MITSUBISHI
ELECTRIC

General-Purpose AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO-J4

General-Purpose Interface AC Servo

MODEL

MR-J4-_A_-RJ
MR-J4-03A6-RJ

SERVO AMPLIFIER
INSTRUCTION MANUAL
(POSITIONING MODE)

B

● 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 according to 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 or inspection, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P+ and N- is safe with a voltage tester and others. 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.
- During power-on or operation, do not open the front cover of the servo amplifier. Otherwise, it may cause an electric shock.
- Do not operate the servo amplifier with the front cover removed. High-voltage terminals and charging area are exposed and you may get an electric shock.
- Except for wiring and periodic inspection, do not remove the front cover of the servo amplifier even if the power is off. The servo amplifier is charged and you may get 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 a fire or smoke generation.
- Always connect a magnetic contactor between the power supply and the main circuit power supply (L1, L2, and 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.
- In order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply, always connect one molded-case circuit breaker or fuse per one servo amplifier between the power supply and the main circuit power supply (L1, L2, and L3) of a servo amplifier. 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.
- 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 voltage specified in the Instruction Manual should be applied to each terminal. Otherwise, a burst, damage, 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 power is on or for some time after power-off. Take safety measures, e.g. provide covers, to avoid accidentally touching the parts (cables, etc.) by hand.

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 front cover when transporting 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.
- 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 strike the servo amplifier and servo motor. Isolate them from all impact loads.
- 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	90 %RH or less (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.

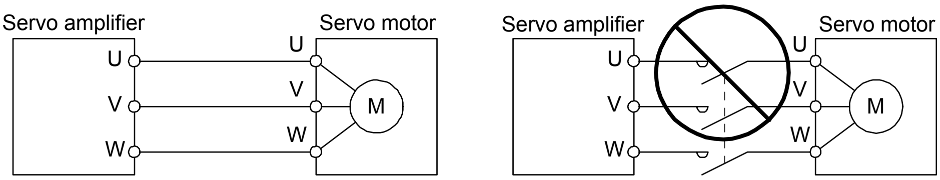
CAUTION

- 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.

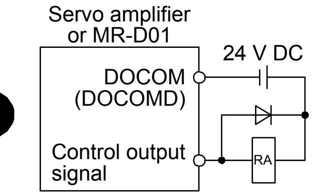
(2) Wiring

CAUTION

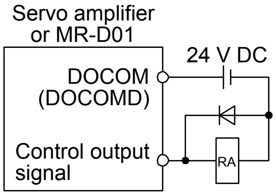
- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Do not install a power capacitor, surge killer, or radio noise filter (optional FR-BIF-(H)) on the servo amplifier output side.
- To avoid a malfunction, connect the wires to the correct phase terminals (U, V, and W) of the servo amplifier and servo motor.
- Connect the servo amplifier power output (U, V, and W) to the servo motor power input (U, V, and 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.



For sink output interface



For source output interface

- 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.

(3) Test run and adjustment

⚠ CAUTION

- ●Before operation, check the parameter settings. Improper settings may cause some machines to operate unexpectedly.
- ●Never make a drastic adjustment or change to the parameter values as doing so will make the 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.
- ●Do not disassemble, repair, or modify the equipment.

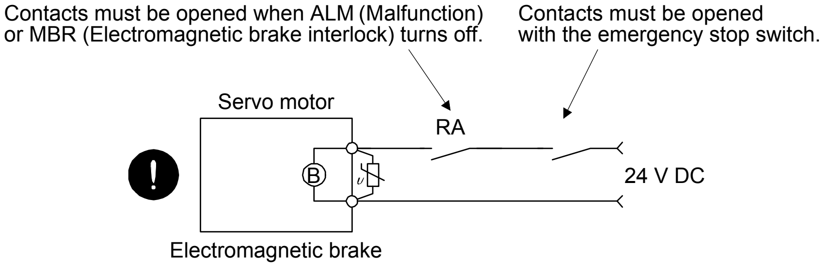
⚠ CAUTION

- ●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.
- ●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 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.

(5) Corrective actions

⚠ 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 electromagnetic brake or external brake to prevent the condition.
- ●Configure an electromagnetic brake circuit so that it is activated also by an external emergency stop switch.



⚠ CAUTION

- ●When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- ●Provide an adequate protection to prevent unexpected restart after an instantaneous power failure.

(6) Maintenance, inspection and parts replacement

⚠ CAUTION

- ●With age, the electrolytic capacitor of the servo amplifier will deteriorate. To prevent a secondary accident due to a malfunction, it is recommended that the electrolytic capacitor be replaced every 10 years when it is used in general environment. Please contact your local sales office.
- ●When using the servo amplifier that has not been energized for an extended period of 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, battery (primary battery) 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

STO function of the servo amplifier

When using the STO function of the servo amplifier, refer to chapter 13 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
For the MR-J3-D05 safety logic unit, refer to appendix 5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Compliance with global standards

For the compliance with global standards, refer to appendix 4 of "MR-J4-_A_(-RJ) 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual	SH(NA)030107
MELSERVO MR-J4-_A_-RJ Servo Amplifier Instruction Manual (Modbus-RTU Protocol) (Note 5)	SH(NA)030175
MELSERVO MR-J4-DU_(-RJ)/MR-CR55K_ Instruction Manual (Note 6)	SH(NA)030153
MELSERVO-J4 MR-J4 Servo Amplifier Instruction Manual (Troubleshooting)	SH(NA)030109
MELSERVO Servo Motor Instruction Manual (Vol. 3) (Note 1)	SH(NA)030113
MELSERVO Linear Servo Motor Instruction Manual (Note 2)	SH(NA)030110
MELSERVO Direct Drive Motor Instruction Manual (Note 3)	SH(NA)030112
MELSERVO Linear Encoder Instruction Manual (Note 2, 4)	SH(NA)030111
EMC Installation Guidelines	IB(NA)67310
Parameter Unit MR-PRU03 Instruction Manual (MR-J4)	SH(NA)030186

Note 1. It is necessary for using a rotary servo motor.
2. It is necessary for using a linear servo motor.
3. It is necessary for using a direct drive motor.
4. It is necessary for using a fully closed loop system.
5. It is necessary for using the Modbus-RTU communication function.
6. It is necessary for using the MR-J4-DU_A_(-RJ) drive unit or MR-CR55K_ converter unit.

This Instruction Manual does not describe the following items. The followings are the same as MR-J4-_A_-RJ Servo amplifiers. For details of the items, refer to each chapter/section of the detailed explanation field. "MR-J4-_A_" means "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Item	Detailed explanation
Installation	MR-J4-_A_ chapter 2
Normal gain adjustment	MR-J4-_A_ chapter 6
Special adjustment functions	MR-J4-_A_ chapter 7
Dimensions	MR-J4-_A_ chapter 9
Characteristics	MR-J4-_A_ chapter 10
ABSOLUTE POSITION DETECTION SYSTEM (only 12.1 Summary and 12.2 Battery)	MR-J4-_A_ chapter 12
USING STO FUNCTION	MR-J4-_A_ chapter 13
USING A LINEAR SERVO MOTOR	MR-J4-_A_ chapter 15
USING A DIRECT DRIVE MOTOR	MR-J4-_A_ chapter 16
FULLY CLOSED LOOP SYSTEM	MR-J4-_A_ chapter 17
MR-J4-03A6-RJ SERVO AMPLIFIER	MR-J4-_A_ chapter 18

«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 1- 1 to 1-10

2. SIGNALS AND WIRING 2- 1 to 2-46

3. DISPLAY AND OPERATION SECTIONS 3- 1 to 3-54

4. HOW TO USE THE POINT TABLE 4- 1 to 4-74

5. HOW TO USE THE PROGRAM 5- 1 to 5-68

6. HOW TO USE INDEXER 6- 1 to 6-30

7. PARAMETERS 7- 1 to 7-98

11. MR-D01 EXTENSION I/O UNIT 11- 1 to 11-80

12. APPLICATION OF FUNCTIONS 12- 1 to 12-22

MEMO

1. FUNCTIONS AND CONFIGURATION

The following items are the same as MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Combinations of servo amplifiers and servo motors	Section 1.4	Section 18.1.4
Model code definition	Section 1.6	Section 18.1.6
Structure (parts identification)	Section 1.7	Section 18.1.7

1.1 For proper use of the positioning mode

(1) Servo amplifier/MR Configurator2

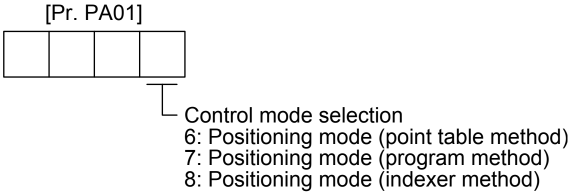
The positioning mode is used by the servo amplifier and MR Configurator2 with the following software versions.

Product name	Model	Software version
Servo amplifier	MR-J4-_A_-RJ 100 W or more	B3 or later
	MR-J4-03A6-RJ	Does not depend on the software version.
MR Configurator2	SW1DNC-MRC2-_	1.34L or later

(2) Parameter setting

(a) Selection of the positioning mode

Select a positioning mode with [Pr. PA01 Operation mode] to use.



(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/indexer method.

1.2 Positioning mode specification list

The specifications only of the positioning mode are listed here. For other specifications, refer to section 1.3 and 18.1.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Item							Description
Servo amplifier model							MR-J4-_A_-RJ 100 W or more/MR-J4-03A6-RJ
Positioning mode	Command method	Point table	Operational specifications				Positioning with specification of point table No. (255 points) (Note 6, 7)
			Position command input (Note 1)	Absolute value command method			Set in the point table. Setting range of feed length per point: -999999 to 999999 [×10^{STM} μm], -99.9999 to 99.9999 [×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 [×10^{STM} μm], 0 to 99.9999 [×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)
			BCD input	Position command input (Note 1)	Absolute value command method		Signed 6-digit BCD digital switch or contact input Setting range of feed length: -999999 to 999999 [×10^{STM} μm], -99.9999 to 99.9999 [×10^{STM} inch], -999999 to 999999 [pulse], Setting range of rotation angle: -360.000 to 360.000 [degree]
					Incremental value command method		Signed 6-digit BCD digital switch or contact input Setting range of feed length: 0 to 999999 [×10^{STM} μm], 0 to 99.9999 [×10^{STM} inch], 0 to 999999 [pulse], Setting range of rotation angle: 0 to 999.999 [degree]
				Speed command input			Selects the rotation speeds and acceleration/deceleration times of the point table No. 1 to 15 by a contact input. Set the S-pattern acceleration/deceleration time constants with [Pr. PC03].
				System			Signed absolute value command method/incremental value command method
			Position command data input	RS-422/RS-485 communication (Note 5)	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 [×10^{STM} μm], -99.9999 to 99.9999 [×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 [×10^{STM} μm], 0 to 99.9999 [×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: 640 steps (256 programs)
			Position command input (Note 1)	Absolute value command method			Set with program language. Setting range of feed length: -999999 to 999999 [×10^{STM} μm], -99.9999 to 99.9999 [×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 [×10^{STM} μm], -99.9999 to 99.9999 [×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	Command method	Indexer	Operational specifications		Positioning by specifying the station position (Note 7) The maximum number of divisions: 255
			Speed command input		Selects the rotation speed and acceleration/deceleration time constant by a contact input.
			System		Rotation direction specifying indexer/shortest rotating indexer
			Digital override		Selects the override multiplying factor by a contact input.
			Torque limit		Set with parameter or external analog input (0 V DC to +10 V DC/maximum torque)
	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 255 speeds)/automatic continuous positioning operation (2 to 255 points)/ Automatic continuous operation to a point table selected at startup/ automatic continuous operation to the point table No. 1
			Program		Depends on settings of program language.
			Indexer	Rotation direction specifying indexer	Positions to the specified station. Rotation direction settable
				Shortest rotating indexer	Positions to the specified station. Rotates in the shorter direction from the current position.
		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.
			Indexer	JOG operation	Decelerates to a stop regardless of the station.
	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 (Note 4)		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 (Note 4)		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
		Indexer	Torque limit changing dog type		Returns to home position upon Z-phase pulse after passing through the front end of the proximity dog. Home position return direction selectable/home position shift amount settable/home position address settable Torque limit automatic changing function
			Torque limit changing data set type		Returns to home position without dog. Sets any position as home position/home position address settable/torque limit automatic changing function
	Automatic positioning to home position function (Note 2)				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 (Note 3)/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. The automatic positioning to home position function is not available with the program method and the indexer method.
3. Indexer method does not have the mark detection function.
4. Dog type last Z-phase reference home position return and dogless Z-phase reference home position return type are not compatible with direct drive motors and incremental linear encoders.
5. For MR-J4-_A_-RJ servo amplifiers with a capacity of 100 W or more, the RS-485 communication is available with the servo amplifiers manufactured in November, 2014 or later.
6. For MR-J4-03A6-RJ servo amplifiers, point table No. 1 to No. 99 can be set with the operation section (4 push buttons). Use MR Configurator2 to set point table No. 100 to 255. (Refer to section 3.2.5.)
7. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 (Point table No. output 1) to PT7 (Point table No. output 8) or PS0 (Station output 1) to PS7 (Station output 8) cannot be outputted simultaneously.

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)
  PS: Positioning mode (indexer 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-J4-_A_" means "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Function		Description	Control mode			Detailed explanation
			CP/BCD	CL	PS	
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 7.5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". This is available with servo amplifiers with software version B4 or later. Check the software version using MR Configurator2.	○	○	○	
Positioning mode (point table method)		Set 1 to 255 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 256 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
Positioning mode (indexer method)		Set 2 to 255 divided stations in advance to perform operation to the station positions. To select station positions, use external input signals or communication function.			○	Chapter 6
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 12.2.1
	Interrupt positioning function	When MSD (Mark detection) turns on, this function converts the remaining distance to the travel amount set in [Pr. PT30] and [Pr. PT31] (Mark sensor stop travel distance). This is available with servo amplifiers with software version B7 or later.	○	○		Section 12.2.2
Infinite feed function (setting degree)		When the unit of position data of the automatic operation or manual operation is set to degree, the detection of [AL. E3.1 Multi-revolution counter travel distance excess warning] is disabled and the home position is retained even if the servo motor rotates 32768 revolutions or more are in the same direction. Thus, the current position is restored after the power is cycled. This function can be used with the absolute position detection system. This is available with servo amplifiers with software version B7 or later.	○	○		Section 12.3
Simple cam function		This function enables synchronous control by using software instead of controlling mechanically with cam. Synchronous operation and synchronous interpolation operation between two axes can be performed using the encoder following function, the mark sensor input compensation function, and the positioning data. This function is not available with the servo amplifier to which the MR-D30 unit has been connected. This is available with servo amplifiers with software version B7 or later. This function will be available with MR-J4-03A6-RJ servo amplifiers in the future.	○	○		Section 12.1

Function	Description	Control mode			Detailed explanation
		CP/BCD	CL	PS	
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
	Torque limit changing dog type/torque limit changing data set type			○	Section 6.4
High-resolution encoder	Rotary servo motors compatible with MELSERVO-J4 series are equipped with high-resolution encoders of 4194304 pulses/rev. However, the encoder resolution of the rotary servo motor compatible with MR-J4-03A6-RJ servo amplifiers will be 262144 pulses/rev.	○	○	○	
Absolute position detection system	Setting a home position once makes home position return unnecessary at every power-on. Only 12.1 Summary and 12.2 Battery will be appropriate references for the positioning mode.	○	○	○	MR-J4-_A_ chapter 12
Gain switching function	You can switch gains during rotation/stop, and can use input devices to switch gains during operation.	○	○	○	MR-J4-_A_ section 7.2
Advanced vibration suppression control II	This function suppresses vibration at the arm end or residual vibration.	○	○	○	MR-J4-_A_ section 7.1.5
Machine resonance suppression filter	This is a filter function (notch filter) which decreases the gain of the specific frequency to suppress the resonance of the mechanical system.	○	○	○	MR-J4-_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-J4-_A_ section 7.1.3
Adaptive filter II	Servo amplifier detects mechanical resonance and sets filter characteristics automatically to suppress mechanical vibration.	○	○	○	MR-J4-_A_ section 7.1.2
Low-pass filter	Suppresses high-frequency resonance which occurs as servo system response is increased.	○	○	○	MR-J4-_A_ section 7.1.4
Machine analyzer function	Analyzes the frequency characteristic of the mechanical system by simply connecting an MR Configurator2 installed personal computer and servo amplifier. MR Configurator2 is necessary for this function.	○	○	○	
Robust filter	This function provides better disturbance response in case low response level that load to motor inertia ratio is high for such as roll send axes.	○	○	○	[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]
	Position commands can be multiplied by 1/9999 to 9999.			○	[Pr. PA07]
Auto tuning	Automatically adjusts the gain to optimum value if load applied to the servo motor shaft varies.	○	○	○	MR-J4-_A_ section 6.3
Brake unit	Used when the regenerative option cannot provide enough regenerative power. Can be used for the 5 kW or more servo amplifier. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ section 11.3
Power regeneration converter	Used when the regenerative option cannot provide enough regenerative power. Can be used for the 5 kW or more servo amplifier. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ section 11.4
Regenerative option	Used when the built-in regenerative resistor of the servo amplifier does not have sufficient regenerative capability for the regenerative power generated. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ section 11.2
Alarm history clear	Alarm history is cleared.	○	○	○	[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 any pins.	○	○	○	[Pr. PD04] [Pr. PD06] [Pr. PD08] [Pr. PD10] [Pr. PD12] [Pr. PD14] [Pr. PD18] [Pr. PD20] [Pr. PD22] [Pr. PD44] [Pr. PD46]

Function	Description	Control mode			Detailed explanation
		CP/BCD	CL	PS	
Output signal selection (device settings)	The output devices including MBR (Electromagnetic brake interlock) can be assigned to certain pins of the CN1 connector. However, [Pr. PD47] is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	[Pr. PD23] to [Pr. PD26] [Pr. PD28] [Pr. PD47]
Output signal (DO) forced output	Output signal can be forced on/off independently of the servo status. Use this function for checking output signal wiring, etc.	○	○	○	MR-J4-_A_ section 4.5.8 section 18.5.9
Command pulse selection	Supports only A-axis/B-axis pulse trains.	○	○	○	[Pr. PA13]
Torque limit	Servo motor torque can be limited to any value.	○	○	○	[Pr. PA11] [Pr. PA12]
Status display	Servo status is shown on the 5-digit, 7-segment LED display. For MR-J4-03A6-RJ servo amplifiers, the servo status is shown on the 3-digit, 7-segment LED display.	○	○	○	Section 3.1.2 Section 3.2.2
External I/O signal display	On/off statuses of external I/O signals are shown on the display.	○	○	○	Section 3.1.7 Section 3.2.7
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 However, MR Configurator2 is necessary for positioning operation, program operation, and single-step feed.	○	○	○	Section 3.1.8 Section 3.1.9 Section 3.2.8 Section 3.2.9 MR-J4-_A_ section 4.5.9 section 18.5.10
Analog monitor output	Servo status is outputted in terms of 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-J4-_A_ section 11.7
Linear servo system	Linear servo system can be configured using a linear servo motor and linear encoder. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○		MR-J4-_A_ chapter 15
Direct drive servo system	The direct drive servo system can be configured to drive a direct drive motor. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ chapter 16
Fully closed loop system	Fully closed loop system can be configured using the load-side encoder. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○		MR-J4-_A_ chapter 17
One-touch tuning	Gain adjustment is performed just by one click on a certain button on MR Configurator2 or operation section.	○	○	○	MR-J4-_A_ section 6.2 section 18.5.4
SEMI-F47 function	This function which complies with the SEMI-F47 standard enables to avoid triggering [AL. 10 Undervoltage] using the electrical energy charged in the capacitor in case that an instantaneous power failure occurs during operation. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ section 7.4 [Pr. PA20] [Pr. PE25]
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-J4-03A6-RJ servo amplifiers are not compatible with the instantaneous power failure tough drive.	○	○	○	MR-J4-_A_ section 7.3

Function	Description	Control mode			Detailed explanation
		CP/BCD	CL	PS	
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 will not operate on the following conditions. 1.You are using the graph function of MR Configurator2. 2.You are using the machine analyzer function. 3.[Pr. PF21] is set to "-1".	○	○	○	[Pr. PA23]
STO function	This amplifier complies with the STO function as functional safety of IEC/EN 61800-5-2. You can create a safety system for the equipment easily. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○	○	MR-J4-_A_ chapter 13
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.	○	○	○	
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]. 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
Digital override	A commanded speed multiplied by an override value selected with OVR (Override selection) will be an actual servo motor speed. A value can be changed from 0% to 360% for a set speed.			○	[Pr. PT42] [Pr. PT43] section 6.4.4 (2)
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 Section 3.2.10
MR-D01 extension I/O unit	MR-D01 is an extension I/O unit that can extend the input/output signals of MR-J4-_A_-RJ servo amplifiers.	○	○	○	Chapter 12
Modbus-RTU communication function	The Modbus protocol uses dedicated message frames for the serial communication between a master and slaves. The dedicated message frames have functions for reading and writing data, and you can write parameters from servo amplifiers and check the operation status of the servo amplifiers by using this function. When the indexer method is used, there are functional restrictions. This function is supported by MR-J4-_A_-RJ servo amplifiers with a capacity of 100 W or more manufactured in November, 2014 or later. This function will be available with MR-J4-03A6-RJ servo amplifiers in the future.	○	○	○	MR-J4-_A_-RJ Servo Amplifier Instruction Manual (Modbus-RTU Protocol)
High-resolution analog input (VC)	The analog input resolution can be increased to 16 bits. This function is available with servo amplifiers manufactured in November 2014 or later. This is not available with MR-J4-03A6-RJ servo amplifiers.	○	○		[Pr. PC60]

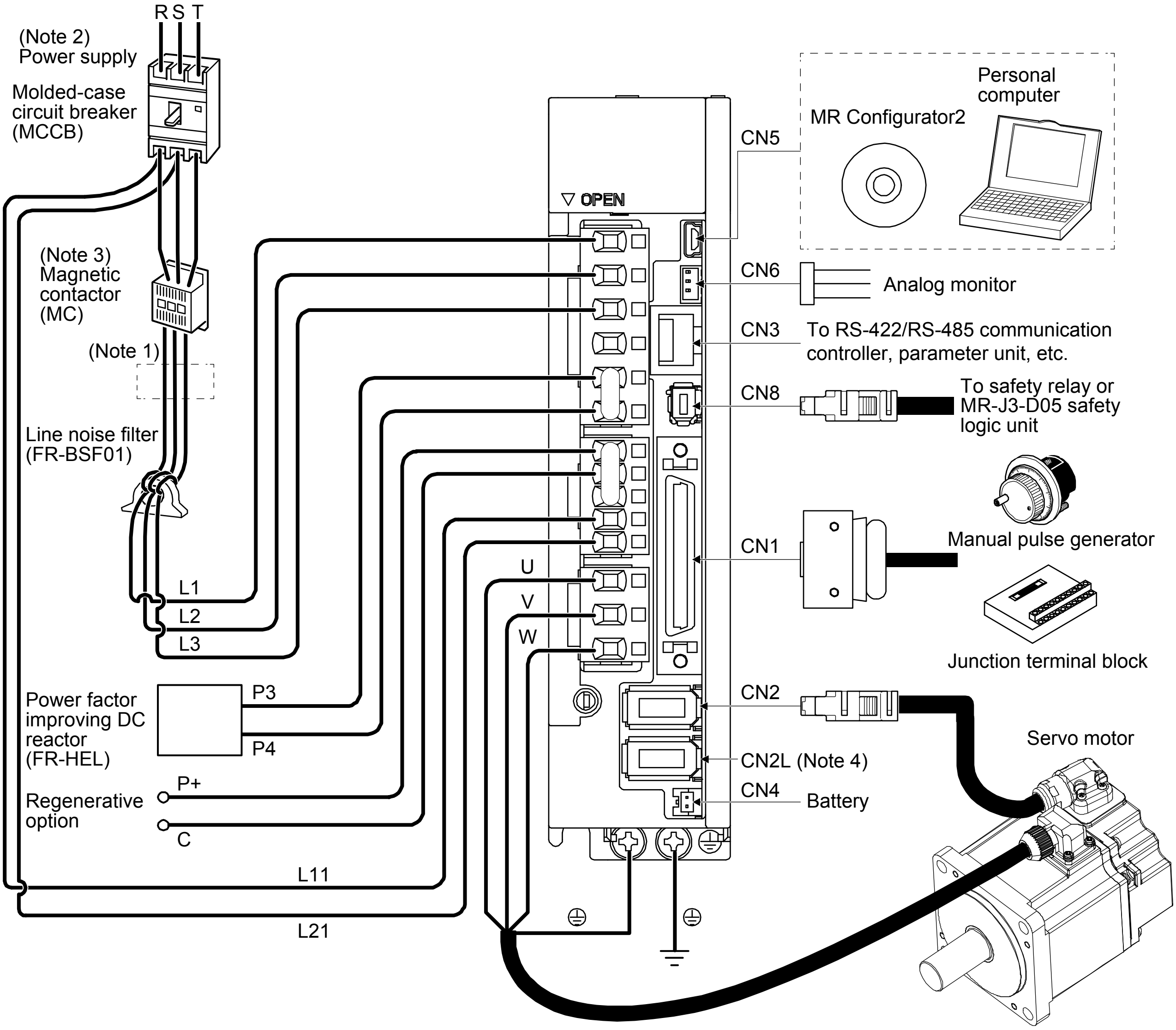
1.4 Configuration including peripheral equipment

⚠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-J4-_A_-RJ 100 W or more
The following illustration is an example of MR-J4-20A-RJ.



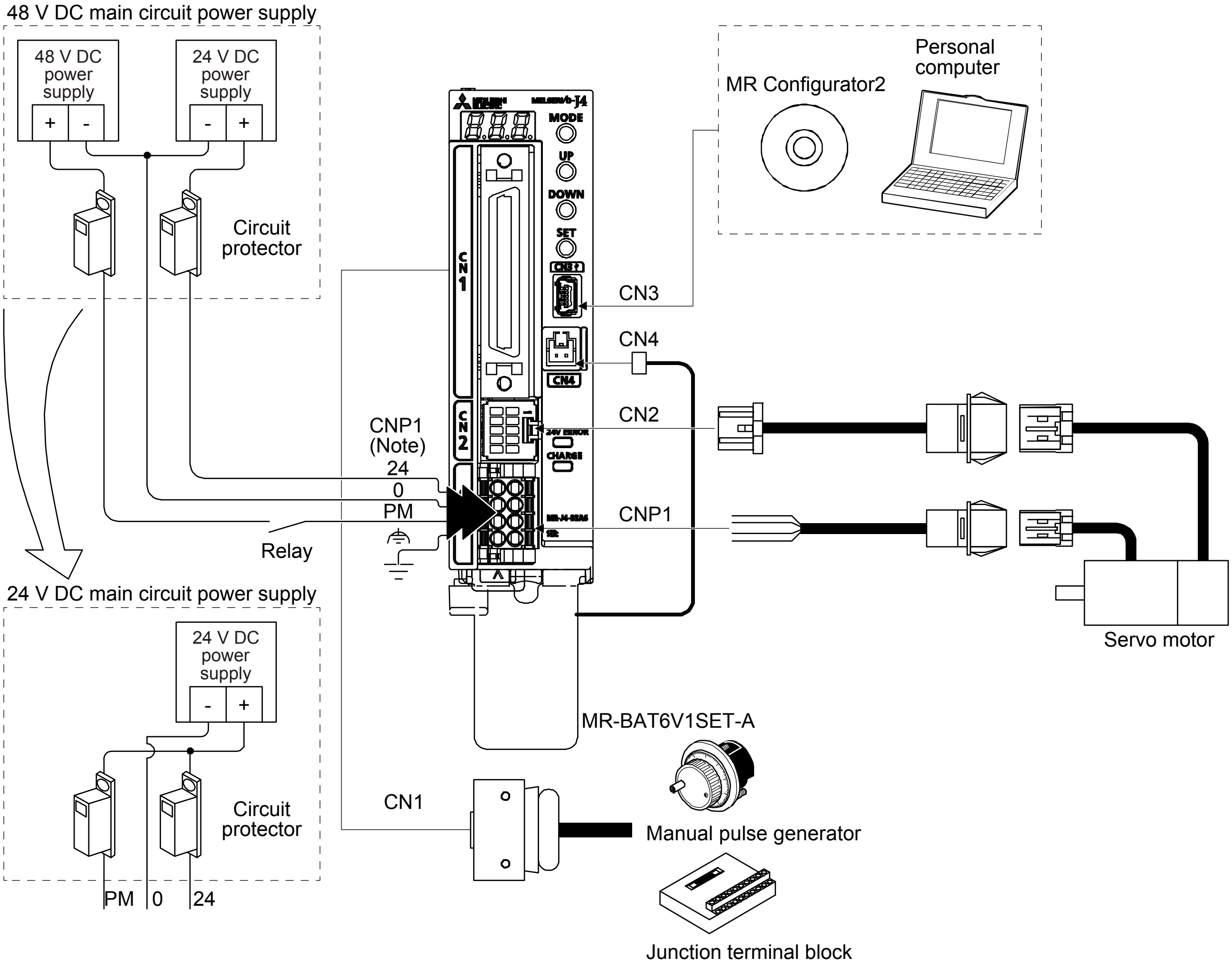
Note 1. The power factor improving AC reactor can also be used. In this case, the power factor improving DC reactor cannot be used. When not using the power factor improving DC reactor, short P3 and P4.

2. A 1-phase 200 V AC to 240 V AC power supply may be used with the servo amplifier of MR-J4-70A-RJ or less. 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

3. Depending on the main circuit voltage and operation pattern, bus voltage decreases, and that may cause the forced stop deceleration to shift to the dynamic brake deceleration. When dynamic brake deceleration is not required, slow the time to turn off the magnetic contactor.

4. When using MR-J4-_A_-RJ servo amplifiers with a capacity of 100 W or more in the linear servo system or in the fully closed loop system, connect an external encoder to this connector. Refer to Table 1.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" and "Linear Encoder Instruction Manual" for the connectible external encoders.

(2) MR-J4-03A6-RJ



Note. For details, refer to section 18.3.2 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

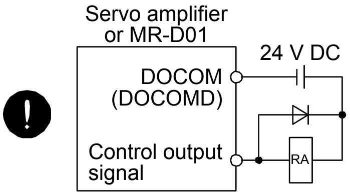
2. SIGNALS AND WIRING

WARNING

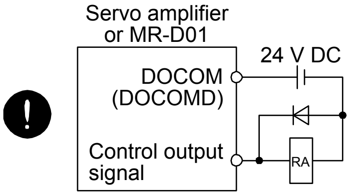
- Any person who is involved in wiring should be fully competent to do the work.
- Before wiring, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P+ and N- is safe with a voltage tester and others. Otherwise, an electric shock 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

- 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.

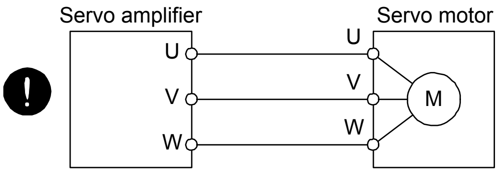


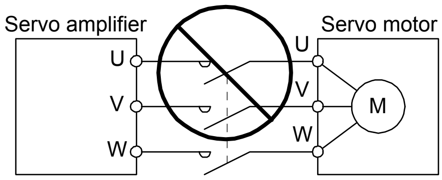
For sink output interface



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-(H)) with the power line of the servo motor.
- When using the regenerative resistor, switch 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 output (U, V, and W) to the servo motor power input (U, V, and W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.





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

The following items are the same as MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Input power supply circuit	Section 3.1	Section 18.3.1
Explanation of power supply system (except section 2.6 Power-on sequence)	Section 3.3	Section 18.3.2
Detailed explanation of signals	Section 3.6	
Forced stop deceleration function	Section 3.7	
Alarm occurrence timing chart	Section 3.8	Section 18.3.8
Interface (except for section 2.5 Internal connection diagram)	Section 3.9	
Servo motor with an electromagnetic brake	Section 3.10	
Grounding	Section 3.11	Section 18.3.10

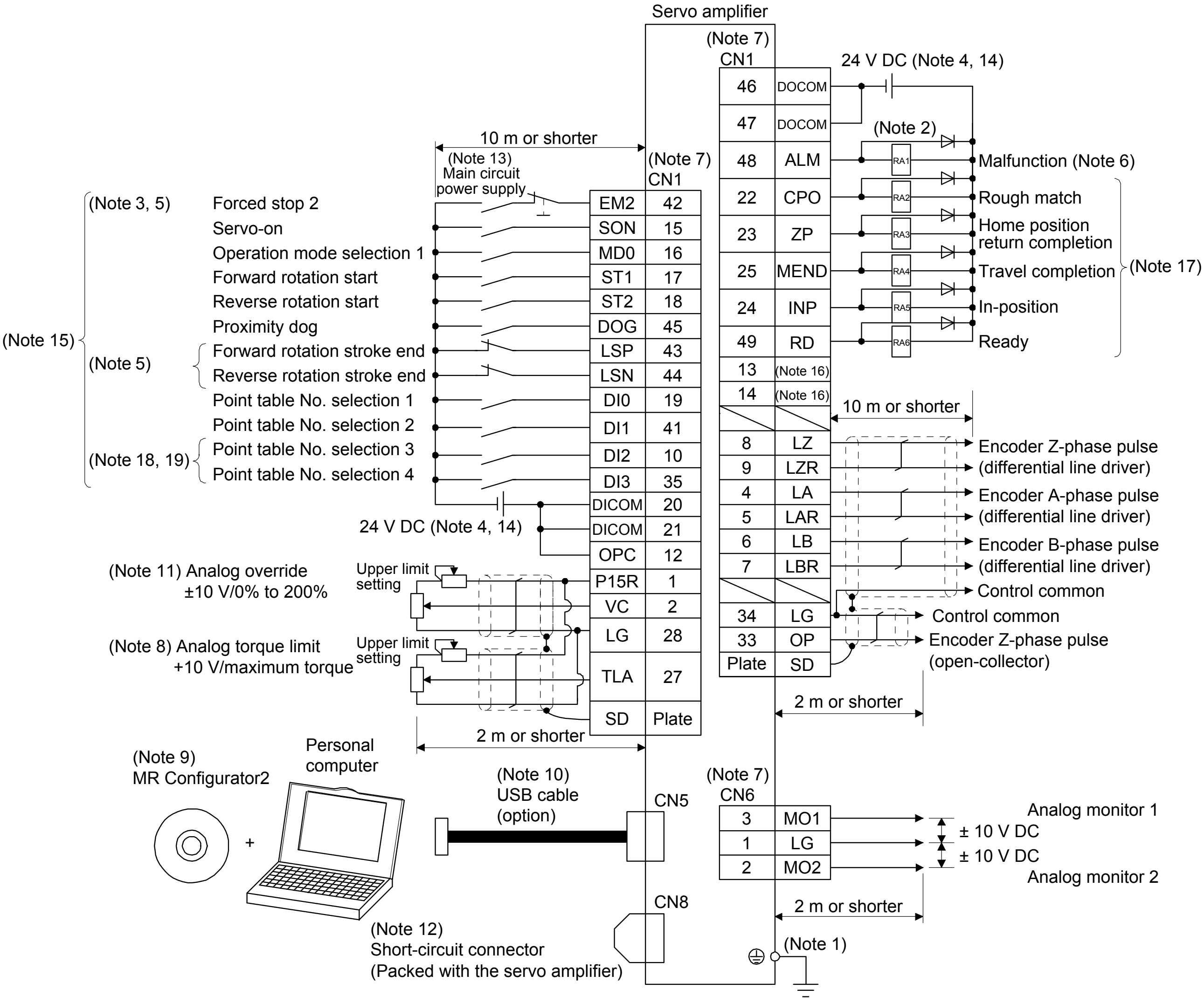
2.1 I/O signal connection example

2.1.1 MR-J4-_A_-RJ 100 W or more

(1) Point table method

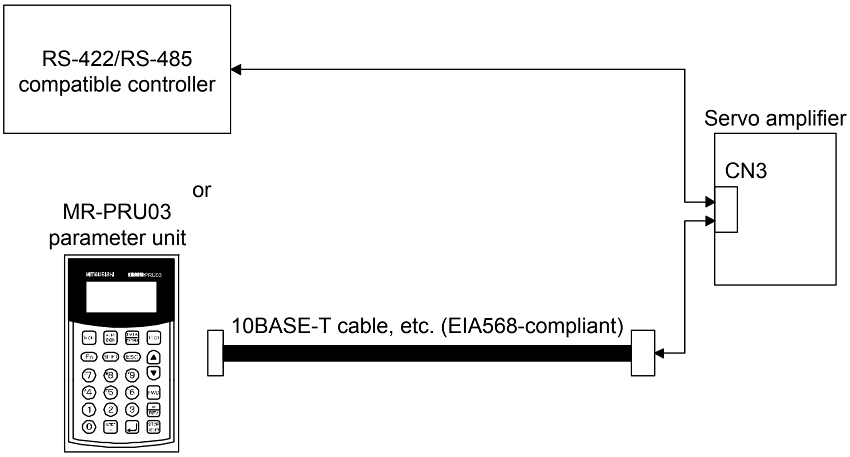
POINT

- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel 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.

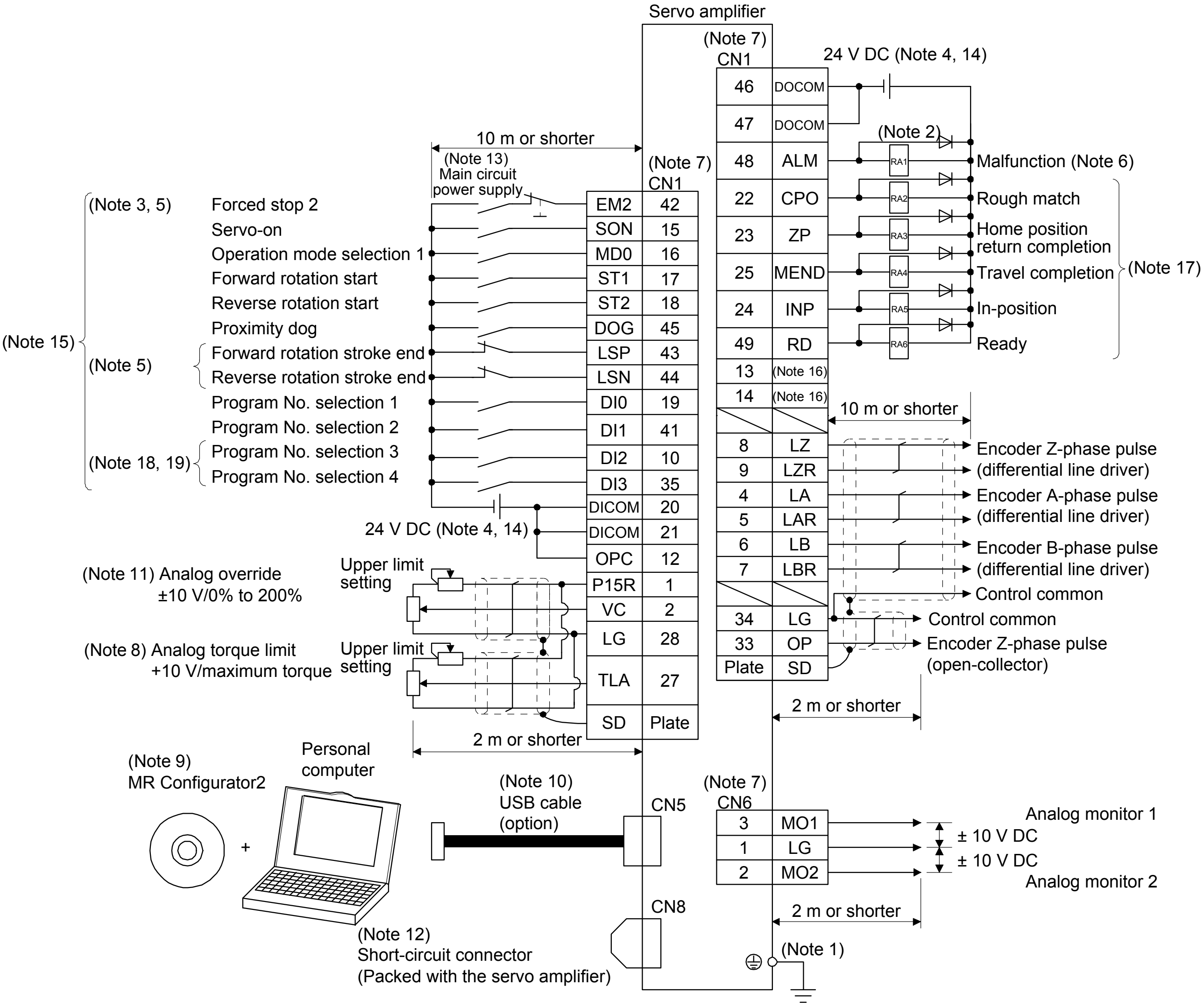
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced stop 2) and other protective circuits.
3. The forced stop switch (normally closed contact) must be installed.
4. Supply 24 V DC ± 10% to interfaces from outside. The total current capacity is up to 500 mA. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end) (normally closed contact).
6. ALM (Malfunction) turns on in normal alarm-free condition (normally closed contact).
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC-MRC2-_. (Refer to section 11.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.



11. Use an external power supply when inputting a negative voltage.
12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
14. This diagram shows sink I/O interface.
15. The device can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
16. Output device are not assigned by default. Assign the output device with [Pr. PD47] as necessary.
17. These device are recommended assignments. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
18. DI2 and DI3 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.
19. Supply + of 24 V DC to OPC (Power input for open-collector sink interface) when input devices are assigned to the CN1-10 pin and the CN1-35 pin. They are not used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

(2) Program method

POINT
●Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26]. CN1-22: CPO (Rough match) CN1-23: ZP (Home position return completion) CN1-25: MEND (Travel 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 is up to 500 mA. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.

5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end) (normally closed contact).

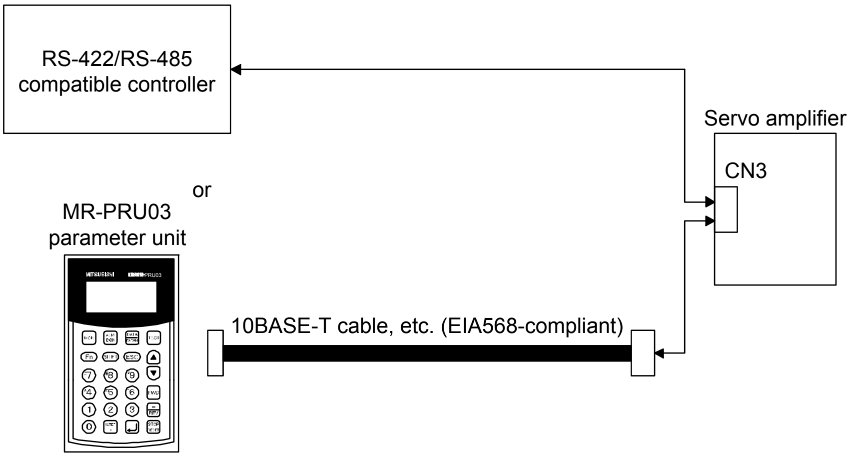
6. ALM (Malfunction) turns on in normal alarm-free condition (normally closed contact).

7. The pins with the same signal name are connected in the servo amplifier.

8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)

9. Use SW1DNC-MRC2-_. (Refer to section 11.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)

10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.



11. Use an external power supply when inputting a negative voltage.

12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.

13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

14. This diagram shows sink I/O interface.

15. The device can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].

16. Output device are not assigned by default. Assign the output device with [Pr. PD47] as necessary.

17. These device are recommended assignments. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].

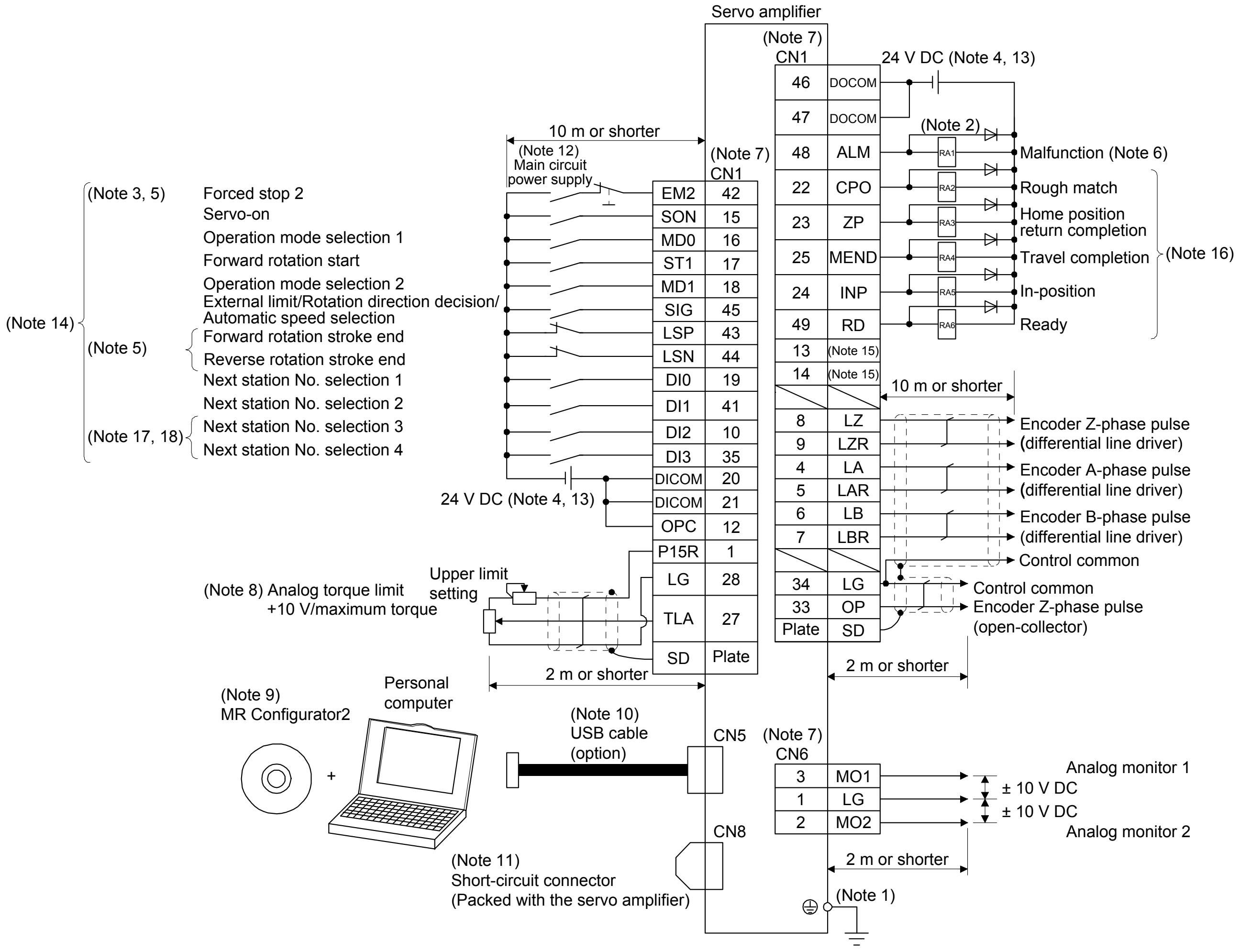
18. DI2 and DI3 are assigned to the CN1-10 and CN1-35 pins by default. When connecting a manual pulse generator, change them with [Pr. PD44] and [Pr. PD46]. Refer to section 9.1 for details of the manual pulse generator.

19. Supply + of 24 V DC to OPC (Power input for open-collector sink interface) when input devices are assigned to the CN1-10 pin and the CN1-35 pin. They are not used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

(3) Indexer method

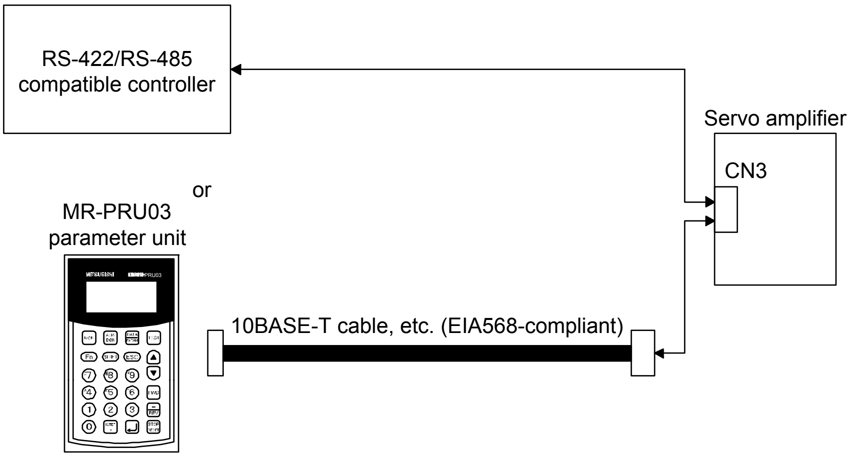
POINT

- In the indexer method, assign the following input device to CN1-18 pin with [Pr. PD10].
  CN1-18: MD1 (Operation mode selection 2)
- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel 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 is up to 500 mA. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end) (normally closed contact).
6. ALM (Malfunction) turns on in normal alarm-free condition (normally closed contact).
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC-MRC2-_ (Refer to section 11.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication.
    Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.



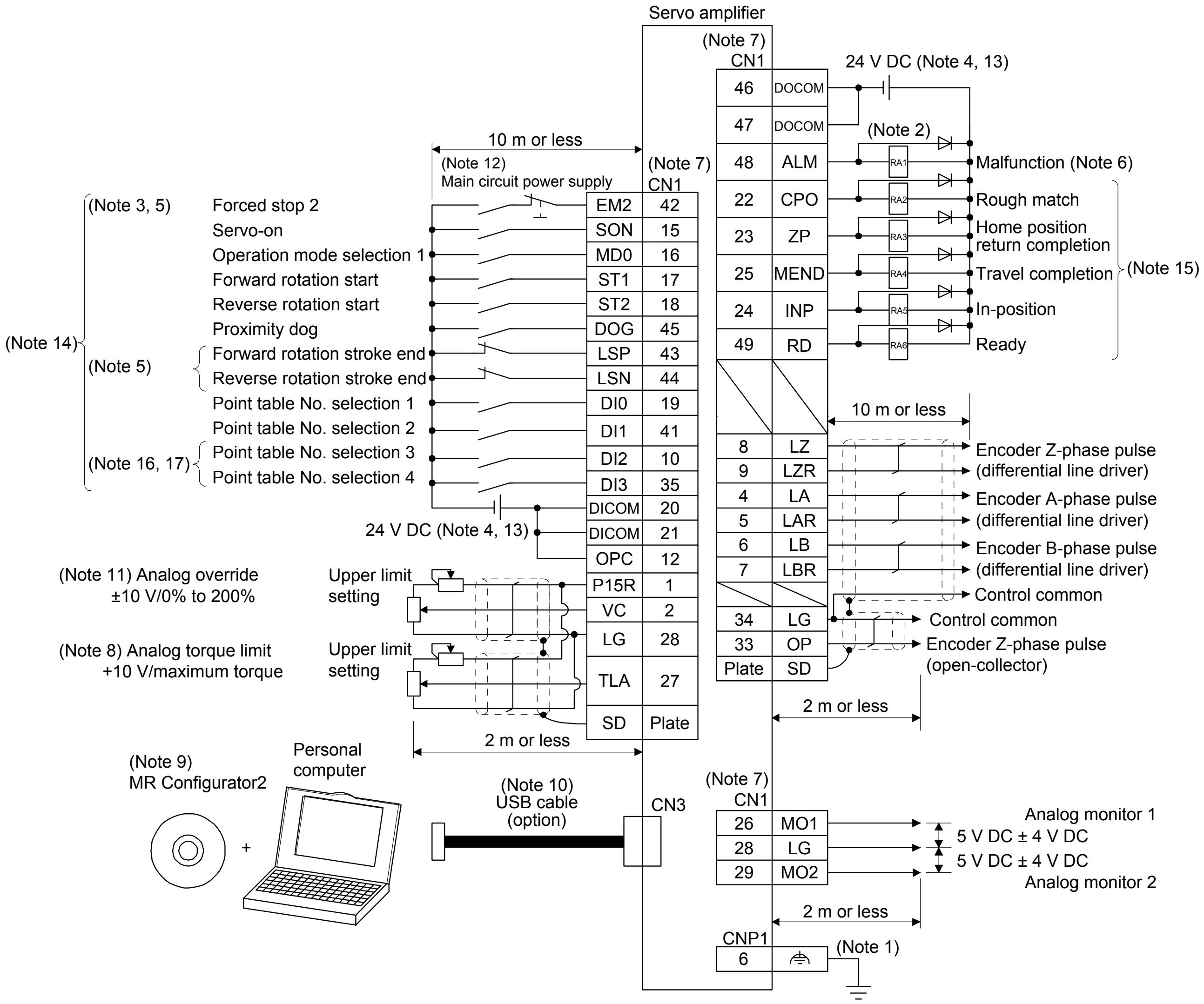
11. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
12. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
13. This diagram shows sink I/O interface.
14. The signals can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
15. Output device are not assigned by default. Assign the output device with [Pr. PD47] as necessary.
16. These device are recommended assignments. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
17. DI2 and DI3 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.
18. Supply + of 24 V DC to OPC (Power input for open-collector sink interface) when input devices are assigned to the CN1-10 pin and the CN1-35 pin. They are not used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

2.1.2 MR-J4-03A6-RJ

(1) Point table method

POINT

- ●Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)



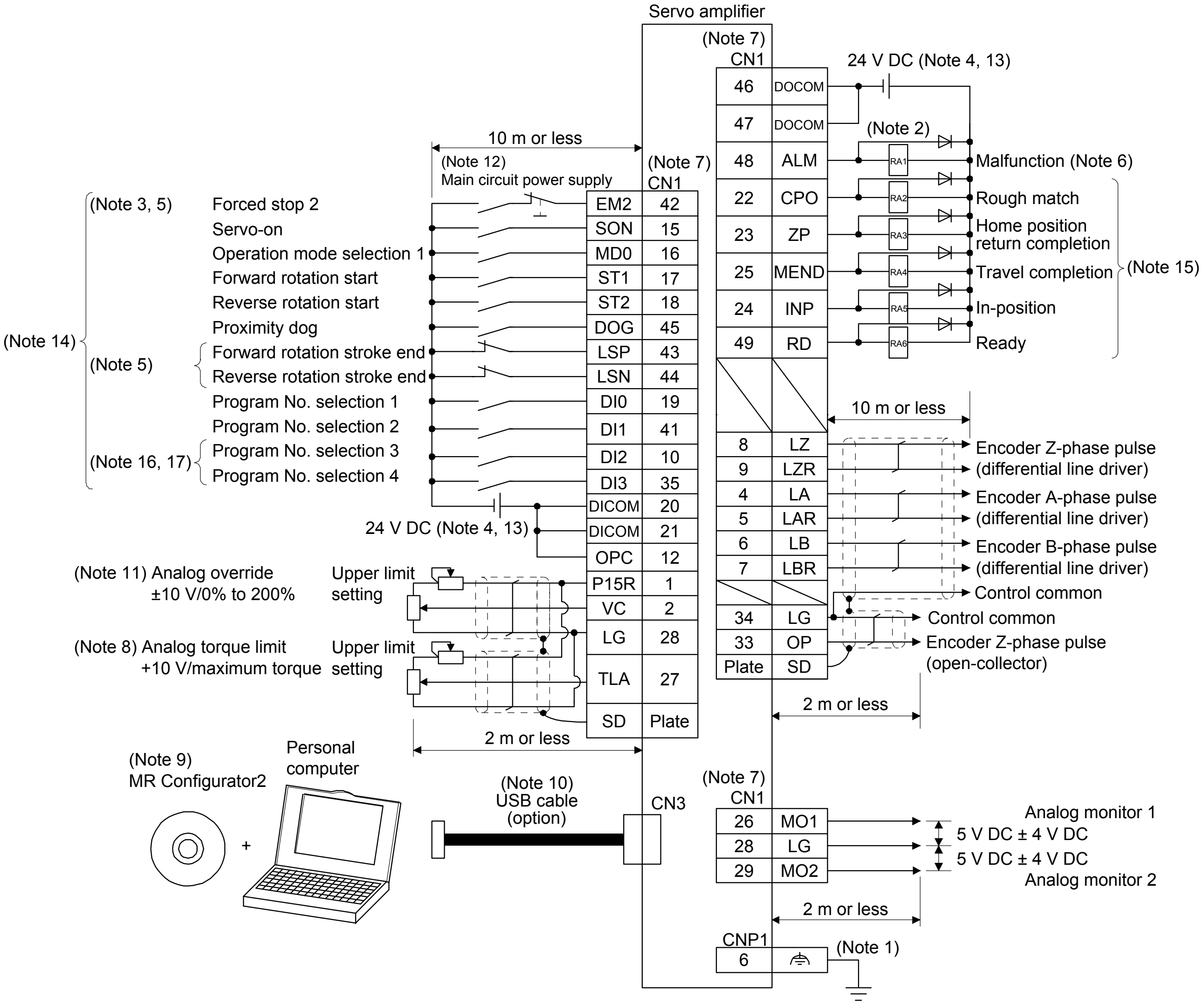
Note 1. To prevent an electric shock, always connect the CNP1 noiseless grounding terminal (⏚marked) of the servo amplifier to the grounding terminal of the cabinet.

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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal. For 24 V DC power for I/O signal, use power other than 24 V DC power of servo amplifier control circuit power supply.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. The USB communication function and RS-422 communication function are mutually exclusive. They cannot be used together.
11. Use an external power supply when inputting a negative voltage.
12. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
13. This diagram shows sink I/O interface.
14. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
15. Recommended device assignments are shown. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
16. DI2 and DI3 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.
17. 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 CN1-35 pin. They cannot be used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

(2) Program method

POINT

- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

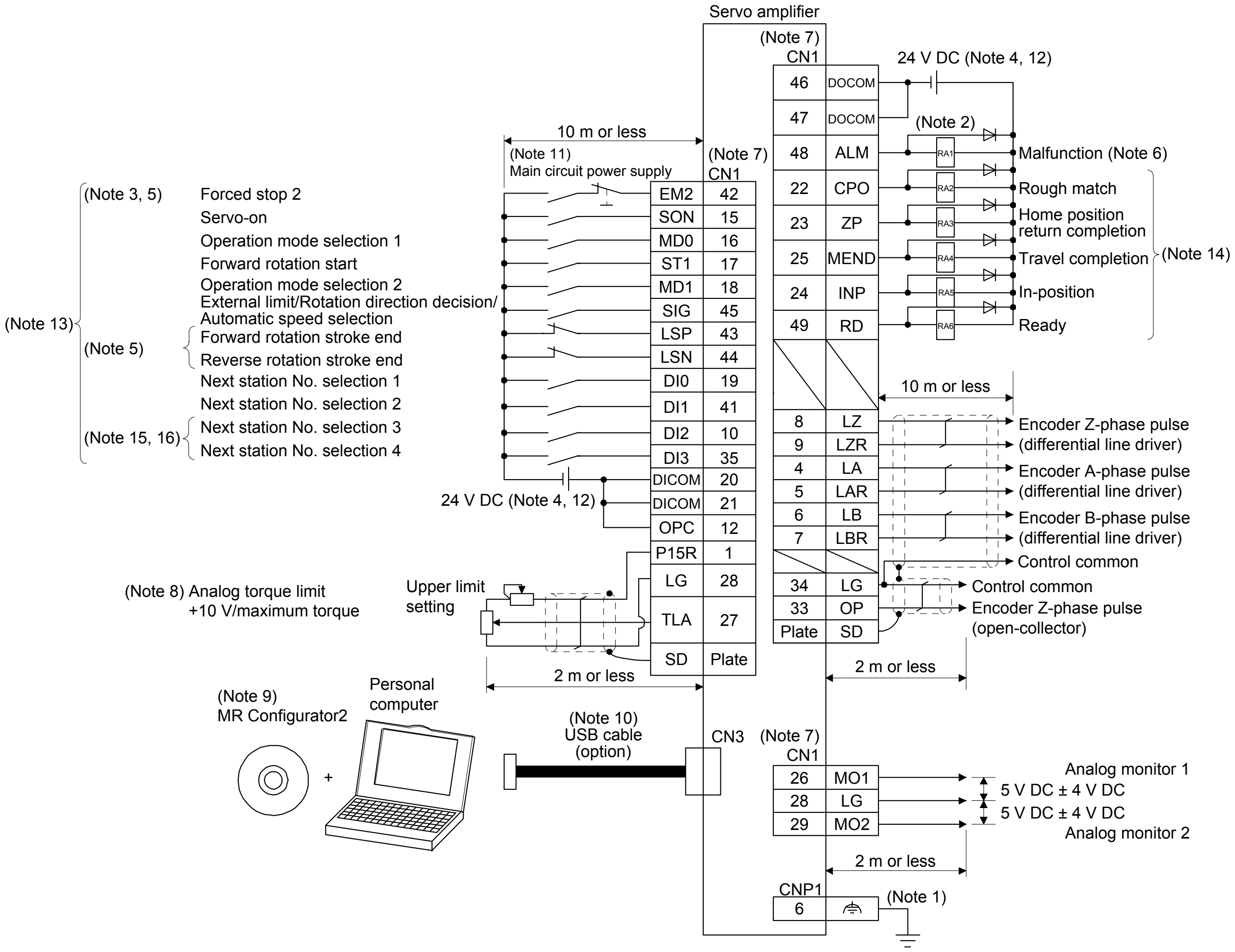


Note 1. To prevent an electric shock, always connect the CNP1 noiseless grounding terminal (⏚marked) to the grounding terminal of the cabinet.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal. For 24 V DC power for I/O signal, use power other than 24 V DC power of servo amplifier control circuit power supply.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. The USB communication function and RS-422 communication function are mutually exclusive. They cannot be used together.
11. Use an external power supply when inputting a negative voltage.
12. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
13. This diagram shows sink I/O interface.
14. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
15. Recommended device assignments are shown. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
16. DI2 and DI3 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.
17. 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 CN1-35 pin. They cannot be used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

(3) Indexer method

POINT

- In the indexer method, assign the following input device to CN1-18 pin with [Pr. PD10].
  CN1-18: MD1 (Operation mode selection 2)
- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

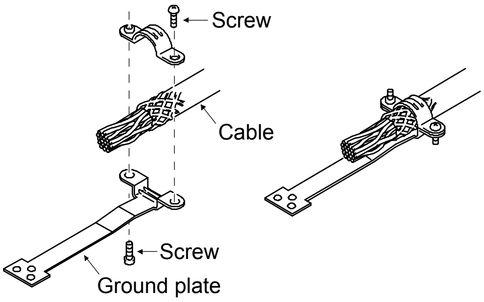


Note 1. To prevent an electric shock, always connect the CNP1 noiseless grounding terminal (⏚marked) to the grounding terminal of the cabinet.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal. For 24 V DC power for I/O signal, use power other than 24 V DC power of servo amplifier control circuit power supply.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. The USB communication function and RS-422 communication function are mutually exclusive. They cannot be used together.
11. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
12. This diagram shows sink I/O interface.
13. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
14. Recommended device assignments are shown. The device can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
15. DI2 and DI3 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.
16. 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 CN1-35 pin. They cannot be used with source input interface. For the positioning mode, input devices (DI2 and DI3) are assigned by default.

2.2 Connectors and pin assignment

POINT

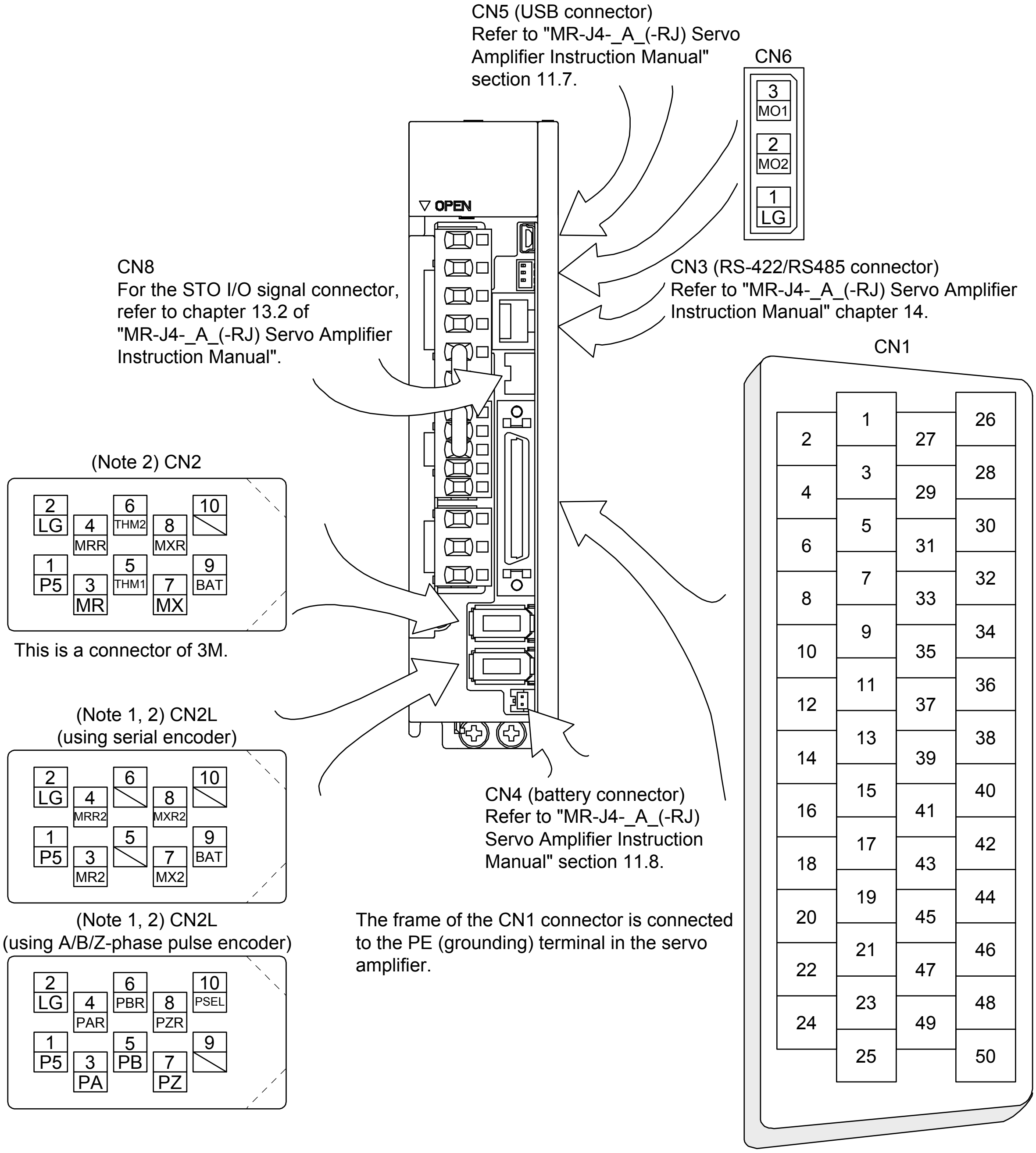
- The pin assignment of the connectors is as viewed from the cable connector wiring section.
- For the STO I/O signal connector (CN8), refer to chapter 13 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
- For the CN1 connector, securely connect the external conductor of the shielded cable to 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.

(1) MR-J4-_A_-RJ 100 W or more

The servo amplifier front view shown is that of the MR-J4-20A-RJ or less. For other views of servo amplifiers, connector arrangements, and details, refer to chapter 9 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".



CN5 (USB connector)
Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.

CN8
For the STO I/O signal connector, refer to chapter 13.2 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

CN3 (RS-422/RS485 connector)
Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" chapter 14.

(Note 2) CN2

This is a connector of 3M.

(Note 1, 2) CN2L
(using serial encoder)

(Note 1, 2) CN2L
(using A/B/Z-phase pulse encoder)

CN4 (battery connector)
Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.8.

The frame of the CN1 connector is connected to the PE (grounding) terminal in the servo amplifier.

Note 1. This CN2L is a connector of 3M.
When using any other connector, refer to each servo motor instruction manual.
2. For the connection with external encoders, refer to table 1.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

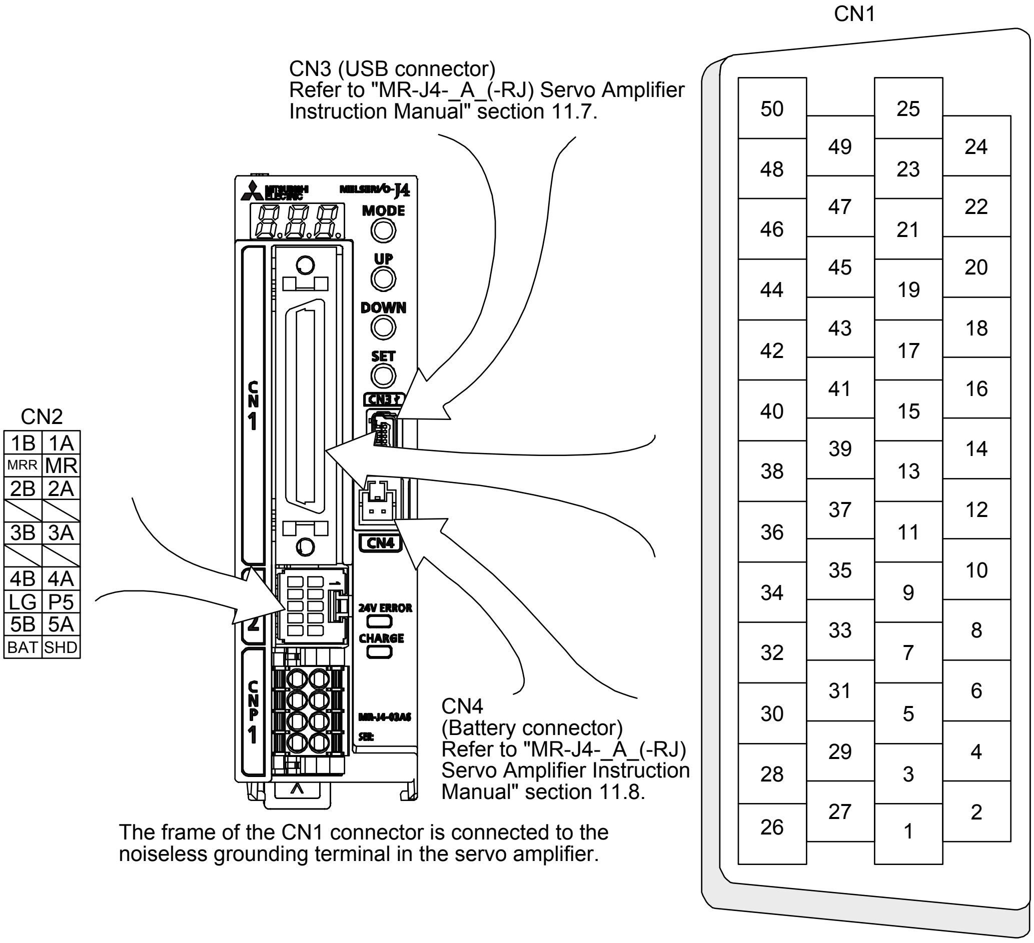
The device assignment of CN1 connector pins changes depending on the control mode. For the pins which are given parameters in the related parameter column, their devices will be changed using those parameters.

Pin No.	(Note 1) I/O	(Note 2) I/O signals in control modes			Related parameter
		CP/BCD (Note 7)	CL	PS	
1		P15R	P15R	P15R	
2	I	VC	VC		
3		LG	LG	LG	
4	O	LA	LA	LA	
5	O	LAR	LAR	LAR	
6	O	LB	LB	LB	
7	O	LBR	LBR	LBR	
8	O	LZ	LZ	LZ	
9	O	LZR	LZR	LZR	
10	(Note 8) I	(Note 10) DI2	(Note 10) DI2	(Note 10) DI2	Pr. PD44 (Note 9)
11	I	PG	PG	PG	
12		OPC	OPC	OPC	
13	O	(Note 4)	(Note 4)	(Note 4)	Pr. PD47
14	O	(Note 4)	(Note 4)	(Note 4)	Pr. PD47
15	I	SON	SON	SON	Pr. PD04
16	I	MD0	MD0	MD0	Pr. PD06
17	I	ST1	ST1	ST1	Pr. PD08
18	I	ST2	ST2	(Note 5) MD1	Pr. PD10
19	I	DI0	DI0	DI0	Pr. PD12
20		DICOM	DICOM	DICOM	
21		DICOM	DICOM	DICOM	
22	O	(Note 6) CPO	(Note 6) CPO	(Note 6) CPO	Pr. PD23
23	O	(Note 6) ZP	(Note 6) ZP	(Note 6) ZP	Pr. PD24
24 or less	O	INP	INP	INP	Pr. PD25
25	O	(Note 6) MEND	(Note 6) MEND	(Note 6) MEND	Pr. PD26
26					
27	I	(Note 3) TLA	(Note 3) TLA	(Note 3) TLA	
28		LG	LG	LG	
29					
30		LG	LG	LG	
31					
32					
33	O	OP	OP	OP	
34		LG	LG	LG	
35	(Note 8) I	(Note 10) DI3	(Note 10) DI3	(Note 10) DI3	Pr. PD46 (Note 9)
36	I	NG	NG	NG	
37 (Note 12)	I	(Note 11)	(Note 11)	(Note 11)	Pr. PD44 (Note 9)
38 (Note 12)	I	(Note 11)	(Note 11)	(Note 11)	Pr. PD46 (Note 9)
39					
40					
41	I	DI1	DI1	DI1	Pr. PD14
42	I	EM2	EM2	EM2	
43	I	LSP	LSP	LSP	Pr. PD18
44	I	LSN	LSN	LSN	Pr. PD20
45	I	DOG	DOG	SIG	Pr. PD22
46		DOCOM	DOCOM	DOCOM	
47		DOCOM	DOCOM	DOCOM	
48	O	ALM	ALM	ALM	
49	O	RD	RD	RD	Pr. PD28
50					

Note
1. I: input signal, O: output signal
2. CP: Positioning mode (point table method)
   BCD: Positioning mode (point table method in the BCD input positioning operation)
   This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
   CL: Positioning mode (program method)
   PS: Positioning mode (indexer method)
3. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
4. Assign any device with [Pr. PD47].
5. In the indexer method, assign the following input device to CN1-18 pin with [Pr. PD10].
   CN1-18: MD1 (Operation mode selection 2)
6. Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
   CN1-22: CPO (Rough match)
   CN1-23: ZP (Home position return completion)
   CN1-25: MEND (Travel completion)
7. For BCD input, refer to chapter 12.
8. Supply + of 24 V DC to OPC (power input for open-collector sink interface) when using the CN1-10 pin and CN1-35 pin for DI.
9. This parameter is available with servo amplifiers with software version B7 or later.
10. This signal 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). This is available with servo amplifiers with software version B7 or later.
11. This signal is used with source interface. Input devices are not assigned by default. Assign the input devices with [Pr. PD44] and [Pr. PD46] as necessary.
12. These pins are available with servo amplifiers having software version B7 or later, and manufactured in January 2015 or later.

(2) MR-J4-03A6-RJ

For the views of servo amplifiers, connector arrangements, and details, refer to section 18.6 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".



CN3 (USB connector)
Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.

CN4
(Battery connector)
Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.8.

The frame of the CN1 connector is connected to the noiseless grounding terminal in the servo amplifier.

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	PS	
1		P15R	P15R	P15R	
2	I	VC	VC		
3		LG	LG	LG	
4	O	LA	LA	LA	
5	O	LAR	LAR	LAR	
6	O	LB	LB	LB	
7	O	LBR	LBR	LBR	
8	O	LZ	LZ	LZ	
9	O	LZR	LZR	LZR	
10	(Note 6) I	(Note 8)	(Note 8)	(Note 8)	Pr. PD44 (Note 7)
11	I	PG	PG	PG	
12		OPC	OPC	OPC	
13	O	SDP	SDP	SDP	
14	O	SDN	SDN	SDN	
15	I	SON	SON	SON	Pr. PD04
16	I	MD0	MD0	MD0	Pr. PD06
17	I	ST1	ST1	ST1	Pr. PD08
18	I	ST2	ST2	(Note 4) MD1	Pr. PD10
19	I	DI0	DI0	DI0	Pr. PD12
20		DICOM	DICOM	DICOM	
21		DICOM	DICOM	DICOM	
22	O	(Note 5) CPO	(Note 5) CPO	(Note 5) CPO	Pr. PD23
23	O	(Note 5) ZP	(Note 5) ZP	(Note 5) ZP	Pr. PD24
24	O	INP	INP	INP	Pr. PD25
25	O	(Note 5) MEND	(Note 5) MEND	(Note 5) MEND	Pr. PD26
26	O	MO1	MO1	MO1	Pr. PC14
27	I	(Note 3) TLA	(Note 3) TLA	(Note 3) TLA	
28		LG	LG	LG	
29	O	MO2	MO2	MO2	Pr. PC15
30		LG	LG	LG	
31	I	TRE	TRE	TRE	
32					
33	O	OP	OP	OP	
34		LG	LG	LG	
35	(Note 6) I	(Note 8)	(Note 8)	(Note 8)	Pr. PD46 (Note 7)
36	I	NG	NG	NG	
37	I	(Note 9)	(Note 9)	(Note 9)	Pr. PD44 (Note 7)
38	I	(Note 9)	(Note 9)	(Note 9)	Pr. PD46 (Note 7)
39	I	RDP	RDP	RDP	
40	I	RDN	RDN	RDN	
41	I	DI1	DI1	DI1	Pr. PD14
42	I	EM2	EM2	EM2	
43	I	LSP	LSP	LSP	Pr. PD18
44	I	LSN	LSN	LSN	Pr. PD20
45	I	DOG	DOG	SIG	Pr. PD22
46		DOCOM	DOCOM	DOCOM	
47		DOCOM	DOCOM	DOCOM	
48	O	ALM	ALM	ALM	
49	O	RD	RD	RD	Pr. PD28
50					

Note
1. I: input signal, O: output signal
2. CP: Positioning mode (point table method)
   CL: Positioning mode (program method)
   PS: Positioning mode (indexer method)
3. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
4. In the indexer method, assign the following input device to CN1-18 pin with [Pr. PD10].
   CN1-18: MD1 (Operation mode selection 2)
5. Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
   CN1-22: CPO (Rough match)
   CN1-23: ZP (Home position return completion)
   CN1-25: MEND (Travel completion)
6. Supply + of 24 V DC to OPC (power input for open-collector sink interface) when using the CN1-10 and CN1-35 pins for DI.
7. This is available with servo amplifiers with software version B7 or later.
8. 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).
9. 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.

2.3 Signal (device) explanations

The pin numbers in the connector pin No. column are those in the initial status.
For the I/O interfaces (symbols in I/O division column in the table), refer to section 2.5. The symbols in the control mode field of the table shows the followings.
CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
"○" and "△" of the table shows the followings.
○: Usable device by default.
△: Usable device by setting the following parameters.
[Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22] to [Pr. PD26], [Pr. PD28], [Pr. PD44], [Pr. PD46], and [Pr. PD47]

(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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</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><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.
Turn EM1 off (open between commons) to bring the motor to a forced stop state. The base circuit is shut off, the dynamic brake is operated and decelerates the servo motor to a stop.
Turn EM1 on (short between commons) in the forced stop state to reset that state.</td><td>DI-1</td><td>△</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.
Set "_ _ _ 4" in [Pr. PD01] to switch this signal on (keep terminals connected) automatically in the servo amplifier.</td><td>DI-1</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Reset</td><td>RES</td><td></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 " _ _ 1 _ " is set in [Pr. PD30].
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><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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Forward rotation stroke end</td><td>LSP</td><td>CN1-43</td><td rowspan="2">To start operation, turn on LSP and LSN. Turn it off to bring the 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 Positive direction</th><th>CW direction Negative 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].
Set [Pr. PD01] as indicated below to switch on the signals (keep terminals connected) automatically 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 turns off, [AL. 99 Stroke limit warning] occurs, and WNG (Warning) turns on. When using WNG, enable it by setting [Pr. PD23] to [Pr. PD26], [Pr. PD28], and [Pr. PD47].
However, [Pr. PD47] is not available with MR-J4-03A6-RJ servo amplifiers.</td><td rowspan="2">DI-1</td><td rowspan="2">○</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-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
For the indexer method, [Pr. PC35 Internal torque limit 2] will be enabled automatically depending on operation status. Refer to each timing chart in section 6.2 and section 6.4.5.</td><td>DI-1</td><td>△</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/internal thrust limit 2], enable TL1 with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. For details, refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
For the indexer method, [Pr. PC35 Internal torque limit 2] will be enabled automatically depending on operation status. Refer to each timing chart in section 6.2 and section 6.4.5.</td><td>DI-1</td><td>△</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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Operation mode selection 1</td><td>MD0</td><td>CN1-16</td><td rowspan="2">Point table method/program method
Turning on MD0 will be automatic operation mode, off will be manual operation mode. Changing an operation mode during operation will clear the command remaining distance and the motor will decelerate to stop.
MD1 cannot be used.

Indexer method
Select an operation mode with combinations of MD0 and MD1. Refer to the following table for combinations.
Changing an operation mode during operation will clear the command remaining distance and the motor will decelerate to stop.
<table>
<tr><th colspan="2">Device (Note)</th><th rowspan="2">Operation mode</th></tr>
<tr><th>MD1</th><th>MD0</th></tr>
<tr><td>0</td><td>0</td><td>Home position return mode</td></tr>
<tr><td>0</td><td>1</td><td>Manual operation mode</td></tr>
<tr><td>1</td><td>0</td><td>Automatic operation mode 1 (rotation direction specifying indexer)</td></tr>
<tr><td>1</td><td>1</td><td>Automatic operation mode 2 (shortest rotating indexer)</td></tr>
</table>
Note. 0: Off
1: On</td><td>DI-1</td><td>○</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><td>△</td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
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 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 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 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 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 DI7. 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 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.			○	
			Indexer method 1. Automatic operation mode 1 or automatic operation mode 2 Turning on ST1 will execute one positioning to the specified station No. 2. Manual operation mode Turning on ST1 with the station JOG operation will rotate the motor in the specified direction with SIG only while it is on. Turning off ST1 will execute a positioning to a station which can be decelerated to a stop. Turning on ST1 with JOG operation will rotate the motor in the direction specified with SIG only while it is on. Turning off will decelerate the motor to a stop regardless of stations. 3. Home position return mode Turning on ST1 will also start home position return.				○
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 position data set in point tables. Turning on ST2 during JOG operation will rotate the 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 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.			○	
			Indexer method This device is not used.				

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Temporary stop/restart</td><td>TSTP</td><td></td><td>Turning on TSTP during automatic operation will temporarily stop the 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 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 will not function during home position return/JOG operation.</td><td>DI-1</td><td>△</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><td></td></tr>
<tr><td>External limit/
Rotation direction decision/
Automatic speed selection</td><td>SIG</td><td>CN1-45</td><td>The function varies depending on the operation mode.
1. Home position return mode (MD1 = 0, MD0 = 0)
You can use SIG as an input device of external limit. This operation mode is enabled when the home position return type of the torque limit changing dog type is selected.
2. Manual operation mode (MD1 = 0, MD0 = 1)
You can use this as an input device for specifying a rotation direction of the servo motor. The rotation direction varies depending on the setting of [Pr. PA14 Rotation direction selection]. (Refer to section 2.1.)
3. Automatic operation mode 1 (rotation direction specifying indexer) (MD1 = 1, MD0 = 0)
You can use this as an input device for specifying a rotation direction of the servo motor. The rotation direction varies depending on the setting of [Pr. PA14 Rotation direction selection]. (Refer to section 2.1.)
4. Automatic operation mode 2 (shortest rotating indexer) (MD1 = 1, MD0 = 1)
You can use SIG as an input device for selecting a speed of the servo motor.

Table 2.1 Rotation direction selection
<table>
<tr><th>[Pr. PA14]</th><th>SIG (Note)</th><th>Servo motor rotation direction</th></tr>
<tr><td>0</td><td>0</td><td>CCW direction</td></tr>
<tr><td>0</td><td>1</td><td>CW direction</td></tr>
<tr><td>1</td><td>0</td><td>CW direction</td></tr>
<tr><td>1</td><td>1</td><td>CCW direction</td></tr>
</table>
Note. 0: Off
1: On</td><td>DI-1</td><td></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><td></td></tr>
<tr><td>Manual pulse generator multiplication 2</td><td>TP1</td><td></td><td>DI-1</td><td>△</td><td>△</td><td></td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP/BCD	Control mode CL	Control mode PS
Analog override selection	OVR		Turning on OVR will enable VC (Analog override).	DI-1	△	△	
Teach	TCH		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.	DI-1	△		
Program input 1	PI1		Turning on PI1 will restart a step which was suspended with the SYNC (1) command during programming.	DI-1		△	
Program input 2	PI2		Turning on PI2 will restart a step which was suspended with the SYNC (2) command during programming.	DI-1		△	
Program input 3	PI3		Turning on PI3 will restart a step which was suspended with the SYNC (3) command during programming.	DI-1		△	
Current position latch input	LPS		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.	DI-1		△	
Point table No./program No. selection 1	DI0	CN1-19	Point table method Select point tables and home position return mode with DI0 to DI7.	DI-1	○	○	
Point table No./program No. selection 2	DI1	CN1-41			○	○	
Point table No./program No. selection 3	DI2	CN1-10			○	○	
Point table No./program No. selection 4	DI3	CN1-35			○	○	
Point table No./program No. selection 5	DI4				△	△	
Point table No./program No. selection 6	DI5				△	△	
Point table No./program No. selection 7	DI6				△	△	
Point table No./program No. selection 8	DI7		Program method Select program Nos. with DI0 to DI7.		△	△	

Point table method

Device (Note)								Selection contents
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	
0	0	0	0	0	0	0	0	Home position return mode
0	0	0	0	0	0	0	1	Point table No. 1
0	0	0	0	0	0	1	0	Point table No. 2
0	0	0	0	0	0	1	1	Point table No. 3
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	1	0	Point table No. 254
1	1	1	1	1	1	1	1	Point table No. 255

Note. 0: Off
1: On

Program method

Device (Note)								Selection contents
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	
0	0	0	0	0	0	0	0	Program No. 1
0	0	0	0	0	0	0	1	Program No. 2
0	0	0	0	0	0	1	0	Program No. 3
0	0	0	0	0	0	1	1	Program No. 4
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	1	0	Program No. 255
1	1	1	1	1	1	1	1	Program No. 256

Note. 0: Off
1: On

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Next station No. selection 1</td><td>DI0</td><td>CN1-19</td><td rowspan="8">Indexer method
Select next station Nos. with DI0 to DI7.
A setting value at ST1 on will be enabled.
<table>
<tr><th colspan="8">Device (Note 1)</th><th rowspan="2">Selection contents</th></tr>
<tr><th>DI7</th><th>DI6</th><th>DI5</th><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>0</td><td>0</td><td>0</td><td>Next station No. 0</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Next station No. 1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Next station No. 2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>Next station No. 3</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><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>1</td><td>1</td><td>1</td><td>0</td><td>Next station No. 254</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Setting inhibited (Note 2)</td></tr>
</table>
Note 1. 0: Off
1: On
2. [AL. 97.2 Next station position warning] will occur.</td><td rowspan="8">DI-1</td><td></td><td></td><td>○</td></tr>
<tr><td>Next station No. selection 2</td><td>DI1</td><td>CN1-41</td><td></td><td></td><td>○</td></tr>
<tr><td>Next station No. selection 3</td><td>DI2</td><td>CN1-10</td><td></td><td></td><td>○</td></tr>
<tr><td>Next station No. selection 4</td><td>DI3</td><td>CN1-35</td><td></td><td></td><td>○</td></tr>
<tr><td>Next station No. selection 5</td><td>DI4</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Next station No. selection 6</td><td>DI5</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Next station No. selection 7</td><td>DI6</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Next station No. selection 8</td><td>DI7</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Second acceleration/deceleration selection</td><td>RT</td><td></td><td>Turning on ST1 with RT-off will select acceleration/deceleration time constants set with [Pr. PC01 Acceleration time constant 1] and [Pr. PC02 Deceleration time constant 1].
Turning on ST1 with RT-on will select acceleration/deceleration time constants set with [Pr. PC30 Acceleration time constant 2] and [Pr. PC31 Deceleration time constant 2].
RT will not be accepted during operation.
<table>
<tr><th>Device (Note)</th><th colspan="2">Description</th></tr>
<tr><th>RT</th><th>Acceleration time constant</th><th>Deceleration time constant</th></tr>
<tr><td>0</td><td>[Pr. PC01]</td><td>[Pr. PC02]</td></tr>
<tr><td>1</td><td>[Pr. PC30]</td><td>[Pr. PC31]</td></tr>
</table>
Note. 0: Off
1: On</td><td>DI-1</td><td></td><td></td><td>△</td></tr>
<tr><td>Second acceleration/deceleration gain selection</td><td>RTCDP</td><td></td><td>This has two functions of CDP (Gain switching) and RT (Second acceleration/deceleration selection).
When RTCDP is off, the servo control gain set with [Pr. PB06], [Pr. PB08] to [Pr. PB10] will be selected. Turning on ST1 (Forward rotation start) will select acceleration/deceleration time constants set with [Pr. PC01 Acceleration time constant 1] and [Pr. PC02 Deceleration time constant 1].
When RTCDP is on, the servo control gain set with [Pr. PB29] to [Pr. PB32] will be selected. Turning on ST1 (Forward rotation start) will select acceleration/deceleration time constants set with [Pr. PC30 Acceleration time constant 2] and [Pr. PC31 Deceleration time constant 2].</td><td>DI-1</td><td></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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Digital override selection 1</td><td>OV0</td><td></td><td rowspan="4">To enable the digital override function, set [Pr. PT38] to "_ _ 1 _".
This signal is for multiplying a command speed by the digital override (multiplying factor).
A command speed multiplied by the digital override value selected with this signal will be an actual servo motor speed.
If the servo motor speed multiplied by the digital override value exceeds the servo motor maximum speed, the speed will be limited at the maximum speed.

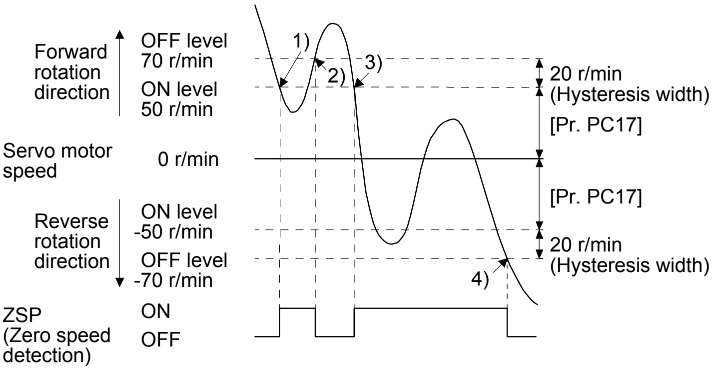
The following table shows an example of setting "50" to [Pr. PT42] and "5" to [Pr. PT43].
<table>
<tr><th colspan="4">Device (Note)</th><th rowspan="2">Description</th></tr>
<tr><th>OV3</th><th>OV2</th><th>OV1</th><th>OV0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>100 [%] of command speed</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>50 [%] of command speed</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>55 [%] of command speed</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>60 [%] of command speed</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>65 [%] of command speed</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>70 [%] of command speed</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>75 [%] of command speed</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>80 [%] of command speed</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>85 [%] of command speed</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>90 [%] of command speed</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td><td>95 [%] of command speed</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>100 [%] of command speed</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td><td>105 [%] of command speed</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>110 [%] of command speed</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>115 [%] of command speed</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0 [%] of command speed</td></tr>
</table>
Note. 0: Off
1: On</td><td rowspan="4">DI-1</td><td></td><td></td><td>△</td></tr>
<tr><td>Digital override selection 2</td><td>OV1</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Digital override selection 3</td><td>OV2</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Digital override selection 4</td><td>OV3</td><td></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 12.2.1. For the current position latch function, refer to section 12.2.2.</td><td>DI-1</td><td>△</td><td>△</td><td></td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Proportion control	PC		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).	DI-1	△	△	△
Clear	CR		Turn CR on to clear the position control counter droop pulse 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.	DI-1	△	△	△
Gain switching	CDP		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.	DI-1	△	△	△
Fully closed loop selection	CLD		Not used with the positioning mode.	DI-1			
Motor-side/load-side deviation counter clear	MECR		Turn on MECR to clear the motor-side/load-side position deviation counter to zero. ・It operates during the fully closed loop control. ・It does not affect the position control droop pulses. ・Turning on this device during the semi closed loop control does not affect the operation. ・Turning on this device while the fully closed loop control error detection function is disabled in [Pr. PE03] does not affect the operation. This device is not available with MR-J4-03A6-RJ servo amplifiers.	DI-1	△	△	
Cam control command	CAMC		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.	DI-1	△	△	
Cam position compensation request	CPCD		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".	DI-1	△	△	
Clutch command	CLTC		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".	DI-1	△	△	
Cam No. selection 0	CI0		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.	DI-1	△	△	
Cam No. selection 1	CI1				△	△	
Cam No. selection 2	CI2				△	△	
Cam No. selection 3	CI3				△	△	

Device (Note 1)				Selection contents
CI3	CI2	CI1	CI0	
0	0	0	0	Linear cam
0	0	0	1	Cam No. 1
0	0	1	0	Cam No. 2
0	0	1	1	Cam No. 3
⋮	⋮	⋮	⋮	⋮
1	0	0	0	Cam No. 8
1	0	0	1	Setting inhibited (Note 2)
⋮	⋮	⋮	⋮	
1	1	1	1	

Note 1. 0: Off
1: On
2. [AL. F6.5 Cam No. external error] occurs.

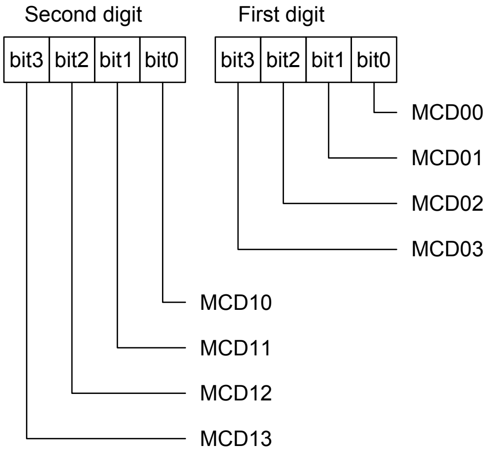
(b) Output device

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Malfunction	ALM	CN1-48	When an alarm occurs, ALM will turn off. When an alarm does not occur, ALM will turn on after 4 s to 5 s after power-on. When [Pr. PD34] is "_ _ 1 _", an alarming or warning will turn off ALM.	DO-1	○	○	○
Malfunction/Warning	ALM WNG		When an alarm occurs, ALMWNG will turn off. When a warning (except [AL. 9F Battery warning]) occurs on and off will be repeated every 1 s. When an alarm/warning is not occurring, turning on the power will turn on ALMWNG after 4 s to 5 s.	DO-1	△	△	△
Warning	WNG		When warning has occurred, WNG turns on. When a warning is not occurring, turning on the power will turn off WNG after 4 s to 5 s.	DO-1	△	△	△
Battery warning	BWNG		BWNG turns on when [AL. 92 Battery cable disconnection warning] or [AL. 9F Battery warning] has occurred. When the battery warning is not occurring, turning on the power will turn off BWNG after 4 s to 5 s.	DO-1	△	△	△
AL9F warning	BW9F		When [AL. 9F Battery warning] occurs, BW9F will turn on.	DO-1	△	△	△
Dynamic brake interlock	DB		When using the signal, enable it by setting [Pr. PD23] to [Pr. PD26], [Pr. PD28], and [Pr. PD47]. DB turns off when the dynamic brake needs to operate. When using an external dynamic brake with the servo amplifier of 11 kW or more, this device is required. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.17.) For the servo amplifier of 7 kW or less, it is not necessary to use this device.	DO-1	△	△	△
Ready	RD	CN1-49	Enabling servo-on to make the servo amplifier ready to operate will turn on RD.	DO-1	○	○	○
In-position	INP	CN1-24	When the number of droop pulses is in the preset in-position range, INP will turn on. The in-position range can be changed using [Pr. PA10]. When the in-position range is increased, INP may be on during low-speed rotation. INP turns on when servo-on turns on.	DO-1	○	○	○
Limiting torque	TLC	CN1-25	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	○	○	○
Zero speed detection	ZSP	CN1-23	ZSP turns on when the servo motor speed is zero speed (50r/min) or less. Zero speed can be changed with [Pr. PC17].  ZSP will turn on when the servo motor is decelerated to 50 r/min (at 1)), and will turn off when the servo motor is accelerated to 70 r/min again (at 2)). ZSP will turn on when the servo motor is decelerated again to 50 r/min (at 3)), and will turn 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 on level, and ZSP turns on, to the point when it is accelerated again and has reached off level is called hysteresis width. Hysteresis width is 20 r/min for this servo amplifier.	DO-1	○	○	○

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Electromagnetic brake interlock	MBR		When using the device, set operation delay time of the electromagnetic brake in [Pr. PC16]. When a servo-off status or alarm occurs, MBR will turn off.	DO-1	△	△	△
Speed command reached	SA		When a command speed is within a target speed at servo-on status, SA will be on. When the command speed is 0 r/min (mm/s), this will be continuously on. When the command speed is in acceleration/deceleration or at servo-off status, SA will be off.	DO-1	△	△	
Home position return completion	ZP		When a home position return completes normally, ZP (Home position return completion) will be on. This will be 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. If once home position return is completed in the absolute position detection system, ZP (Home position return completion) will be the same output status as RD (Ready). However, it will be off with the above 1) to 8) and the following conditions. 9) The home position return is not performed after [AL. 25 Absolute position erased] or [AL. E3 Absolute position counter warning] occurred. 10) The home position return is not performed after the electronic gear ([Pr. PA06] or [Pr. PA07]) was changed. 11) The home position return is not performed after the setting of [Pr. PA03 Absolute position detection system selection] was changed from "Disabled" to "Enabled". 12) [Pr. PA14 Rotation direction selection/travel direction selection] was changed. 13) [Pr. PA01 Operation mode] was changed. 14) [Pr. PT08 Home position return position data] or [Pr. PT28 Number of stations per rotation] was changed.	DO-1	△	△	△
Rough match	CPO		When a command remaining distance is lower than the rough match output range set with [Pr. PT12], CPO will be 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 will be on. This will be off when a home position return does not complete or base circuit shut-off is in progress.	DO-1	△	△	
Temporary stop	PUS		When a deceleration begins for a stop, PUS will be on by TSTP (Temporary stop/restart). When you enable TSTP (Temporary stop/restart) again and start operation, PUS will be 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 will be on. MEND turns on with servo-on. MEND is off at servo-off status. However, MEND will not be off in the indexer method.	DO-1	△	△	△
Position end	PED		When the droop pulses are within the position end output range set with [Pr. PA10] and the command remaining distance is "0", PED will be on. When MEND (Travel completion) is on and ZP (Home position return completion) is on, PED (Position end) will be on. When ZP (Home position return completion) is on with servo-on status, PED will be on. PED is off at servo-off status.	DO-1	△	△	
SYNC synchronous output	SOUT		When the status is waiting for input of the program SYNC (1 to 3), SOUT will be on. When PI1 (Program input 1) to PI3 (Program input 3) turn on, SOUT will be off.	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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Program output 1</td><td>OUT1</td><td></td><td>OUT1 will turn on with the OUTON (1) command during programming.
The OUTOF (1) command will turn off OUT1.
You can also set time to off with [Pr. PT23].</td><td>DO-1</td><td></td><td>△</td><td></td></tr>
<tr><td>Program output 2</td><td>OUT2</td><td></td><td>OUT2 will turn on with the OUTON (2) command during programming.
The OUTOF (2) command will turn off OUT2.
You can also set time to off with [Pr. PT24].</td><td>DO-1</td><td></td><td>△</td><td></td></tr>
<tr><td>Program output 3</td><td>OUT3</td><td></td><td>OUT3 will turn on with the OUTON (3) command during programming.
The OUTOF (3) command will turn off OUT3.
You can also set time to off with [Pr. PT25].</td><td>DO-1</td><td></td><td>△</td><td></td></tr>
<tr><td>Point table No. output 1</td><td>PT0</td><td></td><td>The signals output point table Nos. in 8 bit code simultaneously with MEND (Travel completion) on.</td><td rowspan="8">DO-1</td><td>△</td><td></td><td></td></tr>
<tr><td>Point table No. output 2</td><td>PT1</td><td></td><td rowspan="7">
<table>
<tr><th colspan="8">Device (Note 1, 2)</th><th>Description</th></tr>
<tr><th>PT7</th><th>PT6</th><th>PT5</th><th>PT4</th><th>PT3</th><th>PT2</th><th>PT1</th><th>PT0</th><th></th></tr>
<tr><td>0</td><td>0</td><td>0</td><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>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>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><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Point table No. 254</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Point table No. 255</td></tr>
</table>
Note 1. 0: Off
1: On
2. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.
</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><td></td></tr>
<tr><td>Point table No. output 4</td><td>PT3</td><td></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><td></td></tr>
<tr><td>Point table No. output 6</td><td>PT5</td><td></td><td>△</td><td></td><td></td></tr>
<tr><td>Point table No. output 7</td><td>PT6</td><td></td><td>△</td><td></td><td></td></tr>
<tr><td>Point table No. output 8</td><td>PT7</td><td></td><td>△</td><td></td><td></td></tr>
<tr><td>Station output 1</td><td>PS0</td><td></td><td>The signals output station Nos. simultaneously with MEND on while an alarm is not occurring.</td><td rowspan="8">DO-1</td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 2</td><td>PS1</td><td></td><td rowspan="7">
<table>
<tr><th colspan="8">Device (Note 1, 2)</th><th rowspan="2">Description</th></tr>
<tr><th>PS7</th><th>PS6</th><th>PS5</th><th>PS4</th><th>PS3</th><th>PS2</th><th>PS1</th><th>PS0</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>In-position out of range</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>Next station No. 0</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>Next station No. 1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>Next station No. 2</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>Next station No. 3</td></tr>
<tr><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td><td>.
.
.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>Next station No. 253</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>Next station No. 254</td></tr>
</table>
Note 1. 0: Off
1: On
2. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.
</td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 3</td><td>PS2</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 4</td><td>PS3</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 5</td><td>PS4</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 6</td><td>PS5</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 7</td><td>PS6</td><td></td><td></td><td></td><td>△</td></tr>
<tr><td>Station output 8</td><td>PS7</td><td></td><td></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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>M code 1 (bit 0)</td><td>MCD00</td><td></td><td rowspan="8">This device can be used in the point table method.
These signals can be checked with output devices of the communication function. (Refer to section 10.2 (1).)
To use these signals, set " _ _ 1 _" in [Pr. Po12].
The signals output M code simultaneously with CPO (Rough match) on.
Set M code with point tables.

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

<table>
<tr><th>M code</th><th colspan="4">Device (Note)</th></tr>
<tr><th>First/second digit</th><th>MCD03/
MCD13</th><th>MCD02/
MCD12</th><th>MCD01/
MCD11</th><th>MCD00/
MCD10</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>4</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>5</td><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>6</td><td>0</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>7</td><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>8</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>9</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
</table>
Note. 0: Off
1: On

MCD00 to MCD03 and MCD10 to MCD13 will turn off with the following status.
・Power on
・Servo-off
・Manual operation mode
・At alarm occurrence</td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 2 (bit 1)</td><td>MCD01</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 3 (bit 2)</td><td>MCD02</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 4 (bit 3)</td><td>MCD03</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 5 (bit 4)</td><td>MCD10</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 6 (bit 5)</td><td>MCD11</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 7 (bit 6)</td><td>MCD12</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
<tr><td>M code 8 (bit 7)</td><td>MCD13</td><td></td><td>DO-1</td><td></td><td></td><td></td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Mark detection rising latch completed	MSDH		Turning on MSD (Mark detection) will turn on MSDH.	DO-1	△	△	
Mark detection falling latch completed	MSDL		After MSD (Mark detection) is turned on, turning off MSD will turn on MSDL.	DO-1	△	△	
Alarm code	ACD0	(CN1-24)	To use these signals, set " _ _ _ 1" in [Pr. PD34]. 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.	DO-1	△	△	△
	ACD1	(CN1-23)					
	ACD2	(CN1-22)					
Variable gain selection	CDPS		CDPS turns on during gain switching.	DO-1	△	△	△
Absolute position undetermined	ABSV		ABSV turns on when the absolute position is undetermined.	DO-1	△	△	△
During tough drive	MTTR		When a tough drive is "Enabled" in [Pr. PA20], activating the instantaneous power failure tough drive will turn on MTTR. This device is not available with MR-J4-03A6-RJ servo amplifiers.	DO-1	△	△	△
During fully closed loop control	CLDS		CLDS turns on during fully closed loop control. This device is not available with MR-J4-03A6-RJ servo amplifiers.	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 com 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	△	△	

(2) Input signal

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Manual pulse generator	PP	(CN1-10)	Connect the manual pulse generator (MR-HDP01). When using the signal, enable PP and NP with [Pr. PD44] and [Pr. PD46].	DI-2	△	△	
	NP	(CN1-35)					

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
Analog torque limit	TLA	CN1-27	When using the signal, enable TL (External torque limit selection) with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [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 the positive terminal of the power supply to TLA. The maximum torque is generated at +10 V. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".) If a value equal to or larger than the maximum torque is inputted to TLA, the value is 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 +10V 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 For MR-J4-_A_-RJ 100 W or more servo amplifiers, setting [Pr. PC60] to "_ _ 1 _" increases the analog input resolution to 16 bits. This function is available with servo amplifiers manufactured in November 2014 or later.	Analog input	○	○	

(3) Output signal

(a) MR-J4-_A_-RJ 100 W or more

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP/BCD	CL	PS
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	○	○	○

(b) MR-J4-03A6-RJ

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP	CL	PS
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	CN1-26	This is used to output the data set in [Pr. PC14] to between MO1 and LG in terms of voltage. Output voltage: 5 V ± 4 V Resolution: 10 bits or equivalent	Analog output	○	○	○
Analog monitor 2	MO2	CN1-29	This signal outputs the data set in [Pr. PC15] to between MO2 and LG in terms of voltage. Output voltage: 5 V ± 4 V Resolution: 10 bits or equivalent	Analog output	○	○	○

(4) Communication

(a) MR-J4-_A_-RJ 100 W or more

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

(b) MR-J4-03A6-RJ

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode		
					CP	CL	PS
RS-422 I/F	SDP SDN RDP RDN TRE	CN1-13 CN1-14 CN1-39 CN1-40 CN1-31	These are terminals for RS-422 communication.		○	○	○

2.4 Analog override

POINT

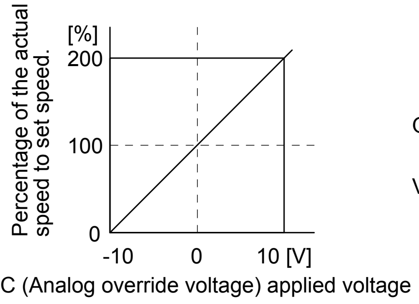
- The override function has two types. One is analog override by using analog voltage input and another is digital override by using parameter settings.
  - Target method of analog override: Point table method/Program method
  - Target method of digital override: Indexer method
- OVR (Analog override selection) is for the analog override. The digital override does not depend on OVR (Analog override selection).
- Refer to [Pr. PT38], [Pr. PT42], and [Pr. PT43] for the digital override.
- 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)

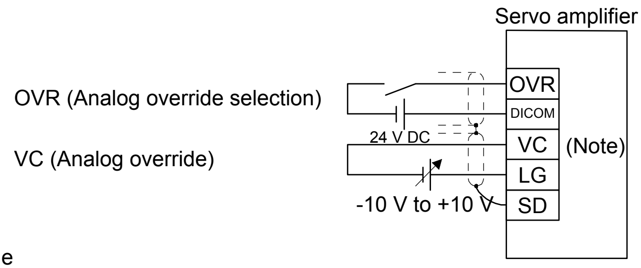
You can change the servo motor speed by using VC (Analog override). The following table shows signals and parameters related to the analog override.

Item	Name	Remark
Analog input signal	VC (Analog override)	
Contact input signal	OVR (Analog override selection)	Turning on OVR will enable 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 V to +10 V) to VC (Analog override). The following shows percentage of the actual speed to input voltage and set speed.

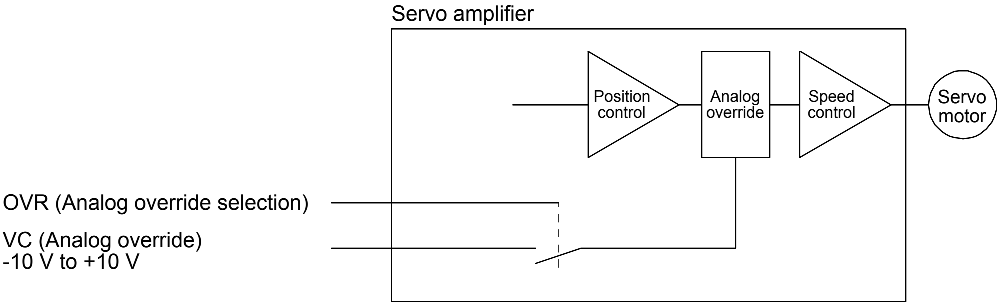




Note. This diagram shows sink input interface.

(2) OVR (Analog override selection)

Select enabled/disabled of VC (Analog override).



Select a changed value 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 is from -9999 to +9999 [mV].

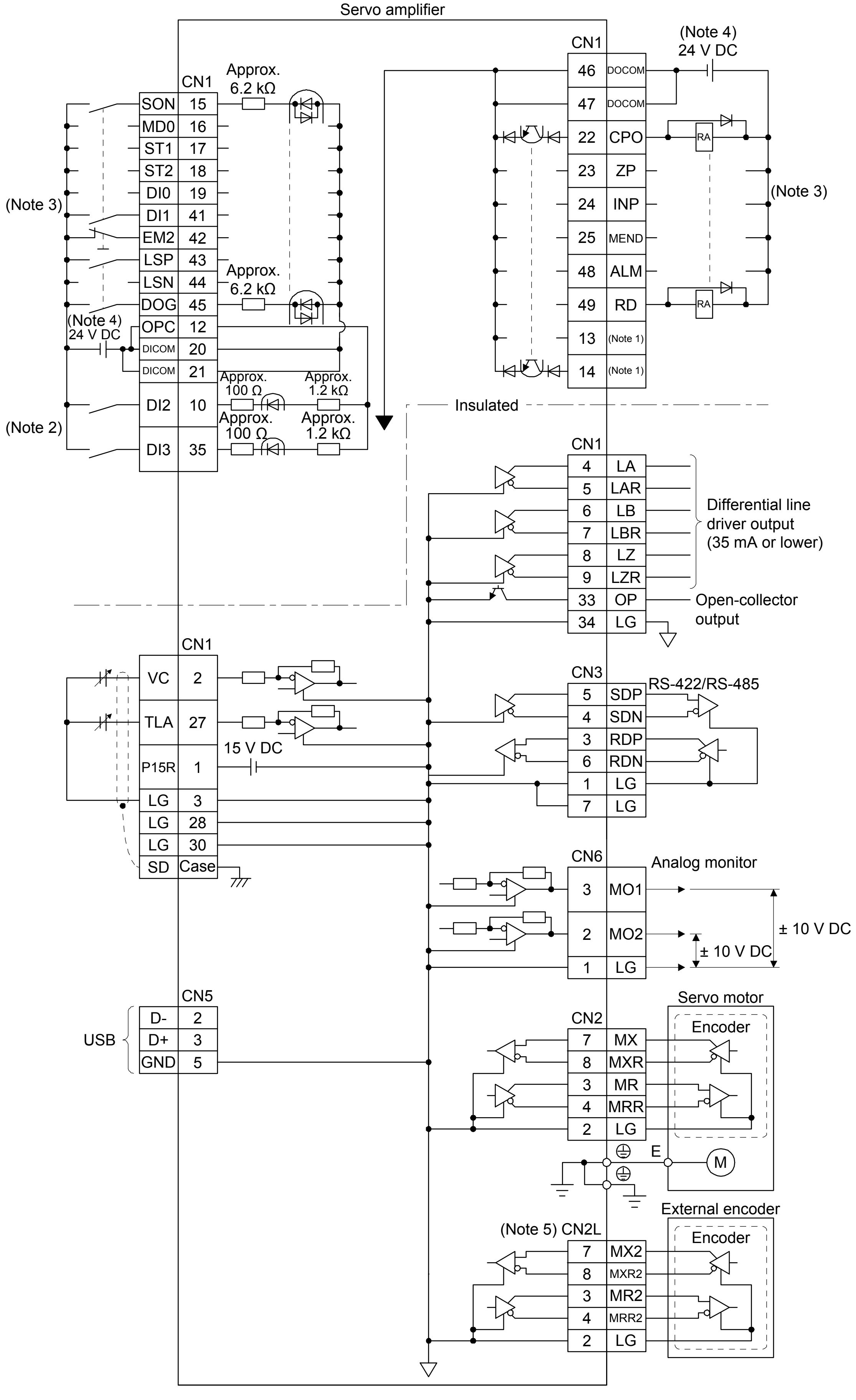
2.5 Internal connection diagram

POINT

- For details of interface and source I/O interface, refer to section 3.9 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
- For the CN8 connector, refer to section 13.3.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

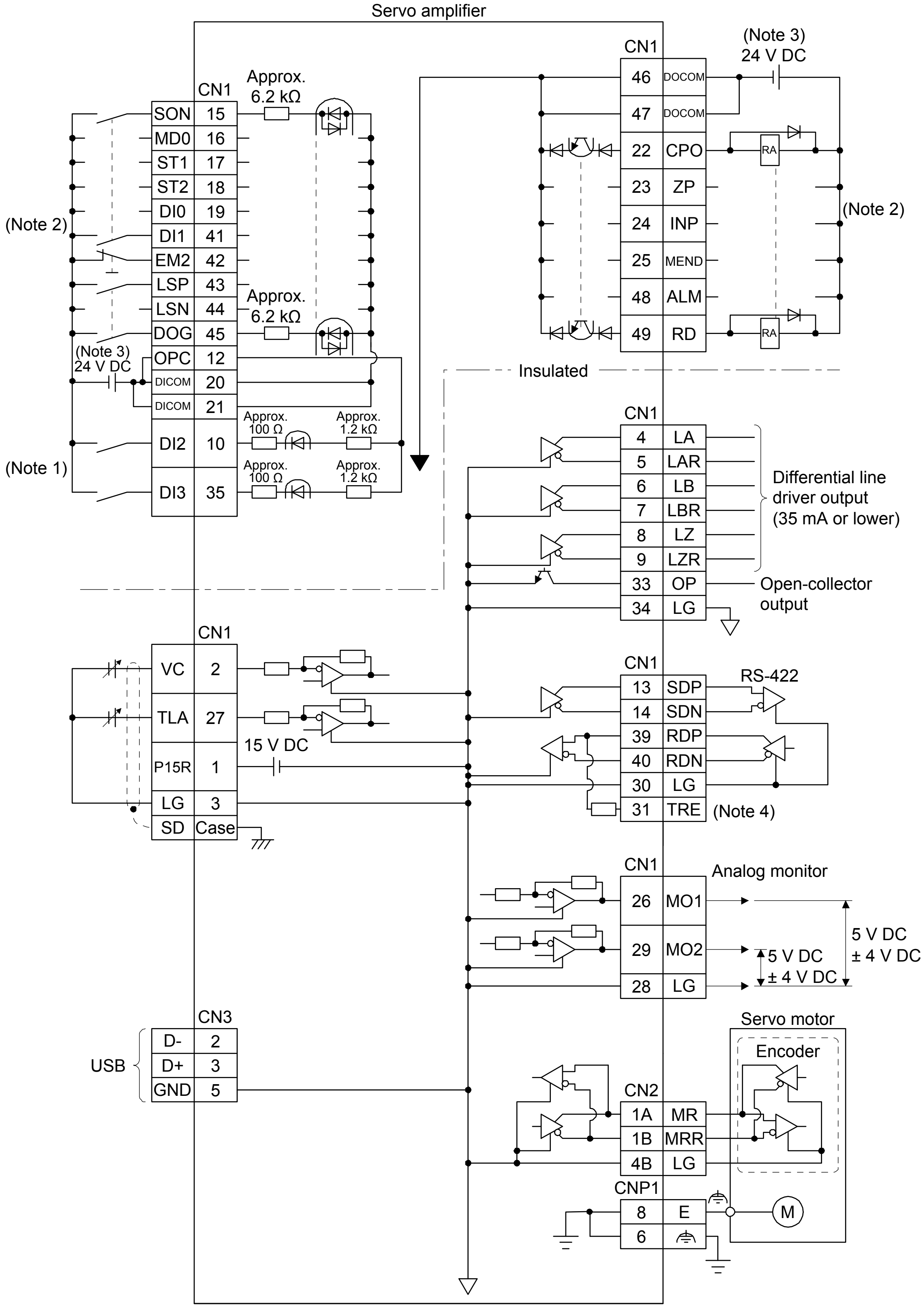
The following shows an example of internal connection diagram of the point table method.

(1) MR-J4-_A_-RJ 100 W or more



Note 1. Output signals are not assigned by default. Assign the output signals with [Pr. PD47] as necessary.
2. Refer to section 9.1 for the connection of manual pulse generator.
3. This diagram shows sink I/O interface. For source I/O interface, refer to section 3.9.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
4. 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. For the connection with external encoders, refer to table 1.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

(2) MR-J4-03A6-RJ



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-J4-_A_(-RJ) 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. For 24 V DC power for I/O signal, use power other than 24 V DC power of servo amplifier control circuit power supply.
4. To use the RS-422 communication function, connect between TRE and RDN of the final axis servo amplifier. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 18.9.)

2.6 Power-on sequence

POINT

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

2.6.1 MR-J4-_A_-RJ 100 W or more

(1) Power-on procedure

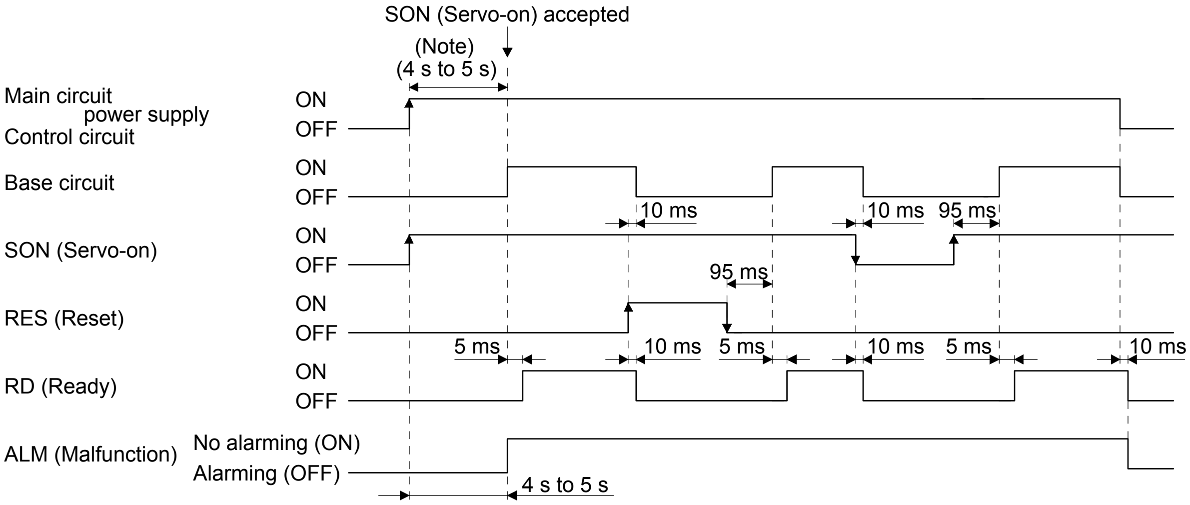
1) Always use a magnetic contactor for the main circuit power supply wiring (L1, L2, and L3) as shown in section 3.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". Configure an external sequence to switch off the magnetic contactor as soon as an alarm occurs.

2) Switch on the control circuit power supply (L11 and L21) simultaneously with the main circuit power supply or before switching on the main circuit power supply. If the main circuit power supply is not on, the display shows the corresponding warning. However, by switching on the main circuit power supply, the warning disappears and the servo amplifier will operate properly.

3) The servo amplifier receives the SON (Servo-on) 4 s to 5 s after the main circuit power supply is switched on. Therefore, when SON (Servo-on) is switched on simultaneously with the main circuit 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) of this section.)

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

(2) Timing chart



Note. The time will be longer during the magnetic pole detection of a linear servo motor and direct drive motor.

2.6.2 MR-J4-03A6-RJ

(1) Power-on procedure

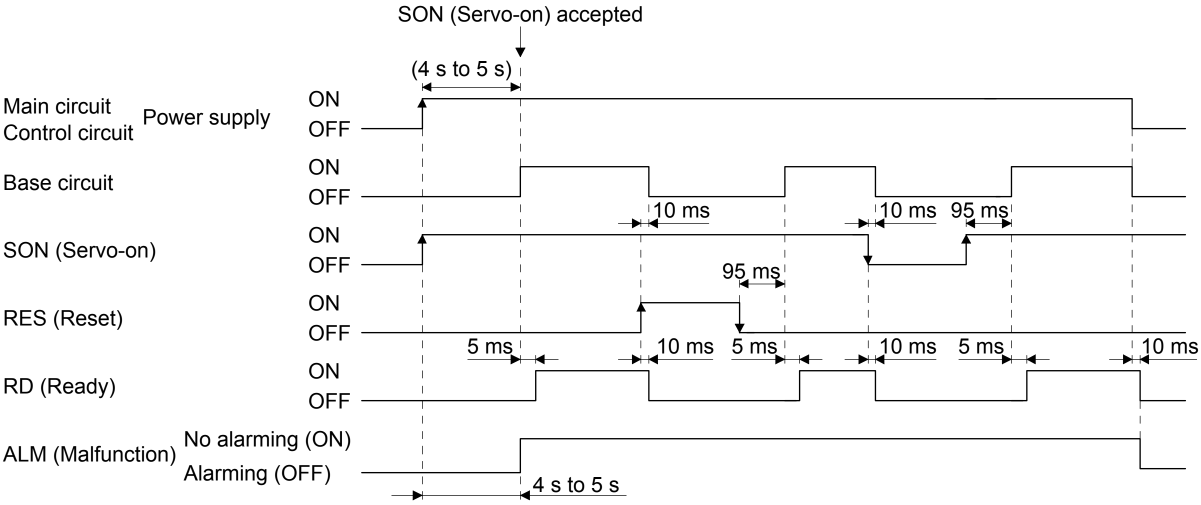
1) When wiring the power supply, always use a circuit protector for the power supply (24/PM). Configure up an external sequence so that the relay connected to PM turns off when an alarm occurs.

2) Switch on the control circuit power supply (24/0) simultaneously with the main circuit power supply (PM/0) or before switching on the main circuit power supply. If the main circuit power supply is not on, the display shows the corresponding warning. However, by switching on the main circuit power supply, the warning disappears and the servo amplifier will operate properly.

3) The servo amplifier receives the SON (Servo-on) within 4 s to 5 s after the main circuit power supply is switched on. Therefore, when SON (Servo-on) is switched on simultaneously with the main circuit 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) of this section.)

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

(2) Timing chart



3. DISPLAY AND OPERATION SECTIONS

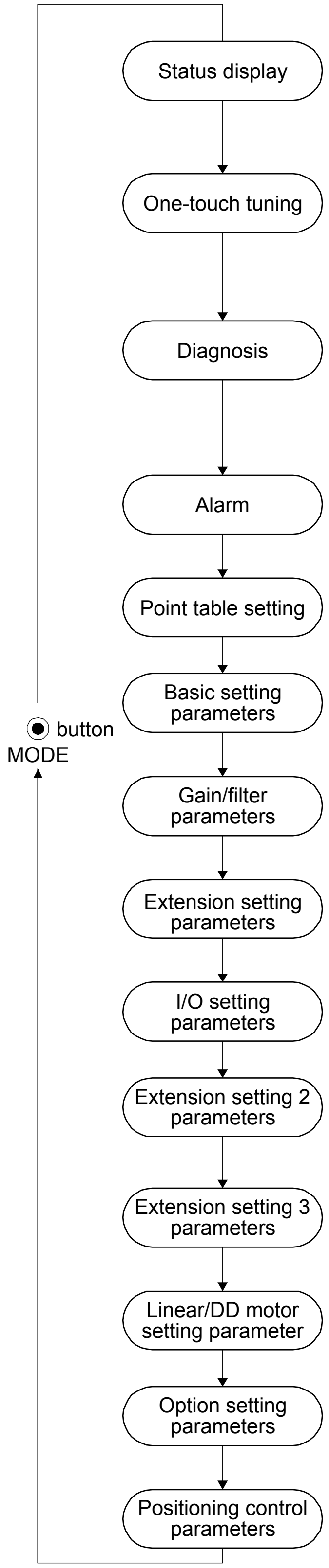
The following items are the same as MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Test operation mode	Section 4.5.9	Section 18.5.10

3.1 MR-J4-_A_-RJ 100 W or more

3.1.1 Display sequence

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 screen	Function	Reference
Status display	PoS	Servo status display. For the point table and program, PoS is displayed at power-on. For indexer, C will be displayed. (Note)	Section 3.1.2
One-touch tuning	Auto	One-touch tuning Select this when performing the one-touch tuning.	MR-J4-_A_ (-RJ) 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. The screen is displayed only in the point table method, and is not displayed in other control mode.	Section 3.1.5
Basic setting parameters	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.	
Linear/DD motor setting parameter	P L01	Display and setting of linear/DD motor setting parameters.	
Option setting parameters	P o01	Display and setting of option setting 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 axis name is displayed and the servo status is then displayed.

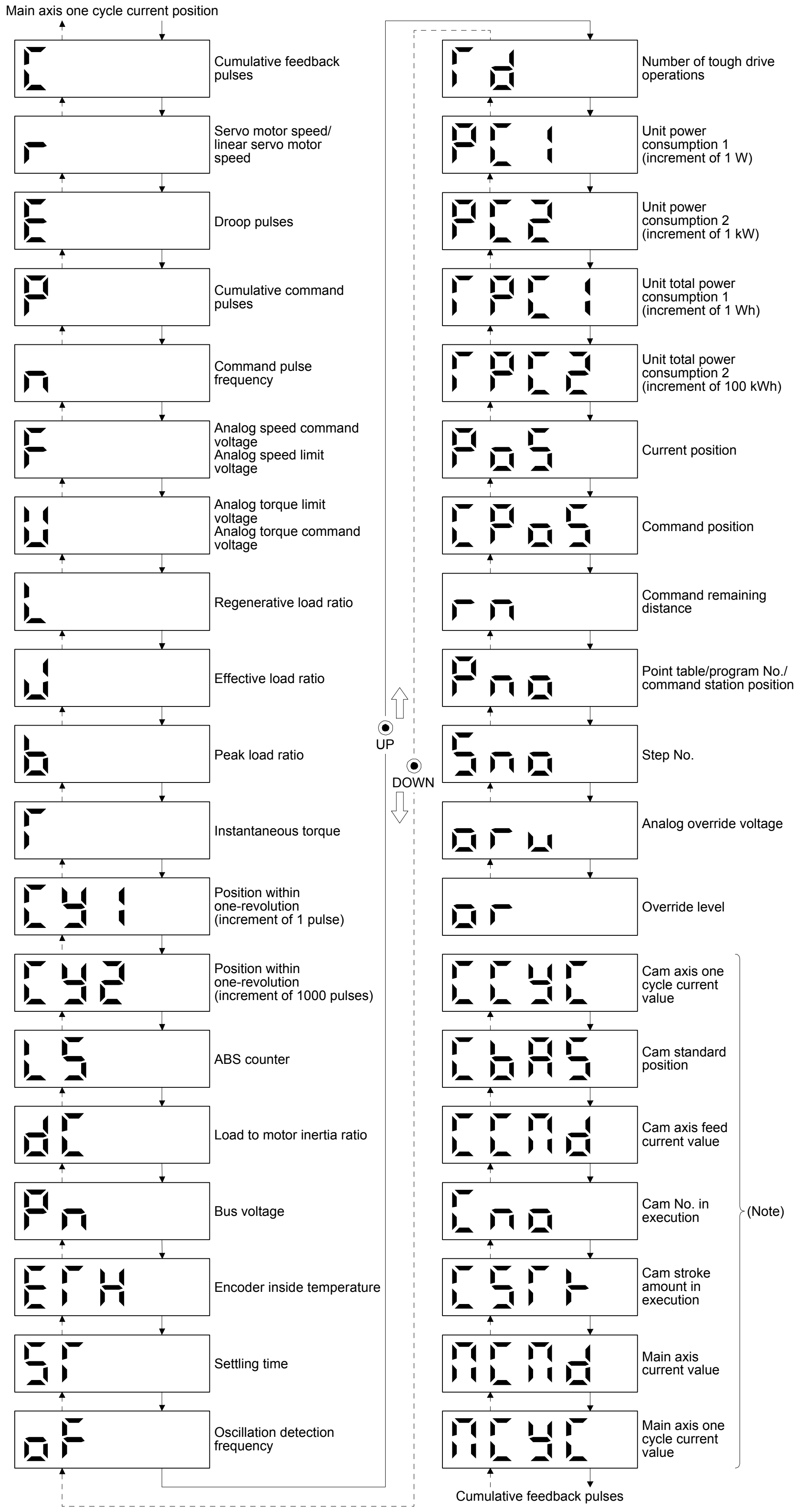
3.1.2 Status display

The servo status during operation is shown on the 5-digit, 7-segment LED display. Press the "UP" or "DOWN" button to change display data as desired. When the required data is selected, the corresponding symbol is displayed. Press the "SET" button to display that data. At only power-on, however, data appears after the symbol of the status display selected in [Pr. PC36] has been shown for 2 s.

(1) Display transition

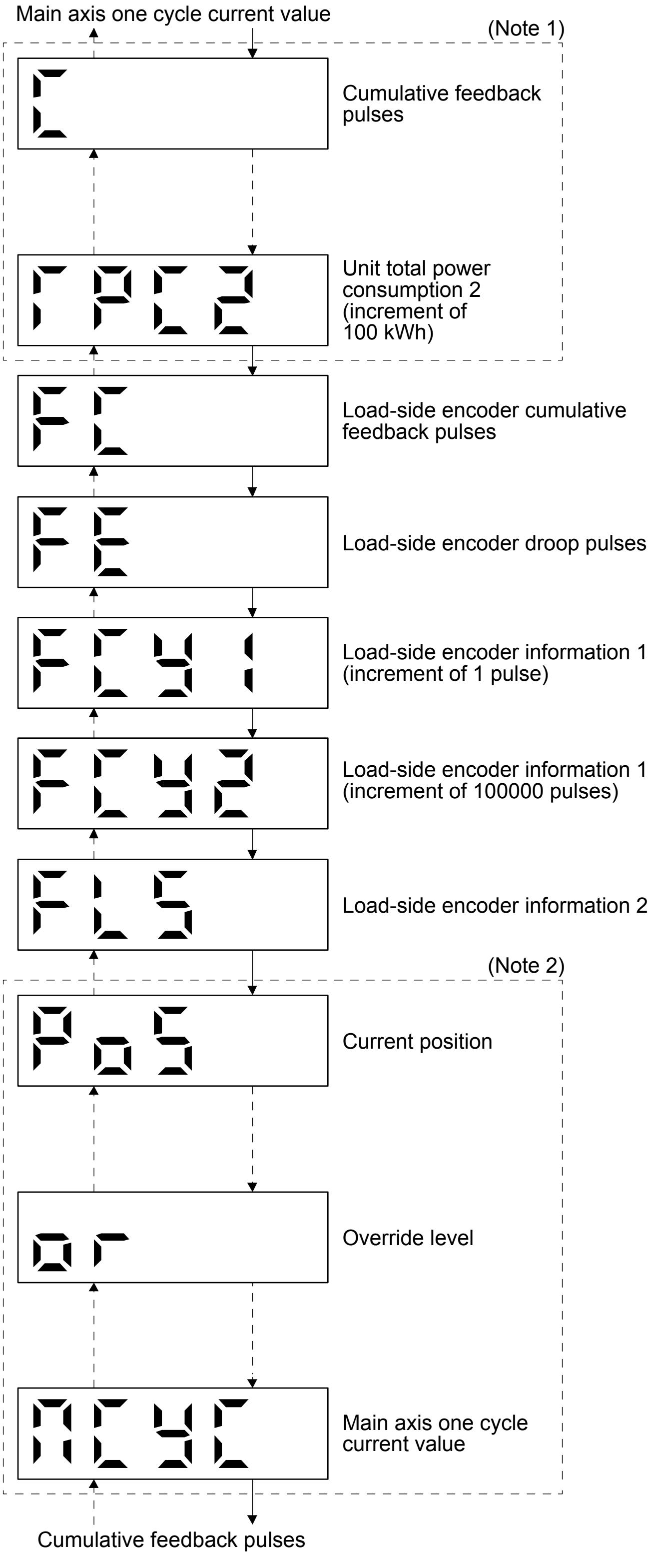
After selecting the status display mode with the "MODE" button, pressing the "UP" or "DOWN" button changes the display as shown below.

(a) Standard control mode (rotary servo motor)/DD motor control mode



Note. Supported by servo amplifiers with software version B7 or above.

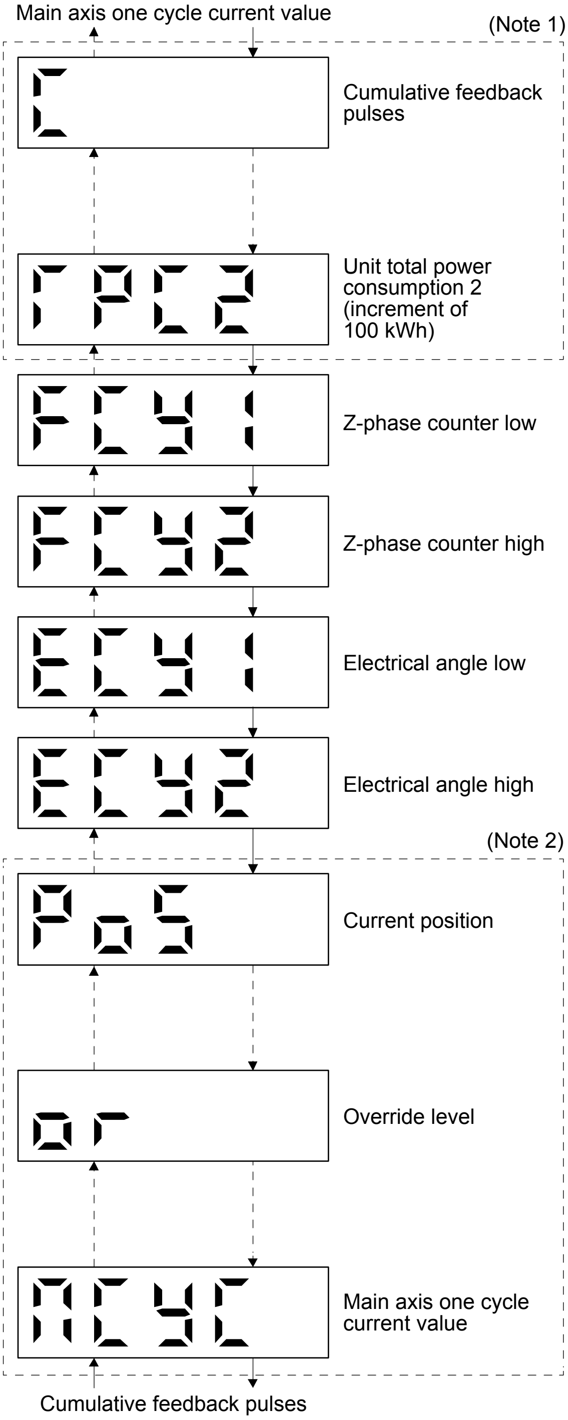
(b) Fully closed loop control mode



Note 1. The displays in the frames are from the cumulative feedback pulses of positioning mode to unit total power consumption 2 (increment of 100 kWh) with some displays omitted.

2. The displays in the frames are from the current position of positioning mode to override level with some displays omitted.

(c) Linear servo motor control mode



Note 1. The displays in the frames are from the cumulative feedback pulses of positioning mode to unit total power consumption 2 (increment of 100 kWh) with some displays omitted.

2. The displays in the frames are from the current position of positioning mode to override level with some displays omitted.

(2) Status display list

The following table lists the servo statuses that may be shown.

