value. (Refer to Section 12.7.8) | |
| Refer to Section 5.3 "List of positioning data" | | | | | <Maximum radius> 536870912 | Correct the positioning data. (Refer to Section 9.2.10, 9.2.11) |
| | | | | | <LOOP to LEND> 1 to 65535 | Set 1 to 65535 in LOOP. (Refer to Section 9.2.22) |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|------------------------------|------------|--|---|---|
| Positioning operation errors | 546 | Illegal setting of ABS direction in unit of degree | The setting value of ABS direction in the unit of degree is as follows. <ul style="list-style-type: none"> • Set outside the setting range. • A figure other than "0" is set when the software stroke limit is valid. | At start: The system will not operate. During operation: The system decelerates to a stop. (Note that, in the continuous positioning control and continuous path control, the system continues operating with the setting set at the time of start even if the setting is changed during the operation.) |
| I/F errors | 800 | Hold error | In the PLC CPU unit parameter "Output at error stop", the setting for QD75 is "Hold". | At start: The system will not operate. During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 sudden stop selection (stop group 3). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 801 | Flash ROM writing error | Data is not written to the flash ROM. | At start: The system will not operate. |
| | 802 | Flash ROM sum check error | While data is written to the flash ROM, the power is turned OFF. | |
| | 803 | PLC CPU error | The PLC CPU has an error. | At start: The system will not operate. During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 sudden stop selection (stop group 3). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 804 | Dedicated instruction error | <ul style="list-style-type: none"> • The ABRST□ instruction is executed with the status set to other than 0. • The PSTRT□ instruction is executed with the start No. set to other than 1 to 600, 7000 to 7004 and 9001 to 9004. • The TEACH□ instruction is executed with the teaching data selection set to other than 0 and 1. • The TEACH□ instruction is executed with the positioning data No. set to other than 1 to 600. • The instruction of a non-existent axis is specified by the ABRST□, PSTRT□ or TEACH□ instruction. | |
| | 805 | Flash ROM exceed writing error | Data is written to the flash ROM continuously 25 times or more from the PLC program. | |
| | | | | At start: The system will not operate. |

| Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|---|--------|--------|--------|---|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| ABS setting direction in the unit of degree | | | | 0: Shortcut 1: Clockwise 2: Counterclockwise | <ul style="list-style-type: none"> Set the ABS setting direction in the unit of degree within the setting range. Set "0" when the software stroke limits are valid. (Refer to Section 9.1.5) |
| 1550 | 1650 | 1750 | 1850 | | |
| Software stroke limit upper limit | | | | <ul style="list-style-type: none"> [mm] [inch] [PLS] -2147483648 to 2147483647 [degree] 0 to 35999999 | Invalidate the software stroke limit. (To invalidate, set the software stroke limit upper limit value to the software stroke limit lower limit value.) (Refer to Section 9.1.5) |
| 18 | 168 | 318 | 468 | | |
| 19 | 169 | 319 | 469 | | |
| Software stroke limit lower limit | | | | | |
| 20 | 170 | 320 | 470 | | |
| 21 | 171 | 321 | 471 | | |
| — | — | — | — | — | Clear the setting of the PLC CPU module parameter "Output at error stop". (Refer to "QCPU User's Manual") |
| — | — | — | — | — | Replace the flash ROM with a new one. |
| 1901 | | | | <Parameter initialization request> 1: Parameter initialization is requested | Return the parameter to that set at the time of delivery from the plant. (Refer to Section 13.2) |
| — | — | — | — | — | (Refer to "QCPU User's Manual") |
| — | — | — | — | <ABRST□ status> 0: Communication complete (received from the servo amplifier) <PSTRT□ start No.> 1 to 600, 7000 to 7004, 9001 to 9004 <TEACH□ teaching data selection> 0: The current feed value is written to the positioning address. 1: The current feed value is written to the arc address. <TEACH□ positioning data No.> 1 to 600 | <ul style="list-style-type: none"> When executing the ABRST□ instruction, set the status to 0 (refer to Section 14.3). When executing the PSTRT□ instruction, set the start No. to within the setting range (refer to Section 14.4). When executing the TEACH□ instruction, set the teaching data selection and positioning data No. to within the setting range (refer to Section 14.5). Do not specify the instruction of a non-existent axis by the ABRST□, PSTRT□ and TEACH□ instructions (refer to Section 14.3 to Section 14.5). |
| — | — | — | — | — | Review the PLC program so that data is not written continuously to the flash ROM. (Using "[Md.19]" in Section 5.6.1, the number of flash ROM write times can be monitored.) (If this error has occurred in a proper using method, writing is enabled by resetting the error, switching power OFF, then ON, or resetting the PLC CPU.) |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--------------------------------|-----------------------------------|---|---|--|
| I/F errors | 806 | Dedicated instruction I/F error | Mismatching occurs between the PLC CPU and QD75. | At start: The system will not operate. |
| Parameter setting range errors | 900 | Outside unit setting range | The set range of the basic parameter 1 "Unit setting" is outside the setting range. | The QD75 READY signal (X0) is not turned ON. |
| | 901 | Outside pulse number per rotation range | The set range of the basic parameter 1 "No. of pulses per rotation" is outside the setting range. | |
| | 902 | Outside movement amount per rotation range | The set range of the basic parameter 1 "Movement amount per rotation" is outside the setting range. | |
| | 903 | Outside unit magnification range | <ul style="list-style-type: none"> The set range of the basic parameter 1 "Unit magnification" is outside the setting range. The "Movement amount per rotation" x "Unit magnification" is more than 2147483647. | |
| | 906 | Outside bias speed range | <ul style="list-style-type: none"> The set range of the basic parameter 1 "Bias speed at start" is outside the setting range. The bias speed exceeds the speed limit. | |
| | 910 | Outside speed limit value range | <ul style="list-style-type: none"> The set range of the basic parameter 2 "Speed limit value" is outside the setting range. The value obtained by the conversion of the speed limit value with respect to the frequency exceeds the maximum output frequency of the unit. The speed limit value is smaller than the OPR speed. | When the power is turned ON or PLC READY signal (Y0) is turned from OFF to ON: QD75 READY signal (X0) is not turned ON. |
| | 911 | Outside acceleration time 0 range | The set range of the basic parameter 2 "Acceleration time 0" is outside the setting range. | At start: The system will not operate. |
| | 912 | Outside deceleration time 0 range | The set range of the basic parameter 2 "Deceleration time 0" is outside the setting range. | |
| | 920 | Backlash compensation amount error | <p>The calculation result of the following equation is smaller than 0 or larger than 65536.</p> $0 \leq \frac{\text{Pr.11} \times \text{Pr.2}}{\text{Pr.3}} \leq 65535$ | |
| 921 | Software stroke limit upper limit | <ul style="list-style-type: none"> In the unit of degree, the set value of the detailed parameter 1 "Software stroke limit upper limit value" is outside the setting range. In a unit other than degree, the software stroke limit upper limit value is smaller than the software stroke limit lower limit value. | The QD75 READY signal (X0) is not turned ON. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|-------------------------------|------------|------------|------------|---|---|---------------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| — | — | — | — | — | — | A trouble occurs. Repair. |
| 0 | 150 | 300 | 450 | 0, 1, 2, 3 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 2 3 | 152 153 | 302 303 | 452 453 | 1 to 200000000 | | |
| 4 5 | 154 155 | 304 305 | 454 455 | 1 to 200000000 | | |
| 1 | 151 | 301 | 451 | 1,10,100,1000 | <ul style="list-style-type: none"> • After setting the "AL x AM" is not less than 2147483647, turn the PLC READY signal [Y0] from OFF to ON. • After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 6 7 | 156 157 | 306 307 | 456 457 | 0 [PLS/s] 0 [mm/min or others] | <ul style="list-style-type: none"> • Set the bias speed to not more than "0". • After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 10 11 | 160 161 | 310 311 | 460 461 | <Speed limit value> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | <ul style="list-style-type: none"> • Set a value which is not less than the home position return (OPR) speed. • After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 12 13 | 162 163 | 312 313 | 462 463 | 1 to 8388608 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 14 15 | 164 165 | 314 315 | 464 465 | 1 to 8388608 | | |
| 17 | 167 | 317 | 467 | $0 \leq \frac{\text{Pr.11} \times \text{Pr.2}}{\text{Pr.3}} \leq 65535$ | <p>Correct the parameters.</p> <ul style="list-style-type: none"> • " Pr.2 No. of pulses per rotation", • " Pr.3 Movement amount per pulse" and • " Pr.11 Backlash compensation amount" <p>(Refer to Section 5.2.3)</p> | |
| 18 19 | 168 169 | 318 319 | 468 469 | <ul style="list-style-type: none"> • [mm] [inch] [PLS] -2147483648 to 2147483647 • [degree] 0 to 35999999 | <ul style="list-style-type: none"> • Set the value inside the setting range. • In a unit other than degree, set the setting so that the lower limit value is smaller than the upper limit value. | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence | |
|--------------------------------|-----------------------------------|---|--|--|--|
| Parameter setting range errors | 922 | Software stroke limit under lower limit | <ul style="list-style-type: none"> In case unit is "degree", the set range of the detailed parameter 1 "Software stroke limit lower limit value" is outside the setting range. In case unit is different than "degree", the software stroke limit upper limit value is smaller than the software stroke limit lower limit value. | The QD75 READY signal (X0) is not turned ON. | |
| | 923 | Software stroke limit selection error | The set range of the detailed parameter 1 "Software stroke limit selection" is outside the setting range. | | |
| | 924 | Software stroke limit valid/invalid setting error | The set range of the detailed parameter 1 "Software stroke limit valid/invalid setting" is outside the setting range. | | |
| | 925 | Command in-position width error | The set range of the detailed parameter 1 "Command in-position width" is outside the setting range. | | |
| | 926 | Illegal torque limit setting value error | The set range of the detailed parameter 1 "Torque limit setting value" is outside the setting range. | | |
| | 927 | M code ON timing error | The set range of the detailed parameter 1 "M code ON signal output timing" is outside the setting range. | | |
| | 928 | Speed switching mode error | The set range of the detailed parameter 1 "Speed switching mode" is outside the setting range. | | |
| | 929 | Interpolation speed designation method error | The set range of the detailed parameter 1 "Interpolation speed designation method" is outside the setting range. | | |
| | 930 | Current value update request error | The set range of the detailed parameter 1 "Current feed value during speed control" is outside the setting range. | | |
| | 932 | Manual pulse generator input mode error | The set range of the detailed parameter 1 "Manual pulse generator input selection" is outside the setting range. | | |
| | 935 | Speed-position function selection error | The detailed parameter 1 "speed-position function selection" is preset to 2 and the following three conditions are not satisfied: 1) Unit is "degree". 2) Software stroke limits are invalid. 3) Update current feed value. | | |
| | 950 | Acceleration time 1 setting error | The set range of the detailed parameter 2 "Acceleration time 1" is outside the setting range. | At start: The system will not operate. | |
| | 951 | Acceleration time 2 setting error | The set range of the detailed parameter 2 "Acceleration time 2" is outside the setting range. | During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 sudden stop selection (stop group 3). | |
| | 952 | Acceleration time 3 setting error | The set range of the detailed parameter 2 "Acceleration time 3" is outside the setting range. | | |
| 953 | Deceleration time 1 setting error | The set range of the detailed parameter 2 "Deceleration time 1" is outside the setting range. | (Note that the deceleration stop only occurs during the manual pulse generator operation.) | | |

| | | Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|----------|------------|-------------------------------|------------|--|--|---|--------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| 20 21 | 170 171 | 320 321 | 470 471 | • [mm] [inch] [PLS] -2147483648 to 2147483647 • [degree] 0 to 35999999 | | <ul style="list-style-type: none"> • In case unit is "degree" set the value inside the setting range. • In case unit is different than "degree", set so that the lower limit value is smaller than the upper limit value. | |
| 22 | 172 | 322 | 472 | 0, 1 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | | |
| 23 | 173 | 323 | 473 | 0, 1 | | | |
| 24 25 | 174 175 | 324 325 | 474 475 | 1 to 2147483647 | | | |
| 26 | 176 | 326 | 476 | 1 to 500 | | | |
| 27 | 177 | 327 | 477 | 0, 1 | | | |
| 28 | 178 | 328 | 478 | 0, 1 | | | |
| 29 | 179 | 329 | 479 | 0, 1 | | | |
| 30 | 180 | 330 | 480 | 0, 1, 2 | | | |
| 33 | — | — | — | 0, 1, 2, 3 | | | |
| 34 | 184 | 334 | 484 | 0, 2 | | Speed-position switching control (ABS mode) should satisfy the conditions 1) to 3) given on the left. When speed-position switching control (ABS mode) is not used, set 0 to speed-position function selection and turn the PLC READY signal (Y0) from OFF to ON. | |
| 36 37 | 186 187 | 336 337 | 486 487 | 1 to 8388608 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | | |
| 38 39 | 188 189 | 338 339 | 488 489 | 1 to 8388608 | | | |
| 40 41 | 190 191 | 340 341 | 490 491 | 1 to 8388608 | | | |
| 42 43 | 192 193 | 342 343 | 492 493 | 1 to 8388608 | | | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--------------------------------|------------|--|---|--|
| Parameter setting range errors | 954 | Deceleration time 2 setting error | The set range of the detailed parameter 2 "Deceleration time 2" is outside the setting range. | At start: The system will not operate. During operation: The system stops with the setting (deceleration stop/sudden stop) of the detailed parameter 2 Sudden stop selection (stop group 3). (Note that the deceleration stop only occurs during the manual pulse generator operation.) |
| | 955 | Deceleration time 3 setting error | The set range of the detailed parameter 2 "Deceleration time 3" is outside the setting range. | |
| | 956 | JOG speed limit value error | <ul style="list-style-type: none"> The set range of the detailed parameter 2 "JOG speed limit value" is outside the setting range. The set range of the detailed parameter 2 "JOG speed limit value" exceeds the speed limit. | |
| | 957 | JOG acceleration time selection setting error | The set range of the detailed parameter 2 "JOG acceleration time selection setting" is outside the setting range. | |
| | 958 | JOG deceleration time selection setting error | The set range of the detailed parameter 2 "JOG deceleration time selection setting" is outside the setting range. | |
| | 959 | Acceleration/ deceleration process selection setting error | The set range of the detailed parameter 2 "Acceleration/deceleration process selection setting" is outside the setting range. | |
| | 960 | S-pattern ratio setting error | The set range of the detailed parameter 2 "S-pattern ratio" is outside the setting range. | |
| | 961 | Illegal sudden stop deceleration time | The set range of the detailed parameter 2 "Sudden stop deceleration time" is outside the setting range. | |
| | 962 | Stop group 1 sudden stop selection error | The set range of the detailed parameter 2 "Stop group 1 sudden stop selection" is outside the setting range. | |
| | 963 | Stop group 2 sudden stop selection error | The set range of the detailed parameter 2 "Stop group 2 sudden stop selection" is outside the setting range. | |
| | 964 | Stop group 3 sudden stop selection error | The set range of the detailed parameter 2 "Stop group 3 sudden stop selection" is outside the setting range. | |
| | 966 | Outside allowance circular interpolation error width | The set range of the detailed parameter 2 "Allowance circular interpolation error width" is outside the setting range. | |
| | 967 | External command function selection error | The set range of the detailed parameter 2 "External command function selection" is outside the setting range. | |
| | 970 | Restart allowable range error | The set range of the detailed parameter 2 "Restart allowable value setting range of the servo ON to OFF" is outside the setting range. | |

| | | Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|----------|------------|-------------------------------|------------|--|---|---|--------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| 44 45 | 194 195 | 344 345 | 494 495 | | 1 to 8388608 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 46 47 | 196 197 | 346 347 | 496 497 | | 1 to 8388608 | | |
| 48 49 | 198 199 | 348 349 | 498 499 | | 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others] | <ul style="list-style-type: none"> • After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. • Change the setting into the speed limit value or below. | |
| 50 | 200 | 350 | 500 | | 0, 1, 2, 3 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. | |
| 51 | 201 | 351 | 501 | | 0, 1, 2, 3 | | |
| 52 | 202 | 352 | 502 | | 0, 1 | | |
| 53 | 203 | 353 | 503 | | 1 to 100 | | |
| 54 55 | 204 205 | 354 355 | 504 505 | | 1 to 8388608 | | |
| 56 | 206 | 356 | 506 | | 0, 1 | | |
| 57 | 207 | 357 | 507 | | 0, 1 | | |
| 58 | 208 | 358 | 508 | | 0, 1 | | |
| 60 61 | 210 211 | 360 361 | 510 511 | | 0 to 10000 | | |
| 62 | 212 | 362 | 512 | | 0, 1, 2, 3 | | |
| 64 65 | 214 215 | 364 365 | 514 515 | | 0 to 163840 | | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--------------------------------|------------|---|---|--|
| Parameter setting range errors | 980 | Home position return (OPR) method error | The set range of the home position return (OPR) basic parameter "Home position return (OPR) method" is outside the setting range. | The QD75 READY signal (X0) is not turned ON. |
| | 981 | Home position return (OPR) direction error | The set range of the home position return (OPR) basic parameter "Home position return (OPR) direction" is outside the setting range. | |
| | 982 | Home position (OP) address setting error | The set range of the home position return (OPR) basic parameter "Home position (OP) address" is outside the setting range. | |
| | 983 | Home position return (OPR) speed error | <ul style="list-style-type: none"> The set range of the home position return (OPR) basic parameter "Home position return (OPR) speed" is outside the setting range. The set range of the home position return (OPR) basic parameter "Home position return (OPR) speed" is smaller than the bias speed at start. | |
| | 984 | Creep speed error | <ul style="list-style-type: none"> The set range of the home position return (OPR) basic parameter "Creep speed" is outside the setting range. The set range of the home position return (OPR) basic parameter "Creep speed" is larger than the home position return (OPR) speed. The set range of the home position return (OPR) basic parameter "Creep speed" is smaller than the bias speed at start. | |
| | 985 | Home position return (OPR) retry error | The set range of the home position return (OPR) basic parameter "Home position return (OPR) retry" is outside the setting range. | |
| | 990 | Home position return (OPR) error | The set range of the home position return (OPR) detailed parameter "Home position return (OPR)" is outside the setting range. | |
| | 991 | Setting for the movement amount after near-point dog ON error | The set range of the home position return (OPR) detailed parameter "Setting for the movement amount after near-point dog ON" is outside the setting range. | |
| | 992 | Home position return (OPR) acceleration time selection error | The set range of the home position return (OPR) detailed parameter "Home position return (OPR) acceleration time selection" is outside the setting range. | |
| | 993 | Home position return (OPR) deceleration time selection error | The set range of the home position return (OPR) detailed parameter "Home position return (OPR) deceleration time selection" is outside the setting range. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|-------------------------------|------------|------------|------------|---|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 70 | 220 | 370 | 520 | | 0, 1, 4, 5, 6 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. |
| 71 | 221 | 371 | 521 | | 0, 1 | |
| 72 73 | 222 223 | 372 373 | 522 523 | <ul style="list-style-type: none"> • [mm] [inch] [PLS] -2147483648 to 2147483647 • [degree] 0 to 35999999 | | |
| 74 75 | 224 225 | 374 375 | 524 525 | <p><Home position return (OPR) speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others]</p> | <ul style="list-style-type: none"> • Set the value inside the setting range. • Set the speed to the bias speed at start or higher. (Refer to Section 5.2.5) | |
| 76 77 | 226 227 | 376 377 | 526 527 | <p><Creep speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or others]</p> | <ul style="list-style-type: none"> • Set the value inside the setting range. • Set the speed to that below the home position return (OPR) speed. • Set the value to the bias speed at start or higher. (Refer to Section 5.2.5) | |
| 78 | 228 | 378 | 528 | | 0, 1 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. |
| 79 | 229 | 379 | 529 | | 0 to 65535 | |
| 80 81 | 230 231 | 380 381 | 530 531 | | 0 to 2147483647 | |
| 82 | 232 | 382 | 532 | | 0, 1, 2, 3 | |
| 83 | 233 | 383 | 533 | | 0, 1, 2, 3 | |

| Classification of errors | Error code | Error name | Error | Operation status at error occurrence |
|--------------------------------|------------|---|---|--|
| Parameter setting range errors | 995 | Home position return (OPR) torque limit value error | <ul style="list-style-type: none"> The set range of the home position return (OPR) detailed parameter "Home position return (OPR) torque limit value" is outside the setting range. The home position return (OPR) detailed parameter "Home position return (OPR) torque limit value" has exceeded the detailed parameter 1 "Torque limit setting value". | The QD75 READY signal (X0) is not turned ON. |
| | 997 | Speed designation during home position (OP) shift error | The set range of the home position return (OPR) detailed parameter "Speed designation during home position (OP) shift" is outside the setting range. | |
| Encoder errors | 1201 | Home position return (OPR) data incorrect | The backup data for absolute position restoration is illegal. | |
| | 1203 | Encoder error 1 | <p>The change amount of the encoder current value during operation is shown below.</p> <p>"Change amount of the encoder current value/ 3.5 [ms] > Motor 180° "</p> <p>Check any time (both servo ON/OFF) after the servo amplifier is turned ON.</p> | Continue the operation. |
| | 1204 | Encoder error 2 | <p>The following equation is established during operation.</p> <p>"Encoder current value (encoder raw data) [PLS] ≠ Feedback current value (data inside servo amplifier) [PLS] (number of encoder significant bits)"</p> <p>Check any time (both servo ON/OFF) after the servo amplifier is turned ON.</p> | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|-------------------------------|--------|--------|--------|--|---|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 86 | 236 | 386 | 536 | | 1 to 300 | After setting the value inside the setting range, turn the PLC READY signal [Y0] from OFF to ON. |
| 88 | 238 | 388 | 538 | | 0, 1 | |
| — | — | — | — | | — | Execute the home position return (OPR). |
| — | — | — | — | | — | <ul style="list-style-type: none"> • Check the servomotor and encoder cable. • Take measures against noise. |
| — | — | — | — | | — | <ul style="list-style-type: none"> • Check the servomotor and encoder cable. • Take measures against noise. • Check whether the rotation direction (Pr.107 Rotation direction selection) is set "0 → 1" or "1 → 0" by PLC program or GX-configurator-QP. (Refer to Section 14.5 "PFWRT" precaution (6).) |

15.2.2 MR-H-BN detection error

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | | |
|--------------------------|------------|----------------------------------|---|---|---|--------------------------------------|--|
| Servo amplifier errors | 2010 | 10 | Under voltage | The power supply voltage to drop. | The power supply voltage is low. | | |
| | | | | | For MR-H700BN or less: There was an instantaneous control power failure of 15ms or longer. | | |
| | | | | | For MR-H11KBN or less: There was an instantaneous control power failure of 10ms or longer. | | |
| | | | | | Shortage of power supply capacity caused the power supply voltage to drop at start, etc. . | | |
| | | | | | Power was restored after the bus voltage had dropped to 200VDC. (Main circuit power switched on within 5s after it had switched off.) | | |
| | | | | | | Faulty parts in the servo amplifier. | |
| | 2012 | 12 | Memory error 1 | ROM or RAM memory error. | | | |
| | 2013 | 13 | Clock error | Printed circuit board fault. | | | |
| | 2014 | 14 | Watchdog error | CPU parts of the circuit fault. | | Faulty parts in the servo amplifier. | |
| | 2015 | 15 | Memory error 2 | EEP-ROM error. | | | |
| | 2016 | 16 | Encoder error 1 | Communication error occurred between encoder and servo amplifier. | The encoder connector is disconnected. | | |
| | | | | | Fault in the encoder. | | |
| | | | | | Encoder cable fault. (Wire breakage or shot) | | |
| | | | | | Improper motor was connected with servo amplifier. | | |
| | 2017 | 17 | Board error 2 | CPU or parts of the circuit fault. | | Faulty parts in the servo amplifier. | |
| 2019 | 19 | Memory error 3 | Flash memory error. | | | | |
| 2020 | 1A | Servomotor combination error | Servomotor and servo amplifier combination | | When using servomotor, improper motor was connected with servo amplifier. | | |
| 2020 | 20 | Encoder error 2 | Communication error occurred between encoder and servo amplifier. | The encoder connector is disconnected. | | | |
| | | | | Fault in the encoder. | | | |
| | | | | Encoder cable fault. (Wire breakage or shot) | | | |
| 2024 | 24 | Motor output side ground fault | Servomotor output (U, V, W phase) ground fault. | Power input cable and servomotor output cable are making contact at the main circuit terminal block(TE1). | | | |
| | | | | Servomotor power cable insulation deteriorated. | | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|---|--------------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Reconsider the power supply voltage. |
| | — | — | — | — | Alarm (A.10) occurs if interface unit is changed. | Change the servo amplifier. |
| | — | — | — | — | Alarm (any of A.12 to 15) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables. | Change the servo amplifier. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | | Use correct combination. |
| | — | — | — | — | Alarm (A.17, A.19) occurs if interface unit is changed. | Change the servo amplifier. |
| | — | — | — | — | | Use correct combination. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the cable. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|------------|----------------------------------|---|--|---|
| Servo amplifier errors | 2025 | 25 | Absolute position lost | Absolute position data in error. | Voltage low in the super capacitor in the encoder. |
| | | | | | Battery voltage low. |
| | | | | | Battery cable or battery fault. |
| | | | | Power was switched on for the first time in the absolute position detection system. | Super capacitor of the absolute position encoder is not charged. |
| | 2030 | 30 | Regenerative error | Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded. | Parameter " [Pr.102] Regenerative brake resistor" setting value error. |
| | | | | | Built-in regenerative brake resistor or regenerative brake option is not connected. |
| | | | | | High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. |
| | | | | | Power supply voltage is abnormal. (260VAC or more) |
| | | | | Regenerative brake option faulty. | |
| | | | | Regenerative transistor fault | Regenerative transistor faulty. |
| | | | | Built-in regenerative brake resistor or regenerative brake option faulty. | |
| | | | Cooling fan stopped. | Unusual overheat due to cooling fan stop. | |
| 2031 | 31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | Small acceleration/deceleration time constant caused overshoot to be large. | |
| | | | | Servo system is instable to cause overshoot. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|------------------------------------|----------|----------|----------|---|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | After alarm has occurred, hold power on for a few minutes, and switch it off once, then on again. Make OPR again. |
| | | | | | | Change the battery. Make OPR again. |
| | — | — | — | — | | After alarm has occurred, hold power on for a few minutes, and switch it off once, then on again. Make OPR again. |
| | Regenerative resistor brake option | | | | | Set correctly. |
| | 30102 | 30202 | 30203 | 30204 | | |
| | — | — | — | — | | Connect correctly |
| | — | — | — | — | Call the status display and check the regenerative load ratio. | <ul style="list-style-type: none"> • Reduce the frequency of positioning. • Use the regenerative brake option of larger capacity. • Reduce the load. |
| | — | — | — | — | | Review power supply. |
| | | | | | | Change the regenerative brake option. |
| | — | — | — | — | <ul style="list-style-type: none"> • The regenerative brake option has overheated abnormally. • The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option. | Change the servo amplifier. |
| | | | | | | Change the servo amplifier or regenerative brake option. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change the servo amplifier or cooling fan. • Reduce ambient temperature. |
| | Load inertia ratio | | | | | Increase acceleration/deceleration time constant. |
| | 30112 | 30212 | 30312 | 30412 | | |
| | Acceleration time | | | | | |
| | 12, 13 | 162, 163 | 312, 313 | 462, 463 | | |
| | 36, 37 | 186, 187 | 336, 337 | 486, 487 | | |
| | 38, 39 | 188, 189 | 338, 389 | 488, 489 | | |
| | 40, 41 | 190, 191 | 340, 341 | 490, 491 | | |
| | Deceleration time | | | | | |
| | 14, 15 | 164, 165 | 314, 315 | 464, 465 | | |
| | 42, 43 | 192, 193 | 342, 343 | 492, 493 | | |
| | 44, 45 | 194, 195 | 344, 345 | 494, 495 | | |
| | 46, 47 | 196, 197 | 346, 347 | 496, 497 | | <ul style="list-style-type: none"> • Reset servo gain to proper value. • If servo gain cannot be set to proper value: <ol style="list-style-type: none"> (1) Reduce " [Pr.112] Load inertia moment ratio"; or (2) Reexamine acceleration/deceleration time constant. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|---|------------|----------------------------------|-------------|--|---|
| Servo amplifier errors | 2031 | 31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | Parameter Pr.103 to Pr.105 setting error. |
| | | | | | Fault in the encoder. |
| | 2032 | 32 | Overcurrent | Current that flew is higher than the permissible current of the servo amplifier. | Output U, V, W phases of the servo amplifier were connected with each other. |
| | | | | | Transistor of the servo amplifier damaged. |
| | | | | | Short circuit in the servo amplifier output U, V, W phases. |
| | | | | | Noise entered the overcurrent detection circuit. |
| | 2033 | 33 | Overvoltage | Converter bus voltage exceeded 400VDC. | Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected. |
| | | | | | Though the regenerative brake option is used, the DRU parameter " Pr.102 Regenerative brake resistor" setting value is "0□00 (not used)". |
| | | | | | Regenerative brake option is open or disconnected. |
| | | | | | Regenerative transistor faulty. |
| | | | | | Wire breakage of built-in regenerative brake resistor or regenerative brake option. |
| | | | | | Capacity of built-in regenerative brake resistor or regenerative brake option is insufficient. |
| | | | | | Power supply voltage high. |
| | 2034 | 34 | CRC error | SSCNET cable communication fault | The SSCNET cable is disconnected. |
| | | | | | Bus cable fault. |
| | | | | | Noise has entered the bus cable. |
| The terminal connector is disconnected. | | | | | |
| The same No. exists in the servo amplifier side axis setting. | | | | | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|--------|--------|--------|--|---|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Motor type | | | | | | Set correctly ([Pr.103] to [Pr.105]). |
| 30102 | 30202 | 30302 | 30402 | | | |
| Motor capacity | | | | | | |
| 30103 | 30203 | 30303 | 30403 | | | |
| Motor rotation speed | | | | | | |
| 30104 | 30204 | 30304 | 30404 | | | |
| — | — | — | — | | Change servomotor. | |
| — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. | |
| — | — | — | — | Alarm (A.32) occurs if power is switched on after disconnection of the U, V, W phase power cables. | Change the servo amplifier. | |
| — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. | |
| — | — | — | — | | Take noise suppression measures. | |
| — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. | |
| Regenerative brake option | | | | | | Set correctly. |
| 30102 | 30202 | 30302 | 30402 | | | |
| — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. | |
| — | — | — | — | | Change the servo amplifier. | |
| — | — | — | — | | <ul style="list-style-type: none"> • For wire breakage of built-in regenerative brake resistor, change the servo amplifier. • For wire breakage of regenerative brake option, change regenerative brake option. | |
| — | — | — | — | | Add regenerative brake option or increase capacity. | |
| — | — | — | — | | Review the power supply. | |
| — | — | — | — | | Connect correctly. | |
| — | — | — | — | | Change the SSCNET cable. | |
| — | — | — | — | | Take measures against noise. | |
| — | — | — | — | | Connect terminal connector. | |
| — | — | — | — | | Set correctly. | |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|---------------------------------|--|---|--|
| Servo amplifier errors | 2035 | 35 | Command pulse frequency error | Input frequency of too high. | Command given is greater than the maximum speed of the servomotor. Noise has entered the SSCNET cable. Fault in the QD75M. | |
| | 2036 | 36 | Transfer error | SSCNET cable or printed board is faulty. | The SSCNET cable is disconnected. The SSCNET cable fault. Printed circuit board (H-C10) fault. The terminal connector is disconnected. | |
| | 2037 | 37 | Parameter error | Parameter setting is wrong. | Servo amplifier fault caused the parameter setting to be rewritten. Parameter data mis-setting by QD75M. | |
| | 2042 | 42 | Feedback error | The motor encoder signal is abnormal. | The motor encoder fault. | |
| | 2045 | 45 | Main circuit device over heated | Main circuit device overheat | Air cooling fan of servo amplifier stops. The power supply was turned on and off continuously by overloaded status. Servo amplifier abnormal. | |
| | 2046 | 46 | Servomotor heated | Servo motor temperature rise actuated the thermal protector. | Servo motor ambient temperature exceeded the operating value of 40°C. Servomotor overloaded. Thermal protector in encoder is faulty. | |
| | 2050 | 50 | Overload 1 | Load exceeded overload protection characteristic of servo amplifier. Load ratio 300%: 2.5s or more Load ratio 200%: 100s or more | The current exceeded the continuous output current of the servo amplifier. The servo system is unstable, causing hunting. Collision with the machine. Servo motor miswiring servo amplifier terminals U, V, W phase do not mach motor terminals U, V, W phase. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|-------------|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Review operation program. Take measures against noise. Change QD75M. |
| | — | — | — | — | | Connect the connector of the SSCNET cable. Change the SSCNET cable. Change the servo amplifier. Connect terminal connector. |
| | — | — | — | — | | Change the servo amplifier. Change the parameter value to within the setting range. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | <ul style="list-style-type: none"> Change the servo amplifier or cooling fan. Reduce ambient temperature. Review operation method. Change the servo amplifier or cooling fan. |
| | — | — | — | — | | Review environment so that ambient temperature is 0 to 40°C. <ul style="list-style-type: none"> Reduce load. Review operation pattern. Use servomotor that provides larger output. Change the servomotor. |
| | — | — | — | — | | <ul style="list-style-type: none"> Reduce load. Review operation pattern. Use servomotor that provides larger output. |
| | Auto tuning | | | | | <ul style="list-style-type: none"> Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". Change " [Pr.109] Servo response" setting. Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| | 30108 | 30208 | 30308 | 30408 | | |
| | Servo response | | | | | |
| | 30109 | 30209 | 30309 | 30409 | | |
| | Input signal logic selection | | | | | <ul style="list-style-type: none"> Review operation pattern. Install limit switches. |
| | 31 | 181 | 331 | 481 | | |
| | — | — | — | — | | Connect correctly. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|------------|----------------------------------|-----------------|--|---|
| Servo amplifier errors | 2050 | 50 | Overload 1 | Load exceeded overload protection characteristic of servo amplifier. Load ratio 300%: 2.5s or more Load ratio 200%: 100s or more | The motor encoder fault. |
| | 2051 | 51 | Overload 2 | Machine collision or the like caused max. output current to flow successively for several seconds. Servomotor locked: 1s or more | Collision with the machine. |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase do not match motor terminals U, V, W phase. |
| | | | | | The servo system is unstable, causing hunting. |
| | | | | | The bus voltage of the unit has decreased. |
| | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value(Initial value: 80kPLS) of the parameter <u>Pr.131</u> . | Encoder faulty. |
| | | | | | Acceleration/deceleration time constant too small. |
| | | | | | Torque limit value too small. |
| | | | | | Start disabled due to insufficient torque caused drop in power supply voltage. |
| | | | | | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|---|---|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| — | — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change servomotor. |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | — | | Connect correctly. |
| Auto tuning | | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | | |
| Servo response | | | | | | |
| 30109 | 30209 | 30309 | 30409 | | | |
| — | — | — | — | — | | Change the servo amplifier. |
| — | — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change the servomotor. |
| Acceleration time | | | | | | Increase the acceleration/deceleration time constant. |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |
| Torque limit value | | | | | | Increase the torque limit value. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| — | — | — | — | — | | <ul style="list-style-type: none"> • Review the power supply capacity. • Use servomotor which provides larger output. |
| Positioning gain 1 | | | | | | Increase set value and adjust to ensure proper operation. |
| 30113 | 30213 | 30313 | 30413 | | | |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|---|----------------------------------|---|--|---|--|
| Servo amplifier errors | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (Initial value: 8 rotation) of the parameter Pr.131 . | Servo motor shaft was rotated by external force. | |
| | | | | | Collision with the machine | |
| | | | | | The motor encoder fault. | |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase don't mach motor terminals U, V, W phase. | |
| | The bus voltage of the unit due to the breakdown. | | | | | |
| 2086 | 8E | Serial communication error | The fault has occurred in communication between the servo amplifier and communication devices (e.g. personal computer). | The communication cable fault. (Wire breakage or shot) | | |
| | | | | The communication devices (e.g. personal computer) fault. | | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|--------|--------|--------|--|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Torque limit value | | | | | | <ul style="list-style-type: none"> • When torque is limited, increase the limit value. • Reduce load. • Use servomotor that provides larger output. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | Change the servomotor. | |
| — | — | — | — | | Connect correctly. | |
| — | — | — | — | | Change the servo amplifier. | |
| — | — | — | — | | Repair or change the cable. | |
| — | — | — | — | | Change the communication devices (e.g. personal computer). | |

15.2.3 MR-J2-B detection error

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|------------|----------------------------------|---|---|---|
| Servo amplifier errors | 2010 | 10 | Under voltage | <ul style="list-style-type: none"> •For MR-J2-□B: The power supply voltage dropped to 160VAC or less. • For MR-J2-□B1: The power supply voltage dropped to 83VAC or less. | The power supply voltage is low. |
| | | | | | There was an instantaneous control power failure of 15ms or longer. |
| | | | | | Shortage of power supply capacity caused the power supply voltage to drop at start, etc. . |
| | | | | | Power was restored after the bus voltage had dropped to 200VDC. (Main circuit power switched on within 5s after it had switched off.) |
| | | | | | Faulty parts in the servo amplifier. |
| | 2011 | 11 | Board error 1 | Printed circuit board fault. | Faulty parts in the servo amplifier. |
| | 2012 | 12 | Memory error 1 | RAM memory error. | |
| | 2013 | 13 | Clock error | Printed circuit board fault. | |
| | 2015 | 15 | Memory error 2 | EEP-ROM error | |
| | 2016 | 16 | Encoder error 1 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CN2) is disconnected. |
| | | | | | Fault in the encoder. |
| | | | | | Encoder cable fault. (Wire breakage or shot) |
| | | | | | Improper motor was connected with servo amplifier. |
| | 2017 | 17 | Board error 2 | CPU or parts of the circuit fault. | Faulty parts in the servo amplifier. |
| | 2018 | 18 | Board error 3 | ROM memory error. | |
| 2020 | 20 | Encoder error 2 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CN2) is disconnected. | |
| | | | | Fault in the encoder. | |
| | | | | Encoder cable fault. (Wire breakage or shot) | |
| 2024 | 24 | Motor output side ground fault | Servomotor output (U, V, W phase) of the servo amplifier ground fault. | Servo amplifier output (U, V, W phase) ground fault. | |
| 2025 | 25 | Absolute position lost | Absolute position data in error. | Voltage low in the super capacitor in the encoder. | |
| | | | | Battery voltage low. | |
| | | | | Battery cable or battery fault. | |
| | | | Power was switched on for the first time in the absolute position detection system. | Super capacitor of the absolute position encoder is not charged. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Reconsider the power supply voltage. |
| | — | — | — | — | Alarm (A.10) occurs if power is switched on after disconnection of the CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | Alarm (any of A.12 to 13, 15) occurs if power is switched on after disconnection of CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | | Connect correctly. |
| | | | | | Change the servomotor. | |
| | | | | | Repair or change the cable. | |
| | | | | | Use correct combination. | |
| | — | — | — | — | Alarm (A.17, A.18) occurs if power is switched on after disconnection of the CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | | Connect correctly. |
| | | | | | Change the servomotor. | |
| | | | | | Repair or change the cable. | |
| | — | — | — | — | | Change the cable. |
| | — | — | — | — | | After leaving the alarm occurring for few minutes, switch power off, then on again. Always make OPR setting again. |
| | | | | | Change the battery unit. Always make OPR setting again. | |
| | — | — | — | — | | After alarm has occurred, hold power on for a few minutes, and switch it off once, then on again. Always make OPR setting again. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|--|--|---|--|
| Servo amplifier errors | 2030 | 30 | Regenerative error | Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded. | Parameter " Pr.102 Regenerative brake resistor" setting value error. | |
| | | | | | Built-in regenerative brake resistor or regenerative brake option is not connected. | |
| | | | | | High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. | |
| | | | | | Power supply voltage is abnormal. MR-J2-B: 260VAC or more MR-J2-B1: 135VAC or more | |
| | | | | | Regenerative brake option faulty. | |
| | | | | Regenerative transistor fault | Regenerative transistor faulty. | |
| | | | | | Built-in regenerative brake resistor or regenerative brake option faulty. | |
| | 2031 | 31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | Small acceleration/deceleration time constant caused overshoot to be large. | |
| | | | | | Servo system is instable to cause overshoot. | |
| | | | | | Fault in the encoder. | |
| 2032 | 32 | Overcurrent | Current that flew is higher than the permissible current of the servo amplifier. | Output phases U, V, W phase of the servo amplifier were connected with each other. | | |
| | | | | Transistor of the servo amplifier damaged. | | |
| | | | | Short circuit in the servo amplifier out put phase U, V, W phase. | | |
| | | | | Noise entered the overcurrent detection circuit. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|------------------------------------|----------|----------|----------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | Regenerative resistor brake option | | | | | Set correctly. |
| | 30102 | 30202 | 30203 | 30204 | | |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | Call the status display and check the regenerative load ratio. | <ul style="list-style-type: none"> • Reduce the frequency of positioning. • Use the regenerative brake option of larger capacity. • Reduce the load. |
| | — | — | — | — | | Review power supply. |
| | | | | | | Change the regenerative brake option. |
| | — | — | — | — | <ul style="list-style-type: none"> • The regenerative brake option has overheated abnormally. • The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option. | Change the servo amplifier. |
| | | | | | | Change the servo amplifier or regenerative brake option. |
| | Load inertia ratio | | | | | Increase acceleration/deceleration time constant. |
| | 30112 | 30212 | 30312 | 30412 | | |
| | Acceleration time | | | | | |
| | 12, 13 | 162, 163 | 312, 313 | 462, 463 | | |
| | 36, 37 | 186, 187 | 336, 337 | 486, 487 | | |
| | 38, 39 | 188, 189 | 338, 339 | 488, 489 | | |
| | 40, 41 | 190, 191 | 340, 341 | 490, 491 | | |
| | Deceleration time | | | | | |
| | 14, 15 | 164, 165 | 314, 315 | 464, 465 | | |
| | 42, 43 | 192, 193 | 342, 343 | 492, 493 | | |
| | 44, 45 | 194, 195 | 344, 345 | 494, 495 | | |
| | 46, 47 | 196, 197 | 346, 347 | 496, 497 | | |
| | — | — | — | — | | Change servomotor. |
| | — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. |
| | — | — | — | — | Alarm (A.32) occurs if power is switched on after disconnection of the U, V, W phase power cables. | Change the servo amplifier. |
| | — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. |
| | | | | | | Take noise suppression measures. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | | |
|--------------------------|------------|----------------------------------|-------------------------------|--|--|---|--|
| Servo amplifier errors | 2033 | 33 | Overvoltage | Converter bus voltage exceeded 400VDC. | Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected. | | |
| | | | | | Though the regenerative brake option is used, the DRU parameter "Pr.102 Regenerative brake resistor" setting value is "0□00 (not used)". | | |
| | | | | | Regenerative brake option is open or disconnected. | | |
| | | | | | Regenerative transistor faulty. | | |
| | | | | | Wire breakage of built-in regenerative brake resistor or regenerative brake option | | |
| | | | | | Capacity of built-in regenerative brake resistor or regenerative brake option is insufficient. | | |
| | | | | | | Power supply voltage high. | |
| | 2034 | 34 | CRC error | SSCNET cable communication fault | | The SSCNET cable is disconnected. | |
| | | | | | | SSCNET cable fault. | |
| | | | | | | Noise has entered the SSCNET cable. | |
| | | | | | | The terminal connector is disconnected. | |
| | | | | | | The same No. exists in the servo amplifier side axis setting. | |
| | 2035 | 35 | Command pulse frequency error | Input frequency of too high. | | Command given is greater than the maximum speed of the servomotor. | |
| | | | | | | Noise has entered the SSCNET cable. | |
| | | | | | | Fault in the QD75M. | |
| | 2036 | 36 | Transfer error | SSCNET cable or printed board is faulty. | | The SSCNET cable is disconnected. | |
| | | | | | | The SSCNET cable fault. | |
| | | | | | | Printed circuit board fault. | |
| | | | | | | The terminal connector is disconnected. | |
| | 2037 | 37 | Parameter error | Parameter setting is wrong. | | Servo amplifier fault caused the parameter setting to be rewritten. | |
| | | | | | | Parameter data mis-setting by QD75M. | |
| | 2046 | 46 | Servomotor heated | Servo motor temperature rise actuated the thermal protector. | | Servo motor ambient temperature exceeded the operating value of 40°C. | |
| | | | | | | Servomotor overloaded. | |
| | | | | | | Thermal protector in encoder is faulty. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|-------------|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. |
| | Regenerative brake option | | | | | Connect correctly. |
| | 30102 | 30202 | 30302 | 30402 | | |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. |
| | | | | | | Change the servo amplifier. |
| | — | — | — | — | | <ul style="list-style-type: none"> • For wire breakage of built-in regenerative brake resistor, change the servo amplifier. • For wire breakage of regenerative brake option, change regenerative brake option. |
| | | | | | | Add regenerative brake option or increase capacity. |
| | | | | | | Review the power supply. |
| | — | — | — | — | | Connect correctly. |
| | | | | | | Change the SSCNET cable. |
| | — | — | — | — | | Take measures against noise. |
| | | | | | | Connect terminal connector. |
| | | | | | | Set correctly. |
| | — | — | — | — | | Review operation program. |
| | | | | | | Take measures against noise. |
| | | | | | | Change QD75M. |
| | — | — | — | — | | Connect the connector of the SSCNET cable. |
| | | | | | | Change the SSCNET cable. |
| | | | | | | Change the servo amplifier. |
| | | | | | | Connect terminal connector. |
| | — | — | — | — | | Change the servo amplifier. |
| | | | | | | Change the parameter value to within the setting range. |
| | — | — | — | — | | Review environment so that ambient temperature is 0 to 40°C. |
| | | | | | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| | | | | | | Change the servomotor. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|-----------------|--|---|--|
| Servo amplifier errors | 2050 | 50 | Overload 1 | Load exceeded overload protection characteristic of servo amplifier. Load ratio 300%: 2.5s or more Load ratio 200%: 100s or more | The current exceeded the continuous output current of the servo amplifier. | |
| | | | | | The servo system is unstable, causing hunting. | |
| | | | | | Collision with the machine. | |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase do not match motor terminals U, V, W phase. | |
| | | | | | The motor encoder fault. | |
| | 2051 | 51 | Overload 2 | Machine collision or the like caused max. output current to flow successively for several seconds. Servomotor locked: 1s or more | Collision with the machine. | |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase don't match motor terminals U, V, W phase. | |
| | | | | | The servo system is unstable, causing hunting. | |
| | | | | | The motor encoder fault. | |
| | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (Initial value: 80kPLS) of the parameter Pr.131 . | Acceleration/deceleration time constant too small. | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|---|-------------|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| — | — | — | — | | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| Auto tuning | | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | | |
| Servo response | | | | | | |
| 30109 | 30209 | 30309 | 30409 | | | |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | | Connect correctly. |
| — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | | Change servomotor. |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | | Connect correctly. |
| Auto tuning | | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | | |
| Servo response | | | | | | |
| 30109 | 30209 | 30309 | 30409 | | | |
| — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | | Change the servomotor. |
| Acceleration time | | | | | | Increase the acceleration/deceleration time constant. |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|--|----------------------------------|---|---|--|
| Servo amplifier errors | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value of the parameter <u>Pr.131</u> . | Torque limit value too small. |
| | | | | | Start disabled due to insufficient torque caused drop in power supply voltage. |
| | | | | | The setting value for " <u>Pr.113</u> Position control gain 1" too small. |
| | | | | | Servo motor shaft was rotated by external force. |
| | | | | | Collision with the machine. |
| | | | | | The motor encoder fault. |
| | Servo motor miswiring servo amplifier terminals U, V, W do not mach motor terminals U, V, W. | | | | |
| 2086 | 8E | Serial communication error | The fault has occurred in communication between the servo amplifier and communication devices (e.g. personal computer). | The communication cable fault. (Wire breakage or shot) | |
| | | | | The communication devices (e.g. personal computer) fault. | |

| Related buffer memory address | | | | Check point | Corrective action |
|-------------------------------|--------|--------|--------|-------------|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| Torque limit value | | | | | Increase the torque limit value. |
| 26 | 176 | 326 | 476 | | |
| OPR torque limit value | | | | | |
| 86 | 236 | 386 | 536 | | |
| Torque output setting value | | | | | |
| 1552 | 1652 | 1752 | 1852 | | |
| — | — | — | — | | <ul style="list-style-type: none"> • When torque is limited, increase the limit value. • Use servomotor that provides larger output. |
| Positioning gain 1 | | | | | Increase set value and adjust to ensure proper operation. |
| 30113 | 30213 | 30313 | 30413 | | |
| Torque limit value | | | | | <ul style="list-style-type: none"> • When torque is limited, increase the limit value. • Reduce load. • Use servomotor that provides larger output. |
| 26 | 176 | 326 | 476 | | |
| OPR torque limit value | | | | | |
| 86 | 236 | 386 | 536 | | |
| Torque output setting value | | | | | |
| 1552 | 1652 | 1752 | 1852 | | |
| Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | |
| — | — | — | — | | Change the servomotor. |
| — | — | — | — | | Connect correctly. |
| — | — | — | — | | Repair or change the cable. |
| — | — | — | — | | Change the communication devices (e.g. personal computer). |

15.2.4 MR-J2S-B detection error

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--|------------|----------------------------------|---|---|---|--|
| Servo amplifier errors | 2010 | 10 | Under voltage | <ul style="list-style-type: none"> •For MR-J2S-□B: The power supply voltage dropped to 160VAC or less. • For MR-J2S-□B1: The power supply voltage dropped to 83VAC or less. | The power supply voltage is low. | |
| | | | | | There was an instantaneous control power failure of 60ms or longer. | |
| | | | | | Shortage of power supply capacity caused the power supply voltage to drop at start, etc. . | |
| | | | | | Power was restored after the bus voltage had dropped to 200VDC. (Main circuit power switched on within 5s after it had switched off.) | |
| | | | | | Faulty parts in the servo amplifier. | |
| | 2012 | 12 | Memory error 1 | RAM memory error. | | |
| | 2013 | 13 | Clock error | Printed circuit board fault. | Faulty parts in the servo amplifier. | |
| | 2015 | 15 | Memory error 2 | EEP-ROM error | | |
| | 2016 | 16 | Encoder error 1 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CN2) is disconnected. | |
| | | | | | Fault in the encoder. | |
| | | | | | Encoder cable fault. (Wire breakage or shot) | |
| | 2017 | 17 | Board error 2 | CPU or parts of the circuit fault. | Faulty parts in the servo amplifier. | |
| | 2019 | 19 | Memory error 3 | ROM memory error. | | |
| | 2020 | 1A | Servomotor combination error | Wrong combination of servo amplifier and servomotor. | Wrong combination of servo amplifier and servomotor connected. | |
| | 2020 | 20 | Encoder error 2 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CN2) is disconnected. | |
| Fault in the encoder. | | | | | | |
| Encoder cable fault. (Wire breakage or shot) | | | | | | |
| 2024 | 24 | Motor output side ground fault | Servomotor output (U, V, W phase) ground fault. | Power input wires and servomotor output wires are in contact at main circuit terminal block (TE1). | | |
| | | | | Sheathes of servomotor power cables deteriorated, resulting in ground fault. | | |
| 2025 | 25 | Absolute position lost | Absolute position data in error. | Voltage low in the super capacitor in the encoder. | | |
| | | | | Battery voltage low. | | |
| | | | | Battery cable or battery fault. | | |
| | | | Power was switched on for the first time in the absolute position detection system. | Super capacitor of the absolute position encoder is not charged. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|--|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Reconsider the power supply voltage. |
| | — | — | — | — | Alarm (A.10) occurs if power is switched on after disconnection of the CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | Alarm (any of A.12 to 13,15) occurs if power is switched on after disconnection of CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | Alarm (A.17, A.19) occurs if power is switched on after disconnection of the CN1A, CN1B and CN3 connector. | Change the servo amplifier. |
| | — | — | — | — | | Use correct combination. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | | Change the cable. |
| | — | — | — | — | | After leaving the alarm occurring for few minutes, switch power off, then on again. Always make OPR setting again. |
| | — | — | — | — | | Change the battery. Always make OPR setting again. |
| | — | — | — | — | | After leaving the alarm occurring for few minutes, switch power off, then on again. Always make OPR setting again. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--|------------|----------------------------------|--------------------|--|---|
| Servo amplifier errors | 2030 | 30 | Regenerative error | Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded. | Parameter " Pr.102 Regenerative brake resistor" setting value error. |
| | | | | | Built-in regenerative brake resistor or regenerative brake option is not connected. |
| | | | | | High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. |
| | | | | | Power supply voltage is abnormal. MR-J2S-B: 260VAC or more MR-J2S-B1: 135VAC or more |
| | | | | | Regenerative brake option faulty. |
| | | | | Regenerative transistor fault | Regenerative transistor faulty. |
| | | | | | Built-in regenerative brake resistor or regenerative brake option faulty. |
| | 2031 | 31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | Small acceleration/deceleration time constant caused overshoot to be large. |
| | | | | | Servo system is instable to cause overshoot. |
| | 2032 | 32 | Overcurrent | Current that flew is higher than the permissible current of the servo amplifier. | Fault in the encoder. |
| Output phases U, V, W phase of the servo amplifier were connected with each other. | | | | | |
| Transistor of the servo amplifier damaged. | | | | | |
| Short circuit in the servo amplifier output phase U, V, W phase. | | | | | |
| | | | | Noise entered the overcurrent detection circuit. | |

| Related buffer memory address | | | | | Check point | Corrective action |
|------------------------------------|----------|----------|----------|---|-------------|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Regenerative resistor brake option | | | | | | Set correctly. |
| 30102 | 30202 | 30302 | 30402 | | | |
| — | — | — | — | | | Connect correctly |
| — | — | — | — | Call the status display and check the regenerative load ratio. | | <ul style="list-style-type: none"> • Reduce the frequency of positioning. • Use the regenerative brake option of larger capacity. • Reduce the load. |
| — | — | — | — | | | Review power supply. |
| | | | | | | Change the regenerative brake option. |
| — | — | — | — | <ul style="list-style-type: none"> • The regenerative brake option has overheated abnormally. • The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option. | | Change the servo amplifier. |
| | | | | | | Change the servo amplifier or regenerative brake option. |
| Load inertia ratio | | | | | | Increase acceleration/deceleration time constant. |
| 30112 | 30212 | 30312 | 30412 | | | |
| Acceleration time | | | | | | |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |
| — | — | — | — | | | Change servomotor. |
| — | — | — | — | | | Correct the U, V, W phase wiring of the servo amplifier. |
| — | — | — | — | Alarm (A.32) occurs if power is switched on after disconnection of the U, V, W phase power cables. | | Change the servo amplifier. |
| — | — | — | — | | | Correct the U, V, W phase wiring of the servo amplifier. |
| | | | | | | Take noise suppression measures. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|-------------------------------|--|--|--|
| Servo amplifier errors | 2033 | 33 | Overvoltage | Converter bus voltage exceeded 400VDC. | Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected. | |
| | | | | | Though the regenerative brake option is used, the DRU parameter "Pr.102 Regenerative brake resistor" setting value is "0□00 (not used)". | |
| | | | | | Regenerative brake option is open or disconnected. | |
| | | | | | Regenerative transistor faulty. | |
| | | | | | Wire breakage of built-in regenerative brake resistor or regenerative brake option | |
| | | | | | Capacity of built-in regenerative brake resistor or regenerative brake option is insufficient. | |
| | | | | | Power supply voltage high. | |
| | 2034 | 34 | CRC error | SSCNET cable communication fault | The SSCNET cable is disconnected. | |
| | | | | | SSCNET cable fault. | |
| | | | | | Noise has entered the SSCNET cable. | |
| | | | | | The terminal connector is disconnected. | |
| | 2035 | 35 | Command pulse frequency error | Input frequency of too high. | Command given is greater than the maximum speed of the servomotor. | |
| | | | | | Noise has entered the SSCNET cable. | |
| | | | | | Fault in the QD75M. | |
| | 2036 | 36 | Transfer error | SSCNET cable or printed board is faulty. | The SSCNET cable is disconnected. | |
| | | | | | SSCNET cable fault. | |
| | | | | | Printed circuit board fault. | |
| | 2037 | 37 | Parameter error | Parameter setting is wrong. | Servo amplifier fault caused the parameter setting to be rewritten. | |
| | | | | | Parameter data mis-setting by QD75M. | |
| | | | | | The number of write times to EEPROM exceeded 100,000 due to parameter write, etc. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|---|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. |
| | Regenerative brake option | | | | | |
| | 30102 | 30202 | 30302 | 30402 | | Connect correctly. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. |
| | | | | | Change the servo amplifier. | |
| | | | | | <ul style="list-style-type: none"> • For wire breakage of built-in regenerative brake resistor, change the servo amplifier. • For wire breakage of regenerative brake option, change regenerative brake option. | |
| | | | | | Add regenerative brake option or increase capacity. | |
| | | | | | Review the power supply. | |
| | — | — | — | — | | Connect correctly. |
| | | | | | Change the SSCNET cable. | |
| | | | | | Take measures against noise. | |
| | | | | | Connect terminal connector. | |
| | | | | | Set correctly. | |
| | — | — | — | — | | Review operation program. |
| | | | | | Take measures against noise. | |
| | | | | | Change QD75M. | |
| | — | — | — | — | | Connect the connector of the SSCNET cable. |
| | | | | | Change the SSCNET cable. | |
| | | | | | Change the servo amplifier. | |
| | | | | | Connect terminal connector. | |
| | — | — | — | — | | Change the servo amplifier. |
| | | | | | Change the parameter value to within the setting range. | |
| | | | | | Change the servo amplifier. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change the servo amplifier or cooling fan. • Reduce ambient temperature. |
| | — | — | — | — | | The drive method is reviewed. |
| | — | — | — | — | | Change the servo amplifier. |
| | — | — | — | — | | Review environment so that ambient temperature is 0 to 40°C. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| | Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| | 30108 | 30208 | 30308 | 30408 | | |
| | Servo response | | | | | |
| | 30109 | 30209 | 30309 | 30409 | | |
| | Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| | 31 | 181 | 331 | 481 | | |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change servomotor. |
| | Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| | 31 | 181 | 331 | 481 | | |
| | — | — | — | — | | Connect correctly. |
| | Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| | 30108 | 30208 | 30308 | 30408 | | |
| | Servo response | | | | | |
| | 30109 | 30209 | 30309 | 30409 | | |
| | — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change the servomotor. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|---|---|---|--|
| Servo amplifier errors | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (Initial value: 8 rotation) of the parameter <u>Pr.131</u> . | Acceleration/deceleration time constant too small. | |
| | | | | | Torque limit value too small. | |
| | | | | | Start disabled due to insufficient torque caused drop in power supply voltage. | |
| | | | | | The setting value for " <u>Pr.113</u> Position control gain 1" too small. | |
| | | | | | Servo motor shaft was rotated by external force. | |
| | | | | | Collision with the machine | |
| | | | | | The motor encoder fault. | |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase don't mach motor terminals U, V, W phase. | |
| 2086 | 8E | Serial communication error | The fault has occurred in communication between the servo amplifier and communication devices (e.g. personal computer). | The communication cable fault. (Wire breakage or shot) | | |
| | | | | The communication devices (e.g. personal computer) fault. | | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|--|--|-------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Acceleration time | | | | | Increase the acceleration/deceleration time constant. | |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |
| Torque limit value | | | | | Increase the torque limit value. | |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| — | — | — | — | | <ul style="list-style-type: none"> • Review the power supply capacity. • Use servomotor which provides larger output. | |
| Positioning gain 1 | | | | | Increase set value and adjust to ensure proper operation. | |
| 30113 | 30213 | 30313 | 30413 | | | |
| Torque limit value | | | | | <ul style="list-style-type: none"> • When torque is limited, increase the limit value. • Reduce load. • Use servomotor that provides larger output. | |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. | |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | Change the servomotor. | |
| — | — | — | — | | Connect correctly. | |
| — | — | — | — | | Repair or change the cable. | |
| — | — | — | — | | Change the communication devices (e.g. personal computer). | |

15.2.5 MR-J2-Jr detection error

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|---|------------|----------------------------------|---|---|--|--|
| Servo amplifier errors | 2010 | 10 | Under voltage | The power supply voltage dropped to 20VDC or less. | The power supply voltage is low. | |
| | | | | | There was an instantaneous control power failure of 40ms or longer. | |
| | | | | | Shortage of power supply capacity caused the power supply voltage to drop at start, etc. . | |
| | | | | | Power was restored after the bus voltage had dropped to 15VDC. (Main circuit power switched on within 5s after it had switched off.) | |
| | | | | | Faulty parts in the servo amplifier. | |
| | 2011 | 11 | Board error 1 | Printed circuit board fault. | Faulty parts in the servo amplifier. | |
| | 2012 | 12 | Memory error 1 | ROM or RAM memory error. | | |
| | 2013 | 13 | Clock error | Printed circuit board fault. | | |
| | 2015 | 15 | Memory error 2 | EEP-ROM error | | |
| | 2016 | 16 | Encoder error 1 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CNP2) is disconnected. | |
| Fault in the encoder. Encoder cable fault. (Wire breakage or shot) | | | | | | |
| 2017 | 17 | Board error 2 | CPU or parts of the circuit fault. | Faulty parts in the servo amplifier. | | |
| 2020 | 20 | Encoder error 2 | Communication error occurred between encoder and servo amplifier. | The encoder connector (CNP2) is disconnected. | | |
| | | | | Fault in the encoder. | | |
| | | | | Encoder cable fault. (Wire breakage or shot) | | |
| 2024 | 24 | Motor output side ground fault | Servomotor output (U, V, W phase) ground fault. | Contact of power supply input cables and servomotor outputs in main circuit terminal block. | | |
| | | | | Sheathes of servomotor power cables deteriorated, resulting in ground fault. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|--|--------------------------------------|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Reconsider the power supply voltage. |
| | — | — | — | — | Alarm (A.10) occurs if power is switched on after disconnection of the CN1A, CN1B, CNP2 and CNP3 connector. | Change the servo amplifier. |
| | — | — | — | — | Alarm (any of A.12 to 15) occurs if power is switched on after disconnection of CN1A, CN1B, CNP2 and CNP3 connector. | Change the servo amplifier. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servo amplifier. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | Alarm (A.17) occurs if power is switched on after disconnection of the CN1A, CN1B, CNP2 and CNP3 connector. | Change the servomotor. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the servomotor. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | Alarm (2024) occurs if power is switched on after disconnection of the CNP2 connector. | Connect correctly. |
| | — | — | — | — | | Change the cable. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|------------|----------------------------------|-------------|--|--|
| Servo amplifier errors | 2031 | 31 | Overspeed | Speed has exceeded the instantaneous permissible speed. | Small acceleration/deceleration time constant caused overshoot to be large. |
| | | | | | Servo system is instable to cause overshoot. |
| | 2032 | 32 | Overcurrent | Current that flew is higher than the permissible current of the servo amplifier. | Fault in the encoder. |
| | | | | | Output phases U, V, W phase of the servo amplifier were connected with each other. |
| | | | | Transistor of the servo amplifier damaged. | |
| | | | | Short circuit in the servo amplifier output phase U, V, W phase. | |
| | | | | Noise entered the overcurrent detection circuit. | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|--|-------------|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Load inertia ratio | | | | | | Increase acceleration/ deceleration time constant. |
| 30112 | 30212 | 30312 | 30412 | | | |
| Acceleration time | | | | | | |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |
| — | — | — | — | | | Change servomotor. |
| — | — | — | — | | | Correct the U, V, W phase wiring of the servo amplifier. |
| — | — | — | — | Alarm (A.32) occurs if power is switched on after disconnection of the CNP2 connector. | | Change the servo amplifier. |
| — | — | — | — | | | Correct the U, V, W phase wiring of the servo amplifier. |
| — | — | — | — | | | Take noise suppression measures. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|---|------------|----------------------------------|-------------------------------|---------------------------------------|---|--|
| Servo amplifier errors | 2033 | 33 | Overvoltage | Converter bus voltage exceeded 35VDC. | Power supply voltage high. | |
| | 2034 | 34 | CRC error | SSCNET cable communication fault | The SSCNET cable is disconnected. | |
| | | | | | SSCNET cable fault. | |
| | | | | | Noise has entered the SSCNET cable. | |
| | | | | | The terminal connector is disconnected. | |
| | 2035 | 35 | Command pulse frequency error | Input frequency of too high. | The same No. exists in the servo amplifier side axis setting. | |
| | | | | | Command given is greater than the maximum speed of the servomotor. | |
| | | | | | Noise has entered the SSCNET cable. | |
| | 2036 | 36 | Transfer error | Bus cable or printed board is faulty. | Fault in the QD75M. | |
| | | | | | The SSCNET cable is disconnected. | |
| | | | | | The SSCNET cable fault. | |
| | | | | | Printed circuit board fault. | |
| | 2037 | 37 | Parameter error | Parameter setting is wrong. | The terminal connector is disconnected. | |
| Servo amplifier fault caused the parameter setting to be rewritten. | | | | | | |
| Parameter data mis-setting by QD75M. | | | | | | |
| | | | | | The number of write times to EEPROM exceeded 100,000 due to parameter write, etc. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|-------------|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Review the power supply. |
| | | | | | | Connect correctly. |
| | | | | | | Change the SSCNET cable. |
| | — | — | — | — | | Take measures against noise. |
| | | | | | | Connect terminal connector. |
| | | | | | | Set correctly. |
| | — | — | — | — | | Review operation program. |
| | | | | | | Take measures against noise. |
| | | | | | | Change QD75M. |
| | | | | | | Connect the connector of the SSCNET cable. |
| | — | — | — | — | | Change the SSCNET cable. |
| | | | | | | Change the servo amplifier. |
| | | | | | | Connect terminal connector. |
| | — | — | — | — | | Change the servo amplifier. |
| | | | | | | Change the parameter value to within the setting range. |
| | | | | | | Change the servo amplifier. |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause |
|--------------------------|------------|----------------------------------|--|--|---|
| Servo amplifier errors | 2050 | 50 | Overload 1 | Load exceeded overload protection characteristic of servo amplifier. Load ratio 200%: 85s or more | The current exceeded the continuous output current of the servo amplifier. |
| | | | | | The servo system is unstable, causing hunting. |
| | | | | | Collision with the machine. |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase do not match motor terminals U, V, W phase. |
| | | | | | The motor encoder fault. |
| | 2051 | 51 | Overload 2 | Machine collision or the like caused max. output current to flow successively for several seconds. Servomotor locked: 1s or more During rotation: 2.5s or more | Collision with the machine |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase do not match motor terminals U, V, W phase. |
| | | | | | The servo system is unstable, causing hunting. |
| | | | | | The bus voltage of the unit has decreased. |
| | | | | | Encoder faulty. |
| 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value of the parameter Pr.131 . | Acceleration/deceleration time constant too small. | |

| Related buffer memory address | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|---|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| — | — | — | — | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | |
| Servo response | | | | | |
| 30109 | 30209 | 30309 | 30409 | | |
| Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | |
| — | — | — | — | | Connect correctly. |
| — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change servomotor. |
| Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | |
| — | — | — | — | | Connect correctly. |
| Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | |
| Servo response | | | | | |
| 30109 | 30209 | 30309 | 30409 | | |
| — | — | — | — | | Change the servo amplifier. |
| — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change the servomotor. |
| Acceleration time | | | | | Increase the acceleration/deceleration time constant. |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | |
| Deceleration time | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | |

| Classification of errors | Error code | LED indicator of servo amplifier | Error name | Description | Cause | |
|--------------------------|---|----------------------------------|---|---|--|--|
| Servo amplifier errors | 2052 | 52 | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (default value: 80kPLS) of the parameter <u>Pr.131</u> . | Torque limit value too small. | |
| | | | | | Start disabled due to insufficient torque caused drop in power supply voltage. | |
| | | | | | The setting value for " <u>Pr.113</u> Position control gain 1" too small. | |
| | | | | | Servo motor shaft was rotated by external force. | |
| | | | | | Collision with the machine | |
| | | | | | The motor encoder fault. | |
| | | | | | Servo motor miswiring servo amplifier terminals U, V, W phase don't match motor terminals U, V, W phase. | |
| | The bus voltage of the unit due to the breakdown. | | | | | |
| 2086 | 8E | Serial communication error | The fault has occurred in communication between the servo amplifier and communication devices (e.g. personal computer). | The communication cable fault. (Wire breakage or shot) | | |
| | | | | The communication devices (e.g. personal computer) fault. | | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|--------|--------|--------|--|---|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Torque limit value | | | | | | Increase the torque limit value. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| — | — | — | — | | <ul style="list-style-type: none"> • Review the power supply capacity. • Use servomotor which provides larger output. | |
| Positioning gain 1 | | | | | | Increase set value and adjust to ensure proper operation. |
| 30113 | 30213 | 30313 | 30413 | | | |
| Torque limit value | | | | | | <ul style="list-style-type: none"> • When torque is limited, increase the limit value. • Reduce load. • Use servomotor that provides larger output. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | Change the servomotor. | |
| — | — | — | — | | Connect correctly. | |
| — | — | — | — | | Change servomotor. | |
| — | — | — | — | | Repair or change the cable. | |
| | | | | | Change the communication device (e.g. personal computer). | |

