MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO-JE

General-Purpose Interface AC Servo

MODEL

MR-JE-_A

SERVO AMPLIFIER
INSTRUCTION MANUAL
(POSITIONING MODE)

C

● Safety Instructions ●

Please read the instructions carefully before using the equipment.

To use the equipment correctly, do not attempt to install, operate, maintain, or inspect the equipment until you have read through this Instruction Manual, Installation guide, and appended documents carefully. Do not use the equipment until you have a full knowledge of the equipment, safety information and instructions.
In this Instruction Manual, the safety instruction levels are classified into "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 medium or slight injury to personnel or may cause physical damage.

Note that the ⚠ CAUTION level may lead to a serious consequence depending on conditions.
Please follow the instructions of both levels because they are important to personnel safety.
What must not be done and what must be done are indicated by the following diagrammatic symbols.

⃠	Indicates what must not be done. For example, "No Fire" is indicated by ⃠ .
●	Indicates what must be done. For example, grounding is indicated by ⏚ .

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".
After reading this Instruction Manual, keep it accessible to the operator.

1. To prevent electric shock, note the following

⚠ WARNING

- Before wiring and inspections, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.
- Ground the servo amplifier and servo motor securely.
- Any person who is involved in wiring and inspection should be fully competent to do the work.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, it may cause an electric shock.
- Do not operate switches with wet hands. Otherwise, it may cause an electric shock.
- The cables should not be damaged, stressed, loaded, or pinched. Otherwise, it may cause an electric shock.
- To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the cabinet.
- To avoid an electric shock, insulate the connections of the power supply terminals.

2. To prevent fire, note the following

⚠ CAUTION

- Install the servo amplifier, servo motor, and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to smoke or a fire.
- Always connect a magnetic contactor between the power supply and the power supply (L1/L2/L3) of the servo amplifier, in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause smoke or a fire when the servo amplifier malfunctions.
- Always connect a molded-case circuit breaker, or a fuse to each servo amplifier between the power supply and the power supply (L1/L2/L3) of the servo amplifier, in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a molded-case circuit breaker or fuse is not connected, continuous flow of a large current may cause smoke or a fire when the servo amplifier malfunctions.
- When using the regenerative resistor, switch power off with the alarm signal. Otherwise, a regenerative transistor malfunction or the like may overheat the regenerative resistor, causing smoke or a fire.
- When you use a regenerative option with an MR-JE-40A to MR-JE-100A, remove the built-in regenerative resistor and wiring from the servo amplifier.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.

3. To prevent injury, note the following

⚠ CAUTION

- Only the power/signal specified in the Instruction Manual must be supplied/applied to each terminal. Otherwise, an electric shock, fire, injury, etc. may occur.
- Connect cables to the correct terminals. Otherwise, a burst, damage, etc. may occur.
- Ensure that polarity (+/-) is correct. Otherwise, a burst, damage, etc. may occur.
- The servo amplifier heat sink, regenerative resistor, servo motor, etc., may be hot while the power is on and for some time after power-off. Take safety measures such as providing covers to avoid accidentally touching them by hands and parts such as cables.

4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a malfunction, injury, electric shock, fire, etc.

(1) Transportation and installation

⚠ CAUTION

- Transport the products correctly according to their mass.
- Stacking in excess of the specified number of product packages is not allowed.
- Do not hold the lead of the built-in regenerative resistor, cables, or connectors when carrying the servo amplifier. Otherwise, it may drop.
- Install the servo amplifier and the servo motor in a load-bearing place in accordance with the Instruction Manual.
- Do not get on or put heavy load on the equipment. Otherwise, it may cause injury.
- The equipment must be installed in the specified direction.
- Leave specified clearances between the servo amplifier and the cabinet walls or other equipment.
- Do not install or operate the servo amplifier and servo motor which have been damaged or have any parts missing.
- Do not block the intake and exhaust areas of the servo amplifier. Otherwise, it may cause a malfunction.
- Do not drop or apply heavy impact on the servo amplifiers and the servo motors. Otherwise, injury, malfunction, etc. may occur.
- Do not strike the connector. Otherwise, a connection failure, malfunction, etc. may occur.
- When you keep or use the equipment, please fulfill the following environment.

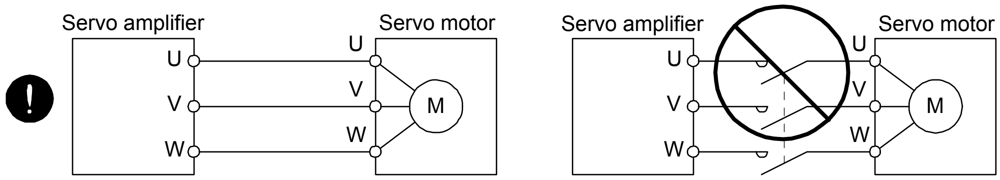
Item		Environment
Ambient temperature	Operation	0 °C to 55 °C (non-freezing)
	Storage	-20 °C to 65 °C (non-freezing)
Ambient humidity	Operation	5 %RH to 90 %RH (non-condensing)
	Storage	
Ambience		Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt
Altitude		2000 m or less above sea level (Contact your local sales office for the altitude for options.)
Vibration resistance		5.9 m/s^2, at 10 Hz to 55 Hz (directions of X, Y and Z axes)

- When the product has been stored for an extended period of time, contact your local sales office.
- When handling the servo amplifier, be careful about the edged parts such as corners of the servo amplifier.
- The servo amplifier must be installed in a metal cabinet.
- When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.
- To prevent a fire or injury from occurring in case of an earthquake or other natural disasters, securely install, mount, and wire the servo motor in accordance with the Instruction Manual.

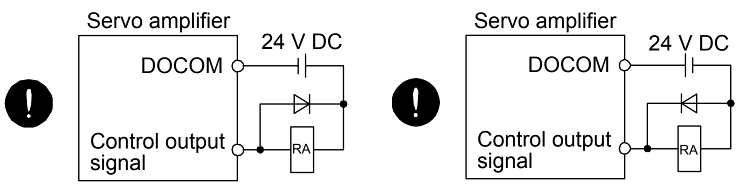
(2) Wiring

⚠ CAUTION

- Before removing the CNP1 connector of MR-JE-40A to MR-JE-100A, disconnect the lead wires of the regenerative resistor from the CNP1 connector.
- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Make sure to connect the cables and connectors by using the fixing screws and the locking mechanism. Otherwise, the cables and connectors may be disconnected during operation.
- Do not install a power capacitor, surge killer, or radio noise filter (optional FR-BIF) on the servo amplifier output side.
- To avoid a malfunction, connect the wires to the correct phase terminals (U/V/W) of the servo amplifier and servo motor.
- Connect the servo amplifier power output (U/V/W) to the servo motor power input (U/V/W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.



- The connection diagrams in this instruction manual are shown for sink interfaces, unless stated otherwise.
- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.



- When the cable is not tightened enough to the terminal block, the cable or terminal block may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.
- Connecting a servo motor of the wrong axis to U, V, W, or CN2 of the servo amplifier may cause a malfunction.
- Configure a circuit to turn off EM2 or EM1 when the power supply is turned off to prevent an unexpected restart of the servo amplifier.
- To prevent malfunction, avoid bundling power lines (input/output) and signal cables together or running them in parallel to each other. Separate the power lines from the signal cables.

(3) Test run and adjustment

⚠ CAUTION

- When executing a test run, follow the notice and procedures in this instruction manual. Otherwise, it may cause a malfunction, damage to the machine, or injury.
- Before operation, check the parameter settings. Improper settings may cause some machines to operate unexpectedly.

⚠ CAUTION

- Never adjust or change the parameter values extremely as it will make operation unstable.
- Do not get close to moving parts during the servo-on status.

(4) Usage

⚠ CAUTION

- When it is assumed that a hazardous condition may occur due to a power failure or product malfunction, use a servo motor with an external brake to prevent the condition.
- For equipment in which the moving part of the machine may collide against the load side, install a limit switch or stopper to the end of the moving part. The machine may be damaged due to a collision.
- Do not disassemble, repair, or modify the product. Otherwise, an electric shock, fire, injury, etc. may occur. Disassembled, repaired, and/or modified products are not covered under warranty.
- Before resetting an alarm, make sure that the run signal of the servo amplifier is off in order to prevent a sudden restart. Otherwise, it may cause an accident.
- Use a noise filter, etc. to minimize the influence of electromagnetic interference. Electromagnetic interference may be given to the electronic equipment used near the servo amplifier.
- Burning or breaking a servo amplifier may cause a toxic gas. Do not burn or break it.
- Use the servo amplifier with the specified servo motor.
- Correctly wire options and peripheral equipment, etc. in the correct combination. Otherwise, an electric shock, fire, injury, etc. may occur.
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- For such reasons as incorrect wiring, service life, and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.
- If the dynamic brake is activated at power-off, alarm occurrence, etc., do not rotate the servo motor by an external force. Otherwise, it may cause a fire.

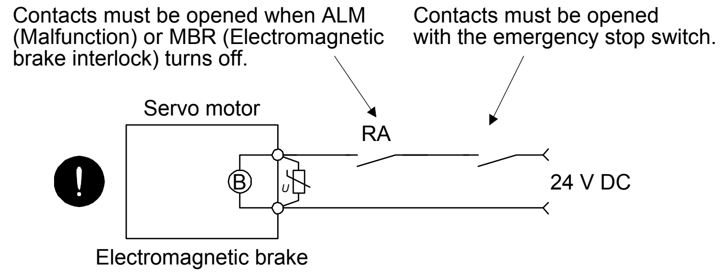
(5) Corrective actions

⚠ CAUTION

- Ensure safety by confirming the power off, etc. before performing corrective actions. Otherwise, it may cause an accident.
- If it is assumed that a power failure, machine stoppage, or product malfunction may result in a hazardous situation, use a servo motor with an electromagnetic brake or provide an external brake system for holding purpose to prevent such hazard.
- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- If the molded-case circuit breaker or fuse is activated, be sure to remove the cause and secure safety before switching the power on. If necessary, replace the servo amplifier and recheck the wiring. Otherwise, it may cause smoke, fire, or an electric shock.
- Provide an adequate protection to prevent unexpected restart after an instantaneous power failure.

⚠ CAUTION

- Configure an electromagnetic brake circuit which is interlocked with an external emergency stop switch.



- To prevent an electric shock, injury, or fire from occurring after an earthquake or other natural disasters, ensure safety by checking conditions, such as the installation, mounting, wiring, and equipment before switching the power on.

(6) Maintenance, inspection and parts replacement

⚠ CAUTION

- Make sure that the emergency stop circuit operates properly such that an operation can be stopped immediately and a power is shut off by the emergency stop switch.
- It is recommended that the servo amplifier be replaced every 10 years when it is used in general environment.
- When using a servo amplifier whose power has not been turned on for a long time, contact your local sales office.

(7) General instruction

- To illustrate details, the equipment in the diagrams of this Instruction Manual may have been drawn without covers and safety guards. When the equipment is operated, the covers and safety guards must be installed as specified. Operation must be performed in accordance with this Instruction Manual.

● DISPOSAL OF WASTE ●

Please dispose a servo amplifier and other options according to your local laws and regulations.

⚠ EEP-ROM life

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier may malfunction when the EEP-ROM reaches the end of its useful life.

- Write to the EEP-ROM due to parameter setting changes
- Write to the EEP-ROM due to device changes
- Write to the EEP-ROM due to point table changes
- Write to the EEP-ROM due to program changes

Compliance with global standards

For the compliance with global standards, refer to app. 2 of "MR-JE-_A Servo Amplifier Instruction Manual".

«About the manual»

You must have this Instruction Manual and the following manuals to use this servo. Ensure to prepare them to use the servo safely.

Relevant manuals

Manual name	Manual No.
MELSERVO MR-JE-_A Servo Amplifier Instruction Manual	SH(NA)030128ENG
MELSERVO MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU Protocol)	SH(NA)030177ENG
MELSERVO-JE Servo amplifier Instruction Manual (Troubleshooting)	SH(NA)030166ENG
MELSERVO HG-KN_/HG-SN_ Servo Motor Instruction Manual	SH(NA)030135ENG
MELSERVO EMC Installation Guidelines	IB(NA)67310ENG

This Instruction Manual does not describe the following items. For the details of the items, refer to each chapter/section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Installation	MR-JE-_A Chapter 2
Normal gain adjustment	MR-JE-_A Chapter 6
Special adjustment functions	MR-JE-_A Chapter 7
Dimensions	MR-JE-_A Chapter 9
Characteristics	MR-JE-_A Chapter 10

«Cables used for wiring»

Wires mentioned in this Instruction Manual are selected based on the ambient temperature of 40 °C.

«U.S. customary units»

U.S. customary units are not shown in this manual. Convert the values if necessary according to the following table.

Quantity	SI (metric) unit	U.S. customary unit
Mass	1 [kg]	2.2046 [lb]
Length	1 [mm]	0.03937 [inch]
Torque	1 [N•m]	141.6 [oz•inch]
Moment of inertia	1 [(× 10^{-4} kg•m^2)]	5.4675 [oz•$inch^2$]
Load (thrust load/axial load)	1 [N]	0.2248 [lbf]
Temperature	N [°C] × 9/5 + 32	N [°F]

CONTENTS

1. FUNCTIONS AND CONFIGURATION

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Combinations of servo amplifiers and servo motors	MR-JE-_A section 1.4
Model designation	MR-JE-_A section 1.6
Structure (parts identification)	MR-JE-_A section 1.7

1.1 For proper use of the positioning mode

(1) Servo amplifier/MR Configurator2
The positioning mode is available with the servo amplifier and MR Configurator2 with the following software versions.

Product name	Model	Software version
Servo amplifier	MR-JE-_A	B7 or later
MR Configurator2	SW1DNC-MRC2-_	1.37P or later

(2) Parameter setting

(a) Selection of the positioning mode
Select a positioning mode with [Pr. PA01 Operation mode].

[Pr. PA01]

Control mode selection
6: Positioning mode (point table method)
7: Positioning mode (program method)

(b) Positioning control parameters ([Pr. PT_ _])
To enable read/write the positioning control parameters ([Pr. PT_ _]), set [Pr. PA19 Parameter writing inhibit] to "0 0 A B".

(c) Assigning recommended input/output devices
Assign recommended input/output devices to the pins of CN1 in accordance with each chapter of point table/program method.

1.2 Positioning mode specification list

Only the specifications of the positioning mode are listed here. For other specifications, refer to section 1.3 of "MR-JE-A Servo Amplifier Instruction Manual".

Item							Description
Servo amplifier model							MR-JE-_A
Positioning mode	Command method	Point table	Operational specifications				Positioning by specifying the point table No. (31 points when using the communication function, and 15 points when assigning input signals) (Note 2)
			Position command input (Note 1)	Absolute value command method			Set in the point table. Setting range of feed length per point: -999999 to 999999 [$\times 10^{STM}$ μm], -99.9999 to 99.9999 [$\times 10^{STM}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -360.000 to 360.000 [degree]
				Incremental value command method			Set in the point table. Setting range of feed length per point: 0 to 999999 [$\times 10^{STM}$ μm], 0 to 99.9999 [$\times 10^{STM}$ inch], 0 to 999999 [pulse], Setting range of rotation angle: 0 to 999.999 [degree]
			Speed command input				Set the acceleration/deceleration time constants in the point table. Set the S-pattern acceleration/deceleration time constants with [Pr. PC03].
			System				Signed absolute value command method/incremental value command method
			Analog override				0 V DC to ±10 V DC/0% to 200%
			Torque limit				Set with parameter or external analog input (0 V DC to +10 V DC/maximum torque)
			Position command data input	RS-422/RS-485 communication	Position command input (Note 1)	Absolute value command method	Setting of position command data with RS-422/RS-485 communication Setting range of feed length per point: -999999 to 999999 [$\times 10^{STM}$ μm], -99.9999 to 99.9999 [$\times 10^{STM}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -360.000 to 360.000 [degree]
						Incremental value command method	Setting of position command data with RS-422/RS-485 communication Setting range of feed length per point: 0 to 999999 [$\times 10^{STM}$ μm], 0 to 99.9999 [$\times 10^{STM}$ inch], 0 to 999999 [pulse], Setting range of rotation angle: 0 to 999.999 [degree]
					Speed command input		Selects the rotation speed and acceleration/deceleration time constant through RS-422/RS-485 communication. Set the S-pattern acceleration/deceleration time constants with [Pr. PC03].
					System		Signed absolute value command method/incremental value command method
		Program	Operational specifications				Program language (program with MR Configurator2) Program capacity: 480 steps (16 programs)
			Position command input (Note 1)	Absolute value command method			Set with program language. Setting range of feed length: -999999 to 999999 [$\times 10^{STM}$ μm], -99.9999 to 99.9999 [$\times 10^{STM}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -360.000 to 360.000 [degree]
				Incremental value command method			Set with program language. Setting range of feed length: -999999 to 999999 [$\times 10^{STM}$ μm], -99.9999 to 99.9999 [$\times 10^{STM}$ inch], -999999 to 999999 [pulse], Setting range of rotation angle: -999.999 to 999.999 [degree]
			Speed command input				Set servo motor speed, acceleration/deceleration time constants, and S-pattern acceleration/deceleration time constants with program language. S-pattern acceleration/deceleration time constants are also settable with [Pr. PC03].
			System				Signed absolute value command method/signed incremental value command method
			Analog override				Set with external analog input (0 V DC to ±10 V DC/0% to 200%)
			Torque limit				Set with parameter or external analog input (0 V DC to +10 V DC/maximum torque)

Item					Description
Positioning mode	Operation mode	Automatic operation mode	Point table	Each positioning operation	Point table No. input method/position data input method Operates each positioning based on position command and speed command.
				Automatic continuous positioning operation	Varying-speed operation (2 to 31 speeds)/automatic continuous positioning operation (2 to 31 points)/ automatic continuous operation to the point table selected at start/automatic continuous operation to point table No. 1.
			Program		Depends on settings of program language.
		Manual operation mode	Point table/program	JOG operation	Executes a contact input or an inching operation with the RS-422/RS-485 communication function based on speed command set with parameters.
				Manual pulse generator operation	Manual feeding is executed with a manual pulse generator. Command pulse multiplication: select from ×1, ×10, and ×100 with a parameter.
	Home position return mode	Point table/program	Dog type		Returns to home position upon Z-phase pulse after passing through the proximity dog. home position address settable/home position shift amount settable/home position return direction selectable Automatic retract on dog back to home position/automatic stroke retract function
			Count type		Returns to home position upon the encoder pulse count after touching the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Data set type		Returns to home position without dog. Sets any position as a home position using manual operation, etc./home position address settable
			Stopper type		Returns to home position upon hitting the stroke end. Home position return direction selectable/home position address settable
			Home position ignorance (servo-on position as home position)		Sets a home position where SON (Servo-on) signal turns on. Home position address settable
			Dog type rear end reference		Returns to home position based on the rear end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Count type front end reference		Returns to home position based on the front end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Dog cradle type		Returns to home position upon the first Z-phase pulse based on the front end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Dog type last Z-phase reference		Returns to home position upon the Z-phase pulse right before the proximity dog based on the front end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Dog type front end reference		Returns to home position to the front end of the dog based on the front end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Automatic retract on dog back to home position/automatic stroke retract function
			Dogless Z-phase reference		Returns to home position to the Z-phase pulse with respect to the first Z-phase pulse. Home position return direction selectable/home position shift amount settable/home position address settable
	Automatic positioning to home position function (Note 3)				High-speed automatic positioning to a defined home position
Other functions					Absolute position detection/backlash compensation/overtravel prevention with external limit switch (LSP/LSN)/software stroke limit/mark detection function/override

Note 1. STM is the ratio to the setting value of the position data. STM can be changed with [Pr. PT03 Feeding function selection].
2. Up to four points of DO are available; therefore, PT0 (Point table No. output 1) to PT4 (Point table No. output 5) cannot be outputted simultaneously.
3. The automatic positioning to home position function is not available with the program method.

1.3 Function list

POINT
●The symbols in the control mode column mean as follows. CP: Positioning mode (point table method) CL: Positioning mode (program method)

The following table lists the functions of this servo. For details of the functions, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_ A Servo Amplifier Instruction Manual".

Function		Description	Control mode CP	Control mode CL	Detailed explanation
Model adaptive control		This function achieves a high response and stable control following the ideal model. The two-degrees-of-freedom model adaptive control enables you to set a response to the command and response to the disturbance separately. Additionally, this function can be disabled. To disable this function, refer to section 7.4 of "MR-JE-A_ Servo Amplifier Instruction Manual".	○	○	
Positioning mode (point table method)		Set 1 to 31 point tables in advance, and select any point table to perform operation in accordance with the set values. To select point tables, use external input signals or communication function.	○		Chapter 4
Positioning mode (program method)		Set 1 to 16 programs in advance and select any program to perform operation in accordance with the programs. To select programs, use external input signals or communication function.		○	Chapter 5
Roll feed display function		Positions based on specified travel distance from a status display "0" of current/command positions at start.	○	○	Section 4.5
Mark detection	Current position latch function	When the mark detection signal turns on, the current position is latched. The latched data can be read with communication commands.	○	○	Section 6.6.2
	Interrupt positioning function	When MSD (Mark detection) turns on, this function converts the remaining distance to the travel distance set in [Pr. PT30] and [Pr. PT31] (Mark sensor stop travel distance).	○	○	Section 6.2.3
Home position return		Dog type/count type/data setting type/stopper type/home position ignorance/dog type rear end reference/count type front end reference/dog cradle type/dog type last Z-phase reference/dog type Z-phase reference/dogless Z-phase reference	○	○	Section 4.4 Section 5.4
High-resolution encoder		High-resolution encoder of 131072 pulses/rev is used as the encoder of the rotary servo motor compatible with the MELSERVO-JE series.	○	○	
Gain switching function		You can switch gains during rotation/stop, and can use input devices to switch gains during operation.	○	○	MR-JE-_A Section 7.2
Advanced vibration suppression control II		This function suppresses vibration at an arm end or residual vibration.	○	○	MR-JE-_A Section 7.1.5
Machine resonance suppression filter		This filter function (notch filter) decreases the gain of the specific frequency to suppress the resonance of the mechanical system.	○	○	MR-JE-_A Section 7.1.1
Shaft resonance suppression filter		When a load is mounted to the servo motor shaft, resonance by shaft torsion during driving may generate a mechanical vibration at high frequency. The shaft resonance suppression filter suppresses the vibration.	○	○	MR-JE-_A Section 7.1.3
Adaptive filter II		The servo amplifier detects mechanical resonance and sets filter characteristics automatically to suppress mechanical vibration.	○	○	MR-JE-_A Section 7.1.2
Low-pass filter		Suppresses high-frequency resonance which occurs as the servo system response is increased.	○	○	MR-JE-_A Section 7.1.4

Function	Description	Control mode CP	Control mode CL	Detailed explanation
Machine analyzer function	Analyzes the frequency characteristic of the mechanical system by simply connecting an MR Configurator2 installed personal computer and the servo amplifier. MR Configurator2 is necessary for this function.	○	○	
Robust filter	For roll feed axis, etc. of which a response level cannot be increased because of the large load to motor inertia ratio, this function improves a disturbance response.	○	○	[Pr. PE41]
Slight vibration suppression control	Suppresses vibration of ±1 pulse generated at a servo motor stop.	○	○	[Pr. PB24]
Electronic gear	Position commands can be multiplied by 1/864 to 33935.	○	○	[Pr. PA06] [Pr. PA07]
Auto tuning	Automatically adjusts the gain to optimum value if load applied to the servo motor shaft varies.	○	○	MR-JE-_A Section 6.3
Regenerative option	Use a regenerative option when the built-in regenerative resistor of the servo amplifier does not have sufficient regenerative capacity for a large regenerative power generated.	○	○	MR-JE-_A Section 11.2
Alarm history clear	Clears alarm histories.	○	○	[Pr. PC18]
Input signal selection (device settings)	ST1 (Forward rotation start), ST2 (Reverse rotation start), and SON (Servo-on) and other input device can be assigned to certain pins of the CN1 connector.	○	○	[Pr. PD04] [Pr. PD12] [Pr. PD14] [Pr. PD18] [Pr. PD20] [Pr. PD44] [Pr. PD46]
Output signal selection (device settings)	The output devices including MBR (Electromagnetic brake interlock) can be assigned to certain pins of the CN1 connector.	○	○	[Pr. PD24] [Pr. PD25] [Pr. PD28]
Output signal (DO) forced output	Turns on/off the output signals forcibly independently of the servo status. Use this function for checking output signal wiring, etc.	○	○	Section 3.1.8 MR-JE-_A Section 4.5.8
Command pulse selection	Supports only A-phase/B-phase pulse trains.	○	○	[Pr. PA13]
Torque limit	Limits the servo motor torque.	○	○	[Pr. PA11] [Pr. PA12]
Status display	Shows servo status on the 5-digit, 7-segment LED display	○	○	Section 3.1.2
External I/O signal display	Shows on/off statuses of external I/O signals on the display.	○	○	Section 3.1.7
Alarm code output	If an alarm has occurred, the corresponding alarm number is outputted in 3-bit code.	○	○	Chapter 8
Test operation mode	Jog operation/positioning operation/motor-less operation/DO forced output/program operation/single-step feed Note that MR Configurator2 is necessary for positioning operation, program operation, and single-step feed.	○	○	Section 3.1.8 Section 3.1.9 MR-JE-_A Section 4.5.8 Section 4.5.9
Analog monitor output	Outputs servo status with voltage in real time.	○	○	[Pr. PC14] [Pr. PC15]
MR Configurator2	Using a personal computer, you can perform the parameter setting, test operation, monitoring, and others.	○	○	MR-JE-_A Section 11.7
One-touch tuning	Adjusts gains just by pressing buttons on the servo amplifier or by clicking a button on MR Configurator2.	○	○	MR-JE-_A Section 6.2

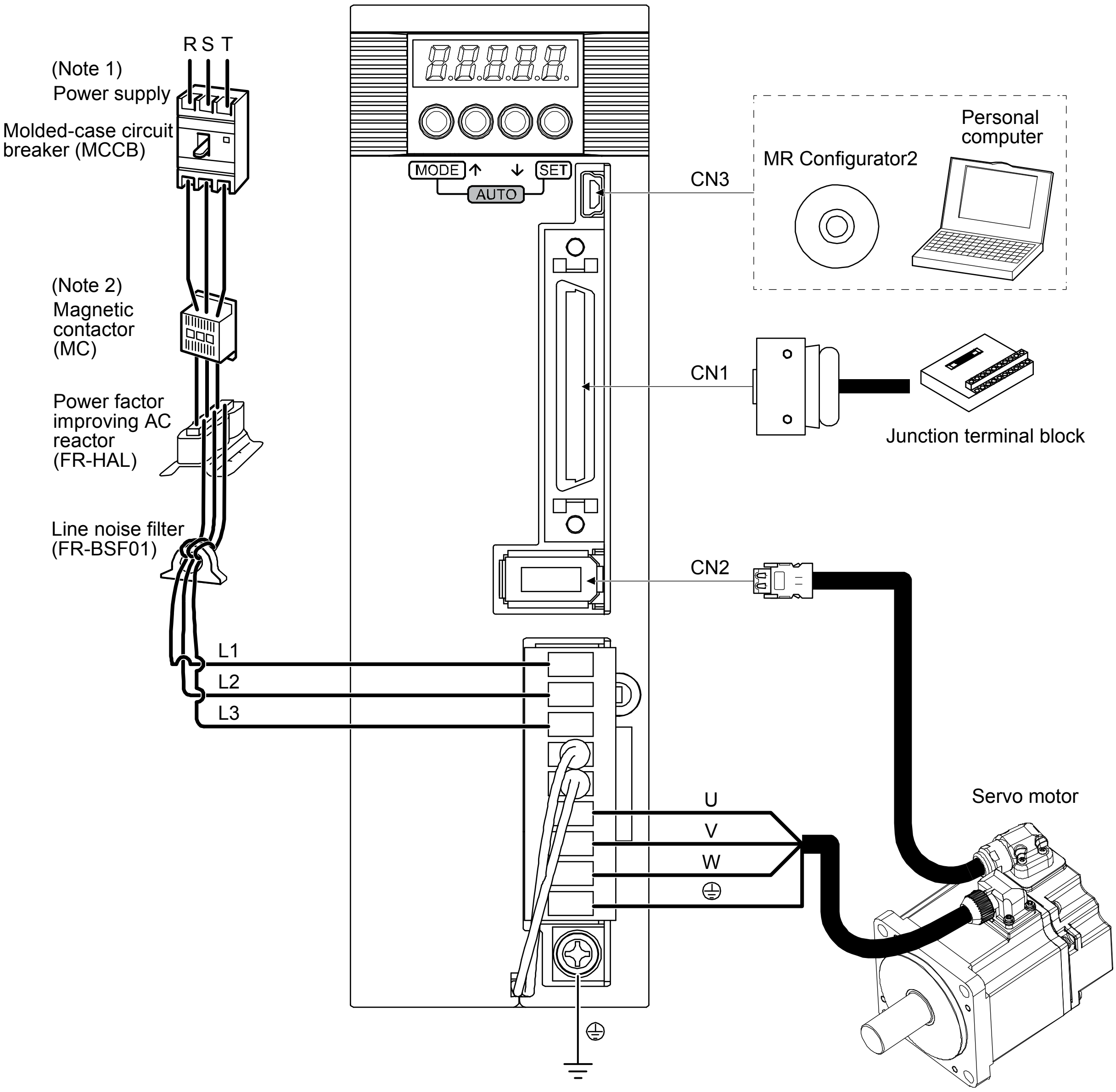
Function	Description	Control mode CP	Control mode CL	Detailed explanation
Tough drive function	This function makes the equipment continue operating even under the condition that an alarm occurs. The tough drive function includes two types: the vibration tough drive and the instantaneous power failure tough drive.	○	○	MR-JE-_A Section 7.3
Drive recorder function	This function continuously monitors the servo status and records the status transition before and after an alarm for a fixed period of time. You can check the recorded data on the drive recorder window on MR Configurator2 by clicking the "Graph" button. However, the drive recorder is not available when: 1. The graph function of MR Configurator2 is being used. 2. The machine analyzer function is being used. 3. [Pr. PF21] is set to "-1".	○	○	[Pr. PA23]
Servo amplifier life diagnosis function	You can check the cumulative energization time and the number of on/off times of the inrush relay. This function gives an indication of the replacement time for parts of the servo amplifier including a capacitor and a relay before they malfunction. MR Configurator2 is necessary for this function.	○	○	
Power monitoring function	This function calculates the power running energy and the regenerative power from the data in the servo amplifier such as speed and current. Power consumption and others are displayed on MR Configurator2.	○	○	
Machine diagnosis function	From the data in the servo amplifier, this function estimates the friction and vibrational component of the drive system in the equipment and recognizes an error in the machine parts, including a ball screw and bearing. MR Configurator2 is necessary for this function.	○	○	
Lost motion compensation function	This function improves the response delay occurred when the machine moving direction is reversed. This is used with servo amplifiers with software version C5 or later. Check the software version of the servo amplifier using MR Configurator2.	○	○	MR-JE-_A Section 7.5
Limit switch	Limits travel intervals using LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).	○	○	
S-pattern acceleration/deceleration	Enables smooth acceleration and deceleration. Set S-pattern acceleration/deceleration time constants with [Pr. PC03]. As compared with linear acceleration/deceleration, the acceleration/deceleration time will be longer for the S-pattern acceleration/deceleration time constants regardless of command speed.	○	○	[Pr. PC03] Section 5.2.2
Software limit	Limits travel intervals by address using parameters. Enables the same function with the limit switch by setting parameters.	○	○	Section 7.4
Analog override	Limits a servo motor speed with analog inputs. A value can be changed from 0% to 200% for a set speed.	○	○	Section 2.4
Teaching function	After an operation travels to a target position with a JOG operation or manual pulse generator operation, pushing the SET button of the operation part or turning on TCH (Teach) will import position data.	○		Section 3.1.10
Simple cam function	This function enables synchronous control by using software instead of controlling mechanically with cam. This function enables the encoder following function, mark sensor input compensation function, synchronous operation using positioning data, and synchronous interpolation operation.	○	○	Section 6.1
Modbus RTU communication function	The Modbus protocol uses dedicated message frames for the serial communication between a master and slaves. Using the functions in the message frames enables to read or write data from/to parameters, write input commands, and check operation status of servo amplifiers.	○	○	MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU Protocol)

1.4 Configuration including peripheral equipment

CAUTION	●Connecting a servo motor of the wrong axis to U, V, W, or CN2 of the servo amplifier may cause a malfunction.

POINT
●Equipment other than the servo amplifier and servo motor are optional or recommended products.

(1) MR-JE-100A or less
The diagram shows MR-JE-40A.

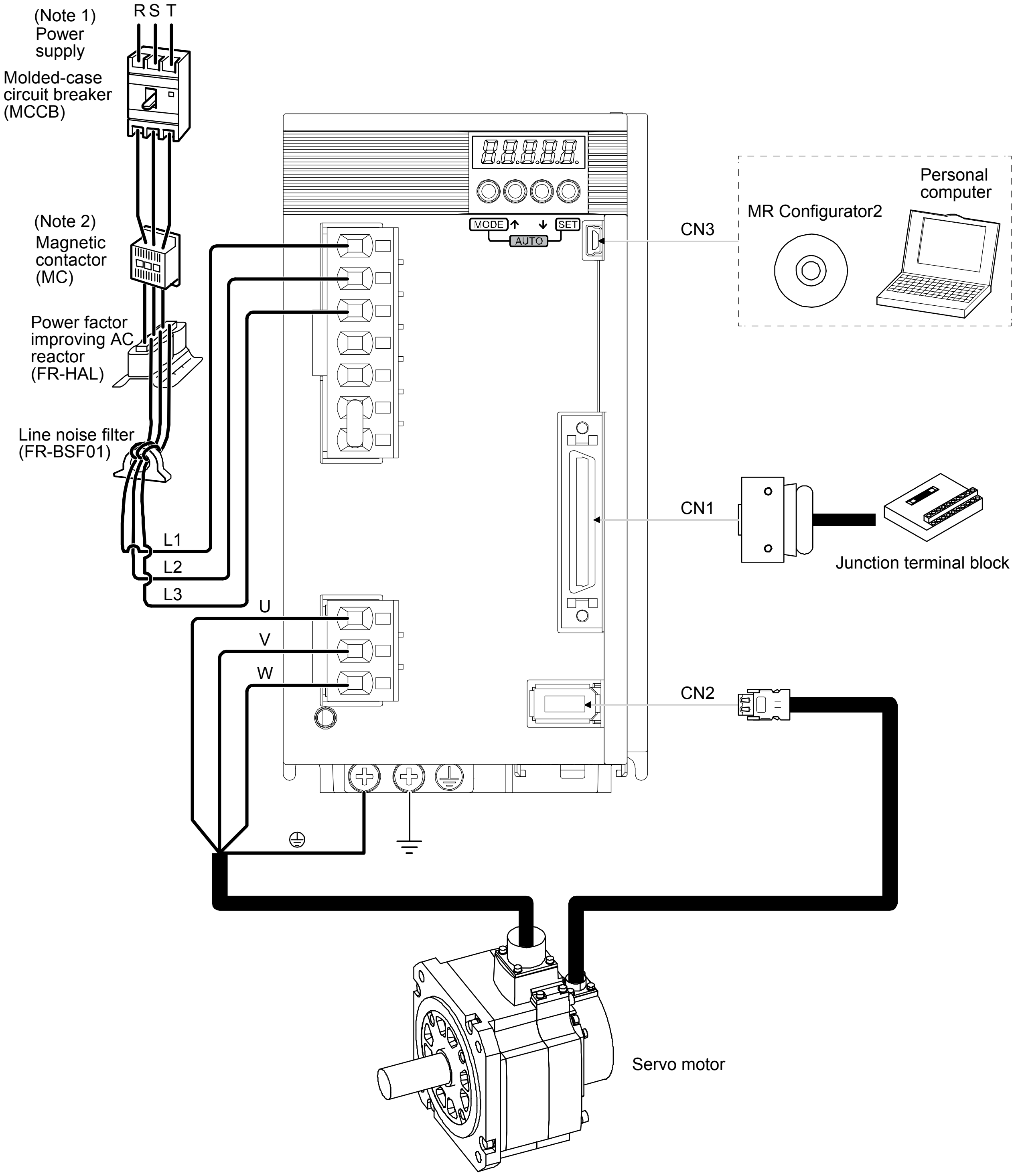


Note 1. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3. Leave L2 open. For power supply specifications, refer to section 1.3 of "MR-JE-_A Servo Amplifier Instruction Manual".

2. Depending on the power supply voltage and operation pattern, a bus voltage may drop, causing dynamic brake deceleration during forced stop deceleration. When dynamic brake deceleration is not required, delay the time to turn off the magnetic contactor.

(2) MR-JE-200A or more

The diagram shows MR-JE-200A.



Note 1. A 1-phase 200 V AC to 240 V AC power supply may be used with the servo amplifier of MR-JE-200A. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L2. Leave L3 open. For power supply specifications, refer to section 1.3 of "MR-JE-_A Servo Amplifier Instruction Manual".

2 Depending on the power supply voltage and operation pattern, a bus voltage may drop, causing dynamic brake deceleration during forced stop deceleration. When dynamic brake deceleration is not required, delay the time to turn off the magnetic contactor.

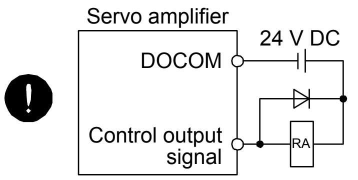
2. SIGNALS AND WIRING

⚠WARNING

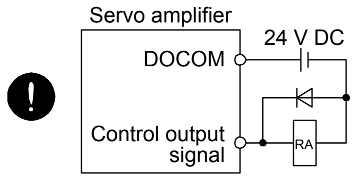
- A person who is involved in wiring should be fully competent to do the work.
- Before wiring, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.
- Ground the servo amplifier and servo motor securely.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, it may cause an electric shock.
- The cables should not be damaged, stressed, loaded, or pinched. Otherwise, it may cause an electric shock.
- To avoid an electric shock, insulate the connections of the power supply terminals.

⚠CAUTION

- Before removing the CNP1 connector from MR-JE-40A to MR-JE-100A, disconnect the lead wires of the regenerative resistor from the CNP1 connector.
- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly, resulting in injury.
- Connect cables to the correct terminals. Otherwise, a burst, damage, etc. may occur.
- Ensure that polarity (+/-) is correct. Otherwise, a burst, damage, etc. may occur.
- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.

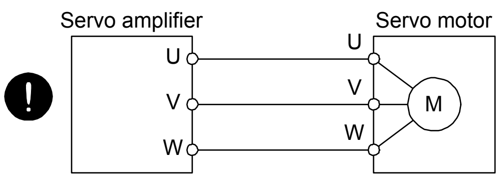


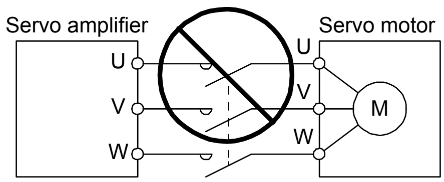
For sink output interface



For source output interface

- Use a noise filter, etc. to minimize the influence of electromagnetic interference. Electromagnetic interference may be given to the electronic equipment used near the servo amplifier.
- Do not install a power capacitor, surge killer or radio noise filter (optional FR-BIF) with the power line of the servo motor.
- When using a regenerative resistor, shut the power off with the alarm signal. Otherwise, a transistor fault or the like may overheat the regenerative resistor, causing a fire.
- Do not modify the equipment.
- Connect the servo amplifier power outputs (U/V/W) to the servo motor power inputs (U/V/W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.





⚠CAUTION	●Connecting a servo motor of the wrong axis to U, V, W, or CN2 of the servo amplifier may cause a malfunction. ●Before wiring, switch operation, etc., eliminate static electricity. Otherwise, it may cause a malfunction.

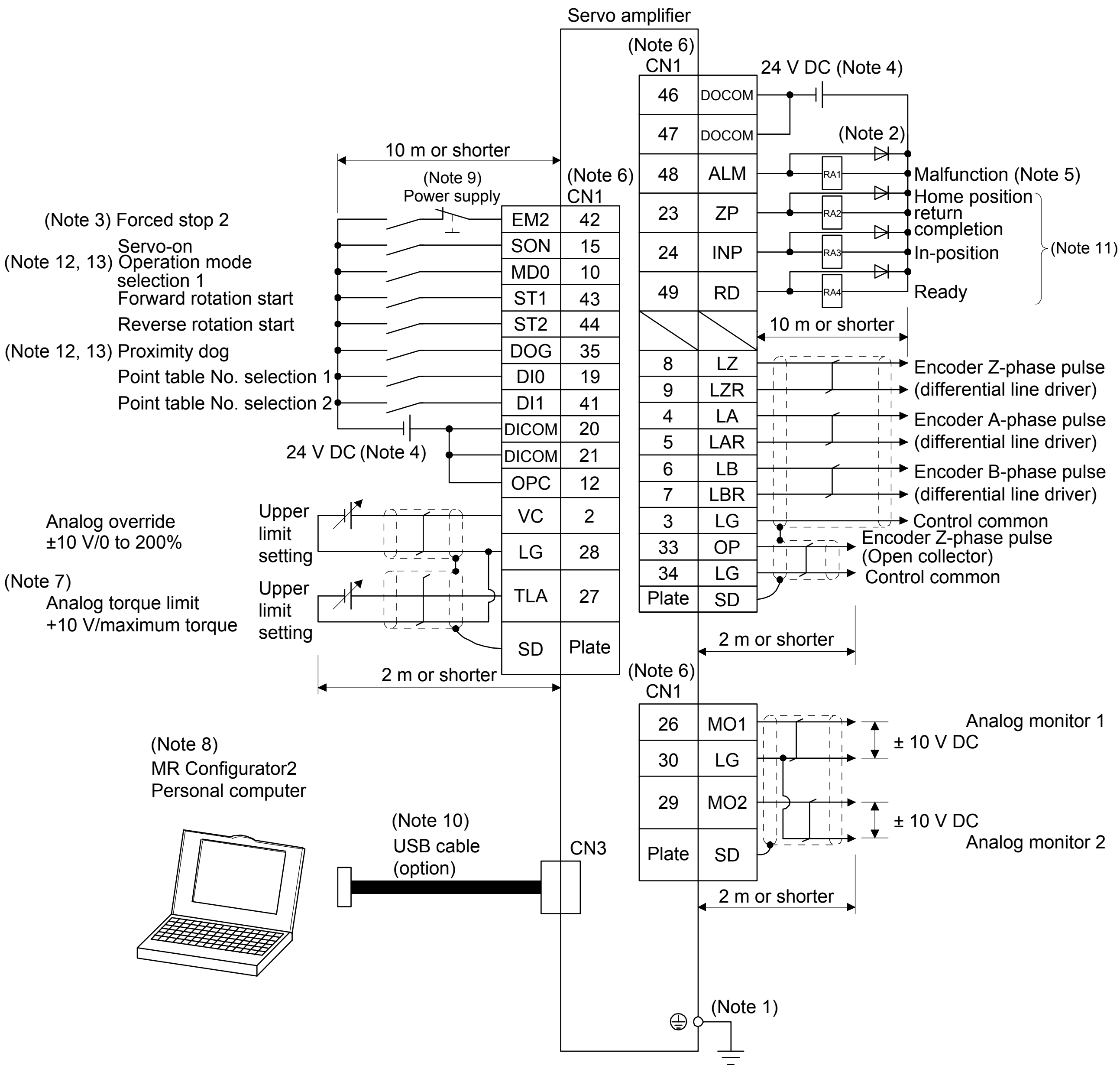
The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Input power supply circuit	MR-JE-_A section 3.1
Explanation of power supply system (except for section 2.6 Power-on sequence)	MR-JE-_A section 3.3
Detailed explanation of signals	MR-JE-_A section 3.6
Forced stop deceleration function	MR-JE-_A section 3.7
Alarm occurrence timing chart	MR-JE-_A section 3.8
Interface (except for section 2.5 Internal connection)	MR-JE-_A section 3.9
Servo motor with an electromagnetic brake	MR-JE-_A section 3.10
Grounding	MR-JE-_A section 3.11

2.1 I/O signal connection example

(1) Point table method

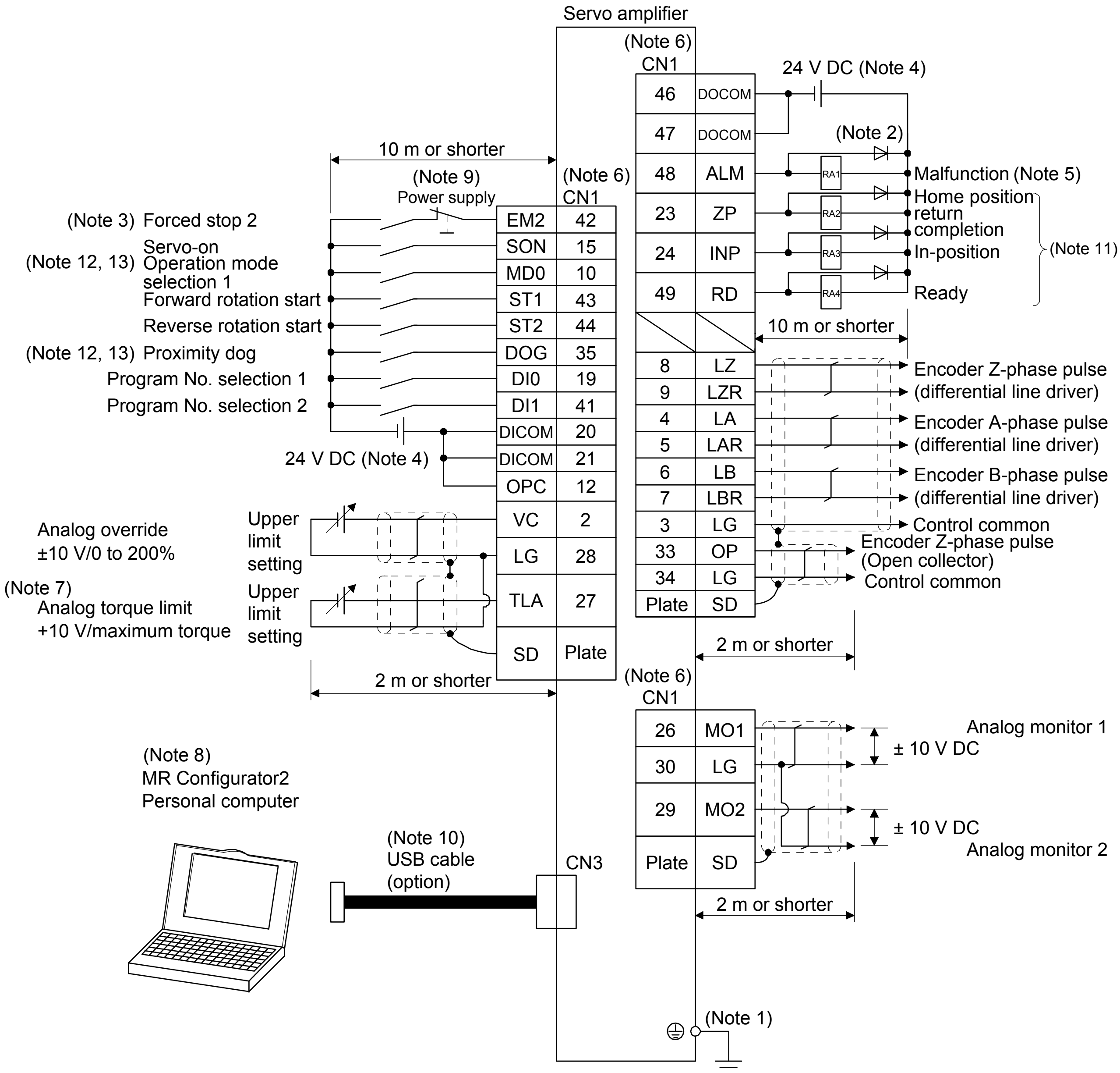
POINT
●Assign the following output device to CN1-23 pin with [Pr. PD24]. CN1-23: ZP (Home position return completion)



Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the cabinet.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced stop 2) and other protective circuits.
3. The forced stop switch (normally closed contact) must be installed.
4. Supply 24 V DC ± 10% to interfaces from outside. The total current capacity of these power supplies must be 300 mA or lower. 300 mA is the value applicable when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points. Refer to section 3.9.2 (1) of "MR-JE-_A Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. The illustration of the 24 V DC power supply is divided between input signal and output signal for convenience. However, they can be configured by one.
5. ALM (Malfunction) turns on in normal alarm-free condition (normally closed contact).
6. The pins with the same signal name are connected in the servo amplifier.
7. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD03], [Pr. PD11], [Pr. PD13], [Pr. PD17], and [Pr. PD19]. (Refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".)
8. Use SW1DNC MRC2-_. (Refer to section 11.4 of "MR-JE-_A Servo Amplifier Instruction Manual".)
9. To prevent an unexpected restart of the servo amplifier, configure a circuit to turn off EM2 when the power is turned off.
10. The USB communication function and RS-422/RS-485 communication function are mutually exclusive. They cannot be used together.
11. Recommended device assignments are shown. The device can be changed by [Pr. PD24] to [Pr. PD25], and [Pr. PD28].
12. MD0 and DOG are assigned to the CN1-10 and CN1-35 pins by default. When connecting a manual pulse generator, change them with [Pr. PD44] and [Pr. PD46]. Refer to section 9.1 for details of the manual pulse generator.
13. Supply + of 24 DC V to OPC (Power input for open-collector sink interface) when input devices are assigned to the CN1-10 pin and the CN-35 pin. They cannot be used with source input interface. For the positioning mode, input devices (MD0 and DOG) are assigned by default.

(2) Program method

POINT
●Assign the following output device to CN1-23 pin with [Pr. PD24]. CN1-23: ZP (Home position return completion)

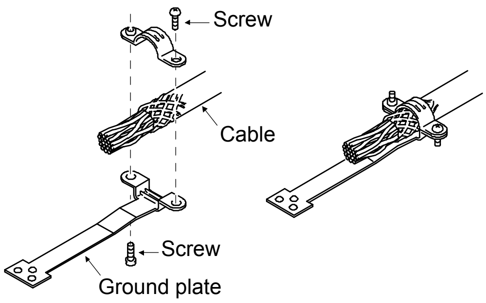


Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the cabinet.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced stop 2) and other protective circuits.
3. The forced stop switch (normally closed contact) must be installed.
4. Supply 24 V DC ± 10% to interfaces from outside. The total current capacity of these power supplies must be 300 mA or lower. 300 mA is the value applicable when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points. Refer to section 3.9.2 (1) of "MR-JE-_A Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. The illustration of the 24 V DC power supply is divided between input signal and output signal for convenience. However, they can be configured by one.
5. ALM (Malfunction) turns on in normal alarm-free condition (normally closed contact).
6. The pins with the same signal name are connected in the servo amplifier.
7. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD03], [Pr. PD11], [Pr. PD13], [Pr. PD17], and [Pr. PD19]. (Refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".)
8. Use SW1DNC MRC2-_. (Refer to section 11.4 of "MR-JE-_A Servo Amplifier Instruction Manual".)
9. To prevent an unexpected restart of the servo amplifier, configure a circuit to turn off EM2 when the power is turned off.
10. The USB communication function and RS-422/RS-485 communication function are mutually exclusive. They cannot be used together.
11. Recommended device assignments are shown. The device can be changed by [Pr. PD24] to [Pr. PD25], and [Pr. PD28].
12. MD0 and DOG are assigned to the CN1-10 and CN1-35 pins by default. When connecting a manual pulse generator, change them with [Pr. PD44] and [Pr. PD46]. Refer to section 9.1 for details of the manual pulse generator.
13. Supply + of 24 DC V to OPC (Power input for open-collector sink interface) when input devices are assigned to the CN1-10 pin and the CN-35 pin. They cannot be used with source input interface. For the positioning mode, input devices (MD0 and DOG) are assigned by default.

2.2 Connectors and pin assignment

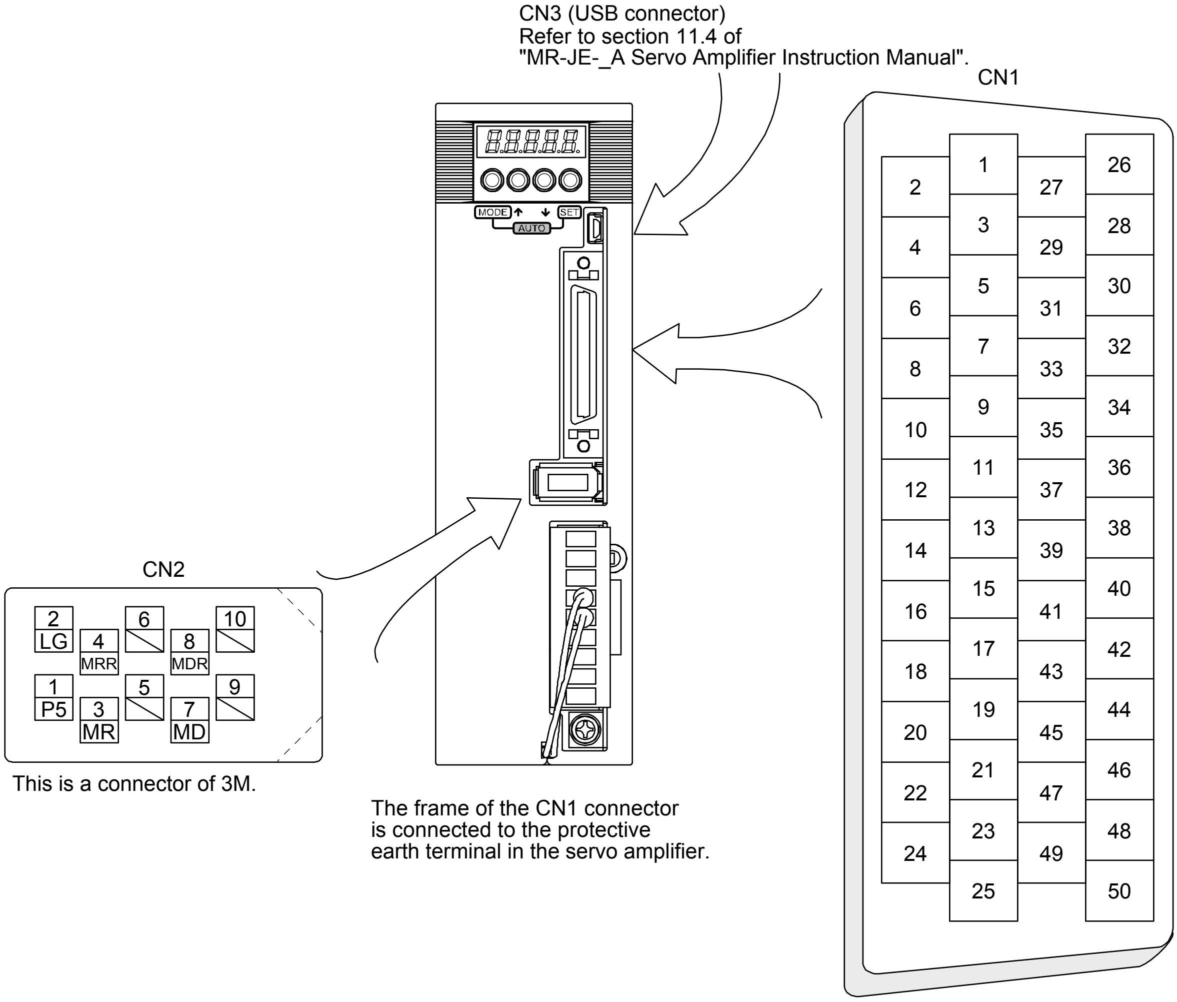
POINT

- The pin assignment of the connectors is as viewed from the cable connector wiring section.
- For the CN1 connector, securely connect the external conductor of the shielded cable to the ground plate and fix it to the connector shell.



- PP (CN1-10 pin) /NP (CN1-35 pin) and PP2 (CN1-37 pin) /NP2 (CN1-38 pin) are exclusive. They cannot be used together.

The following is the front view of MR-JE-40A or less. For external appearance, connector arrangements, and details of other servo amplifiers, refer to chapter 9 of "MR-JE-_A Servo Amplifier Instruction Manual".



The device assignment of the CN1 connector pins changes depending on the control mode. For the pins which are given parameters in the related parameter column, their devices can be changed using those parameters.

Pin No.	(Note 1) I/O	(Note 2) I/O signals in control modes		Related parameter
		CP	CL	
1				
2	I	VC	VC	
3		LG	LG	
4	O	LA	LA	
5	O	LAR	LAR	
6	O	LB	LB	
7	O	LBR	LBR	
8	O	LZ	LZ	
9	O	LZR	LZR	
10	I	(Note 4)	(Note 4)	PD44
11	I	PG	PG	
12		OPC	OPC	
13	O	SDP	SDP	
14	O	SDN	SDN	
15	I	SON	SON	PD03/PD04
16				
17				
18				
19	I	DI0	DI0	PD12
20		DICOM	DICOM	
21		DICOM	DICOM	
22				
23	O	(Note 7) ZP	(Note 7) ZP	PD24
24	O	INP	INP	PD25
25				
26	O	MO1	MO1	PD14
27	I	(Note 3) TLA	(Note 3) TLA	
28		LG	LG	
29	O	MO2	MO2	PC15
30		LG	LG	
31	I	TRE	TRE	
32				
33	O	OP	OP	
34		LG	LG	
35	I	(Note 4)	(Note 4)	PD46
36	I	NG	NG	
37 (Note 6)	I	(Note 5)	(Note 5)	PD44
38 (Note 6)	I	(Note 5)	(Note 5)	PD46
39	I	RDP	RDP	
40	I	RDN	RDN	
41	I	DI1	DI1	PD13/PD14
42	I	EM2	EM2	
43	I	LSP	LSP	PC17/PD18
44	I	LSN	LSN	PD19/PD20
45				
46		DOCOM	DOCOM	
47		DOCOM	DOCOM	
48	O	ALM	ALM	
49	O	RD	RD	PD28
50				

Note 1. I: input signal, O: output signal
2. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
3. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], and [Pr. PD44].
4. This is used with sink interface. Input devices are not assigned by default. Assign the input devices with [Pr. PD44] and [Pr. PD46] as necessary. In addition, supply + of 24 DC V to the CN1-12 pin of OPC (Power input for open-collector sink interface).
5. This is used with source interface. Input devices are not assigned by default. Assign the input devices with [Pr. PD44] and [Pr. PD46] as necessary.
6. These pins are available with servo amplifiers manufactured in May, 2015 or later.
7. Assign the following output device to CN1-23 pin with [Pr. PD24].
CN1-23: ZP (Home position return completion)

2.3 Signal (device) explanations

The connector pin No. column in the table lists the pin Nos. which devices are assigned to by default.
For the I/O interfaces (symbols in I/O division column in the table), refer to section 3.9.2 of "MR-JE-_A Servo Amplifier Instruction Manual". The symbols in the control mode field of the table show the followings.
CP: Positioning mode (point table method)
CL: Positioning mode (program method)
"○" and "△" of the table show the followings.
○: Usable device by default.
△: Usable device by setting the following parameters.
[Pr. PA04], [Pr. PD04], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD24], [Pr. PD25], [Pr. PD28], [Pr. PD44], [Pr. PD46]

(1) I/O device
(a) Input device

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Forced stop 2</td><td>EM2</td><td>CN1-42</td><td>Turn off EM2 (open between commons) to decelerate the servo motor to a stop with commands.
Turn EM2 on (short between commons) in the forced stop state to reset that state.
The following shows the setting of [Pr. PA04].
<table>
<tr><th rowspan="2">[Pr. PA04] setting</th><th rowspan="2">EM2/EM1</th><th colspan="2">Deceleration method</th></tr>
<tr><th>EM2 or EM1 is off</th><th>Alarm occurred</th></tr>
<tr><td>0 _ _ _</td><td>EM1</td><td>MBR (Electromagnetic brake interlock) turns off without the forced stop deceleration.</td><td>MBR (Electromagnetic brake interlock) turns off without the forced stop deceleration.</td></tr>
<tr><td>2 _ _ _</td><td>EM2</td><td>MBR (Electromagnetic brake interlock) turns off after the forced stop deceleration.</td><td>MBR (Electromagnetic brake interlock) turns off after the forced stop deceleration.</td></tr>
</table>
EM2 and EM1 are mutually exclusive.</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Forced stop 1</td><td>EM1</td><td>(CN1-42)</td><td>When using EM1, set [Pr. PA04] to "0 _ _ _" to enable EM1.
When EM1 is turned off (open between commons), the base circuit shuts off, and the dynamic brake operates to decelerate the servo motor to a stop.
The forced stop will be reset when EM1 is turned on (short between commons).</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Servo-on</td><td>SON</td><td>CN1-15</td><td>Turn SON on to power on the base circuit, and make the servo amplifier ready to operate. (servo-on status)
Turn it off to shut off the base circuit, and coast the servo motor.
Setting [Pr. PD01] to "_ _ _ 4" turns the signal on automatically (always connected) in the servo amplifier.</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Reset</td><td>RES</td><td>CN1-19</td><td>Turn on RES for more than 50 ms to reset the alarm.
Some alarms cannot be deactivated by RES (Reset). Refer to chapter 8.
Turning RES on in an alarm-free status shuts off the base circuit. The base circuit is not shut off when [Pr. PD30] is set to " _ _ 1 _ ".
This device is not designed to make a stop. Do not turn it on during operation.</td><td>DI-1</td><td>△</td><td>△</td></tr>
</table>

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Forward rotation stroke end</td><td>LSP</td><td>CN1-43</td><td rowspan="2">To start the operation, turn on LSP and LSN. Turn it off to bring the servo motor to a sudden stop and make it servo-locked.
Setting [Pr. PD30] to " _ _ _ 1" will enable "Slow stop (home position erased)".
<table>
<tr><th colspan="2">(Note) Input device</th><th colspan="2">Operation</th></tr>
<tr><th>LSP</th><th>LSN</th><th>CCW direction</th><th>CW direction</th></tr>
<tr><td>1</td><td>1</td><td>○</td><td>○</td></tr>
<tr><td>0</td><td>1</td><td></td><td>○</td></tr>
<tr><td>1</td><td>0</td><td>○</td><td></td></tr>
<tr><td>0</td><td>0</td><td></td><td></td></tr>
</table>
Note. 0: Off
1: On

The stop method can be changed with [Pr. PD30].
Setting [Pr. PD01] as follows turn the signals on automatically (always connected) in the servo amplifier.
<table>
<tr><th rowspan="2">[Pr. PD01]</th><th colspan="2">Status</th></tr>
<tr><th>LSP</th><th>LSN</th></tr>
<tr><td>_ 4 _ _</td><td>Automatic on</td><td></td></tr>
<tr><td>_ 8 _ _</td><td></td><td>Automatic on</td></tr>
<tr><td>_ C _ _</td><td>Automatic on</td><td>Automatic on</td></tr>
</table>
When LSP or LSN is turned off, [AL. 99 Stroke limit warning] occurs, and WNG (Warning) turns on. When using WNG, enable it by setting [Pr. PD24], [Pr. PD25] and [Pr. PD28].</td><td rowspan="2">DI-1</td><td rowspan="2">○</td><td rowspan="2">○</td></tr>
<tr><td>Reverse rotation stroke end</td><td>LSN</td><td>CN1-44</td></tr>
<tr><td>External torque limit selection</td><td>TL</td><td></td><td>Turning off TL will enable [Pr. PA11 Forward torque limit] and [Pr. PA12 Reverse torque limit], and turning on it will enable TLA (Analog torque limit). For details, refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Internal torque limit selection</td><td>TL1</td><td></td><td>To select [Pr. PC35 Internal torque limit 2], enable TL1 with [Pr. PD04], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD44], and [Pr. PD46]. For details, refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Operation mode selection 1</td><td>MD0</td><td>CN1-10</td><td rowspan="2">Point table method/program method
Automatic operation mode is set by turning MD0 on, and manual operation mode by turning it off. Changing the operation mode during operation will clear the command remaining distance, and the servo motor will decelerate to stop.
MD1 cannot be used.</td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Operation mode selection 2</td><td>MD1</td><td></td><td>DI-1</td><td></td><td></td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode CL
Forward rotation start	ST1	CN1-17	Point table method 1.Absolute value command method Turning on ST1 during automatic operation will execute one positioning based on the position data set in the point tables. Turning on ST1 during home position return will also start home position return. Turning on ST1 during JOG operation will rotate the servo motor in the forward rotation direction while it is on. The forward rotation means address increasing direction. Turning on both ST1 and ST2 during JOG operation will stop the servo motor. 2.Incremental value command method Turning on ST1 during automatic operation will execute one positioning in the forward rotation direction based on the position data set in point tables. Turning on ST1 during home position return will also start home position return. Turning on ST1 during JOG operation will rotate the servo motor in the forward rotation direction while it is on. The forward rotation means address increasing direction. Turning on both ST1 and ST2 during JOG operation will stop the servo motor.	DI-1	○	
			Program method 1.Automatic operation mode Turning on ST1 will execute a program operation selected with DI0 to DI3. The forward rotation means address increasing direction. Turning on both ST1 and ST2 during manual operation mode will stop the servo motor. 2.Manual operation mode Turning on ST1 will rotate the servo motor in the forward rotation direction while it is on. The forward rotation means address increasing direction. Turning on both ST1 and ST2 during manual operation mode will stop the servo motor.			○
Reverse rotation start	ST2	CN1-18	Point table method Use this device with the incremental value command method. Turning on ST2 during automatic operation will execute one positioning in the reverse rotation direction based on the position data set in point tables. Turning on ST2 during JOG operation will rotate the servo motor in the reverse rotation direction while it is on. Turning on both ST1 and ST2 will stop the servo motor. Turning on ST2 during in the home position return mode will execute an automatic positioning to the home position. The reverse rotation means address decreasing direction. Turning on both ST1 and ST2 during JOG operation will stop the servo motor.	DI-1	○	
			Program method Turning on ST2 with JOG operation in the manual operation mode will rotate the servo motor in the reverse rotation direction while it is on. Turning on both ST1 and ST2 will stop the servo motor. The reverse rotation means address decreasing direction. Turning on both ST1 and ST2 during manual operation mode will stop the servo motor. ST2 will be disabled in the automatic operation mode.			○

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Temporary stop/ restart</td><td>TSTP</td><td></td><td>Turning on TSTP during automatic operation will temporarily stop the servo motor.
Turning on TSTP again will restart.
Turning on ST1 (Forward rotation start)/ST2 (Reverse rotation start) during a temporary stop will not rotate the servo motor.
Changing the automatic operation mode to manual operation mode during a temporary stop will erase a travel remaining distance.
The temporary stop/restart input does not function during a home position return or JOG operation.</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Proximity dog</td><td>DOG</td><td>CN1-45</td><td>Turning off DOG will detect a proximity dog. The polarity for dog detection can be changed with [Pr. PT29].
<table><tr><th>[Pr. PT29]</th><th>Polarity for proximity dog detection</th></tr><tr><td>_ _ _ 0</td><td>Detection with off</td></tr><tr><td>_ _ _ 1</td><td>Detection with on</td></tr></table></td><td>DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Manual pulse generator multiplication 1</td><td>TP0</td><td></td><td rowspan="2">Select a multiplication of the manual pulse generator.
When a multiplication is not selected, the setting of [Pr. PT03] will be enabled.
<table><tr><th colspan="2">Device (Note)</th><th rowspan="2">Manual pulse generator multiplication</th></tr><tr><th>TP1</th><th>TP0</th></tr><tr><td>0</td><td>0</td><td>[Pr. PT03] setting</td></tr><tr><td>0</td><td>1</td><td>× 1</td></tr><tr><td>1</td><td>0</td><td>× 10</td></tr><tr><td>1</td><td>1</td><td>× 100</td></tr></table>Note. 0: Off
1: On</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Manual pulse generator multiplication 2</td><td>TP1</td><td></td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Analog override selection</td><td>OVR</td><td></td><td>Turning on OVR will enable VC (Analog override).</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Teach</td><td>TCH</td><td></td><td>Use this for teaching. Turning on TCH in the point table method will rewrite a position data of the selected point table No. to the current position.</td><td>DI-1</td><td>△</td><td></td></tr>
<tr><td>Program input 1</td><td>PI1</td><td></td><td>Turning on PI1 will restart a step which was suspended with the SYNC (1) command during programming.</td><td>DI-1</td><td></td><td>△</td></tr>
<tr><td>Program input 2</td><td>PI2</td><td></td><td>Turning on PI2 will restart a step which was suspended with the SYNC (2) command during programming.</td><td>DI-1</td><td></td><td>△</td></tr>
<tr><td>Program input 3</td><td>PI3</td><td></td><td>Turning on PI3 will restart a step which was suspended with the SYNC (3) command during programming.</td><td>DI-1</td><td></td><td>△</td></tr>
<tr><td>Current position latch input</td><td>LPS</td><td></td><td>Turning on LPS during execution of the LPOS command will latch a current position with its rising edge. The latched current position can be read with communication commands.</td><td>DI-1</td><td></td><td>△</td></tr>
</table>

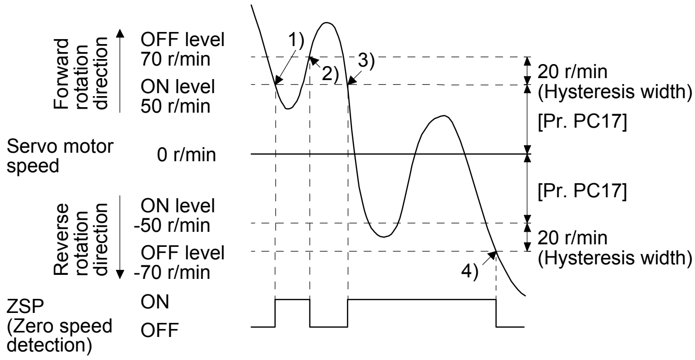
<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Point table No./ program No. selection 1</td><td>DI0</td><td>CN1-19</td><td rowspan="5">Point table method
Select point tables and home position return mode with DI0 to DI4.
<table>
<tr><th colspan="5">Device (Note 1)</th><th rowspan="2">Selection contents</th></tr>
<tr><th>DI4 (Note 2)</th><th>DI3</th><th>DI2</th><th>DI1</th><th>DI0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Home position return mode</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Point table No. 1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Point table No. 2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>Point table No. 3</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Point table No. 30</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Point table No. 31</td></tr>
</table>
Note 1. 0: Off
1: On
2. DI4 is available only with the communication function. This device cannot be assigned as an input signal.

Program method
Select program Nos. with DI0 to DI3.
<table>
<tr><th colspan="5">Device (Note)</th><th rowspan="2">Selection contents</th></tr>
<tr><th>DI4</th><th>DI3</th><th>DI2</th><th>DI1</th><th>DI0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Program No. 1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Program No. 2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Program No. 3</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>Program No. 4</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Program No. 15</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Program No. 16</td></tr>
</table>
Note. 0: Off
1: On</td><td rowspan="5">DI-1</td><td>○</td><td>○</td></tr>
<tr><td>Point table No./ program No. selection 2</td><td>DI1</td><td>CN1-41</td><td>○</td><td>○</td></tr>
<tr><td>Point table No./ program No. selection 3</td><td>DI2</td><td>CN1-10</td><td>○</td><td>○</td></tr>
<tr><td>Point table No./ program No. selection 4</td><td>DI3</td><td>CN1-35</td><td>○</td><td>○</td></tr>
<tr><td>Point table No. 5</td><td>DI4</td><td></td><td>△</td><td></td></tr>
<tr><td>Mark detection</td><td>MSD</td><td></td><td>The current position latch function by sensor input can be used. For the current position latch function, refer to section 6.2.1. For the current position latch function, refer to section 6.2.2.</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Proportional control</td><td>PC</td><td></td><td>Turn PC on to switch the speed amplifier from the proportional integral type to the proportional type.
If the servo motor at a stop is rotated even one pulse due to any external factor, it generates torque to compensate for a position shift. When the servo motor shaft is to be locked mechanically after positioning completion (stop), switching on the PC (Proportion control) upon positioning completion will suppress the unnecessary torque generated to compensate for a position shift.
When the shaft is to be locked for a long time, switch on the PC (Proportion control) and TL (External torque limit selection) at the same time to make the torque less than the rated by TLA (Analog torque limit).</td><td>DI-1</td><td>△</td><td>△</td></tr>
</table>

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Clear</td><td>CR</td><td></td><td>Turn CR on to clear the position control counter droop pulses on its leading edge. The pulse width should be 10 ms or longer.
The delay amount set in [Pr. PB03 Position command acceleration/deceleration time constant] is also cleared. When " _ _ _1 " is set to [Pr. PD32], the pulses are always cleared while CR is on.</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Gain switching</td><td>CDP</td><td></td><td>Turn on CDP to use the values of [Pr. PB29] to [Pr. PB36] and [Pr. PB56] to [Pr. PB60] as the load to motor inertia ratio and gain values.</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Cam control command</td><td>CAMC</td><td></td><td>When using CAMC, set [Pr. PT35] to ”_ 1 _ _” to enable it. Turning CAMC on switches the control from the normal positioning control to the cam control.</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Cam position compensation request</td><td>CPCD</td><td></td><td>Turning CPCD on compensates the cam axis one cycle current value to be in the position set in [Cam control data No. 60 - Cam position compensation target position].</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Clutch command</td><td>CLTC</td><td></td><td>This is used to turning on/off the main shaft clutch command.
This is used when [Cam control data No. 36 - Main shaft clutch control setting] is set to "_ _ _ 1".</td><td>DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Cam No. selection 0</td><td>CI0</td><td></td><td rowspan="4">Select cam No.
This is enabled when [Cam control data No. 49 - Cam No.] is set to "0".
Set the cam control data on the cam setting window of MR Configurator2.
<table>
<tr><th colspan="4">Device (Note 1)</th><th rowspan="2">Selection contents</th></tr>
<tr><th>CI3</th><th>CI2</th><th>CI1</th><th>CI0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>Linear cam</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>Cam No. 1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Cam No. 2</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Cam No. 3</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>Cam No. 8</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td rowspan="3">Setting prohibited (Note 2)</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
Note 1. 0: Off
1: On
2. [AL. F6.5 Cam No. external error] occurs.</td><td rowspan="4">DI-1</td><td>△</td><td>△</td></tr>
<tr><td>Cam No. selection 1</td><td>CI1</td><td></td><td>△</td><td>△</td></tr>
<tr><td>Cam No. selection 2</td><td>CI2</td><td></td><td>△</td><td>△</td></tr>
<tr><td>Cam No. selection 3</td><td>CI3</td><td></td><td>△</td><td>△</td></tr>
</table>

(b) Output device

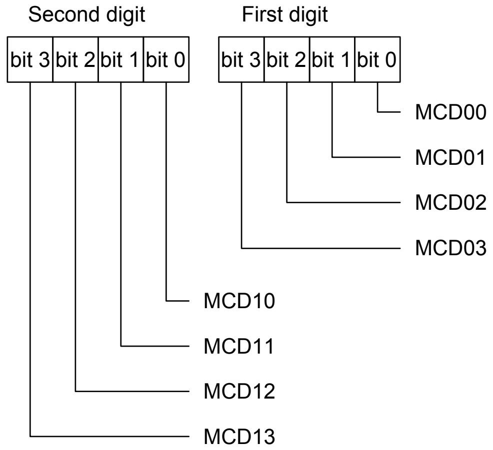
Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode CL
Malfunction	ALM	CN1-48	When an alarm occurs, ALM turns off. When an alarm is not occurring, turning on the power will turn on ALM after 4 s to 5 s. When [Pr. PD34] is set to "_ _ 1 _", an alarming or warning will turn off ALM.	DO-1	○	○
Alarm/warning	ALM WNG		When an alarm occurs, ALMWNG turns off. When a warning occurs (except for [AL. 9F Battery warning]), ALMWNG turns on and off repeatedly approximately every 1 s. When an alarm or a warning is not occurring, turning on the power will turn on ALMWNG after 4 s to 5 s.	DO-1	△	△
Warning	WNG		When a warning occurs, WNG turns on. When a warning is not occurring, WNG will turn off in 4 s to 5 s after power-on.	DO-1	△	△
Ready	RD	CN1-49	When the servo-on is on and the servo amplifier is ready to operate, RD turns on.	DO-1	○	○
In-position	INP	CN1-24	When the number of droop pulses is in the preset in-position range, INP turns on. The in-position range can be changed with [Pr. PA10]. When the in-position range is increased, INP may be always on during low-speed rotation. INP turns on with servo-on.	DO-1	○	○
Limiting torque	TLC		TLC turns on when a generated torque reaches a value set with any of [Pr. PA11 Forward torque limit], [Pr. PA12 Reverse torque limit], or TLA (Analog torque limit).	DO-1	△	△
Under cam control	CAMS		It turns on when the control switches to the cam control. It turns off when the control switches to the normal positioning control.	DO-1	△	△
Cam position compensation execution completed	CPCC		It turns on when the cam compensation execution is enabled. It turns on when the position compensation is not being executed during the cam control.	DO-1	△	△
Clutch on/off status	CLTS		It turns on with clutch-on. It is always off when [Cam control data No. 36 - Main shaft clutch control setting] is set to "_ _ _ 0".	DO-1	△	△
Clutch smoothing status	CLTSM		It outputs clutch smoothing status. The output depends on the setting in [Cam control data No. 42 - Main shaft clutch smoothing system] as follows: 0: Direct Always off 1: Time constant method (index) Always on in clutch-on status It turns off when the clutch is off and the smoothing is complete.	DO-1	△	△

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode	
					CP	CL
Zero speed detection	ZSP	CN1-23	ZSP turns on when the servo motor speed is at zero speed or less. Zero speed can be changed with [Pr. PC17].  ZSP turns on when the servo motor is decelerated to 50 r/min (at 1)), and turns off when the servo motor is accelerated to 70 r/min again (at 2)). ZSP turns on when the servo motor is decelerated again to 50 r/min (at 3)), and turns off when the servo motor speed has reached -70 r/min (at 4)). The range from the point when the servo motor speed has reached the on-level, and ZSP turns on, to the point when it is accelerated again and has reached the off-level is called hysteresis width. Hysteresis width is 20 r/min for this servo amplifier.	DO-1	○	○
Electromagnetic brake interlock	MBR		When using the device, set an operation delay time of the electromagnetic brake in [Pr. PC16]. When a servo-off status or alarm occurs, MBR turns off.	DO-1	△	△
Speed command reached	SA		SA turns on when the command speed reaches the target speed in servo-on status. SA is always on when the command speed is 0 r/min in servo-on status. SA turns off in servo-off status or when the command speed is in acceleration/deceleration.	DO-1	△	△
Home position return completion	ZP		When a home position return completes normally, ZP (Home position return completion) turns on. It turns off with the following conditions in the incremental system. 1) SON (Servo-on) is off. 2) EM2 (Forced stop 2) is off. 3) RES (Reset) is on. 4) At alarm occurrence 5) LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is off. 6) Home position return is not being executed. 7) Software limit is being detected. 8) Home position return is in progress.	DO-1	△	△
Rough match	CPO		When a command remaining distance is lower than the rough match output range set with [Pr. PT12], CPO turns on. This is not outputted during base circuit shut-off. CPO turns on with servo-on.	DO-1	△	△
Position range output	POT		When an actual current position is within the range set with [Pr. PT21] and [Pr. PT22], POT turns on. This will be off when a home position return is not completed or base circuit shut-off is in progress.	DO-1	△	△
During a temporary stop	PUS		When a deceleration begins for a stop, PUS turns on by TSTP (Temporary stop/restart). When TSTP (Temporary stop/restart) is enabled again and an operation is restarted, PUS turns off.	DO-1	△	△
Travel completion	MEND		When the droop pulses are within the in-position output range set with [Pr. PA10] and the command remaining distance is "0", MEND turns on. MEND turns on with servo-on. MEND is off at servo-off status.	DO-1	△	△

<table>
<tr><th rowspan="2">Device</th><th rowspan="2">Symbol</th><th rowspan="2">Connector pin No.</th><th rowspan="2">Function and application</th><th rowspan="2">I/O division</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>Position end</td><td>PED</td><td></td><td>When the droop pulses are within the position end output range set with [Pr. PA10] and the command remaining distance is "0", PED turns on.
When MEND (Travel completion) is on and ZP (Home position return completion) is on, PED (Position end) turns on.
When ZP (Home position return completion) is on with servo-on status, PED turns on.
PED is off at servo-off status.</td><td>DO-1</td><td>△</td><td>△</td></tr>
<tr><td>SYNC synchronous output</td><td>SOUT</td><td></td><td>When the status is waiting for input of the program SYNC (1 to 3), SOUT turns on. When PI1 (Program input 1) to PI3 (Program input 3) turn on, SOUT turns off.</td><td>DO-1</td><td></td><td>△</td></tr>
<tr><td>Program output 1</td><td>OUT1</td><td></td><td>OUT1 turns on with the OUTON (1) command during programming.
The OUTOF (1) command turns off OUT1.
You can also set time to turn off with [Pr. PT23].</td><td>DO-1</td><td></td><td>△</td></tr>
<tr><td>Program output 2</td><td>OUT2</td><td></td><td>OUT2 turns on with the OUTON (2) command during programming.
The OUTOF (2) command turns off OUT2.
You can also set time to turn off with [Pr. PT24].</td><td>DO-1</td><td></td><td>△</td></tr>
<tr><td>Program output 3</td><td>OUT3</td><td></td><td>OUT3 turns on with the OUTON (3) command during programming.
The OUTOF (3) command turns off OUT3.
You can also set time to turn off with [Pr. PT25].</td><td>DO-1</td><td></td><td>△</td></tr>
<tr><td>Point table No. output 1</td><td>PT0</td><td></td><td rowspan="5">The signals output point table Nos. in 5-bit code simultaneously with MEND (Travel completion) on.
<table>
<tr><th colspan="5">Device (Note 1, 2)</th><th rowspan="2">Description</th></tr>
<tr><th>PT4</th><th>PT3</th><th>PT2</th><th>PT1</th><th>PT0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Point table No. 1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Point table No. 2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>Point table No. 3</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Point table No. 30</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Point table No. 31</td></tr>
</table>Note 1. 0: Off
1: On
2. Up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.</td><td rowspan="5">DO-1</td><td>△</td><td></td></tr>
<tr><td>Point table No. output 2</td><td>PT1</td><td></td><td>△</td><td></td></tr>
<tr><td>Point table No. output 3</td><td>PT2</td><td></td><td>△</td><td></td></tr>
<tr><td>Point table No. output 4</td><td>PT3</td><td></td><td>△</td><td></td></tr>
<tr><td>Point table No. output 5</td><td>PT4</td><td></td><td>△</td><td></td></tr>
<tr><td>Mark detection rising latch completed</td><td>MSDH</td><td></td><td>Turning on MSD (Mark detection) will turn on MSDH.</td><td>DO-1</td><td>△</td><td>△</td></tr>
<tr><td>Mark detection falling latch completed</td><td>MSDL</td><td></td><td>After MSD (Mark detection) is turned on, turning off MSD will turn on MSDL.</td><td>DO-1</td><td>△</td><td>△</td></tr>
<tr><td rowspan="3">Alarm code</td><td>ACD0</td><td>(CN1-24)</td><td rowspan="3">To use these signals, set [Pr. PD34] to " _ _ _ 1".
This signal is outputted when an alarm occurs.
When an alarm is not occurring, respective ordinary signals are outputted.
For details of the alarm codes, refer to chapter 8.
When [Pr. PD34] is set to "_ _ _ 1" while MBR or ALM is assigned to CN1-23, CN1-24, or CN1-49 pin, [AL. 37 Parameter error] will occur.</td><td rowspan="3">DO-1</td><td rowspan="3">△</td><td rowspan="3">△</td></tr>
<tr><td>ACD1</td><td>(CN1-23)</td></tr>
<tr><td>ACD2</td><td>(CN1-49)</td></tr>
<tr><td>Variable gain selection</td><td>CDPS</td><td></td><td>CDPS turns on during gain switching.</td><td>DO-1</td><td>△</td><td>△</td></tr>
<tr><td>During tough drive</td><td>MTTR</td><td></td><td>When a tough drive is "Enabled" in [Pr. PA20], activating the instantaneous power failure tough drive will turn on MTTR.</td><td>DO-1</td><td>△</td><td>△</td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode CL
M code 1 (bit 0)	MCD00		This device can be used in the point table method. This device will be available in the future. These signals can be checked with output devices of the communication function. (Refer to section 10.2 (1).) To use these signals, set in [Pr. Po12] to " _ _ 1 _". The signals output M code simultaneously with CPO (Rough match) on. Set M code with point tables.	DO-1	○	
M code 2 (bit 1)	MCD01			DO-1	○	
M code 3 (bit 2)	MCD02			DO-1	○	
M code 4 (bit 3)	MCD03			DO-1	○	
M code 5 (bit 4)	MCD10			DO-1	○	
M code 6 (bit 5)	MCD11			DO-1	○	
M code 7 (bit 6)	MCD12			DO-1	○	
M code 8 (bit 7)	MCD13			DO-1	○	

The code represents one digit of decimal using four digits of binary.
The following shows correspondence of each digit and device.



M code	Device (Note)			
First/second digit	MCD03/ MCD13	MCD02/ MCD12	MCD01/ MCD11	MCD00/ MCD10
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Note. 0: Off
1: On

MCD00 to MCD03 and MCD10 to MCD13 turn off with the following status.
- Power on
- Servo-off
- Manual operation mode
- At alarm occurrence

(2) Input signal

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode CL
Manual pulse generator	PP NP	(CN1-10) (CN1-35)	Connect the manual pulse generator (MR-HDP01). When using the signal, enable PP and NP with [Pr. PD44] and [Pr. PD46].	DI-2	△	△
Analog torque limit	TLA	CN1-27	When using the signal, enable TL (External torque limit selection) with [Pr. PD04], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD44], and [Pr. PD46]. When TLA is enabled, torque is limited in the full servo motor output torque range. Apply 0 V to +10 V DC between TLA and LG. Connect + of the power supply to TLA. The maximum torque is generated at +10 V. (Refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".) If a value equal to or larger than the maximum torque is inputted to TLA, the value will be clamped at the maximum torque. Resolution: 10 bits	Analog input	△	△
Analog override	VC	CN1-2	The signal controls the servo motor setting speed by applying -10 V to +10 V to between VC and LG. The percentage will be 0% with -10 V, 100% with 0 V, and 200% with +10 V to the setting speed of the servo motor. Resolution: 14 bits or equivalent	Analog input	○	○

(3) Output signal

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode CL
Encoder A-phase pulse (differential line driver)	LA LAR	CN1-4 CN1-5	These devices output pulses of encoder output pulse set in [Pr. PA15] in the differential line driver type. In CCW rotation of the servo motor, the encoder B-phase pulse lags the encoder A-phase pulse by a phase angle of π/2. The relation between rotation direction and phase difference of the A-phase and B-phase pulses can be changed with [Pr. PC19].	DO-2	○	○
Encoder B-phase pulse (differential line driver)	LB LBR	CN1-6 CN1-7				
Encoder Z-phase pulse (differential line driver)	LZ LZR	CN1-8 CN1-9	The encoder zero-point signal is outputted in the differential line driver type. One pulse is outputted per servo motor revolution. This turns on when the zero-point position is reached. (negative logic) The minimum pulse width is about 400 μs. For home position return using this pulse, set the creep speed to 100 r/min or less.	DO-2	○	○
Encoder Z-phase pulse (open-collector)	OP	CN1-33	The encoder zero-point signal is outputted in the open-collector type.	DO-2	○	○
Analog monitor 1	MO1	CN6-3	This is used to output the data set in [Pr. PC14] to between MO1 and LG in terms of voltage. Output voltage: ±10 V Resolution: 10 bits or equivalent	Analog output	○	○
Analog monitor 2	MO2	CN6-2	This signal outputs the data set in [Pr. PC15] to between MO2 and LG in terms of voltage. Output voltage: ±10 V Resolution: 10 bits or equivalent	Analog output	○	○

(4) Communication

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode	
					CP	CL
RS-422/RS-485 I/F	SDP SDN RDP RDN TRE	CN3-5 CN3-4 CN3-3 CN3-6 CN1-31	These are terminals for RS-422/RS-485 communication.		○	○

2.4 Analog override

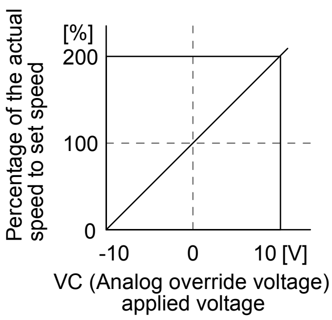
> POINT
>
> ●When using the analog override in the point table method or program method, enable OVR (Analog override selection).
>
> ●The following shows functions whether usable or not with the analog override.
>
> (1) Analog override usable
> - Automatic operation mode (point table method/program method)
> - JOG operation in the manual operation mode
> - Automatic positioning to home position function in the point table method
>
> (2) Analog override unusable
> - Manual pulse generator operation in the manual operation mode
> - Home position return mode
> - Test operation mode using MR Configurator2 (positioning operation/JOG operation)

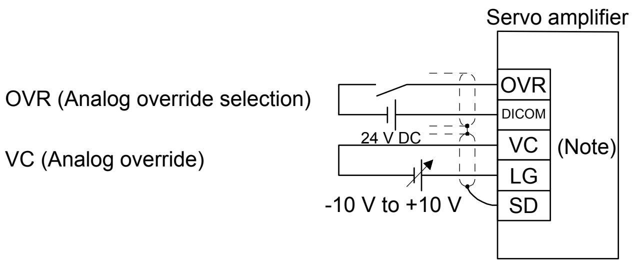
You can change the servo motor speed by using VC (Analog override). The following table shows signals and parameters related to the analog override.

Item	Name	Remark
Analog input signal	VC (Analog override)	
Contact input signal	OVR (Analog override selection)	Turning on OVR enables VC (Analog override) setting value.
Parameter	[Pr. PC37 Analog override offset]	-9999 to 9999 [mV]

(1) VC (Analog override)

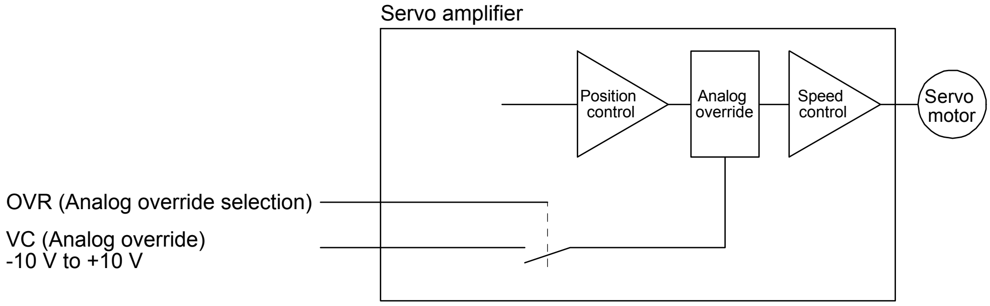
You can continuously set changed values from outside by applying voltage (-10 to +10 V) to VC (Analog override). The following shows percentage of the actual speed to input voltage and set speed.





Note. This diagram shows sink input interface.

(2) OVR (Analog override selection)
Enable or disable VC (Analog override).



Select a changed value by using OVR (Analog override selection).

(Note) External input signal	Speed change value
0	No change
1	Setting of VC (Analog override) is enabled.

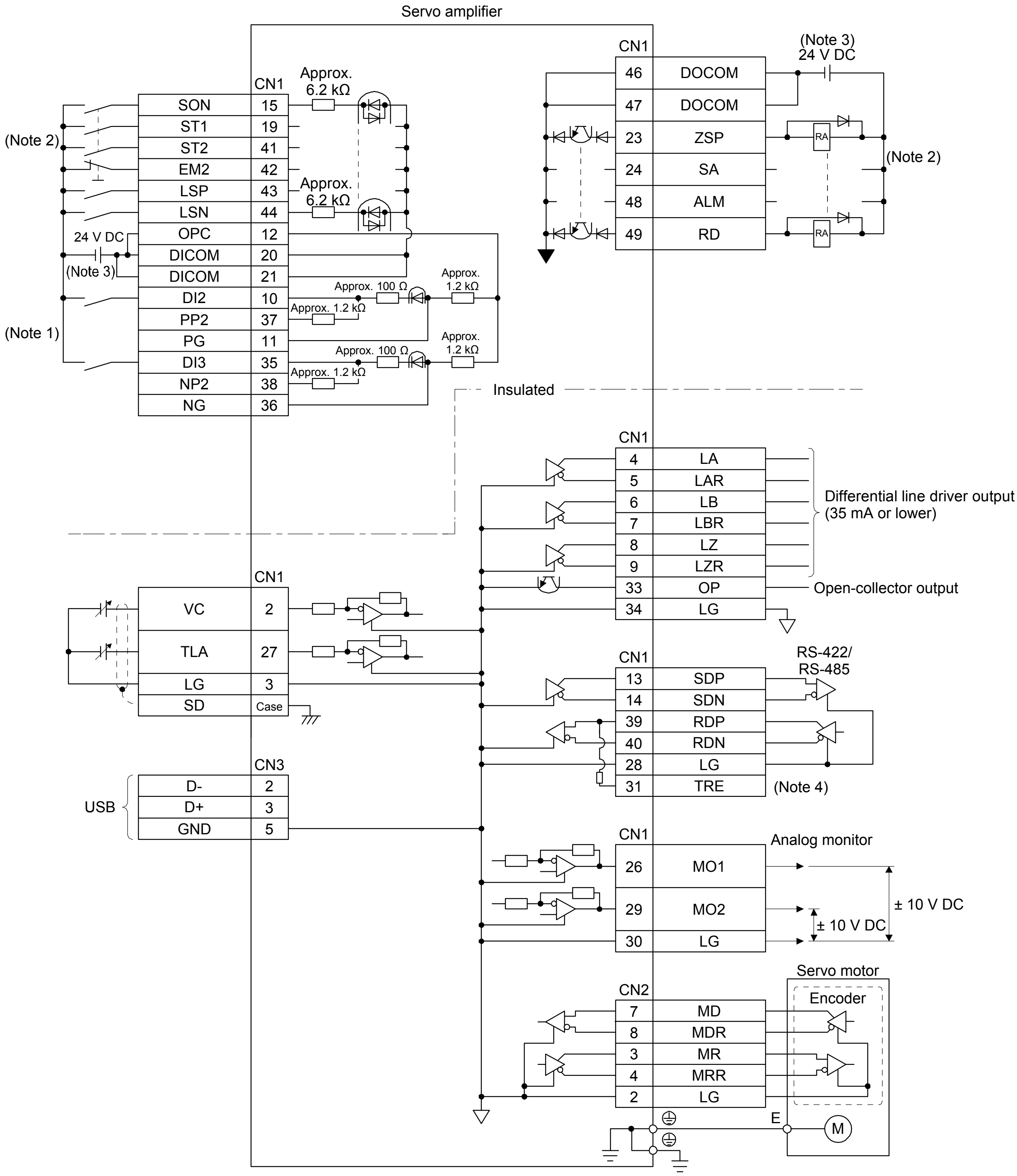
Note. 0: Off
1: On

(3) Analog override offset ([Pr. PC37])
You can set an offset voltage to the input voltage of VC (Analog override) with [Pr. PC37]. The setting value ranges from -9999 to +9999 [mV].

2.5 Internal connection diagram

POINT
●For details of interface and source I/O interface, refer to section 3.9 of "MR-JE-_A Servo Amplifier Instruction Manual".

The following shows an example of internal connection diagram of the point table method.



Note 1. Refer to section 9.1 for the connection of a manual pulse generator.

2. This diagram shows sink I/O interface. For source I/O interface, refer to section 3.9.3 of "MR-JE-_A Servo Amplifier Instruction Manual".

3. The illustration of the 24 V DC power supply is divided between input signal and output signal for convenience. However, they can be configured by one.

4. To use the RS-422/RS-485 communication function, connect between TRE and RDN of the final axis servo amplifier. (Refer to section 12.1.1 of "MR-JE-_A Servo Amplifier Instruction Manual").

2.6 Power-on sequence

POINT
●The voltage of analog monitor output, output signal, etc. may be unstable at power-on.

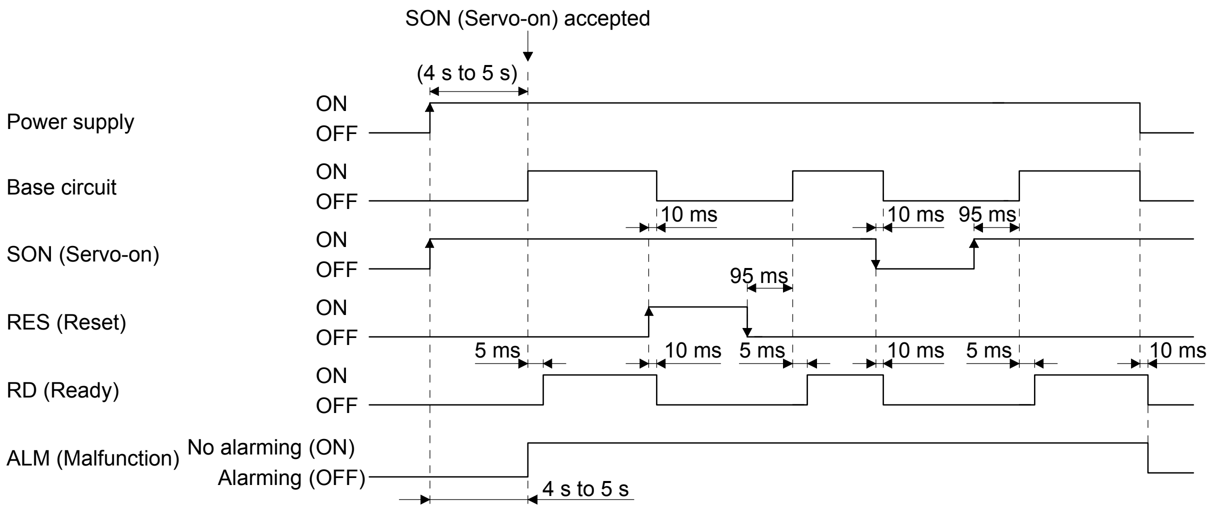
(1) Power-on procedure

1) Always use a magnetic contactor for the power supply wiring (L1/L2/L3) as shown in section 3.1 of "MR-JE-_A Servo Amplifier Instruction Manual". Configure an external sequence to switch off the magnetic contactor as soon as an alarm occurs.

2) The servo amplifier receives the SON (Servo-on) in 4 s to 5 s after the power supply is switched on. Therefore, when SON (Servo-on) is switched on simultaneously with the power supply, the base circuit will switch on in about 4 s to 5 s, and the RD (Ready) will switch on in further about 5 ms, making the servo amplifier ready to operate. (Refer to (2) in this section.)

3) When RES (Reset) is switched on, the base circuit is shut off and the servo motor shaft coasts.

(2) Timing chart



MEMO

3. DISPLAY AND OPERATION SECTIONS

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Test operation mode	MR-JE-_A section 4.5.9

3.1 MR-JE-_A

3.1.1 Display flowchart

Press the "MODE" button once to shift to the next display mode. Refer to section 3.1.2 and later for the description of the corresponding display mode.

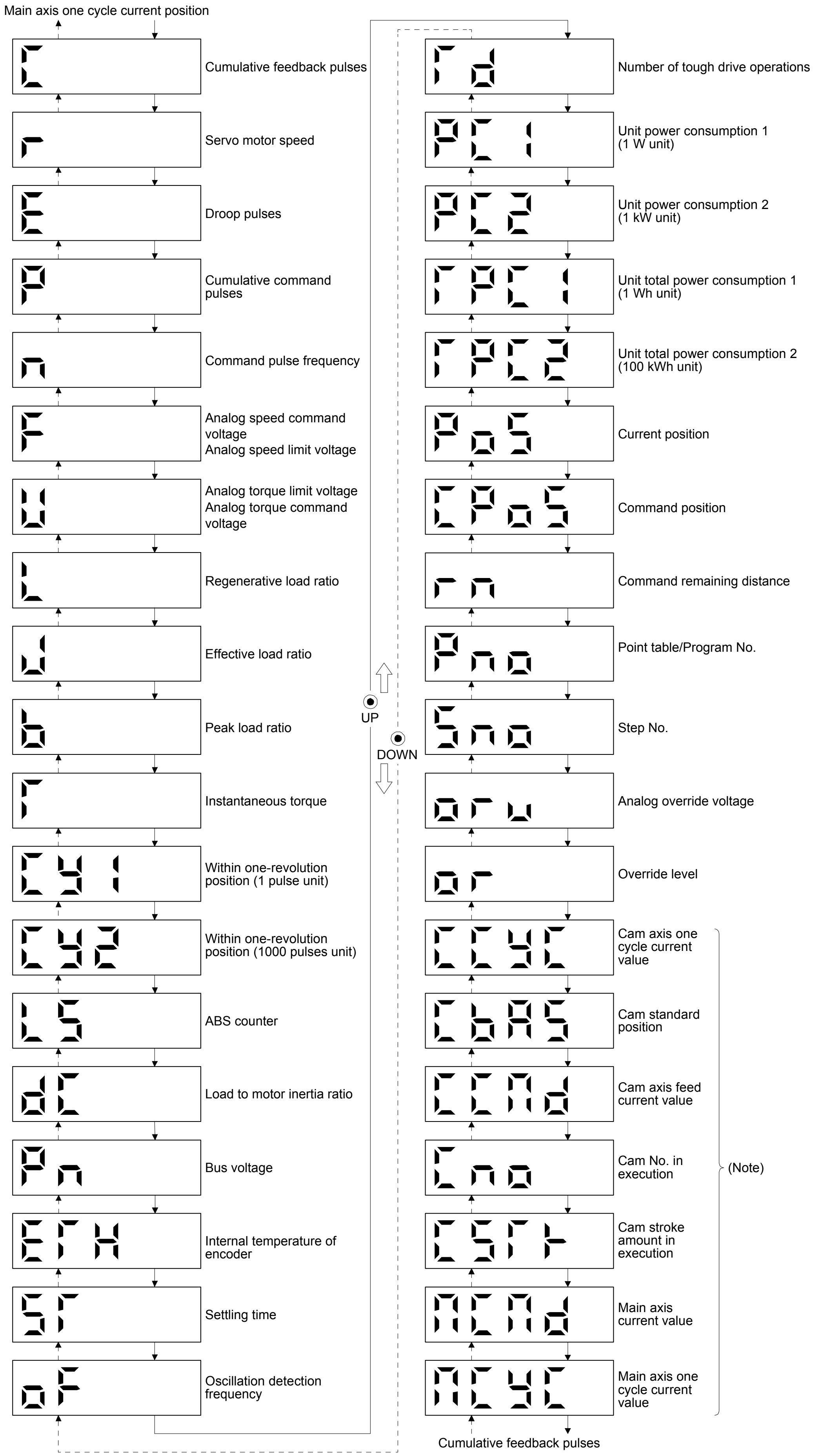
Display mode transition	Initial display	Function	Reference
Status display	PoS	Servo status display. For the point table method and program method, "PoS" is displayed at power-on.	Section 3.1.2
One-touch tuning	Auto	One-touch tuning Select this when performing the one-touch tuning.	MR-JE-_A Servo Amplifier Instruction Manual section 6.2
Diagnosis	rd-oF	Sequence display, drive recorder enabled/disabled display, external I/O signal display, output signal (DO) forced output, test operation, software version display, VC automatic offset, servo motor series ID display, servo motor type ID display, servo motor encoder ID display, teaching function	Section 3.1.3
Alarm	AL---.	Current alarm display, alarm history display, and parameter error No./point table error No. display	Section 3.1.4
Point table setting	Po001	Display and setting of point table data. This is displayed only in the point table method, not in other control modes.	Section 3.1.5
Basic setting parameters (◉ button MODE)	P A01	Display and setting of basic setting parameters.	Section 3.1.6
Gain/filter parameters	P b01	Display and setting of gain/filter parameters.	
Extension setting parameters	P C01	Display and setting of extension setting parameters.	
I/O setting parameters	P d01	Display and setting of I/O setting parameters.	
Extension setting 2 parameters	P E01	Display and setting of extension setting 2 parameters.	
Extension setting 3 parameters	P F01	Display and setting of extension setting 3 parameters.	
Positioning control parameters	P r01	Display and setting of positioning control parameters.	

Note. When the axis name is set to the servo amplifier using MR Configurator2, the servo status is displayed after the axis name is displayed.

3.1.2 Status display mode

The servo status during operation is shown on the 5-digit, 7-segment LED display. Press the "UP" or "DOWN" button to change the display data as desired. When a servo status is selected, the corresponding symbol is displayed. Press the "SET" button to display its data. However, only when the power is turned on, the data will be displayed after the status symbol selected with [Pr. PC36] is displayed for 2 s.

(1) Display transition
After selecting the status display mode with the "MODE" button, pressing the "UP" or "DOWN" button changes the display as follows:


Main axis one cycle current position
Cumulative feedback pulses
Servo motor speed
Droop pulses
Cumulative command pulses
Command pulse frequency
Analog speed command voltage
Analog speed limit voltage
Analog torque limit voltage
Analog torque command voltage
Regenerative load ratio
Effective load ratio
Peak load ratio
Instantaneous torque
Within one-revolution position (1 pulse unit)
Within one-revolution position (1000 pulses unit)
ABS counter
Load to motor inertia ratio
Bus voltage
Internal temperature of encoder
Settling time
Oscillation detection frequency
UP
DOWN
Number of tough drive operations
Unit power consumption 1 (1 W unit)
Unit power consumption 2 (1 kW unit)
Unit total power consumption 1 (1 Wh unit)
Unit total power consumption 2 (100 kWh unit)
Current position
Command position
Command remaining distance
Point table/Program No.
Step No.
Analog override voltage
Override level
Cam axis one cycle current value
Cam standard position
Cam axis feed current value
Cam No. in execution
Cam stroke amount in execution
Main axis current value
Main axis one cycle current value
(Note)
Cumulative feedback pulses

(2) Status display list
The following table lists the servo statuses that may be shown.

Status display	Symbol	Unit	Description	Control mode (Note 1) CP	Control mode (Note 1) CL
Cumulative feedback pulses	C	pulse	Feedback pulses from the servo motor encoder are counted and displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. Press the "SET" button to reset the display value to "0". The decimal points in the upper four digits are lit for negative value.	○	○
Servo motor speed	r	r/min	The servo motor speed is displayed. It is displayed rounding off 0.1 r/min unit.	○	○
Droop pulses	E	pulse	The number of droop pulses in the deviation counter are displayed. The decimal points in the upper four digits are lit for reverse rotation pulses. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. The number of pulses displayed is in the encoder pulse unit.	○	○
Cumulative command pulses	P	pulse	Not used with the positioning mode. "0" is always displayed.		
Command pulse frequency	n	kpulse/s	Not used with the positioning mode. "0" is always displayed.		
Analog speed command voltage Analog speed limit voltage	F	V	Not used with the positioning mode. An applied voltage to the CN1 connector is displayed.		
Analog torque command voltage	U	V	Not used with the positioning mode. An applied voltage to the CN1 connector is displayed.		
Analog torque limit voltage			Voltage of TLA (Analog torque limit) is displayed.	○	○
Regenerative load ratio	L	%	The ratio of regenerative power to permissible regenerative power is displayed in %.	○	○
Effective load ratio	J	%	The continuous effective load current is displayed. The effective value in the past 15 s is displayed, with the rated current being 100 %.	○	○
Peak load ratio	b	%	The maximum torque generated is displayed. The highest value in the past 15 s is displayed, with the rated torque being 100 %.	○	○
Instantaneous torque	T	%	The instantaneous torque is displayed. The torque generated is displayed in real time, with the rated torque being 100%.	○	○
Within one-revolution position (1 pulse unit)	Cy1	pulse	Position within one revolution is displayed in encoder pulses. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the servo motor rotates in the CCW direction, the value is added.	○	○
Within one-revolution position (1000 pulse unit)	Cy2	1000 pulses	The within one-revolution position is displayed in 1000 pulse increments of the encoder. When the servo motor rotates in the CCW direction, the value is added.	○	○
ABS counter	LS	rev	Travel distance from power on is displayed by counter value.	○	○
Load to motor inertia ratio	dC	Multiplier	The estimated ratio of the load inertia moment to the servo motor shaft inertia moment is displayed.	○	○
Bus voltage	Pn	V	The voltage of main circuit converter (between P+ and N-) is displayed.	○	○
Encoder inside temperature	ETh	°C	Inside temperature of encoder detected by the encoder is displayed.	○	○
Settling time	ST	ms	Settling time is displayed. When it exceeds 1000 ms, "1000" will be displayed.	○	○
Oscillation detection frequency	oF	Hz	Frequency at the time of oscillation detection is displayed.	○	○
Number of tough drive operations	Td	times	The number of tough drive functions activated is displayed.	○	○

Status display	Symbol	Unit	Description	Control mode (Note 1) CP	Control mode (Note 1) CL
Unit power consumption 1 (1 W unit)	PC1	W	Unit power consumption is displayed by increment of 1 W. Positive value indicates power running, and negative value indicates regeneration. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits.	○	○
Unit power consumption 2 (1 kW unit)	PC2	kW	Unit power consumption is displayed by increment of 1 kW. Positive value indicates power running, and negative value indicates regeneration.	○	○
Unit total power consumption 1 (1 Wh unit)	TPC1	Wh	Unit total power consumption is displayed by increment of 1 Wh. Positive value is cumulated during power running and negative value during regeneration. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits.	○	○
Unit total power consumption 2 (100 kWh unit)	TPC2	100 kWh	Unit total power consumption is displayed by increment of 100 kWh. Positive value is cumulated during power running and negative value during regeneration.	○	○
Current position	PoS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	When "_ _ 0 _" (positioning display) is set in [Pr. PT26], the current position is displayed as machine home position is 0. When "_ _ 1 _" (roll feed display) is set in [Pr. PT26], the actual current position is displayed as start position is 0. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits.	○	○
Command position	CPoS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	When "_ _ 0 _" (positioning display) is set in [Pr. PT26], the command current position is displayed as machine home position is 0. When "_ _ 1 _" (roll feed display) is set in [Pr. PT26], turning on the start signal starts counting from 0 and a command current position to the target position is displayed in the automatic mode. The command positions of the selected point table are displayed at a stop. At the manual mode, the command positions of the selected point table are displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits.	○	○
Command remaining distance	rn	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	The remaining distance to the command position of the currently selected point table/program is displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits.	○	○
Point table No./Program No.	Pno		The point table No./program No. currently being executed is displayed. The selected number is displayed during a temporary stop or manual operation.	○	○
Step No.	Sno		The step No. of the program currently being executed is displayed. At a stop, 0 is displayed.		○
Analog override voltage	oru	V	The analog override voltage is displayed.	○	○
Override level	or	%	The setting value of the override is displayed. When the override is disabled, 100% is displayed.	○	○
Cam axis one cycle current value	CCyC	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 3)	The current position in one cycle of CAM axis is displayed with the range of "0 to (cam axis one cycle length - 1)", the cam axis one cycle current value which is calculated from the travel distance inputted to the cam axis. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○
Cam standard position	CbAS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	A feed current value which is the standard position of the cam operation is displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○

Status display	Symbol	Unit	Description	Control mode (Note 1) CP	Control mode (Note 1) CL
Cam axis feed current value	CCMd	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	A feed current value during the cam axis control is displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○
Cam No. in execution	Cno		Cam No. in execution is displayed. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○
Cam stroke amount in execution	CSTK	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	Cam stroke amount in execution is displayed. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○
Main axis current value	MCMd	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 3)	A current value of the input axis (synchronous encoder axis or servo input axis) is displayed. Unit is increment of input axis position. The values in excess of ±99999 can be counted. However, the counter shows only the lower five digits of the actual value since the servo amplifier display is five digits. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○
Main axis one cycle current value	MCyC	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 3)	The input travel distance of the input axis in a range between 0 and (cam axis one cycle length setting - 1) is displayed. Unit is an increment of cam axis one cycle. When the simple cam function is disabled, 0 is always displayed. Refer to section 6.1.8 for detecting point.	○	○

Note 1. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
2. The unit can be selected from μm/inch/degree/pulse with [Pr. PT01].
3. Depending on the setting of [Cam control data No. 30 Main shaft input axis selection], the parameters used to set the unit and feed length multiplication will change as follows. For details of each parameter, refer to section 6.1.7 (3) and 7.2.7.