Status display	Symbol	Unit	Description	Control mode (Note 1)			Operation mode (Note 3)			
				CP/BCD	CL	PS	Standard	Full.	Lin.	DD
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 zero. The value of minus is indicated by the lit decimal points in the upper four digits.	○	○	○	○	○	○	○
Servo motor speed/ linear servo motor speed	r	r/min	The servo motor speed or linear servo motor speed is displayed. It is displayed rounding off 0.1 r/min (0.1 mm/s) 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) voltage 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 relative to the rated current of 100 %.	○	○	○	○	○	○	○
Peak load ratio	b	%	The maximum occurrence torque is displayed. The highest value in the past 15 s is displayed relative to the rated torque of 100 %.	○	○	○	○	○	○	○
Instantaneous torque	T	%	The instantaneous torque is displayed. The value of torque being occurred is displayed in real time considering a rated torque as 100%.	○	○	○	○	○	○	○
Position within one-revolution (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.	○	○	○	○	○	○	○
Position within one-revolution (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	The travel distance from the home position is displayed as multi-revolution counter value of the absolution position encoder in the absolution position detection system.	○	○	╲	○	○	○	○
			The travel distance from the home position is displayed as load side multi-revolution counter value in the absolution position detection system.	╲	╲	○	○	○	○	○
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.	○	○	○	○	○	╲	○

Status display	Symbol	Unit	Description	Control mode (Note 1)			Operation mode (Note 3)			
				CP/BCD	CL	PS	Standard	Full.	Lin.	DD
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.	○	○	○	○	○	○	○
Unit power consumption 1 (increment of 1 W)	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 (increment of 1 kW)	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 (increment of 1 Wh)	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 (increment of 100 kWh)	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.	○	○	○	○	○	○	○
Load-side encoder Cumulative feedback pulses	FC	pulse	Feedback pulses from the load-side 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 zero. The value of minus is indicated by the lit decimal points in the upper four digits.	○	○			○		
Load-side encoder Droop pulses	FE	pulse	Droop pulses of the deviation counter between a load-side encoder and a command are displayed. When the count exceeds ±99999, it starts from 0. Negative value is indicated by the lit decimal points in the upper four digits. The display shows the average droop pulse value of 128-time sampling at the rate of 444 [μs].	○	○			○		
Load-side encoder information 1 (1 pulse unit)	FCy1	pulse	The Z-phase counter of a load-side encoder is displayed in the encoder pulse unit. For an incremental linear encoder, the Z-phase counter is displayed. The value is counted up from 0 based on the home position (reference mark). For an absolute position linear encoder, the encoder absolute position is displayed. When the count exceeds 99999, it starts from 0.	○	○			○		
Load-side encoder information 1 (100000 pulses unit)	FCy2	100000 pulses	The Z-phase counter of a load-side encoder is displayed by increments of 100000 pulses. For an incremental linear encoder, the Z-phase counter is displayed. The value is counted up from 0 based on the home position (reference mark). For an absolute position linear encoder, the encoder absolute position is displayed. When the count exceeds 99999, it starts from 0.	○	○			○		
Load-side encoder information 2	FL5	rev	When an incremental linear encoder is used as the load-side encoder, the display shows 0. When an absolute position linear encoder is used as the load-side encoder, the display shows 0. When a rotary encoder is used as the load-side encoder, the display shows the multi-revolution counter value of the encoder.	○	○			○		
Z-phase counter low	FCy1	pulse	The Z-phase counter is displayed in the encoder pulse unit. For an incremental linear encoder, the Z-phase counter is displayed. The value is counted up from 0 based on the home position (reference mark). For an absolute position linear encoder, the encoder absolute position is displayed. When the count exceeds 99999, it starts from 0.	○	○	○			○	

Status display	Symbol	Unit	Description	Control mode (Note 1)			Operation mode (Note 3)			
				CP/BCD	CL	PS	Standard	Full.	Lin.	DD
Z-phase counter high	FCy2	100000 pulses	The Z-phase counter is displayed by increments of 100000 pulses. For an incremental linear encoder, the Z-phase counter is displayed. The value is counted up from 0 based on the home position (reference mark). For an absolute position linear encoder, the encoder absolute position is displayed. When the count exceeds 99999, it starts from 0.	○	○	○			○	
Electrical angle low	ECy1	pulse	The servo motor electrical angle is displayed.	○	○				○	
Electrical angle high	ECy2	100000 pulses	The servo motor electrical angle is displayed by increments of 100000 pulses.	○	○				○	
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 (Note2)	Indicates the remaining distance to the command position of the currently selected point table, program and station. 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./command station position	Pno		For the point table method and program method, the point table and program No. currently being executed are displayed. The selected number is displayed during a temporary stop or manual operation. For the indexer method, the command next station position is displayed.	○	○	○	○	○	○	○
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 4)	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. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 for detecting point.	○	○		○	○	○	○
Cam standard position	CbAS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 3)	A feed current value which is the standard position of the cam operation is displayed. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 for detecting point.	○	○		○	○	○	○

Status display	Symbol	Unit	Description	Control mode (Note 1)			Operation mode (Note 3)			
				CP/BCD	CL	PS	Standard	Full.	Lin.	DD
Cam axis feed current value	CCMd	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 3)	A feed current value during the cam axis control is displayed. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 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 12.1.8 for detecting point.	○	○		○	○	○	○
Cam stroke amount in execution	CSTK	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree (Note 3)	Cam stroke amount in execution is displayed. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 for detecting point.	○	○		○	○	○	○
Main axis current value	MCMd	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree (Note 4)	A current value of the input axis (synchronous encoder axis or servo input axis) is displayed. Unit is increment of input axis position. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 for detecting point.	○	○		○	○	○	○
Main axis one cycle current value	MCyC	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 4)	The input travel amount of the input axis is displayed within the range of "0 and (cam axis one cycle length setting - 1)". Unit is an increment of cam axis one cycle. When the simple cam function is disabled, 0 is always 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. Refer to section 12.1.8 for detecting point.	○	○		○	○	○	○

Note 1. CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
2. The unit can be selected from μm/inch/degree/pulse with [Pr. PT01].
3. Standard: Standard (semi closed loop system) use of the rotary servo motor
Full.: Fully closed loop system use of the rotary servo motor
Lin.: Linear servo motor use
DD: Direct drive (DD) motor use
4. The unit can be changed with "Cam control data No. 14" to μm/inch/degree/pulse.

(3) Changing the status display screen

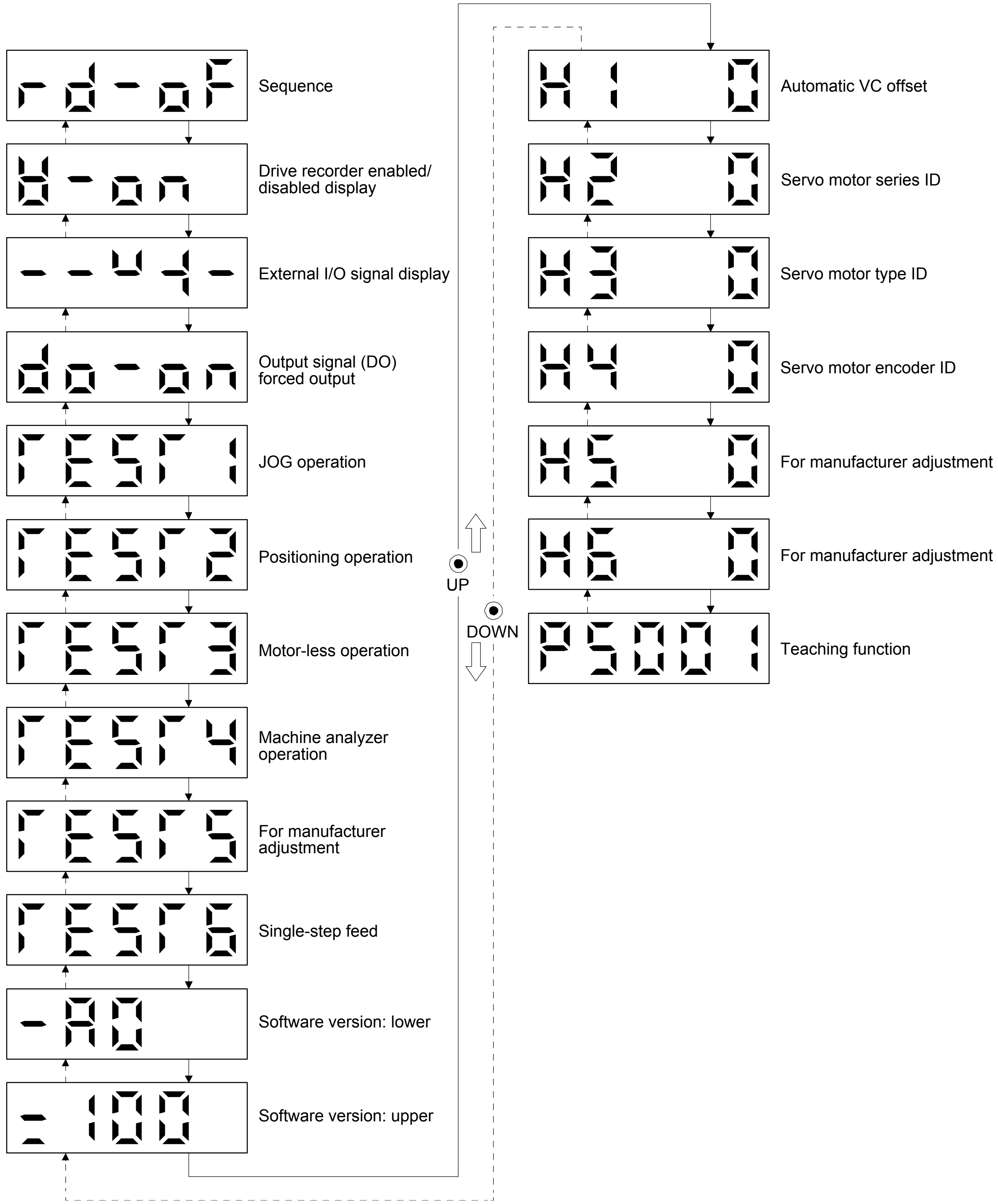
The status display item of the servo amplifier display shown at power-on can be changed by changing [Pr. PC36] settings. The item displayed in the initial status changes with the control mode as follows.

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
Positioning (indexer method)	Cumulative feedback pulses

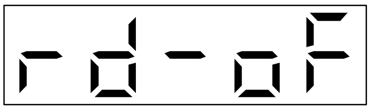
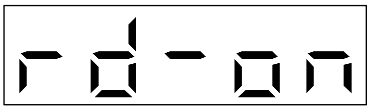
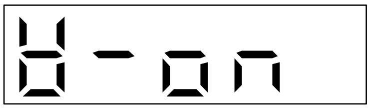
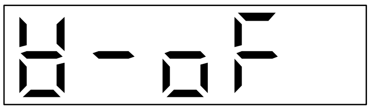
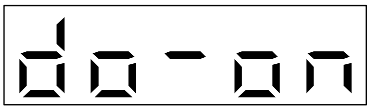
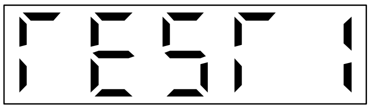
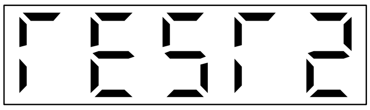
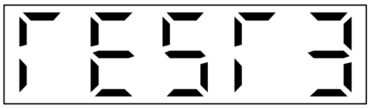
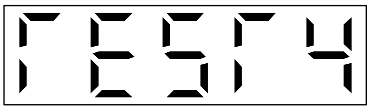
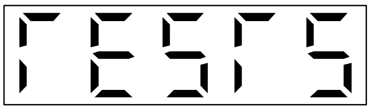
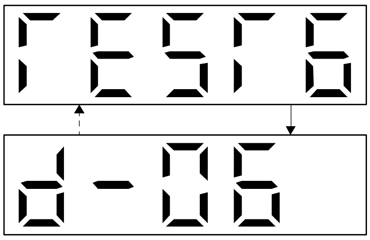
3.1.3 Diagnostic mode

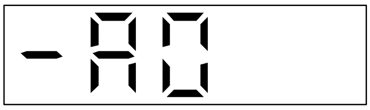
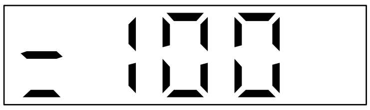
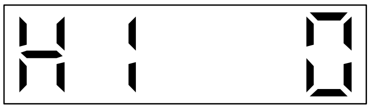
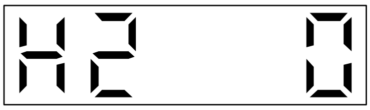
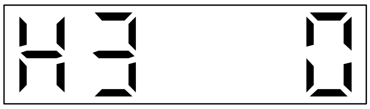
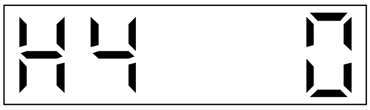
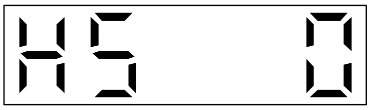
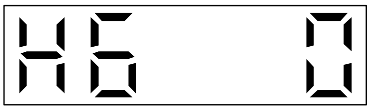
The display can show diagnosis contents. Press the "UP" or "DOWN" button to change display data as desired.

(1) Display transition



(2) Diagnosis display list

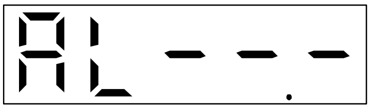
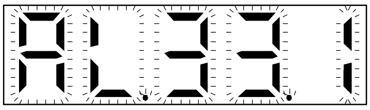
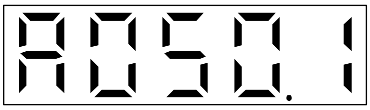
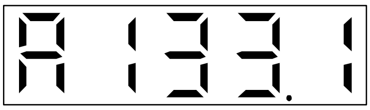
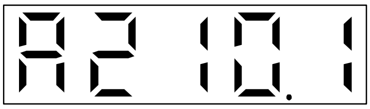
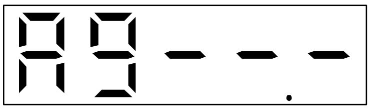
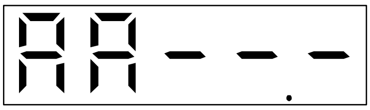
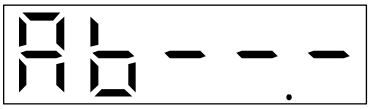
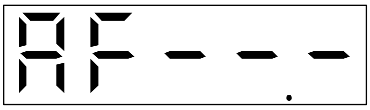
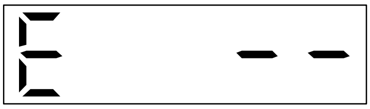
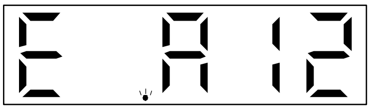
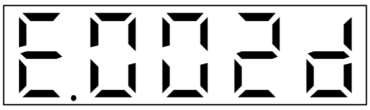
Name		Display	Description
Sequence			Not ready Indicates that the servo amplifier is being initialized or an alarm has occurred.
			Ready Indicates that the servo was switched on after completion of initialization and the servo amplifier is ready to operate.
Drive recorder enabled/disabled display			Drive recorder enabled When an alarm occurs in the status, the drive recorder will operate and write the status of occurrence.
			Drive recorder disabled The drive recorder will not operate on the following conditions. 1.You are using the graph function of MR Configurator2. 2.You are using the machine analyzer function. 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-J4-_A_(-RJ) 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-J4-_A_(-RJ) 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-J4-_A_(-RJ) 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 11.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
	For manufacturer adjustment		This is for manufacturer adjustment.
	Single-step feed		This function is available only in the point table method and program method. 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. For other control mode, the display does not change to "d-06". Refer to section 3.1.9 for details. The status will be displayed with the "MODE" button. The "UP" and "DOWN" buttons are disabled.

<table>
<tr><th>Name</th><th>Display</th><th>Description</th></tr>
<tr><td>Software version - Lower</td><td> </td><td>Indicates the version of the software.</td></tr>
<tr><td>Software version - Upper</td><td> </td><td>Indicates the system number of the software.</td></tr>
<tr><td>Automatic VC offset (Note)</td><td> </td><td>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 or OVC 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.
1) Press the "SET" once.
2) Set the number in the first digit to 1 with "UP"/"DOWN".
3) Press the "SET".
This function cannot be used if the input voltage of VC or OVC is -0.4 V or less, or +0.4 V or more.
When the VC automatic offset is enabled, the following automatic offset voltage is applied according to the setting of [Pr. Po11].
<table>
<tr><th>Pr. Po11</th><th>Offset voltage to be automatically adjusted</th></tr>
<tr><td>_ _ 0 _</td><td>Offset voltage set with [Pr. PC37] (Servo amplifier side)</td></tr>
<tr><td>_ _ 1 _</td><td>Offset voltage set with [Pr. Po21] (MR-D01 side)</td></tr>
</table></td></tr>
<tr><td>Servo motor series ID</td><td> </td><td>Push the "SET" button to show the series ID of the servo motor currently connected.
For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)".</td></tr>
<tr><td>Servo motor type ID</td><td> </td><td>Push the "SET" button to show the type ID of the servo motor currently connected.
For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)".</td></tr>
<tr><td>Servo motor encoder ID</td><td> </td><td>Push the "SET" button to show the encoder ID of the servo motor currently connected.
For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)".</td></tr>
<tr><td>For manufacturer adjustment</td><td> </td><td>This is for manufacturer adjustment.</td></tr>
<tr><td>For manufacturer adjustment</td><td> </td><td>This is for manufacturer adjustment.</td></tr>
<tr><td>Teaching function</td><td>Refer to section 3.1.10.</td><td>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. For other control mode, the display remains the same.</td></tr>
</table>

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 number that has occurred or the parameter number 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]. Flickers 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 control circuit 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: sub 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 shows the functions that can be used at occurrence of an alarm.

(1) Any mode screen displays the current alarm.

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

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

  (a) Switch power off, then on.

  (b) Push the "SET" button on the current alarm screen.

  (c) Turn on RES (Reset).

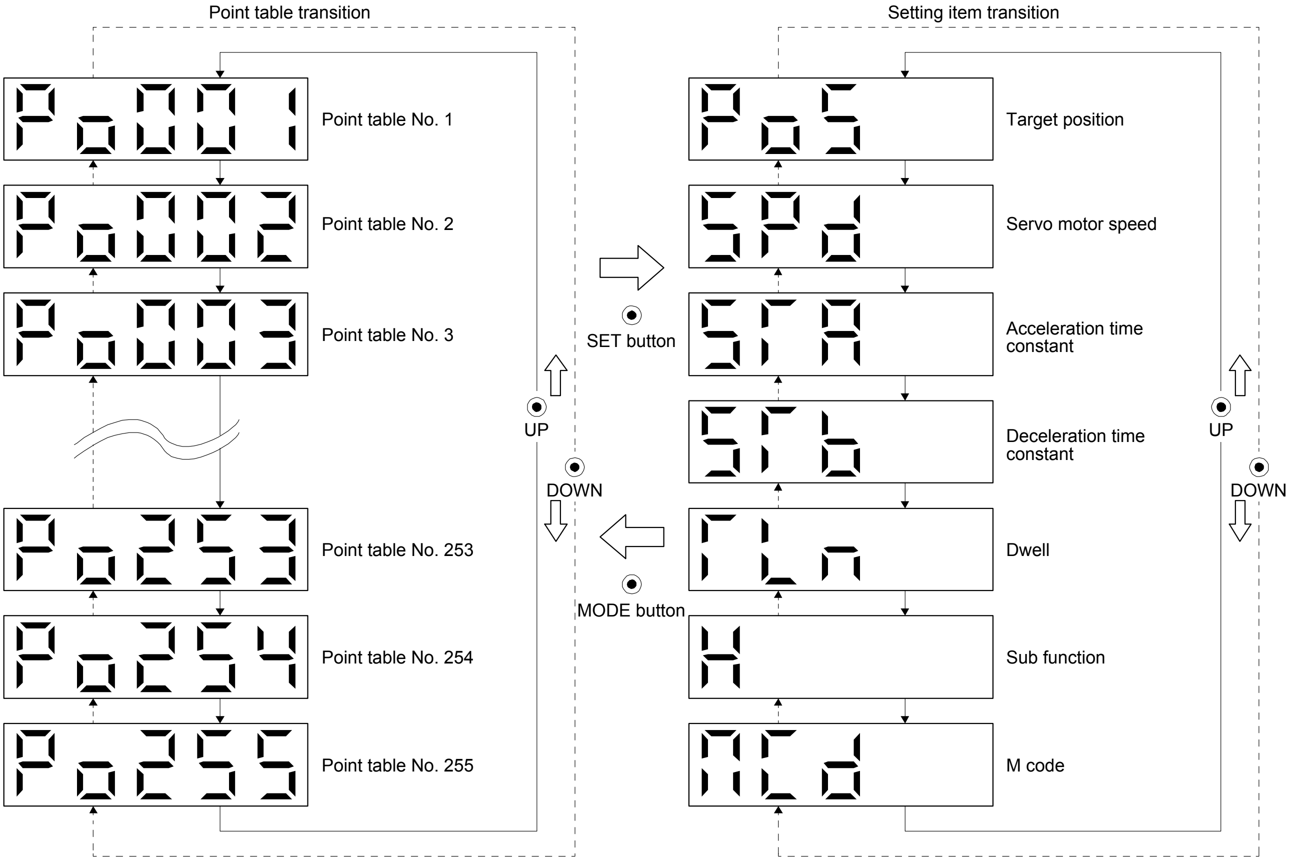
(4) Use [Pr. PC18] to clear the alarm history.

(5) Push "UP" or "DOWN" 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, sub function and M code.

(1) Display transition



(2) Setting list

The following table indicates the point table settings that may 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, sub function and M code.	1 to 255
Target position	PoS	10^{STM} μm $10^{(STM-4)}$ inch 10^{-3} degree pulse (Note 1)	Set the travel distance.	-999999 to 999999
Servo motor speed	SPd	r/min mm/s (Note 2)	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 is clamped at the permissible speed.	0 to Permissible speed
Acceleration time constant	STA	ms	Set a time until the servo motor rotates at the rated speed.	0 to 20000
Deceleration time constant	STb	ms	Set a time from when the servo motor rotates at the rated speed until when the motor stops.	0 to 20000
Dwell	TLn	ms	This function is enabled when you select the point table by input signal. To make the dwell invalid, set "0" or "2" to the sub function. To perform varying-speed operation, set "1", "3", "8", or "9" to the sub 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
Sub function	H		This function is enabled when you select the point table by input signal. (1) When using this point table under the absolute value command method 0: Automatic operation is performed in accordance with a single point table selected. 1: Executes automatic continuous operation without stopping for the next point table. 8: Automatic continuous operation is performed to the point table selected at start-up. 9: Automatic continuous operation is performed to point table No. 1. (2) When using this point table under the incremental value command method 2: Automatic operation is performed in accordance with a single point table selected. 3: Executes automatic continuous operation without stopping for the next point table. 10: Automatic continuous operation is performed to the point table selected at start-up. 11: Automatic continuous operation is performed to 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. 255, [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. Outputs the first digit and the second digit of the M code in 4-bit binary respectively.	0 to 99

Note 1. The unit can be selected from μm/inch/degree/pulse with [Pr. PT01].

2. The unit will be "mm/s" for linear control mode.

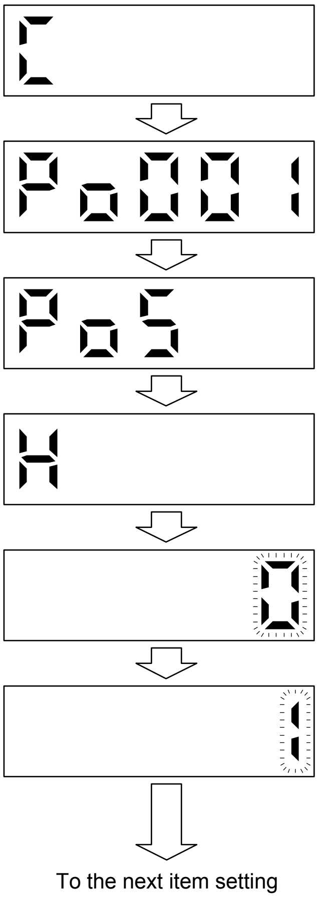
(3) Operation method

POINT

- After changing and defining the setting values of the specified point table, the defined setting values of the point table are displayed. After defining the values, pressing the "MODE" button for 2 s or more to discard the changed setting values, and the previous setting values are 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 sub function of the point table No. 1.



Press the "MODE" button four times.

······ A point table No. is displayed.

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

Press the "SET" button once.

Press the "UP" button five times.

Press the "SET" button twice.

······ The setting value of sub function of specified Point table No. flickers.

Press the "UP" button once.

······ During flickering, the set value can be changed.

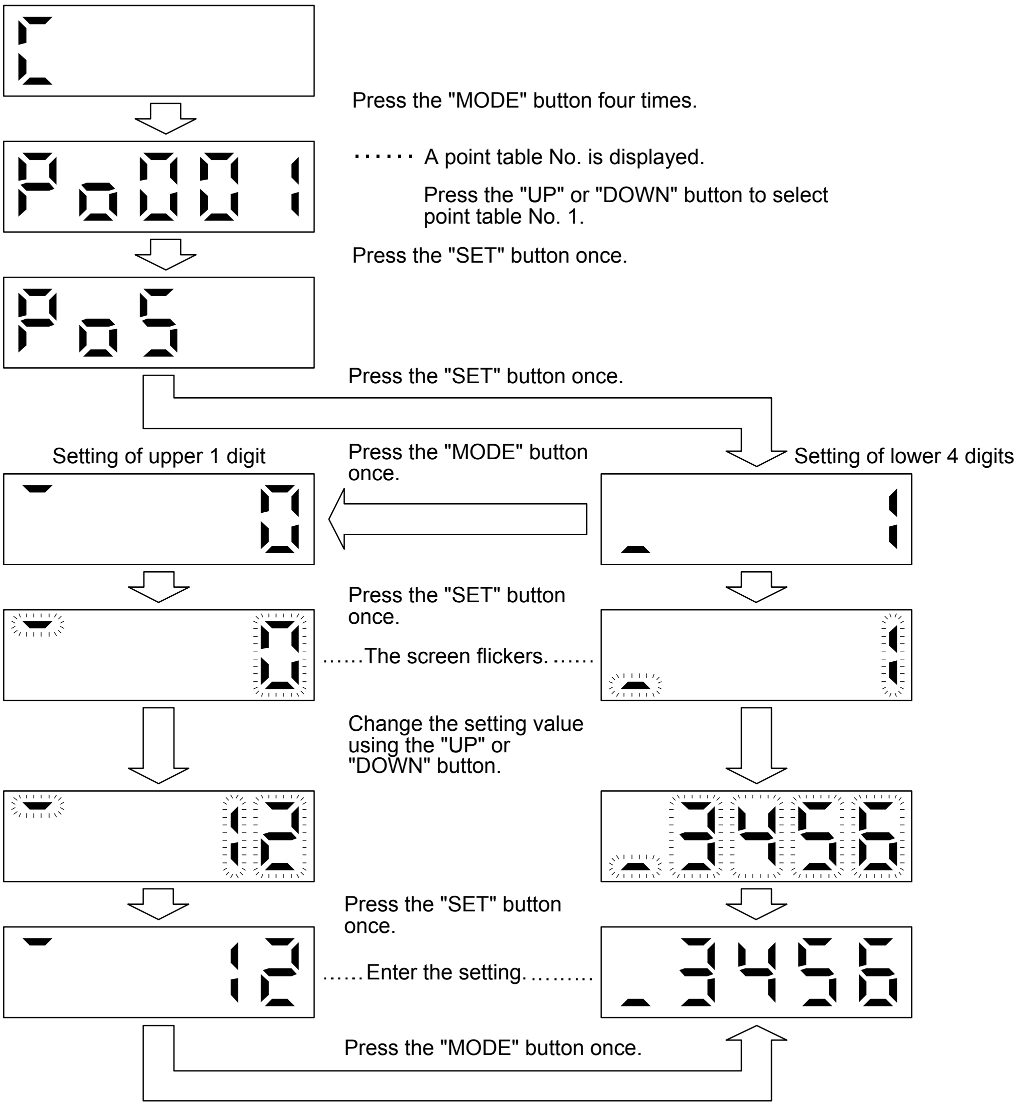
Set using the "UP" or "DOWN" button.

Press "SET" to enter.

Press the "UP" "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

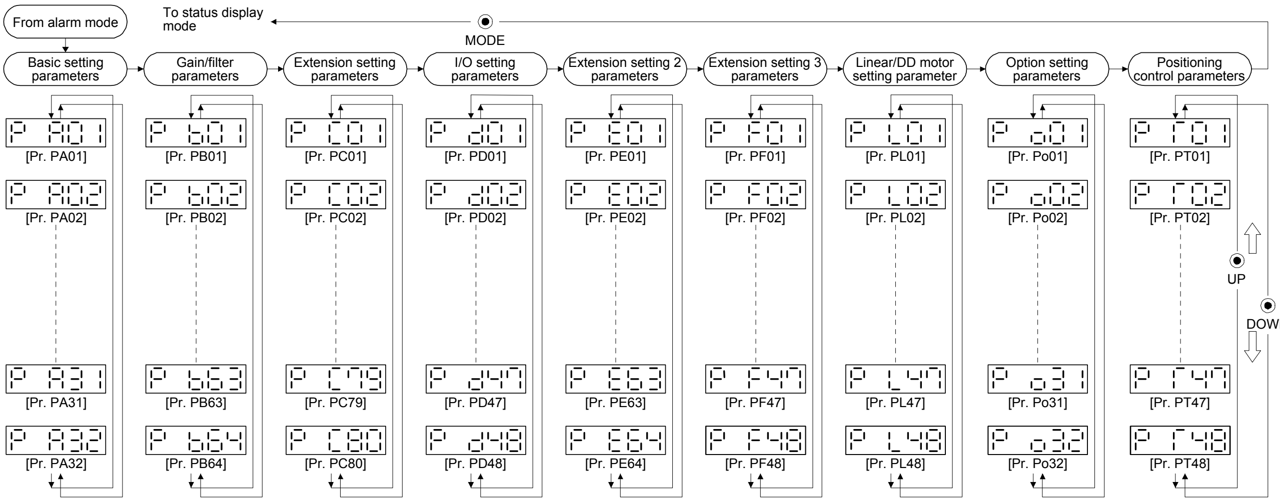
The following example is the operation method to change the position data of the point table No. 1 to "123456".



3.1.6 Parameter mode

(1) Parameter mode transition

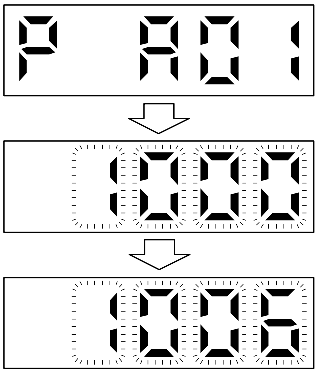
After selecting the corresponding parameter mode with the "MODE" button, pressing the "UP" or "DOWN" button changes the display as shown below.



(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 screen.



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

Press "SET" twice.

……The set value of the specified parameter number flickers.

Press the "UP" button six times.

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

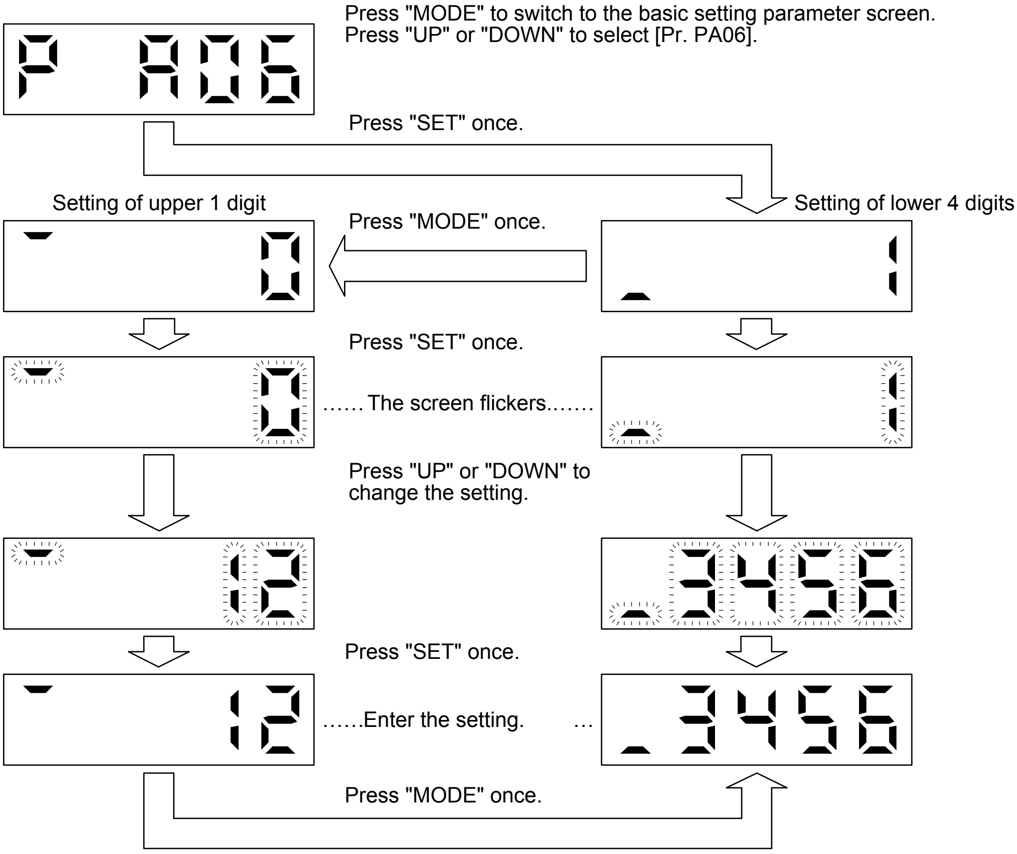
Press "SET" to enter.

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

When changing the [Pr. PA01] setting, change its setting value, then switch power off once and switch it on again to enable the new value.

(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].



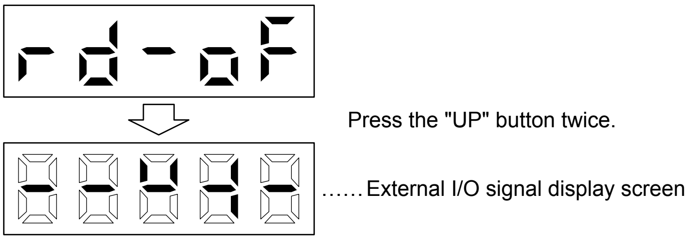
3.1.7 External I/O signal display

POINT
●The I/O signal settings can be changed using the 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.

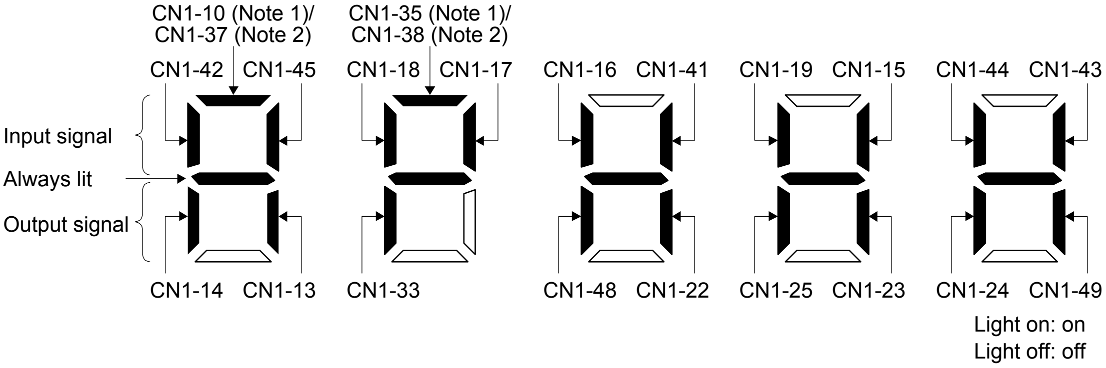
(1) Operation

The display screen at power-on. Using the "MODE" button, display the diagnostic screen.



(2) Display definition

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



Note 1. This pin is available with servo amplifiers having software version B3 or later, and manufactured in November 2014 or later.

2. This pin is available with servo amplifiers having software version B7 or later, and manufactured in January 2015 or later.

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 (1).

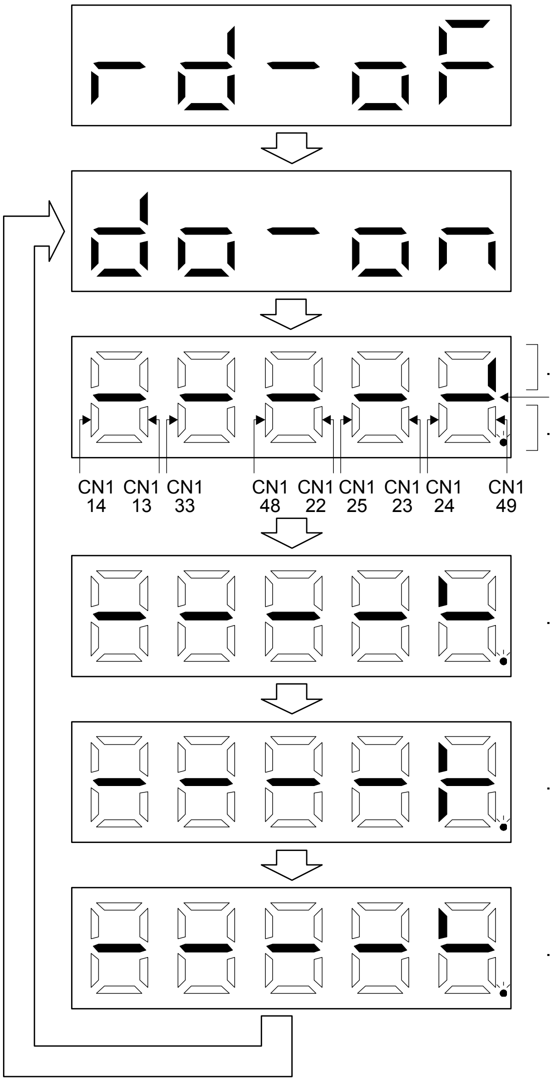
3.1.8 Output signal (DO) forced output

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. Using the "MODE" button, display the diagnostic screen.



Press the "UP" button three times.

Press the "SET" button for 2 s or more.

…… Switch on/off the signal below the lit segment.

…… Indicates on/off of output signal. Definitions of on/off are the same as those for the external I/O signals. (Light on: on, light off: off)

Press the "MODE" button once.

…… The lit LED moves to the upper LED of CN1-24.

Press the "UP" button once.

…… CN1-24 switches on.
(Between CN1-24 and DOCOM are connected.)

Press the "DOWN" button once.

…… CN1-24 switches off.

Press the "SET" button for 2 s or more.

3.1.9 Single-Step feed

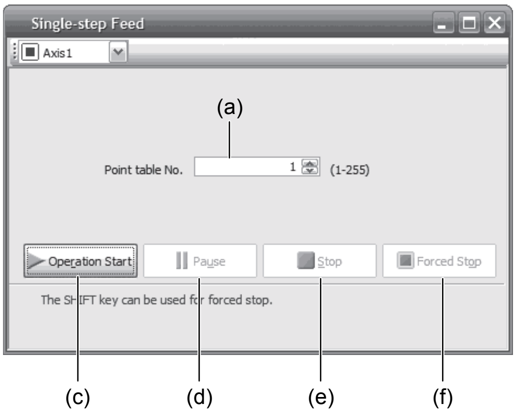
⚠CAUTION

- 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

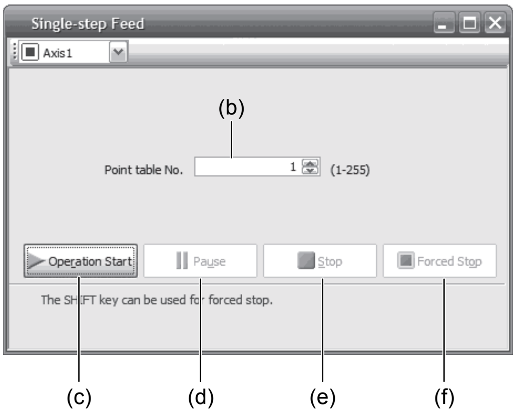
- MR Configurator2 is required to perform single-step feed.
- Test operation cannot be performed if SON (Servo-on) is not turned off.

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



The SHIFT key can be used for forced stop.

Point table operation



The SHIFT key can be used for forced stop.

Program operation

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

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

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

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

(5) Forced stop of the servo motor software

Click the "Forced Stop" (f) button to make an instantaneous stop. When the "Forced Stop" button is enabled, "Operation Start" button cannot be used. Click the "Forced Stop" button again to enable the "Operation Start" button.

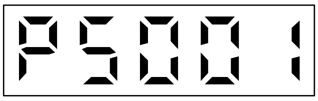
(6) Switch to the normal operation mode

Before switching from the test operation mode to the normal operation mode, turn off the servo amplifier.

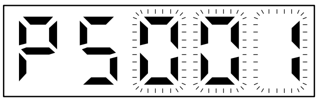
3.1.10 Teaching function

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 part or turning on TCH (Teach) will import position data. This function is available only in the point table method. For other control mode, the display remains the same.

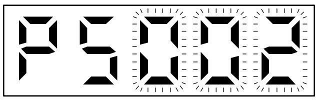
(1) Teaching preparation



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

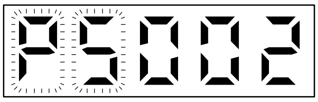


When the lower three digits flicker, press the "UP" or "DOWN" button to select the point table.

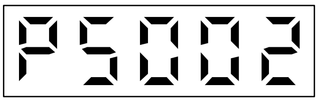


When the lower three digits flicker, press the "SET" button to complete the teaching setting preparation. The upper two digits on the display will flicker on completion of proper preparation

(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 flicker, 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 flicker, 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)

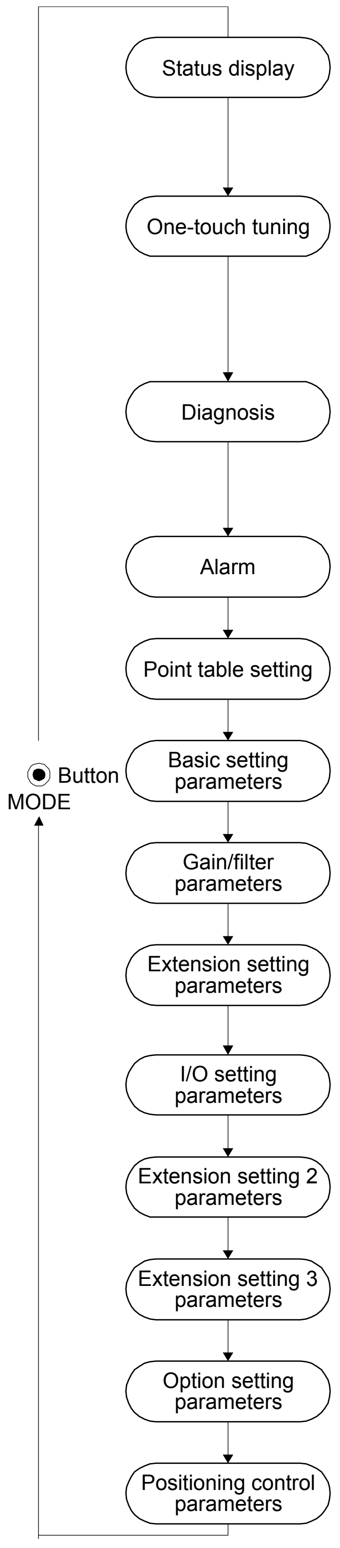
(b) Home position return completion (ZP (Home position return completion) is turned on)

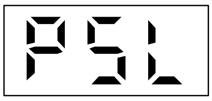
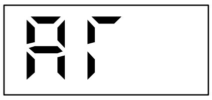
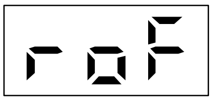
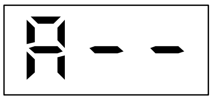
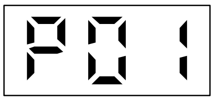
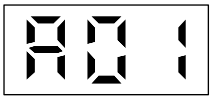
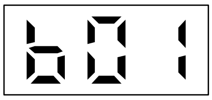
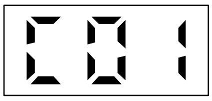
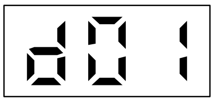
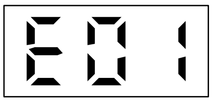
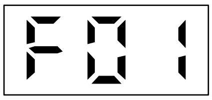
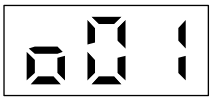
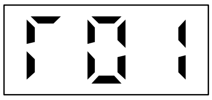
(c) While the servo motor is stopped (command output = 0, MEND (Travel completion) is turned on)

3.2 MR-J4-03A6-RJ

3.2.1 Display flowchart

Press the "MODE" button once to shift to the next display mode. Refer to section 3.2.2 and later for the description of the corresponding display mode.



Display mode transition	Initial screen	Function	Reference
		Servo status display. For the point table and program,  is displayed at power-on. For indexer,  will be displayed. (Note)	Section 3.1.2
		One-touch tuning Select this when performing the one-touch tuning.	MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual section 6.2 Section 18.5.4
		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 3.2.3
		Current alarm display, alarm history display, and parameter error No./point table error No. display	Section 3.2.4
		Display and setting of point table data. This is displayed only in the point table method, not in other control modes.	Section 3.2.5
		Display and setting of basic setting parameters.	Section 3.2.6
		Display and setting of gain/filter parameters.	
		Display and setting of extension setting parameters.	
		Display and setting of I/O setting parameters.	
		Display and setting of extension setting 2 parameters.	
		Display and setting of extension setting 3 parameters.	
		Display and setting of option setting parameters.	
		Display and setting of positioning control parameters.	

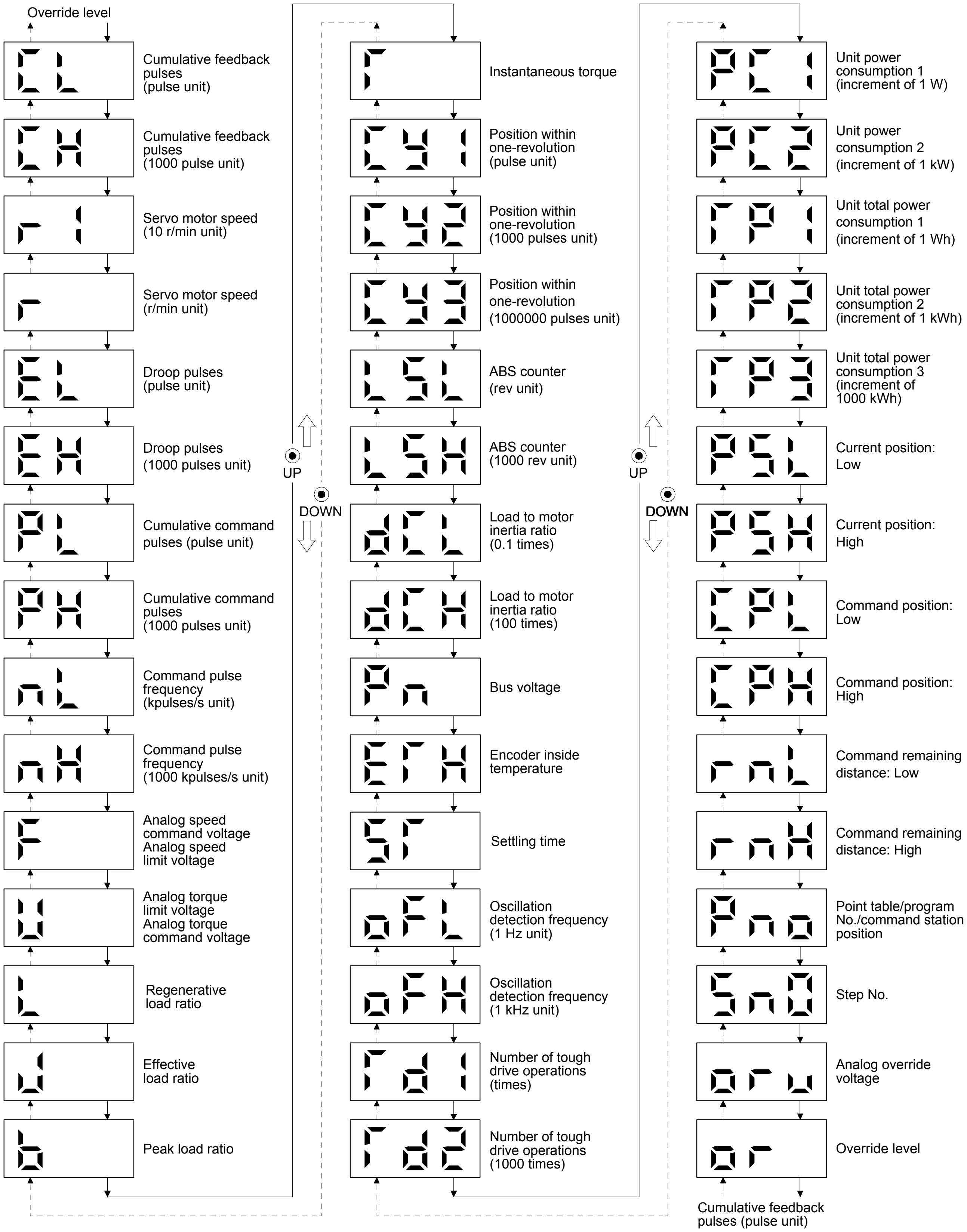
Note. When the axis name is set to the servo amplifier using MR Configurator2, the servo status is displayed after the axis name is displayed.

3.2.2 Status display mode

The servo status during operation is shown on the 3-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:


Override level
Cumulative feedback pulses (pulse unit)
Cumulative feedback pulses (1000 pulse unit)
Servo motor speed (10 r/min unit)
Servo motor speed (r/min unit)
Droop pulses (pulse unit)
Droop pulses (1000 pulses unit)
Cumulative command pulses (pulse unit)
Cumulative command pulses (1000 pulses unit)
Command pulse frequency (kpulses/s unit)
Command pulse frequency (1000 kpulses/s unit)
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
UP
DOWN
Instantaneous torque
Position within one-revolution (pulse unit)
Position within one-revolution (1000 pulses unit)
Position within one-revolution (1000000 pulses unit)
ABS counter (rev unit)
ABS counter (1000 rev unit)
Load to motor inertia ratio (0.1 times)
Load to motor inertia ratio (100 times)
Bus voltage
Encoder inside temperature
Settling time
Oscillation detection frequency (1 Hz unit)
Oscillation detection frequency (1 kHz unit)
Number of tough drive operations (times)
Number of tough drive operations (1000 times)
UP
DOWN
Unit power consumption 1 (increment of 1 W)
Unit power consumption 2 (increment of 1 kW)
Unit total power consumption 1 (increment of 1 Wh)
Unit total power consumption 2 (increment of 1 kWh)
Unit total power consumption 3 (increment of 1000 kWh)
Current position: Low
Current position: High
Command position: Low
Command position: High
Command remaining distance: Low
Command remaining distance: High
Point table/program No./command station position
Step No.
Analog override voltage
Override level
Cumulative feedback pulses (pulse unit)

(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	CL	PS
Cumulative feedback pulses (1 pulse unit)	CL	pulse	Feedback pulses from the servo motor encoder are counted and displayed. When the count exceeds ±999, it starts from 0. Negative value is indicated by the lit decimal points in the upper two digits. Press the "SET" button to reset the display value to zero. The internal counter subtracts 500000000 when the number exceeds 2000000000. The internal counter adds 500000000 when the number exceeds -2000000000.	○	○	○
Cumulative feedback pulses (1000 pulse unit)	Ch	1000 pulses		○	○	○
Servo motor speed (10 r/min unit)	r1	10 r/min	The servo motor speed is displayed. Negative value is indicated by the lit decimal points in the upper two digits. Displayed in increments of 10 r/min.	○	○	○
Servo motor speed (1 r/min unit)	r	r/min	The servo motor speed is displayed. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Droop pulses (1 pulse unit)	EL	pulse	The number of droop pulses in the deviation counter is displayed. When the count exceeds ±999, it starts from 0. The value displayed is not multiplied by the electronic gear (CMX/CDV). Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Droop pulses (1000 pulses unit)	Eh	1000 pulses		○	○	○
Cumulative command pulses (1 pulse unit)	PL	pulse	Not used with the positioning mode. "0" is always displayed.	╲	╲	╲
Cumulative command pulses (1000 pulses unit)	Ph	1000 pulses		╲	╲	╲
Command pulse frequency (1 kpulse/s unit)	nL	kpulse/s	Not used with the positioning mode. "0" is always displayed.	╲	╲	╲
Command pulse frequency (1000 kpulses/s unit)	nh	1000 kpulses/s		╲	╲	╲
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%.	○	○	○
Position within one-revolution (1 pulse unit)	Cy1	pulse	Position within one revolution is displayed in encoder pulses. When the count exceeds 999, it starts from 0. When the servo motor rotates in the CCW direction, the value is added.	○	○	○
Position within one-revolution (1000 pulses unit)	Cy2	1000 pulses	The within one-revolution position is displayed in 1000 pulse increments of the encoder. When the count exceeds 999, it starts from 0. When the servo motor rotates in the CCW direction, the value is added.	○	○	○
Position within one-revolution (1000000 pulses unit)	Cy3	1000000 pulses	The within one-revolution position is displayed in 1000000 pulse increments of the encoder. When the count exceeds 999, it starts from 0. When the servo motor rotates in the CCW direction, the value is added.	○	○	○
ABS counter (1 rev unit)	LSL	rev	The travel distance from the home position is displayed as multi-revolution counter value of the absolution position encoder in the absolution position detection system. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	╲
ABS counter (1000 rev unit)	LSh	1000 rev		○	○	╲

Status display	Symbol	Unit	Description	Control mode (Note 1)		
				CP	CL	PS
ABS counter (1 rev unit)	LSL	rev	The travel distance from the home position is displayed as load side multi-revolution counter value in the absolute position detection system. Negative value is indicated by the lit decimal points in the upper two digits.			○
ABS counter (1000 rev unit)	LSh	1000 rev				○
Load to motor inertia ratio (0.1 times)	dCL	0.1 time	The estimated ratio of the load inertia moment to the servo motor shaft inertia moment is displayed.	○	○	○
Load to motor inertia ratio (100 times)	dCh	100 times		○	○	○
Bus voltage	Pn	V	The voltage of main circuit converter is displayed. It is displayed rounding off 0.1 V unit.	○	○	○
Encoder inside temperature	ETh	°C	Inside temperature of encoder detected by the encoder is displayed.	○	○	○
Settling time	ST	ms	Displays settling time. When it exceeds 999 ms, "999" will be displayed.	○	○	○
Oscillation detection frequency (1 Hz unit)	oFL	Hz	Frequency at the time of oscillation detection is displayed.	○	○	○
Oscillation detection frequency (1 kHz unit)	oFh	kHz		○	○	○
The number of tough drive operations (time)	Td1	times	The number of tough drive functions activated is displayed.	○	○	○
The number of tough drive operations (1000 times)	Td2	1000 times		○	○	○
Unit power consumption 1 (increment of 1 W)	PC1	W	Unit power consumption is displayed by increment of 1 W. Positive value indicate power running, and negative value indicate regeneration. The values in excess of ±999 can be counted. However, the counter shows only the lower three digits of the actual value since the servo amplifier display is three digits. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Unit power consumption 2 (increment of 1 kW)	PC2	kW	Unit power consumption is displayed by increment of 1 kW. Positive value indicate power running, and negative value indicate regeneration. The values in excess of ±99 can be counted. However, the counter shows only the lower three digits of the actual value since the servo amplifier display is three digits. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Unit total power consumption 1 (increment of 1 Wh)	TP1	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 ±999 can be counted. However, the counter shows only the lower three digits of the actual value since the servo amplifier display is three digits. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Unit total power consumption 2 (increment of 1 kWh)	TP2	kWh	Unit total power consumption is displayed by increment of 1 kWh. Positive value is cumulated during power running and negative value during regeneration. The values in excess of ±999 can be counted. However, the counter shows only the lower three digits of the actual value since the servo amplifier display is three digits. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Unit total power consumption 3 (increment of 1000 kWh)	TP3	1000 kWh	Unit total power consumption is displayed by increment of 1000 kWh. Positive value is cumulated during power running and negative value during regeneration. The values in excess of ±99 can be counted. However, the counter shows only the lower three digits of the actual value since the servo amplifier display is three digits. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	○
Current position - Low	PSL	μm 0.0001 inch 0.001 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.	○	○	
Current position - High	PSh	1000 μm 0.1 inch degree 1000 pulse (Note 2)		○	○	

Status display	Symbol	Unit	Description	Control mode (Note 1)		
				CP	CL	PS
Command position - Low	CPL	μm 0.0001 inch 0.001 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. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	
Command position - High	CPh	1000 μm 0.1 inch degree 1000 pulse (Note 2)		○	○	
Command remaining distance - Low	rnL	μm 0.0001 inch 0.001 degree pulse (Note 2)	The remaining distance to the command position of the currently selected point table/program is displayed. Negative value is indicated by the lit decimal points in the upper two digits.	○	○	
Command remaining distance - High	rnh	1000 μm 0.1 inch degree 1000 pulse (Note 2)		○	○	
Point table No./program No./command station position	Pno		For the point table method and program method, the point table and program No. currently being executed are displayed. The selected number is displayed during a temporary stop or manual operation. For the indexer method, the command next station position is displayed.	○	○	○
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.	○	○	○

Note 1. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
2. The unit can be selected from μm/inch/degree/pulse with [Pr. PT01].

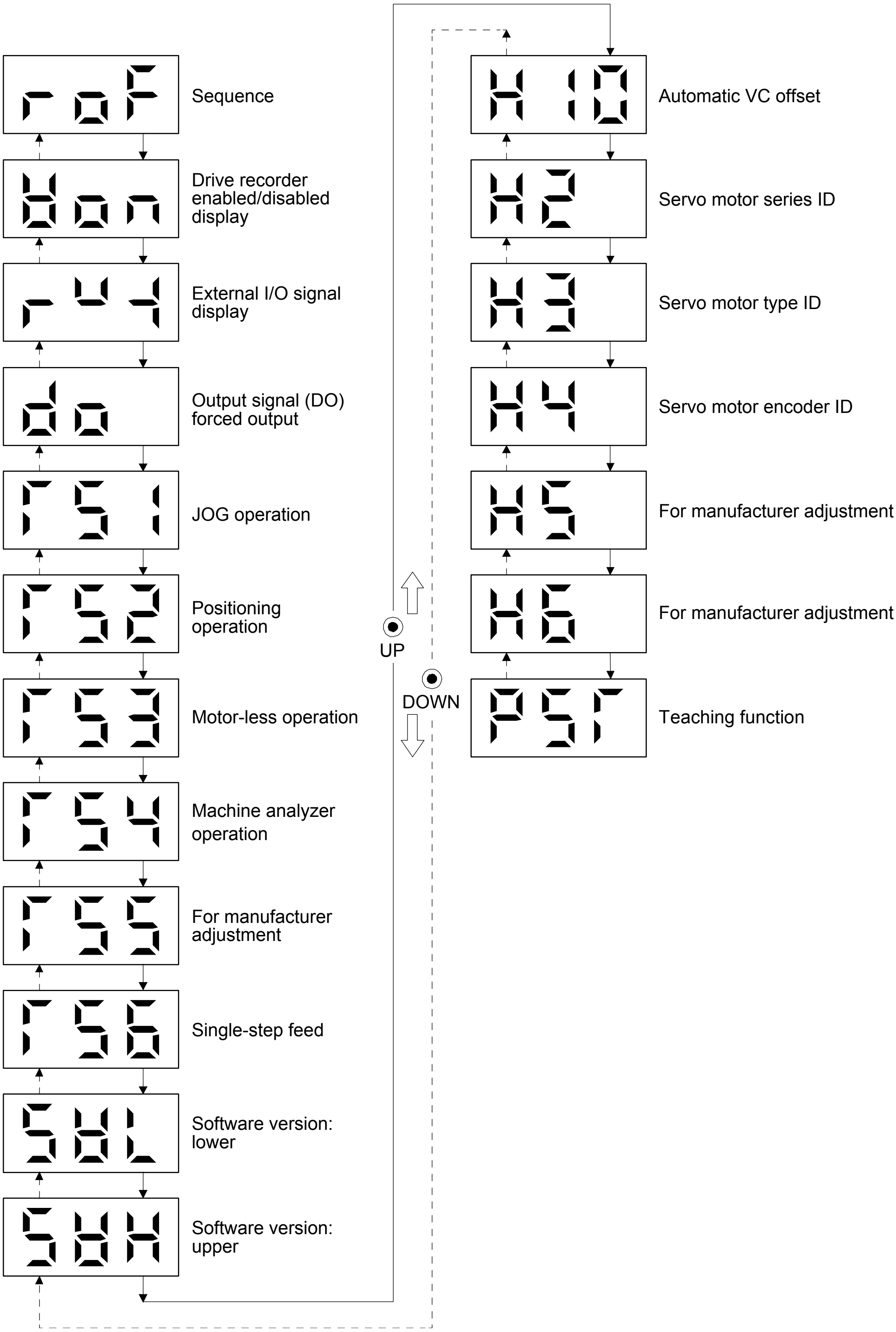
(3) Changing the status display screen
The status display on the servo amplifier at power-on can be changed with [Pr. PC36]. The status displayed by default varies depending on the control mode as follows:

Control mode	Status display
Position	Cumulative feedback pulses (pulse unit)
Position/speed	Cumulative feedback pulses (pulse unit)/ Servo motor speed (r/min unit)
Speed	Servo motor speed (r/min unit)
Speed/torque	Servo motor speed (r/min unit)/Instantaneous torque
Torque	Instantaneous torque
Torque/position	Instantaneous torque/Cumulative feedback pulses (pulse unit)
Positioning (point table method/program method)	Current position - Low
Positioning (indexer method)	Cumulative feedback pulses (pulse unit)

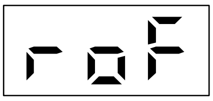
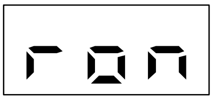
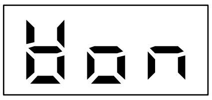
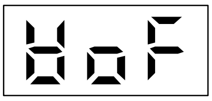
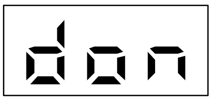
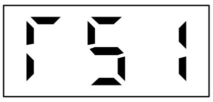
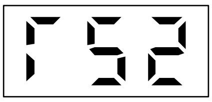
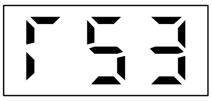
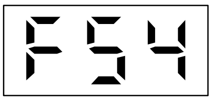
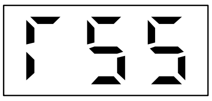
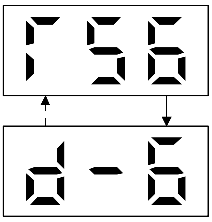
3.2.3 Diagnostic mode

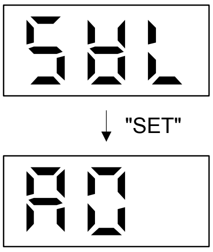
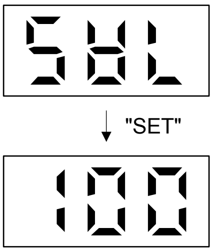
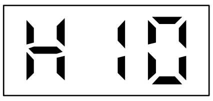
Diagnosis contents can be displayed on the display. Press the "UP" or "DOWN" button to change the display data as desired.

(1) Display transition

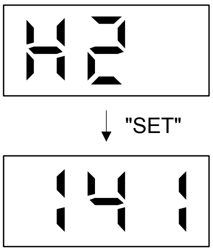
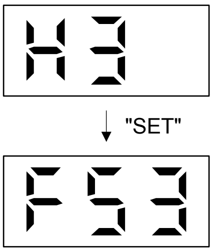
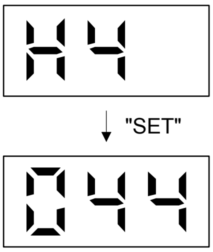
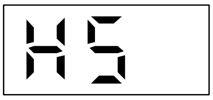
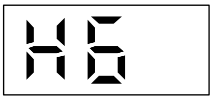


(2) Diagnosis display list

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 3.2.7.	This Indicates the on/off status of external I/O signal.
Output signal (DO) forced output			This allows digital output signal to be switched on/off forcibly. Refer to section 3.2.8 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 18.5.10 (2) of "MR-J4-_A_(-RJ) 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-J4-_A_(-RJ) 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-J4-_A_(-RJ) 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 11.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
	For manufacturer adjustment		This is for manufacturer adjustment.
	Single-step feed		This function is available only in the point table method and program method. When the positioning operation is executed in accordance with the point table or program set by MR Configurator2, the diagnosis display changes to "d-6" during single-step feed. For other control mode, the display does not change to "d-6". Refer to section 3.2.9 for details. The status will be displayed with the "MODE" button. The "UP" and "DOWN" buttons are disabled.

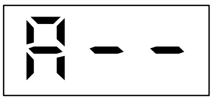
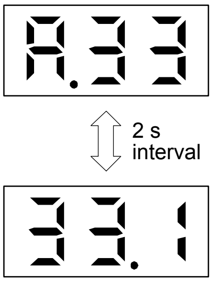
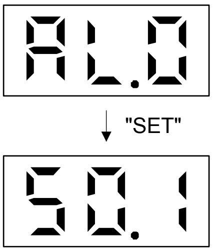
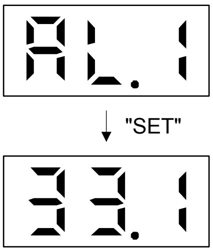
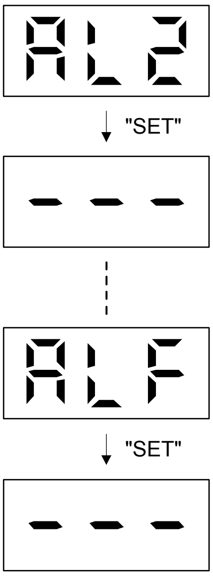
Name	Display	Description
Software version: lower		Indicates the version of the software. The software version is displayed while the "SET" button is pressed and held. Press the "MODE" button to shift to the next display mode. Press the "UP" or "DOWN" button to shift to the next diagnosis menu.
Software version: upper		Indicates the system number of the software. The software system number is displayed while the "SET" button is pressed and held. Press the "MODE" button to shift to the next display mode. Press the "UP" or "DOWN" button to shift to the next diagnosis menu.
Automatic VC offset		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 (Analog override) of 0 V, a zero-adjustment of offset voltages will be automatically performed. When using this function, enable the function in the following procedure. 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. (Note)

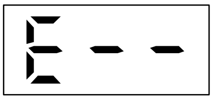
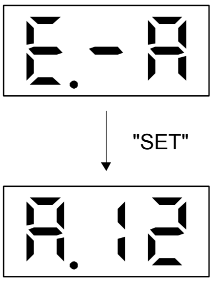
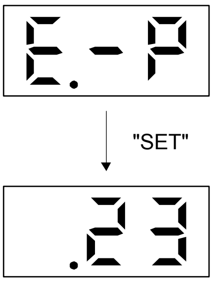
Note. Even if VC automatic offset is performed and 0 V is inputted, the speed may not completely be the set value.

Name	Display	Description
Servo motor series ID		Displays the series ID of the servo motor currently connected. Press the "SET" button to show the lower 3 digits of servo motor series ID. For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)". Press the "UP" or "DOWN" button to shift to the next diagnosis menu.
Servo motor type ID		Displays the type ID of the servo motor currently connected. Press the "SET" button to show the lower 3 digits of servo motor type ID. For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)". Press the "UP" or "DOWN" button to shift to the next diagnosis menu.
Servo motor encoder ID		Displays the servo motor encoder ID of the servo motor currently connected. Press the "SET" button to show the lower 3 digits of servo motor encoder ID. For indication details, refer to appendix 1 of "Servo Motor Instruction Manual (Vol. 3)". Press the "UP" or "DOWN" button to shift to the next diagnosis menu.
For manufacturer adjustment		This is for manufacturer adjustment.
For manufacturer adjustment		This is for manufacturer adjustment.
Teaching function	Refer to section 3.2.10.	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 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.

3.2.4 Alarm mode

The current alarm, past alarm history, and parameter error are displayed. The alarm number that has occurred or the parameter numbers in error are displayed on the display.

Name	Display (Note 1)	Description
Current alarm		Indicates no occurrence of an alarm.
		Indicates the occurrence of [AL. 33.1 Main circuit voltage error]. Flickers at alarm occurrence. The alarm number and detail number are displayed alternately by intervals of 2 s.
Alarm history		Indicates that the last alarm is [AL. 50.1 Thermal overload error 1 during operation]. When an alarm is recorded to alarm history, the second digit decimal point flickers. Press the "SET" button to display the detail number of [AL. 50].
		Indicates the second last alarm is [AL. 33.1 Main circuit voltage error]. When an alarm is recorded to alarm history, the second digit decimal point flickers. Press the "SET" button to display the detail number of [AL. 33].
		Indicates that there is no third alarm in the past. If there is no alarm history, the display will be as shown as in the left, when the "SET" button is pressed. Indicates that there is no sixteenth alarm in the past.

Name	Display (Note 1)	Description
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 parameter group in which the parameter error has occurred is displayed. Press and hold the "SET" button to show the parameter number with the error.
		This indicates that the position data of the point table No. 23 has exceeded the setting range. An error item of the point table is displayed. The point table No. having the error is displayed while the "SET" button is being pressed and held. The following shows the items of a point table: P: position data, d: motor speed, A: acceleration time constant, b: deceleration time constant, n: dwell, H: sub 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].

Functions at occurrence of an alarm

(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 third digit remains flickering.

(3) Remove the cause of the alarm and clear it with 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.

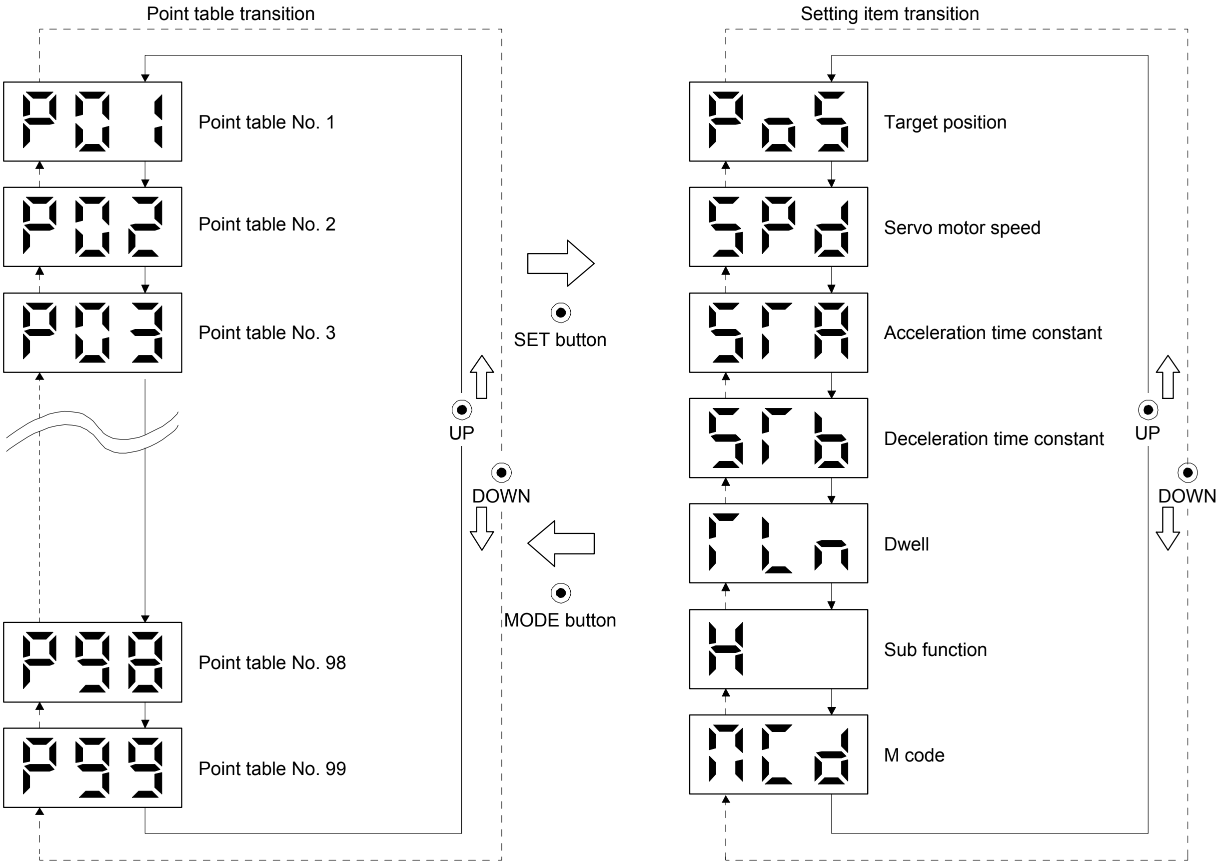
3.2.5 Point table setting

POINT

- Point table No. 1 to No. 99 can be set with the operation section of the servo amplifier. To set point table No. 100 to No. 255, use MR Configurator2.

You can set the target position, servo motor speed, acceleration time constant, deceleration time constant, dwell, sub 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.	P01		Specify the point table to set the target position, servo motor speed, acceleration time constant, deceleration time constant, dwell, sub function, and M code.	1 to 255
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 sub function. To perform a varying-speed operation, set "1", "3", "8", or "9" to the sub 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
Sub function	H		This function is enabled when you select the point table by input signal. (1) When using the 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: Automatic continuous operation is performed to 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: Automatic continuous operation is performed to 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. When "1" or "3" is set to the point table No. 255, [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. The first digit and the second digit of the M code are outputted in 4-bit binary respectively.	0 to 99

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

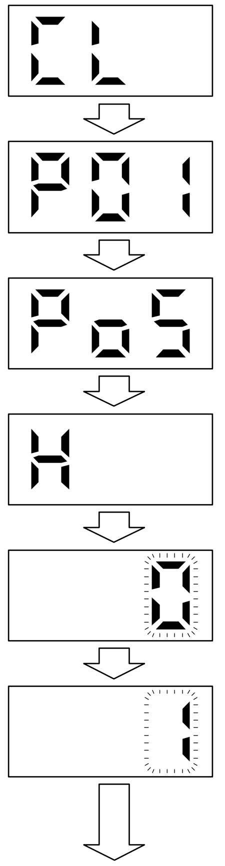
(3) Operation method

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 3 or less digits

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



Press the "MODE" button four times.

……A point table No. is displayed.

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

Press the "SET" button once.

Press the "UP" button five times.

Press the "SET" button twice.

……The setting value of sub function of specified Point table No. flickers.

Press the "UP" button once.

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

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

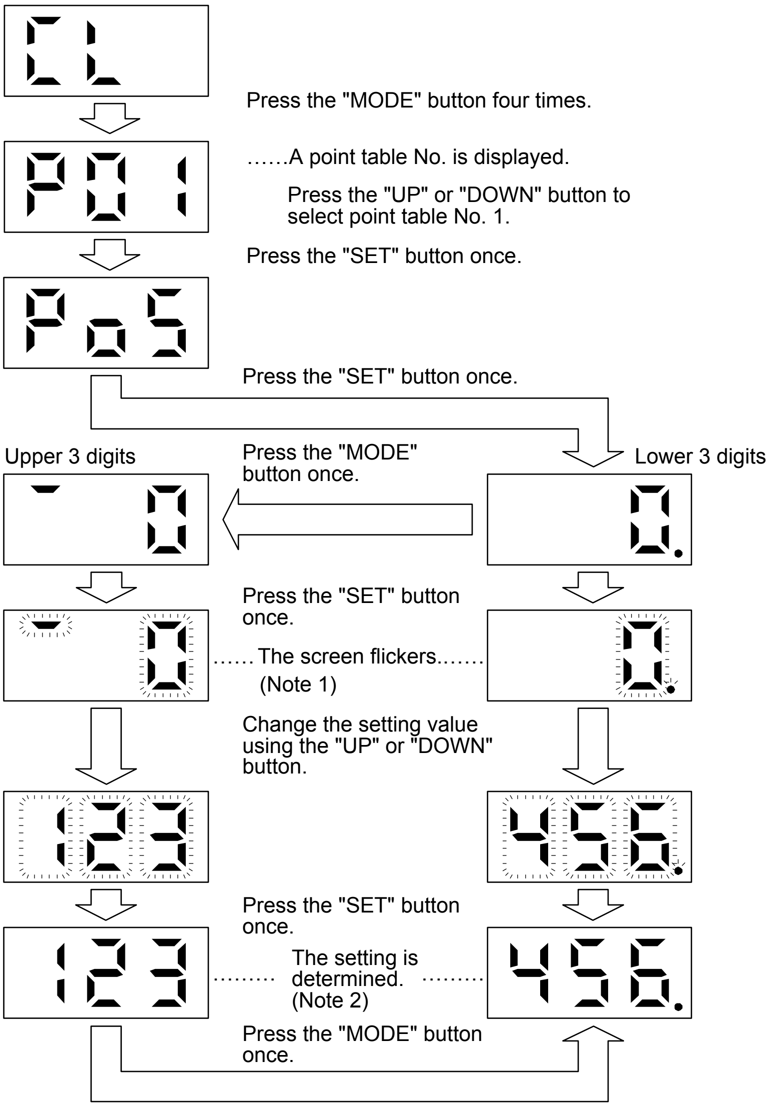
Press "SET" to enter.

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 4 to 6 digits

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



Note 1. Pressing the "SET" button in either upper or lower 3-digit display makes the display flicker.

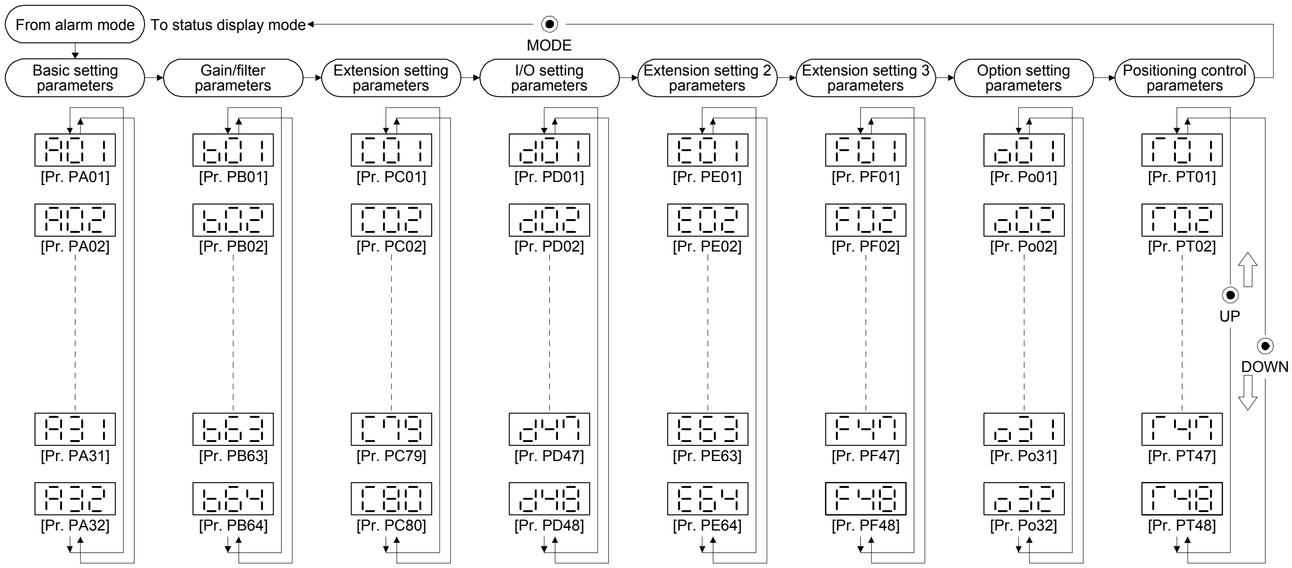
2. Press the "SET" button to confirm on upper 3-digits or lower 3-digits screen.

The display can be switched between upper and lower 3-digit by pressing the "MODE" button.
Switching the display between upper and lower 3-digit is also possible by pressing the "MODE" button while the display is flickering.
The changed value will be canceled when the "MODE" button is pressed for 2 s or more while flickering.
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.

3.2.6 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 follows.



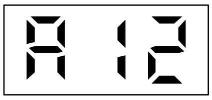
(2) Operation method

(a) Parameters of 3 or less decimal digits.

The following example gives the operation procedure to change [Pr. PA Reverse rotation torque limit].

Press the "MODE" button to switch to the basic setting parameters screen.

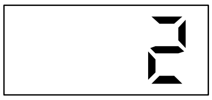
Parameter number selection



Select a parameter number with the "UP" or "DOWN" button.

Press the "SET" button to display the item to be set to the selected parameter number.

Displaying the parameter contents



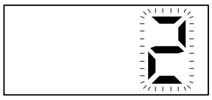
Press the "UP" or "DOWN" button to shift to the setting display of the next parameter number.

Press the "MODE" button to shift to the next display.

Press the "SET" button once to display the setting.

Press the "SET" button once when the setting is displayed. The setting flickers and is possible to be changed.

Changing the parameter contents

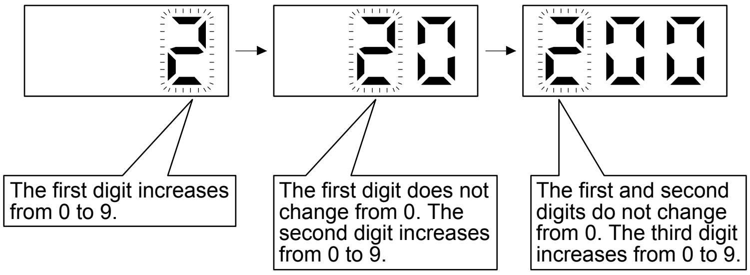


Press the "UP" or "DOWN" button to change the value and press the "SET" button to fix the setting. The setting will be displayed as it is after the setting is fixed.

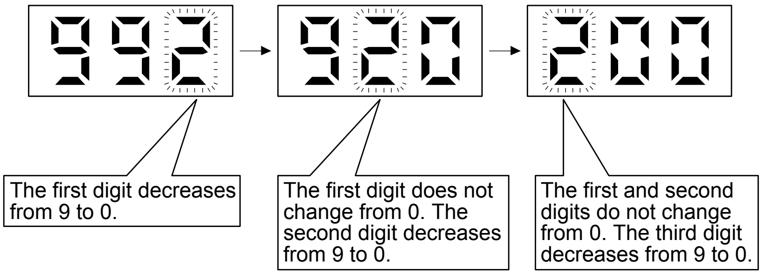
To cancel the setting data, press the "MODE" button for 2 s while the display is flickering. The setting before the change will be displayed.

Press and hold the "UP" or "DOWN" button to change the data continuously. In that case, only the highest digit changes.

Example of pressing and holding the "UP" button



Example of pressing and holding the "DOWN" button

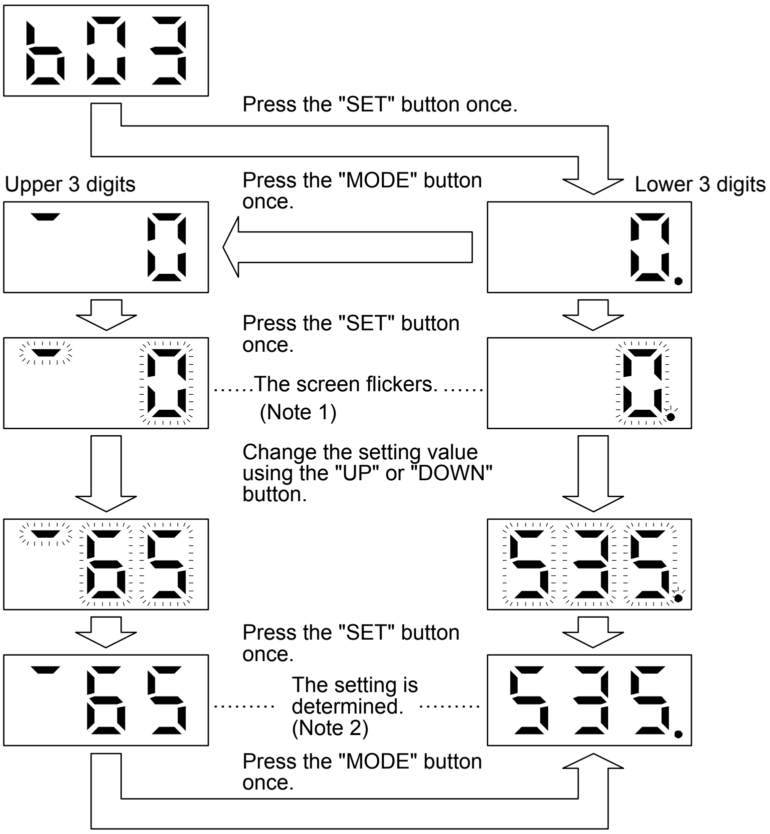


(b) Parameters of 4 to 6 decimal digits

The following example gives the operation procedure to change [Pr. PB03 Positioning command acceleration/deceleration time constants (position smoothing)] to "65535".

Press the "MODE" button to switch to the gain/filter setting parameters screen.

Press the "UP" or "DOWN" button to select [Pr. PB03].



Note 1. Pressing the "SET" button in either upper or lower 3-digit display makes the display flicker.

2. Press the "SET" button to confirm on upper 3-digits or lower 3-digits screen.

The display can be switched between upper and lower 3-digit by pressing the "MODE" button. Switching the display between upper and lower 3-digit is also possible by pressing the "MODE" button while the display is flickering.

The changed value will be canceled when the "MODE" button is pressed for 2 s or more while flickering.

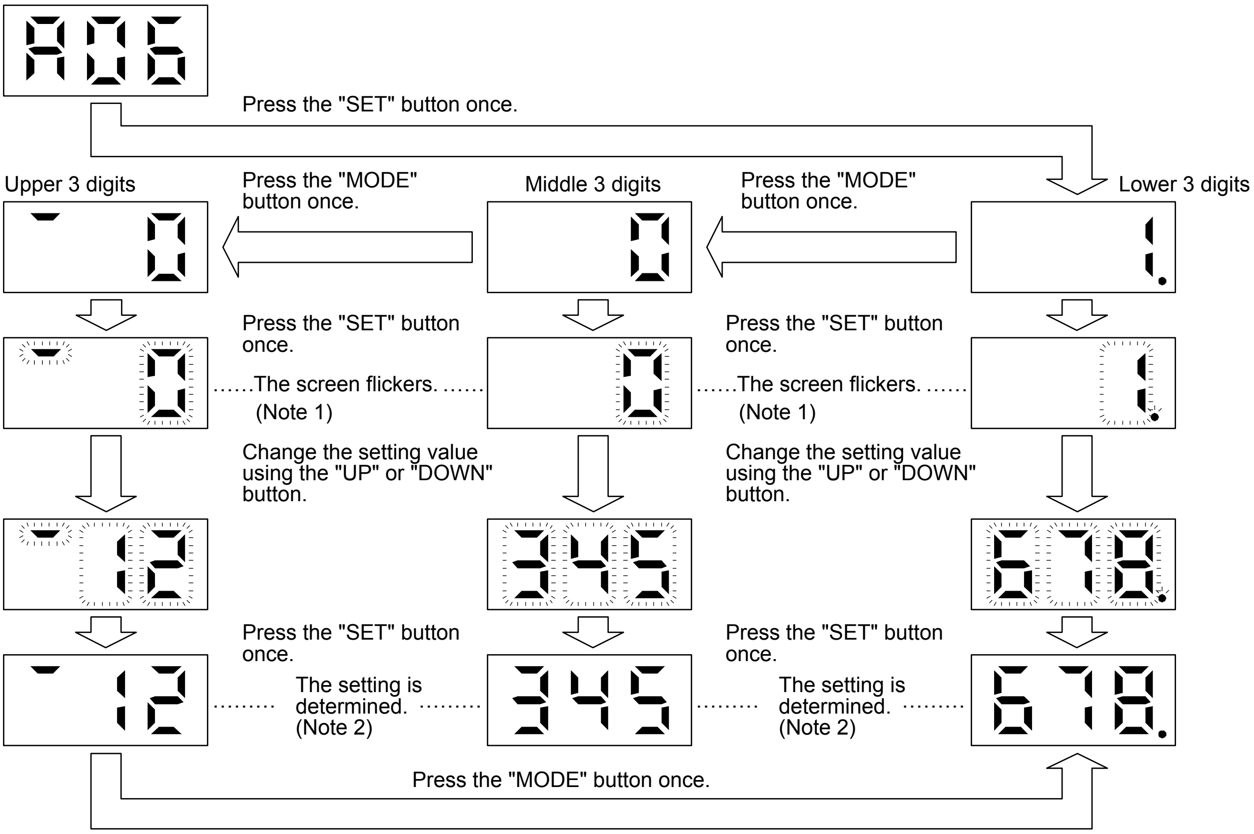
To shift to the next parameter number, press the "UP" or "DOWN" button.

To change the screen to another, press the "UP" or "DOWN" button to change the screen to another parameter number display screen and press the "MODE" button.

(c) Parameters of 7 or more decimal digits

The following example gives the operation procedure to change the [Pr. PA06 Electronic gear numerator (command pulse multiplication numerator)] to "12345678".

Press the "MODE" button to switch to the basic setting parameters screen.



Note 1. Pressing the "SET" button in upper, middle, or lower 3-digit display makes the display flicker.

2. Pressing the "SET" button in upper, middle, or lower 3-digit display fixes the setting.

The display can be switched among upper, middle, and lower 3-digits by pressing the "MODE" button.

Switching the display between upper, middle, and lower 3-digit is also possible by pressing the "MODE" button while the display is flickering.

The changed value will be canceled when the "MODE" button is pressed for 2 s or more while flickering.

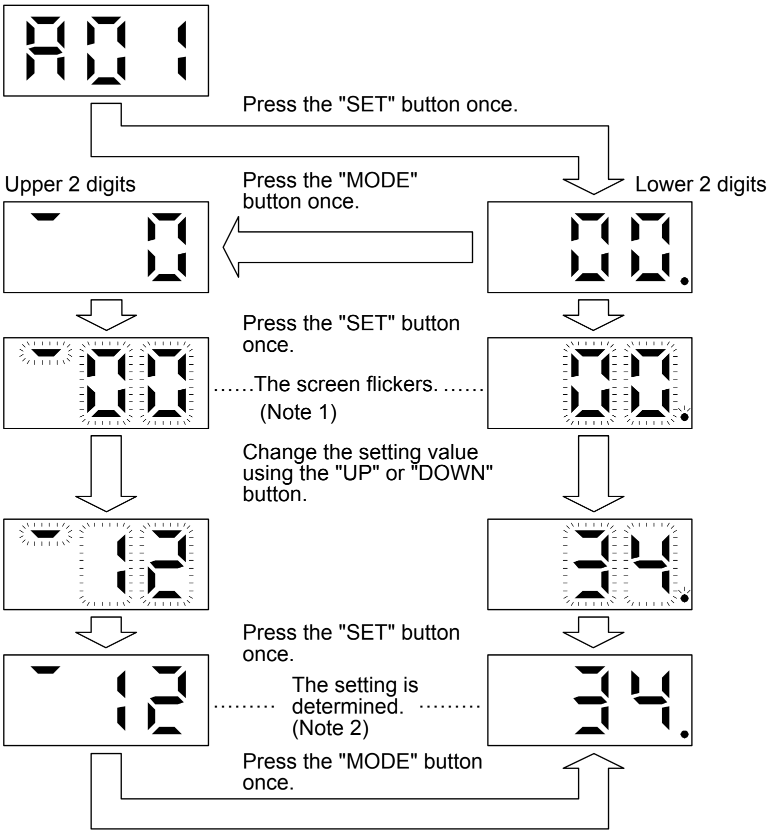
To shift to the next parameter number, press the "UP" or "DOWN" button.

To change the screen to another, press the "UP" or "DOWN" button to change the screen to another parameter number display screen and press the "MODE" button.

(d) Parameter of hexadecimal

The following example gives the operation procedure to change the [Pr. PA01 Operation mode] to "1234".

Press the "MODE" button to switch to the basic setting parameters screen.
Press the "UP" or "DOWN" button to select [Pr. PA01].



Note 1. Pressing the "SET" button in upper, middle, or lower 2-digit display makes the display flicker.
2. Press the "SET" button to confirm on upper 2-digits or lower 2-digits screen.

The display can be switched among upper, middle, and lower 2-digits by pressing the "MODE" button.

Switch the display between upper, middle, and lower 2-digit is also possible by pressing the "MODE" button while the display is flickering.

The changed value will be canceled when the "MODE" button is pressed for 2 s or more while flickering.

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

To change the screen to another, press the "UP" or "DOWN" button to change the screen to another parameter number display screen and press the "MODE" button.

3.2.7 External I/O signal display

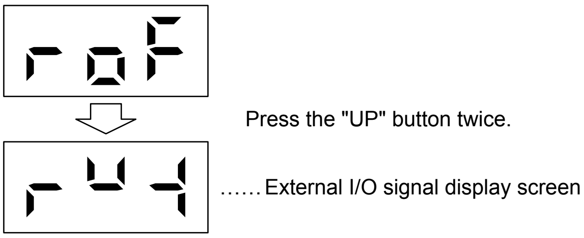
POINT

●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.

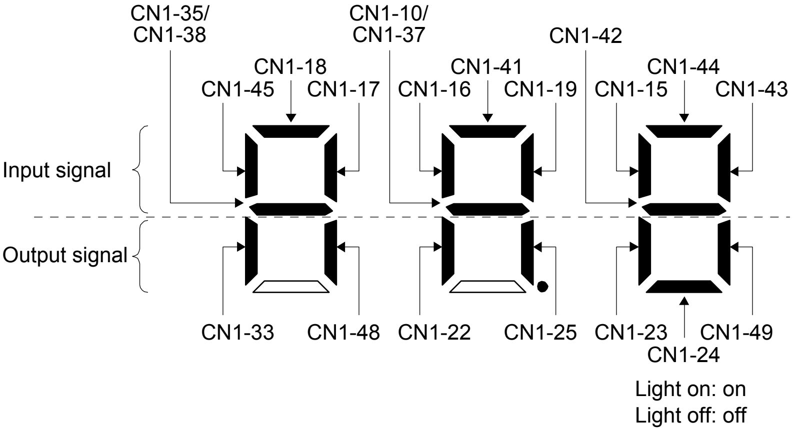
(1) Operation

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



(2) Display definition

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



The LED segment corresponding to the pin is lit to indicate on, and is extinguished to indicate off. The decimal point in the second digit flickers continuously.

For each pin signal in control modes, refer to section 2.2 (2).

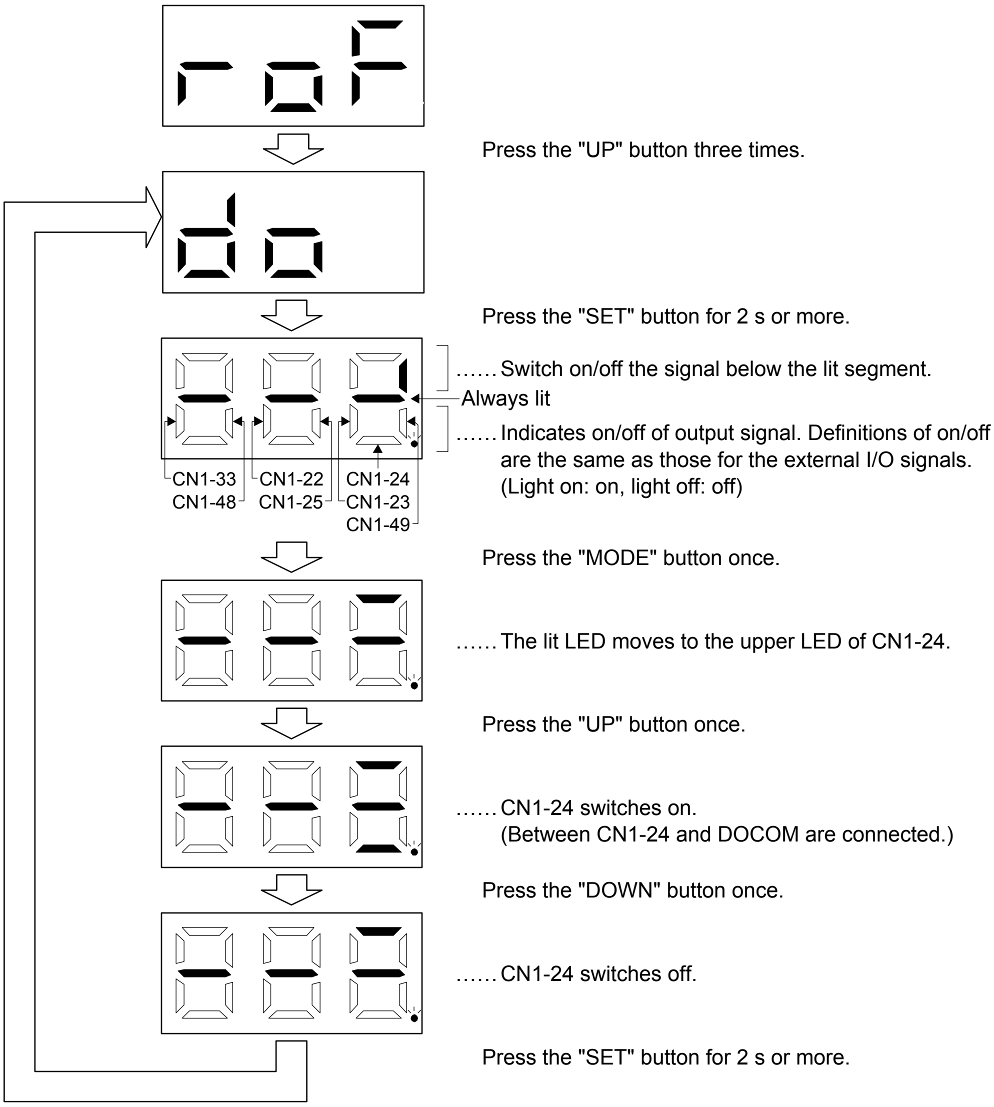
3.2.8 Output signal (DO) forced output

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. Use this function for checking output signal wiring, etc. This operation must be performed in the servo off state by turning off SON (Servo-on).

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



Press the "UP" button three times.

Press the "SET" button for 2 s or more.

...... Switch on/off the signal below the lit segment.

...... Indicates on/off of output signal. Definitions of on/off are the same as those for the external I/O signals. (Light on: on, light off: off)

Press the "MODE" button once.

...... The lit LED moves to the upper LED of CN1-24.

Press the "UP" button once.

...... CN1-24 switches on.
(Between CN1-24 and DOCOM are connected.)

Press the "DOWN" button once.

...... CN1-24 switches off.

Press the "SET" button for 2 s or more.

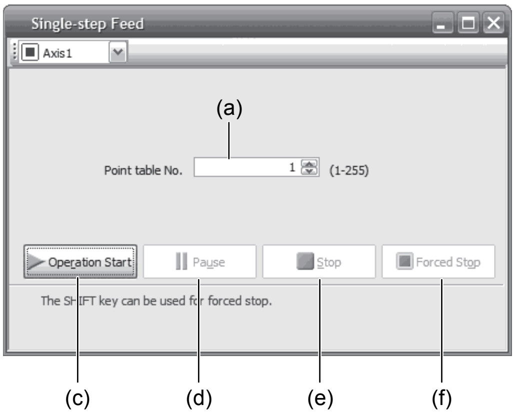
3.2.9 Step feed

⚠CAUTION	●The test operation mode is designed for checking servo operation. Do not use it for an 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 unless SON (Servo-on) is not turned off.

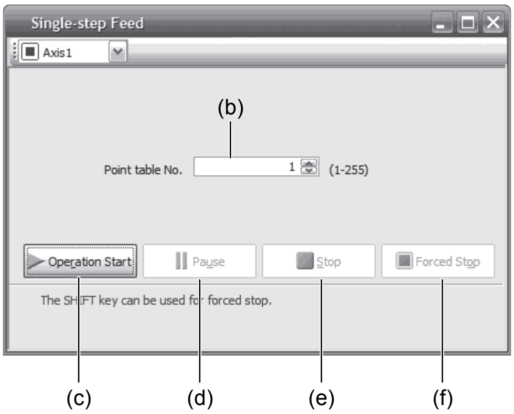
The positioning operation can be performed in accordance with the point table No. or the program No. set by MR Configurator2.
Select the test operation/single-step feed from the menu of MR Configurator2. When the single-step feed window is displayed, input the following items and operate.



Point table No. 1 (1-255)

The SHIFT key can be used for forced stop.

Point table operation



Point table No. 1 (1-255)

The SHIFT key can be used for forced stop.

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) Starting the servo motor
Click "Operation Start" button (c) to rotate the servo motor.

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

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

(5) Forcibly stopping the servo motor software

Click the "Forced Stop" (f) button to make an instantaneous stop. When the "Forced Stop" button is enabled, the "Operation Start" button cannot be used. Click the "Forced Stop" button again to enable the "Operation Start" button.

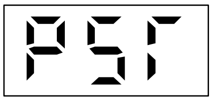
(6) Switching to the normal operation mode

Before switching from the test operation mode to the normal operation mode, turn off the servo amplifier.

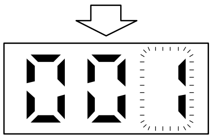
3.2.10 Teaching function

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.

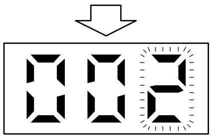
(1) Teaching preparation



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

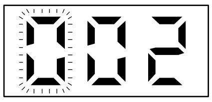


Select the point table No. with the "UP" or "DOWN" button when the first digit on the display flickers.

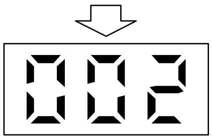


When the first digit on the display flickers, press the "SET" button to complete the teaching setting preparation. When the preparation is properly completed, the first digit on the display is lit and the third digit flickers.

(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 third digit on the display flickers, the current position is written to the selected point table by pressing the "SET" button.



When the first or third digit on the display flickers, 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 being 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-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Switching power on for the first time	Section 4.1	Section 18.4

POINT

- When you use a linear servo motor, replace the following left words to the right words.

Load to motor inertia ratio	→ Load to motor mass ratio
Torque	→ Thrust
(Servo motor) speed	→ (Linear servo motor) speed

- For the mark detection function (Current position latch), refer to section 12.2.1.
- For the mark detection function (Interrupt positioning), refer to section 12.2.2.
- For the infinite feed function (setting degree), refer to section 12.3.

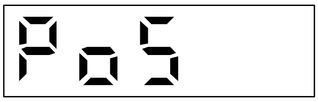
4.1 Startup

4.1.1 Power on and off procedures

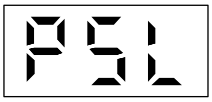
When the servo amplifier is powered on for the first time, the control mode is set to position control mode. (Refer to section 4.2.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
This section provides a case where the servo amplifier is powered on after setting the positioning mode.

(1) Power-on
Switch 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) Switch on the main circuit power supply and control circuit power supply.
The display shows "PoS" ("PSL" for MR-J4-03A6-RJ servo amplifiers), and in 2 s later, shows data.



MR-J4-_A_-RJ 100 W or more



MR-J4-03A6-RJ

(2) Power-off
1) Switch off ST1 (Forward rotation start) and ST2 (Reverse rotation start).
2) Switch off SON (Servo-on).
3) Switch off the main circuit power supply and control circuit power supply.

4.1.2 Stop

If any of the following situations occurs, the servo amplifier suspends the running of the servo motor and brings it to a stop.
Refer to section 3.10 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" for the servo motor with an electromagnetic brake.

Operation/command	Stopping condition
SON (Servo-on) off	The base circuit is shut off and the servo motor coasts.
Alarm occurrence	The servo motor decelerates to a stop with the command. With some alarms, however, the dynamic brake operates to bring the servo motor to a stop. (Refer to chapter 8. (Note 1))
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.
STO (STO1, STO2) off (Note 2)	The base circuit is shut off and the dynamic brake operates to bring the servo motor to a stop.
LSP (Forward rotation stroke end) off, LSN (Reverse rotation stroke end) off	It will bring the motor to a sudden stop and make it servo-locked. It can be run in the opposite direction.

Note 1. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.
2. MR-J4-03A6-RJ servo amplifiers are not compatible with the STO function.

4.1.3 Test operation

Before starting actual operation, perform 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 servo motor operate normally.
With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor correctly rotates at the slowest speed. For the test operation mode, refer to section 3.1.8, 3.1.9, 3.2.8, and 3.2.9 in this manual, and section 4.5.9 and 18.5.10 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Manual operation of the servo motor alone in test operation mode

In this step, confirm that the servo motor correctly rotates 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 put 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, make the servo motor operate, and check the rotation direction of the motor, etc. If the 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 under 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 put 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, make the servo motor operate, and check the rotation direction of the machine, etc. If the machine 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 by 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

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

Operation mode / Operation mode selection item			Parameter setting		Input device setting	
			[Pr. PA01]	[Pr. PT04]	MD0 (Note)	DI0 to DI7 (Note)
Automatic operation mode under point table method	Each positioning operation		_ _ _ 6		On	Set the point table No. to be reached. (Refer to (2) (b) of 4.2.1.)
	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. MD0: Operation mode selection 1, DI0 to DI7: Point table No. selection 1 to Point table No. selection 8

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.
Sub function	Set when performing automatic continuous operation.
M code	Outputs the first digit and the second digit of the M code in 4-bit binary respectively.

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 make a drastic adjustment or change to the parameter values as doing so will make the 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-J4-_A_" means "MR-J4-_A_(-RJ) 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 flickers.	Not improved even if CN1, CN2, and CN3 connectors are disconnected.	1. Power supply voltage fault 2. The servo amplifier is malfunctioning.	
			Improved when CN1 connector is disconnected.	Power supply of CN1 cabling is shorted.	
			Improved when CN2 connector is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is malfunctioning.	
			Improved 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 or 3.2.7) 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 Section 3.2.7

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
3	Perform a home position return.	Servo motor does not rotate.	Call the external I/O signal display and check the on/off status of the input signal. (Refer to section 3.1.7 or 3.2.7.)	LSP, LSN, and ST1 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
		The home position return is not completed.	Call the external I/O signal display and check the on/off status of input signal DOG. (Refer to section 3.1.7 or 3.2.7.)	The proximity dog is set incorrectly.	Section 3.1.7 Section 3.2.7
4	Switch on ST1 (Forward rotation start) or ST2 (Reverse rotation start).	Servo motor does not rotate.	Call the external I/O signal display (section 3.1.7 or 3.2.7) and check the on/off status of the input signal.	LSP, LSN, ST1, and ST2 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
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/ deceleration more than three times to complete auto tuning.	Gain adjustment fault	MR-J4-_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-J4-_A_ Chapter 6

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 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

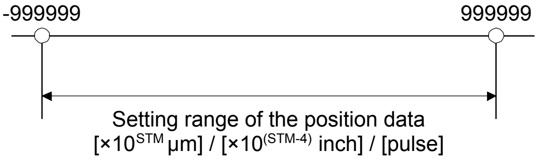
Start operation using ST1 (Forward rotation start) or ST2 (Reverse rotation start). Absolute value command method and incremental value command method are provided in automatic operation mode.

(a) Absolute value command method

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

1) Millimeter, inch, and pulse unit

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

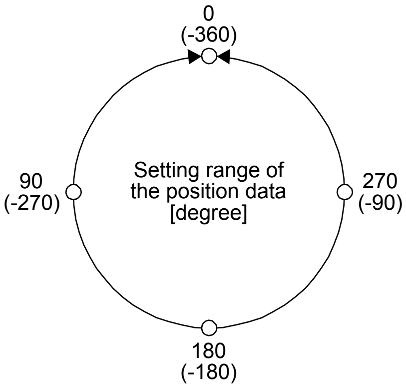


2) Degree unit

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

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

An example of setting is shown below.



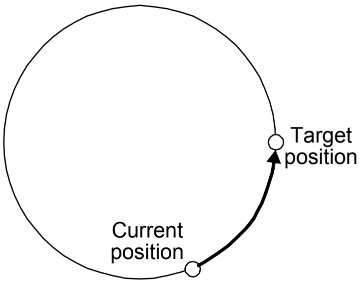
Coordinate system in degrees

- 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.

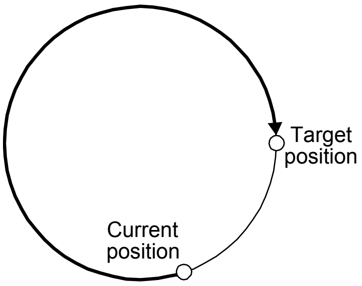
The travel direction to the target position is set with [Pr. PT03].

[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.

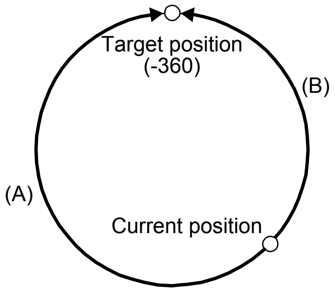
a) When using the Rotation direction specifying ([Pr. PT03] = "_ 0 _ _")
When the position data of 270.000 degrees is specified, the servo motor rotates in the CCW direction.



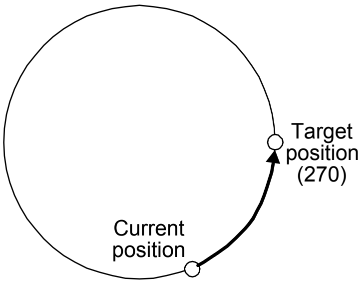
When the position data of -90.000 degrees is specified, the servo motor rotates in the CW direction.



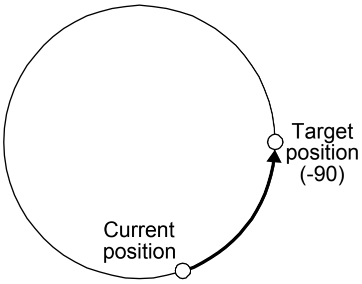
When the position data of -360.000 degrees is specified, the servo motor rotates in the CW direction. (A)
When you specify 360.000 degrees or 0 degree to the position data, the servo motor rotates in the CCW direction. (B)



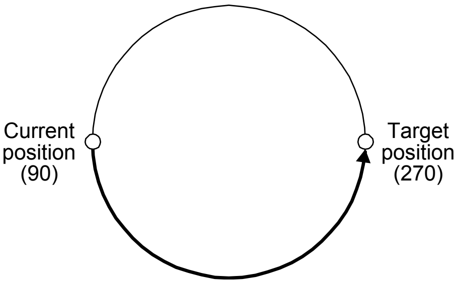
b) When using the shortest rotation specification ([Pr. PT03] = _ 1 _ _)
When the position data of 270.000 degrees is specified, the servo motor rotates in the CCW direction.



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.

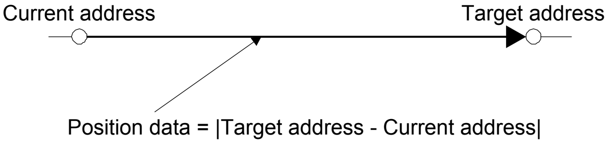


(b) Incremental value command method

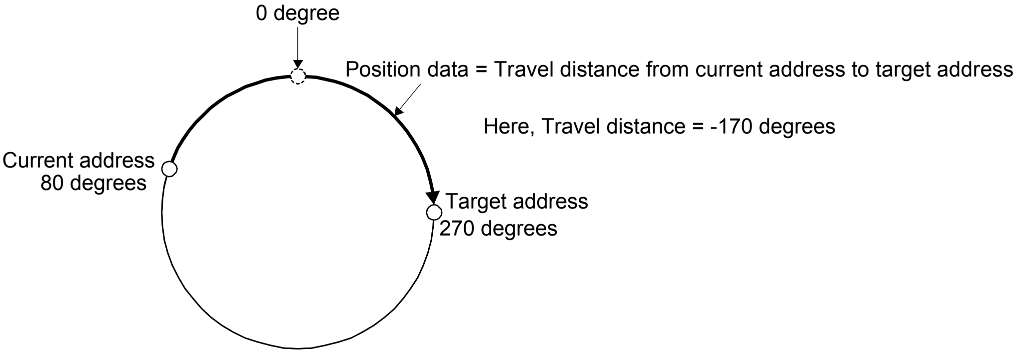
As position data, set the travel distance from the current address to the target address.

1) Millimeter, inch, and pulse unit

Setting range: 0 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



(2) Point table

(a) Point table setting

1 to 255 point tables can be set. To use point table No. 16 to 255, enable DI4 (Point table No. selection 5) to DI7 (Point table No. selection 8) 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.
Sub function	Set when performing automatic continuous operation.
M code	Outputs the first digit and the second digit of the M code in 4-bit binary respectively.

(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 15 in the initial status.

To use point table No. 16 to 255, enable input signals DI4 (Point table No. selection 5) to DI7 (Point table No. selection 8) with "Device Setting" on MR Configurator2.

When using the communication function to select the point table No., refer to chapter 10.

Input signal (Note)								Selected point table No.
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	
0	0	0	0	0	0	0	0	0 (for home position return)
0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	1	0	2
0	0	0	0	0	0	1	1	3
0	0	0	0	0	1	0	0	4
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	1	0	254
1	1	1	1	1	1	1	1	255

Note. 0: Off
1: On

4.2.2 Automatic operation using point table

(1) Absolute value command method
By the sub function of the point table, you can set a point table used under the absolute value command method or the 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 and sub function to the point table.
To use the point table under the absolute value command method, set "0", "1", "8", or "9" to the sub function. To use the point table under the incremental value command method, set "2", "3", "10", or "11" to the sub function.
When you set a value outside this range to the point table, the set value will be clamped with the maximum or minimum value. When changing the command unit or the connected motor results in the set value outside this range, [AL. 37] will occur.

Item	Setting range	Unit	Description
Position data	-999999 to 999999 (Note 1)	$\times 10^{STM}$ μm $\times 10^{(STM-4)}$ inch $\times 10^{-3}$ degree pulse	(1) When using this point table under the absolute value command method Set the target address (absolute value). The teaching function is available for setting this value. (2) When using this point table under 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 mm/s (Note 2)	Set the command speed of the servo motor for execution of positioning. The setting value must be within the permissible instantaneous speed of the servo motor used.
Acceleration time constant	0 to 20000	ms	Set a time until the servo motor rotates at the rated speed.
Deceleration time constant	0 to 20000	ms	Set a time from when the servo motor rotates at the rated speed until when the motor stops.
Dwell	0 to 20000	ms	Set the dwell. To disable the dwell, set "0" or "2" to the sub function. To perform continuous operation, set "1", "3", "8", "9", "10" or "11" to the sub function and 0 to the dwell. When the dwell is set, the position command of the selected point table is completed, and after the set dwell has elapsed, the position command of the next point table is started.

Item	Setting range	Unit	Description
Sub function	0 to 3, 8 to 11		Set the sub function. (1) When using this point table under the absolute value command method 0: Automatic operation is performed in accordance with a single point table selected. 1: Automatic continuous operation is performed to the next point table without a stop. 8: Automatic continuous operation is performed without a stop to the point table selected at start-up. 9: Automatic continuous operation is performed without stopping a point table No. 1. (2) When using this point table under the incremental value command method 2: Automatic operation is performed in accordance with a single point table selected. 3: Automatic continuous operation is performed to the next point table without a stop. 10: Automatic continuous operation is performed to the point table selected at start-up. 11: Automatic continuous operation is performed without stopping a point table No. 1. When a different rotation direction is set, smoothing zero (command output) is confirmed and then the rotation direction is reversed. Setting "1" or "3" to point table No.255 results in an error. Refer to (3) (b) of this section.
M code	0 to 99		Outputs the first digit and the second digit of the M code in 4-bit binary respectively.

Note 1. 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.

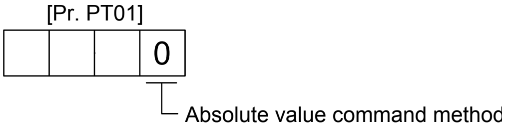
2. The unit will be "mm/s" in the linear control mode.

(b) Parameter setting

Set the following parameters to perform automatic operation.

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

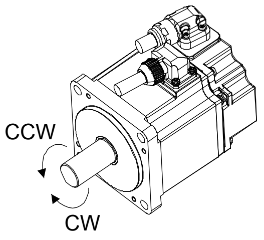
Select the absolute value command method as shown below.



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 (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 DI7 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 invalid.

Item	Used device	Description
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) DI5 (Point table No. selection 6) DI6 (Point table No. selection 7) DI7 (Point table No. selection 8)	Refer to (2) (b) of 4.2.1.
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 and sub function 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. When changing the command unit or the connected motor results in the set value outside the setting range, [AL. 37] will occur.

Item	Setting range	Unit	Description
Position data	0 to 999999 (Note 1)	$\times 10^{STM}$ 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 mm/s (Note 2)	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 until the servo motor rotates at the rated speed.
Deceleration time constant	0 to 20000	ms	Set a time from when the servo motor rotates at the rated speed until when the motor stops.
Dwell	0 to 20000	ms	Set the dwell. To disable the dwell, set "0" to the sub function. To perform continuous operation, set "1", "8" or "9" to the sub function and 0 to the dwell. When the dwell is set, the position command of the selected point table is completed, and after the set dwell has elapsed, the position command of the next point table is started.
Sub function	0, 1, 8 to 9		Set the sub function. 0: Automatic operation is performed in accordance with a single point table selected. 1: Automatic continuous operation is performed to the next point table without a stop. 8: Automatic continuous operation is performed without a stop to the point table selected at start-up. 9: Automatic continuous operation is performed without stopping a point table No. 1. Refer to section 4.2.2 for details.
M code	0 to 99		Outputs the first digit and the second digit of the M code in 4-bit binary respectively.

Note 1. 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.

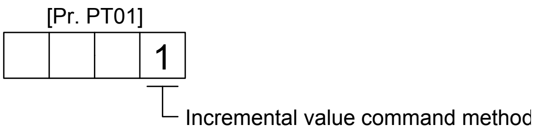
2. The unit will be "mm/s" in the linear control mode.

(b) Parameter setting

Set the following parameters to perform automatic operation.

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

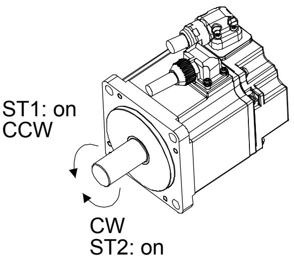
Select the incremental value command method as shown below.



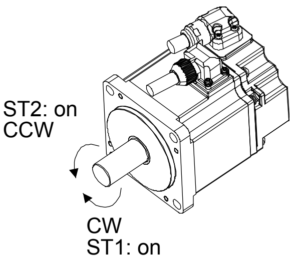
2) Rotation direction selection ([Pr. PA14])

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 (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 DI7 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 under the incremental value command method, the servo motor rotates in the same direction only.

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

Item	Used device	Description
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) DI5 (Point table No. selection 6) DI6 (Point table No. selection 7) DI7 (Point table No. selection 8)	Refer to (2) (b) of 4.2.1.
Start	ST1 (Forward rotation start) ST2 (Reverse rotation start)	Switch on ST1 to start. Switch on ST2 to start.

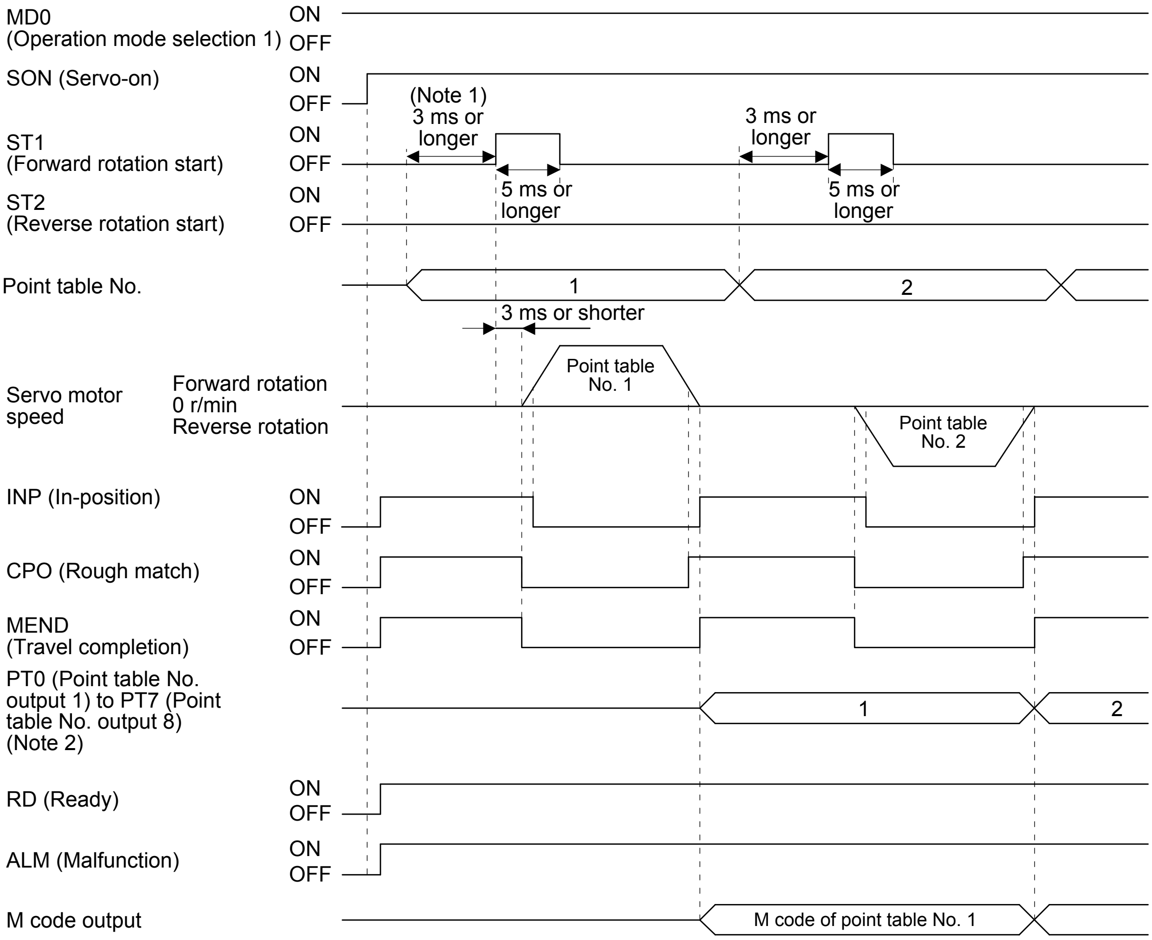
(3) Automatic operation timing chart

(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.

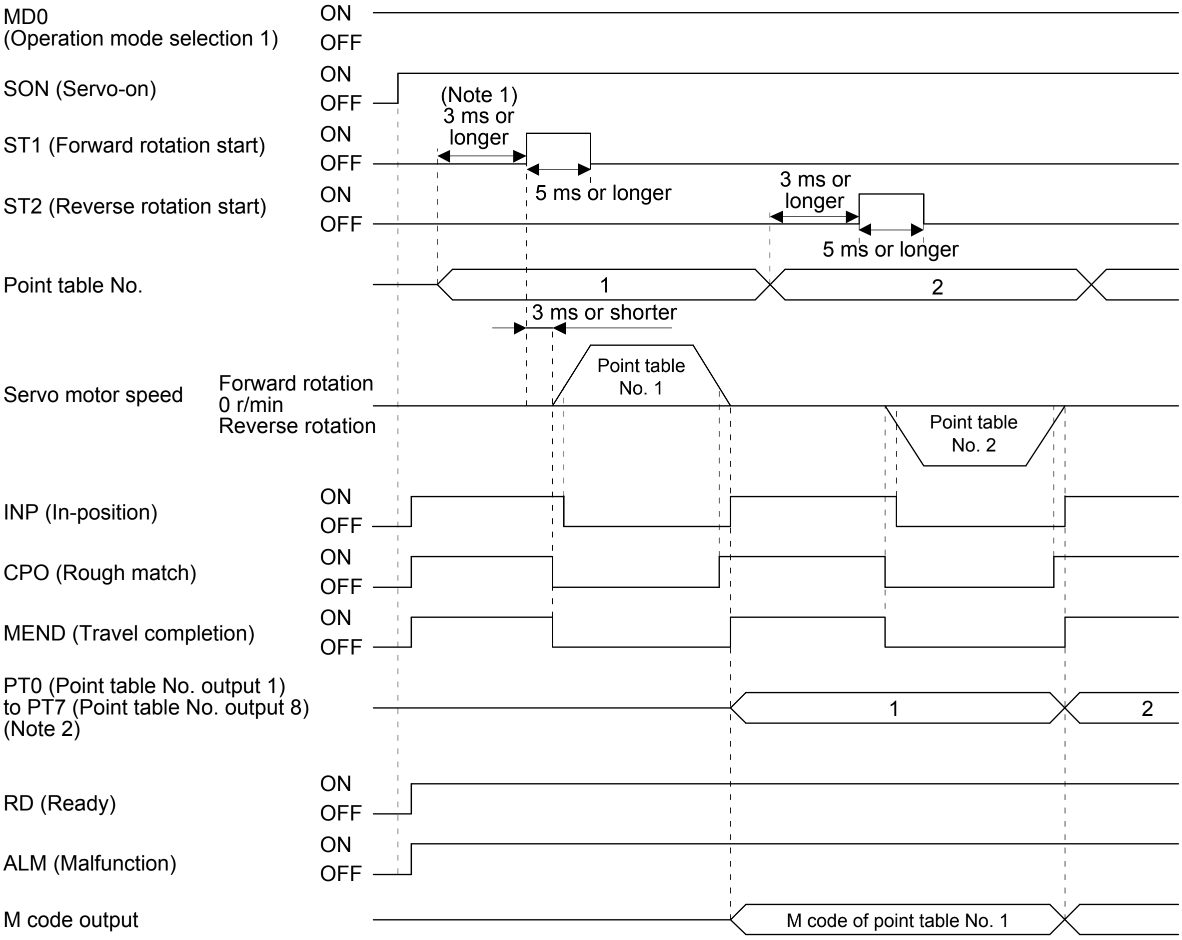
The following shows a timing chart.



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-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

2) Incremental 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-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

(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 sub function of the point table, the automatic continuous operation can be performed.

The following shows how to set.

Point table setting		
Dwell	Sub function	
	When position data is absolute value	When 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.

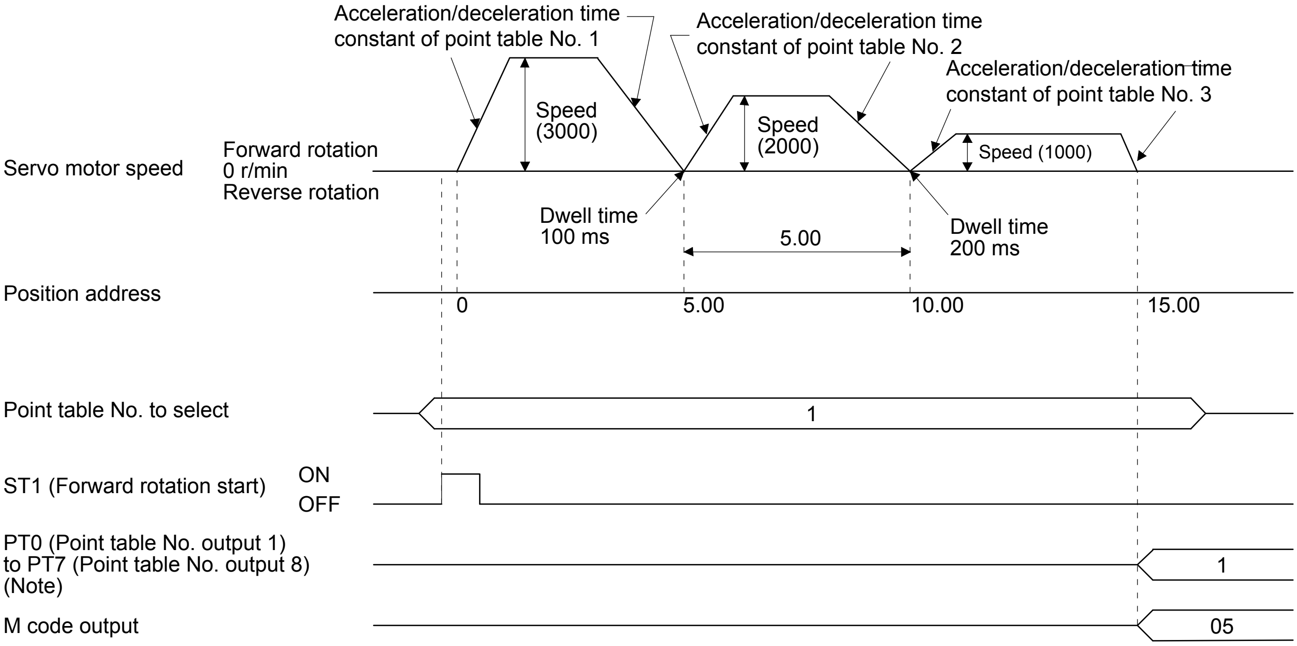
In this example, point table No. 1 and point table No. 3 are under the absolute value command method, and point table No. 2 is under the incremental value command method.

Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Sub function	M code
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)	15

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

0: When using the point table under the absolute value command method

2: When using the point table under the incremental value command method



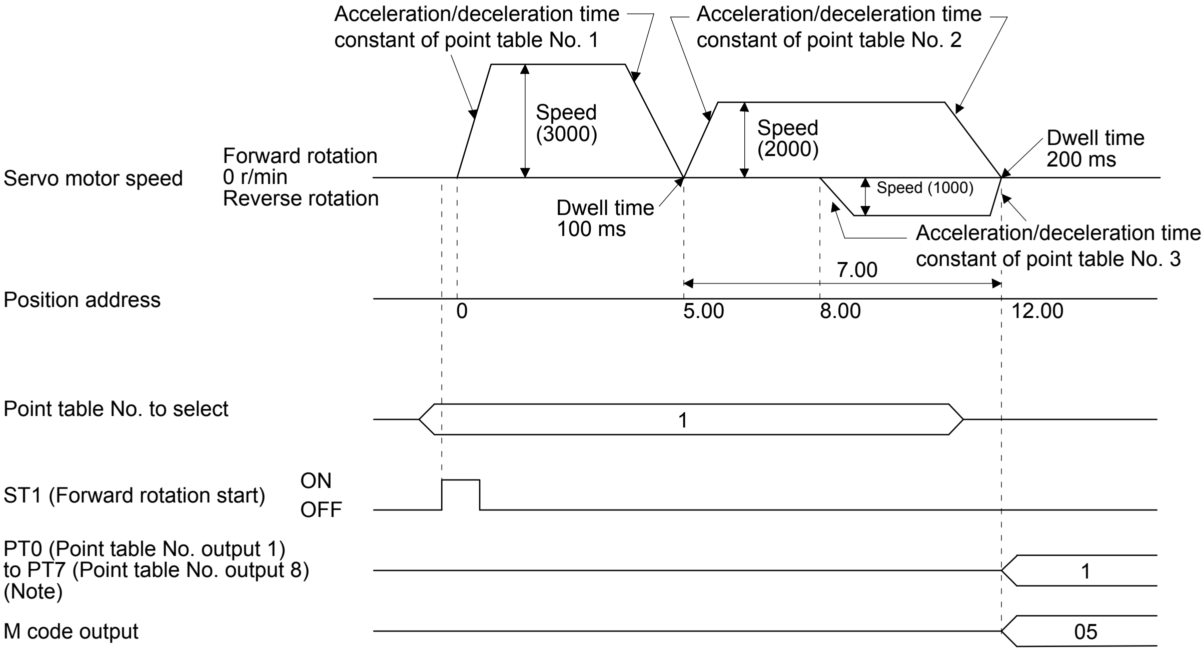
Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

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 point table No. 3 are under the absolute value command method, and point table No. 2 is under 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]	Sub function	M code
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)	15

Note. Always set "0" or "2" to the sub function of the last point table among the consecutive point tables.
0: When using the point table under the absolute value command method
2: When using the point table under the incremental value command method



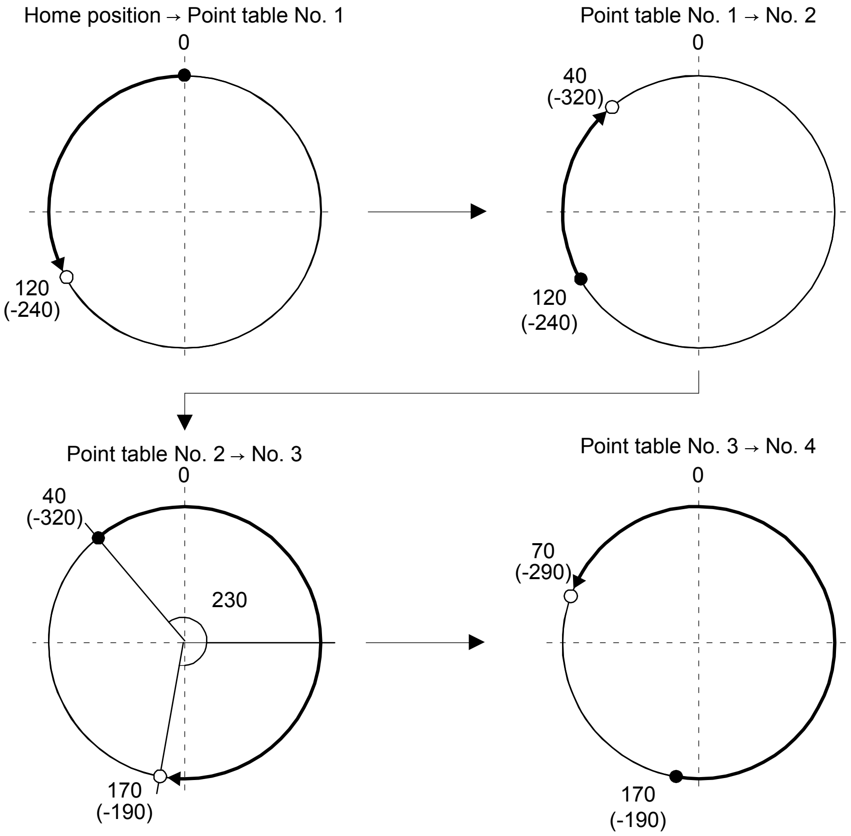
Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

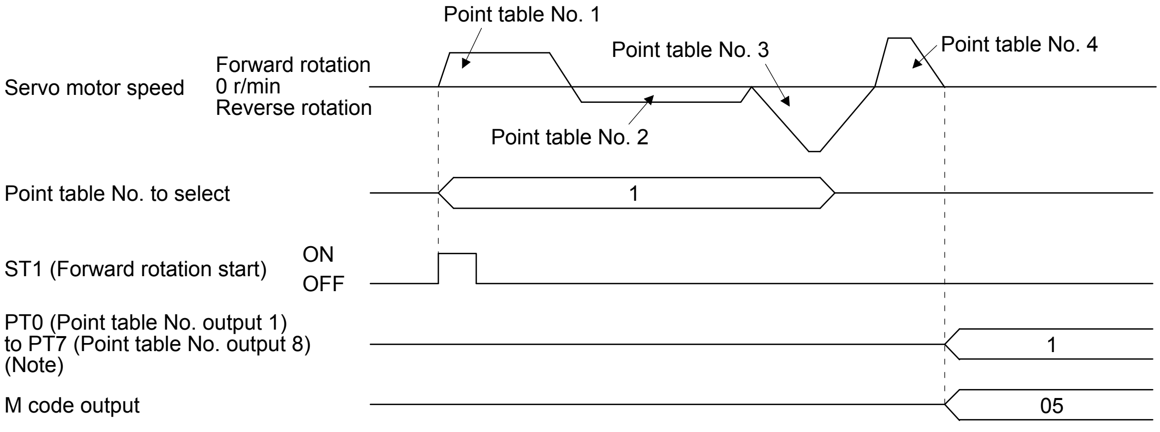
c) Position data in degrees

The following shows an operation example with the set values listed in the table below.
In this example, point table No. 1, point table 2, and point table No. 4 are under the absolute value command method, and point table No. 3 is under 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]	Sub function	M code
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)	20

Note. Always set "0" or "2" to the sub function of the last point table among the consecutive point tables.
0: When using the point table under the absolute value command method
2: When using the point table under the incremental value command method





Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

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.