15.2.6 MR-J2M-B detection error

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|------------------------------|--|---|---|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2010 | FA.10 | — | Under voltage | The power supply voltage dropped to 160VAC or less. | The power supply voltage is low. | |
| | | | | | | There was an instantaneous control power failure of 30ms or longer. | |
| | | | | | | Shortage of power supply capacity caused the power supply voltage to drop at start, etc. . | |
| | | | | | | Power was restored after the bus voltage had dropped to 200VDC. (Main circuit power switched on within 5s after it had switched off.) | |
| | | | | | | Faulty parts in the base unit. | |
| | | | | | | Faulty parts in interface unit. | |
| | | | | | | CNP3 or CNP1B connector unplugged. | |
| | 2012 | FA.12 | — | Memory error 1 | ROM or RAM memory error. | Faulty parts in interface unit. | |
| | 2013 | FA.13 | — | Clock error | Printed circuit board fault. | | |
| | 2014 | FA.14 | — | Watchdog error | CPU parts of the circuit fault. | | |
| | 2015 | FA.15 | — | Memory error 2 | EED-ROM error | | |
| | | | | | | Faulty parts in the drive unit. | |
| | 2012 | — | @A.12# | Memory error 1 | ROM or RAM memory error. | | |
| | 2013 | — | @A.13# | Clock error | Printed circuit board fault. | | |
| | 2014 | — | @A.14# | Watchdog error | CPU parts of the circuit fault. | | |
| | 2015 | — | @A.15# | Memory error 2 | EED-ROM error | | |
| 2016 | — | @A.16# | Encoder error 1 | Communication error occurred between encoder and drive unit. | The encoder connector is disconnected. | | |
| | | | | | Fault in the encoder. | | |
| | | | | | Encoder cable fault. (Wire breakage or shot) | | |
| 2017 | — | @A.17# | Board error 2 | CPU or parts of the circuit fault. | Faulty parts in the drive unit. | | |
| 2019 | FA.19 | @A.19# | Memory error 3 | Flash memory error. | Faulty parts in the interface unit or drive unit. | | |
| 2020 | — | @A.1A# | Servomotor combination error | Wrong combination of drive unit and servomotor. | Wrong combination of drive unit and servomotor connected. | | |
| 2021 | FA.1B | — | Axis set error | Drive unit installed on the same base unit have the same axis. | IFU parameter <u>Pr.111</u> to <u>Pr.118</u> setting mistake. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|---|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Reconsider the power supply voltage. |
| | — | — | — | — | Alarm (A.10) occurs if interface unit is changed. | Change the base unit. |
| | — | — | — | — | Alarm (A.10) occurs if base unit is changed. | Change the interface unit. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | Alarm (any of A.12 to 15) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables. | Change the interface unit. |
| | — | — | — | — | Alarm (any of A.12 to 15) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables. | Change the drive unit. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the drive unit. |
| | — | — | — | — | | Repair or change the cable. |
| | — | — | — | — | Alarm (A.17) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables. | Change the drive unit. |
| | — | — | — | — | Alarm (A.19) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables. | Change the interface unit or drive unit. |
| | — | — | — | — | | Use correct combination. |
| | — | — | — | — | | Connect correctly. |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|--------------------------------|---|---|--|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2022 | FA.1C | — | Base unit bus error 1 | There is error in communication between interface unit and drive unit. | Interface unit connection fault. | |
| | | | | | | Interface unit failure. | |
| | | | | | | Base unit failure. | |
| | 2023 | FA.1D | — | Base unit bus error 2 | There is error in communication between interface unit and drive unit. | Drive unit connection fault. | |
| | | | | | | Drive unit failure. | |
| | | | | | | Base unit failure. | |
| | 2024 | FA.1E | — | Servo amplifier mounting error | Drive unit came off the base unit after initialization. | Drive unit connection fault. | |
| | | | | | | Base unit failure. | |
| | | | | | | Faulty parts in servo amplifier. | |
| | 2020 | — | @A.20# | Encoder error 2 | Communication error occurred between encoder and drive unit. | The encoder connector is disconnected. | |
| | | | | | | Encoder fault. | |
| | | | | | | Encoder cable faulty. (Wire breakage or shorted) | |
| 2024 | — | @A.24# | Motor output side ground fault | Servomotor output (U, V, W phase) ground fault. | Power input wires and servo motor output wires are in contact at CNP2. | | |
| | | | | | Sheathes of servo motor power cables deteriorated, resulting in ground fault. | | |
| | | | | | Main circuit of drive unit failed. | | |
| 2025 | — | @A.25# | Absolute position lost | Absolute position data in error. | Battery unit voltage low. | | |
| | | | | | Battery cable or battery fault. | | |
| | | | | Power was switched on for the first time in the absolute position detection system. | Super capacitor of the absolute position encoder is not charged. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|--|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Connect the interface unit to the base unit properly. Change the interface unit. Change the base unit. |
| | — | — | — | — | | Connect the drive unit to the base unit properly. Change the drive unit. Change the base unit. |
| | — | — | — | — | | Connect the drive unit to the base unit properly. Change the base unit. |
| | — | — | — | — | Alarm (A.1E) occurs if power is switched on after disconnection of the U, V, W phase power cables. | Change the drive unit. |
| | — | — | — | — | | Connect correctly. Change the servomotor. Repair or change cable. |
| | — | — | — | — | | Connect correctly. Change the cable. |
| | — | — | — | — | Alarm (A.24) occurs if power is switched on after disconnection of the U, V, W phase power cables. | Change the drive unit. |
| | — | — | — | — | | Change battery unit. Always make home position setting again. |
| | — | — | — | — | | After leaving the alarm occurring for a few minutes, switch power off, then on again. Always make home position setting again |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|---|------------|----------------------------------|--------|--------------------|--|---|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2030 | FA.30 | — | Regenerative error | Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded. | Parameter " [Pr.102] Regenerative brake resistor" setting value error. | |
| | | | | | | Built-in regenerative brake resistor or regenerative brake option is not connected. | |
| | | | | | | High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. | |
| | | | | | | Power supply voltage is abnormal. (260VAC or more) | |
| | | | | | | Regenerative brake option faulty. | |
| | | | | | Regenerative transistor fault | Regenerative transistor faulty. | |
| | 2031 | — | @A.31# | Overspeed | Speed has exceeded the instantaneous permissible speed. | Small acceleration/deceleration time constant caused overshoot to be large. | |
| | | | | | | Servo system is instable to cause overshoot. | |
| | | | | | | Fault in the encoder. | |
| | 2032 | — | @A.32# | Overcurrent | Current that flew is higher than the permissible current of the drive unit. | Output phases U, V, W phases of the drive unit were connected with each other. | |
| Transistor of the drive unit damaged. | | | | | | | |
| Short circuit in the drive unit out put phase U, V, W phases. | | | | | | | |
| Noise entered the overcurrent detection circuit. | | | | | | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|------------------------------------|----------|----------|----------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | Regenerative resistor brake option | | | | | Set correctly. |
| | 30102 | 30202 | 30302 | 30402 | | |
| | — | — | — | — | | Connect correctly |
| | — | — | — | — | Call the status display and check the regenerative load ratio. | <ul style="list-style-type: none"> • Reduce the frequency of positioning. • Use the regenerative brake option of larger capacity. • Reduce the load. |
| | — | — | — | — | | Review power supply. |
| | — | — | — | — | | Change the regenerative brake option. |
| | — | — | — | — | <ul style="list-style-type: none"> • The regenerative brake option has overheated abnormally. • The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option. | Change the base unit. |
| | Load inertia ratio | | | | | Increase acceleration/deceleration time constant. |
| | 30112 | 30212 | 30312 | 30412 | | |
| | Acceleration time | | | | | |
| | 12, 13 | 162, 163 | 312, 313 | 462, 463 | | |
| | 36, 37 | 186, 187 | 336, 337 | 486, 487 | | |
| | 38, 39 | 188, 189 | 338, 339 | 488, 489 | | |
| | 40, 41 | 190, 191 | 340, 341 | 490, 491 | | |
| | Deceleration time | | | | | |
| | 14, 15 | 164, 165 | 314, 315 | 464, 465 | | |
| | 42, 43 | 192, 193 | 342, 343 | 492, 493 | | |
| | 44, 45 | 194, 195 | 344, 345 | 494, 495 | | |
| | 46, 47 | 196, 197 | 346, 347 | 496, 497 | | |
| | — | — | — | — | | Change servomotor. |
| | — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. |
| | — | — | — | — | Alarm (A.32) occurs if power is switched on after disconnection of the U, V, W phase power cables. | Change the drive unit. |
| | — | — | — | — | | Correct the U, V, W phase wiring of the servo amplifier. |
| | — | — | — | — | | Take noise suppression measures. |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|--------|-------------------------------|--|--|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2033 | FA.33 | — | Overvoltage | Converter bus voltage exceeded 400VDC. | Don't using the regenerative brake option. | |
| | | | | | | Though the regenerative brake option is used, the DRU parameter "Pr.102 Regenerative brake resistor" setting value is "0□00 (not used)". | |
| | | | | | | Regenerative brake option is open or disconnected. | |
| | | | | | | Regenerative transistor faulty. | |
| | | | | | | Wire breakage of built-in regenerative brake resistor or regenerative brake option | |
| | | | | | | Power supply voltage high. | |
| | 2034 | FA.34 | — | CRC error | SSCNET cable communication fault | The SSCNET cable is disconnected. | |
| | | | | | | The SSCNE cable fault. | |
| | | | | | | Noise has entered the SSCNE cable. | |
| | | | | | | The terminal connector is disconnected. | |
| | | | | | | The same No. exists in the interface unit side axis setting. | |
| | 2035 | — | @A.35# | Command pulse frequency error | Input frequency of too high. | Command given is greater than the maximum speed of the servomotor. | |
| | | | | | | Noise has entered the SSCNET cable. | |
| | | | | | | Fault in the QD75M. | |
| | 2036 | FA.36 | — | Transfer error | SSCNET cable or printed board is faulty. | The SSCNET cable is disconnected. | |
| | | | | | | The SSCNET cable fault. | |
| | | | | | | Printed circuit board fault. | |
| | | | | | | The terminal connector is disconnected. | |
| | 2037 | FA.37 | — | IFU parameter error | IFU parameter setting is wrong. | Interface unit fault caused the IFU parameter setting to be rewritten. | |
| | | | | | | There is a IFU parameter whose value was set to outside the setting range by QD75M. | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|-------------|--|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | — | — | — | — | | Use the regenerative brake option. |
| | Regenerative brake option | | | | | Set correctly. |
| | 30102 | 30202 | 30302 | 30402 | | |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change lead. • Connect correctly. |
| | — | — | — | — | | Change base unit. |
| | — | — | — | — | | For wire breakage of regenerative brake option, change regenerative brake option. |
| | — | — | — | — | | Review the power supply. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Change the SSCNET cable. |
| | — | — | — | — | | Take measures against noise. |
| | — | — | — | — | | Connect terminal connector. |
| | — | — | — | — | | Set correctly. |
| | — | — | — | — | | Review operation program. |
| | — | — | — | — | | Take measures against noise. |
| | — | — | — | — | | Change the QD75M. |
| | — | — | — | — | | Connect the connector of the SSCNET cable. |
| | — | — | — | — | | Change the SSCNET cable. |
| | — | — | — | — | | Change the interface unit. |
| | — | — | — | — | | Connect terminal connector. |
| | — | — | — | — | | Change the interface unit. |
| | — | — | — | — | | Change the IFU parameter value to within the setting range. |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|------------|--|--|--|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2037 | — | @A.37# | DRU parameter error | DRU parameter setting is wrong. | Drive unit fault caused the DRU parameter setting to be rewritten. | |
| | | | | | | There is a DRU parameter whose value was set to outside the setting range by QD75M. | |
| | | | | | | The number of write times to EEPROM exceeded 100,000 due to parameter write, etc. | |
| | 2038 | FA.38 | — | DRU adjustment error | In some drive unit, the parameter which requires all axes to be set for the same value differs from those of the other axes. | There is a drive unit whose DRU parameter [Pr.102] or [Pr.123] setting is different from others. | |
| | 2045 | — | @A.45# | Main circuit device overheat | Main circuit device overheat. | Air cooling fan of the drive unit stops | |
| | | | | | | The power supply was turned on and off continuously by overloaded status. | |
| | | | | | | Drive unit faulty. | |
| | 2046 | — | @A.46# | Servomotor heated | Servo motor temperature rise actuated the thermal protector. | Servo motor ambient temperature exceeded the operating value of 40°C. | |
| | | | | | | Servomotor overloaded. | |
| | | | | | | Thermal protector in encoder is faulty. | |
| 2050 | — | @A.50# | Overload 1 | Load exceeded overload protection characteristic of drive unit. Load ratio 300%: 1s or more Load ratio 200%: 10s or more | The current exceeded the continuous output current of the drive unit. | | |
| | | | | | The servo system is unstable, causing hunting. | | |
| | | | | | Collision with the machine. | | |
| | | | | | Servomotor miswiring drive unit terminals U, V, W phase do not match motor terminals U, V, W phase. | | |
| | | | | | The motor encoder fault. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|------------------------------------|--------|--------|--------|---|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | | | | | | Change the drive unit. |
| | — | — | — | — | | Change the DRU parameter value to within the setting range. |
| | | | | | | Change the servo amplifier. |
| | Regenerative resistor brake option | | | | | Set correctly. |
| | 30102 | 30202 | 30302 | 30402 | | |
| | Optional function 1 | | | | | |
| | 30123 | 30223 | 30323 | 30423 | | |
| | | | | | | <ul style="list-style-type: none"> • Change the drive unit or cooling fan. • Reduce ambient temperature. |
| | — | — | — | — | | The drive method is reviewed. |
| | | | | | | Change the drive unit or cooling fan. |
| | | | | | | Review environment so that ambient temperature is 0 to 40°C. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| | | | | | | Change the servomotor. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Reduce load. • Review operation pattern. • Use servomotor that provides larger output. |
| | Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| | 30108 | 30208 | 30308 | 30408 | | |
| | Servo response | | | | | |
| | 30109 | 30209 | 30309 | 30409 | | |
| | Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| | 31 | 181 | 331 | 481 | | |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | Change servomotor. |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--------------------------|------------|----------------------------------|--------|-----------------|--|---|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2051 | — | @A.51# | Overload 2 | Machine collision or the like caused max. output current to flow successively for several seconds. Servomotor locked: 0.3s or more During rotation: 2.5s or more | Collision with the machine | |
| | | | | | | Servomotor miswiring drive unit terminals U, V, W phase don't match motor terminals U, V, W phase. | |
| | | | | | | Wrong connection of servomotor. Drive unit's output U, V, W do not match servo motor's input U, V, W. | |
| | | | | | | The servo system is unstable, causing hunting. | |
| | | | | | | The motor encoder fault. | |
| Servo amplifier errors | 2052 | — | @A.52# | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (Initial value: 2 rotation) of the parameter "Pr.131". | Acceleration/deceleration time constant too small. | |
| | | | | | | Torque limit value too small. | |
| | | | | | | Start disabled due to insufficient torque caused drop in power supply voltage. | |
| | | | | | | The setting value for "Pr.113" Position control gain 1" too small. | |
| | | | | | | Servomotor shaft was rotated by external force. | |

| Related buffer memory address | | | | | Check point | Corrective action |
|-------------------------------|----------|----------|----------|---|-------------|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| Input signal logic selection | | | | | | <ul style="list-style-type: none"> Review operation pattern. Install limit switches. |
| 31 | 181 | 331 | 481 | | | |
| — | — | — | — | | | Connect correctly. |
| — | — | — | — | | | Connect correctly. |
| Auto tuning | | | | | | <ul style="list-style-type: none"> Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". Change " [Pr.109] Servo response" setting. Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| 30108 | 30208 | 30308 | 30408 | | | |
| Servo response | | | | | | |
| 30109 | 30209 | 30309 | 30409 | | | |
| — | — | — | — | When the servomotor shaft is rotated with the servo off, the cumulative feedback pulses should vary in proportion to the rotary angle. If the indication skips or returns midway the encoder if faulty. | | Change servomotor. |
| Acceleration time | | | | | | Increase the acceleration/deceleration time constant. |
| 12, 13 | 162, 163 | 312, 313 | 462, 463 | | | |
| 36, 37 | 186, 187 | 336, 337 | 486, 487 | | | |
| 38, 39 | 188, 189 | 338, 339 | 488, 489 | | | |
| 40, 41 | 190, 191 | 340, 341 | 490, 491 | | | |
| Deceleration time | | | | | | |
| 14, 15 | 164, 165 | 314, 315 | 464, 465 | | | |
| 42, 43 | 192, 193 | 342, 343 | 492, 493 | | | |
| 44, 45 | 194, 195 | 344, 345 | 494, 495 | | | |
| 46, 47 | 196, 197 | 346, 347 | 496, 497 | | | |
| Torque limit value | | | | | | Increase the torque limit value. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |
| — | — | — | — | | | <ul style="list-style-type: none"> Review the power supply capacity. Use servomotor which provides larger output. |
| Positioning gain 1 | | | | | | Increase set value and adjust to ensure proper operation. |
| 30113 | 30213 | 30313 | 30413 | | | |
| Torque limit value | | | | | | <ul style="list-style-type: none"> When torque is limited, increase the limit value. Reduce load. Use servomotor that provides larger output. |
| 26 | 176 | 326 | 476 | | | |
| OPR torque limit value | | | | | | |
| 86 | 236 | 386 | 536 | | | |
| Torque output setting value | | | | | | |
| 1552 | 1652 | 1752 | 1852 | | | |

| Classification of errors | Error code | LED indicator of servo amplifier | | Error name | Description | Cause | |
|--|------------|----------------------------------|--------|-------------------------------|---|---|--|
| | | IFU | DRU | | | | |
| Servo amplifier errors | 2052 | — | @A.52# | Error excessive | Droop pulse of the deviation counter reached or exceeded setting value (Initial value: 2 rotation) of the parameter [Pr.131]. | Collision with the machine | |
| | | | | | | The motor encoder fault. | |
| | | | | | | Servomotor miswiring drive unit terminals U, V, W phase do not match motor terminals U, V, W phase. | |
| | 2053 | FA.53 | — | Multiple axis overload | Drive unit whose effective load factor is 85% or more is adjacent. | Drive unit having large load is adjacent. | |
| | | | | | | Servo system is instable and hunting. | |
| | | | | | | Encoder cable and power cable (U, V, W phase) coming out of one drive unit are connected to the incorrect servomotor. | |
| | 2054 | FA.54 | — | Drive unit alarm | Alarm occurred in one or more axes of drive units installed to the base unit. | Remove the alarm causes of all drive units where alarm has occurred. | |
| | 2090 | FA.8A | — | Serial communication time-out | Serial communication stopped for longer than the time set in IFU parameter [Pr.1]. | Communication cable fault. (Wire break or short circuit) | |
| | | | | | | Communication cycle is longer than the IFU parameter [Pr.1] setting. | |
| | 2086 | FA.8E | — | Serial communication error | The fault has occurred in communication between the interface unit and communication devices (e.g. personal computer). | Protocol is incorrect. | |
| The communication cable fault. (Wire breakage or shot) | | | | | | | |
| | | | | | The communication devices (e.g. personal computer) fault. | | |

| | Related buffer memory address | | | | Check point | Corrective action |
|--|-------------------------------|--------|--------|--------|-------------|---|
| | Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| | Input signal logic selection | | | | | <ul style="list-style-type: none"> • Review operation pattern. • Install limit switches. |
| | 31 | 181 | 331 | 481 | | Change the servomotor. |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | <ul style="list-style-type: none"> • Change the slot of the drive unit whose load is large. • Reduce the load. • Reexamine the operation pattern. • Use a servomotor whose output is large. |
| | Auto tuning | | | | | <ul style="list-style-type: none"> • Repeat acceleration/deceleration to execute " [Pr.108] Auto tuning". • Change " [Pr.109] Servo response" setting. • Set " [Pr.108] Auto tuning" to OFF and make gain adjustment manually. |
| | 30108 | 30208 | 30308 | 30408 | | |
| | Servo response | | | | | |
| | 30109 | 30209 | 30309 | 30409 | | |
| | — | — | — | — | | Connect correctly. |
| | — | — | — | — | | Remove the alarm causes of all drive units where alarm has occurred. |
| | | | | | | Repair or change the cable. |
| | — | — | — | — | | Set the IFU parameter value correctly. IFU parameter [Pr.1] . |
| | | | | | | Correct the protocol. |
| | — | — | — | — | | Repair or change the cable. |
| | | | | | | Change the communication device (e.g. personal computer). |

15.3 List of warnings

The following table shows the warning details and remedies to be taken when a warning occurs.

15.3.1 QD75 detection warning

| Classification of warnings | Warning code | Warning name | Warning | Operation status at warning occurrence | |
|----------------------------|--------------|----------------------------------|---|--|--|
| — | 000 | (Normal status) | — | — | |
| Common warnings | 100 | Start during operation | The start request is issued while the axis is BUSY. | Continue the operation. | |
| | 104 | Restart not possible | The restart command is issued when the axis operation status is not "Stopped". | Continue the operation. | |
| | 109 | Teaching in BUSY | The teaching request is issued while the axis is BUSY. | The warning is issued for the axis designated at the time of the teaching request. | |
| | 110 | Less than minimum speed | The overridden speed becomes "0". | The system is controlled with the currently executing unit of 1. | |
| | 111 | In PLC READY | The request for writing to the flash ROM is issued when the PLC READY is turned ON (at the time of teaching request). | The warning for axis 1 is issued. | |
| | 112 | Illegal override value | A value other than 1 to 300 is set for the override value. | <ul style="list-style-type: none"> Controlled at a setting value of 0 : 100. Controlled at a setting value of 301 or over : 300. | |
| | 113 | Outside new torque value range | A value other than 1 to 500 is set for the new torque value. | The torque change is not carried out. | |
| | 114 | Below bias speed | The command speed is below the bias speed at start. Programming error between QD75P and QD75M. | Operate by the bias speed at start. | |
| JOG operation warnings | 300 | Speed change during deceleration | The speed change request is issued during deceleration stop with JOG start signal OFF. | The speed change is not carried out. | |
| | 301 | JOG speed limit value | The new speed value exceeds the JOG speed limit value when the speed is changed during operation. | <ul style="list-style-type: none"> When the speed exceeds the JOG speed limit, the JOG operation is carried out with the JOG speed limit value. While the speed is limited by the JOG speed limit value, the "Speed limiting flag" is turned ON. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|---|--------------|--------------|--------------|--|--|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| — | — | — | — | — | — | — |
| — | — | — | — | — | — | Normalize the start request ON timing. |
| 1503 | 1603 | 1703 | 1803 | <Restart command> 1: Restart | Normalize the start request ON timing. (Refer to Section 6.5.5) (Do not issue the restart command when the axis operation is not stopped.) | |
| 1548 1549 | 1648 1649 | 1748 1749 | 1848 1849 | <Teaching data selection> 0, 1 <Teaching positioning data No.> 1 to 600 | Carry out the teaching request when the axis is not BUSY. (Refer to Section 12.7.4) | |
| 1513 | 1613 | 1713 | 1813 | <Positioning operation speed override> 1 to 300 | Prevent the overridden speed from being reduced to 0. (Refer to Section 12.5.2) | |
| Same as warning code 109 | | | | | None (If the PLC READY signal (Y0) is turned OFF, respond to the teaching write request). | |
| 1513 | 1613 | 1713 | 1813 | <Positioning operation speed override> 1 to 300 | Set a value within the setting range. | |
| 1525 | 1625 | 1725 | 1825 | <New torque value> 1 to [Torque limit set value] | | |
| 26 | 176 | 326 | 476 | <Torque limit set value> 1 to 500 | | |
| Refer to Section 5.3 "List of positioning data" for command speed | | | | | <Command speed> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or another] | Re-set the command speed/bias speed at start so that the command speed is equal to or larger than the bias speed at start. Set 0 for the bias speed. |
| Bias speed at start | | | | | <Bias speed at start> 0 [PLS/s] 0 [mm/min or another] | |
| 6 7 | 156 157 | 306 307 | 456 457 | | | |
| 1516 | 1616 | 1716 | 1816 | <Speed change request> 1: Speed change is requested | Do not carry out the JOG speed change during deceleration with the JOG start signal OFF. | |
| New speed value | | | | | <New speed value> 0 to 10000000 [PLS/s] 0 to 2000000000 [mm/min or another] | Bring the set value into the setting range. |
| 1514 1515 | 1614 1615 | 1714 1715 | 1814 1815 | | | |
| JOG speed limit value | | | | | <JOG speed limit value> 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or another] | |
| 48 49 | 198 199 | 348 349 | 498 499 | | | |

| Classification of warnings | Warning code | Warning name | Warning | Operation status at warning occurrence | |
|---|--------------|--|---|---|--|
| Manual pulse generator operation warnings | 401 | Outside manual pulse generator input magnification range | The manual pulse generator 1 pulse input magnification is set at 0 or 101 or higher. | <ul style="list-style-type: none"> When input magnification is set at 101 or higher: Re-set to 100. When input magnification is set at 0: Re-set to 1. | |
| Positioning operation warnings | 500 | Deceleration/stop speed change | The speed change request is issued during deceleration stop. | The speed change is not carried out. | |
| | 501 | Speed limit value over | The new value exceeds the speed limit value when the speed is changed during operation. | <ul style="list-style-type: none"> The speed is controlled with the speed limit value. The "speed limiting flag" is turned ON. | |
| | 503 | M code ON signal ON start | The M code ON signal is turned ON when the positioning data is executed. | Continue executing the positioning data. | |
| | 505 | No operation termination setting | In the positioning by block starting, the 50th point of the positioning start data is set to CONTINUE. | The operation is terminated. | |
| | 506 | FOR to NEXT nest construction | FOR to NEXT is nested. | The operation is continued. | |
| | 508 | Speed-position switching (during acceleration) signal ON | The switching signal for speed-position switching control (INC mode) is turned ON during acceleration. | | |
| | 509 | Insufficient remaining distance | <ul style="list-style-type: none"> At a continuous operation interrupt request, the distance required deceleration stop is not long enough. At a speed change request, the remaining distance is shorter than the distance required for speed change. | <ul style="list-style-type: none"> When a command speed is changed: Change to a value as near a new speed value as possible. When a target position is changed: Adjust the speed to a value as near the command speed as possible, and then change to a target position. (When the operation pattern is a continuous path control, ignore the operations stated above.) | |
| | 511 | Step not possible | Code 1 is set for the step start information when the step is outside standby. | The step will not start. | |
| | 512 | Illegal external command function | The detailed parameter 2 "External command function selection" setting range is exceeded. | Even if the external command signal is turned ON, the system will not perform anything. | |
| | 513 | Insufficient movement amount | The movement amount is not large enough for automatic deceleration. | The system stops immediately after it reaches the positioning address. | |

| Related buffer memory address | | | | | Set range (Setting with PLC program) | Remedy |
|--|--------------|--------------|--------------|--|---|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 1522 1523 | 1622 1623 | 1722 1723 | 1822 1823 | <Manual pulse generator 1 pulse input magnification> 1 to 100 | Set the manual pulse generator 1 pulse input magnification to within the setting range. | |
| 1516 | 1616 | 1716 | 1816 | <Speed change request> 1: Speed change is requested | Do not carry out the speed change during deceleration with a stop command, during stoppage, or during automatic deceleration with position control. | |
| New speed value | | | | | 0 to 10000000 [PLS/s] 0 to 2000000000 [mm/min or another] | Set the new speed value to a range of 0 to "speed limit value". |
| 1514 1515 | 1614 1615 | 1714 1715 | 1814 1815 | | | |
| Speed limit value | | | | | 1 to 10000000 [PLS/s] 1 to 2000000000 [mm/min or another] | |
| 10 11 | 160 161 | 310 311 | 460 461 | | | |
| 1504 | 1604 | 1704 | 1804 | <M code OFF request> 1: M code ON signal is turned OFF | Normalize the ON and OFF timings of the "M code OFF request". (Refer to Section 12.7.3) | |
| Refer to Section 5.3 "List of positioning data" | | | | | <Operation pattern> 00: Positioning end 01: Continuous positioning control 11: Continuous path control | Set the operation termination to the 50th point. (Refer to Chapter 10) |
| — | — | — | — | — | Make 1 nest construction for FOR to NEXT. (Refer to Section 10.3.8) | |
| — | — | — | — | — | Do not turn ON the speed-position switching signal during acceleration. (Refer to Section 9.2.16) | |
| — | — | — | — | — | Give a request at the position where there is an enough remaining distance. | |
| 1546 | 1646 | 1746 | 1846 | <Step start information> 1: Step is continued 2: Re-start is carried out | Do not set a "1" to the step start information when the step is not in standby state. (Refer to Section 12.7.1) | |
| 62 | 212 | 362 | 512 | <External command function selection> 0, 1, 2, 3 | Set the detailed parameter 2 "External command function selection" to within the setting range. | |
| Refer to Section 5.3 "List of positioning data" | | | | | — | Set a decelerating address or a movement amount to the positioning data. |

| Classification of warnings | Warning code | Warning name | Warning | Operation status at warning occurrence | |
|--------------------------------|--------------|-------------------------------------|--|--|--|
| Positioning operation warnings | 514 | Outside command speed range | The command speed exceeds the speed limit. | <ul style="list-style-type: none"> • The command speed is controlled at the "speed limit value". • The "speed limiting flag" turns ON. | |
| | 516 | Illegal teaching data No. | The positioning data No. is set outside the setting range. | Teaching is not carried out when the set value is 0 or 601 or more. (A "0" is canceled by the QD75M automatically even when a "0" or "601" or more is set.) | |
| | 517 | Illegal teaching data selection | The teaching data selection set value is outside the setting range. | Teaching is not carried out. | |
| | 518 | Target position change not possible | <ul style="list-style-type: none"> • A target position change request was given for the control system other than ABS1 and INC1. • The target position change request is turned ON during continuous path control. • A new target position address is outside the software stroke limit range. • A target position change request was given during deceleration to a stop. | The target position change is not carried out. | |

| Related buffer memory address | | | | Set range (Setting with PLC program) | Remedy |
|--|------------|------------|------------|--|---|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | |
| For command speed, refer to Section 5.3 "List of positioning data" | | | | 1 to 1000000 [PLS/s] 1 to 2000000000 [mm/min or another] | Set the command speed to within the setting range. |
| Speed limit value | | | | 1 to 1000000 [PLS/s] 1 to 2000000000 [mm/min or another] | |
| 10 11 | 160 161 | 310 311 | 460 461 | | |
| 1549 | 1649 | 1749 | 1849 | <Teaching positioning data No.> 1 to 600 | Set the positioning data No. to within the setting range. |
| 1548 | 1648 | 1748 | 1848 | <Teaching data selection> 0, 1 | Set the teaching data selection set value to within the setting range. |
| 1538 | 1638 | 1738 | 1838 | <Target position change request flag> 1: Target position change request | <ul style="list-style-type: none"> Do not turn ON the target position change request in the following cases. A control system other than ABS1, and INC1 is used. During deceleration stop. An operating pattern "continuous path control" is used. When the target position change address is outside the stroke limit, correct the target position change address. (Refer to Section 12.7.5) |

15.3.2 MR-H-BN detection warning

| Classification of warnings | Warning code | LED display of the servo amplifier | Warning name | Warning | Cause |
|----------------------------|--------------|------------------------------------|---|--|---|
| Servo amplifier warnings | 2092 | 92 | Open battery cable warning | Absolute position detection system battery voltage is low. | Battery cable is open. |
| | | | | | Battery voltage dropped to 2.8VDC or less |
| | 2096 | 96 | OPR setting error warning | OPR was not performed successfully. | Droop pulses remaining are greater than the in-position range setting. |
| | | | | | OPR was executed during operation command. |
| | | | | | Creep speed high. |
| | 2102 | 9F | Battery warning | Voltage of battery for absolute position detection system reduced. | Battery voltage fell to 3.2VDC or less. |
| | 2140 | E0 | Excessive regenerative load warning | There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. |
| | 2141 | E1 | Over load warning | There is a possibility that overload alarm 1 (error code: 2050) or 2 (error code: 2051) may occur. | Load increased to 85% or more of over load alarm 1 (error code: 2050) or 2 (error code: 2051) occurrence level. |
| | 2144 | E4 | Parameter alarm warning | Parameter is out of setting range. | Parameter has been set to a value that is out of setting range from QD75M. |
| | 2146 | E6 | Servo emergency stop warning | EMG1-SG is open. | Emergency stop was made valid. (EMG1-SG was opened.) |
| 2147 | E7 | Controller emergency stop warning | An emergency stop signal is input to the QD75M. | EMG (6 pin) or EMG* (16 pin) in the SSCNET cable is open. | |
| | | | | Fault of connector in the servo amplifier. | |
| | | | | Fault of connector in the QD75. A "watchdog error" will be occurred in the QD75. | |
| 2149 | E9 | Main circuit of warning | Servo ON signal is turned ON while the main circuit power is off. | Servo ON signal is turned ON while the main circuit power is off. | |

| Related buffer memory address | | | | Servo amplifier status of the warning occurrence. | Check point | Corrective action |
|----------------------------------|----------|----------|----------|---|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| — | — | — | — | Servo ON continued | | Repair cable or battery changed. |
| | | | | | | Change battery. |
| In-position range | | | | | | Remove the cause of droop pulse occurrence. |
| 30120 | 30220 | 30320 | 30420 | | | OPR wasn't executed during operation command. |
| — | — | — | — | | | Reduce creep speed. |
| Creep speed | | | | | | |
| 76, 77 | 226, 227 | 376, 377 | 526, 527 | | | |
| — | — | — | — | | | Change battery. |
| — | — | — | — | | Call the status display and check regenerative load ratio. | Reduce frequency of positioning. Change regenerative brake option for the one with larger capacity. Reduce load. |
| — | — | — | — | | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | Refer to error code (2050, 2051) (Refer to Section 15.2.3) |
| Refer to Section 5.2.7 to 5.2.10 | | | | | Set the parameter properly. | |
| Servo emergency stop selection | | | | Servo OFF | | Check for safety and release the emergency stop. |
| 30123 | 30223 | 30323 | 30423 | | Check continuity status of the SSCNET cable | Repair cable or battery changed. Change servo amplifier. |
| — | — | — | — | | | Change QD75. |
| — | — | — | — | | | |
| — | — | — | — | | | Switch on main circuit power. |
| — | — | — | — | | | |

15.3.3 MR-J2-B detection warning

| Classification of warnings | Warning code | LED display of the servo amplifier | Warning name | Warning | Cause |
|----------------------------|--------------|------------------------------------|---|--|---|
| Servo amplifier warnings | 2092 | 92 | Open battery cable warning | Absolute position detection system battery voltage is low. | Battery cable is open. |
| | | | | | Battery voltage dropped to 2.8VDC or less |
| | 2096 | 96 | OPR setting error warning | OPR was not performed successfully. | Droop pulses remaining are greater than the in-position range setting. |
| | | | | | OPR was executed during operation command. |
| | | | | | Creep speed high. |
| | 2140 | E0 | Excessive regenerative load warning | There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. |
| | 2141 | E1 | Over load warning | There is a possibility that overload alarm 1 (error code: 2050) or 2 (error code: 2051) may occur. | Load increased to 85% or more of over load alarm 1 (error code: 2050) or 2 (error code: 2051) occurrence level. |
| | 2143 | E3 | Absolute position counter warning | Absolute position encoder pulses faulty. | Noise entered the encoder. |
| | | | | | Fault of the encoder. |
| | 2144 | E4 | Parameter warning | Parameter outside setting range. | Parameter value set from QD75 controller is outside setting range. |
| | 2146 | E6 | Servo emergency stop warning | EMG1-SG is open. | Emergency stop was made valid. (EMG1-SG was opened.) |
| 2147 | E7 | Controller emergency stop warning | An emergency stop signal is input to the QD75. | EMG (6 pin) or EMG* (16 pin) in the SSCNET cable is open. | |
| | | | | Fault of connector in the servo amplifier. | |
| | | | | Fault of connector in the QD75. | |
| 2149 | E9 | Main circuit of warning | Servo ON signal is turned ON while the main circuit power is off. | Servo ON signal is turned ON while the main circuit power is off. | |

| Related buffer memory address | | | | | Servo amplifier status of the warning occurrence. | Check point | Corrective action |
|----------------------------------|----------|----------|----------|---|--|--|-------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| — | — | — | — | Servo ON continued | | Repair cable or battery changed. | |
| | | | | | | Change battery. | |
| In-position range | | | | | | Remove the cause of droop pulse occurrence. | |
| 30120 | 30220 | 30320 | 30420 | | | | |
| — | — | — | — | | | OPR wasn't executed during operation command. | |
| Creep speed | | | | | | Reduce creep speed. | |
| 76, 77 | 226, 227 | 376, 377 | 526, 527 | | | | |
| — | — | — | — | | Call the status display and check regenerative load ratio. | <ul style="list-style-type: none"> • Reduce frequency of positioning. • Change regenerative brake option for the one with larger capacity. • Reduce load. | |
| — | — | — | — | | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | |
| — | — | — | — | | | Take noise suppression measures. | |
| — | — | — | — | | Change servomotor. | | |
| Refer to Section 5.2.7 to 5.2.10 | | | | | | Set the parameter properly. | |
| Servo emergency stop selection | | | | | Servo OFF | Check for safety and release the emergency stop. | |
| 30123 | 30223 | 30323 | 30423 | | | | |
| — | — | — | — | Check continuity status of the SSCNET cable | | Repair cable or battery changed. | |
| — | — | — | — | | | Change servo amplifier. | |
| — | — | — | — | | | Change QD75. | |
| — | — | — | — | | | Switch on main circuit power. | |

15.3.4 MR-J2S-B detection warning

| Classification of warnings | Warning code | LED display of the servo amplifier | Warning name | Warning | Cause |
|----------------------------|--------------|------------------------------------|---|--|---|
| Servo amplifier warnings | 2092 | 92 | Open battery cable warning | Absolute position detection system battery voltage is low. | Battery cable is open. |
| | | | | | Battery voltage dropped to 2.8VDC or less |
| | 2096 | 96 | OPR setting error warning | OPR was not performed successfully. | Droop pulses remaining are greater than the in-position range setting. |
| | | | | | OPR was executed during operation command. |
| | | | | | Creep speed high. |
| | 2102 | 9F | Battery warning | Voltage of battery for absolute position detection system reduced. | Battery voltage fell to 3.2VDC or less. |
| | 2140 | E0 | Excessive regenerative load warning | There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. |
| | 2141 | E1 | Over load warning | There is a possibility that overload alarm 1 (error code: 2050) or 2 (error code: 2051) may occur. | Load increased to 85% or more of over load alarm 1 (error code: 2050) or 2 (error code: 2051) occurrence level. |
| | 2143 | E3 | Absolute position counter warning | Absolute position encoder pulses faulty. | Noise entered the encoder. |
| | | | | | Fault of the encoder. |
| | 2144 | E4 | Parameter warning | Parameter outside setting range. | Parameter value set from QD75 controller is outside setting range. |
| | 2146 | E6 | Servo emergency stop warning | EMG1-SG is open. | Emergency stop was made valid. (EMG1-SG was opened.) |
| 2147 | E7 | Controller emergency stop warning | An emergency stop signal is input to the QD75. | EMG (6 pin) or EMG* (16 pin) in the SSCNET cable is open. | |
| | | | | Fault of connector in the servo amplifier. | |
| | | | | Fault of connector in the QD75. | |
| 2149 | E9 | Main circuit of warning | Servo ON signal is turned ON while the main circuit power is off. | Servo ON signal is turned ON while the main circuit power is off. | |

| Related buffer memory address | | | | | Servo amplifier status of the warning occurrence. | Check point | Corrective action |
|----------------------------------|----------|----------|----------|--------------------|---|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| — | — | — | — | Servo ON continued | | Repair cable or battery changed. | |
| | | | | | | Change battery. | |
| In-position range | | | | | | Remove the cause of droop pulse occurrence. | |
| 30120 | 30220 | 30320 | 30420 | | | OPR wasn't executed during operation command. | |
| — | — | — | — | | | Reduce creep speed. | |
| Creep speed | | | | | | | |
| 76, 77 | 226, 227 | 376, 377 | 526, 527 | | | Change battery. | |
| — | — | — | — | | | Call the status display and check regenerative load ratio. | <ul style="list-style-type: none"> • Reduce frequency of positioning. • Change regenerative brake option for the one with larger capacity. • Reduce load. |
| — | — | — | — | | | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | Refer to error code (2050, 2051) (Refer to Section 15.2.3) |
| — | — | — | — | | | | Take noise suppression measures. |
| — | — | — | — | | | Change servomotor. | |
| Refer to Section 5.2.7 to 5.2.10 | | | | | | Set the parameter properly. | |
| Servo emergency stop selection | | | | | Servo OFF | | Check for safety and release the emergency stop. |
| 30123 | 30223 | 30323 | 30423 | | | Check continuity status of the SSCNET cable | Repair cable or battery changed. |
| — | — | — | — | | | | Change servo amplifier. |
| — | — | — | — | | | | Change QD75. |
| — | — | — | — | | | | Switch on main circuit power. |
| — | — | — | — | | | | |

15.3.5 MR-J2-Jr detection warning

| Classification of warnings | Warning code | LED display of the servo amplifier | Warning name | Warning | Cause |
|----------------------------|--------------|------------------------------------|-----------------------------------|--|---|
| Servo amplifier warnings | 2141 | E1 | Over load warning | There is a possibility that overload alarm 1 (error code: 2050) or 2 (error code: 2051) may occur. | Load increased to 85% or more of over load alarm 1 (error code: 2050) or 2 (error code: 2051) occurrence level. |
| | 2144 | E4 | Parameter warning | Parameter outside setting range. | Parameter value set from QD75M controller is outside setting range. |
| | 2146 | E6 | Servo emergency stop warning | EMG1-SG is open. | Emergency stop was made valid. (EMG1-SG was opened.) |
| | 2147 | E7 | Controller emergency stop warning | An emergency stop signal is input to the QD75. | EMG (6 pin) or EMG* (16 pin) in the SSCNET cable is open. |
| | | | | | Fault of connector in the servo amplifier. |
| | | | | Fault of connector in the QD75. | |
| | | | | A "watchdog error" will be occurred in the QD75. | |
| | 2149 | E9 | Main circuit of warning | Servo ON signal is turned ON while the main circuit power is off. | Servo ON signal is turned ON while the main circuit power is off. |

| Related buffer memory address | | | | | Servo amplifier status of the warning occurrence. | Check point | Corrective action |
|----------------------------------|--------|--------|--------|---|---|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| — | — | — | — | — | Servo ON continued | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | Refer to error code (2050, 2051) (Refer to Section 15.2.3) |
| Refer to Section 5.2.7 to 5.2.10 | | | | | | | |
| Servo emergency stop selection | | | | | Servo OFF | | Check for safety and release the emergency stop. |
| 30123 | 30223 | 30323 | 30423 | | | Check continuity status of the SSCNET cable | Repair cable or battery changed. |
| — | — | — | — | | | | Change servo amplifier. |
| — | — | — | — | | | | Change QD75. |
| — | — | — | — | | | | Switch on main circuit power. |
| — | — | — | — | | | | |

15.3.6 MR-J2M-B detection warning

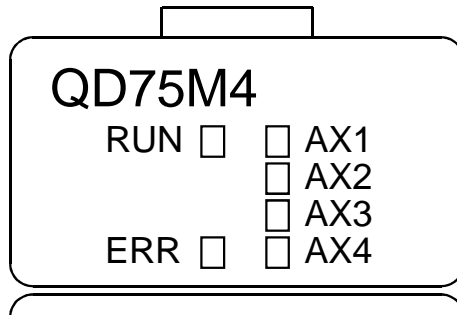
@ in the indication field denotes the slot number of the base unit and # the axis number of the servo amplifier.

| Classification of warnings | Warning code | LED display of the servo amplifier | | Warning name | Warning | Cause | |
|----------------------------|--------------|------------------------------------|--------|-------------------------------------|--|--|--|
| | | IFU | DRU | | | | |
| Servo amplifier warnings | 2092 | — | @A.92# | Open battery cable warning | Absolute position detection system battery voltage is low. | Battery cable is open. Battery voltage dropped to 2.8VDC or less Encoder cable is open. | |
| | 2096 | — | @A.96# | OPR setting error warning | OPR was not performed successfully. | Droop pulses remaining are greater than the in-position range setting. OPR was executed during operation command. Creep speed high. | |
| | 2102 | FA.9F | — | Battery warning | Voltage of battery for absolute position detection system reduced. | Battery voltage fell to 3.2VDC or less. | |
| | 2140 | FA.E0 | — | Excessive regenerative load warning | There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | Regenerative power increased to 85% or more of permissible regenerative power of built-in regenerative brake resistor or regenerative brake option. | |
| | 2141 | — | @A.E1# | Over load warning | There is a possibility that overload alarm 1 (error code: 2050) or 2 (error code: 2051) may occur. | Load increased to 85% or more of over load alarm 1 (error code: 2050) or 2 (error code: 2051) occurrence level. | |
| | 2143 | — | @A.E3# | Absolute position counter warning | Absolute position encoder pulses faulty. | Noise entered the encoder. Fault of the encoder. | |
| | 2144 | — | @A.E4# | Parameter warning | Parameter outside setting range. | Parameter value set from QD75 controller is outside setting range. | |
| | 2146 | FA.E6 | — | Servo emergency stop warning | EMG1-SG is open. | Emergency stop was made valid. (EMG1-SG was opened.) | |
| | 2147 | FA.E7 | — | Controller emergency stop warning | An emergency stop signal is input to the QD75. | EMG (6 pin) or EMG* (16 pin) in the SSCNET cable is open. Fault of connector in the servo amplifier. Fault of connector in the QD75. A "watchdog error" will be occurred in the QD75. | |
| | 2149 | FA.E9 | — | Main circuit of warning | Servo ON signal is turned ON while the main circuit power is off. | Servo ON signal is turned ON while the main circuit power is off. | |

| Related buffer memory address | | | | | Servo amplifier status of the warning occurrence. | Check point | Corrective action |
|----------------------------------|----------|----------|----------|---|--|--|-------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| — | — | — | — | Servo ON continued | | Repair cable or battery changed. | |
| — | — | — | — | | | Change battery. | |
| — | — | — | — | | | Change encoder cable. | |
| In-position range | | | | | | Remove the cause of droop pulse occurrence. | |
| 30120 | 30220 | 30320 | 30420 | | | | |
| — | — | — | — | | | OPR wasn't executed during operation command. | |
| Creep speed | | | | | | Reduce creep speed. | |
| 76, 77 | 226, 227 | 376, 377 | 526, 527 | | | | |
| — | — | — | — | | | Change battery unit. | |
| — | — | — | — | | Call the status display and check regenerative load ratio. | Reduce frequency of positioning. | |
| — | — | — | — | | | Change regenerative brake option for the one with larger capacity. | |
| — | — | — | — | | | Reduce load. | |
| — | — | — | — | | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | Refer to error code (2050, 2051) (Refer to Section 15.2.3) | |
| — | — | — | — | | | | |
| — | — | — | — | | Take noise suppression measures. | | |
| — | — | — | — | | Change servomotor. | | |
| Refer to Section 5.2.7 to 5.2.10 | | | | | | Set the parameter properly. | |
| Servo emergency stop selection | | | | | Servo OFF | Check for safety and release the emergency stop. | |
| 30123 | 30223 | 30323 | 30423 | | | | |
| — | — | — | — | Check continuity status of the SSCNET cable | | Repair cable or battery changed. | |
| — | — | — | — | | | Change servo amplifier. | |
| — | — | — | — | | | Change QD75. | |
| — | — | — | — | | | Switch on main circuit power. | |
| — | — | — | — | | | | |

15.4 LED display functions

The states of QD75 and each axis control can be confirmed by the LEDs located on the front panel of the QD75 main unit.



Each axis can be monitored by the states of the LEDs.
The operation and indications of the LEDs are as shown below.

| Details of indication Goes OFF □ Goes ON ■ Flashes ◆ | Points to be confirmed | Error | Remedy |
|---|--|---|---|
| RUN □ □ AX1 □ AX2 □ AX3 ERR □ □ AX4 | Extinguishment of RUN LED | The hardware is faulty or watch dog timer error occurs. | If the RUN LED does not light up even when the power is turned ON, the module may be out of order. Replace the module with a new one. |
| RUN ■ □ AX1 □ AX2 □ AX3 ERR □ □ AX4 | Lighting of RUN LED, Extinguishment of ERR LED | The module is normal. | — |
| RUN ■ □ AX1 □ AX2 □ AX3 ERR ■ □ AX4 | Lighting of ERR LED | System error | An operation condition setting error or installation PLC CPU type error occurs. (The setting and PLC CPU type are outside the specification range.) Set the PLC CPU type to a one contained in the specification. |
| RUN ■ □ AX1 □ AX2 □ AX3 ERR □ □ AX4 | Extinguishment of AX1 to AX4 LEDs | During axis stop, during axis standby | — |
| RUN ■ ■ AX1 □ AX2 □ AX3 ERR □ □ AX4 | Lighting of AX1 (Same even if the other axis is lit) | During axis operation | This lights up from the positioning start until the positioning is completed, stopped temporarily, or stopped by error (corresponding at a ratio of 1 : 1 to BUSY signals). |
| RUN ■ ◆ AX1 □ AX2 □ AX3 ERR ◆ □ AX4 | Flashing of ERR LED Flashing of AX1 LED (Same even if the other axis flashes) | Axis error | Check the error observed on the buffer memory batch processing monitor of a peripheral device and correct the applicable parameters and positioning data. |
| RUN ■ ■ AX1 ■ AX2 ■ AX3 ERR ■ ■ AX4 | Lighting of all LEDs | The hardware is faulty | The module comes out of order. Replace the module with a new one. |

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Appendix 1 Functions

Appendix 1.1 Multiple CPU correspond function

Refer to the QCPU User's Manual (Multiple CPU system). (SH-080485ENG)

Appendix 1.2 The combination of software package for QD75 and QCPU

Refer to the GX Configurator-QP Operating Manual. (SH-080172)

Appendix 2 Positioning data (No.1 to 600)
List of buffer memory addresses

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 1 | 2000 | 2001 | 2002 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| 2 | 2010 | 2011 | 2012 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| 3 | 2020 | 2021 | 2022 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| 4 | 2030 | 2031 | 2032 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| 5 | 2040 | 2041 | 2042 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 |
| 6 | 2050 | 2051 | 2052 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 |
| 7 | 2060 | 2061 | 2062 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 |
| 8 | 2070 | 2071 | 2072 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 |
| 9 | 2080 | 2081 | 2082 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 |
| 10 | 2090 | 2091 | 2092 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 |
| 11 | 2100 | 2101 | 2102 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 |
| 12 | 2110 | 2111 | 2112 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 |
| 13 | 2120 | 2121 | 2122 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 |
| 14 | 2130 | 2131 | 2132 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 |
| 15 | 2140 | 2141 | 2142 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 |
| 16 | 2150 | 2151 | 2152 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 |
| 17 | 2160 | 2161 | 2162 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 |
| 18 | 2170 | 2171 | 2172 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 |
| 19 | 2180 | 2181 | 2182 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 |
| 20 | 2190 | 2191 | 2192 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 |
| 21 | 2200 | 2201 | 2202 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 |
| 22 | 2210 | 2211 | 2212 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 |
| 23 | 2220 | 2221 | 2222 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 |
| 24 | 2230 | 2231 | 2232 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 |
| 25 | 2240 | 2241 | 2242 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 |
| 26 | 2250 | 2251 | 2252 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 |
| 27 | 2260 | 2261 | 2262 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 |
| 28 | 2270 | 2271 | 2272 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 |
| 29 | 2280 | 2281 | 2282 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 |
| 30 | 2290 | 2291 | 2292 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 |
| 31 | 2300 | 2301 | 2302 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 |
| 32 | 2310 | 2311 | 2312 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 |
| 33 | 2320 | 2321 | 2322 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 |
| 34 | 2330 | 2331 | 2332 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 |
| 35 | 2340 | 2341 | 2342 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 |
| 36 | 2350 | 2351 | 2352 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 |
| 37 | 2360 | 2361 | 2362 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 |
| 38 | 2370 | 2371 | 2372 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 |
| 39 | 2380 | 2381 | 2382 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 |
| 40 | 2390 | 2391 | 2392 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 |
| 41 | 2400 | 2401 | 2402 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 |
| 42 | 2410 | 2411 | 2412 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 |
| 43 | 2420 | 2421 | 2422 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 |
| 44 | 2430 | 2431 | 2432 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 |
| 45 | 2440 | 2441 | 2442 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 |
| 46 | 2450 | 2451 | 2452 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 |
| 47 | 2460 | 2461 | 2462 | 2464 | 2465 | 2466 | 2467 | 2468 | 2469 |
| 48 | 2470 | 2471 | 2472 | 2474 | 2475 | 2476 | 2477 | 2478 | 2479 |
| 49 | 2480 | 2481 | 2482 | 2484 | 2485 | 2486 | 2487 | 2488 | 2489 |
| 50 | 2490 | 2491 | 2492 | 2494 | 2495 | 2496 | 2497 | 2498 | 2499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 51 | 2500 | 2501 | 2502 | 2504 | 2505 | 2506 | 2507 | 2508 | 2509 |
| 52 | 2510 | 2511 | 2512 | 2514 | 2515 | 2516 | 2517 | 2518 | 2519 |
| 53 | 2520 | 2521 | 2522 | 2524 | 2525 | 2526 | 2527 | 2528 | 2529 |
| 54 | 2530 | 2531 | 2532 | 2534 | 2535 | 2536 | 2537 | 2538 | 539 |
| 55 | 2540 | 2541 | 2542 | 2544 | 2545 | 2546 | 2547 | 2548 | 2549 |
| 56 | 2550 | 2551 | 2552 | 2554 | 2555 | 2556 | 2557 | 2558 | 2559 |
| 57 | 2560 | 2561 | 2562 | 2564 | 2565 | 2566 | 2567 | 2568 | 2569 |
| 58 | 2570 | 2571 | 2572 | 2574 | 2575 | 2576 | 2577 | 2578 | 2579 |
| 59 | 2580 | 2581 | 2582 | 2584 | 2585 | 2586 | 2587 | 2588 | 2589 |
| 60 | 2590 | 2591 | 2592 | 2594 | 2595 | 2596 | 2597 | 2598 | 2599 |
| 61 | 2600 | 2601 | 2602 | 2604 | 2605 | 2606 | 2607 | 2608 | 2609 |
| 62 | 2610 | 2611 | 2612 | 2614 | 2615 | 2616 | 2617 | 2618 | 2619 |
| 63 | 2620 | 2621 | 2622 | 2624 | 2625 | 2626 | 2627 | 2628 | 2629 |
| 64 | 2630 | 2631 | 2632 | 2634 | 2635 | 2636 | 2637 | 2638 | 2639 |
| 65 | 2640 | 2641 | 2642 | 2644 | 2645 | 2646 | 2647 | 2648 | 2649 |
| 66 | 2650 | 2651 | 2652 | 2654 | 2655 | 2656 | 2657 | 2658 | 2659 |
| 67 | 2660 | 2661 | 2662 | 2664 | 2665 | 2666 | 2667 | 2668 | 2669 |
| 68 | 2670 | 2671 | 2672 | 2674 | 2675 | 2676 | 2677 | 2678 | 2679 |
| 69 | 2680 | 2681 | 2682 | 2684 | 2685 | 2686 | 2687 | 2688 | 2689 |
| 70 | 2690 | 2691 | 2692 | 2694 | 2695 | 2696 | 2697 | 2698 | 2699 |
| 71 | 2700 | 2701 | 2702 | 2704 | 2705 | 2706 | 2707 | 2708 | 2709 |
| 72 | 2710 | 2711 | 2712 | 2714 | 2715 | 2716 | 2717 | 2718 | 2719 |
| 73 | 2720 | 2721 | 2722 | 2724 | 2725 | 2726 | 2727 | 2728 | 2729 |
| 74 | 2730 | 2731 | 2732 | 2734 | 2735 | 2736 | 2737 | 2738 | 2739 |
| 75 | 2740 | 2741 | 2742 | 2744 | 2745 | 2746 | 2747 | 2748 | 2749 |
| 76 | 2750 | 2751 | 2752 | 2754 | 2755 | 2756 | 2757 | 2758 | 2759 |
| 77 | 2760 | 2761 | 2762 | 2764 | 2765 | 2766 | 2767 | 2768 | 2769 |
| 78 | 2770 | 2771 | 2772 | 2774 | 2775 | 2776 | 2777 | 2778 | 2779 |
| 79 | 2780 | 2781 | 2782 | 2784 | 2785 | 2786 | 2787 | 2788 | 2789 |
| 80 | 2790 | 2791 | 2792 | 2794 | 2795 | 2796 | 2797 | 2798 | 2799 |
| 81 | 2800 | 2801 | 2802 | 2804 | 2805 | 2806 | 2807 | 2808 | 2809 |
| 82 | 2810 | 2811 | 2812 | 2814 | 2815 | 2816 | 2817 | 2818 | 2819 |
| 83 | 2820 | 2821 | 2822 | 2824 | 2825 | 2826 | 2827 | 2828 | 2829 |
| 84 | 2830 | 2831 | 2832 | 2834 | 2835 | 2836 | 2837 | 2838 | 2839 |
| 85 | 2840 | 2841 | 2842 | 2844 | 2845 | 2846 | 2847 | 2848 | 2849 |
| 86 | 2850 | 2851 | 2852 | 2854 | 2855 | 2856 | 2857 | 2858 | 2859 |
| 87 | 2860 | 2861 | 2862 | 2864 | 2865 | 2866 | 2867 | 2868 | 2869 |
| 88 | 2870 | 2871 | 2872 | 2874 | 2875 | 2876 | 2877 | 2878 | 2879 |
| 89 | 2880 | 2881 | 2882 | 2884 | 2885 | 2886 | 2887 | 2888 | 2889 |
| 90 | 2890 | 2891 | 2892 | 2894 | 2895 | 2896 | 2897 | 2898 | 2899 |
| 91 | 2900 | 2901 | 2902 | 2904 | 2905 | 2906 | 2907 | 2908 | 2909 |
| 92 | 2910 | 2911 | 2912 | 2914 | 2915 | 2916 | 2917 | 2918 | 2919 |
| 93 | 2920 | 2921 | 2922 | 2924 | 2925 | 2926 | 2927 | 2928 | 2929 |
| 94 | 2930 | 2931 | 2932 | 2934 | 2935 | 2936 | 2937 | 2938 | 2939 |
| 95 | 2940 | 2941 | 2942 | 2944 | 2945 | 2946 | 2947 | 2948 | 2949 |
| 96 | 2950 | 2951 | 2952 | 2954 | 2955 | 2956 | 2957 | 2958 | 2959 |
| 97 | 2960 | 2961 | 2962 | 2964 | 2965 | 2966 | 2967 | 2968 | 2969 |
| 98 | 2970 | 2971 | 2972 | 2974 | 2975 | 2976 | 2977 | 2978 | 2979 |
| 99 | 2980 | 2981 | 2982 | 2984 | 2985 | 2986 | 2987 | 2988 | 2989 |
| 100 | 2990 | 2991 | 2992 | 2994 | 2995 | 2996 | 2997 | 2998 | 2999 |

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 101 | 3000 | 3001 | 3002 | 3004 | 3005 | 3006 | 3007 | 3008 | 3009 |
| 102 | 3010 | 3011 | 3012 | 3014 | 3015 | 3016 | 3017 | 3018 | 3019 |
| 103 | 3020 | 3021 | 3022 | 3024 | 3025 | 3026 | 3027 | 3028 | 3029 |
| 104 | 3030 | 3031 | 3032 | 3034 | 3035 | 3036 | 3037 | 3038 | 3039 |
| 105 | 3040 | 3041 | 3042 | 3044 | 3045 | 3046 | 3047 | 3048 | 3049 |
| 106 | 3050 | 3051 | 3052 | 3054 | 3055 | 3056 | 3057 | 3058 | 3059 |
| 107 | 3060 | 3061 | 3062 | 3064 | 3065 | 3066 | 3067 | 3068 | 3069 |
| 108 | 3070 | 3071 | 3072 | 3074 | 3075 | 3076 | 3077 | 3078 | 3079 |
| 109 | 3080 | 3081 | 3082 | 3084 | 3085 | 3086 | 3087 | 3088 | 3089 |
| 110 | 3090 | 3091 | 3092 | 3094 | 3095 | 3096 | 3097 | 3098 | 3099 |
| 111 | 3100 | 3101 | 3102 | 3104 | 3105 | 3106 | 3107 | 3108 | 3109 |
| 112 | 3110 | 3111 | 3112 | 3114 | 3115 | 3116 | 3117 | 3118 | 3119 |
| 113 | 3120 | 3121 | 3122 | 3124 | 3125 | 3126 | 3127 | 3128 | 3129 |
| 114 | 3130 | 3131 | 3132 | 3134 | 3135 | 3136 | 3137 | 3138 | 3139 |
| 115 | 3140 | 3141 | 3142 | 3144 | 3145 | 3146 | 3147 | 3148 | 3149 |
| 116 | 3150 | 3151 | 3152 | 3154 | 3155 | 3156 | 3157 | 3158 | 3159 |
| 117 | 3160 | 3161 | 3162 | 3164 | 3165 | 3166 | 3167 | 3168 | 3169 |
| 118 | 3170 | 3171 | 3172 | 3174 | 3175 | 3176 | 3177 | 3178 | 3179 |
| 119 | 3180 | 3181 | 3182 | 3184 | 3185 | 3186 | 3187 | 3188 | 3189 |
| 120 | 3190 | 3191 | 3192 | 3194 | 3195 | 3196 | 3197 | 3198 | 3199 |
| 121 | 3200 | 3201 | 3202 | 3204 | 3205 | 3206 | 3207 | 3208 | 3209 |
| 122 | 3210 | 3211 | 3212 | 3214 | 3215 | 3216 | 3217 | 3218 | 3219 |
| 123 | 3220 | 3221 | 3222 | 3224 | 3225 | 3226 | 3227 | 3228 | 3229 |
| 124 | 3230 | 3231 | 3232 | 3234 | 3235 | 3236 | 3237 | 3238 | 3239 |
| 125 | 3240 | 3241 | 3242 | 3244 | 3245 | 3246 | 3247 | 3248 | 3249 |
| 126 | 3250 | 3251 | 3252 | 3254 | 3255 | 3256 | 3257 | 3258 | 3259 |
| 127 | 3260 | 3261 | 3262 | 3264 | 3265 | 3266 | 3267 | 3268 | 3269 |
| 128 | 3270 | 3271 | 3272 | 3274 | 3275 | 3276 | 3277 | 3278 | 3279 |
| 129 | 3280 | 3281 | 3282 | 3284 | 3285 | 3286 | 3287 | 3288 | 3289 |
| 130 | 3290 | 3291 | 3292 | 3294 | 3295 | 3296 | 3297 | 3298 | 3299 |
| 131 | 3300 | 3301 | 3302 | 3304 | 3305 | 3306 | 3307 | 3308 | 3309 |
| 132 | 3310 | 3311 | 3312 | 3314 | 3315 | 3316 | 3317 | 3318 | 3319 |
| 133 | 3320 | 3321 | 3322 | 3324 | 3325 | 3326 | 3327 | 3328 | 3329 |
| 134 | 3330 | 3331 | 3332 | 3334 | 3335 | 3336 | 3337 | 3338 | 3339 |
| 135 | 3340 | 3341 | 3342 | 3344 | 3345 | 3346 | 3347 | 3348 | 3349 |
| 136 | 3350 | 3351 | 3352 | 3354 | 3355 | 3356 | 3357 | 3358 | 3359 |
| 137 | 3360 | 3361 | 3362 | 3364 | 3365 | 3366 | 3367 | 3368 | 3369 |
| 138 | 3370 | 3371 | 3372 | 3374 | 3375 | 3376 | 3377 | 3378 | 3379 |
| 139 | 3380 | 3381 | 3382 | 3384 | 3385 | 3386 | 3387 | 3388 | 3389 |
| 140 | 3390 | 3391 | 3392 | 3394 | 3395 | 3396 | 3397 | 3398 | 3399 |
| 141 | 3400 | 3401 | 3402 | 3404 | 3405 | 3406 | 3407 | 3408 | 3409 |
| 142 | 3410 | 3411 | 3412 | 3414 | 3415 | 3416 | 3417 | 3418 | 3419 |
| 143 | 3420 | 3421 | 3422 | 3424 | 3425 | 3426 | 3427 | 3428 | 3429 |
| 144 | 3430 | 3431 | 3432 | 3434 | 3435 | 3436 | 3437 | 3438 | 3439 |
| 145 | 3440 | 3441 | 3442 | 3444 | 3445 | 3446 | 3447 | 3448 | 3449 |
| 146 | 3450 | 3451 | 3452 | 3454 | 3455 | 3456 | 3457 | 3458 | 3459 |
| 147 | 3460 | 3461 | 3462 | 3464 | 3465 | 3466 | 3467 | 3468 | 3469 |
| 148 | 3470 | 3471 | 3472 | 3474 | 3475 | 3476 | 3477 | 3478 | 3479 |
| 149 | 3480 | 3481 | 3482 | 3484 | 3485 | 3486 | 3487 | 3488 | 3489 |
| 150 | 3490 | 3491 | 3492 | 3494 | 3495 | 3496 | 3497 | 3498 | 3499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 151 | 3500 | 3501 | 3502 | 3504 | 3505 | 3506 | 3507 | 3508 | 3509 |
| 152 | 3510 | 3511 | 3512 | 3514 | 3515 | 3516 | 3517 | 3518 | 3519 |
| 153 | 3520 | 3521 | 3522 | 3524 | 3525 | 3526 | 3527 | 3528 | 3529 |
| 154 | 3530 | 3531 | 3532 | 3534 | 3535 | 3536 | 3537 | 3538 | 3539 |
| 155 | 3540 | 3541 | 3542 | 3544 | 3545 | 3546 | 3547 | 3548 | 3549 |
| 156 | 3550 | 3551 | 3552 | 3554 | 3555 | 3556 | 3557 | 3558 | 3559 |
| 157 | 3560 | 3561 | 3562 | 3564 | 3565 | 3566 | 3567 | 3568 | 3569 |
| 158 | 3570 | 3571 | 3572 | 3574 | 3575 | 3576 | 3577 | 3578 | 3579 |
| 159 | 3580 | 3581 | 3582 | 3584 | 3585 | 3586 | 3587 | 3588 | 3589 |
| 160 | 3590 | 3591 | 3592 | 3594 | 3595 | 3596 | 3597 | 3598 | 3599 |
| 161 | 3600 | 3601 | 3602 | 3604 | 3605 | 3606 | 3607 | 3608 | 3609 |
| 162 | 3610 | 3611 | 3612 | 3614 | 3615 | 3616 | 3617 | 3618 | 3619 |
| 163 | 3620 | 3621 | 3622 | 3624 | 3625 | 3626 | 3627 | 3628 | 3629 |
| 164 | 3630 | 3631 | 3632 | 3634 | 3635 | 3636 | 3637 | 3638 | 3639 |
| 165 | 3640 | 3641 | 3642 | 3644 | 3645 | 3646 | 3647 | 3648 | 3649 |
| 166 | 3650 | 3651 | 3652 | 3654 | 3655 | 3656 | 3657 | 3658 | 3659 |
| 167 | 3660 | 3661 | 3662 | 3664 | 3665 | 3666 | 3667 | 3668 | 3669 |
| 168 | 3670 | 3671 | 3672 | 3674 | 3675 | 3676 | 3677 | 3678 | 3679 |
| 169 | 3680 | 3681 | 3682 | 3684 | 3685 | 3686 | 3687 | 3688 | 3689 |
| 170 | 3690 | 3691 | 3692 | 3694 | 3695 | 3696 | 3697 | 3698 | 3699 |
| 171 | 3700 | 3701 | 3702 | 3704 | 3705 | 3706 | 3707 | 3708 | 3709 |
| 172 | 3710 | 3711 | 3712 | 3714 | 3715 | 3716 | 3717 | 3718 | 3719 |
| 173 | 3720 | 3721 | 3722 | 3724 | 3725 | 3726 | 3727 | 3728 | 3729 |
| 174 | 3730 | 3731 | 3732 | 3734 | 3735 | 3736 | 3737 | 3738 | 3739 |
| 175 | 3740 | 3741 | 3742 | 3744 | 3745 | 3746 | 3747 | 3748 | 3749 |
| 176 | 3750 | 3751 | 3752 | 3754 | 3755 | 3756 | 3757 | 3758 | 3759 |
| 177 | 3760 | 3761 | 3762 | 3764 | 3765 | 3766 | 3767 | 3768 | 3769 |
| 178 | 3770 | 3771 | 3772 | 3774 | 3775 | 3776 | 3777 | 3778 | 3779 |
| 179 | 3780 | 3781 | 3782 | 3784 | 3785 | 3786 | 3787 | 3788 | 3789 |
| 180 | 3790 | 3791 | 3792 | 3794 | 3795 | 3796 | 3797 | 3798 | 3799 |
| 181 | 3800 | 3801 | 3802 | 3804 | 3805 | 3806 | 3807 | 3808 | 3809 |
| 182 | 3810 | 3811 | 3812 | 3814 | 3815 | 3816 | 3817 | 3818 | 3819 |
| 183 | 3820 | 3821 | 3822 | 3824 | 3825 | 3826 | 3827 | 3828 | 3829 |
| 184 | 3830 | 3831 | 3832 | 3834 | 3835 | 3836 | 3837 | 3838 | 3839 |
| 185 | 3840 | 3841 | 3842 | 3844 | 3845 | 3846 | 3847 | 3848 | 3849 |
| 186 | 3850 | 3851 | 3852 | 3854 | 3855 | 3856 | 3857 | 3858 | 3859 |
| 187 | 3860 | 3861 | 3862 | 3864 | 3865 | 3866 | 3867 | 3868 | 3869 |
| 188 | 3870 | 3871 | 3872 | 3874 | 3875 | 3876 | 3877 | 3878 | 3879 |
| 189 | 3880 | 3881 | 3882 | 3884 | 3885 | 3886 | 3887 | 3888 | 3889 |
| 190 | 3890 | 3891 | 3892 | 3894 | 3895 | 3896 | 3897 | 3898 | 3899 |
| 191 | 3900 | 3901 | 3902 | 3904 | 3905 | 3906 | 3907 | 3908 | 3909 |
| 192 | 3910 | 3911 | 3912 | 3914 | 3915 | 3916 | 3917 | 3918 | 3919 |
| 193 | 3920 | 3921 | 3922 | 3924 | 3925 | 3926 | 3927 | 3928 | 3929 |
| 194 | 3930 | 3931 | 3932 | 3934 | 3935 | 3936 | 3937 | 3938 | 3939 |
| 195 | 3940 | 3941 | 3942 | 3944 | 3945 | 3946 | 3947 | 3948 | 3949 |
| 196 | 3950 | 3951 | 3952 | 3954 | 3955 | 3956 | 3957 | 3958 | 3959 |
| 197 | 3960 | 3961 | 3962 | 3964 | 3965 | 3966 | 3967 | 3968 | 3969 |
| 198 | 3970 | 3971 | 3972 | 3974 | 3975 | 3976 | 3977 | 3978 | 3979 |
| 199 | 3980 | 3981 | 3982 | 3984 | 3985 | 3986 | 3987 | 3988 | 3989 |
| 200 | 3990 | 3991 | 3992 | 3994 | 3995 | 3996 | 3997 | 3998 | 3999 |