Setting of [Cam control data No. 30]	Parameter for the unit setting	Parameter for the feed length multiplication setting
"0" or "1"	[Pr. PT01]	[Pr. PT03]
"2"	[Cam control data No. 14]	[Cam control data No. 14]

(3) Changing the status display screen

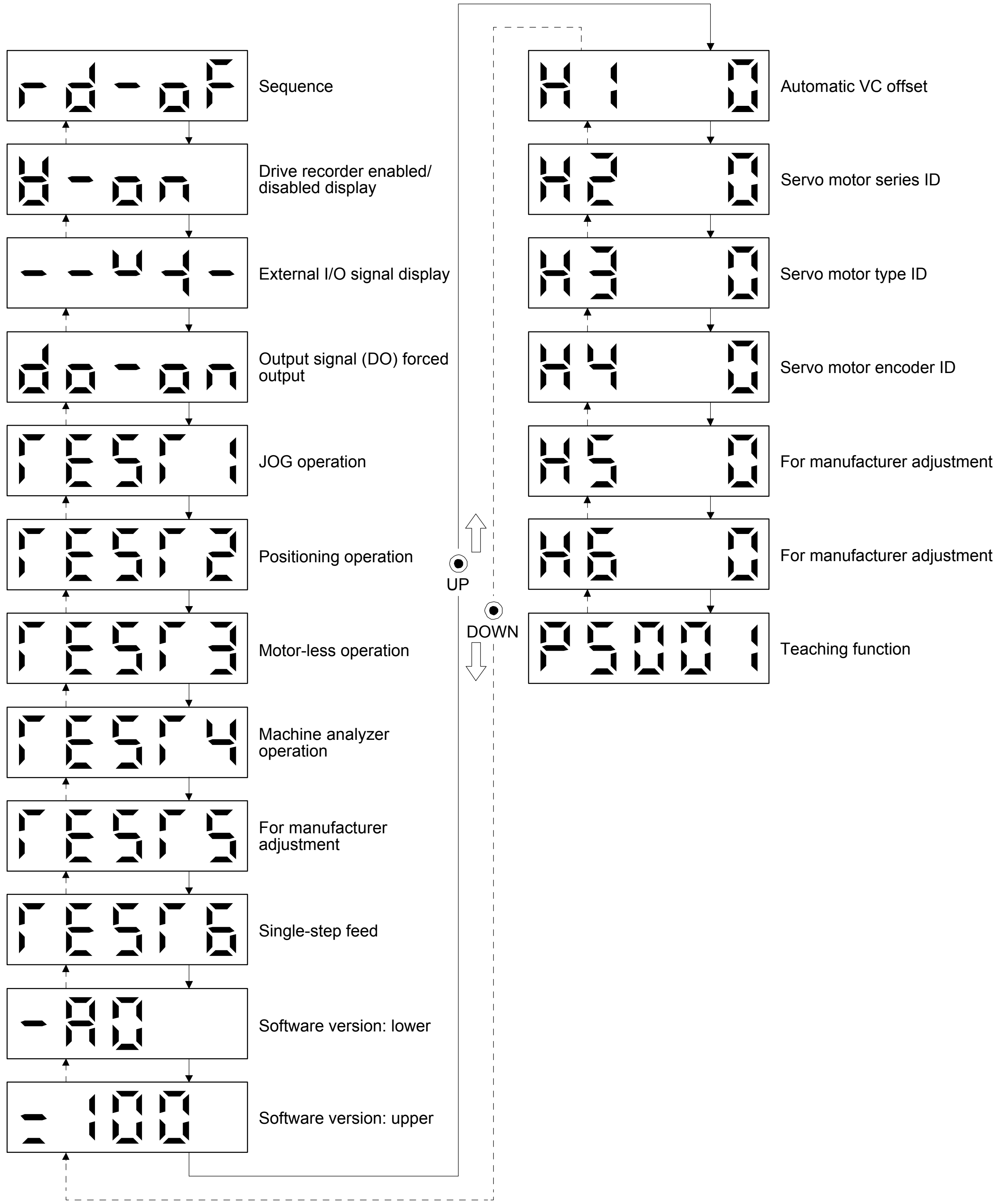
The status display on the servo amplifier at power-on can be changed with [Pr. PC36]. The status displayed by default varies depending on the control mode as follows:

Control mode	Status display
Position	Cumulative feedback pulses
Position/speed	Cumulative feedback pulses/servo motor speed
Speed	Servo motor speed
Speed/torque	Servo motor speed/analog torque command voltage
Torque	Analog torque command voltage
Torque/position	Analog torque command voltage/cumulative feedback pulses
Positioning (point table method/program method)	Current position

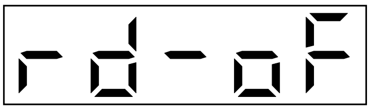
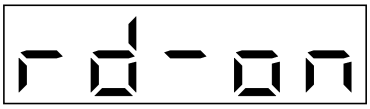
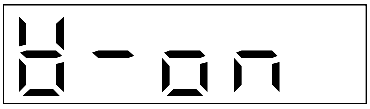
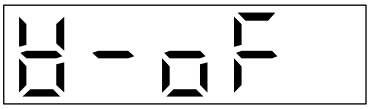
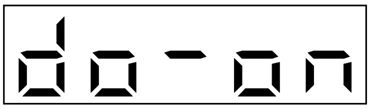
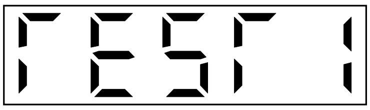
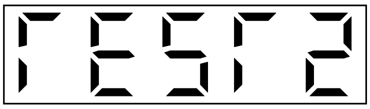
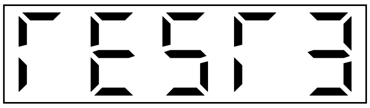
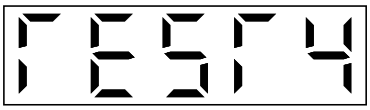
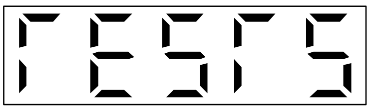
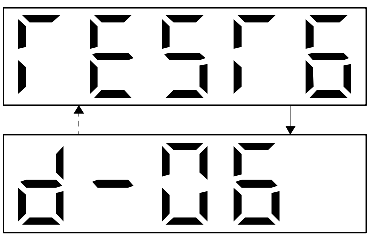
3.1.3 Diagnostic mode

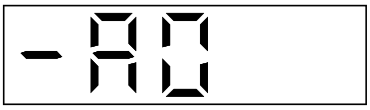
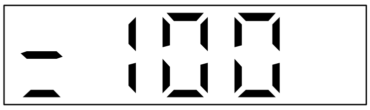
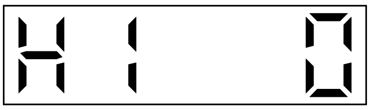
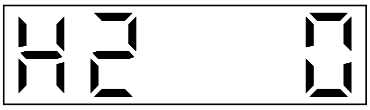
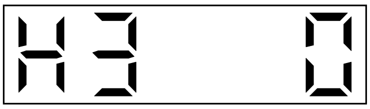
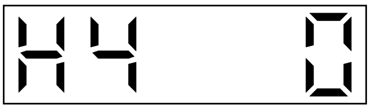
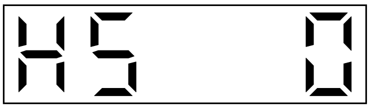
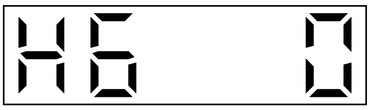
Diagnosis contents can be displayed on the display. Press the "UP" or "DOWN" button to change the display data as desired.

(1) Display transition



(2) Diagnosis display list

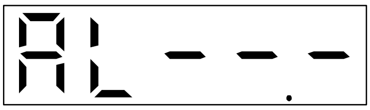
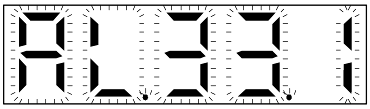
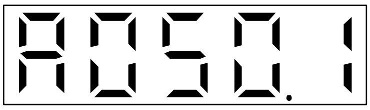
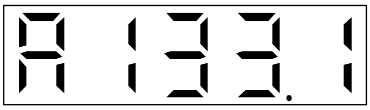
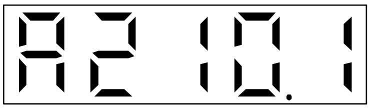
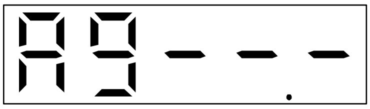
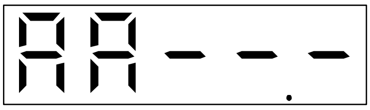
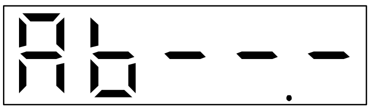
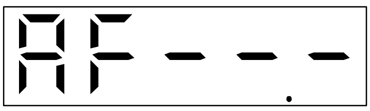
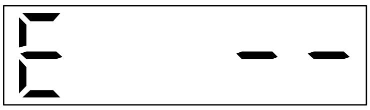
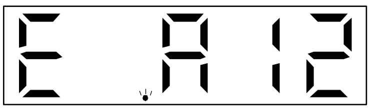
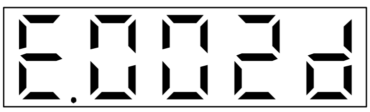
Name		Display	Description
Sequence			Not ready Indicates that the servo amplifier is being initialized or an alarm has occurred.
			Ready Indicates that initialization is completed, and the servo amplifier is in servo-on state and ready to operate.
Drive recorder enabled/disabled display			Drive recorder enabled When an alarm occurs in this state, the drive recorder will operate and record the status of occurrence.
			Drive recorder disabled The drive recorder will not operate on the following conditions. 1. The graph function of MR Configurator2 is being used. 2. The machine analyzer function is being used. 3. [Pr. PF21] is set to "-1".
External I/O signal display		Refer to section 3.1.7.	This Indicates the on/off status of external I/O signal. The upper segments correspond to the input signals and the lower segments to the output signals.
Output signal (DO) forced output			This allows digital output signal to be switched on/off forcibly. Refer to section 3.1.8 for details.
Test operation mode	JOG operation		JOG operation can be performed when there is no command from an external controller. For details, refer to section 4.5.9 (2) of "MR-JE-_A Servo Amplifier Instruction Manual".
	Positioning operation		Positioning operation can be performed when there is no command from an external controller. MR Configurator2 is required to perform positioning operation. For details, refer to section 4.5.9 (3) of "MR-JE-_A Servo Amplifier Instruction Manual".
	Motor-less operation		Without connecting the servo motor, output signals or status display can be provided in response to the input device as if the servo motor is actually running. For details, refer to section 4.5.9 (4) of "MR-JE-_A Servo Amplifier Instruction Manual".
	Machine analyzer operation		Merely connecting the servo amplifier allows the resonance point of the mechanical system to be measured. MR Configurator2 is required to perform machine analyzer operation. For details, refer to section 11.4 of "MR-JE-_A Servo Amplifier Instruction Manual".
	For manufacturer adjustment		This is for manufacturer adjustment.
	Single-step feed		When the positioning operation is executed in accordance with the point table or program set by MR Configurator2, the diagnosis display changes to "d-06" during single-step feed. Refer to section 3.1.9 for details. The status will be displayed with the "MODE" button. The "UP" and "DOWN" buttons are disabled.

Name	Display	Description
Software version: lower		Indicates the version of the software.
Software version: upper		Indicates the system number of the software.
Automatic VC offset (Note)		If offset voltages in the analog circuits inside and outside the servo amplifier cause the servo motor setting speed not to be the designated value at VC of 0 V, a zero-adjustment of offset voltages will be automatically performed. When using the VC automatic offset, enable it in the following procedures. When it is enabled, [Pr. PC37] value changes to the automatically adjusted offset voltage. 1) Press the "SET" button once. 2) Set the number in the first digit to "1" with the "UP" button. 3) Press the "SET" button. This function cannot be used if the input voltage of VC is -0.4 V or less, or +0.4 V or more.
Servo motor series ID		Push the "SET" button to show the series ID of the servo motor currently connected. For indication details, refer to app. 1 of "HF-KN/HF-SN servo Motor Instruction Manual".
Servo motor type ID		Push the "SET" button to show the type ID of the servo motor currently connected. For indication details, refer to app. 1 of "HF-KN/HF-SN servo Motor Instruction Manual".
Servo motor encoder ID		Push the "SET" button to show the encoder ID of the servo motor currently connected. For indication details, refer to app. 1 of "HF-KN/HF-SN servo Motor Instruction Manual".
For manufacturer adjustment		This is for manufacturer adjustment.
For manufacturer adjustment		This is for manufacturer adjustment.
Teaching function	Refer to section 3.1.10.	After an operation travels to a target position (MEND (Travel completion) is turned on) with a JOG operation or manual pulse generator operation, pushing the "SET" button of the operation part or turning on TCH (Teach) will import position data. This function is available only in the point table method. In other control modes, the display remains the same.

Note. Even if VC automatic offset is performed and 0 V is inputted, the speed may not completely be the set value.

3.1.4 Alarm mode

The current alarm, past alarm history and parameter error are displayed. The lower 2 digits on the display indicate the alarm No. that has occurred or the parameter No. in error.

Name	Display (Note 1)	Description
Current alarm		Indicates no occurrence of an alarm.
		Indicates the occurrence of [AL. 33.1 Main circuit voltage error]. Blinks at alarm occurrence.
Alarm history		Indicates that the last alarm is [AL. 50.1 Thermal overload error 1 during operation].
		Indicates the second last alarm is [AL. 33.1 Main circuit voltage error].
		Indicates the third last alarm is [AL. 10.1 Voltage drop in the power].
		Indicates that there is no tenth alarm in the past.
		Indicates that there is no eleventh alarm in the past.
		Indicates that there is no twelfth alarm in the past.
		Indicates that there is no sixteenth alarm in the past.
Parameter error No./point table error No. (Note 2)		This indicates no occurrence of [AL. 37 Parameter error].
		The data content error of [Pr. PA12 Reverse rotation torque limit].
		The value of the point table is over the setting range. The error point table No. (intermediate digit "2") and item (lower digit "d") are displayed. The following shows the items. P: position data, d: motor speed, A: acceleration time constant, b: deceleration time constant, n: dwell, H: auxiliary function, M: M code

Note 1. If a parameter error and point table error occur simultaneously, the display shows the parameter error.
2. The display shows only when the current alarm is [AL. 37 Parameter error].

The following is additional information of alarm occurrence:

(1) The current alarm is displayed in any mode.

(2) Even during an alarm occurrence, the other display can be viewed by pressing the button in the operation area. At this time, the decimal point in the fourth digit remains blinking.

(3) Remove the cause of the alarm and clear it in any of the following methods. (Refer to chapter 8 for the alarms that can be cleared.)

(a) Cycle the power.

(b) Press the "SET" button on the current alarm display.

(c) Turn on RES (Reset).

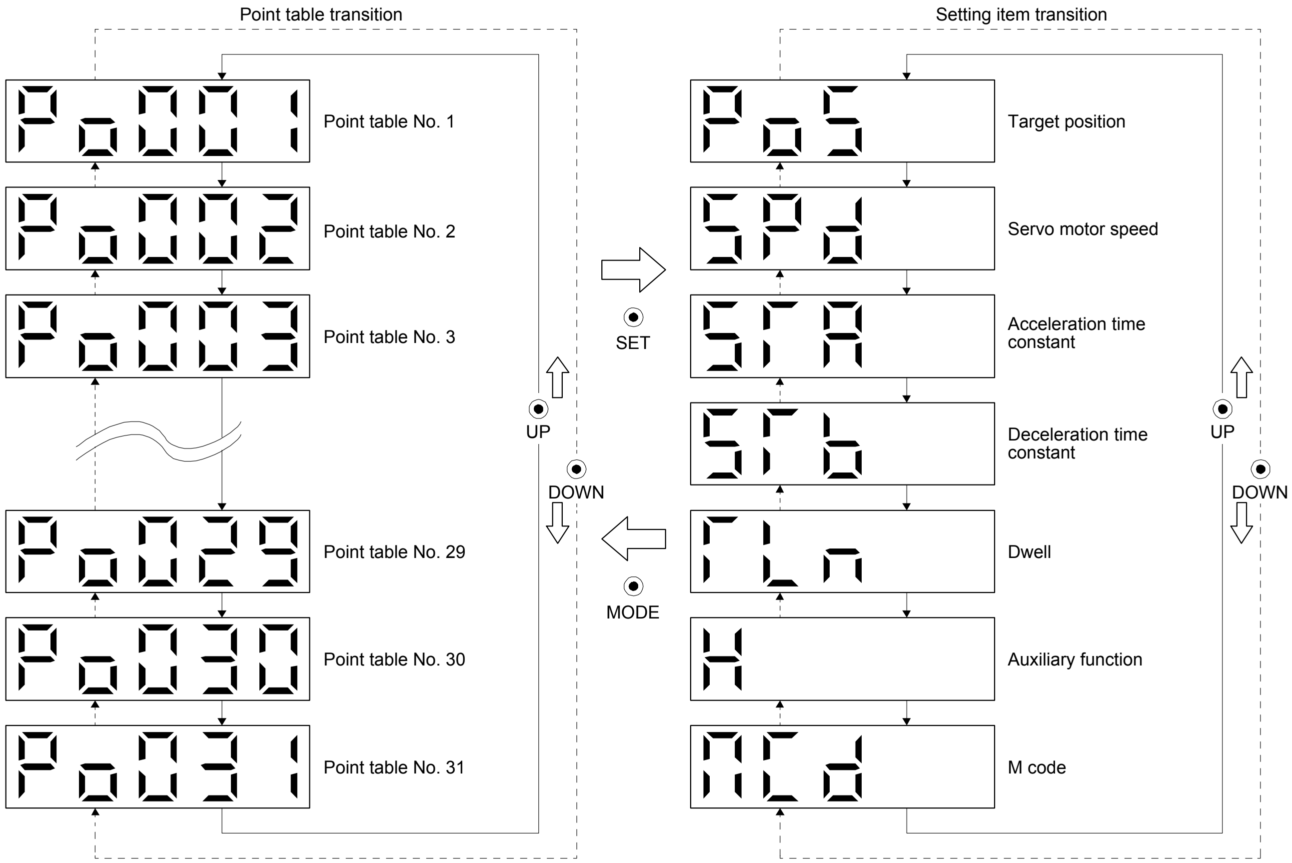
(4) Use [Pr. PC18] to clear the alarm history.

(5) Press the "UP" or "DOWN" button to move to the next history.

3.1.5 Point table setting

You can set the target position, servo motor speed, acceleration time constant, deceleration time constant, dwell, auxiliary function and M code.

(1) Display transition



(2) Setting list

The following point table setting can be displayed.

Status display	Symbol	Unit	Description	Indication range
Point table No.	Po001		Specify the point table to set the target position, servo motor speed, acceleration time constant, deceleration time constant, dwell, auxiliary function and M code.	1 to 31
Target position	PoS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note)	Set the travel distance.	-999999 to 999999
Servo motor speed	SPd	r/min	Set the command speed of the servo motor for execution of positioning. The setting value must be within the permissible speed of the servo motor used. If a value equal to or larger than the permissible speed is set, the value will be clamped at the permissible speed.	0 to Permissible speed
Acceleration time constant	STA	ms	Set a time for the servo motor to reach the rated speed.	0 to 20000
Deceleration time constant	STb	ms	Set a time for the servo motor to stop from the rated speed.	0 to 20000
Dwell	TLn	ms	This function is enabled when you select the point table by input signal. To disable the dwell, set "0" or "2" to the auxiliary function. To perform varying-speed operation, set "1", "3", "8", "9", "10", or "11" to the auxiliary function and 0 to the dwell. When the dwell is set, the position command of the selected point table is completed. After the set dwell has elapsed, start the position command of the next point table.	0 to 20000
Auxiliary function	H		This function is enabled when you select the point table by input signal. (1) When using the point table in the absolute value command method 0: Executes automatic operation for a selected point table. 1: Executes automatic continuous operation without stopping for the next point table. 8: Executes automatic continuous operation without stopping for the point table selected at the start. 9: Executes automatic continuous operation without stopping for the point table No. 1. (2) When using the point table in the incremental value command method 2: Executes automatic operation for a selected point table. 3: Executes automatic continuous operation without stopping for the next point table. 10: Executes automatic continuous operation without stopping for the point table selected at the start. 11: Executes automatic continuous operation without stopping for the point table No. 1. When a different rotation direction is set, smoothing zero (command output) is confirmed and then the rotation direction is reversed. When "1" or "3" is set to the point table No. 31, [AL. 61] will occur at the time of point table execution.	0 to 3, 8 to 11
M code	MCd		This is the code output at the completion of positioning. This code will be available in the future. Outputs the first digit and the second digit of the M code in 4-bit binary respectively.	0 to 99

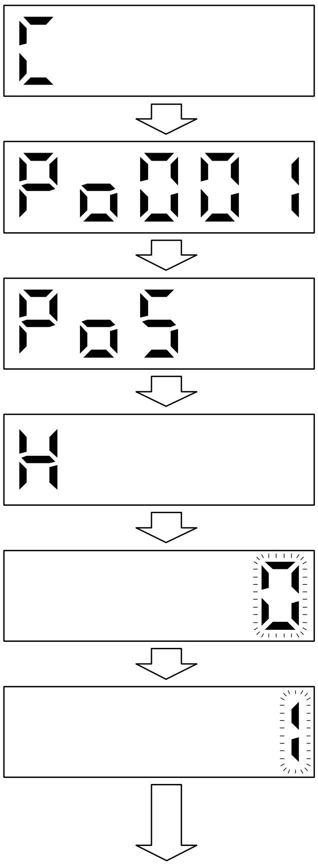
Note. The unit can be selected from μm/inch/degree/pulse with [Pr. PT01].

(3) Operation method

POINT
●After changing and defining the setting values of the specified point table, the defined setting values of the point table are displayed. To discard the changed setting, press the "MODE" button for 2 s or more. The setting before the change will be displayed. Keep pressing the "UP" or "DOWN" button to continuously change the most significant digit of the setting values.

(a) Setting of 5 or less digits

The following example is the operation method at power-on to set "1" to the auxiliary function of the point table No. 1.



Press "MODE" four times.

……… A point table No. is displayed.

Press "UP" or "DOWN" to select point table No. 1.

Press "SET" once.

Press "UP" five times.

Press "SET" twice.

……… The setting value of the auxiliary function of the specified point table No. blinks.

Press "UP" once.

……… During blinking, the set value can be changed.

Set using the "UP" or "DOWN" button.

Press "SET" to enter.

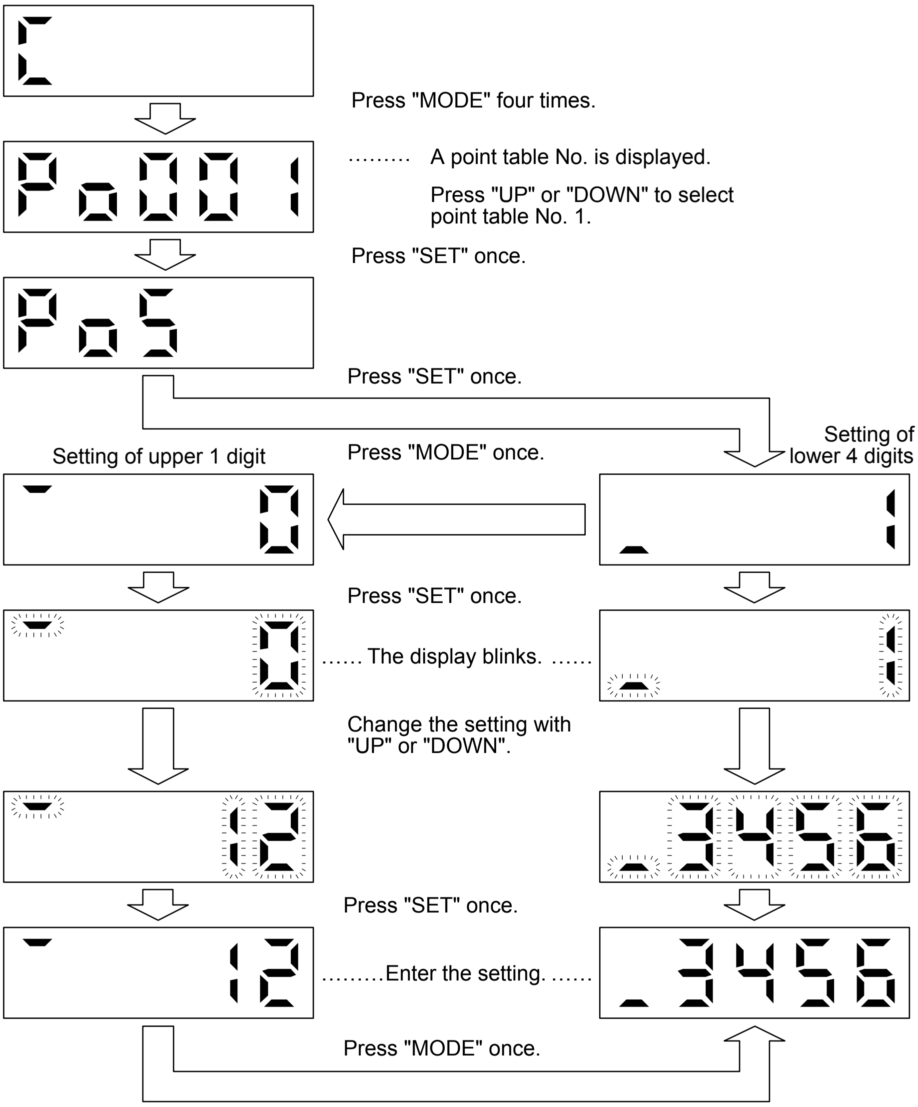
To the next item setting

Press the "UP" or "DOWN" button to switch to other item of the same point table No.

Press the "MODE" button to switch to the next point table No.

(b) Setting of 6 or more digits

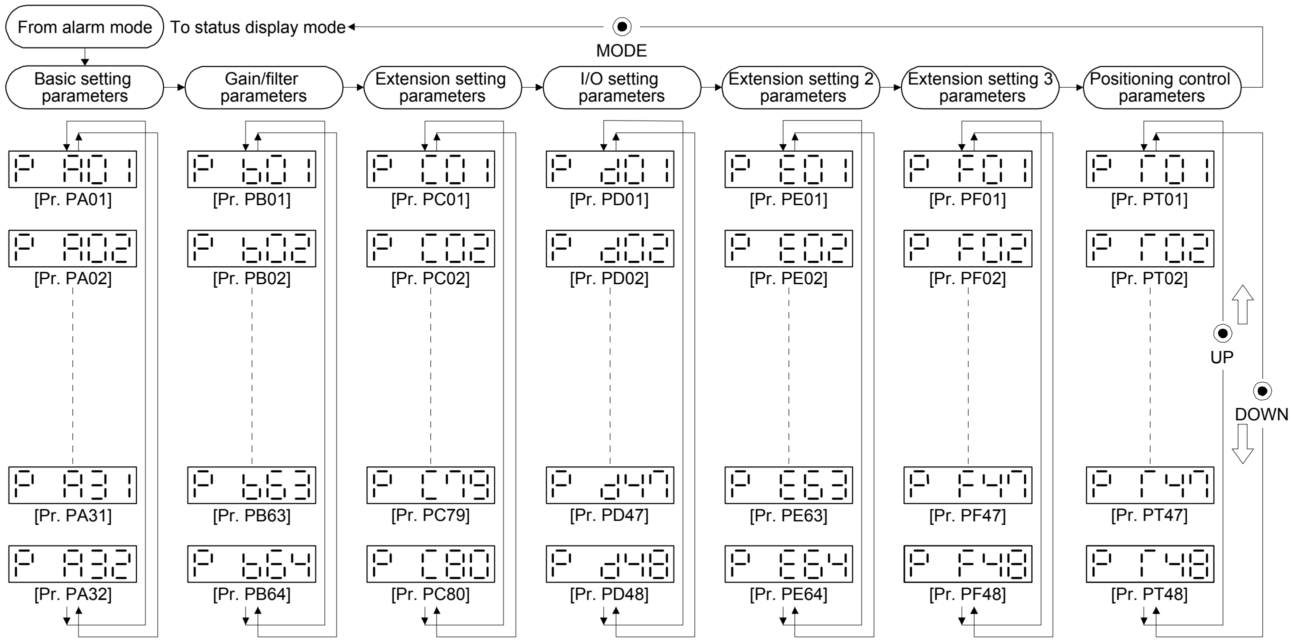
The following example is the operation method to change the position data of the point table No. 1 to "123456".



3.1.6 Parameter mode

(1) Parameter mode transition

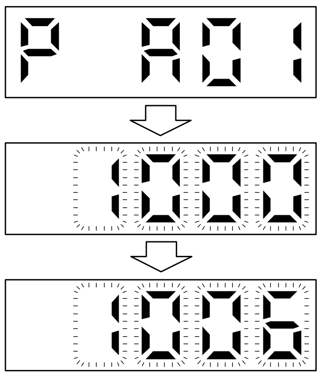
After selecting the corresponding parameter mode with the "MODE" button, pressing the "UP" or "DOWN" button changes the display as shown below.



(2) Operation method

(a) Parameters of 5 or less digits

The following example shows the operation procedure performed after power-on to change the control mode to the positioning mode (point table method) with [Pr. PA01 Operation mode]. Press "MODE" to switch to the basic setting parameter display.



...... The parameter number is displayed.
Press "UP" or "DOWN" to change the number.

Press "SET" twice.

...... The set value of the specified parameter number blinks.

Press "UP" six times.

...... During blinking, the set value can be changed.
Use "UP" or "DOWN".
(_ _ _ 6: Positioning mode (point table method))

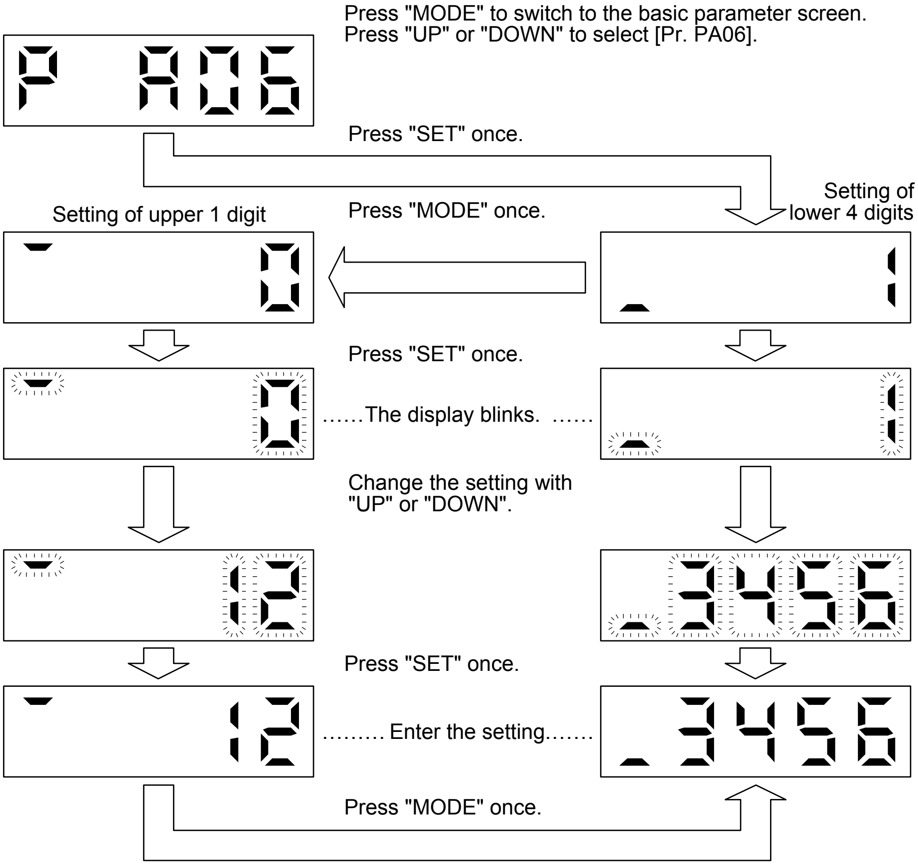
To decide the value , press "SET".

To shift to the next parameter, press the "UP" or "DOWN" button.

After changing [Pr. PA01], cycle the power to enable the setting.

(b) Parameters of 6 or more digits

The following example gives the operation procedure to change the electronic gear numerator to "123456" with [Pr. PA06 Electronic gear numerator].



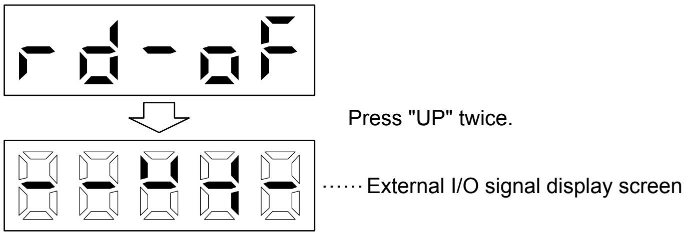
3.1.7 External I/O signal display

POINT
●The I/O signal settings can be changed using I/O setting parameters [Pr. PD04] to [Pr. PD28].

The on/off states of the digital I/O signals connected to the servo amplifier can be confirmed.

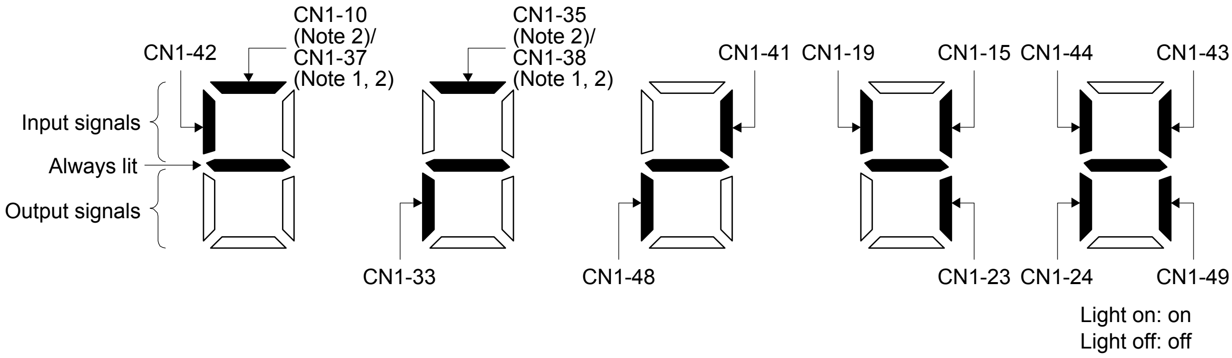
(1) Operation

The display at power-on. Switch to the diagnostic display with the "MODE" button.



(2) Display definition

The 7-segment LED segments and CN1 connector pins correspond as shown below.



Note 1. This is available with servo amplifiers manufactured in May 2015 or later.
2. CN1-10 pin and CN1-37 pin are mutually exclusive, and CN1-35 pin and CN1-38 pin are mutually exclusive.

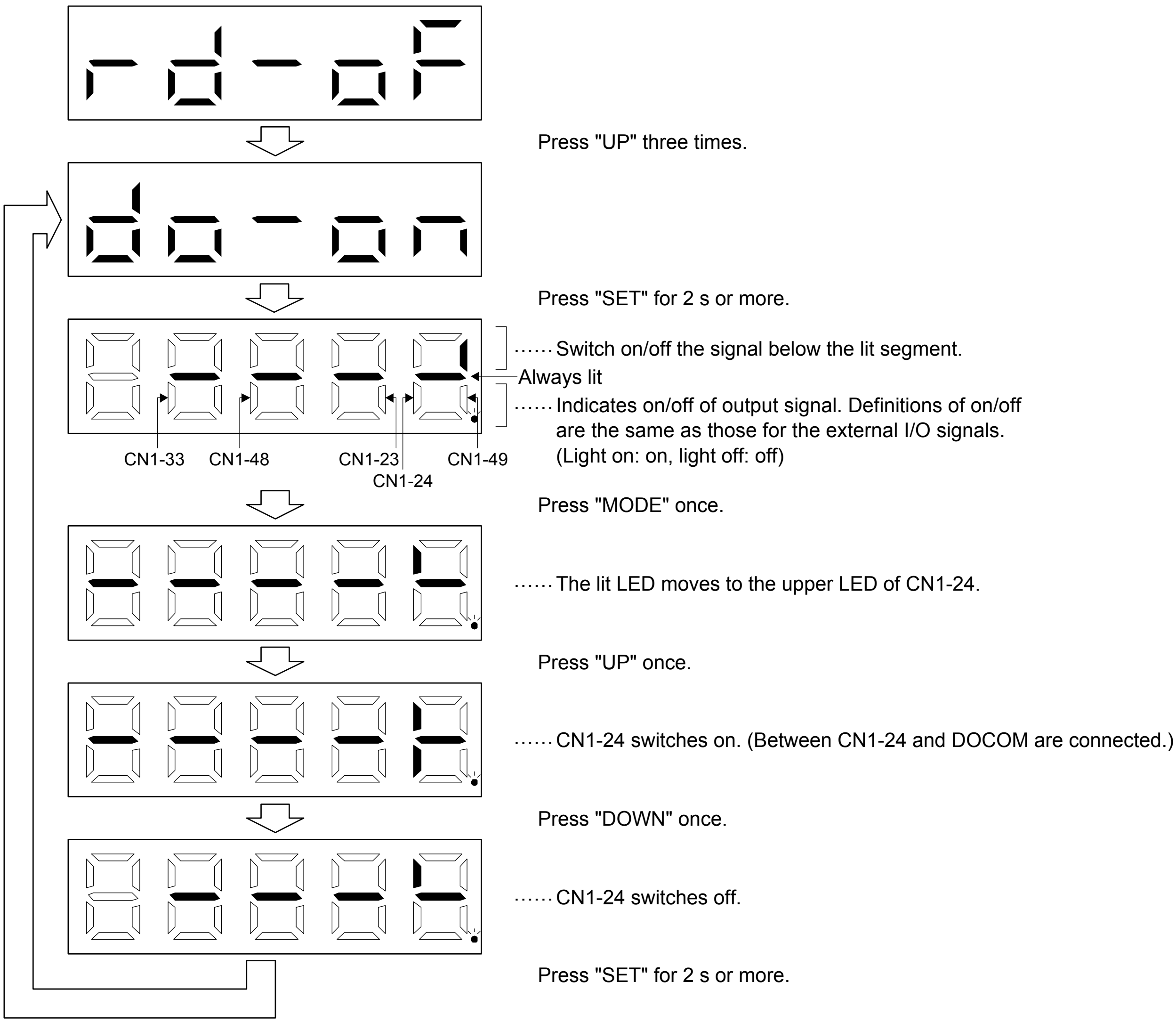
The LED segment corresponding to the pin is lit to indicate on, and is extinguished to indicate off.
For each pin signal in control modes, refer to section 2.2.

3.1.8 Output signal (DO) forced output

POINT
●When the servo system is used in a vertical lift application, turning on MBR (Electromagnetic brake interlock) by the DO forced output after assigning it to connector CN1 will release the electromagnetic brake, causing a drop. Take drop preventive measures on the machine side.

Output signals can be switched on/off forcibly independently of the servo status. This function can be used for output signal wiring check, etc. This operation must be performed in the servo off state by turning off SON (Servo-on).

The display screen at power-on. Switch to the diagnostic display with the "MODE" button.

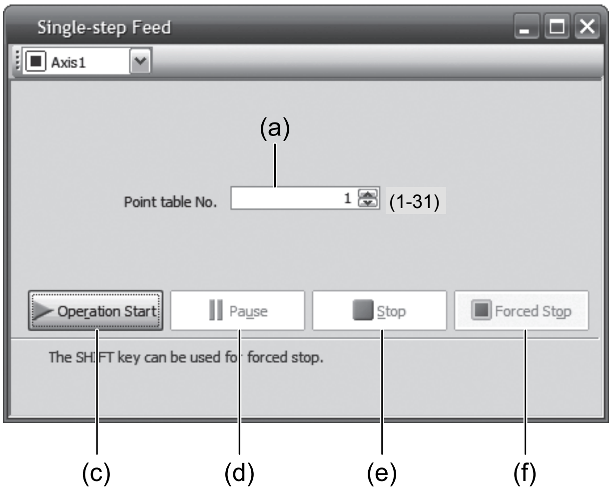


3.1.9 Single-step feed

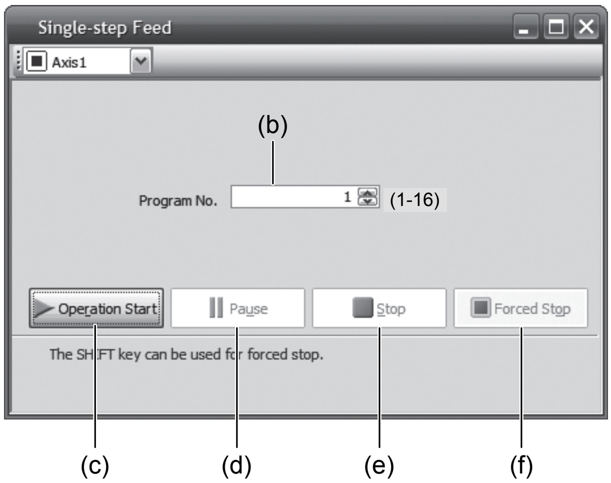
CAUTION	
⚠CAUTION	●The test operation mode is designed for checking servo operation. Do not use it for actual operation. ●If the servo motor operates unexpectedly, use EM2 (Forced stop 2) to stop it.

POINT
●MR Configurator2 is required to perform single-step feed. ●Test operation cannot be performed if SON (Servo-on) is not turned off.

The positioning operation can be performed in accordance with the point table No. or the program No. set by MR Configurator2.
Select the test operation/single-step feed from the menu of MR Configurator2. When the single-step feed window is displayed, input the following items and operate.



Point table operation



Program operation

(1) Point table No. or program No. setting
Enter a point table No. in the input box (a) "Point table No.", or a program No. in the input box (b) "Program No.".

(2) Forward/reverse the servo motor
Click "Operation Start" (c) to rotate the servo motor.

(3) Pause the servo motor
Click "Pause" (d) to temporarily stop the servo motor.
While the servo motor is temporarily stopped, click "Operation Start" (c) to restart the rotation of the travel remaining distance.
While the servo motor is temporarily stopped, click "Stop" (e) to clear the travel remaining distance.

(4) Stop the servo motor
Click "Stop" (e) to stop the servo motor. At this time, the travel remaining distance will be cleared. Click "Operation Start" (c) to restart the rotation.

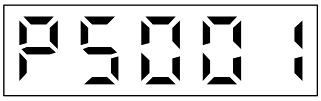
(5) Forced stop of the servo motor software
Click "Forced Stop" (f) to make an instantaneous stop. When "Forced Stop" is enabled, the servo motor does not drive even if "Operation Start" is clicked. Click "Forced Stop" again to enable "Operation Start" to be clicked.

(6) Switch to the normal operation mode
Before switching from the test operation mode to the normal operation mode, turn off the servo amplifier.

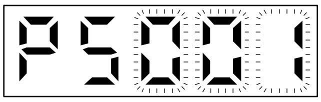
3.1.10 Teaching function

After an operation travels to a target position (MEND (Travel completion) is turned on) with a JOG operation or manual pulse generator operation, pushing the "SET" button of the operation area or turning on TCH (Teach) will import the position data. This function is available only in the point table method. In other control modes, the display remains the same.

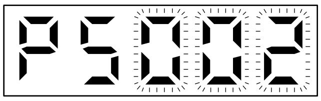
(1) Teaching preparation



Teaching setting initial display
Press the "SET" button for approximately 2 s to switch to the teaching setting mode.

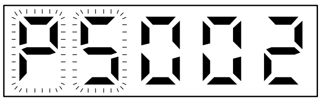


When the lower three digits blink, press the "UP" or "DOWN" button to select the point table.

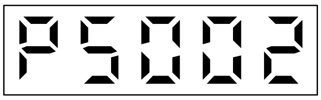


When the lower three digits blink, press the "SET" button to complete the teaching setting preparation. The upper two digits on the display will blink on completion of proper preparation

(2) Position data setting method
After an operation travels to a target position (MEND (Travel completion) is turned on) with a JOG operation or manual pulse generator operation, pushing the "SET" button of the operation part or turning on TCH (Teach) will set the positioning address as position data.



When the upper two digits blink, the current position is written to the selected point table by pressing the "SET" button.



When the upper two digits or the lower two digits blink, the display returns to the teaching setting initial screen by pressing the "MODE" button.
The following shows the conditions for when the teaching function operates.

(a) When the "positioning command method" of [Pr. PT01] is set to absolute value command method (_ _ _ 0)

(b) Home position return completion (ZP (Home position return completion) is turned on)

(c) While the servo motor is stopped (command output = 0, MEND (Travel completion) is turned on)

MEMO

4. HOW TO USE THE POINT TABLE

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Switching power on for the first time	MR-JE-_A section 4.1

POINT

- For the mark detection function (Current position latch), refer to section 6.2.2.
- For the mark detection function (Interrupt positioning), refer to section 6.2.3.
- There are the following restrictions on the number of gear teeth on machine side ([Pr. PA06 Number of gear teeth on machine side]) and the servo motor speed (N).
  - When CMX ≤ 2000, N < 3076.7 r/min
  - When CMX > 2000, N < (3276.7 - CMX)/10 r/min

  When the servo motor is operated at a servo motor speed higher than the limit value, [AL. E3 Absolute position counter warning] will occur.

4.1 Startup

⚠WARNING	●When executing a test run, follow the notice and procedures in this instruction manual. Otherwise, it may cause a malfunction, damage to the machine, or injury. ●Do not operate the switches with wet hands. Otherwise, it may cause an electric shock.

⚠CAUTION	●Before starting operation, check the parameters. Improper settings may cause some machines to operate unexpectedly. ●The servo amplifier heat sink, regenerative resistor, servo motor, etc., may be hot while the power is on and for some time after power-off. Take safety measures such as providing covers to avoid accidentally touching them by hands and parts such as cables. ●During operation, never touch the rotor of the servo motor. Otherwise, it may cause injury. ●Before wiring, switch operation, etc., eliminate static electricity. Otherwise, it may cause a malfunction.

4.1.1 Power on and off procedures

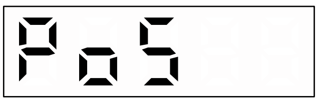
When the servo amplifier is powered on for the first time, the control mode is set to position control mode. (Refer to section 4.2.1 of "MR-JE-_A Servo Amplifier Instruction Manual".)
This section provides a case where the servo amplifier is powered on after setting the positioning mode.

(1) Power-on
Switch the power on in the following procedure. Always follow this procedure at power-on.

1) Switch off SON (Servo-on).

2) Make sure that ST1 (Forward rotation start) and ST2 (Reverse rotation start) are off.

3) Turn on the power.
The display shows "PoS" and 2 s later shows data.



(2) Power-off

1) Switch off ST1 (Forward rotation start) and ST2 (Reverse rotation start).

2) Switch off SON (Servo-on).

3) Shut off the power.

4.1.2 Stop

Turn off SON (Servo-on) after the servo motor has stopped, and then switch the power off.
If any of the following situations occurs, the servo amplifier suspends and stops the operation of the servo motor.
Refer to section 3.10 of "MR-JE-_A Servo Amplifier Instruction Manual" for the servo motor with an electromagnetic brake.

Operation/command	Stopping condition
Switch off SON (Servo-on).	The base circuit is shut off, and the servo motor coasts.
Alarm occurrence	The servo motor decelerates to a stop. With some alarms; however, the dynamic brake operates to stop the servo motor. (Refer to chapter 8. (Note))
EM2 (Forced stop 2) off	The servo motor decelerates to a stop with the command. [AL. E6 Servo forced stop warning] occurs. Refer to section 2.3 for EM1.
LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off	The servo motor stops immediately and will be servo locked. Operation in the opposite direction is possible.

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

4.1.3 Test operation

Before starting an actual operation, perform a test operation to make sure that the machine operates normally.
Refer to section 4.1 for how to power on and off the servo amplifier.

Test operation of the servo motor alone in JOG operation of test operation mode

In this step, confirm that the servo amplifier and the servo motor operate normally.
With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor rotates correctly at the slowest speed. For the test operation mode, refer to section 3.1.8 and 3.1.9 in this manual, and section 4.5.9 of "MR-JE-_A Servo Amplifier Instruction Manual".

Manual operation of the servo motor alone in test operation mode

In this step, confirm that the servo motor rotates correctly at the slowest speed in the manual operation mode.
Make sure that the servo motor rotates in the following procedure.

1) Switch on EM2 (Forced stop 2) and SON (Servo-on). When the servo amplifier is in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) When MD0 (Operation mode selection 1) is switched off from the controller and ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on in the manual operation mode, the servo motor starts rotating. Set a low speed to the point table at first, operate the servo motor, and check the rotation direction of the servo motor, etc. If the servo motor does not operate in the intended direction, check the input signal.

Test operation with the servo motor and machine connected

In this step, connect the servo motor with the machine and confirm that the machine operates normally with the commands from the controller.
Make sure that the servo motor rotates in the following procedure.

1) Switch on EM2 (Forced stop 2) and SON (Servo-on). When the servo amplifier is in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) When MD0 (Operation mode selection 1) is switched off from the controller and ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on in the manual operation mode, the servo motor starts rotating. Set a low speed to the point table at first, operate the servo motor, and check the rotation direction of the machine, etc. If the servo motor does not operate in the intended direction, check the input signal. In the status display, check for any problems of the servo motor speed, load ratio, etc.

Automatic operation using the point table

Check automatic operation from the controller.

4.1.4 Parameter setting

> **POINT**
>
> ● The following encoder cables are of four-wire type. When using any of these encoder cables, set [Pr. PC22] to "1 _ _ _" to select the four-wire type. Incorrect setting will result in [AL. 16 Encoder initial communication error 1].
> MR-EKCBL30M-L
> MR-EKCBL30M-H
> MR-EKCBL40M-H
> MR-EKCBL50M-H
>
> ● Assign the following output devices to the CN1-23 pin with [Pr. PD24].
> CN1-23: ZP (Home position return completion)

When you use the servo in the point table method, set [Pr. PA01] to "_ _ _ 6" (Positioning mode (point table method)). In the point table method, the servo can be used by merely changing the basic setting parameters ([Pr. PA _ _]) and the positioning control parameters ([Pr. PT _ _]) mainly.
As necessary, set other parameters.
The following table shows the necessary setting of [Pr. PA _ _] and [Pr. PT _ _] in the point table method.

Operation mode	Operation mode selection item		Parameter setting: [Pr. PA01]	Parameter setting: [Pr. PT04]	Input device setting: MD0 (Note 1)	Input device setting: DI0 to DI4 (Note 1, 2)
Automatic operation mode in point table method	Each positioning operation		_ _ _ 6		On	Set the point table No. (Refer to section 4.2.1 (2) (b).)
	Automatic continuous operation	Varying-speed operation				
		Automatic continuous positioning operation				
Manual operation mode	JOG operation				Off	
	Manual pulse generator operation					
Home position return mode	Dog type			_ _ _ 0	On	All off
	Count type			_ _ _ 1		
	Data set type			_ _ _ 2		
	Stopper type			_ _ _ 3		
	Home position ignorance (servo-on position as home position)			_ _ _ 4		
	Dog type rear end reference			_ _ _ 5		
	Count type front end reference			_ _ _ 6		
	Dog cradle type			_ _ _ 7		
	Dog type last Z-phase reference			_ _ _ 8		
	Dog type front end reference			_ _ _ 9		
	Dogless Z-phase reference			_ _ _ A		

Note 1. MD0: Operation mode selection 1, DI0 to DI4: Point table No. selection 1 to Point table No. selection 5
2. DI4 is available only with the communication function. This device cannot be assigned as an input signal.

4.1.5 Point table setting

Set the data for operation to the point table. The following shows the items to be set.

Item	Main description
Position data	Set the position data for movement.
Servo motor speed	Set the command speed of the servo motor for execution of positioning.
Acceleration time constant	Set the acceleration time constant.
Deceleration time constant	Set the deceleration time constant.
Dwell	Set the waiting time when performing automatic continuous operation.
Auxiliary function	Set when performing automatic continuous operation.
M code	The first digit and the second digit of the M code are outputted in 4-bit binary respectively. M code will be available in the future.

Refer to section 4.2.2 for details of the point table.

4.1.6 Actual operation

Start actual operation after confirmation of normal operation by test operation and completion of the corresponding parameter settings.

4.1.7 Troubleshooting at start-up

⚠CAUTION

- Never adjust or change the parameter values extremely as it will make operation unstable.

POINT

- Using MR Configurator2, you can refer to the reason for rotation failure, etc.

The following faults may occur at start-up. If any of such faults occurs, take the corresponding action.
"MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
1	Power on	・The 7-segment LED display does not turn on. ・The 7-segment LED display blinks.	Not solved even if CN1, CN2, and CN3 connectors are disconnected.	1. Power supply voltage fault 2. The servo amplifier is malfunctioning.	
			Solved when CN1 connector is disconnected.	Power supply of CN1 cabling is shorted.	
			Solved when CN2 connector is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is malfunctioning.	
			Solved when CN3 connector is disconnected.	Power supply of CN3 cabling is shorted.	
		Alarm occurs.	Refer to chapter 8 and remove the cause.		Chapter 8 (Note)
2	Switch on SON (Servo-on).	Alarm occurs.	Refer to chapter 8 and remove the cause.		Chapter 8 (Note)
		Servo motor shaft is not servo-locked. (Servo motor shaft is free.)	1. Check the display to see if the servo amplifier is ready to operate. 2. Check the external I/O signal indication (section 3.1.7) to see if SON (Servo-on) is on.	1. SON (Servo-on) is not input. (wiring mistake) 2. 24 V DC power is not supplied to DICOM.	Section 3.1.7

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
3	Perform a home position return.	Servo motor does not rotate.	Check the on/off status of the input signal with the external I/O signal display. (Refer to section 3.1.7.)	LSP, LSN, and ST1 are off.	Section 3.1.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low for the load torque.	Section 7.2.1
			When TLA (Analog torque limit) is usable, check the input voltage on the status display.	Torque limit level is too low for the load torque.	Section 3.1.2
		The home position return is not completed.	Check the on/off status of input signal DOG with the external I/O signal display. (Refer to section 3.1.7.)	The proximity dog is set incorrectly.	Section 3.1.7
4	Switch on ST1 (Forward rotation start) or ST2 (Reverse rotation start).	Servo motor does not rotate.	Check the on/off status of the input signal with the external I/O signal display (section 3.1.7).	LSP, LSN, and ST2 are off.	Section 3.1.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low for the load torque.	Section 7.2.1
			When TLA (Analog torque limit) is usable, check the input voltage on the status display.	Torque limit level is too low for the load torque.	Section 3.1.2
5	Gain adjustment	Rotation ripples (speed fluctuations) are large at low speed.	Make gain adjustment in the following procedure. 1. Increase the auto tuning response level. 2. Repeat acceleration and deceleration several times to complete auto tuning.	Gain adjustment fault	MR-JE-_A Chapter 6
		Large load inertia moment causes the servo motor shaft to oscillate side to side.	If the servo motor may be driven with safety, repeat acceleration and deceleration three times or more to complete the auto tuning.	Gain adjustment fault	MR-JE-_A Chapter 6

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

4.2 Automatic operation mode

4.2.1 Automatic operation mode

(1) Command method

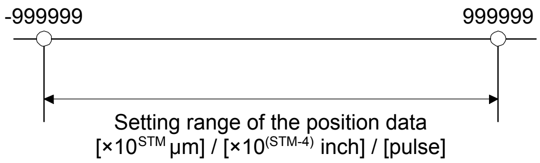
Set point tables in advance, and select any point table by using an input signal or RS-422/RS-485 communication. Start the operation using ST1 (Forward rotation start) or ST2 (Reverse rotation start). Absolute value command method and incremental value command method are available in automatic operation mode.

(a) Absolute value command method

As position data, set the target address to be reached.

1) mm, inch, and pulse unit

Setting range: -999999 to 999999 [$\times 10^{STM}$ μm] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [$\times 10^{(STM-4)}$ inch] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [pulse]

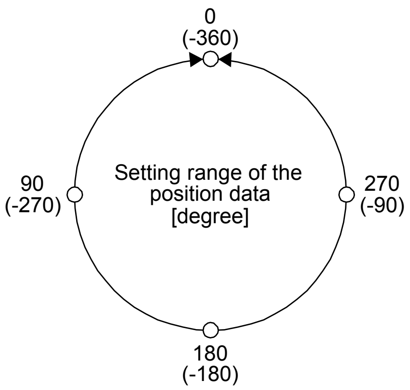


2) Degree unit

Set the target position by indicating the CCW direction with a "+" sign and the CW direction with a "-" sign.

In the absolute value command method, the rotation direction can be specified with a "+" or "-" sign.

An example of setting is shown below.



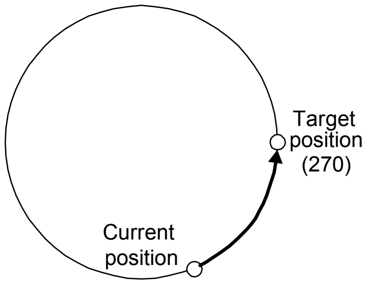
Coordinate system in degrees

- The coordinate is determined by referring to the position of 0 degree.
  + direction: 0 → 90 → 180 → 270 → 0
  - direction: 0 → -90 → -180 → -270 → -360
- The positions of 270 degrees and -90 degrees are the same.
- The positions of 0 degree, 360 degrees and -360 degrees are the same.

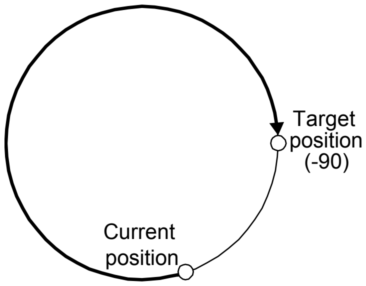
The travel direction to the target position is set with [Pr. PT03].

[Pr. PT03] setting	Servo motor rotation direction
_ 0 _ _	The servo motor rotates to the target position in a direction specified with a sign of the position data.
_ 1 _ _	The servo motor rotates from the current position to the target position in the shorter direction. If the distances from the current position to the target position are the same for CCW and CW, the servo motor rotates in the CCW direction.

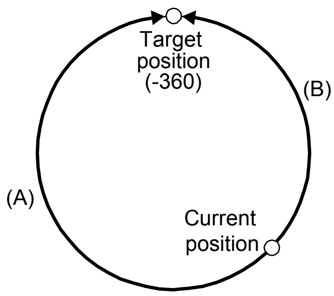
a) When using the Rotation direction specifying ([Pr. PT03] = "_ 0 _ _")
When the position data of 270.000 degrees is specified, the servo motor rotates in the CCW direction.



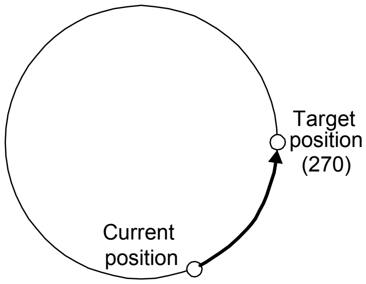
When the position data of -90.000 degrees is specified, the servo motor rotates in the CW direction.



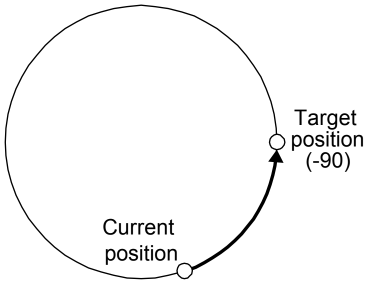
When the position data of -360.000 degrees is specified, the servo motor rotates in the CW direction. (A)
When the position data of 360.000 degrees or 0 degree is specified, the servo motor rotates in the CCW direction. (B)



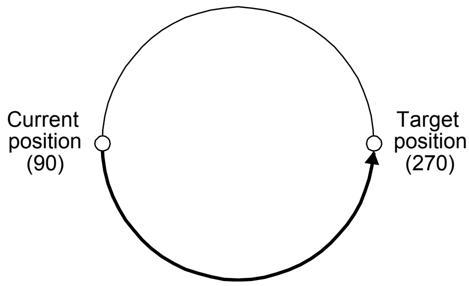
b) When using the shortest rotation specification ([Pr. PT03] = _ 1 _ _)
When the position data of 270.000 degrees is specified, the servo motor rotates in the CCW direction.



When the position data of -90.000 degrees is specified, the servo motor rotates in the CCW direction.



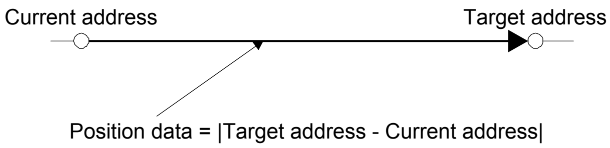
If the position data of 270.000 degrees is specified when the current position is at 90, the distances in the CCW and CW are the same. In such a case, the servo motor rotates in the CCW direction.



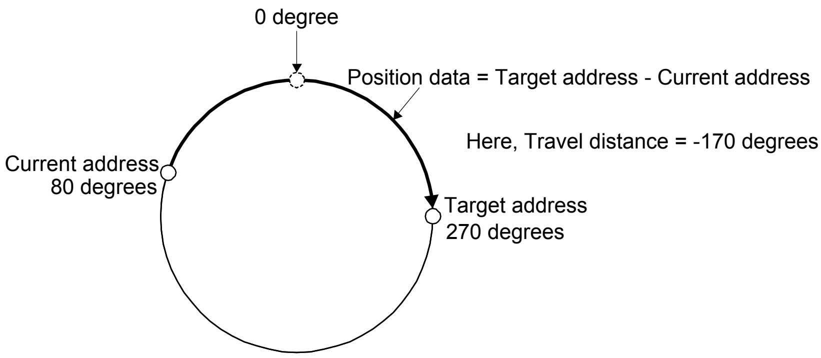
(b) Incremental value command method
As position data, set the travel distance from the current address to the target address.

1) mm, inch, and pulse unit

Setting range: 0 to 999999 [$\times 10^{STM}$ μm] (STM = Feed length multiplication [Pr. PT03])
0 to 999999 [$\times 10^{(STM-4)}$ inch] (STM = Feed length multiplication [Pr. PT03])
0 to 999999 [pulse]



2) Degree unit



(2) Point table

(a) Point table setting

1 to 31 point tables can be set. To use point table No. 4 to 31, enable DI2 (Point table No. selection 3) to DI4 (Point table No. selection 5) with "Device Setting" on MR Configurator2.
Set point tables using MR Configurator2 or the operation section of the servo amplifier.
The following table lists what to set. Refer to section 4.2.2 for details of the settings.

Item	Main description
Position data	Set the position data for movement.
Servo motor speed	Set the command speed of the servo motor for execution of positioning.
Acceleration time constant	Set the acceleration time constant.
Deceleration time constant	Set the deceleration time constant.
Dwell	Set the waiting time when performing automatic continuous operation.
Auxiliary function	Set when performing automatic continuous operation.
M code	The first digit and the second digit of the M code are outputted in 4-bit binary respectively. M code will be available in the future.

(b) Selection of point tables

Using the input signal or the communication function, select the point table No. with the communication command from the controller such as a personal computer.
The following table lists the point table No. selected in response to the input signal and the communication command.
However, when using the input signal to select the point table No., you can only use point table No. 1 to 3 in the initial status.
To use point table No. 4 to 31, enable DI2 (Point table No. selection 3) to DI4 (Point table No. selection 5) with "Device Setting" on MR Configurator2.
When using the communication function to select the point table No., refer to chapter 10.

Input signal (Note 1)					Selected point table No.
DI4 (Note 2)	DI3	DI2	DI1	DI0	
0	0	0	0	0	0 (for home position return)
0	0	0	0	1	1
0	0	0	1	0	2
0	0	0	1	1	3
0	0	1	0	0	4
. . .	. . .	. . .	. . .	. . .	. . .
1	1	1	1	0	30
1	1	1	1	1	31

Note 1. 0: Off
1: On
2. DI4 is available only with the communication function. This device cannot be assigned as an input signal.

4.2.2 Automatic operation using point table

(1) Absolute value command method

This method allows to select absolute value command or incremental value command with the auxiliary function of the point table.

(a) Point table

Set the point table values using MR Configurator2 or the operation section.

Set the position data, servo motor speed, acceleration time constant, deceleration time constant, dwell, auxiliary function, and M code to the point table.

To use the point table with the absolute value command method, set "0", "1", "8", or "9" to the auxiliary function. To use the point table with the incremental value command method, set "2", "3", "10", or "11" to the auxiliary function.

When you set a value outside the setting range to the point table, the set value will be clamped with the maximum or minimum value. If the value becomes out of the range because of the changes in the command unit or the connected servo motor, [AL. 37] will occur.

Item	Setting range	Unit	Description
Position data	-999999 to 999999 (Note)	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 2)	(1) When using this point table with the absolute value command method Set the target address (absolute value). The teaching function is also available for setting this value. (2) When using this point table with the incremental value command method Set the travel distance. A "-" sign indicates a reverse rotation command. The teaching function is not available. When teaching is executed, the setting will not be completed.
Servo motor speed	0 to permissible speed	r/min	Set the command speed of the servo motor for execution of positioning. The setting value must be the permissible instantaneous speed or less of the servo motor used.
Acceleration time constant	0 to 20000	ms	Set a time for the servo motor to reach the rated speed.
Deceleration time constant	0 to 20000	ms	Set a time for the servo motor to stop from the rated speed.
Dwell	0 to 20000	ms	Set the dwell. To disable the dwell, set "0" or "2" to the auxiliary function. To perform a continuous operation, set "1", "3", "8", "9", "10", or "11" to the auxiliary function and "0" to the dwell. When the dwell is set, a positioning of the next point table will be started after the positioning of the selected data is completed, and the set dwell has elapsed.
Auxiliary function	0 to 3, 8 to 11		Set the auxiliary function. (1) When using this point table with the absolute value command method 0: Executes automatic operation for a selected point table. 1: Executes automatic continuous operation without stopping for the next point table. 8: Executes automatic continuous operation without stopping for the point table selected at the start. 9: Executes automatic continuous operation without stopping for the point table No. 1. (2) When using this point table with the incremental value command method 2: Executes automatic operation for a selected point table. 3: Executes automatic continuous operation without stopping for the next point table. 10: Executes automatic continuous operation without stopping for the point table selected at the start. 11: Executes automatic continuous operation without stopping for the point table No. 1. When an opposite rotation direction is set, the servo motor rotates in the opposite direction after smoothing zero (command output) is confirmed. Setting "1" or "3" to point table No. 31 results in an error. For details, refer to (3) (b) in this section.
M code	0 to 99		Outputs the first digit and the second digit of the M code in 4-bit binary respectively. M code will be available in the future.

Note. The setting range of the position data in degrees is -360.000 to 360.000. When the unit of the position data is μm or inch, the location of the decimal point is changed according to the STM setting.

(b) Parameter setting

Set the following parameters to perform automatic operation.

1) Command method selection ([Pr. PT01])

Select the absolute value command method as shown below.

[Pr. PT01]

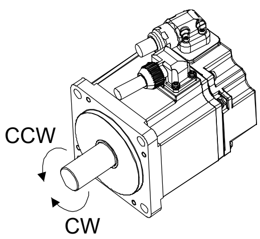
| | | | 0 |

Absolute value command method

2) Rotation direction selection ([Pr. PA14])

Select the servo motor rotation direction when ST1 (Forward rotation start) is switched on.

[Pr. PA14] setting	Servo motor rotation direction when ST1 (Forward rotation start) is switched on
0	CCW rotation with + position data CW rotation with - position data
1	CW rotation with + position data CCW rotation with - position data



3) Position data unit ([Pr. PT01])

Set the unit of the position data.

[Pr. PT01] setting	Position data unit
_ 0 _ _	mm
_ 1 _ _	inch
_ 2 _ _	degree
_ 3 _ _	pulse

4) Feed length multiplication ([Pr. PT03])

Set the feed length multiplication factor (STM) of the position data.

[Pr. PT03] setting	Position data input range			
	[mm]	[inch]	[degree] (Note 1)	[pulse] (Note 1)
_ _ _ 0	- 999.999 to + 999.999	- 99.9999 to + 99.9999	- 360.000 to + 360.000 (Note 2)	- 999999 to + 999999
_ _ _ 1	- 9999.99 to + 9999.99	- 999.999 to + 999.999		
_ _ _ 2	- 99999.9 to + 99999.9	- 9999.99 to + 9999.99		
_ _ _ 3	- 999999 to + 999999	- 99999.9 to + 99999.9		

Note 1. The feed length multiplication setting ([Pr. PT03]) is not applied to the unit multiplication factor. Adjust the unit multiplication factor in the electronic gear setting ([Pr. PA06] and [Pr. PA07]).

2. The "-" sign has different meanings under the absolute value command method and the incremental value command method. Refer to section 4.2.1 for details.

(c) Operation

Selecting DI0 to DI4 for the point table and switching on ST1 starts positioning to the position data at the set speed, acceleration time constant and deceleration time constant. At this time, ST2 (Reverse rotation start) is disabled.

Item	Device to be used	Setting
Automatic operation mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
Point table selection	DI0 (Point table No. selection 1) DI1 (Point table No. selection 2) DI2 (Point table No. selection 3) DI3 (Point table No. selection 4) DI4 (Point table No. selection 5)	Refer to section 4.2.1 (2) (b).
Start	ST1 (Forward rotation start)	Switch on ST1 to start.

(2) Incremental value command method

(a) Point table

Set the point table values using MR Configurator2 or the operation section.

Set the position data, servo motor speed, acceleration time constant, deceleration time constant, dwell, auxiliary function, and M code to the point table.

When you set a value outside the setting range to the point table, the set value will be clamped with the maximum or minimum value. If the value becomes out of the range because of the changes in the command unit or the connected servo motor, [AL. 37] will occur.

Item	Setting range	Unit	Description
Position data	0 to 999999 (Note)	$\times 10^{STM}$ μm $\times 10^{(STM-4)}$ inch $\times 10^{-3}$ degree pulse	Set the travel distance. The teaching function is not available. When teaching is executed, the setting will not be completed. The unit can be changed by [Pr. PT03] (Feed length multiplication).
Servo motor speed	0 to permissible speed	r/min	Set the command speed of the servo motor for execution of positioning. The setting value must be the permissible instantaneous speed or less of the servo motor used.
Acceleration time constant	0 to 20000	ms	Set a time for the servo motor to reach the rated speed.
Deceleration time constant	0 to 20000	ms	Set a time for the servo motor to stop from the rated speed.
Dwell	0 to 20000	ms	Set the dwell. To disable the dwell, set "0" to the auxiliary function. To perform varying-speed operation, set "1", "8" or "9" to the auxiliary function and "0" to the dwell. When the dwell is set, a positioning of the next point table will be started after the positioning of the selected data is completed, and the set dwell has elapsed.
Auxiliary function	0, 1, 8, 9		Set the auxiliary function. 0: Executes automatic operation for a selected point table. 1: Executes automatic continuous operation without stopping for the next point table. 8: Executes automatic continuous operation without stopping for the point table selected at the start. 9: Executes automatic continuous operation without stopping for the point table No. 1. Setting "1" to point table No. 31 results in an error. For details, refer to (3) (b) in this section.
M code	0 to 99		Outputs the first digit and the second digit of the M code in 4-bit binary respectively. M code will be available in the future.

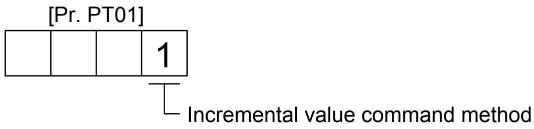
Note. The setting range of the position data in degrees is 0 to 999.999. When the unit of the position data is μm or inch, the location of the decimal point is changed according to the STM setting.

(b) Parameter setting

Set the following parameters to perform automatic operation.

1) Command method selection ([Pr. PT01])

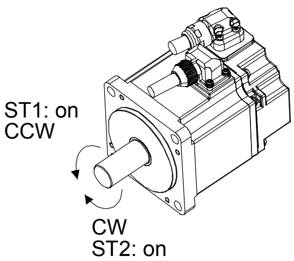
Select the incremental value command method as shown below.



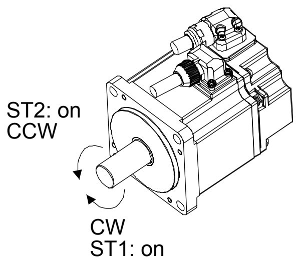
2) Rotation direction selection ([Pr. PA14])

Select the servo motor rotation direction when ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on.

[Pr. PA14] setting	Servo motor rotation direction	
	ST1 (Forward rotation start)	ST2 (Reverse rotation start)
0	CCW rotation (address increase)	CW rotation (address decrease)
1	CW rotation (address increase)	CCW rotation (address decrease)



[Pr. PA14]: 0



[Pr. PA14]: 1

3) Position data unit ([Pr. PT01])

Set the unit of the position data.

[Pr. PT01] setting	Position data unit
_ 0 _ _	mm
_ 1 _ _	inch
_ 2 _ _	degree
_ 3 _ _	pulse

4) Feed length multiplication ([Pr. PT03])

Set the feed length multiplication factor (STM) of the position data.

[Pr. PT03] setting	Position data input range			
	[mm]	[inch]	[degree] (Note)	[pulse] (Note)
_ _ _ 0	0 to + 999.999	0 to + 99.9999	0 to + 999.999	0 to + 999999
_ _ _ 1	0 to + 9999.99	0 to + 999.999		
_ _ _ 2	0 to + 99999.9	0 to + 9999.99		
_ _ _ 3	0 to + 999999	0 to + 99999.9		

Note. The feed length multiplication setting ([Pr. PT03]) is not applied to the unit multiplication factor.
Adjust the unit multiplication factor in the electronic gear setting ([Pr. PA06] and [Pr. PA07]).

(c) Operation

Selecting DI0 to DI4 for the point table and switching on ST1 starts a forward rotation of the motor over the travel distance of the position data at the set speed, acceleration time constant and deceleration time constant.

Switching on ST2 starts a reverse rotation of the motor in accordance with the values set to the selected point table.

When the positioning operation is performed consecutively with the incremental value command method, the servo motor rotates in the same direction only.

To change the travel direction during the continuous operation, perform the operation with the absolute value command method.

Item	Device to be used	Setting
Automatic operation mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
Point table selection	DI0 (Point table No. selection 1) DI1 (Point table No. selection 2) DI2 (Point table No. selection 3) DI3 (Point table No. selection 4) DI4 (Point table No. selection 5)	Refer to section 4.2.1 (2) (b).
Start	ST1 (Forward rotation start) ST2 (Reverse rotation start)	Switch on ST1 to start. Switch on ST2 to start.

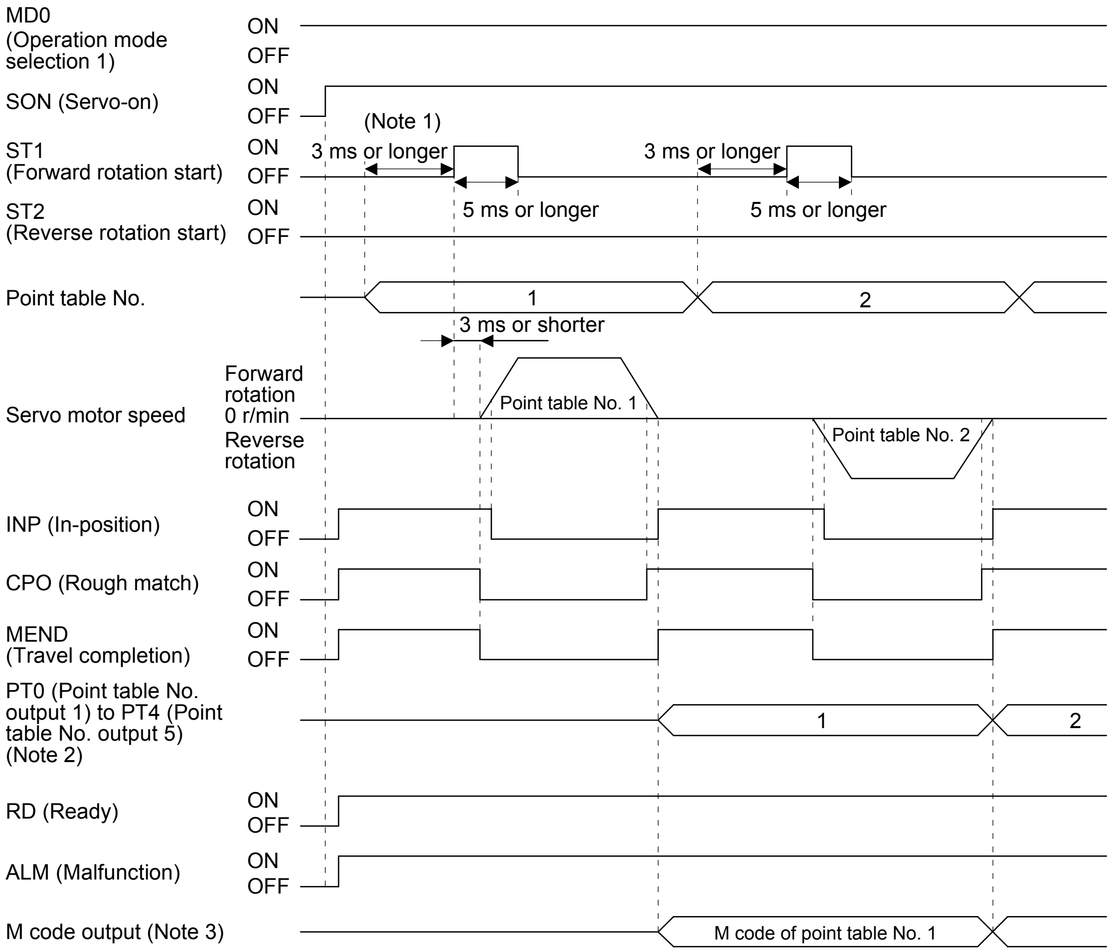
(3) Automatic operation timing chart

(a) Automatic individual positioning operation

1) Absolute value command method ([Pr. PT01] = _ _ _ 0)

While the servo motor is stopped under servo-on state, switching on ST1 (Forward rotation start) starts the automatic positioning operation.

The following shows a timing chart.

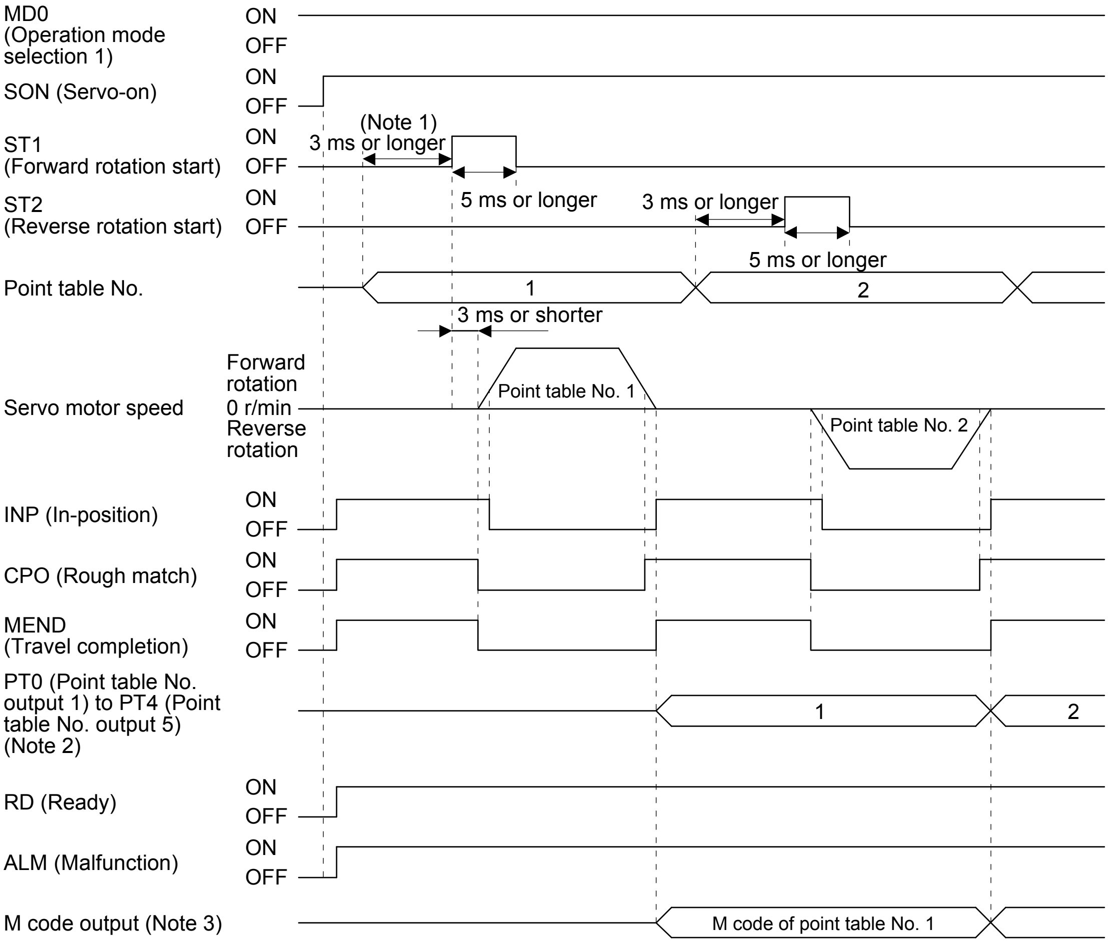


Note 1. The detection of external input signals is delayed by the set time in the input filter setting of [Pr. PD29]. Considering the output signal sequence from the controller and signal variations due to hardware, configure a sequence that changes the point table selection earlier.

2. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.

3. M code will be available in the future.

2) Absolute value command method ([Pr. PT01] = _ _ _ 1)
While the servo motor is stopped under servo-on state, switching on ST1 (Forward rotation start) or ST2 (Reverse rotation start) starts the automatic positioning operation.
The following shows a timing chart.



Note 1. The detection of external input signals is delayed by the set time in the input filter setting of [Pr. PD29]. Considering the output signal sequence from the controller and signal variations due to hardware, configure a sequence that changes the point table selection earlier.
2. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
3. M code will be available in the future.

(b) Automatic continuous positioning operation
By merely selecting a point table and switching on ST1 (Forward rotation start) or ST2 (Reverse rotation start), the operation can be performed in accordance with the point tables having consecutive numbers.

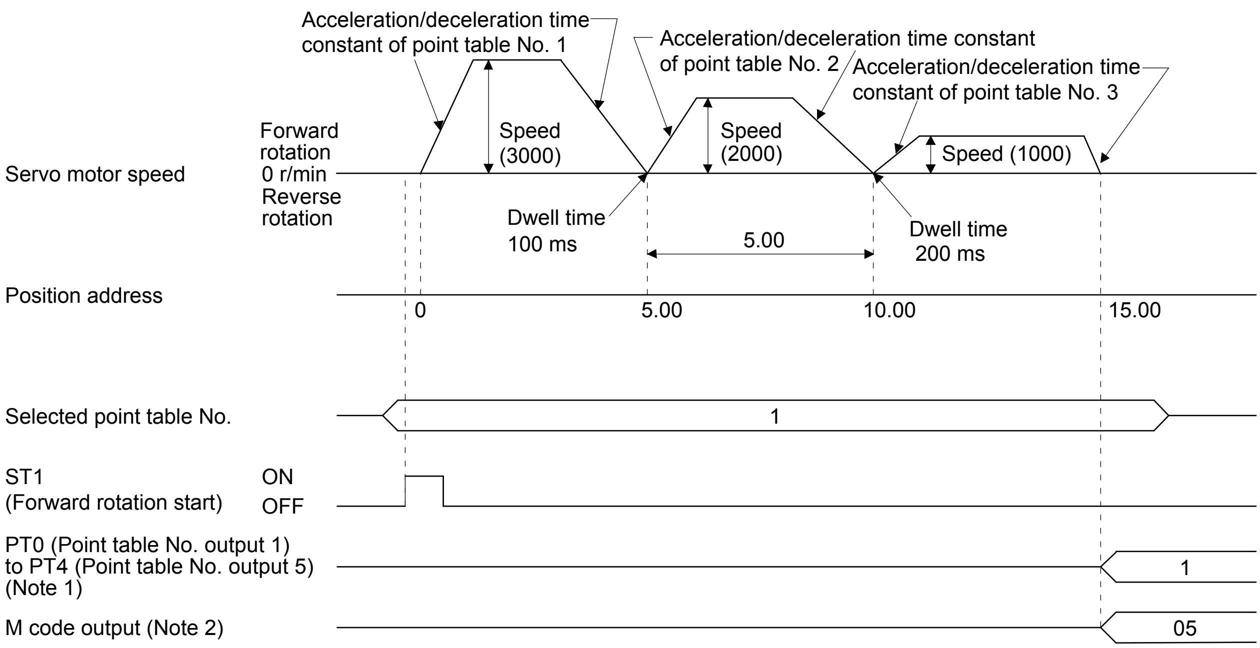
1) Absolute value command method ([Pr. PT01] = _ _ _ 0)
By specifying the absolute value command or the incremental value command in the auxiliary function of the point table, the automatic continuous operation can be performed.
The following shows how to set.

Point table setting		
Dwell	Auxiliary function	
	When the position data is absolute value	When the position data is incremental value
1 or more	1	3

a) Positioning in a single direction
The following shows an operation example with the set values listed in the table below.
In this example, point table No. 1 and No. 3 are set to the absolute value command method, and point table No. 2 the incremental value command method.

Point table No.	Position data [10STM μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note 2)
1	5.00	3000	100	150	100	1	05
2	5.00	2000	150	200	200	3	10
3	15.00	1000	300	100	Disabled	0 (Note 1)	15

Note 1. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
2. M code will be available in the future.



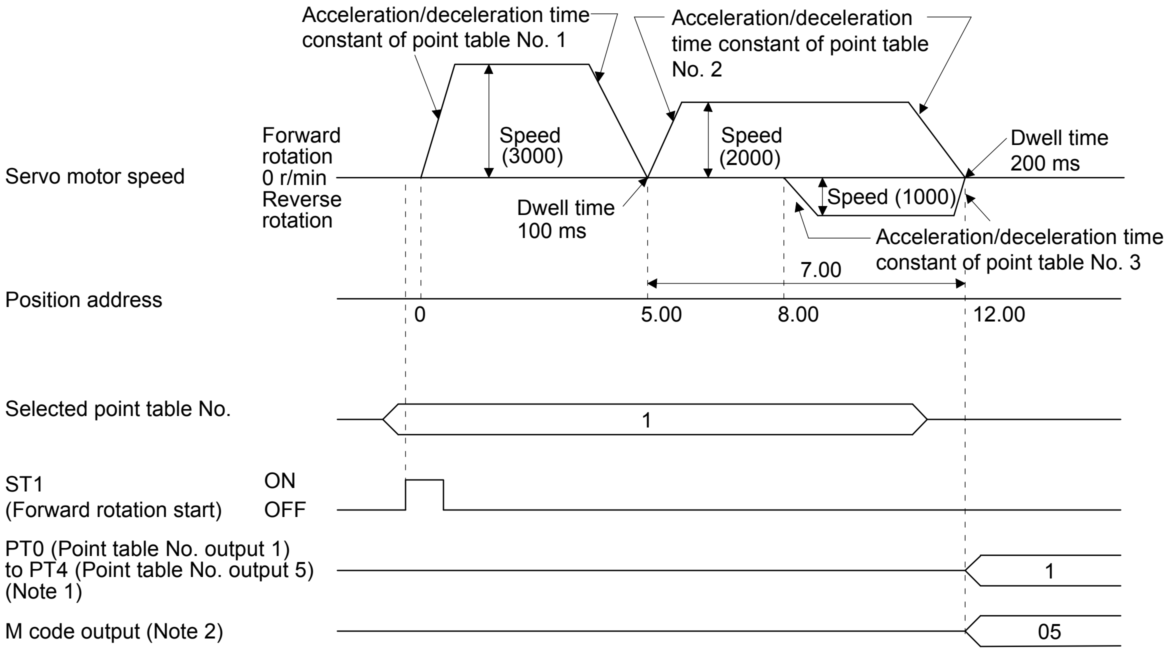
Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

b) Positioning in the reverse direction midway

The following shows an operation example with the set values listed in the table below.
In this example, point table No. 1 and No. 3 are set to the absolute value command method, and point table No. 2 the incremental value command method.

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note 2)
1	5.00	3000	100	150	100	1	05
2	7.00	2000	150	200	200	3	10
3	8.00	1000	300	100	Disabled	0 (Note 1)	15

Note. 1. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
2. M code will be available in the future.



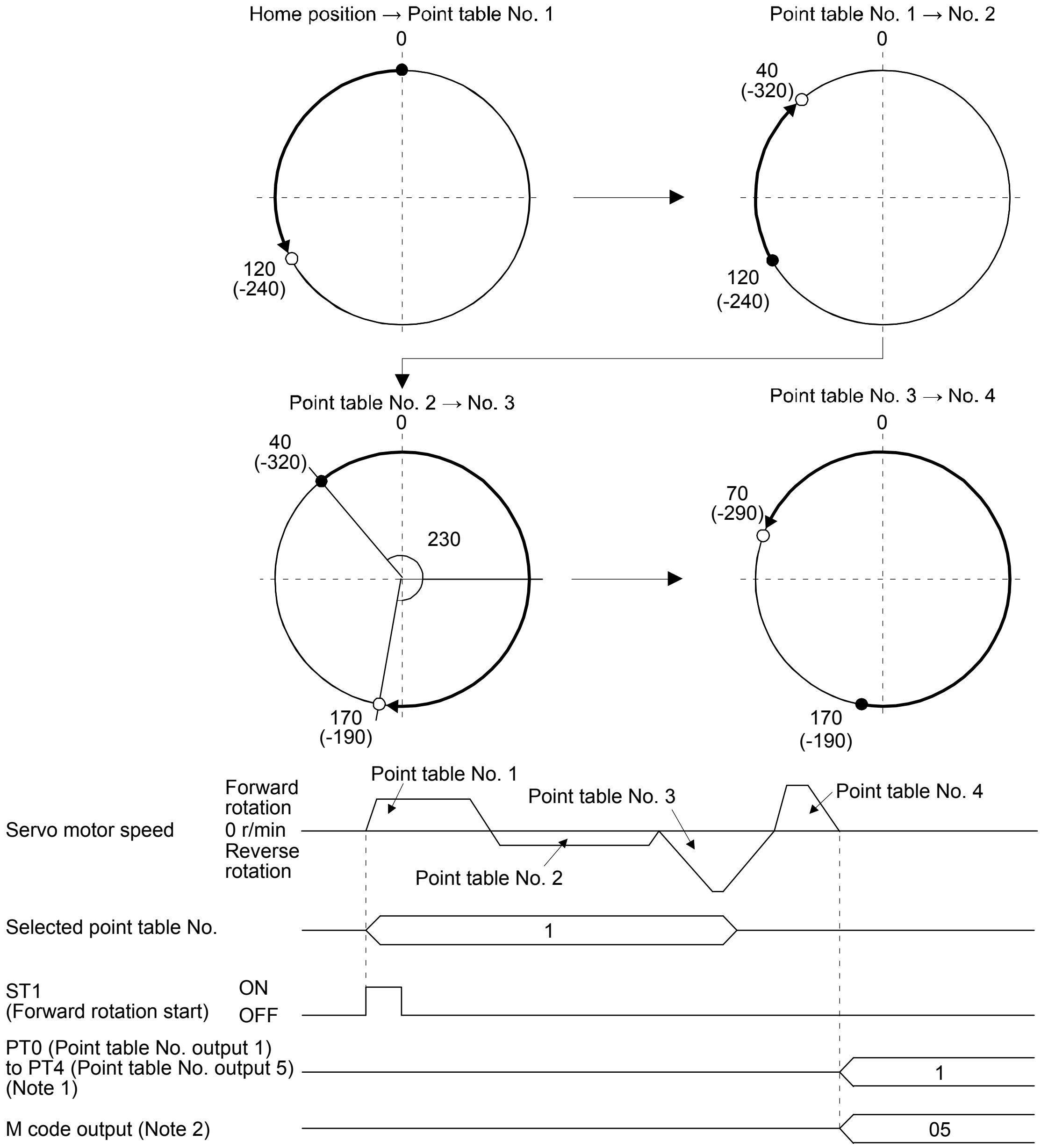
Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

c) Position data in degrees

The following shows an operation example with the set values listed in the table below.
In this example, point table No. 1, No. 2, and No. 4 are set to the absolute value command method, and point table No. 3 the incremental value command method.

Point table No.	Position data [degree]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note 2)
1	120.000	1000	100	150	100	1	05
2	-320.000	500	150	100	200	1	10
3	-230.000	3000	200	300	150	3	15
4	70.000	1500	300	100	Disabled	0 (Note 1)	20

Note 1. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
2. M code will be available in the future.



Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

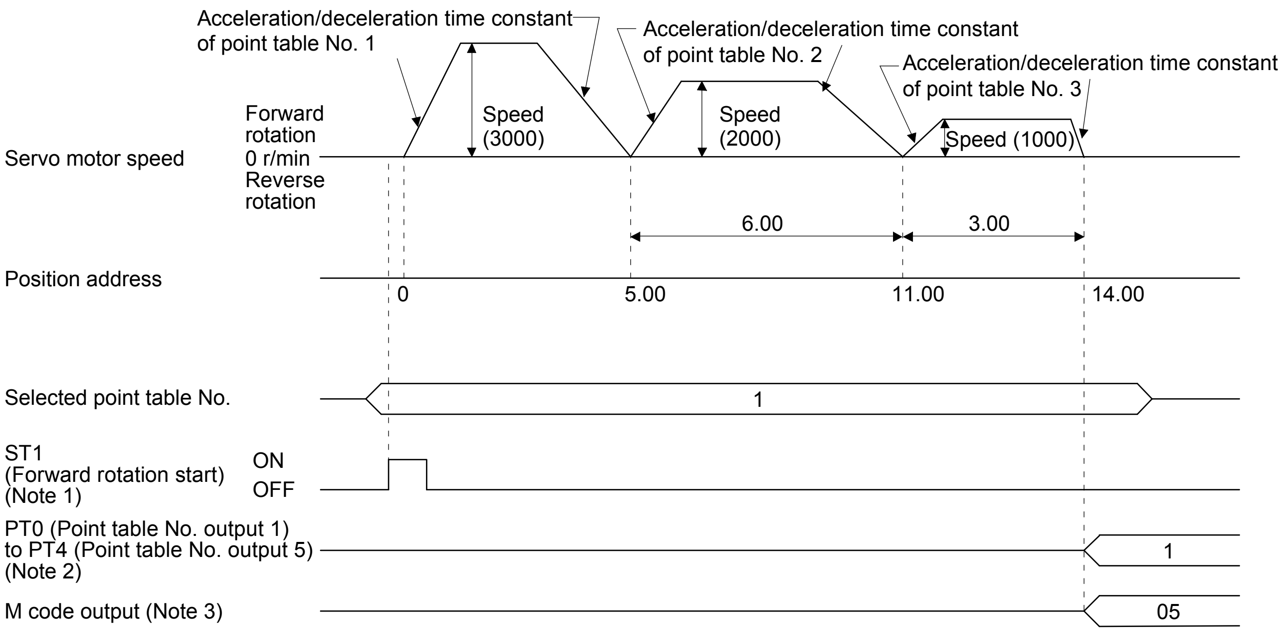
2) Incremental value command method ([Pr. PT01] = _ _ _ 1)
The position data of the incremental value command method is the sum of the position data of consecutive point tables.
The following shows how to set.

Point table setting	
Dwell	Auxiliary function
1 or more	1

a) Positioning in a single direction
The following shows an operation example with the set values listed in the table below.

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note 2)
1	5.00	3000	100	150	100	1	05
2	6.00	2000	150	200	200	1	10
3	3.00	1000	300	100	Disabled	0 (Note 1)	15

Note 1. Always set "0" to the auxiliary function of the last point table among the consecutive point tables.
2. M code will be available in the future.



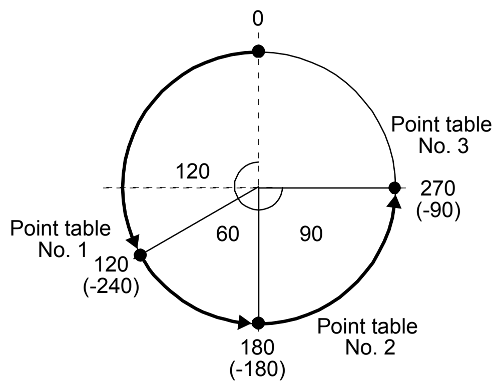
Note 1. Switching on ST2 (Reverse rotation start) starts positioning in the reverse rotation direction.
2. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
3. M code will be available in the future.

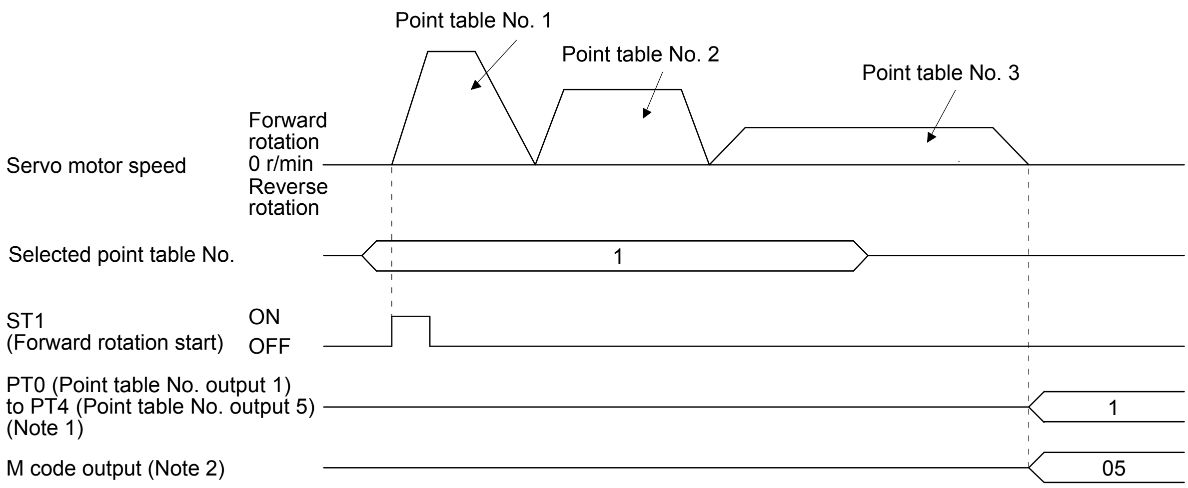
b) Position data in degrees

The following shows an operation example with the set values listed in the table below.

Point table No.	Position data [degree]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note 2)
1	120.000	3000	100	150	0	1	05
2	60.000	1500	150	100	0	1	10
3	90.000	1000	300	100	Disabled	0 (Note 1)	15

Note 1. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
2. M code will be available in the future.





Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

(c) Varying-speed operation

By setting the auxiliary function of the point table, the servo motor speed during positioning can be changed. Point tables are used by the number of the set speed.

1) Absolute value command method ([Pr. PT01] = _ _ _ 0)

Set "1" or "3" to the auxiliary function to execute the positioning at the speed set in the following point table.
At this time, the position data selected at start is enabled, and the acceleration/deceleration time constant set in the next and subsequent point tables is disabled.
By setting "1" or "3" to sub functions until point table No. 30, the operation can be performed at maximum 31 speeds.
Always set "0" or "2" to the auxiliary function of the last point table.
To perform varying-speed operation, always set "0" to the dwell.
Setting "1" or more enables the automatic continuous positioning operation.
The following table shows an example of setting.

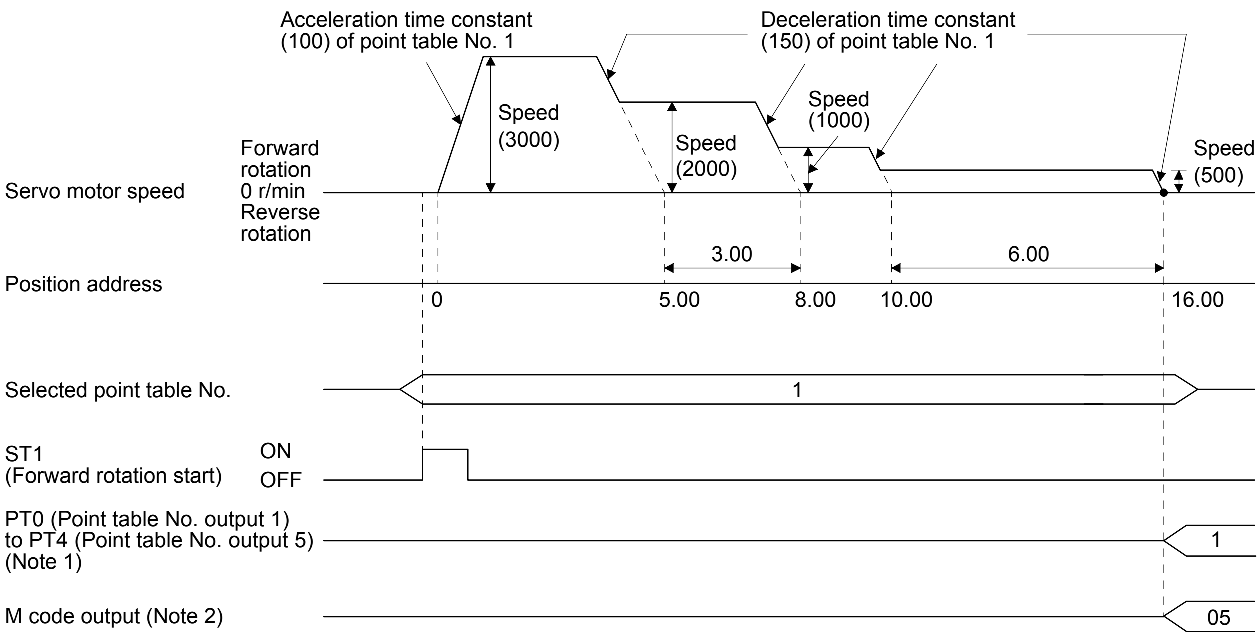
Point table No.	Dwell [ms] (Note 1)	Auxiliary function	Varying-speed operation
1	0	1	Consecutive point table data
2	0	3	
3	Disabled	0 (Note 2)	
4	0	3	Consecutive point table data
5	0	1	
6	Disabled	2 (Note 2)	

Note 1. Always set "0".
2 Always set "0" or "2" to the auxiliary function of the last point table among the consecutive point tables.

a) Positioning in a single direction
The following shows an operation example with the set values listed in the table below.
In this example, point table No. 1 and No. 3 are set to the absolute value command method, and point table No. 2 the incremental value command method.

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms] (Note 1)	Auxiliary function	M code (Note 3)
1	5.00	3000	100	150	0	1	05
2	3.00	2000	Disabled	Disabled	0	3	10
3	10.00	1000	Disabled	Disabled	0	1	15
4	6.00	500	Disabled	Disabled	Disabled	2 (Note 2)	20

Note 1. Always set "0".
2. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
3. M code will be available in the future.



Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

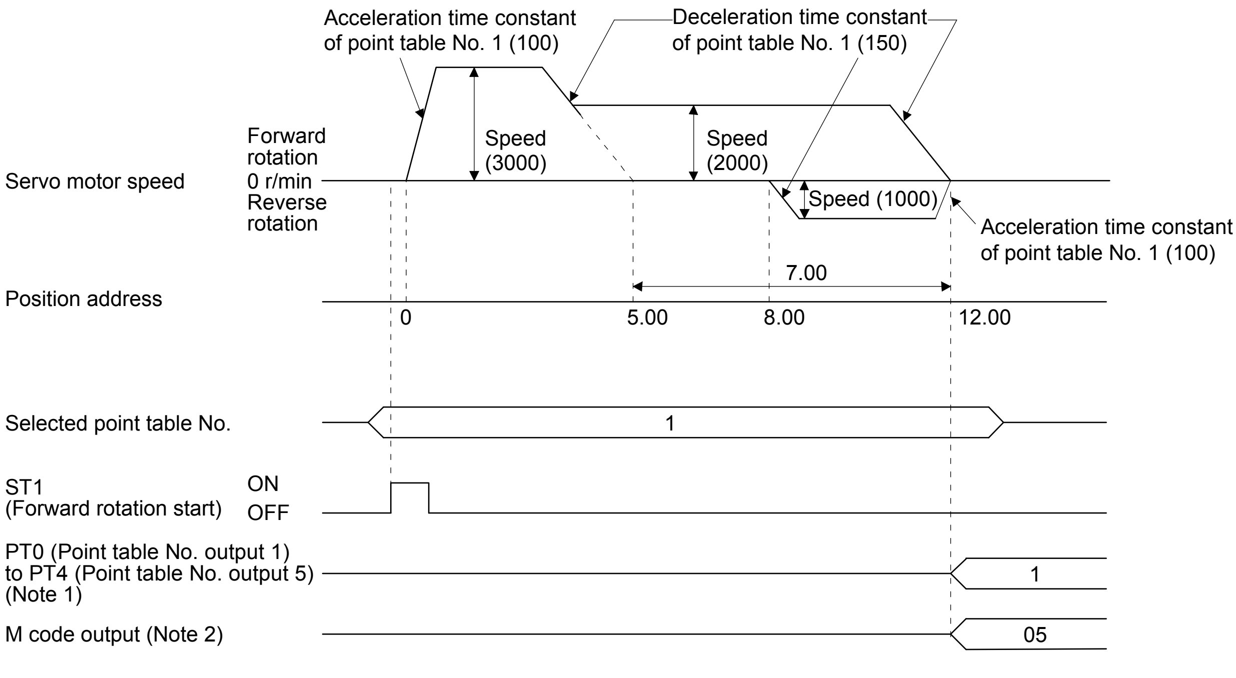
b) Positioning in the reverse direction midway

The following shows an operation example with the set values listed in the table below.

In this example, point table No. 1 and No. 3 are set to the absolute value command method, and point table No. 2 the incremental value command method.