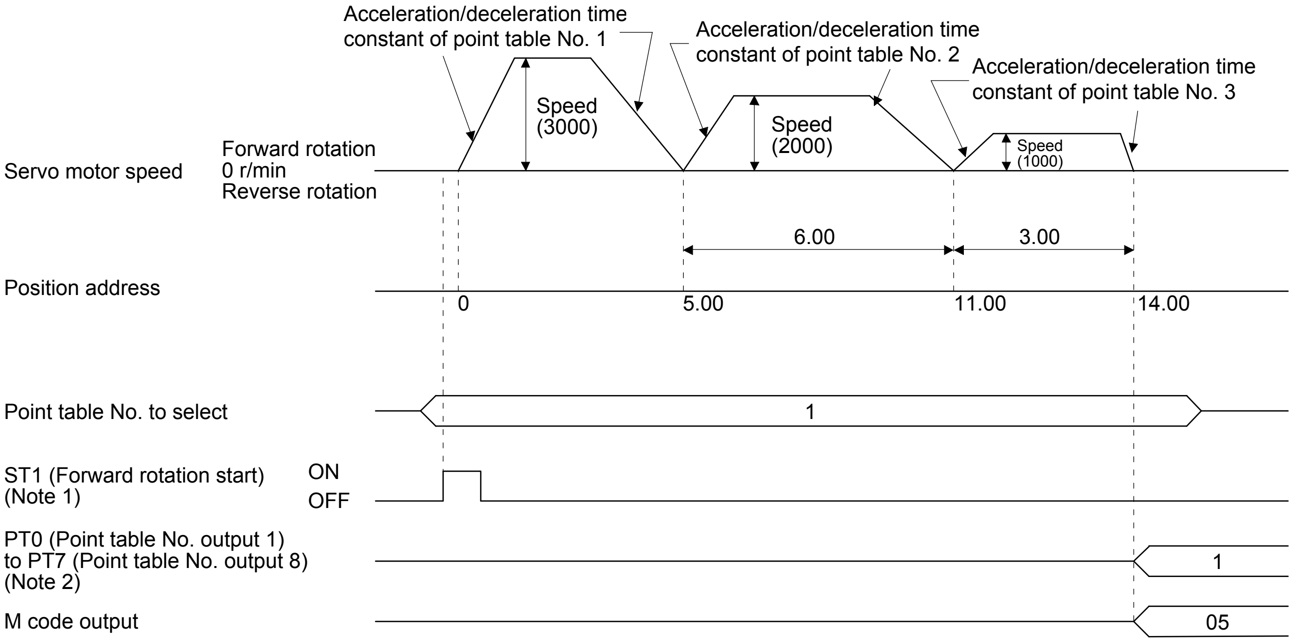
Point table setting	
Dwell	Sub function
1 or more	1

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]	Sub function	M code
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)	15

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



Note 1. Switching on ST2 (Reverse rotation start) starts positioning in the reverse rotation direction.

2. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

b) Position data in degrees

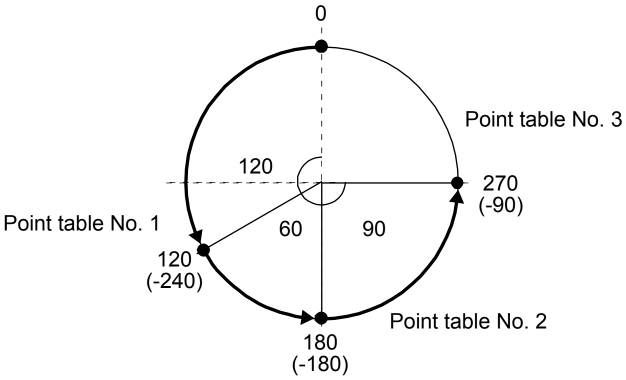
The following shows an operation example with the set values listed in the table below.

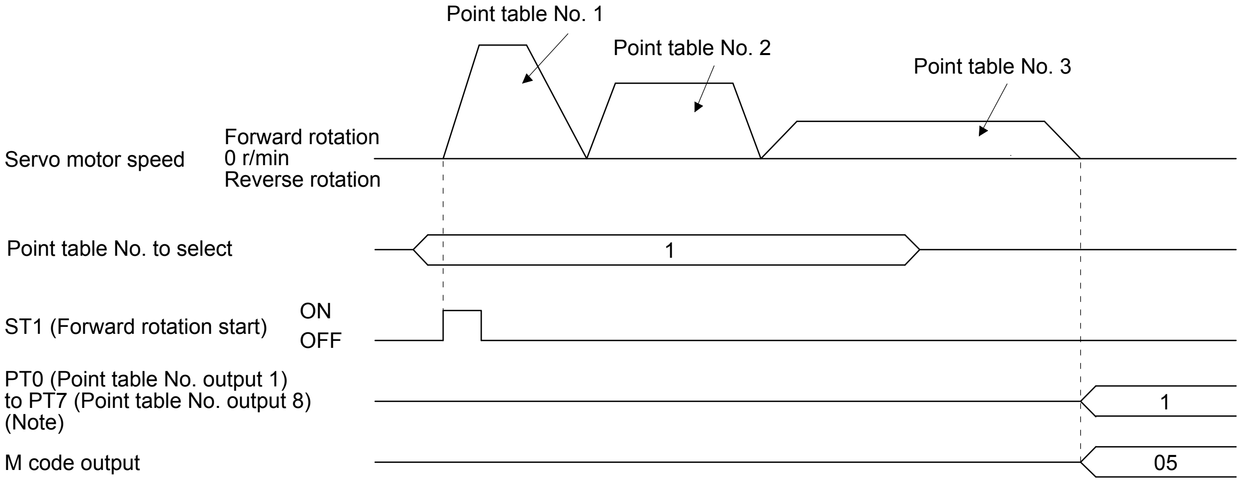
Point table No.	Position data [degree]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Sub function	M code
1	120.000	3000	100	150	0	1	05
2	60.000	1500	150	100	0	1	10
3	90.000	1000	300	100	Disabled	0 (Note)	15

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

0: When using the point table under the absolute value command method

2: When using the point table under the incremental value command method





Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

(c) Varying-speed operation

By setting the sub 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 sub function to execute the positioning at the speed set in the following point table.

At this time, the position data selected at start is valid, and the acceleration/deceleration time constant set in the next and subsequent point tables is invalid.

By setting "1" or "3" to sub functions until point table No. 254, the operation can be performed at maximum 255 speeds.

Always set "0" or "2" to the sub function of the last point table.

To perform varying-speed operation, always set "0" to the dwell.

Setting "1" or more will enables the automatic continuous positioning operation.

The following table shows an example of setting.

Point table No.	Dwell [ms] (Note 1)	Sub 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".

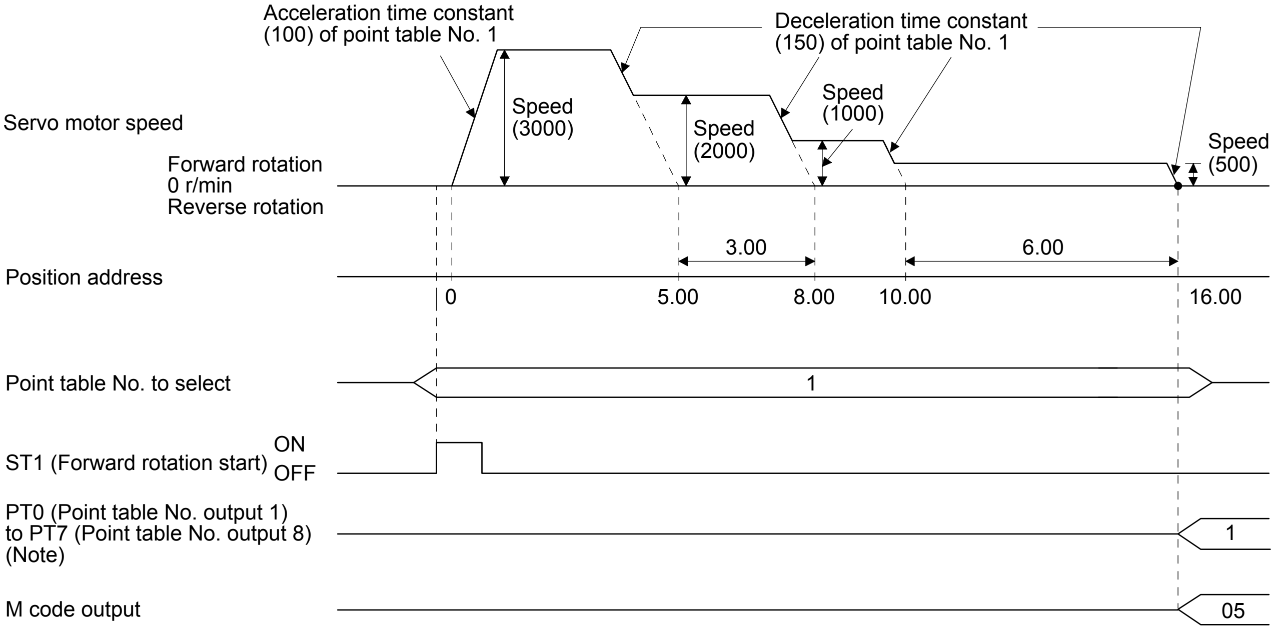
2. Always set "0" or "2" to the sub function of the last point table among the consecutive point tables.

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 point table No. 3 are under the absolute value command method, and point table No. 2 is under 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)	Sub function	M code
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 sub function of the last point table among the consecutive point tables.
0: When using the point table under the absolute value command method
2: When using the point table under the incremental value command method



Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

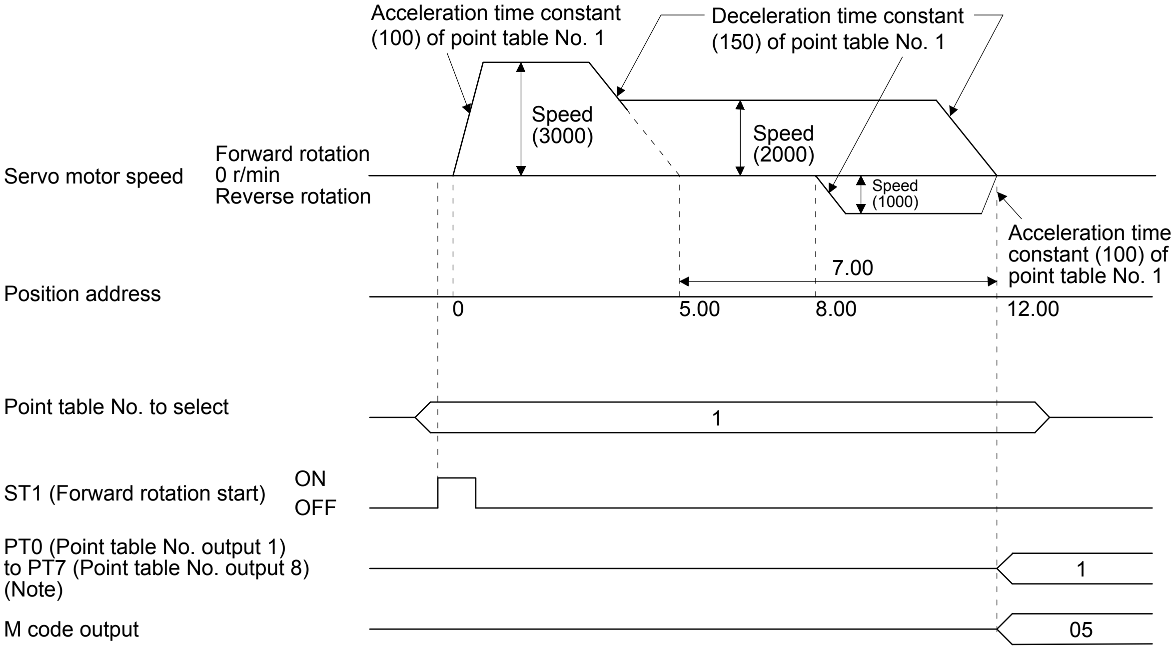
b) Positioning in the reverse direction midway

The following shows an operation example with the set values listed in the table below. In this example, point table No. 1 and point table No. 3 are under the absolute value command method, and point table No. 2 is under 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)	Sub function	M code
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 sub function of the last point table among the consecutive point tables.
0: When using the point table under the absolute value command method
2: When using the point table under the incremental value command method



Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

2) Incremental value command method ([Pr. PT01] = _ _ _ 1)

Setting "1" to the sub function executes positioning at the speed set in the following point table. At this time, the position data selected at start is valid, and the acceleration/deceleration time constant set in the next and subsequent point tables is invalid.

By setting "1" to sub functions until point table No. 254, the operation can be performed at maximum 255 speeds.

Always set "0" to the sub function of the last point table.

To perform varying-speed operation, always set "0" to the dwell.

Setting "1" or more will enables the automatic continuous positioning operation.

The following table shows an example of setting.

Point table No.	Dwell [ms] (Note 1)	Sub 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".

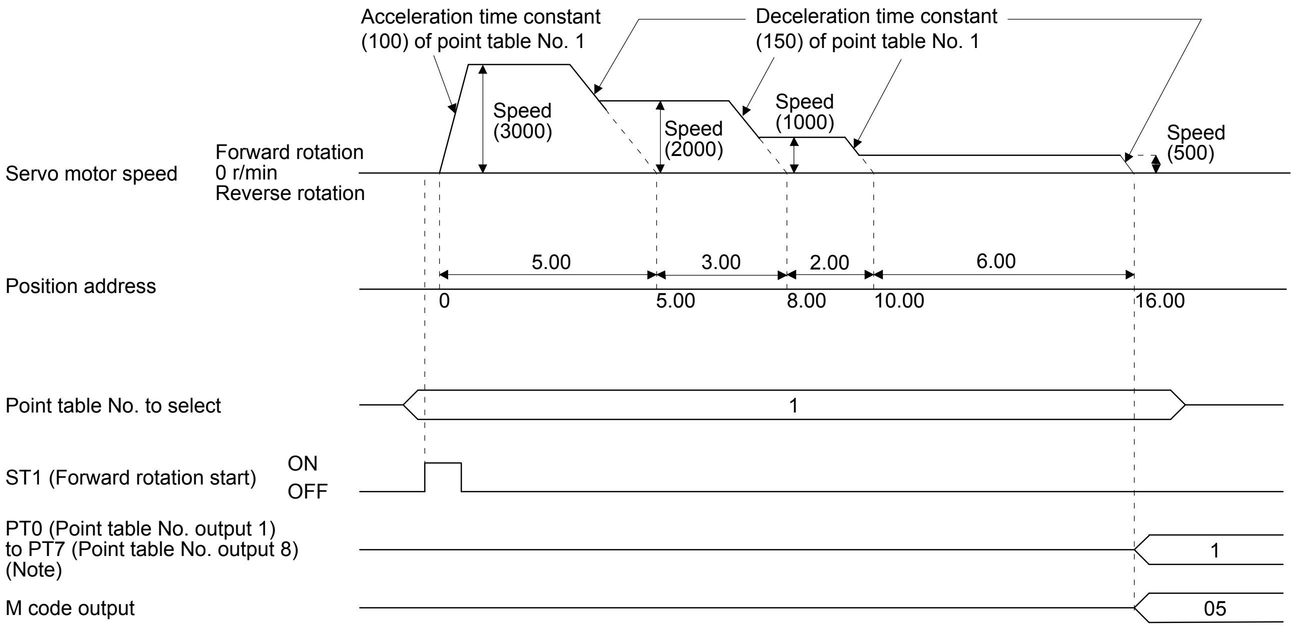
2. Always set "0" to the sub function of the last point table among the consecutive point tables.

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)	Sub function	M code
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 sub function of the last point table among the consecutive point tables.



Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

(d) Automatic repeat positioning operation

By setting the sub 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 sub 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 point table No. used at start-up.

Setting "9" or "11" to the sub 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.

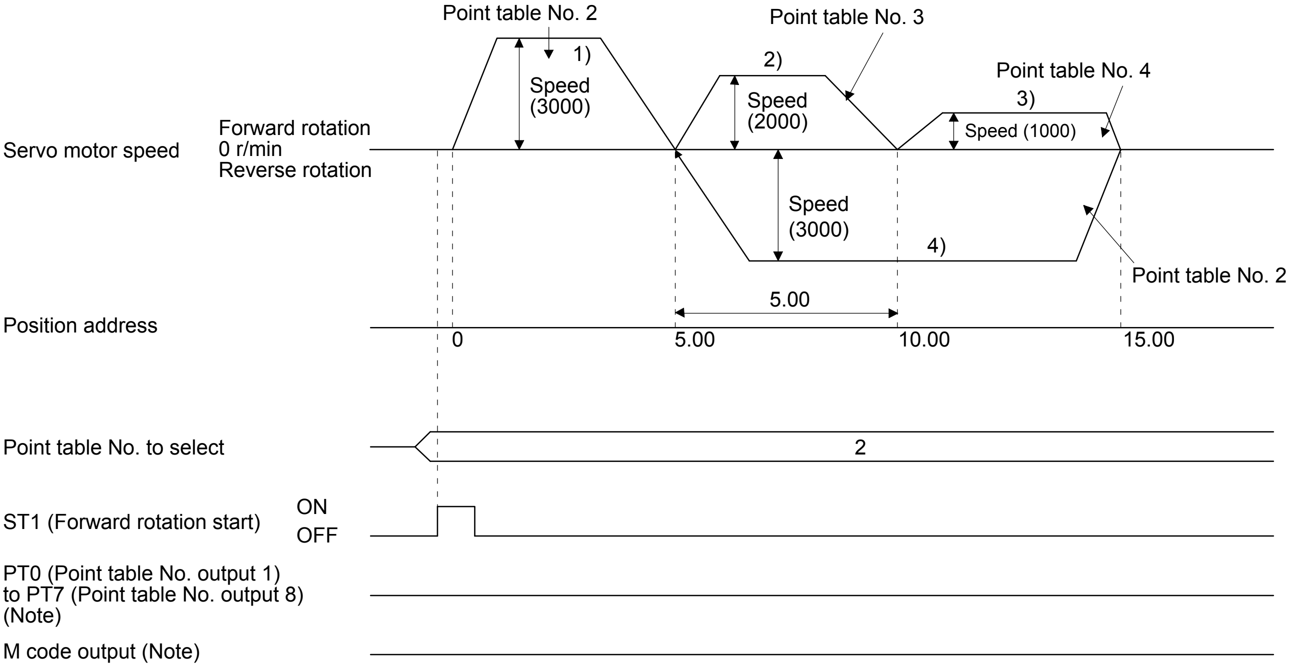
a) Automatic repeat positioning operation by absolute value command method

Example 1. Operations when "8" is set to the sub 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]	Sub function	M code
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

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 sub 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)



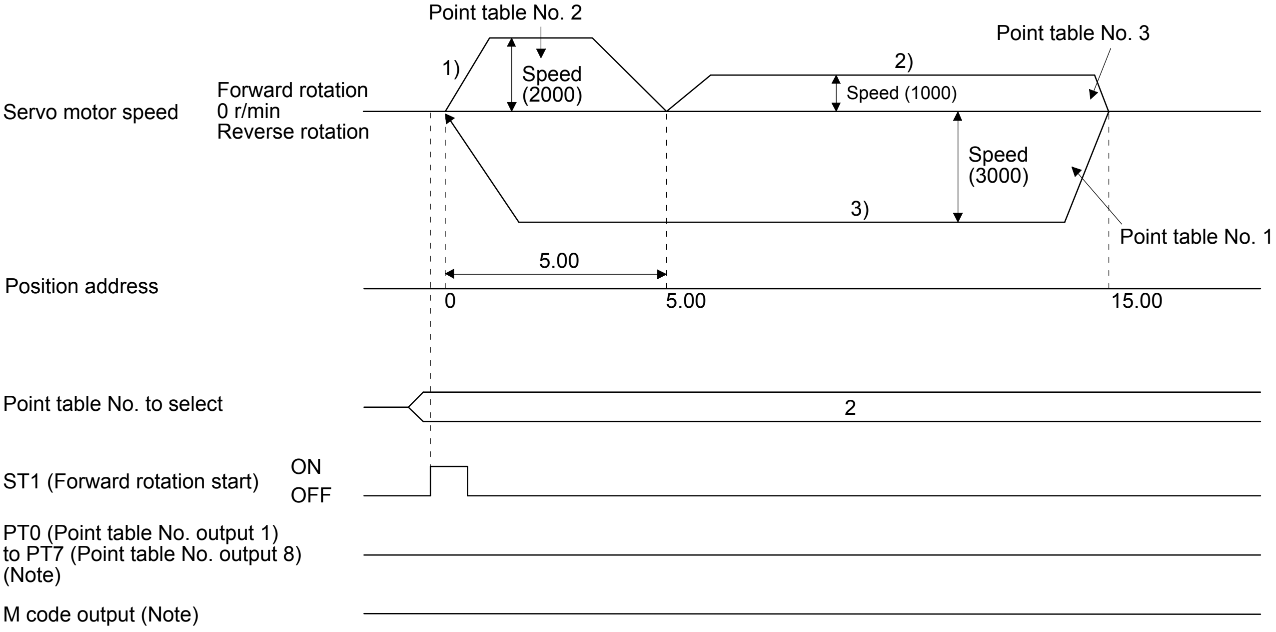
Note. PT0 to PT7 and M code are not outputted in automatic continuous operation.

Example 2. Operations when "9" is set to the sub 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]	Sub function	M code
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

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 sub 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. PT0 to PT7 and M code are not outputted in automatic continuous operation.

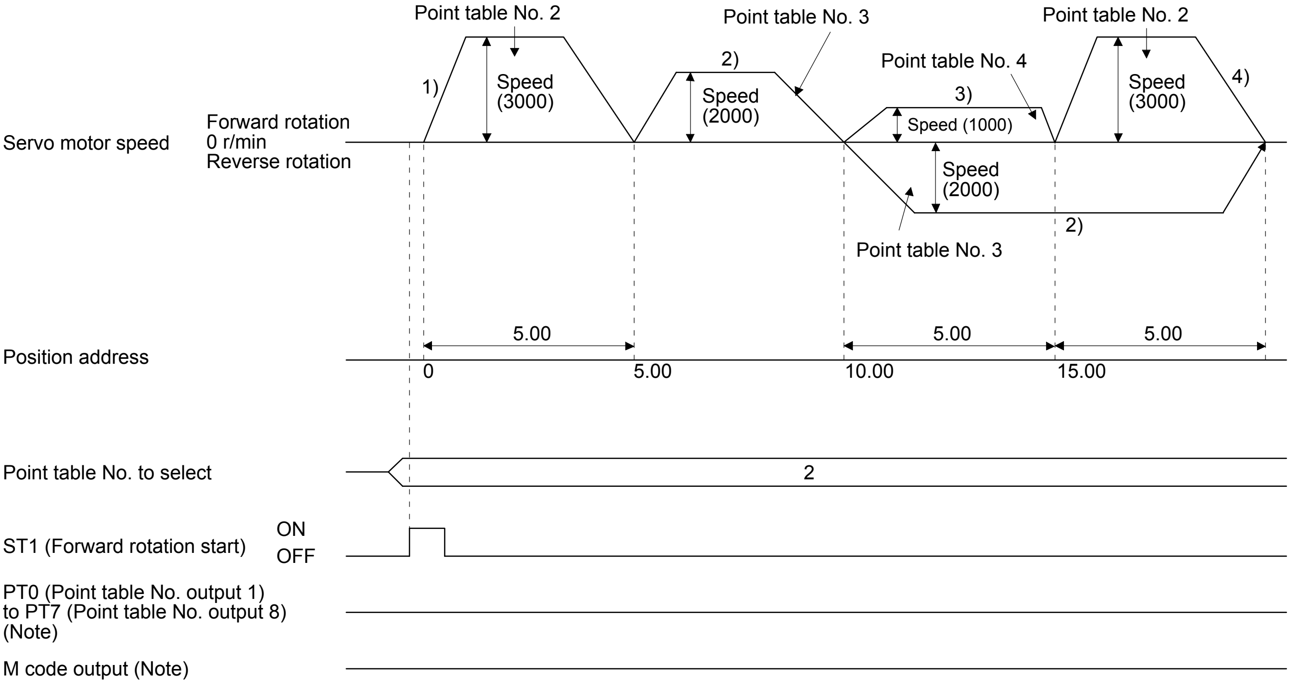
b) Automatic repeat positioning operation by incremental value command method

Example 1. Operations when "10" is set to the sub 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]	Sub function	M code
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

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 sub 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)



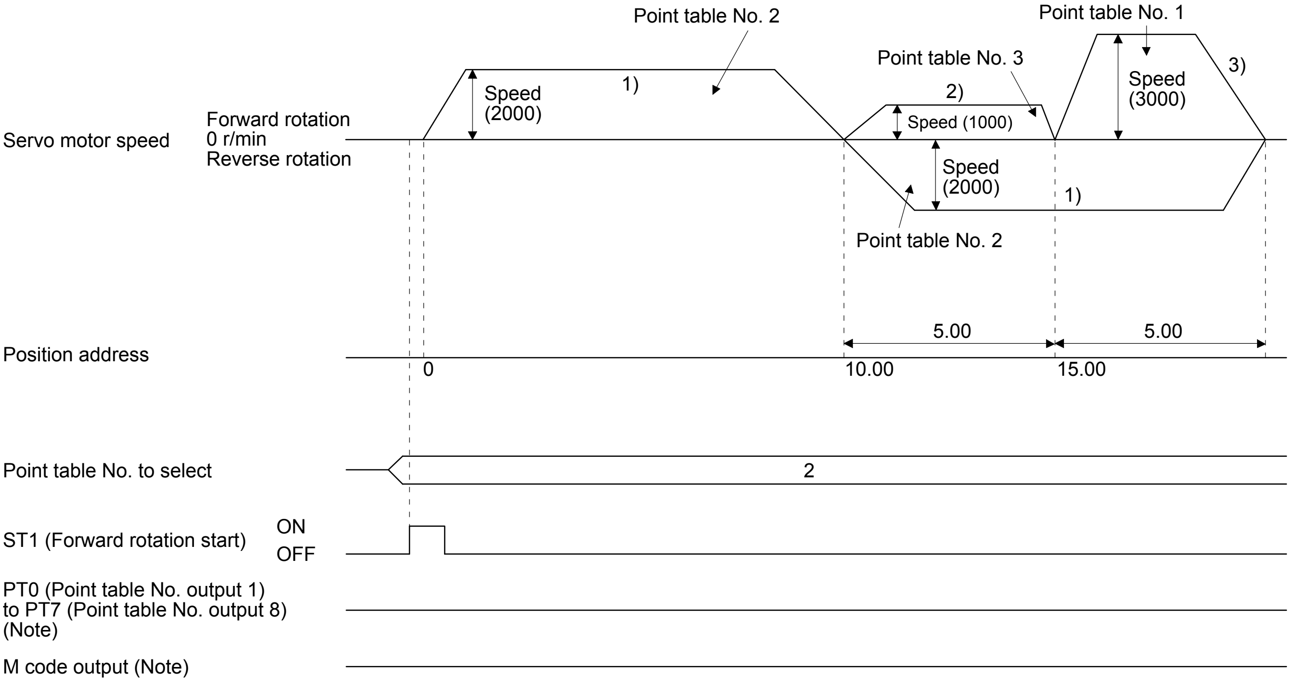
Note. PT0 to PT7 and M code are not outputted in automatic continuous operation.

Example 2. Operations when "11" is set to the sub 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]	Sub function	M code
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

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 sub 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. PT0 to PT7 and M code are not outputted in automatic continuous operation.

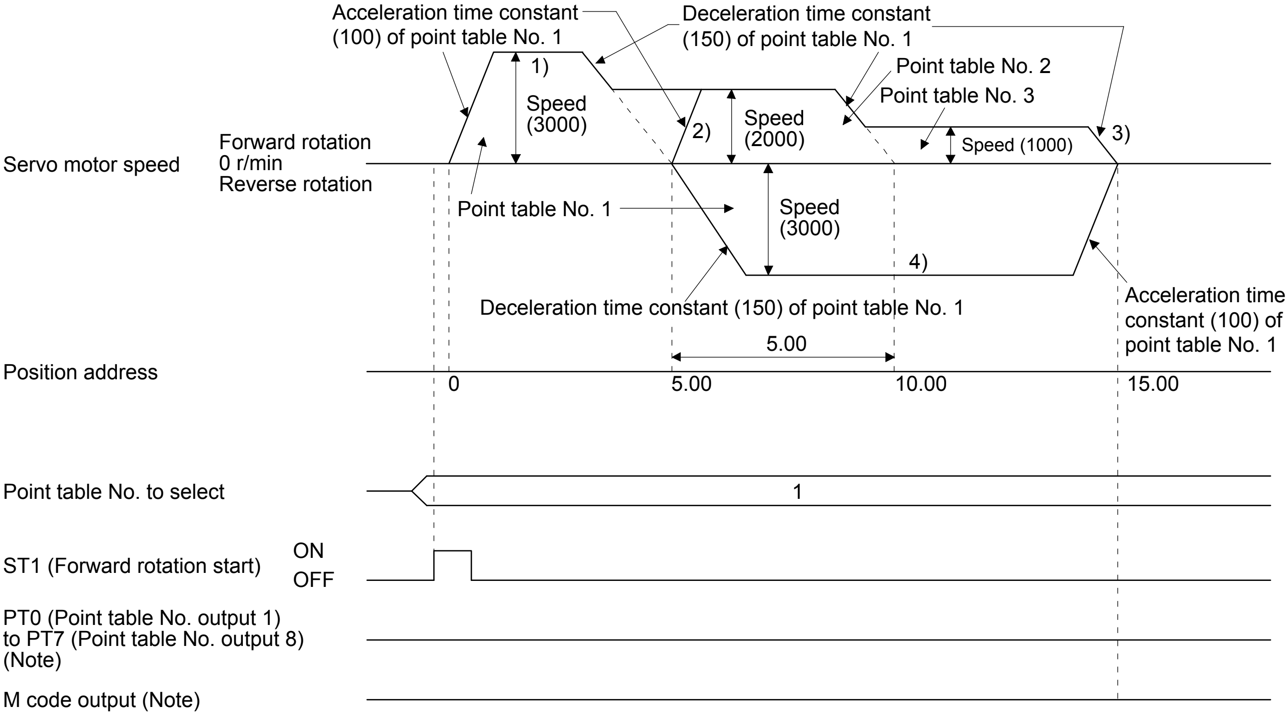
c) Varying-speed operation by absolute value command method

Example. Operations when "8" is set to the sub 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]	Sub function	M code
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

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 sub 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. PT0 to PT7 and M code are not outputted in automatic continuous operation.

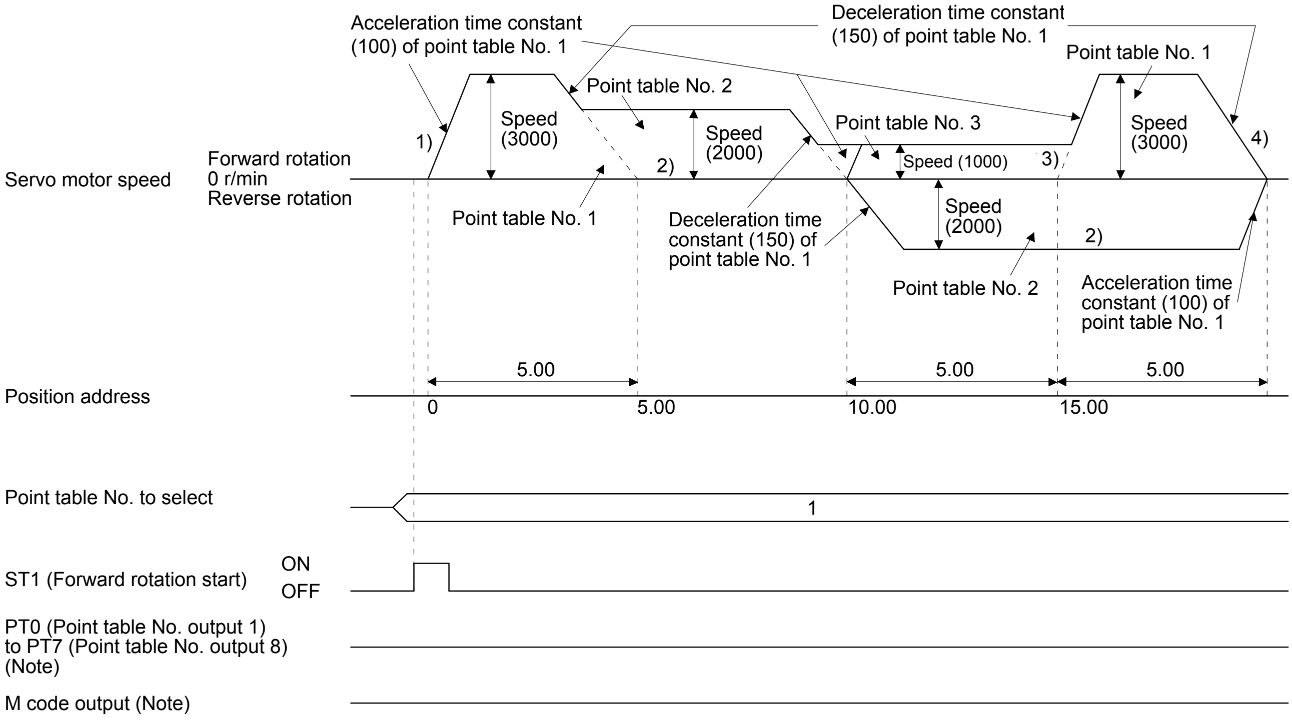
d) Varying-speed operation by incremental value command method

Example. Operations when "10" is set to the sub 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]	Sub function	M code
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

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 sub 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)



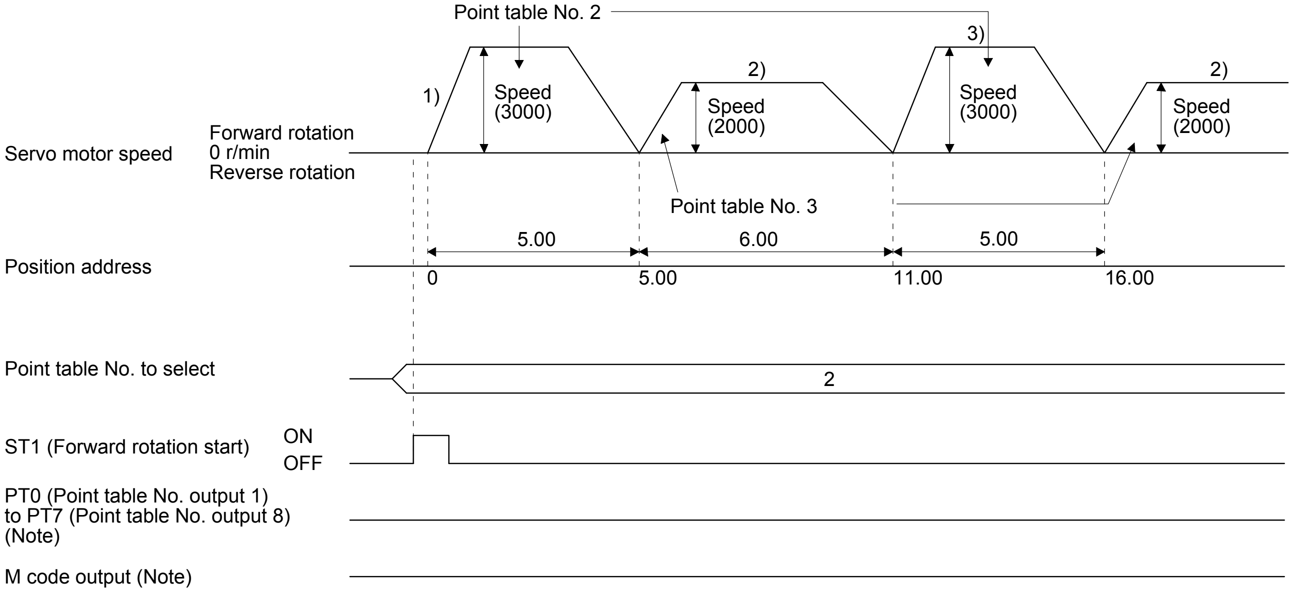
Note. PT0 to PT7 and M code are not outputted in automatic continuous operation.

2) Incremental value command method ([Pr. PT01] = _ _ _ 1)
Setting "8" to the sub 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 sub 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.

a) Automatic repeat positioning operation by incremental value command method
Example 1. Operations when "8" is set to the sub 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]	Sub function	M code
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

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 sub 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. PT0 to PT7 and M code are not outputted in automatic continuous operation.

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

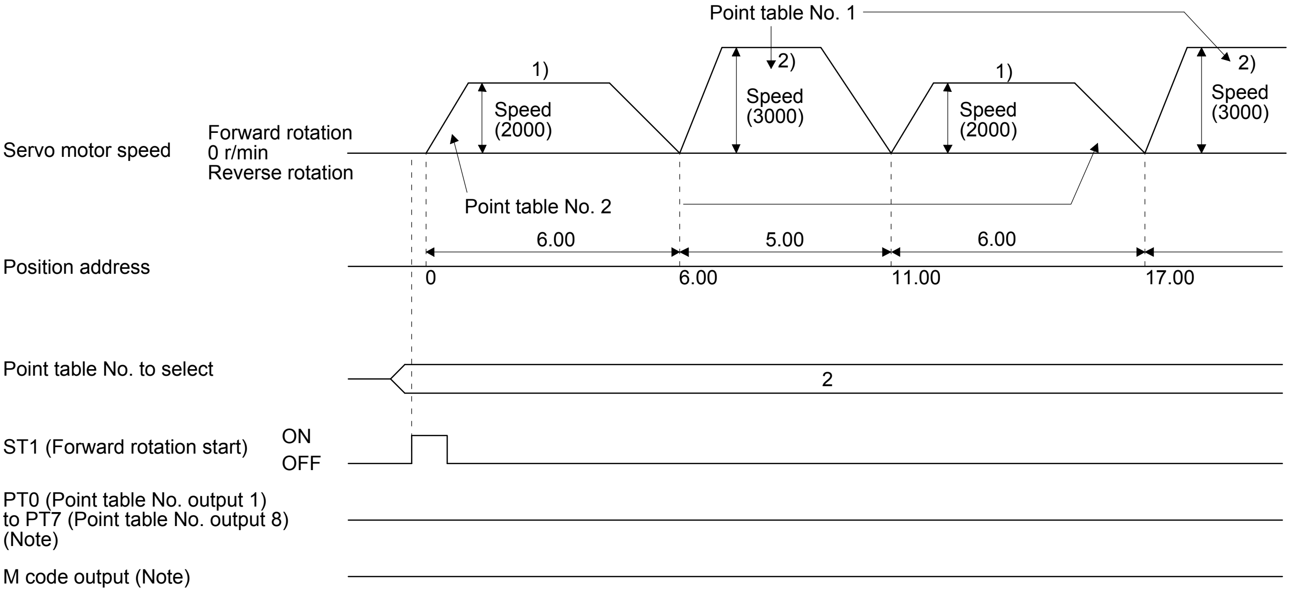
Point table No.	Position data [10^{STM} μm]	Servo motor speed [r/min]	Acceleration time constant [ms]	Deceleration time constant [ms]	Dwell [ms]	Sub function	M code
1	5.00	3000	100	150	100	1	05
2	6.00	2000	150	200	200	9	10

Operation sequence

1) Starting with point table No. 2

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

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



Note. PT0 to PT7 and M code are not outputted in automatic continuous operation.

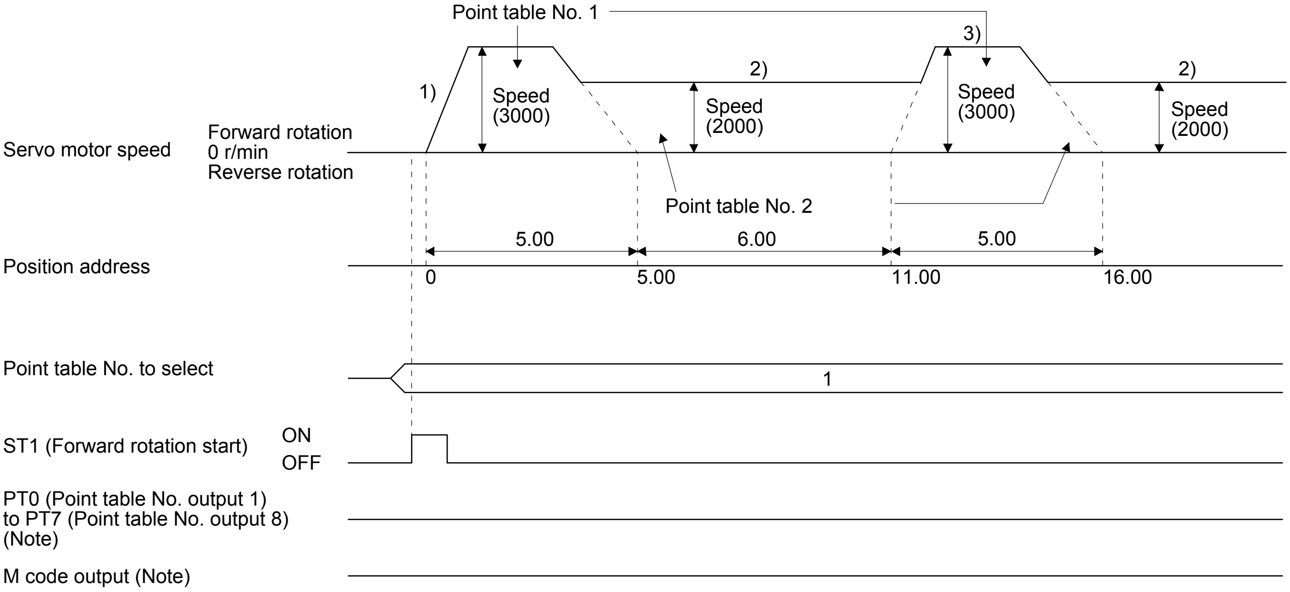
b) Varying-speed operation by incremental value command method

Example. Operations when "8" is set to the sub 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]	Sub function	M code
1	5.00	3000	100	150	0	1	05
2	6.00	2000	Disabled	Disabled	0	8	10

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 sub 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. PT0 to PT7 and M code are not outputted in automatic continuous operation.

(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 restarts the servo motor rotation for the remaining distance.

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

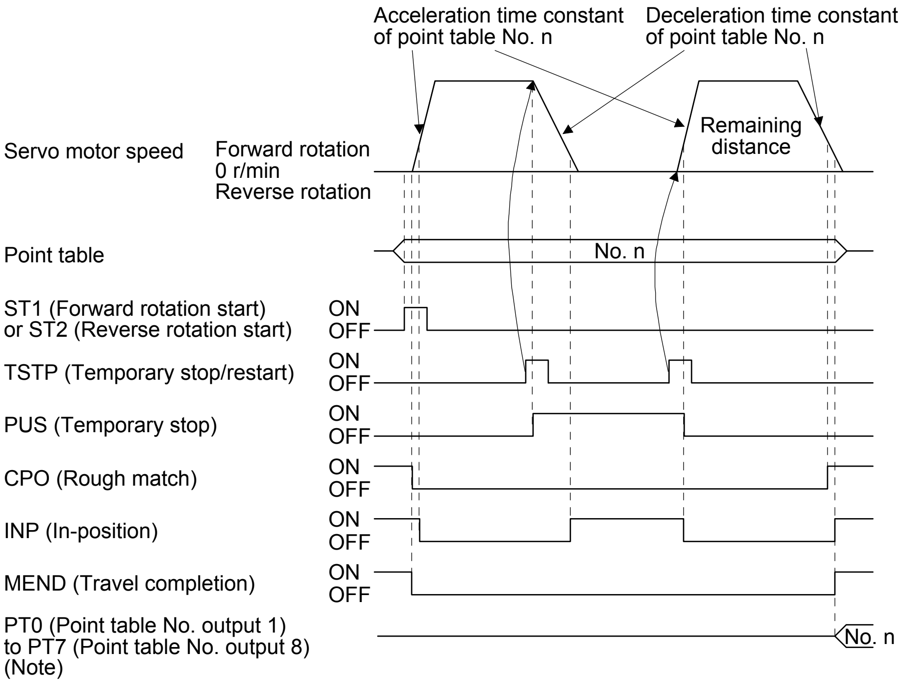
When automatic operation mode is changed to manual operation mode during a temporary stop, the remaining travel distance is cleared at the time of servo-off or inputting the clear signal.

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.

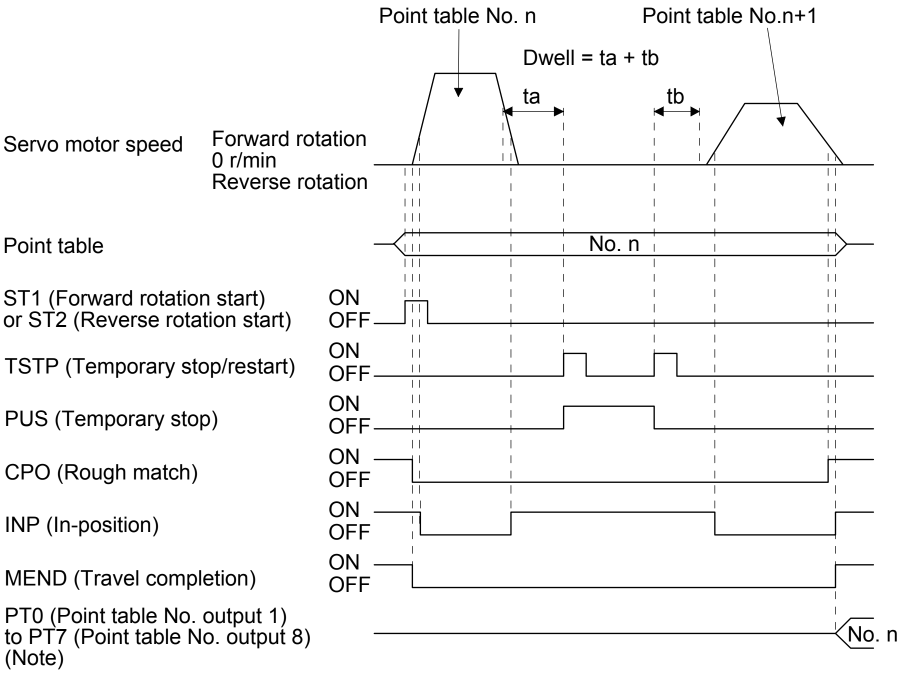
Operation status	Automatic operation	Manual operation	Home position return
During a stop			
During acceleration	Temporary stop		
At a constant speed	Temporary stop		
During deceleration			
During a temporary stop	Restart		

1) When the servo motor is rotating



Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

2) During dwell

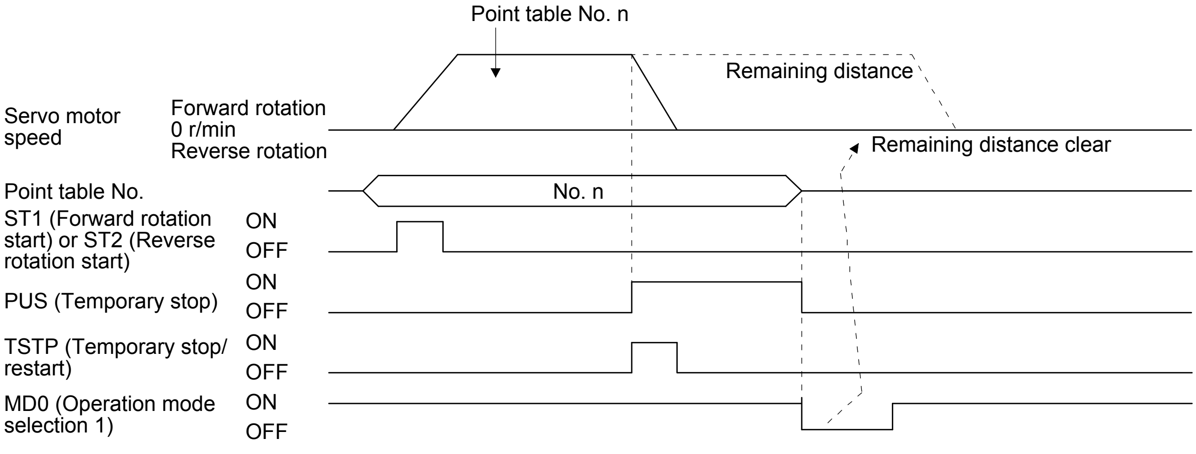


Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 cannot be outputted simultaneously.

(f) Suspension of automatic operation

Suspend the automatic operation or change the operation pattern in the following procedure.

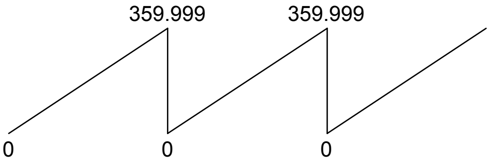
For the suspension during positioning, bring the motor to a stop with TSTP (Temporary stop/restart), then switch off MD0 (Operation mode selection 1) and set the operation to manual mode. At that time, the remaining travel distance is cleared.



(g) Handling of control unit "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 "degree", the setting range of the software limit is 0 degree (lower limit) to 359.999 degrees (upper limit).

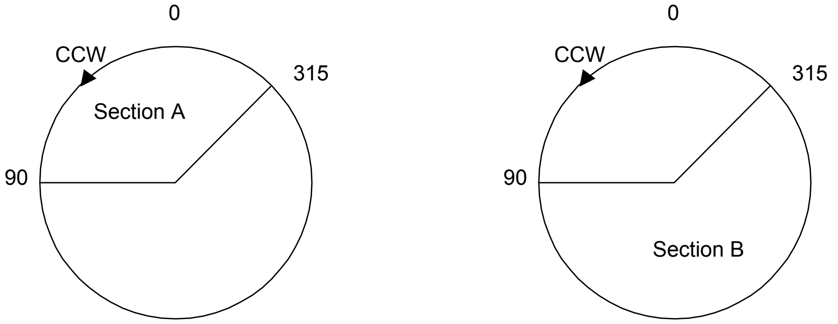
When you set a value other than 0 degree to 359.999 degrees in [Pr. PT15] to [Pr. PT18], the set value is converted as follows. (It will be clamped between 0 degree and 359.999 degrees.)

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 activated

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

- ▪ Software limit - ··· 315.000 degrees
- ▪ Software limit + ··· 90.000 degrees

Set the movable range of section B as follows.

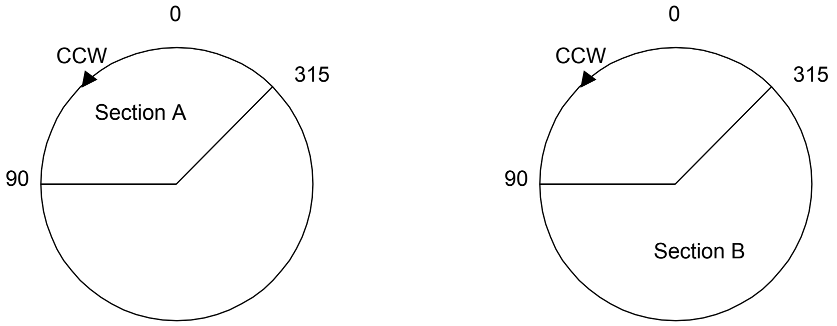
- ▪ Software limit - ··· 90.000 degrees
- ▪ Software limit + ··· 315.000 degrees

c) When the software limit is deactivated
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 activation/deactivation setting
a) Setting range
When the unit is "degree", the setting range of the position range output is 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, matching of home position, or the like, the JOG operation or the manual pulse generator operation can be used for movement to an arbitrary position.

4.3.1 JOG operation

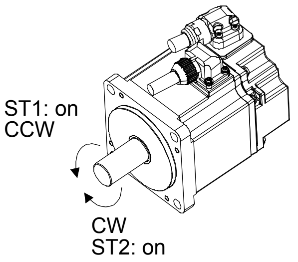
(1) Setting

According to the purpose of use, set input devices and parameters as shown below. In this case, DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8) are invalid.

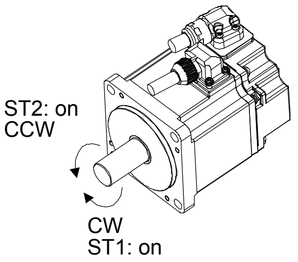
Item	Used device/parameter	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) of this section.
JOG speed	[Pr. PT13]	Set the servo motor speed.
Acceleration/deceleration time constant	Point table No. 1	Use the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

(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



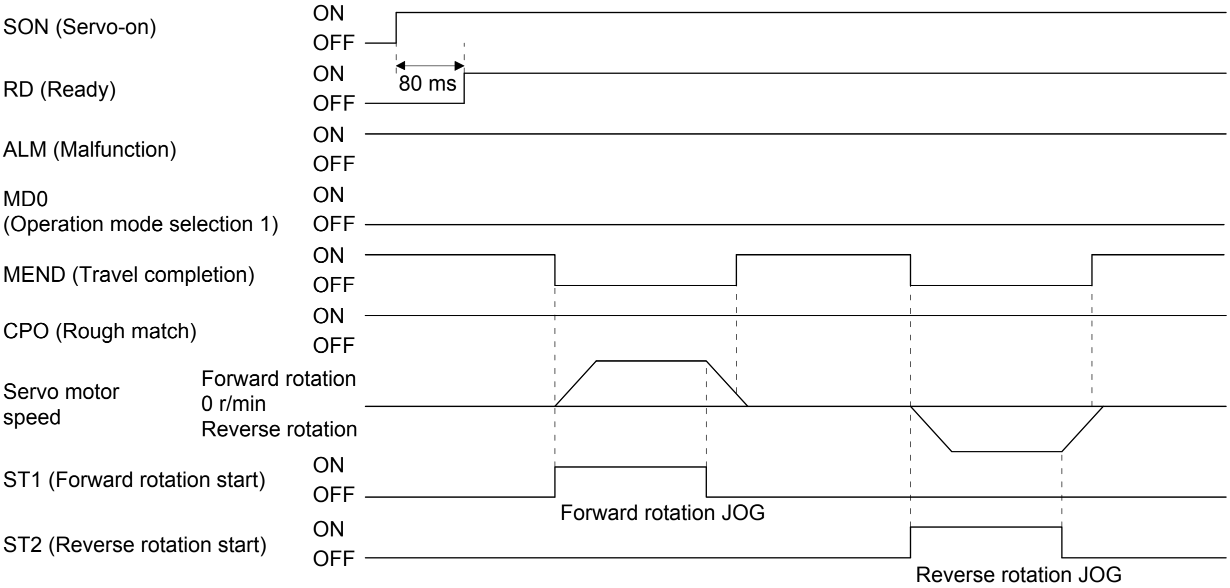
Pr. PA14: 1

(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

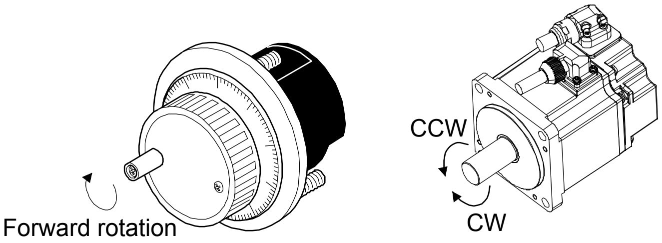
- ●To enhance noise immunity, set "_ 2 _ _" to [Pr. PA13] when the command pulse frequency is 500 kpulse/s or less, or set "_3_ _" to [Pr. PA13] when the command pulse frequency is 200 kpulse/s or less.

According to the purpose of use, set input devices and parameters as shown below. In this case, DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8) are invalid.

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) of this section.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) of 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 to manual pulse generator rotation amount	Travel distance			
			[mm]	[inch]	[degree]	[pulse]
0	0	[Pr. PT03] setting valid				
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

Use [Pr. PT03] to 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 starts the servo motor rotation. For the rotation direction of the servo motor, refer to (2) of 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.
- ●In the following cases, make sure that the Z-phase has been passed through once before performing a home position return.
  - ・When an incremental linear encoder is used in the linear servo motor control mode
  - ・When an incremental external encoder is used in the fully closed loop control mode
  - ・When a servo amplifier is used in the DD motor control mode

  Z-phase unpassed will trigger [AL. 90.5 Home position return incomplete warning].
- ●For servo amplifiers with software version B6 or earlier, the dog type last Z-phase reference home position return and the dogless Z-phase reference home position return cannot be used in the following operation modes.
  - ・Fully closed loop control mode using a incremental linear encoder
  - ・Linear servo motor control mode using a incremental linear encoder
  - ・Direct drive motor control mode

  Setting [Pr. PT04 Home position return type] to "_ _ _ 8" or "_ _ _ A" will trigger [AL. 37 Parameter error].

4.4.1 Outline of home position return

A home position return is performed to match the command coordinates with the machine coordinates. Under the incremental method, every time switching on the input power supply, you have to perform the home position return. Contrastingly, in the absolute position detection system, once you have performed the home position return at machine installation, the current position will be retained even if the power supply is shut off. Thereafter, the home position return is unnecessary when the power supply is switched 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 a home position return automatic retract function. When the machine stops on or beyond the proximity dog, this function automatically backs the machine to the proper position and then performs the home position return. Manually moving the machine by the JOG operation or others is unnecessary.

(1) Home position return types

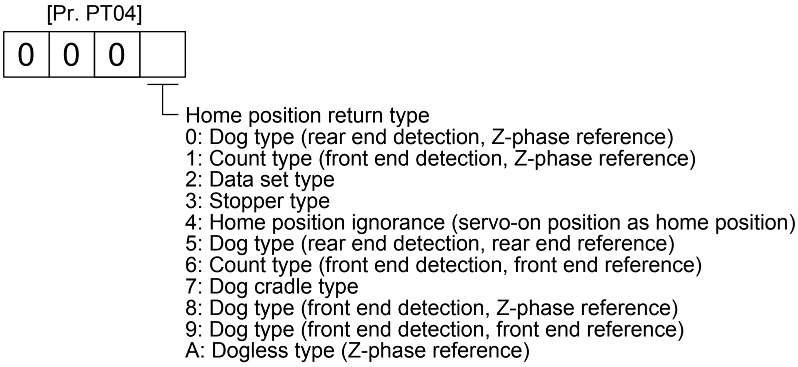
Select the optimum home position return type according to the machine type or others.

Type	Home position return method	Feature
Dog type	Deceleration starts at the proximity dog front end. 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 home position shift distance is used as the home position.	· General home position return method using a proximity dog · The repeatability of the home position return is high. · The machine is less loaded. · Used 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 at the proximity dog front end. 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.	· Home position return method using a proximity dog · Used to minimize the length of the proximity dog.
Data set type	An arbitrary position 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.	· The home position return speed must be low enough because of the collision with the mechanical stopper. · The strength of the machine and its stopper must be increased.
Home position ignorance (servo-on position as home position)	The position where the servo is switched on is used as the home position.	
Dog type rear end reference	Deceleration starts at the proximity dog front end. 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 at the proximity dog front end. 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.
Dog cradle type	After the proximity dog front end 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 proximity dog front end 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	From the proximity dog front end, 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.
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

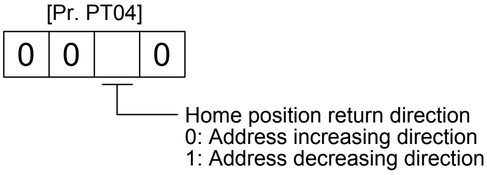
To perform the home position return, set each parameter as follows.

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



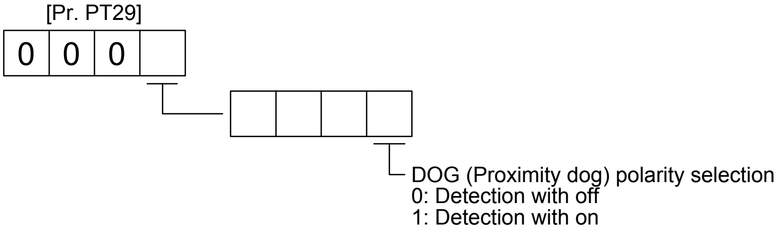
Home position return type
0: Dog type (rear end detection, Z-phase reference)
1: Count type (front end detection, Z-phase reference)
2: Data set type
3: Stopper type
4: Home position ignorance (servo-on position as home position)
5: Dog type (rear end detection, rear end reference)
6: Count type (front 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 the address increase direction from the current position. Setting "1" starts the home position return in the address decrease direction from the current position.



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 the dog when DOG (Proximity dog) is off. Setting "1" detects the dog when DOG (Proximity dog) is on.



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

4.4.2 Dog type home position return

This home position return type uses a proximity dog. Deceleration starts at the proximity dog front end. 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	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to shift the home position specified by the first Z-phase signal after passage of proximity dog rear end.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.

(2) Proximity dog length

To generate the Z-phase signal of the servo motor during the DOG (Proximity dog) detection, the proximity dog length should satisfy formulas (4.1) and (4.2).

$$L_1 \geq \frac{V}{60} \bullet \frac{td}{2} \quad \cdots\cdots (4.1)$$

L_1: Proximity dog length [mm]

V: Home position return speed [mm/min]

td: Deceleration time [s]

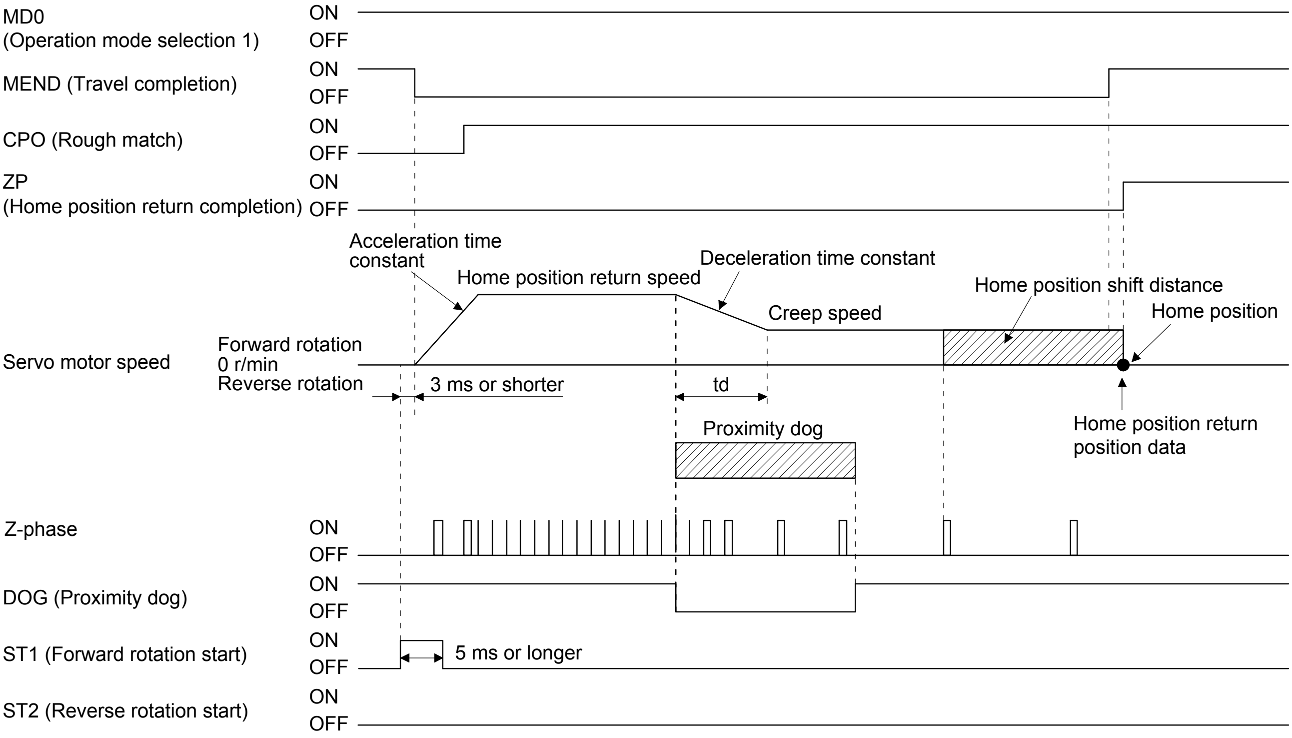
$$L_2 \geq 2 \bullet \Delta S \quad \cdots\cdots (4.2)$$

L_2: Proximity dog length [mm]

ΔS: Travel distance per servo motor revolution [mm] (Note)

Note. For linear servo motor: travel distance per stop interval selection at the home position return of [Pr. PL01]

(3) Timing chart

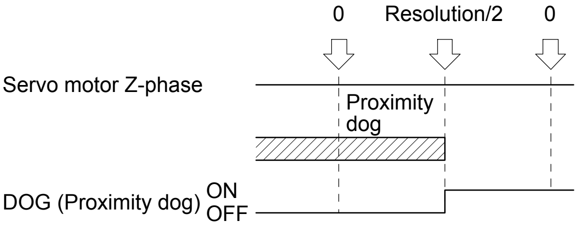


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

(4) Adjustment

For the dog type home position return, adjust the setting to ensure the Z-phase signal generation during the dog detection. Locate the DOG (Proximity dog) rear end almost at the center between the generation positions of two consecutive Z-phase signals.

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



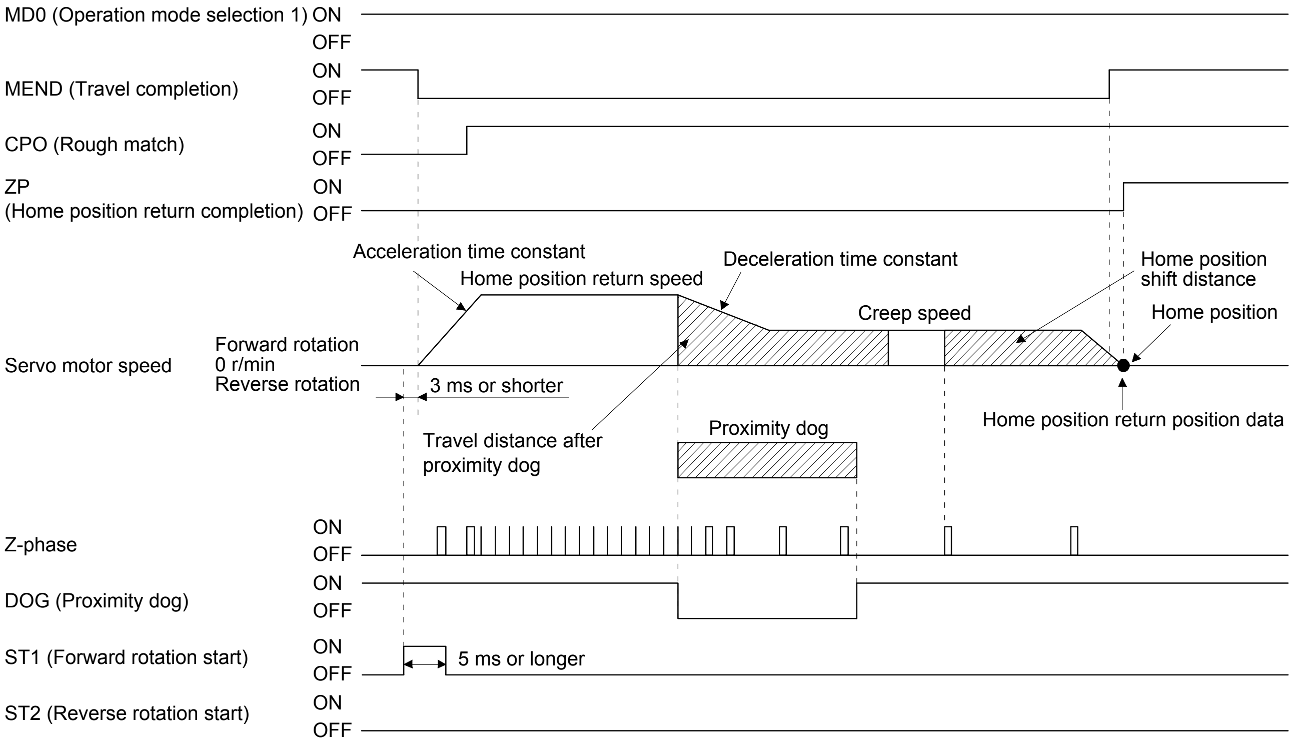
4.4.3 Count type home position return

In the count type home position return, after the proximity dog front end is detected, the motor travels the distance set with [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 DOG (Proximity dog) is on for 10 ms or longer, the proximity dog length 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	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to shift the home position starting at the first Z-phase signal after passage of proximity dog front end and motion over the specified travel distance.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance after passage of proximity dog front end.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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

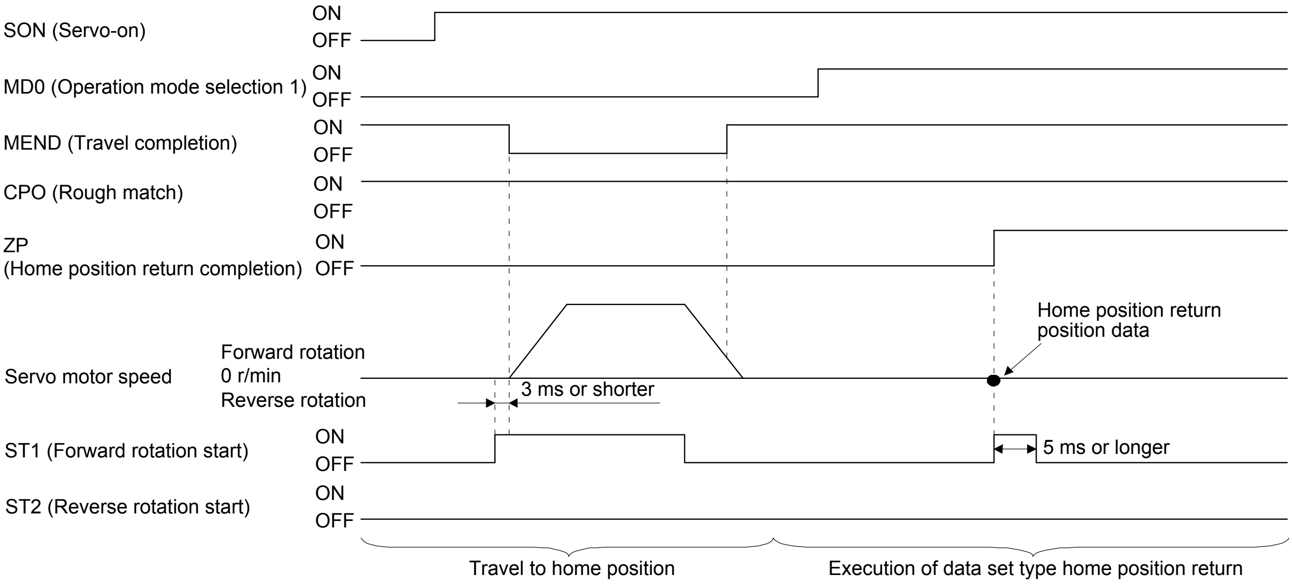
To set an arbitrary position as the home position, use the data set type home position return. The JOG operation, manual pulse generator operation, or the like can be used for movement. You can perform the data set type home position return at servo-on only.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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

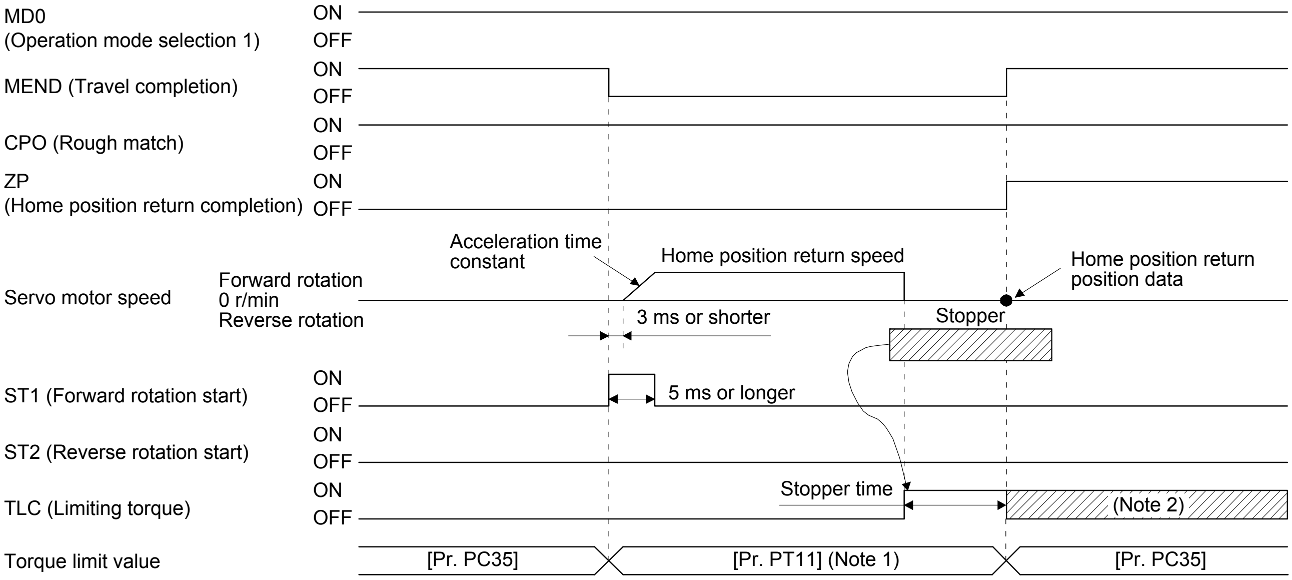
For the stopper type home position return, by using the JOG operation, manual pulse generator operation, or others, a workpiece is pressed against a mechanical stopper, and the position where it is stopped is used as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 mechanical stopper until when ZP (home position return completion) is output.
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.
Home position return acceleration 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



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.

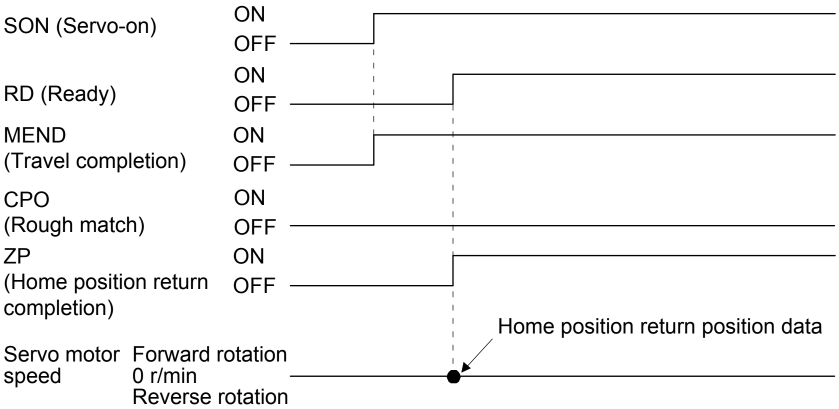
The position at servo-on is used as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used parameter	Setting
Home position ignorance	[Pr. PT04]	_ _ _ 4: Select the home position ignorance.
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.

4.4.7 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 6400 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

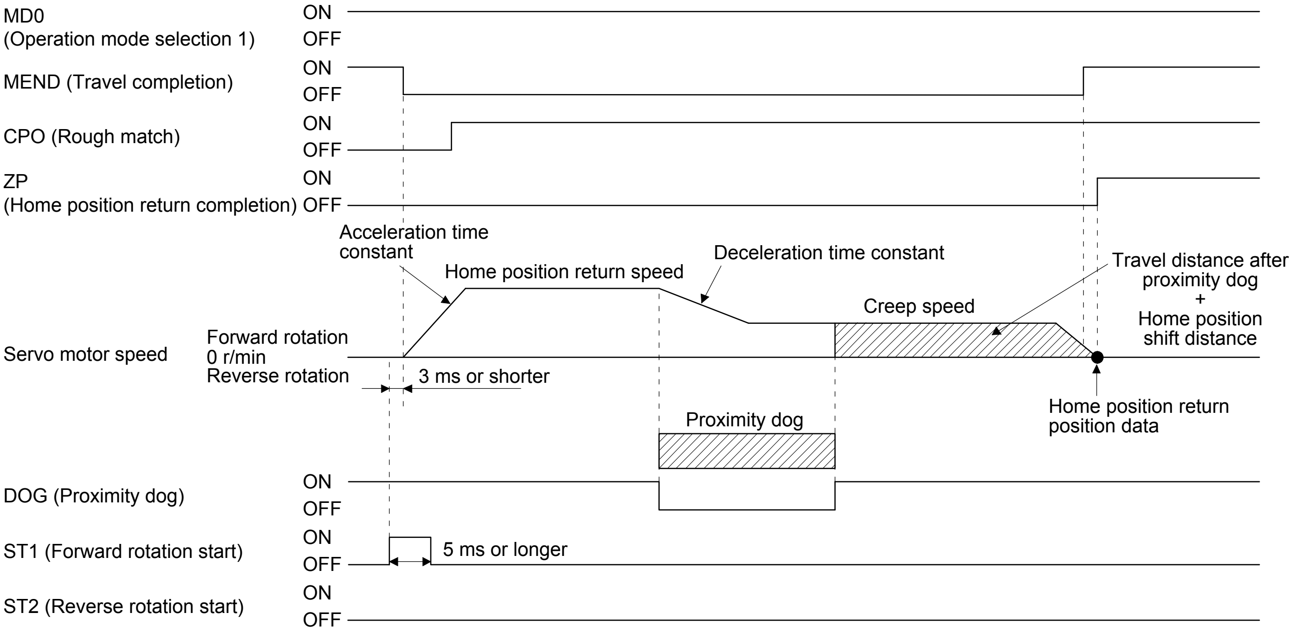
Deceleration starts at the front end of a proximity dog. After the rear end is passed, the position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position. The home position return is available independently 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	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the dog is detected.
Home position shift distance	[Pr. PT07]	Set this item 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 specified after the rear end of a proximity dog is passed.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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.

4.4.8 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 6400 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, when a home position return ends without reaching the creep speed, [AL. 90] 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.

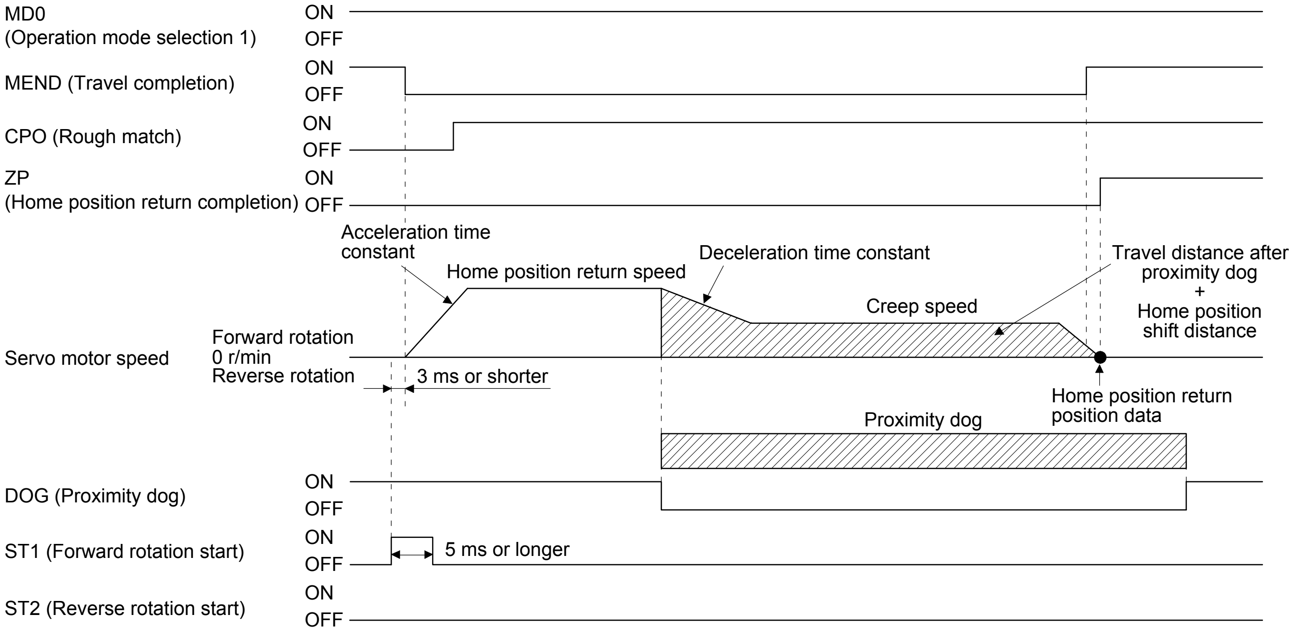
Deceleration starts at the front end of a proximity dog. The position is shifted by the travel distance after proximity dog and the home position shift distance. The position after the shifts is used as the home position. The home position return is available independently of the Z-phase signal. Changing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

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the 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.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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.

4.4.9 Dog cradle type home position return

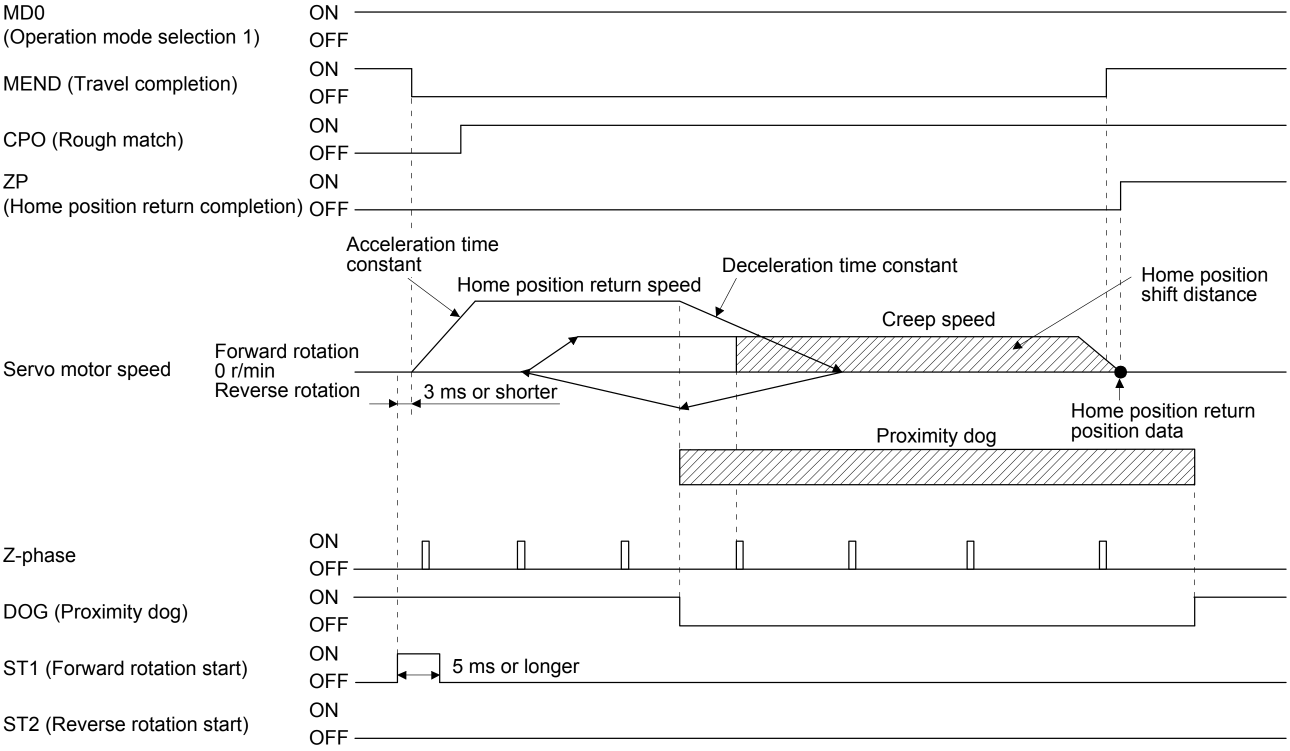
You can use the position, which is specified by the first Z-phase signal after the front end of a proximity dog is detected, as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the 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.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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.

4.4.10 Dog type last Z-phase reference home position return

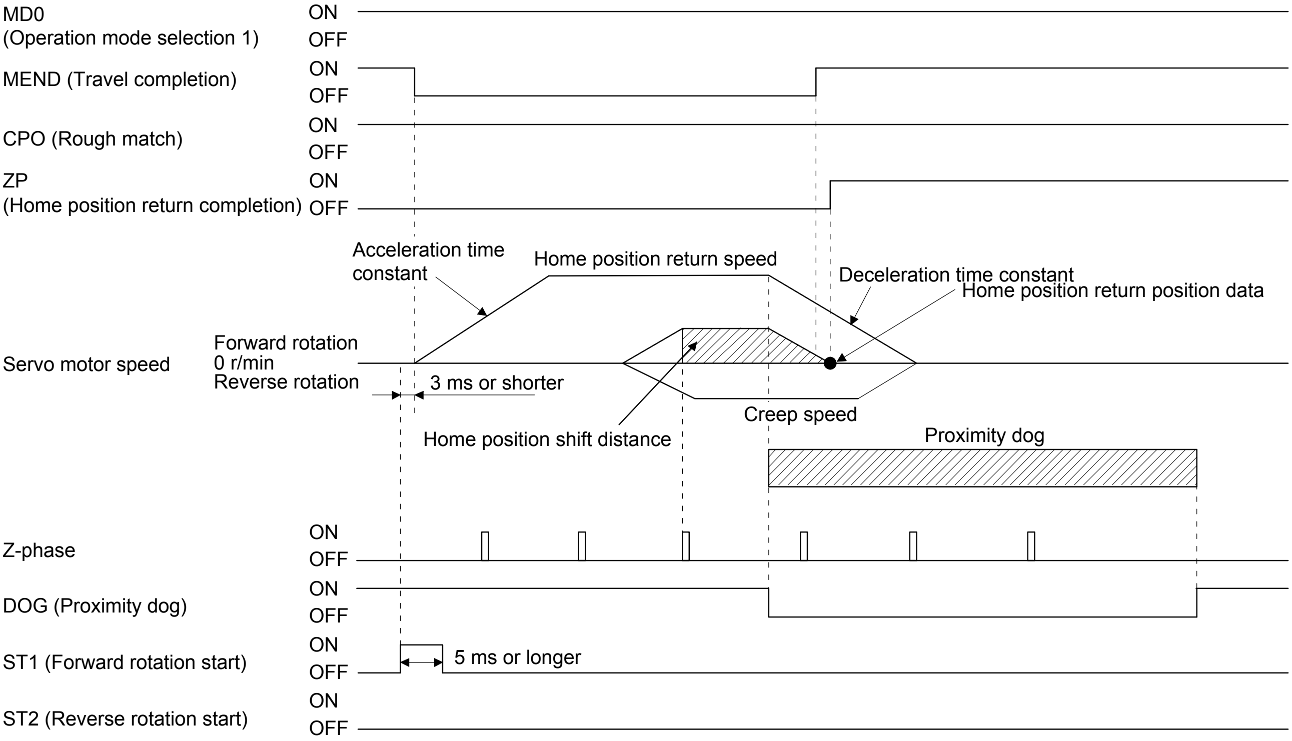
After the front end of a proximity dog is detected, the position is shifted away from the proximity dog at the creep speed in the reverse direction and then specified by the first Z-phase signal. The position of the first Z-phase signal is used as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the 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.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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.

4.4.11 Dog type front end reference home position return type

POINT

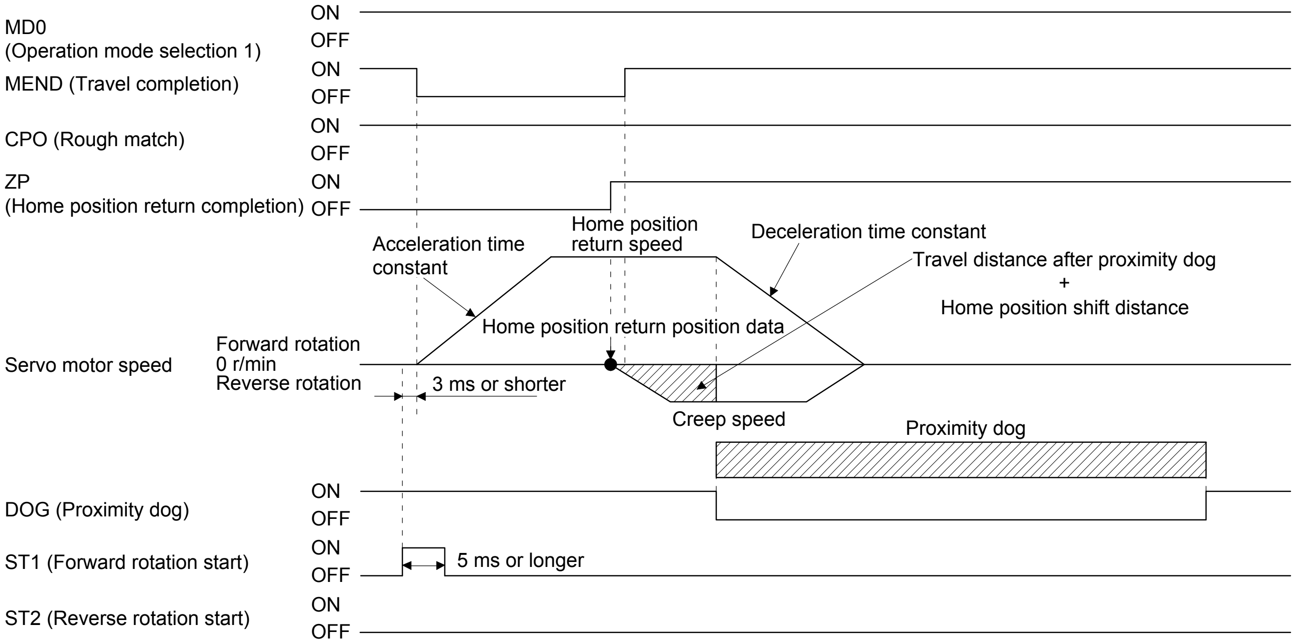
- This home position return method depends on the timing of reading DOG (Proximity dog) that has detected the front end of a proximity dog. Therefore, when a home position return is performed at a creep speed of 100 r/min, the home position has an error of 6400 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

Starting 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 used 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	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 until the dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after the 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.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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.

4.4.12 Dogless Z-phase reference home position return type

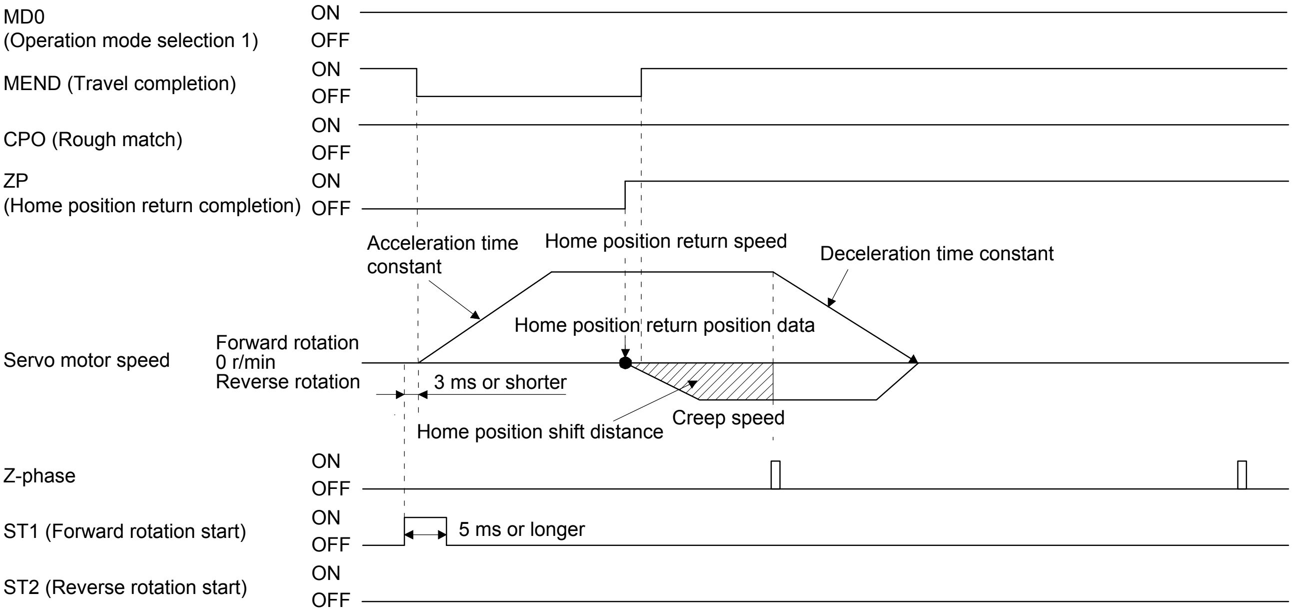
Starting from the Z-phase pulse position after the start of the home position return, the position is shifted by the home position shift distance. The position after the shifts is used as the home position.

(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
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 item to shift the home position, which is specified by the Z-phase signal.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.

(2) Timing chart

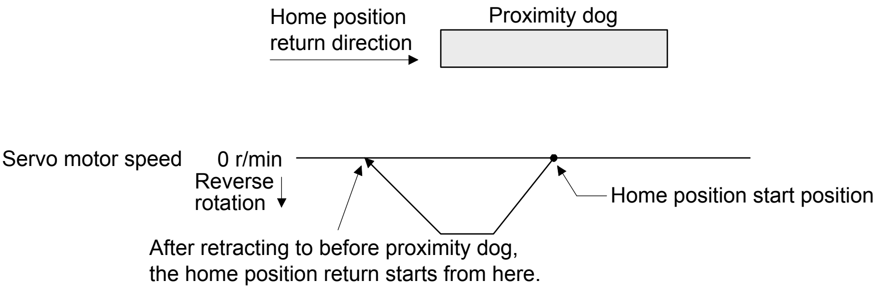


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

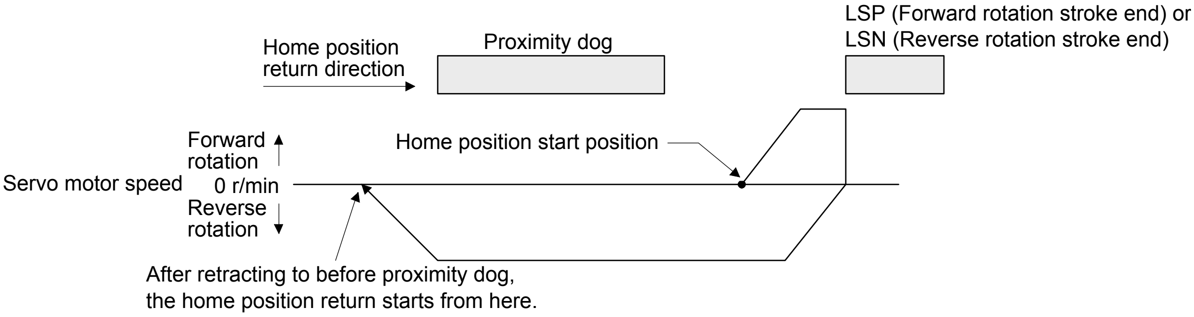
4.4.13 Automatic retract function used for the home position return

For a home position return using the proximity dog, when the home position return is started from the position on or beyond the proximity dog, the home position return is performed after the machine moves back to the position where the home position can be performed.

(1) When the current position is on the proximity dog
When the current position is on the proximity dog, the machine moves backward automatically, and the home position return is performed.



(2) When the current position is beyond the proximity dog
At start-up, the operation is performed in the direction of the home position return. When LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is detected, the machine moves backward automatically. The machine passes and stops before the proximity dog, and the home position return is performed from the position again. If the proximity dog cannot be detected, the machine stops at LSP or LSN on the opposite side, and [AL. 90 Home position return incomplete warning] will occur.



The software limit cannot be used with these functions.

4.4.14 Automatic positioning to home position function

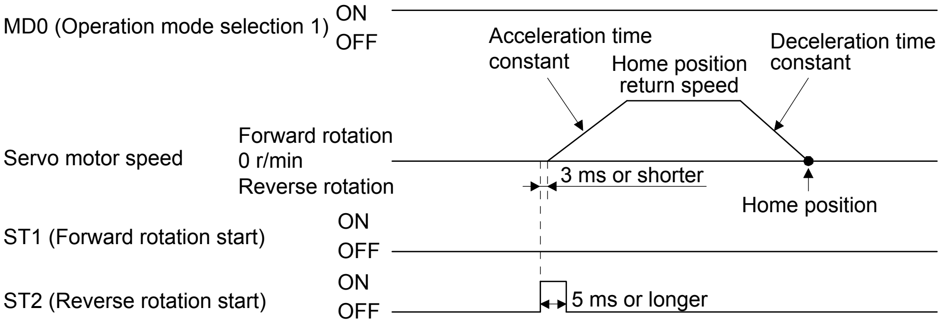
POINT

- ●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.

After power-on, if the home position return is performed again after the home position return is performed to define the home position, this function enables automatic positioning to the home position rapidly. For the absolute position detection system, the home position return is unnecessary after the power-on.
When the automatic positioning to the home position is performed at home position return incompletion, [AL. 90.1] will occur.
After the power-on, perform the home position return in advance.
Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	DI0 (Point table No. selection 1) to DI7 (Point table No. selection 8)	Switch off DI0 to DI7.
Home position return speed	[Pr. PT05]	Set the servo motor speed to travel to the home position.
Home position return acceleration/deceleration time constant	Point table No. 1	Use the acceleration/deceleration time constant of point table No. 1.
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 at the time of degree unit setting with home position return direction of [Pr. PT04].



4.5 Roll feed mode using the roll feed display function

The roll feed display function can change the current position of the status monitor and command position display.

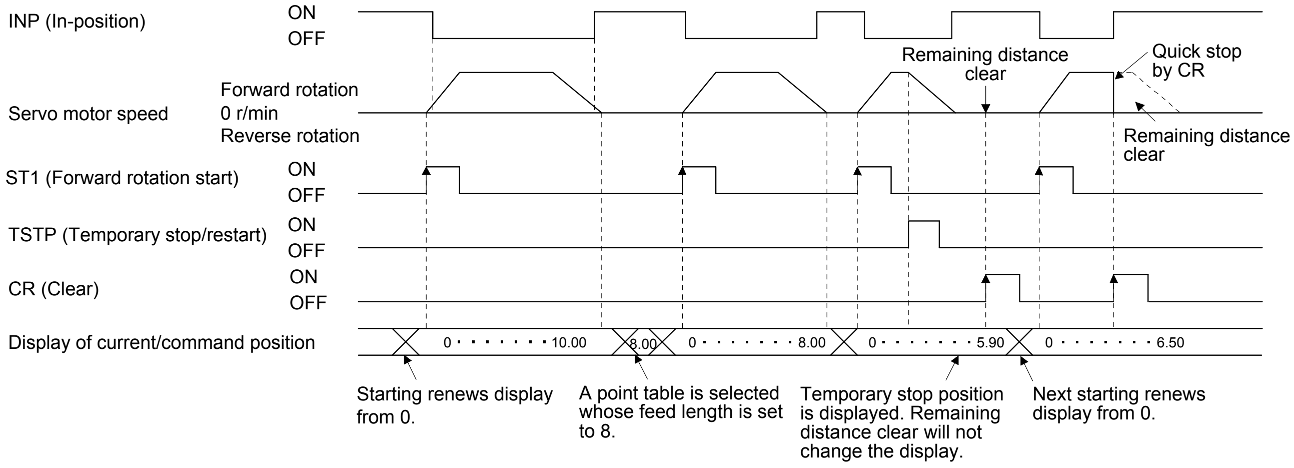
Using the roll feed display function can use this servo amplifier as the roll feed mode. The roll feed mode can be used in the incremental system. Using the override function can change the feed speed during operation. Refer to section 2.4 for details.

(1) Parameter setting

No.	Name	Setting digit	Setting item	Setting value	Setting
PA03	Absolute position detection system	_ _ _ x	Absolute position detection system	_ _ _ 0 (initial value)	Always set the incremental system. It cannot be used by the absolute position detection system.
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 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.

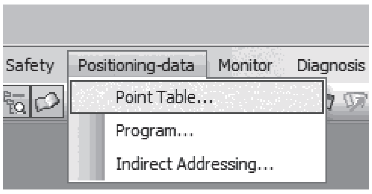
Operation mode		Detailed explanation
Automatic operation	Automatic operation using the point table	Section 4.2.2
Manual operation	JOG operation	Section 4.3.1
	Manual pulse generator operation	Section 4.3.2
Home position return mode		Section 4.4

4.6 Point table setting method

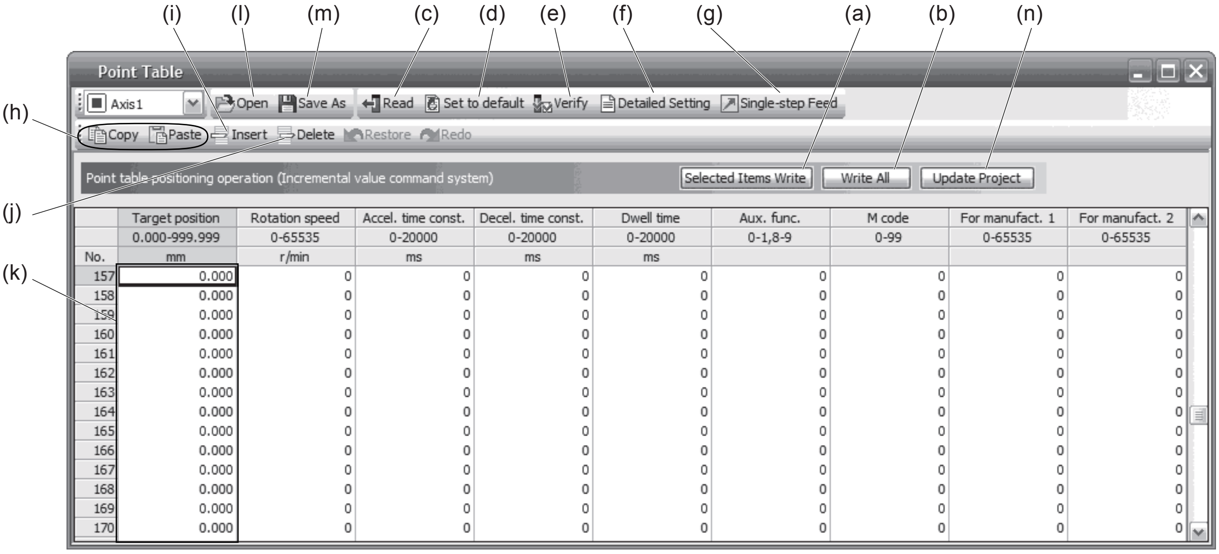
The following shows the setting method of point tables using MR Configurator2.

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 by clicking.



	Target position	Rotation speed	Accel. time const.	Decel. time const.	Dwell time	Aux. func.	M code	For manufact. 1	For manufact. 2
	0.000-999.999	0-65535	0-20000	0-20000	0-20000	0-1,8-9	0-99	0-65535	0-65535
No.	mm	r/min	ms	ms	ms				
157	0.000	0	0	0	0	0	0	0	0
158	0.000	0	0	0	0	0	0	0	0
159	0.000	0	0	0	0	0	0	0	0
160	0.000	0	0	0	0	0	0	0	0
161	0.000	0	0	0	0	0	0	0	0
162	0.000	0	0	0	0	0	0	0	0
163	0.000	0	0	0	0	0	0	0	0
164	0.000	0	0	0	0	0	0	0	0
165	0.000	0	0	0	0	0	0	0	0
166	0.000	0	0	0	0	0	0	0	0
167	0.000	0	0	0	0	0	0	0	0
168	0.000	0	0	0	0	0	0	0	0
169	0.000	0	0	0	0	0	0	0	0
170	0.000	0	0	0	0	0	0	0	0

(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 the "Read" button to read and display all the point table data from the servo amplifier.

(4) Initial setting of point table data (d)
Click the "Set to default" button to initialize all the data of point table No. 1 to 255. This button also initializes data currently being changed.

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

(6) Detailed setting of point table data (f)
Click the "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 or 3.2.9 for details.

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

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

(10) Deleting point table data (j)
Click the "Delete" button to delete all the data of the point table No. selected. The lower rows of the selected point table No. will be shifted up one 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" of this section.

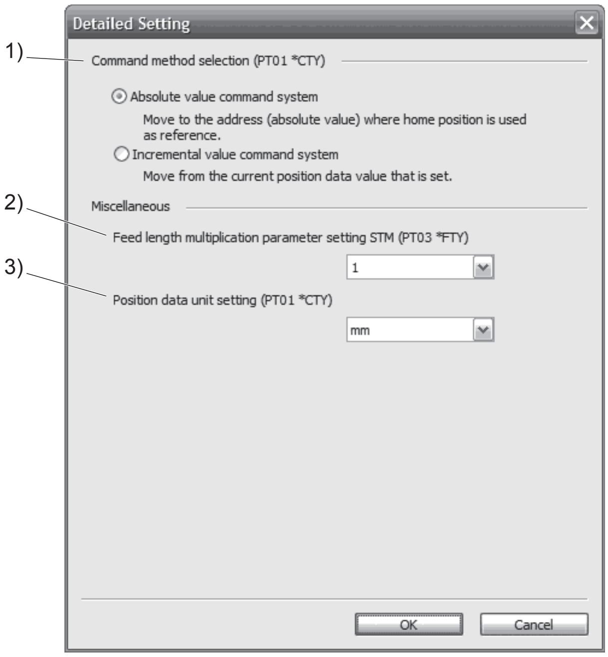
(12) Reading point table data (l)
Click "Open" to read the point table data.

(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

You can change position data range and unit with the detailed setting for 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 the "Update Project" button in the point table window.



Command method selection (PT01 *CTY)

● Absolute value command system
Move to the address (absolute value) where home position is used as reference.

○ Incremental value command system
Move from the current position data value that is set.

Miscellaneous

Feed length multiplication parameter setting STM (PT03 *FTY): 1

Position data unit setting (PT01 *CTY): mm

(1) Command method selection (PT01 *CTY) 1)
Select a positioning command method from the absolute position command method and incremental value command method.

(2) Miscellaneous
- (a) Feed length multiplication parameter setting STM (PT03 *FTY) 2)
  Select any feed length multiplication from 1/10/100/1000.
- (b) Position data unit setting (PT01 *CTY) 3)
  Select any unit of position data from mm/inch/degree/pulse. While degree or pulse is selected, setting of feed length multiplication will be disabled.

MEMO

5. HOW TO USE THE PROGRAM

The following items are the same as MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Switching power on for the first time	Section 4.1	Section 18.4

POINT

●When you use a linear servo motor, replace the following left words to the right words.

Load to motor inertia ratio	→ Load to motor mass ratio
Torque	→ Thrust
(Servo motor) speed	→ (Linear servo motor) speed

●For the mark detection function (Current position latch), refer to section 12.2.1.
●For the mark detection function (Interrupt positioning), refer to section 12.2.2.
●For the infinite feed function (setting degree), refer to section 12.3.

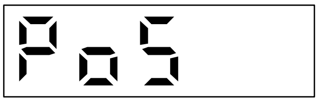
5.1 Startup

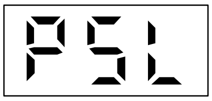
5.1.1 Power on and off procedures

When the servo amplifier is powered on for the first time, the amplifier enters the position control mode. (Refer to section 4.2.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
This section provides a case where the servo amplifier is powered on after the positioning mode setting.

(1) Power-on
Switch 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) Switch on the main circuit power supply and control circuit power supply.
The display shows "PoS" ("PSL" for MR-J4-03A6-RJ servo amplifiers), and in 2 s later, shows data.


MR-J4-_A_-RJ 100 W or more


MR-J4-03A6-RJ

(2) Power-off
1) Switch off ST1 (Forward rotation start).
2) Switch off SON (Servo-on).
3) Switch off the main circuit power supply and control circuit power supply.

5.1.2 Stop

If any of the following situations occurs, the servo amplifier suspends the running of the servo motor and brings it to a stop.
Refer to section 3.10 of "MR-J4-_A_(-RJ) 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 the command. With some alarms, however, the dynamic brake operates to bring the servo motor to a stop. (Refer to chapter 8. (Note 1))
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.
STO (STO1, STO2) off (Note 2)	The base circuit is shut off and the dynamic brake operates to bring the servo motor to a stop.
LSP (Forward rotation stroke end) off, LSN (Reverse rotation stroke end) off	It will bring the motor to a sudden stop and make it servo-locked. It can be run in the opposite direction.

Note 1. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.
2. MR-J4-03A6-RJ servo amplifiers are not compatible with the STO function.

5.1.3 Test operation

Before starting actual operation, perform 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 servo motor operate normally.
With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor correctly rotates at the slowest speed. For the test operation mode, refer to section 3.1.8, 3.1.9, 3.2.8, and 3.2.9 in this manual, and section 4.5.9 and 18.5.10 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Test operation of the servo motor alone

In this step, confirm that the servo motor correctly rotates 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 put in a servo-on status, RD (Ready) is switched 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 under 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 put in a servo-on status, RD (Ready) is switched 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 machine 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

When using this servo by 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 [Pr. PA _ _] and [Pr. PT _ _] settings required for the program method.

Operation mode selection item Operation mode		Parameter setting		Input device setting	
		[Pr. PA01]	[Pr. PT04]	MD0 (Note 1)	DI0 to DI7 (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 DI7: Program No. selection 1 to Program No. selection 8
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 make a drastic adjustment or change to the parameter values as doing so will make the 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-J4-_A_" means "MR-J4-_A_(-RJ) 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 flickers.	Not improved even if CN1, CN2, and CN3 connectors are disconnected.	1. Power supply voltage fault 2. The servo amplifier is malfunctioning.	
			Improved when CN1 connector is disconnected.	Power supply of CN1 cabling is shorted.	
			Improved when CN2 connector is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is malfunctioning.	
			Improved 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 or 3.2.7) 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 Section 3.2.7
3	Perform a home position return.	Servo motor does not rotate.	Call the external I/O signal display and check the on/off status of the input signal. (Refer to section 3.1.7 or 3.2.7.)	LSP, LSN, and ST1 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
		The home position return is not completed.	Call the external I/O signal display and check the on/off status of input signal DOG. (Refer to section 3.1.7 or 3.2.7.)	The proximity dog is set incorrectly.	Section 3.1.7 Section 3.2.7

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
4	Switch on ST1 (Forward rotation start).	Servo motor does not rotate.	Call the external I/O signal display (Section 3.1.7 or 3.2.7) and check the on/off status of the input signal.	LSP, LSN, and ST1 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
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/ deceleration more than three times to complete auto tuning.	Gain adjustment fault	MR-J4-_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-J4-_A_ Chapter 6

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

5.2 Program operation method

5.2.1 Program operation method

In advance, select a program created on MR Configurator2 by using an input signal or communication to start operation with ST1 (Forward rotation start).
This servo amplifier is factory set to the absolute value command method.
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 640. Up to 256 programs can be created; however, the total number of the steps of all programs must be 640 or less.
A set program is selectable by using DI0 (Program No. selection 1) to DI7 (Program No. selection 8).

(1) Command list

<table>
<tr><th>Command</th><th>Name</th><th>Setting</th><th>Setting range</th><th>Unit</th><th>Indirect specif-ication (Note 7)</th><th>Description</th></tr>
<tr><td>SPN
(Note 2)</td><td>Servo motor speed</td><td>SPN
(Setting value)</td><td>0 to permissible instantaneous speed</td><td>r/min
or
mm/s
(Note 9)</td><td>○</td><td>Set the servo motor speed for positioning using this command.
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.</td></tr>
<tr><td>STA
(Note 2)</td><td>Acceleration time constant</td><td>STA
(Setting value)</td><td>0 to 20000</td><td>ms</td><td>○</td><td>Set the acceleration time constant. The setting value is the time from when the used servo motor stops until when its speed reaches the rated speed.
The value cannot be changed during a command output.
If the setting value is unspecified, 1000 ms is applied.</td></tr>
<tr><td>STB
(Note 2)</td><td>Deceleration time constant</td><td>STB
(Setting value)</td><td>0 to 20000</td><td>ms</td><td>○</td><td>Set the deceleration time constant. The setting value is the time from when the used servo motor rotates at the rated speed until when the motor stops.
The value cannot be changed during a command output.
If the setting value is unspecified, 1000 ms is applied.</td></tr>
<tr><td>STC
(Note 2)</td><td>Acceleration/deceleration time constant</td><td>STC
(Setting value)</td><td>0 to 20000</td><td>ms</td><td>○</td><td>Set the acceleration/deceleration time constants.
The setting value is a time period that the servo motor reaches the rated speed from a stop, and stops from the rated speed.
When this command is used, the acceleration time constant and the deceleration time constant become the same.
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.</td></tr>
<tr><td>STD
(Note 2, 5)</td><td>S-pattern acceleration/deceleration time constant</td><td>STD
(Setting value)</td><td>0 to 1000</td><td>ms</td><td>○</td><td>Set the S-pattern acceleration/deceleration time constants.
Set this command to insert S-pattern acceleration/deceleration time constants against the acceleration/deceleration time constants of the program.</td></tr>
<tr><td>MOV</td><td>Absolute value travel command</td><td>MOV
(Setting value)</td><td>-999999
to 999999
(Note 6)</td><td>$\times 10^{STM}$ μm
(Note 6)</td><td>○</td><td>The servo motor rotates using the set value as the absolute value.</td></tr>
<tr><td>MOVA</td><td>Absolute value continuous travel command</td><td>MOV
(Setting value)</td><td>-999999
to 999999
(Note 6)</td><td>$\times 10^{STM}$ μm
(Note 6)</td><td>○</td><td>The servo motor rotates continuously using the set value as the absolute value. Make sure to describe this command after the "MOV" command.</td></tr>
<tr><td>MOVI</td><td>Incremental value travel command</td><td>MOVI
(Setting value)</td><td>-999999
to 999999
(Note 6)</td><td>$\times 10^{STM}$ 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 the address decreasing direction.</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>$\times 10^{STM}$ 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>External signal on wait</td><td>SYNC
(Setting value)</td><td>1 to 3</td><td></td><td></td><td>The following steps stop after SOUT (SYNC synchronous output) is output 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>
</table>

<table>
<tr><th>Command</th><th>Name</th><th>Setting</th><th>Setting range</th><th>Unit</th><th>Indirect specif- ication (Note 7)</th><th>Description</th></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 by using [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>OUTOF
(Note 1)</td><td>External signal off output</td><td>OUTOF
(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 by 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>
<tr><td>FOR
NEXT</td><td>Step repeat command</td><td>FOR
(Setting value)
NEXT</td><td>0, 1 to 10000</td><td>times</td><td></td><td>The servo motor repeats the operation of the steps, which are set between a "FOR (Setting value) command and a "NEXT" command, the set number of times.
Setting "0" repeats the steps endlessly.
Do not describe a "FOR" command between the "FOR" and "NEXT" commands. Otherwise, an error occurs.</td></tr>
<tr><td>LPOS
(Note 1)</td><td>Current position latch</td><td>LPOS</td><td></td><td></td><td></td><td>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.</td></tr>
<tr><td>TIM</td><td>Dwell</td><td>TIM
(Setting value)</td><td>1 to 20000</td><td>ms</td><td>○</td><td>Wait for the next step until the set time elapses.</td></tr>
<tr><td>ZRT</td><td>Home position return</td><td>ZRT</td><td></td><td></td><td></td><td>Perform a home position return.</td></tr>
<tr><td>TIMES</td><td>Number of program executions command</td><td>TIMES
(Setting value)</td><td>0, 1 to 10000</td><td>times</td><td>○</td><td>Position a "TIMES (Setting value)" command at the start of the program, and set the number of program executions. To execute the program only one time, no setting is required. Setting "0" repeats the program endlessly.</td></tr>
<tr><td>STOP</td><td>Program stop</td><td>STOP</td><td></td><td></td><td></td><td>Stop the running program.
Make sure to describe this command in the final row.</td></tr>
</table>

Command	Name	Setting	Setting range	Unit	Indirect specif-ication (Note 7)	Description
TLP (Note 8)	Forward rotation torque limit	TLP (Setting value)	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 valid 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 valid 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 valid 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 valid even during a command output.
2. The "SPN" command is valid while the "MOV", "MOVA", "MOVI", or "MOVIA" command is executed. The "STA", "STB", "STC", and "STD" commands are valid while the "MOV" or "MOVI" command is executed.
3. When the on time is set using [Pr. PT23] to [Pr. PT25], the next command is executed after the set time elapses.
4. When the remaining distance is the set value or less, or while the servo motor stops or decelerates, the program skips the "ITP" command and proceeds to the next step.
5. The parameter value is valid normally. However, the value set for the command is valid 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 for 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 valid normally. However, the value set for the command is valid after the command is executed until the program stops.
9. The unit will be "mm/s" in the linear control mode.

(2) Detailed explanations of commands

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

POINT

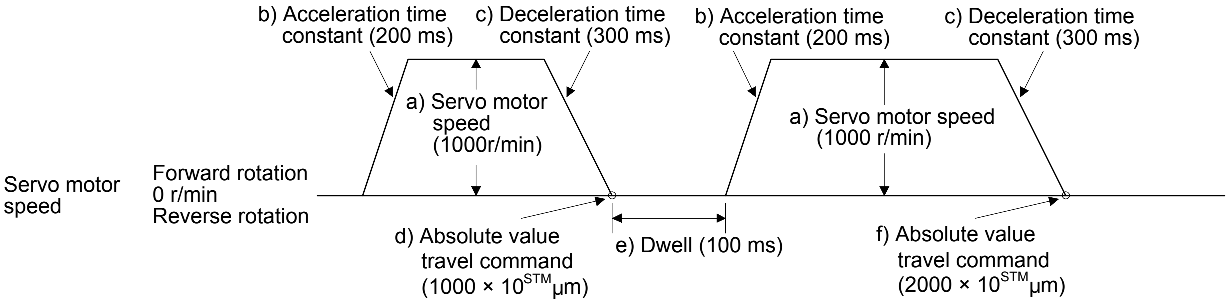
- Once values are set for the "SPN", "STA", "STB" and "STC" commands, the values are valid without resetting them. (The values are not initialized at the program startup.) The settings are valid in the other programs.
- The value set for the "STD" command is valid in the same program only. The value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

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

1) Program example 1

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

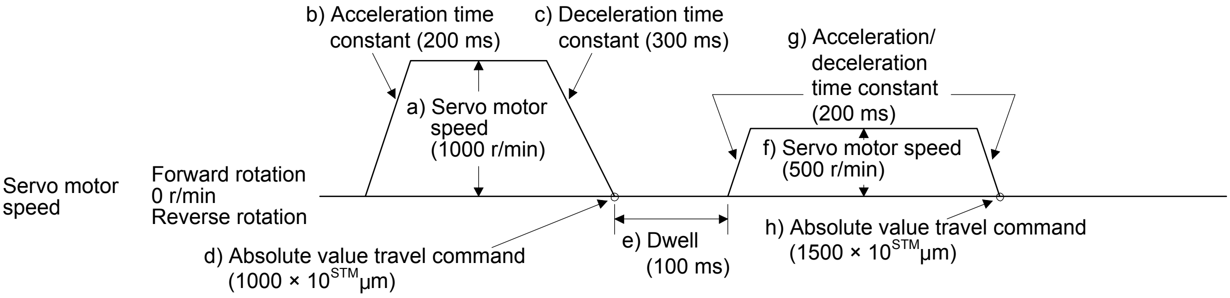
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	d)
TIM (100)	Dwell	100 [ms]	e)
MOV (2000)	Absolute value travel command	2000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



2) Program example 2

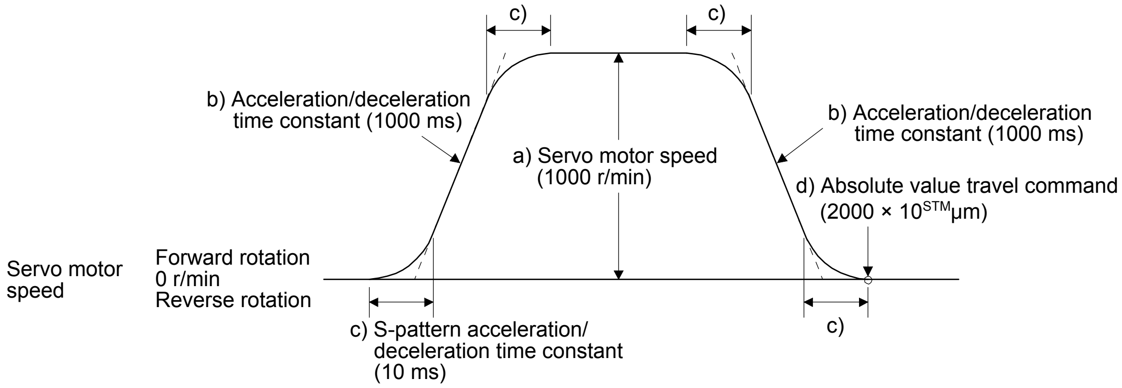
When executing two operations where the servo motor speeds, acceleration time constants, deceleration time constants, and travel commands are different

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 [×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 [×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

- You cannot use a combination of "MOV" and "MOVIA" commands and a combination of "MOVI" and "MOVA" commands.

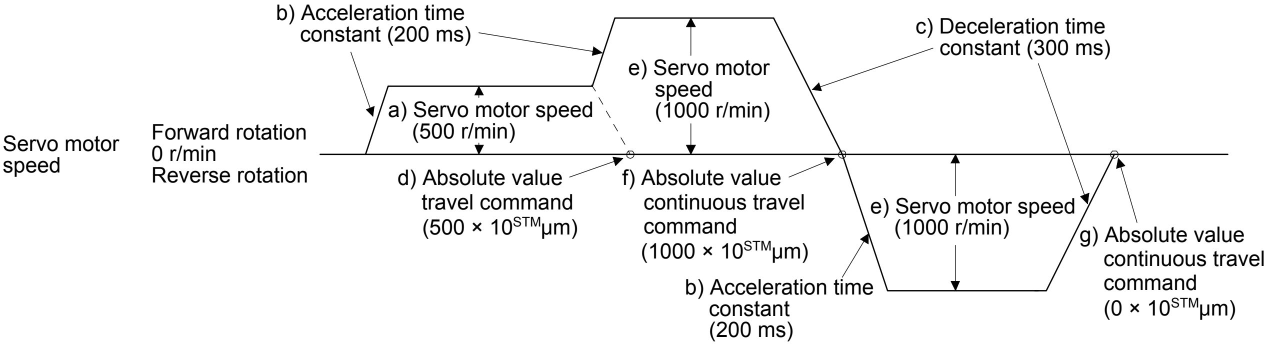
The "MOVA" command is a continuous travel command against the "MOV" command. Upon executing the travel command by the "MOV" command, the travel command by the "MOVA" command is executed continuously without a stop.
The varying speed point under the "MOVA" command is at the deceleration start position of the operation by the preceding "MOV" or "MOVA" command.
The acceleration/deceleration time constants of the "MOVA" command are set to the values at the execution of the preceding "MOV" command.
The "MOVIA" command is a continuous travel command against the "MOVI" command. Upon executing the travel command by the "MOVI" command, the travel command by the "MOVIA" command is executed continuously without a stop.
The varying speed point under the "MOVIA" command is at the deceleration start position of the operation by the preceding "MOVI" or "MOVIA" command.
The acceleration/deceleration time constants of the "MOVIA" command are set to the values at the execution of the preceding "MOVI" 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

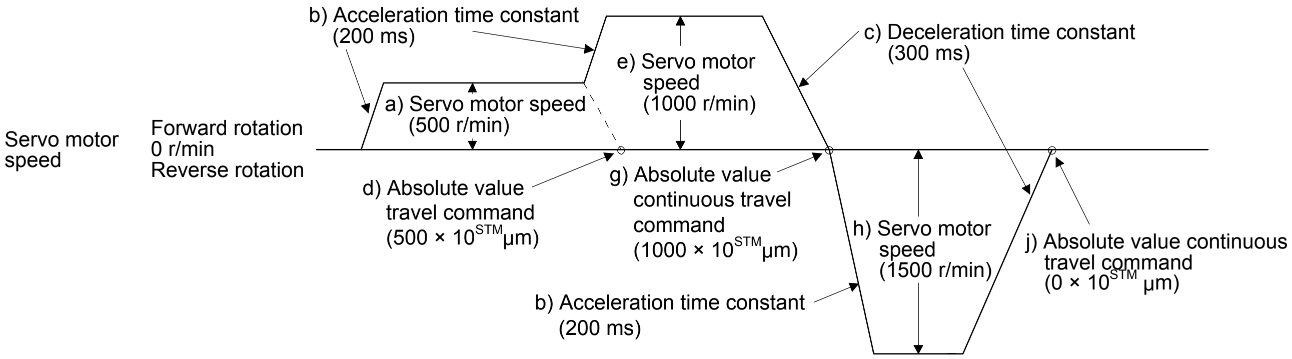
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOV (500)	Absolute value travel command	500 [×10^{STM} µm]	d)
SPN (1000)	Servo motor speed	1000 [r/min]	e)
MOVA (1000)	Absolute value continuous 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 at each change of the servo motor speed. Therefore, even if you insert an "STA", "STB", or "STD" command at a speed change, the command is 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)	Disabled
STC (100)	Acceleration/deceleration time constant	100 [ms]	i)	
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)

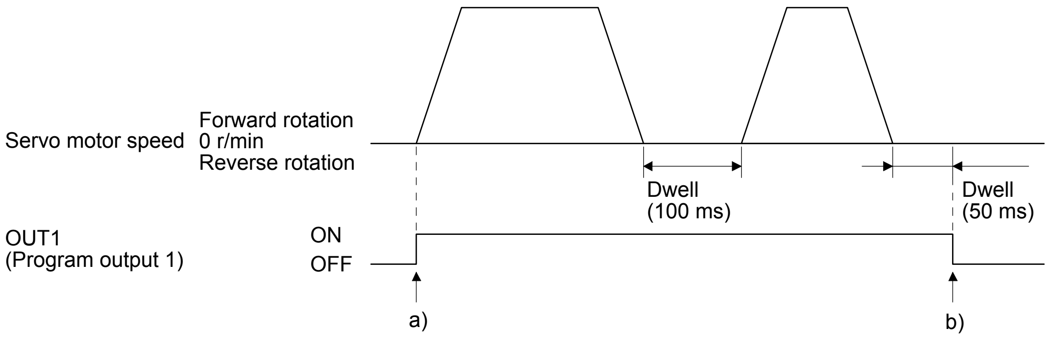
POINT

- 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.
  - Determine whether the servo motor has passed the set address or travel distance by checking the actual position (for each command). Additionally, determine whether the servo motor has passed the set address or travel distance 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 [×10^{STM} μm]	
OUTON (1)	Switch on OUT1 (Program output 1).		a)
TIM (100)	Dwell	100 [ms]	
MOV (250)	Absolute value travel command	250 [×10^{STM} μm]	
TIM (50)	Dwell	50 [ms]	
STOP	Program stop		b)

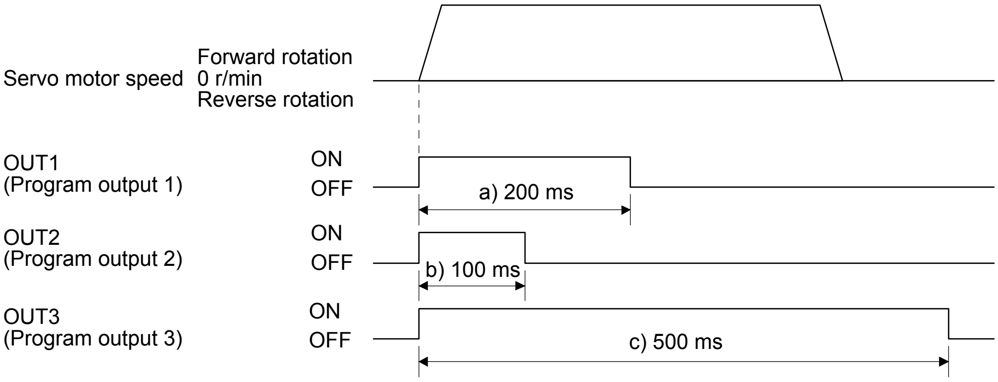


2) Program example 2

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)

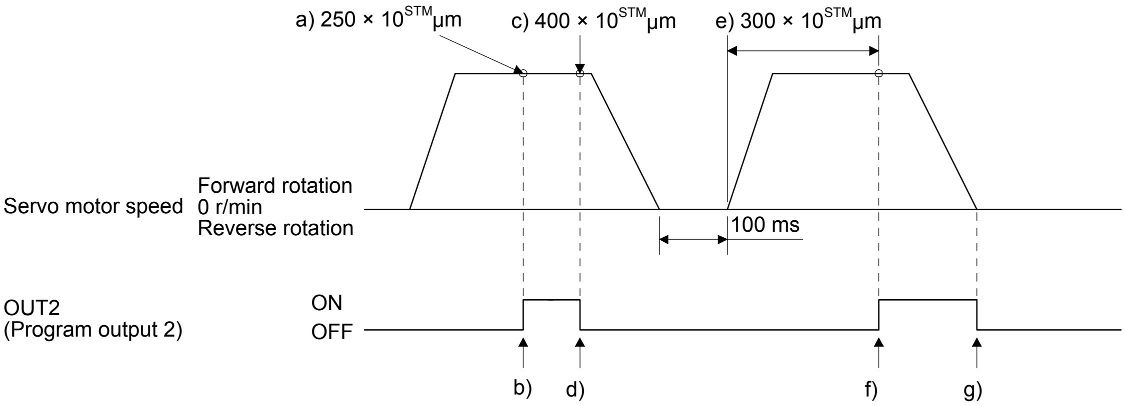
Command	Description	
SPN (500)	Servo motor speed	500 [r/min]
STA (200)	Acceleration time constant	200 [ms]
STB (300)	Deceleration time constant	300 [ms]
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]
OUTON (1)	Switch on OUT1 (Program output 1).	
OUTON (2)	Switch on OUT2 (Program output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



3) Program example 3

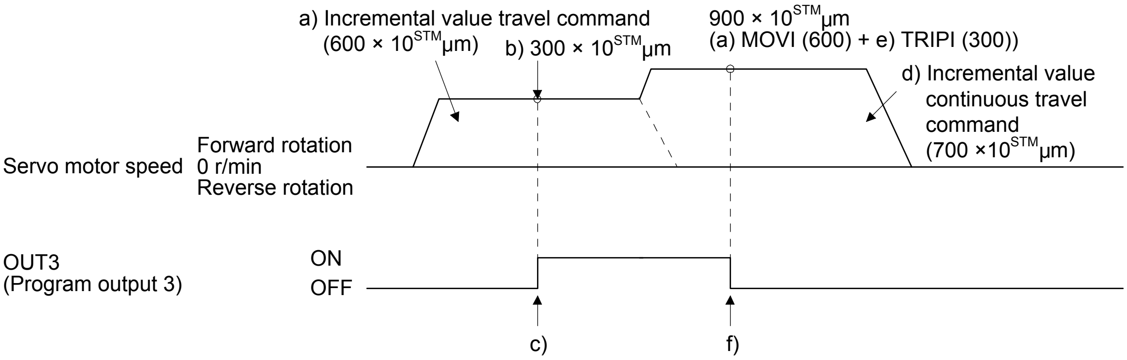
When setting the position address where the "OUTON" or "OUTOF" command is executed by using the "TRIP" or "TRIPI" command

Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (500)	Absolute value travel command	500 [×10^{STM} μm]	
TRIP (250)	Absolute value trip point specification	250 [×10^{STM} μm]	a)
OUTON (2)	Switch on OUT2 (Program output 2).		b)
TRIP (400)	Absolute value trip point specification	400 [×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 [×10^{STM} μm]	
TRIPI (300)	Incremental value trip point specification	300 [×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		



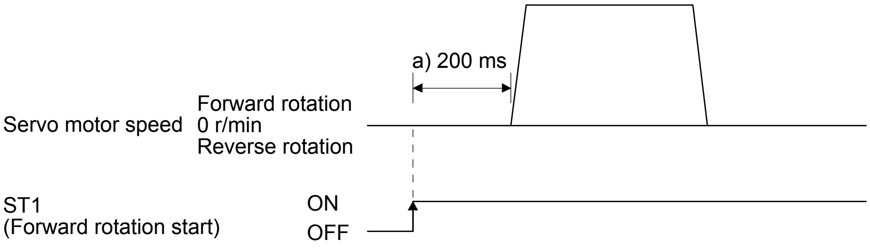
(d) Dwell (TIM)

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.

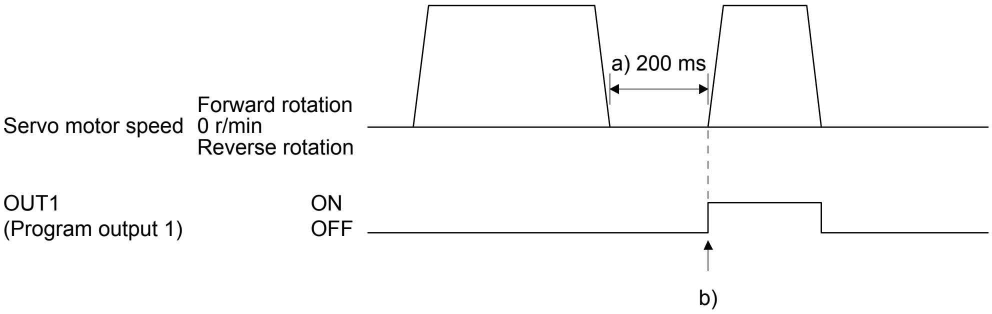
1) Program example 1

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		



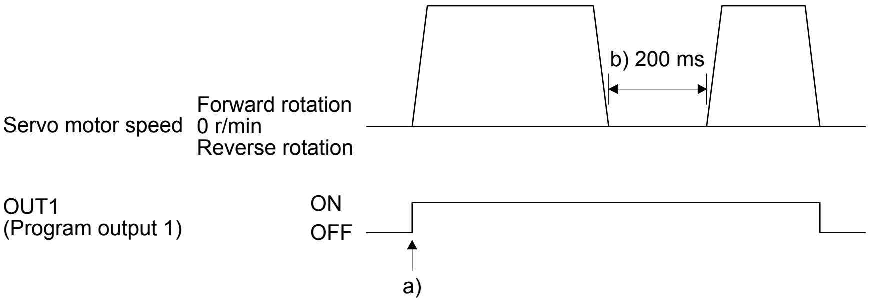
2) Program example 2

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 [$\times 10^{STM}$ μm]	
TIM (200)	Dwell	200 [ms]	a)
OUTON (1)	Switch on OUT1 (Program output 1).		b)
MOVI (500)	Incremental value travel command	500 [$\times 10^{STM}$ μm]	
STOP	Program stop		



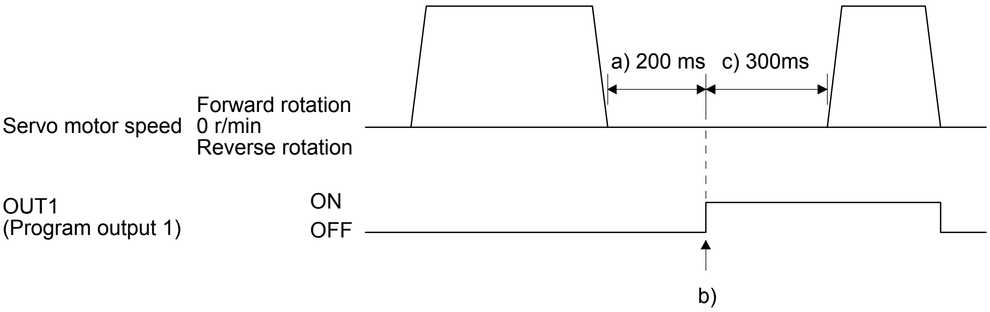
3) Program example 3

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 [$\times 10^{STM}$ μm]	
OUTON (1)	Switch on OUT1 (Program output 1).		a)
TIM (200)	Dwell	200 [ms]	b)
MOVI (500)	Incremental value travel command	500 [$\times 10^{STM}$ μm]	
STOP	Program stop		



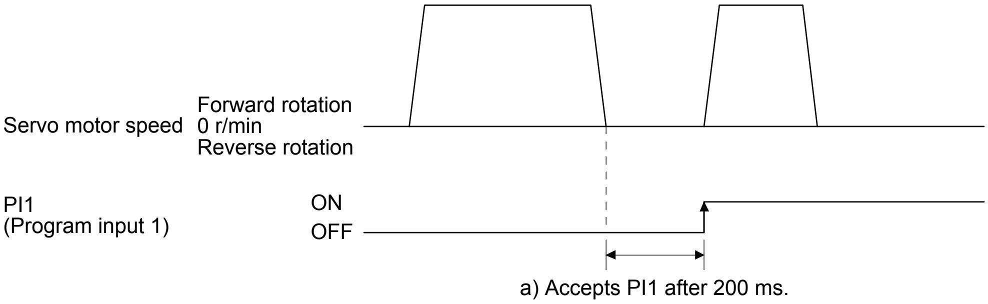
4) Program example 4

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 [×10^{STM} 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 [×10^{STM} μm]	
STOP	Program stop		



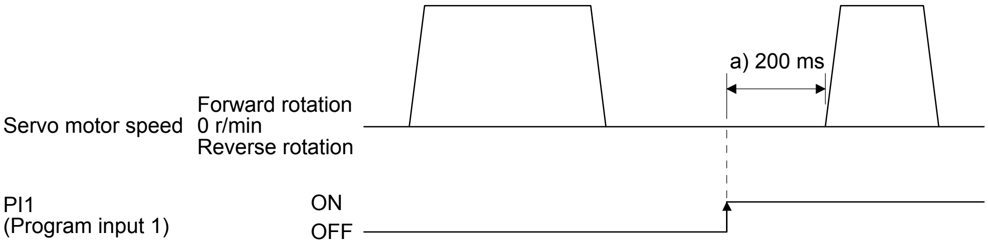
5) Program example 5

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 [×10^{STM} μm]	
TIM (200)	Dwell	200 [ms]	a)
SYNC (1)	Suspend the step until PI1 (Program input) is switched on.		
MOVI (500)	Incremental value travel command	500 [×10^{STM} 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) 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

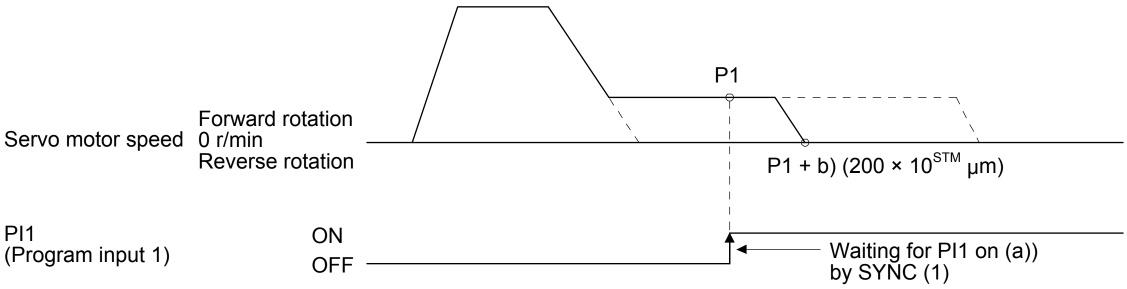
- For positioning with the "ITP" command, the stop position varies depending on the servo motor speed when the "ITP" command becomes enabled.
- In the following cases, the program does not execute the "ITP" command and proceeds to the next step.
  - When the setting value of the "ITP" command is smaller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

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 a distance of the set value and stops.

