MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-R series

MELSEC iQ-R Positioning Module User's Manual (Application)

-RD75P2
-RD75P4
-RD75D2
-RD75D4

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠ **WARNING**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ **CAUTION**	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the programmable controller.
  (2) When the programmable controller detects an abnormal condition, it stops the operation and all outputs are:
    - Turned off if the overcurrent or overvoltage protection of the power supply module is activated.
    - Held or turned off according to the parameter setting if the self-diagnostic function of the CPU module detects an error such as a watchdog timer error.
  (3) All outputs may be turned on if an error occurs in a part, such as an I/O control part, where the CPU module cannot detect any error. To ensure safety operation in such a case, provide a safety mechanism or a fail-safe circuit external to the programmable controller. For a fail-safe circuit example, refer to "General Safety Requirements" in the MELSEC iQ-R Module Configuration Manual.
  (4) Outputs may remain on or off due to a failure of a component such as a relay and transistor in an output circuit. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.
- Configure a circuit so that the external power supply is turned off first and then the programmable controller. If the programmable controller is turned off first, an accident may occur due to an incorrect output or malfunction.
- For the operating status of each station after a communication failure, refer to manuals for the network used. For the manuals, please consult your local Mitsubishi representative. Incorrect output or malfunction due to a communication failure may result in an accident.

[Design Precautions]

⚠WARNING

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents. When a Safety CPU is used, data cannot be modified while the Safety CPU is in SAFETY MODE.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not write any data to the "system area" and "write-prohibited area" of the buffer memory in the module. Also, do not use any "use prohibited" signals as an output signal from the CPU module to each module. Doing so may cause malfunction of the programmable controller system. For the "system area", "write-prohibited area", and the "use prohibited" signals, refer to the user's manual for the module used. For areas used for safety communications, they are protected from being written by users, and thus safety communications failure caused by data writing does not occur.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction. When safety communications are used, an interlock by the safety station interlock function protects the system from an incorrect output or malfunction.
- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) Machine OPR (Original Point Return) is controlled by two kinds of data: an OPR direction and an OPR speed. Deceleration starts when the near-point dog signal turns on. If an incorrect OPR direction is set, motion control may continue without deceleration. To prevent machine damage caused by this, configure an interlock circuit external to the programmable controller.
  (2) When the positioning module detects an error, the motion slows down and stops or the motion suddenly stops, depending on the stop group setting in parameter. Set the parameters to meet the specifications of the positioning control system used. In addition, set the OPR parameters and positioning data within the specified setting range.
  (3) Outputs may remain on or off, or become undefined due to a failure of a component such as an insulation element and transistor in an output circuit, where the positioning module cannot detect any error. In a system where the incorrect outputs could cause a serious accident, configure an external circuit for monitoring output signals.
- An absolute position restoration by the positioning module may turn off the servo-on signal (servo off) for approximately 60ms + scan time, and the motor may run unexpectedly. If this causes a problem, provide an electromagnetic brake to lock the motor during absolute position restoration.

[Design Precautions]

⚠CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to electromagnetic interference. Keep a distance of 100mm or more between those cables.
- During control of an inductive load such as a lamp, heater, or solenoid valve, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Therefore, use a module that has a sufficient current rating.
- After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size. Design circuits so that the entire system will always operate safely, regardless of the time.
- Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.
- When changing the operating status of the CPU module from external devices (such as the remote RUN/STOP functions), select "Do Not Open by Program" for "Opening Method" of "Module Parameter". If "Open by Program" is selected, an execution of the remote STOP function causes the communication line to close. Consequently, the CPU module cannot reopen the line, and external devices cannot execute the remote RUN function.

[Security Precautions]

⚠WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller in an environment that meets the general specifications in the MELSEC iQ-R Module Configuration Manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount a module, place the concave part(s) located at the bottom onto the guide(s) of the base unit, and push in the module until the hook(s) located at the top snaps into place. Incorrect interconnection may cause malfunction, failure, or drop of the module.
- When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction. For the specified torque range, refer to the MELSEC iQ-R Module Configuration Manual.
- When using an extension cable, connect it to the extension cable connector of the base unit securely. Check the connection for looseness. Poor contact may cause malfunction.
- When using an SD memory card, fully insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
- Securely insert an extended SRAM cassette or a battery-less option cassette into the cassette connector of the CPU module. After insertion, close the cassette cover and check that the cassette is inserted completely. Poor contact may cause malfunction.
- Beware that the module could be very hot while power is on and immediately after power-off.
- Do not directly touch any conductive parts and electronic components of the module, SD memory card, extended SRAM cassette, battery-less option cassette, or connector. Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
- After installation and wiring, attach a blank cover module (RG60) to each empty slot before powering on the system for operation. Also, attach an extension connector protective cover*1 to each unused extension cable connector as necessary. Directly touching any conductive parts of the connectors while power is on may result in electric shock.
  *1 For details, please consult your local Mitsubishi Electric representative.

[Wiring Precautions]

⚠CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
- Connectors for external devices must be crimped or pressed with the tool specified by the manufacturer, or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Securely connect the connector to the module. Poor contact may cause malfunction.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Doing so may result in malfunction due to noise. Keep a distance of 100mm or more between those cables.
- Place the cables in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables.
  In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks. Doing so may change the characteristics of the cables, resulting in malfunction.
  Do not clamp the extension cables with the jacket stripped.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- Tighten the terminal screws or connector screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, fire, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, fire, or malfunction.
- When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- When a protective film is attached to the top of the module, remove it before system operation. If not, inadequate heat dissipation of the module may cause a fire, failure, or malfunction.
- Programmable controllers must be installed in control panels. Connect the main power supply to the power supply module in the control panel through a relay terminal block. Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring, refer to the MELSEC iQ-R Module Configuration Manual.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Correctly connect the battery connector. Do not charge, disassemble, heat, short-circuit, solder, or throw the battery into the fire. Also, do not expose it to liquid or strong shock. Doing so will cause the battery to produce heat, explode, ignite, or leak, resulting in injury and fire.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws, connector screws, or module fixing screws. Failure to do so may result in electric shock.

[Startup and Maintenance Precautions]

⚠CAUTION

- When connecting an external device with a CPU module or intelligent function module to modify data of a running programmable controller, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running programmable controller, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) 25cm or more away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the component or wire, short circuit, or malfunction. Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- After the first use of the product, do not perform each of the following operations more than 50 times (IEC 61131-2/JIS B 3502 compliant).
  Exceeding the limit may cause malfunction.
    - Mounting/removing the module to/from the base unit
    - Inserting/removing the extended SRAM cassette or battery-less option cassette to/from the CPU module
    - Mounting/removing the terminal block to/from the module
    - Connecting/disconnecting the extension cable to/from the base unit
- After the first use of the product, do not insert/remove the SD memory card to/from the CPU module more than 500 times. Exceeding the limit may cause malfunction.
- Do not touch the metal terminals on the back side of the SD memory card. Doing so may cause malfunction or failure of the module.
- Do not touch the integrated circuits on the circuit board of an extended SRAM cassette or a battery-less option cassette.
- Do not drop or apply shock to the battery to be installed in the module. Doing so may damage the battery, causing the battery fluid to leak inside the battery. If the battery is dropped or any shock is applied to it, dispose of it without using.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Wearing a grounded antistatic wrist strap is recommended. Failure to discharge the static electricity may cause the module to fail or malfunction.

[Startup and Maintenance Precautions]

⚠CAUTION

- After unpacking, eliminate static electricity from the module to prevent electrostatic discharge from affecting the module. If an electrostatically charged module comes in contact with a grounded metal object, a sudden electrostatic discharge of the module may cause failure. For details on how to eliminate static electricity from the module, refer to the following.
  Antistatic Precautions Before Using MELSEC iQ-R Series Products (FA-A-0368)
- Use a clean and dry cloth to wipe off dirt on the module.
- Before testing the operation, set a low speed value for the speed limit parameter so that the operation can be stopped immediately upon occurrence of a hazardous condition.
- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.

[Operating Precautions]

⚠CAUTION

- When changing data and operating status, and modifying program of the running programmable controller from an external device such as a personal computer connected to an intelligent function module, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
- Do not power off the programmable controller or reset the CPU module while the setting values in the buffer memory are being written to the flash ROM in the module. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so can cause malfunction or failure of the module.
- Note that when the reference axis speed is specified for interpolation operation, the speed of the partner axis (2nd, 3rd, or 4th axis) may exceed the speed limit value.
- Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC iQ-R Module Configuration Manual.

[Transportation Precautions]

⚠CAUTION

- When transporting lithium batteries, follow the transportation regulations. For details on the regulated models, refer to the MELSEC iQ-R Module Configuration Manual.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

CONDITIONS OF USE FOR THE PRODUCT

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

(3) Mitsubishi shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers.
This manual describes the functions, programming, and troubleshooting of the relevant products listed below.
Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.
When applying the program examples provided in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.
Please make sure that the end users read this manual.

Relevant products

RD75P2, RD75P4, RD75D2, RD75D4

Point

In this manual, buffer memory areas are classified into four groups using the following symbols. Each area name is common to axis 1 to 4.

- [Pr.**]: Positioning parameter and OPR parameter
- [Da.**]: Positioning data and block start data
- [Md.**]: Monitor data
- [Cd.**]: Control data

Unless otherwise specified, this manual describes dedicated instructions using G(P).**** instructions. When using Z(P).**** instructions, regard G(P).**** as Z(P).****. Applicable devices differ between G(P).**** instructions and Z(P).**** instructions. Check the devices in the following manual.

📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

MEMO

CONTENTS

RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Positioning Module User's Manual (Application) [SH-081245ENG] (this manual)	Functions, parameter settings, I/O signals, buffer memory, programming, and troubleshooting of the positioning module	Print book e-Manual PDF
MELSEC iQ-R Module Configuration Manual [SH-081262ENG]	Combinations of MELSEC iQ-R series modules that can be used, common information on installing/wiring/configuring systems, and specifications of the power supply module, base unit, SD memory card, and battery	Print book e-Manual PDF
MELSEC iQ-R Positioning Module User's Manual (Startup) [SH-081243ENG]	System configuration, specifications, procedures before operation, wiring, and operation examples of the positioning module	Print book e-Manual PDF
MELSEC iQ-R Programming Manual (Module Dedicated Instructions) [SH-081976ENG]	Dedicated instructions for the intelligent function modules	e-Manual PDF
MELSEC iQ-R Positioning Module Function Block Reference [BCN-P5999-03779]	Specifications, functions, and I/O labels of the positioning module FBs	e-Manual PDF
GX Works3 Operating Manual [SH-081215ENG]	System configuration, parameter settings, and online operations of GX Works3	e-Manual PDF
MELSEC iQ-R Online Module Change Manual [SH-081501ENG]	The online module change, which allows a module to be changed without stopping the system for MELSEC iQ-R series programmable controllers	Print book e-Manual PDF

Point

e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Q series-compatible mode	A mode in which the module operates with the buffer memory map converted to the equivalent one of the MELSEC Q series
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance.
Global label	A label that is valid for all the program data when multiple program data are created in the project. There are two types of global label: a module specific label (module label), which is generated automatically by GX Works3, and an optional label, which can be created for any specified device.
Quick start mode	A mode where the module operates with the start time of 0.3ms. Unless otherwise specified, the functions described in this manual are for when quick start mode is set.
Drive unit (servo amplifier)	A unit that amplifies pulses that are output from the positioning module to control a motor. The unit is provided with a servomotor or stepping motor. It is also called a servo amplifier.
Module label	A label that represents one of memory areas (I/O signals and buffer memory areas) specific to each module in a given character string. For the module used, GX Works3 automatically generates this label, which can be used as a global label.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term/abbreviation	Description
RD75	An abbreviation for the MELSEC iQ-R series positioning module
RD75P□	A generic term for the positioning module RD75P2 and RD75P4
RD75D□	A generic term for the positioning module RD75D2 and RD75D4
Remote head module	An abbreviation for the RJ72GF15-T2 CC-Link IE Field Network remote head module

1 STARTING AND STOPPING

This chapter describes how to start and stop positioning control operations with the RD75.

1.1 Starting

The RD75 starts the positioning control when a start trigger, specific to the control, is turned on. The following table lists the start signals by control type. This section describes starting with Positioning start signal [Y10, Y11, Y12, Y13] and an external command signal.

Control details		Start trigger
Major positioning control		• Turn on Positioning start signal [Y10, Y11, Y12, Y13]. • Execute the GP.PSTRT instruction. • Turn on an external command signal (CHG).
Advanced positioning control		
OPR control		
Manual control	JOG operation	Turn on Forward run JOG start signal [Y8, YA, YC, YE] or Reverse run JOG start signal [Y9, YB, YD, YF].
	Inching operation	
	Manual pulse generator operation	Manipulate a manual pulse generator.

For the controls other than the manual controls, any one of the following start modes can be selected.

- Normal start (☞ Page 25 Normal start)
- Quick start (☞ Page 27 Quick start)
- Multiple axes simultaneous start (☞ Page 32 Multiple axes simultaneous start)

The target position for a control can be specified using positioning data, Block start data, and condition data. Available data depends on the selected start mode.

Start condition

Satisfy the following conditions to start a program. In addition, set the required conditions in the program to prevent an operation from starting if the conditions are not satisfied.

Signal name		Signal status		Device			
				Axis 1	Axis 2	Axis 3	Axis 4
I/O signals	PLC READY signal	ON	The CPU module is ready.	Y0			
	RD75 READY signal	ON	RD75 READY signal	X0			
	Module access flag*1	ON	The RD75 buffer memory can be accessed.	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 has been detected.	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	Drive unit READY signal (READY)	ON	The drive unit is ready.	—			
	Stop signal (STOP)	OFF	Stop signal is off.	—			
	Upper limit signal (FLS)	ON	The current position is within the limit.	—			
	Lower limit signal (RLS)	ON	The current position is within the limit.	—			

*1 The interlock must be provided so that the buffer memory is accessed after Module access flag [X1] turns on. When no interlock is provided, the buffer memory may be accessed while the module parameter and module extension parameter that are sent from the CPU module are updated. If the buffer memory is accessed during the update, an unexpected value may be read or written.

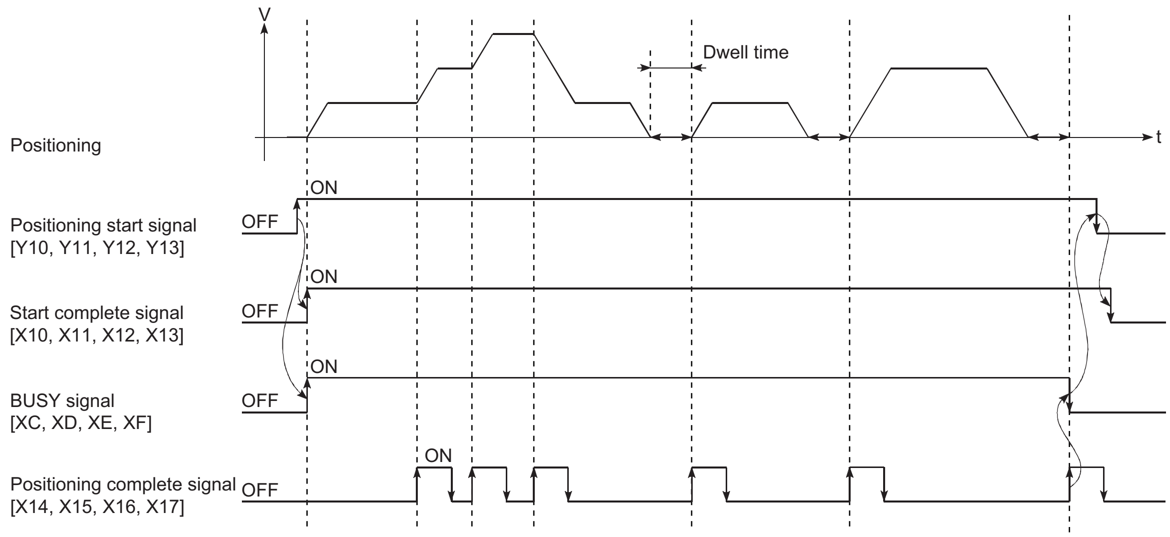
Starting with Positioning start signal [Y10, Y11, Y12, Y13]

This section describes operations started with Positioning start signal [Y10, Y11, Y12, Y13].

- When Positioning start signal [Y10, Y11, Y12, Y13] is turned on, Start complete signal [X10, X11, X12, X13] and BUSY signal [XC, XD, XE, XF] turn on, and the positioning operation starts. The on state of BUSY signal [XC, XD, XE, XF] indicates that the corresponding axis is in operation.
- When Positioning start signal [Y10, Y11, Y12, Y13] is turned off, Start complete signal [X10, X11, X12, X13] turns off. If Positioning start signal [Y10, Y11, Y12, Y13] remains on even after the positioning is completed, Start complete signal [X10, X11, X12, X13] also remains on.
- If Positioning start signal is turned on again while BUSY signal [XC, XD, XE, XF] is on, Start during operation (Warning code: 0900H) occurs.
- The operation performed after the completion of the positioning operation depends on whether or not the next positioning control is set.

Presence or absence of the next positioning control	Processing
When the next positioning control is performed	• If [Da.9] Dwell time is set, the RD75 waits for the set time to elapse, and the positioning will be completed. • When the positioning has been completed, BUSY signal [XC, XD, XE, XF] turns off and Positioning complete signal [X14, X15, X16, X17] turns on. However, when the speed control has been used or the ON time of Positioning complete signal is 0, Positioning complete signal [X14, X15, X16, X17] does not turn on. • When the time set in [Pr.40] Positioning complete signal output time elapses, Positioning complete signal [X14, X15, X16, X17] turns off.
When the next positioning control is not performed	• If [Da.9] Dwell time is set, the RD75 waits for the set time to elapse. • When the time set in [Da.9] Dwell time elapses, the next positioning control starts.

■Time chart for starting



Point

Even when the positioning control of a movement amount 0 is performed, BUSY signal [XC, XD, XE, XF] turns on. However, since the ON time of the signal is short, the ON state of the signal may not be detected in the program. (The on state of 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 program.)

Starting by inputting an external command signal (CHG)

When the positioning control is started by inputting an external command signal (CHG), the start command can be directly input to the RD75. This method eliminates the variation time equivalent to one scan time of the CPU module. Use the start command when an operation is required to be started as soon as possible, or when the starting variation time is to be suppressed.

■Starting method

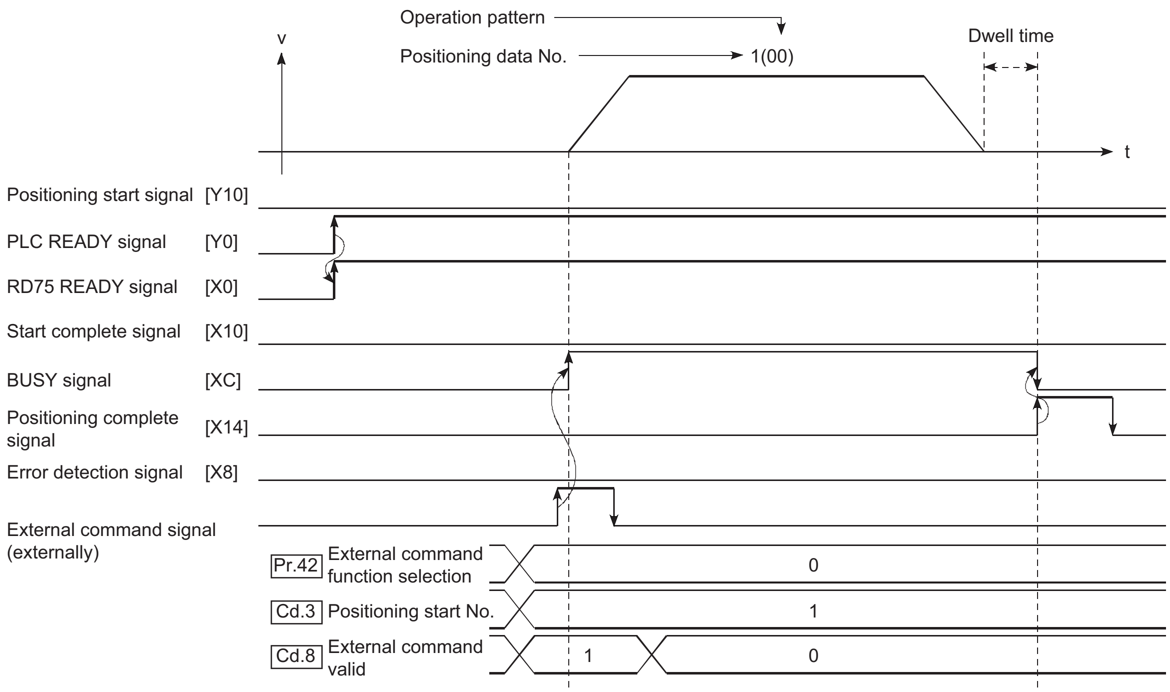
To start the positioning with the external command signal, set [Pr.42] External command function selection beforehand, and validate [Cd.8] External command valid using a program. After setting those two areas, turn on an external command signal (CHG).

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42]	External command function selection	0	Set 0: Start with external command.	62	212	362	512
[Cd.8]	External command valid	1	Set 1: Validate external command.	1505	1605	1705	1805

■Restrictions

When starting by inputting an external command signal (CHG), Start complete signal [X10, X11, X12, X13] does not turn on.

■Time chart for starting



Normal start

Positioning controls can be started by the simplest procedure in this mode. Major positioning controls and advanced positioning controls can be started in this mode.

The following positioning data is used.

- Positioning data (No.1 to No.600)
- Block start data (No.7000 to No.7004)
- Machine OPR (No.9001)
- Fast OPR (No.9002)
- Current value change (No.9003)

Starting method

After setting positioning data, input a start trigger to start the specified positioning data. The following table lists the start triggers used in this mode.

Start trigger name	Starting method (Start trigger)	Positioning data to be started
Positioning start signal	Turning off and on Positioning start signal [Y10, Y11, Y12, Y13]	Starts the positioning data specified in [Cd.3] Positioning start No.
External command signal	Turning off and on an external command signal (CHG)	Starts the positioning data specified in [Cd.3] Positioning start No.
Dedicated instruction	Executing the GP.PSTRT□ instruction	Starts the positioning data specified as the control data.

Program example

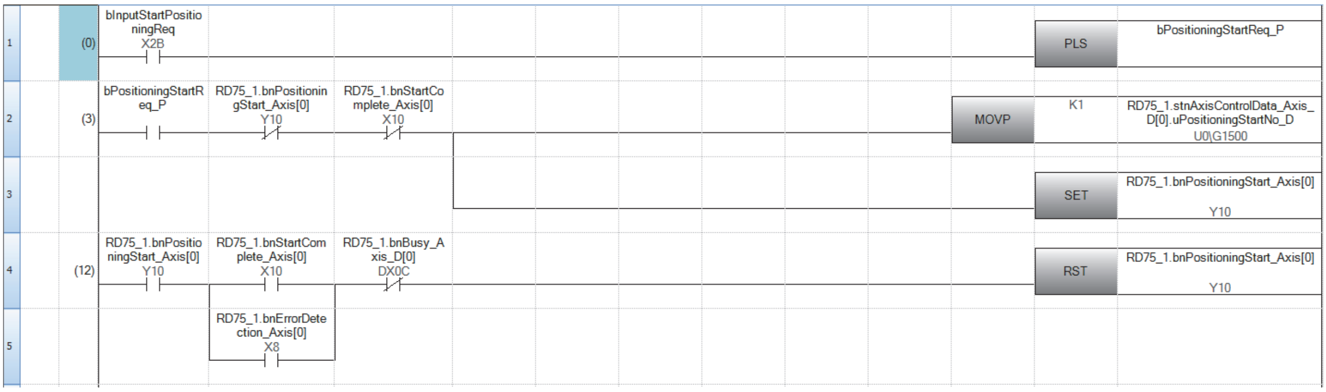
This section shows program examples of the normal start for each command trigger.

■For module FB

For the program example using the module FB, refer to the following.

☞ Page 513 Positioning start program

■For Positioning start signal [Y10, Y11, Y12, Y13]



Classification	Label Name	Description
Module label	RD75_1.bnErrorDetection_Axis[0]	Axis 1 Error detection signal [X8]
	RD75_1.bnBusy_Axis[0]	Axis 1 BUSY signal [XC]
	RD75_1.bnStartComplete_Axis[0]	Axis 1 Start complete signal [X10]
	RD75_1.bnPositioningStart_Axis[0]	Axis 1 Positioning start signal [Y10]
	RD75_1.stnAxisControlData_Axis_D[0].uPositioningStartNo_D	Axis 1 [Cd.3] Positioning start No.
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels. Label Name / Data Type / Class 1 / bPositioningStartReq_P / Bit / VAR Label Name / Data Type / Class / Assign (Device/Label) 115 / bInputStartPositioningReq / Bit / VAR_GLOBAL / X2B	

■For External command signal (CHG)

Positioning can be started by setting 0: Start with external command in [Pr.42] External command function selection and inputting External command signal (CHG) after executing the following program.

☞ Page 511 External command function valid setting program

Quick start

Positioning controls can be started quickly by analyzing in advance the positioning data executed immediately after the current operation to prevent the analysis time affecting the start. Positioning data for the major positioning controls can be started in this mode.

Point

By using an external command signal as a start trigger, positioning controls can be started bypassing a program, which means that the operation is quickly started without being affected by the execution time of the program.

Starting method

After setting positioning data, set [Cd.43] Analysis mode setting to 1: Pre-analysis mode and input a start trigger signal while [Md.61] Analysis complete flag is 1: Analysis completed. The following table shows the start triggers used in this mode.

Start trigger name	Starting method (Start trigger)	Positioning data to be started
Positioning start signal	Turning off and on Positioning start signal [Y10, Y11, Y12, Y13]	Starts the positioning data specified in [Cd.3] Positioning start No.
External command signal	Turning off and on an external command signal (CHG)	Starts the positioning data specified in [Cd.3] Positioning start No.

Depending on the start timing of the positioning data analysis, a start trigger used is determined. Even if the settings are changed after the start of the positioning data analysis, the changed settings are not valid. Therefore, when the following settings are configured, an external command signal (CHG) is used as a start trigger.

- [Pr.42] External command function selection is set to 0: Start with external command.
- [Cd.8] External command valid is set to 1: External command valid.

Otherwise, Positioning start signal [Y10, Y11, Y12, Y13] can be used as a start trigger.

Control details

■Length of time before the positioning starts

While [Cd.43] Analysis mode setting is 1: Pre-analysis mode, the positioning data specified in [Cd.3] Positioning start No. is analyzed. The following shows the start timing of positioning data analysis.

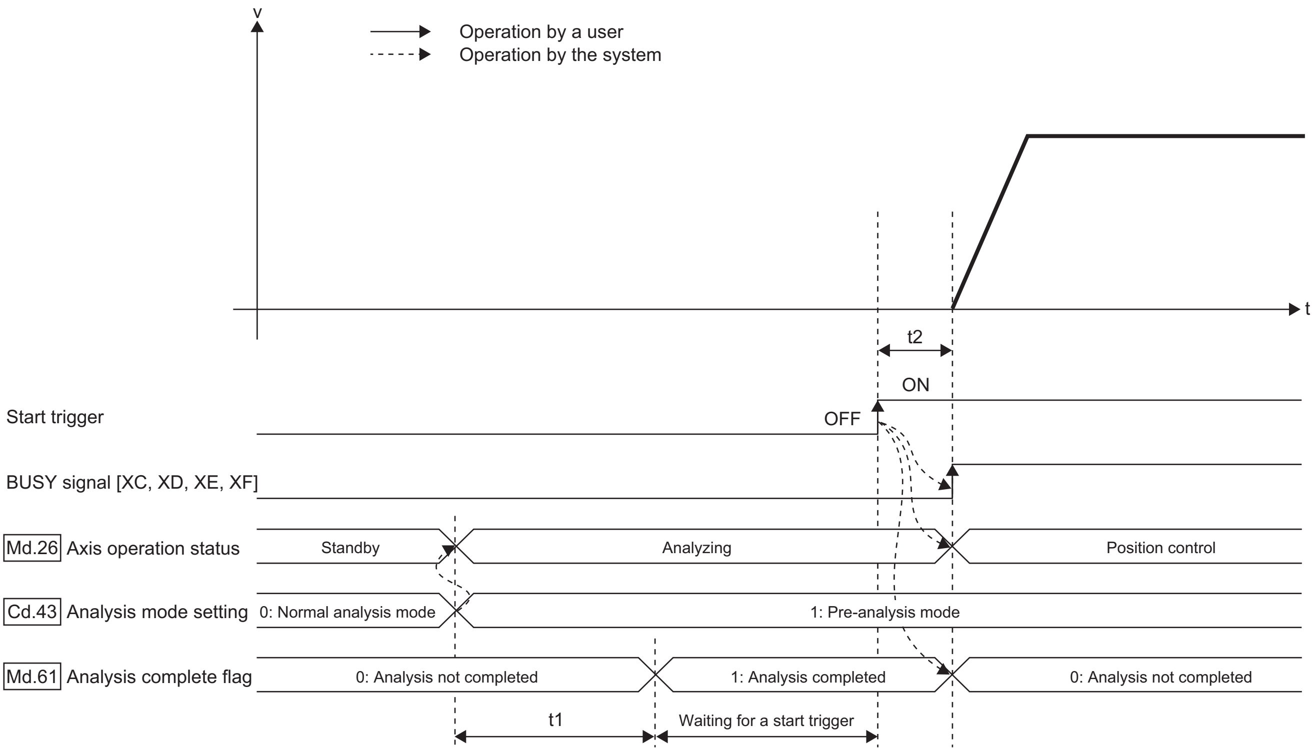
- When the analysis mode is changed to the pre-analysis mode (Timing when the setting of [Cd.43] Analysis mode setting is changed to 1: Pre-analysis mode)
- When the positioning start No. is changed after the analysis of the positioning data has been completed (Timing when the setting of [Cd.3] Positioning start No. is changed while [Md.61] Analysis complete flag is 1: Analysis completed)
- When the positioning operation is completed and [Md.26] Axis operation status turns to 0: Standby However, When M code ON signal [X4, X5, X6, X7] is on, the analysis of the positioning data will not start until M code ON signal [X4, X5, X6, X7] turns off.

Once the analysis of the positioning data is completed, [Md.61] Analysis complete flag turns to 1: Analysis completed. The quick start is executed by inputting a start trigger while [Md.61] Analysis complete flag is 1: Analysis completed. After the quick start is executed, [Md.61] Analysis complete flag turns to 0: Analysis not completed.

The pre-analysis mode is changed to the normal analysis mode not only by setting [Cd.43] Analysis mode setting to 0: Normal analysis mode, but also by the following factors. When the setting of [Cd.43] Analysis mode setting is changed to 0: Normal analysis mode, the positioning data which has already been analyzed is cleared. (In the interpolation control, the positioning data is cleared when the reference axis enters the normal analysis mode.)

- When an error is detected
- When PLC READY signal [Y0] is turned on and off
- When the positioning operation is stopped by a stop signal

If any of the three causes described above occurs, the reference axis or interpolation axis enters the normal analysis mode in the interpolation control.



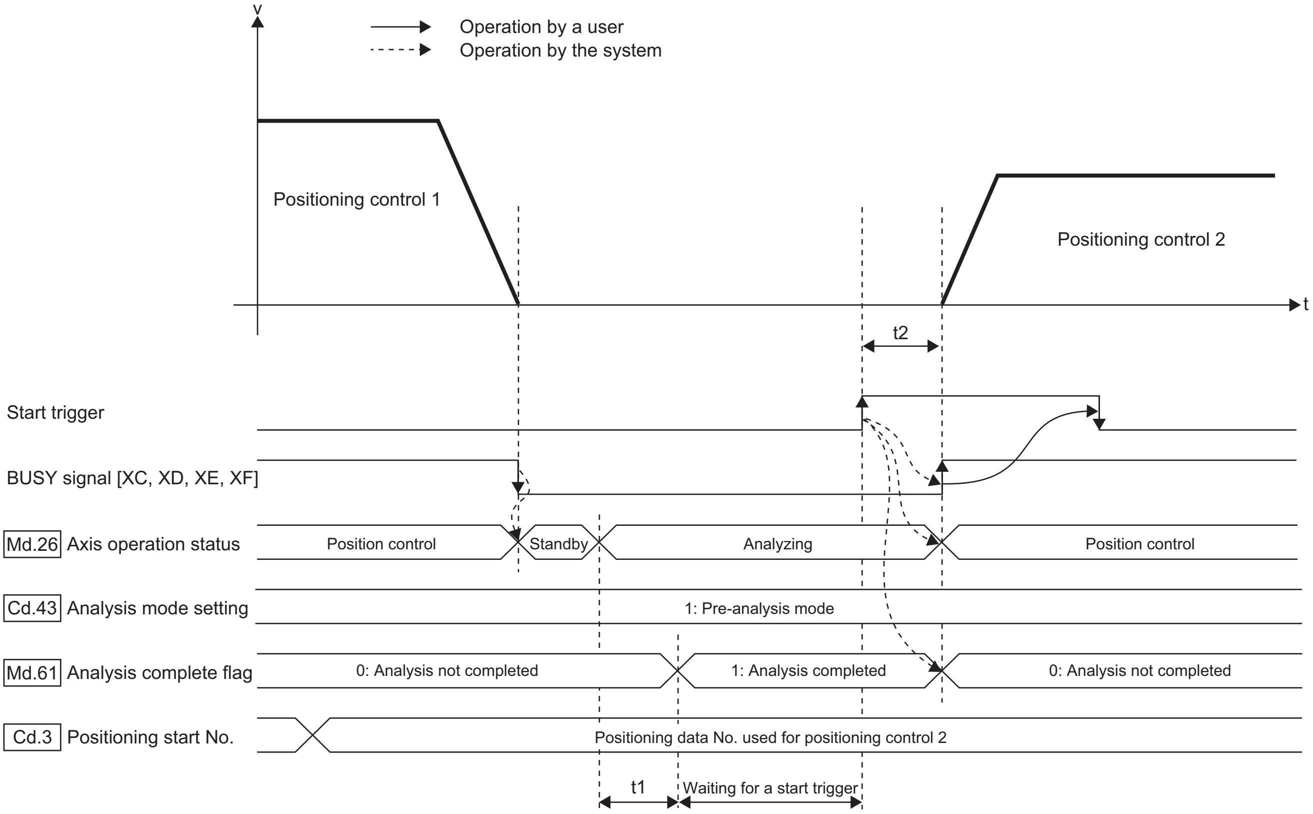
t1	t2
0.88 to 1.77ms	External command signal: 20μs Positioning start signal: 8μs

The shortest time between the completion of the positioning control and the starting of the next positioning control is t1 + t2.

■Executing the quick start repeatedly

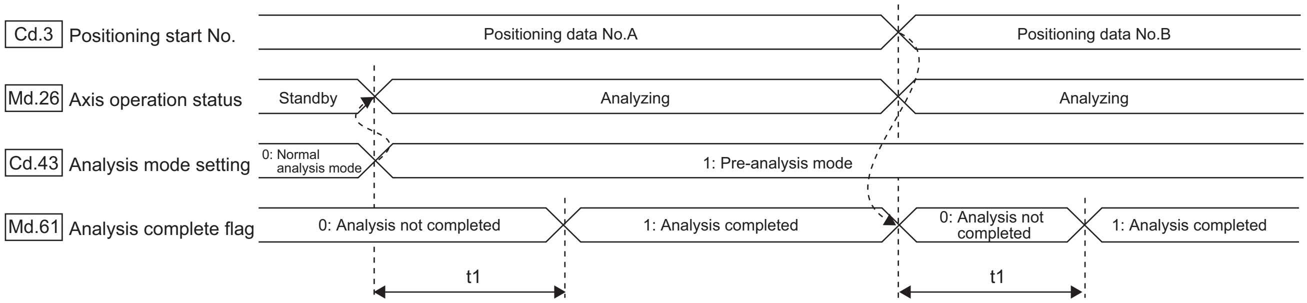
The quick start can be executed repeatedly by remaining [Cd.43] Analysis mode setting to 1: Pre-analysis mode.
When [Cd.3] Positioning start No. is set to the positioning data No. used for the positioning control 2 during the operation of the positioning control 1, the operation is performed as follows.

- The positioning by the positioning control 1 is completed and [Md.26] Axis operation status turns to 0: Standby.
- When [Md.26] Axis operation status turns to 0: Standby, the positioning data specified in [Cd.3] Positioning start No. starts to be analyzed.



■Reanalysis of positioning data

The setting of [Cd.3] Positioning start No. is changed while [Md.61] Analysis complete flag is 1: Analysis completed, [Md.61] Analysis complete flag turns to 0: Analysis not completed and the positioning data will be reanalyzed. When the reanalysis is completed, [Md.61] Analysis complete flag turns again to 1: Analysis completed.



Restrictions

- The range of the positioning data Nos. used for the quick start is between 1 and 600. If a number other than 1 to 600 is set for [Cd.3] Positioning start No., Pre-analysis not possible (Warning code: 09A8H) occurs and the pre-analysis of positioning data is not performed. However, by inputting a start trigger signal, positioning data is analyzed before the positioning is started, just as in the normal analysis mode. In this case, the setting in [Cd.43] Analysis mode setting remains 1: Pre-analysis mode.
- In the pre-analysis mode, restarting is not allowed. To allow restarting, turn on a stop signal and change the analysis mode to the normal analysis mode. If the analysis mode is changed again to the pre-analysis mode after changed to the pre-analysis mode and restarting is attempted, Restart not possible (Error code: 090BH) occurs and restarting cannot be executed.
- In the pre-analysis mode, the step function cannot be used. Even if [Cd.35] Step valid flag is 1: Carry out step operation while positioning data is being analyzed, Step start disabled (Warning code: 09A6H) occurs and the normal operation is performed with the setting ignored. (The step operation does not stop.)
- In the pre-analysis mode, the pre-reading start function cannot be used. The setting of Execution prohibition flag [Y14, Y15, Y16, Y17] is ignored.
- In the pre-analysis mode, the manual control cannot be used. Starting the manual control causes Manual control start in pre-analysis mode (Warning code: 09A4H), and the manual control does not start.
- Do not perform the manual pulse generator operation while the other axis is in the pre-analysis mode. To the axis where the manual pulse generator operation is being performed, pulses may be output at an unintentional timing.
- The machine OPR, the fast OPR, the speed switching control using the positioning control (block start) and External command signal, the position-speed switching control, the speed change, and the skip command cannot be used because External command signal is invalid for a maximum of 1.77ms after the start. However, the speed-position switching control, the position-speed switching control, and the speed change with the buffer memory can be performed.

Precautions

- If a start trigger is input while [Md.61] Analysis complete flag is 0: Analysis not completed, Pre-analysis incomplete start (Warning code: 09A2H) occurs and the positioning will be started after the analysis of the positioning data is completed.
- When [Md.61] Analysis complete flag is set to 1: Analysis completed, errors are detected at intervals of 0.88ms. Thus, if a start trigger is input within 0.88ms after the occurrence of an error, the operation may be started. In this case, the error is detected immediately after the start, and the operation stops.
- The data reflected to basic parameter 2, detailed parameter 2, and positioning data is the one in the buffer memory at the start of the analysis of positioning data. Therefore, even if a set value of basic parameter 2 and other data is changed after the analysis of positioning data has been completed (When [Md.61] Analysis complete flag is 1: Analysis completed), the value is not reflected to the control. To reflect the set value, conduct a reanalysis by changing the setting of [Cd.3] Positioning start No. or using other methods.

Point

The analysis of positioning data is performed by checking the settings of [Cd.43] Analysis mode setting and [Cd.3] Positioning start No. at intervals of 0.88ms. Thus, set [Cd.43] Analysis mode setting and [Cd.3] Positioning start No. beforehand so that the analysis starts 0.88ms earlier than the desired start timing and earlier than a length of time longer than the analysis time for the positioning data. The analysis time for the positioning data is approximately equal to the start time.

- For all the axes to which the quick start is performed, set [Cd.43] Analysis mode setting to 1: Pre-analysis mode. If 1: Pre-analysis mode is set for the reference axis and 0: Normal analysis mode is set for the interpolation axes, Pre-analysis not possible (Warning code: 09A9H) occurs and the pre-analysis of positioning data is not performed. However, by inputting a start trigger signal, positioning data is analyzed before the positioning is started, just as in the normal analysis mode. In this case, the setting in [Cd.43] Analysis mode setting remains 1: Pre-analysis mode.
- In the pre-analysis mode, the analysis of positioning data is performed in ascending order of axis numbers. For axes that do not require the analysis of positioning data, such as an axis to be interpolated, setting [Cd.3] Positioning start No. to 0 is recommended. Because the analysis of positioning data is not performed for the axes for which 0 is set, the time that elapses until the positioning start is cut off.

- When [Pr.42] External command function selection is set to 0: Start with external command and [Cd.8] External command valid is set to 1: External command valid in the pre-analysis mode, do not turn off and on Positioning start signal [Y10, Y11, Y12, Y13]. Positioning start signal input at quick external start (Warning code: 09A7H) occurs and no operation is started.
- When [Pr.42] External command function selection is set to a value other than 0: Start with external command in the pre-analysis mode, an external command signal is disabled for 1.77ms maximum after start starting. Input an external command signal 1.77ms or longer after starting.

■Precautions for the processing performed at the pre-analysis of positioning data

The following table lists the processing performed at the pre-analysis of positioning data.

Major positioning control		Processing performed at the pre-analysis of positioning data
Position control	1-axis linear control	• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17]
	2-axis linear interpolation control 3-axis linear interpolation control 4-axis linear interpolation control	
	1-axis fixed-feed control	• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17] • Clearing the current feed value to 0 • Clearing the values after the decimal point held in the RD75
	2-axis fixed-feed control 3-axis fixed-feed control 4-axis fixed-feed control	
	2-axis circular interpolation control	• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17]
	3-axis helical interpolation control	• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17]
1-axis speed control 2-axis speed control 3-axis speed control 4-axis speed control		• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17] When [Pr.21] Current feed value during speed control is 2: Clear current feed value to 0, the following processing is also performed. • Clearing the current feed value to 0 • Clearing the values after the decimal point held in the RD75
Speed-position switching control		• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17] When [Pr.21] Current feed value during speed control is 2: Clear current feed value to 0, the following processing is also performed. • Clearing the current feed value to 0 • Clearing the values after the decimal point held in the RD75
Position-speed switching control		
Current value change		• Clearing the axis control data • Initializing the axis monitor data • Turning off Positioning complete signal [X14, X15, X16, X17] • Clearing the current feed value to 0 • Clearing the values after the decimal point held in the RD75

Note that if [Cd.43] Analysis mode setting is set to 1: Pre-analysis mode and is held, the analysis of the next positioning data will start immediately after the current positioning operation is completed.

For example, Positioning complete signal [X14, X15, X16, X17] turns on at the completion of positioning and immediately turns off when the pre-analysis is started at the completion of positioning. Thus, depending on the scan time, the on state of the signal may not be detected by the program used. If necessary, set 0 in [Cd.3] Positioning start No. after the positioning starts to avoid the analysis of the next positioning data.

Program example

For the program example of the quick start, refer to the following.

☞ Page 514 Quick start program

Multiple axes simultaneous start

In this starting mode, the simultaneous starting axis and the started axis start outputting pulses at the same timing. Up to four axes can be started simultaneously.

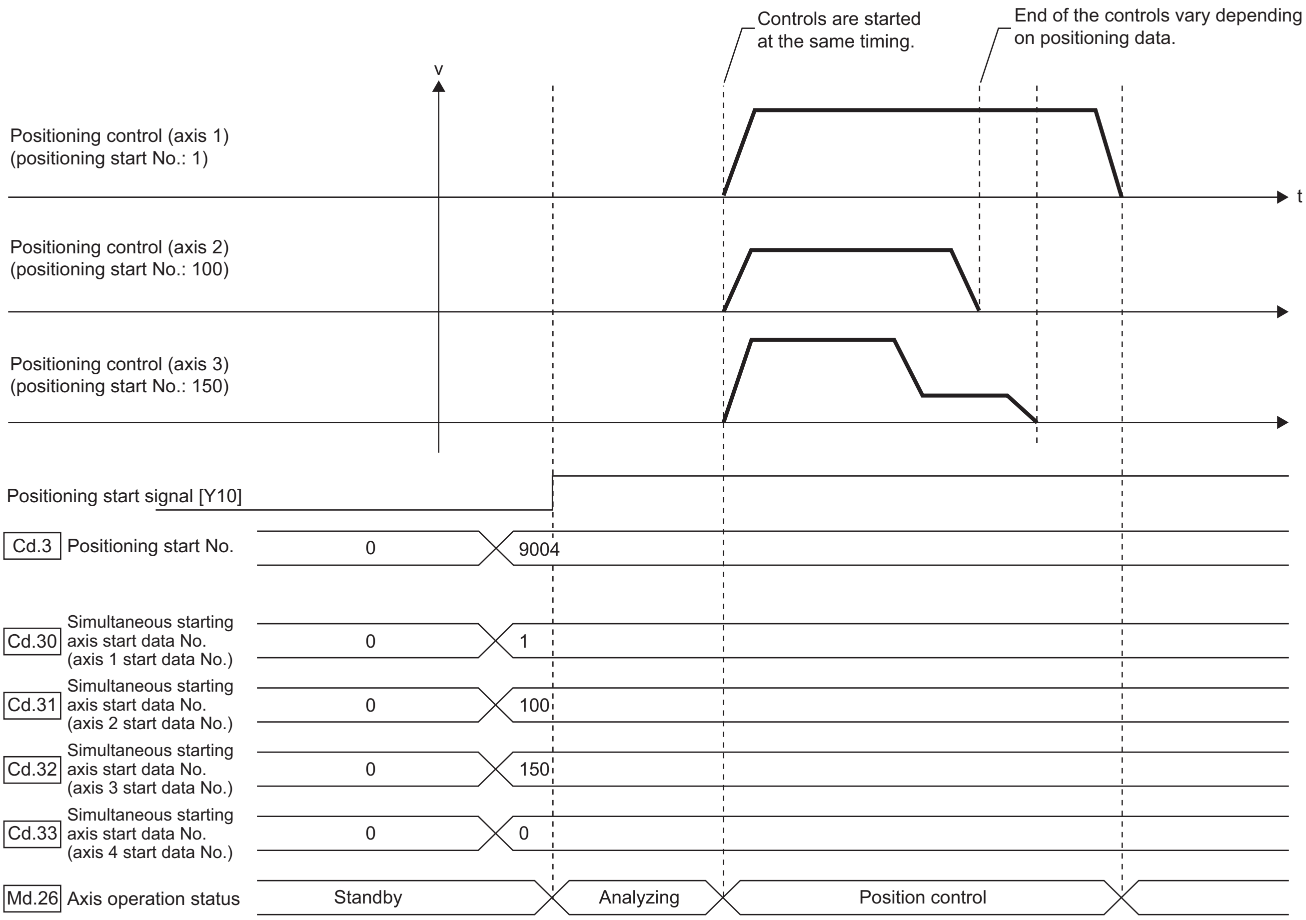
Control details

Perform the multiple axes simultaneous start by setting the following buffer memory areas and turning on a start trigger.

- Set a start data No. of each simultaneous starting axis (positioning data No. of each axis started simultaneously) in [Cd.30] Simultaneous starting axis start data No. (axis 1 start data No.) to [Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.).
- Set 9004 to [Cd.3] Positioning start No. for the starting axis.

Ex.

The following figure shows the control when the multiple axes simultaneous start control is performed with the axis 1 (starting axis), axis 2, and axis 3.



Restrictions

- If [Cd.30] Simultaneous starting axis start data No. (axis 1 start data No.) to [Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.) of the started axis are not set, or the set values are outside the setting range, Error before simultaneous start (Error code: 1991H) occurs and all the simultaneous starting axes will not start.
- If any of the simultaneous starting axes is in the axis BUSY state, Error before simultaneous start (Error code: 1990H) occurs and all the simultaneous starting axes will not start.
- If an error occurs during the analysis of the positioning data on the simultaneous starting axes, Simultaneous start not possible (Error code: 199EH) occurs and all the simultaneous starting axes will not start.
- If the simultaneous starting axis is the started axis only, no error or warning occurs.

Procedure

The following figure shows the procedure for the multiple axes simultaneous start control.

Set $\boxed{\text{Cd.30}}$ to $\boxed{\text{Cd.33}}$ Simultaneous starting axis start data No.

↓

Write "9004" in $\boxed{\text{Cd.3}}$ Positioning start No.

↓

Turn on Positioning start signal of the axis to be started.

Setting method

The following table lists the data settings to perform the multiple axes simultaneous start using Positioning start signal. (Set the axis control data for the starting axis.)

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.3]	Positioning start No.	9004	Set 9004, the start No. for the multiple axes simultaneous start control.	1500	1600	1700	1800
[Cd.30]	Simultaneous starting axis start data No. (axis 1 start data No.)	Set the simultaneous starting axis start data No. Set 0 for the axis other than the simultaneous starting axis.		1540	1640	1740	1840
[Cd.31]	Simultaneous starting axis start data No. (axis 2 start data No.)			1541	1641	1741	1841
[Cd.32]	Simultaneous starting axis start data No. (axis 3 start data No.)			1542	1642	1742	1842
[Cd.33]	Simultaneous starting axis start data No. (axis 4 start data No.)			1543	1643	1743	1843

For details on the settings, refer to the following.

☞ Page 478 [Cd.3] Positioning start No.
☞ Page 487 [Cd.30] Simultaneous starting axis start data No. (Axis 1 start data No.)
☞ Page 487 [Cd.31] Simultaneous starting axis start data No. (Axis 2 start data No.)
☞ Page 487 [Cd.32] Simultaneous starting axis start data No. (Axis 3 start data No.)
☞ Page 487 [Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.)

Setting example

The following table shows the setting example in which the axis 1 is used as the starting axis and the axis 2 and axis 4 is used as the simultaneous starting axis.

Setting item		Setting value	Setting detail	Buffer memory address (Axis 1)
[Cd.3]	Positioning start No.	9004	Set 9004, the start No. for the multiple axes simultaneous start control.	1500
[Cd.30]	Simultaneous starting axis start data No. (axis 1 start data No.)	100	Axis 1 starts the positioning data No.100.	1540
[Cd.31]	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
[Cd.32]	Simultaneous starting axis start data No. (axis 3 start data No.)	0	Will not start simultaneously.	1542
[Cd.33]	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

Point

- The multiple axes simultaneous start control performs an operation equivalent to the simultaneous start using the block start data.
- The setting of the multiple axes simultaneous start control is easier than that of the simultaneous start using the block start data. For the simultaneous start using the block start data, positioning start data, positioning data, block start data, and condition data are required to be set. On the other hand, the multiple axes simultaneous start control can be used only by setting positioning data and axis control data.
- The execution time of the positioning depends on the settings of each axis. Thus, the positioning of each axis is not completed simultaneously.

1.2 Stopping

This section describes the stop control of the positioning. The following events may stop each positioning control by the RD75.

- When each control ends normally
- When Drive unit READY signal (READY) is turned off
- When an error occurred in the CPU module
- When PLC READY signal [Y0] is turned off
- When an error occurs in the RD75
- When an operation is intentionally stopped (When a stop signal sent from the CPU module is turned on, or a stop signal from an external device)

Stop processing

The stop controls are classified into three types: deceleration stop, sudden stop, and immediate stop. The following table describes the stop controls (deceleration stop, sudden stop, and immediate stop) at the occurrence of each stop cause (When the automatic deceleration control is performed).

Stop cause		Stop axis	M code ON signal after stop	[Md.26] Axis operation status after stop	Stop processing					
					OPR control		Major positioning control	Advanced positioning control	Manual control	
					Machine OPR control	Fast OPR control			Inching operation, JOG operation	Manual pulse generator operation
Forced stop	Drive unit READY signal (READY) is off	Each axis	Not changed	Error	Immediate stop					Deceleration stop
Fatal stop (Stop group 1)	Hardware stroke limit upper/lower limit error occurred	Each axis	Not changed	Error	Deceleration stop or sudden stop (Select with [Pr.37] Stop group 1 sudden stop selection.)					Deceleration stop
Emergency stop (Stop group 2)	CPU module error occurred	All axes	Not changed	Error	Deceleration stop or sudden stop (Select with [Pr.38] Stop group 2 sudden stop selection.)					Deceleration stop
	PLC READY signal [Y0] is off		Turned off							
	Failure in the test mode		Not changed							
Relatively safe stop (Stop group 3)	Axis error detection (errors other than the ones in stop group 1 and 2)[*1]	Each axis	Not changed	Error	Deceleration stop or sudden stop (Select with [Pr.39] Stop group 3 sudden stop selection.)					Deceleration stop
	Error at operation mode switching in amplifier-less operation[*2]	All axes	Not changed	Error						
Intentional stop (Stop group 3)	Stop signal turned on by an external device	Each axis	Not changed	Stopped (standby)						
	Axis stop signal [Y4, Y5, Y6, Y7] from the CPU module is turned on.									
	Stop signal from an engineering tool									

*1 When multiple positioning data is executed by the continuous positioning control or continuous path control and there is an invalid setting value in a positioning data, an error occurs and automatic deceleration is performed at the previous positioning data. In this case, the sudden stop is not performed even if sudden stop is selected for the stop group 3. If any of the following errors occurs, the operation is immediately stopped after the execution of the positioning data that is one before the positioning data No. where the error occurred.
No command speed (Error code: 1A13H, 1A14H)
Outside linear movement amount range (Error code: 1A15H, 1A16H)
Large arc error deviation (Error code: 1A17H)
Software stroke limit (+) (Error code: 1A18H, 1A19H)
Software stroke limit (-) (Error code: 1A1AH, 1A1BH)
Sub point setting error (Error code: 1A27H, 1A28H, 1A29H, 1A2AH, 1A37H)
End point setting error (Error code: 1A2BH, 1A2CH)
Center point setting error (Error code: 1A2DH, 1A2EH, 1A2FH)
Outside radius range (Error code: 1A32H)
Illegal setting of ABS direction in unit of degree (Error code: 19A4H, 19A5H)

*2 This indicates Error at switching from normal operation mode to amplifier-less operation mode (Error code: 18B0H) and Error at switching from amplifier-less operation mode to normal operation mode (Error code: 18B1H).

Classification of the stop processing types

The stop processing during the operation is classified into three types: deceleration stop, sudden stop, and immediate stop.

■Deceleration stop

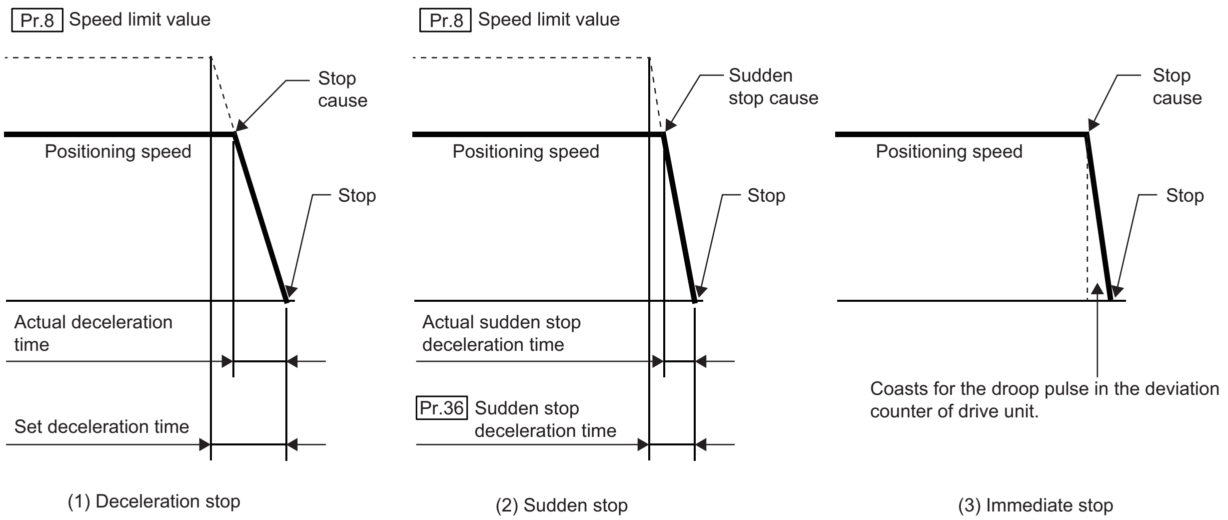
This processing is performed using [Pr.10] Deceleration time 0, and [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3. Select any time from Deceleration time 0 to Deceleration time 3 and set the time in [Da.4] Deceleration time No.

■Sudden stop

This processing is performed using [Pr.36] Sudden stop deceleration time.

■Immediate stop

This processing does not include deceleration processing. The RD75 immediately stops outputting pulses but the target moves for the distance of droop pulses of the deviation counter of the drive unit.



Point

Select either deceleration stop or sudden stop for [Pr.37] Stop group 1 sudden stop selection to [Pr.39] Stop group 3 sudden stop selection in detailed parameter 2. (The factory default setting is Deceleration stop.)

Order of priority for the stop processing

The order of priority for the RD75 stop processing is as follows.

(Deceleration stop) < (Sudden stop) < (Immediate stop)

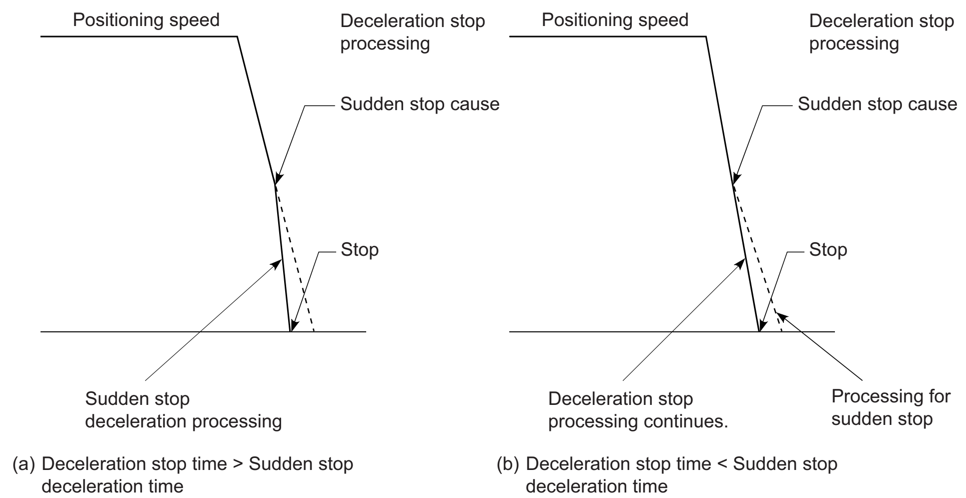
- If the deceleration stop command is on (stop signal is on) or a deceleration stop cause occurs during the deceleration to speed 0 (including automatic deceleration), the operation changes depending on the setting in [Cd.42] Stop command processing for deceleration stop selection. (☞ Page 274 Stop command processing for deceleration stop function)

Positioning control during the deceleration	Setting value of [Cd.42]	Processing
Manual control	—	Regardless of the setting of [Cd.42] Stop command processing for deceleration stop selection, a deceleration curve is re-processed from the speed at the occurrence of a stop cause.
OPR control, positioning control	0: Deceleration curve re-processing	A deceleration curve is re-processed from the speed at the occurrence of a stop cause (☞ Page 274 Deceleration curve re-processing).
	1: Deceleration curve continuation	The current deceleration curve is maintained after the occurrence of a stop cause (☞ Page 274 Deceleration curve continuation).

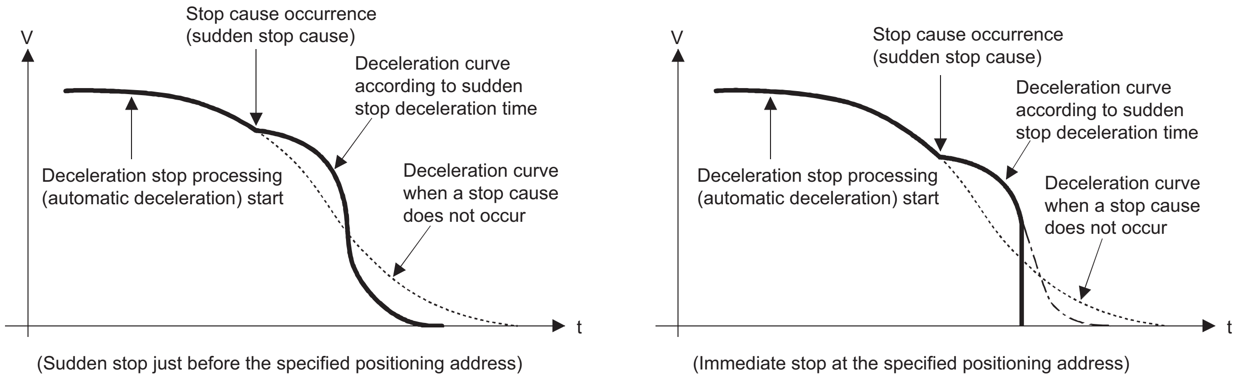
- If the on state of the stop signal or stop cause specified for a sudden stop occurs is detected during deceleration, the sudden stop processing will start at that point. However, if the sudden stop deceleration time is longer than the deceleration time, the deceleration stop processing will be continued even if a sudden stop cause occurs during the deceleration stop processing.

Example

The processing when a sudden stop cause occurred during deceleration stop is shown below.



- In the position control (including the speed-position switching control and position-speed switching control), the positioning may stop depending on the timing of the stop cause occurrence and the set value in [Pr.36] Sudden stop deceleration time.



Stop signal input during deceleration

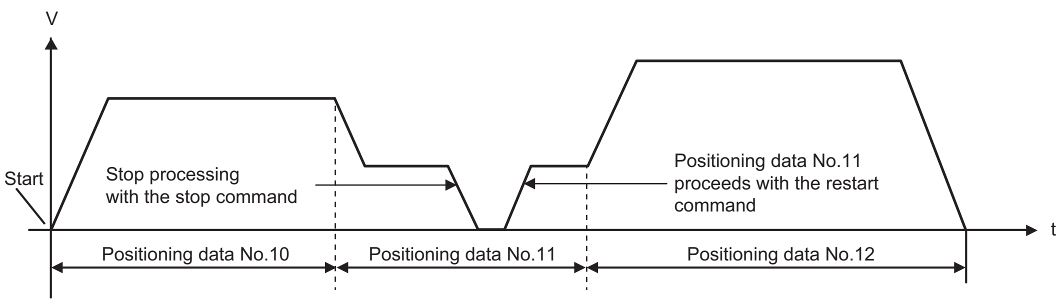
- Even if a stop signal is input during deceleration (including automatic deceleration), the positioning will stop with the current deceleration speed kept until it completely stops.
- When a stop signal is input during deceleration in the OPR control, the positioning will stop with the current deceleration speed kept until it completely stops. If the positioning operates at a creep speed, the positioning will immediately stop.
- If the stop cause specified for a sudden stop occurs during deceleration, the sudden stop processing will start at that point. The sudden stop processing during deceleration is performed only when the sudden stop time is shorter than the deceleration stop time.

1.3 Restarting

If the positioning control is stopped by a stop command (Axis stop signal [Y4, Y5, Y6, Y7] or a stop signal from an external device), the positioning can be restarted from the stopped position to the end point of the position control by using [Cd.6] Restart command. (However, restarting is not possible when the continuous operation is interrupted.)
This command is useful when performing the remaining positioning from the stopped position during the position control of the incremental system such as the INC linear 1. (The remaining distance does not need to be calculated.)

Operation

After a deceleration stop by a stop command is completed, write 1 to [Cd.6] Restart command while [Md.26] Axis operation status is Stopped. The positioning restarts.



Restrictions

- Restarting can be executed only when [Md.26] Axis operation status is Stopped (the deceleration stop by the stop command is completed). If [Md.26] Axis operation status is not Stopped, Restart not possible (Warning code: 0902H) occurs and restarting is not executed. The processing at that time will be continued.
- Restarting can be executed even while Positioning start signal is ON. However, do not turn off and on Positioning start signal while [Md.26] Axis operation status is Stopped. If Positioning start signal is turned off and on while [Md.26] Axis operation status is Stopped, the normal positioning (using the positioning data set in [Cd.3] Positioning start No.) is started.
- If PLC READY signal is turned off and on while [Md.26] Axis operation status is Stopped, the positioning control cannot be restarted. If a restart request is issued, Restart not possible (Warning code: 0902H) occurs.
- Do not execute restarting while the stop command is on. If restarting is attempted while the stop command is on, Stop signal ON at start (Error code: 1908H or 1909H) occurs and [Md.26] Axis operation status turns to Error. In this case, even if the error is reset, the operation cannot be restarted.
- If the positioning is ended with the continuous operation interrupt request, the operation cannot be restarted. If a restart request is issued, Restart not possible (Warning code: 0902H) occurs.
- When the positioning has been stopped with the interpolation operation, write 1: Restart into [Cd.6] Restart command for the reference axis and restart the positioning.
- If any of the reference partner axes executes the positioning operation once, Restart not possible (Warning code: 0902H) occurs, and the positioning cannot be restarted.
- When the machine OPR and fast OPR is stopped, OPR restart not possible (Error code: 1946H) occurs and the positioning cannot be restarted.
- When the manual operation is stopped, Restart not possible (Warning code: 0902H) occurs and the positioning cannot be restarted.

Setting method

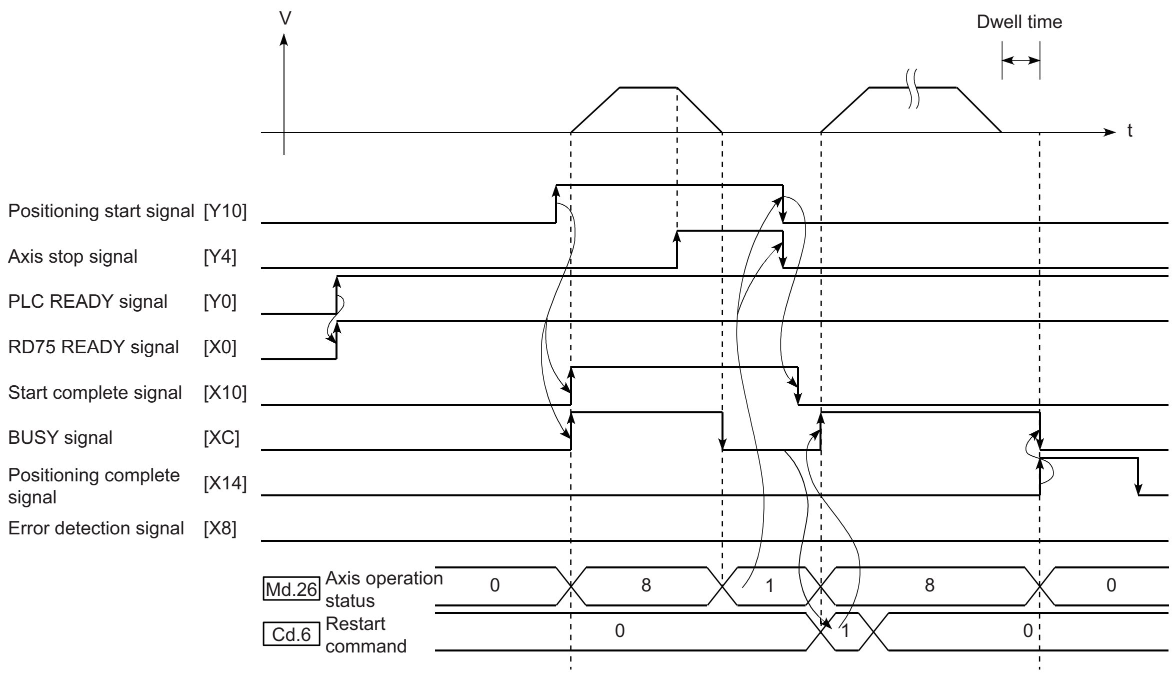
Set the following data to restart the positioning.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.6]	Restart command	1	Set 1: Restart.	1503	1603	1703	1803

For details on the settings, refer to the following.

☞ Page 479 [Cd.6] Restart command

Restart time chart



Program example

For the program example of the restart, refer to the following.

☞ Page 520 Restart program

2 OPR CONTROL

This chapter describes the details and usage of the OPR control.

2.1 Overview of the OPR Control

Two types of OPR controls

The OPR control establishes a start point (= OP) for performing the positioning control, and performs positioning toward that start point. This control is used to return the machine system located at a position other than the OP to the OP when the RD75 issues an OPR request with the power turned on or after the positioning stops.
In the RD75, the two types of controls shown below are defined as OPR control, following the flow of the OPR work. These two types of OPR controls can be executed by setting OPR parameter, setting Positioning start No.9001 and Positioning start No.9002 originally prepared for the RD75 in [Cd.3] Positioning start No., and turning on Positioning start signal.

OPR method	Description
Machine OPR (Positioning start No.9001)	Performs the OPR operation to establish a machine OP position. Subsequent positioning control operations are performed with reference to the OP established after the OPR operation is completed. When the system is powered on and a machine OP has yet to be established (the current value that the RD75 monitors and the actual machine position do not match), the machine OPR is required to be performed.
Fast OPR (Positioning start No.9002)	Performs the positioning toward the OP established by the machine OPR. Specifying positioning start No.9002 performs the fast OPR. Thus, the positioning to the OP can be performed without setting positioning data.

The OPR control can be performed by setting 9001 or 9002 for the start No. of the dedicated instruction GP.PSTRT□. For details on the dedicated instructions, refer to the following.
MELSEC iQ-R Programming Manual (Module Dedicated Instructions)
To perform Fast OPR, perform Machine OPR beforehand.

Restriction

In the following cases, the RD75 turns on OPR request flag ([Md.31] Status: b3), which indicates that the machine OPR needs to be performed.
- When the power is turned on
- When Drive unit READY signal ([Md.30] External I/O signal: b2) turns off
- When PLC READY signal [Y0] is turned off and on

While OPR request flag is on, the address information stored in the RD75 is not guaranteed. When the execution of the machine OPR is normally completed, OPR request flag turns off and OPR complete flag ([Md.31] Status: b4) turns on.

Sub functions specific to OPR

For details on Sub functions that can be combined with the OPR control, refer to the following.
MELSEC iQ-R Positioning Module User's Manual (Startup)
For details on each sub function, refer to the following.
Page 214 CONTROL SUB FUNCTIONS
[Information]
The following two sub functions are only related to the machine OPR.
○: Combination possible, △: Combination limited, ×: Combination not possible

Sub function name	Machine OPR	Fast OPR	Reference
OPR retry function	△	×	Page 216 OPR retry function
OP shift function	○	×	Page 220 OP shift function

When no OPR is required

In a system that does not need any OPR operation, OPR request flag ([Md.31] Status: b3) can be ignored to perform the positioning.

In this case, set all the OPR parameter areas ([Pr.43] to [Pr.57]) to their initial values or values that do not cause errors.

OPR using an engineering tool

Machine OPR and Fast OPR can be executed using the positioning test of the engineering tool. For details on the positioning test, refer to the following.

☞ Page 340 Positioning Test

2.2 Machine OPR

Operation overview of the machine OPR

Restriction

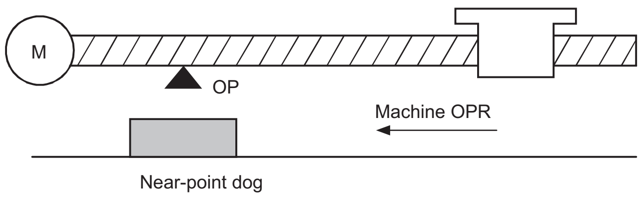
Use the OPR retry function when the OP position is not always in the same direction from the workpiece operation area (when the OP is not set near the upper or lower limit of the machine). The machine OPR may not be completed unless the OPR retry function is used.

Machine OPR operation

In the machine OPR, a machine OP is established.
This operation does not use the address information in the RD75, CPU module, and servo amplifiers at all.
After the machine OPR is completed, the mechanically specified position is handled as the OP, the start point for the positioning control.
The method for establishing an OP by the machine OPR depends on the setting of [Pr.43] OPR method.
The following shows the operation after the machine OPR is started.

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 using the method set in [Pr.43] OPR method, and the operation stops. (Refer to the following. ☞ Page 46 Near-point dog method to Page 60 Data setting method.)
4. If "a" is set as [Pr.45] OP address, "a" will be stored as the current position in [Md.20] Current feed value and [Md.21] Machine feed value which have been monitoring the position.
5. The machine OPR is completed.

[Pr.45] OP address is a fixed value set by users.



Machine OPR method

In the machine OPR, the method by which the machine OP is established (method for judging the position of the OP and the completion of the machine OPR) is specified according to the configuration and application of the positioning system.
The following table shows the seven methods provided as the OPR methods. The OPR method is one of the setting items of the OPR parameter and set in [Pr.43] OPR method.

[Pr.43] OPR method	Operation
Near-point dog method	The deceleration starts on the rising edge of Near-point dog. (The speed is reduced to [Pr.47] Creep speed.) After Near-point dog turns off, the workpiece stops at the first input of zero signals*1. The machine OPR is completed when the deviation counter clear output is completed. The position is set as an OP.
Stopper method 1	The point where a stopper is placed is set as an OP. After the deceleration starts on the rising edge of the near-point dog, the machine presses the workpiece against the stopper at the speed set in [Pr.47] Creep speed and stops. After the stop and the time set in [Pr.49] OPR dwell time elapses, the machine OPR is completed when the deviation counter clear output is completed.
Stopper method 2	The point where a stopper is placed is set as an OP. After the deceleration starts on the rising edge of the near-point dog, the machine presses the workpiece against the stopper at the speed set in [Pr.47] Creep speed and stops. After the stop and Zero signal*1 is detected, the machine OPR is completed when the deviation counter clear output is completed.
Stopper method 3	The point where a stopper is placed is set as an OP. The machine starts at the speed set in [Pr.47] Creep speed from the beginning, presses the workpiece against the stopper and stops. After the stop and Zero signal*1 is detected, the machine OPR is completed when the deviation counter clear output is completed.
Count method 1	After moving the distance set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog turns on, the machine stops at the first input of zero signals*1. The position where the machine stops is set as an OP. The deceleration starts on the rising edge of the near-point dog and the machine moves at the speed set in [Pr.47] Creep speed. After moving the distance set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog turns on, the machine stops at the first input of zero signals*1. When the deviation counter clear output is completed, the machine OPR is completed.
Count method 2	After moving the distance set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog turns on, the machine stops. The position where the machine stops is set as an OP. The deceleration starts on the rising edge of the near-point dog and the machine moves at the speed set in [Pr.47] Creep speed. After moving the distance set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog turns on, the machine stops and the machine OPR is completed.
Data setting method	The point where the machine OPR starts is set as an OP. After the deviation counter clear output is completed, the current feed value and machine feed value are overwritten with the OP address, and the machine OPR is completed.
Limit switch combined method	After the start, the machine moves in the OPR direction, decelerates and stops at the limit switch OFF, then moves in the opposite direction at the speed set in [Pr.47] Creep speed. After the limit switch turns on, the machine stops at the first input of zero signals*1. The machine OPR is completed when the deviation counter clear output is completed.

*1 The following shows the signals input as the zero signals of the RD75 in each OPR method.

Near-point dog method, count method 1, limit switch combined method:	Signal that is output as a single pulse at every motor revolution (including Z-phase signal output from the drive unit)
Stopper method 2 and 3:	Signal that is output at the detection of the contact with the stopper. (This signal is input externally.)

The following table shows the external I/O signals used for the machine OPR.

◎: Required ○: Use as required —: Not required

[Pr.43] OPR method	Signal required for control				Torque limit
	Near-point dog	Zero signal	Upper/lower limit switches	Deviation counter clear output	
Near-point dog method	◎	◎	○	◎	—
Stopper method 1	◎	—	○	◎	◎
Stopper method 2	◎	◎	○	◎	◎
Stopper method 3	—	◎	○	◎	◎
Count method 1	◎	◎	○	◎	—
Count method 2	◎	—	○	—	—
Data setting method	—	—	—	◎	—
Limit switch combined method	—	◎	◎	◎	—

Point

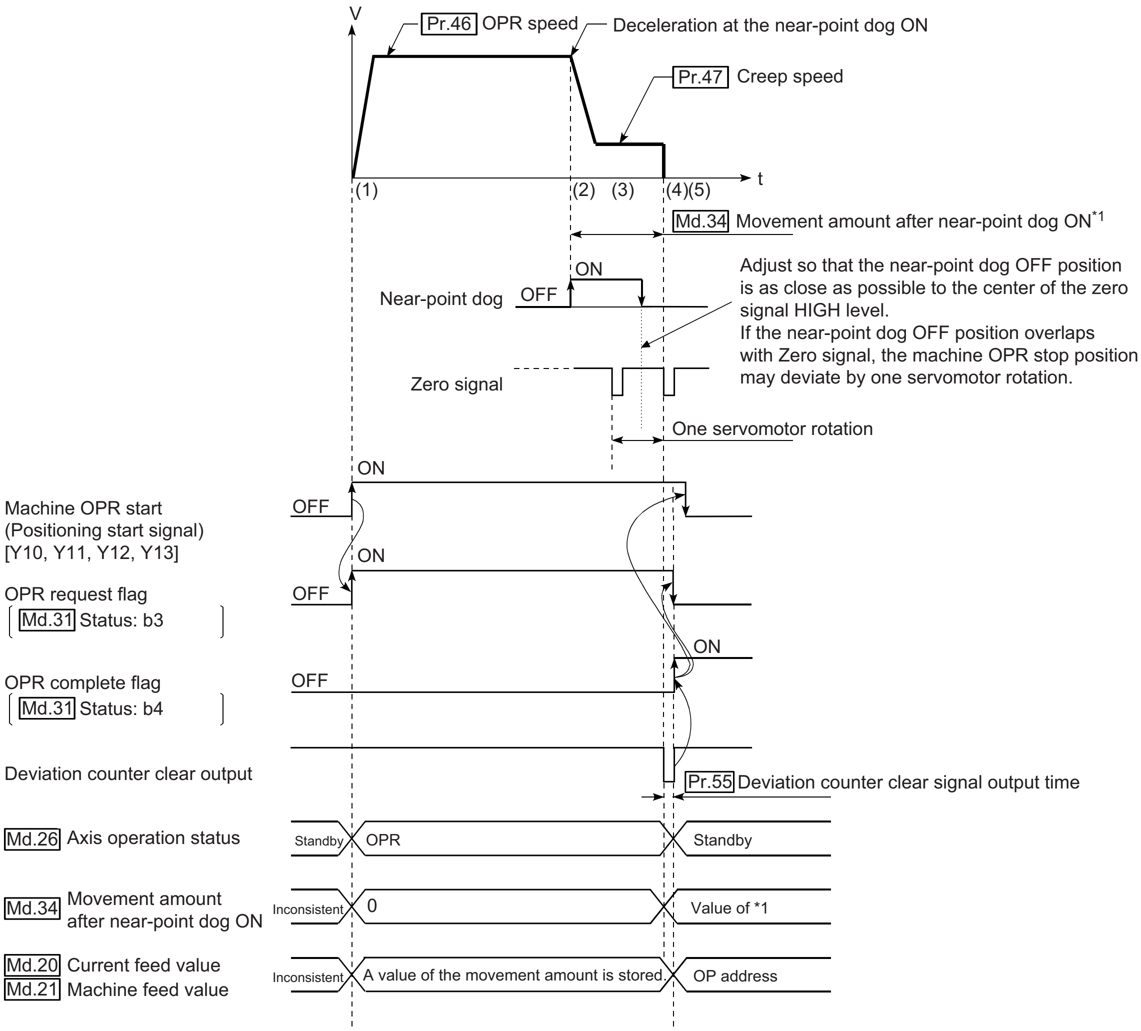
Creep speed

A creep speed is very slow. The stopping accuracy is low when the machine suddenly stops from a fast speed. To improve the stopping accuracy of the machine, change the speed to a slow speed. Set this speed in [Pr.47] Creep speed.

Near-point dog method

The following shows an operation overview of the near-point dog method, one of the OPR methods.

Operation chart



(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)

(2) When the on state of the near-point dog is detected, the machine starts decelerating.

(3) The machine decelerates to the speed set in [Pr.47] Creep speed and moves at the creep speed after that.
(During the deceleration, the near-point dog must be on. Otherwise the deceleration stop will occur.)

(4) After the near-point dog turns off and at the first input of zero signals, the RD75 stops outputting pulses and produces Deviation counter clear output to the drive unit.
(Deviation counter clear signal output time is set in [Pr.55].)

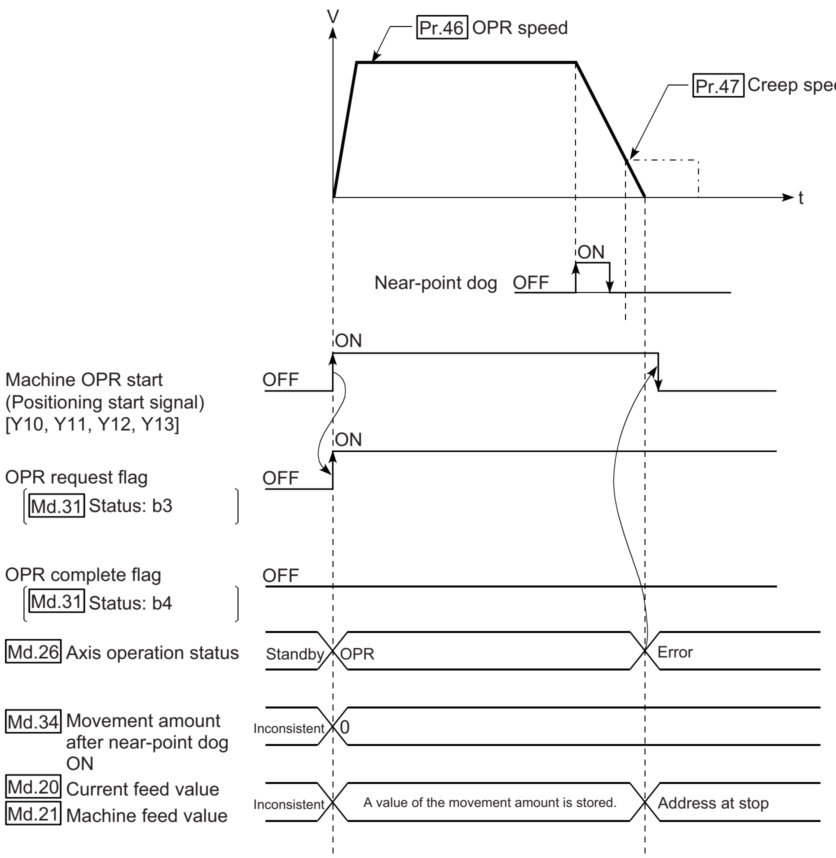
(5) After Deviation counter clear output is completed, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

Restrictions

A pulse generator with a zero signal is required. When using a pulse generator without a zero signal, produce a zero signal using an external signal.

Precautions during the operation

- Start at OP (Error code: 1940H) will occur if another machine OPR is attempted after the completion of the machine OPR when the OPR retry function has not been set ([Pr.48] OPR retry is 0).
- When the machine OPR is started at a point where the near-point dog is on, the machine starts moving at the speed set in [Pr.47] Creep speed.
- The near-point dog must be on during the deceleration from the OPR speed to the speed set in [Pr.47] Creep speed. The workpiece will continue decelerating and stop if the near-point dog is turned off before it has decelerated to the creep speed, causing Dog detection timing fault (Error code: 1941H).
- If the OPR retry function has not been set ([Pr.48] OPR retry is 0) and an OPR operation is performed in the situation above, the machine moves until it reaches a limit switch and Hardware stroke limit (+)/Hardware stroke limit (-) (Error code: 1905H/1907H) will occur. In this case, perform the manual control to move the workpiece to a position closer to the start position than the near-point dog and perform the OPR operation again.

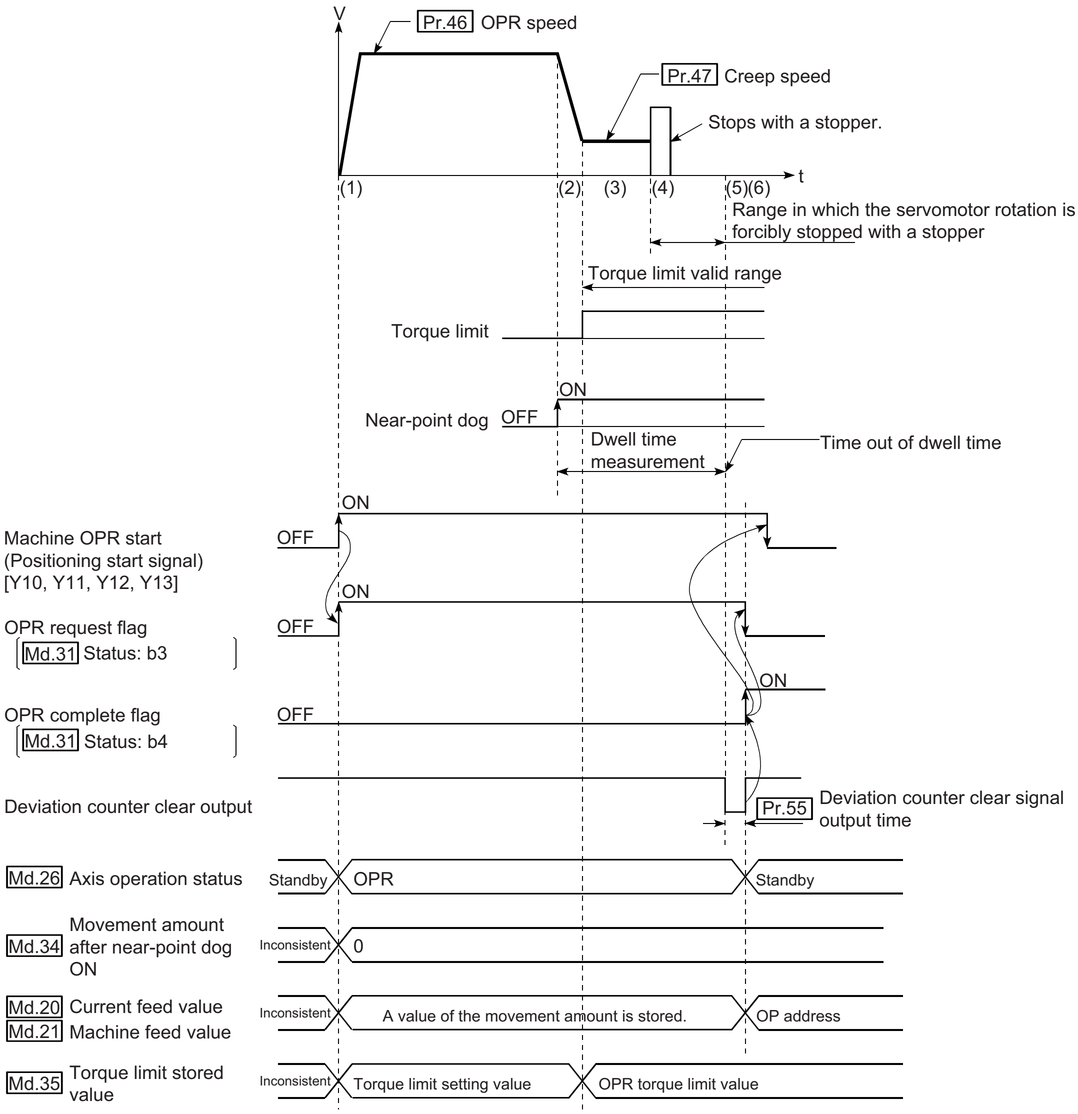


- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Stopper method 1

The following shows an operation overview of the stopper method 1, one of the OPR methods.

Operation chart



(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)

(2) When the on state of the near-point dog is detected, the machine starts decelerating.

(3) The machine decelerates to the speed set in [Pr.47] Creep speed and moves at the creep speed after that.
(The torque must be limited for this operation. Otherwise the servomotor may be damaged in step (4).)

(4) The machine presses the workpiece against the stopper at the creep speed and stops.

(5) When the time set in [Pr.49] OPR dwell time has elapsed after the near-point dog was turned on, the RD75 stops outputting pulses and produces Deviation counter clear output to the drive unit.
(Deviation counter clear signal output time is set in [Pr.55].)

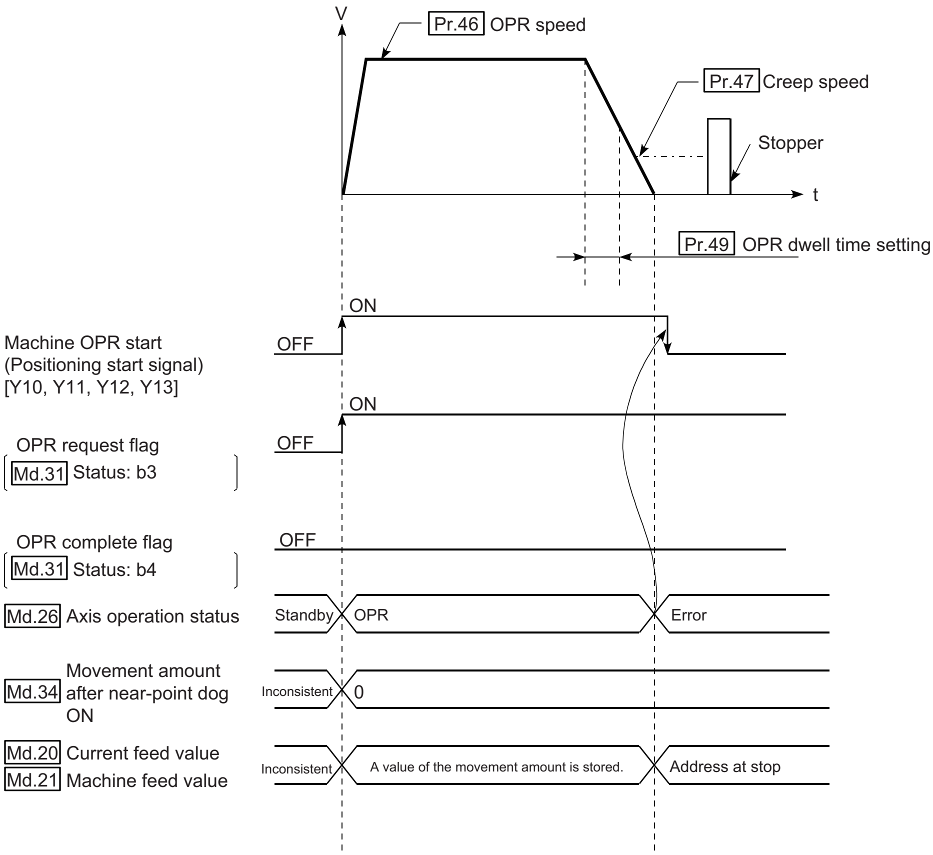
(6) After Deviation counter clear output is completed, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

Restrictions

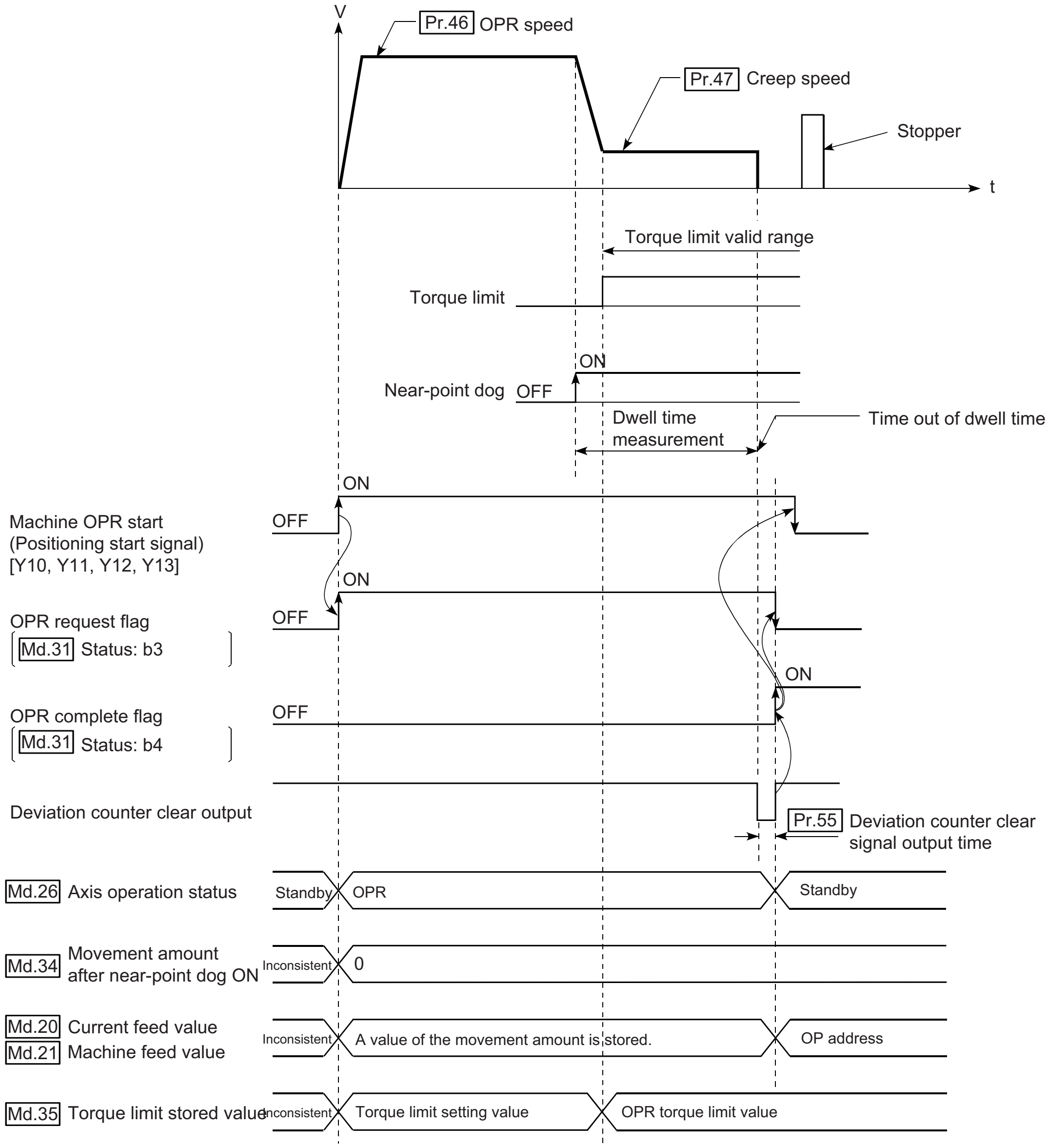
Always limit the servomotor torque after the speed reaches the speed set in [Pr.47] Creep speed.
Otherwise the servomotor may be damaged when the workpiece hits to the stopper. (☞ Page 237 Torque limit function)

Precautions during the operation

- Set [Pr.49] OPR dwell time to the time that is equal to or longer than the movement time taken from when the near-point dog turns on to when the workpiece hits to the stopper.
- The machine will continue decelerating and stop if the time set in [Pr.49] OPR dwell time elapses during the deceleration from the speed set in [Pr.46] OPR speed, and Dwell time fault (Error code: 1943H) occurs.



- If the time set in [Pr.49] OPR dwell time elapses before stopping at the stopper, the workpiece will stop at that position, and the position will be set as an OP. In this case, no error will occur.

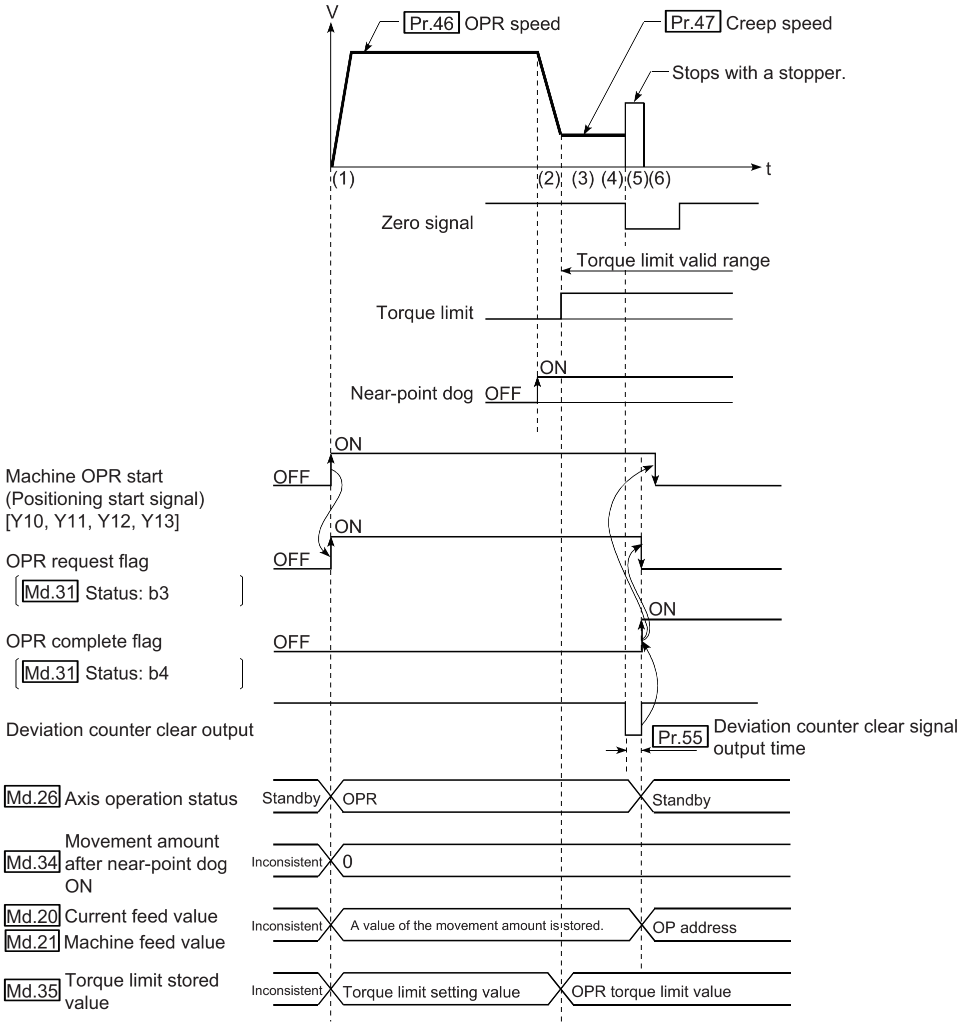


- The near-point dog must be on until the workpiece hits to the stopper. If there is a section in which the near-point dog is off between the near point dog and the stopper, and a machine OPR operation is executed from a point in the section, the workpiece will hit to the stopper at the OPR speed.
- If the machine OPR is started while the near-point dog is on, the workpiece starts traveling at the speed set in [Pr.47] Creep speed.
- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Stopper method 2

The following shows an operation overview of the stopper method 2, one of the OPR methods.

Operation chart



(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)

(2) When the on state of the near-point dog is detected, the machine starts decelerating.

(3) The machine decelerates to the speed set in [Pr.47] Creep speed and moves at the creep speed after that.
(The torque must be limited for this operation. Otherwise the servomotor may be damaged in step (4).)

(4) The machine presses the workpiece against the stopper at the creep speed and stops.

(5) After the stop and a zero signal is input, the RD75 stops outputting pulses and produces Deviation counter clear output to the drive unit.
(Deviation counter clear signal output time is set in [Pr.55].)

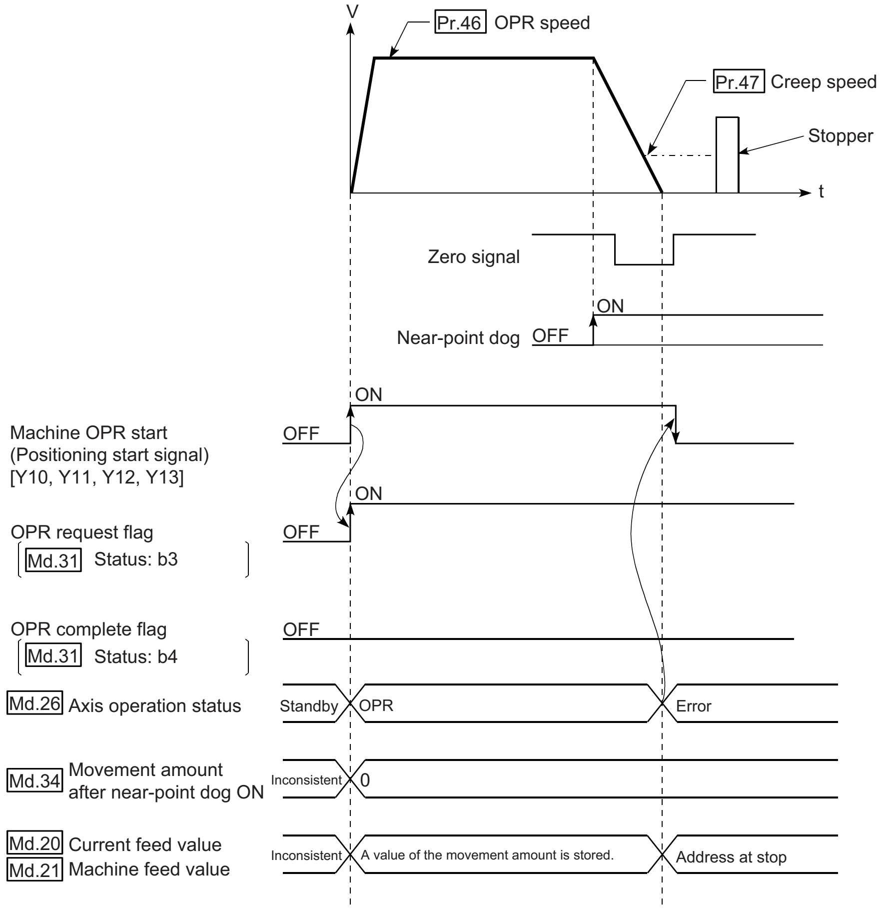
(6) After Deviation counter clear output is completed, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

Restrictions

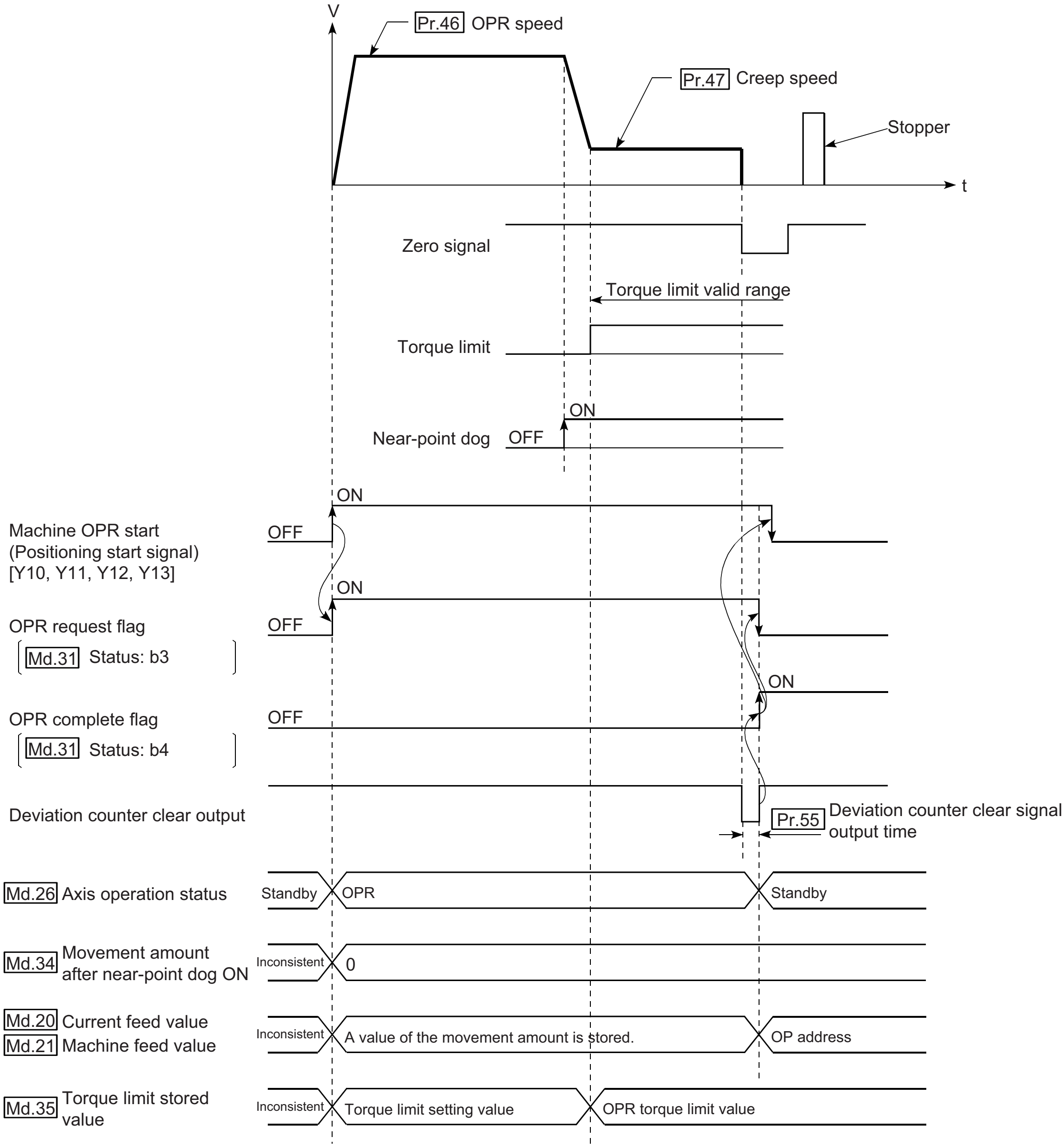
- Always limit the servomotor torque after the speed reaches the speed set in [Pr.47] Creep speed. Otherwise the servomotor may be damaged when the workpiece hits to the stopper. (☞ Page 237 Torque limit function)
- Use an external input signal as a zero signal.

Precautions during the operation

- Input a zero signal from an external source after the workpiece hits to the stopper. If a zero signal is input before the deceleration to the speed set in [Pr.47] Creep speed is completed, the machine will continue decelerating and stop and Zero signal detection timing fault (Error code: 1942H) will occur.



- If a zero signal is input before the workpiece stops at the stopper, the workpiece stops at that position and the position is set as an OP. In this case, no error will occur.

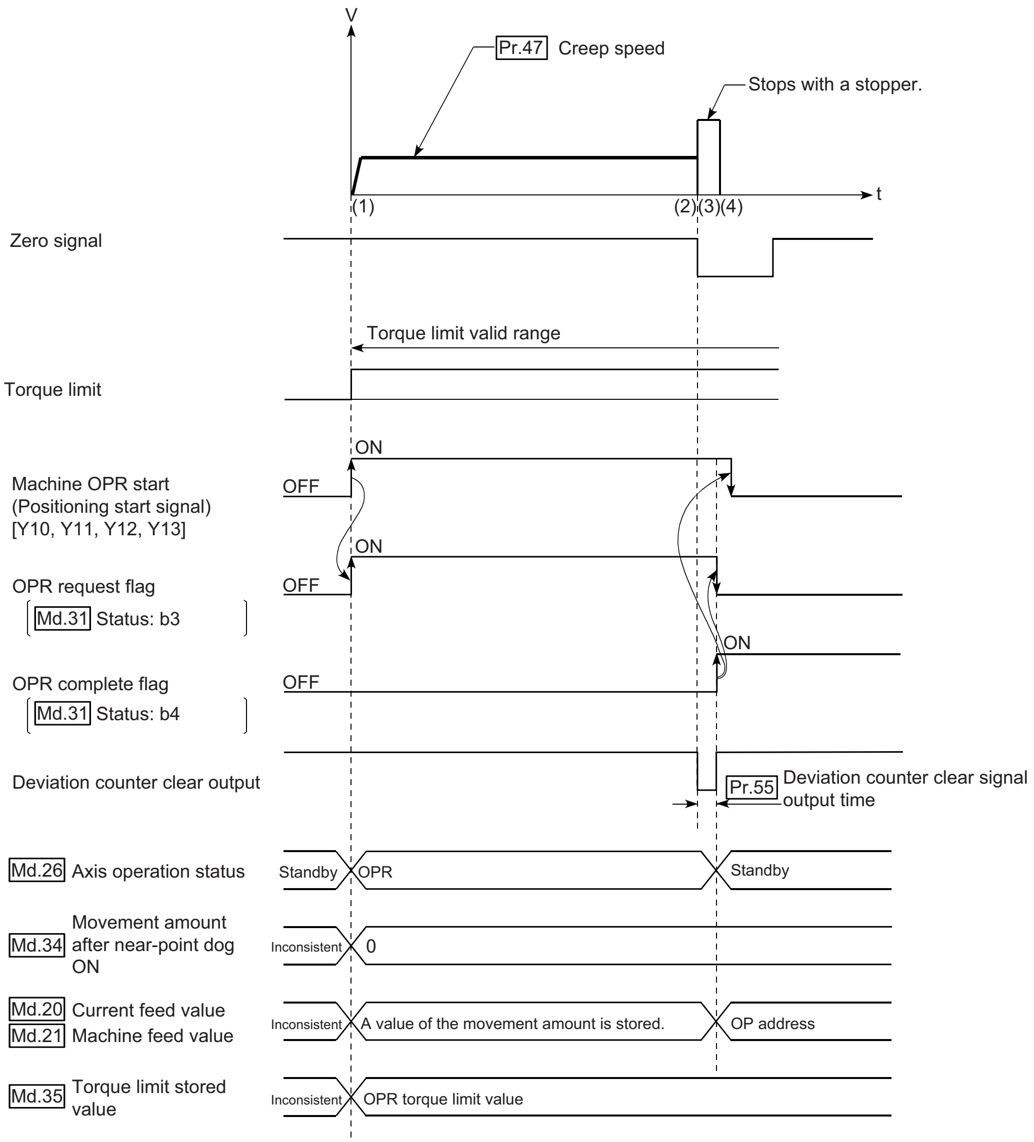


- The near-point dog must be on until the workpiece hits to the stopper. If there is a section in which the near-point dog is off between the near point dog and the stopper, and a machine OPR operation is executed from a point in the section, the workpiece will hit to the stopper at the OPR speed.
- If the machine OPR is started while the near-point dog is on, the workpiece starts traveling at the speed set in [Pr.47] Creep speed.
- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Stopper method 3

The following shows an operation overview of the stopper method 3, one of the OPR methods.
Stopper method 3 is useful for a system in which a near-point dog cannot be installed. (Note that the workpiece starts traveling at the speed set in [Pr.47] Creep speed, which means that it takes some time until the machine OPR is completed.)

Operation chart



(1) The machine OPR is started.
(The machine moves at the speed set in [Pr.47] Creep speed in the direction specified in [Pr.44] OPR direction. The torque must be limited for this operation. Otherwise the servomotor may be damaged in step (2).)

(2) The machine presses the workpiece against the stopper at the speed set in [Pr.47] Creep speed and stops.

(3) After the stop and a zero signal is input, the RD75 stops outputting pulses and produces Deviation counter clear output to the drive unit.
(Deviation counter clear signal output time is set in [Pr.55].)

(4) After Deviation counter clear output is completed, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

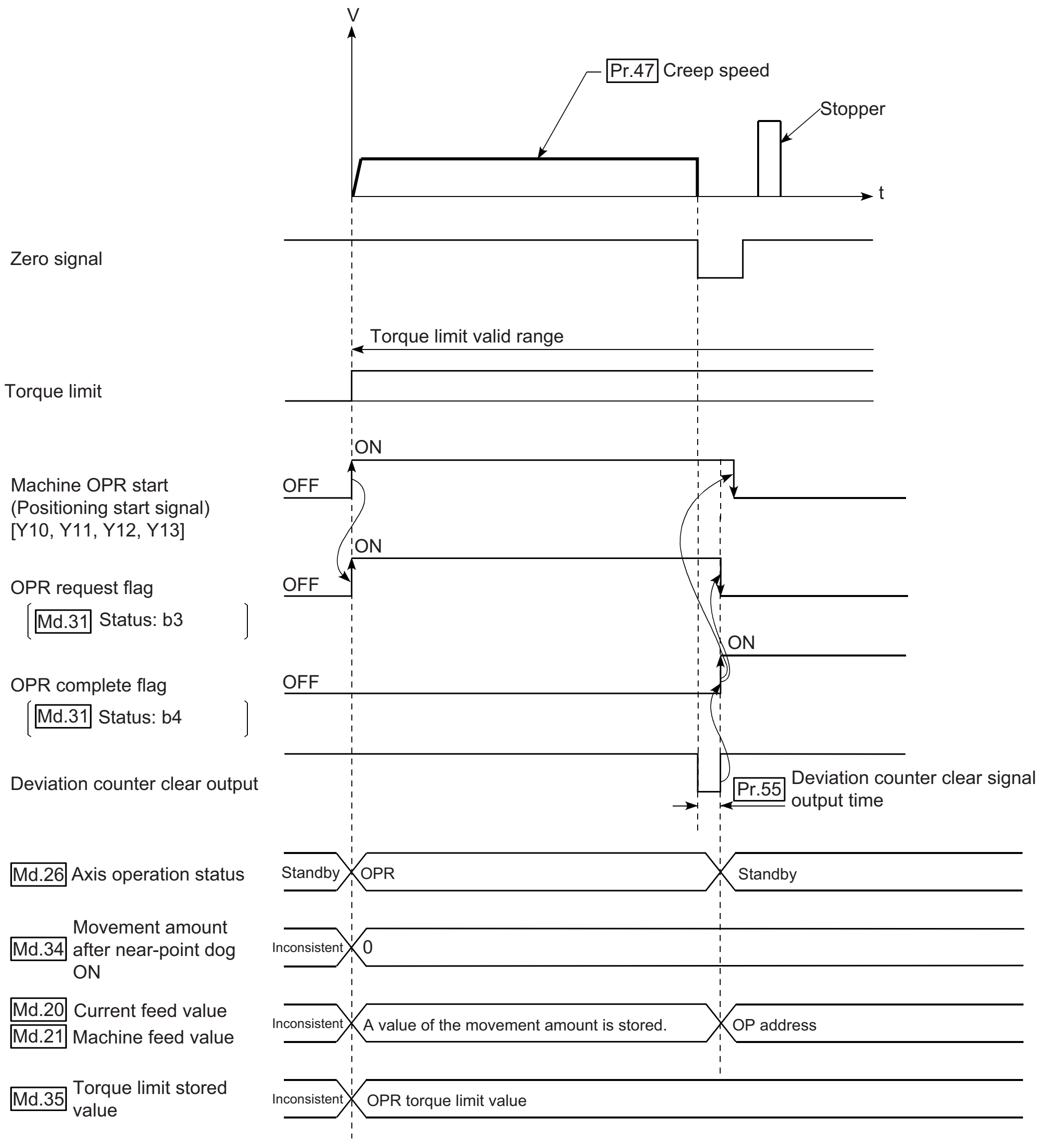
Restrictions

- Always limit the servomotor torque after the speed reaches the speed set in [Pr.47] Creep speed. Otherwise the servomotor may be damaged when the workpiece hits to the stopper. (☞ Page 237 Torque limit function)
- Use an external input signal as a zero signal.
- The OPR retry function cannot be used for Stopper method 3.

2

Precautions during the operation

- If a zero signal is input before the workpiece stops at the stopper, the workpiece stops at that position and the position is set as an OP. In this case, no error will occur.



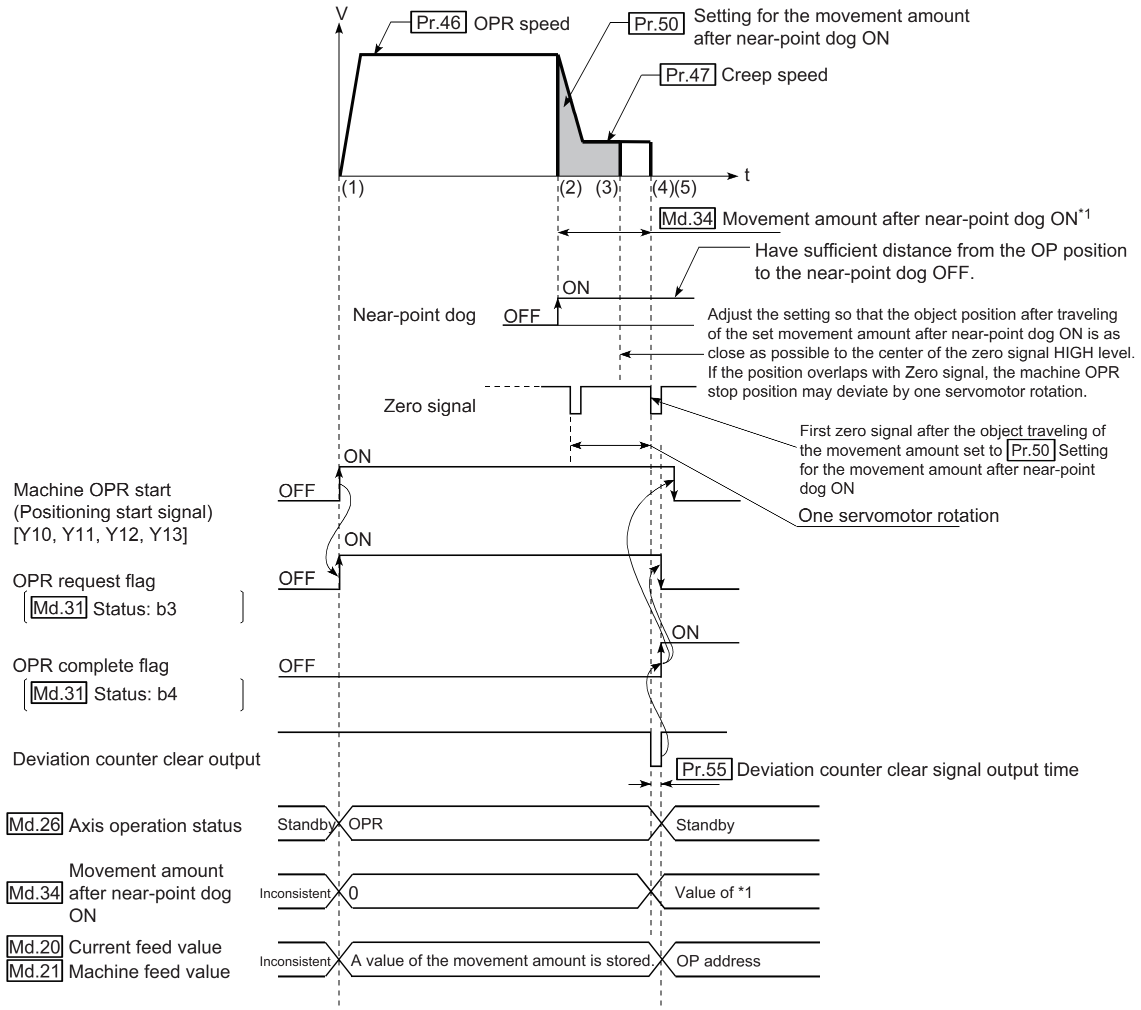
- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Count method 1

The following shows an operation overview of Count method 1, one of the OPR methods. If a machine OPR operation is started using Count method 1 from a point where the near-point dog is on, the machine moves in the direction reverse to the OPR direction to go back to a point where the near-point dog turns off, and a normal machine OPR operation is performed.
The machine OPR can be performed using Count method 1 even in the following situations.

- Where the near-point dog is on
- After the machine OPR is completed

Operation chart



(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)

(2) When the on state of the near-point dog is detected, the machine starts decelerating.

(3) The machine decelerates to the speed set in [Pr.47] Creep speed and moves at the creep speed after that.

(4) When the first zero signal is detected after the axis has traveled the movement amount set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog is turned on, the RD75 stops outputting pulses and produces Deviation counter clear output to the drive unit. (Deviation counter clear signal output time is set in [Pr.55].)

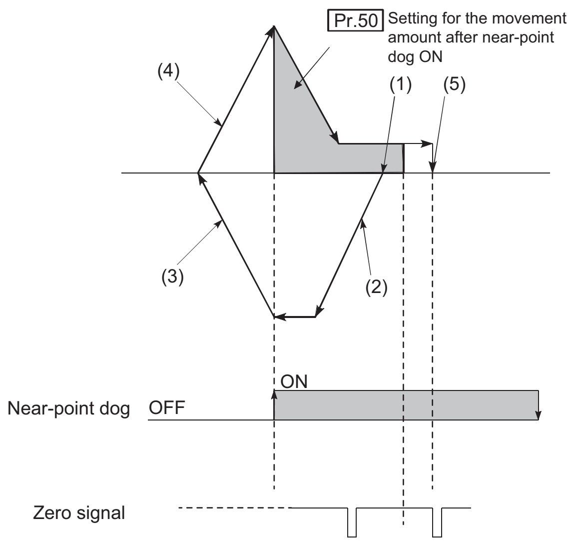
(5) After Deviation counter clear output is completed, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

Restrictions

A pulse generator with a zero signal is required. When using a pulse generator without a zero signal, produce a zero signal using an external signal.

Precautions during the operation

- If the distance set in [Pr.50] Setting for the movement amount after near-point dog ON is shorter than the deceleration distance from [Pr.46] OPR speed to deceleration stop, Count method movement amount fault (Error code: 1944H) occurs and the operation does not start.
- If the speed is changed to a speed faster than the speed set in [Pr.46] OPR speed using the speed change function (☞ Page 248 Speed change function) during a machine OPR operation, the distance required for deceleration stop may not be ensured depending on the setting of [Pr.50] Setting for the movement amount after near-point dog ON. In this case, Count method movement amount fault (Error code: 1944H) occurs and the machine OPR is stopped.
- The following shows the operation performed when the machine OPR is started while the near-point dog is on.



[Operation when the machine OPR is started from a point where the near-point dog is on]

(1) A machine OPR is started.

(2) The machine moves at the OPR speed in the direction reverse to the specified OPR direction.

(3) The deceleration processing is performed according to the setting of [Pr.39] Stop group 3 sudden stop selection when the off state of the near-point dog is detected.

(4) After the machine stops, the machine OPR is performed in the specified OPR direction.

(5) The machine OPR is completed after the deviation counter clear output is provided on the detection of the first zero signal after the workpiece travels for the movement amount set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the on state of the near-point dog is detected.

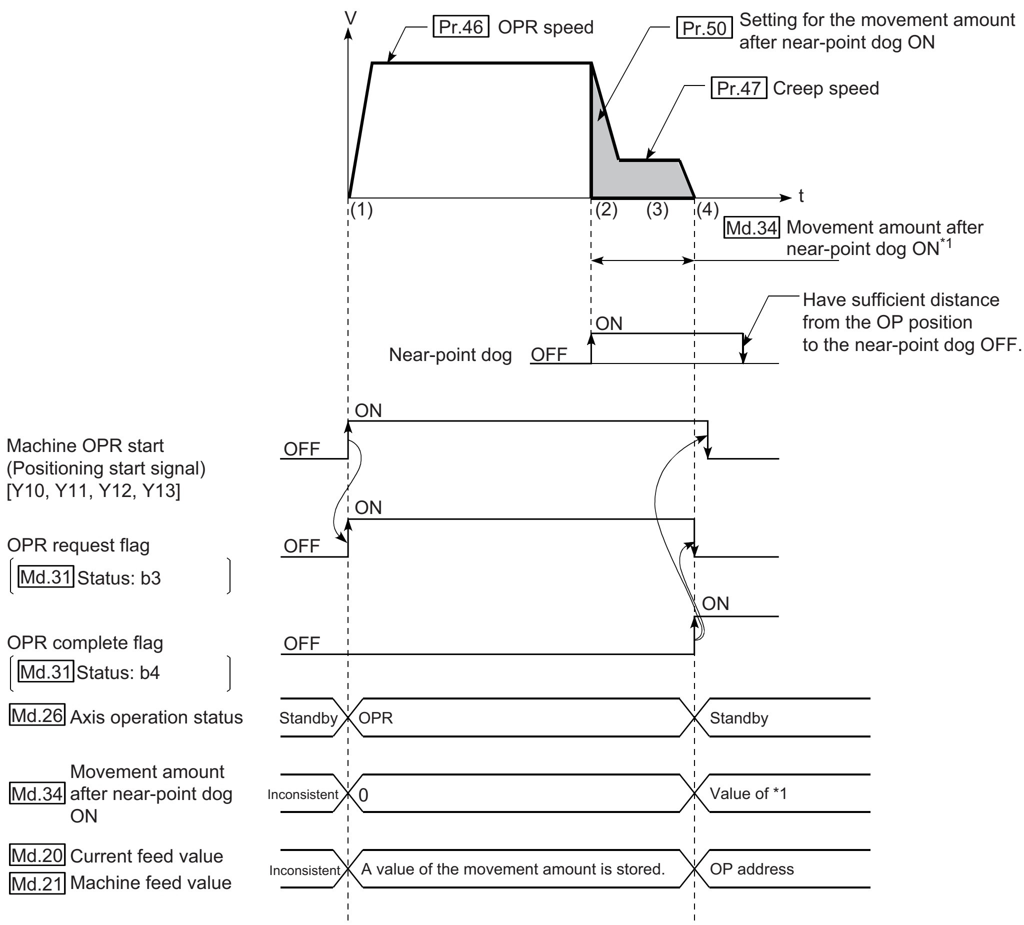
- The near-point dog must be turned off at a sufficient distance from the OP. There is no harm in operation even if the near-point dog is turned off during a machine OPR. However, ensuring a sufficient distance from the OP is recommended for the following reasons when the near-point dog is turned off.
  - If the workpiece is at a point where the near-point dog is still on when the machine OPR is completed, another machine OPR can be performed from that point even though OPR complete flag ([Md.31] Status: b4) is on.
  - If the workpiece is at a point where the near-point dog is off when the machine OPR is completed and another OPR is performed, the workpiece travels at the OPR speed until it reaches a limit switch. This causes Hardware stroke limit (+)/Hardware stroke limit (-) (Error code: 1905H/1907H). If a sufficient distance cannot be ensured for Near-point dog signal to be turned on, use the OPR retry function. When the OPR retry function is used, a retry operation can be performed using limit switches.
- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Count method 2

The following shows an operation overview of Count method 2, one of the OPR methods.
If a machine OPR operation is started using Count method 2 from a point where the near-point dog is on, the machine moves in the direction reverse to the OPR direction to go back to a point where the near-point dog turns off, and a normal machine OPR operation is performed.
Count method 2 is useful for a system that cannot use Zero signal. (Note that compared with Count method 1, the variation of the stop position occurs in the machine OPR.)
As well as Count method 1, the machine OPR operation can be performed using Count method 2 even in the following situations.

- Where the near-point dog is on
- After the machine OPR is completed

Operation chart



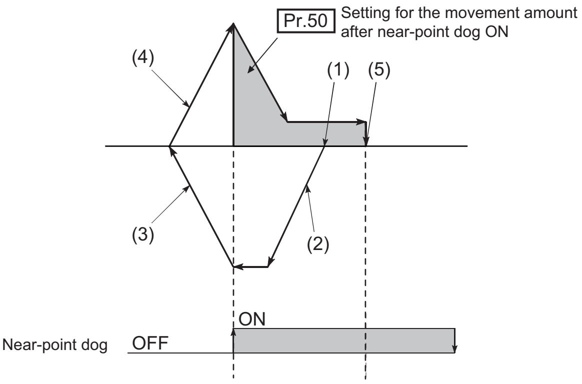
(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)
(2) When the on state of the near-point dog is detected, the machine starts decelerating.
(3) The machine decelerates to the speed set in [Pr.47] Creep speed and moves at the creep speed after that.
(4) When the machine moves for the movement amount set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the near-point dog signal on, the RD75 stops outputting pulses and the machine OPR will be completed.

Restrictions

Since an error of approximately 1ms occurs in taking in the on state of the near-point dog, the variation of the stop position (OP) occurs compared with other OPR methods.

Precautions during the operation

- If the distance set in [Pr.50] Setting for the movement amount after near-point dog ON is shorter than the deceleration distance from [Pr.46] OPR speed to deceleration stop, Count method movement amount fault (Error code: 1944H) occurs and the operation does not start.
- If the speed is changed to a speed faster than the speed set in [Pr.46] OPR speed using the speed change function (☞ Page 248 Speed change function) during a machine OPR operation, the distance required for deceleration stop may not be ensured depending on the setting of [Pr.50] Setting for the movement amount after near-point dog ON. In this case, Count method movement amount fault (Error code: 1944H) occurs and the machine OPR is stopped.
- The following shows the operation performed when the machine OPR is started while the near-point dog is on.



[Operation when the machine OPR is started from a point where the near-point dog is on]

(1) A machine OPR is started.

(2) The machine moves at the OPR speed in the direction reverse to the specified OPR direction.

(3) The deceleration processing is performed according to the setting of [Pr.39] Stop group 3 sudden stop selection when the off state of the near-point dog is detected.

(4) After the machine stops, the machine OPR is performed in the specified OPR direction.

(5) When the machine moves for the movement amount set in [Pr.50] Setting for the movement amount after near-point dog ON from the point where the on state of the near-point dog is detected, the machine OPR will be completed.

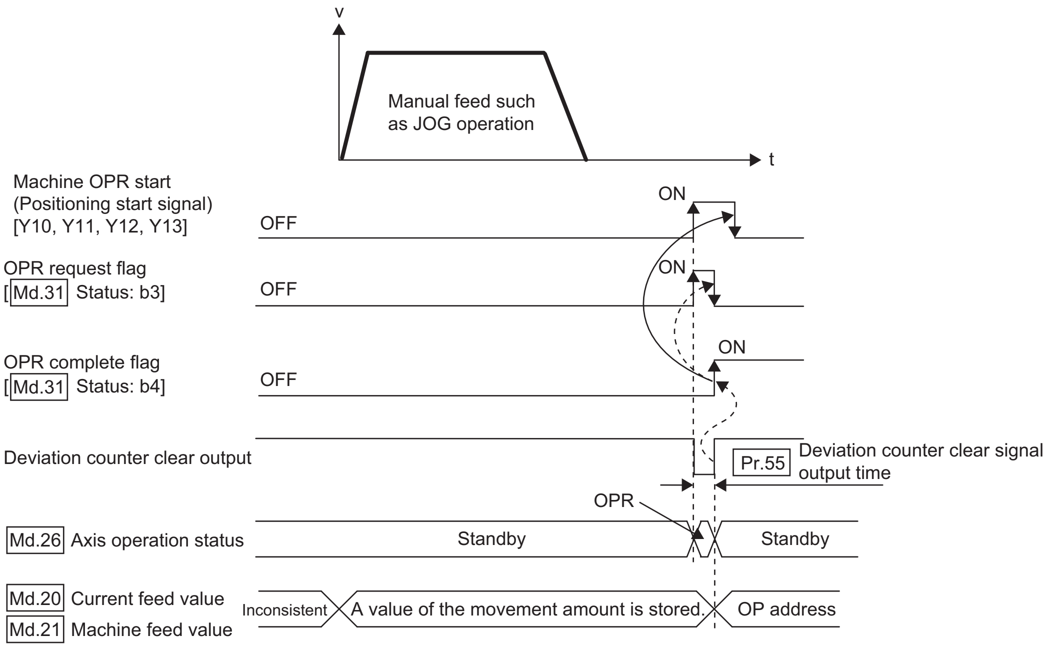
- The near-point dog must be turned off at a sufficient distance from the OP. There is no harm in operation even if the near-point dog is turned off during a machine OPR. However, ensuring a sufficient distance from the OP is recommended for the following reasons when the near-point dog is turned off.
  - If the workpiece is at a point where the near-point dog is still on when the machine OPR is completed, another machine OPR can be performed from that point even though OPR complete flag ([Md.31] Status: b4) is on.
  - If the workpiece is at a point where the near-point dog is off when the machine OPR is completed and another OPR is performed, the workpiece travels at the OPR speed until it reaches a limit switch. This causes Hardware stroke limit (+)/Hardware stroke limit (-) (Error code: 1905H/1907H). If a sufficient distance cannot be ensured for Near-point dog signal to be turned on, use the OPR retry function. When the OPR retry function is used, a retry operation can be performed using limit switches.
- When the machine OPR has been stopped by a stop signal, perform the machine OPR again. If Restart command is turned on after the stop by a stop signal, OPR restart not possible (Error code: 1946H) occurs.

Data setting method

Data setting method is used to set a point at which the workpiece is positioned by a manual feed such as JOG operation as an OP.

When the machine OPR is performed using the data setting method, Deviation counter clear signal is output to the drive unit and the current feed value and machine feed value are overwritten with the OP address.

Operation chart

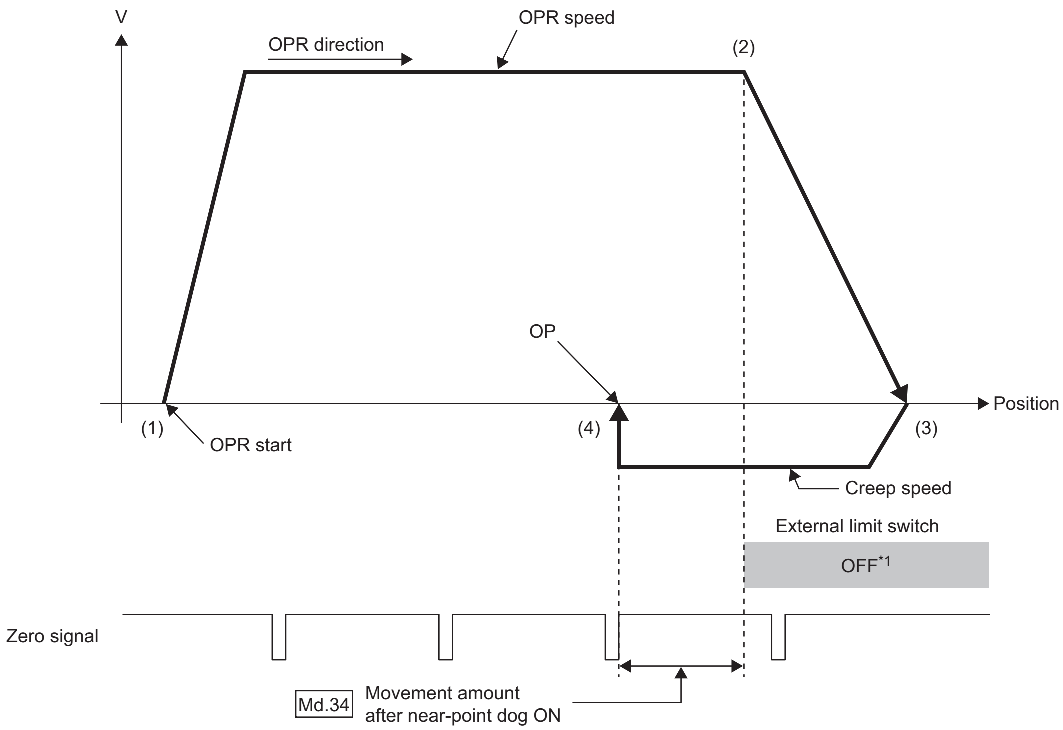


Precautions during the operation

- The OPR parameter areas ([Pr.44] to [Pr.57]) other than [Pr.45] OP address and [Pr.55] Deviation counter clear signal output time are not used for the data setting method. However, if a set value is outside the setting range and PLC READY signal [Y0] is turned on, an error occurs and RD75 READY signal [X0] does not turn on. To avoid the occurrence of an error when PLC READY signal [Y0] is turned on, set values within the setting range (or initial values) for the unused OPR parameter areas.
- When performing an OPR operation using Data setting method for a device for which the backlash compensation function is used, perform the manual control beforehand. Otherwise the backlash compensation cannot be properly executed.

Limit switch combined method

The following shows an operation overview of the limit switch combined method, one of the OPR methods.



*1 The external limit switch is handled as a normally closed contact.

(1) The machine OPR is started.
(The machine starts accelerating according to the setting of [Pr.51] OPR acceleration time selection in the direction specified in [Pr.44] OPR direction, and moves at the speed set in [Pr.46] OPR speed when the acceleration is completed.)

(2) When the OFF state of the limit switch is detected, the machine starts decelerating.

(3) When the time set in [Pr.57] Dwell time during OPR retry has elapsed after the deceleration stop, the machine moves in the direction opposite to that set in [Pr.44] OPR direction at a speed set in [Pr.47] Creep speed.

(4) At the first input of zero signals after the limit switch turns on, the RD75 stops outputting pulses and Deviation counter clear signal is output to the drive unit. (The signal is output for the period set in [Pr.55] Deviation counter clear signal output time.

(5) After the output completion of Deviation counter clear signal, OPR complete flag ([Md.31] Status: b4) turns on and OPR request flag ([Md.31] Status: b3) turns off.

Precautions during the operation

- When the limit switch opposite to the OPR direction turns off, the machine decelerates and stops without the completion of OPR, and an error (Hardware stroke limit (+) (Error code: 1905H) or Hardware stroke limit (-) (Error code: 1907H)) occurs.
- The machine moves in the direction opposite to the OPR direction at a creep speed by performing the OPR while the limit switch in the OPR direction is in OFF state.
- The OPR retry function cannot be used for the limit switch combined method. [Pr.57] Dwell time during OPR retry is always validated, though.
- Consider the deceleration distance when installing the limit switch since the machine decelerates and stops after the limit switch is turned off.

2.3 Fast OPR

Operation overview of the fast OPR

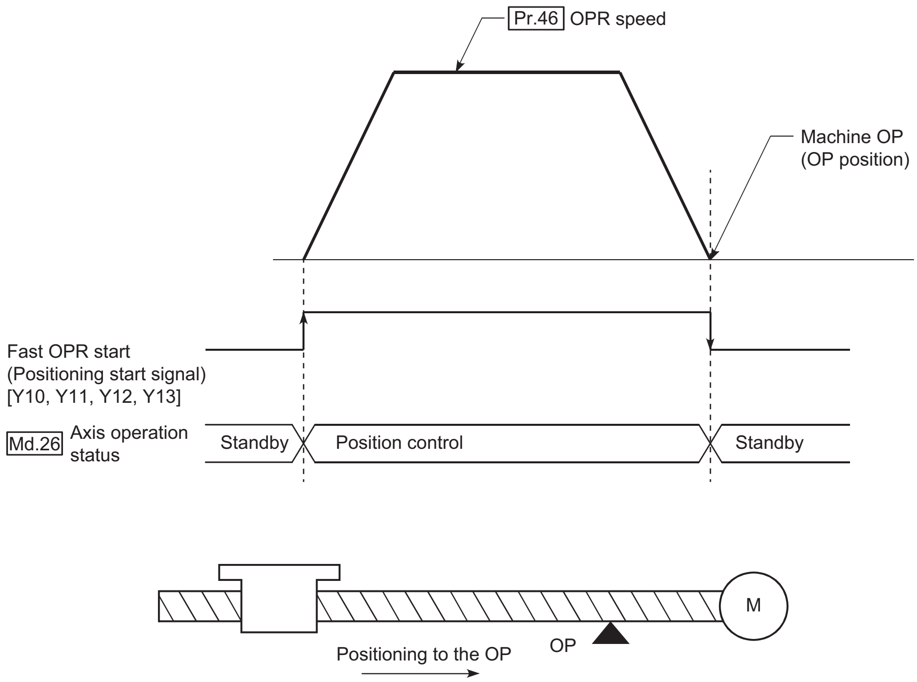
Fast OPR operation

After the OP position is established by performing a machine OPR, the positioning control to the OP position is executed without using a near-point dog or zero signal.
The following shows the operation after the fast OPR is started.

1. The fast OPR is started.

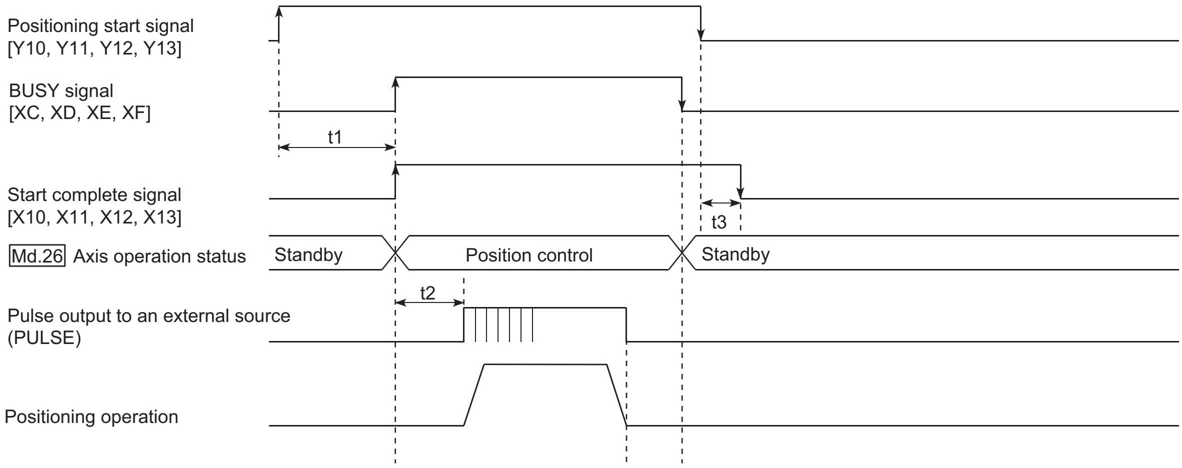
2. The positioning control to the OP position established by a machine OPR operation is performed at the speed set in the OPR parameter areas ([Pr.43] to [Pr.57]).

3. The fast OPR is completed.



Operation timing and the processing time

The following shows the details on the operation timing and processing time in the fast OPR.



Normal timing time

t1	t2	t3
0.2 to 0.3ms	0.1ms or less	0 to 0.88ms

Precautions during the operation

- The fast OPR can only be executed after the OP is established by executing the machine OPR. Otherwise, OPR request ON (Error code: 1945H) occurs. (OPR request flag ([Md.31] Status: b3) must be off.)
- If the pulse for the fraction after the decimal point is cleared to 0 by using the current value change or fixed-feed control, executing the fast OPR causes an error equivalent to the cleared pulse.
- When a limitless-feed operation is executed by the speed control and the machine feed value overflows or underflows once, the fast OPR cannot be executed normally.
- OPR complete flag ([Md.31] Status: b4) does not turn on.
- The axis operation status during the fast OPR is Position control.

3 MAJOR POSITIONING CONTROL

This chapter describes the details and usage of the major positioning control (the control function using Positioning data).
As the major positioning control, Position control (positioning to the specified position using address information), Speed control (controlling a rotating body at a fixed speed), Speed-position switching control (switching the control type from Speed control to Position control), Position-speed switching control (switching the control type from Position control to Speed control), and others are provided.
Configure the settings required for each control.

3.1 Overview of the Major Positioning Controls

Major positioning controls are performed using Positioning data stored in the RD75.
The positioning controls, such as the position control and speed control, are executed by setting the required items in this Positioning data and starting that positioning data.
The control method of Major positioning control is set in [Da.2] Control method of the positioning data.
The control defined as Major positioning control performs the following control depending on the setting in [Da.2] Control method.

Major positioning control			[Da.2] Control method	Description
Position control[*1]	Linear control	1-axis linear control	ABS linear 1 INC linear 1	Performs the positioning control from the start point address (current stop position) to the specified position using the specified one axis.
		2-axis linear interpolation control[*1]	ABS linear 2 INC linear 2	Performs the linear interpolation control from the start point address (current stop position) to the specified position using the specified two axes.
		3-axis linear interpolation control[*1]	ABS linear 3 INC linear 3	Performs the linear interpolation control from the start point address (current stop position) to the specified position using the specified three axes.
		4-axis linear interpolation control[*1]	ABS linear 4 INC linear 4	Performs the linear interpolation control from the start point address (current stop position) to the specified position using four axes.
	Fixed-feed control	1-axis fixed-feed control	Fixed-feed 1	Performs the positioning control from the start point address (current stop position) using the specified one axis. ([Md.20] Current feed value is set to 0 at the start.)
		2-axis fixed-feed control[*1]	Fixed-feed 2	Performs the linear interpolation control from the start point address (current stop position) using the specified two axes. ([Md.20] Current feed value is set to 0 at the start.)
		3-axis fixed-feed control[*1]	Fixed-feed 3	Performs the linear interpolation control from the start point address (current stop position) using the specified three axes. ([Md.20] Current feed value is set to 0 at the start.)
		4-axis fixed-feed control[*1]	Fixed-feed 4	Performs the linear interpolation control from the start point address (current stop position) using four axes. ([Md.20] Current feed value is set to 0 at the start.)
	2-axis circular interpolation control[*1]	Sub point specification	ABS circular sub INC circular sub	Performs the positioning control in an arc path from the start point address (current stop position) to the specified position using the specified two axes.
		Center point specification	ABS circular right ABS circular left INC circular right INC circular left	
	3-axis helical interpolation control[*1]	Sub point specification	ABS helical sub INC helical sub	Performs the circular interpolation control using two axes of the three axes. The remaining axis is used for the positioning of the helical, tangent line, or normal line control to follow the circular interpolation control.
		Center point specification	ABS helical right ABS helical left INC helical right INC helical left	

Major positioning control		[Da.2] Control method	Description
Speed control[*1]	1-axis speed control	Forward run speed 1 Reverse run speed 1	Performs the speed control of the specified one axis.
	2-axis speed control[*1]	Forward run speed 2 Reverse run speed 2	Performs the speed control of the specified two axes.
	3-axis speed control[*1]	Forward run speed 3 Reverse run speed 3	Performs the speed control of the specified three axes.
	4-axis speed control[*1]	Forward run speed 4 Reverse run speed 4	Performs the speed control of four axes.
Speed-position switching control		Forward run speed-position Reverse run speed-position	Performs the speed control, and position control (Positioning with the specified address or movement amount) immediately after that by turning on Speed-position switching signal.
Position-speed switching control		Forward run position-speed Reverse run position-speed	Performs the position control, and speed control immediately after that by turning on Position-speed switching signal.
Other controls	NOP instruction	NOP instruction	A control method that is not executed. When the NOP instruction is set, the operation of the next data starts and this instruction is not executed.
	Current value change	Current value change	Changes the value in [Md.20] Current feed value to the address set in the positioning data. The following two methods can be used. (Machine feed value cannot be changed.) • Current value change using the control method • Current value change using the start No. for a current value change (No.9003)
	JUMP instruction	JUMP instruction	Unconditionally or conditionally jumps to the specified positioning data No.
	LOOP	LOOP	Performs the repetition control with the LOOP to LEND instructions.
	LEND	LEND	Returns to the beginning of the repetition control with LOOP to LEND instructions. When the repetition of the instructions has been completed for the specified number of times, the operation of the next positioning data starts.

*1 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, 3-axis helical interpolation control, 2-axis speed control, 3-axis speed control, and 4-axis speed control, use a motor set for the directions of two or more axes to control the positioning drawing a straight line or an arc path.
This type of control is called interpolation control. (☞ Page 82 Interpolation control)

Data required for major positioning control

The following table lists Positioning data required for performing Major positioning control.

Setting item			Setting detail
Positioning data	[Da.1]	Operation pattern	Set an operation pattern for the continuous positioning data (example: Positioning data No.1 to 3). (☞ Page 67 Operation pattern of major positioning control)
	[Da.2]	Control method	Set a control method defined for Major positioning control used. (☞ Page 64 Overview of the Major Positioning Controls)
	[Da.3]	Acceleration time No.	Select and set an acceleration time at the start of the control. (Select one from four values set in [Pr.9], [Pr.25], [Pr.26], and [Pr.27] as the acceleration time.)
	[Da.4]	Deceleration time No.	Select and set a deceleration time at the stop of the control. (Select one from four values set in [Pr.10], [Pr.28], [Pr.29], and [Pr.30] as the deceleration time.)
	[Da.5]	Axis to be interpolated	Set a target axis (partner axis) for the 2-axis interpolation control, and a circular interpolation axis for the 3-axis helical interpolation control. (☞ Page 82 Interpolation control)
	[Da.6]	Positioning address/movement amount	Set a target value for the position control. (☞ Page 76 Specifying the positioning address)
	[Da.7]	Arc address	Set a sub point or a center point address for the circular interpolation control.
	[Da.8]	Command speed	Set the speed at the execution of the control.
	[Da.9]	Dwell time	The time from when the command pulse output is completed to when Positioning complete signal is turned on. Set this time to absorb the delay of machine systems to the command, such as the delay (deviation) of the servo system.
	[Da.10]	M code	Set an M code to issue a command for a subsidiary work (such as stopping clamps or drills and changing tools) corresponding to each M code number that can be related to the execution of the positioning data.
	[Da.27]	M code ON signal output timing	Set the M code ON signal output timing for each positioning data.
	[Da.28]	ABS direction in degrees	Set the ABS direction in degrees for each positioning data.
	[Da.29]	Interpolation speed specification method	Set the interpolation speed specification method for each positioning data.

The settings of [Da.1] to [Da.10] and [Da.27] to [Da.29] differ depending on the setting of [Da.2] Control method. (☞ Page 87 Positioning Data Setting)

Sub functions for major positioning control

For details on the sub functions that can be combined with the major positioning control, refer to the following.

📖 MELSEC iQ-R Positioning Module User's Manual (Startup)

For details on each sub function, refer to the following.

📖 MELSEC iQ-R Positioning Module User's Manual (Startup)

Major positioning control from an engineering tool

Major positioning controls can be executed using the positioning test of the engineering tool. For details on the positioning test, refer to the following.

☞ Page 340 Positioning Test

Point

Up to 600 positioning data (Positioning data No.1 to 600) can be set for each axis.

Operation pattern of major positioning control

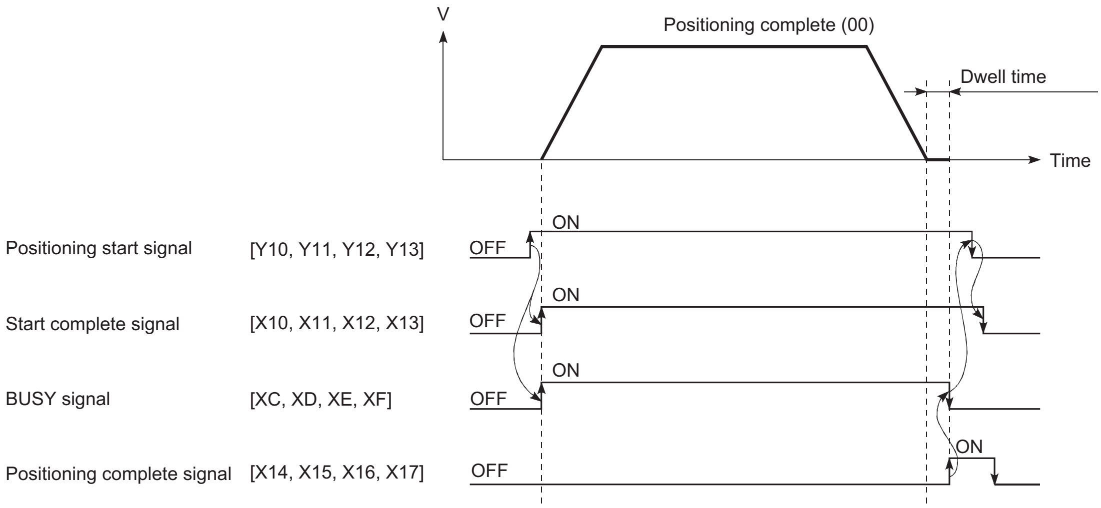
In Major positioning control (Advanced positioning control), [Da.1] Operation pattern can be set to specify whether to continue executing positioning data after the started positioning data. Operation pattern can be classified into the following three patterns.

Positioning control	Operation pattern
Positioning complete	Independent positioning control (operation pattern: 00)
Positioning continue	Continuous positioning control (operation pattern: 01)
	Continuous path control (operation pattern: 11)

Independent positioning control (positioning complete)

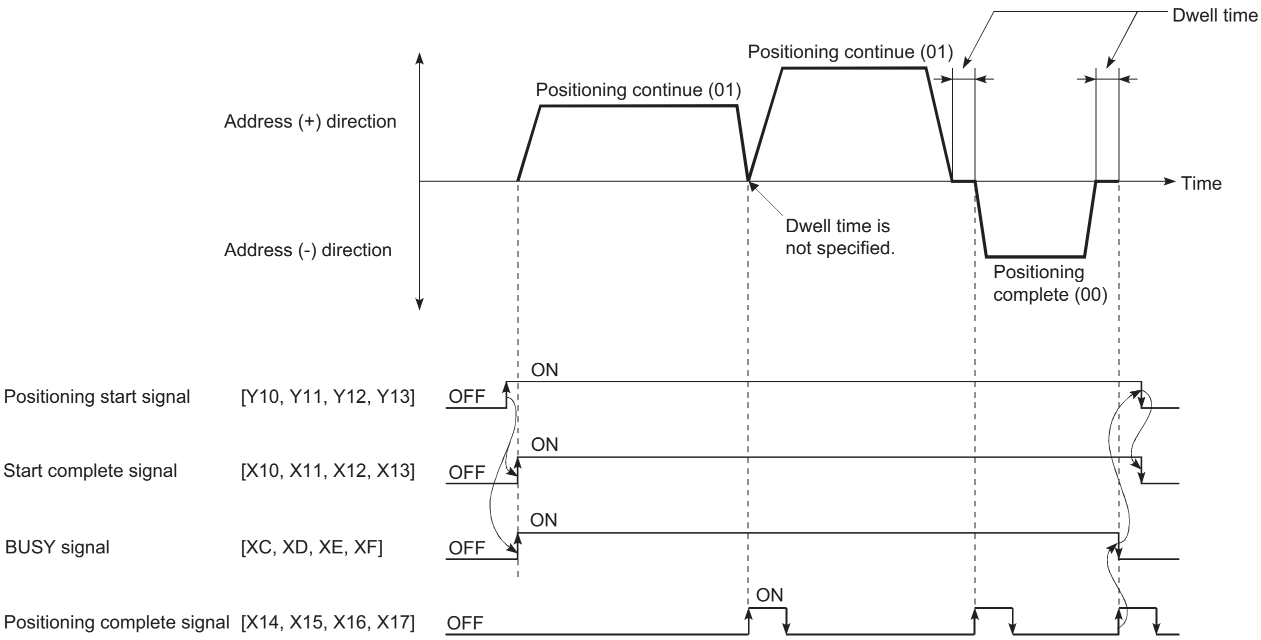
Set this pattern when executing the positioning of only one specified data. If a dwell time is specified, the positioning will be completed when the specified time elapses.

For the block positioning, this data (operation pattern: 00) is the end of the data. (The positioning stops after this data is executed.)



Continuous positioning control

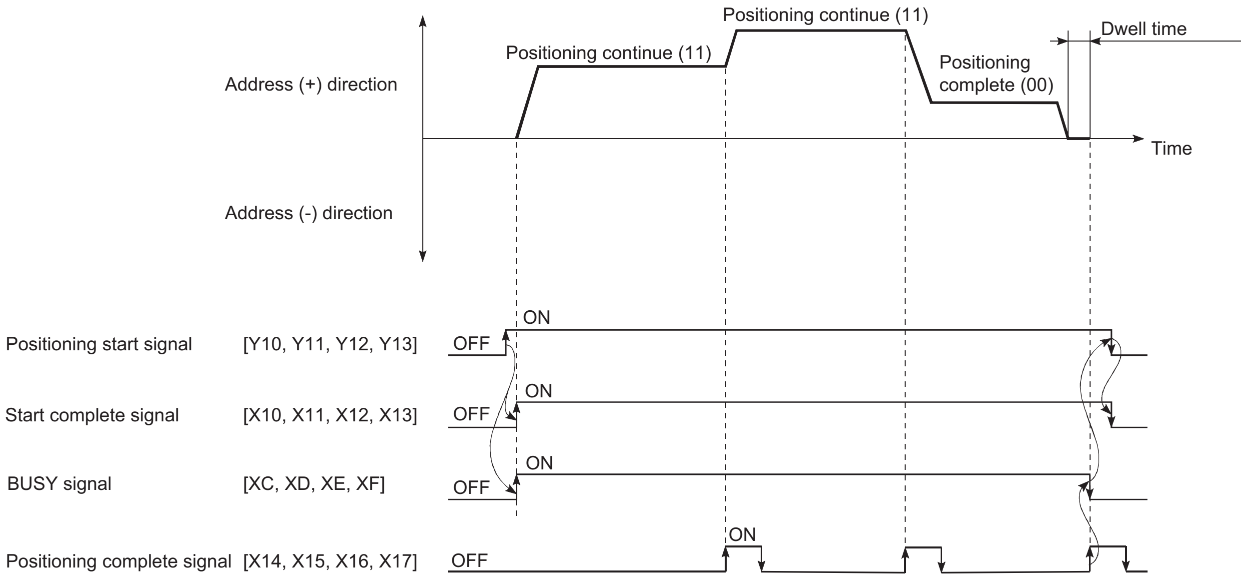
- The machine always automatically decelerates each time the positioning of one positioning data is completed. Acceleration to execute the next positioning data is performed after the command speed of the RD75 reaches 0. If a dwell time is specified, the acceleration is performed after the specified time elapses.
- In the operation by the continuous positioning control (operation pattern: 01), the positioning of the next positioning No. is automatically executed. Always set Operation pattern: 00 to the last positioning data to complete the positioning. If the operation pattern is Positioning continue (01 or 11), the operation continues until Operation pattern: 00 is found. Therefore, if Positioning complete (operation pattern: 00) is not set, the operation continues until the positioning data No. 600. If the operation pattern of the positioning data No. 600 is not set to Positioning complete, the operation will be started again from the positioning data No. 1.



Continuous path control

■ Continuous path control

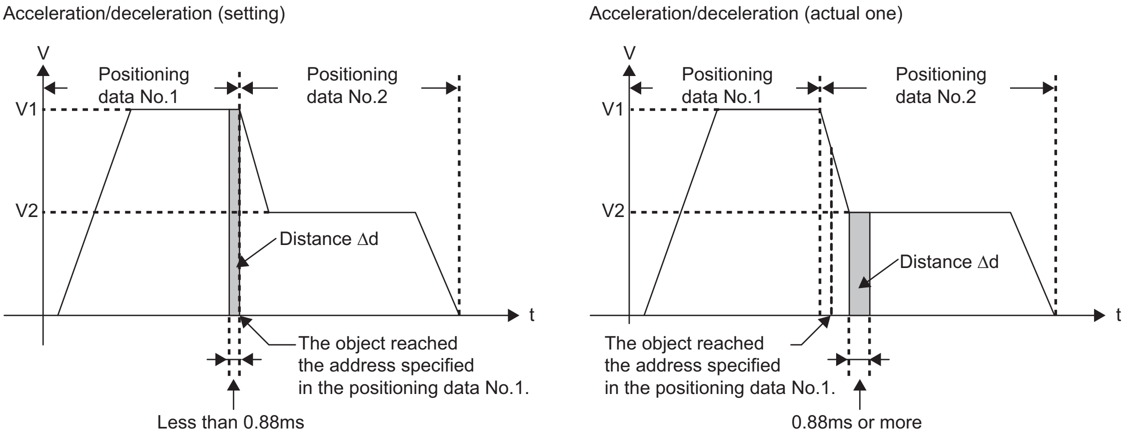
- The speed changes without the deceleration stop from the command speed of the positioning data No. currently being executed to the speed of the next positioning data No. When the current speed is equal to the next speed, the speed does not change.



- When the command speed is set to -1, the speed used in the previous positioning operation is used.
- The dwell time is ignored even if it is set.
- In the operation by the continuous path control (operation pattern: 11), the positioning of the next positioning No. is automatically executed. Always set Operation pattern: 00 to the last positioning data to complete the positioning. If the operation pattern is Positioning continue (01 or 11), the operation continues until Operation pattern: 00 is found. Therefore, if Positioning complete (operation pattern: 00) is not set, the operation continues until the positioning data No. 600. If the operation pattern of the positioning data No. 600 is not set to Positioning complete, the operation will be started again from the positioning data No. 1.
- The speed switching is classified into two modes: the front-loading speed switching mode in which the speed is changed at the end of the current positioning side and the standard speed switching mode in which the speed is changed at the start of the next positioning side. (☞ Page 404 [Pr.19] Speed switching mode)

- In the continuous path control, the positioning may be completed before the set address/movement amount by the distance Δd, and the data to be controlled may be switched to the next positioning data No. The range of the value of the distance Δd is as follows.

0 ≤ Δd < (Moving distance in 0.88ms at the command speed)



The distance Δd is output when the next positioning data No. is executed at the constant speed. Therefore, the execution time of the next positioning data may be extended longer than the set execution time of the positioning control.*1 If the extension of the execution time is a problem, perform the following actions.

Corrective action	Description
Use the near pass control output timing selection function.	By setting the output timing to At deceleration, the execution time of the next positioning is equivalent to the set execution time of the positioning control. (☞ Page 233 Output timing selection of near pass control)
Use the speed change function.	Change the speed using the speed change function instead of the continuous path control. (☞ Page 248 Speed change function)

*1 For the continuous path control, when the command speed V1 of the positioning data and the command speed V2 of the next positioning data is different significantly, and V1 > V2

For the positioning data in which the automatic deceleration is performed, the positioning is completed at the set address. Therefore, in the continuous path control, the address where the positioning is completed may be different from the set value. However, the address will be the specified one at the completion of the automatic deceleration by Continuous path control (01) or Positioning complete (00).

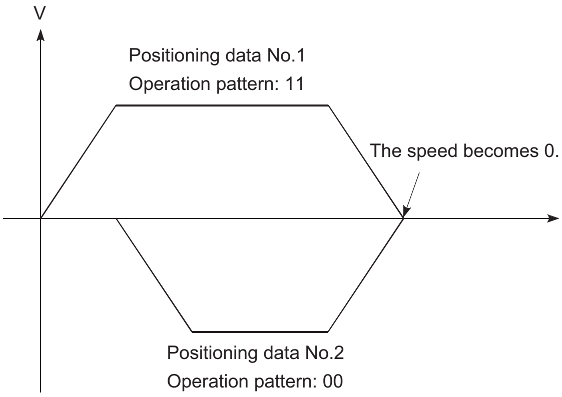
Point

In the continuous path control, the speed is not changed when the positioning data No. is switched by the near pass function. (☞ Page 231 Near pass function)

■Conditions of deceleration stop during the continuous path control

The deceleration stop is not performed in the continuous path control. However, in the following three cases, the deceleration stop is performed and the speed becomes 0 once.

- 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 the positioning control of one axis. (Refer to Point.))



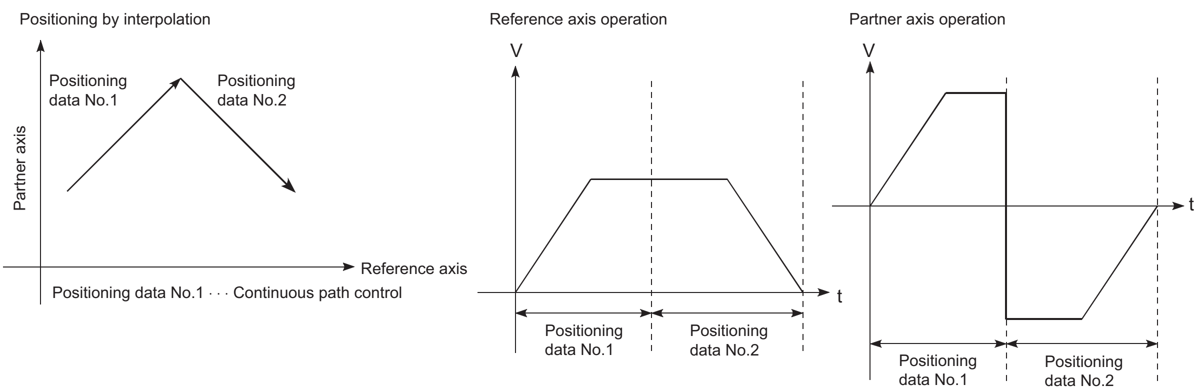
- During the operation with the step operation (☞ Page 278 Step function)
- When an error exists in the next positioning data, the positioning may stop immediately depending on an error. (☞ Page 35 Stopping)

Point

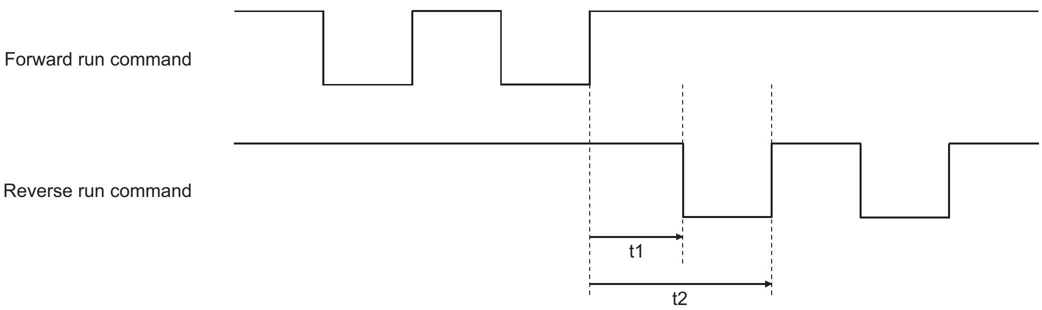
- In the positioning data of the continuous path control, the command speed becomes 0 for about 0.88ms when [Da.6] Positioning address/movement amount is set to 0. If [Da.6] Positioning address/movement amount is set to 0 to increase the number of speed change points in the future, change the setting of [Da.2] Control method to NOP instruction not to execute the positioning data No. (☞ Page 154 NOP instruction)
- In the positioning data of the continuous path control, ensure the movement amount so that the execution time of the data becomes 100ms or longer, or reduce the command speed.

■Operation for sudden direction reversal

- The movement direction is not checked during the interpolation control. Thus, the deceleration stop is not performed even if the movement direction is changed. Therefore, the interpolation axis may suddenly reverse its direction. To avoid the sudden direction reversal, set Continuous positioning control: 01 for the positioning data at the passing point instead of Continuous path control: 11.



- When the interpolation axis suddenly reverses its direction, the command pulses from the RD75 are output as follows.



When a command frequency is f (pulse/s), t1 and t2 are determined using the following calculation formulas.

t1 = 1/2f [s]

t2 = 1/f [s]

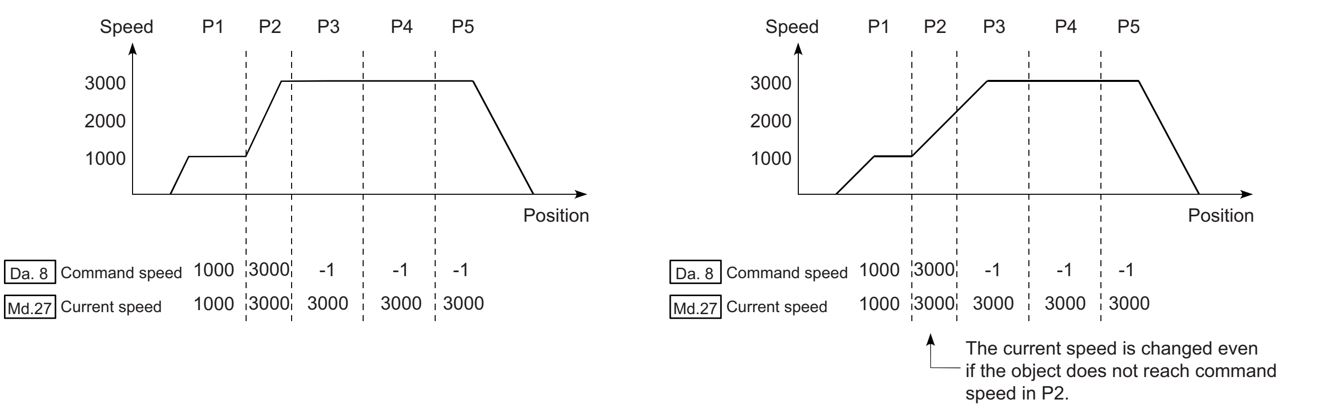
A time of t1 must be ensured by the drive unit for a specified time T [s] or longer. (The time T depends on the specifications of the drive unit.)

When the time of t1 cannot be ensured for T or longer, reduce the value in [Da.8] Command speed of the positioning data.

■Speed handling

- The command speed of the continuous path control is set for each positioning data. The RD75 performs the positioning at the speed specified with each positioning data.
- The command speed can be set to -1 in the continuous path control. When the command speed is set to -1, the control is performed at the speed used in the previous positioning data No. (When the positioning data is set using an engineering tool, Current speed is displayed in the command speed of the engineering tool. Current speed is the speed of the positioning control currently being executed.)
- If the command speed has been set to -1 before the uniform speed control is executed, the speed does not need to be set in each positioning data.
- If the speed is changed or the override function is executed in the previous positioning data when the command speed has been set to -1, the control can be continued at the new speed.
- If -1 is set in the command speed of the first positioning data at the start, No command speed (Error code: 1A12H) occurs and the positioning cannot be started.

[Relation between the command speed and current speed]



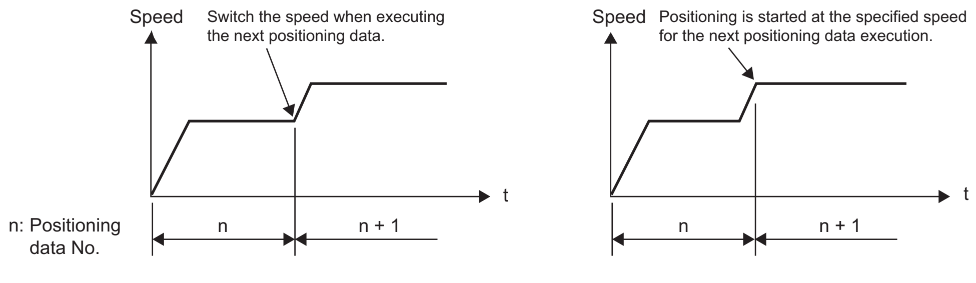
Point

- In the continuous path control, the speed is not changed when the positioning data No. is switched by the near pass function. (☞ Page 231 Near pass function)
- The RD75 holds the command speed set with the positioning data and the latest speed value set with the speed change request as [Md.27] Current speed to control with the current speed when -1 is set for the command speed. (Depending on the relation between the movement amount and the speed, the feedrate may not reach the command speed. However, even in that case, the current speed will be updated.)
- When the address for the speed change is identified beforehand, create and execute the positioning data for the speed change with the continuous path control to perform the speed change without requesting the speed change using a program.

■Switching speed (Refer to [Pr.19] Speed switching mode.)

The following two modes are provided to change the speed.

Speed switching mode	Description
Standard switching	Switches the speed when executing the next positioning data.
Front-loading switching	Switches the speed at the end of the positioning data currently being executed.



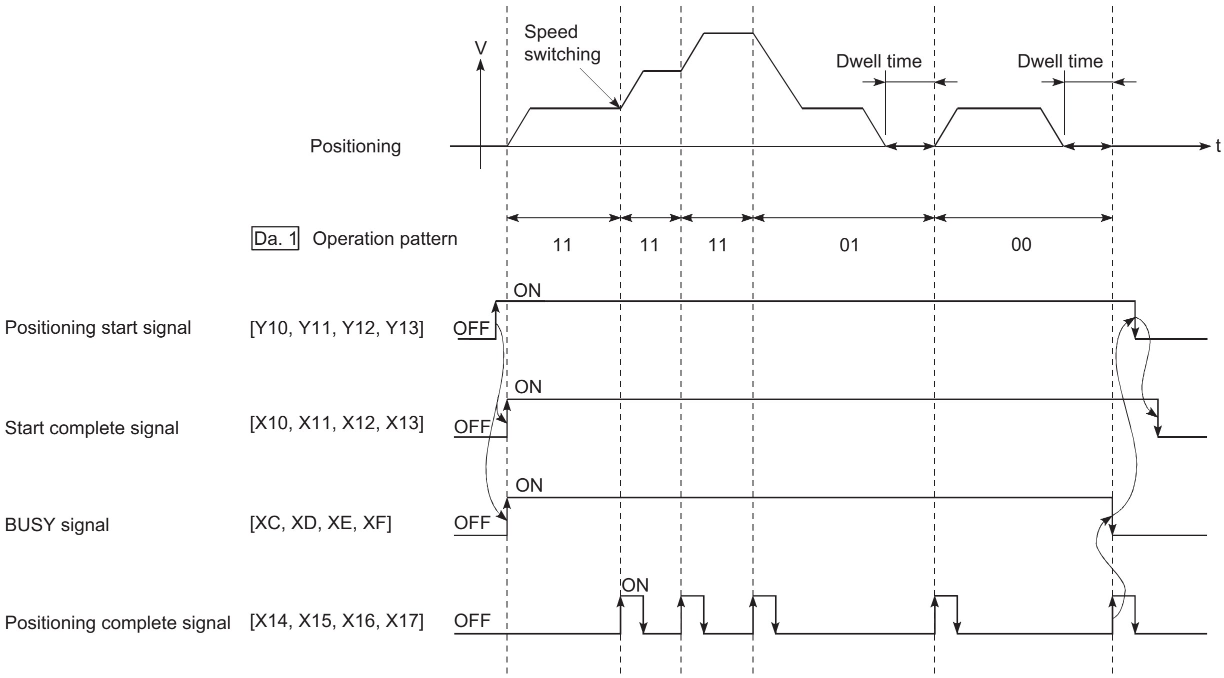
For standard switching

For front-loading switching

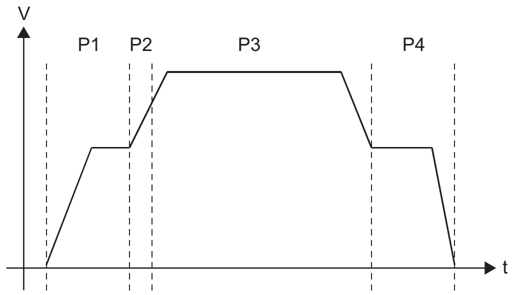
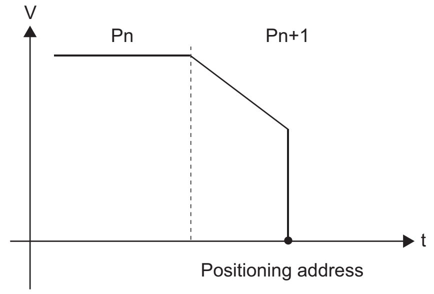
- Standard speed switching mode

1) If the command speed of the positioning data currently being executed and that of the next positioning data differ, 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 next positioning data.

2) The parameters used in the acceleration/deceleration processing to the command speed set in the next positioning data to be executed are those of the next positioning data to be executed.
If the command speeds are the same, the speed changed will not be performed.

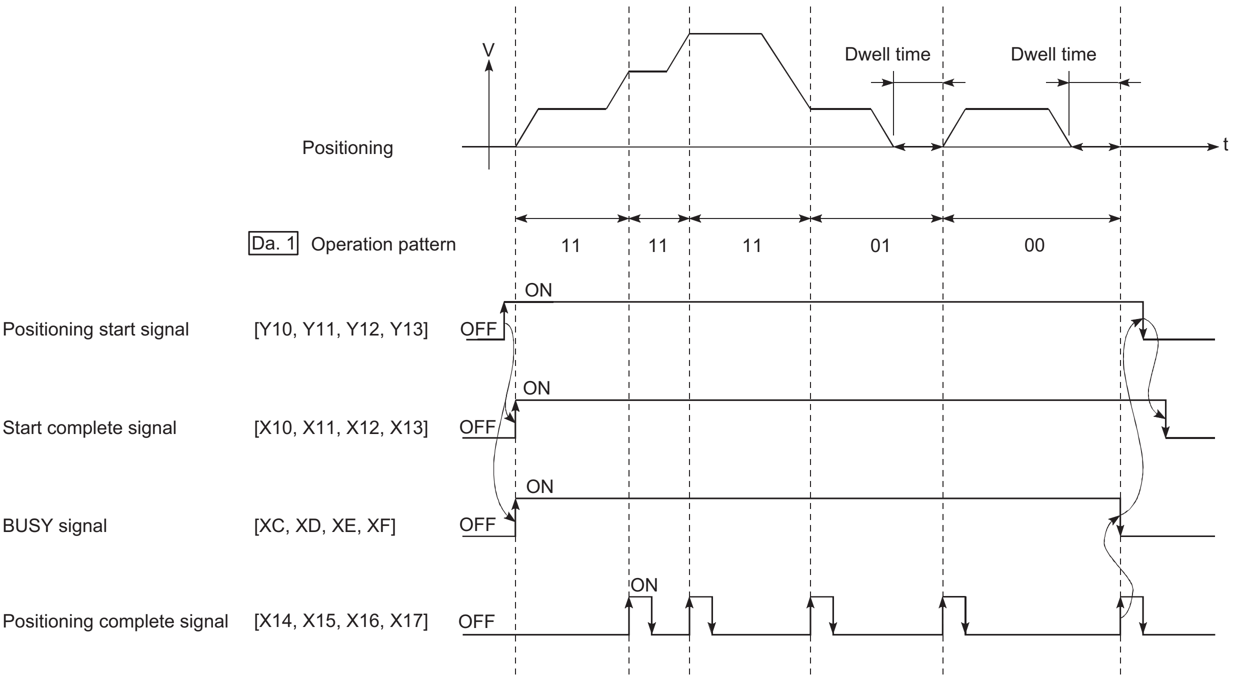


3) Speed switching condition
If the movement amount is small to the target speed and may not reach the target speed even if the acceleration/deceleration is performed, the machine is accelerated or decelerated to get close to the target speed.
If the movement amount will be exceeded when the automatic deceleration needs to be performed (such as when the operation pattern is 00 or 01), the machine will immediately stop at the specified positioning address, and Insufficient movement amount (Warning code: 0998H) occurs.

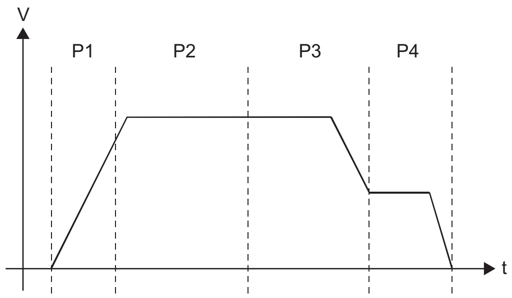
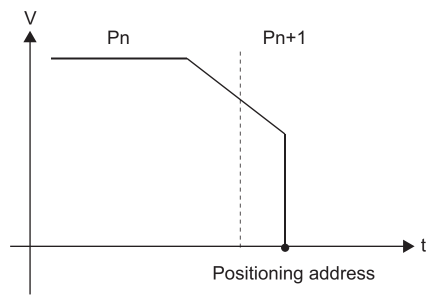
[When the speed cannot be changed in P2]	[When the movement amount is small during the automatic deceleration]
When the relation of the speeds is P1 = P4, P2 = P3, P1 < P2 	Since the movement amount required to perform the automatic deceleration cannot be secured, the machine immediately stops in the status of the speed ≠ 0. 

- Front-loading speed switching mode

1) If the command speed of the positioning data currently being executed and that of the next positioning data differ, the speed will change over to the speed set in the next positioning data at the end of the positioning data currently being executed.
2) The parameters used in the acceleration/deceleration processing to the command speed set in the next positioning data to be executed are those of the next positioning data to be executed.
   If the command speeds are the same, the speed changed will not be performed.



3) Speed switching condition
   If the movement amount is small to the target speed and may not reach the target speed even if the acceleration/deceleration is performed, the machine is accelerated or decelerated to get close to the target speed.
   If the movement amount will be exceeded when the automatic deceleration needs to be performed (such as when the operation pattern is 00 or 01), the machine will immediately stop at the specified positioning address, and Insufficient movement amount (Warning code: 0998H) occurs.

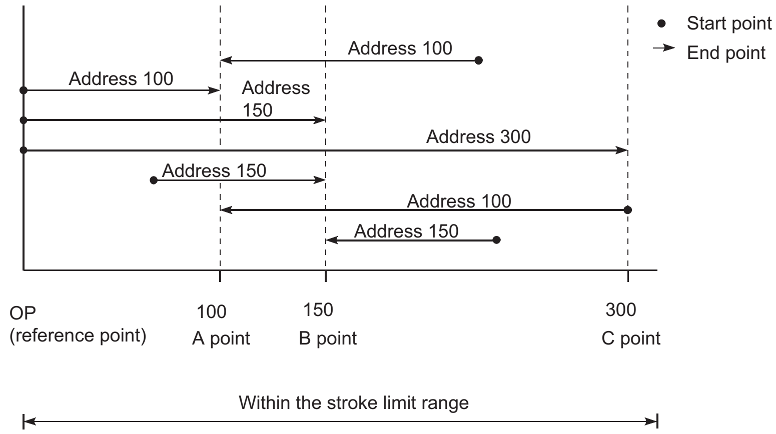
[When the speed cannot be changed to the P2 speed in P1]	[When the movement amount is small during the automatic deceleration]
When the relation of the speeds is P1 = P4, P2 = P3, P1 < P2 	Since the movement amount required to perform the automatic deceleration cannot be secured, the machine immediately stops in the status of the speed ≠ 0. 