Point table No.	Position data [10STM μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms] (Note 1)	Auxiliary function	M code (Note 3)
1	5.00	3000	100	150	0	1	05
2	7.00	2000	Disabled	Disabled	0	3	10
3	8.00	1000	Disabled	Disabled	Disabled	0 (Note 2)	15

Note 1. Always set "0".
2. Always set "0" or "2" to the auxiliary function of the last point table of the consecutive point tables.
0: When using the point table with the absolute value command method
2: When using the point table with the incremental value command method
3. M code will be available in the future.



Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

2) Absolute value command method ([Pr. PT01] = _ _ _ 1)
Setting "1" to the auxiliary function executes positioning at the speed set in the following point table.
At this time, the position data selected at start is enabled, and the acceleration/deceleration time constant set in the next and subsequent point tables is disabled.
By setting "1" to sub functions until point table No. 30, the operation can be performed at maximum 31 speeds.
Always set "0" to the auxiliary function of the last point table.
To perform varying-speed operation, always set "0" to the dwell.
Setting "1" or more enables the automatic continuous positioning operation.
The following table shows an example of setting.

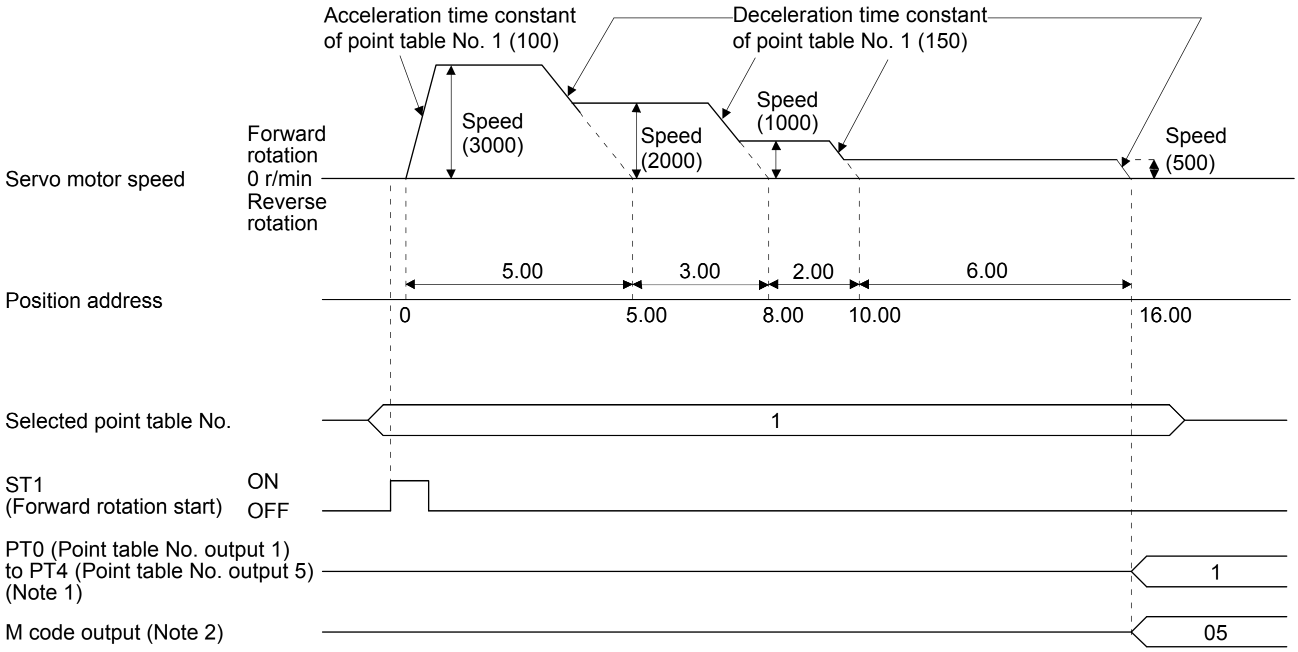
Point table No.	Dwell [ms] (Note 1)	Auxiliary function	Varying-speed operation
1	0	1	Consecutive point table data
2	0	1	
3	Disabled	0 (Note 2)	
4	0	1	Consecutive point table data
5	0	1	
6	Disabled	0 (Note 2)	

Note 1. Always set "0".
2. Always set "0" to the auxiliary function of the last point table among the consecutive point tables.

The following shows an operation example with the set values listed in the table below.

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms] (Note 1)	Auxiliary function	M code (Note 3)
1	5.00	3000	100	150	0	1	05
2	3.00	2000	Disabled	Disabled	0	1	10
3	2.00	1000	Disabled	Disabled	0	1	15
4	6.00	500	Disabled	Disabled	Disabled	0 (Note 2)	20

Note 1. Always set "0".
2. Always set "0" to the auxiliary function of the last point table among the consecutive point tables.
3. M code will be available in the future.



Note 1. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.
2. M code will be available in the future.

(d) Automatic repeat positioning operation

By setting the auxiliary function of the point table, the operation pattern of the set point table No. can be returned to, and the positioning operation can be performed repeatedly.

1) Absolute value command method ([Pr. PT01] = _ _ _ 0)

Setting "8" or "10" to the auxiliary function performs an automatic continuous operation or a varying-speed operation until that point table, and after the completion of positioning, performs the operation again from the operation pattern of the point table No. used at start-up.
Setting "9" or "11" to the auxiliary function performs an automatic continuous operation or a varying-speed operation until that point table, and after the completion of positioning, performs the operation again from the operation pattern of point table No. 1.

a) Automatic repeat positioning operation by absolute value command method

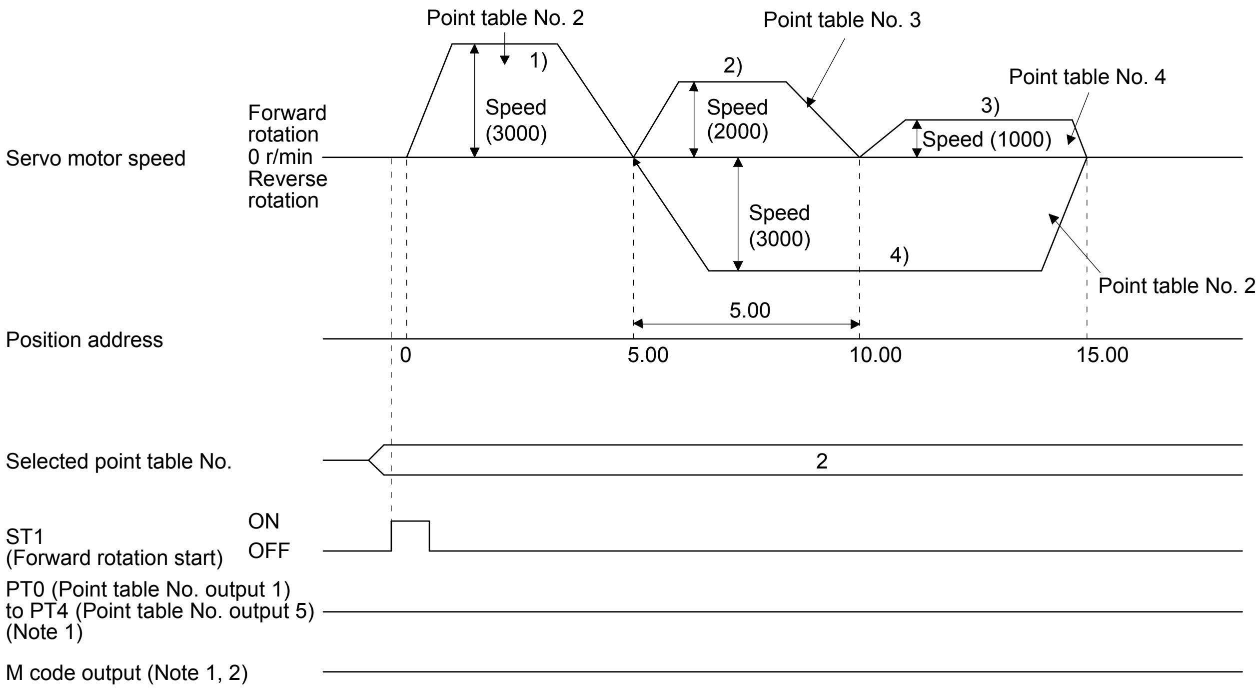
Example 1. Operations when "8" is set to the auxiliary function of point table No. 4

Point table No.	Position data [10STM μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	4.00	1500	200	100	150	1	01
2	5.00	3000	100	150	100	1	05
3	5.00	2000	150	200	200	3	10
4	15.00	1000	300	100	150	8	15

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2
2) Executing point table No. 3
3) Executing point table No. 4
4) Executing again point table No. 2 used at start-up when "8" is set to the auxiliary function of point table No. 4
5) Repeating the above execution in the sequence of 2) to 3) to 4) to 2) to 3) to 4)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

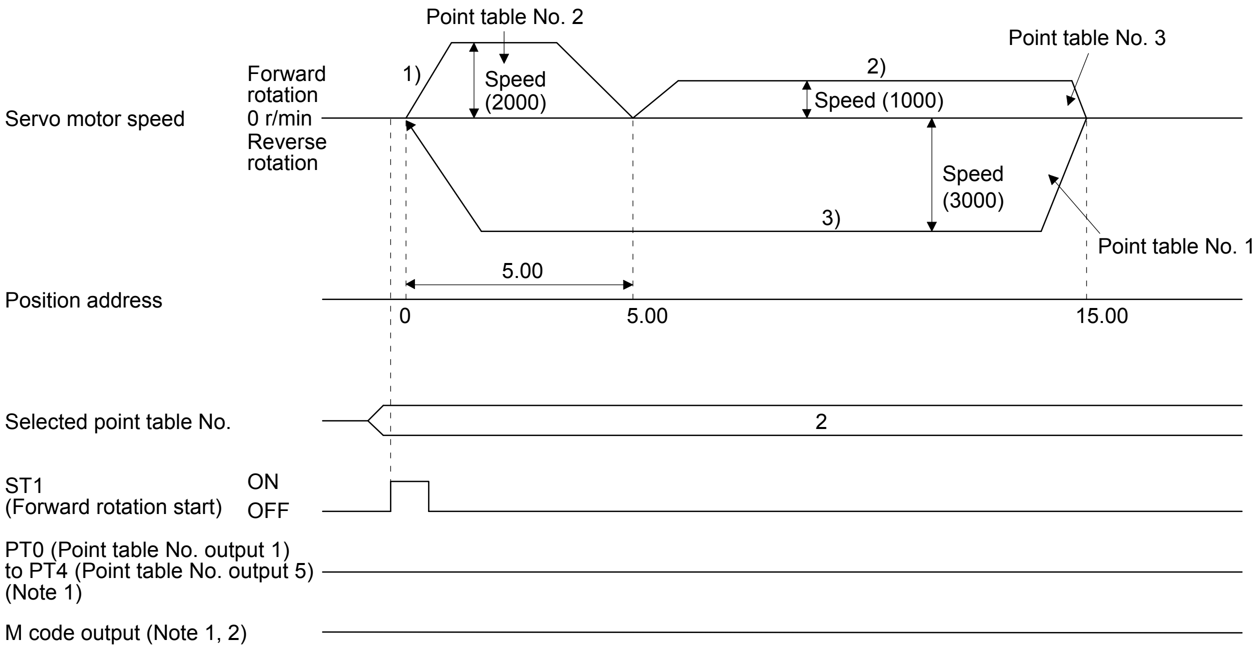
Example 2. Operations when "9" is set to the auxiliary function of point table No. 3

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	0.00	3000	100	150	100	1	05
2	5.00	2000	150	200	200	1	10
3	15.00	1000	300	100	150	9	15

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2
2) Executing point table No. 3
3) Executing point table No. 1 when "9" is set to the auxiliary function of point table No. 3
4) Repeating the above execution in the sequence of 1) to 2) to 3) to 1) to 2) to 3)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

b) Automatic repeat positioning operation by incremental value command method

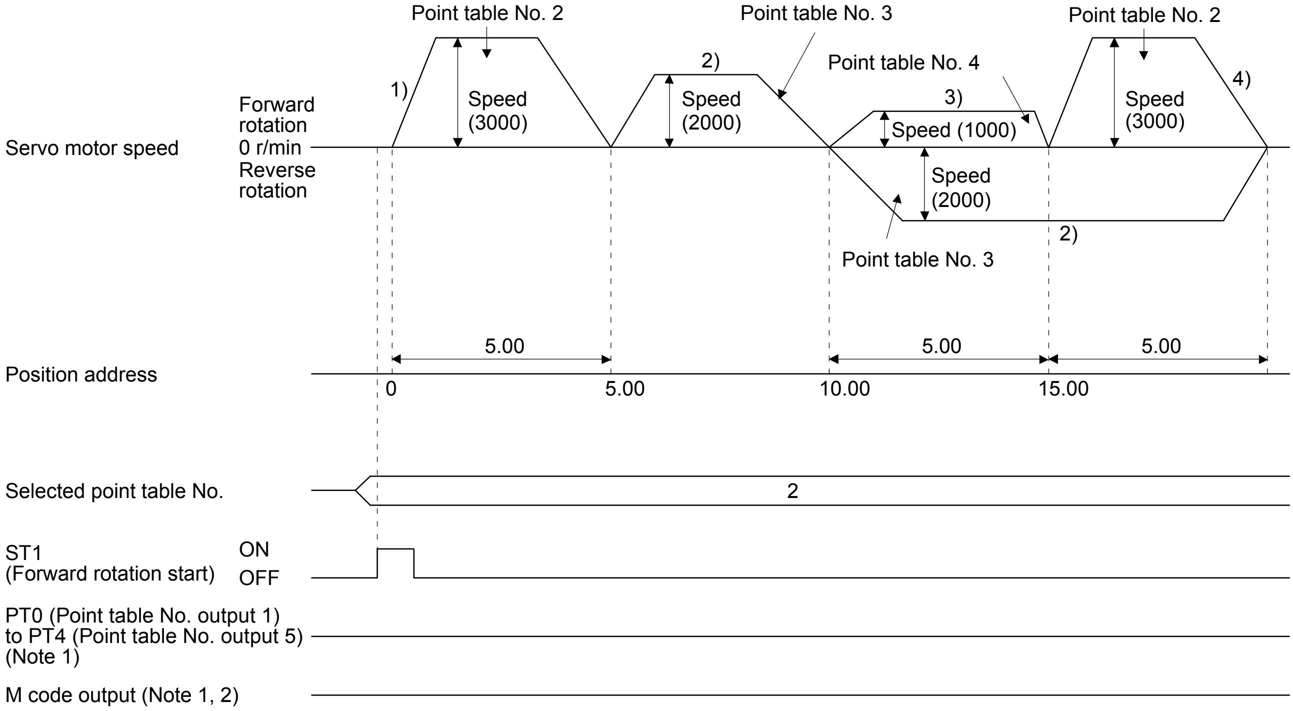
Example 1. Operations when "10" is set to the auxiliary function of point table No. 4

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	4.00	1500	200	100	150	1	01
2	5.00	3000	100	150	100	3	05
3	10.00	2000	150	200	200	1	10
4	5.00	1000	300	100	150	10	15

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2
2) Executing point table No. 3
3) Executing point table No. 4
4) Executing again point table No. 2 used at start-up when "10" is set to the auxiliary function of point table No. 4
5) Repeating the above execution in the sequence of 1) to 2) to 3) to 4) to 2) to 3) to 4)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

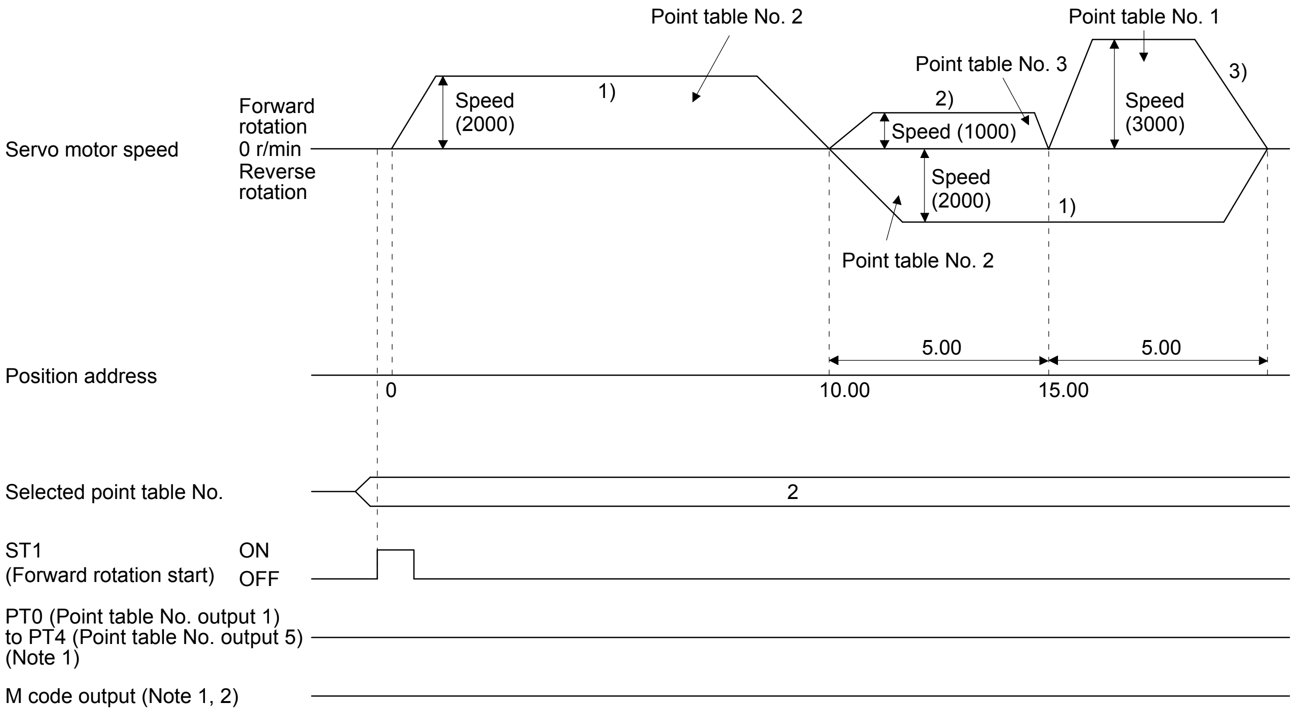
Example 2. Operations when "11" is set to the auxiliary function of point table No. 3

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	5.00	3000	100	150	100	3	05
2	10.00	2000	150	200	200	1	10
3	5.00	1000	300	100	150	11	15

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2
2) Executing point table No. 3
3) Executing point table No. 1 when "11" is set to the auxiliary function of point table No. 3
4) Repeating the above execution in the sequence of 1) to 2) to 3) to 1) to 2) to 3)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

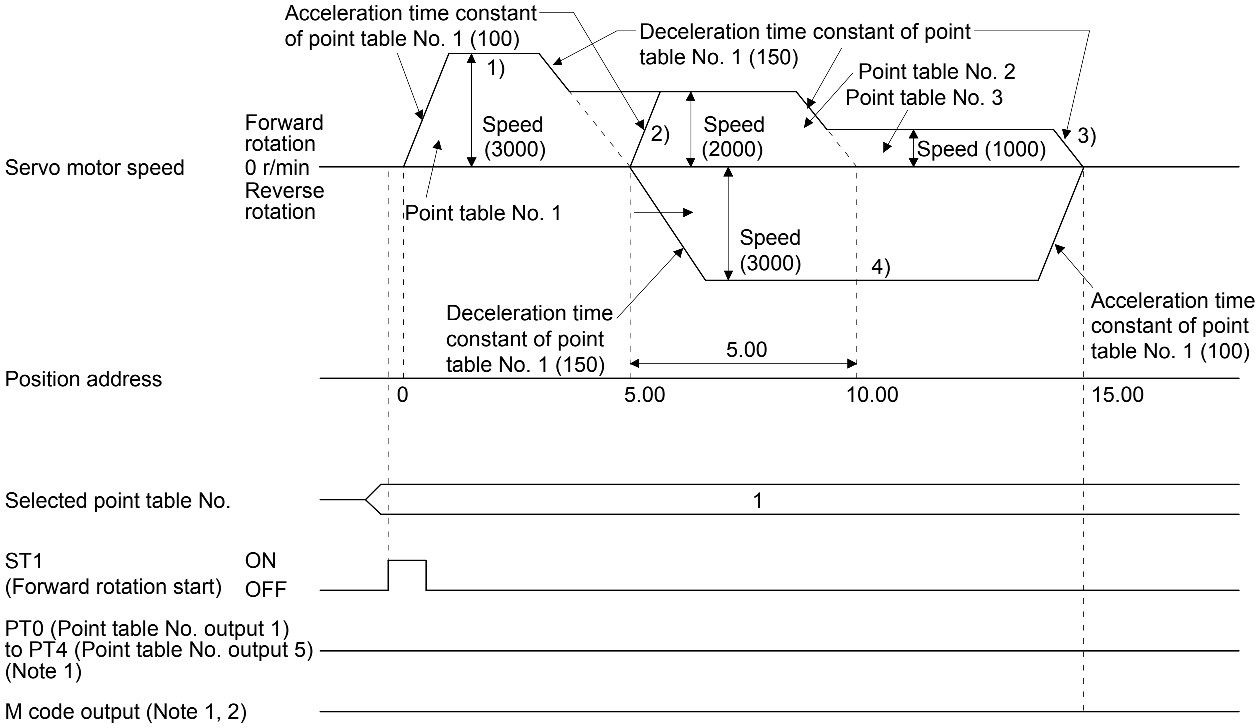
c) Varying-speed operation by absolute value command method

Example. Operations when "8" is set to the auxiliary function of point table No. 3

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	5.00	3000	100	150	0	1	05
2	5.00	2000	Disabled	Disabled	0	3	10
3	15.00	1000	Disabled	Disabled	0	8	15

Note. M code will be available in the future.

Operation sequence
1) Starting with point table No. 1
2) Varying the speed and executing point table No. 2
3) Varying the speed and executing point table No. 3
4) Executing point table No. 1 used at start-up in CW direction when "8" is set to the auxiliary function of point table No. 3
5) Repeating the above execution in the sequence of 1) to 2) to 3) to 4) to 2) to 3) to 4)



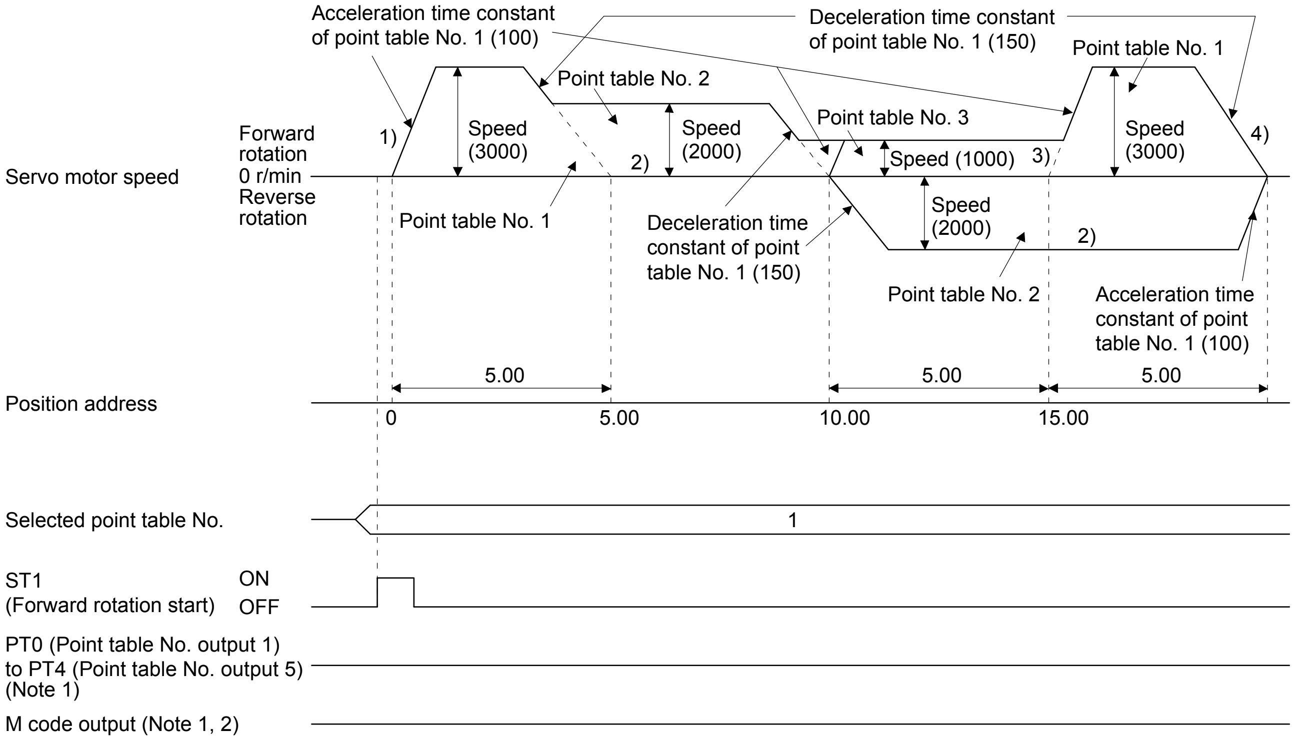
Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

d) Varying-speed operation by incremental value command method
Example. Operations when "10" is set to the auxiliary function of point table No. 3

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	5.00	3000	100	150	0	3	05
2	10.00	2000	150	200	0	1	10
3	5.00	1000	300	100	0	10	15

Note. M code will be available in the future.

Operation sequence
1) Starting with point table No. 1
2) Varying the speed and executing point table No. 2
3) Varying the speed and executing point table No. 3
4) Varying the speed, and executing point table No. 1 when "10" is set to the auxiliary function of point table No. 3
5) Repeating the above execution in the sequence of 1) to 2) to 3) to 4) to 2) to 3) to 4)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

2) Absolute value command method ([Pr. PT01] = _ _ _ 1)
Setting "8" to the auxiliary function performs automatic continuous operation or varying-speed operation until that point table, and after the completion of positioning, performs the operation again from the operation pattern of the set point table.
Setting "9" to the auxiliary function performs automatic continuous operation or varying-speed operation until that point table, and after the completion of positioning, performs the operation again from the operation pattern of point table No. 1.

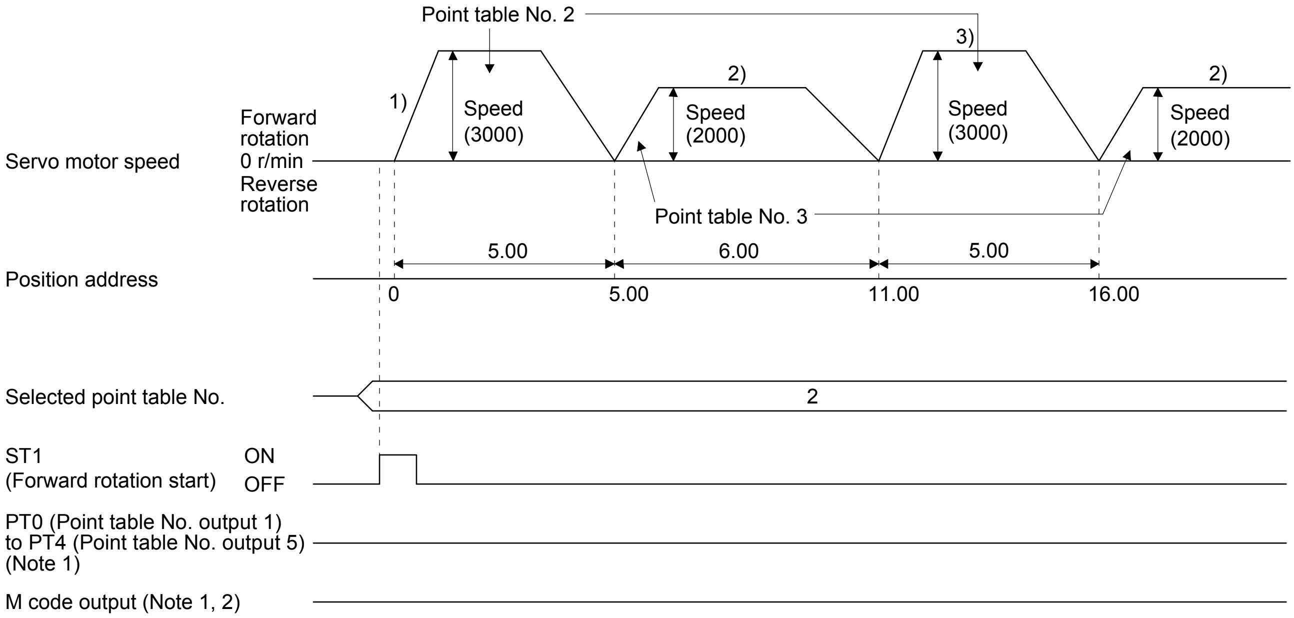
b) Automatic repeat positioning operation by incremental value command method
Example 1. Operations when "8" is set to the auxiliary function of point table No. 3

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	4.00	1500	200	100	150	1	01
2	5.00	3000	100	150	100	1	05
3	6.00	2000	150	200	200	8	10

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2
2) Executing point table No. 3
3) Executing again point table No. 2 used at start-up when "8" is set to the auxiliary function of point table No. 3
4) Repeating the above execution in the sequence of 1) to 2) to 3) to 2) to 3)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

Example 2. Operations when "9" is set to the auxiliary function of point table No. 2

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	5.00	3000	100	150	100	1	05
2	6.00	2000	150	200	200	9	10

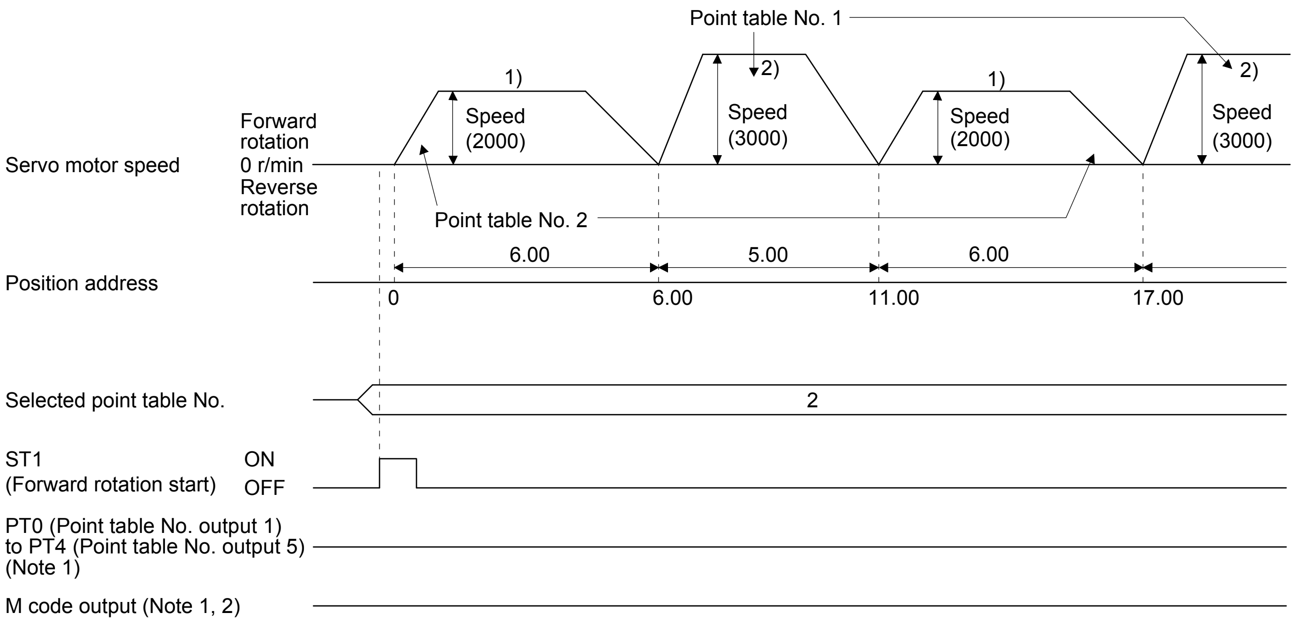
Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 2

2) Executing point table No. 1 when "9" is set to the auxiliary function of point table No. 2

3) Repeating the above execution in the sequence of 1) to 2) to 1) to 2)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.

2. M code will be available in the future.

b) Varying-speed operation by incremental value command method

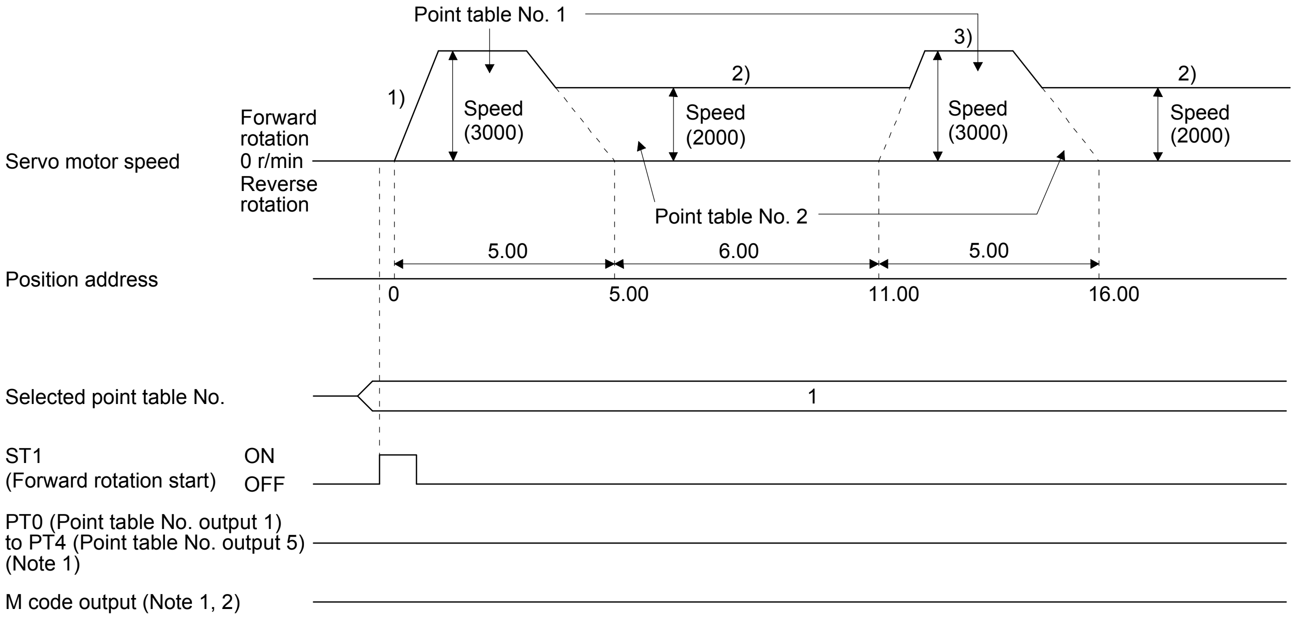
Example. Operations when "8" is set to the auxiliary function of point table No. 2

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Auxiliary function	M code (Note)
1	5.00	3000	100	150	0	1	05
2	6.00	2000	Disabled	Disabled	0	8	10

Note. M code will be available in the future.

Operation sequence

1) Starting with point table No. 1
2) Varying the speed and executing point table No. 2
3) Executing again point table No. 1 used at start-up when "8" is set to the auxiliary function of point table No. 2
4) Repeating the above execution in the sequence of 1) to 2) to 3) to 2) to 3)



Note 1. PT0 to PT4 and M code are not outputted in automatic continuous operation.
2. M code will be available in the future.

(e) Temporary stop/restart

When TSTP (Temporary stop/restart) is switched on during automatic operation, the servo motor decelerates with the deceleration time constant of the point table being executed, and then stops temporarily.

Switching on TSTP (Temporary stop/restart) again starts the servo motor rotation for the remaining travel distance.

During a temporary stop, ST1 (Forward rotation start) or ST2 (Reverse rotation start) does not function even if it is switched on.

When any of the following conditions is satisfied during a temporary stop, the travel remaining distance is cleared.

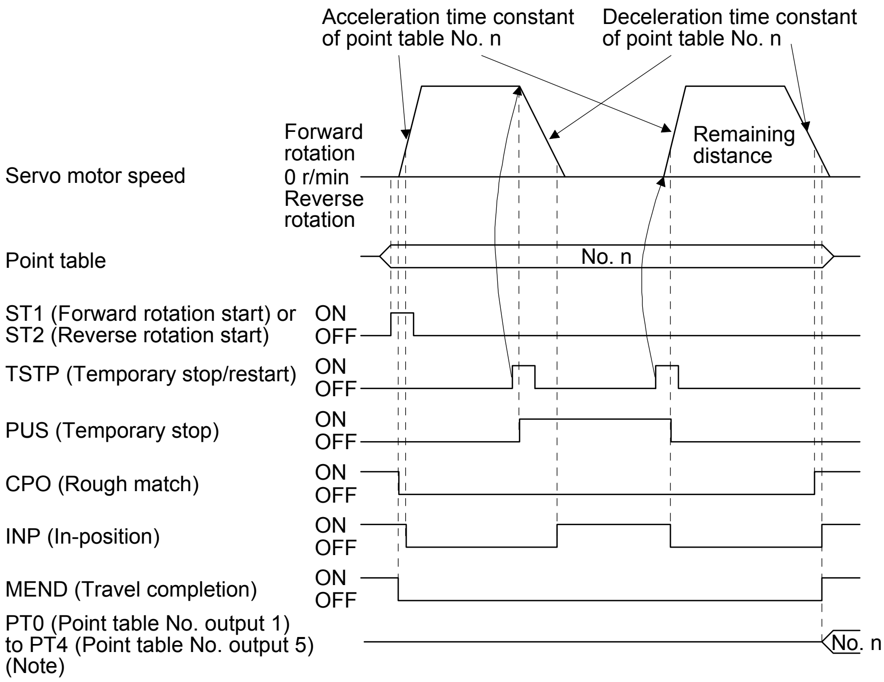
- The operation mode is switched from the automatic mode to the manual mode.
- The servo motor enters the servo-off status.
- The clear signal is input.

The temporary stop/restart input does not function during a home position return or JOG operation.

The temporary stop/restart input functions in the following states.

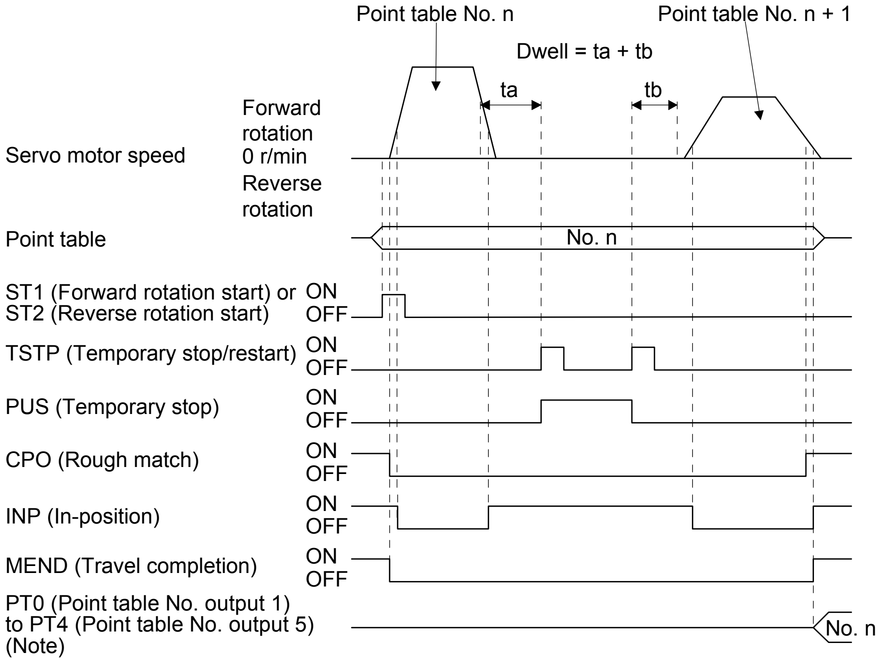
Operation status	Automatic operation	Manual operation	Home position return
During a stop			
During acceleration	Pause		
At a constant speed	Pause		
During deceleration			
During a temporary stop	Restart		

1) When the servo motor is rotating



Note. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.

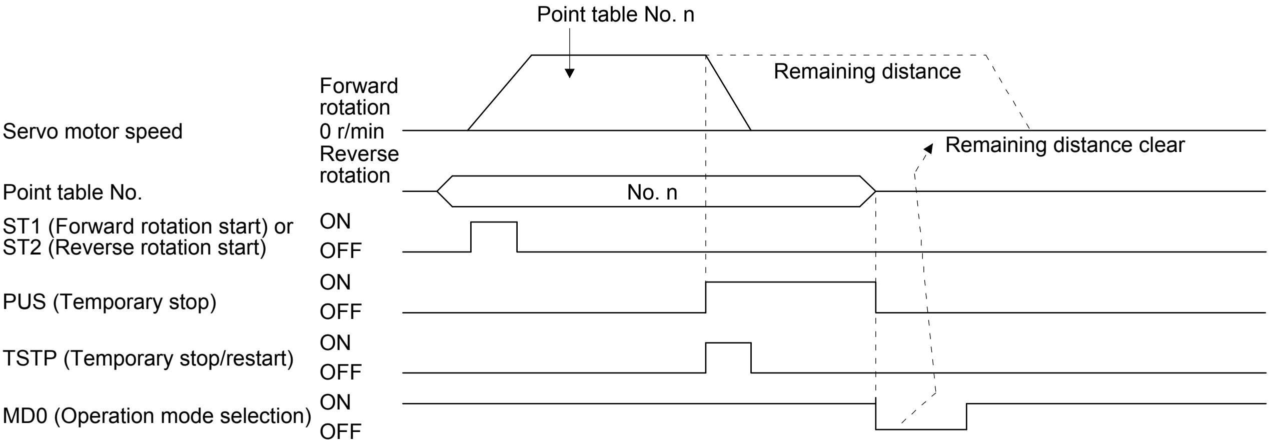
2) During dwell



Note. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.

(f) Suspension of automatic operation

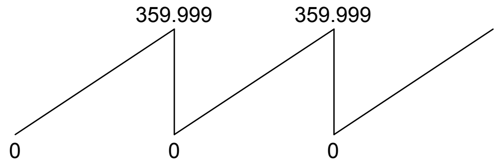
To suspend the automatic operation or change the operation pattern, stop the servo motor with TSTP (Temporary stop/restart), switch off MD0 (Operation mode selection 1), and then set the mode to the manual mode. The travel remaining distance is cleared.



(g) Using a control unit of "degree"

1) Current position/command position address

The current position/command position address is of ring-address type.



2) Software limit activation/deactivation setting

POINT
●After changing the "+" or "-" sign of an axis with the software limit activation setting, perform a home position return. ●When activating the software limit in an incremental system, perform a home position return after power-on.

a) Setting range

When the unit is set to "degree", the setting range of the software limit is from 0 degree (lower limit) to 359.999 degrees (upper limit).

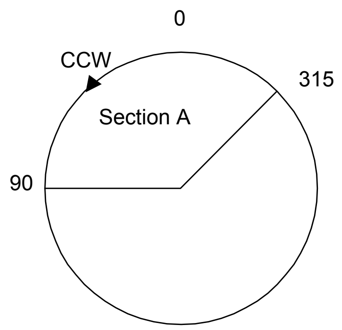
When you set a value other than 0 degree to 359.999 degrees in [Pr. PT15] to [Pr. PT18], the set value is converted as follows. (It will be clamped between 0 degree and 359.999 degrees.)

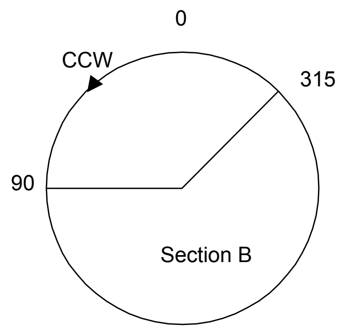
Software limit value	After conversion
360.000 degrees to 999.999 degrees	The remainder of the set value divided by 360
-0.001 degrees to -359.999 degrees	The sum of the set value and 360
-360.000 degrees to -999.999 degrees	The sum of 360 and the quotient of the set value divided by 360

b) When the software limit is enabled

Set the software limit - ([Pr. PT17] and [Pr. PT18]) for the start position and the software limit + ([Pr. PT15] and [Pr. PT16]) for the end position.

The movable range is the section from - to + in the CCW direction.





Set the movable range of section A as follows:

・Software limit - … 315.000 degrees

・Software limit + … 90.000 degrees

Set the movable range of section B as follows:

・Software limit - … 90.000 degrees

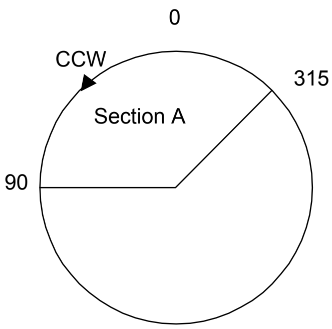
・Software limit + … 315.000 degrees

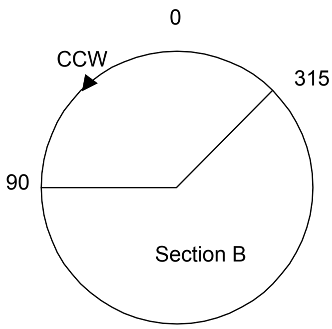
c) When the software limit is disabled
When deactivating the software limit, set the same values to the software limit - ([Pr. PT17] and [Pr. PT18]) and the software limit + ([Pr. PT15] and [Pr. PT16]).
Control can be performed independently of the software limit setting.

3) Position range output enabling/disabling setting
a) Setting range
When the unit is set to "degree", the setting range of the position range output is from 0 degree (lower limit) to 359.999 degrees (upper limit).
When you set a value other than 0 degree to 359.999 degrees in [Pr. PT19] to [Pr. PT22], the set value is converted as follows. (It will be clamped between 0 degree and 359.999 degrees.)

Position range output address	After conversion
360.000 degrees to 999.999 degrees	The remainder of the set value divided by 360
-0.001 degrees to -359.999 degrees	The sum of the set value and 360
-360.000 degrees to -999.999 degrees	The sum of 360 and the quotient of the set value divided by 360

b) Effective setting of position range output
Set the position range output address - ([Pr. PT21] and [Pr. PT22]) for the start position and the position range output address + ([Pr. PT19] and [Pr. PT20]) for the target position.
The movable range is the section from - to + in the CCW direction.





Set the movable range of section A as follows:
・Position range output address - … 315.000 degrees
・Position range output address + … 90.000 degrees
Set the movable range of section B as follows:
・Position range output address - … 90.000 degrees
・Position range output address + … 315.000 degrees

4.3 Manual operation mode

For the machine adjustment, home position adjustment, and others, positioning to any point is possible using the JOG operation or the manual pulse generator.

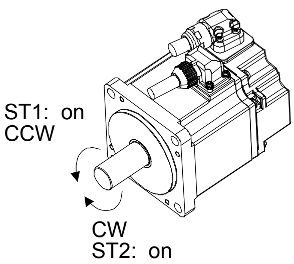
4.3.1 JOG operation

(1) Setting
According to the purpose of use, set input devices and parameters as shown below. In this case, DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5) are disabled.

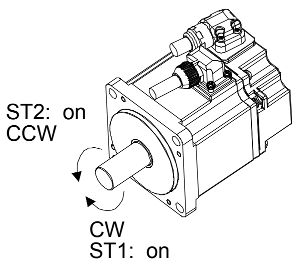
Item	Device/parameter to be used	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) in this section.
JOG speed	[Pr. PT13]	Set the servo motor speed.
Acceleration time constant/Deceleration time constant	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.

(2) Servo motor rotation direction

[Pr. PA14] setting	Servo motor rotation direction	
	ST1 (Forward rotation start) on	ST2 (Reverse rotation start) on
0	CCW rotation	CW rotation
1	CW rotation	CCW rotation



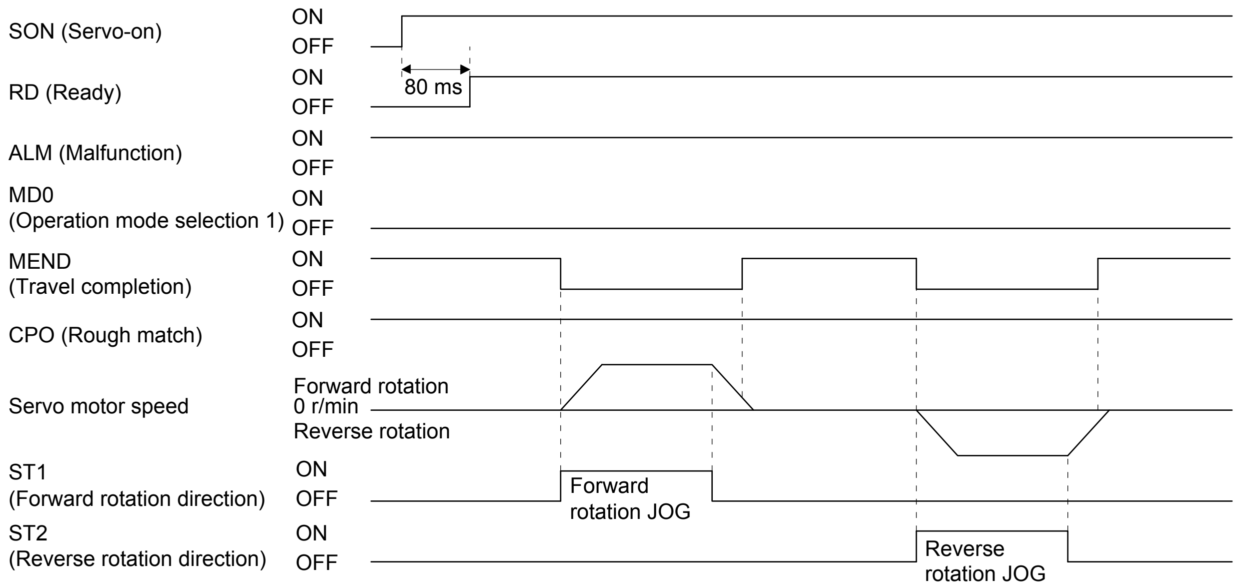
[Pr. PA14]: 0



[Pr. PA14]: 1

(3) Operation
Switching on ST1 (Forward rotation start) performs the operation at the JOG speed set by a parameter and the acceleration/deceleration constant of point table No. 1. For the rotation direction, refer to (2) of this section. Switching on ST2 (Reverse rotation start) starts the rotation in the reverse direction of ST1 (Forward rotation start).
Simultaneously switching on or off ST1 (Forward rotation start) and ST2 (Reverse rotation start) stops the operation.

(4) Timing chart



4.3.2 Manual pulse generator operation

(1) Setting

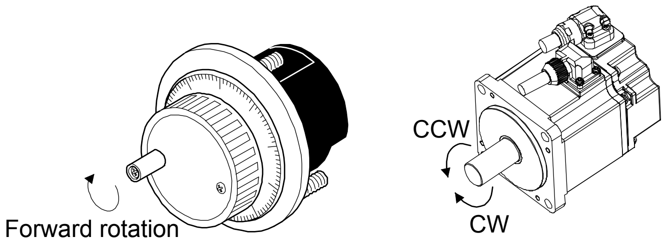
POINT
●To enhance noise tolerance, set "_ 2_ _" to [Pr. PA13] when the command pulse frequency is 500 kpulses/s or less, or set "_3_ _" to [Pr. PA13] when the command pulse frequency is 200 kpulses/s or less.

According to the purpose of use, set input devices and parameters as shown below. In this case, DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5) are disabled.

Item	Device/parameter to be used	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Manual pulse generator multiplication	[Pr. PT03]	Set the multiplication factor for the pulses generated from the manual pulse generator. For details, refer to (3) in this section.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) in this section.
Command input pulse train input form	[Pr. PA13]	Set "_ _ _ 2" (A/B-phase pulse train).
Pulse train filter selection	[Pr. PA13]	Set other than "0" and "1".

(2) Servo motor rotation direction

[Pr. PA14] setting	Servo motor rotation direction	
	Manual pulse generator operation: forward rotation	Manual pulse generator operation: reverse rotation
0	CCW rotation	CW rotation
1	CW rotation	CCW rotation



(3) Manual pulse generator multiplication

(a) Using the input signals (devices) for setting

In "Device setting" of MR Configurator2, set TP0 (Pulse generator multiplication 1) and TP1 (Pulse generator multiplication 2) to input signals.

TP1 (Pulse generator multiplication 2) (Note)	TP0 (Pulse generator multiplication 1) (Note)	Servo motor rotation multiplication factor for manual pulse generator rotation amount	Travel distance			
			[mm]	[inch]	[degree]	[pulse]
0	0	[Pr. PT03] setting enabled				
0	1	1 time	0.001	0.0001	0.001	1
1	0	10 times	0.01	0.001	0.01	10
1	1	100 times	0.1	0.01	0.1	100

Note. 0: Off
1: On

(b) Using the parameter for setting

Using [Pr. PT03], set the servo motor rotation multiplication to the rotation amount of the manual pulse generator.

[Pr. PT03] setting	Servo motor rotation multiplication to manual pulse generator rotation amount	Travel distance			
		[mm]	[inch]	[degree]	[pulse]
_ _ 0 _	1 time	0.001	0.0001	0.001	1
_ _ 1 _	10 times	0.01	0.001	0.01	10
_ _ 2 _	100 times	0.1	0.01	0.1	100

(4) Operation

Turning the manual pulse generator rotates the servo motor. For the rotation direction of the servo motor, refer to (2) in this section. When you turn the manual pulse generator during a JOG operation, the commands inputted from the manual pulse generator are adjusted by the commands of JOG operation.

4.4 Home position return mode

POINT

- Before performing the home position return, make sure that the limit switch operates.
- Check the home position return direction. An incorrect setting will cause a reverse running.
- Check the input polarity of the proximity dog. Otherwise, it may cause an unexpected operation.

4.4.1 Outline of home position return

A home position return is performed to match the command coordinates with the machine coordinates. The home position return is required every time the input power is on.
This section shows the home position return methods of the servo amplifier. Select the optimum method according to the configuration and uses of the machine.
This servo amplifier has the home position return automatic retract function. When the machine stops beyond or on a proximity dog, this function automatically moves the machine back to the proper position to perform the home position return. Manual operation with JOG operation, etc. is unnecessary.

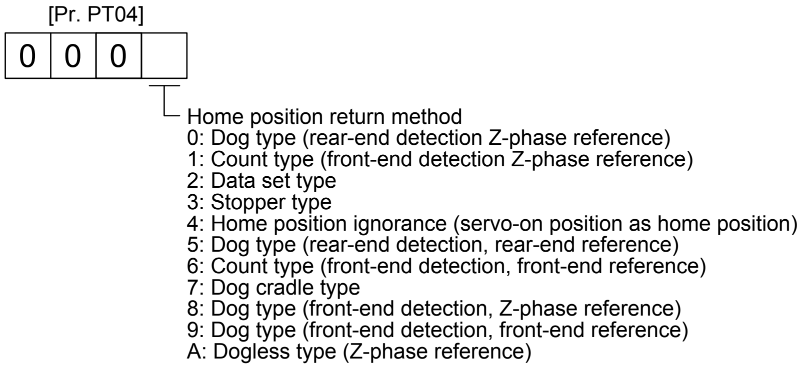
(1) Home position return types
Select the optimum home position return type according to the machine type or others.

Type	Home position return method	Feature
Dog type	Deceleration starts from the front end of the proximity dog. A position of the first Z-phase signal after the rear end is passed or a position moved by the home position shift amount from the Z-phase signal is set as the home position.	· Typical home position return method using a proximity dog · The repeatability of the home position return is high. · The machine is less loaded. · Use this when the width of the proximity dog can be set equal to or greater than the deceleration distance of the servo motor.
Count type	Deceleration starts from the front end of the proximity dog. After the proximity dog is passed, the motor travels the specified travel distance. Then, the position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.	· This is a home position return method using a proximity dog. · Use this to minimize the length of the proximity dog.
Data set type	An arbitrary position is set as the home position.	· No proximity dog is required.
Stopper type	A workpiece is pressed against a mechanical stopper, and the position where it is stopped is set as the home position.	· Since the workpiece collides with the mechanical stopper, the home position return speed must be low enough. · The strength of the machine and stopper must be increased.
Home position ignorance (servo-on position as home position)	Servo-on position is set as the home position.	
Dog type rear end reference	Deceleration starts from the front end of the proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position.	· The Z-phase signal is not required.
Count type front end reference	Deceleration starts from the front end of the proximity dog. A position moved by the moving amount after the proximity dog and the home position shift amount is set as the home position.	· The Z-phase signal is not required.
Dog cradle type	After the front end of the proximity dog is detected, the position specified by the first Z-phase signal is used as the home position.	
Dog type last Z-phase reference	After the front end of the proximity dog is detected, the position is shifted away from the proximity dog in the reverse direction. Then, the position specified by the first Z-phase signal or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.	
Dog type front end reference	Starting from the front end of the proximity dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position.	· The Z-phase signal is not required.
Dogless Z-phase reference	The position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.	

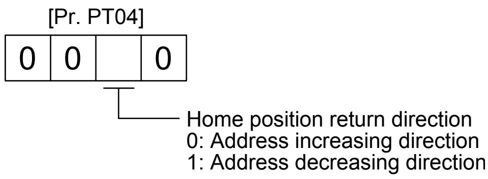
(2) Parameters for home position return

To perform the home position return, set each parameter as follows.

(a) Select the home position return type with [Pr. PT04 Home position return type].

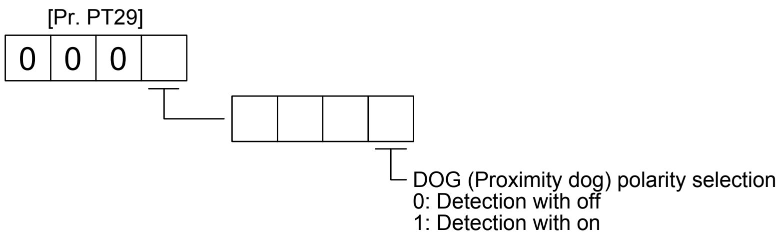


(b) Select the starting direction for the home position return with [Pr. PT04 Home position return type]. Setting "0" starts the home position return in a direction of increasing the address from the current position. Setting "1" starts the home position return in a direction of decreasing the address from the current position.



(c) Select the polarity where the proximity dog is detected with the DOG (Proximity dog) polarity selection of [Pr. PT29 Function selection T-3].

Setting "0" detects a proximity dog when DOG (Proximity dog) is switched off. Setting "1" detects a proximity dog when DOG (Proximity dog) is switched on.



4.4.2 Dog type home position return

This is a home position return method using a proximity dog. Deceleration starts at the front end of the proximity dog. After the rear end is passed, the position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the specified home position shift distance is used as the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dog type home position return	[Pr. PT04]	_ _ _ 0: Select the dog type.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the proximity dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to shift the home position, which is specified by the first Z-phase signal after the rear end of a proximity dog is passed.
Acceleration time constant/Deceleration time constant	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.

(2) Length of the proximity dog
To generate the Z-phase signal of the servo motor during the detection of DOG (Proximity dog), set the length of the proximity dog that satisfies equations (4.1) and (4.2).

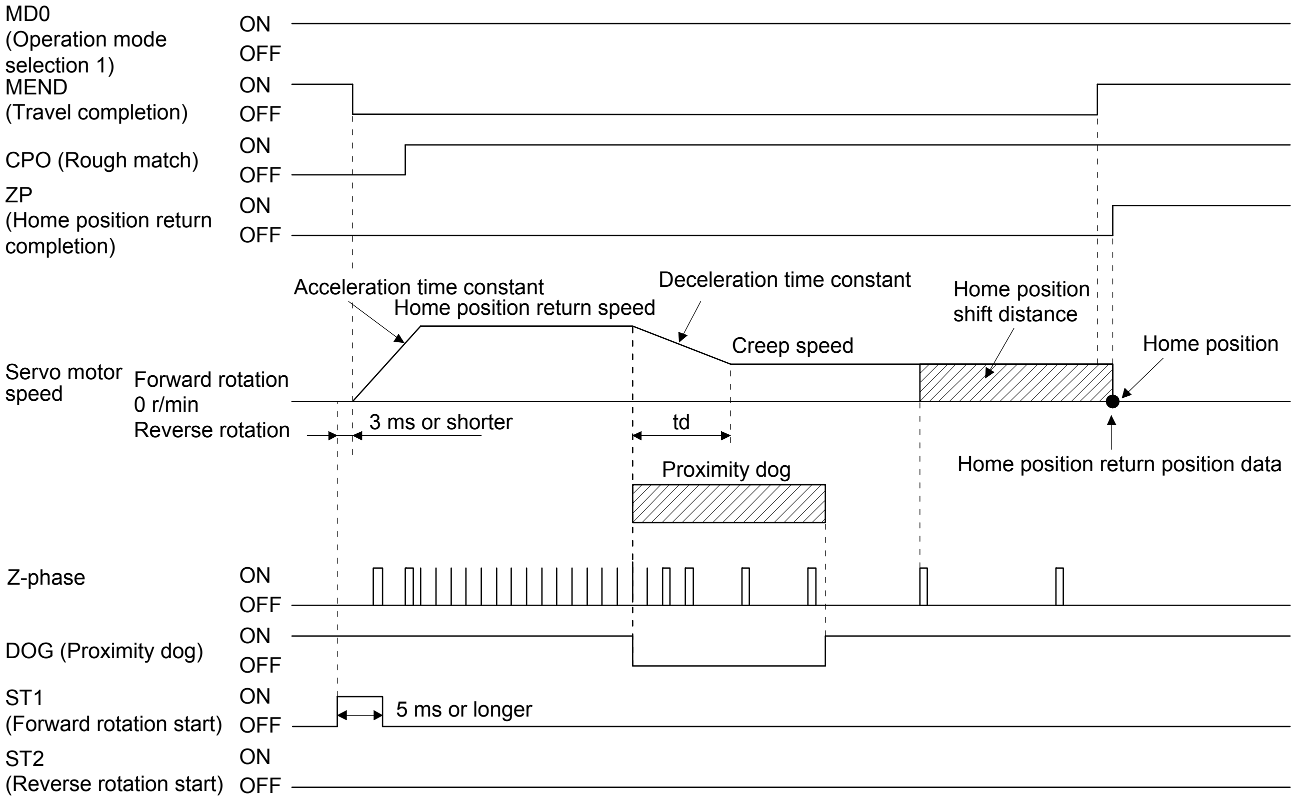
$$L_1 \geq \frac{V}{60} \cdot \frac{td}{2} \qquad \cdots\cdots (4.1)$$

L_1: Length of the proximity dog
V: Home position return speed [mm/min]
td: Deceleration time [s]

$$L_2 \geq 2 \cdot \Delta S \qquad \cdots\cdots (4.2)$$

L_2: Length of the proximity dog
ΔS: Travel distance per servo motor revolution [mm]

(3) Timing chart

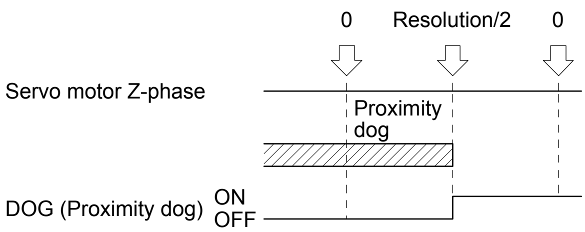


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

(4) Adjustment

For the dog type home position return, adjust the setting so that the Z-phase signal is always generated during the detection of a dog. Make an adjustment so that the rear end of DOG (Proximity dog) is positioned almost at the center between the positions specified by a Z-phase signal and the next Z-phase signal.

The generation position of the Z-phase signal can be checked with "Position within one-revolution" of "Status display" on MR Configurator2.



4.4.3 Count type home position return

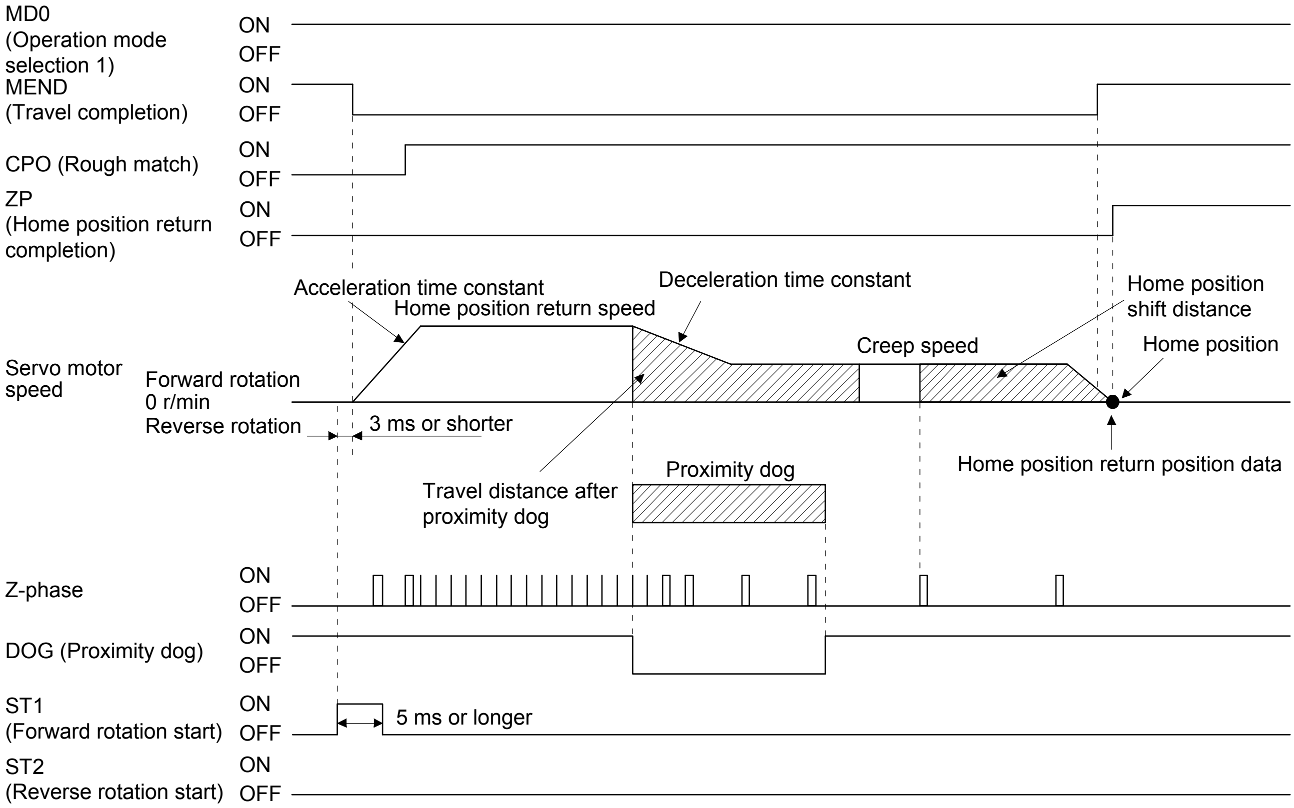
For the count type home position return, after the front end of a proximity dog is detected, the position is shifted by the distance set in [Pr. PT09 Travel distance after proximity dog]. Then, the position specified by the first Z-phase signal is used as the home position. Therefore, when the on-time of DOG (Proximity dog) is 10 ms or more, the length of the proximity dog has no restrictions. When the required proximity dog length for using the dog type home position return cannot be reserved, or when DOG (Proximity dog) is entered electrically from the controller or the like, use the count type home position return.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Count type home position return	[Pr. PT04]	_ _ _ 0: Select the count type.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	After the front end of a proximity dog is passed, the position is shifted by the travel distance and then is specified by the first Z-phase signal. Set this item to shift the position of the first Z-phase signal.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance specified after the front end of the proximity dog is passed.
Acceleration time constant/Deceleration time constant	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

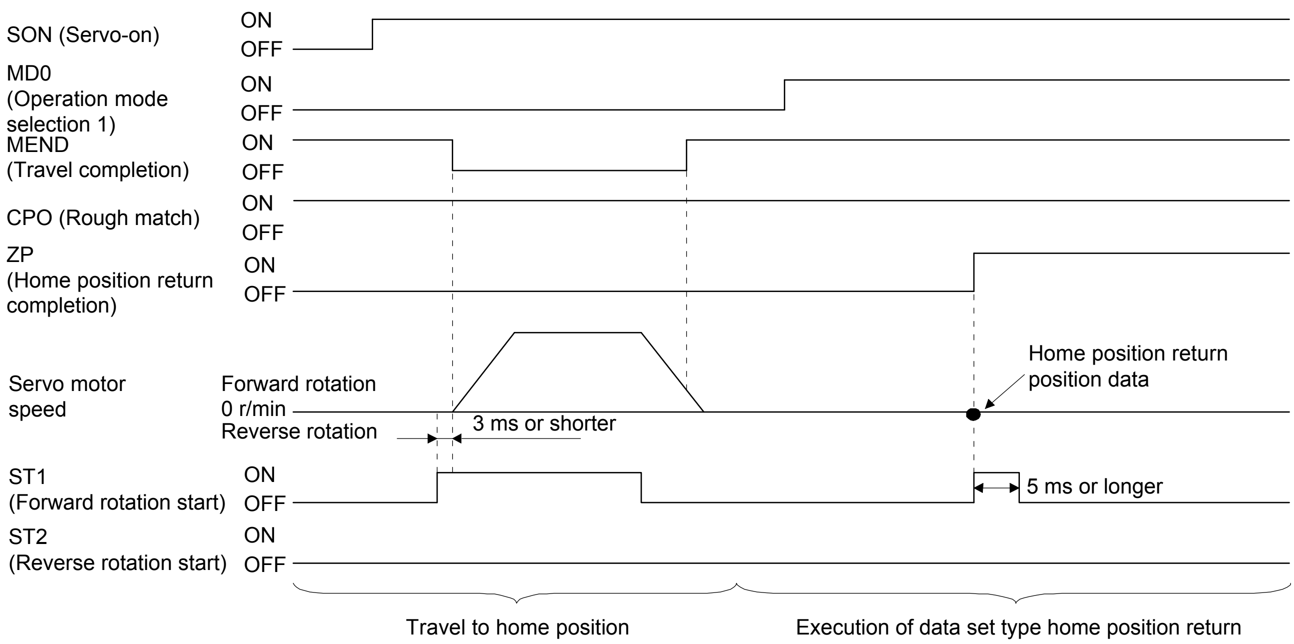
4.4.4 Data set type home position return

To set an arbitrary position as the home position, use the data set type home position return. The JOG operation, the manual pulse generator operation, and others can be used for the travel. The data set type home position return can be performed at servo-on only.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Data set type home position return	[Pr. PT04]	_ _ _ 2: Select the data set type.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.5 Stopper type home position return

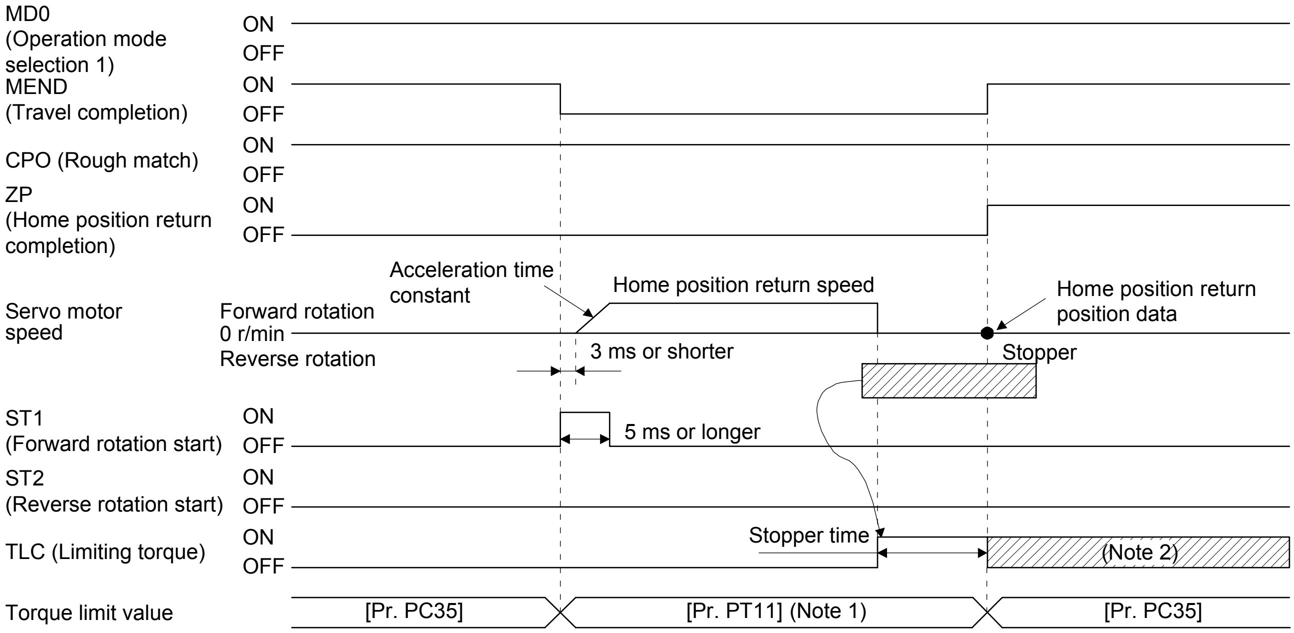
For the stopper type home position return, the home position is set where the workpiece is pressed against the stopper of the machine by using the JOG operation, the manual pulse generator operation, or others.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Stopper type home position return	[Pr. PT04]	_ _ _ 3: Select the stopper type.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Home position return speed	[Pr. PT05]	Set the rotation speed until the workpiece is pressed against the mechanical stopper.
Stopper time	[Pr. PT10]	Set the time from when the home position data is obtained after the workpiece is pressed against the stopper until when ZP (home position return completion) is outputted.
Stopper type home position return torque limit value	[Pr. PT11]	Set the servo motor torque limit value when executing the stopper type home position return.
Acceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1. is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



Note 1. The following torque limits are enabled.

Input device (0: off, 1: on)		Limit value status	Enabled torque limit value
TL1	TL		
0	0		Pr. PT11
0	1	TLA > Pr. PT11	Pr. PT11
		TLA < Pr. PT11	TLA
1	0	Pr. PC35 > Pr. PT11	Pr. PT11
		Pr. PC35 < Pr. PT11	Pr. PC35
1	1	TLA > Pr. PT11	Pr. PT11
		TLA < Pr. PT11	TLA

2. TLC turns on when a generated torque reaches a value set with any of [Pr. PA11 Forward rotation torque limit], [Pr. PA12 Reverse rotation torque limit], or [Pr. PC35 Internal torque limit 2].

The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.6 Home position ignorance (servo-on position as home position)

POINT
●When you perform this home position return, it is unnecessary to switch to the home position return mode.

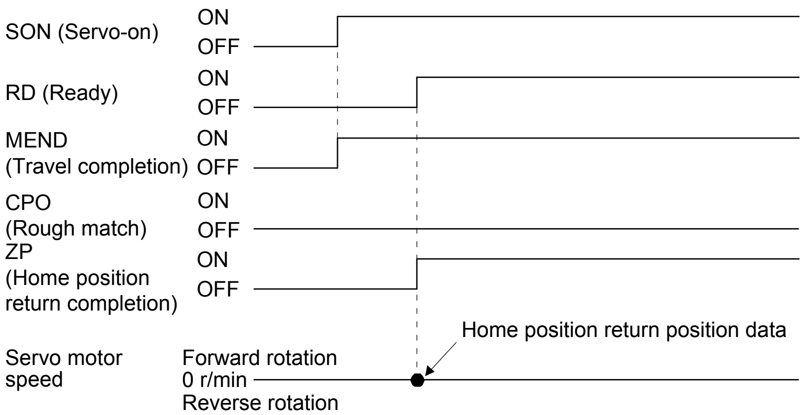
Servo-on position is set as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Parameter to be used	Setting
Home position ignorance	[Pr. PT04]	_ _ _ 4: Select the home position ignorance.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.7 Dog type rear end reference home position return

POINT

- This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the rear end of a proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

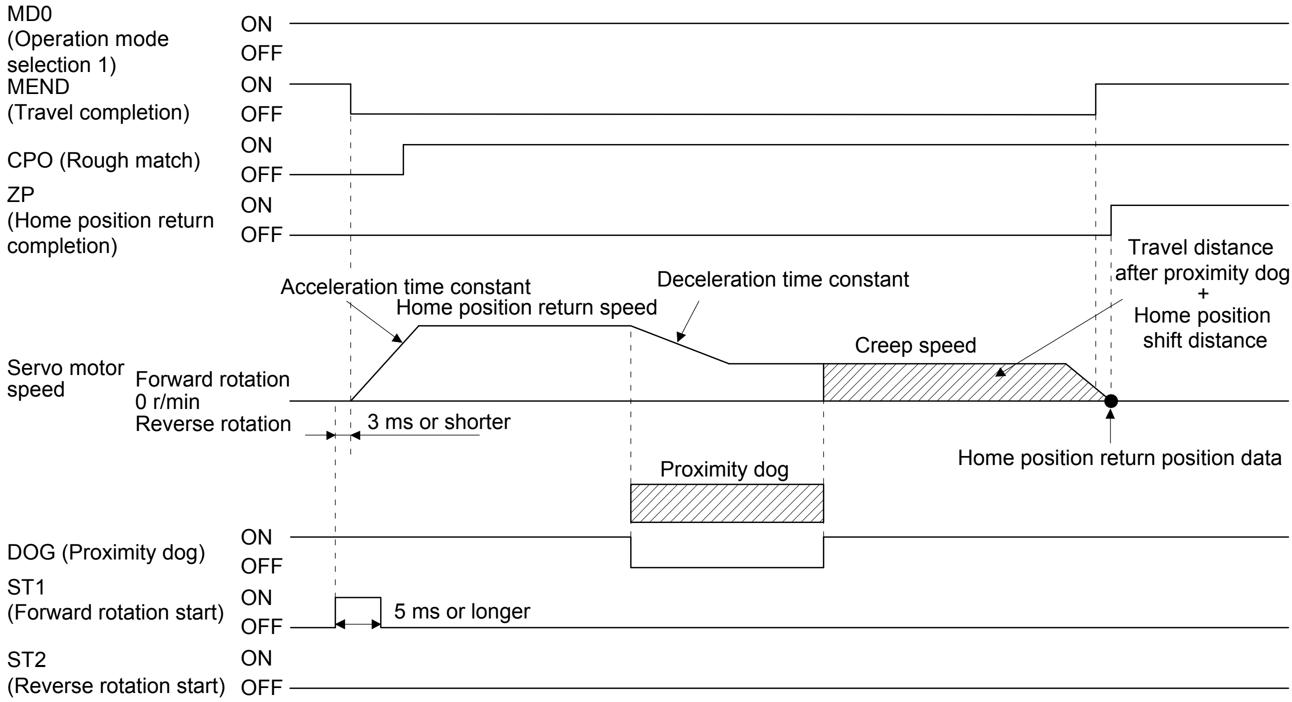
Deceleration starts from the front end of a proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position. The home position return is available independently of the Z-phase signal. Changing the creep speed may change the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dog type rear end reference home position return	[Pr. PT04]	_ _ _ 5: Select the dog type (rear end detection/rear end reference).
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified after the rear end of a proximity dog is passed.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance after the rear end of a proximity dog is passed.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.8 Count type front end reference home position return

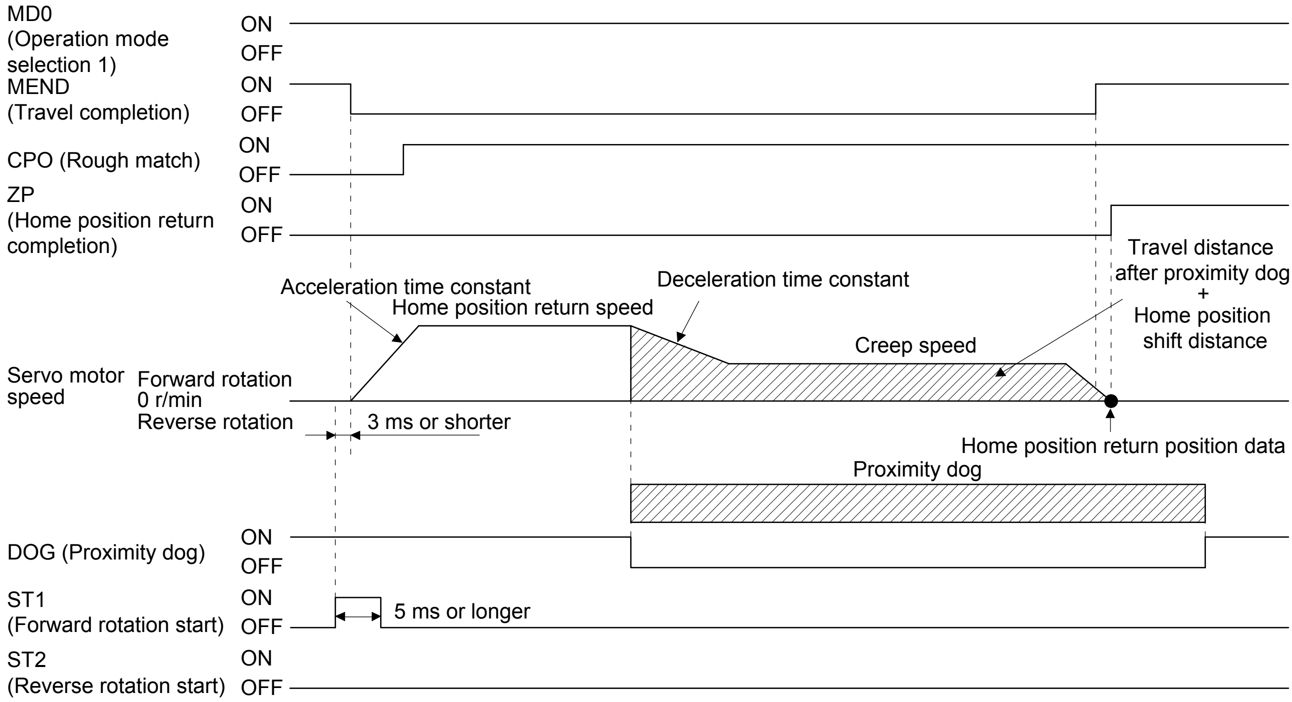
POINT
●This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the front end of a proximity dog. Therefore, when a home position return is performed with the creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position. ●After the front end of a proximity dog is detected, if a home position return ends without reaching the creep speed, [AL. 90.2] occurs. Set the travel distance after proximity dog and the home position shift distance enough for deceleration from the home position return speed to the creep speed.

Deceleration starts from the front end of a proximity dog. The position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position. The home position return is available independently of the Z-phase signal. Changing the creep speed may change the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Count type front end reference home position return	[Pr. PT04]	_ _ _ 6: Select the count type (front end detection/front end reference).
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified after the front end of a proximity dog is passed.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance specified after the front end of the proximity dog is passed.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

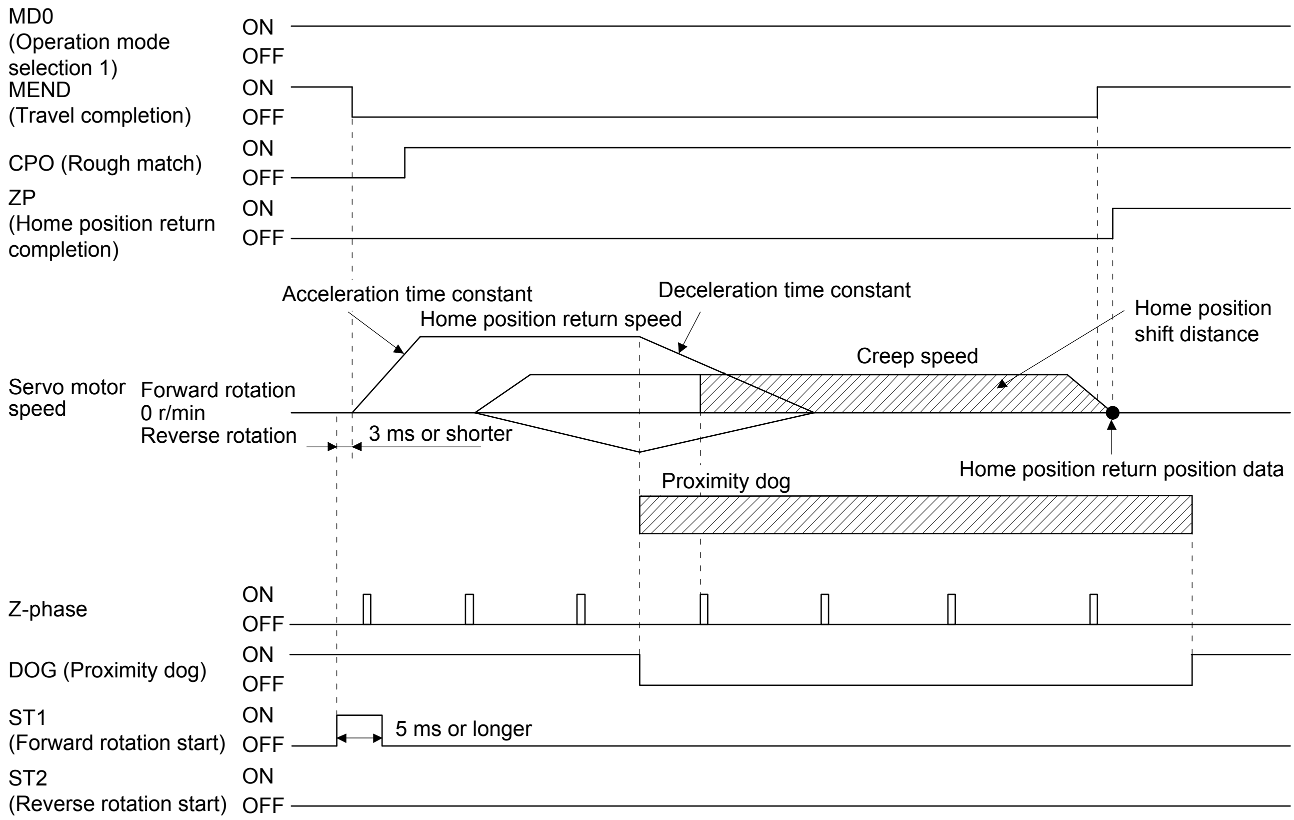
4.4.9 Dog cradle type home position return

A position, which is specified by the first Z-phase signal after the front end of a proximity dog is detected, is set as the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dog cradle type home position return	[Pr. PT04]	_ _ _ 7: Select the dog cradle type.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

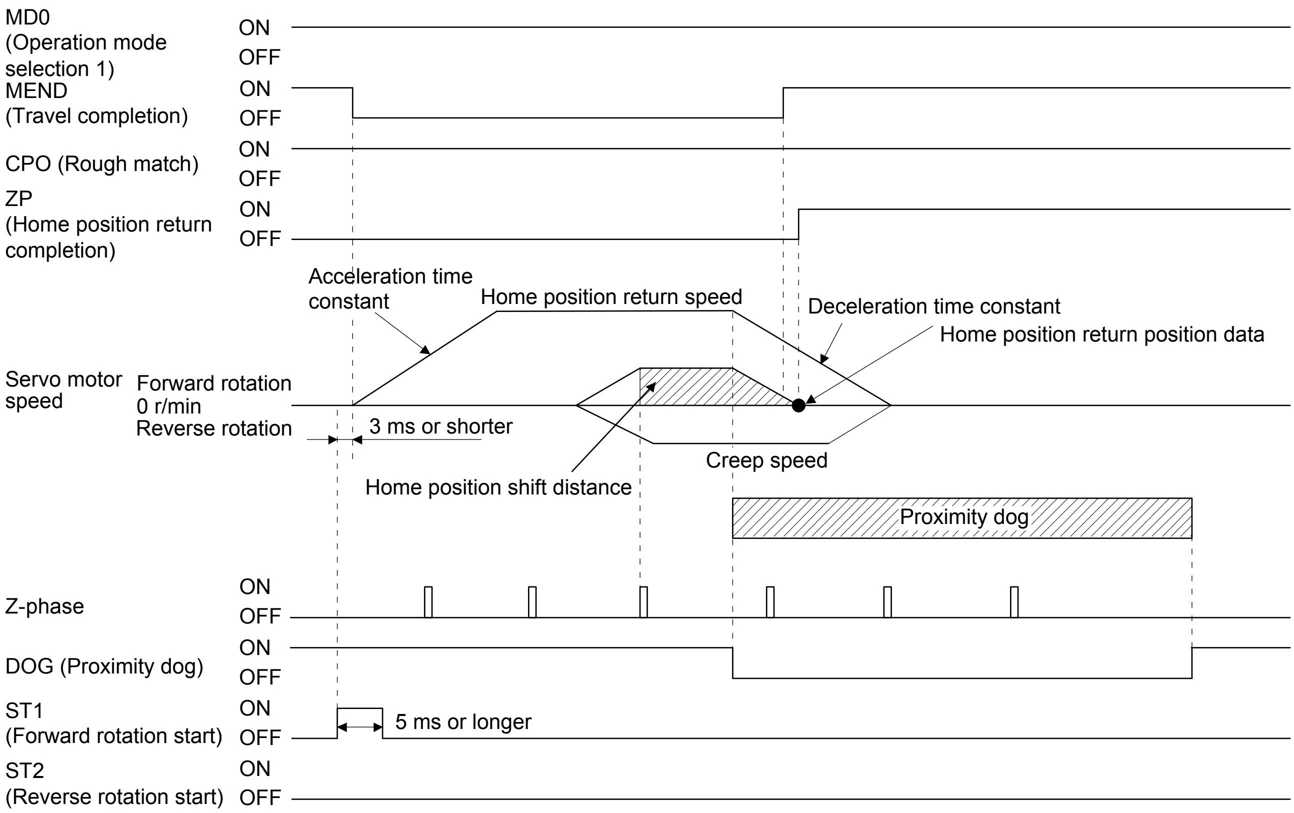
4.4.10 Dog type last Z-phase reference home position return

After the front end of a proximity dog is detected, the position is shifted away from the proximity dog at the creep speed in the reverse direction and then specified by the first Z-phase signal. The position of the first Z-phase signal is set as the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dog type last Z-phase reference home position return	[Pr. PT04]	_ _ _ 8: Select the dog type last Z-phase reference.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.11 Dog type front end reference home position return type

POINT

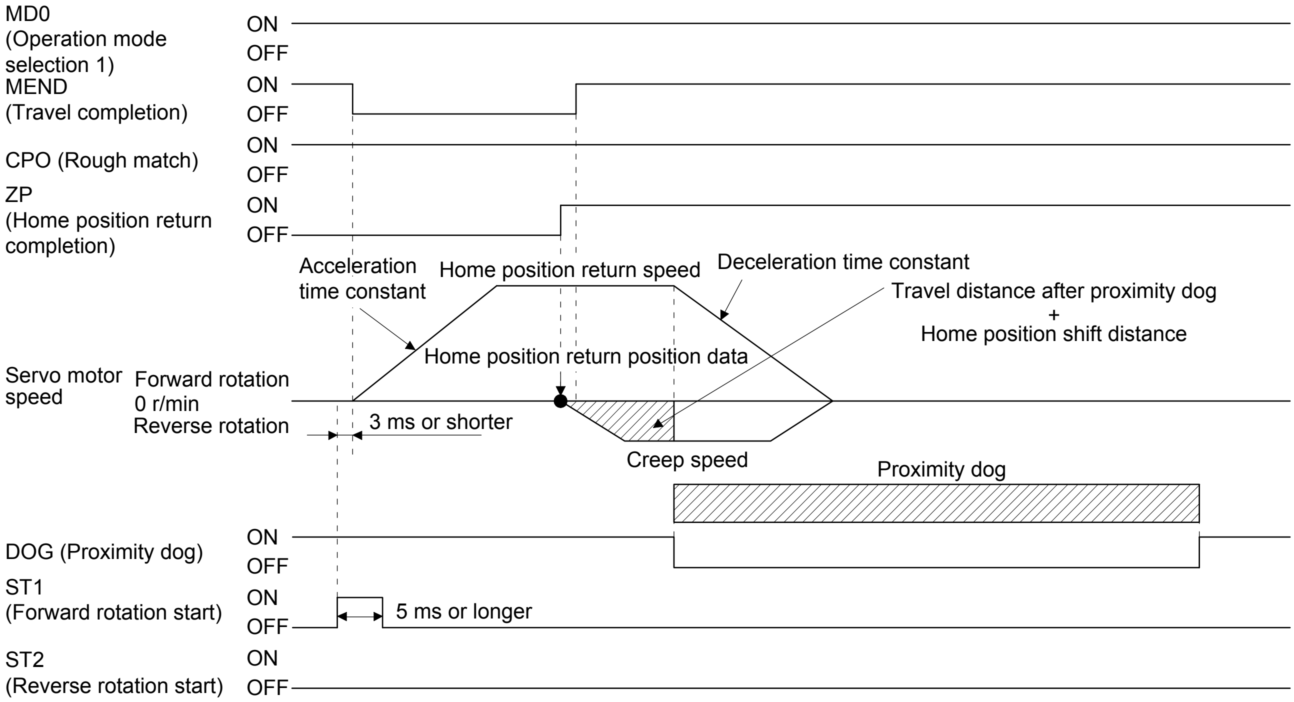
- This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the front end of a proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

A position, which is shifted by the travel distance after proximity dog and the home position shift distance from the front end of a proximity dog, is set as the home position.
The home position return is available independently of the Z-phase signal. Changing the creep speed may change the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dog type front end reference home position return	[Pr. PT04]	_ _ _ 9: Select the dog type front end reference.
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 4.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

4.4.12 Dogless Z-phase reference home position return type

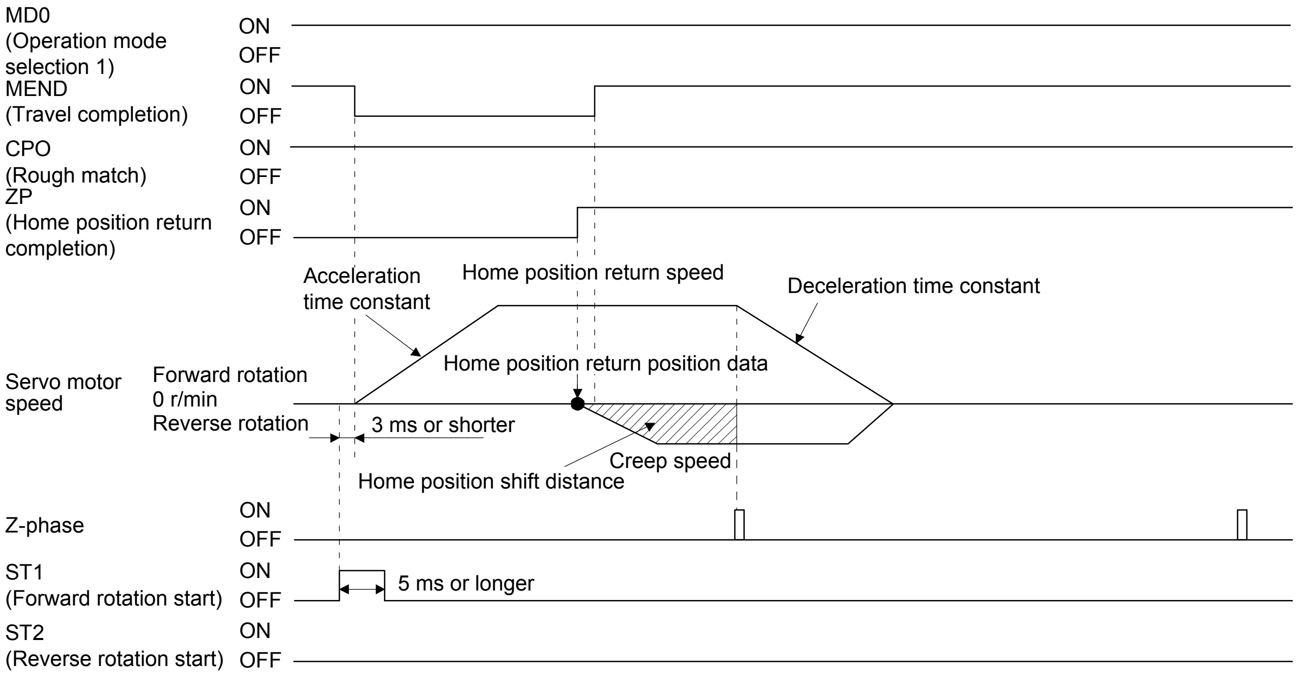
A position, which is shifted to by the home position shift distance from a position specified by the Z-phase pulse right after the start of the home position return, is set as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Dogless Z-phase reference home position return	[Pr. PT04]	_ _ _ A: Select the dogless type (Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to section 4.4.1 (2) to select the home position return direction.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until the Z-phase is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after the Z-phase is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.

(2) Timing chart

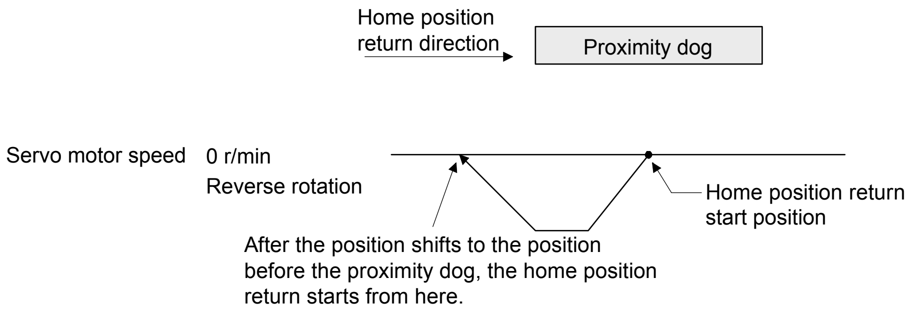


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

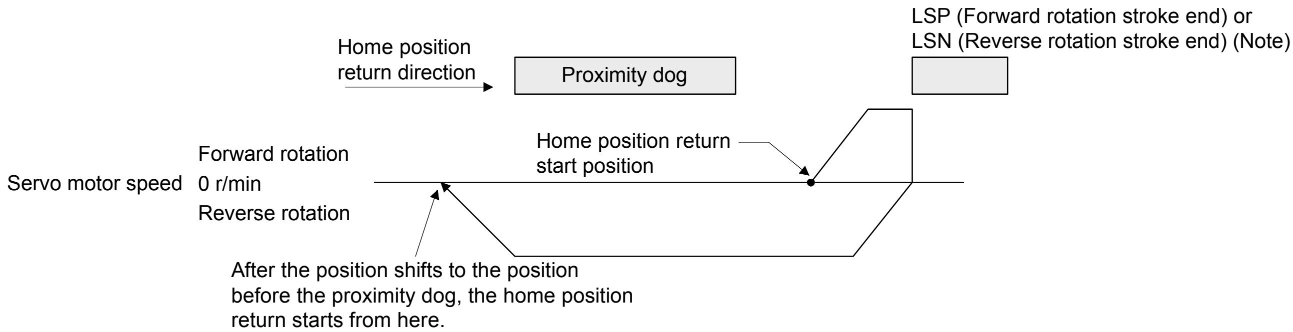
4.4.13 Automatic retract function used for the home position return

For a home position return using a proximity dog, if the home position return starts from or beyond the proximity dog, this function executes the home position return after the position is shifted back to where the home position return is possible.

(1) When the current position is on the proximity dog
When the current position is on the proximity dog, the position is shifted back automatically to execute the home position return.



(2) When the current position is beyond the proximity dog
The position is shifted in a direction of the home position return. When LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is detected, the position is shifted back automatically. The position will be shifted passing the proximity dog, and the travel will stop. The home position return will be restarted from that position. If the proximity dog is not detected, the travel stops at LSP or LSN on the opposite side, and [AL. 90 Home position return incomplete warning] occurs.



Note. The software limit cannot be used instead of LSP (Forward stroke end) and LSN (Reverse stroke end).

4.4.14 Automatic positioning to home position function

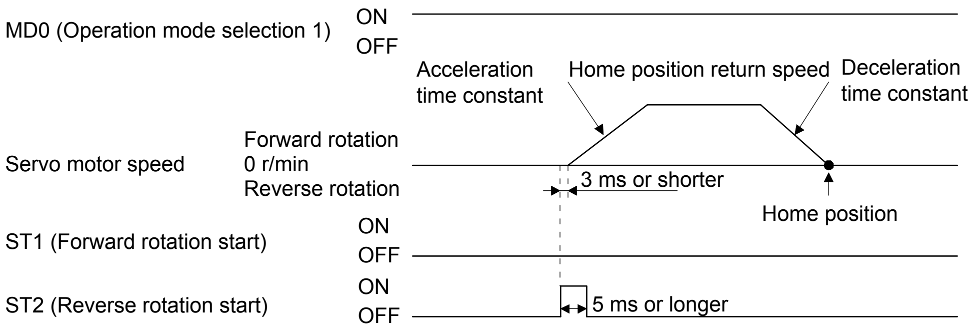
POINT

- The automatic positioning to the home position cannot be performed from outside the setting range of position data. In this case, perform the home position return again using the home position return.

If the home position is fixed by returning to the home position after the power-on, this function enables a high-speed automatic positioning to the home position. For the absolute position detection system, the home position return is unnecessary after the power-on.
If the automatic positioning to the home position is executed without completing the home position return, [AL. 90.1] will occur.
After the power-on, perform the home position return in advance.
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI4 (Point table No. selection 5)	Switch off DI0 to DI4.
Home position return speed	[Pr. PT05]	Set the servo motor speed to travel to the home position.
Acceleration time constant/deceleration time constant of home position return	Point table No. 1	The acceleration/deceleration time constant of point table No. 1 is used.
Home position return direction	[Pr. PT04]	Set the rotation direction in degrees.

Set the home position return speed of the automatic positioning to home position function with [Pr. PT05]. The data of point table No. 1 is used for acceleration/deceleration time constants. Switching on ST2 (Reverse rotation start) enables high-speed automatic return.
Set the rotation direction with home position return direction of [Pr. PT04] when the unit is set to degree.



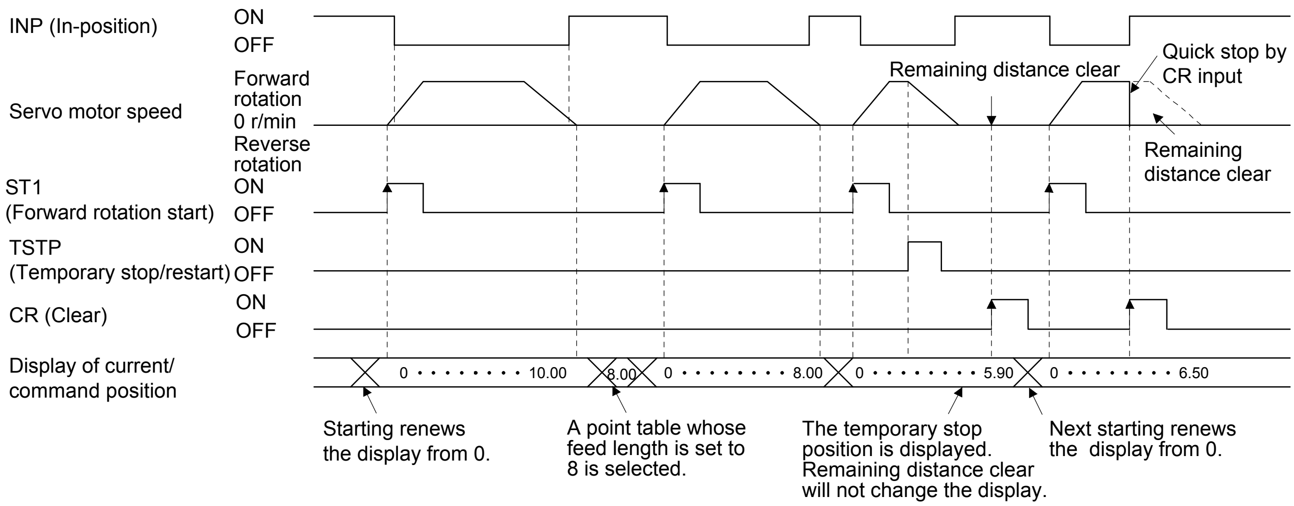
4.5 Roll feed mode using the roll feed display function

The roll feed display function changes the display method of the current position and the command position in the status monitor.
By using the roll feed display function, the servo amplifier can be used in the roll feed mode. The roll feed mode is compatible with the incremental system. Additionally, the feed speed can be changed by the override function during an operation. Refer to section 2.4 for details.

(1) Parameter setting

No.	Name	Setting digit	Setting item	Setting value	Setting
PT26	Current position/command position display selection	_ _ x _	Current position/command position display selection	_ _ 1 _	Select the roll feed display.
PT26	Electronic gear fraction clear selection	_ _ _ x	Electronic gear fraction clear selection	_ _ _ 1	Clear a fraction of the previous command by the electronic gear at start of the automatic operation. Always set "_ _ _ 1" (enabled) in the electronic gear fraction clear.

(2) Roll feed display function
When the roll feed display function is used, the status display of the current position and the command position at start will be 0.



(3) Position data unit
The display unit is expressed in the unit set in [Pr. PT26], and the feed length multiplication is expressed in the unit set in [Pr. PT03].
When the unit is set in degrees, the roll feed display function is disabled.
Refer to section 4.2.2 for details.

(4) Operation method
Only the status display of the current position and command position changes. The operation method is the same as each operation mode.

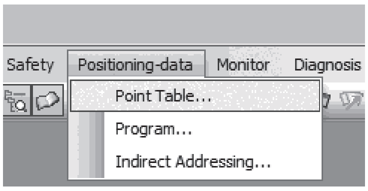
Operation mode		Detailed explanation
Automatic operation	Automatic operation using the point table	Section 4.2.2
Manual operation	JOG operation	Section 4.3.1
	Manual pulse generator operation	Section 4.3.2
Home position return mode		Section 4.4

4.6 Point table setting method

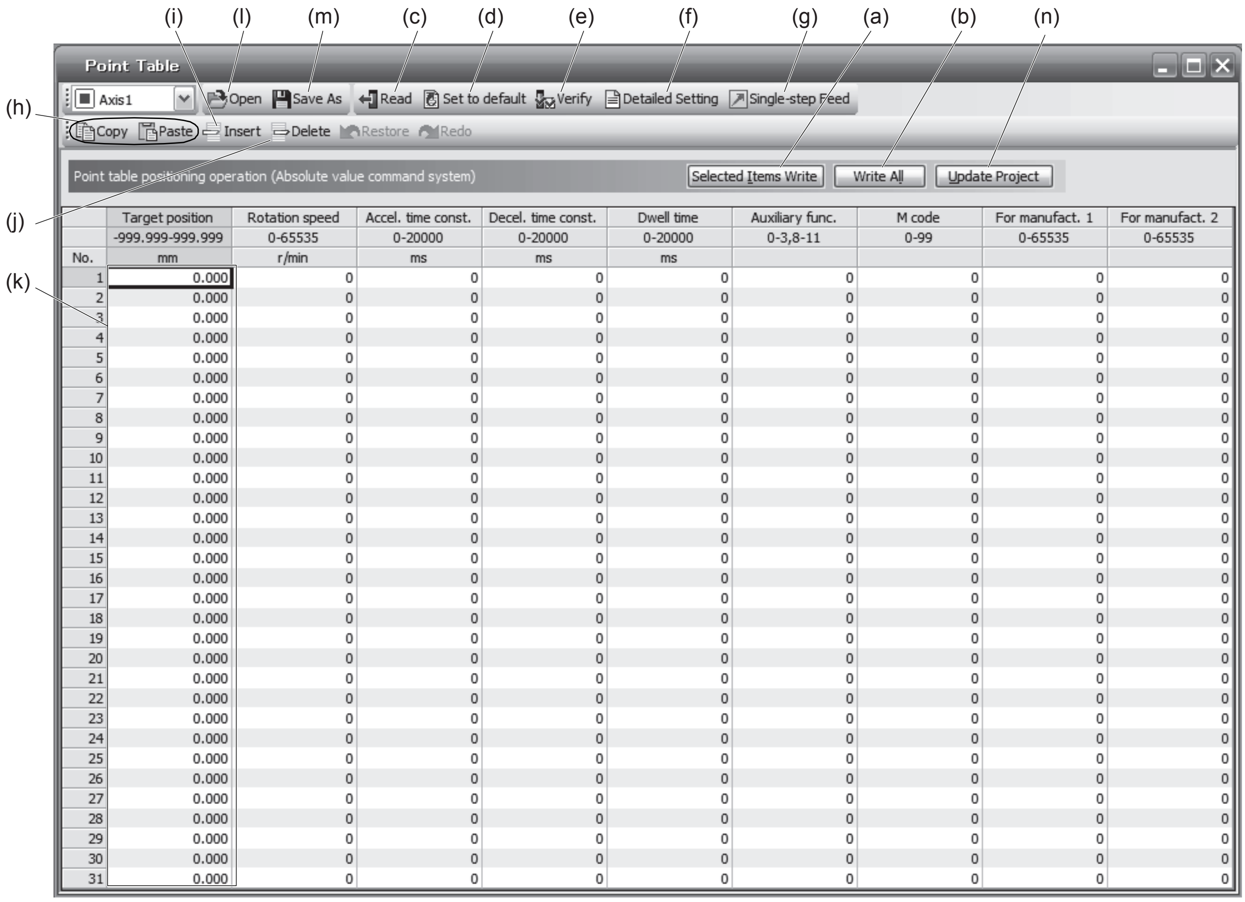
The following shows the setting method of point tables using MR Configurator2.