When using the "ITP" command, make sure to position the command preceding a "SYNC" command.

1) Program example 1

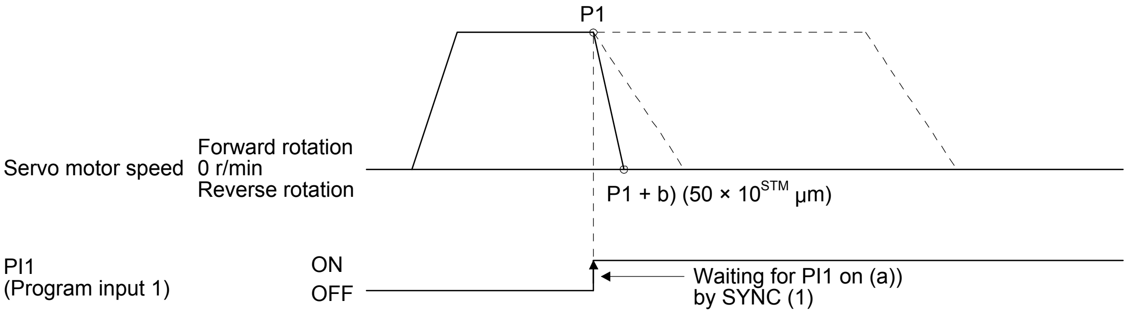
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (600)	Absolute value travel command	600 [×10^{STM} μm]	
SPN (100)	Servo motor speed	100 [r/min]	
MOVA (600)	Continuous travel command	600 [×10^{STM}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

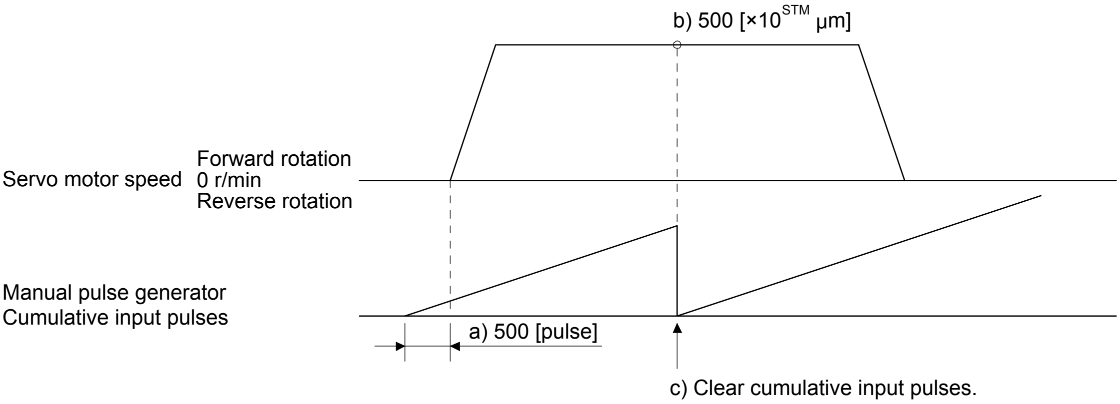
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
SYNC (1)	Suspend the step until PI1 (Program input) is switched on.		a)
ITP (50)	Interrupt positioning	50 [×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 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 [×10^{STM} μm]	
TRIP (500)	Trip point specification	500 [×10^{STM} μm]	b)
COUNT (0)	Clear cumulative input pulses.		c)
STOP	Program stop		



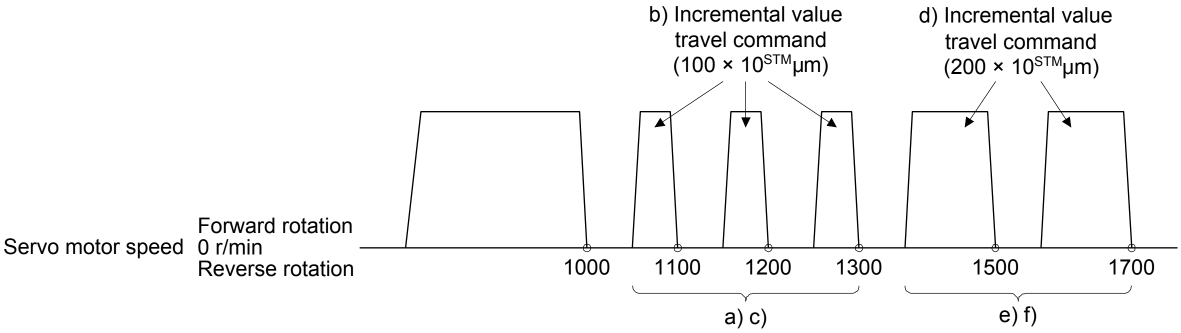
(g) Step repeat command (FOR...NEXT)

POINT

- You cannot insert "FOR...NEXT" commands between a "FOR" command and a "NEXT" command.

The servo motor repeats the operation of the steps, which are set between a "FOR (Setting value) command and a "NEXT" command, the number of set times. Setting "0" repeats the steps endlessly. For how to stop the program, which the steps have been repeated endlessly in, refer to section 5.2.4 (4).

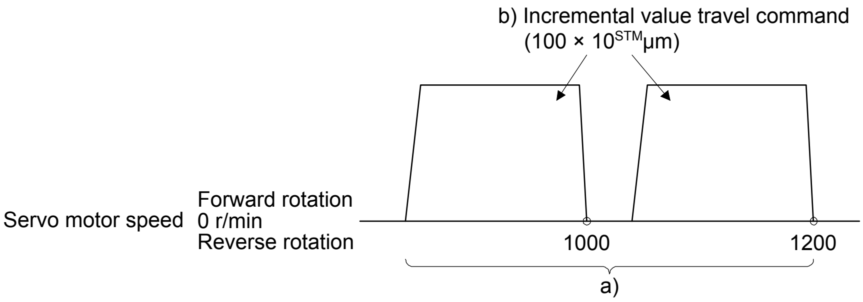
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	
STC (20)	Acceleration/deceleration time constant	20 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
TIM (100)	Dwell	100 [ms]	
FOR (3)	Start of step repeat command	3 [time]	a)
MOVI (100)	Incremental value travel command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



(h) Number of program executions command (TIMES)

By setting the number of program executions for the "TIMES (Setting value)" command, which is positioned at the start of the program, you can repeat the execution of the program. To execute the program one time, the "TIMES" command is not required. Setting "0" repeats the program endlessly. For how to stop the program, which has been repeated endlessly, 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		



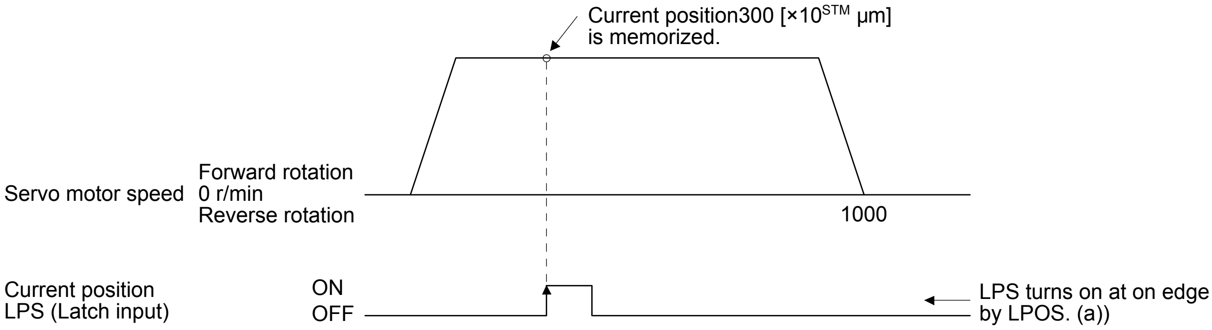
(i) Current position latch (LPOS)

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 proceeds to the next step until LPS (Current position latch input) is switched on.
- The stored data is not cleared without power-off of the servo amplifier.
- After the input of LPS (Current position latch input) becomes valid 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 stops
  - When an alarm occurs
  - When the servo motor enters the servo-off status

The current position at 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, is reset when the program ends. The function is also reset at an operation mode change, forced stop, alarm occurrence, or servo-off. The function is not reset at a temporary stop only.

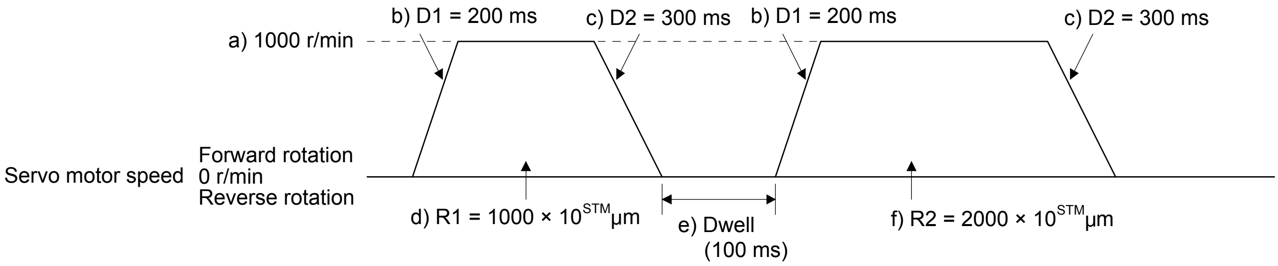
Command	Description		
SPN (500)	Servo motor speed	500 [r/min]	
STA (200)	Acceleration time constant	200 [ms]	
STB (300)	Deceleration time constant	300 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
LPOS	Set a current position latch.		a)
STOP	Program stop		



(j) Indirect specification with general purpose registers (R1 to R4, D1 to 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 to R4, D1 to D4), is used as the setting value of each command.
While the program is not executed by a communication command, you can change the general purpose registers by using MR Configurator2 or a communication command.
The data of the general purpose registers is erased at power-off of the servo amplifier. Note that you can store the data of the general purpose registers (R1 to R4) 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)

Perform a home position return.

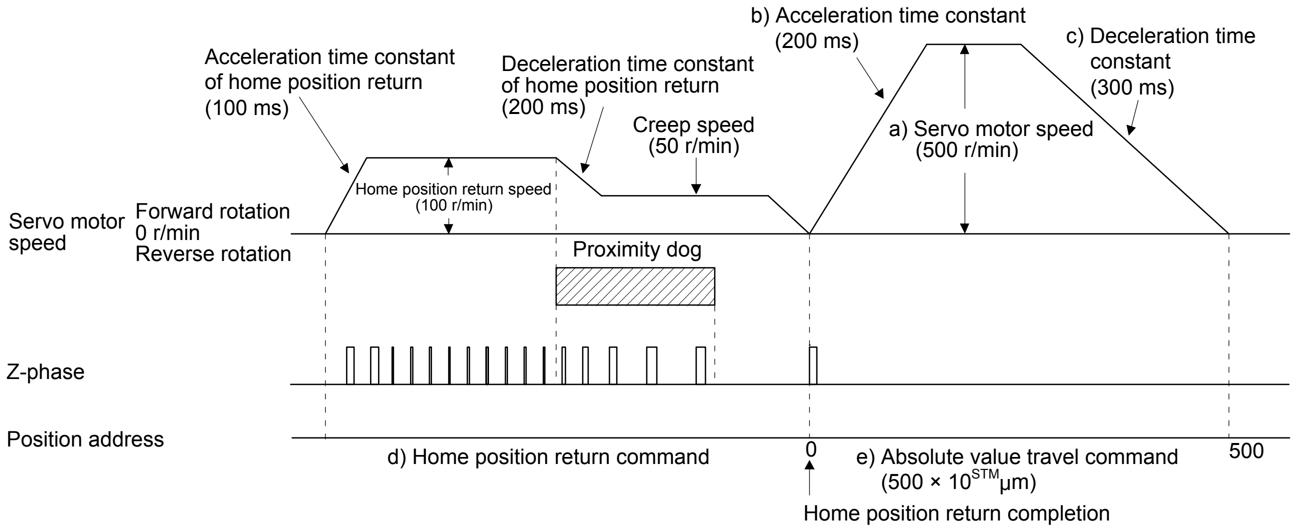
Set the home position with a parameter. (Refer to section 5.4.)

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 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)
ZRT	Home position return		d)
MOV (500)	Absolute value travel command	500 [$\times 10^{STM}$ μm]	e)
STOP	Program stop		

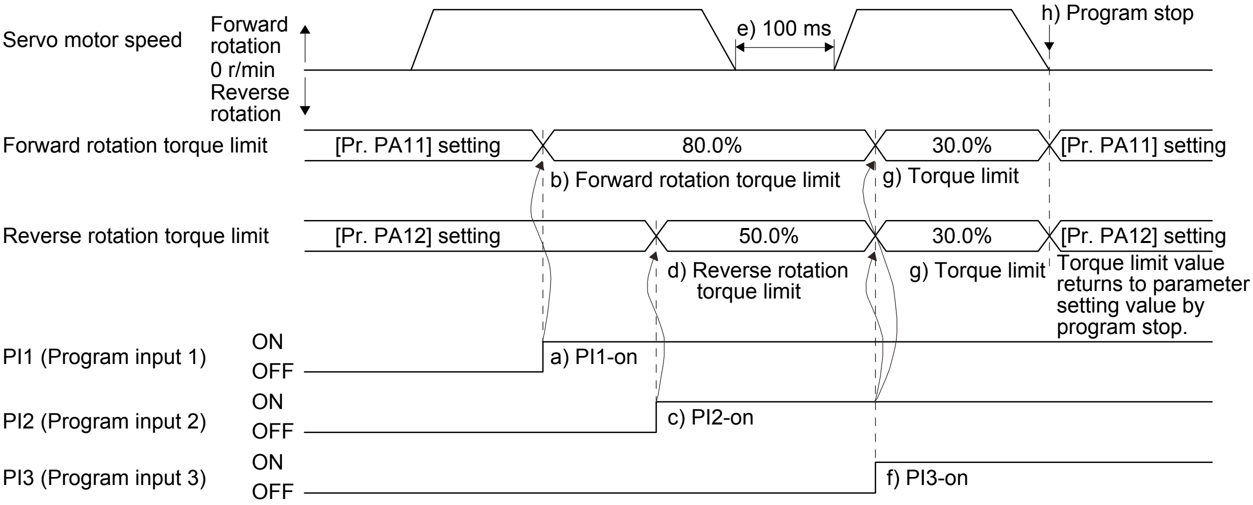
Item	Used parameter	Setting
Dog type home position return	[Pr. PT04]	"_ _ _ 0"
Home position return direction	[Pr. PT04]	"_ _ 0 _" (Address increasing direction)
Dog input polarity	[Pr. PT29]	"_ _ _ 1" (Detects dog when DOG (proximity dog) is on.)
Home position return speed	[Pr. PT05]	100 [r/min]
Creep speed	[Pr. PT06]	50 [r/min]
Home position shift distance	[Pr. PT07]	0 [$\times 10^{STM}$μm]
Home position return acceleration time constant	[Pr. PC30]	100 [ms]
Home position return deceleration time constant	[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	200 [ms]	
MOV (1000)	Absolute value travel command	1000 [×10^{STM} μm]	
SYNC (1)	Suspend the step until PI1 (Program input) is switched on.		a)
TLP (800)	Forward rotation torque limit	800 [0.1%]	b)
SYNC (2)	Suspend the step until PI2 (Program input) 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 [×10^{STM} μm]	
SYNC (3)	Suspend the step until PI3 (Program input) 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

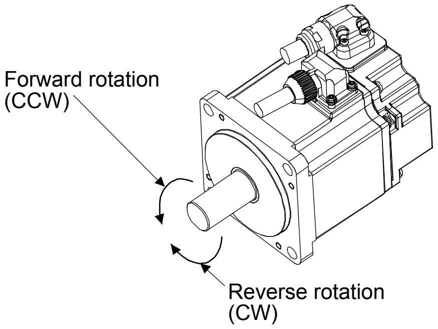
The following shows the setting of [Pr. PA01].

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 [$\times 10^{STM}$ μm]
			_ 1 _ _	[inch]	-999999 to 999999 [$\times 10^{(STM-4)}$ inch]
			_ 2 _ _	[degree]	-360.000 to 360.000
			_ 3 _ _	[pulse]	-999999 to 999999
	Incremental value travel command ("MOVI", "MOVIA")		_ 0 _ _	[mm]	-999999 to 999999 [$\times 10^{STM}$ μm]
			_ 1 _ _	[inch]	-999999 to 999999 [$\times 10^{(STM-4)}$ 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 [$\times 10^{STM}$ μm]
			_ 1 _ _	[inch]	-999999 to 999999 [$\times 10^{(STM-4)}$ inch]
			_ 2 _ _	[degree]	-999.999 to 999.999
			_ 3 _ _	[pulse]	-999999 to 999999

(b) 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
Select a program with DI0 to DI7 and switch on ST1 to perform the positioning operation according to the set program. At this time, ST2 (Reverse rotation start) is invalid.

Item	Used device	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) DI4 (Program No. selection 5) DI5 (Program No. selection 6) DI6 (Program No. selection 7) DI7 (Program No. selection 8)	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

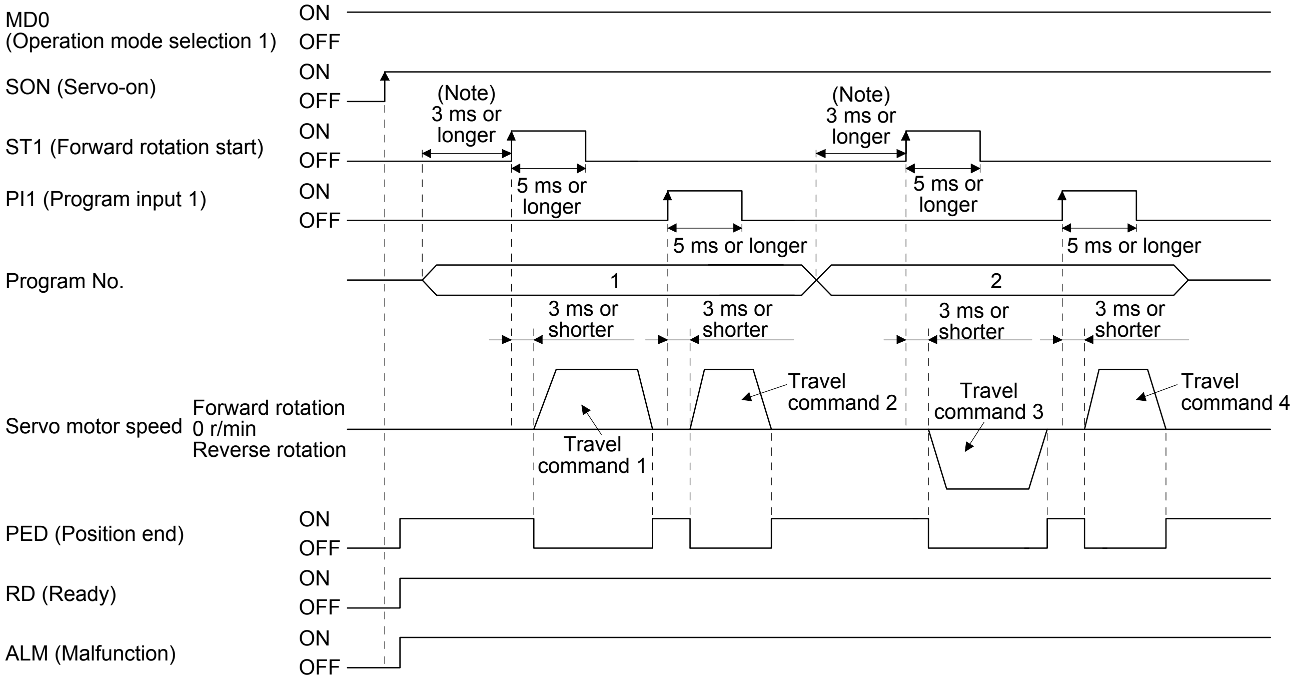
(1) Operation condition

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 [$\times 10^{STM}$ μm]	Travel command 1
SYNC (1)	Suspend the step until PI1 (Program input) is switched on.		
STC (50)	Acceleration/deceleration time constant	50 [ms]	
MOV (7500)	Absolute value travel command	7500 [$\times 10^{STM}$ 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 [$\times 10^{STM}$ μm]	Travel command 3
SYNC (1)	Suspend the step until PI1 (Program input) is switched on.		
STC (50)	Acceleration/deceleration time constant	50 [ms]	
MOV (5000)	Absolute value travel command	5000 [$\times 10^{STM}$ μm]	Travel command 4
STOP	Program stop		

(2) Timing chart



Note. 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 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. Then, switching off and then on TSTP (On-edge detection) restarts the operation for the remaining distance. This function will not operate even if ST1 (Forward rotation start) is switched on during the temporary stop. When the operation mode is changed from the automatic mode to the manual mode during the temporary stop, the remaining travel distance is cleared and the program ends. 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 4.2.2 (3) (e).

(4) How to stop the program

To stop the executing program, switch on TSTP (Temporary stop/restart) to stop the positioning operation, and then switch on CR (Clear). At this time, the remaining distance under the command is cleared, and the program ends.

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 executing program.

Termination condition	Restart condition
Execution of STOP (Program stop)	Switch on ST1 (Forward rotation start). The program starts from the beginning.
When switching the automatic operation mode to the manual operation mode	After switching the mode 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 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

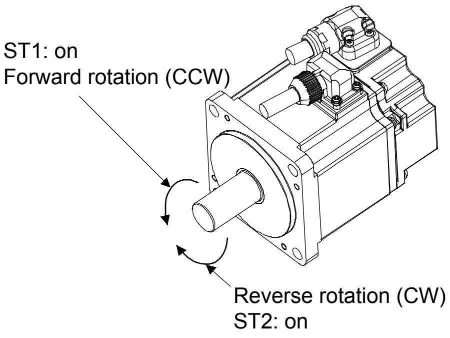
(1) Setting

According to the purpose of use, set input signals and parameters as shown below. In this case, DI0 (Program No. selection 1) to DI7 (Program No. selection 8) are invalid.

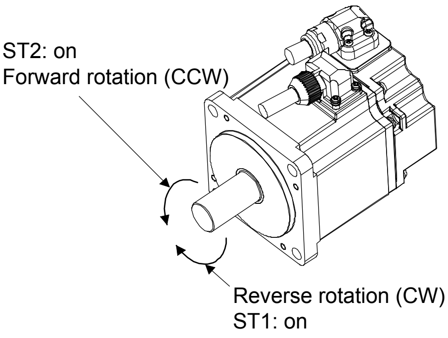
Item	Used device/parameter	Setting
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) of this section.
JOG speed	[Pr. PT13]	Set the servo motor speed.
Acceleration time constant	[Pr. PC01]	Set the acceleration time constant.
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

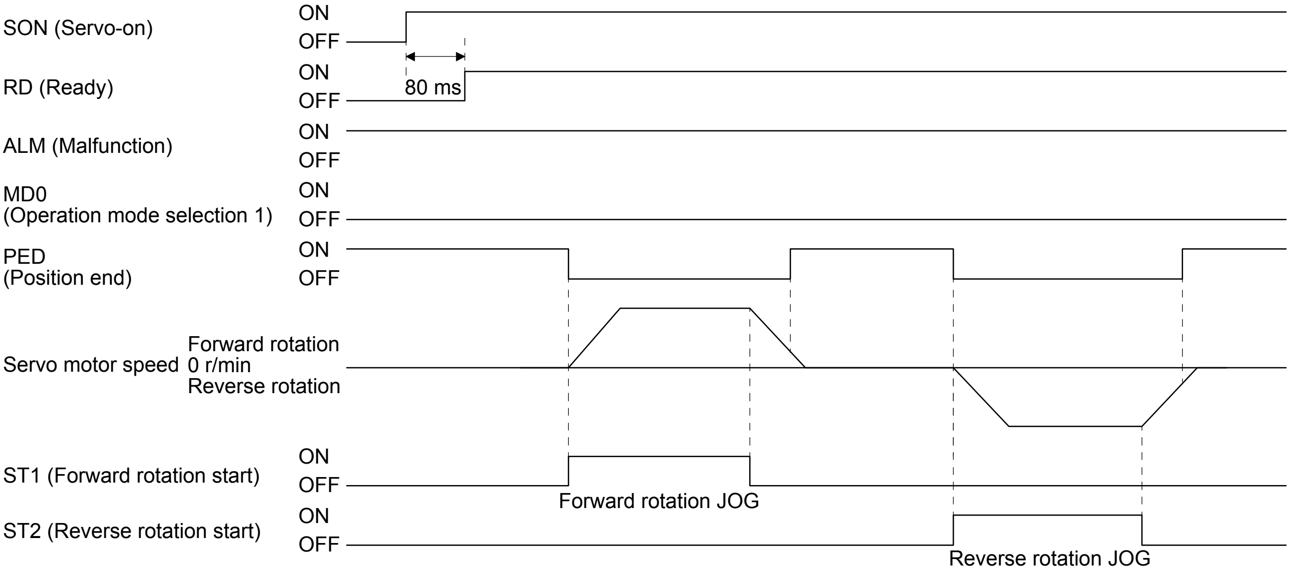


[Pr. PA14] = 1

(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) of 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

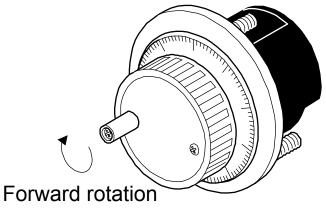
- ●To enhance noise immunity, set "_ 2_ _" to [Pr. PA13] when the command pulse frequency is 500 kpulse/s or less, or set "_ 3 _ _" to [Pr. PA13] when the command pulse frequency is 200 kpulse/s or less.

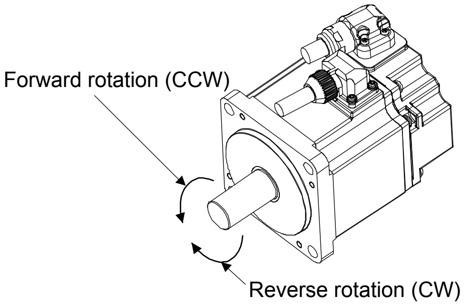
According to the purpose of use, set input signals and parameters as shown below. In this case, DI0 (Program No. selection 1) to DI7 (Program No. selection 8) are invalid.

Item	Setting method	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) of this section.
Servo motor rotation direction	[Pr. PA14]	Refer to (2) of 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 to manual pulse generator rotation amount	Travel distance			
			[mm]	[inch]	[degree]	[pulse]
0	0	[Pr. PT03] setting valid				
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) Setting with a parameter

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) of this section.

5.4 Home position return mode

⚠CAUTION ●Check the input polarity of the proximity dog. Otherwise, it may cause an overrun and malfunction.

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.
- ●In the following cases, make sure that the Z-phase has been passed through once before performing a home position return.
  - ･When an incremental linear encoder is used in the linear servo motor control mode
  - ･When an incremental external encoder is used in the fully closed loop control mode
  - ･When a servo amplifier is used in the DD motor control mode

  Z-phase unpassed will trigger [AL. 90.5 Home position return incomplete warning].
- ●For servo amplifiers with software version B6 or earlier, the dog type last Z-phase reference home return and dogless Z-phase reference home position return cannot be used in the following operation modes.
  - ･Fully closed loop control mode using an incremental linear encoder
  - ･Linear servo motor control mode using an incremental linear encoder
  - ･Direct drive motor control mode

  Setting [Pr. PT04 Home position return type] to "_ _ _ 8" or "_ _ _ A" will trigger [AL. 37 Parameter error].

5.4.1 Summary of home position return

A home position return is performed to match the command coordinates with the machine coordinates.
Under the incremental method, each power-on of the input power supply requires the home position return.
In the absolute position detection system, once you have performed the home position return at machine installation, the current position will be retained even if the power supply is shut off. Therefore, the home position return is unnecessary when the power supply is switched on again.
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. Manually moving the machine by the JOG operation or others is unnecessary.

(1) Home position return type

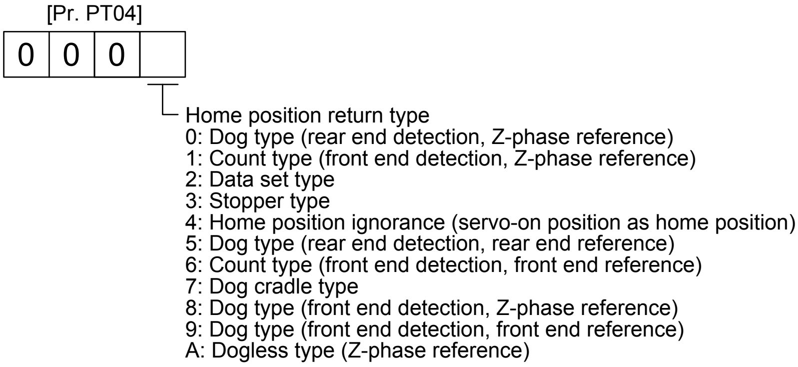
Select the optimum home position return type according to the machine type or others.

Type	Home position return method	Feature
Dog type	Deceleration starts at the front end of a 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.	・General home position return method using a proximity dog ・The repeatability of the home position return is high. ・The machine is less loaded. ・Used 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 at the front end of a proximity dog. After the rear end is passed, the position is shifted by the travel distance. Then, the position specified by the first Z-phase signal or the position of the Z-phase signal shifted by the specified home position shift distance is used as the home position.	・Home position return method using a proximity dog ・Used 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 used 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 at 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 used as the home position.	・The Z-phase signal is not required.
Count type front end reference	Deceleration starts at 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 used as the home position.	・The Z-phase signal is not required.
Dog cradle type	After the front end of a 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 a 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 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 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.	

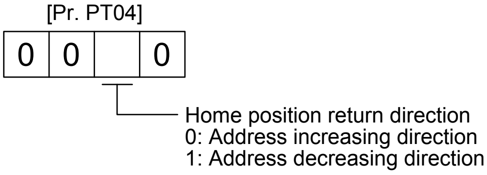
(2) Parameters for home position return

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

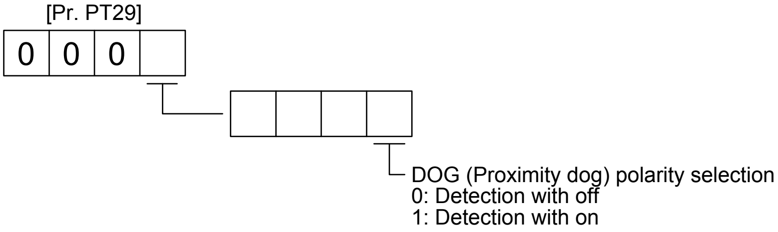
(a) Select the home position return type with [Pr. PT04 Home position return type].



(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 the address increase direction from the current position. Setting "1" starts the home position return in the address decrease direction 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 the dog when DOG (Proximity dog) is off. Setting "1" detects the dog when DOG (Proximity dog) is on.



(3) Program

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 shown below.

Item	Used device/parameter	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 the dog type (rear end detection/Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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 first Z-phase signal after the rear end of a proximity dog is passed.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI0 (Program No. selection 1) to DI7 (Program No. selection 8)	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).

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

L_1: Length of the proximity dog [mm]

V: Home position return speed [mm/min]

td: Deceleration time [s]

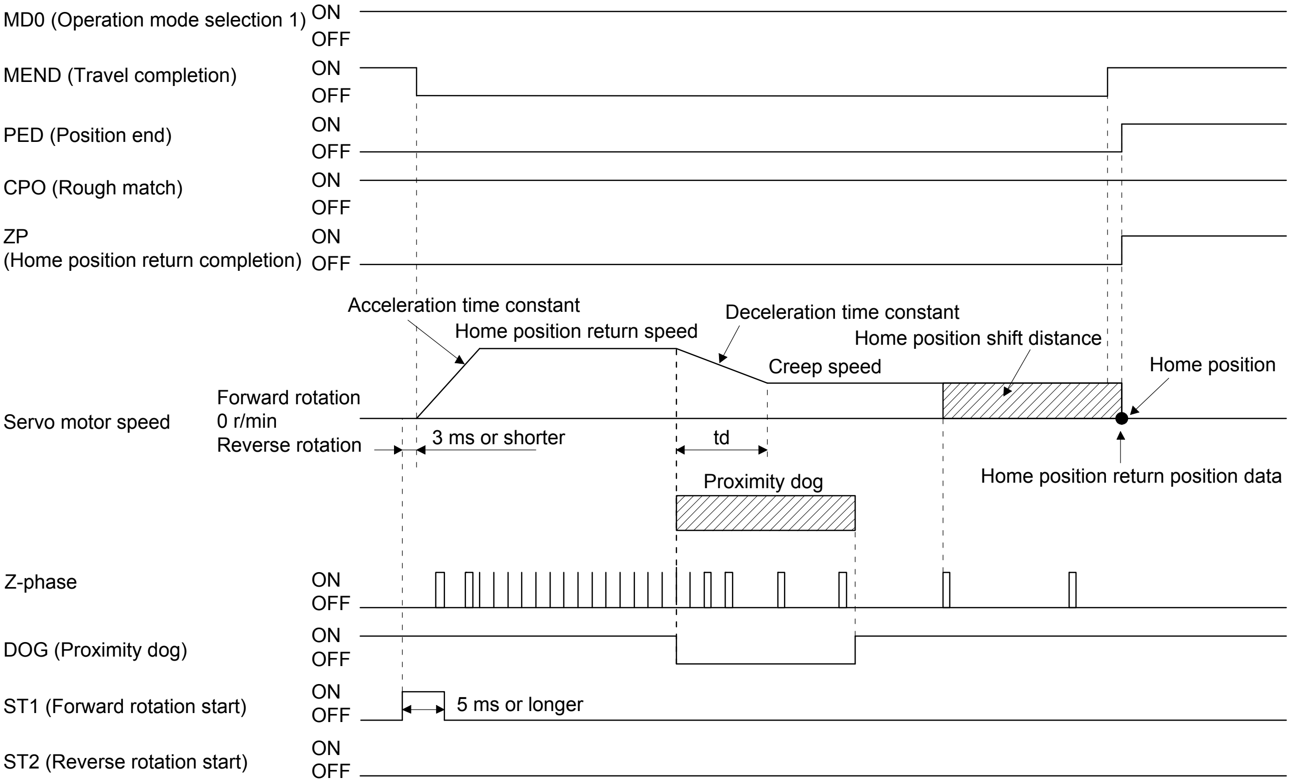
$$L_2 \geq 2 \cdot \triangle S \cdots\cdots (5.2)$$

L_2: Length of the proximity dog [mm]

$\triangle S$: 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.

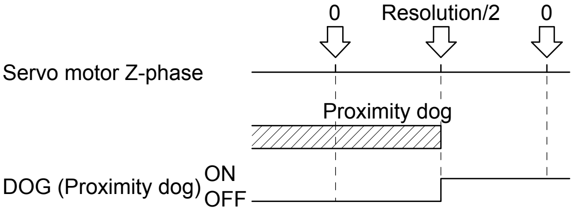


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

(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 position specified by a Z-phase signal and the position specified by 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 a proximity dog is detected, the position is shifted by the distance set for [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.

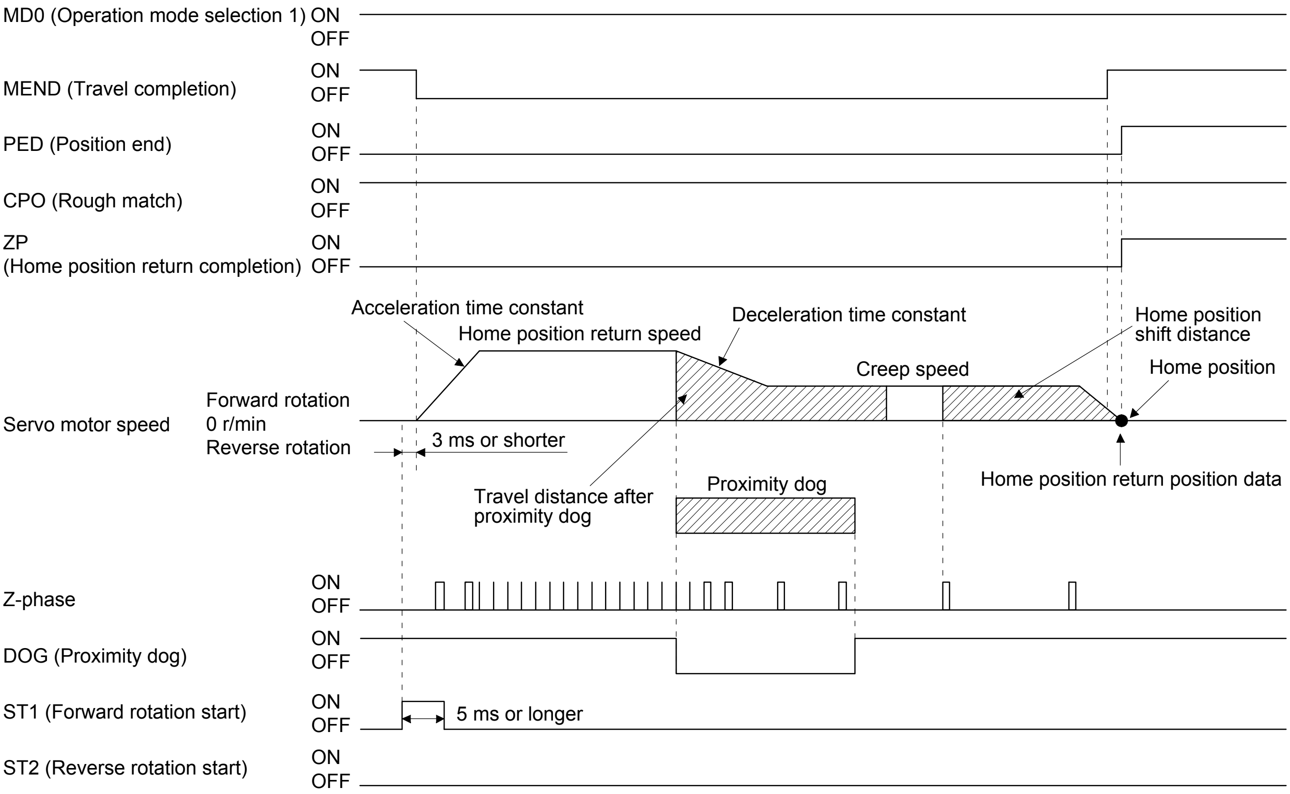
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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

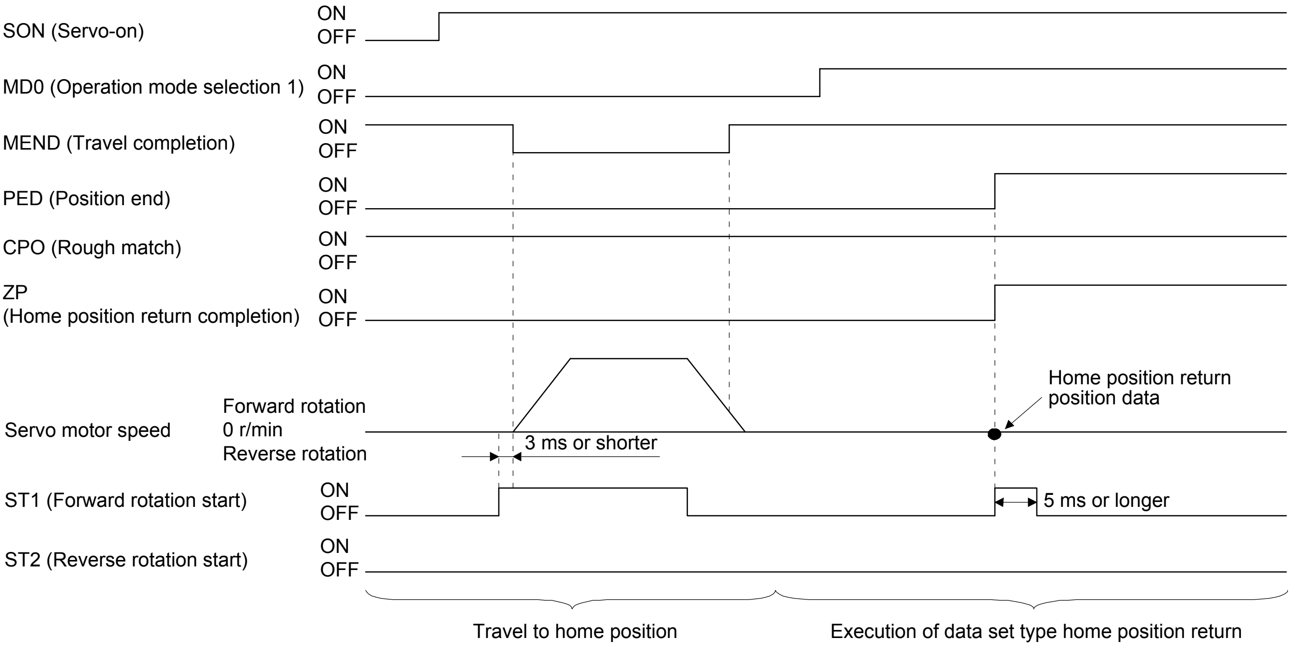
To specify any position as the home position, use the data set type home position return. To shift the position, you can use the JOG operation, the manual pulse generator operation, or others. The data set type home position return is available at servo-on only.

(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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, by using the JOG operation, manual pulse generator operation, or others, a workpiece is pressed against a mechanical stopper, and the position where it is stopped is used as the home position.

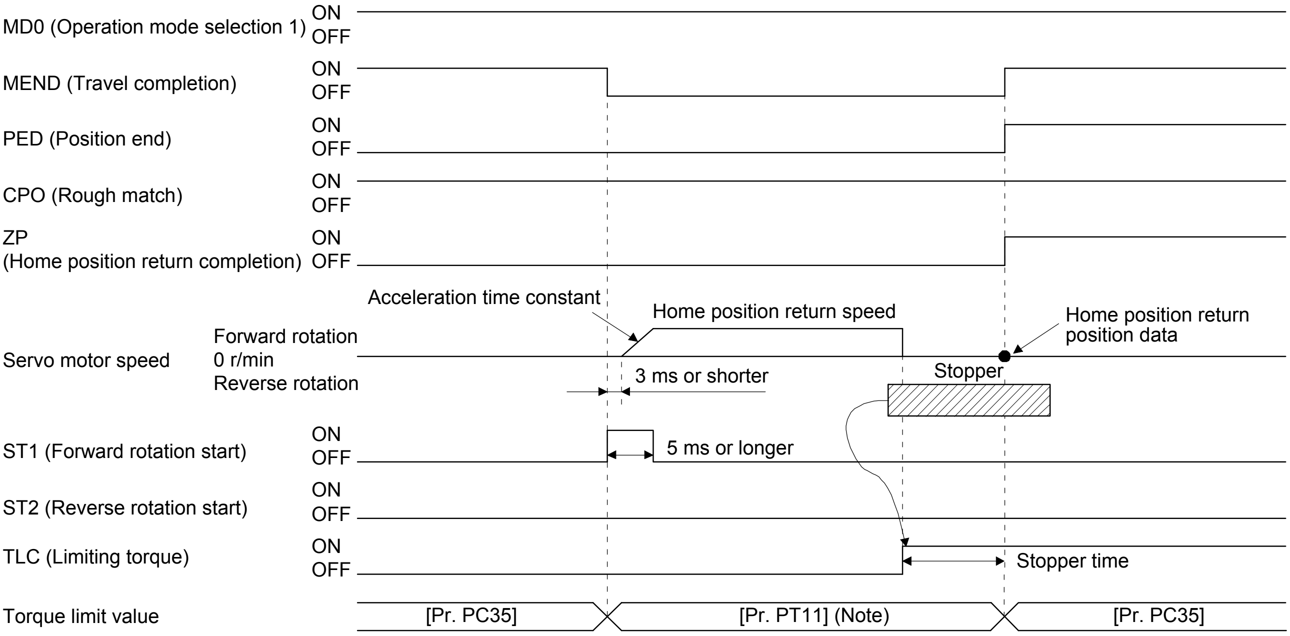
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (2) of section 5.4.1 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 at the execution of the stopper type home position return.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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.

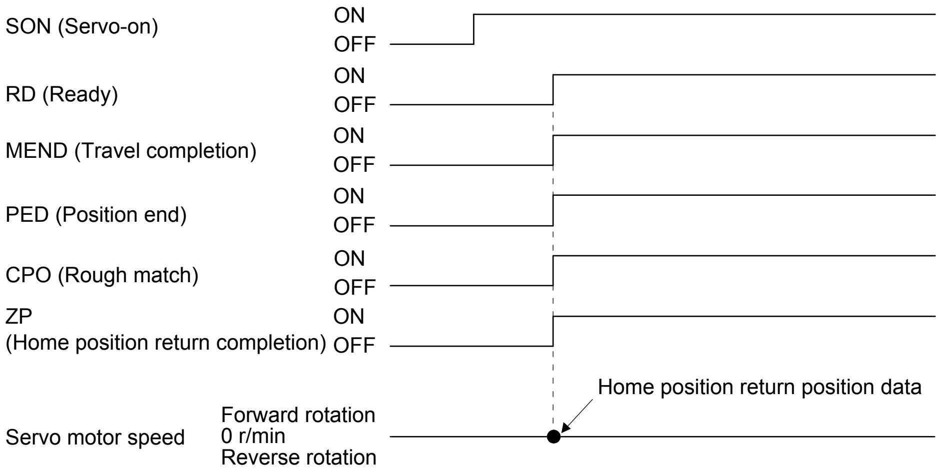
The position at servo-on is used as the home position.

(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 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.

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 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 6400 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

Deceleration starts at 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 used as the home position. The home position return is available independently of the Z-phase signal.

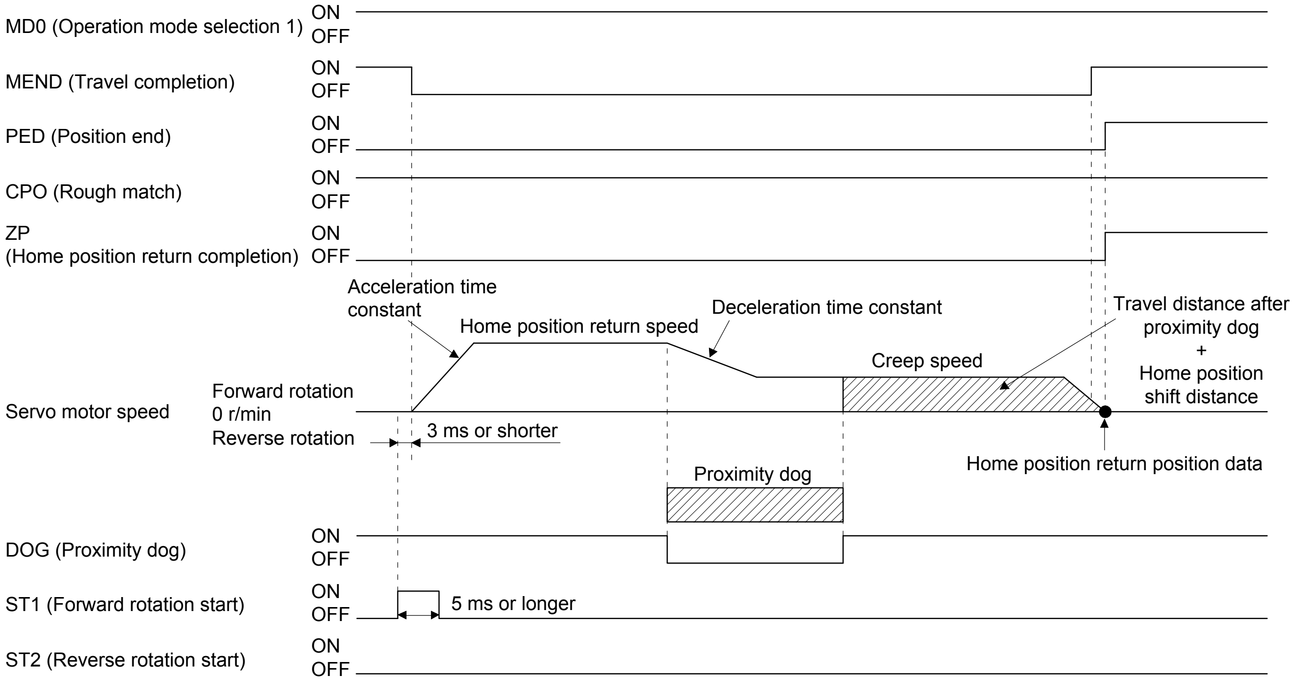
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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 after the rear end of a proximity dog is passed.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance specified after the rear end of a proximity dog is passed.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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 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 6400 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, when 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.

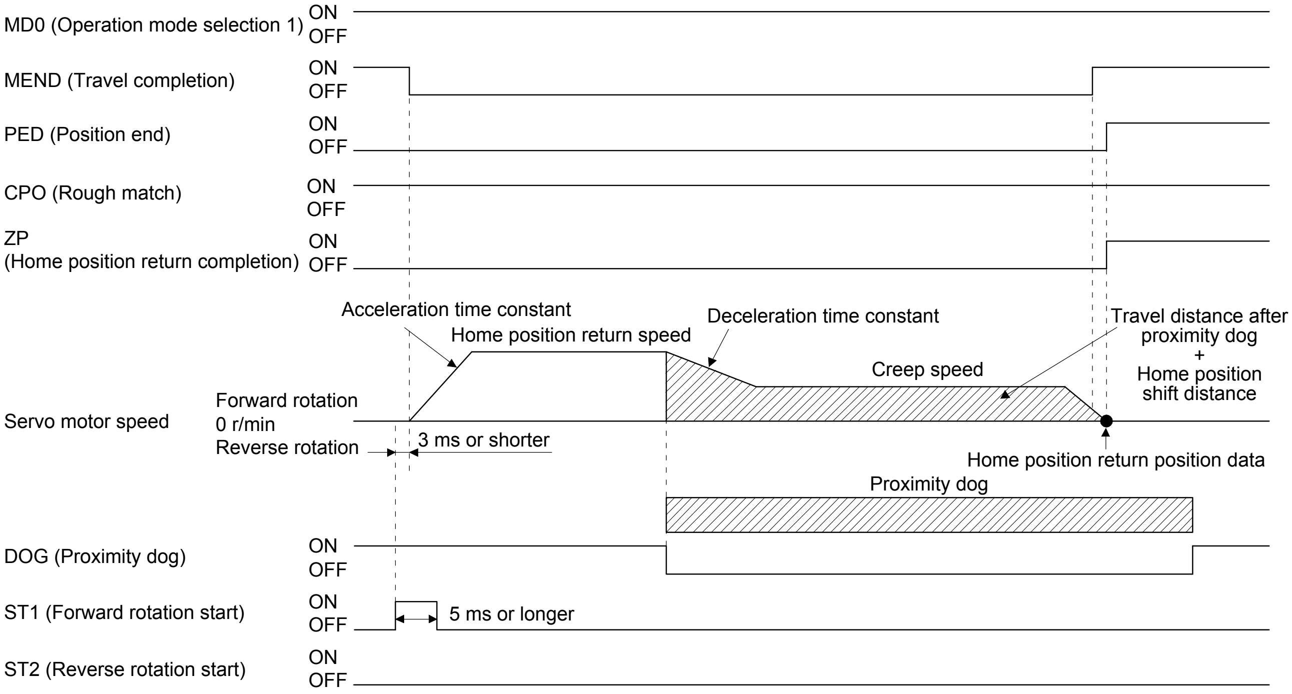
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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

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

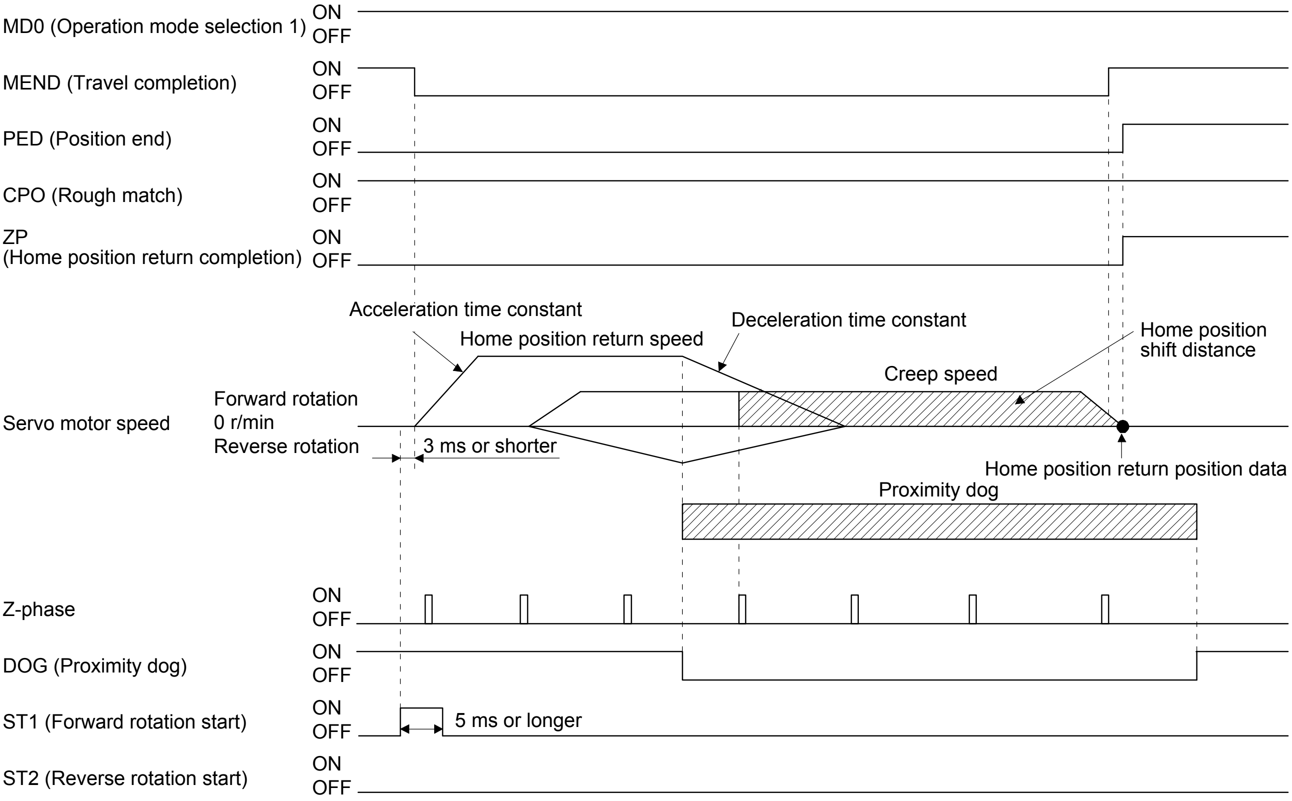
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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 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 used as the home position.

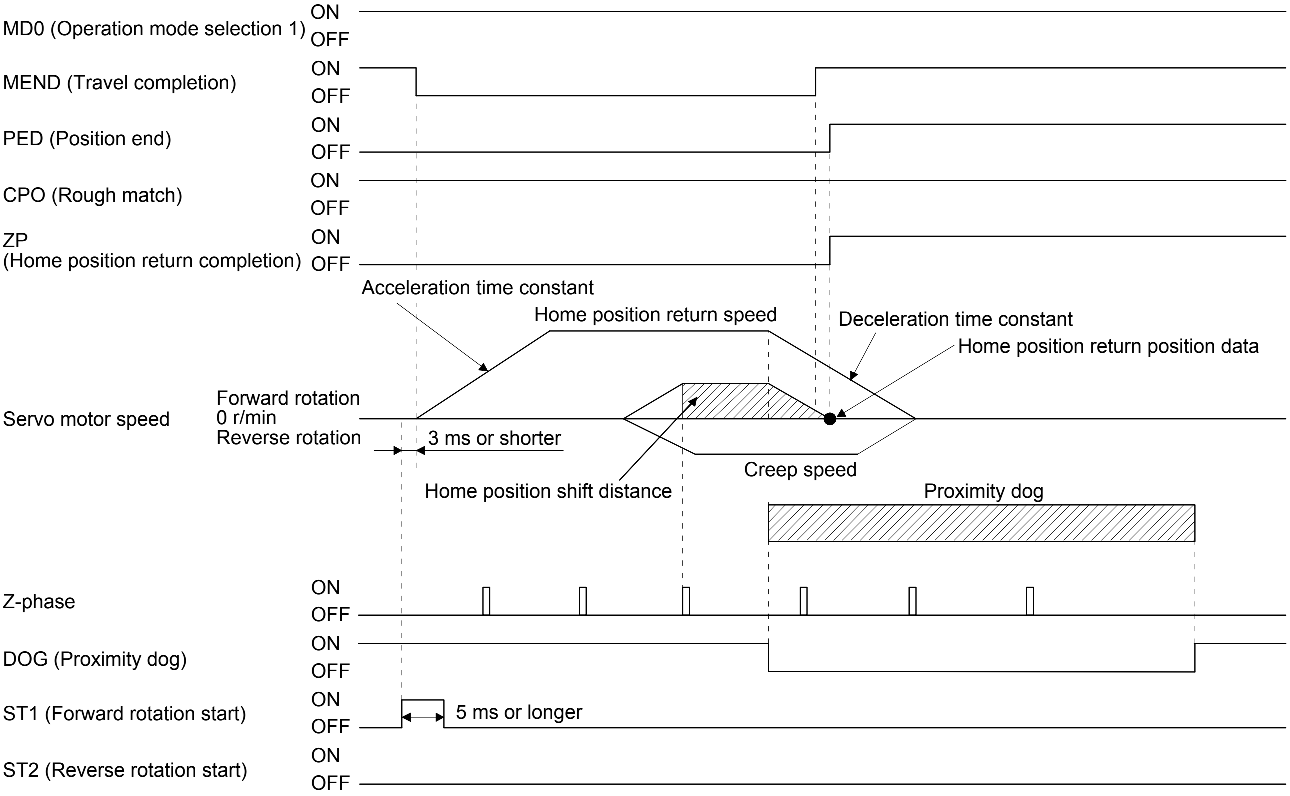
(1) Device/parameter

Set input devices and parameters as shown below.

Item	Used device/parameter	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 (front end detection/Z-phase reference).
Home position return direction	[Pr. PT04]	Refer to (2) of section 5.4.1 to select the home position return direction.
Dog input polarity	[Pr. PT29]	Refer to (2) of section 5.4.1 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.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set the current position at the home position return completion.
Program	DI1 (Program No. selection 1) to DI7 (Program No. selection 8)	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 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 6400 pulses (for HG series servo motor). The higher the creep speed, the greater the error of the home position.

The home position is where the machine moves the travel distance after proximity dog and the home position shift distance from the front end of a proximity dog.
The home position return is available independently of the Z-phase signal. Changing the creep speed may change the home position.

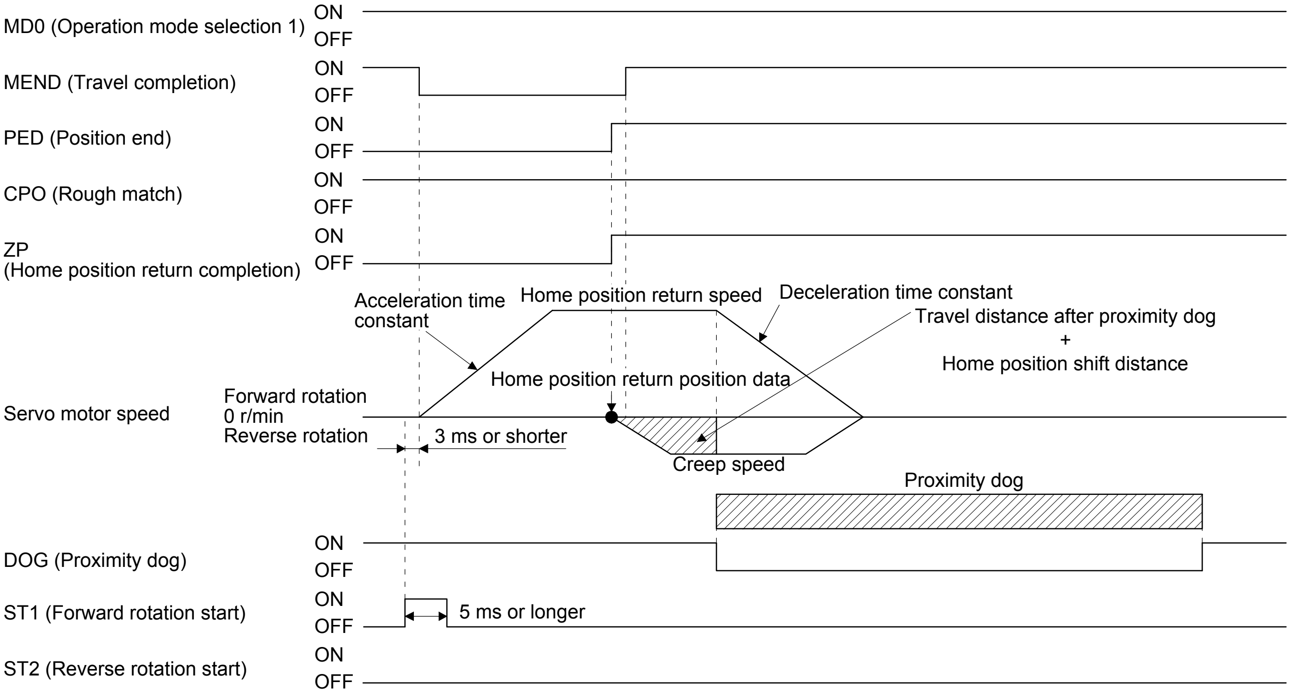
(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	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 until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to move the home position set when the Z-phase signal is given.
Travel distance after proximity dog	[Pr. PT09]	Set the travel distance specified after the front end of the proximity dog is passed.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set a current position at home position return completion.
Program	DI0 (Program No. selection 1) to DI7 (Program No. selection 8)	Select a program containing "ZRT" command that performs a 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

Starting from the Z-phase pulse position after the start of the home position return, the position is shifted by the home position shift distance. The position after the shifts is used as the home position.

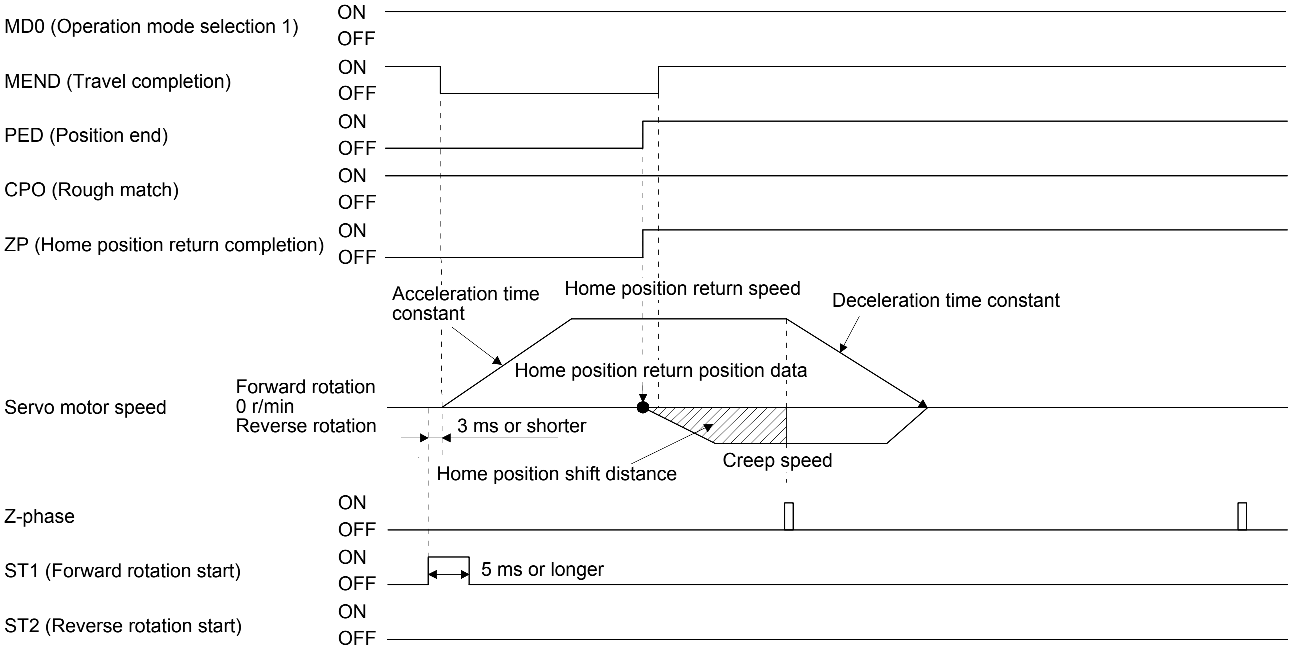
(1) Device/parameter

Set input devices and parameters as follows.

Item	Used device/parameter	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 until a dog is detected.
Creep speed	[Pr. PT06]	Set the rotation speed after a dog is detected.
Home position shift distance	[Pr. PT07]	Set this item to move the home position set when the Z-phase signal is given.
Home position return acceleration time constant	[Pr. PC30]	The acceleration time constant set for [Pr. PC30] is used.
Home position return deceleration time constant	[Pr. PC31]	The deceleration time constant set for [Pr. PC31] is used.
Home position return position data	[Pr. PT08]	Set a current position at home position return completion.
Program	DI0 (Program No. selection 1) to DI7 (Program No. selection 8)	Select a program containing "ZRT" command that performs a home position return.

(2) Timing chart

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

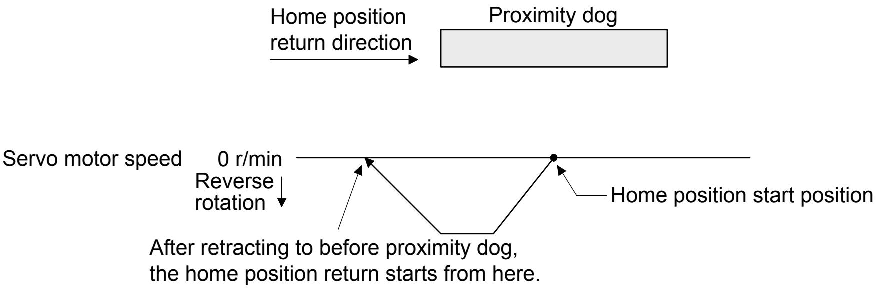


The setting value of [Pr. PT08 Home position return position data] is used as the position address at the home position return completion.

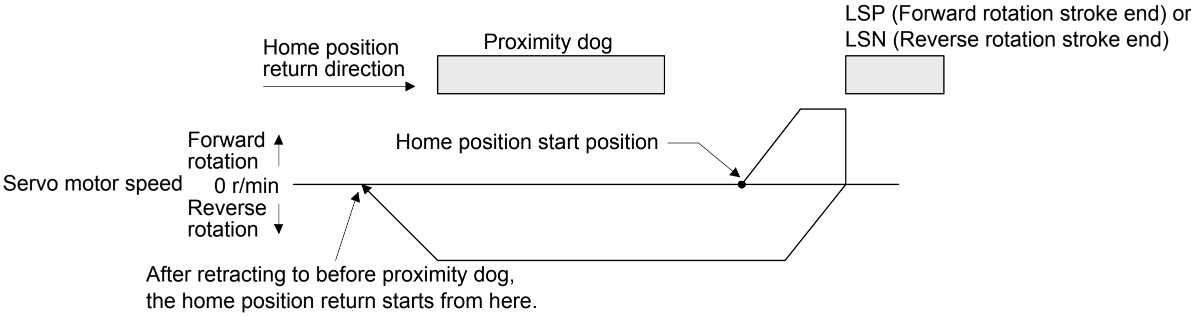
5.4.13 Automatic retract function used for the home position return

For a home position return using the proximity dog, when the home position return is started from the position on or beyond the proximity dog, the home position return is performed after the machine moves back to the position where the home position can be performed.

(1) When the current position is on the proximity dog
When the current position is on the proximity dog, the machine moves backward automatically, and the home position return is performed.



(2) When the current position is beyond the proximity dog
At start-up, the operation is performed in the direction of the home position return. When LSP (Forward rotation stroke end) or LSN (Reverse rotation stroke end) is detected, the machine moves backward automatically. The machine passes and stops before the proximity dog, and the home position return is performed from the position again. If the proximity dog cannot be detected, the machine stops at LSP or LSN on the opposite side, and [AL. 90 Home position return incomplete warning] will occur.



The software limit cannot be used with these functions.

5.5 Serial communication operation

Using the RS-422 communication function, you can use to operate a servo amplifier from the 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.

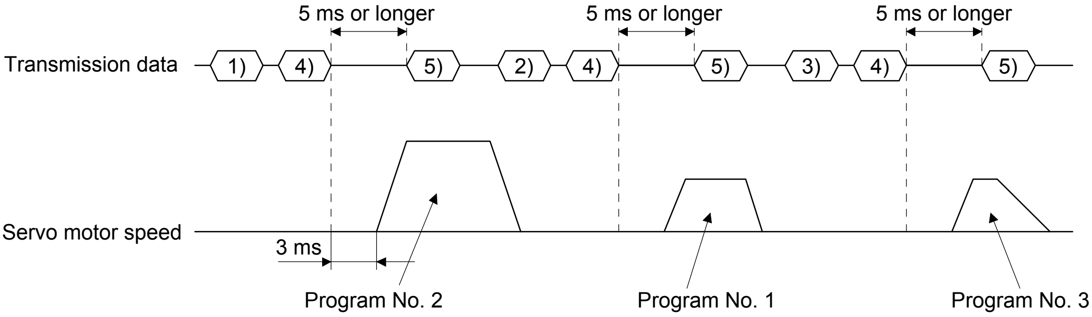
5.5.1 Positioning operation using the program

Using the communication function can select program Nos., perform the positioning operation using the program by switching on ST1 (Forward rotation start).

(1) Program selection

Select program No. 1 to 256 using the forced output of the device from the controller (command [9] [2] and data No. [6] [0]).

(2) Timing chart

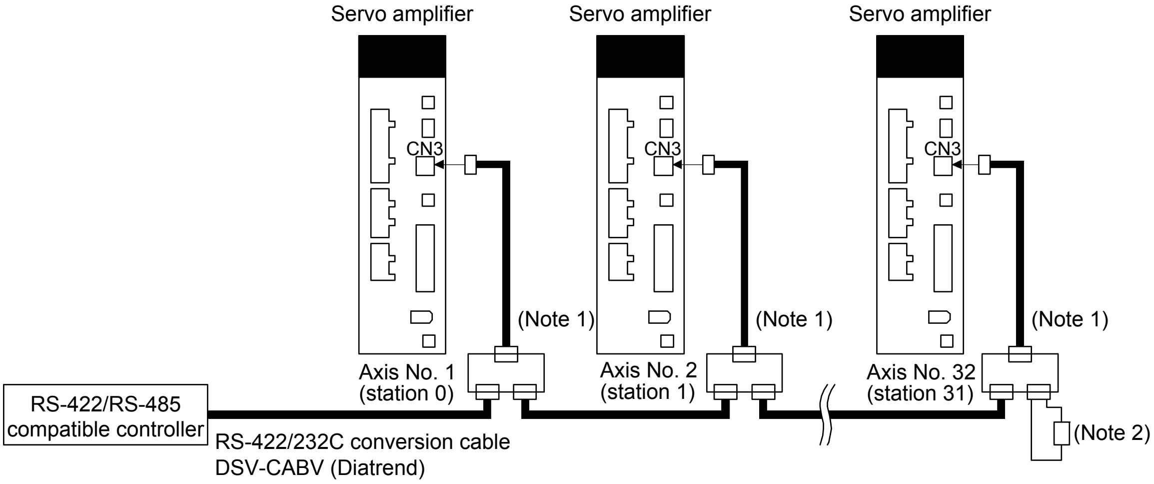


No.	Transmission data description	Command	Data No.
1)	Select Program No. 2.	[9] [2]	[6] [0]
2)	Select Program No. 1.	[9] [2]	[6] [0]
3)	Select Program No. 3.	[9] [2]	[6] [0]
4)	Switch on ST1 (Forward rotation start).	[9] [2]	[6] [0]
5)	Switch off ST1 (Forward rotation start).	[9] [2]	[6] [0]

5.5.2 Multi-drop method (RS-422 communication)

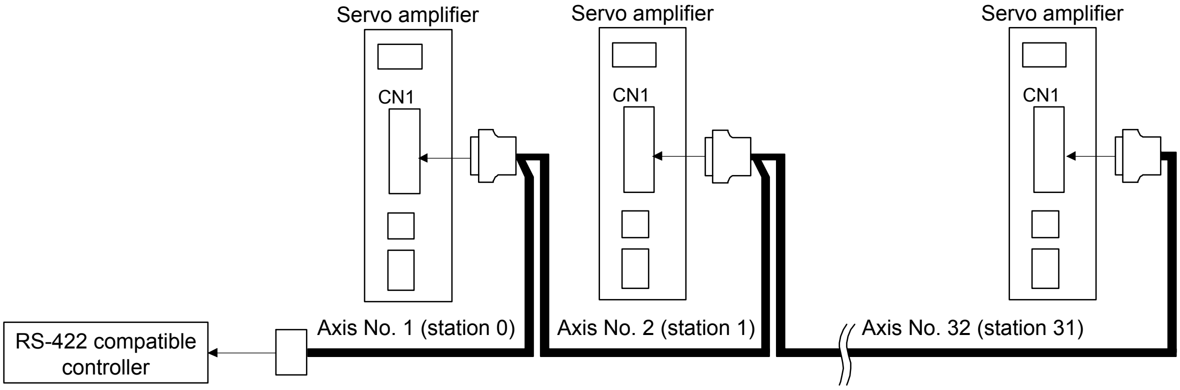
Using the RS-422 communication function can use to operate multiple servo amplifiers on the same bus. In this case, set station numbers to the servo amplifier because the controller recognizes that the data currently being sent is for which servo amplifier. Set station Nos. with [Pr. PC20 Station number setting].
Always set one station No. to one servo amplifier. Setting one station number to multiple servo amplifiers will disable a normal communication. When you use to operate multiple servo amplifiers under one command, use the group specification function in section 5.5.3.

(1) MR-J4-_A_-RJ 100 W or more



Note 1. The BMJ-8 (Hachiko Electric) is recommended as the branch connector.
2. The final axis must be terminated between RDP (pin No.3) and RDN (pin No.6) on the receiving side (servo amplifier) with a 150 Ω resistor.

(2) MR-J4-03A6-RJ



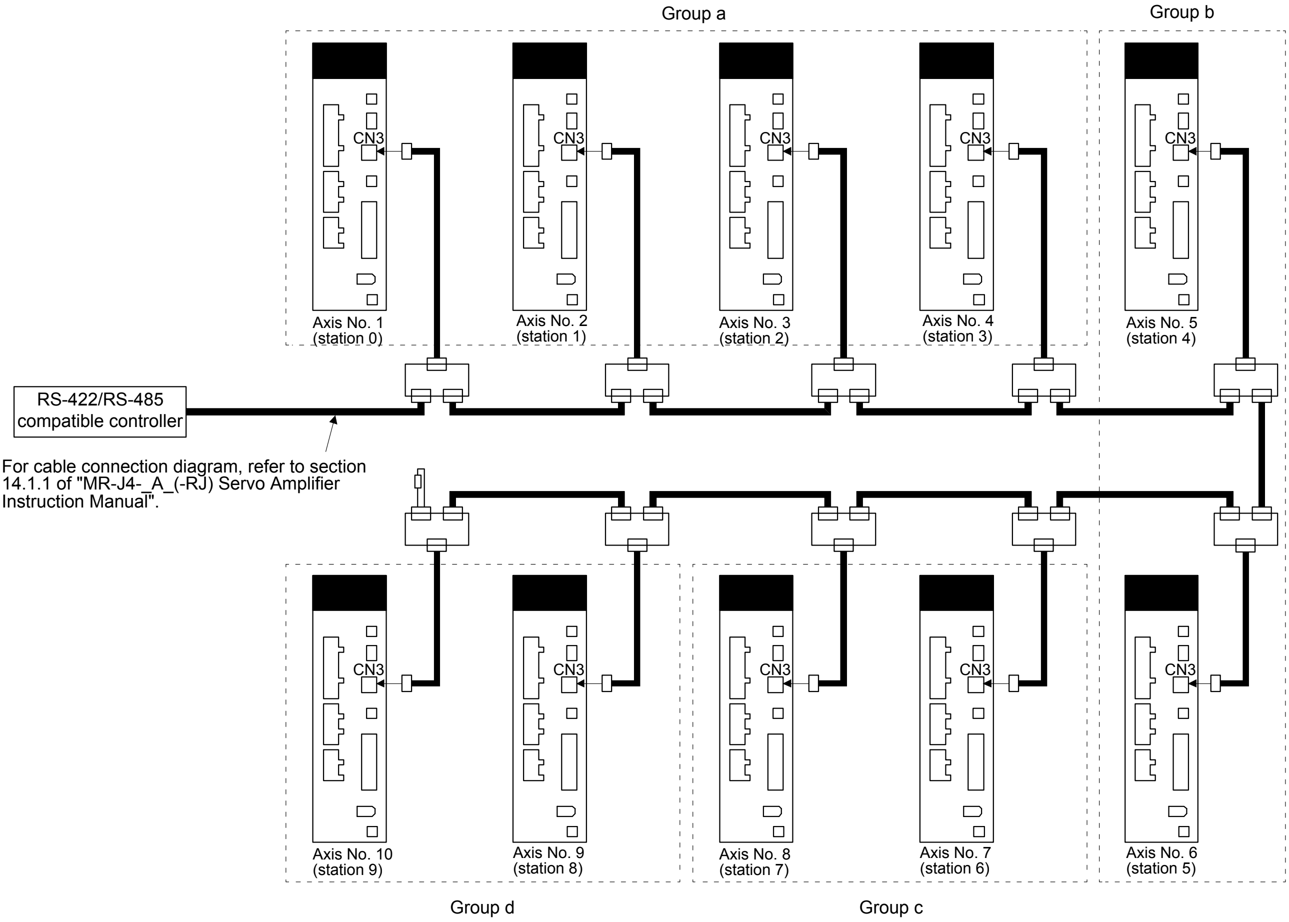
5.5.3 Group specification

⚠CAUTION
- Set only one servo amplifier capable of returning data in a group. If multiple servo amplifiers return data under commands from the controller, the servo amplifiers may malfunction.

When using multiple servo amplifiers, you can set parameters with commands per group.
Up to 6 groups of a to f can be set. Set groups for each station with the communication commands of Mitsubishi general-purpose AC servo protocol.

(1) Group setting example

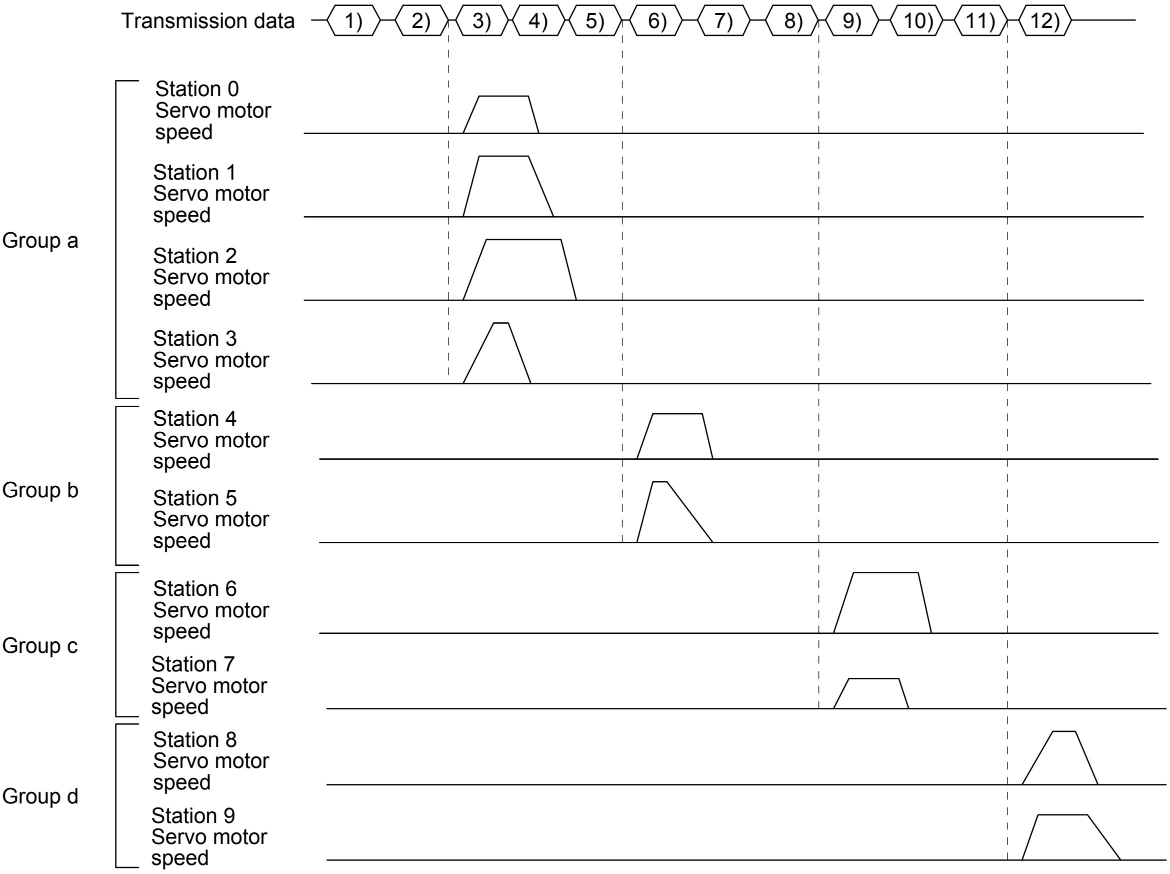
The following shows a configuration diagram of MR-J4-_A_-RJ 100 W or more servo amplifiers.



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.



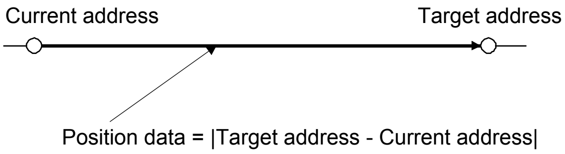
No.	Transmission data description	Command	Data No.
1)	Select Program No. 1 in group a.	[9] [2]	[6] [0]
2)	Switch on ST1 (Forward rotation start).	[9] [2]	[6] [0]
3)	Switch off ST1 (Forward rotation start).	[9] [2]	[6] [0]
4)	Select Program No. 1 in group b.	[9] [2]	[6] [0]
5)	Switch on ST1 (Forward rotation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

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

5.6 Incremental value command method

When using this servo amplifier under the incremental value command method, you must 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.

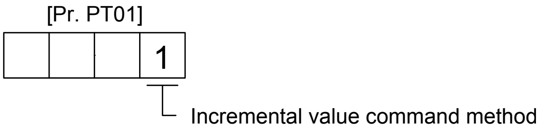
Setting range: -999999 to 999999 [×10^{STM} μm] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [×$10^{(STM-4)}$ inch] (STM = Feed length multiplication [Pr. PT03])
-999999 to 999999 [pulse]



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.



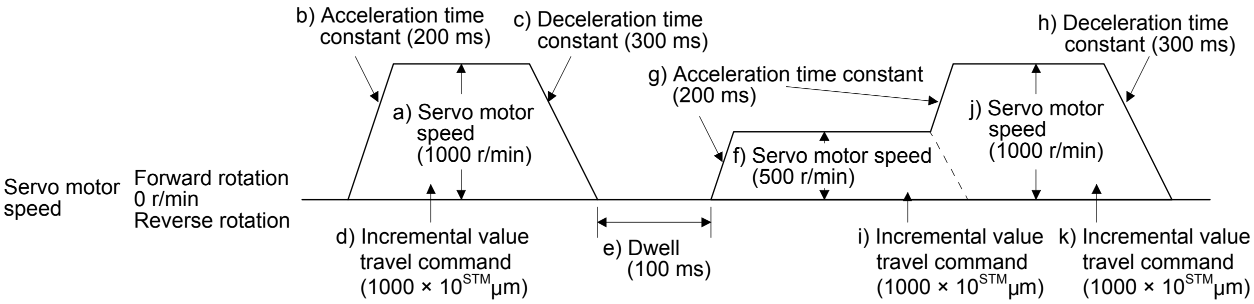
(2) Command

The command contents of "MOV" and "MOVA" are changed as follows. There are no changes in other command. 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	×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	×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

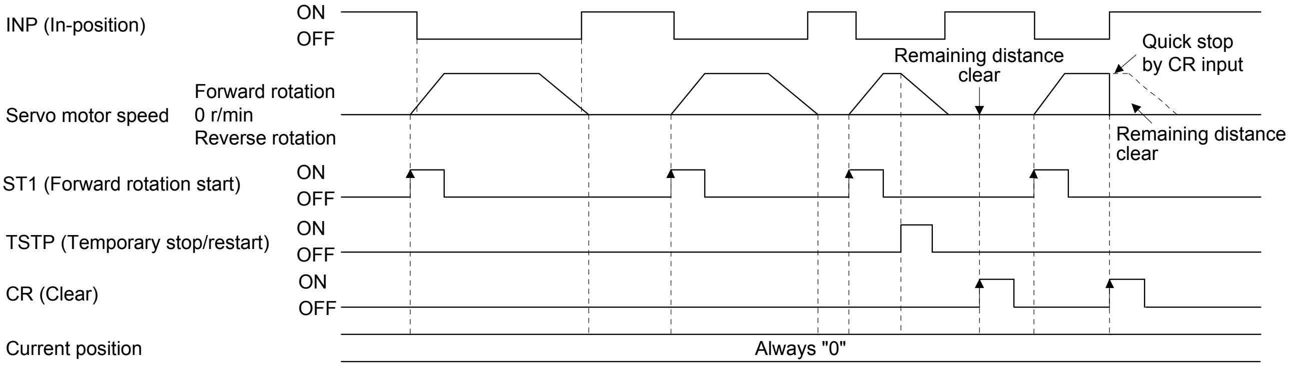
Command	Description		
SPN (1000)	Servo motor speed	1000 [r/min]	a)
STA (200)	Acceleration time constant	200 [ms]	b)
STB (300)	Deceleration time constant	300 [ms]	c)
MOVI (1000)	Incremental value travel command	1000 [×10^{STM} μm]	d)
TIM (100)	Dwell	100 [ms]	e)
SPN (500)	Servo motor speed	500 [r/min]	f)
STA (200)	Acceleration/deceleration 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.

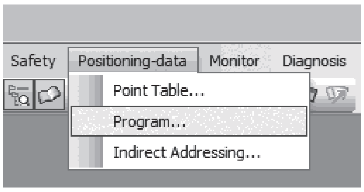


5.8 Program setting method

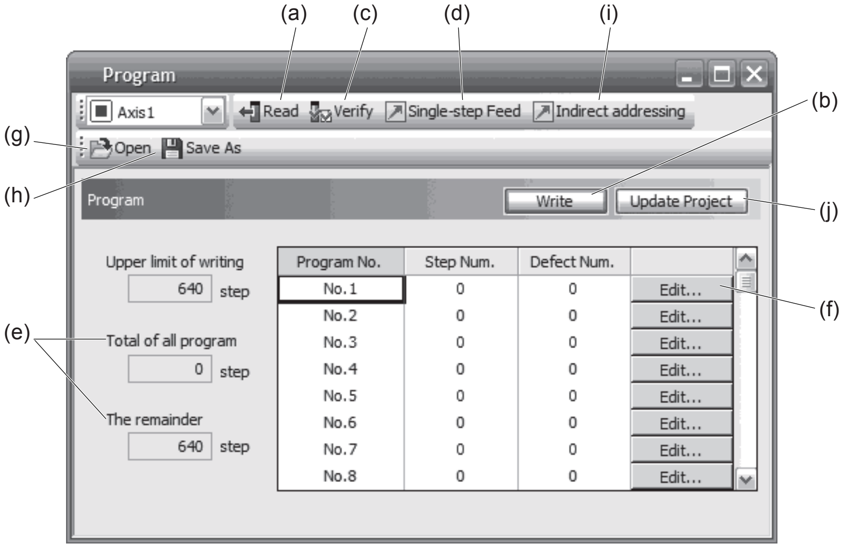
The following shows the setting method of programs using MR Configurator2.

5.8.1 Setting procedure

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



The following window will be displayed by clicking.



Upper limit of writing
640 step

Total of all program
0 step

The remainder
640 step

Program No.	Step Num.	Defect Num.	
No.1	0	0	Edit...
No.2	0	0	Edit...
No.3	0	0	Edit...
No.4	0	0	Edit...
No.5	0	0	Edit...
No.6	0	0	Edit...
No.7	0	0	Edit...
No.8	0	0	Edit...

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

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

(3) Verifying program (c)
Click the "Verify" button to verify the contents of programs in the personal computer with contents of programs of 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 or 3.2.9 for details.

(5) Number of steps (e)
Used number of steps in all programs and remained steps are displayed.

(6) Editing program (f)
You can edit any program. Click the "Edit" button to open the window for program edit. For the rotation direction, refer to section 5.8.2.

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

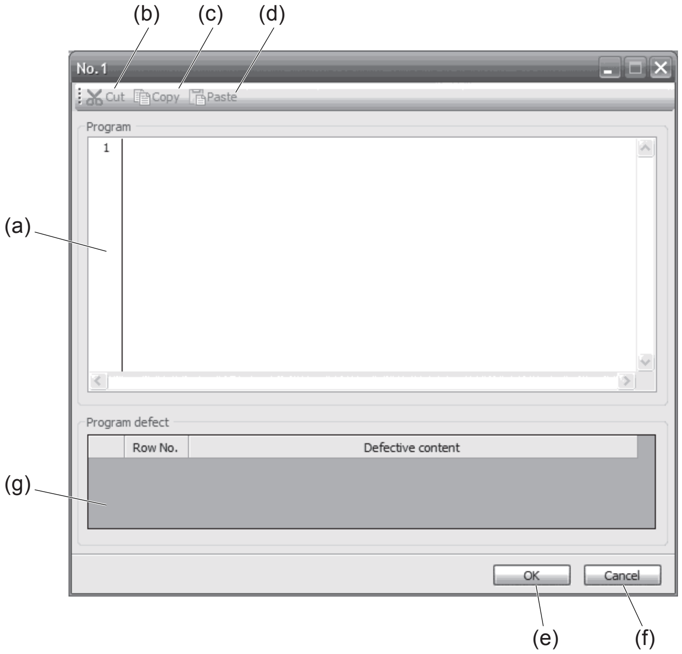
(8) Saving program file (h)
Click "Save As" to save the program.

(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

You can create programs with the window for program edit.



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

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

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

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

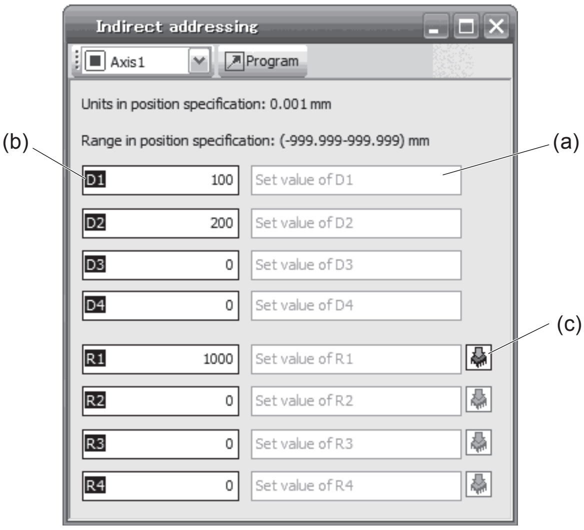
(5) Ending window for program (e)
Click the "OK" button to execute the edit check. When the edit check completes with no error, the edit will finish and the window for program edit will be closed. When the edit check detects an error in the program, it will be displayed.

(6) Canceling window for program edit (f)
Click the "Cancel" button 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 row No. and content of the error will be displayed. Click the error content, the cursor will move to the row of the corresponding program.

5.8.3 Indirect addressing window

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



Units in position specification: 0.001 mm

Range in position specification: (-999.999-999.999) mm

D1	100
D2	200
D3	0
D4	0
R1	1000
R2	0
R3	0
R4	0

(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 button (c)
You can write register values (D1 to D4 and R1 to R4) stored in the servo amplifier to the servo amplifier.

MEMO

6. HOW TO USE INDEXER

The following item is the same as that of MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Switching power on for the first time	Section 4.1	Section 18.4

POINT

- ●In the absolute position detection system, rotating the shaft one revolution or more during power-off may erase a home position. Therefore, do not rotate the shaft one revolution or more during power-off. When a home position is erased, [AL. 90 Home position return incomplete warning] will occur. Then, execute the home position return again.
- ●The indexer method cannot be used in the fully closed loop system and linear servo system. The combination of the indexer method and fully closed loop system/linear servo system triggers [AL. 37 Parameter error].

6.1 Startup

6.1.1 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
This section provides a case where the servo amplifier is powered on after setting the positioning mode.

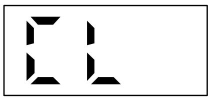
(1) Power-on
Switch power on in the following procedure. Always follow this procedure at power-on.

1) Switch off SON (Servo-on).

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

3) Switch on the main circuit power supply and control circuit power supply.
The display shows "C" ("CL" for MR-J4-03A6-RJ servo amplifiers), and in 2 s later, shows data.

MR-J4-_A_-RJ 100 W or more



MR-J4-03A6-RJ

(2) Power-off
1) Switch off ST1 (Forward rotation start).

2) Switch off SON (Servo-on).

3) Switch off the main circuit power supply and control circuit power supply.

6.1.2 Stop

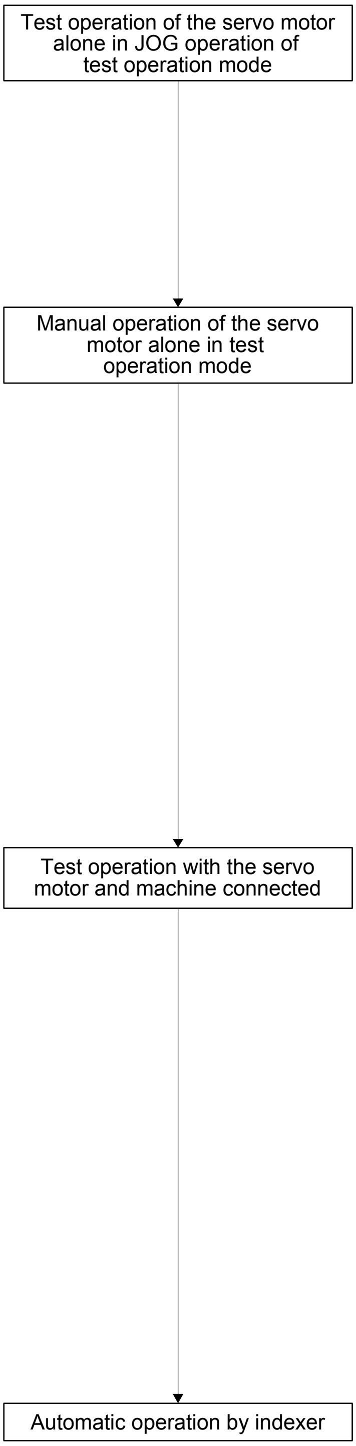
If any of the following situations occurs, the servo amplifier suspends the running of the servo motor and brings it to a stop.
Refer to section 3.10 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" for the servo motor with an electromagnetic brake.

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 the command. With some alarms, however, the dynamic brake operates to bring the servo motor to a stop. (Refer to chapter 8. (Note 1))
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.
STO (STO1, STO2) off (Note 2)	The base circuit is shut off and the dynamic brake operates to bring the servo motor to a stop.
LSP (Forward rotation stroke end) off, LSN (Reverse rotation stroke end) off	It will bring the motor to a sudden stop and make it servo-locked. It can be run in the opposite direction.

Note 1. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.
2. MR-J4-03A6-RJ servo amplifiers are not compatible with the STO function.

6.1.3 Test operation

Before starting actual operation, perform test operation to make sure that the machine operates normally. Refer to section 6.1.1 for how to power on and off the servo amplifier.



In this step, confirm that the servo amplifier and servo motor operate normally.
With the servo motor disconnected from the machine, use the test operation mode and check whether the servo motor correctly rotates at the slowest speed. For the test operation mode, refer to section 3.1.8 and 3.2.8 in this manual, and section 4.5.9 and 18.5.10 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

In this step, confirm that the servo motor correctly rotates 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 put in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) To rotate the servo motor, turn on ST1 (Forward rotation start) in the manual operation mode with the controller. Set a low speed to [Pr. PT13] at first, make the servo motor operate, and check the rotation direction of the motor, etc. If the machine does not operate in the intended direction, check the input signal.

In this step, connect the servo motor with the machine and confirm that the machine operates normally under 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 put in a servo-on status, RD (Ready) switches on.
2) Switch on LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end).
3) To rotate the servo motor, turn on ST1 (Forward rotation start) in the manual operation mode with the controller. Set a low speed to [Pr. PT13] at first, make the servo motor operate, and check the operation direction of the machine, etc. If the machine 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.

Check automatic operation from the controller.

6.1.4 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

When using this servo in the indexer method, set [Pr. PA01] to "_ _ _ 8" (Positioning mode (indexer method)). For the indexer 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 [Pr. PA _ _] and [Pr. PT _ _] settings required for the indexer method.

Operation mode	Operation mode selection item	Parameter setting			Input device setting		
		[Pr. PA01]	[Pr. PT04] (Note 2)	[Pr. PT27]	MD0 (Note 1)	MD1 (Note 1)	DI0 to DI7 (Note 1)
Automatic operation mode	Automatic operation mode 1 (Rotation direction specifying indexer)	_ _ _ 8			Off	On	Set any next station No. (Refer to section 6.2.2 (3).)
	Automatic operation mode 2 (Shortest rotating indexer)				On	On	
Manual operation mode	Station JOG operation			_ _ 0 _	On	Off	Any
	JOG operation			_ _ 1 _			
Home position return mode	Dog type/Torque limit changing dog type		_ _ _ 0		Off	Off	Any
	Data set type/torque limit changing data set type		_ _ _ 2				

Note 1. MD0: Operation mode selection 1, MD1: Operation mode selection 2, DI0 to DI7: Next station No. selection 1 to 8
2. Setting other than "_ _ _ 0" and "_ _ _ 2" will trigger [AL.37 Parameter error].

6.1.5 Actual operation

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

6.1.6 Troubleshooting at start-up

⚠CAUTION ●Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable.

POINT

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

The following faults may occur at start-up. If any of such faults occurs, take the corresponding action. "MR-J4-_A_" means "MR-J4-_A_(-RJ) 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 flickers.	Not improved even if CN1, CN2, and CN3 connectors are disconnected.	1. Power supply voltage fault 2. The servo amplifier is malfunctioning.	
			Improved when CN1 connector is disconnected.	Power supply of CN1 cabling is shorted.	
			Improved when CN2 connector is disconnected.	1. Power supply of encoder cabling is shorted. 2. Encoder is malfunctioning.	
			Improved 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 or 3.2.7) 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 Section 3.2.7
3	Perform a home position return.	Servo motor does not rotate.	Call the external I/O signal display and check the on/off status of the input signal. (Refer to section 3.1.7 or 3.2.7.)	LSP, LSN, and ST1 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
		The home position return is not completed.	Call the external I/O signal display and check the on/off status of DOG. (Refer to section 3.1.7 or 3.2.7.)	The proximity dog is set incorrectly.	Section 3.1.7 Section 3.2.7

No.	Start-up sequence	Fault	Investigation	Possible cause	Reference
4	Switch on ST1 (Forward rotation start).	Servo motor does not rotate.	Call the external I/O signal display (Section 3.1.7 or 3.2.7) and check the on/off status of the input signal.	LSP, LSN, and ST1 are off.	Section 3.1.7 Section 3.2.7
			Check [Pr. PA11 Forward rotation torque limit] and [Pr. PA12 Reverse rotation torque limit].	Torque limit level is too low as compared to 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 as compared to the load torque.	Section 3.1.2 Section 3.2.2
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/ deceleration more than three times to complete auto tuning.	Gain adjustment fault	MR-J4-_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-J4-_A_ Chapter 6

Note. Only a list of alarms and warnings is listed in chapter 8. Refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" for details of alarms and warnings.

6.2 Automatic operation mode

POINT

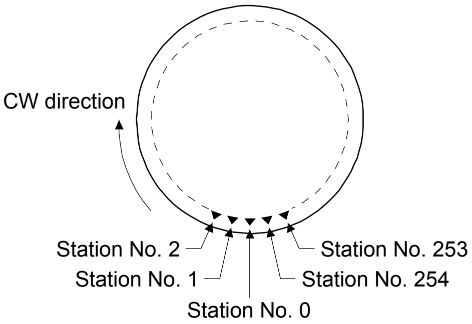
- There are the following conditions between the number of gear teeth on machine side ([Pr. PA06 Number of gear teeth on machine side]) and servo motor speed (N).
  - When CMX ≤ 2000, N < 3076.7 r/min
  - When CMX > 2000, N < 3276.7 - CMX r/min

  When the servo motor is operated at servo motor speed higher than the limit value, [AL. E3 Absolute position counter warning] occurs.
- When the same next station No. is specified as station No. of the current position and a positioning operation is executed, the motor does not start because the travel distance is decided as "0".

6.2.1 Automatic operation mode

(1) Logic of indexer

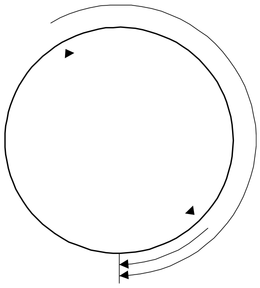
The positioning is executed like this. A station, which one of the divided circumference (360 degrees) into 255 at most on the machine side, is selected by using 8-bit devices of the DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8). The following diagram is an example for when [Pr. PA14] is set to "0".



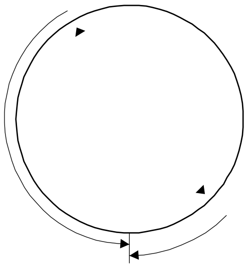
The station No. 0 is set as a home position. The number of divisions is set with [Pr. PT28].

(2) Rotation direction

There are two operation methods: Rotation direction specifying indexer, which always rotates in a fixed direction and execute positioning to a station; Shortest rotating indexer, which automatically changes a rotation direction to the shortest distance and execute positioning to a station



Rotation direction specifying indexer



Shortest rotating indexer

6.2.2 Automatic operation mode 1 (rotation direction specifying indexer)

In this operation mode, the servo motor rotates in a fixed direction to execute positioning to a station. The positioning is executed by selecting a station No. using 8-bit devices of the DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8). For the servo motor speed and acceleration/deceleration time constant during operation, the values set in the point tables are used.

(1) Device/parameter

Set input devices and parameters as follows.

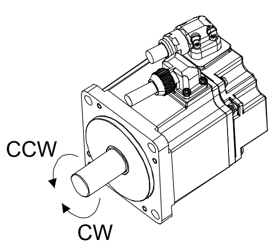
Item	Used device/parameter	Setting
Selecting indexer method	Control mode selection of [Pr. PA01]	Select "_ _ _ 8" (positioning mode (indexer method)).
Next station position	DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8)	Set any next station No. (Refer to (3) of this section.)
Selecting automatic operation mode 1 (rotation direction specifying indexer)	MD0 (Operation mode selection 1)	Switch off MD0.
	MD1 (Operation mode selection 2)	Switch on MD1.
Rotation direction selection	SIG (External limit/Rotation direction decision/Automatic speed selection)	The rotation direction to a station No. will be as follows. Off: Station No. decreasing direction On: Station No. increasing direction
Servo motor speed	[Pr. PC05]	Set a servo motor speed.
Acceleration time constant/Deceleration time constant	RT (Second acceleration/deceleration selection)	1. When RT is turned off Acceleration time constant: setting value of [Pr. PC01 Acceleration time constant 1] Deceleration time constant: setting value of [Pr. PC02 Deceleration time constant 1] 2. When RT is turned on Acceleration time constant: setting value of [Pr. PC30 Acceleration time constant 2] Deceleration time constant: setting value of [Pr. PC31 Deceleration time constant 2]
Torque limit (Note)	[Pr. PA11] [Pr. PA12]	Set a torque limit value for during operation.
	[Pr. PC35]	Set a torque limit value for during stop.
	[Pr. PT39]	Set time to switch the torque limit value from during operation until during stop.

Note. The torque limit will change from [Pr. PC35 Internal torque limit 2] to the setting value of [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit] when ST1 (Forward rotation start) is inputted. After MEND (Travel completion) is outputted, the time has passed set with [Pr. PT39] and the torque limit will change from [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit] to the setting value of [Pr. PC35 Internal torque limit 2].

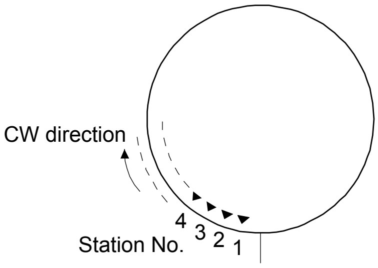
(2) Other parameter settings

(a) Setting assignment direction of station No.

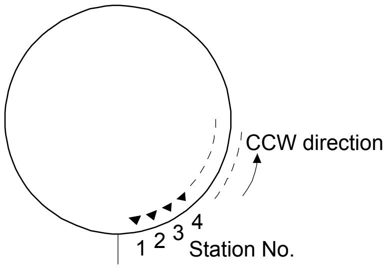
Select an assignment direction of station No. with [Pr. PA14].



[Pr. PA14] setting	Servo motor rotation direction ST1 (Forward rotation start) is on.
0	Next station No. will be assigned in CW direction in order of 1, 2, 3…
1	Next station No. will be assigned in CCW direction in order of 1, 2, 3…



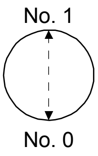
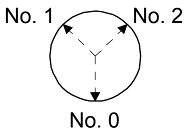
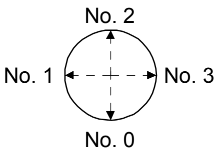
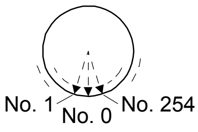
[Pr. PA14]: 0 (initial value)



[Pr. PA14]: 1

(b) Setting number of stations

Set a number of stations to [Pr. PT28].

	[Pr. PT28] setting				
Number of stations	2	3	4	. . .	255
Station No.				. . .	

(3) Operation

Select a target station No. using 8-bit devices of the DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8) for positioning.

Device (Note 1)								Selection contents
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	
0	0	0	0	0	0	0	0	Next station No. 0
0	0	0	0	0	0	0	1	Next station No. 1
0	0	0	0	0	0	1	0	Next station No. 2
0	0	0	0	0	0	1	1	Next station No. 3
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
1	1	1	1	1	1	1	0	Next station No. 254
1	1	1	1	1	1	1	1	Setting inhibited (Note 2)

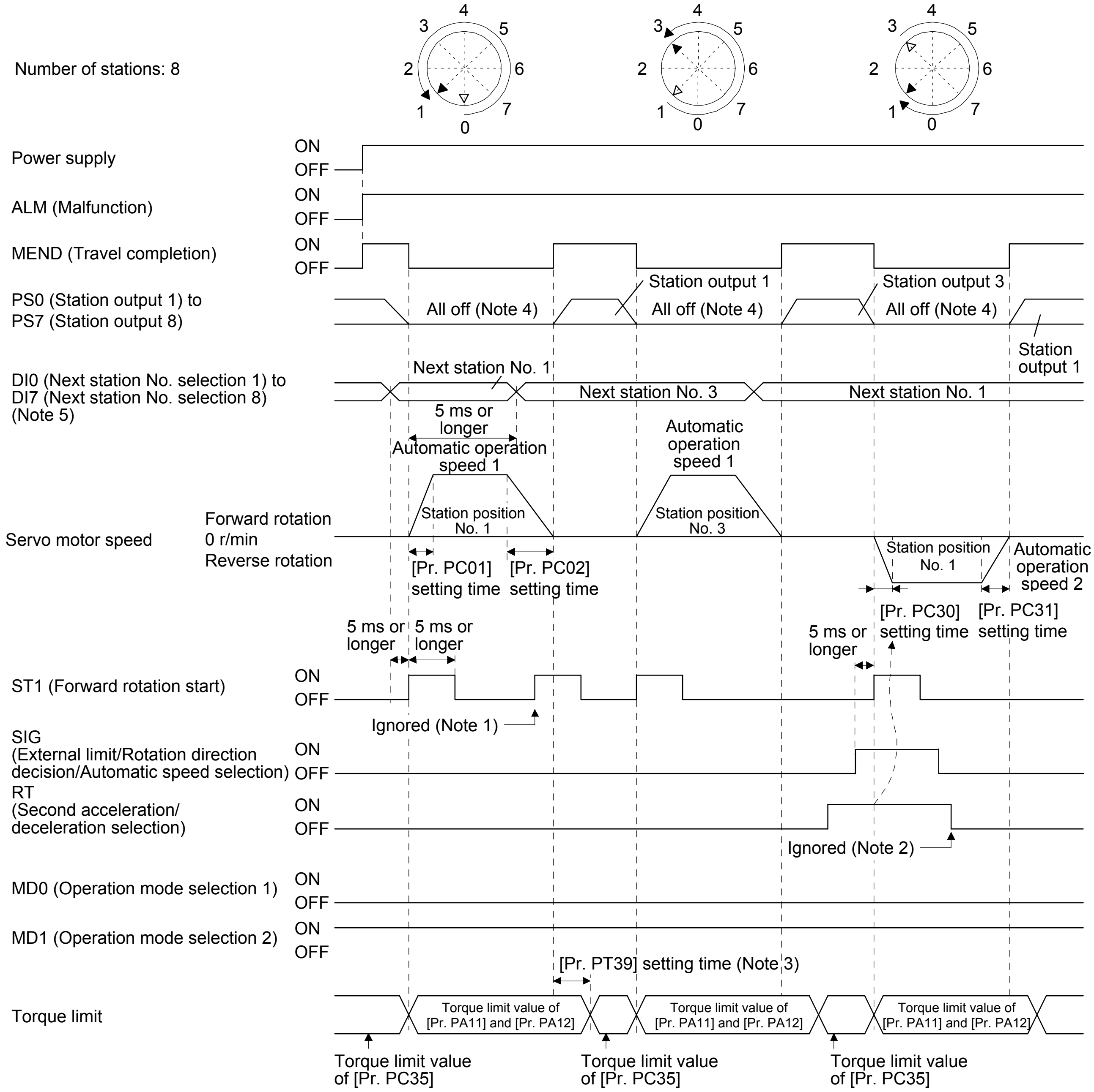
Note 1. 0: Off
1: On
2. [AL. 97.2 Next station position warning] will occur.

(4) Timing chart

POINT

- ●Always perform a home position return. Executing positioning operation without home position return will trigger [AL. 90 Home position return incomplete warning] and ST1 (Forward rotation start) will be disabled.
- ●When a next station position is over the setting value of [Pr. PT28 Number of stations per rotation], [AL. 97 Next station position warning] will occur and ST1 (Forward rotation start) will be disabled.

The following timing chart shows that an operation is performed at a stop of the station No. 0 when servo-on.



Note
1. When the rest of command travel distance is other than "0", ST1 (Forward rotation start) will not be accepted. Refer to section 6.4.5 (1).
2. RT (Second acceleration/deceleration selection) will not be accepted during operation. Selection of the servo motor speed and acceleration/deceleration time constants will be enabled by on-edge of ST1 (Forward rotation start). However, when the rest of command travel distance is other than "0", turning on ST1 (Forward rotation start) will not be enabled.
3. Counting will start when the rest of command travel distance becomes "0".
4. When MEND (Travel completion) is off, the station position outputs will be "0" (all off).
5. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.2.3 Automatic operation mode 2 (shortest rotating indexer)

This operation mode automatically changes a rotation direction to the shortest distance to execute positioning to a station.
The positioning is executed by selecting a station No. using 8-bit devices of the DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8). For the servo motor speed and acceleration/deceleration time constant during operation, the values set in the point tables are used.

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

Item	Used device/parameter	Setting
Selecting indexer method	Control mode selection of [Pr. PA01]	Select "_ _ _ 8" (positioning mode (indexer method)).
Next station position	DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8)	Set any next station No. (Refer to (3) of this section.)
Automatic operation mode 2 (shortest rotating indexer) selection	MD0 (Operation mode selection 1)	Switch on MD0.
	MD1 (Operation mode selection 2)	Switch on MD1.
Servo motor speed	SIG (External limit/Rotation direction decision/Automatic speed selection)	The servo motor speed will be as follows. Off: setting value of [Pr. PC05 Automatic operation speed 1] On: setting value of [Pr. PC06 Automatic operation speed 2]
Acceleration time constant/Deceleration time constant	RT (Second acceleration/deceleration selection)	1. When RT is turned off Acceleration time constant: setting value of [Pr. PC01 Acceleration time constant 1] Deceleration time constant: setting value of [Pr. PC02 Deceleration time constant 1] 2. When RT is turned on Acceleration time constant: setting value of [Pr. PC30 Acceleration time constant 2] Deceleration time constant: setting value of [Pr. PC31 Deceleration time constant 2]

(2) The other parameter setting (number of stations)
Set a number of stations to [Pr. PT28]. The setting is the same as that of automatic operation mode 1. Refer to section 6.2.2 (2) (b).
[Pr. PA14 Rotation direction selection] is not used in the automatic operation mode 2.

(3) Operation

Select a target station No. using 8-bit devices of the DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8) for positioning.

Device (Note 1)								Selection contents
DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0	
0	0	0	0	0	0	0	0	Next station No. 0
0	0	0	0	0	0	0	1	Next station No. 1
0	0	0	0	0	0	1	0	Next station No. 2
0	0	0	0	0	0	1	1	Next station No. 3
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
1	1	1	1	1	1	1	0	Next station No. 254
1	1	1	1	1	1	1	1	Setting inhibited (Note 2)

Note 1. 0: Off

1: On

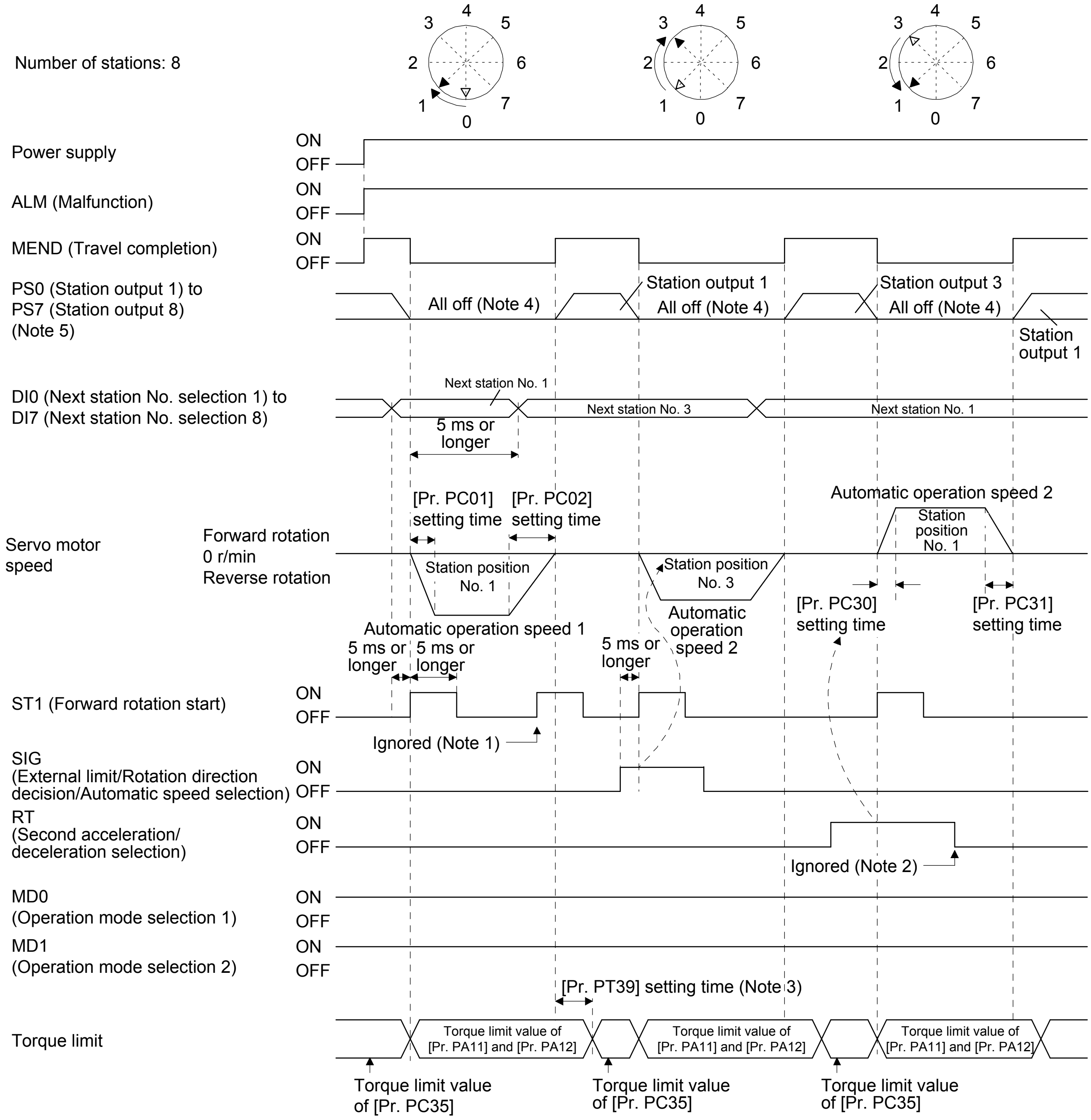
2. [AL. 97.2 Next station position warning] will occur.

(4) Timing chart

POINT

- Always perform a home position return. Executing positioning operation without home position return will trigger [AL. 90 Home position return incomplete warning] and ST1 (Forward rotation start) will be disabled.
- When travel distances are the same to a target station position from CCW and from CW, the shaft will rotate to the station No. increasing direction.

The following timing chart shows that an operation is performed at a stop of the station No. 0 when servo-on.



Note 1. When the rest of command travel distance is other than "0", ST1 (Forward rotation start) will not be accepted. Refer to section 6.4.5 (1).
2. RT (Second acceleration/deceleration selection) will not be accepted during operation. Selection of the servo motor speed and acceleration/deceleration time constants will be enabled by on-edge of ST1 (Forward rotation start). However, when the rest of command travel distance is other than "0", turning on ST1 (Forward rotation start) will not be enabled.
3. Counting will start when the rest of command travel distance becomes "0".
4. When MEND (Travel completion) is off, the station position outputs will be "0" (all off).
5. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.3 Manual operation mode

POINT

- When the operation mode is changed during operation, inputting ST1 (Forward rotation start) is disabled until the operation stops. Switch on ST1 (Forward rotation start) after the operation stops.

For the machine adjustment, home position adjustment, and others, you can shift the position to any position with the station JOG operation or JOG operation.

6.3.1 Station JOG operation

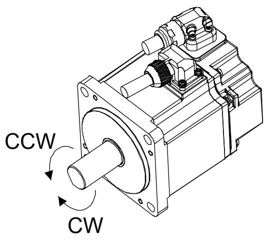
(1) Setting

According to the purpose of use, set devices and parameters as shown below. With this operation, DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8) are disabled.

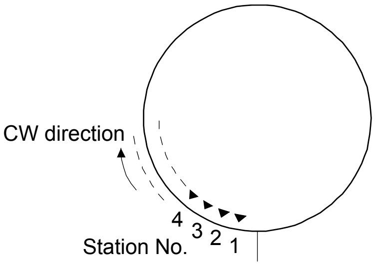
Item	Used device/parameter	Setting
Selecting indexer method	Control mode selection of [Pr. PA01]	Select "_ _ _ 8" (positioning mode (indexer method)).
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	MD1 (Operation mode selection 2)	Switch off MD1.
Station JOG operation selection	[Pr. PT27]	Select "_ _ 0 _" (Station JOG operation).
Rotation direction selection	SIG (External limit/Rotation direction decision/Automatic speed selection)	The rotation direction to a station No. will be as follows. Off: Station No. decreasing direction On: Station No. increasing direction
Servo motor speed	[Pr. PC07]	Set a servo motor speed.
Acceleration time constant/Deceleration time constant	RT (Second acceleration/deceleration selection)	1. When RT is turned off Acceleration time constant: setting value of [Pr. PC01 Acceleration time constant 1] Deceleration time constant: setting value of [Pr. PC02 Deceleration time constant 1] 2. When RT is turned on Acceleration time constant: setting value of [Pr. PC30 Acceleration time constant 2] Deceleration time constant: setting value of [Pr. PC31 Deceleration time constant 2]

(2) Setting assignment direction of station No.

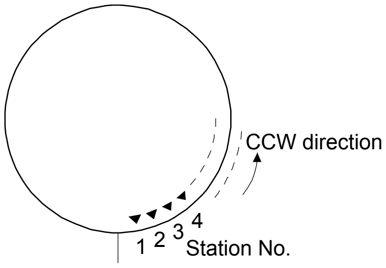
Select an assignment direction of station No. with [Pr. PA14].



[Pr. PA14] setting	Servo motor rotation direction ST1 (Forward rotation start) is on.
0	Next station No. will be assigned in CW direction in order of 1, 2, 3…
1	Next station No. will be assigned in CCW direction in order of 1, 2, 3…



[Pr. PA14]: 0 (initial value)



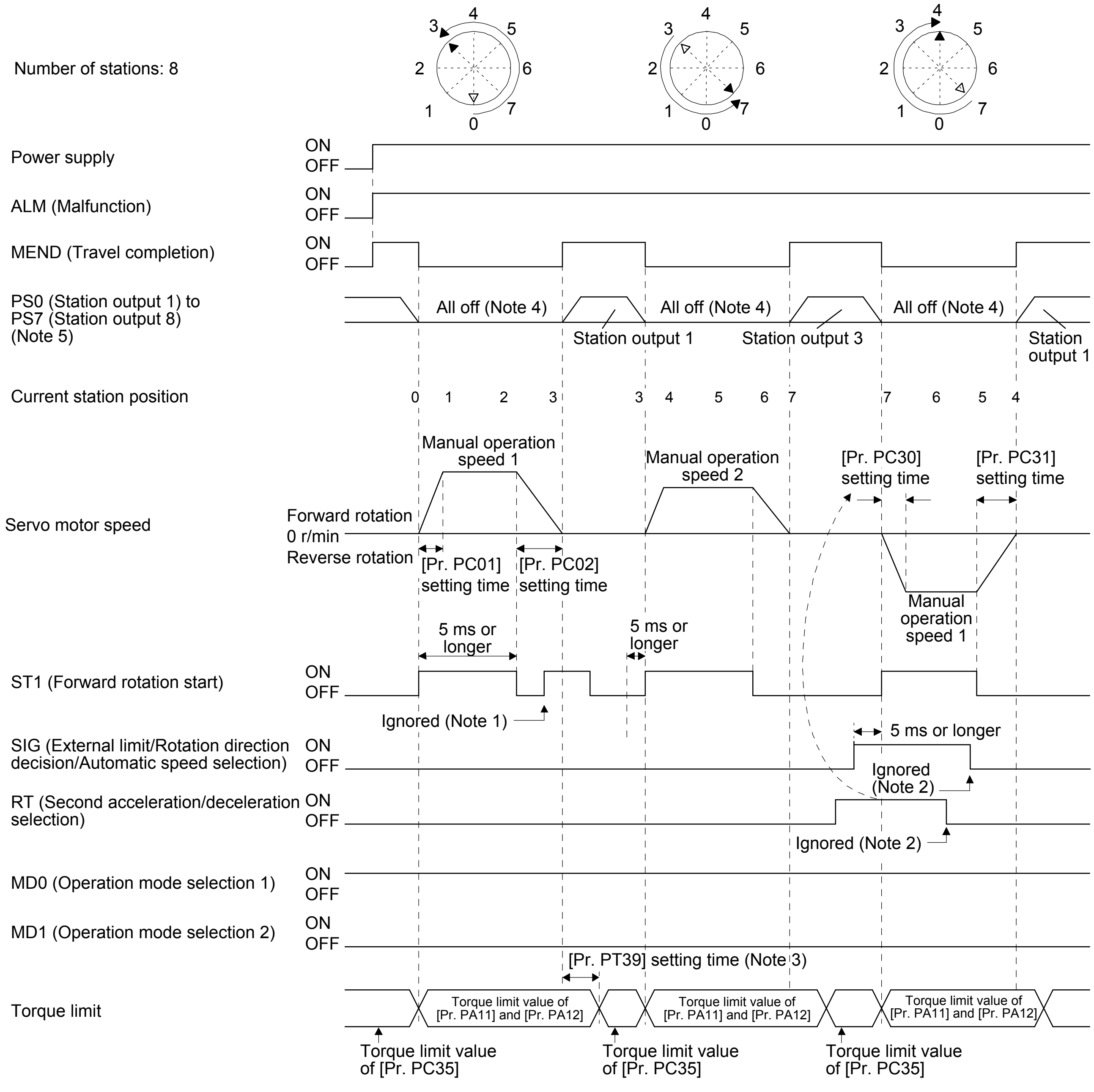
[Pr. PA14]: 1

(3) Operation

Turning on ST1 (Forward rotation start) will start rotation to a direction specified with the rotation direction decision and turning off it will execute a positioning to the closest station position which is possible to decelerate to a stop. However, the shaft stops based on a set time constant depending on the setting value of deceleration time constant. The speed may not reach the specified speed.

(4) Timing chart

The following timing chart shows that a JOG operation is performed at a stop of the station No. 0 when servo-on.



Note
1. When the rest of command travel distance is other than "0", ST1 (Forward rotation start) will not be accepted. Refer to section 6.4.5 (1).
2. SIG and RT (Second acceleration/deceleration selection) will not be accepted during operation. Selection of the servo motor speed and acceleration/deceleration time constants will be enabled by on-edge of ST1 (Forward rotation start). However, when the rest of command travel distance is other than "0", turning on ST1 (Forward rotation start) will not be enabled.
3. Counting will start when the rest of command travel distance becomes "0".
4. When MEND (Travel completion) is off, the station position outputs will be "0" (all off).
5. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.3.2 JOG operation

(1) Setting

According to the purpose of use, set devices and parameters as shown below. With this operation, DI0 (Next station No. selection 1) to DI7 (Next station No. selection 8) are disabled.

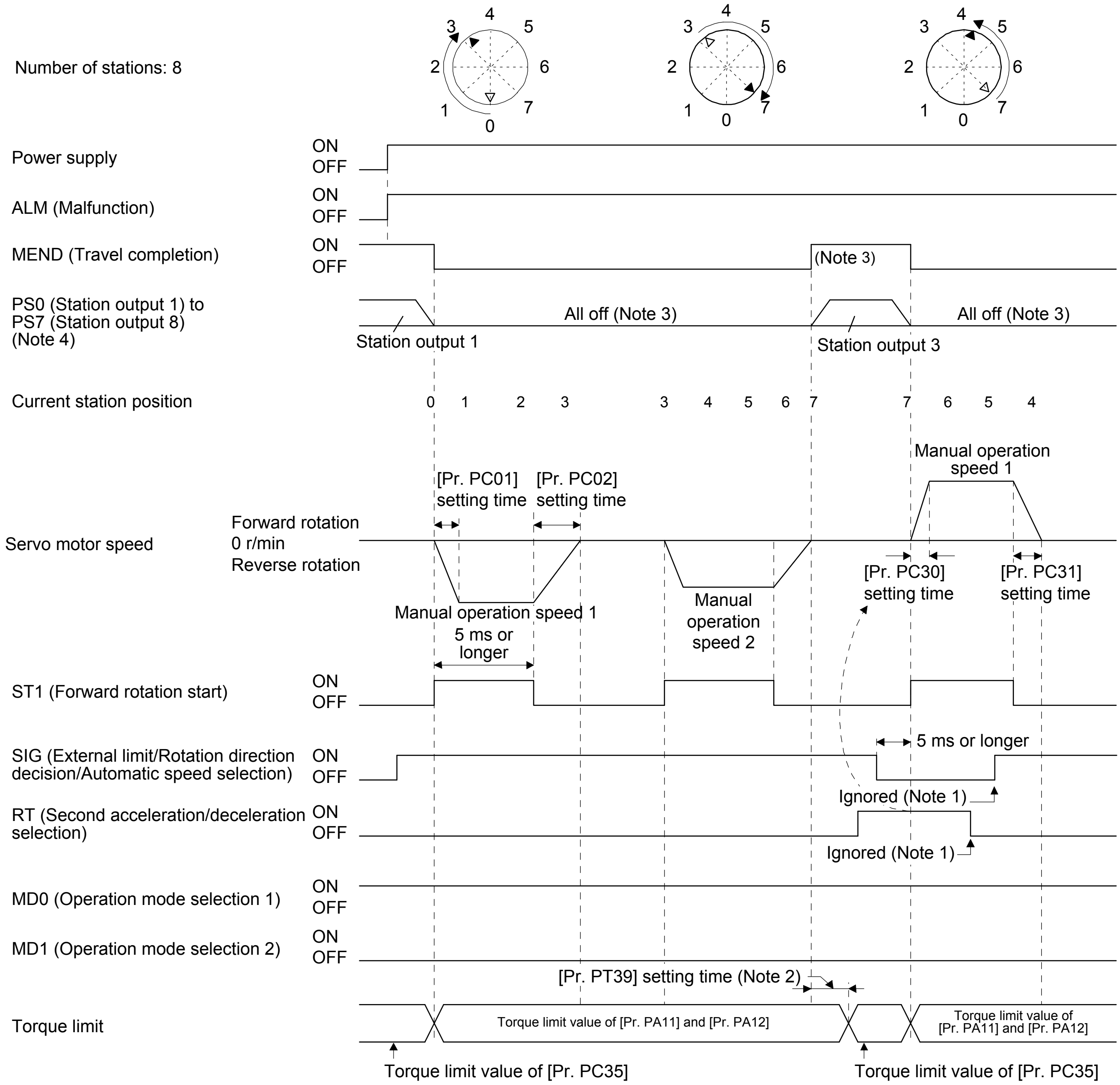
Item	Used device/parameter	Setting
Selecting indexer method	Control mode selection of [Pr. PA01]	Select "_ _ _ 8" (positioning mode (indexer method)).
Manual operation mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	MD1 (Operation mode selection 2)	Switch off MD1.
JOG operation selection	[Pr. PT27]	Select "_ _ 1 _" (JOG operation).
Rotation direction selection	SIG (External limit/Rotation direction decision/Automatic speed selection)	The rotation direction to a station No. will be as follows. Off: Station No. decreasing direction On: Station No. increasing direction
Servo motor speed	[Pr. PC07]	Set a servo motor speed.
Acceleration time constant/Deceleration time constant	RT (Second acceleration/deceleration selection)	1. When RT is turned off Acceleration time constant: setting value of [Pr. PC01 Acceleration time constant 1] Deceleration time constant: setting value of [Pr. PC02 Deceleration time constant 1] 2. When RT is turned on Acceleration time constant: setting value of [Pr. PC30 Acceleration time constant 2] Deceleration time constant: setting value of [Pr. PC31 Deceleration time constant 2]

(2) Operation

Turning on ST1 (Forward rotation start) will start rotation to a direction specified with the rotation direction decision and turning off it will decelerate to a stop regardless of the station position.

(3) Timing chart

The following timing chart shows that a JOG operation is performed at a stop of the station No. 0 when servo-on.



Note 1. SIG and RT (Second acceleration/deceleration selection) will not be accepted during operation. Selection of the servo motor speed and acceleration/deceleration time constants will be enabled by on-edge of ST1 (Forward rotation start). However, when the rest of command travel distance is other than "0", turning on ST1 (Forward rotation start) will not be enabled.

2. Counting will start when the rest of command travel distance becomes "0".

3. MEND (Travel completion) is off because the shaft does not stop within the in-position range of each next station position. When MEND (Travel completion) turns off, PS0 (Station output 1) to PS7 (Station output 8) will not be outputted. Additionally, the station position outputs will be "0" (all off) during home position return incompletion.

4. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.4 Home position return mode

POINT

- Before performing the home position return, check that the limit switch operates and SIG turns on.
- Check the home position return direction. An incorrect setting will cause a reverse running.
- Check the input polarity of the external limit. Otherwise, it may cause an unexpected operation.
- In the following cases, make sure that the Z-phase has been passed through once before performing a home position return.
  - When a servo amplifier is used in the DD motor control mode

  Z-phase unpassed will trigger [AL. 90.5 Home position return incomplete warning].

6.4.1 Outline of home position return

A home position return is performed to match the command coordinates with the machine coordinates. Under the incremental method, each power-on of the input power supply requires the home position return. Contrastingly, in the absolute position detection system, once you have performed the home position return at machine installation, the current position will be retained even if the power supply is shut off. Therefore, the home position return is unnecessary when the power supply is switched on again.
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.

(1) Home position return types

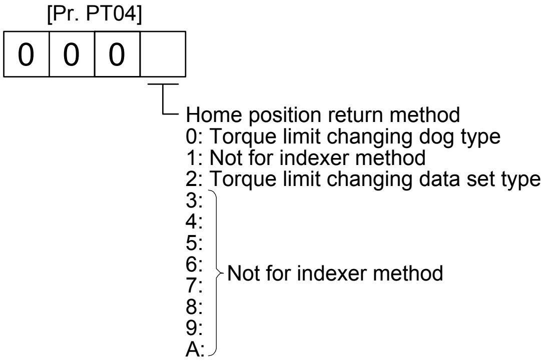
Select the optimum home position return type according to the machine type or others.

System	Home position return method	Feature
Torque limit changing dog type	Deceleration starts at the external limit front end. 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 home position shift distance is used as the home position.	・This is a typical home position return method using an external limit. ・The repeatability of the home position return is high. ・The machine is less loaded. ・Used when the width of the external limit can be set equal to or greater than the deceleration distance of the servo motor.
Torque limit changing data set type	An arbitrary position is used as the home position.	・An external limit is not required.

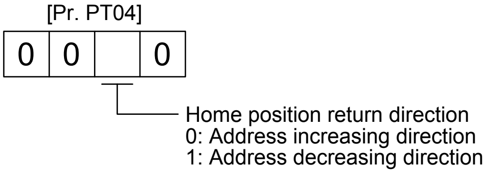
(2) Parameters for home position return

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].

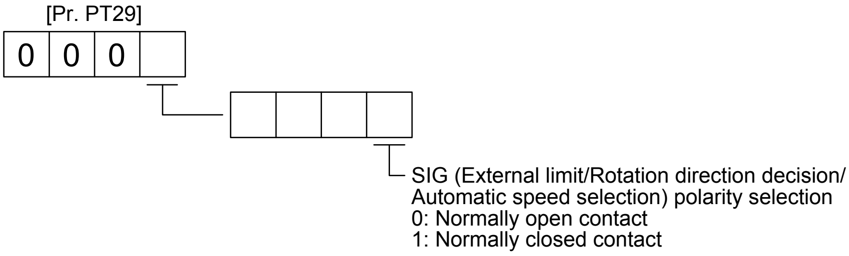


(b) Select the starting direction for the home position return with [Pr. PT04 Home position return type]. Setting "0" starts the home position return in the address increasing direction from the current position. Setting "1" starts the home position return in the address decreasing direction from the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



(c) Select the polarity where the external limit is detected with the SIG polarity selection of [Pr. PT29 Function selection T-3].

Setting "0" is for detection with normally open contact and setting "1" is for detection with normally closed contact.



6.4.2 Torque limit changing dog type home position return

This is a home position return method using an external limit. Deceleration starts at the external limit detection. 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 home position shift distance is used as the home position.