Specifying the positioning address

One of the following two methods can be used for commanding the position in the control using positioning data.

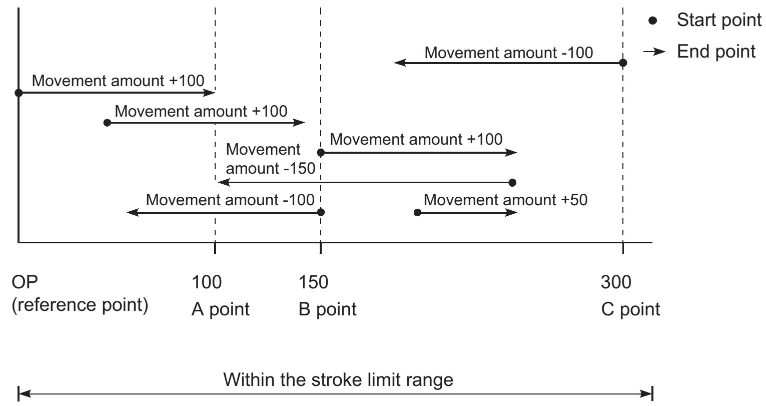
Absolute system

The positioning is performed to a specified position (absolute address) having the OP as a reference. This address is regarded as the positioning address. (Any address can be set as the start point.)



Incremental system

The position where the machine is currently stopped is regarded as the start point, and the positioning is performed for a specified movement amount in a specified movement direction.



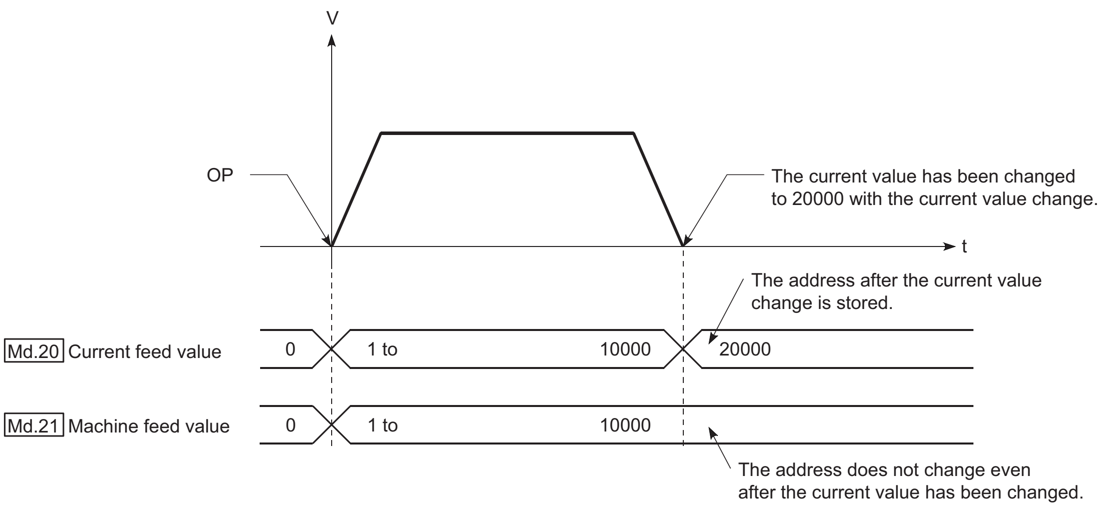
Checking the current value

Values indicating the current values

In the RD75, the following two types of address are used as values to indicate the position.
These addresses (Current feed value and Machine feed value) are stored in the monitor data area, and used for monitoring the current value display.

Item	Description
Current feed value	• The value stored in [Md.20] Current feed value. • This value has an address established with Machine OPR as a reference. However, the address can be changed by changing the current value. • This value is updated every 0.88ms.
Machine feed value	• The value stored in [Md.21] Machine feed value. • This value always has an address established with 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 0.88ms.

Current feed value and Machine feed value are used for monitoring the current value display.



Restrictions

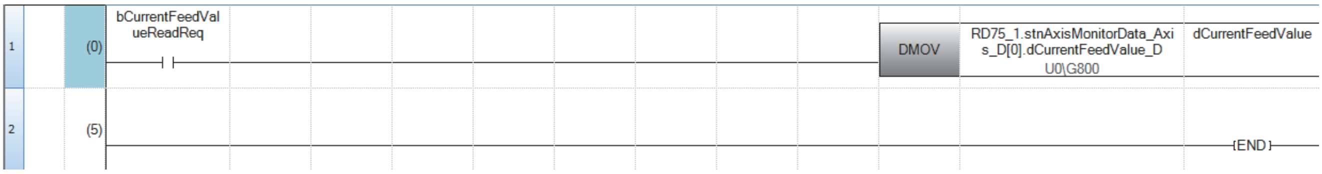
When the stored Current feed value is used for the control, an error of 0.88ms will occur in the update timing of the current value. When the stored Machine feed value is used for the control, an error of 0.88ms will occur in the update timing of the current value.

Monitoring the current value

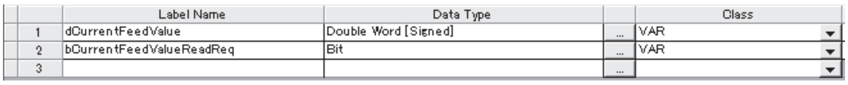
Current feed value and Machine feed value are stored in the following buffer memory areas, and can be read using a DFROM (P) instruction or DMOV (P) instruction from the CPU module.

	Buffer memory address			
	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

The following shows an example of the program that stores the current feed value of the axis 1 in the specified device.



Classification	Label Name	Description
Module label	RD75_1.stnAxisMonitorData_Axis_D[0].dCurrentFeedValue_D	[Md.20] Current feed value of the axis 1
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.	



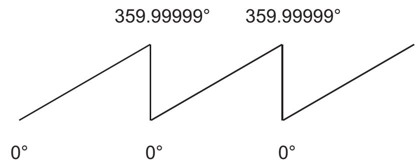
	Label Name	Data Type	Class
1	dCurrentFeedValue	Double Word [Signed]	VAR
2	bCurrentFeedValueReadReq	Bit	VAR
3			

Handling degree (control unit)

If degree is set as the control unit, the following items differ from the ones for when other control units are set.

Addresses of Current feed value and Machine feed value

The address of [Md.20] Current feed value is a ring address from 0 to 359.99999°. However, the address of [Md.21] Machine feed value does not become a ring address.

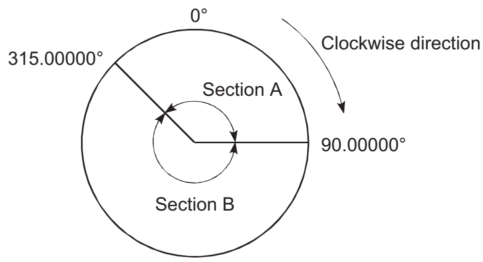


Software stroke limit valid/invalid setting

When the control unit is degree, the upper/lower limit values of the software stroke limit are 0° to 359.99999°.

■Setting to validate the software stroke limit

To validate the software stroke limit, set the lower limit value and upper limit value of the software stroke limit in a clockwise rotation.



1) To set the movement range of section A, set as follows.
   - Software stroke limit lower limit value: 315.00000°
   - Software stroke limit upper limit value: 90.00000°
2) To set the movement range of section B, set as follows.
   - Software stroke limit lower limit value: 90.00000°
   - Software stroke limit upper limit value: 315.00000°

■Setting to invalidate the 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 performed regardless of the setting of the software stroke limit.

Positioning control method when degree is set as the control unit

■When the absolute system is used

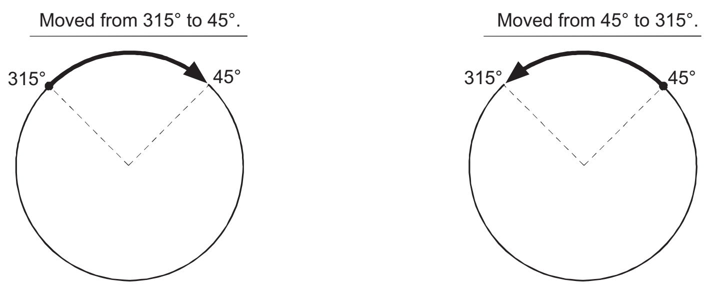
- When the software stroke limit is invalid

The positioning is performed in the direction nearest to the specified address, using the current value as a reference. (This control is called shortcut control.)

Example

(1) Positioning is carried out in a clockwise direction when the current value is moved from 315° to 45°.

(2) Positioning is carried out in a counterclockwise direction when the current value is moved from 45° to 315°.



When the rotation angle is 180°, the rotation direction is determined depending on the start point position.

Start point position	Rotation direction
0° ≤ Start point < 180°	Clockwise
180° ≤ Start point < 0°	Counterclockwise

To specify the positioning direction (when the shortcut control is not performed), invalidate the shortcut control using "[Cd.40] ABS direction in degrees" or "[Da.28] ABS direction in degrees". The positioning in the specified direction can be performed. This function can be executed when the software stroke limit is invalid. When the software stroke limit is valid, Illegal setting of ABS direction in unit of degree (Error code: 19A5H) occurs and the positioning is not started.
With "[Cd.40] ABS direction in degrees" or "[Da.28] ABS direction in degrees", the setting value of the reference axis is applied to the reference axis and interpolation axis. Even if a unit other than degree is set for the reference axis, the setting of the reference axis is applied to the interpolation axis as follows (for the 3-axis linear interpolation control (ABS3)).

Axis	Unit setting	"[Cd.40] ABS direction in degrees"	Rotation direction in degrees
Reference axis	pulse	1: ABS clockwise	—
Interpolation axis 1	degree	—	1: ABS clockwise
Interpolation axis 2	degree	—	1: ABS clockwise

• To specify the rotation direction in degrees for each positioning data, especially for the continuous positioning control and continuous path control, use "[Da.28] ABS direction in degrees".
• To set the same rotation direction for all positioning data, use "[Cd.40] ABS direction in degrees". The same rotation direction can be set for each positioning data in a batch.
  • When "[Cd.40] ABS direction in degrees" is used, set 0 in "[Da.28] ABS direction in degrees". When a value other than 0 is set, "[Da.28] ABS direction in degrees" is enabled.
  • The setting value in "[Cd.40] ABS direction in degrees" is effective only at the start of positioning control. In the continuous positioning control or continuous path control, the operation continues with the setting configured at the 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	Specify the ABS movement direction in increments of degrees. 0: Shortcut (the direction setting is invalid) 1: ABS clockwise 2: ABS counterclockwise	1550	1650	1750	1850	0
[Da.28] ABS direction in degrees	Set "[Cd.40] ABS direction in degrees" for each positioning data. 0: Use the set value of "[Cd.40] ABS direction in degrees" 1: ABS clockwise 2: ABS counterclockwise 3: Shortcut (Direction setting invalid)	2003*1 (b2 to b3)	8003+N*1 (b2 to b3)	14003+N*1 (b2 to b3)	20003+N*1 (b2 to b3)	0

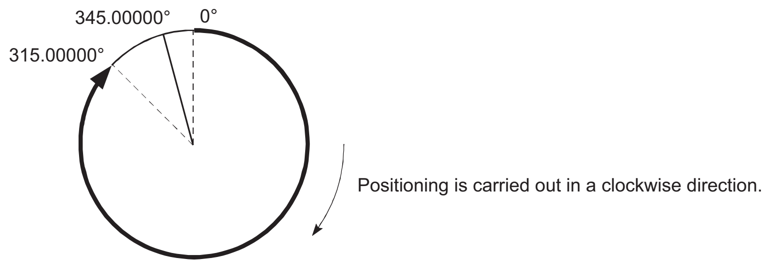
*1 N indicates the offset address of each positioning data.
N = ((Positioning data No.) - 1) × 10

• When the software stroke limit is valid

The positioning is performed in a clockwise or counterclockwise direction depending on the setting method of the software stroke limit range.
Therefore, the positioning with the shortcut control may not be possible.

Example

When the current value is moved from 0° to 315°, positioning is carried out in a clockwise direction if the software stroke limit lower limit value is 0° and the upper limit value is 345°.



Point

The range of positioning addresses is 0° to 359.99999°.
To perform the positioning of one rotation or more, use the incremental system.

■When the incremental system is used

The positioning is performed for a specified movement amount in a specified direction. The movement direction is determined by the sign of the movement amount.

• When the movement direction is positive: Clockwise
• When the movement direction is negative: Counterclockwise

Point

The positioning of 360° or more can be performed with the incremental system.
In this case, invalidate the software stroke limit by setting values as follows.
(Set a value within the setting range of 0° to 359.99999°.)
[Software stroke limit upper limit value = Software stroke limit lower limit value]

Interpolation control

Meaning of the interpolation control

For 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, 2-axis circular interpolation control, and 3-axis helical interpolation control, each control is performed so that linear and arc paths are drawn using motors set in the directions of two to four axes. This type of control is called interpolation control.
In the interpolation control, the axis in which the control method is set is defined as the reference axis and the other axes are defined as the interpolation axes. The RD75 controls the reference axis following the positioning data set in the reference axis, and controls of the interpolation axes corresponding to the control of the reference axis so that a linear or arc path is drawn.
The following table shows the combinations of the reference axis and interpolation axes.

Interpolation control set in [Da.2] Control method	Reference axis	Interpolation axis
2-axis linear interpolation control, 2-axis fixed-feed control, 2-axis circular interpolation control, and 2-axis speed control	Any of Axis 1 to 4	Depends on the axis to be interpolated set in the reference axis
3-axis linear interpolation control, 3-axis fixed-feed control, and 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, and 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

The combinations of axes available for the 3-axis helical interpolation control are the same as the ones for the 3-axis linear interpolation control, 3-axis fixed-feed control, and 3-axis speed control. However, the circular interpolation axis can be specified in [Da.5] Axis to be interpolated of the reference axis. The following table shows the combinations of the reference axis, circular interpolation axis, and linear interpolation axis for the 3-axis helical interpolation control.

Interpolation control set in [Da.2] Control method	Reference axis	Circular interpolation axis*1	Linear interpolation axis*2
3-axis helical interpolation control	Axis 1	Axis 2	Axis 3
		Axis 3	Axis 2
	Axis 2	Axis 3	Axis 4
		Axis 4	Axis 3
	Axis 3	Axis 4	Axis 1
		Axis 1	Axis 4
	Axis 4	Axis 1	Axis 2
		Axis 2	Axis 1

*1 Specified in [Da.5] Axis to be interpolated of the reference axis.
*2 An axis that is not specified in [Da.5] Axis to be interpolated of the reference axis is automatically assigned.

Positioning data setting

When the interpolation control is performed, the same positioning data No. are set for the reference axis and interpolation axis. The following table shows the setting items of Positioning data of the reference axis and interpolation axis.

◎: Always set, ○: Set as required, △: Setting restricted

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Setting item			Setting item of reference axis	Setting item of interpolation axis
Same positioning data No.	[Da.1]	Operation pattern	◎	—
	[Da.2]	Control method	◎ Line 2, 3, 4 Fixed-feed 2, 3, 4 Circular sub, circular right, circular left Helical sub, helical right, helical 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	○*1*2	—
	[Da.6]	Positioning address/movement amount	○ Not required for Forward run speed 2, 3, 4 and Reverse run speed 2, 3, 4	△ Not required for Forward run speed 2, 3, 4 and Reverse run speed 2, 3, 4
	[Da.7]	Arc address	△ Required only for circular sub, circular right, circular left, helical sub, helical right, and helical left	△ Required only for circular sub, circular right, circular left, helical sub, helical right, and helical left
	[Da.8]	Command speed	◎	△ Required for Forward run speed 2, 3, 4 and Reverse run speed 2, 3, 4
	[Da.9]	Dwell time	○	—
	[Da.10]	M code	○	— Set the number of pitch for the linear interpolation axis only for helical sub, helical right, and helical left.
	[Da.27]	M code ON signal output timing	○	—
	[Da.28]	ABS direction in degrees	○	—
	[Da.29]	Interpolation speed specification method	○	—

*1 The partner axis is set for the axis interpolation. If the self-axis is set, Illegal interpolation description command (Error code: 1A22H) occurs. For the 3- and 4-axis interpolation, the axis setting is not required.

*2 For the combinations of the reference axis and interpolation axes in the 3-axis helical interpolation, refer to Page 82 Interpolation control. If any setting other than the setting described is configured, Illegal interpolation description command (Error code: 1A22H) occurs.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Starting the interpolation control

To start the interpolation control, the positioning data Nos. of the reference axis (the axis for which the interpolation control was set in [Da.2] Control method) are started. (Starting of the interpolation axis is not required.)

If both the reference axis and interpolation axis are started, the following errors or warning will occur and the positioning will not start.

- Reference axis: Interpolation while partner axis BUSY (Error code: 1998H)
- Interpolation axis: Control method setting error (Error code: 1A24H), Start during operation (Warning code: 0900H)

Interpolation control continuous positioning

To perform the interpolation control in which Continuous positioning control and Continuous path control are specified in the operation pattern, the positioning method for all the positioning data from the started positioning data to the positioning data in which Positioning complete is set must be set to the interpolation control.

The number of interpolation axes and axes to be interpolated cannot be changed from the intermediate positioning data. If the number of interpolation axes and axes to be interpolated are changed, Control method setting error (Error code: 1A25H) occurs and the positioning will stop.

Precautions

- When a stepping motor is used, the circular interpolation control and 3-axis helical interpolation control cannot be performed. Use a servomotor when the circular interpolation control or 3-axis helical interpolation control is performed.
- If any axis exceeds the value in [Pr.8] Speed limit value during either of the 2-axis speed control, 3-axis speed control, and 4-axis speed control, the axis exceeding the speed limit value is controlled with the speed limit value. The speeds of the other axes being interpolated are suppressed by the command speed ratio.
- If any axis exceeds the value in [Pr.8] Speed limit value during any of the 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, and 3-axis helical interpolation control, the axis exceeding the speed limit value is controlled with the speed limit value. The speeds of the other axes being interpolated are suppressed by the movement amount ratio.
- In the 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, or 4-axis fixed-feed control, when 1: Reference axis speed is set in [Pr.20] Interpolation speed specification method, and when the reference axis is the minor axis and the interpolation axis is the major axis, the speed limit value of the interpolation axis may not function.
- In the 3-axis helical interpolation control, the composite speed of the circular interpolation axis or the speed of the linear interpolation axis is controlled not to exceed the value in [Pr.8] Speed limit value.
- In the 2-axis interpolation, the combination of the interpolation axes cannot be changed during the operation.

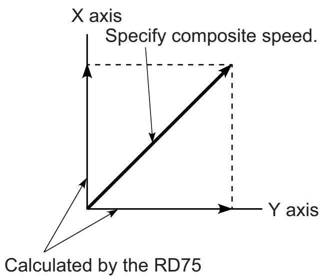
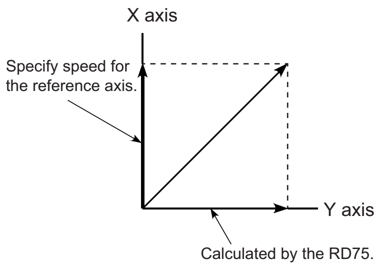
Point

If Reference axis speed is set for the interpolation control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.

Interpolation speed specification method

For the interpolation control, set the composite speed or reference axis speed with "[Pr.20] Interpolation speed specification method" or "[Da.29] Interpolation speed specification method" of the reference axis.

- Composite speed: The movement speed for the control target is specified, and the speed for each axis is calculated by the RD75.
- Reference axis speed: The axis speed set in the reference axis is specified, and the speed for the other axis performing interpolation is calculated by the RD75.

When the composite speed is specified	When the speed for the reference axis is specified
	

- To specify the interpolation speed for each positioning data, use "[Da.29] Interpolation speed specification method".
- To set the same interpolation speed for all positioning data, use "[Pr.20] Interpolation speed specification method". The same interpolation speed specification method can be specified for each positioning data in a batch. When "[Pr.20] Interpolation speed specification method" is used, set 0 in "[Da.29] Interpolation speed specification method". When a value other than 0 is set, "[Da.29] Interpolation speed specification method" is enabled.

Name	Function	Buffer memory address			
		Axis 1	Axis 2	Axis 3	Axis 4
[Pr.20] Interpolation speed specification method	When performing linear interpolation/circular interpolation, set whether to specify the composite speed or the speed for the reference axis. 0: Composite speed 1: Reference axis speed	1550	1650	1750	1850
[Da.29] Interpolation speed specification method	Set "[Pr.20] Interpolation speed specification method" for each positioning data. 0: Use the set value of "[Pr.20] Interpolation speed specification method" 1: Composite speed 2: Reference axis speed	2003+N*1 (b4 to b6)	8003+N*1 (b4 to b6)	14003+N*1 (b4 to b6)	20003+N*1 (b4 to b6)

*1 N indicates the offset address of each positioning data.
N = ((Positioning data No.) - 1) × 10

Limits of the interpolation control

Limits are provided on the interpolation control that can be executed and speed ([Pr.20] Interpolation speed specification method) that can be set, depending on the settings in [Pr.1] Unit setting of the reference axis and interpolation axis. (For example, the circular interpolation control cannot be performed if the unit of the reference axis and that of the interpolation axis differ.)

The following table shows the limits of the interpolation control and speed specification.

○: Setting possible, ×: Setting not possible, —: No interpolation axis

Interpolation control set in [Da.2] Control method	[Pr.20] Interpolation speed specification method	[Pr.1] Unit setting*1	
		The units of the reference axis and interpolation axis are the same, or the combination of mm and inch is used.*4	**The units of the reference axis and interpolation axis differ*4**
1-axis linear control 1-axis fixed-feed control Speed-position switching control Position-speed switching control	Composite speed	—	—
	Reference axis speed	—	—
2-/3-axis linear interpolation control 2-/3-axis fixed-feed control	Composite speed	○	×
	Reference axis speed	○	○
4-axis linear interpolation control 4-axis fixed-feed control	Composite speed*2	×	×
	Reference axis speed	○	○
1-axis speed control	Composite speed	—	—
	Reference axis speed	—	—
2-/3-/4-axis speed control	Composite speed*2	×	×
	Reference axis speed	○	○
2-axis circular interpolation control	Composite speed	○*5	×
	Reference axis speed*3	×	×
3-axis helical interpolation control	Composite speed	○*5	○*6
	Reference axis speed*3	×	×

*1 The units of mm and inch can be mixed.

*2 If Composite speed is set for the 2-axis speed control, 3-axis speed control, 4-axis speed control, and 4-axis linear interpolation control and the positioning is started, Interpolation mode error (Error code: 199AH) occurs and the positioning will not start.

*3 If Reference axis speed is set for the 2-axis circular interpolation control and 3-axis helical interpolation control and the positioning is started, Interpolation mode error (Error code: 199BH) occurs and the positioning will not start.

*4 If the units are different or if mm and inch are mixed, use the unit set to the reference axis for the unit of the speed being controlled.

*5 The unit of degree cannot be set. If the circular interpolation control or 3-axis helical interpolation control is set when the unit is degree, Circular interpolation (Error code: 199FH) occurs and the positioning will not start. During the positioning control, the operation decelerates to stop at the detection of the error.

*6 Only linear interpolation axis can use a unit different from that of the reference axis.

Axis operation status during the interpolation control

During the interpolation control, Interpolation is stored in [Md.26] Axis operation status. When the interpolation control is finished, Standby will be stored. If an error occurs during the interpolation control, both the reference axis and interpolation axis will perform a deceleration stop, and Error is stored in [Md.26] Axis operation status.

3.2 Positioning Data Setting

Relation between each control and positioning data

The setting requirements and details on the setting items of the positioning data differ according to the setting in [Da.2] Control method.

The following table shows the setting items of positioning data prepared for various control systems. (The settings of positioning data in this section are assumed to be performed using an engineering tool.)

◎: Always set, ○: Set as required

×: Setting not possible (If these items are set, Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs at the start.)

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Setting items for positioning data			Position control				Speed control	Speed-position 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	3-axis helical interpolation control	1-axis speed control 2-axis speed control 3-axis speed control 4-axis speed control	
[Da.1]	Operation pattern	Independent positioning control (positioning complete)	◎	◎	◎	◎	◎	◎
		Continuous positioning control	◎	◎	◎	◎	×	◎
		Continuous path control	◎	×	◎	◎	×	×
[Da.2]	Control method		Line 1 Line 2 Line 3 Line 4 *1	Fixed-feed 1 Fixed-feed 2 Fixed-feed 3 Fixed-feed 4	Circular sub Circular right Circular left *1	Helical sub Helical right Helical left *1	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 *1
[Da.3]	Acceleration time No.		◎	◎	◎	◎	◎	◎
[Da.4]	Deceleration time No.		◎	◎	◎	◎	◎	◎
[Da.5]	Axis to be interpolated		◎: 2-axis interpolation control, 3-axis helical interpolation control —: 1-axis control, 3-axis interpolation control, 4-axis interpolation control					—
[Da.6]	Positioning address/movement amount		◎	◎	◎	◎	—	◎
[Da.7]	Arc address		—	—	◎	◎	—	—
[Da.8]	Command speed		◎	◎	◎	◎	◎	◎
[Da.9]	Dwell time		○	○	○	○	—	○
[Da.10]	M code		○	○	○	○*2	○	○
[Da.27]	M code ON signal output timing		○	○	○	○	○	○
[Da.28]	ABS direction in degrees		○	○	○	○	○	○
[Da.29]	Interpolation speed specification method		—: 1-axis control, ○: 2-axis interpolation control, 3-axis interpolation control, 4-axis interpolation control					

*1 Two control methods are available: Absolute (ABS) system and Incremental (INC) system.

*2 Set an M code for the reference axis and set the number of pitches for the linear interpolation axis.

Restriction

Setting Positioning data using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

◎: Always set, ○: Set as required

×: Setting not possible (If these items are set, New current value not possible (Error code: 1A1CH) or Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs at the start.)

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Setting items for positioning data			Position-speed switching control	Other controls				
				NOP instruction	Current value change	JUMP instruction	LOOP instruction	LEND instruction
[Da.1]	Operation pattern	Independent positioning control (Positioning complete)	◎	—	◎	—	—	—
		Continuous positioning control	×	—	◎	—	—	—
		Continuous path control	×	—	×	—	—	—
[Da.2]	Control method		Forward run position-speed Reverse run position-speed	NOP instruction	Current value change	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		◎	—	◎ Address after change	—	—	—
[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	◎ Number of repetitions	—
[Da.27]	M code ON signal output timing		○	—	○	—	—	—
[Da.28]	ABS direction in degrees		○	—	—	—	—	—
[Da.29]	Interpolation speed specification method		—	—	—	—	—	—

1-axis linear control

In the 1-axis linear control ([Da.2] Control method = ABS linear 1, INC linear 1), one motor is used to perform the position control in the set axis direction.

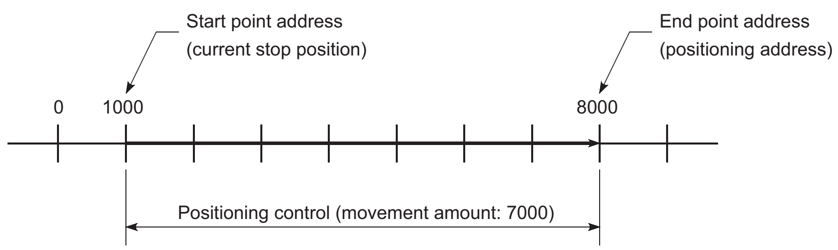
1-axis linear control (ABS linear 1)

■Operation chart

In the 1-axis linear control of the absolute system, the positioning is performed from the current stop position (start point address) to the address set in [Da.6] Positioning address/movement amount (end point address).

Example

When the start point address (current stop position) is 1000 and the end point address (positioning address) is 8000, positioning is carried out in a forward direction with a movement amount of 7000 (8000 - 1000).



■Positioning data to be set

To use the 1-axis linear control (ABS linear 1), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set ABS linear 1.)
[Da.3]	Acceleration time No.	◎
[Da.4]	Deceleration time No.	◎
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎
[Da.7]	Arc address	—
[Da.8]	Command speed	◎
[Da.9]	Dwell time	○
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	○
[Da.29]	Interpolation speed specification method	—

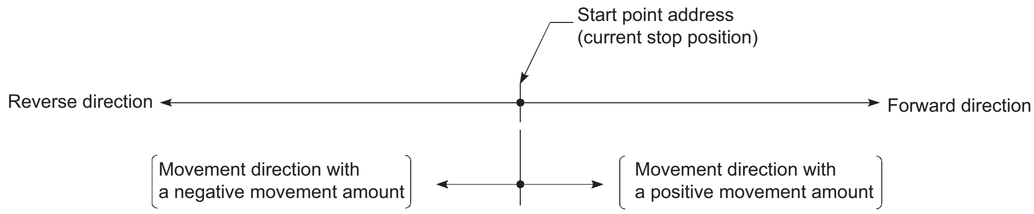
For details on the settings, refer to the following.

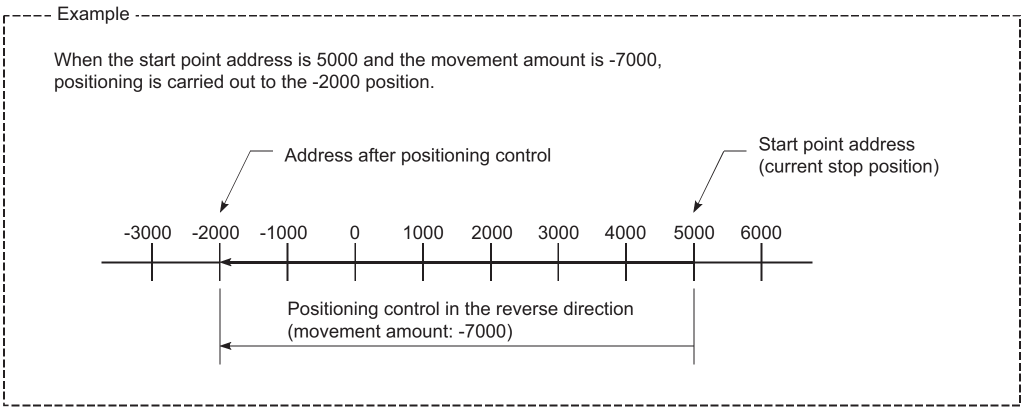
☞ Page 428 Positioning Data

1-axis linear control (INC linear 1)

■Operation chart

In the 1-axis linear control of the incremental system, the positioning for the movement amount set in [Da.6] Positioning address/movement amount is performed from the current stop position (start point address). The movement direction is determined by the sign of the movement amount.





■Positioning data to be set

To use the 1-axis linear control (INC linear 1), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set INC linear 1.)
[Da.3]	Acceleration time No.	◎
[Da.4]	Deceleration time No.	◎
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎
[Da.7]	Arc address	—
[Da.8]	Command speed	◎
[Da.9]	Dwell time	○
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	○
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

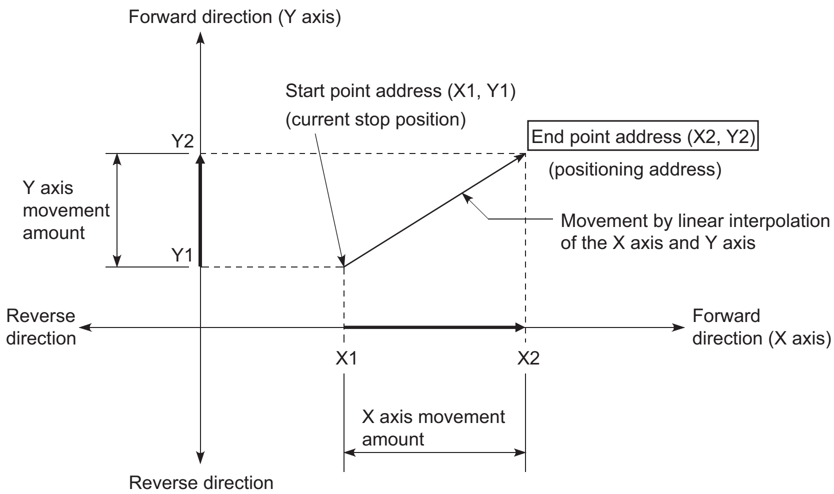
2-axis linear interpolation control

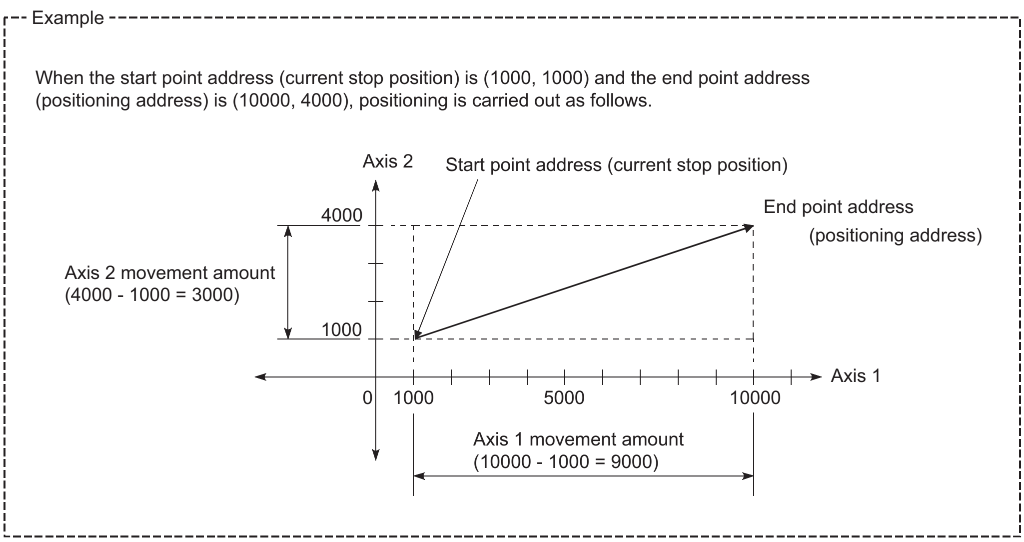
In the 2-axis linear interpolation control ([Da.2] Control method = ABS linear 2, INC linear 2), two motors are used to perform the position control in a linear path while the interpolation is performed for the axis directions set in each axis.
For details on the interpolation control, refer to the following.
☞ Page 82 Interpolation control

2-axis linear interpolation control (ABS linear 2)

■Operation chart

In the 2-axis linear interpolation control of the absolute system, specified two axes are used to perform the linear interpolation positioning from the current stop position (start point address) to the address set in [Da.6] Positioning address/movement amount (end point address).





■Restrictions

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

- If the movement amount of each axis exceeds 1073741824 (= 2^{30}) when 0: Composite speed is set in [Pr.20] Interpolation speed specification method, Outside linear movement amount range (Error code: 1A15H) occurs at the start of the positioning. (The maximum movement amount that can be set in [Da.6] Positioning address/movement amount is 1073741824 (= 2^{30}).)

■Positioning data to be set

To use the 2-axis linear interpolation control (ABS linear 2), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS linear 2.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

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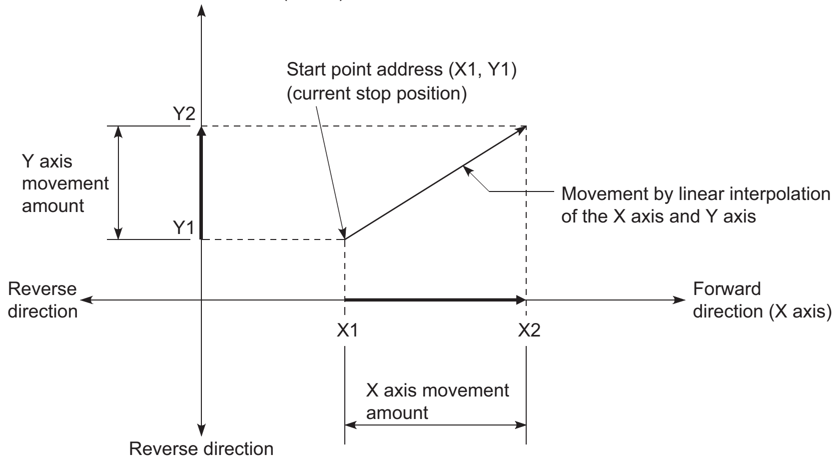
Restriction

If Reference axis speed is used for the 2-axis linear interpolation control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.

2-axis linear interpolation control (INC linear 2)

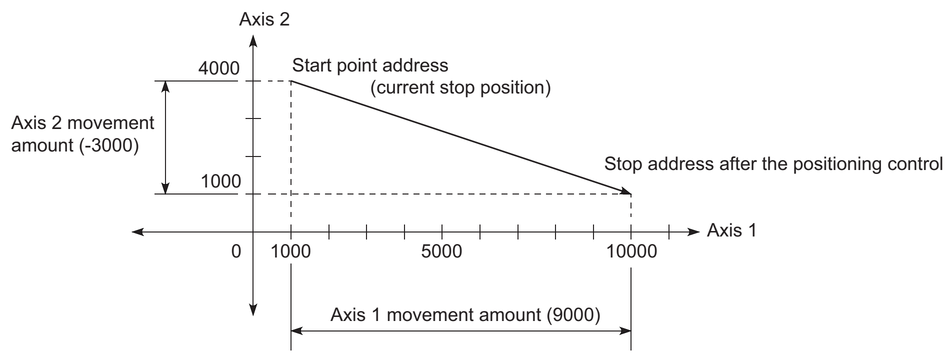
■Operation chart

In the 2-axis linear interpolation control of the incremental system, specified two axes are used to perform the linear interpolation positioning for the movement amount set in [Da.6] Positioning address/movement amount from the current stop position (start point address). 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 is carried out as follows.



■Restrictions

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

- If the movement amount of each axis exceeds 1073741824 (= 2^{30}) when 0: Composite speed is set in [Pr.20] Interpolation speed specification method, Outside linear movement amount range (Error code: 1A15H) occurs at the start of the positioning. (The maximum movement amount that can be set in [Da.6] Positioning address/movement amount is 1073741824 (= 2^{30}).)

■Positioning data to be set

To use the 2-axis linear interpolation control (INC linear 2), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set INC linear 2.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

If Reference axis speed is used for the 2-axis linear interpolation control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.

3-axis linear interpolation control

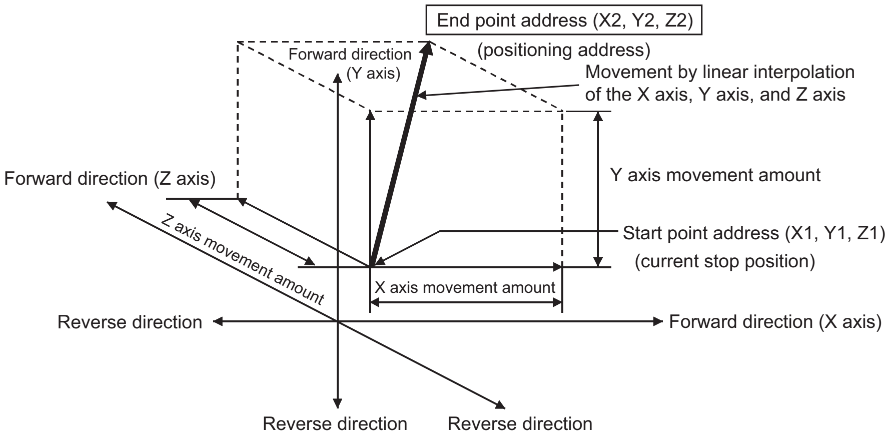
In the 3-axis linear interpolation control ([Da.2] Control method = ABS linear 3, INC linear 3), three motors are used to perform the position control in a linear path while the interpolation is performed for the axis directions set in each axis.
For details on the interpolation control, refer to the following.

☞ Page 82 Interpolation control

3-axis linear interpolation control (ABS linear 3)

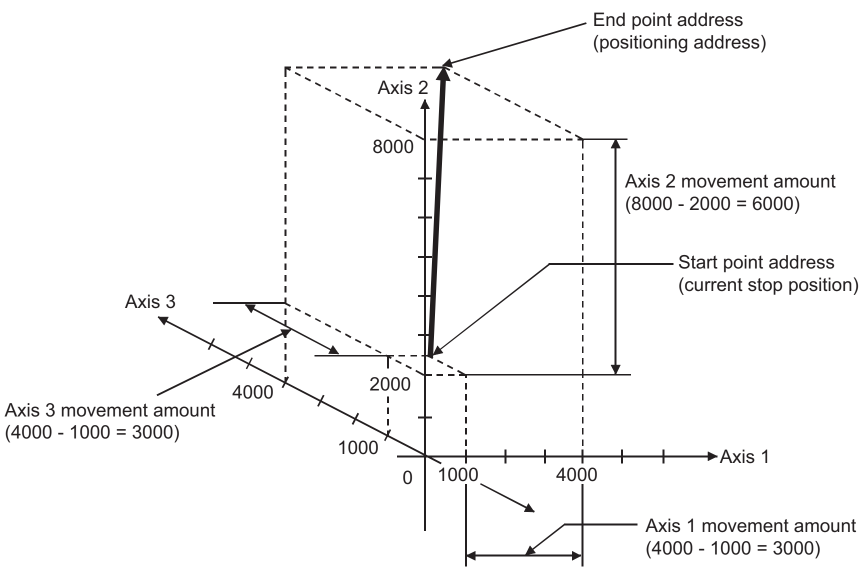
■Operation chart

In the 3-axis linear interpolation control of the absolute system, three axes are used to perform the linear interpolation positioning from the current stop position (start point address) to the address set in [Da.6] Positioning address/movement amount (end point address).



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

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

- If the movement amount of each axis exceeds 1073741824 (= 2^{30}) when 0: Composite speed is set in [Pr.20] Interpolation speed specification method, Outside linear movement amount range (Error code: 1A15H) occurs at the start of the positioning. (The maximum movement amount that can be set in [Da.6] Positioning address/movement amount is 1073741824 (= 2^{30}).)

■Positioning data to be set

To use the 3-axis linear interpolation control (ABS linear 3), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS linear 3.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

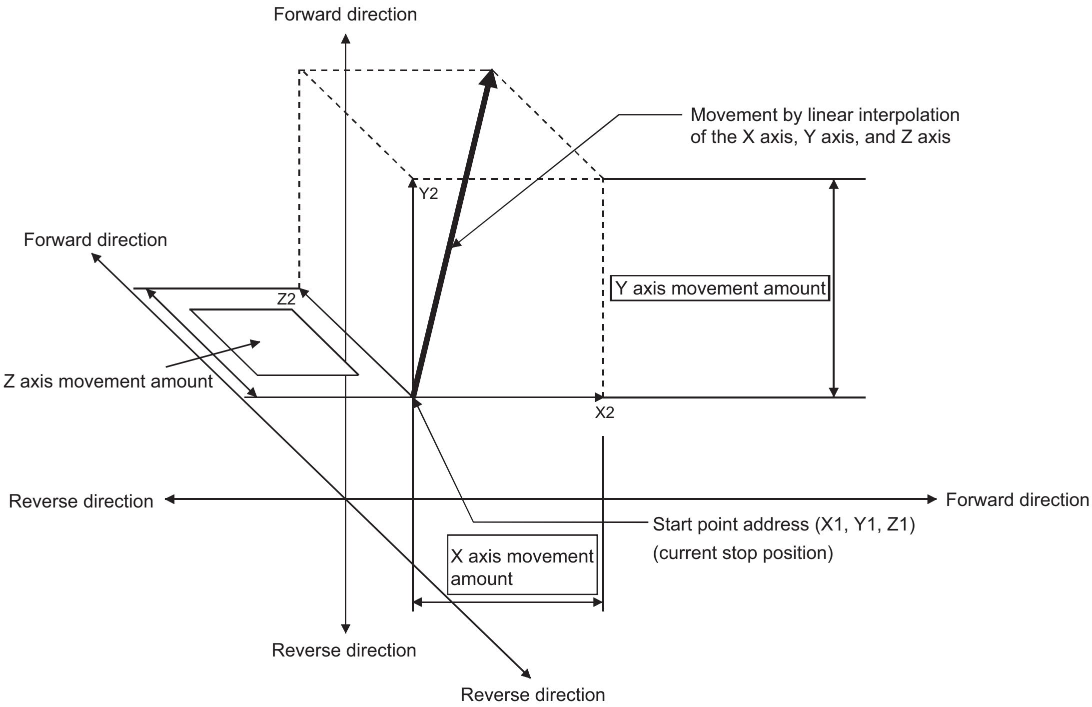
- If Reference axis speed is used for the 3-axis linear interpolation control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.
- For the combinations of the reference axis and interpolation axes, refer to the following.

☞ Page 82 Interpolation control

3-axis linear interpolation control (INC linear 3)

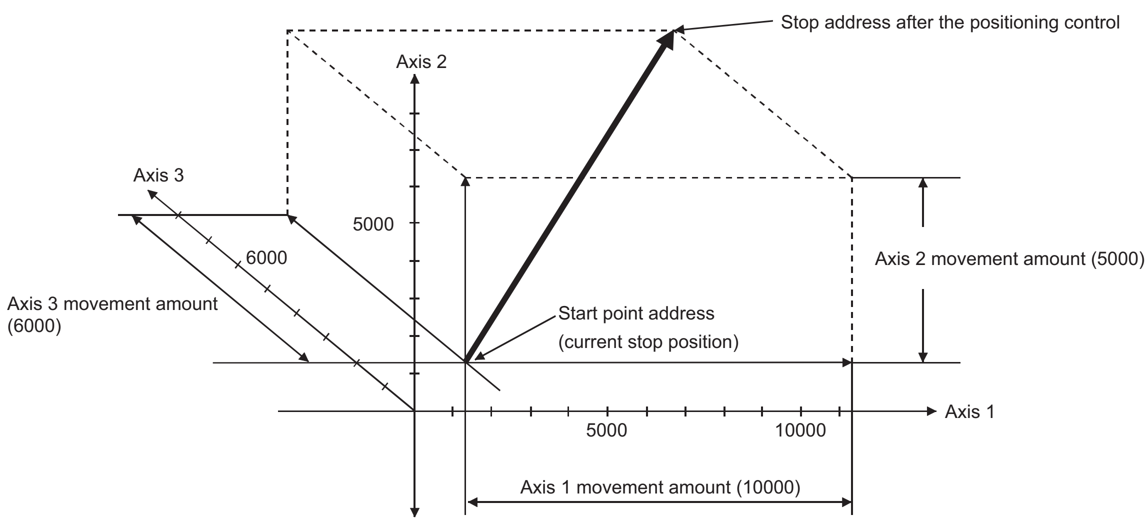
■Operation chart

In the 3-axis linear interpolation control of the incremental system, three axes are used to perform the linear interpolation positioning for the movement amount set in [Da.6] Positioning address/movement amount from the current stop position (start point address). The movement direction is determined by the sign 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

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

- If the movement amount of each axis exceeds 1073741824 (= 2^{30}) when 0: Composite speed is set in [Pr.20] Interpolation speed specification method, Outside linear movement amount range (Error code: 1A15H) occurs at the start of the positioning. (The maximum movement amount that can be set in [Da.6] Positioning address/movement amount is 1073741824 (= 2^{30}).)

■Positioning data to be set

To use the 3-axis linear interpolation control (INC linear 3), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set INC linear 3.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	—	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

- If Reference axis speed is used for the 3-axis linear interpolation control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.
- For the combinations of the reference axis and interpolation axes, refer to the following.

☞ Page 82 Interpolation control

4-axis linear interpolation control

In the 4-axis linear interpolation control ([Da.2] Control method = ABS linear 4, INC linear 4), four motors are used to perform the position control in a linear path while the interpolation is performed for the axis directions set in each axis.
For details on the interpolation control, refer to the following.
☞ Page 82 Interpolation control

4-axis linear interpolation control (ABS linear 4)

In the 4-axis linear interpolation control of the absolute system, four axes are used to perform the linear interpolation positioning from the current stop position (start point address) to the address set in [Da.6] Positioning address/movement amount (end point address).

■Positioning data to be set

To use the 4-axis linear interpolation control (ABS linear 4), set the following positioning data.
◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS linear 4.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.
☞ Page 428 Positioning Data

Restriction

- For the 4-axis linear interpolation control, set Reference axis speed and set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.
- For the combinations of the reference axis and interpolation axes, refer to the following.

☞ Page 82 Interpolation control

4-axis linear interpolation control (INC linear 4)

In the 4-axis linear interpolation control of the incremental system, four axes are used to perform the linear interpolation positioning of the movement amount set in [Da.6] Positioning address/movement amount from the current stop position (start point address). The movement direction is determined by the sign of the movement amount.

■Positioning data to be set

To use the 4-axis linear interpolation control (INC linear 4), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set INC linear 4.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

- For the 4-axis linear interpolation control, set Reference axis speed and set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.
- For the combinations of the reference axis and interpolation axes, refer to the following.

☞ Page 82 Interpolation control

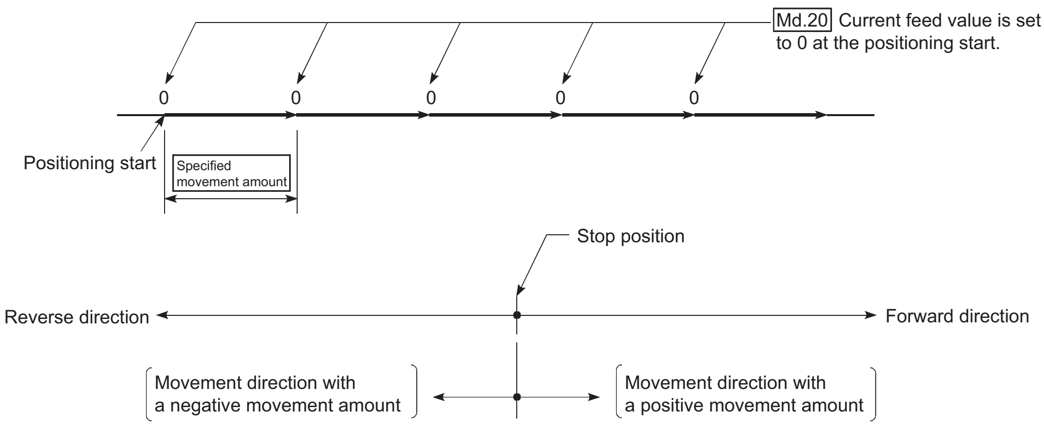
Fixed-feed control

In the fixed-feed control ([Da.2] Control method = Fixed-feed 1, 2, 3, or 4), motors for the number of specified axes are used to perform the fixed-feed control in the set axis direction.
In the fixed-feed control, any reminder of the movement amount specified in the positioning data is rounded down to output the same amount of pulses if it is less than that required for control accuracy.

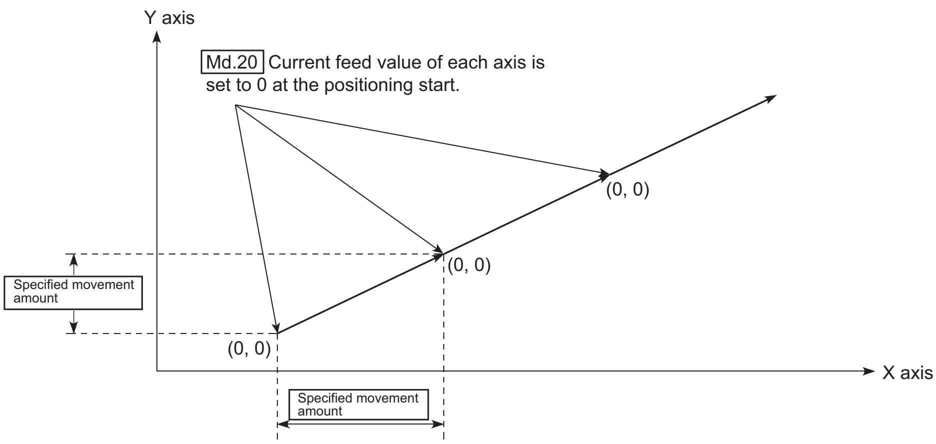
Operation chart

In the fixed-feed control, the address ([Md.20] Current feed value) of the current stop position (start point address) is set to 0, and the positioning for the movement amount set in [Da.6] Positioning address/movement amount is performed. The movement direction is determined by the sign of the movement amount.

- Example of the 1-axis fixed-feed control



- Example of the 2-axis fixed-feed control



Restrictions

- If Continuous path control is set in [Da.1] Operation pattern, Continuous path control not possible (Error code: 1A1FH) occurs and the control will not start. (In the fixed-feed control, Continuous path control cannot be set.)
- Fixed-feed cannot be set in [Da.2] Control method in the positioning data when Continuous path control is set in [Da.1] Operation pattern of the immediately previous positioning data. For example, if the operation pattern of the positioning data No.1 is Continuous path control, the fixed-feed control cannot be set to the positioning data No.2. If this setting is configured, Continuous path control not possible (Error code: 1A1FH) occurs and the deceleration stop is performed.
- In the 2-axis control or 3-axis control, if the movement amount of each axis exceeds 1073741824 (= 2^{30}) when 0: Composite speed is set in [Pr.20] Interpolation speed specification method, Outside linear movement amount range (Error code: 1A15H) occurs at the start of the positioning and the positioning will not start. (The maximum movement amount that can be set in [Da.6] Positioning address/movement amount is 1073741824 (= 2^{30}).)
- For the 4-axis fixed-feed control, set 1: Reference axis speed in [Pr.20] Interpolation speed specification method. If 0: Composite speed is set, Interpolation mode error (Error code: 199AH) occurs and the positioning will not start.

Positioning data to be set

To use the fixed-feed control, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—*1	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○*2	—

*1 To use the 2-axis fixed-feed control (interpolation), the axis to be used as the interpolation axis needs to be set.

*2 To use the 1-axis fixed-feed control, the setting is not required.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

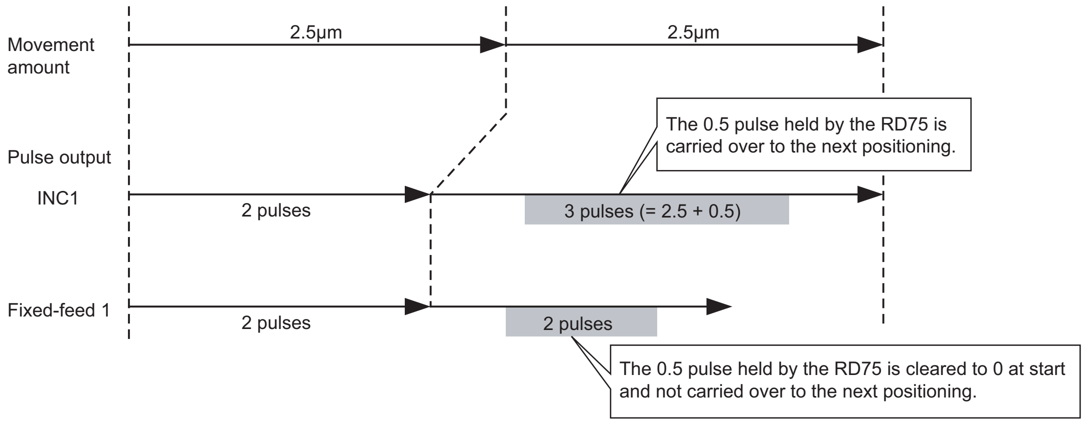
Point

- When the movement amount is converted to the actual number of output pulses, a fraction after the decimal point appears according to the movement amount per pulse. This fraction is usually retained in the RD75 and will be reflected at the next positioning. For the fixed-feed control, since the movement amount is maintained constant (= the number of output pulses is maintained constant), the control is performed after the fractional pulses are cleared to 0 at the start.

Accumulation/cutoff of fractional pulses

When movement amount per pulse is 1.0μm and movement of 2.5μm is executed twice;

⇒ Conversion to output pulses: 2.5[μm] ÷ 1.0 = 2.5 pulses



- If Reference axis speed is used for the 2-axis fixed-feed control, 3-axis fixed-feed control, or 4-axis fixed-feed control, set the major axis as the reference axis. If the minor axis is set as the reference axis, the speed of the major axis cannot be suppressed with [Pr.8] Speed limit value.
- For the combinations of the reference axis and interpolation axes, refer to the following.

☞ Page 82 Interpolation control

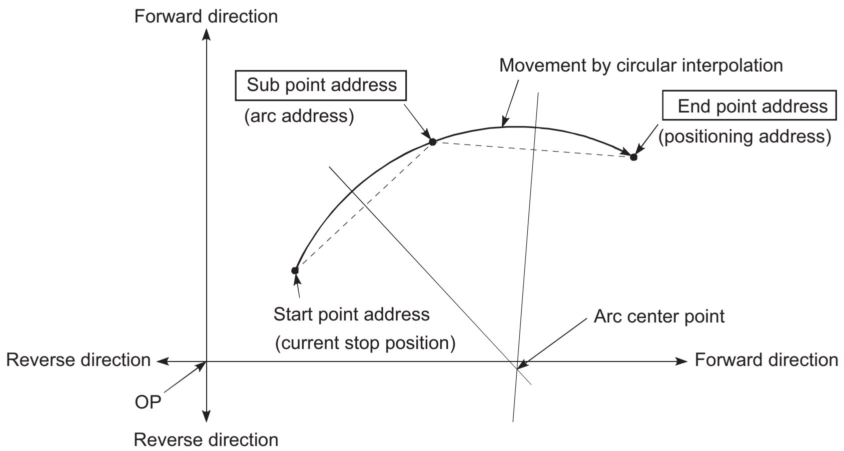
2-axis circular interpolation control with the sub point specified

In the 2-axis circular interpolation control ([Da.2] Control method = ABS circular sub, INC circular sub), two motors are used to perform the position control in an arc path passing through specified sub points, while the interpolation is performed for the axis directions set in each axis.
For details on the interpolation control, refer to the following.
☞ Page 82 Interpolation control

2-axis circular interpolation control with sub point specified (ABS circular sub)

■Operation chart

In the absolute system and 2-axis circular interpolation control with sub point specified, the positioning is performed 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 passing through the sub point address (sub point address) set in [Da.7] Arc address.
The resulting control path is an arc whose center is the intersection point of the 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

In the following cases, the 2-axis circular interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting
- When the units set in [Pr.1] Unit setting are different between the reference axis and interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 ($2^{31}-1$)	Sub point setting error (Error code: 1A37H) occurs at the start of the positioning.
Start point address = End point address	End point setting error (Error code: 1A2BH)
Start point address = Sub point address	Sub point setting error (Error code: 1A27H)
End point address = Sub point address	Sub point setting error (Error code: 1A28H)
When the start point address, sub point address, and end point address are on a straight line	Sub point setting error (Error code: 1A29H)

■Positioning data to be set

To use the 2-axis circular interpolation control with sub point specified (ABS circular sub), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS circular sub.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	◎	◎
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Point

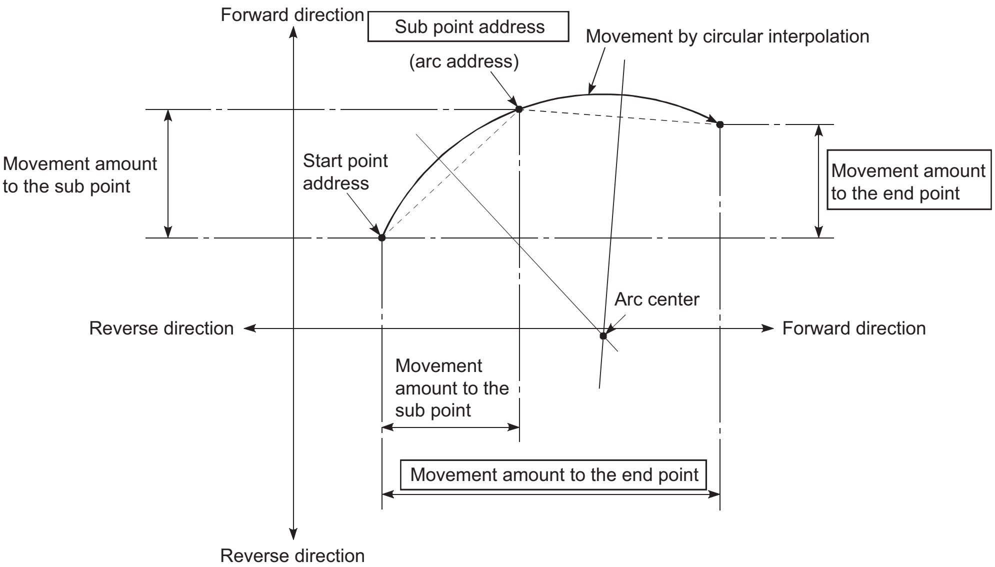
Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

2-axis circular interpolation control with sub point specified (INC circular sub)

■Operation chart

In the incremental system and 2-axis circular interpolation control with sub point specified, the positioning is performed from the current stop position (start point address) to the position of the movement amount set in [Da.6] Positioning address/ movement amount in an arc path passing through the sub point address (sub point address) set in [Da.7] Arc address. The movement direction is determined by the sign of the movement amount.

The resulting control path is an arc whose center is the intersection point of the perpendicular bisectors of a straight line between the start point address (current stop position) and the 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 the end point address (positioning address) calculated from the movement amount to the end point.



■Restrictions

In the following cases, the 2-axis circular interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting
- When the units set in [Pr.1] Unit setting are different between the reference axis and interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the sub point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Sub point setting error (Error code: 1A2AH) occurs at the start of the positioning.
When the end point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	End point setting error (Error code: 1A2CH) occurs at the start of the positioning.
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Sub point setting error (Error code: 1A37H) occurs at the start of the positioning.
Start point address = End point address	End point setting error (Error code: 1A2BH)
Start point address = Sub point address	Sub point setting error (Error code: 1A27H)
End point address = Sub point address	Sub point setting error (Error code: 1A28H)
When the start point address, sub point address, and end point address are on a straight line	Sub point setting error (Error code: 1A29H)

■Positioning data to be set

To use the 2-axis circular interpolation control with sub point specified (INC circular sub), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set INC circular sub.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	◎	◎
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

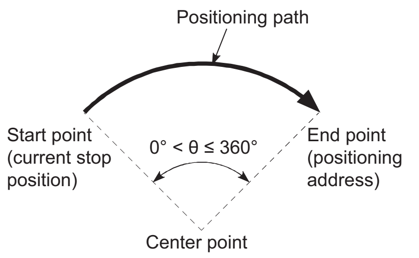
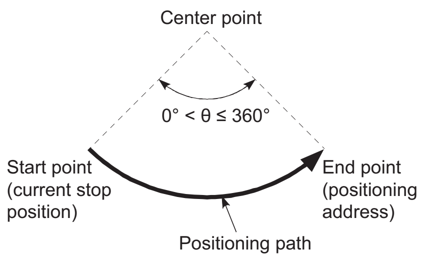
2-axis circular interpolation control with the center point specified

In 2-axis circular interpolation control ([Da.2] Control method = ABS circular right, INC circular right, ABS circular left, and INC circular left), two motors are used to perform the position control in an arc path centered at the arc address while the interpolation is performed for the axis directions set in each axis.

For details on the interpolation control, refer to the following.

☞ Page 82 Interpolation control

The following table shows the rotation directions, central angle of the arc that can be controlled, and positioning path.

Control method	Rotation direction	Central angle of the arc that can be controlled	Positioning path
ABS circular right INC circular right	Clockwise	0° < θ ≤ 360°	
ABS circular left INC circular left	Counterclockwise		

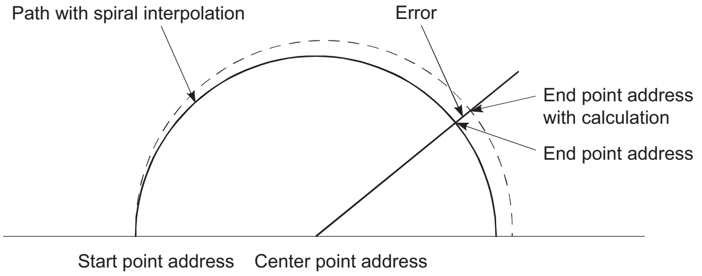
Circular interpolation error compensation

In the circular interpolation control with the center point specification, the arc path calculated with the start point address and center point address and the end point address set in [Da.6] Positioning address/movement amount may deviate.

(☞ Page 415 [Pr.41] Allowable circular interpolation error width)

■Calculated error ≤ [Pr.41] Allowable circular interpolation error width

The circular interpolation control to the set end point address is performed, while the error compensation is performed. (This operation is called Spiral interpolation.)



In the circular interpolation control with the center point specified, an angular velocity is calculated with an assumption that the positioning target moves at the command speed on the arc using the radius calculated from the start point address and center point address. The radius is compensated in proportion to the angular velocity moved from the start point.

Thus, if a difference (error) is found between a radius (start point radius) calculated from the start point address and center point address and a radius (end point radius) calculated from the end point address and center point address, the composite speed differs from the command speed and as follows.

Error between start point radius and end point radius	Composite speed
Start point radius > End point radius	Compared with the speed without an error, the speed becomes slower as the end point address is reached.
Start point radius < End point radius	Compared with the speed without an error, the speed becomes faster as the end point address is reached.

■Calculated error ≥ [Pr.41] Allowable circular interpolation error width

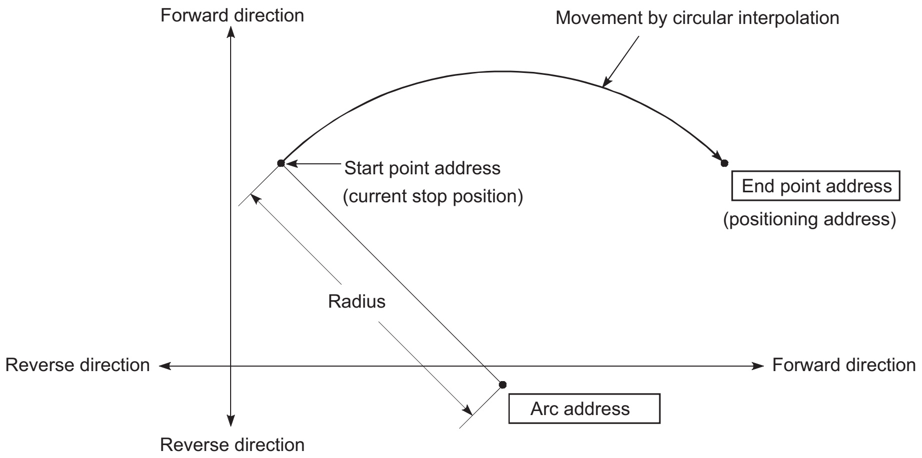
Large arc error deviation (Error code: 1A17H) occurs at the start of the positioning and the control will not start.

During the positioning control, the operation stops immediately at the detection of the error.

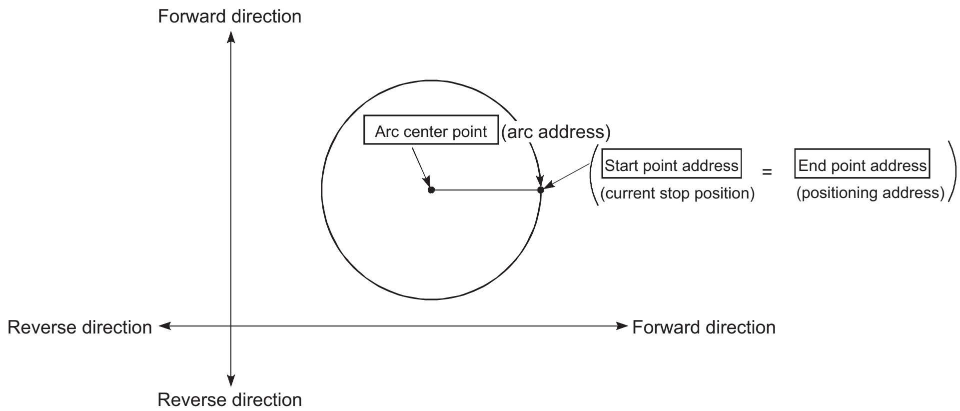
ABS circular right, ABS circular left

■Operation chart

In the absolute system and 2-axis circular interpolation control with center point specified, the positioning is performed 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 whose center is the center point address (arc address) set in [Da.7] Arc address.



If the end point address (positioning address) is set to be the same as the start point address, the positioning of a true circle whose radius is from the start point address to the center point of the arc can be performed.



In the circular interpolation control with the center point specified, an angular velocity is calculated with an assumption that the positioning target moves at the command speed on the arc using the radius calculated from the start point address and center point address. The radius is compensated in proportion to the angular velocity moved from the start point.

Thus, if a difference (error) is found between a radius (start point radius) calculated from the start point address and center point address and a radius (end point radius) calculated from the end point address and center point address, the composite speed differs from the command speed and as follows.

Error between start point radius and end point radius	Composite speed
Start point radius > End point radius	Compared with the speed without an error, the speed becomes slower as the end point address is reached.
Start point radius < End point radius	Compared with the speed without an error, the speed becomes faster as the end point address is reached.

■Restrictions

In the following cases, the 2-axis circular interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting
- When the units set in [Pr.1] Unit setting are different between the reference axis and interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
Start point address = Center point address	Center point setting error (Error code: 1A2DH)
End point address = Center point address	Center point setting error (Error code: 1A2EH)
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 ($2^{31}-1$)	Center point setting error (Error code: 1A2FH)

3

■Positioning data to be set

To use the 2-axis circular interpolation control with center point specified (ABS circular right, ABS circular left), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS circular right or ABS circular left.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	◎	◎
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

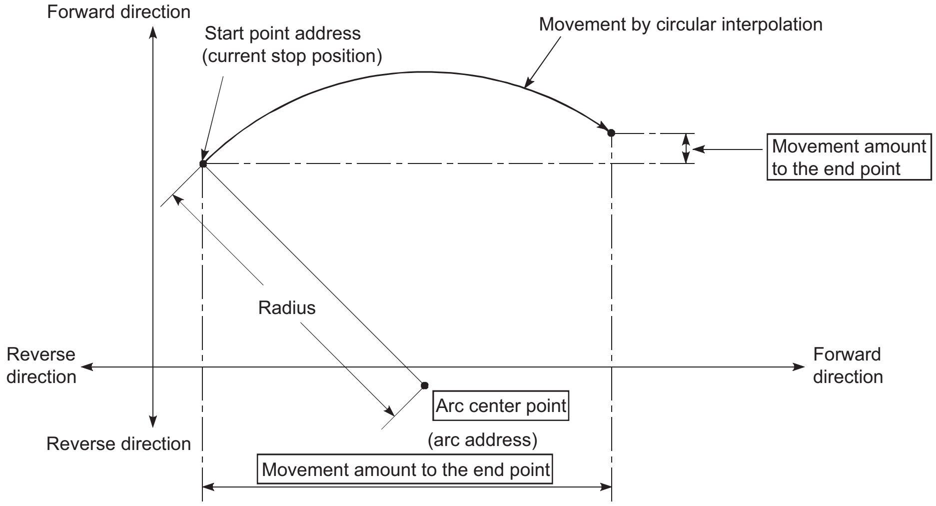
Restriction

Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

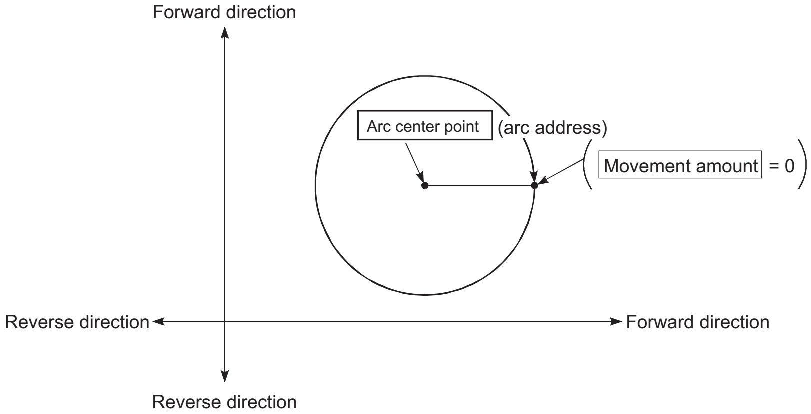
INC circular right, INC circular left

■Operation chart

In the incremental system and 2-axis circular interpolation control with center point specified, the positioning is performed from the current stop position (start point address) to the position of the movement amount set in [Da.6] Positioning address/ movement amount in an arc path whose center is the center point address (arc address) set in [Da.7] Arc address.



If 0 is set for the movement amount, the positioning of a true circle whose radius is from the start point address to the center point address of the arc can be performed.



In the circular interpolation control with the center point specified, an angular velocity is calculated with an assumption that the positioning target moves at the command speed on the arc using the radius calculated from the start point address and center point address. The radius is compensated in proportion to the angular velocity moved from the start point.
Thus, if a difference (error) is found between a radius (start point radius) calculated from the start point address and center point address and a radius (end point radius) calculated from the end point address and center point address, the composite speed differs from the command speed and as follows.

Error between start point radius and end point radius	Composite speed
Start point radius > End point radius	Compared with the speed without an error, the speed becomes slower as the end point address is reached.
Start point radius < End point radius	Compared with the speed without an error, the speed becomes faster as the end point address is reached.

■Restrictions

In the following cases, the 2-axis circular interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting
- When the units set in [Pr.1] Unit setting are different between the reference axis and interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the end point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	End point setting error (Error code: 1A2CH) occurs at the start of the positioning.
Start point address = Center point address	Center point setting error (Error code: 1A2DH)
End point address = Center point address	Center point setting error (Error code: 1A2EH)
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Center point setting error (Error code: 1A2FH)

■Positioning data to be set

To use the 2-axis circular interpolation control with center point specified (INC circular right, INC circular left), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎ (Set ABS circular right or ABS circular left.)	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	◎	—
[Da.6]	Positioning address/movement amount	◎	◎
[Da.7]	Arc address	◎	◎
[Da.8]	Command speed	◎	—
[Da.9]	Dwell time	○	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	○	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

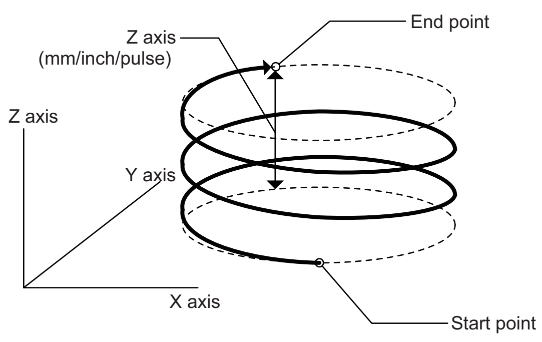
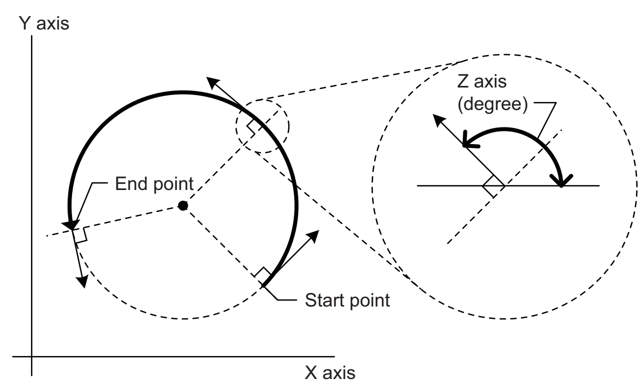
Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

3-axis helical interpolation control with sub point specified

In the 3-axis helical interpolation control, the circular interpolation control is performed using two axes of the three axes. The remaining axis is used for Helical control or Tangent control.
For details on the interpolation control, refer to the following.

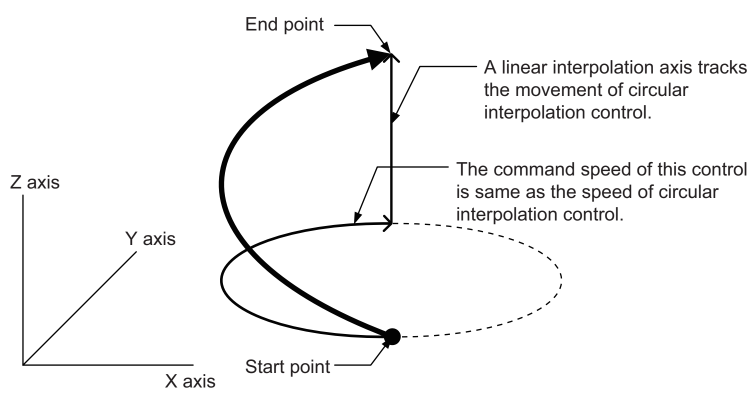
☞ Page 82 Interpolation control

X axis: Reference axis, Y axis: Circular interpolation axis, Z axis: Linear interpolation axis

Control details	Control overview	Positioning path
Helical control		Draws a helical path by following the linear interpolation axis (linear control) to the circular interpolation control. ■Unit setting • Reference axis: mm/inch, pulse • Circular interpolation axis: The same as the reference axis • Linear interpolation axis: mm/inch, pulse
Tangent control		Keeps the direction of the workpiece against the center point of the circular interpolation control by following the value of the linear interpolation axis (degree) to the circular interpolation control. The figure shown on the left is an example in which the direction of the workpiece is kept to the direction of the tangent. ■Unit setting • Reference axis: mm/inch, pulse • Circular interpolation axis: The same as the reference axis • Linear interpolation axis: degree

Speed of the helical interpolation control

The circular interpolation control (Reference axis—Composite speed of the circular interpolation axis) is the target of the command speed of the 3-axis helical interpolation control.



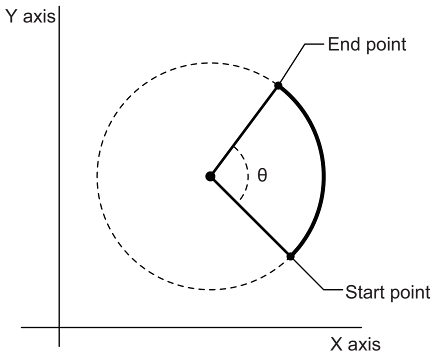
Point

When 0: Composite speed is set in [Pr.20] Interpolation speed specification method, the command speed of ABS3/INC3 is the composite speed of the three axes (x axis—y axis—z axis). The command speed of the 3-axis helical interpolation control is the composite speed of the circular interpolation axis (x axis—y axis). When the continuous path control is performed using ABS3/INC3 and the 3-axis helical interpolation control, the movement speed of the workpiece may change at the positioning data switching; therefore, adjust the command speed not to shake the workpiece.

3

Rotation angle of circular interpolation axis (x axis—y axis)

The rotation angle of the circular interpolation axis in the 3-axis helical interpolation control is as follows.



Number of pitch	Control of the circular interpolation axis
0	θ°
1	360° + θ°
2	720° + θ°
to	to
n	360° × n + θ°
to	to
999	360° × 999 + θ°

Restriction

When the unit is set to Degree, the positioning range of the absolute system is 0 to 359.99999°. If the rotation angle is 360° or larger in the circular interpolation control (x axis—y axis), the tangent control and normal line control cannot be performed because 360° or larger angle cannot be set for the linear control (z axis: degree). To perform the tangent control or normal line control with the rotation of 360° or larger angle, use the 3-axis helical interpolation control (INC).

Rotation direction when the line axis (Z axis) is set in degrees

When Degree is set to [Pr.1] Unit setting for the line axis, the rotation direction is determined depending on the axis control data in [Cd.40] ABS direction in degrees of the reference axis. To set a rotation direction for each positioning data, set [Da.28] ABS direction in degrees of each positioning data.

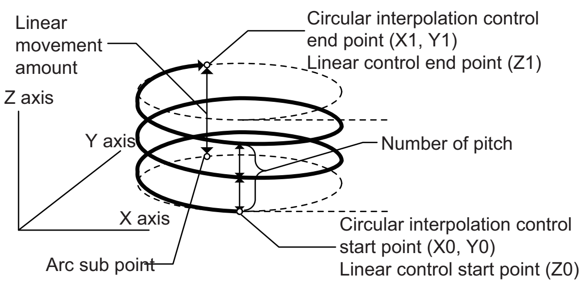
3-axis helical interpolation control with sub point specified (ABS helical sub)

■Operation chart

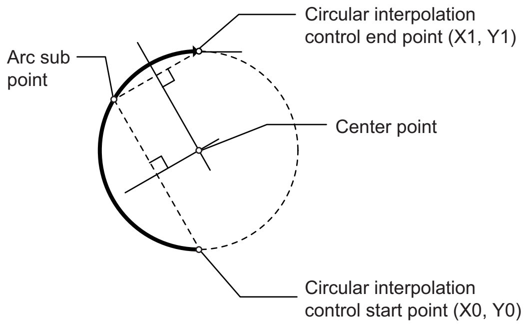
In this control, the positioning is performed from the current stop position (X0, Y0, Z0) to the position indicated with the arc end point address (X1 and Y1) and the line axis end point address (Z1) set in [Da.6] Positioning address/movement amount. As the positioning to the commanded position, the linear interpolation with the other line axes is performed and the positioning target is rotated helically for the number of pitches set in [Da.10] M code of the line axis while the circular interpolation through the sub point address (sub point address) set in [Da.7] Arc address is performed.

The resulting path is an arc whose center is the intersection point of the 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).

Operation chart



Top view of the circular interpolation



■Restrictions

In the following cases, the 3-axis helical interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting of the reference axis and circular interpolation axis
- When the units set in [Pr.1] Unit setting are different between the reference axis and circular interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Sub point setting error (Error code: 1A37H) occurs at the start of the positioning.
Start point address = End point address	End point setting error (Error code: 1A2BH)
Start point address = Sub point address	Sub point setting error (Error code: 1A27H)
End point address = Sub point address	Sub point setting error (Error code: 1A28H)
When the start point address, sub point address, and end point address are on a straight line	Sub point setting error (Error code: 1A29H)

■Positioning data to be set

To use the 3-axis helical interpolation control with sub point specified (ABS helical sub), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of circular interpolation axis[*1]	Setting requirement of linear interpolation axis[*2]
[Da.1]	Operation pattern	◎	—	—
[Da.2]	Control method	◎ (Set ABS helical sub.)	—	—
[Da.3]	Acceleration time No.	◎	—	—
[Da.4]	Deceleration time No.	◎	—	—
[Da.5]	Axis to be interpolated	◎	—	—
[Da.6]	Positioning address/movement amount	◎	◎	◎
[Da.7]	Arc address	◎	◎	—
[Da.8]	Command speed	◎	—	—
[Da.9]	Dwell time	○	—	—
[Da.10]	M code	○	—	◎[*3]
[Da.27]	M code ON signal output timing	○	—	—
[Da.28]	ABS direction in degrees	○	—	—
[Da.29]	Interpolation speed specification method	○	—	—

*1 Specified in [Da.5] Axis to be interpolated of the reference axis.

*2 An axis that is not specified in [Da.5] Axis to be interpolated of the reference axis is automatically assigned. For details, refer to Page 82 Meaning of the interpolation control.

*3 Set the number of pitches for the linear interpolation axis.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

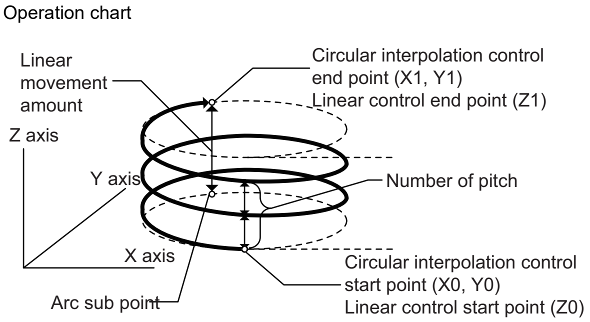
Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

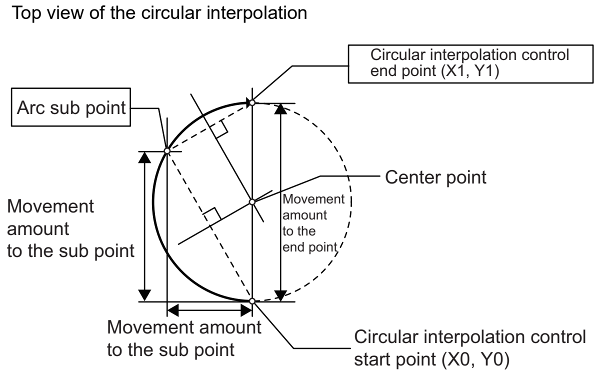
3-axis helical interpolation control with sub point specified (INC helical sub)

■Operation chart

In this control, the positioning is performed from the current stop position (X0, Y0, Z0) to the position (X1, Y1, Z1) for the movement amount set in [Da.6] Positioning address/movement amount. As the positioning to the commanded position, the linear interpolation with the other line axes is performed and the positioning target is rotated helically for the number of pitches set in [Da.10] M code of the line axis while the circular interpolation through the sub point address (sub point address) set in [Da.7] Arc address is performed. The movement direction is determined by the sign of the movement amount.

The resulting path is an arc whose center is the intersection point of the perpendicular bisectors of a straight line between the start point address (current stop position) and the 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 the end point address (positioning address) calculated from the movement amount to the end point.





■Restrictions

In the following cases, the 3-axis helical interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting of the reference axis and circular interpolation axis
- When the units set in [Pr.1] Unit setting are different between the reference axis and circular interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the sub point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Sub point setting error (Error code: 1A2AH) occurs at the start of the positioning.
When the end point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	End point setting error (Error code: 1A2CH) occurs at the start of the positioning.
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Sub point setting error (Error code: 1A37H) occurs at the start of the positioning.
Start point address = End point address	End point setting error (Error code: 1A2BH)
Start point address = Sub point address	Sub point setting error (Error code: 1A27H)
End point address = Sub point address	Sub point setting error (Error code: 1A28H)
When the start point address, sub point address, and end point address are on a straight line	Sub point setting error (Error code: 1A29H)

■Positioning data to be set

To use the 3-axis helical interpolation control with sub point specified (INC helical sub), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of circular interpolation axis*1	Setting requirement of linear interpolation axis*2
[Da.1]	Operation pattern	◎	—	—
[Da.2]	Control method	◎ (Set INC helical sub.)	—	—
[Da.3]	Acceleration time No.	◎	—	—
[Da.4]	Deceleration time No.	◎	—	—
[Da.5]	Axis to be interpolated	◎	—	—
[Da.6]	Positioning address/movement amount	◎	◎	◎
[Da.7]	Arc address	◎	◎	—
[Da.8]	Command speed	◎	—	—
[Da.9]	Dwell time	○	—	—
[Da.10]	M code	○	—	◎*3
[Da.27]	M code ON signal output timing	○	—	—
[Da.28]	ABS direction in degrees	○	—	—
[Da.29]	Interpolation speed specification method	○	—	—

*1 Specified in [Da.5] Axis to be interpolated of the reference axis.

*2 An axis that is not specified in [Da.5] Axis to be interpolated of the reference axis is automatically assigned. For details, refer to Page 82 Meaning of the interpolation control.

*3 Set the number of pitches for the linear interpolation axis.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

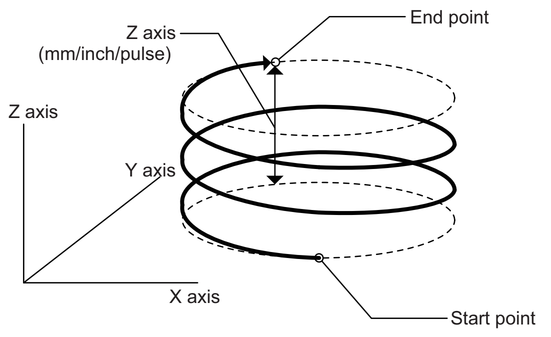
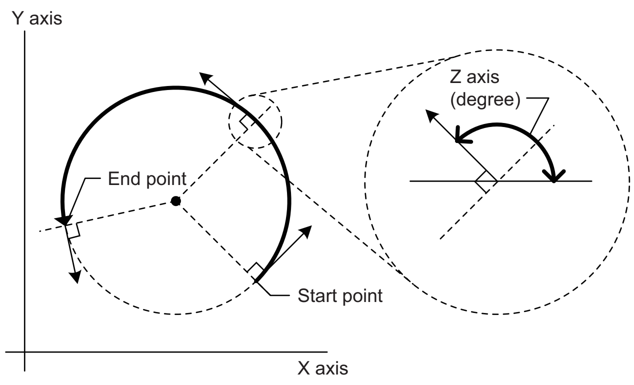
3-axis helical interpolation control with center point specified

In the 3-axis helical interpolation control, the circular interpolation control is performed using two axes of the three axes. The remaining axis is used for Helical control or Tangent control.

For details on the interpolation control, refer to the following.

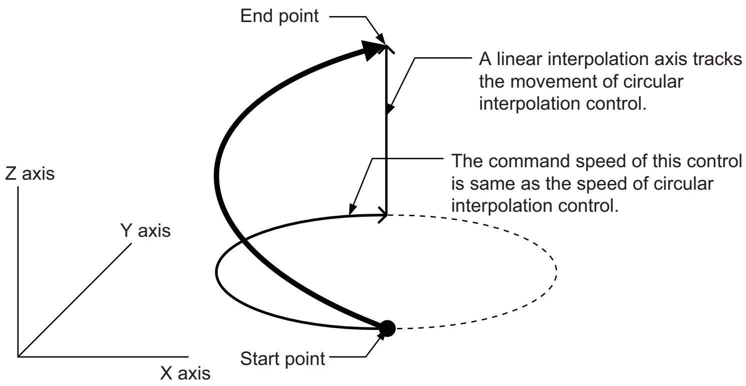
☞ Page 82 Interpolation control

X axis: Reference axis, Y axis: Circular interpolation axis, Z axis: Linear interpolation axis

<table>
<tr><th>Control details</th><th>Control overview</th><th>Positioning path</th></tr>
<tr><td>Helical control</td><td>
</td><td>Draws a helical path by following the linear interpolation axis (linear control) to the circular interpolation control.
■Unit setting
• Reference axis: mm/inch, pulse
• Circular interpolation axis: The same as the reference axis
• Linear interpolation axis: mm/inch, pulse</td></tr>
<tr><td>Tangent control</td><td>
</td><td>Keeps the direction of the workpiece against the center point of the circular interpolation control by following the value of the linear interpolation axis (degree) to the circular interpolation control. The figure shown on the left is an example in which the direction of the workpiece is kept to the direction of the tangent.
■Unit setting
• Reference axis: mm/inch, pulse
• Circular interpolation axis: The same as the reference axis
• Linear interpolation axis: degree</td></tr>
</table>

Speed of the helical interpolation control

The circular interpolation control (Reference axis—Composite speed of the circular interpolation axis) is the target of the command speed of the 3-axis helical interpolation control.



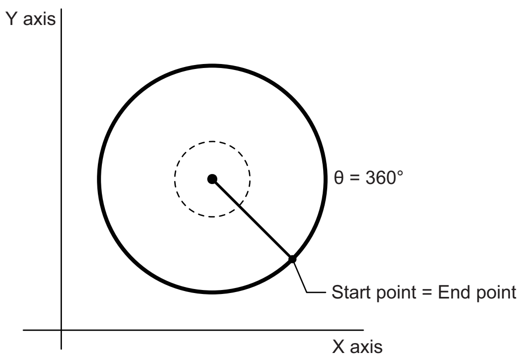
Point

When 0: Composite speed is set in [Pr.20] Interpolation speed specification method, the command speed of ABS3/INC3 is the composite speed of the three axes (x axis—y axis—z axis). The command speed of the 3-axis helical interpolation control is the composite speed of the circular interpolation axis (x axis—y axis). When the continuous path control is performed using ABS3/INC3 and the 3-axis helical interpolation control, the movement speed of the workpiece may change at the positioning data switching; therefore, adjust the command speed not to shake the workpiece.

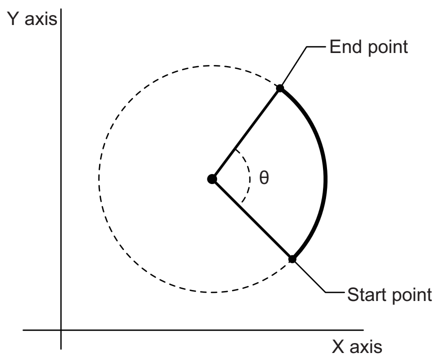
Rotation angle of circular interpolation axis (x axis—y axis)

The rotation angle of the circular interpolation axis in the 3-axis helical interpolation control is as follows.

True circle



Other than the true circle



Number of pitch	Control of the circular interpolation axis	
	True circle	Other than the true circle
0	360°	θ°
1		360° + θ°
2	720°	720° + θ°
to	to	to
n	360° × n	360° × n + θ°
to	to	to
999	360° × 999	360° × 999 + θ°

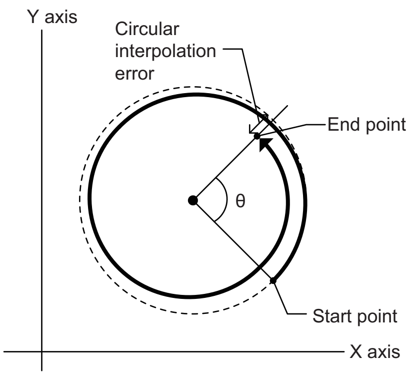
The setting of the true circle is available only when Start point = End point is set for the 3-axis helical interpolation (ABS/INC, center point).

Restriction

When the unit is set to Degree, the positioning range of the absolute system is 0 to 359.99999°. If the rotation angle is 360° or larger in the circular interpolation control (x axis—y axis), the tangent control and normal line control cannot be performed because 360° or larger angle cannot be set for the linear control (z axis: degree). To perform the tangent control or normal line control with the rotation of 360° or larger angle, use the 3-axis helical interpolation control (INC).

Error compensation of the circular interpolation control

In the 3-axis helical interpolation control, as well as the circular interpolation control (2 axes), [Pr.41] Allowable circular interpolation error width is enabled. When a circular interpolation error occurs, the path of the circular interpolation control (X axis—Y axis) becomes spiral as shown below.



Rotation direction when the line axis (Z axis) is set in degrees

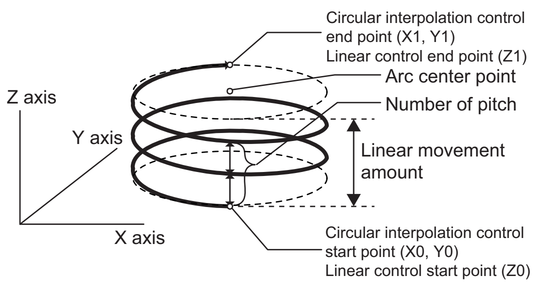
When Degree is set to [Pr.1] Unit setting for the line axis, the rotation direction is determined depending on the axis control data in [Cd.40] ABS direction in degrees of the reference axis. To set a rotation direction for each positioning data, set [Da.28] ABS direction in degrees of each positioning data.

ABS helical right, ABS helical left

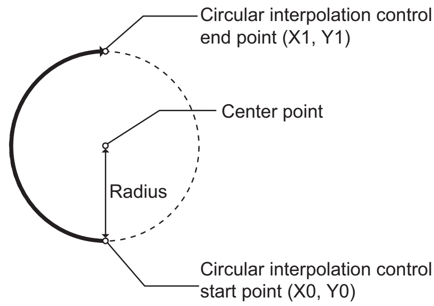
■Operation chart

In this control, the positioning is performed from the current stop position (X0, Y0, Z0) to the position indicated with the arc end point address (X1 and Y1) and the line axis end point address (Z1) set in [Da.6] Positioning address/movement amount. As the positioning to the commanded position, the linear interpolation with the other line axes is performed and the positioning target is rotated helically for the number of pitches set in [Da.10] M code of the line axis while the circular interpolation of the circle whose center is the center point address (arc address) set in [Da.7] Arc address is performed.

Operation chart

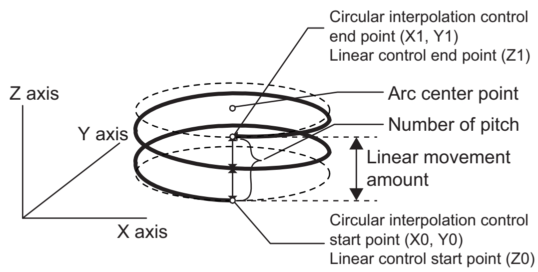


Top view of the circular interpolation

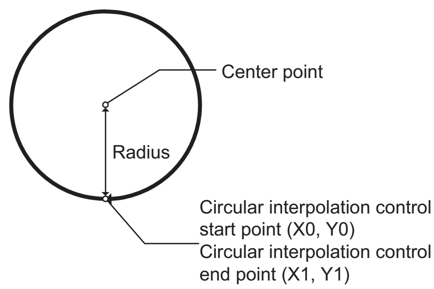


If the end point address (positioning address) of the circular interpolation axis is set to be the same as the start point address, the positioning of a true circle whose radius is from the start point address to the center point of the arc can be performed.

Operation chart



Top view of the circular interpolation



■Restrictions

In the following cases, the 3-axis helical interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting of the reference axis and circular interpolation axis
- When the units set in [Pr.1] Unit setting are different between the reference axis and circular interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
Start point address = Center point address	Center point setting error (Error code: 1A2DH)
End point address = Center point address	Center point setting error (Error code: 1A2EH)
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Center point setting error (Error code: 1A2FH)

■Positioning data to be set

To use the 3-axis helical interpolation control with center point specified (ABS helical right, ABS helical left), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of circular interpolation axis*1	Setting requirement of linear interpolation axis*2
[Da.1]	Operation pattern	◎	—	—
[Da.2]	Control method	◎ (Set ABS helical right or ABS helical left.)	—	—
[Da.3]	Acceleration time No.	◎	—	—
[Da.4]	Deceleration time No.	◎	—	—
[Da.5]	Axis to be interpolated	◎	—	—
[Da.6]	Positioning address/movement amount	◎	◎	◎
[Da.7]	Arc address	◎	◎	—
[Da.8]	Command speed	◎	—	—
[Da.9]	Dwell time	○	—	—
[Da.10]	M code	○	—	◎*3
[Da.27]	M code ON signal output timing	○	—	—
[Da.28]	ABS direction in degrees	○	—	—
[Da.29]	Interpolation speed specification method	○	—	—

*1 Specified in [Da.5] Axis to be interpolated of the reference axis.

*2 An axis that is not specified in [Da.5] Axis to be interpolated of the reference axis is automatically assigned. For details, refer to Page 82 Meaning of the interpolation control.

*3 Set the number of pitches for the linear interpolation axis.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

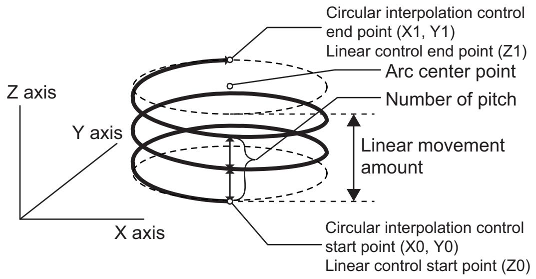
Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

INC helical right, INC helical left

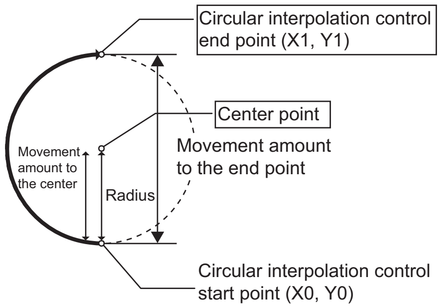
■Operation chart

In this control, the positioning is performed from the current stop position (X0, Y0, Z0) to the position (X1, Y1, Z1) for the movement amount set in [Da.6] Positioning address/movement amount. As the positioning to the commanded position, the linear interpolation with the other line axes is performed and the positioning target is rotated helically for the number of pitches set in [Da.10] M code of the line axis while the circular interpolation of the circle whose center is the center point address (arc address) set in [Da.7] Arc address is performed.

Operation chart

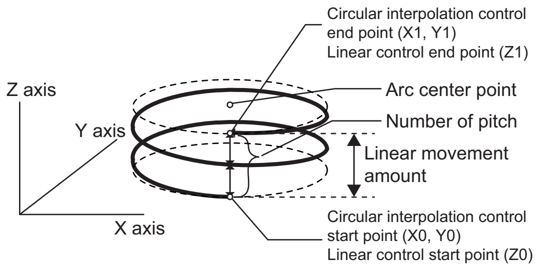


Top view of the circular interpolation

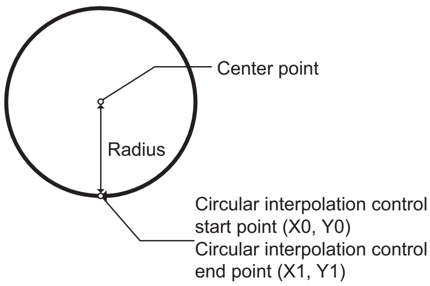


If 0 is set for the movement amount of the circular interpolation axis, the positioning of a true circle whose radius is from the start point address to the center point address of the arc can be performed.

Operation chart



Top view of the circular interpolation



■Restrictions

In the following cases, the 3-axis helical interpolation control cannot be set.

- When Degree is set in [Pr.1] Unit setting of the reference axis and circular interpolation axis
- When the units set in [Pr.1] Unit setting are different between the reference axis and circular interpolation axis (The combination of mm and inch is possible.)
- When Reference axis speed is set in [Pr.20] Interpolation speed specification method

In the following case, an error occurs and the positioning will not start. During the positioning control, the operation stops immediately at the detection of the error.

Error cause	Error code
When the radius exceeds 536870912 (= 2^{29}) (The maximum radius for which the circular interpolation control is possible is 536870912 (= 2^{29}).)	Outside radius range (Error code: 1A32H) occurs at the start of the positioning.
When the end point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	End point setting error (Error code: 1A2CH) occurs at the start of the positioning.
Start point address = Center point address	Center point setting error (Error code: 1A2DH)
End point address = Center point address	Center point setting error (Error code: 1A2EH)
When the center point address is out of the range of -2147483648 (-2^{31}) to 2147483647 (2^{31}-1)	Center point setting error (Error code: 1A2FH)

■Positioning data to be set

To use the 3-axis helical interpolation control with center point specified (INC helical right, INC helical left), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of circular interpolation axis*1	Setting requirement of linear interpolation axis*2
[Da.1]	Operation pattern	◎	—	—
[Da.2]	Control method	◎ (Set INC helical right or INC helical left.)	—	—
[Da.3]	Acceleration time No.	◎	—	—
[Da.4]	Deceleration time No.	◎	—	—
[Da.5]	Axis to be interpolated	◎	—	—
[Da.6]	Positioning address/movement amount	◎	◎	◎
[Da.7]	Arc address	◎	◎	—
[Da.8]	Command speed	◎	—	—
[Da.9]	Dwell time	○	—	—
[Da.10]	M code	○	—	◎*3
[Da.27]	M code ON signal output timing	○	—	—
[Da.28]	ABS direction in degrees	○	—	—
[Da.29]	Interpolation speed specification method	○	—	—

*1 Specified in [Da.5] Axis to be interpolated of the reference axis.

*2 An axis that is not specified in [Da.5] Axis to be interpolated of the reference axis is automatically assigned. For details, refer to Page 82 Meaning of the interpolation control.

*3 Set the number of pitches for the linear interpolation axis.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restriction

Set a value in [Da.8] Command speed so that the speed of each axis does not exceed the value in [Pr.8] Speed limit value. (The speed limit does not function for the speed calculated by the RD75.)

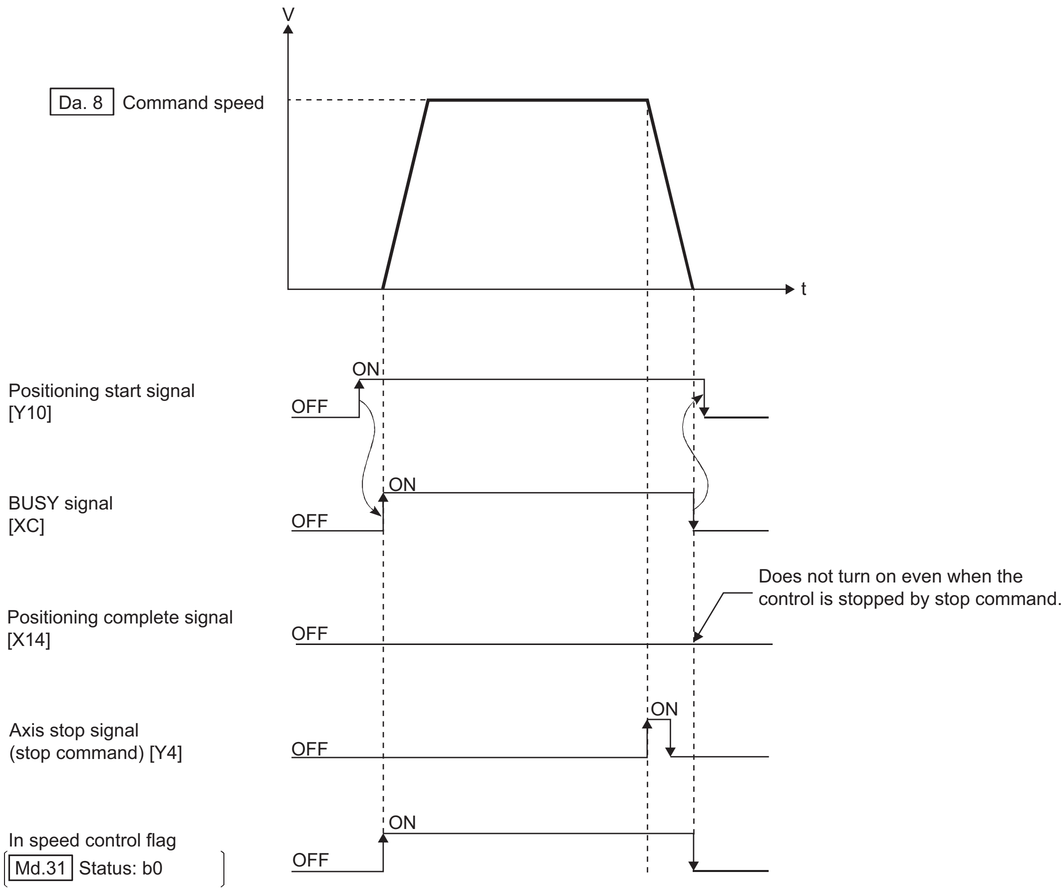
Speed control

In the speed control ([Da.2] Control method = Forward run speed 1 to 4, Reverse run speed 1 to 4), pulses are output continuously at the speed set in [Da.8] Command speed until a stop command is input in the axis 1 to 4 directions set to the positioning data.
The speed control has eight control types including Forward run speed 1 to 4 performed in the forward run direction and Reverse run speed 1 to 4 performed in the reverse run direction.
For the combinations of the reference axis and interpolation axes, refer to the following.
☞ Page 82 Interpolation control

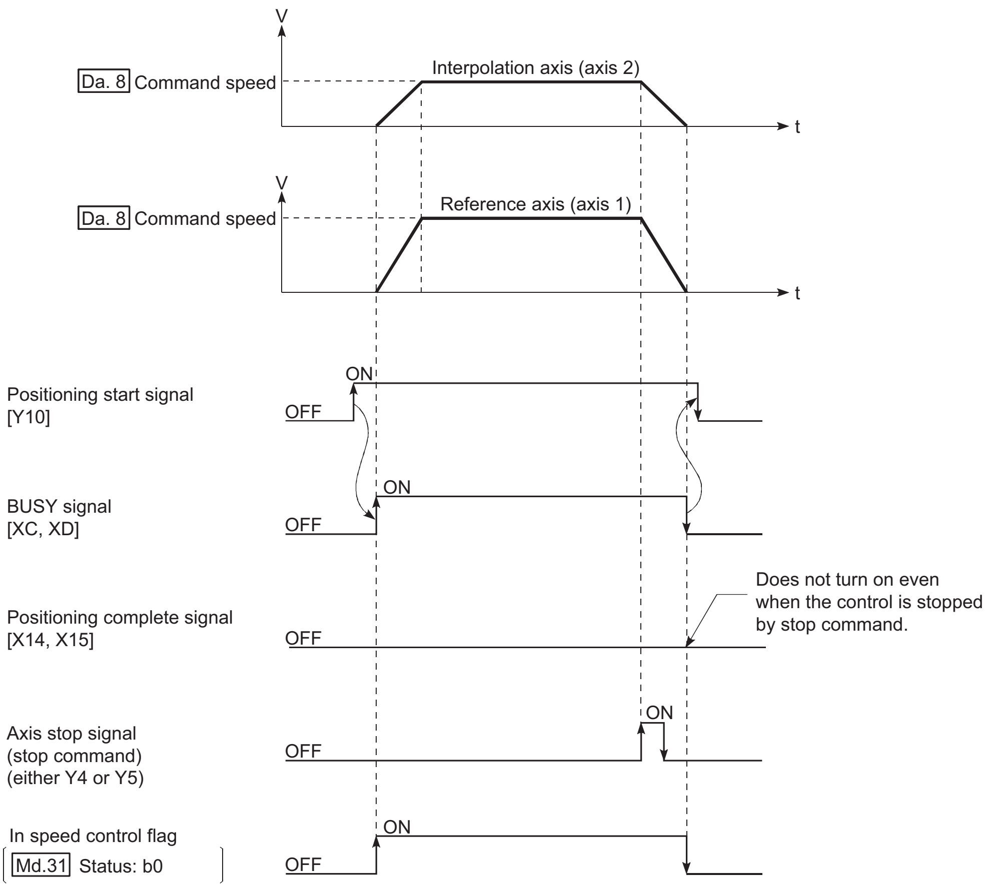
Operation chart

The following shows the operation timing for the 1-axis speed control with the axis 1 and the 2-axis speed control in which the axis 1 is used as the reference axis.
During the speed control, In speed control flag ([Md.31] Status: b0) is on (reference axis only).
Positioning complete signal does not turn on.

- 1-axis speed control



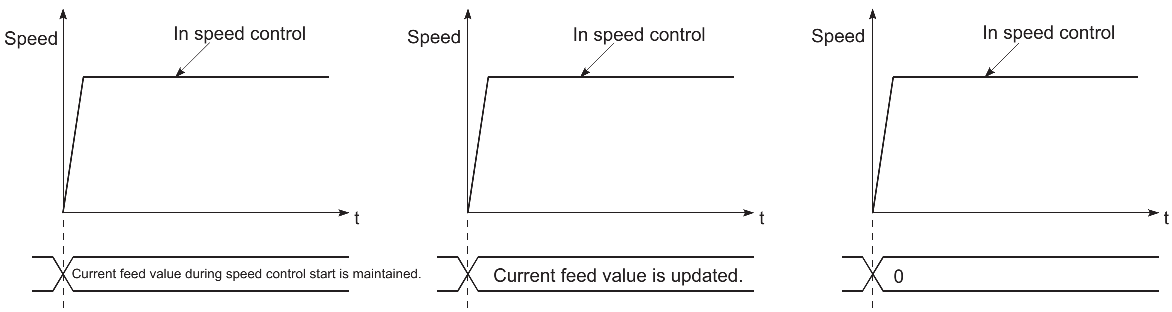
• 2-axis speed control



Current feed value

[Md.20] Current feed value during the speed control depends on the setting of [Pr.21] Current feed value during speed control as follows. (However, the parameters use the set value of the reference axis.)

Setting of [Pr.21] Current feed value during speed control	[Md.20] Current feed value
0: Current feed value is not updated	The current feed value during speed control start is maintained.
1: Current feed value is updated	The current feed value is updated.
2: Current feed value is cleared to zero	The current feed value is fixed to 0.



(a) Current feed value is not updated (b) Current feed value is updated (c) Current feed value is cleared to zero

Restrictions

- Set Positioning complete to [Da.1] Operation pattern. If Continuous positioning control or Continuous path control is set, Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs and the control will not start. (Continuous positioning control and Continuous path control cannot be set for the speed control.)
- If Current speed (-1) is set to [Da.8] Command speed, No command speed (Error code: 1A13H) occurs.
- When the unit is degree, the software stroke limit is not checked.
- Set Reference axis speed to [Pr.20] Interpolation speed specification method. If Composite speed is set, Interpolation mode error (Error code: 199AH) occurs and the positioning will not start.

3

■Restriction on speed limit value

If any axis of the control axes (1 to 4 axes) exceeds the value in [Pr.8] Speed limit value, the axis exceeding the speed limit value is controlled with the speed limit value. In this case, the speeds of the other axes are limited by the ratio of [Da.8] Command speed.

Ex.

When the axis 1 and 2 are used

Setting item		Axis 1	Axis 2
[Pr.8]	Speed limit value	4000.00mm/min	5000.00mm/min
[Da.8]	Command speed	8000.00mm/min	6000.00mm/min

When the values above are set, the operating speed during the speed control is as follows.

- Axis 1: 4000.00mm/min (the speed is limited by [Pr.8].)
- Axis 2: 3000.00mm/min (the speed is limited by the ratio of the command speeds of the axis 1 and 2.)

When the reference axis speed is less than 1 as the result of the speed limit, the operation is performed at the speed 1. When the bias speed is set, the lowest speed is the bias speed.

Positioning data to be set

To use the speed control (Forward run speed 1 to 4, Reverse run speed 1 to 4), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement of reference axis	Setting requirement of interpolation axis
[Da.1]	Operation pattern	◎	—
[Da.2]	Control method	◎	—
[Da.3]	Acceleration time No.	◎	—
[Da.4]	Deceleration time No.	◎	—
[Da.5]	Axis to be interpolated	—*1	—
[Da.6]	Positioning address/movement amount	—	—
[Da.7]	Arc address	—	—
[Da.8]	Command speed	◎	◎
[Da.9]	Dwell time	—	—
[Da.10]	M code	○	—
[Da.27]	M code ON signal output timing	○	—
[Da.28]	ABS direction in degrees	○	—
[Da.29]	Interpolation speed specification method	—*2	—

*1 To use the 2-axis speed control (interpolation), the axis to be used as the interpolation axis needs to be set.

*2 To use the 1-axis speed control, the setting is not required.

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Speed-position switching control (INC mode)

In the speed-position switching control (INC mode) ([Da.2] Control method = Forward run speed-position, Reverse run speed-position), pulses are output continuously at the speed set in [Da.8] Command speed in the axis direction set to the positioning data. When Speed-position switching signal is input, the position control for the movement amount set in [Da.6] Positioning address/movement amount is performed.

The speed-position switching control (INC mode) has two control types including Forward run speed-position performed in the forward run direction and Reverse run speed-position performed in the reverse run direction.

The speed-position switching control (INC mode) can be set to [Pr.150] Speed-position function selection in the detailed parameter 1.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.150]	Speed-position function selection	0	Speed-position switching control (INC mode)	34	184	334	484

If a value other than 0 and 2 is set, the control is performed in the INC mode with the setting value regarded as 0.

For details on the settings, refer to the following.

☞ Page 407 [Pr.150] Speed-position function selection

Switching from the speed control to position control

- Select a method to switch from the speed control to position control setting the value of [Cd.45] Speed-position switching device selection.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	0, 1, 2	Select the device used for the speed to position switching. • 0: Use External command signal • 1: Use Near-point dog signal • 2: Use [Cd.46] Speed-position switching command	1566	1666	1766	1866

- To switch the speed control to the position control, [Cd.24] Speed-position switching enable flag must be turned on and positioning data must be set. (When [Cd.24] Speed-position switching enable flag is turned on after Speed-position switching signal is turned on, the speed control is not switched to the position control. The speed control is switched to the position control when Speed-position switching signal is turned on again. If [Cd.24] Speed-position switching enable flag and External command signal are turned on at the start of the control, only the position control is performed.)

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.24]	Speed-position switching enable flag	1	Set whether to enable or disable Speed-position switching signal. • 0: Speed control is not switched to position control even when Speed-position switching signal is turned on. • 1: Speed control is switched to position control when Speed-position switching signal is turned on.	1528	1628	1728	1828

Speed-position switching signal setting

■When External command signal (CHG) is used

To use External command signal (CHG) as Speed-position switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42]	External command function selection	2	Set 2: Speed-position/position-speed switching request.	62	212	362	512
[Cd.8]	External command valid	1	Set 1: Validate external command.	1505	1605	1705	1805
[Cd.45]	Speed-position switching device selection	0	Set 0: Use External command signal.	1566	1666	1766	1866

■When Near-point dog signal (DOG) is used

To use Near-point dog signal (DOG) as Speed-position switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	1	Set 1: Use Near-point dog signal.	1566	1666	1766	1866

[Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.

■When [Cd.46] Speed-position switching command is used

To use [Cd.46] Speed-position switching command as Speed-position switching signal, set the following items.

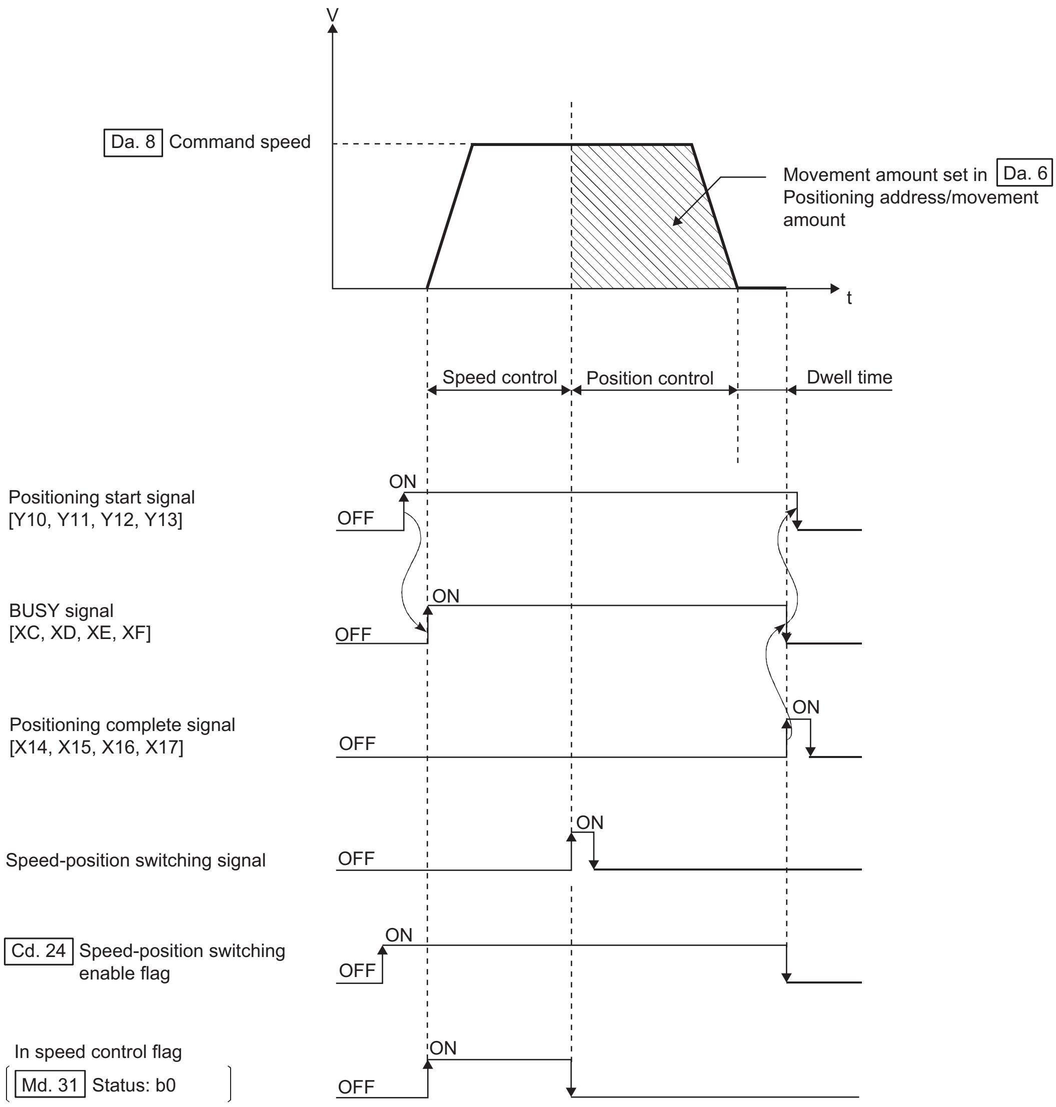
Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	2	Set 2: Use [Cd.46] Speed-position switching command.	1566	1666	1766	1866

- [Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.
- Compared with the switching control using Speed-position switching signal, the operation delays for 0.88ms at maximum in the switching control using [Cd.46] Speed-position switching command. If the responsiveness for the switching signal is required, use Speed-position switching signal.

Operation chart

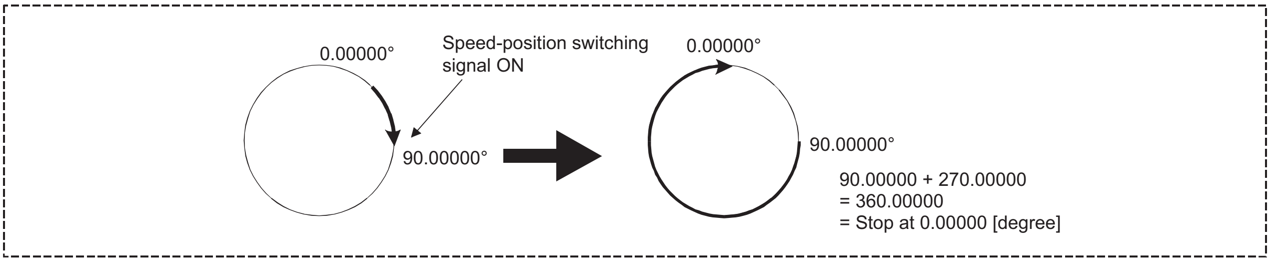
The following shows the operation timing of the speed-position switching control (INC mode).

During the speed control with the speed-position switching control (INC mode), In speed control flag ([Md.31] Status: b0) is on.

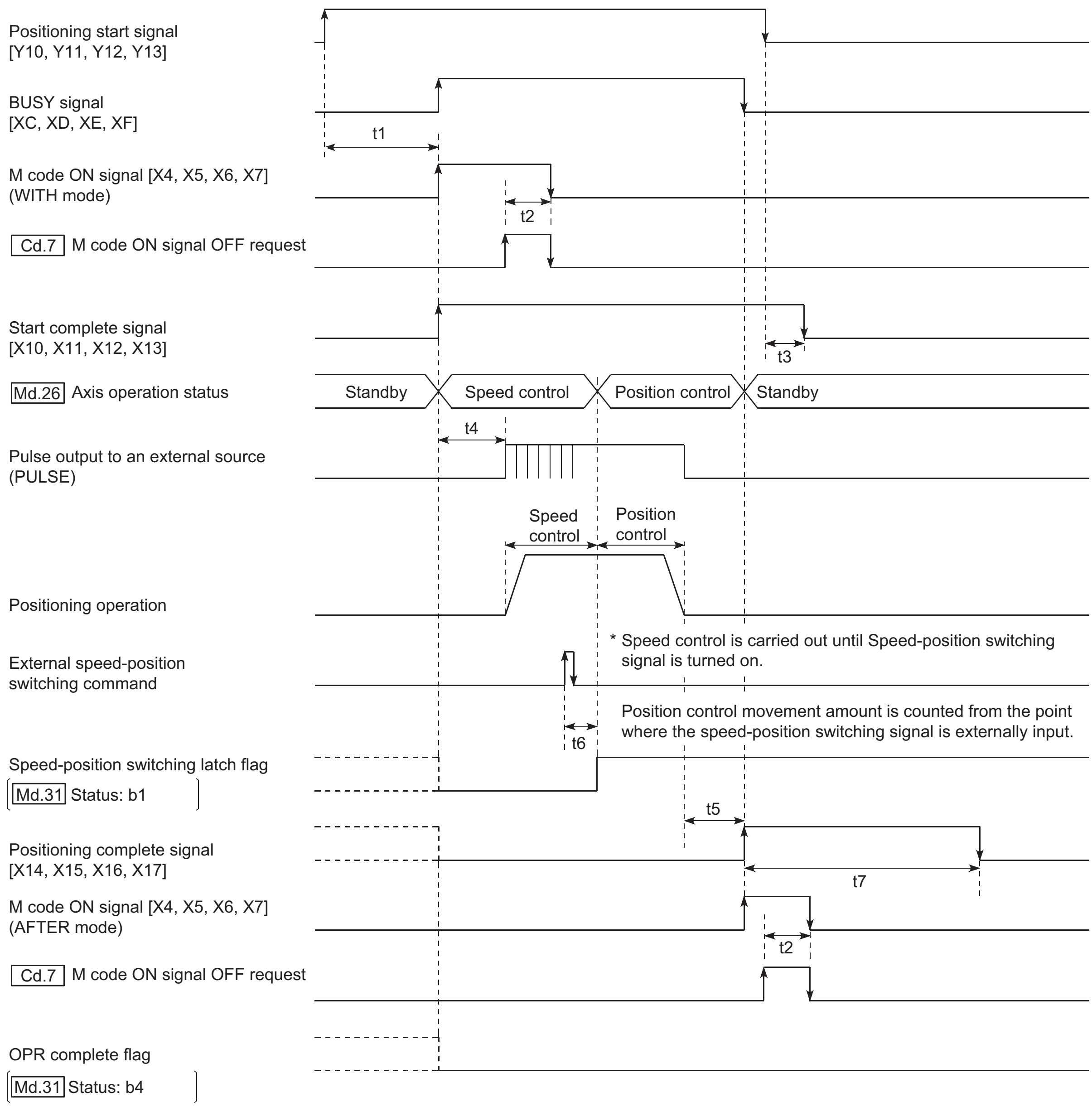


■Operation example

The following figure shows the operation when Speed-position switching signal is input at the position where the current feed value is 90.00000 (degree) during the execution of Forward run speed-position in [Da.2] Control method with the settings as follows: [Pr.1] Unit setting is 2: degree and [Pr.21] Current feed value during speed control is 1: Current feed value is updated. (The setting value of [Da.6] Positioning address/movement amount is 270.00000 (degree).)



Operation timing and the processing time



Normal timing time

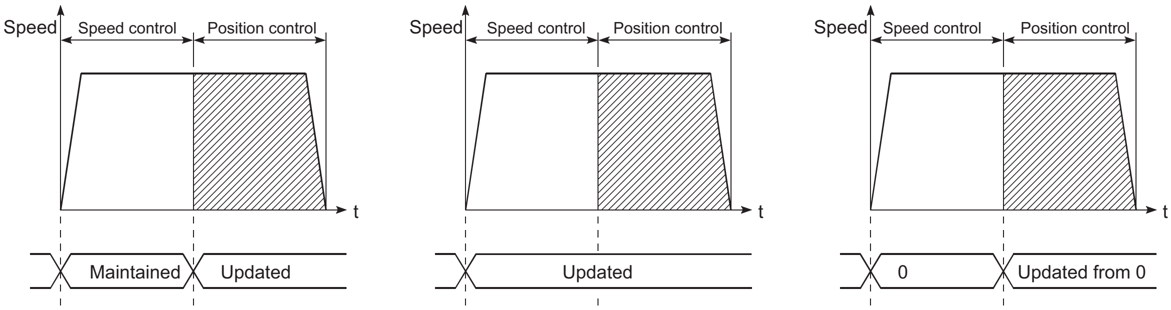
t1	t2	t3	t4	t5	t6	t7
0.2 to 0.3ms	0 to 0.88ms	0 to 0.88ms	0.1ms or less	0 to 0.88ms	1.0 ms	Depends on the parameter

The timing time of t5 described is the time when 0 is set for the dwell time.

Current feed value

[Md.20] Current feed value during the speed-position switching control (INC mode) depends on the setting of [Pr.21] Current feed value during speed control as follows.

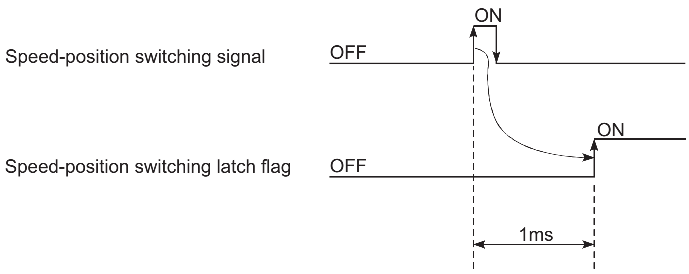
Setting of [Pr.21] Current feed value during speed control	[Md.20] Current feed value
0: Current feed value is not updated	During the speed control, the current feed value at the start of the control is kept. The current feed value is updated when the control is switched to the position control.
1: Current feed value is updated	The current feed value is updated during both speed control and position control.
2: Current feed value is cleared to zero	The current feed value is cleared to 0 at the start of the control. The current feed value is updated when the control is switched to the position control.



(a) Current feed value is not updated (b) Current feed value is updated (c) Current feed value is cleared to zero

Time required to switch the speed control to the position control

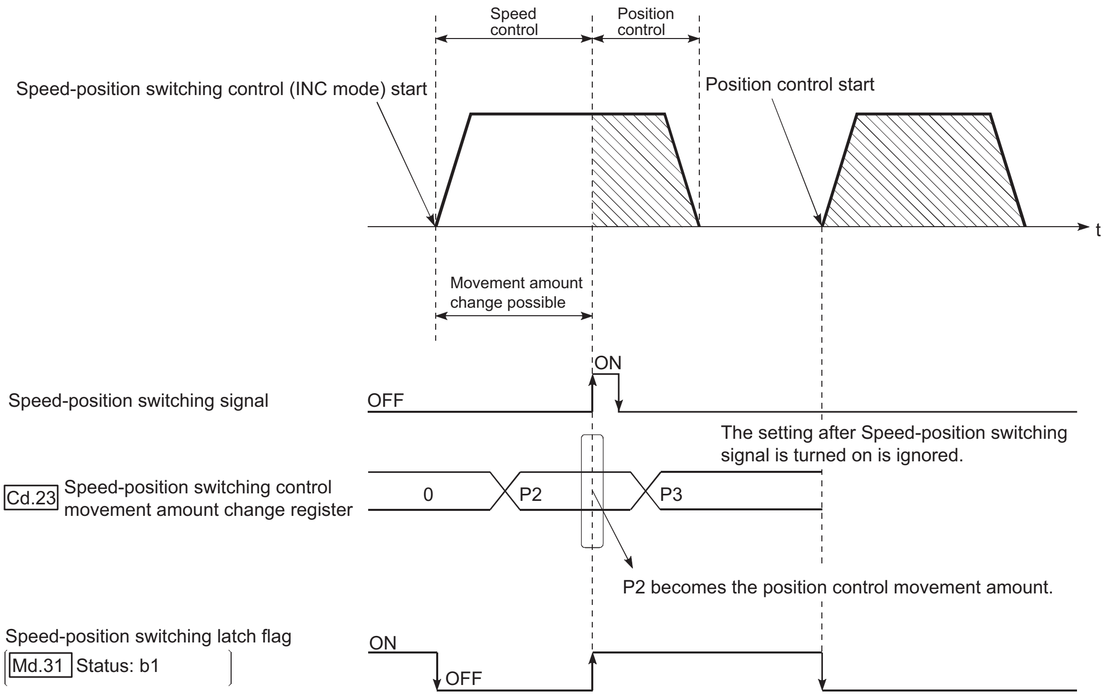
The time taken from when Speed-position switching signal is turned on to when Speed-position switching latch flag ([Md.31] Status: b1) is turned on is 1ms.



Movement amount change of the position control

In Speed-position switching control (INC mode), the movement amount of the position control can be changed during the speed control.

- During the speed control, New movement amount is stored in [Cd.23] Speed-position switching control movement amount change register using a program. When Speed-position switching signal is turned on, the movement amount of the position control is stored in [Cd.23] Speed-position switching control movement amount change register.
- At the input timing of Speed-position switching signal, the movement amount of the speed-position switching control (position control) is stored in [Md.29] Speed-position switching control positioning amount.



Point

- A change request of the movement amount is recognized by writing data into [Cd.23] Speed-position switching control movement amount change register using a program.
- The timing when the new movement amount becomes valid is from when the speed-position switching control (INC mode) is performed to when Speed-position switching signal is input.
- By using Speed-position switching latch flag ([Md.31] Status: b1) of the axis monitor area, the movement amount change can be enabled and disabled using the interlock function in the position control.

Restrictions

- If Continuous path control is set in [Da.1] Operation pattern, Continuous path control not possible (Error code: 1A1FH) occurs and the control will not start.
- Speed-position switching control cannot be set in [Da.2] Control method in the positioning data when Continuous path control is set in [Da.1] Operation pattern of the immediately previous positioning data. (For example, if the operation pattern of the positioning data No.1 is Continuous path control, the speed-position switching control cannot be set to the positioning data No.2.) If this setting is configured, Continuous path control not possible (Error code: 1A20H) occurs and the deceleration stop is performed.
- If Current speed (-1) is set to [Da.8] Command speed, No command speed (Error code: 1A14H) occurs.
- The software stroke limit range check during the speed control is executed only when the following 1) and 2) are satisfied.

1) [Pr.21] Current feed value during speed control is 1: Current feed value is updated.
In any case other than the above, if the movement amount exceeds the software stroke limit range during the speed control, Software stroke limit (+) (Error code: 1A18H) or Software stroke limit (-) (Error code: 1A1AH) occurs and the control decelerates and stops when the control is switched to the position control.

2) When a value other than 2: degree is set in [Pr.1] Unit setting
When the unit is degree, the software stroke limit range is not checked.

- Is the value set in [Da.6] Positioning address/movement amount is negative, Outside address range (Error code: 1A30H) occurs.
- If the movement amount of the position control set in [Da.6] Positioning address/movement amount is smaller than the deceleration distance from [Da.8] Command speed, the deceleration processing is performed when Speed-position switching signal is input.
- Turn on Speed-position switching signal in the speed stabilization region (in the constant speed state). If the signal is turned on during the acceleration, the variation of the droop pulse amount becomes large and Speed-position switching signal ON (Warning code: 0993H) occurs. When a servomotor is used, the actual movement amount after the control is switched to the position control is calculated by adding Set movement amount and Droop pulse amount. If the signal is turned on during the acceleration or deceleration, the variation of the droop pulse amount becomes large and the operation stop position varies. Even if the values in [Md.29] Speed-position switching control positioning amount are the same between the two controls, the stop positions change because the droop pulse amount changes when the values in [Da.8] Command speed of both controls differ.
- When a negative value is set in [Cd.23] Speed-position switching control movement amount change register, Insufficient movement amount (Warning code: 0998H) occurs and the movement amount is the value set in [Da.6] Positioning address/movement amount.

Positioning data to be set

To use the speed-position switching control (INC mode), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set Forward run speed-position or Reverse run speed-position.)
[Da.3]	Acceleration time No.	◎
[Da.4]	Deceleration time No.	◎
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎
[Da.7]	Arc address	—
[Da.8]	Command speed	◎
[Da.9]	Dwell time	○
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	○
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Speed-position switching control (ABS mode)

In the speed-position switching control (ABS mode) ([Da.2] Control method = Forward run speed-position, Reverse run speed-position), pulses are output continuously at the speed set in [Da.8] Command speed in the axis direction set to the positioning data. When Speed-position switching signal is input, the position control to the address set in [Da.6] Positioning address/movement amount is performed.

The speed-position switching control (ABS mode) has two control types including Forward run speed-position performed in the forward run direction and Reverse run speed-position performed in the reverse run direction.

The speed-position switching control (ABS mode) is enabled only when 2: degree is set to [Pr.1] Unit setting.

○: Setting possible, ×: Setting not possible (if the item is set, Speed-position function selection error (Error code: 1AAEH) occurs when PLC READY signal [Y0] is turned on.)

Speed-position function selection	mm	inch	degree	pulse
INC mode	○	○	○	○
ABS mode	×	×	○	×

The speed-position switching control (ABS mode) can be set to [Pr.150] Speed-position function selection in the detailed parameter 1.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.150]	Speed-position function selection	2	Speed-position switching control (ABS mode)	34	184	334	484

If a value other than 0 and 2 is set, the control is performed in the INC mode with the setting value regarded as 0.

For details on the settings, refer to the following.

☞ Page 407 [Pr.150] Speed-position function selection

Switching from the speed control to position control

- To switch the speed control to the position control, set Speed-position switching signal as External command signal.
- Select a method to switch from the speed control to position control setting the value of [Cd.45] Speed-position switching device selection.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	0, 1, 2	Select the device used for the speed to position switching. • 0: Use External command signal • 1: Use Near-point dog signal • 2: Use [Cd.46] Speed-position switching command	1566	1666	1766	1866

- To switch the speed control to the position control, [Cd.24] Speed-position switching enable flag must be turned on and positioning data must be set. (When [Cd.24] Speed-position switching enable flag is turned on after Speed-position switching signal is turned on, the speed control is not switched to the position control. The speed control is switched to the position control when Speed-position switching signal is turned on again. If [Cd.24] Speed-position switching enable flag and External command signal are turned on at the start of the control, only the position control is performed.)

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.24]	Speed-position switching enable flag	0, 1	Set whether to enable or disable Speed-position switching signal. • 0: Speed control is not switched to position control even when Speed-position switching signal is turned on. • 1: Speed control is switched to position control when Speed-position switching signal is turned on.	1528	1628	1728	1828

Speed-position switching signal setting

■When External command signal (CHG) is used

To use External command signal (CHG) as Speed-position switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42]	External command function selection	2	Set 2: Speed-position/position-speed switching request.	62	212	362	512
[Cd.8]	External command valid	1	Set 1: Validate external command.	1505	1605	1705	1805
[Cd.45]	Speed-position switching device selection	0	Set 0: Use External command signal.	1566	1666	1766	1866

■When Near-point dog signal (DOG) is used

To use Near-point dog signal (DOG) as Speed-position switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	1	Set 1: Use Near-point dog signal.	1566	1666	1766	1866

[Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.

■When [Cd.46] Speed-position switching command is used

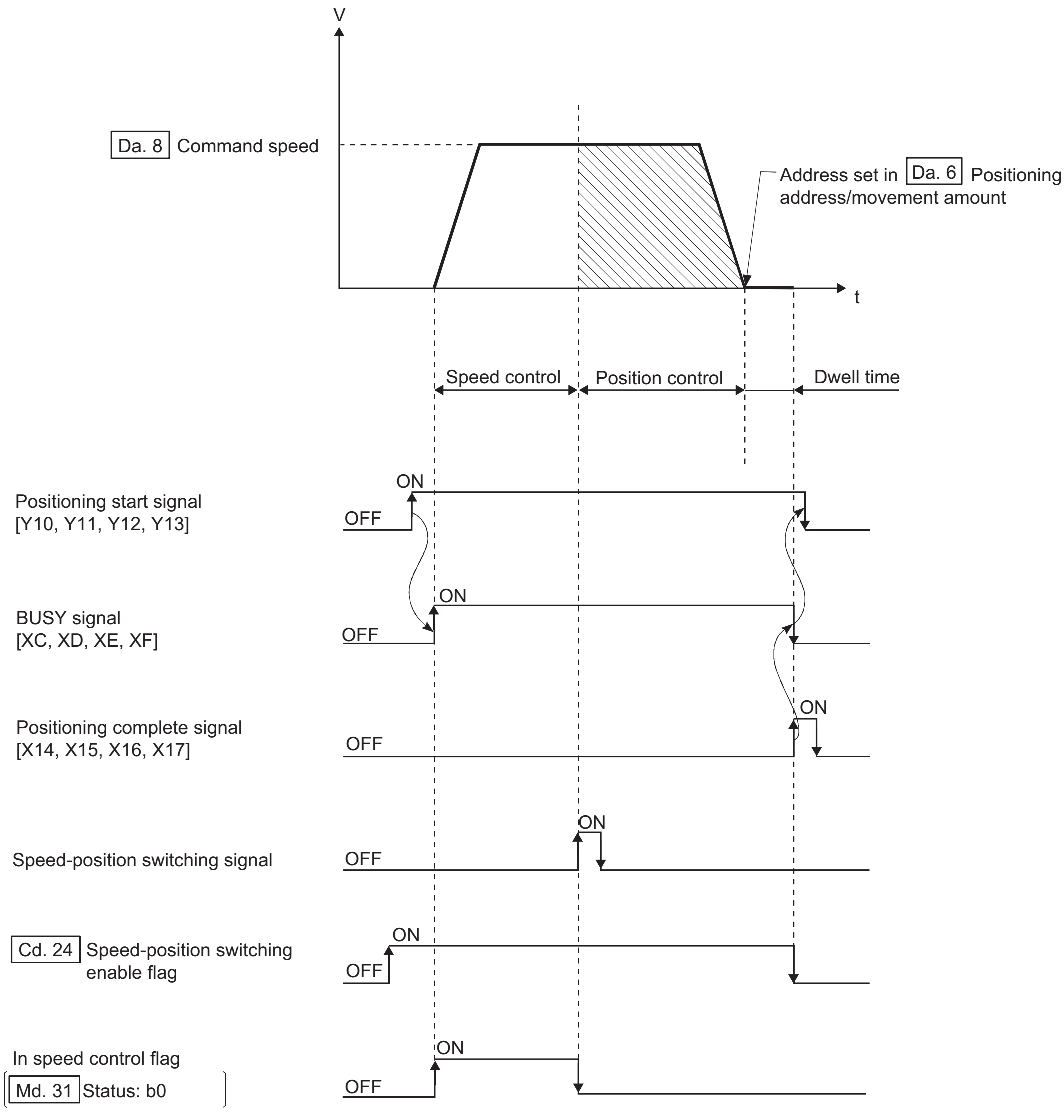
To use [Cd.46] Speed-position switching command as Speed-position switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	2	Set 2: Use [Cd.46] Speed-position switching command.	1566	1666	1766	1866

- [Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.
- Compared with the switching control using Speed-position switching signal, the operation delays for 0.88ms at maximum in the switching control using [Cd.46] Speed-position switching command. If the responsiveness for the switching signal is required, use Speed-position switching signal.

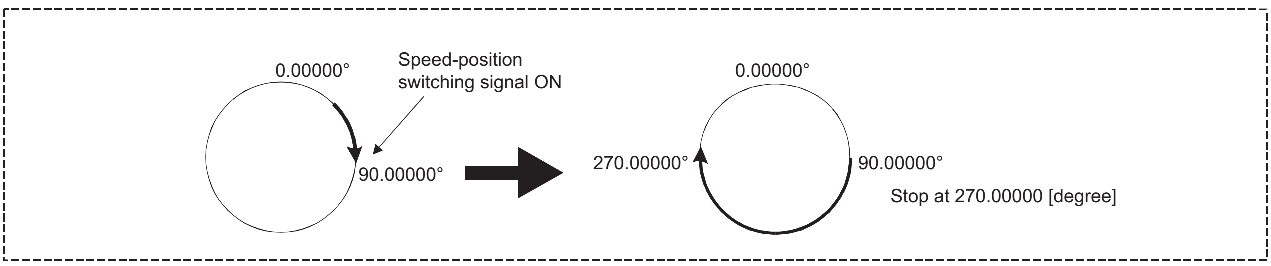
Operation chart

The following shows the operation timing of the speed-position switching control (ABS mode).
During the speed control with the speed-position switching control (ABS mode), In speed control flag ([Md.31] Status: b0) is on.

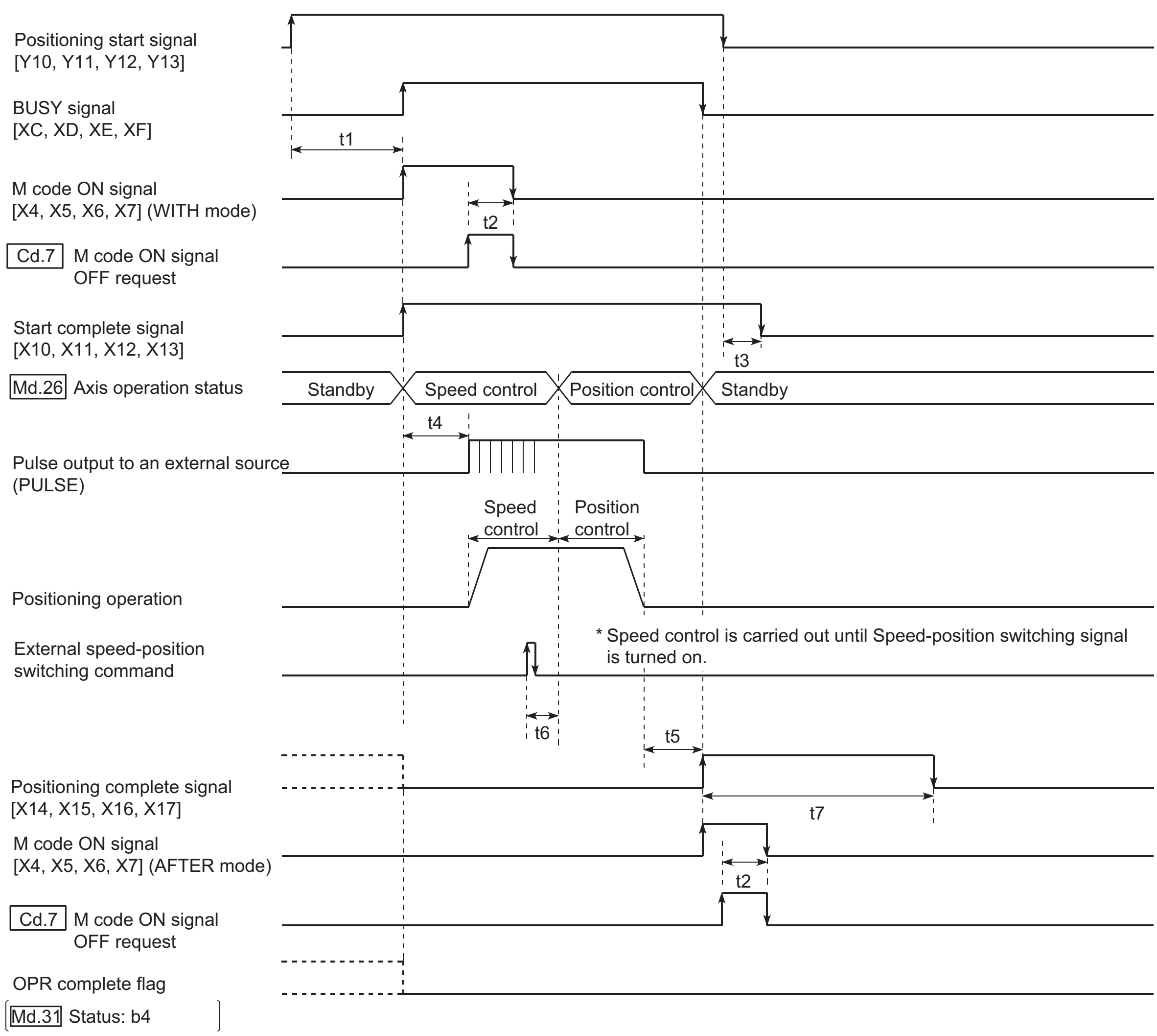


■Operation example

The following figure shows the operation when Speed-position switching signal is input at the position where the current feed value is 90.00000 (degree) during the execution of Forward run speed-position in [Da.2] Control method with the settings as follows: [Pr.1] Unit setting is 2: degree and [Pr.21] Current feed value during speed control is 1: Current feed value is updated. (The setting value of [Da.6] Positioning address/movement amount is 270.00000 (degree).)



Operation timing and the processing time



Normal timing time

t1	t2	t3	t4	t5*1	t6	t7
0.2 to 0.3ms	0 to 0.88ms	0 to 0.88ms	0.1ms or less	0 to 0.88ms	1.0 ms	Depends on the parameter

*1 The timing time of t5 described is the time when 0 is set for the dwell time.

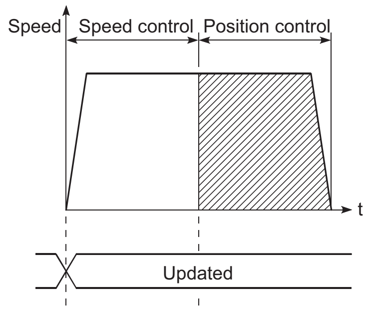
Current feed value

[Md.20] Current feed value during the speed-position switching control (ABS mode) depends on the setting of [Pr.21] Current feed value during speed control as follows.

Setting of [Pr.21] Current feed value during speed control	[Md.20] Current feed value
1: Current feed value is updated	The current feed value is updated during both speed control and position control.

Only 1: Current feed value is updated can be set to [Pr.21] Current feed value during speed control in the speed-position switching control (ABS mode).

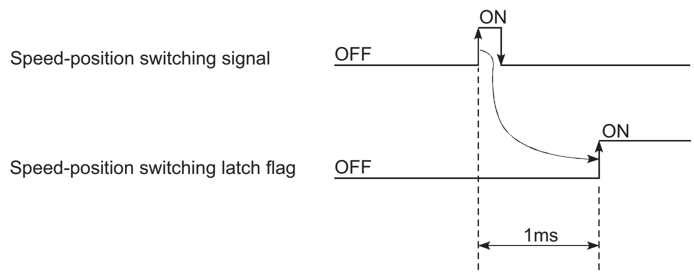
If a value other than 1 is set in [Pr.21] Current feed value during speed control, Speed-position function selection error (Error code: 1AAEH) occurs.



Current feed value is updated

Time required to switch the speed control to the position control

The time taken from when Speed-position switching signal is turned on to when Speed-position switching latch flag ([Md.31] Status: b1) is turned on is 1ms.

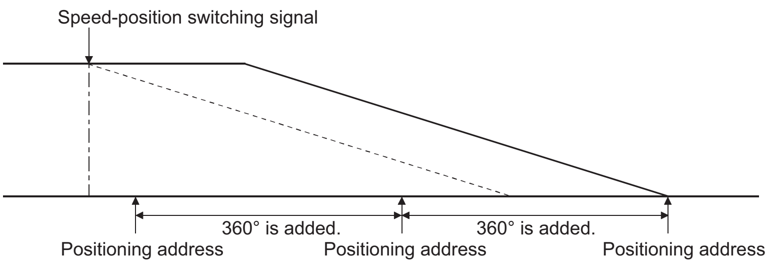


Restrictions

- If Continuous path control is set in [Da.1] Operation pattern, Continuous path control not possible (Error code: 1A1FH) occurs and the control will not start.
- Speed-position switching control cannot be set in [Da.2] Control method in the positioning data when Continuous path control is set in [Da.1] Operation pattern of the immediately previous positioning data. (For example, if the operation pattern of the positioning data No.1 is Continuous path control, the speed-position switching control cannot be set to the positioning data No.2.) If this setting is configured, Continuous path control not possible (Error code: 1A20H) occurs and the deceleration stop is performed.
- If Current speed (-1) is set to [Da.8] Command speed, No command speed (Error code: 1A14H) occurs.
- Is the value set in [Da.6] Positioning address/movement amount is negative, Outside address range (Error code: 1A30H) occurs.
- In the speed-position switching control (ABS mode), the axis control data [Cd.23] Speed-position switching control movement amount change register is not enabled even if it is set. The set value is ignored.
- To perform the speed-position switching control (ABS mode), the following conditions must be satisfied.

1) [Pr.1] Unit setting is 2: degree.
2) The software stroke limit function is disabled (Upper limit value = Lower limit value)
3) [Pr.21] Current feed value during speed control is 1: Current feed value is updated.
4) The setting range of [Da.6] Positioning address/movement amount is 0 to 359.99999 (degree).
   If the amount is out of the range between 0 and 359.99999 (degree), Outside address range (Error code: 1A31H) occurs at the start.
5) [Pr.150] Speed-position function selection is 2: speed-position switching control (ABS mode).

- When the conditions 1) to 3) are not satisfied in the condition 5), Speed-position function selection error (Error code: 1AAEH) occurs when PLC READY signal [Y0] is turned off and on.
- The operation does not stop immediately at the positioning address when the positioning target reaches the positioning address during the deceleration even if the automatic deceleration is started after Speed-position switching signal is input. To decelerate automatically, the positioning target stops at the positioning address after the rotation is performed for N (N: natural number) times. In the following example, the positioning target passes the positioning address twice when the deceleration is performed in the dot-line path. Thus, the deceleration stop is performed to stop at the positioning address at the third time.



Positioning data to be set

To use the speed-position switching control (ABS mode), set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set Forward run speed-position or Reverse run speed-position.)
[Da.3]	Acceleration time No.	◎
[Da.4]	Deceleration time No.	◎
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎
[Da.7]	Arc address	—
[Da.8]	Command speed	◎
[Da.9]	Dwell time	○
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	○
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

3

Position-speed switching control

In Position-speed switching signal ([Da.2] Control method = Forward run speed-position, Reverse run speed-position), the positioning control for the amount set in [Da.6] Positioning address/movement amount is performed in the axis direction set to the positioning data before Position-speed switching signal is input. If Position-speed switching signal is input before the positioning is completed, pulses are continuously output at the speed set in [Da.8] Command speed until a stop command is input.

The position-speed switching control has two control types including Forward run position-speed performed in the forward run direction and Reverse run position-speed performed in the reverse run direction.

Switching from the position control to speed control

- Select a method to switch from the speed control to position control setting the value of [Cd.45] Speed-position switching device selection.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	0, 1, 2	Select the device used for the speed to position switching. • 0: Use External command signal • 1: Use Near-point dog signal • 2: Use [Cd.46] Speed-position switching command	1566	1666	1766	1866

- To switch the position control to the speed control, [Cd.26] Position-speed switching enable flag must be turned on and positioning data must be set. (When [Cd.26] Position-speed switching enable flag is turned on after Position-speed switching signal is turned on, the position control is not switched to the speed control. The position control is switched to the speed control when Position-speed switching signal is turned on again. If [Cd.26] Position-speed switching enable flag and Position-speed switching signal are turned on at the start, only the speed control is performed.)

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.26]	Position-speed switching enable flag	0, 1	Set whether to enable or disable Position-speed switching signal. • 0: Position control is not switched to speed control even when Position-speed switching signal is turned on. • 1: Position control is switched to Speed control when Position-speed switching signal is turned on.	1532	1632	1732	1832

- The control decelerates and stops when Position-speed switching signal is not input until the positioning target moves for the movement amount specified in the position control. When Position-speed switching signal is input during the automatic deceleration in the position control, the speed is accelerated again to the command speed the speed control continues.

Position-speed switching signal setting

■When External command signal (CHG) is used

To use External command signal (CHG) as Position-speed switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42]	External command function selection	2	Set 2: Speed-position/position-speed switching request.	62	212	362	512
[Cd.8]	External command valid	1	Set 1: Validate external command.	1505	1605	1705	1805
[Cd.45]	Speed-position switching device selection	0	Set 0: Use External command signal.	1566	1666	1766	1866

■When Near-point dog signal (DOG) is used

To use Near-point dog signal (DOG) as Position-speed switching signal, set the following items.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	1	Set 1: Use Near-point dog signal.	1566	1666	1766	1866

[Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.

■When [Cd.46] Speed-position switching command is used

To use [Cd.46] Speed-position switching command as Position-speed switching signal, set the following items.

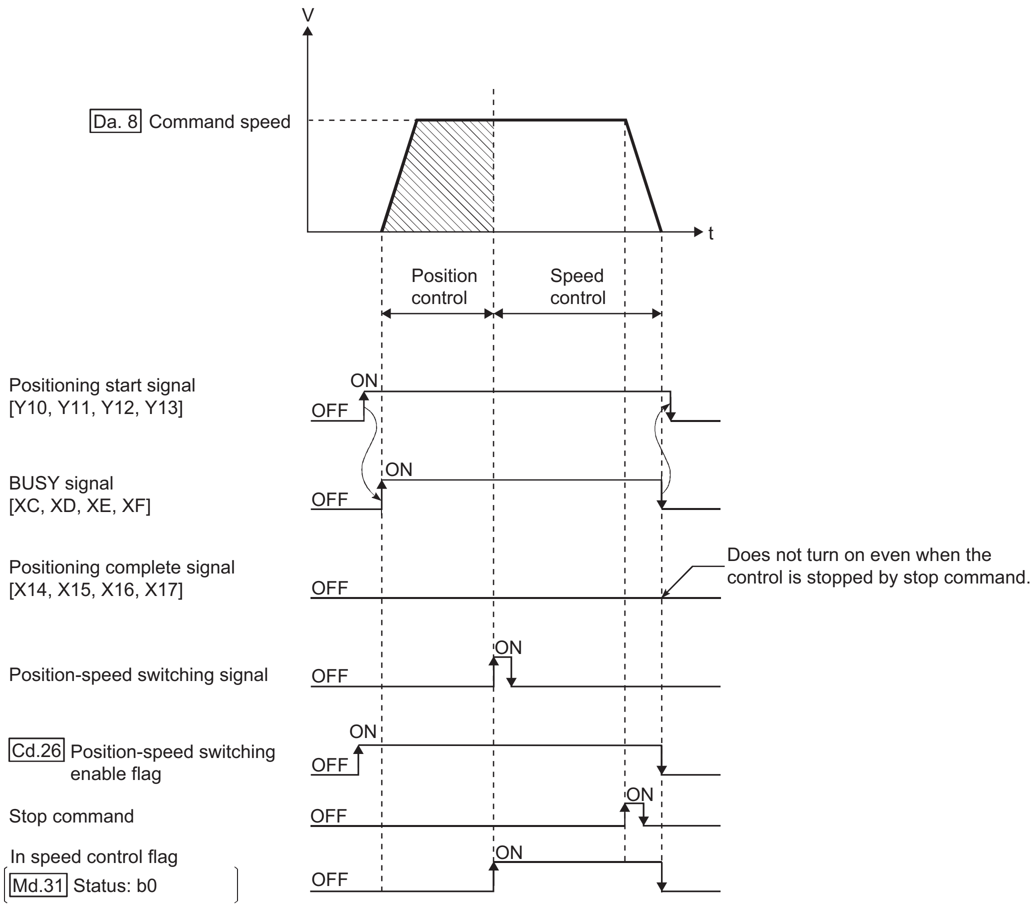
Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45]	Speed-position switching device selection	2	Set 2: Use [Cd.46] Speed-position switching command.	1566	1666	1766	1866

[Pr.42] External command function selection and [Cd.8] External command valid are not required to be set.

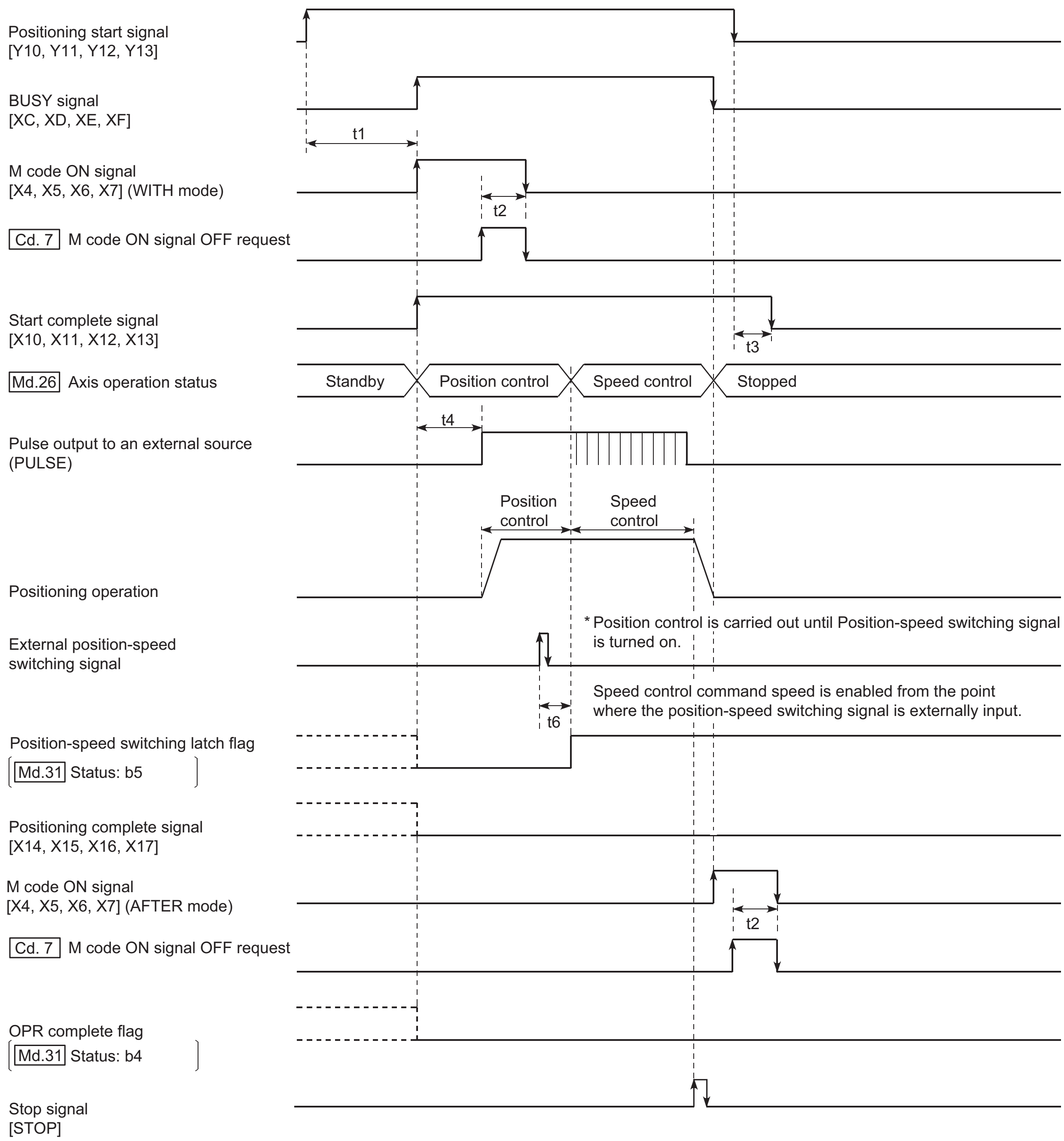
Operation chart

The following shows the operation timing of the position-speed switching control.

During the speed control with the position-speed switching control, In speed control flag ([Md.31] Status: b0) is on.



Operation timing and the processing time



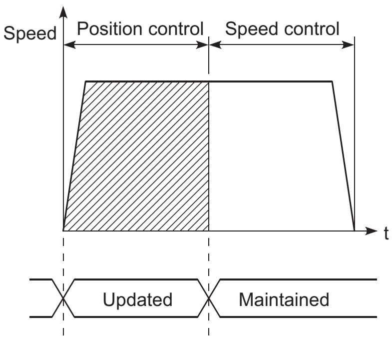
Normal timing time

t1	t2	t3	t4	t5	t6
0.2 to 0.3ms	0 to 0.88ms	0 to 0.88ms	0.1ms or less	—	1.0 ms

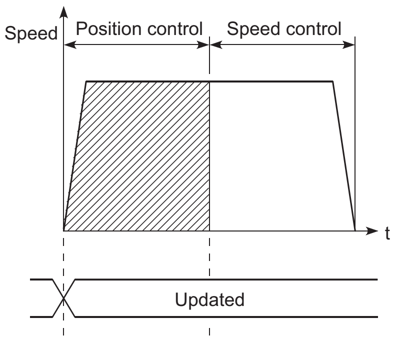
Current feed value

[Md.20] Current feed value during the position-speed switching control depends on the setting of [Pr.21] Current feed value during speed control as follows.

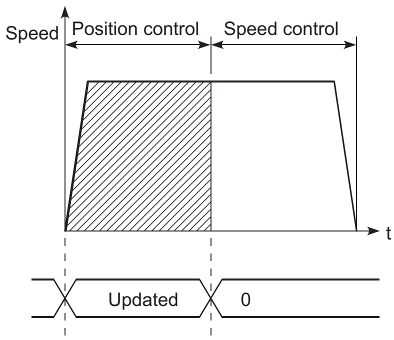
Setting of [Pr.21] Current feed value during speed control	[Md.20] Current feed value
0: Current feed value is not updated	The current feed value is updated during the position control. After the control is switched to the speed control, the current feed value at that point is held.
1: Current feed value is updated	The current feed value is updated during both position control and speed control.
2: Current feed value is cleared to zero	The current feed value is updated during the position control. When the control is switched to the speed control, the current feed value is cleared to 0.



(a) Current feed value is not updated



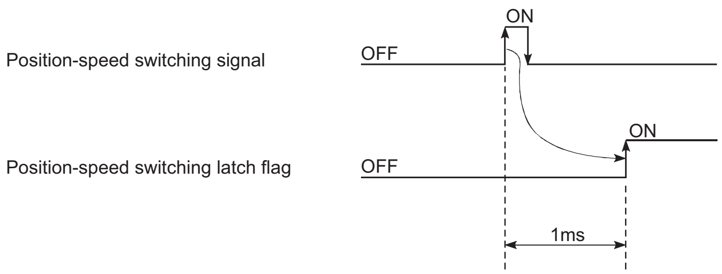
(b) Current feed value is updated



(c) Current feed value is cleared to zero

Time taken for switching from the position control to speed control

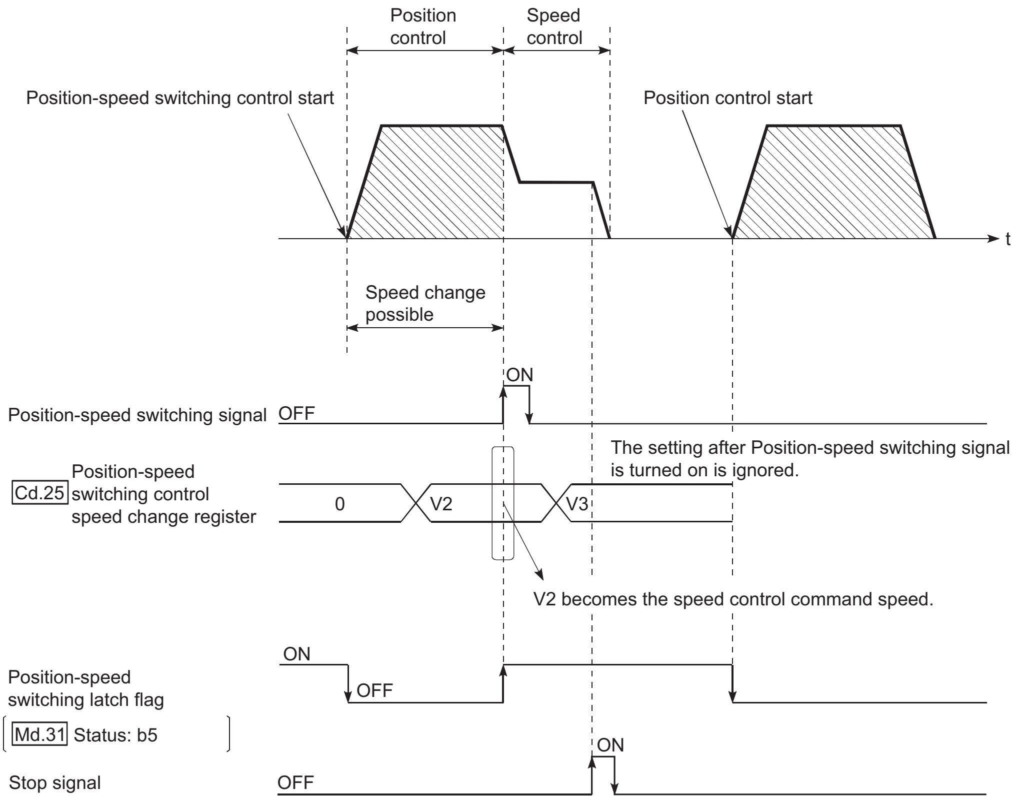
The time taken from when Position-speed switching signal is turned on to when Position-speed switching latch flag ([Md.31] Status: b5) is turned on is 1ms.



Changing the command speed of the speed control

In Position-speed switching control, the command speed of the speed control can be changed during the position control.

- When the command speed change is requested during the control other than the position control of the position-speed switching control, the change request is ignored.
- During the position control, New command speed is stored in [Cd.25] Position-speed switching control speed change register using a program. When Position-speed switching signal is turned on, the setting of [Cd.25] Position-speed switching control speed change register becomes the command speed of the speed control.



Point

- A change request of the command speed is recognized by writing data into [Cd.25] Position-speed switching control speed change register using a program.
- The timing when the new command speed becomes valid is from when the position-speed switching control is performed to when Position-speed switching signal is input.
- By using Position-speed switching latch flag ([Md.31] Status: b5) of the axis monitor area, the speed change can be enabled and disabled using the interlock function in the speed control.

Restrictions

- If Continuous positioning control or Continuous path control is set in [Da.1] Operation pattern, Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs and the control will not start.
- Position-speed switching control cannot be set to [Da.2] Control method of the positioning data when Continuous path control is set to [Da.1] Operation pattern of the previous positioning data. For example, if the operation pattern of the positioning data No.1 is Continuous path control, Position-speed switching control cannot be set to the positioning data No.2. If this setting is configured, Continuous path control not possible (Error code: 1A20H) occurs and the deceleration stop is performed.
- The software stroke limit range during the speed control is checked only when 1: Current feed value is updated is set to [Pr.21] Current feed value during speed control. When the unit is degree, the software stroke limit check range is not checked.
- If the start point address of the position control exceeds the software stroke limit range, Software stroke limit (+) (Error code: 1A18H) or Software stroke limit (-) (Error code: 1A1AH) occurs and the operation will not start.
- If the end point address of the position control exceeds the software stroke limit range, Software stroke limit (+) (Error code: 1A18H) or Software stroke limit (-) (Error code: 1A1AH) occurs and the operation will not start.
- The control decelerates and stops when Position-speed switching signal is not input until the positioning target moves for the movement amount specified. When Position-speed switching signal is input during the automatic deceleration in the position control, the speed is accelerated again to the command speed the speed control continues. When Position-speed switching signal is input during the deceleration stop by Stop signal, the control is switched to the speed control and stops. Restart the speed control using a restart command.
- If the changed command speed is equal to or greater than the value set in [Pr.8] Speed limit value, Speed limit value over (Warning code: 0991H) occurs and the control continues at the speed set in [Pr.8] Speed limit value.
- Is the value set in [Da.6] Positioning address/movement amount is negative, Outside address range (Error code: 1A30H) occurs.

3

Positioning data to be set

To use the position-speed switching control, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set Forward run position-speed or Reverse run position-speed.)
[Da.3]	Acceleration time No.	◎
[Da.4]	Deceleration time No.	◎
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎
[Da.7]	Arc address	—
[Da.8]	Command speed	◎
[Da.9]	Dwell time	○
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	○
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Current value change

In the current value change, the value in [Md.20] Current feed value of the stopping axis is changed to an address. (The value in [Md.21] Machine feed value is not changed even if the current value is changed.)

One of the following two methods can be used for changing the current value.

- When the current value is changed using positioning data
- When the current value is changed using the start No. for a current value change (No.9003)

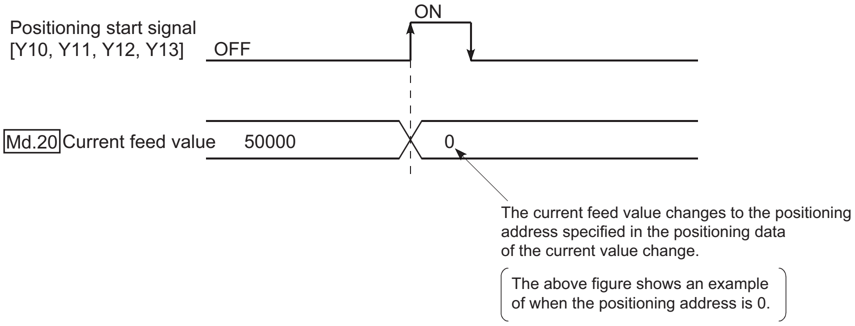
The positioning data can be used during the continuous positioning of multiple blocks.

When the current value is changed using positioning data

In Current value change ([Da.2] Control method = Current value change), the value in [Md.20] Current feed value is changed to the address set in [Da.6] Positioning address/movement amount.

■Operation chart

The following shows the operation timing of the current value change. When Positioning start signal is turned on, the value in [Md.20] Current feed value is changed to the value set in [Da.6] Positioning address/movement amount.



■Restrictions

- If Continuous path control is set in [Da.1] Operation pattern, New current value not possible (Error code: 1A1CH) occurs and the control will not start. (In the current value change, Continuous path control cannot be set.)
- Current value change cannot be set in [Da.2] Control method in the positioning data when Continuous path control is set in [Da.1] Operation pattern of the previous positioning data. (For example, if the operation pattern of the positioning data No.1 is Continuous path control, Current value change cannot be set to the positioning data No.2.) If this setting is configured, New current value not possible (Error code: 1A1DH) occurs and the deceleration stop is performed.
- When degree is set in [Pr.1] Unit setting and the value set in [Da.6] Positioning address/movement amount is out of the setting range (0 to 359.99999 [degree]), Outside new current value range (Error code: 1997H) occurs and the operation will not start.
- If the value set in [Da.6] Positioning address/movement amount is out of the setting range of the software stroke limit ([Pr.12], [Pr.13]), Software stroke limit (+) (Error code: 1A18H) or Software stroke limit (-) (Error code: 1A1AH) occurs and the operation will not start.

■Positioning data to be set

To use the current value change, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	◎
[Da.2]	Control method	◎ (Set Current value change.)
[Da.3]	Acceleration time No.	—
[Da.4]	Deceleration time No.	—
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	◎ (Set the address to be changed.)
[Da.7]	Arc address	—
[Da.8]	Command speed	—
[Da.9]	Dwell time	—
[Da.10]	M code	○
[Da.27]	M code ON signal output timing	○
[Da.28]	ABS direction in degrees	—
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

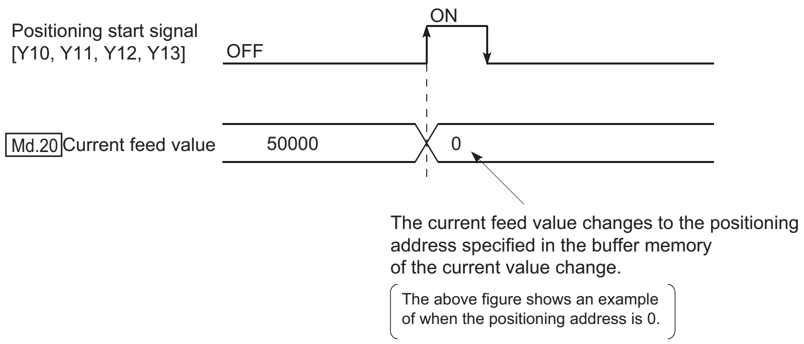
☞ Page 428 Positioning Data

When the start No. for a current value change (No.9003) is used

In Current value change ([Cd.3] Positioning start No. = 9003), [Md.20] Current feed value is changed to the address set in [Cd.9] New current value.

■Operation chart

The current value is changed by turning on Positioning start signal after the new current value is set in [Cd.9] New current value and 9003 is set in [Cd.3] Positioning start No.



■Restrictions

- When the unit setting is degree and the specified value is out of the setting range, Outside new current value range (Error code: 1997H) occurs.
- If the specified value is out of the software stroke limit range, Software stroke limit (+) (Error code: 1994H) or Software stroke limit (-) (Error code: 1996H) occurs.
- The current value cannot be changed while the stop command and M code ON signal are on.
- The M code output function is invalid.

■Procedure

The following shows the procedure for executing the current value change.

Write the current value to Cd.9 New current value.

↓

Write "9003" in Cd.3 Positioning start No.

↓

Turn on Positioning start signal.

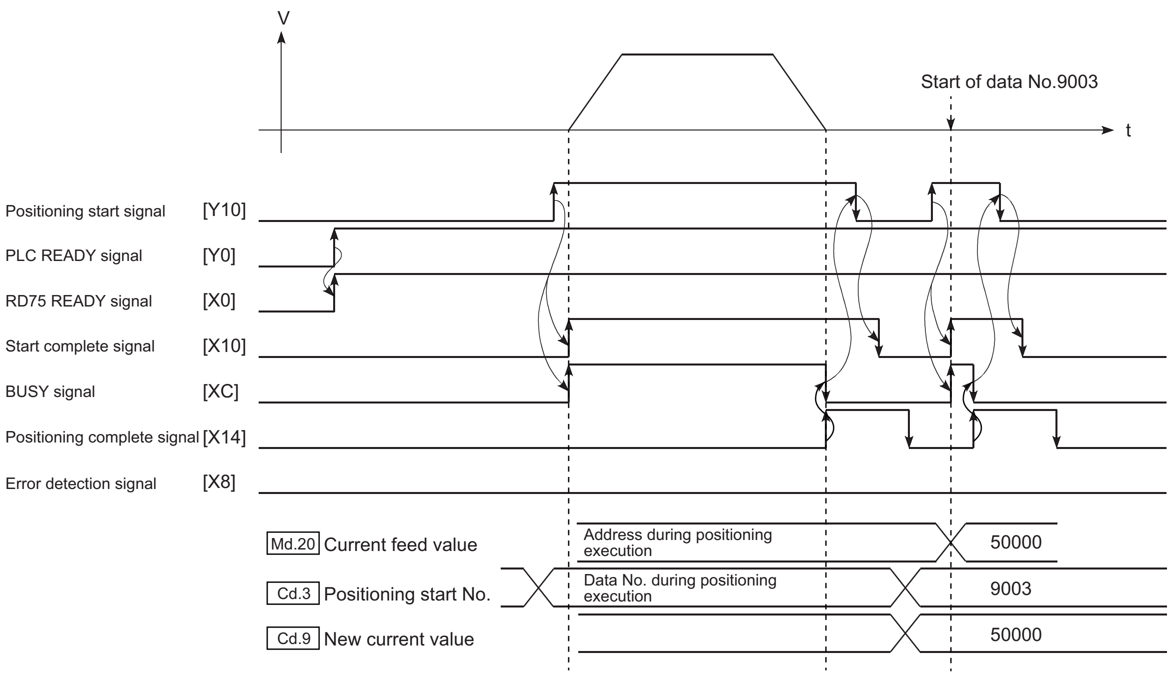
■Setting method

The following shows the data setting and a program example for executing the current value change using Positioning start signal. ([Md.20] Current feed value is changed to 5000.0μm.)

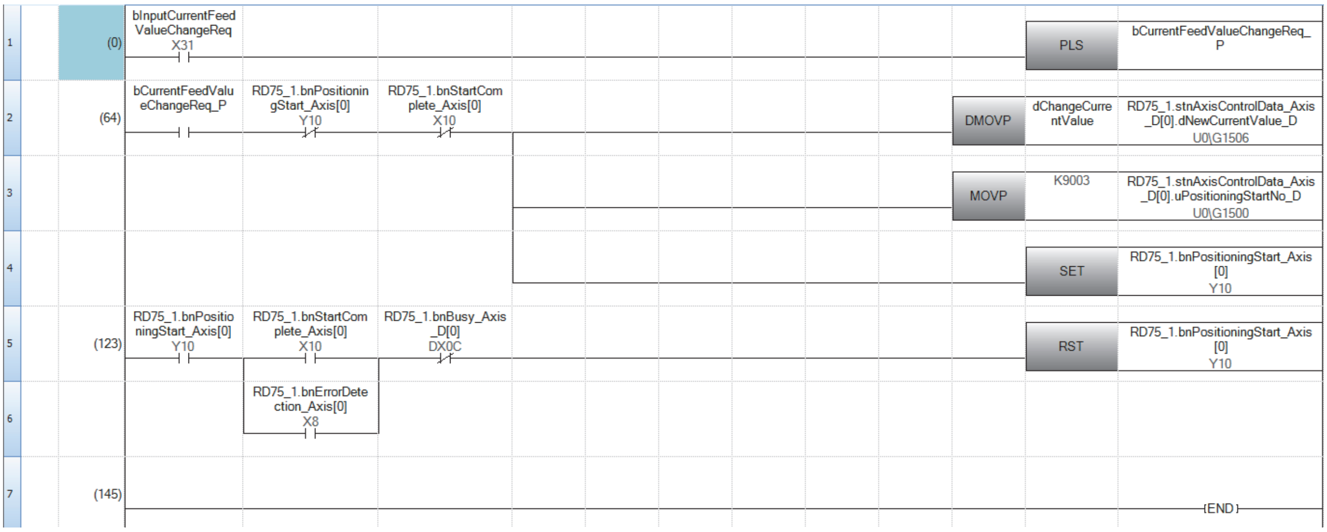
- Set the following data.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.3]	Positioning start No.	9003	Sets 9003, the start No. for a current value change.	1500	1600	1700	1800
[Cd.9]	New current value	50000	(Set [Md.20] Current feed value after the change.)	1506 1507	1606 1607	1706 1707	1806 1807

- The following shows the start time chart.



- Add the following program to the control program, and write it to the CPU module.



Classification	Label Name	Description
Module label	RD75_1.bnErrorDetection_Axis[0]	Axis 1 Error detection signal [X8]
	RD75_1.bnBusy_Axis_D[0]	Axis 1 BUSY signal [XC]
	RD75_1.bnStartComplete_Axis[0]	Axis 1 Start complete signal [X10]
	RD75_1.bnPositioningStart_Axis[0]	Axis 1 Positioning start signal [Y10]
	RD75_1.stnAxisControlData_Axis_D[0].uPositioningStartNo_D	Axis 1 [Cd.3] Positioning start No.
	RD75_1.stnAxisControlData_Axis_D[0].dNewCurrentValue_D	Axis 1 [Cd.9] New current value
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.	