4.6.1 Setting procedure

Click "Positioning-data" in the menu bar, and click "Point Table" in the menu.



The following window will be displayed.



(1) Writing point table data (a)
Select changed point table data, and click "Selected Items Write" to write the changed point table data to the servo amplifier.

(2) Writing all point table data (b)
Click "Write All" to write all the point table data to the servo amplifier.

(3) Reading all point table data (c)
Click "Read" to read all the point table data from the servo amplifier and display them.

(4) Initial setting of point table data (d)
Click "Set to default" to initialize all the data of point table No. 1 to 31. This function also initializes data currently being edited.

(5) Verifying point table data (e)
Click "Verify" to verify all the data displayed and data of the servo amplifier.

(6) Detailed setting of point table data (f)
Click "Detailed Setting" to change position data range and unit in the point table window. Refer to section 4.6.2 for details.

(7) Single-step feed (g)
Click "Single-step Feed" to perform the single-step feed test operation. Refer to section 3.1.9 for details.

(8) Copy and paste of point table data (h)
Click "Copy" to copy the selected point table data. Click "Paste" to paste the copied point table data.

(9) Inserting point table data (i)
Click "Insert" to insert a block before the selected point table No. The selected block and later will be shifted down by one. The selected point table No. and lower rows will be shifted down one by one.

(10) Deleting point table data (j)
Click "Delete" to delete the selected block of the point table No. The selected block and later will be shifted up by one.

(11) Changing point table data (k)
After selecting the data to be changed, enter a new value, and click "Enter". You can change the displayed range and unit with "(6) Detailed setting of point table data" in this section.

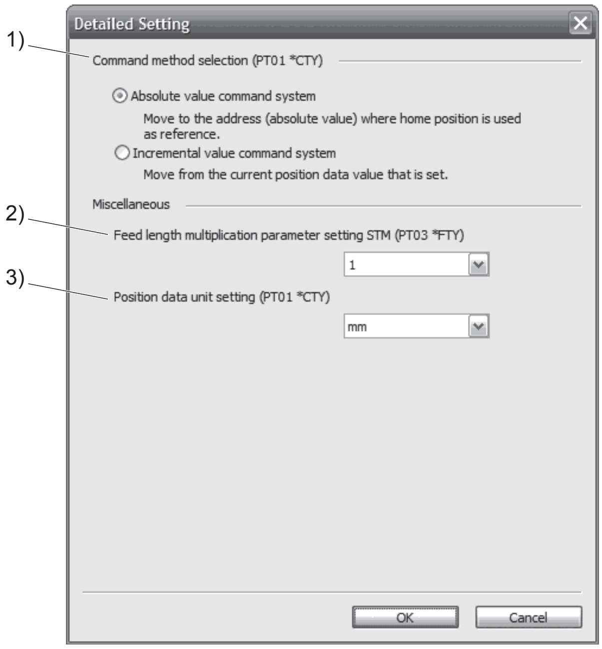
(12) Reading point table data (l)
Click "Open" to read the point table data.

(13) Saving point table data (m)
Click "Save As" to save the point table data.

(14) Updating project (n)
Click "Update Project" to update the point table data to a project.

4.6.2 Detailed setting window

The position data range and unit can be changed with the detailed setting in the point table window. For the position data range and unit of [Pr. PT01] setting, refer to section 4.2.2. To reflect the setting for the corresponding parameter, click "Update Project" in the point table window.



(1) Command method selection (PT01 *CTY): 1)
Select either the absolute position command method or the incremental value command method.

(2) Others
(a) Feed length multiplication parameter setting STM (PT03 *FTY): 2)
Select a feed length multiplication from 1/10/100/1000.

(b) Position data unit setting (PT01 *CTY): 3)
Select a unit of position data from mm/inch/degree/pulse. When degree or pulse is selected for the unit, the setting of feed length multiplication will be disabled.

5. HOW TO USE THE PROGRAM

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Switching power on for the first time	MR-JE-_A section 4.1

POINT
- For the mark detection function (Current position latch), refer to section 6.2.2.
- For the mark detection function (Interrupt positioning), refer to section 6.2.3.

5.1 Startup

⚠WARNING
- When executing a test run, follow the notice and procedures in this instruction manual. Otherwise, it may cause a malfunction, damage to the machine, or injury.
- Do not operate the switches with wet hands. Otherwise, it may cause an electric shock.

⚠CAUTION
- Before starting operation, check the parameters. Improper settings may cause some machines to operate unexpectedly.
- The servo amplifier heat sink, regenerative resistor, servo motor, etc., may be hot while the power is on and for some time after power-off. Take safety measures such as providing covers to avoid accidentally touching them by hands and parts such as cables.
- During operation, never touch the rotor of the servo motor. Otherwise, it may cause injury.
- Before wiring, switch operation, etc., eliminate static electricity. Otherwise, it may cause a malfunction.

5.1.1 Power on and off procedures

When the servo amplifier is powered on for the first time, the control mode is set to position control mode. (Refer to section 4.2.1 of "MR-JE-_A Servo Amplifier Instruction Manual".)
This section provides a case where the servo amplifier is powered on after setting the positioning mode.

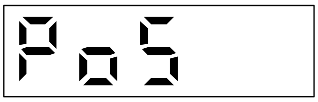
(1) Power-on

Switch the power on in the following procedure. Always follow this procedure at power-on.

1) Switch off SON (Servo-on).

2) Make sure that ST1 (Forward rotation start) is off.

3) Turn on the power.
The display shows "PoS" and 2 s later shows data.



(2) Power-off

1) Switch off ST1 (Forward rotation start).

2) Switch off SON (Servo-on).

3) Shut off the power.

5.1.2 Stop

Turn off SON (Servo-on) after the servo motor has stopped, and then switch the power off.
If any of the following situations occurs, the servo amplifier suspends and stops the operation of the servo motor.
Refer to section 3.10 of "MR-JE-_A Servo Amplifier Instruction Manual" for the servo motor with an electromagnetic brake.

Operation/command	Stopping condition
Switch off SON (Servo-on).	The base circuit is shut off, and the servo motor coasts.
Alarm occurrence	The servo motor decelerates to a stop. With some alarms; however, the dynamic brake operates to stop the servo motor. (Refer to chapter 8. (Note))
EM2 (Forced stop 2) off	The servo motor decelerates to a stop. [AL. E6 Servo forced stop warning] occurs. Refer to section 2.3 for EM1.
LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off	The servo motor stops immediately and will be servo locked. Operation in the opposite direction is possible.

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

5.1.3 Test operation

Before starting an actual operation, perform a test operation to make sure that the machine operates normally.
Refer to section 5.1.1 for how to power on and off the servo amplifier.

Test operation of the servo motor alone in JOG operation of test operation mode

In this step, confirm that the servo amplifier and the servo motor operate normally.
With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor rotates correctly at the slowest speed. For the test operation mode, refer to section 3.1.8 and 3.1.9 in this manual, and section 4.5.9 of "MR-JE-_A Servo Amplifier Instruction Manual".

↓

Test operation of the servo motor alone

In this step, confirm that the servo motor rotates correctly at the slowest speed in the manual operation mode.
Make sure that the servo motor rotates in the following procedure.

1) Switch on EM2 (Forced stop 2) and SON (Servo-on). When the servo amplifier is in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) When MD0 (Operation mode selection 1) is switched off from the controller and ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on in the manual operation mode, the servo motor starts rotating. Give a low speed command at first and check the rotation direction, etc. of the servo motor. If the servo motor does not operate in the intended direction, check the input signal.

↓

Test operation with the servo motor and machine connected

In this step, connect the servo motor with the machine and confirm that the machine operates normally with the commands from the controller.
Make sure that the servo motor rotates in the following procedure.

1) Switch on EM2 (Forced stop 2) and SON (Servo-on). When the servo amplifier is in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) When MD0 (Operation mode selection 1) is switched off from the controller and ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on in the manual operation mode, the servo motor starts rotating. Give a low speed command at first and check the operation direction, etc. of the machine. If the servo motor does not operate in the intended direction, check the input signal. In the status display, check for any problems of the servo motor speed, load ratio, etc.

↓

Automatic operation with programming

Select a program from the controller, and check automatic operation.

5.1.4 Parameter setting

POINT

- The following encoder cables are of four-wire type. When using any of these encoder cables, set [Pr. PC22] to "1 _ _ _" to select the four-wire type. Incorrect setting will result in [AL. 16 Encoder initial communication error 1].
  MR-EKCBL30M-L
  MR-EKCBL30M-H
  MR-EKCBL40M-H
  MR-EKCBL50M-H
- Assign the following output devices to the CN1-23 pin with [Pr. PD24].
  CN1-23: ZP (Home position return completion)

When you use the servo in the program method, set [Pr. PA01] to "_ _ _ 7" (Positioning mode (program method)). For the program method, the servo can be used by merely changing the basic setting parameters ([Pr. PA _ _]) and positioning control parameters ([Pr. PT _ _]) mainly.
As necessary, set other parameters.
The following table shows the necessary setting of [Pr. PA _ _] and [Pr. PT _ _] in the program method.

Operation mode \ Operation mode selection item		Parameter setting [Pr. PA01]	Parameter setting [Pr. PT04]	Input device setting MD0 (Note 1)	Input device setting DI0 to DI4 (Note 1)
Automatic operation mode of the program method		_ _ _ 7		On	Any
Manual operation mode	JOG operation			Off	
	Manual pulse generator operation				
Home position return	Dog type		_ _ _ 0	On	Any (Note 2)
	Count type		_ _ _ 1		
	Data set type		_ _ _ 2		
	Stopper type		_ _ _ 3		
	Home position ignorance (servo-on position as home position)		_ _ _ 4		
	Dog type rear end reference		_ _ _ 5		
	Count type front end reference		_ _ _ 6		
	Dog cradle type		_ _ _ 7		
	Dog type last Z-phase reference		_ _ _ 8		
	Dog type front end reference		_ _ _ 9		
	Dogless Z-phase reference		_ _ _ A		

Note 1. MD0: Operation mode selection 1, DI0 to DI3: Program No. selection 1 to Program No. selection 4
2 Select a program containing a "ZRT" command, which performs the home position return.

5.1.5 Actual operation

Start actual operation after confirmation of normal operation by test operation and completion of the corresponding parameter settings.

5.1.6 Troubleshooting at start-up

CAUTION	●Never adjust or change the parameter values extremely as it will make operation unstable.

POINT
●Using MR Configurator2, you can refer to the reason for rotation failure, etc.

The following faults may occur at start-up. If any of such faults occurs, take the corresponding action.
"MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
1	Power on	・The 7-segment LED display does not turn on. ・The 7-segment LED display blinks.	Not solved even if CN1, CN2, and CN3 connectors are disconnected.	1. Power supply voltage fault 2. The servo amplifier is malfunctioning.	
			Solved when CN1 connector is disconnected.	Power supply of CN1 cabling is shorted.	
			Solved when CN2 connector is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is malfunctioning.	
			Solved when CN3 connector is disconnected.	Power supply of CN3 cabling is shorted.	
		Alarm occurs.	Refer to chapter 8 and remove the cause.		Chapter 8 (Note)
2	Switch on SON (Servo-on).	Alarm occurs.	Refer to chapter 8 and remove the cause.		Chapter 8 (Note)
		Servo motor shaft is not servo-locked. (Servo motor shaft is free.)	1. Check the display to see if the servo amplifier is ready to operate. 2. Check the external I/O signal indication (section 3.1.7) to see if SON (Servo-on) is on.	1. SON (Servo-on) is not input. (wiring mistake) 2. 24 V DC power is not supplied to DICOM.	Section 3.1.7
3	Perform a home position return.	Servo motor does not rotate.	Check the on/off status of the input signal with the external I/O signal display. (Refer to section 3.1.7.)	LSP, LSN, and ST1 are off.	Section 3.1.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low for the load torque.	Section 7.2.1
			When TLA (Analog torque limit) is usable, check the input voltage on the status display.	Torque limit level is too low for the load torque.	Section 3.1.2
		The home position return is not completed.	Check the on/off status of input signal DOG with the external I/O signal display. (Refer to section 3.1.7.)	The proximity dog is set incorrectly.	Section 3.1.7

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
4	Switch on ST1 (Forward rotation start).	Servo motor does not rotate.	Check the on/off status of the input signal with the external I/O signal display (section 3.1.7).	LSP, LSN, and ST1 are off.	Section 3.1.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low for the load torque.	Section 7.2.1
			When TLA (Analog torque limit) is usable, check the input voltage on the status display.	Torque limit level is too low for the load torque.	Section 3.1.2
5	Gain adjustment	Rotation ripples (speed fluctuations) are large at low speed.	Make gain adjustment in the following procedure. 1. Increase the auto tuning response level. 2. Repeat acceleration and deceleration several times to complete auto tuning.	Gain adjustment fault	MR-JE-_A Chapter 6
		Large load inertia moment causes the servo motor shaft to oscillate side to side.	If the servo motor may be driven with safety, repeat acceleration and deceleration three times or more to complete the auto tuning.	Gain adjustment fault	MR-JE-_A Chapter 6

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

5.2 Program operation method

5.2.1 Program operation method

Select a program created in advance on MR Configurator2 by using an input signal or communication, and start an operation with ST1 (Forward rotation start).
This servo amplifier is set to the absolute value command method by factory setting.
For the position data, you can set the absolute value travel command ("MOV" command), which specifies the target address, and the incremental value travel command ("MOVI" command), which specifies the travel distance. Refer to section 4.2.1 (1) and 5.2.3 (1) (a) for the movable range and the setting unit.

5.2.2 Program language

The maximum number of steps of a program is 480. Up to 16 programs can be created; however, the total number of the steps of all programs must be 480 or less.
A set program is selectable by using DI0 (Program No. selection 1) to DI3 (Program No. selection 4).

(1) Command list

Command	Name	Setting	Setting range	Unit	Indirect specification (Note 7)	Description
SPN (Note 2)	Servo motor speed	SPN (Setting value)	0 to permissible instantaneous speed	3000 r/min	○	Set the servo motor command speed for positioning. The setting value must be the permissible instantaneous speed or less of the servo motor used. If the setting value is unspecified, the servo motor rotates at 50 r/min.
STA (Note 2)	Acceleration time constant	STA (Setting value)	0 to 20000	ms	○	Set the acceleration time constant. The setting value is a time period which the servo motor takes from a stop to the rated speed. The value cannot be changed during a command output. If the setting value is unspecified, 1000 ms is applied.
STB (Note 2)	Deceleration time constant	STB (Setting value)	0 to 20000	ms	○	Set the deceleration time constant. The setting value is a time period which the servo motor takes from the rated speed to a stop. The value cannot be changed during a command output. If the setting value is unspecified, 1000 ms is applied.
STC (Note 2)	Acceleration/ deceleration time constant	STC (setting value)	0 to 20000	ms	○	Set the acceleration/deceleration time constants. The setting value is a time period which the servo motor takes from a stop to the rated speed, and from the rated speed to a stop. When this command is used, the same value is applied for both the acceleration time constant and the deceleration time constant. To set the acceleration/deceleration time constants individually, use the "STA" and "STB" commands. The value cannot be changed during a command output. If the setting value is unspecified, 1000 ms is applied.
STD (Note 2, 5)	S-pattern acceleration/ deceleration time constant	STD (Setting value)	0 to 1000	ms	○	Set the S-pattern acceleration/deceleration time constants. Set this command to insert S-pattern acceleration/deceleration time constants to the acceleration/deceleration time constants of the program.
MOV	Absolute value travel command	MOV (setting value)	-999999 to 999999 (Note 6)	$\times 10^{STM}$μm (Note 6)	○	The servo motor rotates using the set value as the absolute value.
MOVA	Absolute value continuous travel command	MOVA (setting value)	-999999 to 999999 (Note 6)	$\times 10^{STM}$μm (Note 6)	○	The servo motor rotates continuously using the set value as the absolute value. Make sure to describe this command after the "MOV" command.

<table>
<tr><th>Command</th><th>Name</th><th>Setting</th><th>Setting range</th><th>Unit</th><th>Indirect specification (Note 7)</th><th>Description</th></tr>
<tr><td>MOVI</td><td>Incremental value travel command</td><td>MOVA (setting value)</td><td>-999999 to 999999 (Note 6)</td><td>×10^{STM}μm (Note 6)</td><td>○</td><td>The servo motor rotates using the set value as the incremental value.
When a negative value is set, the servo motor rotates in the reverse rotation direction.
For the reverse rotation, the servo motor rotates in a direction of decreasing the address.</td></tr>
<tr><td>MOVIA</td><td>Incremental value continuous travel command</td><td>MOVIA (setting value)</td><td>-999999 to 999999 (Note 6)</td><td>×10^{STM}μm (Note 6)</td><td>○</td><td>The servo motor rotates continuously using the set value as the incremental value. Make sure to describe this command after the "MOVI" command.</td></tr>
<tr><td>SYNC (Note 1)</td><td>Waiting for external signal to switch on</td><td>SYNC (setting value)</td><td>1 to 3</td><td></td><td></td><td>After SOUT (SYNC synchronous output) is outputted, the following steps will be stopped until PI1 (Program input 1) to PI3 (Program input 3) are switched on.<table><tr><th>Setting value</th><th>Input signal</th></tr><tr><td>1</td><td>PI1 (Program input 1)</td></tr><tr><td>2</td><td>PI2 (Program input 2)</td></tr><tr><td>3</td><td>PI3 (Program input 3)</td></tr></table></td></tr>
<tr><td>OUTON (Note 1, 3)</td><td>External signal on output</td><td>OUTON (setting value)</td><td>1 to 3</td><td></td><td></td><td>Switch on OUT1 (Program output 1) to OUT3 (Program output 3).
By setting the on-time with [Pr. PT23] to [Pr. PT25], you can switch off the input signals after the set time elapses.<table><tr><th>Setting value</th><th>Input signal</th></tr><tr><td>1</td><td>OUT1 (Program output 1)</td></tr><tr><td>2</td><td>OUT2 (Program output 2)</td></tr><tr><td>3</td><td>OUT3 (Program output 3)</td></tr></table></td></tr>
<tr><td>OUTON (Note 1)</td><td>External signal off output</td><td>OUTON (setting value)</td><td>1 to 3</td><td></td><td></td><td>Switch off OUT1 (Program output 1) to OUT3 (Program output 3), which have been on with the "OUTON" command.<table><tr><th>Setting value</th><th>Input signal</th></tr><tr><td>1</td><td>OUT1 (Program output 1)</td></tr><tr><td>2</td><td>OUT2 (Program output 2)</td></tr><tr><td>3</td><td>OUT3 (Program output 3)</td></tr></table></td></tr>
<tr><td>TRIP (Note 1)</td><td>Absolute value Trip point specification</td><td>TRIP (setting value)</td><td>-999999 to 999999 (Note 6)</td><td>×10^{STM} μm (Note 6)</td><td></td><td>When the servo motor rotates for the travel distance set by the "TRIP" command after the "MOV" or "MOVA" command is initiated, the next step is executed. Make sure to describe this command after the "MOV" or "MOVA" command.</td></tr>
<tr><td>TRIPI (Note 1)</td><td>Incremental value Trip point specification</td><td>TRIPI (setting value)</td><td>-999999 to 999999 (Note 6)</td><td>×10^{STM} μm (Note 6)</td><td></td><td>When the servo motor rotates for the travel distance set by the "TRIPI" command after the "MOVI" or "MOVIA" command is initiated, the next step is executed. Make sure to describe this command after the "MOVI" or "MOVIA" command.</td></tr>
<tr><td>ITP (Note 1, 4)</td><td>Interrupt positioning</td><td>ITP (setting value)</td><td>0 to 999999 (Note 6)</td><td>×10^{STM} μm (Note 6)</td><td></td><td>An interrupt signal stops the servo motor when the motor rotates the set travel distance. Make sure to describe this command after the "SYNC" command.</td></tr>
<tr><td>COUNT (Note 1)</td><td>External pulse count</td><td>COUNT (setting value)</td><td>-999999 to 999999</td><td>pulse</td><td></td><td>When the pulse counter value becomes larger than the count value set for the "COUNT" command, the next step is executed. "COUNT (0)" clears the pulse counter to 0.</td></tr>
</table>

Command	Name	Setting	Setting range	Unit	Indirect specification (Note 7)	Description
FOR NEXT	Step repeat command	FOR (setting value) NEXT	0, 1 to 10000	times		The steps between the "FOR (Setting value)" and the "NEXT" commands are repeated for the set number of times. Setting "0" repeats the operation endlessly. Do not describe another set of "FOR" and "NEXT" command between the "FOR" and "NEXT" commands. Otherwise, an error occurs.
LPOS (Note 1)	Current position Latch	LPOS				Latch the current position at the rising edge of LPS (Current position latch). The latched current position data can be read with communication commands. When the servo motor starts rotating, the latched position varies according to the motor speed and the sampling of input signals.
TIM	Dwell	TIM (setting value)	1 to 20000	ms	○	Waits for the next step until the set time elapses.
ZRT	Home position return	ZRT				Performs a manual home position return.
TIMES	Program count command	TIMES (setting value)	0, 1 to 10000	times	○	Set the number of program executions by writing "TIMES (setting value)" command at the start of the program. To execute the program only one time, no setting is required. Setting "0" repeats the operation endlessly.
STOP	Program stop	STOP				Stop the running program. Make sure to describe this command in the final line.
TLP (Note 8)	Forward rotation torque limit	TLP (setting value)	0, 1 to 1000	0.1 %		Using the maximum torque as 100%, limit the generated torque of the servo motor in the CCW power running or CW regeneration. The setting value is enabled until the program stops. Specifying the setting value to "0" enables the [Pr. PA11] setting.
TLN (Note 8)	Reverse rotation torque limit	TLN (setting value)	0, 1 to 1000	0.1 %		Using the maximum torque as 100%, limit the generated torque of the servo motor in the CW power running or CCW regeneration. The setting value is enabled until the program stops. Specifying the setting value to "0" enables the [Pr. PA12] setting.
TQL (Note 8)	Torque limit	TQL (setting value)	0, 1 to 1000	0.1 %		Using the maximum torque as 100%, limit the generated torque of the servo motor. The setting value is enabled until the program stops. Specifying the setting value to "0" enables the [Pr. PA11] and [Pr. PA12] settings.

Note 1. The "SYNC", "OUTON", "OUTOF", "TRIP", "TRIPI", "COUNT", "LPOS", and "ITP" commands are enabled even during a command output.
2. The "SPN" command is enabled while the "MOV", "MOVA", "MOVI", or "MOVIA" command is executed. The "STA", "STB", "STC", and "STD" commands are enabled while the "MOV" or "MOVI" command is executed.
3. When the on-time is set with [Pr. PT23] to [Pr. PT25], the next command is executed after the set time elapses.
4. When the remaining distance is equal to or less than the set value, or while the servo motor is being stopped or decelerating, the program skips the "ITP" command and proceeds to the next step.
5. The parameter value is enabled normally. However, the value set for the command is enabled after the command is executed until the program stops.
6. The unit of the position command data input can be changed with [Pr. PT01]. For the setting range of each unit, refer to section 5.2.3 (1) (a).
7. For the explanation of the indirect specification, refer to section 5.2.2 (2) (j).
8. The parameter value is enabled normally. However, the value set for the command is enabled after the command is executed until the program stops.

(2) Detailed explanations of commands

(a) Positioning conditions (SPN/STA/STB/STC/STD)

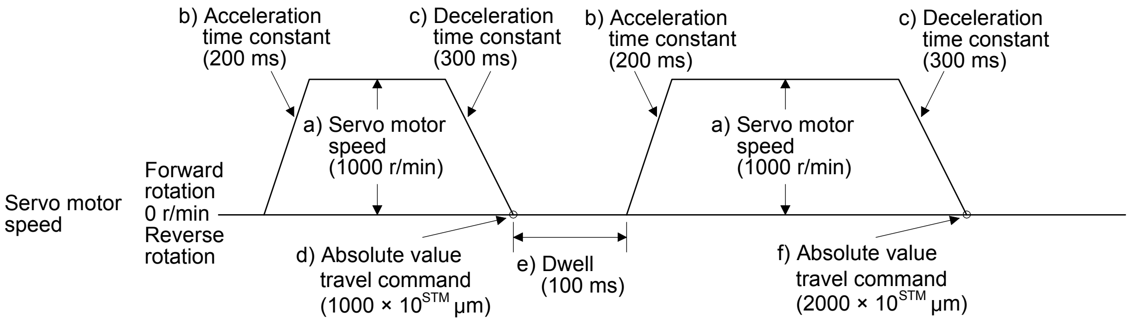
POINT
●Once values are set for the "SPN", "STA", "STB" and "STC" commands, the values are enabled without resetting them. (The values are not initialized at the program startup.) The settings are enabled in the other programs. ●The value set for the "STD" command is enabled in the same program only. The value is initialized to the setting value of [Pr. PC03] at the program startup, and therefore the value is disabled in the other programs.

The "SPN", "STA", "STB", "STC", and "STD" commands are enabled while the "MOV" or "MOVIA command is executed.

1) Program example 1

When executing two operations with the same servo motor speeds, acceleration time constants, and deceleration time constants while the travel commands are different

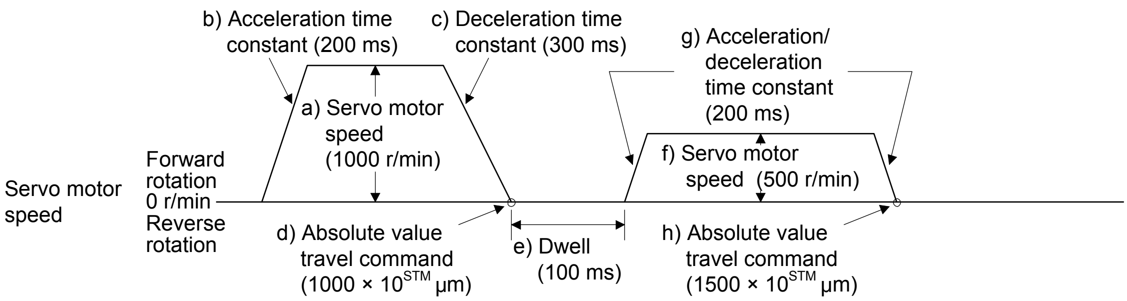
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOV (1000)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	d)
TIM (100)	Dwell	100 [ms]	e)
MOV (2000)	Absolute value travel command	2000 [$\times 10^{STM}$ μm]	f)
STOP	Program stop		



2) Program example 2

When executing two operations with different servo motor speeds, acceleration time constants, deceleration time constants, and travel commands.

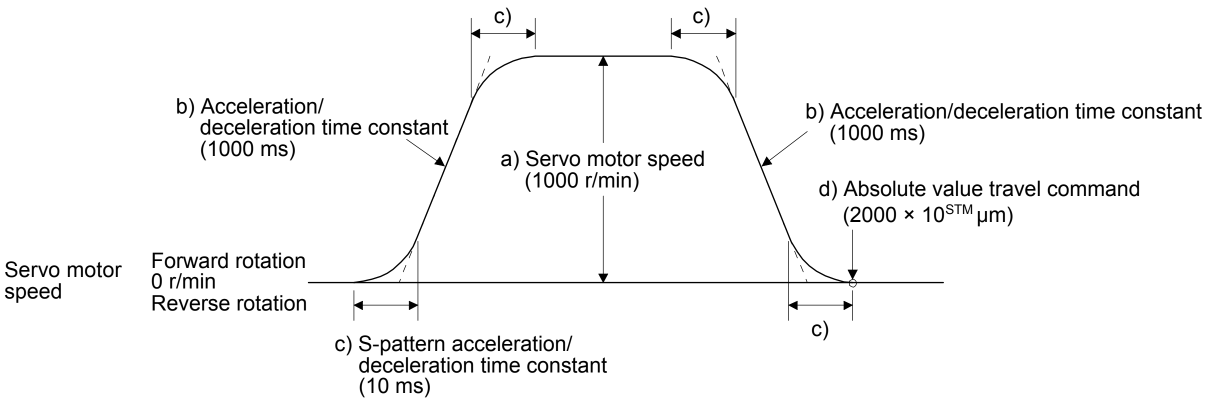
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOV (1000)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	d)
TIM (100)	Dwell	100 [ms]	e)
SPN (500)	Servo motor speed	500 [r/min]	f)
STC (200)	Acceleration/deceleration time constant	200 [ms]	g)
MOV (1500)	Absolute value travel command	1500 [$\times 10^{STM}$ μm]	h)
STOP	Program stop		



3) Program example 3

Using the S-pattern acceleration/deceleration time constants reduces abrupt movements at acceleration or deceleration. When the "STD" command is used, [Pr. PC03 S-pattern acceleration/deceleration time constant] does not function.

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STC (100)	Acceleration/deceleration time constant	1000 [ms]	b)
STD (10)	S-pattern acceleration/deceleration time constant	10 [ms]	c)
MOV (2000)	Absolute value travel command	2000 [×10^{STM} μm]	d)
STOP	Program stop		



(b) Continuous travel commands (MOVA/MOVIA)

POINT
●A combination of "MOV" and "MOVIA" commands, and a combination of "MOVI" and "MOVA" commands are not available.

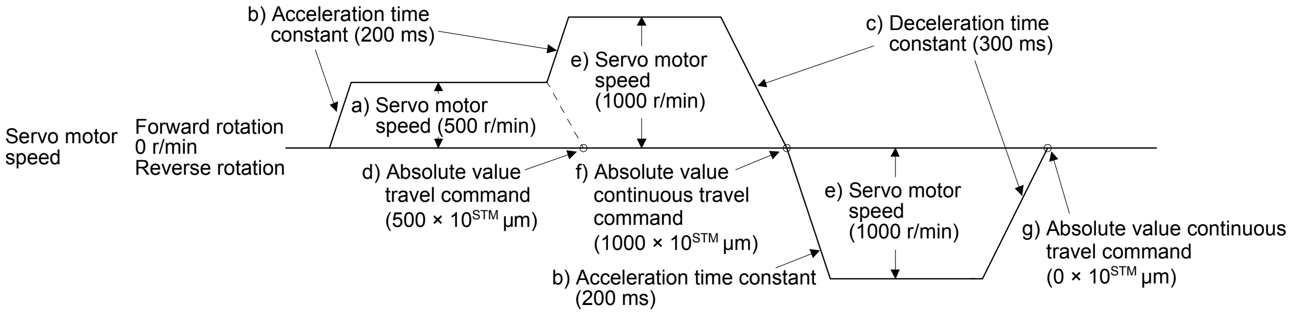
The "MOVA" command is a continuous travel command for the "MOV" command. After the travel with the "MOV" command is executed, the travel with "MOVA" command will be executed continuously without a stop.
The speed specified by the "MOVA command" is enabled from the deceleration start point of the preceding "MOV" or "MOVA" command.
The acceleration/deceleration time constants for the preceding "MOV" command is also applied to those for the "MOVA" command.
The "MOVIA" command is a continuous travel command for the "MOVI" command. After the travel with the "MOVI" command is executed, the travel with "MOVIA" command will be executed continuously without a stop.
The speed specified by the "MOVIA command" is enabled from the deceleration start point of the preceding "MOVI" or "MOVIA" command.

The acceleration/deceleration time constants for the preceding "MOVI" command is also applied to those for the "MOVIA" command.

Command	Name	Setting	Unit	Description
MOV	Absolute value travel command	MOV (setting value)	$\times 10^{STM}$ μm	Absolute value travel command
MOVA	Absolute value continuous travel command	MOVA (setting value)	$\times 10^{STM}$ μm	Absolute value continuous travel command
MOVI	Incremental value travel command	MOVI (setting value)	$\times 10^{STM}$ μm	Incremental value travel command
MOVIA	Incremental value continuous travel command	MOVIA (setting value)	$\times 10^{STM}$ μm	Incremental value continuous travel command

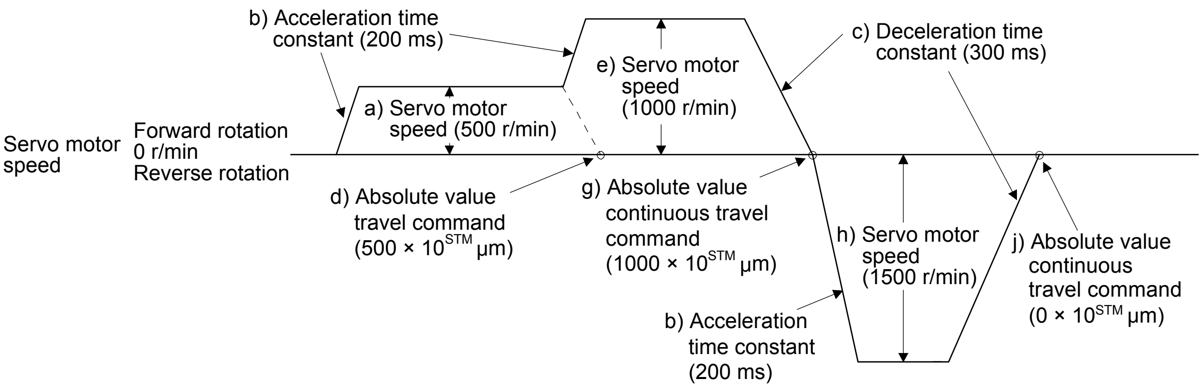
1) Program example 1
When using the absolute value travel command under the absolute value command method

Command	Description			
SPN (500)	Servo motor speed	500 [r/min]	a)	
STA (200)	Acceleration time constant	200 [ms]	b)	
STB (300)	Deceleration time constant	300 [ms]	c)	
MOV (500)	Absolute value travel command	500 [×10^{STM} μm]	d)	
SPN (1000)	Servo motor speed	1000 [r/min]	e)	
MOVA (1000)	Absolute value continuous travel command	1000 [×10^{STM} μm]	f)	
MOVA (0)	Absolute value continuous travel command	0 [×10^{STM} μm]	g)	
STOP	Program stop			



2) Program example 2 (Incorrect usage)
For continuous operations, the acceleration time constant and the deceleration time constant cannot be changed for each different speed. Therefore, even if the "STA", "STB", and "STD" commands are written at a speed change, the commands are invalid.

Command	Description			
SPN (500)	Servo motor speed	500 [r/min]	a)	
STA (200)	Acceleration time constant	200 [ms]	b)	
STB (300)	Deceleration time constant	300 [ms]	c)	
MOV (500)	Absolute value travel command	500 [×10^{STM} μm]	d)	
SPN (1000)	Servo motor speed	1000 [r/min]	e)	
STC (500)	Acceleration/deceleration time constant	500 [ms]	f)	Disabled
MOVA (1000)	Absolute value continuous travel command	1000 [×10^{STM} μm]	g)	
SPN (1500)	Servo motor speed	1500 [r/min]	h)	
STC (100)	Acceleration/deceleration time constant	100 [ms]	i)	Disabled
MOVA (0)	Absolute value continuous travel command	0 [×10^{STM} μm]	j)	
STOP	Program stop			



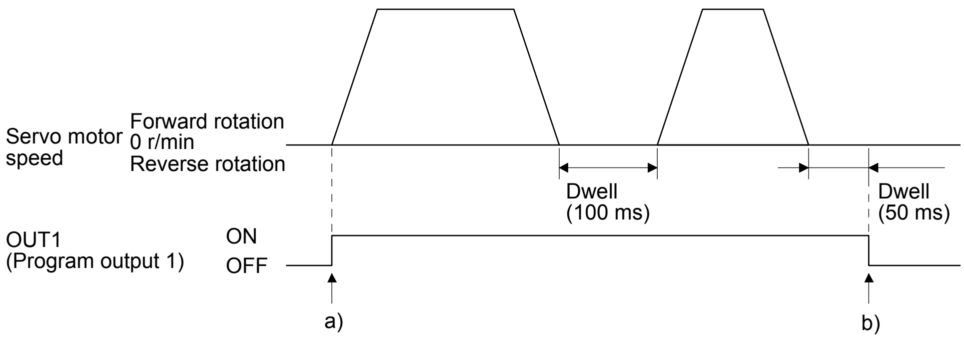
(c) Input/output commands (OUTON/OUTOF) and trip point commands (TRIP/TRIPI)

POINT

- Using [Pr. PT23] to [Pr. PT25], you can set the time until OUT1 (Program output 1) to OUT3 (Program output 3) are switched off. The commands are switched off under the following conditions.
  - The commands are switched off by the OUTOF command.
  - The commands are switched off by a program stop.
- The "TRIP" and "TRIPI" commands have the following restrictions.
  - The "MOV" or "MOVA" command cannot be used in combination with the "TRIPI" command.
  - The "MOVI" or "MOVIA" command cannot be used in combination with the "TRIP" command.
  - The "TRIP" and "TRIPI" commands do not execute the next step until the servo motor passes the set address or travel distance. Set the commands within the travel command range.
  - Whether the servo motor has passed the set address or travel distance is determined by checking the actual position (for each command). It is also determined by checking both edges of the address increasing/decreasing directions.

1) Program example 1
OUT1 (Program output 1) is switched on upon a program execution. When the program ends, OUT1 (Program output 1) is switched off.

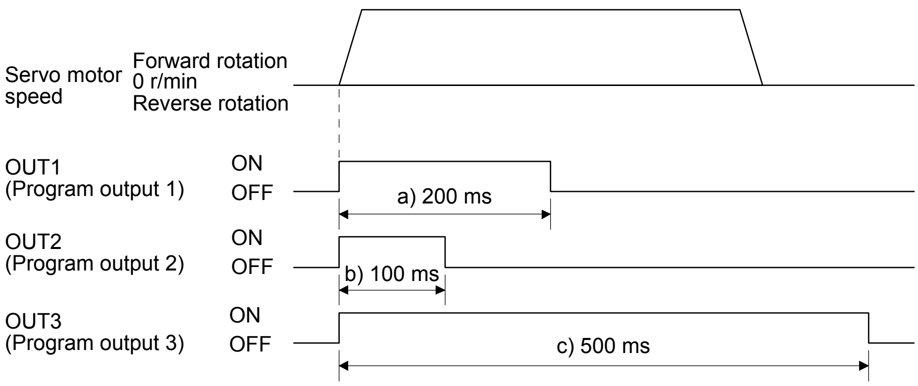
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (500)	Absolute value travel command	500 [$\times 10^{STM}$ μm]	
OUTON (1)	Switch on OUT1 (Program output 1).		a)
TIM (100)	Dwell	100 [ms]	
MOV (250)	Absolute value travel command	250 [$\times 10^{STM}$ μm]	
TIM (50)	Dwell	50 [ms]	
STOP	Program stop		b)



2) Program example 2
Using [Pr. PT23] to [Pr. PT25], you can switch off OUT1 (Program output 1) to OUT3 (Program output 3) automatically.

Parameter	Name	Setting value	Description
Pr. PT23	OUT1 output setting time	20	Switch off OUT1 200 [ms] later. a)
Pr. PT24	OUT2 output setting time	10	Switch off OUT2 100 [ms] later. b)
Pr. PT25	OUT3 output setting time	50	Switch off OUT3 500 [ms] later. c)

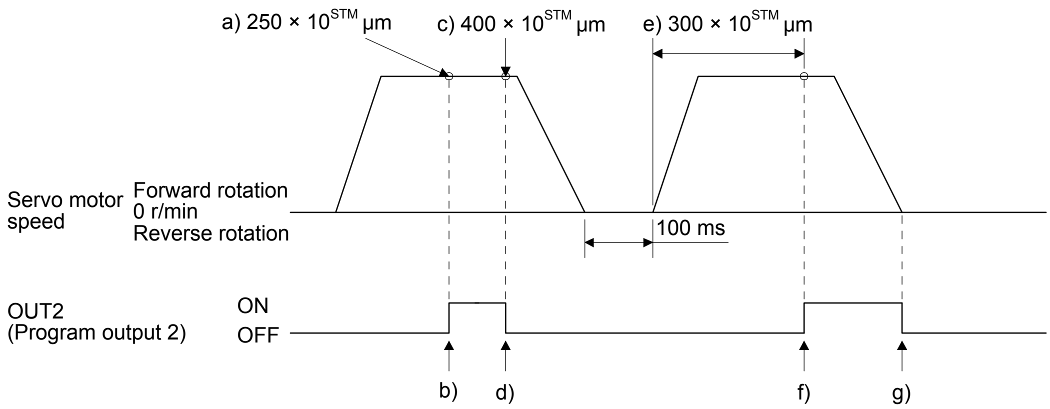
Command	Description	
SPN (500)	Servo motor speed	500 [r/min]
STA (200)	Acceleration time constant	200 [ms]
STB (300)	Deceleration time constant	300 [ms]
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]
OUTON (1)	Switch on OUT1 (Program output 1).	
OUTON (2)	Switch on OUT2 (Program output 2).	
OUTON (3)	Switch on OUT3 (Program output 3).	
STOP	Program stop	



3) Program example 3

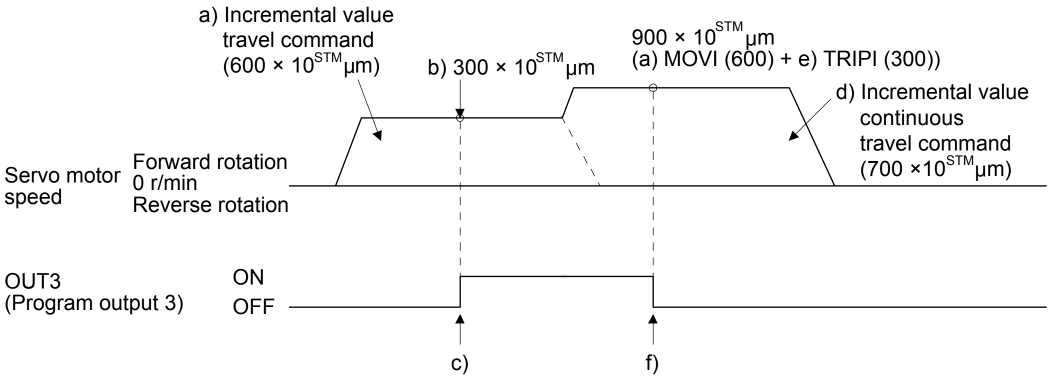
When setting the position address where the "OUTON" or "OUTOF" command is executed by using the "TRIP" or "TRIPI" command

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	1: 300 [ms]	
MOV (500)	Absolute value travel command	500 [$\times 10^{STM}$ μm]	
TRIP (250)	Absolute value trip point specification	250 [$\times 10^{STM}$ μm]	a)
OUTON (2)	Switch on OUT2 (Program output 2).		b)
TRIP (400)	Absolute value trip point specification	400 [$\times 10^{STM}$ μm]	c)
OUTOF (2)	Switch off OUT2 (Program output 2).		d)
TIM (100)	Dwell	100 [ms]	
MOVI (500)	Incremental value travel command	500 [$\times 10^{STM}$ μm]	
TRIPI (300)	Incremental value trip point specification	300 [$\times 10^{STM}$ μm]	e)
OUTON (2)	Switch on OUT2 (Program output 2).		f)
STOP	Program stop		g)



4) Program example 4

Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOVI (600)	Incremental value travel command	600 [×10^{STM} μm]	a)
TRIPI (300)	Incremental value trip point specification	300 [×10^{STM} μm]	b)
OUTON (3)	Switch on OUT3 (Program output 3).		c)
SPN (700)	Servo motor speed	700 [r/min]	
MOVIA (700)	Incremental value continuous travel command	700 [×10^{STM} μm]	d)
TRIPI (300)	Incremental value trip point specification	300 [×10^{STM} μm]	e)
OUTOF (3)	Switch off OUT3 (Program output 3).		f)
STOP	Program stop		



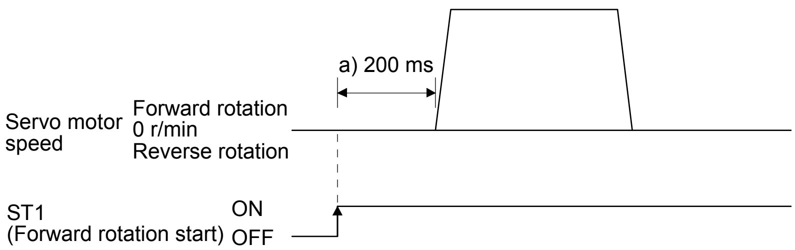
(d) Dwell (TIM)

Using the "TIM (setting value)" command, set the time from when the remaining distance under the command is "0" until when the next step is executed.

The following shows operation examples of using this command in combination with the other commands for reference.

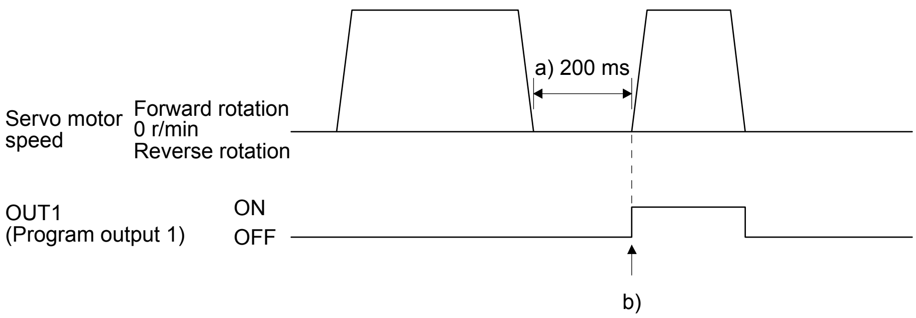
1) Program example 1

Command	Description		
TIM (200)	Dwell	200 [ms]	a)
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
STOP	Program stop		



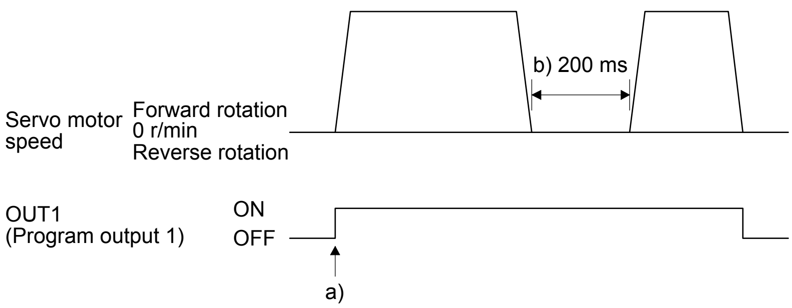
2) Program example 2

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	
TIM (200)	Dwell	1: 200 [ms]	a)
OUTON (1)	Switch on OUT1 (Program output 1).		b)
MOVI (500)	Incremental value travel command	500 [×10^{STM} μm]	
STOP	Program stop		



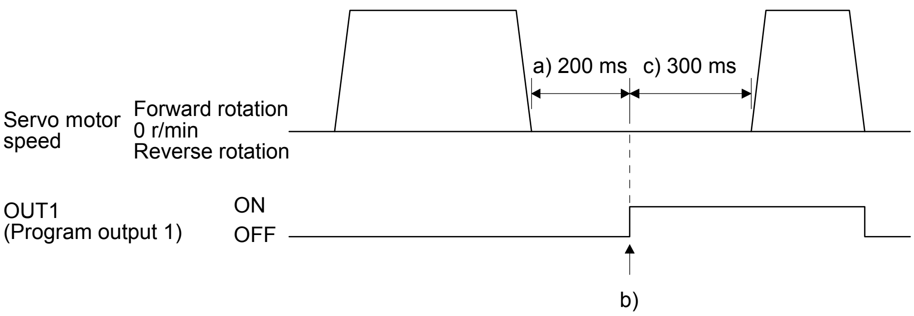
3) Program example 3

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	
OUTON (1)	Switch on OUT1 (Program output 1).		a)
TIM (200)	Dwell	200 [ms]	b)
MOVI (500)	Incremental value travel command	500 [×10^{STM} μm]	
STOP	Program stop		



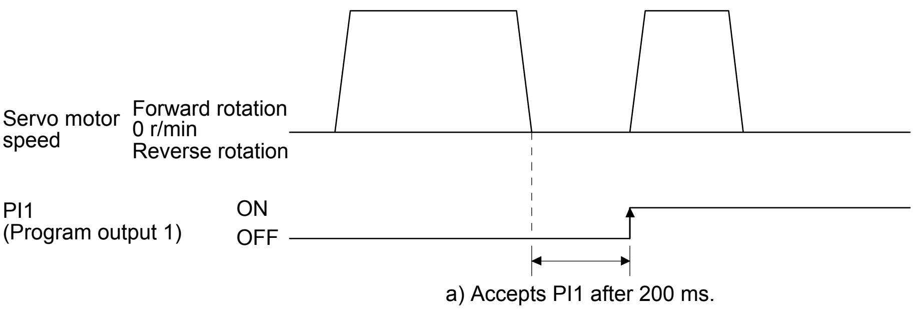
4) Program example 4

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [×10STM μm]	
TIM (200)	Dwell	200 [ms]	a)
OUTON (1)	Switch on OUT1 (Program output 1).		b)
TIM (300)	Dwell	300 [ms]	c)
MOVI (500)	Incremental value travel command	500 [×10STM μm]	
STOP	Program stop		



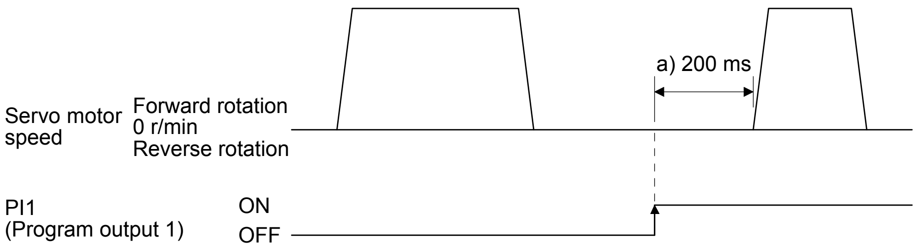
5) Program example 5

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [×10STM μm]	
TIM (200)	Dwell	200 [ms]	a)
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		
MOVI (500)	Incremental value travel command	500 [×10STM μm]	
STOP	Program stop		



6) Program example 6

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		
TIM (200)	Dwell	200 [ms]	a)
MOVI (500)	Incremental value travel command	500 [×10^{STM} μm]	
STOP	Program stop		



(e) Interrupt positioning (ITP)

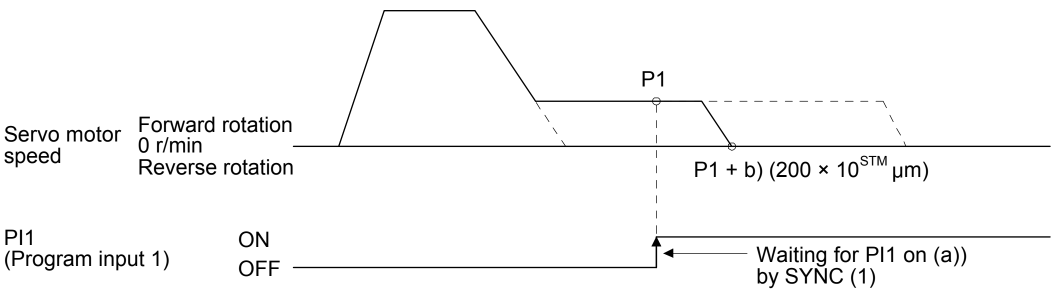
POINT

- For positioning with the ITP command, the stop position varies depending on the servo motor speed when the "ITP" command becomes enabled.
- In the following cases, the program does not execute the "ITP" command and proceeds to the next step.
  - When the setting value of the "ITP" command is smaller than that of the travel command set by the "MOV", "MOVI", "MOVA" or "MOVIA" command
  - When the remaining distance is equal to or less than the travel distance specified by the "ITP" command
  - While the servo motor is decelerating

When an "ITP" command is used in the program, starting from the position where PI1 (Program input 1) to PI3 (Program input 3) are switched on, the servo motor rotates for a distance of the set value and stops.
When using the "ITP" command, make sure to describe the "SYNC" command right before the "ITP" command.

1) Program example 1

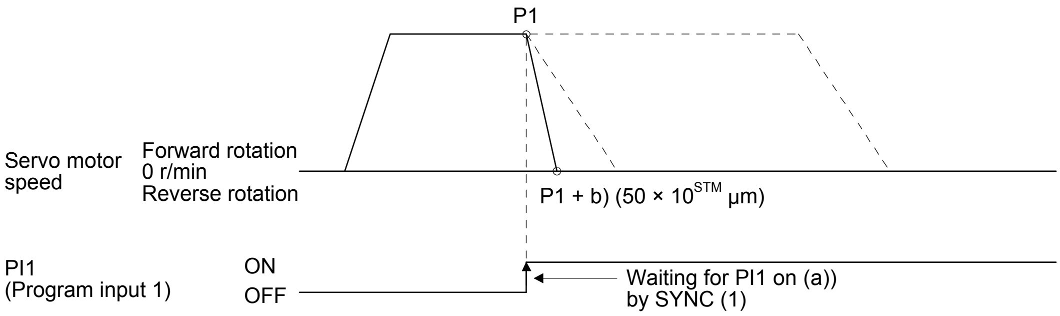
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (600)	Absolute value travel command	600 [×10^{STM} μm]	
SPN (100)	Servo motor speed	100 [r/min]	
MOVA (600)	Continuous travel command	600 [×10^{STM} μm]	
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		a)
ITP (200)	Interrupt positioning	200 [×10^{STM} μm]	b)
STOP	Program stop		



2) Program example 2

When the travel distance set by the "ITP" command is smaller than the travel distance required for deceleration, the actual deceleration time constant becomes smaller than the setting value of the "STB" command.

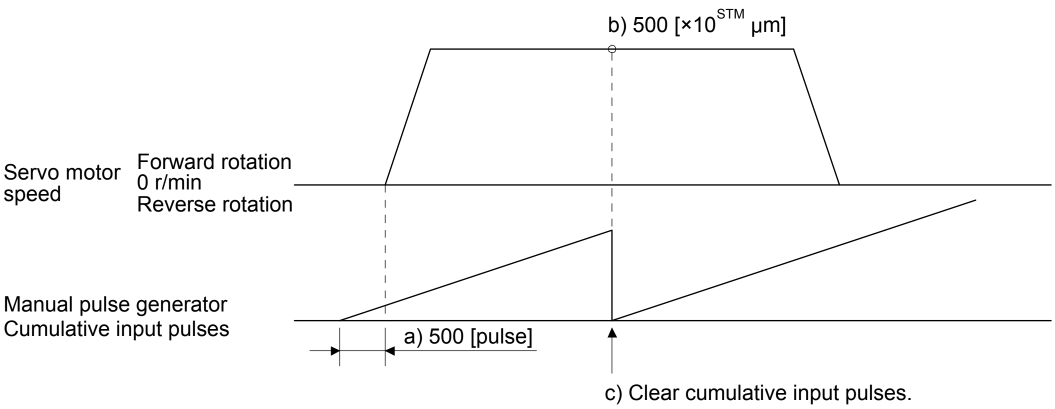
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		a)
ITP (50)	Interrupt positioning	50 [$\times 10^{STM}$ μm]	b)
STOP	Program stop		



(f) External pulse count (COUNT)

When the number of input pulses of the manual pulse generator becomes larger than the value set for the "COUNT" command, the next step is executed. Setting "0" clears the cumulative input pulses.

Command	Description		
COUNT (500)	Wait for the next step until the number of input pulses of the manual pulse generator reaches 500 [pulse].		a)
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	
TRIP (500)	Trip point specification	500 [$\times 10^{STM}$ μm]	b)
COUNT (0)	Clear cumulative input pulses.		c)
STOP	Program stop		

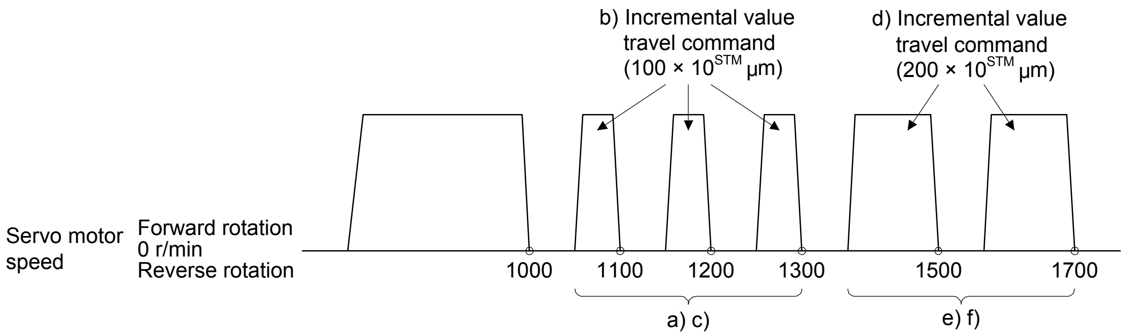


(g) Step repeat instruction (FOR...NEXT)

POINT
●You cannot insert "FOR...NEXT" commands between the "FOR" and "NEXT" commands.

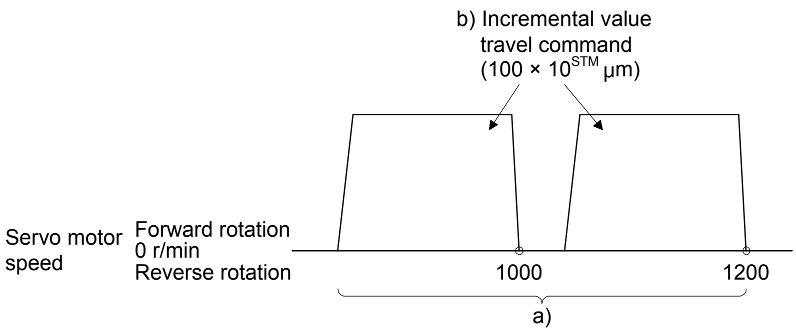
The steps between the "FOR (Setting value)" and the "NEXT" commands are repeated for the set number of times. Setting "0" repeats the operation endlessly.
For how to stop the program in this status, refer to section 5.2.4 (4).

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOV (1000)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	
TIM (100)	Dwell	100 [ms]	
FOR (3)	Start of step repeat instruction	3 [time]	a)
MOVI (100)	Incremental value travel command	100 [$\times 10^{STM}$ μm]	b)
TIM (100)	Dwell	100 [ms]	
NEXT	End of step repeat instruction		c)
FOR (2)	Start of step repeat instruction	2 [time]	d)
MOVI (200)	Incremental value travel command	200 [$\times 10^{STM}$ μm]	e)
TIM (100)	Dwell	100 [ms]	
NEXT	End of step repeat instruction		f)
STOP	Program stop		



(h) Number of program executions command (TIMES)
A program can be executed repeatedly by setting the number of program executions in the "TIMES (setting value) command" placed at the start of the program. To execute the program one time, the "TIMES" command is not required. Setting "0" repeats the operation endlessly. For how to stop the program in this status, refer to section 5.2.4 (4).

Command	Description		
TIMES (2)	Number of program executions command	2 [time]	a)
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOVI (1000)	Incremental value travel command	1000 [$\times 10^{STM}$ μm]	b)
TIM (100)	Dwell	100 [ms]	
STOP	Program stop		



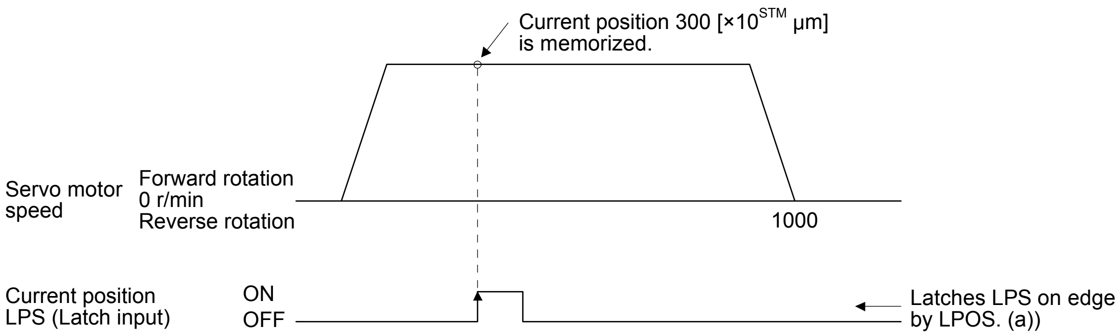
(i) Current position latch (LPOS)

POINT

- When the current position is stored using LPS (Current position latch input), the value varies depending on the servo motor speed at switch-on of LPS.
- The program does not proceed to the next step until LPS (Current position latch input) is switched on.
- The stored data will not be cleared unless the servo amplifier is switched off.
- After the input of LPS (Current position latch input) becomes enabled by the "LPOS" command, the input is cleared in the following conditions.
  - When the rising edge of LPS (Current position latch input) is detected
  - When the program ends
  - When the operation mode is changed
  - When the servo motor forcibly stopped
  - When an alarm occurs
  - When the servo motor enters the servo-off status

The current position upon switch-on of LPS (Current position latch input) is stored. The stored position data can be read with the communication function.
The current position latch function, which is set during the execution of the program, will be canceled when the program ends. The function is also canceled with an operation mode change, forced stop, alarm occurrence, or servo-off. The function will not be canceled by only a temporary stop.

Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
LPOS	Set a current position latch.		a)
STOP	Program stop		



(j) Indirect specification with general purpose registers (R1-R4, D1-D4)

You can indirectly specify the setting values of the "SPN", "STA", "STB", "STC", "STD", "MOV", "MOVI", "MOVA", "MOVIA", "TIM", and "TIMES" commands.

The value, which is stored in each general purpose register (R1-R4, D1-D4), is used as the setting value of each command.

Change the general purpose registers by using MR Configurator2 or a communication command while the program is not executed by a communication command

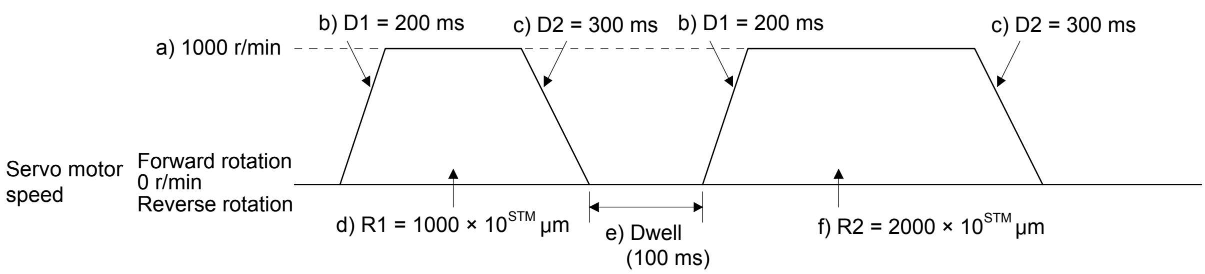
The data of the general purpose registers is erased at power-off of the servo amplifier. Note that the data of the general purpose registers (R1-R4) can be stored in EEP-ROM.

The setting range of each general purpose register is that of the command for which each register is used.

The following explains a case where the general purpose registers are set as shown below before the execution of the program.

General purpose register	Setting
R1	1000
R2	2000
D1	200
D2	300

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (D1)	Acceleration time constant	D1 = 200 [ms]	b)
STB (D2)	Deceleration time constant	D2 = 300 [ms]	c)
MOVI (R1)	Incremental value travel command	R1 = 1000 [$\times 10^{STM}$ μm]	d)
TIM (100)	Dwell	100 [ms]	e)
MOVI (R2)	Incremental value travel command	R2 = 2000 [$\times 10^{STM}$ μm]	f)
STOP	Program stop		

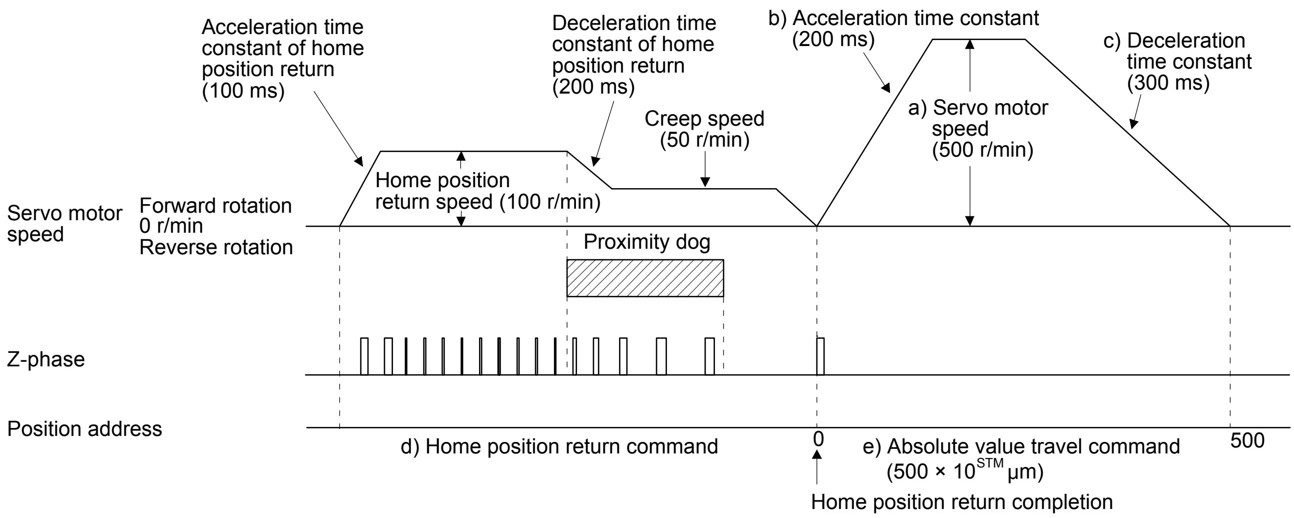


(k) Home position return command (ZRT)
Performs a home position return.
Set the home position with parameters. (Refer to section 5.4.)
With the "ZRT" command, the program proceeds to the next step after the home position return completion.

POINT
●If the home position return has not completed successfully, [AL. 96 Home position return incomplete warning] occurs. In this case, the program proceeds to the next step without a stop. Since the home position return is incomplete, the travel command is disabled.

Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
ZRT	Home position return		d)
MOV (500)	Absolute value travel command	500 [×10^{STM} μm]	e)
STOP	Program stop		

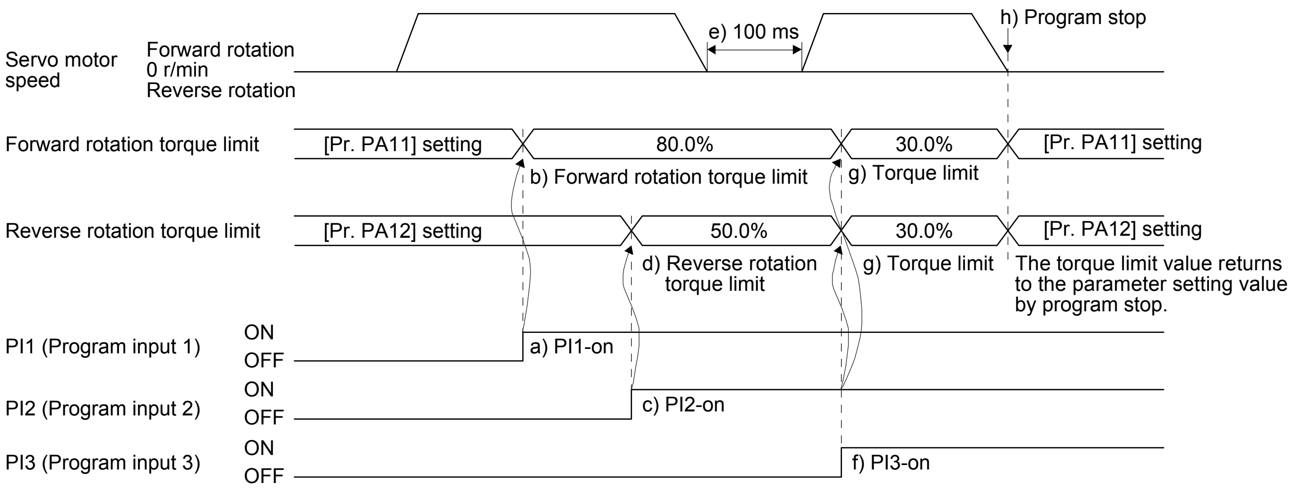
Item	Parameter to be used	Setting
Dog type home position return	[Pr. PT04]	"_ _ _ 0"
Home position return direction	[Pr. PT04]	"_ _ 0 _" (Address increasing direction)
Dog input polarity	[Pr. PT29]	"_ _ _ 1" (Detects dog when DOG (proximity dog) is on.)
Home position return speed	[Pr. PT05]	100 [r/min]
Creep speed	[Pr. PT06]	50 [r/min]
Home position shift distance	[Pr. PT07]	0 [×10^{STM} μm]
Acceleration time constant of home position return	[Pr. PC30]	100 [ms]
Deceleration time constant of home position return	[Pr. PC31]	200 [ms]
Home position return position data	[Pr. PT08]	0



(l) Torque limit value switching (TLP/TLN/TQL)
Using the maximum torque as 100.0%, limit the generated torque of the servo motor.

1) Program example

Command	Description		
SPN (1500)	Servo motor speed	1500 [r/min]	
STA (100)	Acceleration time constant	100 [ms]	
STB (200)	Deceleration time constant	1: 200 [ms]	
MOV (1000)	Absolute value travel command	10^{STM} μm	
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		a)
TLP (800)	Forward rotation torque limit	800 [0.1%]	b)
SYNC (2)	Suspend the step until PI2 (Program input 2) is switched on.		c)
TLN (500)	Reverse rotation torque limit	500 [0.1%]	d)
TIM (100)	Dwell	100 [ms]	e)
MOV (500)	Absolute value travel command	1000 [$\times 10^{STM}$ μm]	
SYNC (3)	Suspend the step until PI3 (Program input 3) is switched on.		f)
TQL (300)	Torque limit	300 [0.1%]	g)
STOP	Program stop		h)



5.2.3 Basic settings of signals and parameters

(1) Parameter

(a) Setting range of the position data

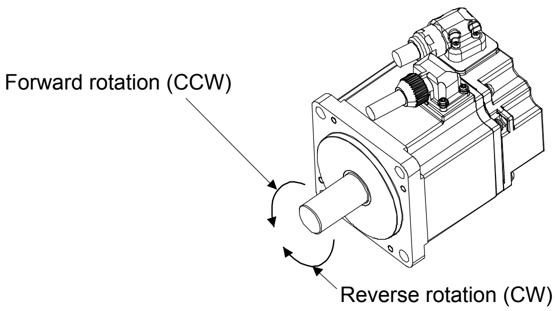
The following shows the setting of [Pr. PT01].

Command method	Travel command	[Pr. PT01]			Position data input range
		Positioning command method	Position data unit		
Absolute value command method	Absolute value travel command ("MOV", "MOVA")	_ _ _ 0	_ 0 _ _	[mm]	-999999 to 999999 [×10^{STM} μm]
			_ 1 _ _	[inch]	-999999 to 999999 [×$10^{(STM-4)}$ inch]
			_ 2 _ _	[degree]	-360.000 to 360.000
			_ 3 _ _	[pulse]	-999999 to 999999
	Incremental value travel command ("MOVI", "MOVIA")		_ 0 _ _	[mm]	-999999 to 999999 [×10^{STM} μm]
			_ 1 _ _	[inch]	-999999 to 999999 [×$10^{(STM-4)}$ inch]
			_ 2 _ _	[degree]	-999.999 to 999.999
			_ 3 _ _	[pulse]	-999999 to 999999
Incremental value command method	Incremental value travel command ("MOVI", "MOVIA")	_ _ _ 1	_ 0 _ _	[mm]	-999999 to 999999 [×10^{STM} μm]
			_ 1 _ _	[inch]	-999999 to 999999 [×$10^{(STM-4)}$ inch]
			_ 2 _ _	[degree]	-999.999 to 999.999
			_ 3 _ _	[pulse]	-999999 to 999999

(c) Rotation direction selection/travel direction selection ([Pr. PA14])

Select the servo motor rotation direction when ST1 (Forward rotation start) is switched on.

[Pr. PA14] setting	Servo motor rotation direction when ST1 (Forward rotation start) is switched on
0 (initial value)	CCW rotation with + position data CW rotation with - position data
1	CW rotation with + position data CCW rotation with - position data



(c) Feed length multiplication ([Pr. PT03])
Set the feed length multiplication factor (STM) of the position data.

[Pr. PT03] setting	Position data input range			
	[mm]	[inch]	[degree] (Note)	[pulse] (Note)
_ _ _ 0 (initial value)	-999.999 to 999.999	-99.9999 to 99.9999	-360.000 to 360.000	-999999 to 999999
_ _ _ 1	-9999.99 to 9999.99	-999.999 to 999.999		
_ _ _ 2	-99999.9 to 99999.9	-9999.99 to 9999.99		
_ _ _ 3	-999999 to 999999	-99999.9 to 99999.9		

Note. The feed length multiplication setting ([Pr. PT03]) is not applied to the unit multiplication factor. Adjust the unit multiplication factor in the electronic gear setting ([Pr. PA06] and [Pr. PA07]).

(2) Signal
Selecting a program with DI0 to DI3 and switching on ST1 perform the positioning operation according to the set program. At this time, ST2 (Reverse rotation start) is disabled.

Item	Device to be used	Setting
Program operation method selection	MD0 (Operation mode selection 1)	Switch on MD0.
Program selection	DI0 (Program No. selection 1) DI1 (Program No. selection 2) DI2 (Program No. selection 3) DI3 (Program No. selection 4)	Refer to section 2.3 (1).
Start	ST1 (Forward rotation start)	Switch on ST1 to execute the program operation.

5.2.4 Timing chart of the program operation

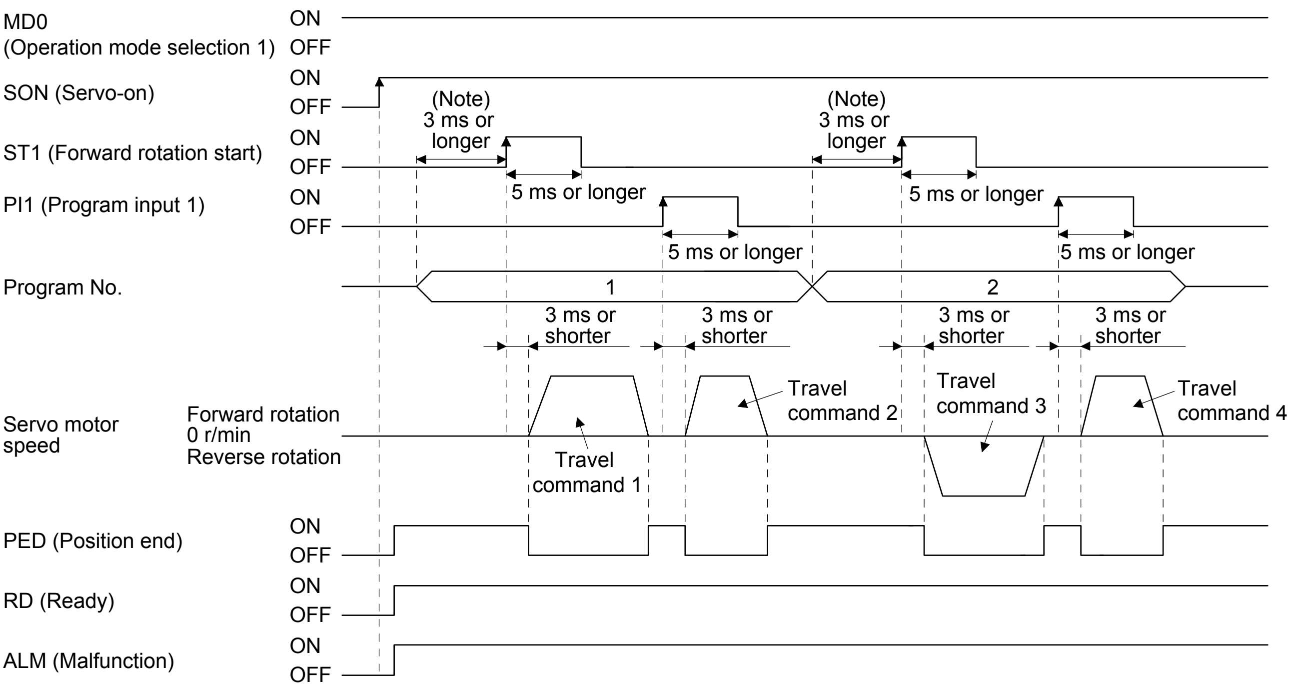
(1) Operation condition

The following shows a timing chart when the program below is executed after the home position return completion under the absolute value command method.

Program No.	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (100)	Acceleration/deceleration time constant	100 [ms]	
MOV (5000)	Absolute value travel command	5000 [×10STM μm]	Travel command 1
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		
STC (50)	Acceleration/deceleration time constant	50 [ms]	
MOV (7500)	Absolute value travel command	7500 [×10STM μm]	Travel command 2
STOP	Program stop		

Program No.	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (100)	Acceleration/deceleration time constant	100 [ms]	
MOV (2500)	Absolute value travel command	2500 [×10STM μm]	Travel command 3
SYNC (1)	Suspend the step until PI1 (Program input 1) is switched on.		
STC (50)	Acceleration/deceleration time constant	50 [ms]	
MOV (5000)	Absolute value travel command	5000 [×10STM μm]	Travel command 4
STOP	Program stop		

(2) Timing chart



Note. The detection of external input signals is delayed by the time set in the input filter setting of [Pr. PD29]. Considering the output signal sequence from the controller and signal variations due to hardware, configure a sequence that changes the program selection earlier.

(3) Temporary stop/restart
When TSTP is switched on during the automatic operation, deceleration is performed using the deceleration time constant under the executing travel command to make a temporary stop. An operation for the remaining travel distance will be started by switching TSTP off and on (on-edge detection).
ST1 (Forward rotation start) does not function even if it is switched on during the temporary stop. When the operation mode is switched from the automatic mode to the manual mode during the temporary stop, the remaining travel distance will be cleared, and the program will end. Switching on TSTP again will not restart the program. To start the program, switch on ST1 (Forward rotation start) again.
The temporary stop/restart input does not function during a home position return or JOG operation.
The timing chart is the same as that of the point table operation mode. Refer to section 4.2.2 (3) (e).

(4) How to stop the program
To stop the program in execution, switch on TSTP (Temporary stop/restart) to stop the positioning operation, and then switch on CR (Clear). At this time, the remaining distance will be cleared, and the program will end.
Switching on TSTP again will not restart the positioning operation.
To start the program, switch on ST1 (Forward rotation start) again.

(5) Program termination condition
The following shows the conditions for terminating the program in execution.

Termination condition	Restart condition
Execution of STOP (Program stop)	Switch on ST1 (Forward rotation start). The program starts from the beginning.
When the automatic operation mode is switched to the manual operation mode	After switching to the automatic operation mode, switch on ST1. The program starts from the beginning.
When the hardware stroke limit is detected	After LSP and LSN are switched on, switch on ST1. The program starts from the beginning.
When the software stroke limit is detected ([Pr. PT15] to [Pr. PT18])	After the machine travels to within the software stroke limit range, switch on ST1. The program starts from the beginning.
At base circuit shut-off	After resetting the base circuit shut-off, switch on ST1. The program starts from the beginning.

5.3 Manual operation mode

For the machine adjustment, home position adjustment, and others, you can shift the position to any position with a JOG operation or manual pulse generator.

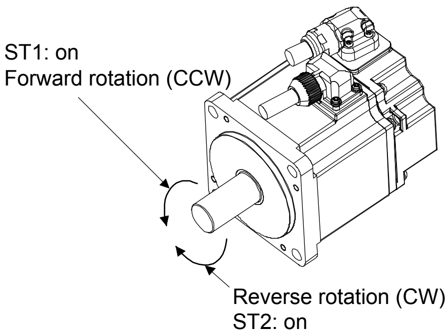
5.3.1 JOG operation

(1) Setting
According to the purpose of use, set input signals and parameters as shown below. At this time, DI0 (Program No. selection 1) to DI3 (Program No. selection 4) are disabled.

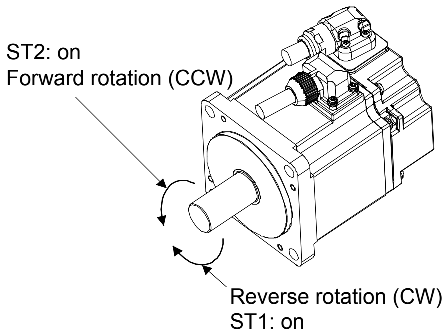
Item	Device/parameter to be used	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) in this section.
JOG speed	[Pr. PT13]	Set the servo motor speed.
Acceleration time constant	[Pr. PC01]	Set the acceleration time constant.
Deceleration time constant	[Pr. PC02]	Set the deceleration time constant.
S-pattern acceleration/deceleration time constant	[Pr. PC03]	Set the S-pattern acceleration/deceleration time constants.

(2) Servo motor rotation direction

[Pr. PA14] setting	Servo motor rotation direction	
	ST1 (Forward rotation start) on	ST2 (Reverse rotation start) on
0	CCW rotation	CW rotation
1	CW rotation	CCW rotation



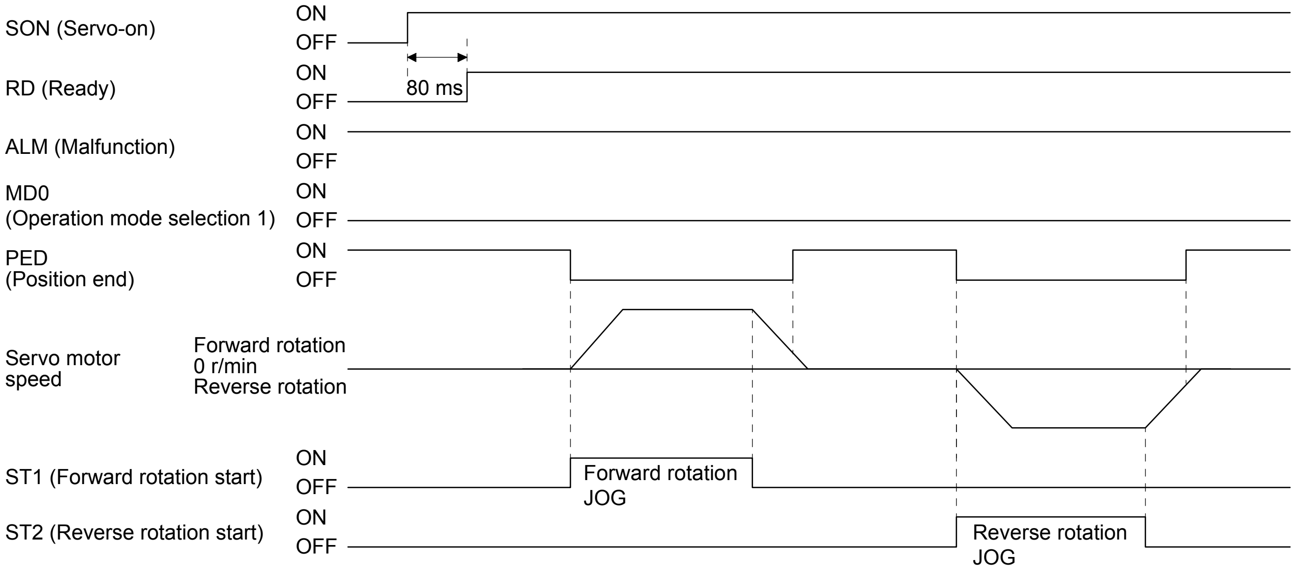
[Pr. PA14]: 0



[Pr. PA14]: 1

(3) Operation
When ST1 is switched on, the servo motor rotates using the JOG speed set in [Pr. PT13] and the acceleration/deceleration constants set with [Pr. PC02] and [Pr. PC03]. For the rotation direction, refer to (2) in this section. Switching on ST2 rotates the servo motor opposite to the direction of ST1 (Forward rotation start).

(4) Timing chart



5.3.2 Manual pulse generator operation

(1) Setting

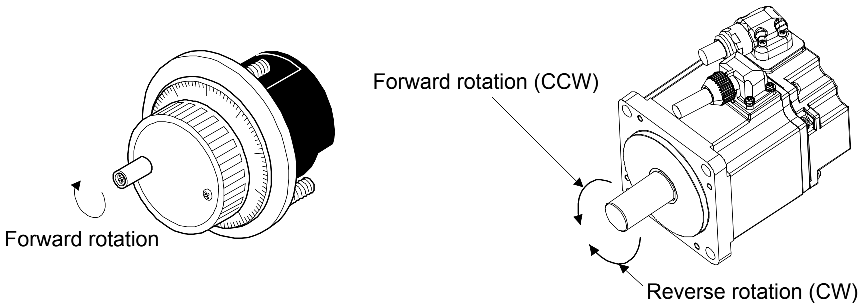
> POINT
>
> ● To enhance noise tolerance, set "_ 2_ _" to [Pr. PA13] when the command pulse frequency is 500 kpulses/s or less, or set "_3_ _" to [Pr. PA13] when the command pulse frequency is 200 kpulses/s or less.

According to the purpose of use, set input signals and parameters as shown below. At this time, DI0 (Program No. selection 1) to DI3 (Program No. selection 4) are disabled.

Item	Device/parameter to be used	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Manual pulse generator multiplication	[Pr. PT03]	Set the multiplication factor for the pulses generated from the manual pulse generator. For details, refer to (3) in this section.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) in this section.
Command input pulse train input form	[Pr. PA13]	Set "_ _ _ 2" (A/B-phase pulse train).
Pulse train filter selection	[Pr. PA13]	Set other than "_ 0 _ _" and "_ 1 _ _".

(2) Servo motor rotation direction

[Pr. PA14] setting	Servo motor rotation direction	
	Manual pulse generator operation: forward rotation	Manual pulse generator operation: reverse rotation
0	CCW rotation	CW rotation
1	CW rotation	CCW rotation



(3) Manual pulse generator multiplication

(a) Setting with input signals

In "Device Setting" of MR Configurator2, set TP0 (Manual pulse generator multiplication 1) and TP1 (Manual pulse generator multiplication 2) for input signals.

TP1 (Pulse generator multiplication 2) (Note)	TP0 (Pulse generator multiplication 1) (Note)	Servo motor rotation multiplication factor for manual pulse generator rotation amount	Travel distance			
			[mm]	[inch]	[degree]	[pulse]
0	0	[Pr. PT03] setting enabled				
0	1	1 time	0.001	0.0001	0.001	1
1	0	10 times	0.01	0.001	0.01	10
1	1	100 times	0.1	0.01	0.1	100

Note. 0: Off
1: On

(b) Using the parameter for setting

Using [Pr. PT03], set the servo motor rotation multiplication factor for the rotation amount of the manual pulse generator.

[Pr. PT03] setting	Servo motor rotation multiplication to manual pulse generator rotation amount	Travel distance			
		[mm]	[inch]	[degree]	[pulse]
_ _ 0 _	1 time	0.001	0.0001	0.001	1
_ _ 1 _	10 times	0.01	0.001	0.01	10
_ _ 2 _	100 times	0.1	0.01	0.1	100

(4) Operation

Turning the manual pulse generator rotates the servo motor. For the rotation direction of the servo motor, refer to (2) in this section.

5.4 Home position return mode

POINT
●Before performing the home position return, make sure that the limit switch operates. ●Check the home position return direction. An incorrect setting will cause a reverse running. ●Check the proximity dog input polarity. Otherwise, it may cause an unexpected operation.

5.4.1 Outline of home position return

A home position return is performed to match the command coordinates with the machine coordinates. The home position return is required every time the input power is on.
This section shows the home position return methods of the servo amplifier. Select the optimum method according to the configuration and uses of the machine.
This servo amplifier has the home position return automatic retract function. When the machine stops beyond or on a proximity dog, this function automatically moves the machine back to the proper position to perform the home position return. Manual operation with JOG operation, etc. is unnecessary.

(1) Home position return types

Select the optimum home position return type according to the machine type or others.

Type	Home position return method	Feature
Dog type	Deceleration starts from the front end of the proximity dog. After the rear end is passed, the position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the specified home position shift distance is used as the home position. The servo amplifier internally recognizes the Z-phase signal one time per servo motor revolution. The Z-phase signal cannot be used as an output signal.	· Typical home position return method using a proximity dog · The repeatability of the home position return is high. · The machine is less loaded. · Use this when the width of the proximity dog can be set equal to or greater than the deceleration distance of the servo motor.
Count type	Deceleration starts from the front end of the proximity dog. After the front end is passed, the position specified by the first Z-phase signal after the set distance or the position of the Z-phase signal shifted by the set home position shift distance is set as a home position.	· This is a home position return method using a proximity dog. · Use this to minimize the length of the proximity dog.
Data set type	The position shifted by any distance manually is used as the home position.	· No proximity dog is required.
Stopper type	A workpiece is pressed against a mechanical stopper, and the position where it is stopped is set as the home position.	· Since the workpiece collides with the mechanical stopper, the home position return speed must be low enough. · The strength of the machine and stopper must be increased.
Home position ignorance (servo-on position as home position)	The position at servo-on is used as the home position.	
Dog type rear end reference	Deceleration starts from the front end of the proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position.	· The Z-phase signal is not required.
Count type front end reference	Deceleration starts from the front end of the proximity dog. The position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position.	· The Z-phase signal is not required.
Dog cradle type	After the front end of the proximity dog is detected, the position specified by the first Z-phase signal is used as the home position.	
Dog type last Z-phase reference	After the front end of the proximity dog is detected, the position is shifted away from the proximity dog in the reverse direction. Then, the position specified by the first Z-phase signal or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.	
Dog type front end reference	Starting from the front end of the proximity dog, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position.	· The Z-phase signal is not required.
Dogless Z-phase reference	The position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the home position shift distance is used as the home position.	

(2) Parameters for home position return
To perform the home position return, set each parameter as follows.

(a) Select the home position return type with [Pr. PT04 Home position return type].

[Pr. PT04]

0	0	0	

Home position return method
0: Dog type (rear-end detection Z-phase reference)
1: Count type (front-end detection Z-phase reference)
2: Data set type
3: Stopper type
4: Home position ignorance (servo-on position as home position)
5: Dog type (rear-end detection, rear-end reference)
6: Count type (front-end detection, front-end reference)
7: Dog cradle type
8: Dog type (front-end detection, Z-phase reference)
9: Dog type (front-end detection, front-end reference)
A: Dogless type (Z-phase reference)

(b) Select the starting direction for the home position return with [Pr. PT04 Home position return type]. Setting "0" starts the home position return in a direction of increasing the address from the current position. Setting "1" starts the home position return in a direction of decreasing the address from the current position.

[Pr. PT04]

0	0		0

Home position return direction
0: Address increasing direction
1: Address decreasing direction

(c) Select the polarity where the proximity dog is detected with the DOG (Proximity dog) polarity selection of [Pr. PT29 Function selection T-3].
Setting "0" detects a proximity dog when DOG (Proximity dog) is switched off. Setting "1" detects a proximity dog when DOG (Proximity dog) is switched on.

[Pr. PT29]

0	0	0	

DOG (Proximity dog) polarity selection
0: Detection with off
1: Detection with on

(3) Program example
Select a program containing a "ZRT" command, which performs the home position return.

5.4.2 Dog type home position return

This is a home position return method using a proximity dog. Deceleration starts at the front end of the proximity dog. After the rear end is passed, the position specified by the first Z-phase signal, or the position of the first Z-phase signal shifted by the specified home position shift distance is used as the home position.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dog type home position return	[Pr. PT04]	_ _ _ 0: Select dog type (rear end detection Z-phase reference)
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the first Z-phase signal after the rear end of the proximity dog is passed.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Length of the proximity dog
To generate the Z-phase signal of the servo motor during the detection of DOG (Proximity dog), set the length of the proximity dog that satisfies equations (5.1) and (5.2).

$$L_1 \geq \frac{V}{60} \cdot \frac{td}{2} \quad \cdots\cdots (5.1)$$

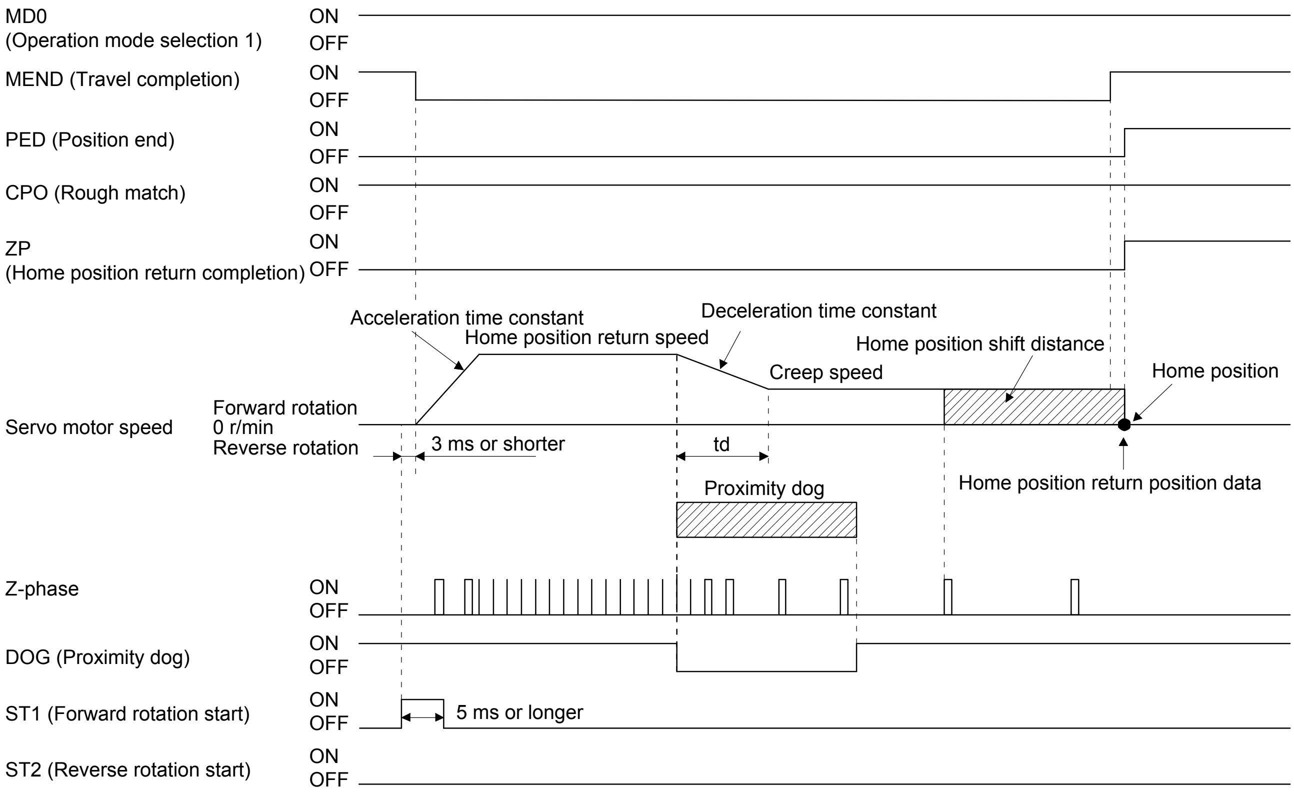
L_1: Length of the proximity dog [mm]
V: Home position return speed [mm/min]
td: Deceleration time [s]

$$L_2 \geq 2 \cdot \Delta S \quad \cdots\cdots (5.2)$$

L_2: Length of the proximity dog [mm]
ΔS: Travel distance per servo motor revolution [mm]

(3) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.

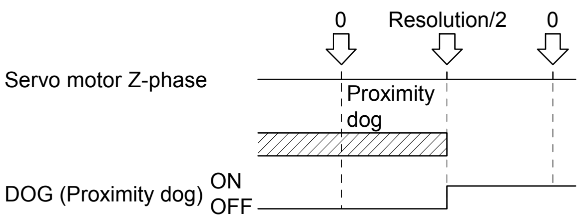


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

(4) Adjustment

For the dog type home position return, adjust the setting so that the Z-phase signal is always generated during the detection of a dog. Make an adjustment so that the rear end of DOG (Proximity dog) is positioned almost at the center between the positions specified by a Z-phase signal and the next Z-phase signal.

The generation position of the Z-phase signal can be checked with "Position within one-revolution" of "Status Display" on MR Configurator2.



5.4.3 Count type home position return

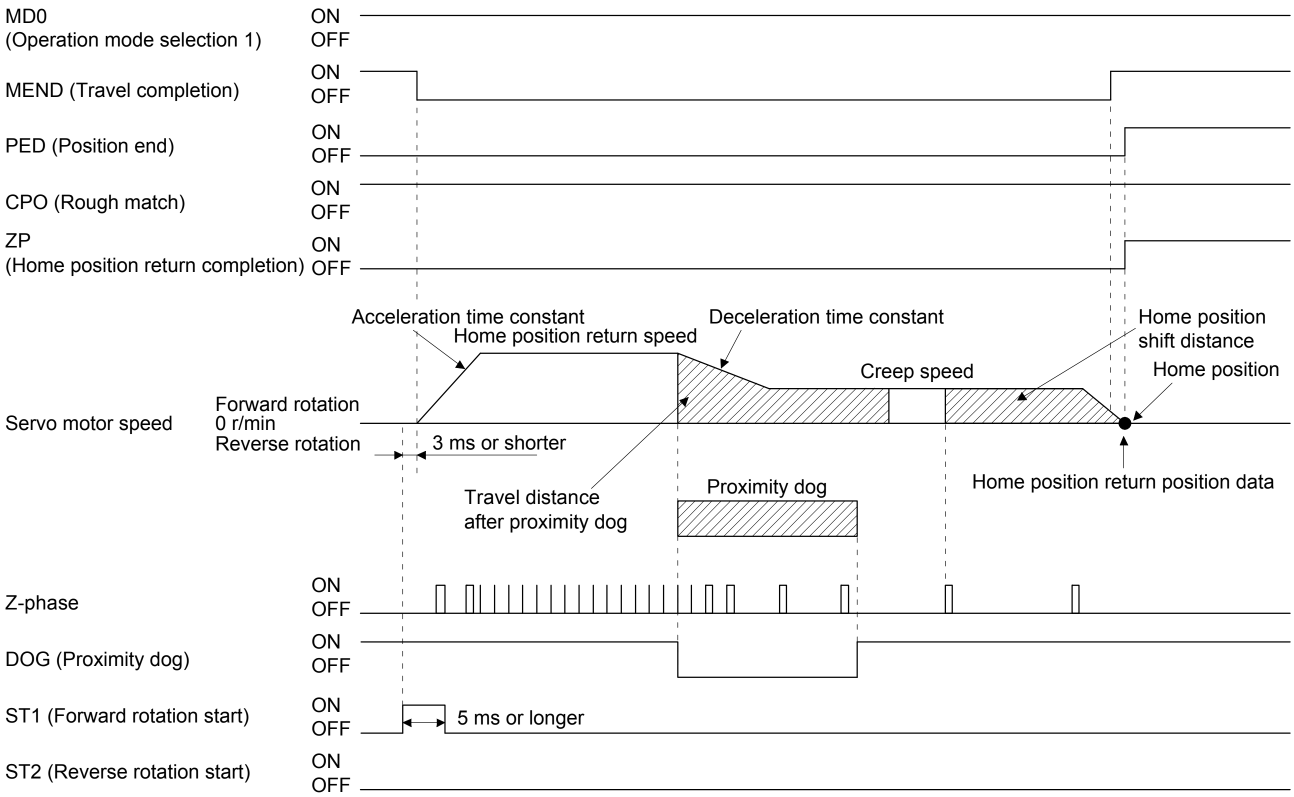
For the count type home position return, after the front end of the proximity dog is detected, the position is shifted by the distance set in [Pr. PT09 Travel distance after proximity dog]. Then, the position specified by the first Z-phase signal is used as the home position. Therefore, when the on-time of DOG (Proximity dog) is 10 ms or more, the length of the proximity dog has no restrictions. Use the count type home position return when you cannot use the dog type home position return because the length of the proximity dog cannot be reserved, when you input DOG (Proximity dog) electrically from the controller, or other cases.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Count type home position return	[Pr. PT04]	_ _ _ 1: Select the count type (front end detection Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	After the front end of the proximity dog is passed, the position is shifted by the travel distance and then is specified by the first Z-phase signal. Set this to shift the position of the first Z-phase signal.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance specified after the front end of the proximity dog is passed.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.4 Data set type home position return

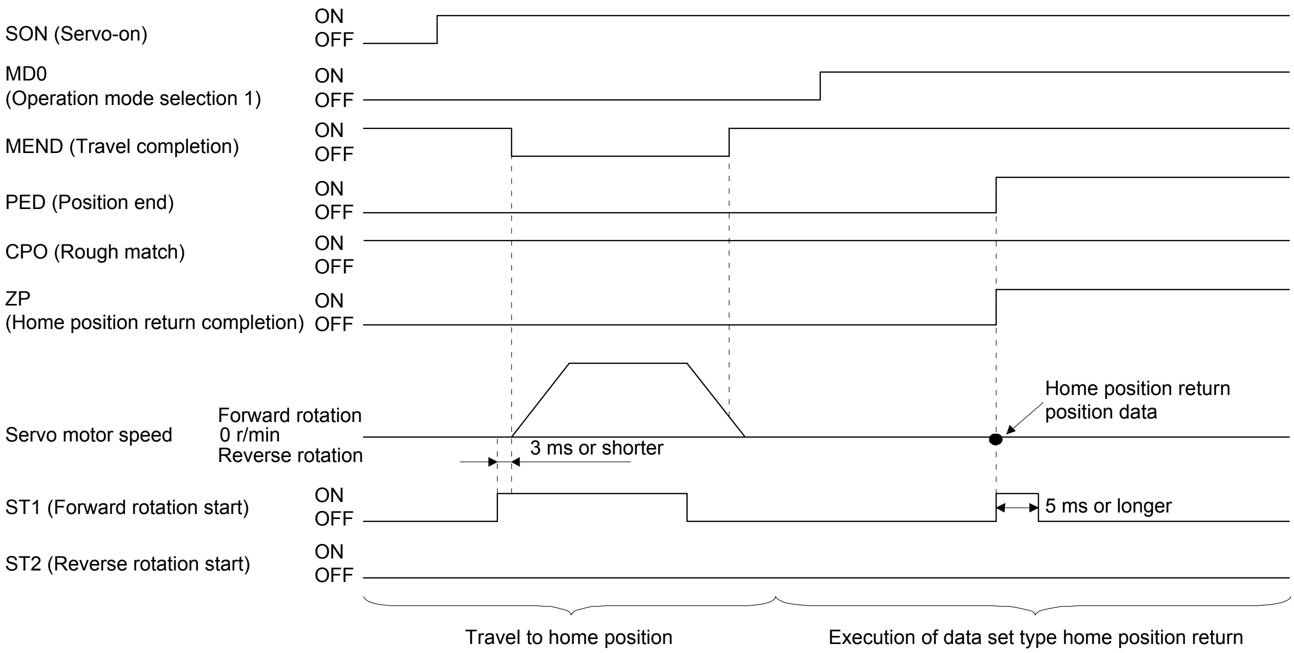
To set an arbitrary position as the home position, use the data set type home position return. The JOG operation, the manual pulse generator operation, and others can be used for the travel. The data set type home position return can be performed only at servo-on.

(1) Device/parameter

Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Data set type home position return	[Pr. PT04]	_ _ _ 2: Select the data set type.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

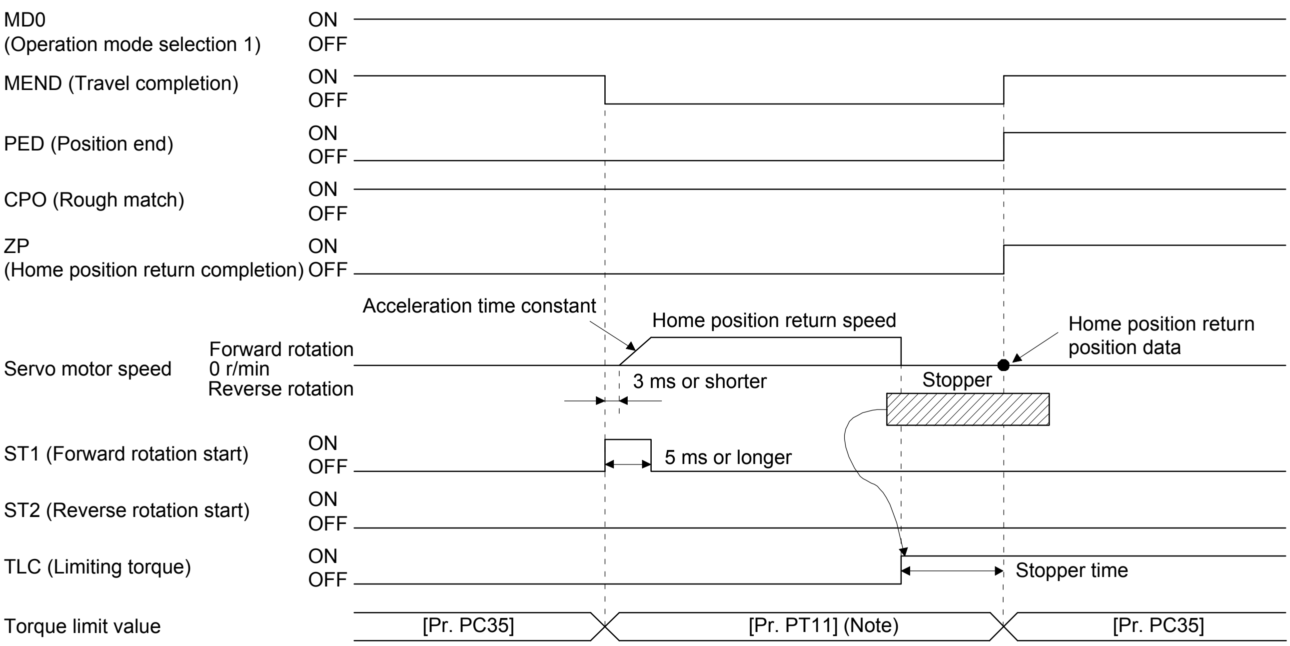
5.4.5 Stopper type home position return

For the stopper type home position return, the home position is set where the workpiece pressed against the stopper of the machine by using the JOG operation, the manual pulse generator operation, or others.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Stopper type home position return	[Pr. PT04]	_ _ _ 3: Select the stopper type.
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Home position return speed	[Pr. PT05]	Set the rotation speed until the workpiece is pressed against the mechanical stopper.
Stopper time	[Pr. PT10]	Set the time from when the home position data is obtained after the workpiece pressed against the stopper until when ZP (Home position return completion) is outputted.
Stopper type home position return torque limit value	[Pr. PT11]	Set the servo motor torque limit value at the execution of the stopper type home position return.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return is complete.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart
The following shows a timing chart after a program containing a "ZRT" command is selected.



Note. The following torque limits are enabled.

Input device (0: off, 1: on)		Limit value status	Enabled torque limit value
TL1	TL		
0	0		Pr. PT11
0	1	TLA > Pr. PT11	Pr. PT11
		TLA < Pr. PT11	TLA
1	0	Pr. PC35 > Pr. PT11	Pr. PT11
		Pr. PC35 < Pr. PT11	Pr. PC35
1	1	TLA > Pr. PT11	Pr. PT11
		TLA < Pr. PT11	TLA

The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.6 Home position ignorance (servo-on position as home position)

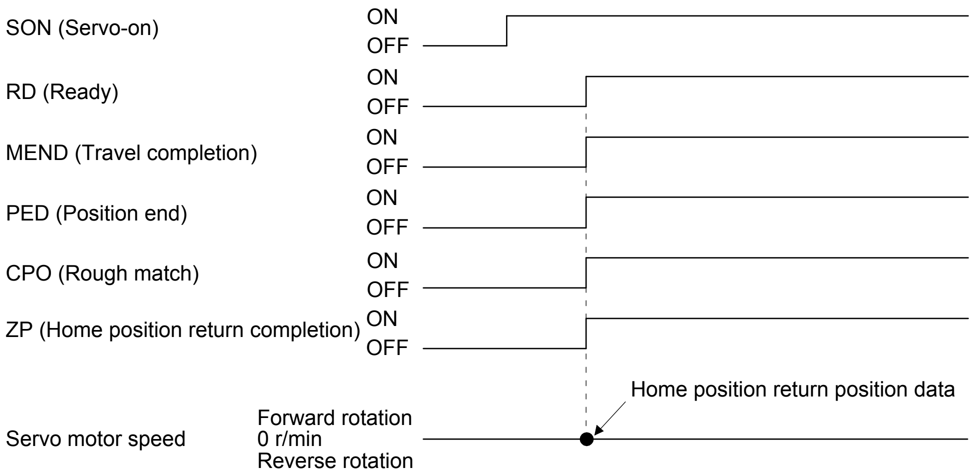
> POINT
>
> ●To perform a home position return by using the home position ignorance, selecting a program containing a "ZRT" command is not required.

The position at servo-on is used as the home position.

(1) Device/parameter
Set input devices and parameters as follows.

Item	Device/parameter to be used	Setting
Home position ignorance	[Pr. PT04]	_ _ _ 4: Select the home position ignorance (servo-on position as home position).
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.