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 201 | 4000 | 4001 | 4002 | 4004 | 4005 | 4006 | 4007 | 4008 | 4009 |
| 202 | 4010 | 4011 | 4012 | 4014 | 4015 | 4016 | 4017 | 4018 | 4019 |
| 203 | 4020 | 4021 | 4022 | 4024 | 4025 | 4026 | 4027 | 4028 | 4029 |
| 204 | 4030 | 4031 | 4032 | 4034 | 4035 | 4036 | 4037 | 4038 | 4039 |
| 205 | 4040 | 4041 | 4042 | 4044 | 4045 | 4046 | 4047 | 4048 | 4049 |
| 206 | 4050 | 4051 | 4052 | 4054 | 4055 | 4056 | 4057 | 4058 | 4059 |
| 207 | 4060 | 4061 | 4062 | 4064 | 4065 | 4066 | 4067 | 4068 | 4069 |
| 208 | 4070 | 4071 | 4072 | 4074 | 4075 | 4076 | 4077 | 4078 | 4079 |
| 209 | 4080 | 4081 | 4082 | 4084 | 4085 | 4086 | 4087 | 4088 | 4089 |
| 210 | 4090 | 4091 | 4092 | 4094 | 4095 | 4096 | 4097 | 4098 | 4099 |
| 211 | 4100 | 4101 | 4102 | 4104 | 4105 | 4106 | 4107 | 4108 | 4109 |
| 212 | 4110 | 4111 | 4112 | 4114 | 4115 | 4116 | 4117 | 4118 | 4119 |
| 213 | 4120 | 4121 | 4122 | 4124 | 4125 | 4126 | 4127 | 4128 | 4129 |
| 214 | 4130 | 4131 | 4132 | 4134 | 4135 | 4136 | 4137 | 4138 | 4139 |
| 215 | 4140 | 4141 | 4142 | 4144 | 4145 | 4146 | 4147 | 4148 | 4149 |
| 216 | 4150 | 4151 | 4152 | 4154 | 4155 | 4156 | 4157 | 4158 | 4159 |
| 217 | 4160 | 4161 | 4162 | 4164 | 4165 | 4166 | 4167 | 4168 | 4169 |
| 218 | 4170 | 4171 | 4172 | 4174 | 4175 | 4176 | 4177 | 4178 | 4179 |
| 219 | 4180 | 4181 | 4182 | 4184 | 4185 | 4186 | 4187 | 4188 | 4189 |
| 220 | 4190 | 4191 | 4192 | 4194 | 4195 | 4196 | 4197 | 4198 | 4199 |
| 221 | 4200 | 4201 | 4202 | 4204 | 4205 | 4206 | 4207 | 4208 | 4209 |
| 222 | 4210 | 4211 | 4212 | 4214 | 4215 | 4216 | 4217 | 4218 | 4219 |
| 223 | 4220 | 4221 | 4222 | 4224 | 4225 | 4226 | 4227 | 4228 | 4229 |
| 224 | 4230 | 4231 | 4232 | 4234 | 4235 | 4236 | 4237 | 4238 | 4239 |
| 225 | 4240 | 4241 | 4242 | 4244 | 4245 | 4246 | 4247 | 4248 | 4249 |
| 226 | 4250 | 4251 | 4252 | 4254 | 4255 | 4256 | 4257 | 4258 | 4259 |
| 227 | 4260 | 4261 | 4262 | 4264 | 4265 | 4266 | 4267 | 4268 | 4269 |
| 228 | 4270 | 4271 | 4272 | 4274 | 4275 | 4276 | 4277 | 4278 | 4279 |
| 229 | 4280 | 4281 | 4282 | 4284 | 4285 | 4286 | 4287 | 4288 | 4289 |
| 230 | 4290 | 4291 | 4292 | 4294 | 4295 | 4296 | 4297 | 4298 | 4299 |
| 231 | 4300 | 4301 | 4302 | 4304 | 4305 | 4306 | 4307 | 4308 | 4309 |
| 232 | 4310 | 4311 | 4312 | 4314 | 4315 | 4316 | 4317 | 4318 | 4319 |
| 233 | 4320 | 4321 | 4322 | 4324 | 4325 | 4326 | 4327 | 4328 | 4329 |
| 234 | 4330 | 4331 | 4332 | 4334 | 4335 | 4336 | 4337 | 4338 | 4339 |
| 235 | 4340 | 4341 | 4342 | 4344 | 4345 | 4346 | 4347 | 4348 | 4349 |
| 236 | 4350 | 4351 | 4352 | 4354 | 4355 | 4356 | 4357 | 4358 | 4359 |
| 237 | 4360 | 4361 | 4362 | 4364 | 4365 | 4366 | 4367 | 4368 | 4369 |
| 238 | 4370 | 4371 | 4372 | 4374 | 4375 | 4376 | 4377 | 4378 | 4379 |
| 239 | 4380 | 4381 | 4382 | 4384 | 4385 | 4386 | 4387 | 4388 | 4389 |
| 240 | 4390 | 4391 | 4392 | 4394 | 4395 | 4396 | 4397 | 4398 | 4399 |
| 241 | 4400 | 4401 | 4402 | 4404 | 4405 | 4406 | 4407 | 4408 | 4409 |
| 242 | 4410 | 4411 | 4412 | 4414 | 4415 | 4416 | 4417 | 4418 | 4419 |
| 243 | 4420 | 4421 | 4422 | 4424 | 4425 | 4426 | 4427 | 4428 | 4429 |
| 244 | 4430 | 4431 | 4432 | 4434 | 4435 | 4436 | 4437 | 4438 | 4439 |
| 245 | 4440 | 4441 | 4442 | 4444 | 4445 | 4446 | 4447 | 4448 | 4449 |
| 246 | 4450 | 4451 | 4452 | 4454 | 4455 | 4456 | 4457 | 4458 | 4459 |
| 247 | 4460 | 4461 | 4462 | 4464 | 4465 | 4466 | 4467 | 4468 | 4469 |
| 248 | 4470 | 4471 | 4472 | 4474 | 4475 | 4476 | 4477 | 4478 | 4479 |
| 249 | 4480 | 4481 | 4482 | 4484 | 4485 | 4486 | 4487 | 4488 | 4489 |
| 250 | 4490 | 4491 | 4492 | 4494 | 4495 | 4496 | 4497 | 4498 | 4499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 251 | 4500 | 4501 | 4502 | 4504 | 4505 | 4506 | 4507 | 4508 | 4509 |
| 252 | 4510 | 4511 | 4512 | 4514 | 4515 | 4516 | 4517 | 4518 | 4519 |
| 253 | 4520 | 4521 | 4522 | 4524 | 4525 | 4526 | 4527 | 4528 | 4529 |
| 254 | 4530 | 4531 | 4532 | 4534 | 4535 | 4536 | 4537 | 4538 | 4539 |
| 255 | 4540 | 4541 | 4542 | 4544 | 4545 | 4546 | 4547 | 4548 | 4549 |
| 256 | 4550 | 4551 | 4552 | 4554 | 4555 | 4556 | 4557 | 4558 | 4559 |
| 257 | 4560 | 4561 | 4562 | 4564 | 4565 | 4566 | 4567 | 4568 | 4569 |
| 258 | 4570 | 4571 | 4572 | 4574 | 4575 | 4576 | 4577 | 4578 | 4579 |
| 259 | 4580 | 4581 | 4582 | 4584 | 4585 | 4586 | 4587 | 4588 | 4589 |
| 260 | 4590 | 4591 | 4592 | 4594 | 4595 | 4596 | 4597 | 4598 | 4599 |
| 261 | 4600 | 4601 | 4602 | 4604 | 4605 | 4606 | 4607 | 4608 | 4609 |
| 262 | 4610 | 4611 | 4612 | 4614 | 4615 | 4616 | 4617 | 4618 | 4619 |
| 263 | 4620 | 4621 | 4622 | 4624 | 4625 | 4626 | 4627 | 4628 | 4629 |
| 264 | 4630 | 4631 | 4632 | 4634 | 4635 | 4636 | 4637 | 4638 | 4639 |
| 265 | 4640 | 4641 | 4642 | 4644 | 4645 | 4646 | 4647 | 4648 | 4649 |
| 266 | 4650 | 4651 | 4652 | 4654 | 4655 | 4656 | 4657 | 4658 | 4659 |
| 267 | 4660 | 4661 | 4662 | 4664 | 4665 | 4666 | 4667 | 4668 | 4669 |
| 268 | 4670 | 4671 | 4672 | 4674 | 4675 | 4676 | 4677 | 4678 | 4679 |
| 269 | 4680 | 4681 | 4682 | 4684 | 4685 | 4686 | 4687 | 4688 | 4689 |
| 270 | 4690 | 4691 | 4692 | 4694 | 4695 | 4696 | 4697 | 4698 | 4699 |
| 271 | 4700 | 4701 | 4702 | 4704 | 4705 | 4706 | 4707 | 4708 | 4709 |
| 272 | 4710 | 4711 | 4712 | 4714 | 4715 | 4716 | 4717 | 4718 | 4719 |
| 273 | 4720 | 4721 | 4722 | 4724 | 4725 | 4726 | 4727 | 4728 | 4729 |
| 274 | 4730 | 4731 | 4732 | 4734 | 4735 | 4736 | 4737 | 4738 | 4739 |
| 275 | 4740 | 4741 | 4742 | 4744 | 4745 | 4746 | 4747 | 4748 | 4749 |
| 276 | 4750 | 4751 | 4752 | 4754 | 4755 | 4756 | 4757 | 4758 | 4759 |
| 277 | 4760 | 4761 | 4762 | 4764 | 4765 | 4766 | 4767 | 4768 | 4769 |
| 278 | 4770 | 4771 | 4772 | 4774 | 4775 | 4776 | 4777 | 4778 | 4779 |
| 279 | 4780 | 4781 | 4782 | 4784 | 4785 | 4786 | 4787 | 4788 | 4789 |
| 280 | 4790 | 4791 | 4792 | 4794 | 4795 | 4796 | 4797 | 4798 | 4799 |
| 281 | 4800 | 4801 | 4802 | 4804 | 4805 | 4806 | 4807 | 4808 | 4809 |
| 282 | 4810 | 4811 | 4812 | 4814 | 4815 | 4816 | 4817 | 4818 | 4819 |
| 283 | 4820 | 4821 | 4822 | 4824 | 4825 | 4826 | 4827 | 4828 | 4829 |
| 284 | 4830 | 4831 | 4832 | 4834 | 4835 | 4836 | 4837 | 4838 | 4839 |
| 285 | 4840 | 4841 | 4842 | 4844 | 4845 | 4846 | 4847 | 4848 | 4849 |
| 286 | 4850 | 4851 | 4852 | 4854 | 4855 | 4856 | 4857 | 4858 | 4859 |
| 287 | 4860 | 4861 | 4862 | 4864 | 4865 | 4866 | 4867 | 4868 | 4869 |
| 288 | 4870 | 4871 | 4872 | 4874 | 4875 | 4876 | 4877 | 4878 | 4879 |
| 289 | 4880 | 4881 | 4882 | 4884 | 4885 | 4886 | 4887 | 4888 | 4889 |
| 290 | 4890 | 4891 | 4892 | 4894 | 4895 | 4896 | 4897 | 4898 | 4899 |
| 291 | 4900 | 4901 | 4902 | 4904 | 4905 | 4906 | 4907 | 4208 | 4209 |
| 292 | 4910 | 4911 | 4912 | 4914 | 4915 | 4916 | 4917 | 4218 | 4219 |
| 293 | 4920 | 4921 | 4922 | 4924 | 4925 | 4926 | 4927 | 4228 | 4229 |
| 294 | 4930 | 4931 | 4932 | 4934 | 4935 | 4936 | 4937 | 4238 | 4239 |
| 295 | 4940 | 4941 | 4942 | 4944 | 4945 | 4946 | 4947 | 4248 | 4249 |
| 296 | 4950 | 4951 | 4952 | 4954 | 4955 | 4956 | 4957 | 4958 | 4959 |
| 297 | 4960 | 4961 | 4962 | 4964 | 4965 | 4966 | 4967 | 4968 | 4969 |
| 298 | 4970 | 4971 | 4972 | 4974 | 4975 | 4976 | 4977 | 4978 | 4979 |
| 299 | 4980 | 4981 | 4982 | 4984 | 4985 | 4986 | 4987 | 4988 | 4989 |
| 300 | 4990 | 4991 | 4992 | 4994 | 4995 | 4996 | 4997 | 4998 | 4999 |

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 301 | 5000 | 5001 | 5002 | 5004 | 5005 | 5006 | 5007 | 5008 | 5009 |
| 302 | 5010 | 5011 | 5012 | 5014 | 5015 | 5016 | 5017 | 5018 | 5019 |
| 303 | 5020 | 5021 | 5022 | 5024 | 5025 | 5026 | 5027 | 5028 | 5029 |
| 304 | 5030 | 5031 | 5032 | 5034 | 5035 | 5036 | 5037 | 5038 | 5039 |
| 305 | 5040 | 5041 | 5042 | 5044 | 5045 | 5046 | 5047 | 5048 | 5049 |
| 306 | 5050 | 5051 | 5052 | 5054 | 5055 | 5056 | 5057 | 5058 | 5059 |
| 307 | 5060 | 5061 | 5062 | 5064 | 5065 | 5066 | 5067 | 5068 | 5069 |
| 308 | 5070 | 5071 | 5072 | 5074 | 5075 | 5076 | 5077 | 5078 | 5079 |
| 309 | 5080 | 5081 | 5082 | 5084 | 5085 | 5086 | 5087 | 5088 | 5089 |
| 310 | 5090 | 5091 | 5092 | 5094 | 5095 | 5096 | 5097 | 5098 | 5099 |
| 311 | 5100 | 5101 | 5102 | 5104 | 5105 | 5106 | 5107 | 5108 | 5109 |
| 312 | 5110 | 5111 | 5112 | 5114 | 5115 | 5116 | 5117 | 5118 | 5119 |
| 313 | 5120 | 5121 | 5122 | 5124 | 5125 | 5126 | 5127 | 5128 | 5129 |
| 314 | 5130 | 5131 | 5132 | 5134 | 5135 | 5136 | 5137 | 5138 | 5139 |
| 315 | 5140 | 5141 | 5142 | 5144 | 5145 | 5146 | 5147 | 5148 | 5149 |
| 316 | 5150 | 5151 | 5152 | 5154 | 5155 | 5156 | 5157 | 5158 | 5159 |
| 317 | 5160 | 5161 | 5162 | 5164 | 5165 | 5166 | 5167 | 5168 | 5169 |
| 318 | 5170 | 5171 | 5172 | 5174 | 5175 | 5176 | 5177 | 5178 | 5179 |
| 319 | 5180 | 5181 | 5182 | 5184 | 5185 | 5186 | 5187 | 5188 | 5189 |
| 320 | 5190 | 5191 | 5192 | 5194 | 5195 | 5196 | 5197 | 5198 | 5199 |
| 321 | 5200 | 5201 | 5202 | 5204 | 5205 | 5206 | 5207 | 5208 | 5209 |
| 322 | 5210 | 5211 | 5212 | 5214 | 5215 | 5216 | 5217 | 5218 | 5219 |
| 323 | 5220 | 5221 | 5222 | 5224 | 5225 | 5226 | 5227 | 5228 | 5229 |
| 324 | 5230 | 5231 | 5232 | 5234 | 5235 | 5236 | 5237 | 5238 | 5239 |
| 325 | 5240 | 5241 | 5242 | 5244 | 5245 | 5246 | 5247 | 5248 | 5249 |
| 326 | 5250 | 5251 | 5252 | 5254 | 5255 | 5256 | 5257 | 5258 | 5259 |
| 327 | 5260 | 5261 | 5262 | 5264 | 5265 | 5266 | 5267 | 5268 | 5269 |
| 328 | 5270 | 5271 | 5272 | 5274 | 5275 | 5276 | 5277 | 5278 | 5279 |
| 329 | 5280 | 5281 | 5282 | 5284 | 5285 | 5286 | 5287 | 5288 | 5289 |
| 330 | 5290 | 5291 | 5292 | 5294 | 5295 | 5296 | 5297 | 5298 | 5299 |
| 331 | 5300 | 5301 | 5302 | 5304 | 5305 | 5306 | 5307 | 5308 | 5309 |
| 332 | 5310 | 5311 | 5312 | 5314 | 5315 | 5316 | 5317 | 5318 | 5319 |
| 333 | 5320 | 5321 | 5322 | 5324 | 5325 | 5326 | 5327 | 5328 | 5329 |
| 334 | 5330 | 5331 | 5332 | 5334 | 5335 | 5336 | 5337 | 5338 | 5339 |
| 335 | 5340 | 5341 | 5342 | 5344 | 5345 | 5346 | 5347 | 5348 | 5349 |
| 336 | 5350 | 5351 | 5352 | 5354 | 5355 | 5356 | 5357 | 5358 | 5359 |
| 337 | 5360 | 5361 | 5362 | 5364 | 5365 | 5366 | 5367 | 5368 | 5369 |
| 338 | 5370 | 5371 | 5372 | 5374 | 5375 | 5376 | 5377 | 5378 | 5379 |
| 339 | 5380 | 5381 | 5382 | 5384 | 5385 | 5386 | 5387 | 5388 | 5389 |
| 340 | 5390 | 5391 | 5392 | 5394 | 5395 | 5396 | 5397 | 5398 | 5399 |
| 341 | 5400 | 5401 | 5402 | 5404 | 5405 | 5406 | 5407 | 5408 | 5409 |
| 342 | 5410 | 5411 | 5412 | 5414 | 5415 | 5416 | 5417 | 5418 | 5419 |
| 343 | 5420 | 5421 | 5422 | 5424 | 5425 | 5426 | 5427 | 5428 | 5429 |
| 344 | 5430 | 5431 | 5432 | 5434 | 5435 | 5436 | 5437 | 5438 | 5439 |
| 345 | 5440 | 5441 | 5442 | 5444 | 5445 | 5446 | 5447 | 5448 | 5449 |
| 346 | 5450 | 5451 | 5452 | 5454 | 5455 | 5456 | 5457 | 5458 | 5459 |
| 347 | 5460 | 5461 | 5462 | 5464 | 5465 | 5466 | 5467 | 5468 | 5469 |
| 348 | 5470 | 5471 | 5472 | 5474 | 5475 | 5476 | 5477 | 5478 | 5479 |
| 349 | 5480 | 5481 | 5482 | 5484 | 5485 | 5486 | 5487 | 5488 | 5489 |
| 350 | 5490 | 5491 | 5492 | 5494 | 5495 | 5496 | 5497 | 5498 | 5499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 351 | 5500 | 5501 | 5502 | 5504 | 5505 | 5506 | 5507 | 5508 | 5509 |
| 352 | 5510 | 5511 | 5512 | 5514 | 5515 | 5516 | 5517 | 5518 | 5519 |
| 353 | 5520 | 5521 | 5522 | 5524 | 5525 | 5526 | 5527 | 5528 | 5529 |
| 354 | 5530 | 5531 | 5532 | 5534 | 5535 | 5536 | 5537 | 5538 | 5539 |
| 355 | 5540 | 5541 | 5542 | 5544 | 5545 | 5546 | 5547 | 5548 | 5549 |
| 356 | 5550 | 5551 | 5552 | 5554 | 5555 | 5556 | 5557 | 5558 | 5559 |
| 357 | 5560 | 5561 | 5562 | 5564 | 5565 | 5566 | 5567 | 5568 | 5569 |
| 358 | 5570 | 5571 | 5572 | 5574 | 5575 | 5576 | 5577 | 5578 | 5579 |
| 359 | 5580 | 5581 | 5582 | 5584 | 5585 | 5586 | 5587 | 5588 | 5589 |
| 360 | 5590 | 5591 | 5592 | 5594 | 5595 | 5596 | 5597 | 5598 | 5599 |
| 361 | 5600 | 5601 | 5602 | 5604 | 5605 | 5606 | 5607 | 5608 | 5609 |
| 362 | 5610 | 5611 | 5612 | 5614 | 5615 | 5616 | 5617 | 5618 | 5619 |
| 363 | 5620 | 5621 | 5622 | 5624 | 5625 | 5626 | 5627 | 5628 | 5629 |
| 364 | 5630 | 5631 | 5632 | 5634 | 5635 | 5636 | 5637 | 5638 | 5639 |
| 365 | 5640 | 5641 | 5642 | 5644 | 5645 | 5646 | 5647 | 5648 | 5649 |
| 366 | 5650 | 5651 | 5652 | 5654 | 5655 | 5656 | 5657 | 5658 | 5659 |
| 367 | 5660 | 5661 | 5662 | 5664 | 5665 | 5666 | 5667 | 5668 | 5669 |
| 368 | 5670 | 5671 | 5672 | 5674 | 5675 | 5676 | 5677 | 5678 | 5679 |
| 369 | 5680 | 5681 | 5682 | 5684 | 5685 | 5686 | 5687 | 5688 | 5689 |
| 370 | 5690 | 5691 | 5692 | 5694 | 5695 | 5696 | 5697 | 5698 | 5699 |
| 371 | 5700 | 5701 | 5702 | 5704 | 5705 | 5706 | 5707 | 5708 | 5709 |
| 372 | 5710 | 5711 | 5712 | 5714 | 5715 | 5716 | 5717 | 5718 | 5719 |
| 373 | 5720 | 5721 | 5722 | 5724 | 5725 | 5726 | 5727 | 5728 | 5729 |
| 374 | 5730 | 5731 | 5732 | 5734 | 5735 | 5736 | 5737 | 5738 | 5739 |
| 375 | 5740 | 5741 | 5742 | 5744 | 5745 | 5746 | 5747 | 5748 | 5749 |
| 376 | 5750 | 5751 | 5752 | 5754 | 5755 | 5756 | 5757 | 5758 | 5759 |
| 377 | 5760 | 5761 | 5762 | 5764 | 5765 | 5766 | 5767 | 5768 | 5769 |
| 378 | 5770 | 5771 | 5772 | 5774 | 5775 | 5776 | 5777 | 5778 | 5779 |
| 379 | 5780 | 5781 | 5782 | 5784 | 5785 | 5786 | 5787 | 5788 | 5789 |
| 380 | 5790 | 5791 | 5792 | 5794 | 5795 | 5796 | 5797 | 5798 | 5799 |
| 381 | 5800 | 5801 | 5802 | 5804 | 5805 | 5806 | 5807 | 5808 | 5809 |
| 382 | 5810 | 5811 | 5812 | 5814 | 5815 | 5816 | 5817 | 5818 | 5819 |
| 383 | 5820 | 5821 | 5822 | 5824 | 5825 | 5826 | 5827 | 5828 | 5829 |
| 384 | 5830 | 5831 | 5832 | 5834 | 5835 | 5836 | 5837 | 5838 | 5839 |
| 385 | 5840 | 5841 | 5842 | 5844 | 5845 | 5846 | 5847 | 5848 | 5849 |
| 386 | 5850 | 5851 | 5852 | 5854 | 5855 | 5856 | 5857 | 5858 | 5859 |
| 387 | 5860 | 5861 | 5862 | 5864 | 5865 | 5866 | 5867 | 5868 | 5869 |
| 388 | 5870 | 5871 | 5872 | 5874 | 5875 | 5876 | 5877 | 5878 | 5879 |
| 389 | 5880 | 5881 | 5882 | 5884 | 5885 | 5886 | 5887 | 5888 | 5889 |
| 390 | 5890 | 5891 | 5892 | 5894 | 5895 | 5896 | 5897 | 5898 | 5899 |
| 391 | 5900 | 5901 | 5902 | 5904 | 5905 | 5906 | 5907 | 5908 | 5909 |
| 392 | 5910 | 5911 | 5912 | 5914 | 5915 | 5916 | 5917 | 5918 | 5919 |
| 393 | 5920 | 5921 | 5922 | 5924 | 5925 | 5926 | 5927 | 5928 | 5929 |
| 394 | 5930 | 5931 | 5932 | 5934 | 5935 | 5936 | 5937 | 5938 | 5939 |
| 395 | 5940 | 5941 | 5942 | 5944 | 5945 | 5946 | 5947 | 5948 | 5949 |
| 396 | 5950 | 5951 | 5952 | 5954 | 5955 | 5956 | 5957 | 5958 | 5959 |
| 397 | 5960 | 5961 | 5962 | 5964 | 5965 | 5966 | 5967 | 5968 | 5969 |
| 398 | 5970 | 5971 | 5972 | 5974 | 5975 | 5976 | 5977 | 5978 | 5979 |
| 399 | 5980 | 5981 | 5982 | 5984 | 5985 | 5986 | 5987 | 5988 | 5989 |
| 400 | 5990 | 5991 | 5992 | 5994 | 5995 | 5996 | 5997 | 5998 | 5999 |

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 401 | 6000 | 6001 | 6002 | 6004 | 6005 | 6006 | 6007 | 6008 | 6009 |
| 402 | 6010 | 6011 | 6012 | 6014 | 6015 | 6016 | 6017 | 6018 | 6019 |
| 403 | 6020 | 6021 | 6022 | 6024 | 6025 | 6026 | 6027 | 6028 | 6029 |
| 404 | 6030 | 6031 | 6032 | 6034 | 6035 | 6036 | 6037 | 6038 | 6039 |
| 405 | 6040 | 6041 | 6042 | 6044 | 6045 | 6046 | 6047 | 6048 | 6049 |
| 406 | 6050 | 6051 | 6052 | 6054 | 6055 | 6056 | 6057 | 6058 | 6059 |
| 407 | 6060 | 6061 | 6062 | 6064 | 6065 | 6066 | 6067 | 6068 | 6069 |
| 408 | 6070 | 6071 | 6072 | 6074 | 6075 | 6076 | 6077 | 6078 | 6079 |
| 409 | 6080 | 6081 | 6082 | 6084 | 6085 | 6086 | 6087 | 6088 | 6089 |
| 410 | 6090 | 6091 | 6092 | 6094 | 6095 | 6096 | 6097 | 6098 | 6099 |
| 411 | 6100 | 6101 | 6102 | 6104 | 6105 | 6106 | 6107 | 6108 | 6109 |
| 412 | 6110 | 6111 | 6112 | 6114 | 6115 | 6116 | 6117 | 6118 | 6119 |
| 413 | 6120 | 6121 | 6122 | 6124 | 6125 | 6126 | 6127 | 6128 | 6129 |
| 414 | 6130 | 6131 | 6132 | 6134 | 6135 | 6136 | 6137 | 6138 | 6139 |
| 415 | 6140 | 6141 | 6142 | 6144 | 6145 | 6146 | 6147 | 6148 | 6149 |
| 416 | 6150 | 6151 | 6152 | 6154 | 6155 | 6156 | 6157 | 6158 | 6159 |
| 417 | 6160 | 6161 | 6162 | 6164 | 6165 | 6166 | 6167 | 6168 | 6169 |
| 418 | 6170 | 6171 | 6172 | 6174 | 6175 | 6176 | 6177 | 6178 | 6179 |
| 419 | 6180 | 6181 | 6182 | 6184 | 6185 | 6186 | 6187 | 6188 | 6189 |
| 420 | 6190 | 6191 | 6192 | 6194 | 6195 | 6196 | 6197 | 6198 | 6199 |
| 421 | 6200 | 6201 | 6202 | 6204 | 6205 | 6206 | 6207 | 6208 | 6209 |
| 422 | 6210 | 6211 | 6212 | 6214 | 6215 | 6216 | 6217 | 6218 | 6219 |
| 423 | 6220 | 6221 | 6222 | 6224 | 6225 | 6226 | 6227 | 6228 | 6229 |
| 424 | 6230 | 6231 | 6232 | 6234 | 6235 | 6236 | 6237 | 6238 | 6239 |
| 425 | 6240 | 6241 | 6242 | 6244 | 6245 | 6246 | 6247 | 6248 | 6249 |
| 426 | 6250 | 6251 | 6252 | 6254 | 6255 | 6256 | 6257 | 6258 | 6259 |
| 427 | 6260 | 6261 | 6262 | 6264 | 6265 | 6266 | 6267 | 6268 | 6269 |
| 428 | 6270 | 6271 | 6272 | 6274 | 6275 | 6276 | 6277 | 6278 | 6279 |
| 429 | 6280 | 6281 | 6282 | 6284 | 6285 | 6286 | 6287 | 6288 | 6289 |
| 430 | 6290 | 6291 | 6292 | 6294 | 6295 | 6296 | 6297 | 6298 | 6299 |
| 431 | 6300 | 6301 | 6302 | 6304 | 6305 | 6306 | 6307 | 6308 | 6309 |
| 432 | 6310 | 6311 | 6312 | 6314 | 6315 | 6316 | 6317 | 6318 | 6319 |
| 433 | 6320 | 6321 | 6322 | 6324 | 6325 | 6326 | 6327 | 6328 | 6329 |
| 434 | 6330 | 6331 | 6332 | 6334 | 6335 | 6336 | 6337 | 6338 | 6339 |
| 435 | 6340 | 6341 | 6342 | 6344 | 6345 | 6346 | 6347 | 6348 | 6349 |
| 436 | 6350 | 6351 | 6352 | 6354 | 6355 | 6356 | 6357 | 6358 | 6359 |
| 437 | 6360 | 6361 | 6362 | 6364 | 6365 | 6366 | 6367 | 6368 | 6369 |
| 438 | 6370 | 6371 | 6372 | 6374 | 6375 | 6376 | 6377 | 6378 | 6379 |
| 439 | 6380 | 6381 | 6382 | 6384 | 6385 | 6386 | 6387 | 6388 | 6389 |
| 440 | 6390 | 6391 | 6392 | 6394 | 6395 | 6396 | 6397 | 6398 | 6399 |
| 441 | 6400 | 6401 | 6402 | 6404 | 6405 | 6406 | 6407 | 6408 | 6409 |
| 442 | 6410 | 6411 | 6412 | 6414 | 6415 | 6416 | 6417 | 6418 | 6419 |
| 443 | 6420 | 6421 | 6422 | 6424 | 6425 | 6426 | 6427 | 6428 | 6429 |
| 444 | 6430 | 6431 | 6432 | 6434 | 6435 | 6436 | 6437 | 6438 | 6439 |
| 445 | 6440 | 6441 | 6442 | 6444 | 6445 | 6446 | 6447 | 6448 | 6449 |
| 446 | 6450 | 6451 | 6452 | 6454 | 6455 | 6456 | 6457 | 6458 | 6459 |
| 447 | 6460 | 6461 | 6462 | 6464 | 6465 | 6466 | 6467 | 6468 | 6469 |
| 448 | 6470 | 6471 | 6472 | 6474 | 6475 | 6476 | 6477 | 6478 | 6479 |
| 449 | 6480 | 6481 | 6482 | 6484 | 6485 | 6486 | 6487 | 6488 | 6489 |
| 450 | 6490 | 6491 | 6492 | 6494 | 6495 | 6496 | 6497 | 6498 | 6499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 451 | 6500 | 6501 | 6502 | 6504 | 6505 | 6506 | 6507 | 6508 | 6509 |
| 452 | 6510 | 6511 | 6512 | 6514 | 6515 | 6516 | 6517 | 6518 | 6519 |
| 453 | 6520 | 6521 | 6522 | 6524 | 6525 | 6526 | 6527 | 6528 | 6529 |
| 454 | 6530 | 6531 | 6532 | 6534 | 6535 | 6536 | 6537 | 6538 | 6539 |
| 455 | 6540 | 6541 | 6542 | 6544 | 6545 | 6546 | 6547 | 6548 | 6549 |
| 456 | 6550 | 6551 | 6552 | 6554 | 6555 | 6556 | 6557 | 6558 | 6559 |
| 457 | 6560 | 6561 | 6562 | 6564 | 6565 | 6566 | 6567 | 6568 | 6569 |
| 458 | 6570 | 6571 | 6572 | 6574 | 6575 | 6576 | 6577 | 6578 | 6579 |
| 459 | 6580 | 6581 | 6582 | 6584 | 6585 | 6586 | 6587 | 6588 | 6589 |
| 460 | 6590 | 6591 | 6592 | 6594 | 6595 | 6596 | 6597 | 6598 | 6599 |
| 461 | 6600 | 6601 | 6602 | 6604 | 6605 | 6606 | 6607 | 6608 | 6609 |
| 462 | 6610 | 6611 | 6612 | 6614 | 6615 | 6616 | 6617 | 6618 | 6619 |
| 463 | 6620 | 6621 | 6622 | 6624 | 6625 | 6626 | 6627 | 6628 | 6629 |
| 464 | 6630 | 6631 | 6632 | 6634 | 6635 | 6636 | 6637 | 6638 | 6639 |
| 465 | 6640 | 6641 | 6642 | 6644 | 6645 | 6646 | 6647 | 6648 | 6649 |
| 466 | 6650 | 6651 | 6652 | 6654 | 6655 | 6656 | 6657 | 6658 | 6659 |
| 467 | 6660 | 6661 | 6662 | 6664 | 6665 | 6666 | 6667 | 6668 | 6669 |
| 468 | 6670 | 6671 | 6672 | 6674 | 6675 | 6676 | 6677 | 6678 | 6679 |
| 469 | 6680 | 6681 | 6682 | 6684 | 6685 | 6686 | 6687 | 6688 | 6689 |
| 470 | 6690 | 6691 | 6692 | 6694 | 6695 | 6696 | 6697 | 6698 | 6699 |
| 471 | 6700 | 6701 | 6702 | 6704 | 6705 | 6706 | 6707 | 6708 | 6709 |
| 472 | 6710 | 6711 | 6712 | 6714 | 6715 | 6716 | 6717 | 6718 | 6719 |
| 473 | 6720 | 6721 | 6722 | 6724 | 6725 | 6726 | 6727 | 6728 | 6729 |
| 474 | 6730 | 6731 | 6732 | 6734 | 6735 | 6736 | 6737 | 6738 | 6739 |
| 475 | 6740 | 6741 | 6742 | 6744 | 6745 | 6746 | 6747 | 6748 | 6749 |
| 476 | 6750 | 6751 | 6752 | 6754 | 6755 | 6756 | 6757 | 6758 | 6759 |
| 477 | 6760 | 6761 | 6762 | 6764 | 6765 | 6766 | 6767 | 6768 | 6769 |
| 478 | 6770 | 6771 | 6772 | 6774 | 6775 | 6776 | 6777 | 6778 | 6779 |
| 479 | 6780 | 6781 | 6782 | 6784 | 6785 | 6786 | 6787 | 6788 | 6789 |
| 480 | 6790 | 6791 | 6792 | 6794 | 6795 | 6796 | 6797 | 6798 | 6799 |
| 481 | 6800 | 6801 | 6802 | 6804 | 6805 | 6806 | 6807 | 6808 | 6809 |
| 482 | 6810 | 6811 | 6812 | 6814 | 6815 | 6816 | 6817 | 6818 | 6819 |
| 483 | 6820 | 6821 | 6822 | 6824 | 6825 | 6826 | 6827 | 6828 | 6829 |
| 484 | 6830 | 6831 | 6832 | 6834 | 6835 | 6836 | 6837 | 6838 | 6839 |
| 485 | 6840 | 6841 | 6842 | 6844 | 6845 | 6846 | 6847 | 6848 | 6849 |
| 486 | 6850 | 6851 | 6852 | 6854 | 6855 | 6856 | 6857 | 6858 | 6859 |
| 487 | 6860 | 6861 | 6862 | 6864 | 6865 | 6866 | 6867 | 6868 | 6869 |
| 488 | 6870 | 6871 | 6872 | 6874 | 6875 | 6876 | 6877 | 6878 | 6879 |
| 489 | 6880 | 6881 | 6882 | 6884 | 6885 | 6886 | 6887 | 6888 | 6889 |
| 490 | 6890 | 6891 | 6892 | 6894 | 6895 | 6896 | 6897 | 6898 | 6899 |
| 491 | 6900 | 6901 | 6902 | 6904 | 6905 | 6906 | 6907 | 6908 | 6909 |
| 492 | 6910 | 6911 | 6912 | 6914 | 6915 | 6916 | 6917 | 6918 | 6919 |
| 493 | 6920 | 6921 | 6922 | 6924 | 6925 | 6926 | 6927 | 6928 | 6929 |
| 494 | 6930 | 6931 | 6932 | 6934 | 6935 | 6936 | 6937 | 6938 | 6939 |
| 495 | 6940 | 6941 | 6942 | 6944 | 6945 | 6946 | 6947 | 6948 | 6949 |
| 496 | 6950 | 6951 | 6952 | 6954 | 6955 | 6956 | 6957 | 6958 | 6959 |
| 497 | 6960 | 6961 | 6962 | 6964 | 6965 | 6966 | 6967 | 6968 | 6969 |
| 498 | 6970 | 6971 | 6972 | 6974 | 6975 | 6976 | 6977 | 6978 | 6979 |
| 499 | 6980 | 6981 | 6982 | 6984 | 6985 | 6986 | 6987 | 6988 | 6989 |
| 500 | 6990 | 6991 | 6992 | 6994 | 6995 | 6996 | 6997 | 6998 | 6999 |