	Label Name	Data Type	Class
1	bCurrentFeedValueChangeReq_P	Bit	VAR
2	dChangeCurrentValue	Double Word [Signed]	VAR

150	bInputCurrentFeedValueChangeReq	Bit	VAR_GLOBAL	X31

NOP instruction

The NOP instruction is a control method that is not executed.

Operation

The positioning data No. to which the NOP instruction is set is not processed and the operation is shifted to the one of the next positioning data No.

Positioning data to be set

To use the NOP instruction, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	—
[Da.2]	Control method	◎ (Set the NOP instruction.)
[Da.3]	Acceleration time No.	—
[Da.4]	Deceleration time No.	—
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	—
[Da.7]	Arc address	—
[Da.8]	Command speed	—
[Da.9]	Dwell time	—
[Da.10]	M code	—
[Da.27]	M code ON signal output timing	—
[Da.28]	ABS direction in degrees	—
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restrictions

When the NOP instruction is set as the control method of the positioning data No.600, Control method setting error (Error code: 1A26H) occurs.

Point

Application example of the NOP instruction

If the speed switching or the operation suspension (automatic deceleration) may be executed during the positioning operation between two points in the future, the data can be reserved using the NOP instruction and can be changed only by replacing the identifier.

JUMP instruction

The JUMP instruction is used to jump to the positioning data No. set in the positioning data during Continuous positioning control or Continuous path control.

The following two JUMP instructions can be used.

JUMP instruction	Description
Unconditional JUMP	When no execution condition is set for the JUMP instruction (when 0 is set as the condition data No.)
Conditional JUMP	When execution conditions are set for the JUMP instruction (The conditions are set in the condition data used with Advanced positioning control.)

By using the JUMP instruction, performing the same positioning control repeatedly and selecting positioning data No. or execution conditions are enabled when Continuous positioning control or Continuous path control is performed.

Operation

■When the unconditional JUMP is used

The JUMP instruction is unconditionally executed and the operation jumps to the positioning data No. set in [Da.9] Dwell time.

■When the conditional JUMP is used

The block start condition data is used as the execution condition of the JUMP instruction.

- When block positioning data (No.7000 to 7004) is started, the condition data of each block is used.
- When the positioning data No.1 to 600 are started, the condition data of the start block 0 is used.
- If the execution condition set in [Da.10] M code of the JUMP instruction is satisfied, the JUMP instruction is executed to jump to the positioning data No. set in [Da.9] Dwell time.
- If the execution condition set in [Da.10] M code of the JUMP instruction is not satisfied, the JUMP instruction is ignored and the next positioning data No. is executed.

Restrictions

- When using a conditional JUMP instruction, establish the execution conditions of the JUMP instruction by when the positioning data whose number is four number before the positioning data No. of the JUMP instruction is executed. If the execution conditions of the JUMP instruction are not established by the time, the processing for when execution conditions are not established is performed. (During the execution of the continuous path control or continuous positioning control, the RD75 calculates the positioning data of the positioning data No. four items after the current positioning data.)
- The positioning control such as the one keeps looping until the conditions are satisfied cannot be executed only using the conditional JUMP instruction. For the target of the JUMP instruction, specify the positioning data whose control method is other than the JUMP instruction and NOP instruction.

Positioning data to be set

To use the JUMP instruction, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	—
[Da.2]	Control method	◎ (Set the JUMP instruction.)
[Da.3]	Acceleration time No.	—
[Da.4]	Deceleration time No.	—
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	—
[Da.7]	Arc address	—
[Da.8]	Command speed	—
[Da.9]	Dwell time	◎ (Set the positioning data No.1 to 600 of the target of the JUMP instruction.)
[Da.10]	M code	◎ (Set the execution condition of the JUMP instruction with a condition data No. as follows: 0: Unconditional JUMP, 1 to 10: Condition data No. (The condition data of Simultaneous start cannot be set.))
[Da.27]	M code ON signal output timing	—
[Da.28]	ABS direction in degrees	—
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

LOOP

The loop control with repetition of the LOOP to LEND instructions is performed.

Operation

The loop of LOOP to LEND is repeated for the set number of the repetition.

Positioning data to be set

To use the LOOP instruction, set the following positioning data.

◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	—
[Da.2]	Control method	◎ (Set LOOP.)
[Da.3]	Acceleration time No.	—
[Da.4]	Deceleration time No.	—
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	—
[Da.7]	Arc address	—
[Da.8]	Command speed	—
[Da.9]	Dwell time	—
[Da.10]	M code	◎ (Sets the number of repetition.)
[Da.27]	M code ON signal output timing	—
[Da.28]	ABS direction in degrees	—
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.

☞ Page 428 Positioning Data

Restrictions

- If 0 is set for the number of repetition, Control method LOOP setting error (Error code: 1A33H) occurs.
- Although the error does not occur even if LEND is not set after LOOP, the repetition is not processed.
- The nesting between LOOP and LEND cannot be set. If the nesting is set, only the inner LOOP to LEND are processed repeatedly.

Point

The setting becomes easier than the special start FOR (times) by setting required items in the control method. (☞ Page 169 Repeated start (FOR loop))

- Special start: Positioning start data, special start data, condition data, and positioning data
- Control method: Positioning data

For the special start FOR to NEXT, positioning data is required for each point of FOR and NEXT. However, the loop is available with only one data in the control method.

The nesting is available by combining the control method LOOP to LEND and the special start FOR to NEXT. However, LOOP to LEND cannot be set across the blocks. Set the processing of LOOP to LEND to be finished in one block.

For details on Block, refer to the following.

☞ Page 159 ADVANCED POSITIONING CONTROL

LEND

The operation is returned to the head of the repeating loop (LOOP to LEND).

Operation

The loop is completed when the number of repetition specified in LOOP is 0 and the processing of the next positioning data No. is executed. (Even if the operation pattern is set to Positioning complete, the setting is ignored.)
To stop the operation after the execution for the specified number of repetition, set a dummy positioning data (for example, the positioning in the incremental system whose movement amount is 0).
The following table shows the operation for when Positioning complete (00) is set to LOOP and LEND.

Positioning data No.	Operation pattern	Control method	Condition	Operation
1	Continuous control	ABS2		Positioning data is executed in the order of No.1 → 2 → 3 → 4 → 5 → 2 → 3 → 4 → 5 → 6. (The operation patterns of the positioning data No.2 and 5 are ignored.)
2	Positioning complete	LOOP	Loop count: 2	
3	Continuous path control	ABS2		
4	Continuous control	ABS2		
5	Positioning complete	LEND		
6	Positioning complete	ABS2		

Positioning data to be set

To use the LEND instruction, set the following positioning data.
◎: Always set, ○: Set as required, —: Setting not required

Setting item		Setting requirement
[Da.1]	Operation pattern	—
[Da.2]	Control method	◎ (Set LEND.)
[Da.3]	Acceleration time No.	—
[Da.4]	Deceleration time No.	—
[Da.5]	Axis to be interpolated	—
[Da.6]	Positioning address/movement amount	—
[Da.7]	Arc address	—
[Da.8]	Command speed	—
[Da.9]	Dwell time	—
[Da.10]	M code	—
[Da.27]	M code ON signal output timing	—
[Da.28]	ABS direction in degrees	—
[Da.29]	Interpolation speed specification method	—

For details on the settings, refer to the following.
☞ Page 428 Positioning Data

Restrictions

- The LEND before the execution of LOOP is ignored.
- If the operation pattern Positioning complete is set between LOOP and LEND, the positioning control is completed after the execution of that positioning data and the loop control is not performed.

4 ADVANCED POSITIONING CONTROL

This chapter describes the details and usage of the advanced positioning control (the control function using Block start data).
The advanced positioning control is used to perform applied controls using Positioning data. Examples of the applied controls use the condition judgment to control the positioning data set with the major positioning control, or start Positioning data for multiple axes simultaneously.
Check the settings and execution procedures for each control, and configure each setting as required.

4.1 Overview of Advanced Positioning Control

For Advanced positioning control, the execution order and execution conditions of Positioning data are set to execute further applied positioning. (The execution order and execution conditions are set in Block start data and Condition data.)
The following types of applied positioning controls can be executed by using Advanced positioning control.

Advanced positioning control	Description
Block*1 start (normal start)	With one start, executes positioning data in a block in the set order.
Condition start	Judges the condition set in Condition data for the specified positioning data, and executes Block start data. • When the condition is established, Block start data is executed. • When not established, that block start data is ignored, and the block start data of the next point is executed.
Wait start	Judges the condition set in Condition data for the specified positioning data, and executes Block start data. • When the condition is established, Block start data is executed. • When not established, the control stops (waits) until the condition is established.
Simultaneous start*2	Simultaneously executes the positioning data for the axes specified with Condition data (outputs pulses at the same timing).
Repeated start (FOR loop)	Repeats the program from the block start data set with FOR loop to the block start data set in NEXT for the specified number of times.
Repeated start (FOR condition)	Repeats the program from the block start data set with FOR condition to the block start data set in NEXT until the conditions set in Condition data are established.

*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 [Da.1] Operation pattern to the positioning data in which Independent positioning control (Positioning complete) is set.
*2 Besides the simultaneous start using Block start data, Multiple axes simultaneous start control of the control system is included.
☞ Page 32 Multiple axes simultaneous start

Sub functions for advanced positioning control

Advance positioning control uses Positioning data set with Major positioning control.
For details on the sub functions that can be combined with the major positioning control, refer to the following.
MELSEC iQ-R Positioning Module User's Manual (Startup)
Note that the pre-reading start function cannot be used together with Advanced positioning control.

Advanced positioning control from an engineering tool

Advanced positioning control (start of Block start data) can be executed using the positioning test of the engineering tool. For details on the positioning test, refer to the following.
☞ Page 340 Positioning Test

Data required for advanced positioning control

Advanced positioning control is performed by setting the required items in Block start data and Condition data, and starting the block start data. Whether or not the operations can be executed is judged at the execution of the control according to the condition data specified in the block start data.

Block start data can be set for each number from 7000 to 7004 (called block No.), and up to 50 points can be set for each axis. (This data is controlled with numbers called Points to distinguish it from the positioning data. For example, the 1st point block start data item is called 1st point block start data or Point No. 1 block start data.)

Condition data can be set for each number from 7000 to 7004 (called block No.), and up to 10 data items can be set for each block No.

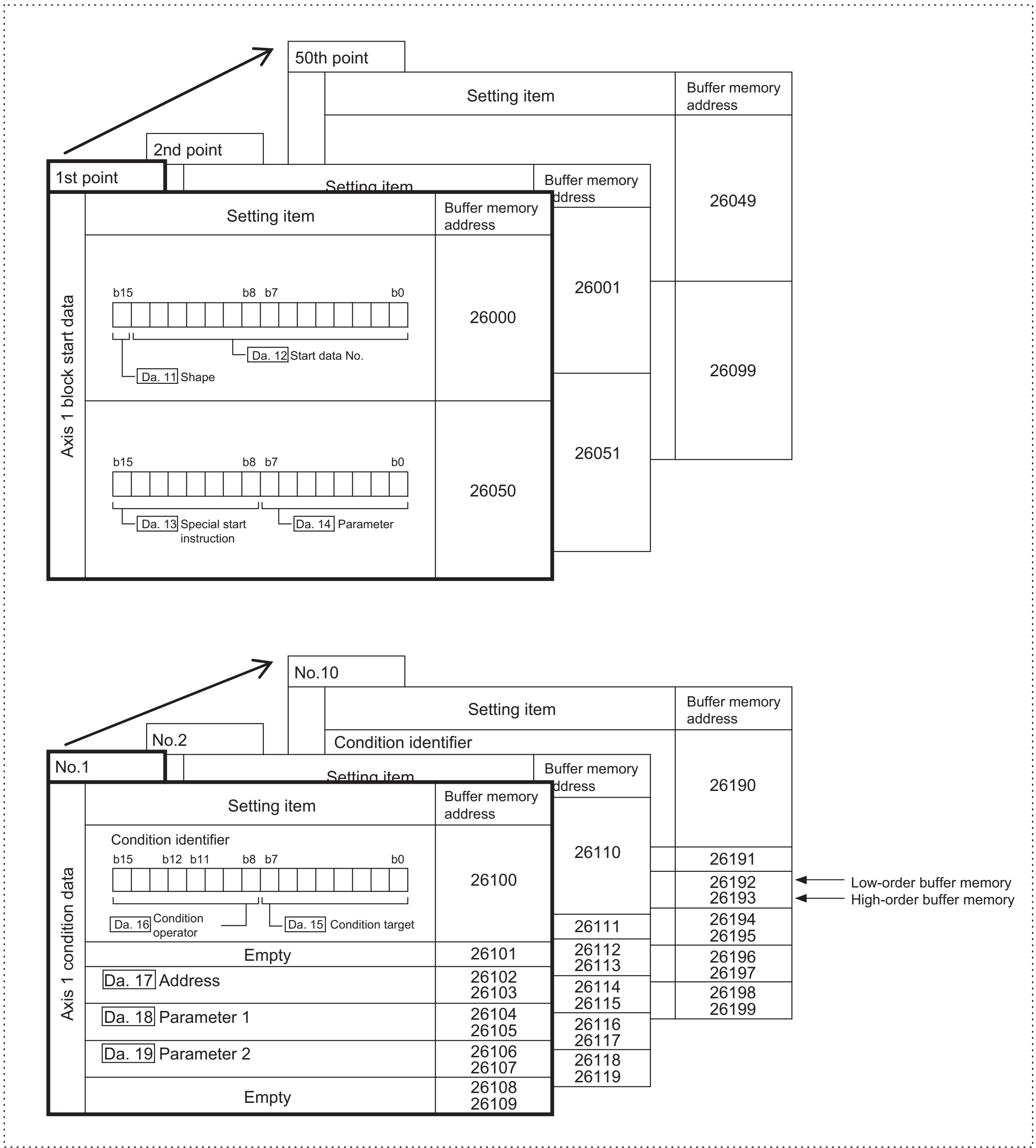
Block start data and Condition data are set as one for each block No.

The following table shows the overview of Block start data and Condition data stored in the RD75.

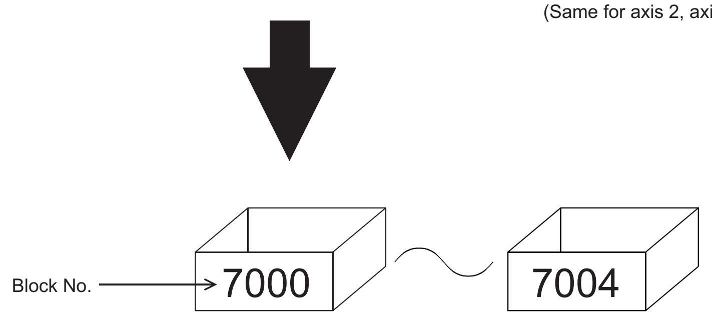
Setting item			Setting detail
Block start data	[Da.11]	Shape	Set whether to end the control after only the block start data of the shape itself is executed, or to continue executing the block start data set in the next point.
	[Da.12]	Start data No.	Set Positioning data No. to be executed.
	[Da.13]	Special 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]. (Specify Condition data No. or No. of repetitions.)
Condition data	[Da.15]	Condition target	Select Device, Stored contents in buffer memory, and Positioning data No. elements for which the conditions are set.
	[Da.16]	Condition operator	Set the judgment method performed for the target set in [Da.15].
	[Da.17]	Address	Set the buffer memory address in which the condition judgment is performed (only when the element set in [Da.15] is Stored contents in buffer memory).
	[Da.18]	Parameter 1	Set the required conditions according to the elements set in [Da.15] and [Da.16].
	[Da.19]	Parameter 2	Set the required conditions according to the elements set in [Da.15] and [Da.16].

Block start data and Condition data configurations

Block start data and Condition data corresponding to Block No.7000 to 7004 can be stored in the buffer memory. (The following table shows an example for Axis 1.)



(Same for axis 2, axis 3, and axis 4)



Set in the RD75 with an engineering tool or a program.

4.2 Execution Procedure for Advanced Positioning Control

The advanced positioning control is performed using the following procedure.

Preparation	STEP 1	Set for the major positioning control.	First prepare to execute the major positioning control because the advanced positioning control is the control to execute each control (major positioning control) set in the positioning data on the specified conditions.
	STEP 2	Set the block start data corresponding to each control. (Da.11 to Da.14) × Required data amount	Up to 50 of block start data (1 to 50 points) can be set.
	STEP 3	Set condition data. (Da.15 to Da.19) × Required data amount	Set the condition data to specify them in the block start data. Up to 10 of condition data can be set.
	STEP 4	Create a program to set "7000*" in Cd.3 Positioning start No. (control data setting)	By specifying "7000", the RD75 recognizes that the control is the advanced positioning control using block start data.
		Set the point No. of block start data to be started (1 to 50) in Cd.4 Positioning starting point No.	Create a program to execute the advanced positioning control.
		Create a program to turn on Positioning start signal using a positioning start command.	
	STEP 5	Write the programs created on STEP 4 to the CPU module.	
Control start	STEP 6	Turn on the positioning start command of the axis to be started.	Same procedure as the start of major positioning control
Control monitoring	STEP 7	Monitor the advanced positioning control.	Monitor using an engineering tool.
Control stop	STEP 8	The operation is stopped when the control is completed.	Same procedure as the stop of major positioning control
		Control end	

Point

- Five sets of Block start data (50 points) and Condition data (10 items) corresponding to No. 7000 to 7004 are set with a program.
- Five sets of data from 7000 to 7004 can also be set using an engineering tool. If an engineering tool is used to set Block start data and Condition data corresponding to 7000 to 7004 and to write the data into the RD75, 7000 to 7004 can be set in [Cd.3] Positioning start No. in STEP 4.

4.3 Setting the Block Start Data

Relation between various controls and block start data

Block start data must be set to perform Advanced positioning control.

The setting requirements and details of each block start data item to be set differ according to the setting of [Da.13] Special start instruction.

The following table shows the setting items of Block start data prepared for various control systems. For details on Condition data with which the control execution is judged, refer to Setting the Condition Data on page 316. (The settings of Block start data in this section are assumed to be performed using an engineering tool.)

◎: Set either of the two setting items.

×: Setting not possible

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Setting items for block start data			Block start (normal start)	Condition start	Wait start	Simultaneous start	Repeated start (FOR loop)	Repeated start (FOR condition)	NEXT start*1
[Da.11]	Shape	0: End	◎	◎	◎	◎	×*2	×*2	◎
		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.	—

*1 NEXT start instruction is used in combination with Repeated start (FOR loop) and Repeated start (FOR condition). The control using only NEXT start instruction will not be performed.

*2 If End is set for the repeated start, the operation that is the same as the one of the block start (normal start) will be performed.

Point

Setting Block start data using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

Block start (normal start)

In Block start (normal start), the positioning data groups of a block are continuously executed in a set sequence starting from the positioning data set in [Da.12] Start data No. by one start.

The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

■Block start data settings

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	—
.				
.				

■Positioning data settings

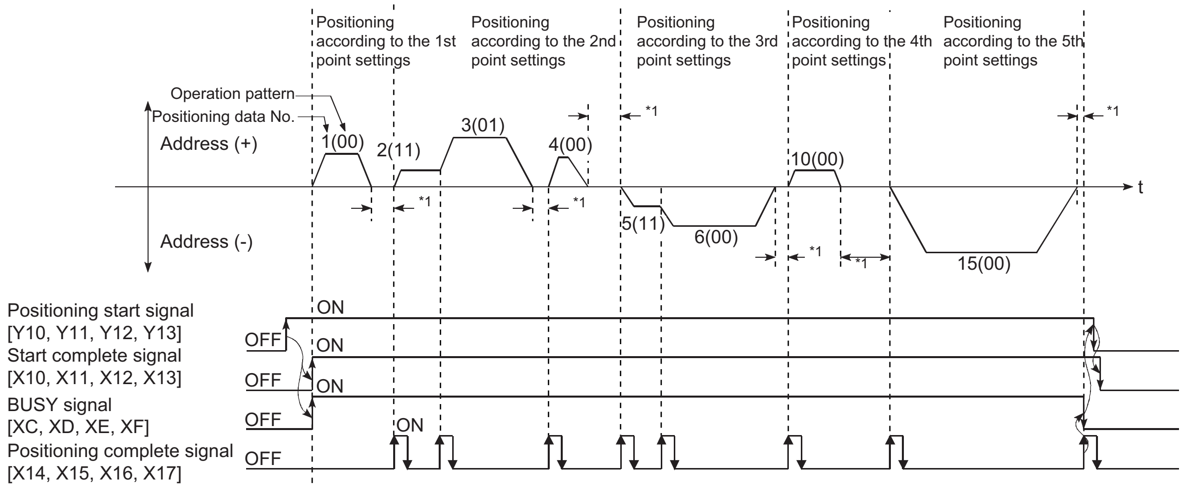
Axis 1 positioning data No.	[Da.1] Operation pattern	
1	00: Positioning complete	
2	11: Continuous path control	1 block*1
3	01: Continuous positioning control	
4	00: Positioning complete	
5	11: Continuous path control	1 block
6	00: Positioning complete	
.		
10	00: Positioning complete	
.		
15	00: Positioning complete	
.		

*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 [Da.1] Operation pattern to the positioning data in which Independent positioning control (Positioning complete) is set.

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

- The positioning data is executed in the following order and the operation will be stopped: Axis 1 positioning data No.1 → 2 → 3 → 4 → 5 → 6 → 10 → 15.



*1 Dwell time of corresponding positioning data

Condition start

In Condition start, the condition judgment of the condition data specified in [Da.14] Parameter is performed for the positioning data set in [Da.12] Start data No. If the conditions have been established, the block start data set as 1: Condition start is executed. If the conditions have not been established, that block start data is ignored, and the block start data of the next point will be executed.
The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

■Block start data settings

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	—
.				
.				

Condition data No. has been set in [Da.14] Parameter.

■Positioning data settings

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
.	

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

	Condition judgment target	Control details
(1)	The condition judgment set in Condition data No.1 is performed before the execution of the positioning data No.1 of the axis 1.	• Conditions established: Positioning data No.1, 2, and 3 are executed and processing proceeds on to (2). • Conditions not established: Processing proceeds on to (2).
(2)	The condition judgment set in Condition data No.2 is performed before the execution of the positioning data No.10 of the axis 1.	• Conditions established: Positioning data No.10, 11, and 12 are executed and processing proceeds on to (3). • Conditions not established: Processing proceeds on to (3).
(3)	-	The positioning data No.50 of Axis 1 is executed and processing stops.

Wait start

In Wait start, the condition judgment of the condition data specified in [Da.14] Parameter is performed 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.
The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

■Block start data settings

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	—
.				
.				

Condition data No. has been set in [Da.14] Parameter.

■Positioning data settings

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
.	

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

	Condition judgment target	Control details
(1)	The condition judgment set in Condition data No.3 is performed to Positioning data No.1 of Axis 1.	• Conditions established: Positioning data No.1, 2, and 3 are executed and processing proceeds on to (2). • Conditions not established: The control stops (waits) until the conditions are established and processing proceeds on to (1).
(2)	-	The positioning data No.10, 11, 12, and 50 of Axis 1 are executed and processing stops.

Simultaneous start

In Simultaneous start, the positioning data set in [Da.12] Start data No. and positioning data of other axes set in the condition data are simultaneously executed. (Pulses are output at the same timing.)
(Specify Condition data with [Da.14] Parameter.)
The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

■Block start data settings

Axis 1 block start data	[Da.11] Shape	[Da.12] Start data No.	[Da.13] Special start instruction	[Da.14] Parameter
1st point	0: End	1	3: Simultaneous start	4
.				
.				
.				
.				

The positioning data of the axis 2 for performing the simultaneous start is assumed to be set for the condition data specified with [Da.14] Parameter.

■Positioning data settings

Axis 1 positioning data No.	[Da.1] Operation pattern
1	01: Continuous positioning control
2	01: Continuous positioning control
3	00: Positioning complete
.	
.	
.	
.	
.	
.	
.	

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

	Condition judgment target	Control details
(1)	The axis operation status of the axis 2 which is regarded as the simultaneous starting axis.	• Axis 2 is in the standby state. : Processing proceeds on to (2). • Axis 2 is performing the positioning. : An error occurs and no simultaneous start will be performed.
(2)	—	The positioning data No.1 of Axis 1 and the positioning data of the axis 2 set to Condition data No.4 are simultaneously started.

Precautions

The positioning data No. executed by the simultaneous starting axis is set for the condition data ([Da.18] Parameter 1 and [Da.19] Parameter 2). However, the setting value of the starting axis (The axis which performs the positioning start) should be 0. If a value other than 0 is set, the positioning data No. set in [Da.18] Parameter 1 or [Da.19] Parameter 2 is given priority to be executed rather than [Da.12] Start data No.
For details, refer to the following.
☞ Page 447 Condition Data

Repeated start (FOR loop)

In 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 dat0 in which 6: NEXT start is set in [Da.13] Special start instruction is repeatedly executed for the number of times set in [Da.14] Parameter. An endless loop will result if the number of repetitions is 0.
(The number 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.)
The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

4

■Block start data settings

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	—
.				
.				

No. of repetitions has been set in [Da.14] Parameter.

■Positioning data settings

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	00: Positioning complete
.	
50	01: Continuous positioning control
51	00: Positioning complete
.	

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

- The positioning data No.1, 2, 3, 10, 11, 50, and 51 of the axis 1 are executed.
- Processing returns to the 1st point block start data of the axis 1 and the positioning data No.1, 2, 3, 10, 11, 50, and 51 is executed again, then the control is stopped. (Processing will be repeated for the number of times (2 times) set in [Da.14].)

Repeated start (FOR condition)

In 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 conditions set in the condition data are established.
The condition judgment will be performed when switching to the point of 6: NEXT start (Before the positioning at the NEXT start point) is performed.
(Specify the condition data in [Da.14] Parameter of the block start data in which 5: FOR condition is set in [Da.13] Special start instruction.)
The following shows setting examples and a control example in which Block start data and Positioning data are set as shown in the setting examples.

Setting example

■Block start data settings

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	—
.				
.				

No. of repetitions has been set in [Da.14] Parameter.

■Positioning data settings

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	00: Positioning complete
.	
50	01: Continuous positioning control
51	00: Positioning complete
.	

Control example

The following describes the control to be executed when the operation using the 1st point block start data of the axis 1 is started.

	Condition judgment target	Control details
(1)	-	The positioning data No.1, 2, 3, 10, and 11 of the axis 1 are executed.
(2)	The condition judgment set in the condition data No.5 of the axis 1 is performed.*1	• Conditions not established: Positioning data No. 50 and 51 are executed and processing proceeds on to (2). • Conditions established: Positioning data No.50 and 51 are executed and the positioning control ends.

*1 The condition judgment will be performed when switching to the point of 6: NEXT start (Before the positioning at the NEXT start point) is performed.

Restrictions when the NEXT start is used

NEXT start instruction shows the end of the repetition when the repeated start (FOR loop) and repeated start (FOR condition) are executed. (☞ Page 169 Repeated start (FOR loop), ☞ Page 170 Repeated start (FOR condition))

This section describes the restrictions when 6: NEXT start is set in Block start data.

- The processing when 6: NEXT start is executed before the execution of 4: FOR loop or 5: FOR condition is the same as that for 0: Block start.
- The repeated processing will not be performed if 6: NEXT start is not set after 4: FOR loop or 5: FOR condition. (Note that no error occurs in this case.)
- Nesting is not possible between 4: FOR loop and 6: NEXT start, or between 5: FOR condition and 6: NEXT start. If nesting is attempted, FOR to NEXT nest construction (Warning code: 09F1H) occurs. The destination of jump by NEXT at the 7th point is changed to the 4th point and NEXT at the 9th point is processed as Normal start.

When a nest construction is not configured

Block start data	Da.13 Special start instruction
1st point	Normal start
2nd point	FOR
3rd point	Normal start
4th point	NEXT
5th point	Normal start
6th point	Normal start
7th point	FOR
8th point	Normal start
9th point	NEXT
.	
.	

When a nest construction is configured

Block start data	Da.13 Special start instruction
1st point	Normal start
2nd point	FOR
3rd point	Normal start
4th point	FOR
5th point	Normal start
6th point	Normal start
7th point	NEXT
8th point	Normal start
9th point	NEXT
.	
.	

A warning occurs when FOR at the 4th point is executed.
The destination of jump by NEXT at the 7th point is changed to the 4th point and NEXT at the 9th point is processed as Normal start.

4.4 Setting the Condition Data

Relation between various controls and condition data

Set Condition data in the following cases.

- When conditions are set during the execution of the JUMP instruction (Major positioning control)
- When conditions are set during the execution of Advanced positioning control

Condition data includes the five setting items from [Da.15] to [Da.19]. However, the setting requirements and details of each setting item differ depending on the control system and setting conditions used.

The following table lists the condition data [Da.15] Condition target corresponding to each type of the controls.

(The settings of Condition data in this section are assumed to be performed using an engineering tool.)

◎: Set either of the two setting items.

×: Setting not possible

Setting items for [Da.15] Condition target	Advanced positioning control				Major positioning control
	Condition start	Wait start	Simultaneous start	Repeated start (FOR condition)	JUMP instruction
01: Device X*1	◎	◎	×	◎	◎
02: Device Y*1	◎	◎	×	◎	◎
03: Buffer memory (1 word)	◎	◎	×	◎	◎
04: Buffer memory (2 words)	◎	◎	×	◎	◎
05: Positioning data No.	×	×	◎	×	×

*1 Includes the buffer memory addresses and devices X/Y which belong to the RD75.

Restriction

Setting Condition data with an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

The setting requirements and details of the setting items of the condition data [Da.16] to [Da.19] differ depending on the setting in [Da.15] Condition target.

The following table lists the setting items of [Da.16] to [Da.19] corresponding to [Da.15] Condition target.

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

**: Value stored in the buffer memory address specified in [Da.17]

[Da.15] Condition target	[Da.16] Condition operator	[Da.17] Address	[Da.18] Parameter 1		[Da.19] Parameter 2	
01H: Device X	07H: DEV = ON 08H: DEV = OFF	—	0 to 1FH (Bit No.)		—	
02H: Device Y			0 to 1FH (Bit No.)			
03H: Buffer memory (1 word)*2	01H: ** = P1 02H: ** ≠ P1 03H: ** ≤ P1 04H: ** ≥ P1 05H: P1 ≤ ** ≤ P2 06H: ** ≤ P1, P2 ≤ **	Buffer memory address	P1 (Numerical value)		P2 (Numerical value) (Set this value only when [Da.16] is [05H] or [06H].)	
04H: Buffer memory (2 words)*2						
05H: Positioning data No.	10H: Axis 1 specification 20H: Axis 2 specification 30H: Axis 1 and 2 specification 40H: Axis 3 specification 50H: Axis 1 and 3 specification 60H: Axis 2 and 3 specification 70H: Axis 1, 2, and 3 specification 80H: Axis 4 specification 90H: Axis 1 and 4 specification A0H: Axis 2, 4 specification B0H: Axis 1, 2, and 4 specification C0H: Axis 3 and 4 specification D0H: Axis 1, 3, and 4 specification E0H: Axis 2, 3, and 4 specification	—	Lower 16 bits	Axis 1 positioning data No.*3	Lower 16 bits	Axis 3 positioning data No.*3
			Upper 16 bits	Axis 2 positioning data No.*3	Upper 16 bits	Axis 4 positioning data No.*3

*2 ≤ and ≥ are judged with signed values. (☞ Page 448 [Da.16] Condition operator)

*3 Set 0 for the starting axis (Axis which has executed the positioning start). If a value other than 0 is set, the positioning data set in [Da.18] Parameter 1 or [Da.19] Parameter 2 is executed rather than [Da.12] Start data No.

Judgment whether the condition operator is = or ≠ at the wait start

Judgment on data is performed for each control cycle of the RD75. Thus, in the judgment on the data such as the current feed value which varies continuously, the condition operator = may not be detected. In cases like this, use a range operator.

Point

Programmable controller CPU memo area can be specified as the buffer memory address to be specified in [Da.17].

Setting examples of the condition data

The following shows setting examples of Condition data.

Example 1

This example uses the on/off state of a device as a condition.

- [Condition] Device XC (= Axis 1 BUSY signal) 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	—	0CH	—

Example 2

This example uses a numerical value stored in the buffer memory as a condition.

- [Condition] The value stored in the 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	—

Example 3

This example specifies an axis and the positioning data No. of the axis as the target for the simultaneous start.

- [Condition] The positioning data No.3 of the axis 2 is the target for the simultaneous start.

[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 specification	—	0003H in the upper 16 bits*1	—*1

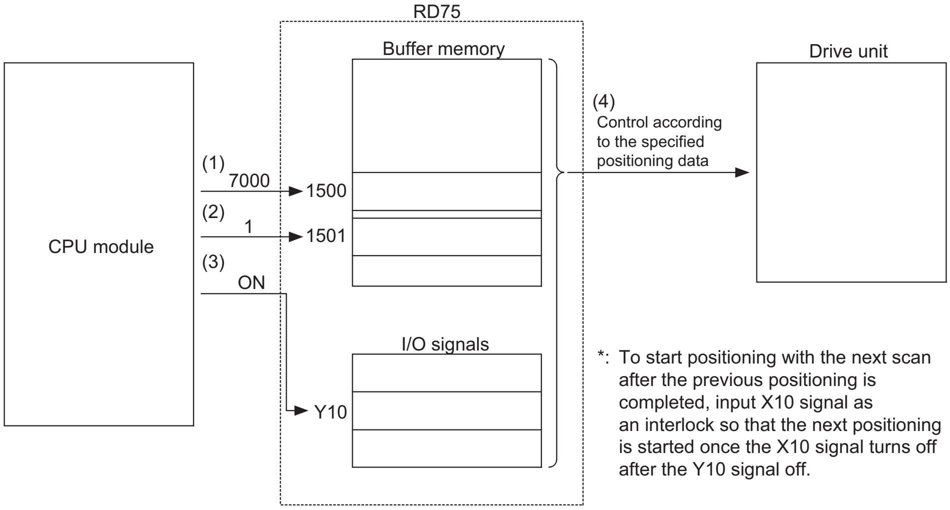
*1 Set 0000H for the starting axis (Axis which has executed the positioning start).

4.5 Start Program for the Advanced Positioning Control

Starting the advanced positioning control

To execute the advanced positioning control, a program must be created to start the control in the same method as for the major positioning control.

The following shows the procedure for starting the 1st point block start data (Regarded as block No.7000) set in the axis 1.



(1) Set 7000 in [Cd.3] Positioning start No. (By setting this value, the control is established as Advanced positioning control using the block start data.)

(2) Set the point number of Block start data started. (In this case, set 1.)

(3) Turn on Start signal.

(4) The positioning data set to 1st point block start data is started.

Start program example for the advanced positioning control

The following shows a start program example for the advanced positioning control in which the 1st point block start data of the axis 1 is started. (The block No. is regarded as 7000.)

Control data requiring settings

The following control data must be set to execute the advanced positioning control. The setting is performed using a program.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.3]	Positioning start No.	7000	Set 7000, which indicates the control using Block start data.	1500	1600	1700	1800
[Cd.4]	Positioning starting point No.	1	Set the point number of the block start data started.	1501	1601	1701	1801

For details on the settings, refer to the following.

☞ Page 478 [Cd.3] Positioning start No.
☞ Page 478 [Cd.4] Positioning starting point No.

Start condition

Satisfy the following conditions to start a program. In addition, set the required conditions in the program to prevent an operation from starting if the conditions are not satisfied.

Signal name		Signal status		Device			
				Axis 1	Axis 2	Axis 3	Axis 4
Interface signal	PLC READY signal	ON	The CPU module is ready.	Y0			
	RD75 READY signal	ON	RD75 READY signal	X0			
	Module access flag	ON	The RD75 buffer memory can be accessed.	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	No error has been detected.	X8	X9	XA	XB
	M code ON signal	OFF	M code ON signal is off.	X4	X5	X6	X7
External signal	Drive unit READY signal	ON	The drive unit is ready.	—			
	Stop signal	OFF	Stop signal is off.	—			
	Upper limit (FLS)	ON	The current position is within the limit.	—			
	Lower limit (RLS)	ON	The current position is within the limit.	—			

Start time chart

The following figure shows a time chart in a case when the positioning data No.1, 2, 10, 11, and 12 of Axis 1 are continuously executed as an example.

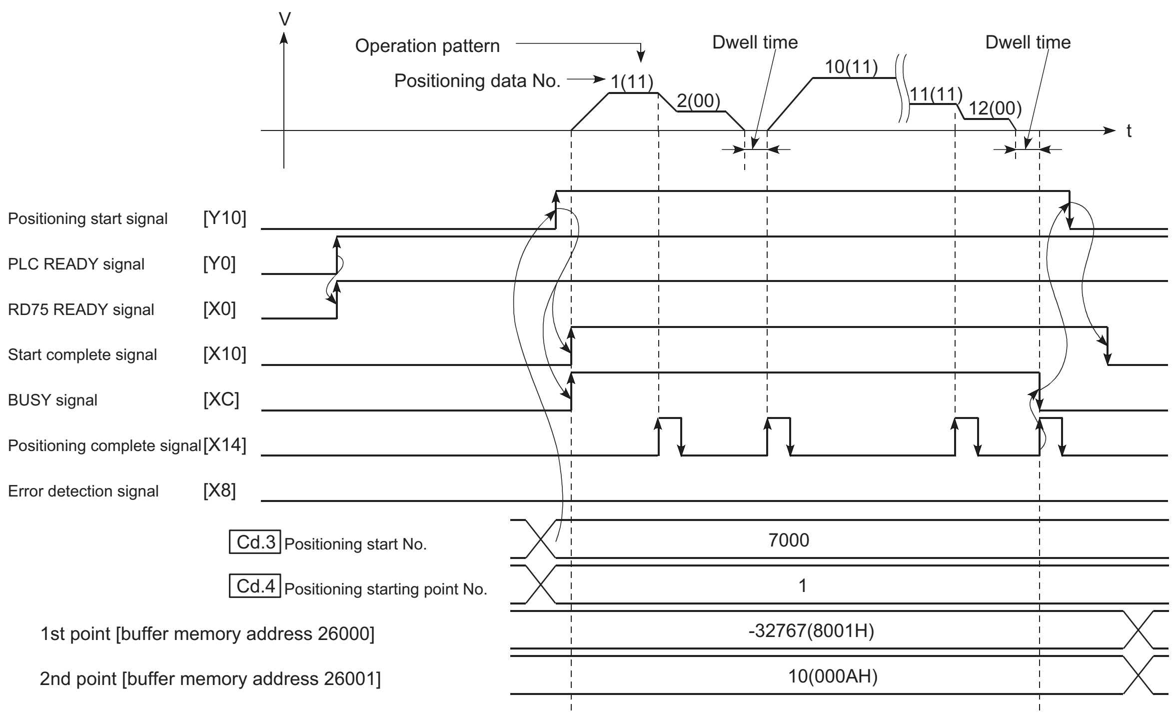
■Block start data settings

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	—
.				

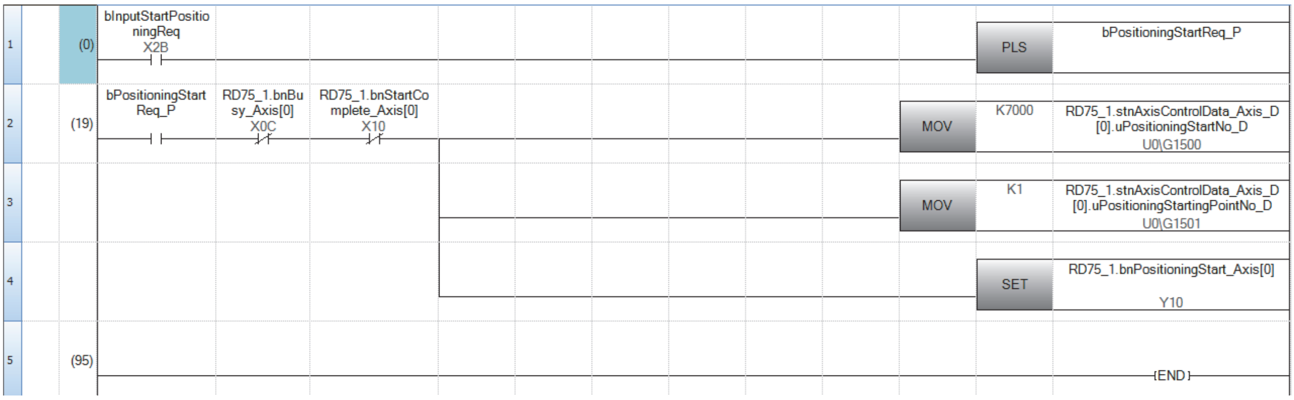
■Positioning data settings

Axis 1 positioning 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
.	

■Start time chart



Program example



<table>
<tr><th>Classification</th><th>Label Name</th><th>Description</th></tr>
<tr><td rowspan="5">Module label</td><td>RD75_1.bnBusy_Axis[0]</td><td>Axis 1 BUSY signal [XC]</td></tr>
<tr><td>RD75_1.bnStartComplete_Axis[0]</td><td>Axis 1 Start complete signal [X10]</td></tr>
<tr><td>RD75_1.bnPositioningStart_Axis[0]</td><td>Axis 1 Positioning start signal [Y10]</td></tr>
<tr><td>RD75_1.stnAxisControlData_Axis_D[0].uPositioningStartNo_D</td><td>Axis 1 [Cd.3] Positioning start No.</td></tr>
<tr><td>RD75_1.stnAxisControlData_Axis_D[0].uPositioningStartingPointNo_D</td><td>Axis 1 [Cd.4] Positioning starting point No.</td></tr>
<tr><td>Global label, local label</td><td colspan="2">Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.
<table>
<tr><th></th><th>Label Name</th><th>Data Type</th><th></th><th>Class</th></tr>
<tr><td>1</td><td>bPositioningStartReq_P</td><td>Bit</td><td>...</td><td>VAR</td></tr>
</table>
<table>
<tr><th></th><th>Label Name</th><th>Data Type</th><th></th><th>Class</th><th>Assign (Device/Label)</th></tr>
<tr><td>115</td><td>bInputStartPositioningReq</td><td>Bit</td><td>...</td><td>VAR_GLOBAL</td><td>X2B</td></tr>
</table>
</td></tr>
</table>

5 MANUAL CONTROL

This chapter describes the details and usage of the manual control.
In the manual control, pulse output commands are issued during the JOG operation and inching operation executed by turning on JOG start signal, or from the manual pulse generator connected to the RD75.
The chapter describes the manual control using a program from the CPU module.

5.1 Overview of the Manual Control

Three manual control methods

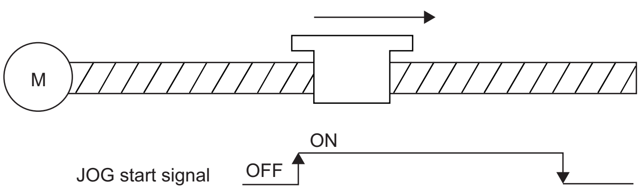
When the manual control is used, the positioning operation is performed in response to a signal input from an external source. Positioning data is not used.
Manual control is classified into three controls: JOG operation, inching operation, and manual pulse generator operation.

5

JOG operation

In the JOG operation, the machine is moved only for a movement amount (pulses are continuously output while JOG start signal is on). This control method is used to move the workpiece in the direction in which a limit signal is turned on when the operation is stopped by turning off the limit signal to check the positioning system connection and obtain the positioning data address (☞ Page 289 Teaching function).

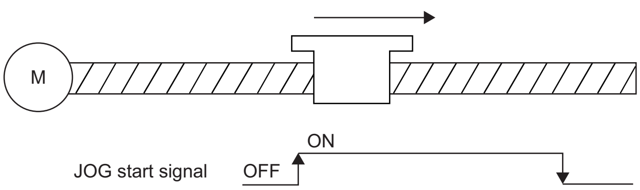
The object keeps moving
while JOG start signal is on.



Inching operation

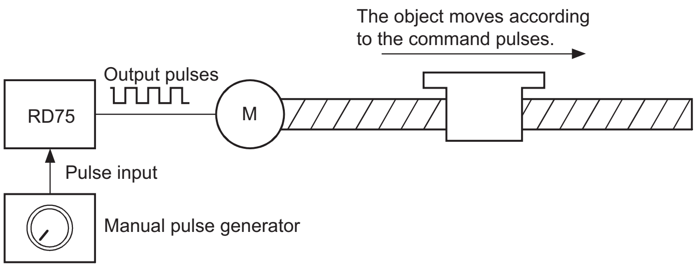
In the inching operation, pulses for a minute movement amount are output manually at 1.77ms. By setting Inching movement amount of the axis control data in the JOG operation, the workpiece moves only for the set movement amount. (However, the JOG operation is performed when Inching movement amount is set to 0.)

The object moves the distance of pulse amount
output for 1.77ms after JOG start signal is on.



Manual pulse generator operation

In the manual pulse generator operation, the positioning is performed depending on the number of pulses input from the manual pulse generator. (Pulses for the number of input pulses are output.) This method is used to perform the fine adjustment manually for the precise positioning and to obtain a positioning address.



■Sub functions for the manual control

For details on the sub functions that can be combined with the manual control, refer to the following.

📖 MELSEC iQ-R Positioning Module User's Manual (Startup)

For details on each sub function, refer to the following.

☞ Page 214 CONTROL SUB FUNCTIONS

■Manual control from an engineering tool

The execution of the JOG operation and Inching operation, and setting whether to enable or disable Manual pulse generator operation can be performed in the test mode of the engineering tool.

■Monitoring the manual control

The manual control can be monitored using the positioning monitor of the engineering tool. For details on the positioning monitor, refer to the following.

☞ Page 338 Positioning Monitor

5.2 JOG Operation

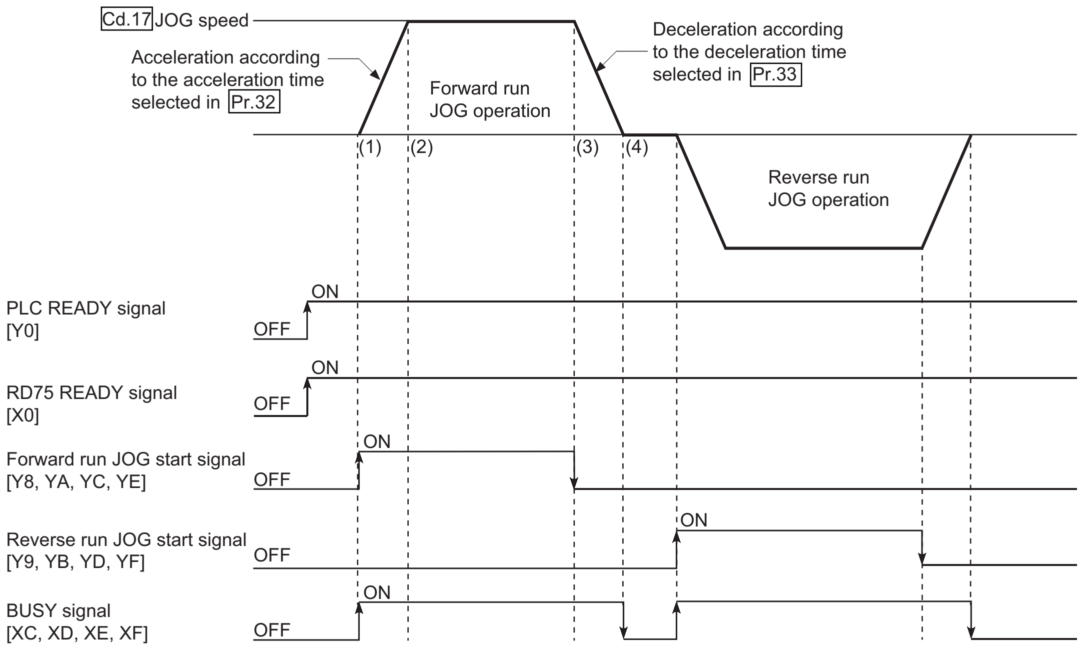
Overview of the JOG operation

Restriction

Use the hardware stroke limit function when performing the JOG operation at a position close to the upper or lower limit. (☞ Page 246 Hardware stroke limit function)
When the hardware stroke limit function is not used, the workpiece moves beyond the movement range, resulting in an accident.

Operation

In the JOG operation, Forward run JOG start signal [Y8, YA, YC, YE] or Reverse run JOG start signal [Y9, YB, YD, YF] is turned on. While one of these signals is on, pulses are output from RD75 to the drive unit to move the workpiece toward the specified direction. The following shows an operation example of JOG operation.



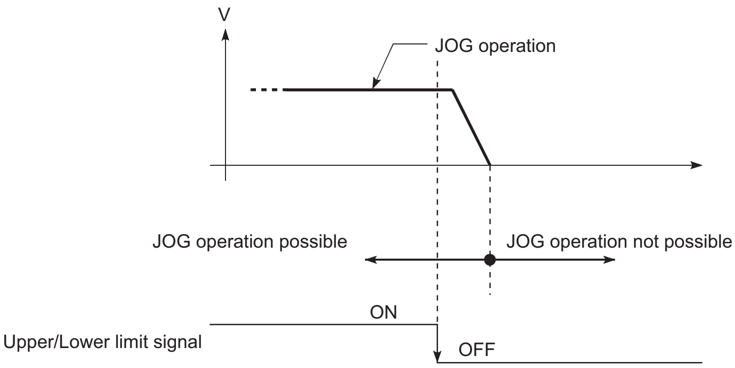
No.	Operation
(1)	When a start signal is turned on, the acceleration starts at the acceleration time specified in [Pr.32] JOG operation acceleration time selection in the direction specified by the start signal. BUSY signal turns on at this time.
(2)	When the accelerating workpiece reaches the speed set in [Cd.17] JOG speed, the workpiece continues moving at that speed. (The workpiece moves at the constant speed during (2) to (3).)
(3)	When the start signal is turned off, the deceleration starts at the deceleration time specified in [Pr.33] JOG operation deceleration time selection from the speed set in [Cd.17] JOG speed.
(4)	When the speed reaches 0, the operation stops. BUSY signal turns off at this time.

Precautions during the operation

- For the safety operation, set a small value in [Cd.17] JOG speed to check the operation, and increase the value gradually.
- If the set JOG speed is out of the setting range or 0 when the JOG operation is started, Outside JOG speed range (Error code: 1980H) occurs and the operation will not start.
- If the value set in [Pr.31] JOG speed limit value is larger than the value in [Pr.8] Speed limit value, JOG speed limit value error (Error code: 1AB8H) occurs and the operation will not start.
- If the value set in [Cd.17] JOG speed exceeds the speed set in [Pr.31] JOG speed limit value, the workpiece will move at the value set in [Pr.31] JOG speed limit value, and JOG speed limit value (Warning code: 0991H) will occur in the RD75.
- The JOG operation continues even when a warning has occurred.
- Set 0 for [Cd.16] Inching movement amount. If a value other than 0 is set, the inching operation is performed. (☞ Page 190 Inching Operation)

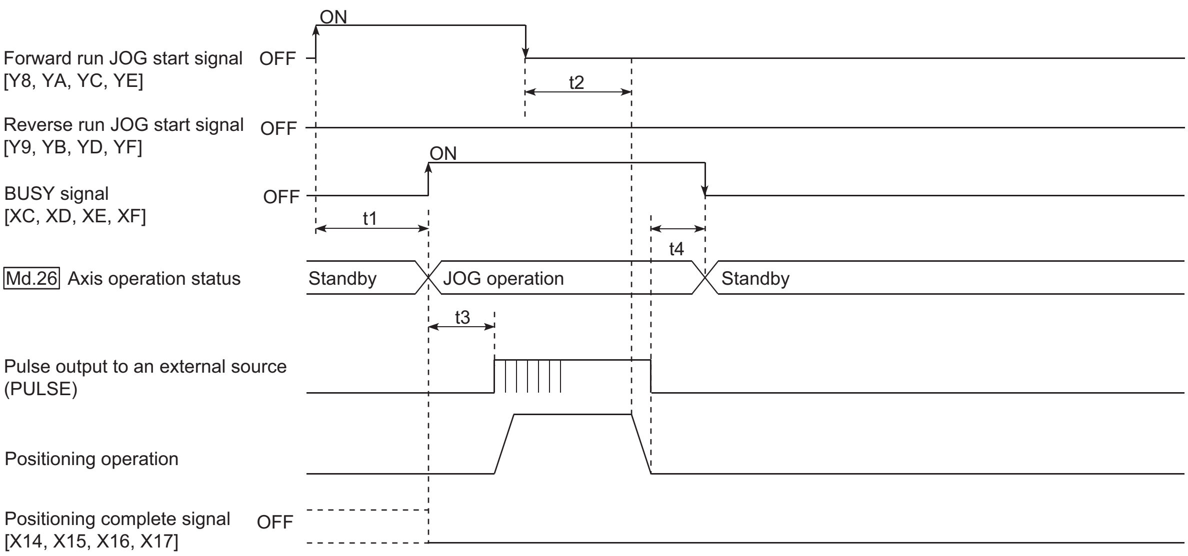
Operation when a stroke limit error occurs

When the operation stops due to a hardware stroke limit error or software stroke limit error during the operation, the JOG operation can be performed in the opposite direction (direction toward the normal range) after the error is reset. (If JOG start signal is turned on in the direction toward outside the limit range, the error occurs again.)



Operation timing and the processing time

The following shows the details on the operation timing and processing time in the JOG operation.



Normal timing time

t1	t2	t3	t4
1.0 to 3.0ms	0 to 0.88ms	0.1ms or less	0 to 0.88ms

Operation procedure of the JOG operation

The JOG operation is performed in the following procedure.

Preparation

STEP 1

Set parameters.
(Pr.1 to Pr.39)

One of the following two methods can be used.

Method 1
: Directly set (write) the parameters to the RD75 using an engineering tool.

Method 2
: Set (write) the parameters from the CPU module to the RD75 using the program (TO instruction).

STEP 2

Create a program to set the following.
· Set 0 in Cd.16 Inching movement amount.
· Set Cd.17 JOG speed. (control data setting)

Create a program to turn on JOG start signal using a JOG operation start command.

STEP 3

Write the programs created on STEP 1 and STEP 2 to the CPU module.

JOG operation start

STEP 4

Turn on JOG start signal of the axis to be started.

Turn on JOG start signal.

	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

JOG operation monitoring

STEP 5

Monitor the JOG operation state.

Monitor using an engineering tool.

JOG operation end

STEP 6

Turn off JOG start signal that is on.

The JOG operation ends when JOG start signal is turned off with the program of STEP 2.

Control end

Point

- Mechanical elements such as limit switches are considered as already installed.
- Setting parameters is the common operation for all controls using the RD75.

Parameters required for the JOG operation

To perform the JOG operation, parameters must be set. The following table shows the required parameters for performing the JOG operation. When only the JOG operation is performed, parameters not described below are not required. (Set the value within the setting range, such as the initial value.)

◎: Always set

○: Set as required (set a value within the setting range such as the initial value when the item is not used.)

Setting item			Setting requirement
Parameter	[Pr.1]	Unit setting	◎
	[Pr.2]	No. of pulses per rotation (Ap) (Unit: pulse)	◎
	[Pr.3]	Movement amount per rotation (Al) (Unit: pulse)	◎
	[Pr.4]	Unit magnification (Am)	◎
	[Pr.5]	Pulse output mode	◎
	[Pr.6]	Rotation direction setting	◎
	[Pr.7]	Bias speed at start (Unit: pulse/s)	○
	[Pr.8]	Speed limit value (Unit: pulse/s)	◎
	[Pr.9]	Acceleration time 0 (Unit: ms)	◎
	[Pr.10]	Deceleration time 0 (Unit: ms)	◎
	[Pr.11]	Backlash compensation amount (Unit: pulse)	○
	[Pr.12]	Software stroke limit upper limit value (Unit: pulse)	○
	[Pr.13]	Software stroke limit lower limit value (Unit: pulse)	○
	[Pr.14]	Software stroke limit selection	○
	[Pr.15]	Software stroke limit valid/invalid setting	○
	[Pr.17]	Torque limit setting value (Unit: %)	○
	[Pr.23]	Output signal logic selection	○
	[Pr.25]	Acceleration time 1 (Unit: ms)	○
	[Pr.26]	Acceleration time 2 (Unit: ms)	○
	[Pr.27]	Acceleration time 3 (Unit: ms)	○
	[Pr.28]	Deceleration time 1 (Unit: ms)	○
	[Pr.29]	Deceleration time 2 (Unit: ms)	○
	[Pr.30]	Deceleration time 3 (Unit: ms)	○
	[Pr.31]	JOG speed limit value (Unit: pulse/s)	◎
	[Pr.32]	JOG operation acceleration time selection	◎
	[Pr.33]	JOG operation deceleration time selection	◎
	[Pr.34]	Acceleration/deceleration processing selection	○
	[Pr.35]	S-curve ratio (Unit: %)	○
	[Pr.36]	Sudden stop deceleration time (Unit: ms)	○
	[Pr.37]	Stop group 1 sudden stop selection	○
	[Pr.38]	Stop group 2 sudden stop selection	○
	[Pr.39]	Stop group 3 sudden stop selection	○

For details on the settings, refer to the following.

☞ Page 354 DATA USED FOR POSITIONING CONTROL

Point

- Setting parameters is the common operation for all controls using the RD75. When performing another control (Major positioning control, Advanced positioning control, or OPR control), configure the setting items required for the control.
- Parameters are set for each axis.

Creating a start program for the JOG operation

To perform the JOG operation, create a program. When creating a program, consider Control data requiring settings, Start condition, and Start time chart. The following shows an example when the JOG operation is started for the axis 1. ([Cd.17] JOG speed is set to 100.00mm/min.)

Control data requiring settings

The following control data must be set to execute the JOG operation. The setting is executed with a program.

Setting item		Setting value	Setting detail	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 that is equal to or larger than the value in [Pr.7] Bias speed at start and also equal to or smaller than the one in [Pr.31] JOG speed limit value.	1518 1519	1618 1619	1718 1719	1818 1819

For details on the settings, refer to the following.

☞ Page 482 [Cd.16] Inching movement amount
☞ Page 482 [Cd.17] JOG speed

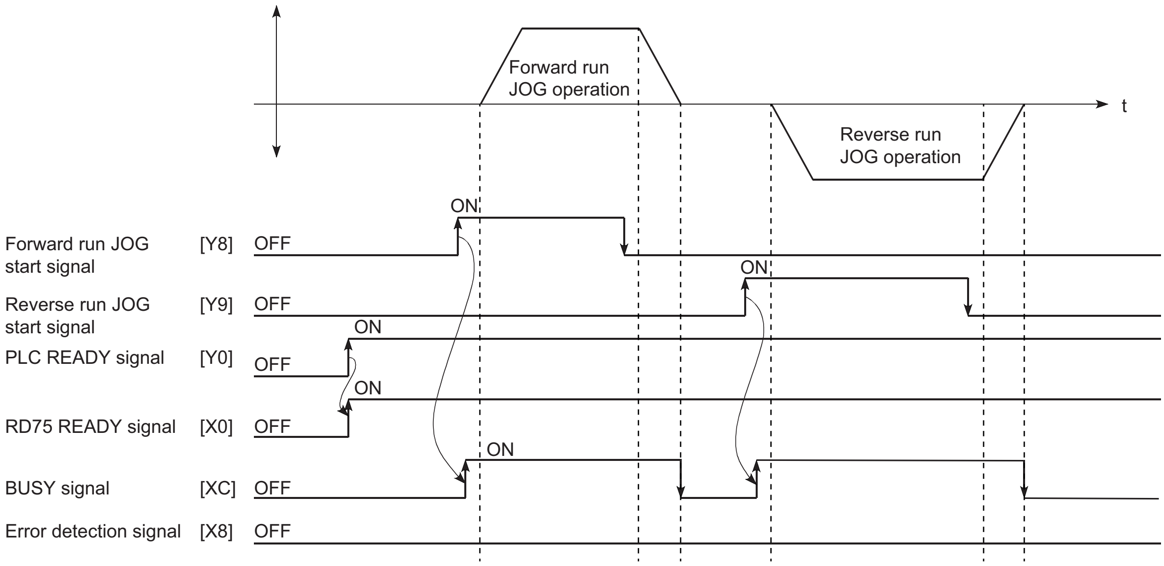
Start condition

Satisfy the following conditions to start a program. In addition, set the required conditions in the program to prevent an operation from starting if the conditions are not satisfied.

Signal name		Signal status		Device			
				Axis 1	Axis 2	Axis 3	Axis 4
Interface signal	PLC READY signal	ON	The CPU module is ready.	Y0			
	RD75 READY signal	ON	RD75 READY signal	X0			
	Module access flag*1	ON	The RD75 buffer memory can be accessed.	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	The RD75 is not in operation.	XC	XD	XE	XF
	Error detection signal	OFF	No error has been detected.	X8	X9	XA	XB
	M code ON signal	OFF	M code ON signal is off.	X4	X5	X6	X7
External signal	Drive unit READY signal	ON	The drive unit is ready.	—			
	Stop signal	OFF	Stop signal is off.	—			
	Upper limit (FLS)	ON	The current position is within the limit.	—			
	Lower limit (RLS)	ON	The current position is within the limit.	—			

*1 The interlock must be provided so that the buffer memory is accessed after Module access flag [X1] turns on. When no interlock is provided, the buffer memory may be accessed while the module parameter and module extension parameter that are sent from the CPU module are updated. If the buffer memory is accessed during the update, an unexpected value may be read or written.

Start time chart



Program example

For the program example of the JOG operation, refer to the following.

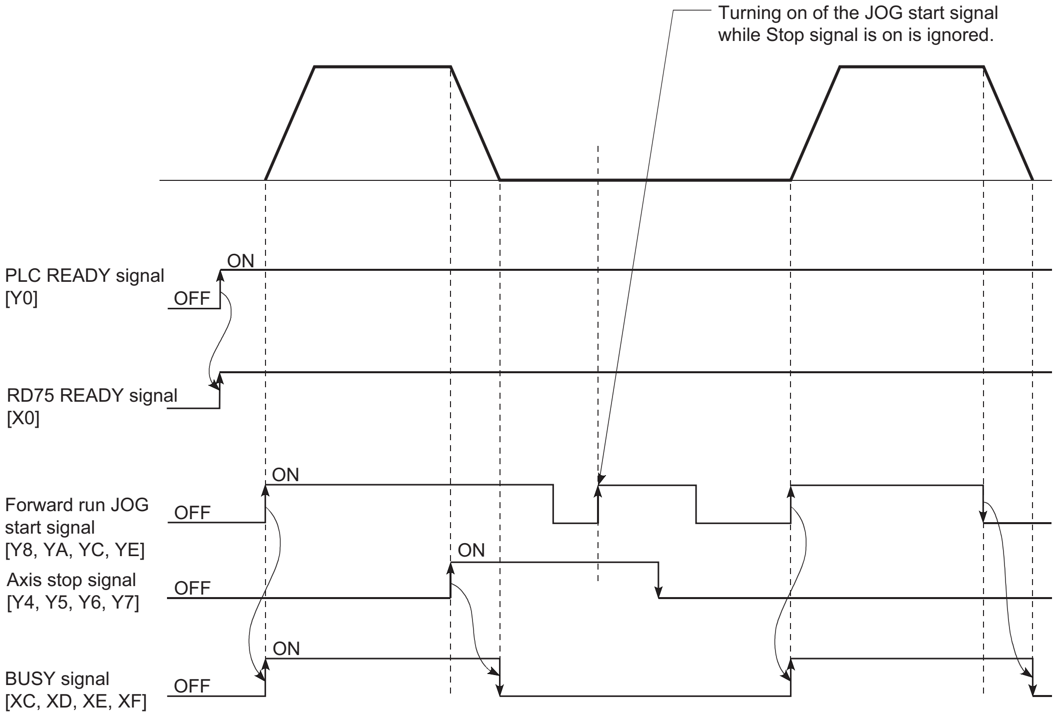
☞ Page 514 JOG operation setting program

☞ Page 515 JOG operation/inching operation execution program

Operation example of the JOG operation

Example 1

When Stop signal is turned on during the JOG operation, the deceleration stop is executed and the JOG operation will stops. When JOG start signal is turned on while Stop signal is turned on, Stop signal ON at start (Error code: 1908H) occurs. The operation can be started when Stop signal is turned off and JOG start signal is off and on again.



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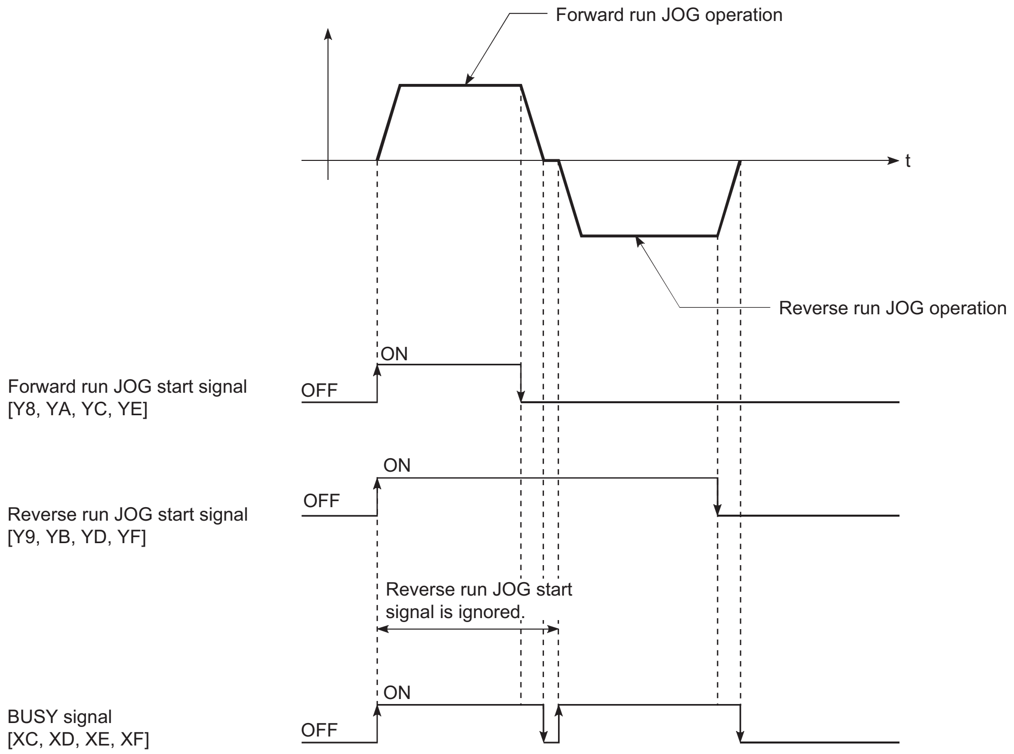
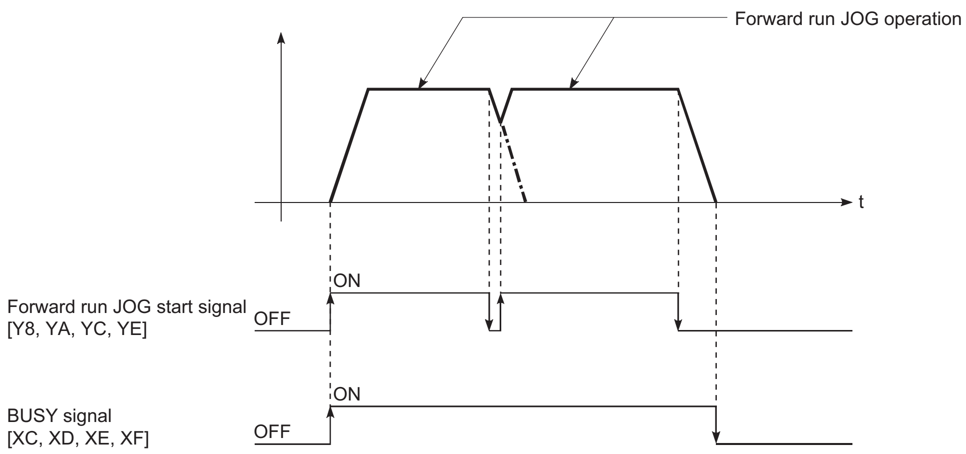
Example 2

When both Forward run JOG start signal and Reverse run JOG start signal are turned on simultaneously for one axis, Forward run JOG start signal is given priority. In this case, Reverse run JOG start signal is validated when BUSY signal of the RD75 turns off. However, if the forward run JOG operation is stopped due to Stop signal or an axis error, the reverse run JOG operation is not performed even if Reverse run JOG start signal is turned on.



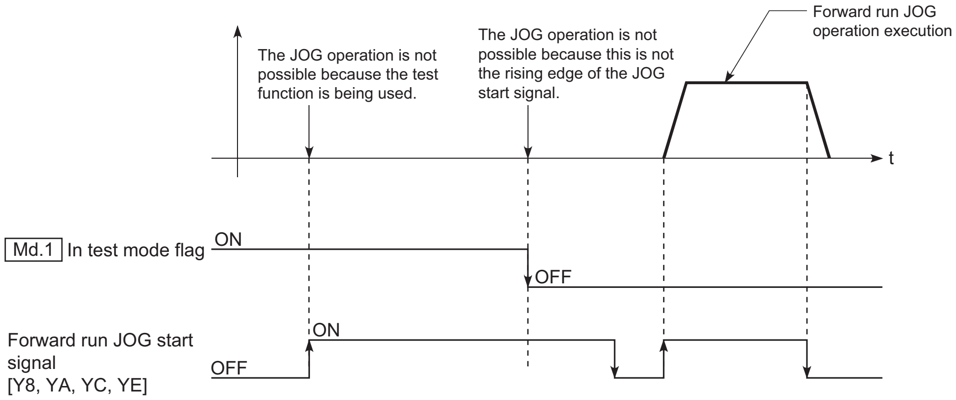
Example 3

When JOG start signal is turned on again during the deceleration due to turning off of JOG start signal, the JOG operation is performed from the point when JOG start signal is turned on.



Example 4

If JOG start signal is turned on during the test mode of the engineering tool, JOG start signal is ignored and the JOG operation is not performed.



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5.3 Inching Operation

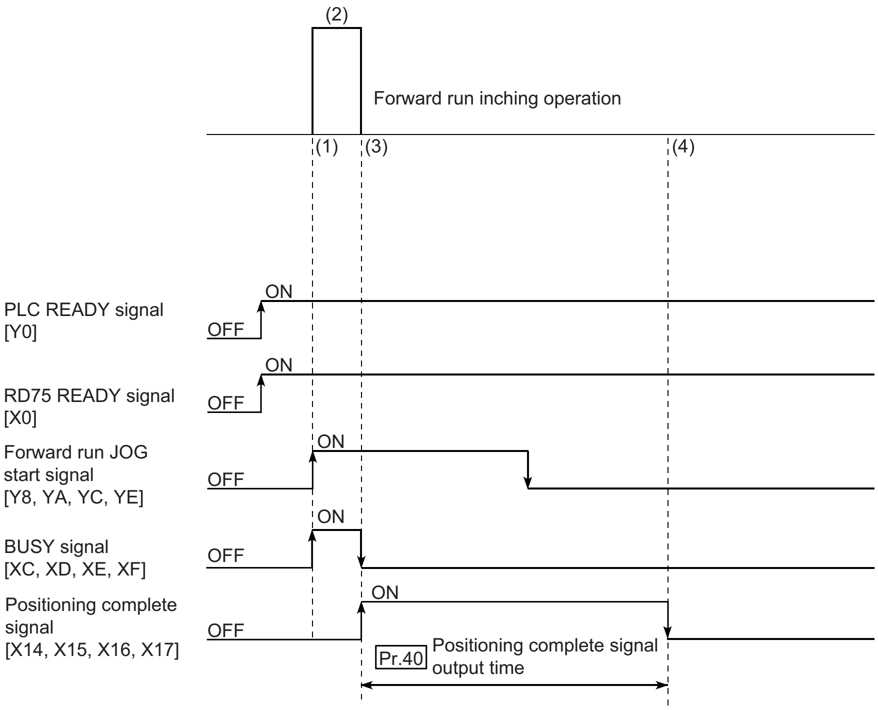
Operation overview of the inching operation

Restriction

Use the hardware stroke limit function when performing the inching operation at a position close to the upper or lower limit. (☞ Page 246 Hardware stroke limit function)
When the hardware stroke limit function is not used, the workpiece moves beyond the movement range, resulting in an accident.

Operation

In the inching operation, pulses are output to the drive unit for 1.77ms from when Forward run JOG start signal [Y8, YA, YC, YE] or Reverse run JOG start signal [Y9, YB, YD, YF] is turned on to move the workpiece for a specified movement amount.
The following shows an operation example of the inching operation.



No.	Operation
(1)	When a start signal is turned on, the inching operation is performed in the direction specified with the start signal. BUSY signal turns on at this time.
(2)	The workpiece moves for the movement amount set in [Cd.16] Inching movement amount.
(3)	When the speed reaches 0, the operation stops. BUSY signal turns off at this time. Positioning complete signal turns on at the same time.
(4)	Positioning complete signal turns off after the time set in [Pr.40] Positioning complete signal output time elapses.

Precautions during the operation

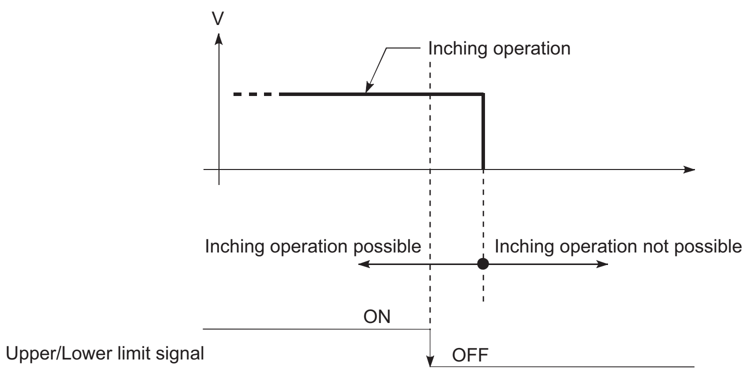
- The inching operation does not perform acceleration/deceleration processing. (Pulses for the specified inching movement amount are output at 1.77ms. The direction of the inching operation is reversed. When the backlash compensation is performed, pulses for the backlash are output at 1.77ms and pulses for the specified inching movement amount are output at the next 1.77ms.) [Cd.17] JOG speed is ignored even if it is set. However, Inching movement amount error (Error code: 1981H) occurs in the following cases.

Unit	Error condition
pulse	([Cd.16] Inching movement amount) × 562.5 > ([Pr.31] JOG speed limit value)
Other than pulse	([Cd.16] Inching movement amount) × 337.5 > ([Pr.31] JOG speed limit value)

- Set a value other than 0 for [Cd.16] Inching movement amount. When 0 is set, the JOG operation is performed. (☞ Page 181 JOG Operation)

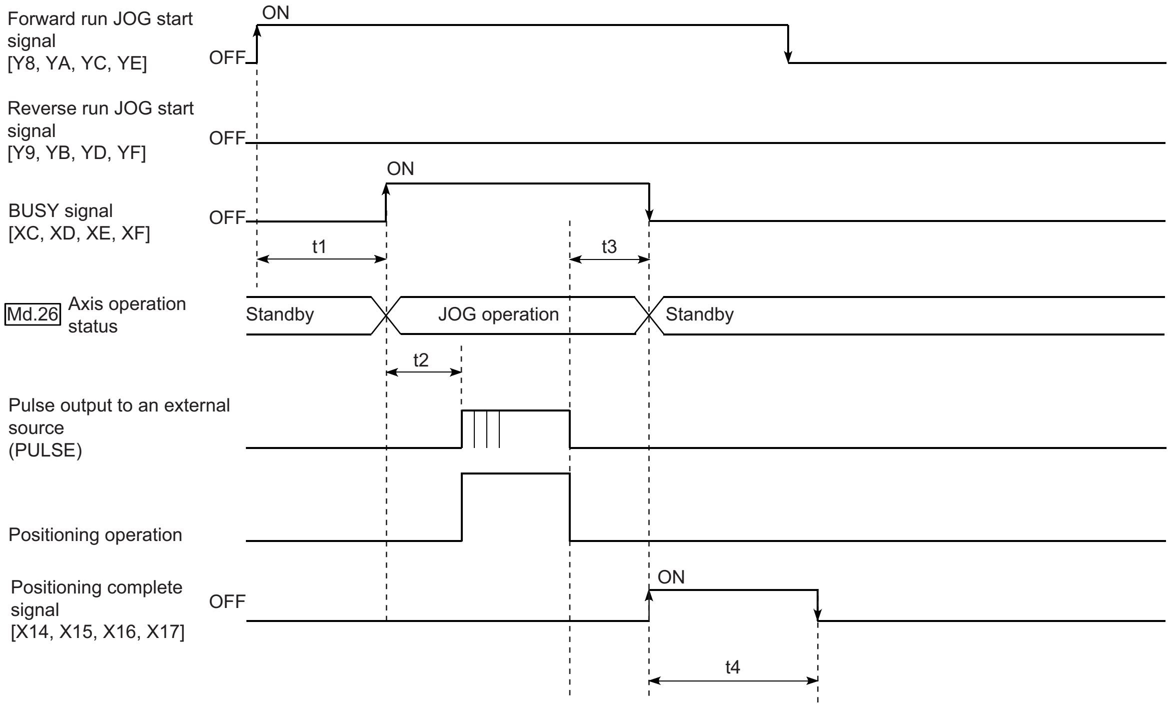
Operation when a stroke limit error occurs

When the operation is stopped due to a hardware stroke limit error or software stroke limit error during the operation, the inching operation can be operated in the opposite direction (direction toward the normal range) after the error is reset. (If JOG start signal is turned on in the direction toward outside the limit range, the error occurs again.)



Operation timing and the processing time

The following shows the details on the operation timing and processing time in the inching operation.



Normal timing time

t1	t2	t3	t4
1.0 to 3.0ms	0.1ms or less	0 to 0.88ms	Depends on the parameter

Operation procedure of the inching operation

The inching operation is performed in the following procedure.

Preparation

STEP 1

Set parameters.
(Pr.1 to Pr.31)

One of the following two methods can be used.

Method 1
: Directly set (write) the parameters to the RD75 using an engineering tool.

Method 2
: Set (write) the parameters from the CPU module to the RD75 using the program (TO instruction).

STEP 2

Create a program to set Cd.16 Inching movement amount. (control data setting)

Create a program to turn on JOG start signal using an inching operation start command.

STEP 3

Write the programs created on STEP 1 and STEP 2 to the CPU module.

Inching operation start

STEP 4

Turn on JOG start signal of the axis to be started.

Turn on JOG start signal.

	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

Inching operation monitoring

STEP 5

Monitor the inching operation state.

Monitor using an engineering tool.

Inching operation end

STEP 6

Turn off JOG start signal that is on.

The inching operation ends when the object has moved the inching movement amount with the program of STEP 2.

Control end

Point

- Mechanical elements such as limit switches are considered as already installed.
- Setting parameters is the common operation for all controls using the RD75.

Parameters required for the inching operation

To perform the inching operation, parameters must be set. The following table shows the required parameters for performing the inching operation. When only the inching operation is performed, parameters not described below are not required. (Set the value within the setting range, such as the initial value.)

◎: Always set

○: Set as required (set a value within the setting range such as the initial value when the item is not used.)

Setting item			Setting requirement
Parameter	[Pr.1]	Unit setting	◎
	[Pr.2]	No. of pulses per rotation (Ap) (Unit: pulse)	◎
	[Pr.3]	Movement amount per rotation (Al) (Unit: pulse)	◎
	[Pr.4]	Unit magnification (Am)	◎
	[Pr.5]	Pulse output mode	◎
	[Pr.6]	Rotation direction setting	◎
	[Pr.8]	Speed limit value (Unit: pulse/s)	○
	[Pr.11]	Backlash compensation amount (Unit: pulse)	○
	[Pr.12]	Software stroke limit upper limit value (Unit: pulse)	○
	[Pr.13]	Software stroke limit lower limit value (Unit: pulse)	○
	[Pr.14]	Software stroke limit selection	○
	[Pr.15]	Software stroke limit valid/invalid setting	○
	[Pr.17]	Torque limit setting value (Unit: %)	○
	[Pr.23]	Output signal logic selection	○
	[Pr.31]	JOG speed limit value (Unit: pulse/s)	◎

Point

- Setting parameters is the common operation for all controls using the RD75. When performing another control (Major positioning control, Advanced positioning control, or OPR control), configure the setting items required for the control.
- Parameters are set for each axis.
- For details on the settings, refer to the following.

☞ Page 388 Basic Setting

Creating a start program for the inching operation

To perform the inching operation, create a program. When creating a program, consider Control data requiring settings, Start condition, and Start time chart. The following shows an example when the inching operation is started for the axis 1. ([Cd.16] Inching movement amount is set to 10.0μm.)

Control data requiring settings

The following control data must be set to execute the inching operation. The setting is executed with a program.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.16]	Inching movement amount	100	Set a setting value so that the command pulse is not larger than the maximum output pulse. Maximum output pulse RD75D□: 5Mpulse/s RD75P□: 200kpulse/s	1517	1617	1717	1817

For details on the settings, refer to the following.

☞ Page 482 [Cd.16] Inching movement amount

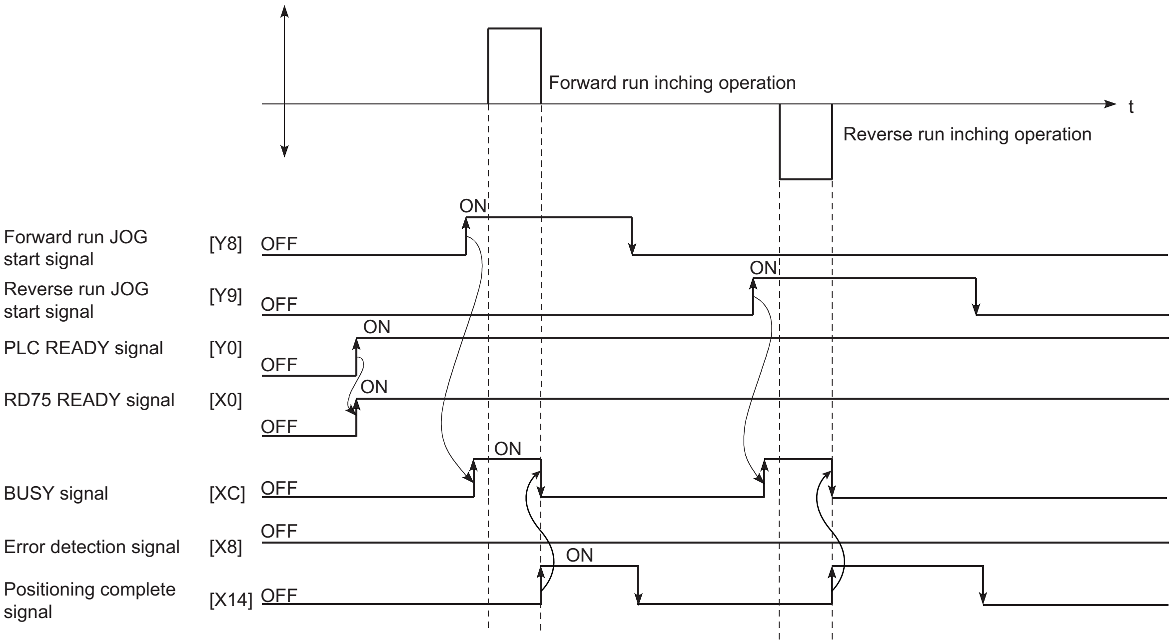
Start condition

Satisfy the following conditions to start a program. In addition, set the required conditions in the program to prevent an operation from starting if the conditions are not satisfied.

Signal name		Signal status		Device			
				Axis 1	Axis 2	Axis 3	Axis 4
Interface signal	PLC READY signal	ON	The CPU module is ready.	Y0			
	RD75 READY signal	ON	RD75 READY signal	X0			
	Module access flag*1	ON	The RD75 buffer memory can be accessed.	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	The RD75 is not in operation.	XC	XD	XE	XF
	Positioning complete signal	OFF	Positioning complete signal is off.	X14	X15	X16	X17
	Error detection signal	OFF	No error has been detected.	X8	X9	XA	XB
	M code ON signal	OFF	M code ON signal is off.	X4	X5	X6	X7
External signal	Drive unit READY signal	ON	The drive unit is ready.	—			
	Stop signal	OFF	Stop signal is off.	—			
	Upper limit (FLS)	ON	The current position is within the limit.	—			
	Lower limit (RLS)	ON	The current position is within the limit.	—			

*1 The interlock must be provided so that the buffer memory is accessed after Module access flag [X1] turns on. When no interlock is provided, the buffer memory may be accessed while the module parameter and module extension parameter that are sent from the CPU module are updated. If the buffer memory is accessed during the update, an unexpected value may be read or written.

Start time chart



Program example

For the program example of the inching operation, refer to the following.

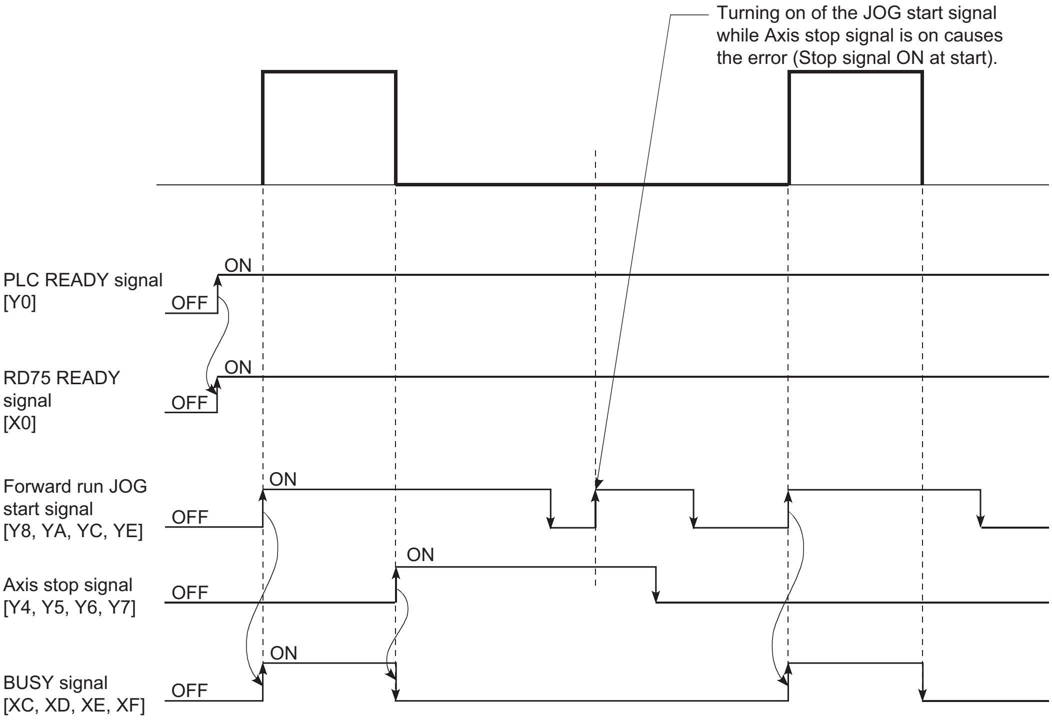
☞ Page 514 Inching operation setting program

☞ Page 515 JOG operation/inching operation execution program

Operation example of the inching operation

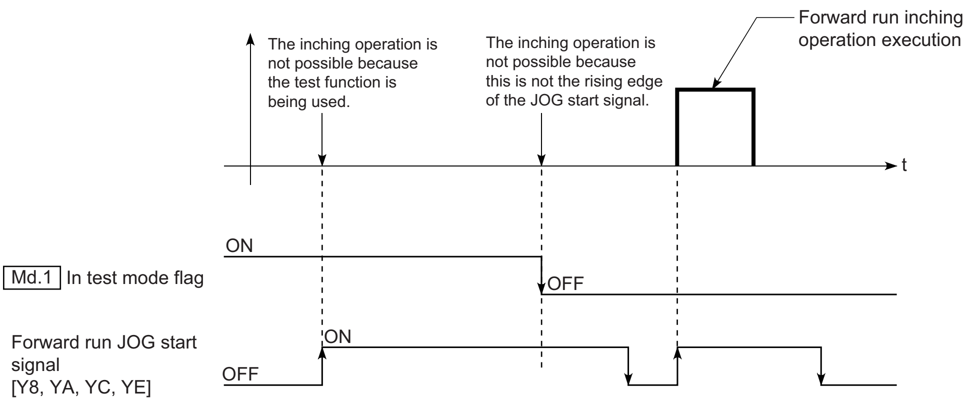
Example 1

When JOG start signal is turned on while Stop signal is turned on, Stop signal ON at start (Error code: 1908H) occurs. The operation can be started when Stop signal is turned off and JOG start signal is off and on again.



Example 2

If JOG start signal is turned on during the test mode of the engineering tool, JOG start signal is ignored and the inching operation is not performed.



5.4 Manual Pulse Generator Operation

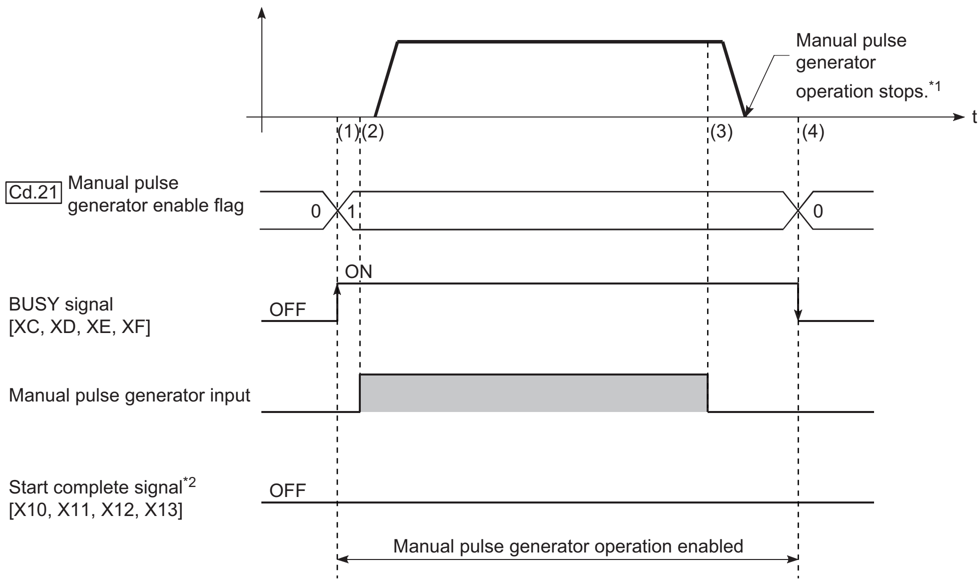
Operation overview of the manual pulse generator operation

Restriction

- A manual pulse generator is required to perform the manual pulse generator operation.
- When the manual pulse generator operation is not performed, create a program in which [Cd.21] Manual pulse generator enable flag is always 0: Disable. Touching the manual pulse generator when [Cd.21] Manual pulse generator enable flag is 1: Enable may cause an accident or incorrect positioning.
- Do not perform the manual pulse generator operation while the other axis is in the pre-analysis mode. To the axis where the manual pulse generator operation is being performed, pulses may be output at an unintentional timing.

Operation

In the manual pulse generator operation, pulses are input from the manual pulse generator to the RD75, and output from the RD75 to the servo amplifier for the number of the input pulses and to move the workpiece in the specified direction. The following shows an operation example of the manual pulse generator operation.



No.	Operation
(1)	When [Cd.21] Manual pulse generator enable flag is set to 1, BUSY signal turns on and the manual pulse generator operation is enabled.
(2)	The workpiece is moved for the number of pulses input from the manual pulse generator.
(3)	The workpiece movement stops when no pulse is input from the manual pulse generator.
(4)	When [Cd.21] Manual pulse generator enable flag is set to 0, BUSY signal turns off and the manual pulse generator operation is disabled.

*1 If the input from the manual pulse generator stops, the machine decelerates and stops within 90ms. If [Cd.21] Manual pulse generator enable flag is set to 0 during the manual pulse generator operation, the machine decelerates and stops within 90ms.

*2 Start complete signal does not turn on in the manual pulse generator operation.

Precautions during the operation

The following details must be understood before performing the manual pulse generator operation.

- The speed during the manual pulse generator operation is not limited with [Pr.8] Speed limit value.
- If [Cd.21] Manual pulse generator enable flag is turned on while the RD75 is busy (BUSY signal is on), Start during operation (Warning code: 0900H) occurs.
- If a stop factor occurs during the manual pulse generator operation, the operation stops and BUSY signal turns off. At this time, [Cd.21] Manual pulse generator enable flag remains on, but the manual pulse generator operation cannot be performed. To perform the manual pulse generator operation again, take measures to eliminate the stop factor and turn off and on [Cd.21] Manual pulse generator enable flag. (Note that this excludes when a hardware/software stroke limit error occurs.)
- Pulses are not output if an error occurs when the manual pulse generator operation is started.

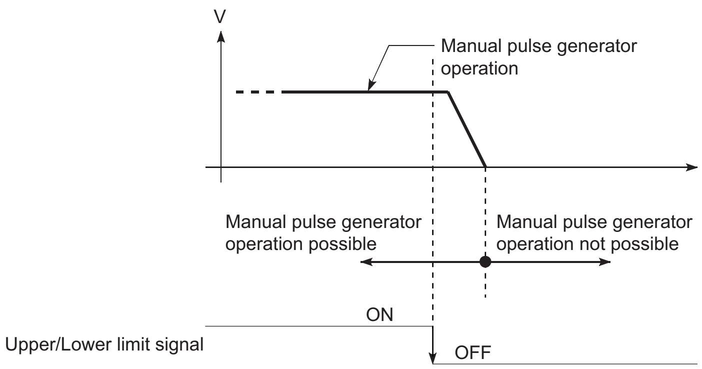
Point

- One RD75 module can be connected to one manual pulse generator.
- The RD75 module can simultaneously output pulses to the axis 1 to axis 4 drive units using one manual pulse generator. (1- to 4-axis simultaneous operation is possible.)

Operation when a stroke limit error occurs

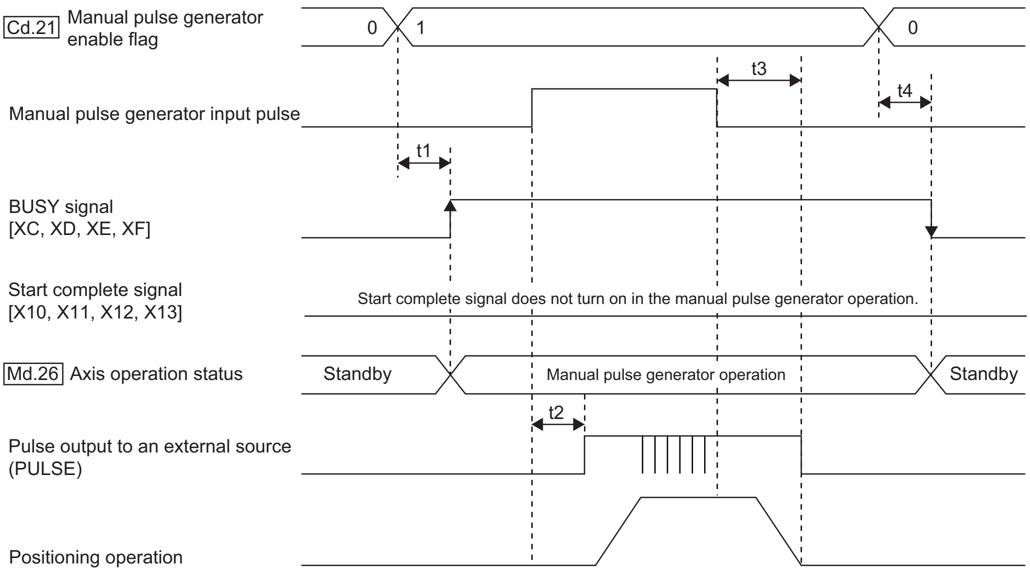
When a hardware stroke limit error or a software stroke limit error is detected during the operation[*1], the deceleration stop is performed. However, the status of [Md.26] Axis operation status remains in Manual pulse generator operation[*1] in this case.
After the operation has stopped, the manual pulse generator input pulses in the direction toward outside the limit range are not accepted, but the operation in the direction toward the range can be executed.

*1 Only when the current feed value or the machine feed value overflows or underflows during the deceleration, the status of [Md.26] Axis operation status is changed to Error and the manual pulse generator operation terminates. To perform the manual pulse generator operation again, turn off [Cd.21] Manual pulse generator enable flag once and turn on.



Operation timing and the processing time

The following shows the details on the operation timing and processing time in the manual pulse generator operation.



Normal timing time

t1	t2	t3	t4
0 to 0.88ms	1.7 to 30.2ms	58.6 to 87.6ms	0 to 0.88ms

Position control by the manual pulse generator operation

In the manual pulse generator operation, the position is moved for Manual pulse generator 1 pulse movement amount per pulse. The current feed value in the positioning control by the manual pulse generator operation can be calculated using the following calculation formula.

Current feed value = Number of input pulses × [Cd.20] Manual pulse generator 1 pulse input magnification × Manual pulse generator 1 pulse movement amount

[Pr.1] Unit setting	mm	inch	degree	pulse
Manual pulse generator 1 pulse movement amount	0.1 μm	0.00001inch	0.00001 degree	1 pulse

For example, when [Pr.1] Unit setting is mm and [Cd.20] Manual pulse generator 1 pulse input magnification is 2, 100 pulses are input from the manual pulse generator and the current feed value is as follows.

100 × 2 × 0.1 = 20 (μm)

= 200 (Current feed value)

The number of pulses output actually to the drive unit is (Manual pulse generator 1 pulse movement amount/Movement amount per pulse).

The movement amount per pulse is given by the following calculation formula.

$$\text{Movement amount per pulse (A)} = \frac{Al \times Am}{Ap}$$

Item	Symbol
[Pr.2] No. of pulses per rotation	Ap
[Pr.3] Movement amount per rotation	Al
[Pr.4] Unit magnification	Am
Movement amount per pulse	A

For example, when [Pr.1] Unit setting is mm and the movement amount per pulse is 1μm, 0.1/1 = 1/10, that is, the number of pulses output to the drive unit from the manual pulse generator per pulse is 1/10 pulse. Thus, the RD75 outputs 1 pulse to the drive unit after receiving 10 pulses from the manual pulse generator.

Speed control by the manual pulse generator operation

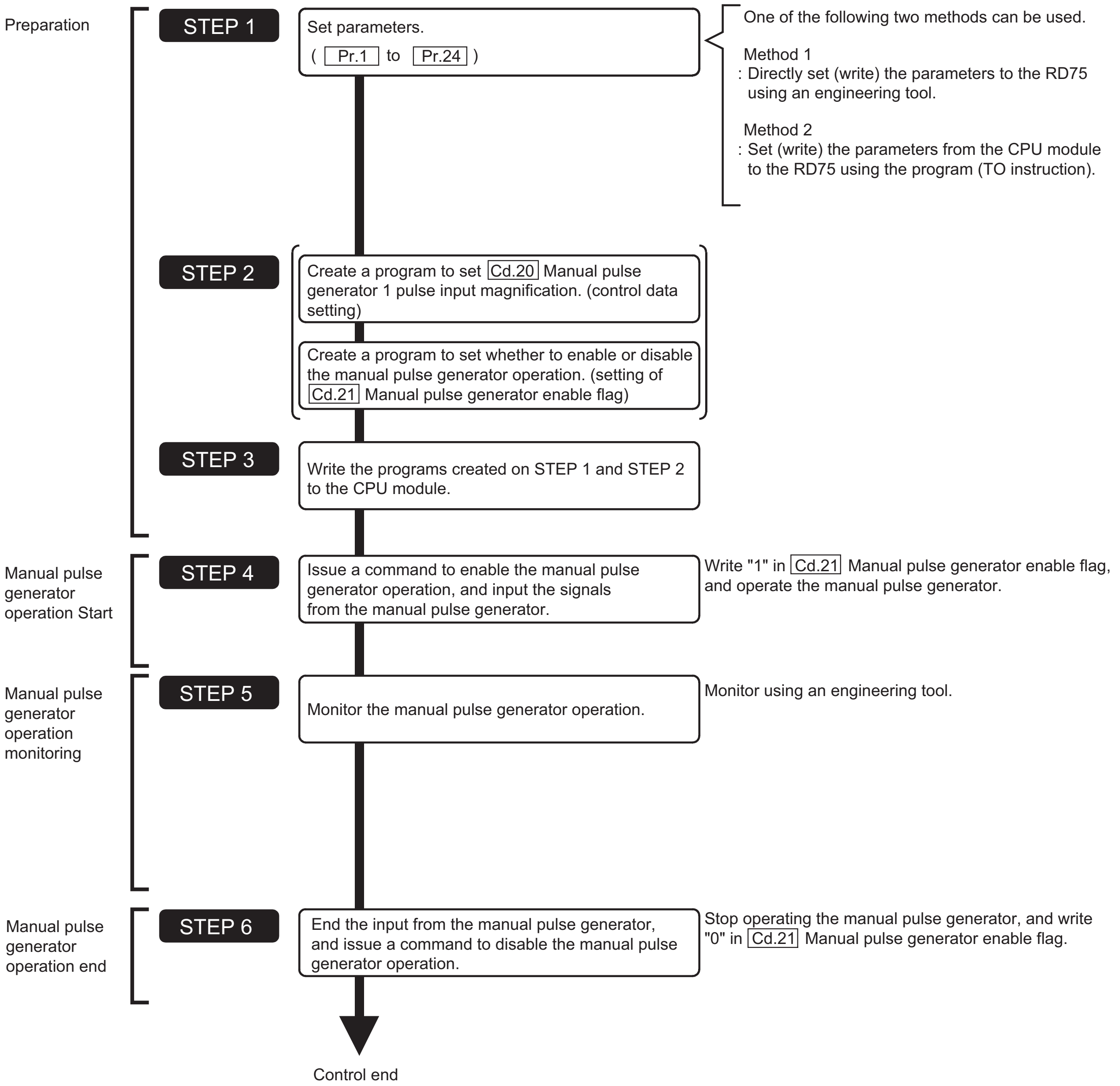
The speed during the positioning control by the manual pulse generator operation depends on the number of input pulses per unit time, and can be calculated using the following calculation formula.

Output command frequency = Input frequency × [Cd.20] Manual pulse generator 1 pulse input magnification

5

Operation procedure of the manual pulse generator operation

The manual pulse generator operation is performed in the following procedure.



Point

- Mechanical elements such as limit switches are considered as already installed.
- Setting parameters is the common operation for all controls using the RD75.

Parameters required for the manual pulse generator operation

To perform the manual pulse generator operation, parameters must be set. The following table shows the required parameters for performing the manual pulse generator operation. When only the manual pulse generator operation is performed, parameters not described below are not required. (Set the value within the setting range, such as the initial value.)

◎: Always set

○: Set as required (set a value within the setting range such as the initial value when the item is not used.)

Setting item			Setting requirement
Parameter	[Pr.1]	Unit setting	◎
	[Pr.2]	No. of pulses per rotation (Ap) (Unit: pulse)	◎
	[Pr.3]	Movement amount per rotation (Al) (Unit: pulse)	◎
	[Pr.4]	Unit magnification (Am)	◎
	[Pr.5]	Pulse output mode	◎
	[Pr.6]	Rotation direction setting	◎
	[Pr.11]	Backlash compensation amount (Unit: pulse)	○
	[Pr.12]	Software stroke limit upper limit value (Unit: pulse)	○
	[Pr.13]	Software stroke limit lower limit value (Unit: pulse)	○
	[Pr.14]	Software stroke limit selection	○
	[Pr.15]	Software stroke limit valid/invalid setting	○
	[Pr.17]	Torque limit setting value (Unit: %)	○
	[Pr.22]	Input signal logic selection	○
	[Pr.23]	Output signal logic selection	○
	[Pr.24]	Manual pulse generator input selection	○

Point

- Setting parameters is the common operation for all controls using the RD75. When performing another control (Major positioning control, Advanced positioning control, or OPR control), configure the setting items required for the control.
- Parameters are set for each axis. However, the manual pulse generator input logic (b8) of [Pr.22] and [Pr.24] are set only for the axis 1. (The setting for the axes 2 to 4 is ignored.)
- For details on the settings, refer to the following.

☞ Page 388 Basic Setting

Creating a program to enable or disable the manual pulse generator operation

To perform the manual pulse generator operation, create a program. When creating a program, consider Control data requiring settings, Start condition, and Start time chart. The following shows an example when the manual pulse generator operation is started for the axis 1.

Control data requiring settings

The following control data must be set to execute the manual pulse generator operation. The setting is executed with a program.

Setting item		Setting value	Setting detail	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 (1 to 10000 times).	1522 1523	1622 1623	1722 1723	1822 1823
[Cd.21]	Manual pulse generator enable flag	1 (0)	Set 1: Enable manual pulse generator operation. (When the manual pulse generator operation is not performed, set 0: Disable manual pulse generator operation.)	1524	1624	1724	1824

For details on the settings, refer to the following.

☞ Page 483 [Cd.20] Manual pulse generator 1 pulse input magnification
☞ Page 484 [Cd.21] Manual pulse generator enable flag

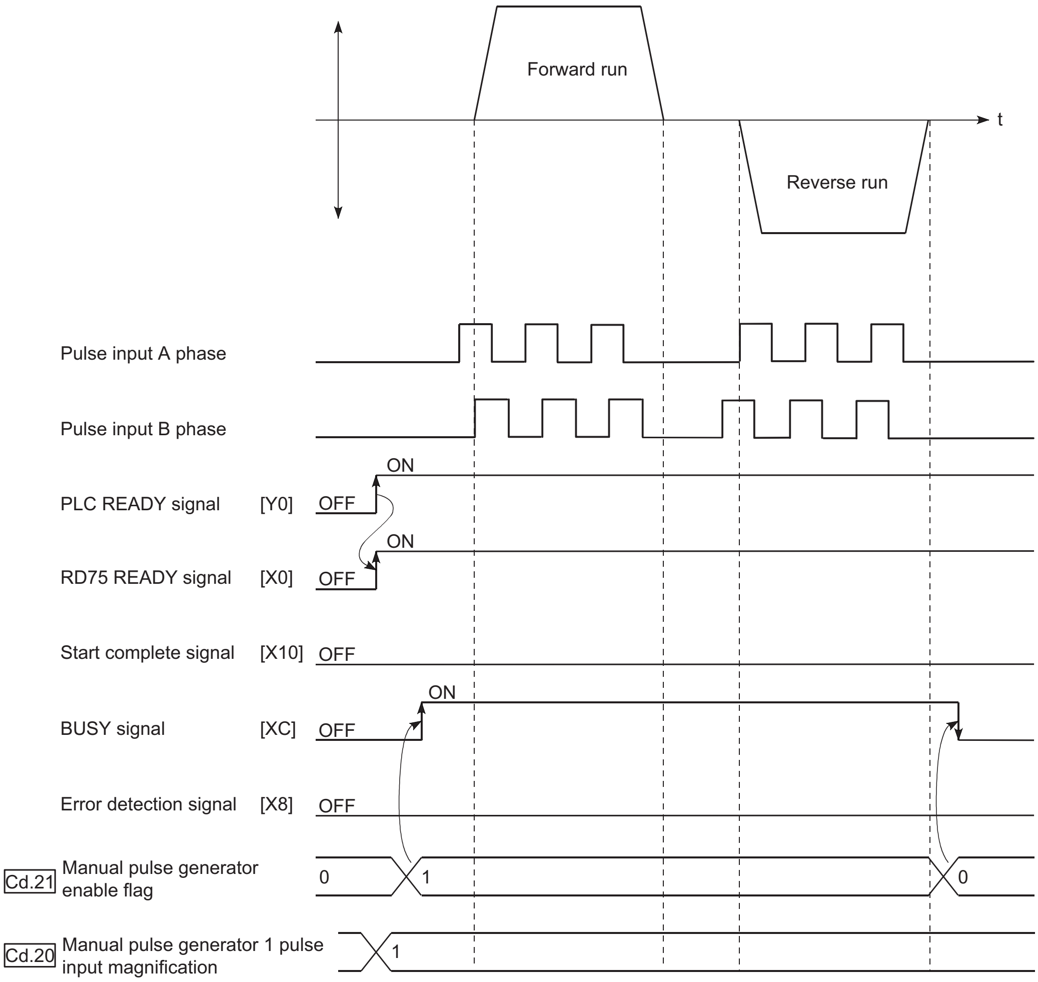
Start condition

Satisfy the following conditions to start a program. In addition, set the required conditions in the program to prevent an operation from starting if the conditions are not satisfied.

Signal name		Signal status		Device			
				Axis 1	Axis 2	Axis 3	Axis 4
Interface signal	PLC READY signal	ON	The CPU module is ready.	Y0			
	RD75 READY signal	ON	RD75 READY signal	X0			
	Module access flag*1	ON	The RD75 buffer memory can be accessed.	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	The RD75 is not in operation.	XC	XD	XE	XF
	Error detection signal	OFF	No error has been detected.	X8	X9	XA	XB
	M code ON signal	OFF	M code ON signal is off.	X4	X5	X6	X7
External signal	Drive unit READY signal	ON	The drive unit is ready.	—			
	Stop signal	OFF	Stop signal is off.	—			
	Upper limit (FLS)	ON	The current position is within the limit.	—			
	Lower limit (RLS)	ON	The current position is within the limit.	—			

*1 The interlock must be provided so that the buffer memory is accessed after Module access flag [X1] turns on. When no interlock is provided, the buffer memory may be accessed while the module parameter and module extension parameter that are sent from the CPU module are updated. If the buffer memory is accessed during the update, an unexpected value may be read or written.

Start time chart



Program example

For the program example of the manual pulse generator operation, refer to the following.

☞ Page 515 Manual pulse generator operation program

6 INTER-MODULE SYNCHRONIZATION FUNCTION (SIMULTANEOUS START OF MULTIPLE MODULES)

This function starts pulse output at the same timing of inter-module synchronization cycle after the acceptance of a positioning start trigger. With this function, positioning controls excluding the manual control start pulse output at the same timing of inter-module synchronization cycle. After the positioning start, each RD75 operates independently. As well as the normal positioning control, the positioning can be started at a different timing for each axis.

Before use

- The inter-module synchronization function performs different controls depending on the setting of [Cd.43] Analysis mode setting. For control details in each setting, refer to the following.

☞ Page 207 Control in Pre-analysis Mode
☞ Page 211 Control in Normal Analysis Mode

- To use the inter-module synchronization function, "Synchronization Setting within the Modules" must be set in "System Parameter" of the engineering tool in advance. For details on the settings, refer to the following.

📖 MELSEC iQ-R Inter-Module Synchronization Function Reference Manual

- The inter-module synchronization function can be used only when "Operation Mode" of the basic parameter 3 is set to "Quick Start Mode". Setting "Operation Mode" to "Q Compatible Mode" and turning off to on PLC READY signal [Y0] cause Q compatible mode setting error (Error code: 18C0H). In this case, RD75 READY signal [X0] does not turn on.
- A dedicated area that is refreshed at the execution of an inter-module synchronous interrupt program (synchronized refresh-dedicated area) is provided. To check [Md.61] Analysis complete flag, check the following. The area is refreshed at the same timing of [Md.61] Analysis complete flag of the axis monitor data. The other buffer memory areas used are refreshed at the same timing of the quick start.

Monitor item		Monitor value	Stored contents	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Md.61]	Analysis complete flag	0, 1	This area stores the start preparation complete state in the pre-analysis mode.	54000	54001	54002	54003

6.1 Control in Pre-analysis Mode

This section describes the control of the inter-module synchronization function in the pre-analysis mode. In the pre-analysis mode, positioning data can be analyzed in advance. Thus, pulse output can be started at the same timing of an inter-module synchronization cycle immediately after a positioning start trigger is input without any regard to the analysis time of the positioning data. This facilitates synchronization of the pulse output start timing among multiple modules. However, the applicable positioning data Nos. are 1 to 600.

Starting method

After setting positioning data, enable the pre-analysis mode and input a start trigger signal to the simultaneous start-target RD75s while their [Md.61] Analysis complete flag is 1: Analysis completed. Only Positioning start signal [Y10, Y11, Y12, Y13] can be used as the start trigger. If a signal other than Positioning start signal [Y10, Y11, Y12, Y13] is used as the start trigger, pulse output may not start simultaneously.

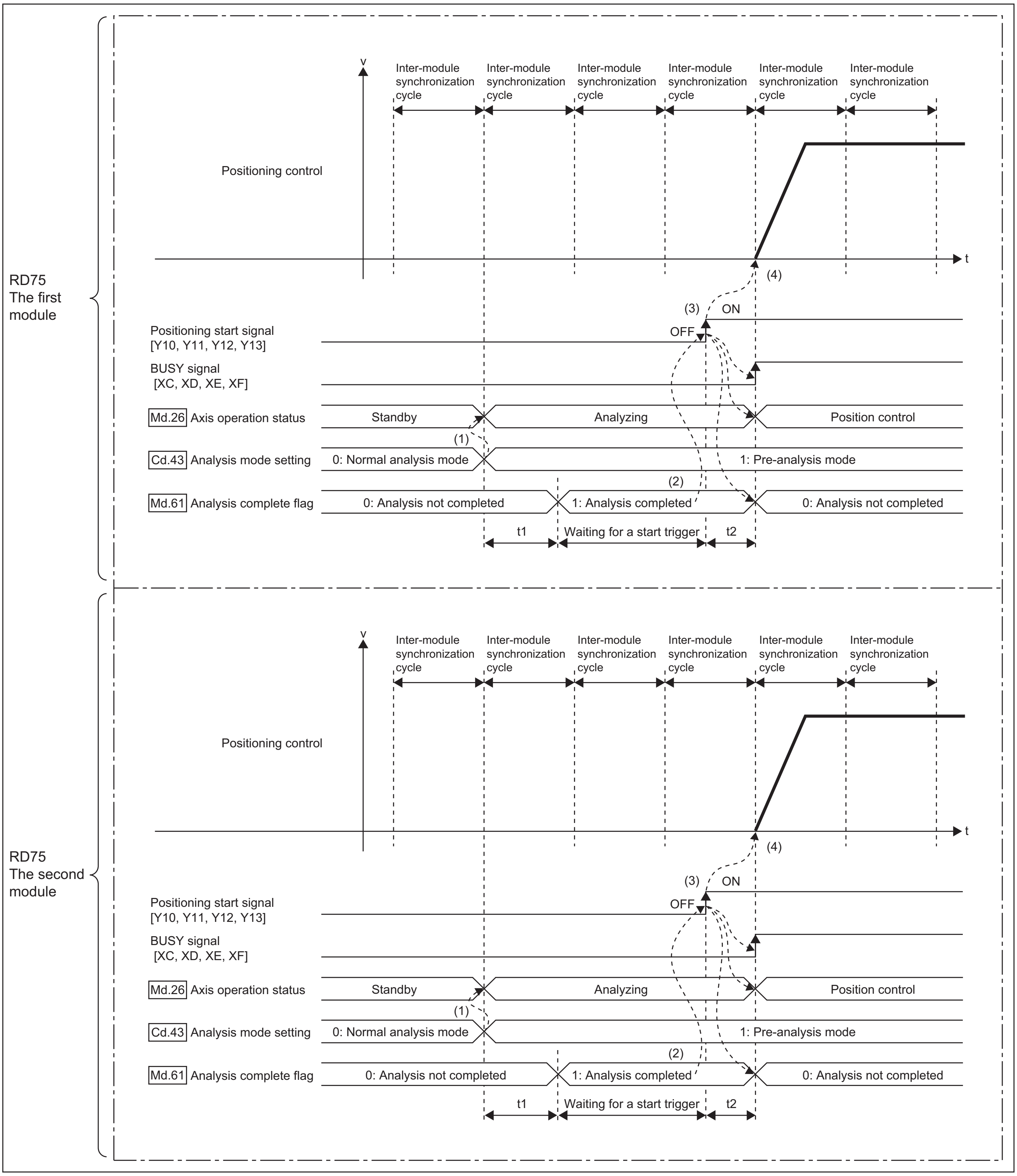
Control details

The control details are the same as those of the quick start. Read the quick start described in the following as the start with the inter-module synchronization.

☞ Page 27 Quick start

Start control example

The following figure shows a control example in the pre-analysis mode.



(1) Enable the pre-analysis mode.
(Set [Cd.43] Analysis mode setting to 1: Pre-analysis mode.)

(2) In the synchronous interrupt program, check that [Md.61] Analysis complete flag of the first and second RD75s has turned to 1: Analysis completed.

(3) In the synchronous interrupt program, turn on Positioning start signal [Y10, Y11, Y12, Y13] of the first and second RD75s 0.1ms or more before the inter-module synchronization cycle at which pulse output starts.

(4) At the same timing of the inter-module synchronization cycle after the acceptance of a positioning start trigger, pulse output starts.

The following table lists the time of t1 and t2 described in the control example.

t1	t2
0.88 to 1.77ms	0.1ms or more and within the inter-module synchronization cycle

t1 indicates the analysis time of the positioning data. t2 indicates the positioning start setup time to start pulse output at the same timing of the inter-module synchronization cycle. The positioning start setup time requires 0.1ms. Adjust the synchronous interrupt program so that the following condition is satisfied.

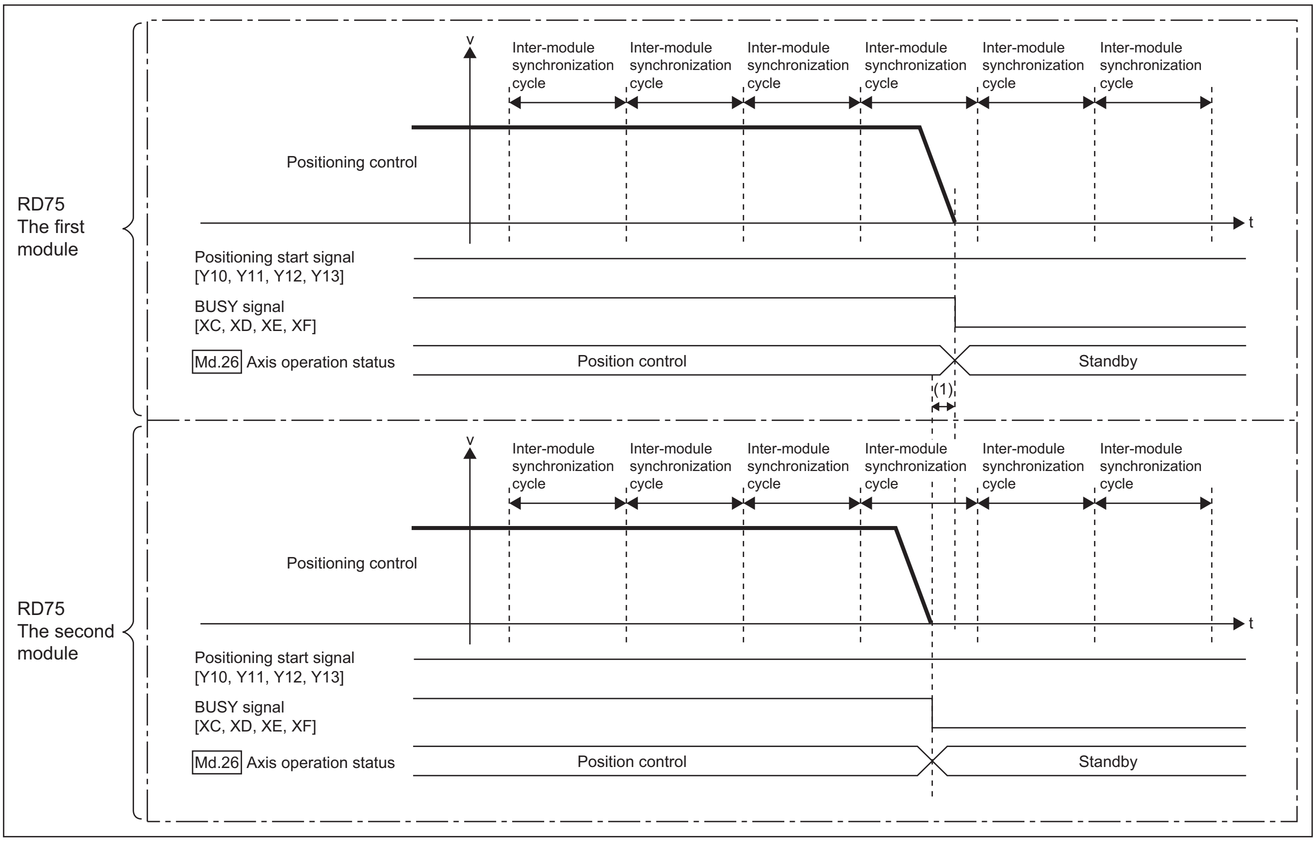
- Synchronous interrupt program < (Inter-module synchronization cycle - 0.1ms)

For the synchronous interrupt program, refer to the following.

📖 MELSEC iQ-R Inter-Module Synchronization Function Reference Manual

Example of automatic deceleration and stop control

The following figure shows an example of automatic deceleration and stop control in the pre-analysis mode.



(1) Even when the same values are set in [Da.6] Positioning address/movement amount and [Da.8] Command speed among the modules and pulse output has started at the same inter-module synchronization cycle, the timing for automatic deceleration or stop of the positioning control may differ because each RD75 operates independently.

Restrictions

When including the RD75 in the synchronization target module, set the value 0.88ms or more in "Synchronous Fixed Scan Interval Setting within the Modules" of "System Parameter". The other restrictions are the same as those of the quick start. For the restrictions, refer to the description of the quick start. (☞ Page 30 Restrictions)

Precautions

- When the positioning start setup time (t2) is shorter than 0.1ms and the positioning cannot be started at the same timing of the inter-module synchronization cycle, Inter-module synchronization processing fault (Error code: 2600H) occurs in the RD75 that has failed to start the positioning and it does not start the operation. In addition, when the CPU is set to stop at a moderate error in "CPU Module Operation Setting at Error Detection" of "System Parameter, the control CPU of the RD75 in which a moderate error has occurred stops due to the error and the operation of the RD75 that has started pulse output decelerates to stop.
- This function synchronizes the start timing of pulse output with the inter-module synchronization cycle. After the start, each RD75 maintains the positioning control independently.
- After the start, each RD75 maintains the positioning control independently. Thus, even if an error occurs in one RD75 and the operation decelerates to stop, the RD75s in which an error does not occur continue positioning. If all the axes need to be stopped at an error, stop the axes with a program.
- After the start, because each RD75 maintains the positioning control independently, Stop signals input with a program are not detected at the same timing and the stop position may differ.
- The other restrictions are the same as those of the quick start. For the restrictions, refer to the description of the quick start. (☞ Page 30 Precautions)

6.2 Control in Normal Analysis Mode

This section describes the control of the inter-module synchronization function in the normal analysis mode. In the normal analysis mode, all the positioning data can be used. However, the analysis time of positioning data must be considered. By setting the inter-module synchronization cycle to the positioning start time of the control method or more, the start timings of pulse output among multiple modules can be synchronized. However, if inputting a start trigger is delayed, analyzing the positioning data may not be finished before the intended inter-module synchronization cycle and pulse output may start at the next inter-module synchronization cycle.

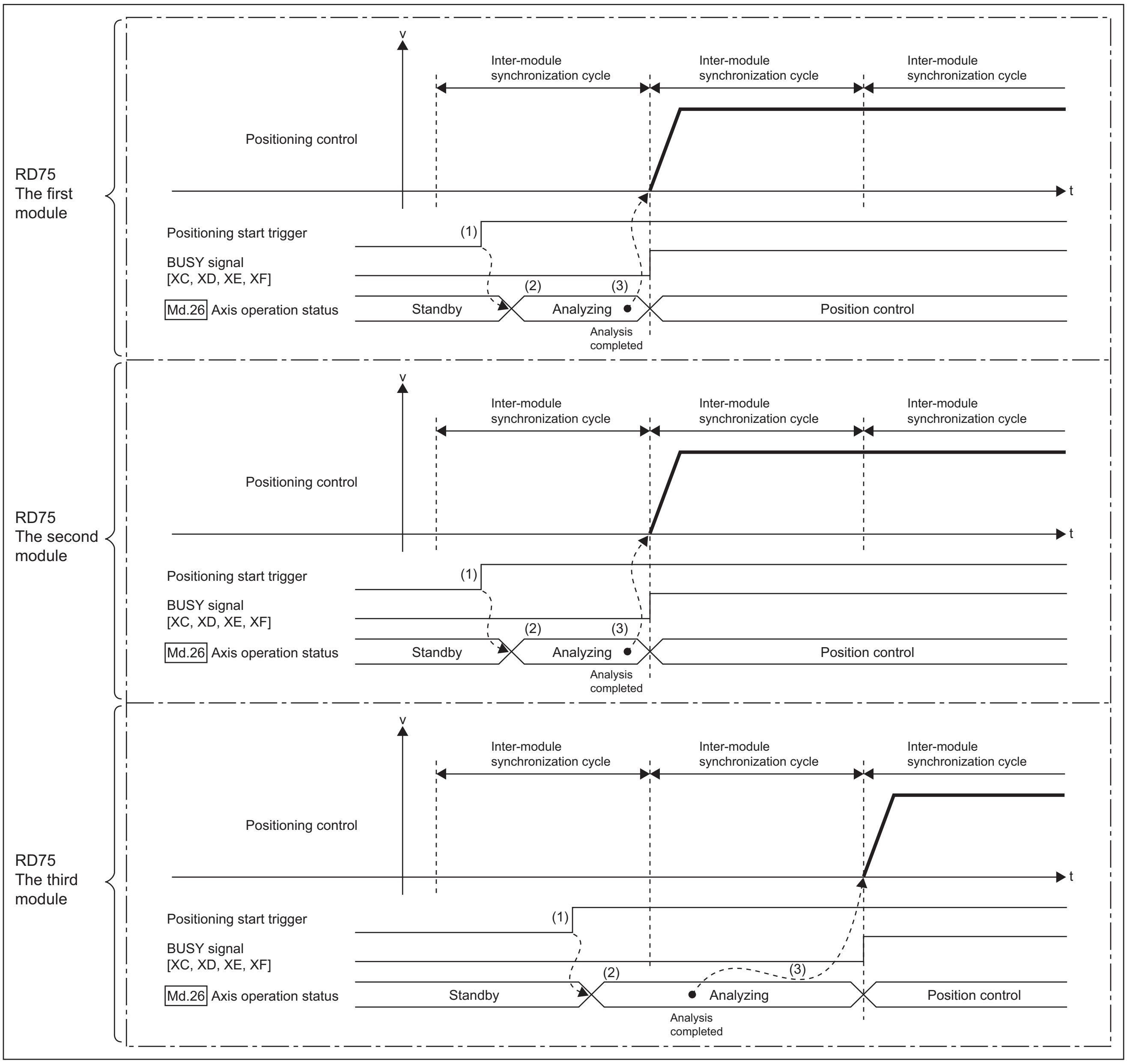
Starting method

After setting positioning data, input a start trigger to start the specified positioning data. The following table lists the start triggers used in the normal analysis mode.

Start trigger name	Starting method (Start trigger)	Positioning data to be started
Positioning start signal	Turning off and on Positioning start signal [Y10, Y11, Y12, Y13]	Starts the positioning data specified in [Cd.3] Positioning start No.
External command signal	Turning off and on an external command signal (CHG)	Starts the positioning data specified in [Cd.3] Positioning start No.
Dedicated instruction	Executing the GP.PSTRT□ instruction	Starts the positioning data specified as the control data.

Start control example

The following figure shows a control example in the normal analysis mode.



(1) Turn on the positioning start trigger.

(2) The RD75 accepts the start trigger and analyzes the positioning data.

(3) The RD75 starts positioning at the inter-module synchronization cycle immediately after the analysis of the positioning data is completed. (The first and second RD75s that have completed the analysis of the positioning data in the same inter-module synchronization cycle can start pulse output at the same inter-module synchronization cycle immediately after the completion. The third RD75 starts pulse output at the next inter-module synchronization cycle because the positioning data analysis crosses the inter-module synchronization cycle.)

Programs are the same as those of the normal start. For the programs, refer to the following. However, create a program as the inter-module synchronous interrupt program.

☞ Page 26 Program example

Example of automatic deceleration and stop control

The automatic deceleration and stop control in the normal analysis mode is the same as those in the pre-analysis mode. For a control example, refer to the following.

☞ Page 209 Example of automatic deceleration and stop control

Restrictions

When including the RD75 in the synchronization target module, set the value 0.88ms or more in "Synchronous Fixed Scan Interval Setting within the Modules" of "System Parameter".

Precautions

- This function synchronizes the start timing of pulse output with the inter-module synchronization cycle. After the start, each RD75 maintains the positioning control independently.
- After the start, each RD75 maintains the positioning control independently. Thus, even if an error occurs in one RD75 and the operation decelerates to stop, the RD75s in which an error does not occur continue positioning. If all the axes need to be stopped at an error, stop the axes with a program.
- After the start, because each RD75 maintains the positioning control independently, Stop signals input with a program are not detected at the same timing and the stop position may differ.

7 CONTROL SUB FUNCTIONS

This chapter describes the details and usage of Sub function added and used in combination with the main functions.
A variety of sub functions, including sub functions specific to machine OPR and generally related functions such as control compensation, are available. More appropriate and finer control can be performed by using these sub functions.
Each sub function is used together with a main function by setting parameters or creating programs. Check the settings and execution procedures for each sub function, and configure each setting as required.

7.1 Overview of Sub Functions

Sub functions compensate or limit the control, or add functions to the control at the execution of a main function. These sub functions are executed by setting parameters, commanding from an engineering tool, or using a program for sub functions.

Overview of sub functions

The following table shows sub functions.

Sub function		Description
Sub functions specific to machine OPR	OPR retry function	Retries the machine OPR with the upper/lower limit switches during the machine OPR. This allows the machine OPR to be performed even if the axis is not returned to a position before the near-point dog with operations such as the JOG operation.
	OP shift function	After the machine OPR, this function compensates the position by the specified distance from the machine OP position and sets that position as the OP address.
Function to compensate control	Backlash compensation function	Compensates the backlash amount of the machine system. 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. A flexible positioning system that matches the machine system can be structured with this function.
	Near pass function*1	Suppresses the machine vibration when positioning data is switched during the continuous path control in the interpolation control.
	Output timing selection of near pass control	This function allows the user to select the timing to output the difference (Δd) between the actual and the set positioning end addresses in the continuous path control, in which the difference (Δd) is output during the execution of the next positioning data.
Function to limit control	Speed limit function	If the command speed exceeds [Pr.8] Speed limit value during the control, this function limits the command speed to within the setting range of [Pr.8] Speed limit value.
	Torque limit function*2	If the torque generated by the servo motor exceeds [Pr.17] Torque limit setting value during the control, this function limits the generated torque to within the setting range of [Pr.17] Torque limit setting value.
	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 the positioning for that command.
	Hardware stroke limit function	Performs the deceleration stop with the limit switch connected to the RD75's connector for external devices.
Functions that change control details	Speed change function	Changes the speed during positioning. Set the new speed in [Cd.14] New speed value, the speed change buffer memory area, and change the speed with [Cd.15] Speed change request.
	Override function	Changes the speed during positioning within a percentage of 0 to 300%. Execute this function using [Cd.13] Positioning operation speed override.
	Acceleration/ deceleration time change function	Changes the acceleration/deceleration time at the speed change (function added to the speed change function and override function).
	Torque change function	Changes Torque limit value during the control.
	Target position change function	Changes the target position during positioning. The position and speed can be changed simultaneously.
Function related to positioning start	Pre-reading start function	If the positioning start is requested while Execution prohibition flag is on, no pulse is output, and when Execution prohibition flag is turned off and detected, outputting pulses is started within 0.88ms.
	Start time adjustment function	After the start trigger was input with the quick start function, this function starts outputting pulses after the preset time has passed.
Absolute position restoration function*3		Restores the absolute position of a specified axis. The OPR after the system is powered on is not required once the OPR is executed at the startup of the system.

Sub function		Description
Function related to positioning stop	Stop command processing for deceleration stop function	Selects a deceleration curve when a stop cause occurs during the deceleration stop processing to speed 0.
	Continuous operation interrupt function	Interrupts the continuous operation. When this request is accepted, the operation will stop at the completion of the positioning data being executed.
	Step function	Temporarily stops the operation to check the positioning operation during debugging and other operation. The operation can be stopped for each Automatic deceleration or Positioning data.
Other functions	Skip function	Pauses (decelerates to stop) the positioning being executed when Skip signal is input, and performs the next positioning.
	M code output function	Issues a command for a subsidiary work (such as stopping clamps or drills and changing tools) corresponding to each M code number (0 to 65535) that can be set to each positioning data.
	Teaching function	Stores the address positioned with the manual control in [Da.6] Positioning address/movement amount of the specified positioning data No.
	Command in-position function	Calculates the remaining distance for the RD75 to reach the positioning stop position for each automatic deceleration, and sets Command in-position flag to 1 when the value is less than the set value. When performing another subsidiary work before the control ends, use this function as a trigger for the subsidiary work.
	Acceleration/ deceleration processing function	Adjusts acceleration/deceleration (acceleration/deceleration time and curve) of the control.
	Deceleration start flag function	To inform the stop timing, this function turns on Deceleration start flag when the speed status is changed from the constant speed or acceleration to deceleration during the position control whose operation pattern is Positioning complete.
	During uncompleted OPR operation setting function	Sets whether or not to execute the positioning control when OPR request flag is on.
	Interrupt function	Generates an interrupt request to the CPU module when an interrupt factor is detected, and starts an interrupt program.

*1 The near pass function is featured as standard and is valid only when the continuous path control for position control operations is set. The function cannot be set to be invalid with parameters.

*2 To perform Torque limit, a D/A converter module and a drive unit capable of the torque limit command with an analog voltage must be needed.

*3 An I/O module with arbitrary number of points and a drive unit capable of configuring an absolute position detection system (which is a Mitsubishi Electric General-Purpose AC Servo and has an absolute position detection function (absolute position data transfer protocol) equivalent to that of MR-J3-□A) are needed.

7.2 Sub Functions Specific to Machine OPR

The sub functions specific to machine OPR include OPR retry function and OP shift function. Each function is executed based on the parameter setting.

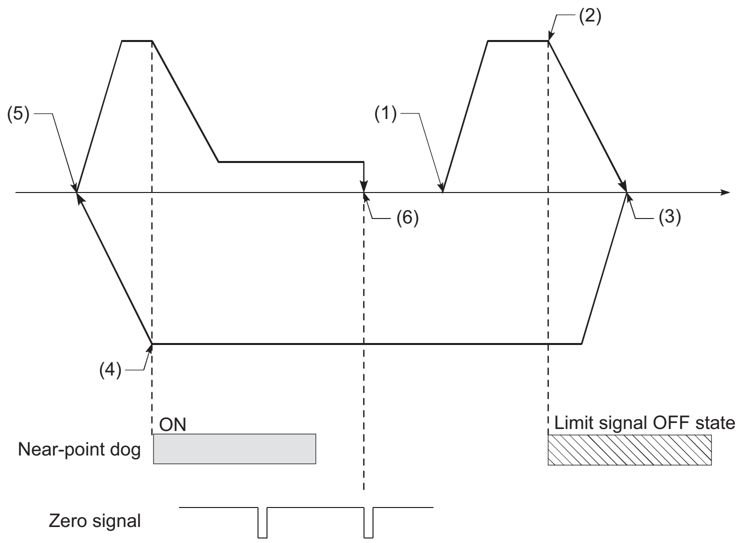
OPR retry function

If a workpiece passes over the OP without stopping during the position control, the workpiece may not move back in the direction of the OP although the machine OPR is commanded, depending on the workpiece position. In this case, the workpiece has to be moved to a position before the near-point dog by the JOG operation or other operations to start the machine OPR again. However, by using the OPR retry function, the machine OPR can be performed regardless of the workpiece position.

Control details

The following shows the operation of the OPR retry function.

■OPR retry operation when the workpiece is within the range between the upper/lower limits



(1) The movement starts in the direction set in [Pr.44] OPR direction by Machine OPR start.

(2) The operation decelerates when Limit signal OFF is detected.

(3) After the operation has stopped due to the detection of Limit signal OFF, the operation moves at the speed set in [Pr.46] OPR speed in the direction opposite to the direction set in [Pr.44] OPR direction.

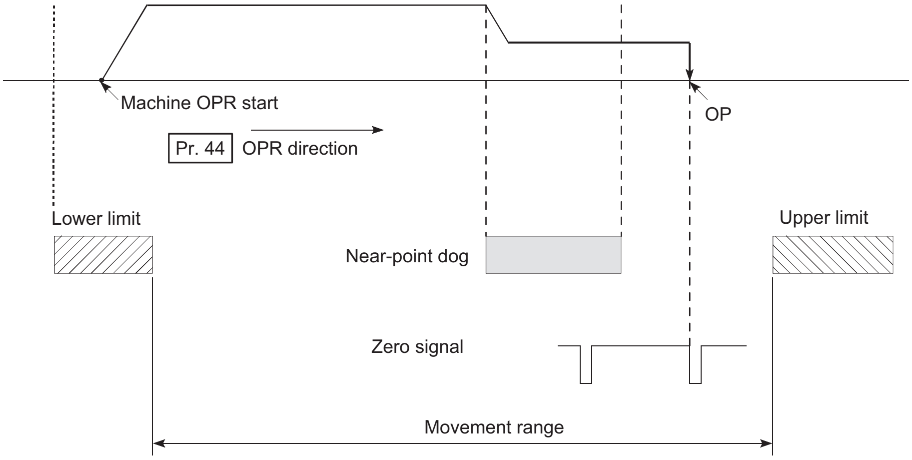
(4) The operation decelerates when Near-point dog signal is turned off.

(5) After the operation has stopped due to turning off of Near-point dog signal, the machine OPR is performed in the direction set in [Pr.44] OPR direction.

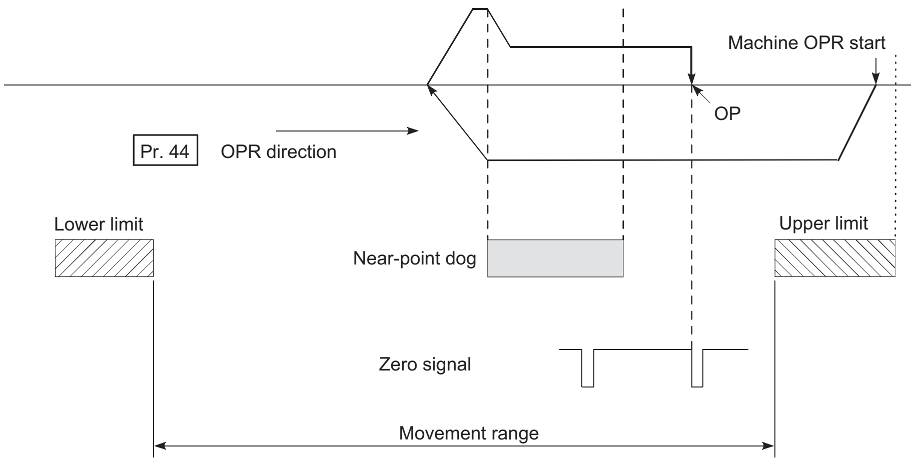
(6) Machine OPR is completed.

■OPR retry operation when the workpiece is outside the range between the upper/lower limits

- When the direction from the workpiece to the OP is the same as the direction set in [Pr.44] OPR direction, the normal machine OPR is performed. The following is an example of when [Pr.44] OPR direction is set to 0: Forward direction.



- When the direction from the workpiece to the OP is the opposite direction from the direction set in [Pr.44] OPR direction, the operation performs the deceleration stop when Near-point dog signal is turned off, and performs the machine OPR in the direction set in [Pr.44] OPR direction. The following is an example of when [Pr.44] OPR direction is set to 0: Forward direction.



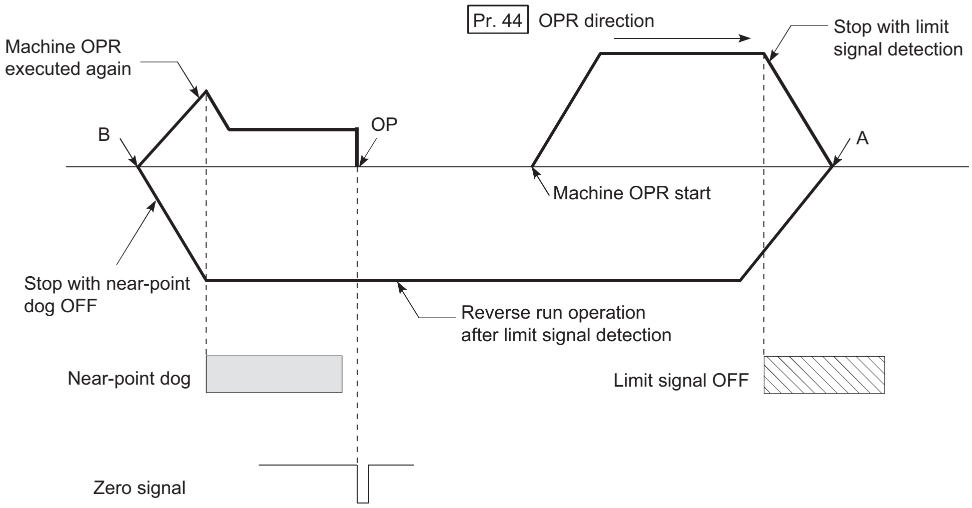
Point

When [Pr.44] OPR direction is set to 0: Forward direction, check that the limit switch placed in the OPR direction works as the upper limit.
When [Pr.44] OPR direction is set to 1: Reverse direction, check that the limit switch placed in the OPR direction works as the lower limit.
Incorrect wiring of these limit switches may cause improper OPR retry operation.
If any malfunction is identified, check and correct the wiring and the setting in [Pr.6] Rotation direction setting.

■Setting the dwell time during OPR retry

The OPR retry function can perform such a function as the dwell time using [Pr.57] Dwell time during OPR retry when the reverse run operation is performed due to the detection of Upper limit signal or Lower limit signal or when the machine OPR is executed after Near-point dog signal is turned off to stop the operation.

[Pr.57] Dwell time during OPR retry is validated when the operation stops at the positions of A and B in the following figure. (The dwell time is the same value at both the positions.)



Control precautions

- The following table shows whether the OPR retry function can be executed or not by the method set in [Pr.43] OPR method.

[Pr.43] OPR method	Execution status of the OPR retry function
Near-point dog method	○: Execution possible
Stopper method 1	○: Execution possible*1
Stopper method 2	○: Execution possible*1
Stopper method 3	×: Execution not possible
Count method 1	○: Execution possible
Count method 2	○: Execution possible
Data setting method	×: Execution not possible
Limit switch combined method	×: Execution not possible

*1 Starting can be executed from the position of the limit switch installed in the opposition direction from the direction set in [Pr.44] OPR direction. (Limit signal is off.) However, since a stopper is set in the OPR direction, the retry operation in the OPR direction using the limit switch cannot be executed.

- Always establish upper/lower limit switches at the upper/lower limit positions of the machine, and connect them to the RD75. 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.
- Do not configure a system in which the drive unit is powered off by the upper/lower limit switches connected to the RD75. If the drive unit is powered off by the switches, the OPR retry cannot be performed.

Setting method

To use the OPR retry function, configure the required settings in the parameters shown in the following table, and write them to the RD75.

When the parameters are set, the OPR retry function will be added to the machine OPR control. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0]. (Set [Pr.57] Dwell time during OPR retry as required.)

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.48]	OPR retry	1	Set 1: Perform OPR retry by limit switch.	0
[Pr.57]	Dwell time during OPR retry	→	Set the deceleration stop time during OPR retry. (Arbitrary value between 0 and 65535 (ms))	0

For details on the settings, refer to the following.

☞ Page 421 [Pr.48] OPR retry
☞ Page 427 [Pr.57] Dwell time during OPR retry

Point

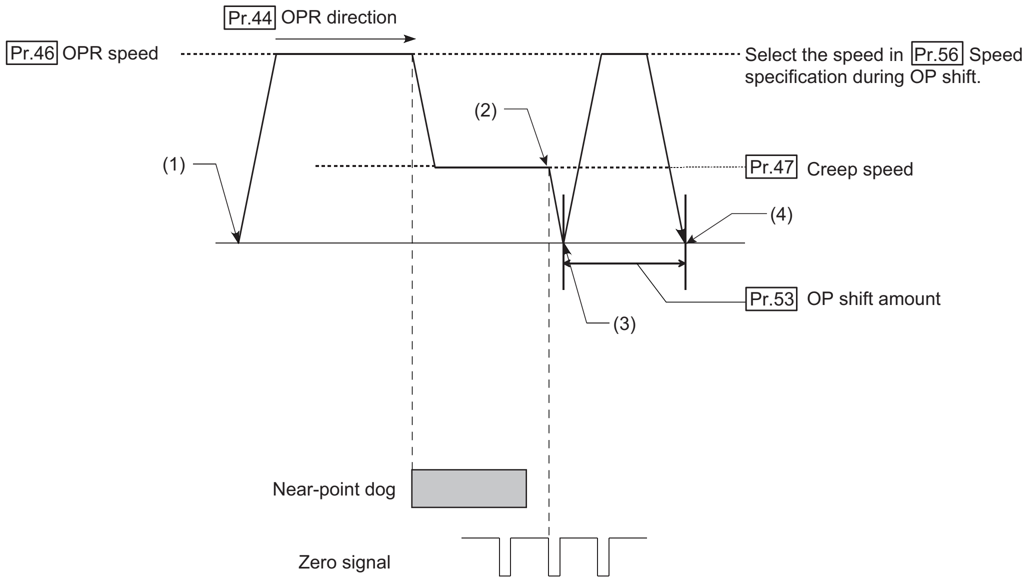
- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

OP shift function

When the machine OPR is performed, the OP is normally established using a near-point dog, stopper, and Zero signal. However, by using the OP shift function, the machine can be moved for a specified movement amount from the position where Zero signal was detected. The point moved from that position can be interpreted as a mechanically established OP.
The OP shift function can be used regardless of the setting in [Pr.43] OPR method.
The section explains the OP shift function.

Control details

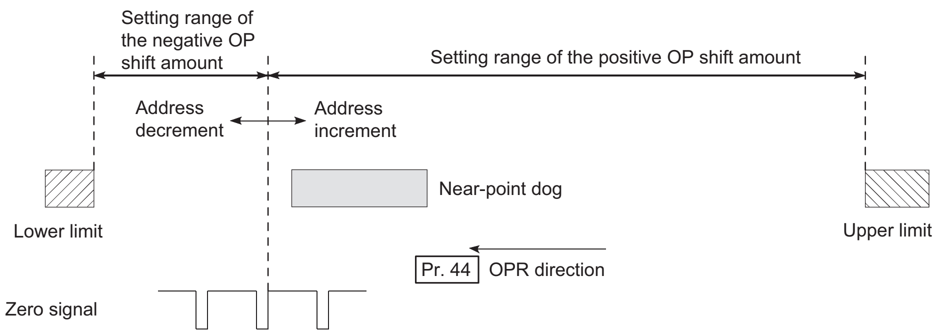
The following figure shows the operation of the OP shift function.



(1) The OPR is performed in the direction set in [Pr.44] OPR direction by Machine OPR start.
(2) The OPR operation stops when Zero signal is detected and outputs Deviation counter clear output to the drive unit.
(3) After Deviation counter clear output is output, the OP shift operation is performed.
(4) The position moved for the amount set in [Pr.53] OP shift amount is set as the OP, and the machine OPR is completed.

Setting range of the OP shift amount

Set the OP shift amount within the range from the detected zero signal to the upper/lower limit switches.

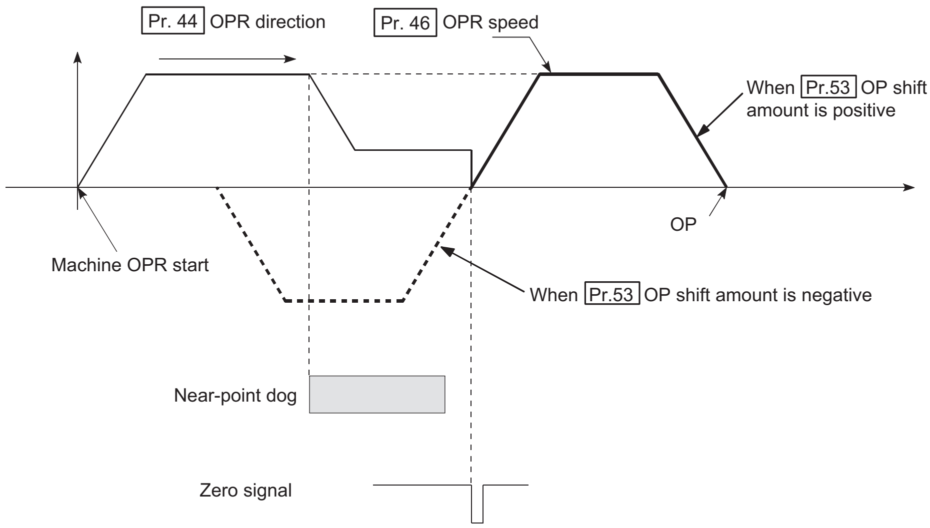


Movement speed during the OP shift

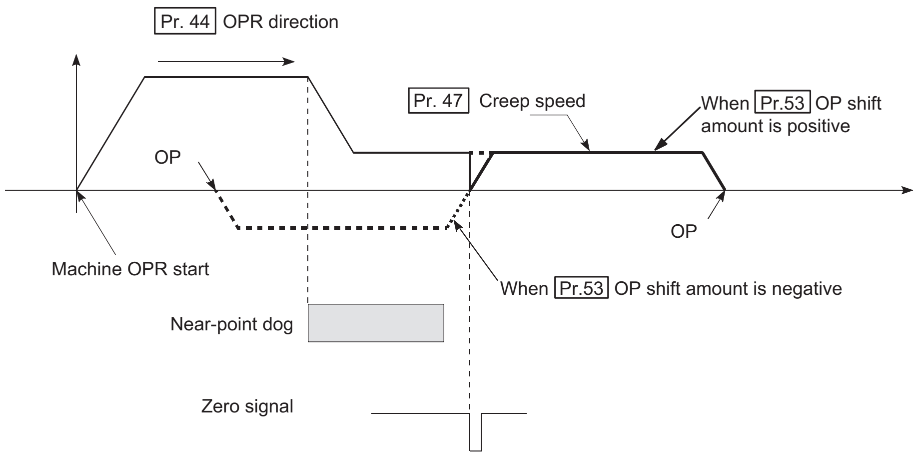
When the OP shift function is used, set the movement speed during the OP shift in [Pr.56] Speed specification during OP shift. Select the movement speed during the OP shift from [Pr.46] OPR speed or [Pr.47] Creep speed. Set the speed in [Pr.56] Speed specification during OP shift.

The following figures show the movement speed during the OP shift when the machine OPR is performed using the near-point dog method.

■OP shift operation at the speed set in [Pr.46] OPR speed (when [Pr.56] Speed specification during OP shift is 0)



■OP shift operation at the speed set in [Pr.47] Creep speed (when [Pr.56] Speed specification during OP shift is 1)



Control precautions

- OPR complete flag ([Md.31] Status: b4), [Md.20] Current feed value, [Md.21] Machine feed value, and [Md.26] Axis operation status are set after the OP shift operation is completed. OPR request flag ([Md.31] Status: b3) is reset after the OP shift operation is completed.
- The value set in [Pr.53] OP shift amount is not added in [Md.34] Movement amount after near-point dog ON. The movement amount immediately before the OP shift operation, considering the amount when the near-point dog is on as 0, is stored. For the stopper method (1, 2, 3), the movement amount is not changed from 0.
- When using the OP shift function with the stopper method (1, 2, 3) selected for the OPR method, configure the OP shift operation in the opposite direction of the OPR direction. Shifting in the OPR direction is not possible due to a mechanical stopper in the OPR direction.

Setting method

To use the OP shift function, configure the required settings in the parameters shown in the following table, and write them to the RD75.

When the parameters are set, the OP shift function will be added to the machine OPR control. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.53]	OP shift amount	→	Set the shift amount during the OP shift.	0
[Pr.56]	Speed specification during OP shift	→	Select the speed during the OP shift. 0: [Pr.46] OPR speed 1: [Pr.47] Creep speed	0

For details on the settings, refer to the following.

☞ Page 425 [Pr.53] OP shift amount
☞ Page 426 [Pr.56] Speed specification during OP shift

Point

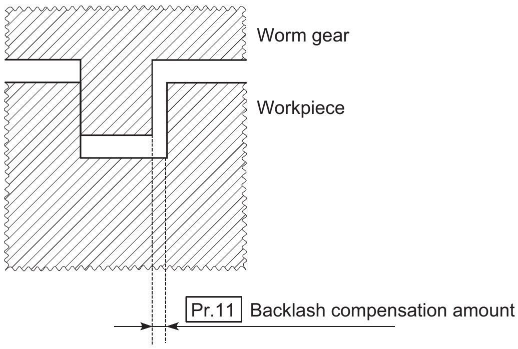
- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

7.3 Function to Compensate Control

The functions to compensate the control include Backlash compensation function, Electronic gear function, Near pass function, and Output timing selection of near pass control. Each function is executed by setting parameters or creating and writing a program.

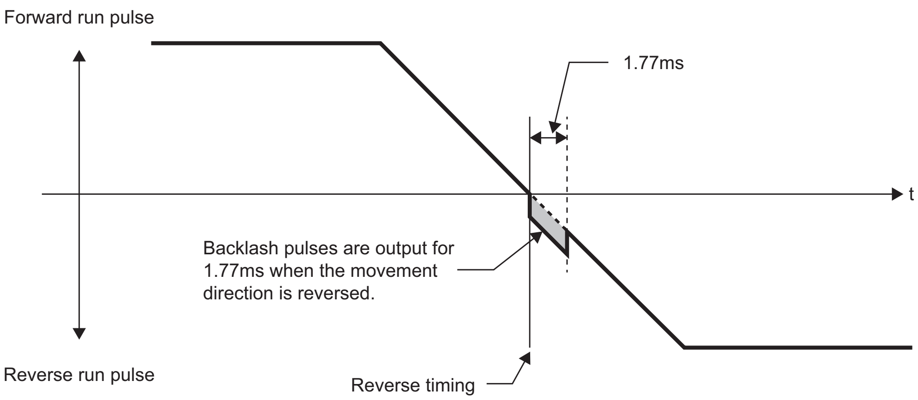
Backlash compensation function

This function compensates the backlash amount in the machine system.
When the backlash compensation amount is set, pulses for an extra amount equivalent to the set backlash amount are output every time the movement direction changes.



Control details

The following figure shows the operation of the backlash compensation function.



7

Control precautions

- The feed pulses of the backlash compensation amount are not added to [Md.20] Current feed value or [Md.21] Machine feed value.
- Always perform the machine OPR before starting the control when using the backlash compensation function (when [Pr.11] Backlash compensation amount is set). If the machine OPR is not performed, the backlash amount in the machine system cannot be correctly compensated.
- The number of pulses output in one backlash compensation (value determined by dividing the value in [Pr.11] Backlash compensation amount by Movement amount per pulse) must be 255 or smaller. If 256 or larger value is set, Backlash compensation amount error (Error code: 1AA0H) occurs. (Depending on the connected servo motor, tracking may not be possible if a large number of pulses are output at once.)

$$0 \leq \frac{\text{Backlash compensation amount}}{\text{Movement amount per pulse}} \leq 255$$

(Omit values after the decimal point.)

- The backlash compensation including the movement amount and [Pr.11] Backlash compensation amount is output when the moving direction changes.
- The backlash compensation function cannot be used for an axis where a stepping motor is connected. Set 0 (initial value) in [Pr.11] Backlash compensation amount.

Setting method

To use Backlash compensation function, set Backlash compensation amount in the parameters shown in the following table and write them to the RD75.

The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.11]	Backlash compensation amount	→	Set the backlash compensation amount.	0

For details on the settings, refer to the following.

☞ Page 399 [Pr.11] Backlash compensation amount

Point

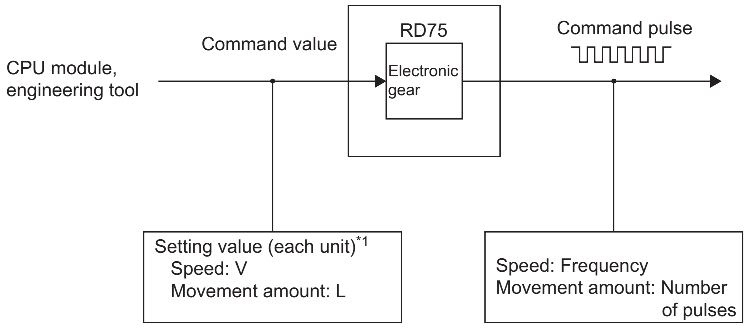
- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

Electronic gear function

This function adjusts the pulses calculated and output according to the parameters set in the RD75 with the actual machine movement amount.

Electronic gear function is classified into the following four functions.

- The function converts the command value (speed, movement amount from the start point to the end point) set in mm units into pulse units and determines the pulse frequency and number of the command pulses.



*1 Unit specified with [Pr.1] Unit setting (mm, inch, degree, or pulse)

- If values less than one pulse are generated by converting the movement amount from the start point to the end point in units of pulses, values less than one pulse are not output and the machine stops at the front side of the positioning direction. The values less than one pulse that are not output are accumulated in the RD75. When the total cumulative value has reached one pulse or more, one pulse is output.
- When the machine OPR is completed, when the current value change is completed, when the speed control is started (excluding when the current feed value change is enabled), or when the fixed-feed control is started, the function clears the cumulative values less than one pulse which could not be output to 0. (If the cumulative value is cleared, an error will occur for the cleared amount in the machine feed value. Control can be constantly performed with the same machine movement amount even when the fixed-feed control is continued.)
- The function compensates the machine system error of the command movement amount and actual movement amount by adjusting Movement amount per pulse. (The value of Movement amount per pulse is defined using [Pr.2] No. of pulses per rotation, [Pr.3] Movement amount per rotation, and [Pr.4] Unit magnification.)

The RD75 automatically performs the processing other than the error compensation.

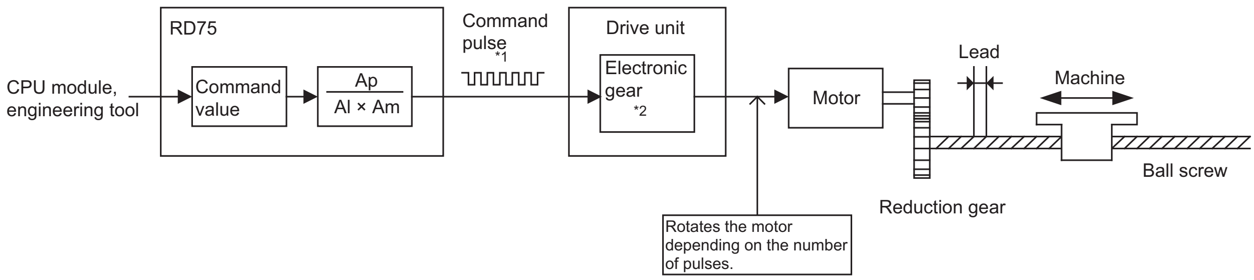
7

Movement amount per pulse

[Pr.2] No. of pulses per rotation (Ap), [Pr.3] Movement amount per rotation (Al), and [Pr.4] Unit magnification (Am) are the items for determining how many rotations (equivalent to how many pulses) a motor should operate to move a machine for the movement amount set in the program.

The drive unit controls the positioning to a motor with the number of pulses.

The following shows the control details of the RD75.



*1 For the RD75P□, the upper limit of the command pulse frequency is 200kpulse/s, and for the RD75D□, the upper limit is 5Mpulse/s.

*2 For a drive unit without the electronic gear function, or when the electronic gear function is not used, this value is 1.

- Consider a system with a motor connected to a ball screw as shown in the figure above. The electronic gear of the drive unit is 1.
- The movement amount of the machine is in units of mm or inches. Set the command value in units of mm or inches to the RD75 for the CPU module program.
- The motor is controlled by the drive unit in units of pulses. Therefore, since the command value in units of mm or inches is converted in units of pulses, set Ap, Al, and Am so that the following relational expression is satisfied. In this case, the machine movement amount for the command 1 pulse output from the RD75 is calculated by the following calculation formula.

$$\text{Movement amount per pulse (A)} = \frac{\text{Al} \times \text{Am}}{\text{Ap}}$$

Item	Symbol
Number of pulses per rotation of motor	Ap
Movement amount per rotation of motor	Al × Am
Movement amount per pulse	A

Point

The command frequency from the RD75 is limited. If the command frequency exceeds the upper limit, increase Movement amount per pulse (A) greater (N times) to decrease the command frequency.

In this case, the electronic gear on the drive unit must be increased by N times as well.

The command pulse from the RD75 is changes to 1/N times. Therefore, multiply it by N on the drive unit side to keep the number of rotations of the motor.

Since Movement amount per pulse (A) is increased, the position accuracy (command resolution) for the command 1 pulse from the RD75 decreases.

Consider to decrease the command speed when the position accuracy is required.

■Setting range of Ap, Al, and Am

The 16-bit mode and 32-bit mode are provided for each Ap, Al, and Am, and they can be switched by setting a value in [Pr.62] Electronic gear selection. When the resolution of the servo amplifier is high, values of Ap and Al can be set without reducing the values by using an electronic gear with 32 bits.

Determined setting ranges are available for Ap, Al, and Am. The following table shows the setting ranges.

Setting item		Setting range		Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.2]	No. of pulses per rotation (Ap)	When [Pr.62] Electronic gear selection is set to 0: 16 bits 1 to 65535		1	151	301	451
		When [Pr.62] Electronic gear selection is set to 1: 32 bits 1 to 200000000		102 103	252 253	402 403	552 553
[Pr.3]	Movement amount per rotation (Al)	When [Pr.62] Electronic gear selection is set to 0: 16 bits 1 to 65535	$\times 10^{-1}$µm $\times 10^{-5}$inch $\times 10^{-5}$degree pulse	2	152	302	452
		When [Pr.62] Electronic gear selection is set to 1: 32 bits 1 to 200000000		104 105	254 255	404 405	554 555
[Pr.4]	Unit magnification (Am)	When [Pr.62] Electronic gear selection is set to 0: 16 bits 1, 10, 100, 1000 time(s)		3	153	303	453
		When [Pr.62] Electronic gear selection is set to 1: 32 bits 1 time					

For details on the settings, refer to the following.

☞ Page 388 [Pr.1] Unit setting
☞ Page 389 [Pr.2] No. of pulses per rotation (16 bits) (Ap)
☞ Page 390 [Pr.3] Movement amount per rotation (16 bits) (Al)
☞ Page 395 [Pr.2] No. of pulses per rotation (32 bits) (Ap)
☞ Page 396 [Pr.3] Movement amount per rotation (32 bits) (Al)

In addition, use the value set in [Pr.3] Movement amount per rotation as the movement amount per rotation (Al) to calculate the movement amount per pulse (A).

Ex.

Movement amount per pulse (A) when [Pr.1] Unit setting is 0: mm

Setting item	Setting value
[Pr.2] No. of pulses per rotation	20000
[Pr.3] Movement amount per rotation	40000
[Pr.4] Unit magnification	1

$A = 40000 \times 10^{-1} \times 1 \div 20000 = 0.2\mu m$

If the value is beyond the setting range, setting values of each parameter can be decreased by reducing the numerator and denominator with the movement amount per pulse (A) kept.

Error compensation method

When the position control is performed using the movement amount per pulse set in the RD75 parameters, an error sometimes occurs between the command movement amount (L) and actual movement amount (L').
That error is compensated in the RD75 by adjusting the values in [Pr.2] No. of pulses per rotation, [Pr.3] Movement amount per rotation, and [Pr.4] Unit magnification (when [Pr.1] Unit setting is 0: mm).

■Definition

Error compensation amount used to perform the error compensation is defined as follows.

$$\text{Error compensation amount} = \frac{\text{Actual movement amount (L')}}{\text{Command movement amount (L)}}$$

In the RD75, Movement amount per pulse is calculated with the following calculation formula. Movement amount per pulse is A, [Pr.2] No. of pulses per rotation is Ap, [Pr.3] Movement amount per rotation is Al, and [Pr.4] Unit magnification is Am.

$$A = \frac{Al}{Ap} \times Am$$

■Procedure

- Set Command movement amount (L) and perform the positioning. Set Movement amount per pulse (A) in advance. (☞ Page 226 Movement amount per pulse)
- After the positioning is completed, measure Actual movement amount (L').
- Calculate Error compensation amount.

$$\text{Error compensation amount} = \frac{L'}{L}$$

- Calculate the post-compensation [Pr.2] No. of pulses per rotation (Ap'), [Pr.3] Movement amount per rotation (Al'), and [Pr.4] Unit magnification (Am') from Post-compensation movement amount per pulse (A').

$$A' = A \times \text{Error compensation amount}$$

$$= \frac{Al}{Ap} \times Am \times \frac{L'}{L}$$

$$= \frac{Al'}{Ap'} \times Am'$$

(Adjust the values with Am' so that Al' and Ap' do not exceed the setting range.)

Calculation example

[Condition]
Movement amount per rotation: ..... 5000(μm/rev)
No. of pulses per rotation: .... 12000(pulse/rev)
Unit magnification: 1

[Positioning result]
Command movement amount 100mm
Actual movement amount............... 101mm

[Compensation amount]

$$\frac{AL'}{AP'} = \frac{5\times10^3}{12000} \times \frac{101\times10^3}{100\times10^3} = \frac{5050}{12000} = \frac{101}{240}$$

Movement amount per rotation: ..... 101(μm/rev) [Set in Pr.3]
No. of pulses per rotation: .... 240(pulse/rev) [Set in Pr.2]
Unit magnification: .... 1 [Set in 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 RD75. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

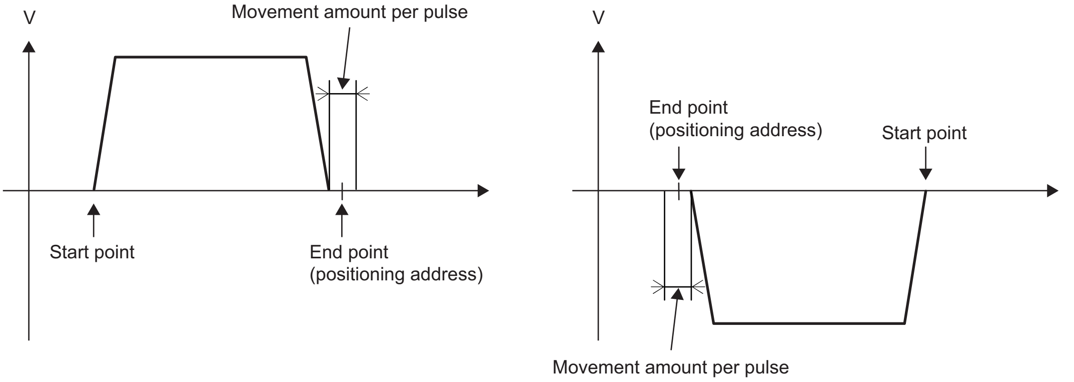
Setting item		**Setting value**	**Setting detail**	**Value before compensation**
[Pr.2]	No. of pulses per rotation	Ap'	Set the post-compensation value.	Ap
[Pr.3]	Movement amount per rotation	Al'	Set the post-compensation value.	Al
[Pr.4]	Unit magnification	Am'	Set the post-compensation value.	Am

For details on the settings, refer to the following.

☞ Page 388 [Pr.1] Unit setting
☞ Page 389 [Pr.2] No. of pulses per rotation (16 bits) (Ap)
☞ Page 390 [Pr.3] Movement amount per rotation (16 bits) (Al)
☞ Page 395 [Pr.2] No. of pulses per rotation (32 bits) (Ap)
☞ Page 396 [Pr.3] Movement amount per rotation (32 bits) (Al)

Control precautions

If values less than one pulse are generated by converting the movement amount from the start point to the end point into units of pulses with the electronic gear function, values less than one pulse are not output and the machine stops at the front side of the positioning direction.
The values less than one pulse that are not output are accumulated in the RD75. When the total cumulative value has reached one pulse or more, one pulse is output.



To prevent values less than one pulse from being generated, set the positioning address so that the value calculated by multiplying the movement amount to the end point by the inverse number of Movement amount per pulse (A) becomes an integer.
Setting a value close to 1 for Movement amount per pulse (A) is recommended for the following reasons. Movement amount per pulse of 1 means the minimum value in each [Pr.1] Unit setting (0.1 (μm) for the unit [mm]).

- Note that if the setting value of the movement amount per pulse is decreased, the command frequency increases.
- If the setting value of the movement amount per pulse is less than 1, the machine system may oscillate. Always use the movement amount per pulse within the following range.

$$\text{Movement amount per pulse (A)} \geq \frac{1}{500}$$

If the machine system oscillates, use the electronic gear function of the drive unit and increase the movement amount per pulse.

- Set the movement amount per pulse so that the pulse output frequency for the drive unit becomes a value in the following table.

	RD75P□	RD75D□
Pulse output frequency for drive unit	200kpulse/s or less	5Mpulse/s or less

If the setting value of the pulse output frequency for the drive unit exceeds a value in the table above, the RD75 may not operate properly.

Point

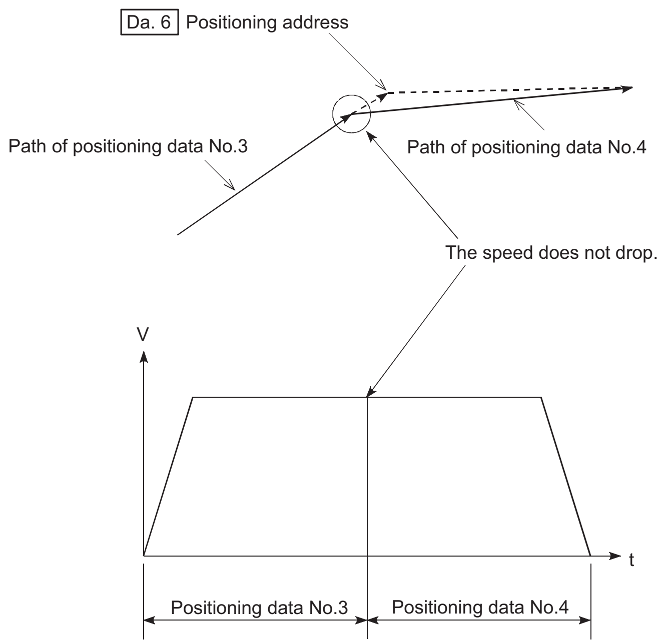
In the RD75, the generic term for the functions in this section is defined as Electronic gear function. For the definition of Electronic gear on the servomotor side, refer to the manual for the servomotor used.

Near pass function

When the continuous pass control is performed using the interpolation control, the near pass function is performed.
This function suppresses the machine vibration occurring at the time of switching the positioning data when the continuous path control is performed using the interpolation control.
[Near pass function]
The extra movement amount occurring at the end of each positioning data being continuously executed is carried over to the next positioning data. Since the alignment is not performed, the output speed drops are eliminated and the machine vibration which occurs during the speed change can be suppressed.
Since the alignment is not performed, the operation is controlled in a path that passes near the position set in [Da.6] Positioning address/movement amount.

Control details

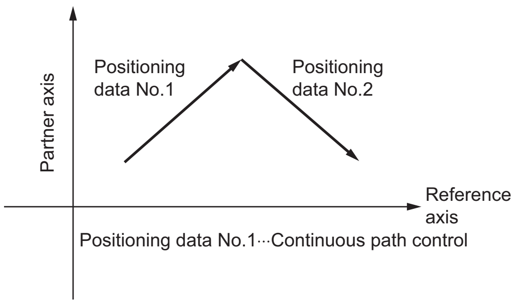
The following figure shows the path of the continuous path control using the 2-axis linear interpolation control.



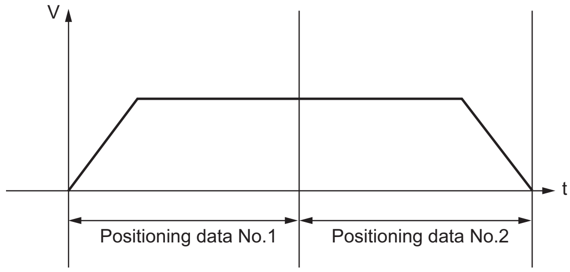
Control precautions

- If the movement amount specified by the positioning data is small during the execution of the continuous path control, the output speed may not reach the command speed.
- The movement direction is not checked during the interpolation control. Thus, the deceleration stop is not performed even if the movement direction is changed. (Refer to the following figure.) Therefore, the interpolation axis may suddenly reverse its direction. To avoid the sudden direction reversal, set Continuous positioning control: 01 for the positioning data at the passing point instead of Continuous path control: 11.

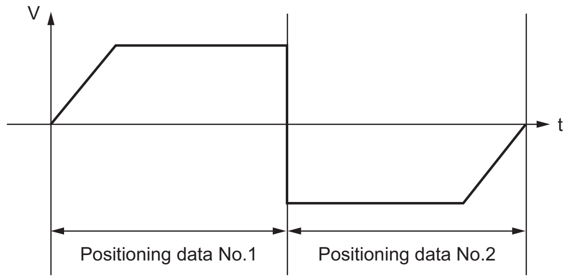
[Positioning by interpolation]



[Reference axis operation]



[Partner axis operation]



Output timing selection of near pass control

This function allows the user to select the timing to output the difference (Δd) between the actual and the set positioning end addresses in the continuous path control, in which the difference (Δd) is output during the execution of the next positioning data.

Control details

At constant speed and At deceleration are available as the setting of the near pass output timing.

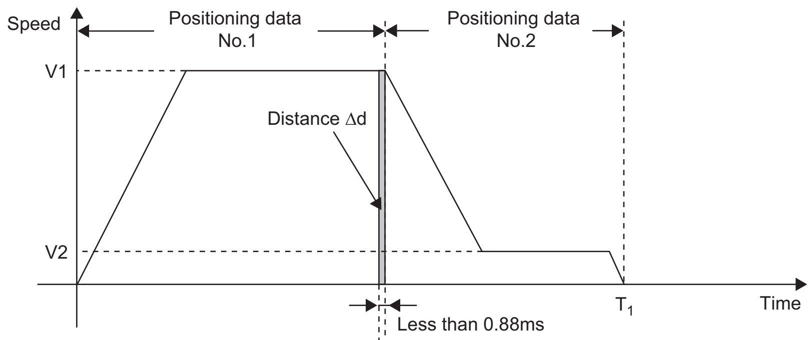
- At constant speed: The distance Δd is output when the next positioning data is executed at the constant speed.
- At deceleration: The distance Δd is output at the deceleration of V1 to V2.

In At constant speed, when V1, the command speed of the positioning data No. 1, is greater than V2, the command speed of the positioning data No. 2, in the operation chart, the distance Δd is output when the next positioning data is executed at the constant speed and the execution time is extended.

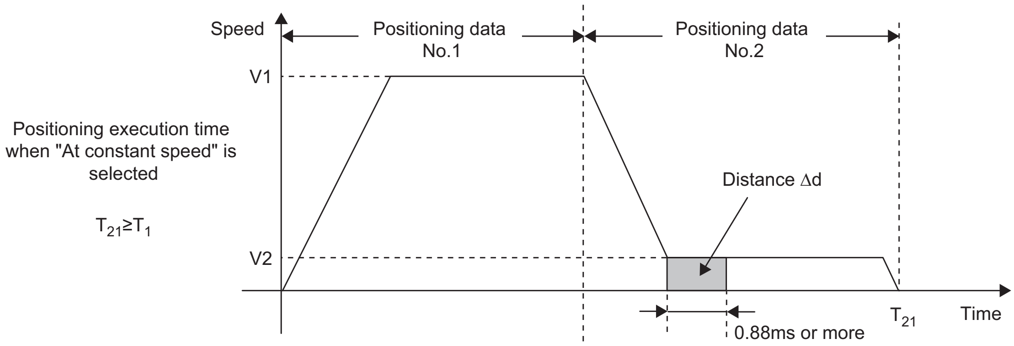
In At deceleration, the execution time is not extended and is equivalent to the set execution time of the positioning control.

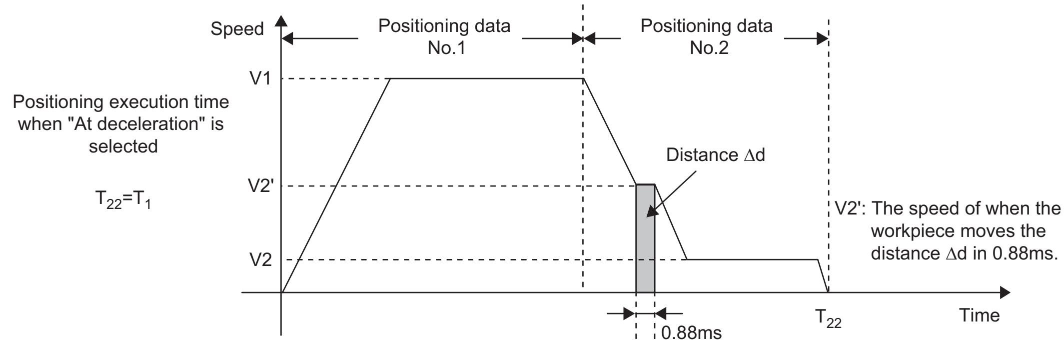
The following shows the operation chart of Output timing selection of near pass control.

- Acceleration/deceleration (setting)



- Acceleration/deceleration with the near pass function (actual one)

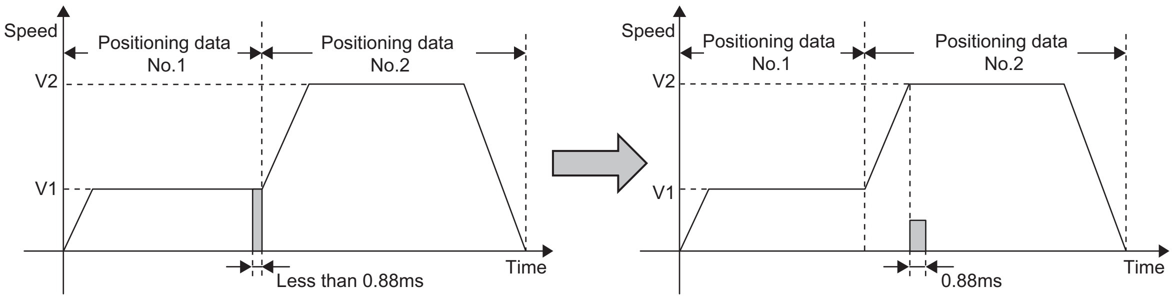




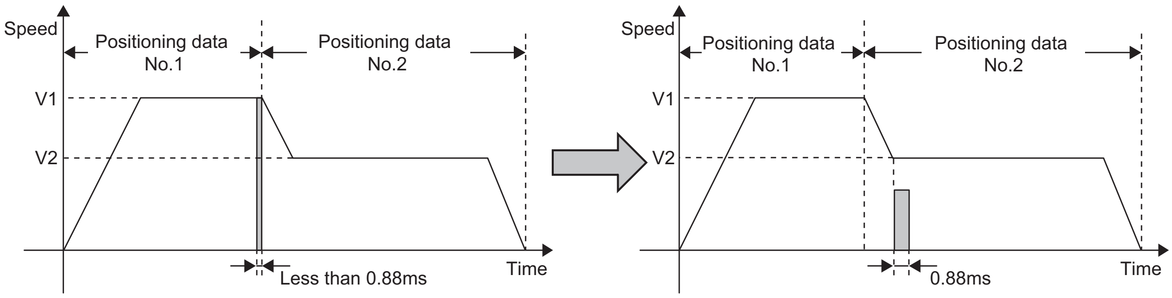
Control precautions

When the relation of command speed V1 and V2 is one of the following, the same command output as the one for At constant speed is executed even if the near pass output timing is set to At deceleration.

- When V1 ≤ V2



- When (the value that the distance Δd is converted into the speed) ≤ V2 < V1



The height of the shaded area in the right figure shows the value that the distance Δd is converted into the speed.

Setting method

To use Output timing selection of near pass control, set the setting value to the following control data with the program. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Cd.43]	Output timing selection of near pass control	→	Select the timing to output the difference (Δd) between the actual and the set positioning end addresses in continuous path control, in which the difference (Δd) is output during the execution of the next positioning data. 0: At constant speed 1: At deceleration	0

For details on the settings, refer to the following.

☞ Page 476 [Cd.43] Output timing selection of near pass control

7.4 Function to Limit Control

Functions to limit the control include Speed limit function, Torque limit function, Software stroke limit function, and Hardware stroke limit function. Each function is executed by setting parameters or creating and writing a program.

Speed limit function

Speed limit function limits the command speed to a value within the setting range of Speed limit value when the command speed during the control exceeds Speed limit value.
When the command speed exceeds the value set in [Pr.8] Speed limit value, [Md.39] In speed limit flag turns on and Speed limit value over (Warning code: 0991H) occurs.

