



General-Purpose AC Servo

# MELSERVO-J3

Turret Indexer AC Servo amplifier  
Servo amplifier MR-J3-□A□-RJ070  
Option Card MR-J3-D01

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## Product Specifications

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MITSUBISHI ELECTRIC CORPORATION  
NAGOYA WORKS

<b>Revision</b>		
<b>Sub-version</b>	<b>Description</b>	<b>Created</b>
*	First edition	'07-Dec-6th
A	<p>Chapter 6, Section (3): Added an explanation of data setting type home position return.</p> <p>Chapter 9: Added AL. 37 alarm details.</p> <p>Corrected the unit of the status display of parameter number PC36.</p> <p>Standardized the automatic operation speed name.</p> <p>Changed the setting ranges for parameter numbers PC03, PC04, and PC05.</p> <p>Chapter 10: Added an MR Configurator (setup software) supporting method.</p>	'08-May-8th

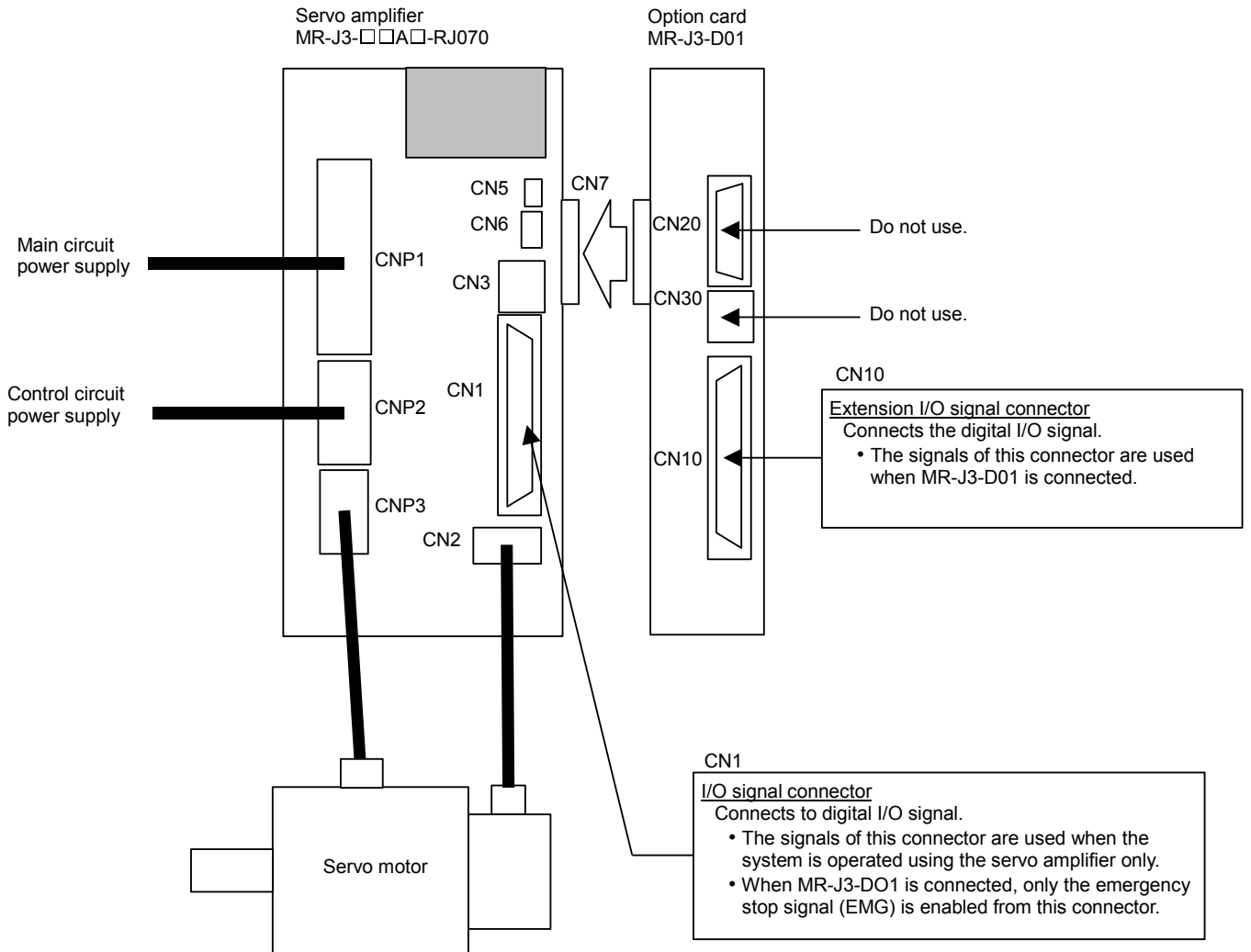


## 2. SYSTEM CONFIGURATION

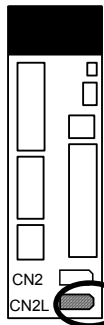
The outside dimensions of the servo amplifier depend on the presence of an additional optional unit. With the additional unit, the servo amplifier width increases by the width of the additional unit.

Model	Amplifier size Comparison		
	Without option	With option	Increase in width
MR-J3-10A/20A-RJ070	40×168×135	<b>60</b> ×168×135	+20mm
MR-J3-40A/60A-RJ070	40×168×170	<b>60</b> ×168×170	+20mm
MR-J3-70A/100A-RJ070	60×168×185	<b>80</b> ×168×185	+20mm
MR-J3-200A/350A-RJ070	90×168×195	<b>105</b> ×168×195	+15mm
MR-J3-500A-RJ070	130×250×200	<b>140</b> ×250×200	+10mm
MR-J3-700A-RJ070	172×300×200	<b>182</b> ×300×200	+10mm
MR-J3-11 to 22KA-RJ070	260×400×260	260×400×260	±0mm
MR-J3-10A1/20A1-RJ070	40×168×135	<b>60</b> ×168×135	+20mm
MR-J3-40A1-RJ070	40×168×170	<b>60</b> ×168×170	+20mm
MR-J3-60A4/100A4-RJ070	60×168×195	<b>80</b> ×168×195	+20mm
MR-J3-200A4-RJ070	90×168×195	<b>105</b> ×168×195	+15mm
MR-J3-350A4/500A4-RJ070	130×250×200	<b>140</b> ×250×200	+10mm
MR-J3-700A4-RJ070	172×300×200	<b>182</b> ×300×200	+10mm
MR-J3-11KA4 to 22KA4-RJ070	260×400×260	260×400×260	±0mm

\* Size comparison: Width (mm) × Height (mm) × Depth (mm)



MR-J3-A-RJ070



Note: Do not use the CN2L terminal of the servo amplifier.

Prohibited to use

### 3. SPECIFICATIONS

#### 3.1 Servo amplifier

Item		Servo amplifier MR-J3-□-RJ070																	
		10A	20A	40A	60A	70A	100A	200A	350A	500A	700A	11KA	15KA	22KA	10A1	20A1	40A1		
Power supply	Voltage/frequency	3-phase 200 to 230VAC, 50/60Hz 1-phase 200 to 230VAC, 50/60Hz					3-phase 200 to 230VAC, 50/60Hz						1-phase 100 to 120VAC, 50/60Hz						
	Permissible voltage fluctuation	For 1-phase 230VAC: 207 to 253VAC For 3-phase 200 to 230VAC: 170 to 253VAC					3-phase 170 to 253VAC						1-phase 85 to 132VAC						
	Permissible frequency fluctuation	Within ±5%																	
Control circuit power supply	Voltage/frequency	1-phase 200 to 230VAC, 50/60Hz												1-phase 100 to 120VAC, 50/60Hz					
	Permissible voltage fluctuation	1-phase 170 to 253VAC												1-phase 85 to 132VAC					
	Permissible frequency fluctuation	Within ±5%																	
	Input	30W						45W						30W					
Inrush current		Refer to Section 11.5 of MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL																	
Interface power supply	Voltage	24VDC±10%																	
	Power supply capacity	300mA (Note 1)																	
Control system		Sine-wave PWM control, current control system																	
Dynamic brake		Built-in						External option						Built-in					
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection																	
Indexer positioning (turret)	Maximum number of stations	MR-J3-□A□-RJ070 only: 15 stations, With MR-J3-D01: 255 stations																	
	Number of gears on servo motor/machine (electronic gears)	1/9999<CMX/CDV<9999, CDV × STN<32767, CMX × CDV<100000																	
	In-position range setting	0 to ±10000 pulses (encoder pulse unit)																	
	Error excessive	±3 revolutions																	
	Torque limit	Set by parameter setting or external analog input (0 to +10VDC/maximum torque)																	
Structure		Self-cooled, open (IP00)						Forced-cooling, open (IP00)						Self-cooled, open (IP00)					
Environment	Ambient temperature	In operation	[°C]	(Note 2) 0 to +55 (non-freezing)															
			[°F]	32 to +131 (non-freezing)															
	In storage	[°C]	-20 to +65 (non-freezing)																
		[°F]	-4 to 149 (non-freezing)																
	Ambient humidity	In operation	90% RH or less (non-condensing)																
		In storage	90% RH or less (non-condensing)																
	Ambient	Indoor (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust, and dirt																	
Altitude	Max. 1000m above sea level																		
Vibration	5.9[m/s <sup>2</sup> ] or less																		
Mass	[kg]	0.8	0.8	1.0	1.0	1.4	1.4	2.3	2.3	4.6	6.2	18.0	18.0	19.0	0.8	0.8	1.0		
	[lb]	1.76	1.76	2.21	2.21	3.09	3.09	5.07	5.07	10.1	13.7	39.7	39.7	41.9	1.76	1.76	2.21		

Note 1. 300mA is the value when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points.

- When closely mounting the servo amplifiers of 3.5kW or less, operate them at the ambient temperatures of 0 to 45°C or at 75% or smaller effective load ratio.

Item		Servo amplifier MR-J3-□-RJ070											
		60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4			
Power supply	Voltage/frequency	3-phase 380 to 480VAC, 50/60Hz											
	Permissible voltage fluctuation	3-phase 323 to 528VAC											
	Permissible frequency fluctuation	Within ±5%											
	Power supply equipment capacity	Refer to Section 11.2											
	Inrush current	Refer to Section 11.5											
Control circuit power supply	Voltage/frequency	1-phase 380 to 480VAC, 50/60Hz											
	Permissible voltage fluctuation	1-phase 323 to 528VAC											
	Permissible frequency fluctuation	Within ±5%											
	Input	30W					45W						
	Inrush current	Refer to Section 11.5 of MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL											
Interface power supply	Voltage	24VDC±10%											
	Power supply capacity	(Note) 300mA											
Control system		Sine-wave PWM control, current control system											
Dynamic brake		Built-in					External option						
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection											
Indexer positioning (turret)	Maximum number of stations	MR-J3-□A□-RJ070 only: 15 stations, With MR-J3-D01: 255 stations											
	Number of gears on servo motor/machine (electronic gears)	1/9999<CMX/CDV<9999, CDV × STN<32767, CMX × CDV<100000											
	In-position range setting	0 to ±10000 pulses (encoder pulse unit)											
	Error excessive	±3 revolutions											
	Torque limit	Set by parameter setting or external analog input (0 to +10VDC/maximum torque)											
Structure		Self-cooled, open (IP00)					Forced-cooling, open (IP00)						
Environment	Ambient temperature	In operation	[°C]	0 to +55 (non-freezing)									
			[°F]	32 to +131 (non-freezing)									
		In storage	[°C]	-20 to +65 (non-freezing)									
			[°F]	-4 to 149 (non-freezing)									
	Ambient humidity	In operation	90% RH or less (non-condensing)										
		In storage											
	Ambient	Indoor (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust, and dirt											
	Altitude	Max. 1000m above sea level											
Vibration	5.9[m/s <sup>2</sup> ] or less												
Mass	[kg]	1.7	1.7	2.1	4.6	4.6	6.2	18	18	19			
	[lb]	3.75	3.75	4.63	10.1	10.1	13.7	39.7	39.7	41.9			

Note. 300mA is the value when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points.

### 3.2 Servo motor

For servo motor specifications, refer to the separate specification. For standard servo motors, refer to the MELSERVO SERVO MOTOR INSTRUCTION MANUAL (Vol. 2).

The servo motor and servo amplifier combinations are described below.

The special number "RJ070" is applied in the squares at the end of the servo amplifier models.

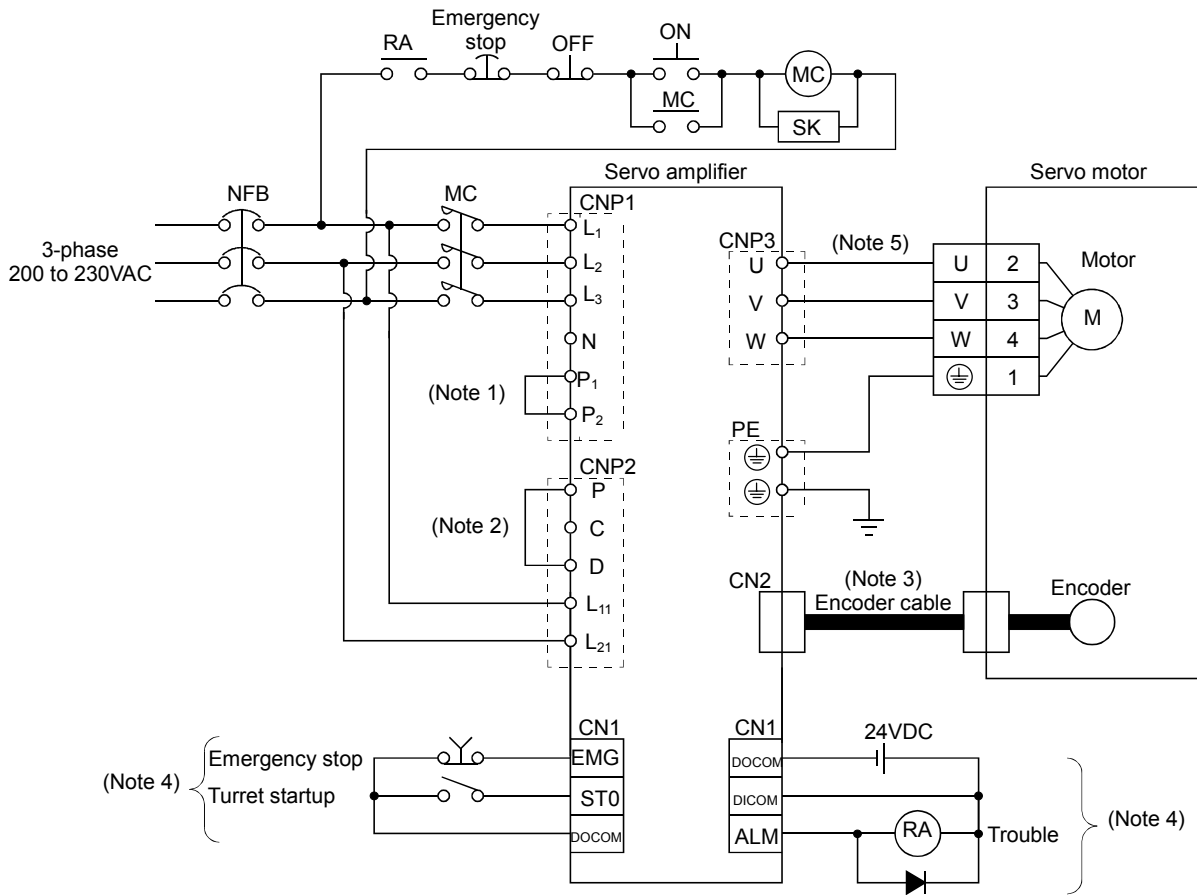
Servo motor	Servo amplifier	Servo motor	Servo amplifier
HF-KP053	MR-J3-10A-□	HC-UP72	MR-J3-70A-□
HF-KP13	MR-J3-10A-□	HC-UP152	MR-J3-200A-□
HF-KP23	MR-J3-20A-□	HC-UP202	MR-J3-350A-□
HF-KP43	MR-J3-40A-□	HC-UP352	MR-J3-500A-□
HF-KP73	MR-J3-70A-□	HC-UP502	MR-J3-500A-□
HF-MP053	MR-J3-10A-□	HC-LP52	MR-J3-60A-□
HF-MP13	MR-J3-10A-□	HC-LP102	MR-J3-100A-□
HF-MP23	MR-J3-20A-□	HC-LP152	MR-J3-200A-□
HF-MP43	MR-J3-40A-□	HC-LP202	MR-J3-350A-□
HF-MP73	MR-J3-70A-□	HC-LP302	MR-J3-500A-□
HF-SP52	MR-J3-60A-□	HA-LP601	MR-J3-700A-□
HF-SP102	MR-J3-100A-□	HA-LP801	MR-J3-11KA-□
HF-SP152	MR-J3-200A-□	HA-LP12K1	MR-J3-11KA-□
HF-SP202	MR-J3-200A-□	HA-LP15K1	MR-J3-15KA-□
HF-SP352	MR-J3-350A-□	HA-LP20K1	MR-J3-22KA-□
HF-SP502	MR-J3-500A-□	HA-LP25K1	MR-J3-22KA-□
HF-SP702	MR-J3-700A-□	HA-LP701M	MR-J3-700A-□
HF-SP51	MR-J3-60A-□	HA-LP11K1M	MR-J3-11KA-□
HF-SP81	MR-J3-100A-□	HA-LP15K1M	MR-J3-15KA-□
HF-SP121	MR-J3-200A-□	HA-LP22K1M	MR-J3-22KA-□
HF-SP201	MR-J3-200A-□	HA-LP502	MR-J3-500A-□
HF-SP301	MR-J3-350A-□	HA-LP702	MR-J3-700A-□
HF-SP421	MR-J3-500A-□	HA-LP11K2	MR-J3-11KA-□
HF-SP524	MR-J3-60A4-□	HA-LP15K2	MR-J3-15KA-□
HF-SP1024	MR-J3-100A4-□	HA-LP22K2	MR-J3-22KA-□
HF-SP1524	MR-J3-200A4-□	HA-LP6014	MR-J3-700A4-□
HF-SP2024	MR-J3-200A4-□	HA-LP8014	MR-J3-11KA4-□
HF-SP3524	MR-J3-350A4-□	HA-LP12K14	MR-J3-11KA4-□
HF-SP5024	MR-J3-500A4-□	HA-LP15K14	MR-J3-15KA4-□
HF-SP7024	MR-J3-700A4-□	HA-LP20K14	MR-J3-22KA4-□
HC-RP103	MR-J3-200A-□	HA-LP701M4	MR-J3-700A4-□
HC-RP153	MR-J3-200A-□	HA-LP11K1M4	MR-J3-11KA4-□
HC-RP203	MR-J3-350A-□	HA-LP15K1M4	MR-J3-15KA4-□
HC-RP353	MR-J3-500A-□	HA-LP22K1M4	MR-J3-22KA4-□
HC-RP503	MR-J3-500A-□	HA-LP11K24	MR-J3-11KA4-□
		HA-LP15K24	MR-J3-15KA4-□
		HA-LP22K24	MR-J3-22KA4-□



## 4. SIGNALS AND WIRING

### 4.1 Connection examples of input power supply circuit

<MR-J3-10A to MR-J3-350A with 3-phase 200 to 230VAC power supply>



Note 1. Always connect P<sub>1</sub> and P<sub>2</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.13.

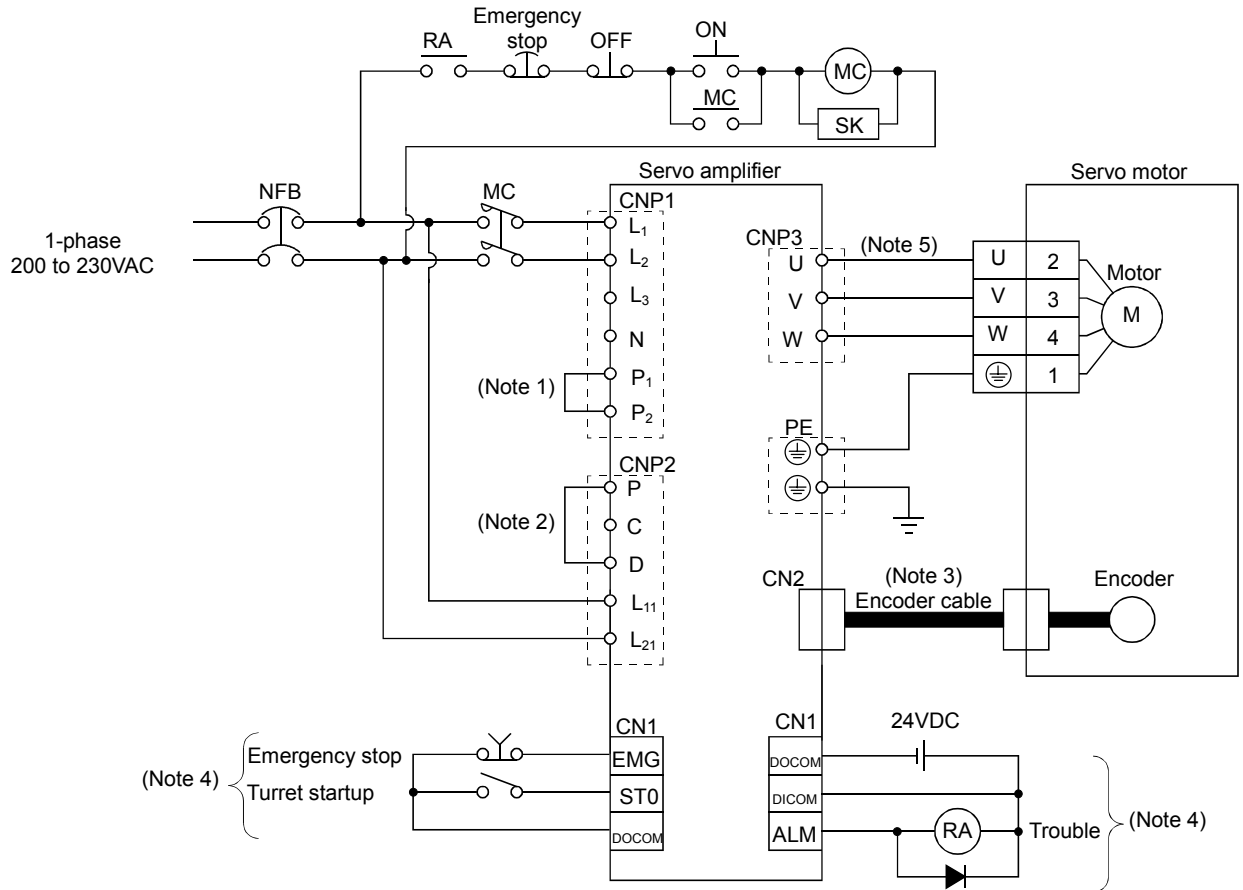
2. Always connect P and D (Factory-wired). When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.

3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.

4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.

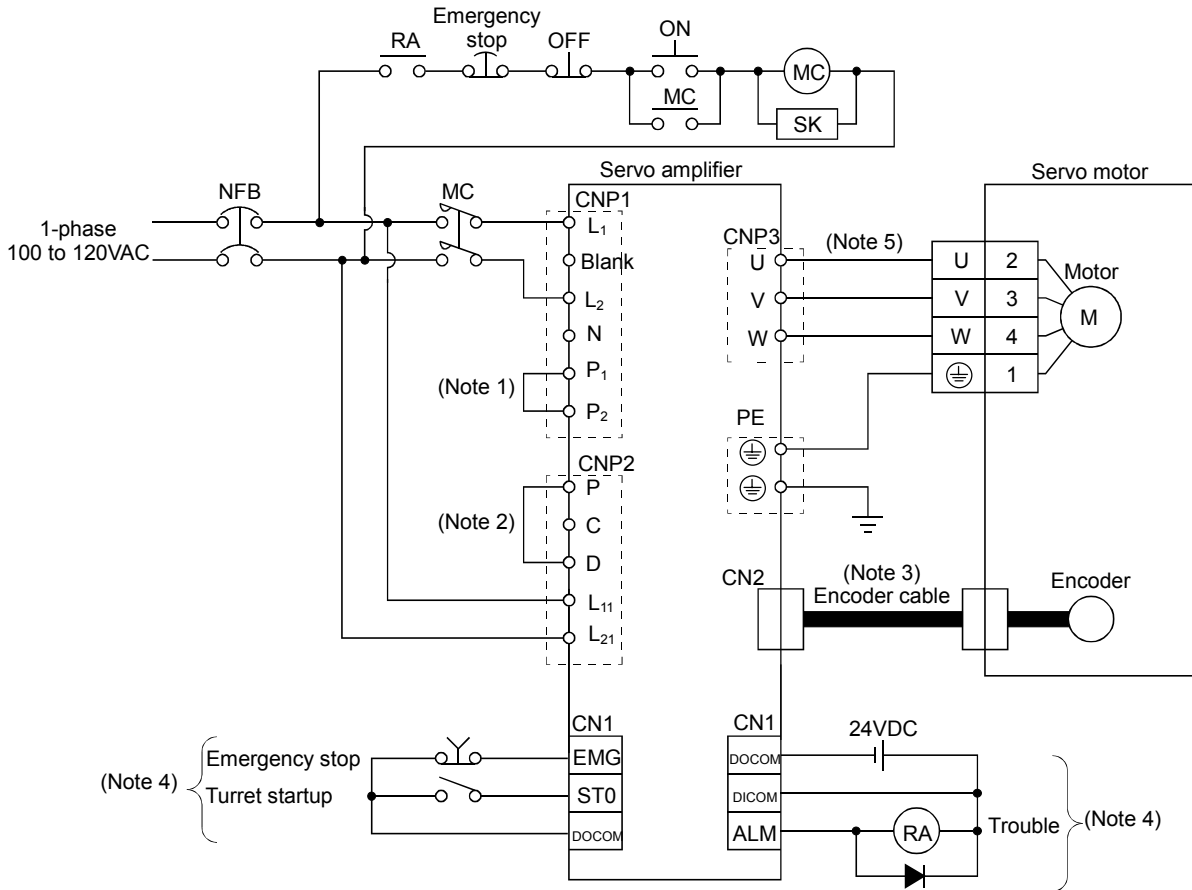
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.