(1) For axis 1

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 501 | 7000 | 7001 | 7002 | 7004 | 7005 | 7006 | 7007 | 7008 | 7009 |
| 502 | 7010 | 7011 | 7012 | 7014 | 7015 | 7016 | 7017 | 7018 | 7019 |
| 503 | 7020 | 7021 | 7022 | 7024 | 7025 | 7026 | 7027 | 7028 | 7029 |
| 504 | 7030 | 7031 | 7032 | 7034 | 7035 | 7036 | 7037 | 7038 | 7039 |
| 505 | 7040 | 7041 | 7042 | 7044 | 7045 | 7046 | 7047 | 7048 | 7049 |
| 506 | 7050 | 7051 | 7052 | 7054 | 7055 | 7056 | 7057 | 7058 | 7059 |
| 507 | 7060 | 7061 | 7062 | 7064 | 7065 | 7066 | 7067 | 7068 | 7069 |
| 508 | 7070 | 7071 | 7072 | 7074 | 7075 | 7076 | 7077 | 7078 | 7079 |
| 509 | 7080 | 7081 | 7082 | 7084 | 7085 | 7086 | 7087 | 7088 | 7089 |
| 510 | 7090 | 7091 | 7092 | 7094 | 7095 | 7096 | 7097 | 7098 | 7099 |
| 511 | 7100 | 7101 | 7102 | 7104 | 7105 | 7106 | 7107 | 7108 | 7109 |
| 512 | 7110 | 7111 | 7112 | 7114 | 7115 | 7116 | 7117 | 7118 | 7119 |
| 513 | 7120 | 7121 | 7122 | 7124 | 7125 | 7126 | 7127 | 7128 | 7129 |
| 514 | 7130 | 7131 | 7132 | 7134 | 7135 | 7136 | 7137 | 7138 | 7139 |
| 515 | 7140 | 7141 | 7142 | 7144 | 7145 | 7146 | 7147 | 7148 | 7149 |
| 516 | 7150 | 7151 | 7152 | 7154 | 7155 | 7156 | 7157 | 7158 | 7159 |
| 517 | 7160 | 7161 | 7162 | 7164 | 7165 | 7166 | 7167 | 7168 | 7169 |
| 518 | 7170 | 7171 | 7172 | 7174 | 7175 | 7176 | 7177 | 7178 | 7179 |
| 519 | 7180 | 7181 | 7182 | 7184 | 7185 | 7186 | 7187 | 7188 | 7189 |
| 520 | 7190 | 7191 | 7192 | 7194 | 7195 | 7196 | 7197 | 7198 | 7199 |
| 521 | 7200 | 7201 | 7202 | 7204 | 7205 | 7206 | 7207 | 7208 | 7209 |
| 522 | 7210 | 7211 | 7212 | 7214 | 7215 | 7216 | 7217 | 7218 | 7219 |
| 523 | 7220 | 7221 | 7222 | 7224 | 7225 | 7226 | 7227 | 7228 | 7229 |
| 524 | 7230 | 7231 | 7232 | 7234 | 7235 | 7236 | 7237 | 7238 | 7239 |
| 525 | 7240 | 7241 | 7242 | 7244 | 7245 | 7246 | 7247 | 7248 | 7249 |
| 526 | 7250 | 7251 | 7252 | 7254 | 7255 | 7256 | 7257 | 7258 | 7259 |
| 527 | 7260 | 7261 | 7262 | 7264 | 7265 | 7266 | 7267 | 7268 | 7269 |
| 528 | 7270 | 7271 | 7272 | 7274 | 7275 | 7276 | 7277 | 7278 | 7279 |
| 529 | 7280 | 7281 | 7282 | 7284 | 7285 | 7286 | 7287 | 7288 | 7289 |
| 530 | 7290 | 7291 | 7292 | 7294 | 7295 | 7296 | 7297 | 7298 | 7299 |
| 531 | 7300 | 7301 | 7302 | 7304 | 7305 | 7306 | 7307 | 7308 | 7309 |
| 532 | 7310 | 7311 | 7312 | 7314 | 7315 | 7316 | 7317 | 7318 | 7319 |
| 533 | 7320 | 7321 | 7322 | 7324 | 7325 | 7326 | 7327 | 7328 | 7329 |
| 534 | 7330 | 7331 | 7332 | 7334 | 7335 | 7336 | 7337 | 7338 | 7339 |
| 535 | 7340 | 7341 | 7342 | 7344 | 7345 | 7346 | 7347 | 7348 | 7349 |
| 536 | 7350 | 7351 | 7352 | 7354 | 7355 | 7356 | 7357 | 7358 | 7359 |
| 537 | 7360 | 7361 | 7362 | 7364 | 7365 | 7366 | 7367 | 7368 | 7369 |
| 538 | 7370 | 7371 | 7372 | 7374 | 7375 | 7376 | 7377 | 7378 | 7379 |
| 539 | 7380 | 7381 | 7382 | 7384 | 7385 | 7386 | 7387 | 7388 | 7389 |
| 540 | 7390 | 7391 | 7392 | 7394 | 7395 | 7396 | 7397 | 7398 | 7399 |
| 541 | 7400 | 7401 | 7402 | 7404 | 7405 | 7406 | 7407 | 7408 | 7409 |
| 542 | 7410 | 7411 | 7412 | 7414 | 7415 | 7416 | 7417 | 7418 | 7419 |
| 543 | 7420 | 7421 | 7422 | 7424 | 7425 | 7426 | 7427 | 7428 | 7429 |
| 544 | 7430 | 7431 | 7432 | 7434 | 7435 | 7436 | 7437 | 7438 | 7439 |
| 545 | 7440 | 7441 | 7442 | 7444 | 7445 | 7446 | 7447 | 7448 | 7449 |
| 546 | 7450 | 7451 | 7452 | 7454 | 7455 | 7456 | 7457 | 7458 | 7459 |
| 547 | 7460 | 7461 | 7462 | 7464 | 7465 | 7466 | 7467 | 7468 | 7469 |
| 548 | 7470 | 7471 | 7472 | 7474 | 7475 | 7476 | 7477 | 7478 | 7479 |
| 549 | 7480 | 7481 | 7482 | 7484 | 7485 | 7486 | 7487 | 7488 | 7489 |
| 550 | 7490 | 7491 | 7492 | 7494 | 7495 | 7496 | 7497 | 7498 | 7499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 551 | 7500 | 7501 | 7502 | 7504 | 7505 | 7506 | 7507 | 7508 | 7509 |
| 552 | 7510 | 7511 | 7512 | 7514 | 7515 | 7516 | 7517 | 7518 | 7519 |
| 553 | 7520 | 7521 | 7522 | 7524 | 7525 | 7526 | 7527 | 7528 | 7529 |
| 554 | 7530 | 7531 | 7532 | 7534 | 7535 | 7536 | 7537 | 7538 | 7539 |
| 555 | 7540 | 7541 | 7542 | 7544 | 7545 | 7546 | 7547 | 7548 | 7549 |
| 556 | 7550 | 7551 | 7552 | 7554 | 7555 | 7556 | 7557 | 7558 | 7559 |
| 557 | 7560 | 7561 | 7562 | 7564 | 7565 | 7566 | 7567 | 7568 | 7569 |
| 558 | 7570 | 7571 | 7572 | 7574 | 7575 | 7576 | 7577 | 7578 | 7579 |
| 559 | 7580 | 7581 | 7582 | 7584 | 7585 | 7586 | 7587 | 7588 | 7589 |
| 560 | 7590 | 7591 | 7592 | 7594 | 7595 | 7596 | 7597 | 7598 | 7599 |
| 561 | 7600 | 7601 | 7602 | 7604 | 7605 | 7606 | 7607 | 7608 | 7609 |
| 562 | 7610 | 7611 | 7612 | 7614 | 7615 | 7616 | 7617 | 7618 | 7619 |
| 563 | 7620 | 7621 | 7622 | 7624 | 7625 | 7626 | 7627 | 7628 | 7629 |
| 564 | 7630 | 7631 | 7632 | 7634 | 7635 | 7636 | 7637 | 7638 | 7639 |
| 565 | 7640 | 7641 | 7642 | 7644 | 7645 | 7646 | 7647 | 7648 | 7649 |
| 566 | 7650 | 7651 | 7652 | 7654 | 7655 | 7656 | 7657 | 7658 | 7659 |
| 567 | 7660 | 7661 | 7662 | 7664 | 7665 | 7666 | 7667 | 7668 | 7669 |
| 568 | 7670 | 7671 | 7672 | 7674 | 7675 | 7676 | 7677 | 7678 | 7679 |
| 569 | 7680 | 7681 | 7682 | 7684 | 7685 | 7686 | 7687 | 7688 | 7689 |
| 570 | 7690 | 7691 | 7692 | 7694 | 7695 | 7696 | 7697 | 7698 | 7699 |
| 571 | 7700 | 7701 | 7702 | 7704 | 7705 | 7706 | 7707 | 7708 | 7709 |
| 572 | 7710 | 7711 | 7712 | 7714 | 7715 | 7716 | 7717 | 7718 | 7719 |
| 573 | 7720 | 7721 | 7722 | 7724 | 7725 | 7726 | 7727 | 7728 | 7729 |
| 574 | 7730 | 7731 | 7732 | 7734 | 7735 | 7736 | 7737 | 7738 | 7739 |
| 575 | 7740 | 7741 | 7742 | 7744 | 7745 | 7746 | 7747 | 7748 | 7749 |
| 576 | 7750 | 7751 | 7752 | 7754 | 7755 | 7756 | 7757 | 7758 | 7759 |
| 577 | 7760 | 7761 | 7762 | 7764 | 7765 | 7766 | 7767 | 7768 | 7769 |
| 578 | 7770 | 7771 | 7772 | 7774 | 7775 | 7776 | 7777 | 7778 | 7779 |
| 579 | 7780 | 7781 | 7782 | 7784 | 7785 | 7786 | 7787 | 7788 | 7789 |
| 580 | 7790 | 7791 | 7792 | 7794 | 7795 | 7796 | 7797 | 7798 | 7799 |
| 581 | 7800 | 7801 | 7802 | 7804 | 7805 | 7806 | 7807 | 7808 | 7809 |
| 582 | 7810 | 7811 | 7812 | 7814 | 7815 | 7816 | 7817 | 7818 | 7819 |
| 583 | 7820 | 7821 | 7822 | 7824 | 7825 | 7826 | 7827 | 7828 | 7829 |
| 584 | 7830 | 7831 | 7832 | 7834 | 7835 | 7836 | 7837 | 7838 | 7839 |
| 585 | 7840 | 7841 | 7842 | 7844 | 7845 | 7846 | 7847 | 7848 | 7849 |
| 586 | 7850 | 7851 | 7852 | 7854 | 7855 | 7856 | 7857 | 7858 | 7859 |
| 587 | 7860 | 7861 | 7862 | 7864 | 7865 | 7866 | 7867 | 7868 | 7869 |
| 588 | 7870 | 7871 | 7872 | 7874 | 7875 | 7876 | 7877 | 7878 | 7879 |
| 589 | 7880 | 7881 | 7882 | 7884 | 7885 | 7886 | 7887 | 7888 | 7889 |
| 590 | 7890 | 7891 | 7892 | 7894 | 7895 | 7896 | 7897 | 7898 | 7899 |
| 591 | 7900 | 7901 | 7902 | 7904 | 7905 | 7906 | 7907 | 7908 | 7909 |
| 592 | 7910 | 7911 | 7912 | 7914 | 7915 | 7916 | 7917 | 7918 | 7919 |
| 593 | 7920 | 7921 | 7922 | 7924 | 7925 | 7926 | 7927 | 7928 | 7929 |
| 594 | 7930 | 7931 | 7932 | 7934 | 7935 | 7936 | 7937 | 7938 | 7939 |
| 595 | 7940 | 7941 | 7942 | 7944 | 7945 | 7946 | 7947 | 7948 | 7949 |
| 596 | 7950 | 7951 | 7952 | 7954 | 7955 | 7956 | 7957 | 7958 | 7959 |
| 597 | 7960 | 7961 | 7962 | 7964 | 7965 | 7966 | 7967 | 7968 | 7969 |
| 598 | 7970 | 7971 | 7972 | 7974 | 7975 | 7976 | 7977 | 7978 | 7979 |
| 599 | 7980 | 7981 | 7982 | 7984 | 7985 | 7986 | 7987 | 7988 | 7989 |
| 600 | 7990 | 7991 | 7992 | 7994 | 7995 | 7996 | 7997 | 7998 | 7999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 1 | 8000 | 8001 | 8002 | 8004 | 8005 | 8006 | 8007 | 8008 | 8009 |
| 2 | 8010 | 8011 | 8012 | 8014 | 8015 | 8016 | 8017 | 8018 | 8019 |
| 3 | 8020 | 8021 | 8022 | 8024 | 8025 | 8026 | 8027 | 8028 | 8029 |
| 4 | 8030 | 8031 | 8032 | 8034 | 8035 | 8036 | 8037 | 8038 | 8039 |
| 5 | 8040 | 8041 | 8042 | 8044 | 8045 | 8046 | 8047 | 8048 | 8049 |
| 6 | 8050 | 8051 | 8052 | 8054 | 8055 | 8056 | 8057 | 8058 | 8059 |
| 7 | 8060 | 8061 | 8062 | 8064 | 8065 | 8066 | 8067 | 8068 | 8069 |
| 8 | 8070 | 8071 | 8072 | 8074 | 8075 | 8076 | 8077 | 8078 | 8079 |
| 9 | 8080 | 8081 | 8082 | 8084 | 8085 | 8086 | 8087 | 8088 | 8089 |
| 10 | 8090 | 8091 | 8092 | 8094 | 8095 | 8096 | 8097 | 8098 | 8099 |
| 11 | 8100 | 8101 | 8102 | 8104 | 8105 | 8106 | 8107 | 8108 | 8109 |
| 12 | 8110 | 8111 | 8112 | 8114 | 8115 | 8116 | 8117 | 8118 | 8119 |
| 13 | 8120 | 8121 | 8122 | 8124 | 8125 | 8126 | 8127 | 8128 | 8129 |
| 14 | 8130 | 8131 | 8132 | 8134 | 8135 | 8136 | 8137 | 8138 | 8139 |
| 15 | 8140 | 8141 | 8142 | 8144 | 8145 | 8146 | 8147 | 8148 | 8149 |
| 16 | 8150 | 8151 | 8152 | 8154 | 8155 | 8156 | 8157 | 8158 | 8159 |
| 17 | 8160 | 8161 | 8162 | 8164 | 8165 | 8166 | 8167 | 8168 | 8169 |
| 18 | 8170 | 8171 | 8172 | 8174 | 8175 | 8176 | 8177 | 8178 | 8179 |
| 19 | 8180 | 8181 | 8182 | 8184 | 8185 | 8186 | 8187 | 8188 | 8189 |
| 20 | 8190 | 8191 | 8192 | 8194 | 8195 | 8196 | 8197 | 8198 | 8199 |
| 21 | 8200 | 8201 | 8202 | 8204 | 8205 | 8206 | 8207 | 8208 | 8209 |
| 22 | 8210 | 8211 | 8212 | 8214 | 8215 | 8216 | 8217 | 8218 | 8219 |
| 23 | 8220 | 8221 | 8222 | 8224 | 8225 | 8226 | 8227 | 8228 | 8229 |
| 24 | 8230 | 8231 | 8232 | 8234 | 8235 | 8236 | 8237 | 8238 | 8239 |
| 25 | 8240 | 8241 | 8242 | 8244 | 8245 | 8246 | 8247 | 8248 | 8249 |
| 26 | 8250 | 8251 | 8252 | 8254 | 8255 | 8256 | 8257 | 8258 | 8259 |
| 27 | 8260 | 8261 | 8262 | 8264 | 8265 | 8266 | 8267 | 8268 | 8269 |
| 28 | 8270 | 8271 | 8272 | 8274 | 8275 | 8276 | 8277 | 8278 | 8279 |
| 29 | 8280 | 8281 | 8282 | 8284 | 8285 | 8286 | 8287 | 8288 | 8289 |
| 30 | 8290 | 8291 | 8292 | 8294 | 8295 | 8296 | 8297 | 8298 | 8299 |
| 31 | 8300 | 8301 | 8302 | 8304 | 8305 | 8306 | 8307 | 8308 | 8309 |
| 32 | 8310 | 8311 | 8312 | 8314 | 8315 | 8316 | 8317 | 8318 | 8319 |
| 33 | 8320 | 8321 | 8322 | 8324 | 8325 | 8326 | 8327 | 8328 | 8329 |
| 34 | 8330 | 8331 | 8332 | 8334 | 8335 | 8336 | 8337 | 8338 | 8339 |
| 35 | 8340 | 8341 | 8342 | 8344 | 8345 | 8346 | 8347 | 8348 | 8349 |
| 36 | 8350 | 8351 | 8352 | 8354 | 8355 | 8356 | 8357 | 8358 | 8359 |
| 37 | 8360 | 8361 | 8362 | 8364 | 8365 | 8366 | 8367 | 8368 | 8369 |
| 38 | 8370 | 8371 | 8372 | 8374 | 8375 | 8376 | 8377 | 8378 | 8379 |
| 39 | 8380 | 8381 | 8382 | 8384 | 8385 | 8386 | 8387 | 8388 | 8389 |
| 40 | 8390 | 8391 | 8392 | 8394 | 8395 | 8396 | 8397 | 8398 | 8399 |
| 41 | 8400 | 8401 | 8402 | 8404 | 8405 | 8406 | 8407 | 8408 | 8409 |
| 42 | 8410 | 8411 | 8412 | 8414 | 8415 | 8416 | 8417 | 8418 | 8419 |
| 43 | 8420 | 8421 | 8422 | 8424 | 8425 | 8426 | 8427 | 8428 | 8429 |
| 44 | 8430 | 8431 | 8432 | 8434 | 8435 | 8436 | 8437 | 8438 | 8439 |
| 45 | 8440 | 8441 | 8442 | 8444 | 8445 | 8446 | 8447 | 8448 | 8449 |
| 46 | 8450 | 8451 | 8452 | 8454 | 8455 | 8456 | 8457 | 8458 | 8459 |
| 47 | 8460 | 8461 | 8462 | 8464 | 8465 | 8466 | 8467 | 8468 | 8469 |
| 48 | 8470 | 8471 | 8472 | 8474 | 8475 | 8476 | 8477 | 8478 | 8479 |
| 49 | 8480 | 8481 | 8482 | 8484 | 8485 | 8486 | 8487 | 8488 | 8489 |
| 50 | 8490 | 8491 | 8492 | 8494 | 8495 | 8496 | 8497 | 8498 | 8499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 51 | 8500 | 8501 | 8502 | 8504 | 8505 | 8506 | 8507 | 8508 | 8509 |
| 52 | 8510 | 8511 | 8512 | 8514 | 8515 | 8516 | 8517 | 8518 | 8519 |
| 53 | 8520 | 8521 | 8522 | 8524 | 8525 | 8526 | 8527 | 8528 | 8529 |
| 54 | 8530 | 8531 | 8532 | 8534 | 8535 | 8536 | 8537 | 8538 | 8539 |
| 55 | 8540 | 8541 | 8542 | 8544 | 8545 | 8546 | 8547 | 8548 | 8549 |
| 56 | 8550 | 8551 | 8552 | 8554 | 8555 | 8556 | 8557 | 8558 | 8559 |
| 57 | 8560 | 8561 | 8562 | 8564 | 8565 | 8566 | 8567 | 8568 | 8569 |
| 58 | 8570 | 8571 | 8572 | 8574 | 8575 | 8576 | 8577 | 8578 | 8579 |
| 59 | 8580 | 8581 | 8582 | 8584 | 8585 | 8586 | 8587 | 8588 | 8589 |
| 60 | 8590 | 8591 | 8592 | 8594 | 8595 | 8596 | 8597 | 8598 | 8599 |
| 61 | 8600 | 8601 | 8602 | 8604 | 8605 | 8606 | 8607 | 8608 | 8609 |
| 62 | 8610 | 8611 | 8612 | 8614 | 8615 | 8616 | 8617 | 8618 | 8619 |
| 63 | 8620 | 8621 | 8622 | 8624 | 8625 | 8626 | 8627 | 8628 | 8629 |
| 64 | 8630 | 8631 | 8632 | 8634 | 8635 | 8636 | 8637 | 8638 | 8639 |
| 65 | 8640 | 8641 | 8642 | 8644 | 8645 | 8646 | 8647 | 8648 | 8649 |
| 66 | 8650 | 8651 | 8652 | 8654 | 8655 | 8656 | 8657 | 8658 | 8659 |
| 67 | 8660 | 8661 | 8662 | 8664 | 8665 | 8666 | 8667 | 8668 | 8669 |
| 68 | 8670 | 8671 | 8672 | 8674 | 8675 | 8676 | 8677 | 8678 | 8679 |
| 69 | 8680 | 8681 | 8682 | 8684 | 8685 | 8686 | 8687 | 8688 | 8689 |
| 70 | 8690 | 8691 | 8692 | 8694 | 8695 | 8696 | 8697 | 8698 | 8699 |
| 71 | 8700 | 8701 | 8702 | 8704 | 8705 | 8706 | 8707 | 8708 | 8709 |
| 72 | 8710 | 8711 | 8712 | 8714 | 8715 | 8716 | 8717 | 8718 | 8719 |
| 73 | 8720 | 8721 | 8722 | 8724 | 8725 | 8726 | 8727 | 8728 | 8729 |
| 74 | 8730 | 8731 | 8732 | 8734 | 8735 | 8736 | 8737 | 8738 | 8739 |
| 75 | 8740 | 8741 | 8742 | 8744 | 8745 | 8746 | 8747 | 8748 | 8749 |
| 76 | 8750 | 8751 | 8752 | 8754 | 8755 | 8756 | 8757 | 8758 | 8759 |
| 77 | 8760 | 8761 | 8762 | 8764 | 8765 | 8766 | 8767 | 8768 | 8769 |
| 78 | 8770 | 8771 | 8772 | 8774 | 8775 | 8776 | 8777 | 8778 | 8779 |
| 79 | 8780 | 8781 | 8782 | 8784 | 8785 | 8786 | 8787 | 8788 | 8789 |
| 80 | 8790 | 8791 | 8792 | 8794 | 8795 | 8796 | 8797 | 8798 | 8799 |
| 81 | 8800 | 8801 | 8802 | 8804 | 8805 | 8806 | 8807 | 8808 | 8809 |
| 82 | 8810 | 8811 | 8812 | 8814 | 8815 | 8816 | 8817 | 8818 | 8819 |
| 83 | 8820 | 8821 | 8822 | 8824 | 8825 | 8826 | 8827 | 8828 | 8829 |
| 84 | 8830 | 8831 | 8832 | 8834 | 8835 | 8836 | 8837 | 8838 | 8839 |
| 85 | 8840 | 8841 | 8842 | 8844 | 8845 | 8846 | 8847 | 8848 | 8849 |
| 86 | 8850 | 8851 | 8852 | 8854 | 8855 | 8856 | 8857 | 8858 | 8859 |
| 87 | 8860 | 8861 | 8862 | 8864 | 8865 | 8866 | 8867 | 8868 | 8869 |
| 88 | 8870 | 8871 | 8872 | 8874 | 8875 | 8876 | 8877 | 8878 | 8879 |
| 89 | 8880 | 8881 | 8882 | 8884 | 8885 | 8886 | 8887 | 8888 | 8889 |
| 90 | 8890 | 8891 | 8892 | 8894 | 8895 | 8896 | 8897 | 8898 | 8899 |
| 91 | 8900 | 8901 | 8902 | 8904 | 8905 | 8906 | 8907 | 8908 | 8909 |
| 92 | 8910 | 8911 | 8912 | 8914 | 8915 | 8916 | 8917 | 8918 | 8919 |
| 93 | 8920 | 8921 | 8922 | 8924 | 8925 | 8926 | 8927 | 8928 | 8929 |
| 94 | 8930 | 8931 | 8932 | 8934 | 8935 | 8936 | 8937 | 8938 | 8939 |
| 95 | 8940 | 8941 | 8942 | 8944 | 8945 | 8946 | 8947 | 8948 | 8949 |
| 96 | 8950 | 8951 | 8952 | 8954 | 8955 | 8956 | 8957 | 8958 | 8959 |
| 97 | 8960 | 8961 | 8962 | 8964 | 8965 | 8966 | 8967 | 8968 | 8969 |
| 98 | 8970 | 8971 | 8972 | 8974 | 8975 | 8976 | 8977 | 8978 | 8979 |
| 99 | 8980 | 8981 | 8982 | 8984 | 8985 | 8986 | 8987 | 8988 | 8989 |
| 100 | 8990 | 8991 | 8992 | 8994 | 8995 | 8996 | 8997 | 8998 | 8999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 101 | 9000 | 9001 | 9002 | 9004 | 9005 | 9006 | 9007 | 9008 | 9009 |
| 102 | 9010 | 9011 | 9012 | 9014 | 9015 | 9016 | 9017 | 9018 | 9019 |
| 103 | 9020 | 9021 | 9022 | 9024 | 9025 | 9026 | 9027 | 9028 | 9029 |
| 104 | 9030 | 9031 | 9032 | 9034 | 9035 | 9036 | 9037 | 9038 | 9039 |
| 105 | 9040 | 9041 | 9042 | 9044 | 9045 | 9046 | 9047 | 9048 | 9049 |
| 106 | 9050 | 9051 | 9052 | 9054 | 9055 | 9056 | 9057 | 9058 | 9059 |
| 107 | 9060 | 9061 | 9062 | 9064 | 9065 | 9066 | 9067 | 9068 | 9069 |
| 108 | 9070 | 9071 | 9072 | 9074 | 9075 | 9076 | 9077 | 9078 | 9079 |
| 109 | 9080 | 9081 | 9082 | 9084 | 9085 | 9086 | 9087 | 9088 | 9089 |
| 110 | 9090 | 9091 | 9092 | 9094 | 9095 | 9096 | 9097 | 9098 | 9099 |
| 111 | 9100 | 9101 | 9102 | 9104 | 9105 | 9106 | 9107 | 9108 | 9109 |
| 112 | 9110 | 9111 | 9112 | 9114 | 9115 | 9116 | 9117 | 9118 | 9119 |
| 113 | 9120 | 9121 | 9122 | 9124 | 9125 | 9126 | 9127 | 9128 | 9129 |
| 114 | 9130 | 9131 | 9132 | 9134 | 9135 | 9136 | 9137 | 9138 | 9139 |
| 115 | 9140 | 9141 | 9142 | 9144 | 9145 | 9146 | 9147 | 9148 | 9149 |
| 116 | 9150 | 9151 | 9152 | 9154 | 9155 | 9156 | 9157 | 9158 | 9159 |
| 117 | 9160 | 9161 | 9162 | 9164 | 9165 | 9166 | 9167 | 9168 | 9169 |
| 118 | 9170 | 9171 | 9172 | 9174 | 9175 | 9176 | 9177 | 9178 | 9179 |
| 119 | 9180 | 9181 | 9182 | 9184 | 9185 | 9186 | 9187 | 9188 | 9189 |
| 120 | 9190 | 9191 | 9192 | 9194 | 9195 | 9196 | 9197 | 9198 | 9199 |
| 126 | 9250 | 9251 | 9252 | 9254 | 9255 | 9256 | 9257 | 9258 | 9259 |
| 127 | 9260 | 9261 | 9262 | 9264 | 9265 | 9266 | 9267 | 9268 | 9269 |
| 128 | 9270 | 9271 | 9272 | 9274 | 9275 | 9276 | 9277 | 9278 | 9279 |
| 129 | 9280 | 9281 | 9282 | 9284 | 9285 | 9286 | 9287 | 9288 | 9289 |
| 130 | 9290 | 9291 | 9292 | 9294 | 9295 | 9296 | 9297 | 9298 | 9299 |
| 131 | 9300 | 9301 | 9302 | 9304 | 9305 | 9306 | 9307 | 9308 | 9309 |
| 132 | 9310 | 9311 | 9312 | 9314 | 9315 | 9316 | 9317 | 9318 | 9319 |
| 133 | 9320 | 9321 | 9322 | 9324 | 9325 | 9326 | 9327 | 9328 | 9329 |
| 134 | 9330 | 9331 | 9332 | 9334 | 9335 | 9336 | 9337 | 9338 | 9339 |
| 135 | 9340 | 9341 | 9342 | 9344 | 9345 | 9346 | 9347 | 9348 | 9349 |
| 136 | 9350 | 9351 | 9352 | 9354 | 9355 | 9356 | 9357 | 9358 | 9359 |
| 137 | 9360 | 9361 | 9362 | 9364 | 9365 | 9366 | 9367 | 9368 | 9369 |
| 138 | 9370 | 9371 | 9372 | 9374 | 9375 | 9376 | 9377 | 9378 | 9379 |
| 139 | 9380 | 9381 | 9382 | 9384 | 9385 | 9386 | 9387 | 9388 | 9389 |
| 140 | 9390 | 9391 | 9392 | 9394 | 9395 | 9396 | 9397 | 9398 | 9399 |
| 141 | 9400 | 9401 | 9402 | 9404 | 9405 | 9406 | 9407 | 9408 | 9409 |
| 142 | 9410 | 9411 | 9412 | 9414 | 9415 | 9416 | 9417 | 9418 | 9419 |
| 143 | 9420 | 9421 | 9422 | 9424 | 9425 | 9426 | 9427 | 9428 | 9429 |
| 144 | 9430 | 9431 | 9432 | 9434 | 9435 | 9436 | 9437 | 9438 | 9439 |
| 145 | 9440 | 9441 | 9442 | 9444 | 9445 | 9446 | 9447 | 9448 | 9449 |
| 146 | 9450 | 9451 | 9452 | 9454 | 9455 | 9456 | 9457 | 9458 | 9459 |
| 147 | 9460 | 9461 | 9462 | 9464 | 9465 | 9466 | 9467 | 9468 | 9469 |
| 148 | 9470 | 9471 | 9472 | 9474 | 9475 | 9476 | 9477 | 9478 | 9479 |
| 149 | 9480 | 9481 | 9482 | 9484 | 9485 | 9486 | 9487 | 9488 | 9489 |
| 150 | 9490 | 9491 | 9492 | 9494 | 9495 | 9496 | 9497 | 9498 | 9499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 151 | 9500 | 9501 | 9502 | 9504 | 9505 | 9506 | 9507 | 9508 | 9509 |
| 152 | 9510 | 9511 | 9512 | 9514 | 9515 | 9516 | 9517 | 9518 | 9519 |
| 153 | 9520 | 9521 | 9522 | 9524 | 9525 | 9526 | 9527 | 9528 | 9529 |
| 154 | 9530 | 9531 | 9532 | 9534 | 9535 | 9536 | 9537 | 9538 | 9539 |
| 155 | 9540 | 9541 | 9542 | 9544 | 9545 | 9546 | 9547 | 9548 | 9549 |
| 156 | 9550 | 9551 | 9552 | 9554 | 9555 | 9556 | 9557 | 9558 | 9559 |
| 157 | 9560 | 9561 | 9562 | 9564 | 9565 | 9566 | 9567 | 9568 | 9569 |
| 158 | 9570 | 9571 | 9572 | 9574 | 9575 | 9576 | 9577 | 9578 | 9579 |
| 159 | 9580 | 9581 | 9582 | 9584 | 9585 | 9586 | 9587 | 9588 | 9589 |
| 160 | 9590 | 9591 | 9592 | 9594 | 9595 | 9596 | 9597 | 9598 | 9599 |
| 161 | 9600 | 9601 | 9602 | 9604 | 9605 | 9606 | 9607 | 9608 | 9609 |
| 162 | 9610 | 9611 | 9612 | 9614 | 9615 | 9616 | 9617 | 9618 | 9619 |
| 163 | 9620 | 9621 | 9622 | 9624 | 9625 | 9626 | 9627 | 9628 | 9629 |
| 164 | 9630 | 9631 | 9632 | 9634 | 9635 | 9636 | 9637 | 9638 | 9639 |
| 165 | 9640 | 9641 | 9642 | 9644 | 9645 | 9646 | 9647 | 9648 | 9649 |
| 166 | 9650 | 9651 | 9652 | 9654 | 9655 | 9656 | 9657 | 9658 | 9659 |
| 167 | 9660 | 9661 | 9662 | 9664 | 9665 | 9666 | 9667 | 9668 | 9669 |
| 168 | 9670 | 9671 | 9672 | 9674 | 9675 | 9676 | 9677 | 9678 | 9679 |
| 169 | 9680 | 9681 | 9682 | 9684 | 9685 | 9686 | 9687 | 9688 | 9689 |
| 170 | 9690 | 9691 | 9692 | 9694 | 9695 | 9696 | 9697 | 9698 | 9699 |
| 176 | 9750 | 9751 | 9752 | 9754 | 9755 | 9756 | 9757 | 9758 | 9759 |
| 177 | 9760 | 9761 | 9762 | 9764 | 9765 | 9766 | 9767 | 9768 | 9769 |
| 178 | 9770 | 9771 | 9772 | 9774 | 9775 | 9776 | 9777 | 9778 | 9779 |
| 179 | 9780 | 9781 | 9782 | 9784 | 9785 | 9786 | 9787 | 9788 | 9789 |
| 180 | 9790 | 9791 | 9792 | 9794 | 9795 | 9796 | 9797 | 9798 | 9799 |
| 181 | 9800 | 9801 | 9802 | 9804 | 9805 | 9806 | 9807 | 9808 | 9809 |
| 182 | 9810 | 9811 | 9812 | 9814 | 9815 | 9816 | 9817 | 9818 | 9819 |
| 183 | 9820 | 9821 | 9822 | 9824 | 9825 | 9826 | 9827 | 9828 | 9829 |
| 184 | 9830 | 9831 | 9832 | 9834 | 9835 | 9836 | 9837 | 9838 | 9839 |
| 185 | 9840 | 9841 | 9842 | 9844 | 9845 | 9846 | 9847 | 9848 | 9849 |
| 186 | 9850 | 9851 | 9852 | 9854 | 9855 | 9856 | 9857 | 9858 | 9859 |
| 187 | 9860 | 9861 | 9862 | 9864 | 9865 | 9866 | 9867 | 9868 | 9869 |
| 188 | 9870 | 9871 | 9872 | 9874 | 9875 | 9876 | 9877 | 9878 | 9879 |
| 189 | 9880 | 9881 | 9882 | 9884 | 9885 | 9886 | 9887 | 9888 | 9889 |
| 190 | 9890 | 9891 | 9892 | 9894 | 9895 | 9896 | 9897 | 9898 | 9899 |
| 191 | 9900 | 9901 | 9902 | 9904 | 9905 | 9906 | 9907 | 9908 | 9909 |
| 192 | 9910 | 9911 | 9912 | 9914 | 9915 | 9916 | 9917 | 9918 | 9919 |
| 193 | 9920 | 9921 | 9922 | 9924 | 9925 | 9926 | 9927 | 9928 | 9929 |
| 194 | 9930 | 9931 | 9932 | 9934 | 9935 | 9936 | 9937 | 9938 | 9939 |
| 195 | 9940 | 9941 | 9942 | 9944 | 9945 | 9946 | 9947 | 9948 | 9949 |
| 196 | 9950 | 9951 | 9952 | 9954 | 9955 | 9956 | 9957 | 9958 | 9959 |
| 197 | 9960 | 9961 | 9962 | 9964 | 9965 | 9966 | 9967 | 9968 | 9969 |
| 198 | 9970 | 9971 | 9972 | 9974 | 9975 | 9976 | 9977 | 9978 | 9979 |
| 199 | 9980 | 9981 | 9982 | 9984 | 9985 | 9986 | 9987 | 9988 | 9989 |
| 200 | 9990 | 9991 | 9992 | 9994 | 9995 | 9996 | 9997 | 9998 | 9999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 201 | 10000 | 10001 | 10002 | 10004 | 10005 | 10006 | 10007 | 10008 | 10009 |
| 202 | 10010 | 10011 | 10012 | 10014 | 10015 | 10016 | 10017 | 10018 | 10019 |
| 203 | 10020 | 10021 | 10022 | 10024 | 10025 | 10026 | 10027 | 10028 | 10029 |
| 204 | 10030 | 10031 | 10032 | 10034 | 10035 | 10036 | 10037 | 10038 | 10039 |
| 205 | 10040 | 10041 | 10042 | 10044 | 10045 | 10046 | 10047 | 10048 | 10049 |
| 206 | 10050 | 10051 | 10052 | 10054 | 10055 | 10056 | 10057 | 10058 | 10059 |
| 207 | 10060 | 10061 | 10062 | 10064 | 10065 | 10066 | 10067 | 10068 | 10069 |
| 208 | 10070 | 10071 | 10072 | 10074 | 10075 | 10076 | 10077 | 10078 | 10079 |
| 209 | 10080 | 10081 | 10082 | 10084 | 10085 | 10086 | 10087 | 10088 | 10089 |
| 210 | 10090 | 10091 | 10092 | 10094 | 10095 | 10096 | 10097 | 10098 | 10099 |
| 211 | 10100 | 10101 | 10102 | 10104 | 10105 | 10106 | 10107 | 10108 | 10109 |
| 212 | 10110 | 10111 | 10112 | 10114 | 10115 | 10116 | 10117 | 10118 | 10119 |
| 213 | 10120 | 10121 | 10122 | 10124 | 10125 | 10126 | 10127 | 10128 | 10129 |
| 214 | 10130 | 10131 | 10132 | 10134 | 10135 | 10136 | 10137 | 10138 | 10139 |
| 215 | 10140 | 10141 | 10142 | 10144 | 10145 | 10146 | 10147 | 10148 | 10149 |
| 216 | 10150 | 10151 | 10152 | 10154 | 10155 | 10156 | 10157 | 10158 | 10159 |
| 217 | 10160 | 10161 | 10162 | 10164 | 10165 | 10166 | 10167 | 10168 | 10169 |
| 218 | 10170 | 10171 | 10172 | 10174 | 10175 | 10176 | 10177 | 10178 | 10179 |
| 219 | 10180 | 10181 | 10182 | 10184 | 10185 | 10186 | 10187 | 10188 | 10189 |
| 220 | 10190 | 10191 | 10192 | 10194 | 10195 | 10196 | 10197 | 10198 | 10199 |
| 221 | 10200 | 10201 | 10202 | 10204 | 10205 | 10206 | 10207 | 10208 | 10209 |
| 222 | 10210 | 10211 | 10212 | 10214 | 10215 | 10216 | 10217 | 10218 | 10219 |
| 223 | 10220 | 10221 | 10222 | 10224 | 10225 | 10226 | 10227 | 10228 | 10229 |
| 224 | 10230 | 10231 | 10232 | 10234 | 10235 | 10236 | 10237 | 10238 | 10239 |
| 225 | 10240 | 10241 | 10242 | 10244 | 10245 | 10246 | 10247 | 10248 | 10249 |
| 226 | 10250 | 10251 | 10252 | 10254 | 10255 | 10256 | 10257 | 10258 | 10259 |
| 227 | 10260 | 10261 | 10262 | 10264 | 10265 | 10266 | 10267 | 10268 | 10269 |
| 228 | 10270 | 10271 | 10272 | 10274 | 10275 | 10276 | 10277 | 10278 | 10279 |
| 229 | 10280 | 10281 | 10282 | 10284 | 10285 | 10286 | 10287 | 10288 | 10289 |
| 230 | 10290 | 10291 | 10292 | 10294 | 10295 | 10296 | 10297 | 10298 | 10299 |
| 231 | 10300 | 10301 | 10302 | 10304 | 10305 | 10306 | 10307 | 10308 | 10309 |
| 232 | 10310 | 10311 | 10312 | 10314 | 10315 | 10316 | 10317 | 10318 | 10319 |
| 233 | 10320 | 10321 | 10322 | 10324 | 10325 | 10326 | 10327 | 10328 | 10329 |
| 234 | 10330 | 10331 | 10332 | 10334 | 10335 | 10336 | 10337 | 10338 | 10339 |
| 235 | 10340 | 10341 | 10342 | 10344 | 10345 | 10346 | 10347 | 10348 | 10349 |
| 236 | 10350 | 10351 | 10352 | 10354 | 10355 | 10356 | 10357 | 10358 | 10359 |
| 237 | 10360 | 10361 | 10362 | 10364 | 10365 | 10366 | 10367 | 10368 | 10369 |
| 238 | 10370 | 10371 | 10372 | 10374 | 10375 | 10376 | 10377 | 10378 | 10379 |
| 239 | 10380 | 10381 | 10382 | 10384 | 10385 | 10386 | 10387 | 10388 | 10389 |
| 240 | 10390 | 10391 | 10392 | 10394 | 10395 | 10396 | 10397 | 10398 | 10399 |
| 241 | 10400 | 10401 | 10402 | 10404 | 10405 | 10406 | 10407 | 10408 | 10409 |
| 242 | 10410 | 10411 | 10412 | 10414 | 10415 | 10416 | 10417 | 10418 | 10419 |
| 243 | 10420 | 10421 | 10422 | 10424 | 10425 | 10426 | 10427 | 10428 | 10429 |
| 244 | 10430 | 10431 | 10432 | 10434 | 10435 | 10436 | 10437 | 10438 | 10439 |
| 245 | 10440 | 10441 | 10442 | 10444 | 10445 | 10446 | 10447 | 10448 | 10449 |
| 246 | 10450 | 10451 | 10452 | 10454 | 10455 | 10456 | 10457 | 10458 | 10459 |
| 247 | 10460 | 10461 | 10462 | 10464 | 10465 | 10466 | 10467 | 10468 | 10469 |
| 248 | 10470 | 10471 | 10472 | 10474 | 10475 | 10476 | 10477 | 10478 | 10479 |
| 249 | 10480 | 10481 | 10482 | 10484 | 10485 | 10486 | 10487 | 10488 | 10489 |
| 250 | 10490 | 10491 | 10492 | 10494 | 10495 | 10496 | 10497 | 10498 | 10499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 251 | 10500 | 10501 | 10502 | 10504 | 10505 | 10506 | 10507 | 10508 | 10509 |
| 252 | 10510 | 10511 | 10512 | 10514 | 10515 | 10516 | 10517 | 10518 | 10519 |
| 253 | 10520 | 10521 | 10522 | 10524 | 10525 | 10526 | 10527 | 10528 | 10529 |
| 254 | 10530 | 10531 | 10532 | 10534 | 10535 | 10536 | 10537 | 10538 | 10539 |
| 255 | 10540 | 10541 | 10542 | 10544 | 10545 | 10546 | 10547 | 10548 | 10549 |
| 256 | 10550 | 10551 | 10552 | 10554 | 10555 | 10556 | 10557 | 10558 | 10559 |
| 257 | 10560 | 10561 | 10562 | 10564 | 10565 | 10566 | 10567 | 10568 | 10569 |
| 258 | 10570 | 10571 | 10572 | 10574 | 10575 | 10576 | 10577 | 10578 | 10579 |
| 259 | 10580 | 10581 | 10582 | 10584 | 10585 | 10586 | 10587 | 10588 | 10589 |
| 260 | 10590 | 10591 | 10592 | 10594 | 10595 | 10596 | 10597 | 10598 | 10599 |
| 261 | 10600 | 10601 | 10602 | 10604 | 10605 | 10606 | 10607 | 10608 | 10609 |
| 262 | 10610 | 10611 | 10612 | 10614 | 10615 | 10616 | 10617 | 10618 | 10619 |
| 263 | 10620 | 10621 | 10622 | 10624 | 10625 | 10626 | 10627 | 10628 | 10629 |
| 264 | 10630 | 10631 | 10632 | 10634 | 10635 | 10636 | 10637 | 10638 | 10639 |
| 265 | 10640 | 10641 | 10642 | 10644 | 10645 | 10646 | 10647 | 10648 | 10649 |
| 266 | 10650 | 10651 | 10652 | 10654 | 10655 | 10656 | 10657 | 10658 | 10659 |
| 267 | 10660 | 10661 | 10662 | 10664 | 10665 | 10666 | 10667 | 10668 | 10669 |
| 268 | 10670 | 10671 | 10672 | 10674 | 10675 | 10676 | 10677 | 10678 | 10679 |
| 269 | 10680 | 10681 | 10682 | 10684 | 10685 | 10686 | 10687 | 10688 | 10689 |
| 270 | 10690 | 10691 | 10692 | 10694 | 10695 | 10696 | 10697 | 10698 | 10699 |
| 271 | 10700 | 10701 | 10702 | 10704 | 10705 | 10706 | 10707 | 10708 | 10709 |
| 272 | 10710 | 10711 | 10712 | 10714 | 10715 | 10716 | 10717 | 10718 | 10719 |
| 273 | 10720 | 10721 | 10722 | 10724 | 10725 | 10726 | 10727 | 10728 | 10729 |
| 274 | 10730 | 10731 | 10732 | 10734 | 10735 | 10736 | 10737 | 10738 | 10739 |
| 275 | 10740 | 10741 | 10742 | 10744 | 10745 | 10746 | 10747 | 10748 | 10749 |
| 276 | 10750 | 10751 | 10752 | 10754 | 10755 | 10756 | 10757 | 10758 | 10759 |
| 277 | 10760 | 10761 | 10762 | 10764 | 10765 | 10766 | 10767 | 10768 | 10769 |
| 278 | 10770 | 10771 | 10772 | 10774 | 10775 | 10776 | 10777 | 10778 | 10779 |
| 279 | 10780 | 10781 | 10782 | 10784 | 10785 | 10786 | 10787 | 10788 | 10789 |
| 280 | 10790 | 10791 | 10792 | 10794 | 10795 | 10796 | 10797 | 10798 | 10799 |
| 281 | 10800 | 10801 | 10802 | 10804 | 10805 | 10806 | 10807 | 10808 | 10809 |
| 282 | 10810 | 10811 | 10812 | 10814 | 10815 | 10816 | 10817 | 10818 | 10819 |
| 283 | 10820 | 10821 | 10822 | 10824 | 10825 | 10826 | 10827 | 10828 | 10829 |
| 284 | 10830 | 10831 | 10832 | 10834 | 10835 | 10836 | 10837 | 10838 | 10839 |
| 285 | 10840 | 10841 | 10842 | 10844 | 10845 | 10846 | 10847 | 10848 | 10849 |
| 286 | 10850 | 10851 | 10852 | 10854 | 10855 | 10856 | 10857 | 10858 | 10859 |
| 287 | 10860 | 10861 | 10862 | 10864 | 10865 | 10866 | 10867 | 10868 | 10869 |
| 288 | 10870 | 10871 | 10872 | 10874 | 10875 | 10876 | 10877 | 10878 | 10879 |
| 289 | 10880 | 10881 | 10882 | 10884 | 10885 | 10886 | 10887 | 10888 | 10889 |
| 290 | 10890 | 10891 | 10892 | 10894 | 10895 | 10896 | 10897 | 10898 | 10899 |
| 291 | 10900 | 10901 | 10902 | 10904 | 10905 | 10906 | 10907 | 10908 | 10909 |
| 292 | 10910 | 10911 | 10912 | 10914 | 10915 | 10916 | 10917 | 10918 | 10919 |
| 293 | 10920 | 10921 | 10922 | 10924 | 10925 | 10926 | 10927 | 10928 | 10929 |
| 294 | 10930 | 10931 | 10932 | 10934 | 10935 | 10936 | 10937 | 10938 | 10939 |
| 295 | 10940 | 10941 | 10942 | 10944 | 10945 | 10946 | 10947 | 10948 | 10949 |
| 296 | 10950 | 10951 | 10952 | 10954 | 10955 | 10956 | 10957 | 10958 | 10959 |
| 297 | 10960 | 10961 | 10962 | 10964 | 10965 | 10966 | 10967 | 10968 | 10969 |
| 298 | 10970 | 10971 | 10972 | 10974 | 10975 | 10976 | 10977 | 10978 | 10979 |
| 299 | 10980 | 10981 | 10982 | 10984 | 10985 | 10986 | 10987 | 10988 | 10989 |
| 300 | 10990 | 10991 | 10992 | 10994 | 10995 | 10996 | 10997 | 10998 | 10999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 301 | 11000 | 11001 | 11002 | 11004 | 11005 | 11006 | 11007 | 11008 | 11009 |
| 302 | 11010 | 11011 | 11012 | 11014 | 11015 | 11016 | 11017 | 11018 | 11019 |
| 303 | 11020 | 11021 | 11022 | 11024 | 11025 | 11026 | 11027 | 11028 | 11029 |
| 304 | 11030 | 11031 | 11032 | 11034 | 11035 | 11036 | 11037 | 11038 | 11039 |
| 305 | 11040 | 11041 | 11042 | 11044 | 11045 | 11046 | 11047 | 11048 | 11049 |
| 306 | 11050 | 11051 | 11052 | 11054 | 11055 | 11056 | 11057 | 11058 | 11059 |
| 307 | 11060 | 11061 | 11062 | 11064 | 11065 | 11066 | 11067 | 11068 | 11069 |
| 308 | 11070 | 11071 | 11072 | 11074 | 11075 | 11076 | 11077 | 11078 | 11079 |
| 309 | 11080 | 11081 | 11082 | 11084 | 11085 | 11086 | 11087 | 11088 | 11089 |
| 310 | 11090 | 11091 | 11092 | 11094 | 11095 | 11096 | 11097 | 11098 | 11099 |
| 311 | 11100 | 11101 | 11102 | 11104 | 11105 | 11106 | 11107 | 11108 | 11109 |
| 312 | 11110 | 11111 | 11112 | 11114 | 11115 | 11116 | 11117 | 11118 | 11119 |
| 313 | 11120 | 11121 | 11122 | 11124 | 11125 | 11126 | 11127 | 11128 | 11129 |
| 314 | 11130 | 11131 | 11132 | 11134 | 11135 | 11136 | 11137 | 11138 | 11139 |
| 315 | 11140 | 11141 | 11142 | 11144 | 11145 | 11146 | 11147 | 11148 | 11149 |
| 316 | 11150 | 11151 | 11152 | 11154 | 11155 | 11156 | 11157 | 11158 | 11159 |
| 317 | 11160 | 11161 | 11162 | 11164 | 11165 | 11166 | 11167 | 11168 | 11169 |
| 318 | 11170 | 11171 | 11172 | 11174 | 11175 | 11176 | 11177 | 11178 | 11179 |
| 319 | 11180 | 11181 | 11182 | 11184 | 11185 | 11186 | 11187 | 11188 | 11189 |
| 320 | 11190 | 11191 | 11192 | 11194 | 11195 | 11196 | 11197 | 11198 | 11199 |
| 321 | 11200 | 11201 | 11202 | 11204 | 11205 | 11206 | 11207 | 11208 | 11209 |
| 322 | 11210 | 11211 | 11212 | 11214 | 11215 | 11216 | 11217 | 11218 | 11219 |
| 323 | 11220 | 11221 | 11222 | 11224 | 11225 | 11226 | 11227 | 11228 | 11229 |
| 324 | 11230 | 11231 | 11232 | 11234 | 11235 | 11236 | 11237 | 11238 | 11239 |
| 325 | 11240 | 11241 | 11242 | 11244 | 11245 | 11246 | 11247 | 11248 | 11249 |
| 326 | 11250 | 11251 | 11252 | 11254 | 11255 | 11256 | 11257 | 11258 | 11259 |
| 327 | 11260 | 11261 | 11262 | 11264 | 11265 | 11266 | 11267 | 11268 | 11269 |
| 328 | 11270 | 11271 | 11272 | 11274 | 11275 | 11276 | 11277 | 11278 | 11279 |
| 329 | 11280 | 11281 | 11282 | 11284 | 11285 | 11286 | 11287 | 11288 | 11289 |
| 330 | 11290 | 11291 | 11292 | 11294 | 11295 | 11296 | 11297 | 11298 | 11299 |
| 331 | 11300 | 11301 | 11302 | 11304 | 11305 | 11306 | 11307 | 11308 | 11309 |
| 332 | 11310 | 11311 | 11312 | 11314 | 11315 | 11316 | 11317 | 11318 | 11319 |
| 333 | 11320 | 11321 | 11322 | 11324 | 11325 | 11326 | 11327 | 11328 | 11329 |
| 334 | 11330 | 11331 | 11332 | 11334 | 11335 | 11336 | 11337 | 11338 | 11339 |
| 335 | 11340 | 11341 | 11342 | 11344 | 11345 | 11346 | 11347 | 11348 | 11349 |
| 336 | 11350 | 11351 | 11352 | 11354 | 11355 | 11356 | 11357 | 11358 | 11359 |
| 337 | 11360 | 11361 | 11362 | 11364 | 11365 | 11366 | 11367 | 11368 | 11369 |
| 338 | 11370 | 11371 | 11372 | 11374 | 11375 | 11376 | 11377 | 11378 | 11379 |
| 339 | 11380 | 11381 | 11382 | 11384 | 11385 | 11386 | 11387 | 11388 | 11389 |
| 340 | 11390 | 11391 | 11392 | 11394 | 11395 | 11396 | 11397 | 11398 | 11399 |
| 341 | 11400 | 11401 | 11402 | 11404 | 11405 | 11406 | 11407 | 11408 | 11409 |
| 342 | 11410 | 11411 | 11412 | 11414 | 11415 | 11416 | 11417 | 11418 | 11419 |
| 343 | 11420 | 11421 | 11422 | 11424 | 11425 | 11426 | 11427 | 11428 | 11429 |
| 344 | 11430 | 11431 | 11432 | 11434 | 11435 | 11436 | 11437 | 11438 | 11439 |
| 345 | 11440 | 11441 | 11442 | 11444 | 11445 | 11446 | 11447 | 11448 | 11449 |
| 346 | 11450 | 11451 | 11452 | 11454 | 11455 | 11456 | 11457 | 11458 | 11459 |
| 347 | 11460 | 11461 | 11462 | 11464 | 11465 | 11466 | 11467 | 11468 | 11469 |
| 348 | 11470 | 11471 | 11472 | 11474 | 11475 | 11476 | 11477 | 11478 | 11479 |
| 349 | 11480 | 11481 | 11482 | 11484 | 11485 | 11486 | 11487 | 11488 | 11489 |
| 350 | 11490 | 11491 | 11492 | 11494 | 11495 | 11496 | 11497 | 11498 | 11499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 351 | 11500 | 11501 | 11502 | 11504 | 11505 | 11506 | 11507 | 11508 | 11509 |
| 352 | 11510 | 11511 | 11512 | 11514 | 11515 | 11516 | 11517 | 11518 | 11519 |
| 353 | 11520 | 11521 | 11522 | 11524 | 11525 | 11526 | 11527 | 11528 | 11529 |
| 354 | 11530 | 11531 | 11532 | 11534 | 11535 | 11536 | 11537 | 11538 | 11539 |
| 355 | 11540 | 11541 | 11542 | 11544 | 11545 | 11546 | 11547 | 11548 | 11549 |
| 356 | 11550 | 11551 | 11552 | 11554 | 11555 | 11556 | 11557 | 11558 | 11559 |
| 357 | 11560 | 11561 | 11562 | 11564 | 11565 | 11566 | 11567 | 11568 | 11569 |
| 358 | 11570 | 11571 | 11572 | 11574 | 11575 | 11576 | 11577 | 11578 | 11579 |
| 359 | 11580 | 11581 | 11582 | 11584 | 11585 | 11586 | 11587 | 11588 | 11589 |
| 360 | 11590 | 11591 | 11592 | 11594 | 11595 | 11596 | 11597 | 11598 | 11599 |
| 361 | 11600 | 11601 | 11602 | 11604 | 11605 | 11606 | 11607 | 11608 | 11609 |
| 362 | 11610 | 11611 | 11612 | 11614 | 11615 | 11616 | 11617 | 11618 | 11619 |
| 363 | 11620 | 11621 | 11622 | 11624 | 11625 | 11626 | 11627 | 11628 | 11629 |
| 364 | 11630 | 11631 | 11632 | 11634 | 11635 | 11636 | 11637 | 11638 | 11639 |
| 365 | 11640 | 11641 | 11642 | 11644 | 11645 | 11646 | 11647 | 11648 | 11649 |
| 366 | 11650 | 11651 | 11652 | 11654 | 11655 | 11656 | 11657 | 11658 | 11659 |
| 367 | 11660 | 11661 | 11662 | 11664 | 11665 | 11666 | 11667 | 11668 | 11669 |
| 368 | 11670 | 11671 | 11672 | 11674 | 11675 | 11676 | 11677 | 11678 | 11679 |
| 369 | 11680 | 11681 | 11682 | 11684 | 11685 | 11686 | 11687 | 11688 | 11689 |
| 370 | 11690 | 11691 | 11692 | 11694 | 11695 | 11696 | 11697 | 11698 | 11699 |
| 371 | 11700 | 11701 | 11702 | 11704 | 11705 | 11706 | 11707 | 11708 | 11709 |
| 372 | 11710 | 11711 | 11712 | 11714 | 11715 | 11716 | 11717 | 11718 | 11719 |
| 373 | 11720 | 11721 | 11722 | 11724 | 11725 | 11726 | 11727 | 11728 | 11729 |
| 374 | 11730 | 11731 | 11732 | 11734 | 11735 | 11736 | 11737 | 11738 | 11739 |
| 375 | 11740 | 11741 | 11742 | 11744 | 11745 | 11746 | 11747 | 11748 | 11749 |
| 376 | 11750 | 11751 | 11752 | 11754 | 11755 | 11756 | 11757 | 11758 | 11759 |
| 377 | 11760 | 11761 | 11762 | 11764 | 11765 | 11766 | 11767 | 11768 | 11769 |
| 378 | 11770 | 11771 | 11772 | 11774 | 11775 | 11776 | 11777 | 11778 | 11779 |
| 379 | 11780 | 11781 | 11782 | 11784 | 11785 | 11786 | 11787 | 11788 | 11789 |
| 380 | 11790 | 11791 | 11792 | 11794 | 11795 | 11796 | 11797 | 11798 | 11799 |
| 381 | 11800 | 11801 | 11802 | 11804 | 11805 | 11806 | 11807 | 11808 | 11809 |
| 382 | 11810 | 11811 | 11812 | 11814 | 11815 | 11816 | 11817 | 11818 | 11819 |
| 383 | 11820 | 11821 | 11822 | 11824 | 11825 | 11826 | 11827 | 11828 | 11829 |
| 384 | 11830 | 11831 | 11832 | 11834 | 11835 | 11836 | 11837 | 11838 | 11839 |
| 385 | 11840 | 11841 | 11842 | 11844 | 11845 | 11846 | 11847 | 11848 | 11849 |
| 386 | 11850 | 11851 | 11852 | 11854 | 11855 | 11856 | 11857 | 11858 | 11859 |
| 387 | 11860 | 11861 | 11862 | 11864 | 11865 | 11866 | 11867 | 11868 | 11869 |
| 388 | 11870 | 11871 | 11872 | 11874 | 11875 | 11876 | 11877 | 11878 | 11879 |
| 389 | 11880 | 11881 | 11882 | 11884 | 11885 | 11886 | 11887 | 11888 | 11889 |
| 390 | 11890 | 11891 | 11892 | 11894 | 11895 | 11896 | 11897 | 11898 | 11899 |
| 391 | 11900 | 11901 | 11902 | 11904 | 11905 | 11906 | 11907 | 11908 | 11909 |
| 392 | 11910 | 11911 | 11912 | 11914 | 11915 | 11916 | 11917 | 11918 | 11919 |
| 393 | 11920 | 11921 | 11922 | 11924 | 11925 | 11926 | 11927 | 11928 | 11929 |
| 394 | 11930 | 11931 | 11932 | 11934 | 11935 | 11936 | 11937 | 11938 | 11939 |
| 395 | 11940 | 11941 | 11942 | 11944 | 11945 | 11946 | 11947 | 11948 | 11949 |
| 396 | 11950 | 11951 | 11952 | 11954 | 11955 | 11956 | 11957 | 11958 | 11959 |
| 397 | 11960 | 11961 | 11962 | 11964 | 11965 | 11966 | 11967 | 11968 | 11969 |
| 398 | 11970 | 11971 | 11972 | 11974 | 11975 | 11976 | 11977 | 11978 | 11979 |
| 399 | 11980 | 11981 | 11982 | 11984 | 11985 | 11986 | 11987 | 11988 | 11989 |
| 400 | 11990 | 11991 | 11992 | 11994 | 11995 | 11996 | 11997 | 11998 | 11999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 401 | 12000 | 12001 | 12002 | 12004 | 12005 | 12006 | 12007 | 12008 | 12009 |
| 402 | 12010 | 12011 | 12012 | 12014 | 12015 | 12016 | 12017 | 12018 | 12019 |
| 403 | 12020 | 12021 | 12022 | 12024 | 12025 | 12026 | 12027 | 12028 | 12029 |
| 404 | 12030 | 12031 | 12032 | 12034 | 12035 | 12036 | 12037 | 12038 | 12039 |
| 405 | 12040 | 12041 | 12042 | 12044 | 12045 | 12046 | 12047 | 12048 | 12049 |
| 406 | 12050 | 12051 | 12052 | 12054 | 12055 | 12056 | 12057 | 12058 | 12059 |
| 407 | 12060 | 12061 | 12062 | 12064 | 12065 | 12066 | 12067 | 12068 | 12069 |
| 408 | 12070 | 12071 | 12072 | 12074 | 12075 | 12076 | 12077 | 12078 | 12079 |
| 409 | 12080 | 12081 | 12082 | 12084 | 12085 | 12086 | 12087 | 12088 | 12089 |
| 410 | 12090 | 12091 | 12092 | 12094 | 12095 | 12096 | 12097 | 12098 | 12099 |
| 411 | 12100 | 12101 | 12102 | 12104 | 12105 | 12106 | 12107 | 12108 | 12109 |
| 412 | 12110 | 12111 | 12112 | 12114 | 12115 | 12116 | 12117 | 12118 | 12119 |
| 413 | 12120 | 12121 | 12122 | 12124 | 12125 | 12126 | 12127 | 12128 | 12129 |
| 414 | 12130 | 12131 | 12132 | 12134 | 12135 | 12136 | 12137 | 12138 | 12139 |
| 415 | 12140 | 12141 | 12142 | 12144 | 12145 | 12146 | 12147 | 12148 | 12149 |
| 416 | 12150 | 12151 | 12152 | 12154 | 12155 | 12156 | 12157 | 12158 | 12159 |
| 417 | 12160 | 12161 | 12162 | 12164 | 12165 | 12166 | 12167 | 12168 | 12169 |
| 418 | 12170 | 12171 | 12172 | 12174 | 12175 | 12176 | 12177 | 12178 | 12179 |
| 419 | 12180 | 12181 | 12182 | 12184 | 12185 | 12186 | 12187 | 12188 | 12189 |
| 420 | 12190 | 12191 | 12192 | 12194 | 12195 | 12196 | 12197 | 12198 | 12199 |
| 421 | 12200 | 12201 | 12202 | 12204 | 12205 | 12206 | 12207 | 12208 | 12209 |
| 422 | 12210 | 12211 | 12212 | 12214 | 12215 | 12216 | 12217 | 12218 | 12219 |
| 423 | 12220 | 12221 | 12222 | 12224 | 12225 | 12226 | 12227 | 12228 | 12229 |
| 424 | 12230 | 12231 | 12232 | 12234 | 12235 | 12236 | 12237 | 12238 | 12239 |
| 425 | 12240 | 12241 | 12242 | 12244 | 12245 | 12246 | 12247 | 12248 | 12249 |
| 426 | 12250 | 12251 | 12252 | 12254 | 12255 | 12256 | 12257 | 12258 | 12259 |
| 427 | 12260 | 12261 | 12262 | 12264 | 12265 | 12266 | 12267 | 12268 | 12269 |
| 428 | 12270 | 12271 | 12272 | 12274 | 12275 | 12276 | 12277 | 12278 | 12279 |
| 429 | 12280 | 12281 | 12282 | 12284 | 12285 | 12286 | 12287 | 12288 | 12289 |
| 430 | 12290 | 12291 | 12292 | 12294 | 12295 | 12296 | 12297 | 12298 | 12299 |
| 431 | 12300 | 12301 | 12302 | 12304 | 12305 | 12306 | 12307 | 12308 | 12309 |
| 432 | 12310 | 12311 | 12312 | 12314 | 12315 | 12316 | 12317 | 12318 | 12319 |
| 433 | 12320 | 12321 | 12322 | 12324 | 12325 | 12326 | 12327 | 12328 | 12329 |
| 434 | 12330 | 12331 | 12332 | 12334 | 12335 | 12336 | 12337 | 12338 | 12339 |
| 435 | 12340 | 12341 | 12342 | 12344 | 12345 | 12346 | 12347 | 12348 | 12349 |
| 436 | 12350 | 12351 | 12352 | 12354 | 12355 | 12356 | 12357 | 12358 | 12359 |
| 437 | 12360 | 12361 | 12362 | 12364 | 12365 | 12366 | 12367 | 12368 | 12369 |
| 438 | 12370 | 12371 | 12372 | 12374 | 12375 | 12376 | 12377 | 12378 | 12379 |
| 439 | 12380 | 12381 | 12382 | 12384 | 12385 | 12386 | 12387 | 12388 | 12389 |
| 440 | 12390 | 12391 | 12392 | 12394 | 12395 | 12396 | 12397 | 12398 | 12399 |
| 441 | 12400 | 12401 | 12402 | 12404 | 12405 | 12406 | 12407 | 12408 | 12409 |
| 442 | 12410 | 12411 | 12412 | 12414 | 12415 | 12416 | 12417 | 12418 | 12419 |
| 443 | 12420 | 12421 | 12422 | 12424 | 12425 | 12426 | 12427 | 12428 | 12429 |
| 444 | 12430 | 12431 | 12432 | 12434 | 12435 | 12436 | 12437 | 12438 | 12439 |
| 445 | 12440 | 12441 | 12442 | 12444 | 12445 | 12446 | 12447 | 12448 | 12449 |
| 446 | 12450 | 12451 | 12452 | 12454 | 12455 | 12456 | 12457 | 12458 | 12459 |
| 447 | 12460 | 12461 | 12462 | 12464 | 12465 | 12466 | 12467 | 12468 | 12469 |
| 448 | 12470 | 12471 | 12472 | 12474 | 12475 | 12476 | 12477 | 12478 | 12479 |
| 449 | 12480 | 12481 | 12482 | 12484 | 12485 | 12486 | 12487 | 12488 | 12489 |
| 450 | 12490 | 12491 | 12492 | 12494 | 12495 | 12496 | 12497 | 12498 | 12499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 451 | 12500 | 12501 | 12502 | 12504 | 12505 | 12506 | 12507 | 12508 | 12509 |
| 452 | 12510 | 12511 | 12512 | 12514 | 12515 | 12516 | 12517 | 12518 | 12519 |
| 453 | 12520 | 12521 | 12522 | 12524 | 12525 | 12526 | 12527 | 12528 | 12529 |
| 454 | 12530 | 12531 | 12532 | 12534 | 12535 | 12536 | 12537 | 12538 | 12539 |
| 455 | 12540 | 12541 | 12542 | 12544 | 12545 | 12546 | 12547 | 12548 | 12549 |
| 456 | 12550 | 12551 | 12552 | 12554 | 12555 | 12556 | 12557 | 12558 | 12559 |
| 457 | 12560 | 12561 | 12562 | 12564 | 12565 | 12566 | 12567 | 12568 | 12569 |
| 458 | 12570 | 12571 | 12572 | 12574 | 12575 | 12576 | 12577 | 12578 | 12579 |
| 459 | 12580 | 12581 | 12582 | 12584 | 12585 | 12586 | 12587 | 12588 | 12589 |
| 460 | 12590 | 12591 | 12592 | 12594 | 12595 | 12596 | 12597 | 12598 | 12599 |
| 461 | 12600 | 12601 | 12602 | 12604 | 12605 | 12606 | 12607 | 12608 | 12609 |
| 462 | 12610 | 12611 | 12612 | 12614 | 12615 | 12616 | 12617 | 12618 | 12619 |
| 463 | 12620 | 12621 | 12622 | 12624 | 12625 | 12626 | 12627 | 12628 | 12629 |
| 464 | 12630 | 12631 | 12632 | 12634 | 12635 | 12636 | 12637 | 12638 | 12639 |
| 465 | 12640 | 12641 | 12642 | 12644 | 12645 | 12646 | 12647 | 12648 | 12649 |
| 466 | 12650 | 12651 | 12652 | 12654 | 12655 | 12656 | 12657 | 12658 | 12659 |
| 467 | 12660 | 12661 | 12662 | 12664 | 12665 | 12666 | 12667 | 12668 | 12669 |
| 468 | 12670 | 12671 | 12672 | 12674 | 12675 | 12676 | 12677 | 12678 | 12679 |
| 469 | 12680 | 12681 | 12682 | 12684 | 12685 | 12686 | 12687 | 12688 | 12689 |
| 470 | 12690 | 12691 | 12692 | 12694 | 12695 | 12696 | 12697 | 12698 | 12699 |
| 471 | 12700 | 12701 | 12702 | 12704 | 12705 | 12706 | 12707 | 12708 | 12709 |
| 472 | 12710 | 12711 | 12712 | 12714 | 12715 | 12716 | 12717 | 12718 | 12719 |
| 473 | 12720 | 12721 | 12722 | 12724 | 12725 | 12726 | 12727 | 12728 | 12729 |
| 474 | 12730 | 12731 | 12732 | 12734 | 12735 | 12736 | 12737 | 12738 | 12739 |
| 475 | 12740 | 12741 | 12742 | 12744 | 12745 | 12746 | 12747 | 12748 | 12749 |
| 476 | 12750 | 12751 | 12752 | 12754 | 12755 | 12756 | 12757 | 12758 | 12759 |
| 477 | 12760 | 12761 | 12762 | 12764 | 12765 | 12766 | 12767 | 12768 | 12769 |
| 478 | 12770 | 12771 | 12772 | 12774 | 12775 | 12776 | 12777 | 12778 | 12779 |
| 479 | 12780 | 12781 | 12782 | 12784 | 12785 | 12786 | 12787 | 12788 | 12789 |
| 480 | 12790 | 12791 | 12792 | 12794 | 12795 | 12796 | 12797 | 12798 | 12799 |
| 481 | 12800 | 12801 | 12802 | 12804 | 12805 | 12806 | 12807 | 12808 | 12809 |
| 482 | 12810 | 12811 | 12812 | 12814 | 12815 | 12816 | 12817 | 12818 | 12819 |
| 483 | 12820 | 12821 | 12822 | 12824 | 12825 | 12826 | 12827 | 12828 | 12829 |
| 484 | 12830 | 12831 | 12832 | 12834 | 12835 | 12836 | 12837 | 12838 | 12839 |
| 485 | 12840 | 12841 | 12842 | 12844 | 12845 | 12846 | 12847 | 12848 | 12849 |
| 486 | 12850 | 12851 | 12852 | 12854 | 12855 | 12856 | 12857 | 12858 | 12859 |
| 487 | 12860 | 12861 | 12862 | 12864 | 12865 | 12866 | 12867 | 12868 | 12869 |
| 488 | 12870 | 12871 | 12872 | 12874 | 12875 | 12876 | 12877 | 12878 | 12879 |
| 489 | 12880 | 12881 | 12882 | 12884 | 12885 | 12886 | 12887 | 12888 | 12889 |
| 490 | 12890 | 12891 | 12892 | 12894 | 12895 | 12896 | 12897 | 12898 | 12899 |
| 491 | 12900 | 12901 | 12902 | 12904 | 12905 | 12906 | 12907 | 12908 | 12909 |
| 492 | 12910 | 12911 | 12912 | 12914 | 12915 | 12916 | 12917 | 12918 | 12919 |
| 493 | 12920 | 12921 | 12922 | 12924 | 12925 | 12926 | 12927 | 12928 | 12929 |
| 494 | 12930 | 12931 | 12932 | 12934 | 12935 | 12936 | 12937 | 12938 | 12939 |
| 495 | 12940 | 12941 | 12942 | 12944 | 12945 | 12946 | 12947 | 12948 | 12949 |
| 496 | 12950 | 12951 | 12952 | 12954 | 12955 | 12956 | 12957 | 12958 | 12959 |
| 497 | 12960 | 12961 | 12962 | 12964 | 12965 | 12966 | 12967 | 12968 | 12969 |
| 498 | 12970 | 12971 | 12972 | 12974 | 12975 | 12976 | 12977 | 12978 | 12979 |
| 499 | 12980 | 12981 | 12982 | 12984 | 12985 | 12986 | 12987 | 12988 | 12989 |
| 500 | 12990 | 12991 | 12992 | 12994 | 12995 | 12996 | 12997 | 12998 | 12999 |