(2) Timing chart



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.7 Dog type rear end reference home position return

POINT
●This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the rear end of the proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

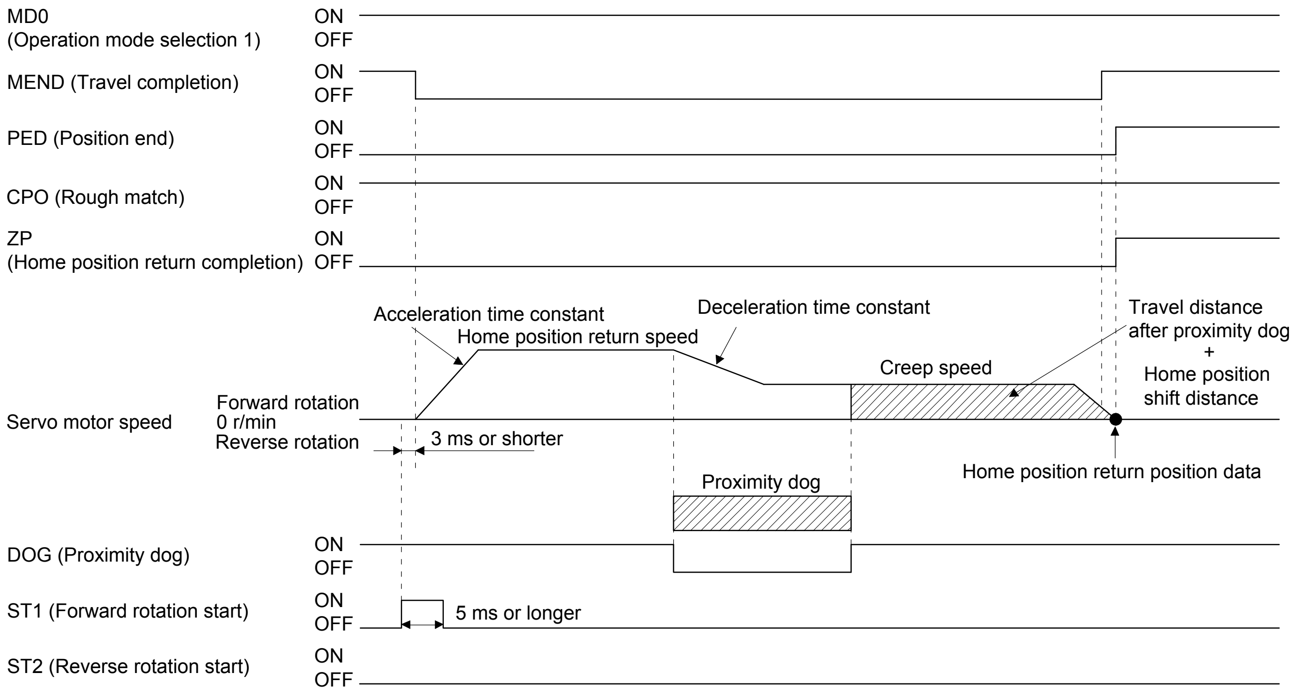
Deceleration starts from the front end of the proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is set as the home position. The home position return is available independently of the Z-phase signal.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dog type rear end reference home position return	[Pr. PT04]	_ _ _ 5: Select the dog type (rear end detection/rear end reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified after the rear end of the proximity dog is passed.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance after the rear end of the proximity dog is passed.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.8 Count type front end reference home position return

POINT

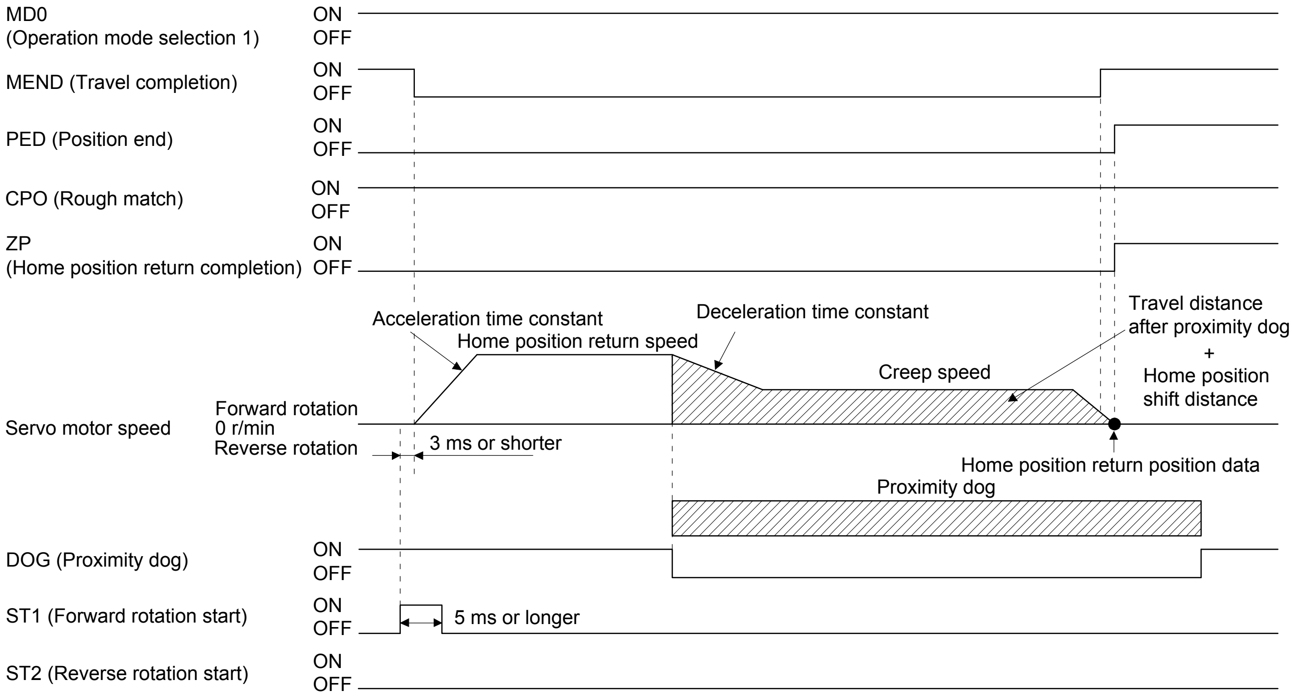
- This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the front end of the proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.
- After the front end of the proximity dog is detected, if a home position return ends without reaching the creep speed, [AL. 90.2] occurs. Set the travel distance after proximity dog and the home position shift distance enough for deceleration from the home position return speed to the creep speed.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Count type front end reference home position return	[Pr. PT04]	_ _ _ 6: Select the count type (front end detection/front end reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified after the rear end of the proximity dog is passed.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance after the rear end of the proximity dog is passed.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.9 Dog cradle type home position return

A position, which is specified by the first Z-phase signal after the front end of the proximity dog is detected, is set as the home position.

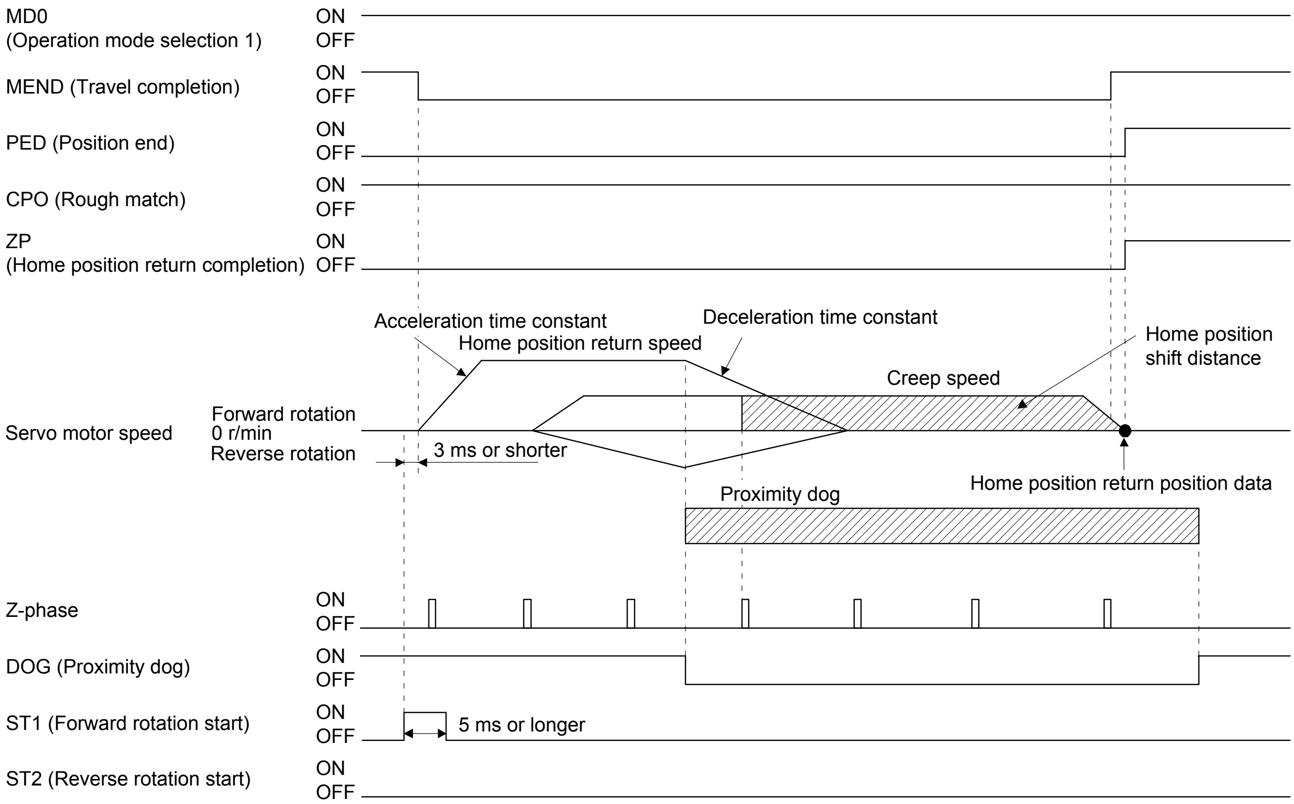
(1) Device/parameter

Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dog cradle type home position return	[Pr. PT04]	_ _ _ 7: Select the dog cradle type.
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.10 Dog type last Z-phase reference home position return

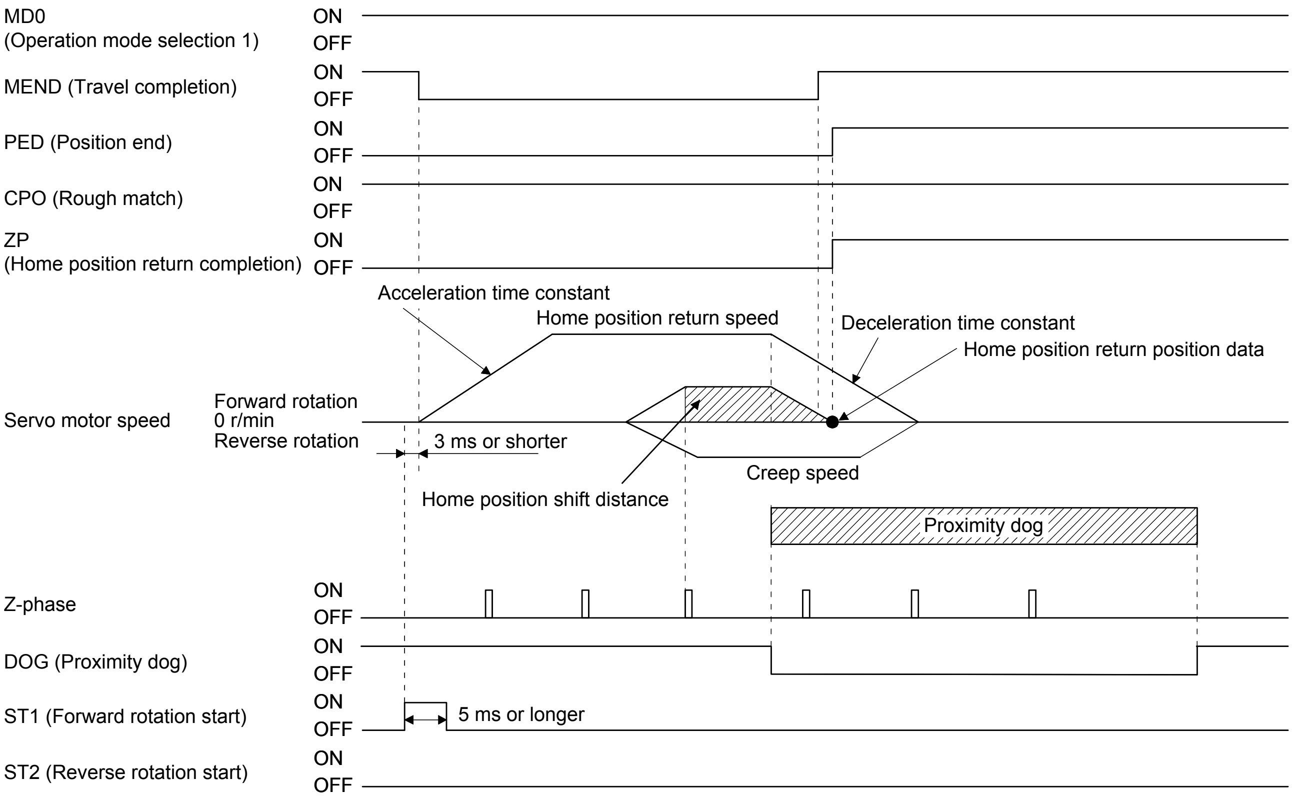
After the front end of the proximity dog is detected, the position is shifted away from the proximity dog at the creep speed in the reverse direction and then specified by the first Z-phase signal. The position of the first Z-phase signal is set as the home position.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dog type last Z-phase reference home position return	[Pr. PT04]	_ _ _ 8: Select the dog type (rear end detection/Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.11 Dog type front end reference home position return type

POINT
●This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the front end of the proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 200 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

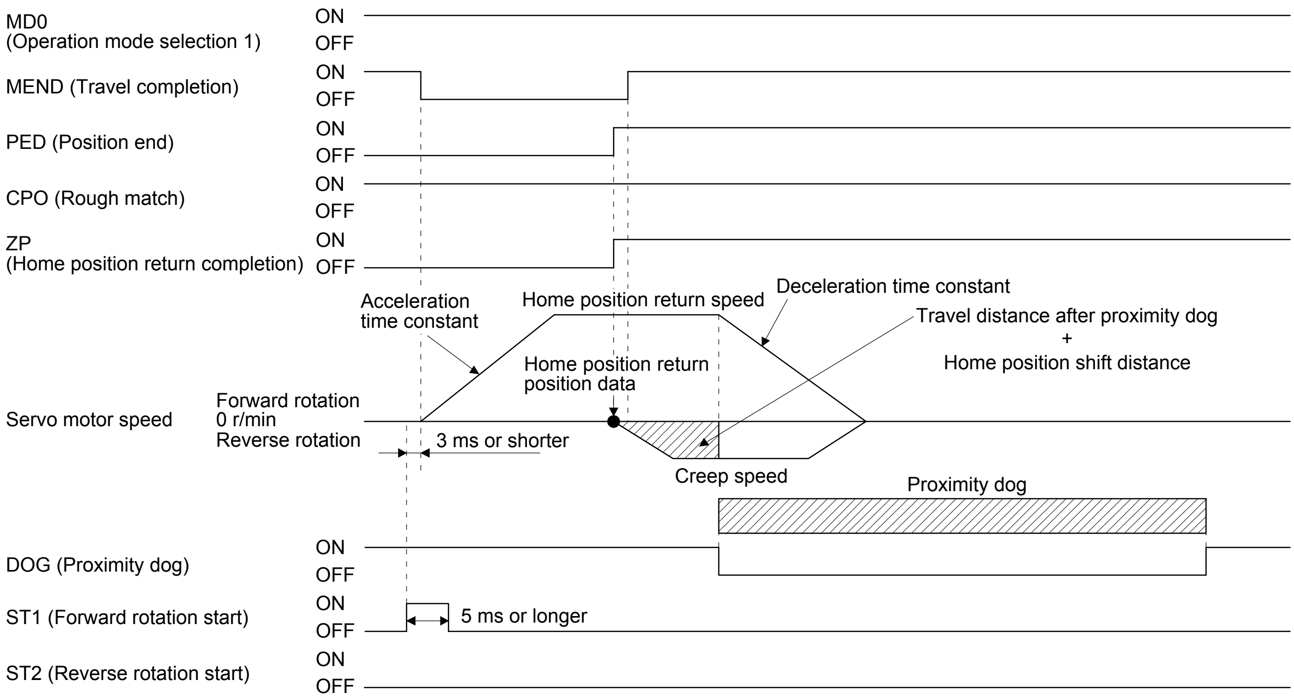
A position, which is shifted by the travel distance after proximity dog and the home position shift distance from the front end of the proximity dog, is set as the home position.
The home position return is available independently of the Z-phase signal. Changing the creep speed may change the home position.

(1) Device/parameter
Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dog type front end reference home position return	[Pr. PT04]	_ _ _ 9: Select the dog type (front end detection/front end reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.



The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

5.4.12 Dogless Z-phase reference home position return type

A position, which is shifted to by the home position shift distance from a position specified by the Z-phase pulse right after the start of the home position return, is set as the home position.

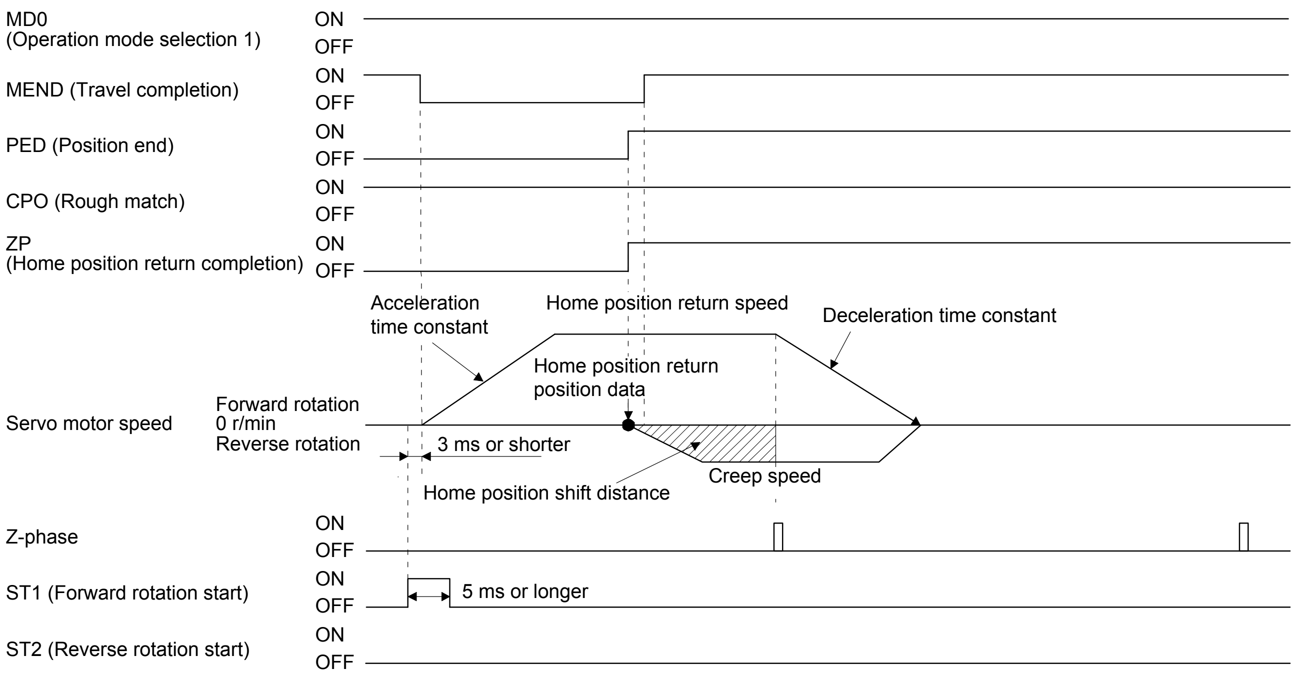
(1) Device/parameter

Set input devices and parameters as follows:

Item	Device/parameter to be used	Setting
Automatic operation mode of the program method	MD0 (Operation mode selection 1)	Switch on MD0.
Dogless Z-phase reference home position return	[Pr. PT04]	_ _ _ A: Select the dogless type (Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to section 5.4.1 (2) to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to section 5.4.1 (2) to select the dog input polarity.
Home position return speed	[Pr. PT05]	Set the rotation speed specified until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this to shift the home position, which is specified by the Z-phase signal.
Acceleration time constant of home position return	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Deceleration time constant of home position return	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position when the home position return completed.
Program	DI0 (Program No. selection 1) to DI3 (Program No. selection 4)	Select a program containing a "ZRT" command, which performs the home position return.

(2) Timing chart

The following shows a timing chart after a program containing a "ZRT" command is selected.

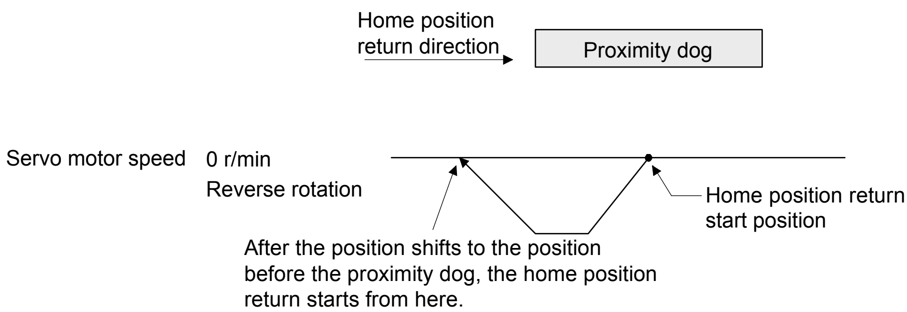


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

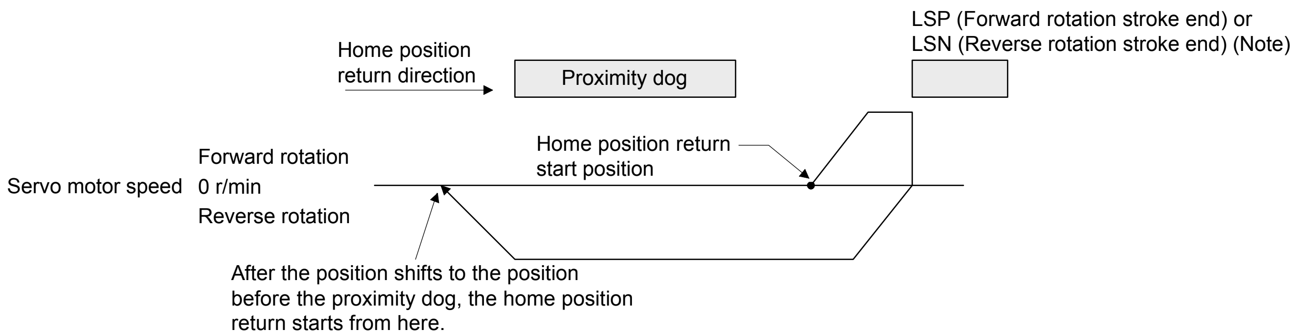
5.4.13 Automatic retract function used for the home position return

For a home position return using a proximity dog, if the home position return starts from or beyond the proximity dog, this function executes the home position return after the position is shifted back to where the home position return is possible.

(1) When the current position is on the proximity dog
When the current position is on the proximity dog, the position is shifted back automatically to execute the home position return.



(2) When the current position is beyond the proximity dog
The position is shifted in a direction of the home position return. When LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is detected, the position is shifted back automatically. The position will be shifted passing the proximity dog, and the travel will stop. The home position return will be restarted from that position. If the proximity dog is not detected, the travel stops at LSP or LSN on the opposite side, and [AL. 90 Home position return incomplete warning] occurs.



Note. The software limit cannot be used instead of LSP (Forward stroke end) and LSN (Reverse stroke end).

5.5 Serial communication operation

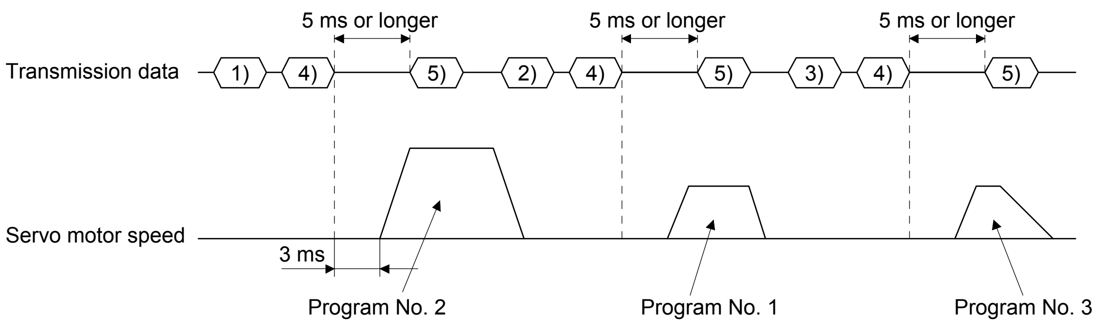
Using the RS-422 communication function, the servo amplifier can be operated from a controller such as a personal computer.
This section explains the data communication procedure. Refer to chapter 10 for details of the connection between the controller and servo amplifier and of communication data.

5.5.1 Positioning operation using the program

The communication function enables to select program No., and positioning operation using program is possible by switching on ST1.

(1) Program selection
Select program No. 1 to 16 by using the forced output (command [9] [2] and data No. [6] [0]) of the device from the controller.

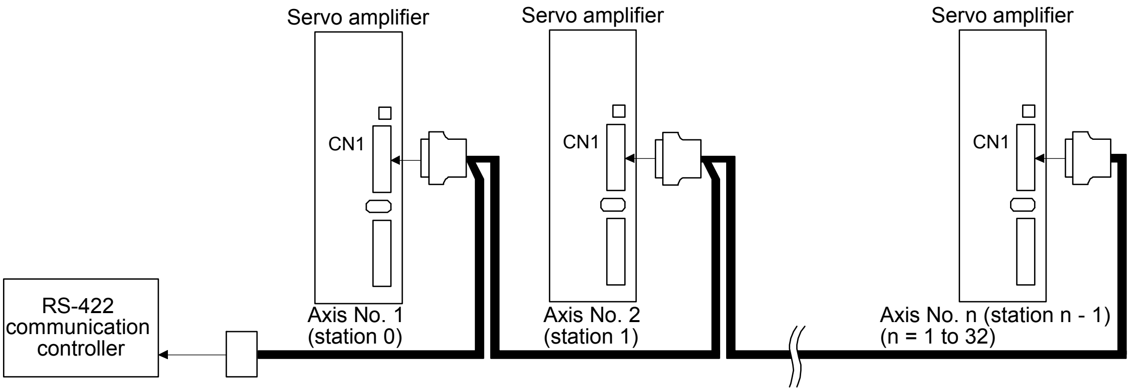
(2) Timing chart



No.	Transmission data description	Command	Data No.
1)	Select program No. 2.	[9] [2]	[6] [0]
2)	Select program No. 1.	[9] [2]	[6] [0]
3)	Select program No. 3.	[9] [2]	[6] [0]
4)	ST1 (Forward rotation start) on	[9] [2]	[6] [0]
5)	ST1 (Forward rotation start) off	[9] [2]	[6] [0]

5.5.2 Multi-drop method (RS-422 communication)

The RS-422 communication function enables to operate multiple servo amplifiers on the same bus. In this method, set station Nos. to the servo amplifiers so that the controller recognizes which servo amplifier is receiving the data currently being sent. Set the station Nos. with [Pr. PC20 Station number setting].
Be sure to set one station No. to one servo amplifier. Setting one station No. to multiple servo amplifiers will disable a normal communication. When operating multiple servo amplifiers with one command, use the group specification function mentioned in section 5.5.3. For the cable connection, refer to section 12.1.1 (2) of "MR-JE-_A Servo Amplifier Instruction Manual".

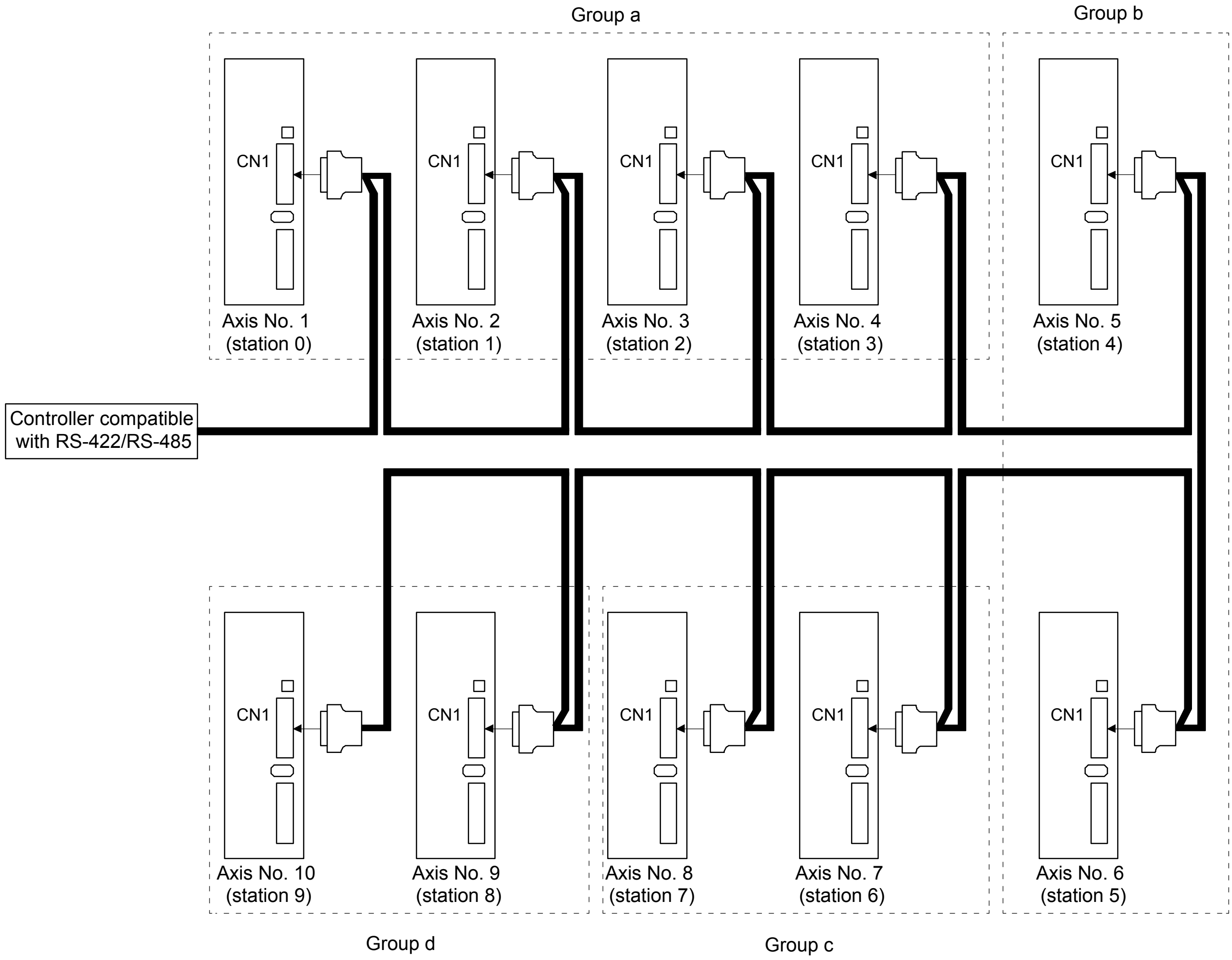


5.5.3 Group specification

CAUTION	●Set only one servo amplifier capable of returning data in a group. If multiple servo amplifiers return data simultaneously after receiving a command from the controller, the servo amplifiers may malfunction.

When using multiple servo amplifiers, you can set parameters with commands per group.
Up to six groups of a to f can be set. Set groups for each station with the communication commands of Mitsubishi Electric general-purpose AC servo protocol.

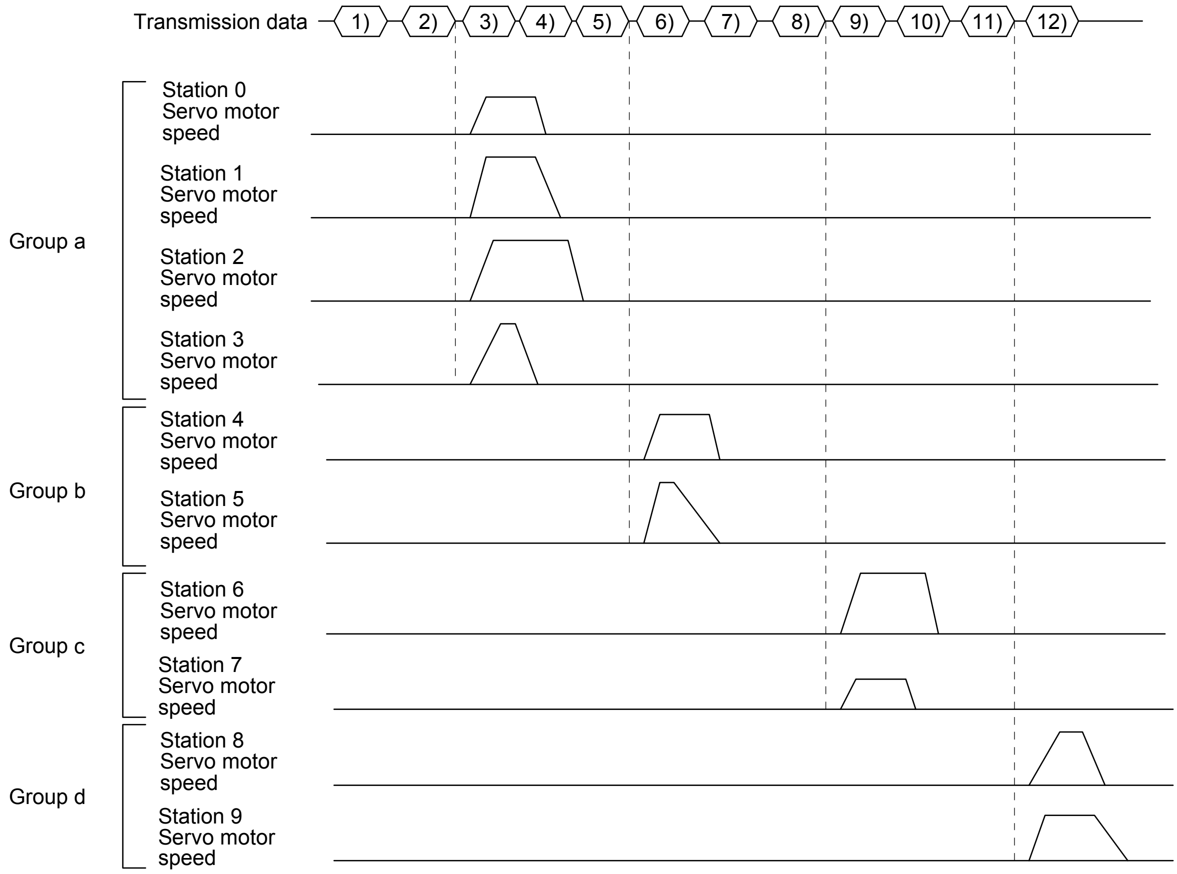
(1) Group setting example



Servo amplifier station No.	Group setting
Station 0	a
Station 1	
Station 2	
Station 3	
Station 4	b
Station 5	
Station 6	c
Station 7	
Station 8	d
Station 9	

(2) Timing chart

The following shows a timing chart of operation for each group performed with setting values set in program No. 1.



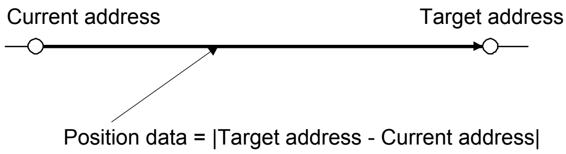
No.	Transmission data description	Command	Data No.
1)	Select program No. 1 in group a.	[9] [2]	[6] [0]
2)	ST1 (Forward rotation start) on	[9] [2]	[6] [0]
3)	ST1 (Forward rotation start) off	[9] [2]	[6] [0]
4)	Select program No. 1 in group b.	[9] [2]	[6] [0]
5)	ST1 (Forward rotation start) on	[9] [2]	[6] [0]
6)	ST1 (Forward rotation start) off	[9] [2]	[6] [0]
7)	Select program No. 1 in group c.	[9] [2]	[6] [0]
8)	ST1 (Forward rotation start) on	[9] [2]	[6] [0]
9)	ST1 (Forward rotation start) off	[9] [2]	[6] [0]
10)	Select program No. 1 in group d.	[9] [2]	[6] [0]
11)	ST1 (Forward rotation start) on	[9] [2]	[6] [0]
12)	ST1 (Forward rotation start) off	[9] [2]	[6] [0]

Besides this, you can perform simultaneous writing of common parameters to stations of each group, reset alarms, etc.

5.6 Incremental value command method

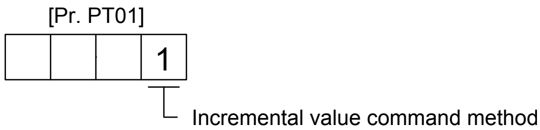
When using this servo amplifier in incremental value command method, change the setting of [Pr. PT01]. As position data, set the travel distance from the current address to the target address. The incremental value command method enables infinitely long constant rate of feeding.

Setting range: -999999 to 999999 [$\times 10^{STM}$ μm] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [$\times 10^{(STM-4)}$ inch] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [pulse]



This section indicates contents different from the absolute value command method (factory setting) when this servo amplifier is used under the incremental value command method.

(1) Parameter setting
Set [Pr. PT01] to select the incremental value command method as shown below.

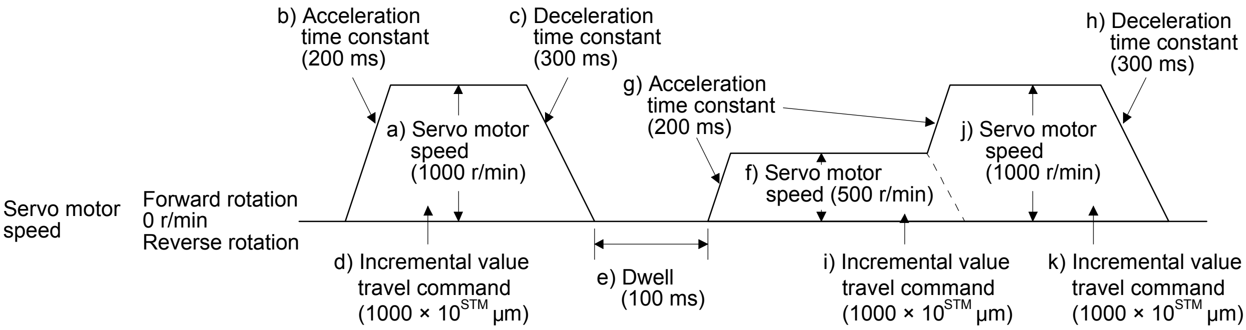


(2) Command
The command contents of "MOV" and "MOVA" are changed as follows. There is no change in other commands. Thus, the command contents are the same between "MOV" and "MOVI", and between "MOVA" and "MOVIA".

Command	Name	Setting	Setting range	Unit	Indirect specification	Description
MOV	Incremental value travel command	MOV (setting value)	-999999 to 999999	$\times 10^{STM}$ μm	○	The servo motor rotates using the set value as the incremental value. The same as "MOVI" command
MOVA	Incremental value continuous travel command	MOVA (setting value)	-999999 to 999999	$\times 10^{STM}$ μm	○	The servo motor rotates continuously as the set incremental value. Make sure to describe this command after the "MOV" command. If this command is described after other command, an error will occur. The same as "MOVIA" command

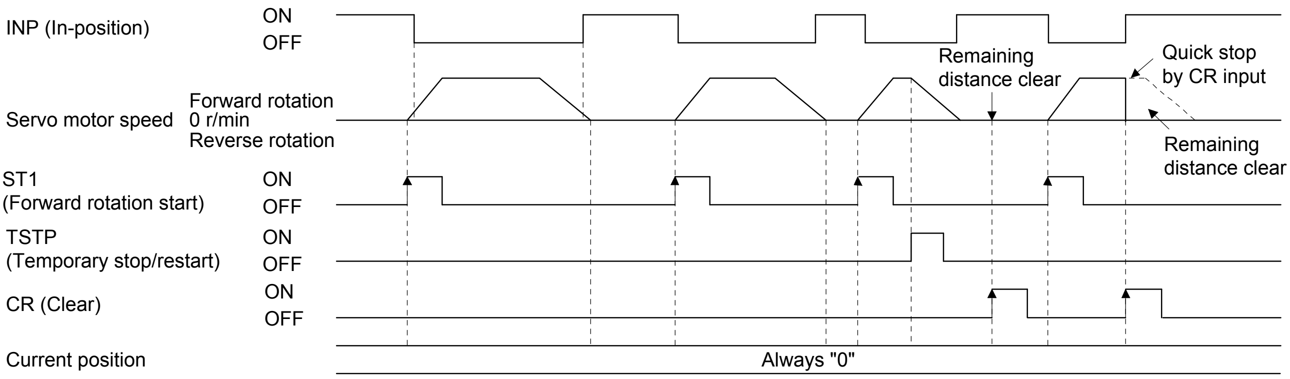
(3) Program example

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	d)
TIM (100)	Dwell	100 [ms]	e)
SPN (500)	Servo motor speed	500 [r/min]	f)
STA (200)	Acceleration time constant	200 [ms]	g)
STB (300)	Deceleration time constant	300 [ms]	h)
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	i)
SPN (1000)	Servo motor speed	1000 [r/min]	j)
MOVIA (1000)	Incremental value continuous travel command	1000 [×10^{STM} μm]	k)
STOP	Program stop		



5.7 Roll feed mode using the roll feed display function

Refer to section 4.5 for parameter settings of roll feed display function, position data unit and operation method.
When the roll feed display function is used, the status display of the current position at start will be 0.

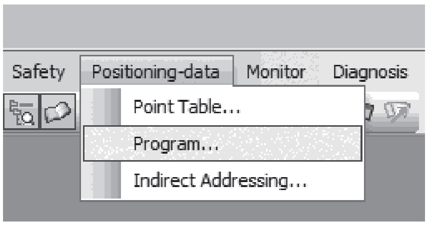


5.8 Program setting method

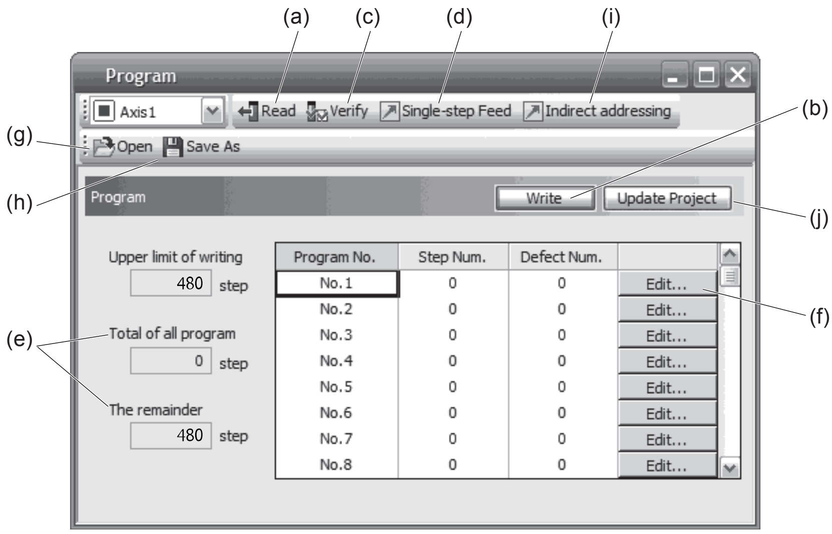
The following shows the setting method of programs using MR Configurator2.

5.8.1 Setting procedure

Click "Positioning-data" in the menu bar and "Program" in the menu.



The following window will be displayed.



(1) Reading program (a)
Click "Read" to read and display programs from the servo amplifier.

(2) Writing program (b)
Click "Write" to write the changed programs to the servo amplifier.

(3) Verifying program (c)
Click "Verify" to verify the contents of programs in the personal computer and the servo amplifier.

(4) Single-step feed (d)
Click "Single-step Feed" to perform the single-step feed test operation. Refer to section 3.1.9 for details.

(5) Number of steps (e)
The numbers of steps used in all programs and the remained steps are displayed.

(6) Editing program (f)
Selected programs can be edited. Click "Edit" to open the program editing window. For the editing window, refer to section 5.8.2.

(7) Reading program file (g)
Click "Open" to read the program table data.

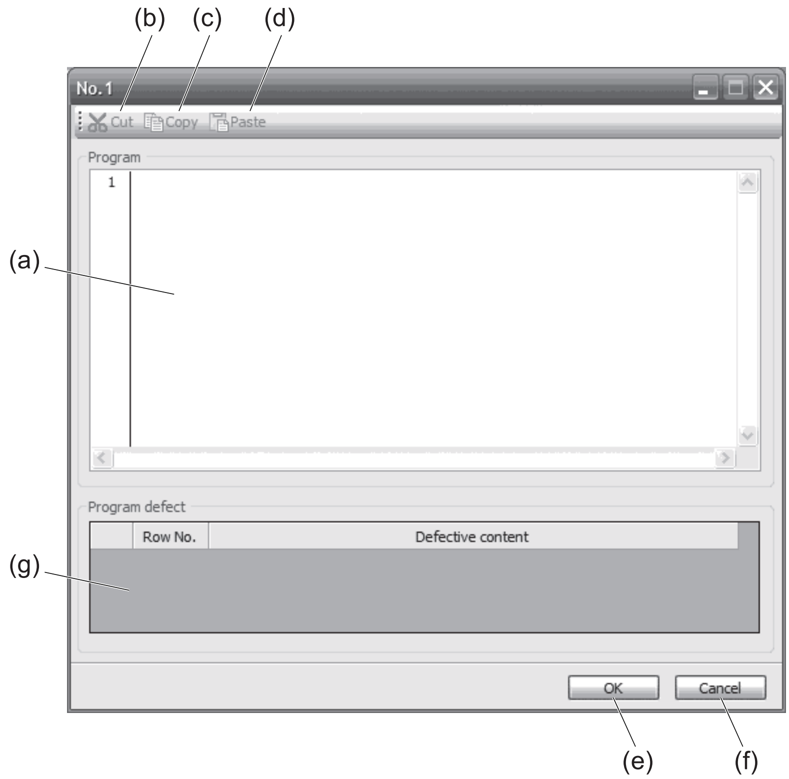
(8) Saving program file (h)
Click "Save As" to save the program table data.

(9) Indirect addressing (i)
Click "Indirect addressing" to open the indirect addressing window. Refer to section 5.8.3 for details.

(10) Updating project (j)
Click "Update Project" to update the program to a project.

5.8.2 Window for program edit

Programs can be created on the program editing window.



(1) Program edit (a)
Input commands to the program edit area (a) in text format.

(2) Cutting text (b)
Select any text in the program edit area, and click "Cut" to cut the selected text.

(3) Copying text (c)
Select any text in the program edit area, and click "Copy" to copy the selected text to the clipboard.

(4) Pasting text (d)
Click "Paste" to paste the copied text on the clipboard to a specified place in the program edit area.

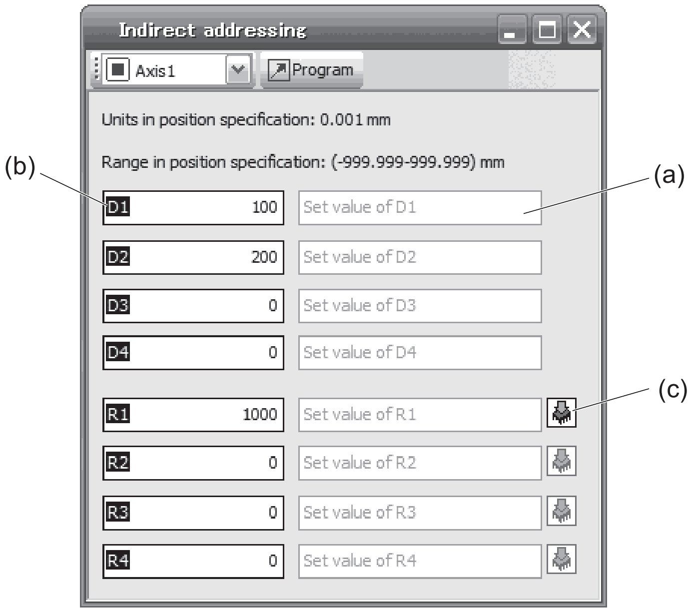
(5) Ending program data window (e)
Click "OK" to execute the edit check. When no error is found in the program, the edit ends and the program data window will be closed. If an error is found in the program after the edit check, the error will be displayed.

(6) Canceling window for program edit (f)
Click "Cancel" to close the window for program edit without saving the program currently being edited.

(7) Displaying error (g)
When the edit check of (5) detects an error in the program, the line No. and content of the error will be displayed. Click the error content, the cursor will move to the line of the corresponding program.

5.8.3 Indirect addressing window

Set general purpose registers (D1 to D4 and R1 to R4) in this window.



(1) Register edit field (a)
Set general purpose register values of D1 to D4 and R1 to R4.

(2) Register reference field (b)
The last register value read from the servo amplifier is displayed.

(3) ROM writing (c)
Write register values (D1 to D4 and R1 to R4) stored in the servo amplifier to the servo amplifier.

MEMO

6. APPLICATION OF FUNCTIONS

This chapter explains about application of using positioning function of servo amplifier.

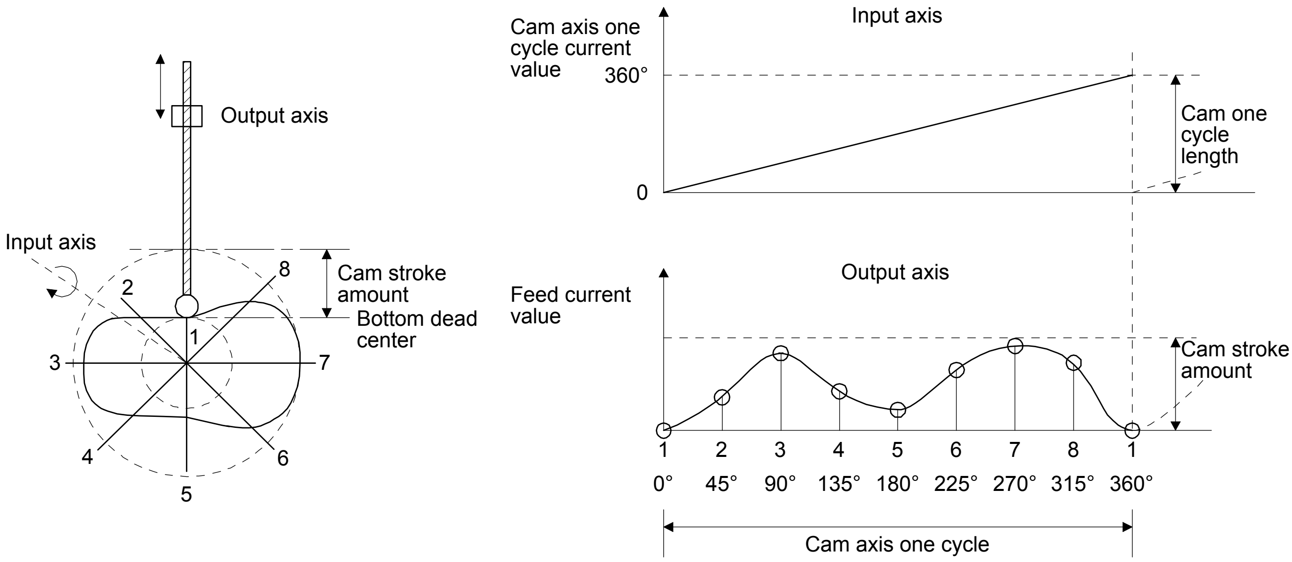
CAUTION	●Note that the number of write times to the Flash-ROM where the cam data is stored is limited to approximately 10000. If the total number of write times exceeds 10000, the servo amplifier may malfunction when the Flash-ROM reaches the end of its useful life.

6.1 Simple cam function

POINT
●When [AL. F5.2 Cam data miswriting warning] occurs during cam data writing, set [Pr. PT34] to "5010" to initialize the cam data. ●When using simple cam function, execute operation so that the machine speed of the input axis is less than "([Cam control data No. 48 - Cam axis one cycle length] × 1/2) / 100 [command unit/s]". When [Cam control data No. 30] is set to "1", the unit of the Cam axis length per cycle will be changed to [mm], [inch], [degree], or [pulse] with the setting of [Pr. PT01]. When [Cam control data No. 30] is set to "2", the unit of the Cam axis length per cycle will be changed to [mm], [inch], [degree], or [pulse] with the setting of [Cam control data No. 14].

6.1.1 Outline of simple cam function

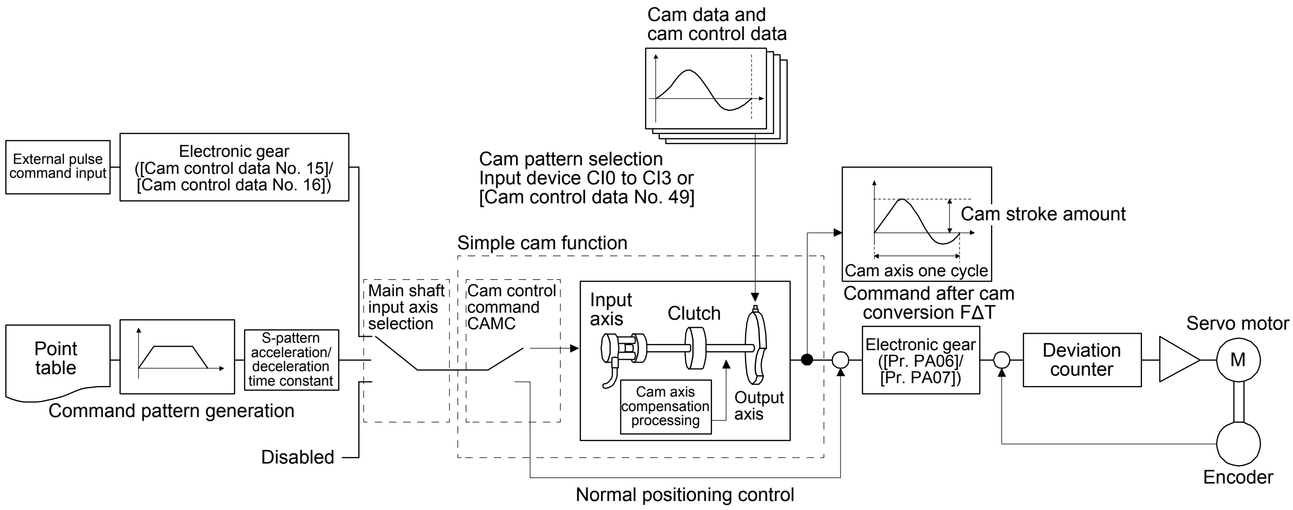
Simple cam function enables synchronous control by using software instead of controlling mechanically with cam.
The following shows a movement trajectory when the cam below is used and the input axis is rotated once.



By setting cam data and cam control data, the simple cam function enables synchronous control with an input axis (external pulse command input, point table command, or program positioning command) with a start of positioning.

6.1.2 Simple cam function block

The function block diagram of the simple cam is shown below. Use MR Configurator2 to set the cam data and the cam control data.



6.1.3 Simple cam specification list

(1) Specification list

<table>
<tr><th colspan="3">Item</th><th>MR-JE-_A</th></tr>
<tr><td colspan="2" rowspan="2">Memory capacity (Note 1)</td><td>Storage area for cam data</td><td>8 Kbytes (Flash-ROM)</td></tr>
<tr><td>Working area for cam data</td><td>8 Kbytes (RAM) (Note 2)</td></tr>
<tr><td colspan="3">Number of registration</td><td>Max. 8</td></tr>
<tr><td colspan="3">Comment</td><td>Max. 32 single-byte characters for each cam data</td></tr>
<tr><td rowspan="4">Cam data and cam control data</td><td rowspan="2">Stroke ratio data type</td><td>Cam resolution</td><td>256/512/1024/2048</td></tr>
<tr><td>Stroke ratio</td><td>-100.000 to 100.000 [%]</td></tr>
<tr><td rowspan="2">Coordinate data type</td><td>Number of coordinate</td><td>2 to 1024</td></tr>
<tr><td>Coordinate data</td><td>Input value: 0 to 999999
Output value: -999999 to 999999</td></tr>
<tr><td colspan="3">Cam curve</td><td>12 types (constant speed/constant acceleration/5th curve/single hypotenuse/cycloid/distorted trapezoid/distorted sine/distorted constant speed/trapecloid/reverse trapecloid/double hypotenuse/reverse double hypotenuse)</td></tr>
</table>

Note 1. The memory capacity includes a use area (storage area for cam data) for storing in the servo amplifier and an actual operation area (working area for cam data).
2. This can be always changed by using Modbus RTU communication during servo-off. Refer to section 6.1.7 (5) for the registers used for writing data via Modbus RTU communication.

(2) Cam resolution

(a) Stroke ratio data type

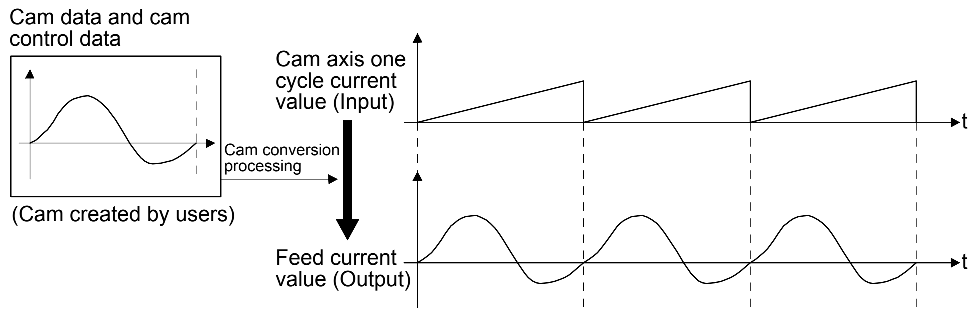
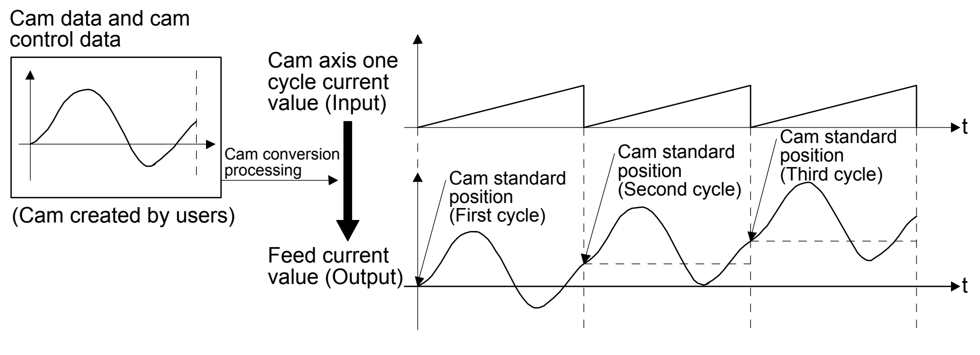
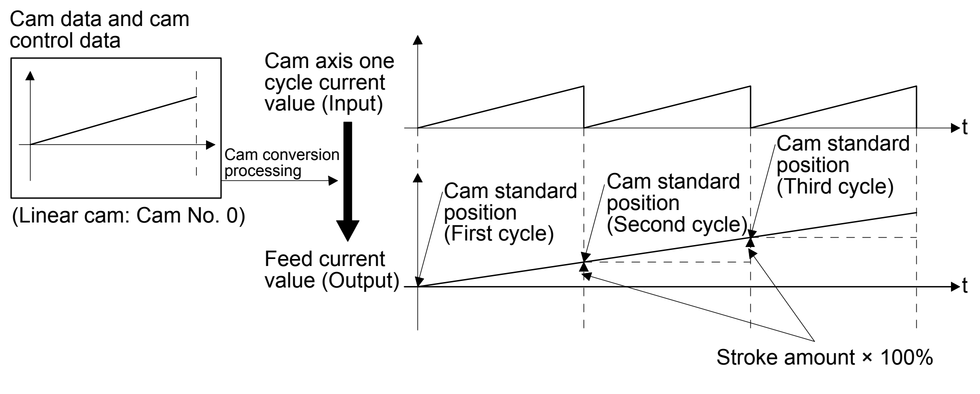
Cam resolution	Max. number of registration
256	8
512	4
1024	2
2048	1

(b) Coordinate data type

Number of coordinate	Max. number of registration
128	8
256	4
512	2
1024	1

6.1.4 Control of simple cam function

The following three cam controls are available by setting the cam data and the cam control data with MR Configurator2.

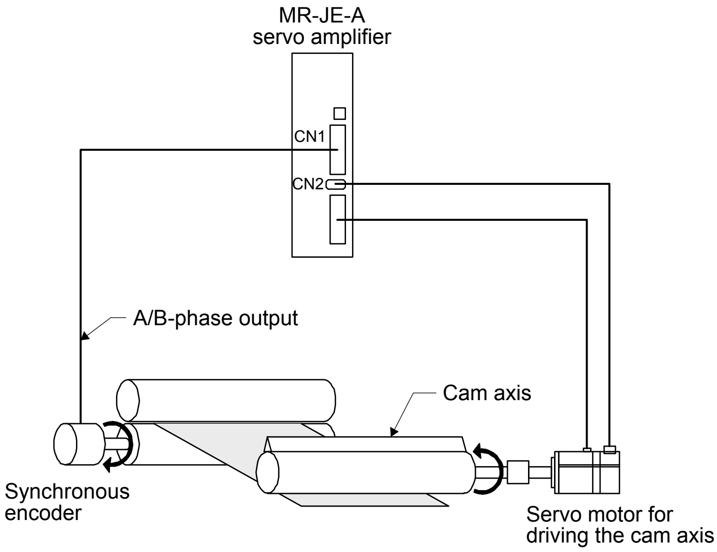
Cam control method	Description	Actual movement
To-and-fro control	Reciprocates within a specified cam stroke.	
Feed control	Updates a cam standard position per cycle.	
Linear control	Performs linear control to keep the one-cycle stroke ratio as 100%.	

6.1.5 Operation in combination with the simple cam

(1) Encoder following function

The servo amplifier receives A/B-phase output signal from a synchronous encoder and starts the servo motor with the signal.

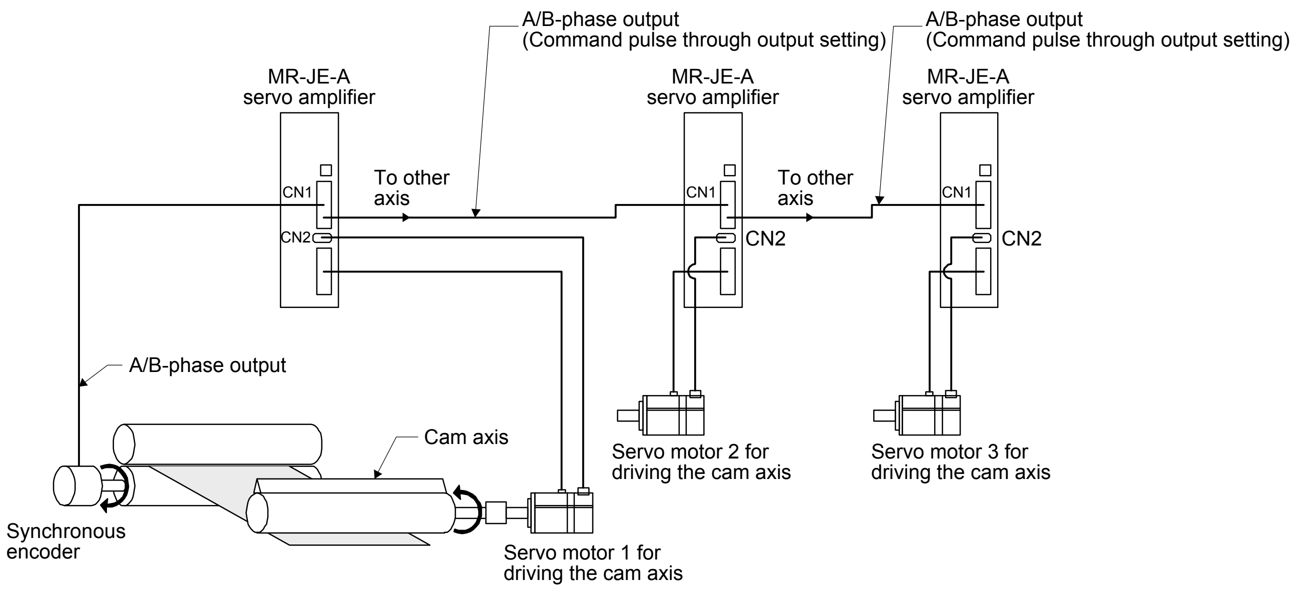
Up to 4 Mpulses/s can be inputted from the synchronous encoder to use with the servo amplifier.



(2) Command pulse input through function

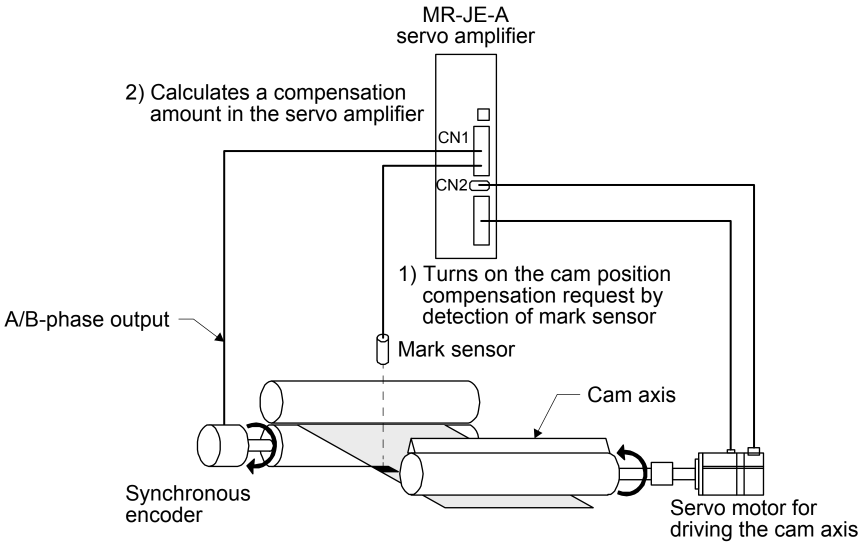
POINT
● It takes about 150 μs at a maximum per axis to execute the function from inputting to outputting of pulses. Example) When the final axis is n Maximum delay time [μs] = 150 μs × (n-1)

The command pulse input through function allows the first axis to output A/B-phase pulses received from the synchronous encoder to the next axis, enabling a system in which the second and later axes are synchronized with the conveyor axis.



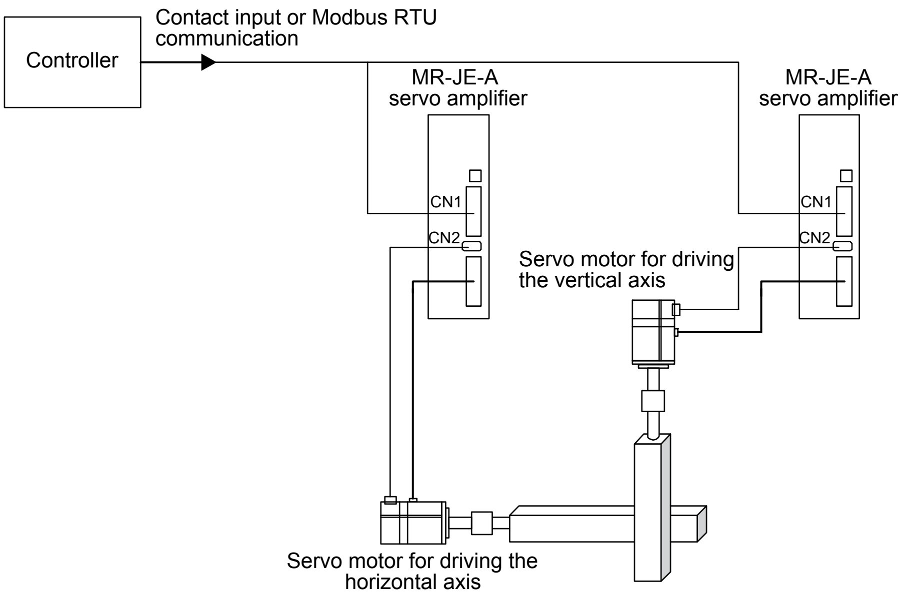
(3) Mark sensor input compensation function

The servo amplifier receives input signals from a mark sensor, calculates compensation amounts, and corrects position errors of the rotary knife axis.



(4) Synchronous operation using positioning data

A synchronous operation is enabled by setting the same positioning data, using a contact input or Modbus RTU communication, and starting the positioning simultaneously. Refer to section 5.8.4 of "MR-J4-_A_-RJ Servo Amplifier Instruction Manual (Modbus RTU communication)" for the simultaneous start with Modbus RTU communication.



6.1.6 Setting list

(1) List of items set with MR Configurator2
Set the following on the cam setting window of MR Configurator2.

Setting item		Setting
Cam control data	Main shaft input axis selection	Select a command input method for the cam axis. Select from "encoder following (external pulse input)" and "internal point table".
	Cam No. selection	Select the number to create the cam control data.
	Resolution setting	Set the cam resolution. Select from 256/512/1024/2048.
	Cam axis one cycle length	Set a travel distance of cam one cycle. Command unit is used as an input unit.
	Cam stroke amount	Set a cam stroke amount for the stroke ratio of 100% when using the stroke ratio data type cam control.
Cam data		Create the cam data on the cam creating window of MR Configurator2. After the data is created, write the cam data to the servo amplifier.

(2) List of items set with parameters of the servo amplifier
Set the following with the parameters of the servo amplifier.

Setting item	Setting
Operation mode selection	Select "Positioning mode (point table method or program method)" with [Pr. PA01 Operation mode].
Cam function setting	Enable the cam function with [Pr. PT35 Function selection T-5].
Cam data selection	Select the cam data to be executed with CI0 (Cam No. selection 0) to CI3 (Cam No. selection 3). Selecting the cam data for execution is also possible with [Cam control data No. 49 - Cam No.].
Device setting	Assign CAMC (Cam control command input), CAMS (Output in cam control), and CI0 (Cam No. selection 0) to CI3 (Cam No. selection 3) with I/O setting parameters ([Pr. PD_ _]).

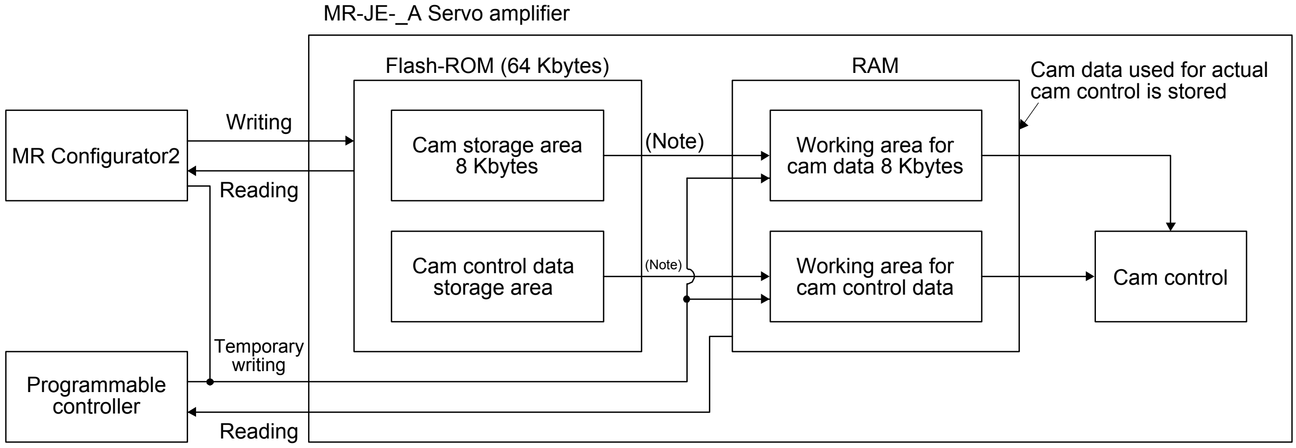
6.1.7 Data to be used with simple cam function

⚠CAUTION	●Note that the number of write times to the Flash-ROM where the cam control data and cam data are stored is limited to approximately 10000. If the total number of write times exceeds 10000, the servo amplifier may malfunction when the Flash-ROM reaches the end of its useful life. If data needs to be changed very frequently, use the temporal writing function and write the data to the RAM, not to the Flash-ROM.

(1) Memory configuration of cam control data and cam data

POINT
●When [AL. F5.2 Cam data miswriting warning] occurs during cam data writing, set [Pr. PT34] to "5010" to initialize the cam data.

The cam control data and the cam data used for the simple cam are stored in Flash-ROM inside the servo amplifier. When the power is turned on, the cam data and the cam control data are copied from the Flash-ROM to the RAM inside the servo amplifier, and then cam control will be executed.



Note. When the power is turned on, the cam data and the cam control data are copied from the Flash-ROM to the RAM.

Use MR Configurator2 or Modbus RTU communication to write the cam data and the cam control data. Be sure to write the cam data and the cam control data in servo-off state.
When writing the data via Modbus RTU communication, transfer the cam data created using MR Configurator2.
Modbus RTU communication uses Request store CAM (2D88h), CAM area (2D89h), and CAM data in CAM area (2D8Bh). Refer to section 6.1.7 (5) for details of each register.

Two writing methods are available.

Writing method	Description	Data transmission method (Note)	
		MR Configurator2	Modbus RTU communication
Temporary writing	Write the cam control data and the cam data to the RAM of the servo amplifier. After writing, the cam control data and the cam data will be reflected. The written data will be disabled if the power is turned off. Use this when creating and adjusting the cam control data and the cam data.	○	○
Writing	Write the cam control data and the cam data to the Flash-ROM. The data will be enabled when the power is cycled after writing After cycling the power, control is performed based on the written data. Conduct this after the cam control data and the cam data are finalized.	○	×

Note. ○: Supported, ×: Unsupported

(2) Cam data

POINT

- If the cam data is set incorrectly, the position command and speed command may increase and may cause machine interference or [AL. 31 Overspeed]. When you have created and changed cam data, make sure to perform test operations and make appropriate adjustments.

The following two types are available for the cam data.

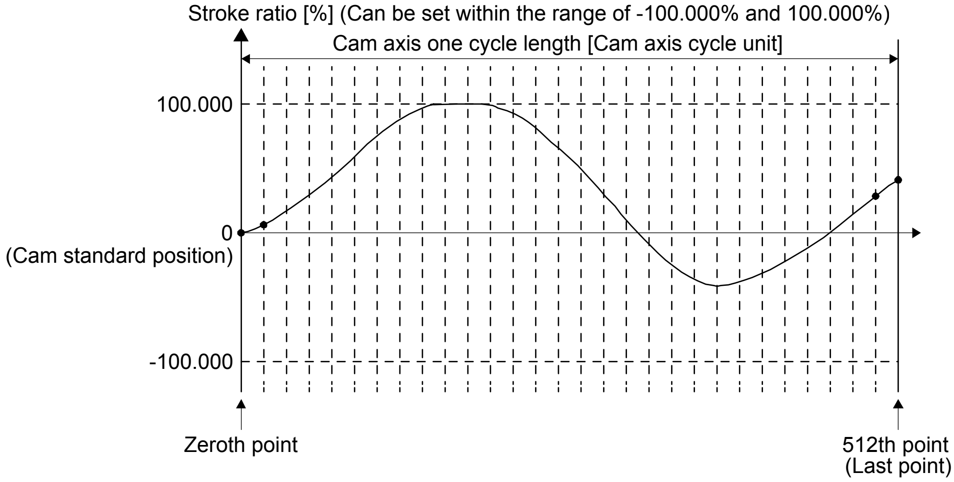
Cam data type	Description
Stroke ratio data type	Cam curve of one cycle is divided equally by the number of cam resolution and defined. The cam curve will be created according to the stroke ratio data of the number of cam resolution.
Coordinate data type	Data in which cam curve of one cycle is defined with two or more points. The coordinate data is defined as (input value, output value). The input value will be the cam axis one cycle current value, and the output value will be the stroke value from the cam standard position.

(a) Stroke ratio data type

The following are set in the stroke ratio data type. Set the following items on the cam setting window of MR Configurator2. When "Cam No." is set to "0", straight-line control is performed so that the stroke ratio at the last point of the cam data becomes 100%.

Setting item	Setting	Setting range
Cam No.	Set a Cam No.	0: Linear cam 1 to 8: User-created cam
Setting method	Set "1: Stroke ratio data type".	
Cam resolution	Set the number of divisions for the cam curve of one cycle.	Select from 256/512/1024/2048.
Cam data start position	Set the positions of the cam data and cam control data to the position of when "Cam axis one cycle current value" is "0".	0 to "Cam resolution - 1"
Stroke ratio data	Set the stroke ratio from the first to the last point.	-100.000 to 100.000

The following is a setting example for "cam resolution = 512" in the stroke ratio data type.

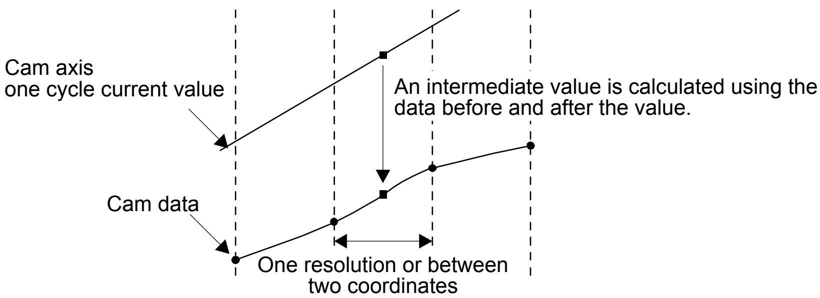


1) Feed current value

The feed current value of the cam axis is calculated as follows:

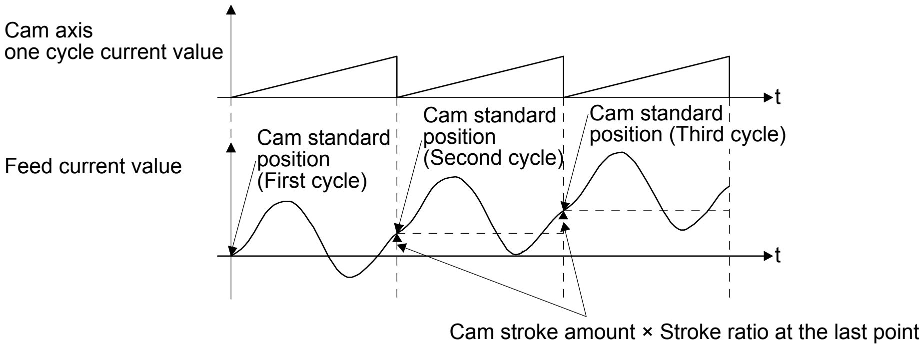
Feed current value = Cam standard position + (Cam stroke amount × Stroke ratio to cam axis one cycle current value)

When the cam axis one cycle current value is in the middle of the specified stroke ratio data, the intermediate value is calculated using the cam data before and after the value.

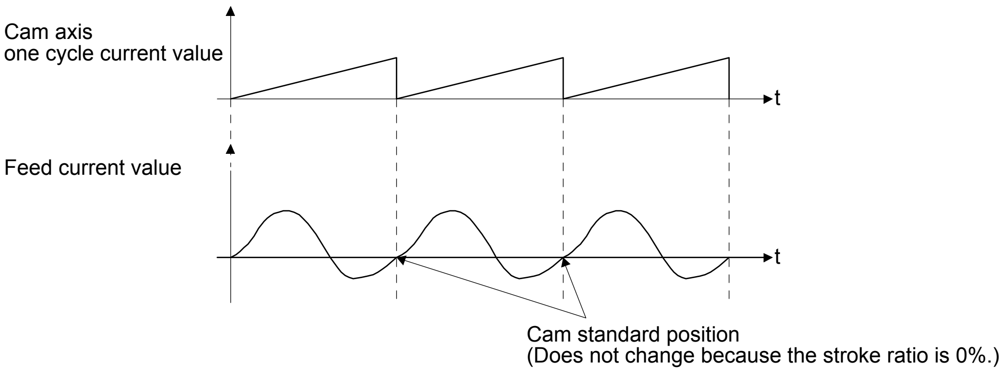


2) Cam standard position
The cam standard position is calculated as follows:

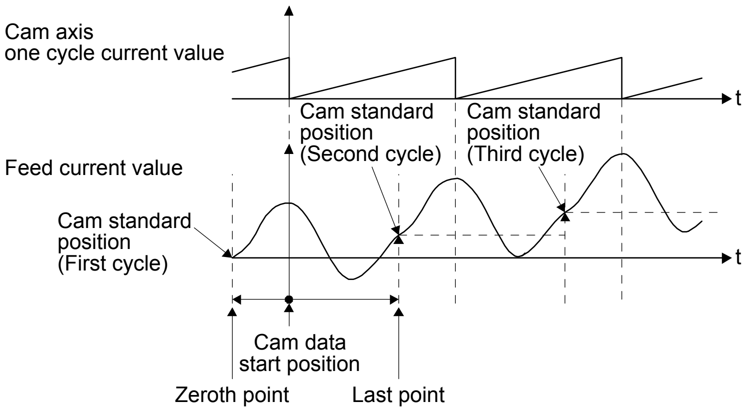
Cam standard position = The preceding cam standard position + (Cam stroke amount × Stroke ratio at the last point)



For to-and-fro control, create the cam data in which the stroke ratio at the last point is 0%.



3) Cam data start position
This setting is available only for the stroke ratio data type cam data.
The cam data position where the "cam axis one cycle current value" becomes "0" can be set as the cam data start position.
The initial value of the cam data start position is "0". The cam axis is controlled with the cam data from the 0th point (stroke ratio = 0%).
When a value other than "0" is set as the cam data start position, cam control is started from the point where the stroke ratio is not 0%.
Set the cam data start position for each cam data within the setting range of "0 to (Cam resolution - 1)".



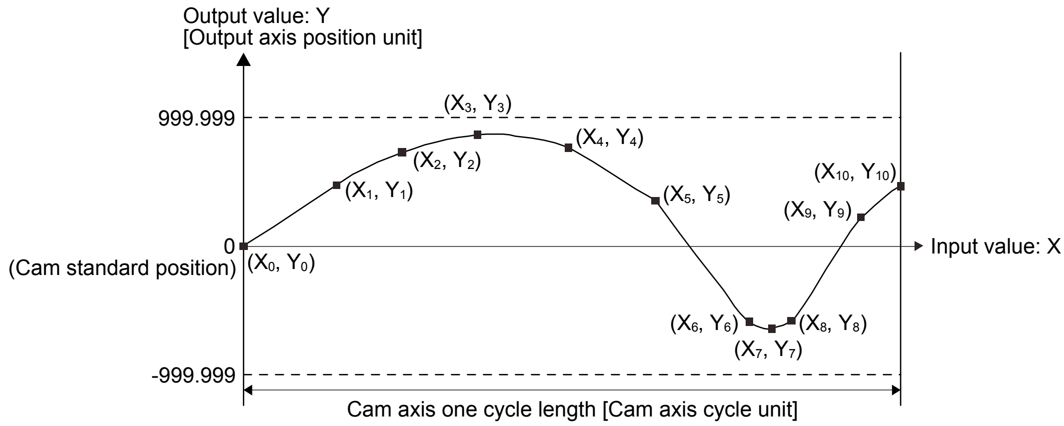
4) Timing of applying cam control data
New values are applied to "Cam No." and "Cam stroke amount" when CAMC (Cam control command) turns on.
"Cam standard position" is updated when "Cam axis one cycle current value" passes through the 0th point of the cam data.

(b) Coordinate data type

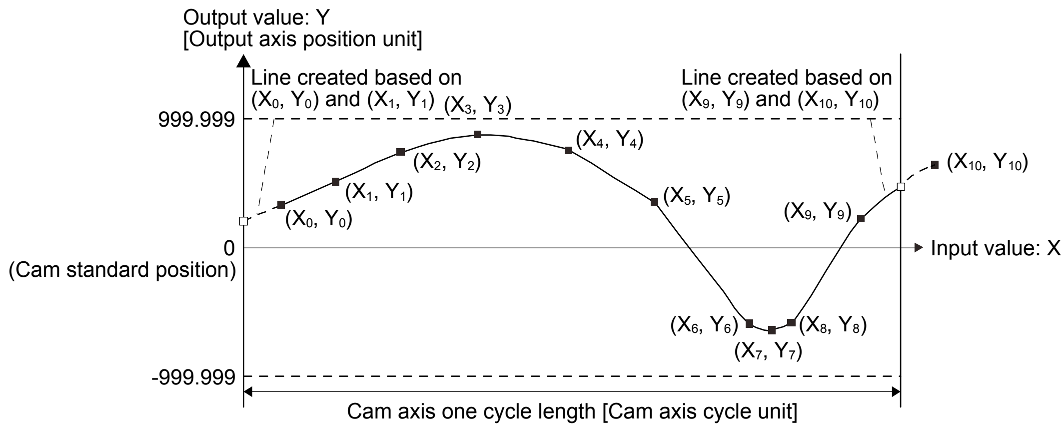
The following are set in the coordinate data type. Set the following items on the cam setting window of MR Configurator2. When "Cam No." is set to "0", straight-line control is performed so that the stroke ratio at the last point of the cam data becomes 100%.

Setting item	Setting	Setting range
Cam No.	Set a Cam No.	0: Linear cam 1 to 8: User-created cam
Setting method	Set "2: Coordinate data type".	
Number of coordinate	Set the number of coordinates for the cam curve of one cycle. The number of coordinates includes 0th point.	2 to 1024
Cam data start position	Setting is not necessary.	
Coordinate data	Set the coordinate data (input value Xn and output value Yn) for the number of coordinates. Set from the 0th coordinate data (X0 and Y0). Set an input value larger than that of the coordinate data.	-999.999 to 999.999

The following is a setting example for the coordinate data type.



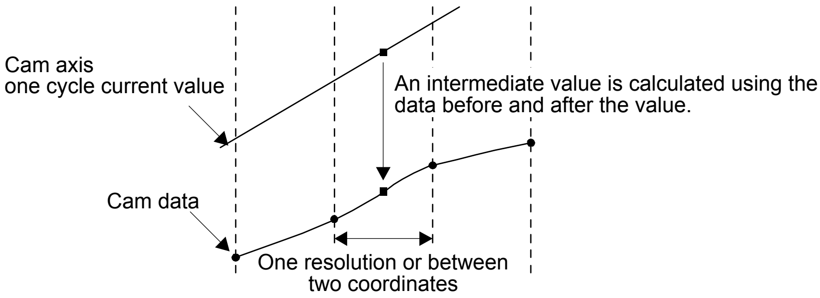
If "input value = 0" and "input value = cam axis one cycle length" are not set in the coordinate data, a control is executed by the line created from the closest two points.



1) Feed current value
The feed current value of the cam axis is calculated as follows:

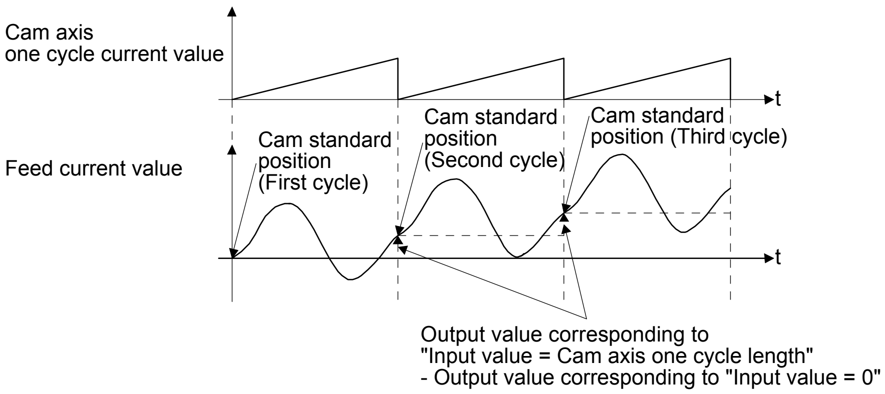
Feed current value = Cam standard position + Output value to cam axis one cycle current value

When the cam axis one cycle current value is in the middle of the specified stroke ratio data, the intermediate value is calculated using the cam data before and after the value.

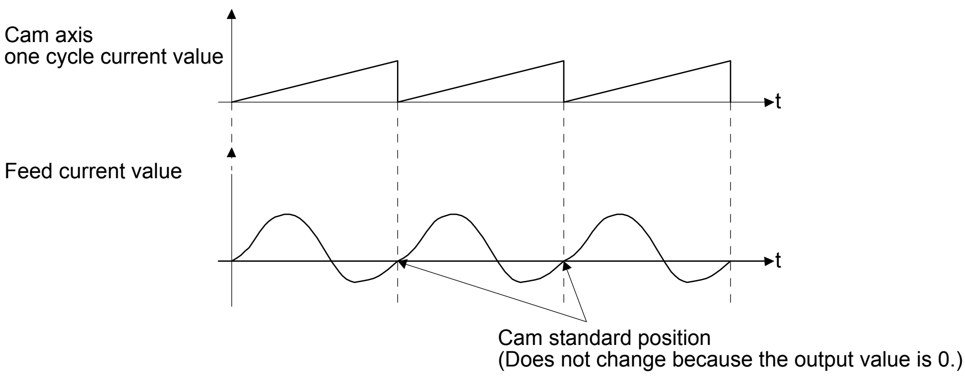


2) Cam standard position
The cam standard position is calculated as follows:

Cam standard position =
The preceding cam standard position + Output value corresponding to "Input value = Cam axis one cycle length" - Output value corresponding to "Input value = 0"



For to-and-fro control, use the output value corresponding to "Input value = Cam axis one cycle length" that is equal to output value corresponding to "Input value = 0".



3) Cam data start position
The cam data start position is not used in the coordinate data type.

4) Timing of applying cam control data
A new value is applied to "Cam No." when CAMC (Cam control command) turns on.
"Cam standard position" is updated when the cam axis one cycle current value passes through "0".

(3) List of cam control data
The following table lists the cam control data added for the simple cam function.
Set the cam control data in the cam control data window of MR Configurator2.

POINT
- Once the servo amplifier is powered off, the temporarily written data will be deleted. To store the temporarily written data, be sure to write it to the Flash-ROM before powering off the servo amplifier.
- To enable the cam control data whose symbol is preceded by *, cycle the power after setting. The cam control data is not applied by the temporal writing of MR Configurator2.

No.	Symbol	Name	Initial value	Unit	Control mode	
					CP	CL
1	MCYSM (Note)	Main axis one cycle current value setting method	0		○	○
2	CPRO (Note)	Cam axis position restoration target	0		○	○
3	CBSSM (Note)	Cam standard position setting method	0		○	○
4	CCYSM (Note)	Cam axis one cycle current value setting method	0		○	○
5	MICYS (Note)	Main axis one cycle current value (initial setting value)	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
6	CIBSS (Note)	Cam standard position (initial setting value)	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
7	CICYS (Note)	Cam axis one cycle current value (initial setting value)	0		○	○
8		For manufacturer setting	0			
9			0			
10			0			
11			0			
12			0			
13			0			
14	*ETYP	Synchronous encoder axis unit	0000h		○	○
15	*ECMX	Synchronous encoder axis unit conversion: Numerator	0		○	○
16	*ECDV	Synchronous encoder axis unit conversion: Denominator	0		○	○

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
17		For manufacturer setting	0			
18			0			
19			0			
20			0			
21			0			
22			0			
23			0			
24			0			
25			0			
26			0			
27			0			
28			0			
29			0			
30	*MAX	Main shaft input axis selection	0		○	○
31		For manufacturer setting	0			
32	MMIX	Main shaft input method	0000h		○	○
33		For manufacturer setting	0			
34			0			
35			0			
36	CLTMD	Main shaft clutch control setting	0000h		○	○
37		For manufacturer setting	0			
38			0			
39			0			
40			0			
41			0			
42	CLTSMM (Note)	Main shaft clutch smoothing system	0		○	○
43	CLTSMT (Note)	Main shaft clutch smoothing time constant	0	[ms]	○	○
44		For manufacturer setting	0			
45			0			
46			0000h			
47			0			
48	CCYL (Note)	Cam axis one cycle length	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
49	CNO (Note)	Cam No.	0		○	○
50		For manufacturer setting	0			
51	CSTK (Note)	Cam stroke amount	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
52		For manufacturer setting	0			
53			0			
54			0			
55			0			
56			0			
57			0			
58			0			
59			0			

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
60	CPHV	Cam position compensation target position	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
61	CPHT	Cam position compensation time constant	0	[ms]	○	○

Note. The data is updated at cam control switching.

(4) Detailed list of cam control data

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
1 *MCYSM Main axis one cycle current value setting method		Select a setting method for the main axis one cycle current value. 0: Previous value 1: Main axis one cycle current value (initial setting value) 2: Calculated from input axis	0	○	○
2 *CPRO Cam axis position restoration target		Select a target whose cam axis position is restored. 0: Cam axis one cycle current value 1: Cam standard position 2: Cam axis feed current value	0	○	○
3 *CBSSM Cam standard position setting method		Select a setting method for the cam standard position used to restore the cam axis one cycle current value. 0: Feed current value 1: Cam standard position (initial setting value) 2: Previous value The cam standard position of the last cam control is stored in the previous value. The feed current value is stored when the cam standard position of the last cam control has not been saved. Turning off the power clears the previous value.	0	○	○
4 *CCYSM Cam axis one cycle current value setting method		Select a setting method for the cam axis one cycle current value used for restoration when "Cam standard position" and "Cam axis feed current value" have been set as the cam axis position restoration targets. 0: Previous value 1: Cam axis one cycle current value (initial setting value) 2: Main axis one cycle current value The cam axis one cycle current value of the last cam control is stored in the previous value. Turning off the power clears the previous value.	0	○	○
5 *MICYS Main axis one cycle current value (initial setting value)		Set the initial value of the main axis one cycle current value. ・When [Cam control data No. 30] is set to "1" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. ・When [Cam control data No. 30] is set to "2" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Cam control data No. 14]. Setting range: 0 to [Cam control data No. 48] - 1	0 Refer to Function column for unit.	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
6 *CIBSS Cam standard position (initial setting value)		This is enabled when [Cam control data No. 3] is set to "1". Set the initial value of the cam standard position in the output axis position unit. The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○
7 *CICYS Cam axis one cycle current value (initial setting value)		Set the position to start the search processing to restore the cam axis one cycle current value. Set this item when restoring the position of the return path with the to-and-fro control cam pattern. ・When [Cam control data No. 30] is set to "1" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. ・When [Cam control data No. 30] is set to "2" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Cam control data No. 14]. Setting range: 0 to [Cam control data No. 48] - 1	0 Refer to Function column for unit.	○	○
14 *ETYP Synchronous encoder axis unit	_ _ _ x	Control unit 0: mm 1: inch 2: degree 3: pulse	0h	○	○
	_ _ x _	Feed length multiplication 0: × 1 1: × 10 2: × 100 3: × 1000 This digit is disabled when [Cam control data No. 14] is set to "_ _ _ 2" or "_ _ _ 3".	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
15 *ECMX Synchronous encoder axis unit conversion: Numerator		Set a numerator used to convert encoder pulses of the synchronous encoder axis into the synchronous encoder axis unit. Set the numerator within the following range. $\frac{1}{16000} \le \frac{ECMX}{ECDV} \le 6000$ Setting a value out of the range will trigger [AL. F6 Cam control warning]. When "0" is set, handle the numerator in the same way as when "1" is set. Setting range: 0 to 16777215	0	○	○
16 *ECDV Synchronous encoder axis unit conversion: Denominator		Set a denominator used to convert encoder pulses of the synchronous encoder axis into the synchronous encoder axis unit. Set a value within the range of [Cam control data No. 15]. Setting a value out of the range will trigger [AL. F6 Cam control warning]. When "0" is set, handle the denominator in the same way as when "1" is set. Setting range: 0 to 16777215	0	○	○
30 *MAX Main shaft input axis selection		Select an input axis of the main shaft input. 0: Disabled 1: Servo input axis 2: Synchronous encoder axis	0	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
32 *MMIX Main shaft input method	_ _ _ x	Main input method 0: Input + 1: Input - 2: No input	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
36 *CLTMD Main shaft clutch control setting	_ _ _ x	ON control mode 0: No clutch 1: Clutch command ON/OFF	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
42 *CLTSMM Main shaft clutch smoothing system		Select a clutch smoothing system. 0: Direct 1: Time constant method (index)	0	○	○
43 *CLTSMT Main shaft clutch smoothing time constant		This is enabled when [Cam control data 42] is set to "1". Set the smoothing time constant. Setting range: 0 to 5000	0 [ms]	○	○
48 *CCYL Cam axis one cycle length		Set an input amount required for cam one cycle. ・When [Cam control data No. 30] is set to "0" or "1" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. ・When [Cam control data No. 30] is set to "2" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Cam control data No. 14]. Setting range: 0 to 999999	0 Refer to Function column for unit.	○	○
49 *CNO Cam No.		Set the cam No. of the cam to be executed. When "0" is set, the selections of the input devices CI0 to CI3 will be prioritized. When a value other than "0" is set, the selections of the input devices CI0 to CI3 will be disabled. Setting range: 0 to 8	0	○	○
51 *CSTK Cam stroke amount		Set a cam stroke amount for the stroke ratio of 100% when using the stroke ratio data type cam. The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○
60 *CPHV Cam position compensation target position		Set a compensation target position to the input axis of the cam axis. Set the mark sensor position with the cam axis one cycle current value. ・When [Cam control data No. 30] is set to "1" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. ・When [Cam control data No. 30] is set to "2" The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Cam control data No. 14]. Setting range: 0 to [Cam control data No. 48] - 1	0 Refer to Function column for unit.	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
61 *CPHT Cam position compensation time constant		Set the time to apply the position compensation for the input axis of the cam axis. Setting range: 0 to 65535	0 [ms]	○	○

(a) Relation among the main shaft input axis, position data unit, and feed length multiplication setting
The parameters used to set the position data unit and feed length multiplication differ depending on the setting of [Cam control data No. 30 Main shaft input axis selection].

Item		Main shaft input axis selection ([Cam control data No. 30]) 0 (Disabled)	1 (Servo input axis)	2 (Synchronous encoder axis)
Main axis one cycle current value setting method ([Cam control data No. 5])	Unit	[Pr. PT01]	[Pr. PT01]	[Cam control data No. 14]
	Multiplication	[Pr. PT03]	[Pr. PT03]	
Cam standard position (initial setting value) ([Cam control data No. 6])	Unit	[Pr. PT01]	[Pr. PT01]	[Pr. PT01]
	Multiplication	[Pr. PT03]	[Pr. PT03]	[Pr. PT03]
Cam axis one cycle current value (initial setting value) ([Cam control data No. 7])	Unit	[Pr. PT01]	[Pr. PT01]	[Cam control data No. 14]
	Multiplication	[Pr. PT03]	[Pr. PT03]	
Synchronous encoder axis unit conversion: Numerator ([Cam control data No. 15])	Unit	[Pr. PT01]	[Pr. PT01]	
	Multiplication	[Pr. PT03]	[Pr. PT03]	
Synchronous encoder axis unit conversion: Denominator ([Cam control data No. 16])	Unit	[Pr. PT01]	[Pr. PT01]	
	Multiplication	[Pr. PT03]	[Pr. PT03]	
Cam axis one cycle length ([Cam control data No. 48])	Unit	[Pr. PT01]	[Pr. PT01]	
	Multiplication	[Pr. PT03]	[Pr. PT03]	
Cam stroke amount ([Cam control data No. 51])	Unit	[Pr. PT01]	[Pr. PT01]	[Pr. PT01]
	Multiplication	[Pr. PT03]	[Pr. PT03]	[Pr. PT03]
Cam position compensation amount ([Cam control data No. 60])	Unit	[Pr. PT01]	[Pr. PT01]	[Cam control data No. 14]
	Multiplication	[Pr. PT03]	[Pr. PT03]	

(b) Synchronous encoder axis unit conversion gear setting
The input travel distance of the synchronous encoder is in encoder pulse units. You can convert the unit into a desired unit through unit conversation by setting [Cam control data No. 15 Synchronous encoder axis unit conversion: Numerator] and [Cam control data No. 16 Synchronous encoder axis unit conversion: Denominator].
Set [Cam control data No. 15] and [Cam control data No. 16] according to the control target machine.

$$\begin{array}{c}\text{Synchronous encoder}\\\text{axis travel distance}\\\text{(after unit conversion)}\end{array} = \begin{array}{c}\text{Synchronous encoder}\\\text{input travel distance}\\\text{(encoder pulse unit)}\end{array} \times \frac{\text{[Cam control data No. 15]}}{\text{[Cam control data No. 16]}}$$

The travel distance (number of pulses) set in [Cam control data No. 16] is set in [Cam control data No. 15] in synchronous encoder axis position units.
Set [Cam control data No. 16] in encoder pulse units of the synchronous encoder.

(5) Modbus register

The following explains the main registers for the Modbus RTU communications used by the simple cam function. Refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)" for the registers not described in this section.

(a) Related registers

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D80h	Target CAM No.	1 byte	Read/write	1	Impossible
2D82h	CAM actual No.	1 byte	Read	1	Impossible
2D84h	One cycle length of CAM axis	4 bytes	Write	2	Impossible
2D85h	Stroke movement of CAM	4 bytes	Write	2	Impossible
2D88h	Request store CAM	1 byte	Write	1	Impossible
2D89h	CAM area	2 bytes	Read/write	1	Impossible
2D8Bh	CAM data in CAM area	64 bytes	Read/write	32	Impossible

(b) Details of registers

1) Cam number setting (2D80h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D80h	Target CAM No.	1 byte	Read/write	1	Impossible

A cam number can be read using the function code "03h" (Read Holding Registers).
A cam number can be set using the function code "10h" (Preset Multiple Registers).

If [Cam control data No. 49 - Cam No.] is "0", the cam number set with this register is enabled.
If the cam number is not "0", the setting of [Cam control data No. 49] is enabled and this register is disabled.

2) Current cam number (2D82h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D82h	CAM actual No.	1 byte	Read	1	Impossible

While a cam control operation is being performed (when "1" is set in bit 5 of 2D12h), the cam number being used in the operation can be read using the function code "03h" (Read Holding Registers).

3) Cam axis one cycle length setting (2D84h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D84h	One cycle length of CAM axis	4 bytes	Write	2	Impossible

The cam axis one cycle length can be written in the RAM space in the servo amplifier using the function code "10h" (Preset Multiple Registers).
The values set with this register are deleted at power-off.

4) Cam stroke length setting (2D85h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D85h	Stroke movement of CAM	4 bytes	Write	2	Impossible

A cam stroke length can be written in the RAM space in the servo amplifier using the function code "10h" (Preset Multiple Registers).
The values set with this register are deleted at power-off.

5) Request store CAM (2D88h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D88h	Request store CAM	1 byte	Write	1	Impossible

Cam data can be written in the RAM space in the servo amplifier using the function code "10h" (Preset Multiple Registers). Always set "0" in this register.
The values set with this register are deleted at power-off.

6) CAM area (2D89h)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D89h	CAM area	2 bytes	Read/write	1	Impossible

The storage area of cam data to be read or written can be set using the function code "10h" (Preset Multiple Registers).

The following table shows the relation between a value set in this register and cam data storage area.

Setting value	Cam data storage area [byte]
0	0 to 63
1	64 to 127
2	128 to 191
. . .	. . .
130	8320 to 8383
131	8384 to 8447 (Note)

Note. Data of up to 8388 bytes can be stored in the cam data storage area. The value "0" is stored in the 8388th cam data storage area or later.

7) CAM data in CAM area (2D8Bh)

Address	Name	Data type	Read/write	No. of points/ No. of Registers	Continuous read/ continuous write
2D8Bh	CAM data in CAM area	64 bytes	Read/write	32	Impossible

Cam data in the area specified with CAM area (2D89h) can be read using the function code "03h" (Read Holding Registers).

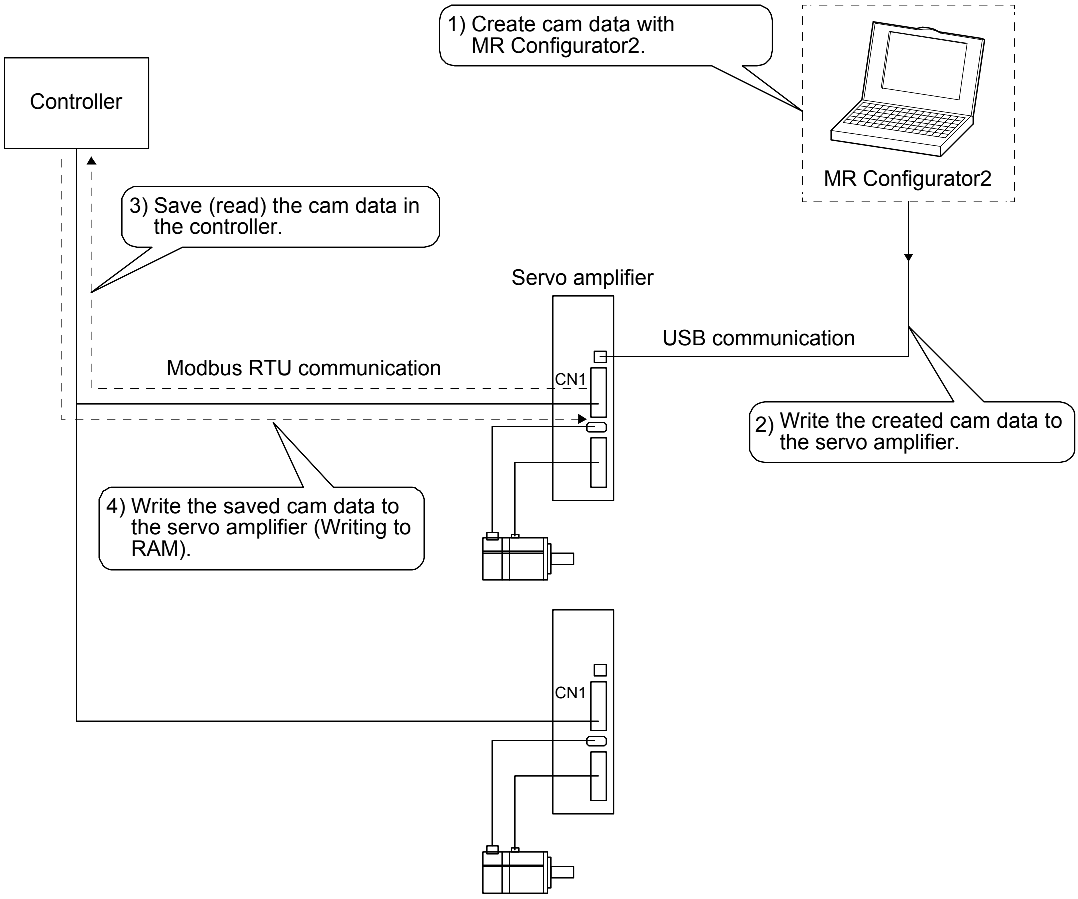
Cam data can be written in the RAM space in the servo amplifier using the function code "10h" (Preset Multiple Registers).
Specify the space in which cam data is written with the CAM area (2D89h).

(6) How to use Modbus RTU communication

When using cam data for the maximum number of registrations or more, save the cam data in the controller with the following method. By writing the stored cam data from the controller, the user can use the cam data for the maximum number of registrations or more.

However, note the following restrictions.

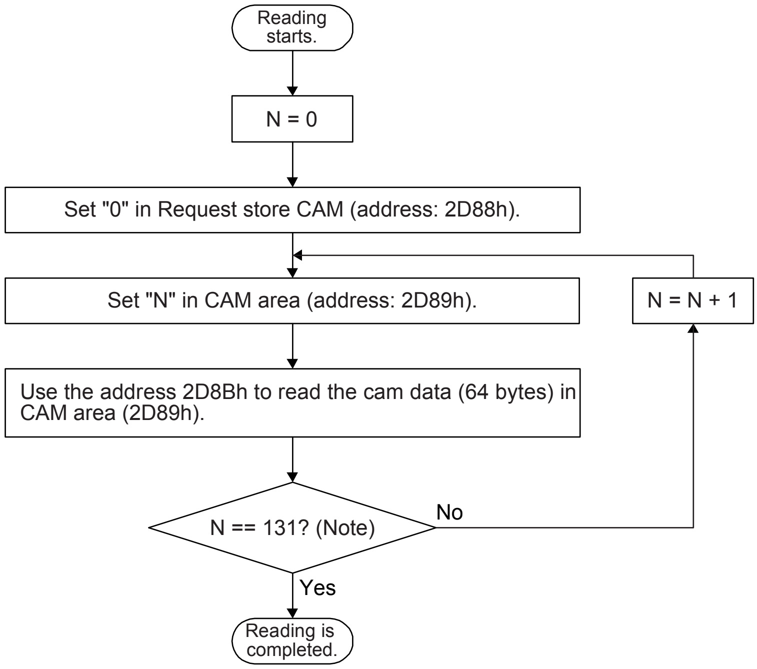
- The cam data written from the controller cannot be read with MR Configurator2.
- Write the cam data and the cam control data in the servo-off state and when CAMC (Cam control command) is off.