Relation between the speed limit function and various controls

The following table shows the relation between Speed limit function and various controls.
◎: Always set
—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

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-/3-/4-axis linear interpolation control	◎	
		1-axis fixed-feed control	◎	
		2-/3-/4-axis fixed-feed control	◎	
		2-axis circular interpolation control	◎	
		3-axis helical interpolation control	◎	
	1-/2-/3-/4-axis speed control		◎	
	Speed-position switching control, Position-speed switching control		◎	
	Other controls	Current value change	—	Setting value is 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 value is invalid

Control precautions

- If any axis exceeds the value in [Pr.8] Speed limit value during either of the 2-axis speed control, 3-axis speed control, and 4-axis speed control, the axis exceeding the speed limit value is controlled with the speed limit value. The speeds of the other axes being interpolated are suppressed by the command speed ratio.
- If any axis exceeds the value in [Pr.8] Speed limit value during any of the 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, and 3-axis helical interpolation control, the axis exceeding the speed limit value is controlled with the speed limit value. The speeds of the other axes being interpolated are suppressed by the movement amount ratio.
- In the 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, or 4-axis fixed-feed control, when 1: Reference axis speed is set in [Pr.20] Interpolation speed specification method, and when the reference axis is the minor axis and the interpolation axis is the major axis, the speed limit value of the interpolation axis may not function.
- In the 3-axis helical interpolation control, the composite speed of the circular interpolation axis or the speed of the linear interpolation axis is controlled not to exceed the value in [Pr.8] Speed limit value.

Setting method

To use the speed limit function, configure the required settings in the parameters shown in the following table, and write them to the RD75. The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.8]	Speed limit value	→	Set the speed limit value (maximum speed during the control).	200000
[Pr.31]	JOG speed limit value	→	Set the speed limit value during the JOG operation (maximum speed during the control). (Note that the value in [Pr.31] JOG speed limit value shall be equal to or less than the one in [Pr.8] Speed limit value.)	20000

For details on the settings, refer to the following.

☞ Page 397 [Pr.8] Speed limit value
☞ Page 409 [Pr.31] JOG speed limit value

Point

- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

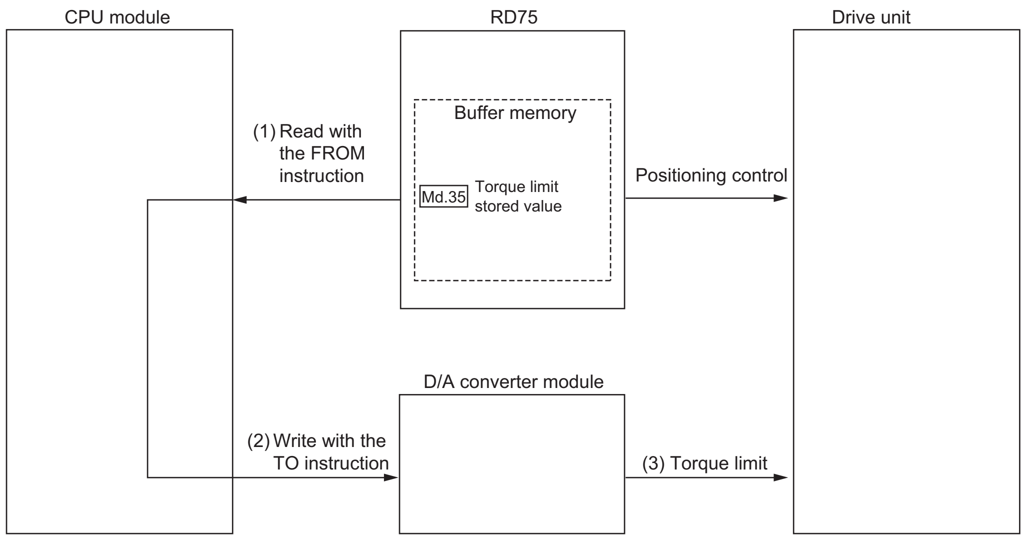
Torque limit function

If the torque generated in the servo motor exceeds Torque limit value, this function limits the generated torque to a value within the setting range of Torque limit value.
This function protects the reducer and limits the power of the pressing operation against the stopper. This function controls the operation so that an excessive load or excessive force is not applied to the machine.
The RD75 does not perform the torque limit of the servo motor directly using this function. The torque limit command to the servo amplifier is performed by the D/A converter module.

System configuration for performing the torque limit

Perform the torque limit in the following configuration. (The following modules are required.)

- D/A converter module
- Drive unit capable of performing the torque limit control with the analog voltage input



(1) Read the value in [Md.35] Torque limit stored value.
(2) Write the read value into the D/A converter module. (The value must be converted according to the specifications of the D/A converter module.)
(3) The drive unit performs the torque limit according to the voltage input value from the D/A converter module.

Point

The RD75 monitors the creep speed reach during the OPR control and updates the value in [Md.35] Torque limit stored value to the one in [Pr.54] OPR torque limit value. Monitoring this value prevents the need to monitor the creep speed reach using the program. If all controls of the torque limit value are performed using the program ((1) Read with the FROM instruction in the figure), this function does not have to be used.

Relation between the torque limit function and various controls

The following table shows the relation between Torque limit function and various controls.

○: Set as required

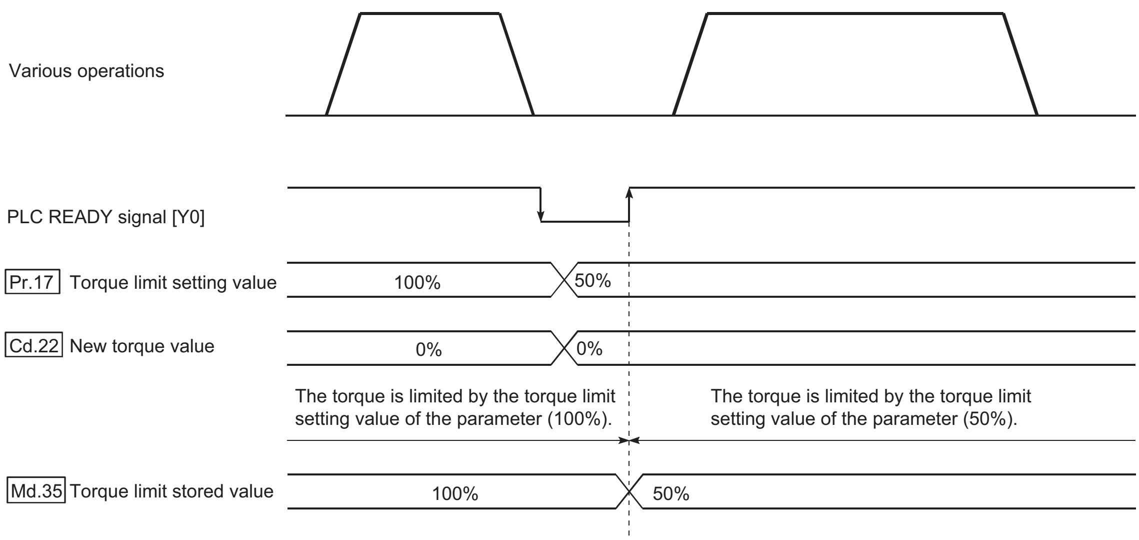
—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Control type			Torque limit function	Torque limit value*1
OPR control	Machine OPR control		○	[Pr.17] Torque limit setting value After the reach of [Pr.47] Creep speed, this value becomes the value in [Pr.54] OPR torque limit value.
	Fast OPR control			
Major positioning control	Position control	1-axis linear control	○	[Pr.17] Torque limit setting value
		2-/3-/4-axis linear interpolation control	○	
		1-axis fixed-feed control	○	
		2-/3-/4-axis fixed-feed control	○	
		2-axis circular interpolation control	○	
		3-axis helical interpolation control	○	
	1-/2-/3-/4-axis speed control		○	
	Speed-position switching control, Position-speed switching control		○	
	Other controls	Current value change	—	Setting value is invalid.
		JUMP instruction, NOP instruction LOOP to LEND	—	
Manual control	JOG operation, Inching operation		○	[Pr.17] Torque limit setting value
	Manual pulse generator operation		○	[Pr.17] Torque limit setting value

*1 The torque limit value when [Cd.22] New torque value is set to 0.

Control details

The following shows the operation of the torque limit function.



Control precautions

- To limit the torque with the value set in [Pr.17] Torque limit setting value, check that [Cd.22] New torque value is set to 0. If a value other than 0 is set for [Cd.22] New torque value, the value is validated and used to the torque limit. (Refer to ☞ Page 259 Torque change function.)
- When the value set in [Pr.54] OPR torque limit value exceeds the value set in [Pr.17] Torque limit setting value, OPR torque limit value error (Error code: 1B0EH) occurs.
- When the operation is stopped by the torque limit, a droop pulse remains in the deviation counter. If Deviation counter clear is performed by issuing an external signal at this time, the position will be deviated when the operation is continued. If the load torque is eliminated, the operation for the amount of droop pulses is performed.

Setting method

- To use the torque limit function, configure the required settings in the parameters shown in the following table, and write them to the RD75. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.17]	Torque limit setting value	→	Set the torque limit value in percentage.	300
[Pr.54]	OPR torque limit value	→	Set the torque limit value after the reach of [Pr.47] Creep speed in percentage.	300

For details on the settings, refer to the following.
☞ Page 402 [Pr.17] Torque limit setting value
☞ Page 426 [Pr.54] OPR torque limit value

The following table shows the buffer memory address of [Md.35] Torque limit stored value.

Monitor item		Monitor value	Stored contents	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Md.35]	Torque limit stored value	→	Torque limit value which is valid at that time is stored. ([Pr.17] Torque limit setting value, [Pr.54] OPR torque limit value, or [Cd.22] New torque value)	826	926	1026	1126

For details on the stored contents, refer to the following.
☞ Page 469 [Md.35] Torque limit stored value

Point

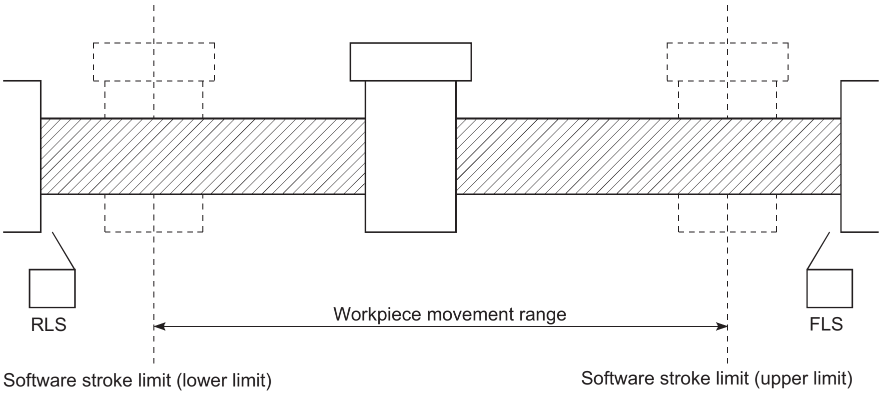
- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

Software stroke limit function

In this function, the address established by the machine OPR is used to set the upper/lower limits of the movable range of the workpiece. If a movement command is issued to an address outside the set range, the command is not performed. In the RD75, Current feed value and Machine feed value are used as the addresses indicating the current value. Select one of the addresses used for the limit check and set a value in [Pr.14] Software stroke limit selection.
For details on Current feed value and Machine feed value, refer to the following.
☞ Page 77 Checking the current value
The upper and lower limits of the movable range of the workpiece are set in [Pr.12] Software stroke limit upper limit value or [Pr.13] Software stroke limit lower limit value.

Differences in the movable range

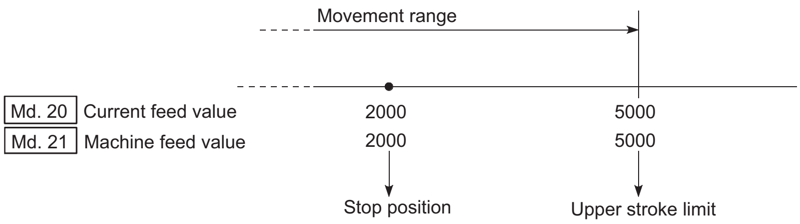
The following figure shows the movable range of the workpiece when the software stroke limit function is used.



The following figures show the differences in the operation when [Md.20] Current feed value and [Md.21] Machine feed value are used for the movable range limit check.

■Condition

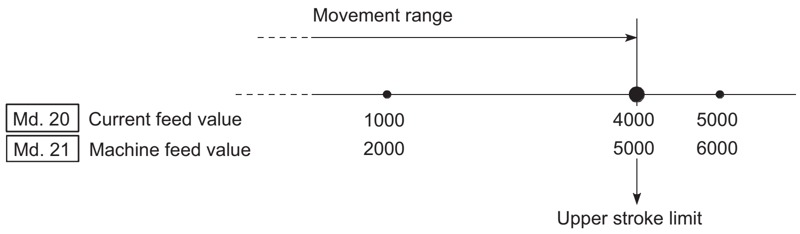
Assume that the current stop position is 2000 and the upper stroke limit is set to 5000.



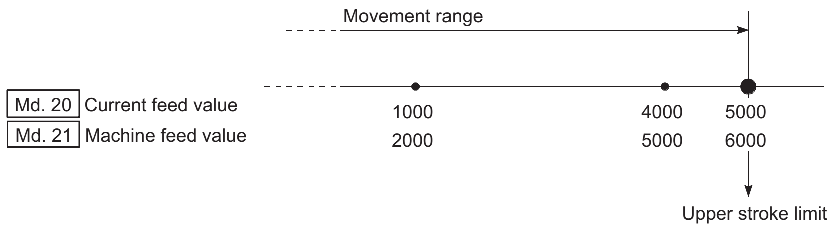
■Current value change

When the current value is changed from 2000 to 1000, the current feed value changes to 1000, but the machine feed value remains 2000.

- When the machine feed value is set as a limit, the machine feed value of 5000 (current feed value: 4000) becomes the upper stroke limit.



- When the current feed value is set as a limit, the current feed value of 5000 (machine feed value: 6000) becomes the upper stroke limit.



Point

When Machine feed value is set in [Pr.14] Software stroke limit selection, the movable range becomes an absolute range based on the OP. When Current feed value is set, the movable range becomes a relative range from Current feed value.

Details of the software stroke limit check

Check detail		Processing when an error occurs
(1)	An error occurs 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.)	Software stroke limit (+) (Error code: 1993H) or Software stroke limit (-) (Error code: 1995H) occurs.
(2)	An error occurs if the command address is outside the software stroke limit range. (Check [Da.6] Positioning address/movement amount.)	Software stroke limit (+) (Error code: 1A18H) or Software stroke limit (-) (Error code: 1A1AH) occurs.

*1 Select either [Md.20] Current feed value or [Md.21] Machine feed value in [Pr.14] Software stroke limit selection.
*2 Movable range from [Pr.12] Software stroke limit upper limit value to [Pr.13] Software stroke limit lower limit value

Relation between the software stroke limit function and various controls

◎: Check valid

○: Check is not performed when the current feed value is not updated at the setting of Current feed value in [Pr.14] Software stroke limit selection during the speed control. (☞ Page 406 [Pr.21] Current feed value during speed control)

-: Check is not performed (check invalid).

△: Valid only when 0: Valid is set in [Pr.15] Software stroke limit valid/invalid setting.

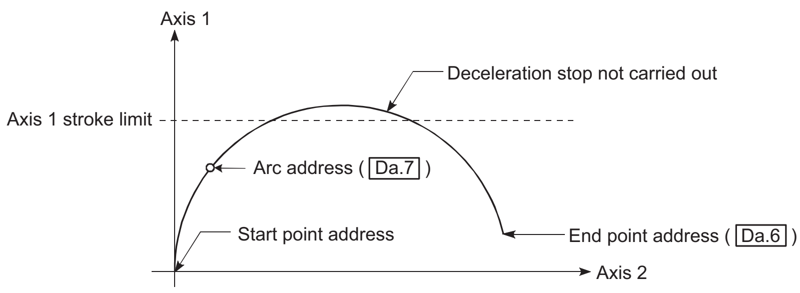
Control type			Limit check	Processing at check
OPR control	Machine OPR control		-	Check is not performed.
	Fast OPR control		-	
Major positioning control	Position control	1-axis linear control	◎	(1) and (2) in the following section are checked. ☞ Page 241 Details of the software stroke limit check For speed control: The machine decelerates and stops when the software stroke limit range is exceeded. For position control: The operation is not performed if the target address is outside the software stroke limit range.
		2-/3-/4-axis linear interpolation control	◎	
		1-axis fixed-feed control	◎	
		2-/3-/4-axis fixed-feed control	◎	
		2-axis circular interpolation control	◎	
		3-axis helical interpolation control	◎	
	1-/2-/3-/4-axis speed control		○[*1*2]	
	Speed-position switching control, Position-speed switching control		○[*1*2]	
	Other controls	Current value change	◎	The current value change is not performed if the new current value is outside the software stroke limit range.
		JUMP instruction, NOP instruction, LOOP to LEND	-	Check is not performed.
Manual control	JOG operation, Inching operation		△[*3]	(1) and (2) in the following section are checked. ☞ Page 241 Details of the software stroke limit check The machine decelerates and stops when the software stroke limit range is exceeded. The operation can be started only toward the direction of the movable range if the target address is outside the software stroke limit range.
	Manual pulse generator operation		△[*3]	

*1 The value in [Md.20] Current feed value differs depending on the setting of [Pr.21] Current feed value during speed control.
*2 When the unit is degree, the limit check is not performed during the speed control.
*3 When the unit is degree, the limit check is not performed.

Precautions for the software stroke limit check

- To execute Software stroke limit function properly, the machine OPR must be performed beforehand.
- During the interpolation control, the stroke limit check is performed for every current value of both the reference axis and interpolation axes. All the axes do not start if an error occurs even if an error occurs only in one axis.
- During the circular interpolation control, [Pr.12] Software stroke limit upper limit value or [Pr.13] Software stroke limit lower limit value may be exceeded. In this case, the machine does not decelerate and stop even if the stroke limit is exceeded. Always install limit switches externally if the stroke limit may be potentially exceeded.

Example



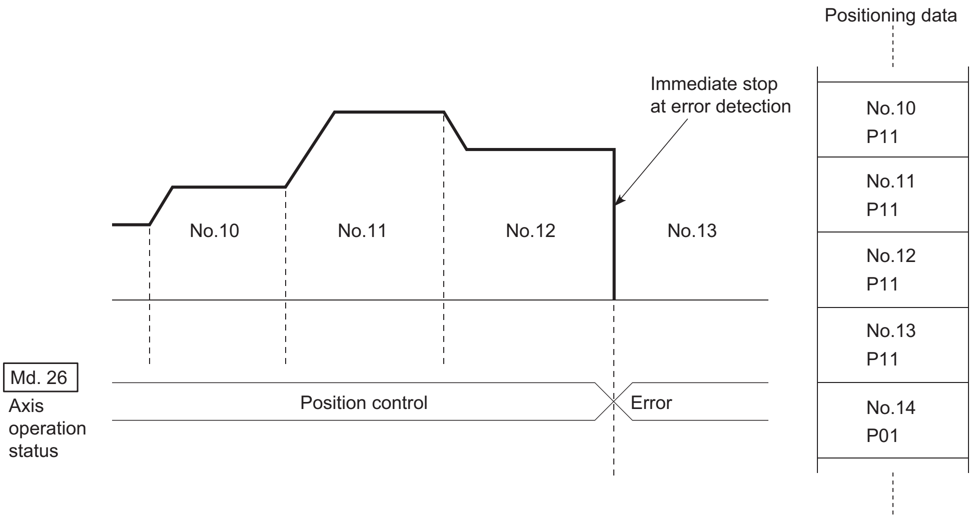
* The software stroke limit check is carried out for the following addresses during circular interpolation control. (Note that the limit check for Da.7 Arc address is carried out only for the circular interpolation control with sub point specified.)

Current value/end point address (Da.6)/Arc address (Da.7)

- If an error is detected during the continuous path control, the operation stops at the completion of the execution of the positioning data right before the positioning data having the error.

Example

· If the positioning address of positioning data No.13 is outside the software stroke limit range, the operation immediately stops when the execution of positioning data No.12 is completed.



- When the simultaneous start is performed, the stroke limit check is performed for every current value of the axes to be started simultaneously. All the axes do not start if an error occurs even if an error occurs only in one axis.

Setting method

To use the software stroke limit function, set the required values in the parameters shown in the following table, and write them to the RD75.

The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.12]	Software stroke limit upper limit value	→	Set the upper limit value of the movement range.	2147483647
[Pr.13]	Software stroke limit lower limit value	→	Set the lower limit value of the movement range.	-2147483648
[Pr.14]	Software stroke limit selection	→	Set whether to use [Md.20] Current feed value or [Md.21] Machine feed value as Current value.	0: Current feed value
[Pr.15]	Software stroke limit valid/invalid setting	0: Valid	Set whether to validate the software stroke limit during the manual control (JOG operation, inching operation, and manual pulse generator operation).	0: Valid

For details on the settings, refer to the following.

☞ Page 401 [Pr.15] Software stroke limit valid/invalid setting

Invalidating the software stroke limit

To invalidate the software stroke limit, set a single value in both [Pr.12] Software stroke limit upper limit value and [Pr.13] Software stroke limit lower limit value and write them to the RD75. (Set a value within the setting range.)
(To invalidate only the manual operation, set 1: Software stroke limit invalid in [Pr.15] Software stroke limit valid/invalid setting.)
The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].
When the unit is degree, the software stroke limit check is not performed during the speed control (including the speed-position switching control and position-speed switching control) or during the manual control regardless of the values set in [Pr.12], [Pr.13], and [Pr.15].

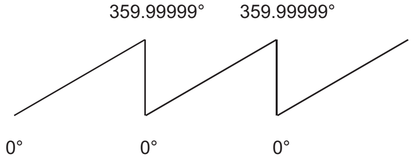
Point

- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

Setting when the control unit is degree

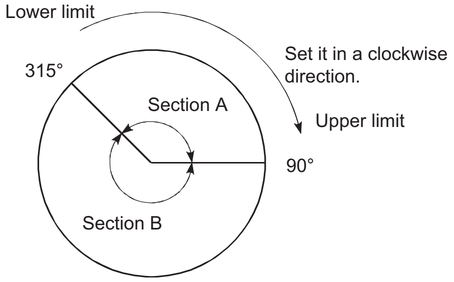
■Current value address

The address of [Md.20] Current feed value is a ring address from 0 to 359.99999°.



■Setting the software stroke limit

The upper/lower limit values of the software stroke limit are between 0 and 359.99999°.
To validate the software stroke limit, set the upper limit value in the clockwise direction from the lower limit value.



To set the section A or B as the movement range, set the following values.

Section set as the movement range	Software stroke limit lower limit value	Software stroke limit upper limit value
Section A	315.00000°	90.00000°
Section B	90.00000°	315.00000°

Hardware stroke limit function

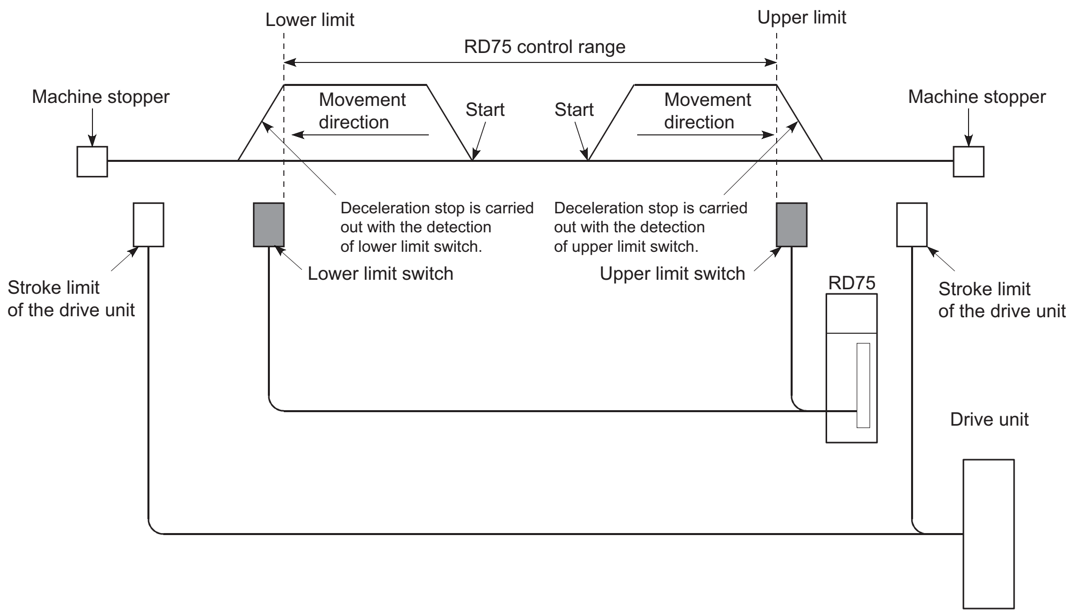
⚠WARNING

When the hardware stroke limit is required to be wired, ensure to wire it in the negative logic using a normally closed contact. If it is set in the positive logic using a normally open contact, the operation cannot be stopped and a collision occurs when a failure such as a disconnection occurs, resulting in the damage of the machine.

In Hardware stroke limit function, limit switches are set at the upper/lower limits of the physical movement range, and the control is stopped (by deceleration stop) by the input of a signal from the limit switch.
This function prevents the machine from being damaged by stopping the operation before the workpiece reaches the upper or lower limit of the physical movement range.
Hardware stroke limit switches are normally installed inside the stroke limit or stroke end on the drive unit side, and the control is stopped before the stroke limit or stoke end on the drive unit side is reached.

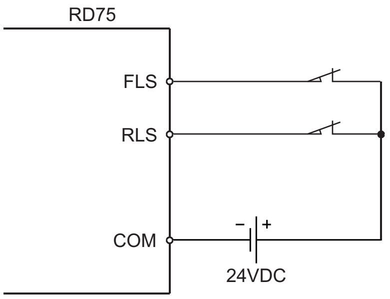
Control details

The following figure shows the operation of the hardware stroke limit function.



Wiring the hardware stroke limit

When the hardware stroke limit function is used, wire the terminal of the FLS (Upper limit signal) and RLS (Lower limit signal) of the RD75 as shown in the following figure. (when the initial value is set in [Pr.22] Input signal logic selection)



Point

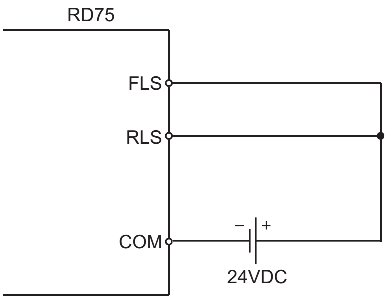
- When wiring the terminals, set the limit switch installed in the direction in which the current feed value increases as the upper limit, and the switch installed in the direction in which the current feed value decreases as the lower limit. If the upper and lower limit switches are wired in incorrect directions, the hardware stroke limit function does not operate properly, and the motor does not stop.
- Adjust the value in [Pr.6] Rotation direction setting so that the increasing or decreasing direction of the current feed value matches with the movement direction of the workpiece. (☞ Page 393 [Pr.6] Rotation direction setting)

Control precautions

- If the machine is stopped outside the RD75 control range (outside the upper/lower limit switches), or is stopped due to the detection of the hardware stroke limit, the OPR control (excluding when the OPR retry function is valid), Major positioning control, and Advanced positioning control cannot be started. To perform these types of the control again, return the workpiece into the RD75 control range using the JOG operation, Inching operation, or Manual pulse generator operation.
- When [Pr.22] Input signal logic selection is set to the initial value, the RD75 cannot perform the positioning control if FLS (Upper limit signal) is separated from COM or RLS (Lower limit signal) is separated from COM (including when not wired).

When the hardware stroke limit function is not used

When the hardware stroke limit function is not used, wire the terminals of the FLS (Upper limit signal) and RLS (Lower limit signal) of the RD75 as shown in the following figure.
When Positive logic is set as the logic for FLS and RLS in [Pr.22] Input signal logic selection, the positioning control can be performed even if FLS and RLS are not wired. For details, refer to the following.
☞ Page 313 External I/O Signal Logic Switching Function



7

7.5 Functions that Change Control Details

Functions that change the control details include Speed change function, Override function, Acceleration/deceleration time change function, and Torque change function. Each function is executed by setting parameters or creating and writing a program.

Both Speed change function and Override function change the speed. The following shows the differences between these functions. Select one function corresponding to the application.

Speed change function

- The speed is changed at any timing, only in the control being executed.
- The new speed is directly set.

Override function

- The speed is changed for all controls to be executed. (Note that the manual pulse generator operation is excluded.)
- The new speed is set in percentage (%) of the command speed.

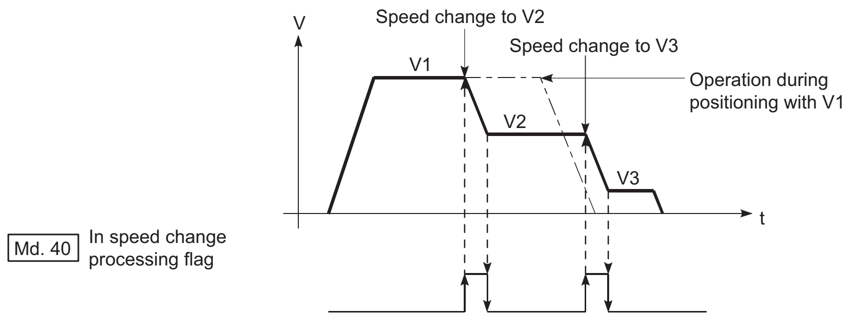
Speed change function

Speed change function changes the speed of the operation being controlled to a newly specified speed at a specified timing. The new speed is directly set in the buffer memory, and the speed is changed using a speed change command ([Cd.15] Speed change request) or an external command signal.

During the machine OPR, the speed change to the creep speed cannot be performed after the deceleration (or acceleration) start due to the detection of the near-point dog ON.

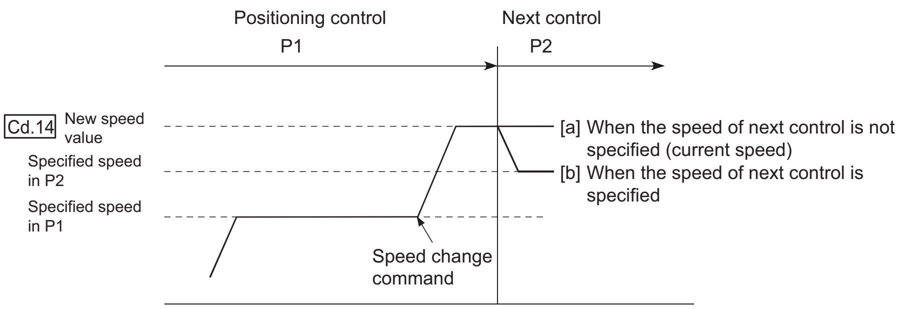
Control details

The following figure shows the operation during the speed change.

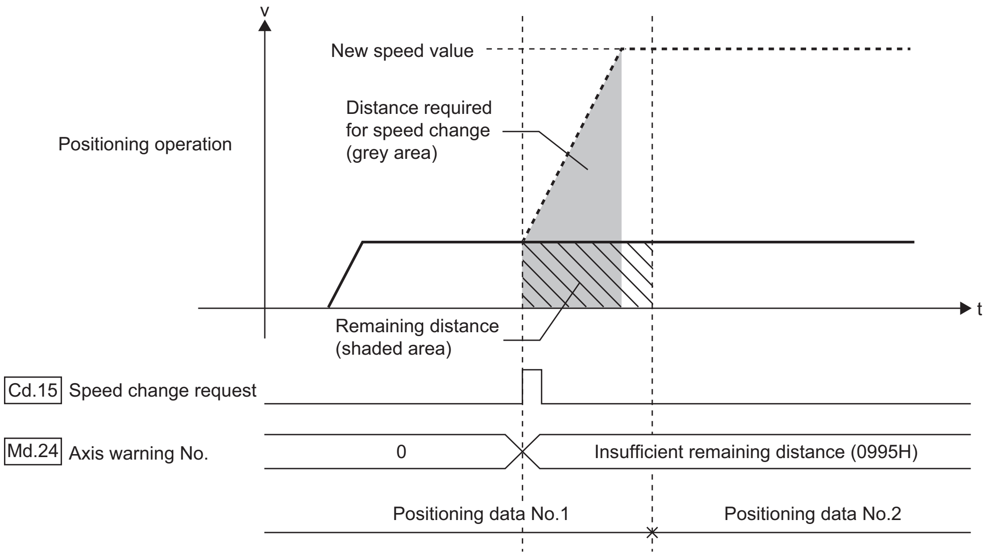


Control precautions

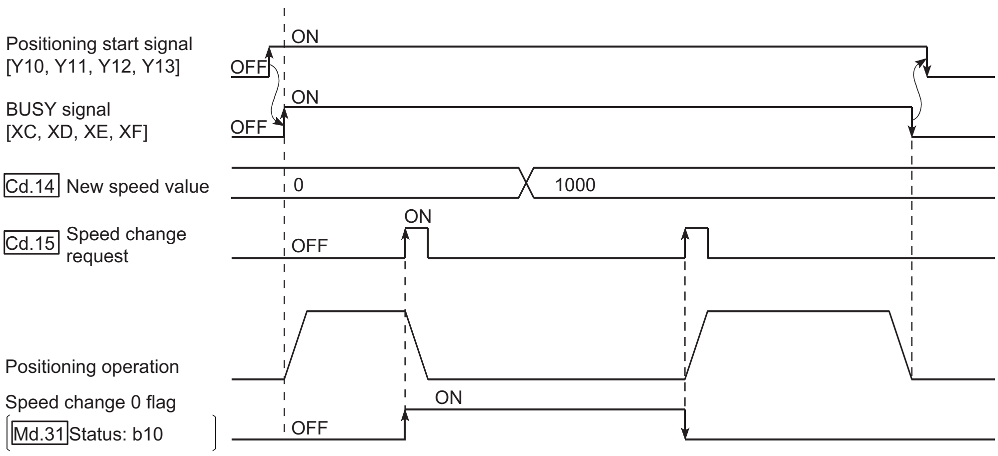
- When the speed is changed during the continuous path control, the next positioning data is controlled with [Cd.14] New speed value if no speed is specified (current speed) in the next positioning data. When a speed is specified in the next positioning data, the next positioning data is controlled at the speed of [Da.8] Command speed.



- When the speed is changed during the continuous path control, the speed change is ignored and Insufficient remaining distance (Warning code: 0995H) occurs if a distance enough to perform the speed change cannot be ensured.



- When the speed is changed by setting [Cd.14] New speed value to 0, the operation is performed as follows.
  - When [Cd.15] Speed change request is turned on, Speed change 0 flag ([Md.31] Status: b10) is turned on. (During the interpolation control, Speed change 0 flag on the reference axis side is turned on.)
  - The axis stops, but [Md.26] Axis operation status does not change and BUSY signal remains on.
  - When a value other than 0 is set in [Cd.14] New speed value and the speed is changed while Speed change 0 flag ([Md.31] Status: b10) is on, Speed change 0 flag ([Md.31] Status: b10) is turned off and the operation continues.
  - (If a stop signal is input while Speed change 0 flag ([Md.31] Status: b10) is on, BUSY signal turns off and [Md.26] Axis operation status changes to Stopped.) In this case, the operation cannot be continued even if a value other than 0 is set in [Cd.14] New speed value and the speed is changed.



- If the speed is changed during the deceleration by a stop command or during the automatic deceleration in the positioning control, Deceleration/stop speed change (Warning code: 0990H) occurs and the speed cannot be changed.
- When the value set in [Cd.14] New speed value exceeds the one in [Pr.8] Speed limit value, Speed limit value over (Warning code: 0991H) occurs and the speed is controlled with [Pr.8] Speed limit value.
- To change the speed during the interpolation control, configure the required setting in the reference axis.
- To change the speed successively, set 10ms or longer as the interval between each speed change. (If the interval between the speed changes is short, [Cd.15] Speed change request may not be accepted properly.)
- When a speed change is requested simultaneously to multiple axes, the speed change is performed one by one. Therefore, the start timing of the speed change is different for each axis.
- During the machine OPR, the speed cannot be changed by setting 0 to [Cd.14] New speed value. The speed change request is ignored.
- Deceleration start flag is not turned on when the deceleration is performed using the speed change function.

Setting the function from the CPU module

The following shows the data setting and a program example for changing the control speed of the axis 1 by the command sent from the CPU module. (In this example, the control speed is changed to 20.00mm/min.)

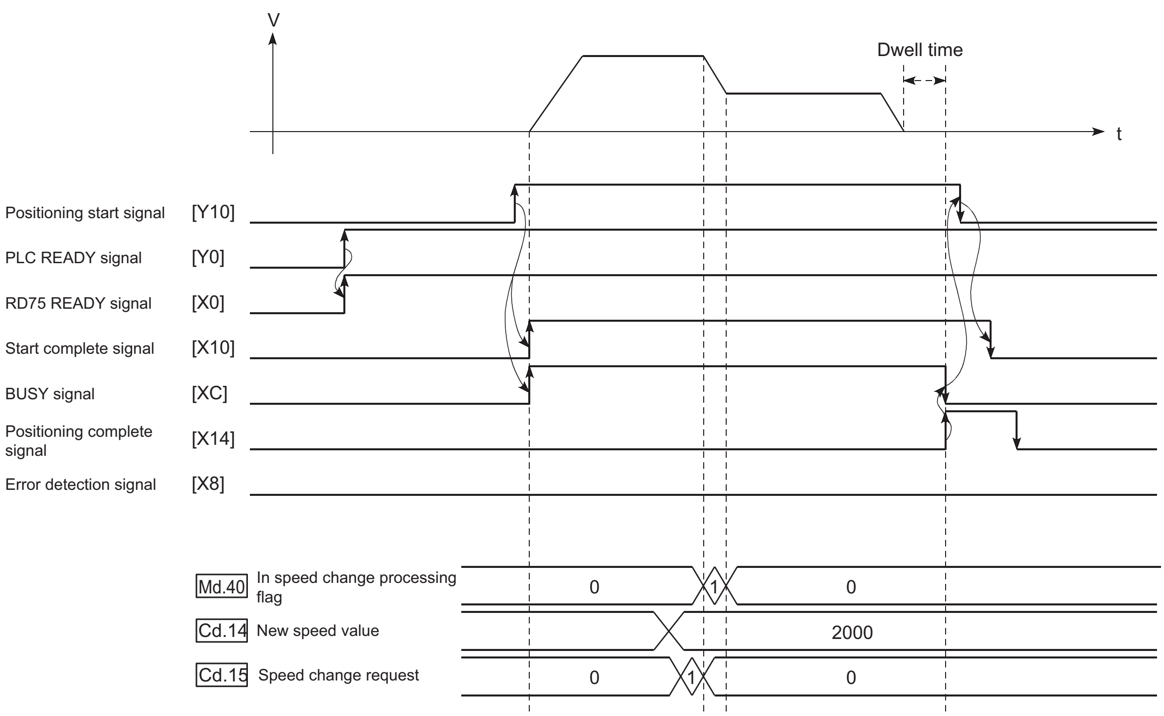
- Set the following data.

Setting item		Setting value	Setting detail	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

For details on the settings, refer to the following.

☞ Page 481 [Cd.14] New speed value
☞ Page 482 [Cd.15] Speed change request

- The following shows the time chart of the speed change.



- Add the following program to the control program, and write it to the CPU module.

☞ Page 516 Speed change program

Setting the function using an external command signal

The speed can also be changed using an external command signal.

The following shows the data setting and a program example for changing the control speed of the axis 1 using an external command signal. (In this example, the control speed is changed to 10000.00mm/min.)

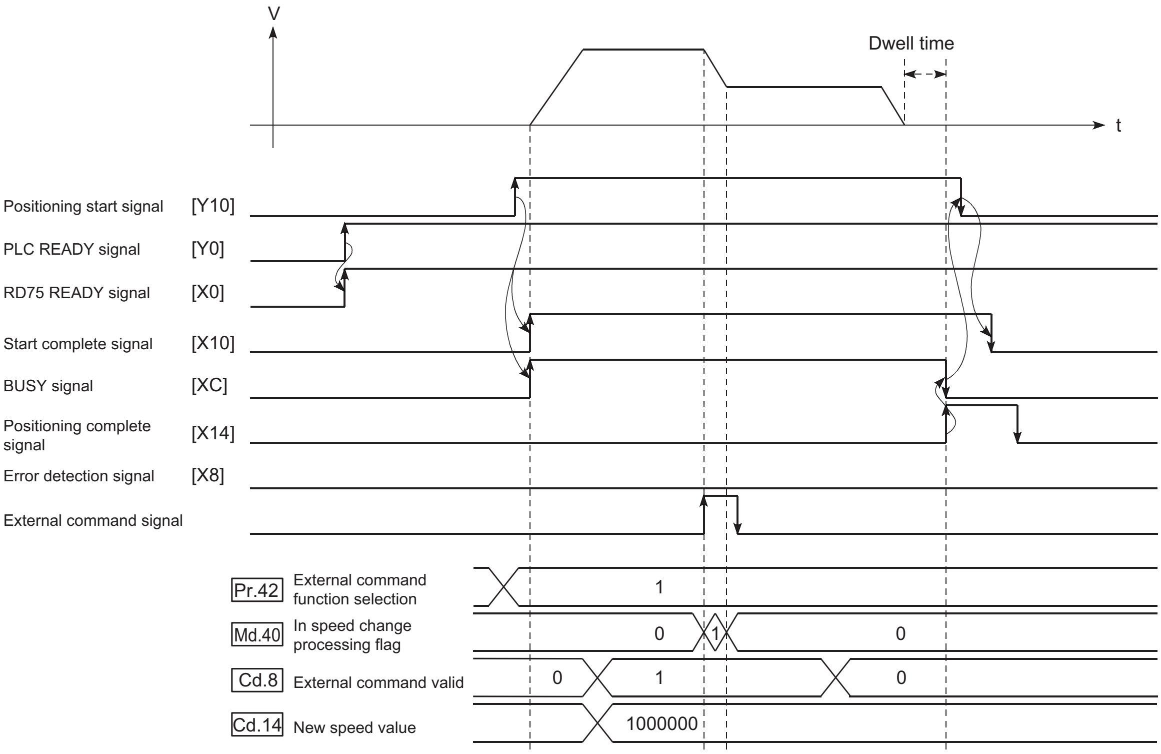
- Set the following data to perform the speed change using an external command signal.

Setting item		Setting value	Setting detail	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 external command.	1505	1605	1705	1805
[Cd.14]	New speed value	1000000	Set the new speed.	1514 1515	1614 1615	1714 1715	1814 1815

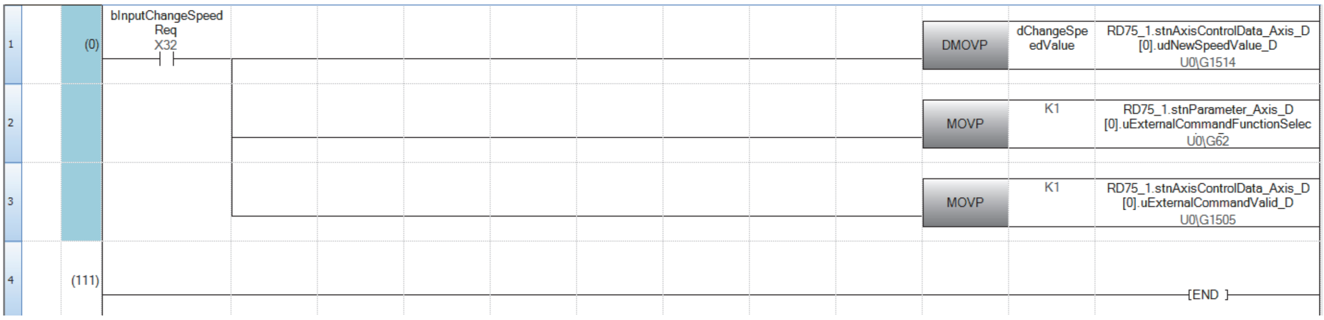
For details on the settings, refer to the following.

☞ Page 416 [Pr.42] External command function selection
☞ Page 479 [Cd.8] External command valid
☞ Page 481 [Cd.14] New speed value

- The following shows the time chart of the speed change.



• Add the following program to the control program, and write it to the CPU module.



<table>
<tr><th>Classification</th><th>Label Name</th><th>Description</th></tr>
<tr><td rowspan="3">Module label</td><td>RD75_1.stnParameter_Axis_D[0].uExternalCommandFunctionSelection_D</td><td>Axis 1 [Pr.42] External command function selection</td></tr>
<tr><td>RD75_1.stnAxisControlData_Axis_D[0].uExternalCommandValid_D</td><td>Axis 1 [Cd.8] External command valid</td></tr>
<tr><td>RD75_1.stnAxisControlData_Axis_D[0].udNewSpeedValue_D</td><td>Axis 1 [Cd.14] New speed value</td></tr>
<tr><td>Global label, local label</td><td colspan="2">Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.
<table>
<tr><th></th><th>Label Name</th><th>Data Type</th><th>Class</th></tr>
<tr><td>1</td><td>dChangeSpeedValue</td><td>Double Word [Unsigned]/Bit String [32-bit]</td><td>VAR</td></tr>
</table>
<table>
<tr><th></th><th>Label Name</th><th>Data Type</th><th>Class</th><th>Assign (Device/Label)</th></tr>
<tr><td>123</td><td>bInputChangeSpeedReq</td><td>Bit</td><td>VAR_GLOBAL</td><td>X32</td></tr>
</table>
</td></tr>
</table>

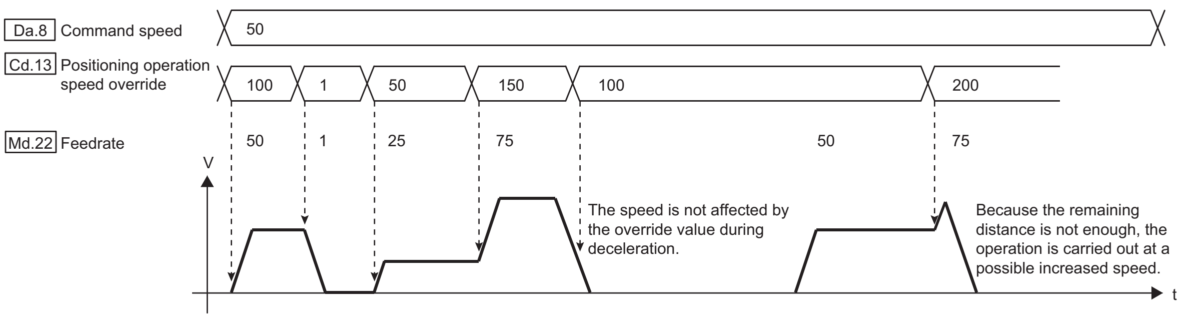
Override function

Override function changes the command speed by a specified percentage (0 to 300%) for all controls 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.

Control details

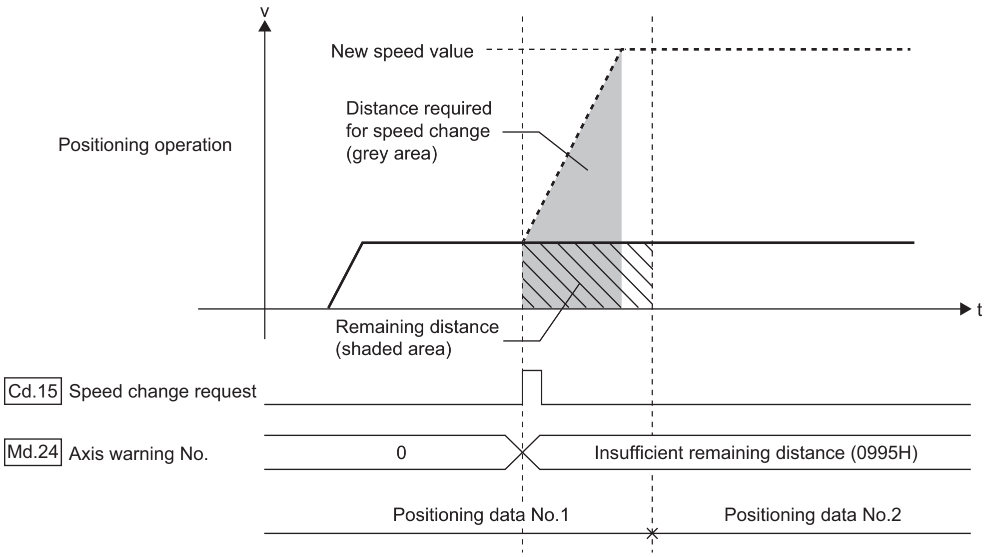
The following shows the operation of the override function.

- This function is valid from the moment when the positioning control is started.
- A value changed using the override function is monitored by [Md.22] Feedrate.
- If [Cd.13] Positioning operation speed override is set to 100%, the speed does not change.
- If [Cd.13] Positioning operation speed override is set to 1 to 100% and the value in [Md.22] Feedrate is less than 1, Less than speed 1 (Warning code: 0904H) occurs and the control is performed at the speed unit 1 at that time.
- When [Cd.13] Positioning operation speed override is set to 0%, the speed becomes 0 and Speed change 0 flag ([Md.31] Status: b10) is turned on.
- When the speed is changed using the override function during the position control or during the position control of the speed-position switching control and position-speed switching control, the operation is performed at a speed for the distance if a distance enough to perform the speed change cannot be ensured.
- If the speed changed using the override function is equal to or greater than the value set in [Pr.8] Speed limit value, Speed limit value over (Warning code: 0991H) occurs and the speed is controlled at the speed set in [Pr.8] Speed limit value. [Md.39] In speed limit flag is turned on.



Control precautions

- When the speed is changed using Override function during the continuous path control, the speed change is ignored and Insufficient remaining distance (Warning code: 0995H) occurs if a distance enough to perform the speed change cannot be ensured.



- During the deceleration by a stop command or during the automatic deceleration in the position control, Deceleration/stop speed change (Warning code: 0990H) occurs and the speed cannot be changed using the override function. (The value set in [Cd.13] Positioning operation speed override is validated after the deceleration stop.)
- To change the speed using the override function during the interpolation control, configure the required setting in the reference axis.
- To change the speed successively using the override function, set 10ms or longer as the interval between each speed change. (If the interval between the speed changes is short, the override value may not be reflected to the speed.)
- When the machine OPR is performed, the speed change using the override function cannot be performed after the start of the deceleration to the creep speed following the detection of the near-point dog ON. In this case, the speed change request is ignored.
- Deceleration start flag is not turned on when the deceleration is performed using the override function.

Setting method

The following shows the data setting and a program example for setting the override value of the axis 1 to 200%.

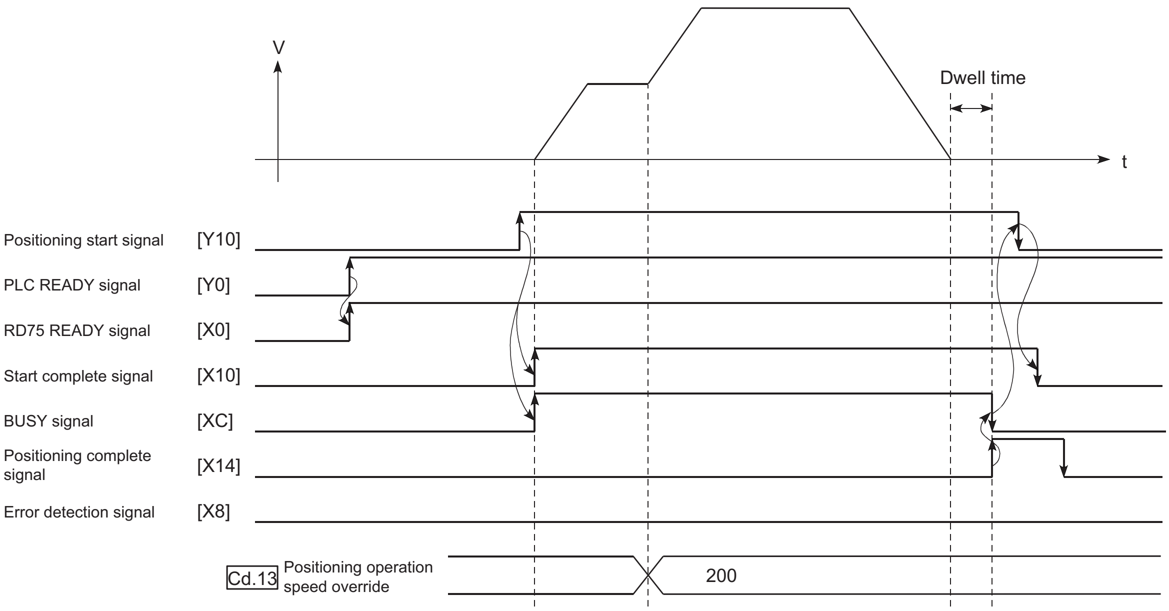
- Set the following data.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.13]	Positioning operation speed override	200	Set the new speed in percentage (%).	1513	1613	1713	1813

For details on the settings, refer to the following.

☞ Page 481 [Cd.13] Positioning operation speed override

- The following shows the time chart of the speed change using the override function.



- Add the following program to the control program, and write it to the CPU module.

☞ Page 516 Override program

Acceleration/deceleration time change function

Acceleration/deceleration time change function is used to change the acceleration/deceleration time during the speed change to an arbitrary value when the speed change is performed using Speed change function and Override function.
In a normal speed change (when the acceleration/deceleration time is not changed), the acceleration/deceleration time previously set in the parameters (values in [Pr.9], [Pr.10], and [Pr.25] to [Pr.30]) is set in [Da.3] and [Da.4] of the positioning data, and the control is performed with that acceleration/deceleration time. However, by setting a new acceleration/deceleration time ([Cd.10] and [Cd.11]) to 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] and [Cd.11]).

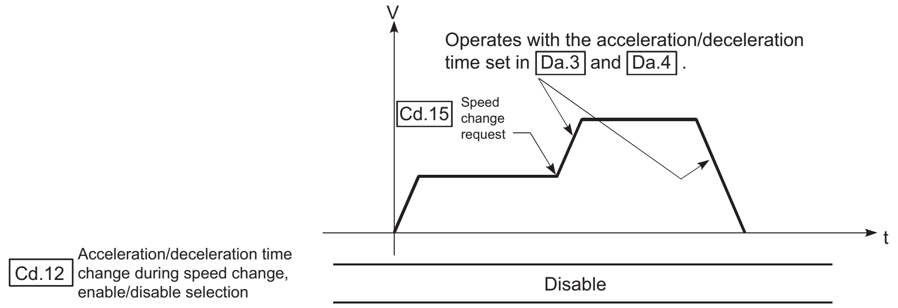
Control details

After setting the following two items, perform the speed change to change the acceleration/deceleration time at the speed change.

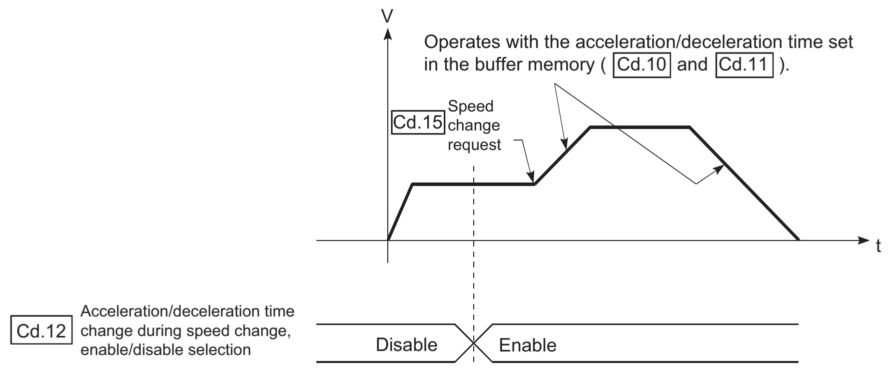
- Setting a new value of the acceleration/deceleration time ([Cd.10] New acceleration time value, [Cd.11] New deceleration time value)
- Enabling the acceleration/deceleration time change ([Cd.12] Acceleration/deceleration time change during speed change, enable/disable selection)

The following figure shows the operation at the acceleration/deceleration time change.

- When Acceleration/deceleration time change disabled is set

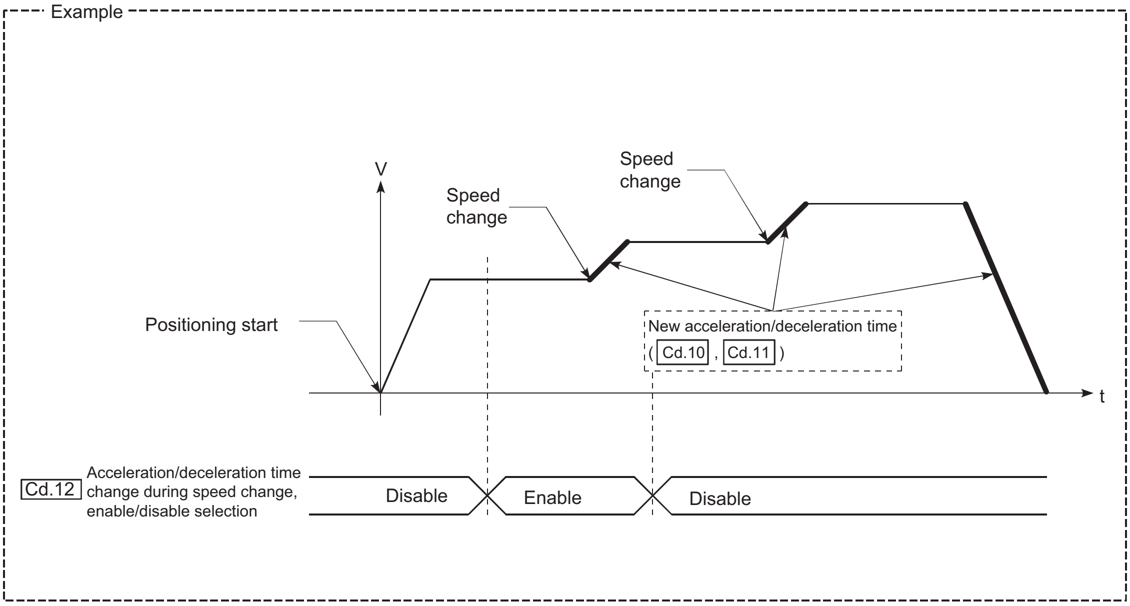


- When Acceleration/deceleration time change enabled is set

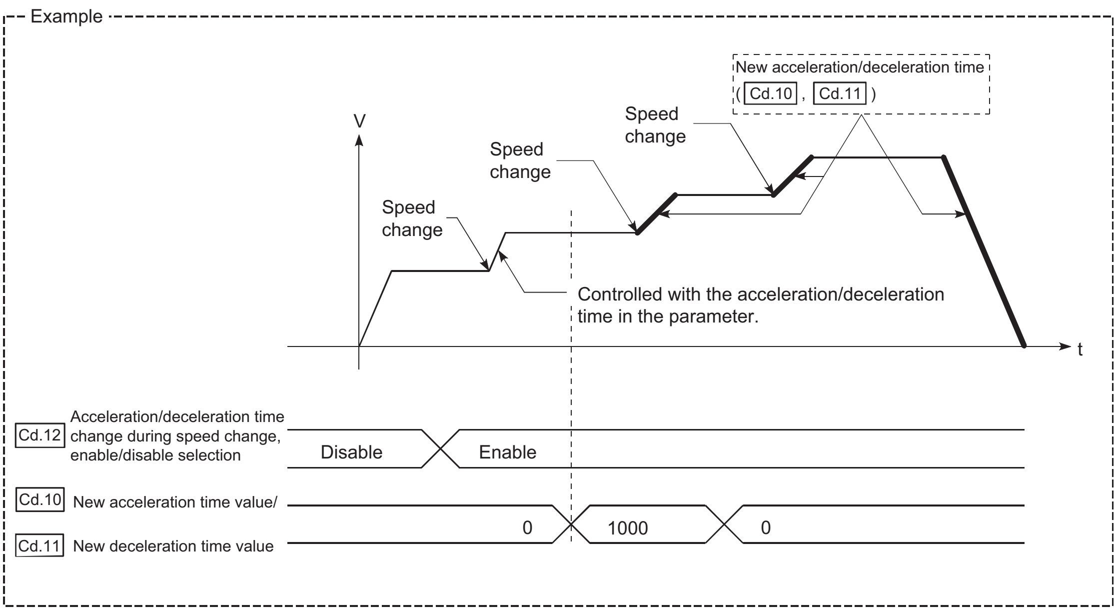


Control precautions

- When 0 is set in [Cd.10] New acceleration time value and [Cd.11] New deceleration time value, the acceleration/deceleration time is not changed even if the speed change is performed. In this case, the operation is controlled at the acceleration/deceleration time previously set in the parameters.
- New acceleration/deceleration time is valid during the execution of the positioning data for which the speed change was performed. In the continuous positioning control and continuous path control, even though the speed change is performed and the acceleration/deceleration time has been changed to the new acceleration/deceleration time ([Cd.10] and [Cd.11]), the control will be performed at the previously set acceleration/deceleration time when switching to the next positioning data is performed.
- Even if the acceleration/deceleration time change is set to be disabled after New acceleration/deceleration time is validated, the positioning data for which New acceleration/deceleration time was validated continues to be controlled with that value. (The next positioning data is controlled at the acceleration/deceleration time set in the parameters in advance.)



- If New acceleration/deceleration time is set to 0 and the speed change is performed after New acceleration/deceleration time is validated, the operation is controlled at the previous New acceleration/deceleration time.



Point

If the speed change is performed when the acceleration/deceleration time change is enabled, New acceleration/deceleration time becomes the acceleration/deceleration time for the positioning data being executed. New acceleration/deceleration time remains valid until switching to the next positioning data is performed. (The automatic deceleration processing at the completion of the positioning is also controlled at the new deceleration time.)

Setting method

To use the acceleration/deceleration time change function, write the following data into the RD75 using a program.
The following shows the data setting and a program example for changing the acceleration/deceleration time of the axis 1 by the command sent from the CPU module. (In this example, the acceleration time is changed to 2000ms and the deceleration time is changed to 0 (the deceleration time is not changed).)
The set data becomes valid when the data is written into the RD75 and the speed change is performed.

- Set the following data.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.10]	New acceleration time value	2000	Set the new acceleration time.	1508 1509	1608 1609	1708 1709	1808 1809
[Cd.11]	New deceleration time value	0	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 enabled.	1512	1612	1712	1812

For details on the settings, refer to the following.
☞ Page 480 [Cd.10] New acceleration time value
☞ Page 480 [Cd.11] New deceleration time value
☞ Page 481 [Cd.12] Acceleration/deceleration time change during speed change, enable/disable

- Add the following program to the control program, and write it to the CPU module.

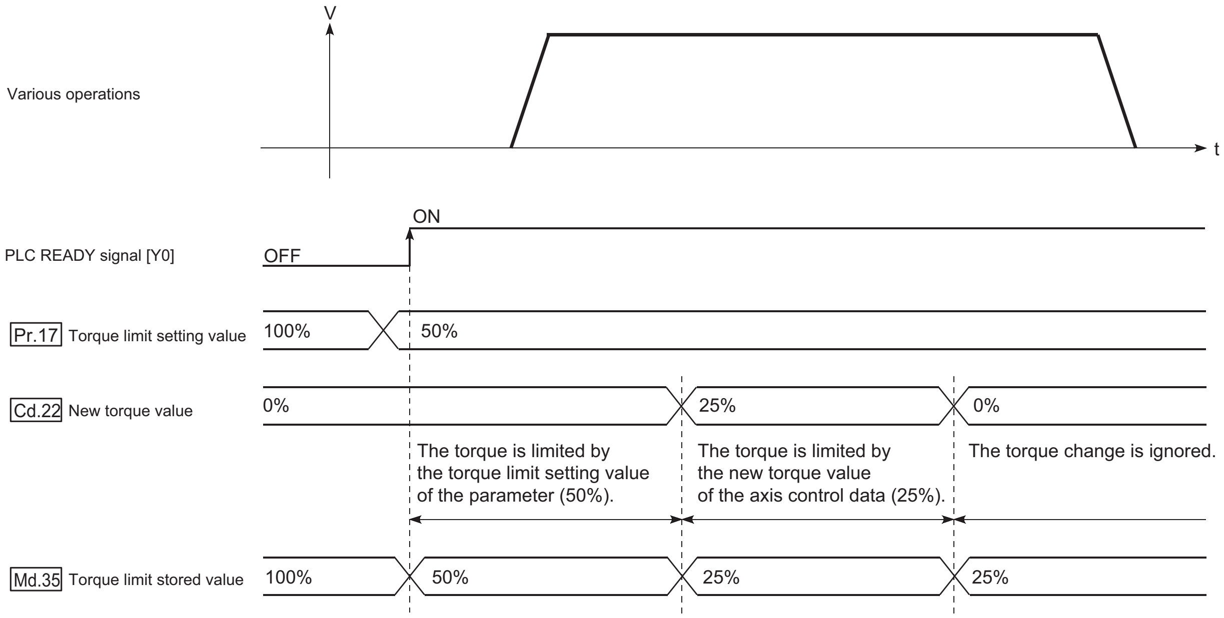
☞ Page 516 Acceleration/deceleration time change program

Torque change function

Torque change function changes the torque limit value during the control. The torque limit value during the control is normally the value in [Pr.17] Torque limit setting value that was previously set in the parameters. However, by setting a new torque limit value in [Cd.22] New torque value, the axis control data, and writing it to the RD75, the torque generated in the servomotor during the control can be limited with the new torque value. ([Cd.22] New torque value is validated when the value is written to the RD75.)

Control details

The setting of [Cd.22] New torque value is reflected to [Md.35] Torque limit stored value when the first PLC READY signal [Y0] is turned on after the power-on. After PLC READY signal [Y0] is turned on, the setting of [Cd.22] New torque value is always reflected to [Md.35] Torque limit stored value every time [Cd.22] New torque value is changed.
To return the value in [Md.35] Torque limit stored value to the value in [Pr.17] Torque limit setting value after the torque is changed, set 0 in [Cd.22] New torque value and turn off and on PLC READY signal [Y0]. (If [Cd.22] New torque value was 0 when PLC READY signal [Y0] is turned on, the value in [Pr.17] Torque limit setting value is set to [Md.35] Torque limit stored value.)
The setting range is between 0 and [Pr.17] Torque limit setting value. When the new torque value is 0, a torque change is considered not to be performed.



Control precautions

- If a value other than 0 is set in [Cd.22] New torque value, the torque generated in the servomotor is limited with that value. To limit the torque with the value set in [Pr.17] Torque limit setting value, set 0 in [Cd.22] New torque value.
- [Cd.22] New torque value is validated when the value is written to the RD75. (Note that [Cd.22] New torque value is not validated from when the power supply is turned on to when PLC READY signal [Y0] is turned on.)
- If the set value is outside the setting range, Outside new torque value range (Warning code: 0907H) occurs and the torque is not changed.
- To change the torque successively using the torque change function, set 10ms or longer as the interval between each torque change. (If the interval between the torque changes is short, the new torque value may not be reflected to the torque.)

Setting method

To use the torque change function, write the following data into the RD75 using a program.

The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	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

For details on the settings, refer to the following.

☞ Page 484 [Cd.22] New torque value

Target position change function

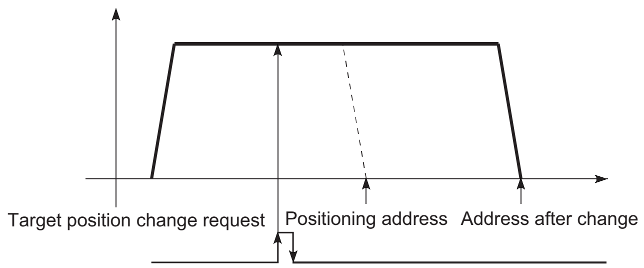
Target position change function changes a target position to a newly specified target position at a specified timing during the position control (1-axis linear control). The command speed can also be changed simultaneously with the target position change.

The new target position and command speed are set directly in the buffer memory, and the target position change is performed by turning on [Cd.29] Target position change request flag.

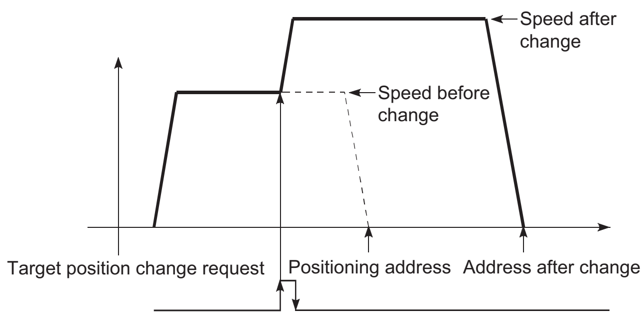
Control details

The following describes the control details of the target position change function.

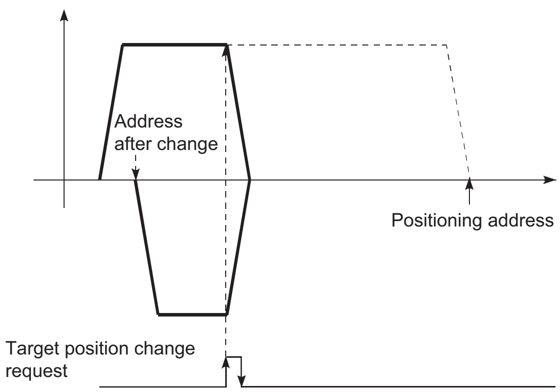
- When the address after change is farther from the start point than the positioning address



- When the speed is changed simultaneously with the address change



- When the direction of the operation is changed



Control precautions

- If the positioning movement direction from the stop position to a new target position is reversed, the operation stops once and the positioning to the new target position is performed.
- If a command speed exceeding the speed limit value is set to change the command speed, Speed limit value over (Warning code: 0991H) occurs, and the new command speed becomes the speed limit value. Also, if a distance to the target value cannot be ensured due to the command speed change, Insufficient remaining distance (Warning code: 0995H) occurs.
- When [Cd.29] Target position change request flag is turned on in the following cases, the target position change request is ignored and a warning occurs.

Occurrence condition	Warning
During the interpolation control	Target position change not possible (Warning code: 099BH)
While the positioning data whose operation pattern is the continuous path control is executed	Target position change not possible (Warning code: 099CH)
The target position change value (new address) is outside the software stroke limit range.	Target position change not possible (Warning code: 099FH, 09A0H)
The target position change value (new address) is outside the range when [Pr.1] Unit setting is set to degree.	Target position change not possible (Warning code: 09A1H)
When the deceleration stop is performed due to a stop cause	Target position change not possible (Warning code: 099DH)
When Speed change 0 flag ([Md.31] Status: b10) is on	Target position change not possible (Warning code: 099EH)

- When the command speed is changed, the current speed is also changed. When the current speed is used as the next positioning speed in the continuous positioning, the next positioning operation is performed with the new speed value. When the speed is set with the next positioning data, that speed becomes the current speed and the operation is performed at the current speed.
- When a target position change request is given during the automatic deceleration in the position control and the movement direction is reversed, the positioning control to a new position is performed after the positioning has stopped once. If the movement direction is not reversed, the speed accelerates to the command speed again and the positioning to the new position is performed.
- Even though the speed changes to the constant speed or the output is reversed by performing the target position change while [Md.48] Deceleration start flag is on, Deceleration start flag remains on. (☞ Page 298 Deceleration start flag function)
- When the speed does not need to be changed, set 0 in [Cd.28] Target position change value (new speed).
- When the target position change is performed to the ABS linear 1 in degrees, the positioning to the new target position may be performed after the deceleration stop was performed once even though the movement direction is not is reversed.

Restriction

To change the target position successively, set 10ms or longer as the interval between each target position change. Set 10ms or longer interval for the speed change or override after the target position change or for the target position change after the speed change or override.

Setting the function from the CPU module

The following shows the data setting and a program example for changing the target position of the axis 1 by the command sent from the CPU module. (In this example, the target position is changed to 300.0μm and the command speed is changed to 10000.00mm/min.)

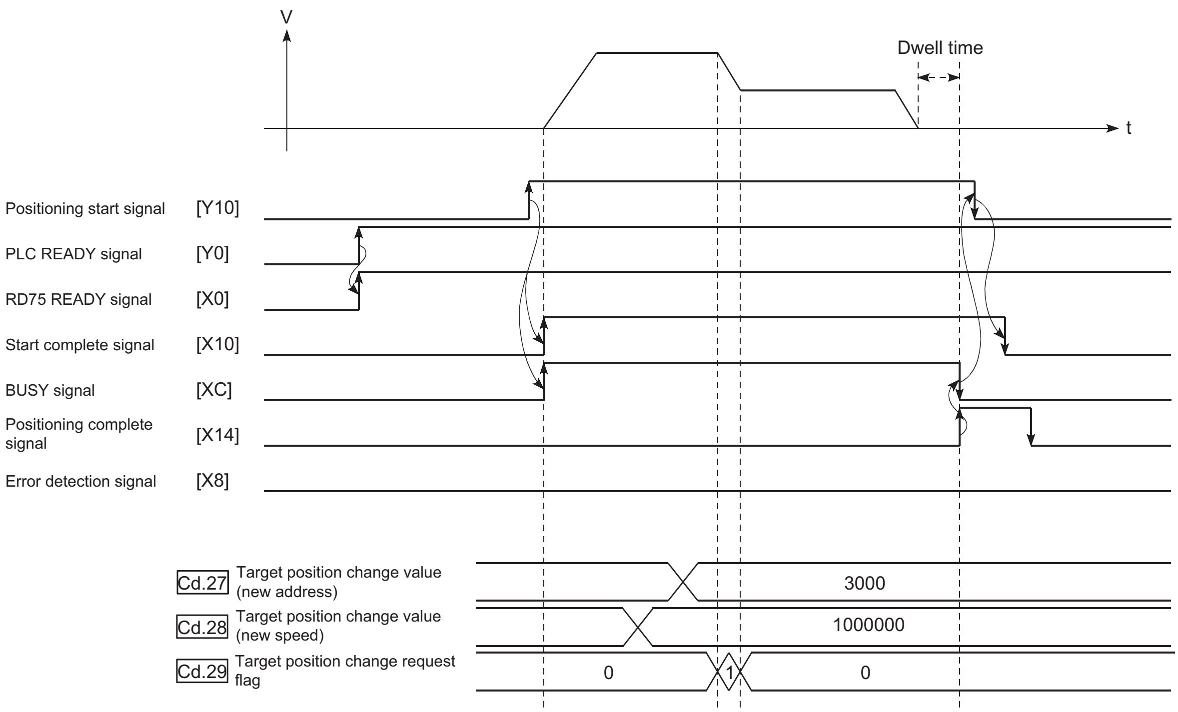
- Set the following data.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.27]	Target position change value (new address)	3000	Set the new address.	1534 1535	1634 1635	1734 1735	1834 1835
[Cd.28]	Target position change 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: Change target position.	1538	1638	1738	1838

For details on the settings, refer to the following.

☞ Page 486 [Cd.27] Target position change value (new address)
☞ Page 486 [Cd.28] Target position change value (new speed)
☞ Page 486 [Cd.29] Target position change request flag

- The following shows the time chart of the target position change.



- Add the following program to the control program, and write it to the CPU module.

☞ Page 519 Target position change program

7.6 Function Related to Start

As the functions related to start, Pre-reading start function and Start time adjustment function are provided. Each function is executed by setting parameters or creating and writing a program.

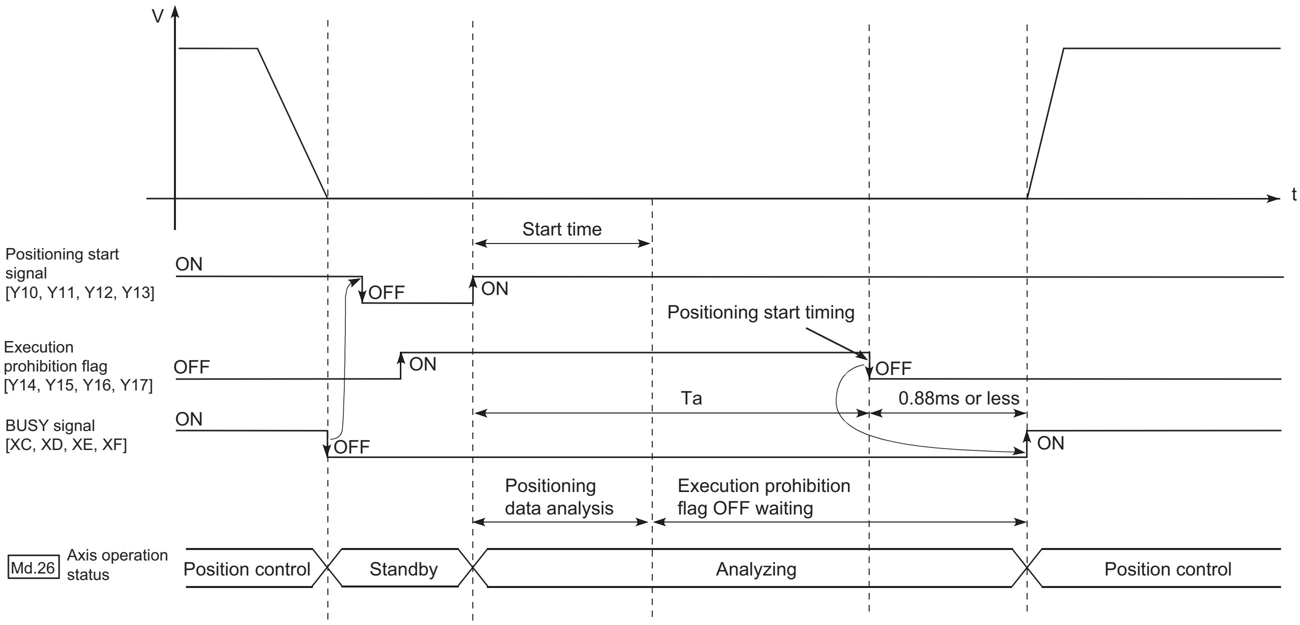
Pre-reading start function

This function is provided to ensure the compatibility with the QD75N and LD75. Pre-reading start function does not output pulses while Execution prohibition flag is on if a positioning start request is given with the Execution prohibition flag on, and starts outputting pulses within 0.88ms after the off state of Execution prohibition flag is detected.

Control details

The pre-reading start function is performed by turning on Positioning start signal [Y10, Y11, Y12, Y13] or executing the dedicated instruction (GP. PSTRT□) while Execution prohibition flag [Y14, Y15, Y16, Y17] is on. If the positioning is started while Execution prohibition flag is on, the positioning data is analyzed but pulses are not output. While Execution prohibition flag is on, the setting of [Md.26] Axis operation status remains 5: Analyzing. When Execution prohibition flag [Y14, Y15, Y16, Y17] is turned off, the RD75 starts outputting pulses within 0.88ms, and changes [Md.26] Axis operation status to the status (such as Position control and In speed control) according to the control method used.

The pre-reading start function is invalid if Execution prohibition flag is turned off in the time between when Positioning start signal is turned on and when the analysis of the positioning data is completed (Ta < Start time). (Ta is the time from when Positioning start signal [Y10, Y11, Y12, Y13] is turned on to when Execution prohibition flag [Y14, Y15, Y16, Y17] is turned off.)



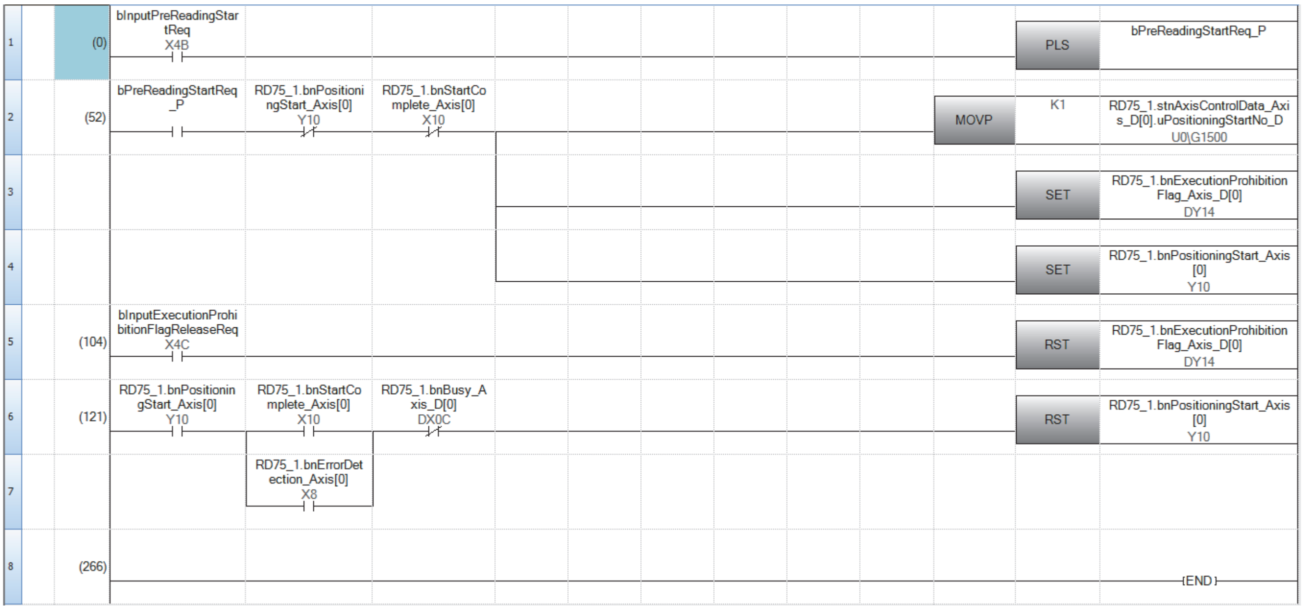
Control precautions

- The time required to analyze the positioning data is up to 7ms.
- After the positioning data analysis, the system is put in the execution prohibition flag OFF waiting state. Any change made to the positioning data in the execution prohibition flag OFF waiting state is not reflected on the positioning data. Change the positioning data before turning on Positioning start signal.
- The data numbers (set in [Cd.3] Positioning start No.) that can be used for the positioning start using the pre-reading start function are from No.1 to 600. If any number between 7000 to 7004 or 9001 to 9004 is set and the pre-reading start function is performed, Outside start No. range (Error code: 19A3H) occurs.
- Always turn on Execution prohibition flag at the same time or before turning on Positioning start signal. Pre-reading may not be started if Execution prohibition flag is turned on after Positioning start signal is turned on and during Ta. The pre-reading start function is invalid if Execution prohibition flag is turned on after the positioning start (pulse output) is performed while Execution prohibition flag is off. (The function is enabled at the next positioning start.)

Program example

The following shows a program example of the pre-reading start function.

- When Positioning start signal [Y10, Y11, Y12, Y13] is used



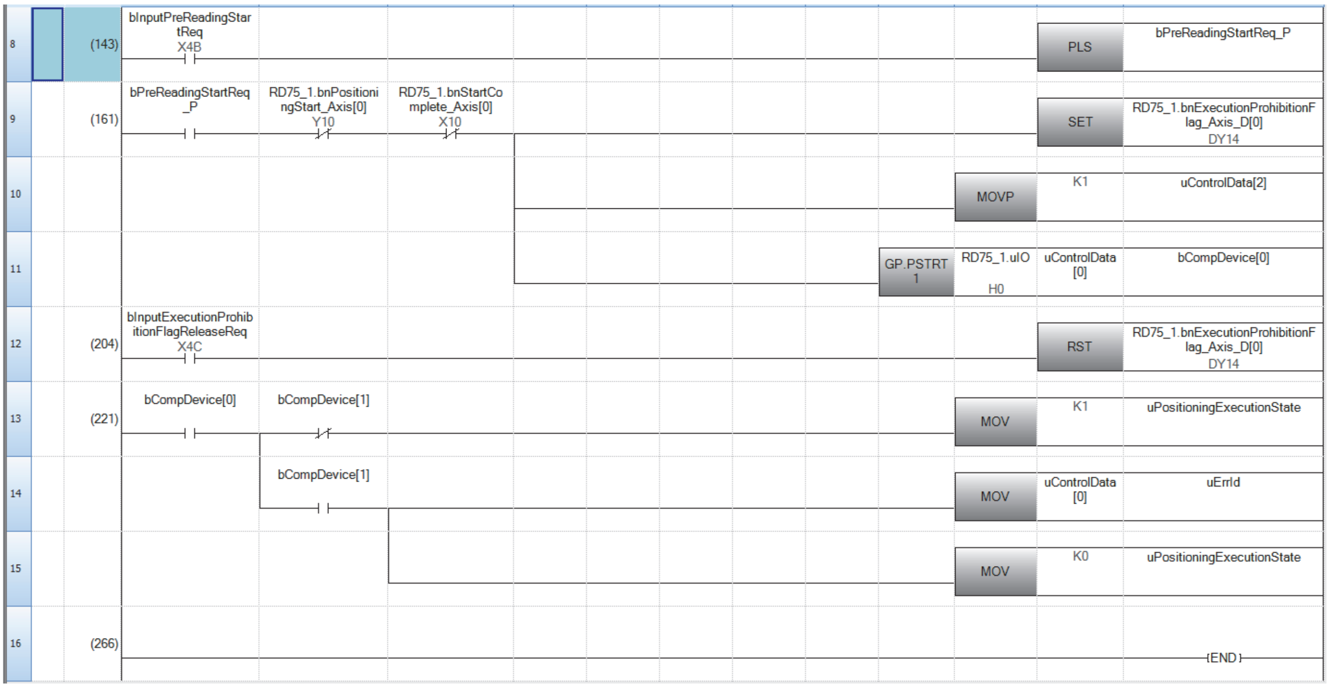
Classification	Label Name	Description
Module label	RD75_1.bnErrorDetection_Axis[0]	Error detection signal [X8]
	RD75_1.bnBusy_Axis_D[0]	Axis 1 BUSY signal [XC]
	RD75_1.bnStartComplete_Axis[0]	Axis 1 Start complete signal [X10]
	RD75_1.bnPositioningStart_Axis[0]	Axis 1 Positioning start signal [Y10]
	RD75_1.bnExecutionProhibitionFlag_Axis_D[0]	Axis 1 Execution prohibition flag [Y14]
	RD75_1.stnAxisControlData_Axis_D[0].uPositioningStartNo_D	Axis 1 [Cd.3] Positioning start No.
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.	

	Label Name	Data Type		Class
1	bPreReadingStartReq_P	Bit	...	VAR

	Label Name	Data Type		Class	Assign (Device/Label)
147	bInputPreReadingStartReq	Bit	...	VAR_GLOBAL	X4B
148	bInputExecutionProhibitionFlagReleaseReq	Bit	...	VAR_GLOBAL	X4C

7

• When the dedicated instruction (GP.PSTRT□) is used



Classification	Label Name	Description
Module label	RD75_1.bnStartComplete_Axis[0]	Axis 1 Start complete signal [X10]
	RD75_1.bnPositioningStart_Axis[0]	Axis 1 Positioning start signal [Y10]
	RD75_1.bnExecutionProhibitionFlag_Axis_D[0]	Axis 1 Execution prohibition flag [Y14]
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.	

	Label Name	Data Type		Class
1	bPreReadingStartReq_P	Bit	...	VAR
2	uControlData	Word [Unsigned]/Bit String [16-bit](0..2)	...	VAR
3	bCompDevice	Bit(0..1)	...	VAR
4	uPositioningExecutionState	Word [Signed]	...	VAR
5	uErrId	Word [Signed]	...	VAR

	Label Name	Data Type		Class	Assign (Device/Label)
147	bInputPreReadingStartReq	Bit	...	VAR_GLOBAL	X4B
148	bInputExecutionProhibitionFlagReleaseReq	Bit	...	VAR_GLOBAL	X4C

Start time adjustment function

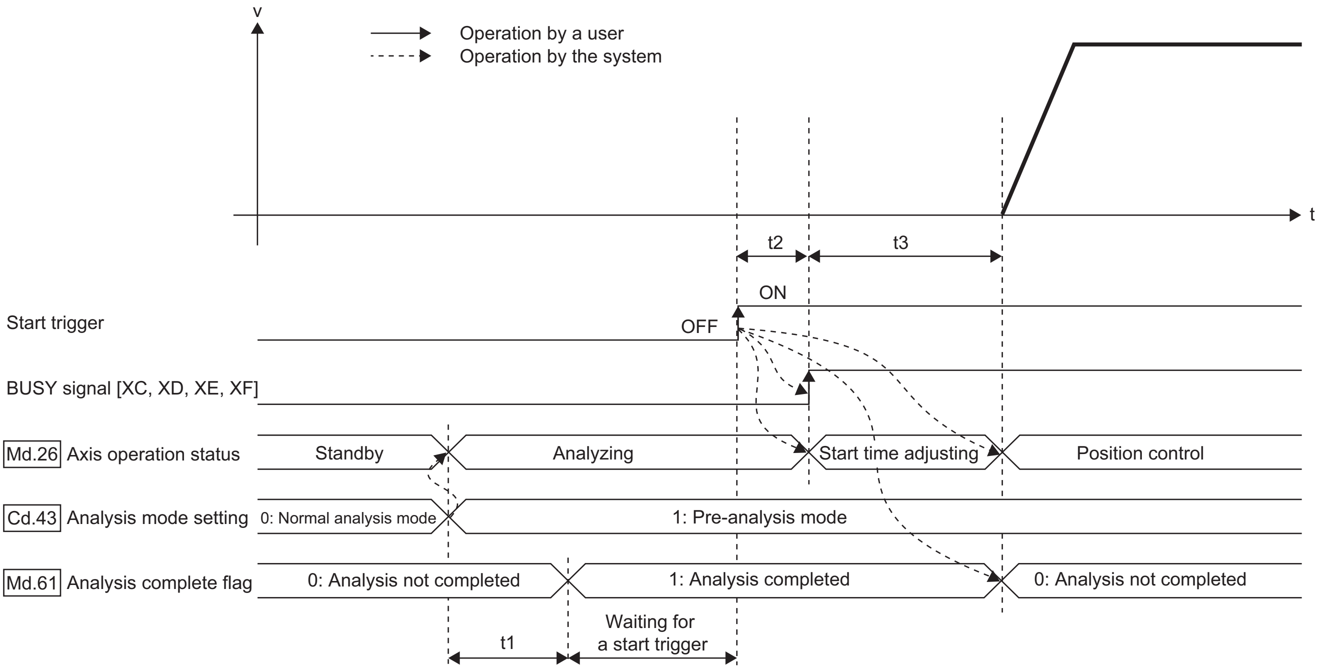
Start time adjustment function is used together with Quick start function to adjust the time from when a positioning start trigger is input to when the RD75 starts outputting pulses.

Point

This function allows users to make a fine adjustment in the start timing without repositioning a sensor.

Control details

The start time adjustment function starts the positioning after a positioning start trigger is input and the time set in [Pr.82] Start adjustment time elapses, as shown in the following figure.



Normal timing time

t1	t2*1	t3
0.88 to 1.77ms	External command signal: 20µs Positioning start signal: 8µs	[Pr.82] Start adjustment time

*1 The start time for when the quick start function is used.

Restrictions

- The start time adjustment function is valid only for Quick start.
- For [Pr.82] Start adjustment time, the setting at the analysis of the positioning data is valid.
- Turn on a start trigger after the analysis of the positioning data is completed. If a start trigger is turned on before the analysis is completed, Pre-analysis incomplete start (Warning code: 09A2H) occurs and the RD75 starts outputting pulses immediately after the analysis is completed.

Restriction

If a positioning start trigger is turned on before the analysis of the positioning data is completed, the RD75 starts outputting pulses immediately after the analysis is completed and the variation in the start timing becomes large.

Setting method

To use the start time adjustment function, write the following data into the RD75 using a program.
The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.82]	Start adjustment time	0 to 1000000	Set the adjustment time for pulse outputs. 0.00 to 10000.00ms (in increments of 0.01mm)	134 135	284 285	434 435	584 585

For details on the settings, refer to the following.
☞ Page 416 [Pr.82] Start adjustment time

Precautions

Even if a single value is set in [Pr.82] Start adjustment time of multiple RD75s, the actual start adjustment times may differ due to the characteristic of each RD75 module. If multiple RD75s start the positioning simultaneously or an RD75 is replaced, adjust the value in [Pr.82] Start adjustment time again.

7.7 Absolute Position Restoration Function

⚠CAUTION

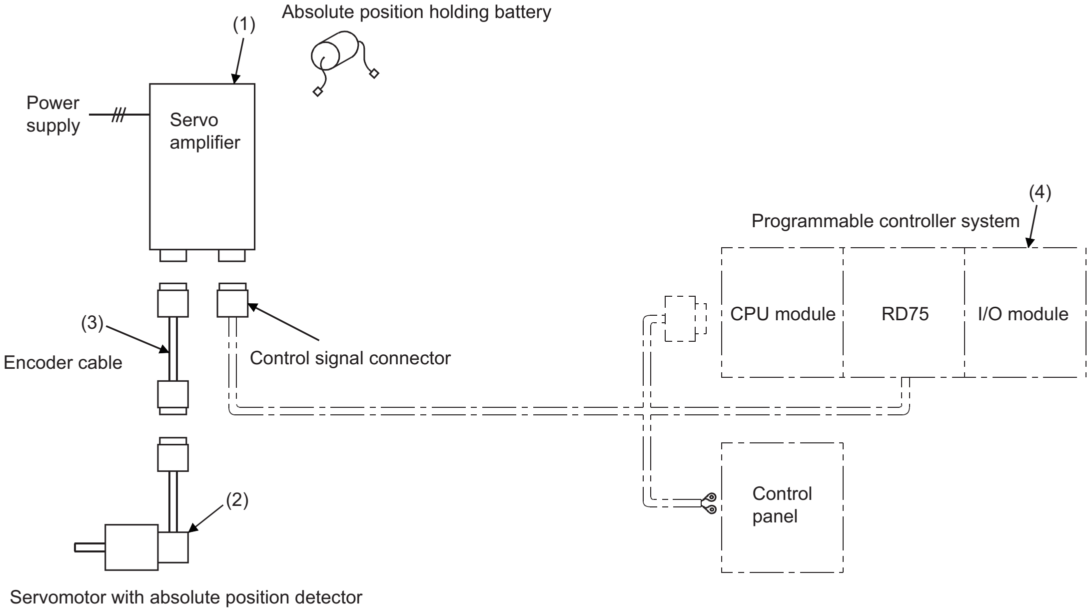
An absolute position restoration by the positioning function may turn off Servo ON signal (servo off) for approximately 60ms + scan time, and the motor may run unexpectedly. If this causes a problem, provide an electromagnetic brake to lock the motor during absolute position restoration.

Absolute position restoration function restores the absolute position of the specified axis using the absolute position detection system. When this function is used, the OPR after power off due to an instantaneous power failure and emergency stop is not required, and the restoration operation at site can be performed easily.

Configuration and preparation of the absolute position detection system

Configuration

The following figure shows the configuration of the absolute position detection system.



Preparation

Prepare the absolute position detection system with caution by referring to the following descriptions.

Component	Description
(1) Servo amplifier	• Use a Mitsubishi Electric General-Purpose AC Servo which has an absolute position detection function (absolute position data transfer protocol) equivalent to that of MR-J3-□A). • Install the battery to the servo amplifier. • Validate the absolute position detection function of the servo amplifier. For details, refer to the manual for the servo amplifier used.
(2) Servomotor	• Use a servomotor with absolute position detector. For details, refer to the manual for the servo motor used.
(3) Encoder cable	• Add a battery power connection cable (BAT/LG signal) to the incremental encoder cable connection. For details, refer to the manual for the cable used.
(4) Programmable controller system	• Establish the communications of absolute position detection data using I/O modules (three input points /three output points). • Use I/O modules with any number of points. • Allocating the three input signals in serial order facilitates the control with a program. This also applies to the three output signals.

Overview of the absolute position detection system

The detector comprises an encoder for the detection of position in one rotation in addition to the A, B, and Z phase signals for the position control in normal operation and an accumulative revolution counter for the detection of the number of rotations.
The absolute position detection system detects the absolute position of the machine constantly and stores it with the backup of the battery irrespective of the state of the power supply to the programmable controller system. Therefore, once the OP initial setting is performed at the time of the installation of the machine, no OPR is required even when the power is turned on later. The restoration of the system can be performed easily even when an instantaneous power failure or an emergency stop occurs.
In addition, because the absolute position data is backed up by a super capacitor in the detector, the absolute position data will be hold for a specified time even if a cable is disconnected or broken.

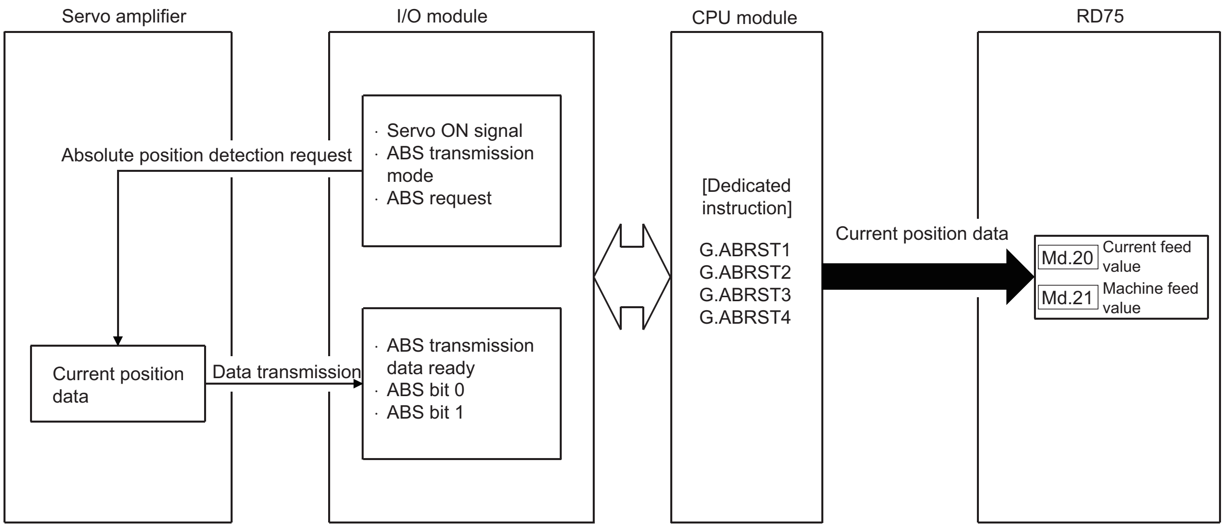
Transmission procedure for absolute position signal

The following figure shows the overview of the absolute position signal transmission procedure between a servo amplifier and a programmable controller system (CPU module, RD75, and I/O modules).
For details on the communication between the servo amplifier and programmable controller system, refer to the manual for the servo amplifier used.

Errors during communication

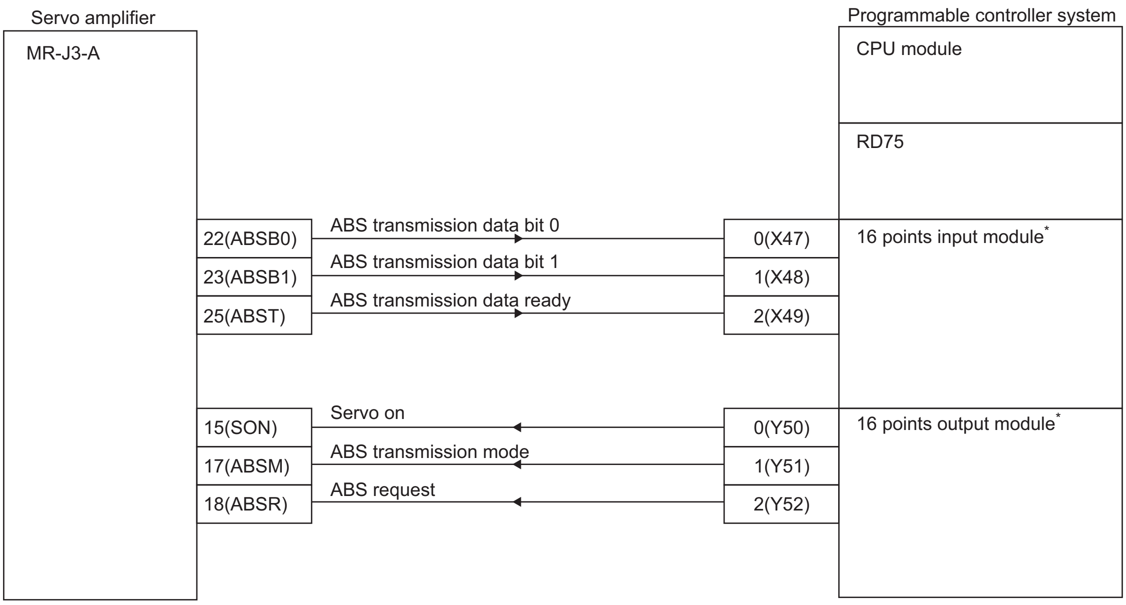
- If a time-out occurs during communication, ABS transmission time out (Error code: 1949H) occurs.
- If transmission data causes a sum error, ABS transmission SUM (Error code: 194AH) occurs.

For corrective actions on errors, refer to the following.
☞ Page 535 List of Error Codes



Connection example

The following figure shows an example of the connection between the programmable controller system and the Mitsubishi Electric servo amplifier (MR-J3-A).



*: The X and Y devices can be set arbitrarily with the program.

The following table describes the pins used for setting the absolute position detection system.

Signal name	Abbreviation	Pin No.	Function and application
ABS transmission mode	ABSM	17*1	While the ABSM is on, the servo amplifier is in the ABS transmission mode, and the CN1-22, 23, and 25 functions are as shown below in this table.
ABS request	ABSR	18*1	The ABSR is turned on when ABS data is requested in the ABS transmission mode.
ABS transmission data bit 0	ABSB0	22	This signal indicates the lower bit of the two bits of ABS data to be transferred from the servo amplifier to the programmable controller system in the ABS transmission mode. The ABSB0 turns on when this signal occurs.
ABS transmission data bit 1	ABSB1	23	This signal indicates the upper bit of the two bits of ABS data to be transferred from the servo amplifier to the programmable controller system in the ABS transfer mode. The ABSB1 turns on when this signal occurs.
ABS transmission data ready	ABST	25	This signal indicates that the ABS transmission data is ready in the ABS transmission mode. When the data is ready, the ABST is turned on.

*1 When Use in the absolute position detection system is selected in the parameter No.PA03, the pin 17 is the ABS transmission mode (ABSM), and the pin 18 is the ABS request (ABSR). The signals do not return to the original signals even after the data transfer is completed.

For details on signals of the pin 17 and 18 while the ABS transmission mode is off and the input/output interface, refer to the manual for the servo amplifier (MR-J3-A).

Control precautions

- When an absolute position detection system is constructed, absolute position restoration must be performed at least once after the power supply is turned on or reset. Also, the servo amplifier does not servo on unless the absolute position restoration is completed.
- For an absolute position detection system, the OP shift function cannot be used together. If these functions are used together, positional deviation will occur.
- Limitless-feed controls exercised only in a fixed direction, such as the one using a turntable, cannot be performed.
- Positioning cannot be performed if the movement amount from the OP address exceeds the range of the conditions 1 and 2 shown in the restrictions on movement amounts. (☞ Page 272 Restrictions on movement amounts)

Restrictions on movement amounts

When performing the positioning in an absolute position detection system, use the system in a range which satisfies the following conditions 1 and 2.

In the range that does not satisfy the condition 1 and 2, positioning cannot be used in the absolute position detection system since the proper current value cannot be provided during the absolute position restoration.

Condition 1: Number of output pulses

This condition limits the number of pulses output from the positioning module to a servo amplifier when the positioning is performed with the OP 0 in the absolute position detection system. In the absolute position detection system, the number of pulses within the range determined by the following calculation formula can be output to the servo amplifier.

- Max. rotation range: OP ±32767 (rev)
- Detector resolution: 8192 (pulse/rev), 16384 (pulse/rev)

(-32767 × Detected resolution) ≤ (Number of output pulses) ≤ (32767 × Detected resolution)

The following table lists the number of output pulses for each detector resolution.

Detected resolution	Number of output pulses
8192 pulses	-268427264 to 268427264 pulses
16384 pulses	-536854528 to 536854528 pulses

When the electronic gear of the servo amplifier is used, the electronic gear ratio must be considered. The actual range of the numbers of output pulses is determined by multiplying the range of the number of output pulses above by the inverse number of the electronic gear ratio.

Electronic gear ratio	Detected resolution	Range of the numbers of output pulses
1/10 times	8192 pulses	-2684272640 to 2684272640 pulses
	16384 pulses	-5368545280 to 5368545280 pulses
20 times	8192 pulses	-13421363 to 13421363 pulses
	16384 pulses	-26842726 to 26842726 pulses

Condition 2: Positioning address

The following positioning addresses can be specified for the RD75:

Unit setting	Range of positioning addresses
mm	-214748364.8 to 214748364.7μm
inch	-21474.83648 to 21474.83647 inches
pulse	-2147483648 to 2147483647 pulses
degree	0 to 359.99999°

■Example 1

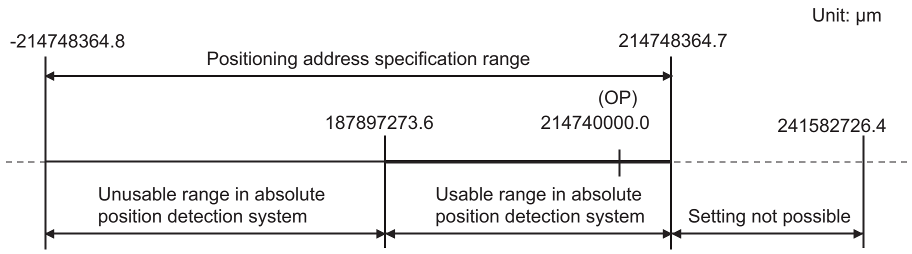
Using the formula 1, this example calculates the positioning address which can be specified in the system with the OP address 214740000.0 (μm).

- Formula 1: (Positioning address) = (Movement amount per pulse) × (Number of output pulses) + (OP address)
- Condition

Item	Value
Movement amount per pulse	0.1 μm
Detected resolution	8192 pluse/rev

- Calculation of the upper limit value and lower limit value of positioning addresses

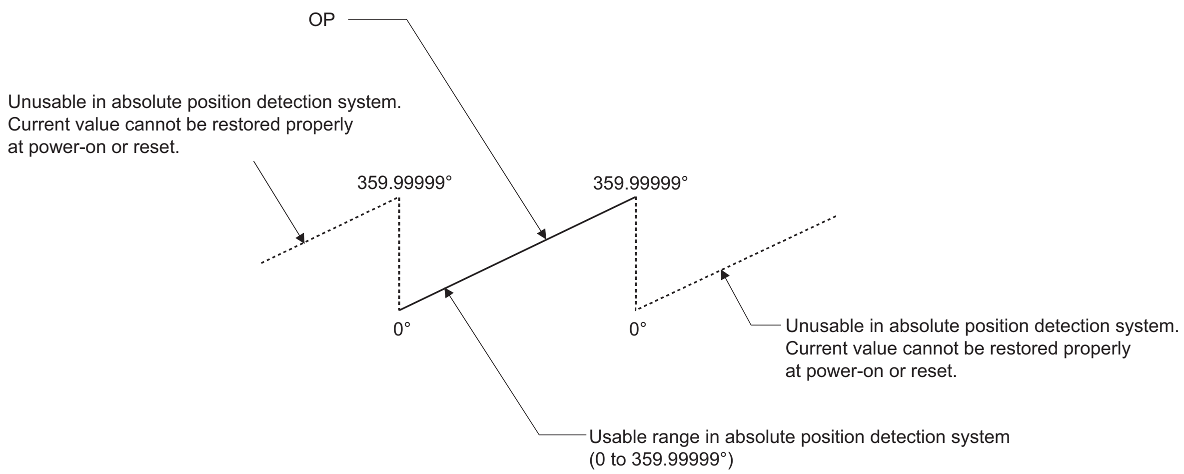
Upper limit value /lower limit value of positioning addresses	Range of positioning addresses
Upper limit value	0.1 × 268427264 + 214740000.0 = 241582726.4μm
Lower limit value	0.1 × (-268427264) + 214740000.0 = 187897273.6μm



■Example 2

This example shows the positioning address specification range that can be specified when degree is selected as the unit.

- In the absolute position detection system, the rage of the available positioning addresses is from 0° to 359.99999°, regardless of the OP address.
- For positioning in one direction, control from maximum to minimum (for address increase: 359.99999° to 0°/for address decrease: 0° to 359.99999°) cannot be exercised.



7.8 Function Related to Stop

As the functions related to stop, Stop command processing for deceleration stop function, Continuous operation interrupt function, and Step function are provided. Each function is executed by setting parameters or creating and writing a program.

Stop command processing for deceleration stop function

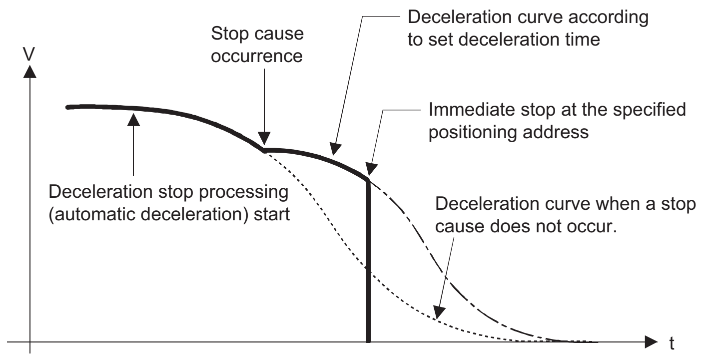
Stop command processing for deceleration stop function is provided to set the deceleration curve if a stop cause occurs during the deceleration stop processing (including automatic deceleration).
This function is valid for both trapezoidal and S-curve acceleration/deceleration processing methods.
For details on the stop cause, refer to the following.
☞ Page 35 Stop processing
Stop command processing for deceleration stop function consists of the deceleration curve re-processing function and deceleration curve continuation function.

Control details

The following shows the operation of the stop command processing for deceleration stop function.

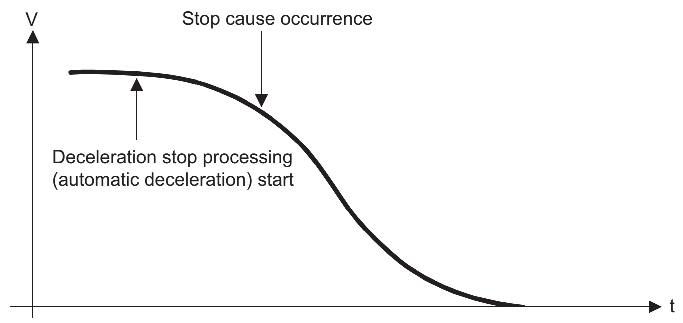
■Deceleration curve re-processing

A deceleration curve is re-processed starting from the speed at the stop cause occurrence to top, according to the set deceleration time. If a stop cause occurs during the automatic deceleration of the position control, the deceleration stop processing stops as soon as the target has reached the positioning address specified in the positioning data currently being executed.



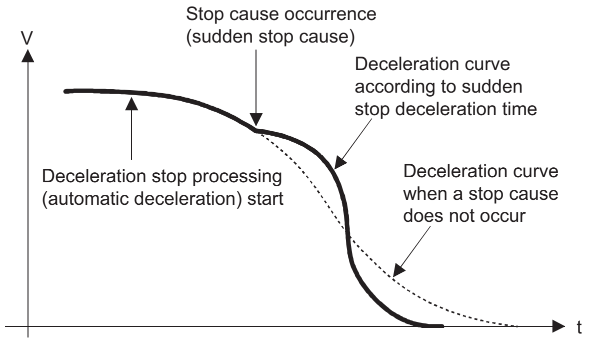
■Deceleration curve continuation

The current deceleration curve is maintained after the occurrence of a stop cause. If a stop cause occurs during the automatic deceleration of the position control, the deceleration stop processing may be completed before the target has reached the positioning address specified in the positioning data currently being executed.

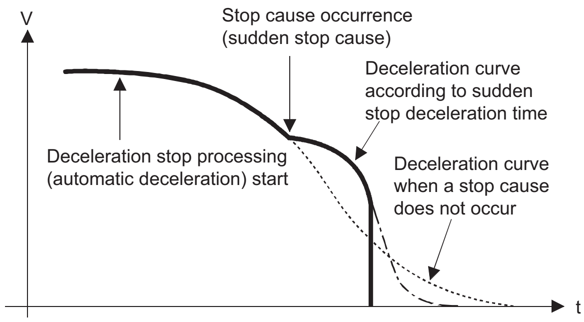


Control precautions

- In the manual control (JOG operation, inching operation, and manual pulse generator operation), the stop command processing for deceleration stop function is invalid.
- 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 the stop cause occurrence.
- 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 reprocessed according to [Pr.36] Sudden stop deceleration time (starting from the speed at the stop cause occurrence to a stop).) In the position control (including the position control of the speed-position switching control and position-speed switching control), the positioning may stop immediately depending on the occurrence timing of the stop cause and the setting of [Pr.36] Sudden stop deceleration time.



(Sudden stop just before the specified positioning address)



(Immediate stop at the specified positioning address)

Setting method

To use the stop command processing for deceleration stop function, set the following control data in a program. The set data becomes valid as soon as they are written to the buffer memory. The status of PLC READY signal [Y0] is irrelevant.

Setting item		Setting value	Setting detail	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 on the settings, refer to the following.

☞ Page 476 [Cd.42] Stop command processing for deceleration stop selection

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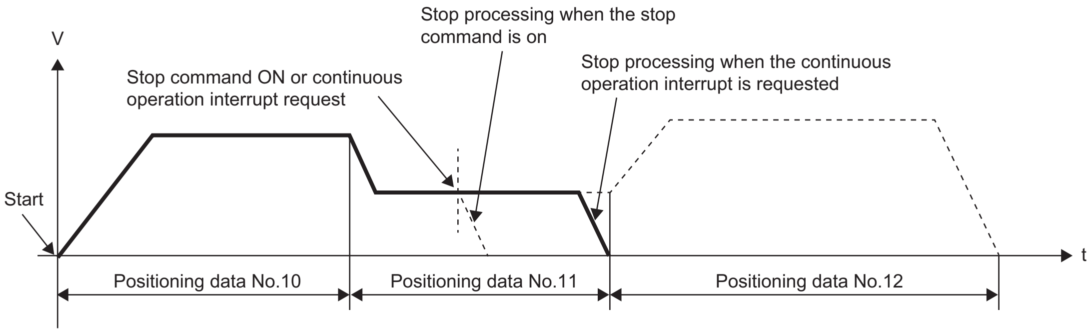
Continuous operation interrupt function

Continuous operation interrupt function can interrupt the positioning operations in the continuous positioning control and continuous path control. When the continuous operation is interrupted, the control will stop when the operation of the positioning data being executed is completed. To interrupt the continuous operation, set 1: Continuous operation interrupt request for [Cd.18] Continuous operation interrupt request.

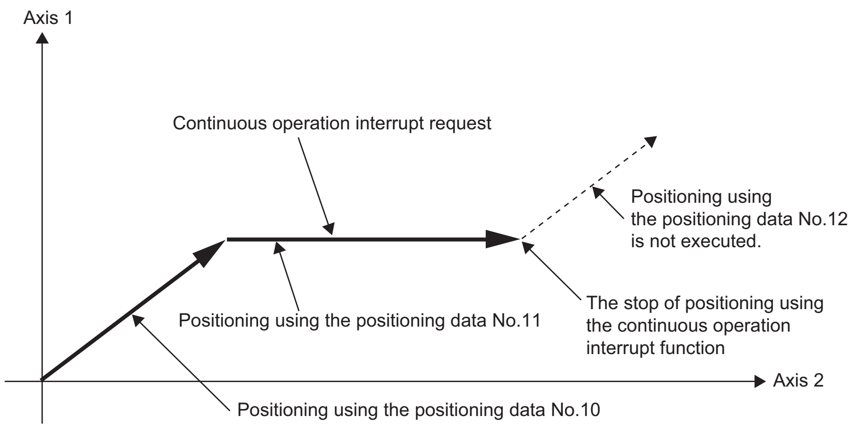
In the continuous path control, the deceleration stop is performed according to the deceleration time set in [Da.4] Deceleration time No.

Operation when the continuous operation is interrupted

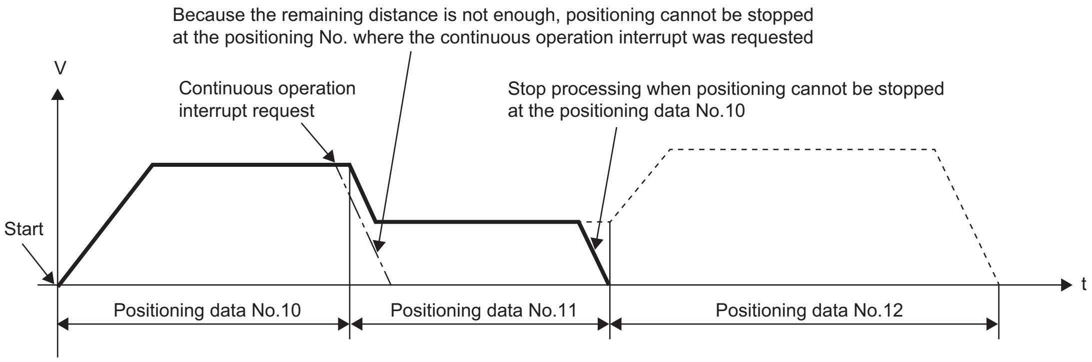


Restrictions

- When Continuous operation interrupt request is executed, the positioning will end. Thus, the operation cannot be restarted after the stop. If [Cd.6] Restart command is issued, Restart not possible (Warning code: 0902H) will occur.
- Even if a stop command is turned on after Continuous operation interrupt request is executed, the continuous operation interrupt request cannot be canceled. Thus, if the restart is executed after the stop is executed by turning on the stop command, the operation will stop when the positioning data No. where Continuous operation interrupt request was executed is completed.



- If the operation cannot be decelerated to a stop because the remaining distance is insufficient when Continuous operation interrupt request is executed with the continuous path control, the interruption of the continuous operation will be postponed. The interruption is executed until the positioning data No. that secures a sufficient remaining distance, the positioning data No. set to positioning complete (pattern: 00), or the positioning data No. set to continuous positioning control (pattern: 01).



- When no operation is performed (when BUSY signal [XC, XD, XE, XF] is off), the continuous operation interrupt request is not accepted. The request is cleared to 0 at a start or restart.

Control data requiring settings

Set the following data to interrupt the continuous operation.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.18]	Continuous operation interrupt request	1	Set 1: Continuous operation interrupt request.	1520	1620	1720	1820

For details on the settings, refer to the following.

☞ Page 483 [Cd.18] Continuous operation interrupt request

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Step function

Step function is used to check each operation of the positioning control.
This function is used in debugging work for the major positioning controls.
The positioning operation in which the step function is used is called a step operation.
In step operations, the timing for stopping the control can be set. (The setting is called the step mode.) The control stopped by a step operation can be continued by using Step start request.

Relation between the step function and various controls

The following table shows the relation between Step function and various controls.
○: Set as required, ×: Setting not possible

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	○	Step operation possible
		2-/3-/4-axis linear interpolation control	○	
		1-axis fixed-feed control	○	
		2-/3-/4-axis fixed-feed control	○	
		2-axis circular interpolation control	○	
		3-axis helical interpolation control	○	
	1-/2-/3-/4-axis speed control		×	Step operation not possible
	Speed-position switching control, Position-speed switching control		○	Step operation possible
	Other controls	Current value change	○	
		JUMP instruction, NOP instruction LOOP to LEND	×	Step operation not possible
Manual control	JOG operation, Inching operation		×	Step operation not possible
	Manual pulse generator operation		×	

Step mode

In step operations, the timing for stopping the control can be set. (The setting is called the step mode.) (Step mode is set in the control data [Cd.34] Step mode.)
Step mode is classified into the following two types.

■Deceleration unit step

The operation stops at the positioning data requiring automatic deceleration. (A normal operation will be performed until the positioning data No. requiring automatic deceleration takes its turn. Once the turn comes, the positioning data will be executed, and the operation will automatically decelerate and stop.)

■Data No. unit step

The operation automatically decelerates and stops for each positioning data. (Even in the continuous path control, the automatic deceleration and the stop will be forcibly performed.)

Step start request

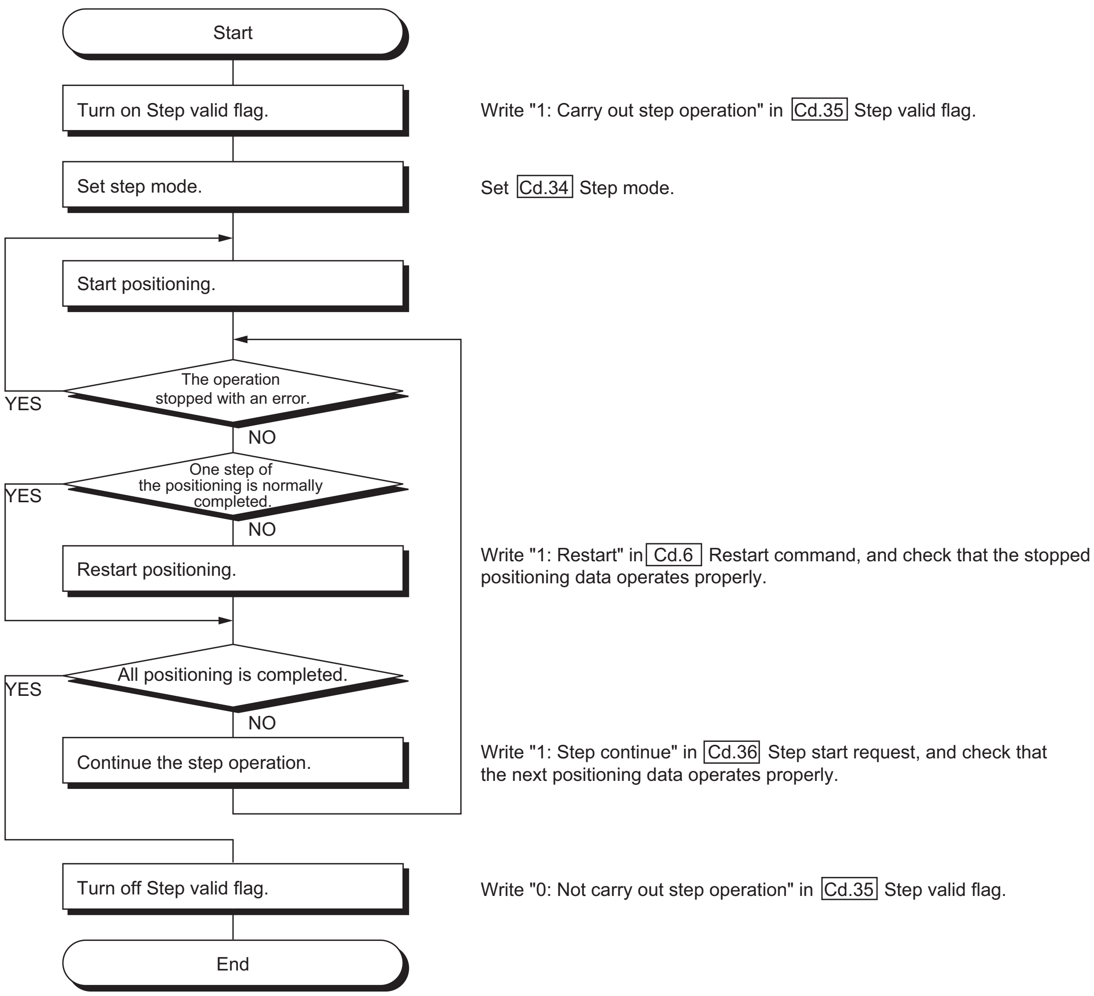
The control stopped by a step operation can be continued by using Step start request. (Step start request is set in the control data [Cd.36] Step start request.) Once accepted, the setting of [Cd.36] Step start request is automatically cleared.
The following table shows the results of starts using the step start request during the step operation.

Stop state in the step operation	[Md.26] Axis operation status	[Cd.36] Step start request	Result of step starts
The positioning of the step operation has normally stopped.	Step standby	1: Step continue	The next positioning data No. is performed.
The positioning of the step operation has not normally stopped. (due to stop signal or an error)	Stopped Error	1: Step continue	Step not possible (Warning code: 0996H)

Step not possible (Warning code: 0996H) will occur and the step operation will not be continued if [Md.26] Axis operation status is other than Step standby or Step valid flag is off when the step start request is set.

Using the step operation

The following figure shows the procedure for checking positioning data in the step operation.



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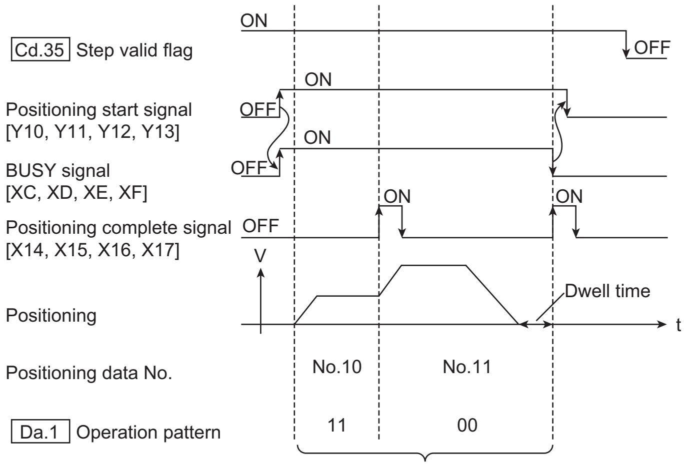
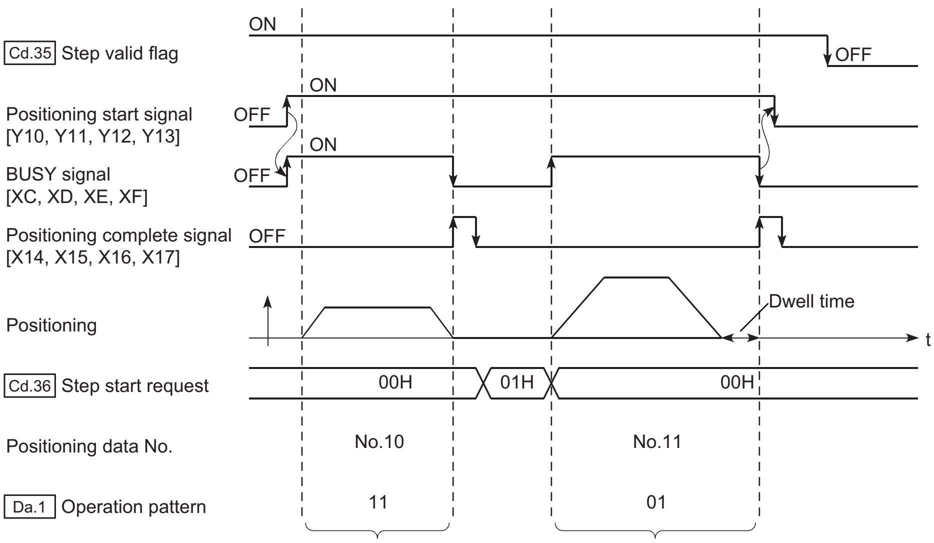
Control details

- The following figure shows a step operation during Deceleration unit step.



Positioning is carried out not by the step of positioning data No. unit but by the step of automatic deceleration unit.

- The following figure shows a step operation during Data No. unit step.



Positioning is carried out by the step of positioning data No. unit even though "11: Continuous path control" is set in Da.1 Operation pattern.

Control precautions

- When a step operation is performed using the positioning data for the interpolation control, the step function settings are performed for the reference axis.
- When Positioning start signal is turned on while Step valid flag is on and [Md.26] Axis operation status is Step standby, the step operation will start from the beginning. (The step operation will be performed from the positioning data set in [Cd.3] Positioning start No.)

Setting the step function

To use the step function, set the following data into the RD75 using a program. For the setting timing, refer to Page 279 Using the step operation. The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.34]	Step mode	→	Set either 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 request	→	Set 1: Step continue, depending on the stop status.	1546	1646	1746	1846

For details on the settings, refer to the following.

☞ Page 488 [Cd.34] Step mode
☞ Page 488 [Cd.35] Step valid flag
☞ Page 488 [Cd.36] Step start request

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7.9 Other Functions

As other functions, Skip function, M code output function, Teaching function, Command in-position function, Acceleration/deceleration processing function, Deceleration start flag function, During uncompleted OPR operation setting function, and Interrupt function. Each function is executed by setting parameters or creating and writing a program.

Skip function

Skip function is used to perform the deceleration stop on the positioning data No. executed when Skip signal was input, and to execute the next positioning data No.

This function uses the positioning data for which Continuous positioning control or Continuous path control is set in [Da.1] Operation pattern during positioning.

Relation between the skip function and various controls

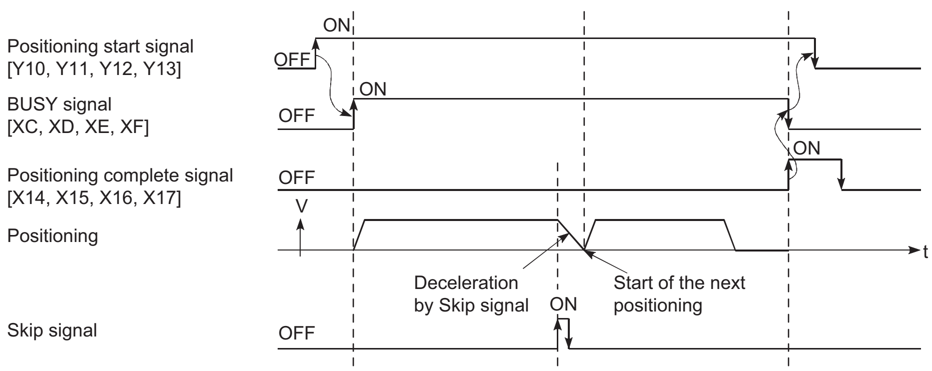
The following table shows the relation between Skip function and various controls.

○: Set as required, ×: Setting not possible

Control type			Skip function	Skip operation applicability
OPR control	Machine OPR control		×	Skip operation not possible
	Fast OPR control		×	
Major positioning control	Position control	1-axis linear control	○	Skip operation possible
		2-/3-/4-axis linear interpolation control	○	
		1-axis fixed-feed control	○	
		2-/3-/4-axis fixed-feed control	○	
		2-axis circular interpolation control	○	
		3-axis helical interpolation control	○	
	1-/2-/3-/4-axis speed control		×	Skip operation not possible
	Speed-position switching control		○	Skip operation possible
	Position-speed switching control		×	Skip operation not possible
	Other controls	Current value change	○	Skip operation possible
		JUMP instruction, NOP instruction LOOP to LEND	×	Skip operation not possible
Manual control	JOG operation, Inching operation		×	Skip operation not possible
	Manual pulse generator operation		×	

Control details

The following figure shows the operation of the skip function.



Control precautions

- When Skip signal is turned on during positioning of the positioning data for which Positioning complete is set in [Da.1] Operation pattern, the operation is completed after the deceleration stop.
- When the control is skipped (when Skip signal is turned on during the control), Positioning complete signal [X14, X15, X16, X17] will not turn on.
- When Skip signal is turned on during the dwell time, the remaining time of the dwell time will be ignored, and the next positioning data will be executed.
- To skip a control during the interpolation control, turn on the skip signal of the reference axis. When the skip signal of the reference axis is turned on, the deceleration stop will be performed for every axis, and the next positioning data of the reference axis will be executed.
- M code ON signals [X4, X5, X6, X7] do 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.)
- No positioning data can be skipped in the speed control and the position-speed switching control.
- If Skip signal is turned on while M code signal is on, the transition to the next data No. is not performed until M code signal is turned off.

Setting the function from the CPU module

The following shows a setting example and program example for skipping the control being executed in the axis 1 by a command sent from the CPU module.

■Setting data

Set the following data.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.37]	Skip command	1	Set 1: Skip request.	1547	1647	1747	1847

For details on the settings, refer to the following.

☞ Page 489 [Cd.37] Skip command

■Program

Add the following program to the control program, and write it to the CPU module.

- ☞ Page 517 Skip program

Setting the function using an external command signal

The skip function can also be executed using an external command signal.

The section shows a setting example and program example for skipping the control being executed in the axis 1 using an external command signal.

■Setting data

Set the following data to execute the skip function using an external command signal.

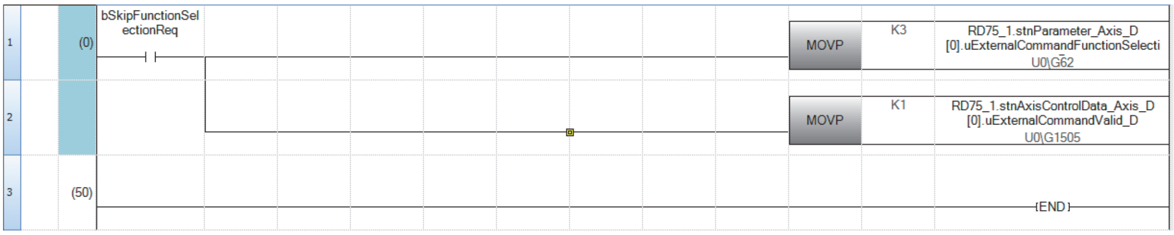
Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42]	External command function selection	3	Set 3: Skip request.	62	212	362	512
[Cd.8]	External command valid	1	Set 1: Validate external command.	1505	1605	1705	1805

For details on the settings, refer to the following.

☞ Page 416 [Pr.42] External command function selection
☞ Page 479 [Cd.8] External command valid

■Program

Add the following program to the control program, and write it to the CPU module.



Classification	Label Name	Description
Module label	RD75_1.stnParameter_Axis_D[0].uExternalCommandFunctionSelection_D	Axis 1 [Pr.42] External command function selection
	RD75_1.stnAxisControlData_Axis_D[0].uExternalCommandValid_D	Axis 1 [Cd.8] External command valid
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels. Label Name / Data Type / Class / Assign (Device/Label) 149 / bSkipFunctionSelectionReq / Bit / VAR_GLOBAL /	

M code output function

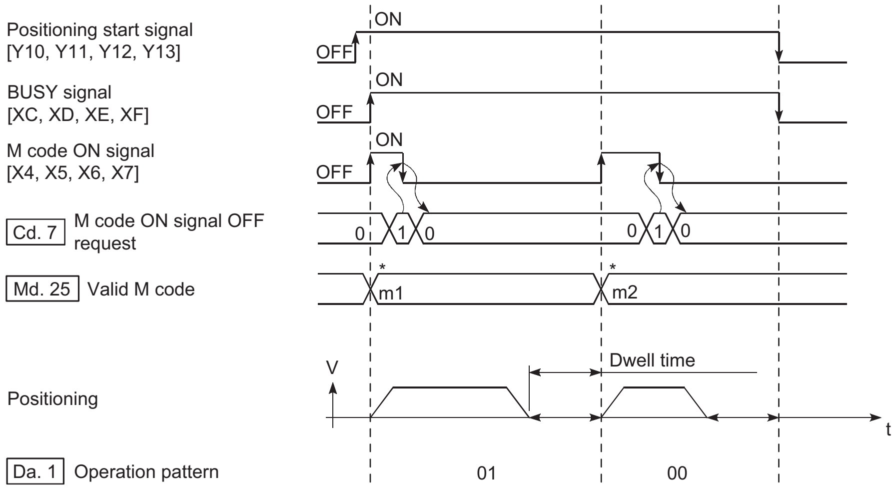
M code output function is used to command a subsidiary work (such as clamping, drilling, and tool replacement) related to the positioning data being executed.
When M code ON signal [X4, X5, X6, X7] turns on during positioning, a number called an M code is stored in [Md.25] Valid M code.
The value set in [Md.25] Valid M code is read from the CPU module, and used to command a subsidiary work. An M code can be set for each positioning data. (Set the M code in [Da.10] M code, one of the setting items of positioning data.)

Output timing of M code ON signal

M code output function can set the output (storage) timing of M codes. (The M code is stored in [Md.25] Valid M code when M code ON signal is turned on.)
The following two types of timing for outputting M codes are provided: WITH mode and AFTER mode.

■WITH mode

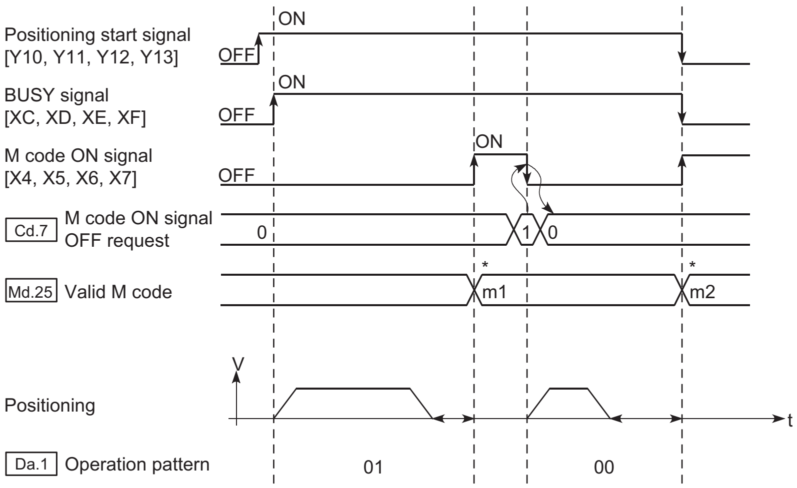
M code ON signal [X4, X5, X6, X7] turns on at the positioning start, and an M code is stored in [Md.25] Valid M code.



*: m1 and m2 indicate set M codes.

■AFTER mode

M code ON signal [X4, X5, X6, X7] turns on at the completion of the positioning and an M code is stored in [Md.25] Valid M code.



*: m1 and m2 indicate set M codes.

M code ON signal OFF request

When M code ON signal [X4, X5, X6, X7] turns on, the signal must be turned off by a program.

To turn off M code ON signal, set 1 (M code ON signal is turned OFF) in [Cd.7] M code ON signal OFF request.

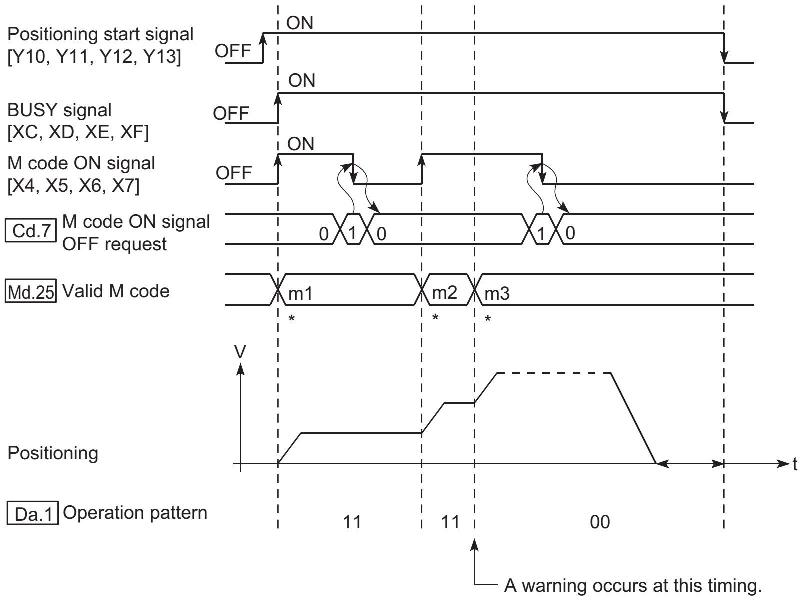
Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.7]	M code ON signal OFF request	1	Set 1: M code ON signal is turned OFF.	1504	1604	1704	1804

For details on the settings, refer to the following.

☞ Page 479 [Cd.7] M code ON signal OFF request

If M code ON signal is not turned off, the following processing will be performed. (The processing depends on the setting of [Da.1] Operation pattern.)

[Da.1] Operation pattern		Processing
00	Independent positioning control (positioning complete)	The next positioning data No. will not be executed until M code ON signal is turned off.
01	Continuous positioning control	
11	Continuous path control	The next positioning data No. is performed. If an M code is set to the next positioning data, M code ON signal ON (Warning code: 0992H) will occur.



*: m1 to m3 indicate set M codes.

Point

If the M code output function is not required, set 0 in [Da.10] M code, one of the setting items of positioning data.

Control precautions

- During the interpolation control, M code ON signal of the reference axis is turned on.
- 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.)
- If M code ON signal is on at the positioning start, M code ON signal ON start (Error code: 19A0H) will occur, and the positioning will not start.
- If PLC READY signal [Y0] is turned off, M code ON signal will turn off and 0 will be stored in [Md.25] Valid M code.
- If the positioning operation time is short in the continuous path control, there will not be enough time to turn off M code ON signal, and M code ON signal ON (Warning code: 0992H) may occur. To avoid the warning, set 0 in [Da.10] M code of the positioning data in that section to prevent the M code from being output.
- When the AFTER mode is set in the speed control, the M code is not output and the M code ON signal is not turned on.
- If 9003 is set in [Cd.3] Positioning start No. and the current value change is performed, the M code output function is disabled.
- If two positioning data, one in the AFTER mode and the other in the WITH mode, are successively executed in the continuous path control, M code ON signal ON (Warning code: 0992H) occurs when the target data switches from the one in the AFTER mode to the one in the WITH mode. To avoid the warning, set 0 in [Da.10] M code of the positioning data in that section to prevent the M code from being output.

Setting method

The following shows the settings required for the M code output function.

■To specify the M code ON signal output timing separately for each positioning data

To specify the M code ON signal output timing separately for each positioning data, use "[Da.27] M code ON signal output timing".

The following settings are required to use the parameter.

- Set an M code number in [Da.10] M code, one of the setting items of positioning data.
- Set the timing to output an M code ON signal [X4, X5, X6, X7] in "[Da.27] M code ON signal output timing" of the positioning data.

■To specify the same M code ON signal output timing for all positioning data

Set "[Pr.18] M code ON signal output timing". The same M code ON signal output timing can be set for each positioning data in a batch. When "[Pr.18] M code ON signal output timing" is used, set 0 in "[Da.27] M code ON signal output timing". When a value other than 0 is set, "[Da.27] M code ON signal output timing" is enabled. (The setting of "[Pr.18] M code ON signal output timing" is validated at the rising edge (when turned off and on) of PLC READY signal [Y0].)

The following settings are required to use the parameter.

- Set an M code number in [Da.10] M code, one of the setting items of positioning data.
- Set "0: Use the setting value in "[Pr.18] M code ON signal output timing"" (initial value) in "[Da.27] M code ON signal output timing" of the positioning data.
- Set the timing to output an M code ON signal [X4, X5, X6, X7] in the detailed parameter "[Pr.18] M code ON signal output timing".

■Buffer memory are to be used

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.18]	M code ON signal output timing	→	Set the output timing of M code ON signal. 0: WITH mode 1: AFTER mode	27	177	327	477
[Da.27]	M code ON signal output timing	→	Set the M code ON signal output timing for each positioning data. 0: Use the set value of "[Pr.18] M code ON signal output timing" 1: WITH mode 2: AFTER mode	2003+N[*1] (b0 to b1)	8003+N[*1] (b0 to b1)	14003+N[*1] (b0 to b1)	20003+N[*1] (b0 to b1)

*1 N indicates the offset address of each positioning data.
N = ((Positioning data No.) - 1) × 10

Reading M codes

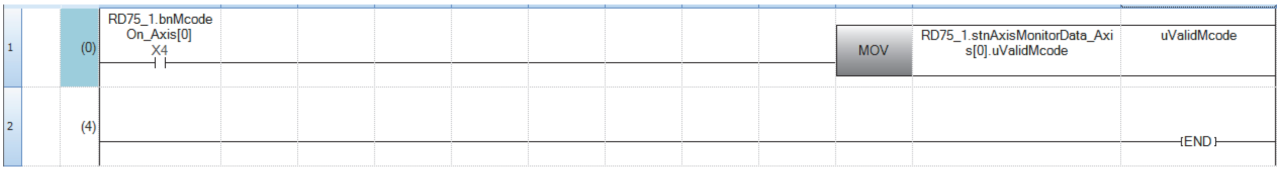
An M code is stored in the following buffer memory address when M code ON signal turns on.

Monitor item		Monitor value	Monitor details	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Md.25]	Valid M code	→	Stores the M code number ([Da.10] M code) set in the positioning data.	808	908	1008	1108

For details on the stored contents, refer to the following.

☞ Page 462 [Md.25] Valid M code

The following shows a program example for reading [Md.25] Valid M code to the CPU module. Read M codes not as rising edge instructions but as ON execution instructions.



Classification	Label Name	Description
Module label	RD75_1.stnAxisMonitorData_Axis[0].uValidMcode	Axis 1 [Md.25] Valid M code
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels. Label Name: uValidMcode / Data Type: Word [Unsigned]/Bit String [16-bit] / Class: VAR	

Teaching function

Teaching function is used to set the address where the target is positioned using the manual control operation (JOG operation, inching operation, or manual pulse generator operation) in the positioning addresses ([Da.6] Positioning address/ movement amount, [Da.7] Arc address).

Control details

■Teaching timing

Teaching is executed using a program while BUSY signal [XC, XD, XE, XF] is off. (During a manual control operation, teaching can be performed even when an error or a warning occurs as long as the axis is not in the BUSY state.)

■Addresses for which teaching is possible

The target address for teaching is the current feed value ([Md.20] Current feed value) having the OP as a reference. The movement amount for positioning in the incremental system cannot be set. The teaching function sets the current feed value in [Da.6] Positioning address/movement amount or [Da.7] Arc address.

■Dedicated instruction GP.TEACH□

If the dedicated instruction GP.TEACH□, provided for the execution of the teaching function, is used, a program can be easily created. For details on the dedicated instructions, refer to the following.

📖 MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

Control precautions

- Before performing the teaching, Machine OPR must be performed to establish the OP. (When the current value change is performed, [Md.20] Current feed value may not show the absolute address having the OP as a reference.)
- Teaching cannot be performed for positions that cannot be targeted using the manual control (positions to which the workpiece cannot physically move). (During the operation that refers to a center point outside the moveable range such as the circular interpolation control operation with a center point specified, teaching cannot be performed for [Da.7] Arc address.)
- If an axis in the BUSY state, the teaching cannot be performed to the axis.
- Written positioning data is stored in the buffer memory. Data in the buffer memory is cleared when the CPU module is powered off or reset. For this reason, it is recommended to register positioning data in the module extension parameter file of the CPU module or the RD75 by performing the module data backup when the positioning operation is normally completed.
- The number of module data backups using a program after the power is turned on once or the CPU module is reset is limited to up to 25 times (including the number of module data initializations). If the writing operation is executed 26th times, Flash ROM write number error (Error code: 1080H) will occur. If this error occurs, reset the error, power off and on the module again, or reset the CPU module.
- Writing to the flash ROM of the RD75 can be executed up to 100000 times. If the number of writing to the flash ROM exceeds 100000 times, writing data to the flash ROM may become impossible and Flash ROM write error (Error code: 1931H) will occur.

Data used in teaching

The following control data is used in teaching.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.1]	Module data backup request	1	Write the data in the buffer memory to a storage destination specified by the extension parameter storage setting. (Positioning data and block start data) 0: Not requested 1: Requested (After the data is written, 0 is automatically stored.)	1900			
[Cd.38]	Teaching data selection	→	Set the write destination of Current feed value. 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.	→	Specify the target data No. for teaching. (Teaching is performed when the set value is 1 to 600.) When the teaching has been completed, this data is cleared to 0.	1549	1649	1749	1849

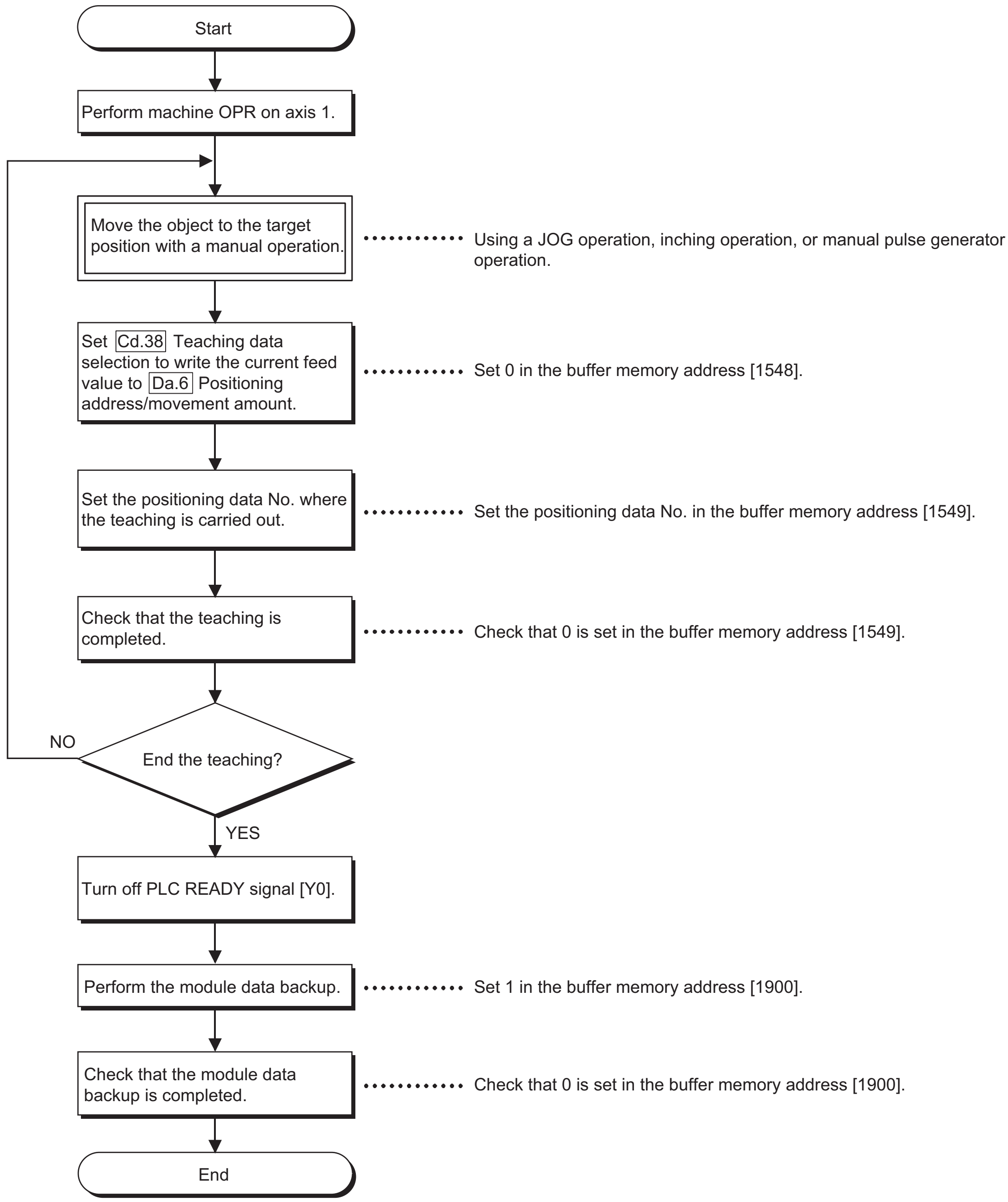
For details on the settings, refer to the following.

☞ Page 475 [Cd.1] Module data backup request
☞ Page 489 [Cd.38] Teaching data selection
☞ Page 489 [Cd.39] Teaching positioning data No.

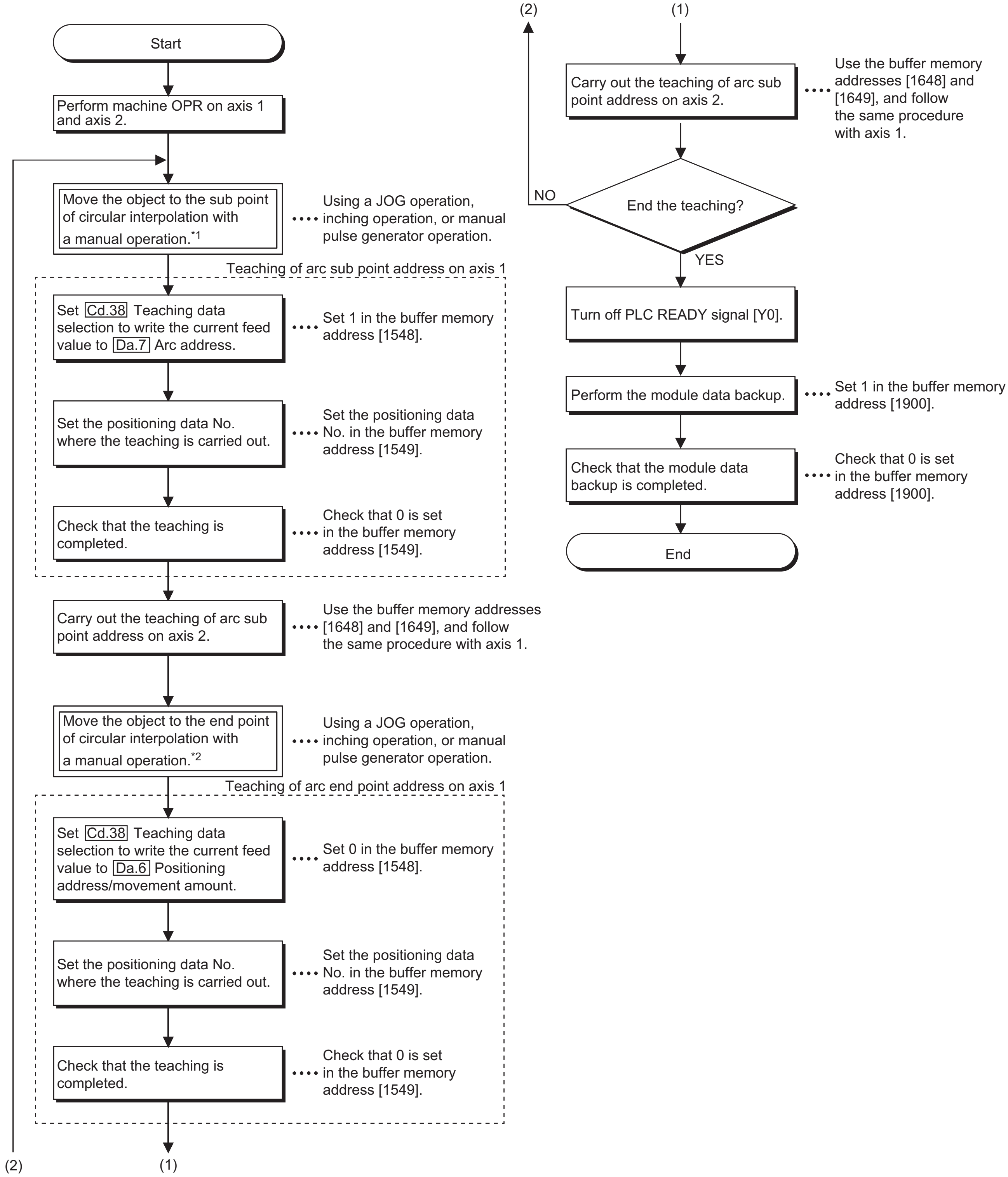
Teaching procedure

The following figure shows the procedure for the teaching operation.

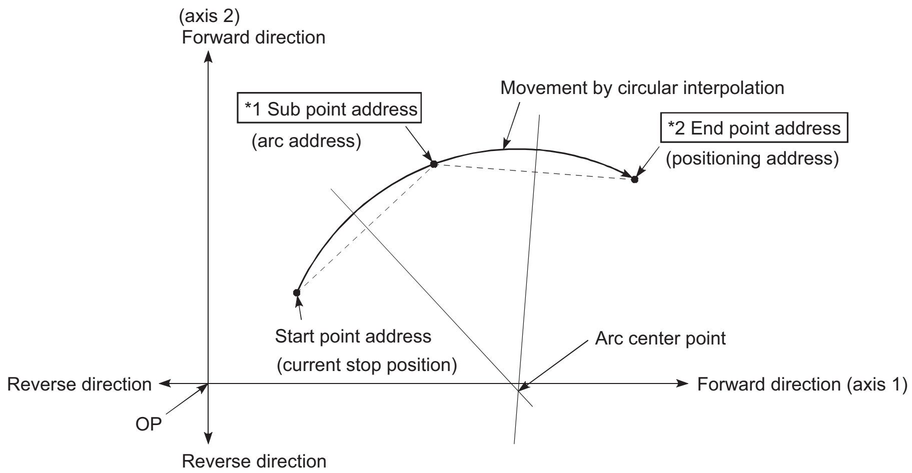
■When the teaching to [Da.6] Positioning address/movement amount is performed (example with the axis 1)



■When the teaching is first performed for [Da.7] Arc address and successively performed for [Da.6] Positioning address/movement amount (example for the 2-axis circular interpolation control with a sub point specified on the axis 1 and 2)



■Operation chart



*1 The sub point address is stored in [Da.7] Arc address.
*2 The end point address is stored in [Da.6] Positioning address/movement amount.

Program example for the teaching

The following shows a program example for setting (writing) the positioning data obtained by the teaching function in the RD75.

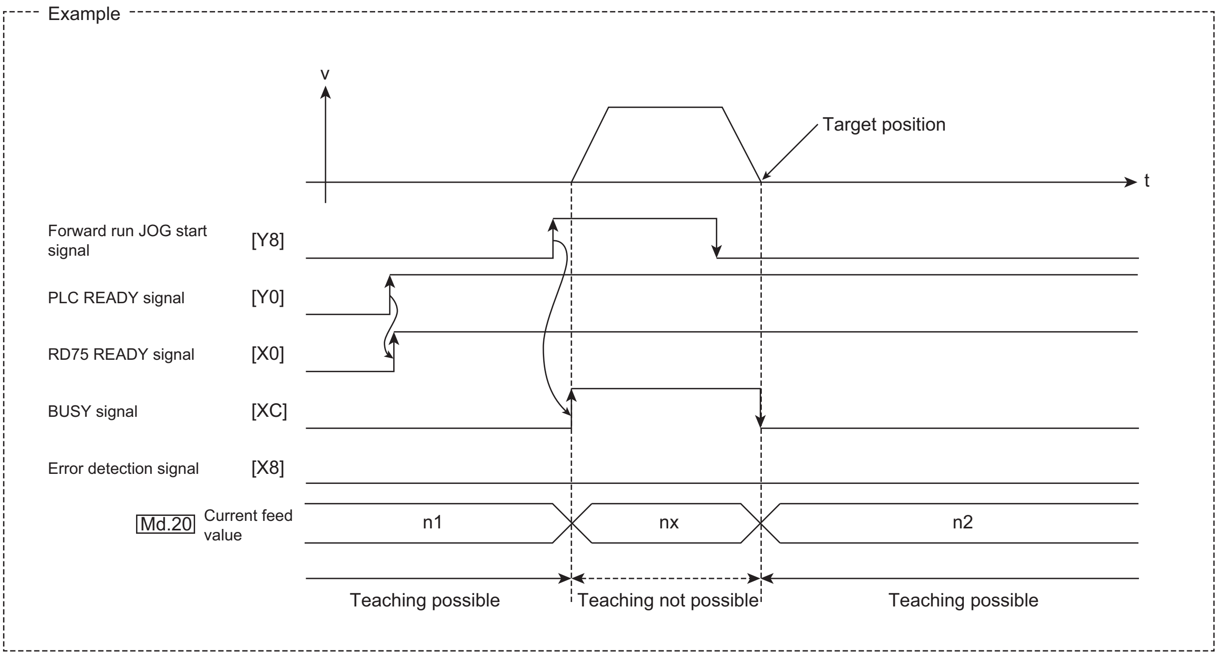
■Setting conditions

When setting the current feed value as a positioning address, write it while BUSY signal is off.

■Program example

The following shows a program example to perform the teaching of the axis 1 using the dedicated instruction GP.TEACH1.

- Move the workpiece to a target position using the JOG operation (inching operation or manual pulse generator operation).



- Perform the teaching operation with the following program.

☞ Page 518 Teaching program

Point

- Before setting positioning data, check the teaching function and teaching procedure.
- The positioning addresses to be written are absolute address (ABS) values.
- When the positioning operation is normally completed with the written positioning data, registering the positioning data in the flash ROM of the RD75 is recommended.

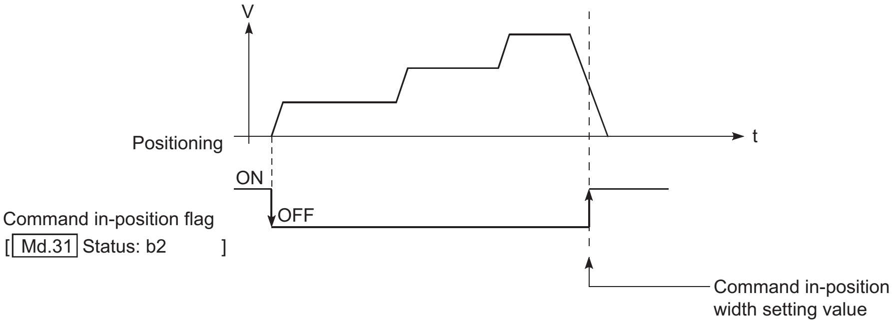
Command in-position function

Command in-position function checks the remaining distance to the stop position during the automatic deceleration of the positioning control, and sets a flag to 1. This flag is called Command in-position flag. The command in-position flag is used as a front-loading signal indicating beforehand the completion of the position control.

Control details

The following shows the control details of the command in-position function.

- When the remaining distance to the stop position during the automatic deceleration of the position control becomes equal to or less than the value set in [Pr.16] Command in-position width, 1 is stored in Command in-position flag ([Md.31] Status: b2).



- The command in-position width check is performed every 0.88ms.

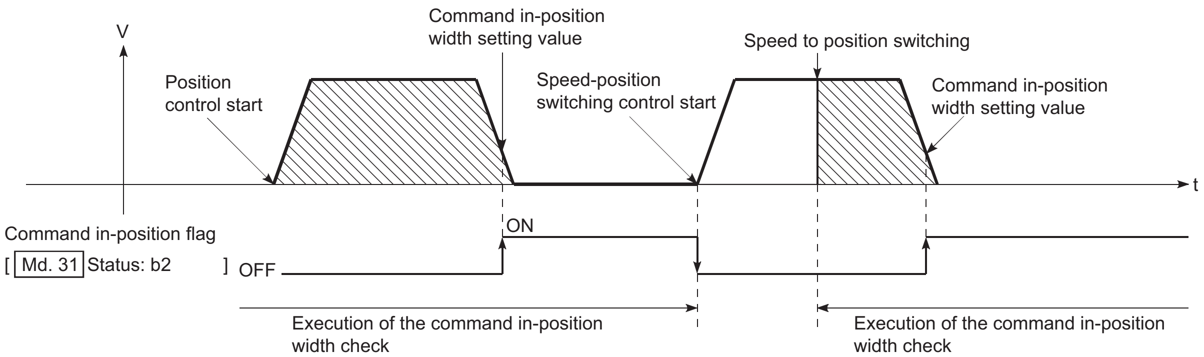
Control precautions

- The command in-position width check will not be performed in the following cases.

In speed control

In speed control of the speed-position switching control

In speed control of the position-speed switching control



- Command in-position flag will be turned off in the following cases. (0 will be stored in [Md.31] Status: b2.)

At the position control start

At the speed control start

At the start of the speed-position switching control or position-speed switching control

At the OPR control start

At the JOG operation start

At the inching operation start

When the manual pulse generator operation is enabled

- [Pr.16] Command in-position width and Command in-position flag ([Md.31] Status: b2) of the reference axis are used during the interpolation control. When [Pr.20] Interpolation speed specification method is Composite speed, the command in-position width check is performed in the remaining distance on the composite axis (line or arc connecting the start point address and end point address).

Setting method

To use the command in-position function, set the required value in the parameter shown in the following table, and write it to the RD75. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.16]	Command in-position width	→	Set the remaining distance to the stop position of the position control to turn on Command in-position flag.	100

For details on the settings, refer to the following.

☞ Page 401 [Pr.16] Command in-position width

Checking the status of Command in-position flag

The status of Command in-position flag is stored in the following buffer memory address.

Monitor item		Monitor value	Monitor details	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Md.31]	Status	→	Command in-position flag is stored in the b2 position.	817	917	1017	1117

For details on the stored contents, refer to the following.

☞ Page 466 [Md.31] Status

Point

- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

Acceleration/deceleration processing function

Acceleration/deceleration processing function adjusts the acceleration/deceleration of each control to the acceleration/deceleration curve suited for the target device. Setting the acceleration/deceleration time changes the slope of the acceleration/deceleration curve. One of the following two methods can be selected for the acceleration/deceleration curve:
- Trapezoidal acceleration/deceleration
- S-curve acceleration/deceleration

Control details and setting of Acceleration/deceleration time 0 to 3

For the RD75, four acceleration times and four deceleration times can be set. The different acceleration/deceleration times can be applied to the operations such as the positioning control, JOG operation, and OPR operation. Set the required values for the acceleration/deceleration times in the parameters shown in the following table, and write them to the RD75. The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.9]	Acceleration time 0	→	Set an acceleration time within the range of 1 to 8388608ms.	1000
[Pr.25]	Acceleration time 1	→		1000
[Pr.26]	Acceleration time 2	→		1000
[Pr.27]	Acceleration time 3	→		1000
[Pr.10]	Deceleration time 0	→	Set a deceleration time within the range of 1 to 8388608ms.	1000
[Pr.28]	Deceleration time 1	→		1000
[Pr.29]	Deceleration time 2	→		1000
[Pr.30]	Deceleration time 3	→		1000

For details on the settings, refer to the following.

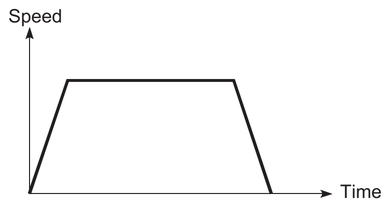
☞ Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0
☞ Page 408 [Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3
☞ Page 408 [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3

Control details and setting of Acceleration/deceleration method setting

In the acceleration/deceleration method setting, an acceleration/deceleration processing method is selected and set. The set acceleration/deceleration processing is applied to the acceleration/deceleration in all operations (excluding the inching operation and manual pulse generator operation). The following two acceleration/deceleration processing methods are provided.

■Trapezoidal acceleration/deceleration processing method

In this method, the linear acceleration/deceleration is performed based on the acceleration time, deceleration time, and speed limit value set by users.



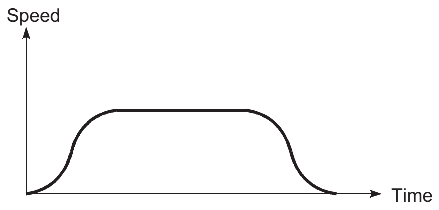
■S-curve acceleration/deceleration processing method

In this method, the motor burden at the start and stop is reduced.

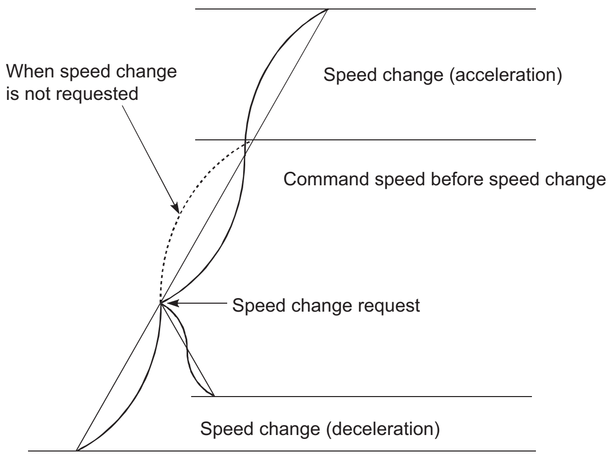
The acceleration/deceleration is reduced gradually, based on the acceleration time, deceleration time, speed limit value, and the value set in [Pr.35] S-curve ratio (1 to 100%) set by users.

When a stepping motor is used, the acceleration increases around the inflection point in the S-shaped curved line compared with the trapezoidal acceleration/deceleration. This may cause step out. (When the trapezoidal acceleration/deceleration and S-curve acceleration/deceleration having the same acceleration/deceleration time are compared.)

In this case, adjust the acceleration/deceleration time so that the acceleration decreases around the inflection point, or use a servomotor.



When an event that generates a speed change request occurs during the S-curve acceleration/deceleration processing (when a speed change request is given or Stop signal is turned on), the S-curve acceleration/deceleration processing begins at that point.



Set the required values for Acceleration/deceleration method setting in the parameter areas shown in the following table, and write them to the RD75. The set data is validated when the data is written into the RD75.

Setting item		Setting value	Setting detail	Initial value at the factory
[Pr.34]	Acceleration/deceleration processing selection	→	Set the acceleration/deceleration method. 0: Trapezoidal acceleration/deceleration processing 1: S-curve acceleration/deceleration processing	0
[Pr.35]	S-curve ratio	→	Set the acceleration/deceleration curve when 1 is set in [Pr.34] Acceleration/deceleration processing selection.	100

For details on the settings, refer to the following.

☞ Page 410 [Pr.34] Acceleration/deceleration processing selection
☞ Page 411 [Pr.35] S-curve ratio

Point

- Parameters are set for each axis.
- Setting the parameters using an engineering tool is recommended. To perform the setting using programs, many programs and devices are required. The execution becomes complicated, and the scan times will increase.

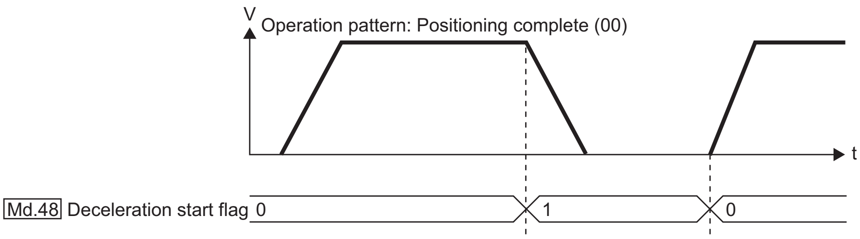
Deceleration start flag function

Deceleration start flag function turns on a flag when the speed is switched from the constant speed or acceleration to the deceleration during the position control whose operation pattern is Positioning complete. The flag can be used as a signal to start the operation to be performed by another device at every completion of the position control or to perform preparatory operation for the next position control.

Control details

When the deceleration stop is started in the position control whose operation pattern is Positioning complete, 1 is stored in [Md.48] Deceleration start flag. When the next operation starts or the manual pulse generator operation is enabled after the stop, 0 is stored.

■Start made with the positioning data No. specified



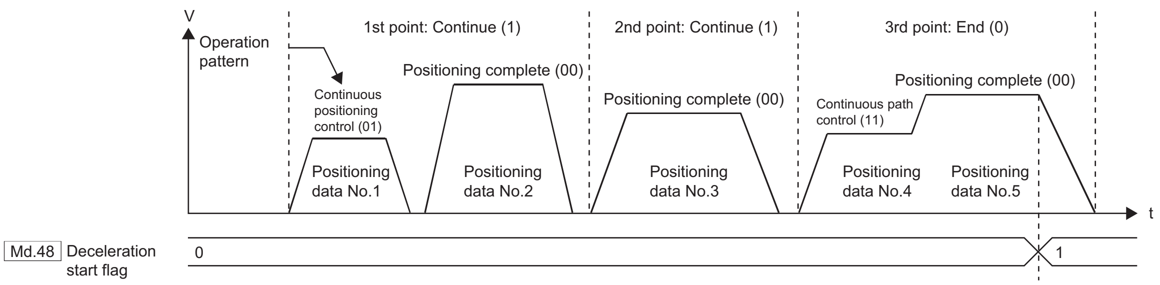
■Block start

For the block start, this function is valid for only the position control whose operation pattern is Positioning complete at the point to which [Da.11] Shape is set to End.

The following table shows the operation of Deceleration start flag in the case when the following block start data and positioning data are used.

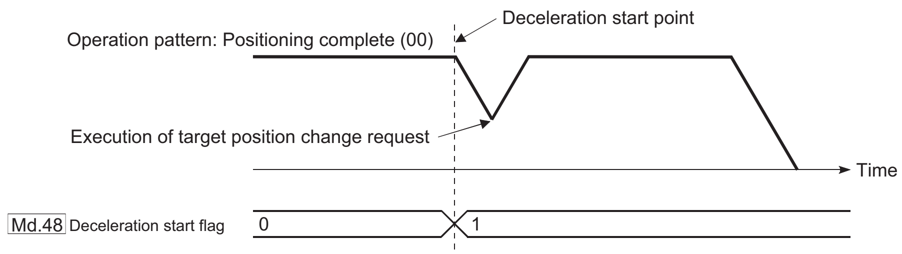
Block start data	[Da.11] Shape	[Da.12] Start data No.	[Da.13] Special start instruction
1st point	1: Continue	1	0: Block start
2nd point	1: Continue	3	0: Block start
3rd point	0: End	4	0: Block start
.			
.			

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
.	
.	

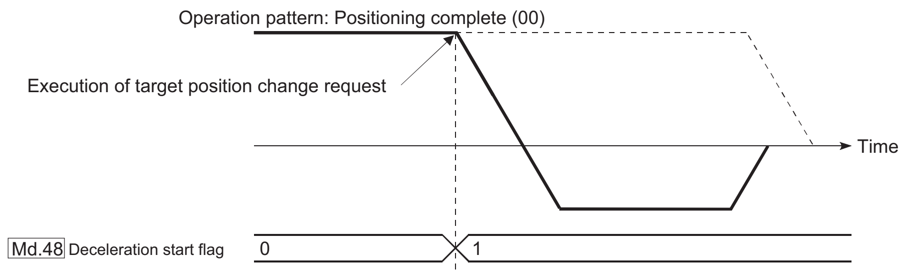


Control precautions

- The deceleration start flag function is valid for the control methods of 1-axis linear control, 2-axis linear interpolation control, 3-axis linear interpolation control, 4-axis linear interpolation control, speed-position switching control, and position-speed switching control. For the linear interpolation control, this function is valid only for the reference axis. (MELSEC iQ-R Positioning Module User's Manual (Startup))
- The deceleration start flag does not turn on when the operation pattern is Continuous positioning control or Continuous path control.
- The deceleration start flag function is invalid for the OPR operation, JOG operation, inching operation, manual pulse generator operation, and during the deceleration by a stop signal.
- The deceleration start flag does not turn on when the deceleration is performed by the speed change or override.
- If the target position change is performed while Deceleration start flag is on, the deceleration start flag remains on.



- When the movement direction is reversed by the target position change, the deceleration start flag turns on.



- During the position control of the position-speed switching control, Deceleration start flag is turned on by the automatic deceleration. Deceleration start flag remains ON if the control is switched to the speed control by Position-speed switching signal after Deceleration start flag has turned ON.
- If the condition start in a block start is not started since the condition is not satisfied, Deceleration start flag turns on as long as [Da.11] Shape is End.
- When a continuous operation interrupt request is issued, Deceleration start flag turns on at the start of the deceleration of the positioning data being executed.

Setting method

To use the deceleration start flag function, set 1 to the following control data to using a program. The settings are validated at the rising edge (when turned off and on) of PLC READY signal [Y0].

Setting item		Setting value	Setting detail	Buffer memory address
[Cd.41]	Deceleration start flag valid	→	Set whether to enable or disable the deceleration start flag function. 0: Deceleration start flag invalid 1: Deceleration start flag valid	1905

For details on the settings, refer to the following.

Page 476 [Cd.41] Deceleration start flag valid

Checking Deceleration start flag

The status of Deceleration start flag is stored in the following buffer memory address.

Monitor item		Monitor value	Monitor 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	899	999	1099	1199

For details on the stored contents, refer to the following.

☞ Page 474 [Md.48] Deceleration start flag

During uncompleted OPR operation setting function

During uncompleted OPR operation setting function is used to select the positioning control performed when OPR request flag is on.

Control details

The following table shows the correspondence between positioning controls and the setting of [Pr.58] Setting of operation during uncompleted OPR to show whether the positioning start can be performed or not for each control.

Positioning control	[Pr.58] Setting of operation during uncompleted OPR	
	0: Do not execute the positioning control and OPR request flag is on	1: Execute the positioning control and OPR request flag is on
• Machine OPR • JOG operation • Inching operation • Manual pulse generator operation • Current value change using the start No. for a current value change (No.9003) • 1-/2-/3-/4-axis speed control	Positioning start possible (can be executed)	Positioning start possible (can be executed)
• 1-axis linear control • 2-/3-/4-axis linear interpolation control • 1-/2-/3-/4-axis fixed-feed control • 2-axis circular interpolation control (sub point specification/ center point specification) • 3-axis helical interpolation control (sub point specification/center point specification) • Speed-position switching control (INC mode/ABS mode) • Position-speed switching control • Current value change using positioning data (No.1 to 600)	Positioning start not possible (cannot be executed) Start error at OPR completion (Error code: 19A6H)	Positioning start possible (can be executed)

Control precautions

Before starting the positioning while 0: Do not execute the positioning control is specified, turn off OPR request flag beforehand.

Setting method

To use the during uncompleted OPR operation setting function, write the following data into the RD75 using a program.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Pr.58]	Setting of operation during uncompleted OPR	→	Set the operation during the OPR. 0: Do not execute the positioning control 1: Execute the positioning control	90	240	390	540

Interrupt function

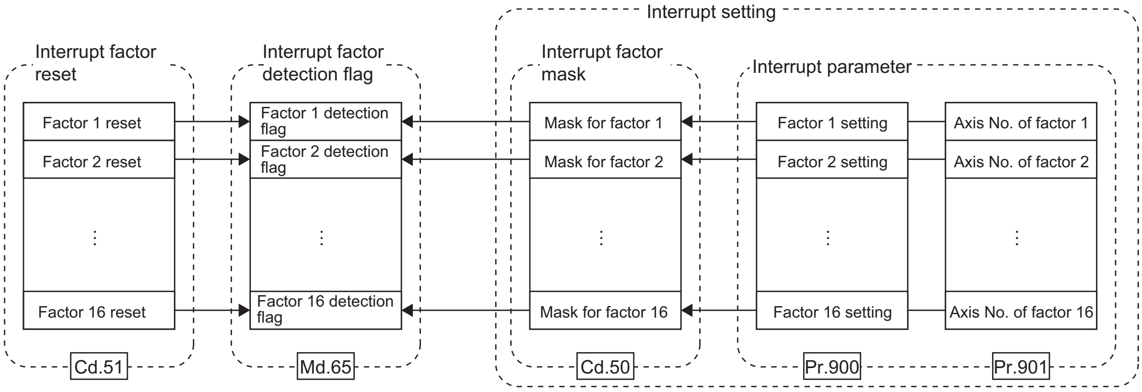
The interrupt function sends an interrupt request to the CPU module when an interrupt factor is detected. By using this function, an interrupt program can be started by detecting the occurrence of an interrupt factor such as the completion of the positioning. The RD75 can use 16 interrupt pointers at maximum.

Point

Using this function avoids the need to check buffer memory addresses periodically in a program. Therefore, this function can be applied to systems that need to switch controls in a short time.
The following processing can be performed.
- Executing an interrupt program for sub work at the instant when the remaining distance falls within a command in-position width (using the command in-position flag is used as an interrupt factor)

Overview of the interrupt function

The RD75 has 16 interrupt settings and can execute 16 interrupt programs. The following shows the configurations of the data used for the interrupt function.



Beginning from the interrupt function setting, the following steps are made to use the interrupt function.
- Set the interrupt parameters ([Pr.900] Interrupt factor setting and [Pr.901] Axis No. for interrupt factor) and write them to the RD75.
- Clear the mask by setting [Cd.50] Interrupt factor mask.
- If the RD75 detects an interrupt factor, an interrupt request is sent to the CPU module and the corresponding interrupt program of the CPU module is executed.
- Set 1: Interrupt factor reset request for [Cd.51] Interrupt factor reset request to clear the interrupt factor. The RD75 can detect a new interrupt factor after the old interrupt factor is cleared.

The interrupt function requires the following setting items.

Item		Buffer memory address			
		Setting 1	Setting 2	Setting n*1	Setting 16
[Md.65]	Interrupt factor detection flag	55000	55001	55000+n	55015
[Cd.50]	Interrupt factor mask	55064	55065	55064+n	55079
[Cd.51]	Interrupt factor reset request	55128	55129	55128+n	55143
[Pr.900]	Interrupt factor setting	55192	55193	55192+n	55207
[Pr.901]	Axis No. for interrupt factor	55256	55257	55256+n	55271

*1 n: 0 (setting 1) to 15 (setting 16)

Interrupt factor setting

To use the interrupt function, set the interrupt parameter. For the interrupt parameter, the setting value when PLC READY signal [Y0] is turned off and on is valid. After the power is switched on or the CPU module is reset, turn off and on PLC READY signal [Y0].