(2) For axis 2

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 501 | 13000 | 13001 | 13002 | 13004 | 13005 | 13006 | 13007 | 13008 | 13009 |
| 502 | 13010 | 13011 | 13012 | 13014 | 13015 | 13016 | 13017 | 13018 | 13019 |
| 503 | 13020 | 13021 | 13022 | 13024 | 13025 | 13026 | 13027 | 13028 | 13029 |
| 504 | 13030 | 13031 | 13032 | 13034 | 13035 | 13036 | 13037 | 13038 | 13039 |
| 505 | 13040 | 13041 | 13042 | 13044 | 13045 | 13046 | 13047 | 13048 | 13049 |
| 506 | 13050 | 13051 | 13052 | 13054 | 13055 | 13056 | 13057 | 13058 | 13059 |
| 507 | 13060 | 13061 | 13062 | 13064 | 13065 | 13066 | 13067 | 13068 | 13069 |
| 508 | 13070 | 13071 | 13072 | 13074 | 13075 | 13076 | 13077 | 13078 | 13079 |
| 509 | 13080 | 13081 | 13082 | 13084 | 13085 | 13086 | 13087 | 13088 | 13089 |
| 510 | 13090 | 13091 | 13092 | 13094 | 13095 | 13096 | 13097 | 13098 | 13099 |
| 511 | 13100 | 13101 | 13102 | 13104 | 13105 | 13106 | 13107 | 13108 | 13109 |
| 512 | 13110 | 13111 | 13112 | 13114 | 13115 | 13116 | 13117 | 13118 | 13119 |
| 513 | 13120 | 13121 | 13122 | 13124 | 13125 | 13126 | 13127 | 13128 | 13129 |
| 514 | 13130 | 13131 | 13132 | 13134 | 13135 | 13136 | 13137 | 13138 | 13139 |
| 515 | 13140 | 13141 | 13142 | 13144 | 13145 | 13146 | 13147 | 13148 | 13149 |
| 516 | 13150 | 13151 | 13152 | 13154 | 13155 | 13156 | 13157 | 13158 | 13159 |
| 517 | 13160 | 13161 | 13162 | 13164 | 13165 | 13166 | 13167 | 13168 | 13169 |
| 518 | 13170 | 13171 | 13172 | 13174 | 13175 | 13176 | 13177 | 13178 | 13179 |
| 519 | 13180 | 13181 | 13182 | 13184 | 13185 | 13186 | 13187 | 13188 | 13189 |
| 520 | 13190 | 13191 | 13192 | 13194 | 13195 | 13196 | 13197 | 13198 | 13199 |
| 521 | 13200 | 13201 | 13202 | 13204 | 13205 | 13206 | 13207 | 13208 | 13209 |
| 522 | 13210 | 13211 | 13212 | 13214 | 13215 | 13216 | 13217 | 13218 | 13219 |
| 523 | 13220 | 13221 | 13222 | 13224 | 13225 | 13226 | 13227 | 13228 | 13229 |
| 524 | 13230 | 13231 | 13232 | 13234 | 13235 | 13236 | 13237 | 13238 | 13239 |
| 525 | 13240 | 13241 | 13242 | 13244 | 13245 | 13246 | 13247 | 13248 | 13249 |
| 526 | 13250 | 13251 | 13252 | 13254 | 13255 | 13256 | 13257 | 13258 | 13259 |
| 527 | 13260 | 13261 | 13262 | 13264 | 13265 | 13266 | 13267 | 13268 | 13269 |
| 528 | 13270 | 13271 | 13272 | 13274 | 13275 | 13276 | 13277 | 13278 | 13279 |
| 529 | 13280 | 13281 | 13282 | 13284 | 13285 | 13286 | 13287 | 13288 | 13289 |
| 530 | 13290 | 13291 | 13292 | 13294 | 13295 | 13296 | 13297 | 13298 | 13299 |
| 531 | 13300 | 13301 | 13302 | 13304 | 13305 | 13306 | 13307 | 13308 | 13309 |
| 532 | 13310 | 13311 | 13312 | 13314 | 13315 | 13316 | 13317 | 13318 | 13319 |
| 533 | 13320 | 13321 | 13322 | 13324 | 13325 | 13326 | 13327 | 13328 | 13329 |
| 534 | 13330 | 13331 | 13332 | 13334 | 13335 | 13336 | 13337 | 13338 | 13339 |
| 535 | 13340 | 13341 | 13342 | 13344 | 13345 | 13346 | 13347 | 13348 | 13349 |
| 536 | 13350 | 13351 | 13352 | 13354 | 13355 | 13356 | 13357 | 13358 | 13359 |
| 537 | 13360 | 13361 | 13362 | 13364 | 13365 | 13366 | 13367 | 13368 | 13369 |
| 538 | 13370 | 13371 | 13372 | 13374 | 13375 | 13376 | 13377 | 13378 | 13379 |
| 539 | 13380 | 13381 | 13382 | 13384 | 13385 | 13386 | 13387 | 13388 | 13389 |
| 540 | 13390 | 13391 | 13392 | 13394 | 13395 | 13396 | 13397 | 13398 | 13399 |
| 541 | 13400 | 13401 | 13402 | 13404 | 13405 | 13406 | 13407 | 13408 | 13409 |
| 542 | 13410 | 13411 | 13412 | 13414 | 13415 | 13416 | 13417 | 13418 | 13419 |
| 543 | 13420 | 13421 | 13422 | 13424 | 13425 | 13426 | 13427 | 13428 | 13429 |
| 544 | 13430 | 13431 | 13432 | 13434 | 13435 | 13436 | 13437 | 13438 | 13439 |
| 545 | 13440 | 13441 | 13442 | 13444 | 13445 | 13446 | 13447 | 13448 | 13449 |
| 546 | 13450 | 13451 | 13452 | 13454 | 13455 | 13456 | 13457 | 13458 | 13459 |
| 547 | 13460 | 13461 | 13462 | 13464 | 13465 | 13466 | 13467 | 13468 | 13469 |
| 548 | 13470 | 13471 | 13472 | 13474 | 13475 | 13476 | 13477 | 13478 | 13479 |
| 549 | 13480 | 13481 | 13482 | 13484 | 13485 | 13486 | 13487 | 13488 | 13489 |
| 550 | 13490 | 13491 | 13492 | 13494 | 13495 | 13496 | 13497 | 13498 | 13499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 551 | 13500 | 13501 | 13502 | 13504 | 13505 | 13506 | 13507 | 13508 | 13509 |
| 552 | 13510 | 13511 | 13512 | 13514 | 13515 | 13516 | 13517 | 13518 | 13519 |
| 553 | 13520 | 13521 | 13522 | 13524 | 13525 | 13526 | 13527 | 13528 | 13529 |
| 554 | 13530 | 13531 | 13532 | 13534 | 13535 | 13536 | 13537 | 13538 | 13539 |
| 555 | 13540 | 13541 | 13542 | 13544 | 13545 | 13546 | 13547 | 13548 | 13549 |
| 556 | 13550 | 13551 | 13552 | 13554 | 13555 | 13556 | 13557 | 13558 | 13559 |
| 557 | 13560 | 13561 | 13562 | 13564 | 13565 | 13566 | 13567 | 13568 | 13569 |
| 558 | 13570 | 13571 | 13572 | 13574 | 13575 | 13576 | 13577 | 13578 | 13579 |
| 559 | 13580 | 13581 | 13582 | 13584 | 13585 | 13586 | 13587 | 13588 | 13589 |
| 560 | 13590 | 13591 | 13592 | 13594 | 13595 | 13596 | 13597 | 13598 | 13599 |
| 561 | 13600 | 13601 | 13602 | 13604 | 13605 | 13606 | 13607 | 13608 | 13609 |
| 562 | 13610 | 13611 | 13612 | 13614 | 13615 | 13616 | 13617 | 13618 | 13619 |
| 563 | 13620 | 13621 | 13622 | 13624 | 13625 | 13626 | 13627 | 13628 | 13629 |
| 564 | 13630 | 13631 | 13632 | 13634 | 13635 | 13636 | 13637 | 13638 | 13639 |
| 565 | 13640 | 13641 | 13642 | 13644 | 13645 | 13646 | 13647 | 13648 | 13649 |
| 566 | 13650 | 13651 | 13652 | 13654 | 13655 | 13656 | 13657 | 13658 | 13659 |
| 567 | 13660 | 13661 | 13662 | 13664 | 13665 | 13666 | 13667 | 13668 | 13669 |
| 568 | 13670 | 13671 | 13672 | 13674 | 13675 | 13676 | 13677 | 13678 | 13679 |
| 569 | 13680 | 13681 | 13682 | 13684 | 13685 | 13686 | 13687 | 13688 | 13689 |
| 570 | 13690 | 13691 | 13692 | 13694 | 13695 | 13696 | 13697 | 13698 | 13699 |
| 571 | 13700 | 13701 | 13702 | 13704 | 13705 | 13706 | 13707 | 13708 | 13709 |
| 572 | 13710 | 13711 | 13712 | 13714 | 13715 | 13716 | 13717 | 13718 | 13719 |
| 573 | 13720 | 13721 | 13722 | 13724 | 13725 | 13726 | 13727 | 13728 | 13729 |
| 574 | 13730 | 13731 | 13732 | 13734 | 13735 | 13736 | 13737 | 13738 | 13739 |
| 575 | 13740 | 13741 | 13742 | 13744 | 13745 | 13746 | 13747 | 13748 | 13749 |
| 576 | 13750 | 13751 | 13752 | 13754 | 13755 | 13756 | 13757 | 13758 | 13759 |
| 577 | 13760 | 13761 | 13762 | 13764 | 13765 | 13766 | 13767 | 13768 | 13769 |
| 578 | 13770 | 13771 | 13772 | 13774 | 13775 | 13776 | 13777 | 13778 | 13779 |
| 579 | 13780 | 13781 | 13782 | 13784 | 13785 | 13786 | 13787 | 13788 | 13789 |
| 580 | 13790 | 13791 | 13792 | 13794 | 13795 | 13796 | 13797 | 13798 | 13799 |
| 581 | 13800 | 13801 | 13802 | 13804 | 13805 | 13806 | 13807 | 13808 | 13809 |
| 582 | 13810 | 13811 | 13812 | 13814 | 13815 | 13816 | 13817 | 13818 | 13819 |
| 583 | 13820 | 13821 | 13822 | 13824 | 13825 | 13826 | 13827 | 13828 | 13829 |
| 584 | 13830 | 13831 | 13832 | 13834 | 13835 | 13836 | 13837 | 13838 | 13839 |
| 585 | 13840 | 13841 | 13842 | 13844 | 13845 | 13846 | 13847 | 13848 | 13849 |
| 586 | 13850 | 13851 | 13852 | 13854 | 13855 | 13856 | 13857 | 13858 | 13859 |
| 587 | 13860 | 13861 | 13862 | 13864 | 13865 | 13866 | 13867 | 13868 | 13869 |
| 588 | 13870 | 13871 | 13872 | 13874 | 13875 | 13876 | 13877 | 13878 | 13879 |
| 589 | 13880 | 13881 | 13882 | 13884 | 13885 | 13886 | 13887 | 13888 | 13889 |
| 590 | 13890 | 13891 | 13892 | 13894 | 13895 | 13896 | 13897 | 13898 | 13899 |
| 591 | 13900 | 13901 | 13902 | 13904 | 13905 | 13906 | 13907 | 13908 | 13909 |
| 592 | 13910 | 13911 | 13912 | 13914 | 13915 | 13916 | 13917 | 13918 | 13919 |
| 593 | 13920 | 13921 | 13922 | 13924 | 13925 | 13926 | 13927 | 13928 | 13929 |
| 594 | 13930 | 13931 | 13932 | 13934 | 13935 | 13936 | 13937 | 13938 | 13939 |
| 595 | 13940 | 13941 | 13942 | 13944 | 13945 | 13946 | 13947 | 13948 | 13949 |
| 596 | 13950 | 13951 | 13952 | 13954 | 13955 | 13956 | 13957 | 13958 | 13959 |
| 597 | 13960 | 13961 | 13962 | 13964 | 13965 | 13966 | 13967 | 13968 | 13969 |
| 598 | 13970 | 13971 | 13972 | 13974 | 13975 | 13976 | 13977 | 13978 | 13979 |
| 599 | 13980 | 13981 | 13982 | 13984 | 13985 | 13986 | 13987 | 13988 | 13989 |
| 600 | 13990 | 13991 | 13992 | 13994 | 13995 | 13996 | 13997 | 13998 | 13999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 1 | 14000 | 14001 | 14002 | 14004 | 14005 | 14006 | 14007 | 14008 | 14009 |
| 2 | 14010 | 14011 | 14012 | 14014 | 14015 | 14016 | 14017 | 14018 | 14019 |
| 3 | 14020 | 14021 | 14022 | 14024 | 14025 | 14026 | 14027 | 14028 | 14029 |
| 4 | 14030 | 14031 | 14032 | 14034 | 14035 | 14036 | 14037 | 14038 | 14039 |
| 5 | 14040 | 14041 | 14042 | 14044 | 14045 | 14046 | 14047 | 14048 | 14049 |
| 6 | 14050 | 14051 | 14052 | 14054 | 14055 | 14056 | 14057 | 14058 | 14059 |
| 7 | 14060 | 14061 | 14062 | 14064 | 14065 | 14066 | 14067 | 14068 | 14069 |
| 8 | 14070 | 14071 | 14072 | 14074 | 14075 | 14076 | 14077 | 14078 | 14079 |
| 9 | 14080 | 14081 | 14082 | 14084 | 14085 | 14086 | 14087 | 14088 | 14089 |
| 10 | 14090 | 14091 | 14092 | 14094 | 14095 | 14096 | 14097 | 14098 | 14099 |
| 11 | 14100 | 14101 | 14102 | 14104 | 14105 | 14106 | 14107 | 14108 | 14109 |
| 12 | 14110 | 14111 | 14112 | 14114 | 14115 | 14116 | 14117 | 14118 | 14119 |
| 13 | 14120 | 14121 | 14122 | 14124 | 14125 | 14126 | 14127 | 14128 | 14129 |
| 14 | 14140 | 14131 | 14132 | 14134 | 14135 | 14136 | 14137 | 14138 | 14139 |
| 15 | 14140 | 14141 | 14142 | 14144 | 14145 | 14146 | 14147 | 14148 | 14149 |
| 16 | 14150 | 14151 | 14152 | 14154 | 14155 | 14156 | 14157 | 14158 | 14159 |
| 17 | 14160 | 14161 | 14162 | 14164 | 14165 | 14166 | 14167 | 14168 | 14169 |
| 18 | 14170 | 14171 | 14172 | 14174 | 14175 | 14176 | 14177 | 14178 | 14179 |
| 19 | 14180 | 14181 | 14182 | 14184 | 14185 | 14186 | 14187 | 14188 | 14189 |
| 20 | 14190 | 14191 | 14192 | 14194 | 14195 | 14196 | 14197 | 14198 | 14199 |
| 21 | 14200 | 14201 | 14202 | 14204 | 14205 | 14206 | 14207 | 14208 | 14209 |
| 22 | 14210 | 14211 | 14212 | 14214 | 14215 | 14216 | 14217 | 14218 | 14219 |
| 23 | 14220 | 14221 | 14222 | 14224 | 14225 | 14226 | 14227 | 14228 | 14229 |
| 24 | 14230 | 14231 | 14232 | 14234 | 14235 | 14236 | 14237 | 14238 | 14239 |
| 25 | 14240 | 14241 | 14242 | 14244 | 14245 | 14246 | 14247 | 14248 | 14249 |
| 26 | 14250 | 14251 | 14252 | 14254 | 14255 | 14256 | 14257 | 14258 | 14259 |
| 27 | 14260 | 14261 | 14262 | 14264 | 14265 | 14266 | 14267 | 14268 | 14269 |
| 28 | 14270 | 14271 | 14272 | 14274 | 14275 | 14276 | 14277 | 14278 | 14279 |
| 29 | 14280 | 14281 | 14282 | 14284 | 14285 | 14286 | 14287 | 14288 | 14289 |
| 30 | 14290 | 14291 | 14292 | 14294 | 14295 | 14296 | 14297 | 14298 | 14299 |
| 31 | 14300 | 14301 | 14302 | 14304 | 14305 | 14306 | 14307 | 14308 | 14309 |
| 32 | 14310 | 14311 | 14312 | 14314 | 14315 | 14316 | 14317 | 14318 | 14319 |
| 33 | 14320 | 14321 | 14322 | 14324 | 14325 | 14326 | 14327 | 14328 | 14329 |
| 34 | 14330 | 14331 | 14332 | 14334 | 14335 | 14336 | 14337 | 14338 | 14339 |
| 35 | 14340 | 14341 | 14342 | 14344 | 14345 | 14346 | 14347 | 14348 | 14349 |
| 36 | 14350 | 14351 | 14352 | 14354 | 14355 | 14356 | 14357 | 14358 | 14359 |
| 37 | 14360 | 14361 | 14362 | 14364 | 14365 | 14366 | 14367 | 14368 | 14369 |
| 38 | 14370 | 14371 | 14372 | 14374 | 14375 | 14376 | 14377 | 14378 | 14379 |
| 39 | 14380 | 14381 | 14382 | 14384 | 14385 | 14386 | 14387 | 14388 | 14389 |
| 40 | 14390 | 14391 | 14392 | 14394 | 14395 | 14396 | 14397 | 14398 | 14399 |
| 41 | 14400 | 14401 | 14402 | 14404 | 14405 | 14406 | 14407 | 14408 | 14409 |
| 42 | 14410 | 14411 | 14412 | 14414 | 14415 | 14416 | 14417 | 14418 | 14419 |
| 43 | 14420 | 14421 | 14422 | 14424 | 14425 | 14426 | 14427 | 14428 | 14429 |
| 44 | 14430 | 14431 | 14432 | 14434 | 14435 | 14436 | 14437 | 14438 | 14439 |
| 45 | 14440 | 14441 | 14442 | 14444 | 14445 | 14446 | 14447 | 14448 | 14449 |
| 46 | 14450 | 14451 | 14452 | 14454 | 14455 | 14456 | 14457 | 14458 | 14459 |
| 47 | 14460 | 14461 | 14462 | 14464 | 14465 | 14466 | 14467 | 14468 | 14469 |
| 48 | 14470 | 14471 | 14472 | 14474 | 14475 | 14476 | 14477 | 14478 | 14479 |
| 49 | 14480 | 14481 | 14482 | 14484 | 14485 | 14486 | 14487 | 14488 | 14489 |
| 50 | 14490 | 14491 | 14492 | 14494 | 14495 | 14496 | 14497 | 14498 | 14499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 51 | 14500 | 14501 | 14502 | 14504 | 14505 | 14506 | 14507 | 14508 | 14509 |
| 52 | 14510 | 14511 | 14512 | 14514 | 14515 | 14516 | 14517 | 14518 | 14519 |
| 53 | 14520 | 14521 | 14522 | 14524 | 14525 | 14526 | 14527 | 14528 | 14529 |
| 54 | 14530 | 14531 | 14532 | 14534 | 14535 | 14536 | 14537 | 14538 | 14539 |
| 55 | 14540 | 14541 | 14542 | 14544 | 14545 | 14546 | 14547 | 14548 | 14549 |
| 56 | 14550 | 14551 | 14552 | 14554 | 14555 | 14556 | 14557 | 14558 | 14559 |
| 57 | 14560 | 14561 | 14562 | 14564 | 14565 | 14566 | 14567 | 14568 | 14569 |
| 58 | 14570 | 14571 | 14572 | 14574 | 14575 | 14576 | 14577 | 14578 | 14579 |
| 59 | 14580 | 14581 | 14582 | 14584 | 14585 | 14586 | 14587 | 14588 | 14589 |
| 60 | 14590 | 14591 | 14592 | 14594 | 14595 | 14596 | 14597 | 14598 | 14599 |
| 61 | 14600 | 14601 | 14602 | 14604 | 14605 | 14606 | 14607 | 14608 | 14609 |
| 62 | 14610 | 14611 | 14612 | 14614 | 14615 | 14616 | 14617 | 14618 | 14619 |
| 63 | 14620 | 14621 | 14622 | 14624 | 14625 | 14626 | 14627 | 14628 | 14629 |
| 64 | 14630 | 14631 | 14632 | 14634 | 14635 | 14636 | 14637 | 14638 | 14639 |
| 65 | 14640 | 14641 | 14642 | 14644 | 14645 | 14646 | 14647 | 14648 | 14649 |
| 66 | 14650 | 14651 | 14652 | 14654 | 14655 | 14656 | 14657 | 14658 | 14659 |
| 67 | 14660 | 14661 | 14662 | 14664 | 14665 | 14666 | 14667 | 14668 | 14669 |
| 68 | 14670 | 14671 | 14672 | 14674 | 14675 | 14676 | 14677 | 14678 | 14679 |
| 69 | 14680 | 14681 | 14682 | 14684 | 14685 | 14686 | 14687 | 14688 | 14689 |
| 70 | 14690 | 14691 | 14692 | 14694 | 14695 | 14696 | 14697 | 14698 | 14699 |
| 71 | 14700 | 14701 | 14702 | 14704 | 14705 | 14706 | 14707 | 14708 | 14709 |
| 72 | 14710 | 14711 | 14712 | 14714 | 14715 | 14716 | 14717 | 14718 | 14719 |
| 73 | 14720 | 14721 | 14722 | 14724 | 14725 | 14726 | 14727 | 14728 | 14729 |
| 74 | 14730 | 14731 | 14732 | 14734 | 14735 | 14736 | 14737 | 14738 | 14739 |
| 75 | 14740 | 14741 | 14742 | 14744 | 14745 | 14746 | 14747 | 14748 | 14749 |
| 76 | 14750 | 14751 | 14752 | 14754 | 14755 | 14756 | 14757 | 14758 | 14759 |
| 77 | 14760 | 14761 | 14762 | 14764 | 14765 | 14766 | 14767 | 14768 | 14769 |
| 78 | 14770 | 14771 | 14772 | 14774 | 14775 | 14776 | 14777 | 14778 | 14779 |
| 79 | 14780 | 14781 | 14782 | 14784 | 14785 | 14786 | 14787 | 14788 | 14789 |
| 80 | 14790 | 14791 | 14792 | 14794 | 14795 | 14796 | 14797 | 14798 | 14799 |
| 81 | 14800 | 14801 | 14802 | 14804 | 14805 | 14806 | 14807 | 14808 | 14809 |
| 82 | 14810 | 14811 | 14812 | 14814 | 14815 | 14816 | 14817 | 14818 | 14819 |
| 83 | 14820 | 14821 | 14822 | 14824 | 14825 | 14826 | 14827 | 14828 | 14829 |
| 84 | 14830 | 14831 | 14832 | 14834 | 14835 | 14836 | 14837 | 14838 | 14839 |
| 85 | 14840 | 14841 | 14842 | 14844 | 14845 | 14846 | 14847 | 14848 | 14849 |
| 86 | 14850 | 14851 | 14852 | 14854 | 14855 | 14856 | 14857 | 14858 | 14859 |
| 87 | 14860 | 14861 | 14862 | 14864 | 14865 | 14866 | 14867 | 14868 | 14869 |
| 88 | 14870 | 14871 | 14872 | 14874 | 14875 | 14876 | 14877 | 14878 | 14879 |
| 89 | 14880 | 14881 | 14882 | 14884 | 14885 | 14886 | 14887 | 14888 | 14889 |
| 90 | 14890 | 14891 | 14892 | 14894 | 14895 | 14896 | 14897 | 14898 | 14899 |
| 91 | 14900 | 14901 | 14902 | 14904 | 14905 | 14906 | 14907 | 14908 | 14909 |
| 92 | 14910 | 14911 | 14912 | 14914 | 14915 | 14916 | 14917 | 14918 | 14919 |
| 93 | 14920 | 14921 | 14922 | 14924 | 14925 | 14926 | 14927 | 14928 | 14929 |
| 94 | 14930 | 14931 | 14932 | 14934 | 14935 | 14936 | 14937 | 14938 | 14939 |
| 95 | 14940 | 14941 | 14942 | 14944 | 14945 | 14946 | 14947 | 14948 | 14949 |
| 96 | 14950 | 14951 | 14952 | 14954 | 14955 | 14956 | 14957 | 14958 | 14959 |
| 97 | 14960 | 14961 | 14962 | 14964 | 14965 | 14966 | 14967 | 14968 | 14969 |
| 98 | 14970 | 14971 | 14972 | 14974 | 14975 | 14976 | 14977 | 14978 | 14979 |
| 99 | 14980 | 14981 | 14982 | 14984 | 14985 | 14986 | 14987 | 14988 | 14989 |
| 100 | 14990 | 14991 | 14992 | 14994 | 14995 | 14996 | 14997 | 14998 | 14999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 101 | 15000 | 15001 | 15002 | 15004 | 15005 | 15006 | 15007 | 15008 | 15009 |
| 102 | 15010 | 15011 | 15012 | 15014 | 15015 | 15016 | 15017 | 15018 | 15019 |
| 103 | 15020 | 15021 | 15022 | 15024 | 15025 | 15026 | 15027 | 15028 | 15029 |
| 104 | 15030 | 15031 | 15032 | 15034 | 15035 | 15036 | 15037 | 15038 | 15039 |
| 105 | 15040 | 15041 | 15042 | 15044 | 15045 | 15046 | 15047 | 15048 | 15049 |
| 106 | 15050 | 15051 | 15052 | 15054 | 15055 | 15056 | 15057 | 15058 | 15059 |
| 107 | 15060 | 15061 | 15062 | 15064 | 15065 | 15066 | 15067 | 15068 | 15069 |
| 108 | 15070 | 15071 | 15072 | 15074 | 15075 | 15076 | 15077 | 15078 | 15079 |
| 109 | 15080 | 15081 | 15082 | 15084 | 15085 | 15086 | 15087 | 15088 | 15089 |
| 110 | 15090 | 15091 | 15092 | 15094 | 15095 | 15096 | 15097 | 15098 | 15099 |
| 111 | 15100 | 15101 | 15102 | 15104 | 15105 | 15106 | 15107 | 15108 | 15109 |
| 112 | 15110 | 15111 | 15112 | 15114 | 15115 | 15116 | 15117 | 15118 | 15119 |
| 113 | 15120 | 15121 | 15122 | 15124 | 15125 | 15126 | 15127 | 15128 | 15129 |
| 114 | 15130 | 15131 | 15132 | 15134 | 15135 | 15136 | 15137 | 15138 | 15139 |
| 115 | 15140 | 15141 | 15142 | 15144 | 15145 | 15146 | 15147 | 15148 | 15149 |
| 116 | 15150 | 15151 | 15152 | 15154 | 15155 | 15156 | 15157 | 15158 | 15159 |
| 117 | 15160 | 15161 | 15162 | 15164 | 15165 | 15166 | 15167 | 15168 | 15169 |
| 118 | 15170 | 15171 | 15172 | 15174 | 15175 | 15176 | 15177 | 15178 | 15179 |
| 119 | 15180 | 15181 | 15182 | 15184 | 15185 | 15186 | 15187 | 15188 | 15189 |
| 120 | 15190 | 15191 | 15192 | 15194 | 15195 | 15196 | 15197 | 15198 | 15199 |
| 121 | 15200 | 15201 | 15202 | 15204 | 15205 | 15206 | 15207 | 15208 | 15209 |
| 122 | 15210 | 15211 | 15212 | 15214 | 15215 | 15216 | 15217 | 15218 | 15219 |
| 123 | 15220 | 15221 | 15222 | 15224 | 15225 | 15226 | 15227 | 15228 | 15229 |
| 124 | 15230 | 15231 | 15232 | 15234 | 15235 | 15236 | 15237 | 15238 | 15239 |
| 125 | 15240 | 15241 | 15242 | 15244 | 15245 | 15246 | 15247 | 15248 | 15249 |
| 126 | 15250 | 15251 | 15252 | 15254 | 15255 | 15256 | 15257 | 15258 | 15259 |
| 127 | 15260 | 15261 | 15262 | 15264 | 15265 | 15266 | 15267 | 15268 | 15269 |
| 128 | 15270 | 15271 | 15272 | 15274 | 15275 | 15276 | 15277 | 15278 | 15279 |
| 129 | 15280 | 15281 | 15282 | 15284 | 15285 | 15286 | 15287 | 15288 | 15289 |
| 130 | 15290 | 15291 | 15292 | 15294 | 15295 | 15296 | 15297 | 15298 | 15299 |
| 131 | 15300 | 15301 | 15302 | 15304 | 15305 | 15306 | 15307 | 15308 | 15309 |
| 132 | 15310 | 15311 | 15312 | 15314 | 15315 | 15316 | 15317 | 15318 | 15319 |
| 133 | 15320 | 15321 | 15322 | 15324 | 15325 | 15326 | 15327 | 15328 | 15329 |
| 134 | 15330 | 15331 | 15332 | 15334 | 15335 | 15336 | 15337 | 15338 | 15339 |
| 135 | 15340 | 15341 | 15342 | 15344 | 15345 | 15346 | 15347 | 15348 | 15349 |
| 136 | 15350 | 15351 | 15352 | 15354 | 15355 | 15356 | 15357 | 15358 | 15359 |
| 137 | 15360 | 15361 | 15362 | 15364 | 15365 | 15366 | 15367 | 15368 | 15369 |
| 138 | 15370 | 15371 | 15372 | 15374 | 15375 | 15376 | 15377 | 15378 | 15379 |
| 139 | 15380 | 15381 | 15382 | 15384 | 15385 | 15386 | 15387 | 15388 | 15389 |
| 140 | 15390 | 15391 | 15392 | 15394 | 15395 | 15396 | 15397 | 15398 | 15399 |
| 141 | 15400 | 15401 | 15402 | 15404 | 15405 | 15406 | 15407 | 15408 | 15409 |
| 142 | 15410 | 15411 | 15412 | 15414 | 15415 | 15416 | 15417 | 15418 | 15419 |
| 143 | 15420 | 15421 | 15422 | 15424 | 15425 | 15426 | 15427 | 15428 | 15429 |
| 144 | 15430 | 15431 | 15432 | 15434 | 15435 | 15436 | 15437 | 15438 | 15439 |
| 145 | 15440 | 15441 | 15442 | 15444 | 15445 | 15446 | 15447 | 15448 | 15449 |
| 146 | 15450 | 15451 | 15452 | 15454 | 15455 | 15456 | 15457 | 15458 | 15459 |
| 147 | 15460 | 15461 | 15462 | 15464 | 15465 | 15466 | 15467 | 15468 | 15469 |
| 148 | 15470 | 15471 | 15472 | 15474 | 15475 | 15476 | 15477 | 15478 | 15479 |
| 149 | 15480 | 15481 | 15482 | 15484 | 15485 | 15486 | 15487 | 15488 | 15489 |
| 150 | 15490 | 15491 | 15492 | 15494 | 15495 | 15496 | 15497 | 15498 | 15499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 151 | 15500 | 15501 | 15502 | 15504 | 15505 | 15506 | 15507 | 15508 | 15509 |
| 152 | 15510 | 15511 | 15512 | 15514 | 15515 | 15516 | 15517 | 15518 | 15519 |
| 153 | 15520 | 15521 | 15522 | 15524 | 15525 | 15526 | 15527 | 15528 | 15529 |
| 154 | 15530 | 15531 | 15532 | 15534 | 15535 | 15536 | 15537 | 15538 | 15539 |
| 155 | 15540 | 15541 | 15542 | 15544 | 15545 | 15546 | 15547 | 15548 | 15549 |
| 156 | 15550 | 15551 | 15552 | 15554 | 15555 | 15556 | 15557 | 15558 | 15559 |
| 157 | 15560 | 15561 | 15562 | 15564 | 15565 | 15566 | 15567 | 15568 | 15569 |
| 158 | 15570 | 15571 | 15572 | 15574 | 15575 | 15576 | 15577 | 15578 | 15579 |
| 159 | 15580 | 15581 | 15582 | 15584 | 15585 | 15586 | 15587 | 15588 | 15589 |
| 160 | 15590 | 15591 | 15592 | 15594 | 15595 | 15596 | 15597 | 15598 | 15599 |
| 161 | 15600 | 15601 | 15602 | 15604 | 15605 | 15606 | 15607 | 15608 | 15609 |
| 162 | 15610 | 15611 | 15612 | 15614 | 15615 | 15616 | 15617 | 15618 | 15619 |
| 163 | 15620 | 15621 | 15622 | 15624 | 15625 | 15626 | 15627 | 15628 | 15629 |
| 164 | 15630 | 15631 | 15632 | 15634 | 15635 | 15636 | 15637 | 15638 | 15639 |
| 165 | 15640 | 15641 | 15642 | 15644 | 15645 | 15646 | 15647 | 15648 | 15649 |
| 166 | 15650 | 15651 | 15652 | 15654 | 15655 | 15656 | 15657 | 15658 | 15659 |
| 167 | 15660 | 15661 | 15662 | 15664 | 15665 | 15666 | 15667 | 15668 | 15669 |
| 168 | 15670 | 15671 | 15672 | 15674 | 15675 | 15676 | 15677 | 15678 | 15679 |
| 169 | 15680 | 15681 | 15682 | 15684 | 15685 | 15686 | 15687 | 15688 | 15689 |
| 170 | 15690 | 15691 | 15692 | 15694 | 15695 | 15696 | 15697 | 15698 | 15699 |
| 171 | 15700 | 15701 | 15702 | 15704 | 15705 | 15706 | 15707 | 15708 | 15709 |
| 172 | 15710 | 15711 | 15712 | 15714 | 15715 | 15716 | 15717 | 15718 | 15719 |
| 173 | 15720 | 15721 | 15722 | 15724 | 15725 | 15726 | 15727 | 15728 | 15729 |
| 174 | 15730 | 15731 | 15732 | 15734 | 15735 | 15736 | 15737 | 15738 | 15739 |
| 175 | 15740 | 15741 | 15742 | 15744 | 15745 | 15746 | 15747 | 15748 | 15749 |
| 176 | 15750 | 15751 | 15752 | 15754 | 15755 | 15756 | 15757 | 15758 | 15759 |
| 177 | 15760 | 15761 | 15762 | 15764 | 15765 | 15766 | 15767 | 15768 | 15769 |
| 178 | 15770 | 15771 | 15772 | 15774 | 15775 | 15776 | 15777 | 15778 | 15779 |
| 179 | 15780 | 15781 | 15782 | 15784 | 15785 | 15786 | 15787 | 15788 | 15789 |
| 180 | 15790 | 15791 | 15792 | 15794 | 15795 | 15796 | 15797 | 15798 | 15799 |
| 181 | 15800 | 15801 | 15802 | 15804 | 15805 | 15806 | 15807 | 15808 | 15809 |
| 182 | 15810 | 15811 | 15812 | 15814 | 15815 | 15816 | 15817 | 15818 | 15819 |
| 183 | 15820 | 15821 | 15822 | 15824 | 15825 | 15826 | 15827 | 15828 | 15829 |
| 184 | 15830 | 15831 | 15832 | 15834 | 15835 | 15836 | 15837 | 15838 | 15839 |
| 185 | 15840 | 15841 | 15842 | 15844 | 15845 | 15846 | 15847 | 15848 | 15849 |
| 186 | 15850 | 15851 | 15852 | 15854 | 15855 | 15856 | 15857 | 15858 | 15859 |
| 187 | 15860 | 15861 | 15862 | 15864 | 15865 | 15866 | 15867 | 15868 | 15869 |
| 188 | 15870 | 15871 | 15872 | 15874 | 15875 | 15876 | 15877 | 15878 | 15879 |
| 189 | 15880 | 15881 | 15882 | 15884 | 15885 | 15886 | 15887 | 15888 | 15889 |
| 190 | 15890 | 15891 | 15892 | 15894 | 15895 | 15896 | 15897 | 15898 | 15899 |
| 191 | 15900 | 15901 | 15902 | 15904 | 15905 | 15906 | 15907 | 15908 | 15909 |
| 192 | 15910 | 15911 | 15912 | 15914 | 15915 | 15916 | 15917 | 15918 | 15919 |
| 193 | 15920 | 15921 | 15922 | 15924 | 15925 | 15926 | 15927 | 15928 | 15929 |
| 194 | 15930 | 15931 | 15932 | 15934 | 15935 | 15936 | 15937 | 15938 | 15939 |
| 195 | 15940 | 15941 | 15942 | 15944 | 15945 | 15946 | 15947 | 15948 | 15949 |
| 196 | 15950 | 15951 | 15952 | 15954 | 15955 | 15956 | 15957 | 15958 | 15959 |
| 197 | 15960 | 15961 | 15962 | 15964 | 15965 | 15966 | 15967 | 15968 | 15969 |
| 198 | 15970 | 15971 | 15972 | 15974 | 15975 | 15976 | 15977 | 15978 | 15979 |
| 199 | 15980 | 15981 | 15982 | 15984 | 15985 | 15986 | 15987 | 15988 | 15989 |
| 200 | 15990 | 15991 | 15992 | 15994 | 15995 | 15996 | 15997 | 15998 | 15999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 201 | 16000 | 16001 | 16002 | 16004 | 16005 | 16006 | 16007 | 16008 | 16009 |
| 202 | 16010 | 16011 | 16012 | 16014 | 16015 | 16016 | 16017 | 16018 | 16019 |
| 203 | 16020 | 16021 | 16022 | 16024 | 16025 | 16026 | 16027 | 16028 | 16029 |
| 204 | 16030 | 16031 | 16032 | 16034 | 16035 | 16036 | 16037 | 16038 | 16039 |
| 205 | 16040 | 16041 | 16042 | 16044 | 16045 | 16046 | 16047 | 16048 | 16049 |
| 206 | 16050 | 16051 | 16052 | 16054 | 16055 | 16056 | 16057 | 16058 | 16059 |
| 207 | 16060 | 16061 | 16062 | 16064 | 16065 | 16066 | 16067 | 16068 | 16069 |
| 208 | 16070 | 16071 | 16072 | 16074 | 16075 | 16076 | 16077 | 16078 | 16079 |
| 209 | 16080 | 16081 | 16082 | 16084 | 16085 | 16086 | 16087 | 16088 | 16089 |
| 210 | 16090 | 16091 | 16092 | 16094 | 16095 | 16096 | 16097 | 16098 | 16099 |
| 211 | 16100 | 16101 | 16102 | 16104 | 16105 | 16106 | 16107 | 16108 | 16109 |
| 212 | 16110 | 16111 | 16112 | 16114 | 16115 | 16116 | 16117 | 16118 | 16119 |
| 213 | 16120 | 16121 | 16122 | 16124 | 16125 | 16126 | 16127 | 16128 | 16129 |
| 214 | 16130 | 16131 | 16132 | 16134 | 16135 | 16136 | 16137 | 16138 | 16139 |
| 215 | 16140 | 16141 | 16142 | 16144 | 16145 | 16146 | 16147 | 16148 | 16149 |
| 216 | 16150 | 16151 | 16152 | 16154 | 16155 | 16156 | 16157 | 16158 | 16159 |
| 217 | 16160 | 16161 | 16162 | 16164 | 16165 | 16166 | 16167 | 16168 | 16169 |
| 218 | 16170 | 16171 | 16172 | 16174 | 16175 | 16176 | 16177 | 16178 | 16179 |
| 219 | 16180 | 16181 | 16182 | 16184 | 16185 | 16186 | 16187 | 16188 | 16189 |
| 220 | 16190 | 16191 | 16192 | 16194 | 16195 | 16196 | 16197 | 16198 | 16199 |
| 221 | 16200 | 16201 | 16202 | 16204 | 16205 | 16206 | 16207 | 16208 | 16209 |
| 222 | 16210 | 16211 | 16212 | 16214 | 16215 | 16216 | 16217 | 16218 | 16219 |
| 223 | 16220 | 16221 | 16222 | 16224 | 16225 | 16226 | 16227 | 16228 | 16229 |
| 224 | 16230 | 16231 | 16232 | 16234 | 16235 | 16236 | 16237 | 16238 | 16239 |
| 225 | 16240 | 16241 | 16242 | 16244 | 16245 | 16246 | 16247 | 16248 | 16249 |
| 226 | 16250 | 16251 | 16252 | 16254 | 16255 | 16256 | 16257 | 16258 | 16259 |
| 227 | 16260 | 16261 | 16262 | 16264 | 16265 | 16266 | 16267 | 16268 | 16269 |
| 228 | 16270 | 16271 | 16272 | 16274 | 16275 | 16276 | 16277 | 16278 | 16279 |
| 229 | 16280 | 16281 | 16282 | 16284 | 16285 | 16286 | 16287 | 16288 | 16289 |
| 230 | 16290 | 16291 | 16292 | 16294 | 16295 | 16296 | 16297 | 16298 | 16299 |
| 231 | 16300 | 16301 | 16302 | 16304 | 16305 | 16306 | 16307 | 16308 | 16309 |
| 232 | 16310 | 16311 | 16312 | 16314 | 16315 | 16316 | 16317 | 16318 | 16319 |
| 233 | 16320 | 16321 | 16322 | 16324 | 16325 | 16326 | 16327 | 16328 | 16329 |
| 234 | 16330 | 16331 | 16332 | 16334 | 16335 | 16336 | 16337 | 16338 | 16339 |
| 235 | 16340 | 16341 | 16342 | 16344 | 16345 | 16346 | 16347 | 16348 | 16349 |
| 236 | 16350 | 16351 | 16352 | 16354 | 16355 | 16356 | 16357 | 16358 | 16359 |
| 237 | 16360 | 16361 | 16362 | 16364 | 16365 | 16366 | 16367 | 16368 | 16369 |
| 238 | 16370 | 16371 | 16372 | 16374 | 16375 | 16376 | 16377 | 16378 | 16379 |
| 239 | 16380 | 16381 | 16382 | 16384 | 16385 | 16386 | 16387 | 16388 | 16389 |
| 240 | 16390 | 16391 | 16392 | 16394 | 16395 | 16396 | 16397 | 16398 | 16399 |
| 241 | 16400 | 16401 | 16402 | 16404 | 16405 | 16406 | 16407 | 16408 | 16409 |
| 242 | 16410 | 16411 | 16412 | 16414 | 16415 | 16416 | 16417 | 16418 | 16419 |
| 243 | 16420 | 16421 | 16422 | 16424 | 16425 | 16426 | 16427 | 16428 | 16429 |
| 244 | 16430 | 16431 | 16432 | 16434 | 16435 | 16436 | 16437 | 16438 | 16439 |
| 245 | 16440 | 16441 | 16442 | 16444 | 16445 | 16446 | 16447 | 16448 | 16449 |
| 246 | 16450 | 16451 | 16452 | 16454 | 16455 | 16456 | 16457 | 16458 | 16459 |
| 247 | 16460 | 16461 | 16462 | 16464 | 16465 | 16466 | 16467 | 16468 | 16469 |
| 248 | 16470 | 16471 | 16472 | 16474 | 16475 | 16476 | 16477 | 16478 | 16479 |
| 249 | 16480 | 16481 | 16482 | 16484 | 16485 | 16486 | 16487 | 16488 | 16489 |
| 250 | 16490 | 16491 | 16492 | 16494 | 16495 | 16496 | 16497 | 16498 | 16499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 251 | 16500 | 16501 | 16502 | 16504 | 16505 | 16506 | 16507 | 16508 | 16509 |
| 252 | 16510 | 16511 | 16512 | 16514 | 16515 | 16516 | 16517 | 16518 | 16519 |
| 253 | 16520 | 16521 | 16522 | 16524 | 16525 | 16526 | 16527 | 16528 | 16529 |
| 254 | 16530 | 16531 | 16532 | 16534 | 16535 | 16536 | 16537 | 16538 | 16539 |
| 255 | 16540 | 16541 | 16542 | 16544 | 16545 | 16546 | 16547 | 16548 | 16549 |
| 256 | 16550 | 16551 | 16552 | 16554 | 16555 | 16556 | 16557 | 16558 | 16559 |
| 257 | 16560 | 16561 | 16562 | 16564 | 16565 | 16566 | 16567 | 16568 | 16569 |
| 258 | 16570 | 16571 | 16572 | 16574 | 16575 | 16576 | 16577 | 16578 | 16579 |
| 259 | 16580 | 16581 | 16582 | 16584 | 16585 | 16586 | 16587 | 16588 | 16589 |
| 260 | 16590 | 16591 | 16592 | 16594 | 16595 | 16596 | 16597 | 16598 | 16599 |
| 261 | 16600 | 16601 | 16602 | 16604 | 16605 | 16606 | 16607 | 16608 | 16609 |
| 262 | 16610 | 16611 | 16612 | 16614 | 16615 | 16616 | 16617 | 16618 | 16619 |
| 263 | 16620 | 16621 | 16622 | 16624 | 16625 | 16626 | 16627 | 16628 | 16629 |
| 264 | 16630 | 16631 | 16632 | 16634 | 16635 | 16636 | 16637 | 16638 | 16639 |
| 265 | 16640 | 16641 | 16642 | 16644 | 16645 | 16646 | 16647 | 16648 | 16649 |
| 266 | 16650 | 16651 | 16652 | 16654 | 16655 | 16656 | 16657 | 16658 | 16659 |
| 267 | 16660 | 16661 | 16662 | 16664 | 16665 | 16666 | 16667 | 16668 | 16669 |
| 268 | 16670 | 16671 | 16672 | 16674 | 16675 | 16676 | 16677 | 16678 | 16679 |
| 269 | 16680 | 16681 | 16682 | 16684 | 16685 | 16686 | 16687 | 16688 | 16689 |
| 270 | 16690 | 16691 | 16692 | 16694 | 16695 | 16696 | 16697 | 16698 | 16699 |
| 271 | 16700 | 16701 | 16702 | 16704 | 16705 | 16706 | 16707 | 16708 | 16709 |
| 272 | 16710 | 16711 | 16712 | 16714 | 16715 | 16716 | 16717 | 16718 | 16719 |
| 273 | 16720 | 16721 | 16722 | 16724 | 16725 | 16726 | 16727 | 16728 | 16729 |
| 274 | 16730 | 16731 | 16732 | 16734 | 16735 | 16736 | 16737 | 16738 | 16739 |
| 275 | 16740 | 16741 | 16742 | 16744 | 16745 | 16746 | 16747 | 16748 | 16749 |
| 276 | 16750 | 16751 | 16752 | 16754 | 16755 | 16756 | 16757 | 16758 | 16759 |
| 277 | 16760 | 16761 | 16762 | 16764 | 16765 | 16766 | 16767 | 16768 | 16769 |
| 278 | 16770 | 16771 | 16772 | 16774 | 16775 | 16776 | 16777 | 16778 | 16779 |
| 279 | 16780 | 16781 | 16782 | 16784 | 16785 | 16786 | 16787 | 16788 | 16789 |
| 280 | 16790 | 16791 | 16792 | 16794 | 16795 | 16796 | 16797 | 16798 | 16799 |
| 281 | 16800 | 16801 | 16802 | 16804 | 16805 | 16806 | 16807 | 16808 | 16809 |
| 282 | 16810 | 16811 | 16812 | 16814 | 16815 | 16816 | 16817 | 16818 | 16819 |
| 283 | 16820 | 16821 | 16822 | 16824 | 16825 | 16826 | 16827 | 16828 | 16829 |
| 284 | 16830 | 16831 | 16832 | 16834 | 16835 | 16836 | 16837 | 16838 | 16839 |
| 285 | 16840 | 16841 | 16842 | 16844 | 16845 | 16846 | 16847 | 16848 | 16849 |
| 286 | 16850 | 16851 | 16852 | 16854 | 16855 | 16856 | 16857 | 16858 | 16859 |
| 287 | 16860 | 16861 | 16862 | 16864 | 16865 | 16866 | 16867 | 16868 | 16869 |
| 288 | 16870 | 16871 | 16872 | 16874 | 16875 | 16876 | 16877 | 16878 | 16879 |
| 289 | 16880 | 16881 | 16882 | 16884 | 16885 | 16886 | 16887 | 16888 | 16889 |
| 290 | 16890 | 16891 | 16892 | 16894 | 16895 | 16896 | 16897 | 16898 | 16899 |
| 291 | 16900 | 16901 | 16902 | 16904 | 16905 | 16906 | 16907 | 16908 | 16909 |
| 292 | 16910 | 16911 | 16912 | 16914 | 16915 | 16916 | 16917 | 16918 | 16919 |
| 293 | 16920 | 16921 | 16922 | 16924 | 16925 | 16926 | 16927 | 16928 | 16929 |
| 294 | 16930 | 16931 | 16932 | 16934 | 16935 | 16936 | 16937 | 16938 | 16939 |
| 295 | 16940 | 16941 | 16942 | 16944 | 16945 | 16946 | 16947 | 16948 | 16949 |
| 296 | 16950 | 16951 | 16952 | 16954 | 16955 | 16956 | 16957 | 16958 | 16959 |
| 297 | 16960 | 16961 | 16962 | 16964 | 16965 | 16966 | 16967 | 16968 | 16969 |
| 298 | 16970 | 16971 | 16972 | 16974 | 16975 | 16976 | 16977 | 16978 | 16979 |
| 299 | 16980 | 16981 | 16982 | 16984 | 16985 | 16986 | 16987 | 16988 | 16989 |
| 300 | 16990 | 16991 | 16992 | 16994 | 16995 | 16996 | 16997 | 16998 | 16999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 301 | 17000 | 17001 | 17002 | 17004 | 17005 | 17006 | 17007 | 17008 | 17009 |
| 302 | 17010 | 17011 | 17012 | 17014 | 17015 | 17016 | 17017 | 17018 | 17019 |
| 303 | 17020 | 17021 | 17022 | 17024 | 17025 | 17026 | 17027 | 17028 | 17029 |
| 304 | 17030 | 17031 | 17032 | 17034 | 17035 | 17036 | 17037 | 17038 | 17039 |
| 305 | 17040 | 17041 | 17042 | 17044 | 17045 | 17046 | 17047 | 17048 | 17049 |
| 306 | 17050 | 17051 | 17052 | 17054 | 17055 | 17056 | 17057 | 17058 | 17059 |
| 307 | 17060 | 17061 | 17062 | 17064 | 17065 | 17066 | 17067 | 17068 | 17069 |
| 308 | 17070 | 17071 | 17072 | 17074 | 17075 | 17076 | 17077 | 17078 | 17079 |
| 309 | 17080 | 17081 | 17082 | 17084 | 17085 | 17086 | 17087 | 17088 | 17089 |
| 310 | 17090 | 17091 | 17092 | 17094 | 17095 | 17096 | 17097 | 17098 | 17099 |
| 311 | 17100 | 17101 | 17102 | 17104 | 17105 | 17106 | 17107 | 17108 | 17109 |
| 312 | 17110 | 17111 | 17112 | 17114 | 17115 | 17116 | 17117 | 17118 | 17119 |
| 313 | 17120 | 17121 | 17122 | 17124 | 17125 | 17126 | 17127 | 17128 | 17129 |
| 314 | 17130 | 17131 | 17132 | 17134 | 17135 | 17136 | 17137 | 17138 | 17139 |
| 315 | 17140 | 17141 | 17142 | 17144 | 17145 | 17146 | 17147 | 17148 | 17149 |
| 316 | 17150 | 17151 | 17152 | 17154 | 17155 | 17156 | 17157 | 17158 | 17159 |
| 317 | 17160 | 17161 | 17162 | 17164 | 17165 | 17166 | 17167 | 17168 | 17169 |
| 318 | 17170 | 17171 | 17172 | 17174 | 17175 | 17176 | 17177 | 17178 | 17179 |
| 319 | 17180 | 17181 | 17182 | 17184 | 17185 | 17186 | 17187 | 17188 | 17189 |
| 320 | 17190 | 17191 | 17192 | 17194 | 17195 | 17196 | 17197 | 17198 | 17199 |
| 321 | 17200 | 17201 | 17202 | 17204 | 17205 | 17206 | 17207 | 17208 | 17209 |
| 322 | 17210 | 17211 | 17212 | 17214 | 17215 | 17216 | 17217 | 17218 | 17219 |
| 323 | 17220 | 17221 | 17222 | 17224 | 17225 | 17226 | 17227 | 17228 | 17229 |
| 324 | 17230 | 17231 | 17232 | 17234 | 17235 | 17236 | 17237 | 17238 | 17239 |
| 325 | 17240 | 17241 | 17242 | 17244 | 17245 | 17246 | 17247 | 17248 | 17249 |
| 326 | 17250 | 17251 | 17252 | 17254 | 17255 | 17256 | 17257 | 17258 | 17259 |
| 327 | 17260 | 17261 | 17262 | 17264 | 17265 | 17266 | 17267 | 17268 | 17269 |
| 328 | 17270 | 17271 | 17272 | 17274 | 17275 | 17276 | 17277 | 17278 | 17279 |
| 329 | 17280 | 17281 | 17282 | 17284 | 17285 | 17286 | 17287 | 17288 | 17289 |
| 330 | 17290 | 17291 | 17292 | 17294 | 17295 | 17296 | 17297 | 17298 | 17299 |
| 331 | 17300 | 17301 | 17302 | 17304 | 17305 | 17306 | 17307 | 17308 | 17309 |
| 332 | 17310 | 17311 | 17312 | 17314 | 17315 | 17316 | 17317 | 17318 | 17319 |
| 333 | 17320 | 17321 | 17322 | 17324 | 17325 | 17326 | 17327 | 17328 | 17329 |
| 334 | 17330 | 17331 | 17332 | 17334 | 17335 | 17336 | 17337 | 17338 | 17339 |
| 335 | 17340 | 17341 | 17342 | 17344 | 17345 | 17346 | 17347 | 17348 | 17349 |
| 336 | 17350 | 17351 | 17352 | 17354 | 17355 | 17356 | 17357 | 17358 | 17359 |
| 337 | 17360 | 17361 | 17362 | 17364 | 17365 | 17366 | 17367 | 17368 | 17369 |
| 338 | 17370 | 17371 | 17372 | 17374 | 17375 | 17376 | 17377 | 17378 | 17379 |
| 339 | 17380 | 17381 | 17382 | 17384 | 17385 | 17386 | 17387 | 17388 | 17389 |
| 340 | 17390 | 17391 | 17392 | 17394 | 17395 | 17396 | 17397 | 17398 | 17399 |
| 341 | 17400 | 17401 | 17402 | 17404 | 17405 | 17406 | 17407 | 17408 | 17409 |
| 342 | 17410 | 17411 | 17412 | 17414 | 17415 | 17416 | 17417 | 17418 | 17419 |
| 343 | 17420 | 17421 | 17422 | 17424 | 17425 | 17426 | 17427 | 17428 | 17429 |
| 344 | 17430 | 17431 | 17432 | 17434 | 17435 | 17436 | 17437 | 17438 | 17439 |
| 345 | 17440 | 17441 | 17442 | 17444 | 17445 | 17446 | 17447 | 17448 | 17449 |
| 346 | 17450 | 17451 | 17452 | 17454 | 17455 | 17456 | 17457 | 17458 | 17459 |
| 347 | 17460 | 17461 | 17462 | 17464 | 17465 | 17466 | 17467 | 17468 | 17469 |
| 348 | 17470 | 17471 | 17472 | 17474 | 17475 | 17476 | 17477 | 17478 | 17479 |
| 349 | 17480 | 17481 | 17482 | 17484 | 17485 | 17486 | 17487 | 17488 | 17489 |
| 350 | 17490 | 17491 | 17492 | 17494 | 17495 | 17496 | 17497 | 17498 | 17499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 351 | 17500 | 17501 | 17502 | 17504 | 17505 | 17506 | 17507 | 17508 | 17509 |
| 352 | 17510 | 17511 | 17512 | 17514 | 17515 | 17516 | 17517 | 17518 | 17519 |
| 353 | 17520 | 17521 | 17522 | 17524 | 17525 | 17526 | 17527 | 17528 | 17529 |
| 354 | 17530 | 17531 | 17532 | 17534 | 17535 | 17536 | 17537 | 17538 | 17539 |
| 355 | 17540 | 17541 | 17542 | 17544 | 17545 | 17546 | 17547 | 17548 | 17549 |
| 356 | 17550 | 17551 | 17552 | 17554 | 17555 | 17556 | 17557 | 17558 | 17559 |
| 357 | 17560 | 17561 | 17562 | 17564 | 17565 | 17566 | 17567 | 17568 | 17569 |
| 358 | 17570 | 17571 | 17572 | 17574 | 17575 | 17576 | 17577 | 17578 | 17579 |
| 359 | 17580 | 17581 | 17582 | 17584 | 17585 | 17586 | 17587 | 17588 | 17589 |
| 360 | 17590 | 17591 | 17592 | 17594 | 17595 | 17596 | 17597 | 17598 | 17599 |
| 361 | 17600 | 17601 | 17602 | 17604 | 17605 | 17606 | 17607 | 17608 | 17609 |
| 362 | 17610 | 17611 | 17612 | 17614 | 17615 | 17616 | 17617 | 17618 | 17619 |
| 363 | 17620 | 17621 | 17622 | 17624 | 17625 | 17626 | 17627 | 17628 | 17629 |
| 364 | 17630 | 17631 | 17632 | 17634 | 17635 | 17636 | 17637 | 17638 | 17639 |
| 365 | 17640 | 17641 | 17642 | 17644 | 17645 | 17646 | 17647 | 17648 | 17649 |
| 366 | 17650 | 17651 | 17652 | 17654 | 17655 | 17656 | 17657 | 17658 | 17659 |
| 367 | 17660 | 17661 | 17662 | 17664 | 17665 | 17666 | 17667 | 17668 | 17669 |
| 368 | 17670 | 17671 | 17672 | 17674 | 17675 | 17676 | 17677 | 17678 | 17679 |
| 369 | 17680 | 17681 | 17682 | 17684 | 17685 | 17686 | 17687 | 17688 | 17689 |
| 370 | 17690 | 17691 | 17692 | 17694 | 17695 | 17696 | 17697 | 17698 | 17699 |
| 371 | 17700 | 17701 | 17702 | 17704 | 17705 | 17706 | 17707 | 17708 | 17709 |
| 372 | 17710 | 17711 | 17712 | 17714 | 17715 | 17716 | 17717 | 17718 | 17719 |
| 373 | 17720 | 17721 | 17722 | 17724 | 17725 | 17726 | 17727 | 17728 | 17729 |
| 374 | 17730 | 17731 | 17732 | 17734 | 17735 | 17736 | 17737 | 17738 | 17739 |
| 375 | 17740 | 17741 | 17742 | 17744 | 17745 | 17746 | 17747 | 17748 | 17749 |
| 376 | 17750 | 17751 | 17752 | 17754 | 17755 | 17756 | 17757 | 17758 | 17759 |
| 377 | 17760 | 17761 | 17762 | 17764 | 17765 | 17766 | 17767 | 17768 | 17769 |
| 378 | 17770 | 17771 | 17772 | 17774 | 17775 | 17776 | 17777 | 17778 | 17779 |
| 379 | 17780 | 17781 | 17782 | 17784 | 17785 | 17786 | 17787 | 17788 | 17789 |
| 380 | 17790 | 17791 | 17792 | 17794 | 17795 | 17796 | 17797 | 17798 | 17799 |
| 381 | 17800 | 17801 | 17802 | 17804 | 17805 | 17806 | 17807 | 17808 | 17809 |
| 382 | 17810 | 17811 | 17812 | 17814 | 17815 | 17816 | 17817 | 17818 | 17819 |
| 383 | 17820 | 17821 | 17822 | 17824 | 17825 | 17826 | 17827 | 17828 | 17829 |
| 384 | 17830 | 17831 | 17832 | 17834 | 17835 | 17836 | 17837 | 17838 | 17839 |
| 385 | 17840 | 17841 | 17842 | 17844 | 17845 | 17846 | 17847 | 17848 | 17849 |
| 386 | 17850 | 17851 | 17852 | 17854 | 17855 | 17856 | 17857 | 17858 | 17859 |
| 387 | 17860 | 17861 | 17862 | 17864 | 17865 | 17866 | 17867 | 17868 | 17869 |
| 388 | 17870 | 17871 | 17872 | 17874 | 17875 | 17876 | 17877 | 17878 | 17879 |
| 389 | 17880 | 17881 | 17882 | 17884 | 17885 | 17886 | 17887 | 17888 | 17889 |
| 390 | 17890 | 17891 | 17892 | 17894 | 17895 | 17896 | 17897 | 17898 | 17899 |
| 391 | 17900 | 17901 | 17902 | 17904 | 17905 | 17906 | 17907 | 17908 | 17909 |
| 392 | 17910 | 17911 | 17912 | 17914 | 17915 | 17916 | 17917 | 17918 | 17919 |
| 393 | 17920 | 17921 | 17922 | 17924 | 17925 | 17926 | 17927 | 17928 | 17929 |
| 394 | 17930 | 17931 | 17932 | 17934 | 17935 | 17936 | 17937 | 17938 | 17939 |
| 395 | 17940 | 17941 | 17942 | 17944 | 17945 | 17946 | 17947 | 17948 | 17949 |
| 396 | 17950 | 17951 | 17952 | 17954 | 17955 | 17956 | 17957 | 17958 | 17959 |
| 397 | 17960 | 17961 | 17962 | 17964 | 17965 | 17966 | 17967 | 17968 | 17969 |
| 398 | 17970 | 17971 | 17972 | 17974 | 17975 | 17976 | 17977 | 17978 | 17979 |
| 399 | 17980 | 17981 | 17982 | 17984 | 17985 | 17986 | 17987 | 17988 | 17989 |
| 400 | 17990 | 17991 | 17992 | 17994 | 17995 | 17996 | 17997 | 17998 | 17999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 401 | 18000 | 18001 | 18002 | 18004 | 18005 | 18006 | 18007 | 18008 | 18009 |
| 402 | 18010 | 18011 | 18012 | 18014 | 18015 | 18016 | 18017 | 18018 | 18019 |
| 403 | 18020 | 18021 | 18022 | 18024 | 18025 | 18026 | 18027 | 18028 | 18029 |
| 404 | 18030 | 18031 | 18032 | 18034 | 18035 | 18036 | 18037 | 18038 | 18039 |
| 405 | 18040 | 18041 | 18042 | 18044 | 18045 | 18046 | 18047 | 18048 | 18049 |
| 406 | 18050 | 18051 | 18052 | 18054 | 18055 | 18056 | 18057 | 18058 | 18059 |
| 407 | 18060 | 18061 | 18062 | 18064 | 18065 | 18066 | 18067 | 18068 | 18069 |
| 408 | 18070 | 18071 | 18072 | 18074 | 18075 | 18076 | 18077 | 18078 | 18079 |
| 409 | 18080 | 18081 | 18082 | 18084 | 18085 | 18086 | 18087 | 18088 | 18089 |
| 410 | 18090 | 18091 | 18092 | 18094 | 18095 | 18096 | 18097 | 18098 | 18099 |
| 411 | 18100 | 18101 | 18102 | 18104 | 18105 | 18106 | 18107 | 18108 | 18109 |
| 412 | 18110 | 18111 | 18112 | 18114 | 18115 | 18116 | 18117 | 18118 | 18119 |
| 413 | 18120 | 18121 | 18122 | 18124 | 18125 | 18126 | 18127 | 18128 | 18129 |
| 414 | 18130 | 18131 | 18132 | 18134 | 18135 | 18136 | 18137 | 18138 | 18139 |
| 415 | 18140 | 18141 | 18142 | 18144 | 18145 | 18146 | 18147 | 18148 | 18149 |
| 416 | 18150 | 18151 | 18152 | 18154 | 18155 | 18156 | 18157 | 18158 | 18159 |
| 417 | 18160 | 18161 | 18162 | 18164 | 18165 | 18166 | 18167 | 18168 | 18169 |
| 418 | 18170 | 18171 | 18172 | 18174 | 18175 | 18176 | 18177 | 18178 | 18179 |
| 419 | 18180 | 18181 | 18182 | 18184 | 18185 | 18186 | 18187 | 18188 | 18189 |
| 420 | 18190 | 18191 | 18192 | 18194 | 18195 | 18196 | 18197 | 18198 | 18199 |
| 421 | 18200 | 18201 | 18202 | 18204 | 18205 | 18206 | 18207 | 18208 | 18209 |
| 422 | 18210 | 18211 | 18212 | 18214 | 18215 | 18216 | 18217 | 18218 | 18219 |
| 423 | 18220 | 18221 | 18222 | 18224 | 18225 | 18226 | 18227 | 18228 | 18229 |
| 424 | 18230 | 18231 | 18232 | 18234 | 18235 | 18236 | 18237 | 18238 | 18239 |
| 425 | 18240 | 18241 | 18242 | 18244 | 18245 | 18246 | 18247 | 18248 | 18249 |
| 426 | 18250 | 18251 | 18252 | 18254 | 18255 | 18256 | 18257 | 18258 | 18259 |
| 427 | 18260 | 18261 | 18262 | 18264 | 18265 | 18266 | 18267 | 18268 | 18269 |
| 428 | 18270 | 18271 | 18272 | 18274 | 18275 | 18276 | 18277 | 18278 | 18279 |
| 429 | 18280 | 18281 | 18282 | 18284 | 18285 | 18286 | 18287 | 18288 | 18289 |
| 430 | 18290 | 18291 | 18292 | 18294 | 18295 | 18296 | 18297 | 18298 | 18299 |
| 431 | 18300 | 18301 | 18302 | 18304 | 18305 | 18306 | 18307 | 18308 | 18309 |
| 432 | 18310 | 18311 | 18312 | 18314 | 18315 | 18316 | 18317 | 18318 | 18319 |
| 433 | 18320 | 18321 | 18322 | 18324 | 18325 | 18326 | 18327 | 18328 | 18329 |
| 434 | 18330 | 18331 | 18332 | 18334 | 18335 | 18336 | 18337 | 18338 | 18339 |
| 435 | 18340 | 18341 | 18342 | 18344 | 18345 | 18346 | 18347 | 18348 | 18349 |
| 436 | 18350 | 18351 | 18352 | 18354 | 18355 | 18356 | 18357 | 18358 | 18359 |
| 437 | 18360 | 18361 | 18362 | 18364 | 18365 | 18366 | 18367 | 18368 | 18369 |
| 438 | 18370 | 18371 | 18372 | 18374 | 18375 | 18376 | 18377 | 18378 | 18379 |
| 439 | 18380 | 18381 | 18382 | 18384 | 18385 | 18386 | 18387 | 18388 | 18389 |
| 440 | 18390 | 18391 | 18392 | 18394 | 18395 | 18396 | 18397 | 18398 | 18399 |
| 441 | 18400 | 18401 | 18402 | 18404 | 18405 | 18406 | 18407 | 18408 | 18409 |
| 442 | 18410 | 18411 | 18412 | 18414 | 18415 | 18416 | 18417 | 18418 | 18419 |
| 443 | 18420 | 18421 | 18422 | 18424 | 18425 | 18426 | 18427 | 18428 | 18429 |
| 444 | 18430 | 18431 | 18432 | 18434 | 18435 | 18436 | 18437 | 18438 | 18439 |
| 445 | 18440 | 18441 | 18442 | 18444 | 18445 | 18446 | 18447 | 18448 | 18449 |
| 446 | 18450 | 18451 | 18452 | 18454 | 18455 | 18456 | 18457 | 18458 | 18459 |
| 447 | 18460 | 18461 | 18462 | 18464 | 18465 | 18466 | 18467 | 18468 | 18469 |
| 448 | 18470 | 18471 | 18472 | 18474 | 18475 | 18476 | 18477 | 18478 | 18479 |
| 449 | 18480 | 18481 | 18482 | 18484 | 18485 | 18486 | 18487 | 18488 | 18489 |
| 450 | 18490 | 18491 | 18492 | 18494 | 18495 | 18496 | 18497 | 18498 | 18499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 451 | 18500 | 18501 | 18502 | 18504 | 18505 | 18506 | 18507 | 18508 | 18509 |
| 452 | 18510 | 18511 | 18512 | 18514 | 18515 | 18516 | 18517 | 18518 | 18519 |
| 453 | 18520 | 18521 | 18522 | 18524 | 18525 | 18526 | 18527 | 18528 | 18529 |
| 454 | 18530 | 18531 | 18532 | 18534 | 18535 | 18536 | 18537 | 18538 | 18539 |
| 455 | 18540 | 18541 | 18542 | 18544 | 18545 | 18546 | 18547 | 18548 | 18549 |
| 456 | 18550 | 18551 | 18552 | 18554 | 18555 | 18556 | 18557 | 18558 | 18559 |
| 457 | 18560 | 18561 | 18562 | 18564 | 18565 | 18566 | 18567 | 18568 | 18569 |
| 458 | 18570 | 18571 | 18572 | 18574 | 18575 | 18576 | 18577 | 18578 | 18579 |
| 459 | 18580 | 18581 | 18582 | 18584 | 18585 | 18586 | 18587 | 18588 | 18589 |
| 460 | 18590 | 18591 | 18592 | 18594 | 18595 | 18596 | 18597 | 18598 | 18599 |
| 461 | 18600 | 18601 | 18602 | 18604 | 18605 | 18606 | 18607 | 18608 | 18609 |
| 462 | 18610 | 18611 | 18612 | 18614 | 18615 | 18616 | 18617 | 18618 | 18619 |
| 463 | 18620 | 18621 | 18622 | 18624 | 18625 | 18626 | 18627 | 18628 | 18629 |
| 464 | 18630 | 18631 | 18632 | 18634 | 18635 | 18636 | 18637 | 18638 | 18639 |
| 465 | 18640 | 18641 | 18642 | 18644 | 18645 | 18646 | 18647 | 18648 | 18649 |
| 466 | 18650 | 18651 | 18652 | 18654 | 18655 | 18656 | 18657 | 18658 | 18659 |
| 467 | 18660 | 18661 | 18662 | 18664 | 18665 | 18666 | 18667 | 18668 | 18669 |
| 468 | 18670 | 18671 | 18672 | 18674 | 18675 | 18676 | 18677 | 18678 | 18679 |
| 469 | 18680 | 18681 | 18682 | 18684 | 18685 | 18686 | 18687 | 18688 | 18689 |
| 470 | 18690 | 18691 | 18692 | 18694 | 18695 | 18696 | 18697 | 18698 | 18699 |
| 471 | 18700 | 18701 | 18702 | 18704 | 18705 | 18706 | 18707 | 18708 | 18709 |
| 472 | 18710 | 18711 | 18712 | 18714 | 18715 | 18716 | 18717 | 18718 | 18719 |
| 473 | 18720 | 18721 | 18722 | 18724 | 18725 | 18726 | 18727 | 18728 | 18729 |
| 474 | 18730 | 18731 | 18732 | 18734 | 18735 | 18736 | 18737 | 18738 | 18739 |
| 475 | 18740 | 18741 | 18742 | 18744 | 18745 | 18746 | 18747 | 18748 | 18749 |
| 476 | 18750 | 18751 | 18752 | 18754 | 18755 | 18756 | 18757 | 18758 | 18759 |
| 477 | 18760 | 18761 | 18762 | 18764 | 18765 | 18766 | 18767 | 18768 | 18769 |
| 478 | 18770 | 18771 | 18772 | 18774 | 18775 | 18776 | 18777 | 18778 | 18779 |
| 479 | 18780 | 18781 | 18782 | 18784 | 18785 | 18786 | 18787 | 18788 | 18789 |
| 480 | 18790 | 18791 | 18792 | 18794 | 18795 | 18796 | 18797 | 18798 | 18799 |
| 481 | 18800 | 18801 | 18802 | 18804 | 18805 | 18806 | 18807 | 18808 | 18809 |
| 482 | 18810 | 18811 | 18812 | 18814 | 18815 | 18816 | 18817 | 18818 | 18819 |
| 483 | 18820 | 18821 | 18822 | 18824 | 18825 | 18826 | 18827 | 18828 | 18829 |
| 484 | 18830 | 18831 | 18832 | 18834 | 18835 | 18836 | 18837 | 18838 | 18839 |
| 485 | 18840 | 18841 | 18842 | 18844 | 18845 | 18846 | 18847 | 18848 | 18849 |
| 486 | 18850 | 18851 | 18852 | 18854 | 18855 | 18856 | 18857 | 18858 | 18859 |
| 487 | 18860 | 18861 | 18862 | 18864 | 18865 | 18866 | 18867 | 18868 | 18869 |
| 488 | 18870 | 18871 | 18872 | 18874 | 18875 | 18876 | 18877 | 18878 | 18879 |
| 489 | 18880 | 18881 | 18882 | 18884 | 18885 | 18886 | 18887 | 18888 | 18889 |
| 490 | 18890 | 18891 | 18892 | 18894 | 18895 | 18896 | 18897 | 18898 | 18899 |
| 491 | 18900 | 18901 | 18902 | 18904 | 18905 | 18906 | 18907 | 18908 | 18909 |
| 492 | 18910 | 18911 | 18912 | 18914 | 18915 | 18916 | 18917 | 18918 | 18919 |
| 493 | 18920 | 18921 | 18922 | 18924 | 18925 | 18926 | 18927 | 18928 | 18929 |
| 494 | 18930 | 18931 | 18932 | 18934 | 18935 | 18936 | 18937 | 18938 | 18939 |
| 495 | 18940 | 18941 | 18942 | 18944 | 18945 | 18946 | 18947 | 18948 | 18949 |
| 496 | 18950 | 18951 | 18952 | 18954 | 18955 | 18956 | 18957 | 18958 | 18959 |
| 497 | 18960 | 18961 | 18962 | 18964 | 18965 | 18966 | 18967 | 18968 | 18969 |
| 498 | 18970 | 18971 | 18972 | 18974 | 18975 | 18976 | 18977 | 18978 | 18979 |
| 499 | 18980 | 18981 | 18982 | 18984 | 18985 | 18986 | 18987 | 18988 | 18989 |
| 500 | 18990 | 18991 | 18992 | 18994 | 18995 | 18996 | 18997 | 18998 | 18999 |