<MR-J3-10A to MR-J3-70A with 1-phase 200 to 230VAC power supply>



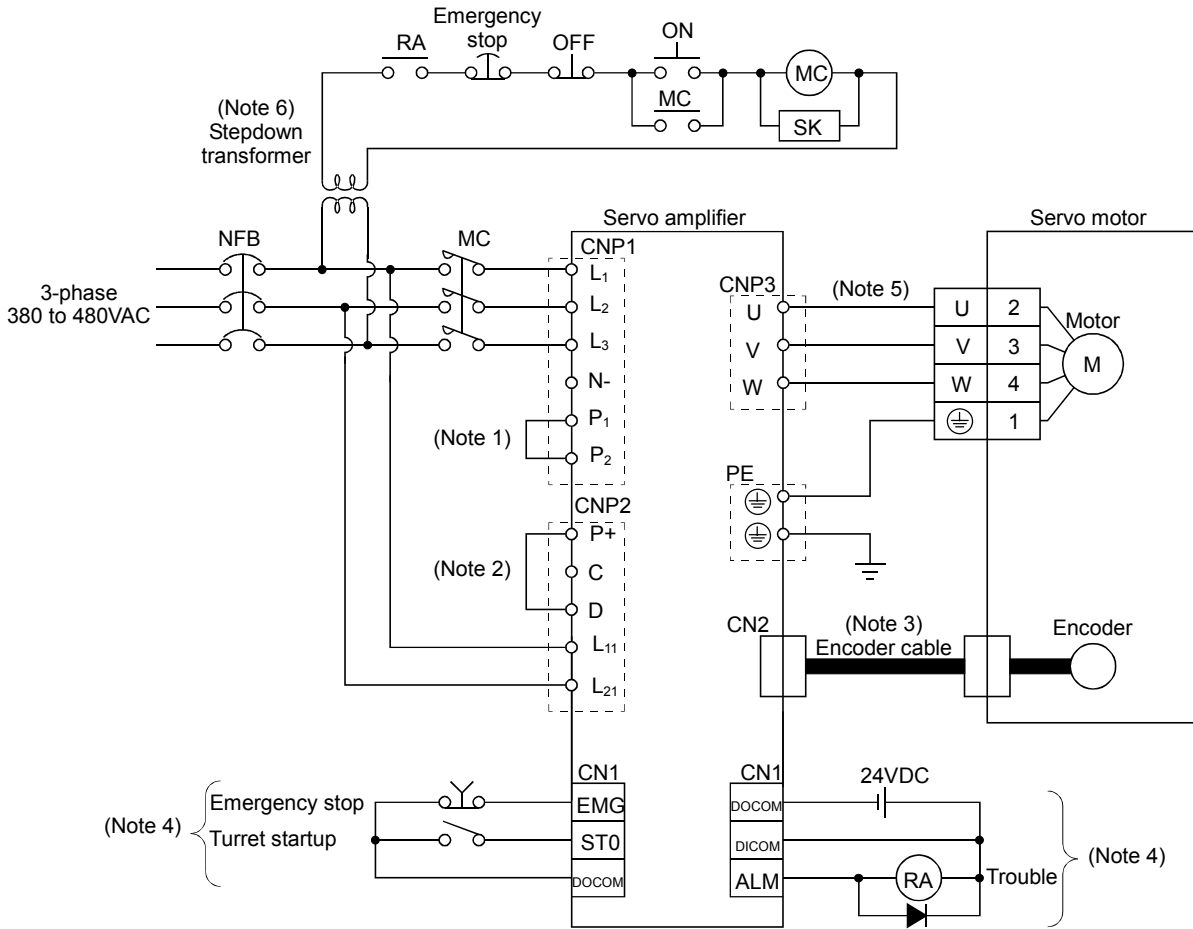
- Note 1. Always connect P<sub>1</sub> and P<sub>2</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.13.
2. Always connect P and D (Factory-wired). When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.
3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.
4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.

<MR-J3-10A1 to MR-J3-40A1 with 1-phase 100 to 120VAC power supply>



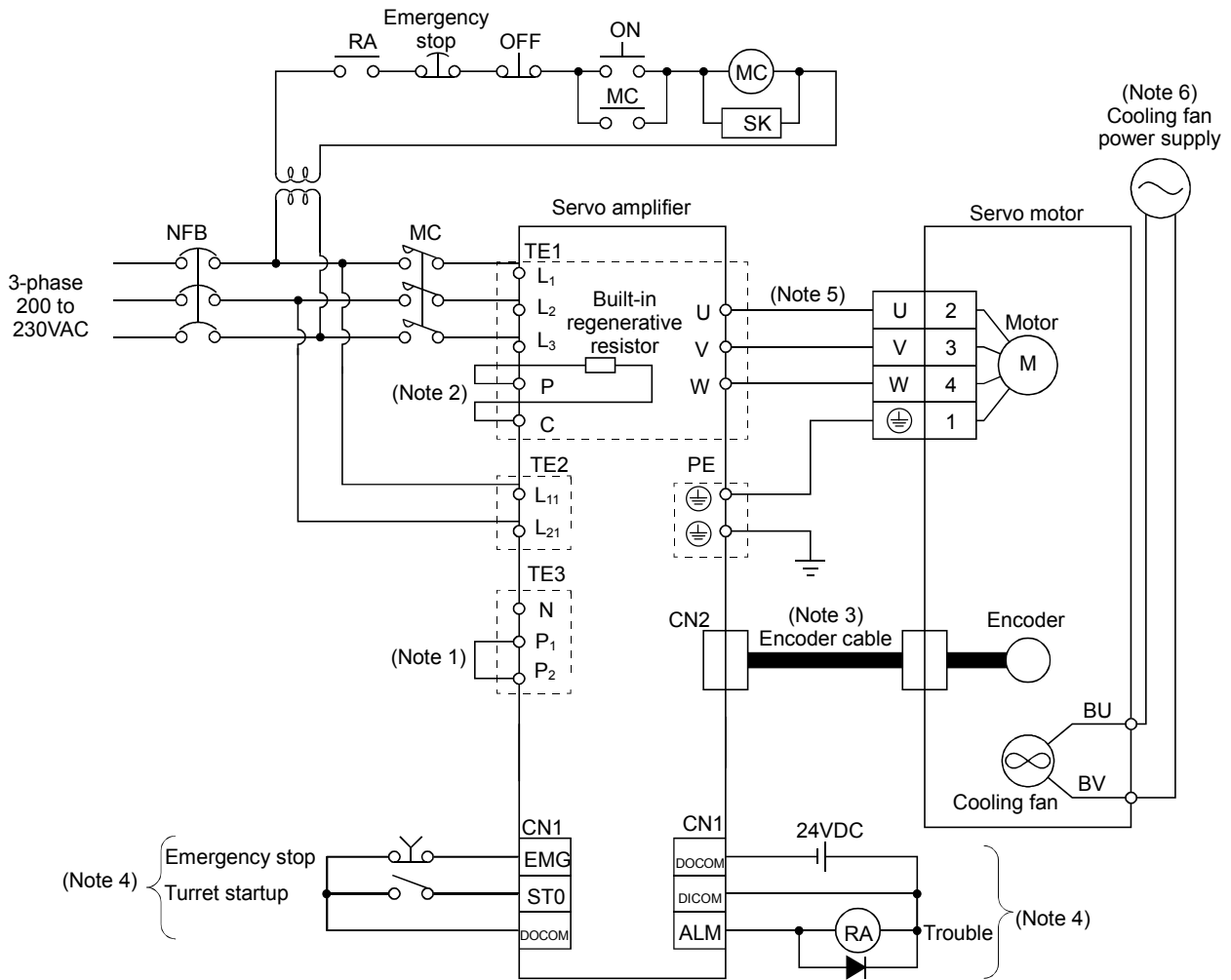
- Note 1. Always connect P<sub>1</sub> and P<sub>2</sub> (Factory-wired). The power factor improving DC reactor is not applicable.
2. Always connect P and D (Factory-wired). When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.
3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.
4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.

<MR-J3-60A4 to MR-J3-200A4 with 3-phase 380 to 480VAC power supply>



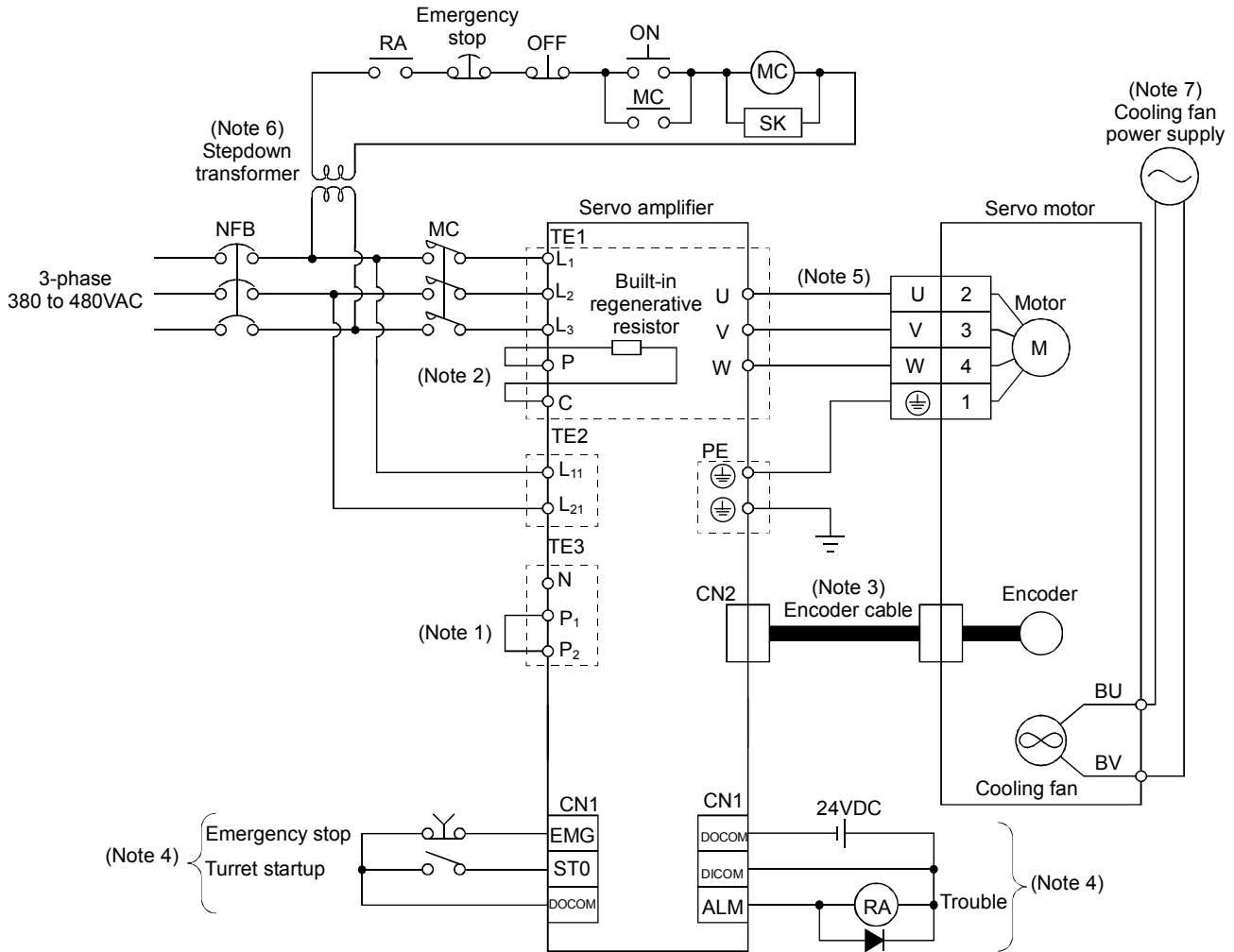
- Note 1. Always connect P<sub>1</sub> and P<sub>2</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.13.
2. Always connect P and D (Factory-wired). When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.
3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.
4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.
6. Stepdown transformer is required when the coil voltage class of the magnetic contactor is 200V.

<MR-J3-500A and MR-J3-700A with 3-phase 200 to 230VAC power supply>



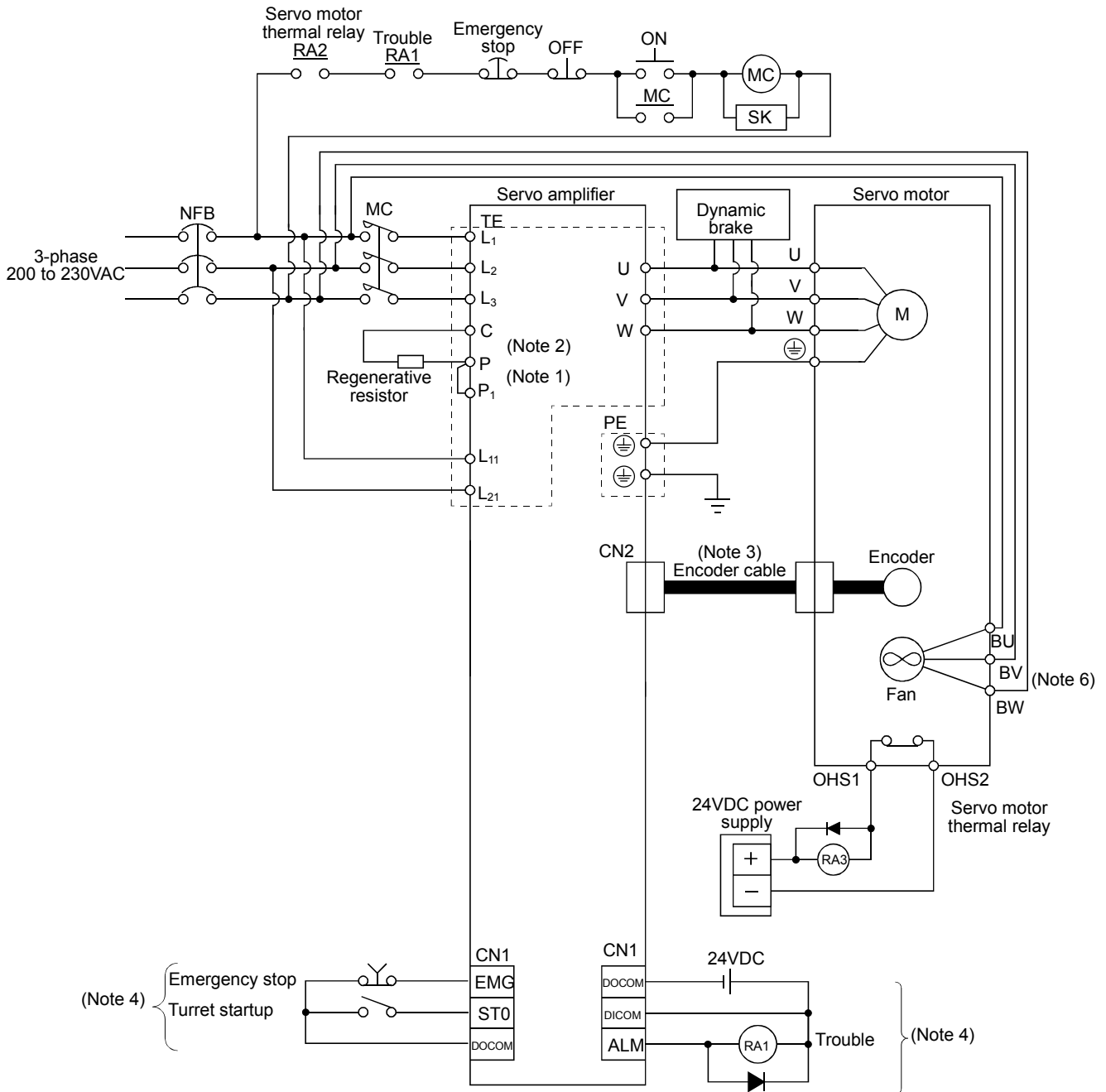
- Note 1. Always connect P<sub>1</sub> and P<sub>2</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.13.
2. When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.
3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.
4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.
6. A cooling fan is attached to the HA-LP6014 and HA-LP701M4 servo motors. For power supply specification of the cooling fan, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.2 (3) (b).

<MR-J3-350A4 to MR-J3-700A4 with 3-phase 380 to 480VAC power supply>



- Note 1. Always connect P and P<sub>1</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.13.
2. When using the regenerative brake option, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.2.
3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.
4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.
6. Stepdown transformer is required when the coil voltage class of the magnetic contactor is 200V.
7. A cooling fan is attached to the HA-LP6014 and HA-LP701M4 servo motors. For power supply specification of the cooling fan, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.2 (3) (b).

<MR-J3-11KA to MR-J3-22KA with 3-phase 200 to 230VAC power supply>



Note 1. Always connect P and P<sub>1</sub> (Factory-wired). When using the power factor improving DC reactor, refer to the MELSERVO-J3-A Instruction Manual, Section 12.13.

2. Connect the regenerative resistor. When using the regenerative option, refer to the MELSERVO-J3-A Instruction Manual, Section 12.2.

3. For the encoder cable, use of the option cable is recommended. For cable selection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 12.1.

4. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.

5. For servo amplifier and servo motor connection, refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL, Section 3.10.

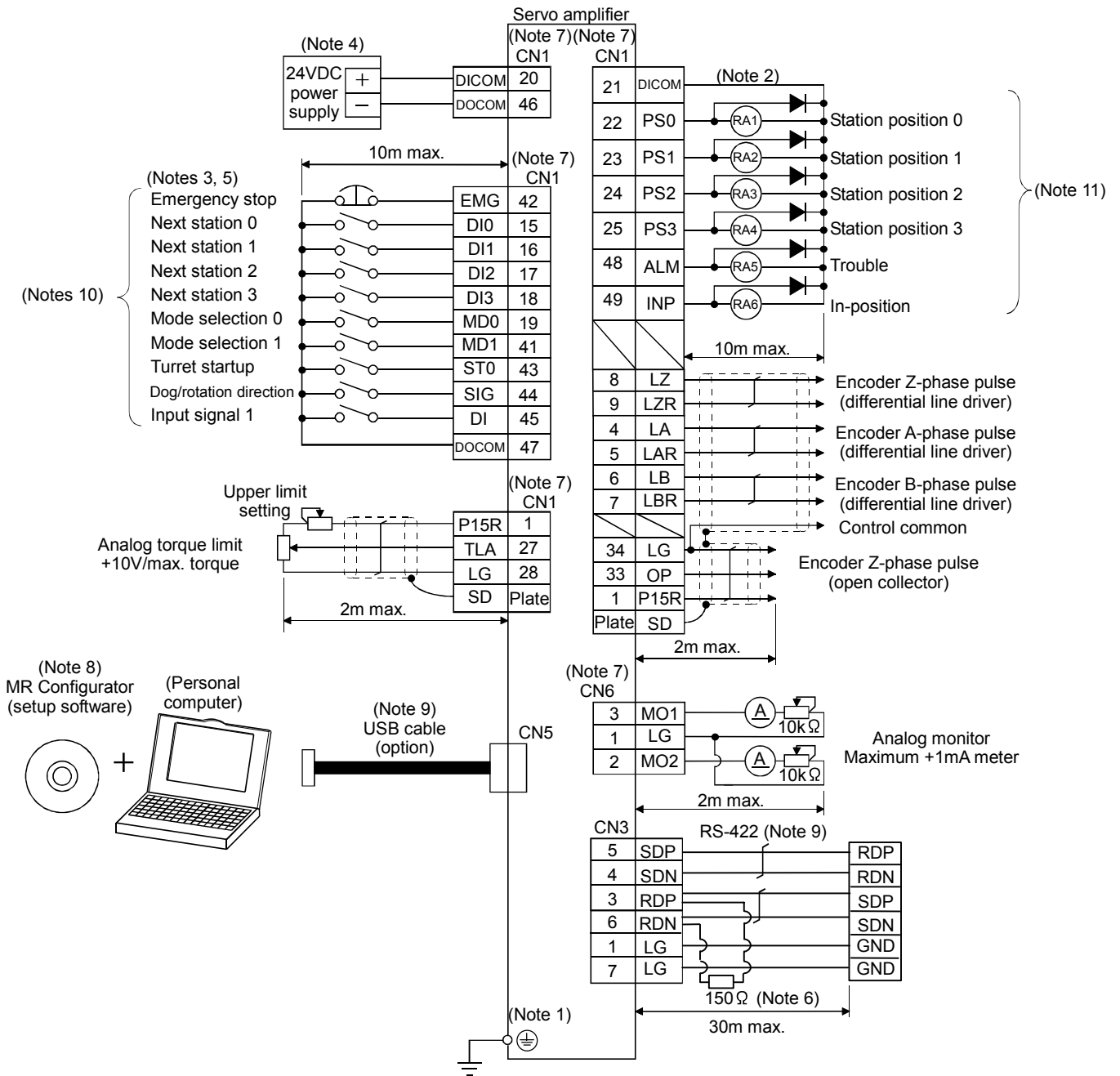
6. The cooling fan power supply for the HA-LP11K2 servo motor is 1-phase. Power supply specification of the cooling fan is different from that of the servo amplifier. Therefore, separate power supply is required.



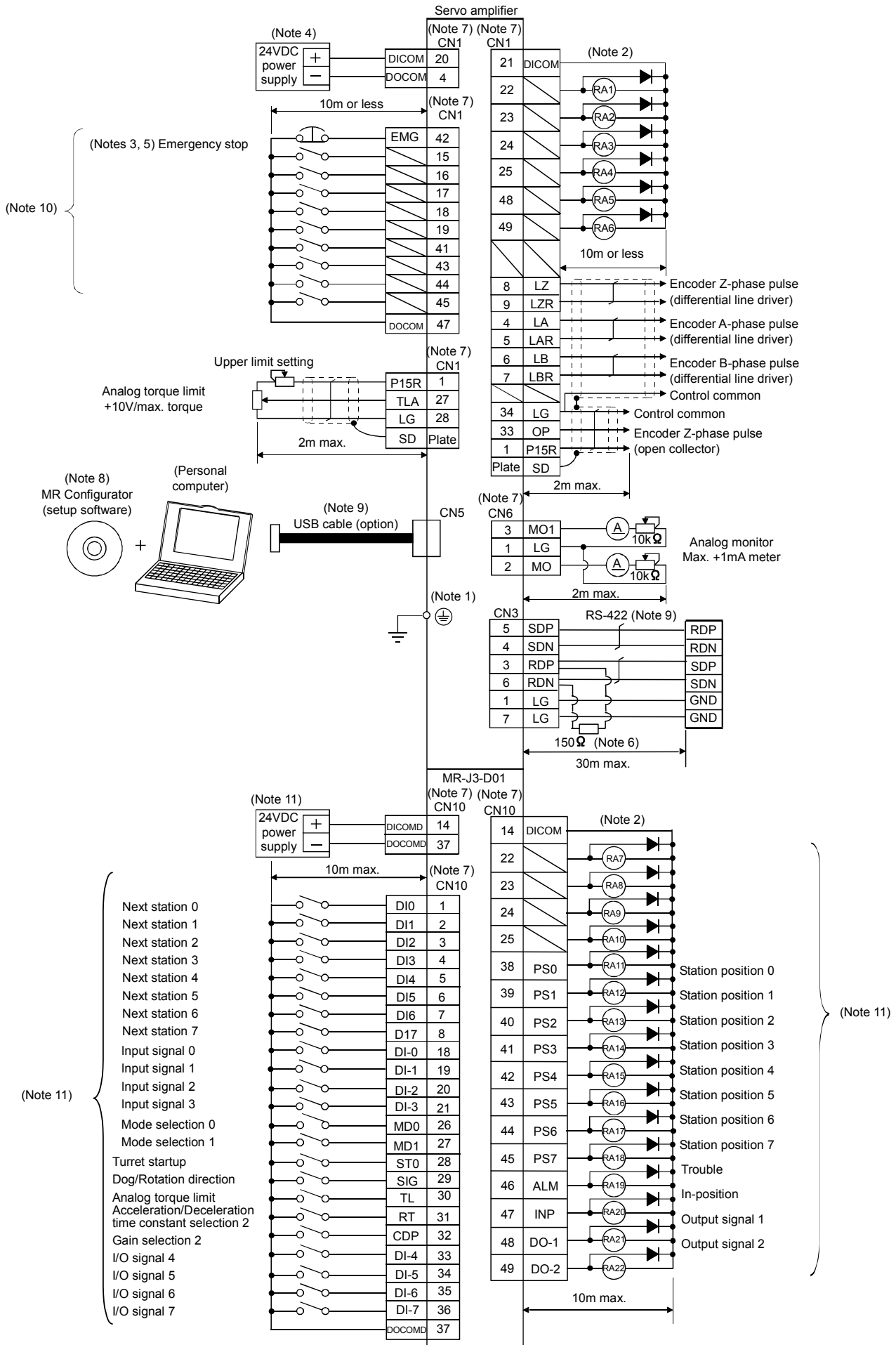


## 4.2 I/O Signal connection examples

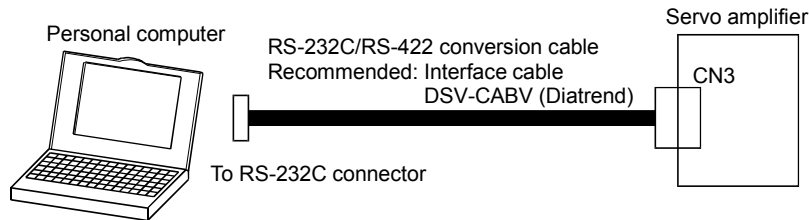
<MR-J3-□A□-RJ070 alone>



<MR-J3-□A□-RJ070 + MR-J3-D01 connection>



- Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal (terminal marked ⊕) of the servo amplifier to the protective earth (PE) of the control box.
2. Connect the diode in the correct direction. If it is connected reversely, the servo amplifier will not output signals due to a fault, disabling the emergency stop (EMG) and other protective circuits to become inoperative.
  3. The emergency stop switch (normally-closed contact) must be installed.
  4. Supply 24VDC  $\pm 10\%$  300mA power for interfaces from the outside. 300mA 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
  5. When starting operation, always turn on the emergency stop (EMG) (normally-closed contact).
  6. For the final axis, execute termination processing using a 150 $\Omega$  resistor between RDP (Pin No. 3) and RDN (Pin No. 6) on the receiving side (servo amplifier).
  7. The pins with the same signal name are connected in the servo amplifier.
  8. When using MR Configurator (setup software), contact local representative.
  9. RS-422 can also be used to connect the servo amplifier and a personal computer.