■[Pr.900] Interrupt factor setting

Setting detail	Setting value	Detection timing	Buffer memory address*1
Set the target interrupt factor.	0: Do not detect	OFF → ON	55192+n
	1: M code ON		
	2: Error detection		
	3: BUSY		
	4: Start complete		
	5: Positioning complete		
	100: Lower limit signal ([Md.30] External I/O signal)	ON → OFF	
	101: Upper limit signal ([Md.30] External I/O signal)		
	102: Drive unit READY ([Md.30] External I/O signal)		
	103: Stop signal ([Md.30] External I/O signal)	OFF → ON	
	104: External command signal ([Md.30] External I/O signal)		
	105: Zero signal ([Md.30] External I/O signal)		
	106: Near-point dog signal ([Md.30] External I/O signal)		
	107: Deviation counter clear signal ([Md.30] External I/O signal)		
	200: In speed control flag ([Md.31] Status)		
	201: Speed-position switching latch flag ([Md.31] Status)		
	202: Command in-position flag ([Md.31] Status)		
	203: OPR request flag ([Md.31] Status)		
	204: OPR complete flag ([Md.31] Status)		
	205: Position-speed switching latch flag ([Md.31] Status)		
	206: Warning detection ([Md.31] Status)		
	207: Speed change 0 flag ([Md.31] Status)		
	300: [Md.48] Deceleration start flag		
	301: [Md.61] Analysis complete flag		

*1 n: 0 (setting 1) to 15 (setting 16)

■[Pr.901] Axis No. for interrupt factor

Setting detail	Setting value	Buffer memory address*1
[Pr.901] Axis No. for interrupt factor	Set the axis number for detecting the factor set in [Pr.900] Interrupt factor setting. • 0: All axes • 1: Axis 1 • 2: Axis 2 • 3: Axis 3 • 4: Axis 4	55256+n

*1 n: 0 (setting 1) to 15 (setting 16)

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Detecting interrupt factors

To send an interrupt request to the CPU module when an interrupt factor is detected, clear the interrupt mask by setting [Cd.50] Interrupt factor mask beforehand.

Setting item		Setting value	Setting detail	Buffer memory address[*1]
[Cd.50]	Interrupt factor mask	0, 1	Set the mask for the interrupt factor used. 0: Mask (disable interruption) 1: Clear mask (enable interruption)	55064+n

*1 n: 0 (setting 1) to 15 (setting 16)

If an interrupt factor occurs, the value in [Md.65] Interrupt factor detection flag changes as follows.

Monitor item		Monitor value	Monitor details	Buffer memory address[*2]
[Md.65]	Interrupt factor detection flag	0, 1	Stores the detecting status of an interrupt factor. 0: Interrupt factor not detected 1: Interrupt factor detected	55000+n

*2 n: 0 (setting 1) to 15 (setting 16)

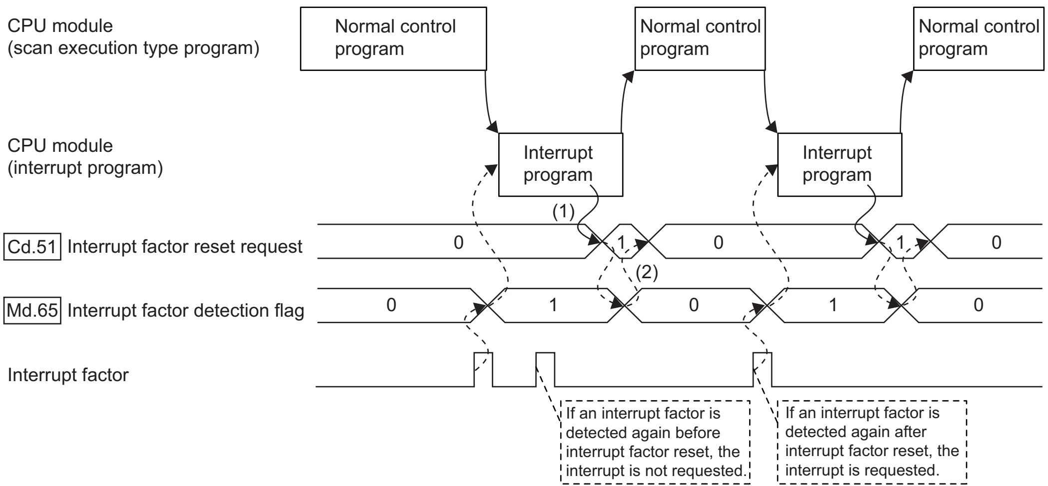
Resetting interrupt factors

When [Cd.51] Interrupt factor reset request is set to 1: Reset request, the interrupt factor is reset and 0: Interrupt factor not detected is stored in [Md.65] Interrupt factor detection flag.

Setting item		Setting value	Setting detail	Buffer memory address[*1]
[Cd.51]	Interrupt factor reset request	0, 1	The interrupt factor is reset. 0: No reset request 1: Reset request When the interrupt factor reset request is accepted, 0 is stored.	55128+n

*1 n: 0 (setting 1) to 15 (setting 16)

The following figure shows an example of the interrupt factor reset processing.



(1) In the interrupt program, set [Cd.51] Interrupt factor reset request to 1: Reset request.

(2) When [Cd.51] Interrupt factor reset request is accepted, [Md.65] Interrupt factor detection flag and [Cd.51] Interrupt factor reset request are cleared to 0.

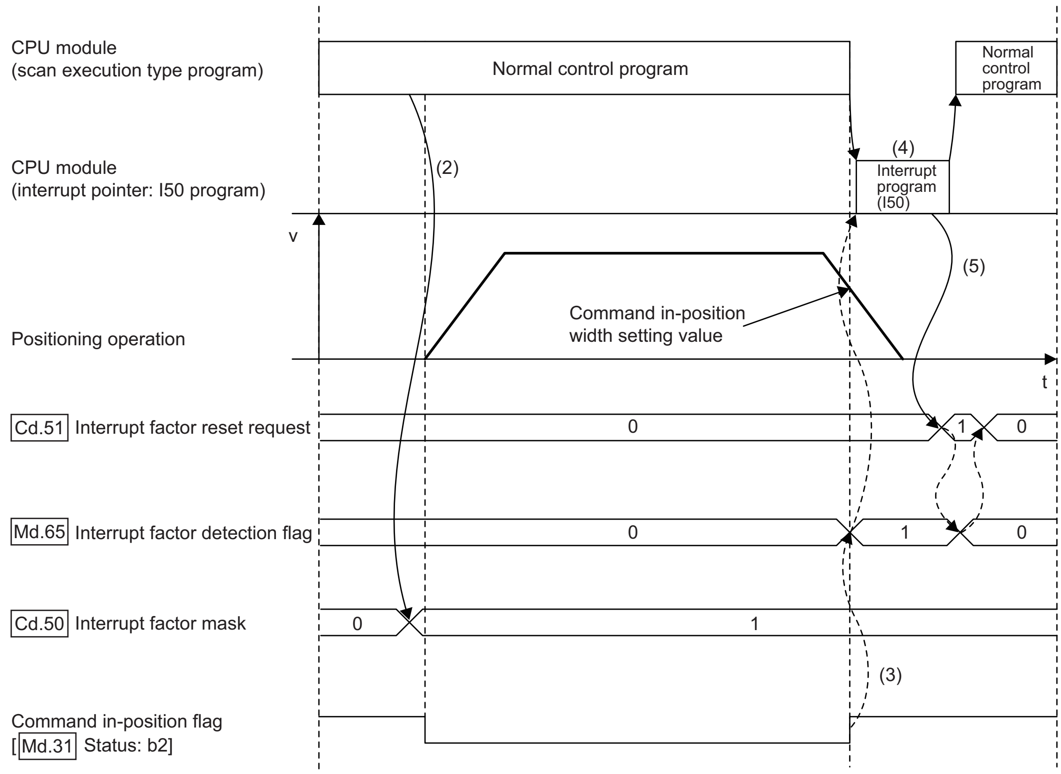
Control precautions

- Even if the same interrupt factor occurs again while [Md.65] Interrupt factor detection flag is 1: Interrupt factor detected, no interrupt request is sent to the CPU module.
- While [Cd.50] Interrupt factor mask is 0: Mask, no interrupt request is sent to the CPU module.
- After the power is switched on or the CPU module is reset, no interrupt request is sent to the CPU module because the interrupt parameter in the RD75 is set to the initial value. Turn off and on PLC READY signal [Y0] to validate the interrupt parameter.
- Starting "Positioning Test" of the engineering tool validates the interrupt parameter at a start.
- If a parameter error occurs when PLC READY signal [Y0] is turned off and on or "Positioning Test" of the engineering tool is started, the interrupt parameter is invalidated. No interrupt request is sent to the CPU module.

Operation example

The following shows an example of the interrupt factor setting and the operation in which the interrupt program of the interrupt pointer I50 is executed if the interrupt factor is detected.

Setting item		Setting value	Setting detail	Buffer memory address
[Pr.900]	Interrupt factor setting (setting 4)	202	202: Command in-position flag ([Md.31] Status)	55195
[Pr.901]	Axis No. for interrupt factor	1	1: Axis 1	55259



(1) Configure the interrupt setting using an engineering tool and create the processing for Axis 1 command in-position in the I50 program. Write the project and validate the setting.

(2) In the normal control program, set [Cd.50] Interrupt factor mask (address: 55067) to 1: Clear mask.

(3) When the remaining distance of the axis 1 falls within the range specified by the command in-position width setting value, [Md.65] Interrupt factor detection flag (address: 55003) of setting 4 turns to 1: Interrupt factor detected at the same time when b2: Command in-position of [Md.31] Status turns on.

(4) The interrupt pointer I50 program of the CPU module is started.

(5) When [Cd.51] Interrupt factor reset request of setting 4 (address: 55131) is set to 1: Reset request, the interrupt factor is cleared and 0: Interrupt factor not detected is stored in [Md.65] Interrupt factor detection flag of setting 4 (address: 55003).

For details on the interrupt pointer I50, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

Interrupt program example

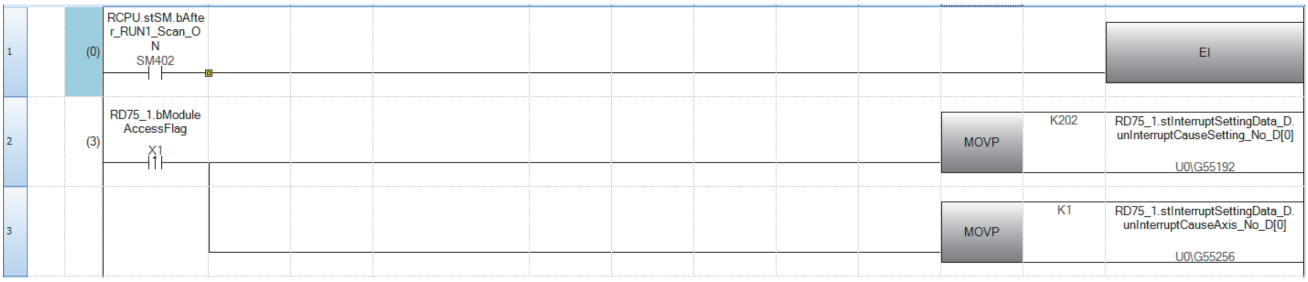
The following figure shows a program example for the interrupt processing with Axis 1 command in-position shown in the operation example. (☞ Page 305 Operation example)

■Interrupt setting program

This program configures the following interrupt setting for the interrupt setting 1.

- Start an interrupt program by turning off and on Axis 1 command in-position. (This step is not required when the interrupt setting is configured in the module parameter).

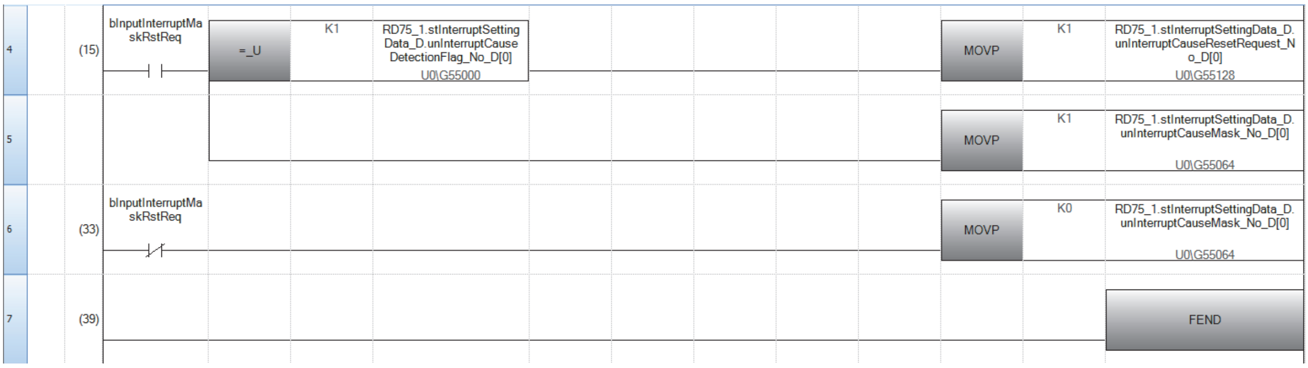
The interrupt pointer setting is available only with an engineering tool.



Classification	Label Name	Description
Module label	RD75_1.bModuleAccessFlag	Module access flag [X1]
	RD75_1.stInterruptSettingData_D.unInterruptCauseSetting_No_D[0]	Interrupt setting No.1 [Pr.900] Interrupt factor setting
	RD75_1.stInterruptSettingData_D.unInterruptCauseAxis_No_D[0]	Interrupt setting No.1 [Pr.901] Axis No. for interrupt factor

■Interrupt mask control program

This program sets or clears the interrupt mask of the interrupt setting 1.



Classification	Label Name	Description
Module label	RD75_1.bModuleAccessFlag	Module access flag [X1]
	RD75_1.stInterruptSettingData_D.unInterruptCauseDetectionFlag_No_D[0]	Interrupt setting No.1 [Md.65] Interrupt factor detection flag
	RD75_1.stnAxisControlData_Axis_D[0].uExternalCommandValid_D	Interrupt setting No.1 [Cd.50] Interrupt factor mask
Global label, local label	Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels. Label Name: bInputInterruptMaskRstReq (146) / Data Type: Bit / Class: VAR_GLOBAL / Assign (Device/Label):	

■Interrupt program

This program executes the processing for when an interrupt factor is detected, and resets the cause of the interrupt setting 1.

<table>
<tr><th>Classification</th><th>Label Name</th><th>Description</th></tr>
<tr><td>Module label</td><td>RD75_1.stInterruptSettingData_D.unInterruptCauseResetRequest_No_D[0]</td><td>Interrupt setting No.1 [Cd.51] Interrupt factor reset request</td></tr>
<tr><td>Global label, local label</td><td colspan="2">Define the global label or local label as follows. Setting Assign (Device/Label) for labels is not necessary because the unused internal relay and data device are automatically assigned to the labels.
<table>
<tr><th></th><th>Label Name</th><th>Data Type</th><th></th><th>Class</th></tr>
<tr><td>1</td><td>uInterruptProgramCount</td><td>Word [Unsigned]/Bit String [16-bit]</td><td>...</td><td>VAR</td></tr>
</table></td></tr>
</table>

7

8 COMMON FUNCTIONS

This chapter describes the details and usage of the common functions executed according to the user's requirements.
Common functions include the functions required for using the RD75 such as the module data initialization function and module data backup function.
Check the setting and execution procedures for each common function, and execute an appropriate function as required.

8.1 Overview of Common Functions

Functions below referred to as Common function can be used as required regardless of the control method used. These common functions are executed by engineering tools or with programs.
The following table shows the functions included in the common functions.

Common function	Description
Module data initialization function	Sets module parameters and module extension parameters (positioning data and block start data) in the buffer memory and setting values in the module extension parameter file to their factory default settings.
Module data backup function	Saves the module extension parameters (positioning data and block start data) in the buffer memory currently being used in control into the module extension parameter file.
External I/O signal logic switching function	Switches I/O signal logics according to the equipment connected to the RD75. For the system in which signals handled as normally closed contacts (such as Drive unit READY signal and limit signals) are not used, the parameter logic setting can be controlled without wiring if the setting is changed to "Positive logic".
External I/O signal monitor function	Monitors External I/O signal using the module's detailed information which can be displayed on the system monitor of an engineering tool.
History monitor function	Monitors the error history, warning history, and start history of all axes.
Amplifier-less operation function	Performs positioning controls without a drive unit. This function is used for debugging user programs at a start-up or simulating positioning operation.
Online module change	Allows the module change without stopping the system. For the online module change procedure, refer to the following. MELSEC iQ-R Online Module Change Manual

8.2 Module Data Initialization Function

This function sets module parameters and module extension parameters (positioning data and block start data) in the buffer memory of the RD75 and setting values in the module extension parameter file to their factory default settings.

Module data initialization means

This function is executed with a program.

Control details

The following table lists the parameters that are initialized with the module data initialization function.

Parameter*1	Extension parameter storage setting*2	
	CPU module	Positioning module
Module parameter	The module parameters in the buffer memory are initialized.	
Module extension parameter	The module extension parameters in the buffer memory are initialized.	
	The module extension parameter file in the CPU module is initialized.*3	The module extension parameter file in the positioning module is initialized.

*1 For the parameter file, refer to the following.
☞ Page 496 Parameter Reflection

*2 The storage destination of module extension parameters is specified by the extension parameter storage setting. For details, refer to the following.
☞ Page 495 Extended parameter storage setting

*3 The module data initialization can be performed only while the CPU module status is STOP.

Control precautions

- Execute the module data initialization function only when the positioning control is not performed (when PLC READY signal [Y0] is off). If the initialization is executed while PLC READY signal [Y0] is on, PLC READY ON write (Warning code: 0905H) will occur.
- Writing to the flash ROM can be executed up to 100000 times. If the number of writing to the flash ROM exceeds 100000 times, writing data to the flash ROM may become impossible and Flash ROM write error (Error code: 1931H) will occur.
- After the parameter initialization is performed, powering off and on the system again or resetting the CPU module is required.
- If an error occurs on the parameter set in the RD75 when PLC READY signal [Y0] is turned on, RD75 READY signal [X0] will not turn on and the control cannot be performed.
- The number of module data initializations using a program after the power is turned on once or the CPU module is reset is limited to up to 25 times (including the number of executions of the module data backup function). If the writing operation is executed 26th times, Flash ROM write number error (Error code: 1080H) will occur. If this error occurs, reset the error, power off and on the module again, or reset the CPU module.

Control restrictions

- When the extension parameter storage setting has been set to "CPU", the module data initialization can be performed only while the CPU module status is STOP. Use "[Cd.2] Module data initialization request" for the module data initialization.
- The module data initialization processing takes about 10 to 30 seconds. Do not turn on and off the power or reset the CPU module during the module data initialization processing. Doing so cancels the flash ROM write and the backed up data will be lost.

Module initialization method

- The parameter initialization can be performed by writing the data shown in the table below into the RD75 buffer memory using the MOV instruction. The parameter initialization is executed at the timing when the data is written into the RD75 buffer memory.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.2]	Module data initialization request	1	0: Not requested 1: Requested	1901			

- The module initialization can also be performed by using the GP.PINIT instruction of the dedicated instructions. For details on the dedicated instructions, refer to the following.

📖 MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

When the initialization is completed, "0" is set in "[Cd.2] Module data initialization request" automatically.

8.3 Module Data Backup Function

When buffer memory data is rewritten with programs or others, the setting values in the module extension parameter file and the execution data being used in control (buffer memory data) may differ. In cases like this, the execution data will be lost if the CPU module is powered off.
For the cases like this, the module data backup function writes the execution data into the module extension parameter file and backs up the data. The data in the module extension parameter file that was backed up will be written into the buffer memory when the power is turned on next time.

Module backing up means

This function is executed with a program.

Control details

The following table lists the data that can be backed up with the module data backup function.

Parameter*1	Extension parameter storage setting*2	
	CPU module	Positioning module
Module parameter	No data is backed up.	
Module extension parameter	The module extension parameters in the buffer memory are backed up in the module extension parameter file of the CPU module.*3	The module extension parameters in the buffer memory are backed up in the module extension parameter file of the positioning module.

*1 For the parameter file, refer to the following.
☞ Page 496 Parameter Reflection
*2 The storage destination of module extension parameters is specified by the extension parameter storage setting. For details, refer to the following.
☞ Page 495 Extended parameter storage setting
*3 The module data backup can be performed only while the CPU module status is STOP.

Control precautions

- Write data into the flash ROM only when the positioning control is not performed (when PLC READY signal [Y0] is off). If the initialization is executed while PLC READY signal [Y0] is on, PLC READY ON write (Warning code: 0905H) will occur.
- Writing to the flash ROM can be executed up to 100000 times. If the number of writing to the flash ROM exceeds 100000 times, writing data to the flash ROM may become impossible and Flash ROM write error (Error code: 1931H) will occur.
- The number of module data backups using a program after the power is turned on once or the CPU module is reset is limited to up to 25 times (including the number of executions of the module data initialization function). If the writing operation is executed 26th times, Flash ROM write number error (Error code: 1080H) will occur. If this error occurs, reset the error, power off and on the module again, or reset the CPU module.

Control restrictions

- When the extension parameter storage setting has been set to "CPU", the module data backup can be performed only while the CPU module status is STOP. Use "[Cd.1] Module data backup request" for the module data backup.
- Do not turn on and off the power or reset the CPU module during the writing processing to the flash ROM. Doing so cancels the flash ROM write and the backed up data will be lost.

Module backing up method

- The module backing up operation can be performed by writing the data shown in the table below into the RD75 buffer memory using the TO instruction. The module data backup operation is executed at the timing when the data is written into the RD75.

Setting item		Setting value	Setting detail	Buffer memory address			
				Axis 1	Axis 2	Axis 3	Axis 4
[Cd.1]	Module data backup request	1	0: Not requested 1: Requested	1900			

- The module backup can also be performed by using the GP.PFWRT instruction of the dedicated instructions. For details on the dedicated instructions, refer to the following.

MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

When the data has been written to the flash ROM, "0" is set in "[Cd.1] Module data backup request" automatically.

8.4 External I/O Signal Logic Switching Function

This function switches the signal logics according to the external device connected to the RD75.
For the system in which Drive unit READY signal handled as a normally closed contact, upper limit switch, and lower limit switch are not used, controlling can be performed by this function without wiring if the parameter logic setting is changed to Positive logic.
When Drive unit READY signal, upper limit switch, and lower limit switch are used, ensure to use them as normally closed contacts.

Parameter setting details

To use the external I/O signal logic switching function, set the parameters shown in the following table.

<table>
<tr><th colspan="2" rowspan="2">Setting item</th><th colspan="3" rowspan="2">Setting detail</th><th rowspan="2">Initial value at the factory</th><th colspan="4">Buffer memory address</th></tr>
<tr><th>Axis 1</th><th>Axis 2</th><th>Axis 3</th><th>Axis 4</th></tr>
<tr><td rowspan="11">[Pr.22]</td><td rowspan="11">Input signal logic selection</td><td colspan="3">• Set the logic of each input signal according to the external device.</td><td rowspan="11">0</td><td rowspan="11">31</td><td rowspan="11">181</td><td rowspan="11">331</td><td rowspan="11">481</td></tr>
<tr><td>b0</td><td>Lower limit signal</td><td rowspan="7">0: Negative logic
1: Positive logic</td></tr>
<tr><td>b1</td><td>Upper limit signal</td></tr>
<tr><td>b2</td><td>Drive unit READY signal</td></tr>
<tr><td>b3</td><td>Stop signal</td></tr>
<tr><td>b4</td><td>External command signal</td></tr>
<tr><td>b5</td><td>Zero signal</td></tr>
<tr><td>b6</td><td>Near-point dog signal</td></tr>
<tr><td>b7</td><td>Use prohibited</td><td>Set 0.</td></tr>
<tr><td>b8</td><td>Manual pulse generator input</td><td>0: Negative logic
1: Positive logic</td></tr>
<tr><td>b9 to b15</td><td>Use prohibited</td><td>Set 0.</td></tr>
<tr><td rowspan="5">[Pr.23]</td><td rowspan="5">Output signal logic selection</td><td colspan="3">• Set the logic of each output signal according to the external device.</td><td rowspan="5">0</td><td rowspan="5">32</td><td rowspan="5">182</td><td rowspan="5">332</td><td rowspan="5">482</td></tr>
<tr><td>b0</td><td>Command pulse signal</td><td>0: Negative logic
1: Positive logic</td></tr>
<tr><td>b1 to b3</td><td>Use prohibited</td><td>Set 0.</td></tr>
<tr><td>b4</td><td>Deviation counter clear signal</td><td>0: Negative logic
1: Positive logic</td></tr>
<tr><td>b5 to b15</td><td>Use prohibited</td><td>Set 0.</td></tr>
</table>

Precautions on the parameter setting

- The parameters for the external I/O signal logic switching function become valid at the timing when PLC READY signal [Y0] is turned off and on. (The logic is negative right after the power is turned on.)
- If the logic of each signal is set incorrectly, the operation may not be performed properly. Before setting logics, check the specifications of the device used.

8.5 External I/O Signal Monitor Function

External I/O signal monitor function monitors the module information on the engineering tool.

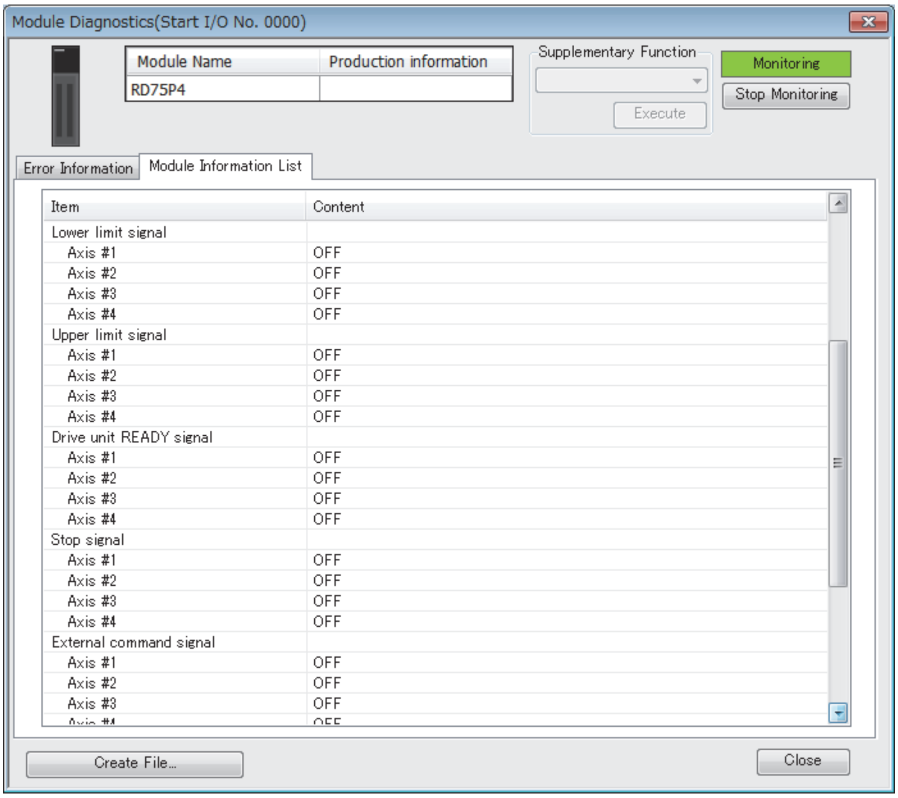
The following shows the information that can be monitored.

- RUN LED, ERR LED
- No. of write accesses to flash ROM (the same information as [Md.19] No. of write accesses to flash ROM)
- External I/O signal (The logics of the external I/O signals are set in [Pr.22] Input signal logic selection and [Pr.23] Output signal logic selection.)

Operation method

Display [Module Information List] by following the procedure shown below.

[Diagnostics] ⇨ [System Monitor] ⇨ Double-click RD75 ⇨ [Module Information List]



8.6 History Monitor Function

This function monitors the start history, error history, and warning history stored in the buffer memory of RD75 during the operation monitoring.

Start history

The start history of past 16 records of operations such as the positioning operation, JOG operation, and manual pulse generator operation can be monitored. Once 16 records are stored, the oldest record is overwritten with the latest record. Therefore, the latest 16 history records are stored at all times. This function allows users to check the operation sequence (whether the operations have been started in a predetermined sequence) when the system is started.
The start history can be checked using the intelligent function module monitor window. The following describes the check method.

1. Display the "Intelligent Function Module Monitor" window.

[View] ⇨ [Docking Window] ⇨ [Intelligent Function Module Monitor] ⇨ [Intelligent Function Module Monitor 1] to [Intelligent Function Module Monitor 10]

2. Select the RD75 from the project view.

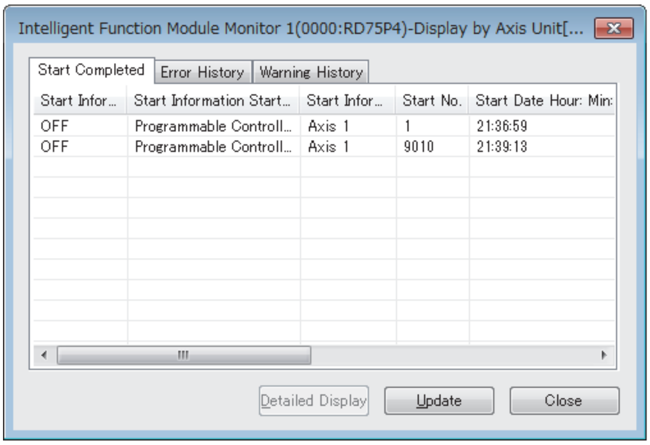
3. Right-click ⇨ Select [Register to Intelligent Function Module Monitor] in the shortcut menu.

4. Select the RD75 from the "Module List" in "Module Information Selection" window.

5. In "Monitor Item Category List", select "Display by Axis Unit" or "Display by Item Unit", and click the [OK] button.

6. Select [Online] ⇨ [Watch] ⇨ [Start Watching].

7. In the registered "Intelligent Function Module Monitor" window, right-click "Start Completed", and select [Detailed Dialog] in the shortcut menu. The start history is displayed.



The start history can be checked using the positioning monitor. For details on the positioning monitor, refer to the following.

☞ Page 338 Positioning Monitor

Error history and warning history

The error history and warning history of past 16 records can be monitored. Once 16 records are stored, the oldest record is overwritten with the latest record. Therefore, the latest 16 history records are stored at all times.

The error history and warning history can be checked using the intelligent function module monitor window. The following describes the check method.

1. Display the "Intelligent Function Module Monitor" window.

[View] ⇨ [Docking Window] ⇨ [Intelligent Function Module Monitor] ⇨ [Intelligent Function Module Monitor 1] to [Intelligent Function Module Monitor 10]

2. Select the RD75 from the project view.

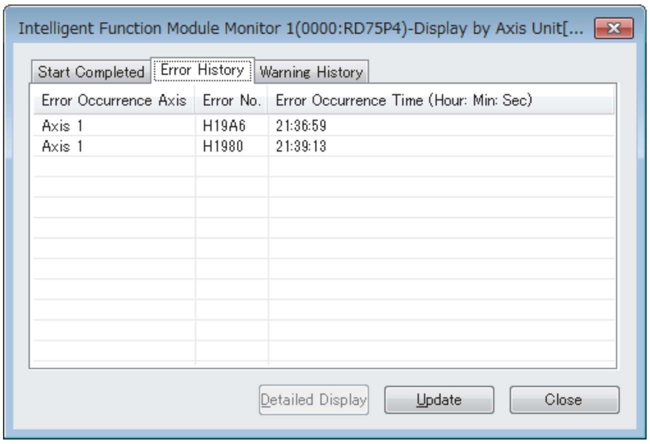
3. Right-click ⇨ Select [Register to Intelligent Function Module Monitor] in the shortcut menu.

4. Select the RD75 from the "Module List" in "Module Information Selection" window.

5. In "Monitor Item Category List", select "Display by Axis Unit" or "Display by Item Unit", and click the [OK] button.

6. Select [Online] ⇨ [Watch] ⇨ [Start Watching].

7. In the registered "Intelligent Function Module Monitor" window, right-click "Error History" or "Warning History", and select [Detailed Dialog] in the shortcut menu. "Error History" or "Warning History" is displayed.



The error history and warning history can be checked using the positioning monitor. For details on the positioning monitor, refer to the following.

☞ Page 338 Positioning Monitor

8.7 Amplifier-less Operation Function

With this function, user programs can be debugged at a start-up or positioning operations can be simulated by inputting a false external input signal from the buffer memory. External wiring with a drive unit or a limit switch is not required.

Control details

To use this function, switch the operation mode from the normal operation mode to the amplifier-less operation mode.

Operation mode	Description
Normal operation mode	• The module is in this mode immediately after the power-on. • In this mode, External I/O signal is connected and the positioning operation is performed.
Amplifier-less operation mode	• In this mode, the setting in [Cd.44] External input signal operation device is used as a false external input signal and the positioning operation is performed. • The starting method of positioning control is the same as that in the normal operation mode.

If the operation mode is switched from the amplifier-less operation mode to the normal operation mode after the amplifier-less operation, the normal operation with External I/O signal connected can be performed.

■Current value

When the operation mode is switched between the normal operation mode and the amplifier-less operation mode, "0" is set in "[Md.20] Current feed value" and "[Md.21] Machine feed value".

■External I/O signal

The following table lists "Enabled external input signals" and "Output status of external output signals" in the normal operation mode and the amplifier-less operation mode.

External I/O signal		Normal operation mode	Amplifier-less operation mode
Enabled external input signals	Drive unit READY signal	Input from external devices	Setting in [Cd.44] External input signal operation device
	Stop signal		
	Upper limit signal		
	Lower limit signal		
	Zero signal		
	Near-point dog signal		
	External command signal		
	Manual pulse generator	Input from external devices	
Output status of external output signals	Deviation counter clear	Output to external devices	No output to external devices
	Pulse output		

Point

Operation mode switching between the normal operation mode and the amplifier-less operation mode is reflected on all axes in a batch. The operation mode cannot be switched for each axis.

Restrictions

- In the amplifier-less operation mode, the following monitor data operations differ from those in the normal operation mode.

<table>
<tr><th colspan="2" rowspan="2">Monitor item</th><th colspan="3" rowspan="2">Monitor details</th><th colspan="4">Buffer memory address</th></tr>
<tr><th>Axis 1</th><th>Axis 2</th><th>Axis 3</th><th>Axis 4</th></tr>
<tr><td rowspan="11">[Md.30]</td><td rowspan="11">External I/O signal</td><td colspan="3">The ON or OFF state of External I/O signal is stored.</td><td rowspan="11">816</td><td rowspan="11">916</td><td rowspan="11">1016</td><td rowspan="11">1116</td></tr>
<tr><td>b0</td><td>Lower limit signal</td><td rowspan="7">The ON or OFF state set in [Cd.44] External input signal operation device is reflected on these signals.</td></tr>
<tr><td>b1</td><td>Upper limit signal</td></tr>
<tr><td>b2</td><td>Drive unit READY signal</td></tr>
<tr><td>b3</td><td>Stop signal</td></tr>
<tr><td>b4</td><td>External command signal</td></tr>
<tr><td>b5</td><td>Zero signal</td></tr>
<tr><td>b6</td><td>Near-point dog signal</td></tr>
<tr><td>b7</td><td>Use prohibited</td><td>—</td></tr>
<tr><td>b8</td><td>Deviation counter clear signal</td><td>These signals turn on or off in the same way in the normal operation mode.</td></tr>
<tr><td>b9 to b15</td><td>Use prohibited</td><td>—</td></tr>
</table>

- If the module is powered on or the CPU module is reset in the amplifier-less operation mode, the operation mode is switched to the normal operation mode.
- Acquisition timing of external input signals and start timing differ between the amplifier-less operation mode and the normal operation mode. Check the actual operation with the actual equipment.
- The amplifier-less operation function cannot be used in the test mode. If the amplifier-less operation mode is requested in the test mode, Error at switching from normal operation mode to amplifier-less operation mode (Error code: 18B0H) occurs and the operation mode is not switched.

Setting method

The following table lists the data used with the amplifier-less operation function.

■System control data

<table>
<tr><th colspan="2" rowspan="2">Setting item</th><th rowspan="2">Setting value</th><th colspan="3" rowspan="2">Setting details</th><th rowspan="2">Initial value at the factory</th><th colspan="4">Buffer memory address</th></tr>
<tr><th>Axis 1</th><th>Axis 2</th><th>Axis 3</th><th>Axis 4</th></tr>
<tr><td>[Cd.137]</td><td>Amplifier-less operation mode switching request</td><td>→</td><td colspan="3">Switches the operation mode.
ABCDH: Switches the operation mode from the normal operation mode to the amplifier-less operation mode.
0000H: Switches the operation mode from the amplifier-less operation mode to the normal operation mode.</td><td>0000H</td><td colspan="4">1926</td></tr>
<tr><td rowspan="9">[Cd.44]</td><td rowspan="9">External input signal operation device</td><td rowspan="9">→</td><td colspan="3">Set the external input signal status for the amplifier-less operation mode. (Acquisition cycle: 0.88ms)</td><td rowspan="9">0000H</td><td rowspan="9">1928</td><td rowspan="9">1929</td><td rowspan="9">1930</td><td rowspan="9">1931</td></tr>
<tr><td>b0</td><td>Lower limit signal</td><td rowspan="7">0: OFF
1: ON</td></tr>
<tr><td>b1</td><td>Upper limit signal</td></tr>
<tr><td>b2</td><td>Drive unit READY signal</td></tr>
<tr><td>b3</td><td>Stop signal</td></tr>
<tr><td>b4</td><td>External command signal</td></tr>
<tr><td>b5</td><td>Zero signal</td></tr>
<tr><td>b6</td><td>Near-point dog signal</td></tr>
<tr><td>b7 to b15</td><td>Use prohibited</td><td>Set 0.</td></tr>
</table>

■System monitor data

<table>
<tr><th colspan="2" rowspan="2">Monitor item</th><th rowspan="2">Monitored value</th><th rowspan="2">Monitor details</th><th colspan="4">Buffer memory address</th></tr>
<tr><th>Axis 1</th><th>Axis 2</th><th>Axis 3</th><th>Axis 4</th></tr>
<tr><td>[Md.70]</td><td>Amplifier-less operation mode status</td><td>→</td><td>Indicates the current operation mode.
0: In normal operation mode
1: In amplifier-less operation mode</td><td colspan="4">1201</td></tr>
</table>

Operation mode switching procedure

■Switching from the normal operation mode to the amplifier-less operation mode

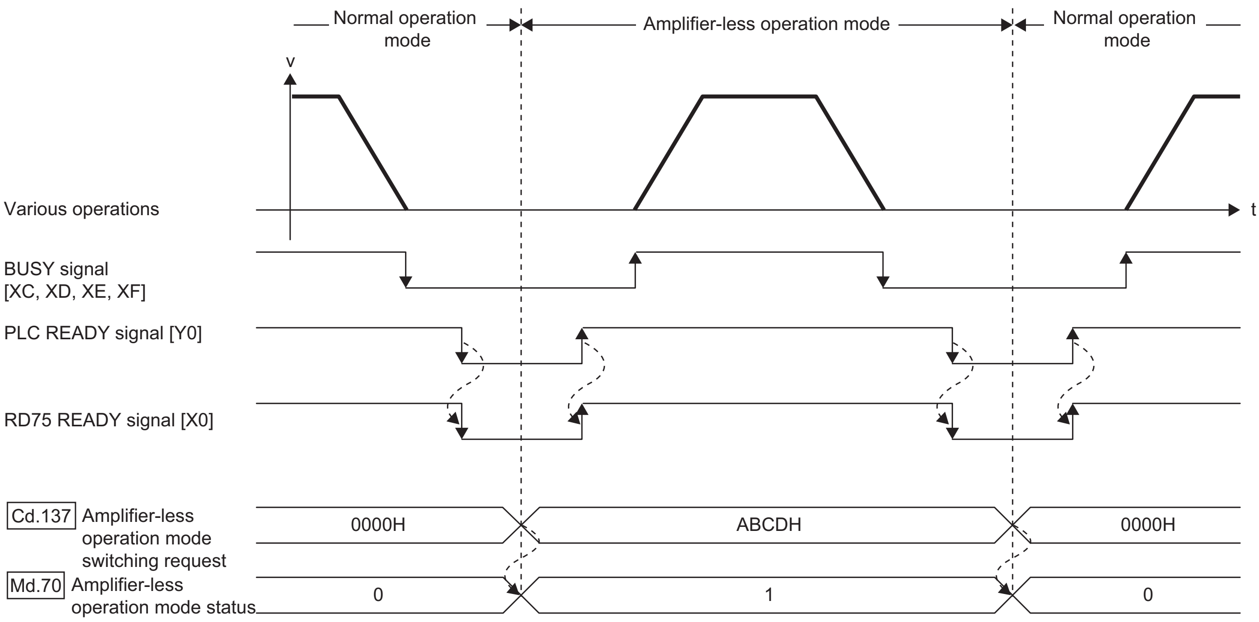
1. Stop all operating axes, and check that BUSY signals of all axes are off.
2. Turn off PLC READY signal [Y0].
3. Check that RD75 READY signal [X0] is off.
4. Set "ABCDH" in "[Cd.137] Amplifier-less operation mode switching request".
5. Check that "[Md.70] Amplifier-less operation mode status" is set to "1: In amplifier-less operation mode".

■Switching from the amplifier-less operation mode to the normal operation mode

1. Stop all operating axes, and check that BUSY signals of all axes are off.
2. Turn off PLC READY signal [Y0].
3. Check that RD75 READY signal [X0] is off.
4. Set "0000H" in "[Cd.137] Amplifier-less operation mode switching request".
5. Check that "[Md.70] Amplifier-less operation mode status" is set to "0: In normal operation mode".

■Operation chart

The following chart shows switching operation between the normal operation mode and the amplifier-less operation mode.



Point

- Check that all input signals [X0 to X17] other than Module access flag [X1] are off, and switch the operation mode between the normal operation mode and the amplifier-less operation mode. If the operation mode is switched while any of input signals other than Module access flag [X1] in on, Error at switching from normal operation mode to amplifier-less operation mode (Error code: 18B0H) or Error at switching from amplifier-less operation mode to normal operation mode (Error code: 18B1H) occurs and the operation mode is not switched.
- The switching operation is enabled when "0000H" or "ABCDH" is set in "[Cd.137] Amplifier-less operation mode switching request". If a value other than "0000H" or "ABCDH" is set, the operation mode is not switched and error detection is not performed.
- The operation mode is switched to the amplifier-less operation mode only when "[Cd.137] Amplifier-less operation mode switching request" is set to "ABCDH" from "0000H". The operation mode is switched to the normal operation mode only when "[Cd.137] Amplifier-less operation mode switching request" is set to "0000H" from "ABCDH".

9 PARAMETER SETTING

This chapter describes the parameter setting of the RD75. By setting parameters, the parameter setting by program is not needed.
The parameter setting has two types including the module parameter and module extension parameter.

9.1 Parameter Setting Procedure

1. Add the RD75 to the engineering tool.

[Navigation] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

2. The parameter setting has two types including the module parameter and module extension parameter. Select either of them from the tree on the following window.

[Navigation] ⇨ [Parameter] ⇨ [Module Information] ⇨ Target module

3. Write the settings to the CPU module with the engineering tool.

[Online] ⇨ [Write to PLC]

4. The settings are reflected by resetting the CPU module or powering off and on the system.

9.2 Module Parameters

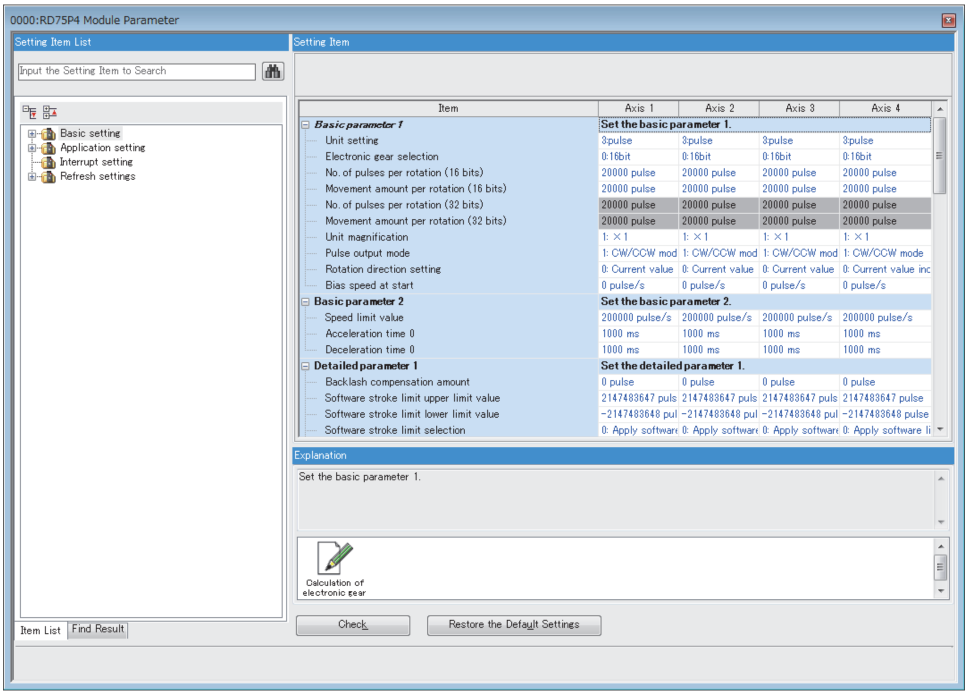
Set the module parameter. The module parameter has the basic setting, application setting, interrupt setting, and refresh setting.

Select the module parameter from the tree on the following window.

[Navigation] ⇨ [Parameter] ⇨ [Module Information] ⇨ Target module

Basic setting

Set the parameter required to use the RD75.



Item		Setting range	Reference
Basic parameter 1	Unit setting	• 0: mm • 1: inch • 2: degree • 3: pulse (default value)	Page 388 [Pr.1] Unit setting
	Electronic gear selection	• 0: 16bit (default value) • 1: 32bit	Page 395 [Pr.62] Electronic gear selection
	No. of pulses per rotation (16 bits)	1 to 65535 pulse (default value: 20000)	Page 389 [Pr.2] No. of pulses per rotation (16 bits) (Ap)
	Movement amount per rotation (16 bits)	Refer to the right item. (default value: 20000)	Page 390 [Pr.3] Movement amount per rotation (16 bits) (Al)
	No. of pulses per rotation (32 bits)	1 to 200000000 pulses (default value: 20000)	Page 395 [Pr.2] No. of pulses per rotation (32 bits) (Ap)
	Movement amount per rotation (32 bits)	Refer to the right item. (default value: 20000)	Page 396 [Pr.3] Movement amount per rotation (32 bits) (Al)
	Unit magnification	• 1: × 1 (default value) • 10: × 10 • 100: × 100 • 1000: × 1000	Page 390 [Pr.4] Unit magnification
	Pulse output mode	• 0: PULSE/SIGN mode • 1: CW/CCW mode (default value) • 2: A-phase/B-phase multiple of 4 • 3: A-phase/B-phase multiple of 1	Page 391 [Pr.5] Pulse output mode
	Rotation direction setting	• 0: Current value increment with forward run pulse output (default value) • 1: Current value increment with reverse run pulse output	Page 393 [Pr.6] Rotation direction setting
	Bias speed at start	Refer to the right item. (default value: 0)	Page 394 [Pr.7] Bias speed at start

Item		Setting range	Reference
Basic parameter 2	Speed limit value	Refer to the right item. (default value: 200000)	Page 397 [Pr.8] Speed limit value
	Acceleration time 0	1 to 8388608 ms (default value: 1000)	Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0
	Deceleration time 0		
Detailed parameter 1	Backlash compensation amount	Refer to the right item. (default value: 0)	Page 399 [Pr.11] Backlash compensation amount
	Software stroke limit upper limit value	Refer to the right item. (default value: 2147483647)	Page 400 [Pr.12] Software stroke limit upper limit value
	Software stroke limit lower limit value	Refer to the right item. (default value: -2147483648)	Page 400 [Pr.13] Software stroke limit lower limit value
	Software stroke limit selection	• 0: Apply software limit for current feed value (default value) • 1: Apply software limit for machine feed value	Page 401 [Pr.14] Software stroke limit selection
	Software stroke limit valid/invalid setting	• 0: Enable (default value) • 1: Disable	Page 401 [Pr.15] Software stroke limit valid/invalid setting
	Command in-position width	Refer to the right item. (default value: 300)	Page 401 [Pr.16] Command in-position width
	Torque limit setting value	1 to 5000 (default value: 300)	Page 402 [Pr.17] Torque limit setting value
	M code ON signal output timing	• 0: WITH mode (default value) • 1: AFTER mode	Page 403 [Pr.18] M code ON signal output timing
	Speed switching mode	• 0: Standard speed switching mode (default value) • 1: Front-loading speed switching mode	Page 404 [Pr.19] Speed switching mode
	Interpolation speed specification method	• 0: Composite speed (default value) • 1: Reference axis speed	Page 405 [Pr.20] Interpolation speed specification method
	Current feed value during speed control	• 0: Do not update current feed value (default value) • 1: Update current feed value • 2: Clear current feed value to 0	Page 406 [Pr.21] Current feed value during speed control
	Input signal logic selection: Lower limit signal	• 0: Negative logic (default value) • 1: Positive logic	Page 406 [Pr.22] Input signal logic selection
	Input signal logic selection: Upper limit signal		
	Input signal logic selection: Drive unit READY signal		
	Input signal logic selection: Stop signal		
	Input signal logic selection: External command signal		
	Input signal logic selection: Zero signal		
	Input signal logic selection: Near-point dog signal		
	Input signal logic selection: Manual pulse generator input		
	Output signal logic selection: Command pulse signal	• 0: Negative logic (default value) • 1: Positive logic	Page 407 [Pr.23] Output signal logic selection
	Output signal logic selection: Deviation counter clear		
	Manual pulse generator input selection	• 0: A-phase/B-phase multiple of 4 (default value) • 1: A-phase/B-phase multiple of 2 • 2: A-phase/B-phase multiple of 1 • 3: PULSE/SIGN	Page 407 [Pr.24] Manual pulse generator input selection
	Speed-position function selection	• 0: Speed-position switching control (INC mode) (default value) • 2: Speed-position switching control (ABS mode)	Page 407 [Pr.150] Speed-position function selection

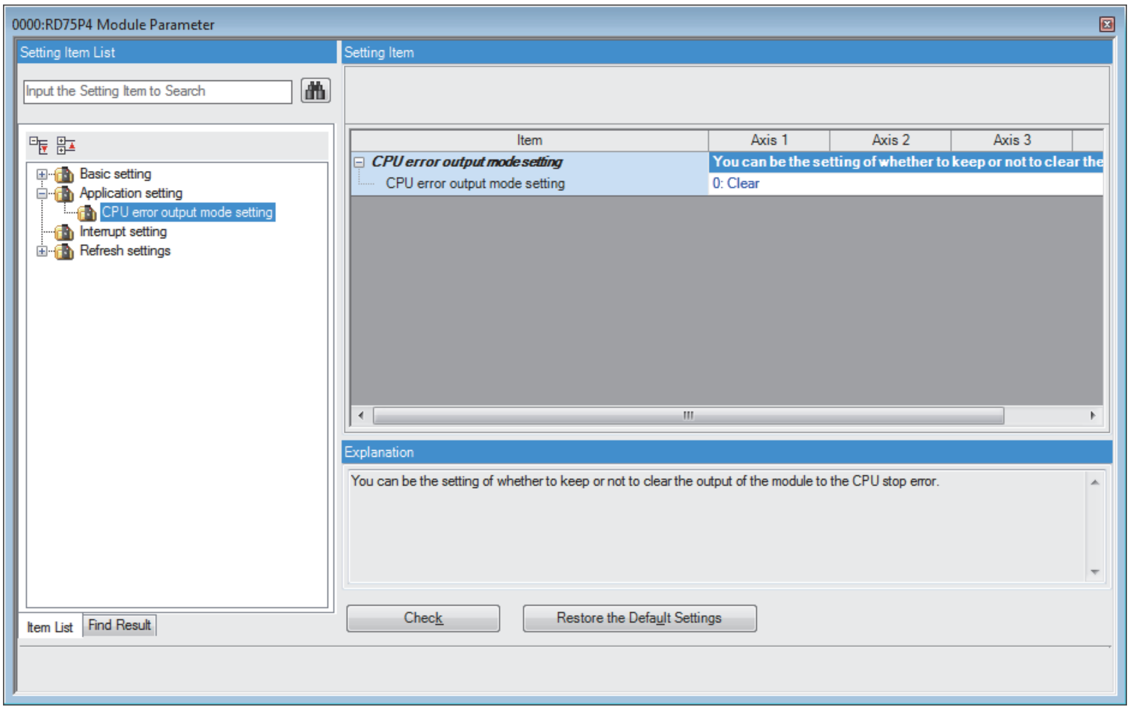
Item		Setting range	Reference
Detailed parameter 2	Acceleration time 1	1 to 8388608 ms (default value: 1000)	Page 408 [Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3
	Acceleration time 2		
	Acceleration time 3		
	Deceleration time 1		Page 408 [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3
	Deceleration time 2		
	Deceleration time 3		
	JOG speed limit value	Refer to the right item. (default value: 20000)	Page 409 [Pr.31] JOG speed limit value
	JOG operation acceleration time selection	• 0: Acceleration time 0 (default value) • 1: Acceleration time 1 • 2: Acceleration time 2 • 3: Acceleration time 3	Page 409 [Pr.32] JOG operation acceleration time selection
	JOG operation deceleration time selection	• 0: Deceleration time 0 (default value) • 1: Deceleration time 1 • 2: Deceleration time 2 • 3: Deceleration time 3	Page 410 [Pr.33] JOG operation deceleration time selection
	Acceleration/deceleration processing selection	• 0: Trapezoidal acceleration/deceleration processing (default value) • 1: S-curve acceleration/deceleration processing	Page 410 [Pr.34] Acceleration/deceleration processing selection
	S-curve ratio	1 to 100 % (default value: 100)	Page 411 [Pr.35] S-curve ratio
	Sudden stop deceleration time	1 to 8388608 ms (default value: 1000)	Page 412 [Pr.36] Sudden stop deceleration time
	Stop group 1 sudden stop selection	• 0: Normal deceleration stop (default value) • 1: Sudden stop	Page 413 [Pr.37] to [Pr.39] Stop group 1 to 3 sudden stop selection
	Stop group 2 sudden stop selection		
	Stop group 3 sudden stop selection		
	Positioning complete signal output time	0 to 65535 ms (default value: 300)	Page 414 [Pr.40] Positioning complete signal output time
	Allowable circular interpolation error width	Refer to the right item. (default value: 100)	Page 415 [Pr.41] Allowable circular interpolation error width
	External command function selection	• 0: External positioning start (default value) • 1: External speed change request • 2: Speed-position control switching request • 3: Skip request	Page 416 [Pr.42] External command function selection
	Start adjustment time	0.00 to 10000.00 ms (default value: 0.00)	Page 416 [Pr.82] Start adjustment time
OPR basic parameter	OPR method	• 0: Near-point dog method (default value) • 1: Stopper method 1 • 2: Stopper method 2 • 3: Stopper method 3 • 4: Count method 1 • 5: Count method 2 • 6: Data setting method • 7: Limit switch combined method	Page 417 [Pr.43] OPR method
	OPR direction	• 0: Positive direction (Address increase direction) (default value) • 1: Negative direction (Address decrease direction)	Page 418 [Pr.44] OPR direction
	OP address	Refer to the right item. (default value: 0)	Page 419 [Pr.45] OP address
	OPR speed	Refer to the right item. (default value: 1)	Page 419 [Pr.46] OPR speed
	Creep speed	Refer to the right item. (default value: 1)	Page 420 [Pr.47] Creep speed
	OPR retry	• 0: Do not perform the OPR retry with limit switches (default value) • 1: Perform the OPR retry with limit switches	Page 421 [Pr.48] OPR retry

Item		Setting range	Reference
OPR detailed parameter	OPR dwell time	0 to 65535 ms (default value: 0)	Page 422 [Pr.49] OPR dwell time
	Setting for the movement amount after near-point dog ON	Refer to the right item. (default value: 0)	Page 423 [Pr.50] Setting for the movement amount after near-point dog ON
	OPR acceleration time selection	• 0: Acceleration time 0 (default value) • 1: Acceleration time 1 • 2: Acceleration time 2 • 3: Acceleration time 3	Page 424 [Pr.51] OPR acceleration time selection
	OPR deceleration time selection	• 0: Deceleration time 0 (default value) • 1: Deceleration time 1 • 2: Deceleration time 2 • 3: Deceleration time 3	Page 424 [Pr.52] OPR deceleration time selection
	OP shift amount	Refer to the right item. (default value: 0)	Page 425 [Pr.53] OP shift amount
	OPR torque limit value	1 to 3000 (default value: 300)	Page 426 [Pr.54] OPR torque limit value
	Deviation counter clear signal output time	1 to 65535 ms (default value: 11)	Page 426 [Pr.55] Deviation counter clear signal output time
	Speed specification during OP shift	• 0: OPR speed (default value) • 1: Creep speed	Page 426 [Pr.56] Speed specification during OP shift
	Dwell time during OPR retry	0 to 65535 ms (default value: 0)	Page 427 [Pr.57] Dwell time during OPR retry
	Setting of operation during uncompleted OPR	• 0: Do not execute positioning control (default value) • 1: Execute the positioning control	Page 427 [Pr.58] Setting of operation during uncompleted OPR
Basic parameter 3	Operation mode	• Q compatible mode (default value) • Quick start mode	—
	Extended parameter storage setting	• CPU (default value) • Positioning module	—

*1 The basic parameter 3 setting is available only with an engineering tool.

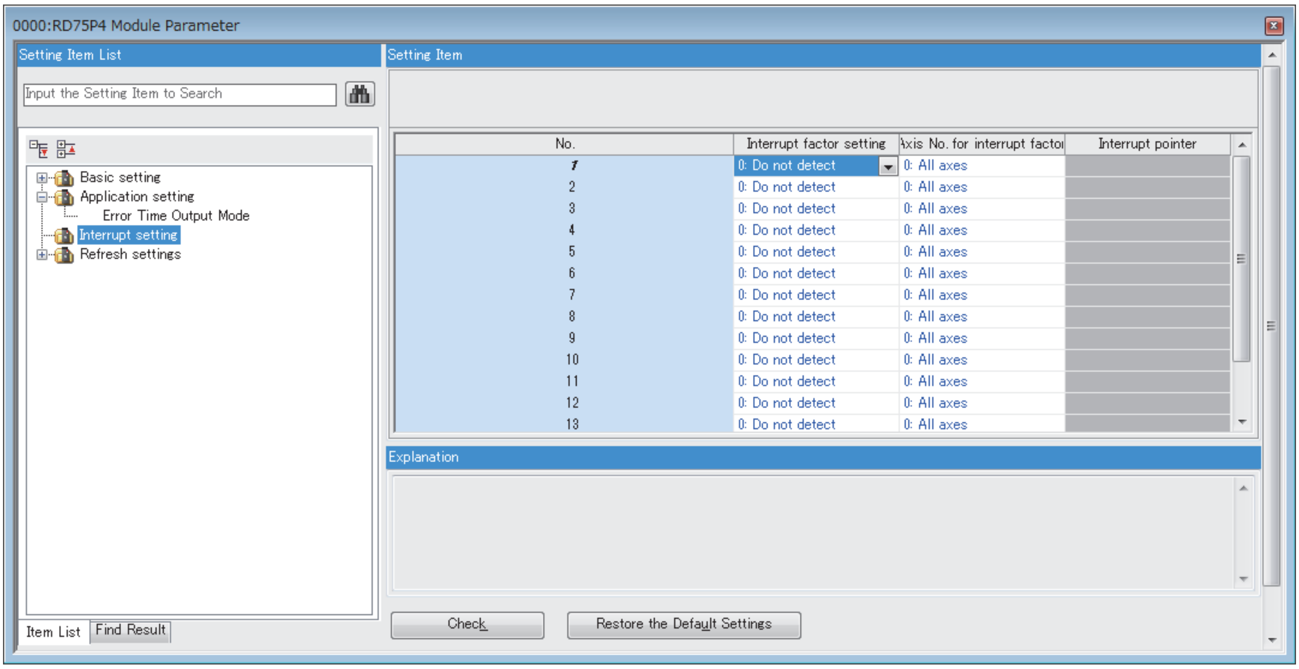
Application setting

Set CPU error output mode setting of the RD75. For the RD75, do not change the setting from its default value ("0: Clear"). If "1: Hold" is set, a hold error (error code: 1930H) occurs when the PLC READY signal [Y0] is turned on.



Interrupt setting

Set the interrupt function of the RD75.



Item	Setting range	Reference
Interrupt factor setting	• 0: Do not detect (default value) • 1: M code ON • 3: BUSY • 2: Error detection • 4: Start complete • 5: Positioning complete • 100: External I/O signal_Lower limit signal • 101: External I/O signal_Upper limit signal • 102: External I/O signal_Drive unit READY signal • 103: External I/O signal_Stop signal • 104: External I/O signal_Special start instruction • 105: External I/O signal_Zero signal • 106: External I/O signal_Near-point dog signal • 107: External I/O signal_Deviation counter clear signal • 200: Status_In speed control flag • 201: Status_Speed-position switching latch flag • 202: Status_Command in-position flag • 203: Status_OPR request flag • 204: Status_OPR complete flag • 205: Status_Position-speed switching latch flag • 206: Status_Warning detection • 207: Status_Speed change 0 flag • 300: Deceleration start flag • 301: Analysis complete flag	Page 493 [Pr.900] Interrupt factor setting
Axis No. for interrupt factor	• 0: All axes (default value) • 1: Axis 1 • 2: Axis 2 • 3: Axis 3 • 4: Axis 4	Page 493 [Pr.901] Axis No. for interrupt factor
Interrupt pointer	I0 to I15, I50 to I1023*1	—

*1 For details on the available interrupt pointers, refer to the following.
MELSEC iQ-R CPU Module User's Manual (Application)

Refresh settings

Configure the setting to transfer the values in the buffer memory of the RD75 to devices or module labels in the CPU module.
By configuring these refresh settings, reading the data by program is not needed.
Select the transfer destination from the following at "Target".

- Module label (☞ Page 326 Module label)
- Refresh data register (☞ Page 326 Refresh data register (RD))
- Specified device (☞ Page 326 Specified device)

Module label

Transfer the setting of the buffer memory to the corresponding module label of each buffer memory area. Setting "Current feed value" of the axis to be transferred to the module label to "Enable" sets all the items of the set axis to "Enable".

Refresh data register (RD)

Transfer the setting of the buffer memory to the refresh data register (RD) of the CPU module. Other transfer destinations are automatically set by setting the refresh data register (RD) to which "Current feed value" of each axis is transferred.

Specified device

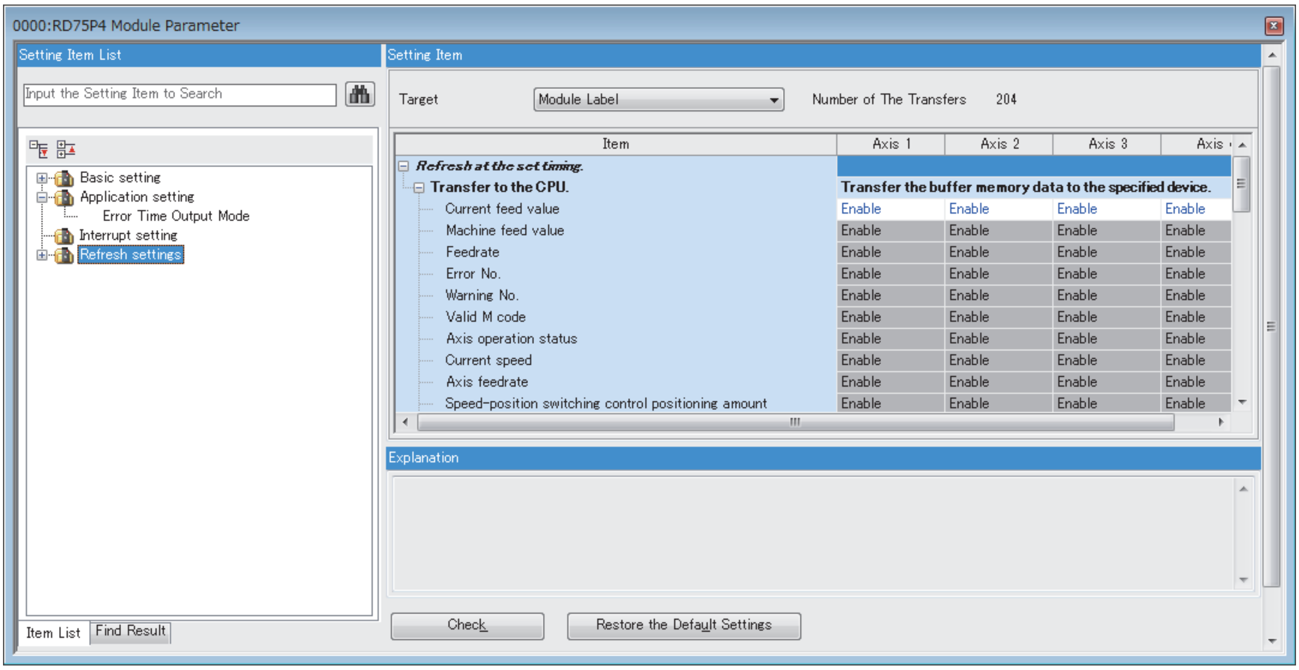
Transfer the setting of the buffer memory to the specified device of the CPU module. The device X, Y, M, L, B, D, W, R, ZR, and RD can be specified. To use the bit device X, Y, M, L, or B, set a number which is divisible by 16 points (example: X10, Y120, M16). The data in the buffer memory is stored in devices for 16 points from the set number.

Ex.

When X10 is set, data is stored in X10 to X1F.

Setting item

The refresh setting has the following items.



Item			Reference
Refresh at the set timing.	Transfer to the CPU.	Current feed value	Page 461 [Md.20] Current feed value
		Machine feed value	Page 461 [Md.21] Machine feed value
		Feedrate	Page 462 [Md.22] Feedrate
		Error No.	Page 462 [Md.23] Axis error No.
		Warning No.	Page 462 [Md.24] Axis warning No.
		Valid M code	Page 462 [Md.25] Valid M code
		Axis operation status	Page 463 [Md.26] Axis operation status
		Current speed	Page 464 [Md.27] Current speed
		Axis feedrate	Page 464 [Md.28] Axis feedrate
		Speed-position switching control positioning amount	Page 465 [Md.29] Speed-position switching control positioning amount
		External I/O signal	Page 465 [Md.30] External I/O signal
		Status	Page 466 [Md.31] Status
		Target value	Page 467 [Md.32] Target value
		Target speed	Page 468 [Md.33] Target speed
		OPR request flag ON cause	Page 468 [Md.63] OPR request flag ON factor
		Positioning control end cause	Page 469 [Md.64] Positioning control complete factor
		Movement amount after near-point dog ON	Page 469 [Md.34] Movement amount after near-point dog ON
		Torque limit stored value	Page 469 [Md.35] Torque limit stored value
		Special start data instruction code setting value	Page 470 [Md.36] Special start data instruction code setting value
		Special start data instruction parameter setting value	Page 470 [Md.37] Special start data instruction parameter setting value
		Start positioning data No. setting value	Page 470 [Md.38] Start positioning data No. setting value
		In speed limit flag	Page 471 [Md.39] In speed limit flag
		In speed change processing flag	Page 471 [Md.40] In speed change processing flag
		Special start repetition counter	Page 471 [Md.41] Special start repetition counter
		Control system repetition counter	Page 471 [Md.42] Control method repetition counter

Item			Reference
Refresh at the set timing.	Transfer to the CPU.	Start data pointer being executed	Page 472 [Md.43] Start data pointer being executed
		Positioning data No. being executed	Page 472 [Md.44] Positioning data No. being executed
		Block No. being executed	Page 472 [Md.45] Block No. being executed
		Last executed positioning data No.	Page 472 [Md.46] Last executed positioning data No.
		Positioning data being executed_Positioning identifier	Page 473 [Md.47] Positioning data being executed
		Positioning data being executed_M code	
		Positioning data being executed_Dwell time	
		Positioning data being executed_Positioning option	
		Positioning data being executed_Command speed	
		Positioning data being executed_Positioning address	
		Positioning data being executed_Arc address	
		Analysis mode	Page 473 [Md.60] Analysis mode
		Analysis complete flag	Page 474 [Md.61] Analysis complete flag
		Deceleration start flag	Page 474 [Md.48] Deceleration start flag
Refresh Group		Refresh Group	Page 328 Refresh group
		Group [n] (n: 1-64)	
Refresh Timing (I/O)*1		Refresh Timing	—
Inter-module synchronous interrupt function	Transfer to CPU	Analysis complete flag	Page 474 [Md.61] Analysis complete flag
Refresh Timing (Synchronous Interrupt)*1		Refresh Group	—

*1 The setting cannot be changed from the default in the RD75.

■Refresh group

Set the refresh timing of the specified refresh destination.

Setting value	Description
At the Execution Time of END Instruction	Performs refresh at END processing of the CPU module.
At the Execution Time of Specified Program	Performs refresh at the execution of the program specified with "Group [n] (n: 1-64)".
At the Execution Time of Synchronous Interrupt Program between Unit	Performs refresh at the execution of the inter-module synchronous interrupt program.

Refresh processing time

A refresh processing time [μs] is a constituent of the scan time of the CPU module. For details on the scan time, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

The refresh processing time [μs], which is taken for refresh processing, is given by:

- Refresh processing time [μs] = Refresh read time (refresh data transfer to the CPU module)

The refresh read time varies depending on the settings of "Target".

With the inter-module synchronization function used, the refresh read time is also added to the execution time of an inter-module synchronous interrupt program.

■When "Target" is a module label or a refresh data register (RD)

The following table shows the refresh read time with an R□CPU used.

Classification	Number of the axis set	When using the refresh settings	When using the inter-module synchronization function
Refresh read time	1	17.58μs	12.63μs
	2	23.56μs	13.66μs
	3	29.54μs	14.69μs
	4	35.52μs	15.72μs

■When "Target" is a specified device

Calculate the refresh read time according to the number of items and the number of their transfer data (word) that are set to be refreshed. For the calculation method, refer to the following.

📖 MELSEC iQ-R CPU Module User's Manual (Application)

9.3 Module Extension Parameter

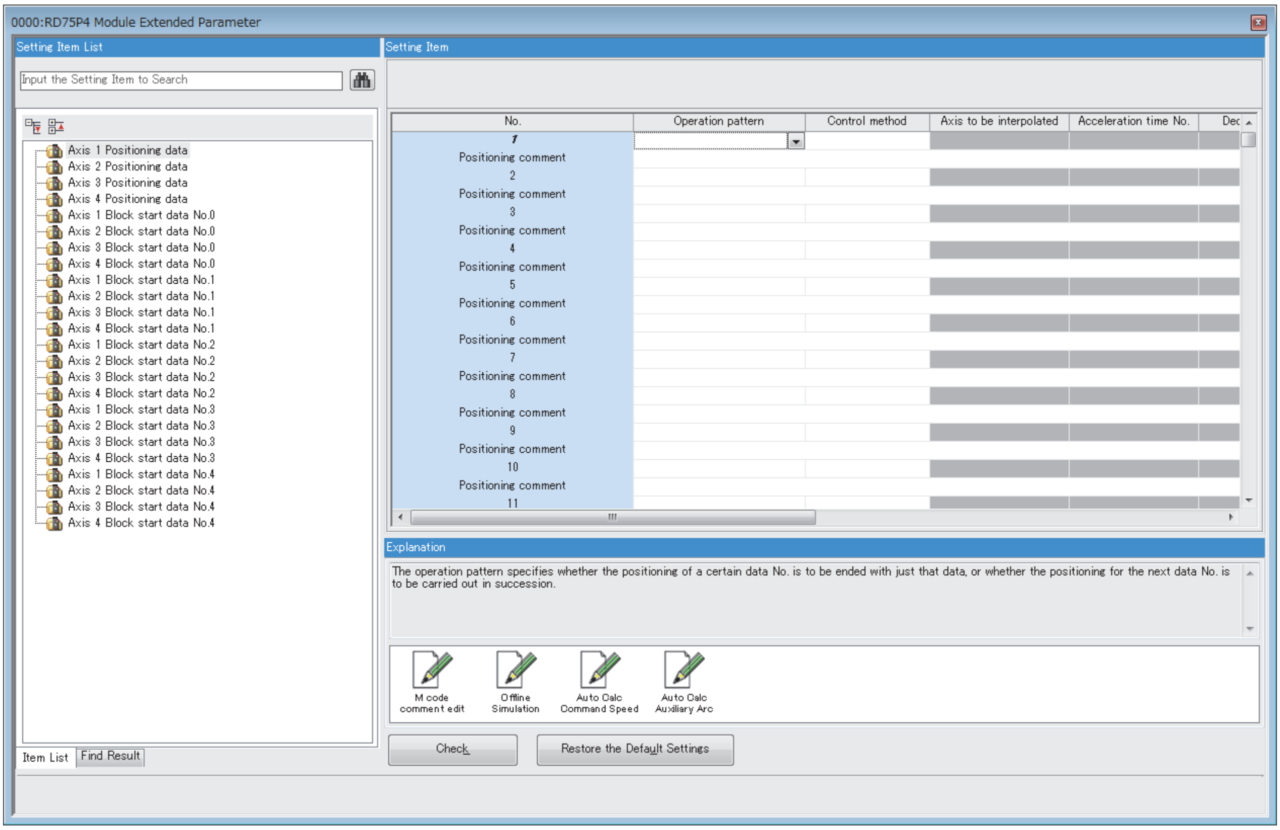
Set the module extension parameter. The module extension parameter has positioning data and block start data number 0 to 4 for each axis.

Select the module extension parameter from the tree on the following window.

[Navigation] ⇨ [Parameter] ⇨ [Module Information] ⇨ Target module ⇨ [Module Extended Parameter]

Positioning data

Set the positioning data for each axis.



Item	Setting range	Reference
Operation pattern	• 0: Positioning complete • 1: Continuous positioning control • 3: Continuous path control	Page 429 [Da.1] Operation pattern

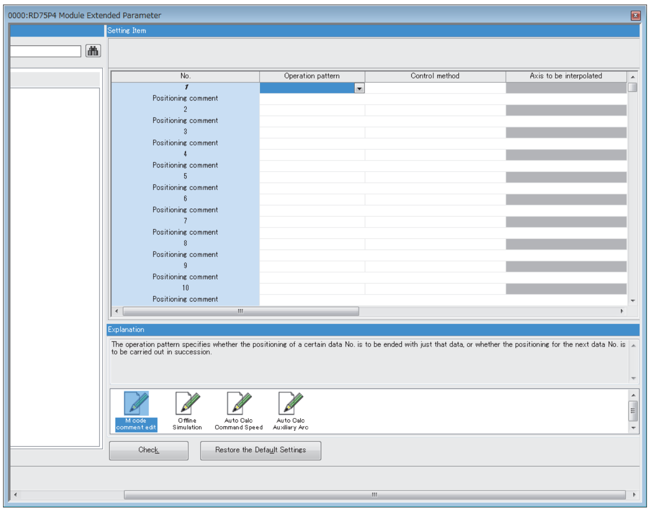
Item	Setting range	Reference
Control method	• 01H: ABS1 1-axis linear control (ABS) • 02H: INC1 1-axis linear control (INC) • 03H: FEED1 1-axis fixed-feed control • 04H: VF1 1-axis speed control (forward run) • 05H: VR1 1-axis speed control (reverse run) • 06H: VPF Speed-position switching control (forward run) • 07H: VPR Speed-position switching control (reverse run) • 08H: PVF Position-speed switching control (forward run) • 09H: PVR Position-speed switching control (reverse run) • 0AH: ABS2 2-axis linear interpolation control (ABS) • 0BH: INC2 2-axis linear interpolation control (INC) • 0CH: FEED2 Fixed-feed control by 2-axis linear interpolation • 0DH: ABS⌒ Circular interpolation control with sub point specified (ABS) • 0EH: INC⌒ Circular interpolation control with sub point specified (INC) • 0FH: ABS. Circular interpolation control with center point specified (ABS, CW) • 10H: ABS. Circular interpolation control with center point specified (ABS, CCW) • 11H: INC. Circular interpolation control with center point specified (INC, CW) • 12H: INC. Circular interpolation control with center point specified (INC, CCW) • 13H: VF2 2-axis speed control (forward run) • 14H: VR2 2-axis speed control (reverse run) • 15H: ABS3 3-axis linear interpolation control (ABS) • 16H: INC3 3-axis linear interpolation control (INC) • 17H: FEED3 Fixed-feed control by 3-axis linear interpolation • 18H: VF3 3-axis speed control (forward run) • 19H: VR3 3-axis speed control (reverse run) • 20H: ABSH⌒ Helical interpolation control with sub point specified (ABS) • 21H: INCH⌒ Helical interpolation control with sub point specified (INC) • 22H: ABSH. Helical interpolation control with center point specified (ABS, CW) • 23H: ABSH. Helical interpolation control with center point specified (ABS, CCW) • 24H: INCH. Helical interpolation control with center point specified (INC, CW) • 25H: INCH. Helical interpolation control with center point specified (INC, CCW) • 1AH: ABS4 4-axis linear interpolation control (ABS) • 1BH: INC4 4-axis linear interpolation control (INC) • 1CH: FEED4 Fixed-feed control by 4-axis linear interpolation • 1DH: VF4 4-axis speed control (forward run) • 1EH: VR4 4-axis speed control (reverse run) • 80H: NOP NOP instruction • 81H: POS Current value change • 82H: JUMP JUMP instruction • 83H: LOOP Beginning of LOOP-to-LEND processing • 84H: LEND End of LOOP-to-LEND processing	Page 430 [Da.2] Control method
Axis to be interpolated	• 0: Axis 1 specification • 1: Axis 2 specification • 2: Axis 3 specification • 3: Axis 4 specification	Page 432 [Da.5] Axis to be interpolated
Acceleration time No.	• 0: Acceleration time 0 • 1: Acceleration time 1 • 2: Acceleration time 2 • 3: Acceleration time 3	Page 431 [Da.3] Acceleration time No.

Item	Setting range	Reference
Deceleration time No.	• 0: Deceleration time 0 • 1: Deceleration time 1 • 2: Deceleration time 2 • 3: Deceleration time 3	Page 431 [Da.4] Deceleration time No.
Positioning address	Refer to the right item.	Page 433 [Da.6] Positioning address/movement amount
Arc address	Refer to the right item.	Page 436 [Da.7] Arc address
Command speed	Refer to the right item.	Page 438 [Da.8] Command speed
Dwell time	• 0 to 65535 ms • 1 to 600	Page 439 [Da.9] Dwell time
M code	• 0 to 10 • 1 to 65535 • 0 to 999 • 0 to 65535	Page 440 [Da.10] M code
M code ON signal output timing	• 0: Use the set value of [Pr.18] M code ON signal output timing • 1: WITH mode • 2: AFTER mode	Page 440 [Da.27] M code ON signal output timing
ABS direction in degrees	• 0: Use the set value of [Cd.40] ABS direction in degrees • 1: ABS clockwise • 2: ABS counterclockwise • 3: Shortcut (Direction setting invalid)	Page 441 [Da.28] ABS direction in degrees
Interpolation speed specification method	• 0: Use the set value of the [Pr.20] Interpolation speed specification method • 1: Composite speed • 2: Reference axis speed	Page 441 [Da.29] Interpolation speed specification method

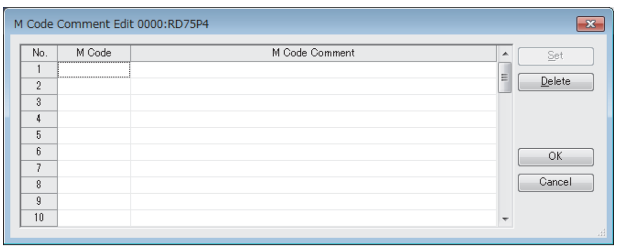
M code comment edit

Set comments for M codes. The set comments are saved in a project.

■Setting method



1. Double-click "M code comment edit" in "Axis □ Positioning data".



2. Input an M code number for which a comment is set in "M Code" in the range of 1 to 65535. The maximum number of M codes for which comments can be set is 50.

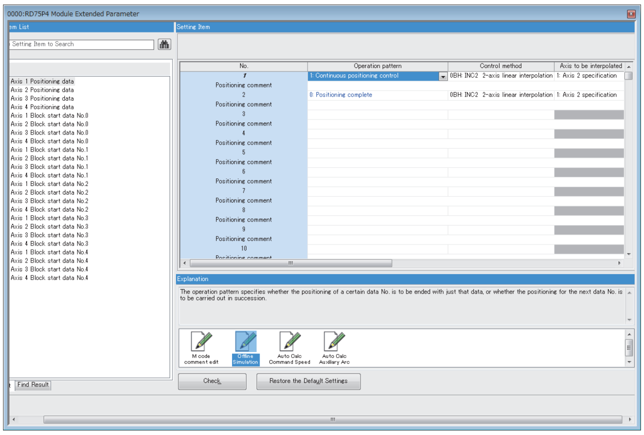
3. Input a comment in "M Code Comment".

4. Click the [OK] button.

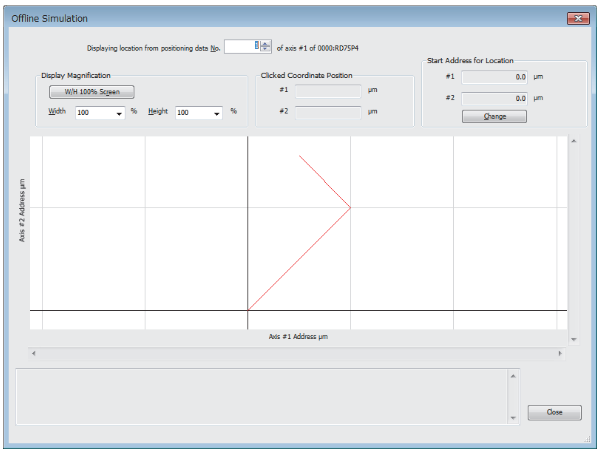
Offline simulation

Check the waveform and path of the created positioning data.

■How to use



1. Double-click "Offline Simulation" in "Axis □ Positioning data".



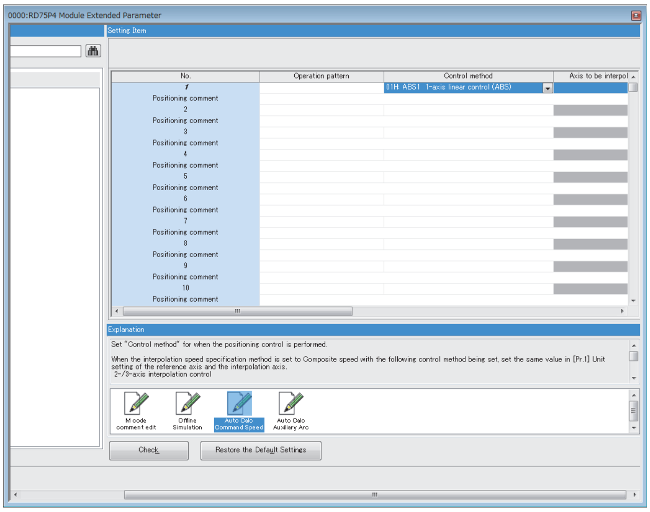
2. Select the positioning data No. with which the simulation is started. The display magnification of the graph and the start point address of the path can be changed.

3. Click the [Close] button to exit the "Offline Simulation" window.

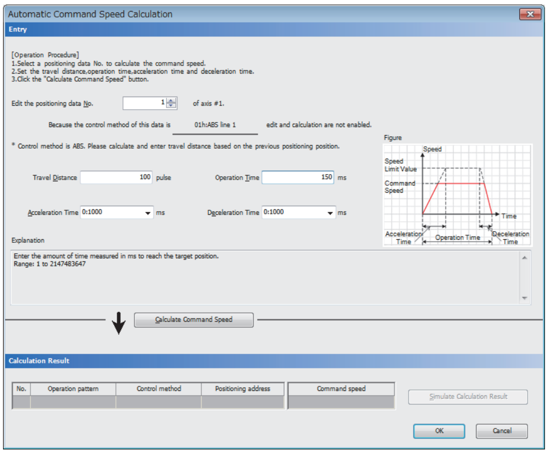
Automatic calculation of a command speed

Set the period required for positioning (from start position to target position) to calculate the constant speed automatically.

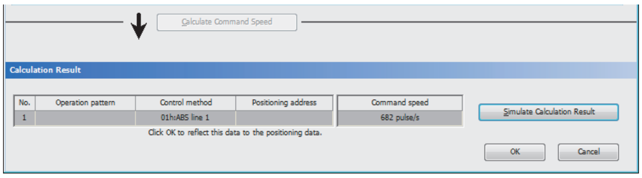
■Setting method



1. Double-click "Auto Calc Command Speed" in "Axis □ Positioning data". (Set "Control method" as required.)



2. Set "Travel Distance", "Operation Time", "Acceleration Time", and "Deceleration Time" for the command speed calculation.



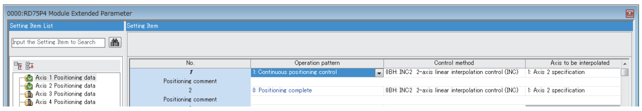
3. The calculation result is reflected to the positioning data by clicking the [Calculate Command Speed] button first and then the [OK] button.

Automatic calculation of an auxiliary arc

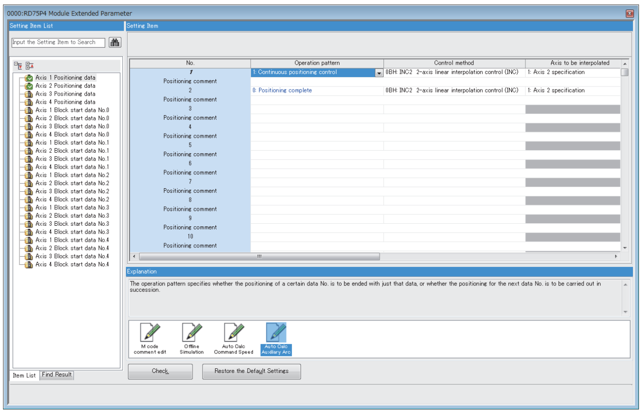
Select two positioning data sets and set the radius to automatically create the circular interpolation control data using the selected positioning data sets.

■Setting method

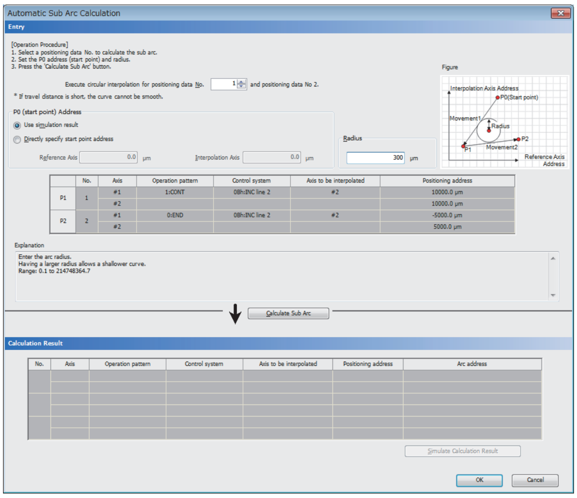
1. Select "Axis □ Positioning data" and set values required for the automatic calculation of an auxiliary arc.



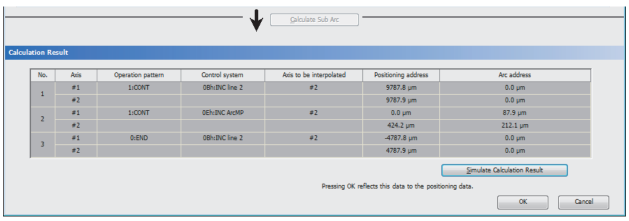
2. Double-click "Auto Calc Auxiliary Arc" in "Axis □ Positioning data".



3. Set the address of start point and the radius for the arc calculation.



4. The calculation result is reflected to the positioning data by clicking the [Calculate Sub Arc] button first and then the [OK] button.



Block start data

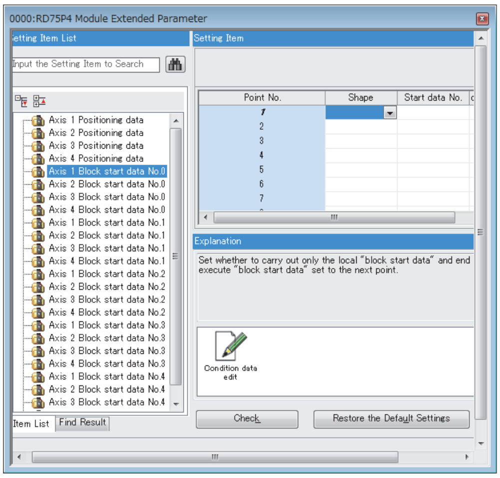
Set the block start data number 0 to 4 for each axis.

Item	Setting range	Reference
Shape	• 0: Termination • 1: Continue	Page 444 [Da.11] Shape
Start data No.	1 to 600	Page 444 [Da.12] Start data No.
Special start instruction	• 00h: Normal start • 01h: Condition start • 02h: Wait start • 03h: Simultaneous start • 04h: FOR loop • 05h: FOR condition • 06h: NEXT start	Page 445 [Da.13] Special start instruction
Parameter	• 1 to 10 • 0 to 255	Page 446 [Da.14] Parameter

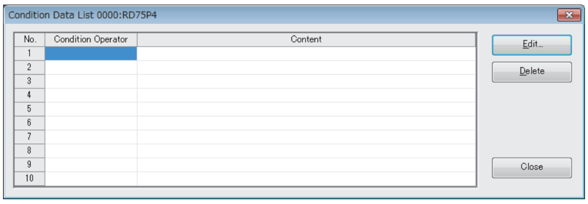
Condition data

Set condition data for each block start data.

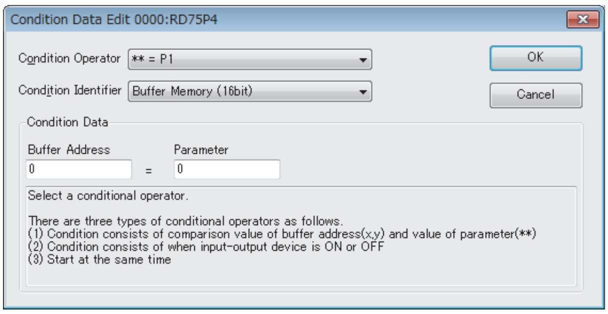
■Setting method



1. Double-click "Condition data edit" in "Axis ☐ Block start data".



2. Click the cell of the condition data number to be edited and click the [Edit] button.



3. Select settings of "Condition Operator" and "Condition Identifier" from the pull-down menu.

4. Set "Condition Data" according to the condition set in step 3.

5. Click the [OK] button.

6. Click the [Close] button.

9

■Setting item

Item		Setting range	Reference
Condition Operator		Refer to the right item.	Page 448 [Da.16] Condition operator
Condition Identifier		Refer to the right item.	Page 447 [Da.15] Condition target
Condition Data	Buffer Address	Refer to the right item.	Page 449 [Da.17] Address
	Parameter	Refer to the right item.	Page 449 [Da.18] Parameter 1 Page 450 [Da.19] Parameter 2
	X device		
	Y device		
	Axis 1 specification		
	Axis 2 specification		
	Axis 3 specification		
	Axis 4 specification		

10 MONITORING/TEST

10.1 Positioning Monitor

With the positioning monitor function, the RD75 operating status can be checked for each axis.
The following monitors are available in this function.

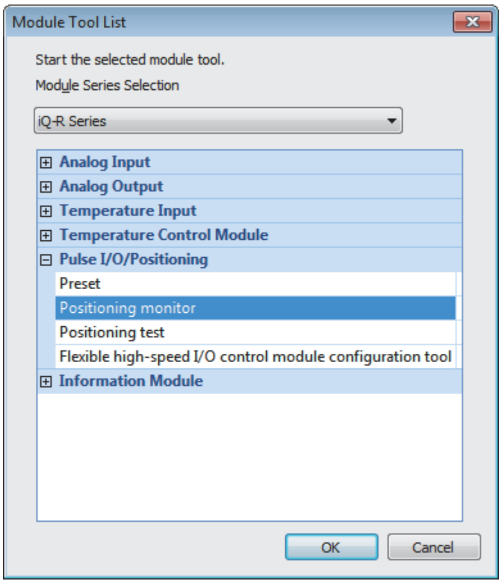
Monitor type	Description
Operation monitor	The status of positioning control being performed such as the current feed value and axis feedrate can be checked.
Operation monitor (Axis control)	The status related to axis control can be checked.
Operation monitor (Speed-position switching control)	The status related to speed-position switching control can be monitored.
Operation monitor (Position-speed switching control)	The status related to position-speed switching control can be monitored.
Operation monitor (OPR monitor)	The status related to OPR control can be monitored.
Operation monitor (JOG/manual pulse)	The status related to JOG operation and manual pulse generator operation can be monitored.
Start history	The start history of past 16 records can be monitored.
Error history	The error history of past 16 records can be monitored.
Warning history	The warning history of past 16 records can be monitored.
Module information list	The on/off state of signals and flags of each axis can be checked.

How to use

Use the positioning monitor with the following procedure.

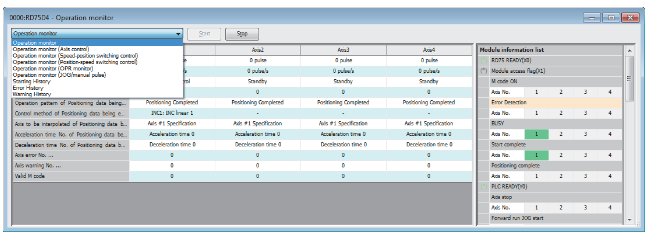
1. Display the "Module Tool List" window and select "Positioning monitor".

[Tool] ⇨ [Module Tool List] ⇨ [Positioning monitor]

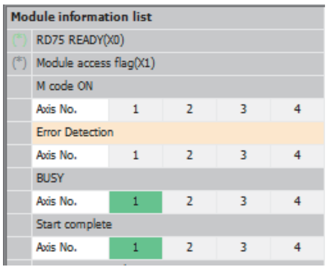


2. Select the RD75 being used from the "Module Selection (Positioning monitor)" window and click the [OK] button.

3. Select a monitoring type from the pull-down menu.



"Module Information List" is always displayed on the right of the "Positioning Monitor" window. In "Module Information List", the on state is indicated in color (green) for each axis.



When an error occurs, the axis in which the error occurs is indicated in orange in "Error Detection". When a warning occurs, the axis in which the warning occurs is indicated in orange in "Status Axis warning detection".

10.2 Positioning Test

This function allows users to perform the following tests while the users monitor the current status of the RD75.

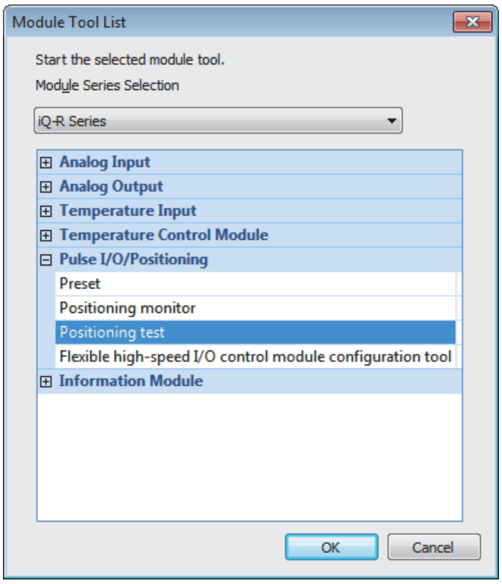
- Positioning control test
- JOG/manual pulse generator/OPR test
- Speed change test
- Other tests

Precautions

Before the positioning test is started, necessary parameters and positioning data must be set and written to the RD75.

Starting method

Start "Positioning test" with the following procedure.



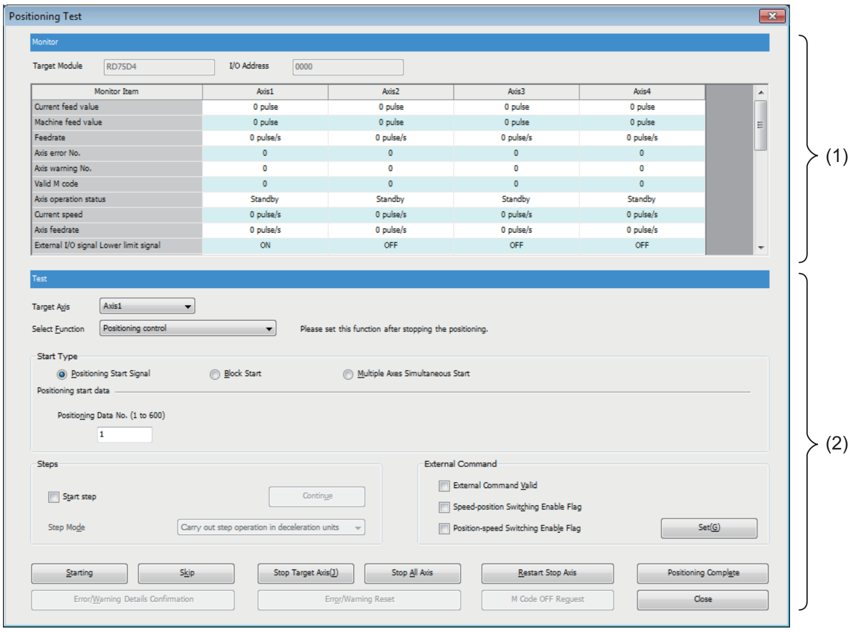
1. Display the "Module Tool List" window and select "Positioning test".

[Tool] ⇨ [Module Tool List] ⇨ [Positioning test]

2. Select the RD75 being used from the "Module Selection (Positioning Test)" window and click the [OK] button.
3. If external input signals are used for the positioning test, click the [Yes] button. If no external input signal is used for the test, click the [No] button.

■Starting window

The following figure and table show the configuration of the "Positioning Test" window.



(1) Monitor part
(2) Test part

Button name	Description
Starting	Starts positioning control.
Skip	Performs the skip function to skip the control of the positioning data being performed.
Stop Target Axis	Stops the positioning control of the axis set as the target axis.
Stop All Axis	Stops the positioning control of all the axes.
Restart Stop Axis	Restarts the positioning control that is stopped by the [Stop Target Axis] or [Stop All Axis] button.
Positioning Complete	Ends the positioning control. When the [Positioning Complete] button is clicked and the [Starting] button is clicked, the positioning control is started from the first.
Error/Warning Details Confirmation	Displays the description and corrective action of the errors and warnings that occurred.
Error/Warning Reset	Resets the errors and warnings that occurred.
M Code OFF Request	Turns off M code ON signal.
Close	Closes the "Positioning Test" window.

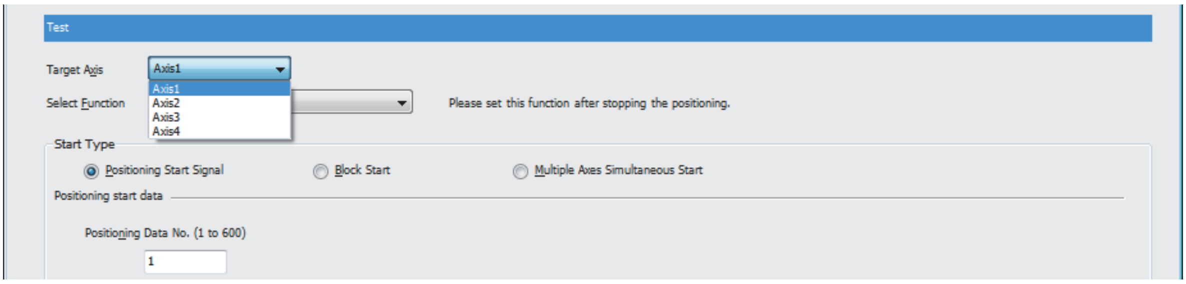
After starting the operation, perform the positioning test according to each positioning test procedure described as follows.

- ☞ Page 342 Positioning control test
- ☞ Page 344 JOG/manual pulse generator/OPR test
- ☞ Page 347 Speed change test
- ☞ Page 349 Other controls

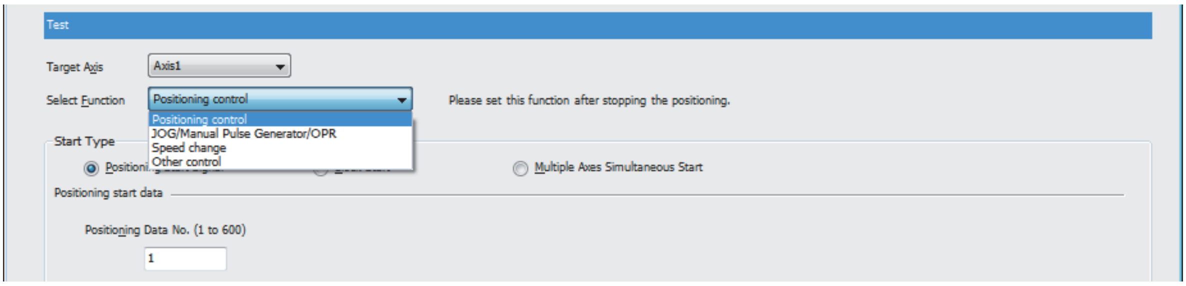
Positioning control test

Specify a positioning data No. or point No. of block start data to perform the test operation.

1. Select a target axis to be tested from the pull-down menu of "Target Axis".



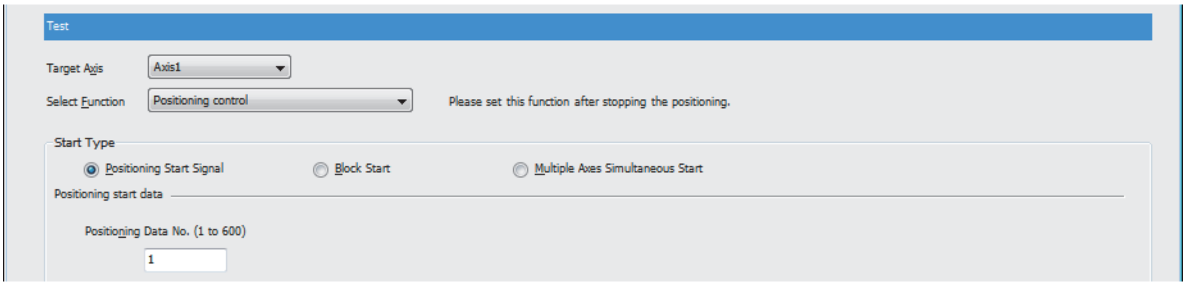
2. Select "Positioning control" from the pull-down menu of "Select Function".



3. Select a control method from "Start Type".

4. Set "Positioning start data" according to the selected control method.

- Positioning Start Signal: Positioning data No.
- Block Start: Block No. and point No.
- Multiple Axes Simultaneous Start: Multiple axes simultaneous start data No.



5. Click the [Starting] button to start the test operation.

6. After the test is completed, click the [Positioning Complete] button, then click the [Close] button.

Point

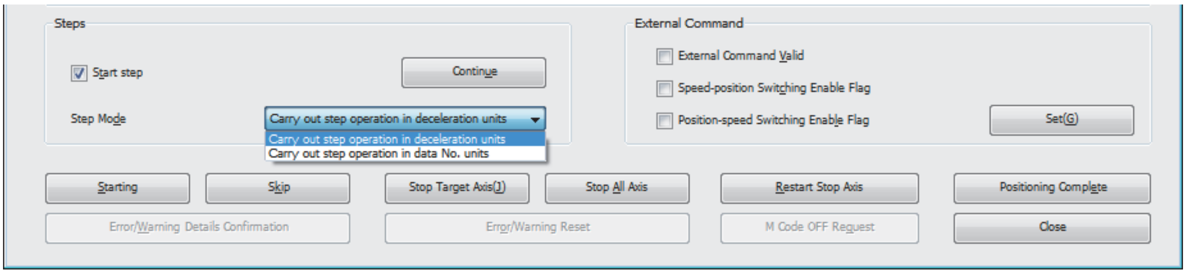
- To stop the positioning control being performed, click the [Stop Target Axis] button or the [Stop All Axis] button.
- By clicking the [Skip] button, the positioning control being performed can be skipped and the next positioning control is started.

■Performing the positioning control test with the step operation

In the positioning control test, positioning control can be performed with the step operation.

1. Before clicking the [Starting] button, select "Start step".

2. Select a step mode from the pull-down menu of "Step Mode".



3. Click the [Starting] button to start the test operation.

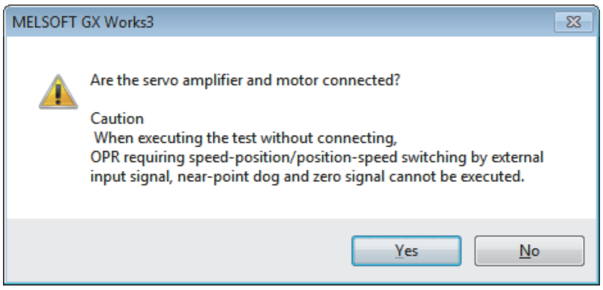
4. When one step is completed, the positioning control stops. To continue the step operation after the stop, click the [Continue] button.

■Performing the positioning control test with External command signal (CHG)

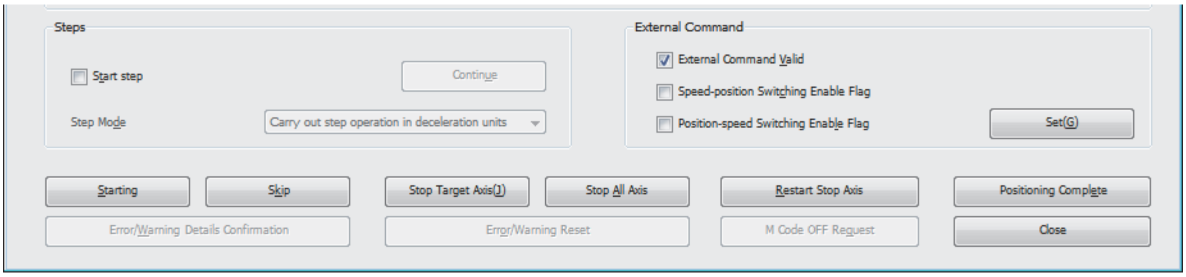
In the positioning control test, the operation can be started or skipped with External command signal (CHG).

1. Set the external command function selection before starting "Positioning Test".

2. When starting "Positioning Test", click the [Yes] button in the following window.



3. Select "External Command Valid" in "External Command". To switch the positioning control between the speed control and position control during the speed-position switching control or position-speed switching control with External command signal (CHG), select "Speed-position Switching Enable Flag" and "Position-speed Switching Enable Flag".



4. Click the [Set] button. The setting in the previous step is reflected to the RD75.

5. By inputting External command signal (CHG), the start or the skip function can be performed.

JOG/manual pulse generator/OPR test

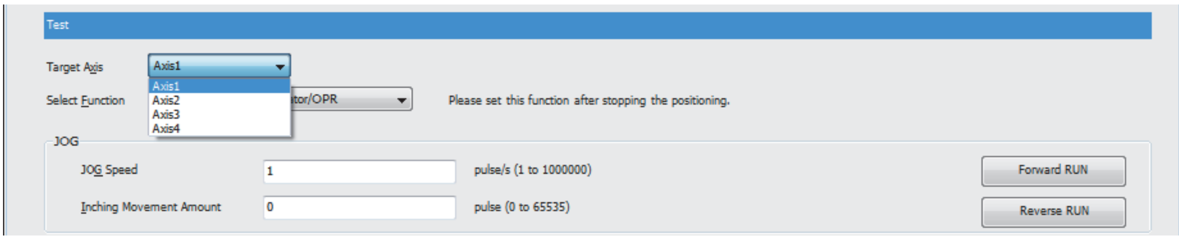
The following tests can be performed with the JOG operation or manual pulse generator operation when the positioning control is debugged.

- Checking the forward run/reverse run direction
- Checking the on/off state of external input signals such as an upper/lower limit switch, Zero signal, and Near-point dog signal
- Operation test of speed and acceleration/deceleration
- Measuring the backlash compensation amount by the forward run/reverse run
- Measuring the accurate address and movement amount

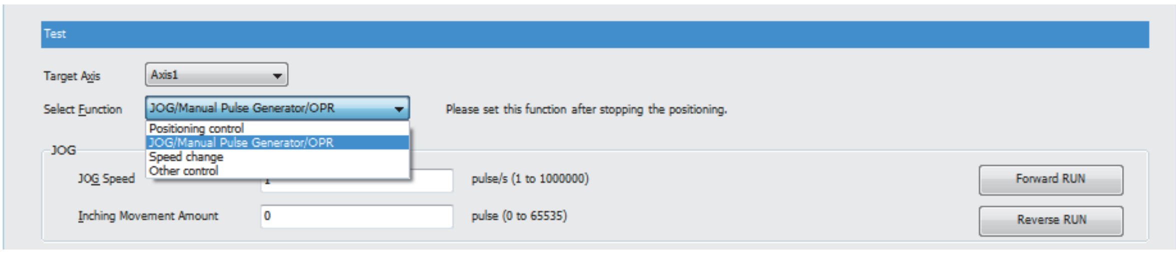
An OP can be established by performing the OPR test and operation can be checked by set OPR basic parameters and OPR detailed parameters.

■JOG operation

1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "JOG/Manual Pulse Generator/OPR" from the pull-down menu of "Select Function".



3. Set "JOG Speed".

4. Set 0 for "Inching Movement Amount".

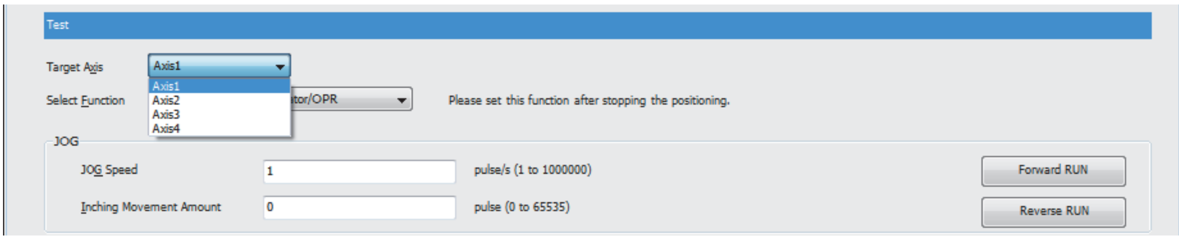
5. Click the [Forward RUN] button or [Reverse RUN] button to start the test for the JOG operation.

Point

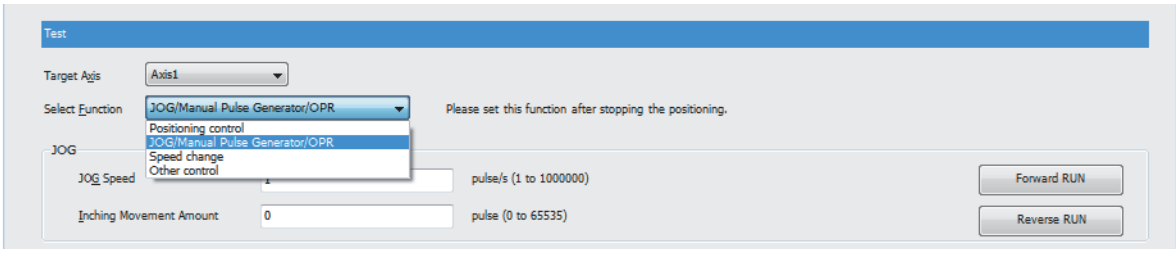
When a value other than 0 is set for "Inching Movement Amount", the test is available with the inching operation.

■Manual pulse generator operation

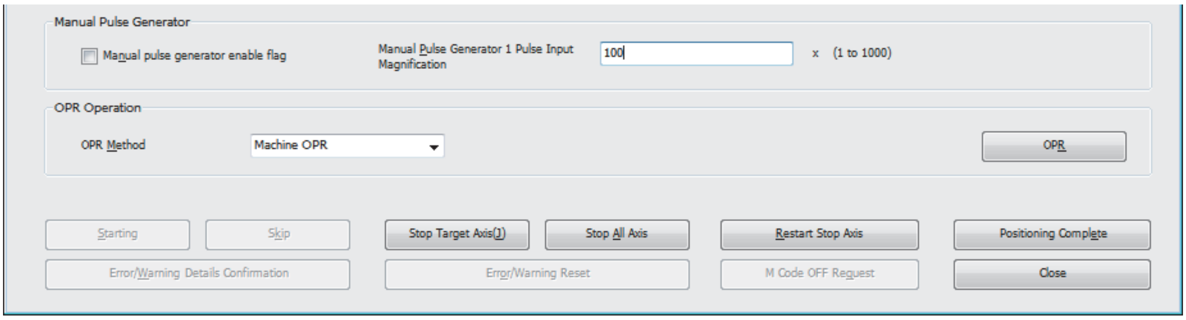
1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "JOG/Manual Pulse Generator/OPR" from the pull-down menu of "Select Function".



3. Set "Manual Pulse Generator 1 pulse Input Magnification".

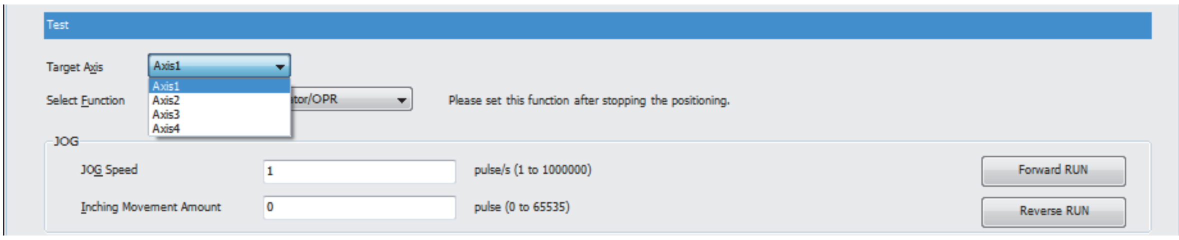


4. Select "Manual pulse generator enable flag".

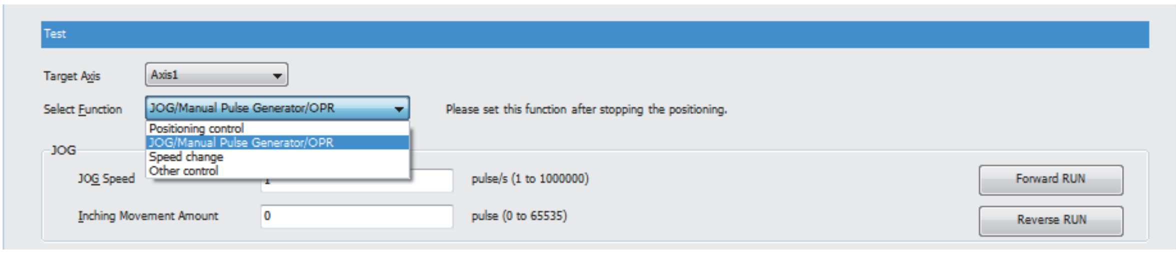
5. The test for manual pulse generator operation starts using the manual pulse generator connected to the RD75.

■OPR control

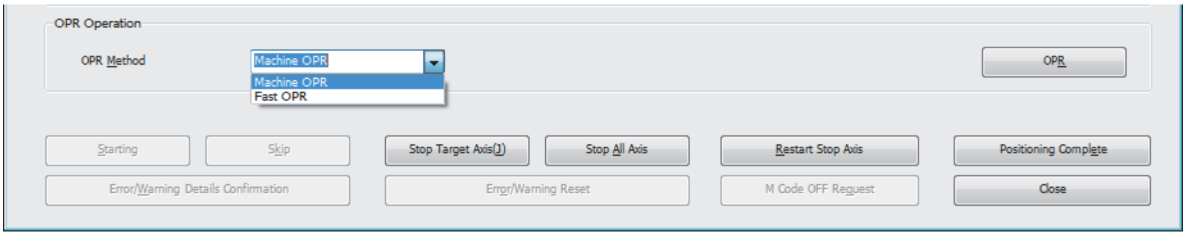
1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "JOG/Manual Pulse Generator/OPR" from the pull-down menu of "Select Function".



3. Select "Machine OPR" or "Fast OPR" from the pull-down menu of "OPR Method".



4. Click the [OPR] button.

Point

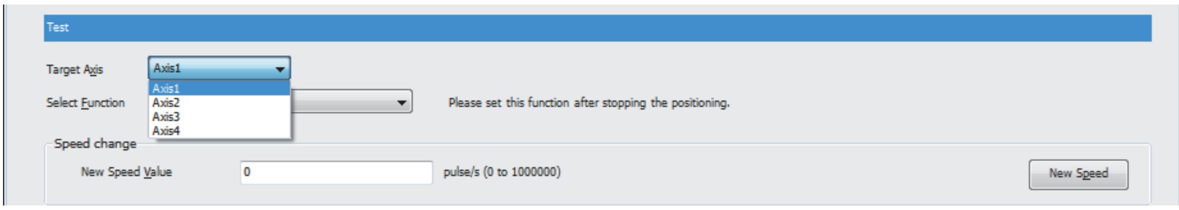
The on state of Near-point dog signal, Zero signal, and OPR complete flag can be checked on the monitor part. Check the OPR completion on the monitor.

Speed change test

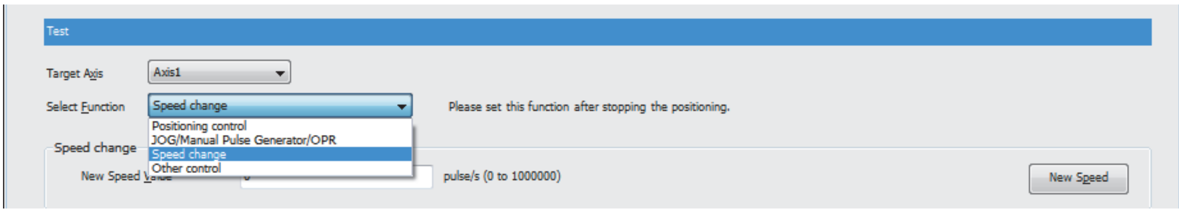
For the axes started with the positioning start test, OPR test, and JOG operation test, perform the speed change function, acceleration/deceleration time change function, or override function to check the proper speed or acceleration/deceleration time.

■Speed change

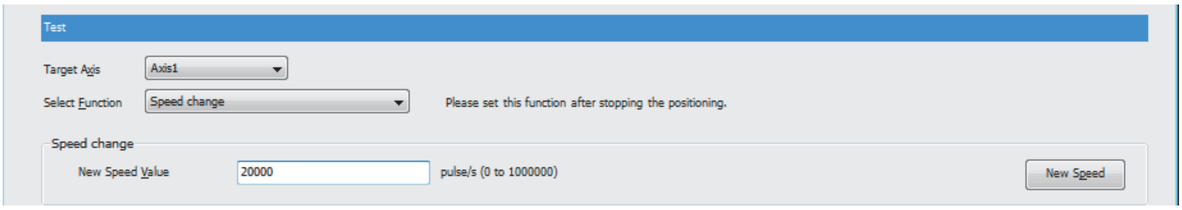
1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "Speed change" from the pull-down menu of "Select Function".



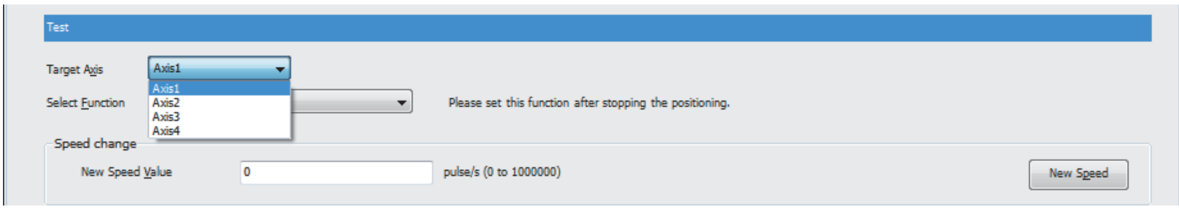
3. Set "New Speed Value".



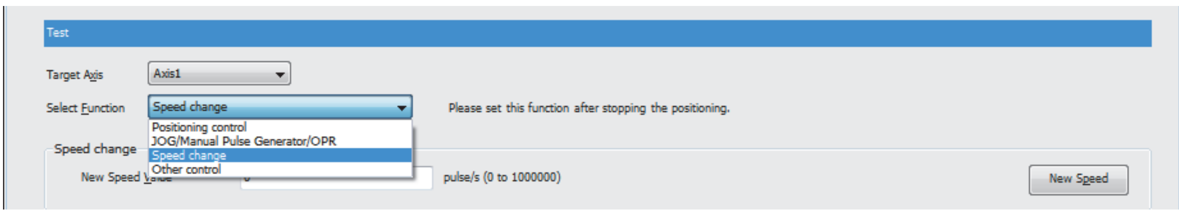
4. Click the [New Speed] button. The set value of "New Speed Value" is reflected to the positioning control being performed.

■Override function

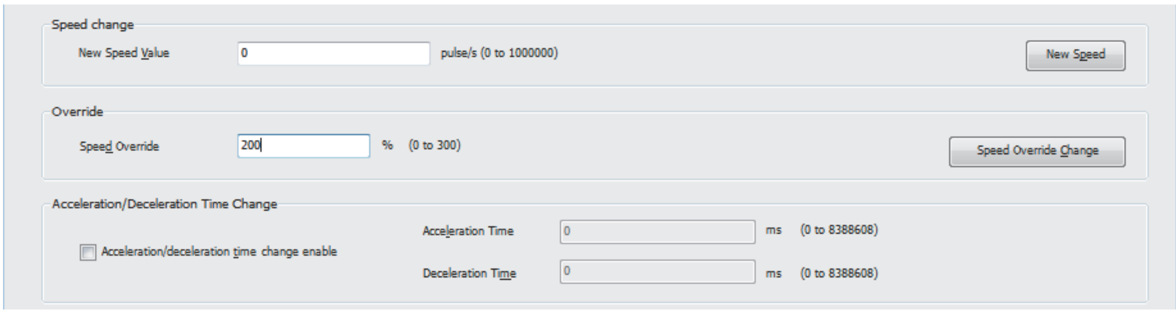
1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "Speed change" from the pull-down menu of "Select Function".



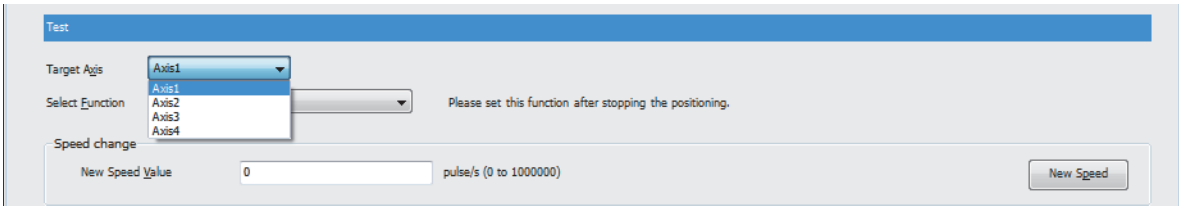
3. Set "Speed Override".



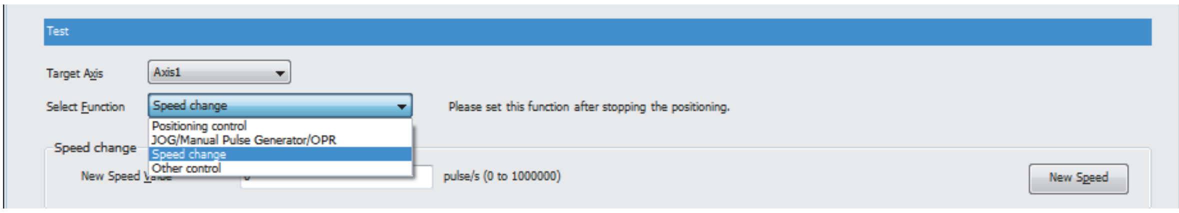
4. Click the [Speed Override Change] button. The set value of "Speed Override" is reflected to the positioning control being performed.

■Acceleration/deceleration time change

1. Select a target axis to be tested from the pull-down menu of "Target Axis".

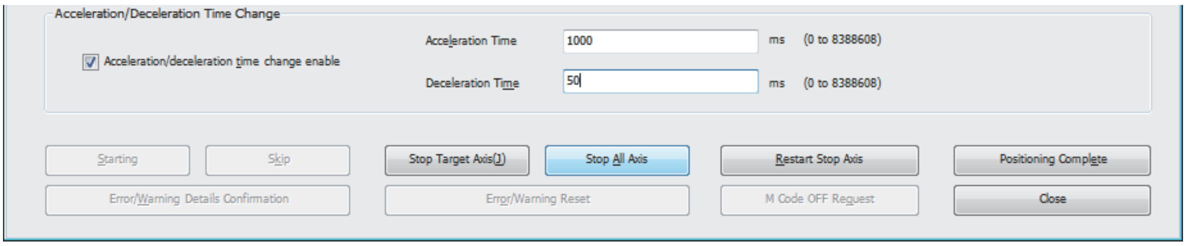


2. Select "Speed change" from the pull-down menu of "Select Function".



3. Select "Acceleration/deceleration time change enable".

4. Set "Acceleration Time" and "Deceleration Time".

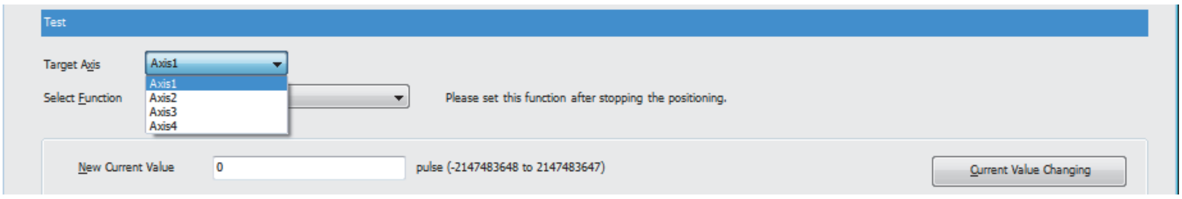


5. Click the [New Speed] button. The set values of "Acceleration Time" and "Deceleration Time" are reflected to the positioning control being performed.

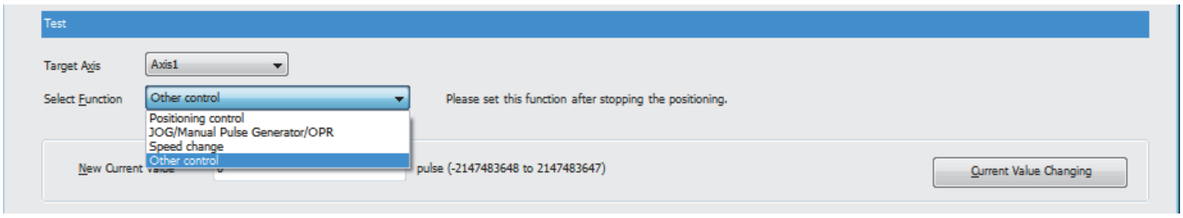
Other controls

Change the current feed value of the RD75 to a specified address.

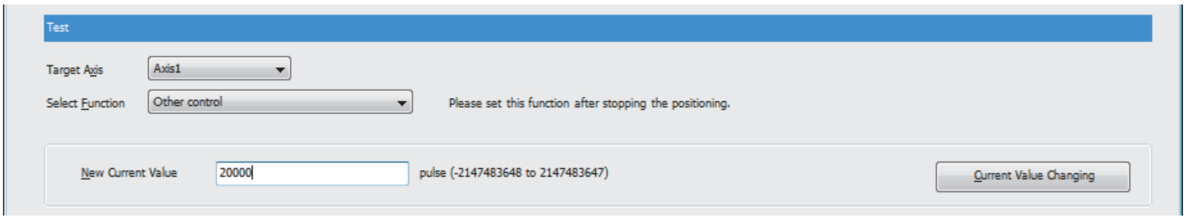
1. Select a target axis to be tested from the pull-down menu of "Target Axis".



2. Select "Other control" from the pull-down menu of "Select Function".



3. Set "New Current Value".



4. Click the [Current Value Changing] button. The set value of "New Current Value" is reflected to "Current feed value".

11 SPECIFICATIONS OF I/O SIGNALS WITH CPU MODULE

11.1 List of I/O Signals with CPU Module

The RD75 uses 32 input points and 32 output points for the data communication with the CPU module. The following shows the list of I/O signals for RD75.

Point

- I/O numbers (X/Y) shown below are described in the case where zero is set as the start I/O number.
- Since the signals described as Use prohibited are used by the system, users cannot use them. If these signals are used (turned off and on), the operation of the RD75 cannot be guaranteed.

Input signal

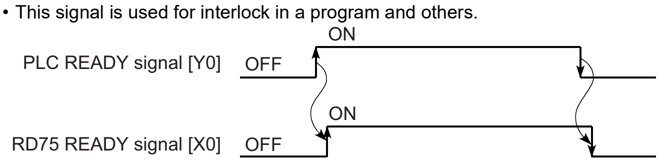
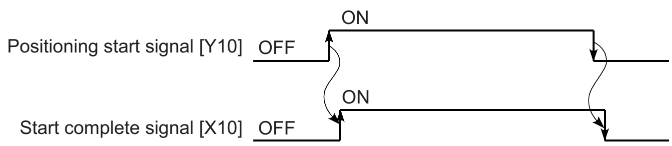
Device No.	Signal name	
X0	RD75 READY signal	
X1	Module access flag	
X2, X3	Use prohibited	
X4	Axis 1	M code ON
X5	Axis 2	
X6	Axis 3	
X7	Axis 4	
X8	Axis 1	Error detection
X9	Axis 2	
XA	Axis 3	
XB	Axis 4	
XC	Axis 1	BUSY
XD	Axis 2	
XE	Axis 3	
XF	Axis 4	
X10	Axis 1	Start complete
X11	Axis 2	
X12	Axis 3	
X13	Axis 4	
X14	Axis 1	Positioning complete
X15	Axis 2	
X16	Axis 3	
X17	Axis 4	
X18 to X1F	Use prohibited	

Output signal

Device No.	Signal name	
Y0	PLC READY	
Y1 to Y3	Use prohibited	
Y4	Axis 1	Axis stop
Y5	Axis 2	
Y6	Axis 3	
Y7	Axis 4	
Y8	Axis 1	Forward run JOG start
Y9	Axis 1	Reverse run JOG start
YA	Axis 2	Forward run JOG start
YB	Axis 2	Reverse run JOG start
YC	Axis 3	Forward run JOG start
YD	Axis 3	Reverse run JOG start
YE	Axis 4	Forward run JOG start
YF	Axis 4	Reverse run JOG start
Y10	Axis 1	Positioning start
Y11	Axis 2	
Y12	Axis 3	
Y13	Axis 4	
Y14	Axis 1	Execution prohibition flag
Y15	Axis 2	
Y16	Axis 3	
Y17	Axis 4	
Y18 to Y1F	Use prohibited	

11.2 Details of Input Signals

The following tables shows the ON/OFF timing and conditions of the input signals.

Device No.	Signal name			Description
X0	RD75 READY signal		On: READY Off: Not READY/ Watchdog timer error	• When PLC READY signal [Y0] is turned off and on, the parameter setting range is checked. If no error is found, this signal turns on. • When PLC READY signal [Y0] is turned off, this signal turns off. • When a watchdog timer error occurs, this signal turns off. • This signal is used for interlock in a program and others. 
X1	Module access flag		Off: Module access disabled On: Module access enabled	• After the CPU module is set to RUN, this signal turns on with the status that allows the access from the CPU module to the RD75. This signal turns off while the CPU module is in the STOP status. • This signal is used for interlock in a program and others.
X4 X5 X6 X7	Axis 1 Axis 2 Axis 3 Axis 4	M code ON	Off: M code is not set On: M code is set	• 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 [Cd.7] M code ON signal OFF request. • When no M code is specified (When [Da.10] M code is 0), this signal remains off. • With using continuous path control for the positioning operation, the positioning continues even when this signal does not turn off. However, M code ON signal ON (Warning code: 0992H) will occur. • When PLC READY signal [Y0] is turned off, this signal also turns off. If the operation is started while the M code is on, M code ON signal ON start (Error code: 19A0H) will occur.
X8 X9 XA XB	Axis 1 Axis 2 Axis 3 Axis 4	Error detection	Off: No error On: Error occurrence	• This signal turns on when an error occurs, and turns off when the error is reset on [Cd.5] Axis error reset.
XC XD XE XF	Axis 1 Axis 2 Axis 3 Axis 4	BUSY*1	Off: Not BUSY On: BUSY	• This signal turns on at the start of the positioning, OPR, or JOG operation. This signal turns off when the time set in [Da.9] Dwell time has passed after the positioning operation 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 [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	Off: Start incomplete On: Start complete	• This signal turns on when the RD75 starts the positioning processing since Positioning start signal is turned on. (Start complete signal also turns on during OPR control.) 
X14 X15 X16 X17	Axis 1 Axis 2 Axis 3 Axis 4	Positioning complete*2	Off: Positioning incomplete On: Positioning complete	• 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. For the interpolation control, Positioning complete signal of the interpolation axis turns on for the time set to the reference axis. (This signal does not turn on when [Pr.40] Positioning complete signal output time is 0.) • This signal will turn off if the positioning (including OPR), JOG operation, inching operation, or manual pulse generator operation is started while this signal is on. • This signal will not turn on when the speed control or positioning is canceled midway.

*1 BUSY signal turns on even when the position control of a movement amount 0 is executed. However, since the ON time is short, the ON status may not be detected in the program.

*2 Positioning complete of the RD75 refers to the point when the pulse output from the RD75 is completed. Thus, even if Positioning complete signal of the RD75 turns on, the system may continue operation.

11.3 Details of Output Signals

The following tables shows the ON/OFF timing and conditions of the output signals.

Device No.	Signal name			Description
Y0	PLC READY		Off: PLC READY OFF On: PLC READY ON	(a) This signal notifies the RD75 that the CPU module is normal. • This signal is turned on and off with the program. • This signal is turned on during the positioning control, OPR control, JOG operation, inching operation, and manual pulse generator operation, unless the system is in the test mode of the engineering tool. (b) When data (including parameter) has been changed, this signal is turned off depending on the changed item. (c) The following processing is performed when this signal is turned off and on. • The parameter setting range is checked. • RD75 READY signal [X0] turns on. (d) The following processing is performed when this signal is turned on and off. In this case, the OFF time should be set to 100ms or more. • RD75 READY signal [X0] turns off. • The operating axis stops. • M code ON signal [X4, X5, X6, X7] for each axis turns off, and 0 is stored in [Md.25] Valid M code. (e) When the module data backup or module data initialization is performed with an engineering tool or the CPU module, turn off this signal.
Y4 Y5 Y6 Y7	Axis 1 Axis 2 Axis 3 Axis 4	Axis stop	Off: No axis stop request On: Axis stop request	• When Axis stop signal is turned on, the OPR control, positioning control, JOG operation, inching operation, and manual pulse generator operation will stop. • By turning on this signal during the positioning operation, the operation will be stopped. • Whether to decelerate or suddenly stop can be selected with [Pr.39] Stop group 3 sudden stop selection. • During the interpolation control of the positioning operation, if this signal of any axis is turned 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	Off: JOG not started On: JOG started	• When this signal is on, the JOG operation will be performed with [Cd.17] JOG speed. When this signal is turned off, the operation will decelerate and stop. • When an inching movement amount is set, the specified movement amount is output for one control cycle and the operation stops.
Y10 Y11 Y12 Y13	Axis 1 Axis 2 Axis 3 Axis 4	Positioning start	Off: No positioning start request On: Positioning start request	• The OPR operation or positioning operation is started. • Positioning start signal is valid at the rising edge, and the operation is started. • When this signal is turned on during BUSY, Start during operation (Warning code: 0900H) will occur.
Y14 Y15 Y16 Y17	Axis 1 Axis 2 Axis 3 Axis 4	Execution prohibition flag	Off: Not during execution prohibition On: During execution prohibition	• If this signal is on when Positioning start signal is turned on, the positioning control does not start until this signal is turned off. (Pulse output is not performed.) This signal is used with Pre-reading start function.

12 DATA USED FOR POSITIONING CONTROL

This chapter describes the parameters and data used for performing the positioning control with the RD75.
In the positioning system using the RD75, the various parameters and data are used for the 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.

12.1 Types of Data

Parameters and data required for the control

The parameters and data required to perform the control using the RD75 include Setting data, Monitor data, and Control data shown below.

Setting data

The data is set beforehand according to the machine and application. Set the data with programs or engineering tools. The data set for the buffer memory can also be saved in the flash ROM in the RD75.
The setting data is classified as follows.

Classification		Item	Description
Module parameter	Basic setting	Basic parameter 1	Set the parameter according to the machine and applicable motor at the system start-up.
		Basic parameter 2	
		Detailed parameter 1	Set the parameter according to the system configuration at the system start-up.
		Detailed parameter 2	
		OPR basic parameter	Set the required values for performing the OPR control.
		OPR detailed parameter	
	Interrupt setting	Interrupt setting data	Set the setting data for the interrupt function.
Module extension parameter	Positioning data	Positioning data	Set the data for the major positioning control.
	Block start data	Block start data	Set the block start data for the advanced positioning control.
		Condition Data	Set the condition data for the advanced positioning control.

■Valid timing of setting data

The following table lists the timings when each type of data is validated.

Valid timing	Applicable data	Description
When PLC READY signal [Y0] is turned off and on	Basic parameter 1 Detailed parameter 1 OPR basic parameter OPR detailed parameter Interrupt setting data	The only valid value of [Pr.5] Pulse output mode is the value at the moment when PLC READY signal [Y0] is turned off and on for the first time after the power is switched on or the CPU module is reset.
When the positioning starts	Basic parameter 2 Detailed parameter 2 Positioning data Block start data	Once the operation has started, any modification to the data is ignored in the control. The modification is valid at the next positioning start. Exceptionally, however, modifications to the following data are valid even during positioning. • 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. • [Pr.42] External command function selection: The value at the time of detection is valid. When the multiple positioning data are continuously processed by using the continuous positioning control or continuous path control, modifications to the data four or more steps after the current step are valid. Modifications to the data three or less steps before the current step may be invalid because the positioning data are pre-read and pre-analyzed.

Monitor data

The data indicates the control status. The data is stored in the buffer memory. Monitor the data as necessary.

The setting data is classified as follows.

Item	Description
System monitor	Monitors the RD75 specifications and the operation history.
Axis monitor data	Monitors the data related to the operating axis, such as the current position and speed.

Control data

The data is used by users to control the positioning system.

The setting data is classified as follows.

Item	Description
System control data	Backs up the setting data of the RD75 or initializes the backup data.
Axis control data	Configures the settings related to the operation, controls the speed change during operation, and stops or restarts the operation.

- The control using the control data is performed with programs.
- [Cd.41] Deceleration start flag valid is valid for only the value of when PLC READY signal [Y0] is turned off and on.

Point

- Setting data is created for each axis.
- The initial values are determined for the parameters of Setting data, and are set as the factory default. (The parameters related to axes that are not used are left at the initial values.)
- Setting data can be initialized with programs.
- Setting of Setting data with engineering tools is recommended. The program for the setting is complicated and many devices must be used. This will increase the scan time.

Setting items for positioning parameters

The following table lists the setting items for Positioning parameter. For Positioning parameter, set the same setting for all controls using the RD75 for each axis.

OPR control

◎: Always set, ○: Set as required, △: Setting restricted

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Positioning parameter		OPR control
Basic parameter 1	[Pr.1] Unit setting	◎
	[Pr.2] No. of pulses per rotation	◎
	[Pr.3] Movement amount per rotation	◎
	[Pr.4] Unit magnification	◎
	[Pr.5] Pulse output mode	◎
	[Pr.6] Rotation direction setting	◎
	[Pr.7] Bias speed at start	○
	[Pr.62] Electronic gear selection	◎
Basic parameter 2	[Pr.8] Speed limit value	◎
	[Pr.9] Acceleration time 0	◎
	[Pr.10] Deceleration time 0	◎
Detailed parameter 1	[Pr.11] Backlash compensation amount	○
	[Pr.12] Software stroke limit upper limit value	—
	[Pr.13] Software stroke limit lower limit value	—
	[Pr.14] Software stroke limit selection	—
	[Pr.15] Software stroke limit valid/invalid setting	—
	[Pr.16] Command in-position width	—
	[Pr.17] Torque limit setting value	△
	[Pr.18] M code ON signal output timing	—
	[Pr.19] Speed switching mode	—
	[Pr.20] Interpolation speed specification method	—
	[Pr.21] Current feed value during speed control	—
	[Pr.22] Input signal logic selection	◎
	[Pr.23] Output signal logic selection	◎
	[Pr.24] Manual pulse generator input selection	—
Detailed parameter 1	[Pr.150] Speed-position function selection	—

Positioning parameter		OPR control
Detailed parameter 2	[Pr.25] Acceleration time 1	◎
	[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	—
	[Pr.32] JOG operation acceleration time selection	—
	[Pr.33] JOG operation deceleration time selection	—
	[Pr.34] Acceleration/deceleration processing selection	△
	[Pr.35] S-curve ratio	—
	[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	—
	[Pr.82] Start adjustment time	—

Major positioning control

◎: Always set, ○: Set as required, △: Setting restricted

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Positioning parameter		Position control				Axis speed control	Speed-position or position-speed switching control	Other controls	
		1-axis linear control 2-/3-/4-axis linear interpolation control	Fixed-feed control	2-axis circular interpolation control	3-axis helical interpolation control			Current value change	JUMP instruction, NOP instruction, LOOP to LEND
Basic parameter 1	[Pr.1] Unit setting	◎	◎	△	△	◎	◎	◎	◎
	[Pr.2] No. of pulses per rotation	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.3] Movement amount per rotation	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.4] Unit magnification	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.5] Pulse output mode	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.6] Rotation direction setting	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.7] Bias speed at start	○	○	○	○	○	○	—	—
	[Pr.62] Electronic gear selection	◎	◎	◎	◎	◎	◎	◎	◎
Basic parameter 2	[Pr.8] Speed limit value	◎	◎	◎	◎	◎	◎	—	—
	[Pr.9] Acceleration time 0	◎	◎	◎	◎	◎	◎	—	—
	[Pr.10] Deceleration time 0	◎	◎	◎	◎	◎	◎	—	—

Positioning parameter		Position control				Axis speed control	Speed-position or position-speed switching control	Other controls	
		1-axis linear control 2-/3-/4-axis linear interpolation control	Fixed-feed control	2-axis circular interpolation control	3-axis helical interpolation control			Current value change	JUMP instruction, NOP instruction, LOOP to LEND
Detailed parameter 1	[Pr.11] Backlash compensation amount	○	○	○	○	○	○	—	—
	[Pr.12] Software stroke limit upper limit value	○	○	○	○	○	○	—	—
	[Pr.13] Software stroke limit lower limit value	○	○	○	○	○	○	—	—
	[Pr.14] Software stroke limit selection	○	○	○	○	○	○	—	—
	[Pr.15] Software stroke limit valid/ invalid setting	—	—	—	—	—	—	○	○
	[Pr.16] Command in-position width	○	○	○	○	—	○	○	○
	[Pr.17] Torque limit setting value	○	○	○	○	○	○	—	—
	[Pr.18] M code ON signal output timing	○	○	○	○	○	○	○	—
	[Pr.19] Speed switching mode	○	○	○	○	—	—	—	—
	[Pr.20] Interpolation speed specification method	△	△	△	△	△	—	—	—
	[Pr.21] Current feed value during speed control	—	—	—	—	○	○	—	—
	[Pr.22] Input signal logic selection	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.23] Output signal logic selection	◎	◎	◎	◎	◎	◎	◎	◎
	[Pr.24] Manual pulse generator input selection	—	—	—	—	—	—	—	—
	[Pr.150] Speed-position function selection	—	—	—	—	—	◎	—	—
Detailed parameter 2	[Pr.25] Acceleration time 1	○	○	○	○	○	○	—	—
	[Pr.26] Acceleration time 2	○	○	○	○	○	○	—	—
	[Pr.27] Acceleration time 3	○	○	○	○	○	○	—	—
	[Pr.28] Deceleration time 1	○	○	○	○	○	○	—	—
	[Pr.29] Deceleration time 2	○	○	○	○	○	○	—	—

Positioning parameter		Position control				Axis speed control	Speed-position or position-speed switching control	Other controls	
		1-axis linear control 2-/3-/4-axis linear interpolation control	Fixed-feed control	2-axis circular interpolation control	3-axis helical interpolation control			Current value change	JUMP instruction, NOP instruction, LOOP to LEND
Detailed parameter 2	[Pr.30] Deceleration time 3	○	○	○	○	○	○	—	—
	[Pr.31] JOG speed limit value	—	—	—	—	—	—	—	—
	[Pr.32] JOG operation acceleration time selection	—	—	—	—	—	—	—	—
	[Pr.33] JOG operation deceleration time selection	—	—	—	—	—	—	—	—
	[Pr.34] Acceleration/ deceleration processing selection	○	○	○	○	○	○	—	—
	[Pr.35] S-curve ratio	○	○	○	○	○	○	—	—
	[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	○	○	○	○	○	◎	○	—
	[Pr.82] Start adjustment time	○	○	○	○	○	○	—	—

Manual control

◎: Always set, ○: Set as required, △: Setting restricted

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Positioning parameter		Manual pulse generator operation	JOG operation Inching operation
Basic parameter 1	[Pr.1] Unit setting	◎	◎
	[Pr.2] No. of pulses per rotation	◎	◎
	[Pr.3] Movement amount per rotation	◎	◎
	[Pr.4] Unit magnification	◎	◎
	[Pr.5] Pulse output mode	◎	◎
	[Pr.6] Rotation direction setting	◎	◎
	[Pr.7] Bias speed at start	—	○
	[Pr.62] Electronic gear selection	◎	◎
Basic parameter 2	[Pr.8] Speed limit value	—	◎
	[Pr.9] Acceleration time 0	—	◎
	[Pr.10] Deceleration time 0	—	◎
Detailed parameter 1	[Pr.11] Backlash compensation amount	○	○
	[Pr.12] Software stroke limit upper limit value	○	○
	[Pr.13] Software stroke limit lower limit value	○	○
	[Pr.14] Software stroke limit selection	○	○
	[Pr.15] Software stroke limit valid/invalid setting	○	○
	[Pr.16] Command in-position width	○	○
	[Pr.17] Torque limit setting value	△	△
	[Pr.18] M code ON signal output timing	—	—
	[Pr.19] Speed switching mode	—	—
	[Pr.20] Interpolation speed specification method	—	—
	[Pr.21] Current feed value during speed control	—	—
	[Pr.22] Input signal logic selection	◎	◎
	[Pr.23] Output signal logic selection	◎	◎
	[Pr.24] Manual pulse generator input selection	◎	—
Detailed parameter 1	[Pr.150] Speed-position function selection	—	—
Detailed parameter 2	[Pr.25] Acceleration time 1	—	◎
	[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	○	○
	[Pr.32] JOG operation acceleration time selection	○	○
	[Pr.33] JOG operation deceleration time selection	○	○
	[Pr.34] Acceleration/deceleration processing selection	△	△
	[Pr.35] S-curve ratio	—	—
	[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	—	—
	[Pr.82] Start adjustment time	—	—

Checking positioning parameters

Positioning parameters are checked at the following timings.

- When PLC READY signal [Y0] output from the CPU module to the RD75 changes from off to on
- When the [Starting] button is clicked at "Positioning Test" of the engineering tool

Point

Advanced positioning control is performed in combination with Major positioning control. For details on the parameters required for Advanced positioning control, refer to the parameter settings of Major positioning control.

Setting items for OPR parameters

OPR parameters must be set to perform OPR control. The following table lists the setting items for OPR parameter.
For OPR parameter, set the same setting for each axis.
◎: Always set, ○: Parameters set for the machine OPR control are used.
—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

OPR parameter		**Machine OPR control**							**Fast OPR control**
OPR basic parameter	[Pr.43] OPR method	Near-point dog method	Stopper method 1	Stopper method 2	Stopper method 3	Count method 1	Count method 2	Data setting method	○
	[Pr.44] OPR direction	◎	◎	◎	◎	◎	◎	—	
	[Pr.45] OP address	◎	◎*1	◎	◎	◎	◎	◎	
	[Pr.46] OPR speed	◎	◎	◎	◎	◎	◎	—	
	[Pr.47] Creep speed	◎	◎	◎	◎	◎	◎	—	
	[Pr.48] OPR retry	◎*1	◎*1	◎*1	—	◎*1	◎*1	—	
OPR detailed parameter	[Pr.49] OPR dwell time	—	◎	—	—	—	—	—	
	[Pr.50] Setting for the movement amount after near-point dog ON	—	—	—	—	◎	◎	—	
	[Pr.51] OPR acceleration time selection	◎*2	◎	◎	◎	◎	◎	—	
	[Pr.52] OPR deceleration time selection	◎	◎	◎	◎	◎	◎	—	
	[Pr.53] OP shift amount	◎*2	◎*2	◎*2	◎*2	◎*2	◎*2	—	
	[Pr.54] OPR torque limit value	—	◎	◎	◎	—	—	—	
	[Pr.55] Deviation counter clear signal output time	◎*3	◎*3	◎*3	◎*3	◎*3	—	◎*3	
	[Pr.56] Speed specification during OP shift	◎*2	◎*2	◎*2	◎*2	◎*2	◎*2	—	
	[Pr.57] Dwell time during OPR retry	◎*1	◎*1	◎*1	—	◎*1	◎*1	—	
	[Pr.58] Setting of operation during uncompleted OPR	◎	◎	◎	◎	◎	◎	◎	

*1 Set these items when the OPR retry function is used.
*2 Set these items when the OP shift function is used.
*3 Set the output time of Deviation counter clear signal.

Checking OPR parameters

OPR parameters are checked at the following timings.

- When PLC READY signal [Y0] output from the CPU module to the RD75 changes from off to on
- When the [Starting] button is clicked at "Positioning Test" of the engineering tool

Setting items for positioning data

Positioning data must be set to perform Major positioning control. The following table lists the setting items for Positioning data.

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

◎: Always set, ○: Set as required

×: Setting not possible (If these items are set, Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs at the start.)

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Setting items for positioning data			Position control				Speed control	Speed-position 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	3-axis helical interpolation control	1-axis speed control 2-axis speed control 3-axis speed control 4-axis speed control	
[Da.1]	Operation pattern	Independent positioning control (positioning complete)	◎	◎	◎	◎	◎	◎
		Continuous positioning control	◎	◎	◎	◎	×	◎
		Continuous path control	◎	×	◎	◎	×	×
[Da.2]	Control method		Line 1 Line 2 Line 3 Line 4 *1	Fixed-feed 1 Fixed-feed 2 Fixed-feed 3 Fixed-feed 4	Circular sub Circular right Circular left *1	Helical sub Helical right Helical left *1	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 *1
[Da.3]	Acceleration time No.		◎	◎	◎	◎	◎	◎
[Da.4]	Deceleration time No.		◎	◎	◎	◎	◎	◎
[Da.5]	Axis to be interpolated		◎: 2-axis interpolation control, 3-axis helical interpolation control —: 1-axis control, 3-axis interpolation control, 4-axis interpolation control					—
[Da.6]	Positioning address/movement amount		◎	◎	◎	◎	—	◎
[Da.7]	Arc address		—	—	◎	◎	—	—
[Da.8]	Command speed		◎	◎	◎	◎	◎	◎
[Da.9]	Dwell time		○	○	○	○	—	○
[Da.10]	M code		○	○	○	○*2	○	○
[Da.27]	M code ON signal output timing		○	○	○	○	○	○
[Da.28]	ABS direction in degrees		○	○	○	○	○	○
[Da.29]	Interpolation speed specification method		—: 1-axis control, ○: 2-axis interpolation control, 3-axis interpolation control, 4-axis interpolation control					

*1 Two control methods are available: Absolute (ABS) system and Incremental (INC) system.

*2 Set an M code for the reference axis and set the number of pitches for the linear interpolation axis.

◎: Always set, ○: Set as required

×: Setting not possible (If these items are set, New current value not possible (Error code: 1A1CH) or Continuous path control not possible (Error code: 1A1EH, 1A1FH) occurs at the start.)

—: Setting not required (The set value is ignored. Set the value within the setting range, such as the initial value.)

Setting items for positioning data			Position-speed switching control	Other controls				
				NOP instruction	Current value change	JUMP instruction	LOOP instruction	LEND instruction
[Da.1]	Operation pattern	Independent positioning control (positioning complete)	◎	—	◎	—	—	—
		Continuous positioning control	×	—	◎	—	—	—
		Continuous path control	×	—	×	—	—	—
[Da.2]	Control method		Forward run position-speed Reverse run position-speed	NOP instruction	Current value change	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		◎	—	◎ Address after change	—	—	—
[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	◎ Number of repetitions	—
[Da.27]	M code ON signal output timing		○	—	○	—	—	—
[Da.28]	ABS direction in degrees		○	—	—	—	—	—
[Da.29]	Interpolation speed specification method		—	—	—	—	—	—

Checking positioning data

The positioning data is checked at the positioning start.

Block start data setting items

Values indicating the current values

Block start data must be set to perform Advanced positioning control. The following table lists the setting items for Block start data.

Up to 50 points of Block start data can be set for each axis.

○: Set as required

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Block start data setting items		Block start (normal start)	Condition start	Wait start	Simultaneous start	Repeated start (FOR loop)	Repeated start (FOR condition)
[Da.11]	Shape (end/ continue)	○	○	○	○	○	○
[Da.12]	Start data No.	○	○	○	○	○	○
[Da.13]	Special start instruction	—	○	○	○	○	○
[Da.14]	Parameter	—	○	○	○	○	○

Checking block start data

Block start data is checked when the block start data starts.

Setting items for condition data

Condition data must be set as required to perform Advanced positioning control or use the JUMP instruction in Major positioning control. The following table lists the setting items for Condition data.

Up to 10 items of Condition data can be set for each axis.

○: Set as required

△: Setting restricted

—: Setting not required (Because this item is an irrelevant item, the set value is ignored. Set the value within the setting range, such as the initial value.)

Condition Data		Major positioning control		Advanced 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	—	△	—	△	△	△	—	△

Checking condition data

Condition data is checked at the following timings.

- When Block start data starts
- When JUMP instruction starts

12.2 List of Buffer Memory Addresses

This section lists the buffer memory addresses of the RD75. For details on the buffer memory addresses, refer to the following.

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Point

Do not write data to system areas and monitor data ([Md.]) in the buffer memory. Writing data to these areas may cause malfunction.