(3) For axis 3

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 501 | 19000 | 19001 | 19002 | 19004 | 19005 | 19006 | 19007 | 19008 | 19009 |
| 502 | 19010 | 19011 | 19012 | 19014 | 19015 | 19016 | 19017 | 19018 | 19019 |
| 503 | 19020 | 19021 | 19022 | 19024 | 19025 | 19026 | 19027 | 19028 | 19029 |
| 504 | 19030 | 19031 | 19032 | 19034 | 19035 | 19036 | 19037 | 19038 | 19039 |
| 505 | 19040 | 19041 | 19042 | 19044 | 19045 | 19046 | 19047 | 19048 | 19049 |
| 506 | 19050 | 19051 | 19052 | 19054 | 19055 | 19056 | 19057 | 19058 | 19059 |
| 507 | 19060 | 19061 | 19062 | 19064 | 19065 | 19066 | 19067 | 19068 | 19069 |
| 508 | 19070 | 19071 | 19072 | 19074 | 19075 | 19076 | 19077 | 19078 | 19079 |
| 509 | 19080 | 19081 | 19082 | 19084 | 19085 | 19086 | 19087 | 19088 | 19089 |
| 510 | 19090 | 19091 | 19092 | 19094 | 19095 | 19096 | 19097 | 19098 | 19099 |
| 511 | 19100 | 19101 | 19102 | 19104 | 19105 | 19106 | 19107 | 19108 | 19109 |
| 512 | 19110 | 19111 | 19112 | 19114 | 19115 | 19116 | 19117 | 19118 | 19119 |
| 513 | 19120 | 19121 | 19122 | 19124 | 19125 | 19126 | 19127 | 19128 | 19129 |
| 514 | 19130 | 19131 | 19132 | 19134 | 19135 | 19136 | 19137 | 19138 | 19139 |
| 515 | 19140 | 19141 | 19142 | 19144 | 19145 | 19146 | 19147 | 19148 | 19149 |
| 516 | 19150 | 19151 | 19152 | 19154 | 19155 | 19156 | 19157 | 19158 | 19159 |
| 517 | 19160 | 19161 | 19162 | 19164 | 19165 | 19166 | 19167 | 19168 | 19169 |
| 518 | 19170 | 19171 | 19172 | 19174 | 19175 | 19176 | 19177 | 19178 | 19179 |
| 519 | 19180 | 19181 | 19182 | 19184 | 19185 | 19186 | 19187 | 19188 | 19189 |
| 520 | 19190 | 19191 | 19192 | 19194 | 19195 | 19196 | 19197 | 19198 | 19199 |
| 521 | 19200 | 19201 | 19202 | 19204 | 19205 | 19206 | 19207 | 19208 | 19209 |
| 522 | 19210 | 19211 | 19212 | 19214 | 19215 | 19216 | 19217 | 19218 | 19219 |
| 523 | 19220 | 19221 | 19222 | 19224 | 19225 | 19226 | 19227 | 19228 | 19229 |
| 524 | 19230 | 19231 | 19232 | 19234 | 19235 | 19236 | 19237 | 19238 | 19239 |
| 525 | 19240 | 19241 | 19242 | 19244 | 19245 | 19246 | 19247 | 19248 | 19249 |
| 526 | 19250 | 19251 | 19252 | 19254 | 19255 | 19256 | 19257 | 19258 | 19259 |
| 527 | 19260 | 19261 | 19262 | 19264 | 19265 | 19266 | 19267 | 19268 | 19269 |
| 528 | 19270 | 19271 | 19272 | 19274 | 19275 | 19276 | 19277 | 19278 | 19279 |
| 529 | 19280 | 19281 | 19282 | 19284 | 19285 | 19286 | 19287 | 19288 | 19289 |
| 530 | 19290 | 19291 | 19292 | 19294 | 19295 | 19296 | 19297 | 19298 | 19299 |
| 531 | 19300 | 19301 | 19302 | 19304 | 19305 | 19306 | 19307 | 19308 | 19309 |
| 532 | 19310 | 19311 | 19312 | 19314 | 19315 | 19316 | 19317 | 19318 | 19319 |
| 533 | 19320 | 19321 | 19322 | 19324 | 19325 | 19326 | 19327 | 19328 | 19329 |
| 534 | 19330 | 19331 | 19332 | 19334 | 19335 | 19336 | 19337 | 19338 | 19339 |
| 535 | 19340 | 19341 | 19342 | 19344 | 19345 | 19346 | 19347 | 19348 | 19349 |
| 536 | 19350 | 19351 | 19352 | 19354 | 19355 | 19356 | 19357 | 19358 | 19359 |
| 537 | 19360 | 19361 | 19362 | 19364 | 19365 | 19366 | 19367 | 19368 | 19369 |
| 538 | 19370 | 19371 | 19372 | 19374 | 19375 | 19376 | 19377 | 19378 | 19379 |
| 539 | 19380 | 19381 | 19382 | 19384 | 19385 | 19386 | 19387 | 19388 | 19389 |
| 540 | 19390 | 19391 | 19392 | 19394 | 19395 | 19396 | 19397 | 19398 | 19399 |
| 541 | 19400 | 19401 | 19402 | 19404 | 19405 | 19406 | 19407 | 19408 | 19409 |
| 542 | 19410 | 19411 | 19412 | 19414 | 19415 | 19416 | 19417 | 19418 | 19419 |
| 543 | 19420 | 19421 | 19422 | 19424 | 19425 | 19426 | 19427 | 19428 | 19429 |
| 544 | 19430 | 19431 | 19432 | 19434 | 19435 | 19436 | 19437 | 19438 | 19439 |
| 545 | 19440 | 19441 | 19442 | 19444 | 19445 | 19446 | 19447 | 19448 | 19449 |
| 546 | 19450 | 19451 | 19452 | 19454 | 19455 | 19456 | 19457 | 19458 | 19459 |
| 547 | 19460 | 19461 | 19462 | 19464 | 19465 | 19466 | 19467 | 19468 | 19469 |
| 548 | 19470 | 19471 | 19472 | 19474 | 19475 | 19476 | 19477 | 19478 | 19479 |
| 549 | 19480 | 19481 | 19482 | 19484 | 19485 | 19486 | 19487 | 19488 | 19489 |
| 550 | 19490 | 19491 | 19492 | 19494 | 19495 | 19496 | 19497 | 19498 | 19499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 551 | 19500 | 19501 | 19502 | 19504 | 19505 | 19506 | 19507 | 19508 | 19509 |
| 552 | 19510 | 19511 | 19512 | 19514 | 19515 | 19516 | 19517 | 19518 | 19519 |
| 553 | 19520 | 19521 | 19522 | 19524 | 19525 | 19526 | 19527 | 19528 | 19529 |
| 554 | 19530 | 19531 | 19532 | 19534 | 19535 | 19536 | 19537 | 19538 | 19539 |
| 555 | 19540 | 19541 | 19542 | 19544 | 19545 | 19546 | 19547 | 19548 | 19549 |
| 556 | 19550 | 19551 | 19552 | 19554 | 19555 | 19556 | 19557 | 19558 | 19559 |
| 557 | 19560 | 19561 | 19562 | 19564 | 19565 | 19566 | 19567 | 19568 | 19569 |
| 558 | 19570 | 19571 | 19572 | 19574 | 19575 | 19576 | 19577 | 19578 | 19579 |
| 559 | 19580 | 19581 | 19582 | 19584 | 19585 | 19586 | 19587 | 19588 | 19589 |
| 560 | 19590 | 19591 | 19592 | 19594 | 19595 | 19596 | 19597 | 19598 | 19599 |
| 561 | 19600 | 19601 | 19602 | 19604 | 19605 | 19606 | 19607 | 19608 | 19609 |
| 562 | 19610 | 19611 | 19612 | 19614 | 19615 | 19616 | 19617 | 19618 | 19619 |
| 563 | 19620 | 19621 | 19622 | 19624 | 19625 | 19626 | 19627 | 19628 | 19629 |
| 564 | 19630 | 19631 | 19632 | 19634 | 19635 | 19636 | 19637 | 19638 | 19639 |
| 565 | 19640 | 19641 | 19642 | 19644 | 19645 | 19646 | 19647 | 19648 | 19649 |
| 566 | 19650 | 19651 | 19652 | 19654 | 19655 | 19656 | 19657 | 19658 | 19659 |
| 567 | 19660 | 19661 | 19662 | 19664 | 19665 | 19666 | 19667 | 19668 | 19669 |
| 568 | 19670 | 19671 | 19672 | 19674 | 19675 | 19676 | 19677 | 19678 | 19679 |
| 569 | 19680 | 19681 | 19682 | 19684 | 19685 | 19686 | 19687 | 19688 | 19689 |
| 570 | 19690 | 19691 | 19692 | 19694 | 19695 | 19696 | 19697 | 19698 | 19699 |
| 571 | 19700 | 19701 | 19702 | 19704 | 19705 | 19706 | 19707 | 19708 | 19709 |
| 572 | 19710 | 19711 | 19712 | 19714 | 19715 | 19716 | 19717 | 19718 | 19719 |
| 573 | 19720 | 19721 | 19722 | 19724 | 19725 | 19726 | 19727 | 19728 | 19729 |
| 574 | 19730 | 19731 | 19732 | 19734 | 19735 | 19736 | 19737 | 19738 | 19739 |
| 575 | 19740 | 19741 | 19742 | 19744 | 19745 | 19746 | 19747 | 19748 | 19749 |
| 576 | 19750 | 19751 | 19752 | 19754 | 19755 | 19756 | 19757 | 19758 | 19759 |
| 577 | 19760 | 19761 | 19762 | 19764 | 19765 | 19766 | 19767 | 19768 | 19769 |
| 578 | 19770 | 19771 | 19772 | 19774 | 19775 | 19776 | 19777 | 19778 | 19779 |
| 579 | 19780 | 19781 | 19782 | 19784 | 19785 | 19786 | 19787 | 19788 | 19789 |
| 580 | 19790 | 19791 | 19792 | 19794 | 19795 | 19796 | 19797 | 19798 | 19799 |
| 581 | 19800 | 19801 | 19802 | 19804 | 19805 | 19806 | 19807 | 19808 | 19809 |
| 582 | 19810 | 19811 | 19812 | 19814 | 19815 | 19816 | 19817 | 19818 | 19819 |
| 583 | 19820 | 19821 | 19822 | 19824 | 19825 | 19826 | 19827 | 19828 | 19829 |
| 584 | 19830 | 19831 | 19832 | 19834 | 19835 | 19836 | 19837 | 19838 | 19839 |
| 585 | 19840 | 19841 | 19842 | 19844 | 19845 | 19846 | 19847 | 19848 | 19849 |
| 586 | 19850 | 19851 | 19852 | 19854 | 19855 | 19856 | 19857 | 19858 | 19859 |
| 587 | 19860 | 19861 | 19862 | 19864 | 19865 | 19866 | 19867 | 19868 | 19869 |
| 588 | 19870 | 19871 | 19872 | 19874 | 19875 | 19876 | 19877 | 19878 | 19879 |
| 589 | 19880 | 19881 | 19882 | 19884 | 19885 | 19886 | 19887 | 19888 | 19889 |
| 590 | 19890 | 19891 | 19892 | 19894 | 19895 | 19896 | 19897 | 19898 | 19899 |
| 591 | 19900 | 19901 | 19902 | 19904 | 19905 | 19906 | 19907 | 19908 | 19909 |
| 592 | 19910 | 19911 | 19912 | 19914 | 19915 | 19916 | 19917 | 19918 | 19919 |
| 593 | 19920 | 19921 | 19922 | 19924 | 19925 | 19926 | 19927 | 19928 | 19929 |
| 594 | 19930 | 19931 | 19932 | 19934 | 19935 | 19936 | 19937 | 19938 | 19939 |
| 595 | 19940 | 19941 | 19942 | 19944 | 19945 | 19946 | 19947 | 19948 | 19949 |
| 596 | 19950 | 19951 | 19952 | 19954 | 19955 | 19956 | 19957 | 19958 | 19959 |
| 597 | 19960 | 19961 | 19962 | 19964 | 19965 | 19966 | 19967 | 19968 | 19969 |
| 598 | 19970 | 19971 | 19972 | 19974 | 19975 | 19976 | 19977 | 19978 | 19979 |
| 599 | 19980 | 19981 | 19982 | 19984 | 19985 | 19986 | 19987 | 19988 | 19989 |
| 600 | 19990 | 19991 | 19992 | 19994 | 19995 | 19996 | 19997 | 19998 | 19999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 1 | 2000 | 20001 | 20002 | 20004 | 20005 | 20006 | 20007 | 20008 | 20009 |
| 2 | 20010 | 20011 | 20012 | 20014 | 20015 | 20016 | 20017 | 20018 | 20019 |
| 3 | 20020 | 20021 | 20022 | 20024 | 20025 | 20026 | 20027 | 20028 | 20029 |
| 4 | 20030 | 20031 | 20032 | 20034 | 20035 | 20036 | 20037 | 20038 | 20039 |
| 5 | 20040 | 20041 | 20042 | 20044 | 20045 | 20046 | 20047 | 20048 | 20049 |
| 6 | 20050 | 20051 | 20052 | 20054 | 20055 | 20056 | 20057 | 20058 | 20059 |
| 7 | 20060 | 20061 | 20062 | 20064 | 20065 | 20066 | 20067 | 20068 | 20069 |
| 8 | 20070 | 20071 | 20072 | 20074 | 20075 | 20076 | 20077 | 20078 | 20079 |
| 9 | 20080 | 20081 | 20082 | 20084 | 20085 | 20086 | 20087 | 20088 | 20089 |
| 10 | 20090 | 20091 | 20092 | 20094 | 20095 | 20096 | 20097 | 20098 | 20099 |
| 11 | 20100 | 20101 | 20102 | 20104 | 20105 | 20106 | 20107 | 20108 | 20109 |
| 12 | 20110 | 20111 | 20112 | 20114 | 20115 | 20116 | 20117 | 20118 | 20119 |
| 13 | 20120 | 20121 | 20122 | 20124 | 20125 | 20126 | 20127 | 20128 | 20129 |
| 14 | 20140 | 20131 | 20132 | 20134 | 20135 | 20136 | 20137 | 20138 | 20139 |
| 15 | 20140 | 20141 | 20142 | 20144 | 20145 | 20146 | 20147 | 20148 | 20149 |
| 16 | 20150 | 20151 | 20152 | 20154 | 20155 | 20156 | 20157 | 20158 | 20159 |
| 17 | 20160 | 20161 | 20162 | 20164 | 20165 | 20166 | 20167 | 20168 | 20169 |
| 18 | 20170 | 20171 | 20172 | 20174 | 20175 | 20176 | 20177 | 20178 | 20179 |
| 19 | 20180 | 20181 | 20182 | 20184 | 20185 | 20186 | 20187 | 20188 | 20189 |
| 20 | 20190 | 20191 | 20192 | 20194 | 20195 | 20196 | 20197 | 20198 | 20199 |
| 21 | 20200 | 20201 | 20202 | 20204 | 20205 | 20206 | 20207 | 20208 | 20209 |
| 22 | 20210 | 20211 | 20212 | 20214 | 20215 | 20216 | 20217 | 20218 | 20219 |
| 23 | 20220 | 20221 | 20222 | 20224 | 20225 | 20226 | 20227 | 20228 | 20229 |
| 24 | 20230 | 20231 | 20232 | 20234 | 20235 | 20236 | 20237 | 20238 | 20239 |
| 25 | 20240 | 20241 | 20242 | 20244 | 20245 | 20246 | 20247 | 20248 | 20249 |
| 26 | 20250 | 20251 | 20252 | 20254 | 20255 | 20256 | 20257 | 20258 | 20259 |
| 27 | 20260 | 20261 | 20262 | 20264 | 20265 | 20266 | 20267 | 20268 | 20269 |
| 28 | 20270 | 20271 | 20272 | 20274 | 20275 | 20276 | 20277 | 20278 | 20279 |
| 29 | 20280 | 20281 | 20282 | 20284 | 20285 | 20286 | 20287 | 20288 | 20289 |
| 30 | 20290 | 20291 | 20292 | 20294 | 20295 | 20296 | 20297 | 20298 | 20299 |
| 31 | 20300 | 20301 | 20302 | 20304 | 20305 | 20306 | 20307 | 20308 | 20309 |
| 32 | 20310 | 20311 | 20312 | 20314 | 20315 | 20316 | 20317 | 20318 | 20319 |
| 33 | 20320 | 20321 | 20322 | 20324 | 20325 | 20326 | 20327 | 20328 | 20329 |
| 34 | 20330 | 20331 | 20332 | 20334 | 20335 | 20336 | 20337 | 20338 | 20339 |
| 35 | 20340 | 20341 | 20342 | 20344 | 20345 | 20346 | 20347 | 20348 | 20349 |
| 36 | 20350 | 20351 | 20352 | 20354 | 20355 | 20356 | 20357 | 20358 | 20359 |
| 37 | 20360 | 20361 | 20362 | 20364 | 20365 | 20366 | 20367 | 20368 | 20369 |
| 38 | 20370 | 20371 | 20372 | 20374 | 20375 | 20376 | 20377 | 20378 | 20379 |
| 39 | 20380 | 20381 | 20382 | 20384 | 20385 | 20386 | 20387 | 20388 | 20389 |
| 40 | 20390 | 20391 | 20392 | 20394 | 20395 | 20396 | 20397 | 20398 | 20399 |
| 41 | 20400 | 20401 | 20402 | 20404 | 20405 | 20406 | 20407 | 20408 | 20409 |
| 42 | 20410 | 20411 | 20412 | 20414 | 20415 | 20416 | 20417 | 20418 | 20419 |
| 43 | 20420 | 20421 | 20422 | 20424 | 20425 | 20426 | 20427 | 20428 | 20429 |
| 44 | 20430 | 20431 | 20432 | 20434 | 20435 | 20436 | 20437 | 20438 | 20439 |
| 45 | 20440 | 20441 | 20442 | 20444 | 20445 | 20446 | 20447 | 20448 | 20449 |
| 46 | 20450 | 20451 | 20452 | 20454 | 20455 | 20456 | 20457 | 20458 | 20459 |
| 47 | 20460 | 20461 | 20462 | 20464 | 20465 | 20466 | 20467 | 20468 | 20469 |
| 48 | 20470 | 20471 | 20472 | 20474 | 20475 | 20476 | 20477 | 20478 | 20479 |
| 49 | 20480 | 20481 | 20482 | 20484 | 20485 | 20486 | 20487 | 20488 | 20489 |
| 50 | 20490 | 20491 | 20492 | 20494 | 20495 | 20496 | 20497 | 20498 | 20499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 51 | 20500 | 20501 | 20502 | 20504 | 20505 | 20506 | 20507 | 20508 | 20509 |
| 52 | 20510 | 20511 | 20512 | 20514 | 20515 | 20516 | 20517 | 20518 | 20519 |
| 53 | 20520 | 20521 | 20522 | 20524 | 20525 | 20526 | 20527 | 20528 | 20529 |
| 54 | 20530 | 20531 | 20532 | 20534 | 20535 | 20536 | 20537 | 20538 | 20539 |
| 55 | 20540 | 20541 | 20542 | 20544 | 20545 | 20546 | 20547 | 20548 | 20549 |
| 56 | 20550 | 20551 | 20552 | 20554 | 20555 | 20556 | 20557 | 20558 | 20559 |
| 57 | 20560 | 20561 | 20562 | 20564 | 20565 | 20566 | 20567 | 20568 | 20569 |
| 58 | 20570 | 20571 | 20572 | 20574 | 20575 | 20576 | 20577 | 20578 | 20579 |
| 59 | 20580 | 20581 | 20582 | 20584 | 20585 | 20586 | 20587 | 20588 | 20589 |
| 60 | 20590 | 20591 | 20592 | 20594 | 20595 | 20596 | 20597 | 20598 | 20599 |
| 61 | 20600 | 20601 | 20602 | 20604 | 20605 | 20606 | 20607 | 20608 | 20609 |
| 62 | 20610 | 20611 | 20612 | 20614 | 20615 | 20616 | 20617 | 20618 | 20619 |
| 63 | 20620 | 20621 | 20622 | 20624 | 20625 | 20626 | 20627 | 20628 | 20629 |
| 64 | 20630 | 20631 | 20632 | 20634 | 20635 | 20636 | 20637 | 20638 | 20639 |
| 65 | 20640 | 20641 | 20642 | 20644 | 20645 | 20646 | 20647 | 20648 | 20649 |
| 66 | 20650 | 20651 | 20652 | 20654 | 20655 | 20656 | 20657 | 20658 | 20659 |
| 67 | 20660 | 20661 | 20662 | 20664 | 20665 | 20666 | 20667 | 20668 | 20669 |
| 68 | 20670 | 20671 | 20672 | 20674 | 20675 | 20676 | 20677 | 20678 | 20679 |
| 69 | 20680 | 20681 | 20682 | 20684 | 20685 | 20686 | 20687 | 20688 | 20689 |
| 70 | 20690 | 20691 | 20692 | 20694 | 20695 | 20696 | 20697 | 20698 | 20699 |
| 71 | 20700 | 20701 | 20702 | 20704 | 20705 | 20706 | 20707 | 20708 | 20709 |
| 72 | 20710 | 20711 | 20712 | 20714 | 20715 | 20716 | 20717 | 20718 | 20719 |
| 73 | 20720 | 20721 | 20722 | 20724 | 20725 | 20726 | 20727 | 20728 | 20729 |
| 74 | 20730 | 20731 | 20732 | 20734 | 20735 | 20736 | 20737 | 20738 | 20739 |
| 75 | 20740 | 20741 | 20742 | 20744 | 20745 | 20746 | 20747 | 20748 | 20749 |
| 76 | 20750 | 20751 | 20752 | 20754 | 20755 | 20756 | 20757 | 20758 | 20759 |
| 77 | 20760 | 20761 | 20762 | 20764 | 20765 | 20766 | 20767 | 20768 | 20769 |
| 78 | 20770 | 20771 | 20772 | 20774 | 20775 | 20776 | 20777 | 20778 | 20779 |
| 79 | 20780 | 20781 | 20782 | 20784 | 20785 | 20786 | 20787 | 20788 | 20789 |
| 80 | 20790 | 20791 | 20792 | 20794 | 20795 | 20796 | 20797 | 20798 | 20799 |
| 81 | 20800 | 20801 | 20802 | 20804 | 20805 | 20806 | 20807 | 20808 | 20809 |
| 82 | 20810 | 20811 | 20812 | 20814 | 20815 | 20816 | 20817 | 20818 | 20819 |
| 83 | 20820 | 20821 | 20822 | 20824 | 20825 | 20826 | 20827 | 20828 | 20829 |
| 84 | 20830 | 20831 | 20832 | 20834 | 20835 | 20836 | 20837 | 20838 | 20839 |
| 85 | 20840 | 20841 | 20842 | 20844 | 20845 | 20846 | 20847 | 20848 | 20849 |
| 86 | 20850 | 20851 | 20852 | 20854 | 20855 | 20856 | 20857 | 20858 | 20859 |
| 87 | 20860 | 20861 | 20862 | 20864 | 20865 | 20866 | 20867 | 20868 | 20869 |
| 88 | 20870 | 20871 | 20872 | 20874 | 20875 | 20876 | 20877 | 20878 | 20879 |
| 89 | 20880 | 20881 | 20882 | 20884 | 20885 | 20886 | 20887 | 20888 | 20889 |
| 90 | 20890 | 20891 | 20892 | 20894 | 20895 | 20896 | 20897 | 20898 | 20899 |
| 91 | 20900 | 20901 | 20902 | 20904 | 20905 | 20906 | 20907 | 20908 | 20909 |
| 92 | 20910 | 20911 | 20912 | 20914 | 20915 | 20916 | 20917 | 20918 | 20919 |
| 93 | 20920 | 20921 | 20922 | 20924 | 20925 | 20926 | 20927 | 20928 | 20929 |
| 94 | 20930 | 20931 | 20932 | 20934 | 20935 | 20936 | 20937 | 20938 | 20939 |
| 95 | 20940 | 20941 | 20942 | 20944 | 20945 | 20946 | 20947 | 20948 | 20949 |
| 96 | 20950 | 20951 | 20952 | 20954 | 20955 | 20956 | 20957 | 20958 | 20959 |
| 97 | 20960 | 20961 | 20962 | 20964 | 20965 | 20966 | 20967 | 20968 | 20969 |
| 98 | 20970 | 20971 | 20972 | 20974 | 20975 | 20976 | 20977 | 20978 | 20979 |
| 99 | 20980 | 20981 | 20982 | 20984 | 20985 | 20986 | 20987 | 20988 | 20989 |
| 100 | 20990 | 20991 | 20992 | 20994 | 20995 | 20996 | 20997 | 20998 | 20999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 101 | 21000 | 21001 | 21002 | 21004 | 21005 | 21006 | 21007 | 21008 | 21009 |
| 102 | 21010 | 21011 | 21012 | 21014 | 21015 | 21016 | 21017 | 21018 | 21019 |
| 103 | 21020 | 21021 | 21022 | 21024 | 21025 | 21026 | 21027 | 21028 | 21029 |
| 104 | 21030 | 21031 | 21032 | 21034 | 21035 | 21036 | 21037 | 21038 | 21039 |
| 105 | 21040 | 21041 | 21042 | 21044 | 21045 | 21046 | 21047 | 21048 | 21049 |
| 106 | 21050 | 21051 | 21052 | 21054 | 21055 | 21056 | 21057 | 21058 | 21059 |
| 107 | 21060 | 21061 | 21062 | 21064 | 21065 | 21066 | 21067 | 21068 | 21069 |
| 108 | 21070 | 21071 | 21072 | 21074 | 21075 | 21076 | 21077 | 21078 | 21079 |
| 109 | 21080 | 21081 | 21082 | 21084 | 21085 | 21086 | 21087 | 21088 | 21089 |
| 110 | 21090 | 21091 | 21092 | 21094 | 21095 | 21096 | 21097 | 21098 | 21099 |
| 111 | 21100 | 21101 | 21102 | 21104 | 21105 | 21106 | 21107 | 21108 | 21109 |
| 112 | 21110 | 21111 | 21112 | 21114 | 21115 | 21116 | 21117 | 21118 | 21119 |
| 113 | 21120 | 21121 | 21122 | 21124 | 21125 | 21126 | 21127 | 21128 | 21129 |
| 114 | 21130 | 21131 | 21132 | 21134 | 21135 | 21136 | 21137 | 21138 | 21139 |
| 115 | 21140 | 21141 | 21142 | 21144 | 21145 | 21146 | 21147 | 21148 | 21149 |
| 116 | 21150 | 21151 | 21152 | 21154 | 21155 | 21156 | 21157 | 21158 | 21159 |
| 117 | 21160 | 21161 | 21162 | 21164 | 21165 | 21166 | 21167 | 21168 | 21169 |
| 118 | 21170 | 21171 | 21172 | 21174 | 21175 | 21176 | 21177 | 21178 | 21179 |
| 119 | 21180 | 21181 | 21182 | 21184 | 21185 | 21186 | 21187 | 21188 | 21189 |
| 120 | 21190 | 21191 | 21192 | 21194 | 21195 | 21196 | 21197 | 21198 | 21199 |
| 121 | 21200 | 21201 | 21202 | 21204 | 21205 | 21206 | 21207 | 21208 | 21209 |
| 122 | 21210 | 21211 | 21212 | 21214 | 21215 | 21216 | 21217 | 21218 | 21219 |
| 123 | 21220 | 21221 | 21222 | 21224 | 21225 | 21226 | 21227 | 21228 | 21229 |
| 124 | 21230 | 21231 | 21232 | 21234 | 21235 | 21236 | 21237 | 21238 | 21239 |
| 125 | 21240 | 21241 | 21242 | 21244 | 21245 | 21246 | 21247 | 21248 | 21249 |
| 126 | 21250 | 21251 | 21252 | 21254 | 21255 | 21256 | 21257 | 21258 | 21259 |
| 127 | 21260 | 21261 | 21262 | 21264 | 21265 | 21266 | 21267 | 21268 | 21269 |
| 128 | 21270 | 21271 | 21272 | 21274 | 21275 | 21276 | 21277 | 21278 | 21279 |
| 129 | 21280 | 21281 | 21282 | 21284 | 21285 | 21286 | 21287 | 21288 | 21289 |
| 130 | 21290 | 21291 | 21292 | 21294 | 21295 | 21296 | 21297 | 21298 | 21299 |
| 131 | 21300 | 21301 | 21302 | 21304 | 21305 | 21306 | 21307 | 21308 | 21309 |
| 132 | 21310 | 21311 | 21312 | 21314 | 21315 | 21316 | 21317 | 21318 | 21319 |
| 133 | 21320 | 21321 | 21322 | 21324 | 21325 | 21326 | 21327 | 21328 | 21329 |
| 134 | 21330 | 21331 | 21332 | 21334 | 21335 | 21336 | 21337 | 21338 | 21339 |
| 135 | 21340 | 21341 | 21342 | 21344 | 21345 | 21346 | 21347 | 21348 | 21349 |
| 136 | 21350 | 21351 | 21352 | 21354 | 21355 | 21356 | 21357 | 21358 | 21359 |
| 137 | 21360 | 21361 | 21362 | 21364 | 21365 | 21366 | 21367 | 21368 | 21369 |
| 138 | 21370 | 21371 | 21372 | 21374 | 21375 | 21376 | 21377 | 21378 | 21379 |
| 139 | 21380 | 21381 | 21382 | 21384 | 21385 | 21386 | 21387 | 21388 | 21389 |
| 140 | 21390 | 21391 | 21392 | 21394 | 21395 | 21396 | 21397 | 21398 | 21399 |
| 141 | 21400 | 21401 | 21402 | 21404 | 21405 | 21406 | 21407 | 21408 | 21409 |
| 142 | 21410 | 21411 | 21412 | 21414 | 21415 | 21416 | 21417 | 21418 | 21419 |
| 143 | 21420 | 21421 | 21422 | 21424 | 21425 | 21426 | 21427 | 21428 | 21429 |
| 144 | 21430 | 21431 | 21432 | 21434 | 21435 | 21436 | 21437 | 21438 | 21439 |
| 145 | 21440 | 21441 | 21442 | 21444 | 21445 | 21446 | 21447 | 21448 | 21449 |
| 146 | 21450 | 21451 | 21452 | 21454 | 21455 | 21456 | 21457 | 21458 | 21459 |
| 147 | 21460 | 21461 | 21462 | 21464 | 21465 | 21466 | 21467 | 21468 | 21469 |
| 148 | 21470 | 21471 | 21472 | 21474 | 21475 | 21476 | 21477 | 21478 | 21479 |
| 149 | 21480 | 21481 | 21482 | 21484 | 21485 | 21486 | 21487 | 21488 | 21489 |
| 150 | 21490 | 21491 | 21492 | 21494 | 21495 | 21496 | 21497 | 21498 | 21499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 151 | 21500 | 21501 | 21502 | 21504 | 21505 | 21506 | 21507 | 21508 | 21509 |
| 152 | 21510 | 21511 | 21512 | 21514 | 21515 | 21516 | 21517 | 21518 | 21519 |
| 153 | 21520 | 21521 | 21522 | 21524 | 21525 | 21526 | 21527 | 21528 | 21529 |
| 154 | 21530 | 21531 | 21532 | 21534 | 21535 | 21536 | 21537 | 21538 | 21539 |
| 155 | 21540 | 21541 | 21542 | 21544 | 21545 | 21546 | 21547 | 21548 | 21549 |
| 156 | 21550 | 21551 | 21552 | 21554 | 21555 | 21556 | 21557 | 21558 | 21559 |
| 157 | 21560 | 21561 | 21562 | 21564 | 21565 | 21566 | 21567 | 21568 | 21569 |
| 158 | 21570 | 21571 | 21572 | 21574 | 21575 | 21576 | 21577 | 21578 | 21579 |
| 159 | 21580 | 21581 | 21582 | 21584 | 21585 | 21586 | 21587 | 21588 | 21589 |
| 160 | 21590 | 21591 | 21592 | 21594 | 21595 | 21596 | 21597 | 21598 | 21599 |
| 161 | 21600 | 21601 | 21602 | 21604 | 21605 | 21606 | 21607 | 21608 | 21609 |
| 162 | 21610 | 21611 | 21612 | 21614 | 21615 | 21616 | 21617 | 21618 | 21619 |
| 163 | 21620 | 21621 | 21622 | 21624 | 21625 | 21626 | 21627 | 21628 | 21629 |
| 164 | 21630 | 21631 | 21632 | 21634 | 21635 | 21636 | 21637 | 21638 | 21639 |
| 165 | 21640 | 21641 | 21642 | 21644 | 21645 | 21646 | 21647 | 21648 | 21649 |
| 166 | 21650 | 21651 | 21652 | 21654 | 21655 | 21656 | 21657 | 21658 | 21659 |
| 167 | 21660 | 21661 | 21662 | 21664 | 21665 | 21666 | 21667 | 21668 | 21669 |
| 168 | 21670 | 21671 | 21672 | 21674 | 21675 | 21676 | 21677 | 21678 | 21679 |
| 169 | 21680 | 21681 | 21682 | 21684 | 21685 | 21686 | 21687 | 21688 | 21689 |
| 170 | 21690 | 21691 | 21692 | 21694 | 21695 | 21696 | 21697 | 21698 | 21699 |
| 171 | 21700 | 21701 | 21702 | 21704 | 21705 | 21706 | 21707 | 21708 | 21709 |
| 172 | 21710 | 21711 | 21712 | 21714 | 21715 | 21716 | 21717 | 21718 | 21719 |
| 173 | 21720 | 21721 | 21722 | 21724 | 21725 | 21726 | 21727 | 21728 | 21729 |
| 174 | 21730 | 21731 | 21732 | 21734 | 21735 | 21736 | 21737 | 21738 | 21739 |
| 175 | 21740 | 21741 | 21742 | 21744 | 21745 | 21746 | 21747 | 21748 | 21749 |
| 176 | 21750 | 21751 | 21752 | 21754 | 21755 | 21756 | 21757 | 21758 | 21759 |
| 177 | 21760 | 21761 | 21762 | 21764 | 21765 | 21766 | 21767 | 21768 | 21769 |
| 178 | 21770 | 21771 | 21772 | 21774 | 21775 | 21776 | 21777 | 21778 | 21779 |
| 179 | 21780 | 21781 | 21782 | 21784 | 21785 | 21786 | 21787 | 21788 | 21789 |
| 180 | 21790 | 21791 | 21792 | 21794 | 21795 | 21796 | 21797 | 21798 | 21799 |
| 181 | 21800 | 21801 | 21802 | 21804 | 21805 | 21806 | 21807 | 21808 | 21809 |
| 182 | 21810 | 21811 | 21812 | 21814 | 21815 | 21816 | 21817 | 21818 | 21819 |
| 183 | 21820 | 21821 | 21822 | 21824 | 21825 | 21826 | 21827 | 21828 | 21829 |
| 184 | 21830 | 21831 | 21832 | 21834 | 21835 | 21836 | 21837 | 21838 | 21839 |
| 185 | 21840 | 21841 | 21842 | 21844 | 21845 | 21846 | 21847 | 21848 | 21849 |
| 186 | 21850 | 21851 | 21852 | 21854 | 21855 | 21856 | 21857 | 21858 | 21859 |
| 187 | 21860 | 21861 | 21862 | 21864 | 21865 | 21866 | 21867 | 21868 | 21869 |
| 188 | 21870 | 21871 | 21872 | 21874 | 21875 | 21876 | 21877 | 21878 | 21879 |
| 189 | 21880 | 21881 | 21882 | 21884 | 21885 | 21886 | 21887 | 21888 | 21889 |
| 190 | 21890 | 21891 | 21892 | 21894 | 21895 | 21896 | 21897 | 21898 | 21899 |
| 191 | 21900 | 21901 | 21902 | 21904 | 21905 | 21906 | 21907 | 21908 | 21909 |
| 192 | 21910 | 21911 | 21912 | 21914 | 21915 | 21916 | 21917 | 21918 | 21919 |
| 193 | 21920 | 21921 | 21922 | 21924 | 21925 | 21926 | 21927 | 21928 | 21929 |
| 194 | 21930 | 21931 | 21932 | 21934 | 21935 | 21936 | 21937 | 21938 | 21939 |
| 195 | 21940 | 21941 | 21942 | 21944 | 21945 | 21946 | 21947 | 21948 | 21949 |
| 196 | 21950 | 21951 | 21952 | 21954 | 21955 | 21956 | 21957 | 21958 | 21959 |
| 197 | 21960 | 21961 | 21962 | 21964 | 21965 | 21966 | 21967 | 21968 | 21969 |
| 198 | 21970 | 21971 | 21972 | 21974 | 21975 | 21976 | 21977 | 21978 | 21979 |
| 199 | 21980 | 21981 | 21982 | 21984 | 21985 | 21986 | 21987 | 21988 | 21989 |
| 200 | 21990 | 21991 | 21992 | 21994 | 21995 | 21996 | 21997 | 21998 | 21999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 201 | 22000 | 22001 | 22002 | 22004 | 22005 | 22006 | 22007 | 22008 | 22009 |
| 202 | 22010 | 22011 | 22012 | 22014 | 22015 | 22016 | 22017 | 22018 | 22019 |
| 203 | 22020 | 22021 | 22022 | 22024 | 22025 | 22026 | 22027 | 22028 | 22029 |
| 204 | 22030 | 22031 | 22032 | 22034 | 22035 | 22036 | 22037 | 22038 | 22039 |
| 205 | 22040 | 22041 | 22042 | 22044 | 22045 | 22046 | 22047 | 22048 | 22049 |
| 206 | 22050 | 22051 | 22052 | 22054 | 22055 | 22056 | 22057 | 22058 | 22059 |
| 207 | 22060 | 22061 | 22062 | 22064 | 22065 | 22066 | 22067 | 22068 | 22069 |
| 208 | 22070 | 22071 | 22072 | 22074 | 22075 | 22076 | 22077 | 22078 | 22079 |
| 209 | 22080 | 22081 | 22082 | 22084 | 22085 | 22086 | 22087 | 22088 | 22089 |
| 210 | 22090 | 22091 | 22092 | 22094 | 22095 | 22096 | 22097 | 22098 | 22099 |
| 211 | 22100 | 22101 | 22102 | 22104 | 22105 | 22106 | 22107 | 22108 | 22109 |
| 212 | 22110 | 22111 | 22112 | 22114 | 22115 | 22116 | 22117 | 22118 | 22119 |
| 213 | 22120 | 22121 | 22122 | 22124 | 22125 | 22126 | 22127 | 22128 | 22129 |
| 214 | 22130 | 22131 | 22132 | 22134 | 22135 | 22136 | 22137 | 22138 | 22139 |
| 215 | 22140 | 22141 | 22142 | 22144 | 22145 | 22146 | 22147 | 22148 | 22149 |
| 216 | 22150 | 22151 | 22152 | 22154 | 22155 | 22156 | 22157 | 22158 | 22159 |
| 217 | 22160 | 22161 | 22162 | 22164 | 22165 | 22166 | 22167 | 22168 | 22169 |
| 218 | 22170 | 22171 | 22172 | 22174 | 22175 | 22176 | 22177 | 22178 | 22179 |
| 219 | 22180 | 22181 | 22182 | 22184 | 22185 | 22186 | 22187 | 22188 | 22189 |
| 220 | 22190 | 22191 | 22192 | 22194 | 22195 | 22196 | 22197 | 22198 | 22199 |
| 221 | 22200 | 22201 | 22202 | 22204 | 22205 | 22206 | 22207 | 22208 | 22209 |
| 222 | 22210 | 22211 | 22212 | 22214 | 22215 | 22216 | 22217 | 22218 | 22219 |
| 223 | 22220 | 22221 | 22222 | 22224 | 22225 | 22226 | 22227 | 22228 | 22229 |
| 224 | 22230 | 22231 | 22232 | 22234 | 22235 | 22236 | 22237 | 22238 | 22239 |
| 225 | 22240 | 22241 | 22242 | 22244 | 22245 | 22246 | 22247 | 22248 | 22249 |
| 226 | 22250 | 22251 | 22252 | 22254 | 22255 | 22256 | 22257 | 22258 | 22259 |
| 227 | 22260 | 22261 | 22262 | 22264 | 22265 | 22266 | 22267 | 22268 | 22269 |
| 228 | 22270 | 22271 | 22272 | 22274 | 22275 | 22276 | 22277 | 22278 | 22279 |
| 229 | 22280 | 22281 | 22282 | 22284 | 22285 | 22286 | 22287 | 22288 | 22289 |
| 230 | 22290 | 22291 | 22292 | 22294 | 22295 | 22296 | 22297 | 22298 | 22299 |
| 231 | 22300 | 22301 | 22302 | 22304 | 22305 | 22306 | 22307 | 22308 | 22309 |
| 232 | 22310 | 22311 | 22312 | 22314 | 22315 | 22316 | 22317 | 22318 | 22319 |
| 233 | 22320 | 22321 | 22322 | 22324 | 22325 | 22326 | 22327 | 22328 | 22329 |
| 234 | 22330 | 22331 | 22332 | 22334 | 22335 | 22336 | 22337 | 22338 | 22339 |
| 235 | 22340 | 22341 | 22342 | 22344 | 22345 | 22346 | 22347 | 22348 | 22349 |
| 236 | 22350 | 22351 | 22352 | 22354 | 22355 | 22356 | 22357 | 22358 | 22359 |
| 237 | 22360 | 22361 | 22362 | 22364 | 22365 | 22366 | 22367 | 22368 | 22369 |
| 238 | 22370 | 22371 | 22372 | 22374 | 22375 | 22376 | 22377 | 22378 | 22379 |
| 239 | 22380 | 22381 | 22382 | 22384 | 22385 | 22386 | 22387 | 22388 | 22389 |
| 240 | 22390 | 22391 | 22392 | 22394 | 22395 | 22396 | 22397 | 22398 | 22399 |
| 241 | 22400 | 22401 | 22402 | 22404 | 22405 | 22406 | 22407 | 22408 | 22409 |
| 242 | 22410 | 22411 | 22412 | 22414 | 22415 | 22416 | 22417 | 22418 | 22419 |
| 243 | 22420 | 22421 | 22422 | 22424 | 22425 | 22426 | 22427 | 22428 | 22429 |
| 244 | 22430 | 22431 | 22432 | 22434 | 22435 | 22436 | 22437 | 22438 | 22439 |
| 245 | 22440 | 22441 | 22442 | 22444 | 22445 | 22446 | 22447 | 22448 | 22449 |
| 246 | 22450 | 22451 | 22452 | 22454 | 22455 | 22456 | 22457 | 22458 | 22459 |
| 247 | 22460 | 22461 | 22462 | 22464 | 22465 | 22466 | 22467 | 22468 | 22469 |
| 248 | 22470 | 22471 | 22472 | 22474 | 22475 | 22476 | 22477 | 22478 | 22479 |
| 249 | 22480 | 22481 | 22482 | 22484 | 22485 | 22486 | 22487 | 22488 | 22489 |
| 250 | 22490 | 22491 | 22492 | 22494 | 22495 | 22496 | 22497 | 22498 | 22499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 251 | 22500 | 22501 | 22502 | 22504 | 22505 | 22506 | 22507 | 22508 | 22509 |
| 252 | 22510 | 22511 | 22512 | 22514 | 22515 | 22516 | 22517 | 22518 | 22519 |
| 253 | 22520 | 22521 | 22522 | 22524 | 22525 | 22526 | 22527 | 22528 | 22529 |
| 254 | 22530 | 22531 | 22532 | 22534 | 22535 | 22536 | 22537 | 22538 | 22539 |
| 255 | 22540 | 22541 | 22542 | 22544 | 22545 | 22546 | 22547 | 22548 | 22549 |
| 256 | 22550 | 22551 | 22552 | 22554 | 22555 | 22556 | 22557 | 22558 | 22559 |
| 257 | 22560 | 22561 | 22562 | 22564 | 22565 | 22566 | 22567 | 22568 | 22569 |
| 258 | 22570 | 22571 | 22572 | 22574 | 22575 | 22576 | 22577 | 22578 | 22579 |
| 259 | 22580 | 22581 | 22582 | 22584 | 22585 | 22586 | 22587 | 22588 | 22589 |
| 260 | 22590 | 22591 | 22592 | 22594 | 22595 | 22596 | 22597 | 22598 | 22599 |
| 261 | 22600 | 22601 | 22602 | 22604 | 22605 | 22606 | 22607 | 22608 | 22609 |
| 262 | 22610 | 22611 | 22612 | 22614 | 22615 | 22616 | 22617 | 22618 | 22619 |
| 263 | 22620 | 22621 | 22622 | 22624 | 22625 | 22626 | 22627 | 22628 | 22629 |
| 264 | 22630 | 22631 | 22632 | 22634 | 22635 | 22636 | 22637 | 22638 | 22639 |
| 265 | 22640 | 22641 | 22642 | 22644 | 22645 | 22646 | 22647 | 22648 | 22649 |
| 266 | 22650 | 22651 | 22652 | 22654 | 22655 | 22656 | 22657 | 22658 | 22659 |
| 267 | 22660 | 22661 | 22662 | 22664 | 22665 | 22666 | 22667 | 22668 | 22669 |
| 268 | 22670 | 22671 | 22672 | 22674 | 22675 | 22676 | 22677 | 22678 | 22679 |
| 269 | 22680 | 22681 | 22682 | 22684 | 22685 | 22686 | 22687 | 22688 | 22689 |
| 270 | 22690 | 22691 | 22692 | 22694 | 22695 | 22696 | 22697 | 22698 | 22699 |
| 271 | 22700 | 22701 | 22702 | 22704 | 22705 | 22706 | 22707 | 22708 | 22709 |
| 272 | 22710 | 22711 | 22712 | 22714 | 22715 | 22716 | 22717 | 22718 | 22719 |
| 273 | 22720 | 22721 | 22722 | 22724 | 22725 | 22726 | 22727 | 22728 | 22729 |
| 274 | 22730 | 22731 | 22732 | 22734 | 22735 | 22736 | 22737 | 22738 | 22739 |
| 275 | 22740 | 22741 | 22742 | 22744 | 22745 | 22746 | 22747 | 22748 | 22749 |
| 276 | 22750 | 22751 | 22752 | 22754 | 22755 | 22756 | 22757 | 22758 | 22759 |
| 277 | 22760 | 22761 | 22762 | 22764 | 22765 | 22766 | 22767 | 22768 | 22769 |
| 278 | 22770 | 22771 | 22772 | 22774 | 22775 | 22776 | 22777 | 22778 | 22779 |
| 279 | 22780 | 22781 | 22782 | 22784 | 22785 | 22786 | 22787 | 22788 | 22789 |
| 280 | 22790 | 22791 | 22792 | 22794 | 22795 | 22796 | 22797 | 22798 | 22799 |
| 281 | 22800 | 22801 | 22802 | 22804 | 22805 | 22806 | 22807 | 22808 | 22809 |
| 282 | 22810 | 22811 | 22812 | 22814 | 22815 | 22816 | 22817 | 22818 | 22819 |
| 283 | 22820 | 22821 | 22822 | 22824 | 22825 | 22826 | 22827 | 22828 | 22829 |
| 284 | 22830 | 22831 | 22832 | 22834 | 22835 | 22836 | 22837 | 22838 | 22839 |
| 285 | 22840 | 22841 | 22842 | 22844 | 22845 | 22846 | 22847 | 22848 | 22849 |
| 286 | 22850 | 22851 | 22852 | 22854 | 22855 | 22856 | 22857 | 22858 | 22859 |
| 287 | 22860 | 22861 | 22862 | 22864 | 22865 | 22866 | 22867 | 22868 | 22869 |
| 288 | 22870 | 22871 | 22872 | 22874 | 22875 | 22876 | 22877 | 22878 | 22879 |
| 289 | 22880 | 22881 | 22882 | 22884 | 22885 | 22886 | 22887 | 22888 | 22889 |
| 290 | 22890 | 22891 | 22892 | 22894 | 22895 | 22896 | 22897 | 22898 | 22899 |
| 291 | 22900 | 22901 | 22902 | 22904 | 22905 | 22906 | 22907 | 22908 | 22909 |
| 292 | 22910 | 22911 | 22912 | 22914 | 22915 | 22916 | 22917 | 22918 | 22919 |
| 293 | 22920 | 22921 | 22922 | 22924 | 22925 | 22926 | 22927 | 22928 | 22929 |
| 294 | 22930 | 22931 | 22932 | 22934 | 22935 | 22936 | 22937 | 22938 | 22939 |
| 295 | 22940 | 22941 | 22942 | 22944 | 22945 | 22946 | 22947 | 22948 | 22949 |
| 296 | 22950 | 22951 | 22952 | 22954 | 22955 | 22956 | 22957 | 22958 | 22959 |
| 297 | 22960 | 22961 | 22962 | 22964 | 22965 | 22966 | 22967 | 22968 | 22969 |
| 298 | 22970 | 22971 | 22972 | 22974 | 22975 | 22976 | 22977 | 22978 | 22979 |
| 299 | 22980 | 22981 | 22982 | 22984 | 22985 | 22986 | 22987 | 22988 | 22989 |
| 300 | 22990 | 22991 | 22992 | 22994 | 22995 | 22996 | 22997 | 22998 | 22999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 301 | 23000 | 23001 | 23002 | 23004 | 23005 | 23006 | 23007 | 23008 | 23009 |
| 302 | 23010 | 23011 | 23012 | 23014 | 23015 | 23016 | 23017 | 23018 | 23019 |
| 303 | 23020 | 23021 | 23022 | 23024 | 23025 | 23026 | 23027 | 23028 | 23029 |
| 304 | 23030 | 23031 | 23032 | 23034 | 23035 | 23036 | 23037 | 23038 | 23039 |
| 305 | 23040 | 23041 | 23042 | 23044 | 23045 | 23046 | 23047 | 23048 | 23049 |
| 306 | 23050 | 23051 | 23052 | 23054 | 23055 | 23056 | 23057 | 23058 | 23059 |
| 307 | 23060 | 23061 | 23062 | 23064 | 23065 | 23066 | 23067 | 23068 | 23069 |
| 308 | 23070 | 23071 | 23072 | 23074 | 23075 | 23076 | 23077 | 23078 | 23079 |
| 309 | 23080 | 23081 | 23082 | 23084 | 23085 | 23086 | 23087 | 23088 | 23089 |
| 310 | 23090 | 23091 | 23092 | 23094 | 23095 | 23096 | 23097 | 23098 | 23099 |
| 311 | 23100 | 23101 | 23102 | 23104 | 23105 | 23106 | 23107 | 23108 | 23109 |
| 312 | 23110 | 23111 | 23112 | 23114 | 23115 | 23116 | 23117 | 23118 | 23119 |
| 313 | 23120 | 23121 | 23122 | 23124 | 23125 | 23126 | 23127 | 23128 | 23129 |
| 314 | 23130 | 23131 | 23132 | 23134 | 23135 | 23136 | 23137 | 23138 | 23139 |
| 315 | 23140 | 23141 | 23142 | 23144 | 23145 | 23146 | 23147 | 23148 | 23149 |
| 316 | 23150 | 23151 | 23152 | 23154 | 23155 | 23156 | 23157 | 23158 | 23159 |
| 317 | 23160 | 23161 | 23162 | 23164 | 23165 | 23166 | 23167 | 23168 | 23169 |
| 318 | 23170 | 23171 | 23172 | 23174 | 23175 | 23176 | 23177 | 23178 | 23179 |
| 319 | 23180 | 23181 | 23182 | 23184 | 23185 | 23186 | 23187 | 23188 | 23189 |
| 320 | 23190 | 23191 | 23192 | 23194 | 23195 | 23196 | 23197 | 23198 | 23199 |
| 321 | 23200 | 23201 | 23202 | 23204 | 23205 | 23206 | 23207 | 23208 | 23209 |
| 322 | 23210 | 23211 | 23212 | 23214 | 23215 | 23216 | 23217 | 23218 | 23219 |
| 323 | 23220 | 23221 | 23222 | 23224 | 23225 | 23226 | 23227 | 23228 | 23229 |
| 324 | 23230 | 23231 | 23232 | 23234 | 23235 | 23236 | 23237 | 23238 | 23239 |
| 325 | 23240 | 23241 | 23242 | 23244 | 23245 | 23246 | 23247 | 23248 | 23249 |
| 326 | 23250 | 23251 | 23252 | 23254 | 23255 | 23256 | 23257 | 23258 | 23259 |
| 327 | 23260 | 23261 | 23262 | 23264 | 23265 | 23266 | 23267 | 23268 | 23269 |
| 328 | 23270 | 23271 | 23272 | 23274 | 23275 | 23276 | 23277 | 23278 | 23279 |
| 329 | 23280 | 23281 | 23282 | 23284 | 23285 | 23286 | 23287 | 23288 | 23289 |
| 330 | 23290 | 23291 | 23292 | 23294 | 23295 | 23296 | 23297 | 23298 | 23299 |
| 331 | 23300 | 23301 | 23302 | 23304 | 23305 | 23306 | 23307 | 23308 | 23309 |
| 332 | 23310 | 23311 | 23312 | 23314 | 23315 | 23316 | 23317 | 23318 | 23319 |
| 333 | 23320 | 23321 | 23322 | 23324 | 23325 | 23326 | 23327 | 23328 | 23329 |
| 334 | 23330 | 23331 | 23332 | 23334 | 23335 | 23336 | 23337 | 23338 | 23339 |
| 335 | 23340 | 23341 | 23342 | 23344 | 23345 | 23346 | 23347 | 23348 | 23349 |
| 336 | 23350 | 23351 | 23352 | 23354 | 23355 | 23356 | 23357 | 23358 | 23359 |
| 337 | 23360 | 23361 | 23362 | 23364 | 23365 | 23366 | 23367 | 23368 | 23369 |
| 338 | 23370 | 23371 | 23372 | 23374 | 23375 | 23376 | 23377 | 23378 | 23379 |
| 339 | 23380 | 23381 | 23382 | 23384 | 23385 | 23386 | 23387 | 23388 | 23389 |
| 340 | 23390 | 23391 | 23392 | 23394 | 23395 | 23396 | 23397 | 23398 | 23399 |
| 341 | 23400 | 23401 | 23402 | 23404 | 23405 | 23406 | 23407 | 23408 | 23409 |
| 342 | 23410 | 23411 | 23412 | 23414 | 23415 | 23416 | 23417 | 23418 | 23419 |
| 343 | 23420 | 23421 | 23422 | 23424 | 23425 | 23426 | 23427 | 23428 | 23429 |
| 344 | 23430 | 23431 | 23432 | 23434 | 23435 | 23436 | 23437 | 23438 | 23439 |
| 345 | 23440 | 23441 | 23442 | 23444 | 23445 | 23446 | 23447 | 23448 | 23449 |
| 346 | 23450 | 23451 | 23452 | 23454 | 23455 | 23456 | 23457 | 23458 | 23459 |
| 347 | 23460 | 23461 | 23462 | 23464 | 23465 | 23466 | 23467 | 23468 | 23469 |
| 348 | 23470 | 23471 | 23472 | 23474 | 23475 | 23476 | 23477 | 23478 | 23479 |
| 349 | 23480 | 23481 | 23482 | 23484 | 23485 | 23486 | 23487 | 23488 | 23489 |
| 350 | 23490 | 23491 | 23492 | 23494 | 23495 | 23496 | 23497 | 23498 | 23499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 351 | 23500 | 23501 | 23502 | 23504 | 23505 | 23506 | 23507 | 23508 | 23509 |
| 352 | 23510 | 23511 | 23512 | 23514 | 23515 | 23516 | 23517 | 23518 | 23519 |
| 353 | 23520 | 23521 | 23522 | 23524 | 23525 | 23526 | 23527 | 23528 | 23529 |
| 354 | 23530 | 23531 | 23532 | 23534 | 23535 | 23536 | 23537 | 23538 | 23539 |
| 355 | 23540 | 23541 | 23542 | 23544 | 23545 | 23546 | 23547 | 23548 | 23549 |
| 356 | 23550 | 23551 | 23552 | 23554 | 23555 | 23556 | 23557 | 23558 | 23559 |
| 357 | 23560 | 23561 | 23562 | 23564 | 23565 | 23566 | 23567 | 23568 | 23569 |
| 358 | 23570 | 23571 | 23572 | 23574 | 23575 | 23576 | 23577 | 23578 | 23579 |
| 359 | 23580 | 23581 | 23582 | 23584 | 23585 | 23586 | 23587 | 23588 | 23589 |
| 360 | 23590 | 23591 | 23592 | 23594 | 23595 | 23596 | 23597 | 23598 | 23599 |
| 361 | 23600 | 23601 | 23602 | 23604 | 23605 | 23606 | 23607 | 23608 | 23609 |
| 362 | 23610 | 23611 | 23612 | 23614 | 23615 | 23616 | 23617 | 23618 | 23619 |
| 363 | 23620 | 23621 | 23622 | 23624 | 23625 | 23626 | 23627 | 23628 | 23629 |
| 364 | 23630 | 23631 | 23632 | 23634 | 23635 | 23636 | 23637 | 23638 | 23639 |
| 365 | 23640 | 23641 | 23642 | 23644 | 23645 | 23646 | 23647 | 23648 | 23649 |
| 366 | 23650 | 23651 | 23652 | 23654 | 23655 | 23656 | 23657 | 23658 | 23659 |
| 367 | 23660 | 23661 | 23662 | 23664 | 23665 | 23666 | 23667 | 23668 | 23669 |
| 368 | 23670 | 23671 | 23672 | 23674 | 23675 | 23676 | 23677 | 23678 | 23679 |
| 369 | 23680 | 23681 | 23682 | 23684 | 23685 | 23686 | 23687 | 23688 | 23689 |
| 370 | 23690 | 23691 | 23692 | 23694 | 23695 | 23696 | 23697 | 23698 | 23699 |
| 371 | 23700 | 23701 | 23702 | 23704 | 23705 | 23706 | 23707 | 23708 | 23709 |
| 372 | 23710 | 23711 | 23712 | 23714 | 23715 | 23716 | 23717 | 23718 | 23719 |
| 373 | 23720 | 23721 | 23722 | 23724 | 23725 | 23726 | 23727 | 23728 | 23729 |
| 374 | 23730 | 23731 | 23732 | 23734 | 23735 | 23736 | 23737 | 23738 | 23739 |
| 375 | 23740 | 23741 | 23742 | 23744 | 23745 | 23746 | 23747 | 23748 | 23749 |
| 376 | 23750 | 23751 | 23752 | 23754 | 23755 | 23756 | 23757 | 23758 | 23759 |
| 377 | 23760 | 23761 | 23762 | 23764 | 23765 | 23766 | 23767 | 23768 | 23769 |
| 378 | 23770 | 23771 | 23772 | 23774 | 23775 | 23776 | 23777 | 23778 | 23779 |
| 379 | 23780 | 23781 | 23782 | 23784 | 23785 | 23786 | 23787 | 23788 | 23789 |
| 380 | 23790 | 23791 | 23792 | 23794 | 23795 | 23796 | 23797 | 23798 | 23799 |
| 381 | 23800 | 23801 | 23802 | 23804 | 23805 | 23806 | 23807 | 23808 | 23809 |
| 382 | 23810 | 23811 | 23812 | 23814 | 23815 | 23816 | 23817 | 23818 | 23819 |
| 383 | 23820 | 23821 | 23822 | 23824 | 23825 | 23826 | 23827 | 23828 | 23829 |
| 384 | 23830 | 23831 | 23832 | 23834 | 23835 | 23836 | 23837 | 23838 | 23839 |
| 385 | 23840 | 23841 | 23842 | 23844 | 23845 | 23846 | 23847 | 23848 | 23849 |
| 386 | 23850 | 23851 | 23852 | 23854 | 23855 | 23856 | 23857 | 23858 | 23859 |
| 387 | 23860 | 23861 | 23862 | 23864 | 23865 | 23866 | 23867 | 23868 | 23869 |
| 388 | 23870 | 23871 | 23872 | 23874 | 23875 | 23876 | 23877 | 23878 | 23879 |
| 389 | 23880 | 23881 | 23882 | 23884 | 23885 | 23886 | 23887 | 23888 | 23889 |
| 390 | 23890 | 23891 | 23892 | 23894 | 23895 | 23896 | 23897 | 23898 | 23899 |
| 391 | 23900 | 23901 | 23902 | 23904 | 23905 | 23906 | 23907 | 23908 | 23909 |
| 392 | 23910 | 23911 | 23912 | 23914 | 23915 | 23916 | 23917 | 23918 | 23919 |
| 393 | 23920 | 23921 | 23922 | 23924 | 23925 | 23926 | 23927 | 23928 | 23929 |
| 394 | 23930 | 23931 | 23932 | 23934 | 23935 | 23936 | 23937 | 23938 | 23939 |
| 395 | 23940 | 23941 | 23942 | 23944 | 23945 | 23946 | 23947 | 23948 | 23949 |
| 396 | 23950 | 23951 | 23952 | 23954 | 23955 | 23956 | 23957 | 23958 | 23959 |
| 397 | 23960 | 23961 | 23962 | 23964 | 23965 | 23966 | 23967 | 23968 | 23969 |
| 398 | 23970 | 23971 | 23972 | 23974 | 23975 | 23976 | 23977 | 23978 | 23979 |
| 399 | 23980 | 23981 | 23982 | 23984 | 23985 | 23986 | 23987 | 23988 | 23989 |
| 400 | 23990 | 23991 | 23992 | 23994 | 23995 | 23996 | 23997 | 23998 | 23999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 401 | 24000 | 24001 | 24002 | 24004 | 24005 | 24006 | 24007 | 24008 | 24009 |
| 402 | 24010 | 24011 | 24012 | 24014 | 24015 | 24016 | 24017 | 24018 | 24019 |
| 403 | 24020 | 24021 | 24022 | 24024 | 24025 | 24026 | 24027 | 24028 | 24029 |
| 404 | 24030 | 24031 | 24032 | 24034 | 24035 | 24036 | 24037 | 24038 | 24039 |
| 405 | 24040 | 24041 | 24042 | 24044 | 24045 | 24046 | 24047 | 24048 | 24049 |
| 406 | 24050 | 24051 | 24052 | 24054 | 24055 | 24056 | 24057 | 24058 | 24059 |
| 407 | 24060 | 24061 | 24062 | 24064 | 24065 | 24066 | 24067 | 24068 | 24069 |
| 408 | 24070 | 24071 | 24072 | 24074 | 24075 | 24076 | 24077 | 24078 | 24079 |
| 409 | 24080 | 24081 | 24082 | 24084 | 24085 | 24086 | 24087 | 24088 | 24089 |
| 410 | 24090 | 24091 | 24092 | 24094 | 24095 | 24096 | 24097 | 24098 | 24099 |
| 411 | 24100 | 24101 | 24102 | 24104 | 24105 | 24106 | 24107 | 24108 | 24109 |
| 412 | 24110 | 24111 | 24112 | 24114 | 24115 | 24116 | 24117 | 24118 | 24119 |
| 413 | 24120 | 24121 | 24122 | 24124 | 24125 | 24126 | 24127 | 24128 | 24129 |
| 414 | 24130 | 24131 | 24132 | 24134 | 24135 | 24136 | 24137 | 24138 | 24139 |
| 415 | 24140 | 24141 | 24142 | 24144 | 24145 | 24146 | 24147 | 24148 | 24149 |
| 416 | 24150 | 24151 | 24152 | 24154 | 24155 | 24156 | 24157 | 24158 | 24159 |
| 417 | 24160 | 24161 | 24162 | 24164 | 24165 | 24166 | 24167 | 24168 | 24169 |
| 418 | 24170 | 24171 | 24172 | 24174 | 24175 | 24176 | 24177 | 24178 | 24179 |
| 419 | 24180 | 24181 | 24182 | 24184 | 24185 | 24186 | 24187 | 24188 | 24189 |
| 420 | 24190 | 24191 | 24192 | 24194 | 24195 | 24196 | 24197 | 24198 | 24199 |
| 421 | 24200 | 24201 | 24202 | 24204 | 24205 | 24206 | 24207 | 24208 | 24209 |
| 422 | 24210 | 24211 | 24212 | 24214 | 24215 | 24216 | 24217 | 24218 | 24219 |
| 423 | 24220 | 24221 | 24222 | 24224 | 24225 | 24226 | 24227 | 24228 | 24229 |
| 424 | 24230 | 24231 | 24232 | 24234 | 24235 | 24236 | 24237 | 24238 | 24239 |
| 425 | 24240 | 24241 | 24242 | 24244 | 24245 | 24246 | 24247 | 24248 | 24249 |
| 426 | 24250 | 24251 | 24252 | 24254 | 24255 | 24256 | 24257 | 24258 | 24259 |
| 427 | 24260 | 24261 | 24262 | 24264 | 24265 | 24266 | 24267 | 24268 | 24269 |
| 428 | 24270 | 24271 | 24272 | 24274 | 24275 | 24276 | 24277 | 24278 | 24279 |
| 429 | 24280 | 24281 | 24282 | 24284 | 24285 | 24286 | 24287 | 24288 | 24289 |
| 430 | 24290 | 24291 | 24292 | 24294 | 24295 | 24296 | 24297 | 24298 | 24299 |
| 431 | 24300 | 24301 | 24302 | 24304 | 24305 | 24306 | 24307 | 24308 | 24309 |
| 432 | 24310 | 24311 | 24312 | 24314 | 24315 | 24316 | 24317 | 24318 | 24319 |
| 433 | 24320 | 24321 | 24322 | 24324 | 24325 | 24326 | 24327 | 24328 | 24329 |
| 434 | 24330 | 24331 | 24332 | 24334 | 24335 | 24336 | 24337 | 24338 | 24339 |
| 435 | 24340 | 24341 | 24342 | 24344 | 24345 | 24346 | 24347 | 24348 | 24349 |
| 436 | 24350 | 24351 | 24352 | 24354 | 24355 | 24356 | 24357 | 24358 | 24359 |
| 437 | 24360 | 24361 | 24362 | 24364 | 24365 | 24366 | 24367 | 24368 | 24369 |
| 438 | 24370 | 24371 | 24372 | 24374 | 24375 | 24376 | 24377 | 24378 | 24379 |
| 439 | 24380 | 24381 | 24382 | 24384 | 24385 | 24386 | 24387 | 24388 | 24389 |
| 440 | 24390 | 24391 | 24392 | 24394 | 24395 | 24396 | 24397 | 24398 | 24399 |
| 441 | 24400 | 24401 | 24402 | 24404 | 24405 | 24406 | 24407 | 24408 | 24409 |
| 442 | 24410 | 24411 | 24412 | 24414 | 24415 | 24416 | 24417 | 24418 | 24419 |
| 443 | 24420 | 24421 | 24422 | 24424 | 24425 | 24426 | 24427 | 24428 | 24429 |
| 444 | 24430 | 24431 | 24432 | 24434 | 24435 | 24436 | 24437 | 24438 | 24439 |
| 445 | 24440 | 24441 | 24442 | 24444 | 24445 | 24446 | 24447 | 24448 | 24449 |
| 446 | 24450 | 24451 | 24452 | 24454 | 24455 | 24456 | 24457 | 24458 | 24459 |
| 447 | 24460 | 24461 | 24462 | 24464 | 24465 | 24466 | 24467 | 24468 | 24469 |
| 448 | 24470 | 24471 | 24472 | 24474 | 24475 | 24476 | 24477 | 24478 | 24479 |
| 449 | 24480 | 24481 | 24482 | 24484 | 24485 | 24486 | 24487 | 24488 | 24489 |
| 450 | 24490 | 24491 | 24492 | 24494 | 24495 | 24496 | 24497 | 24498 | 24499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 451 | 24500 | 24501 | 24502 | 24504 | 24505 | 24506 | 24507 | 24508 | 24509 |
| 452 | 24510 | 24511 | 24512 | 24514 | 24515 | 24516 | 24517 | 24518 | 24519 |
| 453 | 24520 | 24521 | 24522 | 24524 | 24525 | 24526 | 24527 | 24528 | 24529 |
| 454 | 24530 | 24531 | 24532 | 24534 | 24535 | 24536 | 24537 | 24538 | 24539 |
| 455 | 24540 | 24541 | 24542 | 24544 | 24545 | 24546 | 24547 | 24548 | 24549 |
| 456 | 24550 | 24551 | 24552 | 24554 | 24555 | 24556 | 24557 | 24558 | 24559 |
| 457 | 24560 | 24561 | 24562 | 24564 | 24565 | 24566 | 24567 | 24568 | 24569 |
| 458 | 24570 | 24571 | 24572 | 24574 | 24575 | 24576 | 24577 | 24578 | 24579 |
| 459 | 24580 | 24581 | 24582 | 24584 | 24585 | 24586 | 24587 | 24588 | 24589 |
| 460 | 24590 | 24591 | 24592 | 24594 | 24595 | 24596 | 24597 | 24598 | 24599 |
| 461 | 24600 | 24601 | 24602 | 24604 | 24605 | 24606 | 24607 | 24608 | 24609 |
| 462 | 24610 | 24611 | 24612 | 24614 | 24615 | 24616 | 24617 | 24618 | 24619 |
| 463 | 24620 | 24621 | 24622 | 24624 | 24625 | 24626 | 24627 | 24628 | 24629 |
| 464 | 24630 | 24631 | 24632 | 24634 | 24635 | 24636 | 24637 | 24638 | 24639 |
| 465 | 24640 | 24641 | 24642 | 24644 | 24645 | 24646 | 24647 | 24648 | 24649 |
| 466 | 24650 | 24651 | 24652 | 24654 | 24655 | 24656 | 24657 | 24658 | 24659 |
| 467 | 24660 | 24661 | 24662 | 24664 | 24665 | 24666 | 24667 | 24668 | 24669 |
| 468 | 24670 | 24671 | 24672 | 24674 | 24675 | 24676 | 24677 | 24678 | 24679 |
| 469 | 24680 | 24681 | 24682 | 24684 | 24685 | 24686 | 24687 | 24688 | 24689 |
| 470 | 24690 | 24691 | 24692 | 24694 | 24695 | 24696 | 24697 | 24698 | 24699 |
| 471 | 24700 | 24701 | 24702 | 24704 | 24705 | 24706 | 24707 | 24708 | 24709 |
| 472 | 24710 | 24711 | 24712 | 24714 | 24715 | 24716 | 24717 | 24718 | 24719 |
| 473 | 24720 | 24721 | 24722 | 24724 | 24725 | 24726 | 24727 | 24728 | 24729 |
| 474 | 24730 | 24731 | 24732 | 24734 | 24735 | 24736 | 24737 | 24738 | 24739 |
| 475 | 24740 | 24741 | 24742 | 24744 | 24745 | 24746 | 24747 | 24748 | 24749 |
| 476 | 24750 | 24751 | 24752 | 24754 | 24755 | 24756 | 24757 | 24758 | 24759 |
| 477 | 24760 | 24761 | 24762 | 24764 | 24765 | 24766 | 24767 | 24768 | 24769 |
| 478 | 24770 | 24771 | 24772 | 24774 | 24775 | 24776 | 24777 | 24778 | 24779 |
| 479 | 24780 | 24781 | 24782 | 24784 | 24785 | 24786 | 24787 | 24788 | 24789 |
| 480 | 24790 | 24791 | 24792 | 24794 | 24795 | 24796 | 24797 | 24798 | 24799 |
| 481 | 24800 | 24801 | 24802 | 24804 | 24805 | 24806 | 24807 | 24808 | 24809 |
| 482 | 24810 | 24811 | 24812 | 24814 | 24815 | 24816 | 24817 | 24818 | 24819 |
| 483 | 24820 | 24821 | 24822 | 24824 | 24825 | 24826 | 24827 | 24828 | 24829 |
| 484 | 24830 | 24831 | 24832 | 24834 | 24835 | 24836 | 24837 | 24838 | 24839 |
| 485 | 24840 | 24841 | 24842 | 24844 | 24845 | 24846 | 24847 | 24848 | 24849 |
| 486 | 24850 | 24851 | 24852 | 24854 | 24855 | 24856 | 24857 | 24858 | 24859 |
| 487 | 24860 | 24861 | 24862 | 24864 | 24865 | 24866 | 24867 | 24868 | 24869 |
| 488 | 24870 | 24871 | 24872 | 24874 | 24875 | 24876 | 24877 | 24878 | 24879 |
| 489 | 24880 | 24881 | 24882 | 24884 | 24885 | 24886 | 24887 | 24888 | 24889 |
| 490 | 24890 | 24891 | 24892 | 24894 | 24895 | 24896 | 24897 | 24898 | 24899 |
| 491 | 24900 | 24901 | 24902 | 24904 | 24905 | 24906 | 24907 | 24908 | 24909 |
| 492 | 24910 | 24911 | 24912 | 24914 | 24915 | 24916 | 24917 | 24918 | 24919 |
| 493 | 24920 | 24921 | 24922 | 24924 | 24925 | 24926 | 24927 | 24928 | 24929 |
| 494 | 24930 | 24931 | 24932 | 24934 | 24935 | 24936 | 24937 | 24938 | 24939 |
| 495 | 24940 | 24941 | 24942 | 24944 | 24945 | 24946 | 24947 | 24948 | 24949 |
| 496 | 24950 | 24951 | 24952 | 24954 | 24955 | 24956 | 24957 | 24958 | 24959 |
| 497 | 24960 | 24961 | 24962 | 24964 | 24965 | 24966 | 24967 | 24968 | 24969 |
| 498 | 24970 | 24971 | 24972 | 24974 | 24975 | 24976 | 24977 | 24978 | 24979 |
| 499 | 24980 | 24981 | 24982 | 24984 | 24985 | 24986 | 24987 | 24988 | 24989 |
| 500 | 24990 | 24991 | 24992 | 24994 | 24995 | 24996 | 24997 | 24998 | 24999 |

(4) For axis 4

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 501 | 25000 | 25001 | 25002 | 25004 | 25005 | 25006 | 25007 | 25008 | 25009 |
| 502 | 25010 | 25011 | 25012 | 25014 | 25015 | 25016 | 25017 | 25018 | 25019 |
| 503 | 25020 | 25021 | 25022 | 25024 | 25025 | 25026 | 25027 | 25028 | 25029 |
| 504 | 25030 | 25031 | 25032 | 25034 | 25035 | 25036 | 25037 | 25038 | 25039 |
| 505 | 25040 | 25041 | 25042 | 25044 | 25045 | 25046 | 25047 | 25048 | 25049 |
| 506 | 25050 | 25051 | 25052 | 25054 | 25055 | 25056 | 25057 | 25058 | 25059 |
| 507 | 25060 | 25061 | 25062 | 25064 | 25065 | 25066 | 25067 | 25068 | 25069 |
| 508 | 25070 | 25071 | 25072 | 25074 | 25075 | 25076 | 25077 | 25078 | 25079 |
| 509 | 25080 | 25081 | 25082 | 25084 | 25085 | 25086 | 25087 | 25088 | 25089 |
| 510 | 25090 | 25091 | 25092 | 25094 | 25095 | 25096 | 25097 | 25098 | 25099 |
| 511 | 25100 | 25101 | 25102 | 25104 | 25105 | 25106 | 25107 | 25108 | 25109 |
| 512 | 25110 | 25111 | 25112 | 25114 | 25115 | 25116 | 25117 | 25118 | 25119 |
| 513 | 25120 | 25121 | 25122 | 25124 | 25125 | 25126 | 25127 | 25128 | 25129 |
| 514 | 25130 | 25131 | 25132 | 25134 | 25135 | 25136 | 25137 | 25138 | 25139 |
| 515 | 25140 | 25141 | 25142 | 25144 | 25145 | 25146 | 25147 | 25148 | 25149 |
| 516 | 25150 | 25151 | 25152 | 25154 | 25155 | 25156 | 25157 | 25158 | 25159 |
| 517 | 25160 | 25161 | 25162 | 25164 | 25165 | 25166 | 25167 | 25168 | 25169 |
| 518 | 25170 | 25171 | 25172 | 25174 | 25175 | 25176 | 25177 | 25178 | 25179 |
| 519 | 25180 | 25181 | 25182 | 25184 | 25185 | 25186 | 25187 | 25188 | 25189 |
| 520 | 25190 | 25191 | 25192 | 25194 | 25195 | 25196 | 25197 | 25198 | 25199 |
| 521 | 25200 | 25201 | 25202 | 25204 | 25205 | 25206 | 25207 | 25208 | 25209 |
| 522 | 25210 | 25211 | 25212 | 25214 | 25215 | 25216 | 25217 | 25218 | 25219 |
| 523 | 25220 | 25221 | 25222 | 25224 | 25225 | 25226 | 25227 | 25228 | 25229 |
| 524 | 25230 | 25231 | 25232 | 25234 | 25235 | 25236 | 25237 | 25238 | 25239 |
| 525 | 25240 | 25241 | 25242 | 25244 | 25245 | 25246 | 25247 | 25248 | 25249 |
| 526 | 25250 | 25251 | 25252 | 25254 | 25255 | 25256 | 25257 | 25258 | 25259 |
| 527 | 25260 | 25261 | 25262 | 25264 | 25265 | 25266 | 25267 | 25268 | 25269 |
| 528 | 25270 | 25271 | 25272 | 25274 | 25275 | 25276 | 25277 | 25278 | 25279 |
| 529 | 25280 | 25281 | 25282 | 25284 | 25285 | 25286 | 25287 | 25288 | 25289 |
| 530 | 25290 | 25291 | 25292 | 25294 | 25295 | 25296 | 25297 | 25298 | 25299 |
| 531 | 25300 | 25301 | 25302 | 25304 | 25305 | 25306 | 25307 | 25308 | 25309 |
| 532 | 25310 | 25311 | 25312 | 25314 | 25315 | 25316 | 25317 | 25318 | 25319 |
| 533 | 25320 | 25321 | 25322 | 25324 | 25325 | 25326 | 25327 | 25328 | 25329 |
| 534 | 25330 | 25331 | 25332 | 25334 | 25335 | 25336 | 25337 | 25338 | 25339 |
| 535 | 25340 | 25341 | 25342 | 25344 | 25345 | 25346 | 25347 | 25348 | 25349 |
| 536 | 25350 | 25351 | 25352 | 25354 | 25355 | 25356 | 25357 | 25358 | 25359 |
| 537 | 25360 | 25361 | 25362 | 25364 | 25365 | 25366 | 25367 | 25368 | 25369 |
| 538 | 25370 | 25371 | 25372 | 25374 | 25375 | 25376 | 25377 | 25378 | 25379 |
| 539 | 25380 | 25381 | 25382 | 25384 | 25385 | 25386 | 25387 | 25388 | 25389 |
| 540 | 25390 | 25391 | 25392 | 25394 | 25395 | 25396 | 25397 | 25398 | 25399 |
| 541 | 25400 | 25401 | 25402 | 25404 | 25405 | 25406 | 25407 | 25408 | 25409 |
| 542 | 25410 | 25411 | 25412 | 25414 | 25415 | 25416 | 25417 | 25418 | 25419 |
| 543 | 25420 | 25421 | 25422 | 25424 | 25425 | 25426 | 25427 | 25428 | 25429 |
| 544 | 25430 | 25431 | 25432 | 25434 | 25435 | 25436 | 25437 | 25438 | 25439 |
| 545 | 25440 | 25441 | 25442 | 25444 | 25445 | 25446 | 25447 | 25448 | 25449 |
| 546 | 25450 | 25451 | 25452 | 25454 | 25455 | 25456 | 25457 | 25458 | 25459 |
| 547 | 25460 | 25461 | 25462 | 25464 | 25465 | 25466 | 25467 | 25468 | 25469 |
| 548 | 25470 | 25471 | 25472 | 25474 | 25475 | 25476 | 25477 | 25478 | 25479 |
| 549 | 25480 | 25481 | 25482 | 25484 | 25485 | 25486 | 25487 | 25488 | 25489 |
| 550 | 25490 | 25491 | 25492 | 25494 | 25495 | 25496 | 25497 | 25498 | 25499 |

| Data No. | Positioning identifier | M code | Dwell time | Command speed | | Positioning address | | Arc data | |
|----------|------------------------|--------|------------|---------------|------------|---------------------|------------|-----------|------------|
| | | | | Low-order | High-order | Low-order | High-order | Low-order | High-order |
| 551 | 25500 | 25501 | 25502 | 25504 | 25505 | 25506 | 25507 | 25508 | 25509 |
| 552 | 25510 | 25511 | 25512 | 25514 | 25515 | 25516 | 25517 | 25518 | 25519 |
| 553 | 25520 | 25521 | 25522 | 25524 | 25525 | 25526 | 25527 | 25528 | 25529 |
| 554 | 25530 | 25531 | 25532 | 25534 | 25535 | 25536 | 25537 | 25538 | 25539 |
| 555 | 25540 | 25541 | 25542 | 25544 | 25545 | 25546 | 25547 | 25548 | 25549 |
| 556 | 25550 | 25551 | 25552 | 25554 | 25555 | 25556 | 25557 | 25558 | 25559 |
| 557 | 25560 | 25561 | 25562 | 25564 | 25565 | 25566 | 25567 | 25568 | 25569 |
| 558 | 25570 | 25571 | 25572 | 25574 | 25575 | 25576 | 25577 | 25578 | 25579 |
| 559 | 25580 | 25581 | 25582 | 25584 | 25585 | 25586 | 25587 | 25588 | 25589 |
| 560 | 25590 | 25591 | 25592 | 25594 | 25595 | 25596 | 25597 | 25598 | 25599 |
| 561 | 25600 | 25601 | 25602 | 25604 | 25605 | 19606 | 19607 | 19608 | 19609 |
| 562 | 25610 | 25611 | 25612 | 25614 | 25615 | 19616 | 19617 | 19618 | 19619 |
| 563 | 25620 | 25621 | 25622 | 25624 | 25625 | 19626 | 19627 | 19628 | 25629 |
| 564 | 25630 | 25631 | 25632 | 25634 | 25635 | 19636 | 19637 | 19638 | 25639 |
| 565 | 25640 | 25641 | 25642 | 25644 | 25645 | 19646 | 19647 | 19648 | 25649 |
| 566 | 25650 | 25651 | 25652 | 25654 | 25655 | 25656 | 25657 | 25658 | 25659 |
| 567 | 25660 | 25661 | 25662 | 25664 | 25665 | 25666 | 25667 | 25668 | 25669 |
| 568 | 25670 | 25671 | 25672 | 25674 | 25675 | 25676 | 25677 | 25678 | 25679 |
| 569 | 25680 | 25681 | 25682 | 25684 | 25685 | 25686 | 25687 | 25688 | 25689 |
| 570 | 25690 | 25691 | 25692 | 25694 | 25695 | 25696 | 25697 | 25698 | 25699 |
| 571 | 25700 | 25701 | 25702 | 25704 | 25705 | 25706 | 25707 | 25708 | 25709 |
| 572 | 25710 | 25711 | 25712 | 25714 | 25715 | 25716 | 25717 | 25718 | 25719 |
| 573 | 25720 | 25721 | 25722 | 25724 | 25725 | 25726 | 25727 | 25728 | 25729 |
| 574 | 25730 | 25731 | 25732 | 25734 | 25735 | 25736 | 25737 | 25738 | 25739 |
| 575 | 25740 | 25741 | 25742 | 25744 | 25745 | 25746 | 25747 | 25748 | 25749 |
| 576 | 25750 | 25751 | 25752 | 25754 | 25755 | 25756 | 25757 | 25758 | 25759 |
| 577 | 25760 | 25761 | 25762 | 25764 | 25765 | 25766 | 25767 | 25768 | 25769 |
| 578 | 25770 | 25771 | 25772 | 25774 | 25775 | 25776 | 25777 | 25778 | 25779 |
| 579 | 25780 | 25781 | 25782 | 25784 | 25785 | 25786 | 25787 | 25788 | 25789 |
| 580 | 25790 | 25791 | 25792 | 25794 | 25795 | 25796 | 25797 | 25798 | 25799 |
| 581 | 25800 | 25801 | 25802 | 25804 | 25805 | 25806 | 25807 | 25808 | 25809 |
| 582 | 25810 | 25811 | 25812 | 25814 | 25815 | 25816 | 25817 | 25818 | 25819 |
| 583 | 25820 | 25821 | 25822 | 25824 | 25825 | 25826 | 25827 | 25828 | 25829 |
| 584 | 25830 | 25831 | 25832 | 25834 | 25835 | 25836 | 25837 | 25838 | 25839 |
| 585 | 25840 | 25841 | 25842 | 25844 | 25845 | 25846 | 25847 | 25848 | 25849 |
| 586 | 25850 | 25851 | 25852 | 25854 | 25855 | 25856 | 25857 | 25858 | 25859 |
| 587 | 25860 | 25861 | 25862 | 25864 | 25865 | 25866 | 25867 | 25868 | 25869 |
| 588 | 25870 | 25871 | 25872 | 25874 | 25875 | 25876 | 25877 | 25878 | 25879 |
| 589 | 25880 | 25881 | 25882 | 25884 | 25885 | 25886 | 25887 | 25888 | 25889 |
| 590 | 25890 | 25891 | 25892 | 25894 | 25895 | 25896 | 25897 | 25898 | 25899 |
| 591 | 25900 | 25901 | 25902 | 25904 | 25905 | 25906 | 25907 | 25908 | 25909 |
| 592 | 25910 | 25911 | 25912 | 25914 | 25915 | 25916 | 25917 | 25918 | 25919 |
| 593 | 25920 | 25921 | 25922 | 25924 | 25925 | 25926 | 25927 | 25928 | 25929 |
| 594 | 25930 | 25931 | 25932 | 25934 | 25935 | 25936 | 25937 | 25938 | 25939 |
| 595 | 25940 | 25941 | 25942 | 25944 | 25945 | 25946 | 25947 | 25948 | 25949 |
| 596 | 25950 | 25951 | 25952 | 25954 | 25955 | 25956 | 25957 | 25958 | 25959 |
| 597 | 25960 | 25961 | 25962 | 25964 | 25965 | 25966 | 25967 | 25968 | 25969 |
| 598 | 25970 | 25971 | 25972 | 25974 | 25975 | 25976 | 25977 | 25978 | 25979 |
| 599 | 25980 | 25981 | 25982 | 25984 | 25985 | 25986 | 25987 | 25988 | 25989 |
| 600 | 25990 | 25991 | 25992 | 25994 | 25995 | 25996 | 25997 | 25998 | 25999 |

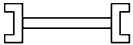




Appendix 3 Connection with servo amplifiers

Appendix 3.1 Connection of SSCNET cables

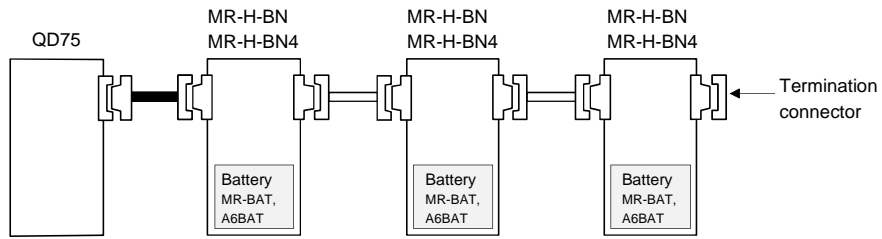
As the SSCNET cables or termination connector is different depending on the servo amplifiers, refer to the following connection example.