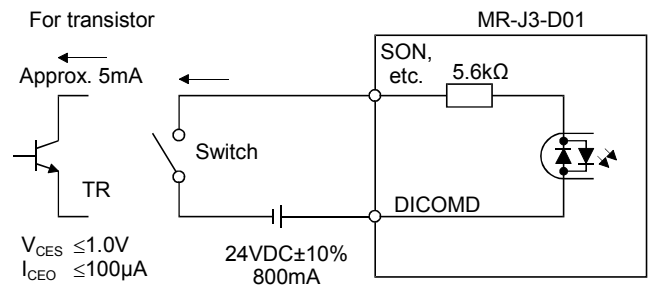
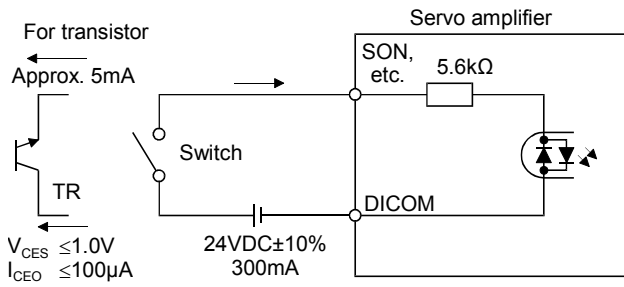


10. For the sink I/O interface. For the source I/O interface, refer to Section 4.4.
11. Supply 24VDC  $\pm 10\%$  800mA power for the MR-J3-DO1 interface from the outside. 800mA is the value when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points

### 4.3 I/O interface details

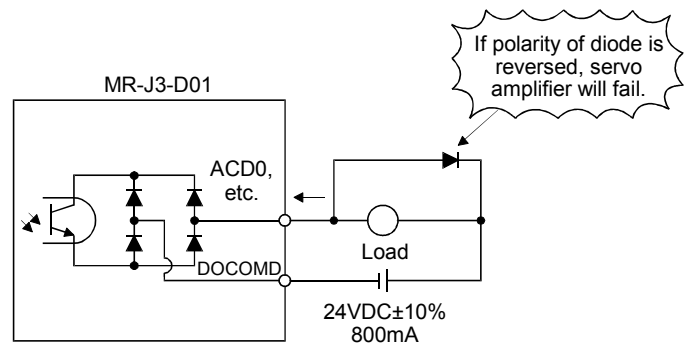
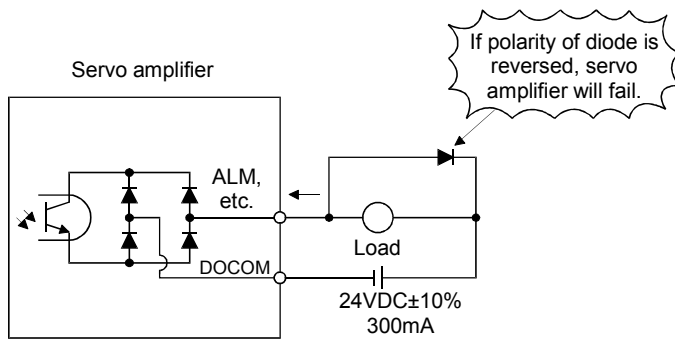
#### (1) Digital input interface DI-1

Give a signal with a relay or open collector transistor.  
For source input, refer to Section 4.4.



#### (2) Digital output interface DO-1

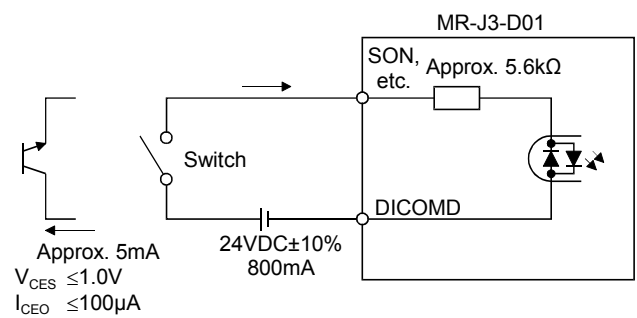
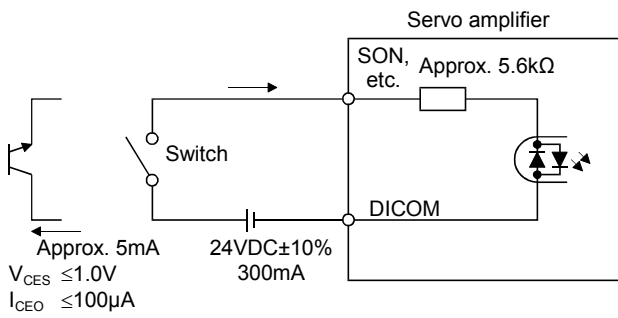
A lamp, relay or photocoupler can be driven. Install a diode (D) for an inductive load and an inrush current suppressing resistor (R) for a lamp load. (Permissible current: 40mA or less, inrush current: 100mA or less) A maximum of 2.6V voltage drop occurs in the servo amplifier.  
For source output, refer to Section 4.4.



#### 4.4 Source I/O interface details

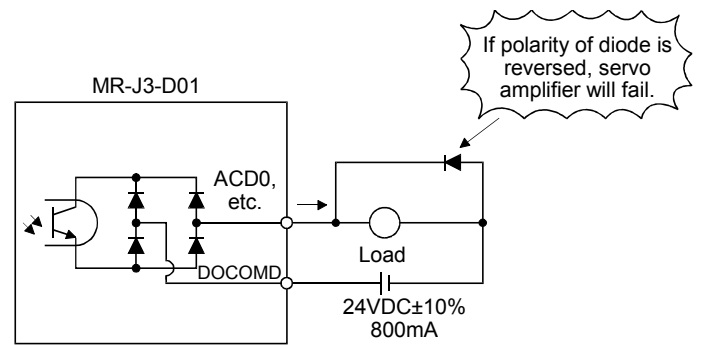
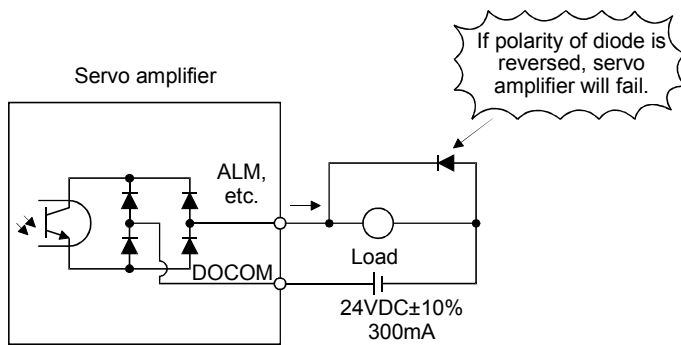
Source type I/O interfaces can be used with this servo amplifier. In this case, all DI-1 input signals and DO-1 output signals are of source type. Perform wiring according to the following interfaces.

##### (1) Digital input interface DI-1



##### (2) Digital output interface DO-1

A maximum of 2.6V voltage drop occurs in the servo amplifier.



## 5. SIGNAL (DEVICE) DESCRIPTIONS

### 5.1 I/O devices

Signal	Symbol	Connector pin No.		Functions/applications																															
		MR-J3-D01 not connected	MR-J3-D01 connected																																
Emergency stop	EMG	CN1-42	CN1-42	Emergency stop signal input terminal Changes the status to emergency stop, shuts off the base circuit, and activates the dynamic brake when EMG is turned off (opens between the commons). Clears emergency stop status when EMG is turned on (shorts between commons) during the emergency stop state.																															
Servo-on	SON	-	-	Servo-on input terminal Supplies power to the base circuit and changes the status to operation enabled when SON is turned on. (Servo-on state) Shuts off the base circuit and changes the servo motor to a free-run state when turned off. This signal turns on automatically in the default setting. When using an external input pin for the servo-on signal, clear the auto ON setting with parameter No. PD01, and change the setting of parameter No. PD12 (No. Po13 when MR-J3-D01 is connected) to enable the servo-on signal with the external pin.																															
Mode selection	MD0	CN1-19	CN10-26	Operation mode selection input terminal Selects the operation mode based on the combination of MD0 and MD1.																															
	MD1	CN1-41	CN10-27																																
<table border="1"> <thead> <tr> <th>MD1</th> <th>MD0</th> <th>Operation Mode</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Home position return mode</td> </tr> <tr> <td>Short</td> <td>Open</td> <td>Automatic operation mode 1 (rotation direction specified)</td> </tr> <tr> <td>Open</td> <td>Short</td> <td>Manual operation mode</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Automatic operation mode 2 (shortest rotation)</td> </tr> </tbody> </table>					MD1	MD0	Operation Mode	Open	Open	Home position return mode	Short	Open	Automatic operation mode 1 (rotation direction specified)	Open	Short	Manual operation mode	Short	Short	Automatic operation mode 2 (shortest rotation)																
MD1	MD0	Operation Mode																																	
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Short	Short	Automatic operation mode 2 (shortest rotation)																																	
Turret start	ST0	CN1-43	CN10-28	Turret start input terminal Changes to the start signal of the following operation modes when ST0 is turned on.																															
					<table border="1"> <thead> <tr> <th>MD1</th> <th>MD0</th> <th>Start Input Terminal</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Home position return start</td> </tr> <tr> <td>Short</td> <td>Open</td> <td>Automatic operation mode 1 (rotation direction specified) start</td> </tr> <tr> <td>Open</td> <td>Short</td> <td>Manual operation start</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Automatic operation mode 2 (shortest rotation) start</td> </tr> </tbody> </table>	MD1	MD0	Start Input Terminal	Open	Open	Home position return start	Short	Open	Automatic operation mode 1 (rotation direction specified) start	Open	Short	Manual operation start	Short	Short	Automatic operation mode 2 (shortest rotation) start															
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Short	Short	Automatic operation mode 2 (shortest rotation) start																																	
External limit / Rotation direction determination / Automatic operation speed selection	SIG	CN1-44	CN10-29	External limit / rotation direction judgment / automatic operation speed selection signal input terminal Changes to the home position return external limit, rotation direction determination, or automatic operation speed selection signal input terminal, depending on the operation mode.																															
					<table border="1"> <thead> <tr> <th>MD1</th> <th>MD0</th> <th>Operation Mode</th> <th>SIG Terminal</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Home position return mode</td> <td>Home position return external limit signal (Note 1)</td> </tr> <tr> <td>Short</td> <td>Open</td> <td>Automatic operation mode 1 (rotation direction specified)</td> <td>Servo motor rotation direction determination signal</td> </tr> <tr> <td>Open</td> <td>Short</td> <td>Manual operation mode</td> <td>Servo motor rotation direction determination signal</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Automatic operation mode 2 (shortest rotation)</td> <td>Automatic operation speed selection signal</td> </tr> </tbody> </table> <p>Note 1. Enabled when the dog type home position return system is selected.</p> <p>When using the external limit signal, the external limit signal turns on by turning on SIG.</p> <p>When using the rotation direction determination signal, the rotation direction differs according to the setting of the rotation direction selection (parameter No. PA14).</p> <table border="1"> <thead> <tr> <th>Parameter No. PA14 set value</th> <th>SIG terminal</th> <th>Servo motor rotation direction</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Open</td> <td>CCW direction</td> </tr> <tr> <td>0</td> <td>Short</td> <td>CW direction</td> </tr> <tr> <td>1</td> <td>Open</td> <td>CW direction</td> </tr> <tr> <td>1</td> <td>Short</td> <td>CCW direction</td> </tr> </tbody> </table>	MD1	MD0	Operation Mode	SIG Terminal	Open	Open	Home position return mode	Home position return external limit signal (Note 1)	Short	Open	Automatic operation mode 1 (rotation direction specified)	Servo motor rotation direction determination signal	Open	Short	Manual operation mode	Servo motor rotation direction determination signal	Short	Short	Automatic operation mode 2 (shortest rotation)	Automatic operation speed selection signal	Parameter No. PA14 set value	SIG terminal	Servo motor rotation direction	0	Open	CCW direction	0	Short	CW direction	1
MD1	MD0	Operation Mode	SIG Terminal																																
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1	Short	CCW direction																																	

Signal	Symbol	Connector pin No.		Functions/applications											
		MR-J3-D01 not connected	MR-J3-D01 connected												
Analog torque limit selection	TL	---	CN10-30	<p>Analog torque limit selection input terminal Enables the forward rotation torque limit (parameter No. PA11) and reverse rotation torque limit (parameter No. PA12) when TL is turned off, and enables the analog torque limit (TLA) when TL is turned on.</p> <table border="1"> <thead> <tr> <th>TL</th> <th>Limit value status</th> <th>Enabled torque limit value</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td></td> <td>Parameter Nos.PA11 and PA12</td> </tr> <tr> <td rowspan="2">Short</td> <td>TLA &gt; Parameter Nos.PA11 and PA12</td> <td>Parameter Nos.PA11 and PA12</td> </tr> <tr> <td>TLA &lt; Parameter Nos.PA11 and PA12</td> <td>TLA</td> </tr> </tbody> </table> <p>To use this signal, enable the signal with parameter No. PD12.</p>	TL	Limit value status	Enabled torque limit value	Open		Parameter Nos.PA11 and PA12	Short	TLA > Parameter Nos.PA11 and PA12	Parameter Nos.PA11 and PA12	TLA < Parameter Nos.PA11 and PA12	TLA
TL	Limit value status	Enabled torque limit value													
Open		Parameter Nos.PA11 and PA12													
Short	TLA > Parameter Nos.PA11 and PA12	Parameter Nos.PA11 and PA12													
	TLA < Parameter Nos.PA11 and PA12	TLA													
Acceleration / deceleration selection 2	RT	---	CN10-31	<p>Acceleration/deceleration selection input terminal 2 Selects the acceleration/deceleration time constant set in the acceleration time constant 1 (parameter No. PC07) / deceleration time constant 1 (parameter No. PC08) by turning on the turret start (ST0) while RT is off.</p> <p>Selects the acceleration/deceleration time constant set in the acceleration time constant 2 (parameter No. PC09) / deceleration time constant 2 (parameter No. PC10) by turning on the turret start (ST0) while RT is on.</p> <table border="1"> <thead> <tr> <th>RT</th> <th>Acceleration time constant</th> <th>Deceleration time constant</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Parameter No. PC07</td> <td>Parameter No. PC08</td> </tr> <tr> <td>Short</td> <td>Parameter No. PC09</td> <td>Parameter No. PC10</td> </tr> </tbody> </table> <p>To use this signal, enable the signal with parameter No. PD12.</p>	RT	Acceleration time constant	Deceleration time constant	Open	Parameter No. PC07	Parameter No. PC08	Short	Parameter No. PC09	Parameter No. PC10		
RT	Acceleration time constant	Deceleration time constant													
Open	Parameter No. PC07	Parameter No. PC08													
Short	Parameter No. PC09	Parameter No. PC10													
Gain selection 2	CDP	---	CN10-32	<p>Gain selection input terminal 2 Switches the load inertia moment ratio and the value of each gain to the values of parameter Nos. PB29 to PB32 when CDP is turned on. To use the gain changing function, set the gain adjustment mode to manual mode in the auto tuning mode (parameter PA08). To use this signal, enable the signal with parameter No. PD12.</p>											
Acceleration / deceleration gain selection 2	RTCDP	---	---	<p>Acceleration/deceleration gain selection input terminal 2 Selects the servo control gain set in parameter Nos. PB06 and PB08 to 10 while RTCDP is off, and selects the acceleration/deceleration time constant set in the acceleration time constant 1 (parameter No. PC07) / deceleration time constant 1 (parameter No. PC08) by turning on (short) the turret start (ST0). Selects the servo control gain set in parameter Nos. PB29 to 32 while RTCDP is on, and, selects the acceleration/deceleration time constant set in acceleration time constant 2 (parameter No. PC09) / deceleration time constant 2 (parameter No. PC10) by turning on (short) the turret start (ST0). To use this signal, enable the signal with parameter No. PD12 (parameter No. Po11 when MR-J3-D01 is connected).</p>											

Signal	Symbol	Connector pin No.		Functions/applications																																																																																																		
		MR-J3-D01 not Connected	MR-J3-D01 connected																																																																																																			
Next station position	DI0	CN1-15	CN10-1	Next station position input terminal Sets the turret indexer position. Enables the set value when turret start (ST0) is input.  <When MR-J3-D01 is not connected> <table border="1"> <thead> <tr> <th>D13</th> <th>D12</th> <th>D11</th> <th>D10</th> <th>Next station position</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Station No. 0</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Station No. 1</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Short</td> <td>Open</td> <td>Station No. 2</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Open</td> <td>Station No. 14</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Setting prohibited (AL97)</td> </tr> </tbody> </table> <When MR-J3-D01 is connected> <table border="1"> <thead> <tr> <th>D17</th> <th>D16</th> <th>D15</th> <th>D14</th> <th>D13</th> <th>D12</th> <th>D11</th> <th>D10</th> <th>Next Station Position</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Station No. 0</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Station No. 1</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Open</td> <td>Station No. 2</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Open</td> <td>Station No. 254</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Setting prohibited (AL97)</td> </tr> </tbody> </table>	D13	D12	D11	D10	Next station position	Open	Open	Open	Open	Station No. 0	Open	Open	Open	Short	Station No. 1	Open	Open	Short	Open	Station No. 2	:	:	:	:	:	Short	Short	Short	Open	Station No. 14	Short	Short	Short	Short	Setting prohibited (AL97)	D17	D16	D15	D14	D13	D12	D11	D10	Next Station Position	Open	Open	Open	Open	Open	Open	Open	Open	Station No. 0	Open	Open	Open	Open	Open	Open	Open	Short	Station No. 1	Open	Open	Open	Open	Open	Open	Short	Open	Station No. 2	:	:	:	:	:	:	:	:	:	Short	Short	Short	Short	Short	Short	Short	Open	Station No. 254	Short	Short	Short	Short	Short	Short	Short	Short	Setting prohibited (AL97)
	D13	D12	D11		D10	Next station position																																																																																																
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DI1	CN1-16	CN10-2																																																																																																				
DI2	CN1-17	CN10-3																																																																																																				
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		MR-J3-D01 not connected	MR-J3-D01 connected																																																																																																																	
Trouble	ALM	CN1-48	CN10-46	Trouble signal output terminal ALM turns off when the power is turned off or when the protective circuit is activated and the base circuit is shut off. When there is no alarm, ALM turns on 1.5s later after the power is turned on.																																																																																																																
AL9F warning	BW9F	---	---	AL9F warning output terminal BW9F turns on when a battery warning (AL9F) occurs. To use this signal, enable the signal with parameter Nos. PD17 and PD18 (parameter Nos. Po26 and Po27 when MR-J3-D01 is connected).																																																																																																																
In-position	INP	CN1-49	CN10-47	In-position signal output INP turns on when the droop pulse is within the set in-position range. The in-position range can be changed with parameter No. PA10.																																																																																																																
Station output	PS0	CN1-22	CN10-38	Station output terminal Outputs simultaneously with outputting the in-position signal.  <When MR-J3-D01 is not connected> <table border="1"> <thead> <tr> <th>PS3</th> <th>PS2</th> <th>PS1</th> <th>PS0</th> <th>Station Position</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Out of in-position range</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Station No. 0</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Open</td> <td>Station No. 1</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Open</td> <td>Short</td> <td>Station No. 2</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Short</td> <td>Open</td> <td>Station No. 13</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Station No. 14</td> </tr> </tbody> </table> <When MR-J3-D01 is connected> <table border="1"> <thead> <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> <th>Station Position</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Out of in-position range</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Station No. 0</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Open</td> <td>Station No. 1</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Short</td> <td>Open</td> <td>Short</td> <td>Station No. 2</td> </tr> <tr> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Open</td> <td>Station No. 253</td> </tr> <tr> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Open</td> <td>Short</td> <td>Station No. 254</td> </tr> </tbody> </table>	PS3	PS2	PS1	PS0	Station Position	Open	Open	Open	Open	Out of in-position range	Short	Short	Short	Short	Station No. 0	Short	Short	Short	Open	Station No. 1	Short	Short	Open	Short	Station No. 2	:	:	:	:	:	Open	Open	Short	Open	Station No. 13	Open	Open	Open	Short	Station No. 14	PS7	PS6	PS5	PS4	PS3	PS2	PS1	PS0	Station Position	Open	Open	Open	Open	Open	Open	Open	Open	Out of in-position range	Short	Short	Short	Short	Short	Short	Short	Short	Station No. 0	Short	Short	Short	Short	Short	Short	Short	Open	Station No. 1	Short	Short	Short	Short	Short	Short	Open	Short	Station No. 2	:	:	:	:	:	:	:	:	:	Open	Open	Open	Open	Open	Open	Short	Open	Station No. 253	Open	Open	Open	Open	Open	Open	Open	Short	Station No. 254
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PS1	CN1-23	CN10-39																																																																																																																		
PS2	CN1-24	CN10-40																																																																																																																		
PS3	CN1-25	CN10-41																																																																																																																		
PS4	---	CN10-42																																																																																																																		
PS5	---	CN10-43																																																																																																																		
PS6	---	CN10-44																																																																																																																		
PS7	---	CN10-45																																																																																																																		

## 5.2 I/O signals

Signal	Symbol	Connector pin No.	Functions/applications
Analog torque limit	TLA	CN1-27	To use this signal, enable TL with parameter No. PD12. Limits the torque over the entire servo motor output torque range when the analog torque limit (TLA) is enabled. Apply 0 to +10VDC between TLA and LG. Connect "+" of the power supply to TLA. The maximum torque is generated at +10V. Resolution: 10 bits
Encoder Z-phase pulse (open collector)	OP	CN1-33	Outputs the encoder zero-point signal. Outputs one pulse per servo motor revolution. OP turns on when the zero-point position is reached. (Negative logic). The minimum pulse width is approximately 400 $\mu$ s. When using the home position return based on this pulse, set the creep speed to 100r/min or less.
Encoder A-phase pulse (differential line driver)	LA LAR	CN1-4 CN1-5	Outputs the number of pulses per servo motor revolution that is set in parameter No. PA15 in the differential line driver system. When the servo motor rotates in the CCW direction, the encoder B-phase pulse is delayed by only $\pi/2$ in comparison with the encoder A-phase pulse.
Encoder B-phase pulse (differential line driver)	LB LBR	CN1-6 CN1-7	The relationship between the A-phase and B-phase pulse rotation direction and phase difference can be changed with parameter No. PC19.
Encoder Z-phase pulse (differential line driver)	LZ LZR	CN1-8 CN1-9	Outputs the same signal as OP in the differential line driver system.
Analog monitor 1	MO1	CN6-3	Outputs the data set in parameter No. PC14 in terms of voltage between MO1 and LG. Resolution: 10 bits
Analog monitor 2	MO2	CN6-2	Outputs the data set in parameter No. PC15 in terms of the voltage between MO2 and LG. Resolution: 10 bits

## 5.3 Communication

Signal	Symbol	Connector pin No.	Functions/applications
RS-422 I/F	SDP SDN RDP RDN	CN3-5 CN3-4 CN3-3 CN3-6	RS-422 I/F data communication terminal The RS-422 communication function and RS-232C communication function cannot be used simultaneously.

## 5.4 Power supply

Signal	Symbol	Connector pin No.	Functions/applications
Digital I/F power supply input	DICOM	CN1-20 CN1-21	Input 24VDC (24VDC $\pm$ 10%, 300mA) for the I/O interface. The power supply capacity changes according to the number of I/O interface points used. For the sink interface, connect with $\oplus$ of the 24VDC external power supply.
Digital I/F common	DOCOM	CN1-46 CN1-47	Common terminal of input signals such as SON and EMG of the servo amplifier. Separated from LG. For the sink interface, connect with $\oplus$ of the 24VDC external power supply.
MR-J3-D01 digital I/F power supply input	DICOMD	CN10-14	Input 24VDC (24VDC $\pm$ 10%, 800mA) for the MR-J3-D01 I/O interface. The power supply capacity changes according to the number of I/O interface points used. For the sink interface, connect with $\oplus$ of the 24VDC external power supply.
MR-J3-D01 digital I/F common	DOCOMD	CN10-37	Common terminal of input signals such as SON of MR-J3-D01. Separated from LG. For the sink interface, connect with $\oplus$ of the 24VDC external power supply.
15VDC power supply output	P15R	CN1-1	Outputs 15VDC between P15R and LG. Permissible current: 30mA
Control common	LG	CN1-28 CN1-34 CN6-1	Common terminals of OP, MO1, MO2, P15R, and TLA. Pins are connected internally.
Shield	SD	Plate	Connect the external conductor of the shielded cable.