Basic setting

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
0 (0H)	150 (96H)	300 (12CH)	450 (1C2H)	[Pr.1] Unit setting	3	×	Basic parameter 1
1 (1H)	151 (97H)	301 (12DH)	451 (1C3H)	[Pr.2] No. of pulses per rotation (16 bits)	20000	×	
2 (2H)	152 (98H)	302 (12EH)	452 (1C4H)	[Pr.3] Movement amount per rotation (16 bits)	20000	×	
3 (3H)	153 (99H)	303 (12FH)	453 (1C5H)	[Pr.4] Unit magnification	1	×	
4 (4H)	154 (9AH)	304 (130H)	454 (1C6H)	[Pr.5] Pulse output mode	1	×	
5 (5H)	155 (9BH)	305 (131H)	455 (1C7H)	[Pr.6] Rotation direction setting	0	×	
6 (6H)	156 (9CH)	306 (132H)	456 (1C8H)	[Pr.7] Bias speed at start	0	×	
7 (7H)	157 (9DH)	307 (133H)	457 (1C9H)				
8 (8H)	158 (9EH)	308 (134H)	458 (1CAH)	System area	—	—	—
9 (9H)	159 (9FH)	309 (135H)	459 (1CBH)				
10 (AH)	160 (A0H)	310 (136H)	460 (1CCH)	[Pr.8] Speed limit value	200000	×	Basic parameter 2
11 (BH)	161 (A1H)	311 (137H)	461 (1CDH)				
12 (CH)	162 (A2H)	312 (138H)	462 (1CEH)	[Pr.9] Acceleration time 0	1000	×	
13 (DH)	163 (A3H)	313 (139H)	463 (1CFH)				
14 (EH)	164 (A4H)	314 (13AH)	464 (1D0H)	[Pr.10] Deceleration time 0	1000	×	
15 (FH)	165 (A5H)	315 (13BH)	465 (1D1H)				
16 (10H)	166 (A6H)	316 (13CH)	466 (1D2H)	System area	—	—	—
17 (11H)	167 (A7H)	317 (13DH)	467 (1D3H)	[Pr.11] Backlash compensation amount	0	×	Detailed parameter 1
18 (12H)	168 (A8H)	318 (13EH)	468 (1D4H)	[Pr.12] Software stroke limit upper limit value	2147483647	×	
19 (13H)	169 (A9H)	319 (13FH)	469 (1D5H)				

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
20 (14H)	170 (AAH)	320 (140H)	470 (1D6H)	[Pr.13] Software stroke limit lower limit value	-2147483648	×	Detailed parameter 1
21 (15H)	171 (ABH)	321 (141H)	471 (1D7H)				
22 (16H)	172 (ACH)	322 (142H)	472 (1D8H)	[Pr.14] Software stroke limit selection	0	×	
23 (17H)	173 (ADH)	323 (143H)	473 (1D9H)	[Pr.15] Software stroke limit valid/invalid setting	0	×	
24 (18H)	174 (AEH)	324 (144H)	474 (1DAH)	[Pr.16] Command in-position width	100	×	
25 (19H)	175 (AFH)	325 (145H)	475 (1DBH)				
26 (1AH)	176 (B0H)	326 (146H)	476 (1DCH)	[Pr.17] Torque limit setting value	300	×	
27 (1BH)	177 (B1H)	327 (147H)	477 (1DDH)	[Pr.18] M code ON signal output timing	0	×	
28 (1CH)	178 (B2H)	328 (148H)	478 (1DEH)	[Pr.19] Speed switching mode	0	×	
29 (1DH)	179 (B3H)	329 (149H)	479 (1DFH)	[Pr.20] Interpolation speed specification method	0	×	
30 (1EH)	180 (B4H)	330 (14AH)	480 (1E0H)	[Pr.21] Current feed value during speed control	0	×	
31 (1FH)	181 (B5H)	331 (14BH)	481 (1E1H)	[Pr.22] Input signal logic selection	0	×	
32 (20H)	182 (B6H)	332 (14CH)	482 (1E2H)	[Pr.23] Output signal logic selection	0	×	
33 (21H)	—	—	—	[Pr.24] Manual pulse generator input selection	0	×	
34 (22H)	184 (B8H)	334 (14EH)	484 (1E4H)	[Pr.150] Speed-position function selection	0	×	
35 (23H)	185 (B9H)	335 (14FH)	485 (1E5H)	System area	—	—	—
36 (24H)	186 (BAH)	336 (150H)	486 (1E6H)	[Pr.25] Acceleration time 1	1000	×	Detailed parameter 2
37 (25H)	187 (BBH)	337 (151H)	487 (1E7H)				
38 (26H)	188 (BCH)	338 (152H)	488 (1E8H)	[Pr.26] Acceleration time 2	1000	×	
39 (27H)	189 (BDH)	339 (153H)	489 (1E9H)				
40 (28H)	190 (BEH)	340 (154H)	490 (1EAH)	[Pr.27] Acceleration time 3	1000	×	
41 (29H)	191 (BFH)	341 (155H)	491 (1EBH)				
42 (2AH)	192 (C0H)	342 (156H)	492 (1ECH)	[Pr.28] Deceleration time 1	1000	×	
43 (2BH)	193 (C1H)	343 (157H)	493 (1EDH)				
44 (2CH)	194 (C2H)	344 (158H)	494 (1EEH)	[Pr.29] Deceleration time 2	1000	×	
45 (2DH)	195 (C3H)	345 (159H)	495 (1EFH)				
46 (2EH)	196 (C4H)	346 (15AH)	496 (1F0H)	[Pr.30] Deceleration time 3	1000	×	
47 (2FH)	197 (C5H)	347 (15BH)	497 (1F1H)				

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
48 (30H)	198 (C6H)	348 (15CH)	498 (1F2H)	[Pr.31] JOG speed limit value	20000	×	Detailed parameter 2
49 (31H)	199 (C7H)	349 (15DH)	499 (1F3H)				
50 (32H)	200 (C8H)	350 (15EH)	500 (1F4H)	[Pr.32] JOG operation acceleration time selection	0	×	
51 (33H)	201 (C9H)	351 (15FH)	501 (1F5H)	[Pr.33] JOG operation deceleration time selection	0	×	
52 (34H)	202 (CAH)	352 (160H)	502 (1F6H)	[Pr.34] Acceleration/deceleration processing selection	0	×	
53 (35H)	203 (CBH)	353 (161H)	503 (1F7H)	[Pr.35] S-curve ratio	100	×	
54 (36H)	204 (CCH)	354 (162H)	504 (1F8H)	[Pr.36] Sudden stop deceleration time	1000	×	
55 (37H)	205 (CDH)	355 (163H)	505 (1F9H)				
56 (38H)	206 (CEH)	356 (164H)	506 (1FAH)	[Pr.37] Stop group 1 sudden stop selection	0	×	
57 (39H)	207 (CFH)	357 (165H)	507 (1FBH)	[Pr.38] Stop group 2 sudden stop selection	0	×	
58 (3AH)	208 (D0H)	358 (166H)	508 (1FCH)	[Pr.39] Stop group 3 sudden stop selection	0	×	
59 (3BH)	209 (D1H)	359 (167H)	509 (1FDH)	[Pr.40] Positioning complete signal output time	300	×	
60 (3CH)	210 (D2H)	360 (168H)	510 (1FEH)	[Pr.41] Allowable circular interpolation error width	100	×	
61 (3DH)	211 (D3H)	361 (169H)	511 (1FFH)				
62 (3EH)	212 (D4H)	362 (16AH)	512 (200H)	[Pr.42] External command function selection	0	×	
63 (3FH) to 69 (45H)	213 (D5H) to 219 (DBH)	363 (16BH) to 369 (171H)	513 (201H) to 519 (207H)	System area	—	—	—
70 (46H)	220 (DCH)	370 (172H)	520 (208H)	[Pr.43] OPR method	0	×	OPR basic parameter
71 (47H)	221 (DDH)	371 (173H)	521 (209H)	[Pr.44] OPR direction	0	×	
72 (48H)	222 (DEH)	372 (174H)	522 (20AH)	[Pr.45] OP address	0	×	
73 (49H)	223 (DFH)	373 (175H)	523 (20BH)				
74 (4AH)	224 (E0H)	374 (176H)	524 (20CH)	[Pr.46] OPR speed	1	×	
75 (4BH)	225 (E1H)	375 (177H)	525 (20DH)				
76 (4CH)	226 (E2H)	376 (178H)	526 (20EH)	[Pr.47] Creep speed	1	×	
77 (4DH)	227 (E3H)	377 (179H)	527 (20FH)				
78 (4EH)	228 (E4H)	378 (17AH)	528 (210H)	[Pr.48] OPR retry	0	×	
79 (4FH)	229 (E5H)	379 (17BH)	529 (211H)	[Pr.49] OPR dwell time	0	×	OPR detailed parameter
80 (50H)	230 (E6H)	380 (17CH)	530 (212H)	[Pr.50] Setting for the movement amount after near-point dog ON	0	×	
81 (51H)	231 (E7H)	381 (17DH)	531 (213H)				

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
82 (52H)	232 (E8H)	382 (17EH)	532 (214H)	[Pr.51] OPR acceleration time selection	0	×	OPR detailed parameter
83 (53H)	233 (E9H)	383 (17FH)	533 (215H)	[Pr.52] OPR deceleration time selection	0	×	
84 (54H)	234 (EAH)	384 (180H)	534 (216H)	[Pr.53] OP shift amount	0	×	
85 (55H)	235 (EBH)	385 (181H)	535 (217H)				
86 (56H)	236 (ECH)	386 (182H)	536 (218H)	[Pr.54] OPR torque limit value	300	×	
87 (57H)	237 (EDH)	387 (183H)	537 (219H)	[Pr.55] Deviation counter clear signal output time	11	×	
88 (58H)	238 (EEH)	388 (184H)	538 (21AH)	[Pr.56] Speed specification during OP shift	0	×	
89 (59H)	239 (EFH)	389 (185H)	539 (21BH)	[Pr.57] Dwell time during OPR retry	0	×	
90 (5AH)	240 (F0H)	390 (186H)	540 (21CH)	[Pr.58] Setting of operation during uncompleted OPR	0	×	
91 (5BH) to 99 (63H)	241 (F1H) to 249 (F9H)	391 (187H) to 399 (18FH)	541 (21DH) to 549 (225H)	System area	—	—	—
100 (64H)	250 (FAH)	400 (190H)	550 (226H)	[Pr.62] Electronic gear selection	0	×	Basic parameter 1
101 (65H)	251 (FBH)	401 (191H)	551 (227H)	System area	—	—	—
102 (66H)	252 (FCH)	402 (192H)	552 (228H)	[Pr.2] No. of pulses per rotation (32 bits)	20000	×	Basic parameter 1
103 (67H)	253 (FDH)	403 (193H)	553 (229H)				
104 (68H)	254 (FEH)	404 (194H)	554 (22AH)	[Pr.3] Movement amount per rotation (32 bits)	20000	×	
105 (69H)	255 (FFH)	405 (195H)	555 (22BH)				
106 (6AH) to 133 (85H)	256 (F1H) to 283 (11BH)	406 (196H) to 433 (1B1H)	556 (22CH) to 583 (247H)	System area	—	—	—
134 (86H)	284 (11CH)	434 (1B2H)	584 (248H)	[Pr.82] Start adjustment time	0	×	Detailed parameter 2
135 (87H)	285 (11DH)	435 (1B3H)	585 (249H)				

Monitor data

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
800 (320H)	900 (384H)	1000 (3E8H)	1100 (44CH)	[Md.20] Current feed value	0	○	Axis monitor data
801 (321H)	901 (385H)	1001 (3E9H)	1101 (44DH)				
802 (322H)	902 (386H)	1002 (3EAH)	1102 (44EH)	[Md.21] Machine feed value	0	○	
803 (323H)	903 (387H)	1003 (3EBH)	1103 (44FH)				
804 (324H)	904 (388H)	1004 (3ECH)	1104 (450H)	[Md.22] Feedrate	0	○	
805 (325H)	905 (389H)	1005 (3EDH)	1105 (451H)				
806 (326H)	906 (38AH)	1006 (3EEH)	1106 (452H)	[Md.23] Axis error No.	0	○	
807 (327H)	907 (38BH)	1007 (3EFH)	1107 (453H)	[Md.24] Axis warning No.	0	○	
808 (328H)	908 (38CH)	1008 (3F0H)	1108 (454H)	[Md.25] Valid M code	0	○	
809 (329H)	909 (38DH)	1009 (3F1H)	1109 (455H)	[Md.26] Axis operation status	0	○	
810 (32AH)	910 (38EH)	1010 (3F2H)	1110 (456H)	[Md.27] Current speed	0	○	
811 (32BH)	911 (38FH)	1011 (3F3H)	1111 (457H)				
812 (32CH)	912 (390H)	1012 (3F4H)	1112 (458H)	[Md.28] Axis feedrate	0	○	
813 (32DH)	913 (391H)	1013 (3F5H)	1113 (459H)				
814 (32EH)	914 (392H)	1014 (3F6H)	1114 (45AH)	[Md.29] Speed-position switching control positioning amount	0	○	
815 (32FH)	915 (393H)	1015 (3F7H)	1115 (45BH)				
816 (330H)	916 (394H)	1016 (3F8H)	1116 (45CH)	[Md.30] External I/O signal	0000H	○	
817 (331H)	917 (395H)	1017 (3F9H)	1117 (45DH)	[Md.31] Status	0008H	○	
818 (332H)	918 (396H)	1018 (3FAH)	1118 (45EH)	[Md.32] Target value	0	○	
819 (333H)	919 (397H)	1019 (3FBH)	1119 (45FH)				
820 (334H)	920 (398H)	1020 (3FCH)	1120 (460H)	[Md.33] Target speed	0	○	
821 (335H)	921 (399H)	1021 (3FDH)	1121 (461H)				
822 (336H)	922 (39AH)	1022 (3FEH)	1122 (462H)	[Md.63] OPR request flag ON factor	0	○	
823 (337H)	923 (39BH)	1023 (3FFH)	1123 (463H)	[Md.64] Positioning control complete factor	0	○	
824 (338H)	924 (39CH)	1024 (400H)	1124 (464H)	[Md.34] Movement amount after near-point dog ON	0	○	
825 (339H)	925 (39DH)	1025 (401H)	1125 (465H)				
826 (33AH)	926 (39EH)	1026 (402H)	1126 (466H)	[Md.35] Torque limit stored value	0	○	
827 (33BH)	927 (39FH)	1027 (403H)	1127 (467H)	[Md.36] Special start data instruction code setting value	0	○	

Address Decimal (Hexadecimal)				Name		Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4					
828 (33CH)	928 (3A0H)	1028 (404H)	1128 (468H)	[Md.37] Special start data instruction parameter setting value		0	○	Axis monitor data
829 (33DH)	929 (3A1H)	1029 (405H)	1129 (469H)	[Md.38] Start positioning data No. setting value		0	○	
830 (33EH)	930 (3A2H)	1030 (406H)	1130 (46AH)	[Md.39] In speed limit flag		0	○	
831 (33FH)	931 (3A3H)	1031 (407H)	1131 (46BH)	[Md.40] In speed change processing flag		0	○	
832 (340H)	932 (3A4H)	1032 (408H)	1132 (46CH)	[Md.41] Special start repetition counter		0	○	
833 (341H)	933 (3A5H)	1033 (409H)	1133 (46DH)	[Md.42] Control method repetition counter		0000H	○	
834 (342H)	934 (3A6H)	1034 (40AH)	1134 (46EH)	[Md.43] Start data pointer being executed		0	○	
835 (343H)	935 (3A7H)	1035 (40BH)	1135 (46FH)	[Md.44] Positioning data No. being executed		0	○	
836 (344H)	936 (3A8H)	1036 (40CH)	1136 (470H)	[Md.45] Block No. being executed		0	○	
837 (345H)	937 (3A9H)	1037 (40DH)	1137 (471H)	[Md.46] Last executed positioning data No.		0	○	
838 (346H)	938 (3AAH)	1038 (40EH)	1138 (472H)	[Md.47] Positioning data being executed	Positioning identifier	0	○	
839 (347H)	939 (3ABH)	1039 (40FH)	1139 (473H)		M code	0	○	
840 (348H)	940 (3ACH)	1040 (410H)	1140 (474H)		Dwell time	0	○	
841 (349H)	941 (3ADH)	1041 (411H)	1141 (475H)		Positioning option	0	○	
842 (34AH)	942 (3AEH)	1042 (412H)	1142 (476H)		Command speed	0	○	
843 (34BH)	943 (3AFH)	1043 (413H)	1143 (477H)					
844 (34CH)	944 (3B0H)	1044 (414H)	1144 (478H)		Positioning address	0	○	
845 (34DH)	945 (3B1H)	1045 (415H)	1145 (479H)					
846 (34EH)	946 (3B2H)	1046 (416H)	1146 (47AH)		Arc address	0	○	
847 (34FH)	947 (3B3H)	1047 (417H)	1147 (47BH)					
848 (350H) to 856 (358H)	948 (3B4H) to 956 (3BCH)	1048 (418H) to 1056 (420H)	1148 (47CH) to 1156 (484H)	System area		—	—	—
857 (359H)	957 (3BDH)	1057 (421H)	1157 (485H)	[Md.60] Analysis mode		0	○	Axis monitor data
858 (35AH)	958 (3BEH)	1058 (422H)	1158 (486H)	[Md.61] Analysis complete flag		0	○	
859 (35BH) to 898 (382H)	959 (3BFH) to 998 (3E6H)	1059 (423H) to 1098 (44AH)	1159 (487H) to 1198 (4AEH)	System area		—	—	—
899 (383H)	999 (3E7H)	1099 (44BH)	1199 (4AFH)	[Md.48] Deceleration start flag		0	○	Axis monitor data

Address Decimal (Hexadecimal) Common for Axis 1 to 4	Name		Default value	Auto refresh	Memory area
1200 (4B0H)	[Md.1] In test mode flag		0	×	System monitor data
1201 (4B1H)	[Md.70] Amplifier-less operation mode status		0	×	
1202(4B2H) to 1211(4BBH)	System area		—	—	—
1212 (4BCH)	Start history 0	[Md.3] Start information	0000H	×	System monitor data
1213 (4BDH)		[Md.4] Start No.	0000H	×	
1214 (4BEH)		[Md.5] Start (date/hour)	0000H	×	
1215 (4BFH)		[Md.6] Start (minute/second)	0000H	×	
1216 (4C0H)		[Md.7] Error judgment	0000H	×	
1440 (5A0H)		[Md.50] Start (year/month)	0000H	×	
1217 (4C1H)	Start history 1	[Md.3] Start information	0000H	×	
1218 (4C2H)		[Md.4] Start No.	0000H	×	
1219 (4C3H)		[Md.5] Start (date/hour)	0000H	×	
1220 (4C4H)		[Md.6] Start (minute/second)	0000H	×	
1221 (4C5H)		[Md.7] Error judgment	0000H	×	
1441 (5A1H)		[Md.50] Start (year/month)	0000H	×	
1222 (4C6H)	Start history 2	[Md.3] Start information	0000H	×	
1223 (4C7H)		[Md.4] Start No.	0000H	×	
1224 (4C8H)		[Md.5] Start (date/hour)	0000H	×	
1225 (4C9H)		[Md.6] Start (minute/second)	0000H	×	
1226 (4CAH)		[Md.7] Error judgment	0000H	×	
1442 (5A2H)		[Md.50] Start (year/month)	0000H	×	
1227 (4CBH)	Start history 3	[Md.3] Start information	0000H	×	
1228 (4CCH)		[Md.4] Start No.	0000H	×	
1229 (4CDH)		[Md.5] Start (date/hour)	0000H	×	
1230 (4CEH)		[Md.6] Start (minute/second)	0000H	×	
1231 (4CFH)		[Md.7] Error judgment	0000H	×	
1443 (5A3H)		[Md.50] Start (year/month)	0000H	×	
1232 (4D0H)	Start history 4	[Md.3] Start information	0000H	×	
1233 (4D1H)		[Md.4] Start No.	0000H	×	
1234 (4D2H)		[Md.5] Start (date/hour)	0000H	×	
1235 (4D3H)		[Md.6] Start (minute/second)	0000H	×	
1236 (4D4H)		[Md.7] Error judgment	0000H	×	
1444 (5A4H)		[Md.50] Start (year/month)	0000H	×	
1237 (4D5H)	Start history 5	[Md.3] Start information	0000H	×	
1238 (4D6H)		[Md.4] Start No.	0000H	×	
1239 (4D7H)		[Md.5] Start (date/hour)	0000H	×	
1240 (4D8H)		[Md.6] Start (minute/second)	0000H	×	
1241 (4D9H)		[Md.7] Error judgment	0000H	×	
1445 (5A5H)		[Md.50] Start (year/month)	0000H	×	
1242 (4DAH)	Start history 6	[Md.3] Start information	0000H	×	
1243 (4DBH)		[Md.4] Start No.	0000H	×	
1244 (4DCH)		[Md.5] Start (date/hour)	0000H	×	
1245 (4DDH)		[Md.6] Start (minute/second)	0000H	×	
1246 (4DEH)		[Md.7] Error judgment	0000H	×	
1446 (5A6H)		[Md.50] Start (year/month)	0000H	×	

Address Decimal (Hexadecimal)	Name		Default value	Auto refresh	Memory area
Common for Axis 1 to 4					
1247 (4DFH)	Start history 7	[Md.3] Start information	0000H	×	System monitor data
1248 (4E0H)		[Md.4] Start No.	0000H	×	
1249 (4E1H)		[Md.5] Start (date/hour)	0000H	×	
1250 (4E2H)		[Md.6] Start (minute/second)	0000H	×	
1251 (4E3H)		[Md.7] Error judgment	0000H	×	
1447 (5A7H)		[Md.50] Start (year/month)	0000H	×	
1252 (4E4H)	Start history 8	[Md.3] Start information	0000H	×	
1253 (4E5H)		[Md.4] Start No.	0000H	×	
1254 (4E6H)		[Md.5] Start (date/hour)	0000H	×	
1255 (4E7H)		[Md.6] Start (minute/second)	0000H	×	
1256 (4E8H)		[Md.7] Error judgment	0000H	×	
1448 (5A8H)		[Md.50] Start (year/month)	0000H	×	
1257 (4E9H)	Start history 9	[Md.3] Start information	0000H	×	
1258 (4EAH)		[Md.4] Start No.	0000H	×	
1259 (4EBH)		[Md.5] Start (date/hour)	0000H	×	
1260 (4ECH)		[Md.6] Start (minute/second)	0000H	×	
1261 (4EDH)		[Md.7] Error judgment	0000H	×	
1449 (5A9H)		[Md.50] Start (year/month)	0000H	×	
1262 (4EEH)	Start history 10	[Md.3] Start information	0000H	×	
1263 (4EFH)		[Md.4] Start No.	0000H	×	
1264 (4F0H)		[Md.5] Start (date/hour)	0000H	×	
1265 (4F1H)		[Md.6] Start (minute/second)	0000H	×	
1266 (4F2H)		[Md.7] Error judgment	0000H	×	
1450 (5AAH)		[Md.50] Start (year/month)	0000H	×	
1267 (4F3H)	Start history 11	[Md.3] Start information	0000H	×	
1268 (4F4H)		[Md.4] Start No.	0000H	×	
1269 (4F5H)		[Md.5] Start (date/hour)	0000H	×	
1270 (4F6H)		[Md.6] Start (minute/second)	0000H	×	
1271 (4F7H)		[Md.7] Error judgment	0000H	×	
1451 (5ABH)		[Md.50] Start (year/month)	0000H	×	
1272 (4F8H)	Start history 12	[Md.3] Start information	0000H	×	
1273 (4F9H)		[Md.4] Start No.	0000H	×	
1274 (4FAH)		[Md.5] Start (date/hour)	0000H	×	
1275 (4FBH)		[Md.6] Start (minute/second)	0000H	×	
1276 (4FCH)		[Md.7] Error judgment	0000H	×	
1452 (5ACH)		[Md.50] Start (year/month)	0000H	×	
1277 (4FDH)	Start history 13	[Md.3] Start information	0000H	×	
1278 (4FEH)		[Md.4] Start No.	0000H	×	
1279 (4FFH)		[Md.5] Start (date/hour)	0000H	×	
1280 (500H)		[Md.6] Start (minute/second)	0000H	×	
1281 (501H)		[Md.7] Error judgment	0000H	×	
1453 (5ADH)		[Md.50] Start (year/month)	0000H	×	
1282 (502H)	Start history 14	[Md.3] Start information	0000H	×	
1283 (503H)		[Md.4] Start No.	0000H	×	
1284 (504H)		[Md.5] Start (date/hour)	0000H	×	
1285 (505H)		[Md.6] Start (minute/second)	0000H	×	
1286 (506H)		[Md.7] Error judgment	0000H	×	
1454 (5AEH)		[Md.50] Start (year/month)	0000H	×	

Address Decimal (Hexadecimal) Common for Axis 1 to 4	Name		Default value	Auto refresh	Memory area
1287 (507H)	Start history 15	[Md.3] Start information	0000H	×	System monitor data
1288 (508H)		[Md.4] Start No.	0000H	×	
1289 (509H)		[Md.5] Start (date/hour)	0000H	×	
1290 (50AH)		[Md.6] Start (minute/second)	0000H	×	
1291 (50BH)		[Md.7] Error judgment	0000H	×	
1455 (5AFH)		[Md.50] Start (year/month)	0000H	×	
1292 (50CH)	[Md.8] Start history pointer		0	×	
1293 (50DH)	Error history 0	[Md.9] Axis in which the error occurred	0	×	
1294 (50EH)		[Md.10] Error No.	0	×	
1295 (50FH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1296 (510H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1456 (5B0H)		[Md.51] Error occurrence (year/month)	0000H	×	
1297 (511H)	Error history 1	[Md.9] Axis in which the error occurred	0	×	
1298 (512H)		[Md.10] Error No.	0	×	
1299 (513H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1300 (514H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1457 (5B1H)		[Md.51] Error occurrence (year/month)	0000H	×	
1301 (515H)	Error history 2	[Md.9] Axis in which the error occurred	0	×	
1302 (516H)		[Md.10] Error No.	0	×	
1303 (517H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1304 (518H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1458 (5B2H)		[Md.51] Error occurrence (year/month)	0000H	×	
1305 (519H)	Error history 3	[Md.9] Axis in which the error occurred	0	×	
1306 (51AH)		[Md.10] Error No.	0	×	
1307 (51BH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1308 (51CH)		[Md.12] Error occurrence (minute/second)	0000H	×	
1459 (5B3H)		[Md.51] Error occurrence (year/month)	0000H	×	
1309 (51DH)	Error history 4	[Md.9] Axis in which the error occurred	0	×	
1310 (51EH)		[Md.10] Error No.	0	×	
1311 (51FH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1312 (520H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1460 (5B4H)		[Md.51] Error occurrence (year/month)	0000H	×	
1313 (521H)	Error history 5	[Md.9] Axis in which the error occurred	0	×	
1314 (522H)		[Md.10] Error No.	0	×	
1315 (523H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1316 (524H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1461 (5B5H)		[Md.51] Error occurrence (year/month)	0000H	×	
1317 (525H)	Error history 6	[Md.9] Axis in which the error occurred	0	×	
1318 (526H)		[Md.10] Error No.	0	×	
1319 (527H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1320 (528H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1462 (5B6H)		[Md.51] Error occurrence (year/month)	0000H	×	
1321 (529H)	Error history 7	[Md.9] Axis in which the error occurred	0	×	
1322 (52AH)		[Md.10] Error No.	0	×	
1323 (52BH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1324 (52CH)		[Md.12] Error occurrence (minute/second)	0000H	×	
1463 (5B7H)		[Md.51] Error occurrence (year/month)	0000H	×	

Address Decimal (Hexadecimal) Common for Axis 1 to 4	Name		Default value	Auto refresh	Memory area
1325 (52DH)	Error history 8	[Md.9] Axis in which the error occurred	0	×	System monitor data
1326 (52EH)		[Md.10] Error No.	0	×	
1327 (52FH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1328 (530H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1464 (5B8H)		[Md.51] Error occurrence (year/month)	0000H	×	
1329 (531H)	Error history 9	[Md.9] Axis in which the error occurred	0	×	
1330 (532H)		[Md.10] Error No.	0	×	
1331 (533H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1332 (534H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1465 (5B9H)		[Md.51] Error occurrence (year/month)	0000H	×	
1333 (535H)	Error history 10	[Md.9] Axis in which the error occurred	0	×	
1334 (536H)		[Md.10] Error No.	0	×	
1335 (537H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1336 (538H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1466 (5BAH)		[Md.51] Error occurrence (year/month)	0000H	×	
1337 (539H)	Error history 11	[Md.9] Axis in which the error occurred	0	×	
1338 (53AH)		[Md.10] Error No.	0	×	
1339 (53BH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1340 (53CH)		[Md.12] Error occurrence (minute/second)	0000H	×	
1467 (5BBH)		[Md.51] Error occurrence (year/month)	0000H	×	
1341 (53DH)	Error history 12	[Md.9] Axis in which the error occurred	0	×	
1342 (53EH)		[Md.10] Error No.	0	×	
1343 (53FH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1344 (540H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1468 (5BCH)		[Md.51] Error occurrence (year/month)	0000H	×	
1345 (541H)	Error history 13	[Md.9] Axis in which the error occurred	0	×	
1346 (542H)		[Md.10] Error No.	0	×	
1347 (543H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1348 (544H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1469 (5BDH)		[Md.51] Error occurrence (year/month)	0000H	×	
1349 (545H)	Error history 14	[Md.9] Axis in which the error occurred	0	×	
1350 (546H)		[Md.10] Error No.	0	×	
1351(547H)		[Md.11] Error occurrence (date/hour)	0000H	×	
1352(548H)		[Md.12] Error occurrence (minute/second)	0000H	×	
1470 (5BEH)		[Md.51] Error occurrence (year/month)	0000H	×	
1353(549H)	Error history 15	[Md.9] Axis in which the error occurred	0	×	
1354 (54AH)		[Md.10] Error No.	0	×	
1355 (54BH)		[Md.11] Error occurrence (date/hour)	0000H	×	
1356 (54CH)		[Md.12] Error occurrence (minute/second)	0000H	×	
1471 (5BFH)		[Md.51] Error occurrence (year/month)	0000H	×	
1357 (54DH)	[Md.13] Error history pointer		0	×	
1358 (54EH)	Warning history 0	[Md.14] Axis in which the warning occurred	0	×	
1359 (54FH)		[Md.15] Warning No.	0	×	
1360(550H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1361(551H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1472 (5C0H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1362(552H)	Warning history 1	[Md.14] Axis in which the warning occurred	0	×	
1363(553H)		[Md.15] Warning No.	0	×	
1364(554H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1365(555H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1473 (5C1H)		[Md.52] Warning occurrence (year/month)	0000H	×	

Address Decimal (Hexadecimal) Common for Axis 1 to 4	Name		Default value	Auto refresh	Memory area
1366(556H)	Warning history 2	[Md.14] Axis in which the warning occurred	0	×	System monitor data
1367(557H)		[Md.15] Warning No.	0	×	
1368(558H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1369(559H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1474 (5C2H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1370 (55AH)	Warning history 3	[Md.14] Axis in which the warning occurred	0	×	
1371 (55BH)		[Md.15] Warning No.	0	×	
1372 (55CH)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1373 (55DH)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1475 (5C3H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1374 (55EH)	Warning history 4	[Md.14] Axis in which the warning occurred	0	×	
1375 (55FH)		[Md.15] Warning No.	0	×	
1376(560H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1377(561H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1476 (5C4H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1378(562H)	Warning history 5	[Md.14] Axis in which the warning occurred	0	×	
1379(563H)		[Md.15] Warning No.	0	×	
1380(564H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1381(565H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1477 (5C5H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1382(566H)	Warning history 6	[Md.14] Axis in which the warning occurred	0	×	
1383(567H)		[Md.15] Warning No.	0	×	
1384(568H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1385(569H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1478 (5C6H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1386 (56AH)	Warning history 7	[Md.14] Axis in which the warning occurred	0	×	
1387 (56BH)		[Md.15] Warning No.	0	×	
1388 (56CH)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1389 (56DH)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1479 (5C7H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1390 (56EH)	Warning history 8	[Md.14] Axis in which the warning occurred	0	×	
1391 (56FH)		[Md.15] Warning No.	0	×	
1392(570H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1393(571H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1480 (5C8H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1394(572H)	Warning history 9	[Md.14] Axis in which the warning occurred	0	×	
1395(573H)		[Md.15] Warning No.	0	×	
1396(574H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1397(575H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1481 (5C9H)		[Md.52] Warning occurrence (year/month)	0000H	×	
1398(576H)	Warning history 10	[Md.14] Axis in which the warning occurred	0	×	
1399(577H)		[Md.15] Warning No.	0	×	
1400(578H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1401(579H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1482 (5CAH)		[Md.52] Warning occurrence (year/month)	0000H	×	
1402 (57AH)	Warning history 11	[Md.14] Axis in which the warning occurred	0	×	
1403 (57BH)		[Md.15] Warning No.	0	×	
1404 (57CH)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1405 (57DH)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1483 (5CBH)		[Md.52] Warning occurrence (year/month)	0000H	×	

Address Decimal (Hexadecimal)	Name		Default value	Auto refresh	Memory area
Common for Axis 1 to 4					
1406 (57EH)	Warning history 12	[Md.14] Axis in which the warning occurred	0	×	System monitor data
1407 (57FH)		[Md.15] Warning No.	0	×	
1408(580H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1409(581H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1484 (5CCH)		[Md.52] Warning occurrence (year/month)	0000H	×	
1410(582H)	Warning history 13	[Md.14] Axis in which the warning occurred	0	×	
1411(583H)		[Md.15] Warning No.	0	×	
1412(584H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1413(585H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1485 (5CDH)		[Md.52] Warning occurrence (year/month)	0000H	×	
1414(586H)	Warning history 14	[Md.14] Axis in which the warning occurred	0	×	
1415(587H)		[Md.15] Warning No.	0	×	
1416(588H)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1417(589H)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1486 (5CEH)		[Md.52] Warning occurrence (year/month)	0000H	×	
1418 (58AH)	Warning history 15	[Md.14] Axis in which the warning occurred	0	×	
1419 (58BH)		[Md.15] Warning No.	0	×	
1420 (58CH)		[Md.16] Warning occurrence (date/hour)	0000H	×	
1421 (58DH)		[Md.17] Warning occurrence (minute/second)	0000H	×	
1487 (5CFH)		[Md.52] Warning occurrence (year/month)	0000H	×	
1422 (58EH)	[Md.18] Warning history pointer		0	×	
1423 (58FH)	System area		—	—	
1424(590H)	[Md.19] No. of write accesses to flash ROM		0	×	
1425(591H)					
1426(592H) to 1487(5CFH)	System area		—	—	
1488 (5D0H)	[Md.53] Date of write accesses to flash ROM (year/month)		0000H	×	
1489 (5D1H)	[Md.54] Date of write accesses to flash ROM (date/hour)		0000H	×	
1490 (5D2H)	[Md.55] Date of write accesses to flash ROM (minute/second)		0000H	×	
1491 (5D3H)	[Md.56] Date of write accesses to flash ROM (ms)		0000H	×	

Control data

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
1500 (5DCH)	1600 (640H)	1700 (6A4H)	1800 (708H)	[Cd.3] Positioning start No.	0	×	Axis control data
1501 (5DDH)	1601 (641H)	1701 (6A5H)	1801 (709H)	[Cd.4] Positioning starting point No.	0	×	
1502 (5DEH)	1602 (642H)	1702 (6A6H)	1802 (70AH)	[Cd.5] Axis error reset	0	×	
1503 (5DFH)	1603 (643H)	1703 (6A7H)	1803 (70BH)	[Cd.6] Restart command	0	×	
1504 (5E0H)	1604 (644H)	1704 (6A8H)	1804 (70CH)	[Cd.7] M code ON signal OFF request	0	×	
1505 (5E1H)	1605 (645H)	1705 (6A9H)	1805 (70DH)	[Cd.8] External command valid	0	×	
1506 (5E2H)	1606 (646H)	1706 (6AAH)	1806 (70EH)	[Cd.9] New current value	0	×	
1507 (5E3H)	1607 (647H)	1707 (6ABH)	1807 (70FH)				
1508 (5E4H)	1608 (648H)	1708 (6ACH)	1808 (710H)	[Cd.10] New acceleration time value	0	×	
1509 (5E5H)	1609 (649H)	1709 (6ADH)	1809 (711H)				
1510 (5E6H)	1610 (64AH)	1710 (6AEH)	1810 (712H)	[Cd.11] New deceleration time value	0	×	
1511 (5E7H)	1611 (64BH)	1711 (6AFH)	1811 (713H)				
1512 (5E8H)	1612 (64CH)	1712 (6B0H)	1812 (714H)	[Cd.12] Acceleration/deceleration time change during speed change, enable/disable selection	0	×	
1513 (5E9H)	1613 (64DH)	1713 (6B1H)	1813 (715H)	[Cd.13] Positioning operation speed override	0	×	
1514 (5EAH)	1614 (64EH)	1714 (6B2H)	1814 (716H)	[Cd.14] New speed value	0	×	
1515 (5EBH)	1615 (64FH)	1715 (6B3H)	1815 (717H)				
1516 (5ECH)	1616 (650H)	1716 (6B4H)	1816 (718H)	[Cd.15] Speed change request	0	×	
1517 (5EDH)	1617 (651H)	1717 (6B5H)	1817 (719H)	[Cd.16] Inching movement amount	0	×	
1518 (5EEH)	1618 (652H)	1718 (6B6H)	1818 (71AH)	[Cd.17] JOG speed	0	×	
1519 (5EFH)	1619 (653H)	1719 (6B7H)	1819 (71BH)				
1520 (5F0H)	1620 (654H)	1720 (6B8H)	1820 (71CH)	[Cd.18] Continuous operation interrupt request	0	×	
1521 (5F1H)	1621 (655H)	1721 (6B9H)	1821 (71DH)	[Cd.19] OPR request flag OFF request	0	×	
1522 (5F2H)	1622 (656H)	1722 (6BAH)	1822 (71EH)	[Cd.20] Manual pulse generator 1 pulse input magnification	1	×	
1523 (5F3H)	1623 (657H)	1723 (6BBH)	1823 (71FH)				
1524 (5F4H)	1624 (658H)	1724 (6BCH)	1824 (720H)	[Cd.21] Manual pulse generator enable flag	0	×	
1525 (5F5H)	1625 (659H)	1725 (6BDH)	1825 (721H)	[Cd.22] New torque value	0	×	
1526 (5F6H)	1626 (65AH)	1726 (6BEH)	1826 (722H)	[Cd.23] Speed-position switching control movement amount change register	0	×	
1527 (5F7H)	1627 (65BH)	1727 (6BFH)	1827 (723H)				

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
1528 (5F8H)	1628 (65CH)	1728 (6C0H)	1828 (724H)	[Cd.24] Speed-position switching enable flag	0	×	Axis control data
1529 (5F9H)	1629 (65DH)	1729 (6C1H)	1829 (725H)	System area	—	—	—
1530 (5FAH)	1630 (65EH)	1730 (6C2H)	1830 (726H)	[Cd.25] Position-speed switching control speed change register	0	×	Axis control data
1531 (5FBH)	1631 (65FH)	1731 (6C3H)	1831 (727H)				
1532 (5FCH)	1632 (660H)	1732 (6C4H)	1832 (728H)	[Cd.26] Position-speed switching enable flag	0	×	
1533 (5FDH)	1633 (661H)	1733 (6C5H)	1833 (729H)	System area	—	—	—
1534 (5FEH)	1634 (662H)	1734 (6C6H)	1834 (72AH)	[Cd.27] Target position change value (new address)	0	×	Axis control data
1535 (5FFH)	1635 (663H)	1735 (6C7H)	1835 (72BH)				
1536 (600H)	1636 (664H)	1736 (6C8H)	1836 (72CH)	[Cd.28] Target position change value (new speed)	0	×	
1537 (601H)	1637 (665H)	1737 (6C9H)	1837 (72DH)				
1538 (602H)	1638 (666H)	1738 (6CAH)	1838 (72EH)	[Cd.29] Target position change request flag	0	×	
1539 (603H)	1639 (667H)	1739 (6CBH)	1839 (72FH)	System area	—	—	—
1540 (604H)	1640 (668H)	1740 (6CCH)	1840 (730H)	[Cd.30] Simultaneous starting axis start data No. (axis 1 start data No.)	0	×	Axis control data
1541 (605H)	1641 (669H)	1741 (6CDH)	1841 (731H)	[Cd.31] Simultaneous starting axis start data No. (axis 2 start data No.)	0	×	
1542 (606H)	1642 (66AH)	1742 (6CEH)	1842 (732H)	[Cd.32] Simultaneous starting axis start data No. (axis 3 start data No.)	0	×	
1543 (607H)	1643 (66BH)	1743 (6CFH)	1843 (733H)	[Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.)	0	×	
1544 (608H)	1644 (66CH)	1744 (6D0H)	1844 (734H)	[Cd.34] Step mode	0	×	
1545 (609H)	1645 (66DH)	1745 (6D1H)	1845 (735H)	[Cd.35] Step valid flag	0	×	
1546 (60AH)	1646 (66EH)	1746 (6D2H)	1846 (736H)	[Cd.36] Step start request	0	×	
1547 (60BH)	1647 (66FH)	1747 (6D3H)	1847 (737H)	[Cd.37] Skip command	0	×	
1548 (60CH)	1648 (670H)	1748 (6D4H)	1848 (738H)	[Cd.38] Teaching data selection	0	×	
1549 (60DH)	1649 (671H)	1749 (6D5H)	1849 (739H)	[Cd.39] Teaching positioning data No.	0	×	
1550 (60EH)	1650 (672H)	1750 (6D6H)	1850 (73AH)	[Cd.40] ABS direction in degrees	0	×	
1551 (60FH) to 1565 (61DH)	1651 (673H) to 1665 (681H)	1751 (6D7H) to 1765 (6E5H)	1851 (73BH) to 1865 (749H)	System area	—	—	—
1566 (61EH)	1666 (682H)	1766 (6E6H)	1866 (74AH)	[Cd.45] Speed-position switching device selection	0	×	Axis control data
1567 (61FH)	1667 (683H)	1767 (6E7H)	1867 (74BH)	[Cd.46] Speed-position switching command	0	×	

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
1568 (620H) to 1589 (635H)	1668 (684H) to 1689 (699H)	1768 (6E8H) to 1789 (6FDH)	1868 (74CH) to 1889 (761H)	System area	—	—	—
1590 (636H)	1690 (69AH)	1790 (6FEH)	1890 (762H)	[Cd.43] Analysis mode setting	0	×	Axis control data
1591 (637H) to 1599 (63FH)	1691 (69BH) to 1699 (6A3H)	1791 (6FFH) to 1799 (707H)	1891 (763H) to 1899 (76BH)	System area	—	—	—
1900 (76CH)				[Cd.1] Module data backup request	0	×	System control data
1901 (76DH)				[Cd.2] Module data initialization request	0	×	
1902(76EH) to 1904(770H)				System area	—	—	—
1905(771H)				[Cd.41] Deceleration start flag valid	0	×	System control data
1906(772H)				System area	—	—	—
1907(773H)				[Cd.42] Stop command processing for deceleration stop selection	0	×	System control data
1908(774H) to 1925(785H)				System area	—	—	—
1926(786H)				[Cd.137] Amplifier-less operation mode switching request	0000H	×	System control data
1927(787H)				System area	—	—	—
1928 (788H)	1929 (789H)	1930 (78AH)	1931 (78BH)	[Cd.44] External input signal operation device	0000H	×	System control data
1932(78CH)				System area	—	—	—
1933 (78DH)				[Cd.49] All axes error reset	0	×	System control data
1934 (78EH)				[Cd.43] Output timing selection of near pass control	0	×	

Positioning data

Address Decimal (Hexadecimal)				Name		Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4					
2000 (7D0H)	8000 (1F40H)	14000 (36B0H)	20000 (4E20H)	Positioning data No.1	Positioning identifier • [Da.1] Operation pattern • [Da.2] Control method • [Da.3] Acceleration time No. • [Da.4] Deceleration time No. • [Da.5] Axis to be interpolated	0	×	Positioning data
2001 (7D1H)	8001 (1F41H)	14001 (36B1H)	20001 (4E21H)		[Da.10] M code/Number of pitch/ Condition data No./Number of LOOP to LEND repetitions	0	×	
2002 (7D2H)	8002 (1F42H)	14002 (36B2H)	20002 (4E22H)		[Da.9] Dwell time/JUMP destination positioning data No.	0	×	
2003 (7D3H)	8003 (1F43H)	14003 (36B3H)	20003 (4E23H)		Positioning option • [Da.27] M code ON signal output timing • [Da.28] ABS direction in degrees • [Da.29] Interpolation speed specification method	0	×	
2004 (7D4H)	8004 (1F44H)	14004 (36B4H)	20004 (4E24H)		[Da.8] Command speed	0	×	
2005 (7D5H)	8005 (1F45H)	14005 (36B5H)	20005 (4E25H)					
2006 (7D6H)	8006 (1F46H)	14006 (36B6H)	20006 (4E26H)		[Da.6] Positioning address/movement amount	0	×	
2007 (7D7H)	8007 (1F47H)	14007 (36B7H)	20007 (4E27H)					
2008 (7D8H)	8008 (1F48H)	14008 (36B8H)	20008 (4E28H)		[Da.7] Arc address	0	×	
2009 (7D9H)	8009 (1F49H)	14009 (36B9H)	20009 (4E29H)					
2010 (7DAH) to 2019 (7E3H)	8010 (1F4AH) to 8019 (1F53H)	14010 (36BAH) to 14019 (36C3H)	20010 (4E2AH) to 20019 (4E33H)	Positioning data No.2		—	—	
2020 (7E4H) to 2029 (7EDH)	8020 (1F54H) to 8029 (1F5DH)	14020 (36C4H) to 14029 (36CDH)	20020 (4E34H) to 20029 (4E3DH)	Positioning data No.3		—	—	
to	to	to	to	to		—	—	
7990 (1F36H) to 7999 (1F3FH)	13990 (36A6H) to 13999 (36AFH)	19990 (4E16H) to 19999 (4E1FH)	25990 (6568H) to 25999 (658FH)	Positioning data No.600		—	—	

Block start data

Address Decimal (Hexadecimal)				Name		Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4					
26000 (6590H)	27000 (6978H)	28000 (6D60H)	29000 (7148H)	Block start data 1st point	[Da.11] Shape [Da.12] Start data No.	0	×	Start block 0 (Block No.7000)
26050 (65C2H)	27050 (69AAH)	28050 (6D92H)	29050 (717AH)		[Da.13] Special start instruction [Da.14] Parameter	0	×	
26001 (6591H)	27001 (6979H)	28001 (6D61H)	29001 (7149H)	Block start data 2nd point	[Da.11] Shape [Da.12] Start data No.	0	×	
26051 (65C3H)	27051 (69ABH)	28051 (6D93H)	29051 (717BH)		[Da.13] Special start instruction [Da.14] Parameter	0	×	
26002 (6592H)	27002 (697AH)	28002 (6D62H)	29002 (714AH)	Block start data 3rd point		0	×	
26052 (65C4H)	27052 (69ACH)	28052 (6D94H)	29052 (717CH)			0	×	
to	to	to	to	to		—	—	
26049 (65C1H)	27049 (69A9H)	28049 (6D91H)	29049 (7179H)	Block start data 50th point		0	×	
26099 (65F3H)	27099 (69DBH)	28099 (6DC3H)	29099 (71ABH)			0	×	
26100 (65F4H)	27100 (69DCH)	28100 (6DC4H)	29100 (71ACH)	Condition data No.1	[Da.15] Condition target [Da.16] Condition operator	0	×	
26101 (65F5H)	27101 (69DDH)	28101 (6DC5H)	29101 (71ADH)		System area	—	—	
26102 (65F6H)	27102 (69DEH)	28102 (6DC6H)	29102 (71AEH)		[Da.17] Address	0	×	
26103 (65F7H)	27103 (69DFH)	28103 (6DC7H)	29103 (71AFH)					
26104 (65F8H)	27104 (69E0H)	28104 (6DC8H)	29104 (71B0H)		[Da.18] Parameter 1	0	×	
26105 (65F9H)	27105 (69E1H)	28105 (6DC9H)	29105 (71B1H)					
26106 (65FAH)	27106 (69E2H)	28106 (6DCAH)	29106 (71B2H)		[Da.19] Parameter 2	0	×	
26107 (65FBH)	27107 (69E3H)	28107 (6DCBH)	29107 (71B3H)					
26108 (65FCH)	27108 (69E4H)	28108 (6DCCH)	29108 (71B4H)		System area	—	—	
26109 (65FDH)	27109 (69E5H)	28109 (6DCDH)	29109 (71B5H)					
26110 (65FEH) to 26119 (6607H)	27110 (69E6H) to 27119 (69EFH)	28110 (6DCEH) to 28119 (6DD7H)	29110 (71B6H) to 29119 (71BFH)	Condition data No.2		0	×	
26120 (6608H) to 26129 (6611H)	27120 (69F0H) to 27129 (69F9H)	28120 (6DD8H) to 28129 (6DE1H)	29120 (71C0H) to 29129 (71C9H)	Condition data No.3		0	×	
to	to	to	to	to		—	—	
26190 (664EH) to 26199 (6657H)	27190 (6A36H) to 27199 (6A3FH)	28190 (6E1EH) to 28199 (6E27H)	29190 (7206H) to 29199 (720FH)	Condition data No.10		0	×	

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
26200 (6658H) to 26299 (66BBH)	27200 (6A40H) to 27299 (6AA3H)	28200 (6E28H) to 28299 (6E8BH)	29200 (7210H) to 29299 (7273H)	Block start data	0	×	Start block 1 (Block No.7001)
26300 (66BCH) to 26399 (671FH)	27300 (6AA4H) to 27399 (6B07H)	28300 (6E8CH) to 28399 (6EEFH)	29300 (7274H) to 29399 (72D7H)	Condition Data	0	×	
26400 (6720H) to 26499 (6783H)	27400 (6B08H) to 27499 (6B6BH)	28400 (6EF0H) to 28499 (6F53H)	29400 (72D8H) to 29499 (733BH)	Block start data	0	×	Start block 2 (Block No.7002)
26500 (6784H) to 26599 (67E7H)	27500 (6B6CH) to 27599 (6BCFH)	28500 (6F54H) to 28599 (6FB7H)	29500 (733CH) to 29599 (739FH)	Condition Data	0	×	
26600 (67E8H) to 26699 (684BH)	27600 (6BD0H) to 27699 (6C33H)	28600 (6FB8H) to 28699 (701BH)	29600 (73A0H) to 29699 (7403H)	Block start data	0	×	Start block 3 (Block No.7003)
26700 (684CH) to 26799 (68AFH)	27700 (6C34H) to 27799 (6C97H)	28700 (701CH) to 28799 (707FH)	29700 (7404H) to 29799 (7467H)	Condition Data	0	×	
26800 (68B0H) to 26899 (6913H)	27800 (6C98H) to 27899 (6CFBH)	28800 (7080H) to 28899 (70E3H)	29800 (7468H) to 29899 (74CBH)	Block start data	0	×	Start block 4 (Block No.7004)
26900 (6914H) to 26999 (6977H)	27900 (6CFCH) to 27999 (6D5FH)	28900 (70E4H) to 28999 (7147H)	29900 (74CCH) to 29999 (752FH)	Condition Data	0	×	
30000(7530H) to 30099(7593H)				Target data for condition judgment of the condition data	0	×	Programmable controller CPU memo area

Interrupt setting

Address Decimal (Hexadecimal) Common for Axis 1 to 4	Name		Default value	Auto refresh	Memory area
55000 (D6D8H)	Interrupt setting No.1	[Md.65] Interrupt factor detection flag	0	×	Interrupt setting data
55064 (D718H)		[Cd.50] Interrupt factor mask	0	×	
55128 (D758H)		[Cd.51] Interrupt factor reset request	0	×	
55192 (D798H)		[Pr.900] Interrupt factor setting	0	×	
55256 (D7D8H)		[Pr.901] Axis No. for interrupt factor	0	×	
55001 (D6D9H)	Interrupt setting No.2	[Md.65] Interrupt factor detection flag	0	×	
55065 (D719H)		[Cd.50] Interrupt factor mask	0	×	
55129 (D759H)		[Cd.51] Interrupt factor reset request	0	×	
55193 (D799H)		[Pr.900] Interrupt factor setting	0	×	
55257 (D7D9H)		[Pr.901] Axis No. for interrupt factor	0	×	
55002 (D6DAH)	Interrupt setting No.3	[Md.65] Interrupt factor detection flag	0	×	
55066 (D71AH)		[Cd.50] Interrupt factor mask	0	×	
55130 (D75AH)		[Cd.51] Interrupt factor reset request	0	×	
55194 (D79AH)		[Pr.900] Interrupt factor setting	0	×	
55258 (D7DAH)		[Pr.901] Axis No. for interrupt factor	0	×	
55003 (D6DBH)	Interrupt setting No.4	[Md.65] Interrupt factor detection flag	0	×	
55067 (D71BH)		[Cd.50] Interrupt factor mask	0	×	
55131 (D75BH)		[Cd.51] Interrupt factor reset request	0	×	
55195 (D79BH)		[Pr.900] Interrupt factor setting	0	×	
55259 (D7DBH)		[Pr.901] Axis No. for interrupt factor	0	×	
55004 (D6DCH)	Interrupt setting No.5	[Md.65] Interrupt factor detection flag	0	×	
55068 (D71CH)		[Cd.50] Interrupt factor mask	0	×	
55132 (D75CH)		[Cd.51] Interrupt factor reset request	0	×	
55196 (D79CH)		[Pr.900] Interrupt factor setting	0	×	
55260 (D7DCH)		[Pr.901] Axis No. for interrupt factor	0	×	
55005 (D6DDH)	Interrupt setting No.6	[Md.65] Interrupt factor detection flag	0	×	
55069 (D71DH)		[Cd.50] Interrupt factor mask	0	×	
55133 (D75DH)		[Cd.51] Interrupt factor reset request	0	×	
55197 (D79DH)		[Pr.900] Interrupt factor setting	0	×	
55261 (D7DDH)		[Pr.901] Axis No. for interrupt factor	0	×	
55006 (D6DEH)	Interrupt setting No.7	[Md.65] Interrupt factor detection flag	0	×	
55070 (D71EH)		[Cd.50] Interrupt factor mask	0	×	
55134 (D75EH)		[Cd.51] Interrupt factor reset request	0	×	
55198 (D79EH)		[Pr.900] Interrupt factor setting	0	×	
55262 (D7DEH)		[Pr.901] Axis No. for interrupt factor	0	×	
55007 (D6DFH)	Interrupt setting No.8	[Md.65] Interrupt factor detection flag	0	×	
55071 (D71FH)		[Cd.50] Interrupt factor mask	0	×	
55135 (D75FH)		[Cd.51] Interrupt factor reset request	0	×	
55199 (D79FH)		[Pr.900] Interrupt factor setting	0	×	
55263 (D7DFH)		[Pr.901] Axis No. for interrupt factor	0	×	
55008 (D6E0H)	Interrupt setting No.9	[Md.65] Interrupt factor detection flag	0	×	
55072 (D720H)		[Cd.50] Interrupt factor mask	0	×	
55136 (D760H)		[Cd.51] Interrupt factor reset request	0	×	
55200 (D7A0H)		[Pr.900] Interrupt factor setting	0	×	
55264 (D7E0H)		[Pr.901] Axis No. for interrupt factor	0	×	

Address Decimal (Hexadecimal)	Name		Default value	Auto refresh	Memory area
Common for Axis 1 to 4					
55009 (D6E1H)	Interrupt setting No.10	[Md.65] Interrupt factor detection flag	0	×	Interrupt setting data
55073 (D721H)		[Cd.50] Interrupt factor mask	0	×	
55137 (D761H)		[Cd.51] Interrupt factor reset request	0	×	
55201 (D7A1H)		[Pr.900] Interrupt factor setting	0	×	
55265 (D7E1H)		[Pr.901] Axis No. for interrupt factor	0	×	
55010 (D6E2H)	Interrupt setting No.11	[Md.65] Interrupt factor detection flag	0	×	
55074 (D722H)		[Cd.50] Interrupt factor mask	0	×	
55138 (D762H)		[Cd.51] Interrupt factor reset request	0	×	
55202 (D7A2H)		[Pr.900] Interrupt factor setting	0	×	
55266 (D7E2H)		[Pr.901] Axis No. for interrupt factor	0	×	
55011 (D6E3H)	Interrupt setting No.12	[Md.65] Interrupt factor detection flag	0	×	
55075 (D723H)		[Cd.50] Interrupt factor mask	0	×	
55139 (D763H)		[Cd.51] Interrupt factor reset request	0	×	
55203 (D7A3H)		[Pr.900] Interrupt factor setting	0	×	
55267 (D7E3H)		[Pr.901] Axis No. for interrupt factor	0	×	
55012 (D6E4H)	Interrupt setting No.13	[Md.65] Interrupt factor detection flag	0	×	
55076 (D724H)		[Cd.50] Interrupt factor mask	0	×	
55140 (D764H)		[Cd.51] Interrupt factor reset request	0	×	
55204 (D7A4H)		[Pr.900] Interrupt factor setting	0	×	
55268 (D7E4H)		[Pr.901] Axis No. for interrupt factor	0	×	
55013 (D6E5H)	Interrupt setting No.14	[Md.65] Interrupt factor detection flag	0	×	
55077 (D725H)		[Cd.50] Interrupt factor mask	0	×	
55141 (D765H)		[Cd.51] Interrupt factor reset request	0	×	
55205 (D7A5H)		[Pr.900] Interrupt factor setting	0	×	
55269 (D7E5H)		[Pr.901] Axis No. for interrupt factor	0	×	
55014 (D6E6H)	Interrupt setting No.15	[Md.65] Interrupt factor detection flag	0	×	
55078 (D726H)		[Cd.50] Interrupt factor mask	0	×	
55142 (D766H)		[Cd.51] Interrupt factor reset request	0	×	
55206 (D7A6H)		[Pr.900] Interrupt factor setting	0	×	
55270 (D7E6H)		[Pr.901] Axis No. for interrupt factor	0	×	
55015 (D6E7H)	Interrupt setting No.16	[Md.65] Interrupt factor detection flag	0	×	
55079 (D727H)		[Cd.50] Interrupt factor mask	0	×	
55143 (D767H)		[Cd.51] Interrupt factor reset request	0	×	
55207 (D7A7H)		[Pr.900] Interrupt factor setting	0	×	
55271 (D7E7H)		[Pr.901] Axis No. for interrupt factor	0	×	

Synchronized refresh-dedicated area

Address Decimal (Hexadecimal)				Name	Default value	Auto refresh	Memory area
Axis 1	Axis 2	Axis 3	Axis 4				
54000 (D2F0H)	54001 (D2F1H)	54002 (D2F2H)	54003 (D2F3H)	[Md.61] Analysis complete flag	0	○	Synchronized refresh-dedicated area

12.3 Basic Setting

Basic parameter 1

This section describes the details on the basic parameter 1.

[Pr.1] Unit setting

Set the command unit used for the positioning control. Select a unit from the following depending on the control target: mm, inch, degree, or pulse. Different units can be set for each axis (axis 1 to 4).

Unit setting	Setting value
mm	0
inch	1
degree	2
pulse	3

When the unit setting is changed, the values of other parameters and positioning data will not be changed automatically. After changing the unit, check if the parameter and data values are within the setting range. Set 2: degree to perform the speed-position switching control (ABS mode).

■Application examples of each unit

The units (mm, inch, degree, and pulse) are applicable to the following systems:

- mm or inch: XY table, conveyor (Select inch when the machine uses the inch as the unit.)
- degree: Rotating body (360 degrees/rotation)
- pulse: XY table, conveyor

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.1] Unit setting	0	150	300	450

■Default value

The default value is 3: pulse for all the axes.

[Pr.2] No. of pulses per rotation (16 bits) (Ap)

Set the number of pulses required for a rotation of the motor shaft with 16 bits. When [Pr.62] Electronic gear selection is set to 0: 16 bits, this area is valid.

If a Mitsubishi servo amplifier is used, set the value given as Resolution per rotation of the servomotor in the speed/position detector specifications. (When Resolution per rotation of the servomotor of the Mitsubishi servo amplifier exceeds 65535 pulses, configure the setting referring to the Servo Amplifier Instruction Manual.)

- Number of pulses per rotation (Ap) = Resolution per rotation of the servomotor

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.2] No. of pulses per rotation (16 bits) (Ap)	1	151	301	451

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■Setting range

The setting range is 1 to 65535.

■Default value

The default value is 20000 for all the axes.

■Movement amount per pulse

In the RD75, the parameters [Pr.2] to [Pr.4] define the movement amount per pulse when a pulse train is output. (The following explains how to set the individual parameters [Pr.2], [Pr.3], and [Pr.4] when mm is selected for [Pr.1] Unit setting.)

The movement amount per pulse is given by the following calculation formula:

$$\text{Movement amount per pulse (A)} = \frac{\text{Al} \times \text{Am}}{\text{Ap}}$$

Item	Symbol
[Pr.2] No. of pulses per rotation	Ap
[Pr.3] Movement amount per rotation	Al
[Pr.4] Unit magnification	Am
Movement amount per pulse	A

Due to the mechanical tolerance, the actual movement amount may differ slightly from the specified movement amount. The error can be compensated by adjusting the value set in Movement amount per pulse. (☞ Page 389 Movement amount per pulse)

Restriction

If the movement amount per pulse is less than 1, command frequency variations occur. Smaller values will increase variations and may cause machine vibration. If the movement amount per pulse becomes less than 1, also use the electronic gear function of the drive unit and configure the setting so that the movement amount per pulse is 1 or greater.

[Pr.3] Movement amount per rotation (16 bits) (AI)

Set the distance of machine movement (movement amount) per rotation of the motor shaft with 16 bits. When [Pr.62] Electronic gear selection is set to 0: 16 bits, this area is valid. When the movement amount per rotation of the motor shaft exceeds the setting range of this area in the system used, adjust the setting value with the following method.

- Use [Pr.4] Unit magnification.
- Use [Pr.3] Movement amount per rotation (32 bits).

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.3] Movement amount per rotation (16 bits) (AI)	2	152	302	452

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0.1 to 6553.5 (μm)	1 to 65535 ($\times 10^{-1}$μm)
1: inch	0.00001 to 0.65535 (inch)	1 to 65535 ($\times 10^{-5}$ inches)
2: degree	0.00001 to 0.65535 (degree)	1 to 65535 ($\times 10^{-5}$ degrees)
3: pulse	1 to 65535 (pulse)	1 to 65535 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 20000 for all the axes.

[Pr.4] Unit magnification

When the movement amount per rotation of the motor shaft exceeds the setting range of [Pr.3] Movement amount per rotation (16 bits), adjust the setting range (10 to 1000 times) with this area. When [Pr.62] Electronic gear selection is set to 0: 16 bits, this area is valid. When [Pr.62] Electronic gear selection is set to 1: 32 bits, the unit magnification is fixed to 1: 1 time.

Unit magnification	Setting value
1 time	1
10 times	10
100 times	100
1000 times	1000

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.4] Unit magnification	3	153	303	453

■Default value

The default value is 1: 1 time for all the axes.

[Pr.5] Pulse output mode

Set the pulse output mode to match the servo amplifier used.

Pulse output mode	Setting value
PULSE/SIGN mode	0
CW/CCW mode	1
A phase/B phase mode (multiple of 4)	2
A phase/B phase mode (multiple of 1)	3

Restriction

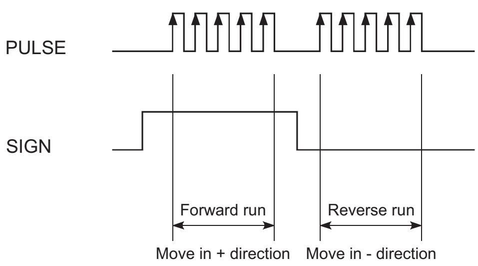
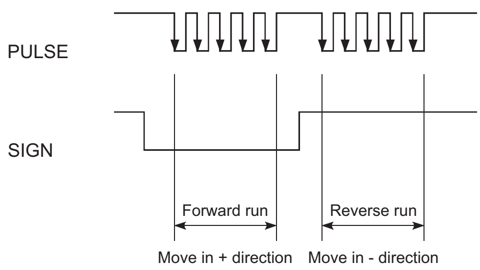
The only valid value of [Pr.5] Pulse output mode is the value at the moment when PLC READY signal [Y0] is turned off and on for the first time after the power is switched on or the CPU module is reset. Once PLC READY signal [Y0] is turned on, the value will not be reset even if another value is set to the parameter and PLC READY signal [Y0] is turned off and on.

Use [Pr.23] Output signal logic selection to choose between the positive logic (pulse rising edge detection) and negative logic (pulse falling edge detection). For the output specifications of each pulse output mode, refer to the following.

MELSEC iQ-R Positioning Module User's Manual (Startup)

The following shows examples of the pulse output modes for positive and negative logic.

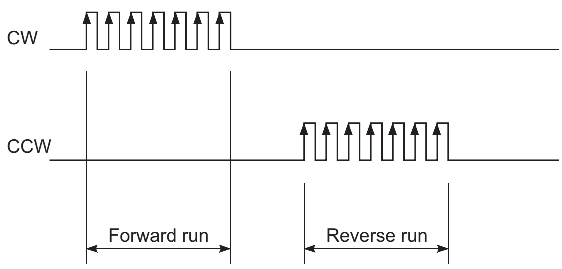
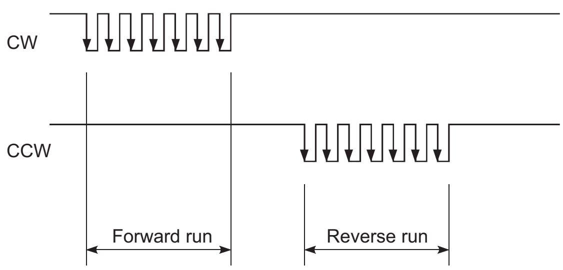
■PULSE/SIGN mode

Positive logic	Negative logic
Forward run and reverse run are controlled with the on/off of the direction sign (SIGN). The motor will forward run when the direction sign is HIGH. The motor will reverse run when the direction sign is LOW.	Forward run and reverse run are controlled with the on/off of the direction sign (SIGN). The motor will forward run when the direction sign is LOW. The motor will reverse run when the direction sign is HIGH.
	

■CW/CCW mode

During forward run, the forward run feed pulse (PULSE F) is output.

During reverse run, the reverse run feed pulse (PULSE R) is output.

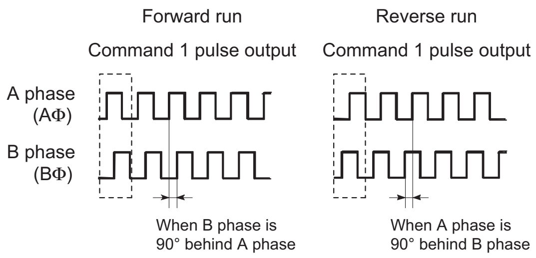
Positive logic	Negative logic
	

■A phase/B phase mode

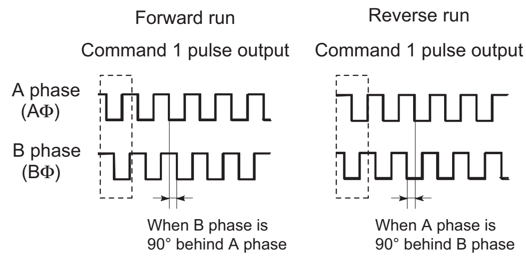
Forward run and reverse run are controlled with the phase difference of the A phase (Aϕ) and B phase (Bϕ). When the B phase is 90° behind the A phase, the motor will forward run. When the B phase is 90° ahead of the A phase, the motor will reverse run.

- For multiple of 1 setting

Positive logic



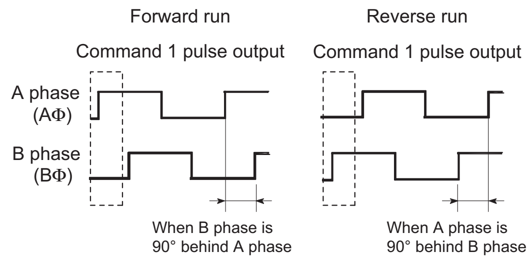
Negative logic



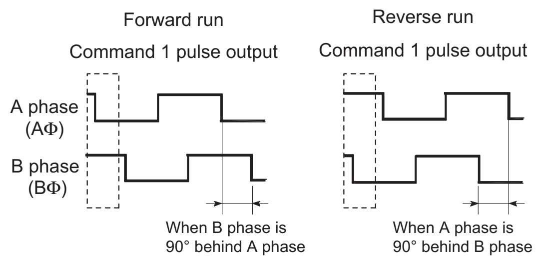
Example) When the command 1 pulse output is set to 1pulse/s, the pulse rises and falls four times per second.

- For multiple of 4 setting

Positive logic



Negative logic



Example) When the command 1 pulse output is set to 1pulse/s, the pulse rises and falls one time per second.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.5] Pulse output mode	4	154	304	454

■Default value

The default value is 1: CW/CCW mode for all the axes.

[Pr.6] Rotation direction setting

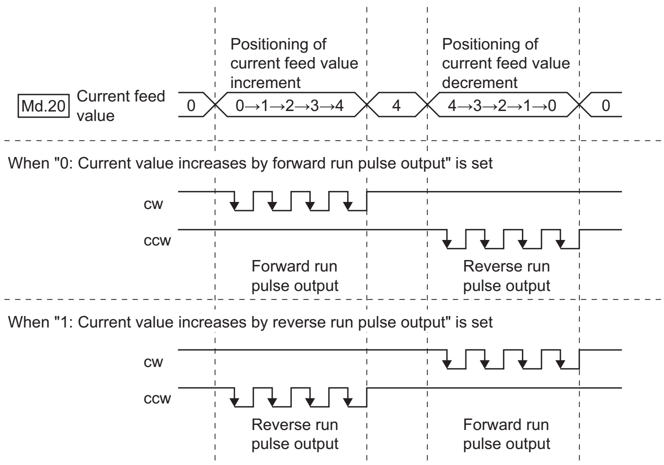
Set the relation of the positioning direction (increment direction or decrement direction of [Md.20] Current feed value) and the pulse output. For the relation of "Forward run pulse output, Reverse run pulse output" and "CW/A phase/PULSE signal, CCW/B phase/SIGN signal", refer to the following.

☞ Page 391 [Pr.5] Pulse output mode

Rotation direction setting	Setting value
Current value increment with forward run pulse output	0
Current value increment with reverse run pulse output	1

Ex.

The following figure shows the pulse outputs of when [Pr.5] Pulse output mode is set to the CW/CCW mode and the positioning of current feed value increment and of current feed value decrement is executed.



Point

When this area is changed from 0 to 1, check if the upper limit switch and lower limit switch operate properly with JOG operation. If any malfunction is identified, check and correct the wiring.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.6] Rotation direction setting	5	155	305	455

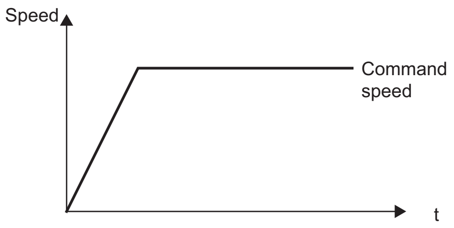
■Default value

The default value is 0: Current value increment with forward run pulse output for all the axes.

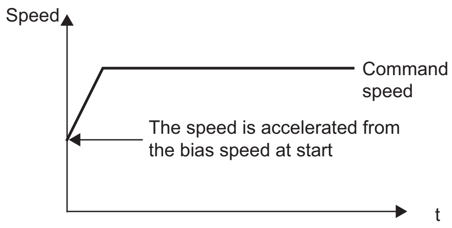
[Pr.7] Bias speed at start

Set Minimum speed at start for Bias speed at start. Set Bias speed at start to allow the motor to start smoothly especially when a stepping motor is used. (A stepping motor does not start smoothly if a low rotation speed is instructed at the start.)

When the bias speed at start is 0



When the bias speed at start is other than 0



The specified Bias speed at start will be valid during the following operations:

- Positioning operation
- OPR
- JOG operation

Set a value equal to or less than the value set in [Pr.8] Speed limit value.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.7] Bias speed at start	6	156	306	456
	7	157	307	457

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0 to 20000000.00 (mm/min)	0 to 2000000000 ($\times 10^{-2}$mm/min)
1: inch	0 to 2000000.000 (inch/min)	0 to 2000000000 ($\times 10^{-3}$ inches/min)
2: degree	0 to 3000000.000 (degree/min)	0 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	0 to 5000000 (pulse/s)	0 to 5000000 (pulse/s)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

■Precautions for using a stepping motor

- For the system that uses a stepping motor, executing the S-curve acceleration/deceleration may cause step out. Before using the S-curve acceleration/deceleration, check that step out does not occur.
- In the system that uses a stepping motor, the circular interpolation control and 3-axis helical interpolation control cannot be performed. Although setting the bias speed at start is required by the characteristics of the stepping motor, the setting of the bias speed at start is disabled for circular interpolation control or 3-axis helical interpolation control. Use a servomotor for both two axes when the circular interpolation control or 3-axis helical interpolation control is performed.

[Pr.62] Electronic gear selection

Select an electronic gear (16 bits or 32 bits) to use.

Electronic gear selection	Setting value
16 bits	0
32 bits	1

The addresses used by the buffer memory areas shown below depend on the setting of this area.

Setting value of [Pr.62] Electronic gear selection	Address of [Pr.2] No. of pulses per rotation	Address of [Pr.3] Movement amount per rotation
0: 16bits	• Axis 1: 1 • Axis 2: 151 • Axis 3: 301 • Axis 4: 451	• Axis 1: 2 • Axis 2: 152 • Axis 3: 302 • Axis 4: 452
1: 32bits	• Axis 1: 102, 103 • Axis 2: 252, 253 • Axis 3: 402, 403 • Axis 4: 552, 553	• Axis 1: 104, 105 • Axis 2: 254, 255 • Axis 3: 404, 405 • Axis 4: 554, 555

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.62] Electronic gear selection	100	250	400	550

■Default value

The default value is 0: 16 bits for all the axes.

[Pr.2] No. of pulses per rotation (32 bits) (Ap)

Set the number of pulses required for a rotation of the motor shaft with 32 bits. When [Pr.62] Electronic gear selection is set to 1: 32 bits, this area is valid. When the resolution per rotation of the servomotor of the servo amplifier used exceeds 65535 pulses, set the number of pulses per rotation with this area.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.2] No. of pulses per rotation (32 bits) (Ap)	102	252	402	552
	103	253	403	553

■Setting range

The setting range is 1 to 200000000.

■Default value

The default value is 20000 for all the axes.

[Pr.3] Movement amount per rotation (32 bits) (AI)

Set the distance of machine movement (movement amount) per rotation of the motor shaft with 32 bits. When [Pr.62] Electronic gear selection is set to 1: 32 bits, this area is valid. When the movement amount per rotation of the motor shaft exceeds the setting range of [Pr.3] Movement amount per rotation (16 bits) in the system used, use this area.

When the movement amount per rotation is set with this area, the adjustment with [Pr.4] Unit magnification is unavailable.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.3] Movement amount per rotation (32 bits) (AI)	104	254	404	554
	105	255	405	555

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0.1 to 20000000.0 (μm)	1 to 200000000 ($\times10^{-1}$μm)
1: inch	0.00001 to 2000.00000 (inch)	1 to 200000000 ($\times10^{-5}$ inches)
2: degree	0.00001 to 2000.00000 (degree)	1 to 200000000 ($\times10^{-5}$ degrees)
3: pulse	1 to 200000000 (pulse)	1 to 200000000 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 20000 for all the axes.

Basic parameter 2

This section describes the details on the basic parameter 2.

[Pr.8] Speed limit value

Set the maximum speed during positioning control and OPR control. If the specified speed exceeds the speed limit value, positioning is limited at the speed limit value.

Positioning control speed must be limited properly depending on the device and control subject.

When the command pulse frequency (pulse/s) converted from the speed limit value exceeds the maximum output pulse of the RD75, Outside speed limit value range (Error code: 1A6AH) occurs. The maximum output pulse of the RD75 is 200kpulse/s for the RD75P☐ and 5Mpulse/s for the RD75D☐.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.8] Speed limit value	10	160	310	460
	11	161	311	461

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0.01 to 20000000.00 (mm/min)	1 to 2000000000 ($\times10^{-2}$mm/min)
1: inch	0.001 to 2000000.000 (inch/min)	1 to 2000000000 ($\times10^{-3}$ inches/min)
2: degree	0.001 to 3000000.000 (degree/min)	1 to 3000000000 ($\times10^{-3}$ degrees/min)
3: pulse	1 to 5000000 (pulse/s)	1 to 5000000 (pulse/s)

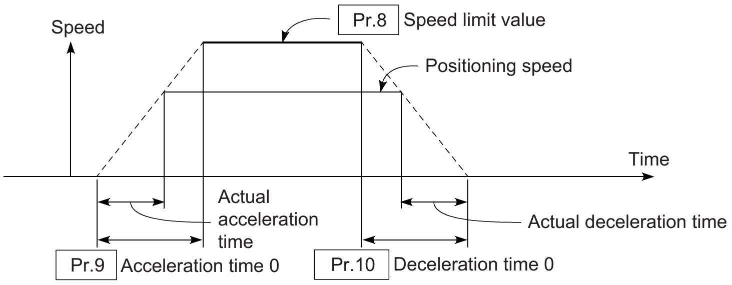
*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 200000 for all the axes.

[Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0

For [Pr.9] Acceleration time 0, set the time for the speed to increase from 0 to [Pr.8] Speed limit value (to [Pr.31] JOG speed limit value during a JOG operation control) in units of ms. For [Pr.10] Deceleration time 0, set the time for the speed to decrease from [Pr.8] Speed limit value (from [Pr.31] JOG speed limit value during a JOG operation control) to 0 in units of ms.



- When the set positioning speed is lower than the value set in [Pr.8] Speed limit value, the actual acceleration/deceleration time is shorter than the set value of the parameters. Thus, set the maximum positioning speed to a value equal to the value set in [Pr.8] Speed limit value or only a little lower value than the speed limit value.
- The settings in these areas are valid for OPR, positioning, and JOG operations.
- In the interpolation positioning, the acceleration/deceleration time set for the reference axis is valid.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.9] Acceleration time 0	12	162	312	462
	13	163	313	463
[Pr.10] Deceleration time 0	14	164	314	464
	15	165	315	465

■Setting range

The setting range is 1 to 8388608.

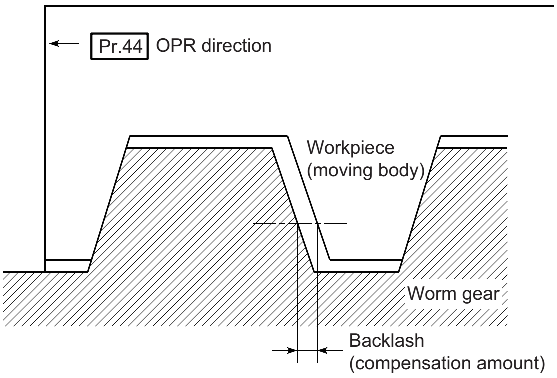
■Default value

The default value is 1000 for all the axes.

Detailed parameter 1

[Pr.11] Backlash compensation amount

The error that occurs due to backlash when the machine is moved via gears can be compensated.
(When the backlash compensation amount is set, pulses equivalent to the compensation amount is output each time the direction changes during the positioning.)



- The backlash compensation is valid after machine OPR. Thus, if the backlash compensation amount is set or changed, always perform machine OPR once.
- The setting range of the backlash compensation amount is 0 to 65535. Set the amount with the following condition satisfied.

$$0 \leq \frac{\text{Backlash compensation amount}}{\text{Movement amount per pulse}} \leq 255$$

(Omit values after the decimal point.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.11] Backlash compensation amount	17	167	317	467

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0 to 6553.5 (μm)	0 to 65535 ($\times10^{-1}$μm)
1: inch	0 to 0.65535 (inch)	0 to 65535 ($\times10^{-5}$ inches)
2: degree	0 to 0.65535 (degree)	0 to 65535 ($\times10^{-5}$ degrees)
3: pulse	0 to 65535 (pulse)	0 to 65535 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

[Pr.12] Software stroke limit upper limit value

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

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.12] Software stroke limit upper limit value	18	168	318	468
	19	169	319	469

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	-214748364.8 to 214748364.7 (μm)	-2147483648 to 2147483647 ($\times10^{-1}$μm)
1: inch	-21474.83648 to 21474.83647 (inch)	-2147483648 to 2147483647 ($\times10^{-5}$ inches)
2: degree	0 to 359.99999 (degree)	0 to 35999999 ($\times10^{-5}$ degrees)
3: pulse	-2147483648 to 2147483647 (pulse)	-2147483648 to 2147483647 (pulse)

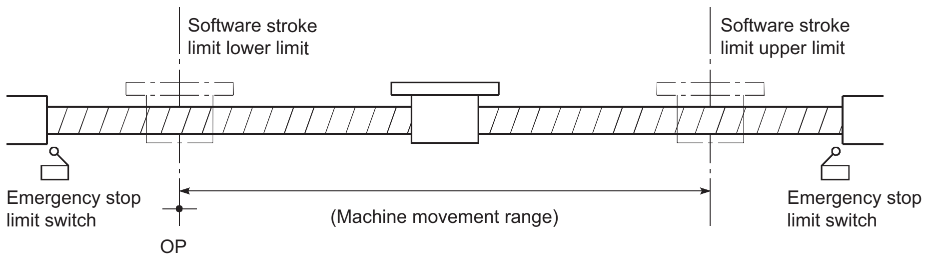
*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 2147483647 for all the axes.

[Pr.13] Software stroke limit lower limit value

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



- In general, the OP is set at the lower limit or upper limit of the stroke limit.
- Setting the upper and lower limits of the software stroke limit prevents the workpiece to overrun the set range; although, in addition, place emergency stop limit switches outside and near the range.
- To invalidate the software stroke limit, set the setting value to Upper limit value = Lower limit value. (Set the value within the setting range, such as the initial value.)
- When the unit is degree, the software stroke limit check is invalid during speed control (including the speed control of speed-position switching control and position-speed switching control) or during manual control.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.13] Software stroke limit lower limit value	20	170	320	470
	21	171	321	471

■Setting range

The setting range is the same as that of [Pr.12] Software stroke limit upper limit value.

■Default value

The default value is -2147483648 for all the axes.

[Pr.14] Software stroke limit selection

Set whether to apply the software stroke limit to Current feed value or Machine feed value. The software stroke limit is validated according to the set value.

Software stroke limit selection	Setting value
Apply the software stroke limit to the current feed value	0
Apply the software stroke limit to the machine feed value	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.14] Software stroke limit selection	22	172	322	472

■Default value

The default value is 0: Apply the software stroke limit to the current feed value for all the axes.

[Pr.15] Software stroke limit valid/invalid setting

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

Software stroke limit valid/invalid setting	Setting value
Software stroke limit is valid during the JOG operation, inching operation, and manual pulse generator operation	0
Software stroke limit is invalid during the JOG operation, inching operation, and manual pulse generator operation	1

■Buffer memory address

The following table shows the buffer memory address of this area.

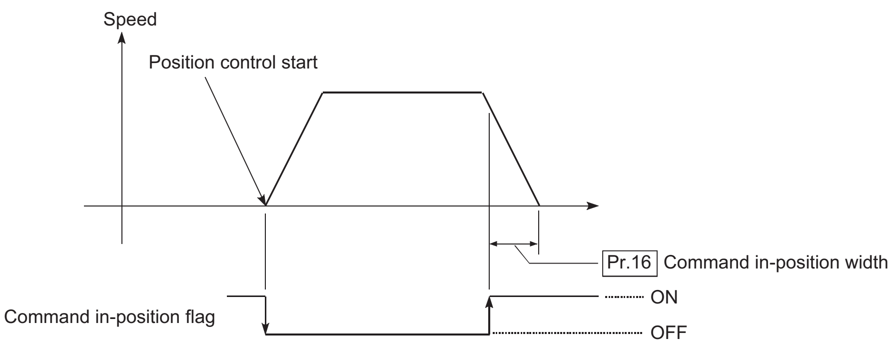
Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.15] Software stroke limit valid/invalid setting	23	173	323	473

■Default value

The default value is 0: Software stroke limit is valid during the JOG operation, inching operation, and manual pulse generator operation for all the axes.

[Pr.16] Command in-position width

Set the remaining distance that turns on the command in-position. The command in-position signal is used as a front-loading signal of the positioning complete signal. When positioning control starts, Command in-position flag (bit 2) in [Md.31] Status turns off, and Command in-position flag turns on at the set position of the command in-position signal.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.16] Command in-position width	24	174	324	474
	25	175	325	475

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0.1 to 214748364.7 (μm)	1 to 2147483647 ($\times 10^{-1}$μm)
1: inch	0.00001 to 21474.83647 (inch)	1 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0.00001 to 21474.83647 (degree)	1 to 2147483647 ($\times 10^{-5}$ degrees)
3: pulse	1 to 2147483647 (pulse)	1 to 2147483647 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 100 for all the axes.

[Pr.17] Torque limit setting value

Set the maximum value of the torque generated by the servomotor in units of %.

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, the control is performed with the set torque limit value.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.17] Torque limit setting value	26	176	326	476

■Setting range

The setting range is 1 to 5000.

■Default value

The default value is 300 for all the axes.

Restriction

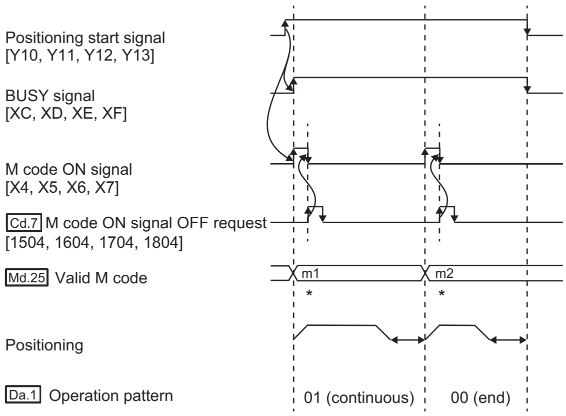
Limits for the pulse train output type

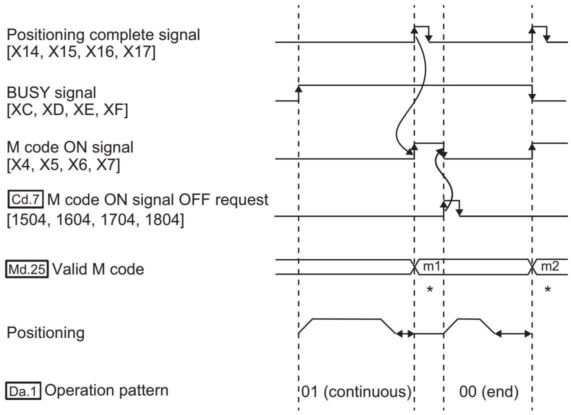
- A drive unit that can issue a torque limit command with analog voltage is required.
- The D/A converter module and the wiring between the D/A converter module and drive unit are required.
- The set value in [Pr.17] Torque limit setting value is set for [Md.35] Torque limit stored value in the buffer memory. Transfer the value set in [Md.35] Torque limit stored value to the D/A converter module with programs.

[Pr.18] M code ON signal output timing

Set the timing of outputting the M code ON signal.

Select either the WITH mode or the AFTER mode as timing of outputting the M code ON signal.

<table>
<tr><th>WITH mode (setting value: 0)</th><th>AFTER mode (setting value: 1)</th></tr>
<tr><td>An M code is output and the M code ON signal [X4, X5, X6, X7] is turned on when a positioning operation starts.


*: m1 and m2 indicate set M codes.</td>
<td>An M code is output and the M code ON signal [X4, X5, X6, X7] is turned on when a positioning operation completes.


*: m1 and m2 indicate set M codes.</td></tr>
</table>

- An M code is a number between 0 and 65535 that can be assigned to each positioning data (shape).
- Programs can be coded to read the M code from [Md.25] Valid M code whenever the M code ON signal [X4, X5, X6, X7] turns on so that a command for sub works such as clamping, drilling, and tool change corresponding to the M code can be issued.
- When the AFTER mode is set in the speed control, the M code is not output and the M code ON signal [X4, X5, X6, X7] is not turned on.
- The M code ON signal output timing can be set for each positioning data with the positioning option ([Da.27] M code ON signal output timing) of the positioning data.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.18] M code ON signal output timing	27	177	327	477

■Default value

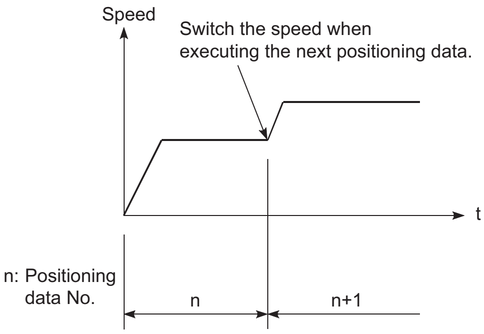
The default value is 0: WITH mode for all the axes.

12

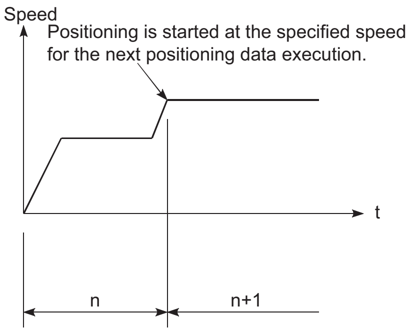
[Pr.19] Speed switching mode

Select the speed switching mode between the standard switching and front-loading switching.

Speed switching mode	Setting value	Description
Standard speed switching mode	0	Switches the speed when executing the next positioning data.
Front-loading speed switching mode	1	Switches the speed at the end of the positioning data being executed.



For standard switching



For front-loading switching

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.19] Speed switching mode	28	178	328	478

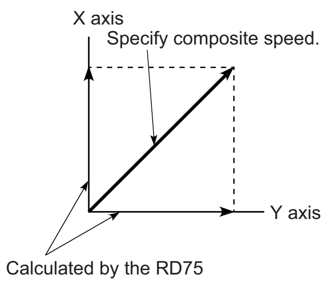
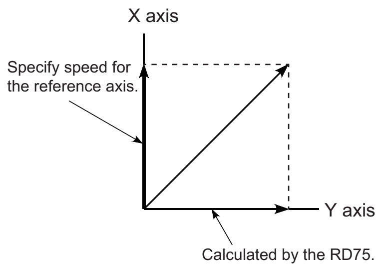
■Default value

The default value is 0: Standard speed switching mode for all the axes.

[Pr.20] Interpolation speed specification method

When performing linear interpolation/circular interpolation, set whether to specify the composite speed or the speed for the reference axis.

Interpolation speed specification method	Setting value	Description
Composite speed	0	The movement speed for the control target is specified, and the speed for each axis is calculated by the RD75.
Reference axis speed	1	The axis speed set for the reference axis is specified, and the speed for the interpolation axis performing interpolation is calculated by the RD75.

When the composite speed is specified	When the speed for the reference axis is specified
	

- When the 4-axis linear interpolation or 2 to 4-axis speed control is performed, specify Reference axis speed. If Composite speed is specified, Interpolation mode error (Error code: 199AH) occurs when the positioning operation starts.
- When the circular interpolation control or 3-axis helical interpolation control is performed, specify 0: Composite speed. If Reference axis speed is specified, Interpolation mode error (Error code: 199BH) occurs when the positioning operation starts.
- The interpolation speed specification method for each positioning data can be set with the positioning option ([Da.29] Interpolation speed specification method) of the positioning data.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.20] Interpolation speed specification method	29	179	329	479

■Default value

The default value is 0: Composite speed for all the axes.

[Pr.21] Current feed value during speed control

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

Current feed value during speed control	Setting value	Description
Current feed value is not updated	0	The current feed value does not change. (The current feed value during speed control start is maintained.)
Current feed value is updated	1	The current feed value is updated. (The current feed value changes from the initial value.)
Current feed value is cleared to zero	2	The current feed is set to 0 and does not change from 0 while the speed control is performed.

- When the speed control is performed over two to four axes, the selection between enabling and disabling the update of [Md.20] Current feed value depends on how the reference axis is set.
- Set 1: Current feed value is updated to perform the speed-position switching control (ABS mode).

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.21] Current feed value during speed control	30	180	330	480

■Default value

The default value is 0: Current feed value is not updated for all the axes.

[Pr.22] Input signal logic selection

Set the logic of each input signal according to the external device.

Input signal logic selection	Setting value
Negative logic	0
Positive logic	1

The following table shows the assignment of each input signal. Set a value for the target bit.

Buffer memory

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0		0							

Assignment of input signals

b0	Lower limit signal
b1	Upper limit signal
b2	Drive unit READY signal
b3	Stop signal
b4	External command signal
b5	Zero signal
b6	Near-point dog signal
b7	Use prohibited (fixed to 0)
b8	Manual pulse generator input
b9 to b15	Use prohibited (fixed to 0)

- A mismatch in the signal logic will disable normal operation. Be careful of this when the setting is changed from the initial value.
- Set the logic selection (b8) of the manual pulse generator input for the axis 1. (Setting for any of the axis 2 to 4 is invalid.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.22] Input signal logic selection	31	181	331	481

■Default value

Each input signal of all the axes is set to 0: Negative logic.

[Pr.23] Output signal logic selection

Set the logic of each output signal according to the external device.

Output signal logic selection	Setting value
Negative logic	0
Positive logic	1

The following table shows the assignment of each output signal. Set a value for the target bit.

Buffer memory

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0		0	0	0	

Assignment of output signals

b0	Command pulse signal
b1 to b3	Use prohibited
b4	Deviation counter clear signal
b5 to b15	Use prohibited

A mismatch in the signal logic will disable normal operation. Be careful of this when the setting is changed from the initial value.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.23] Output signal logic selection	32	182	332	482

■Default value

The default value is 0: Negative logic for each output signal of all the axes.

[Pr.24] Manual pulse generator input selection

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

Manual pulse generator input selection	Setting value
A-phase/B-phase multiple of 4	0
A-phase/B-phase multiple of 2	1
A-phase/B-phase multiple of 1	2
PULSE/SIGN	3

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.24] Manual pulse generator input selection	33	—	—	—

■Default value

The default value is 0: A-phase/B-phase multiple of 4.

[Pr.150] Speed-position function selection

Select the mode of speed-position switching control.

Speed-position function selection	Setting value
Speed-position switching control (INC mode)	0
Speed-position switching control (ABS mode)	2

If a value other than 0 and 2 is set, the control is performed in the INC mode with the setting value regarded as 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.150] Speed-position function selection	34	184	334	484

■Default value

The default value is 0: Speed-position switching control (INC mode) for all the axes.

Detailed parameter 2

[Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3

Set the time for the speed to increase from 0 to [Pr.8] Speed limit value (to [Pr.31] JOG speed limit value during a JOG operation control) during positioning. The specifications of this area are the same as those of [Pr.9] Acceleration time 0. For details, refer to the following.

☞ Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.25] Acceleration time 1	36	186	336	486
	37	187	337	487
[Pr.26] Acceleration time 2	38	188	338	488
	39	189	339	489
[Pr.27] Acceleration time 3	40	190	340	490
	41	191	341	491

■Setting range

The setting range is 1 to 8388608.

■Default value

The default value is 1000 for all the axes.

[Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3

Set the time for the speed to decrease from [Pr.8] Speed limit value (from [Pr.31] JOG speed limit value during a JOG operation control) to zero during positioning. The specifications of this area are the same as those of [Pr.10] Deceleration time 0. For details, refer to the following.

☞ Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.28] Deceleration time 1	42	192	342	492
	43	193	343	493
[Pr.29] Deceleration time 2	44	194	344	494
	45	195	345	495
[Pr.30] Deceleration time 3	46	196	346	496
	47	197	347	497

■Setting range

The setting range is 1 to 8388608.

■Default value

The default value is 1000 for all the axes.

[Pr.31] JOG speed limit value

Set the maximum speed for the JOG operation.

Set the value in JOG speed limit value to a value equal to or less than the value set in [Pr.8] Speed limit value. If the value exceeds the value set in Speed limit value, JOG speed limit value error (Error code: 1AB8H) occurs.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.31] JOG speed limit value	48	198	348	498
	49	199	349	499

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
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 ($\times 10^{-3}$ inches/min)
2: degree	0.001 to 3000000.000 (degree/min)	1 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulses	1 to 5000000 (pulse/s)	1 to 5000000 (pulse/s)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 20000 for all the axes.

[Pr.32] JOG operation acceleration time selection

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

JOG operation acceleration time selection	Setting value	Description
Acceleration time 0	0	Uses the value set in [Pr.9] Acceleration time 0.
Acceleration time 1	1	Uses the value set in [Pr.25] Acceleration time 1.
Acceleration time 2	2	Use the value set in [Pr.26] Acceleration time 2.
Acceleration time 3	3	Use the value set in [Pr.27] Acceleration time 3.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.32] JOG operation acceleration time selection	50	200	350	500

■Default value

The default value is 0: Acceleration time 0 for all the axes.

[Pr.33] JOG operation deceleration time selection

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

JOG operation deceleration time selection	Setting value	Description
Deceleration time 0	0	Use the value set in [Pr.10]Deceleration time 0.
Deceleration time 1	1	Use the value set in [Pr.28] Deceleration time 1.
Deceleration time 2	2	Use the value set in [Pr.29] Deceleration time 2.
Deceleration time 3	3	Use the value set in [Pr.30] Deceleration time 3.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.33] JOG operation deceleration time selection	51	201	351	501

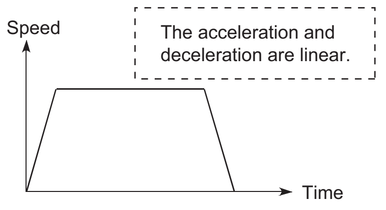
■Default value

The default value is 0: Deceleration time 0 for all the axes.

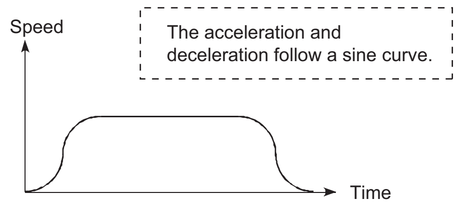
[Pr.34] Acceleration/deceleration processing selection

Set whether to use the trapezoidal acceleration/deceleration processing or S-curve acceleration/deceleration processing for the acceleration/deceleration processing.

Acceleration/deceleration processing selection	Setting value
Trapezoidal acceleration/deceleration processing	0
S-curve acceleration/deceleration processing	1



Trapezoidal acceleration/deceleration



S-curve acceleration/deceleration

For the system that uses a stepping motor, executing the S-curve acceleration/deceleration may cause step out.
Before using the S-curve acceleration/deceleration, check that step out does not occur.

■Buffer memory address

The following table shows the buffer memory address of this area.

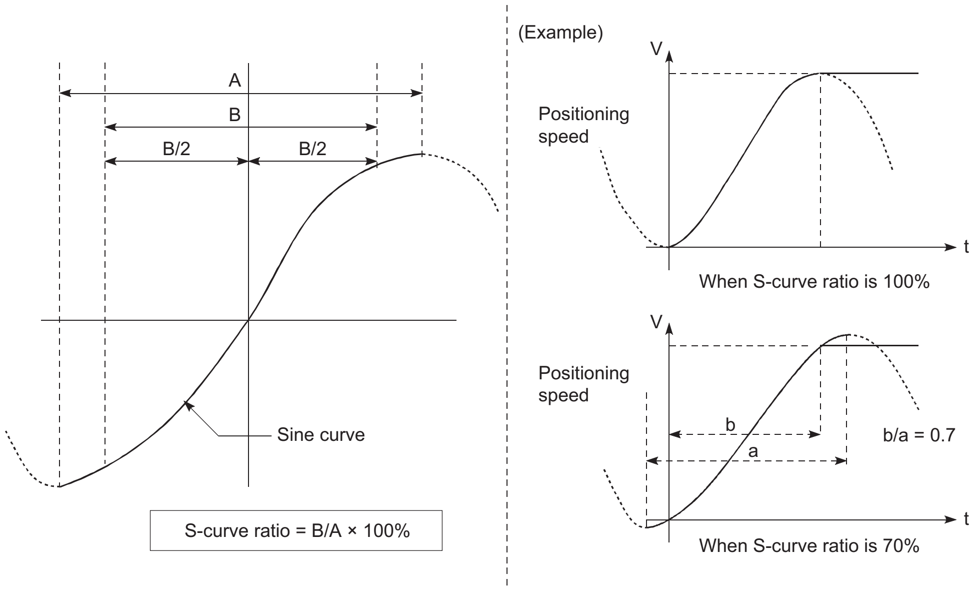
Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.34] Acceleration/deceleration processing selection	52	202	352	502

■Default value

The default value is 0: Trapezoidal acceleration/deceleration processing for all the axes.

[Pr.35] S-curve ratio

Set the S-curve ratio (1 to 100%) for performing the S-curve acceleration/deceleration processing.
The S-curve ratio indicates where to draw the acceleration/deceleration curve using the sine curve as shown below.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.35] S-curve ratio	53	203	353	503

■Setting range

The setting range is 1 to 100.

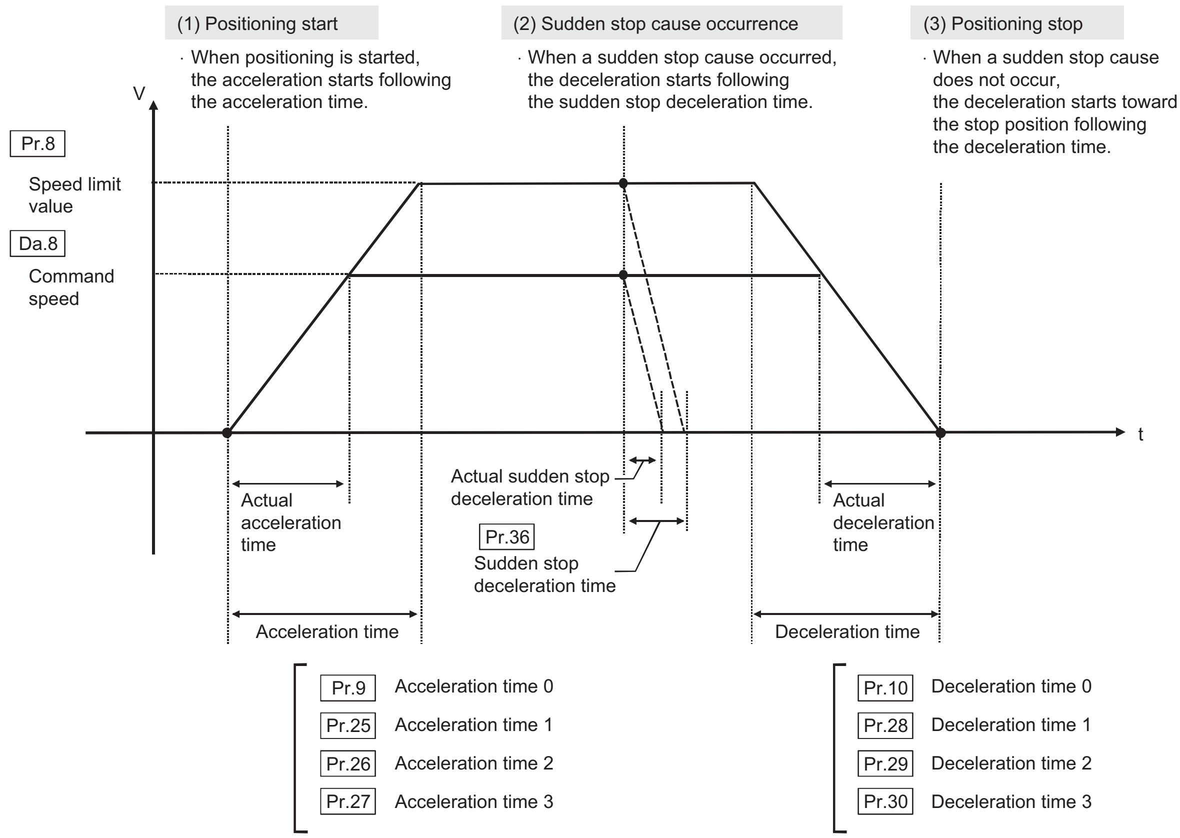
■Default value

The default value is 100 for all the axes.

[Pr.36] Sudden stop deceleration time

Set the time for the speed to decrease from [Pr.8] Speed limit value (from [Pr.31] JOG speed limit value during a JOG operation control) to 0 at a sudden stop in units of ms. Set this parameter to stop (sudden stop) operations in a shorter time than the deceleration time for positioning when a stop cause occurs. Stop causes are classified into stop cause 1 to 3. The stop cause for a sudden stop can be selected with the setting of [Pr.37] Stop group 1 sudden stop selection setting to [Pr.39] Stop group 3 sudden stop selection.

The following figure shows the relation with other parameters.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.36] Sudden stop deceleration time	54	204	354	504
	55	205	355	505

■Setting range

The setting range is 1 to 8388608.

■Default value

The default value is 1000 for all the axes.

[Pr.37] to [Pr.39] Stop group 1 to 3 sudden stop selection

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

- Stop group 1: Stop with the hardware stroke limit
- Stop group 2: CPU module error occurrence, PLC READY signal [Y0] off, fault in the test mode
- Stop group 3: External stop signal, Stop signal from the CPU module, Stop signal from an engineering tool, Error occurrence (excluding errors in stop groups 1 and 2: including only the software stroke limit errors during JOG operation, speed control, speed-position switching control, and position-speed switching control), Error at operation mode switching in amplifier-less operation

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

Stop group 1 sudden stop selection	Setting value
Normal deceleration stop	0
Sudden stop	1

If 1: Sudden stop is selected, the axis suddenly decelerates to a stop according to the setting of [Pr.36] Sudden stop deceleration time when a stop cause occurs.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.37] Stop group 1 sudden stop selection	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

■Default value

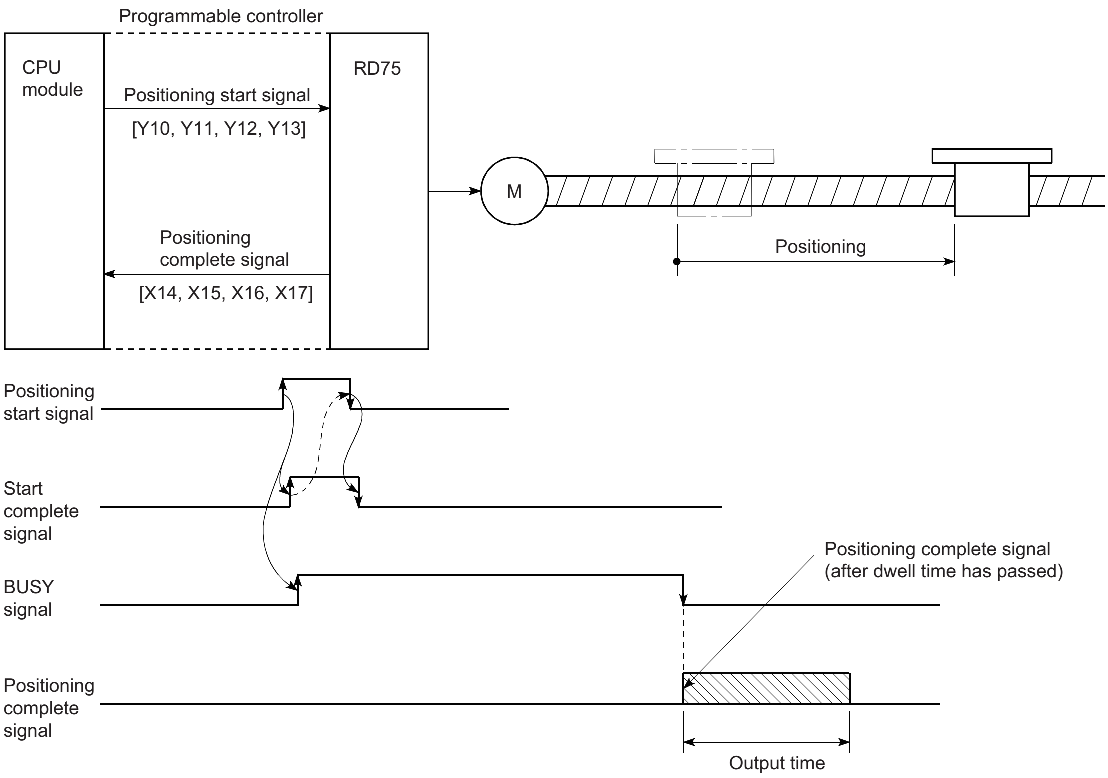
The default value is 0: Normal deceleration stop for all the axes.

[Pr.40] Positioning complete signal output time

Set the output time of Positioning complete signal [X14, X15, X16, X17] output from the RD75 in units of ms.

A positioning completes when the set dwell time is elapsed after the RD75 terminates outputting pulses.

For the interpolation control, Positioning completed signal of interpolation axis is output only for the time set to the reference axis.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.40] Positioning complete signal output time	59	209	359	509

■Setting range

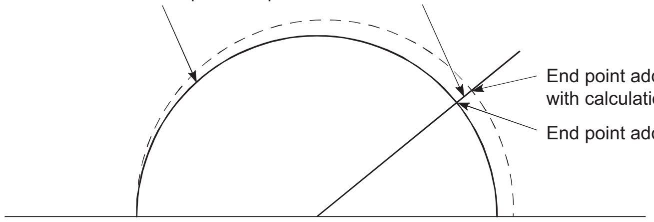
The setting range is 0 to 65535.

■Default value

The default value is 300 for all the axes.

[Pr.41] Allowable circular interpolation error width

For Allowable circular interpolation error width, set the allowable error range of the calculated arc path and end point address. If the error of the calculated arc path and end point address is within the setting range, circular interpolation is performed to the set end point address while the error is compensated with spiral interpolation.
The allowable circular interpolation error width is set in the buffer memory addresses of the reference axis.



In the circular interpolation control using the center point specification, the arc path calculated with the start point address and center point address and the end point address may deviate.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.41] Allowable circular interpolation error width	60	210	360	510
	61	211	361	511

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0 to 10000.0 (μm)	0 to 100000 ($\times 10^{-1}$ μm)
1: inch	0 to 1.00000 (inch)	0 to 100000 ($\times 10^{-5}$ inches)
2: degree	0 to 1.00000 (degree)	0 to 100000 ($\times 10^{-5}$ degrees)
3: pulse	0 to 100000 (pulse)	0 to 100000 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 100 for all the axes.

[Pr.42] External command function selection

Select a function with which external command signals are associated.

External command function selection	Setting value	Description
Start with external command	0	Starts a positioning operation by inputting an external command signal.
External speed change request	1	Changes the speed in the current positioning operation by inputting an external command signal. Set a new speed value in [Cd.14] New speed value.
Speed-position/position-speed switching request	2	Switches the control from the speed control to the position control in the speed-position switching control, or from the position control to the speed control in the position-speed switching control by inputting an external command signal. To enable speed-position switching, set [Cd.24] Speed-position switching enable flag to 1. To enable position-speed switching, set [Cd.26] Position-speed switching enable flag to 1.
Skip request	3	Skips the current positioning operation by inputting an external command signal.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.42] External command function selection	62	212	362	512

■Default value

The default value is 0: Start with external command for all the axes.

Point

To enable the external command signal, [Cd.8] External command valid must be set to 1.

[Pr.82] Start adjustment time

Set the amount of time from when a positioning start trigger signal is input to when the RD75 starts outputting pulses in units of ms with Quick start function. The actual time elapsed before a pulse output starts depends on the start trigger.

- Start with an external command signal: 20µs + [Pr.82] Start adjustment time
- Start with a positioning start signal: 8µs + [Pr.82] Start adjustment time

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.82] Start adjustment time	134	284	434	584
	135	285	435	585

■Setting range

The following table shows the setting range.

Setting value with engineering tools	Setting value with programs
0.00 to 10000.00 (ms)	0 to 1000000 ($\times 10^{-2}$ms)

■Default value

The default value is 0 for all the axes.

OPR basic parameter

[Pr.43] OPR method

Set OPR method for performing the machine OPR.

OPR method	Setting value	Description	Reference
Near-point dog method	0	After the speed of the OPR is decelerated when the near-point dog is on, the OPR stops when the zero signal is detected and the machine OPR completes.	Page 46 Near-point dog method
Stopper method 1	1	After the speed of the OPR is decelerated when the near-point dog is on, the OPR stops with the stopper and the OPR completes when the dwell time is elapsed.	Page 48 Stopper method 1
Stopper method 2	2	After the speed of the OPR is decelerated when the near-point dog is on, the OPR stops with the stopper and the machine OPR completes when the zero signal is detected.	Page 51 Stopper method 2
Stopper method 3	3	After the OPR starts at the creep speed, the OPR stops with the stopper and the machine OPR completes when the zero signal is detected.	Page 54 Stopper method 3
Count method 1	4	After the speed of the OPR is decelerated when the near-point dog is on, the OPR stops when the zero signal is detected after the workpiece is moved for the specified distance, and the machine OPR completes.	Page 56 Count method 1
Count method 2	5	After the speed of the OPR is decelerated when the near-point dog is on, the workpiece is moved for the specified distance and the machine OPR completes.	Page 58 Count method 2
Data setting method	6	The position where the machine OPR starts is set as the OP, and the machine OPR completes.	Page 60 Data setting method
Limit switch combined method	7	After the speed of the OPR is decelerated at turning off of the limit switch, the machine moves in the direction opposite to the OPR direction, stops when the zero signal is detected after turning on of the limit switch. With this, the machine OPR completes.	Page 61 Limit switch combined method

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.43] OPR method	70	220	370	520

■Default value

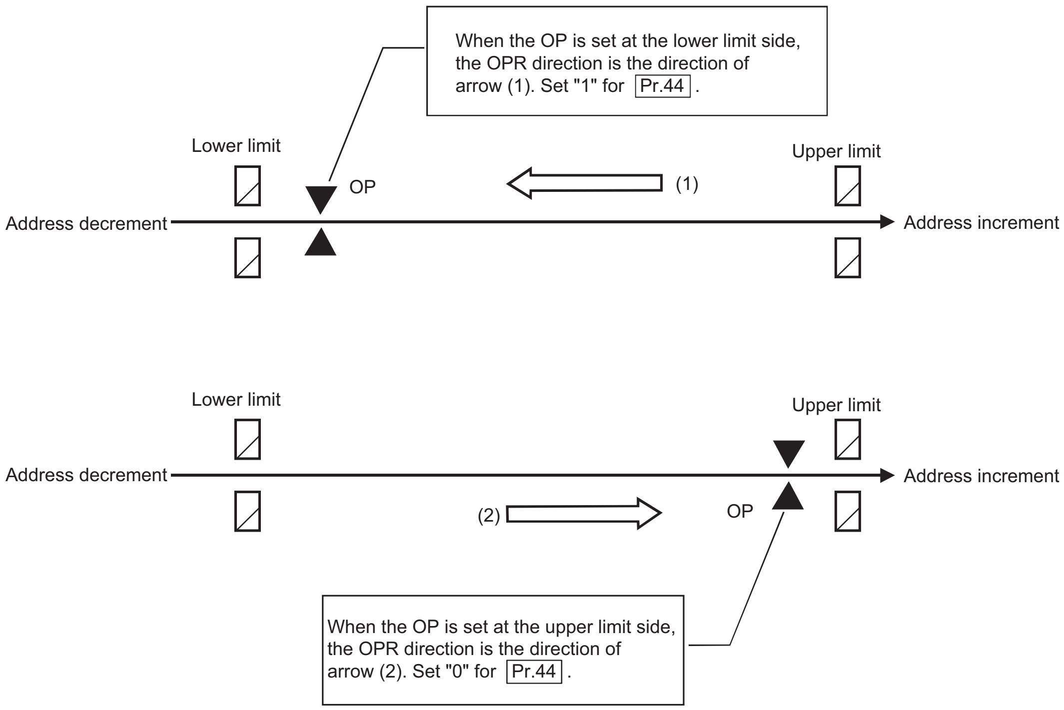
The default value is 0: Near-point dog method for all the axes.

[Pr.44] OPR direction

Set the direction of the movement when the machine OPR starts.

OPR direction	Setting value	Description
Forward direction (address increment)	0	Moves the workpiece in the address increment direction. (Arrow (2))
Reverse direction (address decrement)	1	Moves the workpiece in the address decrement direction. (Arrow (1))

Because the OP is normally set near the lower limit or the upper limit, [Pr.44] OPR direction is set as follows.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.44] OPR direction	71	221	371	521

■Default value

The default value is 0: Forward direction (address increment) for all the axes.

[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 value set in [Pr.45] OP address is stored in [Md.20] Current feed value and [Md.21] Machine feed value.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.45] OP address	72	222	372	522
	73	223	373	523

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs[*1]
0: mm	-214748364.8 to 214748364.7 (μm)	-2147483648 to 2147483647 ($\times 10^{-1}$μm)
1: inch	-21474.83648 to 21474.83647 (inch)	-2147483648 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0 to 359.99999 (degree)	0 to 35999999 ($\times 10^{-5}$ degrees)
3: pulse	-2147483648 to 2147483647 (pulse)	-2147483648 to 2147483647 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

[Pr.46] OPR speed

Set the speed for OPR.
Set OPR speed to a value equal to or less than the value set in [Pr.8] Speed limit value. If the value exceeds the value set in Speed limit value, OPR speed error (Error code: 1B04H) occurs and the OPR is not performed.
Set OPR speed to a value equal to or more than the values set in [Pr.7] Bias speed at start and [Pr.47] Creep speed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.46] OPR speed	74	224	374	524
	75	225	375	525

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs[*1]
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 ($\times 10^{-3}$ inches/min)
2: degree	0.001 to 3000000.000 (degree/min)	1 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	1 to 5000000 (pulse/s)	1 to 5000000 (pulse/s)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

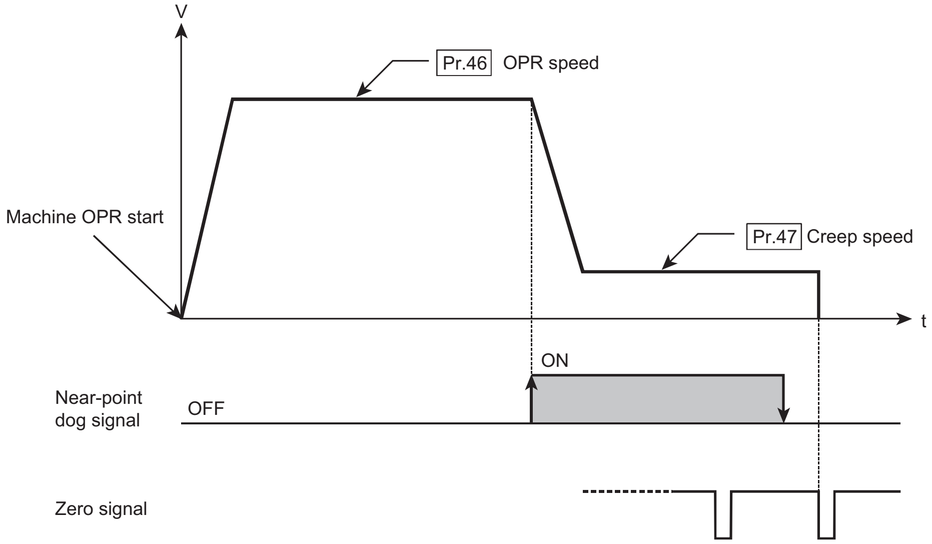
The default value is 1 for all the axes.

[Pr.47] Creep speed

Once the near-point dog turns on, the control decelerates from OPR speed and stops. Set the speed of right before the stop, which is a creep speed. Set the creep speed within the following range.

- ([Pr.46] OPR speed) ≥ ([Pr.47] Creep speed) ≥ ([Pr.7] Bias speed at start)

The creep speed is related to the detection error in the OPR method using the zero signal, and to the size of the shock when a collision occurs in the OPR method using the stopper method.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.47] Creep speed	76	226	376	526
	77	227	377	527

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0.01 to 20000000.00 (mm/min)	1 to 2000000000 ($\times10^{-2}$mm/min)
1: inch	0.001 to 2000000.000 (inch/min)	1 to 2000000000 ($\times10^{-3}$ inches/min)
2: degree	0.001 to 3000000.000 (degree/min)	1 to 3000000000 ($\times10^{-3}$ degrees/min)
3: pulse	1 to 5000000 (pulse/s)	1 to 5000000 (pulse/s)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 1 for all the axes.

[Pr.48] OPR retry

Set whether to perform OPR retry.

OPR retry	Setting value
Do not perform OPR retry by limit switch	0
Perform OPR retry by limit switch	1

For the operation of OPR retry, refer to the following.

☞ Page 216 OPR retry function

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.48] OPR retry	78	228	378	528

■Default value

The default value is 0: Do not perform OPR retry by limit switch for all the axes.

OPR detailed parameter

[Pr.49] OPR dwell time

When stopper method 1 is set in [Pr.43] OPR method set the time for the machine OPR to complete after the near-point dog signal turns on in units of ms. Set a value equal to or grater than the movement time from the near-point dog signal ON to the stop with the stopper.

(If the OPR method is not Stopper method 1, the value in [Pr.49] OPR dwell time is irrelevant.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.49] OPR dwell time	79	229	379	529

■Setting range

The setting range is 0 to 65535.

■Default value

The default value is 0 for all the axes.

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

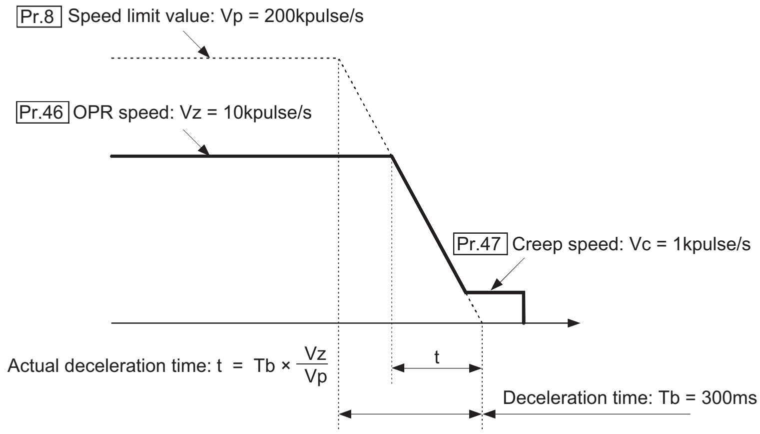
When the OPR method is count method 1 or 2, set the movement amount from the position where the near-point dog signal turns on to the OP.

(Set the value for the movement amount after near-point dog ON to a value 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 10ms at the OPR speed".)

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

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

[Machine OPR operation]



$$[\text{Deceleration distance}] = \frac{1}{2} \times \frac{Vz}{1000} \times t + \underbrace{0.01 \times Vz}_{\text{Movement amount for 10ms at OPR speed}}$$

$$= \frac{Vz}{2000} \times \frac{Tb \times Vz}{Vp} + 0.01 \times Vz$$

$$= \frac{10 \times 10^3}{2000} \times \frac{300 \times 10 \times 10^3}{200 \times 10^3} + 0.01 \times 10 \times 10^3$$

$$= 75 + 100$$

$$= 175$$

↓

Set the value equal to or larger than 175 to Pr.50 Setting for the movement amount after near-point dog ON.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.50] Setting for the movement amount after near-point dog ON	80	230	380	530
	81	231	381	531

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	0 to 214748364.7 (μm)	0 to 2147483647 ($\times 10^{-1}$μm)
1: inch	0 to 21474.83647 (inch)	0 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0 to 21474.83647 (degree)	0 to 2147483647 ($\times 10^{-5}$ degrees)
3: pulse	0 to 2147483647 (pulse)	0 to 2147483647 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

[Pr.51] OPR acceleration time selection

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

OPR acceleration time selection	Setting value	Description
Acceleration time 0	0	Uses the value set in [Pr.9] Acceleration time 0.
Acceleration time 1	1	Uses the value set in [Pr.25] Acceleration time 1.
Acceleration time 2	2	Uses the value set in [Pr.26] Acceleration time 2.
Acceleration time 3	3	Uses the value set in [Pr.27] Acceleration time 3.

■Buffer memory address

The following table shows the buffer memory address of this area.

Name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.51] OPR acceleration time selection	82	232	382	532

■Default value

The default value is 0: Acceleration time 0 for all the axes.

[Pr.52] OPR deceleration time selection

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

OPR deceleration time selection	Setting value	Description
Deceleration time 0	0	Uses the value set in [Pr.10] Deceleration time 0.
Deceleration time 1	1	Uses the value set in [Pr.28] Deceleration time 1.
Deceleration time 2	2	Uses the value set in [Pr.29] Deceleration time 2.
Deceleration time 3	3	Uses the value set in [Pr.30] Deceleration time 3.

■Buffer memory address

The following table shows the buffer memory address of this area.

Name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.52] OPR deceleration time selection	83	233	383	533

■Default value

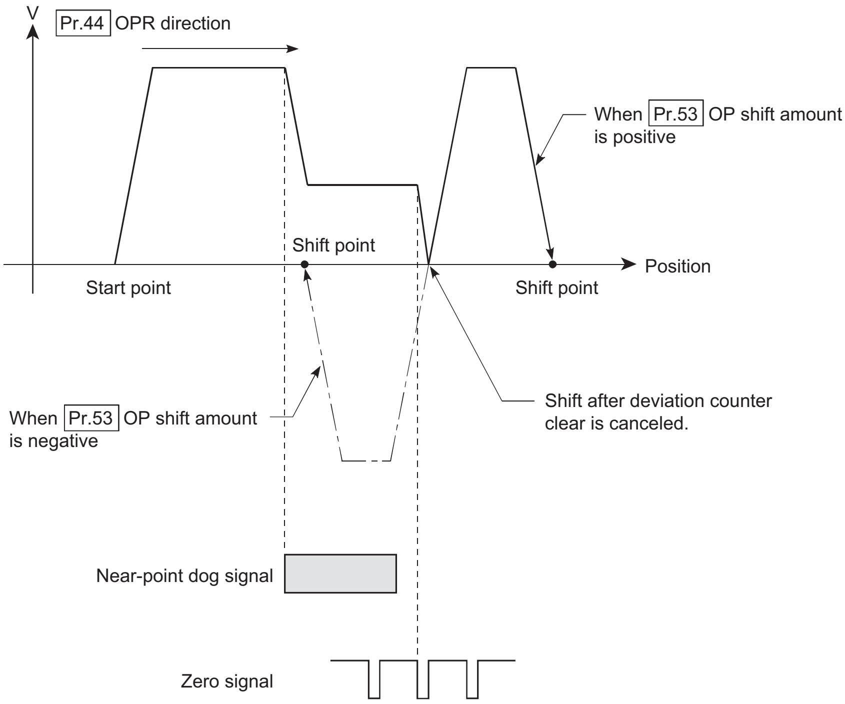
The default value is 0: Deceleration time 0 for all the axes.

[Pr.53] OP shift amount

Set the amount to shift (move) the OP from the stop position with machine OPR.

The OP shift function is used to compensate the OP position stopped with machine OPR.

If the OP position is physically limited due to the installation position of the near-point dog, use this function to compensate the OP to an optimum position.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.53] OP shift amount	84	234	384	534
	85	235	385	535

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
0: mm	-214748364.8 to 214748364.7 (μm)	-2147483648 to 2147483647 ($\times 10^{-1}$μm)
1: inch	-21474.83648 to 21474.83647 (inch)	-2147483648 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	-21474.83648 to 21474.83647 (degree)	-21474.83648 to 21474.83647 ($\times 10^{-5}$ degrees)
3: pulse	-2147483648 to 2147483647 (pulse)	-2147483648 to 2147483647 (pulse)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

[Pr.54] OPR torque limit value

Set the value to limit the servomotor torque after the creep speed is reached during machine OPR in units of %. If the torque is not limited, the servomotor may be in failure.

When the value set in [Pr.54] OPR torque limit value exceeds the value set in [Pr.17] Torque limit setting value, OPR torque limit value error (Error code: 1B0EH) occurs.

For details on the torque limit, refer to the following.

☞ Page 237 Torque limit function

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.54] OPR torque limit value	86	236	386	536

■Setting range

The setting range is 1 to 3000.

■Default value

The default value is 300 for all the axes.

[Pr.55] Deviation counter clear signal output time

Set the time for outputting the deviation counter clear signal during a machine OPR operation in units of ms. The machine OPR operation includes the near-point dog method, stopper method 1 to 3, count method 1, data setting method, and limit switch combined method. (For details, refer to the manual of the drive unit used.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.55] Deviation counter clear signal output time	87	237	387	537

■Setting range

The setting range is 1 to 65535.

■Default value

The default value is 11 for all the axes.

[Pr.56] Speed specification during OP shift

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

Speed specification during OP shift	Setting value	Description
OPR speed	0	Specifies the value set in [Pr.46] OPR speed as the setting value.
Creep speed	1	Specifies the value set in [Pr.47] Creep speed as the setting value.

■Buffer memory address

The following table shows the buffer memory address of this area.

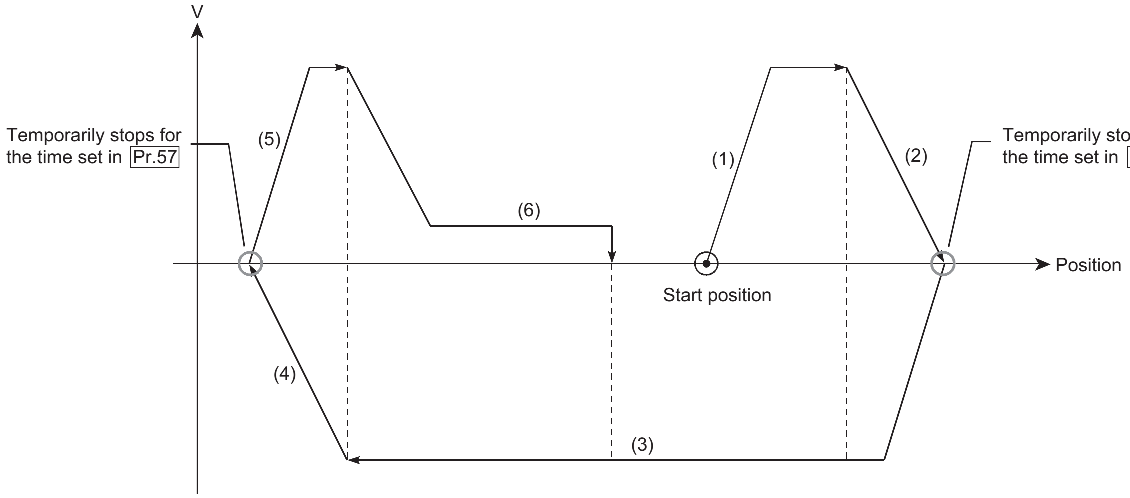
Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.56] Speed specification during OP shift	88	238	388	538

■Default value

The default value is 0: OPR speed for all the axes.

[Pr.57] Dwell time during OPR retry

When OPR retry is performed, set the stop time after the deceleration of (2) and (4) in the following figure in units of ms.



■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.57] Dwell time during OPR retry	89	239	389	539

■Setting range

The setting range is 0 to 65535.

■Default value

The default value is 0 for all the axes.

[Pr.58] Setting of operation during uncompleted OPR

Set whether or not to execute the positioning control when OPR request flag ([Md.31] Status: b3) is on.

Setting of operation during uncompleted OPR	Setting value
Do not execute the positioning control	0
Execute the positioning control	1

■Buffer memory address

The following table shows the buffer memory address of this area.

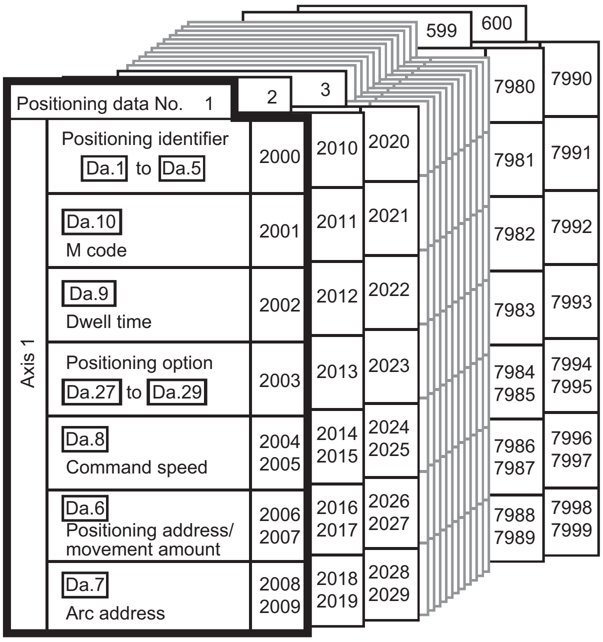
Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Pr.58] Setting of operation during uncompleted OPR	90	240	390	540

■Default value

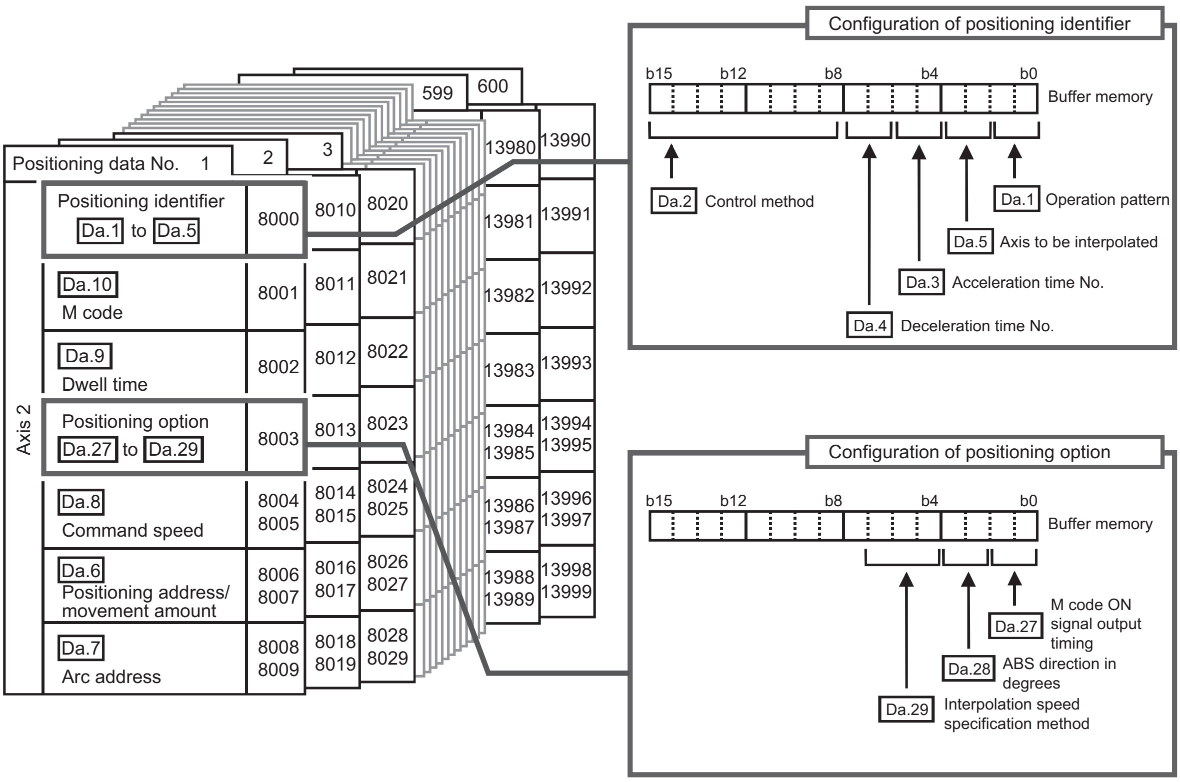
The default value is 0: Do not execute the positioning control for all the axes.

12.4 Positioning Data

The following figure shows the configuration of the positioning data stored in the buffer memory of the RD75.



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



The axis 3 and axis 4 have the same configuration.
Each axis has 600 positioning data (No.1 to No. 600).

[Da.1] Operation pattern

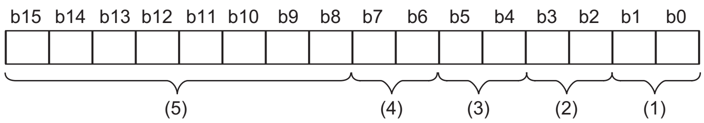
The operation pattern is used to specify whether to end the positioning of a certain data number with just that data or to perform the positioning of the next data number in succession.

Operation pattern	Setting value	Description
Positioning Complete	00	Set this value to execute the positioning to the specified address to complete the positioning.
Continuous positioning control	01	Performs the positioning successively in order of data numbers with one start signal. The operation stops at each position indicated by one positioning data.
Continuous path control	11	Performs the positioning successively in order of data numbers with one start signal. The operation does not stop at each position indicated by one positioning data.

■Configuration of positioning identifier

The positioning identifier consists of [Da.1] Operation pattern to [Da.5] Axis to be interpolated. These five setting values are stored in a buffer memory address. Set the values in [Da.1] Operation pattern to [Da.5] Axis to be interpolated according to the configuration of positioning identifier shown in the following figure.

Configuration of positioning identifier



Assignment	
(1)	[Da.1] Operation pattern
(2)	[Da.5] Axis to be interpolated
(3)	[Da.3] Acceleration time No.
(4)	[Da.4] Deceleration time No.
(5)	[Da.2] Control method

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 00 for all the axes.

[Da.2] Control method

Set Control method for performing the positioning control. The following table lists the available control methods.

Control method	Setting value
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	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	1CH
VF4: 4-axis speed control (forward run)	1DH
VR4: 4-axis speed control (reverse run)	1EH
ABSH ⌒: Helical interpolation control with sub point specified (ABS)	20H
INCH ⌒: Helical interpolation control with sub point specified (INC)	21H
ABSH .: Helical interpolation control with center point specified (ABS, CW)	22H
ABSH .: Helical interpolation control with center point specified (ABS, CCW)	23H
INCH .: Helical interpolation control with center point specified (INC, CW)	24H
INCH .: Helical interpolation control with center point specified (INC, CCW)	25H
NOP: NOP instruction	80H
POS: Current value change	81H
JUMP: JUMP instruction	82H
LOOP: Beginning of LOOP to LEND processing	83H
LEND: End of LOOP to LEND processing	84H

For the setting, refer to the following and check the assignment of this area.

☞ Page 429 Configuration of positioning identifier

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 00H for all the axes.

Restriction

- When JUMP instruction is set for the control method, the setting values in [Da.9] Dwell time and [Da.10] M code differ from the values when another control method is set.
- When LOOP is set for the control method, the setting value in [Da.10] M code differs from the value when another control method is set.
- When degree is set in [Pr.1] Unit setting, the circular interpolation control and 3-axis helical interpolation control cannot be executed. Circular interpolation not possible (Error code: 199FH) occurs when the control is executed.

[Da.3] Acceleration time No.

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

Acceleration time No.	Setting value	Description
Acceleration time 0	00	Uses the value set in [Pr.9] Acceleration time 0.
Acceleration time 1	01	Uses the value set in [Pr.25] Acceleration time 1.
Acceleration time 2	10	Uses the value set in [Pr.26] Acceleration time 2.
Acceleration time 3	11	Uses the value set in [Pr.27] Acceleration time 3.

For the setting, refer to the following and check the assignment of this area.

☞ Page 429 Configuration of positioning identifier

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 00 for all the axes.

[Da.4] Deceleration time No.

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

Deceleration time No.	Setting value	Description
Deceleration time 0	00	Uses the value set in [Pr.10] Deceleration time 0.
Deceleration time 1	01	Uses the value set in [Pr.28] Deceleration time 1.
Deceleration time 2	10	Uses the value set in [Pr.29] Deceleration time 2.
Deceleration time 3	11	Uses the value set in [Pr.30] Deceleration time 3.

For the setting, refer to the following and check the assignment of this area.

☞ Page 429 Configuration of positioning identifier

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 00 for all the axes.

[Da.5] Axis to be interpolated

For operations under the 2-axis interpolation control, set Axis to be interpolated (partner axis). For operations under the 3-axis helical interpolation, set Circular interpolation.

Axis to be interpolated	Setting value	Description
Axis 1 specification	00	Selects the axis 1 as the axis to be interpolated (partner axis).
Axis 2 specification	01	Selects the axis 2 as the axis to be interpolated (partner axis).
Axis 3 specification	10	Selects the axis 3 as the axis to be interpolated (partner axis).
Axis 4 specification	11	Selects the axis 4 as the axis to be interpolated (partner axis).

- An axis which does not exist and the self-axis cannot be set as the axis to be interpolated. Illegal interpolation description command (Error code: 1A22H) occurs when executed.
- For the 3- and 4-axis interpolation, the axis setting is not required.
- For the 3-axis interpolation, axes to be interpolated are as follows.

Reference axis	Axis to be interpolated
Axis 1	Axis 2, Axis 3
Axis 2	Axis 3, Axis 4
Axis 3	Axis 4, Axis 1
Axis 4	Axis 1, Axis 2

- For the 3-axis helical interpolation control, axes to be interpolated are as follows.

Reference axis	Circular interpolation axis	Linear interpolation axis
Axis 1	Axis 2	Axis 3
	Axis 3	Axis 2
Axis 2	Axis 3	Axis 4
	Axis 4	Axis 3
Axis 3	Axis 4	Axis 1
	Axis 1	Axis 4
Axis 4	Axis 1	Axis 2
	Axis 2	Axis 1

For the setting, refer to the following and check the assignment of this area.

☞ Page 429 Configuration of positioning identifier

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 00 for all the axes.

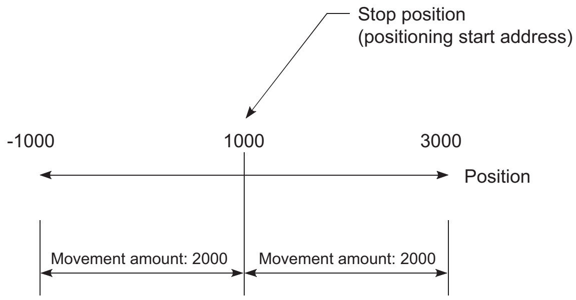
[Da.6] Positioning address/movement amount

Set the address used as the target value for positioning control.

The setting range differs according to the value set in [Da.2] Control method.

■Absolute (ABS) system and current value change

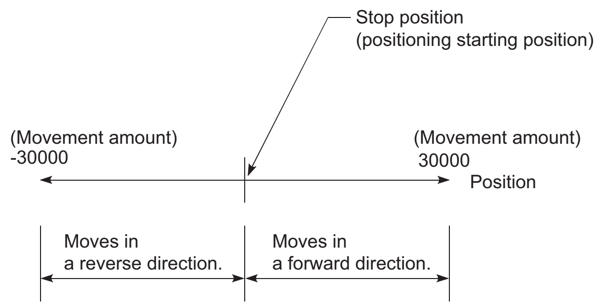
- Set the value (positioning address) with an absolute address (address from the OP) for the ABS system and current value change.



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

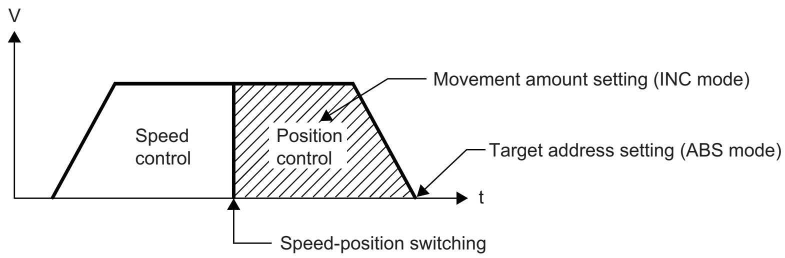
Set the value (movement amount) with a sign for the INC system.

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



■Speed-position switching control

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



■Position-speed switching control

- Set the movement amount in the position control (before switched to the speed control).

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting and [Da.2] Control method.

- When [Pr.1] Unit setting is mm

Setting of [Da.2] Control method*1	Setting value with engineering tools	Setting value with programs
ABS linear 1: 01H ABS linear 2: 0AH ABS linear 3: 15H ABS linear 4: 1AH Current value change: 81H	Set the address. -214748364.8 to 214748364.7 (μm)	Set the address. -2147483648 to 2147483647 ($\times10^{-1}$μm)
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 (μm)	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-1}$μm)
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 (μm)	Set the movement amount. 0 to 2147483647 ($\times10^{-1}$μm)
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -214748364.8 to 214748364.7 (μm)	Set the address. -2147483648 to 2147483647 ($\times10^{-1}$μm)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -214748364.8 to 214748364.7 (μm)	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-1}$μm)
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -214748364.8 to 214748364.7 (μm)	Set the address. -2147483648 to 2147483647 ($\times10^{-1}$μm)
INC helical sub: 21H INC helical right: 24H INC helical left: 25H	Set the movement amount. -214748364.8 to 214748364.7 (μm)	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-1}$μm)

*1 With any control method excluded from the table above, the positioning address and the movement amount do not need to be set.

- When [Pr.1] Unit setting is degree

Setting of [Da.2] Control method*2	Setting value with engineering tools	Setting value with programs
ABS linear 1: 01H ABS linear 2: 0AH ABS linear 3: 15H ABS linear 4: 1AH Current value change: 81H	Set the address. 0 to 359.99999 (degree)	Set the address. 0 to 35999999 ($\times10^{-5}$ degrees)
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 (degree)	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-5}$ degrees)
Forward run speed-position: 06H Reverse run speed-position: 07H	Set the movement amount in the INC mode. 0 to 21474.83647 (degree)	Set the movement amount in the INC mode. 0 to 2147483647 ($\times10^{-5}$ degrees)
	Set the address in the ABS mode. 0 to 359.99999 (degree)	Set the address in the ABS mode. 0 to 35999999 ($\times10^{-5}$ degrees)
Forward run position-speed: 08H Reverse run position-speed: 09H	Set the movement amount. 0 to 21474.83647 (degree)	Set the movement amount. 0 to 2147483647 ($\times10^{-5}$ degrees)
ABS helical sub: 20H*3 ABS helical right: 22H*3 ABS helical left: 23H*3	Set the address. 0 to 359.99999 (degree)	Set the address. 0 to 35999999 ($\times10^{-5}$ degrees)
INC helical sub: 21H*3 INC helical right: 24H*3 INC helical left: 25H*3	Set the movement amount. -21474.83648 to 21474.83647 (degree)	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-5}$ degrees)

*2 With any control method excluded from the table above, the positioning address and the movement amount do not need to be set.

*3 The axis where degree can be set in the 3-axis helical interpolation control is only the linear interpolation axis.

- When [Pr.1] Unit setting is pulse

Setting of [Da.2] Control method*4	Setting value with engineering tools	Setting value with programs
ABS linear 1: 01H ABS linear 2: 0AH ABS linear 3: 15H ABS linear 4: 1AH Current value change: 81H	Set the address. -2147483648 to 2147483647 (pulse)	Set the address. -2147483648 to 2147483647 (pulse)
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 (pulse)	Set the movement amount. -2147483648 to 2147483647 (pulse)
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 (pulse)	Set the movement amount. 0 to 2147483647 (pulse)
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -2147483648 to 2147483647 (pulse)	Set the address. -2147483648 to 2147483647 (pulse)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -2147483648 to 2147483647 (pulse)	Set the movement amount. -2147483648 to 2147483647 (pulse)
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -2147483648 to 2147483647 (pulse)	Set the address. -2147483648 to 2147483647 (pulse)
INC helical sub: 21H INC helical right: 24H INC helical left: 25H	Set the movement amount. -2147483648 to 2147483647 (pulse)	Set the movement amount. -2147483648 to 2147483647 (pulse)

*4 With any control method excluded from the table above, the positioning address and the movement amount do not need to be set.

- When [Pr.1] Unit setting is inch

Setting of [Da.2] Control method*5	Setting value with engineering tools	Setting value with programs
ABS linear 1: 01H ABS linear 2: 0AH ABS linear 3: 15H ABS linear 4: 1AH Current value change: 81H	Set the address. -21474.83648 to 21474.83647 (inch)	Set the address. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
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 (inch)	Set the movement amount. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
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 (inch)	Set the movement amount. 0 to 2147483647 ($\times 10^{-5}$ inches)
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -21474.83648 to 21474.83647 (inch)	Set the address. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -21474.83648 to 21474.83647 (inch)	Set the movement amount. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -21474.83648 to 21474.83647 (inch)	Set the address. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
INC helical sub: 20H INC helical right: 22H INC helical left: 23H	Set the movement amount. -21474.83648 to 21474.83647 (inch)	Set the movement amount. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)

*5 With any control method excluded from the table above, the positioning address and the movement amount do not need to be set.

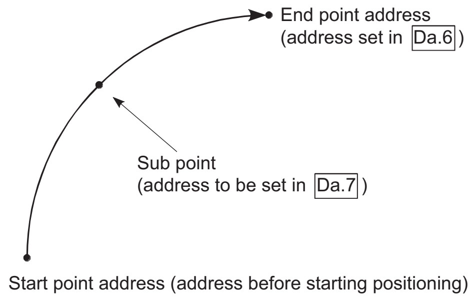
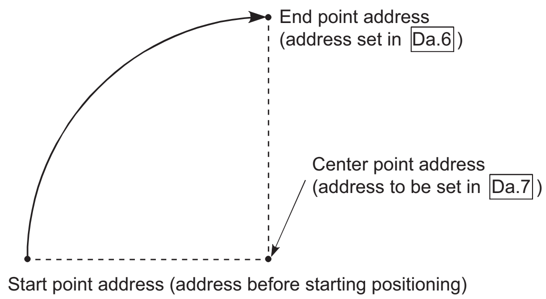
■Default value

The default value is 0 for all the axes.

[Da.7] Arc address

The arc address is the data required only when the circular interpolation control or 3-axis helical interpolation control is performed.

- When the circular interpolation with sub point specified is performed, set the sub point (passing point) address as the arc address.
- When the circular interpolation with center point specified is performed, set the center point address of the arc as the arc address.

Circular interpolation with sub point specified	Circular interpolation with center point specified
	

When the circular interpolation control or 3-axis helical interpolation control is not performed, the value set in [Da.7] Arc address is invalid.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting and [Da.2] Control method.

- When [Pr.1] Unit setting is mm

Setting of [Da.2] Control method	Setting value with engineering tools	Setting value with programs
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -214748364.8 to 214748364.7 (μm)	Set the address. -2147483648 to 2147483647 ($\times10^{-1}$μm)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -214748364.8 to 214748364.7 (μm)*1	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-1}$μm)*1
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -214748364.8 to 214748364.7 (μm)	Set the address. -2147483648 to 2147483647 ($\times10^{-1}$μm)
INC helical sub: 21H INC helical right: 24H INC helical left: 25H	Set the movement amount. -214748364.8 to 214748364.7 (μm)*1	Set the movement amount. -2147483648 to 2147483647 ($\times10^{-1}$μm)*1

*1 Note that the maximum available radius in the circular interpolation control is 536870912, although the value of the arc address can be input within the range in the table above.

- When [Pr.1] Unit setting is degree

No control method requires the setting of the arc address with degree.

- When [Pr.1] Unit setting is pulse

Setting of [Da.2] Control method	Setting value with engineering tools	Setting value with programs
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -2147483648 to 2147483647 (pulse)	Set the address. -2147483648 to 2147483647 (pulse)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -2147483648 to 2147483647 (pulse)*2	Set the movement amount. -2147483648 to 2147483647 (pulse)*2
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -2147483648 to 2147483647 (pulse)	Set the address. -2147483648 to 2147483647 (pulse)
INC helical sub: 21H INC helical right: 24H INC helical left: 25H	Set the movement amount. -2147483648 to 2147483647 (pulse)*2	Set the movement amount. -2147483648 to 2147483647 (pulse)*2

*2 Note that the maximum available radius in the circular interpolation control is 536870912, although the value of the arc address can be input within the range in the table above.

- When [Pr.1] Unit setting is inch

Setting of [Da.2] Control method	Setting value with engineering tools	Setting value with programs
ABS circular sub: 0DH ABS circular right: 0FH ABS circular left: 10H	Set the address. -21474.83648 to 21474.83647 (inch)	Set the address. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
INC circular sub: 0EH INC circular right: 11H INC circular left: 12H	Set the movement amount. -21474.83648 to 21474.83647 (inch)*3	Set the movement amount. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)*3
ABS helical sub: 20H ABS helical right: 22H ABS helical left: 23H	Set the address. -21474.83648 to 21474.83647 (inch)	Set the address. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)
INC helical sub: 21H INC helical right: 24H INC helical left: 25H	Set the movement amount. -21474.83648 to 21474.83647 (inch)*3	Set the movement amount. -2147483648 to 2147483647 ($\times 10^{-5}$ inches)*3

*3 Note that the maximum available radius in the circular interpolation control is 536870912, although the value of the arc address can be input within the range in the table above.

■Default value

The default value is 0 for all the axes.

[Da.8] Command speed

Set the command speed for positioning.

- When the set command speed exceeds the value set in [Pr.8] Speed limit value, positioning is performed at the speed limit value.
- When the command speed is set to -1, the positioning control is performed at the current speed (speed set for previous positioning data No.). Use the current speed for continuous path control and other controls. If -1 is set for continuing positioning data, and the speed is changed, the following speed will also change. Note that when positioning starts, if the speed -1 is set for the positioning data that performs positioning control first, No command speed (Error code: 1A12H) occurs, and the positioning does not start.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with engineering tools	Setting value with programs*1
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 ($\times 10^{-3}$ inches/min)
2: degree	0.001 to 3000000.000 (degree/min)	1 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	1 to 5000000 (pulse/s)	1 to 5000000 (pulse/s)

*1 When this buffer memory area is set with programs, a calculation is performed in the RD75 to convert a setting value to the value in each unit. For setting this buffer memory area, take the value after the unit conversion into consideration.

■Default value

The default value is 0 for all the axes.

[Da.9] Dwell time

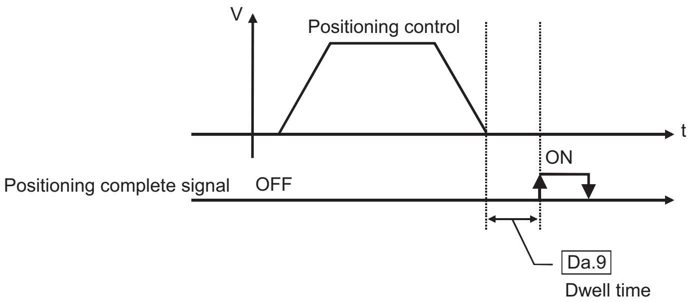
Set Dwell time or Positioning data No. according to the value set in [Da.2] Control method.

- When a method other than JUMP instruction is set in [Da.2] Control method, set the value in Dwell time in units of ms.
- When JUMP instruction is set in [Da.2] Control method, set Positioning data No. for the JUMP destination.

The dwell time is the time between the command pulse output is completed to the positioning complete signal is turned on. Set this time to absorb the delay of machine systems to the command, such as the delay (deviation) of the servo system.
When Dwell time is set, the setting details of Dwell time are as follows according to the value set in [Da.1] Operation pattern.

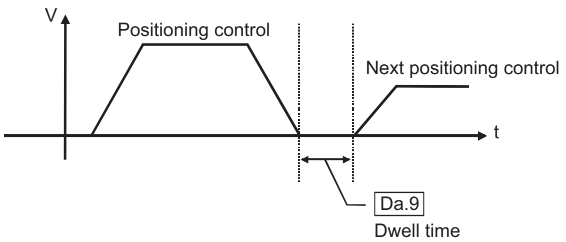
■When [Da.1] Operation pattern is 00: Positioning complete

Set the time from when the positioning ends to when Positioning complete signal [X14, X15, X16, X17] turns on as the dwell time.



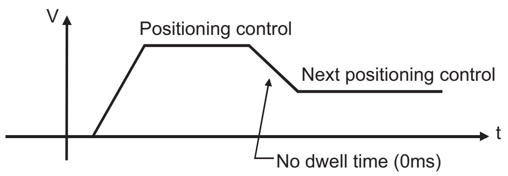
■When [Da.1] Operation pattern is 01: Continuous positioning control

Set the time from when the positioning control ends to when the next positioning control starts as the dwell time.



■When [Da.1] Operation pattern is 11: Continuous path control

The setting value is irrelevant to the control. The dwell time is 0ms.



■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Setting range

The setting range depends on the setting of [Da.2] Control method.

Setting of [Da.2] Control method	Setting value	Setting detail
JUMP instruction: 82H	1 to 600	Positioning data No.
Other than JUMP instruction	0 to 65535 (ms)	Dwell time

■Default value

The default value is 0 for all the axes.

[Da.10] M code

Set M code, Number of pitch, Condition data No., or Number of LOOP to LEND repetitions depending on how [Da.2] Control method is set.

- If a method other than JUMP instruction and LOOP is selected as the setting value in [Da.2] Control method, set M code. If M code does not need to be output, set 0 (default value).
- If 3-axis helical interpolation control is selected as the setting value in [Da.2] Control method, set the number of pitch for the linear interpolation axis. The rotation speed of the circular interpolation is set with the number of pitch.
- If JUMP instruction is selected as the setting value in [Da.2] Control method, set Condition data No. for JUMP. When 0 is set, an unconditional JUMP is performed to the positioning data specified by the value set in [Da.9] Dwell time. When 1 to 10 is set, JUMP is performed according to the condition data No. specified (a number between 1 and 10).
- If LOOP is selected as the setting value in [Da.2] Control method, set the number of LOOP to LEND repetitions. If 0 is set, Control method LOOP setting error (Error code: 1A33H) occurs.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Setting range

The setting range depends on the setting of [Da.2] Control method.

Setting of [Da.2] Control method	Setting value	Setting detail
JUMP instruction: 82H	0 to 10	Condition data No.
LOOP: 83H	1 to 65535	Number of repetitions
Helical interpolation: 20H to 25H	0 to 999	Number of pitch
Other than the above	0 to 65535	M code

■Default value

The default value is 0 for all the axes.

[Da.27] M code ON signal output timing

Set the M code ON signal output timing for each positioning data.

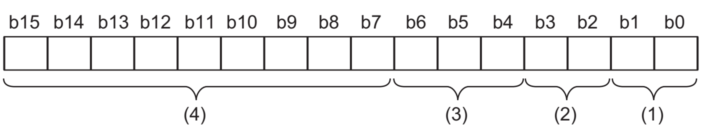
M code ON signal output timing	Setting value
Use the setting value in [Pr.18] M code ON signal output timing	0
WITH mode	1
AFTER mode	2

For details on the settings, refer to the following.

☞ Page 403 [Pr.18] M code ON signal output timing

■Configuration of positioning option

The positioning option consists of [Da.27] M code ON signal output timing to [Da.29] Interpolation speed specification method. These three setting values are stored in a buffer memory address. Set the values in [Da.27] M code ON signal output timing to [Da.29] Interpolation speed specification method according to the configuration of positioning option shown in the following figure.

<table>
<tr><th>Configuration of positioning option</th><th colspan="2">Assignment</th></tr>
<tr><td rowspan="4">
</td><td>(1)</td><td>[Da.27] M code ON signal output timing</td></tr>
<tr><td>(2)</td><td>[Da.28] ABS direction in degrees</td></tr>
<tr><td>(3)</td><td>[Da.29] Interpolation speed specification method</td></tr>
<tr><td>(4)</td><td>Use prohibited (fixed to 0)</td></tr>
</table>

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 0: Use the setting value in [Pr.18] M code ON signal output timing for all the axes.

[Da.28] ABS direction in degrees

Set the ABS movement direction for each positioning data when the unit is degree.

ABS direction in degrees	Setting value
Use the setting value in [Cd.40] ABS direction in degrees	0
ABS clockwise	1
ABS counterclockwise	2
Shortcut (the direction setting is invalid)	3

For the setting, refer to the following and check the assignment of this area.

☞ Page 440 Configuration of positioning option

For details on the settings, refer to the following.

☞ Page 490 [Cd.40] ABS direction in degrees

12

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 559 Positioning data

■Default value

The default value is 0: Use the setting value in [Cd.40] ABS direction in degrees for all the axes.

[Da.29] Interpolation speed specification method

Set the interpolation speed specification method for each positioning data.

Interpolation speed specification method	Setting value
Use the setting value in [Pr.20] Interpolation speed specification method	0
Composite speed	1
Reference axis speed	2

For the setting, refer to the following and check the assignment of this area.

☞ Page 440 Configuration of positioning option

For details on the settings, refer to the following.

☞ Page 405 [Pr.20] Interpolation speed specification method

■Buffer memory address

For the buffer memory address of this area, refer to the following.

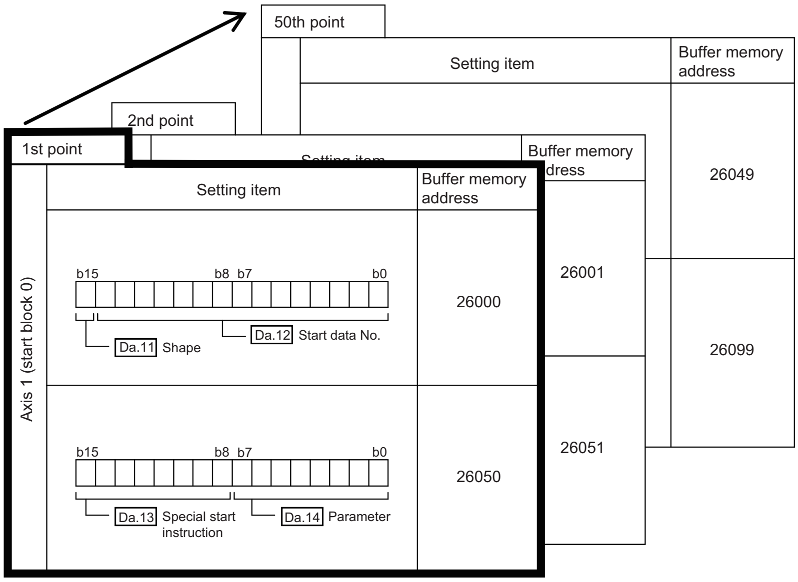
☞ Page 559 Positioning data

■Default value

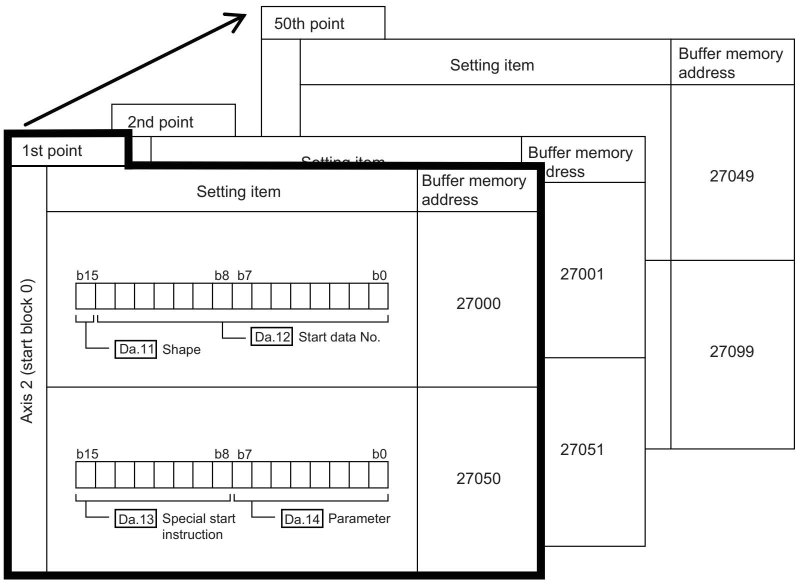
The default value is 0: Use the setting value in [Pr.20] Interpolation speed specification method for all the axes.

12.5 Block Start Data

The following figure shows the configuration of the block start data stored in the buffer memory of the RD75.



- Up to 50 points of block start data for each axis can be set (stored) in the buffer memory addresses shown on the left.
- One block start data is configured of the items shown in the bold box.
- Each axis has five start blocks (block 0 to 4).



The axis 3 and axis 4 have the same configuration.

To perform an advanced positioning control using Block start data, set a number between 7000 and 7004 for [Cd.3] Positioning start No. and use [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 numbers between 7000 and 7004 are called Block No.
With the RD75, up to 50 points of Block start data and up to 10 items of Condition data can be assigned to each Block No.

Block No.*1	Axis	Block start data	Condition	Buffer memory	Engineering tool
7000	Axis 1	Start block 0	Condition data (1 to 10)	Setting possible	Setting possible
	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)		

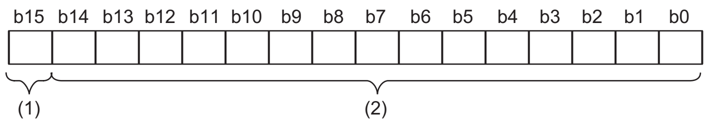
*1 The numbers cannot be set when Pre-reading start function is used. If any number between 7000 and 7004 is set and the pre-reading start function is performed, Outside start No. range (Error code: 19A3H) occurs.

[Da.11] Shape

Set whether to end the control after only Block start data of the shape itself is executed, or continue executing Block start data set in the next point.

Shape	Setting value	Description
End	0	Executes Block start data of the specified point and completes the control.
Continue	1	Executes Block start data of the specified point and completes the control, then executes Block start data of the next point.

The setting value for this area is stored in the same buffer memory address as that of [Da.12] Start data No. Set this area according to the buffer memory configuration.

Buffer memory configuration	Assignment	
	(1)	[Da.11] Shape
	(2)	[Da.12] Start data No.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 561 Block start data

■Default value

The default value is 0: End for all the axes.

[Da.12] Start data No.

Set Positioning data No. specified with Block start data.

For the setting, refer to the following and check the assignment of this area.

☞ Page 444 [Da.11] Shape

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 561 Block start data

■Setting range

The setting range is 1 to 600 (01H to 258H).

■Default value

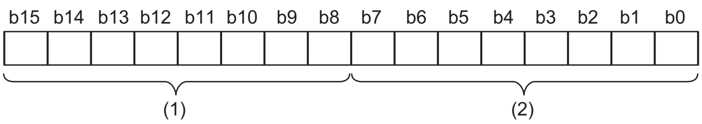
The default value is 0 for all the axes.

[Da.13] Special start instruction

Set Special start instruction for performing Advanced positioning control. (Set the method by which the positioning data set in [Da.12] Start data No. will be started.)

Special start instruction	Setting value	Description
Block start	0H	With one start, executes positioning data in a block in the set order.
Condition start	1H	Performs the condition judgment specified in Condition data for the specified positioning data. If the conditions have been established, Block start data is executed. If the conditions have not been established, that Block start data is ignored, and Block start data of the next point will be executed.
Wait start	2H	Performs the condition judgment specified in Condition data for the specified positioning data. If the conditions have been established, Block start data is executed. If the conditions have not been established, the control stops (waits) until the conditions are established.
Simultaneous start	3H	Simultaneously executes the positioning data having the number for the axis specified with Condition data (Outputs pulses at the same timing). Up to four axes can start simultaneously.
Repeated start (FOR loop)	4H	Repeats the program from the block start data set with FOR loop to the block start data set in NEXT for the specified number of times.
Repeated start (FOR condition)	5H	Repeats the program from the block start data set with FOR condition to the block start data set in NEXT until the conditions set in Condition data are established.
NEXT start	6H	Set the end of the repetition when 04H: Repeated start (FOR loop) or 05H: Repetition start (FOR condition) is set.

The setting value for this area is stored in the same buffer memory address as that of [Da.14] Parameter. Set this area according to the buffer memory configuration.

Buffer memory configuration	Assignment	
	(1)	[Da.13] Special start instruction
	(2)	[Da.14] Parameter

For details on the control, refer to the following.

☞ Page 159 ADVANCED POSITIONING CONTROL

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 561 Block start data

■Default value

The default value is 0: Block start for all the axes.

[Da.14] Parameter

Set a value according to the value set in [Da.13] Special start instruction.

Special start instruction	Description
Block start	Not used. (Setting this item is not required.)
Condition start	Set the condition data No. (number of Condition data which is set to perform condition judgment). (For details on the condition data, refer to Page 447 Condition Data.)
Wait start	
Simultaneous start	
Repeated start (FOR loop)	Set the number of repetitions.
Repeated start (FOR condition)	Set the condition data No. (number of Condition data which is set to perform condition judgment). (For details on the condition data, refer to Page 447 Condition Data.)

For the setting, refer to the following and check the assignment of this area.

☞ Page 445 [Da.13] Special start instruction

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 561 Block start data

■Setting range

The setting range depends on the setting of [Da.13] Special start instruction.

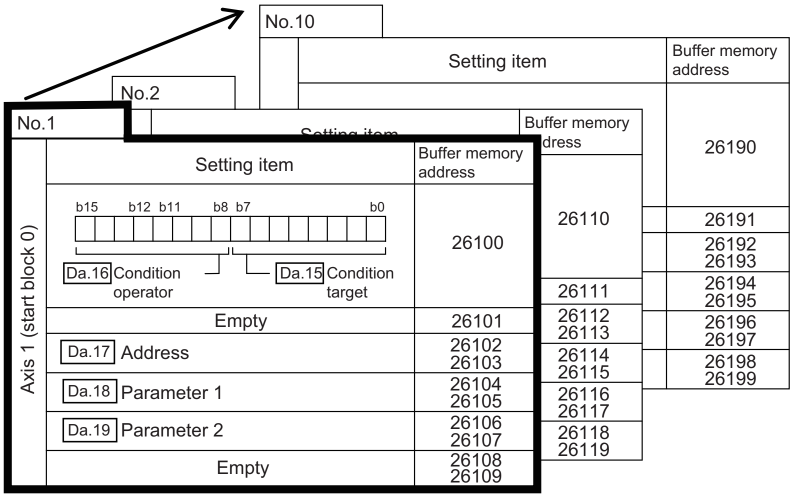
Setting of [Da.2] Control method	Setting value	Setting detail
Condition start	1 to 10	Condition data No.
Wait start		
Simultaneous start		
Repeated start (FOR condition)		
Repeated start (FOR loop)	0 to 255 (00H to FFH)	Number of repetitions

■Default value

The default value is 0 for all the axes.

12.6 Condition Data

The following figure shows the configuration of the condition data stored in the buffer memory of the RD75.



- Up to 10 condition data for each block No. can be set (stored) in the buffer memory addresses shown on the left.
- One condition data is configured of the items shown in the bold box.
- Each axis has five start blocks (block 0 to 4).

The axis 2 to axis 4 have the same configuration.

[Da.15] Condition target

Set the condition target according to each control.

Condition target	Setting value	Description
Device X	01H	Set the state (ON or OFF) of the I/O signals of the RD75 as a condition.
Device Y	02H	
Buffer memory (1 word)	03H	Set the value stored in the buffer memory as a condition. • Set 03H when the target buffer memory is 1 word (16 bits). • Set 04H when the target buffer memory is 2 words (32 bits).
Buffer memory (2 words)	04H	
Positioning data No.	05H	Select this item only for Simultaneous start.

The setting value for this area is stored in the same buffer memory address as that of [Da.16] Condition operator. Set this area according to the buffer memory configuration.

Buffer memory configuration	Assignment	
b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0 (1) b15–b8, (2) b7–b0	(1)	[Da.16] Condition operator
	(2)	[Da.15] Condition target

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 563 Condition data

■Default value

The default value is 0 for all the axes.

[Da.16] Condition operator

Set the condition operator according to the value set in [Da.15] Condition target.

Setting of [Da.15] Condition target	Condition Operator	Setting value	Description
01H: Device X 02H: Device Y	DEV = ON	07H	When the state (ON or OFF) of I/O signals is set as a condition, select ON or OFF as the trigger.
	DEV = OFF	08H	
03H: Buffer memory (1 word) 04H: Buffer memory (2 words)	** = P1	01H	Select how to use the value (**) stored in the buffer memory as a part of the condition. ≤ and ≥ are judged with signed values.
	** ≠ P1	02H	
	** ≤ P1	03H	
	** ≥ P1	04H	
	P1 ≤ ** ≤ P2	05H	
	** ≤ P1, P2 ≤ **	06H	
05H: Positioning data No.	Axis 1 specification	10H	When Simultaneous start is specified, select the axis (or axes) that start(s) simultaneously.
	Axis 2 specification	20H	
	Axis 1 and axis 2 specification	30H	
	Axis 3 specification	40H	
	Axis 1 and axis 3 specification	50H	
	Axis 2 and axis 3 specification	60H	
	Axis 1, axis 2, and axis 3 specification	70H	
	Axis 4 specification	80H	
	Axis 1 and axis 4 specification	90H	
	Axis 2 and axis 4 specification	A0H	
	Axis 1, axis 2, and axis 4 specification	B0H	
	Axis 3 and axis 4 specification	C0H	
	Axis 1, axis 3, and axis 4 specification	D0H	
	Axis 2, axis 3, and axis 4 specification	E0H	

For the setting, refer to the following and check the assignment of this area.

☞ Page 447 [Da.15] Condition target

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 563 Condition data

■Default value

The default value is 0 for all the axes.

[Da.17] Address

Set the address according to the value set in [Da.15] Condition target.

Setting of [Da.15] Condition target	Setting value	Description
01H: Device X	—	Not used. (Setting this item is not required.)
02H: Device Y		
03H: Buffer memory (1 word)	Numerical value (buffer memory address)	Specify the target Buffer memory address. (For the buffer memory of 2 words, set the low-order buffer memory address.)
04H: Buffer memory (2 words)		
05H: Positioning data No.	—	Not used. (Setting this item is not required.)

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■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 563 Condition data

■Default value

The default value is 0 for all the axes.

[Da.18] Parameter 1

Set the parameters according to the value set in [Da.16] Condition operator.

Setting of [Da.16] Condition operator	Setting value	Description
01H: ** = P1	Numerical value	Set the value of P1 to be equal to or smaller than the value of P2 (P1 ≤ P2). If P1 is greater than P2 (P1 > P2), Condition data error (Error code: 1A04H) occurs.
02H: ** ≠ P1		
03H: ** ≤ P1		
04H: ** ≥ P1		
05H: P1 ≤ ** ≤ P2		
06H: ** ≤ P1, P2 ≤ **		
07H: DEV = ON	Numerical value (Bit number)	Set the device bit number. • X: 0H to 1H, 4H to 17H • Y: 0H, 4H to 17H
08H: DEV = OFF		
10H: Axis 1 specification	Numerical value (Positioning data No.)	Set the positioning data number for starting the axis 1 and/or axis 2. • Lower 16 bits: Positioning data No. 1 to 600 for the axis 1 (01H to 258H) • Upper 16 bits: Positioning data No. 1 to 600 for the axis 2 (01H to 258H)
to		
E0H: Axis 2, axis 3, and axis 4 specification		

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 563 Condition data

■Default value

The default value is 0 for all the axes.

[Da.19] Parameter 2

Set the parameters according to the value set in [Da.16] Condition operator.

Setting of [Da.16] Condition operator	Setting value	Description
01H: ** = P1	—	Not used. (Setting this item is not required.)
02H: ** ≠ P1		
03H: ** ≤ P1		
04H: ** ≥ P1		
05H: P1 ≤ ** ≤ P2	Numerical value (Bit number)	Set the value of P2 to be equal to or greater than the value of P1 (P1 ≤ P2). If P1 is greater than P2 (P1>P2), Condition data error (Error code: 1A04H) occurs.
06H: ** ≤ P1, P2 ≤ **		
07H: DEV = ON	—	Not used. (Setting this item is not required.)
08H: DEV = OFF		
10H: Axis 1 specification		
20H: Axis 2 specification		
30H: Axis 1 and axis 2 specification		
40H: Axis 3 specification	Numerical value (Positioning data No.)	Set the positioning data number for starting the axis 3 and/or axis 4. • Lower 16 bits: Positioning data No. 1 to 600 for the axis 1 (01H to 258H) • Upper 16 bits: Positioning data No. 1 to 600 for the axis 2 (01H to 258H)
to		
E0H: Axis 2, axis 3, and axis 4 specification		

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 563 Condition data

■Default value

The default value is 0 for all the axes.

12.7 Monitor Data

System monitor data

[Md.1] In test mode flag

This area stores whether the test mode is used in the engineering tool or not.

In test mode flag	Stored value
Not in test mode	0
In test mode	1

■Buffer memory address

The following table shows the buffer memory address of this area.

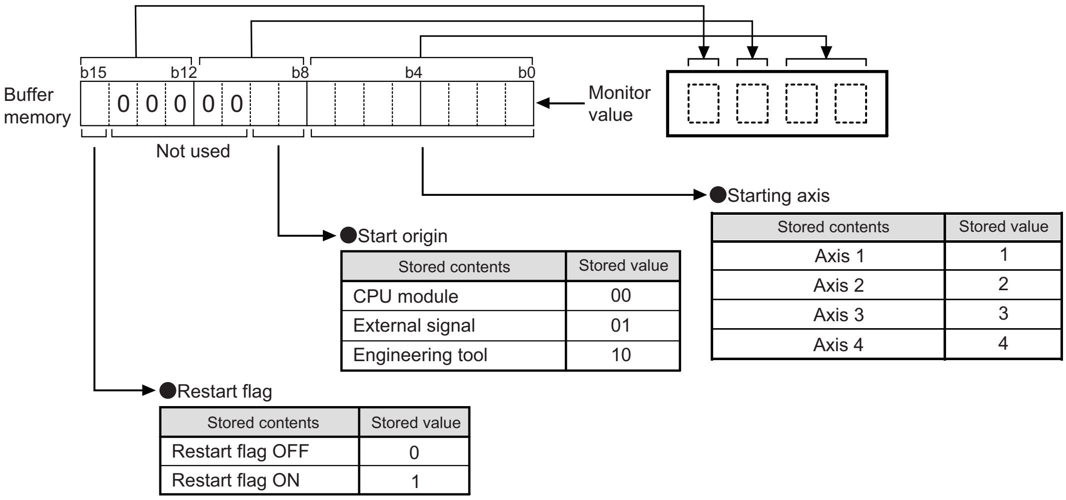
Buffer memory name	Common for Axis 1 to 4
[Md.1] In test mode flag	1200

[Md.3] Start information

This area stores the start information (restart flag, start origin, and starting axis).

- Restart flag: Indicates whether the operation has been temporarily stopped and restarted or not.
- Start origin: Indicates the source of the start signal.
- Starting axis: Indicates the started axis.

The following figure shows the information to be stored.



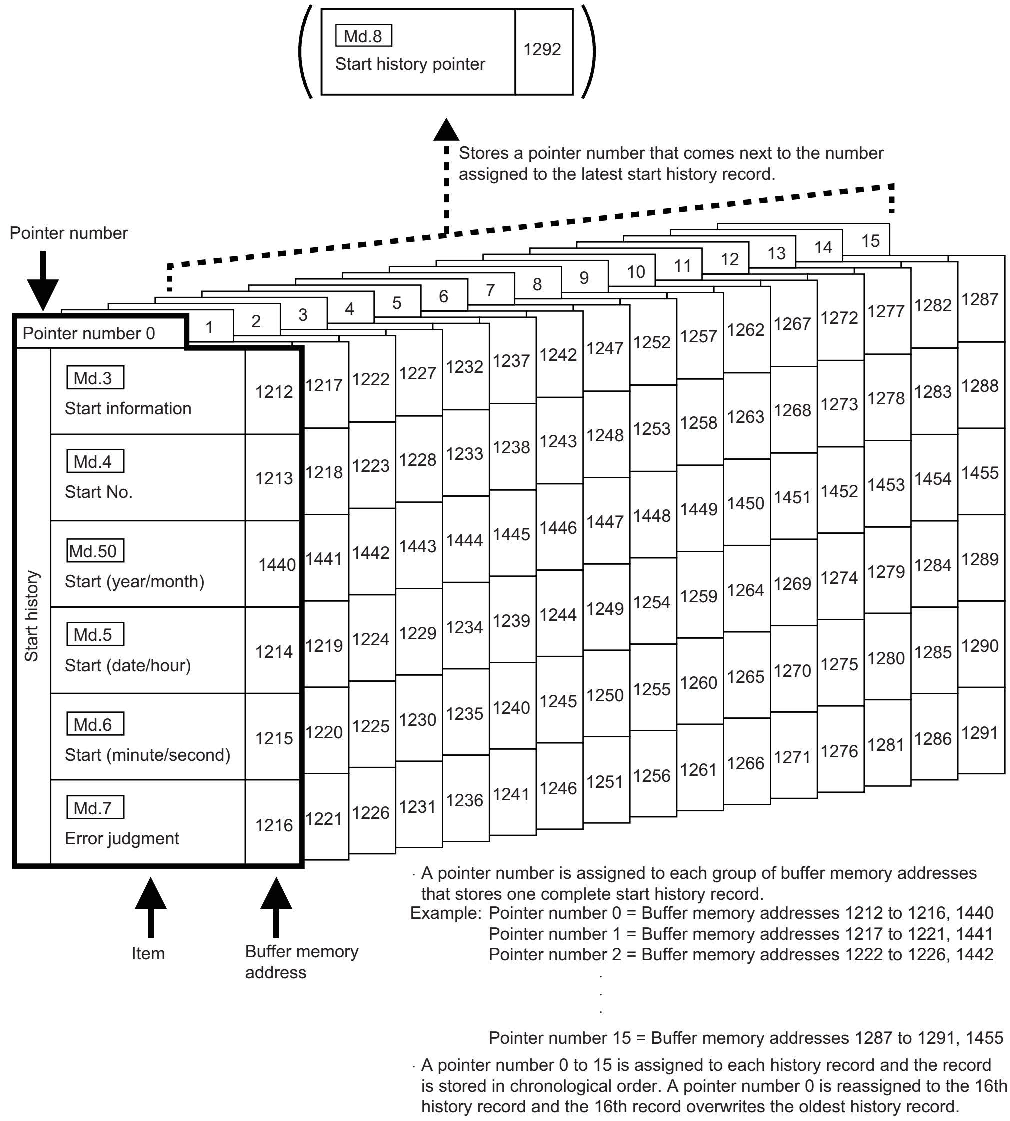
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

■Configuration of start history

Information on starts is stored in the start history of pointer 0 to 15. The following figure shows the configuration of the start history.



When the number of the start history exceeds 15, the newer start information is stored from pointer 0 again and the previous start information is overwritten.

[Md.4] Start No.

This area stores the start number.

Start No.	Stored value
Positioning operation	• 1 to 600 (1H to 258H) • 7000 (1B58H) • 7001 (1B59H) • 7002 (1B5AH) • 7003 (1B5BH) • 7004 (1B5CH)
JOG operation	9010 (2332H)
Manual pulse generator operation	9011 (2333H)
Machine OPR	9001 (2329H)
Fast OPR	9002 (232AH)
Current value change	9003 (232BH)
Simultaneous start	9004 (232CH)

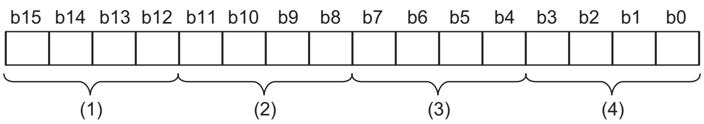
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

[Md.50] Start (year/month)

The start time (year/month) is stored with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Year (tens place)	0 to 9
	(2)	Year (ones place)	0 to 9
	(3)	Month (tens place)	0 and 1
	(4)	Month (ones place)	0 to 9

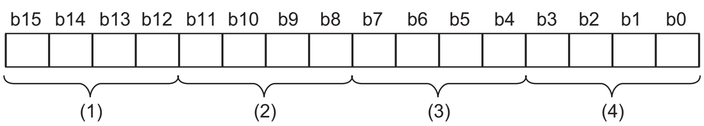
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

[Md.5] Start (date/hour)

The start time (date/hour) is stored with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Day (tens place)	0 to 3
	(2)	Day (ones place)	0 to 9
	(3)	Hour (tens place)	0 to 2
	(4)	Hour (ones place)	0 to 9

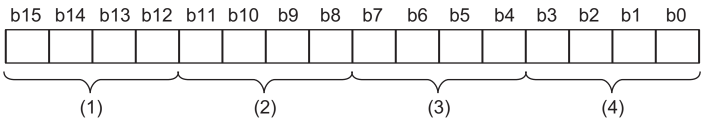
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

[Md.6] Start (minute/second)

The start time (minute/second) is stored with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Minute (tens place)	0 to 5
	(2)	Minute (ones place)	0 to 9
	(3)	Second (tens place)	0 to 5
	(4)	Second (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

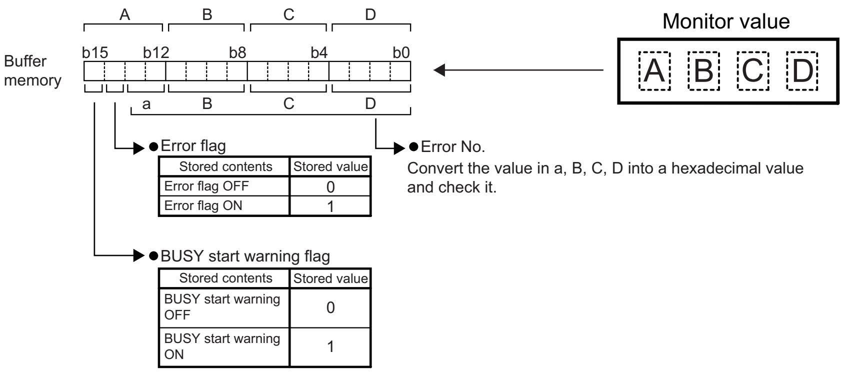
☞ Page 372 Monitor data

[Md.7] Error judgment

This area stores the result of the error judgment performed on the start.

- BUSY start warning flag
- Error flag
- Error No.

The result of the error judgment is stored as follows.



■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

[Md.8] Start history pointer

This area stores a pointer number that comes next to the pointer number assigned to the latest start history record.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.8] Start history pointer	1292

[Md.9] Axis in which the error occurred

This area stores the axis number in which the error is detected.

Axis in which the error occurred	Stored value
Axis 1	1
Axis 2	2
Axis 3	3
Axis 4	4

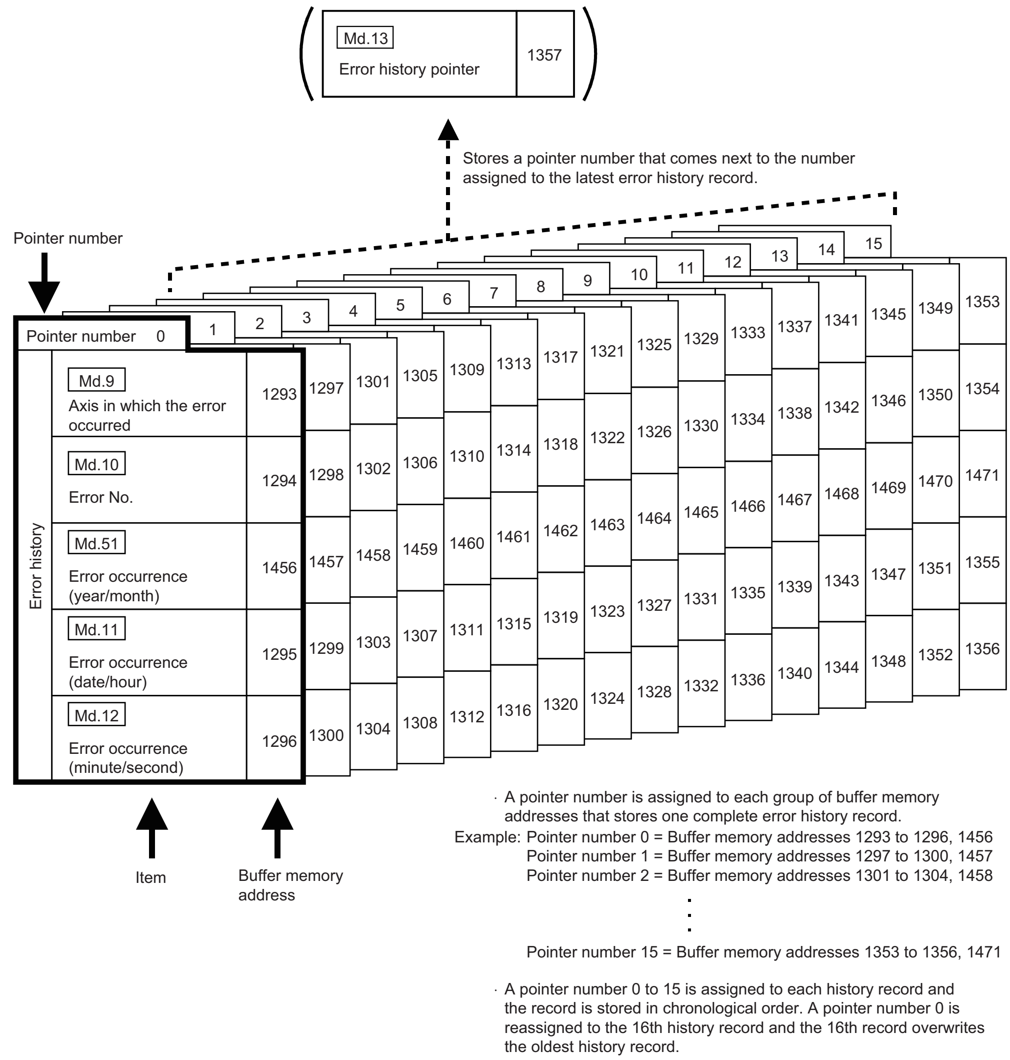
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

■Configuration of error history

Information on errors is stored in the error history of pointer 0 to 15. The following figure shows the configuration of the error history.



When the number of the error history exceeds 15, the newer error information is stored from pointer 0 again and the previous error information is overwritten.

[Md.10] Error No.

This area stores the error number. Monitor the value in hexadecimal.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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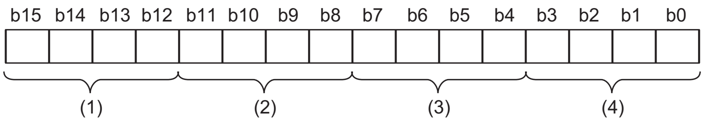
[Md.51] Error occurrence (year/month)

This area stores the time (year/month) when an error occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Year (tens place)	0 to 9
	(2)	Year (ones place)	0 to 9
	(3)	Month (tens place)	0 and 1
	(4)	Month (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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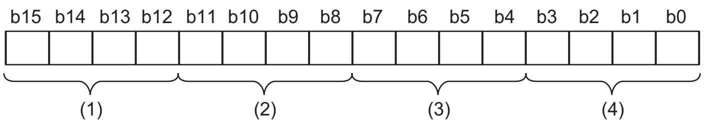
[Md.11] Error occurrence (date/hour)

This area stores the time (date/hour) when an error occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Day (tens place)	0 to 3
	(2)	Day (ones place)	0 to 9
	(3)	Hour (tens place)	0 to 2
	(4)	Hour (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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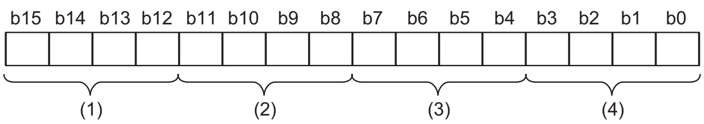
[Md.12] Error occurrence (minute/second)

This area stores the time (minute/second) when an error occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Minute (tens place)	0 to 5
	(2)	Minute (ones place)	0 to 9
	(3)	Second (tens place)	0 to 5
	(4)	Second (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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[Md.13] Error history pointer

This area stores a pointer number that comes next to the number assigned to the latest error history record.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.13] Error history pointer	1357

[Md.14] Axis in which the warning occurred

This area stores the axis number in which the warning is detected.

Axis in which the warning occurred	Stored value
Axis 1	1
Axis 2	2
Axis 3	3
Axis 4	4

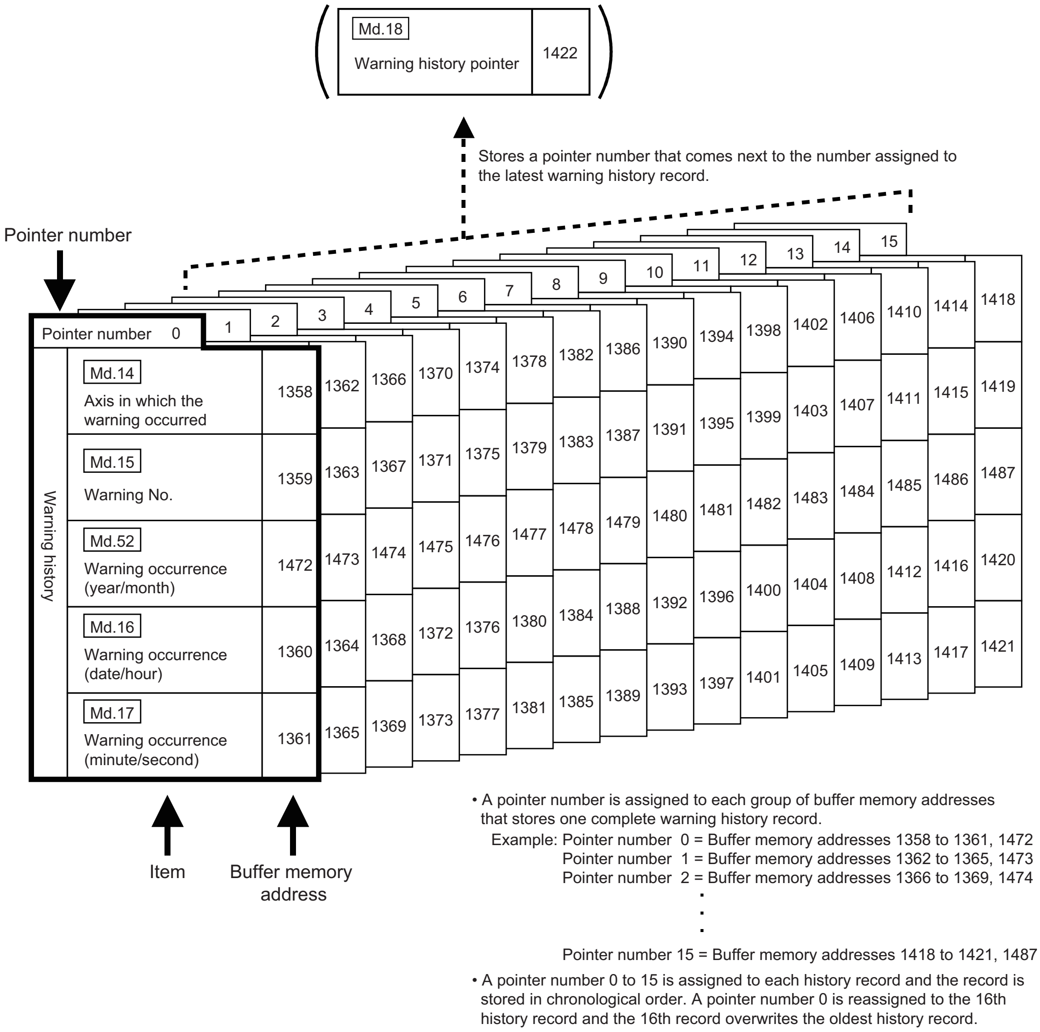
■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 372 Monitor data

■Warning history configuration

Information on warnings is stored in the warning history of pointer 0 to 15. The following figure shows the configuration of the warning history.



When the number of the warning history exceeds 15, the newer warning information is stored from pointer 0 again and the previous warning information is overwritten.

[Md.15] Warning No.

This area stores the warning No. Monitor the value in hexadecimal.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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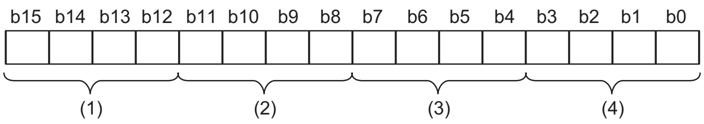
[Md.52] Warning occurrence (year/month)

This area stores the time (year/month) when a warning occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Year (tens place)	0 to 9
	(2)	Year (ones place)	0 to 9
	(3)	Month (tens place)	0 and 1
	(4)	Month (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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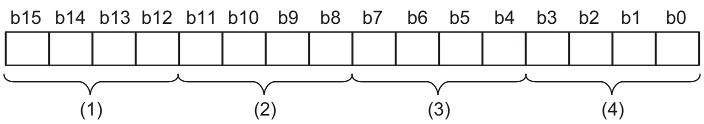
[Md.16] Warning occurrence (date/hour)

This area stores the time (date/hour) when a warning occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Day (tens place)	0 to 3
	(2)	Day (ones place)	0 to 9
	(3)	Hour (tens place)	0 to 2
	(4)	Hour (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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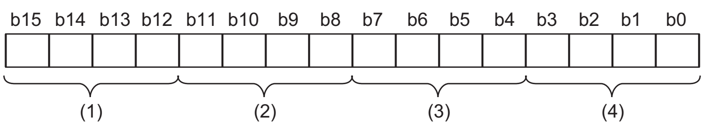
[Md.17] Warning occurrence (minute/second)

This area stores the time (minute/second) when a warning occurs with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Minute (tens place)	0 to 5
	(2)	Minute (ones place)	0 to 9
	(3)	Second (tens place)	0 to 5
	(4)	Second (ones place)	0 to 9

■Buffer memory address

For the buffer memory address of this area, refer to the following.

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[Md.18] Warning history pointer

This area stores a pointer number that comes next to the pointer number assigned to the latest warning history record.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.18] Warning history pointer	1422

[Md.19] No. of write accesses to flash ROM

This area stores the number of module data backups and module data initializations performed with a program after the power-on.

The count is cleared to 0 when Flash ROM write number error (Error code: 1080H) and the error is reset.

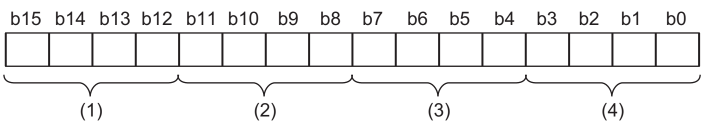
■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.19] No. of write accesses to flash ROM	1424
	1425

[Md.53] Date of write accesses to flash ROM (year/month)

This area stores the latest date (year/month) when the data is written to flash ROM with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Year (tens place)	0 to 9
	(2)	Year (ones place)	0 to 9
	(3)	Month (tens place)	0 and 1
	(4)	Month (ones place)	0 to 9

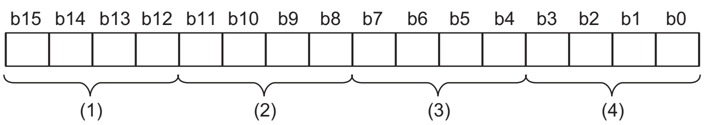
■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.53] Date of write accesses to flash ROM (year/month)	1488

[Md.54] Date of write accesses to flash ROM (date/hour)

This area stores the latest date (date/hour) when the data is written to flash ROM with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Day (tens place)	0 to 3
	(2)	Day (ones place)	0 to 9
	(3)	Hour (tens place)	0 to 2
	(4)	Hour (ones place)	0 to 9

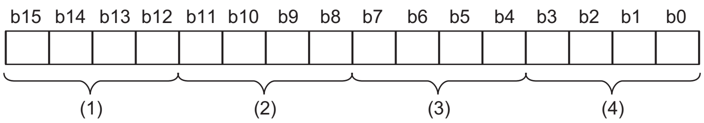
■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.54] Date of write accesses to flash ROM (date/hour)	1489

[Md.55] Date of write accesses to flash ROM (minute/second)

This area stores the latest date (minute/second) when the data is written to flash ROM with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Minute (tens place)	0 to 5
	(2)	Minute (ones place)	0 to 9
	(3)	Second (tens place)	0 to 5
	(4)	Second (ones place)	0 to 9

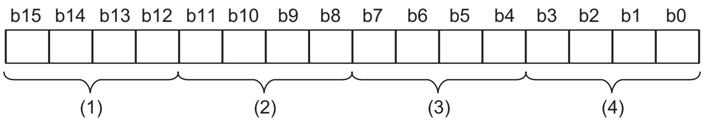
■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.55] Date of write accesses to flash ROM (minute/second)	1490

[Md.56] Date of write accesses to flash ROM (ms)

This area stores the latest date (ms) when the data is written to flash ROM with the BCD code. Monitor the value in hexadecimal.

Buffer memory configuration	Stored contents		Stored value
	(1)	Use prohibited	Fixed to 0
	(2)	ms (hundreds place)	0 to 9
	(3)	ms (tens place)	0 to 9
	(4)	ms (ones place)	0 to 9

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.56] Date of write accesses to flash ROM (ms)	1491

Axis monitor data

[Md.20] Current feed value

This area stores the currently commanded address or the address of the current position. The stored value is different from the actual motor position during operation. Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
μm	$\times 10^{-1}$
inch	$\times 10^{-5}$
degree	$\times 10^{-5}$
pulse	$\times 1$

- When the unit is degree, the address is a ring address of values between 0 and 359.99999°.
- The update cycle of this area is 0.88ms.
- When the machine OPR is completed, the OP address is stored.
- When the current value is changed with the current value change function, the changed value is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.20] Current feed value	800	900	1000	1100
	801	901	1001	1101

[Md.21] Machine feed value

This area stores the address of the current position according to the machine coordinate (coordinate specified with the machine). The stored value is different from the actual motor position during operation. Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
μm	$\times 10^{-1}$
inch	$\times 10^{-5}$
degree	$\times 10^{-5}$
pulse	$\times 1$

- The update cycle of this area is 0.88ms.
- Under the speed control, the machine feed value is constantly updated regardless of the parameter setting.
- The value is not cleared to 0 at the beginning of fixed-feed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.21] Machine feed value	802	902	1002	1102
	803	903	1003	1103

[Md.22] Feedrate

This area stores the command output speed of the operating workpiece. The stored value may be different from the actual motor speed during operation. Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
mm/min	$\times 10^{-2}$
inch/min	$\times 10^{-3}$
degree/min	$\times 10^{-3}$
pulse/s	$\times 1$

- During interpolation operation, the composite speed or reference axis speed is stored for the reference axis and 0 is stored for the interpolation axis.
- The update cycle of this area is 0.88ms.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.22] Feedrate	804	904	1004	1104
	805	905	1005	1105

[Md.23] Axis error No.

When an error is detected, this area stores the error code corresponding to the error. Monitor the value in hexadecimal.

- The latest error code is stored at all times and when a new error occurs, the error code is overwritten.
- When [Cd.5] Axis error reset (axis control data) is turned on, the error code is cleared to 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.23] Axis error No.	806	906	1006	1106

[Md.24] Axis warning No.

When a warning is detected, this area stores the warning code corresponding to the warning. Monitor the value in hexadecimal.

- The latest warning code is stored at all times and when a new warning occurs, the warning code is overwritten.
- When [Cd.5] Axis error reset (axis control data) is turned on, the warning code is cleared to 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.24] Axis warning No.	807	907	1007	1107

[Md.25] Valid M code

This area stores the M code that is currently valid (i.e. set to the positioning data relating to the current operation).

- The range of the stored value is 0 to 65535.
- This area is updated when M code ON signal [X4, X5, X6, X7] turns on.
- When PLC READY signal [Y0] is turned off, 0 is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.25] Valid M code	808	908	1008	1108

[Md.26] Axis operation status

This area stores the axis operation status. The following table shows the stored values.

Axis operation status	Stored value
Step standby	-2
Error	-1
Standby	0
Stopped	1
Interpolation	2
JOG operation	3
Manual pulse generator operation	4
Analyzing	5
Special start standby	6
OPR	7
Position control	8
Speed control	9
Speed control in speed-position switching control	10
Position control in speed-position switching control	11
Position control in position-speed switching control	12
Speed control in position-speed switching control	13
Start time adjusting	14

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.26] Axis operation status	809	909	1009	1109

[Md.27] Current speed

This area stores the value set in [Da.8] Command speed for the positioning data being executed.

- If [Da.8] Command speed is set to -1, this area stores the value in [Da.8] Command speed which is 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 value in [Da.8] Command speed which is set by the positioning data being executed.
- If the speed change function is executed, the value set in [Cd.14] New speed value is stored.

Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
mm/min	$\times 10^{-2}$
inch/min	$\times 10^{-3}$
degree/min	$\times 10^{-3}$
pulse/s	$\times 1$

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.27] Current speed	810	910	1010	1110
	811	911	1011	1111

[Md.28] Axis feedrate

This area stores the speed which is actually output as a command in each axis at that time. The stored value may be different from the actual motor speed. Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
mm/min	$\times 10^{-2}$
inch/min	$\times 10^{-3}$
degree/min	$\times 10^{-3}$
pulse/s	$\times 1$

- When the axis is at a stop, 0 is stored.
- The update cycle of this area is 0.88ms.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.28] Axis feedrate	812	912	1012	1112
	813	913	1013	1113

[Md.29] Speed-position switching control positioning amount

This area stores the movement amount for the position control to end after the control is switched to the position control with the speed-position switching control. Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
μm	$\times 10^{-1}$
inch	$\times 10^{-5}$
degree	$\times 10^{-5}$
pulse	$\times 1$

When [Da.2] Control method is the speed-position switching control (reverse run), a negative value is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.29] Speed-position switching control positioning amount	814	914	1014	1114
	815	915	1015	1115

[Md.30] External I/O signal

This area stores the on/off state of external I/O signals.

External I/O signal	Stored value
OFF	0
ON	1

Values are stored in the bits corresponding to each external I/O signal. The following table shows the assignment of each external I/O signal.

Buffer memory:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0		0							

Assignment of I/O signals:

Bit	Signal
b0	Lower limit signal
b1	Upper limit signal
b2	Drive unit READY signal
b3	Stop signal
b4	External command signal
b5	Zero signal
b6	Near-point dog signal
b7	Use prohibited (fixed to 0)
b8	Deviation counter clear signal
b9 to b15	Use prohibited (fixed to 0)

The update cycle of this area is 0.88ms.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.30] External I/O signal	816	916	1016	1116

Restriction

If 1: Pre-analysis mode is set for [Cd.43] Analysis mode setting and Positioning start signal [Y10, Y11, Y12, Y13] is used as the start trigger, the external command signal (CHG) is disabled from when the positioning data analysis starts until a pulse input starts by inputting the start trigger. Thus, the external command signal ([Md.30] External I/O signal: b4) is fixed to 0 during that time.

[Md.31] Status

This area stores the on/off state of various flags. The following shows the flags to be stored.