The SSCNET cables and termination connector used in the connection example are any of the models shown in the following table.

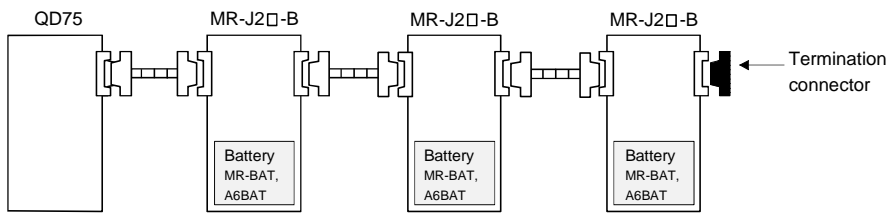
When absolute position detection control is executed, installed battery (MR-BAT/A6BAT) to servo amplifier.

| Part name | Model name | Depiction in connection example | Description |
|-----------------------|--|---|---|
| SSCNET cable | MR-HBUS□M 0.5m (1.64ft.), 1m (3.28ft.), 5m (16.4ft.) |  | • Connection between (MR-H-BN/MR-H-BN4) and (MR-H-BN/ MR-H-BN4). |
| | MR-J2HBUS□M 0.5m (1.64ft.), 1m (3.28ft.), 5m (16.4ft.) |  | • Connection between QD75M□ and (MR-J2-B/MR-J2S-B/ MR-J2-Jr/MR-J2M-B). • Connection between (MR-J2-B/MR-J2S-B/ MR-J2-Jr/MR-J2M-B) and (MR-J2-B/MR-J2S-B/ MR-J2-Jr/MR-J2M-B). |
| | MR-J2HBUS□M-A 0.5m (1.64ft.), 1m (3.28ft.), 5m (16.4ft.) |  | • Connection between (QD75M□/MR-J2-B/MR-J2S-B/ MR-J2-Jr/MR-J2M-B) and (MR-H-BN/MR-H-BN4). |
| Termination connector | MR-TM |  | • Connected to the last servo amplifier (MR-H-BN/MR-H-BN4) by SSCNET. |
| | MR-A-TM |  | • Connected to the last servo amplifier (MR-J2-B/MR-J2S-B/ MR-J2-Jr/MR-J2M-B) by SSCNET. |

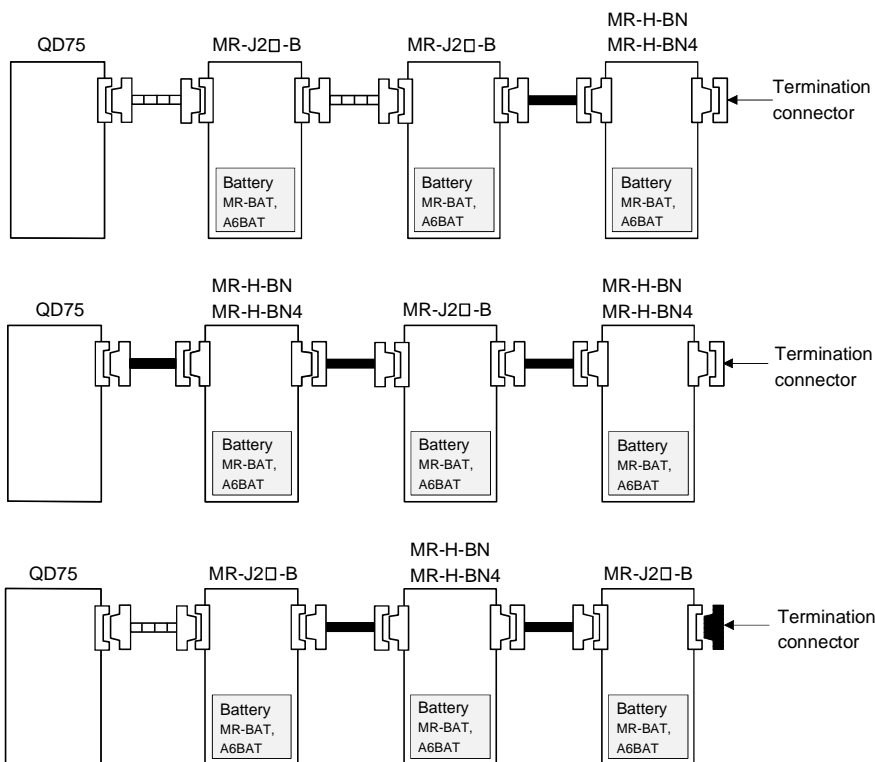
(1) MR-H-BN/MR-H-BN4 configuration



(2) MR-J2□-B configuration



(3) MR-J2□-B/MR-H-BN/MR-H-BN4 configuration



Appendix 3.2 Wiring of SSCNET cables

Generally use the SSCNET cables available as our options. If the required length is not found in our options, fabricate the cable on the customer side.

(1) SSCNET cable

The following table indicates the SSCNET cables used with each motion controller and the servo amplifiers. Make selection according to your operating conditions.

Table 1 Table of SSCNET cable

| Type | Description |
|---------------|--|
| MR-HBUS□M | <ul style="list-style-type: none"> • Connection between MR-H-BN/MR-H-BN4 and MR-H-BN/MR-H-BN4 • MR-HBCNS: connector set (sold separately) |
| MR-J2HBUS□M | <ul style="list-style-type: none"> • Connection between QD75M□ and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) • Connection between (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B) and (MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B). • MR-J2CN1: connector set (sold separately) |
| MR-J2HBUS□M-A | <ul style="list-style-type: none"> • Connection between QD75M□/MR-J2-B/MR-J2S-B/MR-J2-Jr/MR-J2M-B and MR-H-BN/MR-H-BN4. • MR-J2CN1-A: connector set (sold separately) |

Use the following or equivalent twisted pair cables as the SSCNET cables.

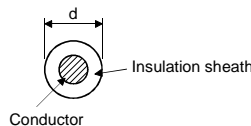
Table 2 Table of wire model

| Type | Length [m(ft.)] | Wire model |
|---------------|-----------------------------|-------------------------------|
| MR-HBUS□M | 0.5(1.64), 1(3.28), 5(16.4) | A14B2343 6 Pair |
| MR-J2HBUS□M | | UL20276 AWG#28 10 pair(CREAM) |
| MR-J2HBUS□M-A | | |

Table 3 Table of wire specifications

| Wire model | Core size [mm ²] | Number of cores | Characteristics of one core | | | Finish OD [mm] (Note-2) |
|-------------------------------|------------------------------|-----------------|--------------------------------|-----------------------------|-------------------------------------|-------------------------|
| | | | Structure [Number of wires/mm] | Conductor resistance [Ω/km] | Insulating sheath OD d[mm] (Note-1) | |
| A14B2343 6P | 0.2 | 12(6 pairs) | 40/0.08 | Max.105 | 0.88 | 7.2 |
| UL20276 AWG#28 10 pair(CREAM) | 0.08 | 20(10 pairs) | 7/0.127 | Max.222 | 0.38 | 6.1 |

(Note-1): d is as shown below.



(Note-2): Standard OD. Max. OD is about 10% larger.

⚠ CAUTION

- When fabricating the bus cable, do not make incorrect connection. Wrong connection will cause runaway or explosion.

(a) MR-HBUS□M

1) Model explanation

Type: MR-HBUS□M

| Symbol | Cable length [m(ft.)] |
|--------|-----------------------|
| 05 | 0.5(1.64) |
| 1 | 1(3.28) |
| 5 | 5(16.4) |

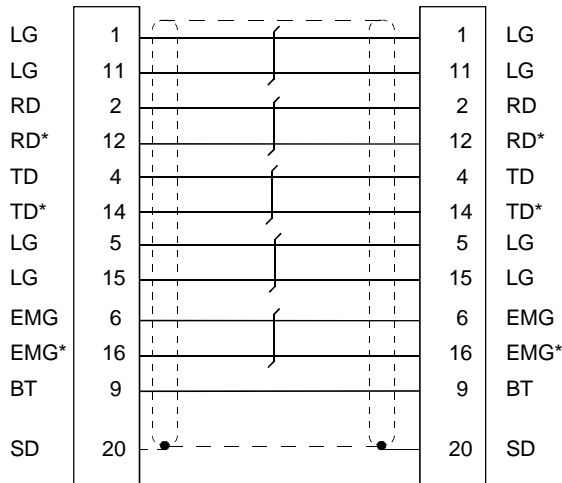
- Connector: HONDA connectors make
PCR-S20FS, PCR-LS20LA1

2) Connection diagram

When fabricating a cable, use the recommended wire given on Appendix 3.2, and make the cable as show in the following connection diagram. The overall distance of the SSCNET cables on the same bus is 30m(98.4ft.) .

MR-HBUS□M

PCR-S20FS (connector) PCR-S20FS (connector)
 PCR-LS20LA1 (connector case) PCR-LS20LA1 (connector case)
 Maker: Honda connectors Maker: Honda connectors



∫ : Twisted pair cable

(b) MR-J2HBUS□M

1) Model explanation

Type: MR-J2HBUS□M

| Symbol | Cable length [m(ft.)] |
|--------|-----------------------|
| 05 | 0.5(1.64) |
| 1 | 1(3.28) |
| 5 | 5(16.4) |

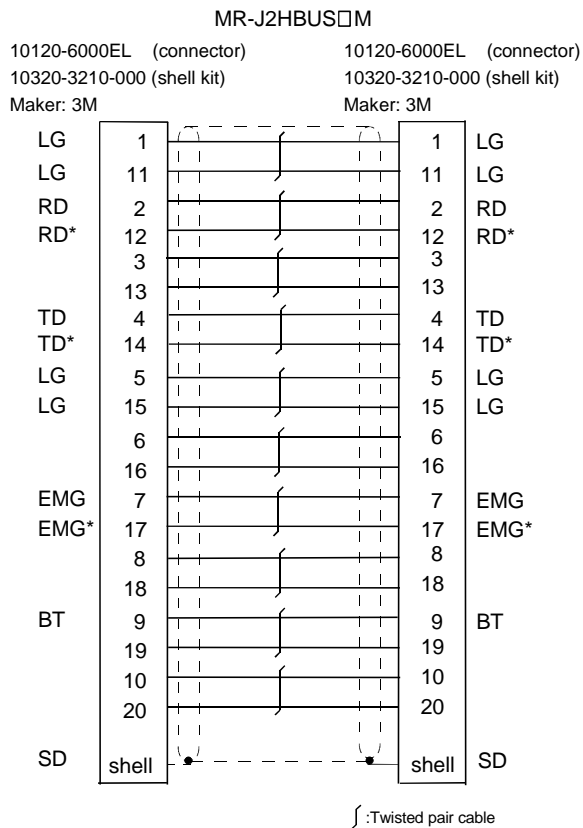
- Connector: Sumitomo 3M make

Insulation displacement type...10120-6000EL, 10320-3210-000

Solder connection type.....10120-3000VE, 10320-52F0-008

2) Connection diagram

When fabricating a cable, use the recommended wire given on Appendix 3.2, and make the cable as show in the following connection diagram. The overall distance of the SSCNET cables on the same bus is 30m(98.4ft.) .



(c) MR-J2HBUS□M-A

1) Model explanation

Type: MR-J2HBUS□M-A

| Symbol | Cable length [m(ft.)] |
|--------|-----------------------|
| 05 | 0.5(1.64) |
| 1 | 1(3.28) |
| 5 | 5(16.4) |

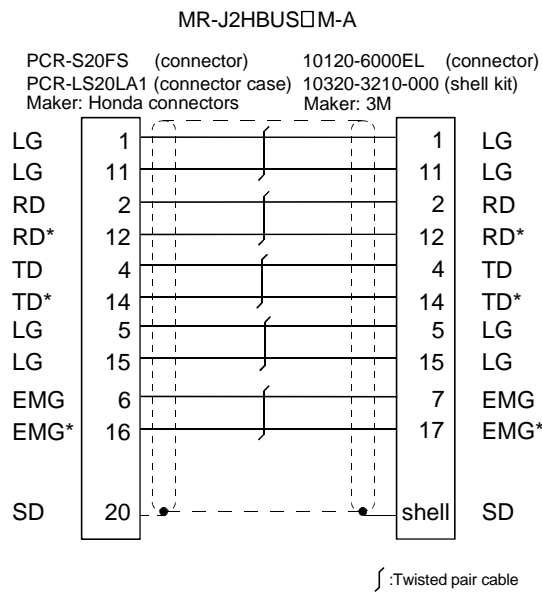
- Connector: Sumitomo 3M make

Insulation displacement type...10120-6000EL, 10320-3210-000

Solder connection type.....10120-3000VE, 10320-52F0-008

2) Connection diagram

When fabricating a cable, use the recommended wire given on Appendix 3.2, and make the cable as show in the following connection diagram. The overall distance of the SSCNET cables on the same bus is 30m(98.4ft.) .

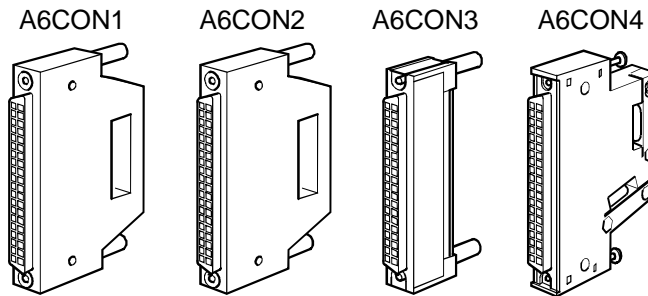


Appendix 4 Connection with external device connector

Appendix 4.1 Connector

Mounted onto an external device connector of the QD75 and used for wiring an external device. The "external device connector" includes the following 4 types.

(1) Appearance



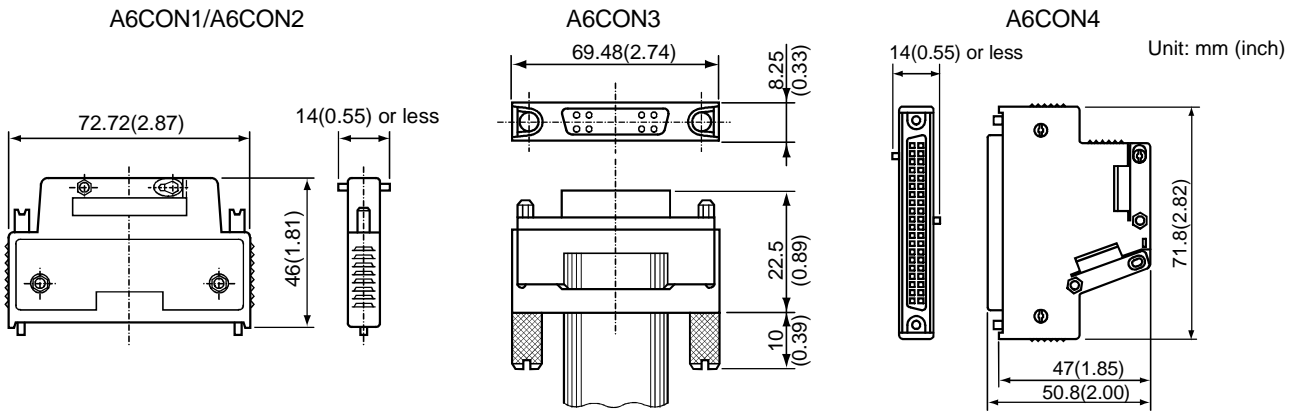
(2) Specifications of the connector

| Part name | Specification | | |
|----------------------|---------------------|--------------|---|
| Applicable connector | A6CON1, A6CON4 | A6CON2 | A6CON3 |
| Applicable wire size | 0.3 mm ² | AWG#24 to 28 | AWG#28 (twisted)/ AWG#30 (single wire) |

※: The external device connector has been prepared.

- A6CON2 Crimp-contact tool
Model name: FCN-363T-T005/H
- A6CON3 Pressure-displacement tool
Model name: FCN-367T-T012/H (locator plate)
: FCN-707T-T001/H (cable cutter)
: FCN-707T-T101/H (hand press)
- Supplier's offices:
 - FUJITSU TAKAMISAWA AMERICA, INC 250E Caribbean Drive Sunnyvale, CA 94089 U.S.A
Tel: (1-408) 745-4900
 - FUJITSU TAKAMISAWA EUROPE B.V. Jupiterstaat 13-15, our 2132 Hoofddorp, The Netherland
Tel: (31) 23-5560910
 - FUJITSU TAKAMISAWA EUROPE B.V. Schatzbogen 86 D-81829 Munchen Germany
Zweiniederlassung Deutschland Tel: (49) 89-42742320
 - FUJITSU TAKAMISAWA EUROPE (U K) Network House, Morres Drive, Maidenhead, Berkshire, SL6 4FJ United Kingdom
Tel: (44) 1628-504600
 - FUJITSU TAKAMISAWA EUROPE B.V. 127 Chemin Des Bassins, Europarc, Cleteril 94035 Cleteril 94035 France
Tel: (33) 145139940
 - FUJITSU TAKAMISAWA ASIA PACIFIC PTE LIMITED 102E Pasir Panjang Road, # 04-01 Citilink Warehouse Complex, Singapore 118529
Tel: (65) 375-8560
 - FUJITSU TAKAMISAWA HONG KONG Co., LTD Suite 913 Ocean Centre, 5 Canton Road. TST, Kowloon, Hong Kong
Tel: (852) 2881-8495

(3) External dimension drawing



Appendix4.2 Wiring of manual pulse generator cable

There are no our option in the manual pulse generator. The manual pulse generator cable fabricate on the customer side.

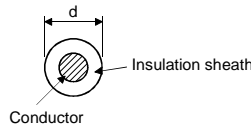
(1) Manual pulse generator cable

The following table indicates the manual pulse generator cables used with motion controller and the manual pulse generator. Make selection according to your operating conditions.

Table 1 Table of wire specifications

| Wire model | Core size [mm ²] | Number of cores | Characteristics of one core | | | Finish OD [mm] (Note-2) |
|-----------------------------------|------------------------------|-----------------|--------------------------------|--------------------------------------|-------------------------------------|-------------------------|
| | | | Structure [Number of wires/mm] | Conductor resistance [Ω /km] | Insulating sheath OD d[mm] (Note-1) | |
| 17/0.16-6P-SRV-SV(2464)K | 0.3 | 12(6 pairs) | 17/0.16 | Max. 57.5 | 1.26 | 8.4 |
| NFKEV-SB 0.3 mm ² × 4P | 0.3 | 8(4 pairs) | 7/0.127 | Max. 66.3 | 1.30 | 7.6 |

(Note-1): d is as shown below.

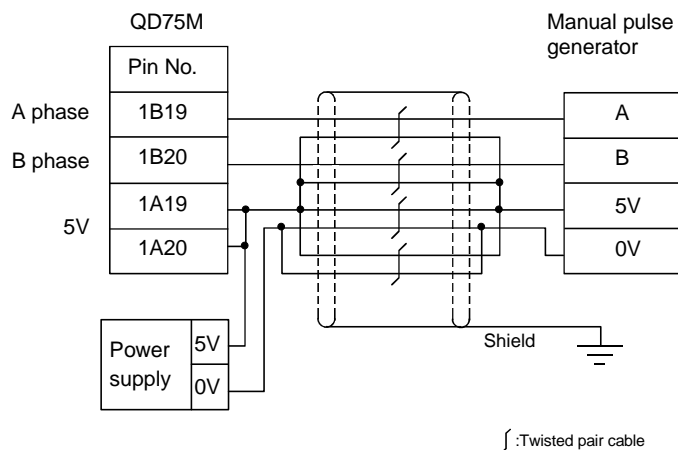


(Note-2): Standard OD. Max. OD is about 10% larger.

(a) Connection diagram

When fabricating a cable, use the recommended wire given on (1), and make the cable as show in the following connection diagram. The overall distance of the manual pulse generator cable on the same bus is 30m(98.4ft.) .

(Note): Connect the shield to ground only on the manual pulse generator side. (Only one side is connected.)



| |
|--|
| ⚠ CAUTION |
| <p>● When fabricating the cable, do not make incorrect connection. Wrong connection will cause runaway or explosion.</p> |

Appendix 5 Comparisons with conventional positioning modules

Appendix 5.1 Comparisons with QD75P model

| Item | | Model | | | |
|--|---|---|--------|--------|--|
| | | QD75M1 | QD75M2 | QD75M4 | QD75P |
| No. of control axes | | 1 | 2 | 4 | 4 |
| No. of positioning data items | | 600/axis | | | 600/axis |
| Interpolation functions | 2-axis linear interpolation | × | ○ | ○ | ○ |
| | 3-axis linear interpolation | × | × | ○ | ○ |
| | 4-axis linear interpolation | × | × | ○ | ○ |
| | 2-axis circular interpolation | × | ○ | ○ | ○ |
| Positioning systems | Position control | ○ | | | ○ |
| | Speed control | ○ | | | ○ |
| | Speed-position switching control | ○ (INC/ABS mode) | | | ○ (INC/ABS mode) |
| | Position-speed switching control | ○ | | | ○ |
| Machine OPR function (OPR method) | | ○ (4 types) Near-point dog method, Count method 1) 2) and Data set method | | | ○ (6 types) Near-point dog method, Stopper method 1) to 3) and Count method 1) 2) |
| JOG operation | | | | | ○ |
| Inching operation | | | | | ○ |
| Manual pulse generator function | | | | | ○ |
| Acceleration/deceleration processing | Automatic trapezoidal acceleration/deceleration | | | | ○ |
| | S-pattern acceleration/deceleration | | | | ○ |
| Acceleration/deceleration time | | Acceleration time and deceleration time setting possible (4 patterns each) | | | |
| Compensation | | Electronic gears, backlash compensation | | | |
| Error display | | Error LED | | | |
| History data storage (Start, error, warning) | | Provided (3 types, 16 items/axis) | | | |
| Data storage destination | | Flash ROM (battery-less backup) | | | |
| Connected to servo amplifier | | SSCNET | | | Pulse signal Servo ON signal Servo READY signal Zero point signal |
| ABS function | | Current value return function. Follow up function | | | — |
| Electronic gears ratio | | Denominator/numerator (32 bit) | | | Denominator/numerator (16 bit) |
| Absolute positioning system (degree) with unlimited length feed can be configured grantee. | | Provided | | | Improvided |
| No. of input/output points | | 32 | | | |
| No. of module occupied slots | | 1 | | | |

○ : Possible, × : Not possible

Appendix 5.2 Comparisons with A1SD75M1/ A1SD75M2/ A1SD75M3 models

(1) Comparisons of performance specifications

| Item | | Model | | | | | | |
|--|--|-----------------------------|--------|---|--------------|----------|----------|---|
| | | QD75M1 | QD75M2 | QD75M4 | A1SD75M1 | A1SD75M2 | A1SD75M3 | |
| No. of control axes | | 1 | 2 | 4 | 1 | 2 | 3 | |
| No. of positioning data items | | 600/axis | | | 600/axis * 1 | | | |
| Position control interpolation functions | 2-axis linear interpolation | × | ○ | ○ | × | ○ | ○ | |
| | 3-axis linear interpolation | × | × | ○ | × | × | × | |
| | 4-axis linear interpolation | × | × | ○ | × | × | × | |
| | 2-axis circular interpolation | × | ○ | ○ | × | ○ | ○ | |
| Positioning systems | Position control | ○ | | | ○ | | | |
| | Speed control | 1-axis | ○ | ○ | ○ | ○ | ○ | ○ |
| | | 2-axis linear interpolation | × | ○ | ○ | × | × | × |
| | | 3-axis linear interpolation | × | × | ○ | × | × | × |
| | | 4-axis linear interpolation | × | × | ○ | × | × | × |
| | Speed-position switching control | ○ | | | ○ | | | |
| Position-speed switching control | ○ | | | × | | | | |
| Positioning range | <Absolute system> -214748364.8 to 214748364.7 (μm) -21474.83648 to 21474.83647 (inch) 0 to 359.99999 (degree) -2147483648 to 2147483647 (PLS) <Incremental system > -214748364.8 to 214748364.7 (μm) -21474.83648 to 21474.83647 (inch) -21474.83648 to 21474.83647 (degree) -2147483648 to 2147483647 (PLS) <Speed-position or position-speed switching controls> 0 to 214748364.7 (μm) 0 to 21474.83647 (inch) 0 to 21474.83647 (degree)/ 0 to 359.99999 (degree) * 2 0 to 2147483647 (PLS) | | | <Absolute system > -214748364.8 to 214748364.7 (μm) /-13421772.8 to 13421772.7 (μm) -21474.83648 to 21474.83647 (inch) /-1342.17728 to 1342.17727 (inch) 0 to 359.99999 (degree) /0 to 359.99999 (degree) -2147483648 to 2147483647 (PLS) /-134217728 to 134217727 (PLS) <Incremental system > -214748364.8 to 214748364.7 (μm) /-13421772.8 to 13421772.7 (μm) -21474.83648 to 21474.83647 (inch) /-1342.17728 to 1342.17727 (inch) -21474.83648 to 21474.83647 (degree) /-1342.17728 to 1342.17727 (degree) -2147483648 to 2147483647 (PLS) /-134217728 to 134217727 (PLS) <Speed-position switching control> 0 to 214748364.7 (μm) /0 to 13421772.7 (μm) 0 to 21474.83647 (inch) /0 to 1342.17727 (inch) 0 to 21474.83647 (degree) /0 to 1342.17727 (degree) 0 to 2147483647 (PLS) /0 to 134217727 (PLS) | | | | |

Comparisons of performance specifications (Continued)

| Model | | QD75M1 | QD75M2 | QD75M4 | A1SD75M1 | A1SD75M2 | A1SD75M3 |
|--|--|--|------------------|------------------|---|----------|----------|
| Item | | | | | | | |
| Speed command range * 2 | | 0.01 to 2000000.00 (mm/min) 0.001 to 2000000.000 (inch/min) 0.001 to 2000000.000 (degree/min) 1 to 10000000 (PLS/s) | | | 0.01 to 6000000.00 (mm/min) /0.01 to 375000.00 (mm/min) 0.001 to 600000.000 (inch/min) /0.001 to 37500.000 (inch/min) 0.001 to 600000.000 (degree/min) /0.001 to 37500.000 (degree/min) 1 to 1000000 (PLS/s) /1 to 62500 (PLS/s) | | |
| Machine OPR function (OPR method) | | ○ (4 types) | | | ○ (4 types) | | |
| JOG operation | | ○ | | | ○ | | |
| Inching operation | | ○ | | | × | | |
| Manual pulse generator function | | 1 generator/module | | | 1 generator/axis | | |
| Acceleration /deceleration processing | Automatic trapezoidal acceleration /deceleration | ○ | | | ○ | | |
| | S-pattern acceleration /deceleration | ○ | | | ○ | | |
| Acceleration/deceleration time | No. of patterns | Acceleration time and deceleration time can be set independently. (4 patterns each) | | | Acceleration time and deceleration time can be set independently. (4 patterns each) | | |
| | Setting range | 1 to 8388608ms | | | 1 to 65535ms/1 to 8388608ms selectable | | |
| Compensation | | Electronic gears, backlash compensation, near pass * 3 | | | Electronic gears, backlash compensation, near pass * 3 | | |
| Error display | | Error LED | | | 17-segment LED | | |
| History data storage (Start, error, warning) | | Provided (3 types, 16 items/axis) | | | Provided (4 types, 16 items/axis) | | |
| Data storage destination | | Flash ROM (battery-less backup) | | | Flash ROM (battery-less backup) | | |
| Connection connector | A6CON1, A6CON4 (Soldering type, optional) | | | | 10136-3000VE (Soldering type, supplied) | | |
| | A6CON2 (Crimp contact type, optional) | | | | 10136-6000EL (Crimp type, optional) | | |
| | A6CON3 (Pressure-displacement type, optional) | | | | — | | |
| Applicable wire size | A6CON1, A6CON4: 0.3mm ² | | | | 10136-3000VE: AWG#24 to #30 (Approx. 0.05 to 0.2 SQ) | | |
| | A6CON2: AWG#24 to 28 | | | | 10136-6000EL: AWG#28 (Approx. 0.08 SQ) | | |
| | A6CON3: AWG#28 (twisted), AWG#30 (single wire) | | | | — | | |
| SSCNET connector type | | ○ | | | | | |
| SSCNET cable maximum connection distance (m/ft.) | | 30 (98.43) | | | | | |
| Internal current consumption (A) [5VDC] | | QD75M1: 0.40A | QD75M2: 0.40A | QD75M4: 0.40A | 0.7A or less | | |
| Flash ROM write count | | Max. 100000 times | | | Max. 100000 times | | |
| No. of occupied I/O points | | 32 | | | 32 | | |
| No. of module occupied slots | | 1 | | | 1 | | |
| Outline dimensions (mm (inch)) | | 98(3.86)(H)×27.4(1.08)(W)×90(3.55)(D) | | | 130(5.12)(H)×34.5(1.36)(W)×93.6(3.69)(D) | | |
| Weight (kg (lb)) | | 0.15 (0.33) | 0.15 (0.33) | 0.16 (0.35) | 0.35 (0.77) | | |

Comparisons of performance specifications (Continued)

| Item | | Model | QD75M1 | QD75M2 | QD75M4 | A1SD75M1 | A1SD75M2 | A1SD75M3 |
|---|------------------------------------|---|--------|--------|----------------------------------|----------|----------|----------|
| I/O signal for external devices | CHG signal | External command signal (External start or speed-position switching selectable with parameters) | | | Speed-position switching signal | | | |
| | In-position (INP) | ○ (for monitor) | | | ○ (for monitor) | | | |
| | Signal logic switching | ○ | | | Command pulse output signal only | | | |
| Peripheral devices (data setting, etc.) | Connection with peripheral devices | Connection via PLC CPU, Q Corresponding Serial Communication Module, Q Corresponding MELSEC/H Remote I/O Module | | | Direct connection | | | |
| | AD71TU | × | | | × | | | |
| | AD75TU | × | | | ○ | | | |
| | A6GPP, A6PHP | × | | | ○ | | | |
| | A7GPP, A7PHP | × | | | ○ | | | |
| | PC-9800 [®] series | ○ | | | ○ | | | |
| | DOS/V personal computer | ○ | | | ○ | | | |

○ : Possible, × : Not possible

*1: Up to 100 data items/axis of positioning data (No. 1 to 100) can be set using the buffer memory. The positioning data in the buffer memory is not backed up.

*2: Indicates the INC mode/ABS mode in speed-position switching control.

*3: The near pass function is valid only during the continuous path control. (A1SD75: Selected with parameters, QD75: Standard function)

(2) Function comparisons

Functions added to those of A1SD75M1/A1SD75M2/A1SD75M3

| Added functions | | Remarks |
|--|---|---|
| External I/O signal logic switching function | | Refer to Section 13.4. |
| Inching operation | | Refer to Section 11.3. |
| Target position change function | | Refer to Section 12.7.5. |
| Multiple axes simultaneous start control | | Refer to Section 10.5. |
| Control systems | 3-axis linear interpolation control 4-axis linear interpolation control 3-axis fixed-feed control 4-axis fixed-feed control 2-axis speed control 3-axis speed control 4-axis speed control Position-speed switching control NOP instruction LOOP instruction, LEND instruction | Refer to Chapter 9. |
| Dedicated instructions | Positioning start Teaching Flash ROM writing Parameter initialization | Refer to Chapter 14. |
| Automatic refresh of intelligent function modules | | Refer to GX Configurator-QP Operating Manual. |
| Output hold/clear parameter setting during PLC CPU error stop | | Refer to QCPU User's Manual (Function Explanation, Program Fundamentals). |
| Flash ROM write limit | | Refer to Section 13.3. |
| Speed-position switching control (ABS mode) | | Refer to Section 9.2.17. |
| Pre-reading start function | | Refer to Section 12.7.8. |
| External I/O signal monitor function | | Refer to Section 13.5. |
| Multiple CPU correspond function | | Refer to QCPU User's Manual (Multiple CPU system). |
| Absolute positioning system (degree unlimited length feed can be configured) | | Refer to Section 12.6 |
| Deceleration start flag function | | Refer to Section 12.7.9 |
| Stop command processing for deceleration stop function | | Refer to Section 12.7.10 |

Functions deleted from those of A1SD75M1/A1SD75M2/A1SD75M3

| Deleted functions | Remarks |
|---|---|
| OPR operation error (Error code: 208) | – |
| Fast machine OPR | – |
| Special start (stop) | – |
| Indirect designation | In the QD75, the start block area on the buffer memory is expanded to five blocks (0 to 4). Each start block can be directly designated with positioning start No. (7000 to 7004). |
| Block transfer | With the A1SD75, this interface is used to set positioning data Nos. 101 to 600 that do not exist on the buffer memory. Since all positioning data can be set in the buffer memory with the QD75, this function is deleted. |
| Positioning data I/F | |
| Start history storage during error | The contents are the same as those of the start history. Therefore, the QD75 stores only the start history. |
| System monitor data (module type, OS information, OS version) | These data were deleted because they can be displayed in system monitor "Module's detailed information" of GX Developer. (Refer to GX Developer Operating Manual.) |

Functions changed from those of A1SD75M1/A1SD75M2/A1SD75M3

| Changed functions | Descriptions |
|---|---|
| Software stroke limit function | <ol style="list-style-type: none"> The limit check of arc address is carried out only when a sub point is designated. It is not carried out when a center point is designated. The software stroke limit check during speed control is carried out in the following cases: <ul style="list-style-type: none"> When the software stroke limit is applied to the current feed value with Pr.14 and the current feed value is updated with Pr.21 . When the software stroke limit is applied to the machine feed value. If an attempt is made to change the current value but the designated address is out of the software stroke limit range, the attempt is considered as an error and the current value is not changed. The conventional models feature three types of software stroke limit error codes for upper limit and lower limit respectively. With the QD75, errors for the software stroke upper limit are integrated into error code 507, and errors for the lower limit are integrated into error code 508. Error codes 509 to 512 are deleted. |
| Current value changing M code function | <ol style="list-style-type: none"> An error occurs when the designated new current value is out of the software stroke limit range. The M code setting value is valid during the positioning data current value changing instruction. |
| Acceleration/deceleration control | Only two-word type (1 to 8388608ms) can be used as the setting value for the acceleration/deceleration time. (The switch between 1-word type and 2-word type is eliminated.) |

| Changed functions | Descriptions | | |
|---|---|---------------------|---------------------|
| Stop process and restart after stop Positioning operation stop | 1. "Peripheral side (emergency) stop" is deleted from the stop causes of Stop group 2 sudden stop selection. "Test mode fault" in the stop causes of Stop group 3 sudden stop selection is changed to be in the stop causes of Stop group 2 sudden stop selection. 2. "Stop (QD75 peripheral)" is added to the stop causes of Stop group 3 sudden stop selection. 3. Error code 100 (Peripheral device stop during operation) is deleted. 4. "PLC CPU error occurrence" is added to the stop causes of Stop group 2 sudden stop selection. | | |
| READY signal (X0) | | A1SD75 | QD75 |
| | OFF | Normal (READY) | Not READY/WDT error |
| | ON | Not READY/WDT error | Normal (READY) |
| Manual pulse generator operation | The No. of connectable manual pulse generator is changed from 1 generator/1 axis to 1 generator/1 module. | | |
| Axis operation status | "Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring". "In position control for position-speed switching control" and "In speed control for position-speed switching control" are added. | | |
| Continuous path control | A1SD75: If the reference axis operates in reverse direction, the control is internally changed into the continuous positioning control (restart after deceleration stop). QD75 : Even if the reference axis operates in reverse direction with interpolation, the control remains as the continuous path control. (In single-axis operation, the operation is the same as that of the A1SD75.) | | |
| Near pass | For the continuous path control, only the near pass function is available. | | |
| 2-axis interpolation <ul style="list-style-type: none"> • 2-axis linear interpolation • 2-axis fixed-feed • Circular interpolation • 2-axis speed control | The interpolation target axis can be randomly set with a positioning identifier. | | |
| Step function | 1. "Step stopped" is changed to "Stopped" and "Step error occurring" is changed to "Error occurring" in the axis operation status parameters. 2. The restart command for step start information (02H) is deleted. 3. The step operation is restarted with the restart command. | | |
| Command in-position function | The command in-position width is expanded. <ul style="list-style-type: none"> • A1SD75: 1 to 32767000 • QD75: 1 to 2147483647 | | |
| Control unit "degree" handling | The operating direction can be designated even for the ABS control in the unit of "degree". | | |

| Changed functions | Descriptions | | |
|---|---|---|---|
| Positioning start No. | No. 9004 (Multiple axes simultaneous start control) is added. Nos. 7004 to 7010 (block start designation) and 8000 to 8049 (indirect designation) are deleted. | | |
| Block start data | With the QD75, the number of blocks is changed to 5 (7000 to 7004). (With the A1SD75, this data is called "positioning start information".) | | |
| Special start data "Simultaneous start" | The simultaneous start is possible up to 4 axes. | | |
| List of errors/warnings | Refer to the following "Error code comparisons" and "Warning code comparisons". | | |
| Start history | The configuration of "start information" and "start No." is changed so that the start No. can be directly checked. | | |
| Synchronization flag (X1) | When the PLC CPU starting method is set to asynchronous, interlock is established with the synchronization flag (X1) signal. | | |
| Detailed parameters " [Pr.15] Software stroke limit valid/invalid setting" | | A1SD75 | QD75 |
| | 0 (Factory setting) | Software stroke limits invalid for manual operation | Software stroke limits valid for manual operation |
| | 1 | Software stroke limits valid for manual operation | Software stroke limits invalid for manual operation |

Error code comparisons

| Error name | Error code | |
|---|------------|------|
| | A1SD75 | QD75 |
| Outside bias speed range | 913 | 906 |
| Illegal sudden stop deceleration time | 962 | 961 |
| Stop group 1 sudden stop selection error | 963 | 962 |
| Stop group 2 sudden stop selection error | 964 | 963 |
| Stop group 3 sudden stop selection error | 965 | 964 |
| Home position return (OPR) torque limit value error | 991 | 995 |
| Setting for the movement amount after near-point dog ON error | 992 | 991 |
| Home position return (OPR) acceleration time selection error | 993 | 992 |
| Home position return (OPR) deceleration time selection error | 994 | 993 |

| Error type | Added | Deleted |
|--|--------------------|-------------------------|
| Fatal error | 002 | 51, 52 |
| Common | – | 100, 108 |
| OPR, Absolute position restoration | 213, 214 | 208 |
| JOG/Inching operation | 301 | – |
| Manual pulse generator operation | – | – |
| Positioning operation | 523, 535, 545, 546 | 509 to 512 |
| I/F | 800 to 806 | – |
| Parameter | 920, 935, 990, 996 | 931, 933, 938, 971, 999 |
| Error whose name is changed: Error code 967 A1SD75: External start selection error QD75: External command function selection error | | |

Warning code comparisons

| Warning type | Added | Deleted |
|---|---------------|----------------------|
| Fatal warning | – | 51, 52 |
| Common | 110 | 101, 105 to 108, 115 |
| OPR, Absolute position restoration | – | – |
| JOG operation/Inching operation | – | – |
| Manual pulse generator operation | – | 402 |
| Positioning operation | 516, 517, 518 | – |
| I/F | – | – |
| Parameter | – | 900 |
| Warning whose name is changed: Warning code 512 | | |
| A1SD75: Illegal external start function | | |
| QD75: Illegal external command function | | |

*: Refer to "Section 15.2 List of errors" and "Section 15.3 List of warnings" for details on error codes and warning codes.

(3) Input/output (X/Y) comparisons

| Name | Input (X) | |
|-----------------------------|------------|------------------------|
| | A1SD75 | QD75 |
| (QD75/A1SD75) READY | X00 * | X00 * |
| Axis 1 Start complete | X01 | X10 |
| Axis 2 Start complete | X02 | X11 |
| Axis 3 Start complete | X03 | X12 |
| Axis 4 Start complete | – | X13 |
| Axis 1 BUSY | X04 | X0C |
| Axis 2 BUSY | X05 | X0D |
| Axis 3 BUSY | X06 | X0E |
| Axis 4 BUSY | – | X0F |
| Axis 1 Positioning complete | X07 | X14 |
| Axis 2 Positioning complete | X08 | X15 |
| Axis 3 Positioning complete | X09 | X16 |
| Axis 4 Positioning complete | – | X17 |
| Axis 1 Error detection | X0A | X08 |
| Axis 2 Error detection | X0B | X09 |
| Axis 3 Error detection | X0C | X0A |
| Axis 4 Error detection | – | X0B |
| Axis 1 M code ON | X0D | X04 |
| Axis 2 M code ON | X0E | X05 |
| Axis 3 M code ON | X0F | X06 |
| Axis 4 M code ON | – | X07 |
| Synchronization flag | – | X01 |
| Use prohibited | X10 to X1F | X02, X03 X18 to X1F |

| Name | Output (Y) | |
|-----------------------------------|--------------------------|------------------------|
| | A1SD75 | QD75 |
| Axis 1 Positioning start | Y10 | Y10 |
| Axis 2 Positioning start | Y11 | Y11 |
| Axis 3 Positioning start | Y12 | Y12 |
| Axis 4 Positioning start | – | Y13 |
| Axis 1 Stop | Y13 | Y04 |
| Axis 2 Stop | Y14 | Y05 |
| Axis 3 Stop | Y1C | Y06 |
| Axis 4 Stop | – | Y07 |
| All axis servo ON | Y15 | Y01 |
| Axis 1 Forward run JOG start | Y16 | Y08 |
| Axis 1 Reverse run JOG start | Y17 | Y09 |
| Axis 2 Forward run JOG start | Y18 | Y0A |
| Axis 2 Reverse run JOG start | Y19 | Y0B |
| Axis 3 Forward run JOG start | Y1A | Y0C |
| Axis 3 Reverse run JOG start | Y1B | Y0D |
| Axis 4 Forward run JOG start | – | Y0E |
| Axis 4 Reverse run JOG start | – | Y0F |
| PLC READY | Y1D | Y00 |
| Axis 1 Execution prohibition flag | – | Y14 |
| Axis 2 Execution prohibition flag | – | Y15 |
| Axis 3 Execution prohibition flag | – | Y16 |
| Axis 4 Execution prohibition flag | – | Y17 |
| Use prohibited | Y00 to Y0F Y1E to Y1F | Y02, Y03 Y18 to Y1F |

*: The ON/OFF statuses for READY are different between the QD75 and A1SD75.

| | Not READY/WDT error | READY |
|--------|---------------------|-------|
| QD75 | OFF | ON |
| A1SD75 | ON | OFF |

(4) Buffer memory address comparisons

The following table shows the buffer memory addresses of the QD75 (Axes 1 to 3) corresponding to the items of the A1SD75.

The shaded area shows the differences between the A1SD75 and QD75.

| Items of A1SD75 | Buffer memory address | | | | | |
|---|-----------------------|------------|------------|----------|------------|------------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.1 Unit setting | 0 | 150 | 300 | 0 | 150 | 300 |
| Pr.2 No. of pulses per rotation (AP) | 1 | 151 | 301 | 2 3 | 152 153 | 302 303 |
| Pr.3 Movement amount per rotation (AL) | 2 | 152 | 302 | 4 5 | 154 155 | 304 305 |
| Pr.4 Unit magnification (AM) | 3 | 153 | 303 | 1 | 151 | 301 |
| Pr.7 Speed limit value | 6 7 | 156 157 | 306 307 | 10 11 | 160 161 | 310 311 |
| Pr.8 Acceleration time 0 | 8 9 | 158 159 | 308 309 | 12 13 | 162 163 | 312 313 |
| Pr.9 Deceleration time 0 | 10 11 | 160 161 | 310 311 | 14 15 | 164 165 | 314 315 |
| Pr.10 Bias speed at start | 12 13 | 162 163 | 312 313 | 6 7 | 156 157 | 306 307 |
| Pr.12 Backlash compensation amount | 15 | 165 | 315 | 17 | 167 | 317 |
| Pr.13 Software stroke limit upper limit value | 16 17 | 166 167 | 316 317 | 18 19 | 168 169 | 318 319 |
| Pr.14 Software stroke limit lower limit value | 18 19 | 168 169 | 318 319 | 20 21 | 170 171 | 320 321 |
| Pr.15 Software stroke limit selection | 20 | 170 | 320 | 22 | 172 | 322 |
| Pr.16 Software stroke limit valid/invalid setting | 21 | 171 | 321 | 23 | 173 | 323 |
| Pr.17 Command in-position width | 22 23 | 172 173 | 322 323 | 24 25 | 174 175 | 324 325 |
| Pr.18 Torque limit setting value | 24 | 174 | 324 | 26 | 176 | 326 |
| Pr.19 M code ON signal output timing | 25 | 175 | 325 | 27 | 177 | 327 |
| Pr.20 Speed switching mode | 26 | 176 | 326 | 28 | 178 | 328 |
| Pr.21 Interpolation speed designation method | 27 | 177 | 327 | 29 | 179 | 329 |
| Pr.22 Current feed value during speed control | 28 | 178 | 328 | 30 | 180 | 330 |
| Pr.23 Manual pulse generator selection | 29 | 179 | 329 | – | – | – |
| Pr.25 Size selection for acceleration/deceleration time | 31 | 181 | 331 | – | – | – |
| Pr.200 Speed-position function selection | – | – | – | 34 | 184 | 334 |
| Pr.26 Acceleration time 1 | 36 37 | 186 187 | 336 337 | 36 37 | 186 187 | 336 337 |
| Pr.27 Acceleration time 2 | 38 39 | 188 189 | 338 339 | 38 39 | 188 189 | 338 339 |
| Pr.28 Acceleration time 3 | 40 41 | 190 191 | 340 341 | 40 41 | 190 191 | 340 341 |

| Items of A1SD75 | Buffer memory address | | | | | |
|---|-----------------------|--------|--------|--------|--------|--------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.29 Deceleration time 1 | 42 | 192 | 342 | 42 | 192 | 342 |
| | 43 | 193 | 343 | 43 | 193 | 343 |
| Pr.30 Deceleration time 2 | 44 | 194 | 344 | 44 | 194 | 344 |
| | 45 | 195 | 345 | 45 | 195 | 345 |
| Pr.31 Deceleration time 3 | 46 | 196 | 346 | 46 | 196 | 346 |
| | 47 | 197 | 347 | 47 | 197 | 347 |
| Pr.32 JOG speed limit value | 48 | 198 | 348 | 48 | 198 | 348 |
| | 49 | 199 | 349 | 49 | 199 | 349 |
| Pr.33 JOG operation acceleration time selection | 50 | 200 | 350 | 50 | 200 | 350 |
| Pr.34 JOG operation deceleration time selection | 51 | 201 | 351 | 51 | 201 | 351 |
| Pr.35 Acceleration/deceleration process selection | 52 | 202 | 352 | 52 | 202 | 352 |
| Pr.36 S-pattern proportion | 53 | 203 | 353 | 53 | 203 | 353 |
| Pr.37 Sudden stop deceleration time | 54 | 204 | 354 | 54 | 204 | 354 |
| | 55 | 205 | 355 | 55 | 205 | 355 |
| Pr.38 Stop group 1 sudden stop selection | 56 | 206 | 356 | 56 | 206 | 356 |
| Pr.39 Stop group 2 sudden stop selection | 57 | 207 | 357 | 57 | 207 | 357 |
| Pr.40 Stop group 3 sudden stop selection | 58 | 208 | 358 | 58 | 208 | 358 |
| Pr.41 Positioning complete signal output time | 59 | 209 | 359 | 59 | 209 | 359 |
| Pr.42 Allowable circular interpolation error width | 60 | 210 | 360 | 60 | 210 | 360 |
| | 61 | 211 | 361 | 61 | 211 | 361 |
| Pr.43 External start function selection | 62 | 212 | 362 | 62 | 212 | 362 |
| (QD75: Pr.42 External command function selection) | | | | | | |
| Pr.201 Restart allowable range when servo OFF to ON | 64 | 214 | 364 | 64 | 214 | 364 |
| | 65 | 215 | 365 | 65 | 215 | 365 |
| Pr.44 Near pass mode selection for path control | 66 | 216 | 366 | – | – | – |
| Pr.45 OPR method | 70 | 220 | 370 | 70 | 220 | 370 |
| Pr.46 OPR direction | 71 | 221 | 371 | 71 | 221 | 371 |
| Pr.47 OP address | 72 | 222 | 372 | 72 | 222 | 372 |
| | 73 | 223 | 373 | 73 | 223 | 373 |
| Pr.48 OPR speed | 74 | 224 | 374 | 74 | 224 | 374 |
| | 75 | 225 | 375 | 75 | 225 | 375 |
| Pr.49 Creep speed | 76 | 226 | 376 | 76 | 226 | 376 |
| | 77 | 227 | 377 | 77 | 227 | 377 |
| Pr.50 OPR retry | 78 | 228 | 378 | 78 | 228 | 378 |
| Pr.51 OPR dwell time | 79 | 229 | 379 | 79 | 229 | 379 |
| Pr.52 Setting for the movement amount after near-point dog ON | 80 | 230 | 380 | 80 | 230 | 380 |
| | 81 | 231 | 381 | 81 | 231 | 381 |
| Pr.53 OPR acceleration time selection | 82 | 232 | 382 | 82 | 232 | 382 |
| Pr.54 OPR deceleration time selection | 83 | 233 | 383 | 83 | 233 | 383 |
| Pr.55 OP shift amount | 84 | 234 | 384 | 84 | 234 | 384 |
| | 85 | 235 | 385 | 85 | 235 | 385 |
| Pr.56 OPR torque limit value | 86 | 236 | 386 | 86 | 236 | 386 |
| Pr.57 Speed designation during OP shift | 88 | 238 | 388 | 88 | 238 | 388 |
| Pr.58 Dwell time during OPR retry | 89 | 239 | 389 | 89 | 239 | 389 |

| Items of A1SD75 | Buffer memory address | | | | | |
|--|-----------------------|--------|--------|--------|--------|--------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.100 Servo series | 100 | 250 | 400 | 30100 | 30200 | 30300 |
| Pr.101 Amplifier setting | 101 | 251 | 401 | 30101 | 30201 | 30301 |
| Pr.102 Regenerative brake resistor | 102 | 252 | 402 | 30102 | 30202 | 30302 |
| Pr.103 Motor type | 103 | 253 | 403 | 30103 | 30203 | 30303 |
| Pr.104 Motor capacity | 104 | 254 | 404 | 30104 | 30204 | 30304 |
| Pr.105 Servo motor speed | 105 | 255 | 405 | 30105 | 30205 | 30305 |
| Pr.106 Feed back pulse | 106 | 256 | 406 | 30106 | 30206 | 30306 |
| Pr.107 Rotation direction selection | 107 | 257 | 407 | 30107 | 30207 | 30307 |
| Pr.108 Auto tuning | 108 | 258 | 408 | 30108 | 30208 | 30308 |
| Pr.109 Servo response | 109 | 259 | 409 | 30109 | 30209 | 30309 |
| Pr.110 Maker setting | 110 | 260 | 410 | 30110 | 30210 | 30310 |
| Pr.111 Maker setting | 111 | 261 | 411 | 30111 | 30211 | 30311 |
| Pr.112 Load inertia ratio | 112 | 262 | 412 | 30112 | 30212 | 30312 |
| Pr.113 Position loop gain 1 | 113 | 263 | 413 | 30113 | 30213 | 30313 |
| Pr.114 Speed loop gain 1 | 114 | 264 | 414 | 30114 | 30214 | 30314 |
| Pr.115 Position loop gain 2 | 115 | 265 | 415 | 30115 | 30215 | 30315 |
| Pr.116 Speed loop gain 2 | 116 | 266 | 416 | 30116 | 30216 | 30316 |
| Pr.117 Speed integral compensation | 117 | 267 | 417 | 30117 | 30217 | 30317 |
| Pr.118 Machine resonance suppression filter | 118 | 268 | 418 | 30118 | 30218 | 30318 |
| Pr.119 Feed forward gain | 119 | 269 | 419 | 30119 | 30219 | 30319 |
| Pr.120 In-position range | 120 | 270 | 420 | 30120 | 30220 | 30320 |
| Pr.121 Electromagnetic brake sequence output | 121 | 271 | 421 | 30121 | 30221 | 30321 |
| Pr.122 Analog monitor output | 122 | 272 | 422 | 30122 | 30222 | 30322 |
| Pr.123 Optional function 1 | 123 | 273 | 423 | 30123 | 30223 | 30323 |
| Pr.124 Optional function 2 | 124 | 274 | 424 | 30124 | 30224 | 30324 |
| Pr.125 Adaptive vibration suppression control/ low pass filter | — | — | — | 30125 | 30225 | 30325 |
| Pr.126 Maker setting | — | — | — | 30126 | 30226 | 30326 |
| Pr.127 Monitor output 1 offset | 127 | 277 | 427 | 30127 | 30227 | 30327 |
| Pr.128 Monitor output 2 offset | 128 | 278 | 428 | 30128 | 30228 | 30328 |

| Items of A1SD75 | Buffer memory address | | | | | |
|--|-----------------------|--------|--------|--------|--------|--------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Pr.129 Pre-alarm data selection | 129 | 279 | 429 | 30129 | 30229 | 30329 |
| Pr.130 Zero speed | 130 | 280 | 430 | 30130 | 30230 | 30330 |
| Pr.131 Error excessive alarm level | 131 | 281 | 431 | 30131 | 30231 | 30331 |
| Pr.132 Optional function 5 | 132 | 282 | 432 | 30132 | 30232 | 30332 |
| Pr.133 Optional function 6 | 133 | 283 | 433 | 30133 | 30233 | 30333 |
| Pr.134 PI-PID control switch-over position droop | 134 | 284 | 434 | 30134 | 30234 | 30334 |
| Pr.135 Maker setting | 135 | 285 | 435 | 30135 | 30235 | 30335 |
| Pr.136 Speed differential compensation | 136 | 286 | 436 | 30136 | 30236 | 30336 |
| Pr.137 Maker setting | 137 | 287 | 437 | 30137 | 30237 | 30337 |
| Pr.138 Encoder output pulses | — | — | — | 30138 | 30238 | 30338 |
| Pr.139 Maker setting | — | — | — | 30139 | 30239 | 30339 |
| Pr.140 Maker setting | — | — | — | 30140 | 30240 | 30340 |
| Pr.141 Maker setting | — | — | — | 30141 | 30241 | 30341 |
| Pr.143 Slight vibration suppression control selection 1 | — | — | — | 30143 | 30243 | 30343 |
| Pr.144 Slight vibration suppression control selection 2 | — | — | — | 30144 | 30244 | 30344 |
| Pr.145 Induction voltage compensation | — | — | — | 30145 | 30245 | 30345 |
| Pr.146 Maker setting | — | — | — | 30146 | 30246 | 30346 |
| Pr.147 Maker setting | — | — | — | 30147 | 30247 | 30347 |
| Pr.148 Maker setting | — | — | — | 30148 | 30248 | 30348 |
| Pr.149 Gain changing selection | — | — | — | 30149 | 30249 | 30349 |
| Pr.150 Gain changing condition | — | — | — | 30150 | 30250 | 30350 |
| Pr.151 Gain changing time constant | — | — | — | 30151 | 30251 | 30351 |
| Pr.152 Ratio of load inertia moment to servomotor inertia moment 2 | — | — | — | 30152 | 30252 | 30352 |
| Pr.153 Position loop gain 2 changing ratio | — | — | — | 30153 | 30253 | 30353 |
| Pr.154 Speed loop gain 2 changing ratio | — | — | — | 30154 | 30254 | 30354 |
| Pr.155 Speed integral compensation changing ratio | — | — | — | 30155 | 30255 | 30355 |
| Pr.156 Maker setting | — | — | — | 30156 | 30256 | 30356 |
| Pr.157 Maker setting | — | — | — | 30157 | 30257 | 30357 |
| Pr.158 Maker setting | — | — | — | 30158 | 30258 | 30358 |
| Pr.159 Maker setting | — | — | — | 30159 | 30259 | 30359 |
| Pr.160 Optional function C | — | — | — | 30160 | 30260 | 30360 |
| Pr.161 Machine resonance suppression filter 2 | — | — | — | 30161 | 30261 | 30361 |
| Pr.162 Maker setting | — | — | — | 30162 | 30262 | 30362 |
| Pr.163 Maker setting | — | — | — | 30163 | 30263 | 30363 |
| Pr.164 Maker setting | — | — | — | 30164 | 30264 | 30364 |
| Pr.165 Maker setting | — | — | — | 30165 | 30265 | 30365 |
| Pr.166 Maker setting | — | — | — | 30166 | 30266 | 30366 |

| Items of A1SD75 | | Buffer memory address | |
|------------------|--|-------------------------|----------------------------|
| | | A1SD75 | QD75 |
| | | Common for axis 1, 2, 3 | Common for axis 1, 2, 3, 4 |
| Md.1 | In test mode flag | 450 | 1200 |
| Md.2 | Module name | 451 | - |
| Md.3 | OS type | 452 453 454 455 | - |
| Md.4 | OS version | 456 457 | - |
| Md.5 | Clock data (hour: minute) | 460 | - |
| Md.6 | Clock data (second: 100 ms) | 461 | - |
| (Pointer number) | | (0) to (15) | |
| Md.7 | Start axis | 462 to 537 | 1212 to 1287 |
| (QD75: Md. 3) | Start information) | | |
| Md.8 | Operation type | 463 to 538 | 1213 to 1288 |
| (QD75: Md. 4) | Start No.) | | |
| Md.9 | Start Hour: minute | 464 to 539 | 1214 to 1289 |
| (QD75: Md. 5) | Start Hour) | | |
| Md.10 | Start Second: 100 ms | 465 to 540 | 1215 to 1290 |
| (QD75: Md. 6) | Start Minute: second) | | |
| Md.11 | Error judgment | 466 to 541 | 1216 to 1291 |
| Md.12 | Start history pointer | 542 | 1292 |
| (Pointer number) | | (0) to (15) | - |
| Md.13 | Start axis | 543 to 618 | - |
| Md.14 | Operation type | 544 to 619 | - |
| Md.15 | Start Hour: minute | 545 to 620 | - |
| Md.16 | Start Second: 100 ms | 546 to 621 | - |
| Md.17 | Error judgment | 547 to 622 | - |
| Md.18 | Start history storage during error | 623 | - |
| (Pointer number) | | (0) to (15) | |
| Md.19 | Axis in which the error occurred | 624 to 684 | 1293 to 1353 |
| Md.20 | Axis error No. | 625 to 685 | 1294 to 1354 |
| Md.21 | Axis error occurrence Hour: minute | 626 to 686 | 1295 to 1355 |
| (QD75: Md. 11) | Axis error occurrence (Hour)) | | |
| Md.22 | Axis error occurrence Second: 100 ms | 627 to 687 | 1296 to 1356 |
| (QD75: Md. 12) | Axis error occurrence (Minute: second)) | | |
| Md.23 | Error history pointer | 688 | 1357 |

| Items of A1SD75 | | Buffer memory address | |
|--|-----------------|-------------------------|----------------------------|
| | | A1SD75 | QD75 |
| | | Common for axis 1, 2, 3 | Common for axis 1, 2, 3, 4 |
| (Pointer number) | Warning history | (0) to (15) | |
| Md.24 Axis in which the warning occurred | | 689 to 749 | 1358 to 1418 |
| Md.25 Axis warning No. | | 690 to 750 | 1359 to 1419 |
| Md.26 Axis warning occurrence Hour: minute | | 691 to 751 | 1360 to 1420 |
| (QD75: Md. 16) Axis warning occurrence (Hour) | | | |
| Md.27 Axis warning occurrence Second: 100 ms | | 692 to 752 | 1361 to 1421 |
| (QD75: Md. 17) Axis warning occurrence (Minute: second) | | | |
| Md.28 Warning history pointer | | 753 | 1422 |

| Items of A1SD75 | Buffer memory address | | | | | |
|--|-----------------------|--------|---------|--------|--------|---------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Md.29 Current feed value | 800 | 900 | 1000 | 800 | 900 | 1000 |
| | 801 | 901 | 1001 | 801 | 901 | 1001 |
| Md.30 Machine feed value | 802 | 902 | 1002 | 802 | 902 | 1002 |
| | 803 | 903 | 1003 | 803 | 903 | 1003 |
| Md.31 Feedrate | 804 | 904 | 1004 | 804 | 904 | 1004 |
| | 805 | 905 | 1005 | 805 | 905 | 1005 |
| Md.32 Valid M code | 806 | 906 | 1006 | 808 | 908 | 1008 |
| Md.33 Axis error No. | 807 | 907 | 1007 | 806 | 906 | 1006 |
| Md.34 Axis warning No. | 808 | 908 | 1008 | 807 | 907 | 1007 |
| Md.35 Axis operation status | 809 | 909 | 1009 | 809 | 909 | 1009 |
| Md.36 Current speed | 810 | 910 | 1010 | 810 | 910 | 1010 |
| | 811 | 911 | 1011 | 811 | 911 | 1011 |
| Md.37 Axis feedrate | 812 | 912 | 1012 | 812 | 912 | 1012 |
| | 813 | 913 | 1013 | 813 | 913 | 1013 |
| Md.38 Speed-position switching control positioning amount | 814 | 914 | 1014 | 814 | 914 | 1014 |
| | 815 | 915 | 1015 | 815 | 915 | 1015 |
| Md.39 External input/output signal | 816 | 916 | 1016 | 816 | 916 | 1016 |
| Md.40 Status | 817 | 917 | 1017 | 817 | 917 | 1017 |
| Md.41 Target value | 818 | 918 | 1018 | 818 | 918 | 1018 |
| | 819 | 919 | 1019 | 819 | 919 | 1019 |
| Md.42 Target speed | 820 | 920 | 1020 | 820 | 920 | 1020 |
| | 821 | 921 | 1021 | 821 | 921 | 1021 |
| Md.43 OP absolute position | 822 | 922 | 1022 | — | — | — |
| | 823 | 923 | 1023 | — | — | — |
| Md.44 Movement amount after near-point dog ON | 824 | 924 | 1024 | 824 | 924 | 1024 |
| | 825 | 925 | 1025 | 825 | 925 | 1025 |
| Md.45 Torque limit stored value | 826 | 926 | 1026 | 826 | 926 | 1026 |
| Md.46 Special start data instruction code setting value | 827 | 927 | 1027 | 827 | 927 | 1027 |
| Md.47 Special start data instruction parameter setting value | 828 | 928 | 1028 | 828 | 928 | 1028 |
| Md.48 Start positioning data No. setting value | 829 | 929 | 1029 | 829 | 929 | 1029 |
| Md.49 In speed control flag | 830 | 930 | 1030 | 830 | 930 | 1030 |
| Md.50 In speed change processing flag | 831 | 931 | 1031 | 831 | 931 | 1031 |
| Md.51 Start data pointer being executed | 832 | 932 | 1032 | 834 | 934 | 1034 |
| Md.52 Last executed positioning data No. | 833 | 933 | 1033 | 837 | 937 | 1037 |
| Md.53 Repetition counter | 834 | 934 | 1034 | 832 | 932 | 1032 |
| (QD75: Md. 41) Special start repetition counter) | | | | | | |
| Md.54 Positioning data No. being executed | 835 | 935 | 1035 | 835 | 935 | 1035 |
| Md.55 Block No. being executed | 836 | 936 | 1036 | 836 | 936 | 1036 |
| Md.56 Positioning data being executed | 838 to | 938 to | 1038 to | 838 to | 938 to | 1038 to |
| | 847 | 947 | 1047 | 847 | 947 | 1047 |