## 5.5 Power supply system signal descriptions

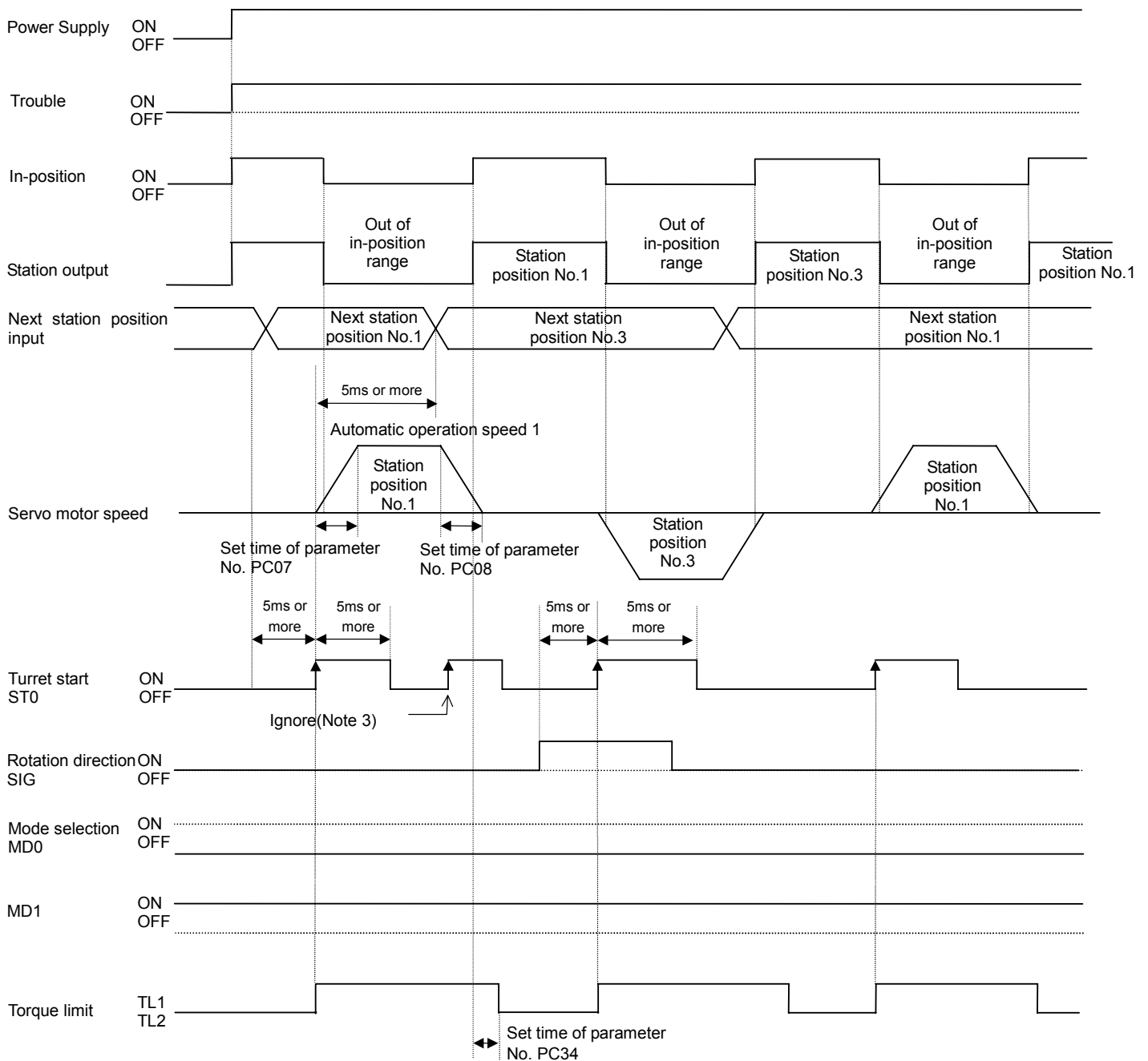
Abbreviation	Connection destination (application)	Description																				
$L_1 \cdot L_2 \cdot L_3$	Main circuit power supply	<p>Supply the following power to <math>L_1</math>, <math>L_2</math>, and <math>L_3</math>. For the 1-phase 200 to 230VAC power supply, connect the power supply to <math>L_1</math> and <math>L_2</math>, and do not connect anything to <math>L_3</math>.</p> <table border="1"> <tr> <td><del>Servo Amplifier Power Supply</del></td> <td>MR-J3-10A to 70A</td> <td>MR-J3-100A to 22KA</td> <td>MAR-J3-10A1 to 40A1</td> </tr> <tr> <td>3-phase 200 to 230VAC, 50/60Hz</td> <td colspan="3"><math>L_1 \cdot L_2 \cdot L_3</math></td> </tr> <tr> <td>1-phase 200 to 230VAC, 50/60Hz</td> <td><math>L_1 \cdot L_2</math></td> <td></td> <td></td> </tr> <tr> <td>1-phase 100 to 120VAC, 50/60Hz</td> <td></td> <td></td> <td><math>L_1 \cdot L_2</math></td> </tr> </table> <table border="1"> <tr> <td><del>Servo Amplifier Power Supply</del></td> <td>MR-J3-60A4 to 22KA4</td> </tr> <tr> <td>3-phase 380 to 480VAC, 50/60Hz</td> <td><math>L_1 \cdot L_2 \cdot L_3</math></td> </tr> </table>	<del>Servo Amplifier Power Supply</del>	MR-J3-10A to 70A	MR-J3-100A to 22KA	MAR-J3-10A1 to 40A1	3-phase 200 to 230VAC, 50/60Hz	$L_1 \cdot L_2 \cdot L_3$			1-phase 200 to 230VAC, 50/60Hz	$L_1 \cdot L_2$			1-phase 100 to 120VAC, 50/60Hz			$L_1 \cdot L_2$	<del>Servo Amplifier Power Supply</del>	MR-J3-60A4 to 22KA4	3-phase 380 to 480VAC, 50/60Hz	$L_1 \cdot L_2 \cdot L_3$
<del>Servo Amplifier Power Supply</del>	MR-J3-10A to 70A	MR-J3-100A to 22KA	MAR-J3-10A1 to 40A1																			
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1-phase 100 to 120VAC, 50/60Hz			$L_1 \cdot L_2$																			
<del>Servo Amplifier Power Supply</del>	MR-J3-60A4 to 22KA4																					
3-phase 380 to 480VAC, 50/60Hz	$L_1 \cdot L_2 \cdot L_3$																					
$P_1 \cdot P_2$	Power factor improving DC reactor	<p>(1) MR-J3-700A(4) or less When not using the power factor improving DC reactor, connect <math>P_1</math> and <math>P_2</math> (Factory-wired). When using the power factor improving DC reactor, disconnect the wiring between <math>P_1</math> and <math>P_2</math>, and connect the power factor improving DC reactor to <math>P_1</math> and <math>P_2</math>.</p> <p>(2) MR-J3-11KA(4) to 22KA(4) MR-J3-11KA(4) to 22KA(4) do not have a <math>P_2</math>-terminal. When not using the power factor improving DC reactor, connect <math>P</math> to <math>P_1</math> (Factory-wired). When using the power factor improving DC reactor, connect the power factor improving DC reactor to <math>P</math> and <math>P_1</math>. For details, refer to the SERVO AMPLIFIER INSTRUCTION MANUAL.</p>																				
$P \cdot C \cdot D$	Regenerative brake option	<p>(1) MR-J3-350A or less, MR-J3-200A4 or less When using the servo amplifier built-in regenerative resistor, connect <math>P(+)</math> and <math>D</math> (Factory-wired). When using the regenerative option, disconnect the wiring between <math>P(+)</math> and <math>D</math>, and connect the regenerative option to <math>P</math> and <math>C</math>.</p> <p>(2) MR-J3-350A4, 500A(4), and 700A(4) MR-J3-350A4, 500A(4), and 700A(4) do not have a <math>D</math>-terminal. When using the servo amplifier built-in regenerative resistor, connect <math>P</math> and <math>C</math> (Factory-wired). When using the regenerative option, disconnect the wiring between <math>P</math> and <math>C</math>, and connect the regenerative option to <math>P</math> and <math>C</math>.</p> <p>(3) MR-J3-11KA(4) to 22KA(4) MR-J3-11KA(4) to 22KA(4) do not have a <math>D</math>-terminal. When not using the power regenerative converter or brake unit, be sure to connect the regenerative option to <math>P</math> and <math>C</math>. For details, refer to the SERVO AMPLIFIER INSTRUCTION MANUAL.</p>																				
$L_{11} \cdot L_{21}$	Control circuit power supply	<p>Supply the following power to <math>L_{11}</math> and <math>L_{21}</math>.</p> <table border="1"> <tr> <td><del>Servo Amplifier Power Supply</del></td> <td>MR-J3-10A to 22KA</td> <td>MR-J3-10A1 to 40A1</td> <td>MAR-J3-60A4 to 22KA4</td> </tr> <tr> <td>1-phase 200 to 230VAC</td> <td><math>L_{11} \cdot L_{21}</math></td> <td></td> <td></td> </tr> <tr> <td>1-phase 100 to 120VAC</td> <td></td> <td><math>L_{11} \cdot L_{21}</math></td> <td></td> </tr> <tr> <td>1-phase 380 to 480VAC</td> <td></td> <td></td> <td><math>L_{11} \cdot L_{21}</math></td> </tr> </table>	<del>Servo Amplifier Power Supply</del>	MR-J3-10A to 22KA	MR-J3-10A1 to 40A1	MAR-J3-60A4 to 22KA4	1-phase 200 to 230VAC	$L_{11} \cdot L_{21}$			1-phase 100 to 120VAC		$L_{11} \cdot L_{21}$		1-phase 380 to 480VAC			$L_{11} \cdot L_{21}$				
<del>Servo Amplifier Power Supply</del>	MR-J3-10A to 22KA	MR-J3-10A1 to 40A1	MAR-J3-60A4 to 22KA4																			
1-phase 200 to 230VAC	$L_{11} \cdot L_{21}$																					
1-phase 100 to 120VAC		$L_{11} \cdot L_{21}$																				
1-phase 380 to 480VAC			$L_{11} \cdot L_{21}$																			
$U \cdot V \cdot W$	Servo motor output	Connect to the servo motor power supply terminals ( $U$ , $V$ and $W$ ). Never switch the servo motor power lines while the power is supplied. Doing so will cause operation errors and other troubles.																				
$N$	Regenerative converter/ Brake unit	When using the regenerative converter or brake unit, connect it to $P$ and $N$ . Do not connect the regenerative converter or brake unit to a servo amplifier of MR-J3-350A(4) or smaller. For details, refer to the SERVO AMPLIFIER INSTRUCTION MANUAL.																				
$\oplus$	Protective earth (PE)	Ground by connecting the protective earth to the earth terminal of the servo motor and a protective earth of the control box.																				

## 6. OPERATION SEQUENCE

### (1) Automatic operation mode 1 (rotation direction specification)

When the automatic operation mode 1 is selected, a movement amount is calculated from the current position and the next station position by turning on (short) the turret start (ST0), and then positioning is performed to the specified next station position in the rotation direction based on the rotation direction determination.

The servo motor speed is set with parameter No. PC03 (ASP1: automatic operation speed 1).

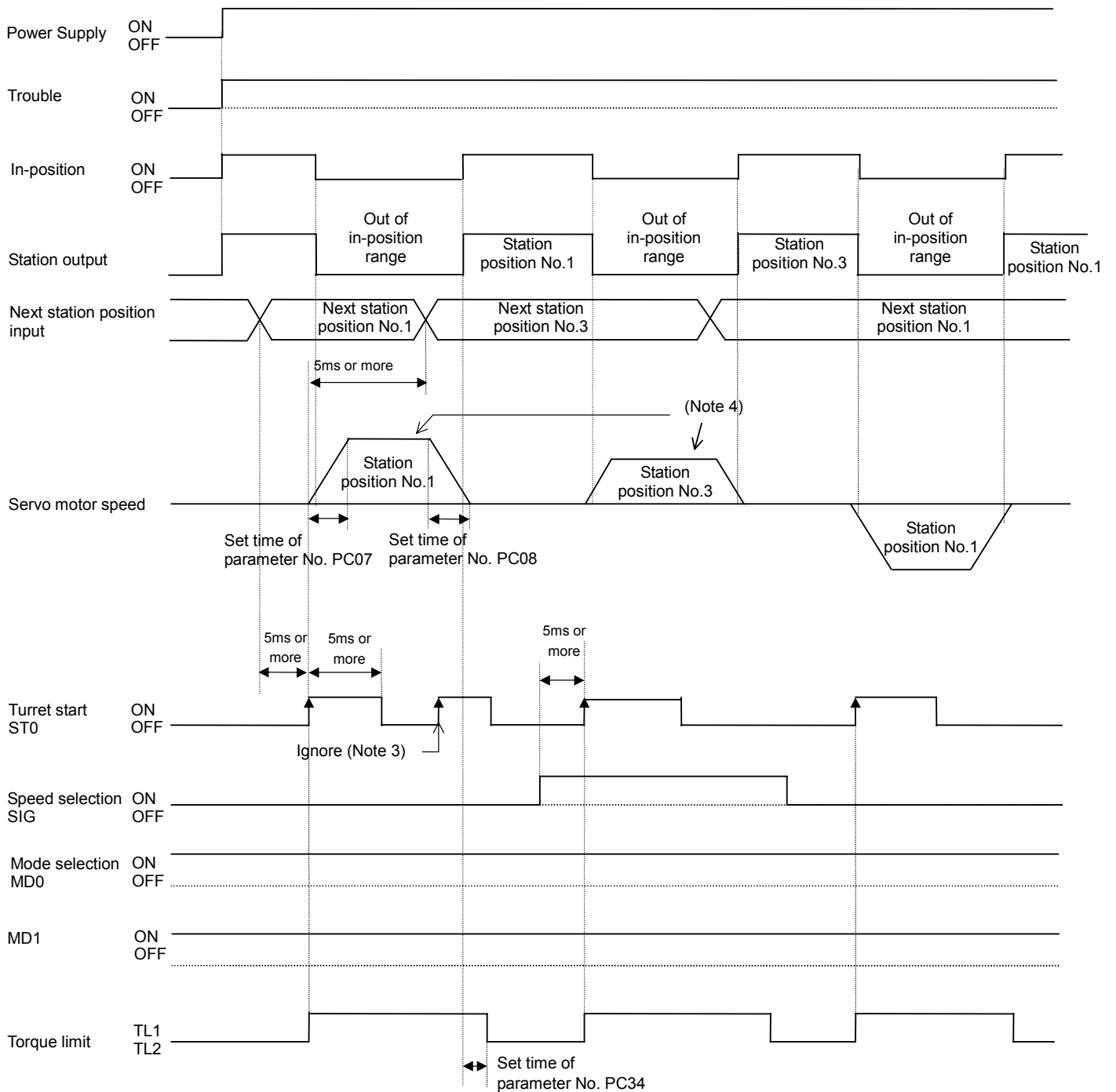


- Note 1. When positioning is performed without returning to the home position, the home positioning incomplete warning occurs and the turret start (ST0) is ignored.
2. When the next station position exceeds the "set value of parameter No. PC02 (STN)", the next station position warning occurs and the turret start (ST0) is ignored.
3. When the remaining of the commanded movement amount is not "0", the turret start (ST0) is not accepted. Refer to "Note" in Section (8), "In-position, station output, and torque limit".

(2) Automatic operation mode 2 (shortest rotation)

When the automatic operation mode 1 is selected, a movement amount is calculated from the current position and the next station position by turning on (short) the turret start (ST0), and then positioning is performed to the specified next station position based on the shortest rotation.

The servo motor speed is set with parameter No. PC03 (ASP1: automatic operation speed 1)/PC04 (ASP2: automatic operation speed 2).



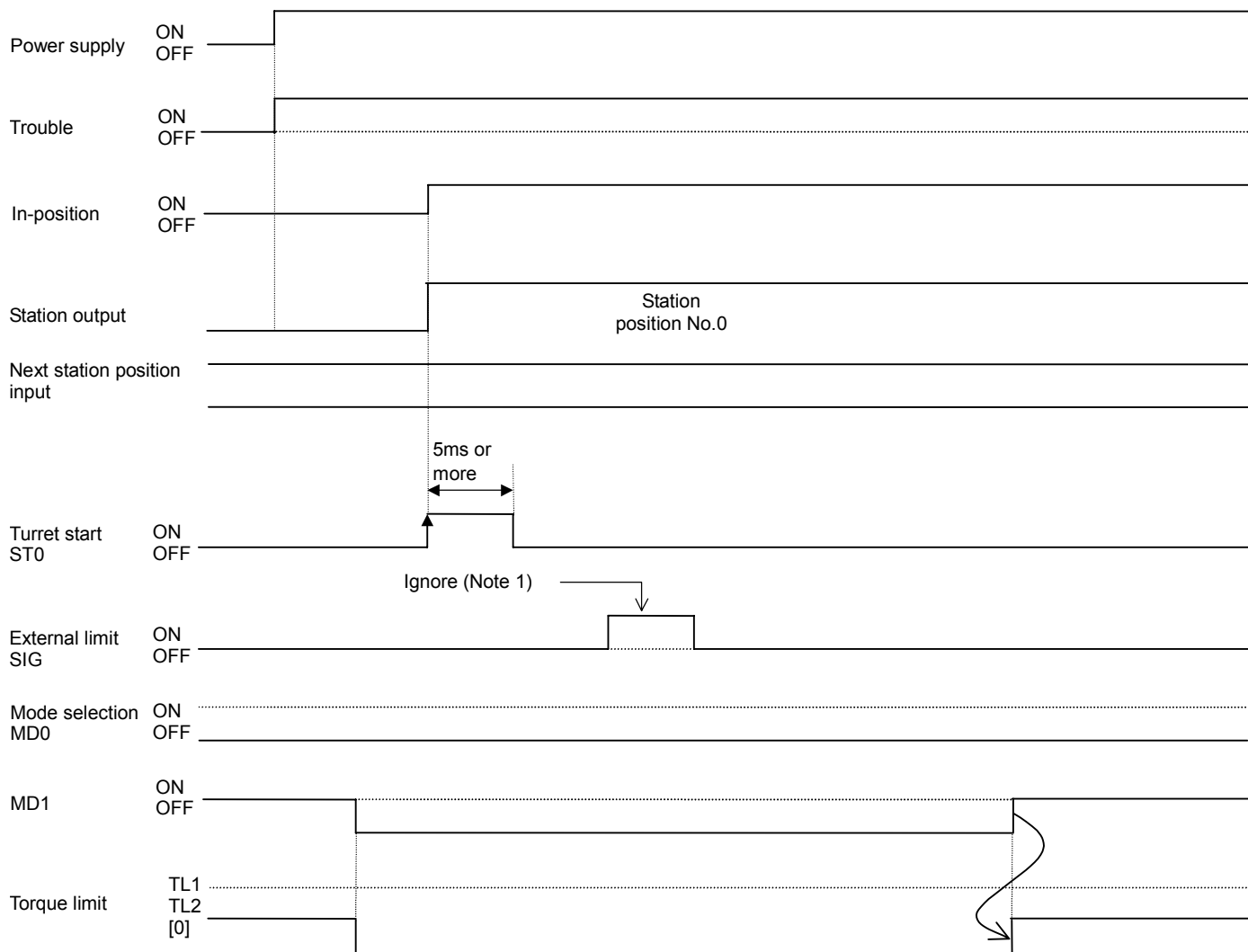
- Note 1. When positioning is performed without returning to the home position, the home positioning incomplete warning occurs and the turret start (ST0) is ignored.
2. When the next station position exceeds the "set value of parameter No. PC02 (STN)", the next station position warning occurs and the turret start (ST0) is ignored.
3. When the remaining of the commanded movement amount is not "0", the turret start (ST0) is not accepted. Refer to "Note" in Section (8), "In-position, station output, and torque limit".
4. The automatic operation speed is the set value of parameter No. PC03 (ASP1) when the SIG signal is off, and the set value of parameter No. PC04 (ASP2) when the SIG signal is on.

### (3) Home position return mode 1 (data setting type)

When the parameter No. PC42 (ZTY) is set to "□□□0", the mode changes to the data setting type home position return mode.

For home position return, the home position is set by turning on (short) the turret start (ST0) when home position return mode is selected.

The station home position shift distance can be set with parameter No. PC46 (ZPS).



Note 1. When the data setting type home position return is selected, the SIG signal is ignored.

2. When the home position is set, the station home position shift distance setting is disabled. The setting will be enabled after the power is turned off and then on again.
3. The station home position shift distance is enabled as an offset against the position where the home position is set. When the station home position shift distance is set to a value greater than the in-position range, the in-position output does not turn on (short) at the first power-on after the home position is set.
4. When the data setting type home position return mode is selected, AL52 is not detected. For this reason, AL52 may occur when the mode is changed to the automatic mode without setting the home position after rotating the servo motor in the home position return mode. Even if AL52 does not occur, the current position may be off location from the commanded position, resulting in correction of the shift distance from the commanded position when the turret start (ST0) is input.
5. When AL90 occurs, executing home position return clears AL90 automatically.
6. When the data setting type home position return mode is selected and you want to change the mode without setting the home position after rotating the servo motor to an arbitrary position, return the motor to the original position and then change the mode. **A**

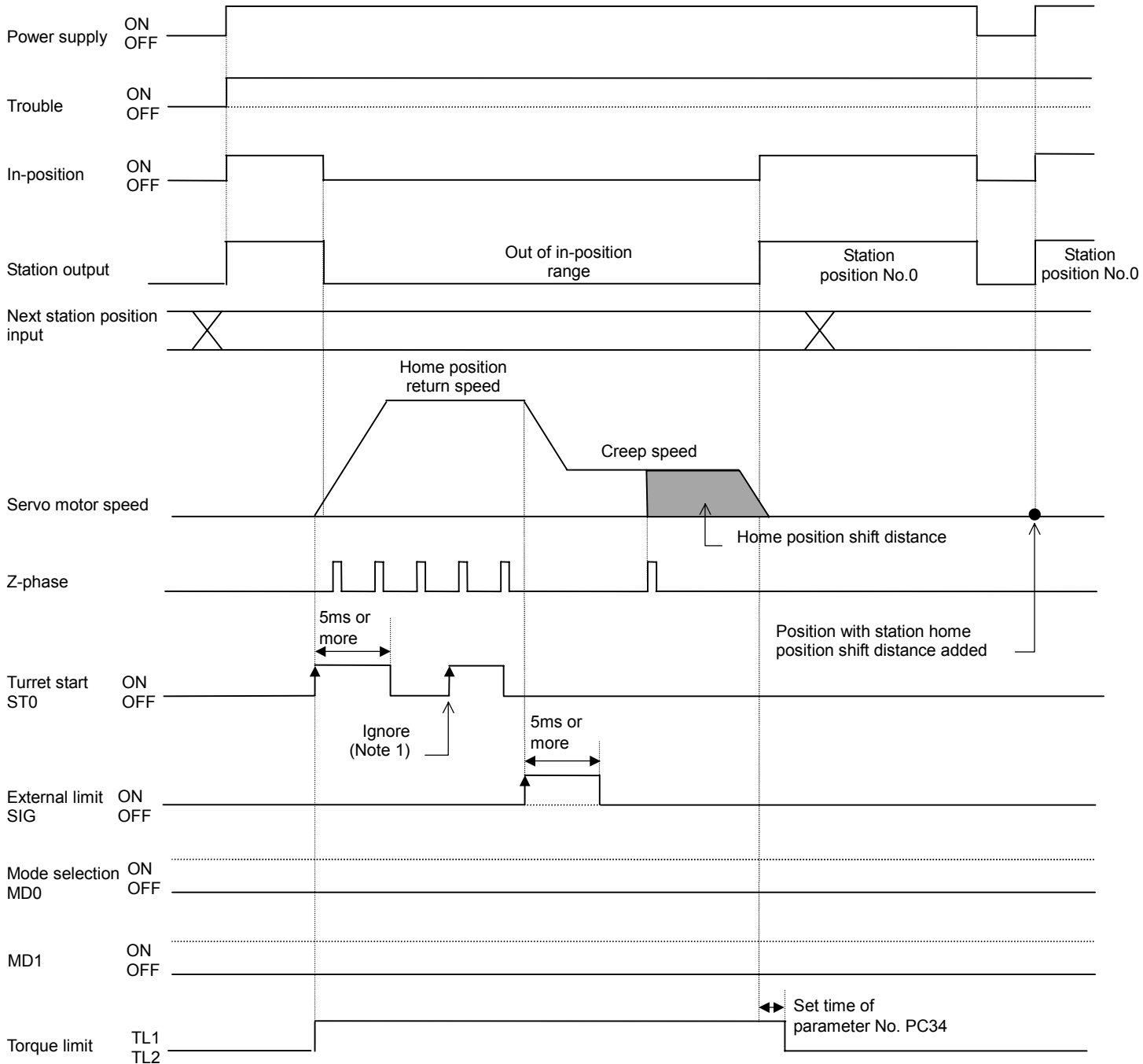
(4) Home position return mode 2 (dog type home position return)

When the parameter No. PC42 (ZTY) is set to "□□□1", the mode changes to the dog type home position return mode.

Home position return is started by turning on (short) the turret start (ST0) when the home position return mode is selected.

The servo motor rotates at the speed specified in the home position return speed (parameter No. PC43: ZRF), causing a short to occur on the external limit signal, thereby reducing the speed to the creep speed set with parameter No. PC44 (CRF) and stopping the servo motor in the initial Z-phase.

When parameter No. PC45 (ZST: home position shift distance) is set, the servo motor moves for the shift distance set for servo motor Z-phase and then stops.



Note 1. When the remaining of the commanded movement amount is not "0", the turret start (ST0) is not accepted. Refer to "Note" in Section (8), "In-position, station output, and torque limit".

2. When the home position is set, the station home position shift distance setting is disabled. The setting will be enabled after the power is turned off and then on again.

3. The station home position shift distance is enabled as an offset against the position where the home position is set. When the station home position shift distance is set to a value greater than the in-position range, the in-position output does not turn on (short) at the first power on after the home position is set.