(1) Device/parameter

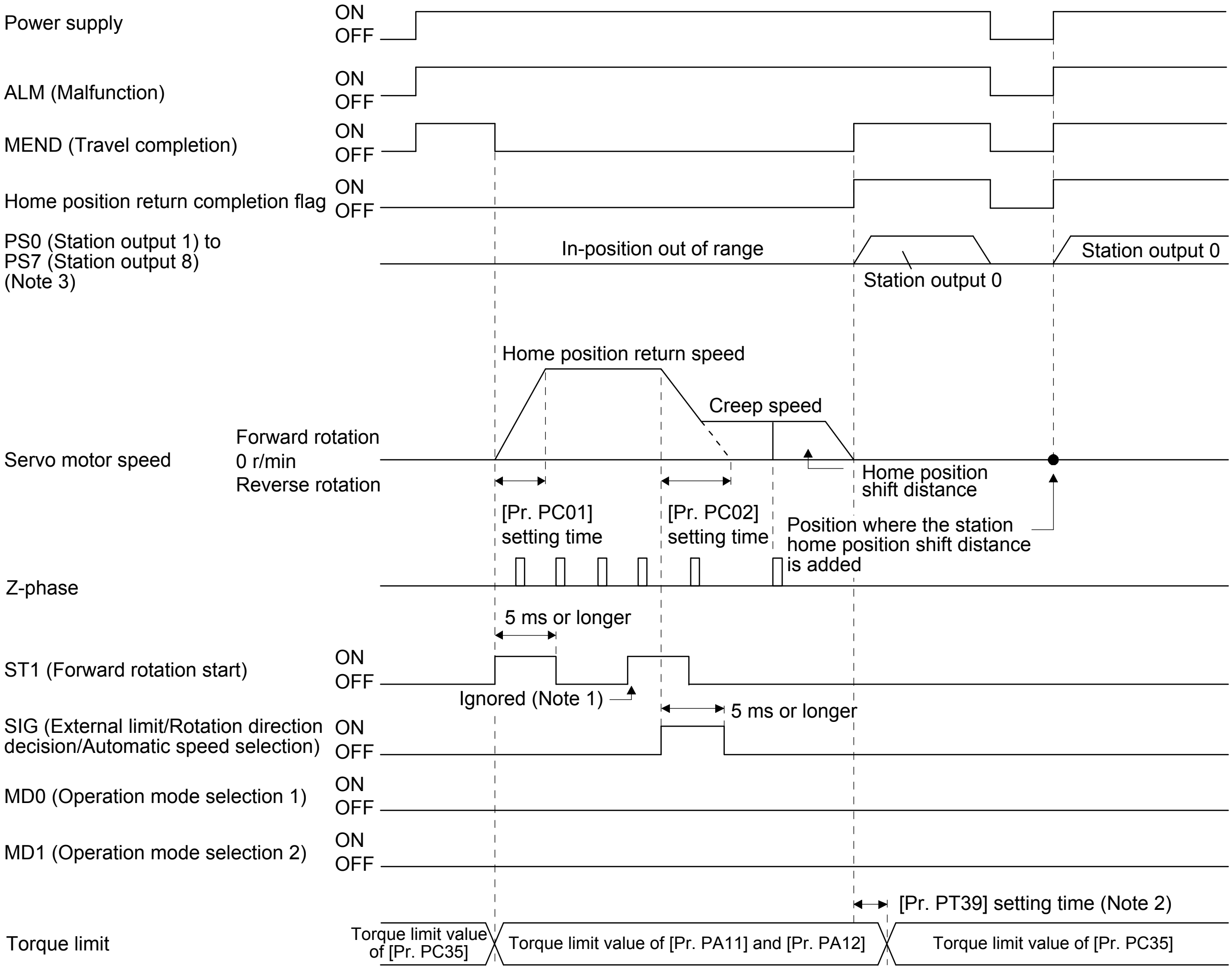
Set input devices and parameters as follows.

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
	MD1 (Operation mode selection 2)	Switch off MD1.
Torque limit changing dog type home position return	[Pr. PT04]	Select "_ _ _ 0" (Torque limit changing dog type).
Home position return speed	[Pr. PT05]	Set the rotation speed specified until an external limit is detected.
Creep speed	[Pr. PT06]	Set the rotation speed specified after an external limit 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 external limit is detected.
Acceleration time constant/Deceleration time constant	RT (Second acceleration/deceleration selection)	1. When RT is turned off Acceleration time constant: setting value of [Pr. PC01 Acceleration time constant 1] Deceleration time constant: setting value of [Pr. PC02 Deceleration time constant 1] 2. When RT is turned on Acceleration time constant: setting value of [Pr. PC30 Acceleration time constant 2] Deceleration time constant: setting value of [Pr. PC31 Deceleration time constant 2]
Station home position shift distance (Note 1, 2)	[Pr. PT40]	Set a shift distance of the station home position (station No. 0) for the home position return completion.

Note 1. The setting of the station home position shift distance is disabled at home position return. Cycling the power will enable the setting.

2. [Pr. PT40 Station home position shift distance] is enabled as an offset to the position that the home position return is performed. If a larger value than the in-position range is set to [Pr. PT40], the completion output of positioning will not turn on (short circuit) at the first power on after home position return.

(2) Timing chart



Note 1. When the rest of command travel distance is other than "0", turning on ST1 (Forward rotation start) will not be enabled.

2. Counting will start when the rest of command travel distance becomes "0".

3. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.4.3 Torque limit changing data set type

POINT

- When the data set type home position return is selected, [AL. 52] and [AL. 42] will not be detected.
- If the servo motor is rotated in the home position return mode and the mode is changed to automatic mode without home position return, the following may occur.
  1. [AL. 42] or [AL. 52] can occur.
  2. Even though [AL. 42] or [AL. 52] does not occur, the motor will try to compensate a position gap to the command position at start signal input because the current position is out of position with the command position. Watch out for the servo motor rotation due to the compensation the gap to zero between command position and current position.
- When [AL. 90] is occurring, performing home position return will automatically cancel the alarm.
- When [AL. 25] is occurring, cycling the power will cancel the alarm.

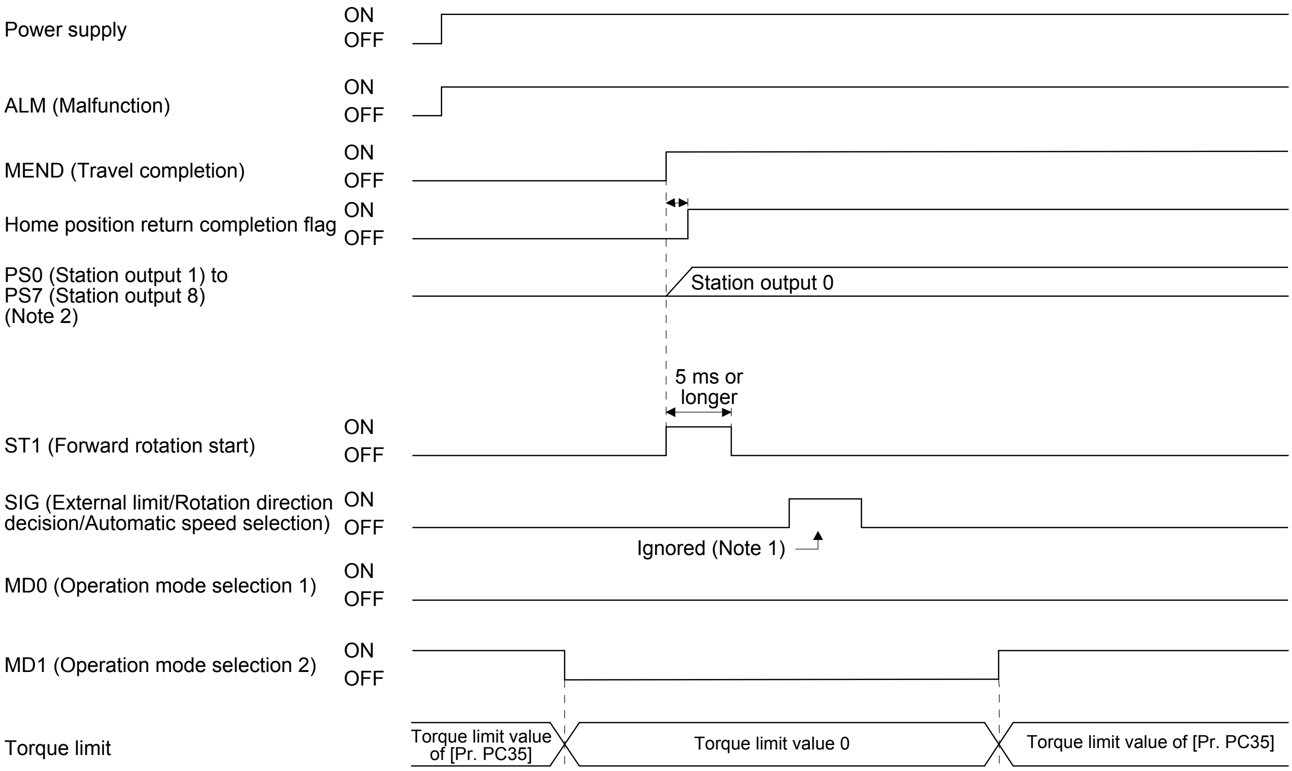
When setting any position as home, use the torque limit changing data set type home position return. The JOG operation, manual pulse generator operation, and others can be used for the travel. With this home position return, torque will not be generated simultaneously at switching to the home position return mode. The shaft can be rotated with an external force to set any home position.
Additionally, SIG is not used. SIG is disabled even if turn off.

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

Item	Used device/parameter	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch off MD0.
	MD1 (Operation mode selection 2)	Switch off MD1.
Data set type home position return	[Pr. PT04]	Select "_ _ _ 2" (Select the torque limit changing data set type.).
Station home position shift distance (Note 1, 2)	[Pr. PT40]	Set a shift distance of the station home position (station No. 0) for the home position return completion.

Note 1. The setting of the station home position shift distance is disabled at home position return. Cycling the power will enable the setting.
2. [Pr. PT40 Station home position shift distance] is enabled as an offset to the position that the home position return is performed. If a larger value than the in-position range is set to [Pr. PT40], the completion output of positioning will not turn on (short circuit) at the first power on after home position return.

(2) Timing chart



Note 1. When a data set type home position return is performed, SIG will be disabled.

2. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

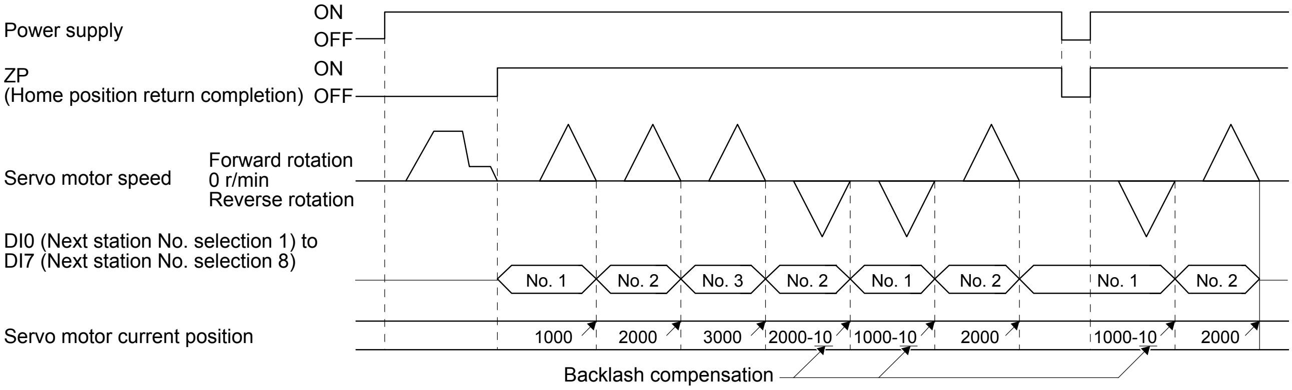
6.4.4 Backlash compensation and digital override

(1) Backlash compensation

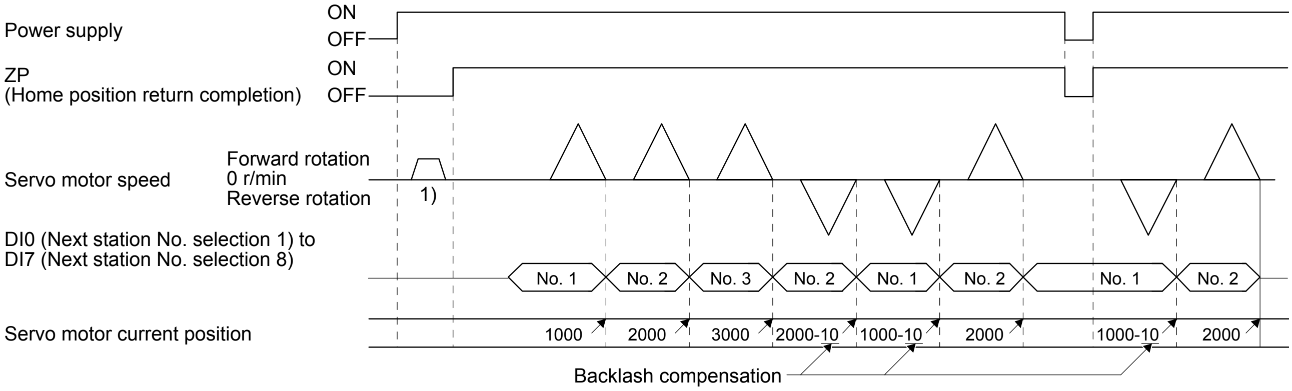
When executing a positioning reversely to the direction to the home position return, set [Pr. PT14 Backlash compensation] to stop the shaft at the compensated position for the setting value.

When the travel distance between stations is set to 1000 and the backlash compensation is set to 10 in the absolute position detection system, the timing chart is as follows.

(a) Torque limit changing dog type home position return



(b) Torque limit changing data set type



Backlash is compensated to the direction set with [Pr. PT38] regardless of a JOG operation (1)) or disturbance after power-on.

[Pr. PT38] setting	Backlash compensation
"0 _ _ _"	Executes backlash compensation assuming a command to the CW rotation direction before home position return.
"1 _ _ _"	Executes backlash compensation assuming a command to the CCW rotation direction before home position return.

(2) Digital override

Setting [Pr. PT38] to "_ _ 1 _" enables the digital override function.

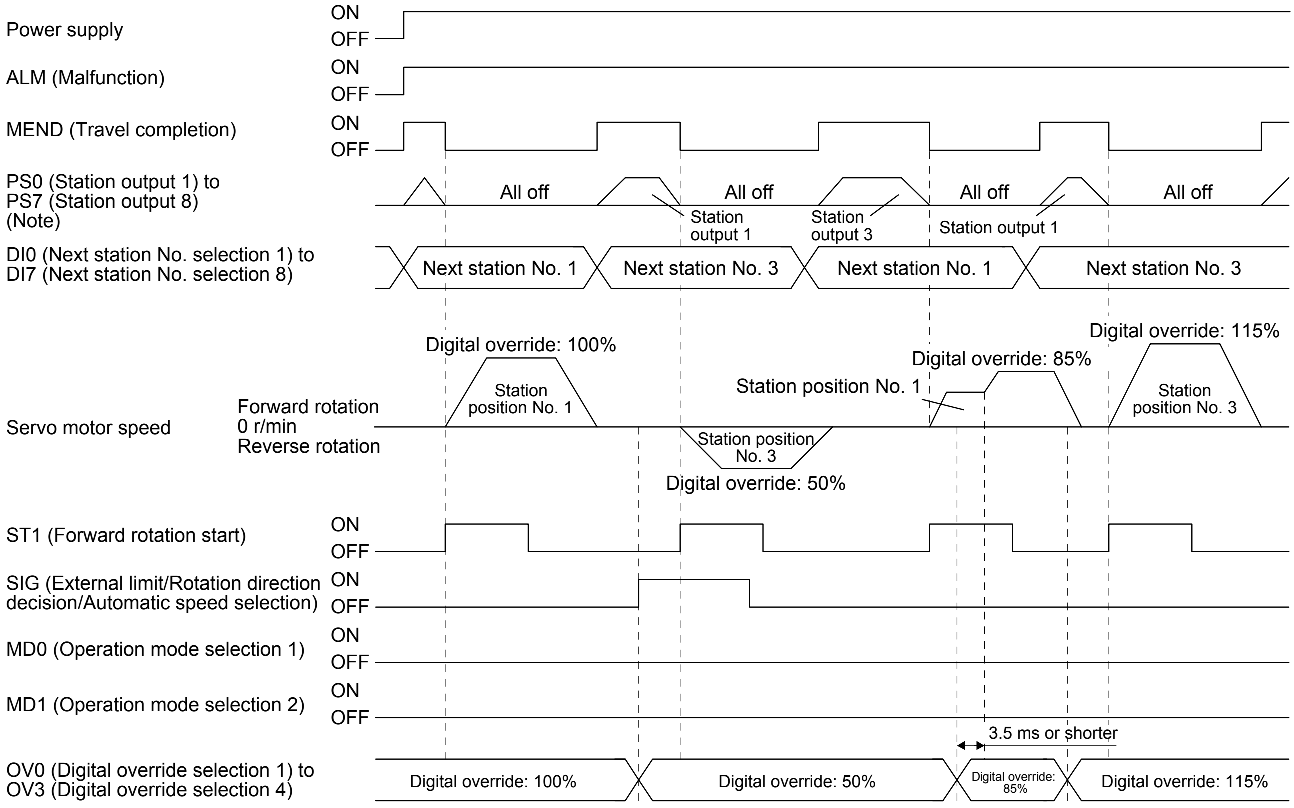
Actual servo motor speed will be the value multiplying the command speed by the digital override selected with OV0 (Digital override selection 1) to OV3 (Digital override selection 4). This is enabled with all the operation modes.

Example) [Pr. PT42]: 50, [Pr. PT43]: 5

(Note) Device				Description
OV3	OV2	OV1	OV0	
0	0	0	0	100 [%] of parameter setting speed
0	0	0	1	50 [%] of parameter setting speed
0	0	1	0	55 [%] of parameter setting speed
0	0	1	1	60 [%] of parameter setting speed
. . .	. . .	. . .	. . .	. . .
1	1	0	1	110 [%] of parameter setting speed
1	1	1	0	115 [%] of parameter setting speed
1	1	1	1	0 [%] of parameter setting speed

Note. 0: Off
1: On

(a) When [Pr. PT42] is set to 50 and [Pr. PT43] to 5 in the automatic operation mode 1 (Rotation direction specifying indexer), the chart will be as follows.

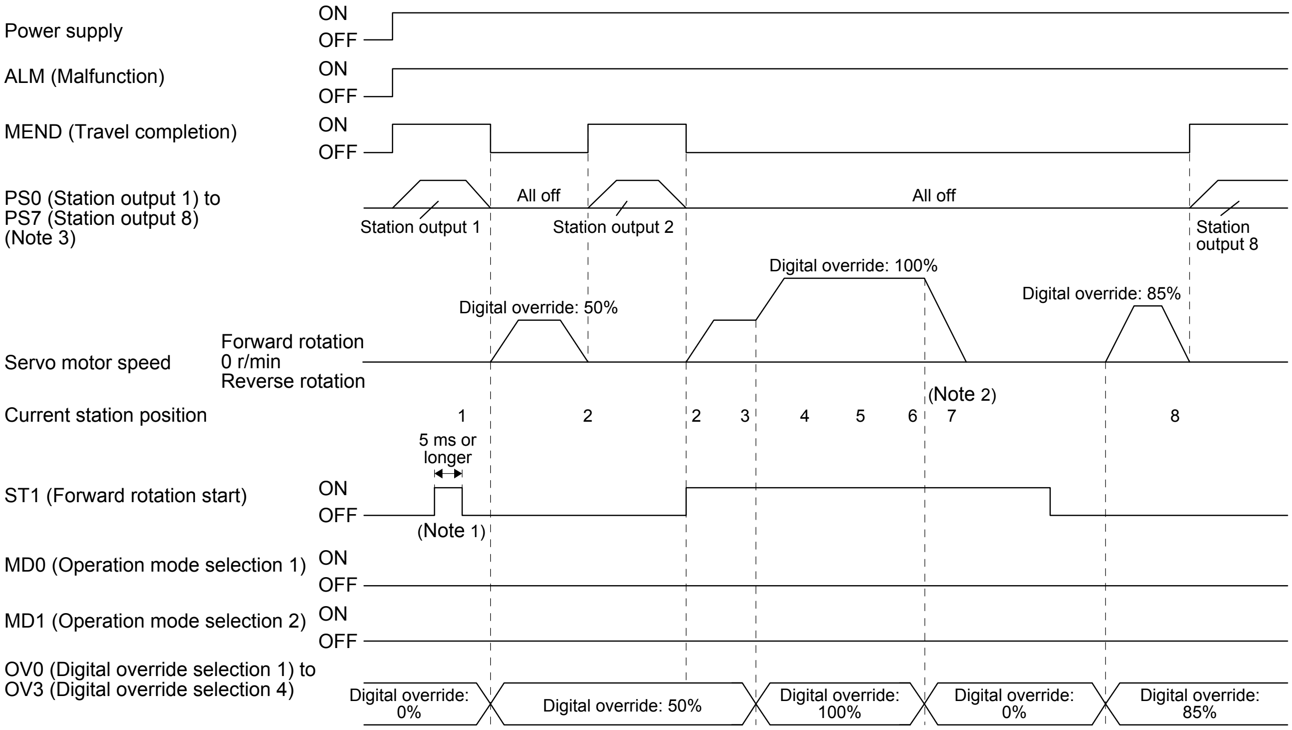


Note. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

POINT

- Speed changes with the digital override function are enabled with the following conditions.
  - Automatic operation mode
  - Manual operation mode
  - Home position return is in progress.

(b) When [Pr. PT42] is set to 50 and [Pr. PT43] to 5 in the station JOG operation, the chart will be as follows.



Note 1. In the manual operation mode, when turning on/off ST1 (Forward rotation start) with 0% digital override and change the digital override to other than 0%, the shaft will stop at the closest station regardless of ST1 (Forward rotation start) off.

2. Changing the digital override to 0% during operation will decelerate to a stop. Then, the digital override is changed to 0%, JOG operation will start again. In that case, the shaft stops at the closest station regardless of ST1 (Forward rotation start) off.

3. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PS0 to PS7 cannot be outputted simultaneously.

6.4.5 Safety precautions

(1) I/O signal

(a) When a home position return is not executed in the absolute position detection system and incremental system...
The station output signals will not be outputted (all off).

(b) When one or more home position returns is completed...

1) At power-on and forced stop, corresponding station output signal will be outputted if only it is within the in-position range of each next station position.

2) After power-on or during servo motor driving after forced stop, PS0 (Station output 1) to PS7 (Station output 8) will be off without change with a command travel distance other than "0" even if it is within the in-position range of target next station.

3) After power-on or after servo motor driving after forced stop canceled, corresponding station output signal will be outputted if only it is within the in-position range of target next station to stop with the rest of command travel distance "0".

(2) Torque limit

The torque limit will change from the setting value of [Pr. PC35 Internal torque limit 2] to the setting value of [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit] at inputting ST1 (Forward rotation start) of the automatic operation mode 1, automatic operation mode 2, manual operation, and torque limit changing dog type home position return. Additionally, after positioning completed signal is outputted, the time has passed set with [Pr. PT39] and the torque limit will change from [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit] to the setting value of [Pr. PC35 Internal torque limit 2].

(3) Test operation

Always turn off the power after the JOG test operation, positioning test operation, and machine analyzer function operation. The shaft cannot stop at the next station position because the coordinate system has a gap for the shaft control.

(4) Deceleration to a stop function

When the operation is stopped with the deceleration to a stop function during each operation mode of the rotation direction specifying indexer, shortest rotating indexer, and station JOG, the shaft will stop regardless of the station position.

MEMO

7. PARAMETERS

⚠CAUTION

- Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable.
- If fixed values are written in the digits of a parameter, do not change these values.
- Do not change parameters for manufacturer setting.
- Do not set a value other than the described values to each parameter.

POINT

- The following parameters are not available with MR-J4-03A6-RJ servo amplifiers.
  - [Pr. PA02 Regenerative option]
  - [Pr. PA17 Servo motor series setting]
  - [Pr. PA18 Servo motor type setting]
  - [Pr. PA26 Function selection A-5]
  - [Pr. PC44 Function selection C-9]
  - [Pr. PC45 Function selection C-A]
  - [Pr. PD47 Output device selection 7]
  - [Pr. PE03 Fully closed loop function selection 2]
  - [Pr. PE04 Fully closed loop control - Feedback pulse electronic gear 1 - Numerator]
  - [Pr. PE05 Fully closed loop control - Feedback pulse electronic gear 1 - Denominator]
  - [Pr. PE06 Fully closed loop control - Speed deviation error detection level]
  - [Pr. PE07 Fully closed loop control - Position deviation error detection level]
  - [Pr. PE08 Fully closed loop dual feedback filter]
  - [Pr. PE10 Fully closed loop function selection 3]
  - [Pr. PE34 Fully closed loop control - Feedback pulse electronic gear 2 - Numerator]
  - [Pr. PE35 Fully closed loop control - Feedback pulse electronic gear 2 - Denominator]
  - [Pr. PF25 SEMI-F47 function - Instantaneous power failure detection time]
  - [Pr. PF34 RS-422 communication function selection 3]
- Linear servo motor/DD motor setting parameters ([Pr. PL_ _]) cannot be used with MR-J4-03A6-RJ servo amplifiers.

7.1 Parameter list

POINT

- To enable a parameter whose symbol is preceded by *, cycle the power after setting it.
- Abbreviations of operation modes indicate the followings.
  Standard: Standard (semi closed loop system) use of the rotary servo motor
  Full.: Fully closed loop system use of the rotary servo motor
  Lin.: Linear servo motor use
  DD: Direct drive (DD) motor use
- For MR-J4-03A6-RJ servo amplifiers, the operation mode is available only in standard (semi closed loop system).
- The symbols in the control mode column mean as follows.
  CP: Positioning mode (point table method)
  BCD: Positioning mode (point table method in the BCD input positioning operation)
  This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
  CL: Positioning mode (program method)
  PS: Positioning mode (indexer 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 a positioning mode, cycle the power after setting.
  - [Pr. PA06 Electronic gear numerator (command pulse multiplication numerator)/Number of gear teeth on machine side]
  - [Pr. PA06 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	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PA01	*STY	Operation mode	1000h		○	○	○	○	○	○	○
PA02	*REG	Regenerative option	0000h		○	○	○	○	○	○	○
PA03	*ABS	Absolute position detection system	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		○	○	○	○	○	○	
		Number of gear teeth on machine side	1		○			○			○
PA07	*CDV	Electronic gear denominator (command pulse multiplication denominator)	1		○	○	○	○	○	○	
		Number of gear teeth on servo motor side	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/positive direction thrust limit	100.0	[%]	○	○	○	○	○	○	○
PA12	TLN	Reverse rotation torque limit/negative direction thrust limit	100.0	[%]	○	○	○	○	○	○	○
PA13	*PLSS	Command pulse input form	0100h		○	○	○	○	○	○	○
PA14	*POL	Rotation direction selection/travel direction selection	0		○	○	○	○	○	○	○
PA15	*ENR	Encoder output pulses	4000	[pulse/rev]	○	○	○	○	○	○	○
PA16	*ENR2	Encoder output pulses 2	1		○	○	○	○	○	○	○
PA17	*MSR	Servo motor series setting	0000h				○		○	○	○
PA18	*MTY	Servo motor type setting	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	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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/load to motor mass 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	0000h		○	○	○	○	○	○	○
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/load to motor mass 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		○	○	○	○	○	○	○

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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]	○	○	○	○	○	○	○
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 a positioning mode, cycle the power after setting.
  - [Pr. PC03 S-pattern acceleration/deceleration time constant]
- The following parameter cannot be used in the positioning mode.
  - [Pr. PC04 Torque command time constant/thrust 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-J4-_A_-RJ 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	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PC01	STA	JOG operation acceleration time constant	0	[ms]	○	○	○	○	\	○	\
		Acceleration time constant 1			○	\	\	○	\	\	○
PC02	STB	JOG operation deceleration time constant	0	[ms]	○	○	○	○	\	○	\
		Deceleration time constant 1			○	\	\	○	\	\	○
PC03	*STC	S-pattern acceleration/deceleration time constant	0	[ms]	○	\	○	○	○	○	\
PC04	TQC	Torque command time constant/thrust command time constant	0	\	\	\	\	\	\	\	\
PC05	SC1	Automatic operation speed 1	100	[r/min]	○	\	\	○	\	\	○
PC06	SC2	Automatic operation speed 2	500	[r/min]	○	\	\	○	\	\	○
PC07	SC3	Manual operation speed 1	1000	[r/min]	○	\	\	○	\	\	○
PC08	SC4	Internal speed command 4	200	[r/min]/ [mm/s]	\	\	\	\	\	\	\
		Internal speed limit 4									
PC09	SC5	Internal speed command 5	300	[r/min]/ [mm/s]							
		Internal speed limit 5									
PC10	SC6	Internal speed command 6	500	[r/min]/ [mm/s]							
		Internal speed limit 6									
PC11	SC7	Internal speed command 7	800	[r/min]/ [mm/s]							
		Internal speed limit 7									
PC12	VCM	Analog speed command - Maximum speed	0	[r/min]/ [mm/s]							
		Analog speed limit - Maximum speed									
PC13	TLC	Analog torque/thrust command maximum output	100.0	[%]	\	\	\	\	\	\	\

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PC14	MOD1	Analog monitor 1 output	0000h		○	○	○	○	○	○	○
PC15	MOD2	Analog monitor 2 output	0001h		○	○	○	○	○	○	○
PC16	MBR	Electromagnetic brake sequence output	0	[ms]	○	○	○	○	○	○	○
PC17	ZSP	Zero speed	50	[r/min]/ [mm/s]	○	○	○	○	○	○	○
PC18	*BPS	Alarm history clear	0000h		○	○	○	○	○	○	○
PC19	*ENRS	Encoder output pulse selection	0000h		○	○	○	○	○	○	○
PC20	*SNO	Station No. setting	0	[station]	○	○	○	○	○	○	○
PC21	*SOP	RS-422 communication function selection	0000h		○	○	○	○	○	○	○
PC22	*COP1	Function selection C-1	0000h		○	○	○	○	○	○	○
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	*COP7	Function selection C-7	0000h				○		○	○	
PC29		For manufacturer setting	0000h								
PC30	STA2	Home position return acceleration time constant	0	[ms]	○		○	○		○	
		Acceleration time constant 2			○			○			○
PC31	STB2	Home position return deceleration time constant	0	[ms]	○		○	○		○	
		Deceleration time constant 2			○			○			○
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/internal thrust 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]/[mm]	○	○	○	○	○	○	○
PC44	*COP9	Function selection C-9	0000h			○			○	○	
PC45	*COPA	Function selection C-A	0000h			○	○		○	○	
PC46		For manufacturer setting	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]/ [0.01mm]	○	○	○	○	○	○	○
PC55		For manufacturer setting	0								
PC56			100								
PC57			0000h								
PC58			0								
PC59			0000h								
PC60	*COPD	Function selection C-D	0000h		○				○	○	

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PC61		For manufacturer setting	0000h								
PC62			0000h								
PC63			0000h								
PC64			0000h								
PC65			0000h								
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		○	○	○	○	○	○	○
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. PD05 Input device selection 2L]
  - [Pr. PD07 Input device selection 3L]
  - [Pr. PD09 Input device selection 4L]
  - [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. PD21 Input device selection 10L]
  - [Pr. PD43 Input device selection 11L]
  - [Pr. PD45 Input device selection 12L]

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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	*DI2L	Input device selection 2L	2100h								
PD06	*DI2H	Input device selection 2H	2021h		○	○	○	○	○	○	○
PD07	*DI3L	Input device selection 3L	0704h								
PD08	*DI3H	Input device selection 3H	0707h		○	○	○	○	○	○	○
PD09	*DI4L	Input device selection 4L	0805h								
PD10	*DI4H	Input device selection 4H	0808h		○	○	○	○	○	○	○
PD11	*DI5L	Input device selection 5L	0303h								
PD12	*DI5H	Input device selection 5H	3803h		○	○	○	○	○	○	○
PD13	*DI6L	Input device selection 6L	2006h								
PD14	*DI6H	Input device selection 6H	3920h		○	○	○	○	○	○	○
PD15		For manufacturer setting	0000h								
PD16			0000h								
PD17	*DI8L	Input device selection 8L	0A0Ah								
PD18	*DI8H	Input device selection 8H	0A00h		○	○	○	○	○	○	○
PD19	*DI9L	Input device selection 9L	0B0Bh								
PD20	*DI9H	Input device selection 9H	0B00h		○	○	○	○	○	○	○
PD21	*DI10L	Input device selection 10L	2323h								
PD22	*DI10H	Input device selection 10H	2B23h		○	○	○	○	○	○	○
PD23	*DO1	Output device selection 1	0004h		○	○	○	○	○	○	○
PD24	*DO2	Output device selection 2	000Ch		○	○	○	○	○	○	○
PD25	*DO3	Output device selection 3	0004h		○	○	○	○	○	○	○
PD26	*DO4	Output device selection 4	0007h		○	○	○	○	○	○	○
PD27		For manufacturer setting	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		○	○	○	○	○	○	○

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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	3A00h		○	○	○	○	○	○	○
PD45	*DI12L	Input device selection 12L	0000h								
PD46	*DI12H	Input device selection 12H	3B00h		○	○	○	○	○	○	○
PD47	*DO7	Output device selection 7	0000h		○	○	○	○	○	○	○
PD48		For manufacturer setting	0000h								

7.1.5 Extension setting 2 parameters ([Pr. PE_ _])

POINT

- The following parameter cannot be used in the positioning mode.
  - [Pr. PE01 Fully closed loop function selection 1]

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PE01	*FCT1	Fully closed loop function selection 1	0000h								
PE02		For manufacturer setting	0000h								
PE03	*FCT2	Fully closed loop function selection 2	0003h			○			○	○	
PE04	*FBN	Fully closed loop control - Feedback pulse electronic gear 1 - Numerator	1			○			○	○	
PE05	*FBD	Fully closed loop control - Feedback pulse electronic gear 1 - Denominator	1			○			○	○	
PE06	BC1	Fully closed loop control - Speed deviation error detection level	400	[r/min]		○			○	○	
PE07	BC2	Fully closed loop control - Position deviation error detection level	100	[kpulse]		○			○	○	
PE08	DUF	Fully closed loop dual feedback filter	10	[rad/s]		○			○	○	
PE09		For manufacturer setting	0000h								
PE10	FCT3	Fully closed loop function selection 3	0000h			○			○	○	
PE11		For manufacturer setting	0000h								
PE12			0000h								
PE13			0000h								
PE14			0111h								
PE15			20								
PE16			0000h								
PE17			0000h								
PE18			0000h								
PE19			0000h								
PE20			0000h								
PE21			0000h								

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PE22		For manufacturer setting	0000h								
PE23			0000h								
PE24			0000h								
PE25			0000h								
PE26			0000h								
PE27			0000h								
PE28			0000h								
PE29			0000h								
PE30			0000h								
PE31			0000h								
PE32			0000h								
PE33			0000h								
PE34	*FBN2	Fully closed loop control - Feedback pulse electronic gear 2 - Numerator	1			○			○	○	
PE35	*FBD2	Fully closed loop control - Feedback pulse electronic gear 2 - Denominator	1			○			○	○	
PE36		For manufacturer setting	0.0								
PE37			0.00								
PE38			0.00								
PE39			20								
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]	○	○	○	○	○	○	○
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-J4-_A_-RJ 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	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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	DBT	Electronic dynamic brake operating time	2000	[ms]	○	○			○	○	○
PF16		For manufacturer setting	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	SEMI-F47 function - Instantaneous power failure detection time	200	[ms]	○	○	○	○	○	○	○
PF26		For manufacturer setting	0								
PF27			0								
PF28			0								
PF29			0000h								
PF30			0								
PF31	FRIC	Machine diagnosis function - Friction judgement speed	0	[r/min]/ [mm/s]	○	○	○	○	○	○	○
PF32		For manufacturer setting	50								
PF33			0000h								
PF34	*SOP3	RS-422 communication function selection 3	0000h		○	○	○	○	○	○	○

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PF35		For manufacturer setting	0000h								
PF36			0000h								
PF37			0000h								
PF38			0000h								
PF39			0000h								
PF40			0								
PF41			0								
PF42			0								
PF43			0								
PF44			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 Linear servo motor/DD motor setting parameters ([Pr. PL_ _])

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PL01	*LIT1	Linear servo motor/DD motor function selection 1	0301h				○	○	○	○	○
PL02	*LIM	Linear encoder resolution - Numerator	1000	[μm]			○		○	○	
PL03	*LID	Linear encoder resolution - Denominator	1000	[μm]			○		○	○	
PL04	*LIT2	Linear servo motor/DD motor function selection 2	0003h				○	○	○	○	○
PL05	LB1	Position deviation error detection level	0	[mm]/ [0.01rev]			○	○	○	○	○
PL06	LB2	Speed deviation error detection level	0	[r/min]/ [mm/s]			○	○	○	○	○
PL07	LB3	Torque/thrust deviation error detection level	100	[%]			○	○	○	○	○
PL08	*LIT3	Linear servo motor/DD motor function selection 3	0010h				○	○	○	○	○
PL09	LPWM	Magnetic pole detection voltage level	30	[%]			○	○	○	○	○
PL10		For manufacturer setting	5								
PL11			100								
PL12			500								
PL13			0000h								
PL14			0000h								
PL15			20								
PL16			0								
PL17	LTSTS	Magnetic pole detection - Minute position detection method - Function selection	0000h				○	○	○	○	○
PL18	IDLV	Magnetic pole detection - Minute position detection method - Identification signal amplitude	0	[%]			○	○	○	○	○
PL19		For manufacturer setting	0								
PL20			0								
PL21			0								
PL22			0								
PL23			0000h								
PL24			0								
PL25			0000h								
PL26			0000h								
PL27			0000h								

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
PL28		For manufacturer setting	0000h								
PL29			0000h								
PL30			0000h								
PL31			0000h								
PL32			0000h								
PL33			0000h								
PL34			0000h								
PL35			0000h								
PL36			0000h								
PL37			0000h								
PL38			0000h								
PL39			0000h								
PL40			0000h								
PL41			0000h								
PL42			0000h								
PL43			0000h								
PL44			0000h								
PL45			0000h								
PL46			0000h								
PL47			0000h								
PL48			0000h								

7.1.8 Option setting parameters ([Pr. Po_ _])

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
Po01		For manufacturer setting	0000h								
Po02	*ODI1	MR-D01 input device selection 1	0302h		○	○	○	○	○	○	○
Po03	*ODI2	MR-D01 input device selection 2	0905h		○	○	○	○	○	○	○
Po04	*ODI3	MR-D01 input device selection 3	2524h		○	○	○	○	○	○	○
Po05	*ODI4	MR-D01 input device selection 4	2026h		○	○	○	○	○	○	○
Po06	*ODI5	MR-D01 input device selection 5	0427h		○	○	○	○	○	○	○
Po07	*ODI6	MR-D01 input device selection 6	0807h		○	○	○	○	○	○	○
Po08	*ODO1	MR-D01 output device selection 1	2726h		○	○	○	○	○	○	○
Po09	*ODO2	MR-D01 output device selection 2	0423h		○	○	○	○	○	○	○
Po10	*OOP1	Function selection O-1	2001h		○	○	○	○	○	○	○
Po11	*OOP2	Function selection O-2	0000h		○	○	○	○	○	○	○
Po12	*OOP3	Function selection O-3	0000h		○	○	○	○	○		
Po13	*OMOD1	MR-D01 analog monitor 1 output selection	0000h		○	○	○	○	○	○	○
Po14	*OMOD2	MR-D01 analog monitor 2 output selection	0000h		○	○	○	○	○	○	○
Po15	OMO1	MR-D01 analog monitor 1 offset	0	[mV]	○	○	○	○	○	○	○
Po16	OMO2	MR-D01 analog monitor 2 offset	0	[mV]	○	○	○	○	○	○	○
Po17		For manufacturer setting	0000h								
Po18			0000h								
Po19			0000h								
Po20			0000h								
Po21	OVCO	MR-D01 override offset	0	[mV]	○	○	○	○	○	○	○
Po22	OTLO	MR-D01 override offset	0	[mV]	○	○	○	○	○	○	○

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
Po23		For manufacturer setting	0000h								
Po24			0000h								
Po25			0000h								
Po26			0000h								
Po27	*ODI7	MR-D01 input device selection 7	2D2Ch								
Po28	*ODI8	MR-D01 input device selection 8	002Eh								
Po29		For manufacturer setting	0000h								
Po30			0000h								
Po31			0000h								
Po32			0000h								

7.1.9 Positioning control parameters ([Pr. PT_ _])

POINT

- ●The following parameters are used for Modbus-RTU communication. For details, refer to "MR-J4-_A_-RJ Servo Amplifier Instruction Manual (Modbus-RTU communication)".
  - ・[Pr. PT45 Home position return type 2]

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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]/[mm/s]	○	○	○	○	○	○	○
PT06	CRF	Creep speed	10	[r/min]/ [mm/s]	○	○	○	○	○	○	○
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]/ [mm/s]	○	○	○	○	○	○	○
PT14	*BKC	Backlash compensation	0	[pulse]	○	○	○	○	○	○	○

No.	Symbol	Name	Initial value	Unit	Operation mode				Control mode		
					Standard	Full.	Lin.	DD	CP/BCD	CL	PS
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		○	○	○	○	○	○	
PT27	*ODM	Operation mode selection	0000h		○			○			○
PT28	*STN	Number of stations per rotation	8	[stations]	○			○			○
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		For manufacturer setting	0000h								
PT36			0000h								
PT37			10								
PT38	*TOP7	Function selection T-7	0000h		○			○			○
PT39	INT	Torque limit delay time	100	[ms]	○			○			○
PT40	*SZS	Station home position shift distance	0	[pulse]	○			○			○
PT41	ORP	Home position return inhibit function selection	0000h		○	○	○	○	○	○	○
PT42	*OVM	Digital override minimum multiplication	0	[%]	○			○			○
PT43	*OVS	Digital override pitch width	0	[%]	○			○			○
PT44		For manufacturer setting	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/BCD	CL	PS
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) 8: Positioning mode (indexer method)	0h	○	○	○
	_ _ x _	Operation mode selection 0: Standard control mode 1: Fully closed loop control mode 4. Linear servo motor control mode 6: DD motor control mode (except 400 V class servo amplifiers) The following settings will trigger [AL. 37 Parameter error]. ・A value is set other than "0", "1", "4", and "6" to this digit. ・"1" or "4" is set to this digit with the indexer method. ・"1" or "4" is set to this digit when "Position data unit" is set to [degree] in [Pr. PT01]. For MR-J4-03A6-RJ servo amplifiers, this digit cannot be used other than the initial value.	0h	○	○	○
	_ x _ _	For manufacturer setting	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 the servo amplifiers of 100 W, a regenerative resistor is not used. ・For servo amplifier of 0.2 kW to 7 kW, built-in regenerative resistor is used. ・Supplied regenerative resistors or regenerative option is used with the servo amplifier of 11 kW to 22 kW. 01: FR-RC-(H)/FR-CV-(H)/FR-BU2-(H) When you use FR-RC-(H) or FR-CV-(H), select "Mode 2 (_ _ _ 1)" of "Undervoltage alarm detection mode selection" in [Pr. PC27]. 02: MR-RB032 03: MR-RB12 04: MR-RB32 05: MR-RB30 06: MR-RB50 (Cooling fan is required.) 08: MR-RB31 09: MR-RB51 (Cooling fan is required.) 0B: MR-RB3N 0C: MR-RB5N (Cooling fan is required.) 80: MR-RB1H-4 81: MR-RB3M-4 (Cooling fan is required.) 82: MR-RB3G-4 (Cooling fan is required.) 83: MR-RB5G-4 (Cooling fan is required.) 84: MR-RB34-4 (Cooling fan is required.) 85: MR-RB54-4 (Cooling fan is required.) 91: MR-RB3U-4 (Cooling fan is required.) 92: MR-RB5U-4 (Cooling fan is required.) FA: When the supplied regenerative resistors or the regenerative option is cooled by the cooling fan to increase the ability with the servo amplifier of 11 kW to 22 kW. For MR-J4-03A6-RJ servo amplifiers, this digit cannot be used other than the initial value.	00h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PA03 *ABS Absolute position detection system	_ _ _ x	Absolute position detection system selection Set this digit when using the absolute position detection system. 0: Disabled (incremental system) 1:Enabled (absolute position detection system) 2: Not used for positioning mode. Setting a value other than "0" and "1" will trigger [AL. 37 Parameter error].	0h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _		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.

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PA06
*CMX
Electronic gear numerator (command pulse multiplication numerator)</td><td></td><td>Set an electronic gear numerator. (Refer to section 7.3.1.)
To enable the parameter values in the positioning mode, cycle the power after setting.
To enable the parameter, select "Electronic gear (0 _ _ _)", "J3 electronic gear setting value compatibility mode (2 _ _ _)", or "J2S electronic gear setting value compatibility mode (3 _ _ _)" of "Electronic gear selection" in [Pr. PA21]. For MR-J4-03A6-RJ servo amplifiers, "J3 electronic gear setting value compatibility mode (2 _ _ _)" and "J2S electronic gear setting value compatibility mode (3 _ _ _)" cannot be selected.
Set the electronic gear within the following range. Setting out of the range will trigger [AL. 37 Parameter error].
<table>
<tr><th>Pr. PA21</th><th>Electronic gear setting range</th></tr>
<tr><td>0 _ _ _</td><td>1/865 < CMX/CDV < 271471</td></tr>
<tr><td>2 _ _ _</td><td>1/13825 < CMX/CDV < 16967</td></tr>
<tr><td>3 _ _ _</td><td>1/27649 < CMX/CDV < 8484</td></tr>
</table>
Setting range: 1 to 16777215</td><td>1</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PA06
*CMX
Number of gear teeth on machine side</td><td></td><td>Set the number of gear teeth on machine side. (Refer to section 7.3.2.)
To enable the parameter values in the positioning mode, cycle the power after setting.
Set the electronic gear within the following range.

(1) 1 ≤ CMX ≤ 16384, 1 ≤ CDV ≤ 16384

(2) $\frac{1}{9999} \le \frac{CMX}{CDV} \le 9999$

(3) CDV × STN ≤ 32767 (STN: Number of stations per rotation [Pr. PT28])

(4) CMX × CDV ≤ 100000

Setting out of the range will trigger [AL. 37 Parameter error].
When a small value is set to the electronic gear ratio with the manual operation mode, the servo motor may not drive at the set servo motor speed.

Travel distance of 1 station = Pt (servo motor resolution) × $\frac{1}{STN} \times \frac{CMX}{CDV}$

Setting range: 1 to 16777215</td><td>1</td><td></td><td></td><td>○</td></tr>
<tr><td>PA07
*CDV
Electronic gear denominator (command pulse multiplication denominator)</td><td></td><td>Set an electronic gear denominator. (Refer to section 7.3.1.)
To enable the parameter values in the positioning mode, cycle the power after setting.
To enable the parameter, select "Electronic gear (0 _ _ _)", "J3 electronic gear setting value compatibility mode (2 _ _ _)", or "J2S electronic gear setting value compatibility mode (3 _ _ _)" of "Electronic gear selection" in [Pr. PA21]. For MR-J4-03A6-RJ servo amplifiers, "J3 electronic gear setting value compatibility mode (2 _ _ _)" and "J2S electronic gear setting value compatibility mode (3 _ _ _)" cannot be selected.
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</td><td>1</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PA07
*CDV
Number of gear teeth on servo motor side</td><td></td><td>Set the number of gear teeth on servo motor side. (Refer to section 7.3.2.)
To enable the parameter values in the positioning mode, cycle the power after setting.
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</td><td>1</td><td></td><td></td><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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]

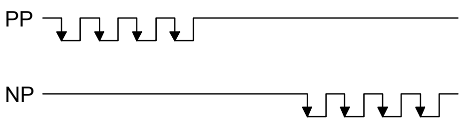
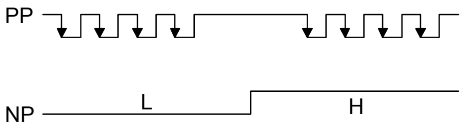
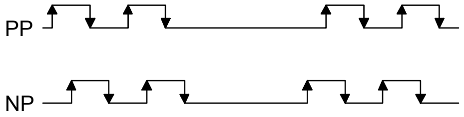
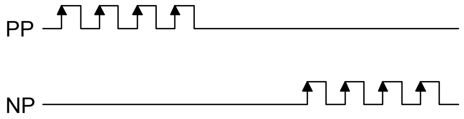
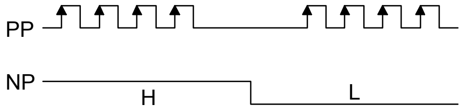
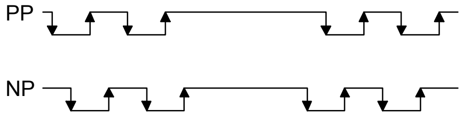
<table>
<tr><th rowspan="2">No./
symbol/name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PA09
RSP
Auto tuning response</td><td colspan="2">Set 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><td>○</td></tr>
<tr><td>PA10
INP
In-position range</td><td colspan="2">Set an in-position range per command.
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 inputted.</td></tr>
<tr><td>_ _ _ 7 (Positioning mode (program method))</td></tr>
<tr><td>_ _ _ 8 (Positioning mode (indexer method))</td><td>The range where MEND (Travel completion) and INP (In-position) are inputted.</td></tr>
</table>
The unit will be as follows depending on the positioning mode.
・Point table method or program method
Select from [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with [Pr. PT01]
・Indexer method
Command unit [pulse] (a load-side rotation expressed by the number of encoder resolution pulses)
For example, when making an in-position range "± 1 degree" for the rotation angle on the load side, set 4194304 × (1/360) = 11650 pulses.

Setting range: 0 to 65535</td><td>100
Refer to Function column for unit.</td><td>○</td><td>○</td><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PA11 TLP Forward rotation torque limit/positive direction thrust limit		You can limit the torque or thrust generated by the servo motor. Set the parameter referring section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". When you output torque or thrust with analog monitor output, the larger value of [Pr. PA11 Forward rotation torque limit/positive direction thrust limit value] or [Pr. PA12 Reverse rotation torque limit/negative direction thrust limit value] will be the maximum output voltage (8 V). Set the parameter on the assumption that the maximum torque or thrust is 100.0 [%]. The parameter is for limiting the torque of the servo motor in the CCW power running or CW regeneration, or limiting the thrust of the linear servo motor in the positive direction power running or negative direction regeneration. Set this parameter to "0.0" to generate no torque or thrust. Setting range: 0.0 to 100.0	100.0 [%]	○	○	○
PA12 TLN Reverse rotation torque limit/negative direction thrust limit		You can limit the torque or thrust generated by the servo motor. Set the parameter referring section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". When you output torque or thrust with analog monitor output, the larger value of [Pr. PA11 Forward rotation torque limit/positive direction thrust limit value] or [Pr. PA12 Reverse rotation torque limit/negative direction thrust limit value] will be the maximum output voltage (8 V). Set the parameter on the assumption that the maximum torque or thrust is 100.0 [%]. The parameter is for limiting the torque of the servo motor in the CW power running or CCW regeneration, or limiting the thrust of the linear servo motor in the positive direction power running or negative direction regeneration. Set this parameter to "0.0" to generate no torque or thrust. 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 Select the same one as logic of command pulse train from controller to connect. Refer to POINT of section 3.6.1 of "MR-J4-_A_(-RJ) 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	○	○	

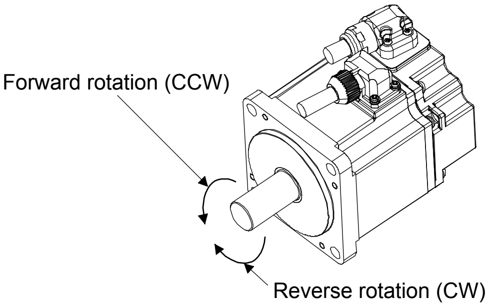
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	Control mode CL	Control mode PS
PA13 *PLSS Command pulse input form	_ x _ _	Command input pulse train filter selection Selecting proper filter enables to enhance noise tolerance. 0: Command input pulse train is 4 Mpulses/s or less. 1: Command input pulse train is 1 Mpulse/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			

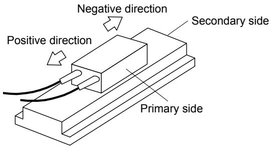
Table 7.3 Command input pulse train form selection

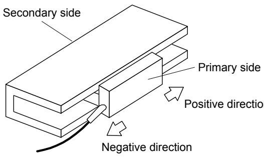
Setting value	Pulse train form		Forward rotation (positive direction)command	Reverse rotation (negative direction)command
_ _ 1 0	Negative logic	Forward rotation pulse train (positive direction pulse train) Reverse rotation pulse train (negative direction pulse train)		
_ _ 1 1		Signed pulse train		
_ _ 1 2		A-phase pulse train B-phase pulse train		
_ _ 0 0	Positive logic	Forward rotation pulse train (positive direction pulse train) Reverse rotation pulse train (negative direction pulse train)		
_ _ 0 1		Signed pulse train		
_ _ 0 2		A-phase pulse train B-phase pulse train		

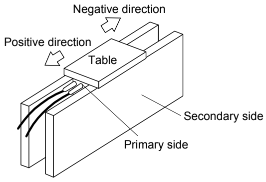
Arrows in the table indicate the timing of importing pulse trains. A-phase/B-phase pulse trains are imported after they have been multiplied by 4.

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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PA14
*POL
Rotation direction selection/travel direction selection</td><td></td><td>Select a rotation direction of the servo motor or travel direction of the linear servo motor for when turning on ST1 (Forward rotation start) or ST2 (Reverse rotation start).
<table>
<tr><th rowspan="2">Setting value</th><th colspan="2">Servo motor rotation direction/linear servo motor travel direction</th></tr>
<tr><th>When positioning address increases</th><th>When positioning address decreases</th></tr>
<tr><td>0</td><td>CCW or positive direction</td><td>CW or negative direction</td></tr>
<tr><td>1</td><td>CW or negative direction</td><td>CCW or positive direction</td></tr>
</table>
The following shows the servo motor rotation directions.


The positive/negative directions of the linear servo motor are as follows.


LM-H3/LM-F series


LM-U2 series


LM-K2 series
Setting range: 0,1</td><td>0</td><td>○</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, for 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><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, for 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><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PA17 *MSR Servo motor series setting		When using a linear servo motor, select any linear servo motor with [Pr. PA17] and [Pr. PA18]. Set this and [Pr. PA18] at a time. Refer to the following table for settings. This parameter is not available with MR-J4-03A6-RJ servo amplifiers.	0000h	○	○	

Linear servo motor series	Linear servo motor (primary side)	Parameter	
		[Pr. PA17] setting	[Pr. PA18] setting
LM-H3	LM-H3P2A-07P-BSS0	00BBh	2101h
	LM-H3P3A-12P-CSS0		3101h
	LM-H3P3B-24P-CSS0		3201h
	LM-H3P3C-36P-CSS0		3301h
	LM-H3P3D-48P-CSS0		3401h
	LM-H3P7A-24P-ASS0		7101h
	LM-H3P7B-48P-ASS0		7201h
	LM-H3P7C-72P-ASS0		7301h
	LM-H3P7D-96P-ASS0		7401h
LM-U2	LM-U2PAB-05M-0SS0	00B4h	A201h
	LM-U2PAD-10M-0SS0		A401h
	LM-U2PAF-15M-0SS0		A601h
	LM-U2PBB-07M-1SS0		B201h
	LM-U2PBD-15M-1SS0		B401h
	LM-U2PBF-22M-1SS0		2601h
	LM-U2P2B-40M-2SS0		2201h
	LM-U2P2C-60M-2SS0		2301h
	LM-U2P2D-80M-2SS0		2401h

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PA17
*MSR
Servo motor series setting</td><td></td><td>
<table>
<tr><th rowspan="2">Linear servo motor series</th><th rowspan="2">Linear servo motor (primary side)</th><th colspan="2">Parameter</th></tr>
<tr><th>[Pr. PA17] setting</th><th>[Pr. PA18] setting</th></tr>
<tr><td rowspan="16">LM-F</td><td>LM-FP2B-06M-1SS0 (natural cooling)</td><td rowspan="16">00B2h</td><td>2201h</td></tr>
<tr><td>LM-FP2D-12M-1SS0 (natural cooling)</td><td>2401h</td></tr>
<tr><td>LM-FP2F-18M-1SS0 (natural cooling)</td><td>2601h</td></tr>
<tr><td>LM-FP4B-12M-1SS0 (natural cooling)</td><td>4201h</td></tr>
<tr><td>LM-FP4D-24M-1SS0 (natural cooling)</td><td>4401h</td></tr>
<tr><td>LM-FP4F-36M-1SS0 (natural cooling)</td><td>4601h</td></tr>
<tr><td>LM-FP4H-48M-1SS0 (natural cooling)</td><td>4801h</td></tr>
<tr><td>LM-FP5H-60M-1SS0 (natural cooling)</td><td>5801h</td></tr>
<tr><td>LM-FP2B-06M-1SS0 (liquid-cooling)</td><td>2202h</td></tr>
<tr><td>LM-FP2D-12M-1SS0 (liquid-cooling)</td><td>2402h</td></tr>
<tr><td>LM-FP2F-18M-1SS0 (liquid-cooling)</td><td>2602h</td></tr>
<tr><td>LM-FP4B-12M-1SS0 (liquid-cooling)</td><td>4202h</td></tr>
<tr><td>LM-FP4D-24M-1SS0 (liquid-cooling)</td><td>4402h</td></tr>
<tr><td>LM-FP4F-36M-1SS0 (liquid-cooling)</td><td>4602h</td></tr>
<tr><td>LM-FP4H-48M-1SS0 (liquid-cooling)</td><td>4802h</td></tr>
<tr><td>LM-FP5H-60M-1SS0 (liquid-cooling)</td><td>5802h</td></tr>
<tr><td rowspan="7">LM-K2</td><td>LM-K2P1A-01M-2SS1</td><td rowspan="7">00B8h</td><td>1101h</td></tr>
<tr><td>LM-K2P1C-03M-2SS1</td><td>1301h</td></tr>
<tr><td>LM-K2P2A-02M-1SS1</td><td>2101h</td></tr>
<tr><td>LM-K2P2C-07M-1SS1</td><td>2301h</td></tr>
<tr><td>LM-K2P2E-12M-1SS1</td><td>2501h</td></tr>
<tr><td>LM-K2P3C-14M-1SS1</td><td>3301h</td></tr>
<tr><td>LM-K2P3E-24M-1SS1</td><td>3501h</td></tr>
</table>
</td><td></td><td></td><td></td><td></td></tr>
</table>

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PA18 *MTY Servo motor type setting		When using a linear servo motor, select any linear servo motor with [Pr. PA17] and [Pr. PA18]. Set this and [Pr. PA17] at a time. Refer to the table of [Pr. PA17] for settings. This parameter is not available with MR-J4-03A6-RJ servo amplifiers.	0000h	○	○	
PA19 *BLK Parameter writing inhibit		Select a reference range and writing range of the parameter. To enable read/write the positioning control parameters ([Pr. PT_ _]), set [Pr. PA19] to "0 0 A B" in the positioning mode. Refer to table 7.4 for settings. Linear servo motor/DD motor setting parameters ([Pr. PL_ _]) cannot be used with MR-J4-03A6-RJ servo amplifiers.	00AAh	○	○	○

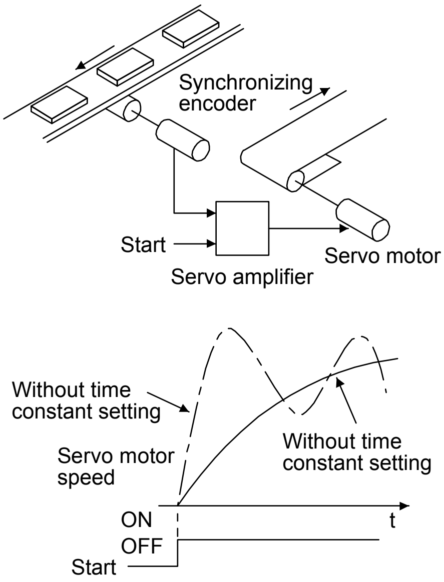
Table 7.4 [Pr. PA19] setting value and reading/writing range

PA19	Setting operation	PA	PB	PC	PD	PE	PF	PL	Po	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/BCD	CL	PS
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 CN1-13, CN1-14, CN1-22 to CN1-25, and CN1-49 with [Pr. PD23] to [Pr. PD26], [Pr. PD28], and [Pr. PD47]. For MR-J4-03A6-RJ servo amplifiers, MTTR (During tough drive) cannot be assigned.					
	_ _ _ x	For manufacturer setting	0h			
	_ _ x _	Vibration tough drive selection 0: Disabled 1: Enabled Selecting "1" enables to suppress vibrations by automatically changing setting values of [Pr. PB13 Machine resonance suppression filter 1] and [Pr. PB15 Machine resonance suppression filter 2] in case that the vibration exceed 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual".	0h	○	○	○
	_ x _ _	SEMI-F47 function selection 0: Disabled 1: Enabled Selecting "1" enables to avoid triggering [AL. 10 Undervoltage] using the electrical energy charged in the capacitor in case that an instantaneous power failure occurs during operation. In [Pr. PF25 SEMI-F47 function - Instantaneous power failure detection time], set the time until the occurrence of [AL. 10.1 Voltage drop in the control circuit power]. For MR-J4-03A6-RJ servo amplifiers, this digit cannot be used other than the initial value.	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]. 2: J3 electronic gear setting value compatibility mode (Electronic gear ([Pr. PA06] and [Pr. PA07] × 16)) The electronic gear setting value can be used set with MR-J3. 3: J2S electronic gear setting value compatibility mode (Electronic gear ([Pr. PA06] and [Pr. PA07] × 32)) The electronic gear setting value can be used set with MR-J2S. For MR-J4-03A6-RJ servo amplifiers, "2" and "3" cannot be selected for this digit.	0h	○	○	

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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".					
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%.	0 [%]	○	○	○
PA26 *AOP5 Function selection A-5	_ _ _ x	Torque limit function selection at instantaneous power failure (instantaneous power failure tough drive selection) 0: Disabled 1: Enabled When an instantaneous power failure occurs during operation, you can save electric energy charged in the capacitor in the servo amplifier by limiting torque at acceleration. You can also delay the time until [AL. 10.2 Voltage drop in the main circuit power] occurs with instantaneous power failure tough drive function. Doing this will enable you to set a longer time in [Pr. PF25 SEMI-F47 function - Instantaneous power failure detection time]. The torque limit function at instantaneous power failure is enabled when "SEMI-F47 function selection" in [Pr. PA20] is "Enabled (_ 1 _ _)". For MR-J4-03A6-RJ servo amplifiers, this digit cannot be used other than the initial value.	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/BCD	CL	PS
PB01 FILT Adaptive tuning mode (adaptive filter II)	_ _ _ x	Filter tuning mode selection Set the adaptive filter tuning. Select the adjustment mode of the machine resonance suppression filter 1. For details, refer to section 7.1.2 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". 0: Disabled 1: Automatic setting 2: Manual setting	0h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _		0h			
	x _ _ _		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-J4-_A_(-RJ) 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual". 0: Disabled 1: Automatic setting 2: Manual setting	0h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
PB03 PST Position command acceleration/deceleration time constant (position smoothing)		This is used to set the constant of a primary delay to the position command. You can select a control method from "Primary delay" or "Linear acceleration/deceleration" in [Pr. PB25 Function selection B-1]. 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 synchronizing encoder, synchronous operation will start smoothly even if it starts during line operation.  Setting range: 0 to 65535	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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PB04
FFC
Feed forward gain</td><td></td><td>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 as the acceleration time constant up to the rated speed.

Setting range: 0 to 100</td><td>0
[%]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="2">PB06
GD2
Load to motor inertia ratio/load to motor mass ratio</td><td></td><td>This is used to set the load to motor inertia ratio or load to motor mass 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 the parameter will be the automatic setting or manual setting depending on the [Pr. PA08] setting. Refer to the following table for details. When the parameter is automatic setting, the value will vary between 0.00 and 100.00.

Setting range: 0.00 to 300.00</td><td>7.00
[Multiplier]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="6">
<table>
<tr><th>Pr. PA08</th><th>This parameter</th></tr>
<tr><td>_ _ _ 0 (2 gain adjustment mode 1 (interpolation mode)</td><td rowspan="2">Automatic setting</td></tr>
<tr><td>_ _ _ 1: (Auto tuning mode 1)</td></tr>
<tr><td>_ _ _ 2: (Auto tuning mode 2)</td><td rowspan="3">Manual setting</td></tr>
<tr><td>_ _ _ 3 (Manual mode)</td></tr>
<tr><td>_ _ _ 4: (2 gain adjustment mode 2)</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">PB07
PG1
Model loop gain</td><td></td><td>Set the response gain up 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/or 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>15.0
[rad/s]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="6">
<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>This is used to 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/or 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><td>○</td></tr>
<tr><td colspan="6">
<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>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PB09 VG2 Speed loop gain		This is used to set the gain of the speed loop. Set this parameter when vibration occurs on machines of low rigidity or large backlash. Increasing the setting value will also increase the response level but will be liable to generate vibration and/or noise. The setting of the parameter will be the automatic setting or manual setting depending on the [Pr. PA08] setting. Refer to the table of [Pr. PB08] for details. Setting range: 20 to 65535	823 [rad/s]	○	○	○
PB10 VIC Speed integral compensation		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/or noise. The setting of the parameter will be the automatic setting or manual setting depending on the [Pr. PA08] setting. Refer to the table of [Pr. PB08] for details. Setting range: 0.1 to 1000.0	33.7 [ms]	○	○	○
PB11 VDC Speed differential compensation		Set the differential compensation. To enable the setting value, turn on PC (proportional control). Setting range: 0 to 1000	980	○	○	○
PB12 OVA Overshoot amount compensation		Set a percentage of viscous friction torque against the servo motor rated value or thrust against the linear servo motor rated value. When the response level is low or when the torque/thrust is limited, the efficiency of the parameter may be lower. Setting range: 0 to 100	0 [%]	○	○	○
PB13 NH1 Machine resonance suppression filter 1		Machine resonance suppression filter 1 Set the notch frequency of the machine resonance suppression filter 1. When "Automatic setting (_ _ _ 1)" of "Filter tuning mode selection" is selected in [Pr. PB01], this parameter will be adjusted automatically. When you select "Manual setting (_ _ _ 2)" of "Filter tuning mode selection" 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 "Automatic setting (_ _ _ 1)" of "Filter tuning mode selection" is selected in [Pr. PB01], this parameter will be adjusted automatically. Set manually for the manual setting.				
	_ _ _ 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]	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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			
PB17 NHF Shaft resonance suppression filter	Set the shaft resonance suppression filter. This is used to suppress a low-frequency machine vibration. When you select "Automatic setting (_ _ _ 0)" of "Shaft resonance suppression filter selection" in [Pr. PB23], the value will be calculated automatically from the servo motor you use and load to motor inertia ratio. It will not be automatically calculated for the linear servo motor. Set manually for "Manual setting (_ _ _ 1)". When "Shaft resonance suppression filter selection" is "Disabled (_ _ _ 2)" in [Pr. PB23], the setting value of this parameter will be disabled. When you select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 4 selection" 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

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="2">PB18
LPF
Low-pass filter setting</td><td></td><td>Set the low-pass filter.
The following shows a relation of a required parameter to this parameter.

Setting range: 100 to 18000</td><td>3141
[rad/s]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="6"><table>
<tr><th>[Pr. PB23]</th><th>[Pr. PB18]</th></tr>
<tr><td>_ _ 0 _ (Initial value)</td><td>Automatic setting</td></tr>
<tr><td>_ _ 1 _</td><td>Setting value enabled</td></tr>
<tr><td>_ _ 2 _</td><td>Setting value disabled</td></tr>
</table></td></tr>
<tr><td>PB19
VRF11
Vibration suppression control 1 - Vibration frequency</td><td></td><td>Set the vibration frequency for vibration suppression control 1 to suppress low-frequency machine vibration.
When "Vibration suppression control 1 tuning mode selection" is "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ _ 2)". For details, refer to section 7.1.5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Setting range: 0.1 to 300.0</td><td>100.0
[Hz]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PB20
VRF12
Vibration suppression control 1 - Resonance frequency</td><td></td><td>Set the resonance frequency for vibration suppression control 1 to suppress low-frequency machine vibration.
When "Vibration suppression control 1 tuning mode selection" is "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ _ 2)". For details, refer to section 7.1.5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Setting range: 0.1 to 300.0</td><td>100.0
[Hz]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PB21
VRF13
Vibration suppression control 1 - Vibration frequency damping</td><td></td><td>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 "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ _ 2)". For details, refer to section 7.1.5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Setting range: 0.00 to 0.30</td><td>0.00</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PB22
VRF14
Vibration suppression control 1 - Resonance frequency damping</td><td></td><td>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 "Automatic setting (_ _ _ 1)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ _ 2)". For details, refer to section 7.1.5 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

Setting range: 0.00 to 0.30</td><td>0.00</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="4">PB23
VFBF
Low-pass filter selection</td><td>_ _ _ x</td><td>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.</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td>Low-pass filter selection
Select the low-pass filter.
0: Automatic setting
1: Manual setting
2: Disabled</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ x _ _</td><td rowspan="2">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td><td></td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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, select "Manual mode (_ _ _ 3)" of "Gain adjustment mode selection" in [Pr. PA08].	0h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _		0h			
	x _ _ _		0h			
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 (Note) 3: Droop pulses 4: Servo motor speed/linear servo motor speed Note. This will be a frequency of the servo motor side (load side for the fully closed loop control) command pulse unit.	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		This is used to set the value of gain switching (command frequency, droop pulses, and servo motor speed/linear servo motor speed) selected in [Pr. PB26]. The set value unit differs depending on the switching condition item. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 7.2.3.) The unit "r/min" will be "mm/s" for linear servo motors. Setting range: 0 to 9999	10 [kpulse/s]/ [pulse]/ [r/min]	○	○	○
PB28 CDT Gain switching time constant		Set the time constant at which the gains will change 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/load to motor mass ratio after gain switching		Set the load to motor inertia ratio/load to motor mass ratio for when gain switching is enabled. This parameter is enabled only when you select "Manual mode (_ _ _ 3)" of "Gain adjustment mode selection" in [Pr. PA08]. Setting range: 0.00 to 300.00	7.00 [Multiplier]	○	○	○
PB30 PG2B Position loop gain after gain switching		Set the position loop gain for when the gain switching is enabled. When you set a value less than 1.0 rad/s, the value will be the same as [Pr. PB08]. This parameter is enabled only when you select "Manual mode (_ _ _ 3)" of "Gain adjustment mode selection" in [Pr. PA08]. Setting range: 0.0 to 2000.0	0.0 [rad/s]	○		○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PB31 VG2B Speed loop gain after gain switching		Set the speed loop gain for when the gain switching is enabled. When you set a value less than 20 rad/s, the value will be the same as [Pr. PB09]. This parameter is enabled only when you select "Manual mode (_ _ _ 3)" of "Gain adjustment mode selection" in [Pr. PA08]. Setting range: 0 to 65535	0 [rad/s]	○	○	○
PB32 VICB Speed integral compensation after gain switching		Set the speed integral compensation for when the gain switching is enabled. When you set a value less than 0.1 ms, the value will be the same as [Pr. PB10]. This parameter is enabled only when you select "Manual mode (_ _ _ 3)" of "Gain adjustment mode selection" 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 for vibration suppression control 1 for when the gain switching is enabled. When you set a value less than 0.1 Hz, the value will be the same as [Pr. PB19]. 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" in [Pr. PB02] is "Manual setting (_ _ _ 2)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear 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 you set a value less than 0.1 Hz, the value will be the same as [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" in [Pr. PB02] is "Manual setting (_ _ _ 2)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear 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" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ・"Vibration suppression control 1 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ _ 2)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ▪ "Vibration suppression control 1 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ _ 2)". ▪ "Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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

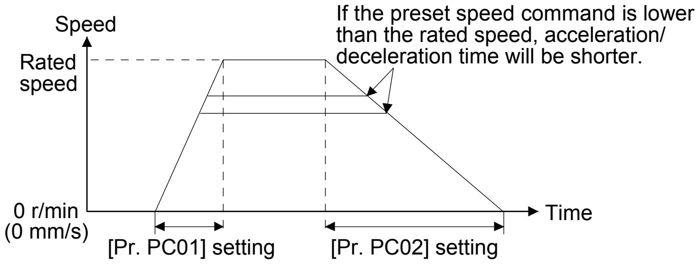
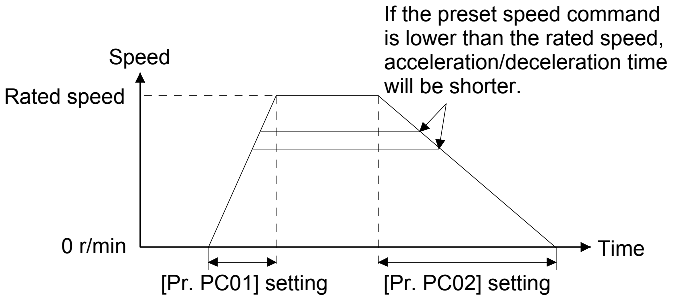
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PB46 NH3 Machine resonance suppression filter 3		Set the notch frequency of the machine resonance suppression filter 3. To enable the setting value, select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 3 selection" 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, select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 4 selection" 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 you select "Enabled" of this digit, [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, select "Enabled (_ _ _ 1)" of "Machine resonance suppression filter 5 selection" in [Pr. PB51]. Setting range: 10 to 4500	4500 [Hz]	○	○	○

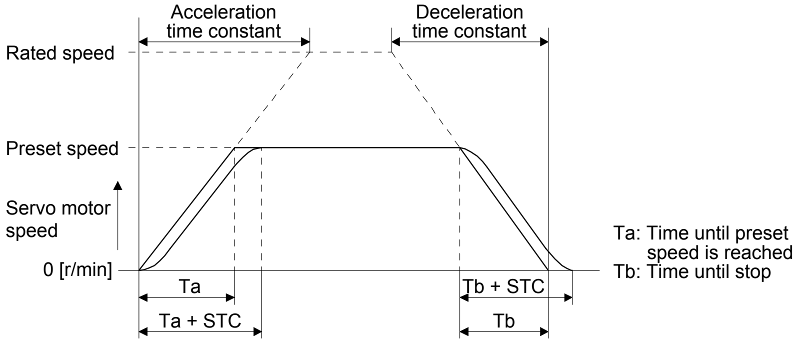
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PB51 NHQ5 Notch shape selection 5		Set forms of the machine resonance suppression filter 5. When you select "Enabled (_ _ _ 1)" of "Robust filter selection" in [Pr. PE41], the machine resonance suppression filter 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 "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ 2 _)". To enable the digit, select "3 inertia mode (_ _ _ 1)" of "Vibration suppression mode selection" 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 "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ 2 _)". To enable the digit, select "3 inertia mode (_ _ _ 1)" of "Vibration suppression mode selection" 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 "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ 2 _)". To enable the digit, select "3 inertia mode (_ _ _ 1)" of "Vibration suppression mode selection" in [Pr. PA24]. Setting range: 0.00 to 0.30	0.00	○	○	○
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 "Automatic setting (_ _ 1 _)" in [Pr. PB02], this parameter will be set automatically. Set manually for "Manual setting (_ _ 2 _)". To enable the digit, select "3 inertia mode (_ _ _ 1)" of "Vibration suppression mode selection" in [Pr. PA24]. Setting range: 0.00 to 0.30	0.00	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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 you set a value less than 0.1 Hz, the value will be the same as [Pr. PB52]. 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 mode selection" in [Pr. PA24] is "3 inertia mode (_ _ _ 1)". ・"Vibration suppression control 2 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ 2 _)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear 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 you set a value less than 0.1 Hz, the value will be the same as [Pr. PB53]. 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 mode selection" in [Pr. PA24] is "3 inertia mode (_ _ _ 1)". ・"Vibration suppression control 2 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ 2 _)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear 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" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ・"Vibration suppression mode selection" in [Pr. PA24] is "3 inertia mode (_ _ _ 1)". ・"Vibration suppression control 2 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ 2 _)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○	○
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" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ・"Vibration suppression mode selection" in [Pr. PA24] is "3 inertia mode (_ _ _ 1)". ・"Vibration suppression control 2 tuning mode selection" in [Pr. PB02] is "Manual setting (_ _ 2 _)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear servo motor stops. Setting range: 0.00 to 0.30	0.00	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PB60 PG1B Model loop gain after gain switching		Set the model loop gain for when the gain switching is enabled. When you set a value less than 1.0 rad/s, the value will be the same as [Pr. PB07]. This parameter will be enabled only when the following conditions are fulfilled. ・"Gain adjustment mode selection" in [Pr. PA08] is "Manual mode (_ _ _ 3)". ・"Gain switching selection" in [Pr. PB26] is "Input device (gain switching (CDP)) (_ _ _ 1)". Switching during driving may cause a shock. Be sure to switch them after the servo motor or linear 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/BCD	CL	PS
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 or 0 mm/s 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]		○	
PC01 STA Acceleration time constant 1		Set an acceleration time constant for the automatic operation of the indexer 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 or 0 mm/s. 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/BCD	CL	PS
PC02 STB Deceleration time constant 1		Set a deceleration time constant for the automatic operation of the indexer 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]			○
PC03 *STC S-pattern acceleration/ deceleration time constant		This enables to start/stop the servo motor or linear servo motor smoothly. Set the time of the arc part for S-pattern 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 a value of 1000 ms or more is set, it will be clamped to 1000 ms. Setting range: 0 to 5000	0 [ms]	○	○	
PC05 SC1 Automatic operation speed 1		Set a positioning speed for the automatic operation speed 1, 2 of the indexer method. Setting range: 0 to permissible instantaneous speed	100 [r/min]			○
PC06 SC2 Automatic operation speed 2		Set a positioning speed for the automatic operation speed 1, 2 of the indexer method. Setting range: 0 to permissible instantaneous speed	500 [r/min]			○
PC07 SC3 Manual operation speed 1		Set a JOG speed of the manual operation mode, JOG operation, and home position return mode of the indexer method. Setting range: 0 to permissible instantaneous speed	1000 [r/min]			○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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 appendix 8.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" for detection points 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 (MR-J4-_A_-RJ 100 W or more)

Setting value	Item	Operation mode (Note 1)			
		Standard	Full.	Lin.	DD
_ _ 0 0	(Linear) servo motor speed (±8 V/max. speed)	○	○	○	○
_ _ 0 1	Torque or thrust (±8 V/max. torque or max. thrust) (Note 3)	○	○	○	○
_ _ 0 2	(Linear) servo motor speed (+8 V/max. speed)	○	○	○	○
_ _ 0 3	Torque or thrust (+8 V/max. torque or max. thrust) (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 A	Feedback position (±10 V/1 Mpulses) (Note 2)	○			
_ _ 0 B	Feedback position (±10 V/10 Mpulses) (Note 2)	○			
_ _ 0 C	Feedback position (±10 V/100 Mpulses) (Note 2)	○			
_ _ 0 D	Bus voltage (200 V class and 100 V class: +8 V/400 V, 400 V class: +8 V/800 V)	○	○	○	○
_ _ 0 E	Speed command 2 (±8 V/max. speed)	○	○	○	○
_ _ 1 0	Load-side droop pulses (±10 V/100 pulses) (Note 2)		○		
_ _ 1 1	Load-side droop pulses (±10 V/1000 pulses) (Note 2)		○		
_ _ 1 2	Load-side droop pulses (±10 V/10000 pulses) (Note 2)		○		
_ _ 1 3	Load-side droop pulses (±10 V/100000 pulses) (Note 2)		○		
_ _ 1 4	Load-side droop pulses (±10 V/1 Mpulses) (Note 2)		○		
_ _ 1 5	Servo motor-side/load-side position deviation (±10 V/100000 pulses)		○		
_ _ 1 6	Servo motor-side/load-side speed deviation (±8 V/max. speed)		○		
_ _ 1 7	Encoder inside temperature (±10 V/±128 ˚C)	○	○		○

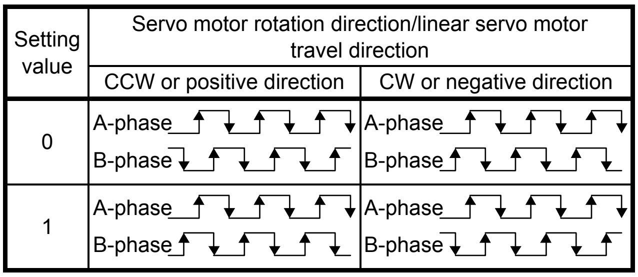
Note 1. Items with ○ are available for each operation mode.
Standard: Standard (semi closed loop system) use of the rotary servo motor
Full.: Fully closed loop system use of the rotary servo motor
Lin.: Linear servo motor use
DD: Direct drive (DD) motor use
2. Encoder pulse unit
3. The value in [Pr. PA11] or [Pr. PA12] whichever is higher is applied for the maximum torque or maximum thrust.

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	CL	PS
PC14 MOD1 Analog monitor 1 output		Table 7.9 Analog monitor setting value (MR-J4-03A6-RJ)				

Setting value	Item
_ _ 0 0	Servo motor speed (5 V ± 3 V/max. speed)
_ _ 0 1	Torque (5 V ± 3 V/max. torque) (Note 2)
_ _ 0 2	Servo motor speed (5 V + 3 V/max. speed)
_ _ 0 3	Torque (5 V + 3 V/max. torque) (Note 2)
_ _ 0 4	Current command (5 V ± 3 V/max. current command)
_ _ 0 5	Command pulse frequency (5 V ± 4 V/±4 Mpulses/s)
_ _ 0 6	Servo motor-side droop pulses (5 V ± 4 V/100 pulses) (Note 1)
_ _ 0 7	Servo motor-side droop pulses (5 V ± 4 V/1000 pulses) (Note 1)
_ _ 0 8	Servo motor-side droop pulses (5 V ± 4 V/10000 pulses) (Note 1)
_ _ 0 9	Servo motor-side droop pulses (5 V ± 4 V/100000 pulses) (Note 1)
_ _ 0 A	Feedback position (5 V ± 4 V/1 Mpulses) (Note 1)
_ _ 0 B	Feedback position (5 V ± 4 V/10 Mpulses) (Note 1)
_ _ 0 C	Feedback position (5 V ± 4 V/100 Mpulses) (Note 1)
_ _ 0 D	Bus voltage (5 V + 4 V/100 V)
_ _ 0 E	Speed command 2 (5 V ± 3 V/max. speed)
_ _ 1 7	Encoder inside temperature (5 V ± 4 V/±128 °C)

Note 1. Encoder pulse unit
2. 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/BCD	CL	PS
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 appendix 8.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" for detection points 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 between MBR (Electromagnetic brake interlock) and 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 or 20 mm/s. Setting range: 0 to 10000	50 [r/min]/ [mm/s]	○	○	○
PC18 *BPS Alarm history clear	_ _ _ x	Alarm history clear selection Used to clear the alarm history. 0: Disabled 1: Enabled When you select "Enabled", the alarm history will be cleared at next power-on. After the alarm history is cleared, the setting is automatically disabled.	0h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _		0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	Control mode CL	Control mode PS
PC19 *ENRS Encoder output pulse selection	_ _ _ x	Encoder output pulse phase selection Select an encoder pulse direction. 0: Increasing A-phase 90° in CCW or positive direction 1: Increasing A-phase 90° in CW or negative direction  Setting value | Servo motor rotation direction/linear servo motor travel direction: CCW or positive direction | CW or negative direction 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 command pulse 3: A-phase/B-phase pulse electronic gear setting 4: A/B-phase pulse through output setting 5: Command pulse input through output setting When you select "1", the settings of [Pr. PA16 Encoder output pulses 2] will be disabled. When you select "2", the settings of [Pr. PA15 Encoder output pulses] and [Pr. PA16 Encoder output pulses 2] will be disabled. Additionally, it will be the servo motor side pulse unit for the indexer method. When you select the setting, do not change the settings in [Pr. PA06] and [Pr. PA07] after the power-on. Setting "4" will be enabled only when A/B/Z-phase differential output linear encoder is used. And "Encoder output pulse phase selection (_ _ _ x)" will be disabled. When another encoder is connected, [AL. 37 Parameter error] will occur. Setting "Standard control mode (_ _ 0 _)" in [Pr. PA01] will trigger [AL. 37 Parameter error]. 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)" and "Encoder selection for encoder output pulse (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 _ _	Selection of the encoders for encoder output pulse Select an encoder used the encoder output pulses which the servo amplifier outputs. 0: Servo motor encoder 1: Load-side encoder When "_ 1 0 _" is set to this parameter, [AL. 37 Parameter error] will occur. This is only for the fully closed loop system. If "1" is set other than in the fully closed loop system, [AL. 37 Parameter error] will occur.	0h	○		
	x _ _ _	For manufacturer setting	0h			
PC20 *SNO Station No. setting		Specify a station No. 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/BCD	CL	PS
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 When using the parameter unit, set "1 _ _ _" in [Pr. PF34]. 0: 9600 [bps] 1: 19200 [bps] 2: 38400 [bps] 3: 57600 [bps] 4: 115200 [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 _		0h			
	_ x _ _		0h			
	x _ _ _	Encoder cable communication method selection Select how to execute the encoder cable communication method. 0: Two-wire type 1: Four-wire type When using an encoder of A/B/Z-phase differential output method, set "0". If the setting is incorrect, [AL. 16 Encoder initial communication error 1] or [AL. 20 Encoder normal communication error 1] occurs. For MR-J4-03A6-RJ servo amplifiers, this digit cannot be used other than the initial value. Also, it does not comply with encoders of A/B/Z-phase differential output method.	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 level unit selection Select a setting unit of the error excessive alarm level set in [Pr. PC43]. 0: Per 1 rev or 1 mm 1: Per 0.1 rev or 0.1 mm 2: Per 0.01 rev or 0.01 mm 3: Per 0.001 rev or 0.001 mm	0h	○	○	○
PC26 *COP5 Function selection C-5	_ _ _ x	[AL. 99 Stroke limit warning] selection Select [AL. 99 Stroke limit warning]. 0: Enabled 1: Disabled	0h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _		0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PC27 *COP6 Function selection C-6	_ _ _ x	[AL. 10 Undervoltage] detection method selection Set this parameter when [AL. 10 Undervoltage] occurs due to distorted power supply voltage waveform while using FR-RC-(H) or FR-CV-(H). 0: [AL. 10] not occurrence 1: [AL. 10] occurrence This digit is not available with MR-J4-03A6-RJ servo amplifiers.	0h	○	○	○
	_ _ x _	Main circuit power supply selection Select a voltage to be connected to the main circuit power supply with an MR-J4-03A6-RJ servo amplifier. 0: 48 V DC 1: 24 V DC When using 24 V DC for the main circuit power supply, set "1" to this digit. This digit is not available with MR-J4-_A_-RJ 100 W or more servo amplifiers. The characteristics of the servo motor vary depending on whether 48 V DC or 24 V DC is used. For details, refer to "Servo Motor Instruction Manual (Vol. 3)".	0h	○	○	○
	_ x _ _	Undervoltage alarm selection Select the alarm and warning that occurs when the bus voltage drops to the undervoltage alarm level. 0: [AL. 10] regardless of servo motor speed 1: [AL. E9] at servo motor speed 50 r/min (50 mm/s) or less, [AL. 10] at over 50 r/min (50 mm/s)	0h	○	○	○
	x _ _ _	For manufacturer setting	0h			
PC28 *COP7 Function selection C-7	_ _ _ x	For manufacturer setting	0h			
	_ _ x _		0h			
	_ x _ _		0h			
	x _ _ _	Linear scale multipoint Z-phase input function selection When two or more reference marks exist during the full stroke of the linear encoder, set "1". 0: Disabled 1: Enabled This parameter setting is used by servo amplifiers with software version A5 or later. This digit is not available with MR-J4-03A6-RJ servo amplifiers.	0h	○	○	
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 at the home position return. Set an acceleration time from 0 r/min or 0 mm/s to the rated speed. Additionally, when 20000 ms or more value is set, it will be clamped to 20000 ms. Setting range: 0 to 50000	0 [ms]		○	
PC30 STA2 Acceleration time constant 2		Set an second acceleration time constant for the automatic operation of the indexer method. Set an acceleration time from 0 r/min to the rated speed. Additionally, when 20000 ms or more value 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 or 0 mm/s. 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/BCD	CL	PS
PC31 STB2 Deceleration time constant 2		Set an second deceleration time constant for the automatic operation of the indexer 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]			○
PC35 TL2 Internal torque limit 2/internal thrust limit 2		Set the parameter on the assumption that the maximum torque or thrust is 100.0 %. The parameter is set for limiting the torque of the servo motor or the thrust of the linear servo motor. No torque or thrust is generated when this parameter is set to "0.0". When TL1 (Internal torque limit selection) is turned on, Internal torque limits 1 and 2 are compared and the lower value will be enabled. Set the parameter referring to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" and section 11.5.3 (6) of this Instruction Manual. Setting range: 0.0 to 100.0	100.0 [%]	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PC36 *DMD Status display selection	_ _ x x	Status display selection at power-on Select a status display shown at power-on. 00: Cumulative feedback pulse 01: Servo motor speed/linear 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/instantaneous thrust 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/load to motor mass ratio 0F: Bus voltage 10: Encoder inside temperature 11: Settling time 12: Oscillation detection frequency 13: Number of tough drives 14: Unit power consumption (increment of 1 W) 15: Unit power consumption (increment of 1 kW) 16: Unit total power consumption (increment of 1 Wh) 17: Unit total power consumption (increment of 100 kWh) 18: Load-side cumulative feedback pulses (Note 1, 3) 19: Load-side droop pulses (Note 1, 3) 1A: Load-side encoder information 1 (1 pulse unit) (Note 1, 3) 1B: Load-side encoder information 1 (100000 pulses unit) (Note 1, 3) 1C: Load-side encoder ABS counter (Note 1, 3) 1D: Z-phase counter (1 pulse unit) (Note 2, 3) 1E: Z-phase counter (100000 pulses unit) (Note 2, 3) 1F: Electrical angle (1 pulse unit) (Note 2, 3) 20: Electrical angle (100000 pulses unit) (Note 2, 3) 21: Current position 22: Command position 23: Command remaining distance 24: Point table No./Program No./Station position 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 Note 1. Setting "18 to 1C" will trigger [AL. 37] in the mode other than the fully closed loop control mode. 2. Setting 1D to 20 will trigger [AL. 37] in the mode other than the linear servo motor control mode. 3. This is not available with the MR-J4-03A6-RJ servo amplifier.	00h	○	○	○

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="2">PC36
*DMD
Status display selection</td><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><tr><td>Positioning (indexer method)</td><td>Cumulative feedback pulses</td></tr></table>1: Depends on the last two digit setting of the parameter</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>x _ _ _</td><td>For manufacturer setting</td><td>0h</td><td></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.

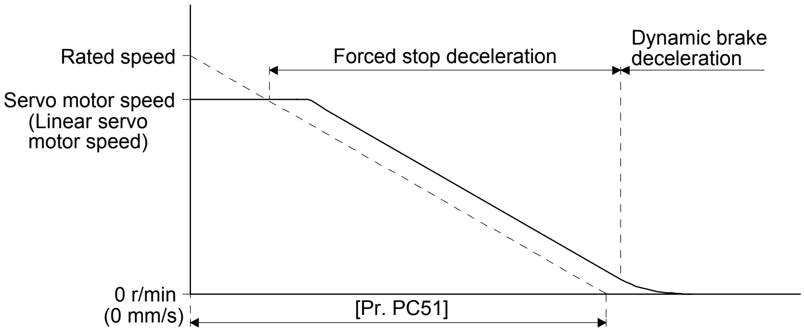
Setting range: -9999 to 9999</td><td>0
[mV]</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PC38
TPO
Analog torque limit offset</td><td></td><td>Set the offset voltage of TLA (Analog torque limit).

Setting range: -9999 to 9999</td><td>0
[mV]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PC39
MO1
Analog monitor 1 offset</td><td></td><td>Set the offset voltage of MO1 (Analog monitor 1).

Setting range: -9999 to 9999</td><td>0
[mV]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PC40
MO2
Analog monitor 2 offset</td><td></td><td>Set the offset voltage of MO2 (Analog monitor 2).

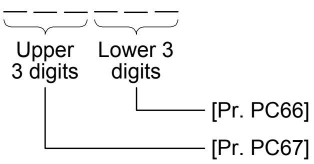
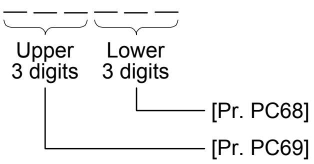
Setting range: -9999 to 9999</td><td>0
[mV]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PC43
ERZ
Error excessive alarm level</td><td></td><td>Set an error excessive alarm level.
You can change the setting unit with "Error excessive alarm level" in [Pr. PC24].
Set this per rev. for rotary servo motors and direct drive motors. Set this per mm for linear servo motors.
Setting "0" will be "3 rev" for rotary servo motors and direct drive motors and "100 mm" for linear servo motors. Setting over 200 rev will be clamped with 200 rev.

Setting range: 0 to 1000</td><td>0
[rev]/
[mm]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="4">PC44
*COP9
Function selection C-9</td><td>_ _ _ x</td><td rowspan="3">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ _ x _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>Load-side encoder cable communication method selection
Select an encoder cable to be connected to the CN2L connector of MR-J4-_A_-RJ.
0: Two-wire type
1: Four-wire type
When using an encoder of A/B/Z-phase differential output method, set "0".
Incorrect setting will trigger [AL. 70] and [AL. 71]. This digit is not available with MR-J4-03A6-RJ servo amplifiers.</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
</table>

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="4">PC45
*COPA
Function selection C-A</td><td>_ _ _ x</td><td>Encoder pulse count polarity selection
Select a polarity of the linear encoder or load-side encoder.
0: Encoder pulse increasing direction in the servo motor CCW or positive direction
1: Encoder pulse decreasing direction in the servo motor CCW or positive direction
This digit is not available with MR-J4-03A6-RJ servo amplifiers.</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td>_ _ x _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>Selection of A/B/Z-phase input interface encoder Z-phase connection judgement function
Select the non-signal detection status for the pulse train signal from the A/B/Z-phase input interface encoder used as a linear encoder or load-side encoder.
This function is enabled only when you use an A/B/Z-phase input interface encoder.
This digit is not available with MR-J4-03A6-RJ servo amplifiers.
<table>
<tr><th rowspan="2">Setting value</th><th>Detection of disconnection</th><th colspan="2">Alarm status</th></tr>
<tr><th>Z-phase-side non-signal</th><th>Full.</th><th>Lin.</th></tr>
<tr><td>_ 0 _ _</td><td>Enabled</td><td>[AL. 71.6] (Z-phase)</td><td>[AL. 20.6] (Z-phase)</td></tr>
<tr><td>_ 1 _ _</td><td>Disabled</td><td></td><td></td></tr>
</table>
</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td>x _ _ _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>PC51
RSBR
Forced stop deceleration time constant</td><td></td><td>Set a deceleration time constant when you use the forced stop deceleration function.
Set the time per ms from the rated speed to 0 r/min or 0 mm/s.


[Precautions]
・If the servo motor torque or linear servo motor thrust is saturated at the maximum value during 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 control circuit power supply is cut, dynamic braking will start regardless of the deceleration time constant setting.
Setting range: 0 to 20000</td><td>100
[ms]</td><td>○</td><td>○</td><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PC54 RSUP1 Vertical axis freefall prevention compensation amount		Set the compensation amount of the vertical axis freefall prevention function. Set it per servo motor rotation amount or linear servo motor travel distance. When setting a positive value, the servo motor/linear servo motor will pull in the direction of the servo motor rotation direction/linear servo motor travel direction at positioning address increasing with the servo motor rotation amount/linear servo motor travel distance unit. When setting a negative value, the servo motor/linear servo motor will pull in the direction of the servo motor rotation direction/linear servo motor travel direction at positioning address decreasing with the servo motor rotation amount/linear servo motor travel distance unit. For example, if a positive compensation amount is set when the [Pr. PA14 Rotation direction selection/travel direction selection] setting is "1", the axis will be pulled to the CW direction. The vertical axis freefall prevention function is performed when all of the following conditions are met. 1) The value of the parameter is other than "0". 2) The forced stop deceleration function is enabled. 3) Alarm occurs or EM2 turns off when the (linear) servo motor speed is zero speed or less. 4) MBR (Electromagnetic brake interlock) was enabled in [Pr. PD23] to [Pr. PD26], [Pr. PD28], and [Pr. PD47], and the base circuit shut-off delay time was set in [Pr. PC16]. Setting range: -25000 to 25000	0 [0.0001 rev]/ [0.01 mm]	○	○	○
PC60 *COPD Function selection C-D	_ _ _ x	Motor-less operation selection Set the motor-less operation. This is not used in the linear servo motor control mode, fully closed loop control, and DD motor control mode. 0: Disabled 1: Enabled	0h	○	○	
	_ _ x _	High-resolution analog input selection Select the resolution of VC (Analog override). When you change parameters, perform offset adjustment with [Pr. PC37 Analog override offset]. The offset adjustment can be performed by executing VC automatic offset. Setting "1" while using a servo amplifier other than MR-J4-_A_-RJ, MR-J4-_A_-RU, and MR-J4-_A_-RZ will trigger [AL. 37]. 0: Disabled 1: Enabled This digit is available with servo amplifiers manufactured in November 2014 or later. This digit is not available with MR-J4-03A6-RJ servo amplifiers.	0h	○	○	
	_ x _ _	For manufacturer setting	0h			
	x _ _ _	[AL. 9B Error excessive warning] selection 0: [AL. 9B Error excessive warning] is disabled. 1: [AL. 9B Error excessive warning] is enabled. This parameter is available with servo amplifiers with software version B4 or later.	0h	○	○	○

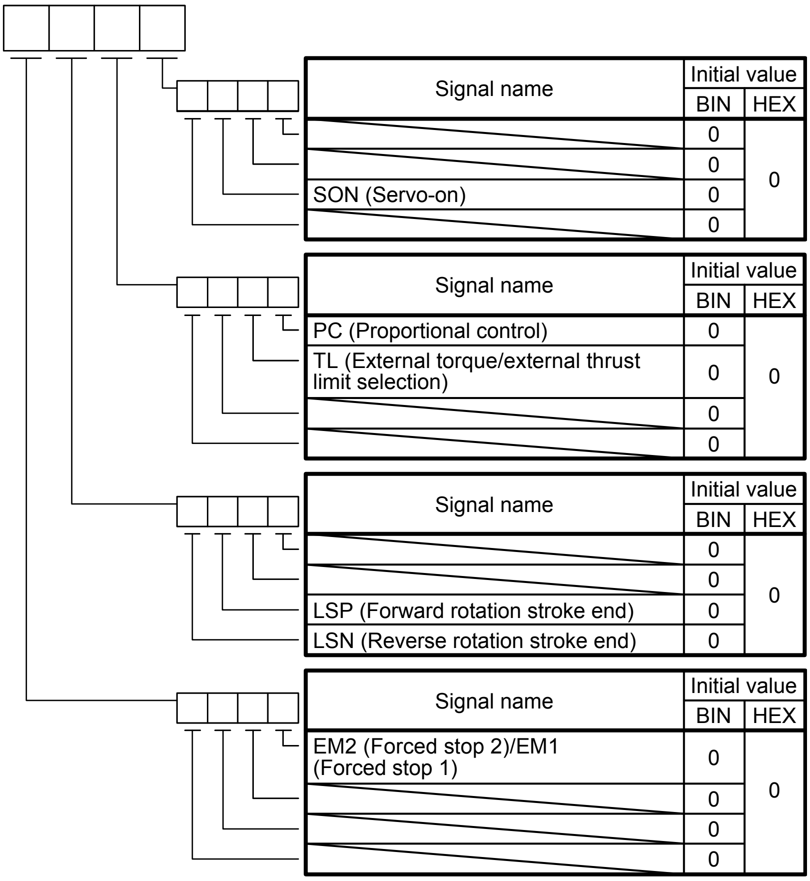
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PC66 LPSPL Mark detection range + (lower three digits)		Set the upper limit of the mark detection. Upper and lower are a set. When the roll feed display is enabled, set this value with the travel distance from the starting position. Setting address:  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. This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -999 to 999	0 Refer to Function column for unit.	○	○	
PC67 LPSPH Mark detection range + (upper three digits)						
PC68 LPSNL Mark detection range - (lower three digits)		Set the lower limit of the mark detection. Upper and lower are a set. When the roll feed display is enabled, set this value with the travel distance from the starting position. Setting address:  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. 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. This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -999 to 999	0 Refer to Function column for unit.	○	○	
PC69 LPSNH Mark detection range - (upper three digits)						

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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 this per rev. for rotary servo motors and direct drive motors. When "0" is set, 1 rev will be applied. Setting over 200 rev will be clamped to 200 rev. Set this per mm for linear servo motors. Setting "0" will be 50 mm. 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. This parameter setting is available with servo amplifiers with software version B4 or later. Setting range: 0 to 1000	0 [rev]/ [mm]	○		

7.2.4 I/O setting parameters ([Pr. PD_ _])

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PD01 *DIA1 Input signal automatic on selection 1	Select input devices to turn on them automatically.					
	_ _ _ 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/external thrust 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)/EM1 (Forced stop 1) 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				

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PD01 *DIA1 Input signal automatic on selection 1	Convert the setting value into hexadecimal as follows.					



Signal name	Initial value	
	BIN	HEX
	0	0
	0	
SON (Servo-on)	0	
	0	

Signal name	Initial value	
	BIN	HEX
PC (Proportional control)	0	0
TL (External torque/external thrust limit selection)	0	
	0	
	0	

Signal name	Initial value	
	BIN	HEX
	0	0
	0	
LSP (Forward rotation stroke end)	0	
LSN (Reverse rotation stroke end)	0	

Signal name	Initial value	
	BIN	HEX
EM2 (Forced stop 2)/EM1 (Forced stop 1)	0	0
	0	
	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/BCD	CL	PS
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 7.10 for settings.	02h	○	○	○

Table 7.10 Selectable input devices

Setting value	Input device (Note 1)		
	CP/BCD	CL	PS
0 2 _ _	SON	SON	SON
0 3 _ _	RES	RES	RES
0 4 _ _	PC	PC	PC
0 5 _ _	TL	TL	TL
0 6 _ _	CR	CR	CR
0 7 _ _	ST1	ST1	ST1
0 8 _ _	ST2	ST2	
0 9 _ _	TL1	TL1	TL1
0 A _ _	LSP	LSP	LSP
0 B _ _	LSN	LSN	LSN
0 D _ _	CDP	CDP	CDP
0 F _ _ (Note 2)	MECR	MECR	
1 2 _ _	MSD	MSD	
1 E _ _	CLTC (Note 3)	CLTC (Note 3)	
1 F _ _	CPCD (Note 3)	CPCD (Note 3)	
2 0 _ _	MD0	MD0	MD0
2 1 _ _	CAMC (Note 3)	CAMC (Note 3)	MD1
2 3 _ _	TCH		
2 4 _ _	TP0	TP0	
2 5 _ _	TP1	TP1	
2 6 _ _	OVR	OVR	
2 7 _ _	TSTP	TSTP	
2 9 _ _	CI0 (Note 3)	CI0 (Note 3)	
2 A _ _	CI1 (Note 3)	CI1 (Note 3)	
2 B _ _	DOG	DOG	SIG
2 C _ _	SPD1 (Note 3)		
2 D _ _	SPD2 (Note 3)		
2 E _ _	SPD3 (Note 3)		
2 F _ _	SPD4 (Note 3)		
3 0 _ _		LPS	
3 1 _ _	CI2 (Note 3)	CI2 (Note 3)	RT
3 2 _ _			RTCDP
3 4 _ _		PI1	OV0
3 5 _ _		PI2	OV1
3 6 _ _		PI3	OV2
3 7 _ _	CI3 (Note 3)	CI3 (Note 3)	OV3
3 8 _ _	DI0	DI0	DI0
3 9 _ _	DI1	DI1	DI1
3 A _ _	DI2	DI2	DI2
3 B _ _	DI3	DI3	DI3
3 C _ _	DI4	DI4	DI4
3 D _ _	DI5	DI5	DI5
3 E _ _	DI6	DI6	DI6
3 F _ _	DI7	DI7	DI7

Note
1. CP: Positioning mode (point table method)
   BCD: Positioning mode (point table method in the BCD input positioning operation)
   This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
   CL: Positioning mode (program method)
   PS: Positioning mode (indexer method)
   The diagonal lines indicate manufacturer settings. Never change the setting.
2. It cannot be set with MR-J4-03A6-RJ servo amplifiers.
3. This is available with servo amplifiers with software version B7 or later.

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PD06 *DI2H Input device selection 2H	Any input device can be assigned to the CN1-16 pin.					
	_ _ x x	Not used with the positioning mode.	21h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	20h	○	○	○
PD08 *DI3H Input device selection 3H	Any input device can be assigned to the CN1-17 pin.					
	_ _ x x	Not used with the positioning mode.	07h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	07h	○	○	○
PD10 *DI4H Input device selection 4H	Any input device can be assigned to the CN1-18 pin.					
	_ _ x x	Not used with the positioning mode.	08h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	08h	○	○	○
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.	03h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	38h	○	○	○
PD14 *DI6H Input device selection 6H	Any input device can be assigned to the CN1-41 pin.					
	_ _ x x	Not used with the positioning mode.	20h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	39h	○	○	○
PD18 *DI8H Input device selection 8H	Any input device can be assigned to the CN1-43 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.	0Ah	○	○	○
PD20 *DI9H Input device selection 9H	Any input device can be assigned to the CN1-44 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.	0Bh	○	○	○
PD22 *DI10H Input device selection 10H	Any input device can be assigned to the CN1-45 pin.					
	_ _ x x	Not used with the positioning mode.	23h	╲	╲	╲
	x x _ _	Positioning mode - Device selection Refer to table 7.10 in [Pr. PD04] for settings.	2Bh	○	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PD23 *DO1 Output device selection 1	_ _ x x	Device selection Any output device can be assigned to the CN1-22 pin. Refer to table 7.11 for settings.	04h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

Table 7.11 Selectable output devices

Setting value	Output device (Note 1)		
	CP/BCD	CL	PS
_ _ 0 0	Always off	Always off	Always off
_ _ 0 2	RD	RD	RD
_ _ 0 3	ALM	ALM	ALM
_ _ 0 4	INP	INP	INP
_ _ 0 5	MBR	MBR	MBR
_ _ 0 6 (Note 2)	DB	DB	DB
_ _ 0 7	TLC	TLC	TLC
_ _ 0 8	WNG	WNG	WNG
_ _ 0 9	BWNG	BWNG	BWNG
_ _ 0 A	SA	SA	Always off
_ _ 0 B	Always off	Always off	Always off
_ _ 0 C	ZSP	ZSP	ZSP
_ _ 0 D (Note 2)	MTTR	MTTR	MTTR
_ _ 0 F	CDPS	CDPS	CDPS
_ _ 1 0 (Note 2)	CLDS	CLDS	CLDS
_ _ 1 1	ABSV	ABSV	ABSV
_ _ 1 F (Note 2)	CPCC (Note 4)	CPCC (Note 4)	
_ _ 2 3	CPO	CPO	CPO
_ _ 2 4	ZP	ZP	ZP
_ _ 2 5	POT	POT	Always off
_ _ 2 6	PUS	PUS	Always off
_ _ 2 7	MEND	MEND	MEND
_ _ 2 9 (Note 2)	CLTS (Note 4)	CLTS (Note 4)	
_ _ 2 B (Note 2)	CLTSM (Note 4)	CLTSM (Note 4)	
_ _ 2 C	PED	PED	
_ _ 2 D		SOUT	
_ _ 2 E		OUT1	
_ _ 2 F		OUT2	
_ _ 3 0		OUT3	
_ _ 3 1	ALMWNG	ALMWNG	ALMWNG
_ _ 3 2	BW9F	BW9F	BW9F
_ _ 3 3	MSDH	MSDH	
_ _ 3 4	MSDL	MSDL	
_ _ 3 7 (Note 2)	CAMS (Note 4)	CAMS (Note 4)	

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	Control mode CL	Control mode PS
PD23 *DO1 Output device selection 1						

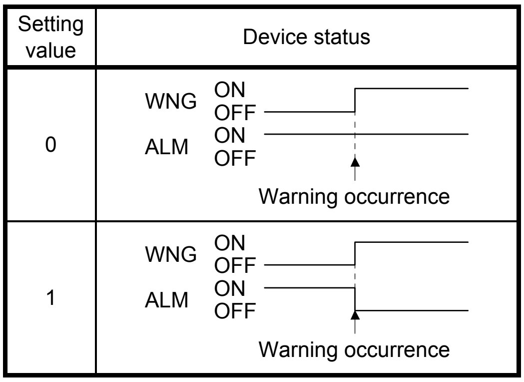
Setting value	Output device (Note 1)		
	CP/BCD	CL	PS
_ _ 3 8 (Note 3)	PT0		PS0
_ _ 3 9 (Note 3)	PT1		PS1
_ _ 3 A (Note 3)	PT2		PS2
_ _ 3 B (Note 3)	PT3		PS3
_ _ 3 C (Note 3)	PT4		PS4
_ _ 3 D (Note 3)	PT5		PS5
_ _ 3 E (Note 3)	PT6		PS6
_ _ 3 F (Note 3)	PT7		PS7

Note 1. CP: Positioning mode (point table method)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
The diagonal lines indicate manufacturer settings. Never change the setting.
2. It cannot be set with MR-J4-03A6-RJ servo amplifiers.
3. For MR-J4-03A6-RJ servo amplifiers, up to six points of DO are available; therefore, PT0 to PT7 or PS0 to PS7 cannot be output simultaneously.
4. This is available with servo amplifiers with software version B7 or later.

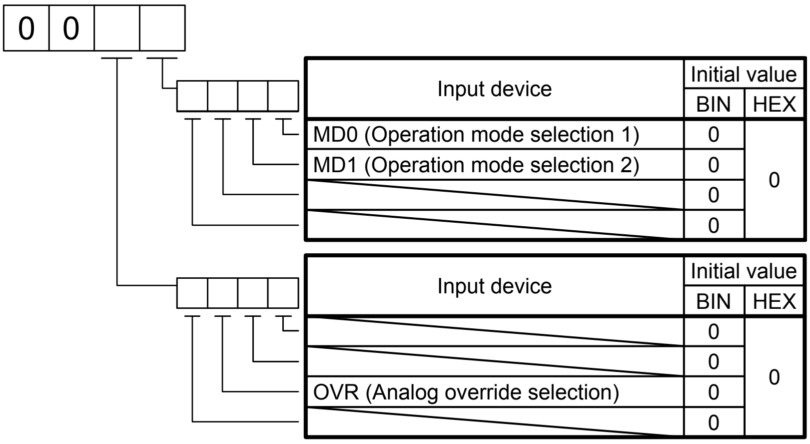
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	Control mode CL	Control mode PS
PD24 *DO2 Output device selection 2	_ _ x x	Device selection Any output device can be assigned to the CN1-23 pin. Refer to table 7.11 in [Pr. PD23] for settings.	0Ch	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
PD25 *DO3 Output device selection 3	_ _ x x	Device selection Any output device can be assigned to the CN1-24 pin. Refer to table 7.11 in [Pr. PD23] for settings.	04h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
PD26 *DO4 Output device selection 4	_ _ x x	Device selection Any output device can be assigned to the CN1-25 pin. Refer to table 7.11 in [Pr. PD23] for settings.	07h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
PD28 *DO6 Output device selection 6	_ _ x x	Device selection Any output device can be assigned to the CN1-49 pin. Refer to table 7.11 in [Pr. PD23] for settings.	02h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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			

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="4">PD30
*DOP1
Function selection D-1</td><td>_ _ _ x</td><td>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.)
<table>
<tr><th rowspan="2">Setting value</th><th colspan="2">Control mode</th></tr>
<tr><th>CP/BCD/CL</th><th>PS</th></tr>
<tr><td>0</td><td colspan="2">Quick stop (home position erased)</td></tr>
<tr><td>1</td><td colspan="2">Slow stop (home position erased)</td></tr>
<tr><td>2</td><td>Slow stop (deceleration to a stop by deceleration time constant)</td><td>Slow stop (home position erased)</td></tr>
<tr><td>3</td><td>Quick stop (stop by clearing remaining distance)</td><td>Quick stop (home position erased)</td></tr>
</table></td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td>Base circuit status selection for RES (Reset) on
0: Base circuit shut-off
1: No base circuit shut-off</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ x _ _</td><td>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)</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td>x _ _ _</td><td>Servo motor thermistor or linear servo motor enabled/disabled selection
0: Enabled
1: Disabled
The setting in this digit will be disabled when using a servo motor or linear servo motor without thermistor.</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="4">PD31
*DOP2
Function selection D-2</td><td>_ _ _ x</td><td rowspan="3">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ _ x _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>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].</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td rowspan="4">PD32
*DOP3
Function selection D-3</td><td>_ _ _ x</td><td>CR (Clear) selection
This is used to set CR (Clear).
0: Deleting droop pulses by turning on the device
1: Continuous deleting of droop pulses during the device on
2: Disabled</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td rowspan="3">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td><td></td></tr>
</table>

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PD33 *DOP4 Function selection D-4	_ _ _ x	For manufacturer setting	0h			
	_ _ x _		0h			
	_ x _ _	Rotation direction selection to enable torque limit/travel direction selection to enable thrust limit Select a direction which enables internal torque limit 2 or external torque limit. 0: Both of "CCW or positive direction" and "CW or negative direction" are enabled. 1: Enabled with "CCW or positive direction" 2: Enabled with "CW or negative direction"	0h	○	○	○
	x _ _ _	For manufacturer setting	0h			
PD34 *DOP5 Function selection D-5	_ _ _ x	Alarm code output Select an output alarm codes. Alarm codes are outputted to pins CN1-22, CN1-23, and CN1-24. 0: Disabled 1: Enabled For details of the alarm codes, refer to chapter 8.	0h	○	○	○
	_ _ x _	Selection of output device at warning occurrence Select ALM (Malfunction) output status for when an warning occurs.  	0h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	CL	PS
PD41 *DIA3 Input signal automatic on selection 3	Select input devices to turn on them automatically.					
	_ _ _ x (HEX)	_ _ _ x (BIN): MD0 (operation mode selection 1) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○	○
		_ _ x _ (BIN): MD1 (operation mode selection 2) 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): OVR (Analog override selection) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	
		x _ _ _ (BIN): For manufacturer setting				
	_ x _ _ (HEX)	_ _ _ x (BIN): For manufacturer setting	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): For manufacturer setting				
		x _ _ _ (BIN): For manufacturer setting				
	Convert the setting value into hexadecimal as follows.					



Input device	Initial value BIN	Initial value HEX
MD0 (Operation mode selection 1)	0	0
MD1 (Operation mode selection 2)	0	
	0	
	0	

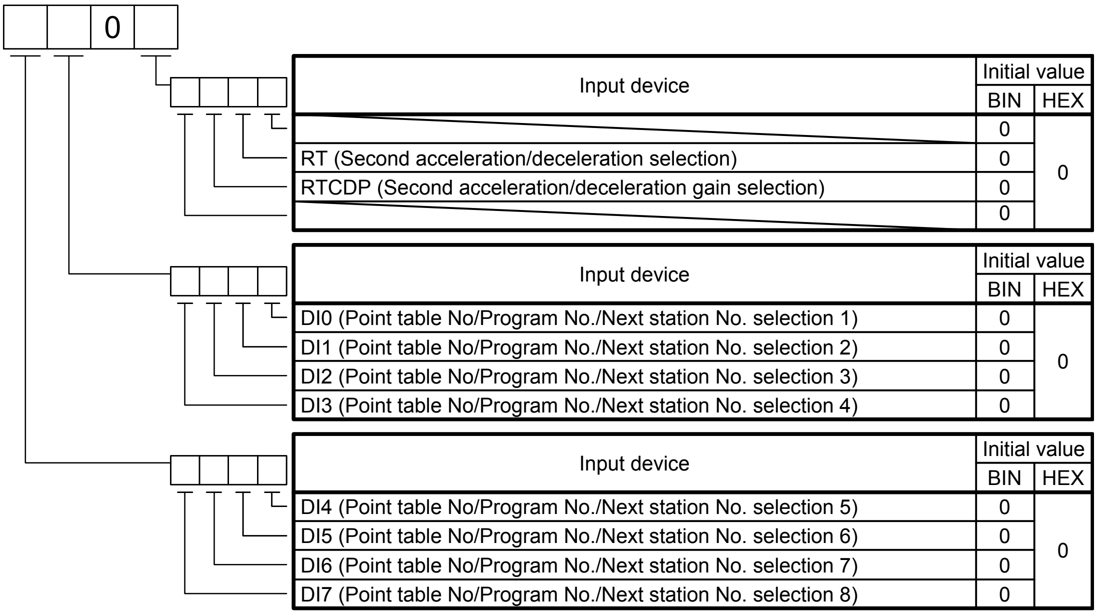
Input device	Initial value BIN	Initial value HEX
	0	0
	0	
OVR (Analog override selection)	0	
	0	

BIN 0: Use for an external input signal.
BIN 1: Automatic on

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	CL	PS
PD42 *DIA4 Input signal automatic on selection 4	Select input devices to turn on them automatically.					
	_ _ _ x (HEX)	_ _ _ x (BIN): For manufacturer setting	0h			
		_ _ x _ (BIN): RT (Second acceleration/deceleration selection) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)				○
		_ x _ _ (BIN): RTCDP (Second acceleration/deceleration gain selection) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)				○
		x _ _ _ (BIN): For manufacturer setting				
	_ _ x _ (HEX)	_ _ _ x (BIN): For manufacturer setting	0h			
		_ _ x _ (BIN): For manufacturer setting				
		_ x _ _ (BIN): For manufacturer setting				
		x _ _ _ (BIN): For manufacturer setting				

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode CP/BCD	CL	PS
PD42 *DIA4 Input signal automatic on selection 4	_ x _ _ (HEX)	_ _ _ x (BIN): DI0 (point table No/Program No./next station No. selection 1) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○	○
		_ _ x _ (BIN): DI1 (point table No/program No./next station No. selection 2) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○
		_ x _ _ (BIN): DI2 (point table No/program No./next station No. selection 3) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○
		x _ _ _ (BIN): DI3 (point table No/program No./next station No. selection 4) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○
	x _ _ _ (HEX)	_ _ _ x (BIN): DI4 (point table No/Program No./next station No. selection 5) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)	0h	○	○	○
		_ _ x _ (BIN): DI5 (point table No/program No./next station No. selection 6) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○
		_ x _ _ (BIN): DI6 (point table No/program No./next station No. selection 7) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○
		x _ _ _ (BIN): DI7 (point table No/program No./next station No. selection 8) 0: Disabled (Use for an external input signal.) 1: Enabled (automatic on)		○	○	○

Convert the setting value into hexadecimal as follows.



Input device	Initial value BIN	Initial value HEX
	0	0
RT (Second acceleration/deceleration selection)	0	
RTCDP (Second acceleration/deceleration gain selection)	0	
	0	

Input device	Initial value BIN	Initial value HEX
DI0 (Point table No/Program No./Next station No. selection 1)	0	0
DI1 (Point table No/Program No./Next station No. selection 2)	0	
DI2 (Point table No/Program No./Next station No. selection 3)	0	
DI3 (Point table No/Program No./Next station No. selection 4)	0	

Input device	Initial value BIN	Initial value HEX
DI4 (Point table No/Program No./Next station No. selection 5)	0	0
DI5 (Point table No/Program No./Next station No. selection 6)	0	
DI6 (Point table No/Program No./Next station No. selection 7)	0	
DI7 (Point table No/Program No./Next station No. selection 8)	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/BCD	CL	PS
PD44 *DI11H Input device selection 11H		Any input device can be assigned to the CN1-10 pin/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 setting values. When "00" is set, PP/PP2 (Forward rotation pulse/Manual pulse generator) will be assigned. The CN1-37 pin is available with servo amplifiers having software version B7 or later, and manufactured in January, 2015 or later.	3Ah	○	○	
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 setting values. When "00" is set, NP/NP2 (Reverse rotation pulse/Manual pulse generator) will be assigned. The CN1-38 pin is available with servo amplifiers having software version B7 or later, and manufactured in January, 2015 or later.	3Bh	○	○	
PD47 *DO7 Output device selection 7		Any output device can be assigned to the CN1-13 pin and CN1-14 pin. This parameter is not available with MR-J4-03A6-RJ servo amplifiers.				
	_ _ x x	Device selection Any output device can be assigned to the CN1-13 pin. Refer to table 7.11 in [Pr. PD23] for setting values.	00h	○	○	○
	x x _ _	Device selection Any output device can be assigned to the CN1-14 pin. Refer to table 7.11 in [Pr. PD23] for setting values.	00h	○	○	○

7.2.5 Extension setting 2 parameters ([Pr. PE_ _])

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="3">PE03
*FCT2
Fully closed loop function selection 2</td><td>_ _ x x</td><td>Fully closed loop control error detection function selection
Select the fully closed loop control error detection function.
This digit is not available with MR-J4-03A6-RJ servo amplifiers.
○: Abnormal detection enabled -: Abnormal detection disabled
<table>
<tr><th rowspan="3">Setting value</th><th rowspan="3">Speed deviation error</th><th colspan="3">Position deviation error</th></tr>
<tr><th colspan="2">During servo-on</th><th rowspan="2">During servo-off</th></tr>
<tr><th>With command</th><th>0 command</th></tr>
<tr><td>_ _ 0 0</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 0 1</td><td>○</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 0 2</td><td>-</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ 0 3</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ 1 0</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 1 1</td><td>○</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 1 2</td><td>-</td><td>-</td><td>○</td><td>-</td></tr>
<tr><td>_ _ 1 3</td><td>○</td><td>-</td><td>○</td><td>-</td></tr>
<tr><td>_ _ 2 0</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 2 1</td><td>○</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>_ _ 2 2</td><td>-</td><td>-</td><td>○</td><td>○</td></tr>
<tr><td>_ _ 2 3</td><td>○</td><td>-</td><td>○</td><td>○</td></tr>
</table>
</td><td>03h</td><td>○</td><td>○</td><td></td></tr>
<tr><td>_ x _ _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>Fully closed loop control error reset selection
0: Reset disabled (reset by powering off/on enabled)
1: Reset enabled
This digit is not available with MR-J4-03A6-RJ servo amplifiers.</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PE04
*FBN
Fully closed loop control - Feedback pulse electronic gear 1 - Numerator</td><td></td><td>Set a numerator of electronic gear for the servo motor encoder pulse at the fully closed loop control.
Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder.
This parameter is not available with MR-J4-03A6-RJ servo amplifiers.
Setting range: 1 to 65535</td><td>1</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PE05
*FBD
Fully closed loop control - Feedback pulse electronic gear 1 - Denominator</td><td></td><td>Set a denominator of electronic gear for the servo motor encoder pulse at the fully closed loop control.
Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder.
This parameter is not available with MR-J4-03A6-RJ servo amplifiers.
Setting range: 1 to 65535</td><td>1</td><td>○</td><td>○</td><td></td></tr>
<tr><td>PE06
BC1
Fully closed loop control - Speed deviation error detection level</td><td></td><td>Set [AL. 42.9 Fully closed loop control error by speed deviation] of the fully closed loop control error detection. When the speed deviation between the servo motor encoder and load-side encoder becomes larger than the setting value, the alarm will occur.
This parameter is not available with MR-J4-03A6-RJ servo amplifiers.
Setting range: 1 to 50000</td><td>400
[r/min]/
[mm/s]</td><td>○</td><td>○</td><td></td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PE07 BC2 Fully closed loop control - Position deviation error detection level		Set [AL. 42.8 Fully closed loop control error by position deviation] of the fully closed loop control error detection. When the position deviation between the servo motor encoder and load-side encoder becomes larger than the setting value, the alarm will occur. This parameter is not available with MR-J4-03A6-RJ servo amplifiers. Setting range: 1 to 20000	100 [kpulse]	○	○	
PE08 DUF Fully closed loop dual feedback filter		Set a dual feedback filter band. For details, refer to section 17.3.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". This parameter is not available with MR-J4-03A6-RJ servo amplifiers. Setting range: 1 to 4500	10 [rad/s]	○	○	
PE10 FCT3 Fully closed loop function selection 3	_ _ _ x	For manufacturer setting	0h			
	_ _ x _	Fully closed loop control - Position deviation error detection level - Unit selection 0: 1 kplulse unit 1: 1 pulse unit This digit is not available with MR-J4-03A6-RJ servo amplifiers.	0h	○	○	
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
PE34 *FBN2 Fully closed loop control - Feedback pulse electronic gear 2 - Numerator		Set a numerator of electronic gear for the servo motor encoder pulse at the fully closed loop control. Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder. For details, refer to section 17.3.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". This parameter is not available with MR-J4-03A6-RJ servo amplifiers. Setting range: 1 to 65535	1	○	○	
PE35 *FBD2 Fully closed loop control - Feedback pulse electronic gear 2 - Denominator		Set a denominator of electronic gear for the servo motor encoder pulse at the fully closed loop control. Set the electronic gear so that the number of servo motor encoder pulses for one servo motor revolution is converted to the resolution of the load-side encoder. For details, refer to section 17.3.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual". This parameter is not available with MR-J4-03A6-RJ servo amplifiers. Setting range: 1 to 65535	1	○	○	
PE41 EOP3 Function selection E-3	_ _ _ x	Robust filter selection 0: Disabled 1: Enabled When you select "Enabled" of this digit, the machine resonance suppression filter 5 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 B4 or later. Setting range: 0 to 30000	0 [0.01%]	○	○	○

No./symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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 B4 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 B4 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. The torque offset cannot be used for linear servo motors and direct drive motors. Set "0". This parameter is available with servo amplifiers with software version B4 or later. Setting range: -10000 to 10000	0 [0.01%]	○	○	○
PE48 *LMOP Lost motion compensation function selection	_ _ _ x	Lost motion compensation selection 0: Lost motion compensation disabled 1: Lost motion compensation enabled This parameter is available with servo amplifiers with software version B4 or later.	0h	○	○	○
	_ _ x _	Unit setting of lost motion compensation non-sensitive band 0: 1 pulse unit 1: 1 kplulse unit This parameter is available with servo amplifiers with software version B4 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 B4 or later. Setting range: 0 to 30000	0 [0.1 ms]	○	○	○
PE50 LMCT Lost motion compensation non-sensitive band		Set the lost motion compensation non-sensitive band. When the model position droop is the setting value or less, the speed will be 0. Setting can be changed in [Pr. PE48]. Set the parameter per encoder unit. This parameter is available with servo amplifiers with software version B4 or later. Setting range: 0 to 65535	0 [pulse]/ [kpulse]	○	○	○

7.2.6 Extension setting 3 parameters ([Pr. PF_ _])

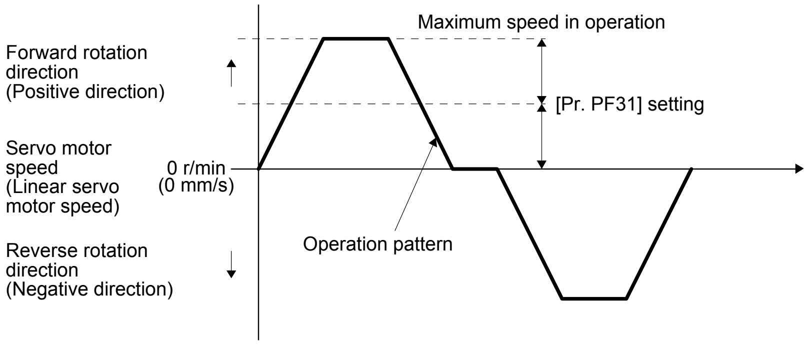
<table>
<tr><th rowspan="2">No./
symbol/name</th><th rowspan="2">Setting digit</th><th rowspan="2">Function</th><th rowspan="2">Initial value [unit]</th><th colspan="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="4">PF09
*FOP5
Function selection F-5</td><td>_ _ _ x</td><td>Electronic dynamic brake selection
0: Enabled only for specified servo motors
2: Disabled
Refer to the following table for the specified servo motors.
<table>
<tr><th>Series</th><th>Servo motor</th></tr>
<tr><td>HG-KR</td><td>HG-KR053/HG-KR13/HG-KR23/HG-KR43</td></tr>
<tr><td>HG-MR</td><td>HG-MR053/HG-MR13/HG-MR23/HG-MR43</td></tr>
<tr><td>HG-SR</td><td>HG-SR51/HG-SR52</td></tr>
<tr><td>HG-AK</td><td>HG-AK0136/HG-AK0236/HG-AK0336</td></tr>
</table></td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td rowspan="3">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>PF15
DBT
Electronic dynamic brake operating time</td><td></td><td>Set an operating time for the electronic dynamic brake.

Setting range: 0 to 10000</td><td>2000
[ms]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PF21
DRT
Drive recorder switching time setting</td><td></td><td>Set a drive recorder switching time.
When a USB communication is cut during using a graph function or a graph function is terminated, 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, it will switch after the setting value.
However, when "0" is set, it will switch after 600 s.
When "-1" is set, the drive recorder function is disabled.

Setting range: -1 to 32767</td><td>0
[s]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PF23
OSCL1
Vibration tough drive - Oscillation detection level</td><td></td><td>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.
However, setting "0" will be 50%.
Example: When you set "50" to the parameter, the filter will be readjusted at the time of 50% or more oscillation level.

Setting range: 0 to 100</td><td>50
[%]</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="4">PF24
*OSCL2
Vibration tough drive function selection</td><td>_ _ _ x</td><td>Oscillation detection alarm selection
Select alarm or warning when an oscillation continues at a filter readjustment sensitivity level of [Pr. PF23].
The digit is continuously 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</td><td>0h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>_ _ x _</td><td rowspan="3">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ x _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>PF25
CVAT
SEMI-F47 function - Instantaneous power failure detection time</td><td></td><td>Set the time of the [AL. 10.1 Voltage drop in the control circuit power] occurrence.
To disable the parameter, set "Disabled (_ 0 _ _)" of "SEMI-F47 function selection" in [Pr. PA20].
This parameter is not available with MR-J4-03A6-RJ servo amplifiers.

Setting range: 30 to 200</td><td>200
[ms]</td><td>○</td><td>○</td><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PF31 FRIC Machine diagnosis function - Friction judgement speed		Set a (linear) servo motor speed that divides a friction estimation area into high and low during the friction estimation process of the machine diagnosis. Setting "0" will set a value half of the rated speed. When your operation pattern is under the rated speed, we recommend that you set a half value of the maximum speed.  Setting range: 0 to permissible speed	0 [r/min]/ [mm/s]	○	○	○
PF34 *SOP3 RS-422 communication function selection 3	_ _ _ x	For manufacturer setting	0h			
	_ _ x _		0h			
	_ x _ _		0h			
	x _ _ _	MR-PRU03 selection Select this if using an MR-PRU03. 0: Disabled 1: Enabled This digit is not available with MR-J4-03A6-RJ servo amplifiers.	0h	○	○	○

7.2.7 Linear servo motor/DD motor setting parameters ([Pr. PL_ _])

POINT

- ●The linear servo motor/DD motor setting parameters ([Pr. PL_ _]) can be used with the direct drive servo system for the indexer method.
- ●Linear servo motor/DD motor setting parameters ([Pr. PL_ _]) cannot be used with MR-J4-03A6-RJ servo amplifiers.

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PL01 *LIT1 Linear servo motor/DD motor function selection 1	_ _ _ x	Linear servo motor/DD motor magnetic pole detection selection The setting value "0" will be enabled only with absolute position linear encoders. 0: Magnetic pole detection disabled 1: Magnetic pole detection at first servo-on 5: Magnetic pole detection at every servo-on	1h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _	Stop interval selection at the home position return Set a stop interval for the dog type home position return. The digit is enabled only for linear servo motors. 0: 2^{13} (= 8192) pulses 1: 2^{17} (= 131072) pulses 2: 2^{18} (= 262144) pulses 3: 2^{20} (= 1048576) pulses 4: 2^{22} (= 4194304) pulses 5: 2^{24} (= 16777216) pulses 6: 2^{26} (= 67108864) pulses	3h	○	○	
	x _ _ _	For manufacturer setting	0h			
PL02 *LIM Linear encoder resolution - Numerator		Set a linear encoder resolution per μm with [Pr. PL02] and [Pr. PL03]. Set a numerator to [Pr. PL02]. This is enabled only for linear servo motors. Setting range: 1 to 65535	1000 [μm]	○	○	
PL03 *LID Linear encoder resolution - Denominator		Set a linear encoder resolution per μm with [Pr. PL02] and [Pr. PL03]. Set a denominator to [Pr. PL03]. This is enabled only for linear servo motors. Setting range: 1 to 65535	1000 [μm]	○	○	
PL04 *LIT2 Linear servo motor/DD motor function selection 2	_ _ _ x	[AL. 42 Servo control error] detection function selection Refer to the following table.	3h	○	○	○

Setting value	Thrust/torque deviation error (Note)	Speed deviation error (Note)	Position deviation error (Note)
0	Disabled	Disabled	Disabled
1			Enabled
2		Enabled	Disabled
3			Enabled
4	Enabled	Disabled	Disabled
5			Enabled
6		Enabled	Disabled
7			Enabled

Note. For the details of each deviation error, refer to chapter 15 and 16 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PL04 *LIT2 Linear servo motor/DD motor function selection 2	_ _ x _	For manufacturer setting	0h			
	_ x _ _	For manufacturer setting	0h			
	x _ _ _	[AL. 42 Servo control error] detection function controller reset condition selection 0: Reset disabled (reset by powering off/on enabled) 1: Reset enabled	0h	○	○	○
PL05 LB1 Position deviation error detection level		Set a position deviation error detection level of the servo control error detection. When the deviation between a model feedback position and actual feedback position is larger than the setting value, [AL. 42 Servo control error] will occur. However, when "0" is set, the level varies depending on the operation mode in [Pr. PA01]. Linear servo motor: 50 mm Direct drive motor: 0.09 rev Setting range: 0 to 1000	0 [mm]/ [0.01 rev]	○	○	○
PL06 LB2 Speed deviation error detection level		Set a speed deviation error detection level of the servo control error detection. When the deviation between a model feedback speed and actual feedback speed is larger than the setting value, [AL. 42 Servo control error] will occur. However, when "0" is set, the level varies depending on the operation mode in [Pr. PA01]. Linear servo motor: 1000 mm/s Direct drive motor: 100 r/min Setting range: 0 to 5000	0 [mm/s]/ [r/min]	○	○	○
PL07 LB3 Torque/thrust deviation error detection level		Set a torque/thrust deviation error detection level of the servo control error detection. When the deviation between a current command and current feedback is larger than the setting value, [AL. 42.3 Servo control error by torque/thrust deviation] will occur. Setting range: 0 to 1000	100 [%]	○	○	○
PL08 *LIT3 Linear servo motor/DD motor function selection 3	_ _ _ x	Magnetic pole detection method selection 0: Position detection method 4: Minute position detection method	0h	○	○	○
	_ _ x _	For manufacturer setting	1h			
	_ x _ _	Magnetic pole detection - Stroke limit enabled/disabled selection 0: Enabled 1: Disabled	0h	○	○	○
	x _ _ _	For manufacturer setting	0h			
PL09 LPWM Magnetic pole detection voltage level		Set a direct current exciting voltage level during the magnetic pole detection. If [AL. 32 Overcurrent], [AL. 50 Overload 1], or [AL. 51 Overload 2] occurs during the magnetic pole detection, decrease the setting value. If [AL. 27 Initial magnetic pole detection error] occurs during the magnetic pole detection, increase the setting value. Setting range: 0 to 100	30 [%]	○	○	○
PL17 LTSTS Magnetic pole detection - Minute position detection method - Function selection	_ _ _ x	Response selection Set a response of the minute position detection method. When reducing a travel distance at the magnetic pole detection, increase the setting value. Refer to table 7.12 for settings.	0h	○	○	○
	_ _ x _	Load to motor mass ratio/load to motor inertia ratio selection Select a load to mass of the linear servo motor primary-side ratio or load to mass of the direct drive motor inertia ratio used at the minute position detection method. Set a closest value to the actual load. Refer to table 7.13 for settings.	0h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>PL17
LTSTS
Magnetic pole detection - Minute position detection method - Function selection</td><td></td><td>

Table 7.12 Response of minute position detection method at magnetic pole detection

<table>
<tr><th>Setting value</th><th>Response</th><th>Setting value</th><th>Response</th></tr>
<tr><td>_ _ _ 0</td><td>Low response</td><td>_ _ _ 8</td><td>Middle response</td></tr>
<tr><td>_ _ _ 1</td><td>↕</td><td>_ _ _ 9</td><td>↕</td></tr>
<tr><td>_ _ _ 2</td><td></td><td>_ _ _ A</td><td></td></tr>
<tr><td>_ _ _ 3</td><td></td><td>_ _ _ B</td><td></td></tr>
<tr><td>_ _ _ 4</td><td></td><td>_ _ _ C</td><td></td></tr>
<tr><td>_ _ _ 5</td><td></td><td>_ _ _ D</td><td></td></tr>
<tr><td>_ _ _ 6</td><td></td><td>_ _ _ E</td><td></td></tr>
<tr><td>_ _ _ 7</td><td>Middle response</td><td>_ _ _ F</td><td>High response</td></tr>
</table>

Table 7.13 Load to motor mass ratio/load to motor inertia ratio

<table>
<tr><th>Setting value</th><th>Load to motor mass ratio/load to motor inertia ratio</th><th>Setting value</th><th>Load to motor mass ratio/load to motor inertia ratio</th></tr>
<tr><td>_ _ 0 _</td><td>10 times or less</td><td>_ _ 8 _</td><td>80 times</td></tr>
<tr><td>_ _ 1 _</td><td>10 times</td><td>_ _ 9 _</td><td>90 times</td></tr>
<tr><td>_ _ 2 _</td><td>20 times</td><td>_ _ A _</td><td>100 times</td></tr>
<tr><td>_ _ 3 _</td><td>30 times</td><td>_ _ B _</td><td>110 times</td></tr>
<tr><td>_ _ 4 _</td><td>40 times</td><td>_ _ C _</td><td>120 times</td></tr>
<tr><td>_ _ 5 _</td><td>50 times</td><td>_ _ D _</td><td>130 times</td></tr>
<tr><td>_ _ 6 _</td><td>60 times</td><td>_ _ E _</td><td>140 times</td></tr>
<tr><td>_ _ 7 _</td><td>70 times</td><td>_ _ F _</td><td>150 times or more</td></tr>
</table>

</td><td></td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>PL18
IDLV
Magnetic pole detection - Minute position detection method - Identification signal amplitude</td><td></td><td>Set an identification signal amplitude used in the minute position detection method.
This parameter is enabled only when the magnetic pole detection is the minute position detection method.
However, setting "0" will be 100% amplitude.