The cam No., cam axis one cycle length, and cam stroke amount of the cam control data can be written to the servo amplifier from the controller. Set them using Cam number setting (2D80h), Cam axis one cycle length setting (2D84h), and Cam stroke length setting (2D85h). Refer to section 6.1.7 (1) for the cam control data.

(a) Reading

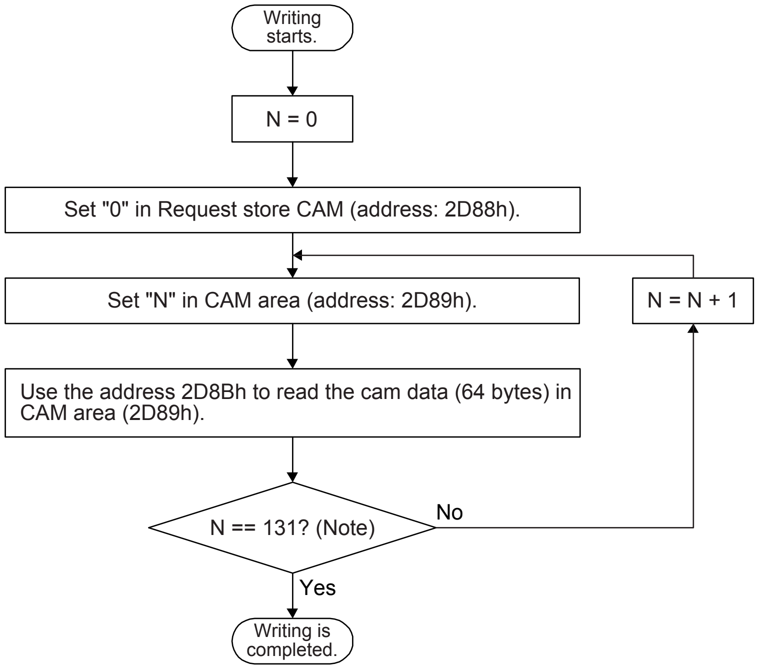
Since cam data is 8 Kbytes, the cam data is divided by 64 bytes and read via Modbus RTU communication. The following shows the procedure for reading cam data with the register addresses 2D88h, 2D89h, and 2D8Bh.



Note. The size of cam data is fixed to 8388 bytes. Thus, N, the setting range of the cam storage area is 0 to 131. Only a part of cam data cannot be read. Read the cam data stored in all areas.

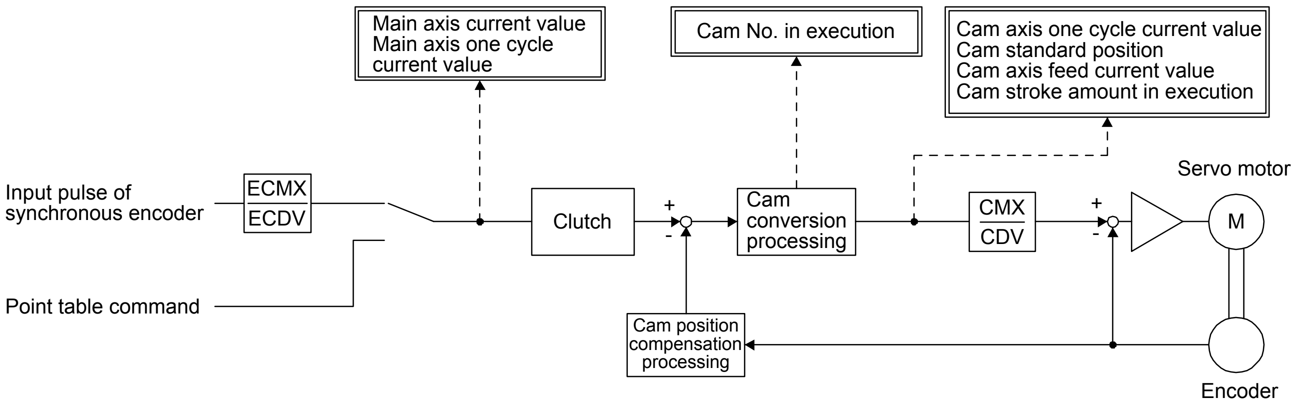
(b) Writing

Since cam data is 8 Kbytes, the cam data is divided by 64 bytes and written via Modbus RTU communication. The following shows the procedure for writing cam data with the register addresses 2D88h, 2D89h, and 2D8Bh.



Note. The size of cam data is fixed to 8388 bytes. Thus, N, the setting range of the cam storage area is 0 to 131. Only a part of cam data cannot be written. Write the cam data stored in all areas.

6.1.8 Function block diagram for displaying state of simple cam control



6.1.9 Operation

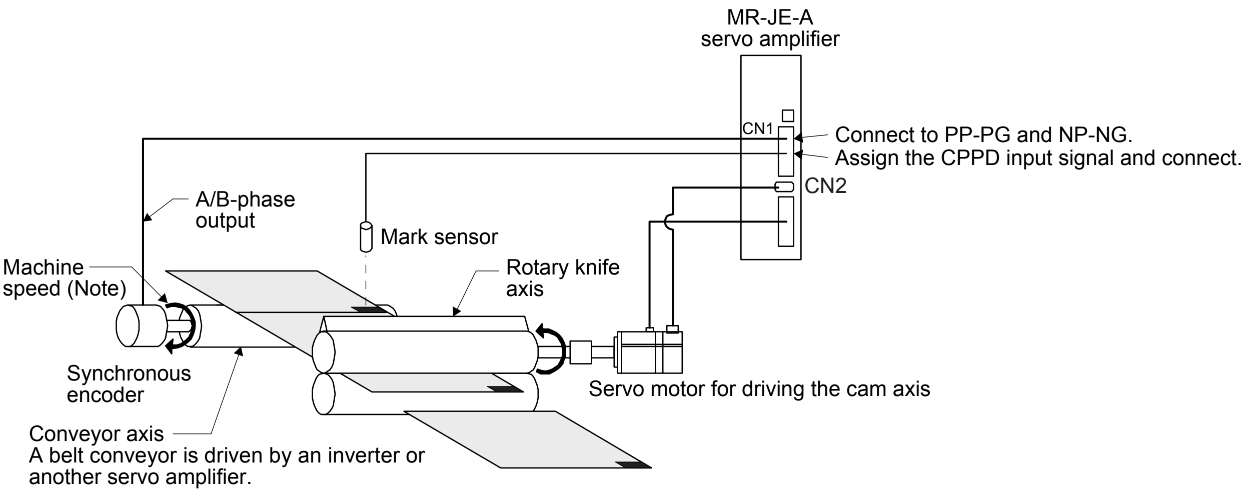
POINT
●When using simple cam function, execute operation so that the machine speed of the input axis is less than "([Cam control data No. 48 - Cam axis one cycle length] × 1/2) / 100 [command unit/s]". When [Cam control data No. 30] is set to "1", the unit of the Cam axis length per cycle will be changed to [mm], [inch], [degree], or [pulse] with the setting of [Pr. PT01]. When [Cam control data No. 30] is set to "2", the unit of the Cam axis length per cycle will be changed to [mm], [inch], [degree], or [pulse] with the setting of [Cam control data No. 14].

This section explains an operation using the simple cam function with concrete examples.

(1) Example of a rotary knife device

(a) Configuration example

The rotary knife cuts the sheet conveyed by the conveyor at a constant speed into a desired length. To prevent variations in the sheet length and a cutting position mismatch, this device reads registration marks that have been printed on the sheet, and compensates cutting positions.



Note. Set the machine speed of the input axis to a value that satisfies the following equation.

The machine speed axis ≤ [Cam control data No. 48 Cam axis one cycle length] × 1/2 × 1000 [command unit/s]

With the graph function of MR Configurator2, you can check the machine speed by observing the waveform of the main axis current value.

The machine speed can be calculated by the following equation.

The machine speed = (L2 - L1)/(T2-T1)

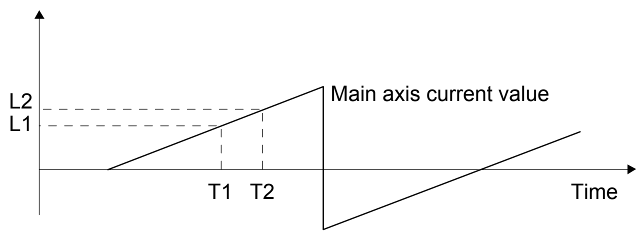


Fig. 6.1 System configuration example

Setting example: When the sheet length is 200.0 mm, the circumferential length of the rotary knife axis (synchronous axis length) is 600.0 mm, and the sheet synchronous width is 10.0 mm

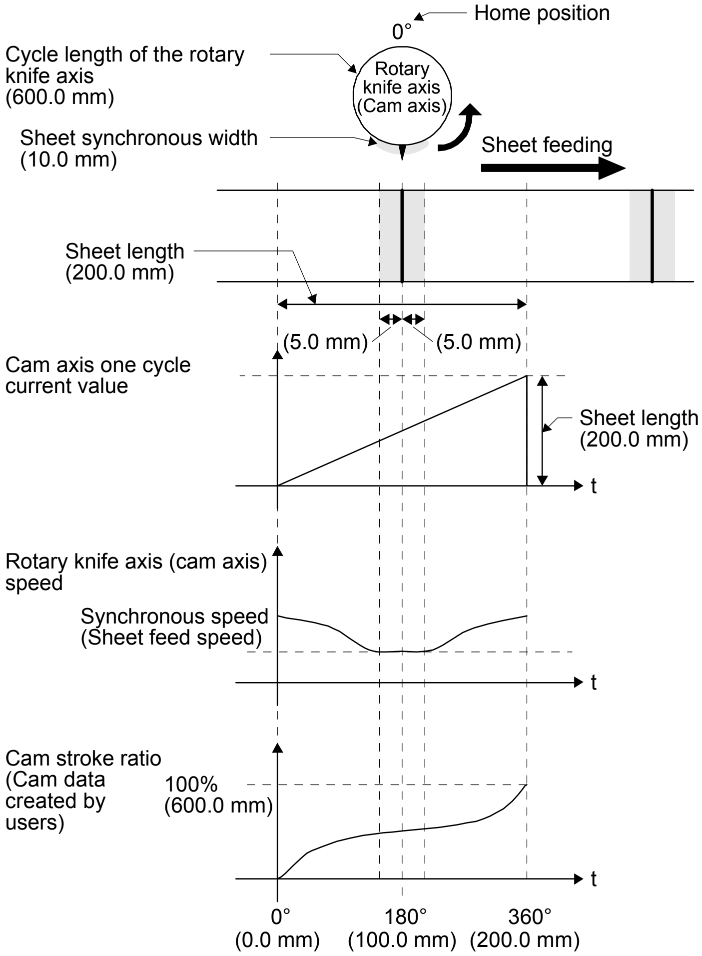


Fig. 6.2 Driving example

Basic settings require to use the simple cam function

Item	Setting	Setting value
Operation mode selection ([Pr. PA01])	Select "Point table method".	"1006"
Simple cam function setting ([Pr. PT35])	Enable the simple cam function.	"_ 1 _ _"
Device setting	Assign CAMC (Cam control command input), CAMS (Output in cam control), and CI0 to CI3 (Cam No. selection 0 to 3) with I/O setting parameters ([Pr. PD_ _]).	Refer to section 7.2.4.

When the conveyor axis (main axis) feeds a sheet by the set length, the rotary knife makes one rotation (360 degrees) to cut the sheet. Set the following items as follows.

Item	Setting	Setting value
Cam axis one cycle length ([Cam control data No. 48])	Set the sheet length.	200.000
Cam stroke amount ([Cam control data No. 51])	Set the rotation amount per rotation in "degree".	360.000
Synchronous encoder axis unit ([Cam control data No. 14])	Set the unit of the sheet length.	0 (mm)
Unit of rotary knife axis ([Pr. PT01])	Set "degree" as the unit of position data.	"_ 2 _ _"
Cam data	Create the cam data with the operation pattern shown in Fig. 6.2.	

Set the following items as follows to use the encoder following function.

Item	Setting	Setting value
Main shaft input axis selection ([Cam control data No. 30])	Select the synchronous encoder axis.	2
Synchronous encoder axis unit multiplication: Numerator ([Cam control data No. 15])	Refer to the synchronous encoder axis unit conversion gear setting in section 6.1.7 (3) (b).	Refer to section 6.1.7 (3) (b).
Synchronous encoder axis unit multiplication: Denominator ([Cam control data No. 16])		

(b) Operation

The following table shows an example of the procedure before operation.

Step	Setting and operation
1. Data setting	Refer to the setting example on the previous page and set the data.
2. Initial position adjustment	Adjust the synchronous positions of the conveyor axis and rotary knife axis. ・When the position of the conveyor axis (main axis current value) is "0", set the position of the rotary knife axis (feed current value) to "0". ・Since the position at power-on is "0", the home position return of the conveyor axis is not required. ・Perform the home position return on the rotary knife axis at the point where the blade of the cutter becomes the top. Adjust the conveyor axis and rotary knife axis so that the 0 position of both axes is located at the center of the sheet length.
3. Selecting cam data	Select the cam data to be executed with CI0 to CI3 (Cam No. selection 0 to 3). The user can use [Cam control data No. 49 - Cam No.] to select the cam data. (Note 1)
4. Servo-on	Switch on SON (Servo-on).
5. Switching cam control	Switch on CAMC (Cam control command) to switch the control to the cam control. (Note 2)
6. Starting the conveyor axis	Check that CAMS (During cam control) is on and start the conveyor axis. (Note 2) The rotary knife axis is driven in synchronization with the conveyor axis.

Note 1. Use Cam number setting (2D80h) to select a cam No. via the Modbus RTU communication.

2. Use C_CAMC (Control input (bit 5 of 2D02h)) to input a cam control command via the Modbus RTU communication. The output status during cam control can be read with S_CAMS (Control output (bit 5 of 2D12h)).

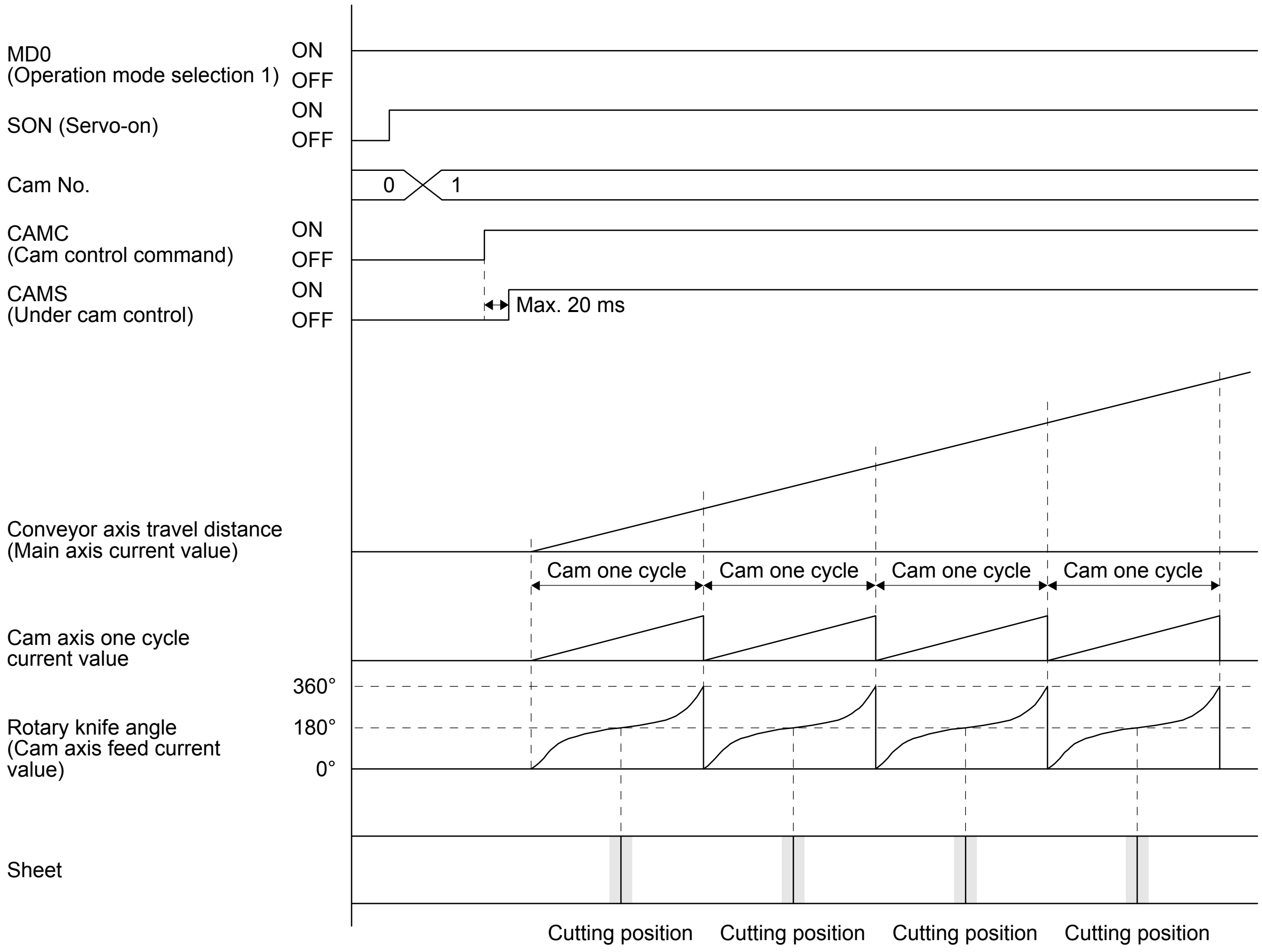


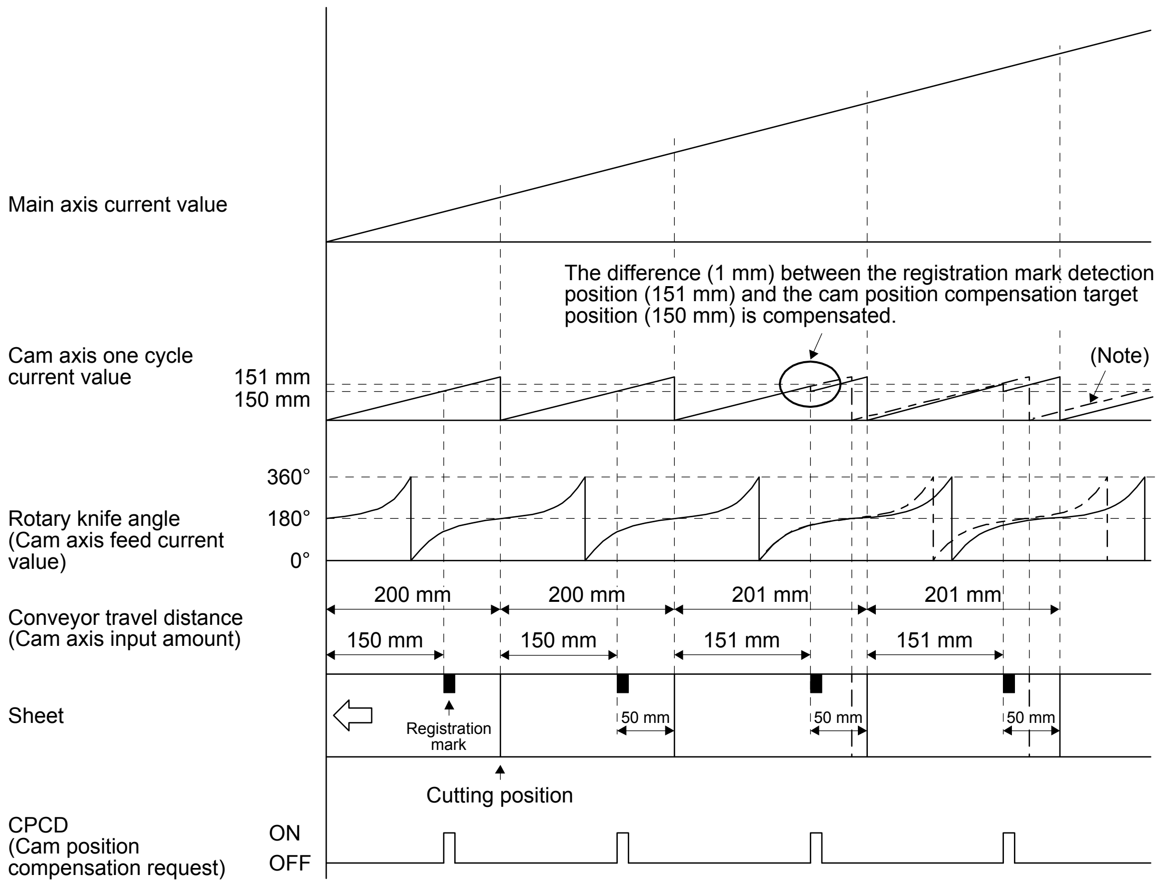
Fig. 6.3 Timing chart

(c) Compensation with mark sensor input

This system detects registration marks that have been equally printed on the sheet, and compensates the difference between the actual cam axis one cycle current value and the ideal cam axis one cycle current value (set value of the cam position compensation target position) by shifting the synchronous phase of the rotary knife axis and the conveyor axis.

Setting example: When the ideal registration mark position is 150 mm and the mark is not detected unless the conveyor feeds the sheet by 151 mm due to stretch
By executing compensation, the rotary knife cuts the sheet keeping the distance of 50 mm between the ideal position for detecting the registration mark and the position for cutting the sheet.

Item	Setting and operation
Assignment of CPCD (Cam position compensation request)	Assign "CPCD" for an input signal pin with the input device selection parameter. Refer to section 7.2.4 for details.
Cam position compensation target position ([Cam control data No. 60])	In this example, the ideal position for detecting the registration mark is 150 mm position from the cam axis one cycle current value. Set "150" for the cam position compensation target position.
Cam position compensation time constant ([Cam control data No. 61])	In this example, the position compensation is executed by one-shot. Set "0" for the cam position compensation time constant.



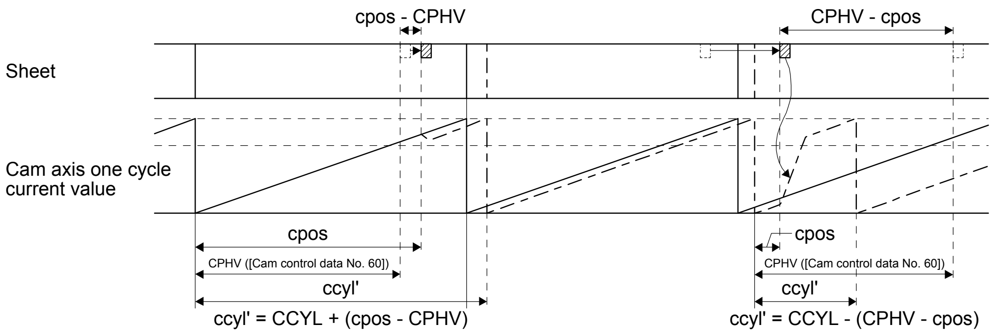
Note. The dot-and-dash line in the above figure shows a waveform of when compensation is not executed.

Fig. 6.4 Control example of cam position compensation

(d) Details of cam position compensation

POINT

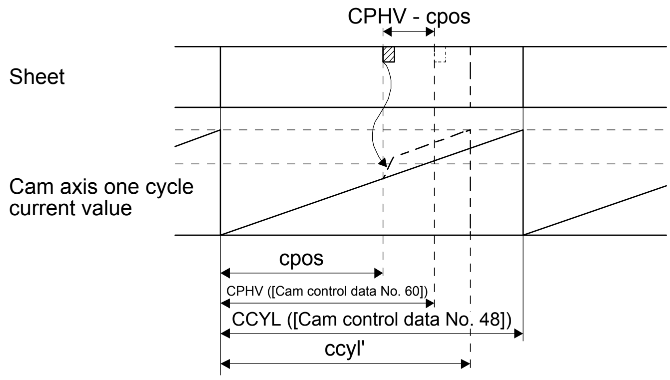
- Adjust the sensor position and cam position compensation target position so that the sensor position is detected before the cam axis one cycle current value exceeds the cam axis one cycle length.
  If the sensor position is detected after the cam axis one cycle current value exceeds the cam axis one cycle length, the sheet length may be determined as extremely short, causing a rapid movement such as the cam axis feed current value is increased in a short time.



The cam position compensation processing compensates the difference between the target position for detecting the sensor and the actual position for detecting the sensor by shifting the cam axis one cycle current value. ccyl', the cam axis one cycle length (sheet length) after compensation, is calculated as follows:

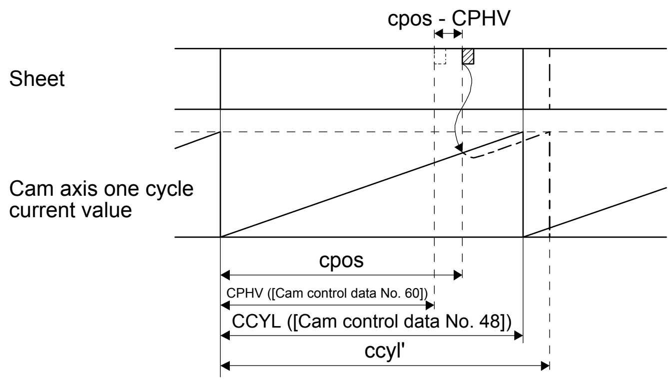
CCYL: Cam axis one cycle length ([Cam control data No. 48])
CPHV: Cam position compensation target position ([Cam control data No. 60])
ccyl': Cam axis one cycle length (after compensation)
cpos: Cam axis one cycle current value at sensor detection
CPHV - cpos: Distance between the target sensor detection position and actual sensor detection position

- When the sensor detection position is before the target position (CPHV ≥ cpos): ccyl' = CCYL - (CPHV - cpos)



Increase the conveyor travel distance by adding the difference (CPHV - cpos) to the cam axis one cycle current value. Adjust the filter time constant for acceleration/deceleration at compensation with [Cam control data No. 61 Cam position compensation time constant].

- When the sensor detection position is after the target position (CPHV < cpos): ccyl' = CCYL + (cpos - CPHV)



Decrease the conveyor travel distance by subtracting the difference (cpos - CPHV) from the cam axis one cycle current value. Adjust the filter time constant for acceleration/deceleration at compensation with [Cam control data No. 61 Cam position compensation time constant].

(2) Example of the simultaneous start function with contact input or via the Modbus RTU communication

(a) Configuration example

To synchronize the vertical motion of the vertical axis (axis 2) with the position of the horizontal axis (axis 1) as shown below, input the positioning commands for axis 1 to axis 2 as well. (Set the same point table data for the axis 1 and 2.)

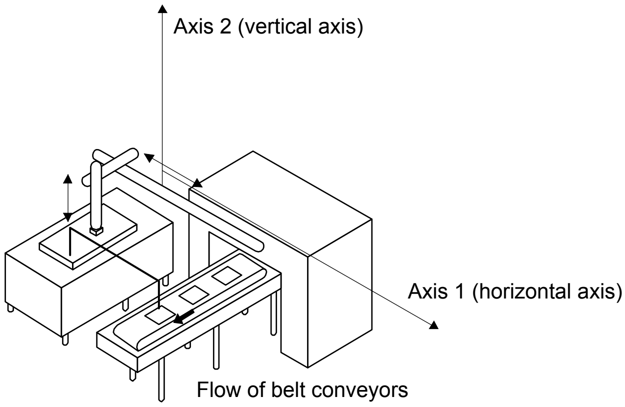
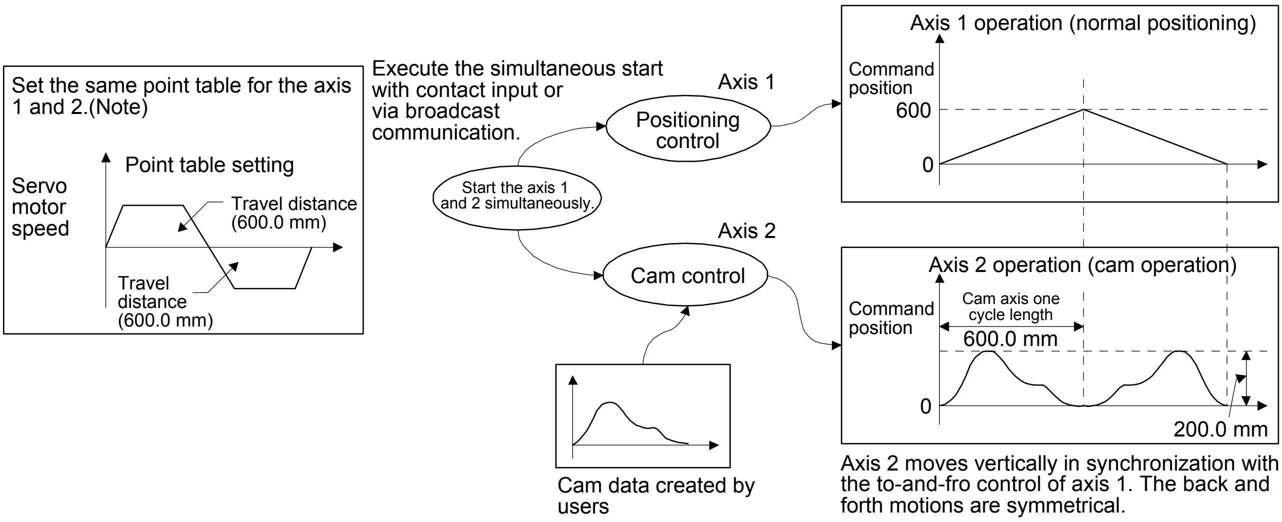


Fig. 6.5 System configuration example

Setting example: When the movable range of the axis 1 (horizontal axis) is 600.0 mm and the axis 2 (vertical axis) is 200.0 mm



Note. Input the same positioning commands (point table data) to the driven shaft (axis 2) as those for the main shaft (axis 1).

Fig. 6.6 Driving example

Set the following items as follows to move up and down the axis 2 in synchronization with the to-and-fro control using absolute value commands with point table No. 1 and 2 of the axis 1.

Setting example of axis 1

Item	Setting	Setting value
Operation mode selection ([Pr. PA01])	Select "Point table method".	"1006"
Positioning command method selection ([Pr. PT01])	Select "Absolute value command method".	"_ _ _ 0"
Command unit ([Pr. PT01])	Set "mm" as the unit of position data.	"_ 0 _ _"
Main shaft input axis selection ([Cam control data No. 30])	Select "Servo input axis".	1
Point table No. 1	Set the target position (outward path in the to-and-fro control).	600.000
	Set "Absolute value command method" for the sub function.	"0", "1", "8", or "9"
Point table No. 2	Set the target position (return path in the to-and-fro control).	0.000
	Set "Absolute value command method" for the sub function.	"0", "1", "8", or "9"

Setting example of axis 2

Item	Setting	Setting value
Operation mode selection ([Pr. PA01])	Select "Point table method".	"1006"
Simple cam function setting ([Pr. PT35])	Enable the simple cam function.	"_ 1 _ _"
Device setting	Assign CAMC (Cam control command input), CAMS (Output in cam control), and CI0 to CI3 (Cam No. selection 0 to 3) with I/O setting parameters ([Pr. PD_ _]).	Refer to section 7.2.4.
Command unit ([Pr. PT01])	Set "mm" as the unit of position data.	"_ 0 _ _"
Cam axis one cycle length ([Cam control data No. 30])	Set the travel distance of the axis 1 (horizontal axis).	600.000
Cam stroke amount ([Cam control data No. 51])	Set the travel distance of the axis 2 (vertical axis).	200.000
Main shaft input axis selection ([Cam control data No. 30])	Select "Servo input axis".	1
Point table No. 1	Set the same target position as that of the point table No. 1 of the axis 1. Set the same servo motor speed and acceleration/deceleration time constants for the point table No. 1 of the axis 1.	600.000
Point table No. 2	Set the same target position as that of the point table No. 2 of the axis 1. Set the same servo motor speed and acceleration/deceleration time constants for the point table No. 2 of the axis 1.	0.000
Cam data	Create a cam pattern according to the axis 1 position. (Refer to Fig. 6.6.)	

(b) Operation

The following table shows an example of the procedure before operation.

Step	Setting and operation
1. Data setting	Refer to the setting example on the previous page and set the data.
2. Initial position adjustment	Adjust the synchronous positions of the axis 1 and 2. In this example, when the position of the axis 1 (command position) is "0", adjust the synchronous position so that the position of the axis 2 (feed current value) becomes "0".
3. Point table selection	Select the point table No. 1 for both axis 1 and 2.
4. Selecting cam data	Select the cam data to be executed with CI0 to CI3 (Cam No. selection 0 to 3) of the axis 2. The user can use [Cam control data No. 49 - Cam No.] to select the cam data.
5. Servo-on	Switch on SON (Servo-on) for both axis 1 and 2.
6. Switching cam control	Switch on CAMC (Cam control command) of the axis 2 to switch the control to the cam control.
7. Starting the simultaneous start function	Check CAMS (During cam control) of the axis 2 is on and start the operations of the axis 1 and 2 simultaneously. The axis 2 is driven in synchronization with the axis 1.

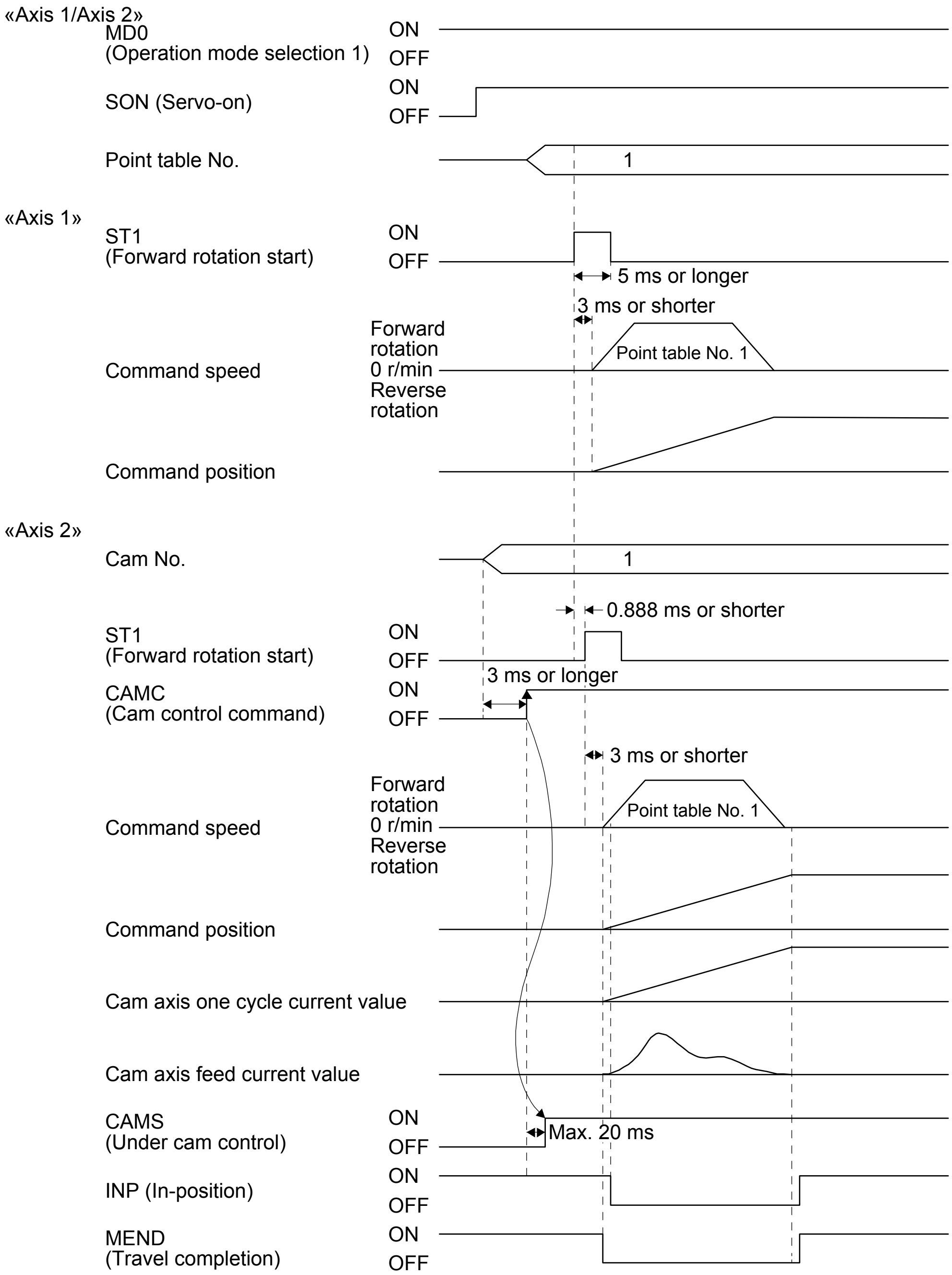


Fig. 6.7 Timing chart

Input start commands simultaneously with the DI signal or serial communication from controllers such as programmable controllers. The start delay time of the main shaft and driven shaft is 888 μs at a maximum because it depends on the fetch cycle of the start signal. The detection of external input signals is delayed by the time set in the input filter setting of [Pr. PD29].
Even though CAMC turns on, the command is not reflected after ST1 turns on (during point table operation or JOG operation). The command is not also reflected even though CAMC turns on in the servo-off state.
CAMC is determined at the on edge, not on level. Even though CAMC turns off or on before CAMS turns on, the command is not reflected.

6.1.10 Cam No. setting method

POINT
●When the cam No. is set to a value other than "0" to "8", [AL. F6.5 Cam No. external error] will occur. If the cam data of a specified cam No. does not exist, [AL. F6.3 Cam unregistered error] occurs. At this time, the cam control is not executed and the servo motor does not start. Turning off the cam control command clears [AL. F6.3] and [AL. F6.5].

You can use external input signals or serial communication commands to set and change the cam No. in the same way as the method specified with [Cam control data No. 49] or the method for selecting a point table No.

Use CI0 (Cam No. selection 0) to CI3 (Cam No. selection 3) as external input signals.
Use commands [92] [61] (Writing DI function bit map) as communication commands.
Modbus RTU communication uses Cam number setting (2D80h). Refer to section 5.8.12 of "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)" for how to set a cam No.

The following table lists the priority of each parameter, external input signal, and communication command.

[Pr. PT35] setting	[Cam control data No. 49] setting	External input signal	Communication command	Setting
_ 0 _ _ (Simple cam function disabling setting)	×	×	×	The cam function will be disabled with the setting of [Pr. PT35].
_ 1 _ _ (Simple cam function enable setting)	"0" (initial value)	○	○	The cam No. is set with the setting of external input signals or communication commands.
	Other than "0"	×	×	The cam No. is set with the setting of [Cam control data No. 49]. The cam No. setting with external input signals or communication commands is disabled.

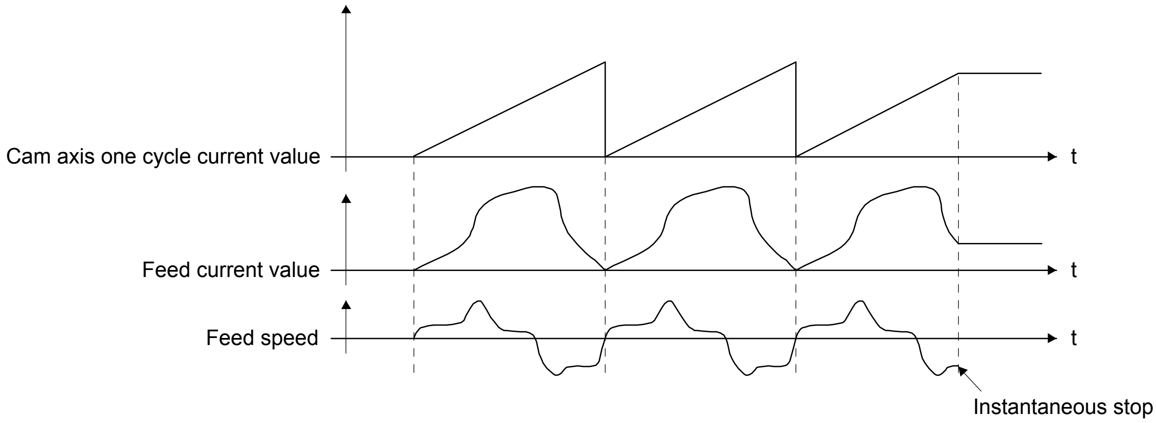
Note 1. ○: Enable, ×: Disable
2. The on/off state of CI0 to CI3 is determined with OR of external input signals and communication command settings.
- On: Either of an external input signal or a communication command turns on.
- Off: Both of the external input signal and communication command turn off.

6.1.11 Stop operation of cam control

If one of the following stop causes occurs on the output axis during cam control, the cam control stops after the output axis is stopped. (CAMS turns off.)
To restart the cam control, adjust the synchronous position of the output axis.

Stop cause	Command stop processing	Remark
Software stroke limit detection	Instantaneous stop	Refer to (1).
Stroke limit detection	Instantaneous stop	Refer to (1).
Stop due to forced stop 1 or 2, or alarm occurrence	Instantaneous stop or deceleration to a stop	Stop due to base circuit shut-off Refer to (1). Stop by the forced stop deceleration function Refer to (2).
Cam control command (CAMC) OFF	Instantaneous stop	Refer to (1).
Servo-off	Instantaneous stop	Coasting state

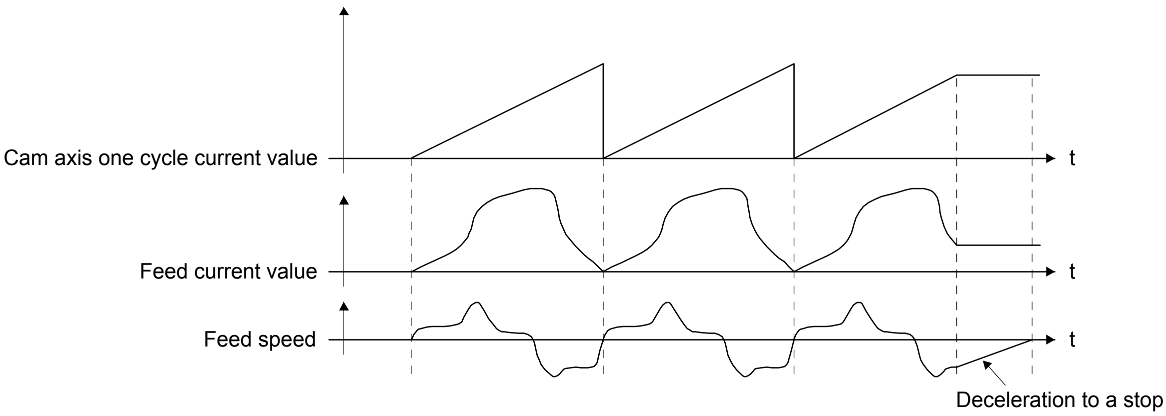
(1) Instantaneous stop
The operation stops without deceleration. The servo amplifier immediately stops the command.



(2) Deceleration stop

The output axis decelerates to stop according to [Pr. PC51 Forced stop deceleration time constant]. After a deceleration stop starts, the cam axis one cycle current value and feed current value are not updated. The path of the feed current value is drawn, and the stop is made regardless of the cam control.

Decelerate the input axis to stop when decelerating the output axis to stop in synchronization with the input axis.

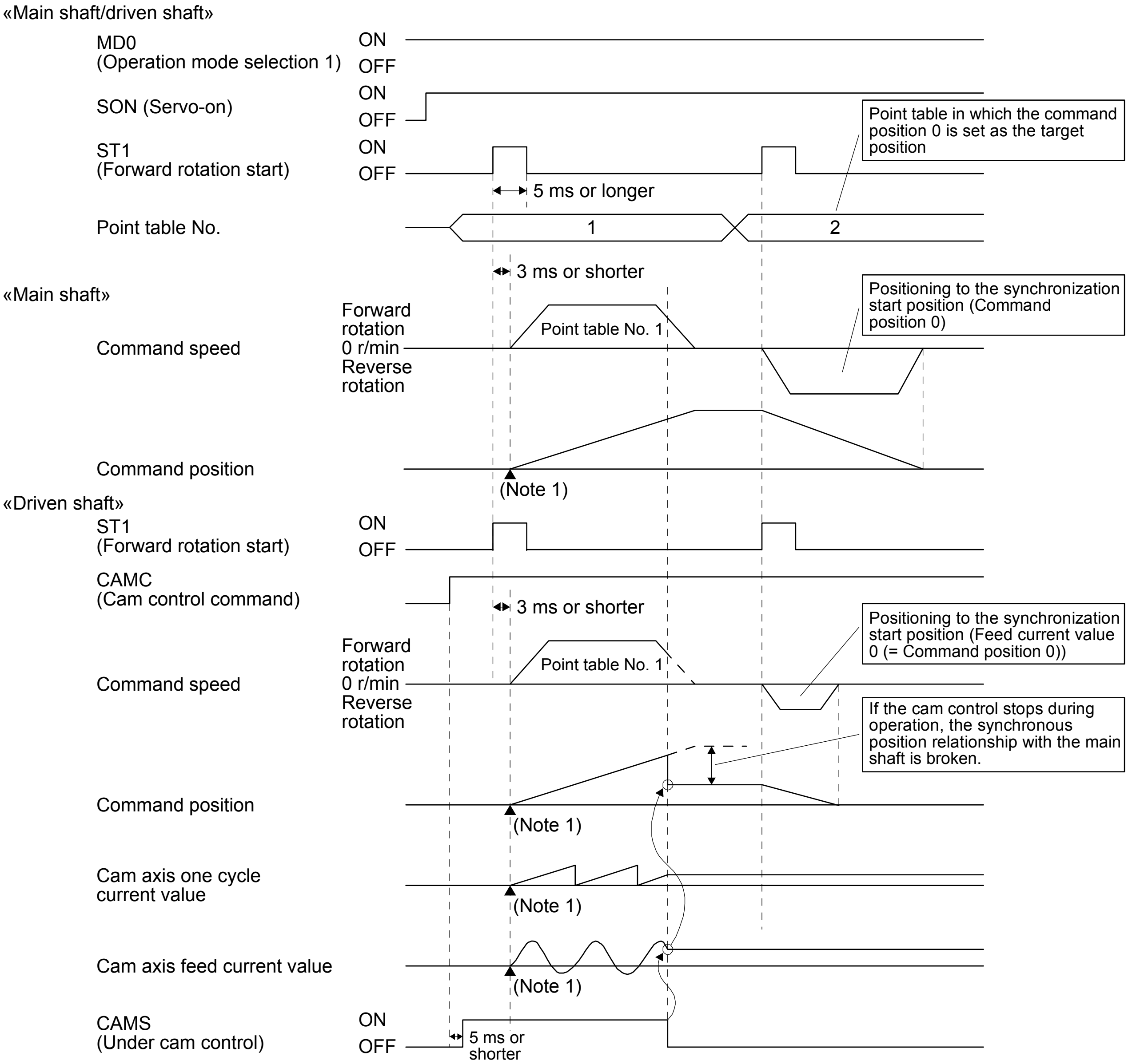


When using a positioning command (internal command) for the input axis, inputting a temporary stop or switching the operation mode decelerates the input axis to stop. Since the output axis stops in synchronization with the input axis, the synchronous relationship is kept and the cam control does not stop.

When the control mode is switched to the home position return mode, the cam control will stop.

6.1.12 Restart operation of cam control

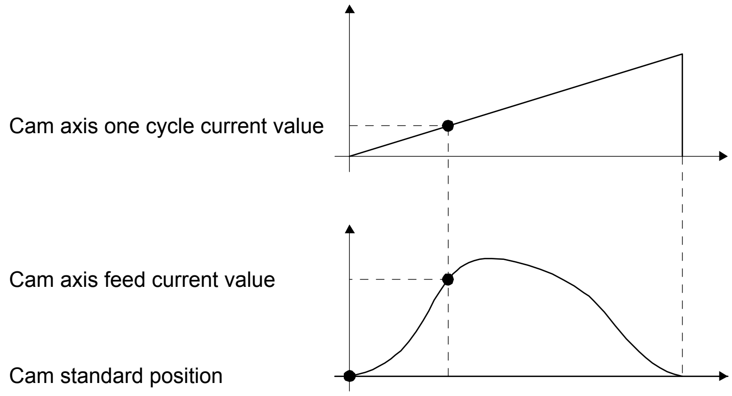
When the cam control is stopped during operation, a gap is generated in the synchronization between the main shaft and the driven shaft. To solve the gap, return the main shaft and the driven shaft to the synchronization starting point and then start the synchronous operation.



The above shows an example for when the synchronization starting point is the point where both command position and feed current value are "0".

6.1.13 Cam axis position at cam control switching

The cam axis position is determined by the positional relationship of three values of "Cam axis one cycle current value", "Cam axis standard position" and "Cam axis feed current value". When the control has been switched to the cam control (CAMC (Cam control command) is on), defining the positions of two of these values restores the position of the remaining one value.



The following table lists the parameters required to be set for the cam axis position restoration. Refer to section 6.1.7 (3) for the settings.

Cam axis position restoration target ([Cam control data No. 2])	Cam standard position setting method ([Cam control data No. 3])	Cam standard position (initial setting value) ([Cam control data No. 6])	Cam axis one cycle current value setting method ([Cam control data No. 4])	Cam axis one cycle current value (initial setting value) ([Cam control data No. 7])	Restoration processing details
0: Cam axis one cycle current value	○	○ (Note)		○ (Used as the search starting point of cam pattern.)	"Cam axis one cycle current value" is restored based on "Cam standard position" and "Cam axis feed current value".
1: Cam standard position			○	○ (Note)	"Cam standard position" is restored based on "Cam axis one cycle current value" and "Cam axis feed current value".
2: Cam axis feed current value	○	○ (Note)	○	○ (Note)	"Cam axis feed current value" is restored based on "Cam axis one cycle current value" and "Cam standard position".

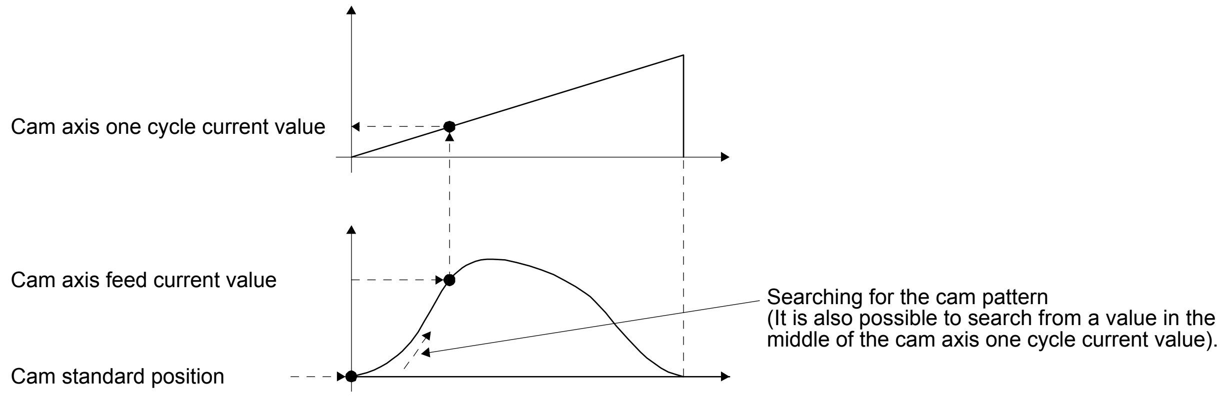
○: Required

Note. Set this parameter when [Cam control data No. 3] is set to "1".

(1) Cam axis one cycle current value restoration

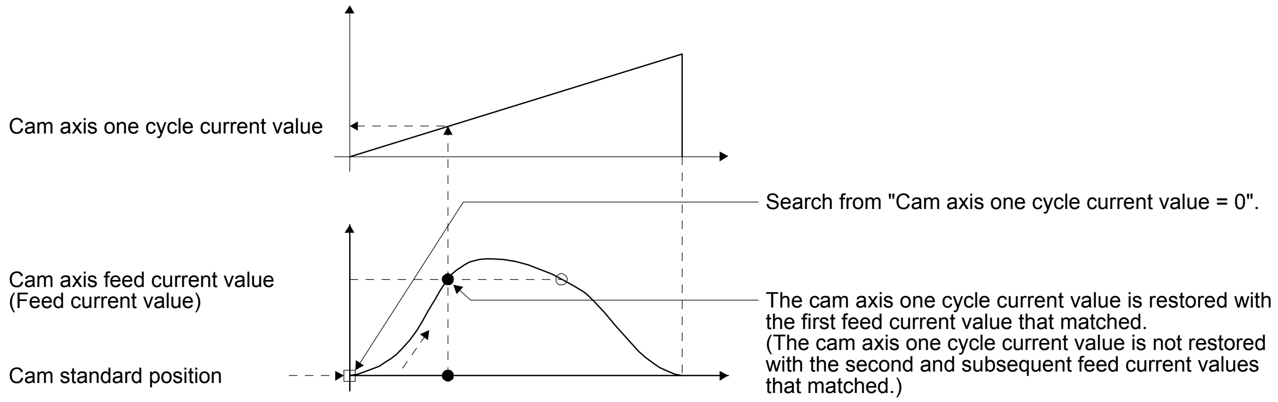
POINT
● For the cam pattern of to-and-fro control, if no corresponding cam axis one cycle current value is found, [AL. F6.1 Cam axis one cycle current value restoration failed] will occur and cam control cannot be executed. ● For the cam pattern of feed control, if no corresponding cam axis one cycle current value is found, the cam standard position will automatically change and the value will be searched again. ● If the cam resolution of the cam used is large, search processing at cam control switching may take a long time.

When CAMC (Cam control command) turns on, "Cam axis one cycle current value" is restored based on "Cam standard position" and "Cam axis feed current value" and the control is switched to the cam control. Set the "cam standard position" used for the restoration with cam control data. The feed current value at cam control switching is used as "Cam axis feed current value".
The cam axis one cycle current value is restored by searching for a corresponding value from the beginning to the end of the cam pattern.
Set the starting point for searching the cam pattern with "[Cam control data No. 7 Cam axis one cycle current value (initial setting value)]". (It is also possible to search from the return path in the cam pattern of to-and-fro control.)

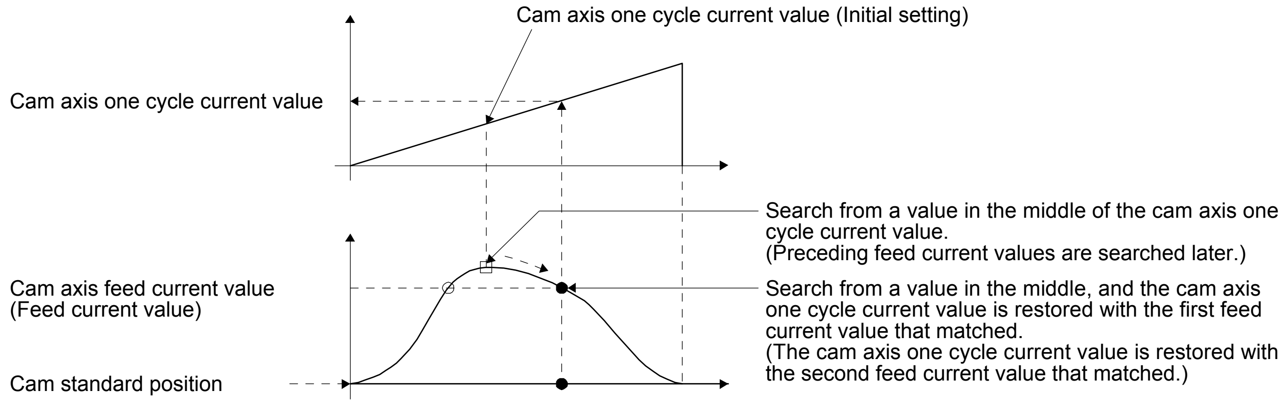


(a) Cam pattern of to-and-fro control

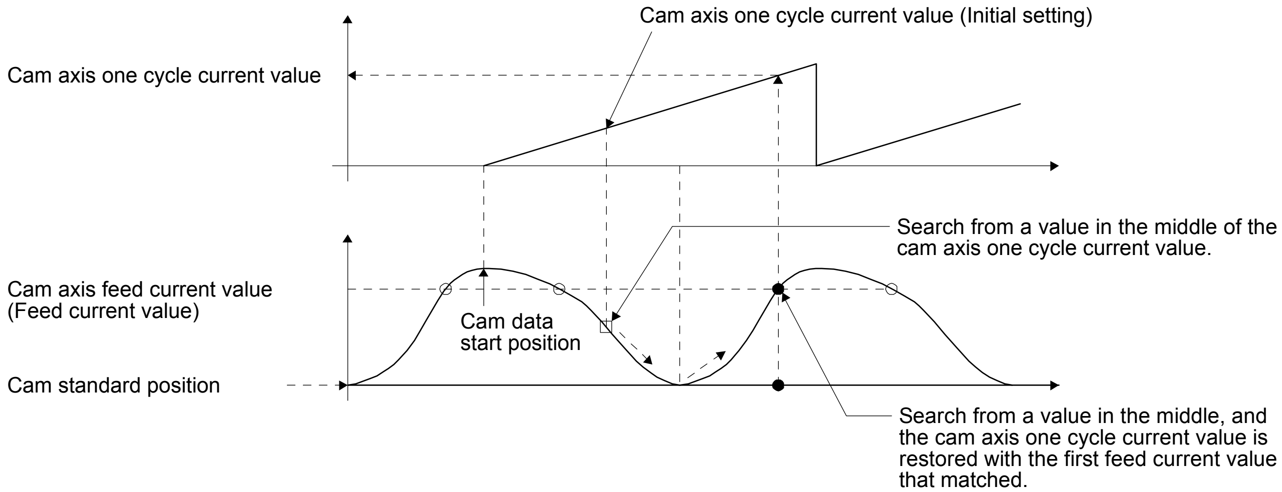
1) Searching from "Cam axis one cycle current value = 0" (Cam data start position = 0)



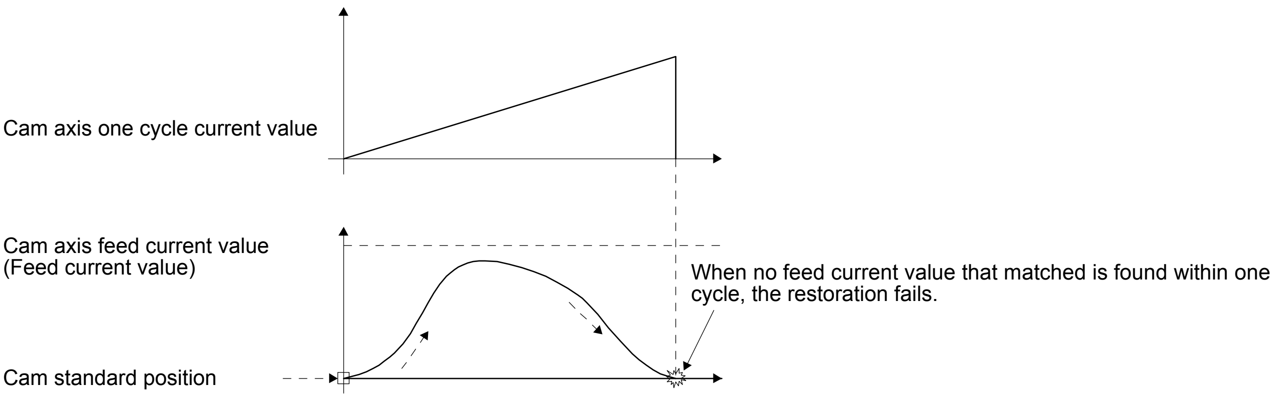
2) Searching from a value in the middle of the cam axis one cycle current value (Cam data start position = 0)



3) Searching from a value in the middle of the cam axis one cycle current value (Cam data start position ≠ 0)

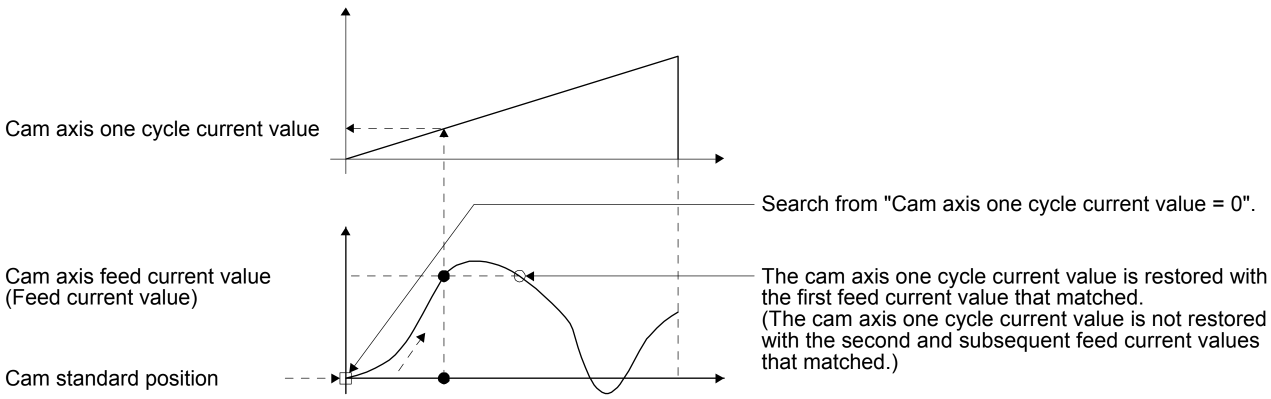


4) Searching fails

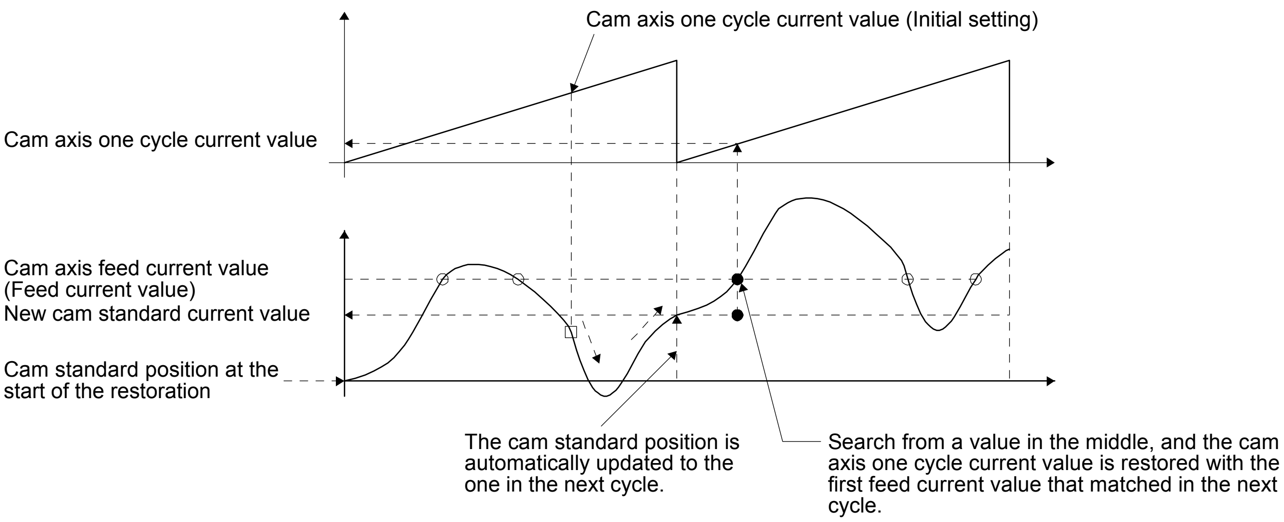


(b) Cam pattern of feed control

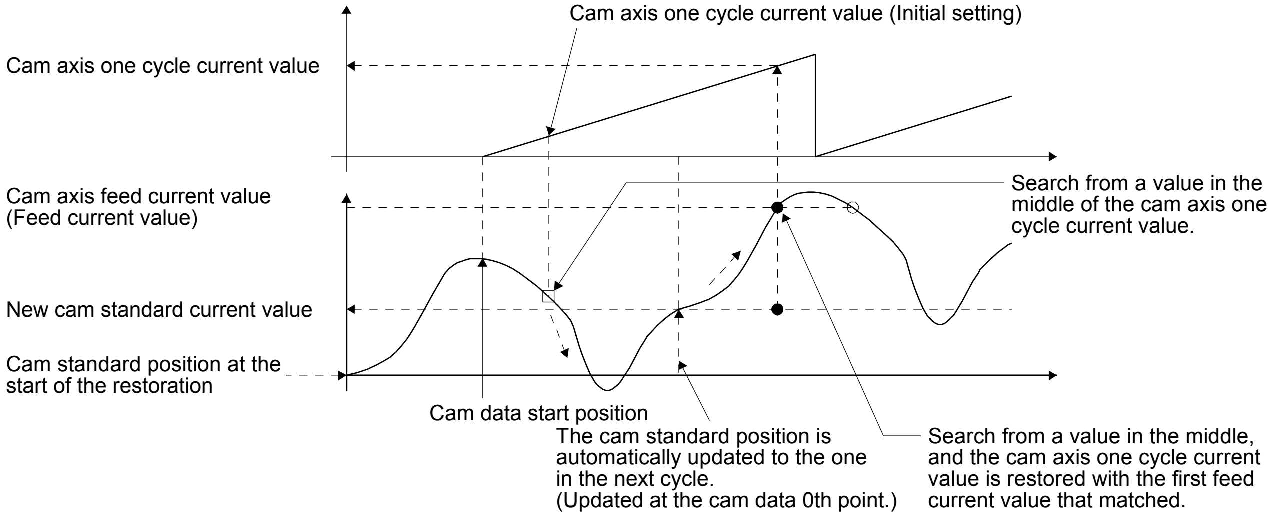
1) Searching from "Cam axis one cycle current value = 0" (Cam data start position = 0)



2) Searching from a value in the middle of the cam axis one cycle current value (Cam data start position = 0)

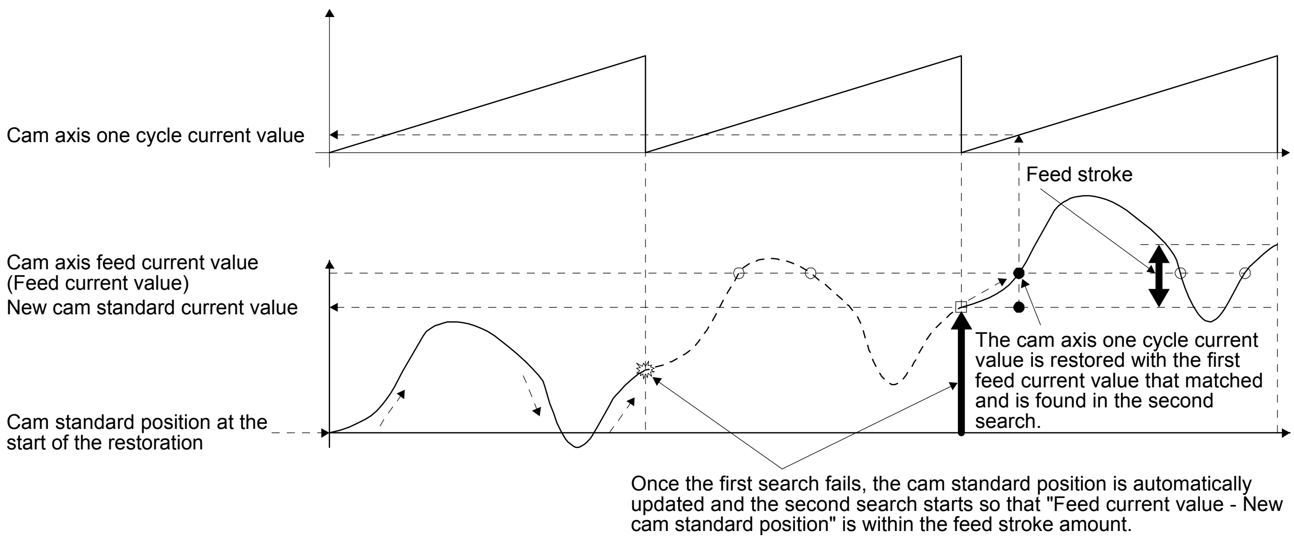


3) Searching from a value in the middle of the cam axis one cycle current value (Cam data start position ≠ 0)



4) The first searching has failed and the second searching starts

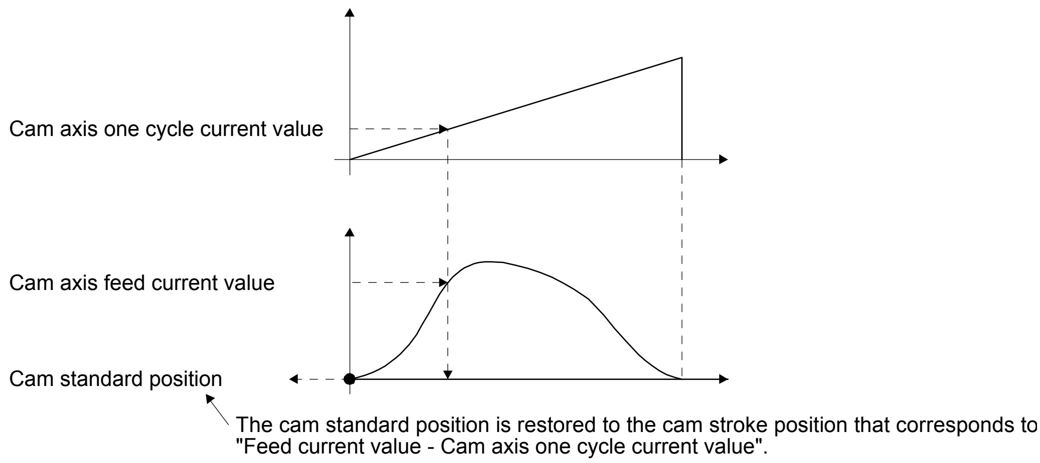
POINT
●If the first searching has failed, the second searching may not be processed in the next cycle for a cam pattern with a feed stroke smaller than 100%. By setting or positioning a cam standard position in advance, an intended cam axis one cycle current value can be found in the first searching.



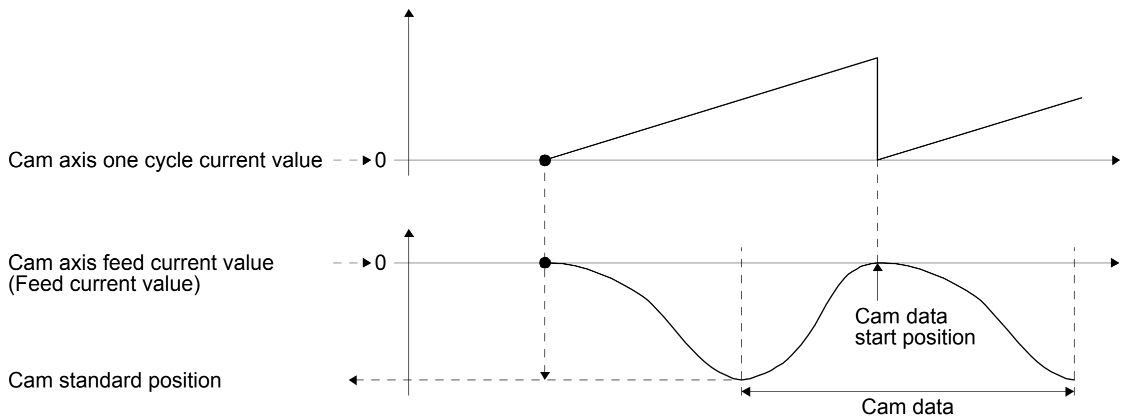
(2) Cam standard position restoration

If the cam axis position restoration target is set to "Cam standard position restoration" and CAMC (Cam control command) turns on, the "cam standard position" will be restored based on "Cam axis one cycle current value" and "Cam axis feed current value" and the control is switched to the cam control.

Set the "cam axis one cycle current value" used for restoration with cam control data. The feed current value of when CAMC (Cam control command) is on is used as the "cam axis feed current value".



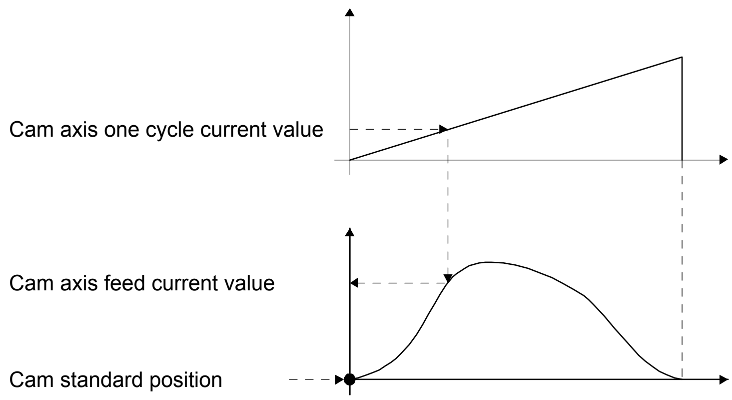
The following shows an example for restoring the cam standard position to start an operation from a point where both the feed current value and the cam axis one cycle current value are 0" in the cam whose cam data start position is not "0".



(3) Cam axis feed current value restoration

POINT
●When the restored cam axis feed current value differs from the feed current value at cam control switching, the cam axis feed current value moves to the value restored just after cam control switching. ●If the difference between the restored cam axis feed current value and the feed current value is larger than the value set in [Pr. PA10 In-position range], [AL. F6.2 Cam axis feed current value restoration failed] will occur and the control cannot be switched to the cam control. Note that, if increasing the value of the in-position range may lead to a rapid cam switching.

If the cam axis position restoration target is set to "Cam axis feed current value restoration" and CAMC (Cam control command) turns on, "Cam axis feed current value" is restored based on "Cam axis one cycle current value" and "Cam standard position" and the control is switched to the cam control.
Set the "cam axis one cycle current value" and "cam standard position" used for the restoration with cam control data.



6.1.14 Clutch

POINT

- Use C_CLTC (Clutch command (bit 11 of 2D02h)) to input a clutch command via the Modbus RTU communication.
  Use S_CLTS (Clutch on/off status (bit 11 of 2D12h)) to read the output status of the clutch on/off status.
- Use S_CLTSM (Clutch smoothing status (bit 12 of 2D12h)) to read the output status of the clutch smoothing status via the Modbus RTU communication.
- C_CLTC, S_CLTS, and S_CLTSM are available with servo amplifiers with software version C1 or later. For details, refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)".

The clutch is used to transmit/disengage command pulses from the main shaft input side to the output axis module through turning the clutch ON/OFF, controlling start/stop of the servo motor operation.
Set whether or not to use the clutch control with [Cam control data No. 36 - Main shaft clutch control setting].
Although the clutch ON/OFF can be changed during cam control, the setting of [Cam control data No. 36] cannot be changed from "1 (Clutch command ON/OFF)" to "0 (No clutch)" during cam control.
When the clutch ON condition and the clutch OFF condition are simultaneously established within the DI scan cycle, both clutch ON processing and clutch OFF processing are executed within the DI scan cycle. Therefore, the clutch status changes from OFF to ON and OFF again when the conditions are established in the clutch OFF status, and the status changes from ON to OFF and ON again when the conditions are established in the clutch ON status.

(1) ON control mode

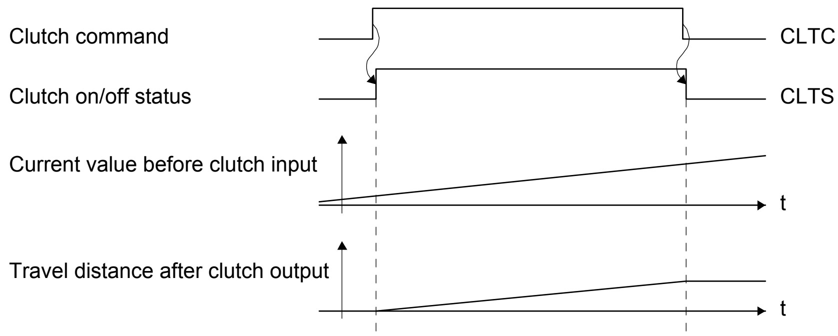
(a) "No clutch"

When [Cam control data No. 36 - Main shaft clutch control setting] is set to "0 (No clutch)", other clutch parameters are not used due to direct coupled operation.

(b) Clutch command ON/OFF

Turning on/off CLTC (Clutch command) turns on/off the clutch.

(Settings in the OFF control mode are not used in the clutch command ON/OFF mode.)



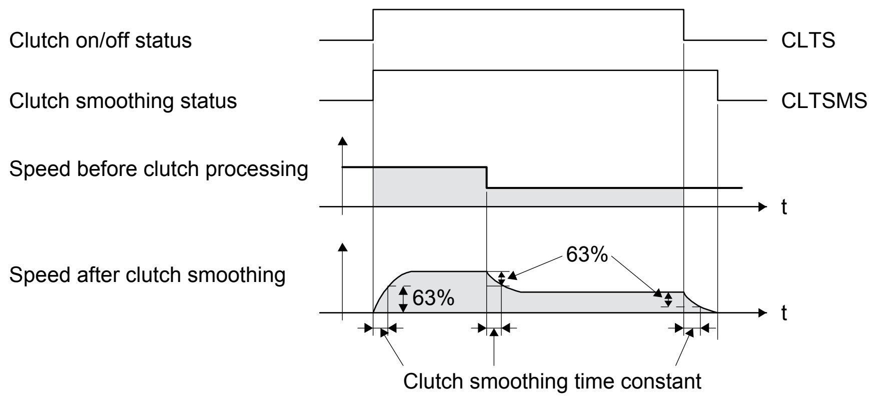
(2) Clutch smoothing method

Smoothing is processed with the time constant set in [Cam control data No. 43 Main shaft clutch smoothing time constant] at clutch ON/OFF. After clutch ON smoothing is completed, smoothing is processed with the set time constant when the speed of the input values changes.
The travel distance from turning on to off of the clutch does not change with smoothing.

Travel distance after clutch smoothing = Travel distance before clutch smoothing

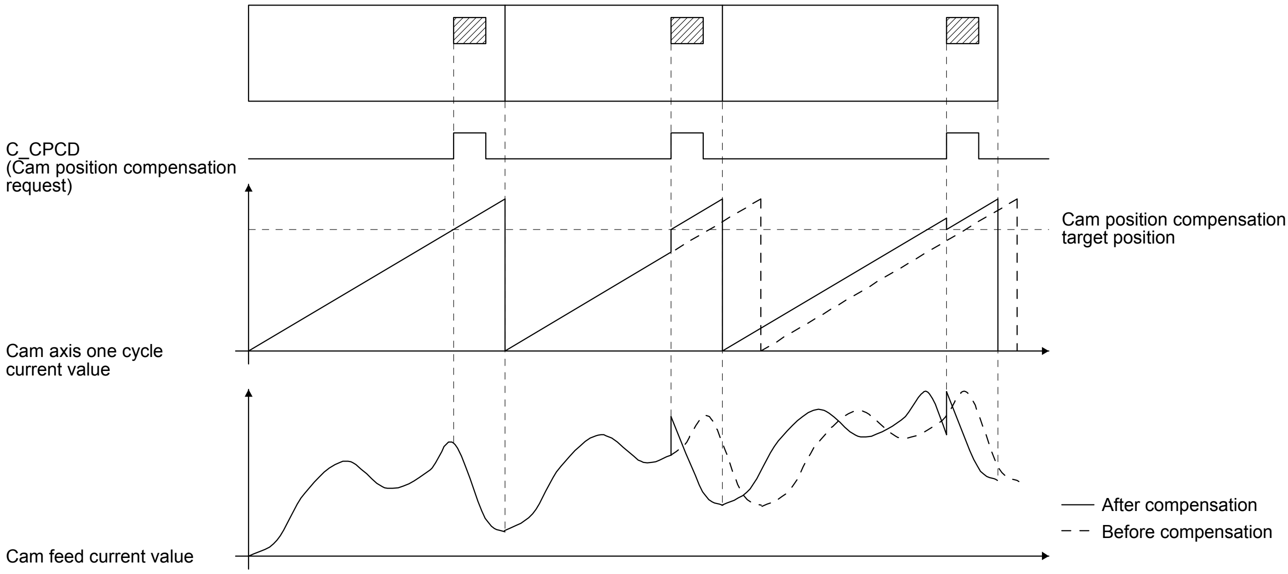
Time constant method exponential curve smoothing

Set [Cam control data No. 42 - Main shaft clutch smoothing system] to "1 (Time constant method (index))".



6.1.15 Cam position compensation target position

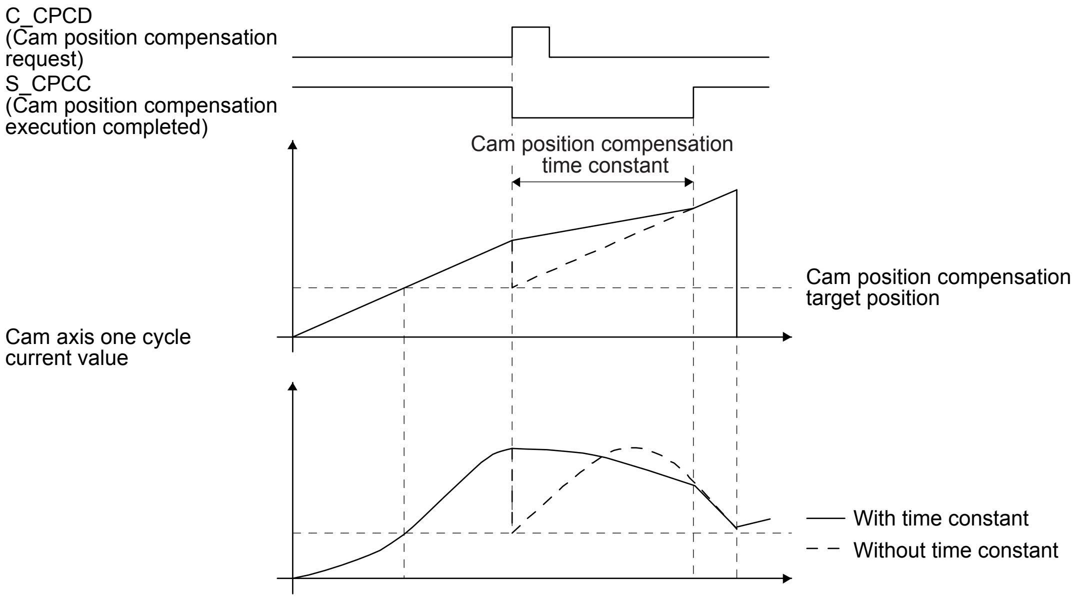
Perform compensation to match the cam axis one cycle current value with the cam position compensation target position ([Cam control parameter No. 60]) by inputting a cam position compensation request.



6.1.16 Cam position compensation time constant

POINT
●Use C_CPCD (Cam position compensation request (bit 13 of 2D02h)) to input a cam position compensation request via the Modbus RTU communication. Use S_CPCC (Cam position compensation execution completed (bit 13 of 2D12h)) to read the output status of Cam position compensation execution completed. ●C_CPCD and S_CPCC are available with servo amplifiers with software version C1 or later. For details, refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)".

The compensation amount calculated when cam position compensation is requested is divided into the time set in [Cam control data No. 61 Cam position compensation time constant] and used for compensation.



6.2 Mark detection

6.2.1 Current position latch function

POINT

- The current position latch function can be used with the point table method and the program method. However, the current position latch function is disabled in the following condition.
  - Home position return
  - Manual operation (excluding home position return)
- The latched actual current position data can be read with communication commands.
- For the servo amplifiers with software version B6 or earlier, the latched position data is not compatible with the current position of the state monitor when the roll feed display function is enabled. Disable the roll feed display function to compare the current data of the state monitor and the latched position data.
- The read latched position data is equal to the travel distance as the starting point is set to "0" when the roll reed display function is enabled. The output value is the same as the current position of the state monitor.

When the mark detection signal turns on, the current position is latched. The latched data can be read with communication commands.

(1) Communication command
Reads mark detection data.

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[1] [A]	[0] [0]	MSD (Mark detection) rising latch data (data part)	○	○		8
	[0] [1]	MSD (Mark detection) falling latch data (data part)	○	○		
	[0] [2]	MSD (Mark detection) rising latch data (data part + additional information)	○	○		12
	[0] [3]	MSD (Mark detection) falling latch data (data part + additional information)	○	○		

(2) Reading data

(a) Rising latch data or falling latch data (data part)

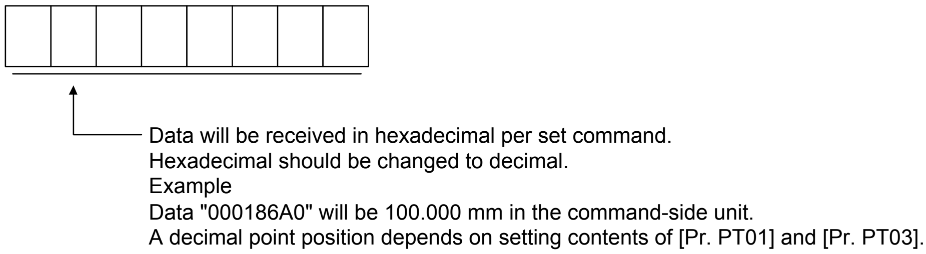
Reads MSD (Mark detection) rising latch data or MSD (Mark detection) falling latch data.

1) Transmission

Transmit command [1] [A] and data No. [0] [0] or [0] [1] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the position data of point table requested.



(b) Rising latch data or falling latch data (data part + additional information)

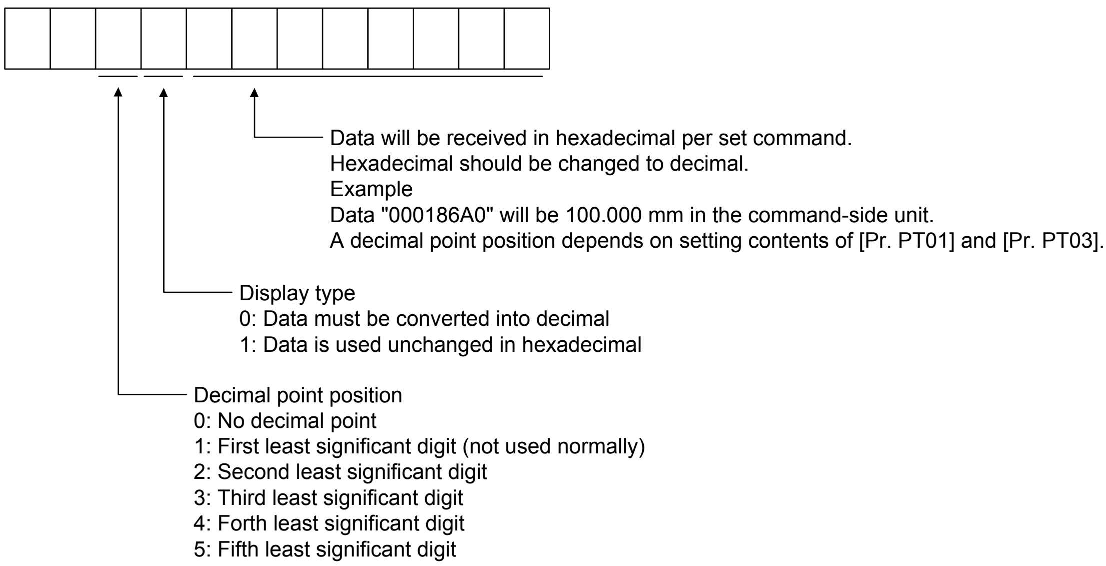
Reads MSD (Mark detection) rising latch data or MSD (Mark detection) falling latch data.

1) Transmission

Transmit command [1] [A] and data No. [0] [2] or [0] [3] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the speed data of point table requested.



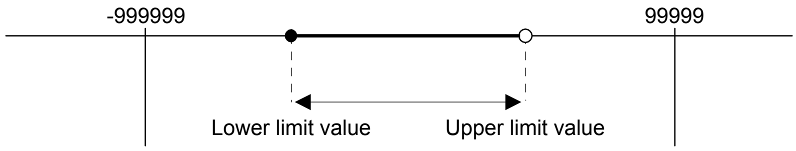
(3) Parameter

Set the parameter as follows:

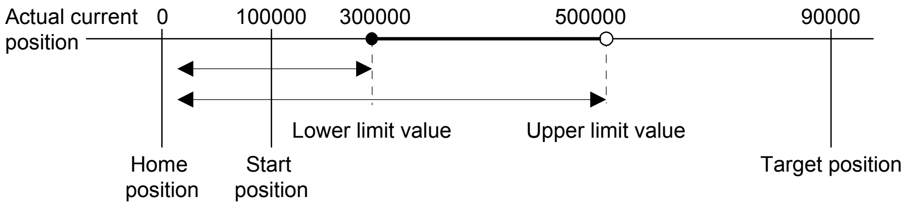
<table>
<tr><th>Item</th><th>Parameter to be used</th><th>Setting</th></tr>
<tr><td>Mark detection function selection</td><td>[Pr. PT26]</td><td>Set the mark detection function selection as follows:
0 _ _ _: Current position latch function</td></tr>
<tr><td>Mark detection range + (lower three digits)</td><td>[Pr. PC66]</td><td rowspan="2">Set the upper limit of the latch data in the current position latch function. When the roll feed display is enabled, set a valid range with the travel distance from the starting position.
Set a same sign for [Pr. PC66] and [Pr. PC67]. A different sign will be recognized as minus sign data.
When changing the direction to address decreasing, change it from the - side of the mark detection ([Pr. PC68] and [Pr. PC69]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PC66] to [Pr. PC69] are all set.</td></tr>
<tr><td>Mark detection range + (upper three digits)</td><td>[Pr. PC67]</td></tr>
<tr><td>Mark detection range - (lower three digits)</td><td>[Pr. PC68]</td><td rowspan="2">Set the lower limit of the latch data in the current position latch function. When the roll feed display is enabled, set a valid range with the travel distance from the starting position.
Set a same sign for [Pr. PC68] and [Pr. PC69]. A different sign will be recognized as minus sign data.
When changing the direction to address increasing, change it from the + side of the mark detection ([Pr. PC66] and [Pr. PC67]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PC66] to [Pr. PC69] are all set.</td></tr>
<tr><td>Mark detection range - (upper three digits)</td><td>[Pr. PC69]</td></tr>
</table>

(4) Latch data range setting
The current position is latched only within the range set in [Pr. PC66] to [Pr. PC69].
When a same value is set for the upper and lower limits, the current value will be latched for a whole range.

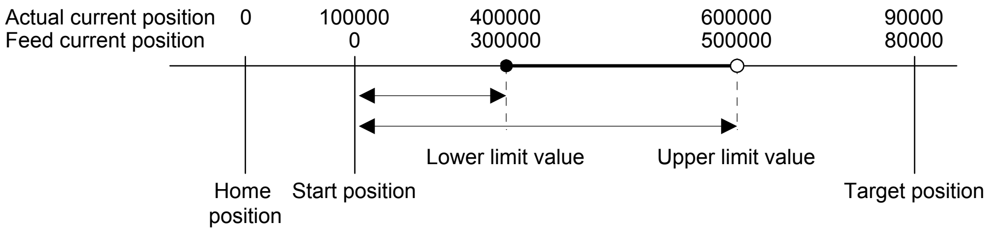
(a) mm, inch, and pulse unit
The current position latch function is enabled when Upper limit value > Lower limit value. The valid range is the same for the absolute value command method ([Pr. PT01]: _ _ _ 0) and the incremental value command method ([Pr. PT01]: _ _ _ 1).
[AL. 37 occurs] when Upper limit value < Lower limit value.



1) When the roll feed display is disabled ([Pr. PT26]: _ _ 0 _)
Set the valid range with the distance from the home position.
When the starting position is at 100000, [Pr. PC66] and [Pr. PC67] are set to 500000, and [Pr. PC68] and [Pr. PC69] are set to 300000, the valid range is between the actual current position of 300000 and 500000 as set in the parameters.



2) When the roll feed display is enabled ([Pr. PT26]: _ _ 1 _)
When the roll feed display is enabled, the valid range is calculated as the starting position is 0.
Set the valid range with the travel distance from the starting position.
When the starting position is at 100000, [Pr. PC66] and [Pr. PC67] are set to 500000, and [Pr. PC68] and [Pr. PC69] are set to 300000, the valid range is between the feed current position of 300000 and 500000 from the start position (between the actual current position of 400000 and 600000).



(b) Degree unit

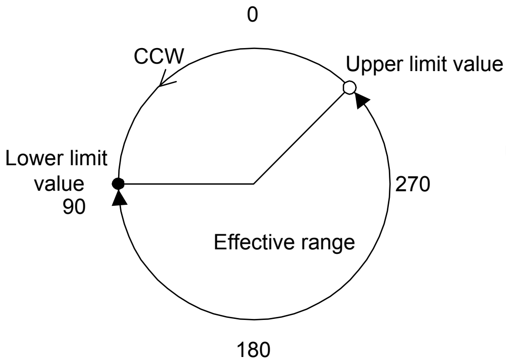
When the unit is set to "degree", the setting range of the current position latch is from 0 degree (upper limit) to 359.999 degrees (lower limit).

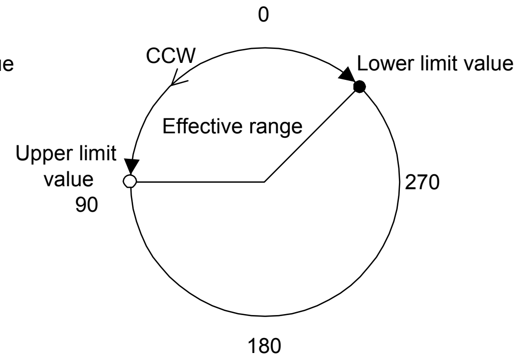
When you set a value other than 0 degree to 359.999 degrees in the current position latch +/- [Pr. PC66] to [Pr. PC69], the set value is converted as follows.

Current position latch range	After conversion
360.000 degrees to 999.999 degrees	(Setting value) % 360
-0.001 degrees to -359.999 degrees	360 + (setting value)
-360.000 degrees to -999.999 degrees	(setting value) % 360 + 360

The valid range of the current position latch varies depending on the setting of the upper and lower limits.

The valid range remains unchanged even if the rotation direction is reversed.





Upper limit value > Lower limit value   Lower limit value > Upper limit value

To enable the current position latch function of section A in the figure, set the parameters as follows:

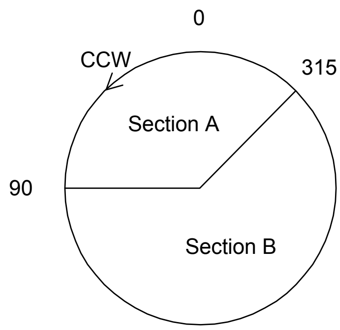
Current position latch range -: 315.000 [degrees] ([Pr. PC68]: 0, [Pr. PC69]: 315)

Current position latch range +: 90.000 [degrees] ([Pr. PC66]: 0, [Pr. PC67]: 90)

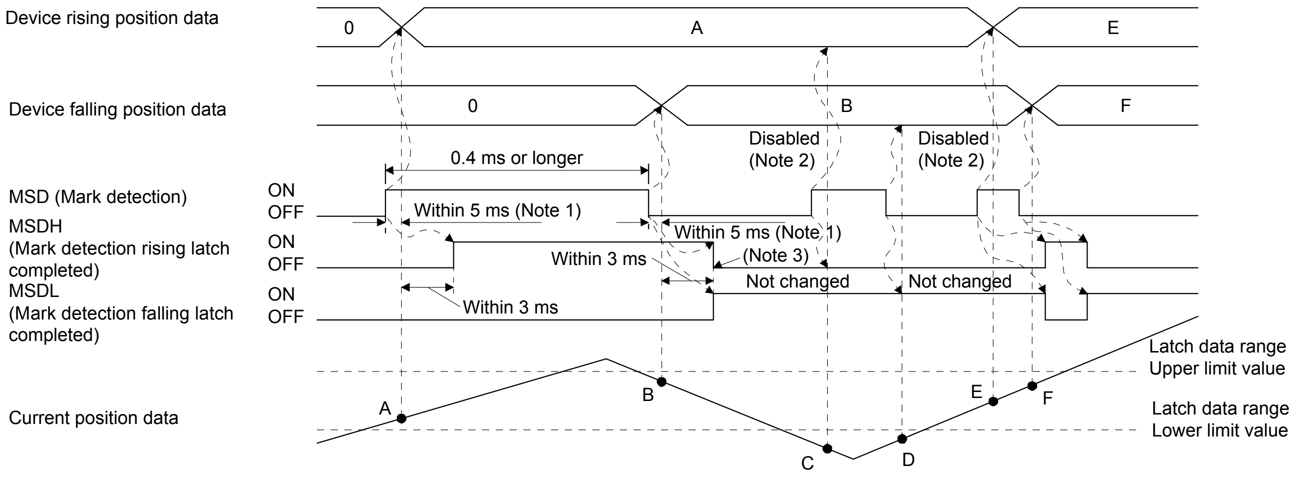
To enable the current position latch function of section B in the figure, set the parameter as follows:

Current position latch range -: 90.000 [degrees] ([Pr. PC68]: 0, [Pr. PC69]: 90)

Current position latch range +: 315.000 [degrees] ([Pr. PC66]: 0, [Pr. PC67]: 315)



(5) Timing chart

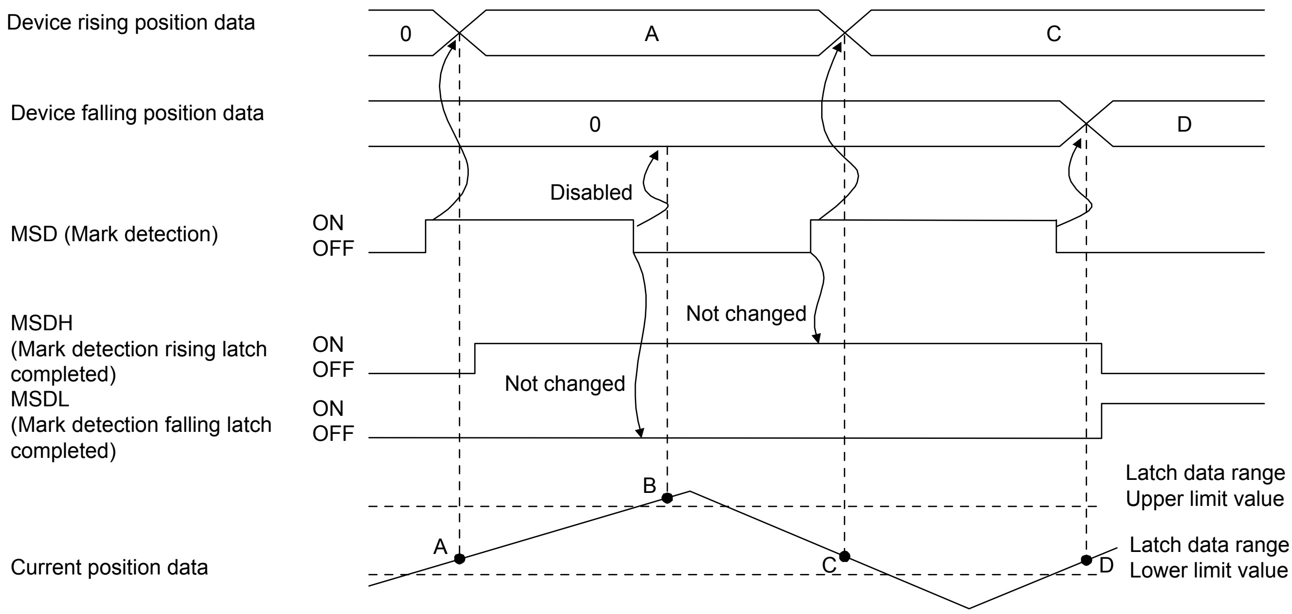


Note 1. When MSD (Mark detection) is assigned to the CN1-10 pin with [Pr. PD44], a current position data can be obtained in high speed (within 0.4 ms). When assigning MSD (Mark detection) to the CN1-10 pin, set "Mark detection fast input signal filter selection" in [Pr. PD31].

2. The position data will not be changed from the previous value.

3. MSDH (Latch completed at rising edge of mark detection) turns off at the same time as MSDL (Latch completed at falling edge of mark detection) turns on. Set as MSDL turns on/off within the range of the latch data.

If MSD (Mark detection) was turned on again when the previous falling was out of the valid range, MSDH (Latch completed at rising edge of mark detection) will not change, but the position data will be updated. Refer to the following timing chart.



6.2.2 Interrupt positioning function

The interrupt positioning function executes an operation by changing the remaining distance to the travel distance that is set with [Pr. PT31] (Mark sensor stop travel distance) when MSD (Mark detection) is turned on. The interrupt positioning function is enabled by setting [Pr. PT26] to "1 _ _ _".

POINT

- The interrupt positioning function can be used with the point table method and the program method. However, the interrupt positioning function is disabled in the following condition.
  - During home position return
  - During manual operation
  - During stop
  - During deceleration or stop with TSTP (Temporary stop/restart)
- An error may occur depending on the droop pulses at the time of MSD (Mark detection) is turned on and a minimum stopping distance required for deceleration.

(1) Parameters

Set the parameters as follows:

Item	Parameter to be used	Setting
Control mode selection	[Pr. PA01]	Select a control mode. _ _ _ 6 (Positioning mode (point table method)) _ _ _ 7 (Positioning mode (program method))
Mark detection function selection	[Pr. PT26]	Set the mark detection function selection as follows: 1 _ _ _: Interrupt positioning function Starts the interrupt positioning function at rising of MSD (Mark detection).
MSD (Mark detection) Polarity selection	[Pr. PT29]	The polarity of MSD (Mark detection) can be changed with [Pr. PT29]. ・Starts the interrupt positioning function at rising of MSD (Mark detection) if "_ _ _ x" bit 3 of [Pr. PT29] is off. ・Starts the interrupt positioning function at falling of MSD (Mark detection) if "_ _ _ x" bit 3 of [Pr. PT29] is on.
Mark sensor stop travel distance (lower three digits)	[Pr. PT30]	Set the lower three digits of the travel distance after the mark detection. The travel distance starts from the current position regardless of the setting of absolute value command method or incremental value command method.
Mark sensor stop travel distance (upper three digits)	[Pr. PT31]	Set the upper three digits of the travel distance after the mark detection. The travel distance starts from the current position regardless of the setting of absolute value command method or incremental value command method.
Mark detection range + (lower three digits)	[Pr. PC66]	Set the upper and lower limits of the interrupt positioning function. If a sign for the upper and lower differ, [AL. 37] occurs. When the roll feed display is enabled, set a valid range with the travel distance from the starting position.
Mark detection range + (upper three digits)	[Pr. PC67]	
Mark detection range - (lower three digits)	[Pr. PC68]	
Mark detection range - (upper three digits)	[Pr. PC69]	

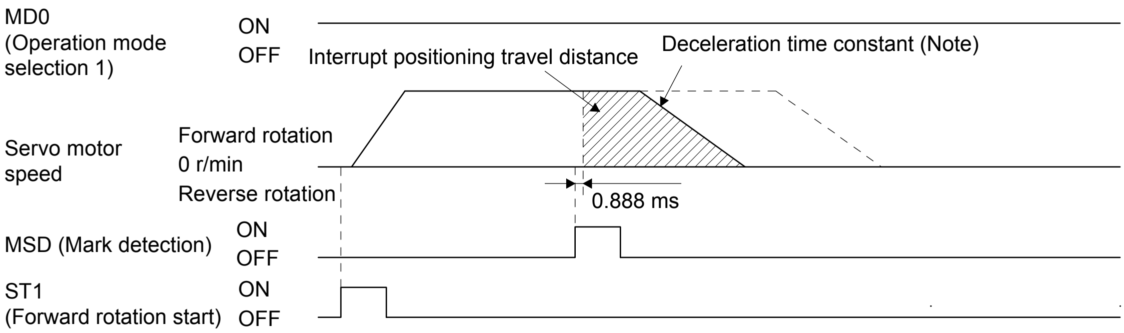
(2) Rotation direction

[Pr. PA14] setting	Servo motor rotation direction ST1 (Forward rotation start) on
_ _ _ 0	CCW rotation with + position data CW rotation with - position data
_ _ _ 1	CW rotation with + position data CCW rotation with - position data

(3) Operation

Travels for the interrupt positioning travel distance ([Pr. PT30] and [Pr. PT31]) starting from the position where MSD (Mark detection) is turned on. The operation after a stop complies with the operation mode and the operation pattern.

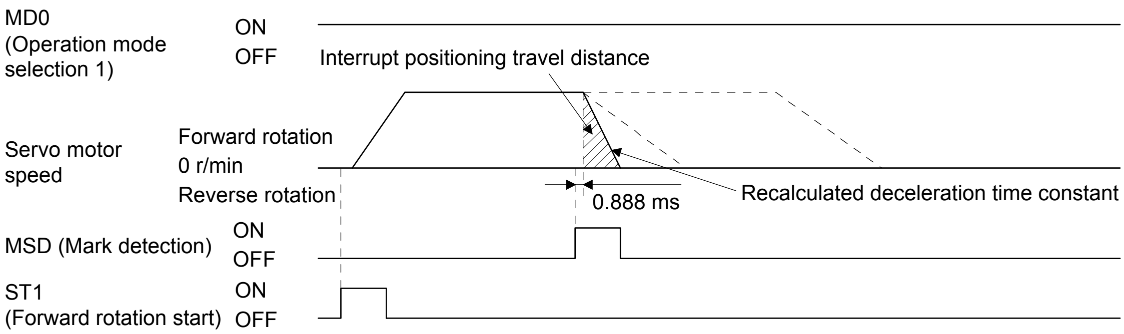
(4) Timing chart



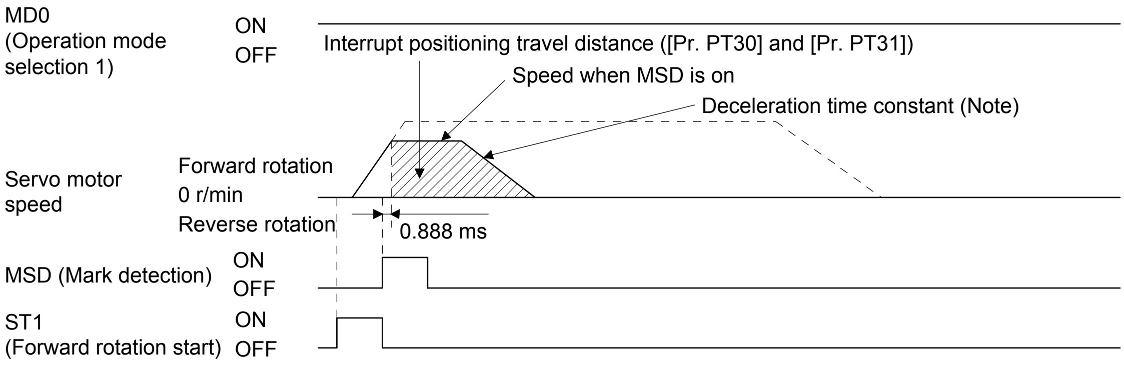
Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

The movement other than above is as follows:

(a) The interrupt positioning travel distance is smaller than the travel distance required for the deceleration, the actual deceleration time constant will be shorter than the set time constant.

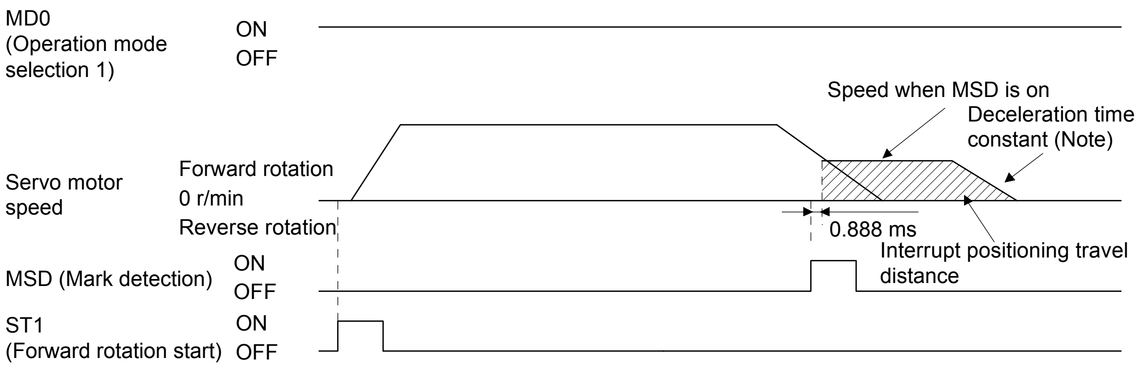


(b) If the interrupt travel distance is large during acceleration, the servo motor stops with the deceleration time constant after rotating with the command speed at which MSD (Mark detection) turned on.