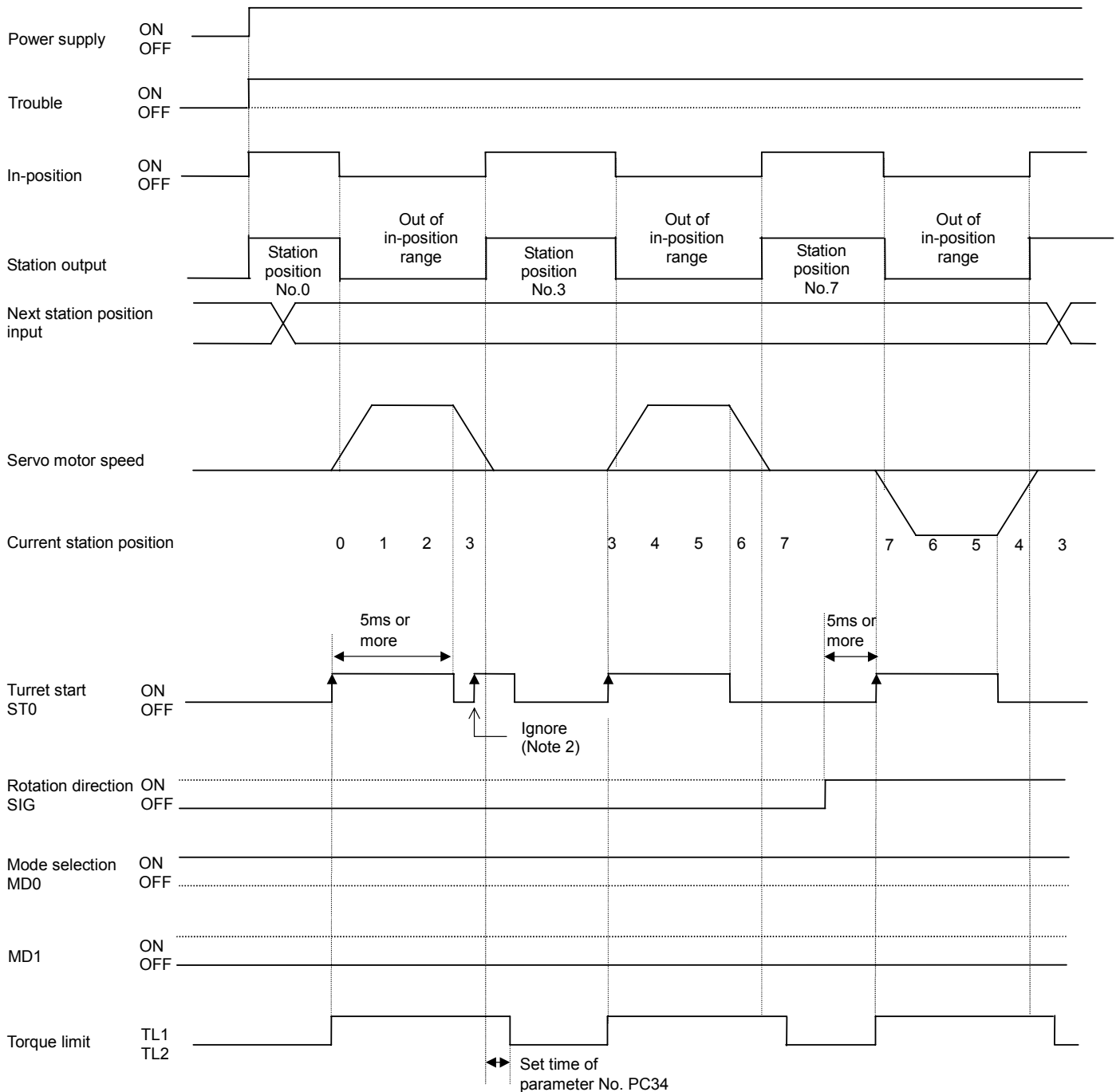
(5) Manual operation mode (station JOG)

When parameter No. PC01 (ODM) is set to "□□0□", the operation mode changes to the station JOG.

In manual operation mode, positioning can be performed to any arbitrary position by turning on (short) the turret start (ST0).

Turning on the turret start (ST0) starts rotation in the rotation direction based on the rotation direction determination. Positioning is performed to the closest station position where the servo motor can decelerate to stop by turning off the turret start.

The servo motor speed can be set with parameter No. PC05 (MSP1: manual operation speed 1).



Note 1. When positioning is performed without returning to the home position, the home positioning incomplete warning occurs and the turret start (ST0) is ignored.

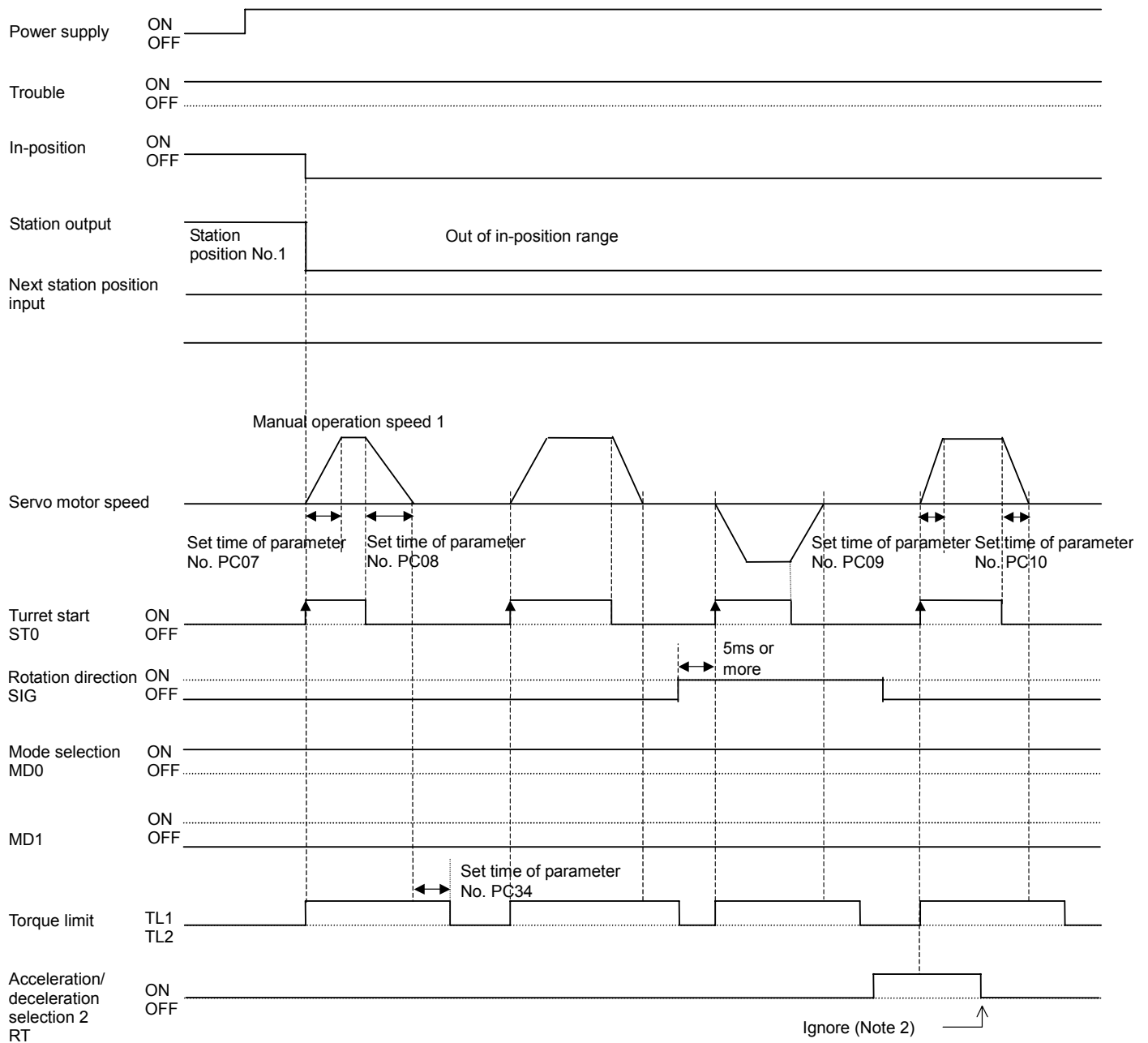
2. When the remaining of the commanded movement amount is not "0", the turret start (ST0) is not accepted. Refer to "Note" in Section (8), "In-position, station output, and torque limit".



### (6) Manual operation mode (JOG)

When parameter No. PC01 (ODM) is set to "□□1□", the mode changes to the JOG operation.

In manual operation mode, turning on the turret start (ST0) starts rotation in the rotation direction based on the rotation direction determination signal. Turning off the turret start (ST0) decelerates and stops the servo motor regardless of the station position.



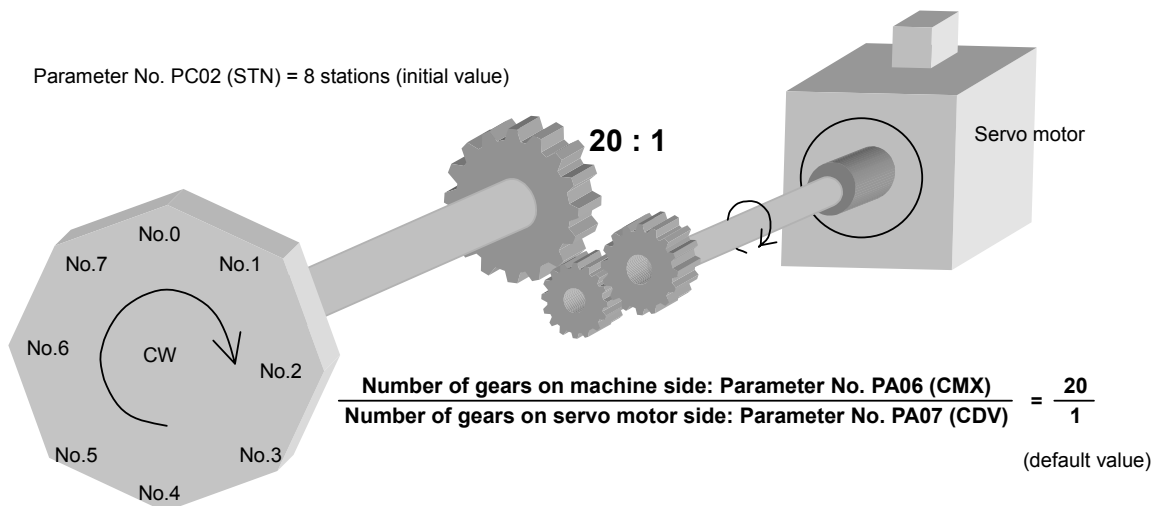
Note 1. When positioning is performed without returning to the home position, the home positioning incomplete warning occurs and the turret start (ST0) is ignored.

2. During operation, the acceleration/deceleration selection 2 (RT) is not accepted. Selection of the acceleration/deceleration time constant is enabled when the turret start (ST0) is turned on.

(7) Station numbers

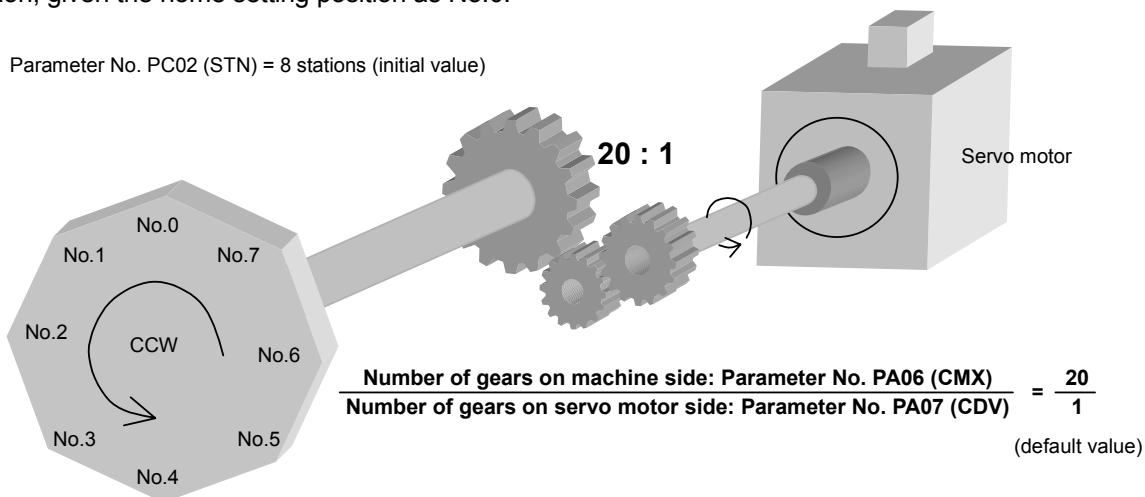
(a) Parameter No. PA14 (POL) setting = "0"

The station numbers are set in order of No.1 and No.2 respectively in the CW direction of the servo motor rotation, given the home setting position as No.0.



(b) Parameter No. PA14 (POL) setting = "1"

The station numbers are set in order of No.1 and No.2 respectively in the CCW direction of the servo motor rotation, given the home setting position as No.0.



Note. Any changes to the setting of parameter No. PA14 (rotation direction) are enabled after the power is turned off and then on again.  
The rotation direction and station number allocation are changed with reference to the station home position (No. 0).  
The station numbers of the current position change before and after power-on by changing the rotation direction setting.

(8) In-position, station output, and torque limit

- (a) At factory default, if such parameter as Nos. PA06, PA07, and PC02 that require home position return are changed, the station output signal will not be output (all turns off) even if the power is turned off and then on because home position return has not been performed.
- (b) At power-on or emergency stop, when the servo motor is within the in-position range of the next station position, the applicable station output signal is output.
- (c) During servo motor operation by the turret start (ST0) after power-on or after clearing of emergency stop, when the servo motor is within the in-position range of the target next station, applicable station output signal is output.
- (d) During servo motor operation by manual operation after power-on or after clearing of emergency stop, when the servo motor is within the in-position range of the target next station where the servo motor should stop by turning off the turret start (ST0), applicable station output signal is output.
- (e) The torque limit changes from TL2 to TL1 when inputting the turret start (ST0) in the automatic operation mode 1 or 2, manual operation, or dog type home position return. The torque limit changes from TL1 to TL2 after the time set with parameter No. PC34 (INT) elapses after outputting the in-position output.

Note. During servo motor operation by the turret start (ST0), the station output signal remains off when the remaining of the commanded movement amount is not "0", even if the servo motor is within the in-position range of the target next station.

(9) Servo-on

The servo-on is automatically turned on internally. Thus, when the emergency stop input is shorted and no alarm occurs after power-on, the base circuit automatically turns on.

The servo-on can also be assigned to an external pin based on parameter settings. Enable the external pin use with parameter No. PD12 (parameter No. Po13 when MR-J3-D01 is connected). In such a case, clear the automatic ON function with parameter No. PD01.

(10) Turret rotation during power-off

When the turret is rotated by hand one or more rotations during the power-off, the home position may be erased. Therefore, do not rotate the turret one or more rotations when the power is off. When the home position is erased, execute home position return operation again.

(11) Writing home position multi-revolution data to EEPROM

When the movement amount from the home position exceeds the updated rotation range, the home position multi-revolution data are updated and written to EEPROM.

As a result, when the turret is continually rotated in one direction at high speed, the EEPROM write cycle shortens (the number of writes increases), thereby shortening the EEPROM life. When such conditions constantly continue, the AL-E3 warning occurs.

When the turret is continuously rotated in one direction at high speed and AL-E3 occurs, reduce the servo motor speed.

Parameter No. PA06 CMX Number of gears on machine side	AL-E3 Warning occurrence conditions
CMX ≤ 2000	When the servo motor speed exceeds 30767 revolutions in 10 minutes
CMX > 2000	When the servo motor speed exceeds (32767 – CMX) revolutions in 10 minutes

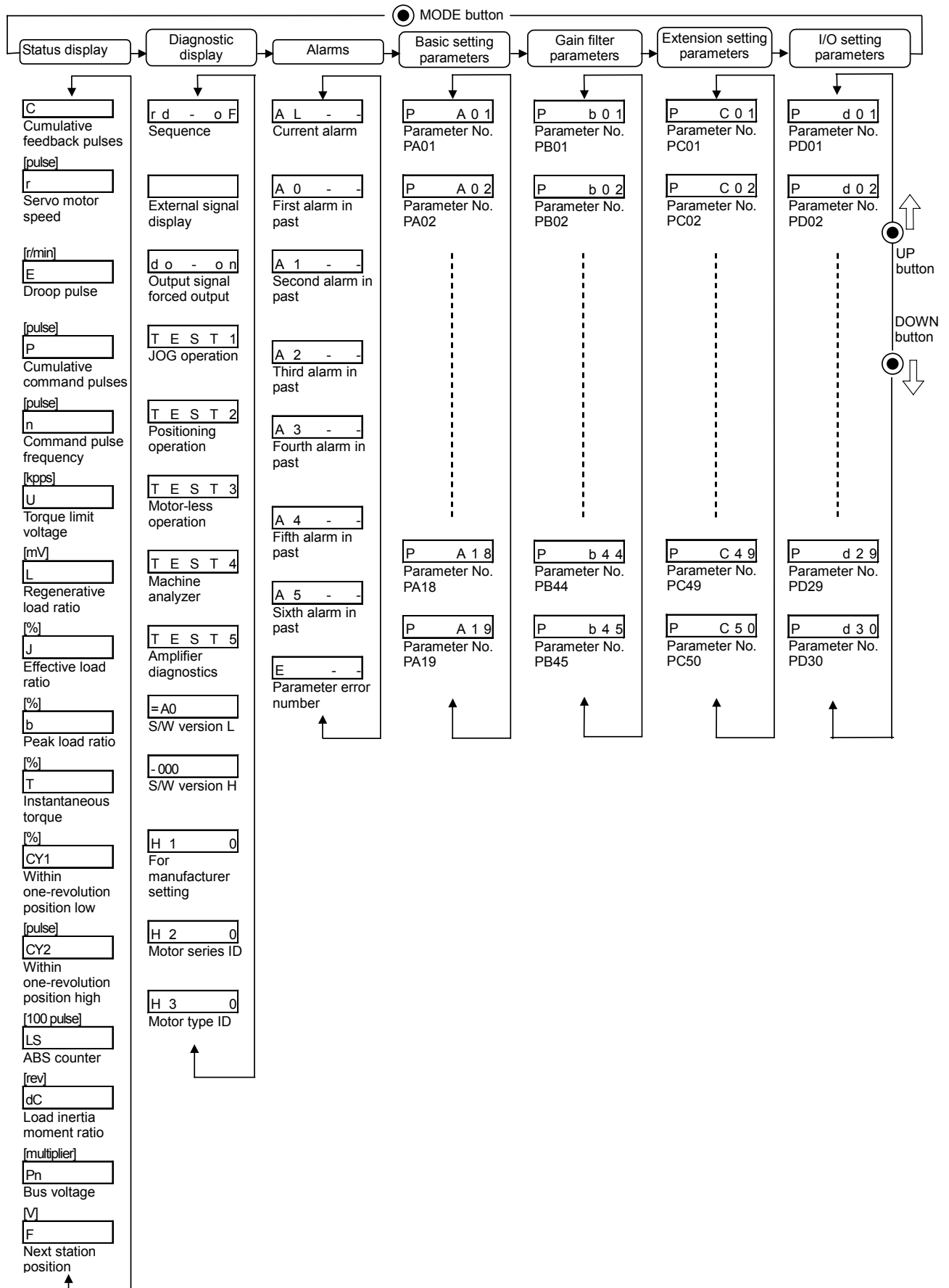
## 7. DISPLAY

This chapter describes the display (5-digit, 7-segment LED) and controls (four push-buttons) of the MR-J3-□A□-RJ070 servo amplifier.

Functions not described in this chapter are the same as those of the standard servo amplifier MR-J3-□A.

Refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL.

### 7.1 Display flow

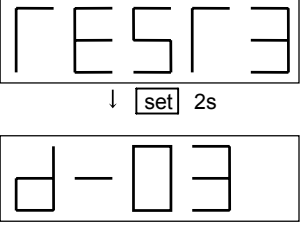
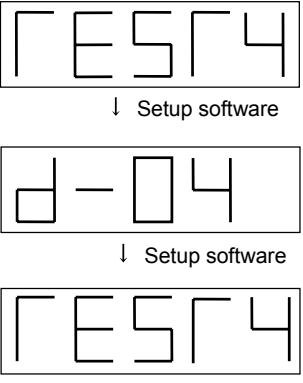

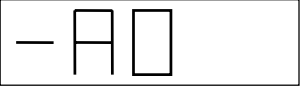
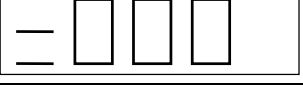
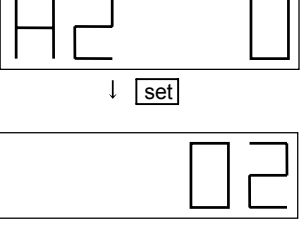
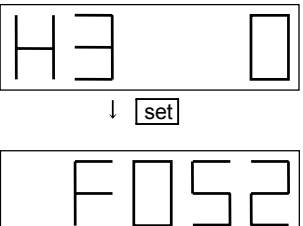
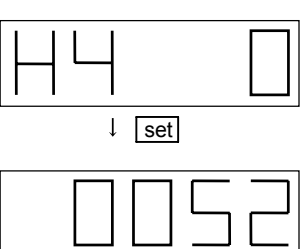


## 7.2 Status displays

Status display	Symbol	Unit	Description	Display range
Cumulative feedback pulses	C	pulse	Feedback pulses from the servo motor encoder are counted and displayed. The count exceeding 99999 can be counted, but since the servo amplifier display is five digits, it shows the lower five digits of the actual count although counting further continues. Press the "SET" button to reset the count to 0 (zero). The decimal points in 2nd to 5th are lit for negative value.	-99999 to 99999
Servo motor speed	r	r/min	The servo motor speed is displayed. The value is rounded off to the nearest whole number and displayed.	-7200 to 7200
Droop pulses	E	pulse	The number of droop pulses in the deviation counter is displayed. The decimal points in 2nd to 5th are lit for reverse pulses. The count exceeding 99999 can be counted, but since the servo amplifier display is five digits, it shows the lower five digits of the actual count although counting further continues. The pulse count displayed here is based on the encoder pulse unit.	-99999 to 99999
Cumulative command pulses	P	pulse	The position command input pulses are counted and displayed. As the value displayed is not yet multiplied by the electronic gear (CMX/CDV), it may not match the indication of the cumulative feedback pulses. The count exceeding 99999 can be counted, but since the servo amplifier display is five digits, it shows the lower five digits of the actual count although counting further continues. Press the "SET" button to reset the count to 0 (zero). The decimal points in 2nd to 5th are lit for reverse pulses.	-99999 to 99999
Command pulse frequency	n	kpps	The frequency of the position command input pulses is displayed. The value displayed is not multiplied by the electronic gear (CMX/CDV).	-1500 to 1500
Analog torque limit voltage	U	V	Analog torque limit voltage is displayed.	0 to +10.00
Regenerative load ratio	L	%	The ratio of regenerative power to permissible regenerative power is displayed in %.	0 to 100
Effective load ratio	J	%	The continuous effective load current is displayed. The effective value in the past 15 seconds is displayed relative to the rated current of 100%.	0 to 300
Peak load ratio	b	%	The maximum torque generated is displayed. The effective value in the past 15 seconds is displayed relative to the rated current of 100%.	0 to 400
Instantaneous torque	T	%	Torque that occurred instantaneously is displayed. The value of the torque that occurred is displayed in real time relative to the rate torque of 100%.	0 to 400
Within one-revolution position (1 pulse unit)	Cy1	pulse	Position within one-revolution is displayed in encoder pulses. The value returns to 0 (zero) when the maximum number of pulses is exceeded, but since the servo amplifier display is five digits, it shows the lower five digits of the actual count The reading is incremented when the servo motor rotates in the CCW direction.	0 to 99999
Within one-revolution position (100 pulse unit)	Cy2	100 pulse	Position within one-revolution is displayed in 100 pulse increments of the encoder pulses. The value returns to 0 (zero) when the maximum number of pulses is exceeded. The reading is incremented when the servo motor rotates in the CCW direction.	0 to 2621
ABS counter	LS	rev	Movement amount from the home position in the absolute position detection system is displayed in terms of the multi-revolution counter value of the absolute position encoder.	-32768 to 32767
Load inertia moment ratio	dC	Multiplier	The estimated ratio of the load inertia moment converted into the equivalent value on servo motor shaft to the servo motor inertia moment.	0.0 to 300.0
Bus voltage	Pn	V	The voltage (between P and N) of the main circuit converter is displayed.	0 to 450
Command next station position	F		The commanded next station position is displayed. The stopped position by turning off the turret start (ST0) is displayed in the manual operation mode.	0 to 254


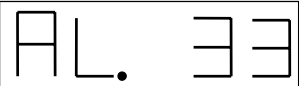



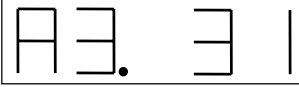

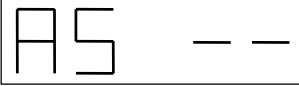

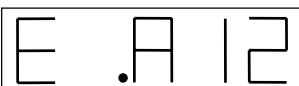
### 7.3 Diagnostic displays

Name	Display	Description
Sequence		Not ready. Indicates that the servo amplifier is being initialized or that an alarm has occurred.
		Ready. Indicates that the servo was switched on after completion of initialization and is ready to operate after initialization is completed.
External I/O signal display		Indicates the ON/OFF states of external I/O signals. The upper segments correspond to the input signals and the lower segments to the output signals.
Output signal forced output		The digital output signal can be forcibly turned on/off. Hold down <b>[set]</b> for about two seconds to change the screen to the DO forced output screen. On the DO output check screen, the meanings of the keys change as follows: <b>[mode]</b> : Moves the cursor segment to the left. <b>[up]</b> : Turns on the lower CN1 output pin of the cursor segment. <b>[down]</b> : Turns off the lower CN1 output pin of the cursor segment. Hold down <b>[set]</b> for about 2 seconds to return the screen back to the original screen.
JOG operation		Hold down <b>[set]</b> for about two seconds to change the screen to the JOG test operation screen. On the JOG test operation screen, the meanings of the keys change as follows: <b>[mode]</b> : Changes the test operation status display screen (next item). <b>[up]</b> : Rotates the servo motor in forward rotation (CCW) while pressed. <b>[down]</b> : Rotates the servo motor in reverse rotation (CW) while pressed. Hold down <b>[set]</b> for about 2 seconds to return the screen back to the original screen. The speed is fixed to 200r/min. Note. Execute the JOG test operation using the servo motor alone. Because the coordinate system for turret control is shifted, the servo motor cannot be stopped at the next station position.
Positioning operation		The screen changes to the positioning test operation screen based on communication. On the positioning test operation screen, the meanings of the keys change as follows: <b>[mode]</b> : Changes the test operation status display screen (next item). <b>[up]</b> <b>[down]</b> : Disabled. Note. To execute the positioning operation, MR Configurator (setup software) MRZJW3-SETUP221E is required. Execute the positioning test operation with the servo motor alone. After the positioning test operation, always turn off the power. Because the coordinate system for turret control is shifted, the servo motor cannot be stopped at the next station position.