| Items of A1SD75 | Buffer memory address | | | | | |
|--|-----------------------|--------|--------|--------|--------|--------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Md.100 OPR re-travel value | — | | | 848 | 948 | 1048 |
| | — | | | 849 | 949 | 1049 |
| Md.101 Real current value | — | | | 850 | 950 | 1050 |
| | — | | | 851 | 951 | 1051 |
| Md.102 Deviation counter value | — | | | 852 | 952 | 1052 |
| | — | | | 853 | 953 | 1053 |
| Md.103 Motor rotation speed | — | | | 854 | 954 | 1054 |
| | — | | | 855 | 955 | 1055 |
| Md.104 Motor current value | — | | | 856 | 956 | 1056 |
| Md.105 Auto tuning | — | | | 857 | 957 | 1057 |
| Md.105 Load inertia ratio | — | | | 858 | 958 | 1058 |
| Md.105 Position loop gain 1 | — | | | 859 | 959 | 1059 |
| Md.105 Speed loop gain 1 | — | | | 860 | 960 | 1060 |
| Md.105 Position loop gain 2 | — | | | 861 | 961 | 1061 |
| Md.105 Speed loop gain 2 | — | | | 862 | 962 | 162 |
| Md.105 Speed integral compensation | — | | | 863 | 963 | 1063 |
| Md.106 Servo amplifier software No. | — | | | 864 | 964 | 1064 |
| | — | | | 865 | 965 | 1065 |
| | — | | | 866 | 966 | 1066 |
| | — | | | 867 | 967 | 1067 |
| | — | | | 868 | 968 | 1068 |
| Md.107 Parameter error No. (No.0 to 15) | — | | | 869 | 969 | 1069 |
| | — | | | 870 | 970 | 1070 |
| Md.107 Parameter error No. (No.16 to 31) | — | | | 871 | 971 | 1071 |
| Md.107 Parameter error No. (No.32 to 47) | — | | | 872 | 972 | 1072 |
| Md.107 Parameter error No. (No.48 to 63) | — | | | 873 | 973 | 1073 |
| Md.107 Parameter error No. (No.64 to 75) | — | | | 874 | 974 | 1074 |
| | — | | | 875 | 975 | 1075 |
| Maker setting | — | | | 876 | 976 | 1076 |
| | — | | | 877 | 977 | 1077 |
| Md.108 Servo status | — | | | 878 | 978 | 1078 |
| Md.109 Regenerative load ratio | — | | | 879 | 979 | 1079 |
| Md.110 Effective load torque | — | | | 880 | 980 | 1080 |
| Md.111 Peak torque ratio | — | | | 899 | 999 | 1099 |
| Md.48 Deceleration start flag | — | | | 899 | 999 | 1099 |

| Items of A1SD75 | Buffer memory address | | | | | |
|--|-----------------------|--------|--------|--------|--------|--------|
| | A1SD75 | | | QD75 | | |
| | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 |
| Cd.1 Clock data setting (hour) | 1100 | | | - | | |
| Cd.2 Clock data setting (minute, second) | 1101 | | | - | | |
| Cd.3 Clock data writing | 1102 | | | - | | |
| Cd.4 Target axis | 1103 | | | - | | |
| Cd.5 Positioning data No. | 1104 | | | - | | |
| Cd.6 Write pattern | 1105 | | | - | | |
| Cd.7 Read/write request | 1106 | | | - | | |
| Cd.8 Read/write positioning data I/F | 1108 to 1137 | | | - | | |
| Cd.9 Flash ROM write request | 1138 | | | 1900 | | |
| Cd.10 Parameter initialization request | 1139 | | | 1901 | | |
| Cd.11 Positioning start No. | 1150 | 1200 | 1250 | 1500 | 1600 | 1700 |
| Cd.12 Axis error reset | 1151 | 1201 | 1251 | 1502 | 1602 | 1702 |
| Cd.13 Restart command | 1152 | 1202 | 1252 | 1503 | 1603 | 1703 |
| Cd.14 M code OFF request | 1153 | 1203 | 1253 | 1504 | 1604 | 1704 |
| Cd.15 New current value | 1154 | 1204 | 1254 | 1506 | 1606 | 1706 |
| | 1155 | 1205 | 1255 | 1507 | 1607 | 1707 |
| Cd.16 New speed value | 1156 | 1206 | 1256 | 1514 | 1614 | 1714 |
| | 1157 | 1207 | 1257 | 1515 | 1615 | 1715 |
| Cd.17 Speed change request | 1158 | 1208 | 1258 | 1516 | 1616 | 1716 |
| Cd.18 Positioning operation speed override | 1159 | 1209 | 1259 | 1513 | 1613 | 1713 |
| Cd.19 JOG speed | 1160 | 1210 | 1260 | 1518 | 1618 | 1718 |
| | 1161 | 1211 | 1261 | 1519 | 1619 | 1719 |
| Cd.20 Speed-position switching enable flag | 1163 | 1213 | 1263 | 1528 | 1628 | 1728 |
| Cd.21 Speed-position switching control movement amount change register | 1164 | 1214 | 1264 | 1526 | 1626 | 1726 |
| | 1165 | 1215 | 1265 | 1527 | 1627 | 1727 |
| Cd.22 Manual pulse generator enable flag | 1167 | 1217 | 1267 | 1524 | 1624 | 1724 |
| Cd.23 Manual pulse generator 1 pulse input magnification | 1168 | 1218 | 1268 | 1522 | 1622 | 1722 |
| | 1169 | 1219 | 1269 | 1523 | 1623 | 1723 |
| Cd.24 OPR return request flag OFF request | 1170 | 1220 | 1270 | 1521 | 1621 | 1721 |
| Cd.25 External start valid | 1171 | 1221 | 1271 | 1505 | 1605 | 1705 |
| (QD75: Cd. 8) External command valid | | | | | | |
| Cd.26 Step valid flag | 1172 | 1222 | 1272 | 1545 | 1645 | 1745 |
| Cd.27 Step mode | 1173 | 1223 | 1273 | 1544 | 1644 | 1744 |
| Cd.28 Step start information | 1174 | 1224 | 1274 | 1546 | 1646 | 1746 |
| Cd.29 Skip command | 1175 | 1225 | 1275 | 1547 | 1647 | 1747 |
| Cd.30 New torque value | 1176 | 1226 | 1276 | 1525 | 1625 | 1725 |
| Cd.31 Positioning starting point No. | 1178 | 1228 | 1278 | 1501 | 1601 | 1701 |
| Cd.32 Interrupt request during continuous operation | 1181 | 1231 | 1281 | 1520 | 1620 | 1720 |
| Cd.33 New acceleration time value | 1184 | 1234 | 1284 | 1508 | 1608 | 1708 |
| | 1185 | 1235 | 1285 | 1509 | 1609 | 1709 |

| Items of A1SD75 | | Buffer memory address | | | | | | | | | | | | | |
|----------------------|---|-----------------------|--------------|--------------|--------------|--------------|----------------|-------|--|--------------|--------------|--------------|--------------|----------------|-------|
| | | A1SD75 | | | QD75 | | | | | | | | | | |
| | | Axis 1 | Axis 2 | Axis 3 | Axis 1 | Axis 2 | Axis 3 | | | | | | | | |
| Cd.34 | New deceleration time value | 1186 | 1236 | 1286 | 1510 | 1610 | 1710 | | | | | | | | |
| | | 1187 | 1237 | 1287 | 1511 | 1611 | 1711 | | | | | | | | |
| Cd.35 | Acceleration/deceleration time change during speed change, enable/disable selection | 1188 | 1238 | 1288 | 1512 | 1612 | 1712 | | | | | | | | |
| Cd.41 | Deceleration start flag valid | — | | | 1905 | | | | | | | | | | |
| Cd.42 | Stop command processing for deceleration stop selection | — | | | 1907 | | | | | | | | | | |
| Cd.100 | Servo OFF command | — | | | 1551 | 1651 | 1751 | | | | | | | | |
| Cd.101 | Torque output setting value | — | | | 1552 | 1652 | 1752 | | | | | | | | |
| Cd.102 | Servo amplifier data read | — | | | 1553 | 1653 | 1753 | | | | | | | | |
| Positioning data * 1 | Da.1 | No.1 | 1300 | 2300 | 3300 | 2000 | 8000 | 14000 | | | | | | | |
| | Da.2 | | | | | | | | Control system | | | | | | |
| | Da.3 | | | | | | | | Acceleration time No. | | | | | | |
| | Da.4 | | | | | | | | Deceleration time No. | | | | | | |
| | Da.9 | | | | | | | | M code/condition data | | | | | | |
| | Da.8 | | | | | | | | Dwell time/JUMP destination positioning data No. | | | | | | |
| | Da.7 | | | | | | | | Command speed | | | | | | |
| | | | | | | | | | | 1305 | 2305 | 3307 | 2005 | 8005 | 14005 |
| | Da.5 | | | | | | | | Positioning address/movement amount | | | | | | |
| | | | | | | | | | | 1307 | 2307 | 3307 | 2007 | 8007 | 14007 |
| | Da.6 | | | | | | | | Arc address | | | | | | |
| | | | | | | | | | | 1309 | 2309 | 3309 | 2009 | 8009 | 14009 |
| | No.2 | | | | | | | | 1310 to 1319 | 2320 to 2329 | 3310 to 3319 | 2010 to 2019 | 8010 to 8019 | 14010 to 14019 | |
| | No.3 | | | | | | | | 1320 to 1329 | 2330 to 2339 | 3320 to 3329 | 2020 to 2029 | 8020 to 8029 | 14020 to 14029 | |
| to | | to | to | to | to | to | to | | | | | | | | |
| No.100 | | 2290 to 2299 | 3290 to 3299 | 4290 to 4299 | 2990 to 2999 | 8990 to 8999 | 14990 to 14999 | | | | | | | | |

* 1: With the QD75, the positioning data buffer memory addresses are Nos. 1 to 600.

Refer to Appendix 7 "List of buffer memory addresses" for details.

| Items of A1SD75 | | | | Buffer memory address | | | | | | | | | | | | | |
|-----------------------------------|--|---------------------------------|--------------------------|-----------------------|------|--------------|------|--------------|-------|----------------|-------|----------------|-------|----------------|-------|----|--|
| | | | | A1SD75 | | | | | | QD75 | | | | | | | |
| | | | | Axis 1 | | Axis 2 | | Axis 3 | | Axis 1 | | Axis 2 | | Axis 3 | | | |
| Positioning start information * 2 | Start block data * 2 | Da.10 Shape | 1st point | 4300 | 4350 | 4550 | 4600 | 4800 | 4850 | 26000 | 26050 | 27000 | 27050 | 28000 | 28050 | | |
| | | Da.11 Start data No. | | 4301 | 4351 | 4551 | 4601 | 4801 | 4851 | 26001 | 26051 | 27001 | 27051 | 28001 | 28051 | | |
| | | Da.12 Special start instruction | | 4302 | 4352 | 4552 | 4602 | 4802 | 4852 | 26002 | 26052 | 27002 | 27052 | 28002 | 28052 | | |
| | | Da.13 Parameter | | to | to | to | to | to | to | to | to | to | to | to | to | | |
| | | 2nd point | | 4349 | 4399 | 4599 | 4649 | 4849 | 4899 | 26049 | 26099 | 27049 | 27099 | 28049 | 28099 | | |
| | Condition data | No.1 | Da.14 Condition target | No.1 | 4400 | | 4650 | | 4900 | | 26100 | | 27100 | | 28100 | | |
| | | | Da.15 Condition operator | | 4402 | | 4652 | | 4902 | | 26102 | | 27102 | | 28102 | | |
| | | | Da.16 Address | | 4403 | | 4653 | | 4903 | | 26103 | | 27103 | | 28103 | | |
| | | No.1 | Da.17 Parameter 1 | 4404 | | 4654 | | 4904 | | 26104 | | 27104 | | 28104 | | | |
| | | | | 4405 | | 4655 | | 4905 | | 26105 | | 27105 | | 28105 | | | |
| | | No.1 | Da.18 Parameter 2 | 4406 | | 4656 | | 4906 | | 26106 | | 27106 | | 28106 | | | |
| | | | | 4407 | | 4657 | | 4907 | | 26107 | | 27107 | | 28107 | | | |
| | | No.2 | | 4410 to 4419 | | 4660 to 4669 | | 4910 to 4919 | | 26110 to 26119 | | 27110 to 27119 | | 28110 to 28119 | | | |
| | | No.3 | | 4420 to 4429 | | 4670 to 4679 | | 4920 to 4929 | | 26120 to 26129 | | 27120 to 27129 | | 28120 to 28129 | | | |
| | | to | | to | | to | | to | | to | | to | | to | | | |
| | | No.10 | | 4490 to 4499 | | 4740 to 4749 | | 4990 to 4999 | | 26190 to 26199 | | 27190 to 27199 | | 28190 to 28199 | | | |
| | | Positioning | Indirect designation | Start No. 8001 | | 4500 | | 4750 | | 5000 | | - | | - | | - | |
| | | | | Start No. 8002 | | 4501 | | 4751 | | 5001 | | - | | - | | - | |
| | | | | to | | to | | to | | to | | to | | to | | to | |
| | | | | Start No. 8050 | | 4549 | | 4799 | | 5049 | | - | | - | | - | |
| PLC CPU memo area | Condition judgment target data of the condition data | | 5050 | | | | | | 30000 | | | | | | | | |
| | | | to | | | | | | to | | | | | | | | |
| | | | 5099 | | | | | | 30099 | | | | | | | | |
| Target axis | | | | 5100 | | | | | | - | | | | | | | |
| Head positioning block No. | | | | 5101 | | | | | | - | | | | | | | |
| No. of read/write data items | | | | 5102 | | | | | | - | | | | | | | |
| Read/write request | | | | 5103 | | | | | | - | | | | | | | |
| Read/write block | | | | 5110 to 6109 | | | | | | - | | | | | | | |

*2: With the QD75, it is called "block start data".

*3: With the QD75, the "block start data" and "condition data" in the shaded area are called "start block 0". There are five start blocks: 0 to 4.

Refer to Appendix 7 "List of buffer memory addresses" for details.

(5) Input/output signal comparisons

Input signal comparisons

| Name | A1SD75 | | QD75 | |
|---|-----------------------------------|------------------------------|-----------------------------------|------------------------------|
| | Logic (initial status) | Logic switch with parameters | Logic (initial status) | Logic switch with parameters |
| In-position signal | Negative logic | Not possible | – | – |
| Manual pulse generator A phase Manual pulse generator B phase *1 | Negative logic (multiple of 4) | Not possible | Negative logic (multiple of 4) | Possible |
| Near-point signal | Negative logic | Not possible | Negative logic | Possible |
| Stop signal | Negative logic | Not possible | Negative logic | Possible |
| Upper limit | Negative logic | Not possible | Negative logic | Possible |
| Lower limit | Negative logic | Not possible | Negative logic | Possible |
| External start *2 | Negative logic | Not possible | Negative logic | Possible |
| Speed-position switching signal *2 | Negative logic | Not possible | Negative logic | Possible |

*1: Comparisons about manual pulse generator A phase/B phase.

| | A1SD75 | QD75 |
|--|--------------------|--|
| No. of connectable manual pulse generators | 1 generator/1 axis | 1 generator/1 module |
| Mode selection (with parameter) | Not possible | Possible Multiple of 1 mode, multiple of 2 mode, multiple of 4 mode, PLS/SIGN mode |

*2: With the QD75, the "external start signal" and "speed-position switching signal" are combined into the "external command signal/switching signal".

Appendix 6 Positioning control troubleshooting

| Trouble type | Questions/Trouble | Remedy | No. |
|---------------------------|---|--|-----|
| Parameter | Display reads "FFFFH" when a parameter is read with GX Configurator-QP. | The PLC CPU power was turned OFF or the PLC CPU was reset, etc., during flash ROM writing, which deleted the data in the flash ROM. Initialize the parameters, and reset the required parameters. (Refer to Section 13.2 "Parameter initialization function" for details.) | 1 |
| | How can the parameters be returned to their initial values ? | Set the " [Cd.2] Parameter initialization request" to "1". (Refer to Section 13.2 "Parameter initialization function" for details.) | 2 |
| | A parameter error occurred although the parameter was set correctly by GX Configurator-QP. | The parameter may have been overwritten in the PLC program. Review the PLC program. | 3 |
| Hardware stroke limit | The machine overruns if operating at high speeds when the hardware stroke limit range is exceeded. | In the QD75, deceleration stops are executed after the machine exceeds hardware stroke limit range. Because of this, more time is required for the deceleration stop as the speed increases, and the overrun becomes larger. (The deceleration time becomes shorter at lower speeds, so the overrun becomes smaller.) | 4 |
| | When the machine exceeded the hardware stroke limit range, positioning toward inside the range was started, but the machine did not start. | Use a "JOG operation", " Inching operation" or "Manual pulse generator operation" to return the machine to inside the hardware stroke limit range. (When the hardware stroke limit range is exceeded, positioning will not start toward inside the range even when so commanded. Once the range is exceeded, a return to inside the range can only be executed using a "JOG operation", "Inching operation" or "Manual pulse generator operation".) | 5 |
| Degree | Exactly one rotation is required, but the setting range for a "degree" unit setting is "0 to 359.999...". Won't the rotation deviate by "0.00...1"? | Designate "360.000" in the INC control. The motor will make exactly one rotation. | 6 |
| Movement amount per pulse | If the "movement amount per pulse" is calculated as written in the manual, settings smaller than the basic parameter setting range cannot be carried out. | Set "movement amount per pulse" in the QD75 using the three parameter values of [Pr.2] to [Pr.4] . Try setting the values following the explanations for each parameter. | 7 |
| Override | Will an override setting value written before starting be valid? | It will be valid. | 8 |
| | During path control, will the override still be valid after the point is passed? | It will still be valid. | 9 |
| | How can the override be canceled? | Set the " [Cd.13] Positioning operation speed override" to "100". | 10 |

| Trouble type | Questions/Trouble | Remedy | No. |
|--------------------------------|--|--|-----|
| Acceleration/deceleration time | How can the deceleration stop time during stopping be shortened using the hardware stroke limit? | Set "1: Sudden stop" in the " Pr.37 Stop group 1 sudden stop selection", and reduce the setting value of " Pr.36 Sudden stop deceleration time". | 11 |
| | The motor does not operate at "60000ms" although the acceleration/deceleration time is set to "60000ms". | The value set for the acceleration/deceleration time is the time required for the machine to accelerate from speed "0" to the value set in " Pr.8 Speed limit value". Because of that, the acceleration/deceleration time will also be shorter than "60000ms" if the command speed value is smaller than the " Pr.8 Speed limit value". (Refer to the explanation for Pr.9 and Pr.10 for details.) | 12 |
| | Can each acceleration/deceleration time be individually set to trapezoidal or S-pattern acceleration/deceleration? | The trapezoidal and S-pattern acceleration/deceleration processing is a common setting for all acceleration/deceleration times, so individual setting is not possible. (Refer to Section 12.7.7 "Acceleration/deceleration process function".) | 13 |
| | The machine starts and stops suddenly when carrying out JOG operations and positioning operations. (Using an MR-J2S servo amplifier.) | Review the parameter settings for acceleration/deceleration time, speed limit value, JOG speed limit value, JOG acceleration/deceleration time, etc. | 14 |
| Simplified absolute value | Are simplified absolute values possible in the QD75P and QD75D Positional deviation models? | They are possible if the models are used in combination with a Mitsubishi "AC Servo". (Refer to "AC servo User's Manual" for details.) | 15 |
| Positional deviation | The physical position deviates from the commanded position, although the positioning is complete (and the monitored current position is correct). | If the deviation counter value is not "0", the servo side is still moving. Increase the torque. | 16 |
| Electronic gear | A setting of "1 μ m = 1PLS" is required in the following system. <ul style="list-style-type: none"> Ball screw pitch = 10mm No. of feedback pulses = 8192PLS | In this case, the following values will result. <ul style="list-style-type: none"> No. of pulses per rotation = 8192 Movement amount per rotation = 10000 Unit magnification = 10 Therefore, the "Movement amount per pulse" will become "1.2207 μ m". This value is fixed by the machine system, so it cannot be changed. Thus, the setting "1 μ m = 1PLS" cannot be achieved. | 17 |

| Trouble type | Questions/Trouble | Remedy | No. |
|--------------------|---|---|-----|
| Error compensation | <p>The machine only moves to "10081230", although positioning with a command value of "10081234" carried out.</p> <p>How can the error be compensated?</p> <p>The following values are currently set.</p> <ul style="list-style-type: none"> " Pr.2 No. of pulses per rotation" = 8192PLS " Pr.3 Movement amount per rotation" = 8000μm | <p>Reset Pr.3 and Pr.2 in the following order.</p> <ol style="list-style-type: none"> 1) Calculate "8192/8000 × 10081234/10081230". 2) Obtain the reduced value. 3) Set the numerator in " Pr.3 Movement amount per rotation", and the denominator in " Pr.2 No. of pulses per rotation". | 18 |
| OPR | <p>When carrying out a count-method machine OPR, the message "Leave Sufficient Distance From The OP Position To The Near-Point Dog OFF." appears. Is there a problem if the distance is short?</p> | <p>The near-point dog must be set to turn OFF at a position after the OP is passed. (When the OPR is started on the near-point dog ON in a count-method machine OPR, the machine enters a normal machine OPR operation after returning to the near-point dog OFF region.) (If the near-point dog is turned OFF before the OP, and the machine OPR is started between the near-point dog OFF position and the OP, the machine will mistakenly interpret that its current position is before the near-point dog ON position, and it will pass over the OP and continue moving.)</p> | 19 |
| | <p>In the near-point dog method machine OPR, the stop positions are not uniform.</p> | <p>Carry out the following measures.</p> <ol style="list-style-type: none"> 1) Separate the near-point dog signal and zero signal detection positions. 2) Lower the values in " Pr.46 OPR speed" and " Pr.47 Creep speed". 3) Confirm whether the zero signal and near-point dog signal turn ON normally. 4) Check that there is no play (backlash) in the machine system. | 20 |
| | <p>Can the machine OPR be carried out with the OPR retry function when it is started with the near-point dog ON and the upper/lower limit OFF?</p> | <p>A "Hardware stroke limit error" will occur and the operation will not be carried out. (The machine will interpret any position where the near-point dog is ON as being within the working range, and that the upper/lower limit is ON.)</p> | 21 |
| | <p>Are ABS and INC positioning possible without carrying out an OPR?</p> | <p>They are possible. In this case, the position where the power is turned ON is handled as the current feed value "0".</p> | 22 |
| | <p>After an OPR, the OPR request flag sometimes turns ON for no apparent reason.</p> | <p>The OPR request flag turns ON in the following cases.</p> <ol style="list-style-type: none"> 1) When the power is turned ON. 2) When the absolute system has not been set. 3) When the OPR has not been executed at the absolute position system. 4) When an OPR operation starts. <p>If no problem is found when the above are checked, then it is possible that the communication is being interrupted by "a fault in the bus cable", "noise influence", etc.</p> | 23 |

| Trouble type | Questions/Trouble | Remedy | No. |
|----------------------------------|---|---|-----|
| Start | The positioning start signal [Y10] is kept ON until the BUSY signal is OFF, but is there any problem with turning it OFF before the BUSY signal turns OFF? | After the BUSY signal turns ON, there is no problem with turning [Y10] OFF before the BUSY signal turns OFF. (The QD75 detects the rising edge (OFF → ON) of the positioning start signal [Y10].) | 25 |
| | The operation will not start even when the start signal is turned ON. | Check the " [Md.26] Axis operation status" and " [Md.23] Axis error No.". | 26 |
| Stop | How many milliseconds should the axis stop signal [Y4] be turned ON for? | The signal should be turned ON at 4ms or more. (If possible, set the signal so it does not turn ON only momentarily, but instead stays ON until the BUSY signal turns OFF. This will keep the stop signal from skipping.) | 27 |
| | How can a sudden stop be selected? | Set "1: Sudden stop" in the parameter from [Pr.37] to [Pr.39] corresponding to the stop group, and reduce the setting value of " [Pr.36] Sudden stop deceleration time". | 28 |
| | "Normal deceleration stop" was selected in " [Pr.39] Stop group 3 sudden stop", and Y stop was turned ON. If the " [Pr.39] "setting is changed to "sudden stop" during a deceleration stop, and the Y stop signal turns from OFF to ON, will the operation change to a sudden stop from that point? | The operation will not change. Even if the same stop factor is input again during the deceleration stop, it will be ignored. The same deceleration stop process used when the stop signal was first input will be continued. (This also applies for [Pr.37] and [Pr.38] .) | 29 |
| Circular interpolation | ABS system circular interpolation operates normally, but a vertically oblong circle results when INC system circular interpolation is carried out. | The address designation may be incorrect. When carrying out INC system circular interpolation, designate the relative addresses from the starting point of both the center point and end point. | 30 |
| Speed-position switching control | Can the speed be changed during speed control and position control by speed-position switching control? | No. The speed for the speed control and position control cannot be set differently. | 31 |
| JOG operation | Even if the JOG start signal is turned ON, the response until it turns ON is sometimes slow. | Either of the following is possible. 1) The PLC program may be incorrect. Check by creating a test program in which the JOG start signal is turned ON only. 2) If the machine is hitting something when the torque setting is low, it may be trying to move by JOG operation in the opposite direction. In this case, the machine will start moving only after the internal droop pulses have been reached 0 in the counter, even if the JOG start signal has been turned ON. This makes it seem that the response is slow. | 32 |
| | The operation is not carried out at the set JOG speed, although the speed limit value has not been reached. | Either of the following is possible. 1) The JOG start signal may be chattering. Monitor the JOG start signal to confirm whether it is chattering. (When using the "BUSY signal" in the JOG operation start circuit, check the position of the BUSY signal.) 2) The " [Pr.31] JOG speed limit value" may not be appropriate. Review the setting value and carry out the JOG operation again. | 33 |

| Trouble type | Questions/Trouble | Remedy | No. |
|----------------------------------|---|--|-----|
| JOG operation | When a JOG operation is attempted, an error results and the machine does not move. | The " [Pr.31] JOG speed limit value" may be larger than the " [Pr.8] Speed limit value". Review the parameters and carry out the JOG operation again. | 34 |
| | Why does the positioning complete signal turns ON during the JOG operation? | If a value other than "0" is set for " [Cd.16] Inching movement amount", the inching operation is carried out and the positioning complete signal turns ON. Confirm that the " [Cd.16] Inching movement amount" is set to "0". | 35 |
| Manual pulse generator operation | Is it possible to count the pulses when the B phase is set to "1", and only A phase pulses are input? | Possible. Set the " [Pr.24] Manual pulse generator input selection" to "3: PLS/ SIGN mode". It is possible to count the pulses when only A phase pulses are input. | 36 |
| | Can a manual pulse generator other than the Mitsubishi MR-HDP01 be used? | Other manual pulse generators can be used if they conform to Section 3.4 "Specifications for interfaces with external devices." | 37 |
| | Can one manual pulse generator be operated connected to several QD75 modules? | This is possible if the system conforms to the electrical specifications. | 38 |
| Current value changing | The BUSY signal is not canceled by the current value changing. How can it be canceled? | The BUSY signal may remain if the scan time is long. Use a complete signal to check whether the current value changing has been executed. | 39 |
| QD75 READY signal | The QD75 READY signal does not turn ON even when the PLC READY signal [Y0] is turned ON. | "A parameter error" has occurred. Confirm the error No. in the error history, and correct the parameter. | 40 |
| M code ON signal | Is there any problem with setting an M code ON signal OFF request in the next scan after the M code ON signal ON? | The QD75 checks the M code ON signal OFF request every "3.5ms", so there is a possibility that the M code ON signal OFF may be delayed by a maximum of "3.5ms" after the M code ON signal ON, even if an M code ON signal OFF request is set. | 41 |
| Servo ON | The servo amplifier LED remains "Ab" even if all axis servo Y1 is turned ON. | Set the motor capacity for servo parameter (30104, 30204, 30304, 30404). | 42 |
| Module | Error 537 (PLC READY signal OFF at positioning start) occurs after the QD75 is replaced. (The PLC program is the same.) | The internal parameters of the QD75 may be different. Check if the QD75 READY signal [X0] turns ON when the PLC READY signal [Y0] turns ON. When the PLC READY signal is ON but the QD75 READY signal is OFF, the parameter error has occurred. Check the error code and modify the parameter with the error. | 43 |
| Motor | The motor only rotates in one direction. | The parameter settings on the QD75 side may not match those on the servo side. Check the parameter settings. | 44 |
| | Can the current motor speed be monitored? | The speed shown on the QD75 monitor is calculated from the number of pulses output from the module. Thus, the actual motor speed cannot be monitored. (" [Md.22] Feedrate" monitors the commanded speed. It does not show the actual motor speed.) | 45 |

| Trouble type | Questions/Trouble | Remedy | No. |
|-------------------------------|--|--|-----|
| Error/warning | Error 920 (backlash compensation amount error) occurs even when the backlash compensation value is set to "1". | $0 \leq \frac{\text{Backlash compensation value}}{\text{Movement amount per pulse}} \leq 65535$ Setting is not possible if the above equation is not satisfied. | 46 |
| | When a JOG operation is attempted, errors such as error 104 (hardware stroke limit+) or error 105 (hardware stroke limit -) occur and the machine does not move. | The hardware stroke limit wiring has probably not been carried out. Refer to section "12.4.4 Hardware stroke limit function" for details, and wire accordingly. | 47 |
| | Error 997 (Speed selection at OP shift error) appears when the PLC READY signal [Y0] turns from OFF to ON. | A value besides "0" or "1" may be set in the [Pr.56] Speed designation during OP shift. Review the set PLC program, and reset the correct parameters. | 48 |
| | When the start signal was turned ON immediately after the stop signal ON, warning 100 (start during operation) was detected, and the start was ignored. | The QD75 starts the deceleration stop process when the stop signal ON is detected. Thus, the machine interprets that "positioning is still being executed" immediately after the stop signal ON. Even if the start signal is turned ON at that time, the start request will be ignored and warning 100 will occur. | 49 |
| | Does warning 500 (deceleration and stop speed change) occur only during "stop deceleration" and "automatically deceleration"? Is there any problem if the operation is continued in that state without resetting the error? | The warning occurs only at those times mentioned at the left. Because this is a warning, there is no problem if the operation can be continued without resetting the error. (When the speed is changed using the override, the new value will not be reflected on the data being executed, but will be reflected from the next start.) | 50 |
| Positioning completion signal | When the position control is carried out, the positioning completion signal is not turned ON. | The positioning may have not been completed properly by the occurrence of the stop factor. Check the axis monitor " [Md.26] axis operation state" after BUSY signal OFF. Stopped : The stop signal is turned ON during positioning. Check the condition of the stop signal (Y stop or external stop) ON. During error occurrence : An error occurred during positioning. Check the cause of error occurrence from " [Md.23] axis error number". | 51 |
| | | The setting value for detailed parameter 2 "Positioning completion signal output time" is 0 or shorter than scan time. Set the properly detectable time using the PLC program. | 52 |

Appendix 7 List of buffer memory addresses

The following shows the relation between the buffer memory addresses and the various items.

Do not set other than the default value "0" of the "Maker setting".

| Buffer memory address | | | | Item | Memory area | |
|-----------------------|--------|--------|--------|---|-----------------------|------------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | Basic parameters 1 | Positioning parameters |
| 0 | 150 | 300 | 450 | Pr.1 Unit setting | | |
| 2 | 152 | 302 | 452 | Pr.2 No. of pulses per rotation (AP) | | |
| 3 | 153 | 303 | 453 | | | |
| 4 | 154 | 304 | 454 | Pr.3 Movement amount per rotation (AL) | | |
| 5 | 155 | 305 | 455 | | | |
| 1 | 151 | 301 | 451 | Pr.4 Unit magnification (AM) | | |
| 6 | 156 | 306 | 456 | Pr.7 Bias speed at start | | |
| 7 | 157 | 307 | 457 | | | |
| 8 | 158 | 308 | 458 | Maker setting | Basic parameters 2 | |
| 9 | 159 | 309 | 459 | | | |
| 10 | 160 | 310 | 460 | Pr.8 Speed limit value | | |
| 11 | 161 | 311 | 461 | | | |
| 12 | 162 | 312 | 462 | Pr.9 Acceleration time 0 | | |
| 13 | 163 | 313 | 463 | | | |
| 14 | 164 | 314 | 464 | Pr.10 Deceleration time 0 | | |
| 15 | 165 | 315 | 465 | | | |
| 17 | 167 | 317 | 467 | Pr.11 Backlash compensation amount | Detailed parameters 1 | |
| 18 | 168 | 318 | 468 | Pr.12 Software stroke limit upper limit value | | |
| 19 | 169 | 319 | 469 | | | |
| 20 | 170 | 320 | 470 | Pr.13 Software stroke limit lower limit value | | |
| 21 | 171 | 321 | 471 | | | |
| 22 | 172 | 322 | 472 | Pr.14 Software stroke limit selection | | |
| 23 | 173 | 323 | 473 | Pr.15 Software stroke limit valid/invalid selection | | |
| 24 | 174 | 324 | 474 | Pr.16 Command in-position width | | |
| 25 | 175 | 325 | 475 | | | |
| 26 | 176 | 326 | 476 | Pr.17 Torque limit setting value | | |
| 27 | 177 | 327 | 477 | Pr.18 M code ON signal output timing | | |
| 28 | 178 | 328 | 478 | Pr.19 Speed switching mode | | |
| 29 | 179 | 329 | 479 | Pr.20 Interpolation speed designation method | | |
| 30 | 180 | 330 | 480 | Pr.21 Current feed value during speed control | | |
| 31 | 181 | 331 | 481 | Pr.22 Input signal logic selection | | |
| 33 | — | — | — | Pr.24 Manual pulse generator input selection | | |
| 34 | 184 | 334 | 484 | Pr.200 Speed-position function selection | | |
| 35 | 185 | 335 | 485 | Maker setting | Detailed parameters 2 | |
| 36 | 186 | 336 | 486 | Pr.25 Acceleration time 1 | | |
| 37 | 187 | 337 | 487 | | | |
| 38 | 188 | 338 | 488 | Pr.26 Acceleration time 2 | | |
| 39 | 189 | 339 | 489 | | | |

| Buffer memory address | | | | Item | Memory area | |
|-----------------------|--------|--------|--------|---|-------------------------|------------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 40 | 190 | 340 | 490 | Pr.27 Acceleration time 3 | Detailed parameters 2 | Positioning parameters |
| 41 | 191 | 341 | 491 | | | |
| 42 | 192 | 342 | 492 | Pr.28 Deceleration time 1 | | |
| 43 | 193 | 343 | 493 | | | |
| 44 | 194 | 344 | 494 | Pr.29 Deceleration time 2 | | |
| 45 | 195 | 345 | 495 | | | |
| 46 | 196 | 346 | 496 | Pr.30 Deceleration time 3 | | |
| 47 | 197 | 347 | 497 | | | |
| 48 | 198 | 348 | 498 | Pr.31 JOG speed limit value | | |
| 49 | 199 | 349 | 499 | | | |
| 50 | 200 | 350 | 500 | Pr.32 JOG operation acceleration time selection | | |
| 51 | 201 | 351 | 501 | Pr.33 JOG operation deceleration time selection | | |
| 52 | 202 | 352 | 502 | Pr.34 Acceleration/deceleration process selection | | |
| 53 | 203 | 353 | 503 | Pr.35 S-pattern proportion | | |
| 54 | 204 | 354 | 504 | Pr.36 Sudden stop deceleration time | | |
| 55 | 205 | 355 | 505 | | | |
| 56 | 206 | 356 | 506 | Pr.37 Stop group 1 sudden stop selection | | |
| 57 | 207 | 357 | 507 | Pr.38 Stop group 2 sudden stop selection | | |
| 58 | 208 | 358 | 508 | Pr.39 Stop group 3 sudden stop selection | | |
| 59 | 209 | 359 | 509 | Pr.40 Positioning complete signal output time | | |
| 60 | 210 | 360 | 510 | Pr.41 Allowable circular interpolation error width | | |
| 61 | 211 | 361 | 511 | | | |
| 62 | 212 | 362 | 512 | Pr.42 External command function selection | | |
| 64 | 214 | 364 | 514 | Pr.201 Restart allowable range when servo OFF to ON | | |
| 65 | 215 | 365 | 515 | | | |
| 70 | 220 | 370 | 520 | Pr.43 OPR method | OPR basic parameters | OPR parameters |
| 71 | 221 | 371 | 521 | Pr.44 OPR direction | | |
| 72 | 222 | 372 | 522 | Pr.45 OP address | | |
| 73 | 223 | 373 | 523 | | | |
| 74 | 224 | 374 | 524 | Pr.46 OPR speed | | |
| 75 | 225 | 375 | 525 | | | |
| 76 | 226 | 376 | 526 | Pr.47 Creep speed | | |
| 77 | 227 | 377 | 527 | | | |
| 78 | 228 | 378 | 528 | Pr.48 OPR retry | | |
| 80 | 230 | 380 | 530 | Pr.50 Setting for the movement amount after near-point dog ON | OPR detailed parameters | |
| 81 | 231 | 381 | 531 | | | |
| 82 | 232 | 382 | 532 | Pr.51 OPR acceleration time selection | | |
| 83 | 233 | 383 | 533 | Pr.52 OPR deceleration time selection | | |
| 84 | 234 | 384 | 534 | Pr.53 OP shift amount | | |
| 85 | 235 | 385 | 535 | | | |
| 86 | 236 | 386 | 536 | Pr.54 OPR torque limit value | | |
| 88 | 238 | 388 | 538 | Pr.56 Speed designation during OP shift | | |
| 89 | 239 | 389 | 539 | Pr.57 Dwell time during OPR retry | | |

| Buffer memory address | | | | | | | | | | | | | | | Item | Memory area | | | |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|------------------------------------|---------------------|--|----------------------|
| Common to axes 1, 2, 3, and 4 | | | | | | | | | | | | | | | | | | | |
| 1200 | | | | | | | | | | | | | | | Md.1 | In test mode flag | System monitor data | | |
| 1201 | | | | | | | | | | | | | | | Maker setting | Start History | | | |
| 1202 | | | | | | | | | | | | | | | | | | | |
| 1203 | | | | | | | | | | | | | | | | | | | |
| 1204 | | | | | | | | | | | | | | | | | | | |
| 1205 | | | | | | | | | | | | | | | | | | | |
| 1206 | | | | | | | | | | | | | | | | | | | |
| 1207 | | | | | | | | | | | | | | | | | | | |
| 1208 | | | | | | | | | | | | | | | | | | | |
| 1209 | | | | | | | | | | | | | | | | | | | |
| 1210 | | | | | | | | | | | | | | | | | | | |
| 1211 | | | | | | | | | | | | | | | | | | | |
| (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (Pointer No.) | | Error History | |
| 1212 | 1217 | 1222 | 1227 | 1232 | 1237 | 1242 | 1247 | 1252 | 1257 | 1262 | 1267 | 1272 | 1277 | 1282 | 1287 | Md.3 | | | Start information |
| 1213 | 1218 | 1223 | 1228 | 1233 | 1238 | 1243 | 1248 | 1256 | 1258 | 1263 | 1268 | 1273 | 1278 | 1283 | 1288 | Md.4 | | | Start No. |
| 1214 | 1219 | 1224 | 1229 | 1234 | 1239 | 1244 | 1249 | 1254 | 1259 | 1264 | 1269 | 1274 | 1279 | 1284 | 1289 | Md.5 | | | Start Hour |
| 1215 | 1220 | 1225 | 1230 | 1235 | 1240 | 1245 | 1250 | 1255 | 1260 | 1265 | 1270 | 1275 | 1280 | 1285 | 1290 | Md.6 | | | Start Minute: second |
| 1216 | 1221 | 1226 | 1231 | 1236 | 1241 | 1246 | 1251 | 1256 | 1261 | 1266 | 1271 | 1276 | 1281 | 1286 | 1291 | Md.7 | | | Error judgment |
| 1292 | | | | | | | | | | | | | | | Md.8 | Start history pointer | | | |
| (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (Pointer No.) | Error History | | |
| 1293 | 1297 | 1301 | 1305 | 1309 | 1313 | 1317 | 1321 | 1325 | 1329 | 1333 | 1337 | 1341 | 1345 | 1349 | 1353 | Md.9 | | Axis in which the error occurred | |
| 1294 | 1298 | 1302 | 1306 | 1310 | 1314 | 1318 | 1322 | 1326 | 1330 | 1334 | 1338 | 1342 | 1346 | 1350 | 1354 | Md.10 | | Axis error No. | |
| 1295 | 1299 | 1303 | 1307 | 1311 | 1315 | 1319 | 1323 | 1327 | 1331 | 1335 | 1339 | 1343 | 1347 | 1351 | 1355 | Md.11 | | Axis error occurrence (Hour) | |
| 1296 | 1300 | 1304 | 1308 | 1312 | 1316 | 1320 | 1324 | 1328 | 1332 | 1336 | 1340 | 1344 | 1348 | 1352 | 1356 | Md.12 | | Axis error occurrence (Minute: second) | |
| 1357 | | | | | | | | | | | | | | | Md.13 | Error history pointer | | | |
| (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (Pointer No.) | Warning history | | |
| 1358 | 1362 | 1366 | 1370 | 1374 | 1378 | 1382 | 1386 | 1390 | 1394 | 1398 | 1402 | 1406 | 1410 | 1414 | 1418 | Md.14 | | Axis in which the warning occurred | |
| 1359 | 1363 | 1367 | 1371 | 1375 | 1379 | 1383 | 1387 | 1391 | 1395 | 1399 | 1403 | 1407 | 1411 | 1415 | 1419 | Md.15 | | Axis warning No. | |
| 1360 | 1364 | 1368 | 1372 | 1376 | 1380 | 1384 | 1388 | 1392 | 1396 | 1400 | 1404 | 1408 | 1412 | 1416 | 1420 | Md.16 | | Axis warning occurrence (Hour) | |
| 1361 | 1365 | 1369 | 1373 | 1377 | 1381 | 1385 | 1389 | 1393 | 1397 | 1401 | 1405 | 1409 | 1413 | 1417 | 1421 | Md.17 | | Axis warning occurrence (Minute: second) | |
| 1422 | | | | | | | | | | | | | | | Md.18 | Warning history pointer | | | |
| 1424 | | | | | | | | | | | | | | | Md.19 | No. of write accesses to flash ROM | | | |
| 1425 | | | | | | | | | | | | | | | | | | | |

| Buffer memory address | | | | Item | Memory area | | |
|-----------------------|------------|--------------|--------------|-------|--|-------------------|--------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| 800 | 900 | 1000 | 1100 | Md.20 | Current feed value | Axis monitor data | Monitor data |
| 801 | 901 | 1001 | 1101 | | | | |
| 802 | 902 | 1002 | 1102 | Md.21 | Machine feed value | | |
| 803 | 903 | 1003 | 1103 | | | | |
| 804 | 904 | 1004 | 1104 | Md.22 | Feedrate | | |
| 805 | 905 | 1005 | 1105 | | | | |
| 806 | 906 | 1006 | 1106 | Md.23 | Axis error No. | | |
| 807 | 907 | 1007 | 1107 | Md.24 | Axis warning No. | | |
| 808 | 908 | 1008 | 1108 | Md.25 | Valid M code | | |
| 809 | 909 | 1009 | 1109 | Md.26 | Axis operation status | | |
| 810 | 910 | 1010 | 1110 | Md.27 | Current speed | | |
| 811 | 911 | 1011 | 1111 | | | | |
| 812 | 912 | 1012 | 1112 | Md.28 | Axis feedrate | | |
| 813 | 913 | 1013 | 1113 | | | | |
| 814 | 914 | 1014 | 1114 | Md.29 | Speed-position switching control positioning amount | | |
| 815 | 915 | 1015 | 1115 | | | | |
| 816 | 916 | 1016 | 1116 | Md.30 | External input/output signal | | |
| 817 | 917 | 1017 | 1117 | Md.31 | Status | | |
| 818 | 918 | 1018 | 1118 | Md.32 | Target value | | |
| 819 | 919 | 1019 | 1119 | | | | |
| 820 | 920 | 1020 | 1120 | Md.33 | Target speed | | |
| 821 | 921 | 1021 | 1121 | | | | |
| 824 | 924 | 1024 | 1124 | Md.34 | Movement amount after near-point dog ON | | |
| 825 | 925 | 1025 | 1125 | | | | |
| 826 | 926 | 1026 | 1126 | Md.35 | Torque limit stored value | | |
| 827 | 927 | 1027 | 1127 | Md.36 | Special start data instruction parameter setting value | | |
| 828 | 928 | 1028 | 1128 | Md.37 | Special start data instruction No. setting value | | |
| 829 | 929 | 1029 | 1129 | Md.38 | Start positioning data No. setting value. | | |
| 830 | 930 | 1030 | 1130 | Md.39 | In speed control flag | | |
| 831 | 931 | 1031 | 1131 | Md.40 | In speed change processing flag | | |
| 832 | 932 | 1032 | 1132 | Md.41 | Special start repetition counter | | |
| 833 | 933 | 1033 | 1133 | Md.42 | Control system repetition counter | | |
| 834 | 934 | 1034 | 1134 | Md.43 | Start data pointer being executed | | |
| 835 | 935 | 1035 | 1135 | Md.44 | Positioning data No. being executed | | |
| 836 | 936 | 1036 | 1136 | Md.45 | Block No. being executed | | |
| 837 | 937 | 1037 | 1137 | Md.46 | Last executed positioning data No. | | |
| 838 to 847 | 938 to 947 | 1038 to 1047 | 1138 to 1147 | Md.47 | Positioning data being executed | | |

| Buffer memory address | | | | Item | Memory area | |
|-----------------------|--------|--------|--------|---|-------------------|--------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 848 | 948 | 1048 | 1148 | Md.100 OPR re-travel value | Axis monitor data | Monitor data |
| 849 | 949 | 1049 | 1149 | | | |
| 850 | 950 | 1050 | 1150 | Md.101 Real current value | | |
| 851 | 951 | 1051 | 1151 | | | |
| 852 | 952 | 1052 | 1152 | Md.102 Deviation counter value | | |
| 853 | 953 | 1053 | 1153 | | | |
| 854 | 954 | 1054 | 1154 | Md.103 Motor rotation speed | | |
| 855 | 955 | 1055 | 1155 | | | |
| 856 | 956 | 1056 | 1156 | Md.104 Motor current value | | |
| 857 | 957 | 1057 | 1157 | Md.105 Auto tuning | | |
| 858 | 958 | 1058 | 1158 | Md.105 Load inertia ratio | | |
| 859 | 959 | 1059 | 1159 | Md.105 Position loop gain 1 | | |
| 860 | 960 | 1060 | 1160 | Md.105 Speed loop gain 1 | | |
| 861 | 961 | 1061 | 1161 | Md.105 Position loop gain 2 | | |
| 862 | 962 | 1062 | 1162 | Md.105 Speed loop gain 2 | | |
| 863 | 963 | 1063 | 1163 | Md.105 Speed integral compensation | | |
| 864 | 964 | 1064 | 1164 | Md.106 Servo amplifier software No. | | |
| 865 | 965 | 1065 | 1165 | | | |
| 866 | 966 | 1066 | 1166 | | | |
| 867 | 967 | 1067 | 1167 | | | |
| 868 | 968 | 1068 | 1168 | | | |
| 869 | 969 | 1069 | 1169 | | | |
| 870 | 970 | 1070 | 1170 | Md.107 Parameter error No. (No.0 to 15) | | |
| 871 | 971 | 1071 | 1171 | Md.107 Parameter error No. (No.16 to 31) | | |
| 872 | 972 | 1072 | 1172 | Md.107 Parameter error No. (No.32 to 47) | | |
| 873 | 973 | 1073 | 1173 | Md.107 Parameter error No. (No.48 to 63) | | |
| 874 | 974 | 1074 | 1174 | Md.107 Parameter error No. (No.64 to 75) | | |
| 875 | 975 | 1075 | 1175 | Maker setting | | |
| 876 | 976 | 1076 | 1176 | | | |
| 877 | 977 | 1077 | 1177 | Md.108 Servo status | | |
| 878 | 978 | 1078 | 1178 | Md.109 Regenerative load ratio | | |
| 879 | 979 | 1079 | 1179 | Md.110 The continuous effective load torque is indicated. | | |
| 880 | 980 | 1080 | 1180 | Md.111 Peak torque ratio | | |
| 899 | 999 | 1099 | 1199 | Md.48 Deceleration start flag | | |

| Buffer memory address | | | | Item | Memory area | | |
|-----------------------|--------|--------|--------|---------------|---|-------------------|--------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| 1500 | 1600 | 1700 | 1800 | Cd.3 | Positioning start No. | Axis control data | Control data |
| 1501 | 1601 | 1701 | 1801 | Cd.4 | Positioning starting point No. | | |
| 1502 | 1602 | 1702 | 1802 | Cd.5 | Axis error reset | | |
| 1503 | 1603 | 1703 | 1803 | Cd.6 | Restart command | | |
| 1504 | 1604 | 1704 | 1804 | Cd.7 | M code OFF request | | |
| 1505 | 1605 | 1705 | 1805 | Cd.8 | External command valid | | |
| 1506 | 1606 | 1706 | 1806 | Cd.9 | New current value | | |
| 1507 | 1607 | 1707 | 1807 | | | | |
| 1508 | 1608 | 1708 | 1808 | Cd.10 | New acceleration time value | | |
| 1509 | 1609 | 1709 | 1809 | | | | |
| 1510 | 1610 | 1710 | 1810 | Cd.11 | New deceleration time value | | |
| 1511 | 1611 | 1711 | 1811 | | | | |
| 1512 | 1612 | 1712 | 1812 | Cd.12 | Acceleration/deceleration time change during speed change, enable/disable selection | | |
| 1513 | 1613 | 1713 | 1813 | Cd.13 | Positioning operation speed override | | |
| 1514 | 1614 | 1714 | 1814 | Cd.14 | New speed value | | |
| 1515 | 1615 | 1715 | 1815 | | | | |
| 1516 | 1616 | 1716 | 1816 | Cd.15 | Speed change request | | |
| 1517 | 1617 | 1717 | 1817 | Cd.16 | Inching movement amount | | |
| 1518 | 1618 | 1718 | 1818 | Cd.17 | JOG speed | | |
| 1519 | 1619 | 1719 | 1819 | | | | |
| 1520 | 1620 | 1720 | 1820 | Cd.18 | Interrupt request during continuous operation | | |
| 1521 | 1621 | 1721 | 1821 | Cd.19 | OPR request flag OFF request | | |
| 1522 | 1622 | 1722 | 1822 | Cd.20 | Manual pulse generator 1 pulse input magnification | | |
| 1523 | 1623 | 1723 | 1823 | | | | |
| 1524 | 1624 | 1724 | 1824 | Cd.21 | Manual pulse generator enable flag | | |
| 1525 | 1625 | 1725 | 1825 | Cd.22 | New torque value | | |
| 1526 | 1626 | 1726 | 1826 | Cd.23 | Speed-position switching control movement amount change register | | |
| 1527 | 1627 | 1727 | 1827 | | | | |
| 1528 | 1628 | 1728 | 1828 | Cd.24 | Speed-position switching enable flag | | |
| 1529 | 1629 | 1729 | 1829 | Maker setting | | | |
| 1530 | 1630 | 1730 | 1830 | Cd.25 | Position-speed switching control speed change register | | |
| 1531 | 1631 | 1731 | 1831 | | | | |
| 1532 | 1632 | 1732 | 1832 | Cd.26 | Position-speed switching enable flag | | |
| 1533 | 1633 | 1733 | 1833 | Maker setting | | | |
| 1534 | 1634 | 1734 | 1834 | Cd.27 | Target position change value (new address) | | |
| 1535 | 1635 | 1735 | 1835 | | | | |
| 1536 | 1636 | 1736 | 1836 | Cd.28 | Target position change value (new speed) | | |
| 1537 | 1637 | 1737 | 1837 | | | | |
| 1538 | 1638 | 1738 | 1838 | Cd.29 | Target position change request flag | | |
| 1539 | 1639 | 1739 | 1839 | Maker setting | | | |
| 1540 | 1640 | 1740 | 1840 | Cd.30 | Simultaneous starting axis start data No. (axis 1 start data No.) | | |

| Buffer memory address | | | | Item | Memory area | |
|-----------------------|--------|--------|--------|---|---------------------|--------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | |
| 1541 | 1641 | 1741 | 1841 | Cd.31 Simultaneous starting axis start data No. (axis 2 start data No.) | Axis control data | Control data |
| 1542 | 1642 | 1742 | 1842 | Cd.32 Simultaneous starting axis start data No. (axis 3 start data No.) | | |
| 1543 | 1643 | 1743 | 1843 | Cd.33 Simultaneous starting axis start data No. (axis 4 start data No.) | | |
| 1544 | 1644 | 1744 | 1844 | Cd.34 Step mode | | |
| 1545 | 1645 | 1745 | 1845 | Cd.35 Step valid flag | | |
| 1546 | 1646 | 1746 | 1846 | Cd.36 Step start information | | |
| 1547 | 1647 | 1747 | 1847 | Cd.37 Skip command | | |
| 1548 | 1648 | 1748 | 1848 | Cd.38 Teaching data selection | | |
| 1549 | 1649 | 1749 | 1849 | Cd.39 Teaching positioning data No. | | |
| 1550 | 1650 | 1750 | 1850 | Cd.40 ABS direction in degrees | | |
| 1551 | 1651 | 1751 | 1851 | Cd.100 Servo OFF command | | |
| 1552 | 1652 | 1752 | 1852 | Cd.101 Torque output setting value | | |
| 1553 | 1653 | 1753 | 1853 | Cd.102 Servo amplifier data read | | |
| 1900 | | | | Cd.1 Flash ROM write request | System control data | |
| 1901 | | | | Cd.2 Parameter initialization request | | |
| 1905 | | | | Cd.41 Deceleration start flag valid | | |
| 1907 | | | | Cd.42 Stop command processing for deceleration stop selection | | |

| Buffer memory address | | | | Item | Memory area | | |
|-----------------------|----------------------|----------------------|----------------------|---|-------------|------------------|------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | | | |
| 2000 | 8000 | 14000 | 20000 | Da.1 Operation pattern Da.2 Control system Da.3 Acceleration time No. Da.4 Deceleration time No. Da.5 Axis to be interpolated | No.1 | Positioning data | Positioning data |
| 2001 | 8001 | 14001 | 20001 | Da.10 M code/condition data No. /No. of LOOP to LEND repetitions | | | |
| 2002 | 8002 | 14002 | 20002 | Da.9 Dwell time/JUMP destination positioning data No. | | | |
| 2003 | 8003 | 14003 | 20003 | Maker setting | | | |
| 2004 2005 | 8004 8005 | 14004 14005 | 20004 20005 | Da.8 Command speed | | | |
| 2006 2007 | 8006 8007 | 14006 14007 | 20006 20007 | Da.6 Positioning address/movement amount | | | |
| 2008 2009 | 8008 8009 | 14008 14009 | 20008 20009 | Da.7 Arc address | | | |
| 2010 to 2019 | 8010 to 8019 | 14010 to 14019 | 20010 to 20019 | No.2 | | | |
| 2020 to 2029 | 8020 to 8029 | 14020 to 14029 | 20020 to 20020 | No.3 | | | |
| to | to | to | to | To | | | |
| 7990 to 7999 | 13990 to 13999 | 19990 to 19999 | 25990 to 25999 | No.600 | | | |

| Buffer memory address | | | | | | | | Item | Memory area | | |
|-----------------------|-------|----------------|-------|-------------------|-------|----------------|-------|---|------------------|------------------|------------------|
| Axis 1 | | Axis 2 | | Axis 3 | | Axis 4 | | | 1st point | Block start data | Starting block 0 |
| 26000 | 26050 | 27000 | 27050 | 28000 | 28050 | 29000 | 29050 | Da.11 Shape Da.12 Start data No. Da.13 Special start instruction Da.14 Parameter | | | |
| 26001 | 26051 | 27001 | 27051 | 28001 | 28051 | 29001 | 29051 | 2nd point | | | |
| 26002 | 26052 | 27002 | 27052 | 28002 | 28052 | 29002 | 29052 | 3rd point | | | |
| to | | to | | to | | to | | to | | | |
| 26049 | 26099 | 27049 | 27099 | 28049 | 28099 | 29049 | 29099 | 50th point | | | |
| 26100 | | 27100 | | 28100 | | 29100 | | Da.15 Condition target Da.16 Condition operator | Condition data | Starting block 0 | |
| 26102 | 27102 | 28102 | 29102 | Da.17 Address | | | | | | | |
| 26103 | 27103 | 28103 | 29103 | Da.18 Parameter 1 | | | | | | | |
| 26104 | 27104 | 28104 | 29104 | Da.19 Parameter 2 | | | | | | | |
| 26105 | 27105 | 28105 | 29105 | | | | | | | | |
| 26106 | | 27106 | | 28106 | | 29106 | | | | | |
| 26107 | | 27107 | | 28107 | | 29107 | | | | | |
| 26110 to 26119 | | 27110 to 27119 | | 28110 to 28119 | | 29110 to 29119 | | No.2 | | | |
| 26120 to 26129 | | 27120 to 27129 | | 28120 to 28129 | | 29120 to 29129 | | No.3 | | | |
| to | | to | | to | | to | | to | | | |
| 26190 to 26199 | | 27190 to 27199 | | 28190 to 28199 | | 29190 to 29199 | | No.10 | | | |
| 26200 to 26299 | | 27200 to 27299 | | 28200 to 28299 | | 29200 to 29299 | | Block start data | Starting block 1 | | |
| 26300 to 26399 | | 27300 to 27399 | | 28300 to 28399 | | 29300 to 29399 | | Condition data | Starting block 1 | | |
| 26400 to 26499 | | 27400 to 27499 | | 28400 to 28499 | | 29400 to 29499 | | Block start data | Starting block 2 | | |
| 26500 to 26599 | | 27500 to 27599 | | 28500 to 28599 | | 29500 to 29599 | | Condition data | Starting block 2 | | |
| 26600 to 26699 | | 27600 to 27699 | | 28600 to 28699 | | 29600 to 29699 | | Block start data | Starting block 3 | | |
| 26700 to 26799 | | 27700 to 27799 | | 28700 to 28799 | | 29700 to 29799 | | Condition data | Starting block 3 | | |
| 26800 to 26899 | | 27800 to 27899 | | 28800 to 28899 | | 29800 to 29899 | | Block start data | Starting block 4 | | |
| 26900 to 26999 | | 27900 to 27999 | | 28900 to 28999 | | 29900 to 29999 | | Condition data | Starting block 4 | | |

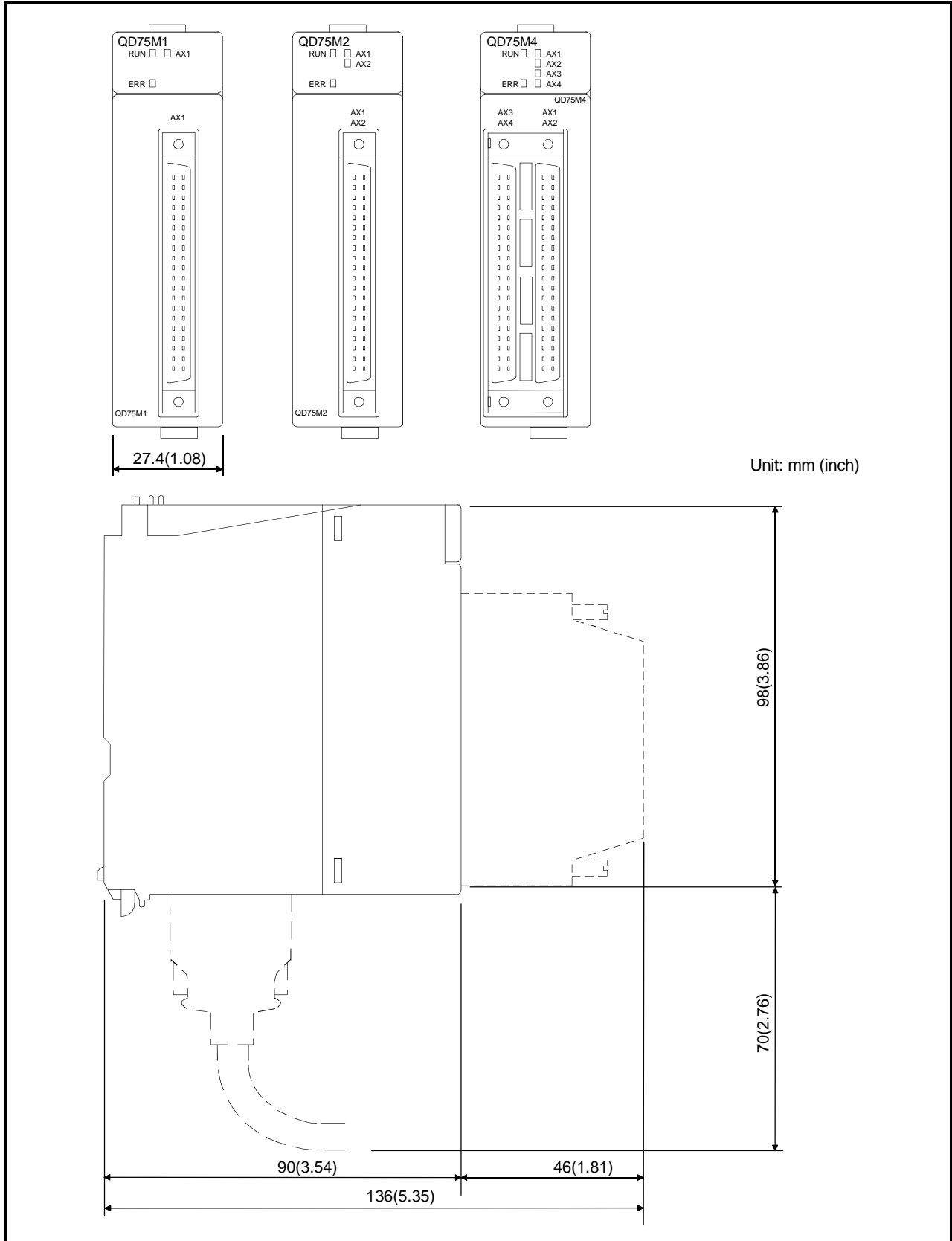
| Buffer memory address | | | | Item | Memory area | | | |
|-----------------------|--------|--------|--------|---|----------------------|------------------|--|--|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | PLC CPU memo area | Positioning data | | |
| 30000 | | | | Condition judgement target data of the condition data | | | | |
| to | | | | | | | | |
| 30099 | | | | | | | | |

| Buffer memory address | | | | Item | Memory area | |
|-----------------------|--------|--------|--------|--|------------------------|------------------|
| Axis 1 | Axis 2 | Axis 3 | Axis 4 | | Servo basic parameters | Servo parameters |
| 30100 | 30200 | 30300 | 30400 | Pr.100 Servo series | | |
| 30101 | 30201 | 30301 | 30401 | Pr.101 Amplifier setting | | |
| 30102 | 30202 | 30302 | 30402 | Pr.102 Regenerative brake resistor | | |
| 30103 | 30203 | 30303 | 30403 | Pr.103 Motor type | | |
| 30104 | 30204 | 30304 | 30404 | Pr.104 Motor capacity | | |
| 30105 | 30205 | 30305 | 30405 | Pr.105 Servo motor speed | | |
| 30106 | 30206 | 30306 | 30406 | Pr.106 Feed back pulse | | |
| 30107 | 30207 | 30307 | 30407 | Pr.107 Rotation direction selection | | |
| 30108 | 30208 | 30308 | 30408 | Pr.108 Auto tuning | | |
| 30109 | 30209 | 30309 | 30409 | Pr.109 Servo response | | |
| 30110 | 30210 | 30310 | 30410 | Pr.110 Maker setting | | |
| 30111 | 30211 | 30311 | 30411 | Pr.111 Maker setting | | |
| 30112 | 30212 | 30312 | 30412 | Pr.112 Load inertia ratio | | |
| 30113 | 30213 | 30313 | 30413 | Pr.113 Position loop gain 1 | | |
| 30114 | 30214 | 30314 | 30414 | Pr.114 Speed loop gain 1 | | |
| 30115 | 30215 | 30315 | 30415 | Pr.115 Position loop gain 2 | | |
| 30116 | 30216 | 30316 | 30416 | Pr.116 Speed loop gain 2 | | |
| 30117 | 30217 | 30317 | 30417 | Pr.117 Speed integral compensation | | |
| 30118 | 30218 | 30318 | 30418 | Pr.118 Machine resonance suppression filter | | |
| 30119 | 30219 | 30319 | 30419 | Pr.119 Feed forward gain | | |
| 30120 | 30220 | 30320 | 30420 | Pr.120 In-position range | | |
| 30121 | 30221 | 30321 | 30421 | Pr.121 Electromagnetic brake sequence output | | |
| 30122 | 30222 | 30322 | 30422 | Pr.122 Analog monitor output | | |
| 30123 | 30223 | 30323 | 30423 | Pr.123 Optional function 1 | | |
| 30124 | 30224 | 30324 | 30424 | Pr.124 Optional function 2 | | |
| 30125 | 30225 | 30325 | 30425 | Pr.125 Adaptive vibration suppression control/ low pass filter | | |
| 30126 | 30226 | 30326 | 30426 | Pr.126 Maker setting | | |
| 30127 | 30227 | 30327 | 30427 | Pr.127 Monitor output 1 offset | | |
| 30128 | 30228 | 30328 | 30428 | Pr.128 Monitor output 2 offset | | |
| 30129 | 30229 | 30329 | 30429 | Pr.129 Pre-alarm data selection | | |
| 30130 | 30230 | 30330 | 30430 | Pr.130 Zero speed | | |
| 30131 | 30231 | 30331 | 30431 | Pr.131 Error excessive alarm level | | |
| 30132 | 30232 | 30332 | 30432 | Pr.132 Optional function 5 | | |
| 30133 | 30233 | 30333 | 30433 | Pr.133 Optional function 6 | | |
| 30134 | 30234 | 30334 | 30434 | Pr.134 PI-PID control switch-over position droop | | |
| 30135 | 30235 | 30335 | 30435 | Pr.135 Maker setting | | |
| 30136 | 30236 | 30336 | 30436 | Pr.136 Speed differential compensation | | |
| 30137 | 30237 | 30337 | 30437 | Pr.137 Maker setting | | |
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WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
 1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
 2. Failure caused by unapproved modifications, etc., to the product by the user.
 3. When the Mitsubishi product is assembled into a user's device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
 5. Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
 7. Any other failure found to not be the responsibility of Mitsubishi or the user.

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- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by failures in Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

- (1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for each Japan Railways company or the Department of Defense shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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