Setting range: 0 to 100</td><td>0
[%]</td><td>○</td><td>○</td><td>○</td></tr>
</table>

7.2.8 Option setting parameters ([Pr. Po_ _])

<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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</th></tr>
<tr><td rowspan="3">Po02
*ODI1
MR-D01 input device selection 1</td><td colspan="6">Any input device can be assigned to the CN10-21 pin and CN10-26 pin.</td></tr>
<tr><td>_ _ x x</td><td>CN10-21 selection
Select an input signal function of the CN10-21 pin.
Refer to table 7.14 for settings.
This parameter setting is available with servo amplifiers with software version B7 or later.</td><td>02h</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>x x _ _</td><td>CN10-26 selection
Select an input signal function of the CN10-26 pin.
Refer to table 7.14 for settings.
This parameter setting is available with servo amplifiers with software version B7 or later.</td><td>03h</td><td>○</td><td>○</td><td>○</td></tr>
</table>

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po02 *ODI1 MR-D01 input device selection 1						

Table 7.14 Selectable input devices

Setting value	Input device (Note)		
	CP/BCD	CL	PS
02	SON	SON	SON
03	RES	RES	RES
04	PC	PC	PC
05	TL	TL	TL
06	CR	CR	CR
07	ST1	ST1	ST1
08	ST2	ST2	
09	TL1	TL1	TL1
0A	LSP	LSP	LSP
0B	LSN	LSN	LSN
0D	CDP	CDP	CDP
0F	MECR	MECR	
12	MSD	MSD	
1E	CLTC	CLTC	
1F	CPCD	CPCD	
20	MD0	MD0	MD0
21	CAMC	CAMC	MD1
23	TCH		
24	TP0	TP0	
25	TP1	TP1	
26	OVR	OVR	
27	TSTP	TSTP	
29	CI0	CI0	
2A	CI1	CI1	
2B	DOG	DOG	SIG
2C	SPD1		
2D	SPD2		
2E	SPD3		
2F	SPD4		
30		LPS	
31	CI2	CI2	RT
32			RTCDP
34		PI1	OV0
35		PI2	OV1
36		PI3	OV2
37	CI3	CI3	OV3
38	DI0	DI0	DI0
39	DI1	DI1	DI1
3A	DI2	DI2	DI2
3B	DI3	DI3	DI3
3C	DI4	DI4	DI4
3D	DI5	DI5	DI5
3E	DI6	DI6	DI6
3F	DI7	DI7	DI7

Note. CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
The diagonal lines indicate manufacturer settings. Never change the setting.

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po03 *ODI2 MR-D01 input device selection 2	Any input device can be assigned to the CN10-27 pin and CN10-28 pin.					
	_ _ x x	CN10-27 selection Select an input signal function of the CN10-27 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	05h	○	○	○
	x x _ _	CN10-28 selection Select an input signal function of the CN10-28 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	09h	○	○	○
Po04 *ODI3 MR-D01 input device selection 3	Any input device can be assigned to the CN10-29 pin and CN10-30 pin.					
	_ _ x x	CN10-28 selection Select an input signal function of the CN10-28 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	24h	○	○	○
	x x _ _	CN10-30 selection Select an input signal function of the CN10-30 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	25h	○	○	○
Po05 *ODI4 MR-D01 input device selection 4	Any input device can be assigned to the CN10-31 pin and CN10-32 pin.					
	_ _ x x	CN10-31 selection Select an input signal function of the CN10-31 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	26h	○	○	○
	x x _ _	CN10-32 selection Select an input signal function of the CN10-32 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	20h	○	○	○
Po06 *ODI5 MR-D01 input device selection 5	Any input device can be assigned to the CN10-33 pin and CN10-34 pin.					
	_ _ x x	CN10-33 selection Select an input signal function of the CN10-33 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	27h	○	○	○
	x x _ _	CN10-34 selection Select an input signal function of the CN10-34 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	04h	○	○	○
Po07 *ODI6 MR-D01 input device selection 6	Any input device can be assigned to the CN10-35 pin and CN10-36 pin.					
	_ _ x x	CN10-35 selection Select an input signal function of the CN10-35 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	07h	○	○	○
	x x _ _	CN10-36 selection Select an input signal function of the CN10-36 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	08h	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po08 *ODO1 MR-D01 output device selection 1	Any output device can be assigned to the CN10-46 pin and CN10-47 pin.					
	_ _ x x	CN10-46 selection Select an output signal function of the CN10-46 pin. Refer to table 7.15 for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	26h	○	○	○
	x x _ _	CN10-47 selection Select an output signal function of the CN10-47 pin. Refer to table 7.15 for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	27h	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po08 *ODO1 MR-D01 output device selection 1						

Table 7.15 Selectable output devices

Setting value	Output device (Note)		
	CP/BCD	CL	PS
00	Always off	Always off	Always off
02	RD	RD	RD
03	ALM	ALM	ALM
04	INP	INP	INP
05	MBR	MBR	MBR
06	DB	DB	DB
07	TLC	TLC	TLC
08	WNG	WNG	WNG
09	BWNG	BWNG	BWNG
0A	SA	SA	Always off
0B	Always off	Always off	Always off
0C	ZSP	ZSP	ZSP
0D	MTTR	MTTR	MTTR
0F	CDPS	CDPS	CDPS
10	CDLS	CDLS	CDLS
11	ABSV	ABSV	ABSV
1F	CPCC	CPCC	╲
23	CPO	CPO	CPO
24	ZP	ZP	ZP
25	POT	POT	Always off
26	PUS	PUS	Always off
27	MEND	MEND	MEND
29	CLTS	CLTS	╲
2B	CLTSM	CLTSM	╲
2C	PED	PED	╲
2D	╲	SOUT	╲
2E	╲	OUT1	╲
2F	╲	OUT2	╲
30	╲	OUT3	╲
31	ALMWNG	ALMWNG	ALMWNG
32	BW9F	BW9F	BW9F
33	MSDH	MSDH	╲
34	MSDL	MSDL	╲
37	CAMS	CAMS	╲
38	PT0	╲	PS0
39	PT1	╲	PS1
3A	PT2	╲	PS2
3B	PT3	╲	PS3
3C	PT4	╲	PS4
3D	PT5	╲	PS5
3E	PT6	╲	PS6
3F	PT7	╲	PS7

Note. CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
The diagonal lines indicate manufacturer settings. Never change the setting.

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po09 *ODO9 MR-D01 output device selection 2	Any output device can be assigned to the CN10-48 pin and CN10-49 pin.					
	_ _ x x	CN10-48 selection Select an output signal function of the CN10-48 pin. Refer to table 7.15 in [Pr. Po08] for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	23h	○	○	○
	x x _ _	CN10-49 selection Select an output signal function of the CN10-49 pin. Refer to table 7.15 in [Pr. Po08] for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	04h	○	○	○
Po10 *OOP1 Function selection O-1	Always set this parameter when using MR-D01. Set the MR-D01 input device selection, select whether to enable or disable position data input signs, and set a data establishment condition.					
	_ _ _ x	MR-D01 DI0 to DI14 input signal device selection 0: Disabled 1: Point table: 255 points 2: BCD 3 digits × 2 inputs This parameter setting is available with servo amplifiers with software version B7 or later.	1h	○	○	○
	_ _ x _	For manufacturer setting	0h			
	_ x _ _	MR-D01 position data input sign +/- 0: Disabled 1: Enabled This parameter setting is available with servo amplifiers with software version B7 or later.	0h	○	○	○
	x _ _ _	MR-D01 data establishment condition 0: Strobe signal enabled (when the PLC is used) 2: 3.55 ms data matching time (Strobe signal disabled) This parameter setting is available with servo amplifiers with software version B7 or later.	2h	○	○	○
Po11 *OOP2 Function selection O-2	Select the input devices of the override input and torque limit.					
	_ _ _ x	For manufacturer setting	0h			
	_ _ x _	Override input CN1-2/CN20-2 switching selection 0: CN1-2 pin enabled 1: CN20-2 pin enabled Setting "1" when no MR-D01 has been connected will trigger [AL. 37].	0h	○	○	○
	_ x _ _	Torque limit CN1-27/CN20-12 switching selection 0: CN1-27 pin enabled 1: CN20-12 pin enabled Setting "1" when no MR-D01 has been connected will trigger [AL. 37].	0h	○	○	○
	x _ _ _	For manufacturer setting	0h			
Po12 *OOP3 Function selection O-3	Select an alarm code output setting and an M code output setting.					
	_ _ _ x	MR-D01 alarm code output 0: Disabled 1: Enabled Selecting "1" in this digit will output an alarm code when an alarm occurs. This parameter setting is available with servo amplifiers with software version B7 or later.	0h	○	○	○
	_ _ x _	M code output selection 0: Disabled 1: Enabled Selecting "1" in this digit will enable you to check outputs according to M codes (0 to 99) set with point tables by using output devices of the communication function.	0h	○		
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po13 *OMOD1 MR-D01 analog monitor 1 output selection	Set a signal to output to Analog monitor 1.					
	_ _ x x	Analog monitor 1 output selection Refer to table 7.16 for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	00h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			

Table 7.16 Analog monitor setting value

Setting value	Item	Operation mode (Note 1)			
		Standard	Full.	Lin.	DD
_ _ 0 0	(Linear) servo motor speed (±8 V/max. speed)	○	○	○	○
_ _ 0 1	Torque or thrust (±8 V/max. torque or max. thrust) (Note 3)	○	○	○	○
_ _ 0 2	(Linear) servo motor speed (+8 V/max. speed)	○	○	○	○
_ _ 0 3	Torque or thrust (+8 V/max. torque or max. thrust) (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 A	Feedback position (±10 V/1 Mpulses) (Note 2)	○			
_ _ 0 B	Feedback position (±10 V/10 Mpulses) (Note 2)	○			
_ _ 0 C	Feedback position (±10 V/100 Mpulses) (Note 2)	○			
_ _ 0 D	Bus voltage (200 V class and 100 V class: +8 V/400 V, 400 V class: +8 V/800 V)	○	○	○	○
_ _ 0 E	Speed command 2 (±8 V/max. speed)	○	○	○	○
_ _ 1 0	Load-side droop pulses (±10 V/100 pulses) (Note 2)		○		
_ _ 1 1	Load-side droop pulses (±10 V/1000 pulses) (Note 2)		○		
_ _ 1 2	Load-side droop pulses (±10 V/10000 pulses) (Note 2)		○		
_ _ 1 3	Load-side droop pulses (±10 V/100000 pulses) (Note 2)		○		
_ _ 1 4	Load-side droop pulses (±10 V/1M pulses) (Note 2)		○		
_ _ 1 5	Servo motor-side/load-side position deviation (±10 V/100000 pulses)		○		
_ _ 1 6	Servo motor-side/load-side speed deviation (±8 V/max. speed)		○		
_ _ 1 7	Encoder inside temperature (±10 V/±128 ˚C)	○	○		○

Note 1. Items with ○ are available for each operation mode.
Standard: Standard (semi closed loop system) use of the rotary servo motor
Full.: Fully closed loop system use of the rotary servo motor
Lin.: Linear servo motor use
DD: Direct drive (DD) motor use
2. Encoder pulse unit
3. 8 V is outputted at the maximum torque. However, when [Pr. PA11] and [Pr. PA12] are set to limit torque, 8 V is output at the torque highly limited.

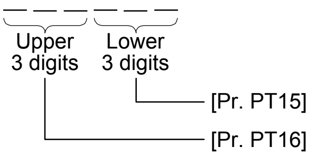
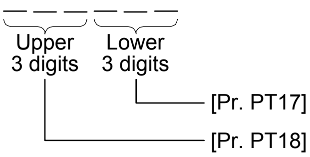
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
Po14 OMOD2 MR-D01 analog monitor 2 output selection	Set a signal to output to Analog monitor 2.					
	_ _ x x	Analog monitor 2 output selection Select a signal to output to MO2 (Analog monitor 2). Refer to [Pr. Po13] for settings. This parameter setting is available with servo amplifiers with software version B7 or later.	00h	○	○	○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _		0h			
Po15 OMO1 MR-D01 analog monitor 1 offset		This is used to set the offset voltage of MO1 (Analog monitor 1). This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -9999 to 9999	0 [mV]	○	○	○
Po16 OMO2 MR-D01 analog monitor 2 offset		This is used to set the offset voltage of MO2 (Analog monitor 2). This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -9999 to 9999	0 [mV]	○	○	○
Po21 OVCO MR-D01 override offset		This is used to set the offset voltage of the override. This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -9999 to 9999	0 [mV]	○	○	○
Po22 OTLO MR-D01 Analog torque limit offset		This is used to set the offset voltage of the analog torque limit. This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: -9999 to 9999	0 [mV]	○	○	○
Po27 *ODI7 MR-D01 input device selection 7	Any input device can be assigned to the CN10-18 pin and CN10-19 pin.					
	_ _ x x	CN10-18 selection Select an input signal function of the CN10-18 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	2Ch	○	○	○
	x x _ _	CN10-19 selection Select an input signal function of the CN10-19 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	2Dh	○	○	○
Po28 *ODI8 MR-D01 input device selection 8	Any input device can be assigned to the CN10-20 pin.					
	_ _ x x	CN10-20 selection Select an input signal function of the CN10-20 pin. Refer to table 7.14 in [Pr. Po02] for setting values. This parameter setting is available with servo amplifiers with software version B7 or later.	2Eh	○	○	○
	x x _ _	For manufacturer setting	00h			

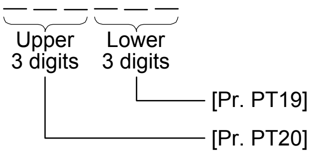
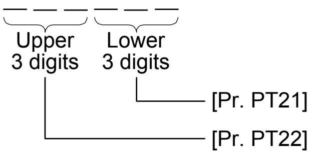
7.2.9 Positioning control parameters ([Pr. PT_ _])

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
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 For the simple cam function, set a command unit of the cam axis one cycle input during the cam control. The setting unit is applied to the cam axis one cycle length setting and the cam axis one cycle current value.	0h	○	○	
	x _ _ _	RS-422 communication - Previous model equivalent selection 0: Disabled (MR-J4 standard) 1: Enabled (equivalent to MR-J3-T) 2: Enabled (equivalent to MR-J2S-CP) 3: Enabled (equivalent to MR-J2S-CL) For the communication command of the Mitsubishi general-purpose AC servo protocol, the status display and read/write commands of input/output devices can be used with the data Nos. and bit assignment of the same as previous models. When this digit is "1" or "2", MR Configurator2 cannot be used with the USB communication.	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 This parameter setting is available with servo amplifiers with software version B7 or later.	0h	○	○	
	x _ _ _	For manufacturer setting	0h			

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PT04 *ZTY Home position return type	_ _ _ x	Home position return method 0: Dog type (rear end detection, Z-phase reference)/torque limit changing dog type 1: Count type (front end detection, Z-phase reference) (Note 1) 2: Data set type/torque limit changing data set type 3: Stopper type (Note 1) 4: Home position ignorance (servo-on position as home position) (Note 1) 5: Dog type (rear end detection, rear end reference) (Note 1) 6: Count type (front end detection, front end reference) (Note 1) 7: Dog cradle type (Note 1) 8: Dog type (front end detection, Z-phase reference) (Note 1, 2) 9: Dog type (front end detection, front end reference) (Note 1) A: Dogless type (Z-phase reference) (Note 1, 2) Note 1. Setting "1" and "3" to "A" will trigger [AL. 37 Parameter error] for the indexer method. 2. This type is available when a linear encoder or a DD motor is used with servo amplifiers with software version B7 or later. This type is not available when a linear encoder or a DD motor is not used with servo amplifiers with software version B6 or earlier. Setting this type will trigger [AL. 37 Parameter error].	0h	○	○	○
	_ _ x _	Home position return direction 0: Address increasing direction 1: Address decreasing direction d 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 "0" to "3" can be used for the indexer method. When [degree] of "Position data unit" is set in [Pr. PT01] in the point table method or program method, "0" and "1" can be used. ("2" or more will be recognized as "1".)	0h	○	○	○
	x _ _ _	For manufacturer setting	0h			
PT05 ZRF Home position return speed		Set a (linear) servo motor speed at home position return. Setting range: 0 to permissible instantaneous speed	100 [r/min]/ [mm/s]	○	○	○
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]/ [mm/s]	○	○	○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PT07 ZST Home position shift distance		Set a shift distance from the Z-phase pulse detection position in the encoder. The unit will be as follows depending on the positioning mode. ・Point table method or program method It will be change to [μm], 10^{-4} [inch], 10^{-3} [degree], or [pulse] with [Pr. PT01]. ・Indexer method It will be command unit [pulse]. (unit of a load-side rotation expressed by the number of encoder resolution pulses) Refer to the Function column of [Pr. PA10] for the command unit [pulse]. Additionally, when "Home position shift distance multiplication" is set in [Pr. PT04], it is used with "$\times 10^{n}$". Setting range: 0 to 65535	0 Refer to Function column for unit.	○	○	○
PT08 *ZPS Home position return position data		Set a current position at home position return completion. 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.	○	○	
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	1000 Refer to Function column for unit.	○	○	
PT10 ZTM Stopper type home position return stopper time		Set time from a moving part touches the stopper and torques reaches to the torque limit of [Pr. PT10 Stopper type home position return - Torque limit value] to a home position set for the stopper type home position return. Setting "0" to "4" will be the same as setting "5". 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 "0.0" will be the same as setting "1.0". Setting range: 0 to 1000	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 as follows depending on the positioning mode. ・Point table method or program method The unit will be changed to 10^{STM} [μm], $10^{-(STM-4)}$ [inch], 10^{-3} [degree], or [pulse] with the setting of [Pr. PT01]. ・Indexer method It will be command unit [pulse]. (unit of a load-side rotation expressed by the number of encoder resolution pulses) Refer to the Function column of [Pr. PA10] for the command unit [pulse]. 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]/ [mm/s]	○	○	○

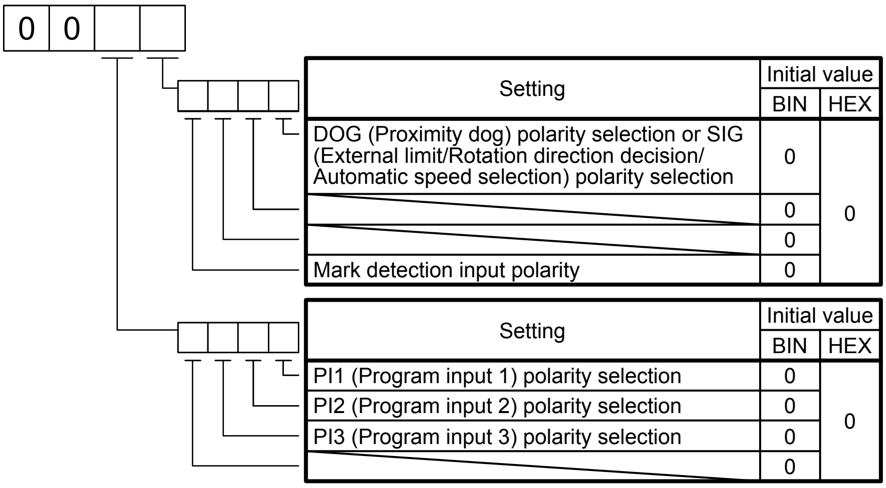
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PT14 *BKC Backlash compensation		Set a backlash compensation for reversing command direction. This parameter compensates backlash pulses against the home position return direction. For the home position ignorance (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. The unit [pulse] will be the command pulse per revolution. Setting range: 0 to 65535	0 [pulse]	○	○	○
PT15 LMPL Software limit + (third least significant digit) PT16 LMPH Software limit + (third most significant digit)		Set an address increasing side of the software stroke limit. Upper and lower are a set. Setting address:  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.	○	○	
PT17 LMNL Software limit - (third least significant digit) PT18 LMNH Software limit - (third most significant digit)		Set an address decreasing side of the software stroke limit. Upper and lower are a set. Setting address:  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 the address increasing direction, change it from the + side of the software limit ([Pr. PT15] and [Pr. PT16]). 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/BCD	CL	PS
PT19 *LPPL Position range output address + (third least significant digit)		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:  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 a setting, always set the third least significant digit before setting the third most significant digit. 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.	○	○	
PT20 *LPPH Position range output address + (third most significant digit)						
PT21 *LNPL Position range output address - (third least significant digit)		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:  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 a setting, always set the third least significant digit before setting the third most significant digit. 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 - (third most significant digit)						
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 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 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 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="3">Control mode</th></tr>
<tr><th>CP/BCD</th><th>CL</th><th>PS</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><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 will be displayed as machine home position is 0.</td><td>Command current position will be displayed as machine home position is 0.</td></tr>
<tr><td rowspan="2">_ _ 1 _</td><td rowspan="2">Roll feed display</td><td>Auto</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 will be displayed.
When a stop, a point table command position for the point table method will be displayed and 0 will be continuously displayed for the program method.</td></tr>
<tr><td>Manual</td><td>0 will be continuously 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><td></td></tr>
<tr><td>_ x _ _</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>Mark detection function selection
0: Current position latch function
1: Interrupt positioning function (Note)
Note. The interrupt positioning function is available with servo amplifiers with software version B7 or later.</td><td>0h</td><td>○</td><td>○</td><td></td></tr>
<tr><td rowspan="4">PT27
*ODM
Operation mode selection</td><td>_ _ _ x</td><td>For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>_ _ x _</td><td>Manual operation method selection
0: Station JOG operation
1: JOG operation</td><td>0h</td><td></td><td></td><td>○</td></tr>
<tr><td>_ x _ _</td><td rowspan="2">For manufacturer setting</td><td>0h</td><td></td><td></td><td></td></tr>
<tr><td>x _ _ _</td><td>0h</td><td></td><td></td><td></td></tr>
</table>

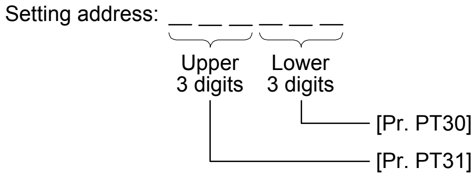
No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PT28 *STN Number of stations per rotation		Set the number of stations per rotation (number of indexer stations). Setting "2" or less will be "2". Setting range: 0 to 255	8 [Stations]			○
PT29 *TOP3 Function selection 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): SIG (External limit/Rotation direction decision/Automatic speed selection) polarity selection 0: Normally open contact 1: Normally closed contact				○
		_ _ 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 This is available with servo amplifiers with software version B7 or later.		○	○	
	_ _ 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.



Setting	Initial value	
	BIN	HEX
DOG (Proximity dog) polarity selection or SIG (External limit/Rotation direction decision/ Automatic speed selection) polarity selection	0	0
	0	
	0	
Mark detection input polarity	0	

Setting	Initial value	
	BIN	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/BCD	CL	PS
PT30 MSTL Mark sensor stop travel distance (lower 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.  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] to [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]. This parameter setting is available with servo amplifiers with software version B7 or later. Setting range: 0 to 999	0 Refer to Function column for unit.	○	○	
PT31 MSTH Mark sensor stop travel distance (upper three digits)						
PT34 *PDEF Point table/program default		Use this parameter when initializing a point table and program. A point table and program will be the following status by initializing. Point table: All "0" Program: Erased Initialize them 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, it takes about 20 s to complete the initialization. "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	○	○	
PT38 *TOP7 Function selection T-7	_ _ _ x	For manufacturer setting	0h			
	_ _ x _	Digital override selection 0: Override function is disabled with DI input 1: Override function is enabled with DI input	0h			○
	_ x _ _	For manufacturer setting	0h			
	x _ _ _	Backlash compensation direction selection at data set type home position return 0: Executes backlash compensation assuming a command to the CW rotation direction before home position return. 1: Executes backlash compensation assuming a command to the CCW rotation direction before home position return. When setting this digit, execute a home position return again.	0h			○
PT39 INT Torque limit delay time		Set delay time from outputting INP (In-position) to enabling [Pr. PC35 Internal torque limit 2/internal thrust limit 2]. Setting range: 0 to 1000	100 [ms]			○

No./ symbol/name	Setting digit	Function	Initial value [unit]	Control mode		
				CP/BCD	CL	PS
PT40 *SZS Station home position shift distance		Set a shift distance of the station home position with encoder pulse unit at home position return. Setting this parameter enables to shift the station home position (station No. 0) to the position for home position return. The following shows cautions for the setting. ・The setting of the station home position shift distance is disabled at home position return. Cycling the power will enable the setting. ・When a home position shift distance is longer than the in-position range, INP (In-position) will not be on regardless of cycle of the power after home position return. Setting range: -32000 to 32000	0 [pulse]			○
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			
PT42 *OVM Digital override minimum multiplication		Set a minimum speed for when the digital override function is enabled. When you use the digital override function, multiplication can be set with [Pr. PT42] and [Pr. PT43]. Set this and [Pr. PT43] at a time. Refer to the following table for how to calculate multiplication value. Setting "0" will be recognized as "1". Setting range: 0 to 100	0 [%]			○

(Note) Input device				Multiplication [%]
OV3	OV2	OV1	OV0	
0	0	0	0	Fixed to 100
0	0	0	1	[Pr. PT42]
0	0	1	0	[Pr. PT42] + [Pr. PT43] × 1
0	0	1	1	[Pr. PT42] + [Pr. PT43] × 2
0	1	0	0	[Pr. PT42] + [Pr. PT43] × 3
0	1	0	1	[Pr. PT42] + [Pr. PT43] × 4
0	1	1	0	[Pr. PT42] + [Pr. PT43] × 5
0	1	1	1	[Pr. PT42] + [Pr. PT43] × 6
1	0	0	0	[Pr. PT42] + [Pr. PT43] × 7
1	0	0	1	[Pr. PT42] + [Pr. PT43] × 8
1	0	1	0	[Pr. PT42] + [Pr. PT43] × 9
1	0	1	1	[Pr. PT42] + [Pr. PT43] × 10
1	1	0	0	[Pr. PT42] + [Pr. PT43] × 11
1	1	0	1	[Pr. PT42] + [Pr. PT43] × 12
1	1	1	0	[Pr. PT42] + [Pr. PT43] × 13
1	1	1	1	Fixed to 0

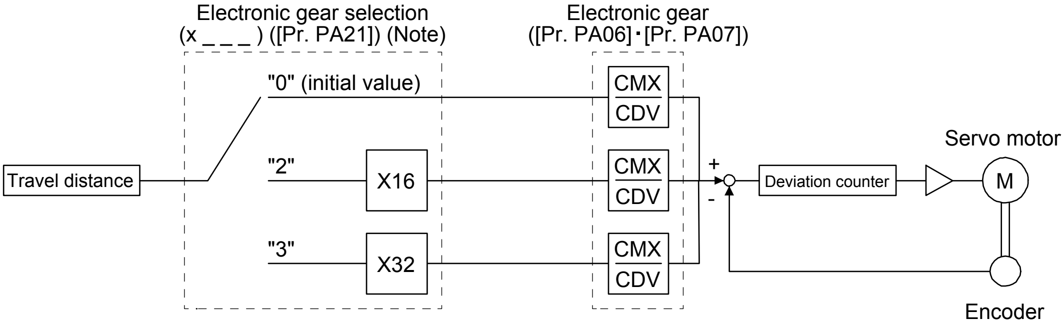
Note. 0: Off
1: On

No./ symbol/name	Setting digit	Function	Initial value [unit]	CP/BCD	CL	PS
PT43 *OVS Digital override pitch width		Set an override pitch width for when the digital override function is enabled. When you use the digital override function, multiplication can be set with [Pr. PT42] and [Pr. PT43]. Set this and [Pr. PT42] at a time. Refer to the table of [Pr. PT42] for settings. Setting "0" will be recognized as "1". Setting range: 0 to 20	0 [%]			○

7.3 How to set the electronic gear

7.3.1 Electronic gear settings in the point table method and program method

(1) Setting [mm], [inch], or [pulse] with "Position data unit" of [Pr. PT01].
Adjust [Pr. PA06] and [Pr. PA07] so that the servo motor setting matches with the travel distance of the machine.



Pt: Servo motor encoder resolution: 4194304 [pulse/rev]
ΔS: Travel distance per servo motor revolution [mm/rev]/[inch/rev]/[pulse/rev]
CMX/CDV = Pt/ΔS

Note. For MR-J4-03A6-RJ servo amplifiers, "2 _ _ _" or "3 _ _ _" cannot be set to [Pr. PA21].

Set the electronic gear within the following range. Setting out of the range will trigger [AL. 37 Parameter error].

Pr. PA21	Electronic gear setting range
0 _ _ _	1/865 < CMX/CDV < 271471
2 _ _ _	1/13825 < CMX/CDV < 16967
3 _ _ _	1/27649 < CMX/CDV < 8484

The following setting example explains how to calculate the electronic gear.

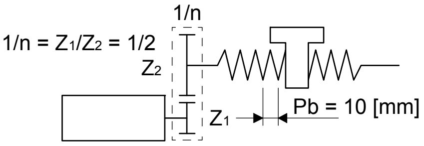
POINT

- To calculate the electronic gear, the following specification symbols are required.
  Pb: Ball screw lead [mm]
  1/n: Reduction ratio
  Pt: Servo motor encoder resolution [pulse/rev]
  ΔS: Travel distance per servo motor revolution [mm/rev]

(a) Setting example of a ball screw

Machine specifications

Ball screw lead Pb = 10 [mm]
Reduction ratio: $1/n = Z_1/Z_2 = 1/2$
Z_1: Number of gear teeth on servo motor side
Z_2: Number of gear teeth on load gear



Servo motor encoder resolution
4194304 [pulse/rev]

Servo motor encoder resolution P_t = 4194304 [pulse/rev]

$$\frac{CMX}{CDV} = \frac{P_t}{\Delta S} = \frac{P_t}{n \cdot Pb \cdot \alpha \text{ (Note)}} = \frac{4194304}{1/2 \cdot 10 \cdot 1000} = \frac{4194304}{5000} = \frac{524288}{625}$$

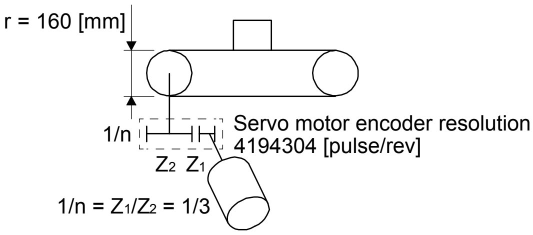
Note. Because the command unit is "mm", α = 1000 is set. When the unit is "inch", convert the setting into α = 10000. When the unit is "pulse", convert the setting into α = 1.

Therefore, set CMX = 524288 and CDV = 625.

(b) Setting example of a conveyor

Machine specifications

Pulley diameter: r = 160 [mm]
Reduction ratio: 1/n = Z_1/Z_2 = 1/3
Z_1: Number of gear teeth on servo motor side
Z_2: Number of gear teeth on load gear



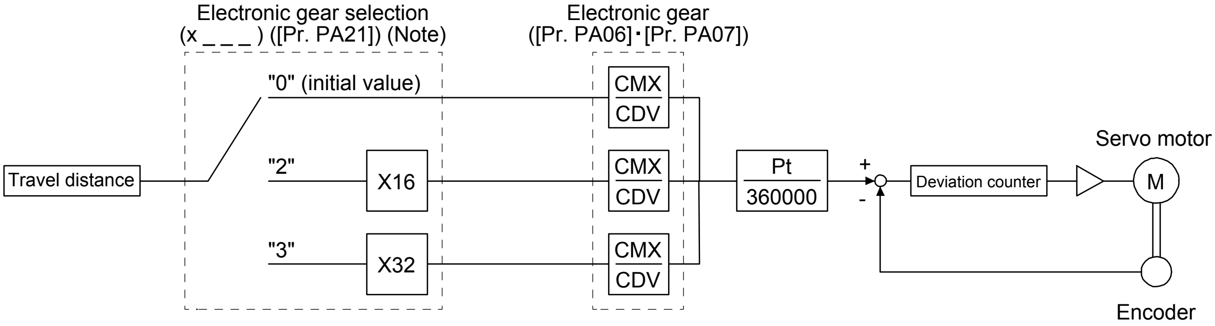
Servo motor encoder resolution P_t = 4194304 [pulse/rev]

$$\frac{CMX}{CDV} = \frac{P_t}{\Delta S} = \frac{P_t}{n \cdot r \cdot \pi \cdot \alpha \text{ (Note)}} = \frac{4194304}{1/3 \cdot 160 \cdot \pi \cdot 1000} = \frac{4194304}{167551.61} \approx \frac{524288}{20944}$$

Note. Because the command unit is "mm", α = 1000 is set. When the unit is "inch", convert the setting into α = 10000. When the unit is "pulse", convert the setting into α = 1.

Reduce CMX and CDV to within the setting range or lower and round off each value to the closest whole number.
Therefore, set CMX = 524288 and CDV = 20944.

(2) Setting [degree] with "Position data unit" of [Pr. PT01].
Set the number of gear teeth on machine side to [Pr. PA06] and number of gear teeth on servo motor side to [Pr. PA07].



Pt: Servo motor encoder resolution: 4194304 [pulse/rev]

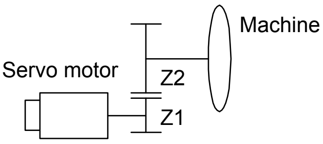
Note. For MR-J4-03A6-RJ servo amplifiers, "2 _ _ _" or "3 _ _ _" cannot be set to [Pr. PA21].

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.
Number of gear teeth on machine side: 25, number of gear teeth on servo motor side: 11
Set [Pr. PA06] = 25 and [Pr. PA07] = 11.

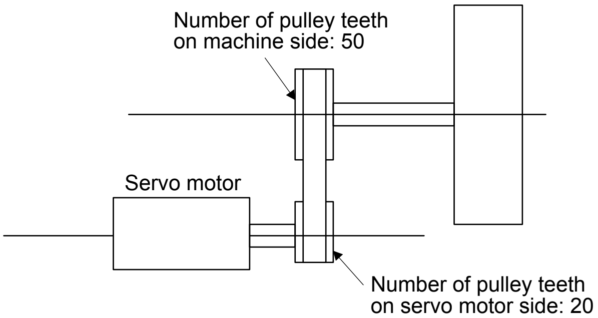


Pt (Servo motor resolution): 4194304 pulses/rev
Z1: Number of gear teeth on servo motor side
Z2: Number of gear teeth on machine side
Z1: Z2 = 11:25

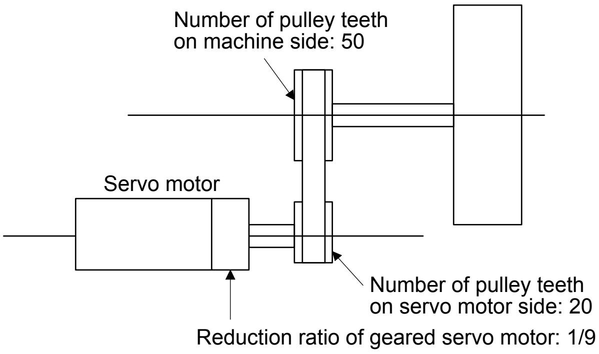
7.3.2 Electronic gear setting in the indexer method

Adjust [Pr. PA06] and [Pr. PA07] to align the rotation amount "m" of the servo motor shaft necessary to rotate the load side for "n" times. The following shows a setting example of the electronic gear.

(1) Number of pulley teeth on machine side: 50, number of pulley teeth on servo motor side: 20
Set [Pr. PA06] = 50 and [Pr. PA07] = 20.



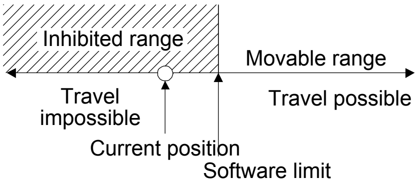
(2) Number of pulley teeth on machine side: 50, number of pulley teeth on servo motor side: 20, with geared servo motor of 1/9
Set [Pr. PA06] = 450 and [Pr. PA07] = 20.



$$\frac{50}{20} \times \frac{9}{1} = \frac{450}{20}$$

7.4 Software limit

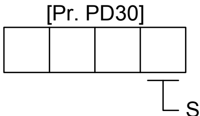
The limit stop with the software limit ([Pr. PT15] to [Pr. PT18]) is the same as the motion of the stroke end. Exceeding a setting range will stop and servo-lock the shaft. This will be enabled at power-on and will be disabled at home position return. Setting a same value to "Software limit +" and "Software limit -" will disable this function. Setting a larger value to "Software limit -" than "Software limit +" will trigger [AL. 37.2 Parameter combination error].



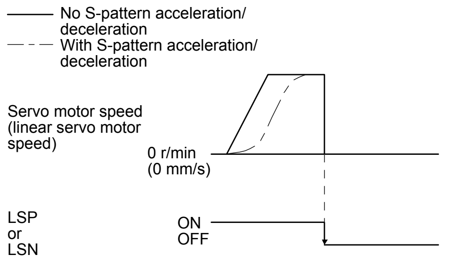
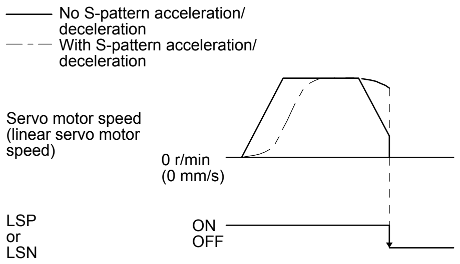
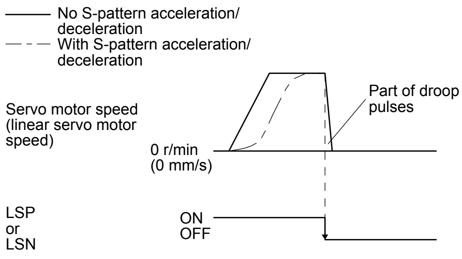
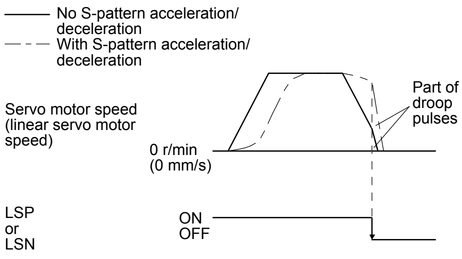
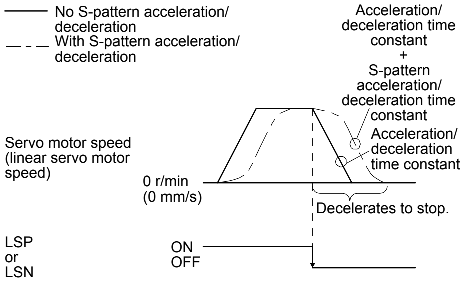
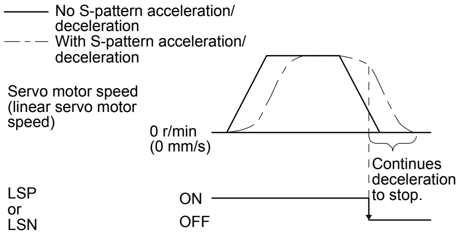
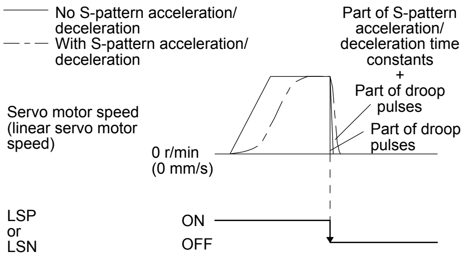
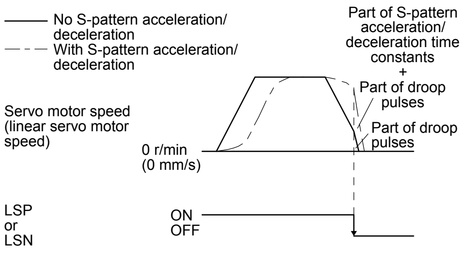
The software limit is disabled in the indexer method.

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].



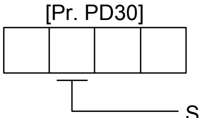
Stop method selection for LSP (Forward rotation stroke end) off or LSN (Reverse rotation stroke end) off
0: Quick stop (home position erased)
1: Slow stop (home position erased)
2: Slow stop (deceleration to a stop by deceleration time constant)
3: Quick stop (stop by clearing remaining distance)

[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 motor. Erases the home position. A difference will be generated between command position and current position. Perform a home position return again.
_ _ _ 1			Erases the droop pulse portion and stops the motor. Erases the home position. A difference will be generated between command position and current position. Perform a home position return again.
_ _ _ 2 (Note 1)			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 (Note 2)			Erases the droop pulse portion and stops the motor. Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants. Maintains the home position.

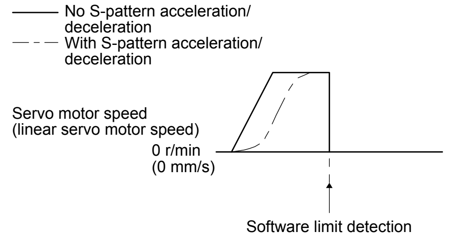
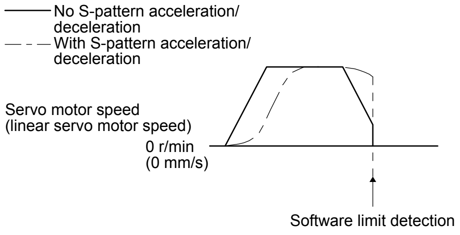
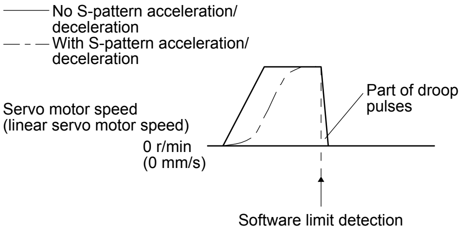
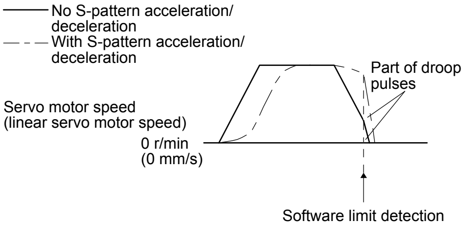
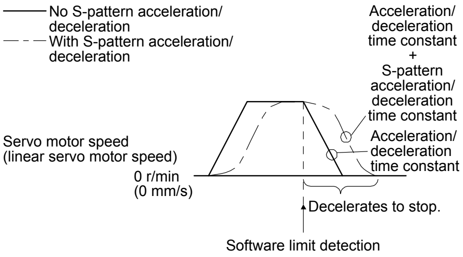
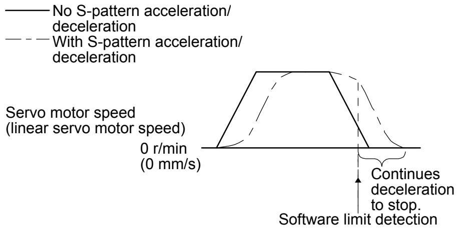
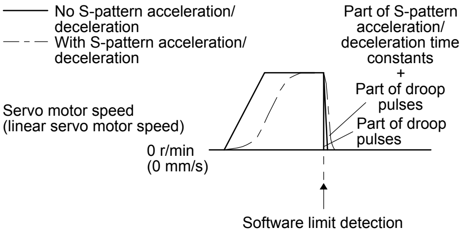
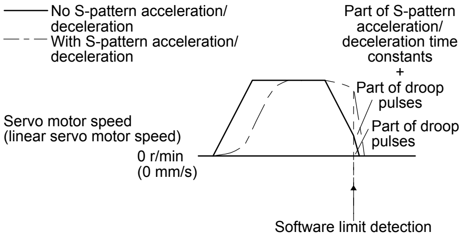
Note 1. This will be the same motion as setting "_ _ _ 1" to [Pr. PD30] in the indexer method.
2. This will be the same motion as setting "_ _ _ 0" to [Pr. PD30] in the indexer method.

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.
The software limit is disabled in the indexer method.



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 motor. Erases the home position. A difference will be generated between command position and current position. Perform a home position return again.
_ 1 _ _			Erases the droop pulse portion and stops the motor. Erases the home position. A difference will be generated between command position and 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. Keeps the home position.
_ 3 _ _			Erases the droop pulse portion and stops the motor. Continues operation for a delay portion of the S-pattern acceleration/deceleration time constants. Keeps the home position.

MEMO

8. TROUBLESHOOTING

POINT

- ●Refer to "MELSERVO-J4 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 the alarm or the warning is displayed, refer to "MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)" to remove the failure. When an alarm occurs, ALM will turn off.

8.1 Explanation for the lists

(1) No./Name/Detail No./Detail name

Indicates each 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 its cause has been removed, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column. Warnings are automatically canceled after the cause of occurrence is removed. Alarms are deactivated with alarm reset or cycling the power.

Alarm deactivation	Explanation
Alarm reset	1. Turning on RES (Reset) with input device 2. Pushing the "SET" button while the display of the servo amplifier is the current alarm display status 3. Pushing the "Occurring Alarm Reset" button in the "Alarm Display" window of MR Configurator2
Cycling the power	Turning off the power and on again

(4) Alarm code

To output alarm codes, set [Pr. PD34] to "_ _ _ 1". Alarm codes are outputted by on/off of 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	Cycling the power	CN1 22 (Bit 2)	CN1 23 (Bit 1)	CN1 24 (Bit 0)
Alarm	10	Undervoltage	10.1	Voltage drop in the control circuit power	EDB	○	○	0	1	0
			10.2	Voltage drop in the main circuit power	SD	○	○			
	12	Memory error 1 (RAM)	12.1	RAM error 1	DB		○	0	0	0
			12.2	RAM error 2	DB		○			
			12.4	RAM error 4	DB		○			
			12.5	RAM error 5	DB		○			
	13	Clock error	13.1	Clock error 1	DB		○	0	0	0
			13.2	Clock error 2	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		○			
	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		○			
	19	Memory error 3 (Frash-ROM)	19.1	Frash-ROM error 1	DB		○	0	0	0
			19.2	Frash-ROM error 2	DB		○			
	1A	Servo motor combination error	1A.1	Servo motor combination error 1	DB		○	1	1	0
			1A.2	Servo motor control mode combination error	DB		○			
			1A.4	Servo motor combination error 2	DB		○			
	1E	Encoder initial communication error 2	1E.1	Encoder malfunction	DB		○	1	1	0
			1E.2	Load-side encoder malfunction	DB		○			
	1F	Encoder initial communication error 3	1F.1	Incompatible encoder	DB		○	1	1	0
			1F.2	Incompatible load-side encoder	DB		○			
	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		○			

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Cycling the power	CN1 22 (Bit 2)	CN1 23 (Bit 1)	CN1 24 (Bit 0)
Alarm	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		○			
			21.4	Encoder non-signal 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 by hardware detection circuit	DB		○	1	0	0
			24.2	Ground fault detected by software detection function	DB	○	○			
	25	Absolute position erased	25.1	Servo motor encoder - Absolute position erased	DB		○	1	1	0
	27	Initial magnetic pole detection error	27.1	Initial magnetic pole detection - Abnormal termination	DB	○	○	1	1	0
			27.2	Initial magnetic pole detection - Time out error	DB	○	○			
			27.3	Initial magnetic pole detection - Limit switch error	DB	○	○			
			27.4	Initial magnetic pole detection - Estimated error	DB	○	○			
			27.5	Initial magnetic pole detection - Position deviation error	DB	○	○			
			27.6	Initial magnetic pole detection - Speed deviation error	DB	○	○			
			27.7	Initial magnetic pole detection - Current error	DB	○	○			
	28	Linear encoder error 2	28.1	Linear encoder - Environment error	EDB		○	1	1	0
	2A	Linear encoder error 1	2A.1	Linear encoder error 1-1	EDB		○	1	1	0
			2A.2	Linear encoder error 1-2	EDB		○			
			2A.3	Linear encoder error 1-3	EDB		○			
			2A.4	Linear encoder error 1-4	EDB		○			
			2A.5	Linear encoder error 1-5	EDB		○			
			2A.6	Linear encoder error 1-6	EDB		○			
			2A.7	Linear encoder error 1-7	EDB		○			
			2A.8	Linear encoder error 1-8	EDB		○			
	2B	Encoder counter error	2B.1	Encoder counter error 1	EDB		○	1	1	0
			2B.2	Encoder counter error 2	EDB		○			
	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
	35	Command frequency error	35.1	Command frequency error	SD	○	○	1	0	1
	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	Command 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.6	Operation mode switch error	DB		○	0	0	0

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Cycling the power	CN1 22 (Bit 2)	CN1 23 (Bit 1)	CN1 24 (Bit 0)
Alarm	42	Servo control error (for linear servo motor and direct drive motor)	42.1	Servo control error by position deviation	EDB	(Note 4)	○	1	1	0
			42.2	Servo control error by speed deviation	EDB	(Note 4)	○			
			42.3	Servo control error by torque/thrust deviation	EDB	(Note 4)	○			
		Fully closed loop control error (for fully closed loop control)	42.8	Fully closed loop control error by position deviation	EDB	(Note 4)	○			
			42.9	Fully closed loop control error by speed deviation	EDB	(Note 4)	○			
			42.A	Fully closed loop control error by position deviation during command stop	EDB	(Note 4)	○			
	45	Main circuit device overheat	45.1	Main circuit device overheat error 1	SD	○ (Note 1)	○ (Note 1)	0	1	1
			45.2	Main circuit device overheat error 2	SD	○ (Note 1)	○ (Note 1)			
	46	Servo motor overheat	46.1	Abnormal temperature of servo motor 1	SD	○ (Note 1)	○ (Note 1)	0	1	1
			46.2	Abnormal temperature of servo motor 2	SD	○ (Note 1)	○ (Note 1)			
			46.3	Thermistor disconnected error	SD	○ (Note 1)	○ (Note 1)			
			46.4	Thermistor circuit error	SD	○ (Note 1)	○ (Note 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	47.1	Cooling fan stop error	SD		○	0	1	1
			47.2	Cooling fan speed reduction error	SD		○			
	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	○	○			

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)	Alarm deactivation		Alarm code		
						Alarm reset	Cycling the power	CN1 22 (Bit 2)	CN1 23 (Bit 1)	CN1 24 (Bit 0)
Alarm	61	Operation error	61.1	Point table setting range error	DB	○	○	1	0	1
	63	STO timing error	63.1	STO1 off	DB	○	○	1	1	0
			63.2	STO2 off	DB	○	○			
	70	Load-side encoder initial communication error 1	70.1	Load-side encoder initial communication - Receive data error 1	DB		○	1	1	0
			70.2	Load-side encoder initial communication - Receive data error 2	DB		○			
			70.3	Load-side encoder initial communication - Receive data error 3	DB		○			
			70.5	Load-side encoder initial communication - Transmission data error 1	DB		○			
			70.6	Load-side encoder initial communication - Transmission data error 2	DB		○			
			70.7	Load-side encoder initial communication - Transmission data error 3	DB		○			
			70.A	Load-side encoder initial communication - Process error 1	DB		○			
			70.B	Load-side encoder initial communication - Process error 2	DB		○			
			70.C	Load-side encoder initial communication - Process error 3	DB		○			
			70.D	Load-side encoder initial communication - Process error 4	DB		○			
			70.E	Load-side encoder initial communication - Process error 5	DB		○			
			70.F	Load-side encoder initial communication - Process error 6	DB		○			
	71	Load-side encoder normal communication error 1	71.1	Load-side encoder normal communication - Receive data error 1	EDB		○	1	1	0
			71.2	Load-side encoder normal communication - Receive data error 2	EDB		○			
			71.3	Load-side encoder normal communication - Receive data error 3	EDB		○			
			71.5	Load-side encoder normal communication - Transmission data error 1	EDB		○			
			71.6	Load-side encoder normal communication - Transmission data error 2	EDB		○			
			71.7	Load-side encoder normal communication - Transmission data error 3	EDB		○			
			71.9	Load-side encoder normal communication - Receive data error 4	EDB		○			
			71.A	Load-side encoder normal communication - Receive data error 5	EDB		○			
	72	Load-side encoder normal communication error 2	72.1	Load-side encoder data error 1	EDB		○	1	1	0
			72.2	Load-side encoder data update error	EDB		○			
			72.3	Load-side encoder data waveform error	EDB		○			
			72.4	Load-side encoder non-signal error	EDB		○			
			72.5	Load-side encoder hardware error 1	EDB		○			
			72.6	Load-side encoder hardware error 2	EDB		○			
			72.9	Load-side encoder data error 2	EDB		○			
	8A	USB communication time-out error/serial communication time-out error	8A.1	USB communication time-out error/serial communication time-out error	SD	○	○	0	0	0
	8E	USB communication error/serial 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	○	○			
	88888	Watchdog	8888._	Watchdog	DB		○			

Note 1. Leave for about 30 minutes of cooling time after removing the cause of occurrence.

2. The following shows three stop methods of DB, EDB, and SD.

DB: Stops with dynamic brake. (Coasts for the servo amplifier without dynamic brake.)
MR-J4-03A6-RJ servo amplifiers coast. Note that EDB is applied when an alarm below occurs; [AL. 30.1], [AL. 32.2], [AL. 32.4], [AL. 51.1], [AL. 51.2]

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 will be DB.

Series	Servo motor
HG-KR	HG-KR053/HG-KR13/HG-KR23/HG-KR43
HG-MR	HG-MR053/HG-MR13/HG-MR23/HG-MR43
HG-SR	HG-SR51/HG-SR52
HG-AK	HG-AK0136/HG-AK0236/HG-AK0336

SD: Forced stop deceleration

3. This is applicable when [Pr. PA04] is set to the initial value. The stop system of SD can be changed to DB using [Pr. PA04].

4. The alarm can be canceled by setting as follows:
For the fully closed loop control: set [Pr. PE03] to "1 _ _ _".
When a linear servo motor or direct drive motor is used: set [Pr. PL04] to "1 _ _ _".

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	
	93	ABS data transfer warning	93.1	ABS data transfer requirement warning during magnetic pole detection	
	95	STO warning	95.1	STO1 off detection	DB
			95.2	STO2 off detection	DB
	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	
			96.4	Home positioning warning during magnetic pole detection	
	97	Program operation disabled/next station position warning	97.1	Program operation disabled warning	
			97.2	Next station position 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)
	9A	Optional unit input data error warning	9A.1	Optional unit input data sign error	
			9A.2	Optional unit BCD input data error	
	9F	Battery warning	9F.1	Low battery	
			9F.2	Battery degradation warning	
	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 error 1 during a stop	
			E1.6	Thermal overload error 2 during a stop	
			E1.7	Thermal overload error 3 during a stop	
			E1.8	Thermal overload error 4 during a stop	
	E2	Servo motor overheat warning	E2.1	Servo motor temperature warning	
	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	
	E5	ABS time-out warning	E5.1	Time-out during ABS data transfer	
			E5.2	ABSM off during ABS data transfer	
			E5.3	SON off during ABS data transfer	
	E6	Servo forced stop warning	E6.1	Forced stop warning	SD
	E8	Cooling fan speed reduction warning	E8.1	Decreased cooling fan speed warning	
			E8.2	Cooling fan stop	
	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
	EA	ABS servo-on warning	EA.1	ABS servo-on warning	
	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	

	No.	Name	Detail No.	Detail name	Stop method (Note 2, 3)
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. Leave for about 30 minutes of cooling time after removing the cause of occurrence.
2. The following shows two stop methods of DB and SD.
DB: Stops with dynamic brake. (Coasts for the servo amplifier without dynamic brake.)
MR-J4-03A6-RJ servo amplifiers coast.
SD: Forced stop deceleration
3. This is applicable when [Pr. PA04] is set to the initial value. The stop system of SD can be changed to DB using [Pr. PA04].
4. Quick stop or slow stop can be selected using [Pr. PD30].

9. OPTIONS AND PERIPHERAL EQUIPMENT

⚠WARNING

- ●Before connecting any option or peripheral equipment, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P+ and N- is safe with a voltage tester and others. 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.
- ●Configure MR-HDP01 with sink interface.

⚠CAUTION

- ●Use the specified peripheral equipment and options to prevent a malfunction or a fire.

The following items are the same as MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Cable/connector sets	Section 11.1	Section 18.8.1
Regenerative option	Section 11.2	
FR-BU2- (H) brake unit	Section 11.3	
FR-RC-(H) power regeneration converter	Section 11.4	
FR-CV-(H) power regeneration common converter	Section 11.5	
Junction terminal block MR-TB50 (recommended)	Section 11.6	
MR Configurator2	Section 11.7	
Battery	Section 11.8	
Selection example of wires	Section 11.9	Section 18.8.3
Molded-case circuit breakers, fuses, magnetic contactors	Section 11.10	
Power factor improving DC reactor	Section 11.11	
Power factor improving AC reactor	Section 11.12	
Relay (recommended)	Section 11.13	
Noise reduction techniques	Section 11.14	
Earth-leakage current breaker	Section 11.15	
EMC filter (recommended)	Section 11.16	
External dynamic brake	Section 11.17	
Panel through attachment (MR-J4ACN15K/MR-J3ACN)	Section 11.18	
Circuit protector		Section 18.8.4

9.1 MR-HDP01 manual pulse generator

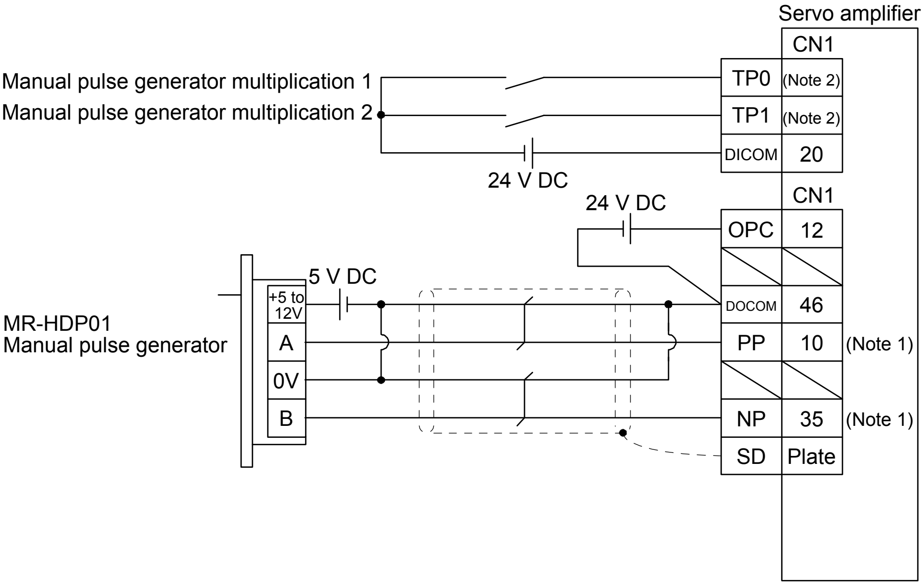
POINT
●When using an MR-HDP01, set [Pr. PA13 Command pulse input form] to "_ 2 _ 2" or "_ 3 _ 2".

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

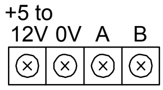
Item		Specifications
Power supply	Voltage	4.5 V DC to 13.2 V DC
	Consumption current	60 mA or less
Interface		Maximum output current: 20mA for open collector output
Pulse signal form		A-phase/B-phase, 2 signals of 90˚ phase difference
Pulse resolution		100 pulses/rev
Maximum speed		Instantaneous maximum: 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].

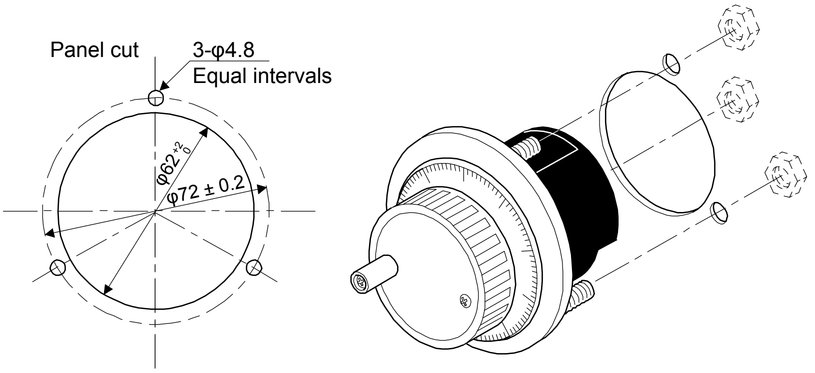
(3) Terminal assignment



Signal name	Description
+5 to 12V	Power supply input
0V	Common for power and signal
A	A-phase output pulse
B	B-phase output pulse

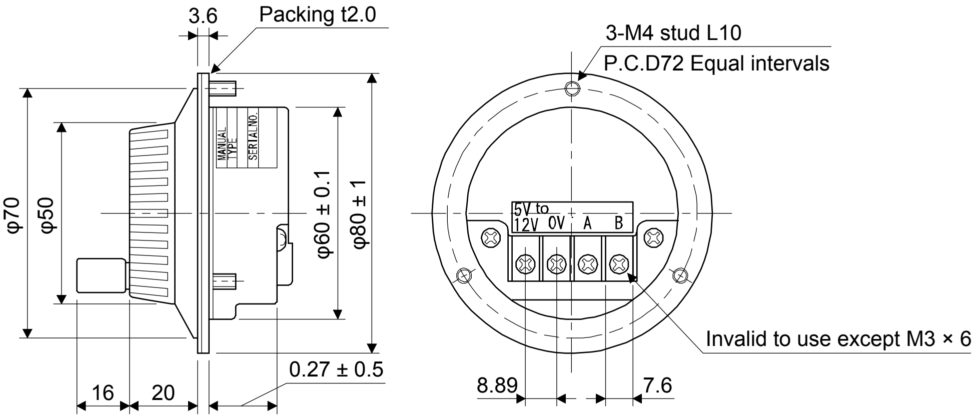
(4) Mounting

[Unit: mm]



(5) Dimensions

[Unit: mm]



MEMO

10. COMMUNICATION FUNCTION (MITSUBISHI GENERAL-PURPOSE AC SERVO PROTOCOL)

The following items are the same as those of MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section (in "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual") indicated in the detailed explanation field.

Item	Detailed explanation	
	MR-J4-_A_-RJ 100 W or more	MR-J4-03A6-RJ
Structure	Section 14.1	Section 18.9
Communication specifications	Section 14.2	
Protocol	Section 14.3	
Data processing	Section 14.5.1	
Status display	Section 14.5.2	
Parameter	Section 14.5.3	
Prohibiting/canceling I/O devices (DIO)	Section 14.5.6	
Alarm history	Section 14.5.10	
Current alarm	Section 14.5.11	
Other commands	Section 14.5.12	

POINT

- ●Creating and reading programs are not available with Mitsubishi general-purpose AC servo protocol (RS-422 communication). Use MR Configurator2.
- ●A personal computer cannot be connected to the CN30 connector of MR-D01.

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)
  - BCD: Positioning mode (point table method in the BCD input positioning operation)
    This method is available only when the MR-D01 unit is connected. Refer to chapter 12 for details.
  - CL: Positioning mode (program method)
  - PS: Positioning mode (indexer method)

10.1.1 Reading command

(1) Status display (command [0] [1])

Command	Data No.	Description	Status display	Control mode			Frame length
				CP/BCD	CL	PS	
[0] [1]	[0] [0]	Status display symbol and unit	Cumulative feedback pulses Servo motor-side cumulative feedback pulses (after gear)	○	○	○	16
	[0] [1]		Servo motor speed 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 Instantaneous thrust	○	○	○	
	[0] [B]		Position within one-revolution Servo motor encoder position within one-revolution Virtual position within one-revolution	○	○	○	
	[0] [C]		ABS counter Servo motor encoder ABS counter Virtual ABS counter	○	○	○	
	[0] [D]		Load to motor inertia ratio Load to motor mass ratio	○	○	○	
	[0] [E]		Bus voltage	○	○	○	
	[0] [F] (Note)		Load-side cumulative feedback pulses	○	○	○	
	[1] [0] (Note)		Load-side droop pulses	○	○	○	
	[1] [1] (Note)		Load-side encoder information 1 Z-phase counter	○	○	○	
	[1] [2] (Note)		Load-side encoder information 2	○	○	○	
	[1] [6] (Note)		Temperature of servo motor thermistor	○	○	○	
	[1] [7] (Note)		Servo motor-side cumulative feedback pulses (before gear)	○	○	○	
	[1] [8] (Note)		Electrical angle	○	○	○	
	[1] [E] (Note)		Servo motor-side/load-side position deviation	○	○	○	
	[1] [F] (Note)		Servo motor-side/load-side speed deviation	○	○	○	
	[2] [0]		Encoder inside temperature	○	○	○	
	[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./Station position No.	○	○	○	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

Command	Data No.	Description	Status display	Control mode			Frame length
				CP/BCD	CL	PS	
[0] [1]	[2] [E]	Status display symbol and unit	Step No.		○		16
	[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	○	○		
	[8] [0]	Status display data value and processing information	Cumulative feedback pulses Servo motor-side cumulative feedback pulses (after gear)	○	○	○	12
	[8] [1]		Servo motor speed Servo motor speed	○	○	○	
	[8] [2]		Droop pulses Servo motor-side 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 Instantaneous thrust	○	○	○	
	[8] [B]		Position within one-revolution Servo motor encoder position within one-revolution Virtual position within one-revolution	○	○	○	
	[8] [C]		ABS counter Servo motor encoder ABS counter Virtual ABS counter	○	○	○	
	[8] [D]		Load to motor inertia ratio Load to motor mass ratio	○	○	○	
	[8] [E]		Bus voltage	○	○	○	
	[8] [F] (Note)		Load-side cumulative feedback pulses	○	○	○	
	[9] [0] (Note)		Load-side droop pulses	○	○	○	
	[9] [1] (Note)		Load-side encoder information 1 Z-phase counter	○	○	○	
	[9] [2] (Note)		Load-side encoder information 2	○	○	○	
	[9] [6] (Note)		Temperature of servo motor thermistor	○	○	○	
	[9] [7] (Note)		Servo motor-side cumulative feedback pulses (before gear)	○	○	○	
	[9] [8] (Note)		Electrical angle	○	○	○	
	[9] [E] (Note)		Servo motor-side/load-side position deviation	○	○	○	
	[9] [F] (Note)		Servo motor-side/load-side speed deviation	○	○	○	
	[A] [0]		Encoder inside temperature	○	○	○	
	[A] [1]		Settling time	○	○	○	
	[A] [2]		Oscillation detection frequency	○	○	○	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

Command	Data No.	Description	Status display	Control mode			Frame length
				CP/BCD	CL	PS	
[0] [1]	[A] [3]	Status display data value and processing information	Number of tough drive operations	○	○	○	12
	[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./ Station position 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			Frame length
			CP/BCD	CL	PS	
[0] [4]	[0] [1]	Reading 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_ _]) 0009: Option setting parameters ([Pr. Po_ _]) 000B: Linear servo motor/DD motor setting parameters ([Pr. PL_ _]) (Note) 000C: Positioning control parameters ([Pr. PT_ _]) Reads the parameter group specified with the command [8] [5] + data No. [0] [0]. Before reading the current values, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0].	○	○	○	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]. Before reading the current values, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. The decimal equivalent of the data No. (hexadecimal) value 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]. Before reading the upper limit values, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. The decimal equivalent of the data No. (hexadecimal) value corresponds to the parameter No.	○	○	○	

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[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]. Before reading the lower limit values, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. The decimal equivalent of the data No. (hexadecimal) value corresponds to the parameter No.	○	○	○	12
[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]. Before reading the symbols, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. The decimal equivalent of the data No. (hexadecimal) value 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]. Before reading writing enable/disable, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. 0000: Writing enabled 0001: Writing disabled	○	○	○	4

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(3) External I/O signals (command [1] [2])

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[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			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 or less
	[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			Frame length
				CP/BCD	CL	PS	
[3] [3]	[1] [0]	Alarm No. in alarm history	Most recent alarm	○	○	○	4
	[1] [1]		First alarm in past	○	○	○	
	[1] [2]		Second alarm in past	○	○	○	
	[1] [3]		Third alarm in past	○	○	○	
	[1] [4]		Fourth alarm in past	○	○	○	
	[1] [5]		Fifth alarm in past	○	○	○	
	[1] [6]		Sixth alarm in past	○	○	○	
	[1] [7]		Seventh alarm in past	○	○	○	
	[1] [8]		Eighth alarm in past	○	○	○	
	[1] [9]		Ninth alarm in past	○	○	○	
	[1] [A]		Tenth alarm in past	○	○	○	
	[1] [B]		Eleventh alarm in past	○	○	○	
	[1] [C]		Twelfth alarm in past	○	○	○	
	[1] [D]		Thirteenth alarm in past	○	○	○	
	[1] [E]		Fourteenth alarm in past	○	○	○	
	[1] [F]		Fifteenth alarm in past	○	○	○	
	[2] [0]	Alarm occurrence time in alarm history	Most recent alarm	○	○	○	8
	[2] [1]		First alarm in past	○	○	○	
	[2] [2]		Second alarm in past	○	○	○	
	[2] [3]		Third alarm in past	○	○	○	
	[2] [4]		Fourth alarm in past	○	○	○	
	[2] [5]		Fifth alarm in past	○	○	○	
	[2] [6]		Sixth alarm in past	○	○	○	
	[2] [7]		Seventh alarm in past	○	○	○	
	[2] [8]		Eighth alarm in past	○	○	○	
	[2] [9]		Ninth alarm in past	○	○	○	
	[2] [A]		Tenth alarm in past	○	○	○	
	[2] [B]		Eleventh alarm in past	○	○	○	
	[2] [C]		Twelfth alarm in past	○	○	○	
	[2] [D]		Thirteenth alarm in past	○	○	○	
	[2] [E]		Fourteenth alarm in past	○	○	○	
	[2] [F]		Fifteenth alarm in past	○	○	○	

(6) Current alarm (command [0] [2])

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[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/BCD	CL	PS	
[3] [5]	[0] [0]	Status display symbol and unit	Cumulative feedback pulses Servo motor-side cumulative feedback pulses (after gear)	○	○	○	16
	[0] [1]		Servo motor speed 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 Instantaneous thrust	○	○	○	
	[0] [B]		Position within one-revolution Servo motor encoder position within one-revolution Virtual position within one-revolution	○	○	○	
	[0] [C]		ABS counter Servo motor encoder ABS counter Virtual ABS counter	○	○	○	
	[0] [D]		Load to motor inertia ratio Load to motor mass ratio	○	○	○	
	[0] [E]		Bus voltage	○	○	○	
	[0] [F] (Note)		Load-side cumulative feedback pulses	○	○	○	
	[1] [0] (Note)		Load-side droop pulses	○	○	○	
	[1] [1] (Note)		Load-side encoder information 1 Z-phase counter	○	○	○	
	[1] [2] (Note)		Load-side encoder information 2	○	○	○	
	[1] [6] (Note)		Temperature of servo motor thermistor	○	○	○	
	[1] [7] (Note)		Servo motor-side cumulative feedback pulses (before gear)	○	○	○	
	[1] [8] (Note)		Electrical angle	○	○	○	
	[1] [E] (Note)		Servo motor-side/load-side position deviation	○	○	○	
	[1] [F] (Note)		Servo motor-side/load-side speed deviation	○	○	○	
	[2] [0]		Encoder inside temperature	○	○	○	
	[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./ Station position No.	○	○	○	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

Command	Data No.	Description	Status display	Control mode			Frame length
				CP/BCD	CL	PS	
[3] [5]	[2] [E]	Status display symbol and unit	Step No.		○		16
	[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	○	○		
	[8] [0]	Status display data value and processing information	Cumulative feedback pulses Servo motor-side cumulative feedback pulses (after gear)	○	○	○	12
	[8] [1]		Servo motor speed Servo motor speed	○	○	○	
	[8] [2]		Droop pulses Servo motor-side 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 Instantaneous thrust	○	○	○	
	[8] [B]		Position within one-revolution Servo motor encoder position within one-revolution Virtual position within one-revolution	○	○	○	
	[8] [C]		ABS counter Servo motor encoder ABS counter Virtual ABS counter	○	○	○	
	[8] [D]		Load to motor inertia ratio Load to motor mass ratio	○	○	○	
	[8] [E]		Bus voltage	○	○	○	
	[8] [F] (Note)		Load-side cumulative feedback pulses	○	○	○	
	[9] [0] (Note)		Load-side droop pulses	○	○	○	
	[9] [1] (Note)		Load-side encoder information 1 Z-phase counter	○	○	○	
	[9] [2] (Note)		Load-side encoder information 2	○	○	○	
	[9] [6] (Note)		Temperature of servo motor thermistor	○	○	○	
	[9] [7] (Note)		Servo motor-side cumulative feedback pulses (before gear)	○	○	○	
	[9] [8] (Note)		Electrical angle	○	○	○	
	[9] [E] (Note)		Servo motor-side/load-side position deviation	○	○	○	
	[9] [F] (Note)		Servo motor-side/load-side speed deviation	○	○	○	
	[A] [0]		Encoder inside temperature	○	○	○	
	[A] [1]		Settling time	○	○	○	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

Command	Data No.	Description	Status display	Control mode			Frame length
				CP/BCD	CL	PS	
[3] [5]	[A] [2]	Status display data value and processing information	Oscillation detection frequency	○	○	○	12
	[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./ Station position 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/BCD	CL	PS	
[4] [0]	[0] [0] to [F] [F]	Reading position data of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			8
[4] [5]	[0] [0] to [F] [F]	Reading M code of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			
[5] [0]	[0] [0] to [F] [F]	Reading speed data of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			
[5] [4]	[0] [0] to [F] [F]	Reading acceleration time constant of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			
[5] [8]	[0] [0] to [F] [F]	Reading deceleration time constant of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			
[6] [0]	[0] [0] to [F] [F]	Reading dwell of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	○			
[6] [4]	[0] [0] to [F] [F]	Reading sub function of each point table The decimal equivalent of the data No. value (hexadecimal) 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/BCD	CL	PS	
[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/BCD	CL	PS	
[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/BCD	CL	PS	
[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) General purpose register number (command [6] [F])

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[6] [F]	[0] [0]	Reading general purpose register (Rx) number		○		8
	[0] [1]	Reading general purpose register (Dx) number		○		

(13) Others (command [0] [0], [0] [2])

Command	Data No.	Description	Control mode			Frame length
			CP/BCD	CL	PS	
[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	○	○	○ (Note)	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) 0008: Positioning mode (indexer method)	○	○	○	
[0] [2]	[9] [0]	Servo motor-side pulse unit absolute position	○	○	○	8
	[9] [1]	Command unit absolute position	○	○	○	
	[7] [0]	Software version	○	○	○	16

Note. "0005 (single-step feed operation)" is not available in the indexer method.

10.1.2 Writing commands

(1) Status display (command [8] [1])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[8] [1]	[0] [0]	Status display data deletion	1EA5	○	○	○	4

(2) Parameter (command [9] [4], [8] [5])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[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]. Before writing the values, therefore, always specify the parameter group with the command [8] [5] + data No. [0] [0]. The decimal equivalent of the data No. (hexadecimal) value corresponds to the parameter No.	Depending on the parameter	○	○	○	12
[8] [5]	[0] [0]	Parameter group writing 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_ _]) 0009: Option setting parameters ([Pr. Po_ _]) 000B: Linear servo motor/DD motor setting parameters ([Pr. PL_ _]) (Note) 000C: Positioning control parameters ([Pr. PT_ _])	0000 to 000C	○	○	○	4

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(3) External I/O signals (command [9] [2])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[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/BCD	CL	PS	
[8] [2]	[2] [0]	Alarm history clear	1EA5	○	○	○	4

(5) Current alarm (command [8] [2])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[8] [2]	[0] [0]	Alarm clear	1EA5	○	○	○	4

(6) I/O device prohibition (command [9] [0])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[9] [0]	[0] [0]	Turns off the input device, external analog input signal, and pulse train input, except EM2, LSP and LSN, independently of the external on/off statuses.	1EA5	○	○	○	4
	[0] [3]	Prohibits all output devices (DO).	1EA5	○	○	○	
	[1] [0]	Cancels the prohibition of the input device, external analog input signal and pulse train input, except EM2, LSP and LSN.	1EA5	○	○	○	
	[1] [3]	Cancels the prohibition of the output device.	1EA5	○	○	○	

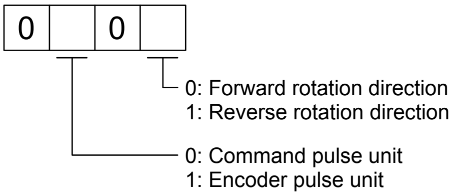
(7) Operation mode selection (command [8] [B])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[8] [B]	[0] [0]	Selection of 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	○	○	○ (Note)	4

Note. "0005 (single-step feed operation)" is not available in the indexer method.

(8) Test operation mode data (command [9] [2], [A] [0])

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[9] [2]	[0] [0] to [0] [2]	Input signal for test operation	(Refer to section 14.5.7 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)	○	○	○	8
	[A] [0]	Forced output of signal pin	(Refer to section 14.5.9 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)	○	○	○	

Command	Data No.	Description	Setting range	Control mode			Frame length
				CP/BCD	CL	PS	
[A] [0]	[1] [0]	Writes the servo motor speed in the test operation mode (JOG operation and positioning operation).	0000 to 7FFF	○	○	○	4
	[1] [1]	Writes 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).  	0000 to 0101	○	○	○	4
	[4] [0]	This is a start command of the test operation (positioning operation).	1EA5	○	○	○	
	[4] [1]	This is used 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			Frame length
				CP/BCD	CL	PS	
[C] [0]	[0] [0] to [F] [F]	Writing position data of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	-999999 to 999999	○			8
[C] [2]	[0] [0] to [F] [F]	Writing M code of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	0 to 99	○			
[C] [6]	[0] [0] to [F] [F]	Writing speed data of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	0 to permissible speed	○			
[C] [7]	[0] [0] to [F] [F]	Writing acceleration time constant of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	0 to 20000	○			
[C] [8]	[0] [0] to [F] [F]	Writing deceleration time constant of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	0 to 20000	○			
[C] [A]	[0] [0] to [F] [F]	Writing dwell of each point table The decimal equivalent of the data No. value (hexadecimal) corresponds to the point table No.	0 to 20000	○			
[C] [B]	[0] [0] to [F] [F]	Writing sub function of each point table The decimal equivalent of the data No. value (hexadecimal) 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			Frame length
				CP/BCD	CL	PS	
[B] [9]	[0] [1]	Writing general purpose register (R1) value	Depends on commands to use. 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			Frame length
				CP/BCD	CL	PS	
[B] [A]	[0] [1]	Writing general purpose register (D1) value	Depends on commands to use. 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.

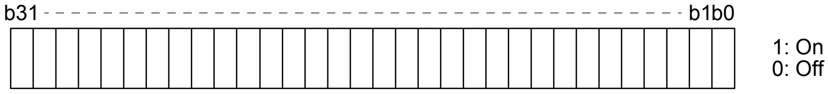
(a) Transmission

Transmit command [1] [2] + data No. [0] [0] to [0] [3].

Command	Data No.
[1] [2]	[0] [0] to [0] [3]

(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. [0] [0]	Data No. [0] [1]	Data No. [0] [2]	Data No. [0] [3]
0	SON		MD0	POS00
1	LSP	ABSM	MD1	POS01
2	LSN	ABSR		POS02
3	TL		TCH	POS03
4	TL1		TP0	POS10
5	PC		TP1	POS11
6	RES		OVR	POS12
7	CR			POS13
8	SP1		STAB	POS20
9	SP2		DOG/SIG	POS21
10	SP3		SPD1	POS22
11	ST1/RS2		SPD2	POS23
12	ST2/RS1		SPD3	POSP
13	CMX1		SPD4	POSN
14	CMX2			STRB
15	LOP			
16		MSD	LPS	
17		PI1	RT	
18	EM2/EM1	PI2	RTCDP	
19		PI3		
20	STAB2	CAMC	OV0	
21		CI0	OV1	
22		CI1	OV2	
23		CI2	OV3	
24	TSTP	CI3	DI0	
25		CLTC	DI1	
26		CPCD	DI2	
27	CDP		DI3	
28	CLD		DI4	
29	MECR (Note)		DI5	
30			DI6	
31			DI7	

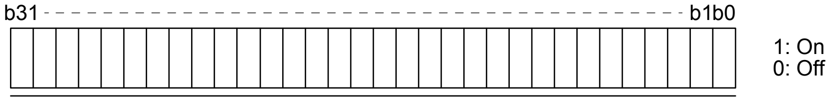
Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(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], [4] [1].

Command	Data No.
[1] [2]	[4] [0], [4] [1]

(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	CN10 connector pin
0	43	1
1	44	2
2	42	3
3	15	4
4	19	5
5	41	6
6	16	7
7	17	8
8	18	9
9	45	10
10	10 (Note)	11
11	35 (Note)	12
12		15
13		16
14		17
15		18

Bit	CN1 connector pin	CN10 connector pin
16		19
17		20
18		21
19		26
20		27
21		28
22		29
23		30
24		31
25		32
26		33
27		34
28		35
29		36
30		
31		

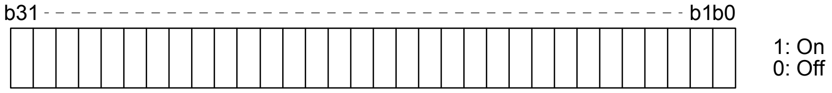
Note. When the pulse train input is selected with [Pr. PD44] or [Pr. PD46], this bit will continuously be "0" (off).

(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] [3].

Command	Data No.
[1] [2]	[6] [0] to [6] [3]

(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]	Data No. [6] [3]
0	SON		MD0	POS00
1	LSP	ABSM	MD1	POS01
2	LSN	ABSR		POS02
3	TL		TCH	POS03
4	TL1		TP0	POS10
5	PC		TP1	POS11
6	RES		OVR	POS12
7	CR			POS13
8	SP1		STAB	POS20
9	SP2		DOG/SIG	POS21
10	SP3		SPD1	POS22
11	ST1/RS2		SPD2	POS23
12	ST2/RS1		SPD3	POSP
13	CMX1		SPD4	POSN
14	CMX2			STRB
15	LOP			
16		MSD	LPS	
17		PI1	RT	
18	EM2/EM1	PI2	RTCDP	
19		PI3		
20	STAB2	CAMC	OV0	
21		CI0	OV1	
22		CI1	OV2	
23		CI2	OV3	
24	TSTP	CI3	DI0	
25		CLTC	DI1	
26		CPCD	DI2	
27	CDP		DI3	
28	CLD		DI4	
29	MECR (Note)		DI5	
30			DI6	
31			DI7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(4) Reading external output pin status

Reads the on/off statuses of the external output pins.

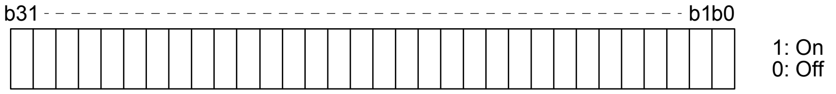
(a) Transmission

Transmit command [1] [2] + data No. [C] [0], [C] [1].

Command	Data No.
[1] [2]	[C] [0], [C] [1]

(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	CN10 connector pin
0	49	22
1	24	23
2	23	24
3	25	25
4	22	38
5	48	39
6	33	40
7	13 (Note)	41
8	14 (Note)	42
9		43
10		44
11		45
12		46
13		47
14		48
15		49
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(5) Reading output device status

Reads the on/off statuses of the output devices.

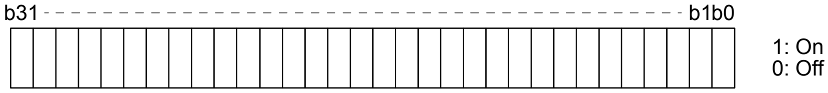
(a) Transmission

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			ACD0
9	OP			ACD1
10	MBR			ACD2
11	DB (Note)			ACD3
12	ALCD0		PED	PRQ0
13	ALCD1			PRQ1
14	ALCD2			
15	BWNG			
16				
17			ALMWNG	
18			BW9F	
19		MSDH		
20		MSDL		
21		SOUT		
22		OUT1		
23		OUT2		
24		OUT3	PT0/PS0	
25	CDPS	CAMS	PT1/PS1	
26	CLDS (Note)	CLTS	PT2/PS2	
27	ABSV	CLTSM	PT3/PS3	
28		CLTS	PT4/PS4	
29			PT5/PS5	
30			PT6/PS6	
31	MTTR (Note)		PT7/PS7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

10.2.2 Input device on/off

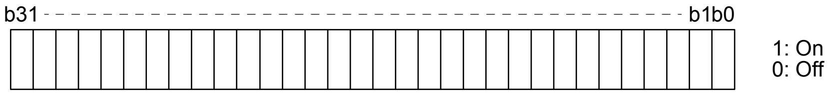
POINT

- ●The on/off statuses 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] [3].

Command	Data No.	Setting data
[9] [2]	[6] [0] to [6] [3]	See below.



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]	Data No. [6] [3]
0	SON		MD0	POS00
1	LSP	ABSM	MD1	POS01
2	LSN	ABSR		POS02
3	TL		TCH	POS03
4	TL1		TP0	POS10
5	PC		TP1	POS11
6	RES		OVR	POS12
7	CR			POS13
8	SP1		STAB	POS20
9	SP2		DOG/SIG	POS21
10	SP3		SPD1	POS22
11	ST1/RS2		SPD2	POS23
12	ST2/RS1		SPD3	POSP
13	CMX1		SPD4	POSN
14	CMX2			STRB
15	LOP			
16		MSD	LPS	
17		PI1	RT	
18	EM2/EM1	PI2	RTCDP	
19		PI3		
20	STAB2	CAMC	OV0	
21		CI0	OV1	
22		CI1	OV2	
23		CI2	OV3	
24	TSTP	CI3	DI0	
25		CLTC	DI1	
26		CPCD	DI2	
27	CDP		DI3	
28	CLD		DI4	
29	MECR (Note)		DI5	
30			DI6	
31			DI7	

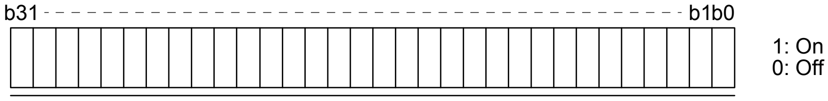
Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

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] [3].

Command	Data No.	Setting data
[9] [2]	[0] [0] to [0] [3]	See below.



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]	Data No. [0] [3]
0	SON		MD0	POS00
1	LSP	ABSM	MD1	POS01
2	LSN	ABSR		POS02
3	TL		TCH	POS03
4	TL1		TP0	POS10
5	PC		TP1	POS11
6	RES		OVR	POS12
7	CR			POS13
8	SP1		STAB	POS20
9	SP2		DOG/SIG	POS21
10	SP3		SPD1	POS22
11	ST1/RS2		SPD2	POS23
12	ST2/RS1		SPD3	POSP
13	CMX1		SPD4	POSN
14	CMX2			STRB
15	LOP			
16		MSD	LPS	
17		PI1	RT	
18	EM2/EM1	PI2	RTCDP	
19		PI3		
20	STAB2	CAMC	OV0	
21		CI0	OV1	
22		CI1	OV2	
23		CI2	OV3	
24	TSTP	CI3	DI0	
25		CLTC	DI1	
26		CPCD	DI2	
27	CDP		DI3	
28	CLD		DI4	
29	MECR (Note)		DI5	
30			DI6	
31			DI7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

10.2.4 Test operation mode

POINT

- The test operation mode is used to check operation. Do not use it for actual operation.
- If communication stops for longer than 0.5 s during test operation, the servo amplifier decelerates to a stop, resulting in servo-lock. To prevent this, keep the communication all the time by checking the status display, etc.
- Even during operation, you can switch the servo amplifier to the test operation mode. In this case, switching to the test operation mode will shut off the base circuit to coast the motor.

(1) How to prepare and cancel the test operation mode

(a) Preparing the test operation mode

Set the test operation mode type with the following procedure.

1) Selection of test operation mode

Transmit the command [8] [B] + data No. [0] [0] + data to select the test operation mode.

Command	Data No.	Transmission data	Selection of 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.

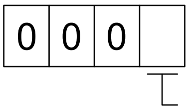
a) Transmission

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.



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

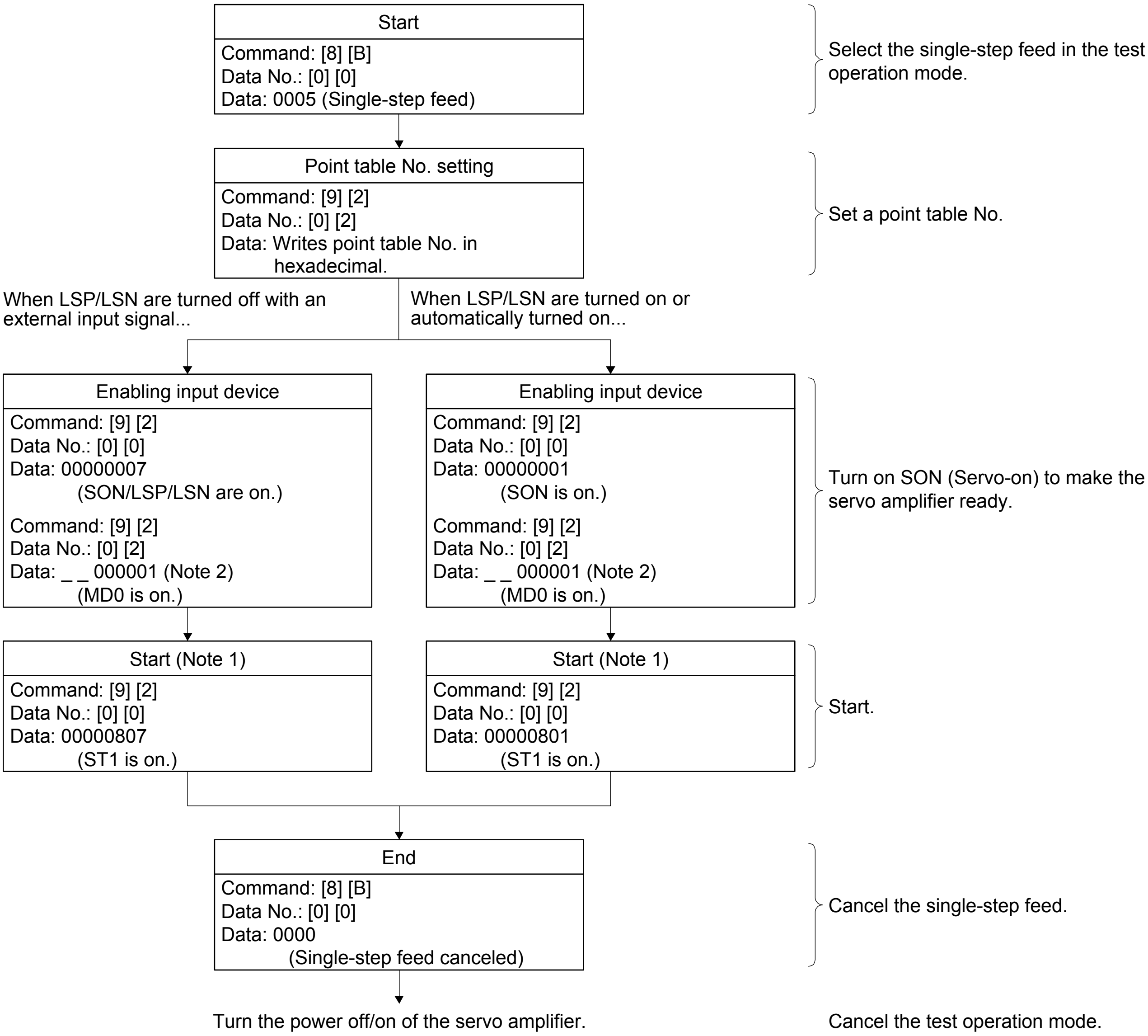
(b) Cancel of test operation mode

To stop the test operation mode, transmit the command [8] [B] + data No. [0] [0] + data. Before switching from the test operation mode to the normal operation mode, turn off the servo amplifier once.

Command	Data No.	Transmission data	Selection of test operation mode
[8] [B]	[0] [0]	0000	Test operation mode canceled

(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.



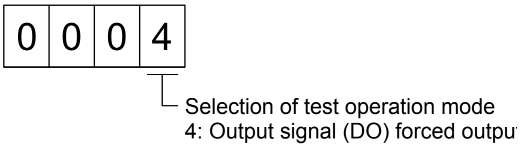
Note 1. After checking ZP (Home position return completion), start it. See the 4 bit of the read data with the command [1] [2] and data No. [8] [2].

2. A point table No. in hexadecimal will be entered to "_ _".

10.2.5 Output signal pin on/off (output signal (DO) forced output)

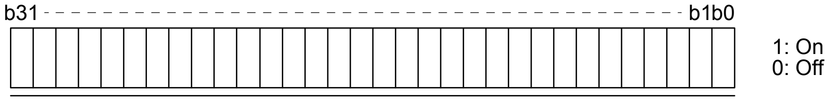
In the test operation mode, the output signal pins can be turned on/off regardless of the servo status. Disable the external input signals in advance with command [9] [0].

(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.



(2) External output signal on/off
Transmit the following communication commands.

Command	Data No.	Setting data
[9] [2]	[A] [0], [A] [1]	See below.



Command of each bit is transmitted to the master station as hexadecimal data.

Bit	CN1 connector pin	CN10 connector pin
0	49	22
1	24	23
2	23	24
3	25	25
4	22	38
5	48	39
6	33	40
7	13 (Note)	41
8	14 (Note)	42
9		43
10		44
11		45
12		46
13		47
14		48
15		49
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(3) Output signal (DO) forced output
To stop the output signal (DO) forced output, transmit command [8] [B] + data No. [0] [0] + data. Before switching from the test operation mode to the normal operation mode, turn off the servo amplifier once.

Command	Data No.	Transmission data	Selection of test operation mode
[8] [B]	[0] [0]	0000	Test operation mode canceled

10.2.6 Point table

(1) Reading data

(a) Position data

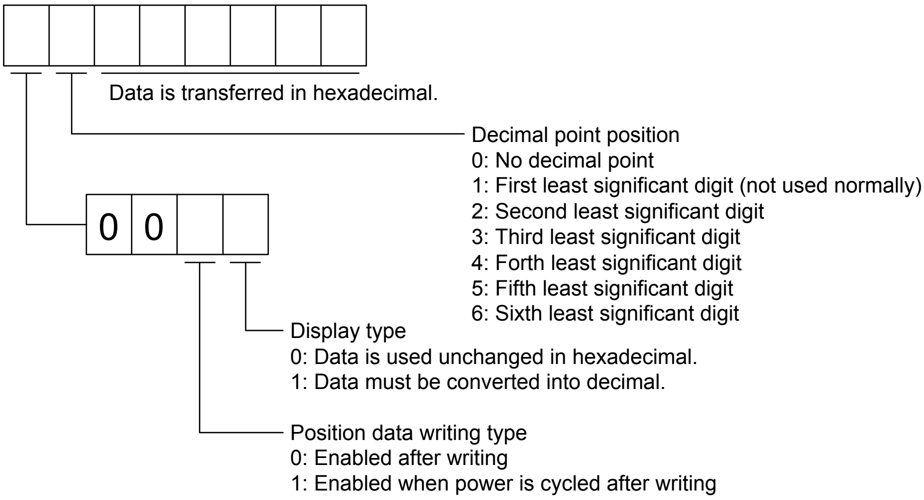
Reads position data of point tables.

1) Transmission

Transmits the command [4] [0] + the data No. [0] [1] to [F] [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

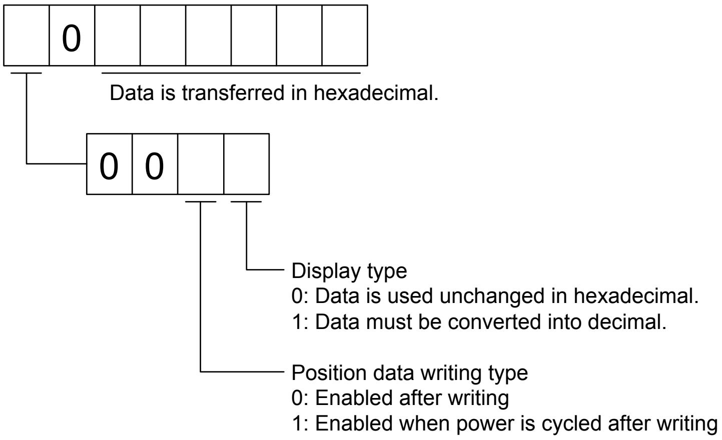
Reads speed data of point tables.

1) Transmission

Transmits the command [5] [0] + the data No. [0] [1] to [F] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

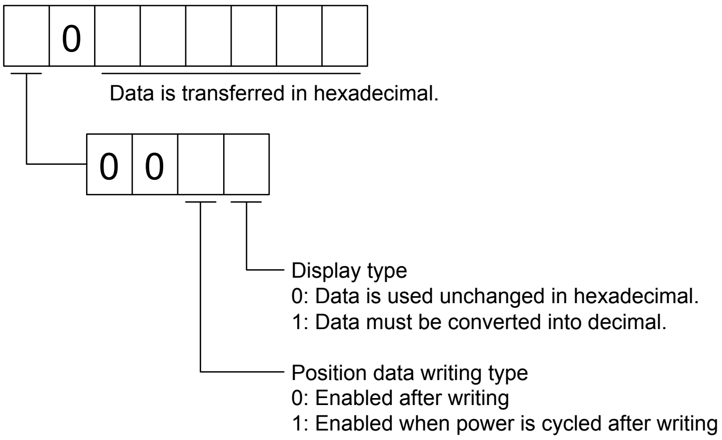
The slave station returns the speed data of point table requested.



(c) Acceleration time constant
Reads acceleration time constant of point tables.

1) Transmission
Transmits the command [5] [4] + the data No. [0] [1] to [F] [F] corresponding to the point tables to read. Refer to section 10.1.1.

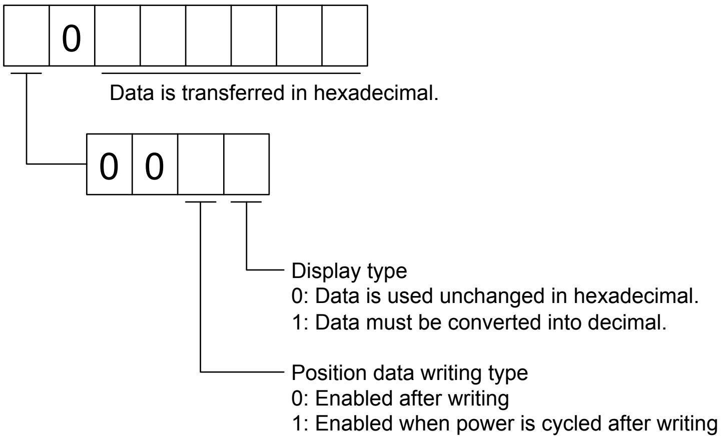
2) Return
The slave station returns the acceleration time constant of point table requested.



(d) Deceleration time constant
Reads deceleration time constant of point tables.

1) Transmission
Transmits the command [5] [8] + the data No. [0] [1] to [F] [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

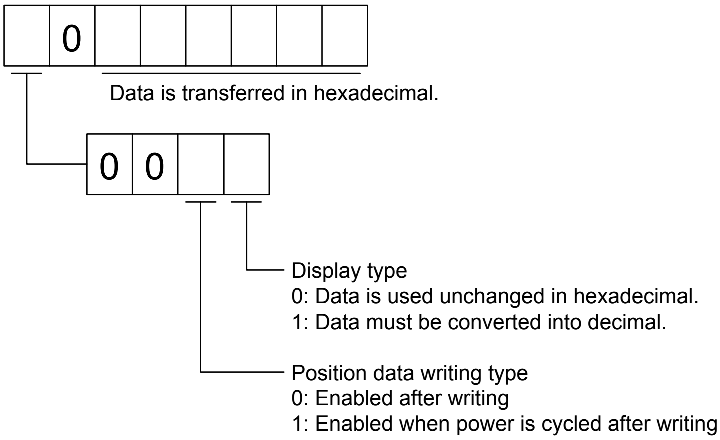
Reads dwell of point tables.

1) Transmission

Transmits the command [6] [0] + the data No. [0] [1] to [F] [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) Sub function

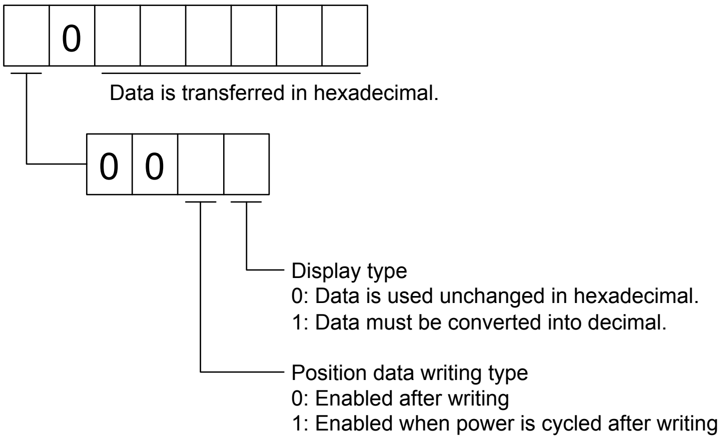
Reads sub function of point tables.

1) Transmission

Transmits the command [6] [4] + the data No. [0] [1] to [F] [F] corresponding to the point tables to read. Refer to section 10.1.1.

2) Return

The slave station returns the sub function of point table requested.



(g) M code

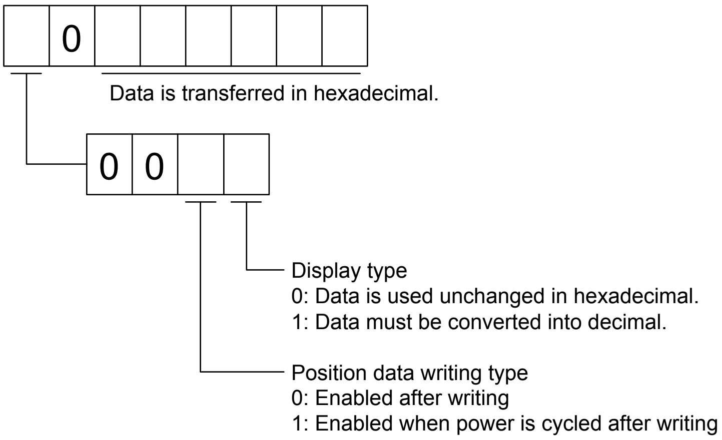
Reads M code of point tables.

1) Transmission

Transmits the command [4] [5] + the data No. [0] [1] to [F] [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

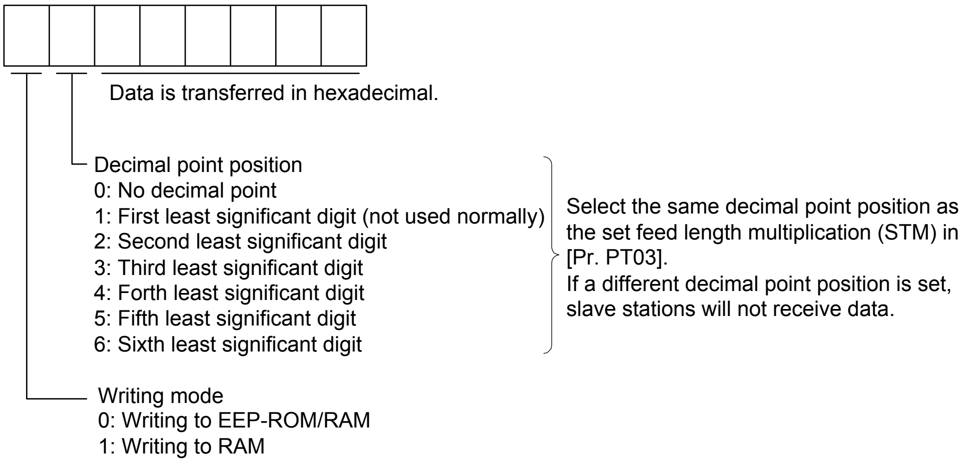
⚠CAUTION

- If setting values need to be changed with a high frequency (i.e. once or more per one 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 [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [0]	[0] [1] to [F] [F]	Refer to the following diagram.



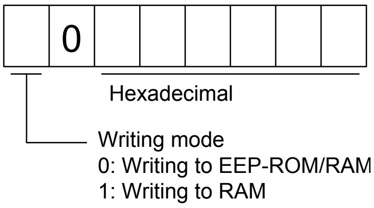
When the position data is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.
When changing data once or more within an hour, do not write it to the EEP-ROM.

(b) Speed data

Writes speed data of point tables.

Transmits the command [C] [6] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [6]	[0] [1] to [F] [F]	Refer to the following diagram.



When the speed data is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

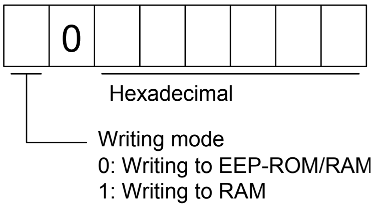
When changing data once or more within an hour, do not write it to the EEP-ROM.

(c) Acceleration time constant

Writes acceleration time constant of point tables.

Transmits the command [C] [7] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [7]	[0] [1] to [F] [F]	Refer to the following diagram.



When the acceleration time constant is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

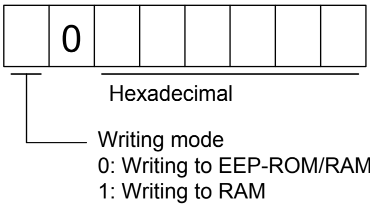
When changing data once or more within an hour, do not write it to the EEP-ROM.

(d) Deceleration time constant

Writes deceleration time constant of point tables.

Transmits the command [C] [8] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [8]	[0] [1] to [F] [F]	Refer to the following diagram.



When the deceleration time constant is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

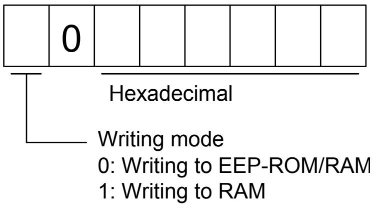
When changing data once or more within an hour, do not write it to the EEP-ROM.

(e) Dwell

Writes dwell of point tables.

Transmits the command [C] [A] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [A]	[0] [1] to [F] [F]	Refer to the following diagram.



When the dwell is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

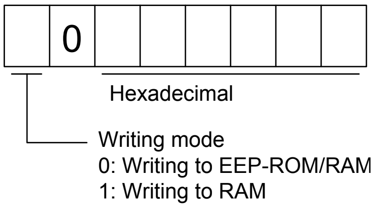
When changing data once or more within an hour, do not write it to the EEP-ROM.

(f) Sub function

Writes sub function of point tables.

Transmits the command [C] [B] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [B]	[0] [1] to [F] [F]	Refer to the following diagram.



When the sub function is changed frequently using communication, set "1" to the mode to change only the RAM data in the servo amplifier.

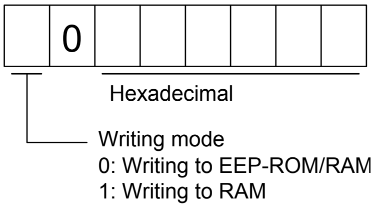
When changing data once or more within an hour, do not write it to the EEP-ROM.

(g) M code

Writes M code of point tables.

Transmits the command [C] [2] + the data No. [0] [1] to [F] [F] corresponding to the point tables to write + data. Refer to section 10.1.1.

Command	Data No.	Data
[C] [2]	[0] [1] to [F] [F]	Refer to the following diagram.



When the M code is changed 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.

10.3 Settings equivalent to previous models

You can change the status monitor display and DIO function map to communication commands of MR-J3-T or MR-J2S-CP with "RS-422 communication - Previous model equivalent selection" in [Pr. PT01].

10.3.1 Relevant matters to monitor information

You can use the commands and data Nos. for previous models (MR-J3-T/MR-J2S-CP) as they are.

Command	Data No.	[Pr. PT01]: "0 _ _ _" (MR-J4 standard)	[Pr. PT01]: "1 _ _ _" (equivalent to MR-J3-T)	[Pr. PT01]: "2 _ _ _" (equivalent to MR-J2S-CP)	[Pr. PT01]: "3 _ _ _" (equivalent to MR-J2S-CL)
[0] [1] [0] [E] [3] [5] [3] [E] [8] [1]	[0] [0]/[8] [0]	Cumulative feedback pulses	Current position	Current position	Current position
	[0] [1]/[8] [1]	Servo motor speed/ Linear servo motor speed	Command position	Command position	Command position
	[0] [2]/[8] [2]	Droop pulses	Command remaining distance	Command remaining distance	Command remaining distance
	[0] [3]/[8] [3]	Cumulative command pulses	Point table No./ Program No./ Station position No.	Point table No./ Program No./ Station position No.	Point table No./ Program No./ Station position No.
	[0] [4]/[8] [4]	Command pulse frequency	Cumulative feedback pulses	Cumulative feedback pulses	Step No.
	[0] [5]/[8] [5]	Analog speed command voltage/ Analog speed limit voltage	Servo motor speed/ Linear servo motor speed	Servo motor speed/ Linear servo motor speed	Cumulative feedback pulses
	[0] [6]/[8] [6]	Analog speed limit voltage/ Analog speed command voltage	Droop pulses	Droop pulses	Servo motor speed
	[0] [7]/[8] [7]	Regenerative load ratio	Analog override voltage	Override level	Droop pulses
	[0] [8]/[8] [8]	Effective load ratio	Override level	Analog speed limit voltage/ Analog speed command voltage	Override level
	[0] [9]/[8] [9]	Peak load ratio	Analog speed limit voltage/ Analog speed command voltage	Regenerative load ratio	Analog torque limit voltage Analog torque command voltage
	[0] [A]/[8] [A]	Instantaneous torque	Regenerative load ratio	Effective load ratio	Regenerative load ratio
	[0] [B]/[8] [B]	Position within one-revolution	Effective load ratio	Peak load ratio	Effective load ratio
	[0] [C]/[8] [C]	ABS counter	Peak load ratio	Instantaneous torque	Peak load ratio
	[0] [D]/[8] [D]	Load to motor inertia ratio	Instantaneous torque	Position within one-revolution [Lower]	Instantaneous torque
	[0] [E]/[8] [E]	Bus voltage	Position within one-revolution	ABS counter	Position within one-revolution [Lower]
	[0] [F]/[8] [F] (Note)	Load-side encoder cumulative feedback pulses	ABS counter	Load to motor inertia ratio	ABS counter
	[1] [0]/[9] [0] (Note)	Load-side encoder droop pulses	Load to motor inertia ratio	Bus voltage	Load to motor inertia ratio
	[1] [1]/[9] [1] (Note)	Load-side encoder information 1	Bus voltage		Bus voltage
	[1] [2]/[9] [2] (Note)	Load-side encoder information 2			
	[1] [3]/[9] [3]				
	[1] [4]/[9] [4]				
	[1] [5]/[9] [5]				
	[1] [6]/[9] [6] (Note)	Temperature of servo motor thermistor			

Command	Data No.	[Pr. PT01]: "0 _ _ _" (MR-J4 standard)	[Pr. PT01]: "1 _ _ _" (equivalent to MR-J3-T)	[Pr. PT01]: "2 _ _ _" (equivalent to MR-J2S-CP)	[Pr. PT01]: "3 _ _ _" (equivalent to MR-J2S-CL)
[0] [1] [0] [E] [3] [5] [3] [E] [8] [1]	[1] [7]/[9] [7] (Note)	Cumulative feedback pulses (servo motor-side unit)			
	[1] [8]/[9] [8] (Note)	Electrical angle			
	[1] [9]/[9] [9]				
	[1] [A]/[9] [A]				
	[1] [B]/[9] [B]				
	[1] [C]/[9] [C]				
	[1] [D]/[9] [D]				
	[1] [E]/[9] [E] (Note)	Servo motor-side/load-side position deviation			
	[1] [F]/[9] [F] (Note)	Servo motor-side/load-side speed deviation			
	[2] [0]/[A] [0]	Encoder inside temperature			
	[2] [1]/[A] [1]	Settling time			
	[2] [2]/[A] [2]	Oscillation detection frequency			
	[2] [3]/[A] [3]	Number of tough drive operations			
	[2] [4]/[A] [4]				
	[2] [5]/[A] [5]				
	[2] [6]/[A] [6]				
	[2] [7]/[A] [7]				
	[2] [8]/[A] [8]	Unit power consumption			
	[2] [9]/[A] [9]	Unit total power consumption			
	[2] [A]/[A] [A]	Current position			
	[2] [B]/[A] [B]	Command position			
	[2] [C]/[A] [C]	Command remaining distance			
	[2] [D]/[A] [D]	Point table No./ Program No./ Station position No.			
	[2] [E]/[A] [E]	Step No.			
	[2] [F]/[A] [F]	Analog override voltage			
	[3] [0]/[B] [0]	Override level			
	[3] [1]/[B] [1]				
	[3] [3]/[B] [3]	Cam axis one cycle current value			
	[3] [4]/[B] [4]	Cam standard position			
	[3] [5]/[B] [5]	Cam axis feed current value			
	[3] [6]/[B] [6]	Cam No. in execution			
	[3] [7]/[B] [7]	Cam stroke amount in execution			
	[3] [8]/[B] [8]	Main axis current value			
	[3] [9]/[B] [9]	Main axis one cycle current value			

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

10.3.2 Relevant matters to input/output

(1) Input signal (command [1] [2], [9] [2])

(a) "0 _ _ _" (MR-J4 standard) is set to [Pr. PT01]

Bit	Symbol			
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]	Data No. [0] [3]
0	SON		MD0	POS00
1	LSP	ABSM	MD1	POS01
2	LSN	ABSR		POS02
3	TL		TCH	POS03
4	TL1		TP0	POS10
5	PC		TP1	POS11
6	RES		OVR	POS12
7	CR			POS13
8	SP1			POS20
9	SP2		DOG/SIG	POS21
10	SP3		SPD1	POS22
11	ST1/RS2		SPD2	POS23
12	ST2/RS1		SPD3	POSP
13	CMX1		SPD4	POSN
14	CMX2			STRB
15	LOP			
16		MSD	LPS	
17		PI1	RT	
18	EM2/EM1	PI2	RTCDP	
19		PI3		
20	STAB2	CAMC	OV0	
21		CI0	OV1	
22		CI1	OV2	
23		CI2	OV3	
24	TSTP	CI3	DI0	
25		CLTC	DI1	
26		CPCD	DI2	
27	CDP		DI3	
28	CLD		DI4	
29	MECR (Note)		DI5	
30			DI6	
31			DI7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(b) "1 _ _ _" (equivalent to MR-J3-T) is set to [Pr. PT01]

Bit	Symbol		
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]
0	SON		POS00
1	LSP		POS01
2	LSN		POS02
3	TL		POS03
4	TL1		POS10
5	PC		POS11
6	RES		POS12
7	CR		POS13
8			POS20
9			POS21
10			POS22
11	ST1/RS2		POS23
12	ST2/RS1		POSP
13			POSN
14			STRB
15			
16			
17	MD0		
18	DOG/SIG		
19			
20		SPD1	
21		SPD2	
22		SPD3	
23	OVR	SPD4	
24	TSTP	DI0	
25	TP0	DI1	
26	TP1	DI2	
27	CDP	DI3	
28		DI4	
29		DI5	
30		DI6	
31		DI7	

(c) "2 _ _ _" (equivalent to MR-J2S-CP) is set to [Pr. PT01]

Bit	Symbol
	Data No. [0] [0]
0	SON
1	LSP
2	LSN
3	TL
4	TL1
5	PC
6	RES
7	
8	
9	
10	
11	ST1/RS2
12	ST2/RS1
13	
14	
15	

Bit	Symbol
	Data No. [0] [0]
16	EM2/EM1
17	MD0
18	DOG/SIG
19	DI0
20	DI1
21	DI2
22	DI3
23	OVR
24	TSTP
25	TP0
26	TP1
27	CDP
28	
29	DI4
30	TCH
31	

(d) "3 _ _ _" (equivalent to MR-J2S-CL) is set to [Pr. PT01]

Bit	Symbol	Bit	Symbol
	Data No. [0] [0]		Data No. [0] [0]
0	SON	16	EM2/EM1
1	LSP	17	MD0
2	LSN	18	DOG/SIG
3	TL	19	DI0
4	TL1	20	DI1
5	PC	21	DI2
6	RES	22	DI3
7		23	OVR
8		24	TSTP
9		25	TP0
10	LPS	26	TP1
11	ST1/RS2	27	CDP
12	ST2/RS1	28	
13		29	PI1
14		30	PI2
15		31	PI3

(2) Output signal (command [1] [2])

(a) "0 _ _ _" (MR-J4 standard) is set to [Pr. PT01]

Bit	Symbol			
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]	Data No. [0] [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			ACD0
9	OP			ACD1
10	MBR			ACD2
11	DB (Note)			ACD3
12	ALCD0		PED	PRQ0
13	ALCD1			PRQ1
14	ALCD2			
15	BWNG			
16				
17			ALMWNG	
18			BW9F	
19		MSDH		
20		MSDL		
21		SOUT		
22		OUT1		
23		OUT2		
24		OUT3	PT0/PS0	
25	CDPS	CAMS	PT1/PS1	
26	CLDS (Note)	CLTS	PT2/PS2	
27	ABSV	CLTSM	PT3/PS3	
28		CLTS	PT4/PS4	
29			PT5/PS5	
30			PT6/PS6	
31	MTTR (Note)		PT7/PS7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(b) "1 _ _ _" (equivalent to MR-J3-T) is set to [Pr. PT01]

Bit	Symbol		
	Data No. [0] [0]	Data No. [0] [1]	Data No. [0] [2]
0	RD	ABSB0	MCD00
1		ABSB1	MCD01
2	ZSP	ABST	MCD02
3	TLC		MCD03
4		ALMWNG	MCD10
5	INP	BW9F	MCD11
6			MCD12
7	WNG		MCD13
8	ALM		ACD0
9			ACD1
10	MBR		ACD2
11	DB (Note)		ACD3
12			PRQ0
13			PRQ1
14			
15	BWNG		
16	CPO		
17	ZP		
18	POT		
19	PUS		
20			
21			
22			
23			
24		PT0/PS0	
25	CDPS	PT1/PS1	
26		PT2/PS2	
27		PT3/PS3	
28	MEND	PT4/PS4	
29		PT5/PS5	
30		PT6/PS6	
31		PT7/PS7	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(c) "2 _ _ _" (equivalent to MR-J2S-CP) is set to [Pr. PT01]

Bit	Symbol
	Data No. [0] [0]
0	RD
1	
2	
3	TLC
4	
5	INP
6	
7	WNG
8	ALM
9	
10	MBR
11	DB (Note)
12	
13	
14	
15	BWNG
16	CPO
17	ZP
18	POT
19	PUS
20	PT0/PS0
21	PT1/PS1
22	PT2/PS2
23	PT3/PS3
24	PT4/PS4
25	
26	
27	
28	MEND
29	
30	
31	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

(d) "3 _ _ _" (equivalent to MR-J2S-CL) is set to [Pr. PT01]

Bit	Symbol
	Data No. [0] [0]
0	RD
1	
2	
3	TLC
4	
5	INP
6	
7	WNG
8	ALM
9	
10	MBR
11	DB (Note)
12	
13	
14	
15	BWNG
16	
17	ZP
18	POT
19	PUS
20	OUT1
21	OUT2
22	OUT3
23	SOUT
24	PED
25	
26	
27	
28	
29	
30	
31	

Note. This is not available with the MR-J4-03A6-RJ servo amplifier.

11. MR-D01 EXTENSION I/O UNIT

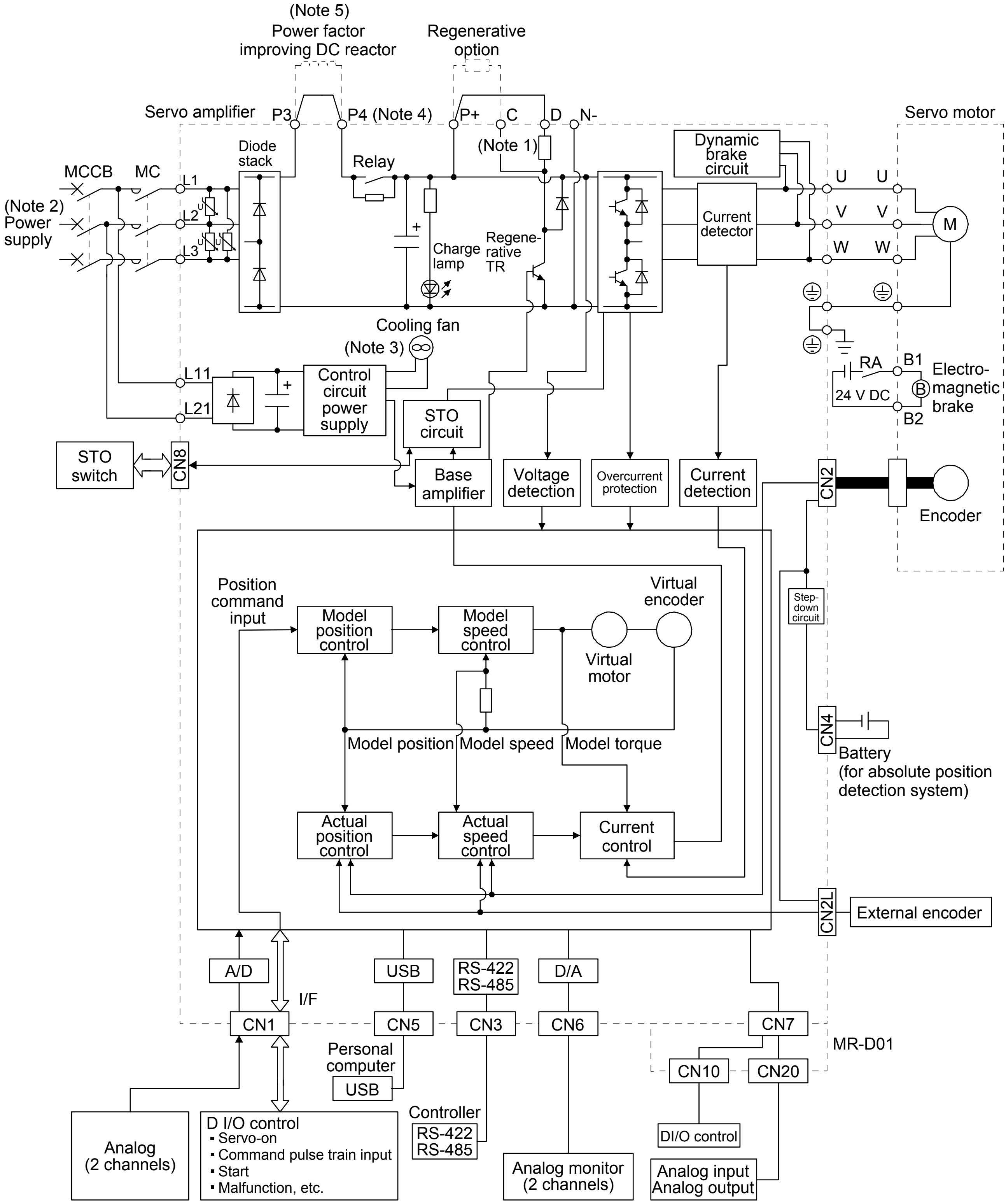
MR-D01 is an extension I/O unit that can extend the input/output signals of MR-J4-_A_-RJ servo amplifiers.

POINT

- MR-D01 cannot be used with the MR-J4-_(-RJ) drive unit.
- MR-D01 cannot be used with MR-J4-03A6(-RJ) servo amplifiers.

11.1 Function block diagram

The function block diagram of this servo is shown below.
The following illustration is an example of MR-J4-20A-RJ.



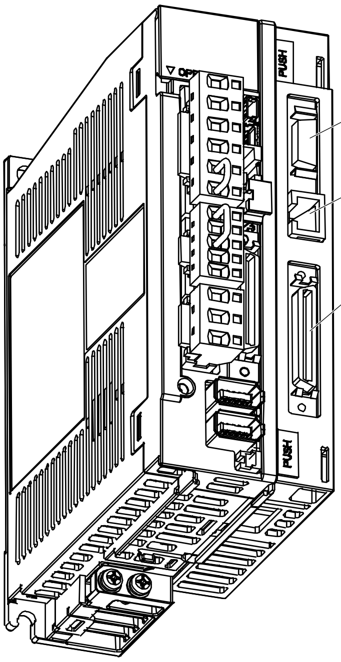
Note 1. The built-in regenerative resistor is not provided for MR-J4-10A-RJ.
2. For power supply specifications, refer to section 1.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
3. Servo amplifiers MR-J4-70A-RJ or more have a cooling fan.
4. MR-J4 servo amplifier has P3 and P4 in the upstream of the inrush current suppression circuit. They are different from P1 and P2 of MR-J3 servo amplifiers.
5. The power factor improving AC reactor can also be used. In this case, the power factor improving DC reactor cannot be used. When not using the power factor improving DC reactor, short P3 and P4.

11.2 Structure

11.2.1 Parts identification

(1) Interface

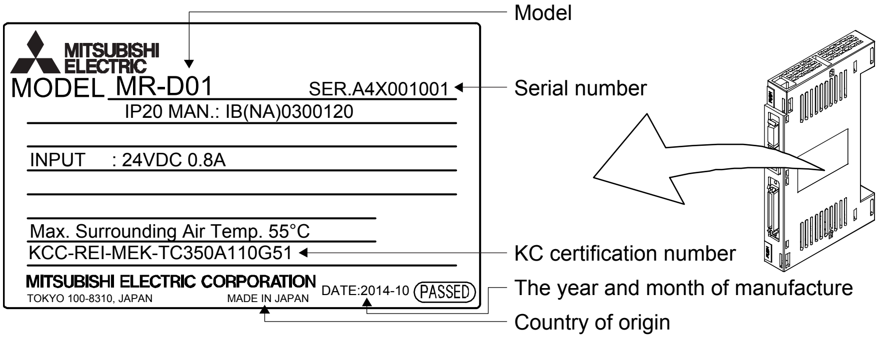
The following figure shows the interface of when MR-J4-20A-RJ and MR-D01 have been connected. For servo amplifiers, refer to section 1.7.1 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".



Name/Application	Detailed explanation
Analog input signal connector (CN20) Connect analog input signals of analog torque limit and override.	Section 11.5.1
Manufacturer setting connector (CN30) This connector is attached on the MR-D01, but not for use.	
I/O signal connector (CN10) Connect digital I/O signal and analog output signal.	Section 11.5.1

(2) Rating plate

The following shows an example of the rating plate for explanation of each item.


MITSUBISHI ELECTRIC
MODEL MR-D01 SER.A4X001001
IP20 MAN.: IB(NA)0300120
INPUT : 24VDC 0.8A
Max. Surrounding Air Temp. 55°C
KCC-REI-MEK-TC350A110G51
MITSUBISHI ELECTRIC CORPORATION
TOKYO 100-8310, JAPAN MADE IN JAPAN
DATE:2014-10 PASSED

11.2.2 Installation and removal of the MR-D01 extension I/O unit

⚠WARNING

- ●Before installing or removing MR-D01, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Then, confirm that the voltage between P+ and N- is safe with a voltage tester and others. 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

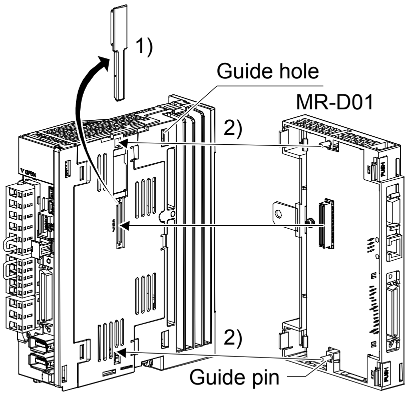
- ●Avoid installing and removing MR-D01 repeatedly. Any contact failure of the connector may be caused.
- ●Avoid unsealing MR-D01 to be free of dust and dirt against the connector except installing. Make sure to use the pre-packing when storing.
- ●Avoid using MR-D01 of which the hook and knobs for fixing are damaged. Any contact failure of the connector may be caused.
- ●When mounting/dismounting MR-D01 to/from MR-J4-500A-RJ to MR-J4-22KA-RJ and MR-J4-350A4-RJ to MR-J4-22KA4-RJ servo amplifiers, avoid dropping out the installing screw inside it. Otherwise, it may cause a malfunction.
- ●When mounting MR-D01 to MR-J4-500A-RJ to MR-J4-22KA-RJ and MR-J4-350A4-RJ to MR-J4-22KA4-RJ servo amplifiers, avoid damaging the control board by the fixing plate. Otherwise, it may cause a malfunction.
- ●Make sure to tighten MR-D01 with the enclosed installing screws when installing.

POINT

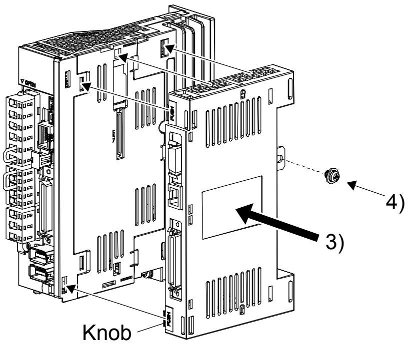
- ●The internal circuits of the servo amplifier and MR-D01 may be damaged by static electricity. Always take the following precautions.
  - ・Ground human body and work bench.
  - ・Do not touch the conductive areas, such as connector pins and electrical parts, directly by hand.

(1) For MR-J4-200A(4)-RJ or less and MR-J4-350A-RJ

(a) Installation of MR-D01

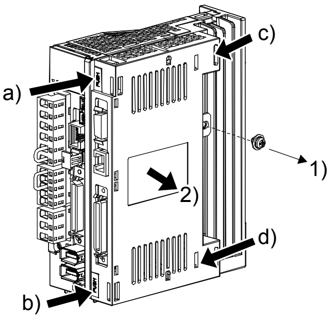


1) Remove the covers of CN7 and CN9 connectors.
Make sure to store the removed cover.
2) Find the guide hole on the side of the servo amplifier. To the guide hole, insert the MR-D01's guide pins.

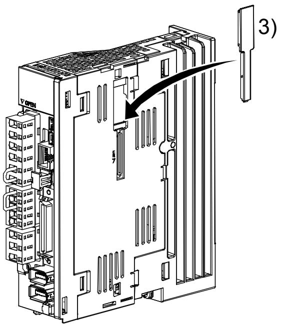


3) Push the four corners of the side of MR-D01 simultaneously to the servo amplifier until the four knobs click so that the CN7 connector is connected straight.
4) Tighten the unit with the enclosed installing screw (M4).

(b) Removal of MR-D01



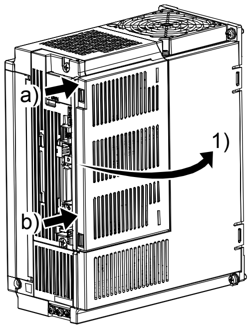
1) Remove the installing screw.
2) Keep pushing the knobs (a) ,b), c), d)) and pull out MR-D01 to the arrow direction. Avoid pulling out MR-D01 while it is tightened with the installation screw.



3) After removing MR-D01, make sure to cap the CN7 and CN9 connectors to avoid dust and dirt.

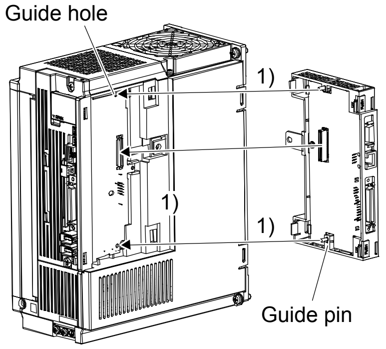
(2) MR-J4-500A-RJ to MR-J4-700A-RJ and MR-J4-350A4-RJ to MR-J4-700A4-RJ

(a) Removal of the side cover

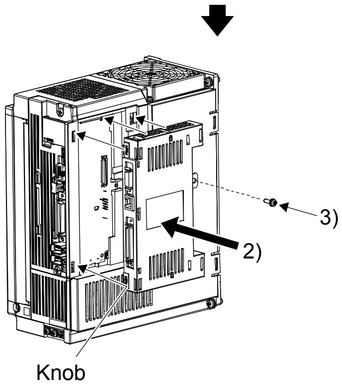


1) Keep pushing the knobs (a), b)) and pull out the side cover to the arrow direction.

(b) Installation of MR-D01

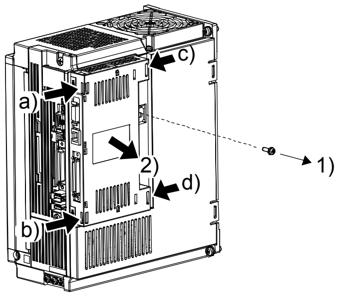


1) Find the guide hole on the side of the servo amplifier. To the guide hole, insert the MR-D01's guide pins.



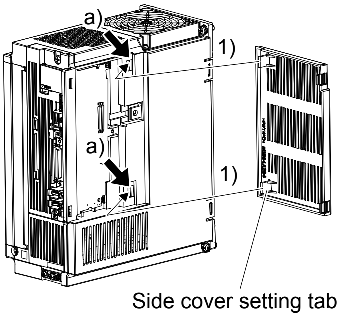
2) Push the four corners of the side of MR-D01 simultaneously to the servo amplifier until the four knobs click so that the CN7 connector is connected straight.
3) Tighten the unit with the enclosed installing screw (M4).

(c) Removal of MR-D01

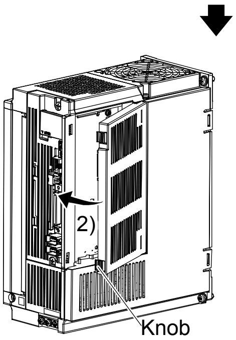


1) Remove the installing screw.
2) Keep pushing the knobs (a) ,b), c), d)) and pull out MR-D01 to the arrow direction. Avoid pulling out MR-D01 while it is tightened with the installation screw.

(d) Installation of the side cover



1) Insert the side cover setting tabs into the sockets a) of the servo amplifier.



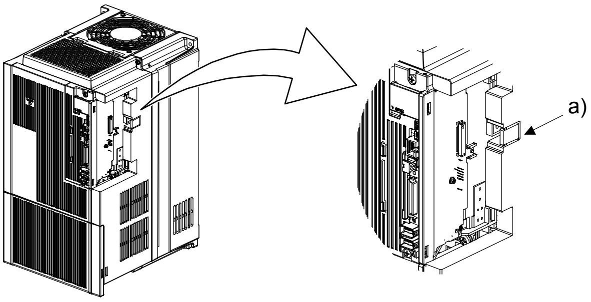
2) Push the side cover at the supporting point a) until the knobs click.

(3) MR-J4-11KA(4)-RJ to MR-J4-22KA(4)-RJ

⚠CAUTION

- Avoid touching any remained burr after cutting off the part a) of the case. Otherwise, it may cause injury.

The installing screw holes for the MR-J4-11KA(4)-RJ to MR-J4-22KA(4)-RJ are covered and the screw holes for mounting are not shown at shipping. When installing the unit for the first time, cut off the part a) of the case after removing the side cover.
When cutting off the part a), avoid damaging the case of the servo amplifier. After cutting off it, inside of the servo amplifier has been exposed even though the side cover and the unit are installed. Avoid unwanted parts from entering through the opened area into the servo amplifier.
For installing or removing the unit, refer to (2) in this section. The side cover structure is the same for MR-J4-11KA(4)-RJ to MR-J4-22KA(4)-RJ and for this unit. Install or remove the side cover with the same way as for the unit.