Flag	Description	Stored value
In speed control flag	This signal, which turns on during the speed control, is used to judge whether the operation is performed under the speed control or position control. This signal turns off at the power-on, in the position control, and during the JOG operation or manual pulse generator operation. During the speed-position switching control or position-speed switching control, this signal turns on only when the speed control is performed. When the speed control is switched to the position control by the speed-position switching signal, this signal turns off. When the position control is switched to the speed control by the position-speed switching signal, this signal turns on.	0: OFF 1: ON
Speed-position switching latch flag	This signal is used to interlock the movement amount change function in the speed-position switching control. During the speed-position switching control, this signal turns on when the speed control is switched to the position control. This signal turns off when the next positioning data is processed, and during the JOG operation or manual pulse generator operation.	
Command in-position flag	This signal turns on when the remaining distance is equal to or less than the command in-position width (set by a detailed parameter). This signal remains off with the data for which the continuous path control (P11) is specified as the operation pattern. The state of this signal is monitored every 0.88ms. It is not monitored under the speed control or while the speed control is in effect during the speed-position switching control or position-speed switching control. While operations are performed with interpolation, this signal turns on only for the starting axis. (This signal turns off for all the axes at the start.)	
OPR request flag	This signal turns on when the power is switched on, Drive unit READY signal is turned off, PLC READY signal [Y0] in turned on, or a machine OPR starts. This signal turns off when the machine OPR completes.	
OPR complete flag	This signal turns on when a machine OPR completes normally. It turns off when the operation starts, Drive unit READY signal is turned off, or PLC READY signal [Y0] is turned on.	
Position-speed switching latch flag	This signal is used to interlock the command speed change function in the position-speed switching control. During the position-speed switching control, this signal turns on when the position control is switched to the speed control. This signal turns off when the next positioning data is processed, and during the JOG operation or manual pulse generator operation.	
Axis warning detection	This signal turns on when an axis warning occurs and turns off when Axis error reset is turned on.	
Speed change 0 flag	This signal turns on when a speed change request is issued with the new speed value being 0 and turns off when a speed change request issued with a new speed value other than 0.	

Values are stored in the bits corresponding to each flag. The following table shows the assignment of each external input signal.

Buffer memory

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0			0	0	0						

Assignment of flags

b0	In speed control flag
b1	Speed-position switching latch flag
b2	Command in-position flag
b3	OPR request flag
b4	OPR complete flag
b5	Position-speed switching latch flag
b6 to b8	Use prohibited (fixed to 0)
b9	Axis warning detection
b10	Speed change 0 flag
b11 to b15	Use prohibited (fixed to 0)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.31] Status	817	917	1017	1117

[Md.32] Target value

This area stores the target value ([Da.6] Positioning address/movement amount) for a positioning operation. The stored value depends on the positioning operation as shown below.

Positioning operation	Stored value
When the position control and current value change are started	The value of [Da.6] Positioning address/movement amount is stored.
When the OP shift operation of the OPR control	The value of the OP shift amount is stored.
Other than the above	0 is stored.

Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
μm	$\times 10^{-1}$
inch	$\times 10^{-5}$
degree	$\times 10^{-5}$
pulse	$\times 1$

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■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.32] Target value	818	918	1018	1118
	819	919	1019	1119

[Md.33] Target speed

The stored value depends on the positioning operation as shown below.

Positioning operation	Stored value
Operation with positioning data	The actual target speed, considering the override, speed limit value and other factors, is stored. When positioning is completed, 0 is stored.
Interpolation of position control	The composite speed or reference axis speed is stored in this area of the reference axis, and 0 is stored in this area of the interpolation axis.
Interpolation of speed control	The target speeds of the reference axis and interpolation axis are stored in the monitor of each axis.
JOG operation	The actual target speed, considering the JOG speed limit value for the JOG speed, is stored.
Manual pulse generator operation	0 is stored.

Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
mm/min	$\times 10^{-2}$
inch/min	$\times 10^{-3}$
degree/min	$\times 10^{-3}$
pulse/s	$\times 1$

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.33] Target speed	820	920	1020	1120
	821	921	1021	1121

[Md.63] OPR request flag ON factor

This area stores the cause which turns on OPR request flag ([Md.31] Status: b3).

OPR request flag ON cause	Stored value
No cause	0
Power-on	1
PLC READY is turned off and on	2
Drive unit READY OFF	3
Test mode	4
Machine OPR start	5

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.63] OPR request flag ON factor	822	922	1022	1122

[Md.64] Positioning control complete factor

This area stores the complete factor of OPR control and major positioning control.

Positioning control end cause	Stored value
Operation does not start after power-on or operation is being performed	0
Normal completion (Positioning control is completed correctly)	1
Normal completion (Positioning control is completed by a stop signal)	2
Normal completion (Positioning control is completed by the external stop)	3
Error completion (Positioning control is completed by an error occurrence at start)	4
Error completion (Positioning control is completed by an error occurrence during an operation)	5

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.64] Positioning control complete factor	823	923	1023	1123

[Md.34] Movement amount after near-point dog ON

- This area stores 0 when machine OPR starts.
- After machine OPR starts, the movement amount from the near-point dog ON to the machine OPR completion is stored. The movement amount indicates the amount machine to OPR completion using near-point dog ON as 0. The OP shift amount is excluded.
- For the stopper method 1, 2, or 3, 0 is always stored.

Multiplying the stored value by the following converted value enables the monitoring of the converted value in each unit.

Unit	Converted value
μm	$\times 10^{-1}$
inch	$\times 10^{-5}$
degree	$\times 10^{-5}$
pulse	$\times 1$

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.34] Movement amount after near-point dog ON	824	924	1024	1124
	825	925	1025	1125

[Md.35] Torque limit stored value

This area stores the value set in [Pr.17] Torque limit setting value or [Cd.22] New torque value.

- During positioning start, JOG operation start, manual pulse generator operation (when [Cd.21] Manual pulse generator enable flag is turned on), the value set in [Pr.17] Torque limit setting value is stored.
- When a value other than 0 is set in [Cd.22] New torque value, the value set in [Cd.22] New torque value is stored.
- When the creep speed is reached with the OPR, the value set in [Pr.54] OPR torque limit value is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.35] Torque limit stored value	826	926	1026	1126

[Md.36] Special start data instruction code setting value

This area stores Instruction code used with special start and indicated by the start data pointer currently being executed.

Special start data instruction code setting value	Stored value
Block start (normal start)	0
Condition start	1
Wait start	2
Simultaneous start	3
FOR loop	4
FOR condition	5
NEXT	6

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.36] Special start data instruction code setting value	827	927	1027	1127

[Md.37] Special start data instruction parameter setting value

This area stores Instruction parameter used with special start and indicated by the start data pointer currently being executed is stored. The stored value depends on the value stored in [Md.36] Special start data instruction code setting value as shown below.

Stored value of [Md.36] Special start data instruction code setting value	Stored contents	Stored value
Block start (normal start), NEXT	None	None
Condition start, wait start, simultaneous start, FOR condition	Condition data No.	1 to 10
FOR loop	Number of repetitions	0 to 255

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.37] Special start data instruction parameter setting value	828	928	1028	1128

[Md.38] Start positioning data No. setting value

This area stores Positioning data No. indicated by the start data pointer currently being executed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.38] Start positioning data No. setting value	829	929	1029	1129

[Md.39] In speed limit flag

This area stores whether the operation is performed with the speed limited.

In speed limit flag	Stored value
Not in speed limit (off)	0
In speed limit (on)	1

- If the speed exceeds the value set in [Pr.8] Speed limit value due to a speed change or override, the speed limit functions, and this area turns on.
- When the speed drops to less than the value set in [Pr.8] Speed limit value, or when the axis stops, this area turns off.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.39] In speed limit flag	830	930	1030	1130

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[Md.40] In speed change processing flag

This area stores whether the speed is being changed or not.

In speed limit flag	Stored value
Not in speed change (off)	0
In speed change (on)	1

- When the speed is changed during positioning control, this area turns on.
- After the speed change processing is completed or when deceleration starts with a stop signal during the speed change processing, this area turns off.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.40] In speed change processing flag	831	931	1031	1131

[Md.41] Special start repetition counter

This area stores the remaining number of repetitions when Repetition is executed with the special start.

- The range of the stored value is 0 to 255.
- The count is decremented by one at the loop end.
- When the count reaches 0, the loop ends
- For an endless loop, 0 is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.41] Special start repetition counter	832	932	1032	1132

[Md.42] Control method repetition counter

This area stores the remaining number of repetitions when Repetition is executed with the control method.

- The count is decremented by one at the loop start.
- The loop ends with the positioning data of the control method LEND, after the counter reaches 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.42] Control method repetition counter	833	933	1033	1133

[Md.43] Start data pointer being executed

This area stores a point number (1 to 50) of the start data currently being executed. When a positioning operation completes, it stores 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.43] Start data pointer being executed	834	934	1034	1134

[Md.44] Positioning data No. being executed

This area stores the positioning data No. of the positioning data currently being executed. When the JOG operation or inching operation is executed, 0 is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.44] Positioning data No. being executed	835	935	1035	1135

[Md.45] Block No. being executed

When the operation is controlled by Block start data, this area stores the block No. (7000 to 7004) of the block currently being executed. In other operations, this area stores 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.45] Block No. being executed	836	936	1036	1136

[Md.46] Last executed positioning data No.

This area stores the positioning data No. of the positioning data that was executed last time.

- The value is held until a new positioning operation is executed.
- When the JOG operation or inching operation is executed, 0 is stored.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.46] Last executed positioning data No.	837	937	1037	1137

[Md.47] Positioning data being executed

The details of the positioning data currently being executed (data with the positioning data No. set by [Md.44] Positioning data No. being executed) are stored in the following buffer memory addresses.

Buffer memory address of this area				Stored item	Reference
Axis 1	Axis 2	Axis 3	Axis 4		
838	938	1038	1138	Positioning identifier • [Da.1] Operation pattern • [Da.2] Control method • [Da.3] Acceleration time No. • [Da.4] Deceleration time No. • [Da.5] Axis to be interpolated	• Page 429 [Da.1] Operation pattern • Page 430 [Da.2] Control method • Page 431 [Da.3] Acceleration time No. • Page 431 [Da.4] Deceleration time No. • Page 432 [Da.5] Axis to be interpolated
839	939	1039	1139	[Da.10] M code	Page 440 [Da.10] M code
840	940	1040	1140	[Da.9] Dwell time	Page 439 [Da.9] Dwell time
841	941	1041	1141	Positioning option • [Da.27] M code ON signal output timing • [Da.28] ABS direction in degrees • [Da.29] Interpolation speed specification method	• Page 440 [Da.27] M code ON signal output timing • Page 441 [Da.28] ABS direction in degrees • Page 441 [Da.29] Interpolation speed specification method
842	942	1042	1142	[Da.8] Command speed	Page 438 [Da.8] Command speed
843	943	1043	1143		
844	944	1044	1144	[Da.6] Positioning address/movement amount	Page 433 [Da.6] Positioning address/ movement amount
845	945	1045	1145		
846	946	1046	1146	[Da.7] Arc address	Page 436 [Da.7] Arc address
847	947	1047	1147		

[Md.60] Analysis mode

This area stores the positioning start mode currently being executed.

Analysis mode	Stored value
Normal analysis mode	0
Pre-analysis mode	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.60] Analysis mode	857	957	1057	1157

[Md.61] Analysis complete flag

This area stores the start preparation complete state in the pre-analysis mode.

Analysis complete flag	Stored value
Analysis not completed	0
Analysis completed	1

In the interpolation control, only the value of the reference axis is changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.61] Analysis complete flag	858	958	1058	1158

[Md.48] Deceleration start flag

- When the speed status is changed from the constant speed or acceleration to deceleration during the position control whose operation pattern is Positioning complete, this area stores 1.
- At the next operation start or manual pulse generator operation enable, it stores 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Md.48] Deceleration start flag	899	999	1099	1199

[Md.70] Amplifier-less operation mode status

This area stores the operation mode currently being executed.

Operation mode status	Stored value
In normal operation mode	0
In amplifier-less operation mode	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Md.70] Amplifier-less operation mode status	1201

12.8 Control Data

System control data

[Cd.1] Module data backup request

Set this area to write module extension parameters (positioning data and block start data) to the module extension parameter file.

Module data backup request	Setting value
Not requested	0
Requested	1

- After the data is written, 0 is automatically stored. Storing 0 indicates the completion of the writing.
- For details on the module data backup function, refer to the following.

☞ Page 311 Module Data Backup Function

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.1] Module data backup request	1900

■Default value

The default value is 0.

[Cd.2] Module data initialization request

Set this area to initialize module parameters and module extension parameters (positioning data and block start data) in the buffer memory and setting values in the module extension parameter file to their factory default settings.

Module data initialization request	Setting value
Not requested	0
Requested	1

- After the data is initialized, 0 is automatically stored. Storing 0 indicates the completion of the initialization.
- After the data is initialized, turn on the systm again, or reset the CPU module.
- For details on the module data initialization function, refer to the following.

☞ Page 309 Module Data Initialization Function

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.2] Module data initialization request	1901

■Default value

The default value is 0.

[Cd.41] Deceleration start flag valid

Set whether to validate [Md.48] Deceleration start flag.

Deceleration start flag valid	Setting value
Deceleration start flag invalid	0
Deceleration start flag valid	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.41] Deceleration start flag valid	1905

■Default value

The default value is 0: Deceleration start flag invalid.

[Cd.42] Stop command processing for deceleration stop selection

Set the stop command processing for deceleration stop function (deceleration curve re-processing or deceleration curve continuation).

Deceleration start flag valid	Setting value
Deceleration curve re-processing	0
Deceleration curve continuation	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.42] Stop command processing for deceleration stop selection	1907

■Default value

The default value is 0: Deceleration curve re-processing.

[Cd.43] Output timing selection of near pass control

Select the timing to output the difference (Δd) between the actual and the set positioning end addresses in continuous path control, in which the difference is output during the execution of the next positioning data.

Output timing selection of near pass control	Setting value
At constant speed	0
At deceleration	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.43] Output timing selection of near pass control	1934

■Default value

The default value is 0: At constant speed.

[Cd.44] External input signal operation device

Set the external input signal status for the amplifier-less operation mode.

The setting of this area is applied from the buffer memory to the RD75 every 0.88ms.

Setting item		Setting value
b0	Lower limit signal	0: OFF 1: ON
b1	Upper limit signal	
b2	Drive unit READY signal	
b3	Stop signal	
b4	External command signal	
b5	Zero signal	
b6	Near-point dog signal	
b7 to b15	Use prohibited	Set 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.44] External input signal operation device	1928	1929	1930	1931

■Default value

The default value is 0: OFF.

[Cd.49] All axes error reset

Clear the axis error detection, axis error No., axis warning detection, and axis warning No. for all the axes.

- Errors are cleared by setting 1: Reset axis errors for this area.
- After the error is reset, 0 is automatically stored. Storing 0 indicates the completion of the error reset.
- When the axis operation status is Error, this area clears the errors and sets the status of the RD75 to Standby again.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.49] All axes error reset	1933

■Default value

The default value is 0.

[Cd.137] Amplifier-less operation mode switching request

Switch the operation mode.

Amplifier-less operation mode switching request	Setting value
Switching from the normal operation mode to the amplifier-less operation mode	ABCDH
Switching from the amplifier-less operation mode to the normal operation mode	0000H

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Common for Axis 1 to 4
[Cd.137] Amplifier-less operation mode switching request	1926

■Default value

The default value is 0000H.

Axis control data

[Cd.3] Positioning start No.

Set the positioning start No.

Positioning start No.	Setting value
Positioning data No.	1 to 600
Block start specification	7000 to 7004
Machine OPR	9001
Fast OPR	9002
Current value change	9003
Multiple axes simultaneous start	9004

*1 Only 1 to 600 can be set for the pre-reading start function.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.3] Positioning start No.	1500	1600	1700	1800

■Default value

The default value is 0.

[Cd.4] Positioning starting point No.

Set Starting point No. (1 to 50) to use block start data for positioning. (If a value other than 1 to 50 is set, the value is handled as 1.)

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.4] Positioning starting point No.	1501	1601	1701	1801

■Setting range

The setting range is 1 to 50.

■Default value

The default value is 0 for all the axes.

[Cd.5] Axis error reset

Clear the axis error detection, axis error No., axis warning detection, and axis warning No for each axis.

- Errors are cleared by setting 1: Reset axis errors for this area.
- After the error is reset, 0 is automatically stored. Storing 0 indicates the completion of the error reset.
- When the axis operation status is Error, this area clears the errors and sets the status of the RD75 to Standby again.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.5] Axis error reset	1502	1602	1702	1802

■Default value

The default value is 0 for all the axes.

[Cd.6] Restart command

Set this area to restart positioning from the stop status.

- When positioning is stopped for any reason (when the axis operation status is Stopped), setting 1: Restart for this area performs the positioning again from the stop position to the end point of the stopped positioning data.
- After the restart command is accepted, 0 is automatically stored. Storing 0 indicates the completion of the restart command acceptance.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.6] Restart command	1503	1603	1703	1803

■Default value

The default value is 0 for all the axes.

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[Cd.7] M code ON signal OFF request

Set this area to turn off M code ON signal [X4, X5, X6, X7].

- M code ON signal [X4, X5, X6, X7] is turned off by setting 1: M code ON signal is turned off for this Area.
- After the OFF request is accepted, 0 is automatically stored. Storing 0 indicates the completion of the OFF request acceptance.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.7] M code ON signal OFF request	1504	1604	1704	1804

■Default value

The default value is 0 for all the axes.

[Cd.8] External command valid

Set whether to validate external command signals.

External command valid	Setting value
Invalidate external command	0
Validate external command	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.8] External command valid	1505	1605	1705	1805

■Default value

The default value is 0: Invalidate external command for all the axes.

[Cd.9] New current value

Set a new feed value to change the current feed value using the start No. 9003.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.9] New current value	1506	1606	1706	1806
	1507	1607	1707	1807

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	-2147483648 to 2147483647 ($\times 10^{-1}$μm)
1: inch	-2147483648 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0 to 35999999 ($\times 10^{-5}$ degrees)
3: pulse	-2147483648 to 2147483647 (pulse)

■Default value

The default value is 0 for all the axes.

[Cd.10] New acceleration time value

When changing the acceleration time during a speed change, use this area to specify a new acceleration time value in units of ms. When 0 is set, the acceleration time is not changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.10] New acceleration time value	1508	1608	1708	1808
	1509	1609	1709	1809

■Setting range

The setting range is 0 to 8388608.

■Default value

The default value is 0 for all the axes.

[Cd.11] New deceleration time value

When changing the deceleration time during a speed change, use this area to specify a new deceleration time in units of ms. When 0 is set, the deceleration time is not changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.11] New deceleration time value	1510	1610	1710	1810
	1511	1611	1711	1811

■Setting range

The setting range is 0 to 8388608.

■Default value

The default value is 0 for all the axes.

[Cd.12] Acceleration/deceleration time change during speed change, enable/disable

Set whether to enable modifications to the acceleration/deceleration time during a speed change.

Acceleration/deceleration time change during speed change, enable/disable selection	Setting value
Acceleration/deceleration time change enabled	1
Acceleration/deceleration time change disabled	Other than 1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.12] Acceleration/deceleration time change during speed change, enable/disable selection	1512	1612	1712	1812

■Default value

The default value is 0 for all the axes.

[Cd.13] Positioning operation speed override

When using the positioning operation speed override function, use this area to specify the value of Override in units of %.

- If the speed becomes lower than the minimum unit due to override 1% or other causes, the speed is raised to the minimum unit. At this time, Less than speed 1 (Warning code: 0904H) occurs.
- When 0% is set, the speed is set to 0 and Speed change 0 flag ([Md.31] Status: b10) is set to 1. In this case, no warning occurs.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.13] Positioning operation speed override	1513	1613	1713	1813

■Setting range

The setting range is 0 to 300.

■Default value

The default value is 100 for all the axes.

[Cd.14] New speed value

Set a new speed value when changing speed. When 0 is set, the axis stops and BUSY signal remains on.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.14] New speed value	1514	1614	1714	1814
	1515	1615	1715	1815

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 2000000000 ($\times 10^{-2}$mm/min)
1: inch	0 to 2000000000 ($\times 10^{-3}$ inches/min)
2: degree	0 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	0 to 5000000 (pulse/s)

■Default value

The default value is 0 for all the axes.

[Cd.15] Speed change request

Set this area to request a speed change.

- After setting [Cd.14] New speed value, set 1: Change the speed to request a speed change (validate the value set in [Cd.14] New speed value).
- After the speed change is accepted, 0 is automatically stored. Storing 0 indicates the completion of the speed change acceptance.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.15] Speed change request	1516	1616	1716	1816

■Default value

The default value is 0.

[Cd.16] Inching movement amount

Set the inching movement amount. When 0 is set, the JOG operation is performed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.16] Inching movement amount	1517	1617	1717	1817

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 65535 ($\times 10^{-1}\mu$m)
1: inch	0 to 65535 ($\times 10^{-5}$ inches)
2: degree	0 to 65535 ($\times 10^{-5}$ degrees)
3: pulse	0 to 65535 (pulse)

■Default value

The default value is 0 for all the axes.

[Cd.17] JOG speed

Set JOG speed for JOG operation.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.17] JOG speed	1518	1618	1718	1818
	1519	1619	1719	1819

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 2000000000 ($\times 10^{-2}$mm/min)
1: inch	0 to 2000000000 ($\times 10^{-3}$ inches/min)
2: degree	0 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	0 to 5000000 (pulse/s)

■Default value

The default value is 0 for all the axes.

[Cd.18] Continuous operation interrupt request

Set this area to interrupt continuous operation.

- The continuous operation is interrupted by setting 1: Interrupt continuous control or continuous path control for this area.
- After the continuous operation interruption is accepted, 0 is automatically stored. Storing 0 indicates the completion of the continuous operation interruption.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.18] Continuous operation interrupt request	1520	1620	1720	1820

■Default value

The default value is 0 for all the axes.

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[Cd.19] OPR request flag OFF request

Set this area to request to forcibly turn off the OPR request flag with the program when the flag is on.

- The OPR request flag is turned off by setting 1: Turn off OPR request flag for this area.
- After the OPR request flag is turned off, 0 is automatically stored. Storing 0 indicates the completion of the OPR request flag OFF request.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.19] OPR request flag OFF request	1521	1621	1721	1821

■Default value

The default value is 0 for all the axes.

[Cd.20] Manual pulse generator 1 pulse input magnification

Set the factor by which the number of pulses from the manual pulse generator is magnified.

- When the setting value is 0, the value is handled as 1.
- When the setting value is 10001 or greater, the value is handled as 10000.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.20] Manual pulse generator 1 pulse input magnification	1522	1622	1722	1822
	1523	1623	1723	1823

■Setting range

The setting range is 1 to 10000.

■Default value

The default value is 1 for all the axes.

[Cd.21] Manual pulse generator enable flag

Set whether to enable manual pulse generator operations.

Manual pulse generator enable flag	Setting value
Disable manual pulse generator operation	0
Enable manual pulse generator operation	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.21] Manual pulse generator enable flag	1524	1624	1724	1824

■Default value

The default value is 0: Disable manual pulse generator operation for all the axes.

[Cd.22] New torque value

To change the value set in [Md.35] Torque limit stored value, set a new torque limit stored value in units of %.

- Set a value within the allowable range of [Pr.17] Torque limit setting value.
- When 0 is set, the torque is not changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.22] New torque value	1525	1625	1725	1825

■Setting range

The setting range is between 0 to [Pr.17] Torque limit setting value.

■Default value

The default value is 0 for all the axes.

[Cd.23] Speed-position switching control movement amount change register

During the speed control of the speed-position switching control (INC mode), the movement amount during the position control can be changed. For that, set a new movement amount.

- Set the new movement amount during the speed control of the speed-position switching control (INC mode).
- The setting value is cleared to 0 when the next operation starts.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.23] Speed-position switching control movement amount change register	1526	1626	1726	1826
	1527	1627	1727	1827

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 2147483647 ($\times 10^{-1}$ μm)
1: inch	0 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0 to 2147483647 ($\times 10^{-5}$ degrees)
3: pulse	0 to 2147483647 (pulse)

■Default value

The default value is 0 for all the axes.

[Cd.24] Speed-position switching enable flag

Set whether to enable the external control signal (External command signal (CHG): Speed-position/position-speed switching request is selected).

Speed-position switching enable flag	Setting value
Speed control is not switched to position control even when External command signal (CHG) is turned on	0
Speed control is switched to position control when External command signal (CHG) is turned on	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.24] Speed-position switching enable flag	1528	1628	1728	1828

12

■Default value

The default value is 0: Speed control is switched to position control when External command signal (CHG) is turned on for all the axes.

[Cd.25] Position-speed switching control speed change register

During the position control of the position-speed switching control, the speed during the speed control can be changed. For that, set a new speed.

- Set the new speed during the position control of the position-speed switching control.
- The setting value is cleared to 0 when the next operation starts.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.25] Position-speed switching control speed change register	1530	1630	1730	1830
	1531	1631	1731	1831

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 2000000000 ($\times 10^{-2}$mm/min)
1: inch	0 to 2000000000 ($\times 10^{-3}$ inches/min)
2: degree	0 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	0 to 5000000 (pulse/s)

■Default value

The default value is 0 for all the axes.

[Cd.26] Position-speed switching enable flag

Set whether to enable the external control signal (External command signal (CHG): Speed-position/position-speed switching request is selected).

Position-speed switching enable flag	Setting value
Position control is not switched to speed control even when External command signal (CHG) is turned on	0
Position control is switched to speed control when External command signal (CHG) is turned on	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.26] Position-speed switching enable flag	1532	1632	1732	1832

■Default value

The default value is 0: Speed control is switched to position control when External command signal (CHG) is turned on.

[Cd.27] Target position change value (new address)

Set a new positioning address to change the target position during positioning.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.27] Target position change value (new address)	1534	1634	1734	1834
	1535	1635	1735	1835

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs (ABS)	Setting value with programs (INC)
0: mm	-2147483648 to 2147483647 ($\times 10^{-1}\mu m$)	-2147483648 to 2147483647 ($\times 10^{-1}\mu m$)
1: inch	-2147483648 to 2147483647 ($\times 10^{-5}$ inches)	-2147483648 to 2147483647 ($\times 10^{-5}$ inches)
2: degree	0 to 35999999 ($\times 10^{-5}$ degrees)	-2147483648 to 2147483647 ($\times 10^{-5}$ degrees)
3: pulse	-2147483648 to 2147483647 (pulse)	-2147483648 to 2147483647 (pulse)

■Default value

The default value is 0 for all the axes.

[Cd.28] Target position change value (new speed)

Set a new speed to change the target position during positioning. When 0 is set, the speed is not changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.28] Target position change value (new speed)	1536	1636	1736	1836
	1537	1637	1737	1837

■Setting range

The setting range depends on the setting of [Pr.1] Unit setting.

Setting of [Pr.1] Unit setting	Setting value with programs
0: mm	0 to 2000000000 ($\times 10^{-2}$mm/min)
1: inch	0 to 2000000000 ($\times 10^{-3}$ inches/min)
2: degree	0 to 3000000000 ($\times 10^{-3}$ degrees/min)
3: pulse	0 to 5000000 (pulse/s)

■Default value

The default value is 0 for all the axes.

[Cd.29] Target position change request flag

Set whether to change the target position during positioning.

- The target position is changed by setting 1: Target position change request for this area.
- After the target position is changed, 0 is automatically stored. Storing 0 indicates the completion of the target position change.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.29] Target position change request flag	1538	1638	1738	1838

■Default value

The default value is 0 for all the axes.

[Cd.30] Simultaneous starting axis start data No. (Axis 1 start data No.)

Set the simultaneous starting axis start data No.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.30] Simultaneous starting axis start data No. (Axis 1 start data No.)	1540	1640	1740	1840

■Setting range

The setting range is 1 to 600.

■Default value

The default value is 0 for all the axes.

12

[Cd.31] Simultaneous starting axis start data No. (Axis 2 start data No.)

Set the simultaneous starting axis start data No.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.31] Simultaneous starting axis start data No. (Axis 2 start data No.)	1541	1641	1741	1841

■Setting range

The setting range is 1 to 600.

■Default value

The default value is 0 for all the axes.

[Cd.32] Simultaneous starting axis start data No. (Axis 3 start data No.)

Set the simultaneous starting axis start data No.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.32] Simultaneous starting axis start data No. (Axis 3 start data No.)	1542	1642	1742	1842

■Setting range

The setting range is 1 to 600.

■Default value

The default value is 0 for all the axes.

[Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.)

Set the simultaneous starting axis start data No.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.33] Simultaneous starting axis start data No. (Axis 4 start data No.)	1543	1643	1743	1843

■Setting range

The setting range is 1 to 600.

■Default value

The default value is 0 for all the axes.

[Cd.34] Step mode

Set the units by which a step operation is carried out.

Step mode	Setting value
Carry out step operation in deceleration units	0
Carry out step operation in data No. units	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.34] Step mode	1544	1644	1744	1844

■Default value

The default value is 0: Carry out step operation in deceleration units for all the axes.

[Cd.35] Step valid flag

Set whether to validate step operations.

Step valid flag	Setting value
Do not carry out step operation	0
Carry out step operation	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.35] Step valid flag	1545	1645	1745	1845

■Default value

The default value is 0: Do not carry out step operation for all the axes.

[Cd.36] Step start request

When the step function is used, set this area to continue the operation stooped by the step operation.

- The step operation continues by setting 1: Continue step operation for this area of the axis where step operation is stopped correctly.
- After the step start request is accepted, 0 is automatically stored. Storing 0 indicates the completion of the step start request acceptance.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.36] Step start request	1546	1646	1746	1846

■Default value

The default value is 0 for all the axes.

[Cd.37] Skip command

Set this area to skip the current positioning operation.

- The current positioning operation is skipped and the next positioning starts by setting 1: Issue a skip command to execute the machine deceleration, stop, and start the next positioning operation for this area.
- After the skip request is accepted, 0 is automatically stored. Storing 0 indicates the completion of the skip request.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.37] Skip command	1547	1647	1747	1847

■Default value

The default value is 0 for all the axes.

12

[Cd.38] Teaching data selection

Set the data to which the teaching result is written. When the teaching has been completed, this data is cleared to 0.

Teaching data selection	Setting value
Take the current feed value as a positioning address	0
Take the current feed value as arc data	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.38] Teaching data selection	1548	1648	1748	1848

■Default value

The default value is 0: Take the current feed value as a positioning address for all the axes.

[Cd.39] Teaching positioning data No.

Specify the positioning data No. for teaching.

- Teaching is performed when the set value is 1 to 600.
- The value is cleared to 0 when the RD75 is initialized. It is also cleared to 0 when an illegal value (601 or greater) is entered.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.39] Teaching positioning data No.	1549	1649	1749	1849

■Setting range

The setting range is 1 to 600.

■Default value

The default value is 0 for all the axes.

[Cd.40] ABS direction in degrees

Set the ABS movement direction for the position control when the unit is degree.

ABS direction in degrees	Setting value
Shortcut (the direction setting is invalid)	0
ABS clockwise	1
ABS counterclockwise	2

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.40] ABS direction in degrees	1550	1650	1750	1850

■Default value

The default value is 0: Shortcut (the direction setting is invalid) for all the axes.

[Cd.45] Speed-position switching device selection

Select the device used for the speed to position switching.

Speed-position switching device selection		Setting value
Speed-position switching control	Position-speed switching control	
External command signal is used for switching speed control to position control	External command signal is used for switching position control to speed control	0
Near-point dog signal is used for switching speed control to position control	Near-point dog signal is used for switching position control to speed control	1
[Cd.46] Speed-position switching command is used for switching speed control to position control	[Cd.46] Speed-position switching command is used for switching position control to speed control	2

When the setting value is out of the setting range at the start, the value is handled as 0.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.45] Speed-position switching device selection	1566	1666	1766	1866

■Default value

The default value is 0 for all the axes.

[Cd.46] Speed-position switching command

Switch the control between speed control and position switching when 2 is set in [Cd.45] Speed-position switching device selection. Only when [Cd.45] Speed-position switching device selection starts with 2, this area is enabled.

Speed-position switching device selection		Setting value
Speed-position switching control	Position-speed switching control	
Speed control is not switched to position control	Position control is not switched to speed control	0
Speed control is switched to position control	Position control is switched to speed control	1

- When 1 is set for this area, the position control is switched to the speed control and the speed control is switched to the position control.
- When the speed-position switching command is accepted, 0 is automatically stored. Storing 0 indicates the completion of the speed-position switching command acceptance.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.46] Speed-position switching command	1567	1667	1767	1867

■Default value

The default value is 0 for all the axes.

[Cd.43] Analysis mode setting

Set the positioning start mode.

Analysis mode setting	Setting value
Normal analysis mode	0
Pre-analysis mode	1

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
[Cd.43] Analysis mode setting	1590	1690	1790	1890

■Default value

The default value is 0 for all the axes.

12.9 Interrupt Setting

[Md.65] Interrupt factor detection flag

This area stores the detecting status of an interrupt factor.

Interrupt factor detection flag	Stored value
Interrupt factor not detected	0
Interrupt factor detected	1

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 386 Interrupt setting

[Cd.50] Interrupt factor mask

Set the interrupt factor mask.

Interrupt factor mask	Setting value
Mask (disable interruption)	0
Clear mask (enable interruption)	1

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 386 Interrupt setting

■Default value

The default value is 0: Mask.

[Cd.51] Interrupt factor reset request

Perform the interrupt factor reset request.

Interrupt factor reset request	Setting value
No reset request	0
Reset request	1

- The interrupt factor is reset by setting 1: Reset request for this area.
- When the interrupt factor reset request acceptance is completed, 0: No reset request is automatically stored. Storing 0 indicates the completion of the interrupt factor reset request.

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 386 Interrupt setting

■Default value

The default value is 0: No reset request.

[Pr.900] Interrupt factor setting

Specify the target (module) for the interrupt detection. The following table lists the available targets.

Interrupt factor setting	Detection timing	Setting value
Do not detect	OFF → ON	0
M code ON		1
Error detection		2
BUSY		3
Start complete		4
Positioning complete		5
Lower limit signal ([Md.30] External I/O signal)	ON → OFF	100
Upper limit signal ([Md.30] External I/O signal)		101
Drive unit READY ([Md.30] External I/O signal)		102
Stop signal ([Md.30] External I/O signal)	OFF → ON	103
External command signal ([Md.30] External I/O signal)		104
Zero signal ([Md.30] External I/O signal)		105
Near-point dog signal ([Md.30] External I/O signal)		106
Deviation counter clear signal ([Md.30] External I/O signal)		107
In speed control flag ([Md.31] Status)		200
Speed-position switching latch flag ([Md.31] Status)		201
Command in-position flag ([Md.31] Status)		202
OPR request flag ([Md.31] Status)		203
OPR complete flag ([Md.31] Status)		204
Position-speed switching latch flag ([Md.31] Status)		205
Warning detection ([Md.31] Status)		206
Speed change 0 flag ([Md.31] Status)		207
[Md.48] Deceleration start flag		300
[Md.61] Analysis complete flag		301

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 386 Interrupt setting

■Default value

The default value is 0: Do not detect.

[Pr.901] Axis No. for interrupt factor

Set the axis number in which an interrupt factor is detected.

Axis No. for interrupt factor	Setting value
All axes	0
Axis 1	1
Axis 2	2
Axis 3	3
Axis 4	4

■Buffer memory address

For the buffer memory address of this area, refer to the following.

☞ Page 386 Interrupt setting

■Default value

The default value is 0: All axes.

12.10 Synchronized Refresh-dedicated Area

[Md.61] Analysis complete flag

This area stores the start preparation complete state in the pre-analysis mode. Only when the RD75 is set as the inter-module synchronization target module, this area is valid.

Analysis complete flag	Stored value
Analysis not completed	0
Analysis completed	1

In the interpolation control, only the value of the reference axis is changed.

■Buffer memory address

The following table shows the buffer memory address of this area.

Buffer memory name	Axis 1	Axis 2	Axis 3	Axis 4
Analysis complete flag	54000	54001	54002	54003

12.11 Basic Parameter 3

This section describes the basic parameter 3 of the RD75. The start time and the storage location of module extension parameters of the RD75 can be changed with the basic parameter 3. The basic parameter 3 can be changed only from the module parameter of the engineering tool.

For the setting method, refer to the following.

☞ Page 321 Basic setting

Operation mode

Switch the mode of the start time between the Q series-compatible mode and quick start mode. The setting is the same for all the axes.

Operation mode	Description
Q series-compatible mode	The start time is 1.5ms. In this mode, the start time corresponds to the start time of the QD75N and LD75.
Quick start mode	The start time is 0.3ms.

■Default value

The default value is Q series-compatible mode.

Extended parameter storage setting

Set the storage location for module extension parameters. The setting is the same for all the axes.

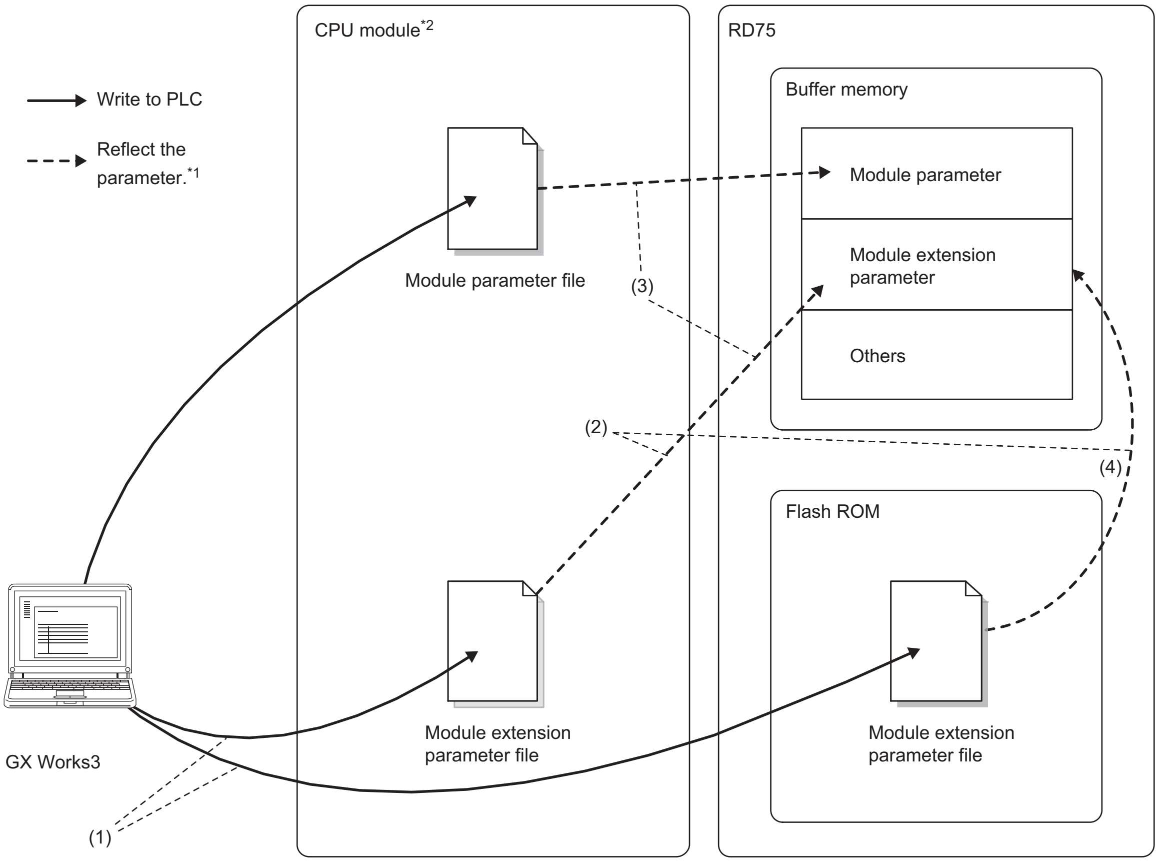
Extended parameter storage setting	Description
CPU	The module extension parameters stored in the CPU module are used. • When the power is turned on or the CPU module status is changed from STOP to RUN, the module extension parameters in the module extension parameter file stored in the CPU module are reflected to the buffer memory. • At the module data backup or module data initialization, the parameters are reflected to the module extension parameter file stored in the CPU module.
Positioning module	The module extension parameters stored in the RD75 are used. • When the power is turned on, the module extension parameters in the module extension parameter file stored in the the RD75 are reflected to the buffer memory. When the CPU module status is changed from STOP to RUN, the value just before the status change is held. • At the module data backup or module data initialization, the parameters are reflected to the module extension parameter file stored in the RD75.

Point

By setting the extension parameter storage setting to "Positioning module", MELSEC-Q series programs that extension parameters can be changed by turning on SM402, not by turning on Module access flag [X01] can be utilized.

12.12 Parameter Reflection

The parameters of the RD75 are classified into the module parameter and module extension parameter.
The parameters are stored in the CPU module or the RD75 as a module parameter file and module extension parameter file.



*1 For the reflection timing of parameters, refer to the following.
☞ Page 496 Parameter storage destination and reflection timing
*2 "Memory Card Parameters" of the CPU module determines whether the parameter file in the CPU module is used or the parameter file in the SD memory card is used.

(1) Select a write destination (CPU module or RD75) with "Write to PLC".
(2) "Extension parameter storage setting" determines whether the file in the CPU module is used or the file in the RD75 is used.
(3) The power is turned on or the CPU module status is changed from STOP to RUN.
(4) The power is turned on.

Parameter storage destination and reflection timing

The following table lists the parameter storage destinations.

Parameter file	Parameter			Storage destination
	Type	Item		
Module parameter file	Module parameter	Basic setting	Basic parameter 1, 2 Detailed parameter 1, 2 OPR basic parameter OPR detailed parameter	CPU module
		Application setting	CPU error output mode setting	
		Interrupt setting	Parameters for the Interrupt setting	
Module extension parameter file	Module extension parameter	Positioning data	Positioning data	CPU module or RD75*1
		Block start data	Block start data	
			Condition data	

*1 The storage destination differs depending on the extension parameter storage setting. For details, refer to the following.
☞ Extended parameter storage setting

Each parameter is reflected to the buffer memory of the RD75 at the following reflection timings.

Parameter storage timing	Operation	Parameter setting value reflected to the buffer memory		
		Module parameter*2	Module extension parameter*3 (Extension parameter storage setting)	
			CPU module	RD75
Power-on	Power-on	Setting value of the module parameter file in the CPU module*4	Setting value of the module extension parameter file in the CPU module	Setting value of the module extension parameter file in the RD75
CPU module status: STOP → RUN	CPU module status: STOP → RUN			The parameter just before the status change of STOP to RUN is held.
Module data initialization	• Dedicated instruction (GP.PINIT) • [Cd.2] Module data initialization request	Initial value (factory default setting value)		

*2 Some module parameters are reflected to the RD75 from the buffer memory by turning off and on PLC READY signal [Y0]. For details, refer to the following.
☞ Page 354 Valid timing of setting data
*3 When the parameter to be reflected does not exist at the reflection timing, refer to the following.
☞ Page 497 Parameter reflection
*4 If the parameter is not set with an engineering tool, the initial value is stored.

■Precautions

- To write module extension parameters to a file, specify the same write destination as the one set in the extension parameter storage setting. When a different write destination is specified, written module extension parameters are not valid. When the module extension parameter file does not exist in the storage destination set in the extension parameter storage setting, Extension parameter acquisition error (Warning code: 0992H) occurs at the reflection timing.
- To change a module extension parameter from a program when the extension parameter storage setting is "CPU", change the parameter while Module access flag [X1] is on (module access permitted). While Module access flag [X1] is off (module access disabled), the module extension parameter is changed by the internal processing of the RD75.
- To use the module extension parameters stored in the SD memory card of the CPU module, set the storage location to "CPU" in the extension parameter storage setting. Set "Memory Card Parameters" of the CPU module so that module extension parameters can be used.

■Restrictions

When the extension parameter storage setting has been set to "CPU", the module data backup and the module data initialization can be performed only while the CPU module status is STOP. Use "[Cd.1] Module data backup request" for the module data backup and "[Cd.2] Module data initialization request" for the module data initialization.

Parameter reflection

In the RD75, the parameter is reflected to the buffer memory at power-on or when the CPU module status is changed from STOP to RUN. The following table shows the parameters reflected to the buffer memory.

Parameter type	Extended parameter storage setting	Power-on	CPU module status: STOP → RUN
Module Parameter	—	Parameter stored in the CPU module*1	
Module Extension Parameter*1	CPU	Module extension parameter stored in the CPU module or SD memory card	
	Positioning module	Module extension parameter stored in the RD75*2	—

*1 When the parameter of the RD75 does not exist in the CPU module, the setting value of the buffer memory is the factory default value at power-on and the value just before the status change is held when the CPU module status is changed from STOP to RUN.
*2 When the data in the RD75 is damaged, Flash ROM sum check error (Error code: 1932H) occurs.

Point

When a module extension parameter is changed with a program, the changed module extension parameter can be reflected to the buffer memory when the power is turned on or the CPU module status is changed from STOP to RUN.

■Precautions

- When the CPU is set in the extension parameter storage setting and the module extension parameter cannot be reflected at power-on or the CPU module status is changed from STOP to RUN, Extension parameter acquisition error (Warning code: 0B00H, 0B01H, 0B02H) occurs. At this time, the module extension parameter is the initial value set at the factory.
- The module parameter set with a program is overwritten with the parameter set with an engineering tool at power-on or when the CPU module status is changed from STOP to RUN. When the module parameter is not written to the CPU module, the setting value of the buffer memory is the factory default value at power-on and the value just before the status change is held when the CPU module status is changed from STOP to RUN.
- To use the module extension parameter set with a program after the power is turned off or the CPU module status is changed from STOP to RUN as well, backup the module extension parameter by using the module data backup function.

Parameter initialization

Initialize the parameter of the RD75 according to the methods as shown below.

○: Initialized, ×: Not initialized

Initialization method	Data type	Parameter to be initialized	
		Module parameter	Module extension parameter
• Dedicated instruction GP.PINIT • [Cd.2] Module data initialization request	Buffer memory	○	○
	Parameter file*1	×	○

*1 The extension parameter storage setting determines whether the module extension parameter file stored in the CPU module is initialized or the module extension parameter file stored in the RD75 is initialized.

■Precautions

When the module parameter is written to the CPU module, the written module parameter is reflected at power-on or when the CPU module status is changed from STOP to RUN. To cancel reflecting the parameter, delete the parameter from the CPU module or initialize the parameter with an engineering tool.

■Restrictions

When the extension parameter storage setting has been set to "CPU", the module data initialization can be performed only while the CPU module status is STOP. Use "[Cd.2] Module data initialization request" for the module data initialization.

Parameter backup

The module extension parameter in the buffer memory of the RD75 can be reflected to the module extension parameter file with the following methods.

Backup method	Parameter to be backed up	
	Module parameter	Module extension parameter
Dedicated instruction GP.PFWRT	×	○
[Cd.1] Module data backup request	×	○

*1 The extension parameter storage setting determines whether the module extension parameter file stored in the CPU module is backed up or the module extension parameter file stored in the RD75 is backed up.

■Restrictions

When the extension parameter storage setting has been set to "CPU", the module data backup can be performed only while the CPU module status is STOP. Use "[Cd.1] Module data backup request" for the module data backup.

13 PROGRAMMING

This chapter describes the program required for performing the positioning control with the RD75. When creating a program required for the control, consider Start condition, Start time chart, Device setting, and the configuration of the whole control. (According to the control to be performed, set data such as parameters, positioning data, block start data, and condition data for the RD75, and create a setting program of control data and a start program of each control.)

13.1 Precautions on Programming

This section describes common precautions for writing data of the CPU module to the buffer memory of the RD75.

Reading/writing data

Using an engineering tool is recommended to set the data shown in this chapter (various parameters, positioning data, and block start data). Because setting the data with programs requires many programs and devices, the execution becomes complicated, and the scan times will increase. When changing positioning data during the continuous path control or continuous positioning control, rewrite the data before positioning data four steps before is executed. If data has not been rewritten when positioning data four steps before is executed, the data is processed as data that is not rewritten.

Restrictions on the execution interval of speed change

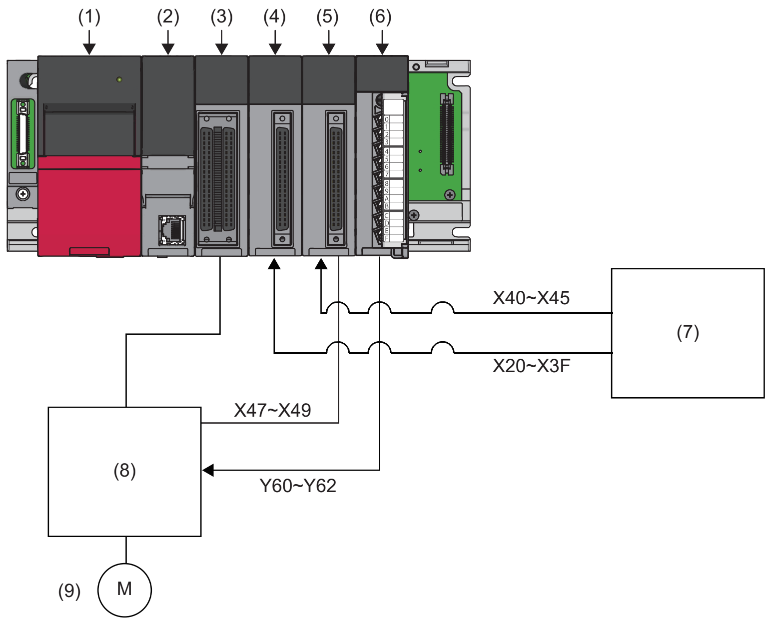
To change the speed successively using the speed change function or override function in the RD75, set 10ms or longer as the interval between each speed change.

Measures against an overrun

Setting [Pr.12] Software stroke limit upper limit value and [Pr.13] Software stroke limit lower limit value of detailed parameter 1 can prevent an overrun. Note that this is valid only when the RD75 is operating normally. Set limit switches to ensure the safety of the entire system. Establishing an external circuit through which the motor power turns off when a limit switch turns on is recommended.

System configuration

The following figure shows the system configuration used for the program examples in this section.



(1) R61P
(2) R04CPU
(3) RD75D4 (X0 to X1F/Y0 to Y1F)
(4) RX41C4 (X20 to X3F)
(5) RX41C4 (X40 to X5F)
(6) RY40NT5P (Y60 to Y6F)
(7) External device
(8) Servo amplifier
(9) Servomotor

13.2 List of Labels Used

The following table lists the assignment of the labels to be used for the program examples in this section.

Module label

Classification	Label Name	Description
Input signals of the RD75	RD75_1.bReady	RD75 READY [X0]
	RD75_1.bModuleAccessFlag	Module access flag [X1]
	RD75_1.bnMcodeOn_Axis[0]	Axis 1 M code ON signal [X4]
	RD75_1.bnErrorDetection_Axis[0]	Axis 1 Error detection signal [X8]
	RD75_1.bnBusy_Axis[0]	Axis 1 BUSY signal [XC]
	RD75_1.bnBusy_Axis_D[0]	
	RD75_1.bnStartComplete_Axis[0]	Axis 1 Start complete signal [X10]
	RD75_1.bnPositioningComplete_Axis[0]	Axis 1 Positioning complete signal [X14]
Output signals of the RD75	RD75_1.bPLCReady	PLC READY signal [Y0]
	RD75_1.bnAxisStop_Axis[0]	Axis 1 Axis stop signal [Y4]
	RD75_1.bnPositioningStart_Axis[0]	Axis 1 Positioning start signal [Y10]
Buffer memory	RD75_1.stnParameter_Axis_D[0].uUnitSetting_D	Axis 1 [Pr.1] Unit setting
	RD75_1.stnParameter_Axis_D[0].uElectronicGearSelection_D	Axis 1 [Pr.62] Electronic gear selection
	RD75_1.stnParameter_Axis_D[0].udPulsesPerRotation32bit_D	Axis 1 [Pr.2] No. of pulses per rotation (32 bits)
	RD75_1.stnParameter_Axis_D[0].udMovementAmountPerRotation32bit_D	Axis 1 [Pr.3] Movement amount per rotation (32 bits)
	RD75_1.stnParameter_Axis_D[0].uPulseOutputMode_D	Axis 1 [Pr.5] Pulse output mode
	RD75_1.stnParameter_Axis_D[0].uRotationDirectionSetting_D	Axis 1 [Pr.6] Rotation direction setting
	RD75_1.stnParameter_Axis_D[0].udBiasSpeed_D	Axis 1 [Pr.7] Bias speed at start
	RD75_1.stnParameter_Axis_D[0].uPulsesPerRotation16bit_D	Axis 1 [Pr.2] No. of pulses per rotation (16 bits)
	RD75_1.stnParameter_Axis_D[0].uMovementAmountPerRotation16bit_D	Axis 1 [Pr.3] Movement amount per rotation (16 bits)
	RD75_1.stnParameter_Axis_D[0].uUnitMagnification_D	Axis 1 [Pr.4] Unit magnification
	RD75_1.stnParameter_Axis_D[0].uOPR_Method_D	Axis 1 [Pr.43] OPR method
	RD75_1.stnParameter_Axis_D[0].uOPR_Direction_D	Axis 1 [Pr.44] OPR direction
	RD75_1.stnParameter_Axis_D[0].dOP_Address_D	Axis 1 [Pr.45] OP address
	RD75_1.stnParameter_Axis_D[0].udOPR_Speed_D	Axis 1 [Pr.46] OPR speed
	RD75_1.stnParameter_Axis_D[0].udCreepSpeed_D	Axis 1 [Pr.47] Creep speed
	RD75_1.stnParameter_Axis_D[0].uOPR_Retry_D	Axis 1 [Pr.48] OPR retry
	RD75_1.stnParameter_Axis_D[0].dSoftwareStrokeLimitUpperLimitValue_D	Axis 1 [Pr.12] Software stroke limit upper limit value
	RD75_1.stnParameter_Axis_D[0].dSoftwareStrokeLimitLowerLimitValue_D	Axis 1 [Pr.13] Software stroke limit lower limit value
	RD75_1.stnParameter_Axis_D[0].uCurrentFeedValue_SpeedControl_D	Axis 1 [Pr.21] Current feed value during speed control
	RD75_1.stnParameter_Axis_D[0].uSpeedPositionFunctionSelection_D	Axis 1 [Pr.150] Speed-position function selection
	RD75_1.stnAxisControlData_Axis_D[0].uOPR_RequestFlagOffRequest_D	Axis 1 [Cd.19] OPR request flag OFF request
	RD75_1.stnAxisControlData_Axis_D[0].uExternalCommandValid_D	Axis 1 [Cd.8] External command valid
	RD75_1.stnAxisControlData_Axis_D[0].uSpeedPositionSwitchingEnableFlag_D	Axis 1 [Cd.24] Speed-position switching enable flag
	RD75_1.stnAxisControlData_Axis_D[0].udSpeedPositionSwitchingControlMovementAmountChangeRegister_D	Axis 1 [Cd.23] Speed-position switching control movement amount change register
	RD75_1.stnAxisControlData_Axis_D[0].uPositionSpeedSwitchingControlEnableFlag_D	Axis 1 [Cd.26] Position-speed switching enable flag
	RD75_1.stnAxisControlData_Axis_D[0].udPositionSpeedSwitchingControlSpeedChangeRegister_D	Axis 1 [Cd.25] Position-speed switching control speed change register
	RD75_1.stnAxisControlData_Axis_D[0].uAnalysisModeSetting_D	Axis 1 [Cd.43] Analysis mode setting
	RD75_1.stnAxisControlData_Axis_D[0].uMcodeOnSignalTurnsOffRequest_D	Axis 1 [Cd.7] M code ON signal OFF request

Classification	Label Name	Description
Buffer memory	RD75_1.stnAxisControlData_Axis_D[0].uPositioningOperationSpeedOverride_D	Axis 1 [Cd.13] Positioning operation speed override
	RD75_1.stnAxisControlData_Axis_D[0].uNewTorqueValue_D	Axis 1 [Cd.22] New torque value
	RD75_1.stnAxisControlData_Axis_D[0].uStepMode_D	Axis 1 [Cd.34] Step mode
	RD75_1.stnAxisControlData_Axis_D[0].uStepValidFlag_D	Axis 1 [Cd.35] Step valid flag
	RD75_1.stnAxisControlData_Axis_D[0].uSkipCommand_D	Axis 1 [Cd.37] Skip command
	RD75_1.stnAxisControlData_Axis_D[0].uInterruptionRequest_ContinuousOperation_D	Axis 1 [Cd.18] Continuous operation interrupt request

Global label

The following table lists the global labels used for the program examples in this section. Set the global labels as follows.

- Global labels for which Assign (Device/Label) is set

	Label Name	Data Type		Class	Assign (Device/Label)
1	bOutpuAbsReq	Bit	...	VAR_GLOBAL	Y62
2	bOutpuAbsTrMode	Bit	...	VAR_GLOBAL	Y61
3	bOutpuServoON	Bit	...	VAR_GLOBAL	Y60
4	bInputFastStartReq	Bit	...	VAR_GLOBAL	X52
5	bInputFBErrResetReq	Bit	...	VAR_GLOBAL	X4E
6	bInputbInputSpeedPositionSwitchingAbsSetReq	Bit	...	VAR_GLOBAL	X4D
7	bInputExecutionProhibitionFlagReleaseReq	Bit	...	VAR_GLOBAL	X4C
8	bInputPreReadingStartReq	Bit	...	VAR_GLOBAL	X4B
9	bInputTrDataComp	Bit	...	VAR_GLOBAL	X49
10	bInputAbsBit1	Bit	...	VAR_GLOBAL	X48
11	bInputAbsBit0	Bit	...	VAR_GLOBAL	X47
12	bInputTargetPositionChangeReq	Bit	...	VAR_GLOBAL	X45
13	bInputSetInchingMovementAmountReq	Bit	...	VAR_GLOBAL	X44
14	bInputChangePositionSpeedSwitchingSpeedReq	Bit	...	VAR_GLOBAL	X43
15	bInputPositionSpeedSwitchingDisableReq	Bit	...	VAR_GLOBAL	X42
16	bInputPositionSpeedSwitchingEnableReq	Bit	...	VAR_GLOBAL	X41
17	bInputPositionSpeedSwitchingReq	Bit	...	VAR_GLOBAL	X40
18	bInputStopReq	Bit	...	VAR_GLOBAL	X3F
19	bInputErrResetReq	Bit	...	VAR_GLOBAL	X3E
20	bInputWriteFlashReq	Bit	...	VAR_GLOBAL	X3D
21	bInputInitializeParameterReq	Bit	...	VAR_GLOBAL	X3C
22	bInputRestartReq	Bit	...	VAR_GLOBAL	X3B
23	bInputStopContinuousOperationReq	Bit	...	VAR_GLOBAL	X3A
24	bInputTeachingReq	Bit	...	VAR_GLOBAL	X39
25	bInputSkipReq	Bit	...	VAR_GLOBAL	X38
26	bInputStepOperationReq	Bit	...	VAR_GLOBAL	X37
27	bInputChangeTorqueReq	Bit	...	VAR_GLOBAL	X36
28	bInputChangeAccDecTimeDisable	Bit	...	VAR_GLOBAL	X35
29	bInputChangeAccDecTimeReq	Bit	...	VAR_GLOBAL	X34
30	bInputOverrideReq	Bit	...	VAR_GLOBAL	X33
31	bInputChangeSpeedReq	Bit	...	VAR_GLOBAL	X32
32	bInputCurrentFeedValueChangeReq	Bit	...	VAR_GLOBAL	X31
33	bInputStartMPGReq	Bit	...	VAR_GLOBAL	X30
34	bInputReverseJogStartReq	Bit	...	VAR_GLOBAL	X2F
35	bInputForwardJogStartReq	Bit	...	VAR_GLOBAL	X2E
36	bInputSetJogSpeedReq	Bit	...	VAR_GLOBAL	X2D
37	bInputMcodeOffReq	Bit	...	VAR_GLOBAL	X2C
38	bInputStartPositioningReq	Bit	...	VAR_GLOBAL	X2B
39	bInputStartAdvancedPositioningReq	Bit	...	VAR_GLOBAL	X2A
40	bInputChangeSpeedPositionSwitchingMovementAmount	Bit	...	VAR_GLOBAL	X29
41	bInputSpeedPositionSwitchingDisableReq	Bit	...	VAR_GLOBAL	X28
42	bInputSpeedPositionSwitchingEnableReq	Bit	...	VAR_GLOBAL	X27
43	bInputSpeedPositionSwitchingReq	Bit	...	VAR_GLOBAL	X26
44	bInputSetStartPositioningNoReq	Bit	...	VAR_GLOBAL	X25
45	bInputFastOPRStartReq	Bit	...	VAR_GLOBAL	X24
46	bInputOPRStartReq	Bit	...	VAR_GLOBAL	X23
47	bInputExternalCommandInvalidReq	Bit	...	VAR_GLOBAL	X22
48	bInputExternalCommandValidReq	Bit	...	VAR_GLOBAL	X21
49	bInputOPRReqFlagOffReq	Bit	...	VAR_GLOBAL	X20

• Global labels for which Assign (Device/Label) is not set (When Assign (Device/Label) is not set, the unused internal relay and data device are automatically assigned.)

	Label Name	Data Type		Class	Assign (Device/Label)
50	bSetPositioningData_bEN	Bit	...	VAR_GLOBAL	
51	bSetPositioningData_bENO	Bit	...	VAR_GLOBAL	
52	bSetPositioningData_bOK	Bit	...	VAR_GLOBAL	
53	bSetPositioningData_bErr	Bit	...	VAR_GLOBAL	
54	uSetPositioningData_bErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
55	bJOG_bENO	Bit	...	VAR_GLOBAL	
56	bJOG_bOK	Bit	...	VAR_GLOBAL	
57	bJOG_bErr	Bit	...	VAR_GLOBAL	
58	uJOG_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
59	bMPG_bENO	Bit	...	VAR_GLOBAL	
60	bMPG_bOK	Bit	...	VAR_GLOBAL	
61	bMPG_bErr	Bit	...	VAR_GLOBAL	
62	uMPG_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
63	bChangeSpeed_bENO	Bit	...	VAR_GLOBAL	
64	bChangeSpeed_bOK	Bit	...	VAR_GLOBAL	
65	bChangeSpeed_bErr	Bit	...	VAR_GLOBAL	
66	uChangeSpeed_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
67	bChangeAccDecTime_bENO	Bit	...	VAR_GLOBAL	
68	bChangeAccDecTime_bOK	Bit	...	VAR_GLOBAL	
69	bChangeAccDecTime_bErr	Bit	...	VAR_GLOBAL	
70	uChangeAccDecTime_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
71	bChangePosition_bENO	Bit	...	VAR_GLOBAL	
72	bChangePosition_bOK	Bit	...	VAR_GLOBAL	
73	bChangePosition_bErr	Bit	...	VAR_GLOBAL	
74	uChangePosition_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
75	bRestart_bENO	Bit	...	VAR_GLOBAL	
76	bRestart_bOK	Bit	...	VAR_GLOBAL	
77	bRestart_bErr	Bit	...	VAR_GLOBAL	
78	uRestart_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
79	bInitializeParameter_bENO	Bit	...	VAR_GLOBAL	
80	bInitializeParameter_bOK	Bit	...	VAR_GLOBAL	
81	bInitializeParameter_bErr	Bit	...	VAR_GLOBAL	
82	uInitializeParameter_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
83	bOperateError_bENO	Bit	...	VAR_GLOBAL	
84	bOperateError_bOK	Bit	...	VAR_GLOBAL	
85	bOperateError_bModuleErr	Bit	...	VAR_GLOBAL	
86	uOperateError_uModuleErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
87	bOperateError_bModuleWarn	Bit	...	VAR_GLOBAL	
88	uOperateError_uModuleWarnId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
89	bOperateError_bErr	Bit	...	VAR_GLOBAL	
90	uOperateError_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
91	bWriteFlash_bENO	Bit	...	VAR_GLOBAL	
92	bWriteFlash_bOK	Bit	...	VAR_GLOBAL	
93	bWriteFlash_bErr	Bit	...	VAR_GLOBAL	
94	uWriteFlash_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
95	bBasicParamSetComp	Bit	...	VAR_GLOBAL	
96	bSetElectronicGear16bit	Bit	...	VAR_GLOBAL	
97	bOPRParamSetComp	Bit	...	VAR_GLOBAL	
98	uBlockData	Word [Unsigned]/Bit String [16-bit](0..4)	...	VAR_GLOBAL	
99	uBlockInstData	Word [Unsigned]/Bit String [16-bit](0..4)	...	VAR_GLOBAL	
100	bOPRReqFlagOffReq_P	Bit	...	VAR_GLOBAL	

	Label Name	Data Type		Class	Assign (Device/Label)
101	bOPRReqFlagOffReq_H	Bit	...	VAR_GLOBAL	
102	bOPRReqFlagOffReq	Bit	...	VAR_GLOBAL	
103	udMovementAmount	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	
104	udSpeed	Double Word [Signed]	...	VAR_GLOBAL	
105	bStartPositioning_bENO	Bit	...	VAR_GLOBAL	
106	bStartPositioning_bOK	Bit	...	VAR_GLOBAL	
107	bStartPositioning_bErr	Bit	...	VAR_GLOBAL	
108	uStartPositioning_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
109	bDuringMPGOperation	Bit	...	VAR_GLOBAL	
110	bFastStartPreparationComp	Bit	...	VAR_GLOBAL	
111	bFastOPRStartReq	Bit	...	VAR_GLOBAL	
112	bFastOPRStartReq_H	Bit	...	VAR_GLOBAL	
113	bDuringJogInchingOperation	Bit	...	VAR_GLOBAL	
114	udJogOperationSpeed	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	
115	uInchingMovementAmount	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
116	bChangeSpeedReq	Bit	...	VAR_GLOBAL	
117	bOverrideReq_P	Bit	...	VAR_GLOBAL	
118	bChangeAccDecTime_iEnable	Bit	...	VAR_GLOBAL	
119	bStepOperationReq_P	Bit	...	VAR_GLOBAL	
120	bChangeTorqueReq	Bit	...	VAR_GLOBAL	
121	bSkipReq_P	Bit	...	VAR_GLOBAL	
122	bSkipReq	Bit	...	VAR_GLOBAL	
123	bTeachingReq_P	Bit	...	VAR_GLOBAL	
124	bTeachingReq	Bit	...	VAR_GLOBAL	
125	uTeachingData	Word [Unsigned]/Bit String [16-bit](0..3)	...	VAR_GLOBAL	
126	uTeachingDevice	Bit(0..1)	...	VAR_GLOBAL	
127	bStopContinuousOperationReq_P	Bit	...	VAR_GLOBAL	
128	bTargetPositionChangeReq	Bit	...	VAR_GLOBAL	
129	bRestartReq	Bit	...	VAR_GLOBAL	
130	bInitializeParameterReq	Bit	...	VAR_GLOBAL	
131	bWriteFlashReq	Bit	...	VAR_GLOBAL	
132	bErrResetReq	Bit	...	VAR_GLOBAL	
133	bStopReq_P	Bit	...	VAR_GLOBAL	
134	bABRSTReq	Bit	...	VAR_GLOBAL	
135	bErrReadReq	Bit	...	VAR_GLOBAL	
136	bPositioningStartReq	Bit	...	VAR_GLOBAL	
137	bABRSTReq_P	Bit	...	VAR_GLOBAL	
138	bABRST_bENO	Bit	...	VAR_GLOBAL	
139	bABRST_bOK	Bit	...	VAR_GLOBAL	
140	bABRST_bAbsNG	Bit	...	VAR_GLOBAL	
141	uABRST_uAbsErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
142	bABRST_bErr	Bit	...	VAR_GLOBAL	
143	uABRST_uErrId	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
144	uPositioningStartNo	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	
145	bInputInterruptMaskRstReq	Bit	...	VAR_GLOBAL	
146	bSkipFunctionSelectionReq	Bit	...	VAR_GLOBAL	

13.3 Creating Programs

This section describes Operation programs for the positioning control actually used.

Overall configuration of programs

The following table shows the overall configuration of positioning control operation programs.

No.	Program name	Remarks
1	Parameter setting program	• The programs are unnecessary when parameters, positioning data, and block start data are set using an engineering tool. • When the machine OPR control is not performed, setting OPR parameters is unnecessary.
2	Positioning data setting program	
3	Block start data setting program	
4	OPR request OFF program	The program is unnecessary when the machine OPR is performed.
5	External command function valid setting program	—
6	PLC READY signal [Y0] ON program	
7	Positioning start No. setting program	
8	OPR program	When the machine OPR control is not performed, setting OPR parameters is unnecessary.
9	Positioning start program	—
10	Quick start program	The program is unnecessary when the quick start is not performed.
11	M code OFF program	The program is unnecessary when the M code output function is not used.
12	JOG operation setting program	The program is unnecessary when the JOG operation is not used.
13	Inching operation setting program	The program is unnecessary when the inching operation is not used.
14	JOG operation/inching operation execution program	The program is unnecessary when the JOG operation and inching operation are not used.
15	Manual pulse generator operation program	The program is unnecessary when the manual pulse generator operation is not used.
16	Speed change program	The program is added as required.
17	Override program	
18	Acceleration/deceleration time change program	
19	Torque change program	
20	Step operation program	
21	Skip program	
22	Teaching program	
23	Continuous operation interrupt program	
24	Target position change program	
25	Absolute position restoration program	
26	Restart program	
27	Parameter/data initialization program	
28	Flash ROM write program	
29	Error reset program	
30	Stop program	—

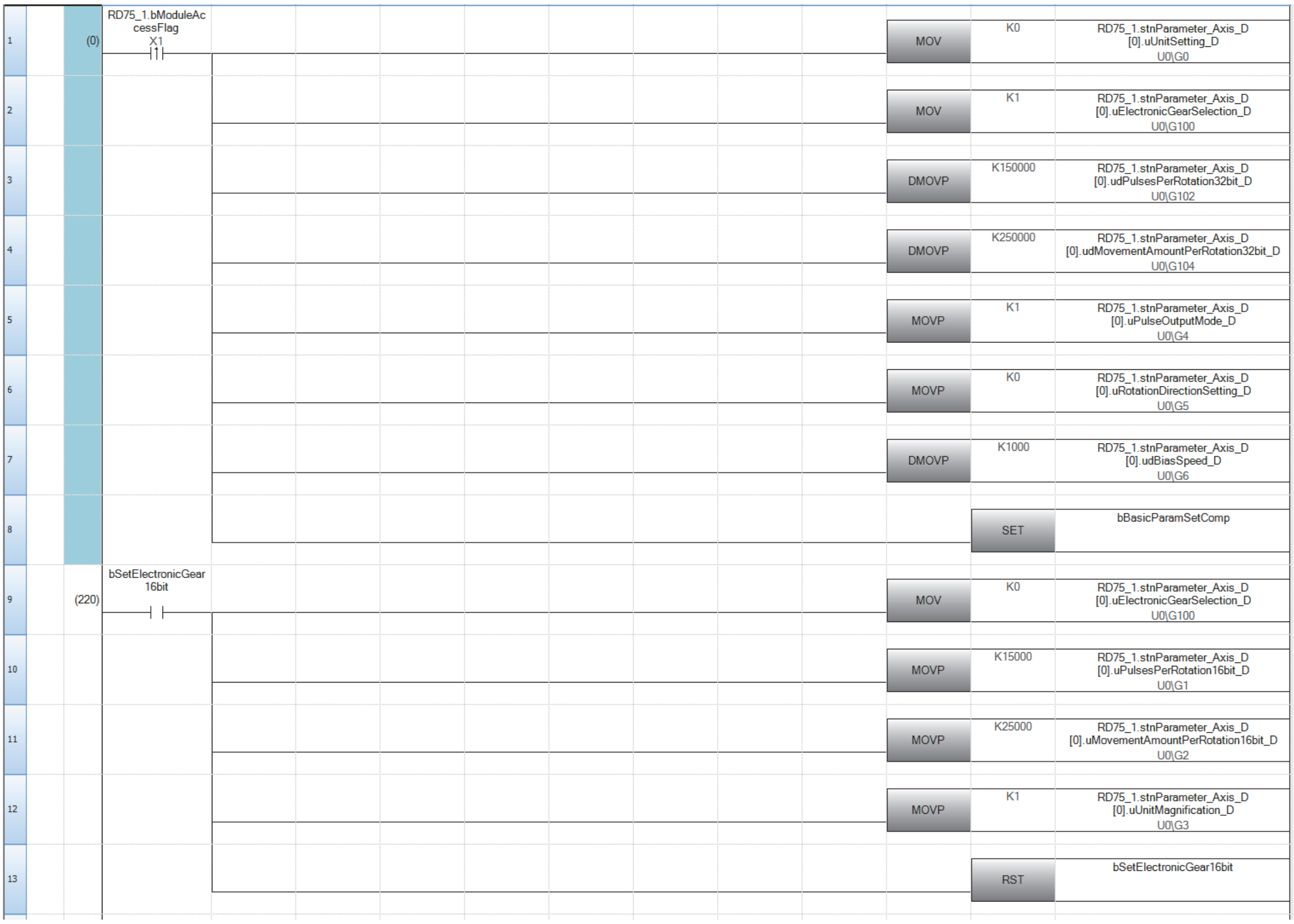
13.4 Program Example

This section shows program examples for positioning of Axis 1.

Parameter setting program

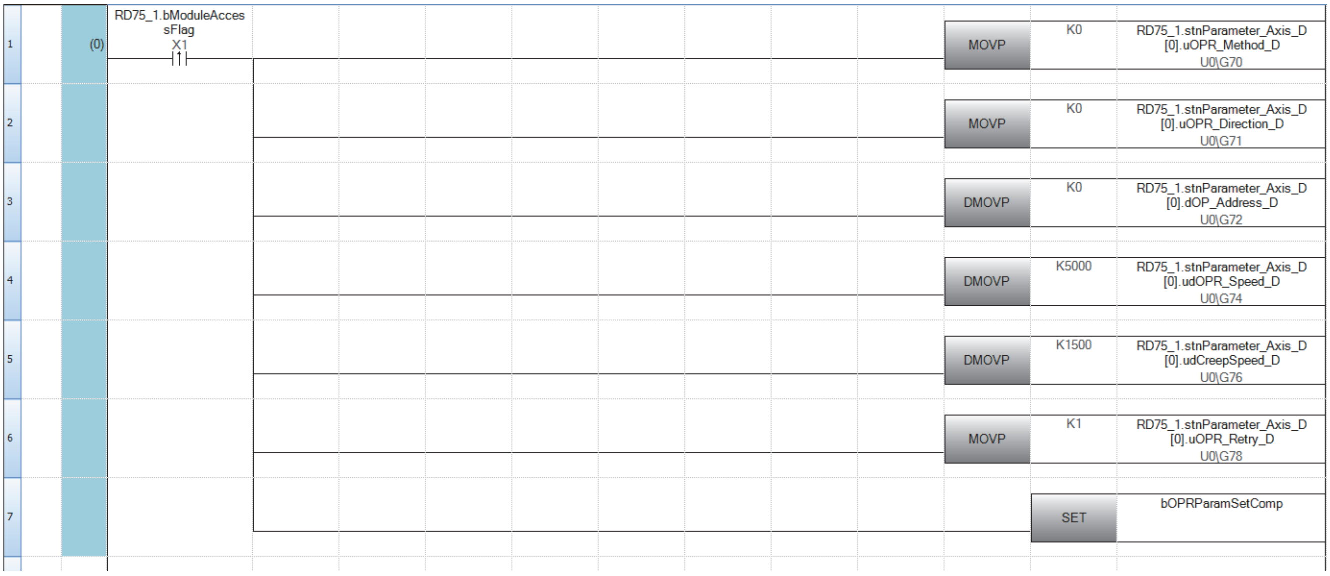
When parameters are set in the module parameter of an engineering tool, this program is unnecessary.

■Setting of basic parameter 1 (axis 1)



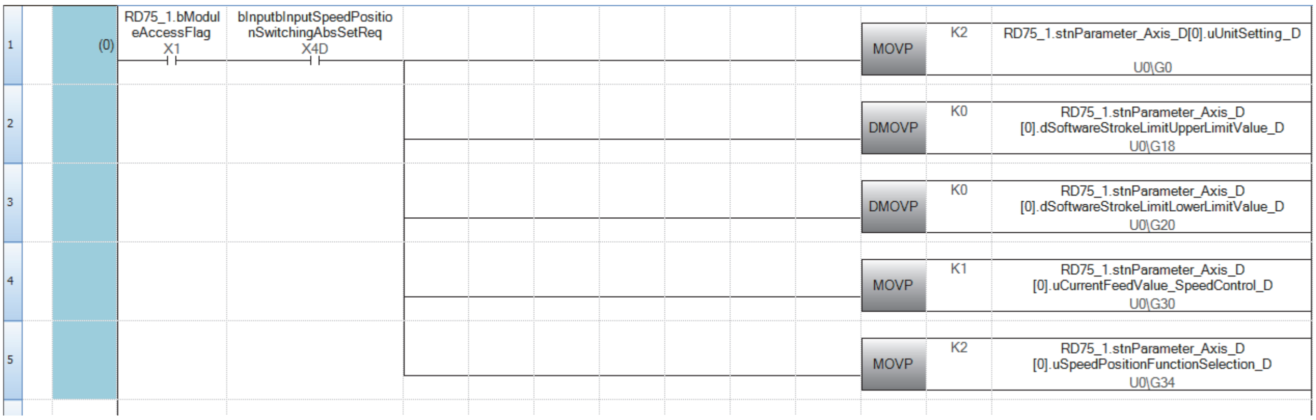
(220) For using the electronic gear function in 16 bits

■Setting of OPR basic parameter (axis 1)



■Parameter setting program for the speed-position switching control (ABS mode)

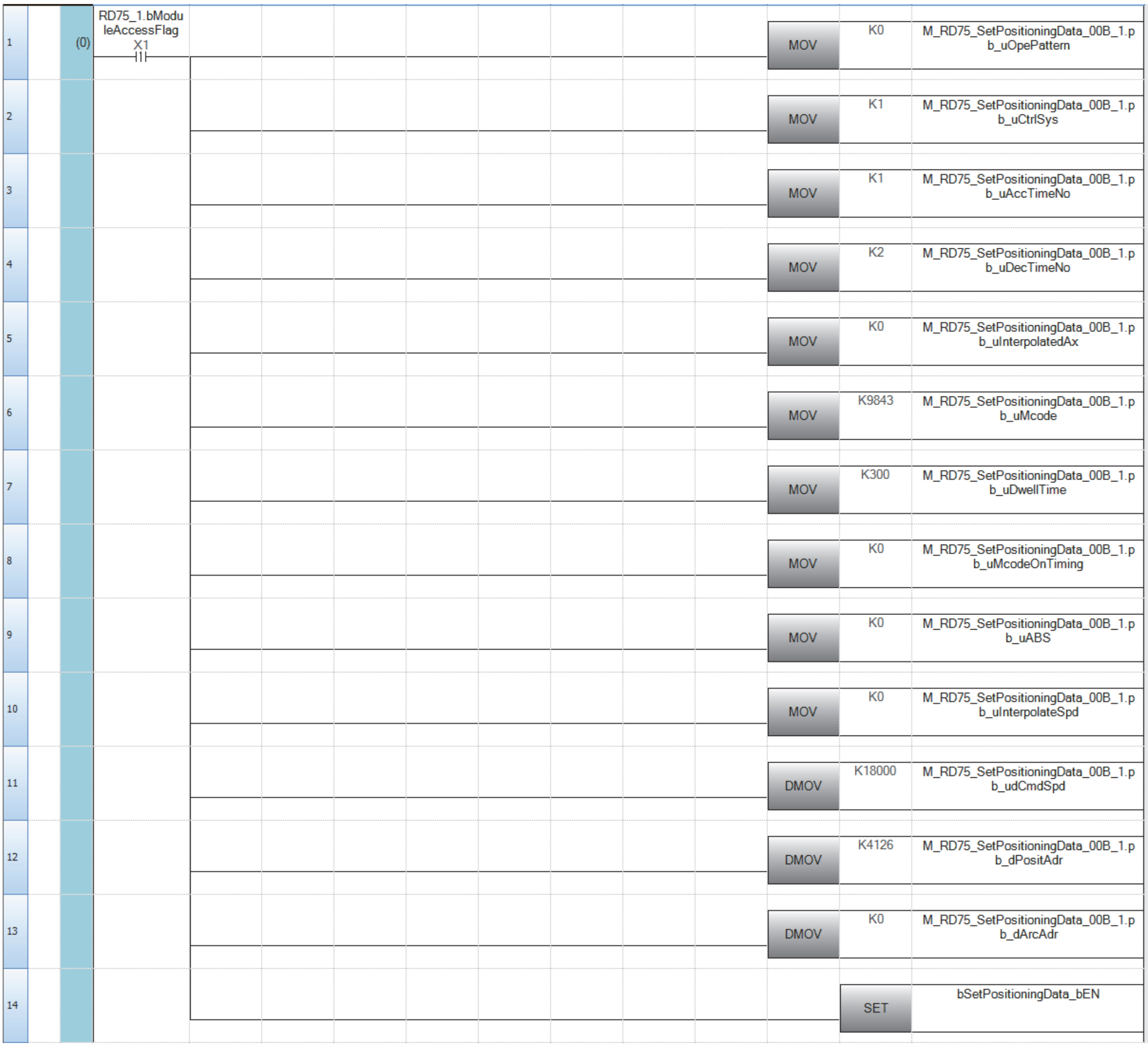
This program is unnecessary when the speed-position switching control (ABS mode) is not executed.

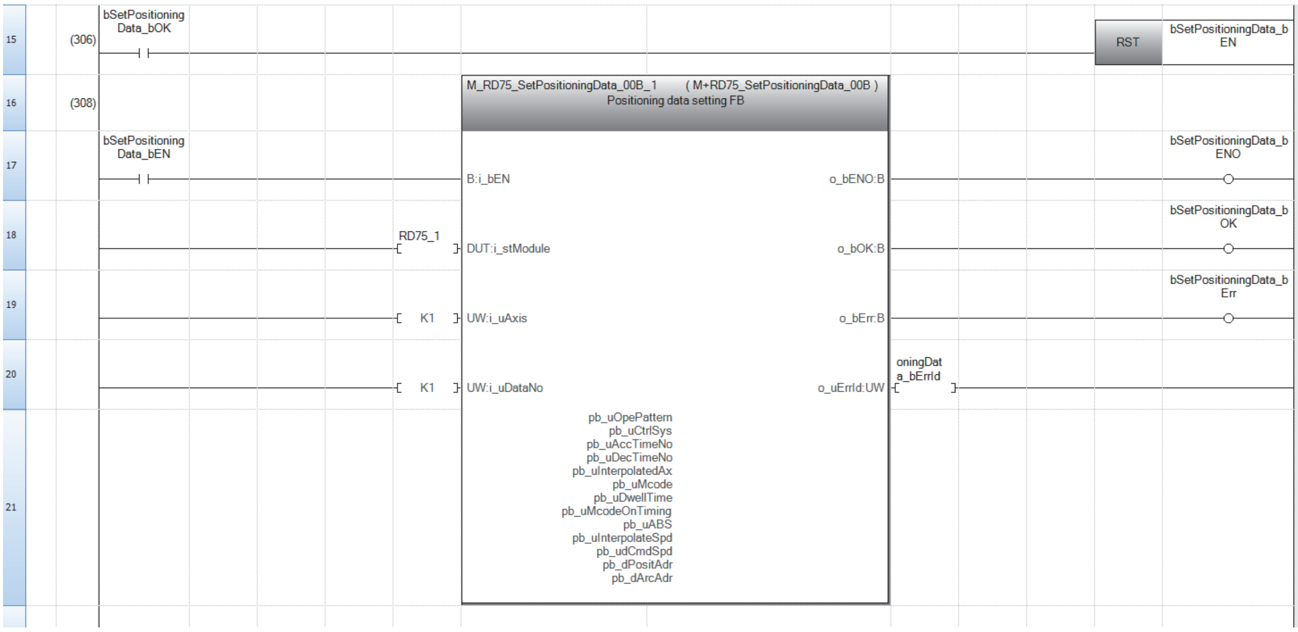


13

Positioning data setting program

When positioning data is set in "Module Extended Parameter" of an engineering tool, this program is unnecessary.

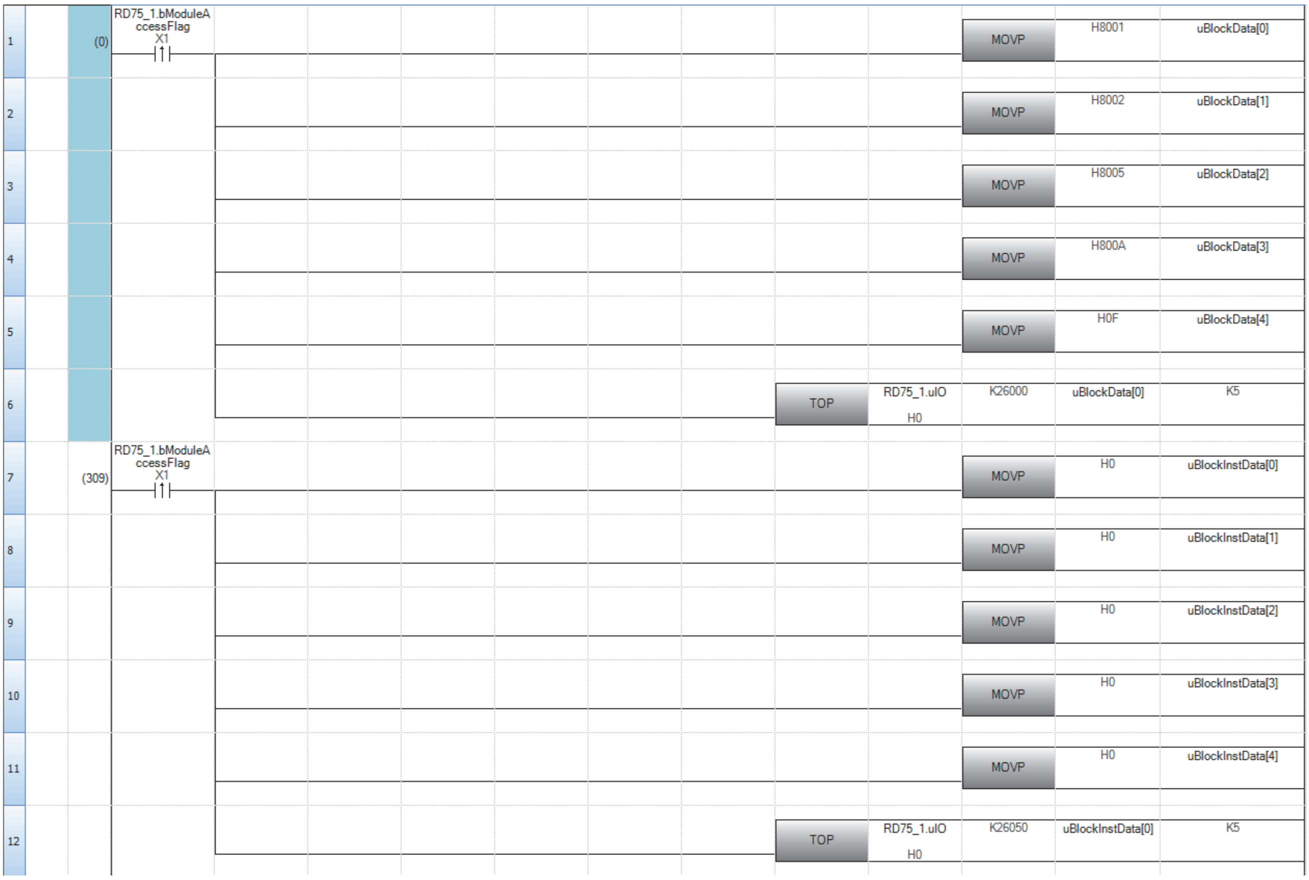



15
(306)
bSetPositioning Data_bOK
RST
bSetPositioningData_bEN
16
(308)
M_RD75_SetPositioningData_00B_1 (M+RD75_SetPositioningData_00B)
Positioning data setting FB
17
bSetPositioning Data_bEN
B:i_bEN
o_bENO:B
bSetPositioningData_bENO
18
RD75_1
DUT:i_stModule
o_bOK:B
bSetPositioningData_bOK
19
K1
UW:i_uAxis
o_bErr:B
bSetPositioningData_bErr
20
K1
UW:i_uDataNo
o_uErrId:UW
oningData_bErrId
21
pb_uOpePattern
pb_uCtrlSys
pb_uAccTimeNo
pb_uDecTimeNo
pb_uInterpolatedAx
pb_uMcode
pb_uDwellTime
pb_uMcodeOnTiming
pb_uABS
pb_uInterpolateSpd
pb_udCmdSpd
pb_dPositAdr
pb_dArcAdr

13

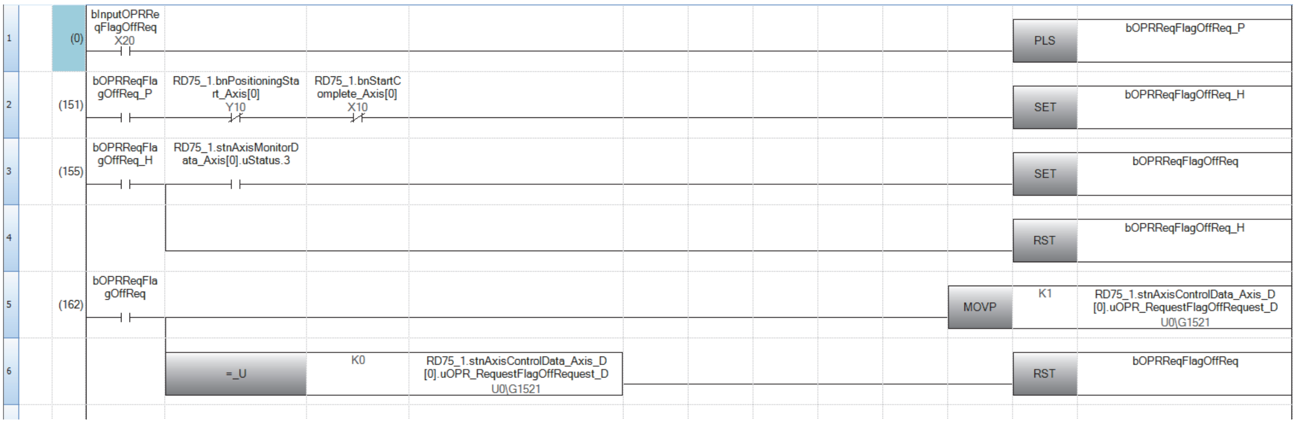
Block start data setting program

When positioning data is set in "Module Extended Parameter" of an engineering tool, this program is unnecessary.

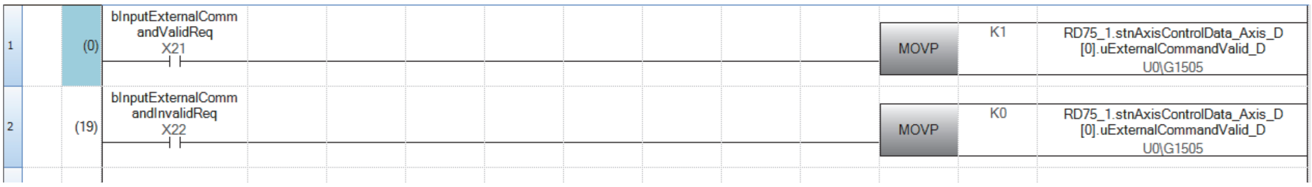


OPR request OFF program

When "Setting of operation during uncompleted OPR" is set to "1: Execute positioning control" in the module parameter of an engineering tool, this program is unnecessary.



External command function valid setting program

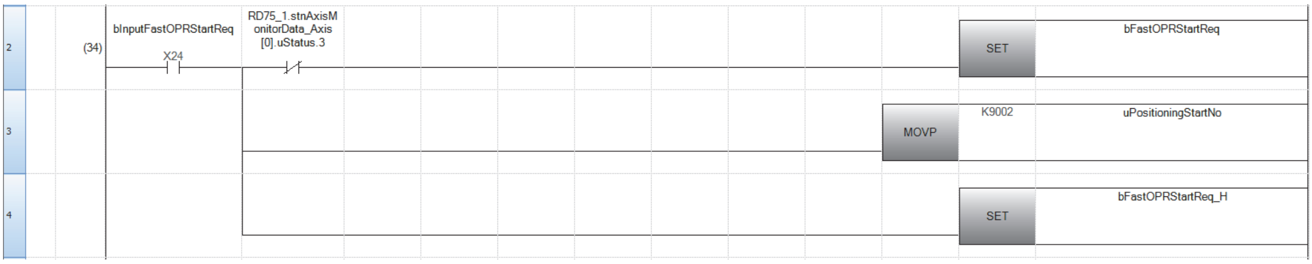


PLC READY signal [Y0] ON program

Positioning start No. setting program

■Machine OPR

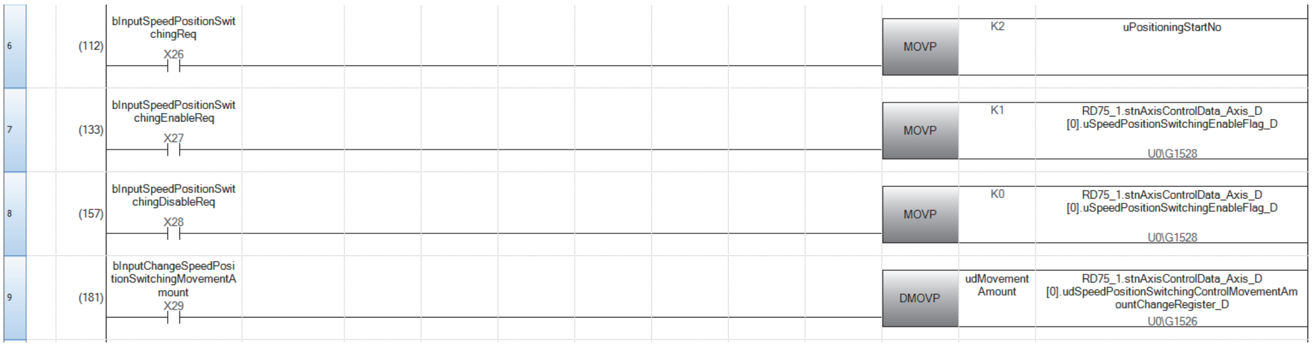
■Fast OPR



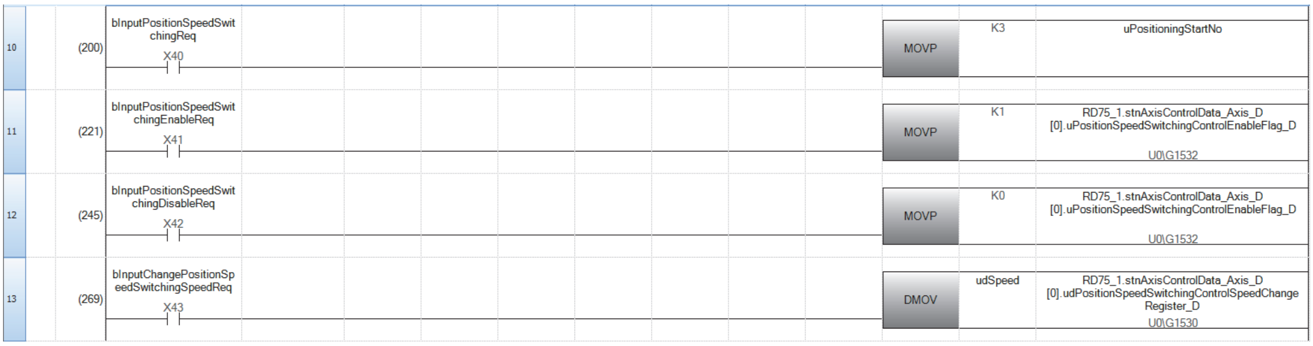
■Positioning with the positioning data No.1

■Speed-position switching control (positioning data No.2)

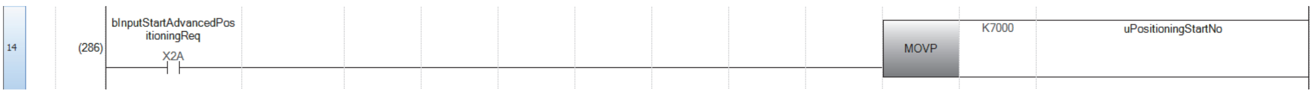
For the ABS mode, writing the target movement amount after change is unnecessary.



■Position-speed switching control (positioning data No.3)

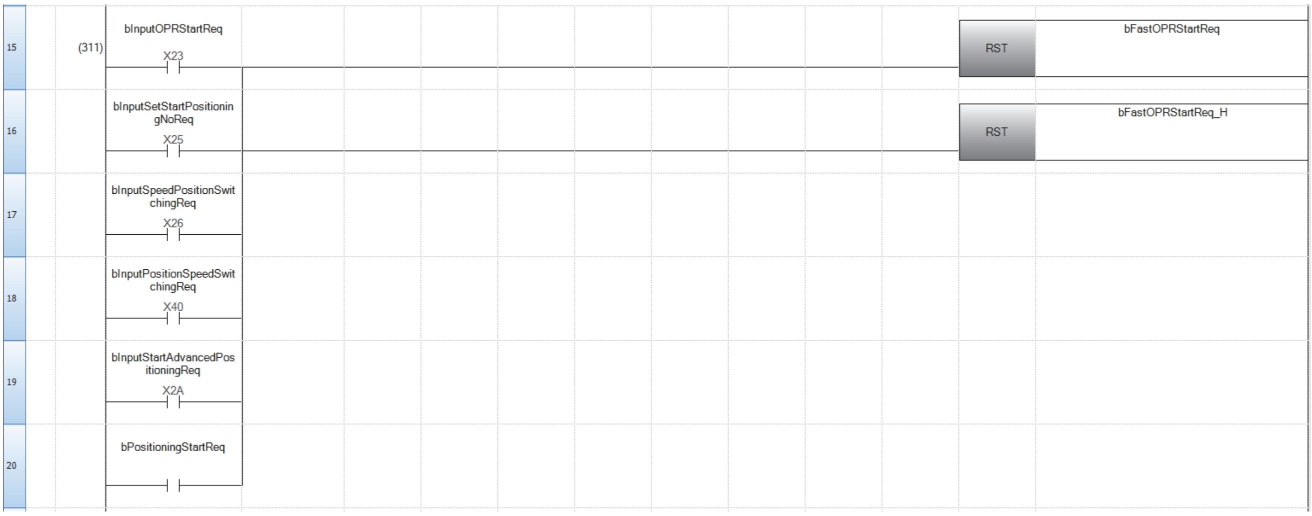


■Advanced positioning control

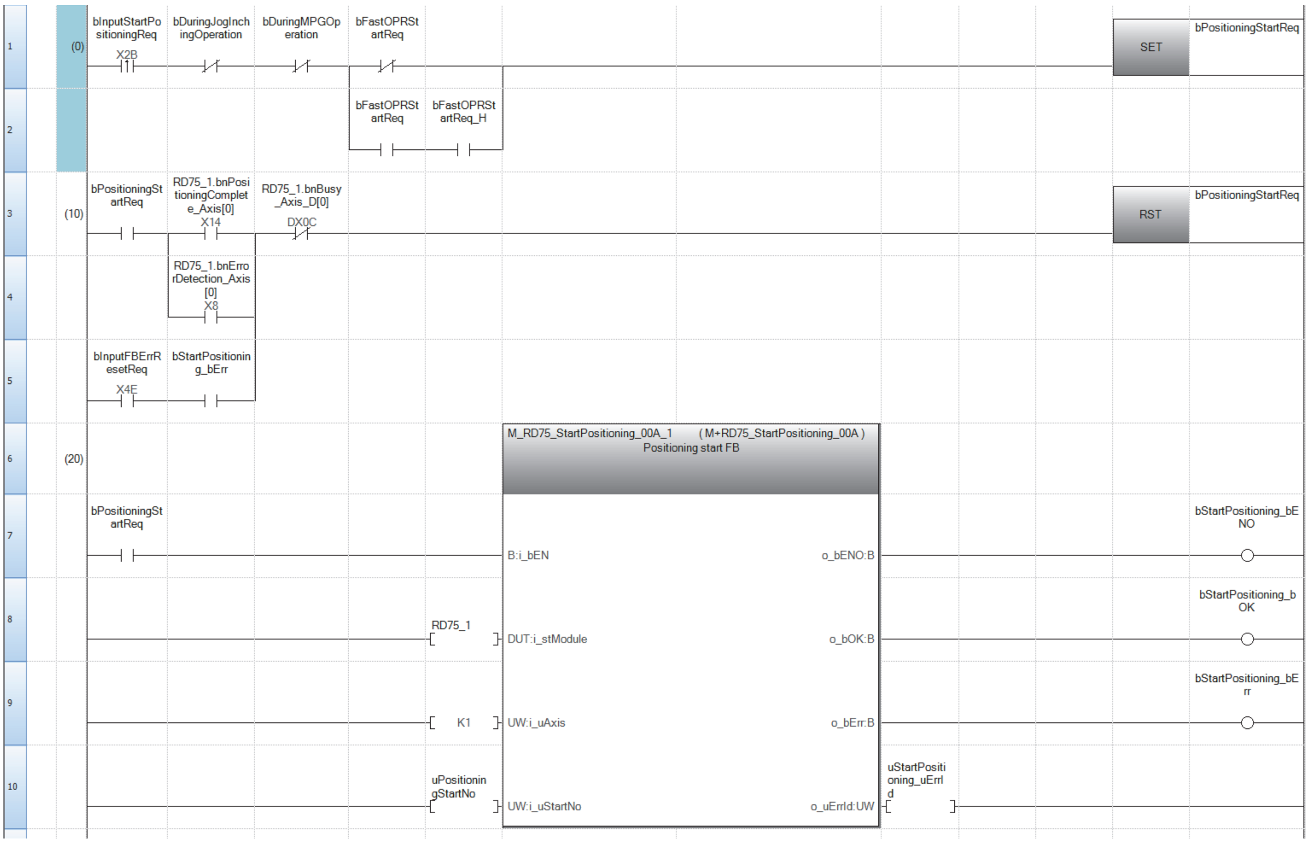


■Turning off a fast OPR command and fast OPR command storage

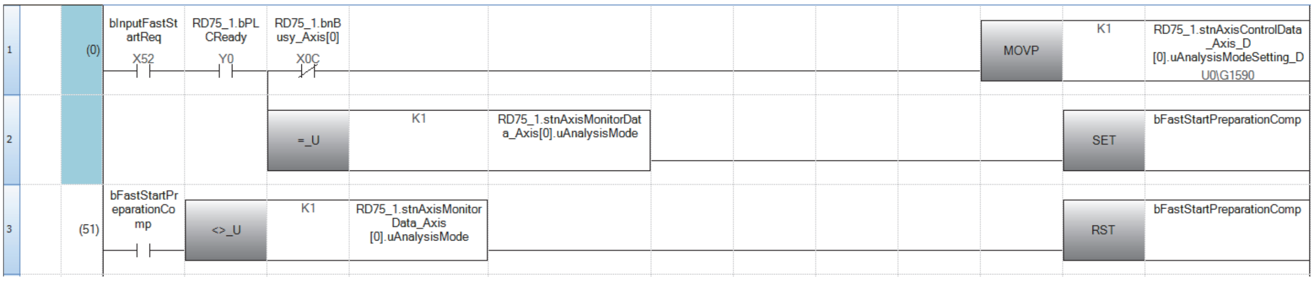
This program is unnecessary when the fast OPR is not used.



Positioning start program

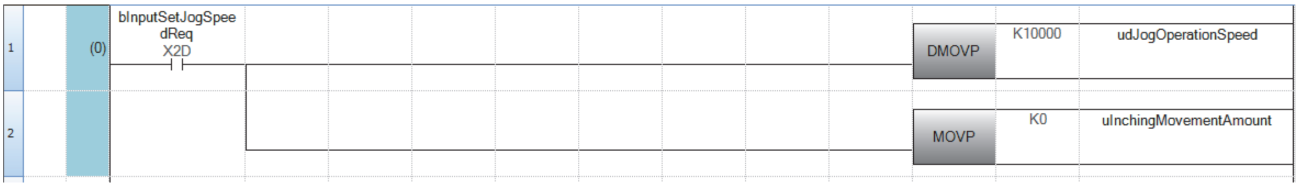


Quick start program

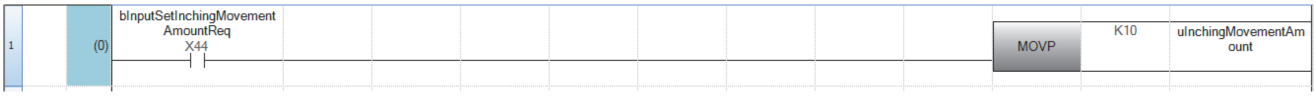


M code OFF program

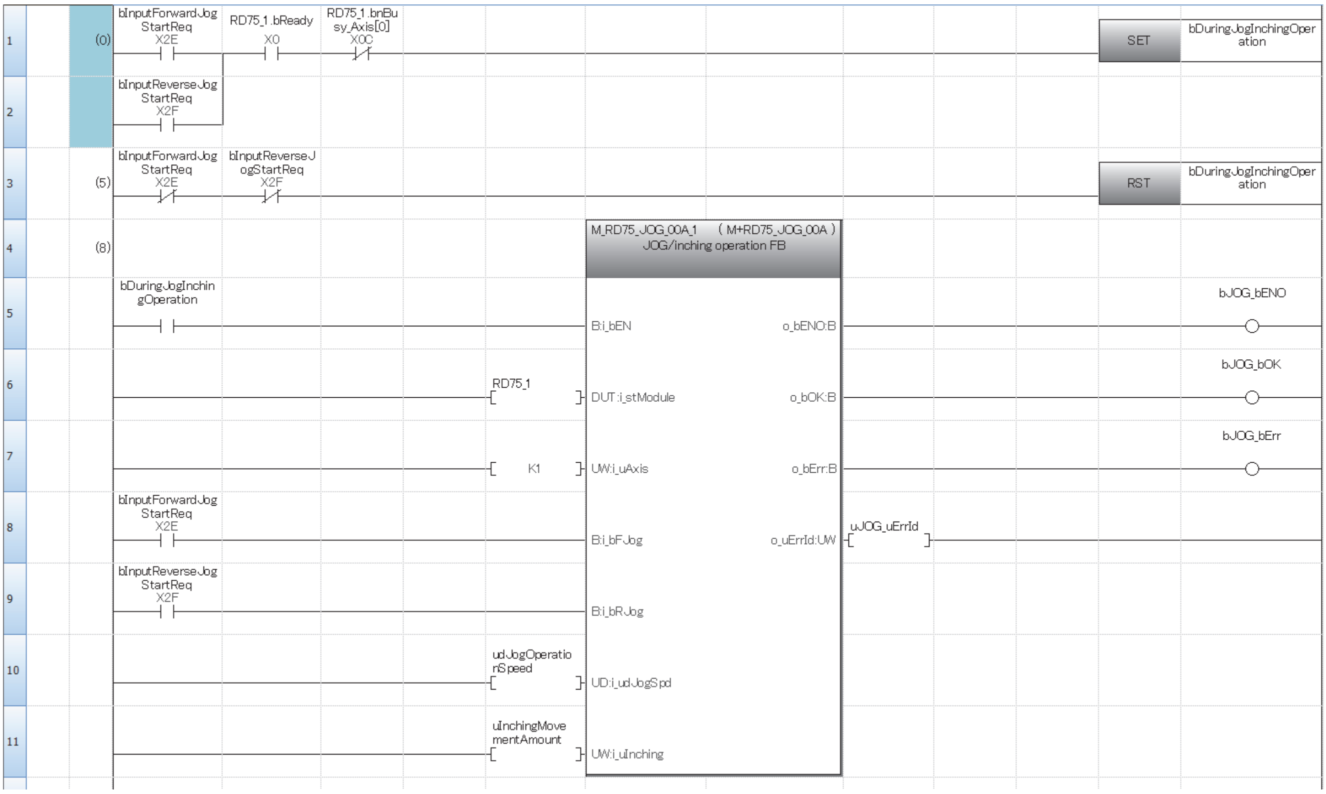
JOG operation setting program



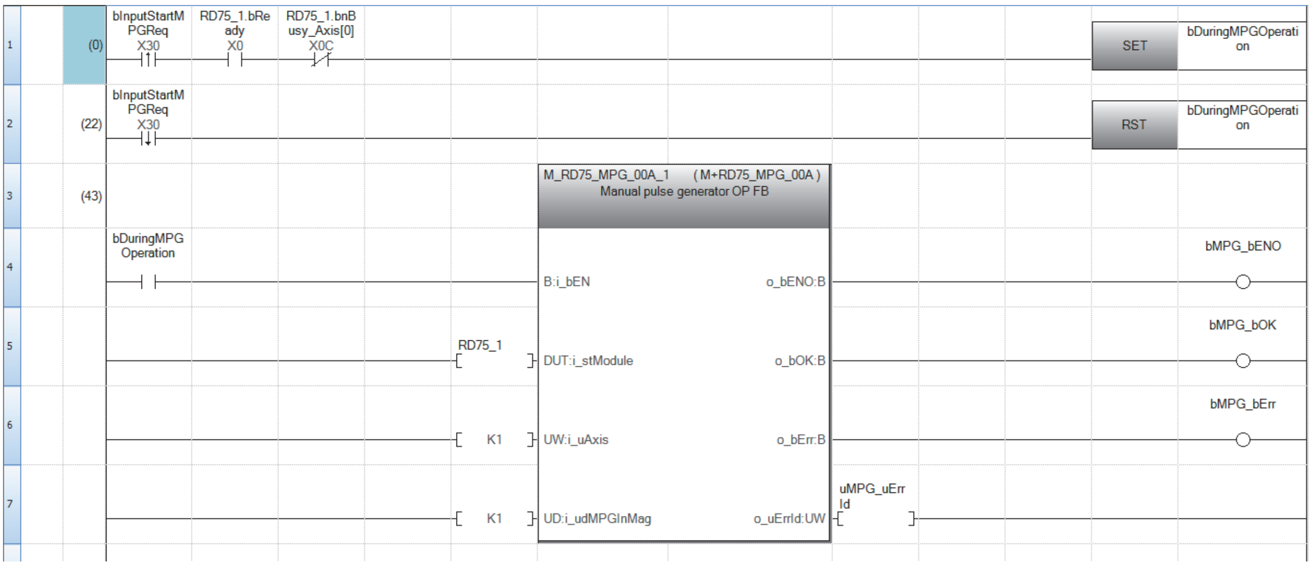
Inching operation setting program



JOG operation/inching operation execution program



Manual pulse generator operation program



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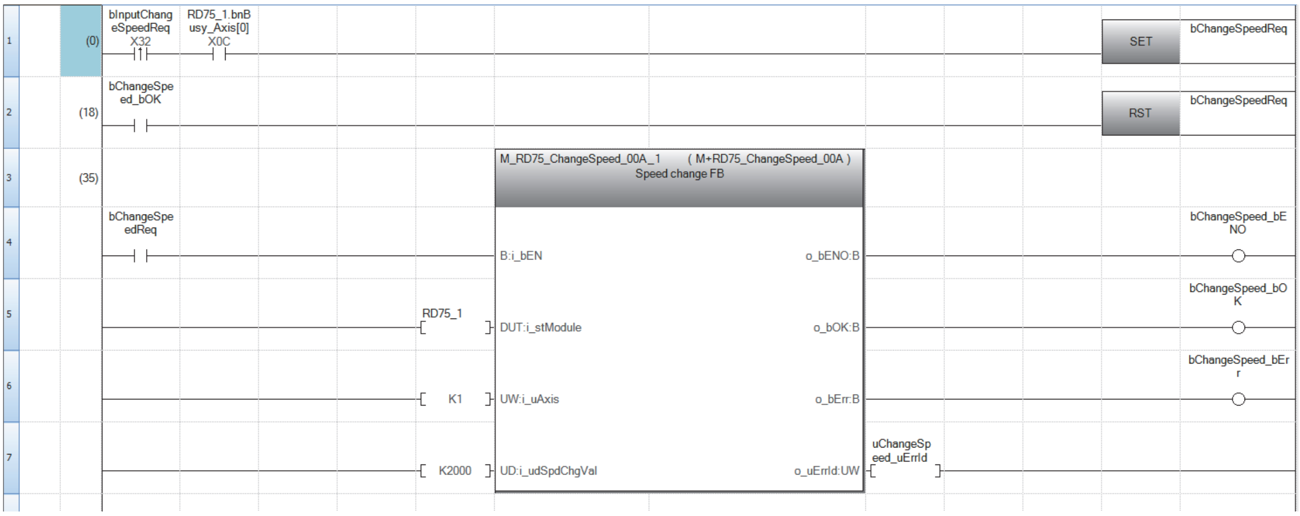
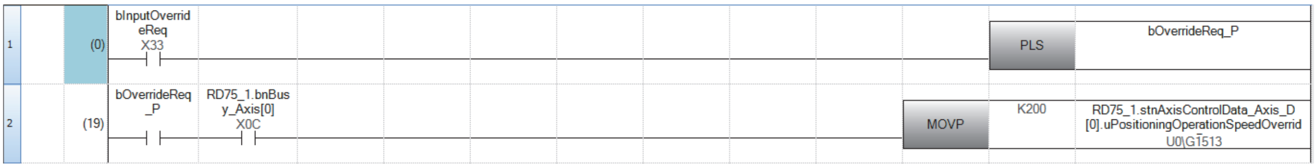
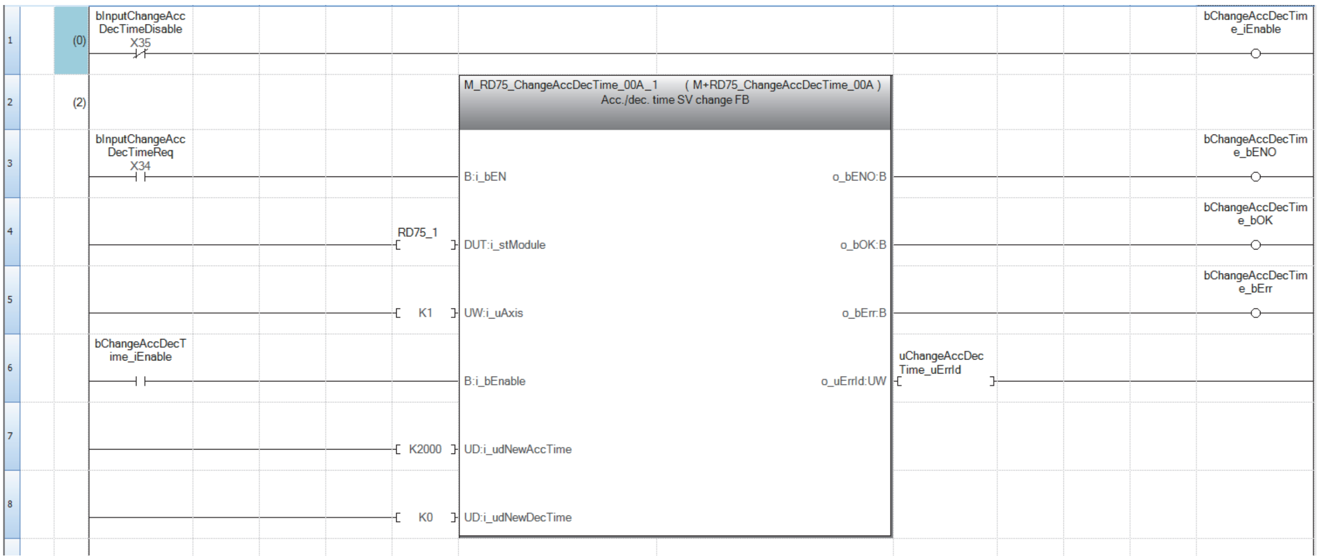
Speed change program



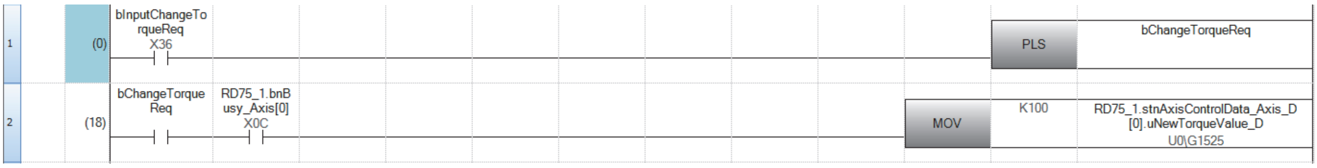
Override program



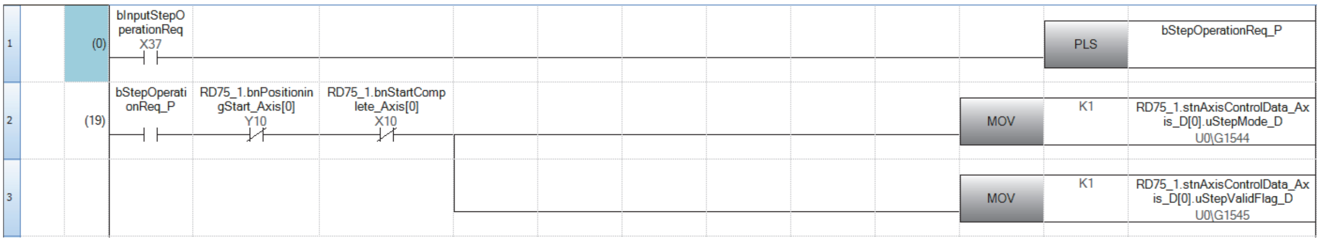
Acceleration/deceleration time change program



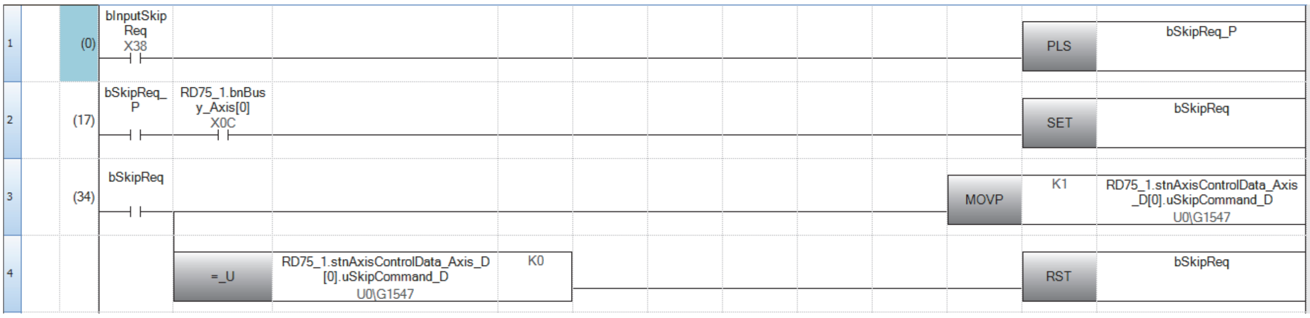
Torque change program



Step operation program



Skip program



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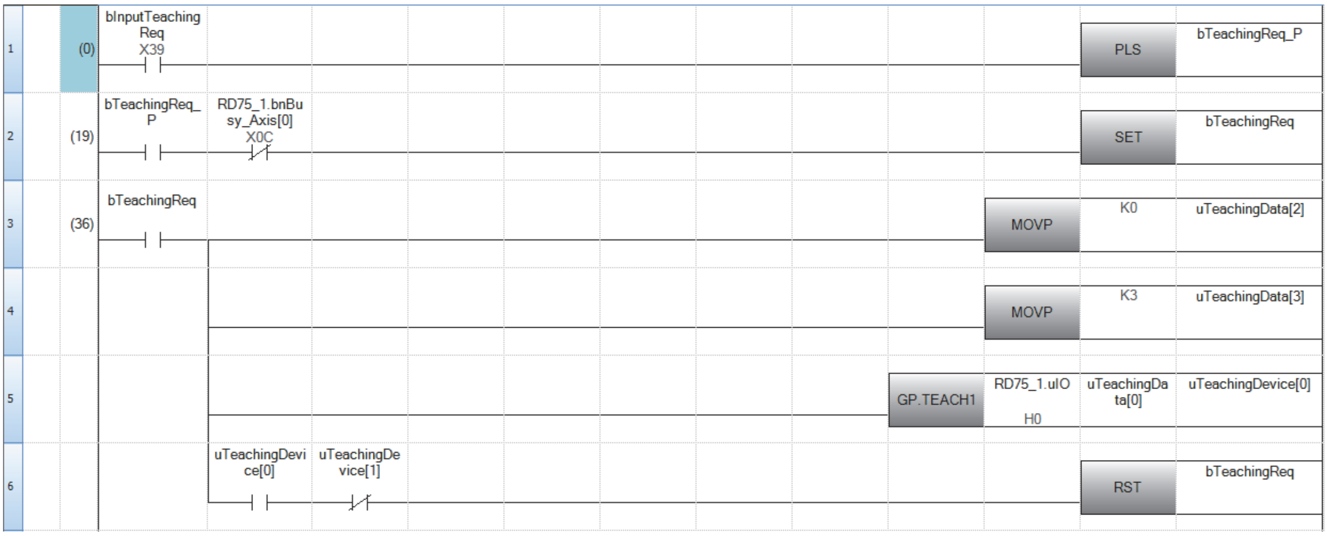
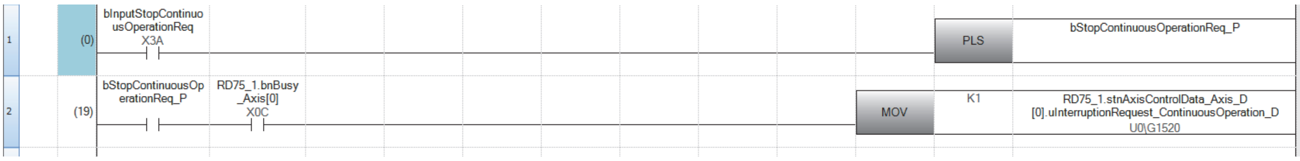
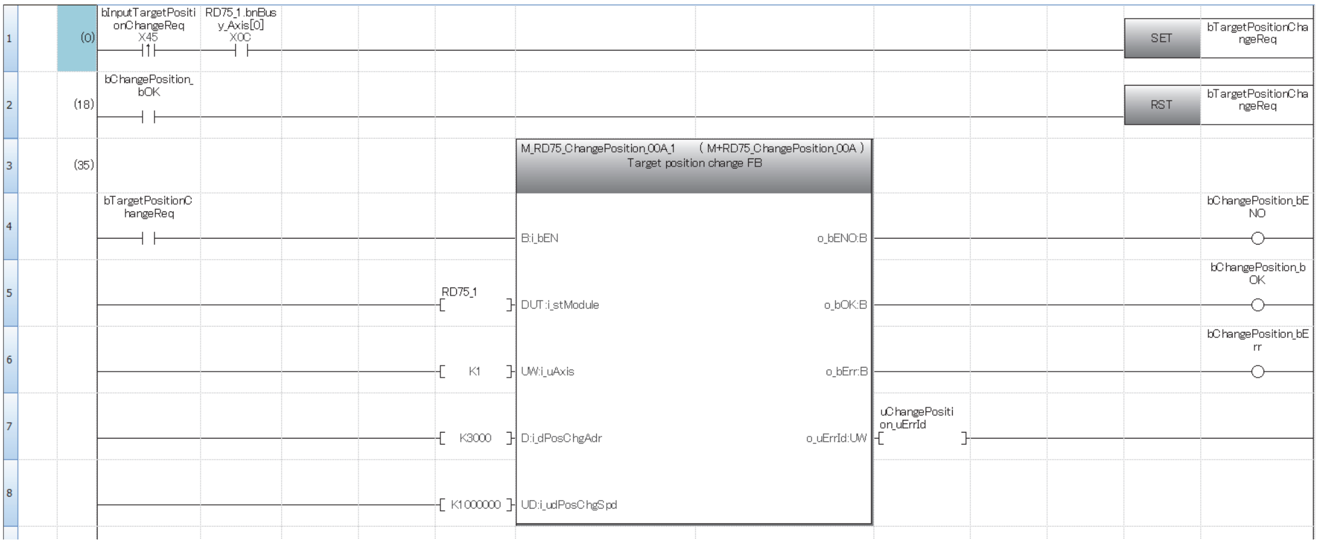
Teaching program



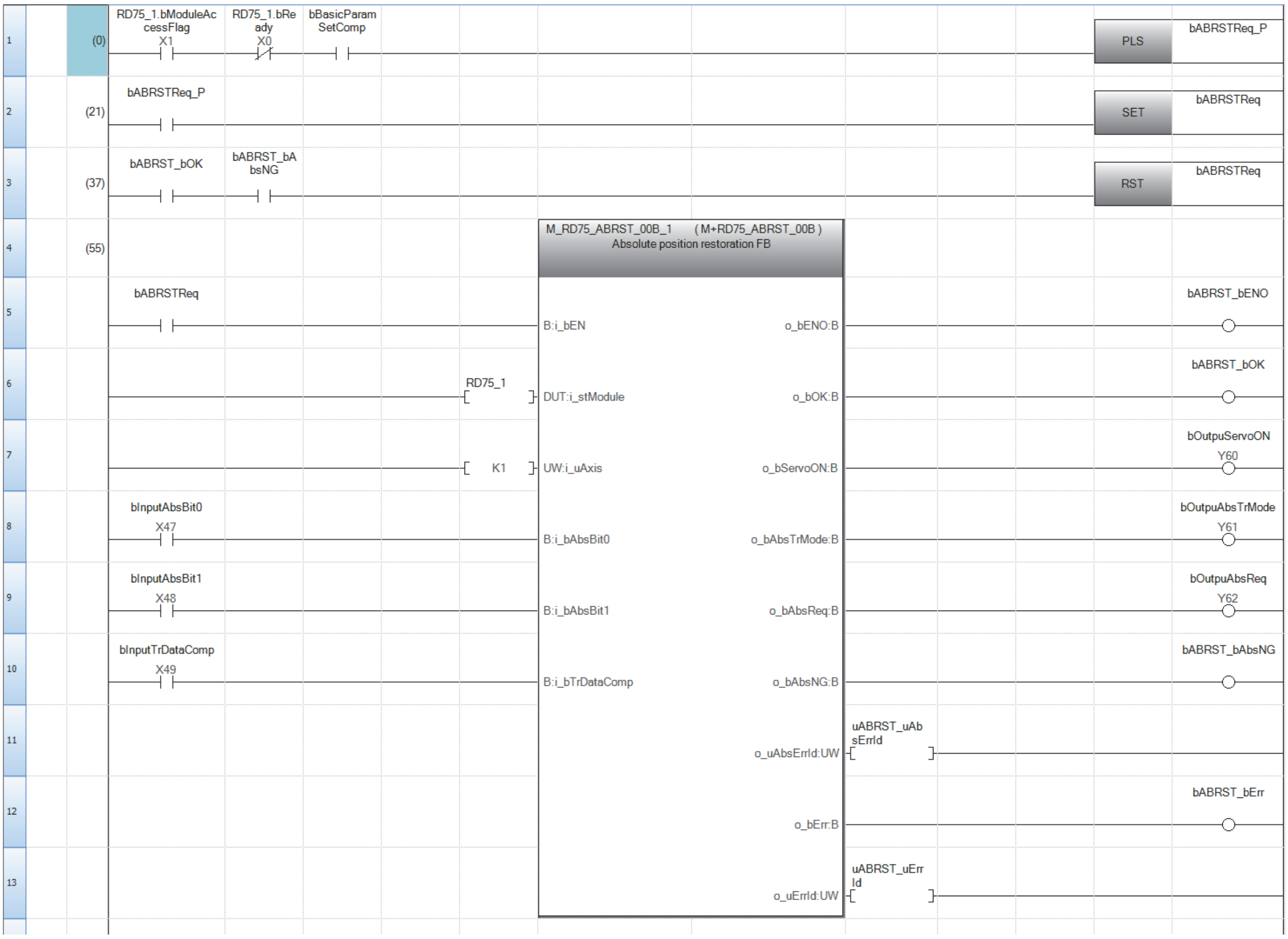
Continuous operation interrupt program



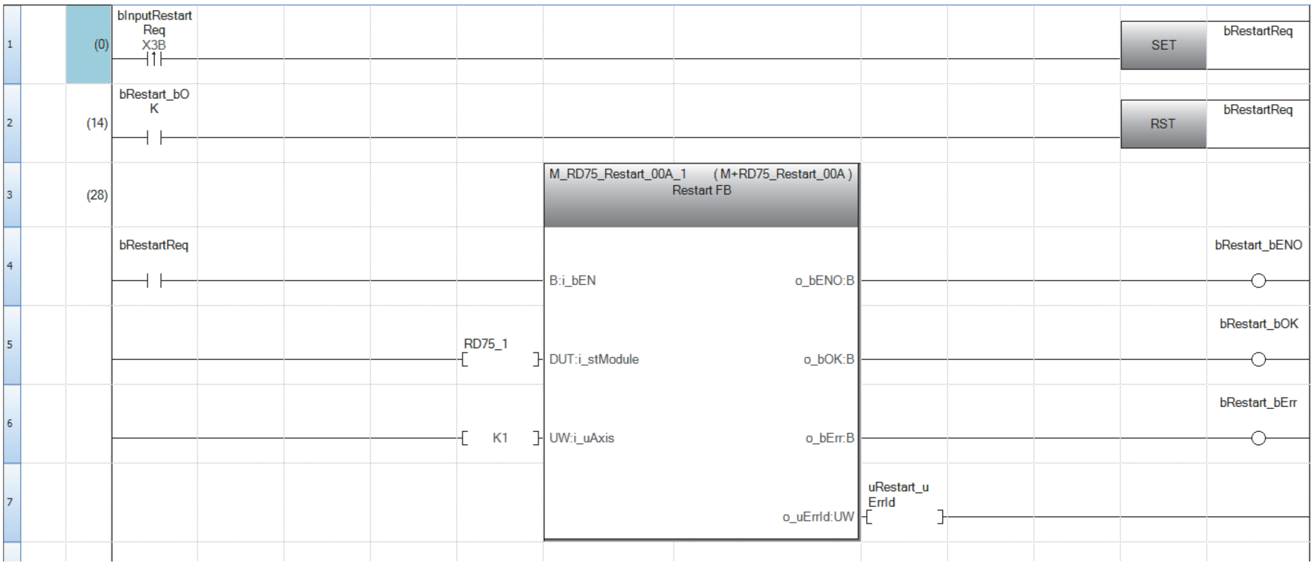
Target position change program



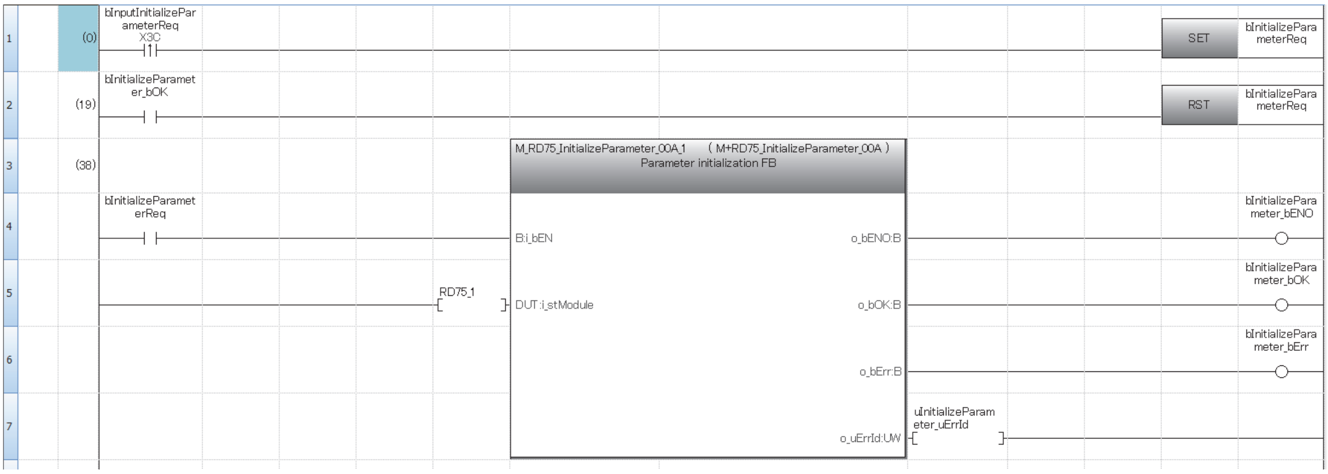
Absolute position restoration program



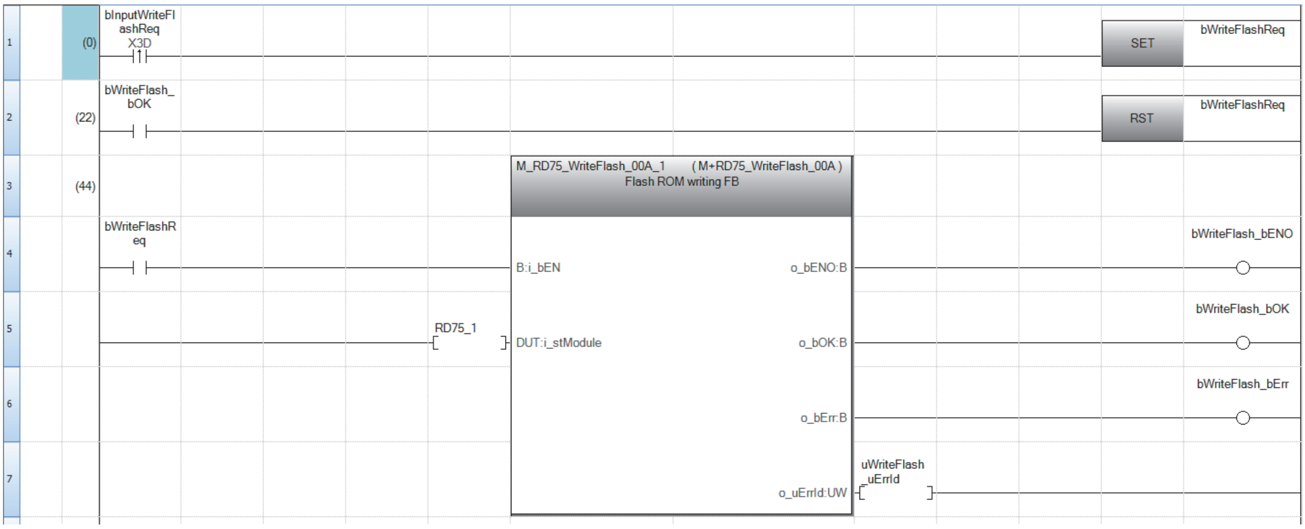
Restart program



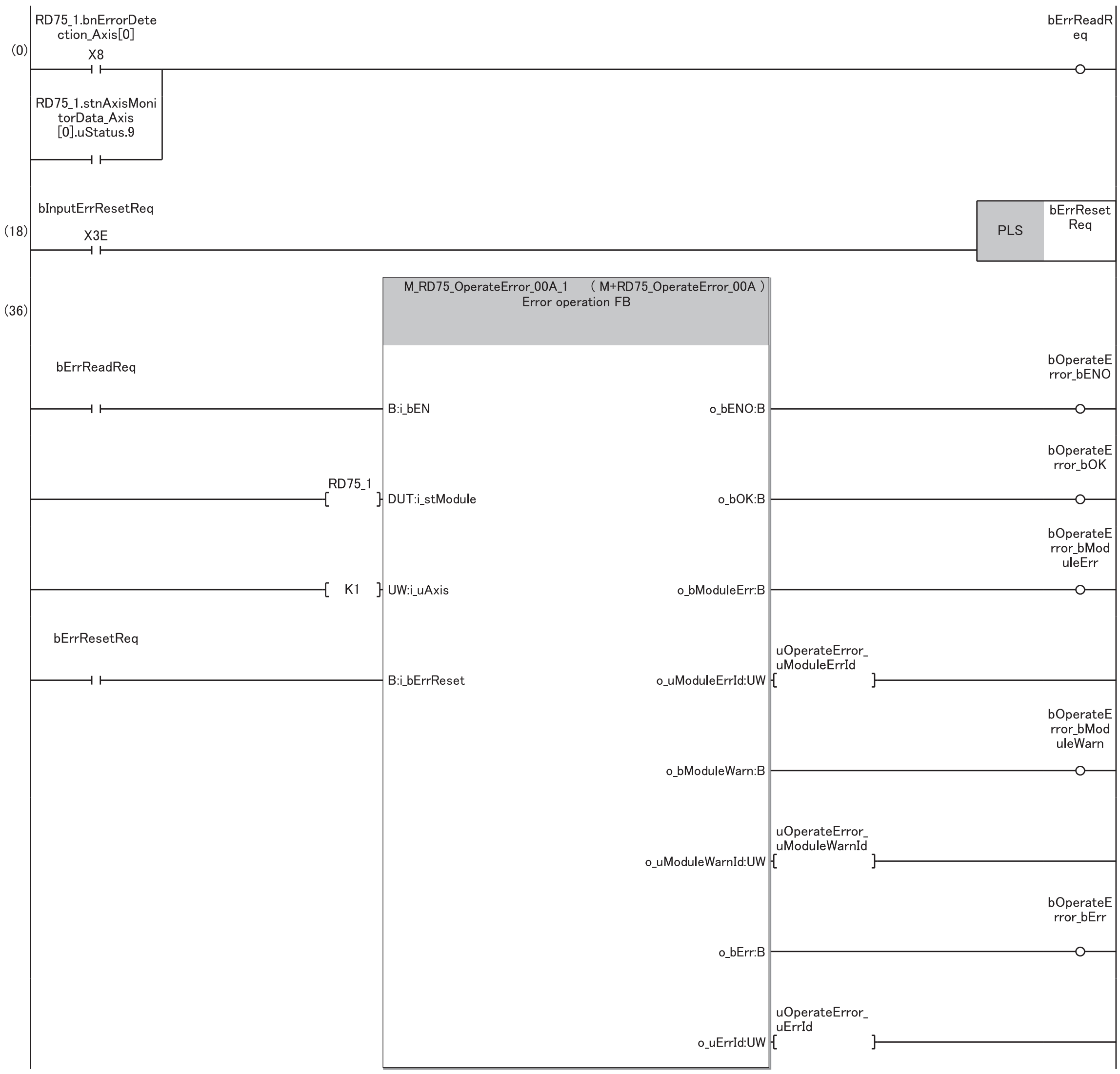
Parameter/data initialization program



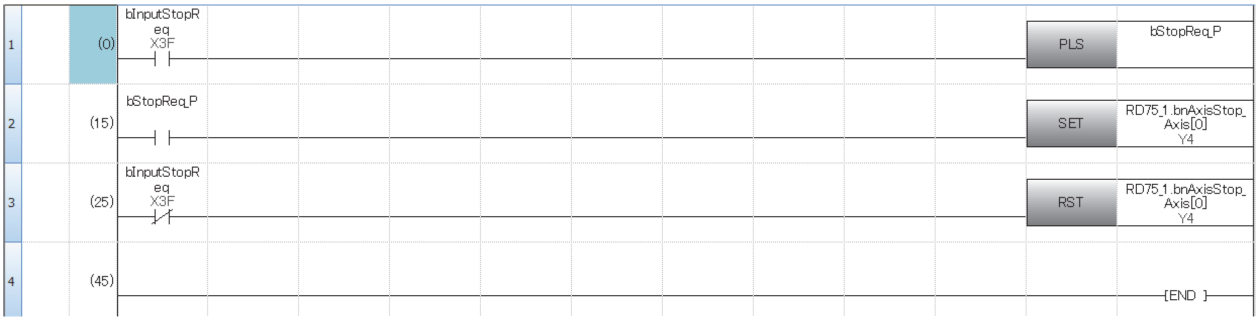
Flash ROM write program



Error reset program



Stop program



14 TROUBLESHOOTING

This chapter describes errors that may occur when the RD75 is used, and those troubleshooting.

14.1 Troubleshooting Procedure

If a problem occurs, perform troubleshooting by following the procedure below.

1. Check that each module is mounted correctly.
(MELSEC iQ-R Module Configuration Manual)

2. Check the LEDs of the power supply module and CPU module.
(MELSEC iQ-R CPU Module User's Manual (Startup))

3. Check that each module is operating correctly with its LEDs. (Page 523 Checks with LEDs)

4. Check that the module is operating correctly using the module diagnostics of an engineering tool. (Page 524 Check of module status)

Checks with LEDs

By checking the display status of LEDs, the problem can be primarily diagnosed without an engineering tool and the cause is narrowed down.

•

The RD75 status can be checked with the RUN LED and the ERR LED. The following table lists the RD75 status and the corresponding LED displays.

□: Off, ■: On, ●: Flashing (at 400ms intervals)

RD75 status	LED display		Description	Action
Normal operation	RUN: ■ AX3: □ AX4: □	ERR: □ AX1: □ AX2: □	• The axes stopped • The axes on standby	—
	RUN: ■ AX3: □ AX4: □	ERR: □ AX1: ■ AX2: □	The axis in operation	The LED remains on from the positioning start until the axis stops at completion of positioning or with an error.
Operation failure	RUN: ■ AX3: □ AX4: □	ERR: ■ AX1: ● AX2: □	Minor error	Check the error code of the error using the module diagnostics of an engineering tool, and take the action according to the list of error codes.
	RUN: ■ AX3: □ AX4: □	ERR: ● AX1: □ AX2: □	Moderate error	
	RUN: □ AX3: □ AX4: □	ERR: ■ AX1: □ AX2: □		
	RUN: □ AX3: □ AX4: □	ERR: □ AX1: □ AX2: □		
Online module change	RUN: ● AX3: □ AX4: □	ERR: □ AX1: □ AX2: □	When the target module is selected	—
	RUN: □ AX3: □ AX4: □	ERR: □ AX1: □ AX2: □	When the target module is ready to be replaced	—

The RUN LED has turned off

Check item	Action
The power is not supplied.	Check that the voltage supplied to the power supply module is within the rated range.
The capacity of the power supply module is not sufficient.	Calculate the total current consumption of modules mounted on the base unit (CPU module, I/O modules, and intelligent function modules) and check that the power capacity is sufficient.
The modules are not mounted on the base unit correctly.	Check the mounting status of modules.

The ERR LED has turned on and an axis display LED is flashing

Check item	Action
A minor error has occurred.	Check the error code and take the action.

The ERR LED has turned on

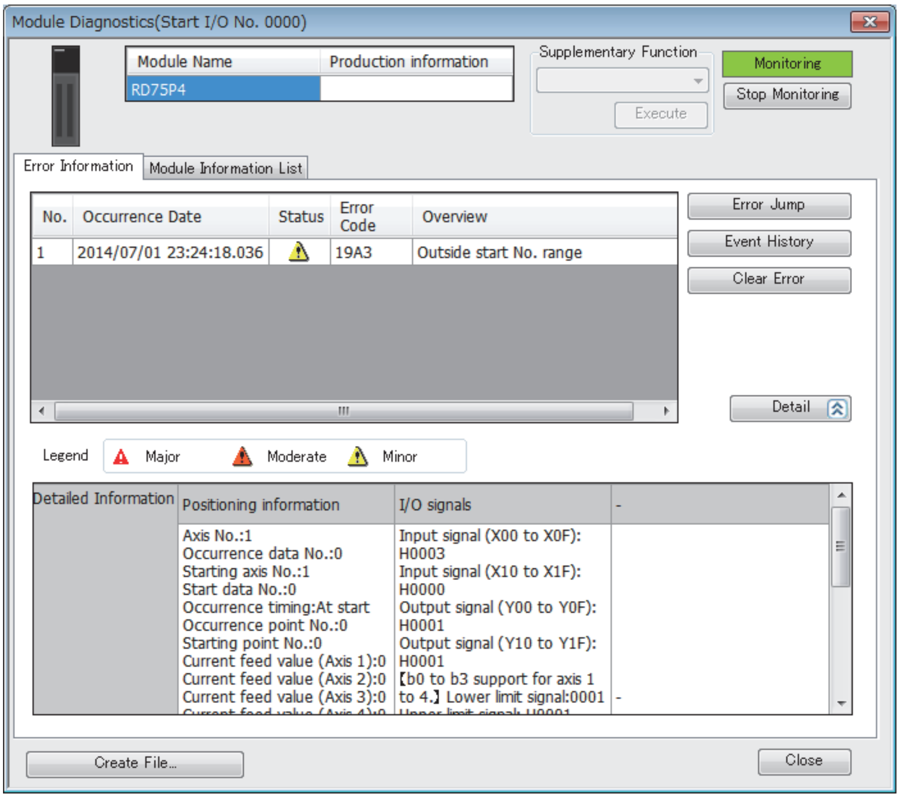
Check item	Action
A moderate error has occurred.	Check the error code and take the action.

The ERR LED is flashing

Check item	Action
A moderate error has occurred.	An error may have occurred on the CPU module. Check the error on the CPU module and take the action.

Check of module status

Error codes (warning codes) and error histories of the RD75 can be checked with the module diagnostics window of an engineering tool.



14.2 Troubleshooting by Symptom

A motor does not rotate

The check items and actions are listed below.

Check item	Action
PLC READY signal is off.	Review the program so that PLC READY signal [Y0] turns on.
The drive unit is not powered on.	Power on the drive unit.
An error may have occurred on the drive unit.	Check the error code of the drive unit and take the action.
The RD75 is not wired to the drive unit correctly.	Check and correct the wiring between the RD75 and the drive unit.
The drive unit is not wired to the motor correctly.	Check and correct the wiring between the drive unit and the motor.
The limit signals are not wired correctly.	Check the wiring and logic setting of the limit signals and correct them.
An error may have occurred on the RD75. (The ERR LED is on or flashing.)	Check the error code and take the action.
1: Stopped is stored in [Md.26] Axis operation status.	• Review the stop program. • Check that Stop signal (STOP) is not accidentally input.
The value in [Md.20] Current feed value did not change even after the execution of positioning.	Review the start program.
The number of input pulses in the monitor of the drive unit did not change even after the execution of positioning.*1	Refer to the manual for the drive unit used and check that the function to suppress the motor rotation is not working.
The pulse output mode setting does not meet the specifications of the drive unit.	Set a value in [Pr.5] Pulse output mode so that the setting meets the specifications of the drive unit.
The output logic setting of the command pulse signal does not meet the specifications of the drive unit.	Set the logic of the command pulse signal ([Pr.23] Output signal logic selection, b0) so that the setting meets the specifications of the drive unit.

*1 Check this item only when the drive unit has a monitor function of the number of input pulses.

If a motor does not rotate even after the above items are checked, the possible cause is a module failure. Please consult your local Mitsubishi representative.

A motor does not rotate as intended

The check items and actions are listed below.

■A motor rotates only in one direction

Check item	Action
The wiring is not correct.	Check that the signal line of the pulse output (for axis 1, connector pin No.1A15 to No.1A18) is correctly wired and not disconnected.
The pulse output mode setting does not meet the specifications of the drive unit.	Set a value in [Pr.5] Pulse output mode so that the setting meets the specifications of the drive unit.

■A motor rotates in the reverse direction

Check item	Action
The wiring is not correct.	Check that the signal line of the pulse output (for axis 1, connector pin No. 1A15 to 1A18) is correctly wired (CW and CCW or A phase and B phase is not reversely wired).
The setting of [Pr.6] Rotation direction setting and the logic of the command pulse signal ([Pr.23] Output signal logic selection, b0) do not match the setting of the drive unit.	Set the value in [Pr.6] Rotation direction setting and set the logic of the command pulse signal ([Pr.23] Output signal logic selection, b0) so that they meet the setting of the drive unit.

■A motor does not rotate at the set speed

Check item	Action
The value in [Md.28] Axis feedrate is same with or different from the set speed.	[When the value in [Md.28] Axis feedrate is same with the set speed] • The electronic gear of 16 bits is used: Check that settings of [Pr.2] No. of pulses per rotation (16 bits), [Pr.3] Movement amount per rotation (16 bits), and [Pr.4] Unit magnification meet the system. • The electronic gear of 32 bits is used: Check that settings of [Pr.2] No. of pulses per rotation (32 bits) and [Pr.3] Movement amount per rotation (32 bits) meet the system. • When the drive unit has the electronic gear function, check that the settings meet the system.
	[When the value in [Md.28] Axis feedrate is different from the set speed] • Check that the speed is not limited by the value in [Pr.8] Speed limit value. • In JOG operation, check that the speed is not limited by the value in [Pr.31] JOG speed limit value. • In JOG operation, check that Forward run JOG start signal [Y8, YA, YC, YE] or Reverse run JOG start signal [Y9, YB, YD, YF] do not repeatedly turn on and off.

■The object did not reach the set position

Check item	Action
The value in [Md.20] Current feed value is same with or different from the set position.	[When the value in [Md.20] Current feed value has reached the set position] • The electronic gear of 16 bits is used: Check that settings of [Pr.2] No. of pulses per rotation (16 bits), [Pr.3] Movement amount per rotation (16 bits), and [Pr.4] Unit magnification meet the system. • The electronic gear of 32 bits is used: Check that settings of [Pr.2] No. of pulses per rotation (32 bits) and [Pr.3] Movement amount per rotation (32 bits) meet the system. • When the drive unit has the electronic gear function, check that the settings meet the system.
	[When the value in [Md.20] Current feed value has not reached the set position] • If the motor is stopped by Axis stop signal [Y4, Y5, Y6, Y7] or by Stop signal (STOP), 1: Stopped is stored in [Md.26] Axis operation status. • If the motor is stopped with an axis error, -1: Error is stored in [Md.26] Axis operation status. Check the error code and take the action described in the following. ☞ Page 535 List of Error Codes

14.3 Error and Warning Details

Error type

Errors detected by the MELSEC iQ-R series modules are classified into three levels: major error, moderate error, and minor error.
The RD75 detects moderate errors and minor errors.
Moderate errors and minor errors include parameter setting range errors and errors at the operation start or during operation.

Parameter setting range errors

Parameters are checked on the rising edge of PLC READY signal [Y0] (turning on of the signal) and if the setting of a parameter is not correct, an error occurs.
If this error has occurred, RD75 READY signal [X0] does not turn on.
To clear this error, set the correct value in the parameter with the error and turn on PLC READY signal [Y0].

Errors at the operation start or during operation

There are the errors that occur at the start or during operation in positioning control, JOG operation, or inching operation.
If an axis error has occurred during interpolation operation, Error No. is stored both in the reference axis and in the interpolation axis.
Note that Error No. is not stored in the axis to be interpolated or simultaneous starting axis for the following cases.

■The interpolation axis is BUSY

Axis error No. is stored only in the reference axis during analysis of positioning data.

■An error has occurred in positioning data or parameters that are not related to interpolation control

Axis error No. is stored only in the reference axis during analysis of positioning data.

■An error has occurred before the execution of simultaneous start of positioning (such as invalid axis No. and other axis BUSY)

Error before simultaneous start (error code: 1990H, 1991H) is stored in the starting axis.

■An error has occurred after the execution of simultaneous start of positioning (such as positioning data error and software stroke limit error)

The corresponding error code is stored in the axis where the error has occurred.
Simultaneous start not possible (error code: 199EH) is stored in all axes where the error has not occurred because the simultaneous start cannot be carried out. -1: Error is stored in [Md.26] Axis operation status of the axis where the error has occurred.
If an error occurs during operation, any moving axis decelerates to a stop and -1: Error is stored in [Md.26] Axis operation status. During interpolation operation, if an error occurs even in one axis, all axes decelerate to a stop.

Error code classification

Error level	Error code	Error type
Moderate error	2600H to 2619H	Error at inter-module synchronization
	3000H to 3BFFH	H/W error
Minor error	17C0H to 17DFH	Module extension parameter file error
	1800H to 185FH	Error at interrupt function setting range check
	1860H to 18BFH	Dedicated instruction error
	18C0H to 18FFH	Error at inter-module synchronization
	1900H to 193FH	Error common to positioning control
	1940H to 197FH	Error at OPR or absolute position restoration
	1980H to 198FH	Error in manual control
	1990H to 19EFH	Error in positioning operation
	19F0H to 19FFH	Block start data setting error
	1A00H to 1A0FH	Condition data setting error
	1A10H to 1A5FH	Positioning data setting error
	1A60H to 1A9FH	Error at basic parameter setting range check
	1AA0H to 1AFFH	Error at detailed parameter setting range check
	1B00H to 1B3FH	Error at OPR parameter setting range check
	1B40H to 1B9FH	Error at extension/system parameter setting range check

Error storage

If a moderate error or a minor error has occurred, Error detection signal turns on, and the corresponding error code is stored in the following buffer memory address of [Md.23] Axis error No. Every time an error occurs, [Md.23] Axis error No. is overwritten with the latest error code.

Axis No.	Error detection signal	Buffer memory address ([Md.23] Axis error No.)
1	X8	806
2	X9	906
3	XA	1006
4	XB	1106

If any of the following errors is detected, the error code is stored in [Md.23] Axis error No. of axis 1.
Error code: 1080H, 190AH, 1930H, 1931H, 1932H, 3001H, 3002H

Warning type

Warnings include the ones that occur in each operation (positioning operation, manual pulse generator operation, and JOG operation) and the ones that occur in the settings common to positioning control.

Warning classification

Warning code	Warning type
0900H to 093FH	Warning common to positioning control
0980H to 098FH	Warning in manual operation (JOG operation and manual pulse generator operation)
0990H to 09EFH	Warning in positioning operation
0A10H to 0A5FH	Warning at positioning data setting range check
09F0H to 09FFH	Block start data setting warning
0B00H to 0B02H	Extension parameter acquisition warning

Warning storage

If a warning has occurred, the corresponding warning code is stored in the following buffer memory address of [Md.24] Axis warning No.

Axis No.	Buffer memory address ([Md.24] Axis warning No.)
1	807
2	907
3	1007
4	1107

If a warning has occurred in positioning operation, 1 is stored in the following buffer memory address of [Md.31] Status, Axis warning detection (b9).

Axis No.	Buffer memory address ([Md.31] Status)
1	817
2	917
3	1017
4	1117

Clearing errors or warnings

Eliminate the cause of an error or warning by referring to the actions described in the following, and clear the error or warning using the error reset.

☞ Page 531 List of Warning Codes
☞ Page 535 List of Error Codes

Clearing errors/warnings by each axis

By setting 1 to the following buffer memory address of [Cd.5] Axis error reset, the error or warning is cleared after the completion of the processing below.

Axis No.	Buffer memory address ([Cd.5] Axis error reset)
1	1502
2	1602
3	1702
4	1802

■Processing

Error detection signal [X8, X9, XA, XB] is turned off.

[Md.23] Axis error No. is cleared.

[Md.24] Axis warning No. is cleared.

The value in [Md.26] Axis operation status changes from -1: Error to 0: Standby.

[Md.31] Status, Axis warning detection (b9) is turned off.

Clearing errors/warnings of all axes collectively

By setting 1 to [Cd.49] All axes error reset, errors or warnings of all axes are collectively cleared.

Axis No.	Buffer memory address ([Cd.49] All axes error reset)
All axes	1933

■Processing

Error detection signal [X8, X9, XA, XB] is turned off.

[Md.23] Axis error No. is cleared.

[Md.24] Axis warning No. is cleared.

The value in [Md.26] Axis operation status changes from -1: Error to 0: Standby.

[Md.31] Status, Axis warning detection (b9) is turned off.

14.4 List of Warning Codes

Warning code	Warning name	Cause and description	Action
0900H	Start during operation	The start request has been performed while the axis is in BUSY state. [Operation of when the warning has occurred] The operation is continued.	Do not perform the start request while the axis is in BUSY state.
0901H	Deviation counter clear request	The deviation counter clear has been requested while the axis is in BUSY state. [Operation of when the warning has occurred] The deviation counter clear request is ignored.	Do not request the deviation counter clear while the axis is in BUSY state.
0902H	Restart not possible	The restart command has been performed when the axis operation status is not Stopped. [Operation of when the warning has occurred] The operation is continued.	Perform the restart command when the axis operation status is stopped.
0903H	Teaching in BUSY	The teaching has been requested while the axis is in BUSY state. [Operation of when the warning has occurred] An error occurs in the axis that is subject to the teaching.	Request the teaching when the axis is not in BUSY state.
0904H	Less than speed 1	The speed changed with the override function became less than 1 in the unit that is currently set. [Operation of when the warning has occurred] The operation is controlled at the speed of 1.	Set a value for the override function so that the changed speed becomes 1 or more in the unit that is currently set.
0905H	PLC READY ON write	The write request to the flash ROM has been performed while PLC READY signal [Y0] is on. [Operation of when the warning has occurred] Data is not written to the flash ROM.	Perform the write request to the flash ROM while PLC READY signal [Y0] is off.
0906H	Illegal override value	A value other than 0 to 300 is set in [Cd.13] Positioning operation speed override. [Operation of when the warning has occurred] The speed is changed as 300 is set.	Correct the value within the setting range. For details, refer to ☞ Page 481 [Cd.13] Positioning operation speed override.
0907H	Outside new torque value range	The value set in [Cd.22] New torque value is greater than the value in [Pr.17] Torque limit setting value. [Operation of when the warning has occurred] The torque is controlled with the value in [Pr.17] Torque limit setting value.	Set the value equal to or smaller than [Pr.17] Torque limit setting value to [Cd.22] New torque value. For details, refer to the following. ☞ Page 406 [Pr.22] Input signal logic selection ☞ Page 484 [Cd.22] New torque value
0908H	Below bias speed	The value in [Da.8] Command speed is smaller than the value in [Pr.7] Bias speed at start. [Operation of when the warning has occurred] The positioning is performed at the speed of [Pr.7] Bias speed at start.	Correct the values in [Da.8] Command speed/[Pr.7] Bias speed at start so that the command speed is equal to or greater than the bias speed at start. For details, refer to the following. ☞ Page 394 [Pr.7] Bias speed at start ☞ Page 438 [Da.8] Command speed
0909H	Analysis mode change in BUSY	The value in [Cd.43] Analysis mode setting has been changed while the axis is operating. [Operation of when the warning has occurred] The change of [Cd.43] Analysis mode setting is ignored.	Do not change the value in [Cd.43] Analysis mode setting when the axis operation status is not Standby.
090AH	PLC READY ON read	The read request from the flash ROM has been performed while PLC READY signal [Y0] is on. [Operation of when the warning has occurred] Data is not read from the flash ROM.	Perform the read request from the flash ROM while PLC READY signal [Y0] is off.
090BH	Restart not possible	The restart command has been performed in pre-analysis mode. [Operation of when the warning has occurred] The positioning does not restart.	Do not perform the restart command in pre-analysis mode. (The warning code: 0902H is recognized prior to 090BH.)
0980H	Speed change during deceleration	The speed change has been requested while the operation is decelerating to a stop by turning off of the JOG start signal. [Operation of when the warning has occurred] The speed is not changed.	Do not change JOG speed while the operation is decelerating by turning off of the JOG start signal.

Warning code	Warning name	Cause and description	Action
0981H	JOG speed limit value	JOG speed at the start is over the speed set in [Pr.31] JOG speed limit value. [Operation of when the warning has occurred] JOG operation is controlled at the speed set in [Pr.31] JOG speed limit value. (In speed limit flag is on while the speed is limited with [Pr.31] JOG speed limit value.)	Correct the value within the setting range. For details, refer to ☞ Page 409 [Pr.31] JOG speed limit value.
0982H		A value greater than the one in [Pr.31] JOG speed limit value has been set to change the speed during JOG operation. [Operation of when the warning has occurred] JOG operation is controlled at the speed set in [Pr.31] JOG speed limit value. (In speed limit flag is on while the speed is limited with [Pr.31] JOG speed limit value.)	Correct the value within the setting range. For details, refer to ☞ Page 409 [Pr.31] JOG speed limit value.
0988H	Outside manual pulse generator input magnification range	A value of 0, 10001, or greater is set in [Cd.20] Manual pulse generator 1 pulse input magnification. [Operation of when the warning has occurred] • A value of 10001 or greater is set as the input magnification: It is regarded as 10000. • A value of 0 is set as the input magnification: It is regarded as 1.	Correct the value within the setting range. For details, refer to ☞ Page 483 [Cd.20] Manual pulse generator 1 pulse input magnification.
0990H	Deceleration/ stop speed change	The speed change has been requested while the operation is decelerating or stopped. [Operation of when the warning has occurred] The speed is not changed.	Do not request the speed change during the deceleration by a stop command, the operation stop, or the automatic deceleration in the position control.
0991H	Speed limit value over	A value greater than the one in [Pr.8] Speed limit value has been set to change the speed during operation. [Operation of when the warning has occurred] • The speed is controlled with the value in [Pr.8] Speed limit value. • In speed limit flag is on.	Correct the changed value within 0 to [Pr.8] Speed limit value. For details, refer to ☞ Page 481 [Cd.14] New speed value.
0992H	M code ON signal ON	M code ON signal is on when the positioning data where Continuous path control is set in [Da.1] Operation pattern has been executed. [Operation of when the warning has occurred] The execution of positioning data is continued.	Check and correct the on/off timing of [Cd.7] M code ON signal OFF request.
0993H	Speed-position switching signal ON during acceleration	A speed-position switching signal has been turned on while the operation is accelerating in speed-position switching control (INC mode). [Operation of when the warning has occurred] The operation is continued.	Do not turn on a speed-position switching signal during acceleration.
0994H	Insufficient remaining distance	The operation has been interrupted with [Cd.18] Continuous operation interrupt request when the remaining distance is not enough for the deceleration. [Operation of when the warning has occurred] At the command speed change The speed close to [Cd.14] New speed value is applied to the change. At the target position change The target position is changed after the speed is adjusted to be closer to [Cd.28] Target position change value (new speed). (When Continuous path control is set in [Da.1] Operation pattern, the descriptions above are not applied.)	Turn on the request when the remaining distance is sufficient.
0995H		The speed change has been requested when the remaining distance is not enough for the speed change. [Operation of when the warning has occurred] At the command speed change The speed close to [Cd.14] New speed value is applied to the change. At the target position change The target position is changed after the speed is adjusted to be closer to [Cd.28] Target position change value (new speed). (When Continuous path control is set in [Da.1] Operation pattern, the descriptions above are not applied.)	Turn on the request when the remaining distance is sufficient.
0996H	Step not possible	1: Step continue is set in [Cd.36] Step start request when 0: Do not carry out step operation is set in [Cd.35] Step valid flag or Step standby is not set in [Md.26] Axis operation status. [Operation of when the warning has occurred] The step does not start.	Do not set 1: Step continue in [Cd.36] Step start request when 0: Do not carry out step operation is set in [Cd.35] Step valid flag or Step standby is not set in [Md.26] Axis operation status.

Warning code	Warning name	Cause and description	Action
0997H	Illegal external command function	A value outside the setting range is set in [Pr.42] External command function selection of detailed parameter 2. [Operation of when the warning has occurred] Nothing changes in the operation even if External command signal has been tuned on.	Correct the value within the setting range. For details, refer to ☞ Page 416 [Pr.42] External command function selection.
0998H	Insufficient movement amount	Movement amount is not enough for automatic deceleration. [Operation of when the warning has occurred] The positioning stops immediately when the object has reached the positioning address.	Set the address or movement amount necessary for the deceleration to positioning data.
0999H	Illegal teaching data No.	The positioning data No. outside the setting range is set. [Operation of when the warning has occurred] The teaching is not performed.	Set the positioning data No. within the setting range. For details, refer to ☞ Page 489 [Cd.39] Teaching positioning data No..
099AH	Illegal teaching data selection	The value outside the setting range is set in [Cd.38] Teaching data selection. [Operation of when the warning has occurred] The teaching is not performed.	Correct the value within the setting range. For details, refer to ☞ Page 489 [Cd.38] Teaching data selection.
099BH	Target position change not possible	The target position change has been requested while the control other than ABS1 and INC1 in [Da.2] Control method is being executed. [Operation of when the warning has occurred] The target position is not changed.	Do not turn on Target position change request flag while the control other than ABS1 and INC1 in [Da.2] Control method is being executed.
099CH		Target position change request flag has been turned on in continuous path control. [Operation of when the warning has occurred] The target position is not changed.	Do not turn on Target position change request flag when Continuous path control is set.
099DH		The target position change has been requested while the operation is decelerating to a stop. [Operation of when the warning has occurred] The target position is not changed.	Do not turn on Target position change request flag during deceleration stop.
099EH		The target position change has been requested when Speed change 0 flag ([Md.31] Status: b10) is on. [Operation of when the warning has occurred] The target position is not changed.	Do not turn on Target position change request flag when Speed change 0 flag ([Md.31] Status: b10) is on.
099FH		The value set in [Cd.27] Target position change value (new address) is outside the software stroke limit range (+). [Operation of when the warning has occurred] The target position is not changed.	Correct the value in [Cd.27] Target position change value (new address) if it is outside the software stroke limit range (+). For details, refer to ☞ Page 486 [Cd.27] Target position change value (new address).
09A0H		The value set in [Cd.27] Target position change value (new address) is outside the software stroke limit range (-). [Operation of when the warning has occurred] The target position is not changed.	Correct the value in [Cd.27] Target position change value (new address) if it is outside the software stroke limit range (-). For details, refer to ☞ Page 486 [Cd.27] Target position change value (new address).
09A1H		When the unit is degree, the value other than 0 to 359.99999 is set in [Cd.27] Target position change value (new address). [Operation of when the warning has occurred] The target position is not changed.	Correct the value of [Cd.27] Target position change value (new address) within the setting range. For details, refer to ☞ Page 486 [Cd.27] Target position change value (new address).
09A2H	Pre-analysis incomplete start	A positioning start trigger has been input before 1: Analysis completed is stored in [Md.61] Analysis complete flag. [Operation of when the warning has occurred] A pulse output starts once positioning data analysis is completed and 1: Analysis completed is stored in [Md.61] Analysis complete flag.	Start positioning after 1: Analysis completed is stored in [Md.61] Analysis complete flag.
09A4H	Manual control start in pre-analysis mode	The manual control is started in pre-analysis mode. [Operation of when the warning has occurred] The manual control does not start.	Perform the manual control after 0: Normal analysis mode is set in [Cd.43] Analysis mode setting.
09A6H	Step start disabled	1: Step continue has been set in [Cd.36] Step start request in pre-analysis mode. [Operation of when the warning has occurred] The step does not start.	Do not set 1: Step continue in [Cd.36] Step start request in pre-analysis mode.
		Positioning data analysis has been performed after 1: Carry out step operation was set in [Cd.35] Step valid flag. [Operation of when the warning has occurred] The step operation is not performed.	Do not set 1: Carry out step operation in [Cd.35] Step valid flag.

Warning code	Warning name	Cause and description	Action
09A7H	Positioning start signal input at quick external start	Positioning start signal has been input when 0: Start with external command is set in [Pr.42] External command function selection and 1: External command valid is set in [Cd.8] External command valid. [Operation of when the warning has occurred] The positioning does not start.	Do not input Positioning start signal.
09A8H	Pre-analysis not possible	The value other than 1 to 600 has been set in [Cd.3] Positioning start No. during positioning data analysis in pre-analysis mode. [Operation of when the warning has occurred] After the start trigger is input, the same operation in normal analysis mode is started while the state remains in pre-analysis mode.	Set a value within 1 to 600 in [Cd.3] Positioning start No.
09A9H		The axis to be interpolated is not in pre-analysis mode during positioning data analysis in pre-analysis mode. [Operation of when the warning has occurred] After the start trigger is input, the same operation in normal analysis mode is started while the state remains in pre-analysis mode.	Change the state of the axis to be interpolated to pre-analysis mode as well.
0A10H	Outside command speed range	The speed set in [Da.8] Command speed is over the speed set in [Pr.8] Speed limit value. [Operation of when the warning has occurred] • [Da.8] Command speed is controlled with [Pr.8] Speed limit value. • In speed limit flag is on.	• Correct a value in [Da.8] Command speed within the setting range. For details, refer to ☞ Page 438 [Da.8] Command speed. • Correct the set value in the [Cd.13] Positioning operation speed override. For details, refer to ☞ Page 481 [Cd.13] Positioning operation speed override.
09F0H	No operation termination setting	The 50th point of block start data is set to Continue when the positioning has been performed with block start data. [Operation of when the warning has occurred] The operation ends.	Set the 50th point of block start data to End.
09F1H	FOR to NEXT nest construction	FOR to NEXT is nested. [Operation of when the warning has occurred] The operation is continued.	Do not configure FOR to NEXT nest construction.
0B00H	Extension parameter acquisition error	Extension parameters have not been acquired. (no file) [Operation of when the warning has occurred] The setting values of extension parameters of buffer memory become as follows. • Power on: Factory default setting value • RUN: Setting value just before RUN	Write extension parameters to the storage location set in the extension parameter storage setting, and change the CPU module status from STOP to RUN.
0B01H		Extension parameters have not been acquired. (data error) [Operation of when the warning has occurred] The setting values of extension parameters of buffer memory become factory default setting values.	Write extension parameters to the storage location set in the extension parameter storage setting, and change the CPU module status from STOP to RUN.
0B02H		Extension parameters have not been acquired. (retry count over) [Operation of when the warning has occurred] The setting values of extension parameters of buffer memory become factory default setting values.	• Change the CPU module status from STOP to RUN. • Set Positioning module in the extension parameter storage setting.

14.5 List of Error Codes

Error code	Error name	Cause and description	Action
1080H	Flash ROM write number error	Writing to the flash ROM has been executed more than 25 times in a row with the program. [Operation of when the error has occurred] Data is not written to the flash ROM.	• Correct the program so that writing to the flash ROM is not executed in a row. (The number of write accesses to the flash ROM can be checked with [Md.19] No. of write accesses to flash ROM.) • If this error has occurred when the module is used correctly, data can be written after the error is reset, the system is powered off and on, or the CPU module is reset.
17C3H	Module extension parameter writing error	The "Extended parameter storage setting" is set to "CPU", and error has occurred while executing module data backup function or module data initialization function. [Operation of when the error has occurred] The module data backup function or the module data initialization function does not operate.	Check the free space on the data memory of the control CPU and the SD memory card, and execute the module data backup function or the module data initialization function.
17C4H		The "Extended parameter storage setting" is set to "CPU", and execute the module data backup function or the module data initialization function when the CPU module is in the RUN state. [Operation of when the error has occurred] The module data backup function or the module data initialization function does not operate.	Execute the module data backup function or the module data initialization function when the CPU module is in the STOP state.
1800H	Interrupt factor setting error	The value outside the setting range is set in the interrupt factor setting. [Operation of when the error has occurred] The interrupt function does not operate.	Correct the value of the interrupt factor setting and turn on PLC READY signal [Y0].
1801H	Axis No. for interrupt factor setting error	The value outside the setting range is set in the axis No. for interrupt factor. [Operation of when the error has occurred] The interrupt function does not operate.	Correct the value of the axis No. for interrupt factor and turn on PLC READY signal [Y0].
1860H	Dedicated instruction error	The G.ABRST□ instruction has been executed when the value other than 0 is stored in the status. (at the communication start with a servo amplifier) [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Set 0 in the status when executing the G.ABRST□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1861H		The status has been changed during absolute position restoration (during communication with a servo amplifier) by the G.ABRST□ instruction. [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Do not change the status during absolute position restoration by the G.ABRST□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1862H		The GP.PSTRT□ instruction has been executed when a value other than 1 to 600, 7000 to 7004, and 9001 to 9004 is stored in the start No. [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Choose the start number within the setting range when executing the GP.PSTRT□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1863H		The GP.TEACH□ instruction has been executed when a value other than 0 and 1 is set in the teaching data selection. [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Set 0 or 1 in the teaching data selection when executing the GP.TEACH□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1864H		The GP.TEACH□ instruction has been executed when a value other than 1 to 600 is set in the teaching positioning data No. [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Set the value within the setting range in the teaching positioning data No. (1 to 600) when executing the GP.TEACH□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1865H		The G.ABRST□, GP.PSTRT□, or GP.TEACH□ instruction has been executed with a non-existent axis being specified as the target of the instruction. [Operation of when the error has occurred] The positioning function corresponding to each dedicated instruction is not executed.	Do not specify a non-existent axis as the target of the instruction when executing the G.ABRST□, GP.PSTRT□, or GP.TEACH□ instruction. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).

Error code	Error name	Cause and description	Action
1867H 1868H 1869H	Dedicated instruction I/F error	The interface of the CPU module does not match the interface of the RD75. [Operation of when the error has occurred] The specified dedicated instruction is not accepted.	Check the dedicated instruction that is being executed. If the instruction has no problem, the possible cause is a module failure. Therefore replace the module with another one. For details, refer to MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
18B0H	Error at switching from normal operation mode to amplifier-less operation mode	• Input signals other than Module access flag [X1] are ON when switching from the normal operation mode to the amplifier-less operation mode. • The module was switched from the normal operation mode to the amplifier-less operation mode during test mode. [Operation of when the error has occurred] The operation mode is not switched.	• Switch the operation mode after confirming that all input signals other than Module access flag [X1] are OFF. • Switch the operation mode after confirming that the module is not in the test mode.
18B1H	Error at switching from amplifier-less operation mode to normal operation mode	Input signals other than Module access flag [X1] are ON when switching from the amplifier-less operation mode to the normal operation mode. [Operation of when the error has occurred] The operation mode is not switched.	Switch the operation mode after checking that all the input signals other than Module access flag [X1] are OFF.
18C0H	Q compatible mode setting error	Although the inter-module synchronization function is set, the basic parameter 3 (operation mode) is set to Q series-compatible mode, which does not support the inter-module synchronization function. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Set the basic parameter 3 (operation mode) to Quick start mode, and power off and on the system or reset the CPU module.
1900H	PLC READY OFF during operation	PLC READY signal [Y0] has been turned off during operation. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.38] Stop group 2 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the program with which PLC READY signal [Y0] is turned on or off.
1901H	Drive unit READY OFF	The start request has been performed while Drive unit READY signal is off. [Operation of when the error has occurred] The operation does not start.	• Check the power supply of the drive unit, wiring between the drive unit and other devices, and the connection status (connector). • Check the setting of [Pr.22] Input signal logic selection. • When using the drive unit without the READY signal output, wire a system so that the input of Drive unit READY signal is always on in the RD75.
1902H		Drive unit READY signal has been turned off during operation. [Operation of when the error has occurred] The operation stops immediately.	Check the power supply of the drive unit, wiring between the drive unit and other devices, and the connection status (connector).
1903H	Test mode faults during operation	Communication failed between the personal computer and the CPU module. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.38] Stop group 2 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	• Check that the interface of the personal computer where the cable is connected has no problem. • Check that the cable connecting the personal computer to the CPU module has no problem.
1904H	Hardware stroke limit (+)	The start request has been performed while Upper limit signal (FLS) is off. [Operation of when the error has occurred] The operation does not start.	• Check the wiring of Upper limit signal (FLS). • Check that the specifications of the limit switch match the setting of [Pr.22] Input signal logic selection. • For the system that does not require the limit switch installation, wire it so that the input of Upper limit signal (FLS) is always on in the RD75.
1905H		Upper limit signal (FLS) has been turned off during operation. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.37] Stop group 1 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	After performing the axis error reset, move the object with a manual operation to the position where Upper limit signal (FLS) is not turned off.

Error code	Error name	Cause and description	Action
1906H	Hardware stroke limit (-)	The start request has been performed while Lower limit signal (RLS) is off. [Operation of when the error has occurred] The operation does not start.	• Check the wiring of Lower limit signal (RLS). • Check that the specifications of the limit switch match the setting of [Pr.22] Input signal logic selection. • For the system that does not require the limit switch installation, wire it so that the input of Lower limit signal (RLS) is always on in the RD75.
1907H		Lower limit signal (RLS) has been turned off during operation. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.37] Stop group 1 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	After performing the axis error reset, move the object with a manual operation to the position where Lower limit signal (RLS) is not turned off.
1908H	Stop signal ON at start	The start request has been performed while Stop signal is on. [Operation of when the error has occurred] The operation does not start.	Correct the timing so that the operation starts after the stop command is cleared.
1909H		The start request has been performed while External stop signal is on. [Operation of when the error has occurred] The operation does not start.	Correct the timing so that the operation starts after the external stop is cleared.
190AH	PLC READY OFF → ON during BUSY	PLC READY signal [Y0] has been turned on while BUSY signal [XC, XD, XE, XF] is on. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Turn on PLC READY signal [Y0] while BUSY signal [XC, XD, XE, XF] of all axes are off.
1930H	Hold error	The parameter "CPU error output mode setting" is set to "Hold" for the RD75. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Set the parameter "CPU error output mode setting" to "Clear".
1931H	Flash ROM write error	Data cannot be written to the flash ROM. [Operation of when the error has occurred] Data cannot be written to the flash ROM correctly.	The flash ROM may be at the end of writable life.
1932H	Flash ROM sum check error	The system has been powered off while data is being written to the flash ROM. [Operation of when the error has occurred] Data cannot be written to the flash ROM correctly.	Return the value of the parameter to the factory default.
1940H	Start at OP	When [Pr.48] OPR retry is set to 0 (Do not perform OPR retry by limit switch), the machine OPR has been performed using the near-point dog method with OPR complete flag being on. [Operation of when the error has occurred] The machine OPR is not started.	• Set 1 (Perform the OPR retry with limit switches) in [Pr.48] OPR retry. For details, refer to ☞ Page 421 [Pr.48] OPR retry. • Perform the machine OPR after moving the object from the current position (OP) with a manual operation.
1941H	Dog detection timing fault	At the machine OPR using the near-point dog method, Near-point dog signal has turned off while the speed is decelerating from OPR speed to creep speed. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	• Slow down the OPR speed. For details, refer to ☞ Page 419 [Pr.46] OPR speed. • Make the input time of Near-point dog signal longer.
1942H	Zero signal detection timing fault	At the machine OPR using the stopper method 2, Zero signal has turned off while the speed is decelerating from OPR speed to creep speed. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	• Slow down the OPR speed. For details, refer to ☞ Page 419 [Pr.46] OPR speed. • Input Zero signal while the object is moving at creep speed when inputting the signal from an external source. For details, refer to ☞ Page 51 Stopper method 2.
1943H	Dwell time fault	At the machine OPR using the stopper method 1, the dwell time has passed while the speed is decelerating from OPR speed to creep speed. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	• Slow down the OPR speed. For details, refer to ☞ Page 419 [Pr.46] OPR speed. • Set a greater value in [Pr.49] OPR dwell time. For details, refer to ☞ Page 422 [Pr.49] OPR dwell time.

Error code	Error name	Cause and description	Action
1944H	Count method movement amount fault	At the machine OPR using the count method 1 or 2, the distance set in [Pr.50] Setting for the movement amount after near-point dog ON is shorter than the distance required from the OPR speed to the deceleration stop. [Operation of when the error has occurred] The machine OPR is not started.	• Calculate the movement amount of the object from the speed limit value, OPR speed, and deceleration time, and set [Pr.50] Setting for the movement amount after near-point dog ON so that the movement amount is longer than the deceleration distance. For details, refer to ☞ Page 423 [Pr.50] Setting for the movement amount after near-point dog ON. • Set the smaller value in [Pr.46] OPR speed.
1945H	OPR request ON	OPR request flag is on at the fast OPR start (Positioning start No.9002). [Operation of when the error has occurred] The fast OPR is not started.	Execute the machine OPR (Positioning start No.9001).
1946H	OPR restart not possible	Restart command has been turned on after the machine OPR stop with Stop signal. [Operation of when the error has occurred] The operation does not restart.	Execute the machine OPR (Positioning start No.9001) again.
1947H	Signal allocation error	Near-point dog signal has turned on and the hardware stroke limit switch in the OPR direction has turned off at the OPR using the near-point dog method. [Operation of when the error has occurred] The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Install limit switches so that the areas where Near-point dog signal is on and the hardware stroke limit switch in the OPR direction is off do not overlap each other.
1949H	ABS transmission time out	Communication with a servo amplifier failed during absolute position restoration using the dedicated instruction. [Operation of when the error has occurred] The absolute position restoration is not performed.	• Correct the wiring. For details, refer to 📖 MELSEC iQ-R Positioning Module User's Manual (Startup). • Correct the program.
194AH	ABS transmission SUM		• Correct the wiring. For details, refer to 📖 MELSEC iQ-R Positioning Module User's Manual (Startup). • Correct the program. • Correct the control data of the dedicated instruction. For details, refer to 📖MELSEC iQ-R Programming Manual (Module Dedicated Instructions).
1980H	Outside JOG speed range	The value outside the setting range is set in [Cd.17] JOG speed at the JOG start. [Operation of when the error has occurred] The JOG operation is not performed.	Correct the value of [Cd.17] JOG speed within the setting range. For details, refer to ☞ Page 482 [Cd.17] JOG speed.
1981H	Inching movement amount error	The value to meet the setting condition is not set in [Cd.16] Inching movement amount. (The setting value is large.) Setting condition: (Inching movement amount) × (A) ≤ (JOG speed limit value) The value of (A) is as follows. • When the unit setting is pulse: 562.5 • When the unit setting is a value other than pulse: 337.5 [Operation of when the error has occurred] The inching operation is not performed.	Set a smaller value in [Cd.16] Inching movement amount to meet the setting condition. For details, refer to the following. ☞ Page 190 Inching Operation ☞ Page 409 [Pr.31] JOG speed limit value ☞ Page 482 [Cd.16] Inching movement amount
1990H	Error before simultaneous start	• The partner axis for the simultaneous start is in BUSY state. • The partner axis for the simultaneous start does not exist. [Operation of when the error has occurred] The operation is not performed.	• Start the operation after BUSY state of the simultaneous starting axis is cleared. • Specify an axis that exists for the simultaneous starting axis.
1991H		• The simultaneous starting axis start data No. of the starting axis is 0 or a value outside the setting range. • The simultaneous starting axis start data No. of the axis other than the starting axis is a value outside the setting range. [Operation of when the error has occurred] The operation is not performed.	Correct the simultaneous starting axis start data No. For details, refer to the following. ☞ Page 487 [Cd.30] Simultaneous starting axis start data No. (Axis 1 start data No.) ☞ Page 487 [Cd.31] Simultaneous starting axis start data No. (Axis 2 start data No.) ☞ Page 487 [Cd.32] Simultaneous starting axis start data No. (Axis 3 start data No.) ☞ Page 487 [Cd.33] Simultaneous starting axis start data No. (axis 4 start data No.)