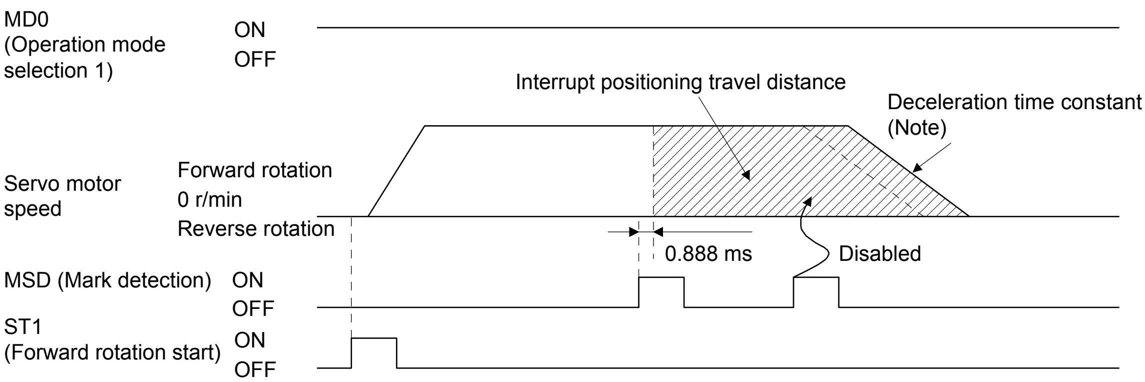
Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

(c) If the interrupt travel distance is large during deceleration, the servo motor stops with the deceleration time constant after rotating with the command speed at which MSD (Mark detection) turned on.



Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

(d) Input will be disabled if MSD (Mark detection) is turned on again during the interrupt positioning.



Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

(5) Using together with other functions
Availability of other functions during the interrupt positioning is as follows:

Function	Available (Note 1)
S-pattern acceleration/deceleration	○
Stroke limit	○
Software limit	○
Temporary stop/restart	×
Speed change value	×
Analog override	△(Note 2)
Backlash	×
Rough match	○
Electronic gear	○
Roll feed display function	×
Mark detection function (current position latch function)	×

Note 1. ○: enabled, ×: disabled, △: enabled with condition
2 Enabled only in a constant speed

ITP (Interrupt positioning) is available with the program function.
Because the interrupt positioning function with MSD (Mark detection) input signal is prioritized, the interrupt positioning function with MSD (Mark detection) can be used during the interrupt positioning function with ITP (Interrupt positioning). However, ITP (Interrupt positioning) cannot be used during the interrupt positioning with MSD (Mark detection).

MEMO

7. PARAMETERS

⚠CAUTION	●Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable. ●Do not change the parameter settings as described below. Doing so may cause an unexpected condition, such as failing to start up the servo amplifier. ・Changing the values of the parameters for manufacturer setting ・Setting a value out of the range ・Changing the fixed values in the digits of a parameter

7.1 Parameter list

POINT

- To enable a parameter whose symbol is preceded by *, turn off the power for 1 s or more after setting and turn it on again. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20].
- The symbols in the control mode column mean as follows:
  CP: Positioning mode (point table method)
  CL: Positioning mode (program method)
- Setting a value out of the setting range in each parameter will trigger [AL. 37 Parameter error].

7.1.1 Basic setting parameters ([Pr. PA_ _])

POINT

- To enable the following parameters in the positioning mode, turn off the power for 1 s or more after setting and turn it on again. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20].
  - [Pr. PA06 Electronic gear numerator (command pulse multiplication numerator)/Number of gear teeth on machine side]
  - [Pr. PA07 Electronic gear denominator (command pulse multiplication denominator)/Number of gear teeth on servo motor side]
- The following parameter cannot be used in the positioning mode.
  - [Pr. PA05 Number of command input pulses per revolution]

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PA01	*STY	Operation mode	1000h		○	○
PA02	*REG	Regenerative option	0000h		○	○
PA03		For manufacturer setting	0000h			
PA04	*AOP1	Function selection A-1	2000h		○	○
PA05	*FBP	Number of command input pulses per revolution	10000			
PA06	*CMX	Electronic gear numerator (command pulse multiplication numerator)	1		○	○
PA07	*CDV	Electronic gear denominator (command pulse multiplication denominator)	1		○	○
PA08	ATU	Auto tuning mode	0001h		○	○
PA09	RSP	Auto tuning response	16		○	○
PA10	INP	In-position range	100	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PA11	TLP	Forward rotation torque limit	100.0	[%]	○	○
PA12	TLN	Reverse rotation torque limit	100.0	[%]	○	○
PA13	*PLSS	Command pulse input form	0100h		○	○
PA14	*POL	Rotation direction selection	0		○	○
PA15	*ENR	Encoder output pulses	4000	[pulse/rev]	○	○
PA16	*ENR2	Encoder output pulses 2	1		○	○
PA17		For manufacturer setting	0000h			
PA18			0000h			
PA19	*BLK	Parameter writing inhibit	00AAh		○	○
PA20	*TDS	Tough drive setting	0000h		○	○
PA21	*AOP3	Function selection A-3	0001h		○	○
PA22		For manufacturer setting	0000h			
PA23	DRAT	Drive recorder arbitrary alarm trigger setting	0000h		○	○
PA24	AOP4	Function selection A-4	0000h		○	○
PA25	OTHOV	One-touch tuning - Overshoot permissible level	0	[%]	○	○
PA26	*AOP5	Function selection A-5	0000h		○	○
PA27		For manufacturer setting	0000h			
PA28			0000h			
PA29			0000h			
PA30			0000h			
PA31			0000h			
PA32			0000h			

7.1.2 Gain/filter setting parameters ([Pr. PB_ _])

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PB01	FILT	Adaptive tuning mode (adaptive filter II)	0000h		○	○
PB02	VRFT	Vibration suppression control tuning mode (advanced vibration suppression control II)	0000h		○	○
PB03	PST	Position command acceleration/deceleration time constant (position smoothing)	0	[ms]	○	○
PB04	FFC	Feed forward gain	0	[%]	○	○
PB05		For manufacturer setting	500			
PB06	GD2	Load to motor inertia ratio	7.00	[Multiplier]	○	○
PB07	PG1	Model loop gain	15.0	[rad/s]	○	○
PB08	PG2	Position loop gain	37.0	[rad/s]	○	○
PB09	VG2	Speed loop gain	823	[rad/s]	○	○
PB10	VIC	Speed integral compensation	33.7	[ms]	○	○
PB11	VDC	Speed differential compensation	980		○	○
PB12	OVA	Overshoot amount compensation	0	[%]	○	○
PB13	NH1	Machine resonance suppression filter 1	4500	[Hz]	○	○
PB14	NHQ1	Notch shape selection 1	0000h		○	○
PB15	NH2	Machine resonance suppression filter 2	4500	[Hz]	○	○
PB16	NHQ2	Notch shape selection 2	0000h		○	○
PB17	NHF	Shaft resonance suppression filter	0000h		○	○
PB18	LPF	Low-pass filter setting	3141	[rad/s]	○	○
PB19	VRF11	Vibration suppression control 1 - Vibration frequency	100.0	[Hz]	○	○
PB20	VRF12	Vibration suppression control 1 - Resonance frequency	100.0	[Hz]	○	○
PB21	VRF13	Vibration suppression control 1 - Vibration frequency damping	0.00		○	○
PB22	VRF14	Vibration suppression control 1 - Resonance frequency damping	0.00		○	○
PB23	VFBF	Low-pass filter selection	0100h		○	○
PB24	*MVS	Slight vibration suppression control	0000h		○	○
PB25	*BOP1	Function selection B-1	0000h		○	○
PB26	*CDP	Gain switching function	0000h		○	○
PB27	CDL	Gain switching condition	10	[kpulse/s]/ [pulse]/ [r/min]	○	○
PB28	CDT	Gain switching time constant	1	[ms]	○	○
PB29	GD2B	Load to motor inertia ratio after gain switching	7.00	[Multiplier]	○	○
PB30	PG2B	Position loop gain after gain switching	0.0	[rad/s]	○	○
PB31	VG2B	Speed loop gain after gain switching	0	[rad/s]	○	○
PB32	VICB	Speed integral compensation after gain switching	0.0	[ms]	○	○
PB33	VRF1B	Vibration suppression control 1 - Vibration frequency after gain switching	0.0	[Hz]	○	○
PB34	VRF2B	Vibration suppression control 1 - Resonance frequency after gain switching	0.0	[Hz]	○	○
PB35	VRF3B	Vibration suppression control 1 - Vibration frequency damping after gain switching	0.00		○	○
PB36	VRF4B	Vibration suppression control 1 - Resonance frequency damping after gain switching	0.00		○	○
PB37		For manufacturer setting	1600			
PB38			0.00			
PB39			0.00			
PB40			0.00			
PB41			0000h			
PB42			0000h			
PB43			0000h			
PB44			0.00			
PB45	CNHF	Command notch filter	0000h		○	○
PB46	NH3	Machine resonance suppression filter 3	4500	[Hz]	○	○

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PB47	NHQ3	Notch shape selection 3	0000h		○	○
PB48	NH4	Machine resonance suppression filter 4	4500	[Hz]	○	○
PB49	NHQ4	Notch shape selection 4	0000h		○	○
PB50	NH5	Machine resonance suppression filter 5	4500	[Hz]	○	○
PB51	NHQ5	Notch shape selection 5	0000h		○	○
PB52	VRF21	Vibration suppression control 2 - Vibration frequency	100.0	[Hz]	○	○
PB53	VRF22	Vibration suppression control 2 - Resonance frequency	100.0	[Hz]	○	○
PB54	VRF23	Vibration suppression control 2 - Vibration frequency damping	0.00		○	○
PB55	VRF24	Vibration suppression control 2 - Resonance frequency damping	0.00		○	○
PB56	VRF21B	Vibration suppression control 2 - Vibration frequency after gain switching	0.0	[Hz]	○	○
PB57	VRF22B	Vibration suppression control 2 - Resonance frequency after gain switching	0.0	[Hz]	○	○
PB58	VRF23B	Vibration suppression control 2 - Vibration frequency damping after gain switching	0.00		○	○
PB59	VRF24B	Vibration suppression control 2 - Resonance frequency damping after gain switching	0.00		○	○
PB60	PG1B	Model loop gain after gain switching	0.0	[rad/s]	○	○
PB61		For manufacturer setting	0.0			
PB62			0000h			
PB63			0000h			
PB64			0000h			

7.1.3 Extension setting parameters ([Pr. PC_ _])

> **POINT**
>
> ●To enable the following parameters in the positioning mode, turn off the power for 1 s or more after setting and turn it on again. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20].
> - [Pr. PC03 S-pattern acceleration/deceleration time constant]
>
> ●The following parameter cannot be used in the positioning mode.
> - [Pr. PC04 Torque command time constant]
> - [Pr. PC08 Internal speed command 4/internal speed limit 4]
> - [Pr. PC09 Internal speed command 5/internal speed limit 5]
> - [Pr. PC10 Internal speed command 6/internal speed limit 6]
> - [Pr. PC11 Internal speed command 7/internal speed limit 7]
> - [Pr. PC12 Analog speed command - Maximum speed/Analog speed limit - Maximum speed]
> - [Pr. PC13 Analog torque/thrust command maximum output]
> - [Pr. PC23 Function selection C-2]
> - [Pr. PC32 Command input pulse multiplication numerator 2]
> - [Pr. PC33 Command input pulse multiplication numerator 3]
> - [Pr. PC34 Command input pulse multiplication numerator 4]
>
> ●The following parameters are used for Modbus RTU communication. For details, refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)".
> - [Pr. PC70 Modbus RTU communication station number setting]
> - [Pr. PC71 Function selection C-F]
> - [Pr. PC72 Function selection C-G]

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PC01	STA	JOG operation acceleration time constant	0	[ms]		○
PC02	STB	JOG operation deceleration time constant	0	[ms]		○
PC03	*STC	S-pattern acceleration/deceleration time constant	0	[ms]	○	○
PC04	TQC	Torque command time constant	0			
PC05		For manufacturer setting	100			
PC06			500			
PC07			1000			
PC08	SC4	Internal speed command 4 Internal speed limit 4	200	[r/min]		
PC09	SC5	Internal speed command 5 Internal speed limit 5	300	[r/min]		
PC10	SC6	Internal speed command 6 Internal speed limit 6	500	[r/min]		
PC11	SC7	Internal speed command 7 Internal speed limit 7	800	[r/min]		
PC12	VCM	Analog speed command - Maximum speed Analog speed limit - Maximum speed	0	[r/min]		
PC13	TLC	Analog torque command maximum output	100.0	[%]		
PC14	MOD1	Analog monitor 1 output	0000h		○	○

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PC15	MOD2	Analog monitor 2 output	0001h		○	○
PC16	MBR	Electromagnetic brake sequence output	0	[ms]	○	○
PC17	ZSP	Zero speed	50	[r/min]	○	○
PC18	*BPS	Alarm history clear	0000h		○	○
PC19	*ENRS	Encoder output pulse selection	0000h		○	○
PC20	*SNO	Station number setting	0	[station]	○	○
PC21	*SOP	RS-422 communication function selection	0000h		○	○
PC22	*COP1	Function selection C-1	0020h		○	○
PC23	*COP2	Function selection C-2	0000h			
PC24	*COP3	Function selection C-3	0000h		○	○
PC25		For manufacturer setting	0000h			
PC26	*COP5	Function selection C-5	0000h		○	○
PC27	*COP6	Function selection C-6	0000h		○	○
PC28		For manufacturer setting	0000h			
PC29			0000h			
PC30	STA2	Home position return acceleration time constant	0	[ms]		○
PC31	STB2	Home position return deceleration time constant	0	[ms]		○
PC32	CMX2	Command input pulse multiplication numerator 2	1			
PC33	CMX3	Command input pulse multiplication numerator 3	1			
PC34	CMX4	Command input pulse multiplication numerator 4	1			
PC35	TL2	Internal torque limit 2	100.0	[%]	○	○
PC36	*DMD	Status display selection	0000h		○	○
PC37	VCO	Analog override offset	0	[mV]	○	○
PC38	TPO	Analog torque limit offset	0	[mV]	○	○
PC39	MO1	Analog monitor 1 offset	0	[mV]	○	○
PC40	MO2	Analog monitor 2 offset	0	[mV]	○	○
PC41		For manufacturer setting	0			
PC42			0			
PC43	ERZ	Error excessive alarm detection level	0	[rev]	○	○
PC44		For manufacturer setting	0000h			
PC45			0000h			
PC46			0			
PC47			0			
PC48			0			
PC49			0			
PC50			0000h			
PC51	RSBR	Forced stop deceleration time constant	100	[ms]	○	○
PC52		For manufacturer setting	0			
PC53			0			
PC54	RSUP1	Vertical axis freefall prevention compensation amount	0	[0.0001rev]	○	○
PC55		For manufacturer setting	0			
PC56			100			
PC57			0000h			
PC58			0			
PC59			0000h			
PC60	*COPD	Function selection C-D	0000h		○	○
PC61		For manufacturer setting	0000h			
PC62			0000h			
PC63			0000h			
PC64			0000h			
PC65			0000h			

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PC66	LPSPL	Mark detection range + (lower three digits)	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PC67	LPSPH	Mark detection range + (upper three digits)	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PC68	LPSNL	Mark detection range - (lower three digits)	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PC69	LPSNH	Mark detection range - (upper three digits)	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PC70	*SNOM	Modbus RTU communication station number setting	0		○	○
PC71	*COPF	Function selection C-F	0040h		○	○
PC72	*COPG	Function selection C-G	0000h		○	○
PC73	ERW	Error excessive warning level	0	[rev]	○	○
PC74		For manufacturer setting	0000h			
PC75			0000h			
PC76			0000h			
PC77			0000h			
PC78			0000h			
PC79			0000h			
PC80			0000h			

7.1.4 I/O setting parameters ([Pr. PD_ _])

POINT

●The following parameter cannot be used in the positioning mode.
- [Pr. PD03 Input device selection 1L]
- [Pr. PD11 Input device selection 5L]
- [Pr. PD13 Input device selection 6L]
- [Pr. PD17 Input device selection 8L]
- [Pr. PD19 Input device selection 9L]
- [Pr. PD43 Input device selection 11L]
- [Pr. PD45 Input device selection 12L]

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PD01	*DIA1	Input signal automatic on selection 1	0000h		○	○
PD02		For manufacturer setting	0000h			
PD03	*DI1L	Input device selection 1L	0202h			
PD04	*DI1H	Input device selection 1H	0202h		○	○
PD05		For manufacturer setting	0000h			
PD06			0000h			
PD07			0000h			
PD08			0000h			
PD09			0000h			
PD10			0000h			
PD11	*DI5L	Input device selection 5L	0703h			
PD12	*DI5H	Input device selection 5H	3807h		○	○
PD13	*DI6L	Input device selection 6L	0806h			
PD14	*DI6H	Input device selection 6H	3908h		○	○
PD15		For manufacturer setting	0000h			
PD16			0000h			
PD17	*DI8L	Input device selection 8L	0A0Ah			
PD18	*DI8H	Input device selection 8H	0700h		○	○
PD19	*DI9L	Input device selection 9L	0B0Bh			
PD20	*DI9H	Input device selection 9H	0800h		○	○
PD21		For manufacturer setting	0000h			
PD22			0000h			
PD23			0000h			
PD24	*DO2	Output device selection 2	000Ch		○	○
PD25	*DO3	Output device selection 3	0004h		○	○
PD26		For manufacturer setting	0000h			
PD27			0003h			
PD28	*DO6	Output device selection 6	0002h		○	○
PD29	*DIF	Input filter setting	0004h		○	○
PD30	*DOP1	Function selection D-1	0000h		○	○
PD31	*DOP2	Function selection D-2	0000h		○	○
PD32	*DOP3	Function selection D-3	0000h		○	○
PD33	*DOP4	Function selection D-4	0000h		○	○
PD34	DOP5	Function selection D-5	0000h		○	○
PD35		For manufacturer setting	0000h			
PD36			0000h			
PD37			0000h			
PD38			0			
PD39			0			
PD40			0			
PD41	*DIA3	Input signal automatic on selection 3	0000h		○	○
PD42	*DIA4	Input signal automatic on selection 4	0000h		○	○
PD43	*DI11L	Input device selection 11L	0000h			
PD44	*DI11H	Input device selection 11H	2000h		○	○
PD45	*DI12L	Input device selection 12L	0000h			
PD46	*DI12H	Input device selection 12H	2B00h		○	○
PD47		For manufacturer setting	0000h			
PD48			0000h			

7.1.5 Extension setting 2 parameters ([Pr. PE_ _])

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PE01		For manufacturer setting	0000h			
PE02			0000h			
PE03			0000h			
PE04			0			
PE05			0			
PE06			0			
PE07			0			
PE08			0			
PE09			0000h			
PE10			0000h			
PE11			0000h			
PE12			0000h			
PE13			0000h			
PE14			0111h			
PE15			20			
PE16			0000h			
PE17			0000h			
PE18			0000h			
PE19			0000h			
PE20			0000h			
PE21			0000h			
PE22			0000h			
PE23			0000h			
PE24			0000h			
PE25			0000h			
PE26			0000h			
PE27			0000h			
PE28			0000h			
PE29			0000h			
PE30			0000h			
PE31			0000h			
PE32			0000h			
PE33			0000h			
PE34			0			
PE35			0			
PE36			0.0			
PE37			0.00			
PE38			0.00			
PE39			0			
PE40			0000h			
PE41	EOP3	Function selection E-3	0000h		○	○
PE42		For manufacturer setting	0			
PE43			0.0			
PE44	LMCP	Lost motion compensation positive-side compensation value selection	0	[0.01%]	○	○
PE45	LMCN	Lost motion compensation negative-side compensation value selection	0	[0.01%]	○	○
PE46	LMFLT	Lost motion filter setting	0	[0.1 ms]	○	○
PE47	TOF	Torque offset	0	[0.01%]	○	○
PE48	*LMOP	Lost motion compensation function selection	0000h		○	○
PE49	LMCD	Lost motion compensation timing	0	[0.1 ms]	○	○
PE50	LMCT	Lost motion compensation non-sensitive band	0	[pulse]/[kpulse]	○	○

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PE51		For manufacturer setting	0000h			
PE52			0000h			
PE53			0000h			
PE54			0000h			
PE55			0000h			
PE56			0000h			
PE57			0000h			
PE58			0000h			
PE59			0000h			
PE60			0000h			
PE61			0.00			
PE62			0.00			
PE63			0.00			
PE64			0.00			

7.1.6 Extension setting 3 parameters ([Pr. PF_ _])

POINT

- The following parameters are used for Modbus RTU communication. For details, refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)".
  - [Pr. PF45 Function selection F-12]
  - [Pr. PF46 Modbus RTU communication time out selection]

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PF01		For manufacturer setting	0000h			
PF02			0000h			
PF03			0000h			
PF04			0			
PF05			0			
PF06			0000h			
PF07			1			
PF08			1			
PF09	*FOP5	Function selection F-5	0000h		○	○
PF10		For manufacturer setting	0000h			
PF11			0000h			
PF12			10000			
PF13			100			
PF14			100			
PF15			2000			
PF16			0000h			
PF17			10			
PF18			0000h			
PF19			0000h			
PF20			0000h			
PF21	DRT	Drive recorder switching time setting	0	[s]	○	○
PF22		For manufacturer setting	200			
PF23	OSCL1	Vibration tough drive - Oscillation detection level	50	[%]	○	○
PF24	*OSCL2	Vibration tough drive function selection	0000h		○	○
PF25	CVAT	Instantaneous power failure tough drive - Detection time	200	[ms]	○	○
PF26		For manufacturer setting	0			
PF27			0			
PF28			0			
PF29			0000h			
PF30			0			
PF31	FRIC	Machine diagnosis function - Friction judgment speed	0	[r/min]	○	○
PF32		For manufacturer setting	50			
PF33			0000h			
PF34			0000h			
PF35			0000h			
PF36			0000h			
PF37			0000h			
PF38			0000h			
PF39			0000h			
PF40			0			
PF41			0			
PF42			0			
PF43			0			

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PF44		For manufacturer setting	0			
PF45	*FOP12	Function selection F-12	0000h			
PF46	MIC	Modbus RTU communication time out selection	0			
PF47		For manufacturer setting	0000h			
PF48			0000h			

7.1.7 Positioning control parameters ([Pr. PT_ _])

POINT
●The following parameters are used for Modbus RTU communication. For details, refer to "MR-JE-_A Servo Amplifier Instruction Manual (Modbus RTU communication)". ・[Pr. PT45 Home position return type 2]

No.	Symbol	Name	Initial value	Unit	Control mode	
					CP	CL
PT01	*CTY	Command mode selection	0000h		○	○
PT02	*TOP1	Function selection T-1	0000h		○	○
PT03	*FTY	Feeding function selection	0000h		○	○
PT04	*ZTY	Home position return type	0010h		○	○
PT05	ZRF	Home position return speed	100	[r/min]	○	○
PT06	CRF	Creep speed	10	[r/min]	○	○
PT07	ZST	Home position shift distance	0	[μm]/ 10^{-4} [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT08	*ZPS	Home position return position data	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT09	DCT	Travel distance after proximity dog	1000	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT10	ZTM	Stopper type home position return stopper time	100	[ms]	○	○
PT11	ZTT	Stopper type home position return torque limit value	15.0	[%]	○	○
PT12	CRP	Rough match output range	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT13	JOG	JOG operation	100	[r/min]	○	○
PT14	*BKC	Backlash compensation	0	[pulse]	○	○
PT15	LMPL	Software limit +	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT16	LMPH					
PT17	LMNL	Software limit -	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT18	LMNH					
PT19	*LPPL	Position range output address +	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT20	*LPPH					
PT21	*LNPL	Position range output address -	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT22	*LNPH					
PT23	OUT1	OUT1 output setting time	0	[ms]		○
PT24	OUT2	OUT2 output setting time	0	[ms]		○
PT25	OUT3	OUT3 output setting time	0	[ms]		○
PT26	*TOP2	Function selection T-2	0000h		○	○

No.	Symbol	Name	Initial value	Unit	Control mode CP	Control mode CL
PT27		For manufacturer setting	0000h			
PT28			0000h			
PT29	*TOP3	Function selection T-3	0000h		○	○
PT30	MSTL	Mark sensor stop travel distance	0	10^{STM} [μm]/ $10^{(STM-4)}$ [inch]/ 10^{-3} [degree]/ [pulse]	○	○
PT31	MSTH		0		○	○
PT32		For manufacturer setting	0000h			
PT33			0000h			
PT34	*PDEF	Point table/program default	0000h		○	○
PT35	*TOP5	Function selection T-5	0000h		○	○
PT36		For manufacturer setting	0000h			
PT37			0000h			
PT38			0000h			
PT39			0000h			
PT40			0000h			
PT41	ORP	Home position return inhibit function selection	0000h		○	○
PT42		For manufacturer setting	0000h			
PT43			0000h			
PT44			0000h			
PT45	*CZTY	Home position return type 2	0000h			
PT46		For manufacturer setting	0000h			
PT47			0000h			
PT48			0000h			

7.2 Detailed list of parameters

POINT
●Set a value to each "x" in the "Setting digit" columns.

7.2.1 Basic setting parameters ([Pr. PA_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA01 *STY Operation mode	_ _ _ x	Control mode selection Select a control mode. 0 to 5: Not used for positioning mode. 6: Positioning mode (point table method) 7: Positioning mode (program method)	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		1h		
PA02 *REG Regenerative option	_ _ x x	Regenerative option Select a regenerative option. Incorrect setting may cause the regenerative option to burn. If a selected regenerative option is not for use with the servo amplifier, [AL. 37 Parameter error] occurs. 00: Regenerative option is not used. ・For a servo amplifier of 200 W or less, no regenerative resistor is used. ・For servo amplifier of 0.4 kW to 3 kW, built-in regenerative resistor is used. 02: MR-RB032 03: MR-RB12 04: MR-RB32 05: MR-RB30 06: MR-RB50 (Cooling fan is required.)	00h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PA04 *AOP1 Function selection A-1	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _		0h		
	x _ _ _	Forced stop deceleration function selection 0: Forced stop deceleration function disabled (EM1) 2: Forced stop deceleration function enabled (EM2) Refer to table 7.1 for details.	2h	○	○

Table 7.1 Deceleration method

Setting value	EM2/EM1	Deceleration method	
		EM2 or EM1 is off	Alarm occurred
0 _ _ _	EM1	MBR (Electromagnetic brake interlock) turns off without the forced stop deceleration.	MBR (Electromagnetic brake interlock) turns off without the forced stop deceleration.
2 _ _ _	EM2	MBR (Electromagnetic brake interlock) turns off after the forced stop deceleration.	MBR (Electromagnetic brake interlock) turns off after the forced stop deceleration.

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA06 *CMX Electronic gear numerator (command pulse multiplication numerator)		Set an electronic gear numerator. (Refer to section 7.3.1.) To enable the parameter value in the positioning mode, turn off the power for 1 s or more after setting and turn it on again. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20]. To enable the parameter, select "Electronic gear (0 _ _ _)" of "Electronic gear selection" in [Pr. PA21]. Set the electronic gear within the following range. Setting out of the range will trigger [AL. 37 Parameter error]. 1/27649 < CMX/CDV < 8484 Setting range: 1 to 16777215	1	○	○
PA07 *CDV Electronic gear denominator (command pulse multiplication denominator)		Set an electronic gear denominator. (Refer to section 7.3.1.) To enable the parameter value in the positioning mode, turn off the power for 1 s or more after setting and turn it on again. However, the time will be longer depending on a setting value of [Pr. PF25 Instantaneous power failure tough drive - Detection time] when "instantaneous power failure tough drive selection" is enabled in [Pr. PA20]. To enable the parameter, select "Electronic gear (0 _ _ _)" of "Electronic gear selection" in [Pr. PA21]. Set the electronic gear within the range of [Pr. PA06]. Setting out of the range will trigger [AL. 37 Parameter error]. Setting range: 1 to 16777215	1	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA08 ATU Auto tuning mode	_ _ _ x	Gain adjustment mode selection Select the gain adjustment mode. 0: 2 gain adjustment mode 1 (interpolation mode) 1: Auto tuning mode 1 2: Auto tuning mode 2 3: Manual mode 4: 2 gain adjustment mode 2 Refer to table 7.2 for details.	1h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		

Table 7.2 Gain adjustment mode selection

Setting value	Gain adjustment mode	Automatically adjusted parameter
_ _ _ 0	2 gain adjustment mode 1 (interpolation mode)	[Pr. PB06 Load to motor inertia ratio] [Pr. PB08 Position loop gain] [Pr. PB09 Speed loop gain] [Pr. PB10 Speed integral compensation]
_ _ _ 1	Auto tuning mode 1	[Pr. PB06 Load to motor inertia ratio] [Pr. PB07 Model loop gain] [Pr. PB08 Position loop gain] [Pr. PB09 Speed loop gain] [Pr. PB10 Speed integral compensation]
_ _ _ 2	Auto tuning mode 2	[Pr. PB07 Model loop gain] [Pr. PB08 Position loop gain] [Pr. PB09 Speed loop gain] [Pr. PB10 Speed integral compensation]
_ _ _ 3	Manual mode	
_ _ _ 4	2 gain adjustment mode 2	[Pr. PB08 Position loop gain] [Pr. PB09 Speed loop gain] [Pr. PB10 Speed integral compensation]

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>PA09
RSP
Auto tuning response</td><td colspan="2">Set the auto tuning response.
<table>
<tr><th rowspan="2">Setting value</th><th colspan="2">Machine characteristic</th></tr>
<tr><th>Response</th><th>Guideline for machine resonance frequency [Hz]</th></tr>
<tr><td>1</td><td>Low response</td><td>2.7</td></tr>
<tr><td>2</td><td>↑</td><td>3.6</td></tr>
<tr><td>3</td><td></td><td>4.9</td></tr>
<tr><td>4</td><td></td><td>6.6</td></tr>
<tr><td>5</td><td></td><td>10.0</td></tr>
<tr><td>6</td><td></td><td>11.3</td></tr>
<tr><td>7</td><td></td><td>12.7</td></tr>
<tr><td>8</td><td></td><td>14.3</td></tr>
<tr><td>9</td><td></td><td>16.1</td></tr>
<tr><td>10</td><td></td><td>18.1</td></tr>
<tr><td>11</td><td></td><td>20.4</td></tr>
<tr><td>12</td><td></td><td>23.0</td></tr>
<tr><td>13</td><td></td><td>25.9</td></tr>
<tr><td>14</td><td></td><td>29.2</td></tr>
<tr><td>15</td><td></td><td>32.9</td></tr>
<tr><td>16</td><td></td><td>37.0</td></tr>
<tr><td>17</td><td></td><td>41.7</td></tr>
<tr><td>18</td><td></td><td>47.0</td></tr>
<tr><td>19</td><td>↓</td><td>52.9</td></tr>
<tr><td>20</td><td>Middle response</td><td>59.6</td></tr>
</table>
<table>
<tr><th rowspan="2">Setting value</th><th colspan="2">Machine characteristic</th></tr>
<tr><th>Response</th><th>Guideline for machine resonance frequency [Hz]</th></tr>
<tr><td>21</td><td>Middle response</td><td>67.1</td></tr>
<tr><td>22</td><td>↑</td><td>75.6</td></tr>
<tr><td>23</td><td></td><td>85.2</td></tr>
<tr><td>24</td><td></td><td>95.9</td></tr>
<tr><td>25</td><td></td><td>108.0</td></tr>
<tr><td>26</td><td></td><td>121.7</td></tr>
<tr><td>27</td><td></td><td>137.1</td></tr>
<tr><td>28</td><td></td><td>154.4</td></tr>
<tr><td>29</td><td></td><td>173.9</td></tr>
<tr><td>30</td><td></td><td>195.9</td></tr>
<tr><td>31</td><td></td><td>220.6</td></tr>
<tr><td>32</td><td></td><td>248.5</td></tr>
<tr><td>33</td><td></td><td>279.9</td></tr>
<tr><td>34</td><td></td><td>315.3</td></tr>
<tr><td>35</td><td></td><td>355.1</td></tr>
<tr><td>36</td><td></td><td>400.0</td></tr>
<tr><td>37</td><td></td><td>446.6</td></tr>
<tr><td>38</td><td></td><td>501.2</td></tr>
<tr><td>39</td><td>↓</td><td>571.5</td></tr>
<tr><td>40</td><td>High response</td><td>642.7</td></tr>
</table>
Setting range: 1 to 40</td><td>16</td><td>○</td><td>○</td></tr>
<tr><td>PA10
INP
In-position range</td><td colspan="2">Set an in-position range in a command unit.
To change it to the servo motor encoder pulse unit, set [Pr. PC24].
<table>
<tr><th>Pr. PA01</th><th>In-position setting range</th></tr>
<tr><td>_ _ _ 6 (Positioning mode (point table method))</td><td rowspan="2">The range where MEND (Travel completion), PED (Position end) and INP (In-position) are outputted.</td></tr>
<tr><td>_ _ _ 7 (Positioning mode (program method))</td></tr>
</table>
When [Pr. PC24] is set to "_ _ _ 0", the unit can be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. When [Pr. PC24] is set to "_ _ _ 1", the unit is fixed to [pulse].

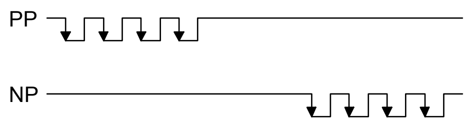
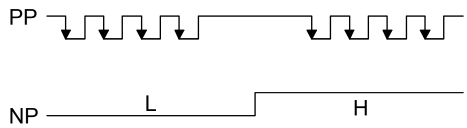
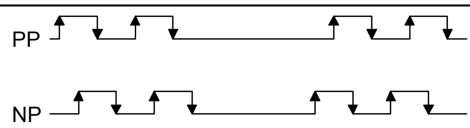
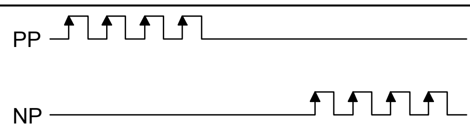
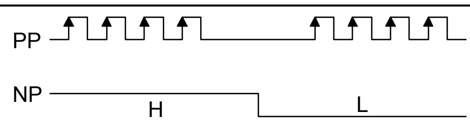
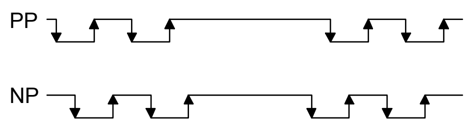
Setting range: 0 to 65535</td><td>100
Refer to Function column for unit.</td><td>○</td><td>○</td></tr>
<tr><td>PA11
TLP
Forward rotation torque limit</td><td></td><td>You can limit the torque generated by the servo motor. Set this parameter referring to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual".
When the torque is outputted with the analog monitor output, the setting of [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit], whichever is larger, will be the maximum output voltage (8 V).
Set the parameter on the assumption that the maximum torque is 100 [%]. The parameter is for limiting the torque of the servo motor in the CCW power running or CW regeneration. No torque is generated when this parameter is set to "0.0".

Setting range: 0.0 to 100.0</td><td>100.0
[%]</td><td>○</td><td>○</td></tr>
</table>

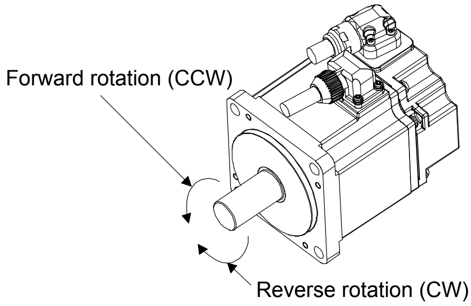
No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	CL
PA12 TLN Reverse rotation torque limit		You can limit the torque generated by the servo motor. Set this parameter referring to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual". When the torque is outputted with the analog monitor output, the setting of [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit], whichever is larger, will be the maximum output voltage (8 V). Set the parameter on the assumption that the maximum torque is 100.0 [%]. The parameter is for limiting the torque of the servo motor in the CW power running or CCW regeneration. No torque is generated when this parameter is set to "0.0". Setting range: 0.0 to 100.0	100.0 [%]	○	○
PA13 *PLSS Command pulse input form	_ _ _ x	Command input pulse train form selection 0: Forward/reverse rotation pulse train 1: Signed pulse train 2: A-phase/B-phase pulse train (The servo amplifier imports input pulses after multiplying by four.) When connecting the manual pulse generator MR-HDP01 in the positioning mode, set "2" to this digit. Refer to table 7.3 for settings.	0h	○	○
	_ _ x _	Pulse train logic selection 0: Positive logic 1: Negative logic Match the logic of the command pulse train received from a connected controller. Refer to POINT of section 3.6.1 of "MR-JE-_A Servo Amplifier Instruction Manual" for logic of MELSEC iQ-R series/MELSEC-Q series/MELSEC-L series/MELSEC-F series. When connecting the manual pulse generator MR-HDP01 in the positioning mode, set "0" to this digit. Refer to table 7.3 for settings.	0h	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA13 *PLSS Command pulse input form	_ x _ _	Command input pulse train filter selection Selecting proper filter enables to enhance noise tolerance. 0: Command input pulse train is 4 Mpulses/s or less. 1: Command input pulse train is 1 Mpulses/s or less. 2: Command input pulse train is 500 kpulses/s or less. 3: Command input pulse train is 200 kpulses/s or less. 1 Mpulse/s or lower commands are supported by "1". When inputting commands over 1 Mpulse/s and 4 Mpulses/s or lower, set "0". When connecting the manual pulse generator MR-HDP01 in the positioning mode, set "2" or "3" to this digit. Incorrect setting may cause the following malfunctions. ・Setting a value higher than actual command will lower noise tolerance. ・Setting a value lower than actual command will cause a position mismatch.	1h	○	○
	x _ _ _	For manufacturer setting	0h		

Table 7.3 Command input pulse train form selection

Setting value		Pulse train form	Forward rotation command / Reverse rotation command
_ _ 10h	Negative logic	Forward rotation pulse train Reverse rotation pulse train	
_ _ 11h	Negative logic	Signed pulse train	
_ _ 12h	Negative logic	A-phase pulse train B-phase pulse train	
_ _ 00h	Positive logic	Forward rotation pulse train Reverse rotation pulse train	
_ _ 01h	Positive logic	Signed pulse train	
_ _ 02h	Positive logic	A-phase pulse train B-phase pulse train	

Arrows in the table indicate the timing of importing pulse trains. A-phase/B-phase pulse trains are imported after they have been multiplied by 4.
When connecting the manual pulse generator MR-HDP01 in the positioning mode, set "_ _ 02h".

<table>
<tr><th rowspan="2">No./symbol/
name</th><th rowspan="2">Setting
digit</th><th rowspan="2">Function</th><th rowspan="2">Initial
value
[unit]</th><th colspan="2">Control
mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>PA14
*POL
Rotation direction selection</td><td></td><td>Select the servo motor rotation direction when ST1 (Forward rotation start) or ST2 (Reverse rotation start) is switched on.
<table>
<tr><th rowspan="2">Setting value</th><th colspan="2">Servo motor rotation direction</th></tr>
<tr><th>When positioning address increases</th><th>When positioning address decreases</th></tr>
<tr><td>0</td><td>CCW</td><td>CW</td></tr>
<tr><td>1</td><td>CW</td><td>CCW</td></tr>
</table>
The following shows the servo motor rotation directions.


Setting range: 0, 1</td><td>0</td><td>○</td><td>○</td></tr>
<tr><td>PA15
*ENR
Encoder output pulses</td><td></td><td>Set the encoder output pulses from the servo amplifier by using the number of output pulses per revolution, dividing ratio, or electronic gear ratio. (after multiplication by 4)
Set a numerator of the electronic gear when selecting "A-phase/B-phase pulse electronic gear setting (_ _ 3 _)" of "Encoder output pulse setting selection" in [Pr. PC19].
The maximum output frequency is 4.6 Mpulses/s. Set the parameter within this range.

Setting range: 1 to 4194304</td><td>4000
[pulse/
rev]</td><td>○</td><td>○</td></tr>
<tr><td>PA16
*ENR2
Encoder output pulses 2</td><td></td><td>Set a denominator of the electronic gear for the A/B-phase pulse output.
Set a denominator of the electronic gear when selecting "A-phase/B-phase pulse electronic gear setting (_ _ 3 _)" of "Encoder output pulse setting selection" in [Pr. PC19].

Setting range: 1 to 4194304</td><td>1</td><td>○</td><td>○</td></tr>
</table>

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA19 *BLK Parameter writing inhibit		Select a reference range and writing range of the parameter. For the positioning mode, set [Pr. PA19] to "0 0 A B" to enable read/write the positioning control parameters ([Pr. PT_ _]). Refer to table 7.4 for settings.	00AAh	○	○

Table 7.4 [Pr. PA19] setting value and reading/writing range

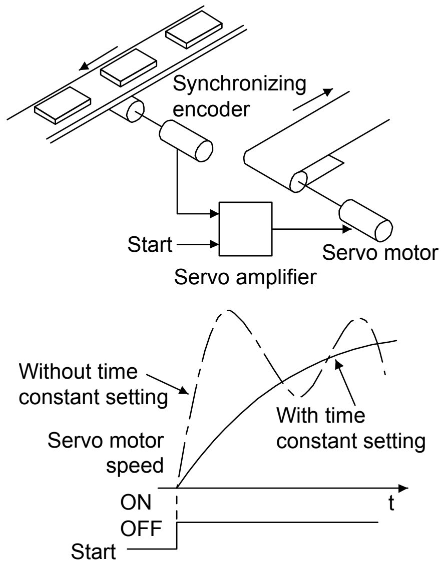
PA19	Setting operation	PA	PB	PC	PD	PE	PF	PT
Other than below	Reading	○						
	Writing	○						
000Ah	Reading	Only 19						
	Writing	Only 19						
000Bh	Reading	○	○	○				
	Writing	○	○	○				
000Ch	Reading	○	○	○	○			
	Writing	○	○	○	○			
00AAh (Initial value)	Reading	○	○	○	○	○	○	
	Writing	○	○	○	○	○	○	
00ABh	Reading	○	○	○	○	○	○	○
	Writing	○	○	○	○	○	○	○
100Bh	Reading	○						
	Writing	Only 19						
100Ch	Reading	○	○	○	○			
	Writing	Only 19						
10AAh	Reading	○	○	○	○	○	○	
	Writing	Only 19						
10ABh	Reading	○	○	○	○	○	○	○
	Writing	Only 19						

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA20 *TDS Tough drive setting	Alarms may not be avoided with the tough drive function depending on the situations of the power supply and load fluctuation. You can assign MTTR (During tough drive) to pins CN1-23, CN1-24, and CN1-49 with [Pr. PD24], [Pr. PD25], and [Pr. PD28].				
	_ _ _ x	For manufacturer setting	0h		
	_ _ x _	Vibration tough drive selection 0: Disabled 1: Enabled Selecting "1" enables to suppress vibrations by automatically changing the setting values of [Pr. PB13 Machine resonance suppression filter 1] and [Pr. PB15 Machine resonance suppression filter 2] in case that the vibration exceeds the value of the oscillation level set in [Pr. PF23]. To output the oscillation detection alarm as a warning, set [Pr. PF24 Vibration tough drive function selection]. For details, refer to section 7.3 of "MR-JE-_A Servo Amplifier Instruction Manual".	0h	○	○
	_ x _ _	Instantaneous power failure tough drive selection 0: Disabled 1: Enabled Selecting "1" enables to avoid triggering [AL. 10 Undervoltage] by using the electrical energy charged in the capacitor in the servo amplifier in case that an instantaneous power failure occurs during operation. Set the time until the occurrence of [AL. 10.1 Voltage drop in the power] with [Pr. PF25 Instantaneous power failure tough drive - Detection time]. When "1" is selected for this digit, the power should be off for the setting value of [Pr. PF25] + 1 s or more before cycling the power to enable a parameter whose symbol is preceded by "*".	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PA21 *AOP3 Function selection A-3	_ _ _ x	One-touch tuning function selection 0: Disabled 1: Enabled When the digit is "0", the one-touch tuning is not available.	1h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _	Electronic gear selection When this digit is changed, the home position will be changed. Execute the home position return again. 0: Electronic gear ([Pr. PA06] and [Pr. PA07]) 1: Not used for positioning mode. Setting this will trigger [AL. 37 Parameter error].	0h	○	○
PA23 DRAT Drive recorder arbitrary alarm trigger setting	_ _ x x	Alarm detail No. setting Set the digits when you execute the trigger with arbitrary alarm detail No. for the drive recorder function. When these digits are "0 0", only the arbitrary alarm No. setting will be enabled.	00h	○	○
	x x _ _	Alarm No. setting Set the digits when you execute the trigger with arbitrary alarm No. for the drive recorder function. When "0 0" are set, arbitrary alarm trigger of the drive recorder will be disabled.	00h	○	○
	Setting example: To activate the drive recorder when [AL. 50 Overload 1] occurs, set "5 0 0 0". To activate the drive recorder when [AL. 50.3 Thermal overload error 4 during operation] occurs, set "5 0 0 3".				

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PA24 AOP4 Function selection A-4	_ _ _ x	Vibration suppression mode selection 0: Standard mode 1: 3 inertia mode 2: Low response mode When you select the standard mode or low response mode, "Vibration suppression control 2" is not available. When you select the 3 inertia mode, the feed forward gain is not available.	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PA25 OTHOV One-touch tuning - Overshoot permissible level		Set a permissible value of overshoot amount for one-touch tuning as a percentage of the in-position range. However, setting "0" will be 50%. Setting range: 0 to 100	0 [%]	○	○
PA26 *AOP5 Function selection A-5	_ _ _ x	Torque limit function selection at instantaneous power failure 0: Disabled 1: Enabled Selecting "1" for this digit will limit torques to save electric energy when an instantaneous power failure occurs during operation and will make [AL. 10 Undervoltage] less likely to occur. The torque limit function at instantaneous power failure is enabled when "instantaneous power failure tough drive selection" in [Pr. PA20] is "Enabled (_ 1 _ _)".	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		

7.2.2 Gain/filter setting parameters ([Pr. PB_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB01 FILT Adaptive tuning mode (adaptive filter II)	_ _ _ x	Filter tuning mode selection Set the adaptive tuning. Select the adjustment mode of the machine resonance suppression filter 1. For details, refer to section 7.1.2 of "MR-JE-_A Servo Amplifier Instruction Manual". 0: Disabled 1: Automatic setting 2: Manual setting	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _	Tuning accuracy selection 0: Standard 1: High accuracy The frequency is estimated more accurately in the high accuracy mode compared to the standard mode. However, the tuning sound may be larger in the high accuracy mode. For details, refer to section 7.1.2 of "MR-JE-_A Servo Amplifier Instruction Manual". This digit is available with servo amplifier with software version C5 or later.	0h		
PB02 VRFT Vibration suppression control tuning mode (advanced vibration suppression control II)	_ _ _ x	Vibration suppression control 1 tuning mode selection Select the tuning mode of the vibration suppression control 1. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". 0: Disabled 1: Automatic setting 2: Manual setting	0h	○	○
	_ _ x _	Vibration suppression control 2 tuning mode selection Select the tuning mode of the vibration suppression control 2. To enable the digit, select "3 inertia mode (_ _ _ 1)" of "Vibration suppression mode selection" in [Pr. PA24]. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". 0: Disabled 1: Automatic setting 2: Manual setting	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB03 PST Position command acceleration/ deceleration time constant (position smoothing)		Set the constant of a primary delay to the position command. You can select a control method from "Primary delay" or "Linear acceleration/deceleration" of "Position acceleration/deceleration filter type selection" in [Pr. PB25]. The setting range of "Linear acceleration/deceleration" is 0 ms to 10 ms. Setting of longer than 10 ms will be recognized as 10 ms. (Example) When a command is given from a synchronous encoder, a synchronous operation will start smoothly even if it starts during line operation.  Setting range: 0 to 65535	0 [ms]	○	○
PB04 FFC Feed forward gain		Set the feed forward gain. When the setting is 100%, the droop pulses during operation at constant speed are nearly zero. However, sudden acceleration/deceleration will increase the overshoot. As a guideline, when the feed forward gain setting is 100%, set 1 s or more for the acceleration time constant to the rated speed. Setting range: 0 to 100	0 [%]	○	○
PB06 GD2 Load to motor inertia ratio		Set the load to motor inertia ratio. Setting a value considerably different from the actual load moment of inertia may cause an unexpected operation such as an overshoot. The setting of this parameter will be automatic or manual depending on the setting of [Pr. PA08]. Refer to the following table for details. When the parameter is set to automatic, the value will vary between 0.00 and 100.00. Setting range: 0.00 to 300.00	7.00 [times]	○	○

Pr. PA08	This parameter
_ _ _ 0 (2 gain adjustment mode 1 (interpolation mode)	Automatic setting
_ _ _ 1 (Auto tuning mode 1)	
_ _ _ 2 (Auto tuning mode 2)	Manual setting
_ _ _ 3 (Manual mode)	
_ _ _ 4 (2 gain adjustment mode 2)	

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td rowspan="2">PB07
PG1
Model loop gain</td><td></td><td>Set the response gain to the target position.
Increasing the setting value will also increase the response level to the position command but will be liable to generate vibration and noise.
For the vibration suppression control tuning mode, the setting range of [Pr. PB07] is limited. Refer to section 7.1.5 (4) of "MR-JE-_A Servo Amplifier Instruction Manual" for details.
The setting of this parameter will be automatic or manual depending on the setting of [Pr. PA08]. Refer to the following table for details.

Setting range: 1.0 to 2000.0</td><td>15.0
[rad/s]</td><td>○</td><td>○</td></tr>
<tr><td colspan="5">
<table>
<tr><th>Pr. PA08</th><th>This parameter</th></tr>
<tr><td>_ _ _ 0 (2 gain adjustment mode 1 (interpolation mode)</td><td>Manual setting</td></tr>
<tr><td>_ _ _ 1 (Auto tuning mode 1)</td><td rowspan="2">Automatic setting</td></tr>
<tr><td>_ _ _ 2 (Auto tuning mode 2)</td></tr>
<tr><td>_ _ _ 3 (Manual mode)</td><td rowspan="2">Manual setting</td></tr>
<tr><td>_ _ _ 4 (2 gain adjustment mode 2)</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">PB08
PG2
Position loop gain</td><td></td><td>Set the gain of the position loop.
Set this parameter to increase the position response to level load disturbance.
Increasing the setting value will also increase the response level to the load disturbance but will be liable to generate vibration and noise.
The setting of the parameter will be the automatic setting or manual setting depending on the [Pr. PA08] setting. Refer to the following table for details.

Setting range: 1.0 to 2000.0</td><td>37.0
[rad/s]</td><td>○</td><td>○</td></tr>
<tr><td colspan="5">
<table>
<tr><th>Pr. PA08</th><th>This parameter</th></tr>
<tr><td>_ _ _ 0 (2 gain adjustment mode 1 (interpolation mode))</td><td rowspan="3">Automatic setting</td></tr>
<tr><td>_ _ _ 1 (Auto tuning mode 1)</td></tr>
<tr><td>_ _ _ 2 (Auto tuning mode 2)</td></tr>
<tr><td>_ _ _ 3 (Manual mode)</td><td>Manual setting</td></tr>
<tr><td>_ _ _ 4 (2 gain adjustment mode 2)</td><td>Automatic setting</td></tr>
</table>
</td></tr>
<tr><td>PB09
VG2
Speed loop gain</td><td></td><td>Set the gain of the speed loop.
Set this parameter when vibration occurs on machines of low rigidity or with large backlash. Increasing the setting value will also increase the response level but will be liable to generate vibration and noise.
The setting of the parameter will be automatic or manual depending on the setting of [Pr. PA08]. Refer to the table of [Pr. PB08] for details.

Setting range: 20 to 65535</td><td>823
[rad/s]</td><td>○</td><td>○</td></tr>
<tr><td>PB10
VIC
Speed integral compensation</td><td></td><td>Set the integral time constant of the speed loop.
Decreasing the setting value will increase the response level but will be liable to generate vibration and noise.
The setting of the parameter will be automatic or manual depending on the setting of [Pr. PA08]. Refer to the table of [Pr. PB08] for details.

Setting range: 0.1 to 1000.0</td><td>33.7
[ms]</td><td>○</td><td>○</td></tr>
<tr><td>PB11
VDC
Speed differential compensation</td><td></td><td>Set the differential compensation.
To enable the setting value, turn on PC (proportional control).

Setting range: 0 to 1000</td><td>980</td><td>○</td><td>○</td></tr>
</table>

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB12 OVA Overshoot amount compensation		Set a viscous friction torque in percentage to the rated torque at servo motor rated speed. When the response level is low, or when the torque is limited, the efficiency of the parameter can be lower. Setting range: 0 to 100	0 [%]	○	○
PB13 NH1 Machine resonance suppression filter 1		Set the notch frequency of the machine resonance suppression filter 1. When "Filter tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB01], this parameter will be adjusted automatically by adaptive tuning. When "Filter tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB01], the setting value will be enabled. Setting range: 10 to 4500	4500 [Hz]	○	○
PB14 NHQ1 Notch shape selection 1	Set forms of the machine resonance suppression filter 1. When "Filter tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB01], this parameter will be adjusted automatically by adaptive tuning. When "Filter tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB01], the setting value will be enabled.				
	_ _ _ x	For manufacturer setting	0h		
	_ _ x _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	_ x _ _	Notch width selection 0: α = 2 1: α = 3 2: α = 4 3: α = 5	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PB15 NH2 Machine resonance suppression filter 2		Set the notch frequency of the machine resonance suppression filter 2. To enable the setting value, select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 2 selection" in [Pr. PB16]. Setting range: 10 to 4500	4500 [Hz]	○	○
PB16 NHQ2 Notch shape selection 2	Set forms of the machine resonance suppression filter 2.				
	_ _ _ x	Machine resonance suppression filter 2 selection 0: Disabled 1: Enabled	0h	○	○
	_ _ x _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	_ x _ _	Notch width selection 0: α = 2 1: α = 3 2: α = 4 3: α = 5	0h	○	○
	x _ _ _	For manufacturer setting	0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB17 NHF Shaft resonance suppression filter		Set the shaft resonance suppression filter. This is used to suppress a low-frequency machine vibration. When "Shaft resonance suppression filter selection" is set to "Automatic setting (_ _ _ 0)" in [Pr. PB23], the value will be calculated automatically from the servo motor you use and load to motor inertia ratio. When "Manual setting (_ _ _ 1)" is selected, the setting written to the parameter is used. When "Shaft resonance suppression filter selection" is set to "Disabled (_ _ _ 2)" in [Pr. PB23], the setting value of this parameter will be disabled. When "Machine resonance suppression filter 4 selection" is set to "Enabled (_ _ _ 1)" in [Pr. PB49], the shaft resonance suppression filter is not available.			
	_ _ x x	Shaft resonance suppression filter setting frequency selection Refer to table 7.5 for settings. Set the value closest to the frequency you need.	00h	○	○
	_ x _ _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	x _ _ _	For manufacturer setting	0h		

Table 7.5 Shaft resonance suppression filter setting frequency selection

Setting value	Frequency [Hz]	Setting value	Frequency [Hz]
_ _ 0 0	Disabled	_ _ 1 0	562
_ _ 0 1	Disabled	_ _ 1 1	529
_ _ 0 2	4500	_ _ 1 2	500
_ _ 0 3	3000	_ _ 1 3	473
_ _ 0 4	2250	_ _ 1 4	450
_ _ 0 5	1800	_ _ 1 5	428
_ _ 0 6	1500	_ _ 1 6	409
_ _ 0 7	1285	_ _ 1 7	391
_ _ 0 8	1125	_ _ 1 8	375
_ _ 0 9	1000	_ _ 1 9	360
_ _ 0 A	900	_ _ 1 A	346
_ _ 0 B	818	_ _ 1 B	333
_ _ 0 C	750	_ _ 1 C	321
_ _ 0 D	692	_ _ 1 D	310
_ _ 0 E	642	_ _ 1 E	300
_ _ 0 F	600	_ _ 1 F	290

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB18 LPF Low-pass filter setting		Set the low-pass filter. The following shows a relation of a required parameter to this parameter. Setting range: 100 to 18000	3141 [rad/s]	○	○

[Pr. PB23]	[Pr. PB18]
_ _ 0 _ (Initial value)	Automatic setting
_ _ 1 _	Setting value enabled
_ _ 2 _	Setting value disabled

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB19 VRF11 Vibration suppression control 1 - Vibration frequency		Set the vibration frequency for vibration suppression control 1 to suppress low-frequency machine vibration. When "Vibration suppression control 1 tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ _ 2)" is selected, the setting written to the parameter is used. The setting range of this parameter varies, depending on the value in [Pr. PB07]. If a value out of the range is set, the vibration suppression control will be disabled. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". Setting range: 0.1 to 300.0	100.0 [Hz]	○	○
PB20 VRF12 Vibration suppression control 1 - Resonance frequency		Set the resonance frequency for vibration suppression control 1 to suppress low-frequency machine vibration. When "Vibration suppression control 1 tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ _ 2)" is selected, the setting written to the parameter is used. The setting range of this parameter varies, depending on the value in [Pr. PB07]. If a value out of the range is set, the vibration suppression control will be disabled. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". Setting range: 0.1 to 300.0	100.0 [Hz]	○	○
PB21 VRF13 Vibration suppression control 1 - Vibration frequency damping		Set a damping of the vibration frequency for vibration suppression control 1 to suppress low-frequency machine vibration. When "Vibration suppression control 1 tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ _ 2)" is selected, the setting written to the parameter is used. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". Setting range: 0.00 to 0.30	0.00	○	○
PB22 VRF14 Vibration suppression control 1 - Resonance frequency damping		Set a damping of the resonance frequency for vibration suppression control 1 to suppress low-frequency machine vibration. When "Vibration suppression control 1 tuning mode selection" is set to "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ _ 2)" is selected, the setting written to the parameter is used. For details, refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual". Setting range: 0.00 to 0.30	0.00	○	○
PB23 VFBF Low-pass filter selection	_ _ _ x	Shaft resonance suppression filter selection Select the shaft resonance suppression filter. 0: Automatic setting 1: Manual setting 2: Disabled When you select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 4 selection" in [Pr. PB49], the shaft resonance suppression filter is not available.	0h	○	○
	_ _ x _	Low-pass filter selection Select the low-pass filter. 0: Automatic setting 1: Manual setting 2: Disabled	0h	○	○
	_ x _ _	For manufacturer setting	1h		
	x _ _ _		0h		
PB24 *MVS Slight vibration suppression control	_ _ _ x	Slight vibration suppression control selection Select the slight vibration suppression control. 0: Disabled 1: Enabled To enable the slight vibration suppression control, set "Gain adjustment mode selection" to "Manual mode (_ _ _ 3)" in [Pr. PA08].	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB25 *BOP1 Function selection B-1	_ _ _ x	For manufacturer setting	0h		
	_ _ x _	Position acceleration/deceleration filter type selection Select the position acceleration/deceleration filter type. 0: Primary delay 1: Linear acceleration/deceleration	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PB26 *CDP Gain switching function		Select the gain switching condition. Set conditions to enable the gain switching values set in [Pr. PB29] to [Pr. PB36] and [Pr. PB56] to [Pr. PB60].			
	_ _ _ x	Gain switching selection 0: Disabled 1: Input device (gain switching (CDP)) 2: Command frequency 3: Droop pulses 4: Servo motor speed	0h	○	○
	_ _ x _	Gain switching condition selection 0: Gain after switching is enabled with gain switching condition or more 1: Gain after switching is enabled with gain switching condition or less	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PB27 CDL Gain switching condition		Set the value of the gain switching (command frequency, droop pulses, or servo motor speed) selected in [Pr. PB26]. The set value unit differs depending on the switching condition item. (Refer to section 7.2.3 of "MR-JE-_A Servo Amplifier Instruction Manual".) Setting range: 0 to 9999	10 [kpulse/s]/ [pulse]/ [r/min]	○	○
PB28 CDT Gain switching time constant		Set the time constant until the gains switch in response to the conditions set in [Pr. PB26] and [Pr. PB27]. Setting range: 0 to 100	1 [ms]	○	○
PB29 GD2B Load to motor inertia ratio after gain switching		Set the load to motor inertia ratio for when gain switching is enabled. This parameter is enabled only when "Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. Setting range: 0.00 to 300.00	7.00 [times]	○	○
PB30 PG2B Position loop gain after gain switching		Set the position loop gain for when the gain switching is enabled. When a value less than 1.0 rad/s is set, the value will be the same as that of [Pr. PB08]. This parameter is enabled only when "Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. Setting range: 0.0 to 2000.0	0.0 [rad/s]	○	
PB31 VG2B Speed loop gain after gain switching		Set the speed loop gain for when the gain switching is enabled. When a value less than 20 rad/s is set, the value will be the same as that of [Pr. PB09]. This parameter is enabled only when "Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. Setting range: 0 to 65535	0 [rad/s]	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB32 VICB Speed integral compensation after gain switching		Set the speed integral compensation for when the gain switching is enabled. When a value less than 0.1 ms is set, the value will be the same as that of [Pr. PB10]. This parameter is enabled only when "Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. Setting range: 0.0 to 5000.0	0.0 [ms]	○	○
PB33 VRF1B Vibration suppression control 1 - Vibration frequency after gain switching		Set the vibration frequency of the vibration suppression control 1 for when the gain switching is enabled. When a value less than 0.1 Hz is set, the value will be the same as that of [Pr. PB19]. This parameter is enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression control 1 tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.0 to 300.0	0.0 [Hz]	○	○
PB34 VRF2B Vibration suppression control 1 - Resonance frequency after gain switching		Set the resonance frequency for vibration suppression control 1 for when the gain switching is enabled. When a value less than 0.1 Hz is set, the value will be the same as that of [Pr. PB20]. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ・"Vibration suppression control 1 tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.0 to 300.0	0.0 [Hz]	○	○
PB35 VRF3B Vibration suppression control 1 - Vibration frequency damping after gain switching		Set a damping of the vibration frequency for vibration suppression control 1 when the gain switching is enabled. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression control 1 tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○
PB36 VRF4B Vibration suppression control 1 - Resonance frequency damping after gain switching		Set a damping of the resonance frequency for vibration suppression control 1 when the gain switching is enabled. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression control 1 tuning mode selection" is set to "Manual setting (_ _ _ 2)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB45 CNHF Command notch filter	Set the command notch filter.				
	_ _ x x	Command notch filter setting frequency selection Refer to table 7.6 for the relation of setting values to frequency.	00h	○	○
	_ x _ _	Notch depth selection Refer to table 7.7 for details.	0h	○	○
	x _ _ _	For manufacturer setting	0h		

Table 7.6 Command notch filter setting frequency selection

Setting value	Frequency [Hz]	Setting value	Frequency [Hz]	Setting value	Frequency [Hz]
_ _ 0 0	Disabled	_ _ 2 0	70	_ _ 4 0	17.6
_ _ 0 1	2250	_ _ 2 1	66	_ _ 4 1	16.5
_ _ 0 2	1125	_ _ 2 2	62	_ _ 4 2	15.6
_ _ 0 3	750	_ _ 2 3	59	_ _ 4 3	14.8
_ _ 0 4	562	_ _ 2 4	56	_ _ 4 4	14.1
_ _ 0 5	450	_ _ 2 5	53	_ _ 4 5	13.4
_ _ 0 6	375	_ _ 2 6	51	_ _ 4 6	12.8
_ _ 0 7	321	_ _ 2 7	48	_ _ 4 7	12.2
_ _ 0 8	281	_ _ 2 8	46	_ _ 4 8	11.7
_ _ 0 9	250	_ _ 2 9	45	_ _ 4 9	11.3
_ _ 0 A	225	_ _ 2 A	43	_ _ 4 A	10.8
_ _ 0 B	204	_ _ 2 B	41	_ _ 4 B	10.4
_ _ 0 C	187	_ _ 2 C	40	_ _ 4 C	10
_ _ 0 D	173	_ _ 2 D	38	_ _ 4 D	9.7
_ _ 0 E	160	_ _ 2 E	37	_ _ 4 E	9.4
_ _ 0 F	150	_ _ 2 F	36	_ _ 4 F	9.1
_ _ 1 0	140	_ _ 3 0	35.2	_ _ 5 0	8.8
_ _ 1 1	132	_ _ 3 1	33.1	_ _ 5 1	8.3
_ _ 1 2	125	_ _ 3 2	31.3	_ _ 5 2	7.8
_ _ 1 3	118	_ _ 3 3	29.6	_ _ 5 3	7.4
_ _ 1 4	112	_ _ 3 4	28.1	_ _ 5 4	7.0
_ _ 1 5	107	_ _ 3 5	26.8	_ _ 5 5	6.7
_ _ 1 6	102	_ _ 3 6	25.6	_ _ 5 6	6.4
_ _ 1 7	97	_ _ 3 7	24.5	_ _ 5 7	6.1
_ _ 1 8	93	_ _ 3 8	23.4	_ _ 5 8	5.9
_ _ 1 9	90	_ _ 3 9	22.5	_ _ 5 9	5.6
_ _ 1 A	86	_ _ 3 A	21.6	_ _ 5 A	5.4
_ _ 1 B	83	_ _ 3 B	20.8	_ _ 5 B	5.2
_ _ 1 C	80	_ _ 3 C	20.1	_ _ 5 C	5.0
_ _ 1 D	77	_ _ 3 D	19.4	_ _ 5 D	4.9
_ _ 1 E	75	_ _ 3 E	18.8	_ _ 5 E	4.7
_ _ 1 F	72	_ _ 3 F	18.2	_ _ 5 F	4.5

Table 7.7 Notch depth selection

Setting value	Depth [dB]	Setting value	Depth [dB]
_ 0 _ _	-40.0	_ 8 _ _	-6.0
_ 1 _ _	-24.1	_ 9 _ _	-5.0
_ 2 _ _	-18.1	_ A _ _	-4.1
_ 3 _ _	-14.5	_ B _ _	-3.3
_ 4 _ _	-12.0	_ C _ _	-2.5
_ 5 _ _	-10.1	_ D _ _	-1.8
_ 6 _ _	-8.5	_ E _ _	-1.2
_ 7 _ _	-7.2	_ F _ _	-0.6

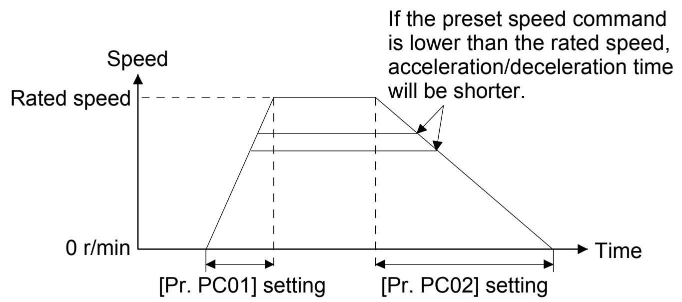
No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB46 NH3 Machine resonance suppression filter 3		Set the notch frequency of the machine resonance suppression filter 3. To enable the setting value, set "Machine resonance suppression filter 3 selection" to "Enabled (_ _ _ 1)" in [Pr. PB47]. Setting range: 10 to 4500	4500 [Hz]	○	○
PB47 NHQ3 Notch shape selection 3	Set forms of the machine resonance suppression filter 3.				
	_ _ _ x	Machine resonance suppression filter 3 selection 0: Disabled 1: Enabled	0h	○	○
	_ _ x _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	_ x _ _	Notch width selection 0: α = 2 1: α = 3 2: α = 4 3: α = 5	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PB48 NH4 Machine resonance suppression filter 4		Set the notch frequency of the machine resonance suppression filter 4. To enable the setting value, set "Machine resonance suppression filter 4 selection" to "Enabled (_ _ _ 1)" in [Pr. PB49]. Setting range: 10 to 4500	4500 [Hz]	○	○
PB49 NHQ4 Notch shape selection 4	Set forms of the machine resonance suppression filter 4.				
	_ _ _ x	Machine resonance suppression filter 4 selection 0: Disabled 1: Enabled When "Enabled" is set, [Pr. PB17 Shaft resonance suppression filter] is not available.	0h	○	○
	_ _ x _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	_ x _ _	Notch width selection 0: α = 2 1: α = 3 2: α = 4 3: α = 5	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PB50 NH5 Machine resonance suppression filter 5		Set the notch frequency of the machine resonance suppression filter 5. To enable the setting value, set "Machine resonance suppression filter 5 selection" to "Enabled (_ _ _ 1)" in [Pr. PB51]. Setting range: 10 to 4500	4500 [Hz]	○	○

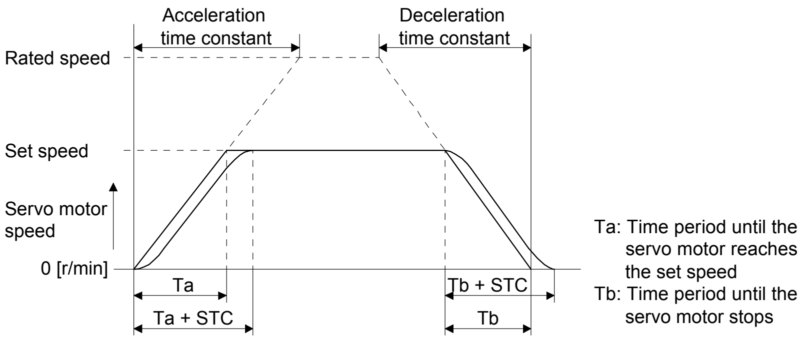
No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB51 NHQ5 Notch shape selection 5		Set forms of the machine resonance suppression filter 5. When "Robust filter selection" is set to "Enabled (_ _ _ 1)" in [Pr. PE41], the machine resonance suppression filter 5 is not available.			
	_ _ _ x	Machine resonance suppression filter 5 selection 0: Disabled 1: Enabled	0h	○	○
	_ _ x _	Notch depth selection 0: -40 dB 1: -14 dB 2: -8 dB 3: -4 dB	0h	○	○
	_ x _ _	Notch width selection 0: α = 2 1: α = 3 2: α = 4 3: α = 5	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PB52 VRF21 Vibration suppression control 2 - Vibration frequency		Set the vibration frequency for vibration suppression control 2 to suppress low-frequency machine vibration. When "Vibration suppression control 2 tuning mode selection" is set to "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ 2 _)" is selected, the setting written to the parameter is used. The setting range of this parameter varies, depending on the value in [Pr. PB07]. If a value out of the range is set, the vibration suppression control will be disabled. Refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual" for details. To enable the setting value, set "Vibration suppression mode selection" to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. Setting range: 0.1 to 300.0	100.0 [Hz]	○	○
PB53 VRF22 Vibration suppression control 2 - Resonance frequency		Set the resonance frequency for vibration suppression control 2 to suppress low-frequency machine vibration. When "Vibration suppression control 2 tuning mode selection" is set to "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ 2 _)" is selected, the setting written to the parameter is used. The setting range of this parameter varies, depending on the value in [Pr. PB07]. If a value out of the range is set, the vibration suppression control will be disabled. Refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual" for details. To enable the setting value, set "Vibration suppression mode selection" to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. Setting range: 0.1 to 300.0	100.0 [Hz]	○	○
PB54 VRF23 Vibration suppression control 2 - Vibration frequency damping		Set a damping of the vibration frequency for vibration suppression control 2 to suppress low-frequency machine vibration. When "Vibration suppression control 2 tuning mode selection" is set to "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ 2 _)" is selected, the setting written to the parameter is used. Refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual" for details. To enable the setting value, set "Vibration suppression mode selection" to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. Setting range: 0.00 to 0.30	0.00	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB55 VRF24 Vibration suppression control 2 - Resonance frequency damping		Set a damping of the resonance frequency for vibration suppression control 2 to suppress low-frequency machine vibration. When "Vibration suppression control 2 tuning mode selection" is set to "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. When "Manual setting (_ _ 2 _)" is selected, the setting written to the parameter is used. Refer to section 7.1.5 of "MR-JE-_A Servo Amplifier Instruction Manual" for details. To enable the setting value, set "Vibration suppression mode selection" to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. Setting range: 0.00 to 0.30	0.00	○	○
PB56 VRF21B Vibration suppression control 2 - Vibration frequency after gain switching		Set the vibration frequency for vibration suppression control 2 for when the gain switching is enabled. When a value less than 0.1 Hz is set, the value will be the same as that of [Pr. PB52]. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression mode selection" is set to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. ・"Vibration suppression control 2 tuning mode selection" is set to "Manual setting (_ _ 2 _)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.0 to 300.0	0.0 [Hz]	○	○
PB57 VRF22B Vibration suppression control 2 - Resonance frequency after gain switching		Set the resonance frequency for vibration suppression control 2 for when the gain switching is enabled. When a value less than 0.1 Hz is set, the value will be the same as that of [Pr. PB53]. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression mode selection" is set to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. ・"Vibration suppression control 2 tuning mode selection" is set to "Manual setting (_ _ 2 _)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.0 to 300.0	0.0 [Hz]	○	○
PB58 VRF23B Vibration suppression control 2 - Vibration frequency damping after gain switching		Set a damping of the vibration frequency for vibration suppression control 2 when the gain switching is enabled. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression mode selection" is set to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. ・"Vibration suppression control 2 tuning mode selection" is set to "Manual setting (_ _ 2 _)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PB59 VRF24B Vibration suppression control 2 - Resonance frequency damping after gain switching		Set a damping of the resonance frequency for vibration suppression control 2 when the gain switching is enabled. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Vibration suppression mode selection" is set to "3 inertia mode (_ _ _ 1)" in [Pr. PA24]. ・"Vibration suppression control 2 tuning mode selection" is set to "Manual setting (_ _ 2 _)" in [Pr. PB02]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○
PB60 PG1B Model loop gain after gain switching		Set the model loop gain for when the gain switching is enabled. When a value less than 1.0 rad/s is set, the value will be the same as that of [Pr. PB07]. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" is set to "Manual mode (_ _ _ 3)" in [Pr. PA08]. ・"Gain switching selection" is set to "Input device (gain switching (CDP)) (_ _ _ 1)" in [Pr. PB26]. Switching during driving may cause a shock. Be sure to switch them after the servo motor stops. Setting range: 0.0 to 2000.0	0.0 [rad/s]	○	○

7.2.3 Extension setting parameters ([Pr. PC_ _])

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC01 STA JOG operation acceleration time constant		Set an acceleration time constant for the JOG operation of the program method. Set an acceleration time from 0 r/min to the rated speed.  For example for the servo motor of 3000 r/min rated speed, set 3000 (3 s) to increase speed from 0 r/min to 1000 r/min in 1 s. Additionally, when 20000 ms or more value is set, it will be clamped to 20000 ms. Setting range: 0 to 50000	0 [ms]		○
PC02 STB JOG operation deceleration time constant		Set a deceleration time constant for the JOG operation of the program method. Set a deceleration time from the rated speed to 0 r/min. Additionally, when 20000 ms or more value is set, it will be clamped to 20000 ms. Setting range: 0 to 50000	0 [ms]		○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC03 *STC S-pattern acceleration/ deceleration time constant		This parameter is used to smooth start/stop of the servo motor. Set the time of the arc part for S-pattern acceleration/deceleration. Setting "0" will make it linear acceleration/deceleration. Servo is usually operated with linear acceleration and deceleration; however, smooth start and stop are enabled by setting [Pr. PC03 S-pattern acceleration/deceleration time constants]. When the S-pattern acceleration/deceleration time constants are set, smooth positioning is enabled as shown in the following figure. Note that when it is set, a time period from the start to output of MEND (Travel completion) is longer by the S-pattern acceleration/deceleration time constants.  When the STC value is set longer than the constant speed time, the speed may not reach to the command speed. Additionally, when 1000 ms or more value is set, it will be clamped to 1000 ms. Setting range: 0 to 5000	0 [ms]	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC14 MOD1 Analog monitor 1 output	_ _ x x	Analog monitor 1 output selection Select a signal to output to MO1 (Analog monitor 1). Refer to app. 8.3 of "MR-JE-_A Servo Amplifier Instruction Manual" for detection point of output selection. Refer to table 7.8 or 7.9 for settings.	00h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		

Table 7.8 Analog monitor setting value

Setting value	Item
_ _ 0 0	Servo motor speed (±8 V/max. speed) (Note 1)
_ _ 0 1	Torque (±8 V/max. torque) (Note 3)
_ _ 0 2	Servo motor speed (+8 V/max. speed) (Note 1)
_ _ 0 3	Torque (+8 V/max. torque) (Note 3)
_ _ 0 4	Current command (±8 V/max. current command)
_ _ 0 5	Command pulse frequency (±10 V/±4 Mpulses/s)
_ _ 0 6	Servo motor-side droop pulses (±10 V/100 pulses) (Note 2)
_ _ 0 7	Servo motor-side droop pulses (±10 V/1000 pulses) (Note 2)
_ _ 0 8	Servo motor-side droop pulses (±10 V/10000 pulses) (Note 2)
_ _ 0 9	Servo motor-side droop pulses (±10 V/100000 pulses) (Note 2)
_ _ 0 D	Bus voltage (+8 V/400 V)
_ _ 0 E	Speed command 2 (±8 V/max. speed) (Note 1)
_ _ 1 7	Internal temperature of encoder (±10 V/±128 °C)

Note 1. The maximum speed of the HF-KN series servo motor is 4500 r/min and that of the HG-KN series is 5000 r/min. Please watch out when using an HG-KN series servo motor as a replacement for the HF-KN series servo motor because HG-KN series outputs 8 V at 5000 r/min. HG-KN series servo motors output 8 V at 6000 r/min when you set "_ _ _ 1" in [Pr. PA28] to change the maximum speed to 6000 r/min.
2. Encoder pulse unit
3. The value in [Pr. PA11] or [Pr. PA12] whichever is higher is applied for the maximum torque.

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC15 MOD2 Analog monitor 2 output	_ _ x x	Analog monitor 2 output selection Select a signal to output to MO2 (Analog monitor 2). Refer to app. 8.3 of "MR-JE-_A Servo Amplifier Instruction Manual" for detection point of output selection. Refer to [Pr. PC14] for settings.	01h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PC16 MBR Electromagnetic brake sequence output		Set the delay time from when MBR (Electromagnetic brake interlock) turns off until when the base drive circuit is shut-off. Setting range: 0 to 1000	0 [ms]	○	○
PC17 ZSP Zero speed		Set an output range of ZSP (Zero speed detection). ZSP (Zero speed detection) has hysteresis of 20 r/min. Setting range: 0 to 10000	50 [r/min]	○	○

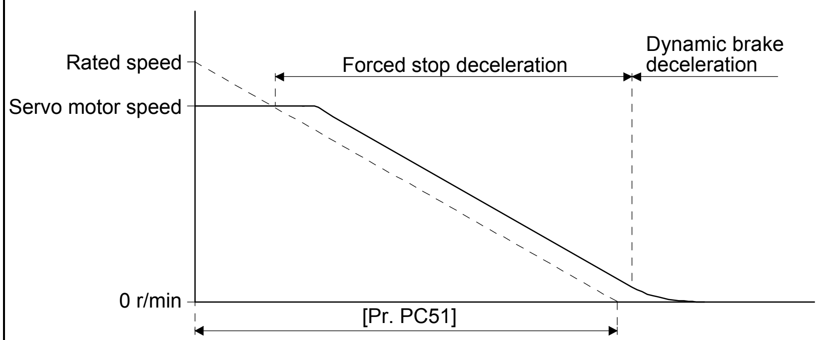
No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC18 *BPS Alarm history clear	_ _ _ x	Alarm history clear selection This parameter is used to clear the alarm history. 0: Disabled 1: Enabled When "Enabled" is set, the alarm history will be cleared at the next power-on. Once the alarm history is cleared, the setting becomes disabled automatically.	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PC19 *ENRS Encoder output pulse selection	_ _ _ x	Encoder output pulse phase selection Select an encoder pulse direction. 0: Increasing A-phase 90° in CCW 1: Increasing A-phase 90° in CW Setting value | Servo motor rotation direction: CCW | CW 0 | A-phase / B-phase | A-phase / B-phase 1 | A-phase / B-phase | A-phase / B-phase	0h	○	○
	_ _ x _	Encoder output pulse setting selection 0: Output pulse setting 1: Division ratio setting 2: The same output pulse setting as the command pulse 3: A-phase/B-phase pulse electronic gear setting 5: Command pulse input through output setting When "1" is set, the settings of [Pr. PA16 Encoder output pulses 2] will be disabled. When "2" is set, the settings of [Pr. PA15 Encoder output pulses] and [Pr. PA16 Encoder output pulses 2] will be disabled. When using this setting, do not change the settings in [Pr. PA06] and [Pr. PA07] after the power-on. When "5" is set, the settings of [Pr. PA15 Encoder output pulses] and [Pr. PA16 Encoder output pulses 2] will be disabled. "Encoder output pulse phase selection (_ _ _ x)" will be also disabled. When [Pr. PA01] is set to other than "Point table method (_ _ _ 6)" and "Program method (_ _ _ 7)", [AL. 37 Parameter error] occurs. When "5" is set, assign PP/PP2 with [Pr. PD44] and NP/NP2 with [Pr. PD46].	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PC20 *SNO Station number setting		Specify a station Number of the servo amplifier for RS-422 and USB communication. Always set one station to one axis of the servo amplifier. Setting one station Number to two or more stations will disable a normal communication. Setting range: 0 to 31	0 [Station]	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC21 *SOP RS-422 communication function selection		Select the details of RS-422 communication function.			
	_ _ _ x	For manufacturer setting	0h		
	_ _ x _	RS-422 communication baud rate selection 0: 9600 [bps] 1: 19200 [bps] 2: 38400 [bps] 3: 57600 [bps] 4: 115200 [bps] 6: 4800 [bps]	0h	○	○
	_ x _ _	RS-422 communication response delay time selection 0: Disabled 1: Enabled (responding after 800 μs or longer delay time)	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PC22 *COP1 Function selection C-1	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		2h		
	_ x _ _		0h		
	x _ _ _	Encoder cable communication method selection Select the encoder cable communication method. 0: Two-wire type 1: Four-wire type If the setting is incorrect, [AL. 16 Encoder initial communication error 1] or [AL. 20 Encoder normal communication error 1] occurs.	0h	○	○
PC24 *COP3 Function selection C-3	_ _ _ x	In-position range unit selection Select a unit of in-position range. 0: Command unit 1: Servo motor encoder pulse unit	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _	Error excessive alarm/error excessive warning level unit selection Select units for the error excessive alarm level setting with [Pr. PC43] and for the error excessive warning level setting with [Pr. PC73]. 0: 1 rev unit 1: 0.1 rev unit 2: 0.01 rev unit 3: 0.001 rev unit	0h	○	○
PC26 *COP5 Function selection C-5	_ _ _ x	[AL. 99 Stroke limit warning] selection Enable or disable [AL. 99 Stroke limit warning]. 0: Enabled 1: Disabled	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PC27 *COP6 Function selection C-6	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _	Undervoltage alarm selection Select the alarm and warning that occurs when the bus voltage drops to the undervoltage alarm level. 0: [AL. 102] regardless of servo motor speed 1: [AL. E9.1] occurs when the servo motor speed is 50 r/min or less, and [AL. 10.2] occurs when the servo motor speed is over 50 r/min.	0h	○	○
	x _ _ _	For manufacturer setting	0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC30 STA2 Home position return acceleration time constant		This parameter is used when a home position return is executed with the program method. Set the acceleration time constant for the home position return. Set an acceleration time from 0 r/min to the rated speed. Additionally, when a value of 20000 ms or more is set, it will be clamped to 20000 ms. Setting range: 0 to 50000	0 [ms]		○
PC31 STB2 Home position return deceleration time constant		This parameter is used when a home position return is executed with the program method. Set the deceleration time constant at the home position return. Set a deceleration time from the rated speed to 0 r/min. Additionally, when a value of 20000 ms or more is set, it will be clamped to 20000 ms. Setting range: 0 to 50000	0 [ms]		○
PC35 TL2 Internal torque limit 2		Set the parameter on the assumption that the maximum torque is 100.0 %. The parameter is for limiting the torque of the servo motor. No torque is generated when this parameter is set to "0.0". When TL1 (Internal torque limit selection) is turned on, internal torque limit 1 and internal torque limit 2 are compared and the lower value will be enabled. Set the parameter referring to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual". Setting range: 0.0 to 100.0	100.0 [%]	○	○

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td rowspan="3">PC36
*DMD
Status display selection</td><td>_ _ x x</td><td>Status display selection at power-on
Select a status display shown at power-on.
00: Cumulative feedback pulse
01: Servo motor speed
02: Droop pulses
03: Cumulative command pulses
04: Command pulse frequency
05: Analog speed command voltage (not used for the positioning mode)
06: Analog torque limit voltage
07: Regenerative load ratio
08: Effective load ratio
09: Peak load ratio
0A: Instantaneous torque
0B: Position within one-revolution/virtual position within one-revolution (1 pulse unit)
0C: Position within one-revolution/virtual position within one-revolution (1000 pulses unit)
0D: ABS counter/virtual ABS counter
0E: Load to motor inertia ratio
0F: Bus voltage
10: Internal temperature of encoder
11: Settling time
12: Oscillation detection frequency
13: Number of tough drives
14: Unit power consumption (1 W unit)
15: Unit power consumption (1 kW unit)
16: Unit total power consumption (1 Wh unit)
17: Unit total power consumption (100 kWh unit)
21: Current position
22: Command position
23: Command remaining distance
24: Point table No./Program No.
25: Step No.
26: Override voltage
27: Override level
28: Cam axis one cycle current value
29: Cam standard position
2A: Cam axis feed current value
2B: Cam No. in execution
2C: Cam stroke amount in execution
2D: Main axis current value
2E: Main axis one cycle current value</td><td>00h</td><td>○</td><td>○</td></tr>
<tr><td>_ x _ _</td><td>Status display at power-on in corresponding control mode
0: Depends on the control mode
<table><tr><th>Control mode</th><th>Status display at power-on</th></tr><tr><td>Positioning (point table method)</td><td>Current position</td></tr><tr><td>Positioning (program method)</td><td>Current position</td></tr></table>
1: Depends on the setting in the lower two digits of this parameter</td><td>0h</td><td>○</td><td>○</td></tr>
<tr><td>x _ _ _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td></tr>
<tr><td>PC37
VCO
Analog override Offset</td><td></td><td>Set an offset voltage of VC (Override input).
This will be automatic setting by executing VC automatic offset.

Setting range: -9999 to 9999</td><td>0
[mV]</td><td>○</td><td>○</td></tr>
</table>

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC38 TPO Analog torque limit offset		Set the offset voltage of TLA (Analog torque limit). Setting range: -9999 to 9999	0 [mV]	○	○
PC39 MO1 Analog monitor 1 offset		Set the offset voltage of MO1 (Analog monitor 1). Setting range: -9999 to 9999	0 [mV]	○	○
PC40 MO2 Analog monitor 2 offset		Set the offset voltage of MO2 (Analog monitor 2). Setting range: -9999 to 9999	0 [mV]	○	○
PC43 ERZ Error excessive alarm level		Set an error excessive alarm level. You can change the setting unit with "Error excessive alarm/error excessive warning level unit selection" in [Pr. PC24]. However, setting "0" will be 3 rev. Setting over 200 rev will be clamped to 200 rev. Setting range: 0 to 1000	0 [rev]	○	○
PC51 RSBR Forced stop deceleration time constant		Set a deceleration time constant for the forced stop deceleration function. Set the time taken from the rated speed to 0 r/min in a unit of ms. Setting "0" will be 100 ms.  [Precautions] ・If the servo motor torque is saturated at the maximum torque during a forced stop deceleration because the set time is too short, the time to stop will be longer than the set time constant. ・[AL. 50 Overload alarm 1] or [AL. 51 Overload alarm 2] may occur during forced stop deceleration, depending on the set value. ・After an alarm that leads to a forced stop deceleration, if an alarm that does not lead to a forced stop deceleration occurs or if the power supply is cut, dynamic braking will start regardless of the deceleration time constant setting. Setting range: 0 to 20000	100 [ms]	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PC54 RSUP1 Vertical axis freefall prevention compensation amount		Set the compensation amount of the vertical axis freefall prevention function. Set the amount in a unit of the servo motor rotation. The servo motor pulls up in a rotation direction of increasing address for the positive value and in a direction of decreasing address for the negative value in a unit of the servo motor rotation. For example, when [Pr. PA14 Rotation direction selection/travel direction selection] is set to "1" and a positive value is set for the compensation amount, the servo motor pulls up in the CW direction. The vertical axis freefall prevention function is performed when all of the following conditions are met. 1) The setting value of this parameter is other than "0". 2) The forced stop deceleration function is enabled. 3) Alarm has occurred or EM2 has turned off when the servo motor rotates at the zero speed or less. 4) MBR (Electromagnetic brake interlock) was enabled in [Pr. PD24], [Pr. PD25], and [Pr. PD28], and the base circuit shut-off delay time was set in [Pr. PC16]. Setting range: -25000 to 25000	0 [0.0001 rev]	○	○
PC60 *COPD Function selection C-D	_ _ _ x	Motor-less operation selection Set the motor-less operation. 0: Disabled 1: Enabled	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _	[AL. 9B Error excessive warning] selection 0: [AL. 9B Error excessive warning] is disabled. 1: [AL. 9B Error excessive warning] is enabled.	0h	○	○
PC66 LPSPL Mark detection range + (lower three digits) PC67 LPSPH Mark detection range + (upper three digits)		Set the upper limit of the mark detection. Upper and lower are a set. Setting address: $\underbrace{\_\ \_\ \_}_{\text{Upper 3 digits}}\ \underbrace{\_\ \_\ \_}_{\text{Lower 3 digits}}$ Lower 3 digits: [Pr. PC66] Upper 3 digits: [Pr. PC67] The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Set a same sign for [Pr. PC66] and [Pr. PC67]. A different sign will be recognized as minus sign data. When changing the direction to address decreasing, change it from the - side of the mark detection ([Pr. PC68] and [Pr. PC69]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PC66] to [Pr. PC69] are all set. Setting range: -999 to 999	0 Refer to Function column for unit.	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode	
				CP	CL
PC68 LPSNL Mark detection range - (lower three digits) PC69 LPSNH Mark detection range - (upper three digits)		Set the lower limit of the mark detection. Upper and lower are a set. Setting address: _ _ _ _ _ _ $\underbrace{\_\ \_\ \_}_{\text{Upper 3 digits}}\ \underbrace{\_\ \_\ \_}_{\text{Lower 3 digits}}$ Lower 3 digits: [Pr. PC68] Upper 3 digits: [Pr. PC69] The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Set a same sign for [Pr. PT68] and [Pr. PT69]. A different sign will be recognized as minus sign data. When changing the direction to address increasing, change it from the + side of the mark detection ([Pr. PC66] and [Pr. PC67]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PC66] to [Pr. PC69] are all set. Setting range: -999 to 999	0 Refer to Function column for unit.	○	○
PC73 ERW Error excessive warning level		Set an error excessive warning level. To enable the parameter, set "[AL. 9B Error excessive warning] selection" to "Enabled (1 _ _ _)" in [Pr. PC60]. The setting unit can be changed with "Error excessive alarm/error excessive warning level unit selection" in [Pr. PC24]. Set the level in rev unit. When "0" is set, 1 rev will be applied. Setting over 200 rev will be clamped to 200 rev. When an error reaches the set value, [AL. 9B Error excessive warning] will occur. When the error decreases lower than the set value, the warning will be canceled automatically. The minimum pulse width of the warning signal is 100 [ms]. Set as follows: [Pr. PC73 Error excessive warning level] < [Pr. PC43 Error excessive alarm level] When you set as [Pr. PC73 Error excessive warning level] ≥ [Pr. PC43 Error excessive alarm level], [AL. 52 Error excessive] will occur earlier than the warning. Setting range: 0 to 1000	0 [rev]	○	○

7.2.4 I/O setting parameters ([Pr. PD_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD01	Select input devices to turn on automatically.				
*DIA1 Input signal automatic on selection 1	_ _ _ x (HEX)	_ _ _ x (BIN): For manufacturer setting	0h		
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): SON (Servo-on) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		x _ _ _ (BIN): For manufacturer setting			
	_ _ x _ (HEX)	_ _ _ x (BIN): PC (Proportional control) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○
		_ _ x _ (BIN): TL (External torque limit selection) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		_ x _ _ (BIN): For manufacturer setting			
		x _ _ _ (BIN): For manufacturer setting			
	_ x _ _ (HEX)	_ _ _ x (BIN): For manufacturer setting	0h		
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): LSP (Forward rotation stroke end) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		x _ _ _ (BIN): LSN (Reverse rotation stroke end) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
	x _ _ _ (HEX)	_ _ _ X (BIN): EM2 (Forced stop 2) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): For manufacturer setting			
		x _ _ _ (BIN): For manufacturer setting			

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td>PD01
*DIA1
Input signal automatic on selection 1</td><td colspan="5">Convert the setting value into hexadecimal as follows.
<table>
<tr><th rowspan="2">Input device</th><th colspan="2">Initial value</th></tr>
<tr><th>BIN</th><th>HEX</th></tr>
<tr><td></td><td>0</td><td rowspan="4">0</td></tr>
<tr><td></td><td>0</td></tr>
<tr><td>SON (Servo-on)</td><td>0</td></tr>
<tr><td></td><td>0</td></tr>
</table>
<table>
<tr><th rowspan="2">Input device</th><th colspan="2">Initial value</th></tr>
<tr><th>BIN</th><th>HEX</th></tr>
<tr><td>PC (Proportional control)</td><td>0</td><td rowspan="4">0</td></tr>
<tr><td>TL (External torque limit selection)</td><td>0</td></tr>
<tr><td></td><td>0</td></tr>
<tr><td></td><td>0</td></tr>
</table>
<table>
<tr><th rowspan="2">Input device</th><th colspan="2">Initial value</th></tr>
<tr><th>BIN</th><th>HEX</th></tr>
<tr><td></td><td>0</td><td rowspan="4">0</td></tr>
<tr><td></td><td>0</td></tr>
<tr><td>LSP (Forward rotation stroke end)</td><td>0</td></tr>
<tr><td>LSN (Reverse rotation stroke end)</td><td>0</td></tr>
</table>
<table>
<tr><th rowspan="2">Input device</th><th colspan="2">Initial value</th></tr>
<tr><th>BIN</th><th>HEX</th></tr>
<tr><td>EM2 (Forced stop 2)</td><td>0</td><td rowspan="4">0</td></tr>
<tr><td></td><td>0</td></tr>
<tr><td></td><td>0</td></tr>
<tr><td></td><td>0</td></tr>
</table>
BIN 0: Use for an external input signal.
BIN 1: Automatic on</td></tr>
</table>

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD04 *DI1H Input device selection 1H	Any input device can be assigned to the CN1-15 pin.				
	_ _ x x	Not used with the positioning mode.	02h		
	x x _ _	Positioning mode - Device selection Refer to table 7.9 for settings.	02h	○	○

Table 7.9 Selectable input devices

Setting value	Input device (Note) CP	Input device (Note) CL
0 2 _ _	SON	SON
0 3 _ _	RES	RES
0 4 _ _	PC	PC
0 5 _ _	TL	TL
0 6 _ _	CR	CR
0 7 _ _	ST1	ST1
0 8 _ _	ST2	ST2
0 9 _ _	TL1	TL1
0 A _ _	LSP	LSP
0 B _ _	LSN	LSN
0 D _ _	CDP	CDP
1 2 _ _	MSD	MSD
1 E _ _	CLTC	CLTC
1 F _ _	CPCD	CPCD
2 0 _ _	MD0	MD0
2 1 _ _	CAMC	CAMC
2 3 _ _	TCH	
2 4 _ _	TP0	TP0
2 5 _ _	TP1	TP1
2 6 _ _	OVR	OVR
2 7 _ _	TSTP	TSTP
2 9 _ _	CI0	CI0
2 A _ _	CI1	CI1
2 B _ _	DOG	DOG
3 0 _ _		LPS
3 1 _ _	CI2	CI2
3 4 _ _		PI1
3 5 _ _		PI2
3 6 _ _		PI3
3 7 _ _	CI3	CI3
3 8 _ _	DI0	DI0
3 9 _ _	DI1	DI1
3 A _ _	DI2	DI2
3 B _ _	DI3	DI3
3 C _ _	DI4	

Note. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
The diagonal lines indicate manufacturer settings. Never change the setting.

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD12 *DI5H Input device selection 5H	Any input device can be assigned to the CN1-19 pin.				
	_ _ x x	Not used with the positioning mode.	07h		
	x x _ _	Positioning mode - Device selection Refer to table 7.9 in [Pr. PD04] for settings.	38h	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode	
				CP	CL
PD14	Any input device can be assigned to the CN1-41 pin.				
*DI6H	_ _ x x	Not used with the positioning mode.	08h		
Input device selection 6H	x x _ _	Positioning mode - Device selection Refer to table 7.9 in [Pr. PD04] for settings.	39h	○	○
PD18	Any input device can be assigned to the CN1-43 pin.				
*DI8H	_ _ x x	Not used with the positioning mode.	00h		
Input device selection 8H	x x _ _	Positioning mode - Device selection Refer to table 7.9 in [Pr. PD04] for settings.	07h	○	○
PD20	Any input device can be assigned to the CN1-44 pin.				
*DI9H	_ _ x x	Not used with the positioning mode.	00h		
Input device selection 9H	x x _ _	Positioning mode - Device selection Refer to table 7.9 in [Pr. PD04] for settings.	08h	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode	
				CP	CL
PD24 *DO2 Output device selection 2	_ _ x x	Device selection Any output device can be assigned to the CN1-23 pin. Refer to table 7.10 for settings.	0Ch	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		

Table 7.10 Selectable output devices

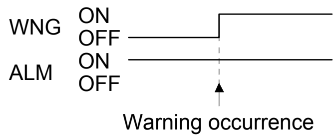
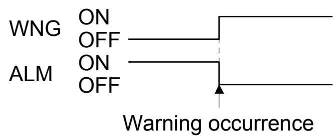
Setting value	Output device (Note)	
	CP	CL
_ _ 0 0	Always off	Always off
_ _ 0 2	RD	RD
_ _ 0 3	ALM	ALM
_ _ 0 4	INP	INP
_ _ 0 5	MBR	MBR
_ _ 0 7	TLC	TLC
_ _ 0 8	WNG	WNG
_ _ 0 A	SA	SA
_ _ 0 B	Always off	Always off
_ _ 0 C	ZSP	ZSP
_ _ 0 D	MTTR	MTTR
_ _ 0 F	CDPS	CDPS
_ _ 1 F	CPCC	CPCC
_ _ 2 3	CPO	CPO
_ _ 2 4	ZP	ZP
_ _ 2 5	POT	POT
_ _ 2 6	PUS	PUS
_ _ 2 7	MEND	MEND
_ _ 2 9	CLTS	CLTS
_ _ 2 B	CLTSM	CLTSM
_ _ 2 C	PED	PED
_ _ 2 D		SOUT
_ _ 2 E		OUT1
_ _ 2 F		OUT2
_ _ 3 0		OUT3
_ _ 3 1	ALMWNG	ALMWNG
_ _ 3 3	MSDH	MSDH
_ _ 3 4	MSDL	MSDL
_ _ 3 7	CAMS	CAMS
_ _ 3 8	PT0	
_ _ 3 9	PT1	
_ _ 3 A	PT2	
_ _ 3 B	PT3	

Note. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
The diagonal lines indicate manufacturer settings. Never change the setting.

No./symbol/ name	Setting digit	Function	Initial value [unit]	CP	CL
PD25 *DO3 Output device selection 3	_ _ x x	Device selection Any output device can be assigned to the CN1-24 pin. Refer to table 7.10 in [Pr. PD24] for settings.	04h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD28 *DO6 Output device selection 6	_ _ x x	Device selection Any output device can be assigned to the CN1-49 pin. Refer to table 7.10 in [Pr. PD24] for settings.	02h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PD29 *DIF Input filter setting	Select a filter for the input signal.				
	_ _ _ x	Input signal filter selection If external input signal causes chattering due to noise, etc., input filter is used to suppress it. 0: None 1: 0.888 [ms] 2: 1.777 [ms] 3: 2.666 [ms] 4: 3.555 [ms] 5: 4.444 [ms] 6: 5.333 [ms]	4h	○	○
	_ _ x _	RES (Reset) dedicated filter selection 0: Disabled 1: Enabled (50 [ms])	0h	○	○
	_ x _ _	CR (Clear) dedicated filter selection 0: Disabled 1: Enabled (50 [ms])	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PD30 *DOP1 Function selection D-1	_ _ _ x	Stop method selection for LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off Select a stop method for LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off. (Refer to section 7.5.) 0: Quick stop (home position erased) 1: Slow stop (home position erased) 2: Slow stop (deceleration to a stop by deceleration time constant) 3: Quick stop (stop by clearing remaining distance)	0h	○	○
	_ _ x _	Base circuit status selection for RES (Reset) on 0: Base circuit shut-off 1: No base circuit shut-off	0h	○	○
	_ x _ _	Stop method selection at software limit detection Select a stop method selection at software limit detection. (Refer to section 7.6.) 0: Quick stop (home position erased) 1: Slow stop (home position erased) 2: Slow stop (deceleration to a stop by deceleration time constant) 3: Quick stop (stop by clearing remaining distance)	0h	○	○
	x _ _ _	For manufacturer setting	0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD31 *DOP2 Function selection D-2	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _		0h		
	x _ _ _	Mark detection fast input signal filter selection 0: Standard 0.166 [ms] 1: 0.055 [ms] 2: 0.111 [ms] 3: 0.166 [ms] 4: 0.222 [ms] 5: 0.277 [ms] 6: 0.333 [ms] 7: 0.388 [ms] 8: 0.444 [ms] 9 to E: Disabled (Setting this will be the same as "F".) F: Non-filter This digit will be enabled when MSD (Mark detection) is assigned to the CN1-10 pin with [Pr. PD44].	0h	○	○
PD32 *DOP3 Function selection D-3	_ _ _ x	CR (Clear) selection This is used to set CR (Clear). 0: Deletes droop pulses by turning on the device 1: Always deletes droop pulses during the device on 2: Disabled	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PD33 *DOP4 Function selection D-4	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _	Rotation direction selection for enabling torque limit Select a rotation direction which enables the internal torque limit 2 and the external torque limit. Refer to section 3.6.1 (5) of "MR-JE-_A Servo Amplifier Instruction Manual" for details. 0: Enabled in both CCW or positive direction and CW or negative direction 1: Enabled in CCW or positive direction 2: Enabled in CW or negative direction	0h	○	○
	x _ _ _	For manufacturer setting	0h		

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td rowspan="4">PD34
*DOP5
Function selection D-5</td><td>_ _ _ x</td><td>Alarm code output
Select an alarm code output.
When an alarm occurs, the alarm code is outputted to CN1-23, CN1-24, and CN1-49 pins.
0: Disabled
1: Enabled
For details of the alarm codes, refer to chapter 8.
When "1" is set to this digit while MBR or ALM is assigned to CN1-23, CN1-24, or CN1-49 pin, [AL. 37 Parameter error] will occur.</td><td>0h</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td>Selection of output device at warning occurrence
Select ALM (Malfunction) output status for a warning occurrence.
<table><tr><th>Setting value</th><th>Device status</th></tr><tr><td>0</td><td></td></tr><tr><td>1</td><td></td></tr></table></td><td>0h</td><td>○</td><td>○</td></tr>
<tr><td>_ x _ _</td><td rowspan="2">For manufacturer setting</td><td>0h</td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td></tr>
</table>

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD41 *DIA3 Input signal automatic on selection 3		Select input devices to turn on automatically.			
	_ _ _ x (HEX)	_ _ _ x (BIN): MD1 (operation mode selection 2) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): For manufacturer setting			
		x _ _ _ (BIN): For manufacturer setting			
	_ _ x _ (HEX)	_ _ _ x (BIN): For manufacturer setting	0h		
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): OVR (Analog override selection) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		x _ _ _ (BIN): For manufacturer setting			
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
		Convert the setting value into hexadecimal as follows.			

0 0 _ _

Input device	Initial value BIN	Initial value HEX
MD0 (Operation mode selection 1)	0	0
	0	
	0	
	0	

Input device	Initial value BIN	Initial value HEX
	0	0
	0	
OVR (Analog override selection)	0	
	0	

BIN 0: Use for an external input signal.
BIN 1: Automatic on

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD42 *DIA4 Input signal automatic on selection 4		Select input devices to turn on automatically.			
	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _ (HEX)	_ _ _ x (BIN): DI0 (Point table No./program No. selection 1) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○
		_ _ x _ (BIN): DI1 (Point table No./Program No. selection 2) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		_ x _ _ (BIN): DI2 (Point table No./Program No. selection 3) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
		x _ _ _ (BIN): DI3 (Point table No./Program No. selection 4) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○
	x _ _ _	For manufacturer setting	0h		
		Convert the setting value into hexadecimal as follows.			