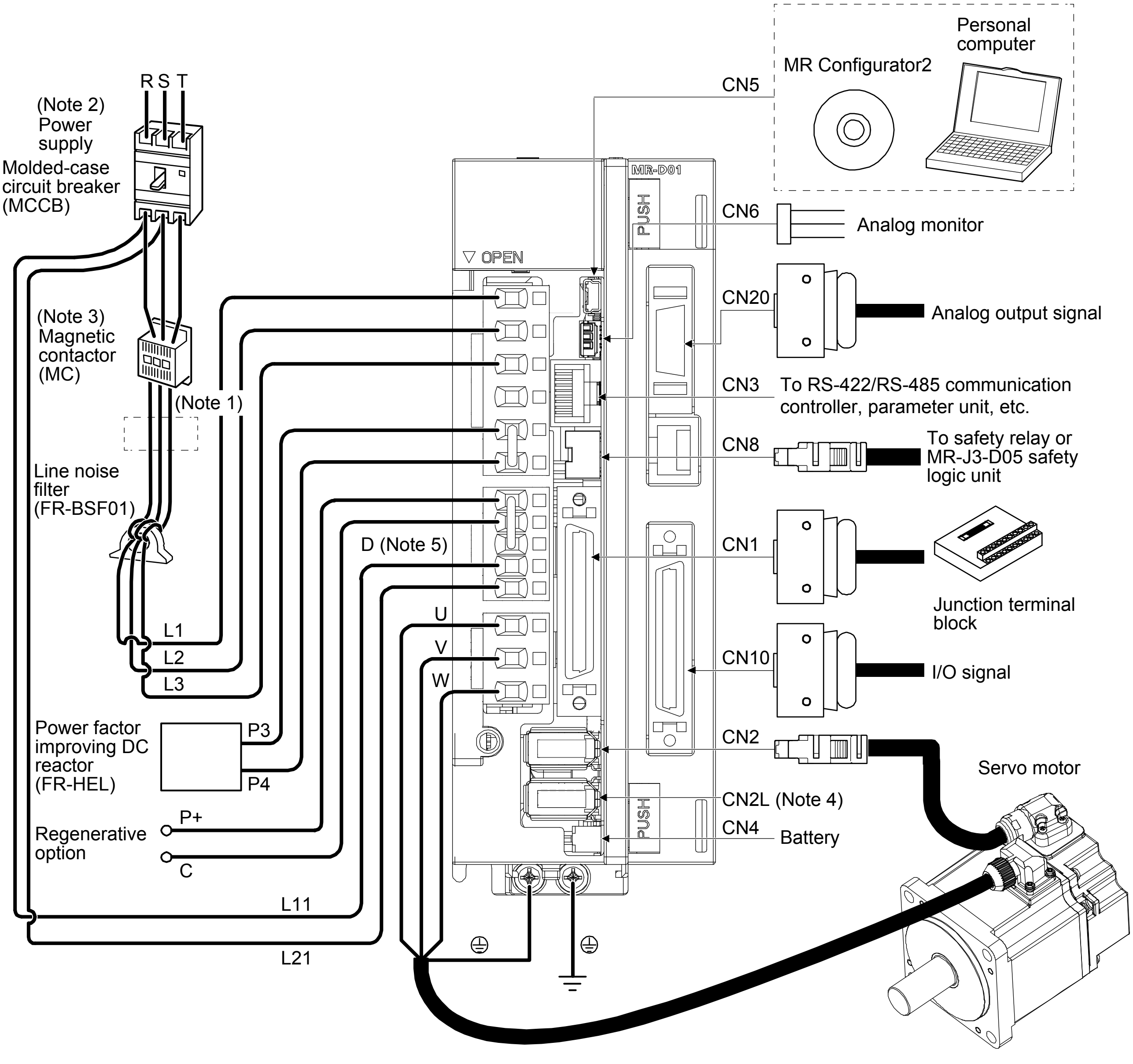


11.3 Configuration including peripheral equipment

⚠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.

The diagram shows MR-J4-20A-RJ.



Note 1. The power factor improving AC reactor can also be used. In this case, the power factor improving DC reactor cannot be used. When not using the power factor improving DC reactor, short P3 and P4.

2. A 1-phase 200 V AC to 240 V AC power supply may be used with the servo amplifier of MR-J4-70A-RJ or less. 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

3. Depending on the main circuit 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.

4. This is for the MR-J4-_A-RJ servo amplifier. The MR-J4-_A servo amplifier does not have the CN2L connector. When using an MR-J4-_A-RJ servo amplifier in the linear servo system or in the fully closed loop system, connect an external encoder to this connector. Refer to Table 1.1 and "Linear Encoder Instruction Manual" for the compatible external encoders.

5. Always connect between P+ and D terminals. When using the regenerative option, refer to section 11.2.

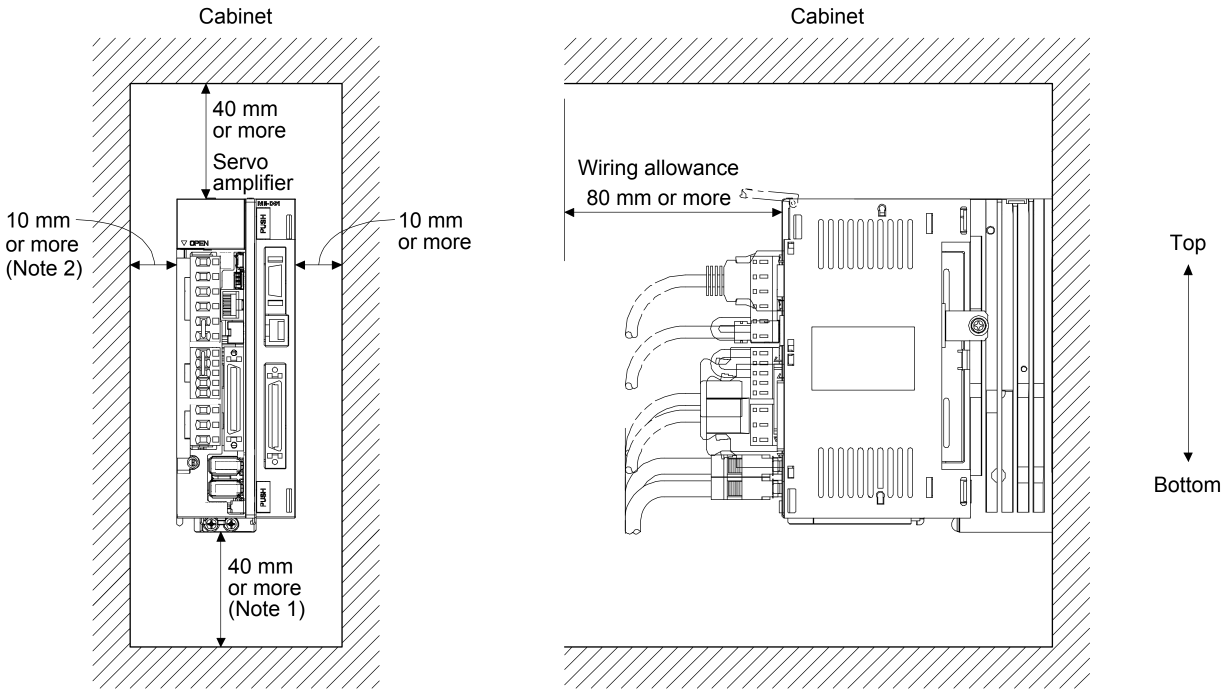
11.4 Installation direction and clearances

⚠CAUTION

- ●The equipment must be installed in the specified direction. Otherwise, it may cause malfunction.
- ●Leave specified clearances between the servo amplifier and cabinet walls or other equipment. Otherwise, it may cause malfunction.

(1) Installation clearances of the servo amplifier

(a) Installation of one servo amplifier



Note 1. For the 11 kW to 22 kW servo amplifiers, the clearance between the bottom and the ground will be 120 mm or more.

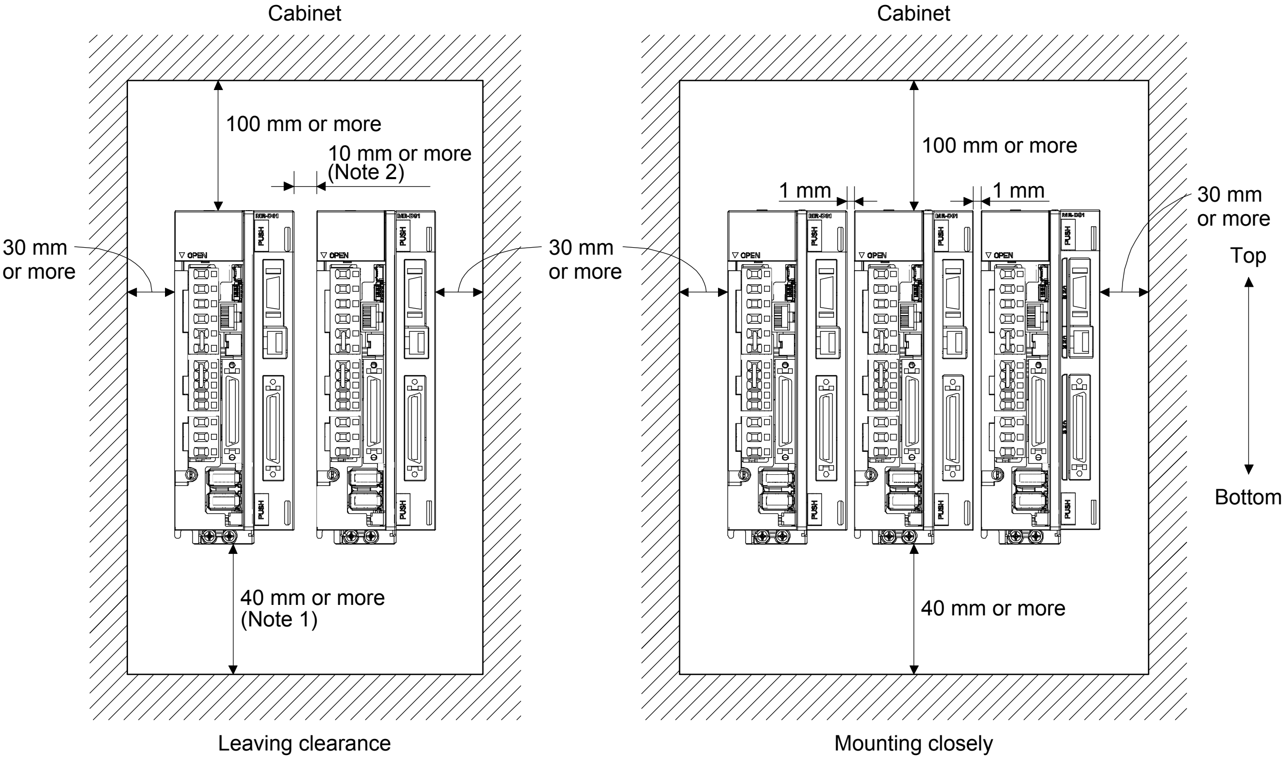
2. For the MR-J4-500A-RJ, the clearance between the left side and wall will be 25 mm or more.

(b) Installation of two or more servo amplifiers

POINT

- ●Close mounting is possible depending on the capacity of the servo amplifier. For the possibility of close mounting, refer to section 1.3 of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
- ●When mounting the servo amplifiers closely, do not install the servo amplifier whose depth is larger than that of the left side servo amplifier since CNP1, CNP2, and CNP3 connectors cannot be disconnected.

Leave a large clearance between the top of the servo amplifier and the cabinet walls, and install a cooling fan to prevent the internal temperature of the cabinet from exceeding the environmental conditions.
When mounting the servo amplifiers closely, leave a clearance of 1 mm between the adjacent servo amplifiers in consideration of mounting tolerances. In this case, operate the servo amplifiers at the ambient temperature of 0 ˚C to 45 ˚C or at 75% or less of the effective load ratio.



Note 1. For the 11 kW to 22 kW servo amplifiers, the clearance between the bottom and the ground will be 120 mm or more.
2. When you install MR-J4-500A-RJ on the right side, the clearance between the left side and the wall will be 25 mm or more.

(2) Others

When using heat generating equipment such as the regenerative option, install them with full consideration of heat generation so that the servo amplifier is not affected.
Install the servo amplifier on a perpendicular wall in the correct vertical direction.

11.5 Signals and wiring

POINT

- Input signals of the servo amplifier are valid even when the MR-D01 has been connected. When the same input devices have been assigned to the servo amplifier and MR-D01 and both input signals are turned on, the input signal that has turned on first is enabled. Even though turning off one of the input signals that have been turned on is attempted, the input signal cannot be turned off. Refer to the following table for details. The following table shows ST1 (Forward rotation start) as an example.

Device	(Note) Servo amplifier	(Note) MR-D01	Servo motor
ST1	0	0	Stop
	0	1	Forward rotation
	1	0	Forward rotation
	1	1	Forward rotation

Note. 0: Off
1: On

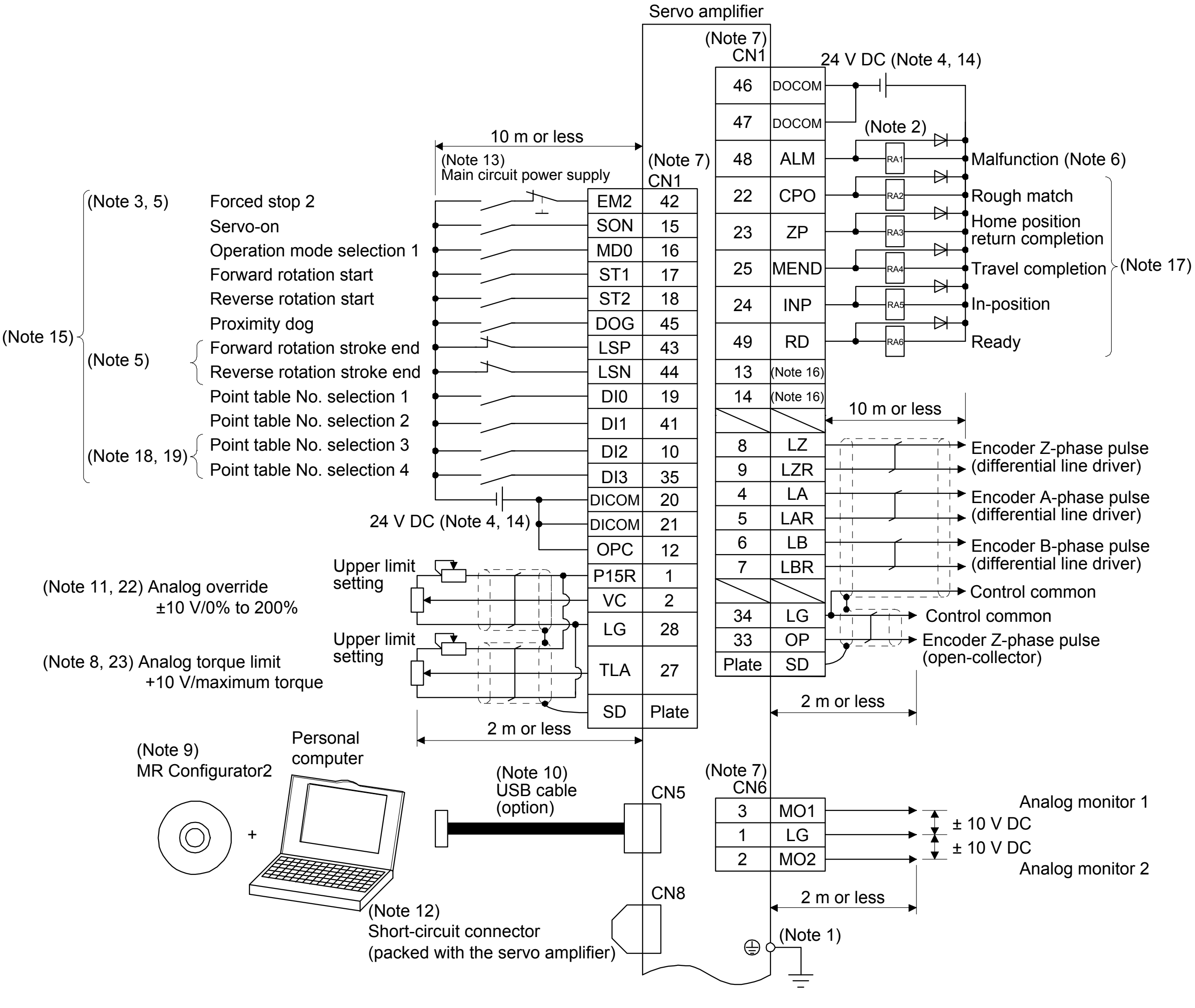
11.5.1 I/O signal connection diagram

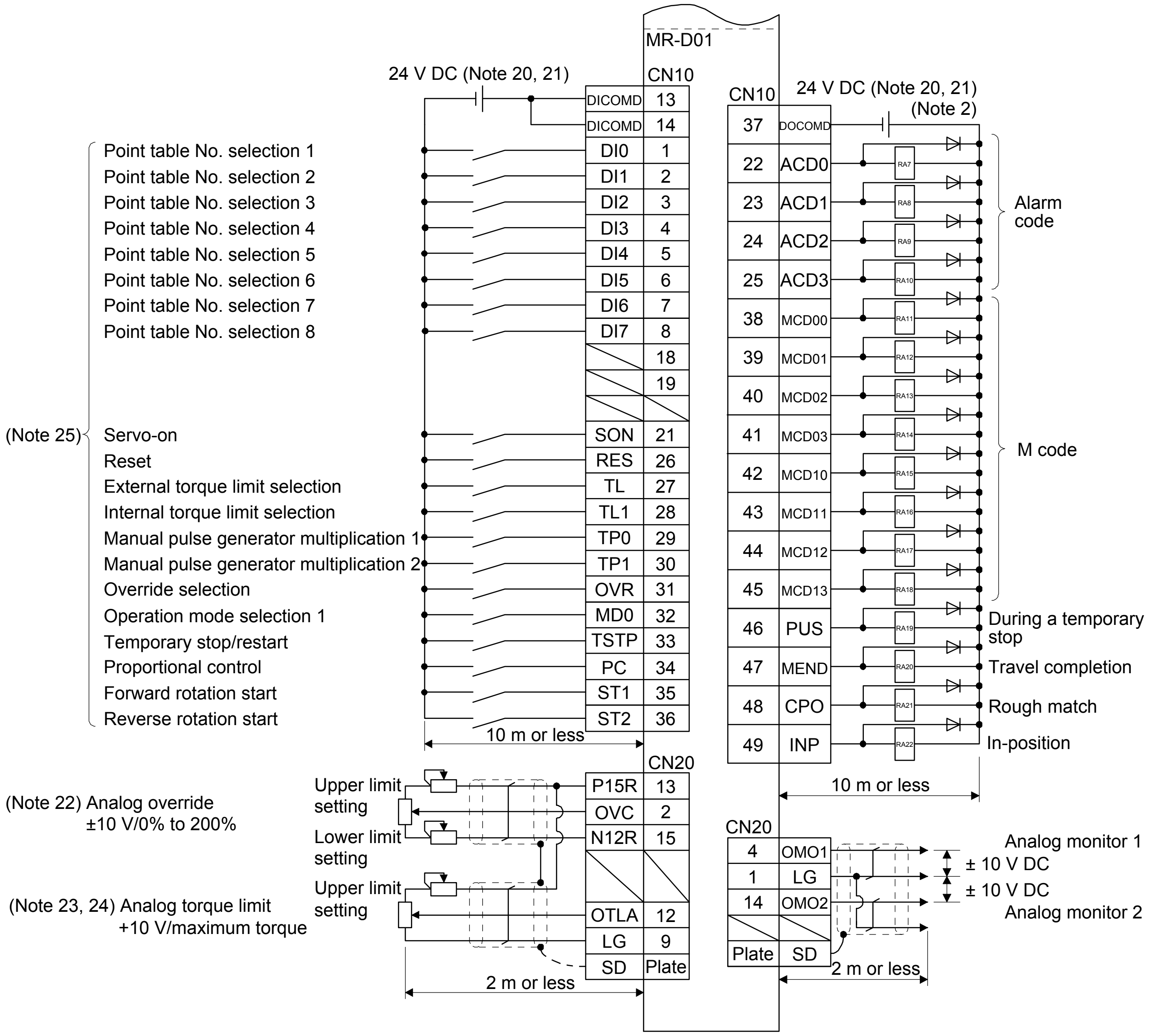
(1) Point table method

POINT

- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

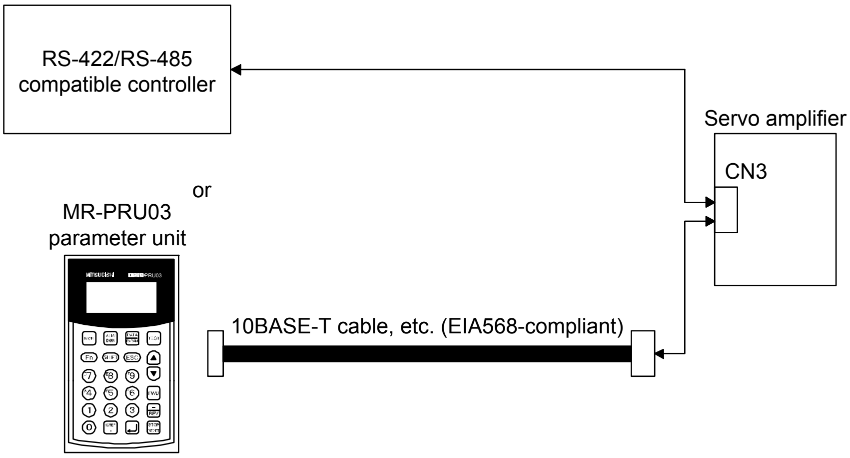
(a) Sink I/O interface




MR-D01
24 V DC (Note 20, 21)
CN10
DICOMD 13
DICOMD 14
Point table No. selection 1
Point table No. selection 2
Point table No. selection 3
Point table No. selection 4
Point table No. selection 5
Point table No. selection 6
Point table No. selection 7
Point table No. selection 8
DI0 1
DI1 2
DI2 3
DI3 4
DI4 5
DI5 6
DI6 7
DI7 8
18
19
(Note 25)
Servo-on
Reset
External torque limit selection
Internal torque limit selection
Manual pulse generator multiplication 1
Manual pulse generator multiplication 2
Override selection
Operation mode selection 1
Temporary stop/restart
Proportional control
Forward rotation start
Reverse rotation start
SON 21
RES 26
TL 27
TL1 28
TP0 29
TP1 30
OVR 31
MD0 32
TSTP 33
PC 34
ST1 35
ST2 36
10 m or less
CN20
(Note 22) Analog override
±10 V/0% to 200%
Upper limit setting
Lower limit setting
(Note 23, 24) Analog torque limit
+10 V/maximum torque
Upper limit setting
P15R 13
OVC 2
N12R 15
OTLA 12
LG 9
SD Plate
2 m or less
CN10
24 V DC (Note 20, 21)
(Note 2)
37 DOCOMD
22 ACD0
23 ACD1
24 ACD2
25 ACD3
38 MCD00
39 MCD01
40 MCD02
41 MCD03
42 MCD10
43 MCD11
44 MCD12
45 MCD13
46 PUS
47 MEND
48 CPO
49 INP
RA7
RA8
RA9
RA10
RA11
RA12
RA13
RA14
RA15
RA16
RA17
RA18
RA19
RA20
RA21
RA22
Alarm code
M code
During a temporary stop
Travel completion
Rough match
In-position
10 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2
2 m or less

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 500 mA or lower. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.

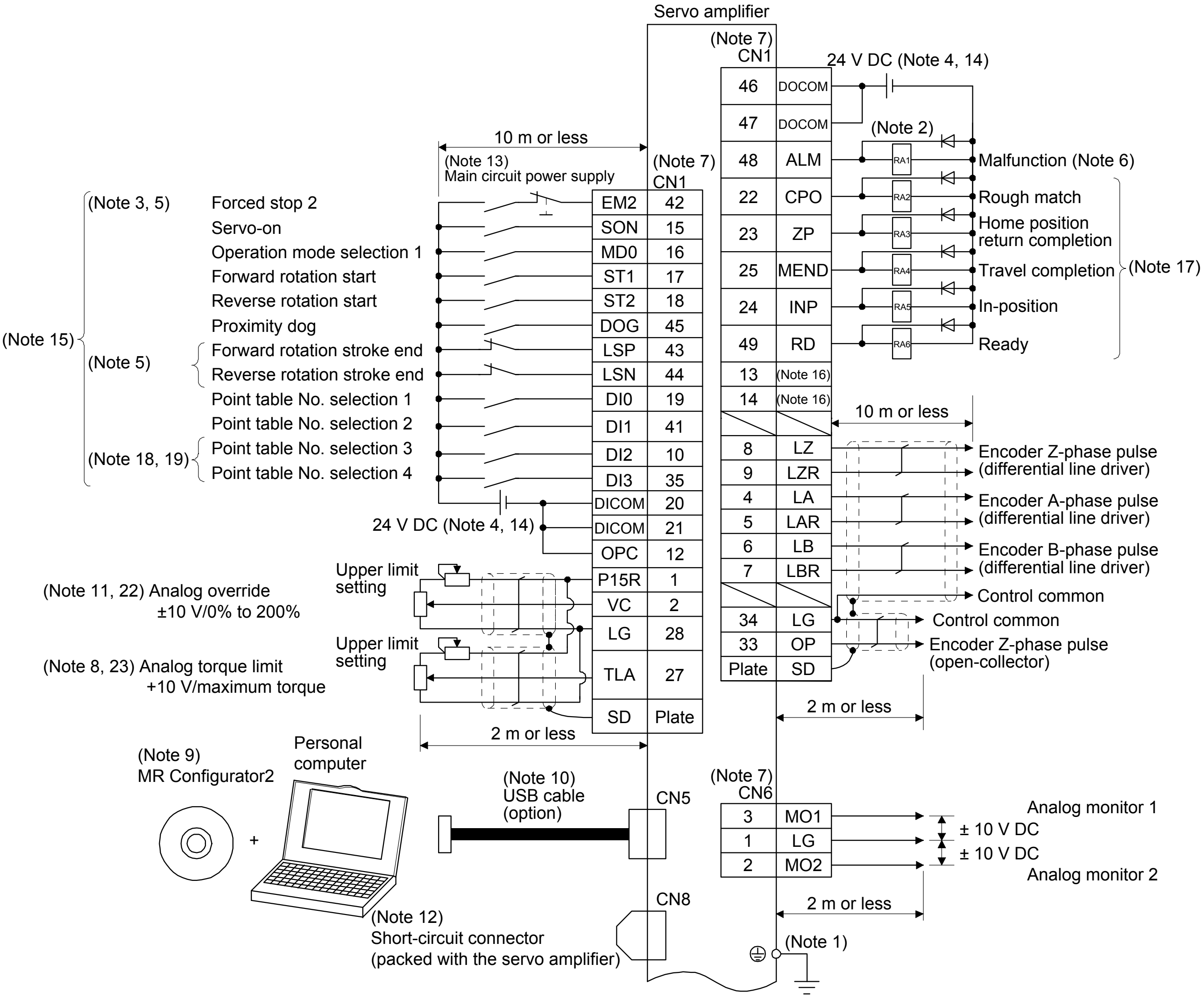


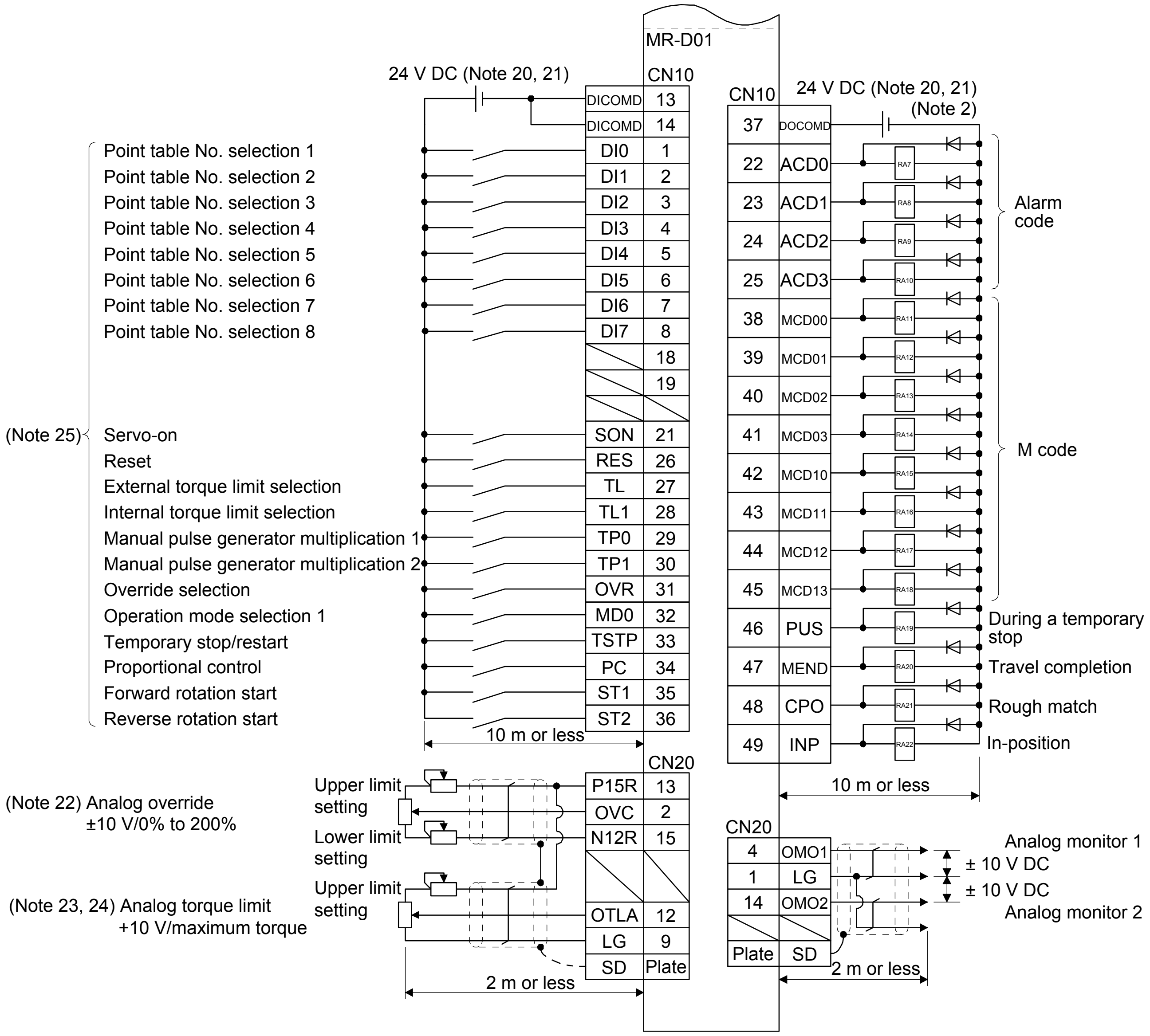
11. Use an external power supply when inputting a negative voltage.
12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
14. This diagram shows sink I/O interface.
15. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
16. Output devices are not assigned by default. Assign the output devices with [Pr. PD47] as necessary.
17. Recommended device assignments are shown. The devices can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
18. DI2 and DI3 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.
19. 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 (DI2 and DI3) are assigned with the initial values.
20. Supply 24 V DC ± 10% to interfaces of the MR-D01 from outside. The total current capacity of these power supplies must be 800 mA or lower. 800 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. For the current required for the interface, refer to section 3.8.2 (1) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
21. As the 24 V DC for the input/output signals, one 24 V DC power supply can be used to supply to the servo amplifier and MR-D01. In this case, select an appropriate power supply capacity depending on the number of points of the input/output signals to be used.
22. The CN1-2 pin and CN20-2 pin are exclusive. The CN1-2 pin is set by default. Select this item with [Pr. Po11].
23. The CN1-27 pin and CN20-12 pin are exclusive. The CN1-27 pin is set by default. Select this item with [Pr. Po11].
24. OTLA will be available when TL (External torque limit selection) is enabled with [Pr. Po02] to [Pr. Po07]. (Refer to section 11.5.3 (6).)
25. The devices can be changed by [Pr. Po02] to [Pr. Po07].

(b) Source I/O interface

POINT

- For notes, refer to (1) (a) of this section.




MR-D01
24 V DC (Note 20, 21)
CN10
DICOMD 13
DICOMD 14
Point table No. selection 1
Point table No. selection 2
Point table No. selection 3
Point table No. selection 4
Point table No. selection 5
Point table No. selection 6
Point table No. selection 7
Point table No. selection 8
DI0 1
DI1 2
DI2 3
DI3 4
DI4 5
DI5 6
DI6 7
DI7 8
18
19
(Note 25)
Servo-on
Reset
External torque limit selection
Internal torque limit selection
Manual pulse generator multiplication 1
Manual pulse generator multiplication 2
Override selection
Operation mode selection 1
Temporary stop/restart
Proportional control
Forward rotation start
Reverse rotation start
SON 21
RES 26
TL 27
TL1 28
TP0 29
TP1 30
OVR 31
MD0 32
TSTP 33
PC 34
ST1 35
ST2 36
10 m or less
CN20
(Note 22) Analog override
±10 V/0% to 200%
Upper limit setting
Lower limit setting
P15R 13
OVC 2
N12R 15
(Note 23, 24) Analog torque limit
+10 V/maximum torque
Upper limit setting
OTLA 12
LG 9
SD Plate
2 m or less
CN10
24 V DC (Note 20, 21)
(Note 2)
37 DOCOMD
22 ACD0
23 ACD1
24 ACD2
25 ACD3
38 MCD00
39 MCD01
40 MCD02
41 MCD03
42 MCD10
43 MCD11
44 MCD12
45 MCD13
46 PUS
47 MEND
48 CPO
49 INP
RA7
RA8
RA9
RA10
RA11
RA12
RA13
RA14
RA15
RA16
RA17
RA18
RA19
RA20
RA21
RA22
Alarm code
M code
During a temporary stop
Travel completion
Rough match
In-position
10 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2
2 m or less

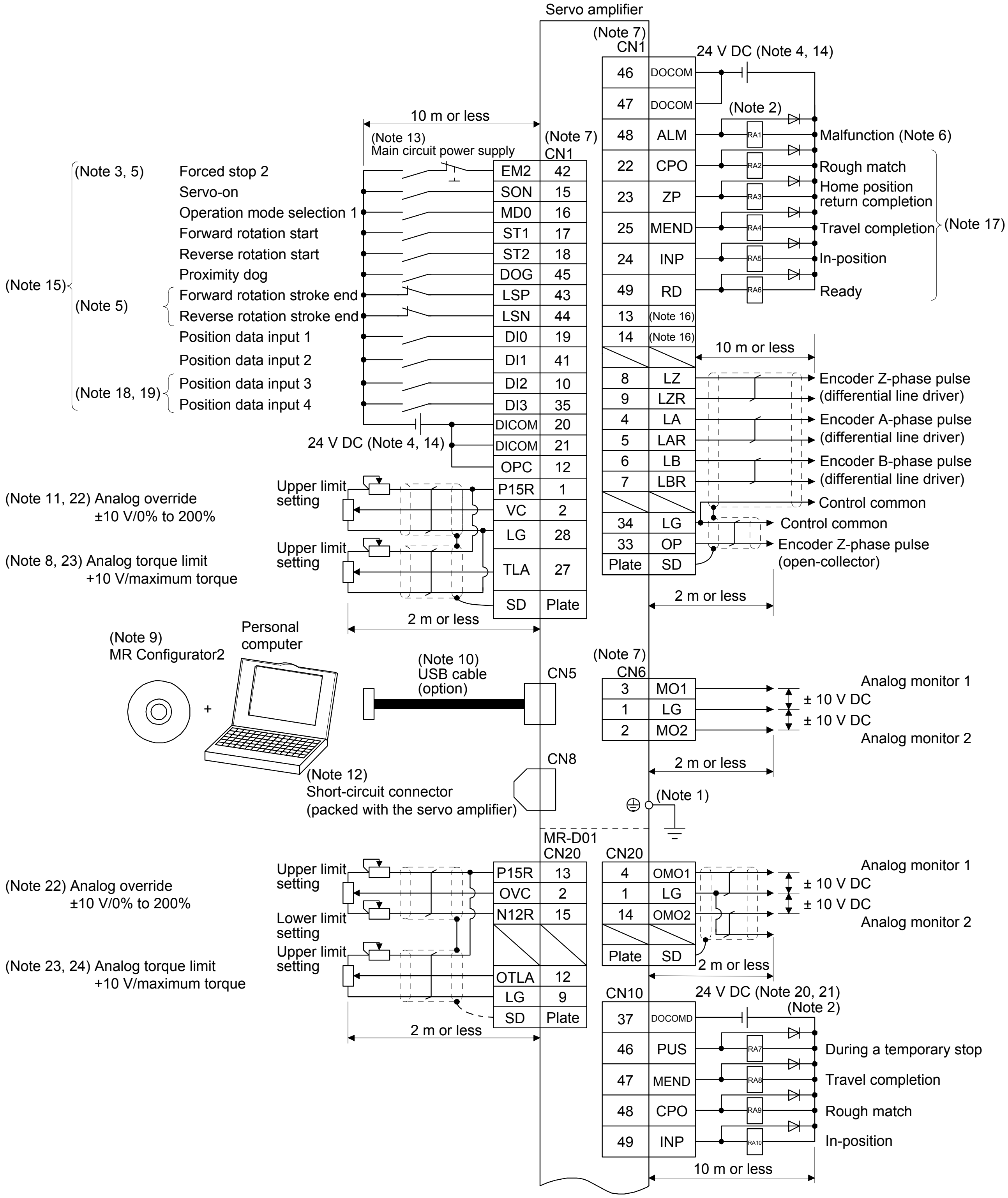
(2) Point table method in the BCD input positioning operation

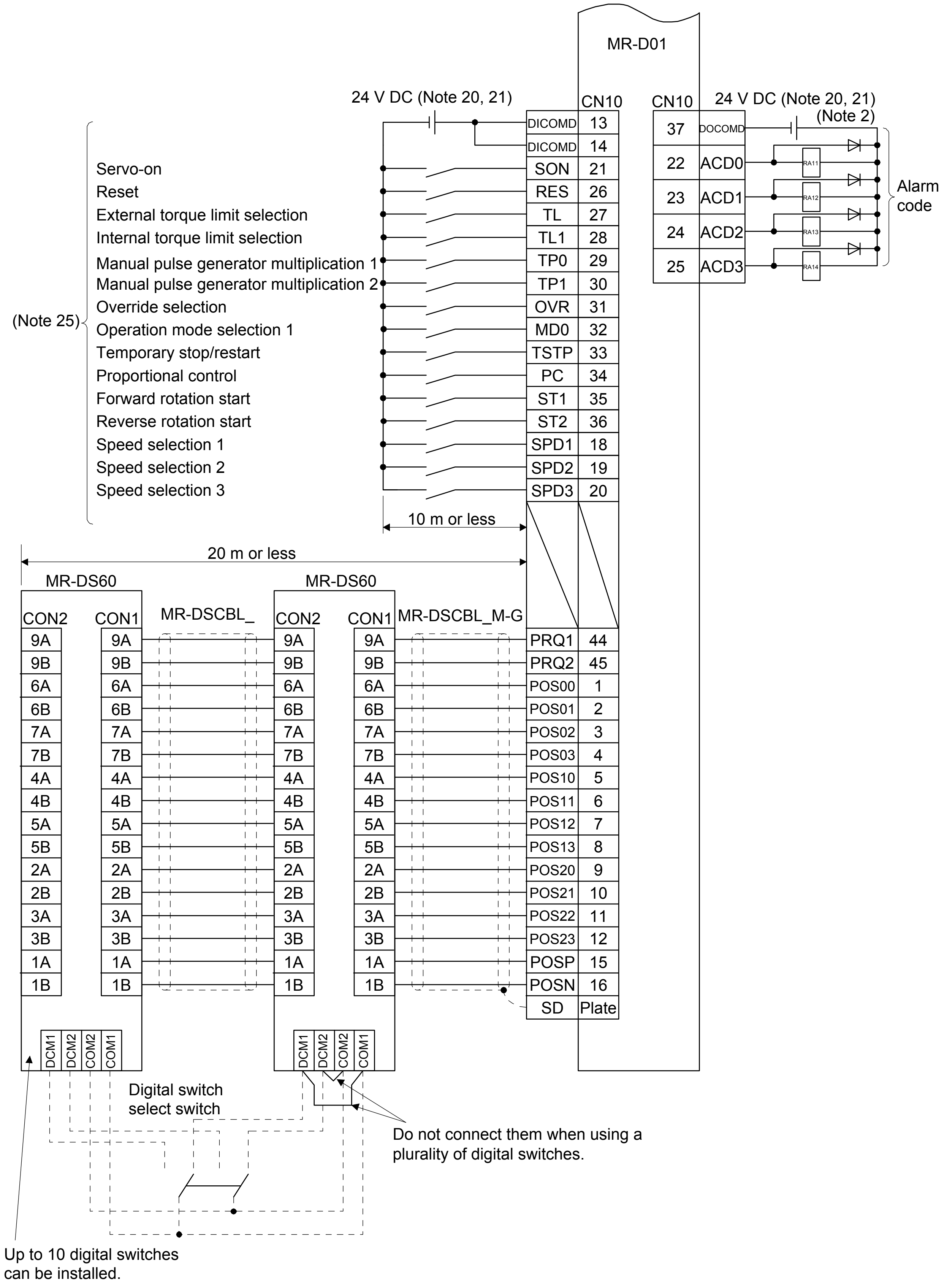
POINT

- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

(a) When using a digital switch

1) Sink I/O interface




MR-D01
24 V DC (Note 20, 21)
CN10
DICOMD 13
DICOMD 14
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Manual pulse generator multiplication 1 TP0 29
Manual pulse generator multiplication 2 TP1 30
Override selection OVR 31
Operation mode selection 1 MD0 32
Temporary stop/restart TSTP 33
Proportional control PC 34
Forward rotation start ST1 35
Reverse rotation start ST2 36
Speed selection 1 SPD1 18
Speed selection 2 SPD2 19
Speed selection 3 SPD3 20
(Note 25)
10 m or less
20 m or less
CN10
24 V DC (Note 20, 21)
(Note 2)
37 DOCOMD
22 ACD0 RA11
23 ACD1 RA12
24 ACD2 RA13
25 ACD3 RA14
Alarm code
MR-DS60
MR-DS60
CON2
CON1
MR-DSCBL_
MR-DSCBL_M-G
9A 9B 6A 6B 7A 7B 4A 4B 5A 5B 2A 2B 3A 3B 1A 1B
PRQ1 44
PRQ2 45
POS00 1
POS01 2
POS02 3
POS03 4
POS10 5
POS11 6
POS12 7
POS13 8
POS20 9
POS21 10
POS22 11
POS23 12
POSP 15
POSN 16
SD Plate
DCM1 DCM2 COM2 COM1
Digital switch select switch
Do not connect them when using a plurality of digital switches.
Up to 10 digital switches can be installed.

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 500 mA or lower. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.

5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)

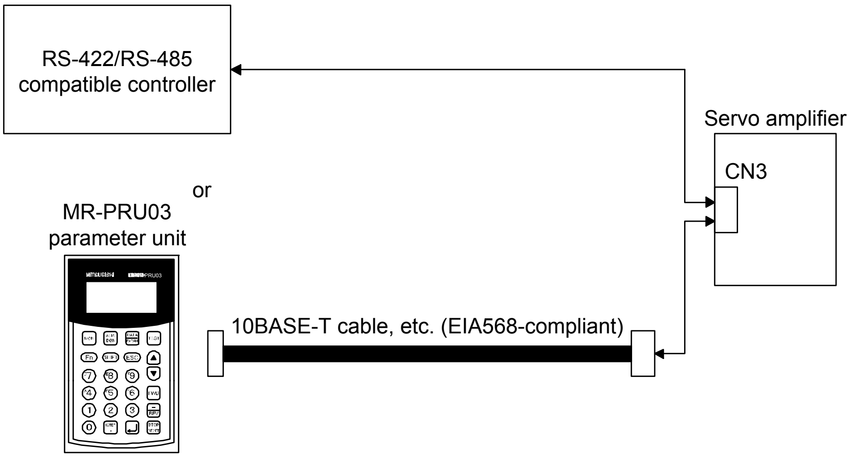
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)

7. The pins with the same signal name are connected in the servo amplifier.

8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)

9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)

10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.



11. Use an external power supply when inputting a negative voltage.

12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.

13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.

14. This diagram shows sink I/O interface.

15. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].

16. Output devices are not assigned by default. Assign the output devices with [Pr. PD47] as necessary.

17. Recommended device assignments are shown. The devices can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].

18. DI2 and DI3 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.

19. 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 (DI2 and DI3) are assigned with the initial values.

20. Supply 24 V DC ± 10% to interfaces of the MR-D01 from outside. The total current capacity of these power supplies must be 800 mA or lower. 800 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. For the current required for the interface, refer to section 3.8.2 (1) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

21. As the 24 V DC for the input/output signals, one 24 V DC power supply can be used to supply to the servo amplifier and MR-D01. In this case, select an appropriate power supply capacity depending on the number of points of the input/output signals to be used.

22. The CN1-2 pin and CN20-2 pin are exclusive. The CN1-2 pin is set by default. Select this item with [Pr. Po11].

23. The CN1-27 pin and CN20-12 pin are exclusive. The CN1-27 pin is set by default. Select this item with [Pr. Po11].

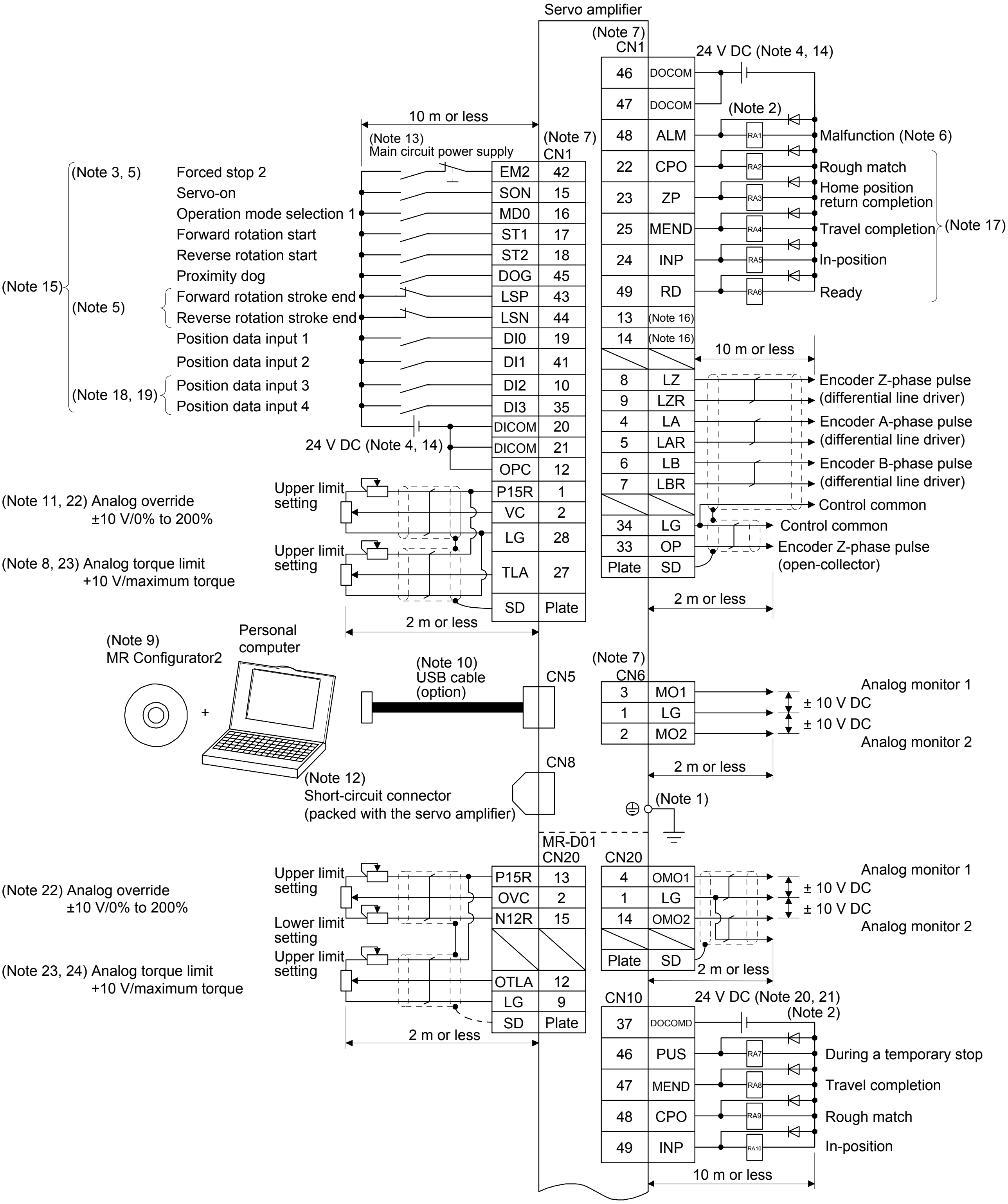
24. OTLA will be available when TL (External torque limit selection) is enabled with [Pr. Po02] to [Pr. Po07]. (Refer to section 11.5.3 (6).)

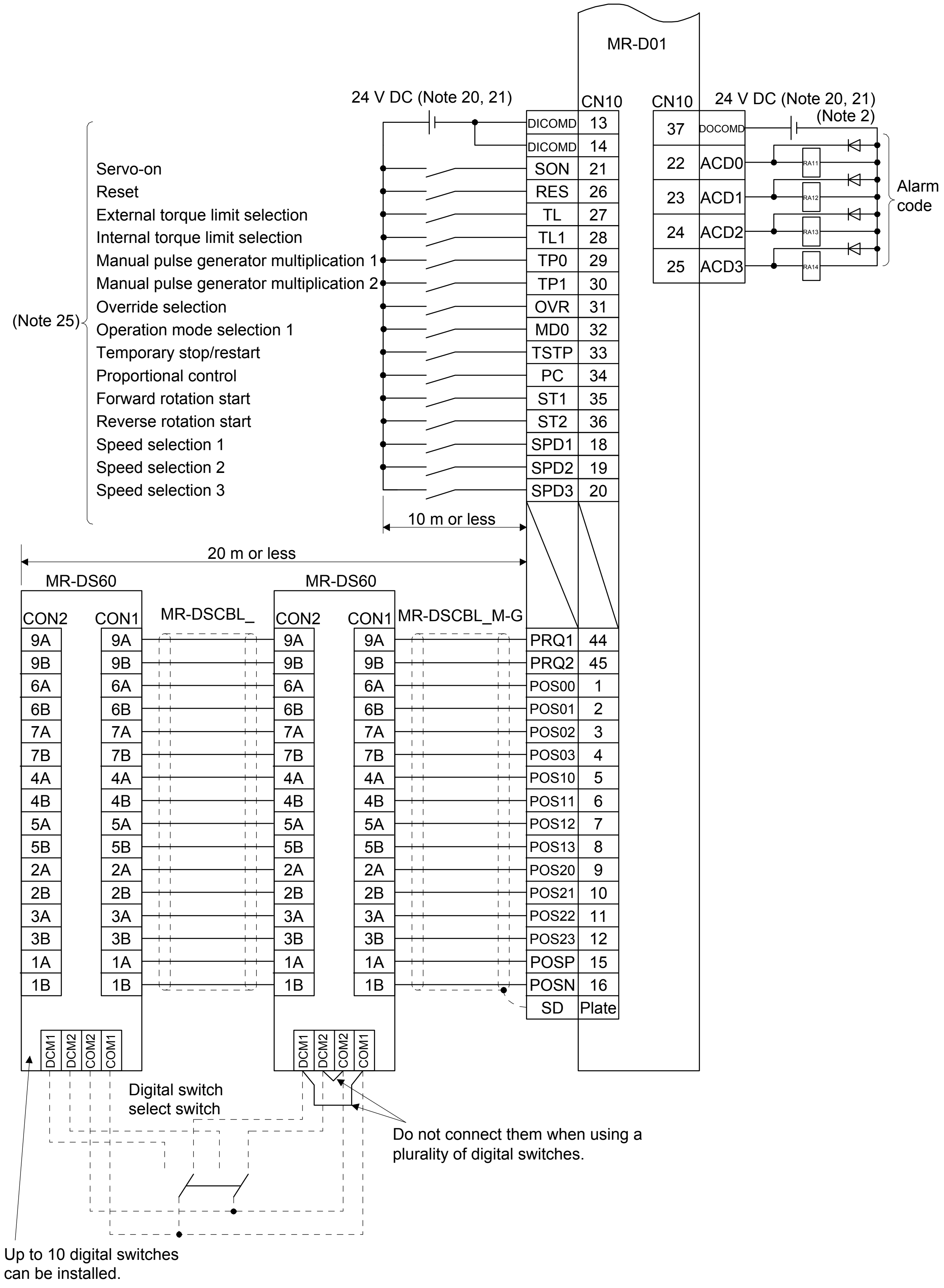
25. The devices can be changed by [Pr. Po02] to [Pr. Po07].

2) Source I/O interface

POINT

- For notes, refer to (2) (a) 1) of this section.



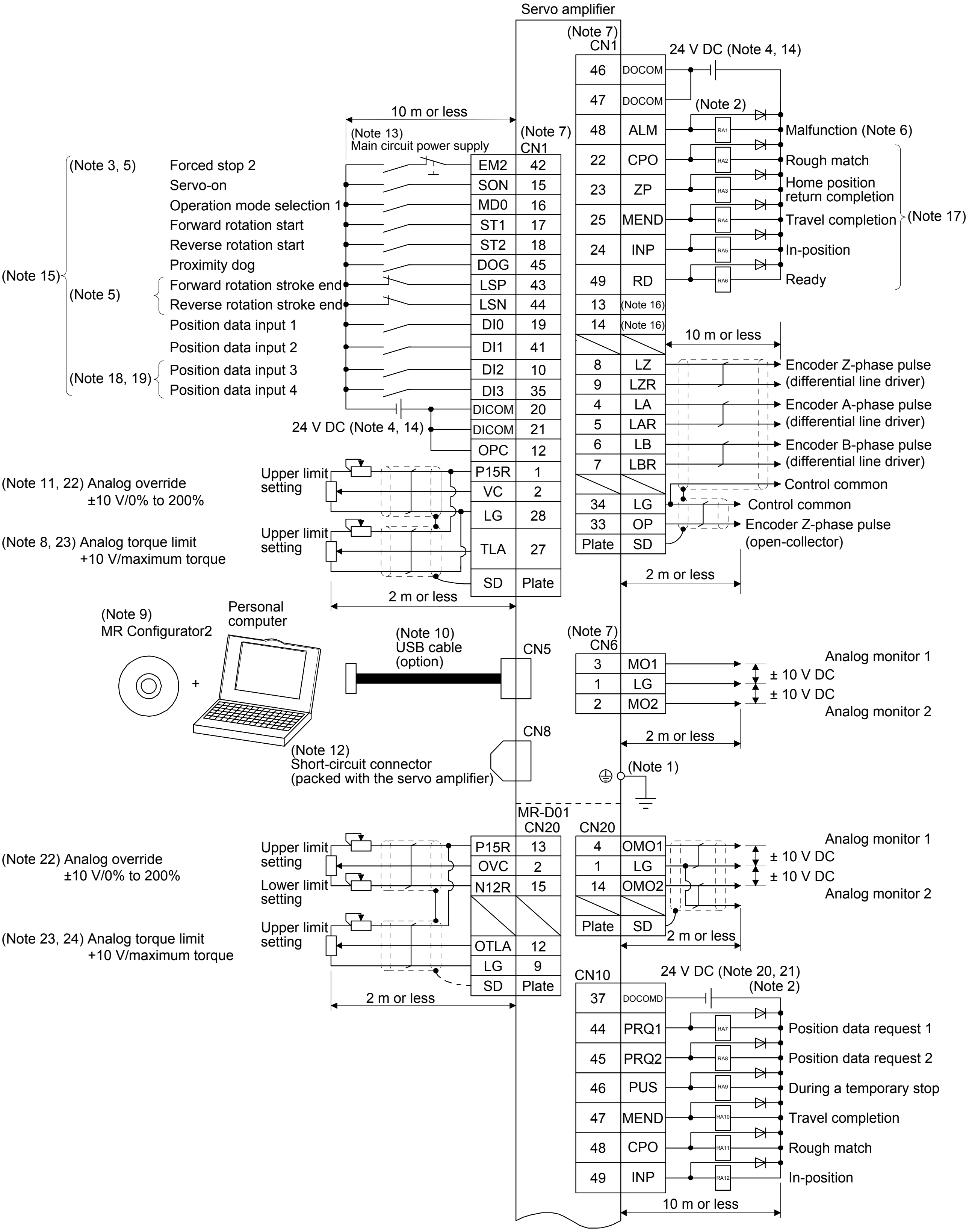

MR-D01
24 V DC (Note 20, 21)
CN10
CN10
24 V DC (Note 20, 21)
(Note 2)
DICOMD 13
DICOMD 14
37 DOCOMD
22 ACD0
23 ACD1
24 ACD2
25 ACD3
RA11
RA12
RA13
RA14
Alarm code
(Note 25)
Servo-on
Reset
External torque limit selection
Internal torque limit selection
Manual pulse generator multiplication 1
Manual pulse generator multiplication 2
Override selection
Operation mode selection 1
Temporary stop/restart
Proportional control
Forward rotation start
Reverse rotation start
Speed selection 1
Speed selection 2
Speed selection 3
SON 21
RES 26
TL 27
TL1 28
TP0 29
TP1 30
OVR 31
MD0 32
TSTP 33
PC 34
ST1 35
ST2 36
SPD1 18
SPD2 19
SPD3 20
10 m or less
20 m or less
MR-DS60
MR-DS60
CON2
CON1
MR-DSCBL_
CON2
CON1
MR-DSCBL_M-G
9A
9B
6A
6B
7A
7B
4A
4B
5A
5B
2A
2B
3A
3B
1A
1B
PRQ1 44
PRQ2 45
POS00 1
POS01 2
POS02 3
POS03 4
POS10 5
POS11 6
POS12 7
POS13 8
POS20 9
POS21 10
POS22 11
POS23 12
POSP 15
POSN 16
SD Plate
DCM1
DCM2
COM2
COM1
Digital switch select switch
Do not connect them when using a plurality of digital switches.
Up to 10 digital switches can be installed.

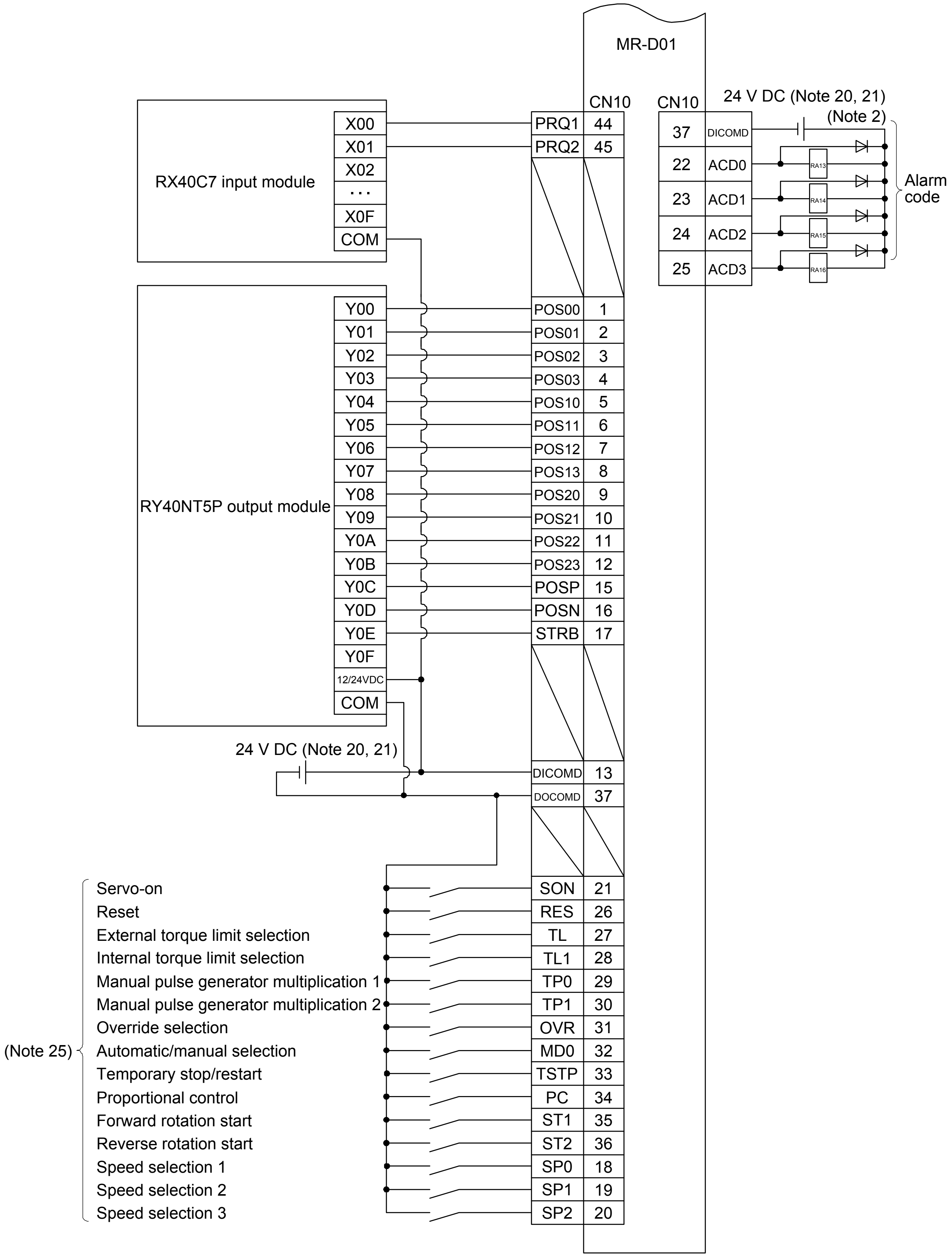
POINT

- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

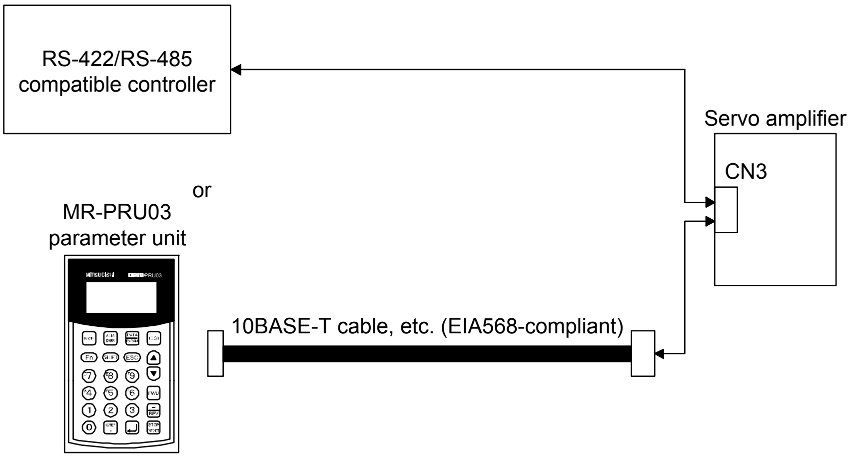
(b) When using programmable controllers

1) Sink I/O interface




MR-D01
CN10
CN10
24 V DC (Note 20, 21)
(Note 2)
Alarm code
RX40C7 input module
X00
X01
X02
X0F
COM
PRQ1 44
PRQ2 45
37 DICOMD
22 ACD0
23 ACD1
24 ACD2
25 ACD3
RA13
RA14
RA15
RA16
RY40NT5P output module
Y00 POS00 1
Y01 POS01 2
Y02 POS02 3
Y03 POS03 4
Y04 POS10 5
Y05 POS11 6
Y06 POS12 7
Y07 POS13 8
Y08 POS20 9
Y09 POS21 10
Y0A POS22 11
Y0B POS23 12
Y0C POSP 15
Y0D POSN 16
Y0E STRB 17
Y0F
12/24VDC
COM
24 V DC (Note 20, 21)
DICOMD 13
DOCOMD 37
(Note 25)
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Manual pulse generator multiplication 1 TP0 29
Manual pulse generator multiplication 2 TP1 30
Override selection OVR 31
Automatic/manual selection MD0 32
Temporary stop/restart TSTP 33
Proportional control PC 34
Forward rotation start ST1 35
Reverse rotation start ST2 36
Speed selection 1 SP0 18
Speed selection 2 SP1 19
Speed selection 3 SP2 20

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 500 mA or lower. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.

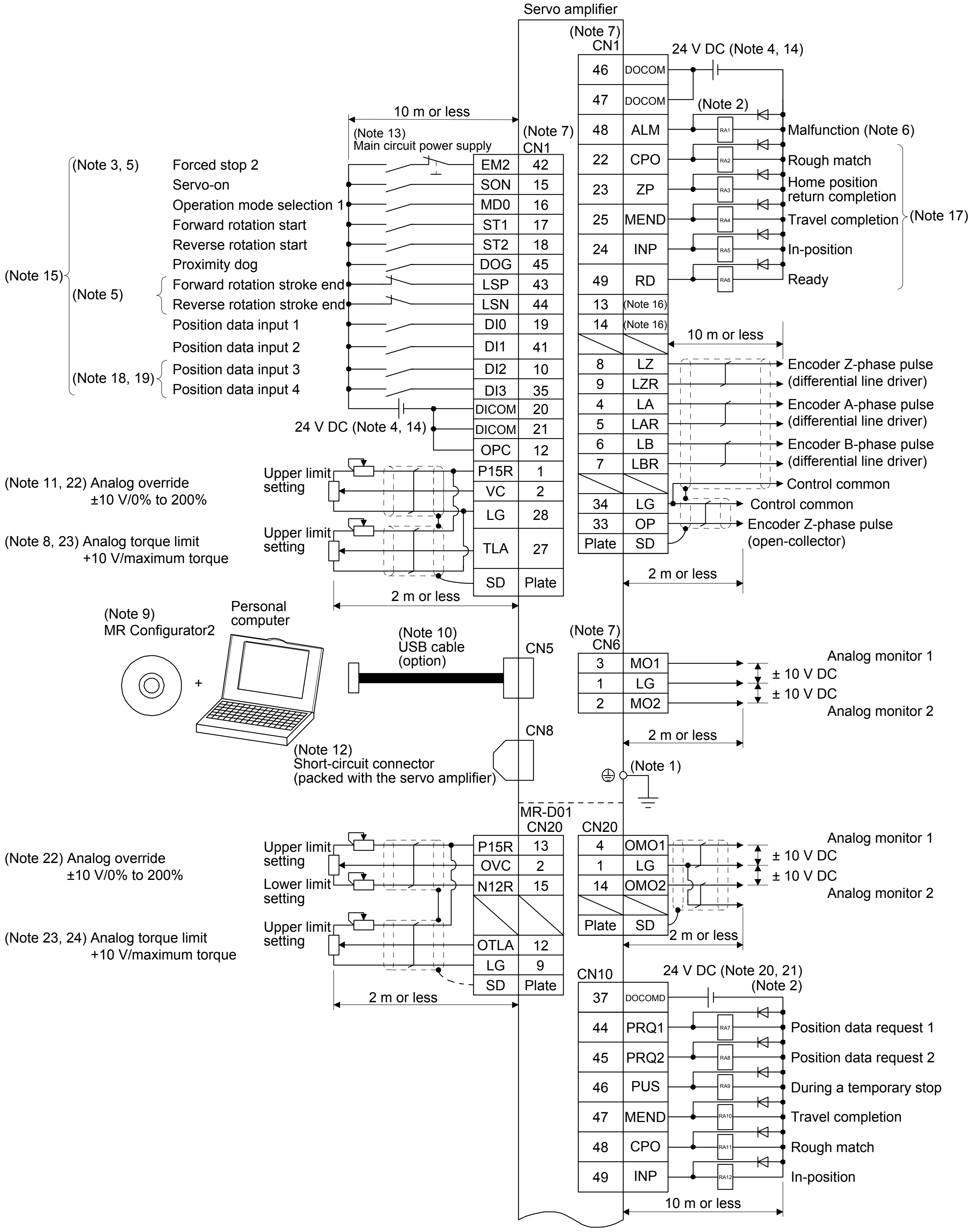


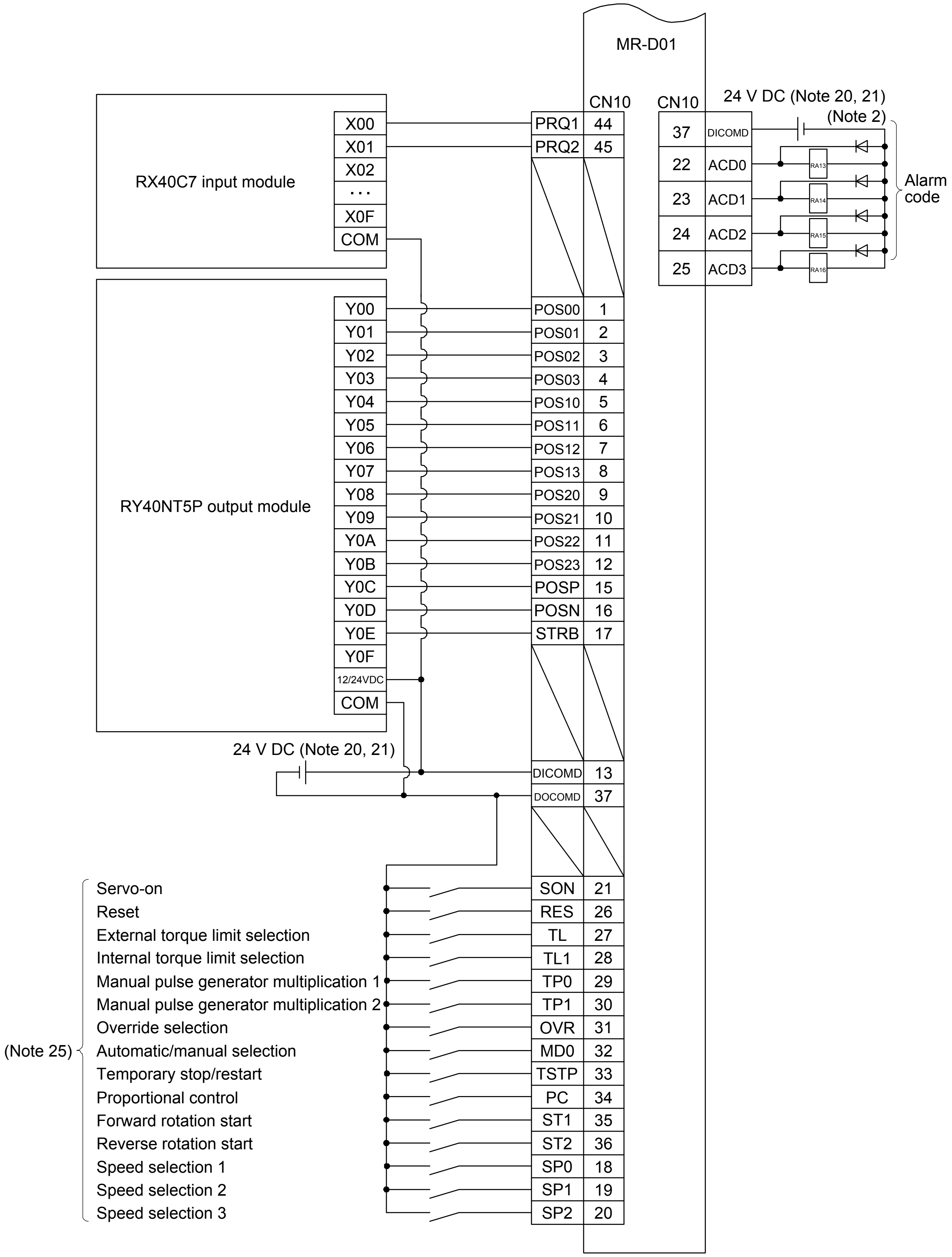
11. Use an external power supply when inputting a negative voltage.
12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
14. This diagram shows sink I/O interface.
15. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
16. Output devices are not assigned by default. Assign the output devices with [Pr. PD47] as necessary.
17. Recommended device assignments are shown. The devices can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
18. DI2 and DI3 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.
19. 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 (DI2 and DI3) are assigned with the initial values.
20. Supply 24 V DC ± 10% to interfaces of the MR-D01 from outside. The total current capacity of these power supplies must be 800 mA or lower. 800 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. For the current required for the interface, refer to section 3.8.2 (1) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
21. As the 24 V DC for the input/output signals, one 24 V DC power supply can be used to supply to the servo amplifier and MR-D01. In this case, select an appropriate power supply capacity depending on the number of points of the input/output signals to be used.
22. The CN1-2 pin and CN20-2 pin are exclusive. The CN1-2 pin is set by default. Select this item with [Pr. Po11].
23. The CN1-27 pin and CN20-12 pin are exclusive. The CN1-27 pin is set by default. Select this item with [Pr. Po11].
24. OTLA will be available when TL (External torque limit selection) is enabled with [Pr. Po02] to [Pr. Po07]. (Refer to section 11.5.3 (6).)
25. The devices can be changed by [Pr. Po02] to [Pr. Po07].

2) Source I/O interface

POINT

- ●For notes, refer to (2) (b) 1) of this section.



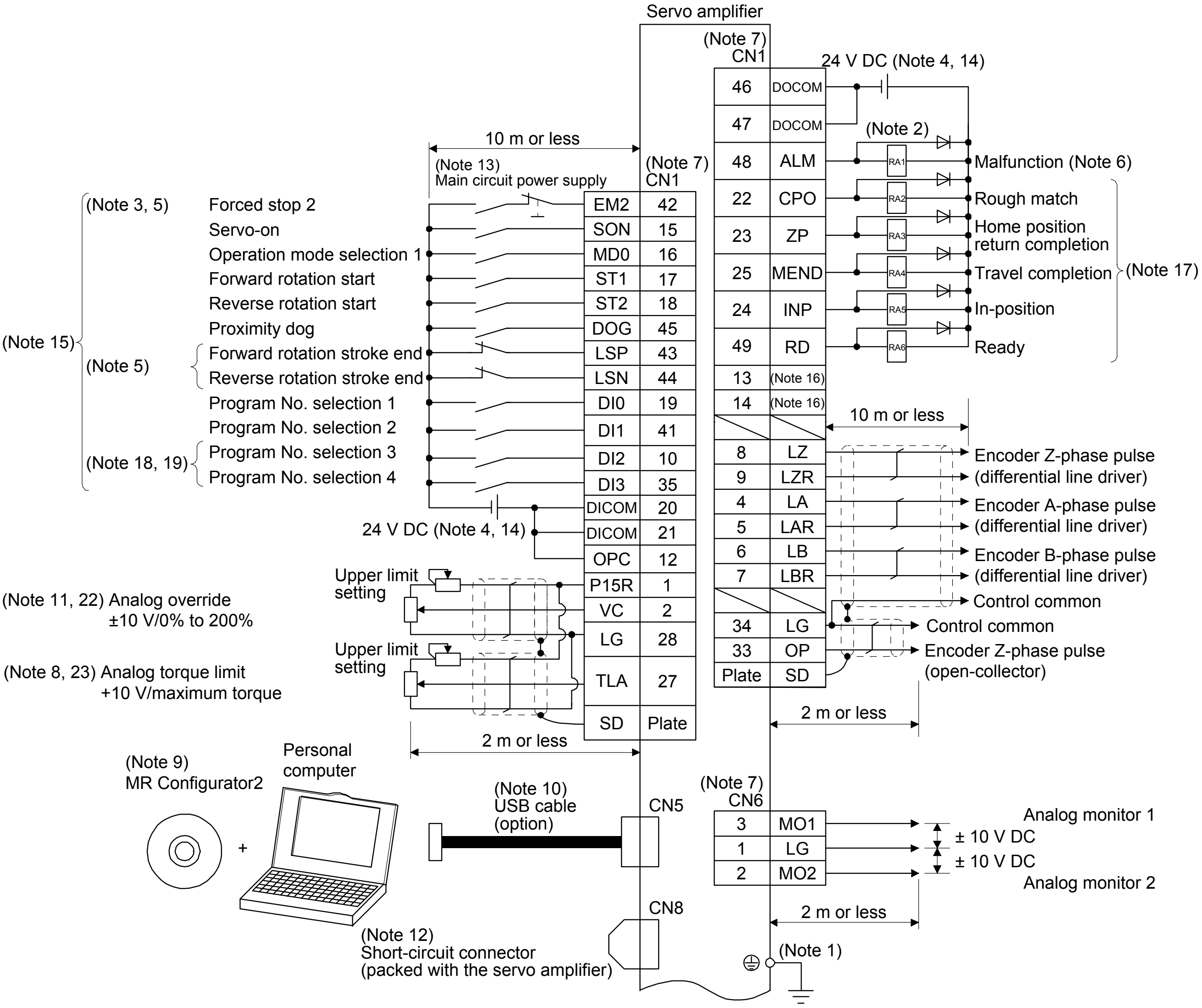

MR-D01
CN10
CN10
24 V DC (Note 20, 21)
(Note 2)
RX40C7 input module
X00
X01
X02
...
X0F
COM
PRQ1 44
PRQ2 45
37 DICOMD
22 ACD0
23 ACD1
24 ACD2
25 ACD3
RA13
RA14
RA15
RA16
Alarm code
RY40NT5P output module
Y00 POS00 1
Y01 POS01 2
Y02 POS02 3
Y03 POS03 4
Y04 POS10 5
Y05 POS11 6
Y06 POS12 7
Y07 POS13 8
Y08 POS20 9
Y09 POS21 10
Y0A POS22 11
Y0B POS23 12
Y0C POSP 15
Y0D POSN 16
Y0E STRB 17
Y0F
12/24VDC
COM
24 V DC (Note 20, 21)
DICOMD 13
DOCOMD 37
(Note 25)
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Manual pulse generator multiplication 1 TP0 29
Manual pulse generator multiplication 2 TP1 30
Override selection OVR 31
Automatic/manual selection MD0 32
Temporary stop/restart TSTP 33
Proportional control PC 34
Forward rotation start ST1 35
Reverse rotation start ST2 36
Speed selection 1 SP0 18
Speed selection 2 SP1 19
Speed selection 3 SP2 20

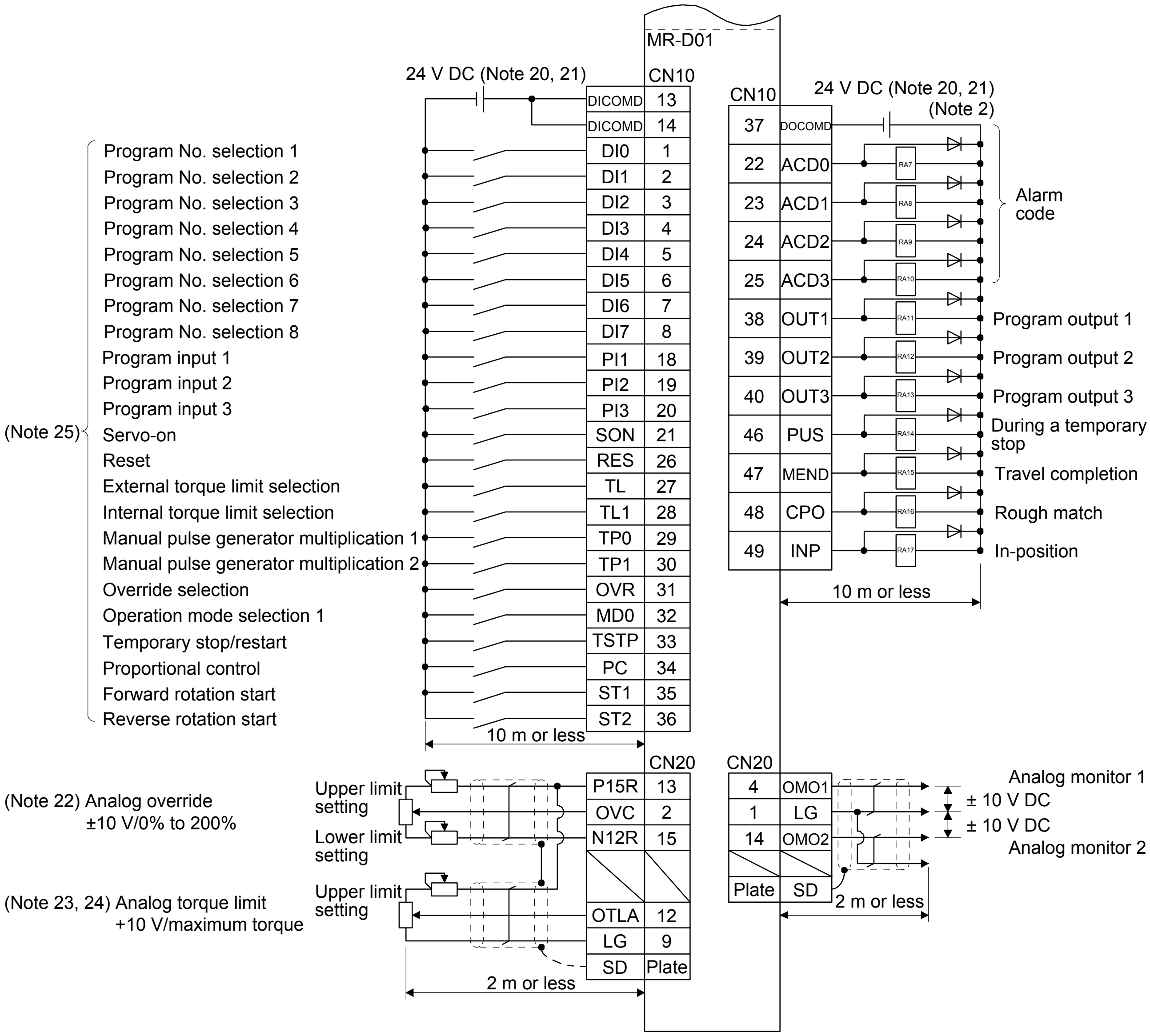
(3) Program method

POINT

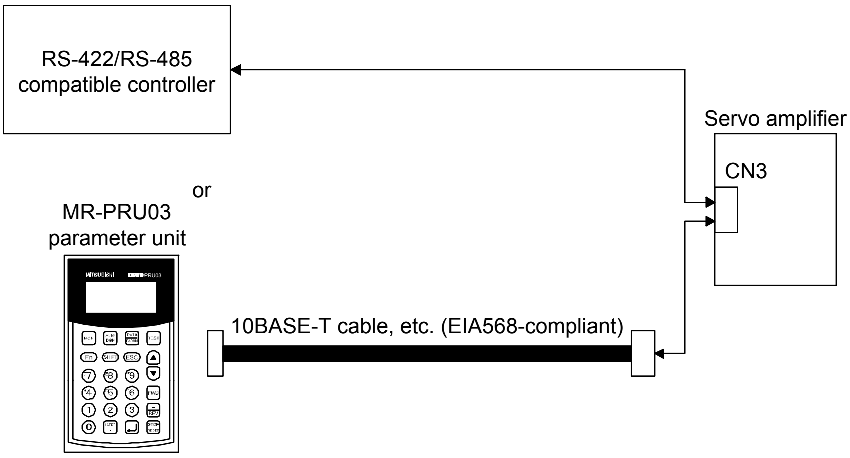
- Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

(a) Sink I/O interface




MR-D01
24 V DC (Note 20, 21)
CN10
DICOMD 13
DICOMD 14
(Note 25)
Program No. selection 1 DI0 1
Program No. selection 2 DI1 2
Program No. selection 3 DI2 3
Program No. selection 4 DI3 4
Program No. selection 5 DI4 5
Program No. selection 6 DI5 6
Program No. selection 7 DI6 7
Program No. selection 8 DI7 8
Program input 1 PI1 18
Program input 2 PI2 19
Program input 3 PI3 20
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Manual pulse generator multiplication 1 TP0 29
Manual pulse generator multiplication 2 TP1 30
Override selection OVR 31
Operation mode selection 1 MD0 32
Temporary stop/restart TSTP 33
Proportional control PC 34
Forward rotation start ST1 35
Reverse rotation start ST2 36
10 m or less
CN10
24 V DC (Note 20, 21)
(Note 2)
37 DOCOMD
22 ACD0 RA7
23 ACD1 RA8
24 ACD2 RA9
25 ACD3 RA10
Alarm code
38 OUT1 RA11 Program output 1
39 OUT2 RA12 Program output 2
40 OUT3 RA13 Program output 3
46 PUS RA14 During a temporary stop
47 MEND RA15 Travel completion
48 CPO RA16 Rough match
49 INP RA17 In-position
10 m or less
CN20
(Note 22) Analog override ±10 V/0% to 200%
Upper limit setting
Lower limit setting
P15R 13
OVC 2
N12R 15
(Note 23, 24) Analog torque limit +10 V/maximum torque
Upper limit setting
OTLA 12
LG 9
SD Plate
2 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
2 m or less
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2

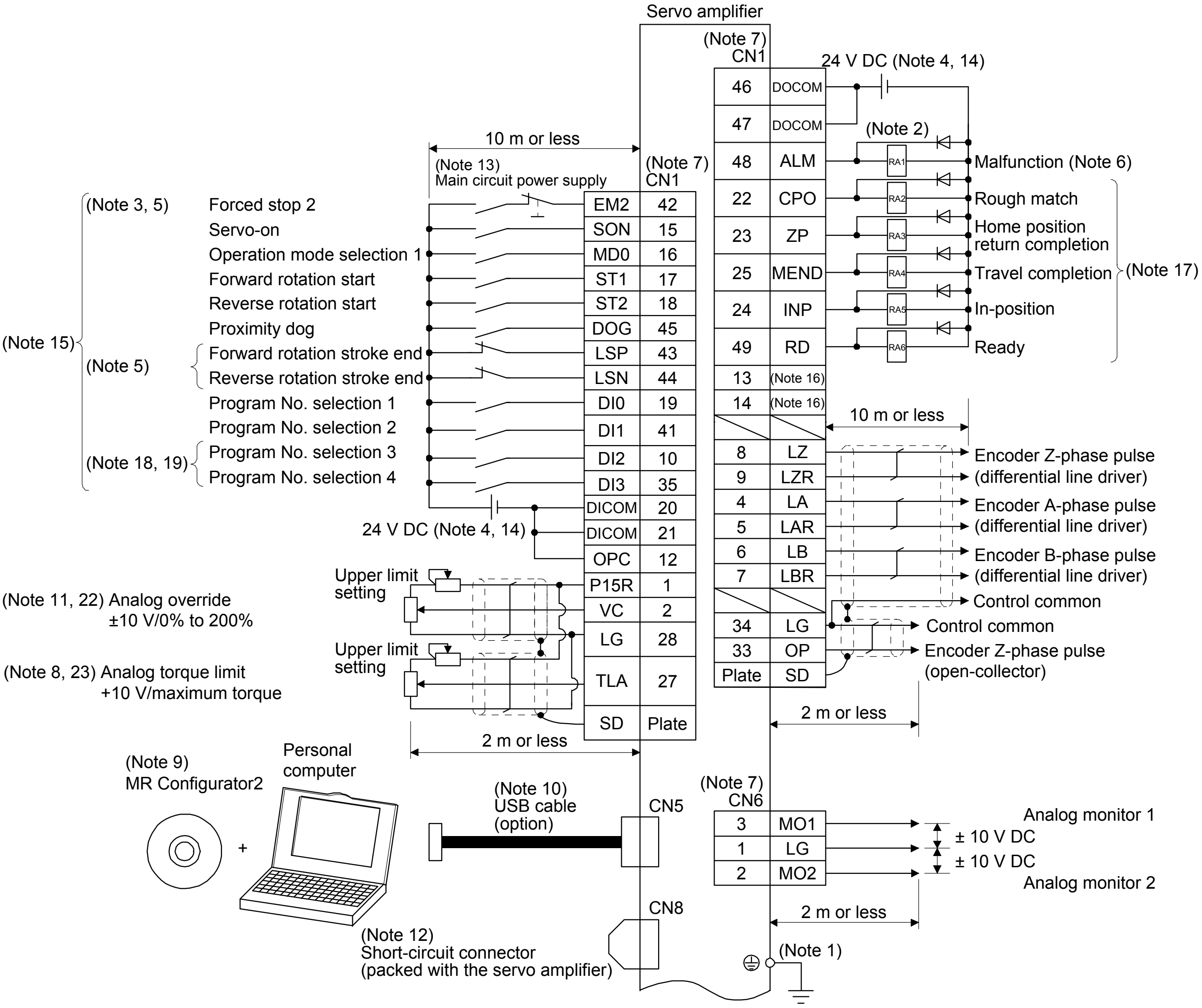
Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the cabinet.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output 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 500 mA or lower. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.

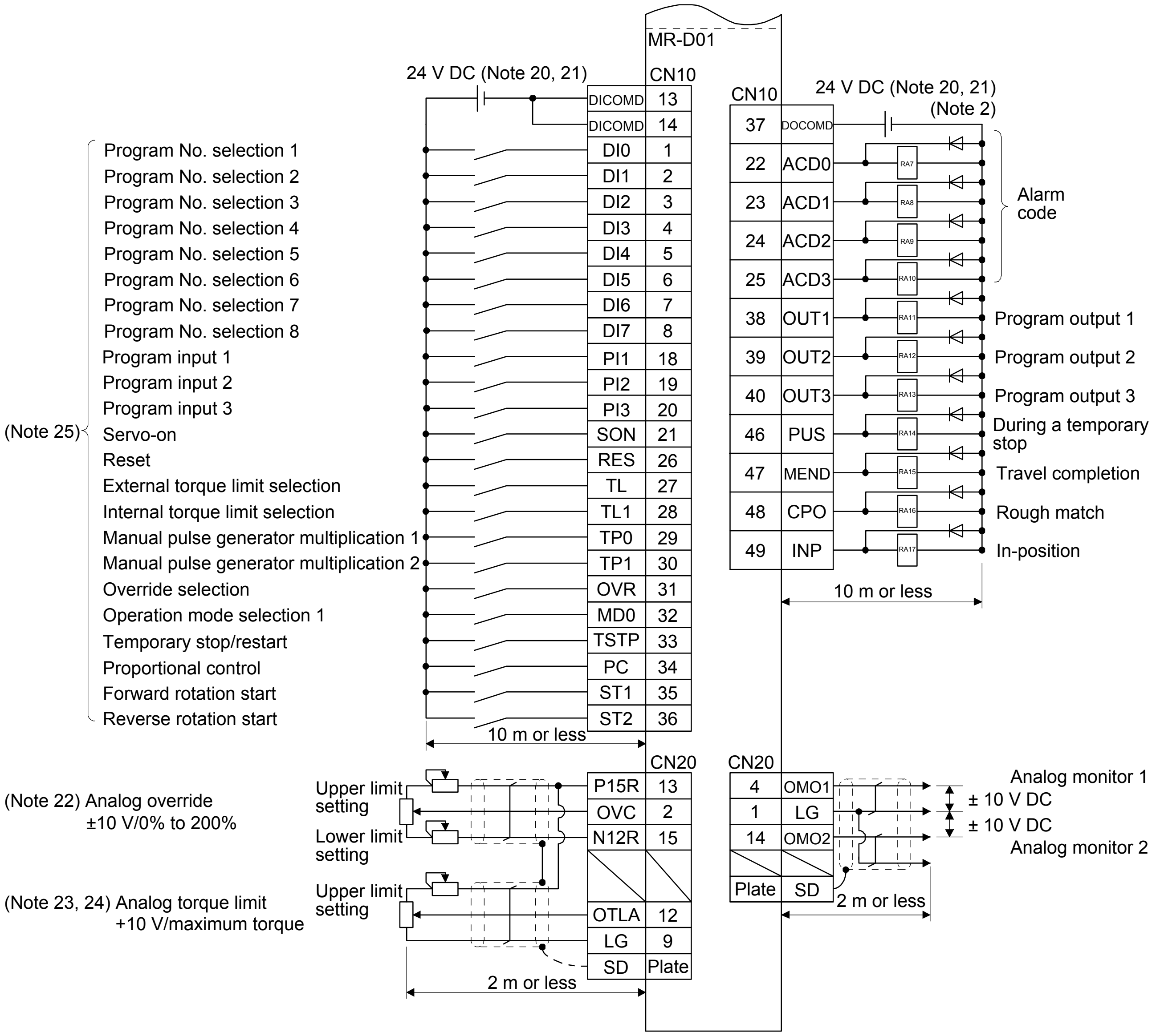


11. Use an external power supply when inputting a negative voltage.
12. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
13. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
14. This diagram shows sink I/O interface.
15. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
16. Output devices are not assigned by default. Assign the output devices with [Pr. PD47] as necessary.
17. Recommended device assignments are shown. The devices can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
18. DI2 and DI3 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.
19. 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 (DI2 and DI3) are assigned with the initial values.
20. Supply 24 V DC ± 10% to interfaces of the MR-D01 from outside. The total current capacity of these power supplies must be 800 mA or lower. 800 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. For the current required for the interface, refer to section 3.8.2 (1) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
21. As the 24 V DC for the input/output signals, one 24 V DC power supply can be used to supply to the servo amplifier and MR-D01. In this case, select an appropriate power supply capacity depending on the number of points of the input/output signals to be used.
22. The CN1-2 pin and CN20-2 pin are exclusive. The CN1-2 pin is set by default. Select this item with [Pr. Po11].
23. The CN1-27 pin and CN20-12 pin are exclusive. The CN1-27 pin is set by default. Select this item with [Pr. Po11].

(b) Source I/O interface

POINT
●For notes, refer to (3) (a) of this section.



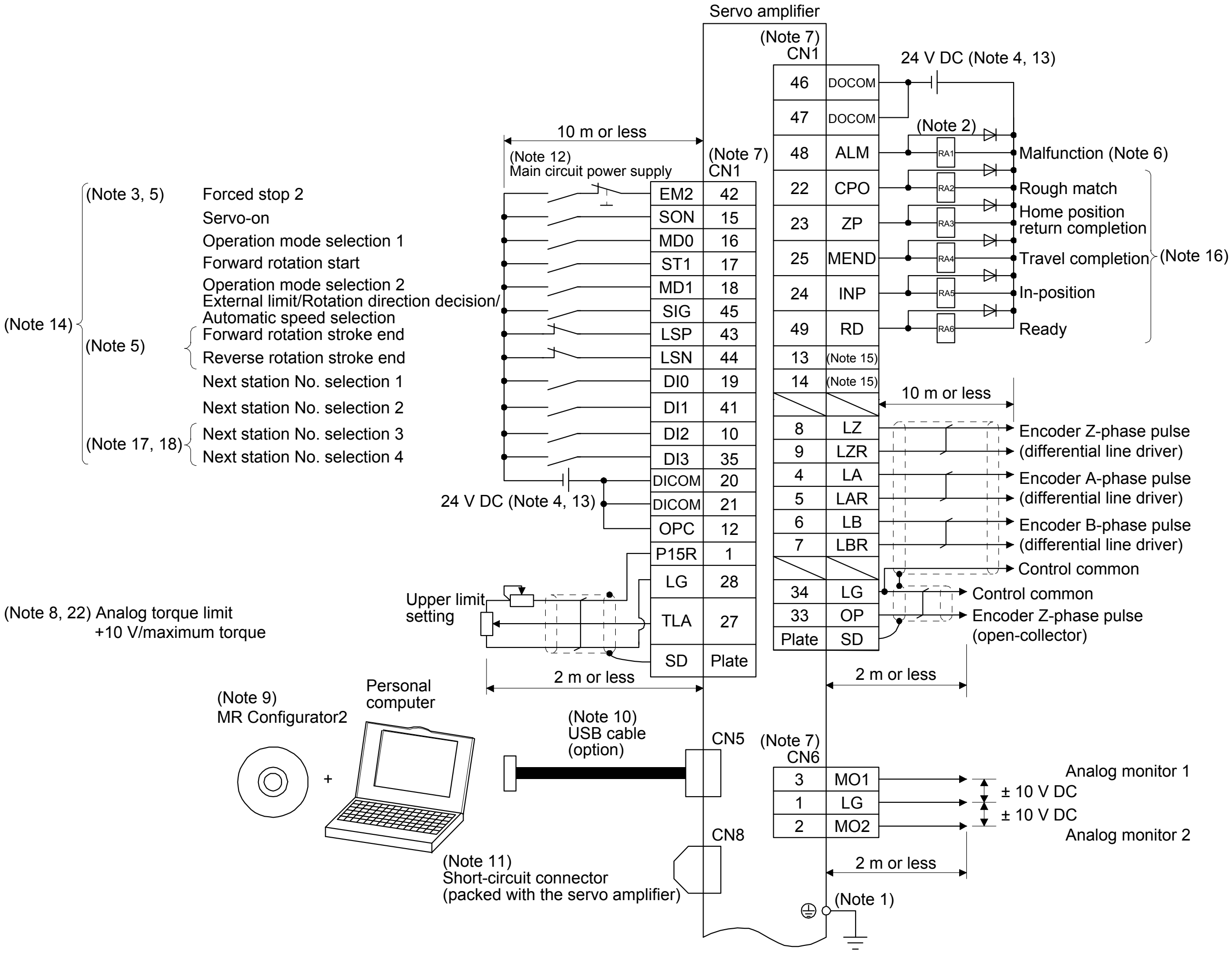

MR-D01
24 V DC (Note 20, 21)
CN10
DICOMD 13
DICOMD 14
(Note 25)
Program No. selection 1 DI0 1
Program No. selection 2 DI1 2
Program No. selection 3 DI2 3
Program No. selection 4 DI3 4
Program No. selection 5 DI4 5
Program No. selection 6 DI5 6
Program No. selection 7 DI6 7
Program No. selection 8 DI7 8
Program input 1 PI1 18
Program input 2 PI2 19
Program input 3 PI3 20
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Manual pulse generator multiplication 1 TP0 29
Manual pulse generator multiplication 2 TP1 30
Override selection OVR 31
Operation mode selection 1 MD0 32
Temporary stop/restart TSTP 33
Proportional control PC 34
Forward rotation start ST1 35
Reverse rotation start ST2 36
10 m or less
CN10
24 V DC (Note 20, 21)
(Note 2)
37 DOCOMD
22 ACD0 RA7
23 ACD1 RA8
24 ACD2 RA9
25 ACD3 RA10
Alarm code
38 OUT1 RA11 Program output 1
39 OUT2 RA12 Program output 2
40 OUT3 RA13 Program output 3
46 PUS RA14 During a temporary stop
47 MEND RA15 Travel completion
48 CPO RA16 Rough match
49 INP RA17 In-position
10 m or less
CN20
(Note 22) Analog override
±10 V/0% to 200%
Upper limit setting
Lower limit setting
P15R 13
OVC 2
N12R 15
(Note 23, 24) Analog torque limit
+10 V/maximum torque
Upper limit setting
OTLA 12
LG 9
SD Plate
2 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2
2 m or less

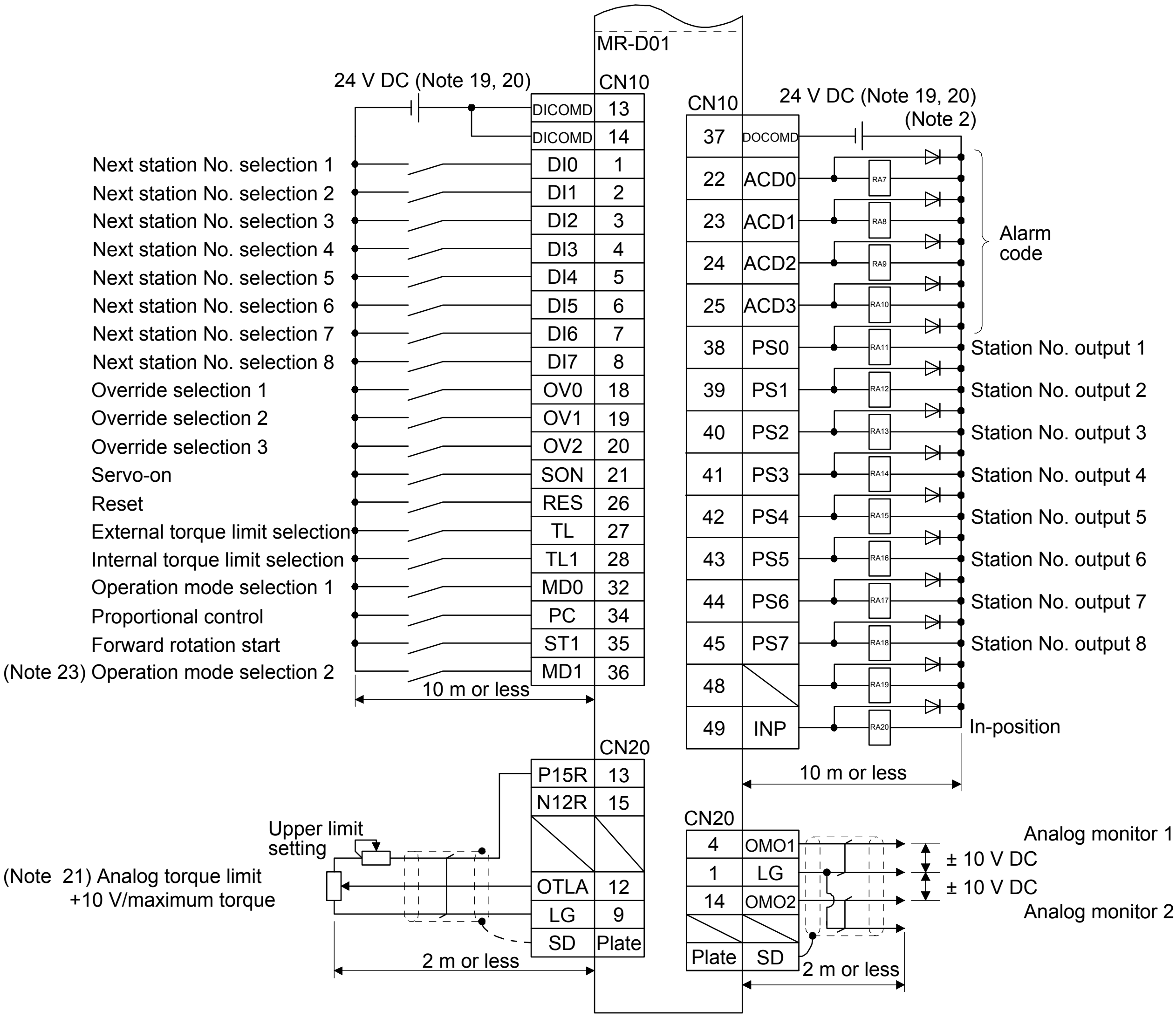
(4) Indexer method

POINT

- ●Use MD1 (Operation mode selection 2) in the indexer method. When using MD1 with the servo amplifier, assign MD1 (Operation mode selection 2) to the CN1-18 pin with [Pr. PD10]. When using MD1 with the MR-D01, assign MD1 (Operation mode selection 2) to the CN10-36 pin with [Pr. Po07].
- ●Assign the following output devices to CN1-22, CN1-23, and CN1-25 pins with [Pr. PD23], [Pr. PD24], and [Pr. PD26].
  CN1-22: CPO (Rough match)
  CN1-23: ZP (Home position return completion)
  CN1-25: MEND (Travel completion)

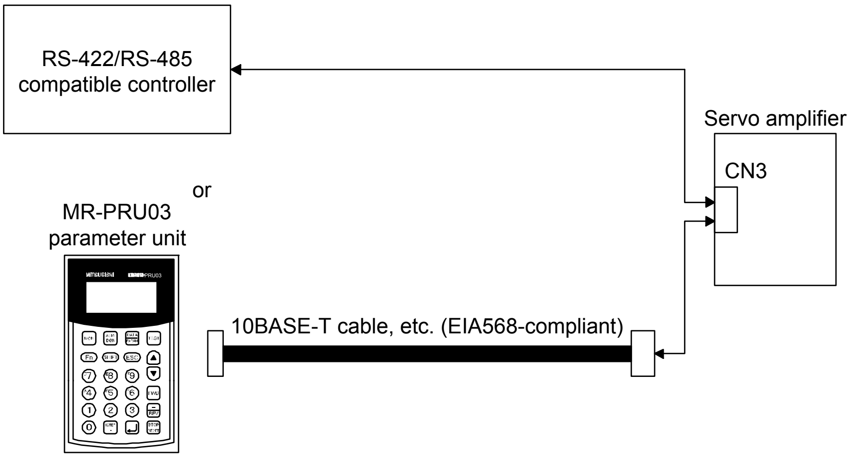
(a) Sink I/O interface




MR-D01
24 V DC (Note 19, 20)
CN10
DICOMD 13
DICOMD 14
Next station No. selection 1 DI0 1
Next station No. selection 2 DI1 2
Next station No. selection 3 DI2 3
Next station No. selection 4 DI3 4
Next station No. selection 5 DI4 5
Next station No. selection 6 DI5 6
Next station No. selection 7 DI6 7
Next station No. selection 8 DI7 8
Override selection 1 OV0 18
Override selection 2 OV1 19
Override selection 3 OV2 20
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Operation mode selection 1 MD0 32
Proportional control PC 34
Forward rotation start ST1 35
(Note 23) Operation mode selection 2 MD1 36
10 m or less
CN10
24 V DC (Note 19, 20)
(Note 2)
37 DOCOMD
22 ACD0 RA7
23 ACD1 RA8
24 ACD2 RA9
25 ACD3 RA10
Alarm code
38 PS0 RA11 Station No. output 1
39 PS1 RA12 Station No. output 2
40 PS2 RA13 Station No. output 3
41 PS3 RA14 Station No. output 4
42 PS4 RA15 Station No. output 5
43 PS5 RA16 Station No. output 6
44 PS6 RA17 Station No. output 7
45 PS7 RA18 Station No. output 8
48 RA19
49 INP RA20 In-position
10 m or less
CN20
P15R 13
N12R 15
Upper limit setting
(Note 21) Analog torque limit
+10 V/maximum torque
OTLA 12
LG 9
SD Plate
2 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2
2 m or less

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.

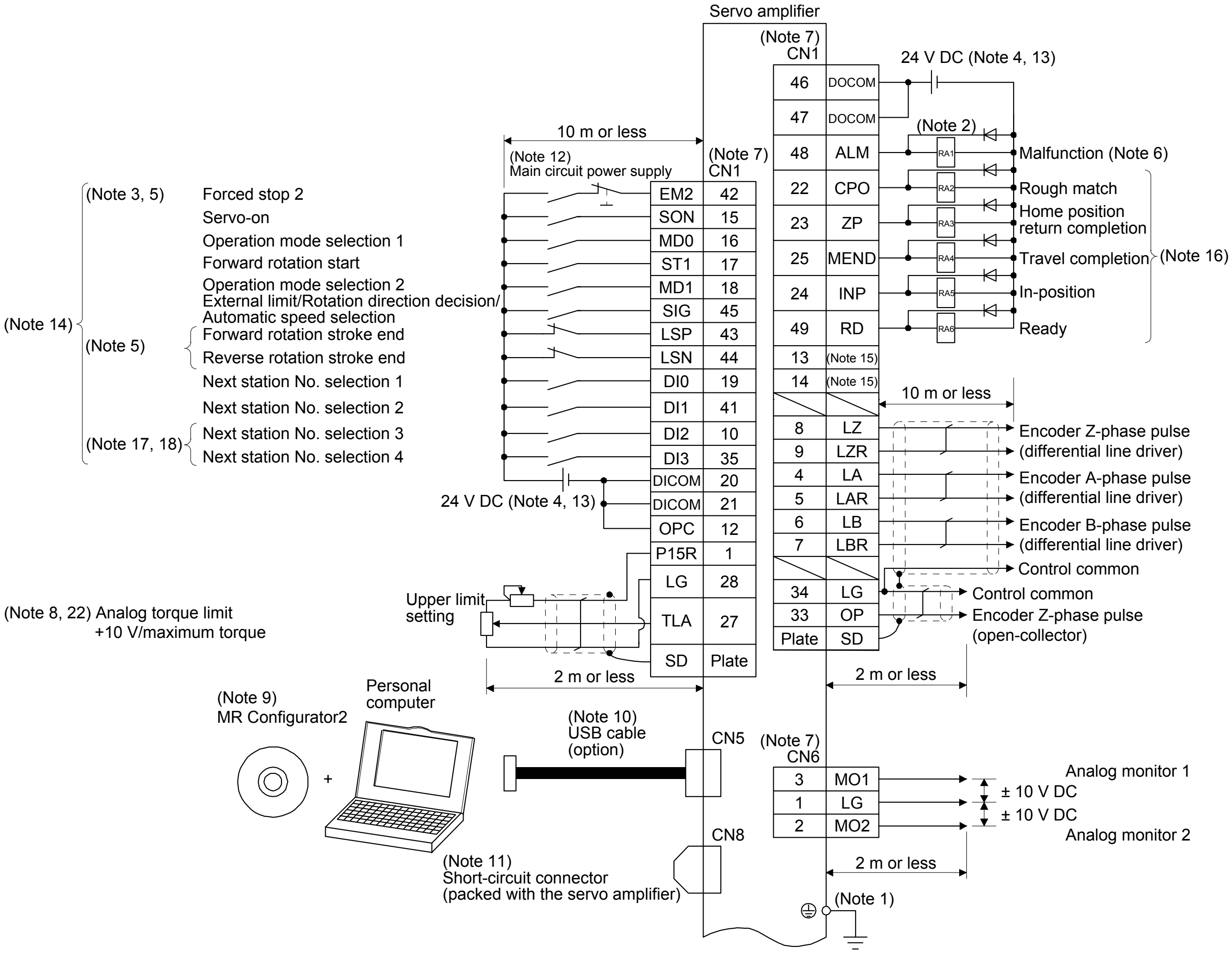
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will malfunction and will not output signals, disabling EM2 (Forced stop 2) and other protective circuits.
3. The forced stop switch (normally closed contact) must be installed.
4. Supply 24 V DC ± 10% to interfaces from outside. The total current capacity of these power supplies must be 500 mA or lower. 500 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-J4-_A_(-RJ) Servo Amplifier Instruction Manual" that gives the current value necessary for the interface. A 24 V DC power supply can be used for both input signal and output signal.
5. When starting operation, always turn on EM2 (Forced stop 2), LSP (Forward rotation stroke end) and LSN (Reverse rotation stroke end). (Normally closed contact)
6. ALM (Malfunction) turns on in normal alarm-free condition. (Normally closed contact)
7. The pins with the same signal name are connected in the servo amplifier.
8. TLA will be available when TL (External torque limit selection) is enabled with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46]. (Refer to section 3.6.1 (5) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".)
9. Use SW1DNC MRC2-_. (Refer to "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual" section 11.7.)
10. Controllers or parameter units can also be connected via the CN3 connector with the RS-422/RS-485 communication. Note that using the USB communication function (CN5 connector) prevents the RS-422/RS-485 communication function (CN3 connector) from being used, and vice versa. They cannot be used together.

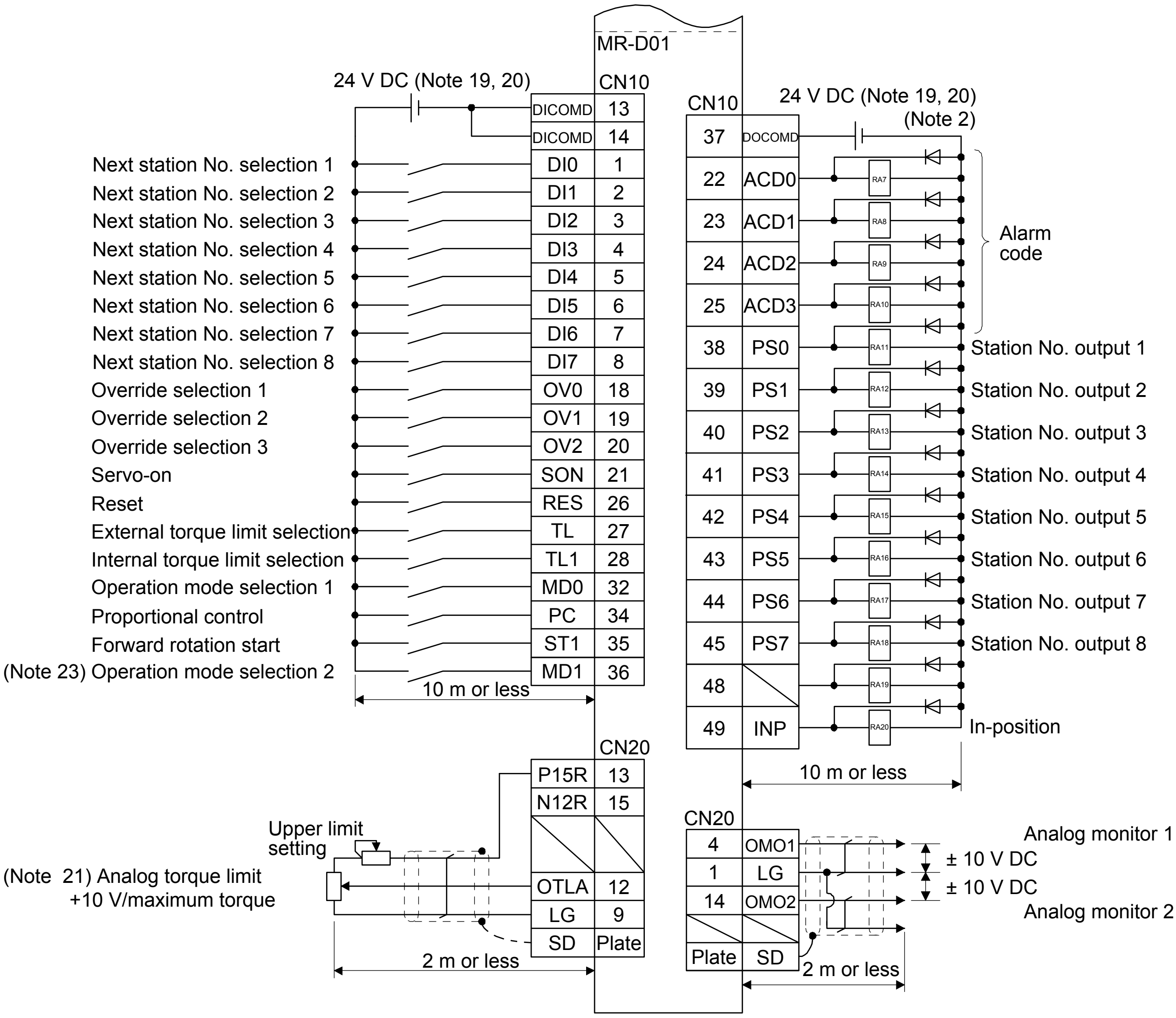


11. When not using the STO function, attach the short-circuit connector came with a servo amplifier.
12. Configure a circuit to turn off EM2 when the main circuit power is turned off to prevent an unexpected restart of the servo amplifier.
13. This diagram shows sink I/O interface.
14. The devices can be changed with [Pr. PD04], [Pr. PD06], [Pr. PD08], [Pr. PD10], [Pr. PD12], [Pr. PD14], [Pr. PD18], [Pr. PD20], [Pr. PD22], [Pr. PD44], and [Pr. PD46].
15. Output devices are not assigned by default. Assign the output devices with [Pr. PD47] as necessary.
16. Recommended device assignments are shown. The devices can be changed by [Pr. PD23] to [Pr. PD26], and [Pr. PD28].
17. DI2 and DI3 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.
18. 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 (DI2 and DI3) are assigned with the initial values.
19. Supply 24 V DC ± 10% to interfaces of the MR-D01 from outside. The total current capacity of these power supplies must be 800 mA or lower. 800 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. For the current required for the interface, refer to section 3.8.2 (1) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".
20. As the 24 V DC for the input/output signals, one 24 V DC power supply can be used to supply to the servo amplifier and MR-D01. In this case, select an appropriate power supply capacity depending on the number of points of the input/output signals to be used.
21. The CN1-27 pin and CN20-12 pin are exclusive. The CN1-27 pin is set by default. Select with [Pr. Po11].
22. When using Operation mode selection 2 (MD1) in the unit, change [Pr. PD10] to "2108" to assign Operation mode selection 2 (MD1) to the CN1-18 pin in advance.

(b) Source I/O interface

POINT
●For notes, refer to (4) (a) of this section.




MR-D01
24 V DC (Note 19, 20)
CN10
DICOMD 13
DICOMD 14
Next station No. selection 1 DI0 1
Next station No. selection 2 DI1 2
Next station No. selection 3 DI2 3
Next station No. selection 4 DI3 4
Next station No. selection 5 DI4 5
Next station No. selection 6 DI5 6
Next station No. selection 7 DI6 7
Next station No. selection 8 DI7 8
Override selection 1 OV0 18
Override selection 2 OV1 19
Override selection 3 OV2 20
Servo-on SON 21
Reset RES 26
External torque limit selection TL 27
Internal torque limit selection TL1 28
Operation mode selection 1 MD0 32
Proportional control PC 34
Forward rotation start ST1 35
(Note 23) Operation mode selection 2 MD1 36
10 m or less
CN10
24 V DC (Note 19, 20)
(Note 2)
37 DOCOMD
22 ACD0 RA7
23 ACD1 RA8
24 ACD2 RA9
25 ACD3 RA10
Alarm code
38 PS0 RA11 Station No. output 1
39 PS1 RA12 Station No. output 2
40 PS2 RA13 Station No. output 3
41 PS3 RA14 Station No. output 4
42 PS4 RA15 Station No. output 5
43 PS5 RA16 Station No. output 6
44 PS6 RA17 Station No. output 7
45 PS7 RA18 Station No. output 8
48 RA19
49 INP RA20 In-position
10 m or less
CN20
P15R 13
N12R 15
Upper limit setting
(Note 21) Analog torque limit +10 V/maximum torque
OTLA 12
LG 9
SD Plate
2 m or less
CN20
4 OMO1
1 LG
14 OMO2
Plate SD
Analog monitor 1
± 10 V DC
± 10 V DC
Analog monitor 2
2 m or less

11.5.2 Connectors and pin assignment

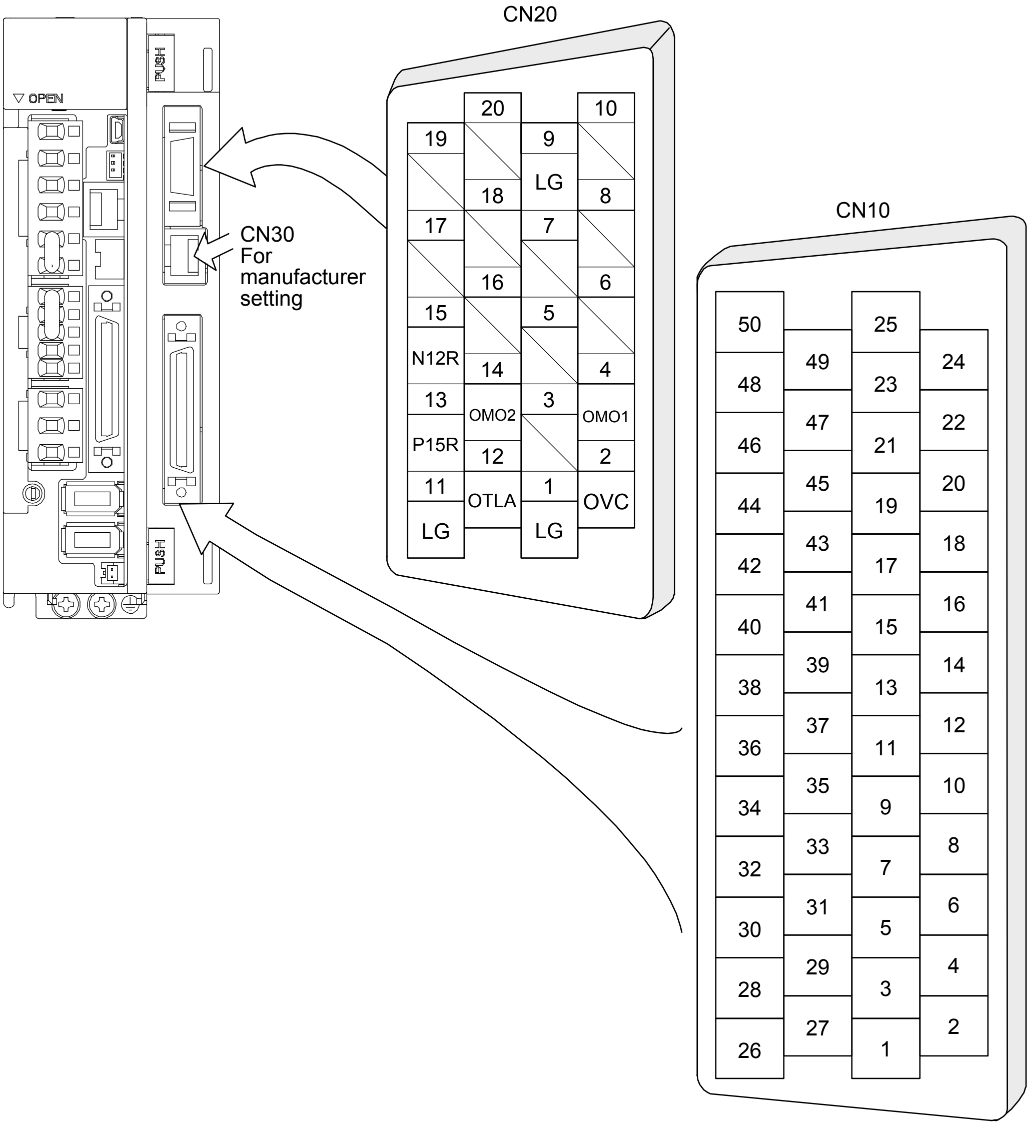
POINT

- ●The pin assignment of the connectors is as viewed from the cable connector wiring section.
- ●The CN30 connector is for manufacturer setting. This connector is attached on the MR-D01 servo amplifier, but not for use.
- ●For the pin assignment of the CN10 connector, refer to (2) in this section.

For details of each signal (device), refer to section 11.5.3.

(1) Pin assignment

The following is the front view of MR-J4-10A-RJ or MR-D01.



For the pin assignment, refer to (3) of this section.

(2) Pin assignment of the CN10 connector

Pin No.	(Note 1) I/O	(Note 2) I/O signals in control modes				Related parameter
		CP	BCD	CL	PS	
1	I	DI0	POS00	DI0	DI0	
2	I	DI1	POS01	DI1	DI1	
3	I	DI2	POS02	DI2	DI2	
4	I	DI3	POS03	DI3	DI3	
5	I	DI4	POS10	DI4	DI4	
6	I	DI5	POS11	DI5	DI5	
7	I	DI6	POS12	DI6	DI6	
8	I	DI7	POS13	DI7	DI7	
9	I		POS20			
10	I		POS21			
11	I		POS22			
12	I		POS23			
13		DICOMD	DICOMD	DICOMD	DICOMD	
14		DICOMD	DICOMD	DICOMD	DICOMD	
15	I		POSP			
16	I		POSN			
17	I		STRB			
18	I		SPD1			Pr. Po27
19	I		SPD2			Pr. Po27
20	I		SPD3			Pr. Po28
21	I	SON	SON	SON	SON	Pr. Po02
22	O	ACD0	ACD0	ACD0	ACD0	
23	O	ACD1	ACD1	ACD1	ACD1	
24	O	ACD2	ACD2	ACD2	ACD2	
25	O	ACD3	ACD3	ACD3	ACD3	
26	I	RES	RES	RES	RES	Pr. Po02
27	I	TL	TL	TL	TL	Pr. Po03
28	I	TL1	TL1	TL1	TL1	Pr. Po03
29	I	TP0	TP0	TP0		Pr. Po04
30	I	TP1	TP1	TP1		Pr. Po04
31	I	OVR	OVR	OVR		Pr. Po05
32	I	MD0	MD0	MD0	MD0	Pr. Po05
33	I	TSTP	TSTP	TSTP		Pr. Po06
34	I	PC	PC	PC	PC	Pr. Po06
35	I	ST1	ST1	ST1	ST1	Pr. Po07
36	I	ST2	ST2	ST2	MD1	Pr. Po07
37		DOCOMD	DOCOMD	DOCOMD	DOCOMD	
38	O	MCD00		OUT1	PS0	
39	O	MCD01		OUT2	PS1	
40	O	MCD02		OUT3	PS2	
41	O	MCD03			PS3	
42	O	MCD10			PS4	
43	O	MCD11			PS5	
44	O	MCD12	PRQ1		PS6	
45	O	MCD13	PRQ2		PS7	
46	O	PUS	PUS	PUS		Pr. Po08
47	O	MEND	MEND	MEND	MEND	Pr. Po08
48	O	CPO	CPO	CPO	CPO	Pr. Po09
49	O	INP	INP	INP	INP	Pr. Po09
50		SD	SD	SD	SD	

Note 1. I: Input signal, O: Output signal

2. CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)

11.5.3 Signal (device) explanations

This section describes the signals (devices) of the MR-D01 extension I/O unit.
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 the I/O division column in the table), refer to section 2.5. The symbols in the control mode field of the table shows the followings.
CP: Positioning mode (point table method)
BCD: Positioning mode (point table method in the BCD input positioning operation)
CL: Positioning mode (program method)
PS: Positioning mode (indexer method)
"○" and "△" of the table shows the followings.
○: Usable device by default.
△: Usable device by setting the following parameters.
[Pr. Po02] to [Pr. Po09], [Pr. Po27], and [Pr. Po28]

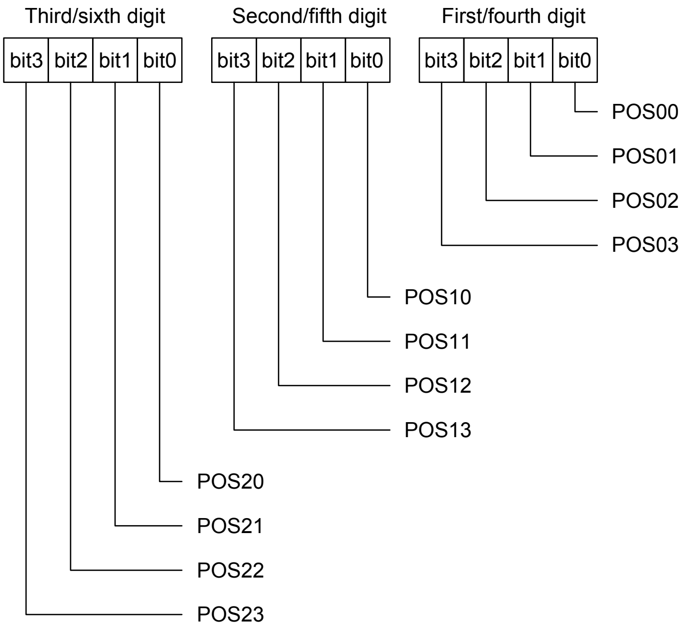
(1) I/O device

(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="4">Control mode</th></tr>
<tr><th>CP</th><th>BCD</th><th>CL</th><th>PS</th></tr>
<tr><td>Servo-on</td><td>SON</td><td>CN10-21</td><td rowspan="6">Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (a).</td><td>DI-1</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Reset</td><td>RES</td><td>CN10-26</td><td>DI-1</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Forward rotation stroke end</td><td>LSP</td><td></td><td rowspan="2">DI-1</td><td rowspan="2">△</td><td rowspan="2">△</td><td rowspan="2">△</td><td rowspan="2">△</td></tr>
<tr><td>Reverse rotation stroke end</td><td>LSN</td><td></td></tr>
<tr><td>External torque limit selection</td><td>TL</td><td>CN10-27</td><td>DI-1</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td>Internal torque limit selection</td><td>TL1</td><td>CN10-28</td><td>DI-1</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td rowspan="2">Operation mode selection 1</td><td rowspan="2">MD0</td><td rowspan="2">CN10-32</td><td>Automatic operation mode is set by turning MD0 on, and manual operation mode by turning it off. Changing an operation mode during operation will clear the command remaining distance and the motor will decelerate to stop.</td><td rowspan="2">DI-1</td><td>○</td><td>○</td><td>○</td><td></td></tr>
<tr><td>Select an operation mode with combinations of MD0 and MD1. Refer to the following table for combinations.
Changing an operation mode during operation will clear the command remaining distance and the motor will decelerate to stop.
<table>
<tr><th colspan="2">Device (Note 1)</th><th rowspan="2">Operation mode</th></tr>
<tr><th>MD1</th><th>MD0</th></tr>
<tr><td>0</td><td>0</td><td>Home position return mode</td></tr>
<tr><td>0</td><td>1</td><td>Manual operation mode</td></tr>
<tr><td>1</td><td>0</td><td>Automatic operation mode 1 (rotation direction specifying)</td></tr>
<tr><td>1</td><td>1</td><td>Automatic operation mode 2 (shortest rotating)</td></tr>
</table>
The following table shows the actions of when the operation mode is changed during operation.
<table>
<tr><th colspan="2">Operation mode</th><th>Operation mode change</th></tr>
<tr><td colspan="2">Home position return mode</td><td>Disabled (Note 2)</td></tr>
<tr><td rowspan="2">Manual operation mode</td><td>Station JOG operation</td><td>Disabled (Note 2)</td></tr>
<tr><td>JOG operation</td><td>Deceleration to a stop</td></tr>
<tr><td colspan="2">Automatic operation mode 1 (rotation direction specifying)</td><td>Disabled (Note 2)</td></tr>
<tr><td colspan="2">Automatic operation mode 2 (shortest rotating)</td><td>Disabled (Note 2)</td></tr>
</table>
Note 1. 0: Off
1: On
2. After the completion of the operation, the operation mode change will be accepted.</td><td></td><td></td><td></td><td>○</td></tr>
</table>

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Operation mode selection 2	MD1		Select an operation mode with combinations of MD0 and MD1. For the combinations, refer to the table of Operation mode 1.	DI-1				△
Forward rotation start	ST1	CN10-35	Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (a).	DI-1	○	○	○	○
Reverse rotation start	ST2	CN10-36		DI-1	○	○	○	
Temporary stop/restart	TSTP	CN10-33		DI-1	○	○	○	
Proximity dog	DOG			DI-1	△	△	△	
External limit/Rotation direction decision/Automatic speed selection	SIG			DI-1				△
Manual pulse generator multiplication 1	TP0	CN10-29		DI-1	○	○	○	
Manual pulse generator multiplication 2	TP1	CN10-30		DI-1	○	○	○	
Analog override selection	OVR	CN10-31		DI-1	○	○	○	
Teach	TCH			DI-1	△			
Program input 1	PI1			DI-1			△	
Program input 2	PI2			DI-1			△	
Program input 3	PI3			DI-1			△	
Current position latch input	LPS			DI-1			△	
Point table No. 1/Program No. selection 1/Next station No. selection 1	DI0	CN10-1		DI-1	○		○	○
Point table No. 2/Program No. selection 2/Next station No. selection 2	DI1	CN10-2		DI-1	○		○	○
Point table No. 3/Program No. selection 3/Next station No. selection 3	DI2	CN10-3		DI-1	○		○	○
Point table No. 4/Program No. selection 4/Next station No. selection 4	DI3	CN10-4		DI-1	○		○	○
Point table No. 5/Program No. selection 5/Next station No. selection 5	DI4	CN10-5		DI-1	○		○	○
Point table No. 6/Program No. selection 6/Next station No. selection 6	DI5	CN10-6		DI-1	○		○	○

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Point table No. 7/Program No. selection 7/Next station No. selection 7	DI6	CN10-7	Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (a).	DI-1	○		○	○
Point table No. 8/Program No. selection 8/Next station No. selection 8	DI7	CN10-8		DI-1	○		○	○

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Position data input 1 (1st/4th digit, bit 0)	POS00	CN10-1	This device can be used when an MR-D01 has been connected. To use these signals, set [Pr. Po10] to "_ _ _2". Input the 6-digit (3-digit BCD × 2) position data with POS00 to POS03, POS10 to POS13, and POS20 to POS23. The code represents one digit of decimal using four digits of binary. The following shows correspondence of each digit and device. 	DI-1		○		
Position data input 2 (1st/4th digit, bit 1)	POS01	CN10-2		DI-1		○		
Position data input 3 (1st/4th digit, bit 2)	POS02	CN10-3		DI-1		○		
Position data input 4 (1st/4th digit, bit 3)	POS03	CN10-4		DI-1		○		
Position data input 5 (2nd/5th digit, bit 0)	POS10	CN10-5		DI-1		○		
Position data input 6 (2nd/5th digit, bit 1)	POS11	CN10-6		DI-1		○		
Position data input 7 (2nd/5th digit, bit 2)	POS12	CN10-7		DI-1		○		
Position data input 8 (2nd/5th digit, bit 3)	POS13	CN10-8		DI-1		○		
Position data input 9 (3rd/6th digit, bit 0)	POS20	CN10-9		DI-1		○		
Position data input 10 (3rd/6th digit, bit 1)	POS21	CN10-10		DI-1		○		
Position data input 11 (3rd/6th digit, bit 2)	POS22	CN10-11		DI-1		○		
Position data input 12 (3rd/6th digit, bit 3)	POS23	CN10-12		DI-1		○		

Device (Note 1)				Setting (decimal)
POS03 POS13 POS23	POS02 POS12 POS22	POS01 POS11 POS21	POS00 POS10 POS20	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	Setting inhibited (Note 2)
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	

Note 1. 0: Off
1: On
2. If these devices are set, [AL. A9A.2 Optional unit input data error warning] occurs.