Error code	Error name	Cause and description	Action
1993H	Software stroke limit (+)	In manual control or in speed control, the positioning has been performed at the position where the current feed value is over [Pr.12] Software stroke limit upper limit value. (If the machine feed value is selected in [Pr.14] Software stroke limit selection, it becomes the target for the stroke limit.) [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation In speed control ("during speed control" in speed-position switching control and in position-speed switching control included), the operation stops according to the setting in [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop only) when a value in [Md.20] Current feed value or in [Md.21] Machine feed value has become outside the software stroke limit range in manual operation.	If the current feed value or machine feed value is outside the software stroke limit range, move the object to the position within the software stroke limit range with a manual operation.
1994H		The new current value is over [Pr.12] Software stroke limit upper limit value. [Operation of when the error has occurred] The current value change is not performed.	Correct the new current value within the software stroke limit range. For details, refer to ☞ Page 480 [Cd.9] New current value.
1995H	Software stroke limit (-)	In manual control or in speed control, the positioning has been performed at the position where the current feed value is below [Pr.13] Software stroke limit lower limit value. (If the machine feed value is selected in [Pr.14] Software stroke limit selection, it becomes the target for the stroke limit.) [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation In speed control ("during speed control" in speed-position switching control and in position-speed switching control included), the operation stops according to the setting in [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop only) when a value in [Md.20] Current feed value or in [Md.21] Machine feed value has become outside the software stroke limit range in manual operation.	If the current feed value or machine feed value is outside the software stroke limit range, move the object to the position within the software stroke limit range with a manual operation.
1996H		The new current value is below [Pr.13] Software stroke limit lower limit value. [Operation of when the error has occurred] The current value change is not performed.	Correct the new current value within the software stroke limit range. For details, refer to ☞ Page 480 [Cd.9] New current value.
1997H	Outside new current value range	When the unit is degree, the value other than 0 to 359.99999 is set in [Cd.9] New current value. [Operation of when the error has occurred] The current value change is not performed.	Correct the new current value within the setting range. For details, refer to ☞ Page 480 [Cd.9] New current value.
1998H	Interpolation while partner axis BUSY	The interpolation operation has been started while the partner axis is operating. [Operation of when the error has occurred] The operation is not performed.	• Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method. • Change the axis to be interpolated. For details, refer to ☞ Page 432 [Da.5] Axis to be interpolated. • Start the operation after BUSY state of the axis to be interpolated is cleared.
1999H	Unit group unmatched	The units of the reference axis and interpolation axis differ when Composite speed is set in [Pr.20] Interpolation speed specification method or [Da.29] Interpolation speed specification method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation • The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). • The operation stops at the stop position while the speed is 0.	Correct the positioning data or a value in [Pr.1] Unit setting of the interpolation axis. For details, refer to the following. ☞ Page 82 Interpolation control ☞ Page 388 [Pr.1] Unit setting ☞ Page 405 [Pr.20] Interpolation speed specification method ☞ Page 441 [Da.29] Interpolation speed specification method

Error code	Error name	Cause and description	Action
199AH	Interpolation mode error	In interpolation control or 4-axis linear interpolation control of speed control, the operation has been performed with Composite speed being set in [Pr.20] Interpolation speed specification method of the reference axis. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation • The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). • The operation stops at the stop position while the speed is 0.	Correct the value in [Pr.20] Interpolation speed specification method. For details, refer to ☞ Page 405 [Pr.20] Interpolation speed specification method.
199BH		In circular interpolation control or helical interpolation control, the operation has been performed with Reference axis speed being set in [Pr.20] Interpolation speed specification method of the reference axis. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation • The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). • The operation stops at the stop position while the speed is 0.	Correct the value in [Pr.20] Interpolation speed specification method. For details, refer to ☞ Page 405 [Pr.20] Interpolation speed specification method.
199CH	Control method setting error	The machine OPR, fast OPR, speed-position switching control, or position-speed switching control has been performed in wiring-less mode. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation • The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). • The operation stops at the stop position while the speed is 0.	Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method.
199DH		A value other than 0 is set in the buffer memory address 1906 (use prohibited area). [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation • The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). • The operation stops at the stop position while the speed is 0.	Do not set any value in the buffer memory address 1906 (use prohibited area).
199EH	Simultaneous start not possible	An error (except the error of 199EH) has occurred in any of the simultaneous starting axes. [Operation of when the error has occurred] The operation is not performed.	• Find the axis where the error (except the error of 199EH) has occurred with the error history and eliminate the error cause. • Correct the block start data and positioning data. For details, refer to the following. ☞ Page 428 Positioning Data ☞ Page 442 Block Start Data
199FH	Circular interpolation not possible	The circular interpolation or helical interpolation has been performed to the axis where the unit is degree. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Correct the value in [Da.2] Control method or [Pr.1] Unit setting. For details, refer to the following. ☞ Page 388 [Pr.1] Unit setting ☞ Page 430 [Da.2] Control method

Error code	Error name	Cause and description	Action
19A0H	M code ON signal ON start	The positioning has been performed while M code ON signal [X4, X5, X6, X7] is on. [Operation of when the error has occurred] The operation is not performed.	Start the positioning after M code ON signal [X4, X5, X6, X7] has turned off. For details, refer to ☞ Page 285 M code output function.
19A1H	PLC READY OFF start	The positioning has been performed while PLC READY signal [Y0] is off. [Operation of when the error has occurred] The operation is not performed.	Check the program with which PLC READY signal [Y0] is turned on or off and start the positioning after PLC READY signal [Y0] is turned on.
19A2H	READY OFF start	The positioning has been performed while RD75 READY signal [X0] is off. [Operation of when the error has occurred] The operation is not performed.	Start the positioning after RD75 READY signal [X0] has turned on.
19A3H	Outside start No. range	At the positioning start, the setting value of Positioning start No. of axis control data is other than 1 to 600, 7000 to 7004, and 9001 to 9004. [Operation of when the error has occurred] The operation is not performed.	Correct the value of the positioning start No. For details, refer to ☞ Page 478 [Cd.3] Positioning start No..
19A4H	Illegal setting of ABS direction in unit of degree	A value outside the setting range is set in [Cd.40] ABS direction in degrees when the software stroke limit is invalid and the unit is degree. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Correct the value in [Cd.40] ABS direction in degrees within the setting range. For details, refer to ☞ Page 490 [Cd.40] ABS direction in degrees.
19A5H		A value other than 0 is set in [Cd.40] ABS direction in degrees when the software stroke limit is valid and the unit is degree. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	• Set 0 in [Cd.40] ABS direction in degrees. For details, refer to ☞ Page 490 [Cd.40] ABS direction in degrees. • Invalidate the software stroke limit. (The stroke limit is invalidated when Software stroke limit upper limit value = Software stroke limit lower limit value.)
19A6H	Start error at OPR completion	The positioning has been performed with OPR request flag being on when 0: Do not execute the positioning control is set in [Pr.58] Setting of operation during uncompleted OPR. [Operation of when the error has occurred] The operation is not performed.	• Start the positioning after OPR is completed. • For the system where positioning control is possible with OPR request flag being on, set 1 to [Pr.58] Setting of operation during uncompleted OPR. For details, refer to ☞ Page 427 [Pr.58] Setting of operation during uncompleted OPR.
19F0H	Illegal condition data No.	The positioning of block start using condition data has been performed by the special start instruction (condition start, wait start, simultaneous start, repeated start (FOR condition)) when the condition data No. is outside the setting range. (1 ≤ Condition data No. ≤ 10) [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the condition data No. For details, refer to ☞ Page 446 [Da.14] Parameter.
19F1H	Error before simultaneous start	The partner axis for the simultaneous start of block start is in BUSY state. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	• Correct the condition operator. For details, refer to ☞ Page 448 [Da.16] Condition operator. • Start the operation after BUSY state of the simultaneous starting axis is cleared.
19F2H	Special start instruction error	The special start instruction is not corresponding to the operation. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the special start instruction. For details, refer to ☞ Page 445 [Da.13] Special start instruction.

Error code	Error name	Cause and description	Action
1A00H	Condition data error	The condition target is not set or the value is outside the setting range. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the block start data. For details, refer to ☞ Page 447 [Da.15] Condition target.
1A01H		The condition operator is not set or the value is outside the setting range. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the block start data. For details, refer to ☞ Page 448 [Da.16] Condition operator.
1A02H		The condition operator is a bit operator and the parameter 1 is 32 or more. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the block start data. For details, refer to the following. ☞ Page 446 [Da.14] Parameter ☞ Page 448 [Da.16] Condition operator
1A04H		The condition operator is 05H (P1 ≤ VAL ≤ P2) or 06H (VAL ≤ P1, P2 ≤ VAL) and the parameter 1 is greater than the parameter 2. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the block start data. For details, refer to the following. ☞ Page 449 [Da.18] Parameter 1 ☞ Page 450 [Da.19] Parameter 2
1A05H		The condition target is buffer memory (1 word/2 words) and the value of the address is outside the setting range. (1 word: 0 to 32767, 2 words: 0 to 32766) [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the block start data. For details, refer to ☞ Page 449 [Da.17] Address.
1A10H	Illegal data No.	The positioning data No. for the JUMP destination is currently being executed. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the positioning data. For details, refer to ☞ Page 439 [Da.9] Dwell time.
1A11H		A value other than 1 to 600 is set as the positioning data No. for the JUMP destination. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation ends.	Correct the positioning data. For details, refer to ☞ Page 439 [Da.9] Dwell time.
1A12H	No command speed	At the OPR or the positioning start of position control, the command speed was set to -1 (current speed) for the positioning data that was to be executed firstly. [Operation of when the error has occurred] The operation is not performed.	Correct the positioning data. For details, refer to ☞ Page 438 [Da.8] Command speed.
1A13H		The command speed is set to -1 (current speed) when the speed control has been performed. [Operation of when the error has occurred] The operation is not performed.	Correct the positioning data. For details, refer to ☞ Page 438 [Da.8] Command speed.
1A14H		The command speed is set to -1 (current speed) when the speed-position switching control or the position-speed switching control has been performed. [Operation of when the error has occurred] The operation is not performed.	Correct the positioning data. For details, refer to ☞ Page 438 [Da.8] Command speed.

Error code	Error name	Cause and description	Action
1A15H	Outside linear movement amount range	The movement amount of each axis set to the positioning data is over 1073741824 (2^{30}) when the linear interpolation control has been performed with Composite speed being set in [Pr.20] Interpolation speed specification method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the value in [Da.6] Positioning address. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A16H		When the unit is degree, the value in [Pr.12] Software stroke limit upper limit value is not equal to the value in [Pr.13] Software stroke limit lower limit value and the positioning address for the control of incremental system is -360.00000 or smaller or 360.00000 or greater. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the value in [Da.6] Positioning address. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A17H	Large arc error deviation	The difference of "distance (radius) of start point and center point" and "distance (radius) of end point and center point" is over the value in [Pr.41] Allowable circular interpolation error width when the circular interpolation control or helical interpolation control has been performed with the center point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	• Correct the center point address (arc address). For details, refer to ☞ Page 436 [Da.7] Arc address. • Correct the end point address (positioning address). For details, refer to ☞ Page 433 [Da.6] Positioning address/ movement amount.
1A18H	Software stroke limit (+)	The positioning address set in [Da.6] Positioning address/ movement amount is over the value in [Pr.12] Software stroke limit upper limit value. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the value in [Da.6] Positioning address. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A19H		The sub point is over the value in [Pr.12] Software stroke limit upper limit value when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	• Correct the sub point address (arc address). For details, refer to ☞ Page 436 [Da.7] Arc address. • Correct the end point address (positioning address). For details, refer to ☞ Page 433 [Da.6] Positioning address/ movement amount.
1A1AH	Software stroke limit (-)	The positioning address set in [Da.6] Positioning address/ movement amount is below the value in [Pr.13] Software stroke limit lower limit value. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the value in [Da.6] Positioning address. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A1BH		The sub point is below the value in [Pr.13] Software stroke limit lower limit value when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	• Correct the sub point address (arc address). For details, refer to ☞ Page 436 [Da.7] Arc address. • Correct the end point address (positioning address). For details, refer to ☞ Page 433 [Da.6] Positioning address/ movement amount.

Error code	Error name	Cause and description	Action
1A1CH	New current value not possible	Continuous path control has been set in [Da.1] Operation pattern of the positioning data where Current value change is set in [Da.2] Control method. [Operation of when the error has occurred] The current value change is not performed.	Do not set Continuous path control in [Da.1] Operation pattern with Current value change being set in [Da.2] Control method. For details, refer to the following. ☞ Page 429 [Da.1] Operation pattern ☞ Page 430 [Da.2] Control method
1A1DH		Current value change has been set in [Da.2] Control method of the positioning data next to the one where Continuous path control is set in [Da.1] Operation pattern. [Operation of when the error has occurred] The current value change is not performed.	Do not set Current value change in [Da.2] Control method of the positioning data next to the one where Continuous path control is set in [Da.1] Operation pattern. For details, refer to the following. ☞ Page 429 [Da.1] Operation pattern ☞ Page 430 [Da.2] Control method
1A1EH	Continuous path control not possible	Continuous positioning control has been set in [Da.1] Operation pattern of the positioning data where the control that cannot perform the continuous positioning control (such as speed control, or position-speed switching control) is set in [Da.2] Control method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Do not set Continuous positioning control in [Da.1] Operation pattern while the speed control or position-speed switching control is set in [Da.2] Control method. For details, refer to the following. ☞ Page 429 [Da.1] Operation pattern ☞ Page 430 [Da.2] Control method
1A1FH		Continuous path control has been set in [Da.1] Operation pattern of the positioning data where the control that cannot perform the continuous path control (such as speed control, speed-position switching control, position-speed switching control, or fixed-feed control) is set in [Da.2] Control method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Do not set Continuous path control in [Da.1] Operation pattern while the speed control, speed-position switching control, position-speed switching control, or fixed-feed control is set in [Da.2] Control method. For details, refer to the following. ☞ Page 429 [Da.1] Operation pattern ☞ Page 430 [Da.2] Control method
1A20H		The speed control, speed-position switching control, position-speed switching control, or fixed-feed control has been set in [Da.2] Control method of the positioning data next to the one where Continuous path control is set in [Da.1] Operation pattern. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Do not set the speed control, speed-position switching control, position-speed switching control, or fixed-feed control in [Da.2] Control method of the positioning data next to the one where Continuous path control is set in [Da.1] Operation pattern. For details, refer to the following. ☞ Page 429 [Da.1] Operation pattern ☞ Page 430 [Da.2] Control method
1A21H	Outside operation pattern range	The value set in [Da.1] Operation pattern is 2. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Correct the value in [Da.1] Operation pattern. For details, refer to ☞ Page 429 [Da.1] Operation pattern.

Error code	Error name	Cause and description	Action
1A22H	Illegal interpolation description command	The self-axis or an axis that does not exist is set in [Da.5] Axis to be interpolated when the 2-axis interpolation control or helical interpolation control has been performed. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	• Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method. • Correct the value in [Da.5] Axis to be interpolated. For details, refer to ☞ Page 432 [Da.5] Axis to be interpolated.
1A23H	Command speed setting error	The value outside the setting range is set in [Da.8] Command speed. Linear interpolation control, circular interpolation control, helical interpolation control: The reference axis is outside the setting range. Interpolation control of speed control: One axis (the reference axis or interpolation axes) is outside the setting range. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Correct the value in [Da.8] Command speed. For details, refer to ☞ Page 438 [Da.8] Command speed.
1A24H	Control method setting error	A value outside the setting range is set in [Da.2] Control method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method.
1A25H		The number of controlled axes or the value in [Da.5] Axis to be interpolated was different from the previous data when positioning data have been successively executed in the continuous positioning control or continuous path control. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	• Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method. • Correct the value in [Da.5] Axis to be interpolated. For details, refer to ☞ Page 432 [Da.5] Axis to be interpolated.
1A26H		The NOP instruction has been set in [Da.2] Control method of the positioning data No.600. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The deceleration stop is performed for [Da.6] Positioning address/movement amount of the previous positioning data according to the value set in [Da.4] Deceleration time No. of the previous positioning data.	Correct the value in [Da.2] Control method. For details, refer to ☞ Page 430 [Da.2] Control method.

Error code	Error name	Cause and description	Action
1A27H	Sub point setting error	The start point is same with the sub point when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the sub point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A28H		The end point is same with the sub point when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the sub point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A29H		The start point, end point, and sub point are in the same straight line when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the sub point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A2AH		The sub point address is outside the range of -2147483648 to 2147483647 when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the sub point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A2BH	End point setting error	The start point is same with the end point when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the end point address with [Da.6] Positioning address/movement amount. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A2CH		The end point address is outside the range of -2147483648 to 2147483647 when the circular interpolation control or helical interpolation control has been performed with the sub point or the center point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the end point address with [Da.6] Positioning address/movement amount. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.

Error code	Error name	Cause and description	Action
1A2DH	Center point setting error	The start point is same with the center point when the circular interpolation control or helical interpolation control has been performed with the center point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the center point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A2EH		The end point is same with the center point when the circular interpolation control or helical interpolation control has been performed with the center point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the center point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A2FH		The center point address is outside the range of -2147483648 to 2147483647 when the circular interpolation control or helical interpolation control has been performed with the center point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the center point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A30H	Outside address range	A negative value is set in [Da.6] Positioning address/ movement amount when the speed-position switching control (INC) or the position-speed switching control (INC) has been performed. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Correct the value in [Da.6] Positioning address/movement amount. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A31H		A value outside the range of 0 to 359.99999 [degree] is set in [Da.6] Positioning address/movement amount when ABS1, ABS2, ABS3, ABS4, helical interpolation control (ABS), or speed-position switching control (ABS) has been performed. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Correct the value in [Da.6] Positioning address/movement amount. For details, refer to ☞ Page 433 [Da.6] Positioning address/movement amount.
1A32H	Outside radius range	The radius of the arc is over 536870912. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the positioning data. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A33H	Control method LOOP setting error	The number of LOOP repetition is 0 when LOOP is set in [Da.2] Control method. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Set a value of 1 to 65535 as the number of LOOP repetition. For details, refer to ☞ Page 440 [Da.10] M code.

Error code	Error name	Cause and description	Action
1A34H	M code ON timing error	A value outside the setting range is set in [Da.27] M code ON signal output timing of positioning data. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Set a value of 0 to 2 in [Da.27] M code ON signal output timing. For details, refer to ☞ Page 440 [Da.27] M code ON signal output timing.
1A35H	Interpolation speed specification method error	A value outside the setting range is set in [Da.29] Interpolation speed specification method of the positioning data. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Set a value of 0 to 2 in [Da.29] Interpolation speed specification method. For details, refer to ☞ Page 441 [Da.29] Interpolation speed specification method.
1A36H	Outside number of pitch	The number of pitch set in [Da.10] M code of the line axis is outside the setting range when the helical interpolation control has been performed. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop).	Correct the number of pitch in [Da.10] M code of the line axis within 0 to 999. For details, refer to ☞ Page 440 [Da.10] M code.
1A37H	Sub point setting error	The sub point address is outside the range of -2147483648 to 2147483647 when the circular interpolation control or helical interpolation control has been performed with the sub point being specified. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops immediately.	Correct the sub point address with [Da.7] Arc address. For details, refer to ☞ Page 436 [Da.7] Arc address.
1A60H	Outside unit setting range	A value outside the setting range is set in [Pr.1] Unit setting of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 388 [Pr.1] Unit setting.
1A61H	Outside pulse number per rotation range	A value outside the setting range is set in [Pr.2] No. of pulses per rotation of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 389 [Pr.2] No. of pulses per rotation (16 bits) (Ap) ☞ Page 395 [Pr.2] No. of pulses per rotation (32 bits) (Ap)
1A62H	Outside movement amount per rotation range	A value outside the setting range is set in [Pr.3] Movement amount per rotation of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 390 [Pr.3] Movement amount per rotation (16 bits) (Al) ☞ Page 396 [Pr.3] Movement amount per rotation (32 bits) (Al)
1A63H	Outside unit magnification range	A value outside the setting range is set in [Pr.4] Unit magnification of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 390 [Pr.4] Unit magnification.
1A64H	Pulse output mode error	A value outside the setting range is set in [Pr.5] Pulse output mode of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 391 [Pr.5] Pulse output mode.
1A65H	Rotation direction setting error	A value outside the setting range is set in [Pr.6] Rotation direction setting of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 393 [Pr.6] Rotation direction setting.

Error code	Error name	Cause and description	Action
1A66H	Outside bias speed range	A value outside the setting range is set in [Pr.7] Bias speed at start of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 394 [Pr.7] Bias speed at start.
1A67H		[Pr.7] Bias speed at start of basic parameter 1 is over [Pr.8] Speed limit value. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Set values so that [Pr.7] Bias speed at start becomes equal to or below [Pr.8] Speed limit value, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 394 [Pr.7] Bias speed at start ☞ Page 397 [Pr.8] Speed limit value
1A68H	Outside electronic gear selection	A value outside the setting range is set in [Pr.62] Electronic gear selection of basic parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 395 [Pr.62] Electronic gear selection.
1A69H	Outside speed limit value range	A value outside the setting range is set in [Pr.8] Speed limit value of basic parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 397 [Pr.8] Speed limit value.
1A6AH		The command pulse frequency converted from the value in [Pr.8] Speed limit value of basic parameter 2 is over the maximum output pulse of the module. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value so that the command pulse frequency is not over the maximum output pulse of the module, and turn on PLC READY signal [Y0] if the signal is off. • RD75P: 200000 (pulse/s) • RD75D: 5000000 (pulse/s)
1A6BH	Outside acceleration time 0 range	A value outside the setting range is set in [Pr.9] Acceleration time 0 of basic parameter 2. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0.
1A6CH	Outside deceleration time 0 range	A value outside the setting range is set in [Pr.10] Deceleration time 0 of basic parameter 2. [Operation of when the error has occurred] ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 398 [Pr.9] Acceleration time 0, [Pr.10] Deceleration time 0.
1AA0H	Backlash compensation amount error	The number of pulses converted from the movement amount per pulse is 256 or greater. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Set values so that the number of pulses converted from the movement amount per pulse becomes smaller than 256, and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 399 [Pr.11] Backlash compensation amount.
1AA1H	Software stroke limit upper limit	When the unit is degree, a value outside the setting range is set in [Pr.12] Software stroke limit upper limit value of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 400 [Pr.12] Software stroke limit upper limit value.
1AA2H		When the unit other than degree is set, [Pr.12] Software stroke limit upper limit value is smaller than [Pr.13] Software stroke limit lower limit value. (The error code: 1AA4H is stored as well.) [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	When the unit is other than degree, set values so that [Pr.12] Software stroke limit upper limit value becomes greater than [Pr.13] Software stroke limit lower limit value, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 400 [Pr.12] Software stroke limit upper limit value ☞ Page 400 [Pr.13] Software stroke limit lower limit value

Error code	Error name	Cause and description	Action
1AA3H	Software stroke limit lower limit	When the unit is degree, a value outside the setting range is set in [Pr.13] Software stroke limit lower limit value of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 400 [Pr.13] Software stroke limit lower limit value.
1AA4H		When the unit other than degree is set, [Pr.12] Software stroke limit upper limit value is smaller than [Pr.13] Software stroke limit lower limit value. (The error code: 1AA2H is stored as well.) [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	When the unit is other than degree, set values so that [Pr.12] Software stroke limit upper limit value becomes greater than [Pr.13] Software stroke limit lower limit value, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 400 [Pr.12] Software stroke limit upper limit value ☞ Page 400 [Pr.13] Software stroke limit lower limit value
1AA5H	Software stroke limit selection	A value outside the setting range is set in [Pr.14] Software stroke limit selection of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 401 [Pr.14] Software stroke limit selection.
1AA6H	Software stroke limit valid/invalid setting	A value outside the setting range is set in [Pr.15] Software stroke limit valid/invalid setting of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 401 [Pr.15] Software stroke limit valid/invalid setting.
1AA7H	Command in-position width	A value outside the setting range is set in [Pr.16] Command in-position width of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 401 [Pr.16] Command in-position width.
1AA8H	Illegal torque limit setting value	A value outside the setting range is set in [Pr.17] Torque limit setting value of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 402 [Pr.17] Torque limit setting value.
1AA9H	M code ON timing error	A value outside the setting range is set in [Pr.18] M code ON signal output timing of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 403 [Pr.18] M code ON signal output timing.
1AAAH	Speed switching mode error	A value outside the setting range is set in [Pr.19] Speed switching mode of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 404 [Pr.19] Speed switching mode.
1AABH	Interpolation speed specification method error	A value outside the setting range is set in [Pr.20] Interpolation speed specification method of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 405 [Pr.20] Interpolation speed specification method.
1AACH	Current value update request error	A value outside the setting range is set in [Pr.21] Current feed value during speed control of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 406 [Pr.21] Current feed value during speed control.
1AADH	Manual pulse generator input mode error	A value outside the setting range is set in [Pr.24] Manual pulse generator input selection of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 407 [Pr.24] Manual pulse generator input selection.
1AAEH	Speed-position function selection error	Although 2: Speed-position switching control (ABS mode) is set in [Pr.150] Speed-position function selection of detailed parameter 1, the following three conditions are not met. • The unit is degree. • The software stroke limit is invalid. • Current feed value is updated. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	• When executing the speed-position switching control (ABS mode), set values to meet the three conditions described on the left side. • When not executing speed-position switching control (ABS mode), set 0: Speed-position switching control (INC mode) in [Pr.150] Speed-position function selection and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 407 [Pr.150] Speed-position function selection.

Error code	Error name	Cause and description	Action
1AB1H	Acceleration time 1 setting error	A value outside the setting range is set in [Pr.25] Acceleration time 1 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3.
1AB2H	Acceleration time 2 setting error	A value outside the setting range is set in [Pr.26] Acceleration time 2 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3.
1AB3H	Acceleration time 3 setting error	A value outside the setting range is set in [Pr.27] Acceleration time 3 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.25] Acceleration time 1 to [Pr.27] Acceleration time 3.
1AB4H	Deceleration time 1 setting error	A value outside the setting range is set in [Pr.28] Deceleration time 1 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3.
1AB5H	Deceleration time 2 setting error	A value outside the setting range is set in [Pr.29] Deceleration time 2 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3.

Error code	Error name	Cause and description	Action
1AB6H	Deceleration time 3 setting error	A value outside the setting range is set in [Pr.30] Deceleration time 3 of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed. ■During operation The operation stops according to the setting of [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2 (deceleration stop/sudden stop). (for manual pulse generator operation, deceleration stop only)	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 408 [Pr.28] Deceleration time 1 to [Pr.30] Deceleration time 3.
1AB7H	JOG speed limit value error	A value outside the setting range is set in [Pr.31] JOG speed limit value of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 409 [Pr.31] JOG speed limit value.
1AB8H		A value set in [Pr.31] JOG speed limit value of detailed parameter 2 is over [Pr.8] Speed limit value. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value so that [Pr.31] JOG speed limit value is equal to or below [Pr.8] Speed limit value, and turn on PLC READY signal [Y0] if the signal is off. For details, refer to the following. ☞ Page 397 [Pr.8] Speed limit value ☞ Page 409 [Pr.31] JOG speed limit value
1AB9H		The value set in [Pr.31] JOG speed limit value of detailed parameter 2 is below [Pr.7] Bias speed at start. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value so that [Pr.31] JOG speed limit value is equal to or over [Pr.7] Bias speed at start, and turn on PLC READY signal [Y0] if the signal is off. For details, refer to the following. ☞ Page 397 [Pr.8] Speed limit value ☞ Page 409 [Pr.31] JOG speed limit value
1ABCH	JOG acceleration time selection setting error	A value outside the setting range is set in [Pr.32] JOG operation acceleration time selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 409 [Pr.32] JOG operation acceleration time selection.
1ABDH	JOG deceleration time selection setting error	A value outside the setting range is set in [Pr.33] JOG operation deceleration time selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 410 [Pr.33] JOG operation deceleration time selection.
1ABEH	Acceleration/ deceleration processing selection setting error	A value outside the setting range is set in [Pr.34] Acceleration/ deceleration processing selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 410 [Pr.34] Acceleration/deceleration processing selection.
1ABFH	S-curve ratio setting error	A value outside the setting range is set in [Pr.35] S-curve ratio of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 411 [Pr.35] S-curve ratio.

Error code	Error name	Cause and description	Action
1AC0H	Illegal sudden stop deceleration time	A value outside the setting range is set in [Pr.36] Sudden stop deceleration time of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 412 [Pr.36] Sudden stop deceleration time.
1AC1H	Stop group 1 sudden stop selection error	A value outside the setting range is set in [Pr.37] Stop group 1 sudden stop selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 413 [Pr.37] to [Pr.39] Stop group 1 to 3 sudden stop selection.
1AC2H	Stop group 2 sudden stop selection error	A value outside the setting range is set in [Pr.38] Stop group 2 sudden stop selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 413 [Pr.37] to [Pr.39] Stop group 1 to 3 sudden stop selection.
1AC3H	Stop group 3 sudden stop selection error	A value outside the setting range is set in [Pr.39] Stop group 3 sudden stop selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 413 [Pr.37] to [Pr.39] Stop group 1 to 3 sudden stop selection.
1AC4H	Outside allowance circular interpolation error width	A value outside the setting range is set in [Pr.41] Allowable circular interpolation error width of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 415 [Pr.41] Allowable circular interpolation error width.
1AC5H	External command function selection error	A value outside the setting range is set in [Pr.42] External command function selection of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 416 [Pr.42] External command function selection.
1AC7H	Outside start adjustment time error	A value outside the setting range is set in [Pr.82] Start adjustment time of detailed parameter 2. [Operation of when the error has occurred] ■At power-on or at turning on of PLC READY signal [Y0] RD75 READY signal [X0] does not turn on. ■At the start of operation The operation is not performed.	Correct the value within the setting range and turn on PLC READY signal [Y0] if the signal is off. For details, refer to ☞ Page 416 [Pr.82] Start adjustment time.
1B00H	OPR method error	A value outside the setting range is set in [Pr.43] OPR method of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 417 [Pr.43] OPR method.
1B01H	OPR direction error	A value outside the setting range is set in [Pr.44] OPR direction of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 418 [Pr.44] OPR direction.
1B02H	OP address setting error	A value outside the setting range is set in [Pr.45] OP address of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 419 [Pr.45] OP address.

Error code	Error name	Cause and description	Action
1B03H	OPR speed error	A value outside the setting range is set in [Pr.46] OPR speed of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 419 [Pr.46] OPR speed.
1B04H		A value set in [Pr.46] OPR speed of OPR basic parameter is over [Pr.8] Speed limit value. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value so that [Pr.46] OPR speed is equal to or below [Pr.8] Speed limit value, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 397 [Pr.8] Speed limit value ☞ Page 419 [Pr.46] OPR speed
1B05H		A value set in [Pr.46] OPR speed of OPR basic parameter is below [Pr.7] Bias speed at start. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value so that [Pr.46] OPR speed is equal to or over [Pr.7] Bias speed at start, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 394 [Pr.7] Bias speed at start ☞ Page 419 [Pr.46] OPR speed
1B06H	Creep speed error	A value outside the setting range is set in [Pr.47] Creep speed of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 420 [Pr.47] Creep speed.
1B07H		A value set in [Pr.47] Creep speed of OPR basic parameter is over [Pr.46] OPR speed. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value so that [Pr.47] Creep speed is equal to or below [Pr.46] OPR speed, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 419 [Pr.46] OPR speed ☞ Page 420 [Pr.47] Creep speed
1B08H		A value set in [Pr.47] Creep speed of OPR basic parameter is below [Pr.7] Bias speed at start. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value so that [Pr.47] Creep speed is equal to or over [Pr.7] Bias speed at start, and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 394 [Pr.7] Bias speed at start ☞ Page 420 [Pr.47] Creep speed
1B09H	OPR retry error	A value outside the setting range is set in [Pr.48] OPR retry of OPR basic parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 421 [Pr.48] OPR retry.
1B0AH	Setting for the movement amount after near-point dog ON error	A value outside the setting range is set in [Pr.50] Setting for the movement amount after near-point dog ON of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 423 [Pr.50] Setting for the movement amount after near-point dog ON.
1B0BH	OPR acceleration time selection error	A value outside the setting range is set in [Pr.51] OPR acceleration time selection of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 424 [Pr.51] OPR acceleration time selection.
1B0CH	OPR deceleration time selection error	A value outside the setting range is set in [Pr.52] OPR deceleration time selection of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 424 [Pr.52] OPR deceleration time selection.
1B0DH	OPR torque limit value error	A value outside the setting range is set in [Pr.54] OPR torque limit value of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 426 [Pr.54] OPR torque limit value.
1B0EH		[Pr.54] OPR torque limit value of OPR detailed parameter is over [Pr.17] Torque limit setting value of detailed parameter 1. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to the following. ☞ Page 402 [Pr.17] Torque limit setting value ☞ Page 426 [Pr.54] OPR torque limit value
1B0FH	Deviation counter clear signal output time setting error	A value outside the setting range is set in [Pr.55] Deviation counter clear signal output time of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 426 [Pr.55] Deviation counter clear signal output time.

Error code	Error name	Cause and description	Action
1B10H	Speed specification during OP shift error	A value outside the setting range is set in [Pr.56] Speed specification during OP shift of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 426 [Pr.56] Speed specification during OP shift.
1B11H	Setting of operation during uncompleted OPR	A value outside the setting range is set in [Pr.58] Setting of operation during uncompleted OPR of OPR detailed parameter. [Operation of when the error has occurred] RD75 READY signal [X0] does not turn on.	Correct the value within the setting range and turn on PLC READY signal [Y0]. For details, refer to ☞ Page 427 [Pr.58] Setting of operation during uncompleted OPR.
2600H	Inter-module synchronization processing fault	In pre-analysis mode, the positioning has not been started by the start timing of next inter-module synchronization cycle after the input of start trigger. [Operation of when the error has occurred] The operation stops immediately.	Adjust settings to meet the following condition. Synchronous interrupt program < (Inter-module synchronization cycle - 0.1ms)
2610H	Inter-module synchronization signal fault	The error (step-out) of the inter-module synchronization signal of the own system module has been detected. [Operation of when the error has occurred] The operation stops immediately.	Check for noise influence.
3001H	Fault	Hardware failure [Operation of when the error has occurred] The operation stops immediately.	Check for noise influence.
3002H	Internal circuit fault	Hardware failure [Operation of when the error has occurred] The operation stops immediately.	Check for noise influence.
3020H 3021H	CPU module error	An error was detected in the CPU module. [Operation of when the error has occurred] The operation stops slowly.	Check the error of the CPU module and take corrective action using the module diagnostics.

14

APPENDICES

Appendix 1 Module Label

The functions of the RD75 can be set by using module labels.

Module label of I/O signals

The label names of I/O signals are defined with the following configuration.
"Module name"_"Module number".b"Label name"_"Axis[ax]" or "Module name"_"Module number".b"Label name"_"Axis[ax]"_D

Ex.
RD75_1.bnMcodeOn_Axis[0]_D

■Module name

The module name indicates the model of the module.

■Module number

The module number starts from one and is added for identifying modules with the same module name.

■Label name

The label name is unique by modules.

■Axis[ax]

Axis[ax] indicates the axis number corresponding to the module label. A numerical value from 0 to 3 is used for [ax] according to the axes from 1 to 4. (Axis 1: 0, axis 2: 1, axis 3: 2, axis 4: 3)

■_D

_D indicates that the module label is for the direct access input (DX) or direct access output (DY). When _D is not described, it indicates that the label is for the refresh processing input (X) or refresh processing output (Y).

Module label of buffer memory areas

The names of the module labels of the buffer memory areas are defined with the following configuration.
"Module name"_"Module number"."Data type"_"Axis_[ax]"."Data type""Label name" or
"Module name"_"Module number"."Data type"_"Axis_D[ax]"."Data type""Label name"_D

■Module name

The module name indicates the model of the module.

■Module number

The module number starts from one and is added for identifying modules with the same module name.

■Data type

The data type indicates the type of a buffer memory area. The following shows the classification.

Data type	Description
stnParameter	Indicates the basic setting.
stnAxisMonitorData	Indicates the axis monitor data.
stnAxisControlData	Indicates the axis control data.
stSystemControlData	Indicates the system control data.
stInterruptSettingData	Indicates the system monitor data.

■Label name

The label name is unique by modules.

■Axis[ax]

Axis[ax] indicates the axis number corresponding to the module label. A numerical value from 0 to 3 is used for [ax] according to the axes from 1 to 4. (Axis 1: 0, axis 2: 1, axis 3: 2, axis 4: 3)

■Data type

The data type indicates the size of a buffer memory area. The following shows the classification.

Data Type	Description
u	Word [Unsigned]/Bit String [16-bit]
w	Word [Signed]
ud	Double Word [Unsigned]/Bit String [32-bit]
d	Double Word [Signed]

■_D

_D indicates that the module label is for direct access. When _D is not described, it indicates that the label is for auto refresh.

The following shows the differences between auto refresh and direct access.

Type	Description	Access timing	Example
Auto refresh	Values that has been read from or written to module labels are applied to the module in a batch at auto refresh. The execution time of a program can be shortened. To use auto refresh, "Target" must be set to "Module Label" in "Refresh Setting" of the module parameter.	At auto refresh	RD75_1.stnAxisMonitorData_Axis[0].dCurrentFeedValue
Direct access	Values that has been read from or written to module labels are immediately applied to the module. The execution time is longer than the one at auto refresh, but the responsiveness is high. For details on the instruction processing time, refer to the following: MELSEC iQ-R Programming Manual (CPU Module Instructions, Standard Functions/Function Blocks)	At reading/writing data from/ to the module label	RD75_1.stnAxisMonitorData_Axis_D[0].dCurrentFeedValue_D

Appendix 2 Dedicated Instruction

The following table lists dedicated instructions.

Application	Dedicated instruction	Function overview
Absolute position restoration	G.ABRST1	Restores the absolute position of a specified axis of the RD75.
	G.ABRST2	
	G.ABRST3	
	G.ABRST4	
	Z.ABRST1	
	Z.ABRST2	
	Z.ABRST3	
	Z.ABRST4	
Positioning start	GP.PSTRT1	Starts the positioning control of a specified axis of the RD75.
	GP.PSTRT2	
	GP.PSTRT3	
	GP.PSTRT4	
	ZP.PSTRT1	
	ZP.PSTRT2	
	ZP.PSTRT3	
	ZP.PSTRT4	
Teaching	GP.TEACH1	Performs teaching of a specified axis of the RD75.
	GP.TEACH2	
	GP.TEACH3	
	GP.TEACH4	
	ZP.TEACH1	
	ZP.TEACH2	
	ZP.TEACH3	
	ZP.TEACH4	
Module data backup	GP.PFWRT	Writes module extension parameters (positioning data and block start data) in the buffer memory to the module extension parameter file.
	ZP.PFWRT	
Module data initialization	GP.PINIT	Sets module parameters and module extension parameters (positioning data and block start data) in the buffer memory and setting values in the module extension parameter file to their factory default settings.
	ZP.PINIT	

For details on the dedicated instructions, refer to the following.

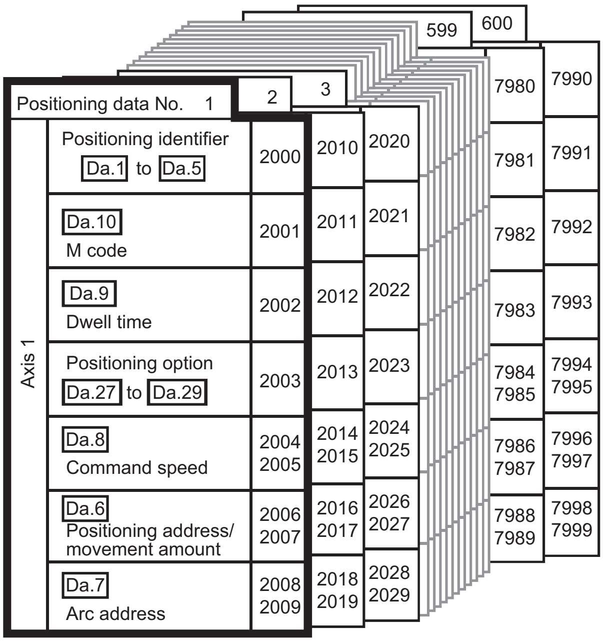
📖 MELSEC iQ-R Programming Manual (Module Dedicated Instructions)

Appendix 3 How to Find Buffer Memory Addresses

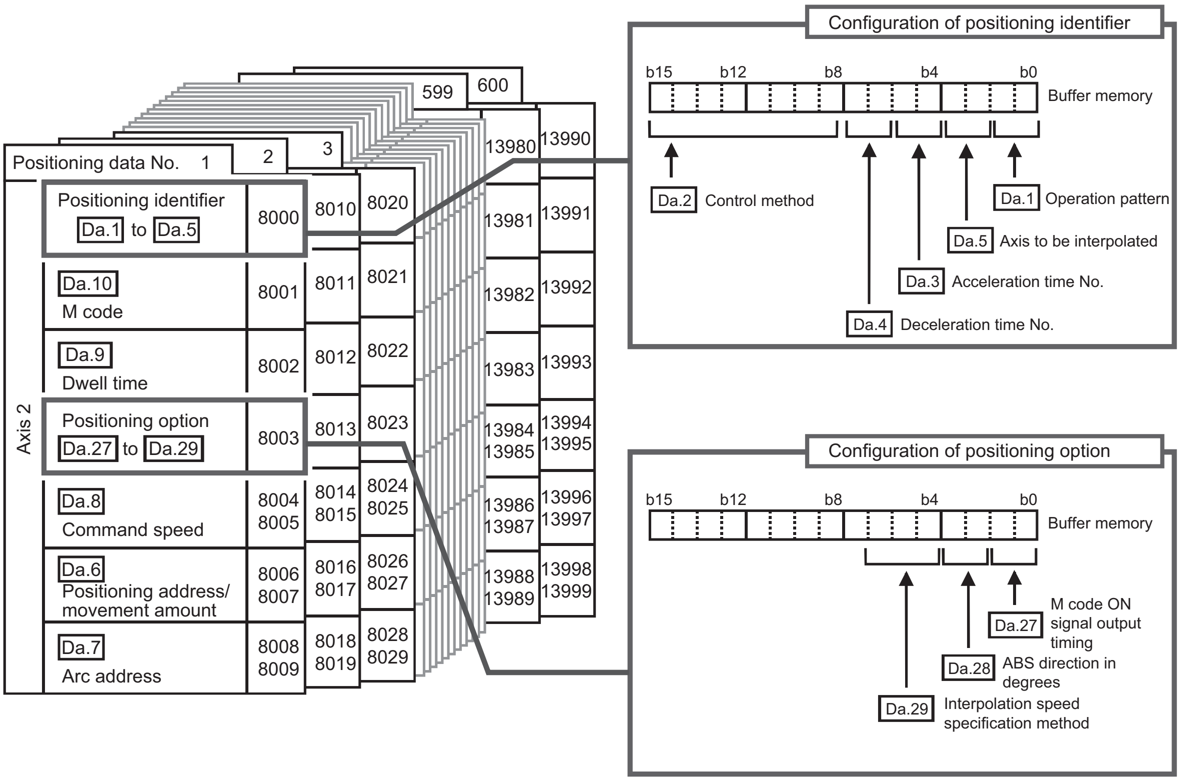
This section describes how to find the buffer memory addresses of positioning data, block start data, and condition data.

Positioning data

Positioning data No.1 to No.600 are assigned to each axis. Positioning data has the following structure.



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



A

When setting positioning data using a program, determine buffer memory addresses using the following calculation formula and set the addresses.

- 2000 + 6000 × (Ax - 1) + 10 × (N - 1) + S

For each variable, substitute a number following the description below.

Item	Description
Ax	The axis number of the buffer memory address to be determined. Substitute a number from 1 to 4.
N	The positioning data No. of the buffer memory address to be determined. Substitute a number from 1 to 600.
S	Substitute one of the following numbers according to the buffer memory address to be determined. • Positioning identifier ([Da.1] to [Da.5]): 0 • [Da.10] M code: 1 • [Da.9] Dwell time: 2 • Positioning option ([Da.27] to [Da.29]): 3 • [Da.8] Command speed (lower 16 bits): 4 • [Da.8] Command speed (upper 16 bits): 5 • [Da.6] Positioning address/movement amount (lower 16 bits): 6 • [Da.6] Positioning address/movement amount (upper 16 bits): 7 • [Da.7] Arc address (lower 16 bits): 8 • [Da.7] Arc address (upper 16 bits): 9

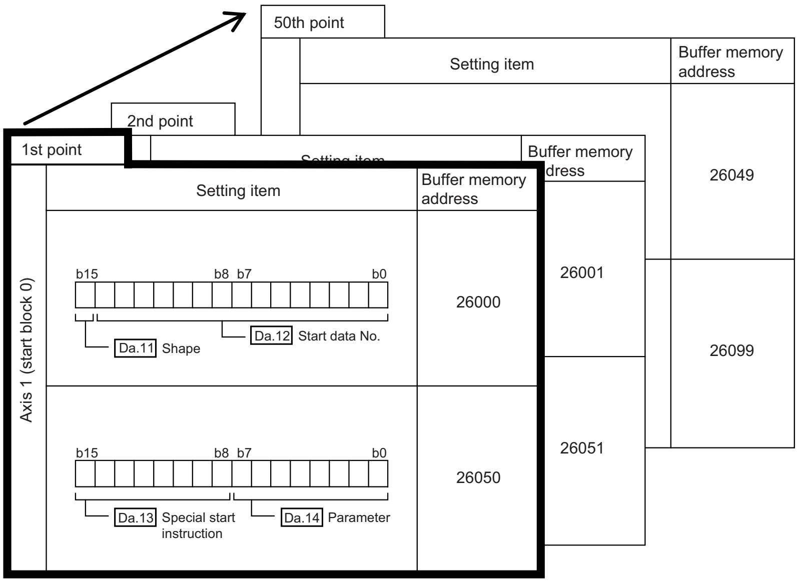
Ex.

When the buffer memory address of [Da.9] Dwell time of the positioning data No.200 of axis 2 is determined

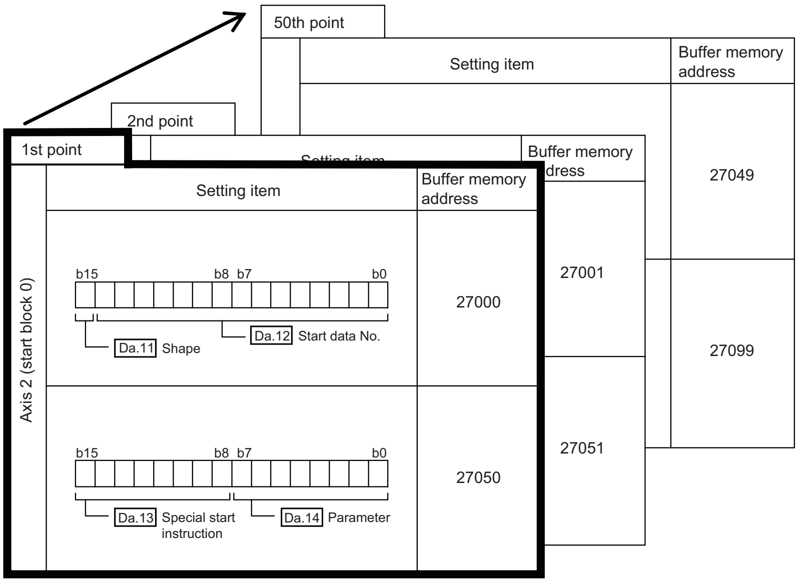
2000 + 6000 × (2 - 1) + 10 × (200 - 1) + 2 = 9992

Block start data

Block start data consists of five start blocks from Start block 0 to 4, and the block start data of 1 to 50 points is assigned to each block. The start blocks are assigned to each axis. Block start data has the following structure.



- Up to 50 points of block start data for each axis can be set (stored) in the buffer memory addresses shown on the left.
- One block start data is configured of the items shown in the bold box.
- Each axis has five start blocks (block 0 to 4).



A

When setting block start data using a program, determine buffer memory addresses using the following calculation formula and set the addresses.

■Calculation formula for [Da.11] Shape and [Da.12] Start data No.

Use the following calculation formula.

- 26000 + (1000 × (Ax - 1)) + (200 × M) + (P - 1)

For each variable, substitute a number following the description below.

Item	Description
Ax	The axis number of the buffer memory address to be determined. Substitute a number from 1 to 4.
M	The start block No. of the buffer memory address to be determined. Substitute a number from 0 to 4.
P	The block start data point of the buffer memory address to be determined. Substitute a number from 1 to 50.

Ex.

When the buffer memory address that satisfies the following conditions is determined

- Axis 3
- Start block No.2
- Block start data point: 40

26000 + (1000 × (3 - 1)) + (200 × 2) + (40 - 1) = 28439

■Calculation formula for [Da.13] Special start instruction and [Da.14] Parameter

Use the following calculation formula.

- 26050 + (1000 × (Ax - 1)) + (200 × M) + (P - 1)

For each variable, substitute a number following the description below.

Item	Description
Ax	The axis number of the buffer memory address to be determined. Substitute a number from 1 to 4.
M	The start block No. of the buffer memory address to be determined. Substitute a number from 0 to 4.
P	The block start data point of the buffer memory address to be determined. Substitute a number from 1 to 50.

Ex.

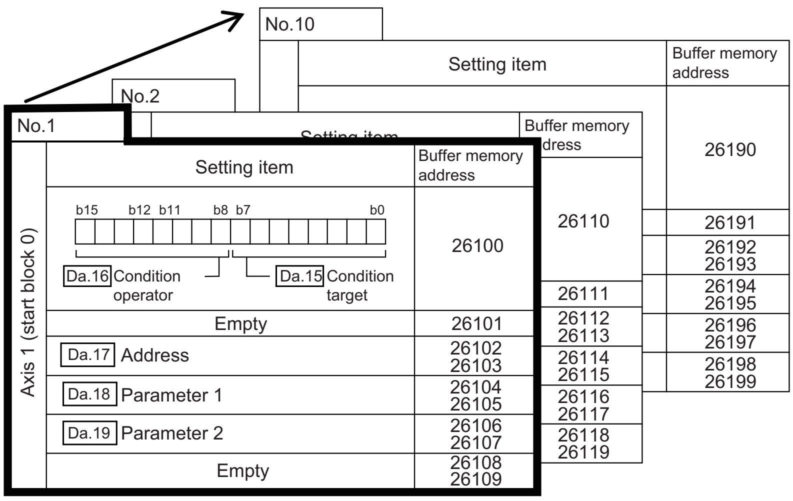
When the buffer memory address that satisfies the following conditions is determined

- Axis 2
- Start block No.1
- Block start data point: 25

26050 + (1000 × (2 - 1)) + (200 × 1) + (25 - 1) = 27274

Condition data

Condition data consists of five start blocks from Start block 0 to 4, and the condition data No.1 to 10 are assigned to each block. The start blocks are assigned to each axis. Condition data has the following structure.



- Up to 10 condition data for each block No. can be set (stored) in the buffer memory addresses shown on the left.
- One condition data is configured of the items shown in the bold box.
- Each axis has five start blocks (block 0 to 4).

When setting block start data using a program, determine buffer memory addresses using the following calculation formula and set the addresses.

- 26100 + (1000 × (Ax - 1)) + (200 × M) + (10 × (Q - 1)) + R

For each variable, substitute a number following the description below.

Item	Description
Ax	The axis number of the buffer memory address to be determined. Substitute a number from 1 to 4.
M	The start block No. of the buffer memory address to be determined. Substitute a number from 0 to 4.
Q	The condition data No. of the buffer memory address to be determined. Substitute a number from 1 to 10.
R	Substitute one of the following numbers according to the buffer memory address to be determined. • [Da.15] Condition target: 0 • [Da.16] Condition operator: 0 • [Da.17] Address (lower 16 bits): 2 • [Da.17] Address (upper 16 bits): 3 • [Da.18] Parameter 1 (lower 16 bits): 4 • [Da.18] Parameter 1 (upper 16 bits): 5 • [Da.19] Parameter 2 (lower 16 bits): 6 • [Da.19] Parameter 2 (upper 16 bits): 7

Ex.

When the buffer memory address that satisfies the following conditions is determined

- Axis 4
- Start block No.3
- Condition data No.5
- [Da.19] Parameter 2 (lower 16 bits)

26100 + (1000 × (4 - 1)) + (200 × 3) + (10 × (5 - 1)) + 6 = 29746

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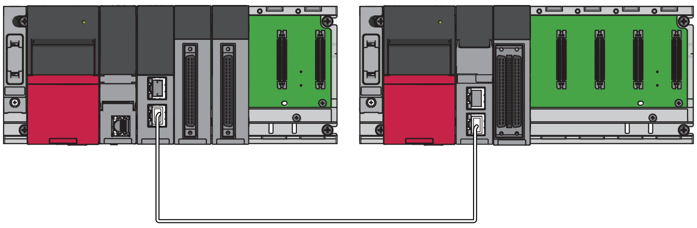
Appendix 4 Operation Examples of When the Remote Head Module Is Mounted

This section describes operation examples of when the remote head module is mounted.

System configuration example

The following system configuration is used to explain an example of operation.



(1) Master station (Network number 1, station number 0)
- Power supply module: R61P
- CPU module: R04CPU
- Master/local module: RJ71GF11-T2 (Start I/O number: 0000H to 001FH)
- Input module: RX41C4 (Start I/O number: 0020H to 003FH)
- Input module: RX41C4 (Start I/O number: 0040H to 005FH)

(2) Intelligent device station (Network number 1, station number 1)
- Power supply module: R61P
- Remote head module: RJ72GF15-T2
- Positioning module: RD75D4 (Start I/O number: 0000H to 001FH)*1

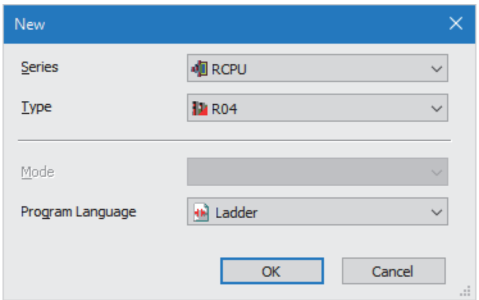
*1 In the RX/RY setting of the master station, set 0100H to 011FH as the start I/O number of the RD75.

Setting in the master station

Connect the engineering tool to the CPU module of the master station and set parameters.

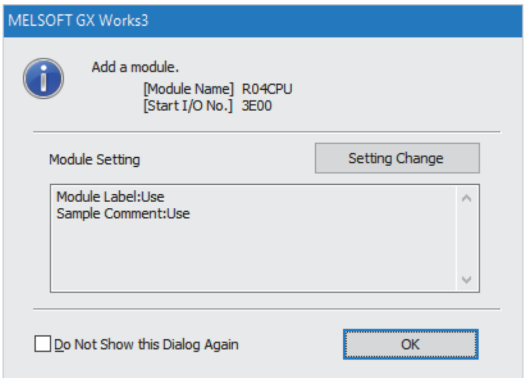
1. Create the project with the following settings.

[Project] ⇨ [New]



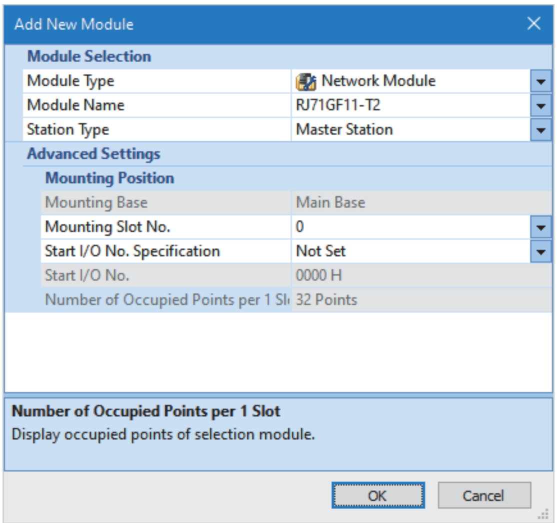
2. Click the [Setting Change] button and set the module to use the module label.

3. Click the [OK] button in the following window to add the module labels of the CPU module.

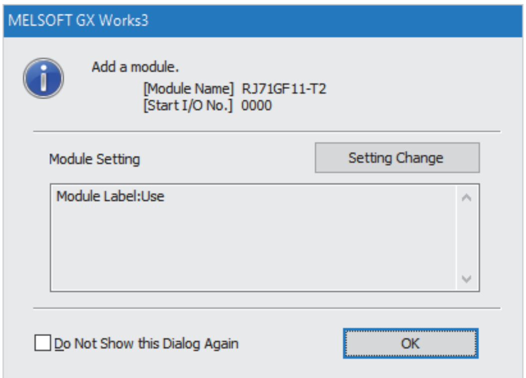


4. Add the master/local module with the following settings.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]

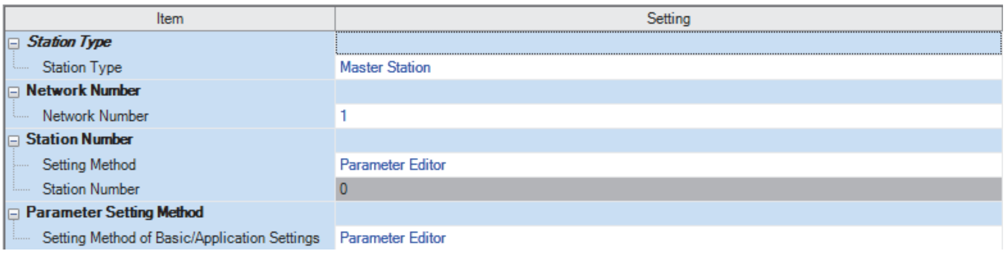


5. Click the [OK] button in the following window to add the module labels of the master/local module.



6. Set "Required Settings" of the module parameter of the master/local module as shown below.

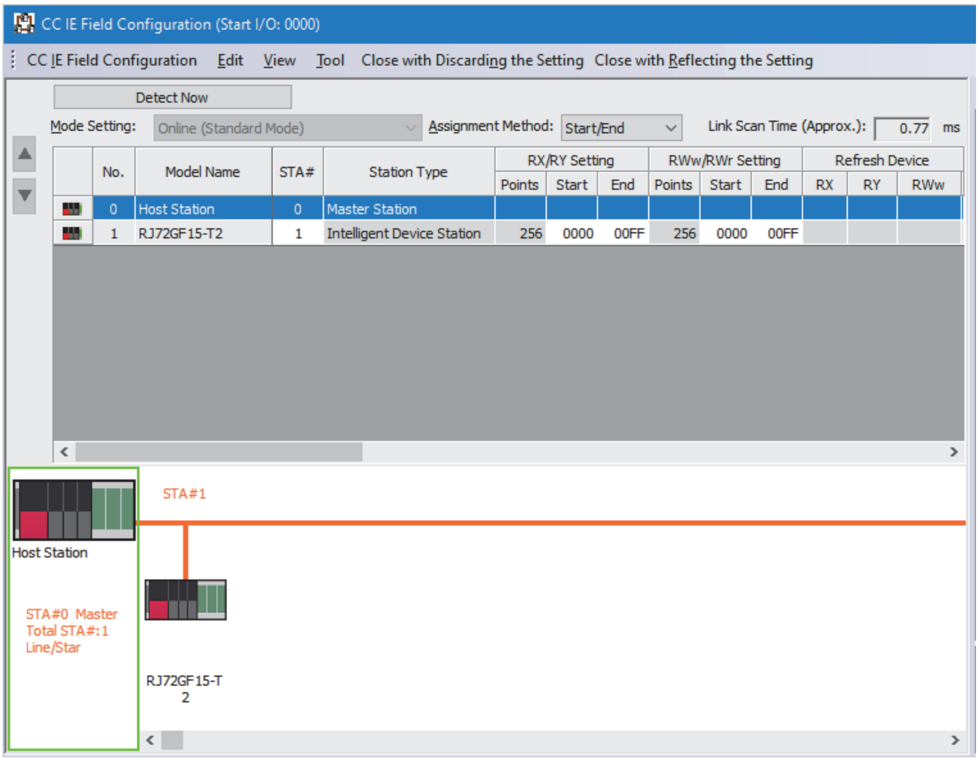
[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71GF11-T2] ⇨ [Required Settings]



Item	Setting
Station Type	
Station Type	Master Station
Network Number	
Network Number	1
Station Number	
Setting Method	Parameter Editor
Station Number	0
Parameter Setting Method	
Setting Method of Basic/Application Settings	Parameter Editor

7. Set "Network Configuration Settings" of the module parameter of the master/local module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71GF11-T2] ⇨ [Basic Settings] ⇨ [Network Configuration Settings]



8. Set "Refresh Setting" of the module parameter of the master/local module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [Module Information] ⇨ [RJ71GF11-T2] ⇨ [Basic Settings] ⇨ [Refresh Setting]

No.	Link Side					CPU Side				
	Device Name	Points	Start	End		Target	Device Name	Points	Start	End
-	SB	512	00000	001FF	⇔	Module Label				
-	SW	512	00000	001FF	⇔	Module Label				
1	RX	32	00100	0011F	⇔	Specify Device	X	32	00100	0011F
2	RY	32	00100	0011F	⇔	Specify Device	Y	32	00100	0011F
3	RWr	256	00000	000FF	⇔	Specify Device	W	256	00000	000FF
4	RWw	256	00000	000FF	⇔	Specify Device	W	256	00100	001FF

9. Write the set parameters to the CPU module on the master station. Then reset the CPU module or power off and on the system.

[Online] ⇨ [Write to PLC]

Point

For parameters of the master/local module which are not described in this procedure, set default values. For details on parameters of the master/local module, refer to the following.

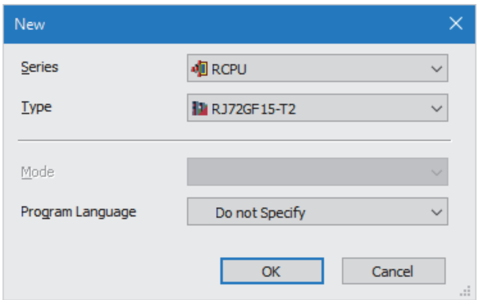
MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

Setting in the intelligent device station

Connect the engineering tool to the remote head module of the intelligent device station and set parameters.

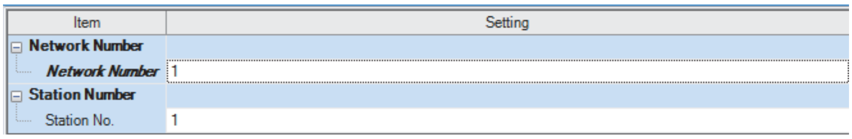
1. Create the project with the following settings.

[Project] ⇨ [New]



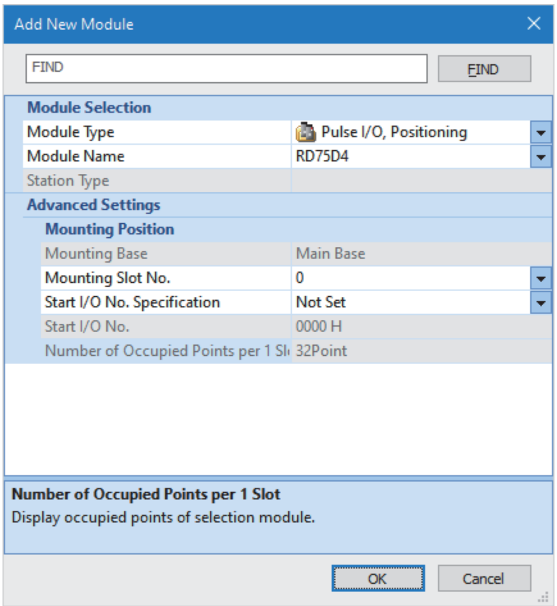
2. Set "Network Required Setting" of "CPU Parameter" of the remote head module as shown below.

[Navigation window] ⇨ [Parameter] ⇨ [RJ72GF15-T2] ⇨ [CPU Parameter] ⇨ [Network Required Setting]

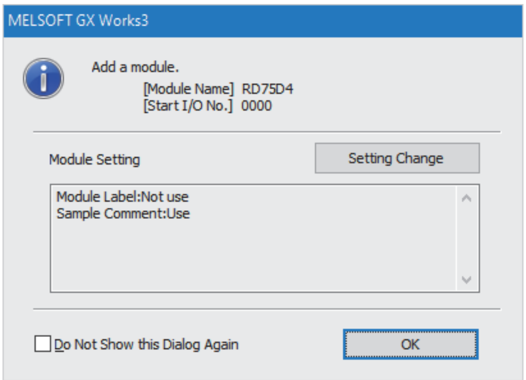


3. Add the RD75 with the following settings.

Navigation window ⇨ [Parameter] ⇨ [Module Information] ⇨ Right-click ⇨ [Add New Module]



4. Configure the setting not to use the module labels.



5. Since the parameters are already set with a program in this program example, use default values for module parameter settings of the engineering tool. When setting module parameters with the engineering tool, refer to the following.

☞ Page 321 Module Parameters

6. Write the set parameters to the remote head module on the intelligent device station. Then reset the remote head module or power off and on the system.

[Online] ⇨ [Write to PLC]

Point

For parameters of the remote head module which are not described in this procedure, set default values. For details on parameters of the remote head module, refer to the following.

- MELSEC iQ-R CC-Link IE Field Network Remote Head Module User's Manual (Application)

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Checking the network status

After setting parameters to the master station and the intelligent device station, check whether data link is normally performed between the master station and the intelligent device station. Check the network status using the CC-Link IE Field Network diagnostics of the engineering tool.

For how to perform the CC-Link IE Field Network diagnostics from the master station, refer to the following.

📖 MELSEC iQ-R CC-Link IE Field Network User's Manual (Application)

Program examples

Write the programs to the CPU module on the master station.

Module label

For the program examples, the module labels of the CPU module and master/local module are used.

Label name	Description	Device
RCPU.stSM.bAfter_RUN1_Scan_ON	ON for one scan after RUN	SM402
RCPU.stSM.bAfter_RUN1_Scan_OFF	OFF for one scan after RUN	SM403
GF11_1.bSts_DataLinkError	Data link error status of own station	SB0049
GF11_1.bnSts_DataLinkError_Station[1]	Data link status of each station (station number 1)	SW00B0.0

Global label

■List of global labels

Define global labels as shown below:

	Label Name	Data Type		Class	Assign (Device/Lab
1	uStatus	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D0
2	uMPG_EnableFlag	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D10
3	udNewSpeedValue	Double Word [Unsigned]/Bit String [32-bit]	...	VAR_GLOBAL	D11
4	uSpeedChangeRequest	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D13
5	uOverrideValue	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D14
6	uStepMode	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D20
7	uStepValidFlag	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D21
8	uPositioningStartNo	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D32
9	uErrorCode	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D79
10	wAxisOperationStatus	Word [Signed]	...	VAR_GLOBAL	D80
11	uOPR_RequestFlagOffRequestSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D81
12	uExternalCommandValidSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D85
13	uSpeedPositionSwitchingEnableFlagSettin	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D86
14	uPositionSpeedSwitchingEnableFlagSettin	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D87
15	uMcodeOnSignalTurnsOffRequestSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D90
16	uSkipCommandSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D91
17	uRestartSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D92
18	uInitializeParameterSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D93
19	uWriteFlashSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D94
20	uStopContinuousOperationRequestSettin	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D95
21	uErrorResetRequestSetting	Word [Unsigned]/Bit String [16-bit]	...	VAR_GLOBAL	D96
22	bOPR_RequestFlagOffRequest	Bit	...	VAR_GLOBAL	M0
23	bOPR_RequestFlagOffRequestPulse	Bit	...	VAR_GLOBAL	M1
24	bOPR_RequestFlagOffRequestMemmory	Bit	...	VAR_GLOBAL	M2
25	bFastOPR_Request	Bit	...	VAR_GLOBAL	M3
26	bFastOPR_RequestMemmory	Bit	...	VAR_GLOBAL	M4
27	bPositioningStartRequestPulse	Bit	...	VAR_GLOBAL	M5
28	bPositioningStartRequestMemmory	Bit	...	VAR_GLOBAL	M6
29	bJogInchingOperationFlag	Bit	...	VAR_GLOBAL	M7
30	bMPG_EnableFlagRequest	Bit	...	VAR_GLOBAL	M8
31	bMPG_OperationFlag	Bit	...	VAR_GLOBAL	M9
32	bMPG_DisableRequest	Bit	...	VAR_GLOBAL	M10
33	bSpeedChangeRequestPulse	Bit	...	VAR_GLOBAL	M11
34	bSpeedChangeRequestMemory	Bit	...	VAR_GLOBAL	M12
35	bOverrideRequest	Bit	...	VAR_GLOBAL	M13
36	bChangeAccDecTimeSettingRequest	Bit	...	VAR_GLOBAL	M14
37	bStepOperationRequestPulse	Bit	...	VAR_GLOBAL	M16
38	bSkipCommandRequestPulse	Bit	...	VAR_GLOBAL	M17
39	bSkipCommandRequestMemory	Bit	...	VAR_GLOBAL	M18
40	bStopContinuousOperationRequest	Bit	...	VAR_GLOBAL	M21
41	bRestartRequest	Bit	...	VAR_GLOBAL	M22
42	bRestartRequestMemory	Bit	...	VAR_GLOBAL	M23
43	bInitializeParameterRequestPulse	Bit	...	VAR_GLOBAL	M24
44	bInitializeParameterRequestMemory	Bit	...	VAR_GLOBAL	M25
45	bWriteFlashRequestPulse	Bit	...	VAR_GLOBAL	M26
46	bWriteFlashRequestMemory	Bit	...	VAR_GLOBAL	M27
47	bErrorReset	Bit	...	VAR_GLOBAL	M28
48	bStopRequestPulse	Bit	...	VAR_GLOBAL	M29
49	bTargetPositionChangeRequestPulse	Bit	...	VAR_GLOBAL	M30
50	bTargetPositionChangeRequestMemory	Bit	...	VAR_GLOBAL	M31

	Label Name	Data Type		Class	Assign (Device/Lab
51	bBasicParameterSettingCompleteFlag	Bit	...	VAR_GLOBAL	M50
52	bOPR_BasicParameterSettingCompleteFlag	Bit	...	VAR_GLOBAL	M51
53	bSpeedPositionSwitchingParameterSetting	Bit	...	VAR_GLOBAL	M52
54	bOPR_RequestFlagOffRequestConfirmation	Bit	...	VAR_GLOBAL	M60
55	bRestartRequestConfirmation	Bit	...	VAR_GLOBAL	M61
56	bSpeedChangeRequestConfirmation	Bit	...	VAR_GLOBAL	M62
57	bTargetPositionChangeRequestConfirmatio	Bit	...	VAR_GLOBAL	M63
58	bSkipCommandRequestConfirmation	Bit	...	VAR_GLOBAL	M64
59	bAxisOperationStatusAcquisitionRequest	Bit	...	VAR_GLOBAL	M65
60	bInitializeParameterRequestConfirmation	Bit	...	VAR_GLOBAL	M66
61	bWriteFlashRequestConfirmation	Bit	...	VAR_GLOBAL	M67
62	bAfter_RUN1_Scan_ON_Memory	Bit	...	VAR_GLOBAL	M99
63	bBasicParametarSettingRequest	Bit	...	VAR_GLOBAL	M100
64	bOPR_BasicParameterSettingRequest	Bit	...	VAR_GLOBAL	M101
65	bSpeedPositionSwitchingSettingRequest	Bit	...	VAR_GLOBAL	M102
66	bPositioningDataSettingRequest	Bit	...	VAR_GLOBAL	M103
67	bBlockStartDataSettingRequest	Bit	...	VAR_GLOBAL	M104
68	bBlockStartData_SpecialStartCommandSet	Bit	...	VAR_GLOBAL	M105
69	bCommunicatingConditionSatisfactionFlag	Bit	...	VAR_GLOBAL	M120
70	bBasicParameterSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5000
71	bOPR_BasicParameterSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5010
72	bSpeedPositionSwitchingSettingRet1	Bit(0..1)	...	VAR_GLOBAL	M5020
73	bSpeedPositionSwitchingSettingRet2	Bit(0..1)	...	VAR_GLOBAL	M5022
74	bSpeedPositionSwitchingSettingRet3	Bit(0..1)	...	VAR_GLOBAL	M5024
75	bSpeedPositionSwitchingSettingRet4	Bit(0..1)	...	VAR_GLOBAL	M5026
76	bPositioningDataSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5030
77	bBlockStartDataSettingRet1	Bit(0..1)	...	VAR_GLOBAL	M5040
78	bBlockStartDataSettingRet2	Bit(0..1)	...	VAR_GLOBAL	M5050
79	bStatusRet	Bit(0..1)	...	VAR_GLOBAL	M5100
80	bOPR_RequestFlagOffRet1	Bit(0..1)	...	VAR_GLOBAL	M5110
81	bOPR_RequestFlagOffRet2	Bit(0..1)	...	VAR_GLOBAL	M5120
82	bExternalCommandValidRet	Bit(0..1)	...	VAR_GLOBAL	M5130
83	bSpeedPositionSwitchingEnableRet	Bit(0..1)	...	VAR_GLOBAL	M5140
84	bChangeMovementAmountRet	Bit(0..1)	...	VAR_GLOBAL	M5150
85	bPositionSpeedSwitchingEnableRet	Bit(0..1)	...	VAR_GLOBAL	M5160
86	bPVSpeedChangeRet	Bit(0..1)	...	VAR_GLOBAL	M5170
87	bPositioningStartRet	Bit(0..1)	...	VAR_GLOBAL	M5180
88	bMcodeOffRet	Bit(0..1)	...	VAR_GLOBAL	M5200
89	bJogSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5210
90	bInchingSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5220
91	bMPG_SettingRet	Bit(0..1)	...	VAR_GLOBAL	M5230
92	bMPG_EnableRet	Bit(0..1)	...	VAR_GLOBAL	M5240
93	bSpeedChangeSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5250
94	bOverrideSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5260
95	bChangeAccDecTimeSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5270
96	bChangeAccDecTimeEnableRet	Bit(0..1)	...	VAR_GLOBAL	M5280
97	bStepOperationSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5290
98	bSkipCommandSettingRet	Bit(0..1)	...	VAR_GLOBAL	M5300
99	bTargetPositionChangeRet	Bit(0..1)	...	VAR_GLOBAL	M5310
100	bAxisOperationStatusRet	Bit(0..1)	...	VAR_GLOBAL	M5320

	Label Name	Data Type		Class	Assign (Device/Lab
101	bRestartRet	Bit(0..1)	...	VAR_GLOBAL	M5330
102	bInitializeParameterRet	Bit(0..1)	...	VAR_GLOBAL	M5340
103	bWriteFlashRet	Bit(0..1)	...	VAR_GLOBAL	M5350
104	bStopContinuousOperationRet	Bit(0..1)	...	VAR_GLOBAL	M5360
105	bErrorCodeRet1	Bit(0..1)	...	VAR_GLOBAL	M5370
106	bErrorCodeRet2	Bit(0..1)	...	VAR_GLOBAL	M5380
107	bErrorResetCompleteAbnormalFlag	Bit	...	VAR_GLOBAL	M5381
108	tdPLCReadyOff1	Timer	...	VAR_GLOBAL	T104
109	tdPLCReadyOff2	Timer	...	VAR_GLOBAL	T105
110	bInputUnitError	Bit	...	VAR_GLOBAL	X0
111	bUnitReady	Bit	...	VAR_GLOBAL	X0F
112	bInputOPR_RequestFlagOffRequest	Bit	...	VAR_GLOBAL	X20
113	bInputExternalCommandValidRequest	Bit	...	VAR_GLOBAL	X21
114	bInputExternalCommandInvalidRequest	Bit	...	VAR_GLOBAL	X22
115	bInputFastStartRequest	Bit	...	VAR_GLOBAL	X23
116	bInputFastOPR_StartRequest	Bit	...	VAR_GLOBAL	X24
117	bInputSetStartPositioningNoRequest	Bit	...	VAR_GLOBAL	X25
118	bInputSpeedPositionSwitchingRequest	Bit	...	VAR_GLOBAL	X26
119	bInputSpeedPositionSwitchingEnableReque	Bit	...	VAR_GLOBAL	X27
120	bInputSpeedPositionSwitchingDisableRequ	Bit	...	VAR_GLOBAL	X28
121	bInputChangeMovementAmountRequest	Bit	...	VAR_GLOBAL	X29
122	bInputStartAdvancedPositioningRequest	Bit	...	VAR_GLOBAL	X2A
123	bInputMcodeOffRequest	Bit	...	VAR_GLOBAL	X2C
124	bInputSetJogSpeedRequest	Bit	...	VAR_GLOBAL	X2D
125	bInputForwardJogStartRequest	Bit	...	VAR_GLOBAL	X2E
126	bInputReverseJogStartRequest	Bit	...	VAR_GLOBAL	X2F
127	bInputMPG_EnableRequest	Bit	...	VAR_GLOBAL	X30
128	bInputMPG_DisableRequest	Bit	...	VAR_GLOBAL	X31
129	bInputSpeedChangeRequest	Bit	...	VAR_GLOBAL	X32
130	bInputOverrideRequest	Bit	...	VAR_GLOBAL	X33
131	bInputChangeAccDecTimeRequest	Bit	...	VAR_GLOBAL	X34
132	bInputChangeAccDecTimeDisable	Bit	...	VAR_GLOBAL	X35
133	bInputStepOperationRequest	Bit	...	VAR_GLOBAL	X37
134	bInputSkipCommandRequest	Bit	...	VAR_GLOBAL	X38
135	bInputStopContinuousOperationRequest	Bit	...	VAR_GLOBAL	X3A
136	bInputRestartRequest	Bit	...	VAR_GLOBAL	X3B
137	bInputModuleInitializeParameterRequest	Bit	...	VAR_GLOBAL	X3C
138	bInputWriteFlashRequest	Bit	...	VAR_GLOBAL	X3D
139	bInputErrResetRequest	Bit	...	VAR_GLOBAL	X3E
140	bInputStopRequest	Bit	...	VAR_GLOBAL	X3F
141	bInputPositionSpeedSwitchingRequest	Bit	...	VAR_GLOBAL	X40
142	bInputPositionSpeedSwitchingEnableReque	Bit	...	VAR_GLOBAL	X41
143	bInputPositionSpeedSwitchingDisableRequ	Bit	...	VAR_GLOBAL	X42
144	bInputChangePositionSpeedSwitchingSpee	Bit	...	VAR_GLOBAL	X43
145	bInputInchingMovementAmountSettingRe	Bit	...	VAR_GLOBAL	X44
146	bInputTargetPositionChangeRequest	Bit	...	VAR_GLOBAL	X45
147	bInputSpeedPositionSwitchingSettingRequ	Bit	...	VAR_GLOBAL	X4D
148	bInputStartPositioningRequest	Bit	...	VAR_GLOBAL	X4E
149	bReady	Bit	...	VAR_GLOBAL	X100
150	bModuleAccessFlag	Bit	...	VAR_GLOBAL	X101

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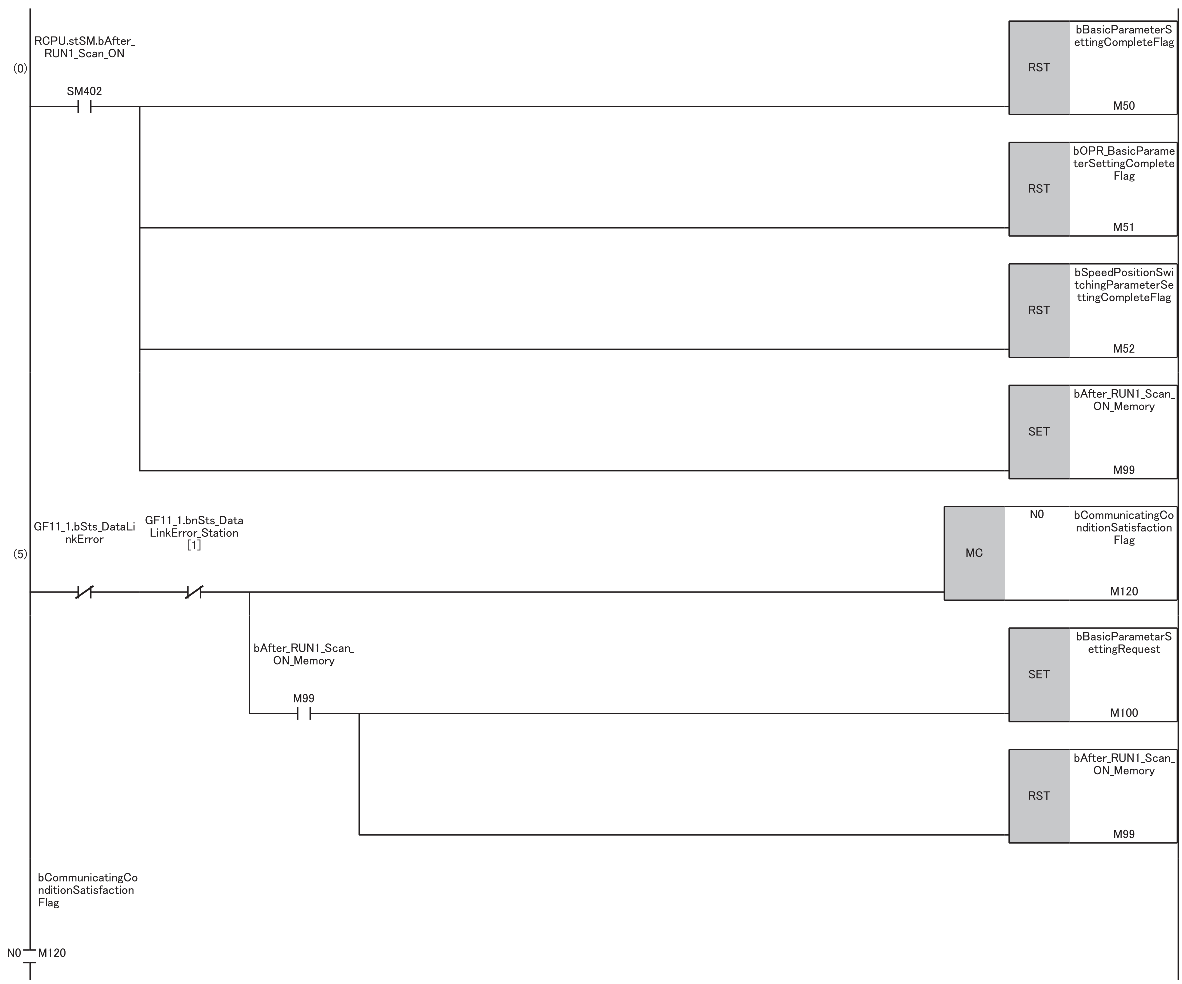
	Label Name	Data Type		Class	Assign (Device/Lab
151	bMcodeOn_Axis1	Bit	...	VAR_GLOBAL	X104
152	bMcodeOn_Axis2	Bit	...	VAR_GLOBAL	X105
153	bMcodeOn_Axis3	Bit	...	VAR_GLOBAL	X106
154	bMcodeOn_Axis4	Bit	...	VAR_GLOBAL	X107
155	bErrorDetection_Axis1	Bit	...	VAR_GLOBAL	X108
156	bErrorDetection_Axis2	Bit	...	VAR_GLOBAL	X109
157	bErrorDetection_Axis3	Bit	...	VAR_GLOBAL	X10A
158	bErrorDetection_Axis4	Bit	...	VAR_GLOBAL	X10B
159	bBusy_Axis1	Bit	...	VAR_GLOBAL	X10C
160	bBusy_Axis2	Bit	...	VAR_GLOBAL	X10D
161	bBusy_Axis3	Bit	...	VAR_GLOBAL	X10E
162	bBusy_Axis4	Bit	...	VAR_GLOBAL	X10F
163	bStartComplete_Axis1	Bit	...	VAR_GLOBAL	X110
164	bStartComplete_Axis2	Bit	...	VAR_GLOBAL	X111
165	bStartComplete_Axis3	Bit	...	VAR_GLOBAL	X112
166	bStartComplete_Axis4	Bit	...	VAR_GLOBAL	X113
167	bPositioningComplete_Axis1	Bit	...	VAR_GLOBAL	X114
168	bPositioningComplete_Axis2	Bit	...	VAR_GLOBAL	X115
169	bPositioningComplete_Axis3	Bit	...	VAR_GLOBAL	X116
170	bPositioningComplete_Axis4	Bit	...	VAR_GLOBAL	X117
171	bPLCReady	Bit	...	VAR_GLOBAL	Y100
172	bAxisStop_Axis1	Bit	...	VAR_GLOBAL	Y104
173	bAxisStop_Axis2	Bit	...	VAR_GLOBAL	Y105
174	bAxisStop_Axis3	Bit	...	VAR_GLOBAL	Y106
175	bAxisStop_Axis4	Bit	...	VAR_GLOBAL	Y107
176	bForwardRunJogStart_Axis1	Bit	...	VAR_GLOBAL	Y108
177	bReverseRunJogStart_Axis1	Bit	...	VAR_GLOBAL	Y109
178	bForwardRunJogStart_Axis2	Bit	...	VAR_GLOBAL	Y10A
179	bReverseRunJogStart_Axis2	Bit	...	VAR_GLOBAL	Y10B
180	bForwardRunJogStart_Axis3	Bit	...	VAR_GLOBAL	Y10C
181	bReverseRunJogStart_Axis3	Bit	...	VAR_GLOBAL	Y10D
182	bForwardRunJogStart_Axis4	Bit	...	VAR_GLOBAL	Y10E
183	bReverseRunJogStart_Axis4	Bit	...	VAR_GLOBAL	Y10F
184	bPositioningStart_Axis1	Bit	...	VAR_GLOBAL	Y110
185	bPositioningStart_Axis2	Bit	...	VAR_GLOBAL	Y111
186	bPositioningStart_Axis3	Bit	...	VAR_GLOBAL	Y112
187	bPositioningStart_Axis4	Bit	...	VAR_GLOBAL	Y113
188	bExecutionProhibitionFlag_Axis1	Bit	...	VAR_GLOBAL	Y114
189	bExecutionProhibitionFlag_Axis2	Bit	...	VAR_GLOBAL	Y115
190	bExecutionProhibitionFlag_Axis3	Bit	...	VAR_GLOBAL	Y116
191	bExecutionProhibitionFlag_Axis4	Bit	...	VAR_GLOBAL	Y117

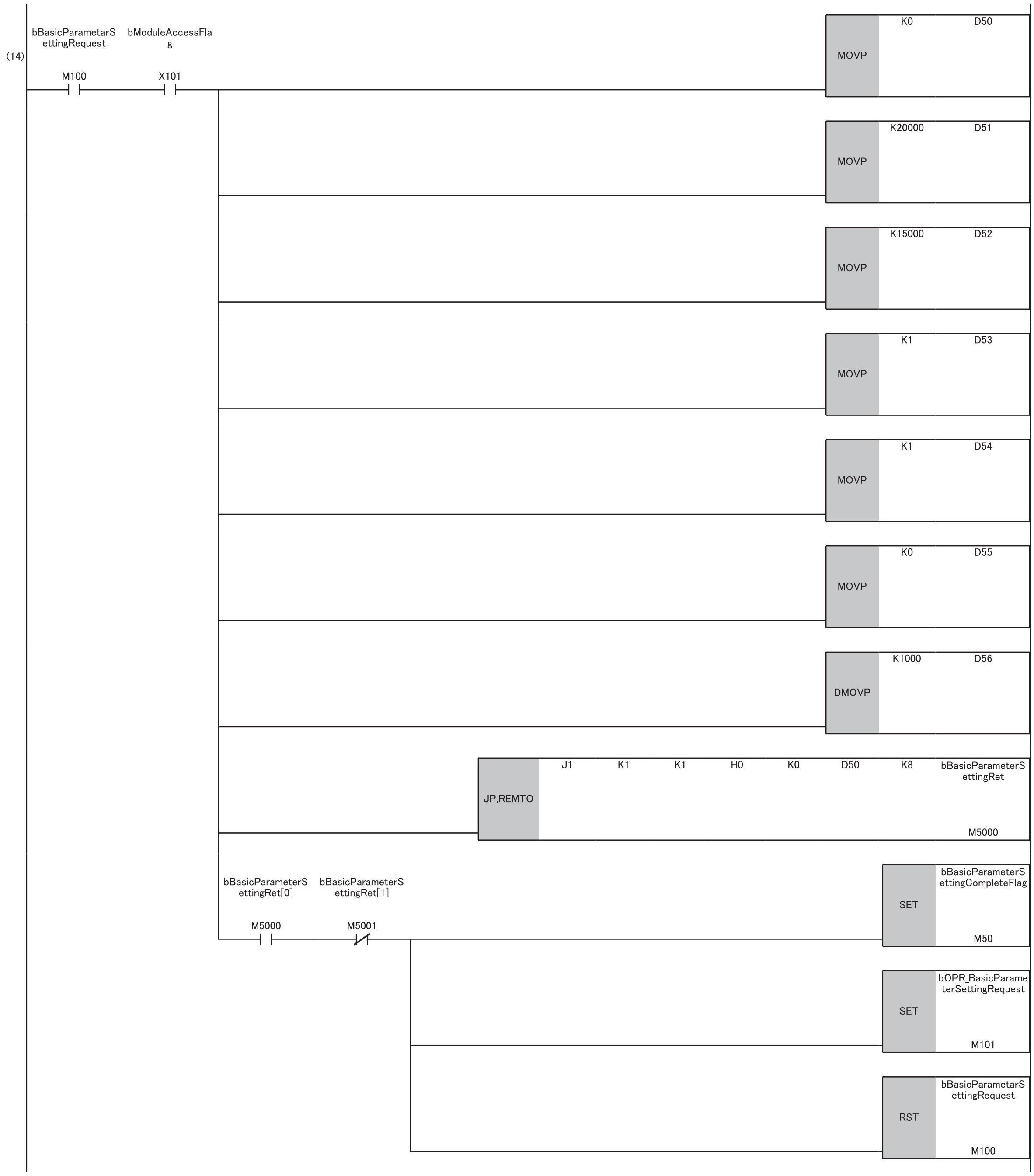
Common program



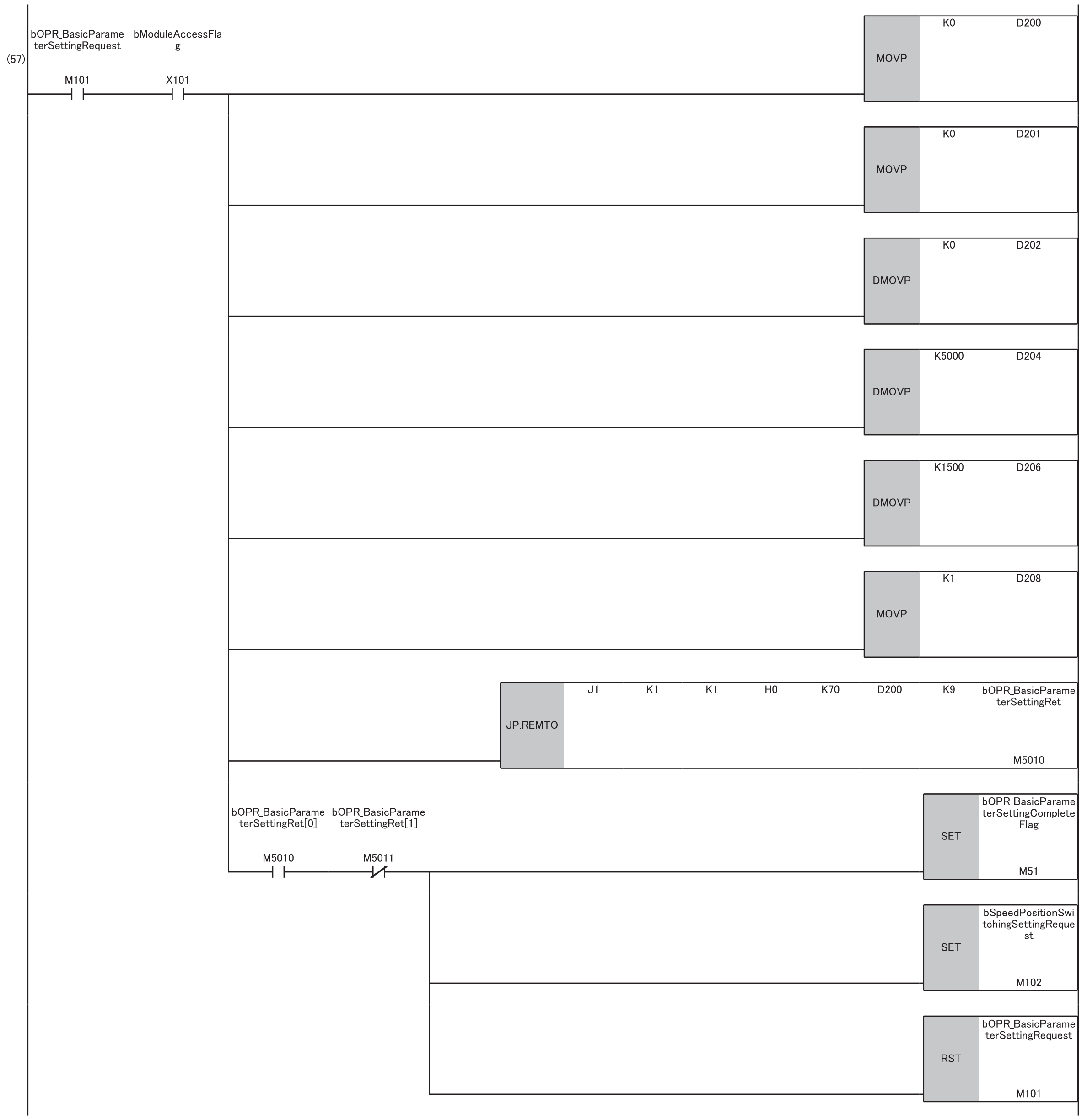
Parameter setting program

When parameters are set in the module parameter of the engineering tool, this program is unnecessary.

■Setting of basic parameter 1 (axis 1)

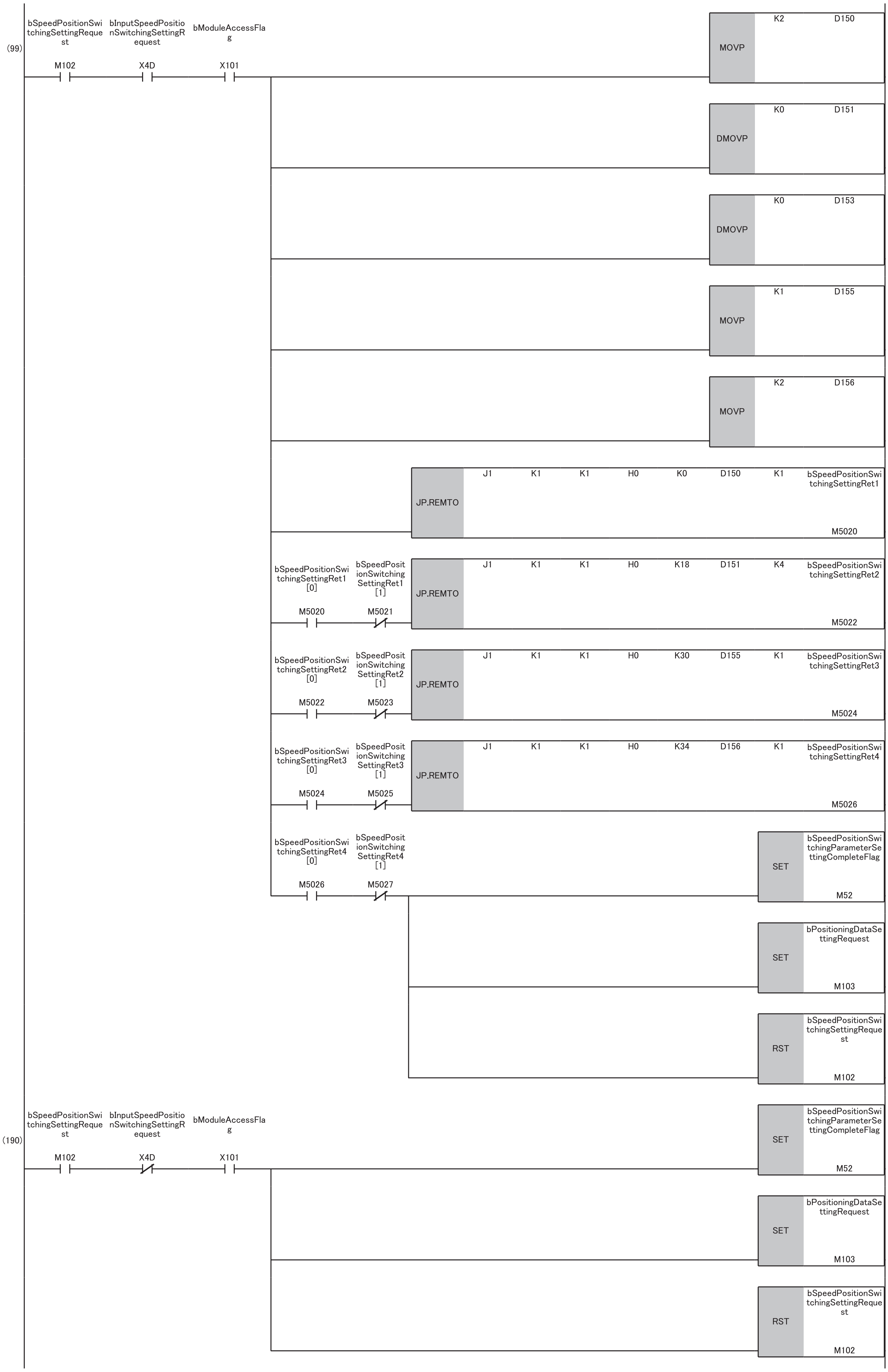


■Setting of OPR basic parameter (axis 1)



■Parameter setting program for the speed-position switching control (ABS mode)

This program is unnecessary when the speed-position switching control (ABS mode) is not executed.



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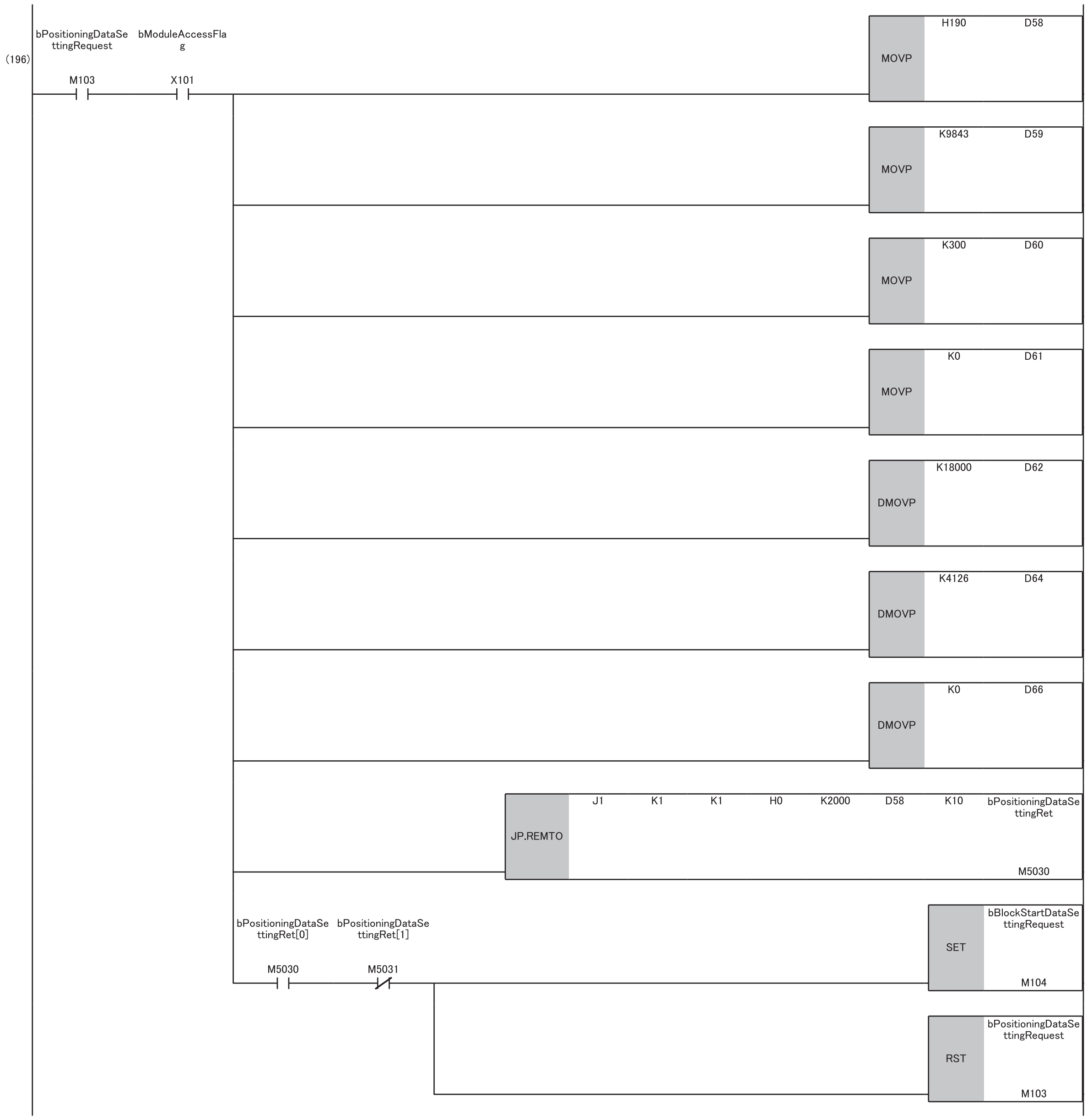
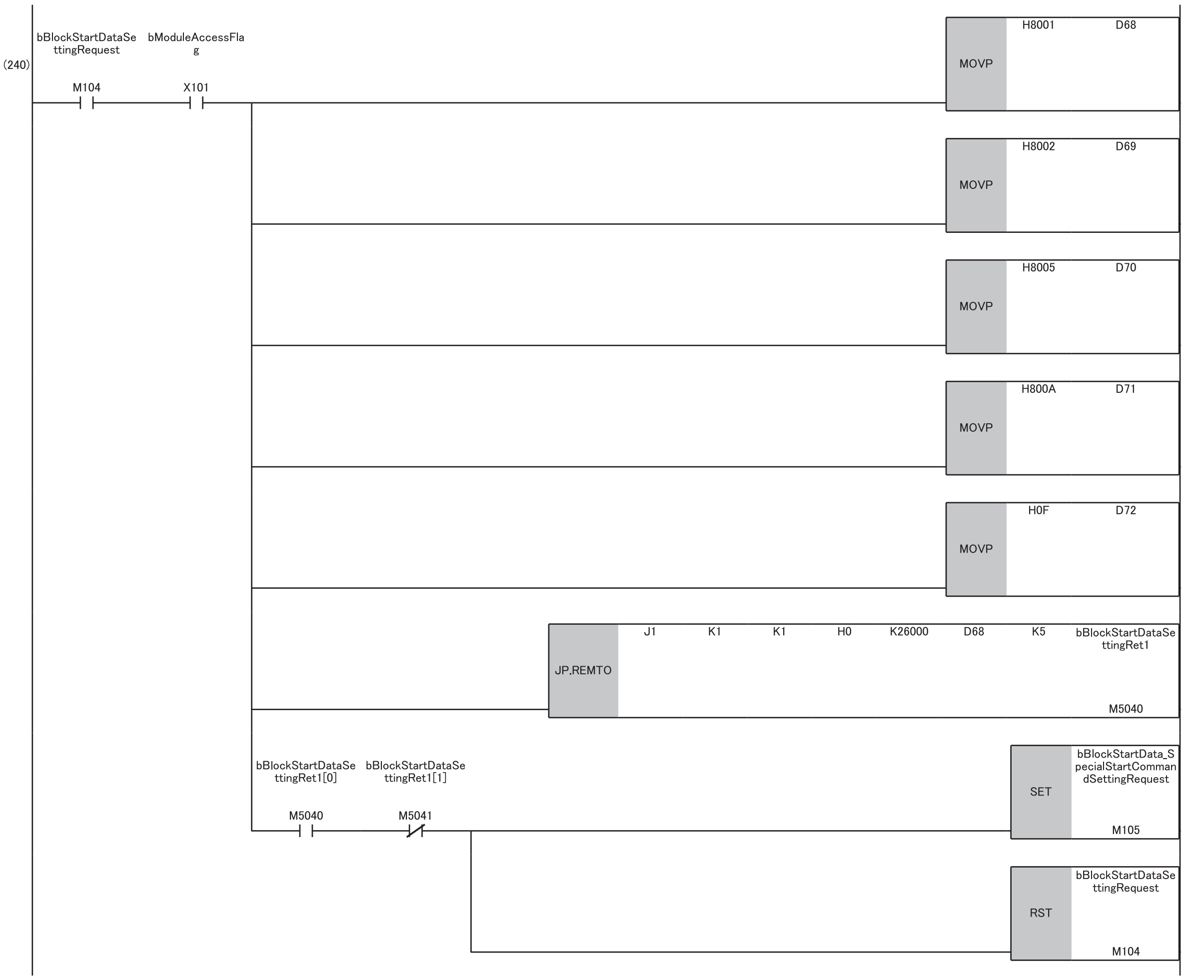
Positioning data setting program

When parameters are set in the module parameter of the engineering tool, this program is unnecessary.



Block start data setting program

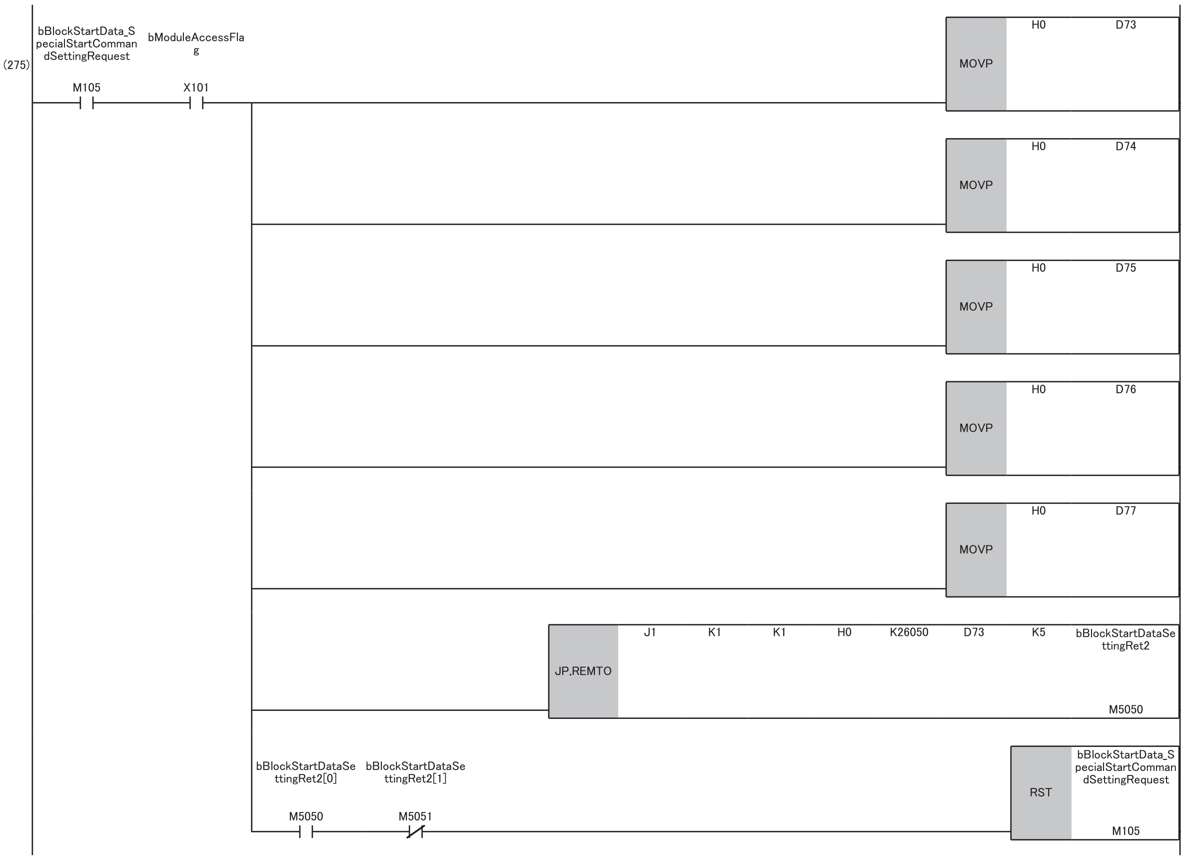
When block start data is set in "Module Extended Parameter" of the engineering tool, this program is unnecessary.



A

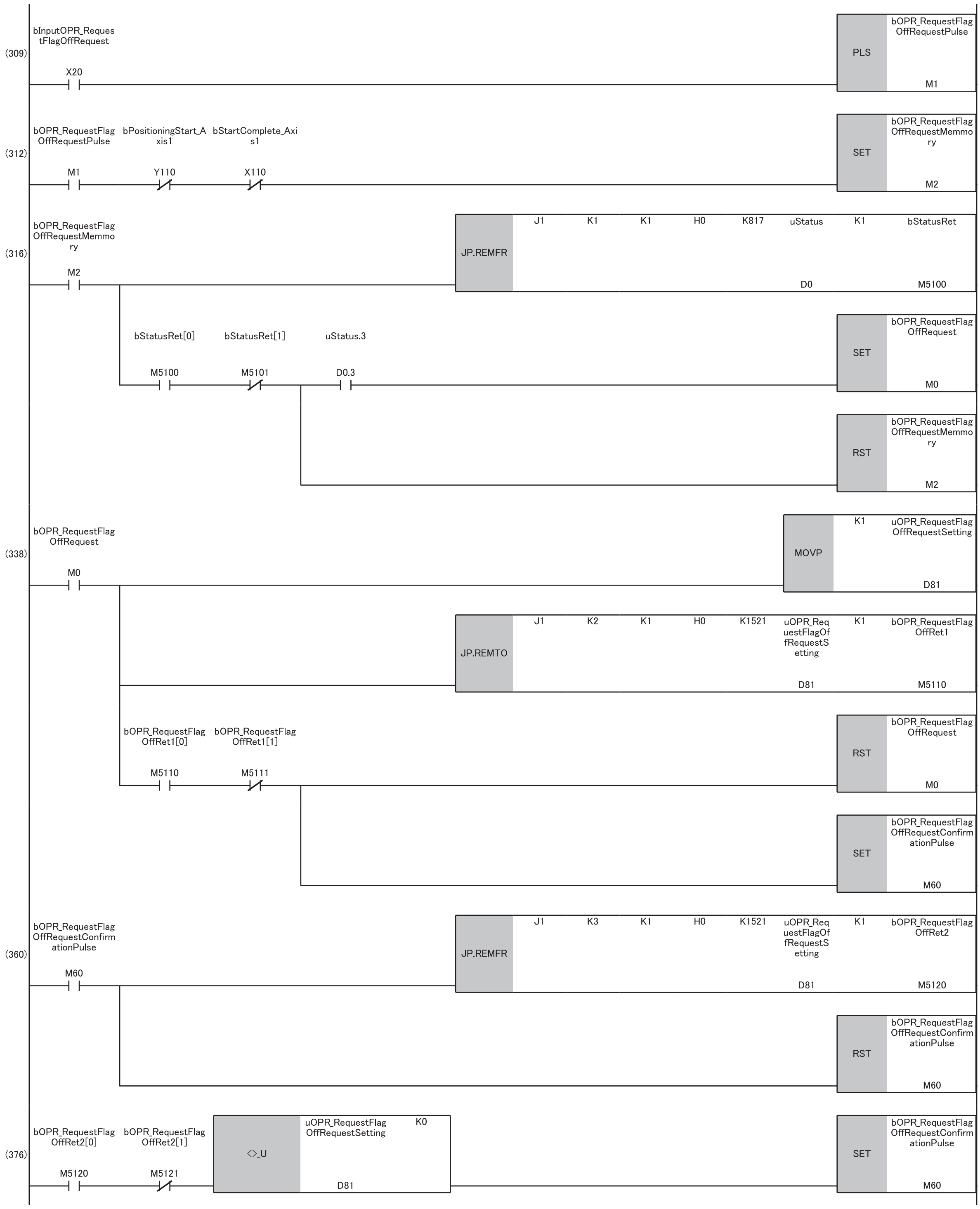
Setting Special start instruction to Normal start

When block start data is set in "Module Extended Parameter" of the engineering tool, this program is unnecessary.



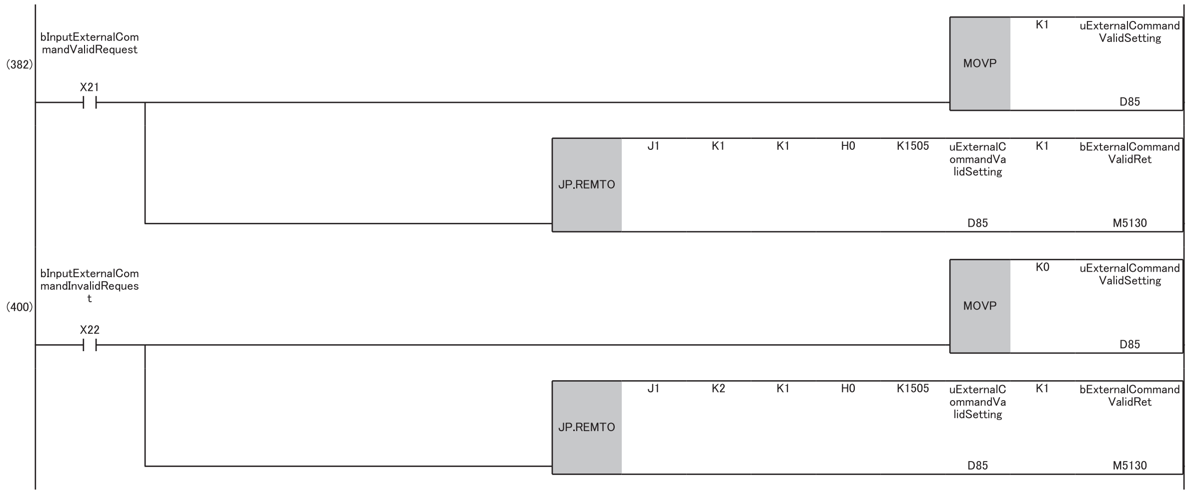
OPR request OFF program

When "Setting of operation during uncompleted OPR" is set to "1: Execute the positioning control" in the module parameter of the engineering tool, this program is unnecessary.

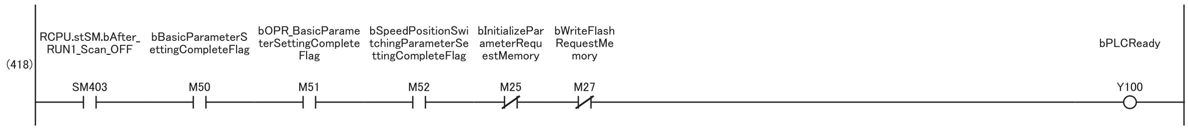


A

External command function valid setting program



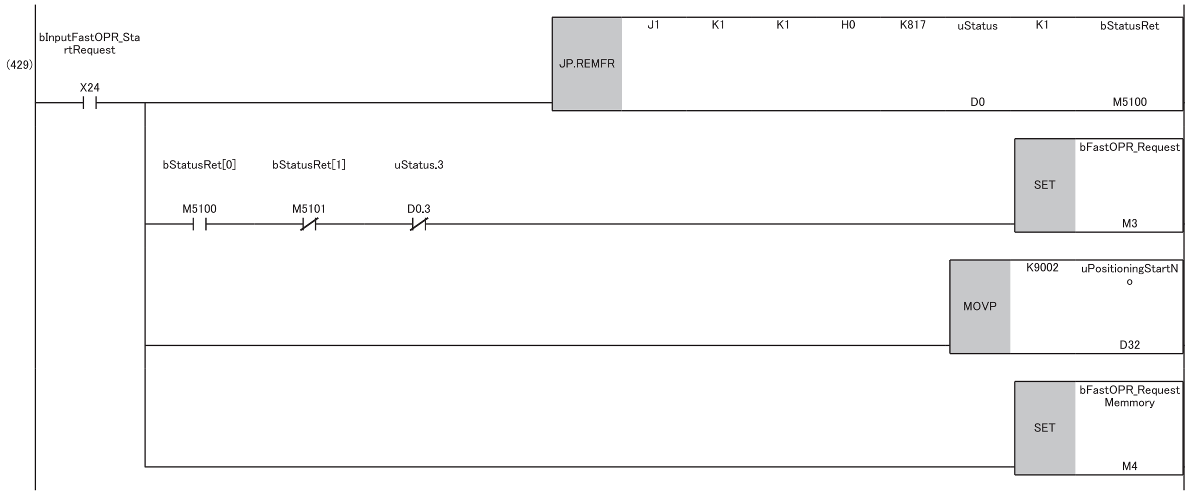
PLC READY signal [Y0] ON program



Positioning start No. setting program

■Machine OPR

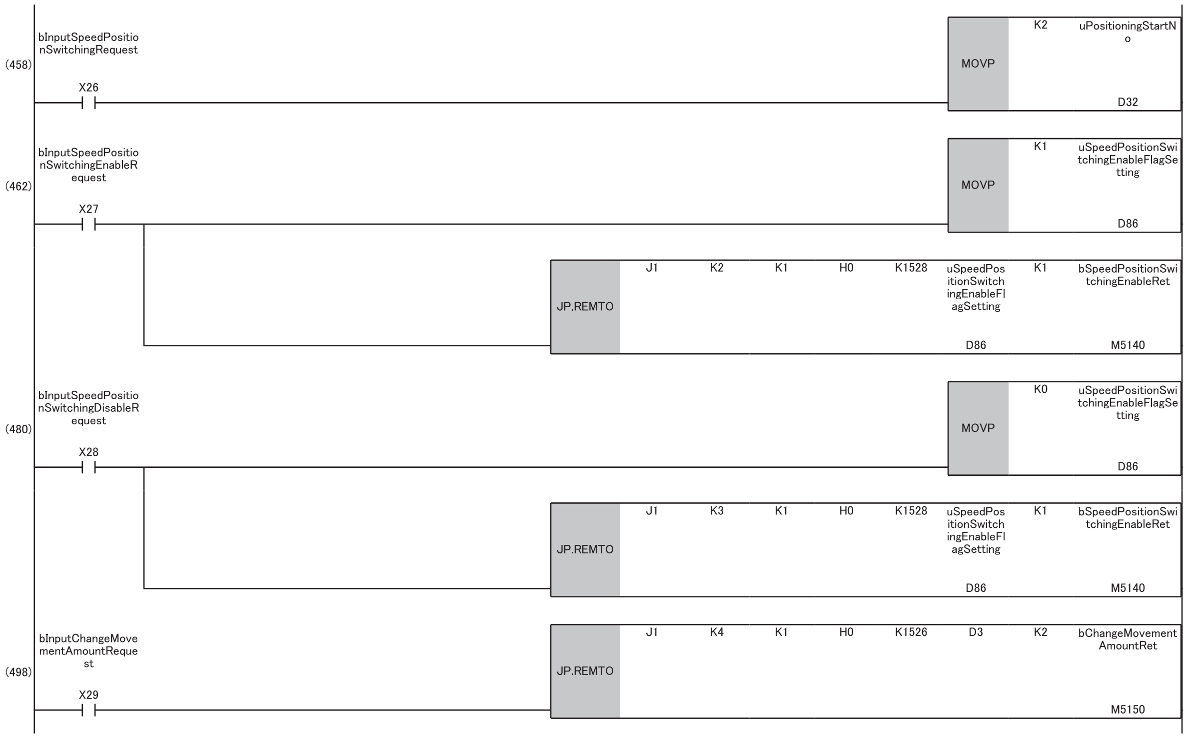
■Fast OPR



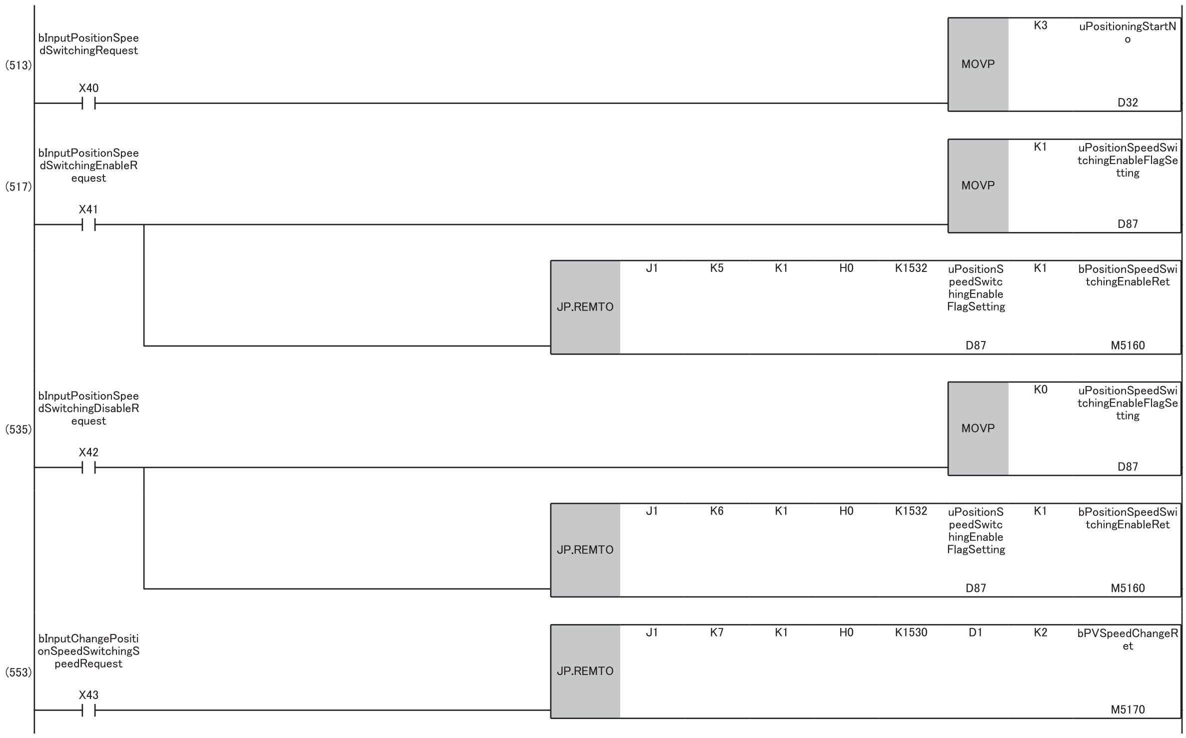
■Positioning with the positioning data No.1

■Speed-position switching control (positioning data No.2)

For the ABS mode, writing the target movement amount after change is unnecessary.



■Position-speed switching control (positioning data No.3)



■Advanced positioning control

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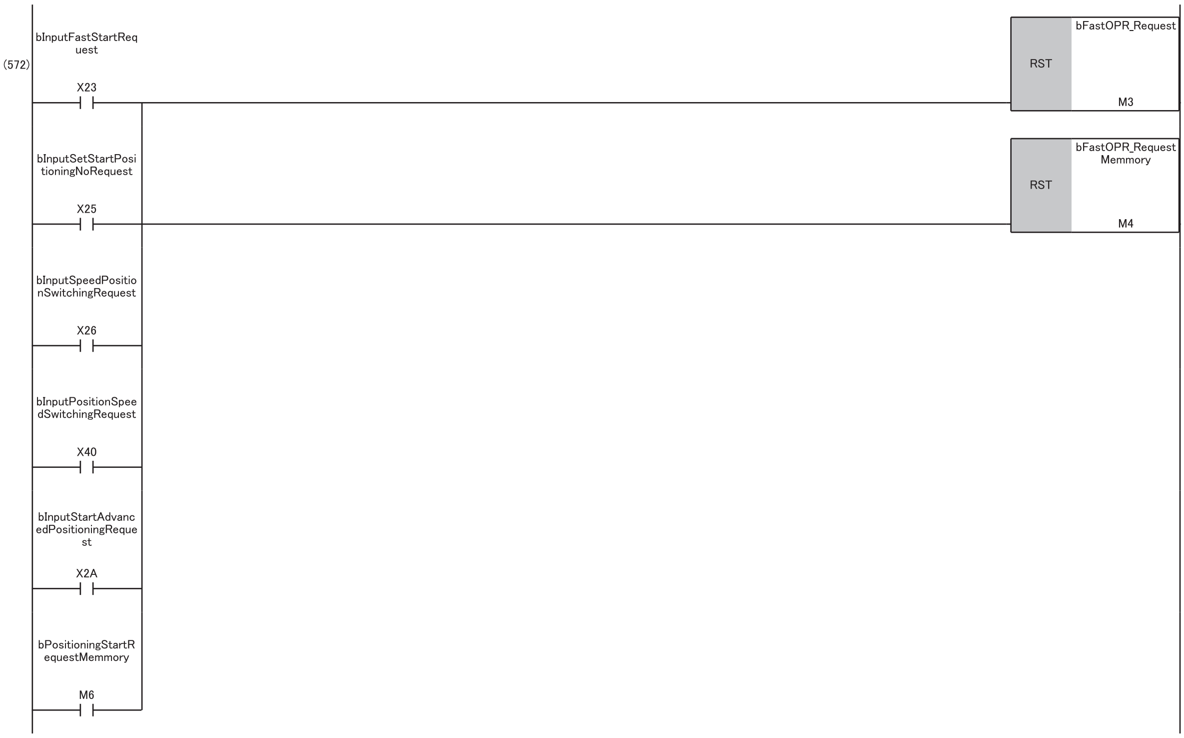
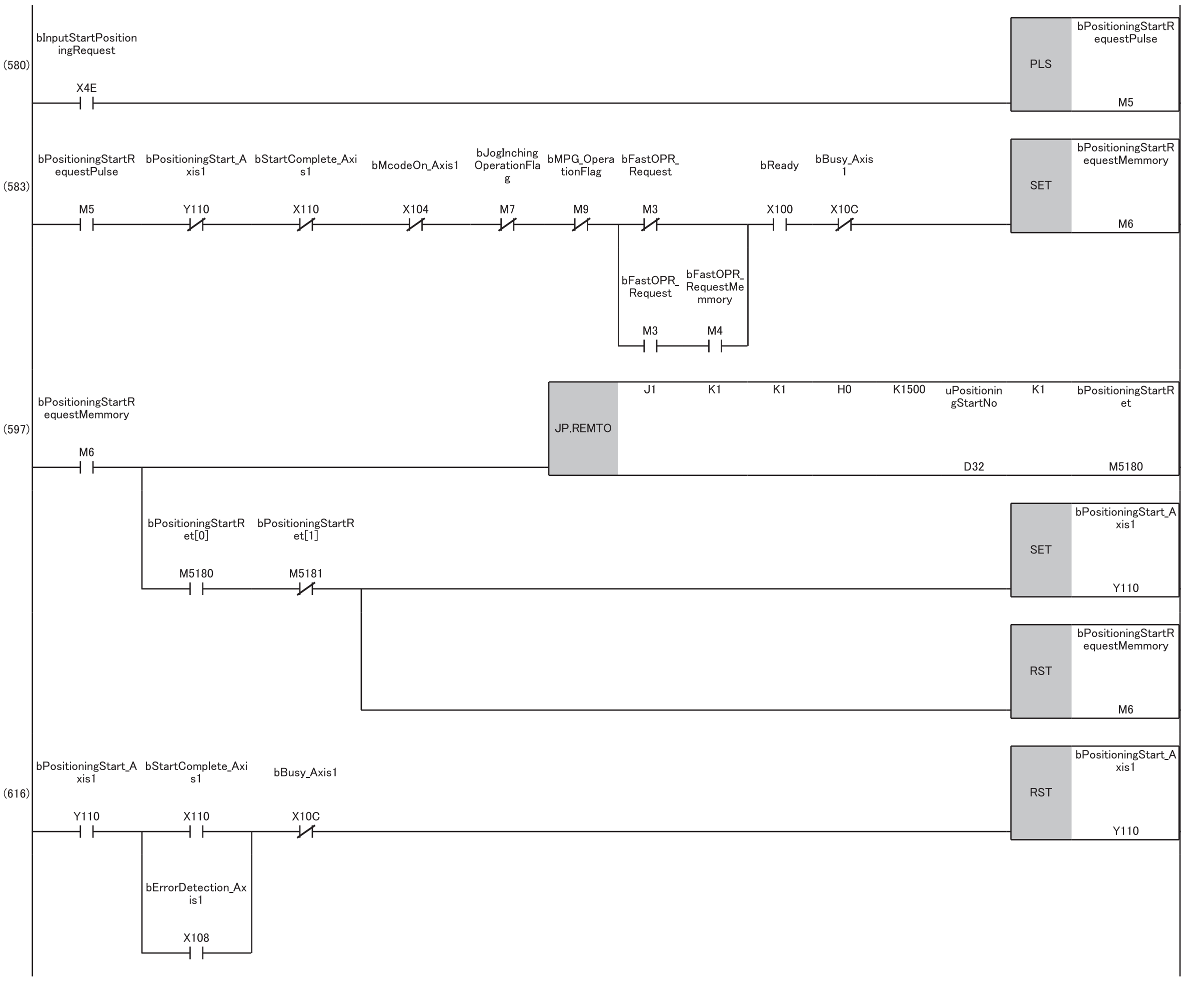
■Turning off a fast OPR command and fast OPR command storage

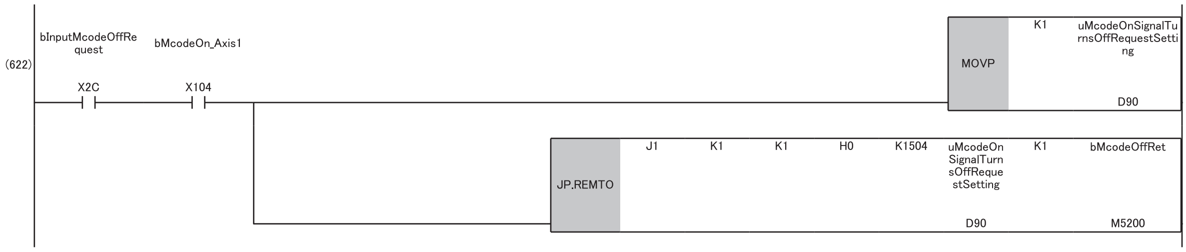
This program is unnecessary when the fast OPR is not used.



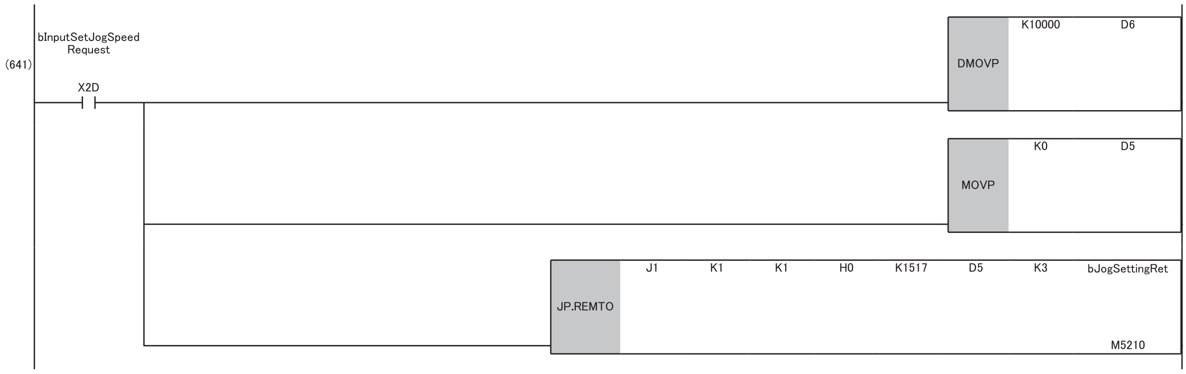
Positioning start program



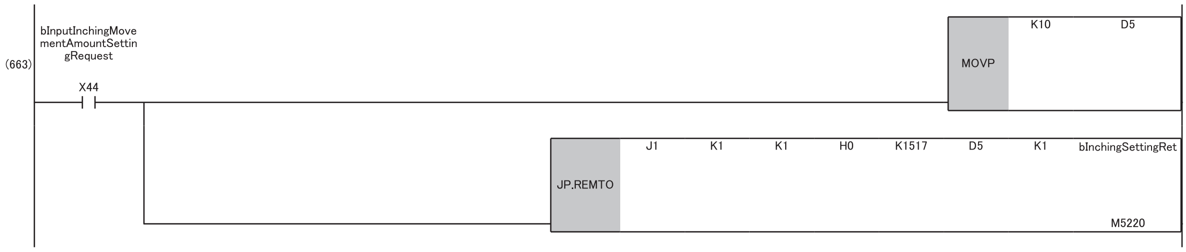
M code OFF program



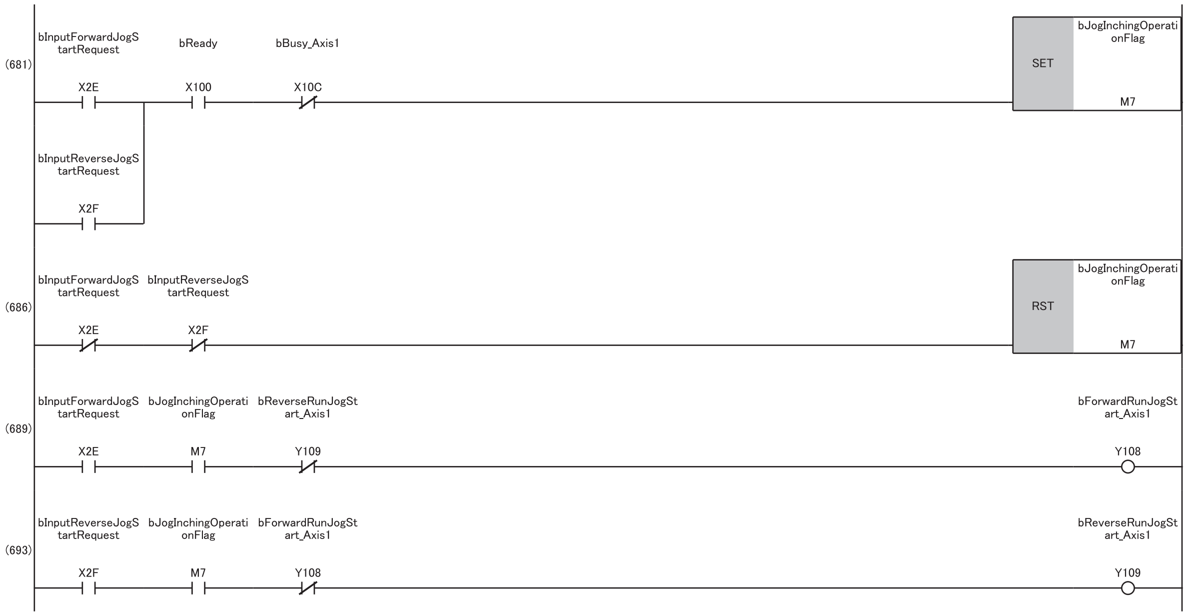
JOG operation setting program



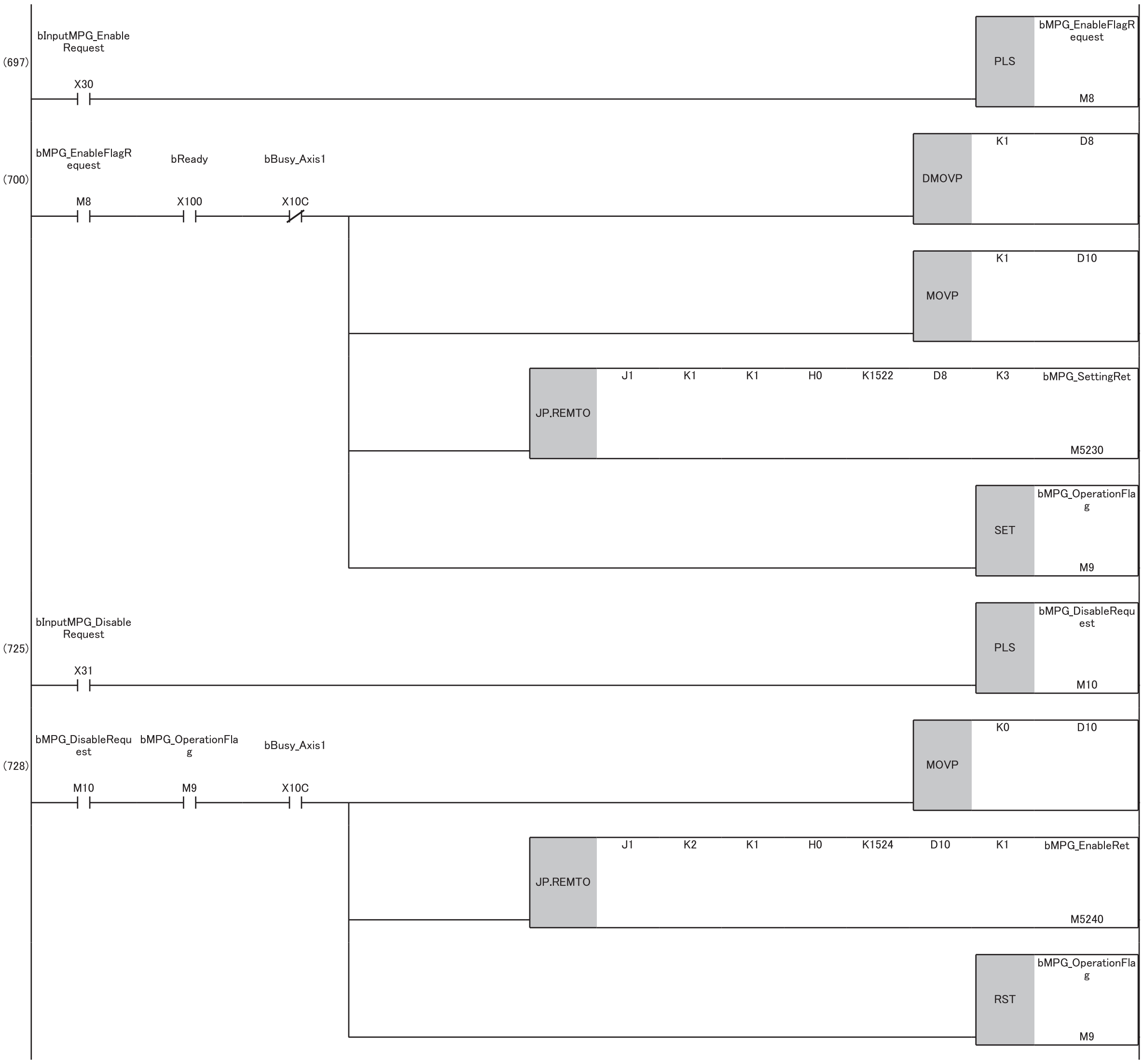
Inching operation setting program



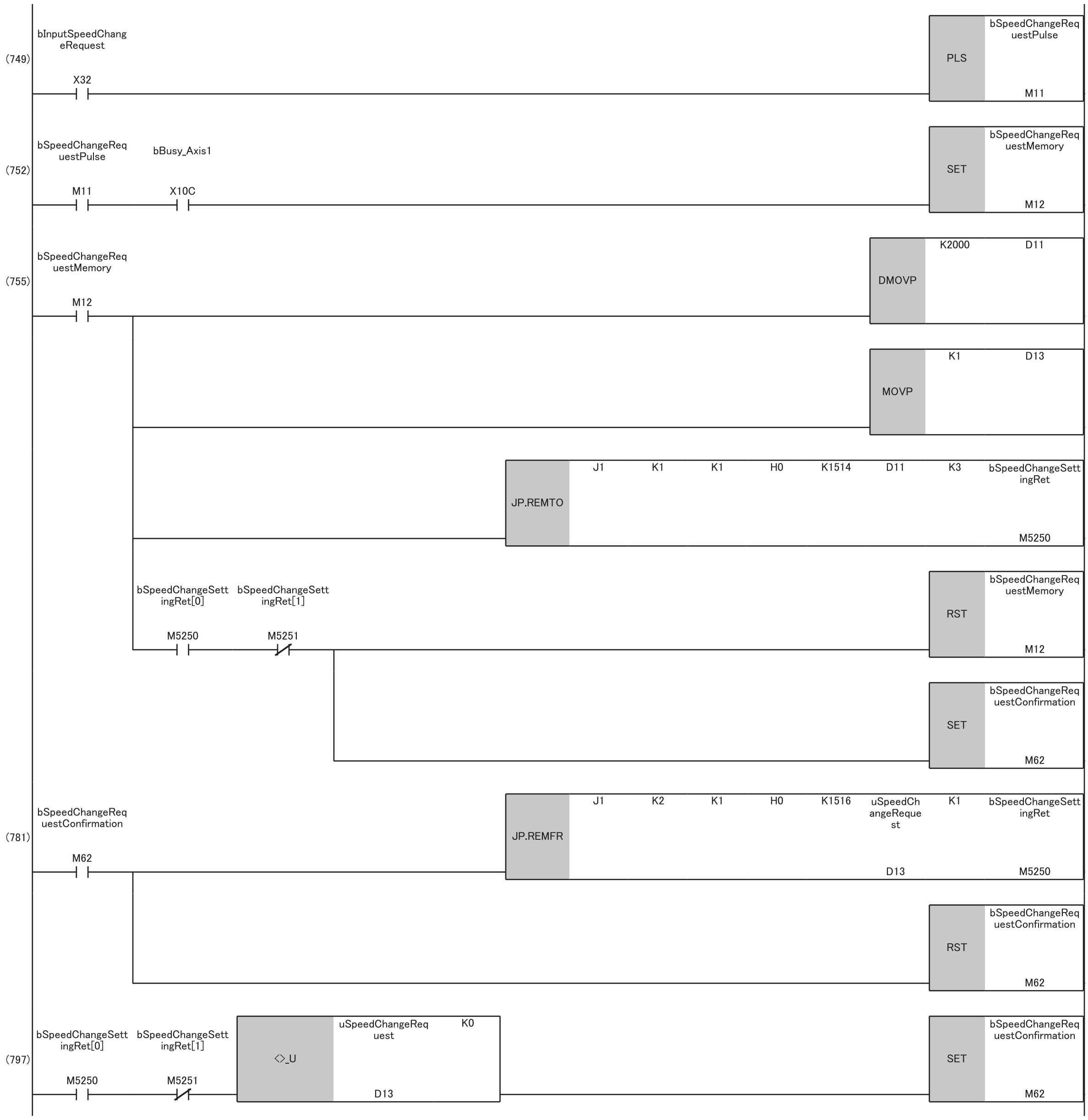
JOG operation/inching operation execution program



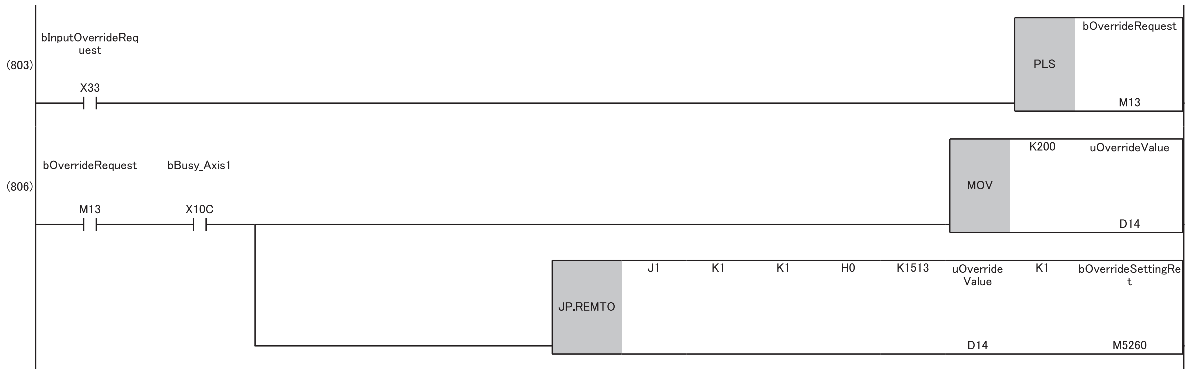
Manual pulse generator operation program



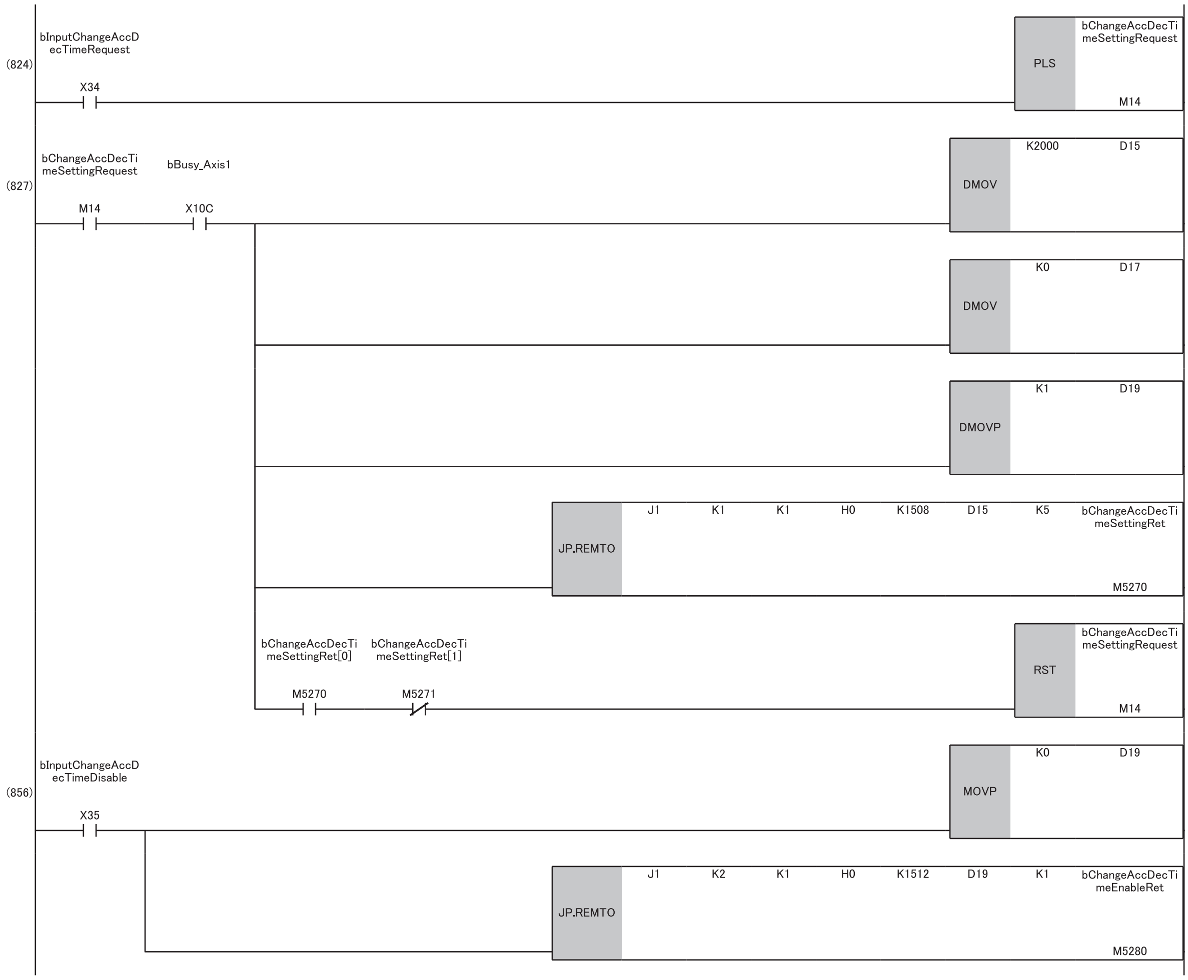
Speed change program



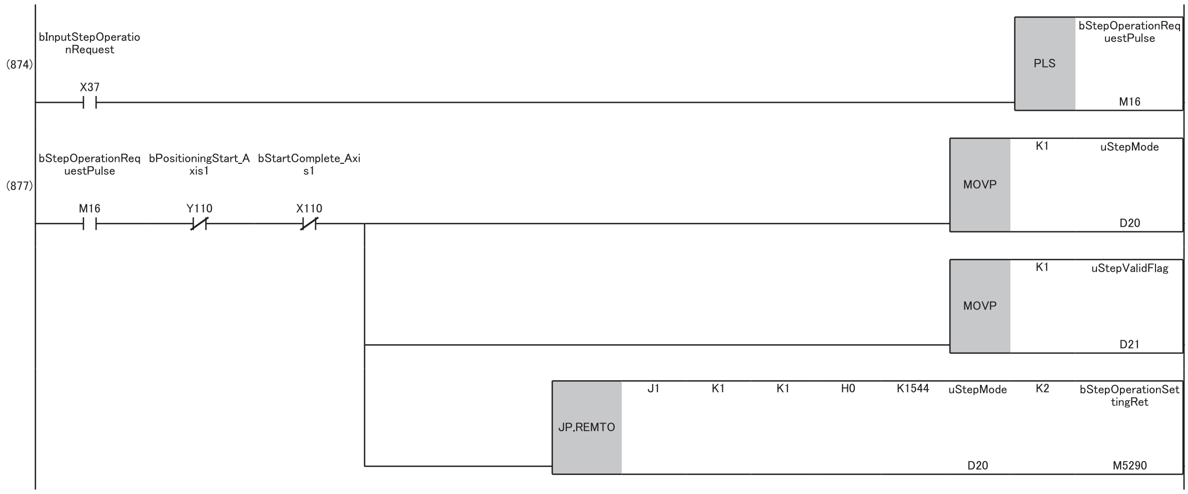
Override program



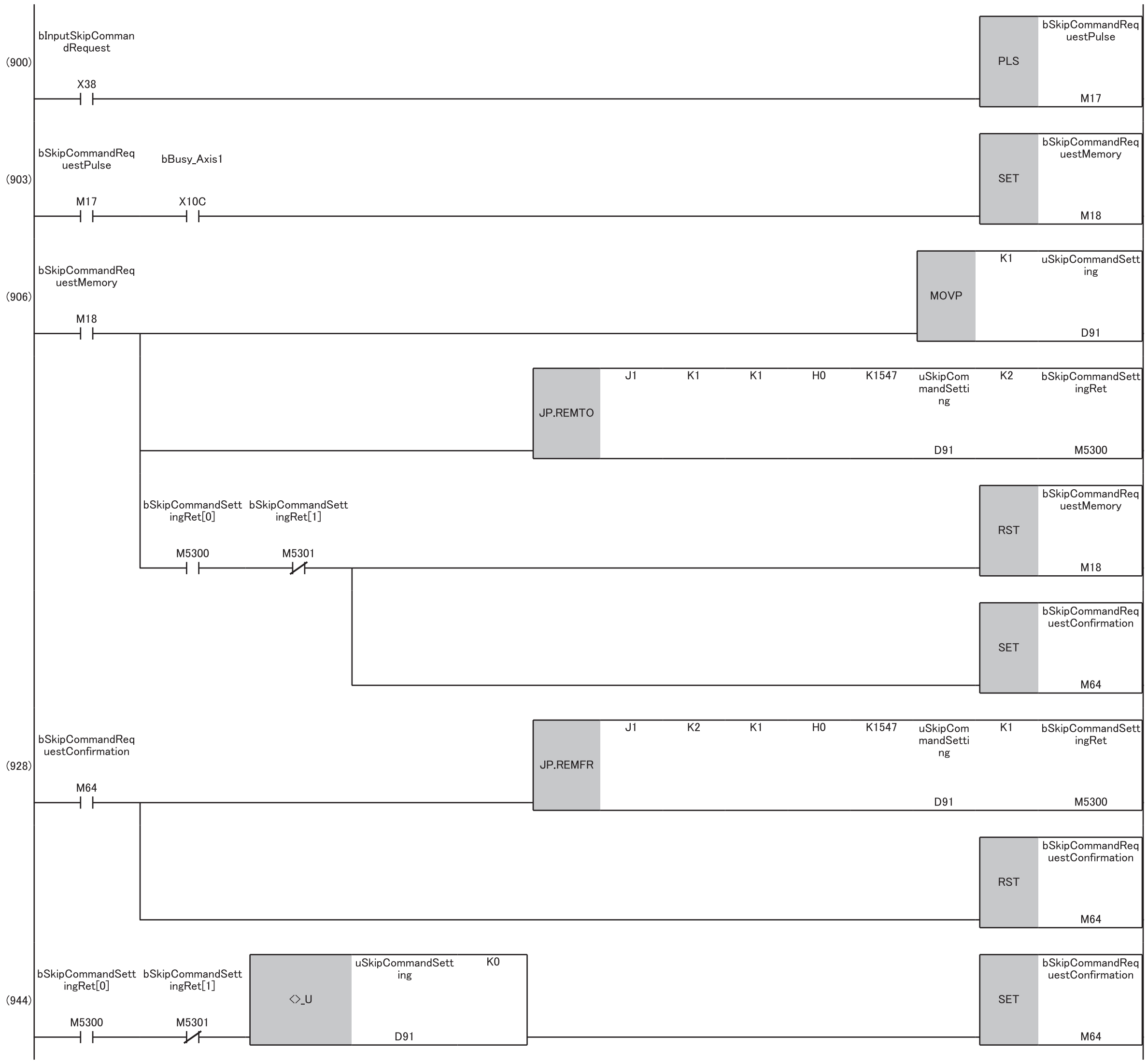
Acceleration/deceleration time change program



Step operation program



Skip program



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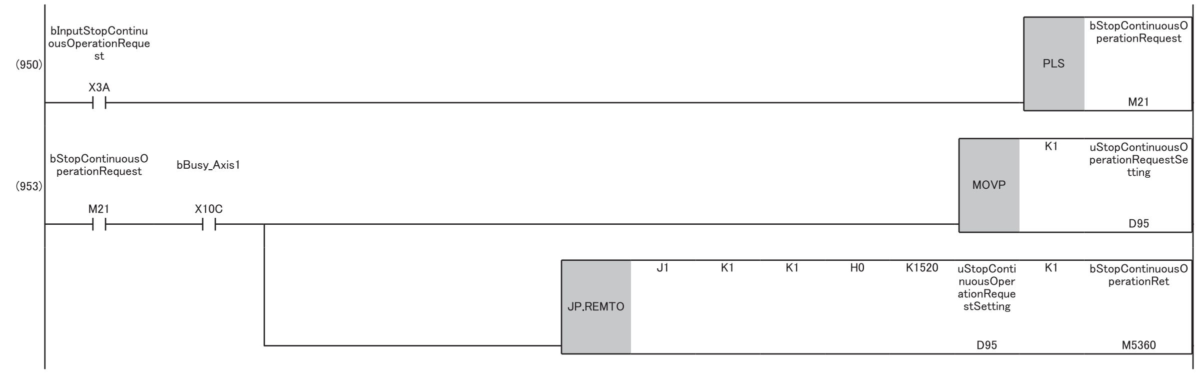
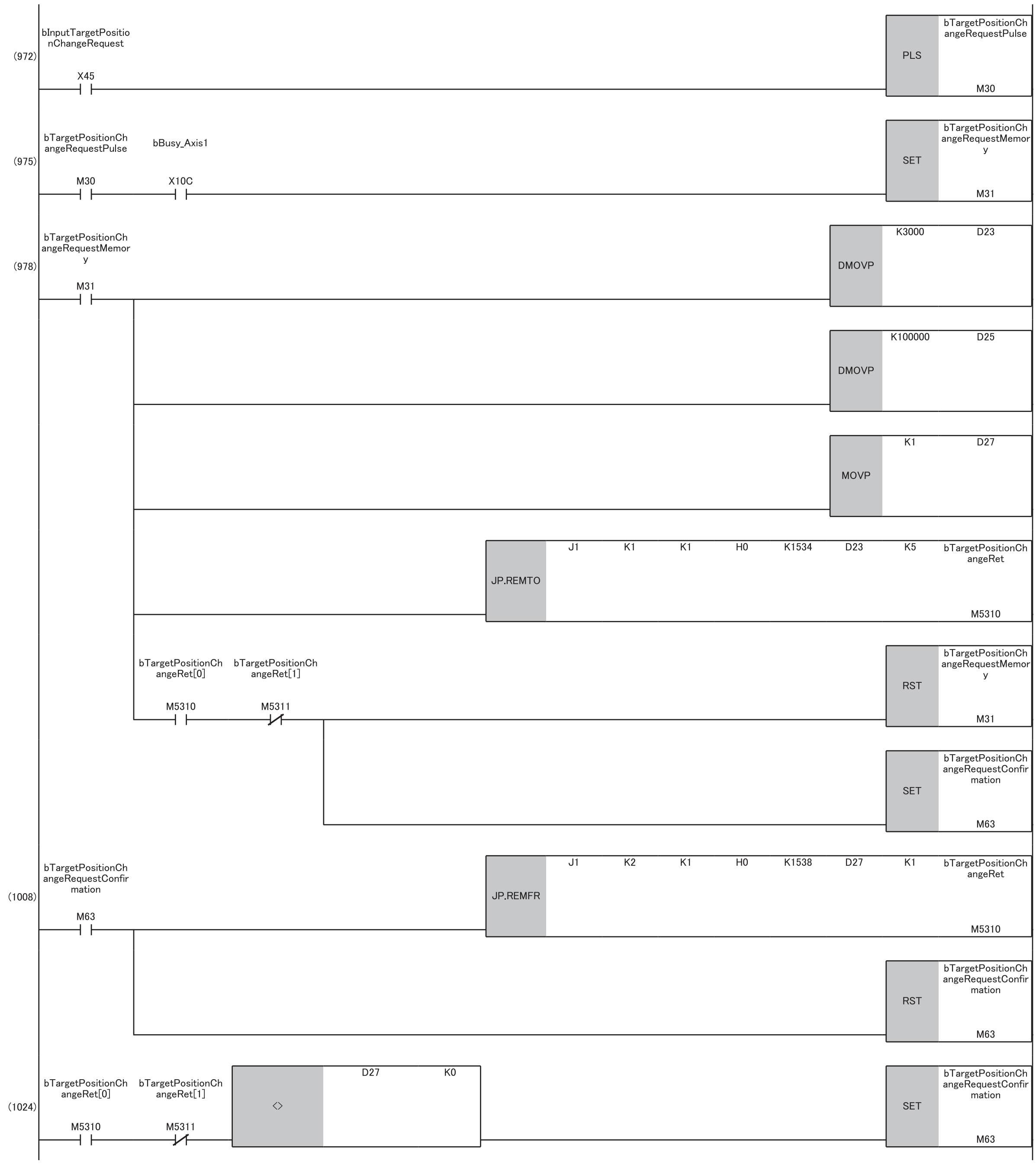
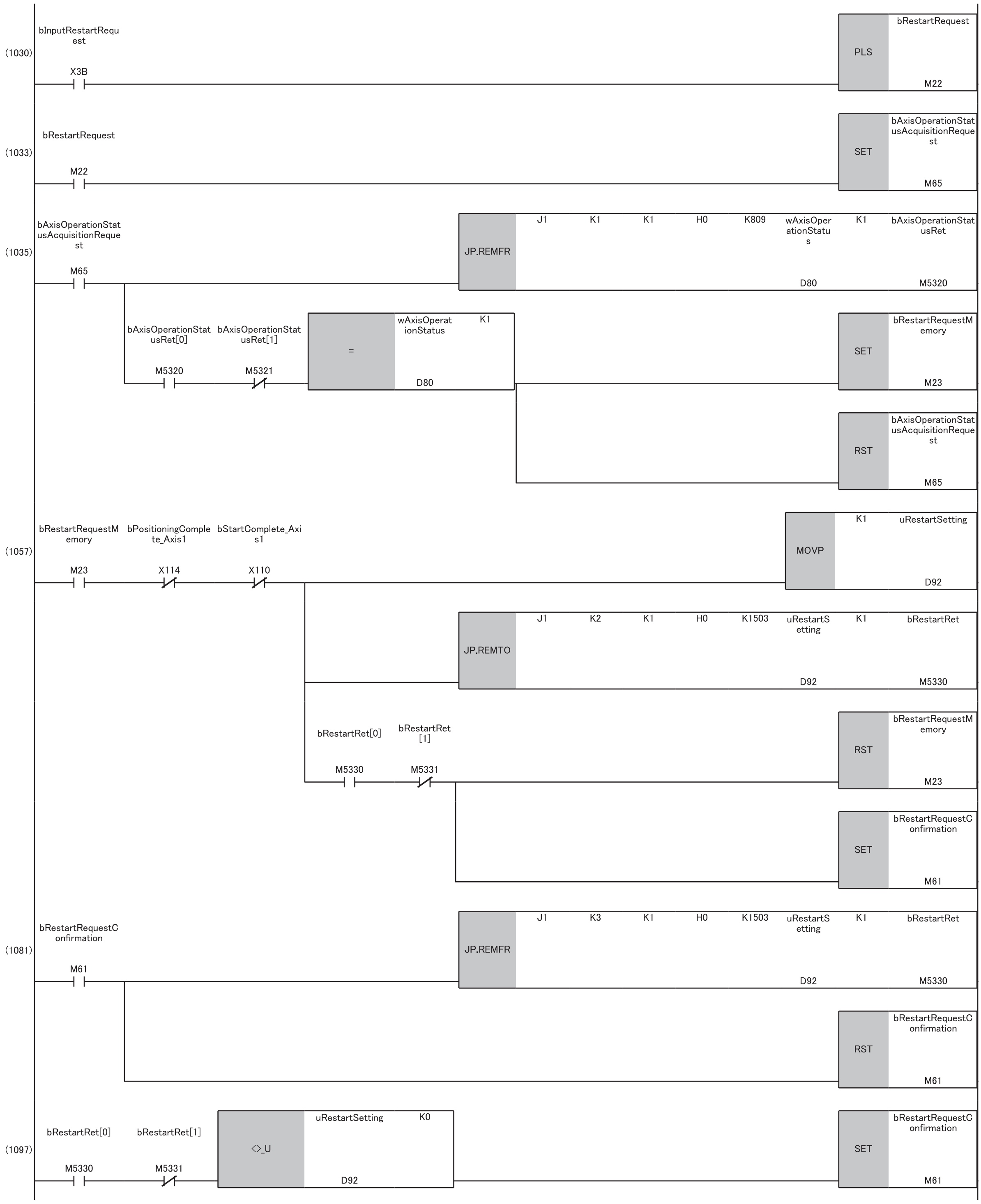
Continuous operation interrupt program



Target position change program

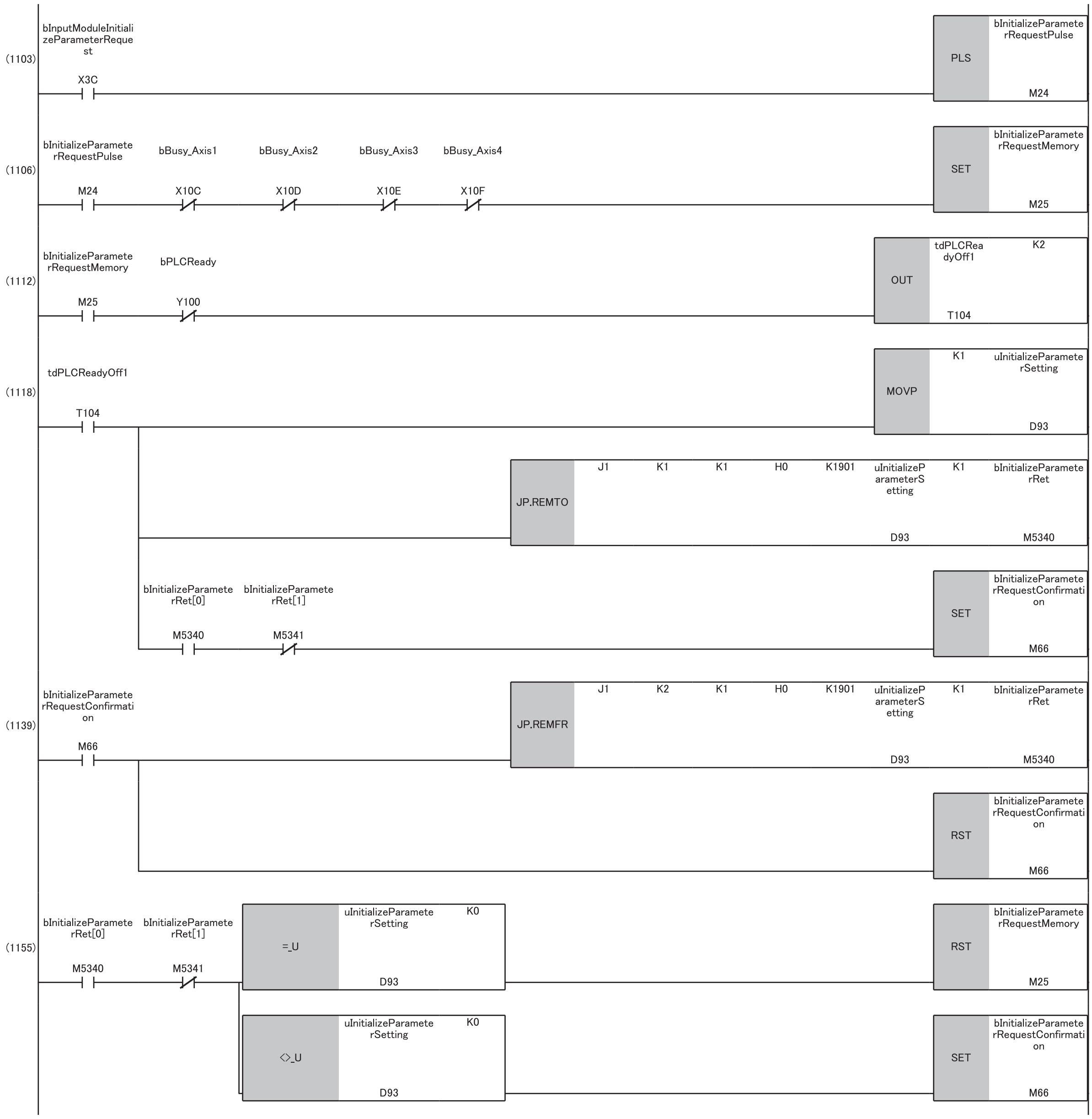


Restart program

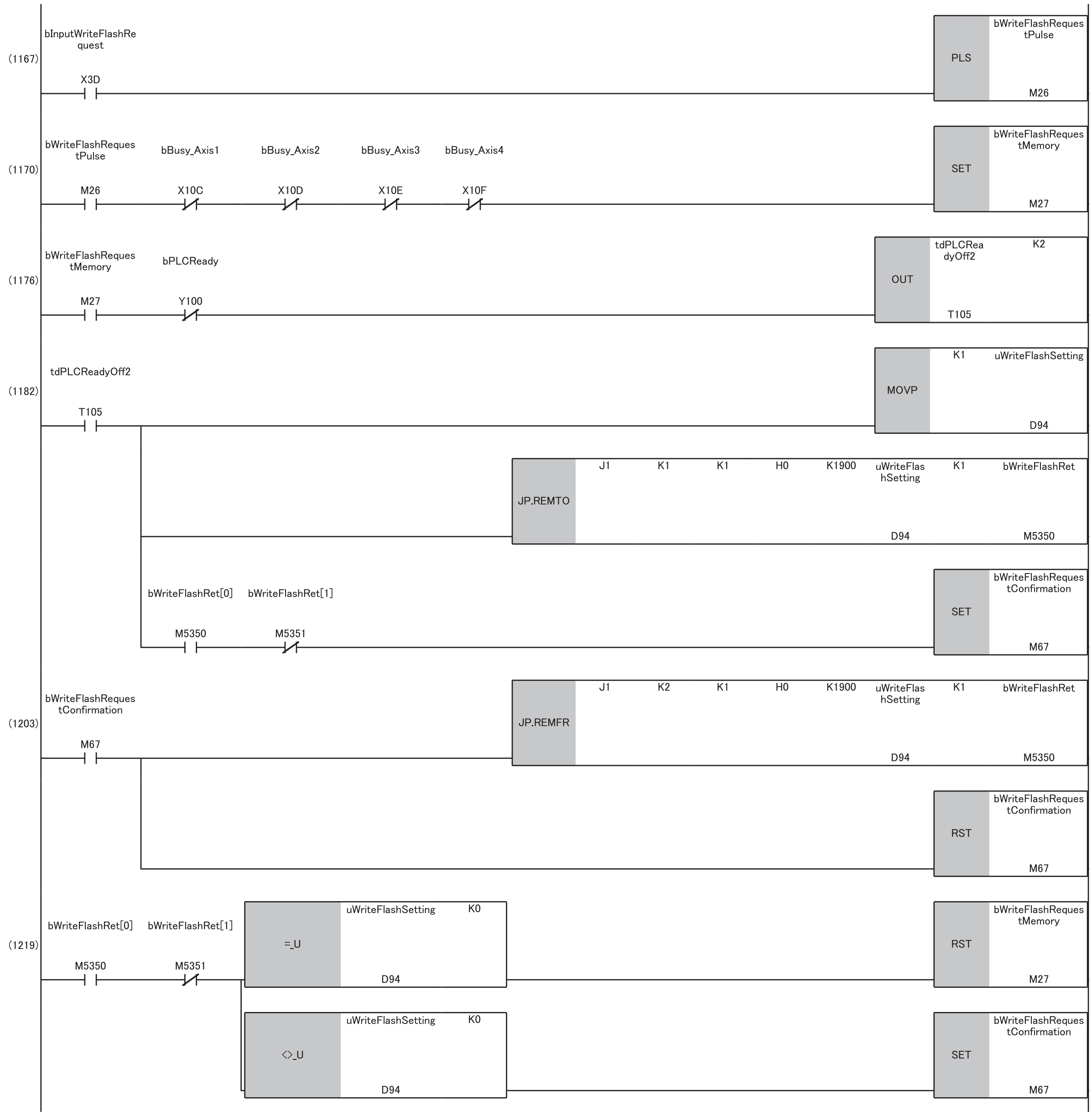


A

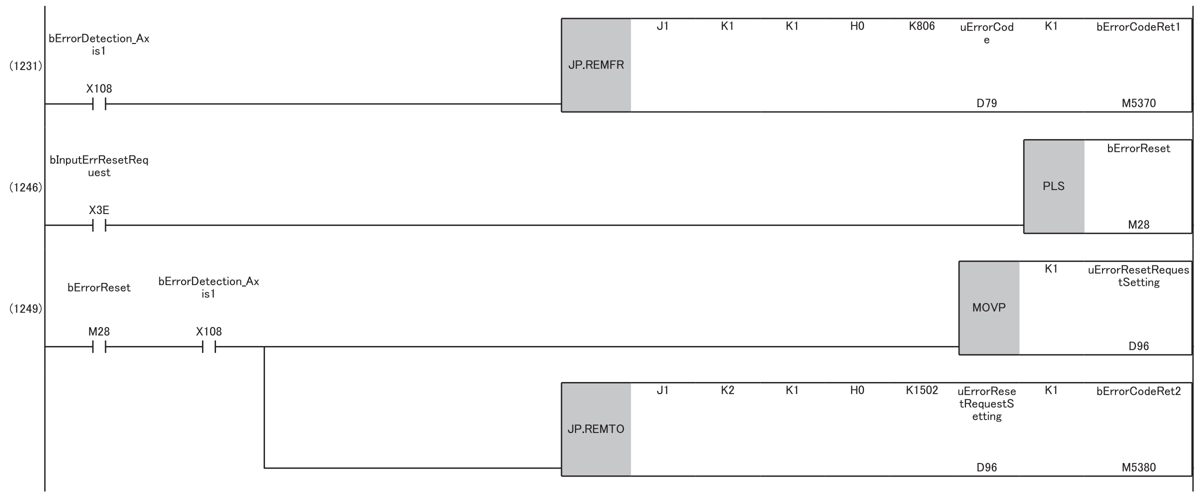
Parameter/data initialization program



Flash ROM write program



Error reset program



Stop program

The RD75 operation when the remote head module is mounted

This section describes the RD75 operation for when the RD75 is used with the remote head module disconnected.

The RD75 operation with the remote head module disconnected

An output signal is turned off when the remote head module is disconnected because "CPU error output mode setting" of the RD75 is fixed to "0: Clear". Thus, if the remote head module is disconnected during positioning operation, the PLC READY signal [Y0] is turned off from on, a PLC READY OFF during operation (error code: 1900) occurs, and the positioning operation decelerates to stop.

To carry out positioning after the remote head module is re-connected, clear the error state with an error reset and start the positioning again.

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Appendix 5 Using the Module in the Redundant System with Redundant Extension Base Unit

This chapter describes restrictions and precautions for using the RD75 that is mounted on the extension base unit in the redundant system.

Restrictions on functions and specifications

Functions

Function			Restriction
Inter-module synchronization function (simultaneous start of multiple modules)			Cannot be used. When the function is used, proper operation cannot be guaranteed.
Sub functions for control	Functions that change control details	Speed change function	The function may operate with time delay when system switching occurs. Use it considering the time required for system switching.
		Override function	
		Acceleration/deceleration time change function	
		Torque change function	
		Target position change function	
	Functions related to start	Pre-reading start function	
		Start time adjustment function	
	Other function	Interrupt function	The interrupt program cannot be executed.

Dedicated instructions

Any dedicated instructions of the RD75 cannot be used.

Module FBs

Name	Availability
M+RD75_StartPositioning	The positioning start may be executed multiple times when system switching occurs. If system switching has occurred while the axis is in operation, stop the axis, check its state, and start the operation again.
M+RD75_ABRST	Cannot be used. When the FB is used, proper operation cannot be guaranteed.
M+RD75_StartAddressOffsetPositioning	The positioning start may be executed multiple times when system switching occurs. If system switching has occurred while the axis is in operation, stop the axis, check its state, and start the operation again.

Module extension parameters

The module extension parameters cannot be stored in the CPU module.
Set "Extended parameter storage setting" of "Basic parameter 3" to "Positioning module".

Positioning parameter

■[Pr.40] Positioning complete signal output time

When setting [Pr.40] Positioning complete signal output time, take into account the extension of scan time due to tracking transfer as well as the time required for system switching, and set a larger value. If a set value is not appropriate, the CPU module may fail to receive Positioning complete signal [X14, X15, X16, X17].
For details on the extension of scan time and the system switching time, refer to the Appendix, Processing Time of the following manual.
📖 MELSEC iQ-R CPU Module User's Manual (Application)

Signals that are affected by system switching

■Axis stop

When system switching has occurred, turning on/off of Axis stop signal [Y4 to Y7] may take effect with time delay. Configure the circuit to externally turn off the axis if necessary.

■JOG operation

When system switching has occurred, turning on/off of Forward run JOG start signal [Y8, YA, YC, YE] or Reverse run JOG start signal [Y9, YB, YD, YF] may take effect with time delay, causing JOG start or JOG stop to be delayed. Configure the circuit to externally turn off the axis if necessary.

■Execution prohibition flag

When system switching has occurred, turning on/off of Execution prohibition flag [Y14, Y15, Y16, Y17] may take effect with time delay. Use these signals considering the time required for system switching.

■Positioning start

When system switching has occurred, the positioning start may be executed multiple times by using Positioning start signal [Y10, Y11, Y12, Y13]. If system switching has occurred while the axis is in operation, stop the axis, check its state, and start the operation again.

Precautions

When using the positioning monitor

Connect the engineering tool to the CPU module of the control system.
The engineering tool cannot recognize the RD75 if it is connected to the CPU module of the standby system.

When using the positioning test

Connect the engineering tool to the CPU module of the control system.
The engineering tool cannot recognize the RD75 if it is connected to the CPU module of the standby system.

Program examples

Unless otherwise specified, program examples provided in this manual and the following manual are for when the module is used in the single CPU system or in the multiple CPU system.
MELSEC iQ-R Positioning Module User's Manual (Startup)
When using the module in the redundant system, refer to the following manual and observe the precautions on programming for when using the Process CPU (redundant mode).
MELSEC iQ-R CPU Module User's Manual (Application)

Signal flow tracking setting

When using the module FBs and applying the program examples to an actual system, set "Signal Flow Memory Tracking Setting" to "Transfer". If not, the module FBs and programs may not work properly when system switching occurs.

[CPU Parameter] ⇨ [Redundant System Settings] ⇨ [Tracking Setting]

Appendix 6 Added or Changed Functions

This section describes the functions added to or changed for the RD75.

Added or changed contents	Firmware version	Reference
Online module change	"02" or later	MELSEC iQ-R Online Module Change Manual
Change in the extension parameter storage timing		Page 596 Change in the extension parameter storage timing
Amplifier-less operation function	"03" or later	Page 317 Amplifier-less Operation Function
Change in the destination at the module data backup or module data initialization		Page 596 Change in the destination at the module data backup or module data initialization
Reading module extension parameters while PLC READY signal [Y0] is on	"04" or later	Page 596 Reading module extension parameters while PLC READY signal [Y0] is on
Limit switch combined method	"05" or later	Page 61 Limit switch combined method

Change in the extension parameter storage timing

When the extension parameter storage setting is "Positioning module", the extension parameter is stored in the buffer memory at power-on.

■When the RD75 with the unsupported version is used

When the extension parameter storage setting is "Positioning module", the extension parameter is stored in the buffer memory at power-on or when the CPU module status is changed from STOP to RUN.

Change in the destination at the module data backup or module data initialization

For the module data backup or module data initialization, the destination is specified with the extension parameter storage setting.

Extension parameter storage setting	Description
CPU	Parameters are backed up in the module extension parameter file of the CPU module or the module extension parameter file of the CPU module is initialized.
Positioning module	Parameters are backed up in the module extension parameter file (flash ROM) of the RD75 or the module extension parameter file (flash ROM) of the RD75 is initialized.

■When the RD75 of an unsupported version is used

The destination for the module data backup or module data initialization is the module extension parameter file (flash ROM) of the RD75 regardless of the extension parameter storage setting.

Reading module extension parameters while PLC READY signal [Y0] is on

Module extension parameters can be read from the CPU module or the RD75 while PLC READY signal [Y0] is on.
Read module extension parameters by performing [Online] ⇨ [Read from PLC] from an engineering tool.

■When the RD75 of an unsupported version is used

Module extension parameters can be read only from the CPU module while PLC READY signal [Y0] is on.

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REVISIONS

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

Revision date	*Manual number	Description
June 2014	SH(NA)-081245ENG-A	First edition
July 2014	SH(NA)-081245ENG-B	Correction of descriptions regarding dedicated instructions
January 2015	SH(NA)-081245ENG-C	■Added function Online module change ■Added or modified parts RELEVANT MANUALS, Section 3.1, 7.9, 12.11, 12.12, 14.1, 14.4, 14.5
December 2015	SH(NA)-081245ENG-D	■Added function Amplifier-less operation function ■Added or modified parts RELEVANT MANUALS, Section 1.1, 1.2, 5.4, 7.9, 8.1, 8.2, 8.3, 8.7, 9.2, 11.3, 12.2, 12.3, 12.7, 12.8, 12.11, 12.12, 14.3, 14.5, Appendix 2, Appendix 4
January 2017	SH(NA)-081245ENG-E	■Added or modified parts SAFETY PRECAUTIONS, TERMS, Section 9.2, Appendix 4
April 2017	SH(NA)-081245ENG-F	■Added or modified parts Section 1.1, 2.2, 5.4, 7.2, 7.4, 9.2, 9.3, 12.3, 13.2, 13.4, Appendix 5
April 2018	SH(NA)-081245ENG-G	■Added or modified parts Section 10.1, 10.2
October 2018	SH(NA)-081245ENG-H	■Added or modified part Appendix 5
October 2020	SH(NA)-081245ENG-I	■Added or modified parts SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, RELEVANT MANUALS, TERMS, GENERIC TERMS AND ABBREVIATIONS, Appendix 5
May 2024	SH(NA)-081245ENG-J	■Added or modified parts SAFETY PRECAUTIONS, Section 7.4, Appendix 1, 4

Japanese manual number: SH-081244-I

WARRANTY

Please confirm the following product warranty details before using this product.

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 sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[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 not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(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 available 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 loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

TRADEMARKS

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

SH(NA)-081245ENG-J(2405)MEE
MODEL: RD75-U-OU-E
MODEL CODE: 13JX15

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