0   0 0

Input device	Initial value BIN	Initial value HEX
DI0 (Point table No./Program No. 1)	0	0
DI1 (Point table No./Program No. 2)	0	
DI2 (Point table No./Program No. 3)	0	
DI3 (Point table No./Program No. 4)	0	

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PD44 *DI11H Input device selection 11H		Any input device can be assigned to the CN1-10 pin and the CN1-37 pin.			
	_ _ x x	Not used with the positioning mode.	00h		
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings. When "00" is set, PP/PP2 (Forward rotation pulse/Manual pulse generator) will be assigned. The CN1-37 pin is available with servo amplifiers manufactured in May, 2015 or later.	20h	○	○
PD46 *DI12H Input device selection 12H		Any input device can be assigned to the CN1-35 pin and the CN1-38 pin.			
	_ _ x x	Not used with the positioning mode.	00h		
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings. When "00" is set, NP/NP2 (Reverse rotation pulse/Manual pulse generator) will be assigned. The CN1-38 pin is available with servo amplifiers manufactured in May, 2015 or later.	2Bh	○	○

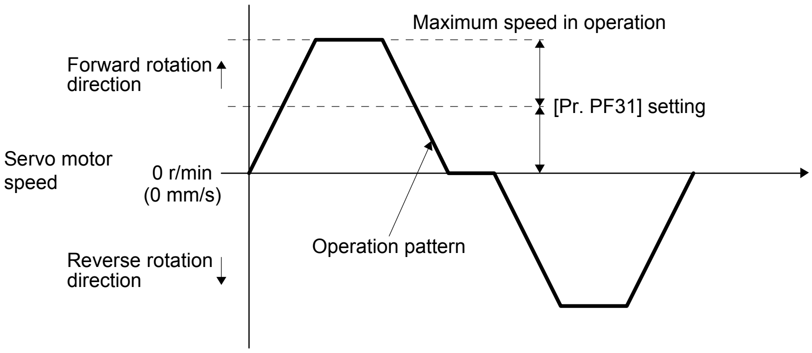
7.2.5 Extension setting 2 parameters ([Pr. PE_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PE41 EOP3 Function selection E-3	_ _ _ x	Robust filter selection 0: Disabled 1: Enabled When "Enabled" is set, the machine resonance suppression filter 5 that is set in [Pr. PB51] is not available.	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PE44 LMCP Lost motion compensation positive-side compensation value selection		Set the lost motion compensation for when reverse rotation (CW) switches to forward rotation (CCW) in increments of 0.01% assuming the rated torque as 100%. This parameter is available with servo amplifiers with software version C5 or later. Setting range: 0 to 30000	0 [0.01%]	○	○
PE45 LMCN Lost motion compensation negative-side compensation value selection		Set the lost motion compensation for when forward rotation (CCW) switches to reverse rotation (CW) in increments of 0.01% assuming the rated torque as 100%. This parameter is available with servo amplifiers with software version C5 or later. Setting range: 0 to 30000	0 [0.01%]	○	○
PE46 LMFLT Lost motion filter setting		Set the time constant of the lost motion compensation filter in increments of 0.1 ms. If the time constant is "0", the torque is compensated with the value set in [Pr. PE44] and [Pr. PE45]. If the time constant is other than "0", the torque is compensated with the high-pass filter output value of the set time constant, and the lost motion compensation will continue. This parameter is available with servo amplifiers with software version C5 or later. Setting range: 0 to 30000	0 [0.1 ms]	○	○
PE47 TOF Torque offset		Set this when canceling unbalanced torque of vertical axis. Set this assuming the rated torque of the servo motor as 100%. The torque offset does not need to be set for a machine not generating unbalanced torque. This parameter is available with servo amplifiers with software version C5 or later. Setting range: -10000 to 10000	0 [0.01%]	○	○
PE48 *LMOP Lost motion compensation function selection	_ _ _ x	Lost motion compensation selection 0: Disabled 1: Enabled This parameter is available with servo amplifiers with software version C5 or later.	0h	○	○
	_ _ x _	Unit setting of lost motion compensation non-sensitive band 0: 1 pulse unit 1: 1 kpulse unit This parameter is available with servo amplifiers with software version C5 or later.	0h	○	○
	_ x _ _	For manufacturer setting	0h		
	x _ _ _		0h		
PE49 LMCD Lost motion compensation timing		Set the lost motion compensation timing in increments of 0.1 ms. You can delay the timing to perform the lost motion compensation for the set time. This parameter is available with servo amplifiers with software version C5 or later. Setting range: 0 to 30000	0 [0.1 ms]	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PE50 LMCT Lost motion compensation non-sensitive band		Set the lost motion compensation non-sensitive band. When the fluctuation of droop pulses equals to or less than the setting value, the speed will be "0".The setting unit can be changed in [Pr. PE48].Set this parameter per encoder. This parameter is available with servo amplifiers with software version C5 or later. Setting range: 0 to 65535	0 [pulse]/ [kpulse]	○	○

7.2.6 Extension setting 3 parameters ([Pr. PF_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PF09 *FOP5 Function selection F-5		Electronic dynamic brake selection 0: Disabled 3: Automatic (enabled only for specified servo motors) Refer to the following table for the specified servo motors. Series / Servo motor HG-KN / HG-KN053/HG-KN13/HG-KN23/HG-KN43 HG-SN / HG-SN52	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		
PF21 DRT Drive recorder switching time setting		Set a drive recorder switching time. When a graph function is terminated or a USB communication is cut during using a graph function, the function will be changed to the drive recorder function after the setting time of this parameter. When a value from "1" to "32767" is set, the function will be switched to the drive recorder function after the set time. However, when "0" is set, it will be switched after 600 s. When "-1" is set, the drive recorder function is disabled. Setting range: -1 to 32767	0 [s]	○	○
PF23 OSCL1 Vibration tough drive - Oscillation detection level		Set a filter readjustment sensitivity of [Pr. PB13 Machine resonance suppression filter 1] and [Pr. PB15 Machine resonance suppression filter 2] while the vibration tough drive is enabled. Note that setting "0" will be 50%. Example: When "50" is set to this parameter, the filter will be readjusted at the time of the oscillation level reaching 50% or more. Setting range: 0 to 100	50 [%]	○	○
PF24 *OSCL2 Vibration tough drive function selection	_ _ _ x	Oscillation detection alarm selection Select whether to generate an alarm or a warning when an oscillation continues at a filter readjustment sensitivity level of [Pr. PF23]. The setting is always enabled regardless of the vibration tough drive in [Pr. PA20]. 0: [AL. 54 Oscillation detection] will occur at oscillation detection. 1: [AL. F3.1 Oscillation detection warning] will occur at oscillation detection. 2: Oscillation detection function disabled	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode	
				CP	CL
PF25 CVAT Instantaneous power failure tough drive - Detection time		Set the time until the occurrence of [AL. 10.1 Voltage drop in the power]. When "instantaneous power failure tough drive selection" is set to "Disabled (_ 0 _ _)" in [Pr. PA20], this parameter is disabled. When "Instantaneous power failure tough drive selection" is set to "Enabled (_ 1 _ _)" in [Pr. PA20], the power should be off for the setting value of this parameter +1 s or more before turning on the power to enable a parameter whose symbol is preceded by "*". Setting range: 30 to 2000	200 [ms]	○	○
PF31 FRIC Machine diagnosis function - Friction judgment speed		Set a servo motor speed to divide a friction estimation area into high and low for the friction estimation process of the machine diagnosis. However, setting "0" will be the value half of the rated speed. When your operation pattern is under rated speed, we recommend that you set half value to the maximum speed with this.  Setting range: 0 to permissible speed	0 [r/min]	○	○

7.2.7 Positioning control parameters ([Pr. PT_ _])

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT01 *CTY Command mode selection	_ _ _ x	Positioning command method selection 0: Absolute value command method 1: Incremental value command method	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _	Position data unit 0: mm 1: inch 2: degree 3: pulse	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PT02 *TOP1 Function selection T-1	_ _ _ x	Follow-up of SON (Servo-on) off/EM2 (Forced stop 2) off with absolute value command method in incremental system 0: Disabled (Home position is erased at servo-off or EM2 off.) 1: Enabled (Home position is not erased even if servo-off, EM2 off, or alarm occurrence which can be canceled with reset. The operation can be continued.)	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _	Point table/program writing inhibit 0: Allow 1: Inhibit	0h	○	○
PT03 *FTY Feeding function selection	_ _ _ x	Feed length multiplication [STM] 0: × 1 1: × 10 2: × 100 3: × 1000 This digit will be disabled when [degree] or [pulse] of "Position data unit" is set in [Pr. PT01].	0h	○	○
	_ _ x _	Manual pulse generator multiplication 0: × 1 1: × 10 2: × 100	0h	○	○
	_ x _ _	Shortest rotation selection per degree 0: Rotation direction specifying 1: Shortest rotation	0h	○	○
	x _ _ _	For manufacturer setting	0h		

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT04 *ZTY Home position return type	_ _ _ x	Home position return method 0: Dog type (rear end detection, Z-phase reference) 1: Count type (front end detection, Z-phase reference) 2: Data set type 3: Stopper type 4: Home position ignorance (servo-on position as home position) 5: Dog type (rear end detection, rear end reference) 6: Count type (front end detection, front end reference) 7: Dog cradle type 8: Dog type (front end detection, Z-phase reference) 9: Dog type (front end detection, front end reference) A: Dogless type (Z-phase reference)	0h	○	○
	_ _ x _	Home position return direction 0: Address increasing direction 1: Address decreasing command Setting "2" or more to this digit will be recognized as "1: Address decreasing direction".	1h	○	○
	_ x _ _	Home position shift distance multiplication Set a multiplication of [Pr. PT07 Home position shift distance]. 0: × 1 1: × 10 2: × 100 3: × 1000 When [degree] of "Position data unit" is set in [Pr. PT01] in the point table method or program method, only "0" and "1" are enabled.	0h	○	○
	x _ _ _	For manufacturer setting	0h		
PT05 ZRF Home position return speed		Set the servo motor speed for the home position return.. Setting range: 0 to permissible instantaneous speed	100 [r/min]	○	○
PT06 CRF Creep speed		Set a creep speed after proximity dog at home position return. Setting range: 0 to permissible instantaneous speed	10 [r/min]	○	○
PT07 ZST Home position shift distance		Set a shift distance from the Z-phase pulse detection position in the encoder. The unit will be changed to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. When "Home position shift distance multiplication" is set in [Pr. PT04], it is used with "×10n". Setting range: 0 to 65535	0 Refer to Function column for unit.	○	○
PT08 *ZPS Home position return position data		Set the current position when the home position return is complete. The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Additionally, when the following parameters are changed, the home position return position data will be changed. Execute the home position return again. ・"Position data unit" in [Pr. PT01] ・"Feed length multiplication (STM)" in [Pr. PT03] ・"Home position return type" in [Pr. PT04] Setting range: -32768 to 32767	0 Refer to Function column for unit.	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT09 DCT Travel distance after proximity dog		Set a travel distance after proximity dog at home position return for the count type, dog type rear end reference, count type front end reference, and dog type front end reference. The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: 0 to 65535	0 Refer to Function column for unit.	○	○
PT10 ZTM Stopper type home position return stopper time		Set a time from a moving part touches the stopper and torques reaches to the torque limit of [Pr. PT11 Stopper type home position return - Torque limit value] to a home position is set for the stopper type home position return. Setting range: 0 to 1000	100 [ms]	○	○
PT11 ZTT Stopper type home position return torque limit value		Set a torque limit value with [%] to the maximum torque at stopper type home position return. Setting range: 0.0 to 100.0	15.0 [%]	○	○
PT12 CRP Rough match output range		Set a range of the command remaining distance which outputs CPO (Rough match). The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: 0 to 65535	0 Refer to Function column for unit.	○	○
PT13 JOG JOG speed		Set a JOG speed. Setting range: 0 to permissible instantaneous speed	100 [r/min]	○	○
PT14 *BKC Backlash compensation		Set a backlash compensation for reversing command direction. This parameter compensates backlash pulses against the home position return direction. For the home position ignorance (servo-on position as home position), this turns on SON (Servo-on) and decides a home position, and compensates backlash pulses against the first rotation direction. Setting range: 0 to 65535	0 [pulse]	○	○
PT15 LMPL Software limit + (lower three digits) PT16 LMPH Software limit + (upper three digits)		Set an address increasing side of the software stroke limit. Upper and lower are a set. Setting address: _ _ _ _ _ _ Upper 3 digits → [Pr. PT16] Lower 3 digits → [Pr. PT15] The stop method depends on "Stop method selection at software limit detection" of [Pr. PD30]. The initial value is "Quick stop (home position erased)". Setting a same value with "Software limit -" will disable the software stroke limit. (Refer to section 7.4.) Set a same sign for [Pr. PT15] and [Pr. PT16]. A different sign will be recognized as minus sign data. When changing the direction to address decreasing, change it from the - side of the software limit ([Pr. PT17] and [Pr. PT18]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PT15] to [Pr. PT18] are all set. The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT17 LMNL Software limit - (lower three digits) PT18 LMNH Software limit - (upper three digits)		Set an address decreasing side of the software stroke limit. Upper and lower are a set. Setting address: _ _ _ _ _ _ Upper 3 digits: [Pr. PT18] Lower 3 digits: [Pr. PT17] The stop method depends on "Stop method selection at software limit detection" of [Pr. PD30]. The initial value is "Quick stop (home position erased)". Setting a same value with "Software limit +" will disable the software stroke limit. (Refer to section 7.4.) Set a same sign for [Pr. PT17] and [Pr. PT18]. A different sign will be recognized as minus sign data. When changing the direction to address increasing, change it from the + side of the software limit ([Pr. PT15] and [Pr. PT17]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PT15] to [Pr. PT18] are all set. The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○
PT19 *LPPL Position range output address + (lower three digits) PT20 *LPPH Position range output address + (upper three digits)		Set an address increasing side of the position range output address. Upper and lower are a set. Set a range which POT (Position range) turns on with [Pr. PT19] to [Pr. PT22]. Setting address: _ _ _ _ _ _ Upper 3 digits: [Pr. PT20] Lower 3 digits: [Pr. PT19] The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Set a same sign for [Pr. PT19] and [Pr. PT20]. Setting a different sign will trigger [AL. 37 Parameter error]. When changing the setting, be sure to set the lower three-digit data first and then the upper three-digit data. When changing the direction to address decreasing, change it from the - side of the position range output address ([Pr. PT21] and [Pr. PT22]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PT19] to [Pr. PT22] are all set. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT21 *LNPL Position range output address - (lower three digits)		Set an address decreasing side of the position range output address. Upper and lower are a set. Set a range which POT (Position range) turns on with [Pr. PT19] to [Pr. PT22]. Setting address: _ _ _ _ _ _ Upper 3 digits → [Pr. PT22] Lower 3 digits → [Pr. PT21] The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Set a same sign for [Pr. PT21] and [Pr. PT22]. Setting a different sign will trigger [AL. 37 Parameter error]. When changing the setting, be sure to set the lower three-digit data first and then the upper three-digit data. When changing the direction to address increasing, change it from the + side of the position range output address ([Pr. PT19] and [Pr. PT20]). An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PT19] to [Pr. PT22] are all set. Setting range: -999999 to 999999	0 Refer to Function column for unit.	○	○
PT22 *LNPH Position range output address - (upper three digits)					
PT23 OUT1 OUT1 output setting time		Set an output time for when OUT1 (Program output 1) is turned on with the OUTON command. Setting "0" will keep the on-state. To turn it off, use the OUTOF command. Setting range: 0 to 20000	0 [ms]		○
PT24 OUT2 OUT2 output setting time		Set an output time for when OUT2 (Program output 2) is turned on with the OUTON command. Setting "0" will keep the on-state. To turn it off, use the OUTOF command. Setting range: 0 to 20000	0 [ms]		○
PT25 OUT3 OUT3 output setting time		Set an output time for when OUT3 (Program output 3) is turned on with the OUTON command. Setting "0" will keep the on-state. To turn it off, use the OUTOF command. Setting range: 0 to 20000	0 [ms]		○

<table>
<tr><th rowspan="2">No./symbol/ name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="2">Control mode</th></tr>
<tr><th>CP</th><th>CL</th></tr>
<tr><td rowspan="4">PT26
*TOP2
Function selection T-2</td><td>_ _ _ x</td><td>Electronic gear fraction clear selection
0: Disabled
1: Enabled
Selecting "Enabled" will clear a fraction of the previous command by the electronic gear at start of the automatic operation.
Setting "2" or more to this digit will be "Disabled".</td><td>0h</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td>Current position/command position display selection
Select how to display a current position and command position.
<table>
<tr><th rowspan="2">Setting value</th><th rowspan="2">Displayed data</th><th rowspan="2">Operation mode</th><th colspan="2">Status display</th></tr>
<tr><th>Current position</th><th>Command position</th></tr>
<tr><td>0</td><td>Positioning display</td><td>Auto/Manual</td><td>Actual current position is displayed as machine home position is 0.</td><td>Command current position is displayed as machine home position is 0.</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Roll feed display</td><td>Automatic</td><td rowspan="2">Actual current position will be displayed as automatic operation start position is 0.</td><td>When ST1 (Forward rotation start) or ST2 (Reverse rotation start) is turned on, counting starts from 0 and a command current position to the target position is displayed.
When a stop, a point table command position is displayed for the point table method and 0 is always displayed for the program method.</td></tr>
<tr><td>Manual</td><td>"0" is always displayed.</td></tr>
</table>
This digit will be disabled when [degree] of "Position data unit" is set in [Pr. PT01].
Additionally, setting "2" or more will be "positioning display".</td><td>0h</td><td>○</td><td>○</td></tr>
<tr><td>_ x _ _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>Mark detection function selection
0: Current position latch function
1: Interrupt positioning function</td><td>0h</td><td>○</td><td>○</td></tr>
</table>

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT29 *TOP3 Function selection T-3		Set a polarity of DOG, SIG, PI1, PI2, and PI3.			
	_ _ _ x (HEX)	_ _ _ x (BIN): DOG (Proximity dog) polarity selection 0: Dog detection with off 1: Dog detection with on	0h	○	○
		_ _ x _ (BIN): For manufacturer setting			
		_ x _ _ (BIN): For manufacturer setting			
		x _ _ _ (BIN): Mark detection input polarity Select MSD (Mark detection) input polarity. 0: Normally closed contact 1: Normally open contact		○	○
	_ _ x _ (HEX)	_ _ _ x (BIN): PI1 (Program input 1) polarity selection 0: Positive logic 1: Negative logic	0h		○
		_ _ x _ (BIN): PI2 (Program input 2) polarity selection 0: Positive logic 1: Negative logic			○
		_ x _ _ (BIN): PI3 (Program input 3) polarity selection 0: Positive logic 1: Negative logic			○
		x _ _ _ (BIN): For manufacturer setting			
	_ x _ _	For manufacturer setting	0h		
	x _ _ _	For manufacturer setting	0h		

Convert the setting value into hexadecimal as follows.

0 0

Setting	Initial value BIN	Initial value HEX
DOG (Proximity dog) polarity selection	0	0
	0	
	0	
Mark detection input polarity	0	

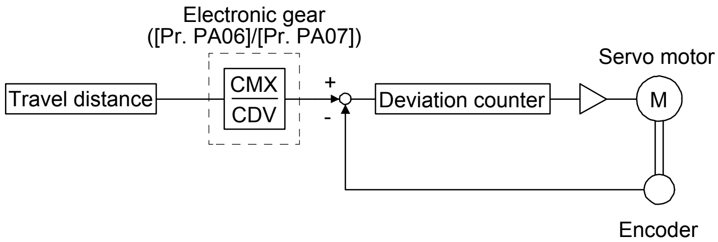
Setting	Initial value BIN	Initial value HEX
PI1 (Program input 1) polarity selection	0	0
PI2 (Program input 2) polarity selection	0	
PI3 (Program input 3) polarity selection	0	
	0	

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT30 MSTL Mark sensor stop travel distance (lower three digits) PT31 MSTH Mark sensor stop travel distance (upper three digits)		Set a mark sensor stop travel distance. Upper and lower are a set. When MSD (Mark detection) is on, the remaining distance will be changed to the travel distance that is set with this parameter. Setting address: _ _ _ _ _ _ (Upper 3 digits: [Pr. PT31]; Lower 3 digits: [Pr. PT30]) When changing the setting, be sure to set the lower three digits first. Then, set the upper three digits. An incorrect order of the setting will trigger [AL. 37]. Therefore, cycling power may be required after [Pr. PT30] and [Pr. PT31] are all set. The unit will be changed to 10^{STM} [μm], $10^{(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. Setting range: 0 to 999	0 Refer to Function column for unit.	○	○
PT34 *PDEF Point table/program default		Use this parameter when initializing point tables, programs, and cam data. The point tables, the programs, and the cam data will be the following status by being initialized. Point table: All "0" Program: Erased Cam data: Erased Initialize the point tables and the programs with the following procedures: 1) Set "5001h" to this parameter. 2) Cycle the power of the servo amplifier. After the servo amplifier power is on, the initialization completes in about 20 s. "dEF" will be displayed on the display (five-digit, seven-segment LED) during the initialization. After the initialization, the setting of this parameter will be "0000h" automatically. Initialize the cam data with the following procedures: 1) Set "5010h" to this parameter. 2) Cycle the power of the servo amplifier. After the initialization, the setting of this parameter will be "0000h" automatically. Initialize the point tables, the programs and the cam data with the following procedures: 1) Set "5011h" to this parameter. 2) Cycle the power of the servo amplifier. After the servo amplifier power is on, the initialization completes in about 20 s. "dEF" will be displayed on the display (five-digit, seven-segment LED) during the initialization. After the initialization, the setting of this parameter will be "0000h" automatically.	0000h	○	○
PT35 *TOP5 Function selection T-5	_ _ _ x	For manufacturer setting	0h		
	_ _ x _		0h		
	_ x _ _	Simple cam function selection 0: Disabled 1: Enabled This digit is enabled when the control mode is in the point table method or the program method. Enabling this digit in other control modes will trigger [AL. 37 Parameter error].	0h	○	○
	x _ _ _	For manufacturer setting	0h		

No./symbol/ name	Setting digit	Function	Initial value [unit]	Control mode CP	Control mode CL
PT41 ORP Home position return inhibit function selection	_ _ _ x	Home position return inhibit selection 0: Disabled (home position return allowed) 1: Enabled (home position return inhibited) Selecting "1" for this digit will disable the home position return regardless of turning on ST1 in the home position return mode.	0h	○	○
	_ _ x _	For manufacturer setting	0h		
	_ x _ _		0h		
	x _ _ _		0h		

7.3 How to set the electronic gear

(1) Setting [mm], [inch], or [pulse] with "Position data unit" of [Pr. PT01].
Adjust [Pr. PA06] and [Pr. PA07] to match the servo amplifier setting with the travel distance of the machine.

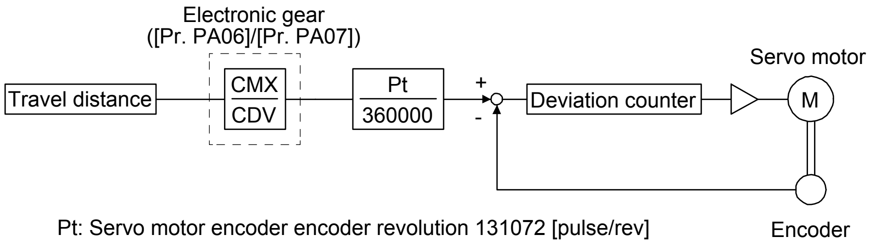


Pt: Servo motor encoder revolution 131072 [pulse/rev]
ΔS: Travel distance per servo motor revolution [mm/rev]/[inch/rev]/[pulse/rev]
CMX/CDV = Pt/ΔS

Set the electronic gear within the following range. Setting out of the range will trigger [AL. 37 Parameter error].

Electronic gear setting range
1/865 < CMX/CDV < 271471

(2) Setting [degree] with "Position data unit" of [Pr. PT01].
Set the number of gear teeth on machine side to [Pr. PA06] and the number of gear teeth on servo motor side to [Pr. PA07].

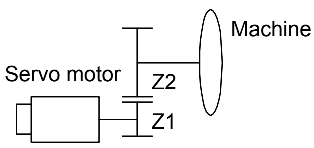


Pt: Servo motor encoder encoder revolution 131072 [pulse/rev]

Set the electronic gear within the following range. Setting out of the range will trigger [AL. 37 Parameter error].

(a) Set values to make numerator and denominator 16384 or lower if the electronic gear (CMX/CDV) is reduced to its lowest terms.
(b) Set values to make numerator and denominator 16777216 or lower if (CMX × Pt)/(CDV × 360000) is reduced to its lowest terms.

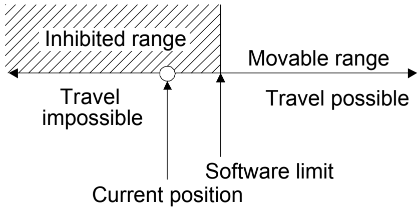
The following shows a setting example of the electronic gear.
The number of gear teeth on machine side: 25, and the number of gear teeth on servo motor side: 11
Set [Pr. PA06] = 25 and [Pr. PA07] = 11.



Pt (Servo motor resolution): 131072 pulses/rev
Z1: Number of gear teeth on servo motor side
Z2: Number of gear teeth on machine side
Z1: Z2 = 11:25

7.4 Software limit

The limit stop with the software limit ([Pr. PT15] to [Pr. PT18]) is the same as the motion of the stroke end. Exceeding a setting range will stop and servo-lock the shaft. This will be enabled at power-on and will be disabled at home position return. Setting a same value to "Software limit +" and "Software limit -" will disable this function. Setting a larger value to "Software limit -" than "Software limit +" will trigger [AL. 37.2 Parameter combination error].

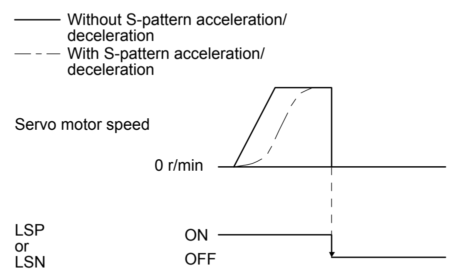
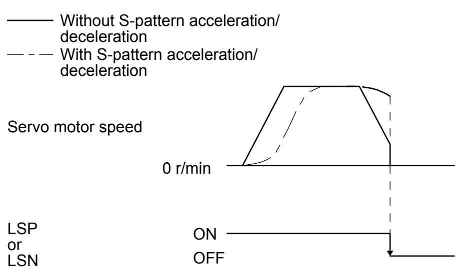
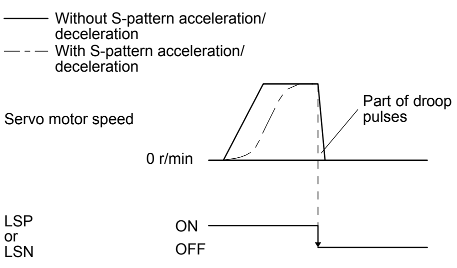
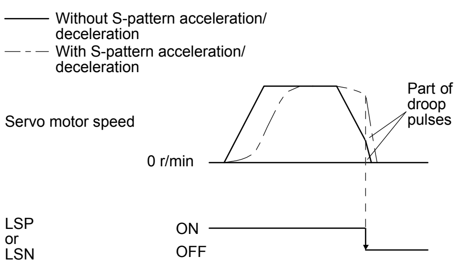
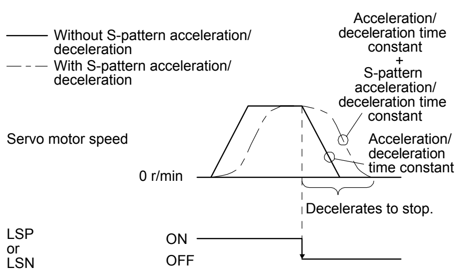
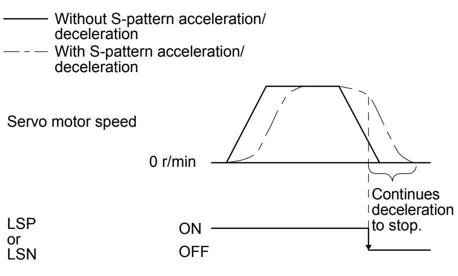
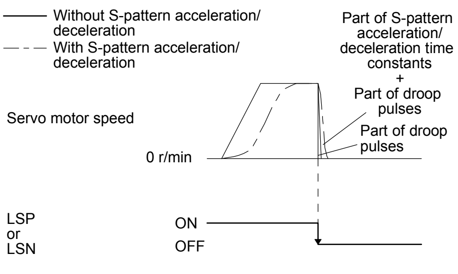
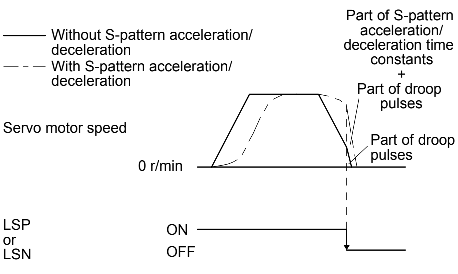


7.5 Stop method for LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off

Select a servo motor stop method for when LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is off with the first digit of [Pr. PD30].

[Pr. PD30]

Stop method selection for LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off
0: Quick stop (home position erased)
1: Slow stop (home position erased)
2: Slow stop (deceleration to a stop by deceleration time constant)
3: Quick stop (stop by clearing remaining distance)

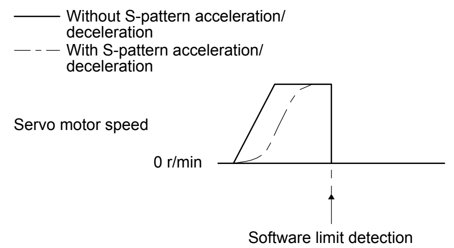
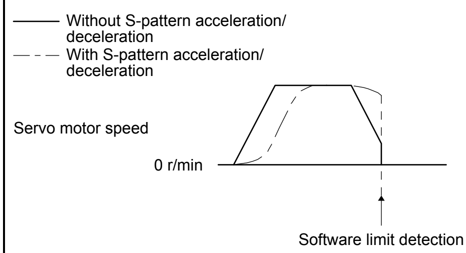
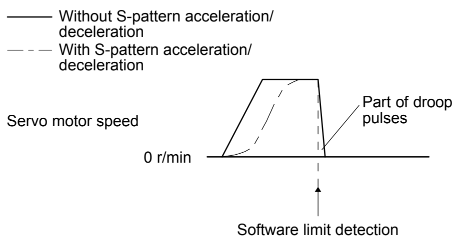
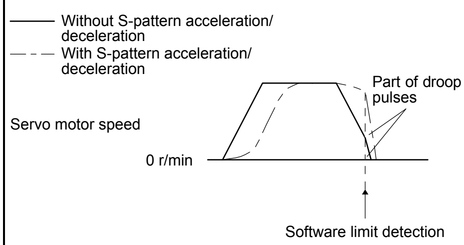
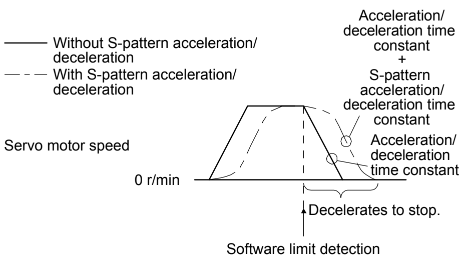
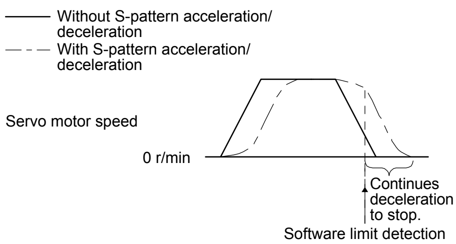
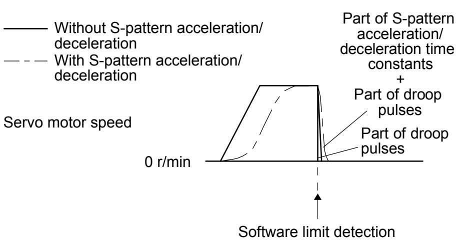
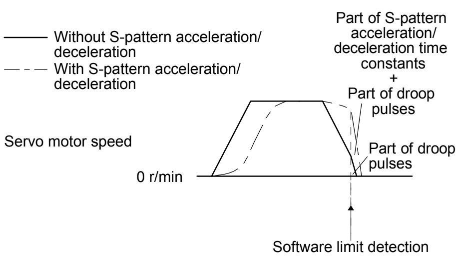
<table>
<tr><th rowspan="2">[Pr. PD30] setting</th><th colspan="2">Operation status</th><th rowspan="2">Remark</th></tr>
<tr><th>During rotation at constant speed</th><th>During deceleration to a stop</th></tr>
<tr><td>_ _ _ 0
(initial value)</td><td></td><td></td><td>Erases the droop pulses and stops the servo motor.
Erases the home position.
A difference will be generated between the command position and the current position.
Perform a home position return again.</td></tr>
<tr><td>_ _ _ 1</td><td></td><td></td><td>Travels for the droop pulses portion and stops the servo motor.
Erases the home position.
A difference will be generated between the command position and the current position.
Perform a home position return again.</td></tr>
<tr><td>_ _ _ 2</td><td></td><td></td><td>Decelerates to a stop with the deceleration time constant currently selected with the point table or the program.
Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants.
Maintains the home position.</td></tr>
<tr><td>_ _ _ 3</td><td></td><td></td><td>Travels for the droop pulses portion and stops the servo motor.
Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants.
Maintains the home position.</td></tr>
</table>

7.6 Stop method at software limit detection

Select a stop method of the servo motor for when a software limit ([Pr. PT15] to [Pr. PT18]) is detected with the setting of the third digit in [Pr. PD30]. The software limit limits a command position controlled in the servo amplifier. Therefore, actual stop position will not reach the set position of the software limit.

[Pr. PD30]

Stop method selection at software limit detection
0: Quick stop (home position erased)
1: Slow stop (home position erased)
2: Slow stop (deceleration to a stop by deceleration time constant)
3: Quick stop (stop by clearing remaining distance)

[Pr. PD30] setting	Operation status		Remark
	During rotation at constant speed	During deceleration to a stop	
_ 0 _ _ (initial value)			Erases the droop pulses and stops the servo motor. Erases the home position. A difference will be generated between the command position and the current position. Perform a home position return again.
_ 1 _ _			Travels for the droop pulses portion and stops the servo motor. Erases the home position. A difference will be generated between the command position and the current position. Perform a home position return again.
_ 2 _ _			Decelerates to a stop with the deceleration time constant currently selected with the point table or the program. Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants. Maintains the home position.
_ 3 _ _			Travels for the droop pulses portion and stops the servo motor. Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants. Maintains the home position.

8. TROUBLESHOOTING

POINT
●Refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings. ●As soon as an alarm occurs, turn SON (Servo-on) off and interrupt the power. ●[AL. 37 Parameter error] and warnings (except [AL. F0 Tough drive warning]) are not recorded in the alarm history.

When an error occurs during operation, the corresponding alarm or warning is displayed. When an alarm or the warning displayed, refer to "MELSERVO-JE Servo Amplifier Instruction Manual (Troubleshooting)" to remove the failure. When an alarm occurs, ALM (Malfunction) will turn off.

8.1 Explanations of the lists

(1) No./Name/Detail No./Detail name
Indicates the No./name/detail No./detail name of alarms or warnings.

(2) Stop method
For the alarms and warnings in which "SD" is written in the stop method column, the servo motor stops with the dynamic brake after forced stop deceleration. For the alarms and warnings in which "DB" or "EDB" is written in the stop method column, the servo motor stops with the dynamic brake without forced stop deceleration.

(3) Alarm deactivation
After the cause of the alarm has been removed, the alarm can be deactivated by any of the methods marked ○ in the alarm deactivation column. Warnings are automatically canceled after the cause of occurrence is removed. Alarms are deactivated by alarm reset or power cycling.

Alarm deactivation	Explanation
Alarm reset	1. Turn on RES (Reset) with an input device. 2. Push the "SET" button while the display of the servo amplifier is in the current alarm display mode. 3. Click "Occurring Alarm Reset" in the "Alarm Display" window of MR Configurator2.
Power cycling	Turn off the power, check that the 5-digit, 7-segment LED display is off, and then turn on the power.

(4) Alarm code
To output alarm codes, set [Pr. PD34] to "_ _ _ 1". Alarm codes are outputted by turning on/off bit 0 to bit 2. Warnings ([AL. 90] to [AL. F3]) do not have alarm codes. The alarm codes in the following table will be outputted when they occur. The alarm codes will not be outputted in normal condition.

8.2 Alarm list

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Power cycling	ACD2 (Bit 2)	ACD1 (Bit 1)	ACD0 (Bit 0)
Alarm	10	Undervoltage	10.1	Voltage drop in the power	EDB	○	○	0	1	0
			10.2	Bus voltage drop	SD	○	○			
	12	Memory error 1 (RAM)	12.1	RAM error 1	DB		○	0	0	0
			12.2	RAM error 2	DB		○			
			12.3	RAM error 3	DB		○			
			12.4	RAM error 4	DB		○			
			12.5	RAM error 5	DB		○			
			12.6	RAM error 6	DB		○			
	13	Clock error	13.1	Clock error 1	DB		○	0	0	0
			13.2	Clock error 2	DB		○			
			13.3	Clock error 3	DB		○			
	14	Control process error	14.1	Control process error 1	DB		○	0	0	0
			14.2	Control process error 2	DB		○			
			14.3	Control process error 3	DB		○			
			14.4	Control process error 4	DB		○			
			14.5	Control process error 5	DB		○			
			14.6	Control process error 6	DB		○			
			14.7	Control process error 7	DB		○			
			14.8	Control process error 8	DB		○			
			14.9	Control process error 9	DB		○			
			14.A	Control process error 10	DB		○			
			14.C	Control process error 12	DB		○			
			14.D	Control process error 13	DB		○			
	15	Memory error 2 (EEP-ROM)	15.1	EEP-ROM error at power on	DB		○	0	0	0
			15.2	EEP-ROM error during operation	DB		○			
			15.4	Home position information read error	DB		○			
	16	Encoder initial communication error 1	16.1	Encoder initial communication - Receive data error 1	DB		○	1	1	0
			16.2	Encoder initial communication - Receive data error 2	DB		○			
			16.3	Encoder initial communication - Receive data error 3	DB		○			
			16.5	Encoder initial communication - Transmission data error 1	DB		○			
			16.6	Encoder initial communication - Transmission data error 2	DB		○			
			16.7	Encoder initial communication - Transmission data error 3	DB		○			
			16.A	Encoder initial communication - Process error 1	DB		○			
			16.B	Encoder initial communication - Process error 2	DB		○			
			16.C	Encoder initial communication - Process error 3	DB		○			
			16.D	Encoder initial communication - Process error 4	DB		○			
			16.E	Encoder initial communication - Process error 5	DB		○			
			16.F	Encoder initial communication - Process error 6	DB		○			
	17	Board error	17.1	Board error 1	DB		○	0	0	0
			17.3	Board error 2	DB		○			
			17.4	Board error 3	DB		○			
			17.5	Board error 4	DB		○			
			17.6	Board error 5	DB		○			
			17.7	Board error 7	DB		○			

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation: Alarm reset	Alarm deactivation: Power cycling	Alarm code: ACD2 (Bit 2)	Alarm code: ACD1 (Bit 1)	Alarm code: ACD0 (Bit 0)
Alarm	19	Memory error 3 (Flash-ROM)	19.1	Flash-ROM error 1	DB		○	0	0	0
			19.2	Flash-ROM error 2	DB		○			
			19.4	Flash-ROM error 4	DB		○			
			19.5	Flash-ROM error 5	DB		○			
	1A	Servo motor combination error	1A.1	Servo motor combination error 1	DB		○	1	1	0
			1A.4	Servo motor combination error 2	DB		○			
	1E	Encoder initial communication error 2	1E.1	Encoder malfunction	DB		○	1	1	0
	1F	Encoder initial communication error 3	1F.1	Incompatible encoder	DB		○	1	1	0
	20	Encoder normal communication error 1	20.1	Encoder normal communication - Receive data error 1	EDB		○	1	1	0
			20.2	Encoder normal communication - Receive data error 2	EDB		○			
			20.3	Encoder normal communication - Receive data error 3	EDB		○			
			20.5	Encoder normal communication - Transmission data error 1	EDB		○			
			20.6	Encoder normal communication - Transmission data error 2	EDB		○			
			20.7	Encoder normal communication - Transmission data error 3	EDB		○			
			20.9	Encoder normal communication - Receive data error 4	EDB		○			
			20.A	Encoder normal communication - Receive data error 5	EDB		○			
	21	Encoder normal communication error 2	21.1	Encoder data error 1	EDB		○	1	1	0
			21.2	Encoder data update error	EDB		○			
			21.3	Encoder data waveform error	EDB		○			
			21.5	Encoder hardware error 1	EDB		○			
			21.6	Encoder hardware error 2	EDB		○			
			21.9	Encoder data error 2	EDB		○			
	24	Main circuit error	24.1	Ground fault detected at hardware detection circuit	DB		○	1	0	0
			24.2	Ground fault detected at software detection function	DB	○	○			
	25	Absolute position erased	25.1	Servo motor encoder - Absolute position erased	DB		○			
	30	Regenerative error	30.1	Regeneration heat error	DB	○ (Note 1)	○ (Note 1)	0	0	1
			30.2	Regeneration signal error	DB	○ (Note 1)	○ (Note 1)			
			30.3	Regeneration feedback signal error	DB	○ (Note 1)	○ (Note 1)			
	31	Overspeed	31.1	Abnormal motor speed	SD	○	○	1	0	1
	32	Overcurrent	32.1	Overcurrent detected at hardware detection circuit (during operation)	DB		○	1	0	0
			32.2	Overcurrent detected at software detection function (during operation)	DB	○	○			
			32.3	Overcurrent detected at hardware detection circuit (during a stop)	DB		○			
			32.4	Overcurrent detected at software detection function (during a stop)	DB	○	○			
	33	Overvoltage	33.1	Main circuit voltage error	EDB	○	○	0	0	1
	34	SSCNET receive error 1	34.1	SSCNET receive data error	SD	○	○			
			34.2	SSCNET connector connection error	SD	○	○			
			34.3	SSCNET communication data error	SD	○	○			
			34.4	Hardware error signal detection	SD	○	○			
	35	Command frequency error	35.1	Command frequency error	SD	○	○	1	0	1

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Power cycling	ACD2 (Bit 2)	ACD1 (Bit 1)	ACD0 (Bit 0)
Alarm	36	SSCNET receive error 2	36.1	Continuous communication data error	SD	○	○			
	37	Parameter error	37.1	Parameter setting range error	DB		○	0	0	0
			37.2	Parameter combination error	DB		○			
			37.3	Point table setting error	DB		○			
	39	Program error	39.1	Program error	DB		○	0	0	0
			39.2	Instruction argument external error	DB		○			
			39.3	Register No. error	DB		○			
			39.4	Non-correspondence command error	DB		○			
	3A	Inrush current suppression circuit error	3A.1	Inrush current suppression circuit error	EDB		○	0	0	0
	3E	Operation mode error	3E.1	Operation mode error	DB		○			
			3E.6	Operation mode switch error	DB		○	0	0	0
	45	Main circuit device overheat	45.1	Main circuit device overheat error 1	SD	○ (Note 1)	○ (Note 1)	0	1	1
	46	Servo motor overheat	46.1	Abnormal temperature of servo motor 1	SD	○ (Note 1)	○ (Note 1)	0	1	1
			46.5	Abnormal temperature of servo motor 3	DB	○ (Note 1)	○ (Note 1)			
			46.6	Abnormal temperature of servo motor 4	DB	○ (Note 1)	○ (Note 1)			
	47	Cooling fan error	47.2	Cooling fan speed reduction error	SD		○	0	1	1
	50	Overload 1	50.1	Thermal overload error 1 during operation	SD	○ (Note 1)	○ (Note 1)	0	1	1
			50.2	Thermal overload error 2 during operation	SD	○ (Note 1)	○ (Note 1)			
			50.3	Thermal overload error 4 during operation	SD	○ (Note 1)	○ (Note 1)			
			50.4	Thermal overload error 1 during a stop	SD	○ (Note 1)	○ (Note 1)			
			50.5	Thermal overload error 2 during a stop	SD	○ (Note 1)	○ (Note 1)			
			50.6	Thermal overload error 4 during a stop	SD	○ (Note 1)	○ (Note 1)			
	51	Overload 2	51.1	Thermal overload error 3 during operation	DB	○ (Note 1)	○ (Note 1)	0	1	1
			51.2	Thermal overload error 3 during a stop	DB	○ (Note 1)	○ (Note 1)			
	52	Error excessive	52.1	Excess droop pulse 1	SD	○	○	1	0	1
			52.3	Excess droop pulse 2	SD	○	○			
			52.4	Error excessive during 0 torque limit	SD	○	○			
			52.5	Excess droop pulse 3	EDB	○	○			
	54	Oscillation detection	54.1	Oscillation detection error	EDB	○	○	0	1	1
	56	Forced stop error	56.2	Over speed during forced stop	EDB	○	○	1	1	0
			56.3	Estimated distance over during forced stop	EDB	○	○			
	61	Operation error	61.1	Point table setting range error	DB	○	○	1	0	1
	69	Command error	69.1	Forward rotation-side software limit detection - Command excess error	SD	○	○	1	0	1
			69.2	Reverse rotation-side software limit detection - Command excess error	SD	○	○			
			69.3	Forward rotation stroke end detection - Command excess error	SD	○	○			
			69.4	Reverse rotation stroke end detection - Command excess error	SD	○	○			
	86	Network communication error	86.1	Network communication error 1	SD	○	○	0	0	0
			86.4	Network communication error 4	SD	○	○			
			86.5	Network communication error 5	SD	○	○			

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Power cycling	ACD2 (Bit 2)	ACD1 (Bit 1)	ACD0 (Bit 0)
Alarm	8A	USB communication time-out error/serial communication time-out error/Modbus RTU communication time-out error	8A.1	USB communication time-out error/serial communication time-out error	SD	○	○	0	0	0
			8A.2	Modbus RTU communication time-out error	SD	○	○			
	8C	Network module communication error	8C.1	Network module communication error 1	SD		○	0	0	0
			8C.2	Network module communication error 2	SD		○			
			8C.3	Network module communication error 3	SD		○			
			8C.4	Network module communication error 4	SD		○			
			8C.5	Network module communication error 5	SD		○			
			8C.6	Network module communication error 6	SD		○			
			8C.7	Network module communication error 7	SD		○			
	8E	USB communication error/serial communication error/Modbus RTU communication error	8E.1	USB communication receive error/serial communication receive error	SD	○	○	0	0	0
			8E.2	USB communication checksum error/serial communication checksum error	SD	○	○			
			8E.3	USB communication character error/serial communication character error	SD	○	○			
			8E.4	USB communication command error/serial communication command error	SD	○	○			
			8E.5	USB communication data number error/serial communication data number error	SD	○	○			
			8E.6	Modbus RTU communication receive error	SD	○	○			
			8E.7	Modbus RTU communication message frame error	SD	○	○			
			8E.8	Modbus RTU communication CRC error	SD	○	○			
	888/ 88888	Watchdog	88._/ 8888._	Watchdog	DB		○			

Note 1. After resolving the source of trouble, cool the equipment for approximately 30 minutes.

2. The following shows three stop methods of DB, EDB, and SD.

DB: Dynamic brake stop (For a servo amplifier without the dynamic brake, the servo motor coasts.)

EDB: Electronic dynamic brake stop (available with specified servo motors)

Refer to the following table for the specified servo motors. The stop method for other than the specified servo motors is DB.

For MR-JE_A, setting [Pr. PF09] to "(_ _ _ 3)" enables the electronic dynamic brake.

Series	Servo motor
HG-KN	HG-KN053/HG-KN13/HG-KN23/HG-KN43
HG-SN	HG-SN52

SD: Forced stop deceleration

3. This is applicable when [Pr. PA04] is set to the initial value. The stop method of SD can be changed to DB using [Pr. PA04].

8.3 Warning list

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)
Warning	90	Home position return incomplete warning	90.1	Home position return incomplete	
			90.2	Home position return abnormal termination	
			90.5	Z-phase unpassed	
	91	Servo amplifier overheat warning (Note 1)	91.1	Main circuit device overheat warning	
	92	Battery cable disconnection warning	92.1	Encoder battery cable disconnection warning	
			92.3	Battery degradation	
	96	Home position setting warning	96.1	In-position warning at home positioning	
			96.2	Command input warning at home positioning	
			96.3	Servo off warning at home positioning	
	97	Positioning specification warning	97.1	Program operation disabled warning	
	98	Software limit warning	98.1	Forward rotation-side software stroke limit reached	
			98.2	Reverse rotation-side software stroke limit reached	
	99	Stroke limit warning	99.1	Forward rotation stroke end off	(Note 4)
			99.2	Reverse rotation stroke end off	(Note 4)
	9B	Error excessive warning	9B.1	Excess droop pulse 1 warning	
			9B.3	Excess droop pulse 2 warning	
			9B.4	Error excessive warning during 0 torque limit	
	9F	Battery warning	9F.1	Low battery	
	E0	Excessive regeneration warning	E0.1	Excessive regeneration warning	
	E1	Overload warning 1	E1.1	Thermal overload warning 1 during operation	
			E1.2	Thermal overload warning 2 during operation	
			E1.3	Thermal overload warning 3 during operation	
			E1.4	Thermal overload warning 4 during operation	
			E1.5	Thermal overload warning 1 during a stop	
			E1.6	Thermal overload warning 2 during a stop	
			E1.7	Thermal overload warning 3 during a stop	
			E1.8	Thermal overload warning 4 during a stop	
	E3	Absolute position counter warning	E3.1	Multi-revolution counter travel distance excess warning	
			E3.2	Absolute position counter warning	
			E3.4	Absolute positioning counter EEP-ROM writing frequency warning	
			E3.5	Encoder absolute positioning counter warning	
	E4	Parameter warning	E4.1	Parameter setting range error warning	
	E6	Servo forced stop warning	E6.1	Forced stop warning	SD
	E7	Controller forced stop warning	E7.1	Controller forced stop input warning	SD
	E8	Cooling fan speed reduction warning	E8.1	Decreased cooling fan speed warning	

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)
Warning	E9	Main circuit off warning	E9.1	Servo-on signal on during main circuit off	DB
			E9.2	Bus voltage drop during low speed operation	DB
			E9.3	Ready-on signal on during main circuit off	DB
	EC	Overload warning 2	EC.1	Overload warning 2	
	ED	Output watt excess warning	ED.1	Output watt excess warning	
	F0	Tough drive warning	F0.1	Instantaneous power failure tough drive warning	
			F0.3	Vibration tough drive warning	
	F2	Drive recorder - Miswriting warning	F2.1	Drive recorder - Area writing time-out warning	
			F2.2	Drive recorder - Data miswriting warning	
	F3	Oscillation detection warning	F3.1	Oscillation detection warning	
	F4	Positioning warning	F4.4	Target position setting range error warning	
			F4.6	Acceleration time constant setting range error warning	
			F4.7	Deceleration time constant setting range error warning	
			F4.8	Control command input error warning	
	F5	Simple cam function - Cam data miswriting warning	F5.1	Cam data - Area writing time-out warning	
			F5.2	Cam data - Area miswriting warning	
			F5.3	Cam data checksum error	
	F6	Simple cam function - Cam control warning	F6.1	Cam axis one cycle current value restoration failed	
			F6.2	Cam axis feed current value restoration failed	
			F6.3	Cam unregistered error	
			F6.4	Cam control data setting range error	
			F6.5	Cam No. external error	
			F6.6	Cam control inactive	

Note 1. After resolving the source of trouble, cool the equipment for approximately 30 minutes.
2. The following shows two stop methods of DB and SD.
DB: Dynamic brake stop (For a servo amplifier without the dynamic brake, the servo motor coasts.)
SD: Forced stop deceleration
3. This is applicable when [Pr. PA04] is set to the initial value. The stop method of SD can be changed to DB using [Pr. PA04].
4. Quick stop or slow stop can be selected using [Pr. PD30] for the MR-JE-_A or using [Pr. PD35] for the MR-JE-_C (except in the profile mode).

MEMO

9. OPTIONS AND PERIPHERAL EQUIPMENT

⚠WARNING	●Before connecting options and peripheral equipment, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.

⚠CAUTION	●Use the specified peripheral equipment and options to prevent a malfunction or a fire.

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Cable/connector sets	MR-JE-_A section 11.1
Regenerative option	MR-JE-_A section 11.2
Junction terminal block MR-TB50	MR-JE-_A section 11.3
MR Configurator2	MR-JE-_A section 11.4
Selection example of wires	MR-JE-_A section 11.5
Molded-case circuit breakers, fuses, magnetic contactors	MR-JE-_A section 11.6
Power factor improving AC reactor	MR-JE-_A section 11.7
Relay (recommended)	MR-JE-_A section 11.8
Noise reduction techniques	MR-JE-_A section 11.9
Earth-leakage current breaker	MR-JE-_A section 11.10
EMC filter (recommended)	MR-JE-_A section 11.11

9.1 MR-HDP01 manual pulse generator

POINT

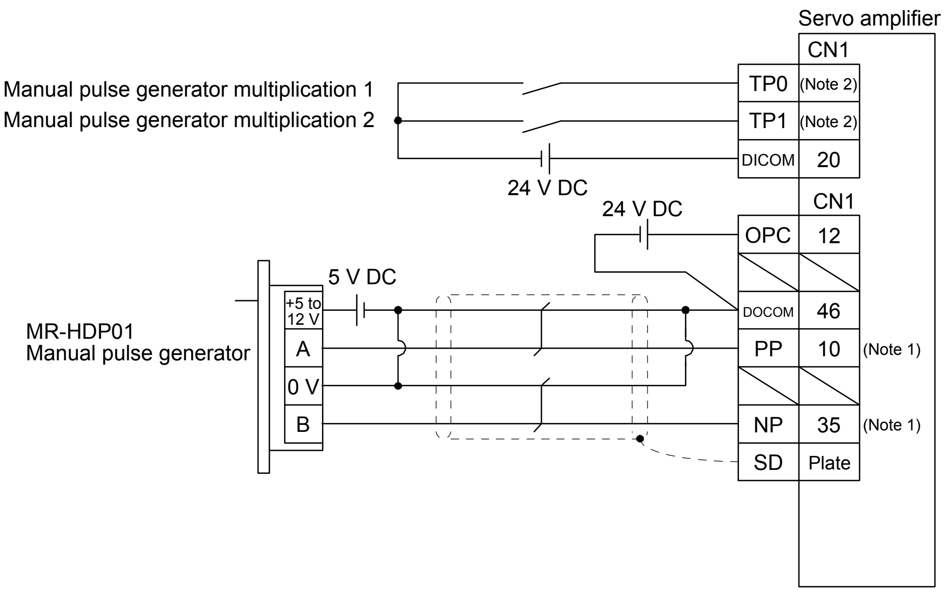
- When using an MR-HDP01, set [Pr. PA13 Command pulse input form] to "_ 2 _ 2" or "_ 3 _ 2".
- Configure MR-HDP01 with sink interface.

You can operate servo motors by using MR-HDP01 manual pulse generator. A multiplication to pulse signals which MR-HDP01 generates with external input signals can be changed with TP0 (Manual pulse generator multiplication 1) and TP1 (Manual pulse generator multiplication 2).

(1) Specifications

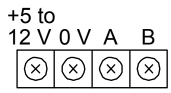
Item		Specifications
Power supply	Voltage	4.5 V DC to 13.2 V DC
	Consumption current	60 mA or less
Interface		Maximum output current: 20 mA for open collector output
Pulse signal form		A-phase/B-phase, 2 signals of 90° phase difference
Pulse resolution		100 pulses/rev
Maximum speed		Instantaneous maximum: 600 r/min, normal: 200 r/min
Temperature range for operation		-10 °C to 60 °C
Temperature range for storage		-30 °C to 80 °C

(2) Connection example



Note 1. To assign PP and NP, set [Pr. PD44] and [Pr. PD46] to "0 0 _ _".
2. To use this as an input device, assign to specified pin of the CN1 connector with [Pr. PD04] to [Pr. PD22].

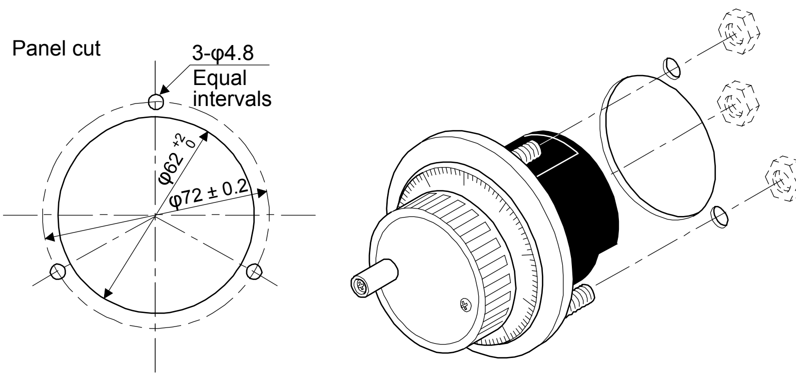
(3) Terminal assignment



Signal name	Description
+5 to 12 V	Power supply input
0 V	Common for power and signal
A	A-phase output pulse
B	B-phase output pulse

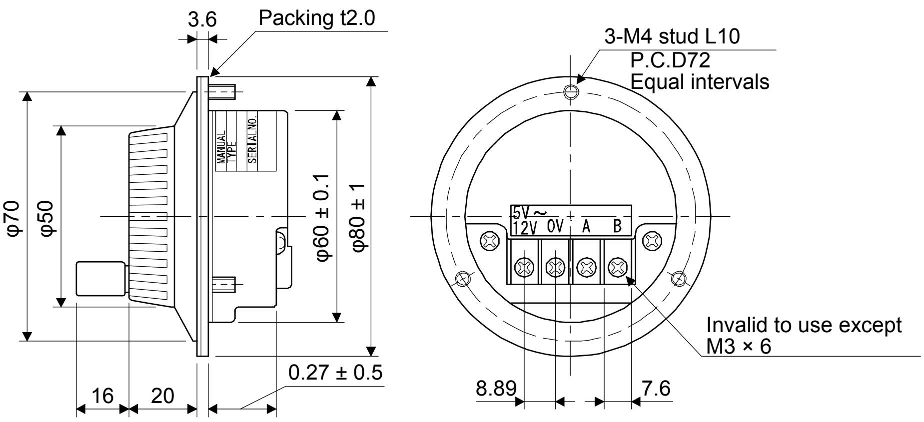
(4) Mounting

[Unit: mm]



(5) Dimensions

[Unit: mm]



MEMO

10. COMMUNICATION FUNCTION (MITSUBISHI ELECTRIC GENERAL-PURPOSE AC SERVO PROTOCOL)

The following items are the same as MR-JE-_A servo amplifiers. For details, refer to each section indicated in the detailed explanation field. "MR-JE-_A" means "MR-JE-_A Servo Amplifier Instruction Manual".

Item	Detailed explanation
Structure	MR-JE-_A section 12.1
Communication specifications	MR-JE-_A section 12.2
Protocol	MR-JE-_A section 12.3
Data processing	MR-JE-_A section 12.5.1
Status display	MR-JE-_A section 12.5.2
Parameter	MR-JE-_A section 12.5.3
Prohibiting/canceling I/O devices (DIO)	MR-JE-_A section 12.5.6
Alarm history	MR-JE-_A section 12.5.10
Current alarm	MR-JE-_A section 12.5.11
Software version	MR-JE-_A section 12.5.12

POINT

- Creating and reading programs are not available with Mitsubishi Electric general-purpose AC servo protocol (RS-422 communication). Use MR Configurator2.

10.1 Command and data No. list

POINT

- Even if a command or data No. is the same between different model servo amplifiers, its description may differ.
- The symbols in the control mode column mean as follows:
  CP: Positioning mode (point table method)
  CL: Positioning mode (program method)

10.1.1 Reading command

(1) Status display (command [0] [1])

Command	Data No.	Description	Status display	Control mode CP	Control mode CL	Frame length
[0] [1]	[0] [0]	Status display symbol and unit	Cumulative feedback pulses	○	○	16
	[0] [1]		Servo motor speed	○	○	
	[0] [2]		Droop pulses Servo motor-side droop pulses	○	○	
	[0] [3]		Cumulative command pulses			
	[0] [4]		Command pulse frequency			
	[0] [5]		Analog speed command voltage Analog speed limit voltage			
	[0] [6]		Analog torque limit voltage Analog torque command voltage			
	[0] [7]		Regenerative load ratio	○	○	
	[0] [8]		Effective load ratio	○	○	
	[0] [9]		Peak load ratio	○	○	
	[0] [A]		Instantaneous torque	○	○	
	[0] [B]		Position within one-revolution	○	○	
	[0] [C]		ABS counter	○	○	
	[0] [D]		Load to motor inertia ratio	○	○	
	[0] [E]		Bus voltage	○	○	
	[2] [0]		Internal temperature of encoder	○	○	
	[2] [1]		Settling time	○	○	
	[2] [2]		Oscillation detection frequency	○	○	
	[2] [3]		Number of tough drive operations	○	○	
	[2] [8]		Unit power consumption	○	○	
	[2] [9]		Unit total power consumption	○	○	
	[2] [A]		Current position	○	○	
	[2] [B]		Command position	○	○	
	[2] [C]		Command remaining distance	○	○	
	[2] [D]		Point table No./Program No.	○	○	
	[2] [E]		Step No.		○	
	[2] [F]		Analog override voltage	○	○	
	[3] [0]		Override level	○	○	
	[3] [3]		Cam axis one cycle current value	○	○	
	[3] [4]		Cam standard position	○	○	
	[3] [5]		Cam axis feed current value	○	○	
	[3] [6]		Cam No. in execution	○	○	
	[3] [7]		Cam stroke amount in execution	○	○	
	[3] [8]		Main axis current value	○	○	
	[3] [9]		Main axis one cycle current value	○	○	

Command	Data No.	Description	Status display	Control mode		Frame length
				CP	CL	
[0] [1]	[8] [0]	Status display data value and processing information	Cumulative feedback pulses	○	○	12
	[8] [1]		Servo motor speed	○	○	
	[8] [2]		Droop pulses	○	○	
	[8] [3]		Cumulative command pulses			
	[8] [4]		Command pulse frequency			
	[8] [5]		Analog speed command voltage Analog speed limit voltage			
	[8] [6]		Analog torque limit voltage Analog torque command voltage			
	[8] [7]		Regenerative load ratio	○	○	
	[8] [8]		Effective load ratio	○	○	
	[8] [9]		Peak load ratio	○	○	
	[8] [A]		Instantaneous torque	○	○	
	[8] [B]		Position within one-revolution	○	○	
	[8] [C]		ABS counter	○	○	
	[8] [D]		Load to motor inertia ratio	○	○	
	[8] [E]		Bus voltage	○	○	
	[A] [0]		Internal temperature of encoder	○	○	
	[A] [1]		Settling time	○	○	
	[A] [2]		Oscillation detection frequency	○	○	
	[A] [3]		Number of tough drive operations	○	○	
	[A] [8]		Unit power consumption	○	○	
	[A] [9]		Unit total power consumption	○	○	
	[A] [A]		Current position	○	○	
	[A] [B]		Command position	○	○	
	[A] [C]		Command remaining distance	○	○	
	[A] [D]		Point table No./Program No.	○	○	
	[A] [E]		Step No.		○	
	[A] [F]		Analog override voltage	○	○	
	[B] [0]		Override level	○	○	
	[B] [3]		Cam axis one cycle current value	○	○	
	[B] [4]		Cam standard position	○	○	
	[B] [5]		Cam axis feed current value	○	○	
	[B] [6]		Cam No. in execution	○	○	
	[B] [7]		Cam stroke amount in execution	○	○	
	[B] [8]		Main axis current value	○	○	
	[B] [9]		Main axis one cycle current value	○	○	

(2) Parameter (command [0] [4], [1] [5], [1] [6], [1] [7], [0] [8], and [0] [9])

Command	Data No.	Description	Control mode CP	Control mode CL	Frame length
[0] [4]	[0] [1]	Parameter group reading 0000: Basic setting parameters ([Pr. PA_ _]) 0001: Gain/filter parameters ([Pr. PB_ _]) 0002: Extension setting parameters ([Pr. PC_ _]) 0003: I/O setting parameters ([Pr. PD_ _]) 0004: Extension setting 2 parameters ([Pr. PE_ _]) 0005: Extension setting 3 parameters ([Pr. PF_ _]) 000C: Positioning control parameters ([Pr. PT_ _]) Reads the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the current values.	○	○	4
[1] [5]	[0] [1] to [F] [F]	Current value of each parameter Reads the current values of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the current values. The data No. (hexadecimal) value which is converted to decimal corresponds to the parameter No.	○	○	12
[1] [6]	[0] [1] to [F] [F]	Upper limit value of each parameter setting range Reads the permissible upper limit values of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the upper limit values. The data No. (hexadecimal) value which is converted to decimal corresponds to the parameter No.	○	○	
[1] [7]	[0] [1] to [F] [F]	Lower limit value of each parameter setting range Reads the permissible lower limit values of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the lower limit values. The data No. (hexadecimal) value which is converted to decimal corresponds to the parameter No.	○	○	
[0] [8]	[0] [1] to [F] [F]	Each parameter symbol Reads the symbols of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the symbol. The data No. (hexadecimal) value which is converted to decimal corresponds to the parameter No.	○	○	
[0] [9]	[0] [1] to [F] [F]	Writing enable/disable of parameters Reads writing enable/disable of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before reading the writing enable/disable. 0000: Writing enabled 0001: Writing disabled	○	○	4

(3) External I/O signals (command [1] [2])

Command	Data No.	Description	Control mode CP	Control mode CL	Frame length
[1] [2]	[0] [0] to [0] [2]	Input device status	○	○	8
	[4] [0]	External input pin status	○	○	
	[6] [0] to [6] [2]	Status of input device turned on by communication	○	○	
	[8] [0] to [8] [3]	Output device status	○	○	
	[C] [0]	External output pin status	○	○	

(4) Current position latch display (command [1] [A])

Command	Data No.	Description	Control mode CP	Control mode CL	Frame length
[1] [A]	[0] [0]	MSD (Mark detection) rising latch data (data part)	○	○	8
	[0] [1]	MSD (Mark detection) falling latch data (data part)	○	○	
	[0] [2]	MSD (Mark detection) rising latch data (data part + additional information)	○	○	12
	[0] [3]	MSD (Mark detection) falling latch data (data part + additional information)	○	○	

(5) Alarm history (command [3] [3])

Command	Data No.	Description	Alarm occurrence sequence	Control mode CP	Control mode CL	Frame length
[3] [3]	[1] [0]	Alarm No. in alarm history	Most recent alarm	○	○	4
	[1] [1]		One alarm ago	○	○	
	[1] [2]		Two alarms ago	○	○	
	[1] [3]		Three alarms ago	○	○	
	[1] [4]		Four alarms ago	○	○	
	[1] [5]		Five alarms ago	○	○	
	[1] [6]		Six alarms ago	○	○	
	[1] [7]		Seven alarms ago	○	○	
	[1] [8]		Eight alarms ago	○	○	
	[1] [9]		Nine alarms ago	○	○	
	[1] [A]		Ten alarms ago	○	○	
	[1] [B]		Eleven alarms ago	○	○	
	[1] [C]		Twelve alarms ago	○	○	
	[1] [D]		Thirteen alarms ago	○	○	
	[1] [E]		Fourteen alarms ago	○	○	
	[1] [F]		Fifteen alarms ago	○	○	
	[2] [0]	Alarm occurrence time in alarm history	Most recent alarm	○	○	8
	[2] [1]		One alarm ago	○	○	
	[2] [2]		Two alarms ago	○	○	
	[2] [3]		Three alarms ago	○	○	
	[2] [4]		Four alarms ago	○	○	
	[2] [5]		Five alarms ago	○	○	
	[2] [6]		Six alarms ago	○	○	
	[2] [7]		Seven alarms ago	○	○	
	[2] [8]		Eight alarms ago	○	○	
	[2] [9]		Nine alarms ago	○	○	
	[2] [A]		Ten alarms ago	○	○	
	[2] [B]		Eleven alarms ago	○	○	
	[2] [C]		Twelve alarms ago	○	○	
	[2] [D]		Thirteen alarms ago	○	○	
	[2] [E]		Fourteen alarms ago	○	○	
	[2] [F]		Fifteen alarms ago	○	○	

(6) Current alarm (command [0] [2])

Command	Data No.	Description	Control mode CP	Control mode CL	Frame length
[0] [2]	[0] [0]	Current alarm No.	○	○	4

(7) Status display at alarm occurrence (command [3] [5])

Command	Data No.	Description	Status display	Control mode		Frame length
				CP	CL	
[3] [5]	[0] [0]	Status display symbol and unit	Cumulative feedback pulses	○	○	16
	[0] [1]		Servo motor speed	○	○	
	[0] [2]		Droop pulses	○	○	
	[0] [3]		Cumulative command pulses			
	[0] [4]		Command pulse frequency			
	[0] [5]		Analog speed command voltage Analog speed limit voltage			
	[0] [6]		Analog torque limit voltage Analog torque command voltage			
	[0] [7]		Regenerative load ratio	○	○	
	[0] [8]		Effective load ratio	○	○	
	[0] [9]		Peak load ratio	○	○	
	[0] [A]		Instantaneous torque	○	○	
	[0] [B]		Position within one-revolution	○	○	
	[0] [C]		ABS counter	○	○	
	[0] [D]		Load to motor inertia ratio	○	○	
	[0] [E]		Bus voltage	○	○	
	[2] [0]		Internal temperature of encoder	○	○	
	[2] [1]		Settling time	○	○	
	[2] [2]		Oscillation detection frequency	○	○	
	[2] [3]		Number of tough drive operations	○	○	
	[2] [8]		Unit power consumption	○	○	
	[2] [9]		Unit total power consumption	○	○	
	[2] [A]		Current position	○	○	
	[2] [B]		Command position	○	○	
	[2] [C]		Command remaining distance	○	○	
	[2] [D]		Point table No./Program No.	○	○	
	[2] [E]		Step No.		○	
	[2] [F]		Analog override voltage	○	○	
	[3] [0]		Override level	○	○	
	[3] [3]		Cam axis one cycle current value	○	○	
	[3] [4]		Cam standard position	○	○	
	[3] [5]		Cam axis feed current value	○	○	
	[3] [6]		Cam No. in execution	○	○	
	[3] [7]		Cam stroke amount in execution	○	○	
	[3] [8]		Main axis current value	○	○	
	[3] [9]		Main axis one cycle current value	○	○	

Command	Data No.	Description	Status display	Control mode		Frame length
				CP	CL	
[3] [5]	[8] [0]	Status display data value and processing information	Cumulative feedback pulses	○	○	12
	[8] [1]		Servo motor speed	○	○	
	[8] [2]		Droop pulses	○	○	
	[8] [3]		Cumulative command pulses			
	[8] [4]		Command pulse frequency			
	[8] [5]		Analog speed command voltage Analog speed limit voltage			
	[8] [6]		Analog torque limit voltage Analog torque command voltage			
	[8] [7]		Regenerative load ratio	○	○	
	[8] [8]		Effective load ratio	○	○	
	[8] [9]		Peak load ratio	○	○	
	[8] [A]		Instantaneous torque	○	○	
	[8] [B]		Position within one-revolution	○	○	
	[8] [C]		ABS counter	○	○	
	[8] [D]		Load to motor inertia ratio	○	○	
	[8] [E]		Bus voltage	○	○	
	[A] [0]		Internal temperature of encoder	○	○	
	[A] [1]		Settling time	○	○	
	[A] [2]		Oscillation detection frequency	○	○	
	[A] [3]		Number of tough drive operations	○	○	
	[A] [8]		Unit power consumption	○	○	
	[A] [9]		Unit total power consumption	○	○	
	[A] [A]		Current position	○	○	
	[A] [B]		Command position	○	○	
	[A] [C]		Command remaining distance	○	○	
	[A] [D]		Point table No./Program No.	○	○	
	[A] [E]		Step No.		○	
	[A] [F]		Analog override voltage	○	○	
	[B] [0]		Override level	○	○	
	[B] [3]		Cam axis one cycle current value	○	○	
	[B] [4]		Cam standard position	○	○	
	[B] [5]		Cam axis feed current value	○	○	
	[B] [6]		Cam No. in execution	○	○	
	[B] [7]		Cam stroke amount in execution	○	○	
	[B] [8]		Main axis current value	○	○	
	[B] [9]		Main axis one cycle current value	○	○	

(8) Point table setting data (command [4] [0], [4] [5], [5] [0], [5] [4], [5] [8], [6] [0], [6] [4])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[4] [0]	[0] [1] to [1] [F]	Reading position data of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		8
[4] [5]	[0] [1] to [1] [F]	Reading M code of each point table This command will be available in the future. The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		
[5] [0]	[0] [1] to [1] [F]	Reading speed data of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		
[5] [4]	[0] [1] to [1] [F]	Reading acceleration time constant of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		
[5] [8]	[0] [1] to [1] [F]	Reading deceleration time constant of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		
[6] [0]	[0] [1] to [1] [F]	Reading dwell of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		
[6] [4]	[0] [1] to [1] [F]	Reading auxiliary function of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	○		

(9) Position data unit/Current position latch data (command [6] [C])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[6] [C]	[0] [0]	Reading position data unit _ _ _ x 0: mm, 1: inch, 2: pulse, 3: degree _ _ x _ 0: Enabled, 1: Disabled	○	○	4
	[0] [1]	Reading current position latch data Reads data latched at rising edge of LPS signal using LPOS command in the program operation.		○	12

(10) General purpose register (Rx) value (command [6] [D])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[6] [D]	[0] [1]	Reading general purpose register (R1) value		○	8
	[0] [2]	Reading general purpose register (R2) value		○	
	[0] [3]	Reading general purpose register (R3) value		○	
	[0] [4]	Reading general purpose register (R4) value		○	

(11) General purpose register (Dx) value (command [6] [E])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[6] [E]	[0] [1]	Reading general purpose register (D1) value		○	8
	[0] [2]	Reading general purpose register (D2) value		○	
	[0] [3]	Reading general purpose register (D3) value		○	
	[0] [4]	Reading general purpose register (D4) value		○	

(12) Number of general purpose register (command [6] [F])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[6] [F]	[0] [0]	Reading the number of general purpose register (Rx)		○	8
	[0] [1]	Reading the number of general purpose register (Dx)		○	

(13) Others (command [0] [0], [0] [2])

Command	Data No.	Description	Control mode		Frame length
			CP	CL	
[0] [0]	[1] [2]	Reading test operation mode 0000: Normal mode (not test operation mode) 0001: JOG operation 0002: Positioning operation 0004: Output signal (DO) forced output 0005: Single-step feed operation	○	○	4
	[1] [D]	Reading EEP-ROM stored data type 0000: Initial state 0001: Point table method 0002: Program method	○	○	
	[1] [E]	Reading control mode 0006: Positioning mode (point table method) 0007: Positioning mode (program method)	○	○	
[0] [2]	[9] [0]	Servo motor-side pulse unit absolute position	○	○	8
	[9] [1]	Command unit absolute position	○	○	
	[7] [0]	Software version	○	○	16

10.1.2 Writing commands

(1) Status display (command [8] [1])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[8] [1]	[0] [0]	Deleting status display data	1EA5	○	○	4

(2) Parameter (command [9] [4], [8] [5])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[9] [4]	[0] [1] to [F] [F]	Writing each parameter Writes the values of the parameters in the parameter group specified with the command [8] [5] + data No. [0] [0]. Therefore, be sure to specify the parameter group with the command [8] [5] + data No. [0] [0] before writing the values. The data No. (hexadecimal) value which is converted to decimal corresponds to the parameter No.	Varies depending on the parameter	○	○	12
[8] [5]	[0] [0]	Writing parameter group 0000: Basic setting parameters ([Pr. PA_ _]) 0001: Gain/filter parameters ([Pr. PB_ _]) 0002: Extension setting parameters ([Pr. PC_ _]) 0003: I/O setting parameters ([Pr. PD_ _]) 0004: Extension setting 2 parameters ([Pr. PE_ _]) 0005: Extension setting 3 parameters ([Pr. PF_ _]) 000C: Positioning control parameters ([Pr. PT_ _])	0000 to 000C	○	○	4

(3) External I/O signals (command [9] [2])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[9] [2]	[6] [0] to [6] [2]	Communication input device signal	Refer to section 10.2.2.	○	○	8

(4) Alarm history (command [8] [2])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[8] [2]	[2] [0]	Clearing alarm history	1EA5	○	○	4

(5) Current alarm (command [8] [2])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[8] [2]	[0] [0]	Clearing alarm	1EA5	○	○	4

(6) I/O device prohibition (command [9] [0])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[9] [0]	[0] [0]	Turns off the input devices except EM2, LSP and LSN, external analog input signals, and pulse train inputs, independently of the external on/off status.	1EA5	○	○	4
	[0] [3]	Prohibits all output devices (DO).	1EA5	○	○	
	[1] [0]	Cancels the prohibition of the input devices except EM2, LSP and LSN, external analog input signals and pulse train inputs.	1EA5	○	○	
	[1] [3]	Cancels the prohibition of the output device.	1EA5	○	○	

(7) Operation mode selection (command [8] [B])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[8] [B]	[0] [0]	Selecting test operation mode 0000: Test operation mode cancel 0001: JOG operation 0002: Positioning operation 0004: Output signal (DO) forced output 0005: Single-step feed operation	0000 to 0002, 0004, 0005	○	○	4

(8) Test operation mode data (command [9] [2], [A] [0])

Command	Data No.	Description	Setting range	Control mode		Frame length
				CP	CL	
[9] [2]	[0] [0] to [0] [2]	Input signal for test operation	Refer to section 14.5.7 of "MR-JE-_A Servo Amplifier Instruction Manual".	○	○	8
	[A] [0]	Forced output of signal pin	Refer to section 14.5.9 of "MR-JE-_A Servo Amplifier Instruction Manual".	○	○	
[A] [0]	[1] [0]	Write the servo motor speed in the test operation mode (JOG operation and positioning operation).	0000 to 7FFF	○	○	4
	[1] [1]	Write the acceleration/deceleration time constant in the test operation mode (JOG operation and positioning operation).	00000000 to 7FFFFFFF	○	○	8
	[2] [0]	Set the travel distance of the test operation mode (positioning operation).	00000000 to 7FFFFFFF	○	○	
	[2] [1]	Select the positioning direction of the test operation (positioning operation). 0 □ 0 □ 0: Forward rotation direction 1: Reverse rotation direction 0: Command pulse unit 1: Encoder pulse unit	0000 to 0101	○	○	4
	[4] [0]	This is a start command of the test operation (positioning operation).	1EA5	○	○	
	[4] [1]	Use this to make a temporary stop during test operation (positioning operation). "□" in the data indicates a blank. STOP: Temporary stop GO□□: Restart for remaining distance CLR□: Remaining distance clear	STOP GO□□ CLR□	○	○	

(9) Point table setting data (command [C] [0], [C] [2], [C] [6], [C] [7], [C] [8], [C] [A], [C] [B])

Command	Data No.	Description	Setting range	Control mode CP	Control mode CL	Frame length
[C] [0]	[0] [1] to [1] [F]	Writing position data of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	-999999 to 999999	○		8
[C] [2]	[0] [1] to [1] [F]	Writing M code of each point table This command will be available in the future. The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to 99	○		
[C] [6]	[0] [1] to [1] [F]	Writing speed data of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to permissible speed	○		
[C] [7]	[0] [1] to [1] [F]	Writing acceleration time constant of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to 20000	○		
[C] [8]	[0] [1] to [1] [F]	Writing deceleration time constant of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to 20000	○		
[C] [A]	[0] [1] to [1] [F]	Writing dwell of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to 20000	○		
[C] [B]	[0] [1] to [1] [F]	Writing auxiliary function of each point table The data No. (hexadecimal) value which is converted to decimal corresponds to the point table No.	0 to 3, 8 to 11	○		

(10) General purpose register (Rx) value (command [B] [9])

Command	Data No.	Description	Setting range	Control mode CP	Control mode CL	Frame length
[B] [9]	[0] [1]	Writing general purpose register (R1) value	Varies depending on the commands (Refer to section 5.2.2.)		○	8
	[0] [2]	Writing general purpose register (R2) value			○	
	[0] [3]	Writing general purpose register (R3) value			○	
	[0] [4]	Writing general purpose register (R4) value			○	

(11) General purpose register (Dx) value (command [B] [A])

Command	Data No.	Description	Setting range	Control mode CP	Control mode CL	Frame length
[B] [A]	[0] [1]	Writing general purpose register (D1) value	Varies depending on the commands (Refer to section 5.2.2.)		○	8
	[0] [2]	Writing general purpose register (D2) value			○	
	[0] [3]	Writing general purpose register (D3) value			○	
	[0] [4]	Writing general purpose register (D4) value			○	

10.2 Detailed explanations of commands

10.2.1 External I/O signal status (DIO diagnosis)

(1) Reading input device status
The current input device status can be read.

(a) Transmission
Transmit command [1] [2] + data No. [0] [0] to [0] [2].

Command	Data No.
[1] [2]	[0] [0] to [0] [2]

(b) Return
The slave station returns the status of the input devices.

b31 ... b1b0

1: On
0: Off

Command of each bit is transmitted to the master station as hexadecimal data.

Bit	Symbol		
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]
0	SON		MD0
1	LSP		
2	LSN		
3	TL		TCH
4	TL1		TP0
5	PC		TP1
6	RES		OVR
7	CR		
8	SP1		
9	SP2		DOG
10	SP3		
11	ST1/RS2		
12	ST2/RS1		
13	CMX1		
14	CMX2		
15	LOP		
16		MSD	LPS
17		PI1	
18	EM2/EM1	PI2	
19		PI3	
20	STAB2	CAMC	
21		CI0	
22		CI1	
23		CI2	
24	TSTP	CI3	DI0
25		CLTC	DI1
26		CPCD	DI2
27	CDP		DI3
28			DI4
29			
30			
31			

(2) Reading external input pin status

Reads the on/off statuses of the external input pins.

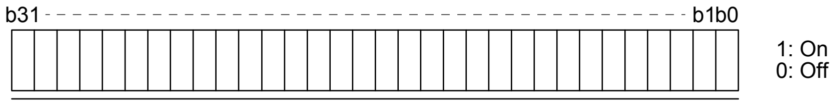
(a) Transmission

Transmit command [1] [2] + data No. [4] [0].

Command	Data No.
[1] [2]	[4] [0]

(b) Return

The on/off statuses of the input pins are returned.



Command of each bit is transmitted to the master station as hexadecimal data.

Bit	CN1 connector pin	Bit	CN1 connector pin
0	43	16	
1	44	17	
2	42	18	
3	15	19	
4	19	20	
5	41	21	
6	10 (Note)	22	
7	35 (Note)	23	
8		24	
9		25	
10		26	
11		27	
12		28	
13		29	
14		30	
15		31	

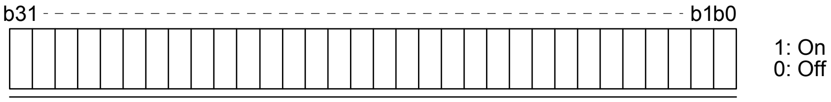
Note. When the pulse train input is selected with [Pr. PD44] or [Pr. PD46], this bit will be always "0" (off).

(3) Reading the status of input devices switched on with communication
Reads the on/off statuses of the input devices switched on with communication.

(a) Transmission
Transmit command [1] [2] + data No. [6] [0] to [6] [2].

Command	Data No.
[1] [2]	[6] [0] to [6] [2]

(b) Return
The slave station returns the status of the input devices.



Command of each bit is transmitted to the master station as hexadecimal data.

Bit	Symbol		
	Data No. [6] [0]	Data No. [6] [1]	Data No. [6] [2]
0	SON		MD0
1	LSP		
2	LSN		
3	TL		TCH
4	TL1		TP0
5	PC		TP1
6	RES		OVR
7	CR		
8	SP1		
9	SP2		DOG
10	SP3		
11	ST1/RS2		
12	ST2/RS1		
13	CMX1		
14	CMX2		
15	LOP		
16		MSD	LPS
17		PI1	
18	EM2/EM1	PI2	
19		PI3	
20	STAB2	CAMC	
21		CI0	
22		CI1	
23		CI2	
24	TSTP	CI3	DI0
25		CLTC	DI1
26		CPCD	DI2
27	CDP		DI3
28			DI4
29			
30			
31			

(4) Reading external output pin status

Reads the on/off statuses of the external output pins.

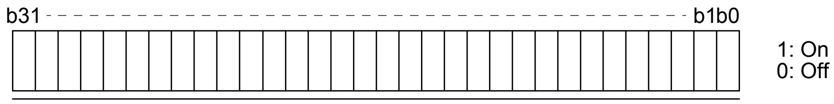
(a) Transmission

Transmit command [1] [2] + data No. [C] [0].

Command	Data No.
[1] [2]	[C] [0]

(b) Return

The slave station returns the status of the output devices.



Command of each bit is transmitted to the master station as hexadecimal data.

Bit	CN1 connector pin	Bit	CN1 connector pin
0	49	16	
1	24	17	
2	23	18	
3		19	
4		20	
5	48	21	
6	33	22	
7		23	
8		24	
9		25	
10		26	
11		27	
12		28	
13		29	
14		30	
15		31	

(5) Reading output device status

Reads the on/off statuses of the output devices.

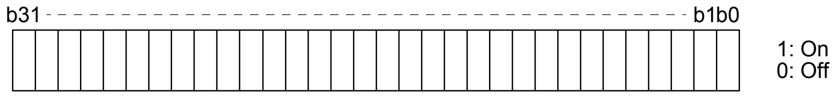
(a) Transmission

Transmit command [1] [2] + data No. [8] [0] to [8] [3].

Command	Data No.
[1] [2]	[8] [0] to [8] [3]

(b) Return

The slave station returns the status of the input/output devices.



Command of each bit is transmitted to the master station as hexadecimal data.

Bit	Symbol			
	Data No. [8] [0]	Data No. [8] [1]	Data No. [8] [2]	Data No. [8] [3]
0	RD			MCD00
1	SA			MCD01
2	ZSP			MCD02
3	TLC		CPO	MCD03
4	VLC		ZP	MCD10
5	INP		POT	MCD11
6			PUS	MCD12
7	WNG		MEND	MCD13
8	ALM			
9	OP			
10	MBR			
11				
12	ALCD0		PED	
13	ALCD1			
14	ALCD2			
15				
16				
17			ALMWNG	
18				
19		MSDH		
20		MSDL		
21		SOUT		
22		OUT1		
23		OUT2		
24		OUT3	PT0 (Note)	
25	CDPS	CAMS	PT1 (Note)	
26		CLTS	PT2 (Note)	
27		CLTSM	PT3 (Note)	
28		CPCC	PT4 (Note)	
29				
30				
31	MTTR			

Note. For MR-JE-_A servo amplifiers, up to four points of DO are available; therefore, PT0 to PT4 cannot be outputted simultaneously.

10.2.2 Input device on/off

POINT

- The on/off status of all devices in the servo amplifier are the status of the data received at last. Therefore, when there is a device which must be kept on, transmit data which turns the device on every time.

Each input device can be switched on/off. However, when the device to be switched off is in the external input signal, also switch off the input signal.

Transmit command [9] [2] + data No. [6] [0] to [6] [2].

Command	Data No.	Setting data
[9] [2]	[6] [0] to [6] [2]	See below.

b31 -- b1b0

1: On
0: Off

Command of each bit is transmitted to the master station as hexadecimal data.

Bit	Symbol		
	Data No. [6] [0]	Data No. [6] [1]	Data No. [6] [2]
0	SON		MD0
1	LSP		
2	LSN		
3	TL		TCH
4	TL1		TP0
5	PC		TP1
6	RES		OVR
7	CR		
8	SP1		
9	SP2		DOG
10	SP3		
11	ST1/RS2		
12	ST2/RS1		
13	CMX1		
14	CMX2		
15	LOP		
16		MSD	LPS
17		PI1	
18	EM2/EM1	PI2	
19		PI3	
20	STAB2	CAMC	
21		CI0	
22		CI1	
23		CI2	
24	TSTP	CI3	DI0
25		CLTC	DI1
26		CPCD	DI2
27	CDP		DI3
28			DI4
29			
30			
31			

10.2.3 Input device on/off (for test operation)

Each input devices can be turned on/off for test operation. However, when the device to be switched off is in the external input signal, also switch off the input signal.

Transmit command [9] [2] + data No. [0] [0] to [0] [2].

Command	Data No.	Setting data
[9] [2]	[0] [0] to [0] [2]	See below.

b31 - - - b1b0

1: On
0: Off

Command of each bit is transmitted to the master station as hexadecimal data.

Bit	Symbol		
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]
0	SON		MD0
1	LSP		
2	LSN		
3	TL		TCH
4	TL1		TP0
5	PC		TP1
6	RES		OVR
7	CR		
8	SP1		
9	SP2		DOG
10	SP3		
11	ST1/RS2		
12	ST2/RS1		
13	CMX1		
14	CMX2		
15	LOP		
16		MSD	LPS
17		PI1	
18	EM2/EM1	PI2	
19		PI3	
20	STAB2	CAMC	
21		CI0	
22		CI1	
23		CI2	
24	TSTP	CI3	DI0
25		CLTC	DI1
26		CPCD	DI2
27	CDP		DI3
28			DI4
29			
30			
31			

10.2.4 Test operation mode

POINT

- The test operation mode is for checking an operation. Do not use it for an actual operation.
- If communication stops for 0.5 s or longer during the test operation, the servo motor decelerates to a stop, resulting in servo-lock. To prevent this, keep the communication all the time by checking the status display, etc.
- The test operation mode can be started even in operation. In this case, switching to the test operation mode will shut off the base circuit to coast the servo motor.

(1) How to prepare and cancel the test operation mode

(a) Preparation of the test operation mode

Set the test operation mode type with the following procedure.

1) Setting of test operation mode

Transmit the command [8] [B] + data No. [0] [0] + data to set the test operation mode.

Command	Data No.	Transmission data	Setting test operation mode
[8] [B]	[0] [0]	0004	Output signal (DO) forced output (Note)
		0005	Single-step feed

Note. Refer to section 10.2.5 for the output signal (DO) forced output.

2) Check of test operation mode

Read the test operation mode set for the slave station, and check that it is set correctly.

a) Transmission

Transmit command [0] [0] + data No. [1] [2].

Command	Data No.
[0] [0]	[1] [2]

b) Return

The slave station returns the preset operation mode.

0	0	0	

Reading test operation mode
0: Normal mode (not test operation mode)
1: JOG operation
2: Positioning operation
3: Motor-less operation
4: Output signal (DO) forced output
5: Single-step feed

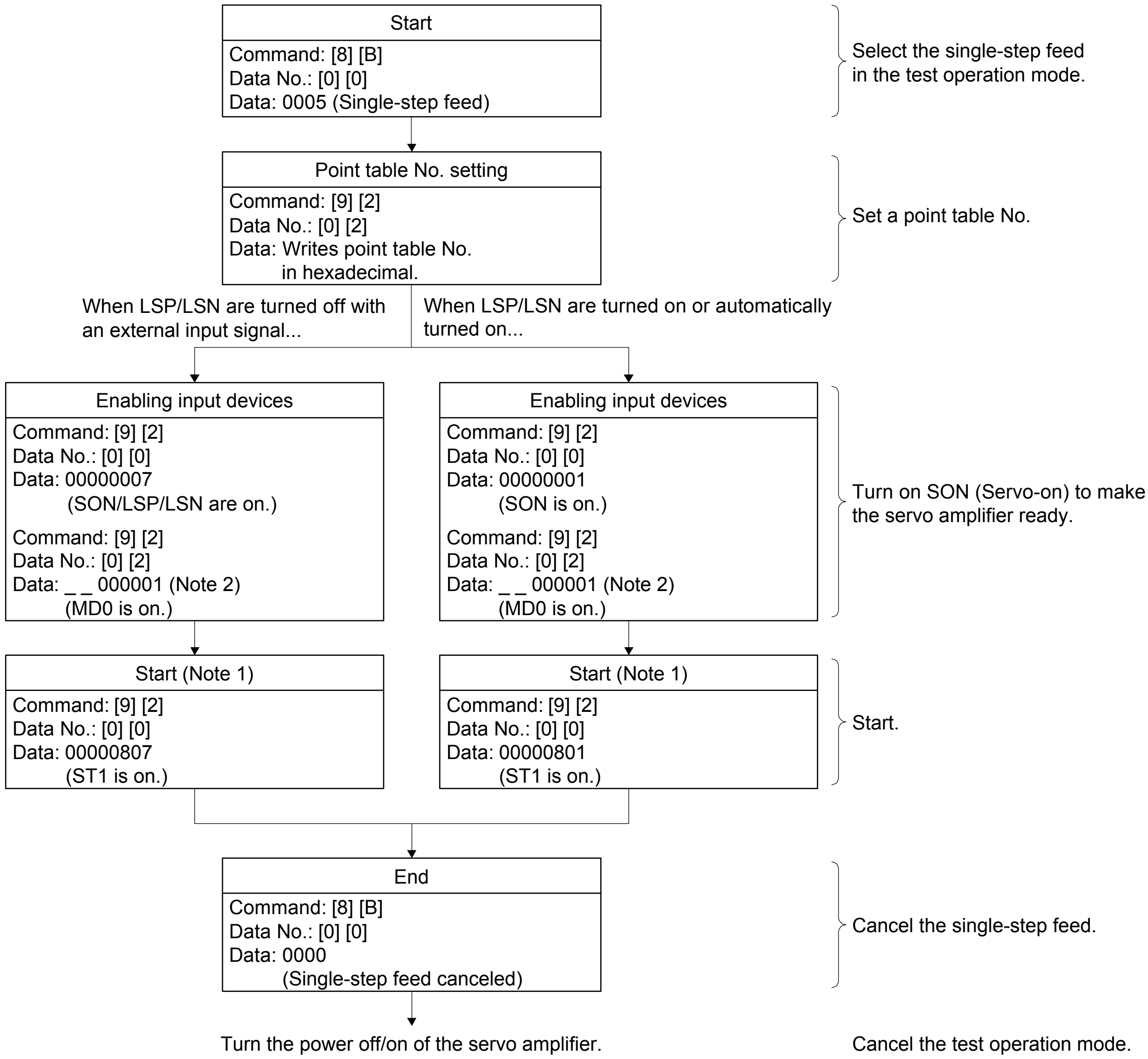
(b) Cancel of test operation mode

To stop the test operation mode, transmit the command [8] [B] + data No. [0] [0] + data. Turn off the servo amplifier before switching the operation mode from the test to the normal.

Command	Data No.	Transmission data	Setting test operation mode
[8] [B]	[0] [0]	0000	Test operation mode cancel

(2) Single-step feed

Set each value of target point tables for the single-step feed before executing single-step feed. Transmit command and data No. to execute single-step feed.



Note 1. Start it after checking ZP (Home position return completion). See the 4 bit of the read data with the command [1] [2] and data No. [8] [2].

2. A point table No. in hexadecimal will be entered to "_ _".

10.2.5 Output signal pin on/off (output signal (DO) forced output)

In the test operation mode, the output signal pins can be turned on/off regardless of the servo status. Disable the external input signals in advance with command [9] [0].

(1) Selecting the output signal (DO) forced output of the test operation mode
Transmit command + [8] [B] + data No. [0] [0] + data "0004" to select the output signal (DO) forced output.

0	0	0	4

Setting test operation mode
4: Output signal (DO) forced output

(2) External output signal on/off
Transmit the following communication commands.

Command	Data No.	Setting data
[9] [2]	[A] [0]	See below.

b31 -- b1b0

1: On
0: Off

Command of each bit is transmitted to the master station as hexadecimal data.

Bit	CN1 connector pin	Bit	CN1 connector pin
0	49	16	
1	24	17	
2	23	18	
3		19	
4		20	
5	48	21	
6	33	22	
7		23	
8		24	
9		25	
10		26	
11		27	
12		28	
13		29	
14		30	
15		31	

(3) Output signal (DO) forced output
To stop the output signal (DO) forced output, transmit command [8] [B] + data No. [0] [0] + data. Turn off the servo amplifier before switching the operation mode from the test to the normal.

Command	Data No.	Transmission data	Setting test operation mode
[8] [B]	[0] [0]	0000	Test operation mode cancel

10.2.6 Point table

(1) Reading data

(a) Position data

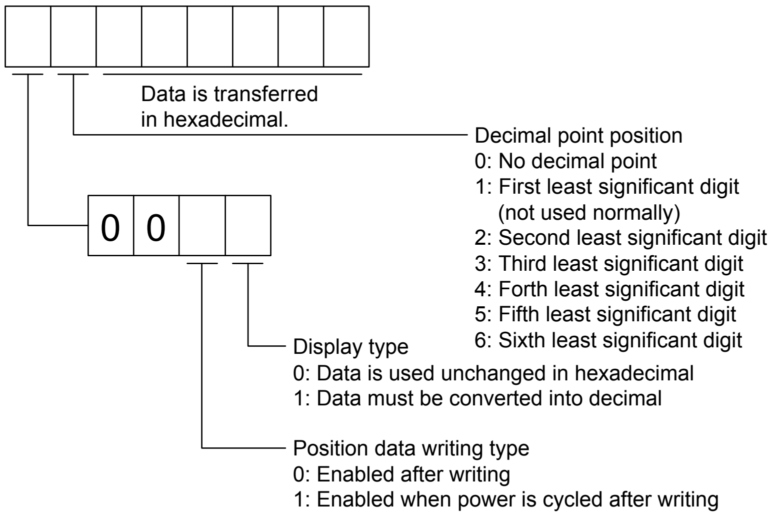
Reads position data of point tables.

1) Transmission

Transmits the command [4] [0] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the position data of point table requested.



(b) Speed data

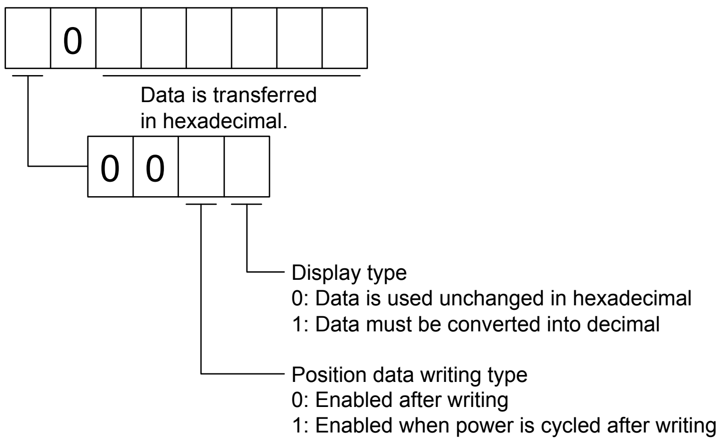
Reads speed data of point tables.

1) Transmission

Transmits the command [5] [0] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the speed data of point table requested.



(c) Acceleration time constant

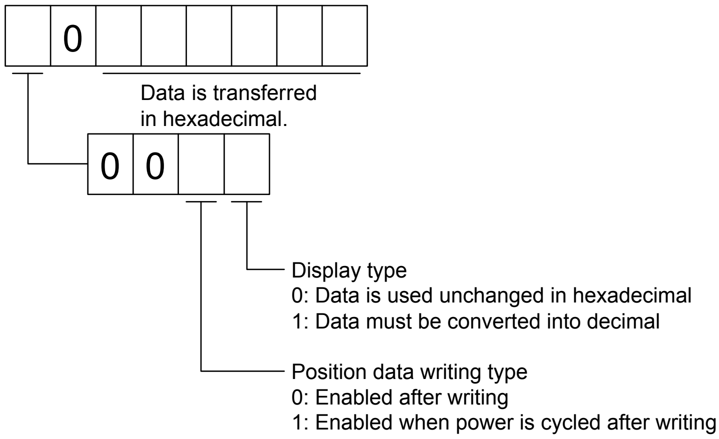
Reads acceleration time constant of point tables.

1) Transmission

Transmits the command [5] [4] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the acceleration time constant of point table requested.



(d) Deceleration time constant

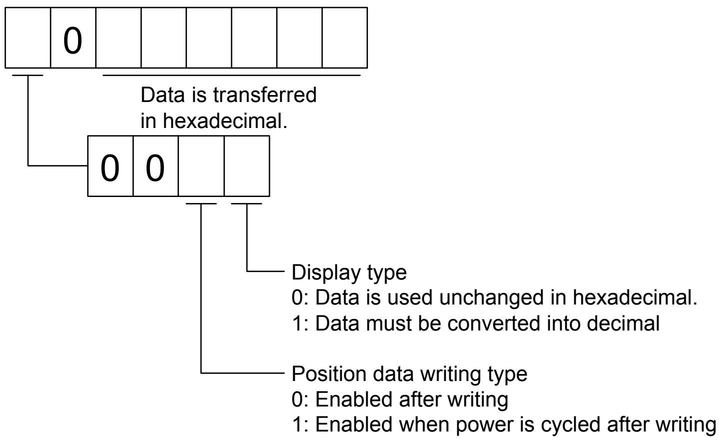
Reads deceleration time constant of point tables.

1) Transmission

Transmits the command [5] [8] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

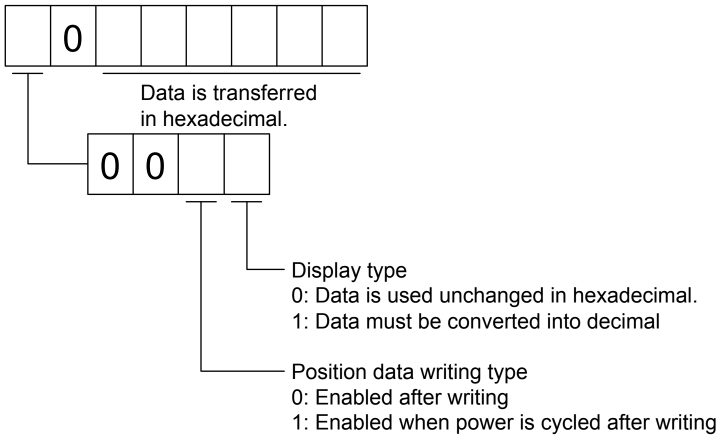
The slave station returns the deceleration time constant of point table requested.



(e) Dwell
Reads dwell of point tables.

1) Transmission
Transmits the command [6] [0] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

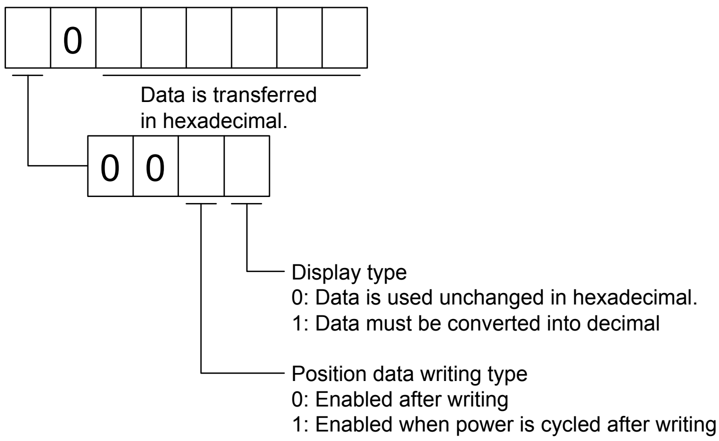
2) Return
The slave station returns the dwell of point table requested.



(f) Auxiliary function
Reads auxiliary function of point tables.

1) Transmission
Transmits the command [6] [4] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return
The slave station returns the auxiliary function of point table requested.



(g) M code

Reads M code of point tables.

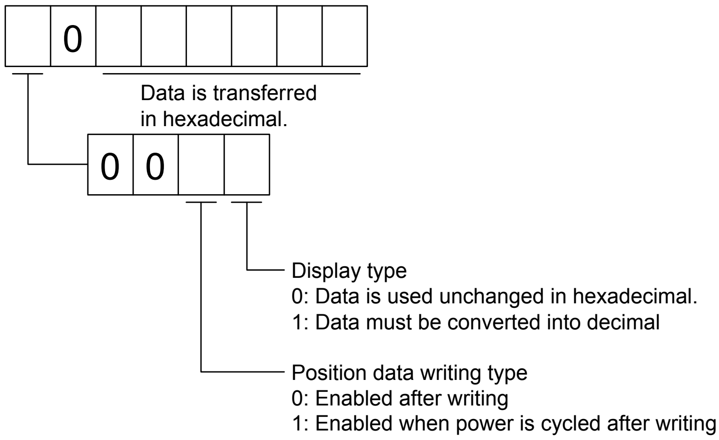
M code will be available in the future.

1) Transmission

Transmits the command [4] [5] + the data No. [0] [1] to [1] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the M code of point table requested.



(2) Writing data

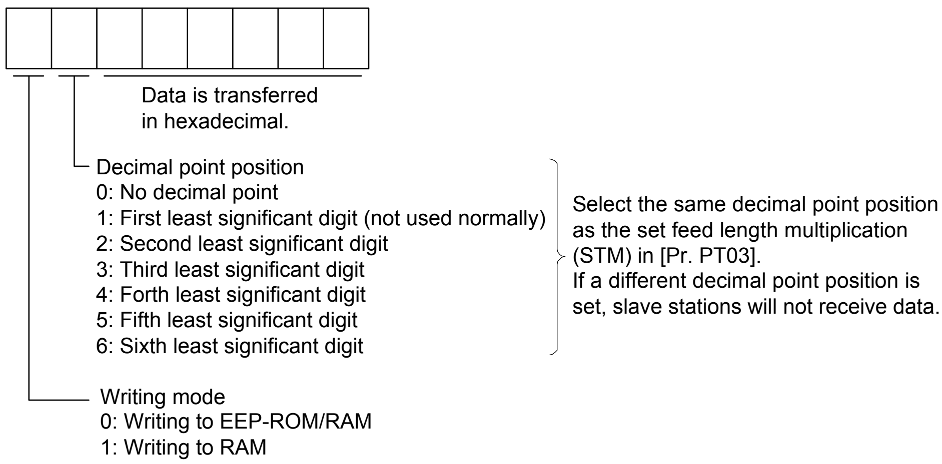
CAUTION	●If setting values need to be changed with a high frequency (i.e. once or more per hour), write the setting values to the RAM, not to the EEP-ROM. The EEP-ROM has a limitation in the number of write times, and exceeding this limitation causes the servo amplifier to malfunction. Note that the number of write times to the EEP-ROM is limited to approximately 100,000.

(a) Position data

Writes position data of point tables.

Transmits the command [C] [0] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [0]	[0] [1] to [1] [F]	Refer to the following:



When changing the position data frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

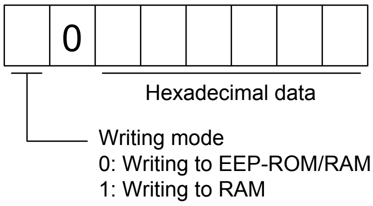
When changing data once or more within an hour, do not write it to the EEP-ROM.

(b) Speed data

Writes speed data of point tables.

Transmits the command [C] [6] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [6]	[0] [1] to [1] [F]	Refer to the following:



When changing the speed data frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

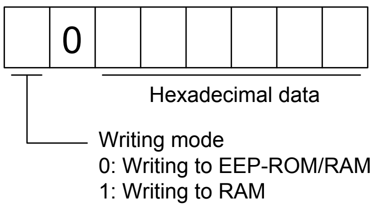
When changing data once or more within an hour, do not write it to the EEP-ROM.

(c) Acceleration time constant

Writes acceleration time constant of point tables.

Transmits the command [C] [7] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [7]	[0] [1] to [1] [F]	Refer to the following:



When changing the acceleration time constant frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

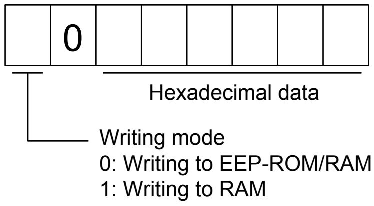
When changing data once or more within an hour, do not write it to the EEP-ROM.

(d) Deceleration time constant

Writes deceleration time constant of point tables.

Transmits the command [C] [8] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [8]	[0] [1] to [1] [F]	Refer to the following:



When changing the deceleration time constant frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

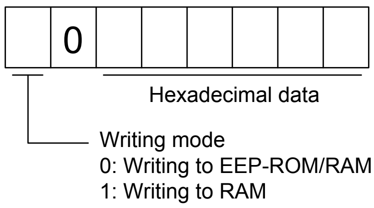
When changing data once or more within an hour, do not write it to the EEP-ROM.

(e) Dwell

Writes dwell of point tables.

Transmits the command [C] [A] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [A]	[0] [1] to [1] [F]	Refer to the following diagram.



When changing the dwell frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

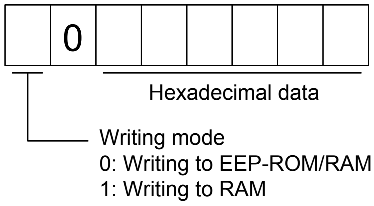
When changing data once or more within an hour, do not write it to the EEP-ROM.

(f) Auxiliary function

Writes auxiliary function of point tables.

Transmits the command [C] [B] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [B]	[0] [1] to [1] [F]	Refer to the following:



When changing the auxiliary function frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

When changing data once or more within an hour, do not write it to the EEP-ROM.

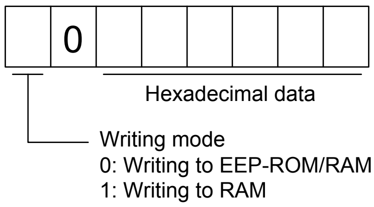
(g) M code

Writes M code of point tables.

M code will be available in the future.

Transmits the command [C] [2] + the data No. [0] [1] to [1] [F] corresponding to the point tables to write. Refer to section 10.1.1.

Command	Data No.	Data
[C] [2]	[0] [1] to [1] [F]	Refer to the following:



When changing the M code frequently using communication, set "1" to the write mode to change only the RAM data in the servo amplifier.

When changing data once or more within an hour, do not write it to the EEP-ROM.

MEMO

REVISIONS

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

Revision Date	*Manual Number	Revision	
May. 2015	SH(NA)030150ENG-A	First edition	
Dec. 2016	SH(NA)030150ENG-B	The details of the simple cam function are added.	
		3. To prevent injury, note the following	Partially changed.
		4. Additional instructions	
		(1) Transportation and installation	Partially changed.
		(2) Wiring	Partially added.
		(5) Corrective actions	Partially added.
		(6) Maintenance, inspection and parts replacement	Partially added and partially changed.
		DISPOSAL OF WASTE	The contents are entirely changed.
		Servo amplifier harmonic suppression measures	Deleted.
		Compliance with global standards	Partially changed.
		About the manual	The manual numbers are changed.
		Section 1.2	Partially changed.
		Section 1.3	Partially added and partially changed.
		Section 1.4	Partially added and partially changed.
		Section 2.2	Partially changed.
		Section 2.3	Partially changed.
		Section 2.6	Partially changed.
		Section 3.1.1	Partially changed.
		Section 3.1.2 (2)	Note is changed.
		Section 3.1.7	Notes are added.
		Section 3.1.9	Partially changed.
		Chapter 4	Sentences are added in the POINT.
		Section 4.1.1	Partially changed.
		Section 4.1.4	Sentences are added in the POINT.
		Section 4.2.1 (1) (b)	Partially changed.
		Section 4.2.2 (3) (e)	Partially changed.
		Section 4.2.2 (3) (f)	Partially changed.
		Section 4.4.8	Partially changed.
		Section 4.6	Partially changed.
		Section 5.1.1	Partially changed.
		Section 5.1.4	Sentences are added in the POINT.
		Section 5.2.2 (1)	Partially changed.
		Section 5.2.2 (2) (g)	Partially changed.
		Section 5.2.2 (2) (h)	Partially changed.
		Section 5.4.4	Partially changed.
		Section 5.8	Partially changed.
		Section 6.1	The composition is changed. The contents are added.
		Section 7.1	[Pr. PE44] to [Pr. PE50] are added and partially changed.
		Section 7.2	[Pr. PE44] to [Pr. PE50] are added and partially changed.
		Section 8.2	The composition is changed.
		Section 8.3	Deleted.
		Section 10.2.1	Partially changed.
		Section 10.2.2	Partially changed.
		Section 10.2.3	Partially changed.
Aug. 2017	SH(NA)030150ENG-C	A maximum altitude of 2000 m above sea level is supported.	
		3. To prevent injury, note the following	Partially changed.

Revision Date	*Manual Number	Revision	
Aug. 2017	SH(NA)030150ENG-C	4. Additional instructions	Partially changed.
		(1) Transportation and installation	Partially changed.
		(2) Wiring	Partially changed.
		(3) Test run and adjustment	Partially changed.
		(4) Usage	Partially changed.
		(5) Corrective actions	Partially changed.
		Relevant manuals	Partially changed.
		Chapter 2	CAUTION is added.
		Section 2.1	Partially changed.
		Section 4.1	WARNING and CAUTION are added. Partially changed.
		Section 4.2.2	Partially changed.
		Section 5.1	WARNING and CAUTION are added. Partially changed.
		Section 6.1	POINT is added. Partially changed.
		Section 6.1.9	POINT is added. Partially changed.
		Section 6.2.2	Partially changed.
		Chapter 7	CAUTION is changed.
		Section 7.2.2	Partially changed. Partially added.
		Section 7.2.3	Partially added.
		Section 7.2.4	Partially changed.
		Section 8.2	Partially changed.
		Section 8.3	Partially changed.

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first (“Warranty Period”). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

(1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule.
It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.

(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
- (i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
- (ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
- (iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
- (iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
- (v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
- (vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
- (vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
- (viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

(1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

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. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

(1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

(2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries.
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

MODEL	MR-JE-A INSTRUCTIONMANUAL(ITIGIME)
MODEL CODE	1CW707

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG MARUNOUCHI TOKYO 100-8310

SH(NA)030150ENG-C(1708)MEE Printed in Japan