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode BCD	Control mode CL	Control mode PS
Position data input sign +	POSP	CN10-15	Input + signs of 3-digit BCD × 2 inputs. If + and - signs are set at the same time or different signs are set to the 1st to 3rd digits and 4th digit to 6th digit, [AL. 9A.2 Optional unit input data error warning] occurs.	DI-1		○		
Position data input sign -	POSN	CN10-16	Input - signs of 3-digit BCD × 2 inputs. If + and - signs are set at the same time or different signs are set to the 1st to 3rd digits and 4th digit to 6th digit, [AL. 9A.2 Optional unit input data error warning] occurs.	DI-1		○		
Strobe input	STRB	CN10-17	This strobe signal is used when 3-digit BCD × 2 is input from a programmable controller.	DI-1		○		
Speed selection 1	SPD1	CN10-18	This device can be used when an MR-D01 has been connected. To use these signals, set [Pr. Po10] to "_ _ _2". Select point tables and home position return mode with SPD1 to SPD4. The values of the rotation speed, acceleration/deceleration time constants, and deceleration time constant of the selected point table become speed commands in a positioning operation by 3-digit BCD × 2 inputs.	DI-1		○		
Speed selection 2	SPD2	CN10-19		DI-1		○		
Speed selection 3	SPD3	CN10-20		DI-1		○		
Speed selection 4	SPD4			DI-1		△		

Device (Note)				Selection contents
SPD4	SPD3	SPD2	SPD1	
0	0	0	0	Home position return mode
0	0	0	1	Point table No. 1
0	0	1	0	Point table No. 2
. . .	. . .	. . .	. . .	. . .
1	1	1	0	Point table No. 14
1	1	1	1	Point table No. 15

Note. 0: Off
1: On

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode CP	Control mode BCD	Control mode CL	Control mode PS
Second acceleration/deceleration selection	RT		Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (a).	DI-1				△
Second acceleration/deceleration gain selection	RTCDP			DI-1				△
Digital override selection 1	OV0			DI-1				△
Digital override selection 2	OV1							△
Digital override selection 3	OV2							△
Digital override selection 4	OV3							△
Mark detection	MSD			DI-1	△	△	△	
Proportional control	PC	CN10-34		DI-1	○	○	○	○
Clear	CR			DI-1	△	△	△	△
Gain switching	CDP			DI-1	△	△	△	△
Fully closed loop selection	CLD		Not used with the positioning mode.	DI-1				
Motor-side/load-side deviation counter clear	MECR		Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (a).	DI-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="4">Control mode</th></tr>
<tr><th>CP</th><th>BCD</th><th>CL</th><th>PS</th></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><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><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><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><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".
<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><td>△</td><td></td></tr>
<tr><td>Cam No. selection 1</td><td>CI1</td><td></td><td>△</td><td>△</td><td>△</td><td></td></tr>
<tr><td>Cam No. selection 2</td><td>CI2</td><td></td><td>△</td><td>△</td><td>△</td><td></td></tr>
<tr><td>Cam No. selection 3</td><td>CI3</td><td></td><td>△</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	BCD	CL	PS
Malfunction	ALM		Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (b).	DO-1	△	△	△	△
Alarm/warning	ALM WNG			DO-1	△	△	△	△
Warning	WNG			DO-1	△	△	△	△
Battery warning	BWNG			DO-1	△	△	△	△
AL9F Warning	BW9F			DO-1	△	△	△	△
Dynamic brake interlock	DB			DO-1	△	△	△	△
Ready	RD			DO-1	△	△	△	△
In-position	INP			DO-1	△	△	△	△
Limiting torque	TLC			DO-1	△	△	△	△
Zero speed detection	ZSP			DO-1	△	△	△	△
Electromagnetic brake interlock	MBR			DO-1	△	△	△	△
Speed command reached	SA			DO-1	△	△	△	
Home position return completion	ZP			DO-1	△	△	△	△
Rough match	CPO	CN10-48		DO-1	○	○	○	○
Position range output	POT			DO-1	△	△	△	
During a temporary stop	PUS	CN10-46		DO-1	○	○	○	
Travel completion	MEND			DO-1	△	△	△	△
Position end	PED			DO-1			△	
SYNC synchronous output	SOUT	CN10-19		DO-1			○	
Program output 1	OUT1	CN10-38		DO-1			○	
Program output 2	OUT2	CN10-39		DO-1			○	
Program output 3	OUT3	CN10-40		DO-1			○	
Point table No. output 1	PT0			DO-1	△	△		
Point table No. output 2	PT1			DO-1	△	△		
Point table No. output 3	PT2			DO-1	△	△		
Point table No. output 4	PT3			DO-1	△	△		
Point table No. output 5	PT4			DO-1	△	△		
Point table No. output 6	PT5			DO-1	△	△		
Point table No. output 7	PT6			DO-1	△	△		
Point table No. output 8	PT7			DO-1	△	△		
Station output 1	PS0	CN10-38		DO-1				○
Station output 2	PS1	CN10-39		DO-1				○
Station output 3	PS2	CN10-40		DO-1				○

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Station output 4	PS3	CN10-41	Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (b).	DO-1				○
Station output 5	PS4	CN10-42		DO-1				○
Station output 6	PS5	CN10-43		DO-1				○
Station output 7	PS6	CN10-44		DO-1				○
Station output 8	PS7	CN10-45		DO-1				○
M code 1 (bit 0)	MCD00	CN10-38		DO-1	○			
M code 2 (bit 1)	MCD01	CN10-39		DO-1	○			
M code 3 (bit 2)	MCD02	CN10-40		DO-1	○			
M code 4 (bit 3)	MCD03	CN10-41		DO-1	○			
M code 5 (bit 4)	MCD10	CN10-42		DO-1	○			
M code 6 (bit 5)	MCD11	CN10-43		DO-1	○			
M code 7 (bit 6)	MCD12	CN10-44		DO-1	○			
M code 8 (bit 7)	MCD13	CN10-45		DO-1	○			
Position data request 1	PRQ1	CN10-44	When signs and positioning data of 4th to 6th digits are required with 3-digit BCD × 2 inputs, PRQ1 turns on.	DO-1		△		
Position data request 2	PRQ2	CN10-45	When signs and positioning data of 1st to 3rd digits are required with 3-digit BCD × 2 inputs, PRQ2 turns on.	DO-1		△		
Mark detection rising latch completed	MSDH		Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (b).	DO-1	△	△	△	
Mark detection falling latch completed	MSDL			DO-1	△	△	△	
Alarm code 0	ACD0	CN10-38 CN10-22	To use these signals, set [Pr. Po12] to "_ _ _1". In the indexer method, Alarm codes 0 to 3 are output to CN10-38 to CN10-41. For details of the alarm codes, refer to chapter 8.	DO-1	○	○	○	○
Alarm code 1	ACD1	CN10-39 CN10-23		DO-1	○	○	○	○
Alarm code 2	ACD2	CN10-40 CN10-24		DO-1	○	○	○	○
Alarm code 3	ACD3	CN10-41 CN10-25		DO-1	○	○	○	○
Variable gain selection	CDPS		Same as the one of when used with only a servo amplifier. Refer to section 2.3 (1) (b).	DO-1	△	△	△	△
Absolute position undetermined	ABSV			DO-1	△	△	△	△
During tough drive	MTTR			DO-1	△	△	△	△
During fully closed loop control	CLDS			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 com 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	△	△	△	

(2) Input signal

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Analog torque limit	OTLA	CN20-12	To use this signal, set [Pr. Po11] to "_1_ _". When OTLA is enabled, torque is limited in the full servo motor output torque range. Apply 0 V to +10 V DC between OTLA and LG. Connect + of the power supply to OTLA. The maximum torque is generated at +10 V. Resolution: 12 bits	Analog input	△	△	△	△
Analog override	OVC	CN20-2	To use this signal, set [Pr. Po11] to "_ _1_". The signal controls the servo motor setting speed by applying -10 V to +10V DC to between VC and LG. The percentage will be 0% with -10 V, 100% with 0 V, and 200% with +10 V to the servo motor setting speed. Resolution: 12 bits	Analog input	△	△	△	

(3) Output signal

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
Analog monitor 1	OMO1	CN20-4	This signal outputs the data set in [Pr. Po13] to between OMO1 and LG in terms of voltage. Resolution: 12 bits or equivalent	Analog output	○	○	○	○
Analog monitor 2	OMO2	CN20-14	This signal outputs the data set in [Pr. Po14] to between OMO2 and LG in terms of voltage. Resolution: 12 bits or equivalent	Analog output	○	○	○	○

(4) Power supply

Device	Symbol	Connector pin No.	Function and application	I/O division	Control mode			
					CP	BCD	CL	PS
MR-D01 digital I/F power supply input	DICOMD	CN10-13 CN10-14	Input 24 V DC (24 V DC ± 10% 800 mA) for I/O interface. The power supply capacity changes depending on the number of I/O interface points to be used. For sink interface, connect + of 24 V DC external power supply. For source interface, connect - of 24 V DC external power supply.		○	○	○	○
MR-D01 digital I/F common	DOCOMD	CN10-37	Common terminal of input signals such as SON, RES, and others of the servo amplifier. This is separated from LG. For sink interface, connect - of 24 V DC external power supply. For source interface, connect + of 24 V DC external power supply.		○	○	○	○
15 V DC power supply	P15R	CN20-13	This outputs 15 V DC to between P15R and LG. This is available as the power for OTLA and OVC. Permissible current: 30 mA		○	○	○	○
-12 V DC power supply	N12R	CN20-15	This outputs -12 V DC to between N12R and LG. This is available as the power for VC. However, the voltage varies within the range of -12 V to -15 V. Permissible current: 30 mA		○	○	○	○
Control common	LG	CN20-1 CN20-9 CN20-11	This is a common terminal for OTLA, OVC, OMO1, OMO2, and P15R. Pins are connected internally.		○	○	○	○
Shield	SD	CN10-50 plate	Connect the external conductor of the shielded wire.		○	○	○	○

(5) Analog override

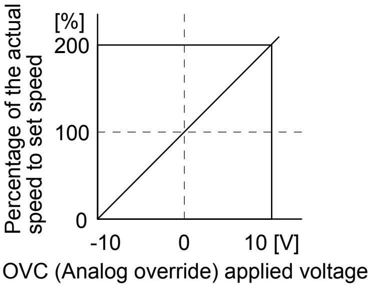
POINT

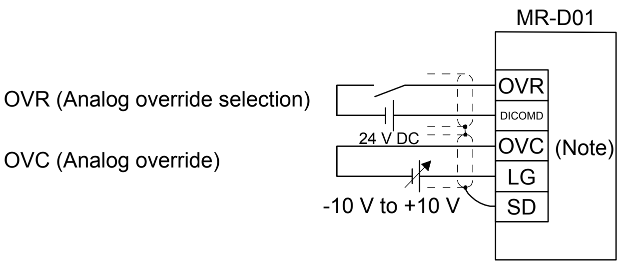
- To use OVC (analog override), set [Pr. Po11] to "_ _ 1 _".
- The override function has two types. One is analog override by using analog voltage input and another is digital override by using parameter settings.
  - Analog override target method: Point table method/program method
  - Digital override target method: Indexer method
- OVR (Analog override selection) is for the analog override. The digital override does not depend on OVR (Analog override selection).
- Refer to [Pr. PT38], [Pr. PT42], and [Pr. PT43] for the digital override.
- When using the analog override in the point table method or program method, enable OVR (Analog override selection).
- The following shows usable functions and non-usable functions.
  (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 OVC (Analog override). The following table shows signals and parameters related to the analog override.

Item	Name	Remark
Analog input signal	OVC (Analog override)	To use OVC (analog override), set [Pr. Po11] to "_ _ 1 _".
Contact input signal	OVR (Analog override selection)	Turning on OVR enables the OVC (Analog override) setting value.
Parameter	[Pr. Po21 D01 override offset]	-9999 to 9999 [mV]

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

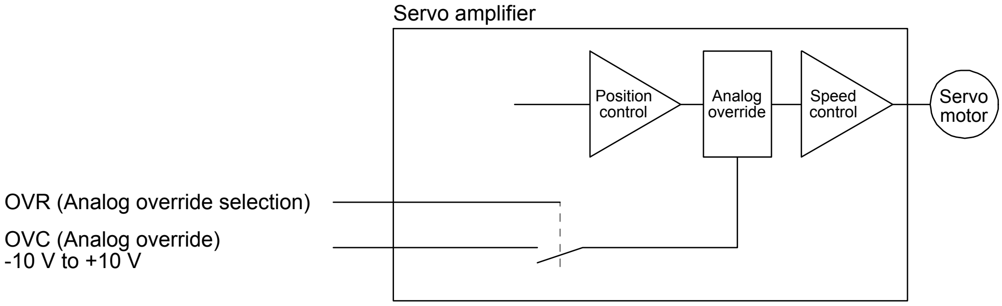




Note. This diagram shows sink input interface.

(b) OVR (Analog override selection)

Enable or disable OVC (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 OVC (Analog override) is enabled.

Note. 0: Off

1: On

(c) Analog override offset ([Pr. Po21])

You can set an offset voltage to the input voltage of OVC (Analog override) with [Pr. Po21]. The setting value ranges from -9999 to +9999 [mV].

(6) Torque limit

⚠CAUTION

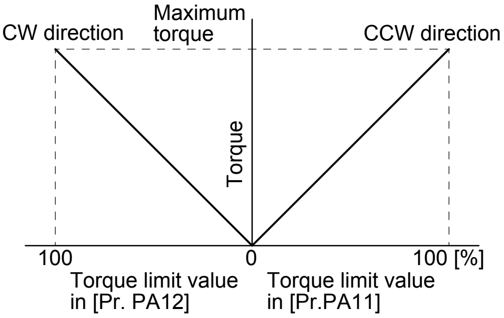
- ●If the torque limit is canceled during servo-lock, the servo motor may suddenly rotate according to position deviation in respect to the command position.
- ●When using the torque limit, check that [Pr. PB06 Load to motor inertia ratio] is set properly. Improper settings may cause an unexpected operation such as an overshoot.

POINT

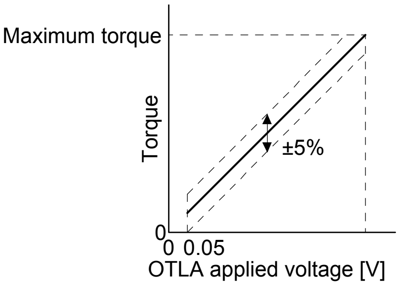
- ●To use OTLA (Analog torque limit), set [Pr. Po11] to "_ 1 _ _".

(a) Torque limit and torque

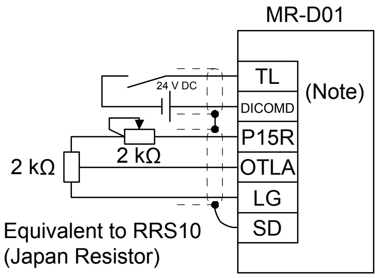
By setting [Pr. PA11 Forward rotation torque limit] or [Pr. PA12 Reverse rotation torque limit], torque is always limited to the maximum value during operation. A relation between the limit value and servo motor torque is as follows.



A relation between the applied voltage of OTLA (Analog torque limit) and the torque limit value of the servo motor is as follows. Torque limit values will vary about 5% relative to the voltage depending on products. At the voltage of less than 0.05 V, torque may vary as it may not be limited sufficiently. Therefore, use this function at the voltage of 0.05 V or more.



OTLA applied voltage vs. torque limit value



Connection example

Note. This diagram shows sink I/O interface. For source I/O interface, refer to section 11.5.5 (5).

(b) Torque limit value selection

The following shows how to select a torque limit using TL (External torque limit selection) from [Pr. PA11 Forward torque limit] or [Pr. PA12 Reverse torque limit] and OTLA (Analog torque limit). When TL1 (Internal torque limit selection) is enabled with [Pr. Po02] to [Pr. Po07], [Pr. Po27], and [Pr. Po28], you can select [Pr. PC35 internal torque limit 2/Internal thrust limit 2]. However, if [Pr. PA11] and [Pr. PA12] value is less than the limit value selected by TL/TL1, [Pr. PA11] and [Pr. PA12] value will be enabled.

(Note) Input device		Limit value status			Enabled torque limit value	
TL1	TL				CCW power running/ CW regeneration	CW power running/ CCW regeneration
0	0				Pr. PA11	Pr. PA12
0	1	OTLA	>	Pr. PA11 Pr. PA12	Pr. PA11	Pr. PA12
		OTLA	<	Pr. PA11 Pr. PA12	OTLA	OTLA
1	0	Pr. PC35	>	Pr. PA11 Pr. PA12	Pr. PA11	Pr. PA12
		Pr. PC35	<	Pr. PA11 Pr. PA12	Pr. PC35	Pr. PC35
1	1	OTLA	>	Pr. PC35	Pr. PC35	Pr. PC35
		OTLA	<	Pr. PC35	OTLA	OTLA

Note. 0: Off
1: On

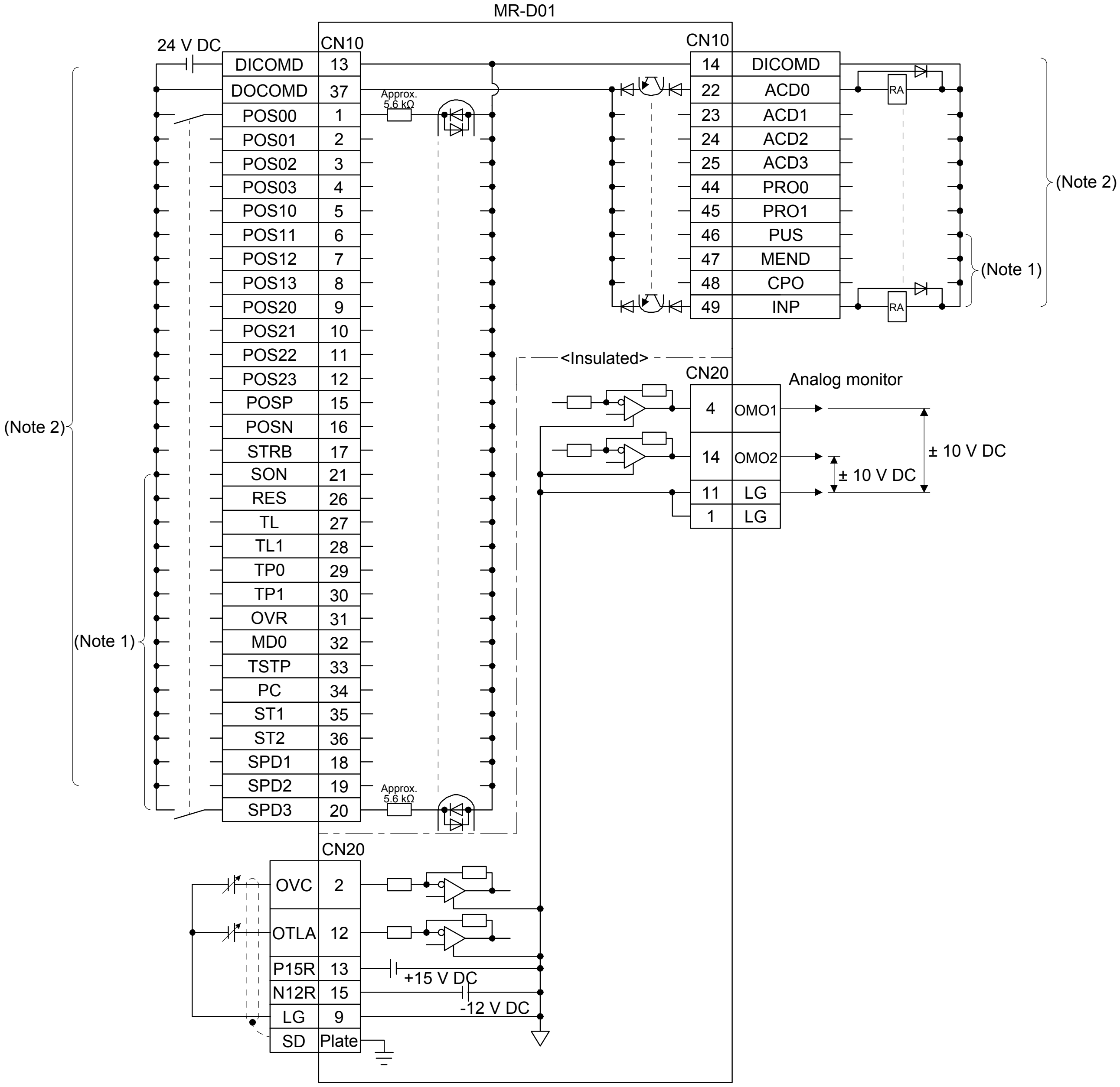
(c) TLC (Limiting torque)

TLC turns on when the servo motor torque reaches the torque limited using the forward rotation torque limit, reverse rotation torque limit or analog torque limit.

11.5.4 Interfaces

(1) Internal connection diagram

The following shows an example of internal connection diagram of the point table method in a BCD input positioning operation. For the internal connection diagram of the servo amplifier, refer to section 2.5.1.



Note 1. The devices can be changed by [Pr. Po02] to [Pr. Po07], [Pr. Po27], and [Pr. PD28].

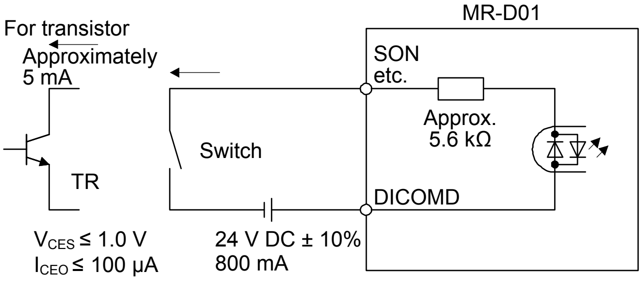
2. This diagram shows sink I/O interface. For source I/O interface, refer to section 2.5.3.

(2) Detailed explanation of interfaces

This section provides the details of the I/O signal interfaces (refer to the I/O division in the table) given in section 11.5.3. Refer to the following and make connection with the external device.

(a) Digital input interface DI-1

This is an input circuit whose photocoupler cathode side is input terminal. Transmit signals from sink (open-collector) type transistor output, relay switch, etc. The following is a connection diagram for sink input.



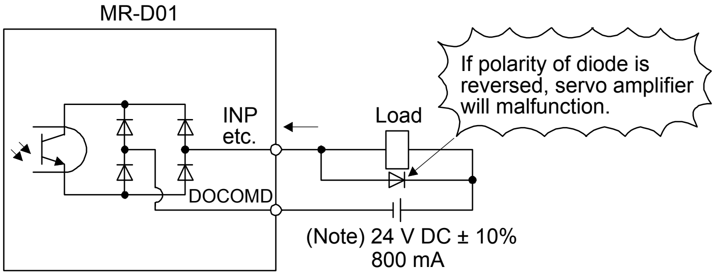
(b) Digital output interface DO-1

This is a circuit in which the collector of the output transistor is the output terminal. When the output transistor is turned on, the current will flow from the collector terminal.

A lamp, relay, or photocoupler can be driven. Install a diode (D) for an inductive load, or install an inrush current suppressing resistor (R) for a lamp load.

(Rated current: 40 mA or less, maximum current: 50 mA or less, inrush current: 100 mA or less) A maximum of 2.6 V voltage drop occurs in the servo amplifier.

The following shows a connection diagram for sink output.

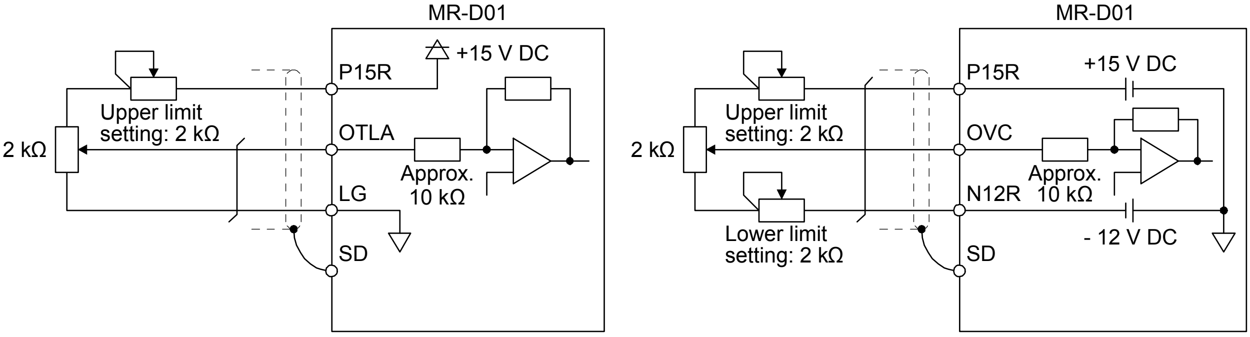


Note. If the voltage drop (maximum of 2.6 V) interferes with the relay operation, apply a high voltage (maximum of 26.4 V) from an external source.

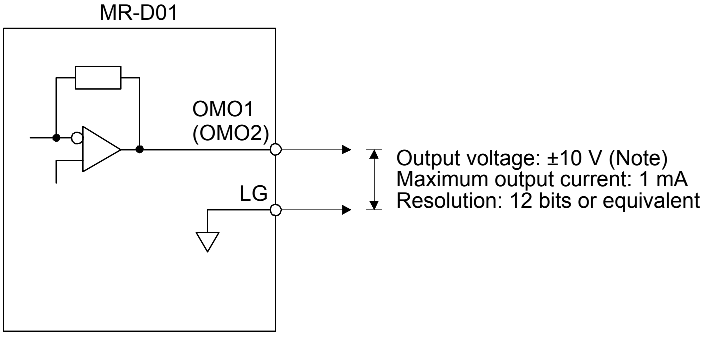
(3) Analog input

Input impedance

10 kΩ to 12 kΩ



(4) Analog output



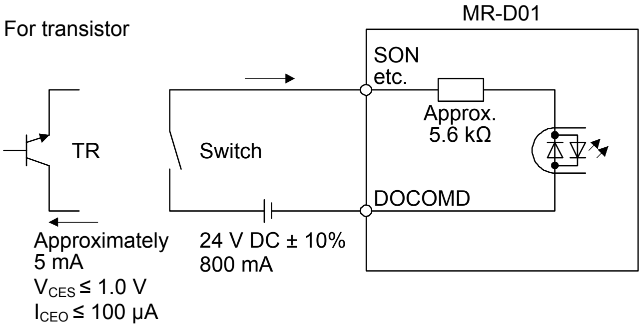
Note. Output voltage range varies depending on the monitored signal. When connecting analog output to an external device, use the withstand voltage of 15 V DC or higher.

(5) Source I/O interface

In this servo amplifier, source type I/O interfaces can be used.

(a) Digital input interface DI-1

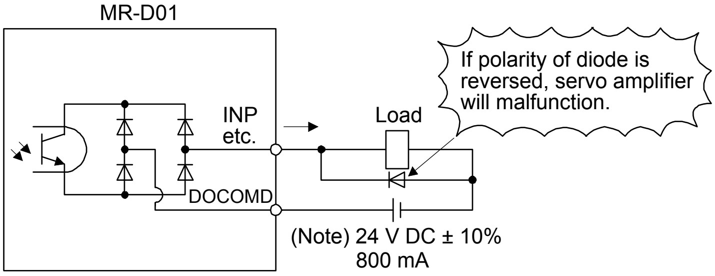
This is an input circuit in which the anode of the photocoupler is the input terminal. Transmit signals from a source (open-collector) type transistor output, relay switch, etc.



(b) Digital output interface DO-1

This is a circuit in which the emitter of the output transistor is the output terminal. When the output transistor is turned on, the current will flow from the output terminal to a load.

A maximum of 2.6 V voltage drop occurs in the servo amplifier.

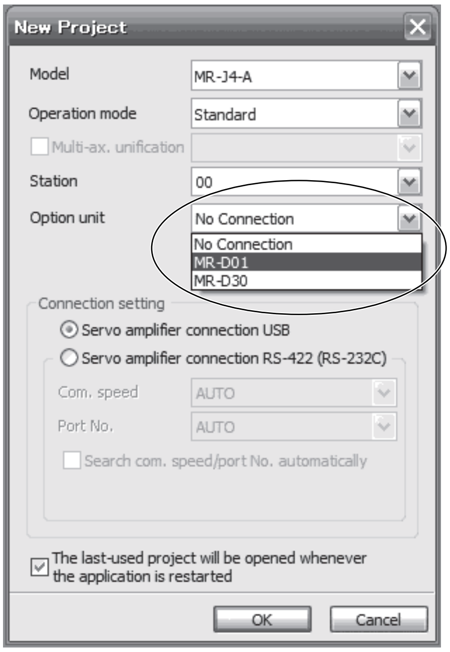


Note. If the voltage drop (maximum of 2.6 V) interferes with the relay operation, apply a high voltage (maximum of 26.4 V) from an external source.

11.6 Monitor display with MR Configurator2

The following shows how to display the input/output monitor with MR Configurator2 when MR-D01 has been connected.

(1) Initial setting
When MR-D01 has been connected, click "MR-D01" from the "Option unit" menu in the creating new project window of MR Configurator2.



New Project

Model: MR-J4-A

Operation mode: Standard

☐ Multi-ax. unification

Station: 00

Option unit: No Connection

Connection setting

● Servo amplifier connection USB

○ Servo amplifier connection RS-422 (RS-232C)

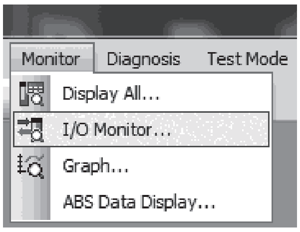
Com. speed: AUTO

Port No.: AUTO

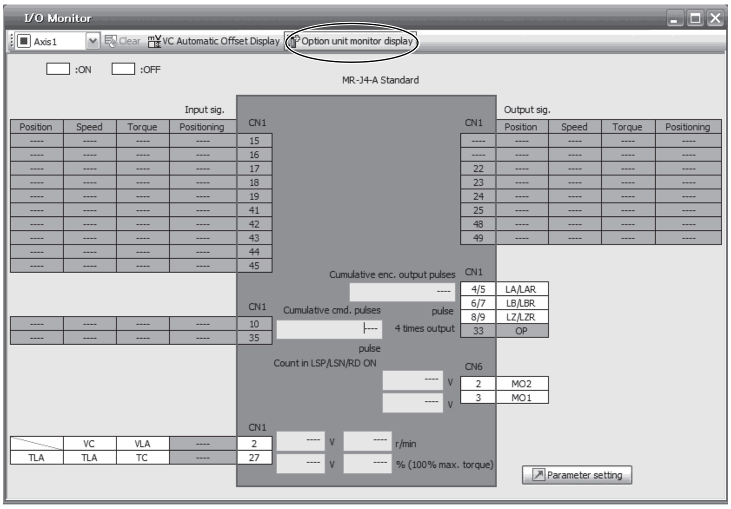
☐ Search com. speed/port No. automatically

☑ The last-used project will be opened whenever the application is restarted

(2) How to open the optional unit monitor window
Click "Monitor" in the menu bar and "I/O Monitor" from the menu.



The following window is displayed. Click "Option unit monitor" in the menu bar.



Position	Speed	Torque	Positioning	CN1
----	----	----	----	15
----	----	----	----	16
----	----	----	----	17
----	----	----	----	18
----	----	----	----	19
----	----	----	----	41
----	----	----	----	42
----	----	----	----	43
----	----	----	----	44
----	----	----	----	45

				CN1
----	----	----	----	10
----	----	----	----	35

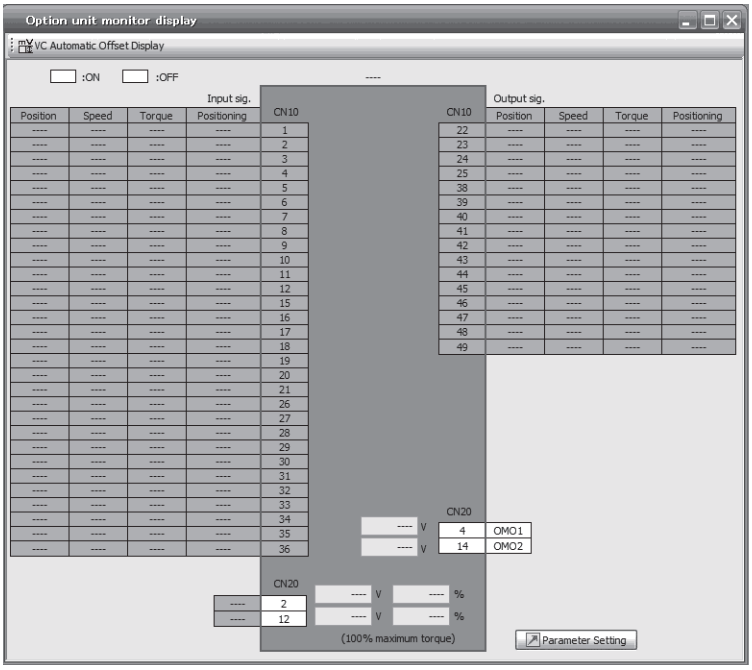
				CN1
	VC	VLA	----	2
TLA	TLA	TC	----	27

CN1	Position	Speed	Torque	Positioning
----	----	----	----	----
----	----	----	----	----
22	----	----	----	----
23	----	----	----	----
24	----	----	----	----
25	----	----	----	----
48	----	----	----	----
49	----	----	----	----

CN1	
4/5	LA/LAR
6/7	LB/LBR
8/9	LZ/LZR
33	OP

CN6	
2	MO2
3	MO1

The following window is displayed. The input/output monitor on the MR-D01 side can be checked.



Position	Speed	Torque	Positioning	CN10
----	----	----	----	1
----	----	----	----	2
----	----	----	----	3
----	----	----	----	4
----	----	----	----	5
----	----	----	----	6
----	----	----	----	7
----	----	----	----	8
----	----	----	----	9
----	----	----	----	10
----	----	----	----	11
----	----	----	----	12
----	----	----	----	15
----	----	----	----	16
----	----	----	----	17
----	----	----	----	18
----	----	----	----	19
----	----	----	----	20
----	----	----	----	21
----	----	----	----	26
----	----	----	----	27
----	----	----	----	28
----	----	----	----	29
----	----	----	----	30
----	----	----	----	31
----	----	----	----	32
----	----	----	----	33
----	----	----	----	34
----	----	----	----	35
----	----	----	----	36

	CN20
----	2
----	12

CN10	Position	Speed	Torque	Positioning
22	----	----	----	----
23	----	----	----	----
24	----	----	----	----
25	----	----	----	----
38	----	----	----	----
39	----	----	----	----
40	----	----	----	----
41	----	----	----	----
42	----	----	----	----
43	----	----	----	----
44	----	----	----	----
45	----	----	----	----
46	----	----	----	----
47	----	----	----	----
48	----	----	----	----
49	----	----	----	----

CN20	
4	OMO1
14	OMO2

11.7 Operation

The following items are same as those of MR-J4-_A_-RJ servo amplifiers. For the details of the items, refer to each chapter/section indicated in the detailed explanation field.

Item	Detailed explanation
Startup (except parameter setting)	Section 4.1

11.7.1 Operation mode and selecting method

When MR-D01 is used, the following automatic operation modes in the following table can be selected. Select an operation mode used in the parameter and input device.

Operation mode selection item / Operation mode		[Pr. Po10] setting	Input device setting (Note)		Detailed explanation
			MD0	SPD1 to SPD4	
Automatic operation mode	When using a MR-DS60 digital switch for automatic operation with BCD (3 digits × 2) inputs	_ _ _ 2	On	Any	Section 12.6.2
	When using a programmable controller for automatic operation with BCD (3 digits × 2) inputs				Section 12.6.3

Note. MD0: Automatic/manual selection, SPD1 to SPD4: Speed selection 1 to 4

11.7.2 When using MR-DS60 (6-digit digital switch) for automatic operation with BCD (3-digit × 2) inputs

POINT

- The speed change with the analog override function is enabled in both of the automatic operation mode and manual operation mode. However, it is disabled under the following conditions.
  - During home position return
  - During deceleration or stop with TSTP (Temporary stop/restart)

Based on the position data set with MR-DS60 (6-digit digital switch) and the selected speed command, positioning is executed. For a connection example of MR-DS60 (6-digit digital switch) and servo amplifier, refer to section 11.5.1 (2) (a).

(1) Parameter setting

Set the parameters to use BCD (3-digit × 2) inputs with [Pr. Po10]. Refer to the following table and set the parameters as necessary.

No.	Name	Setting digit	Setting item	Setting value	Setting
[Pr. Po10]	Function selection O-1	_ _ _ x	Operation method	_ _ _ 2	Always set this item. Enable the input/output devices required for BCD input. For the devices to be enabled, refer to section 11.5.2.
		x _ _ _	Strobe	2 _ _ _ (initial value)	STRB (Strobe) is not used. Do not change the initial value.
		_ x _ _	Sign of the position data for BCD positioning	_ 0 _ _	6-digit position data without signs (+/-)
				_ 1 _ _ (initial value)	6-digit position data with signs (+/-)
[Pr. PT01]	Command mode selection	_ _ _ x	Positioning command method selection	_ _ _ 0 (initial value)	Absolute value command method
				_ _ _ 1	Incremental value command method
[Pr. PT03]	Feeding function selection	_ _ _ x	Feed length multiplication [STM]		Refer to section 7.2.9.
[Pr. PA14]	Rotation direction selection/ Travel direction selection		Servo motor rotation direction	0 (initial value)	ST1 (Forward rotation start) on: Rotates the servo motor in the CCW direction. ST2 (Reverse rotation start) on: Rotates the servo motor in the CW direction.
				1	ST1 (Forward rotation start) on: Rotates the servo motor in the CW direction. ST2 (Reverse rotation start) on: Rotates the servo motor in the CCW direction.

(2) Operation

Set position data with the MR-DS60 (6-digit digital switch) and turn on ST1 (Forward rotation start) to move the travel distance of the position data in the forward direction with the rotation speed, acceleration time constant, and deceleration time constant set in the point table selected with SPD1 (Speed selection 1) to SPD4 (Speed selection 4). In the incremental value command method, turning on ST2 (Reverse rotation start) moves the travel distance in the reverse direction.

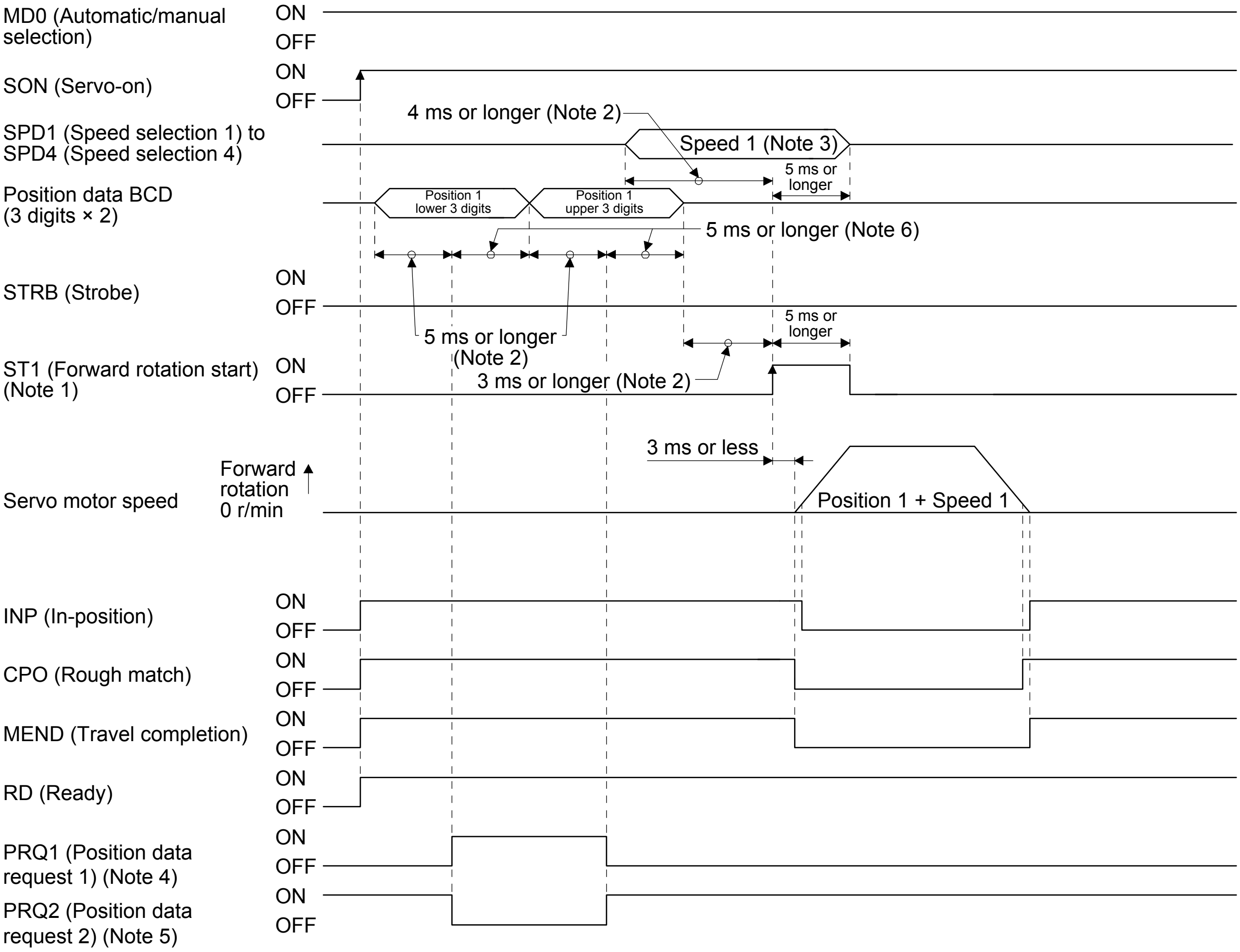
Select point tables as follows with SPD1 (Speed selection 1) to SPD4 (Speed selection 4) and execute the positioning based on the set rotation speed, acceleration time constant, and deceleration time constant.

In this case, the position data set to the point table is not used.

(Note) Device				Selected Point table No.
SPD4	SPD3	SPD2	SPD1	
0	0	0	1	1
0	0	1	0	2
⋮	⋮	⋮	⋮	⋮
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

Note. 0: Off
1: On

(3) Timing chart



Note 1. In the incremental value command method, ST2 (Reverse rotation start) can be used. In this case, the timing chart is the same as the one for ST1.

2. 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 position data earlier.
3. The speed command selected in Speed selection 1 (SPD1) to 4 (SPD4)
4. This signal is off when the power is on.
5. This signal is on when the power is on.
6. The lower three digits or upper three digits of the position data is changed with "x _ _ _" of [Pr. Po10 MR-D01 data establishment condition].

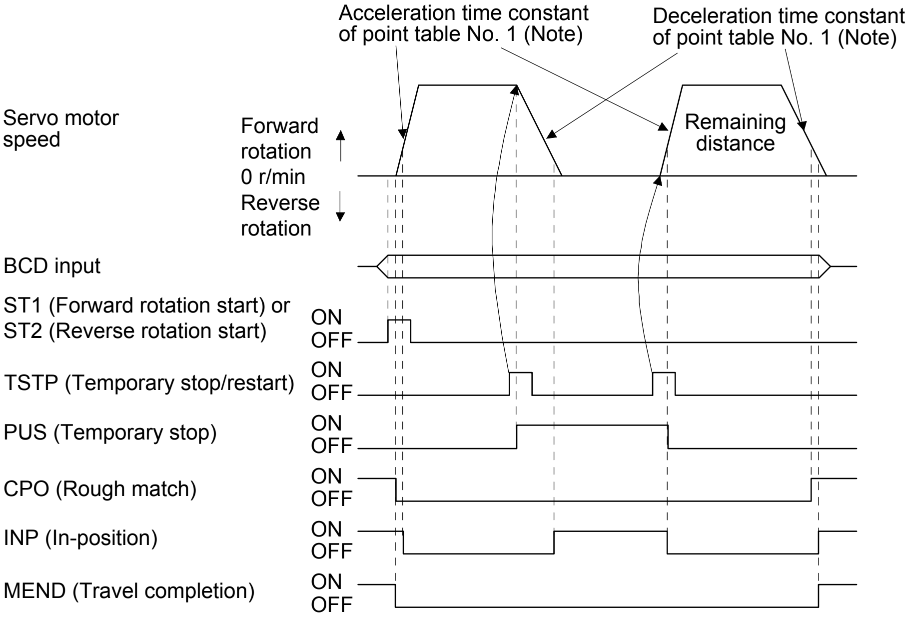
(4) Temporary stop/restart during automatic operation

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 restarts the servo motor rotation for the remaining distance.

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

Changing the automatic mode to manual mode during a temporary stop will erase a travel remaining distance.

The TSTP (Temporary stop/restart) does not function during a home position return or JOG operation.



Note. When SPD1 (Speed selection 1) to SPD4 (Speed selection 4) are used, the acceleration/deceleration time constants of the point table selected at the start are used.

11.7.3 When using a programmable controller for automatic operation with BCD (3 digits × 2) inputs

POINT

- The speed change with the analog override function is enabled in both of the automatic operation mode and manual operation mode. However, it is disabled under the following conditions.
  - During home position return
  - During deceleration or stop with TSTP (Temporary stop/restart)

Based on the position data set with the programmable controller and the selected speed command, positioning is executed. For a connection example of the programmable controller and servo amplifier, refer to section 11.5.1 (2) (b).

(1) Parameter setting

Set the parameters to use BCD (3 digits × 2) inputs and STRB (Strobe) with [Pr. Po10]. Refer to the following table and set the parameters as necessary.

No.	Name	Setting digit	Setting item	Setting value	Setting
[Pr. Po10]	Function selection O-1	_ _ _ x	Operation method	_ _ _ 2	Always set this item. Enable the input/output devices required for BCD input. For the devices to be enabled, refer to section 3.4.
		x _ _ _	Strobe	0 _ _ _	Always set this item. When using a programmable controller, STRB (Strobe) is required.
		_ x _ _	Sign of the position data for BCD positioning	_ 0 _ _	6-digit position data without signs (+/-)
				_ 1 _ _ (initial value)	6-digit position data with signs (+/-)
[Pr. PT01]	Command mode selection	_ _ _ x	Positioning command method selection	_ _ _ 0 (initial value)	Absolute value command method
				_ _ _ 1	Incremental value command method
[Pr. PT03]	Feeding function selection	_ _ _ x	Feed length multiplication [STM]		Refer to section 7.2.9.
[Pr. PA14]	Rotation direction selection/ Travel direction selection		Servo motor rotation direction	0 (initial value)	ST1 (Forward rotation start) on: Rotates the servo motor in the CCW direction. ST2 (Reverse rotation start) on: Rotates the servo motor in the CW direction.
				1	ST1 (Forward rotation start) on: Rotates the servo motor in the CW direction. ST2 (Reverse rotation start) on: Rotates the servo motor in the CCW direction.

(2) Operation

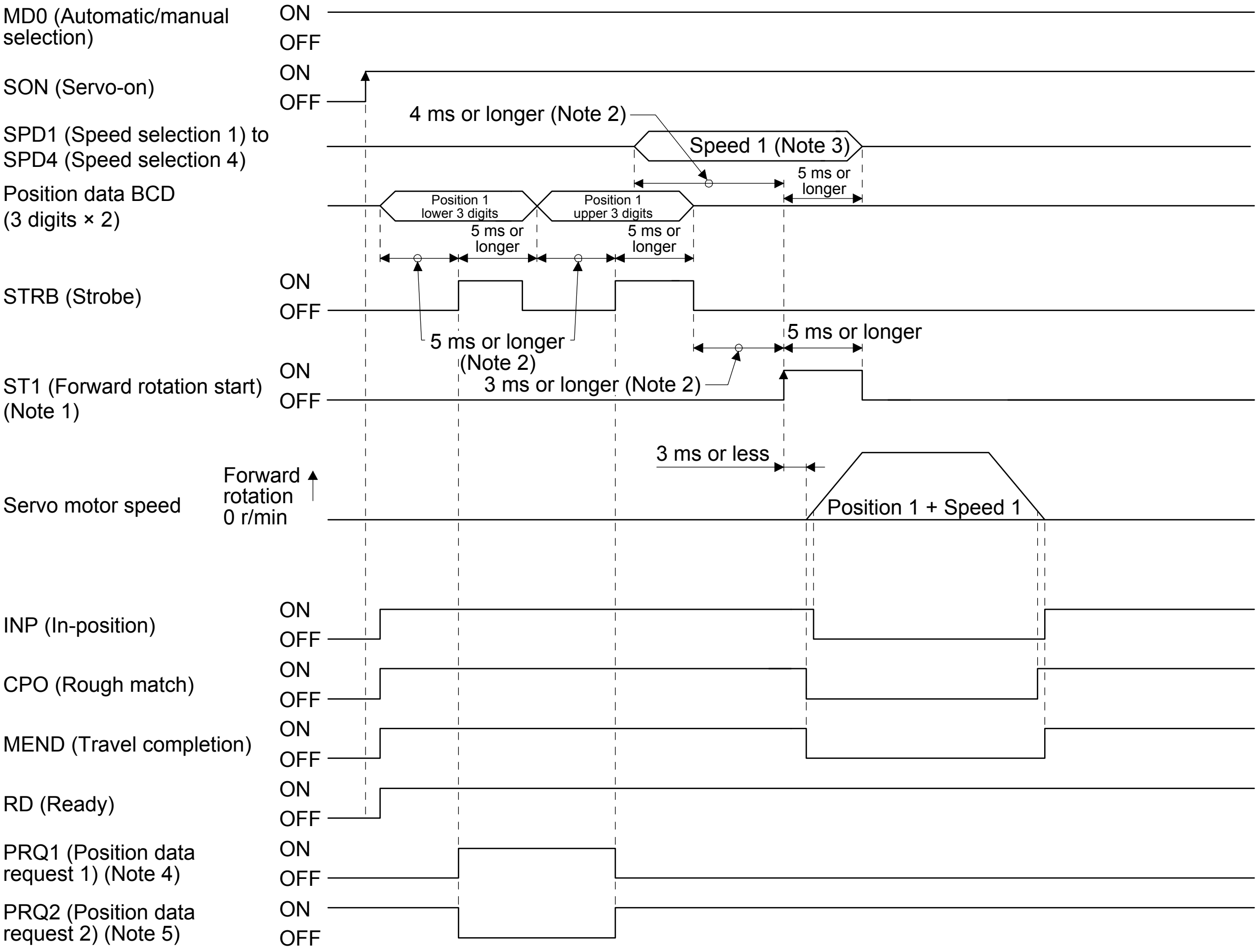
Set position data with the programmable controller and turn on ST1 (Forward rotation start) to move the travel distance of the position data with the rotation speed, acceleration time constant, and deceleration time constant set in the point table selected with SPD1 (Speed selection 1) to SPD4 (Speed selection 4). In the incremental value command method, turning on ST2 (Reverse rotation start) moves the travel distance in the reverse direction.

Select point tables as follows with SPD1 (Speed selection 1) to SPD4 (Speed selection 4) and execute the positioning based on the set rotation speed, acceleration time constant, and deceleration time constant.

(Note) Device				Selected Point table No.
SPD4	SPD3	SPD2	SPD1	
0	0	0	1	1
0	0	1	0	2
. . .	. . .	. . .	. . .	. . .
1	1	0	1	13
1	1	1	0	14
1	1	1	1	15

Note. 0: Off
1: On

(3) Timing chart



Note 1. In the incremental value command method, ST2 (Reverse rotation start) can be used. In this case, the timing chart is the same as the one for ST1.

2. 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 position data earlier.

3. The speed command selected in Speed selection 1 (SPD1) to 4 (SPD4)

4. This signal is off when the power is on.

5. This signal is on when the power is on.

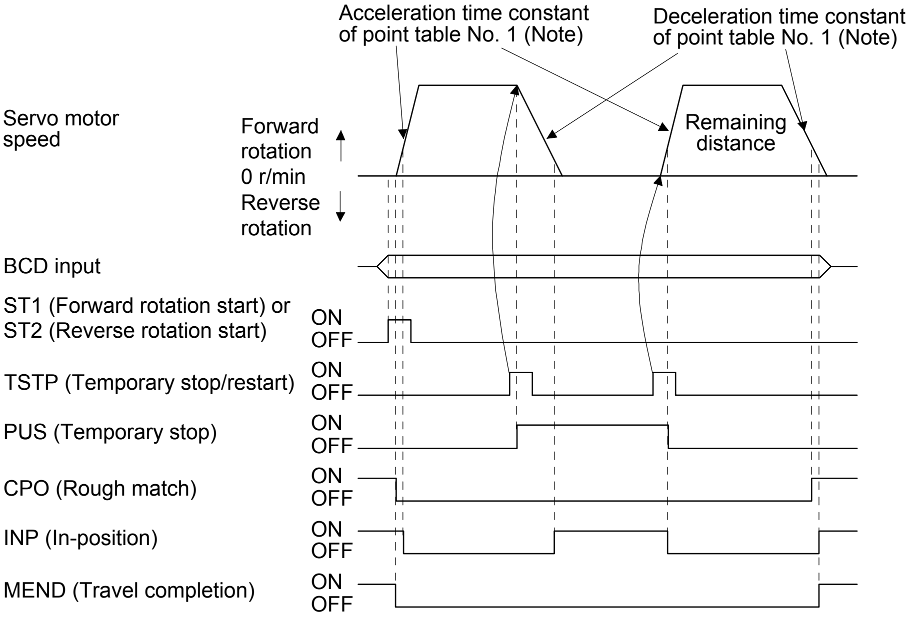
(4) Temporary stop/restart during automatic operation

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 again restarts the servo motor rotation for the remaining distance.

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

Changing the automatic mode to manual mode during a temporary stop will erase a travel remaining distance.

The TSTP (Temporary stop/restart) does not function during a home position return or JOG operation.



Note. When SPD1 (Speed selection 1) to SPD4 (Speed selection 4) are used, the acceleration/deceleration time constants of the point table selected at the start are used.

11.7.4 Home position return in the BCD (3 digits × 2) input operation

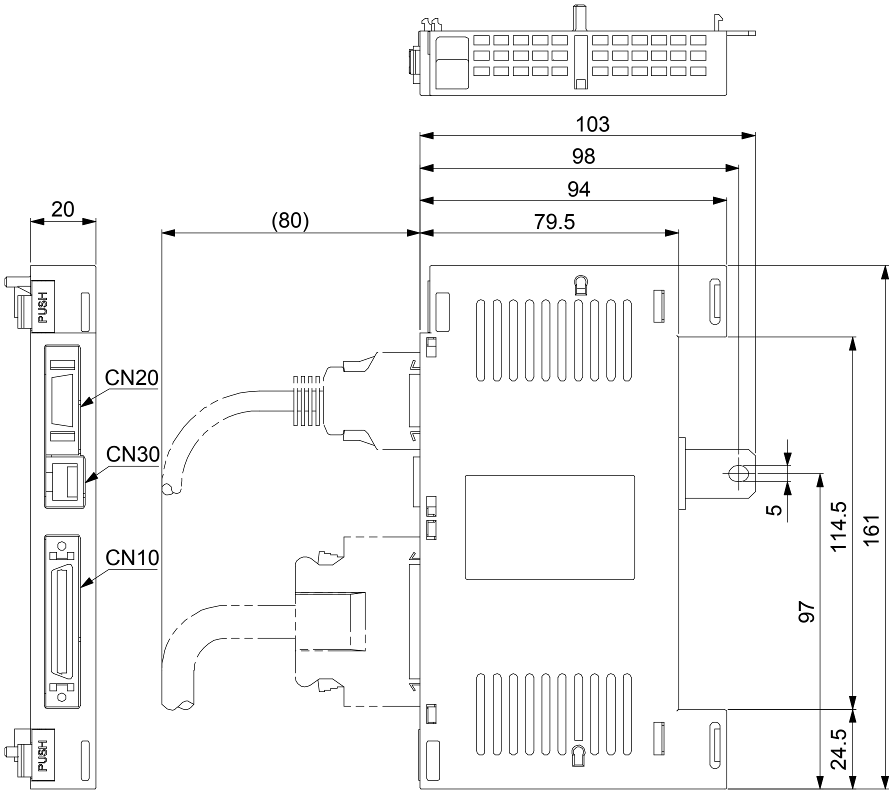
The home position return in the BCD (3 digits × 2) input operation is the same as the one in the point table method. Refer to section 4.4. For the devices, refer to the following table.

Item	Device to be used	Setting
Home position return mode selection	MD0 (Operation mode selection 1)	Switch on MD0.
	SPD1 (Speed selection 1) to SPD4 (Speed selection 4)	Turn off SPD1 to SPD4.
	ST1 (Forward rotation start)	Turn on ST1 for the manual home position return.
	ST2 (Reverse rotation start)	Turn on ST2 for automatic positioning to the home position.

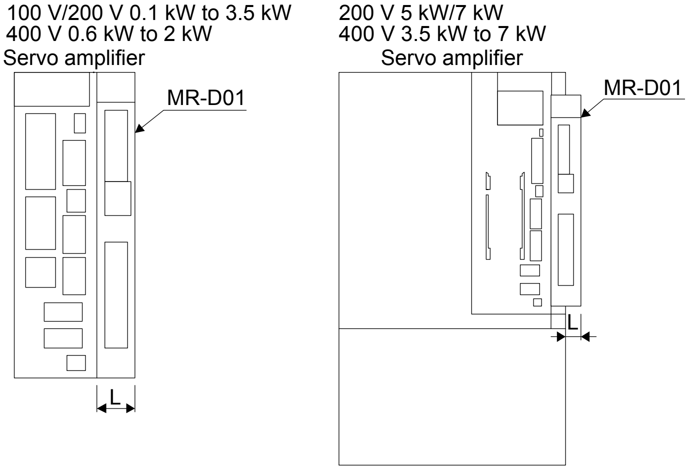
11.8 Dimensions

11.8.1 MR-D01 extension I/O unit

[Unit: mm]



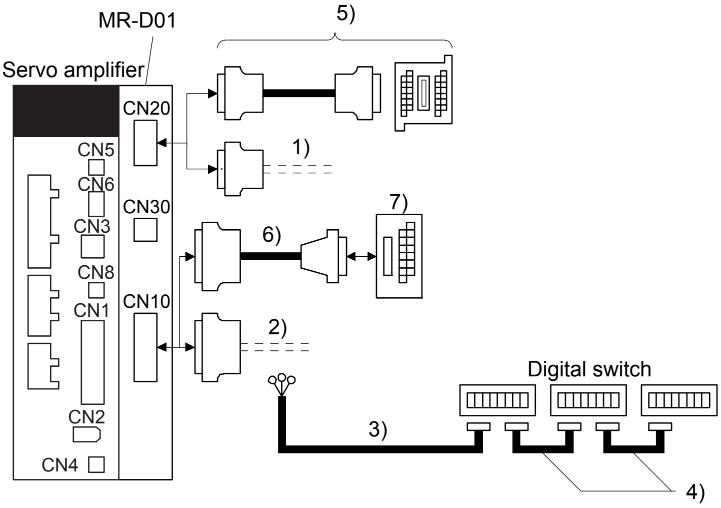
11.8.2 When an MR-D01 extension IO unit is connected to a servo amplifier

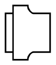
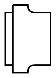
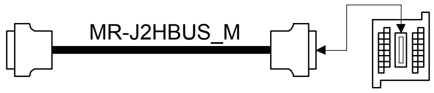


Servo amplifier	L [mm]
MR-J4-10A1-RJ to MR-J4-40A1-RJ MR-J4-10A-RJ to MR-J4-100A-RJ MR-J4-60A4-RJ to MR-J4-100A4-RJ	20
MR-J4-200A-RJ/MR-J4-350A-RJ MR-J4-200A4-RJ	15
MR-J4-500A-RJ/MR-J4-700A-RJ MR-J4-350A4-RJ to MR-J4-700A4-RJ	10
MR-J4-11KA-RJ to MR-J4-22KA-RJ MR-J4-11KA4-RJ to MR-J4-22KA4-RJ	0

11.9 Options and peripheral equipment

11.9.1 Combinations of cable/connector sets



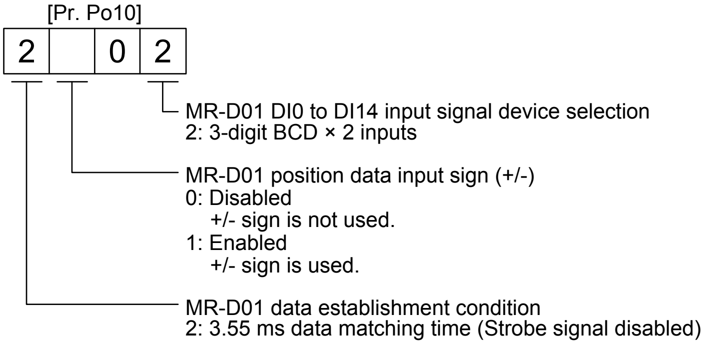
No.	Product name	Model	Description	Application
1)	Connector set	MR-CCN1	 Connector: 10120-3000PE Shell kit: 10320-52F0-008 (3M or equivalent)	
2)	Connector set	MR-J3CN1	 Connector set: 10150-3000PE Shell kit: 10350-52F0-008 (3M or equivalent)	
3)	Digital switch cable	MR-DSCBL_M-G	 Refer to section 11.5.1 (2) (a) and 11.9.2 for details.	For digital switch
4)	Digital switch cable	MR-DSCBL_	 Refer to section 11.5.1 (2) (a) and 11.9.2 for details.	For digital switch junction
5)	Junction terminal block (recommended)		PS7DW-20V14B-F (Toho Technology Corp.)  Junction terminal block PS7DW-20V14B-F is not option. For using the junction terminal block, option MR-J2HBUS_M is necessary. Refer to section 11.9.3 for details.	
6)	Junction terminal block Cable	MR-J2M-CN1TBL_M Cable length: 0.5/1 m (Refer to section 11.9.4.)	Junction terminal block connector Connector: D7950-B500FL (3M) CN10 connector Connector: 10150-6000EL Shell kit: 10350-3210-000 (3M or equivalent) 	For junction terminal block connection
7)	Junction terminal block	MR-TB50	Refer to section 11.9.4.	

11.9.2 MR-DS60 (6-digit digital switch)

Position data can be provided with BCD signals by using MR-DS60 (6-digit digital switch). For the connection of MR-DS60 and MR-D01, refer to section 11.5.1 (2) (a).

(1) Parameter setting

When using MR-DS60, set [Pr. Po10] to "2 _ 0 2".



(2) Specifications of MR-DS60

Item	Specifications
Model	MR-DS60
Number of digits	Signed 6-digit BCD
Electrical characteristics	28 V DC (0.5 A)
Withstand voltage	500 Vr.m.s
Contact resistance	100 mΩ or lower
Life	1,000,000 times
Temperature range for operation	0 °C to 60 °C
Storage temperature	-5 °C to 70 °C

(3) Digital switch cable

Use the following digital switch cables and connect them with MR-D01.

Cable model	Cable length					Application
	0.25 m	1 m	3 m	5 m	10 m	
MR-DSCBL_M-G			3	5	10	Between MR-DS60 and MR-D01
MR-DSCBL_	25	100				Between MR-DS60 and MR-DS60

(4) Terminal assignment

CON1, CON2

10B			10A
	DO04	DO05	
	DI03	DI02	
	DI01	DI00	
	DI07	DI06	
	DI05	DI04	
	DI11	DI10	
	DI09	DI08	
1B	DI13	DI12	1A

Signal name	Pin No.	Description
DO04	9A	Common output 1 sign, ×1000, ×10000, Common output on ×100000 side
DO05	9B	Common output 2 signs, ×1, ×10, ×100 side Common output
DI00	6A	×1, ×1000 bit 0
DI01	6B	×1, ×1000 bit 1
DI02	7A	×1, ×1000 bit 2
DI03	7B	×1, ×1000 bit 3
DI04	4A	×10, ×10000 bit 0
DI05	4B	×10, ×10000 bit 1
DI06	5A	×10, ×10000 bit 2
DI07	5B	×10, ×10000 bit 3
DI08	2A	×100, ×100000 bit 0
DI09	2B	×100, ×100000 bit 1
DI10	3A	×100, ×100000 bit 2
DI11	3B	×100, ×100000 bit 3
DI12	1A	Sign bit 0+
DI13	1B	Sign bit 1-

TB

⊗ DCM2

⊗ COM2

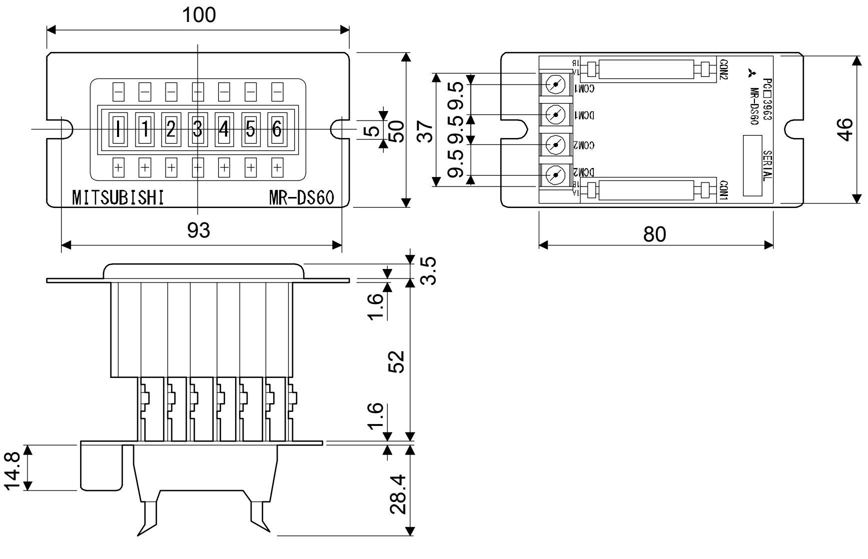
⊗ DCM1

⊗ COM1

Signal name	Description
DCM2	Common input 2 Connect this signal with COM2 at block selection.
COM2	Common output 2 Common 2 at switching multi steps
DCM1	Common input 1 Connect this signal with COM1 at block selection.
COM1	Common output 1 Common 1 at switching multi steps

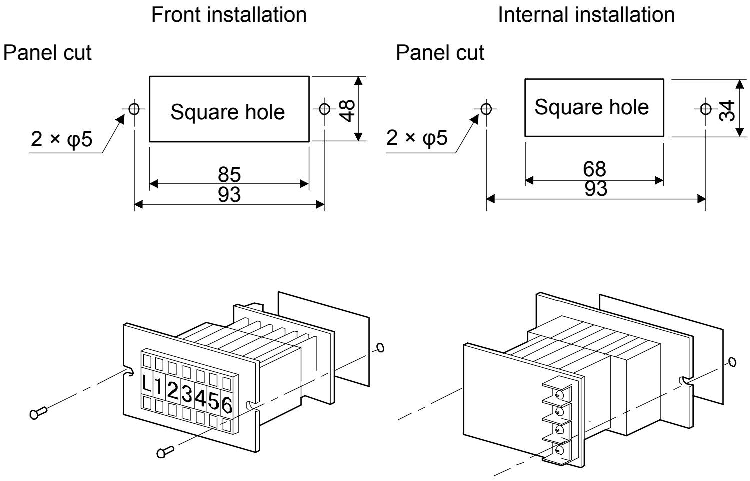
(5) Dimensions

[Unit: mm]



(6) Mounting

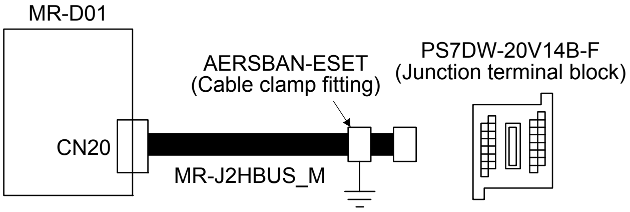
[Unit: mm]



11.9.3 PS7DW-20V14B-F (Junction terminal block) (recommended)

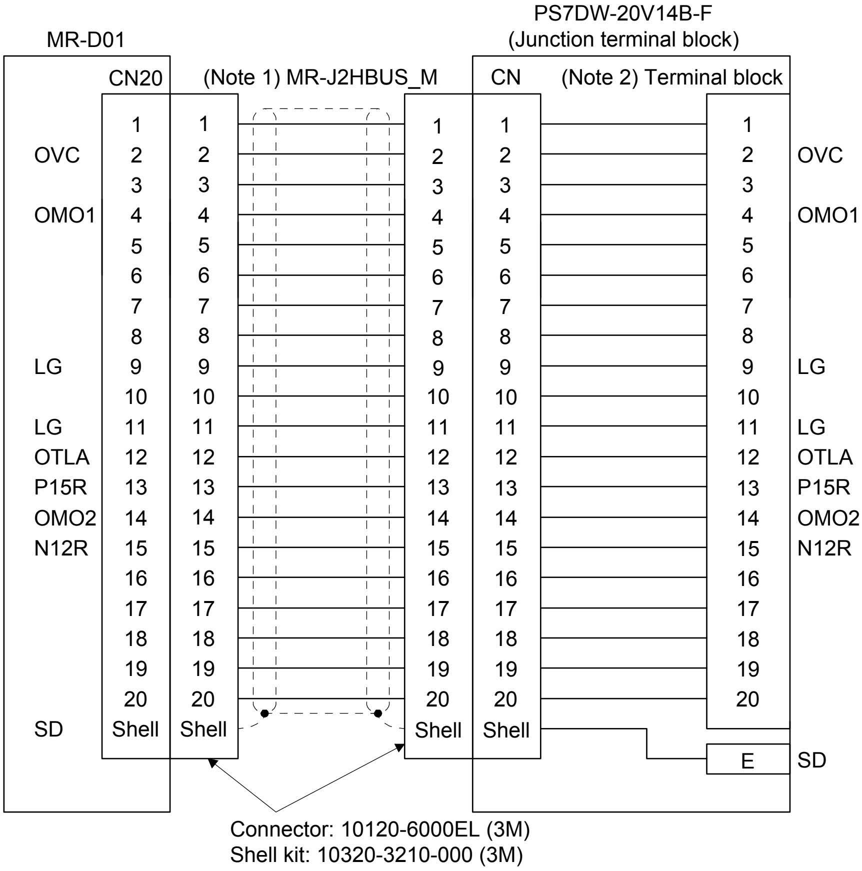
(1) Usage

Always use the PS7DW-20V14B-F (Junction terminal block) (Yoshida Electric Industry)) with the option cable (MR-J2HBUS_M) as a set. A connection example is shown below.



Ground the option cable on the junction terminal block side with AERSBAN-ESET (cable clamp fitting). For how to use the cable clamp fitting, refer to section 11.14 (2) (c) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

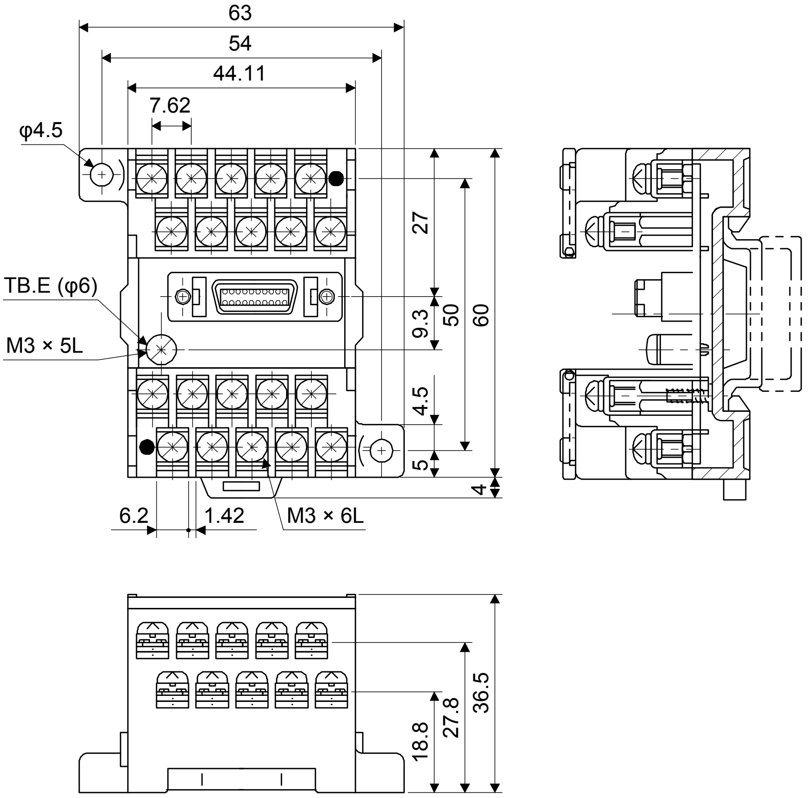
(2) Connection of MR-J2HBUS_M cable and junction terminal block



Note 1. Symbol indicating cable length is put in _.
05: 0.5 m
1: 1 m
5: 5 m
2. Do not connect anything to the terminal where no signal has been assigned.

(3) Dimensions of junction terminal block

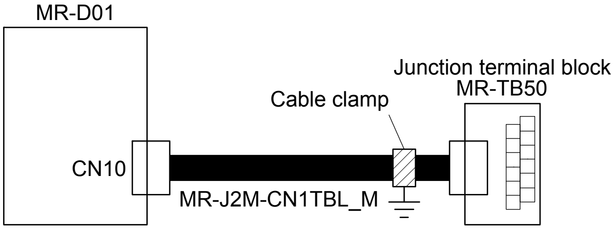
[Unit: mm]



11.9.4 MR-TB50 (Junction terminal block)

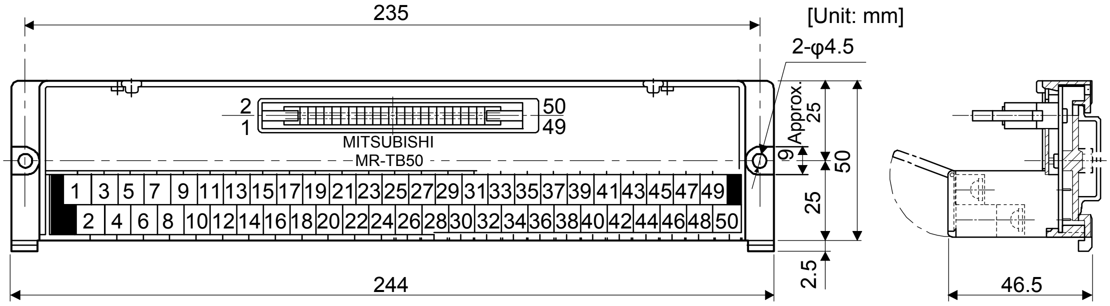
(1) Usage

Always use MR-TB50 (Junction terminal block) with MR-J2M-CN1TBL_M (Junction terminal block cable) as a set.



Ground the junction terminal block cable on the junction terminal block side with the supplied AERSBAN-ESET (cable clamp fitting). For how to use the cable clamp fitting, refer to section 11.14 (2) (c) of "MR-J4-_A_(-RJ) Servo Amplifier Instruction Manual".

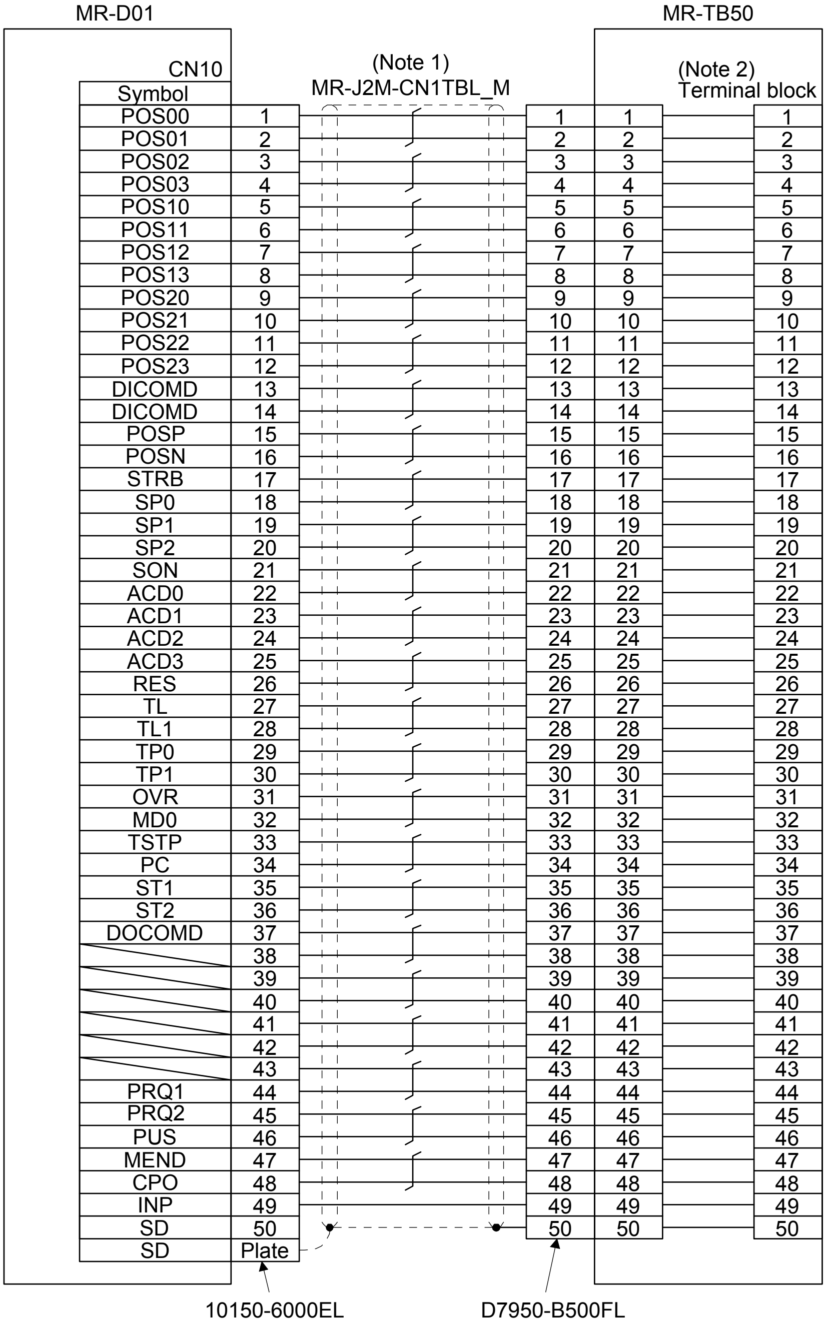
(2) Dimensions of MR-TB50



Terminal screw: M3.5
Applicable wire: 2 mm^2
Crimp terminal width: 7.2 mm or less

(3) Connection diagram of MR-J2M-CN1TBL_M cable and MR-TB50

The following connection diagram shows BCD input as an example.



Note 1. Symbol indicating cable length is put in _.
05: 0.5 m
1: 1 m
2. Do not connect anything to the terminal where no signal has been assigned.

MEMO

12. 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 1000. If the total number of write times exceeds 1000, the servo amplifier may malfunction when the Flash-ROM reaches the end of its useful life.

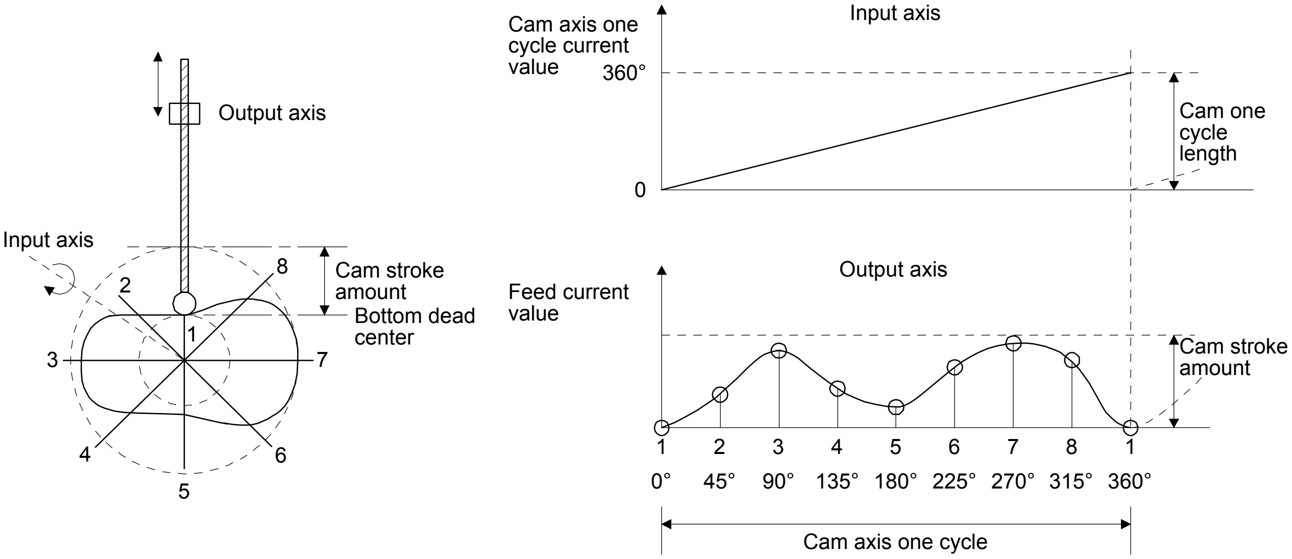
12.1 Simple cam function

POINT

- ●The simple cam function is available with servo amplifiers with software version B7 or later.
- ●The simple cam function can be used with the point table method and the program method.
- ●This function is not available with the servo amplifier to which the MR-D30 unit has been connected.

12.1.1 Outline of simple cam function

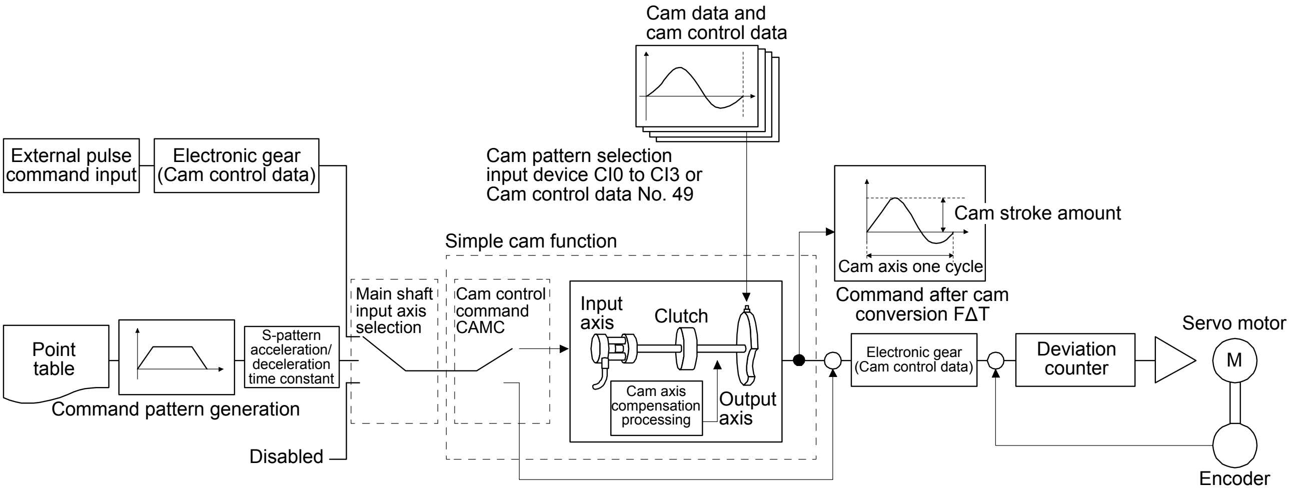
Simple cam function enables synchronous control by using software instead of controlling mechanically with cam.
The following shows a movement trajectory when the cam below is used and the input axis is rotated once.



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.

12.1.2 Simple cam function block

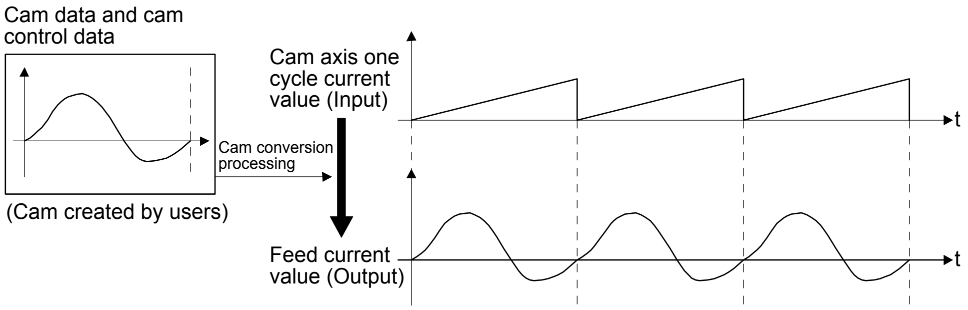
The function block diagram of the simple cam is shown below. Use MR Configurator2 to set the cam data and the cam control data.

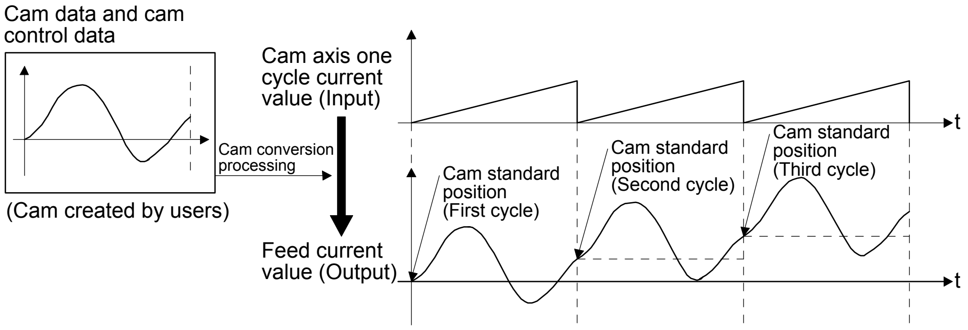


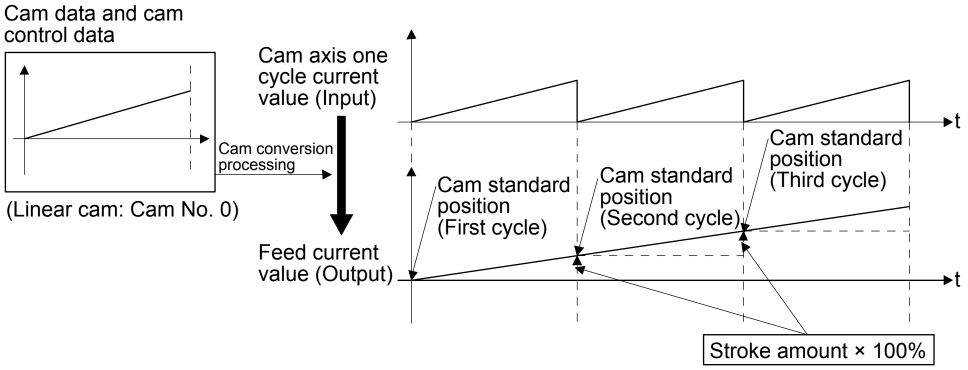
Normal positioning control

12.1.3 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.

<table>
<tr><th>Cam control method</th><th>Description</th><th>Actual movement</th></tr>
<tr><td>To-and-fro control</td><td>Reciprocates within a specified cam stroke.</td><td>


</td></tr>
<tr><td>Feed control</td><td>Updates a cam standard position per cycle.</td><td>


</td></tr>
<tr><td>Linear control</td><td>Performs linear control to keep one-cycle ratio as 100%.</td><td>


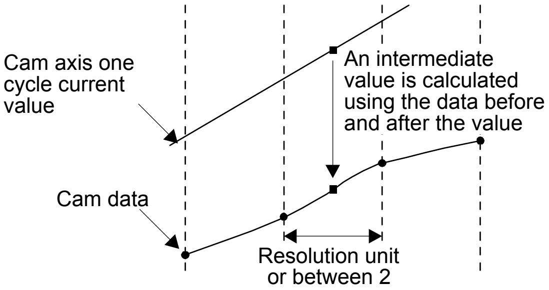
</td></tr>
</table>

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

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

(2) Coordinate data type
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.



12.1.4 Simple cam specification list

(1) Specification list

Item			MR-J4-_A
Memory capacity (Note 1)		Storage area for cam data	8 Kbytes (Flash-ROM)
		Working area for cam data	8 Kbytes (RAM) (Note 2)
Number of registration			Max. 8
Comment			Max. 32 single-byte characters for each cam data
Cam data and cam control data	Stroke ratio data type	Cam resolution	256/512/1024/2048
		Stroke ratio	-100.000 to 100.000 [%]
	Coordinate data type	Number of coordinate	2 to 1024
		Coordinate data	Input value: 0 to 999999 Output value: -999999 to 999999
Cam curve			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)

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.

(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

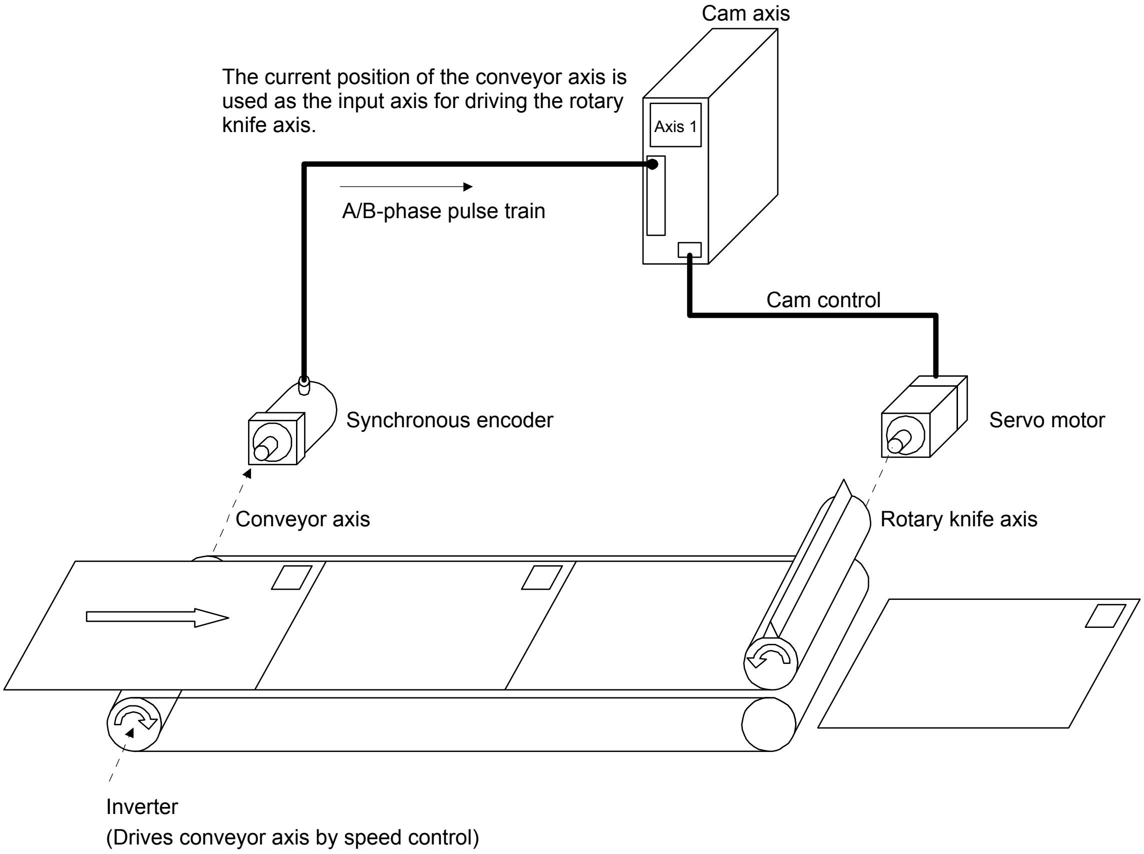
Number of coordinate	Max. number of registration
128	8
256	4
512	2
1024	1

12.1.5 Operation in combination with the simple cam

(1) Encoder following function

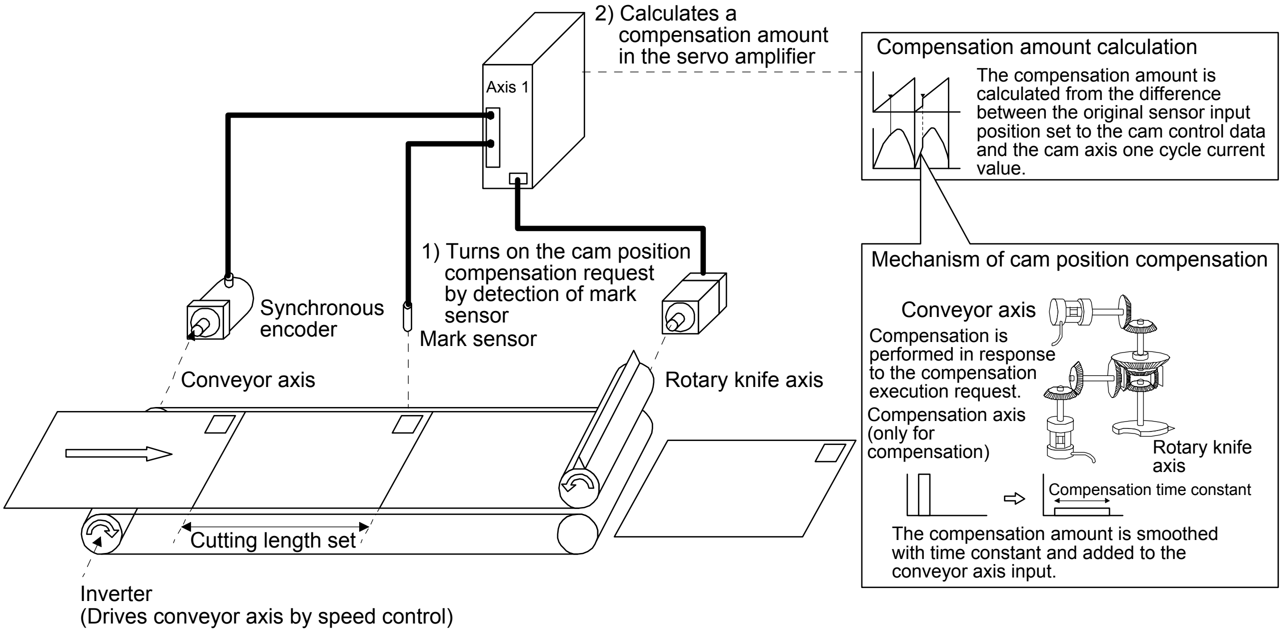
The servo amplifier receives A/B-phase output signal from a synchronous encoder and starts the servo motor with the signal.

Up to 4 Mpulses/s of input from synchronous encoder is compatible with the servo amplifier.



(2) Mark sensor input compensation function

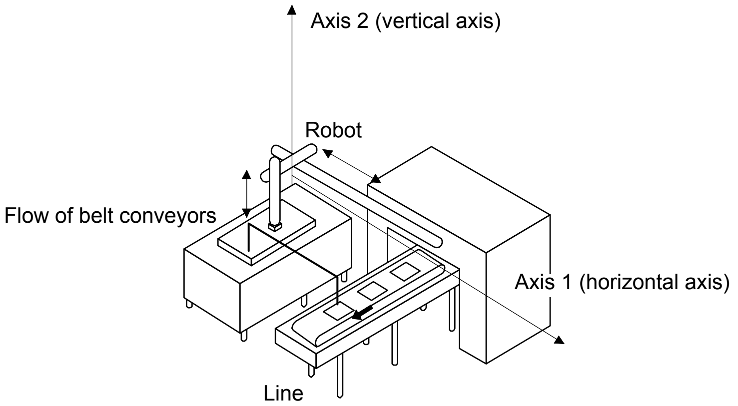
The servo amplifier receives input signals from a mark sensor, calculates compensation amounts, and corrects position errors of the rotary knife axis.

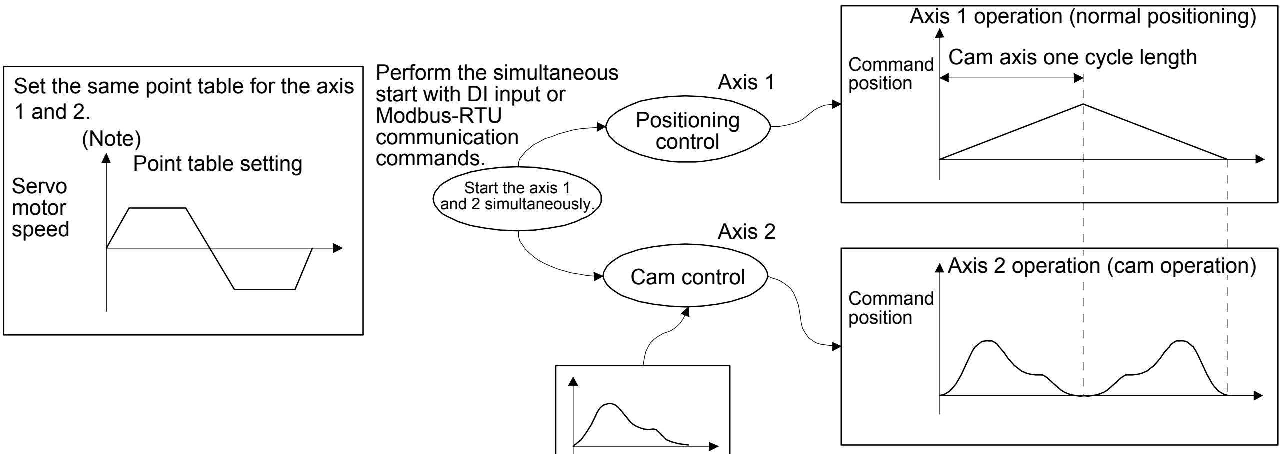


Item	Specifications
Number of mark detection setting	One setting (one input)
Input signal detection direction	Detected by rising edge of an external input signal
Detection accuracy (compensation cycle)	Max. 888 μs

(3) Synchronous operation using positioning data

A synchronous operation is enabled by setting the same positioning data and starting the positioning simultaneously. For example, to synchronize the vertical motion of the vertical axis (axis 2) with the position of the horizontal axis (axis 1), input the positioning commands for axis 1 to axis 2 as well.





Set the same point table for the axis 1 and 2.

Perform the simultaneous start with DI input or Modbus-RTU communication commands.

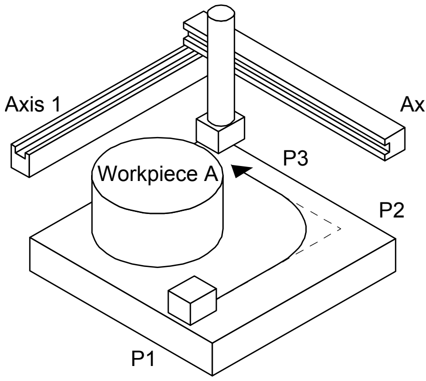
Cam data created by users and cam control data

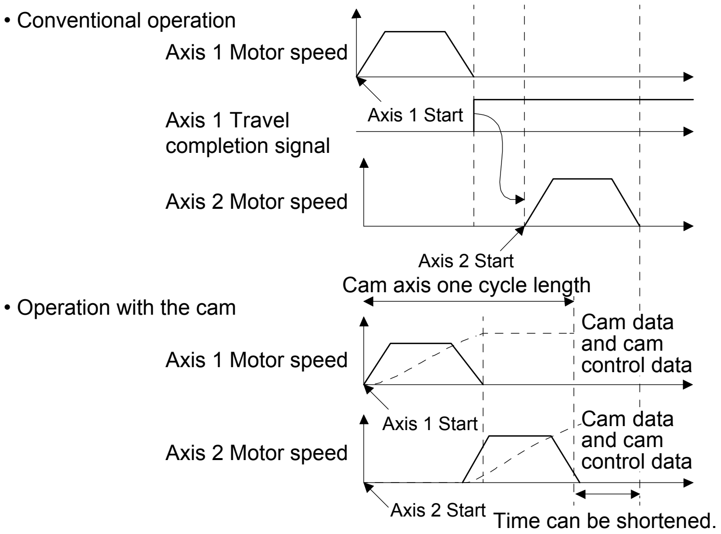
Axis 2 moves vertically synchronized with the reciprocating operation of axis 1. The back and forth motions are symmetrical.

Note. Input the same positioning commands (point table data) to the driven shaft (axis 2) as those for the main shaft (axis 1).

(4) Operation example of synchronous interpolation between two axes

To move a part from point P1 to P3 making a detour to avoid work A, axis 2 starts moving after the travel completion signal of axis 1 is checked at point P2. However, by using the cam control, checking of the travel completion signal is not necessary, shortening the positioning time.





(5) Cam data transmission through Modbus-RTU

Rewriting cam data is possible by transmitting the cam data through Modbus-RTU communication if over eight cam data exceeding the maximum number of registration need to be used. In this case, be sure to rewrite the cam data in servo-off state.

12.1.6 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 amount 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.

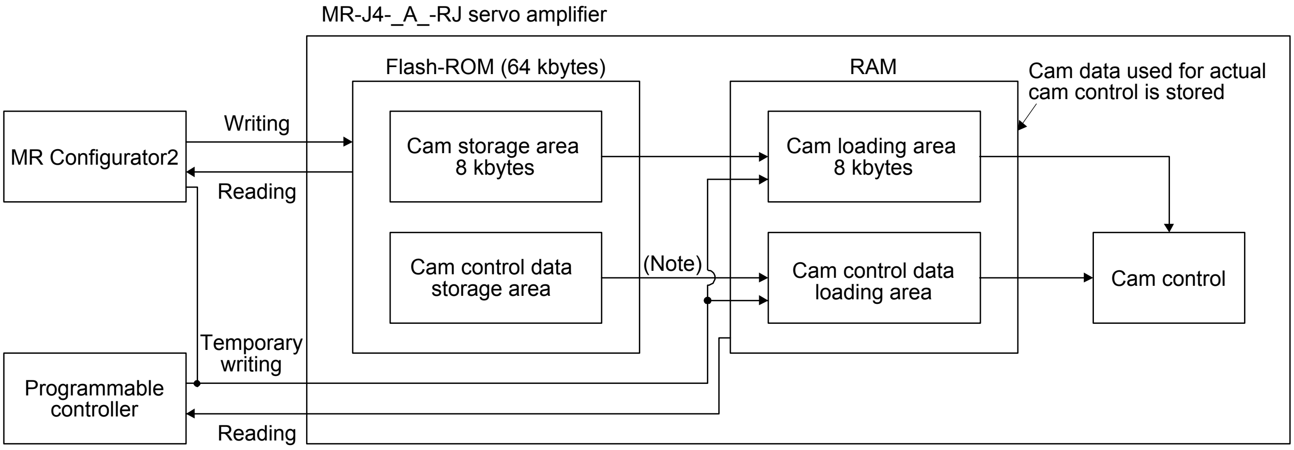
Setting item	Setting
Operation mode selection	Select "Positioning mode (point table method or program method)" with [Pr. PA01 Operation mode].
Cam function setting	Enable the cam function with [Pr. PT35 Function selection T-5].
Cam data selection	Select the cam data to be executed with CI0 (Cam No. selection 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_ _]).

12.1.7 Data to be used with simple cam function

⚠CAUTION	●Note that the number of write times to the Flash-ROM is limited to approximately 100,000. Exceeding the limited number of write times causes the servo amplifier to malfunction. If setting values need to be changed with a high frequency, write the setting values to the RAM, not to the Flash-ROM.

(1) Memory configuration of cam control data and 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 to write the cam control. Two writing methods are available.

Writing method	Description
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.

(2) Cam data and cam control data

The following two types are available for the cam data and cam control data.

Cam data and cam control 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.

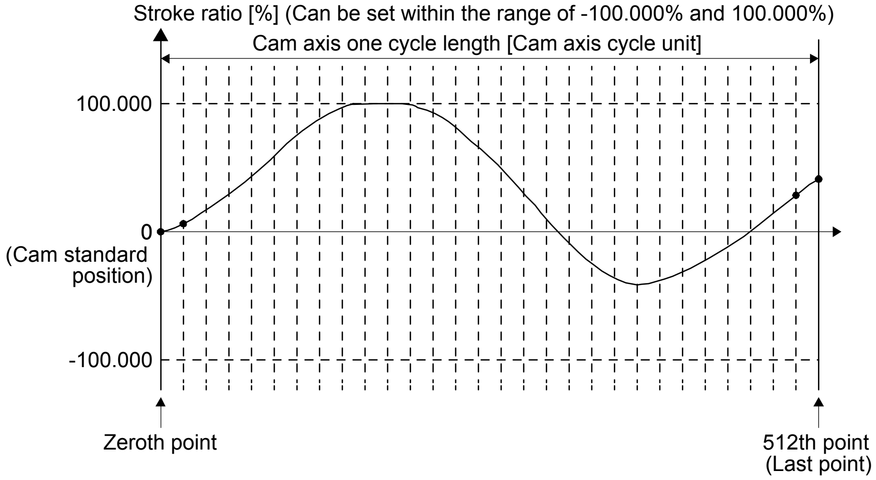
(a) Stroke ratio data type

The following are set in the stroke ratio data type.

Set these on the cam setting window of MR Configurator2.

Setting item	Setting	Setting range
Cam No.	Set a Cam No.	0: Linear cam 1 to 8: User-created cam
Cam data and cam control data type	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 and cam control 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 shows a setting example for "cam resolution = 512" in the stroke ratio data type.

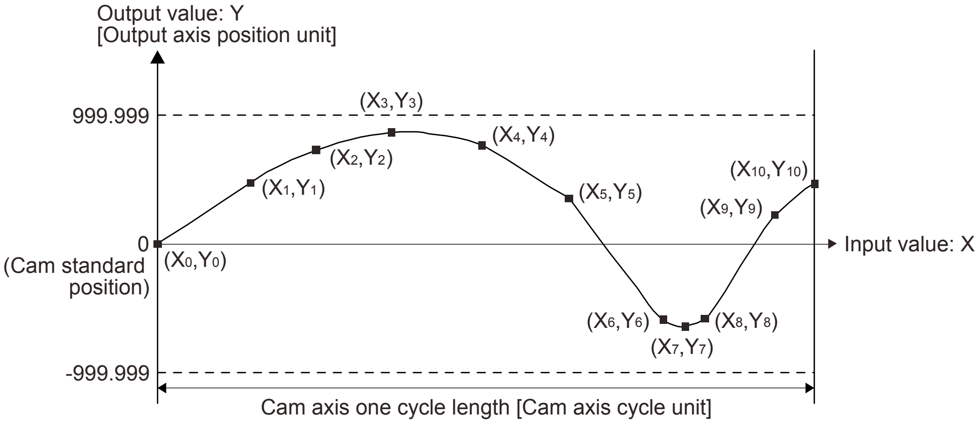


(b) Coordinate data type

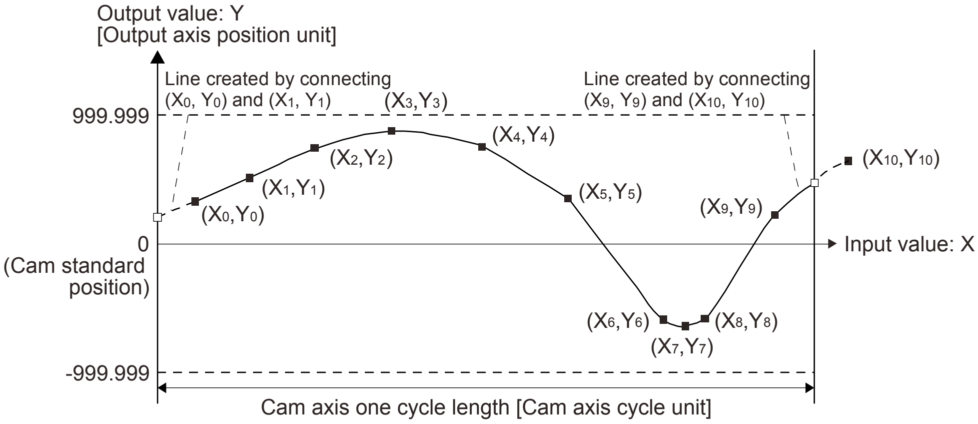
The following are set in the coordinate data type. Set these on the cam setting window of MR Configurator2.

Setting item	Setting	Setting range
Cam No.	Set a Cam No.	0: Linear cam 1 to 8: User-created cam
Cam data and cam control data type	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 and cam control data start position	Setting is not necessary.	
Coordinate data	Set the coordinate data as "(input value Xn, output value Yn)" for the number of coordinates. Set from the 0th coordinate data as "(X0, Y0)". Set an input value larger than that of the coordinate data.	-999.999 to 999.999

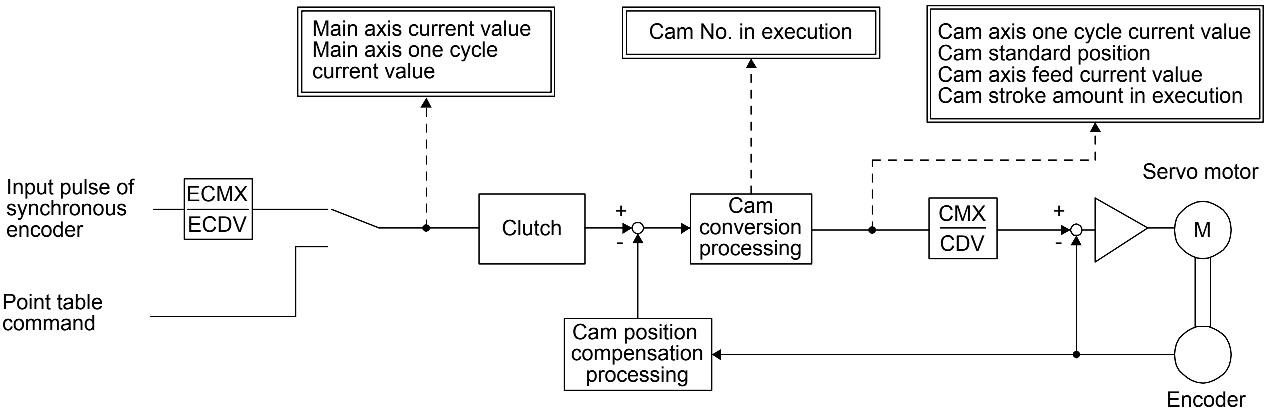
The following is a setting example for the coordinate data type.



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 connecting the closest two points.



12.1.8 Function block diagram for displaying state of simple cam control



12.1.9 Operation

For operation method, contact your local sales office.

12.2 Mark detection

12.2.1 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.
- ●For the servo amplifiers with software version B7 or later, 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)

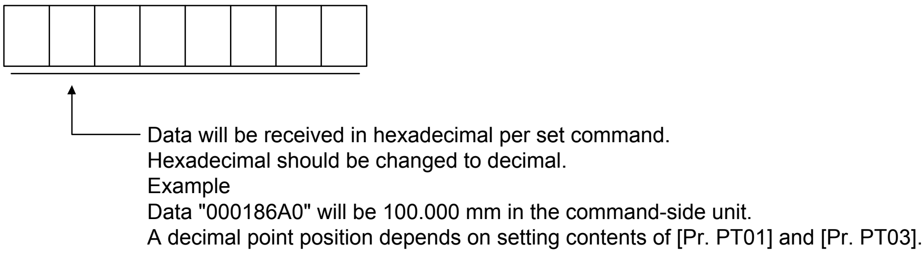
Reads MSD (Mark detection) rising latch data or MSD (Mark detection) falling latch data.

1) Transmission

Transmit command [1] [A] and latch data No. to be read [0] [0] or [0] [1]. Refer to section 10.1.1.

2) Return

The slave station returns the requested latch data.



Data will be received in hexadecimal per set command.
Hexadecimal should be changed to decimal.
Example
Data "000186A0" will be 100.000 mm in the command-side unit.
A decimal point position depends on setting contents of [Pr. PT01] and [Pr. PT03].

(b) Rising latch data or falling latch data (data part + additional information)

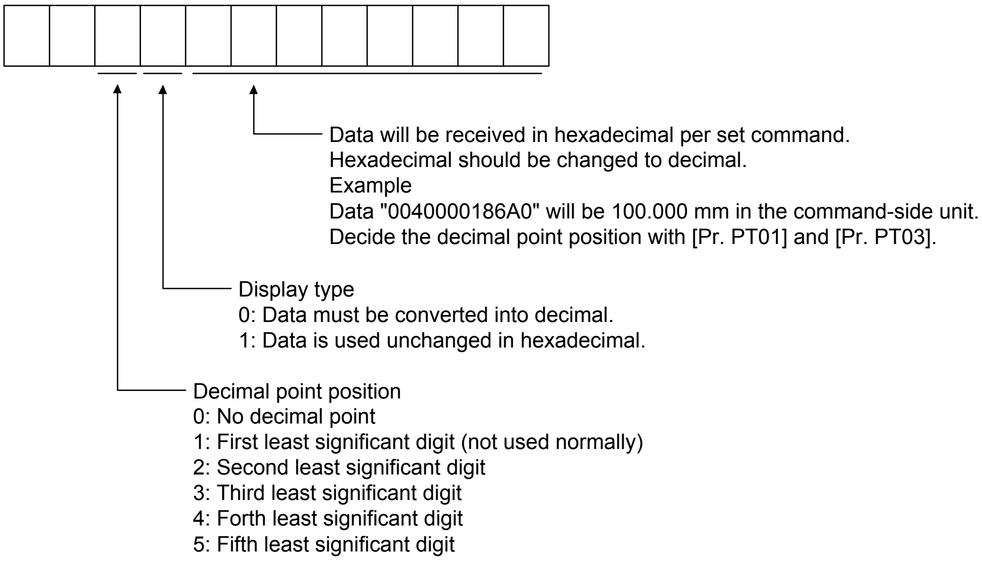
Reads MSD (Mark detection) rising latch data or MSD (Mark detection) falling latch data.

1) Transmission

Transmit command [1] [A] and latch data No. to be read [0] [2] or [0] [3]. Refer to section 10.1.1.

2) Return

The slave station returns the requested latch data.



Data will be received in hexadecimal per set command.
Hexadecimal should be changed to decimal.
Example
Data "0040000186A0" will be 100.000 mm in the command-side unit.
Decide the decimal point position with [Pr. PT01] and [Pr. PT03].

Display type
0: Data must be converted into decimal.
1: Data is used unchanged in hexadecimal.

Decimal point position
0: No decimal point
1: First least significant digit (not used normally)
2: Second least significant digit
3: Third least significant digit
4: Forth least significant digit
5: Fifth least significant digit

(3) Parameter

Set the parameters as follows:

Item	Parameter to be used	Setting
Mark detection function selection	[Pr. PT26]	Set the mark detection function selection as follows: 0 _ _ _: Current position latch function
Mark detection range + (lower three digits)	[Pr. PC66]	Set the upper limit of the latch data in the current position latch function. When the roll feed display is enabled, set this value with the travel distance from the starting position. Set the 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. This parameter setting is available with servo amplifiers with software version B7 or later.
Mark detection range + (upper three digits)	[Pr. PC67]	
Mark detection range - (lower three digits)	[Pr. PC68]	Set the lower limit of the latch data in the current position latch function. When the roll feed display is enabled, set this value with the travel distance from the starting position. Set the 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. This parameter setting is available with servo amplifiers with software version B7 or later.
Mark detection range - (upper three digits)	[Pr. PC69]	

(4) Latch data range setting

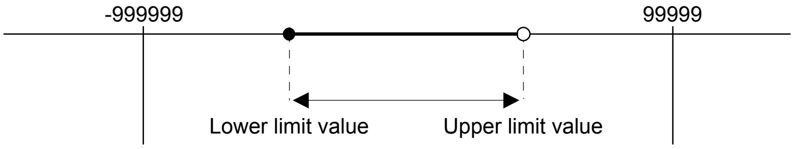
The current position is latched only within the range set in [Pr. PC66] to [Pr. PC69]. (The valid range includes the upper limit value and lower limit value set to the parameters.)

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).

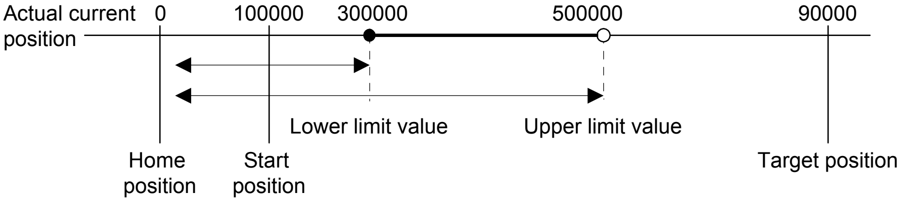
[AL. 37 occurs] when Upper limit value < Lower limit value.



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.

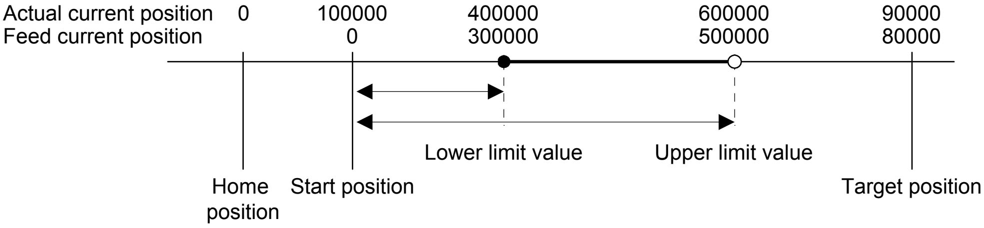


2) When the roll feed display is enabled ([Pr. PT26]: _ _ 1 _)

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

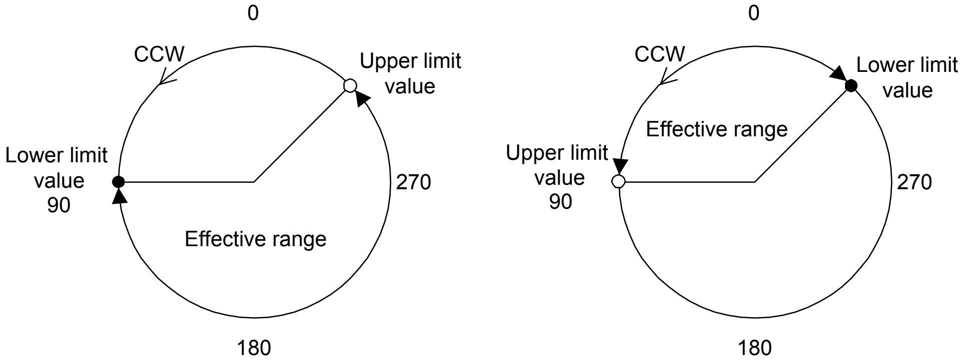
When the unit is set to [degree], the setting range of the current position latch is from 0 degree (upper limit) to 359.999 degrees (lower limit).

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

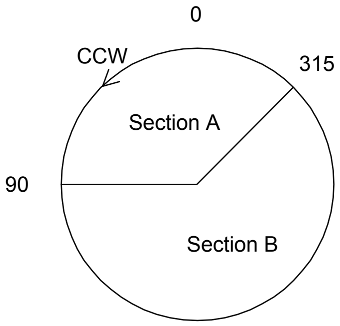
The valid range of the current position latch varies depending on the setting of the upper and lower limits.

The valid range remains unchanged even if the rotation direction is reversed.

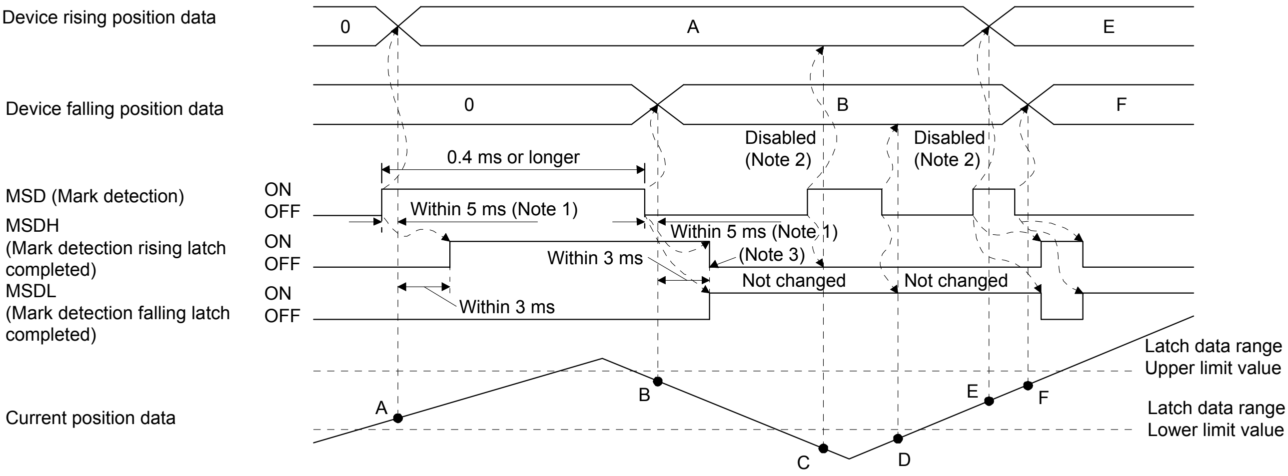


Upper limit value > Lower limit value   Lower limit value > Upper limit value

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

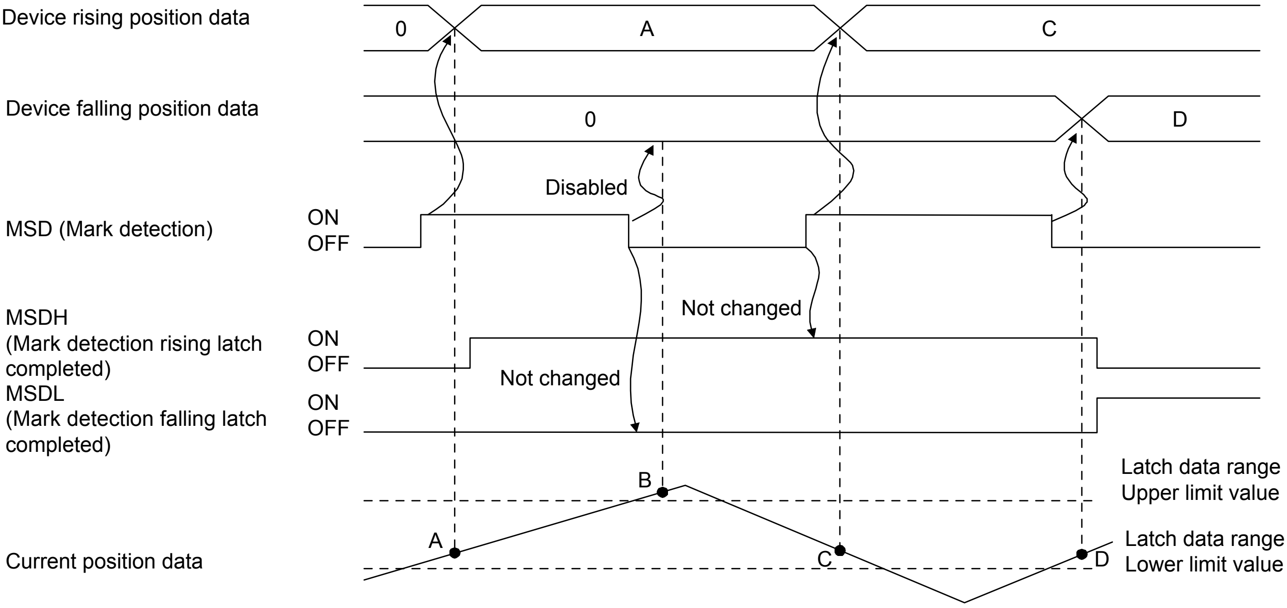


Note 1. When MSD (Mark detection) is assigned to the CN1-10 pin with [Pr. PD44], current position data can be obtained in high speed (within 0.4 ms). When assigning MSD (Mark detection) to the CN1-10 pin, set "Mark detection fast input signal filter selection" in [Pr. PD31].

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 timing 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.



12.2.2 Interrupt positioning function

The interrupt positioning function executes an operation by changing the remaining distance to the travel distance that is set with [Pr. PT30] and [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 is available with servo amplifiers with software version B7 or later.

●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 at the mark sensor stop position depending on the droop pulses of when MSD (Mark detection) is turned on and a minimum stopping distance required for deceleration.

(1) Parameter

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).
PI1 (Program input 1) Polarity selection to PI3 (Program input 3) 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 this value 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]	

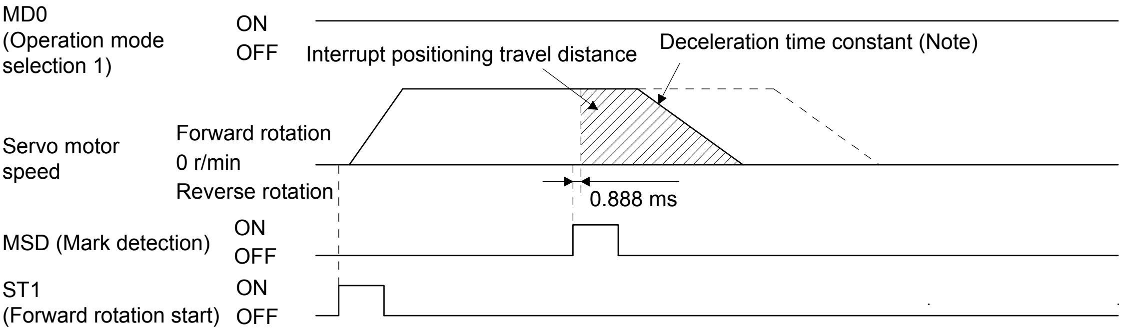
(2) Rotation direction

[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.

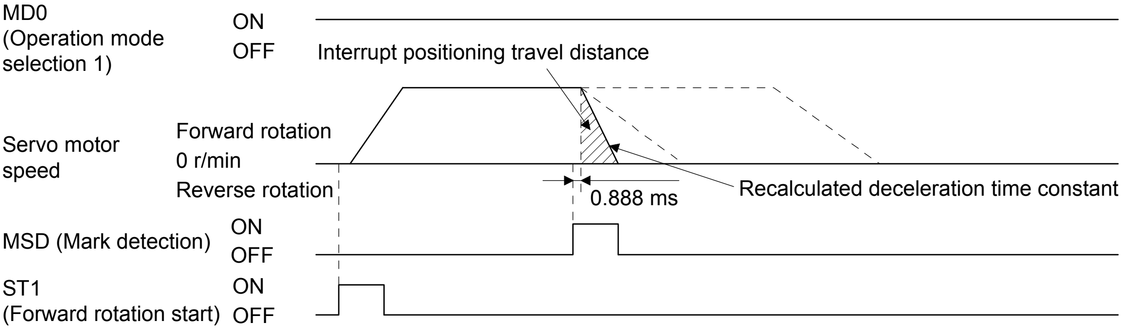
(4) Timing chart



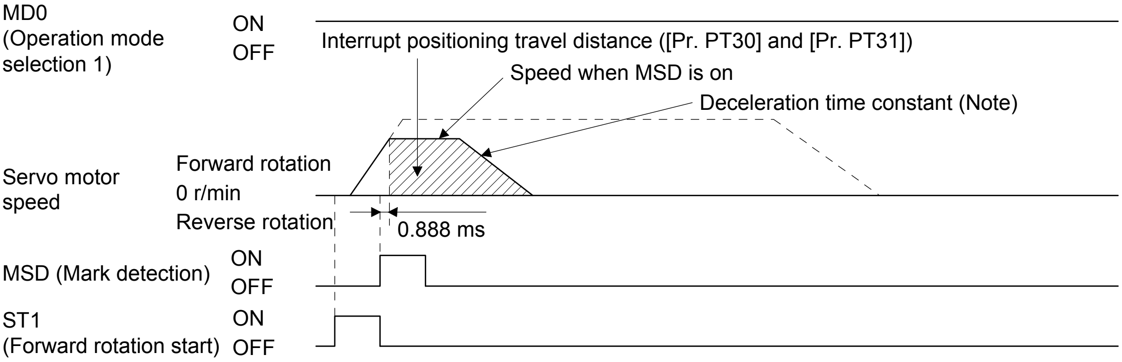
Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

The movement other than above is as follows:

(a) When 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.

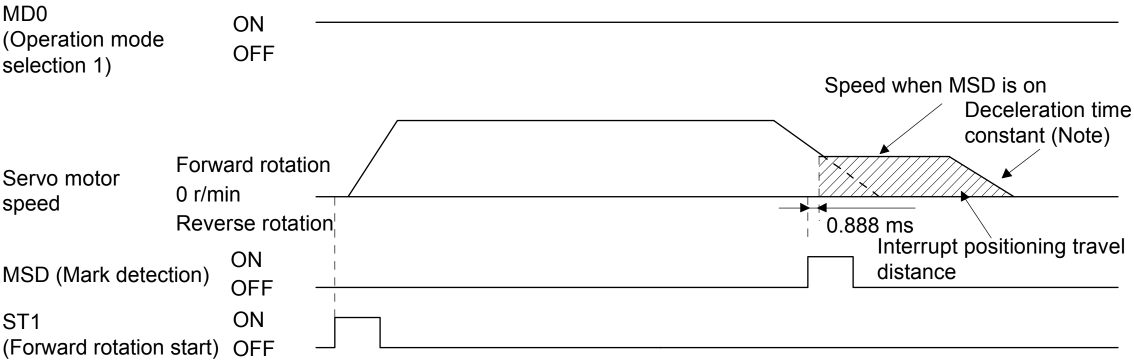


(b) When the interrupt travel distance is large during acceleration, the servo motor stops with the deceleration time constant after rotating with the command speed at which MSD (Mark detection) turned on.



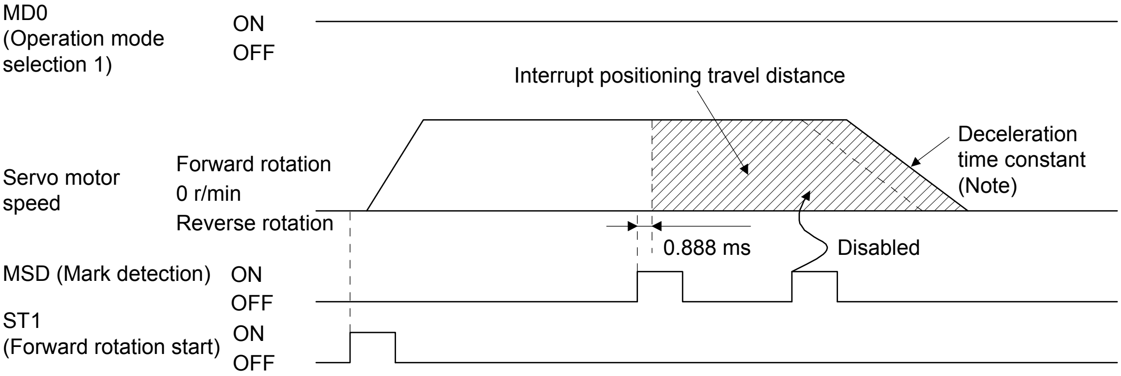
Note. Deceleration time constant of the point table at the time of start is applied for the point table method, and deceleration time constant set by the program in execution is applied for the program method.

(c) When 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) When MSD (Mark detection) is turned on again during the interrupt positioning, the input will be disabled.



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	Availability (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 in the program method.
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).

12.3 Infinite feed function (setting degree)

POINT

- ●This function can be used with the absolute position detection system.
- ●The infinite feed function (setting degree) is available with servo amplifiers with software version B7 or later.
- ●The infinite feed function (setting degree) can be used in the point table method and the program method.

When degree is set as the position data unit at the automatic operation or manual operation in the point table method or program method, [AL. E3.1 Multi-revolution counter travel distance excess warning] does not occur and the home position is not erased even if the servo motor rotates 32768 rev or more in the same direction. Thus, the current position is restored after the power is cycled. For other command units, [AL. E3.1 Multi-revolution counter travel distance excess warning] occurs and the home position is erased if the servo motor rotates 32768 rev or more in the same direction.

The following shows differences depending on the position data unit when the servo motor rotates 32768 rev or more in the same direction.

Parameter	Name	Setting digit	Setting value	Unit	[AL. E3.1]	Home position erasure	Current position restoration
PT01	Position data unit	_ x _ _	0	[mm]	It occurs.	Supported	Not supported
			1	[inch]	It occurs.	Supported	Not supported
			2	[degree]	It does not occur. (Note)	None (Note)	Supported (Note)
			3	[pulse]	It occurs.	Supported	Not supported

Note. For the servo amplifiers with software version B6 or earlier, [AL. E3.1] occurs and the home position is erased.

REVISION

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

Print Data	*Manual Number	Revision	
Apr. 2014	SH(NA)030143-A	First edition	
Aug. 2015	SH(NA)030143-B	MR-J4-03A6-RJ servo amplifier, MR-D01, compatibility to source pulses, interrupt positioning function, and infinite feed function (setting degree) are added.	
		Safety Instructions	Partially added and partially changed.
		Relevant manuals	Relevant manuals are added.
		Chapter 1	Partially changed.
		Section 1.1	Partially added and partially changed.
		Section 1.2	Partially added and partially changed.
		Section 1.3	Partially added and partially changed.
		Section 1.4	Using MR-J4-03A6-RJ is added.
		Chapter 2	Partially changed.
		Section 2.1	Page arrangement is changed as MR-J4-03A6-RJ is added.
		Section 2.2	Sentences are added in the POINT, and using MR-J4-03A6-RJ are added.
		Section 2.3	Partially added.
		Section 2.3 (1)	Partially added and partially changed.
		Section 2.3 (2)	Partially added.
		Section 2.3 (3) (b)	Using MR-J4-03A6-RJ is added.
		Section 2.3 (4) (b)	Using MR-J4-03A6-RJ is added.
		Section 2.4	Partially changed.
		Section 2.5	The title is changed, a sentence is added in the POINT, and internal circuit of MR-J4-03A6-RJ is added.
		Section 2.5.2	Deleted.
		Section 2.5.3	Deleted.
		Section 2.6	Using MR-J4-03A6-RJ is added.
		Chapter 3	Page arrangement is changed as MR-J4-03A6-RJ is added. Partially changed.
		Section 3.2	Using MR-J4-03A6-RJ is added.
		Chapter 4	Sentences are added in the POINT. Partially changed.
		Section 4.1	Partially added and partially changed.
		Section 4.2	Partially added and partially changed.
		Section 4.3	Partially changed.
		Section 4.4	Partially changed.
		Section 4.5	Partially changed.
		Section 4.6	Partially changed.
		Chapter 5	Sentences are added in the POINT. Partially changed.
		Section 5.1	Partially changed.
		Section 5.2	Partially added and partially changed.
		Section 5.3	Partially changed.
		Section 5.4	Sentences are partially deleted from the POINT. Partially changed.
		Section 5.5	Partially added and partially changed.
		Section 5.6	Partially added and partially changed.
		Section 5.8	Partially changed.
		Chapter 6	Partially changed.
		Section 6.1	Partially added and partially changed.
		Section 6.2	Partially added and partially changed.
		Section 6.3	Partially added and partially changed.
		Section 6.4	Sentences are partially changed in the POINT. Partially changed.
		Chapter 7	POINT is added.

Print Data	*Manual Number	Revision	
Aug. 2015	SH(NA)030143-B	Section 7.1	Sentences are added in the POINT.
			Partially added and partially changed.
		Section 7.2	Partially added and partially changed.
		Section 7.3.1	POINT is added.
			Partially changed.
		Section 7.3.2	Partially changed.
		Section 7.5	Partially changed.
		Section 7.6	Partially changed.
		Chapter 8	Partially changed.
		Section 8.2	Partially changed.
		Section 8.3	Partially added.
		Chapter 9	Partially changed.
		Chapter 10	The title is changed.
			Partially changed.
		Section 10.1	Partially added and partially changed.
		Section 10.2	Partially added and partially changed.
		Section 10.2.7	Deleted.
		Section 10.3	Partially added and partially changed.
		Chapter 11	Fully changed.
		Chapter 12	Newly added.

Country/Region	Sales office	Tel/Fax
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Mexico	MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch Mariano Escobedo #69, Col. Zona Industrial, Tlalnepantla Edo, C.P.54030, Mexico	Tel : +52-55-3067-7500 Fax : –
Brazil	MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA. Rua Jussara, 1750- Bloco B Anexo, Jardim Santa Cecilia, CEP 06465-070, Barueri - SP, Brasil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
UK	MITSUBISHI ELECTRIC EUROPE B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, U.K.	Tel : +44-1707-28-8780 Fax : +44-1707-27-8695
Italy	MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch Centro Direzionale Colleoni - Palazzo Sirio Viale Colleoni 7, 20864 Agrate Brianza (Milano) Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch Carretera de Rubí, 76-80-Apdo. 420, 08173 Sant Cugat del Vallés (Barcelona), Spain	Tel : +34-935-65-3131 Fax : +34-935-89-1579
France	MITSUBISHI ELECTRIC EUROPE B.V. French Branch 25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France	Tel : +33-1-55-68-55-68 Fax : +33-1-55-68-57-57
Czech Republic	MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch Avenir Business Park, Radlicka 751/113e, 158 00 Praha5, Czech Republic	Tel : +420-251-551-470 Fax : +420-251-551-471
Poland	MITSUBISHI ELECTRIC EUROPE B.V. Polish Branchul. Krakowska 50, 32-083 Balice, Poland	Tel : +48-12-630-47-00 Fax : +48-12-630-47-01
Russia	MITSUBISHI ELECTRIC EUROPE B.V. Russian Branch St. Petersburg office Piskarevsky pr. 2, bld 2, lit “Sch”, BC “Benua”, office 720; RU-195027 St. Petersburg, Russia	Tel : +7-812-633-3497 Fax : +7-812-633-3499
Sweden	MITSUBISHI ELECTRIC EUROPE B.V. (Scandinavia) Fjelievägen 8, SE-22736 Lund, Sweden	Tel : +46-8-625-10-00 Fax : +46-46-39-70-18
Turkey	MITSUBISHI ELECTRIC TURKEY A.Ş Ümraniye Branch Şerifali Mahallesi Nutuk Sokak No:5, TR-34775 Ümraniye, İstanbul, Türkey	Tel : +90-216-526-3990 Fax : +90-216-526-3995
UAE	MITSUBISHI ELECTRIC EUROPE B.V. Dubai Branch Dubai Silicon Oasis, P.O.BOX 341241, Dubai, U.A.E.	Tel : +971-4-3724716 Fax : +971-4-3724721
South Africa	ADROIT TECHNOLOGIES 20 Waterford Office Park, 189 Witkoppen Road, Fourways, Johannesburg, South Africa	Tel : +27-11-658-8100 Fax : +27-11-658-8101
China	MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Shanghai, China	Tel : +86-21-2322-3030 Fax : +86-21-2322-3000
Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan, R.O.C.	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. 7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 157-801, Korea	Tel : +82-2-3660-9510 Fax : +82-2-3664-8372/8335
Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD. 307, Alexandra Road, Mitsubishi Electric Building, Singapore 159943	Tel : +65-6473-2308 Fax : +65-6476-7439
Thailand	MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD. 12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang, Khet Yannawa, Bangkok 10120, Thailand	Tel : +66-2682-6522 to 6531 Fax : +66-2682-6020
Indonesia	PT. MITSUBISHI ELECTRIC INDONESIA Gedung Jaya 11th Floor, JL. MH. Thamrin No.12, Jakarta Pusat 10340, Indonesia	Tel : +62-21-3192-6461 Fax : +62-21-3192-3942
Vietnam	MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED Unit 01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam	Tel : +84-8-3910-5945 Fax : +84-8-3910-5947
India	MITSUBISHI ELECTRIC INDIA PVT. LTD. Pune Branch Emerald House, EL -3, J Block, M.I.D.C Bhosari, Pune - 411026, Maharashtra, India	Tel : +91-20-2710-2000 Fax : +91-20-2710-2100
Australia	MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD. 348 Victoria Road, P.O. Box 11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245

MELSERVO is a trademark or registered trademark of Mitsubishi Electric Corporation in Japan and/or other countries.
Modbus is registered trademark of SCHNEIDER ELECTRIC USA, INC.
All other product names and company names are trademarks or registered trademarks of their respective companies.

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 responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

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-J4-A-RJ INSTRUCTIONMANUAL(ITIGIME)
MODEL CODE	1CW819

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BLDG MARUNOUCHI TOKYO 100-8310

SH (NA) 030143-B (1508) MEE Printed in Japan

This Instruction Manual uses recycled paper.
Specifications are subject to change without notice.