Name	Display	Description
Motor-less operation		<p>Hold down <b>set</b> for about two seconds to change the screen to the motor-less operation screen.</p> <p>On the motor-less operation screen, the meanings of the keys change as follows:</p> <p><b>mode</b> : Changes the test operation status display screen (next item).</p> <p><b>up</b> <b>down</b> : Disabled.</p> <p>Note. To cancel the motor-less test operation, turn off the power and then on again.</p>
Machine analyzer operation		<p>The screen changes to the machine analyzer operation screen by communication.</p> <p>On the machine analyzer operation screen, the meanings of the keys change as follows:</p> <p><b>mode</b> : Changes the test operation status display screen (next item).</p> <p><b>up</b> <b>down</b> : Disabled.</p> <p>Note. To execute the machine analyzer operation, MR Configurator (setup software) MRZJW3-SETUP221E is required.</p> <p>After the machine analyzer operation, always turn off the power. Because the coordinate system for turret control is shifted, the servo motor cannot be stopped at the next station position.</p>
Amplifier diagnosis		<p>This function performs simple trouble diagnostics to check whether or not the servo amplifier I/O interface is functioning normally.</p> <p>Note. To execute amplifier diagnostics, a diagnostic cable (MR-J3ACHECK) and MR Configurator (setup software) MRZJW3-SETUP221E are required.</p>
Software version low		<p>This function displays the software version.</p>
Software version high		<p>This function displays the system number of the software.</p>
Motor series ID		<p>This function displays the servo motor series ID.</p> <p>Press <b>set</b> to display the servo motor series ID.</p>
Motor type ID		<p>This function displays the servo motor type ID.</p> <p>Press <b>set</b> to display the servo motor type ID.</p>
Encoder ID		<p>This function displays the encoder ID.</p> <p>Press <b>set</b> to display the encoder ID.</p>

During the DO signal check and during test operation, the decimal point of the first digit flashes.

## 7.4 Alarm displays

Name	Display	Description
Current alarm		Indicates no alarm occurrence.
		Indicates the occurrence of overvoltage (AL. 33). Lights up when an alarm occurs.
Alarm history		Indicates that the last alarm is overload 1 (AL.50).
		Indicates that the second last alarm was overvoltage (AL.33).
		Indicates that the third last alarm was undervoltage (AL.10).
		Indicates that the forth last alarm was overspeed (AL.31).
		Indicates that no fifth alarm in the past.
		Indicates that no sixth alarm in the past.
Parameter error number		Indicates no parameter error occurrence (AL37).
		Indicates that the data of parameter No. PA12 is faulty.

- (1) When an alarm occurs, the current alarm is displayed, regardless of the mode.
- (2) Even in an alarm occurrence, the other screens can be viewed by pressing the buttons in the operation area. Under such conditions, the decimal point of the fourth digit remains flashing.
- (3) To clear the alarm, remove the alarm cause, change the RES signal from short to open, switch the power from off to on, and press the set button on the current alarm screen. Use parameter No. PC18 (BPS) to clear the alarm history.

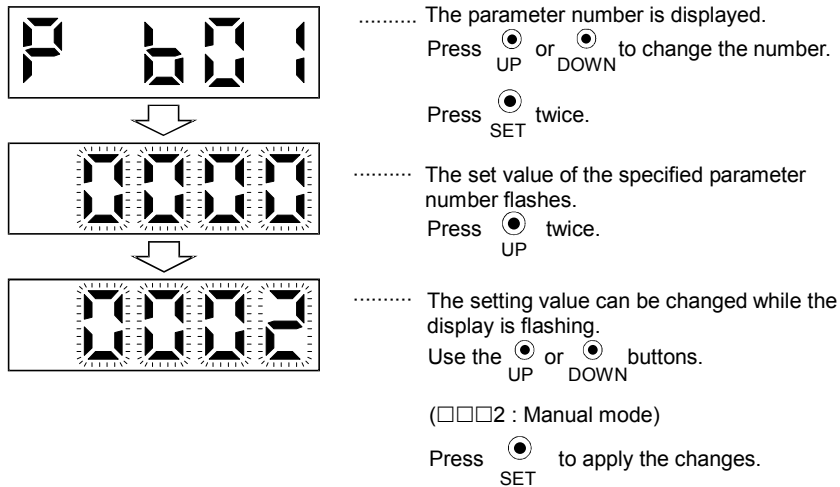


## 7.5 Parameter settings

### • Parameters of 5 or less digits

The following shows, as an example, the operation method used after power-on for changing the mode from adaptive tuning mode to manual mode (Parameter No. PB01).

Press the “MODE” button to display the gain/filter parameter screen.

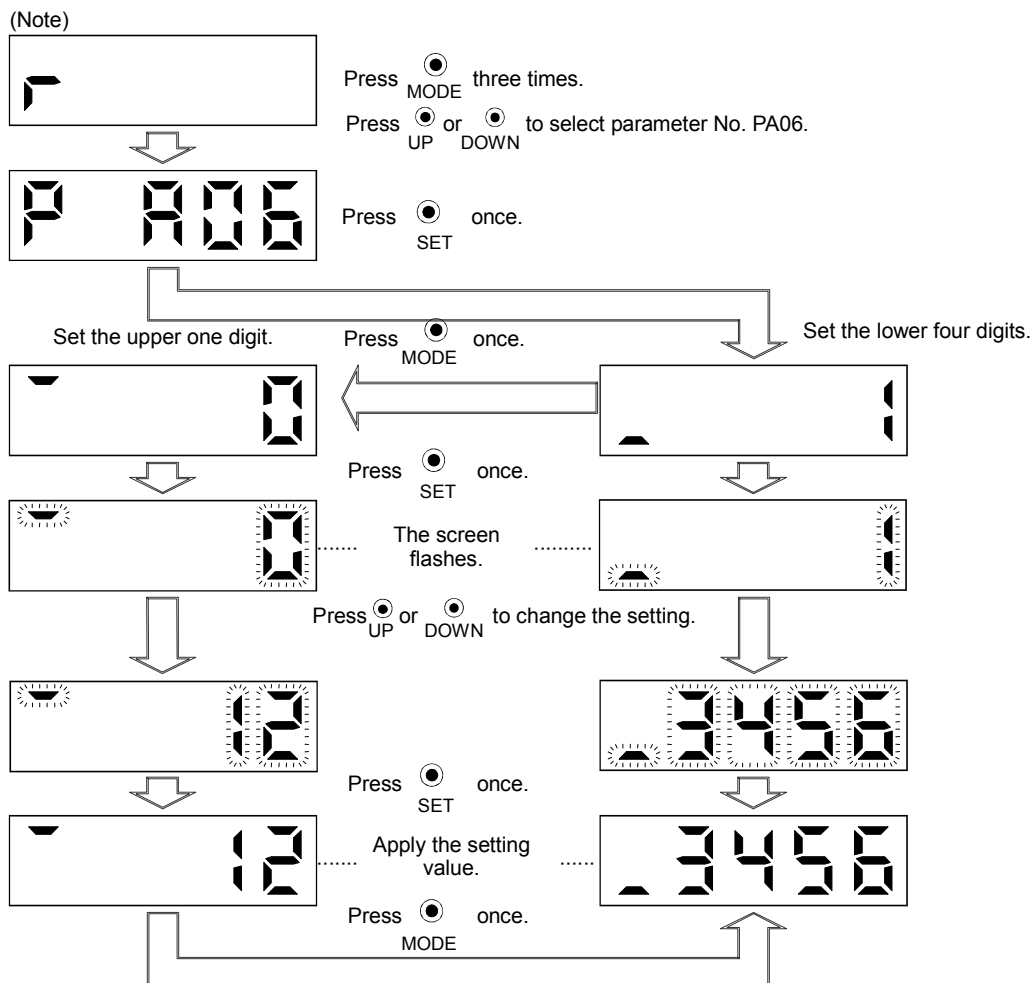


To move to the next parameter, press the “UP”/“DOWN” buttons.

The change for parameter No. PB01 becomes valid when the set value is changed.

### • Parameters of six or more digits

The following shows, as an example, the operation method for changing the number of gears on the machine-side (parameter No. PA06) to “123456”.



Note. The above illustrates a case where the status display screen at power-on is set to servo motor speed with parameter No. PC36.

## 8. PARAMETERS

### 8.1 Parameter lists

#### (1) Basic setting parameters

No.	Symbol	Name	Initial value	Unit	Remarks
PA01	*STY	Control mode	0000h		
PA02	*REG	Regenerative option	0000h		
PA03	*ABS	Absolute position detection system	0001h		
PA04		For manufacturer setting	0000h		
PA05		For manufacturer setting	0		
PA06	*CMX	Number of gears on machine-side	20		
PA07	*CDV	Number of gears on servo motor-side	1		
PA08	ATU	Auto-tuning mode	0001h		
PA09	RSP	Auto-tuning response	16		
PA10	INP	In-position range	400	pulse	
PA11	TLP	Forward rotation torque limit	100.0	%	
PA12	TLN	Reverse rotation torque limit	100.0	%	
PA13		For manufacturer setting	0000h		
PA14	*POL	Rotation direction selection	0		
PA15	*ENR	Encoder output pulse	4000	pulse/rev	
PA16		For manufacturer setting	0000h		
PA17		For manufacturer setting	0000h		
PA18		For manufacturer setting	0000h		
PA19	*BLK	Parameter write inhibit	000Bh		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

(2) Gain/Filter parameters

No.	Symbol	Name	Initial value	Unit	Remarks
PB01	FILT	Adaptive tuning mode	0000h		
PB02	VRFT	Vibration suppression control filter tuning mode	0000h		
PB03		For manufacturer setting	0	ms	
PB04	FFC	Feed forward gain	0	%	
PB05		For manufacturer setting	500		
PB06	GD2	Ratio of load inertia moment to servo motor inertia moment	7.0	multiplier	
PB07	PG1	Model loop gain	40	rad/s	
PB08	PG2	Position loop gain	60	rad/s	
PB09	VG2	Speed loop gain	1316	rad/s	
PB10	VIC	Speed integral compensation	20.8	ms	
PB11	VDC	Speed differential compensation	980		
PB12		For manufacturer setting	0		
PB13	NH1	Machine resonance suppression filter 1	4500	Hz	
PB14	NHQ1	Notch form selection 1	0000h		
PB15	NH2	Machine resonance suppression filter 2	4500	Hz	
PB16	NHQ2	Notch form selection 2	0000h		
PB17		For manufacturer setting	---h		(Note 1)
PB18	LPF	Low-pass filter setting	3141	rad/s	
PB19	VRF1	Vibration suppression control vibration frequency setting	100.0	Hz	
PB20	VRF2	Vibration suppression control resonance frequency setting	100.0	Hz	
PB21		For manufacturer setting	0.00		
PB22		For manufacturer setting	0.00		
PB23	VFBF	Low-pass filter selection	0000h		
PB24	*MVS	Slight vibration suppression control selection	0000h		
PB25		For manufacturer setting	0000h		
PB26	*CDP	Gain changing selection	0000h		
PB27	CDL	Gain changing condition	10		
PB28	CDT	Gain changing time constant	1	ms	
PB29	GD2B	Gain changing ratio of load inertia moment to servo motor inertia moment	7.0	multiplier	
PB30	PG2B	Gain changing position loop gain	37	rad/s	
PB31	VG2B	Gain changing speed loop gain	823	rad/s	
PB32	VICB	Gain changing speed integral compensation	33.7	ms	
PB33	VRF1B	Gain changing vibration suppression control vibration frequency setting	100.0	Hz	
PB34	VRF2B	Gain changing vibration suppression control resonance frequency setting	100.0	Hz	
PB35		For manufacturer setting	0.00		
PB36		For manufacturer setting	0.00		
PB37		For manufacturer setting	100		
PB38		For manufacturer setting	0.0		
PB39		For manufacturer setting	0.0		
PB40		For manufacturer setting	0.0		
PB41		For manufacturer setting	1125		
PB42		For manufacturer setting	1125		
PB43		For manufacturer setting	0004h		
PB44		For manufacturer setting	0000h		
PB45		For manufacturer setting	0000h		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Note 1. Automatically set according to machine status.

(3) Extension setting parameters

No.	Symbol	Name	Initial value	Unit	Remarks
PC01	*ODM	Operation mode selection	0000h		
PC02	*STN	Number of stations per rotation	8	stations	
PC03	ASP1	Automatic operation speed 1	1000	r/min	
PC04	ASP2	Automatic operation speed 2	1000	r/min	
PC05	MSP1	Manual operation speed 1	500	r/min	
PC06		For manufacturer setting	500		
PC07	ACC1	Acceleration time constant 1	150	ms	
PC08	DEC1	Deceleration time constant 1	150	ms	
PC09	ACC2	Acceleration time constant 2	150	ms	
PC10	DEC2	Deceleration time constant 2	150	ms	
PC11		For manufacturer setting	10		
PC12		For manufacturer setting	0000h		
PC13		For manufacturer setting	0		
PC14	MOD1	Analog monitor output 1	0000h		
PC15	MOD2	Analog monitor output 2	0001h		
PC16		For manufacturer setting	100		
PC17	ZSP	Zero speed	50	r/min	
PC18	*BPS	Alarm history clear	0000h		
PC19	*ENRS	Encoder output pulse selection	0000h		
PC20	*SNO	Station number setting	0	station	
PC21	*SOP	Communication function selection	0000h		
PC22		For manufacturer setting	0000h		
PC23		For manufacturer setting	0000h		
PC24	*COP3	Function selection C-3	0001h		
PC25		For manufacturer setting	0000h		
PC26		For manufacturer setting	0000h		
PC27		For manufacturer setting	0000h		
PC28		For manufacturer setting	0000h		
PC29		For manufacturer setting	0000h		
PC30		For manufacturer setting	0		
PC31		For manufacturer setting	0		
PC32		For manufacturer setting	0		
PC33		For manufacturer setting	0		
PC34	INT	Torque limit delay time	100	ms	
PC35	TL2	Internal torque limit 2	1.0	%	
PC36	*DMD	Display selection at LED power-on	0000h		
PC37		For manufacturer setting	0		
PC38		For manufacturer setting	0		
PC39	MO1	Analog monitor offset 1	0	mV	
PC40	MO2	Analog monitor offset 2	0	mV	
PC41		For manufacturer setting	0		
PC42	*ZTY	Home position return type	0000h		
PC43	ZRF	Home position return speed	100	r/min	
PC44	CRF	Creep speed	10	r/min	
PC45	*ZST	Home position shift distance	0	pulse	
PC46	*ZPS	Station home position shift distance	0	pulse	
PC47		For manufacturer setting	0		
PC48		For manufacturer setting	0000h		
PC49		For manufacturer setting	0000h		
PC50	COPB	Function selection C-B	0000h		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

## (4) I/O setting parameters

No.	Symbol	Name	Initial value	Unit	Remarks
PD01	*DIA1	Input signal automatic ON selection 1	0C04h		
PD02		For manufacturer setting	0000h		
PD03		For manufacturer setting	00000038h		
PD04		For manufacturer setting	00000039h		
PD05		For manufacturer setting	0000003Ah		
PD06		For manufacturer setting	0000003Bh		
PD07		For manufacturer setting	00000020h		
PD08		For manufacturer setting	00000021h		
PD09		For manufacturer setting	00000000h		
PD10		For manufacturer setting	00000022h		
PD11		For manufacturer setting	00000023h		
PD12	*DI10	Input signal device selection 10 (CN1-45)	00000000h		
PD13		For manufacturer setting	0038h		
PD14		For manufacturer setting	0039h		
PD15		For manufacturer setting	003Ah		
PD16		For manufacturer setting	003Bh		
PD17	*DO5	Output signal device selection 5 (CN1-48)	0003h		
PD18	*DO6	Output signal device selection 6 (CN1-49)	0004h		
PD19	*DIF	Input filter setting	0004h		
PD20		For manufacturer setting	0000h		
PD21		For manufacturer setting	0000h		
PD22		For manufacturer setting	0000h		
PD23		For manufacturer setting	0000h		
PD24		For manufacturer setting	0000h		
PD25	*DIA3	Input signal automatic ON selection 3	0000h		
PD26	*DIA4	Input signal automatic ON selection 4	0000h		
PD27		For manufacturer setting	0000h		
PD28		For manufacturer setting	0000h		
PD29		For manufacturer setting	0000h		
P30		For manufacturer setting	0000h		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

## (5) Option card parameters

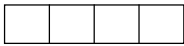
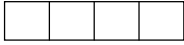
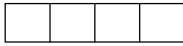
No.	Symbol	Name	Initial value	Unit	Remarks
Po01		Option card installation detection	---h		(Note 1)
Po02		For manufacturer setting	0		
Po03		For manufacturer setting	0		
Po04		For manufacturer setting	0		
Po05		For manufacturer setting	0000h		
Po06		For manufacturer setting	0000h		
Po07		For manufacturer setting	0000h		
Po08		For manufacturer setting	0000h		
Po09		For manufacturer setting	00212000h		
Po10		For manufacturer setting	00052322h		
Po11	*ODI3	MR-J3-D01 input signal device selection 3 (CN10-33)	00000D24h		
Po12		For manufacturer setting	00000000h		
Po13	*ODI5	MR-J3-D01 input signal device selection 5 (CN10-20)	00000026h		
Po14		For manufacturer setting	00000000h		
Po15		For manufacturer setting	00000000h		
Po16		For manufacturer setting	0000h		
Po17		For manufacturer setting	0001h		
Po18		For manufacturer setting	0		
Po19		For manufacturer setting	0		
Po20		For manufacturer setting	0		
Po21		For manufacturer setting	0		
Po22		For manufacturer setting	0000h		
Po23		For manufacturer setting	0000h		
Po24		For manufacturer setting	0000h		
Po25		For manufacturer setting	0000h		
Po26	*ODO5	MR-J3-D01 output signal device selection 5 (CN10-46, 47)	0403h		
Po27	*ODO6	MR-J3-D01 output signal device selection 6 (CN10-48, 49)	0000h		
Po28		For manufacturer setting	0000h		
Po29		For manufacturer setting	0000h		
Po30		For manufacturer setting	0000h		
Po31		For manufacturer setting	0000h		
Po32		For manufacturer setting	0		
Po33		For manufacturer setting	0		
Po34		For manufacturer setting	0		
Po35		For manufacturer setting	0		
Po36		For manufacturer setting	0		
Po37		For manufacturer setting	0		
Po38		For manufacturer setting	0		
Po39		For manufacturer setting	0		
Po40		For manufacturer setting	0		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Note 1. Automatically set, depending on whether or not an option card is installed.

## 8.2 Parameter details

Never change the manufacturer setting parameters.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
Basic setting parameters	PA01	*STY	<p>Control mode Used to select the control mode.</p>  <p>Selection of control mode 0: Position control mode</p>	0000h		Refer to the "Name and Function" column.
	PA02	*REG	<p>Regenerative option Used to select the regenerative option.</p>  <p>Selection of regenerative option 00: Regenerative option is not used</p> <ul style="list-style-type: none"> <li>• For servo amplifier of 100W, regenerative resistor is not used.</li> <li>• For servo amplifier of 200W to 7kW, built-in regenerative resistor is used.</li> <li>• Supplied regenerative resistor or regenerative option is used with 11k to 22kW servo amplifier.</li> </ul> <p>01:FR-BU2-(H)/FR-RC-(H)/FR-CV-(H) 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 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) FA: When the supplied regenerative resistor is cooled with a cooling fan to increase capacity with an 11k to 22kW servo amplifier</p> <p>Note: Wrong setting may cause the regenerative option to burn. A parameter error (AL. 37) occurs when a regenerative option not to be combined with the servo amplifier is selected.</p>	0000h		Refer to the "Name and Function" column.
	PA03	*ABS	<p>Absolute position detection system Used to select the absolute position detection system.</p>  <p>0: Used in incremental system 1: Used in absolute position detection system</p>	0001h		Refer to the "Name and Function" column.
	PA04		For manufacturer setting	0000h		
	PA05			0		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																		
Basic setting parameters	PA06	*CMX	Number of gears on machine-side Used to set the number of gears on the machine-side.	20		1 to 16384																		
	PA07	*CDV	Number of gears on servo motor-side Used to set the number of gears on the servo motor-side.  Note: Be sure to set CMX and CDV within the following conditional ranges:  (1) $\frac{1}{9999} < \frac{CMX}{CDV} < 9999$ (2) $CDV \times STN < 32767$ (STN: Parameter No. PC02 (Number of stations per rotation)) (3) $CMX \times CDV < 100000$  When the gear ratio is decreased, the servo motor may not be able to be operated at the set speed. Caution is required.  Movement amount of 1 station = $Servo\ motor\ resolution \times \frac{1}{STN} \times \frac{CMX}{CDV}$	1		1 to 16384																		
	PA08	ATU	Auto tuning mode Used to set estimated items in auto tuning mode.  <table border="1" style="margin-left: 40px;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> <div style="margin-left: 40px;">Auto tuning mode selection</div> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Set value</th> <th>Gain Adjustment Mode</th> <th>Parameter Nos. Automatically Set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Interpolation mode</td> <td>PB06, PB08, PB09, PB10</td> </tr> <tr> <td>1</td> <td>Auto tuning mode 1</td> <td>PB06, PB07, PB08, PB09, PB10</td> </tr> <tr> <td>2</td> <td>Auto tuning mode 2</td> <td>PB07, PB08, PB09, PB10</td> </tr> <tr> <td>3</td> <td>Manual mode</td> <td></td> </tr> </tbody> </table>					Set value	Gain Adjustment Mode	Parameter Nos. Automatically Set	0	Interpolation mode	PB06, PB08, PB09, PB10	1	Auto tuning mode 1	PB06, PB07, PB08, PB09, PB10	2	Auto tuning mode 2	PB07, PB08, PB09, PB10	3	Manual mode		0001h	
Set value	Gain Adjustment Mode	Parameter Nos. Automatically Set																						
0	Interpolation mode	PB06, PB08, PB09, PB10																						
1	Auto tuning mode 1	PB06, PB07, PB08, PB09, PB10																						
2	Auto tuning mode 2	PB07, PB08, PB09, PB10																						
3	Manual mode																							

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.





Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																																																																						
Basic setting parameters	PA09	RSP	Auto tuning response Used to set the auto tuning response. <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th>Set value</th> <th>Response</th> <th>Machine Resonance (Target)</th> </tr> </thead> <tbody> <tr><td>1</td><td rowspan="5">Low response</td><td>10Hz</td></tr> <tr><td>2</td><td>(11.3Hz)</td></tr> <tr><td>3</td><td>(12.7Hz)</td></tr> <tr><td>4</td><td>(14.3Hz)</td></tr> <tr><td>5</td><td>(16.1Hz)</td></tr> <tr><td>6</td><td>(18.1Hz)</td></tr> <tr><td>7</td><td>(20.4Hz)</td></tr> <tr><td>8</td><td>(23.0Hz)</td></tr> <tr><td>9</td><td>(25.9Hz)</td></tr> <tr><td>10</td><td>(29.2Hz)</td></tr> <tr><td>11</td><td>(32.9Hz)</td></tr> <tr><td>12</td><td>(37.0Hz)</td></tr> <tr><td>13</td><td>(41.7Hz)</td></tr> <tr><td>14</td><td>(47.0Hz)</td></tr> <tr><td>15</td><td>(52.9Hz)</td></tr> <tr><td>16</td><td rowspan="5">Intermediate response</td><td>(59.6Hz)</td></tr> <tr><td>17</td><td>(67.1Hz)</td></tr> <tr><td>18</td><td>(75.6Hz)</td></tr> <tr><td>19</td><td>(85.2Hz)</td></tr> <tr><td>20</td><td>(95.9Hz)</td></tr> <tr><td>21</td><td>(108.0Hz)</td></tr> <tr><td>22</td><td>(121.7Hz)</td></tr> <tr><td>23</td><td>(137.1Hz)</td></tr> <tr><td>24</td><td>(154.4Hz)</td></tr> <tr><td>25</td><td>(173.9Hz)</td></tr> <tr><td>26</td><td>(195.9Hz)</td></tr> <tr><td>27</td><td>(200.6Hz)</td></tr> <tr><td>28</td><td>(248.5Hz)</td></tr> <tr><td>29</td><td>(279.9Hz)</td></tr> <tr><td>30</td><td>(315.2Hz)</td></tr> <tr><td>31</td><td>(355.1Hz)</td></tr> <tr><td>32</td><td>High response</td><td>400Hz</td></tr> </tbody> </table>	Set value	Response	Machine Resonance (Target)	1	Low response	10Hz	2	(11.3Hz)	3	(12.7Hz)	4	(14.3Hz)	5	(16.1Hz)	6	(18.1Hz)	7	(20.4Hz)	8	(23.0Hz)	9	(25.9Hz)	10	(29.2Hz)	11	(32.9Hz)	12	(37.0Hz)	13	(41.7Hz)	14	(47.0Hz)	15	(52.9Hz)	16	Intermediate response	(59.6Hz)	17	(67.1Hz)	18	(75.6Hz)	19	(85.2Hz)	20	(95.9Hz)	21	(108.0Hz)	22	(121.7Hz)	23	(137.1Hz)	24	(154.4Hz)	25	(173.9Hz)	26	(195.9Hz)	27	(200.6Hz)	28	(248.5Hz)	29	(279.9Hz)	30	(315.2Hz)	31	(355.1Hz)	32	High response	400Hz	16		1 to 32
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32	High response	400Hz																																																																										
	PA10	INP	In-position range Used to set the range in which the in-position (INP) signal is output in encoder pulse units.	400	pulse	0 to 65535																																																																						

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																										
Basic setting parameters	PA11	TLP	Forward rotation torque limit Used to set the forward rotation torque limit to limit the generated torque during servo motor CCW power activation or CW regeneration, given a maximum torque of 100.0%. No torque is generated when set to "0.0." When torque is output using analog monitor output, either the torque value of this parameter or parameter No. PA12 (reverse rotation torque limit), whichever of the two is smaller, results in the maximum output voltage (+8[V]).	100.0	%	0 to 100.0																										
	PA12	TLN	Reverse rotation torque limit Used to set the reverse rotation torque limit to limit the generated torque during servo motor CW power activation or CCW regeneration, given a maximum torque of 100.0%. No torque is generated when set to "0.0."	100.0	%	0 to 100.0																										
	PA13		For manufacturer setting	0000h																												
	PA14	*POL	Rotation direction selection Used to set the rotation direction in the automatic operation modes 1 and 2, manual operation mode, and home position return mode (dog type home position return).	0		0 to 1																										
			<table border="1"> <thead> <tr> <th>Set Value</th> <th>Automatic operation modes 1 and 2, manual operation mode</th> <th>Home position return mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>The station number is incremented with CW rotation. Station numbers are set in order of No.1 and No.2 respectively in the CW direction of the servo motor rotation, given the home setting position as No.0.</td> <td>CW rotation direction</td> </tr> <tr> <td>1</td> <td>The station number is incremented with CCW rotation. Station numbers are set in order of No.1 and No.2 respectively in the CCW direction of the servo motor rotation, given the home setting position as No.0.</td> <td>CCW rotation direction</td> </tr> </tbody> </table>	Set Value	Automatic operation modes 1 and 2, manual operation mode	Home position return mode	0	The station number is incremented with CW rotation. Station numbers are set in order of No.1 and No.2 respectively in the CW direction of the servo motor rotation, given the home setting position as No.0.	CW rotation direction	1	The station number is incremented with CCW rotation. Station numbers are set in order of No.1 and No.2 respectively in the CCW direction of the servo motor rotation, given the home setting position as No.0.	CCW rotation direction																				
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	PA15	*ENR	Encoder output pulse Used to set the encoder pulses (A-phase and B-phase) output by the servo amplifier. Set a value that is 4 times greater than the A-phase or B-phase pulses. The number of output pulses setting or the output dividing ratio setting can be selected with parameter No. PC19 (ENRS). The maximum output frequency is 4.6Mpps (after multiplied by 4). Use this parameter within this range.	4000	pulse /rev	1 to 100000																										
	PA16		For manufacturer setting	0000h																												
PA17			0000h																													
PA18			0000h																													
PA19	*BLK	Parameter write inhibit Used to select the parameter reference range and writing range.	000Bh		Refer to the "Name and Function" column.																											
		<table border="1"> <thead> <tr> <th>Set value</th> <th>Reference parameter range</th> <th>Writing parameter range</th> </tr> </thead> <tbody> <tr> <td>Other than below</td> <td>Basic setting (PA)</td> <td>←</td> </tr> <tr> <td>000A</td> <td>Parameter PA19 only</td> <td>←</td> </tr> <tr> <td>000B</td> <td>Basic setting (PA), gain/filter (PB), extension setting (PC)</td> <td>←</td> </tr> <tr> <td>000C</td> <td>Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD)</td> <td>←</td> </tr> <tr> <td>000E</td> <td>Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD), option card (PO)</td> <td>←</td> </tr> <tr> <td>100B</td> <td>Basic setting (PA)</td> <td>Parameter PA19 only</td> </tr> <tr> <td>100C</td> <td>Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD)</td> <td>Parameter PA19 only</td> </tr> <tr> <td>100E</td> <td>Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD), option card (PO)</td> <td>Parameter PA19 only</td> </tr> </tbody> </table>	Set value	Reference parameter range	Writing parameter range	Other than below	Basic setting (PA)	←	000A	Parameter PA19 only	←	000B	Basic setting (PA), gain/filter (PB), extension setting (PC)	←	000C	Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD)	←	000E	Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD), option card (PO)	←	100B	Basic setting (PA)	Parameter PA19 only	100C	Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD)	Parameter PA19 only	100E	Basic setting (PA), gain/filter (PB), extension setting (PC), I/O setting (PD), option card (PO)	Parameter PA19 only			
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Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial Value	Unit	Setting Range												
Gain/Filter parameters	PB01	FILT	<p>Adaptive tuning mode (adaptive filter II) Used to select the setting method for filter tuning. When this parameter is set to "□□□1" (filter tuning mode 1), the machine resonance suppression filter 1 (parameter No. PB13) and notch form selection 1 (parameter No. PB14) are automatically changed.</p> <div style="text-align: center;">  <p>Filter tuning mode selection</p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Set value</th> <th>Filter adjustment mode</th> <th>Parameters automatically set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Filter OFF</td> <td>(Note)</td> </tr> <tr> <td>1</td> <td>Filter tuning mode</td> <td>Parameter No. PB13 Parameter No. PB14</td> </tr> <tr> <td>2</td> <td>Manual mode</td> <td></td> </tr> </tbody> </table> <p>Note: Parameter Nos. PB13 and PB14 are fixed to the initial values.</p> <p>When this parameter is set to "□□□1", tuning is completed after a certain amount of period and a certain amount of rotation and positioning, and then the setting changes to "□□□2". When filter tuning is not needed, the setting changes to "□□□0." When the parameter is set to "□□□0", the initial values are set to the machine resonance suppression filter 1 and the notch form selection 1. Note that this does not occur during the servo off.</p>	Set value	Filter adjustment mode	Parameters automatically set	0	Filter OFF	(Note)	1	Filter tuning mode	Parameter No. PB13 Parameter No. PB14	2	Manual mode		0000h		Refer to the "Name and Function" column.
	Set value	Filter adjustment mode	Parameters automatically set															
	0	Filter OFF	(Note)															
1	Filter tuning mode	Parameter No. PB13 Parameter No. PB14																
2	Manual mode																	
PB02	VRFT	<p>Vibration suppression control filter tuning mode (advanced vibration suppression control) Vibration suppression control is enabled when parameter No. PA08 (auto tuning) is set to "□□□2" or "□□□3." Select the setting method for vibration suppression control filter tuning. When the parameter is set to "□□□1" (vibration suppression control filter tuning mode), the vibration suppression control vibration frequency setting (parameter No. PB19) and vibration suppression control resonance frequency (parameter number PB20) are automatically changed.</p> <div style="text-align: center;">  <p>Vibration suppression control tuning mode selection</p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Set Value</th> <th>Vibration suppression control adjustment mode</th> <th>Parameters automatically set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Vibration suppression control OFF</td> <td>(Note)</td> </tr> <tr> <td>1</td> <td>Vibration suppression control filter tuning mode</td> <td>Parameter No. PB19 Parameter No. PB20</td> </tr> <tr> <td>2</td> <td>Manual mode</td> <td></td> </tr> </tbody> </table> <p>Note: Parameter Nos. PB19 and PB20 are fixed to initial values.</p> <p>When this parameter is set to "□□□1", tuning is completed after positioning for a certain amount of period and a certain amount of rotation, and then the setting changes to "□□□2". When filter tuning is not needed, the setting changes to "□□□0". When the parameter is set to "□□□0", the initial values are set to the vibration suppression control vibration frequency setting and vibration suppression control resonance frequency. Note that this does not occur during the servo off.</p>	Set Value	Vibration suppression control adjustment mode	Parameters automatically set	0	Vibration suppression control OFF	(Note)	1	Vibration suppression control filter tuning mode	Parameter No. PB19 Parameter No. PB20	2	Manual mode		0000h		Refer to the "Name and Function" column.	
Set Value	Vibration suppression control adjustment mode	Parameters automatically set																
0	Vibration suppression control OFF	(Note)																
1	Vibration suppression control filter tuning mode	Parameter No. PB19 Parameter No. PB20																
2	Manual mode																	
PB03		For manufacturer setting		0														

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
Gain/Filter parameters	PB04	FFC	Feed forward gain Used to set the feed forward gain. When this value is set to 100%, the droop pulse during operation at a constant speed is virtually zero. However, note that overshoot increases with sudden acceleration or deceleration. As a general target, when the feed forward gain is set to 100%, set the acceleration/deceleration time constant until reaching the rated speed to 1s or longer.	0	%	0 to 100
	PB05		For manufacturer setting	500		
	PB06	GD2	Ratio of load inertia moment to servo motor inertia moment Used to set the ratio of the load inertia moment to the servo motor inertia moment for the servo motor shaft. When auto tuning mode 1 and interpolation mode are selected, the value is automatically set to the auto tuning result. In such a case, the value changes within the range of 0.0 to 100.0.	7.0	times	0.0 to 300.0
	PB07	PG1	Model loop gain Used to set the response gain up to the target position. Increasing the gain improves following capability with respect to the position command. When the mode is set to auto tuning mode 1 or 2, the value is automatically set to the result of auto tuning.	40	rad/s	1 to 2000
	PB08	PG2	Position loop gain Used to set the position loop gain. Set this parameter to increase the position response with respect to load disturbance. Increasing the set value enhances response, but also makes vibration and noise occur more readily. When auto tuning mode 1 or 2, manual mode, and interpolation are set, the value is automatically set to the auto tuning result.	60	rad/s	1 to 1000
	PB09	VG2	Speed loop gain Used to set the speed loop gain. Set this parameter when vibration occurs on a machine with low rigidity or high backlash. Increasing the set value enhances response, but also makes vibration and noise occur more readily. When auto tuning mode 1 or 2, and interpolation are set, the value is automatically set to the auto tuning result.	1316	rad/s	20 to 50000
	PB10	VIC	Speed integral compensation Used to set the speed loop integral time constant. Lowering the set value enhances response, but also makes vibration and noise occur more readily. When auto tuning mode 1 or 2, and interpolation are set, the value is automatically set to the auto tuning result.	20.8	ms	0.1 to 1000.0
	PB11	VDC	Speed differential compensation Used to set the differential compensation. The setting is enabled by turning on the proportion control signal (PC) or turning on PID with PI-PID changeover.	980		0 to 1000
PB12		For manufacturer setting	0			

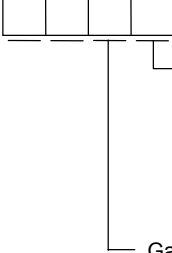
Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																											
Gain/Filter parameters	PB13	NH1	Machine resonance suppression filter 1 Used to set the notch frequency of machine resonance suppression filter 1. When parameter No. PB01 (filter tuning mode) is set to "□□□1," this parameter is automatically set. When parameter No. PB01 is set to "□□□0," the setting of this parameter is ignored.	4500	Hz	100 to 4500																											
	PB14	NHQ1	Notch form selection 1 Used to set the form of machine resonance suppression filter 1.  <table border="1" data-bbox="555 548 861 716"> <caption>Notch width selection</caption> <thead> <tr> <th>Set value</th> <th>Width</th> <th><math>\alpha</math></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Standard</td> <td>2</td> </tr> <tr> <td>1</td> <td rowspan="2">I</td> <td>3</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>Wide</td> <td>5</td> </tr> </tbody> </table> <table border="1" data-bbox="880 443 1187 616"> <caption>Notch depth selection</caption> <thead> <tr> <th>Set value</th> <th>Depth</th> <th>Gain</th> </tr> </thead> <tbody> <tr> <td>0</td> <td rowspan="2">Deep</td> <td>-40dB</td> </tr> <tr> <td>1</td> <td>-14dB</td> </tr> <tr> <td>2</td> <td rowspan="2">Shallow</td> <td>-8dB</td> </tr> <tr> <td>3</td> <td>-4dB</td> </tr> </tbody> </table> When parameter No. PB01 (filter tuning mode) is set to "□□□1," this parameter is automatically set. When parameter No. PB01 is set to "□□□0," the setting of this parameter is ignored.	Set value	Width	$\alpha$	0	Standard	2	1	I	3	2	4	3	Wide	5	Set value	Depth	Gain	0	Deep	-40dB	1	-14dB	2	Shallow	-8dB	3	-4dB	0000h		Refer to the "Name and Function" column.
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3		-4dB																															
PB15	NH2	Machine resonance suppression filter 2 Used to set the notch frequency of machine resonance suppression filter 2.  When parameter No. PB16 (notch form selection 2) is set to "□□□1," this parameter is enabled.	4500	Hz	100 to 4500																												
PB16	NHQ2	Notch form selection 2 Used to set the form of machine resonance suppression filter 2.  <p>Machine resonance suppression filter 2 selection 0: Invalid 1: Valid</p> <table border="1" data-bbox="558 1579 865 1751"> <caption>Notch width selection</caption> <thead> <tr> <th>Set Value</th> <th>Width</th> <th><math>\alpha</math></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Standard</td> <td>2</td> </tr> <tr> <td>1</td> <td rowspan="2">I</td> <td>3</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>Wide</td> <td>5</td> </tr> </tbody> </table> <table border="1" data-bbox="900 1460 1206 1632"> <caption>Notch depth selection</caption> <thead> <tr> <th>Set Value</th> <th>Depth</th> <th>Gain</th> </tr> </thead> <tbody> <tr> <td>0</td> <td rowspan="2">Deep</td> <td>-40dB</td> </tr> <tr> <td>1</td> <td>-14dB</td> </tr> <tr> <td>2</td> <td rowspan="2">Shallow</td> <td>-8dB</td> </tr> <tr> <td>3</td> <td>-4dB</td> </tr> </tbody> </table>	Set Value	Width	$\alpha$	0	Standard	2	1	I	3	2	4	3	Wide	5	Set Value	Depth	Gain	0	Deep	-40dB	1	-14dB	2	Shallow	-8dB	3	-4dB	0000h		Refer to the "Name and Function" column.	
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	PB17		For manufacturer setting																														

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
Gain/Filter parameters	PB18	LPF	Low-pass filter setting Used to select the low-pass filter. When parameter No. PB23 (low-pass filter selection) is set to "□□0□," this parameter is automatically changed. When parameter No. PB23 is set to "□□1□," this parameter can be set manually.	3141	rad/s	100 to 18000
	PB19	VRF1	Vibration suppression control vibration frequency setting Used to set the vibration frequency of vibration suppression control, which suppresses low-frequency machine vibration such as housing vibration.  When parameter No. PB02 (vibration suppression control filter tuning mode) is set to "□□□1," this parameter is automatically changed. When parameter No. PB02 is set to "□□□2," this parameter can be set manually.	100.0	Hz	0.1 to 100.0
	PB20	VRF2	Vibration suppression control resonance frequency setting Used to set the resonance frequency of vibration suppression control, which suppresses low-frequency machine vibration such as housing vibration. When parameter No. PB02 (vibration suppression control filter tuning mode) is set to "□□□1," this parameter is automatically changed. When parameter No. PB02 is set to "□□□2," this parameter can be set manually.	100.0	Hz	0.1 to 100.0
	PB21		For manufacturer setting	0.00		
	PB22			0.00		
	PB23	VFBF	Low-pass filter selection Used to select the low-pass filter.  <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <p style="margin-left: 40px;">Low-pass filter selection 0: Automatic setting 1: Manual setting (set value of parameter No. PB18)</p> <p style="margin-left: 40px;">* When automatic setting is selected, a filter close to the band that is calculated by <math>\frac{VG2 \cdot 10}{1 + D2}</math> [rad/s] is selected.</p>	0000h		Refer to the "Name and Function" column.
	PB24	*MVS	Slight vibration suppression control selection Used to select slight vibration suppression control. When parameter No. PA08 (auto tuning mode) is set to "□□□3," this parameter is enabled.  <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> </div> <p style="margin-left: 40px;">Slight vibration suppression control selection 0: Invalid 1: Valid</p>	0000h		Refer to the "Name and Function" column.
	PB25		For manufacturer setting	0000h		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.


Category	No.	Symbol	Name and function	Initial Value	Unit	Setting Range
Gain/Filter parameters	PB26	*CDP	Gain changing selection Used to select gain changing selection conditions.  Gain changing selection 0: Invalid 1: Gain changing (CDP) 2: Command frequency (set value of parameter No. PB27) 3: Droop pulse (set value of parameter No. PB27) 4: Servo motor speed (set value of parameter No. PB27)  Gain changing conditions 0: Enabled with the set value or larger for the gain changing condition selected above [enabled when gain changing (CDP) is on] 1: Enabled with the set value or smaller for the gain changing condition selected above [enabled when gain changing (CDP) is off]	0000h		Refer to the "Name and Function" column.
	PB27	CDL	Gain changing condition Used to set the value of the gain changing condition (command frequency, droop pulse or servo motor speed) selected with parameter No. PB26. The set value unit differs according to the changing condition item.	10	kpps pulse r/min	0 to 9999
	PB28	CDT	Gain changing time constant Used to set the time constant with which the gain is changed for the conditions set in parameter Nos. PB26 and 27.	1	ms	0 to 100
	PB29	GD2B	Gain changing ratio of load inertia moment to servo motor inertia moment Used to set the ratio of load inertia moment to servo motor inertia moment when the gain changing is enabled. Enabled when auto tuning is disabled (when parameter No. PA0 is set to "□□□3").	7.0	times	0.0 to 300.0
	PB30	PG2B	Gain changing position loop gain Used to set the position loop gain when the gain changing is enabled. Enabled when auto tuning is disabled (when parameter No. PA08 is set to "□□□3").	37	rad/s	1 to 2000
	PB31	VG2B	Gain changing speed loop gain Used to set the speed loop gain when the gain changing is enabled. Enabled when auto tuning is disabled (when parameter No. PA08 is set to "□□□3").	823	rad/s	20 to 50000
	PB32	VICB	Gain changing speed integral compensation Used to set the speed integral compensation when the gain changing is enabled. Enabled when auto tuning is disabled (when parameter No. PA08 is set to "□□□3").	33.7	ms	0.1 to 5000.0

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

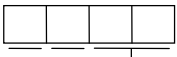
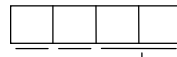
Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
Gain/Filter parameters	PB33	VRF1B	Gain changing vibration suppression control vibration frequency setting Used to set the vibration suppression control vibration frequency when the gain changing is enabled. Enabled when parameter No. PB02 is set to "□□□2," and parameter No. PB26 is set to "□□□1." When using vibration suppression control gain changing, be sure to change the gain after the servo motor stops.	100.0	Hz	0.1 to 100.0
	PB34	VRF2B	Gain changing vibration suppression control resonance frequency setting Used to set the vibration suppression control resonance frequency when gain changing is enabled. When using vibration suppression control gain changing, be sure to change the gain after the servo motor stops.	100.0	Hz	0.1 to 100.0
	PB35		For manufacturer setting	0.00		
	PB36			0.00		
	PB37			100		
	PB38			0.0		
	PB39			0.0		
	PB40			0.0		
	PB41			1125		
	PB42			1125		
	PB43			0004h		
PB44		0000h				
PB45		0000h				

Note: For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

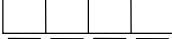




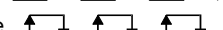

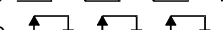





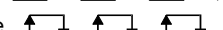

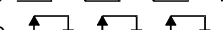





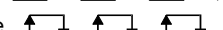

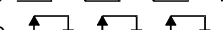





Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																					
Extension setting parameters	PC01	*ODM	<p>Operation mode selection</p>  <p>0: Turret input mode</p> <p>Used to select the manual operation method.</p> <table border="1" data-bbox="576 349 956 463"> <thead> <tr> <th>Set Value</th> <th>Manual operation method</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Station JOG operation</td> </tr> <tr> <td>1</td> <td>JOG operation</td> </tr> </tbody> </table> <p>0: Normal operation mode The operation mode is changed by the mode selection inputs MD0 and MD1.</p> <table border="1" data-bbox="501 573 1072 766"> <thead> <tr> <th>MD1</th> <th>MD0</th> <th>Normal operation mode</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Open</td> <td>Home position return mode</td> </tr> <tr> <td>Short</td> <td>Open</td> <td>Automatic operation mode 1 (rotation direction specified)</td> </tr> <tr> <td>Open</td> <td>Short</td> <td>Manual operation mode</td> </tr> <tr> <td>Short</td> <td>Short</td> <td>Automatic operation mode 2 (shortest rotation)</td> </tr> </tbody> </table>	Set Value	Manual operation method	0	Station JOG operation	1	JOG operation	MD1	MD0	Normal operation mode	Open	Open	Home position return mode	Short	Open	Automatic operation mode 1 (rotation direction specified)	Open	Short	Manual operation mode	Short	Short	Automatic operation mode 2 (shortest rotation)	0000h		Refer to the "Name and Function" column.
	Set Value	Manual operation method																									
	0	Station JOG operation																									
	1	JOG operation																									
	MD1	MD0	Normal operation mode																								
	Open	Open	Home position return mode																								
	Short	Open	Automatic operation mode 1 (rotation direction specified)																								
	Open	Short	Manual operation mode																								
Short	Short	Automatic operation mode 2 (shortest rotation)																									
PC02	*STN	Number of stations per rotation Used to set the number of stations (number of indexer stations) per machine rotation.	8	stations	2 to 255																						
PC03	ASP1	Automatic operation speed 1 Used to set the positioning speed of the automatic operation modes 1 and 2.	1000	r/min	0 to maximum permissible speed A																						
PC04	ASP2	Automatic operation speed 2 Used to set the positioning speed of the automatic operation modes 1 and 2.	1000	r/min	0 to maximum permissible speed A																						
PC05	MSP1	Manual operation speed 1 Used to set the JOG speed of the manual operation mode.	500	r/min	0 to maximum permissible speed A																						
PC06		For manufacturer setting	500																								
PC07	ACC1	Acceleration time constant 1 Used to set the acceleration time from stop to the rated speed in response to the position command.	150	ms	0 to 10000																						
PC08	DEC1	Deceleration time constant 1 Used to set the deceleration time from the rated speed to stop in response to the position command.	150	ms	0 to 10000																						

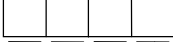

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																													
Extension setting parameters	PC09	ACC2	Acceleration time constant 2 Used to set the acceleration time from stop to the rated speed in response to the position command.	150	ms	0 to 10000																													
	PC10	DEC2	Deceleration time constant 2 Used to set the deceleration time from the rated speed to stop in response to the position command.	150	ms	0 to 10000																													
	PC11		For manufacturer setting	10																															
	PC12			0000h																															
	PC13			0																															
	PC14	MOD1	Analog monitor output 1 Used to set the signal to be output to the analog monitor output (MO1). 	0000h		Refer to the "Name and Function" column.																													
	<p>Analog monitor (MO1) output selection</p> <table border="1"> <thead> <tr> <th>Set Value</th> <th>Item</th> </tr> </thead> <tbody> <tr><td>00</td><td>Servo motor speed (<math>\pm 8V</math>/maximum speed)</td></tr> <tr><td>01</td><td>Torque (<math>\pm 8V</math>/maximum torque) (Note 2)</td></tr> <tr><td>02</td><td>Servo motor speed (+8V/maximum speed)</td></tr> <tr><td>03</td><td>Torque (+8V/maximum torque) (Note 2)</td></tr> <tr><td>04</td><td>Current command (<math>\pm 8V</math>/maximum current command)</td></tr> <tr><td>05</td><td>Command pulse frequency (<math>\pm 10V/\pm 1</math>[Mpps])</td></tr> <tr><td>06</td><td>Droop pulse (<math>\pm 10V/100</math> pulses) (Note 1)</td></tr> <tr><td>07</td><td>Droop pulse (<math>\pm 10V/1,000</math> pulses) (Note 1)</td></tr> <tr><td>08</td><td>Droop pulse (<math>\pm 10V/10,000</math> pulses) (Note 1)</td></tr> <tr><td>09</td><td>Droop pulse (<math>\pm 10V/100,000</math> pulses) (Note 1)</td></tr> <tr><td>0A</td><td>Feedback position (<math>\pm 10V/1</math> Mpulses) (Note 1)</td></tr> <tr><td>0B</td><td>Feedback position (<math>\pm 10V/10</math> Mpulses) (Note 1)</td></tr> <tr><td>0C</td><td>Feedback position (<math>\pm 10V/100</math> Mpulses) (Note 1)</td></tr> <tr><td>0D</td><td>Bus voltage (+8/400V)</td></tr> </tbody> </table> <p>Note 1. The unit is encoder pulses. 2. 8V is output at maximum torque. Note, however, when the torque is limited by parameter Nos. PA11 and PA12, 8V is output at the higher of the two limited torque.</p>			Set Value	Item		00	Servo motor speed ( $\pm 8V$ /maximum speed)	01	Torque ( $\pm 8V$ /maximum torque) (Note 2)	02	Servo motor speed (+8V/maximum speed)	03	Torque (+8V/maximum torque) (Note 2)	04	Current command ( $\pm 8V$ /maximum current command)	05	Command pulse frequency ( $\pm 10V/\pm 1$ [Mpps])	06	Droop pulse ( $\pm 10V/100$ pulses) (Note 1)	07	Droop pulse ( $\pm 10V/1,000$ pulses) (Note 1)	08	Droop pulse ( $\pm 10V/10,000$ pulses) (Note 1)	09	Droop pulse ( $\pm 10V/100,000$ pulses) (Note 1)	0A	Feedback position ( $\pm 10V/1$ Mpulses) (Note 1)	0B	Feedback position ( $\pm 10V/10$ Mpulses) (Note 1)	0C	Feedback position ( $\pm 10V/100$ Mpulses) (Note 1)	0D	Bus voltage (+8/400V)	
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04	Current command ( $\pm 8V$ /maximum current command)																																		
05	Command pulse frequency ( $\pm 10V/\pm 1$ [Mpps])																																		
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0C	Feedback position ( $\pm 10V/100$ Mpulses) (Note 1)																																		
0D	Bus voltage (+8/400V)																																		
PC15	MOD2	Analog monitor output 2 Used to set the signal to be output to the analog monitor output (MO2). 	0001h		Refer to the "Name and Function" column.																														
<p>Analog monitor (MO2) output selection [Refer to parameter No. PC14 (MOD1).]</p>																																			
	PC16		For manufacturer setting	100																															



Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range											
Extension setting parameters	PC17	ZSP	Zero speed Used to set the output range of the zero speed signal (ZSP). Zero speed signal detection has a hysteresis width of 20r/min.	50	r/min	0 to 10000											
	PC18	*BPS	Alarm history clear Used to select alarm history clear.  Alarm history clear selection 0: Invalid 1: Valid When the alarm history clear is set valid, the alarm history will be cleared at the next power-on. After the alarm history is cleared, alarm history clear will be automatically disabled (changed to 0).	0000h		Refer to the "Name and Function" column.											
	PC19	*ENRS	Encoder output pulse selection Used to select the encoder output pulse direction and encoder output pulse setting.  Encoder output pulse phase changing Used to change the phase of A and B- phases of encoder output pulse. <table border="1" data-bbox="557 929 1268 1176"> <thead> <tr> <th rowspan="2">Set value</th> <th colspan="2">Servo motor rotation direction</th> </tr> <tr> <th>CCW</th> <th>CW</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>A-phase  B-phase </td> <td>A-phase  B-phase </td> </tr> <tr> <td>1</td> <td>A-phase  B-phase </td> <td>A-phase  B-phase </td> </tr> </tbody> </table> Encoder output pulse setting selection 0: Output pulse setting 1: Division ratio setting 2: Command input pulse unit setting Setting "2" above disables the set value of parameter No. PA15 (encoder output pulse).	Set value	Servo motor rotation direction		CCW	CW	0	A-phase  B-phase 	A-phase  B-phase 	1	A-phase  B-phase 	A-phase  B-phase 	0000h		Refer to the "Name and Function" column.
	Set value	Servo motor rotation direction															
		CCW	CW														
	0	A-phase  B-phase 	A-phase  B-phase 														
	1	A-phase  B-phase 	A-phase  B-phase 														
PC20	*SNO	Station number setting Used to specify the servo amplifier station number. Be sure to set one station per servo amplifier axis. When stations are set in duplicate, normal communication can no longer be achieved.	0	station	0 to 31												
PC21	*SOP	RS422 communication function selection Used to select the communication I/F and each RS-422 communication condition.  RS422 communication baud rate selection 0: 9600[bps] 1: 19200[bps] 2: 38400[bps] 3: 57600[bps] 4:115200[bps] RS-422 communication response delay time 0: Invalid 1: Valid: Returns after a delay of 800μs or longer.	0000h		Refer to the "Name and Function" column.												
PC22		For manufacturer setting	0000h														
PC23			0000h														

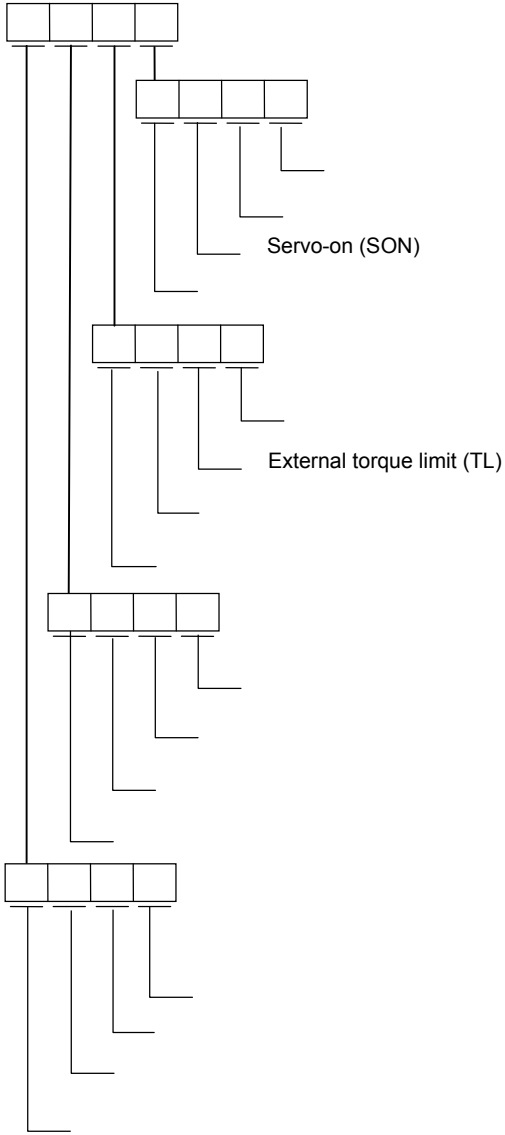
Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																																																							
Extension setting parameters	PC24	*COP3	Selection function C-3 Used to select the unit of in-position range.  In-position range unit selection 0: Command input pulse unit 1: Servo motor encoder pulse unit	0001h		Refer to the "Name and Function" column.																																																							
	PC25		For manufacturer setting	0000h																																																									
	PC26			0000h																																																									
	PC27			0000h																																																									
	PC28			0000h																																																									
	PC29			0000h																																																									
	PC30			0																																																									
	PC31			0																																																									
	PC32			0																																																									
	PC33		0																																																										
	PC34	INT		Torque limit delay time Used to set the delay time for enabling the torque limit (TL2) after the in-position (INP) signal is output.	100	ms	0 to 1000																																																						
	PC35	TL2		Internal torque limit 2 Used to set the torque generated under the conditions set with parameter Nos. PA10 (INP) and PC34 (INT), given a maximum torque of 100%. Torque is not generated when set to "0".	1.0	%	0 to 100.0																																																						
	PC36	*DMD	Display selection at LED power-on Used to select the status display shown at power-on.  Select the LED status display of the main unit at power-on. <table border="1" data-bbox="611 974 1142 1608"> <thead> <tr> <th>Set Value</th> <th>Status display data</th> <th>Unit</th> </tr> </thead> <tbody> <tr><td>0</td><td>Cumulative feedback pulse</td><td>pulse</td></tr> <tr><td>1</td><td>Servo motor speed</td><td>r/min</td></tr> <tr><td>2</td><td>Droop pulse</td><td>pulse</td></tr> <tr><td>3</td><td>Cumulative command input pulse</td><td>pulse</td></tr> <tr><td>4</td><td>Command input pulse frequency</td><td>kpps</td></tr> <tr><td>5</td><td>Analog torque command (limit) voltage</td><td>0.01V</td></tr> <tr><td>6</td><td>Regenerative load ratio</td><td>%</td></tr> <tr><td>7</td><td>Effective load ratio</td><td>%</td></tr> <tr><td>8</td><td>Peak load ratio</td><td>%</td></tr> <tr><td>9</td><td>Instantaneous torque</td><td>%</td></tr> <tr><td>A</td><td>Within one-revolution position low</td><td>pulse</td></tr> <tr><td>B</td><td>Within one-revolution position high</td><td>100pulse</td></tr> <tr><td>C</td><td>ABS counter</td><td>rev</td></tr> <tr><td>D</td><td>Load inertia moment ratio</td><td>times</td></tr> <tr><td>E</td><td>Bus voltage</td><td>V</td></tr> <tr><td>F</td><td>Station position</td><td></td></tr> </tbody> </table> Main unit display switching 0: According to control mode <table border="1" data-bbox="564 1700 1102 1760"> <tr><td>Control mode</td><td>With automatic display selected</td></tr> <tr><td>Position</td><td>Cumulative feedback pulses</td></tr> </table> 1: According to setting of the first digit of this parameter.	Set Value	Status display data	Unit	0	Cumulative feedback pulse	pulse	1	Servo motor speed	r/min	2	Droop pulse	pulse	3	Cumulative command input pulse	pulse	4	Command input pulse frequency	kpps	5	Analog torque command (limit) voltage	0.01V	6	Regenerative load ratio	%	7	Effective load ratio	%	8	Peak load ratio	%	9	Instantaneous torque	%	A	Within one-revolution position low	pulse	B	Within one-revolution position high	100pulse	C	ABS counter	rev	D	Load inertia moment ratio	times	E	Bus voltage	V	F	Station position		Control mode	With automatic display selected	Position	Cumulative feedback pulses	0000h		Refer to the "Name and Function" column.
	Set Value	Status display data	Unit																																																										
0	Cumulative feedback pulse	pulse																																																											
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A	Within one-revolution position low	pulse																																																											
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PC37		For manufacturer setting		0																																																									
PC38				0																																																									

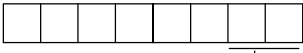

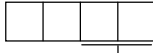
Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range						
Extension setting parameters	PC39	MO1	Analog monitor offset 1 Used to set the offset voltage of analog monitor CH1 output (MO1).	0	mV	−999 to 999						
	PC40	MO2	Analog monitor offset 2 Used to set the offset voltage of the analog monitor CH2 output (MO2).	0	mV	−999 to 999						
	PC41		For manufacturer setting	0								
	PC42	*ZTY	Home position return type Used to select the home position return type.  Used to select the home position return type. <table border="1" data-bbox="606 504 1117 593"> <tr> <td>Set value</td> <td>Home position return type</td> </tr> <tr> <td>0</td> <td>Data setting type home position return</td> </tr> <tr> <td>1</td> <td>Dog type home position return</td> </tr> </table>	Set value	Home position return type	0	Data setting type home position return	1	Dog type home position return	0000h		Refer to the "Name and Function" column.
	Set value	Home position return type										
	0	Data setting type home position return										
	1	Dog type home position return										
	PC43	ZRF	Home position return speed Used to set the servo motor speed for home position return.	100	r/min	1 to maximum permissible speed						
	PC44	CRF	Creep speed Used to set the creep speed after the proximity dog.	10	r/min	1 to maximum permissible speed						
	PC45	*ZST	Home position shift distance Used to set the shift travel from the Z-phase pulse detection position within the encoder, in encoder [pulse] units.	0	pulse	0 to 65535						
	PC46	*ZPS	Station home position shift distance Used to set the shift distance of the station home position during home position return, in encoder [pulse] units. Setting this parameter shifts the station home position (No. 0) with respect to the home position return position.  Note 1. The station home position shift setting is disabled when the home position is set. The setting is enabled after the power is turned off and then on again. 2. When the station home position shift set value is set to a value greater than the in-position range, the in-position output does not turn on (short) at power-on after the home position is set.	0	pulse	−1999 to 1999						
	PC47		For manufacturer setting	0								
	PC48			0000h								
PC49			0000h									
PC50	COPB	Function selection C-B  Home position return inhibit selection 0: Invalid Enables normal home position return for each home position return method.  1: Valid Does not perform home position return for either the dog type or data setting type home position return method, even if the home position return mode is set and the start signal (ST0) is turned on.	0000h		Refer to the "Name and Function" column.							


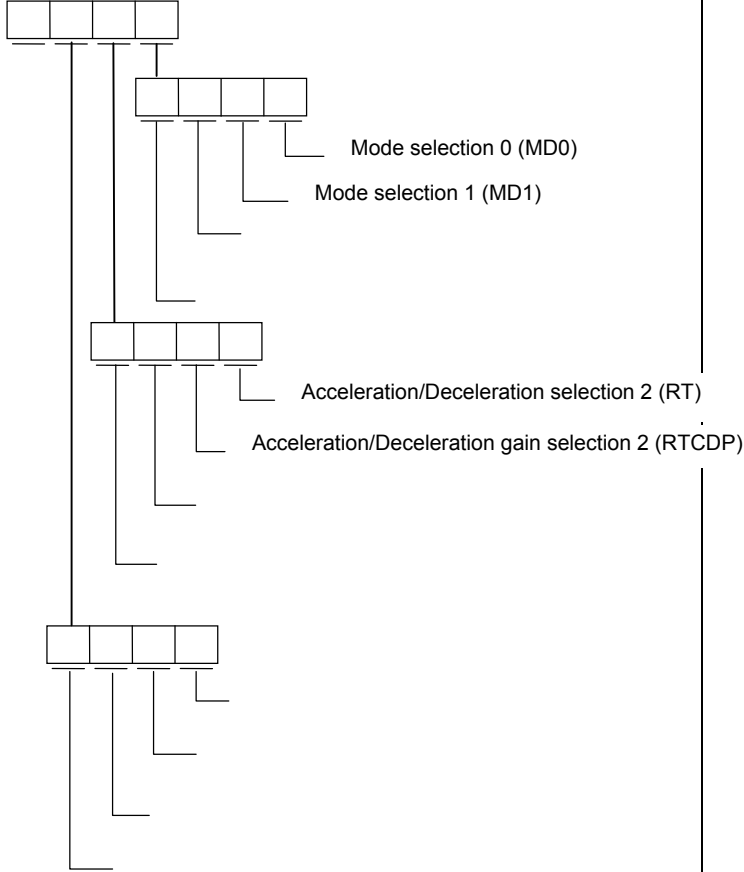
Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
I/O setting parameters	PD01	*DIA1	Input signal automatic ON selection 1 Used to select the input devices to be automatically turned on.  	0C04h		Refer to the "Name and Function" column.
	PD02		For manufacturer setting	0000h		

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

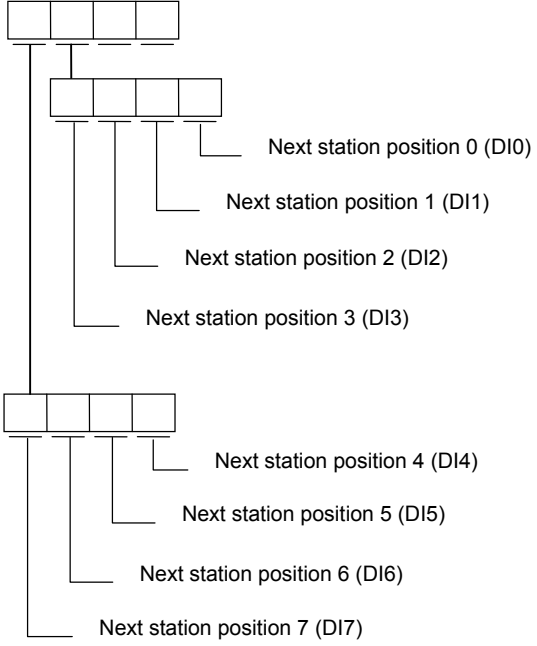
Category	No.	Symbol	Name and function	Initial value	Unit	Setting range	
I/O setting parameters	PD03		For manufacturer setting	0000038h			
	PD04			0000039h			
	PD05			000003Ah			
	PD06			000003Bh			
	PD07			0000020h			
	PD08			0000021h			
	PD09			0000000h			
	PD10			0000022h			
	PD11			0000023h			
	PD12	*DI10		Input signal device selection 10 (CN1-45) An arbitrary input device can be assigned to the CN1-45 pin. 	0000000h		Refer to the "Name and Function" column.
			Used to select the input device of the CN1-45 pin. 00: No assigned function 02: Servo-on (SON) (Note) 05: External torque limit selection (TL) 0D: Gain changing (CDP) 24: Acceleration/Deceleration selection 2 (RT) 25: Acceleration/Deceleration gain selection 2 (RTCDP)				
			Note. Servo-on (SON) is set to automatically turn on at factory default. If SON is to be assigned to an external pin, clear the automatic ON setting with parameter No. PD01.				
	PD13		For manufacturer setting	0038h			
	PD14			0039h			
	PD15			003Ah			
	PD16			003Bh			
	PD17	*DO5	Output signal device selection 5 (CN1-48) An arbitrary output device can be assigned to the CN1-48 pin. 	0003h		Refer to the "Name and Function" column.	
			Used to select the output device of the CN1-48 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)				
PD18	*DO6	Output signal device selection 6 (CN1-49) An arbitrary output device can be assigned to the CN1-49 pin. 	0004h		Refer to the "Name and Function" column.		
		Used to select the output device of the CN1-49 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)					

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.



Category	No.	Symbol	Name and function	Initial value	Unit	Setting range																
I/O setting parameters	PD19	*DIF	Input filter setting Used to set the input signal filter.  <table border="1" data-bbox="614 280 1109 537"> <thead> <tr> <th>Set value</th> <th>Input signal filter</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>1</td> <td>0.888 [ms]</td> </tr> <tr> <td>2</td> <td>1.777 [ms]</td> </tr> <tr> <td>3</td> <td>2.666 [ms]</td> </tr> <tr> <td>4</td> <td>3.555 [ms]</td> </tr> <tr> <td>5</td> <td>4.444 [ms]</td> </tr> <tr> <td>6</td> <td>5.333 [ms]</td> </tr> </tbody> </table> *This parameter is enabled along with the amplifier main unit input signal and the J3-D01 input signal.	Set value	Input signal filter	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]	0004h		Refer to the "Name and Function" column.
	Set value	Input signal filter																				
	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]																					
P D20			For manufacturer setting	0000h																		
P D21				0000h																		
P D22				0000h																		
P D23				0000h																		
P D24				0000h																		
P D25	*DIA3	Input signal automatic ON selection 3 Used to select the input devices to be automatically turned on. 	0000h		Refer to the "Name and Function" column.																	

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

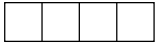
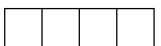


Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
I/O setting parameters	PD26	*DIA4	Input signal automatic ON selection 4 Used to select the input devices to be automatically turned on.  	0000h		Refer to the "Name and Function" column.
	P D27		For manufacturer setting	0000h		
	P D28			0000h		
	P D29			0000h		
	P D30				0000h	

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range						
Option card parameters	Po01		Option card installation detection Servo amplifier automatically writes the option card ID when an option card is installed.  <table border="1"> <tr> <td>Set value</td> <td>Installed option card</td> </tr> <tr> <td>0000</td> <td>Option card is not installed</td> </tr> <tr> <td>1234</td> <td>MR-J3-D01</td> </tr> </table>	Set value	Installed option card	0000	Option card is not installed	1234	MR-J3-D01	----h		
	Set value	Installed option card										
	0000	Option card is not installed										
	1234	MR-J3-D01										
	Po02		For manufacturer setting	0								
	Po03			0								
	Po04			0								
	Po05			0000h								
	Po06			0000h								
	Po07			0000h								
	Po08			0000h								
	Po09			00212000h								
	Po10			00052322h								
	Po11	*ODI3	MR-J3-D01 input signal device selection 3 (CN10-33) An arbitrary input device can be assigned to the CN10-33 pin.   <p>Used to select the input device of the CN10-33 pin. 00: No assigned function 25: Acceleration/Deceleration gain selection 2 (RTCDP)</p>	00000D24h								
	Po12		For manufacturer setting	00000000h								
	Po13	*ODI5	MR-J3-D01 input signal device selection 5 (CN10-20) Enables assignment of an arbitrary input device to the CN10-20 pin.   <p>Used to select the input device of the CN10-20 pin. 00: No assigned function 02: Servo-on (SON) (Note)</p> <p>Note. Servo-on (SON) is set to automatically turn on at factory default. When SON is to be assigned to an external pin, clear the automatic ON setting with parameter No. PD01.</p>	00000026h		Refer to the "Name and Function" column.						
	Po14		For manufacturer setting	00000000h								
	Po15			00000000h								
	Po16			0000h								
	Po17			0001h								
	Po18			0								
	Po19			0								
	Po20			0								
	Po21			0								
	Po22			0000h								
Po23		0000h										
Po24		0000h										
Po25		0000h										

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

Category	No.	Symbol	Name and function	Initial value	Unit	Setting range
Option card parameters	Po26	*ODO5	MR-J3-D01 output signal device selection 5 (CN10-46, 47) Enables assignment of arbitrary output devices to the CN10-46 and 47 pins.   <p>Used to select the output device of the CN10-46 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)</p> <p>Used to select the output device of the CN10-47 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)</p>	0403h		Refer to the "Name and Function" column.
	Po27	*ODO6	MR-J3-D01 output signal device selection 6 (CN10-48, 49) Enables assignment of arbitrary output devices to the CN10-48 and 49 pins.   <p>Used to select the output device of the CN10-48 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)</p> <p>Used to select the output device of the CN10-49 pin. 03: Trouble (ALM) 04: In-position (INP) 28: AL9F warning output (BW9F)</p>	0000h		Refer to the "Name and Function" column.
	Po28		For manufacturer setting	0000h		
	Po29			0000h		
	Po30			0000h		
	Po31			0000h		
	Po32			0		
	Po33			0		
	Po34			0		
	Po35			0		
	Po36			0		
	Po37			0		
	Po38			0		
Po39			0			
Po40			0			

Note. For the parameters with an asterisk (\*), turn off the power after setting. Then, turn on the power again to complete the setting.

## 9. ALARMS AND WARNINGS

### 9.1 Alarms and Warning List

	Display	Name
Alarms	AL.10	Undervoltage
	AL.12	Memory error 1 (RAM)
	AL.13	Clock error
	AL.15	Memory error 2 (EEPROM)
	AL.16	Encoder error 1 (at power ON)
	AL.17	Board error
	AL.19	Memory error 3 (Flash-ROM)
	AL.1A	Motor combination error
	AL.20	Encoder error 2
	AL.24	Main circuit error
	AL.25	Absolute position erase
	AL.30	Regenerative error
	AL.31	Overspeed
	AL.32	Overcurrent
	AL.33	Overvoltage
	AL.35	Command pulse frequency error
	AL.37	Parameter error
	AL.45	Main circuit device overheat
	AL.46	Servo motor overheat
	AL.47	Cooling fan alarm
AL.50	Overload 1	
AL.51	Overload 2	
AL.52	Error excessive	
AL.8A	Serial communication time-out	
AL.8E	Serial communication error	
88888	Watchdog	
Warnings	AL.90	Home positioning incomplete
	AL.92	Battery cable disconnection warning
	AL.96	Home position setting error
	AL.97	Next station position warning
	AL.9F	Battery warning
	AL.E3	Absolute position counter warning
	AL.E6	Servo emergency stop
AL.E9	Main circuit off warning	

## 9.2 Alarm and warning details

This chapter describes new and changed alarms and warnings of this software version. Alarms and warnings not described in this chapter are the same as those of the standard servo amplifier, MR-J3-□A. Refer to the MR-J3-□A SERVO AMPLIFIER INSTRUCTION MANUAL.

Display	Name	Description	Cause	Action
AL.15	Memory error 2 (EEPROM)	EEPROM fault	<p>(1) Faulty parts in the servo amplifier.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">Checking Method</p> <p>An alarm (AL. 15) occurs when the power is turned on after all cables other than for the control circuit power are disconnected.</p> </div> <p>(2) The number of writes to EEPROM exceeded 100,000.</p> <p>(3) The multi-revolution data read from EEPROM and saved as the home position are abnormal.</p>	Replace the servo amplifier.
AL.37 A	Parameter error	Parameter set value is abnormal.	(1) The number of stations/rotation (parameter No. PC02) was set to a value greater than or equal to the maximum number of stations. "16 or more" was set without connecting the option card MR-J3-D01.	Set parameter No. PC02 correctly.
AL.90	Home positioning incomplete warning	Home positioning is incomplete.	<p>(1) AL25 or ALE3 occurred.</p> <p>(2) The number of gears (parameter Nos. PA06 and PA07) or number of stations/rotation (parameter No. PC02) was changed.</p> <p>(3) The absolute position detection system was changed.</p> <p>(4) Automatic operation or manual operation (station JOG) was started without returning to the home position.</p> <p>(5) The home position return speed could not be decelerated to creep speed.</p> <p>Note. (2) and (3) occur after the parameter has been changed and the power has been switched from off to on.</p>	<p>Perform home position return.</p> <p>Note. When home position return is performed, AL90 is automatically cleared.</p> <p>Check the home position return speed and creep speed.</p>
AL.96	Home position setting error	The home position could not be set.	<p>(1) The remaining droop pulses are greater than the set value of the in-position range.</p> <p>(2) A command pulse was input after droop pulses were erased.</p> <p>(3) The creep speed is high.</p>	<p>Remove the cause of the droop pulse.</p> <p>Do not input a command pulse after erasing the droop pulse.</p> <p>Lower the creep speed.</p>
AL.97	Next station position warning	Automatic operation was performed with an illegal next station position.	<p>(1) Automatic operation was started after specifying a value that exceeds the set value of parameter No. PC02 (STN) for the next station position.</p> <p>(2) Operation was started with all next station position settings shorted.</p>	<p>Specify the next station position input correctly.</p> <p>Set parameter Nos. PC01 and PC02 correctly.</p>
AL.E3	Absolute position counter warning	An abnormality exists in the absolute position encoder pulse.	(1) Noise entered the encoder.	Take noise suppression measures.
			(2) The encoder is faulty.	Replace the servo motor.
		The refresh cycle to write the multi-revolution counter value of the absolute position encoder to EEPROM is too short.	(3) The servo motor speed is high when the servo motor is continuously rotated in one direction.	Reduce the servo motor speed.

## 10. MR CONFIGURATOR (SETUP S/W)

The model selection “MR-J3-A” of MR Configurator does not support the new or changed functions or parameter reference/changing functions of MR-J3-□A□-RJ070. Follow the procedures below to add “MR-J3-A-RJ070” to the model selection.

### 10.1 Supporting method

- Start MR Configurator and check the version under “Product information.” If the version is a prior to the following, upgrade to the newest version.

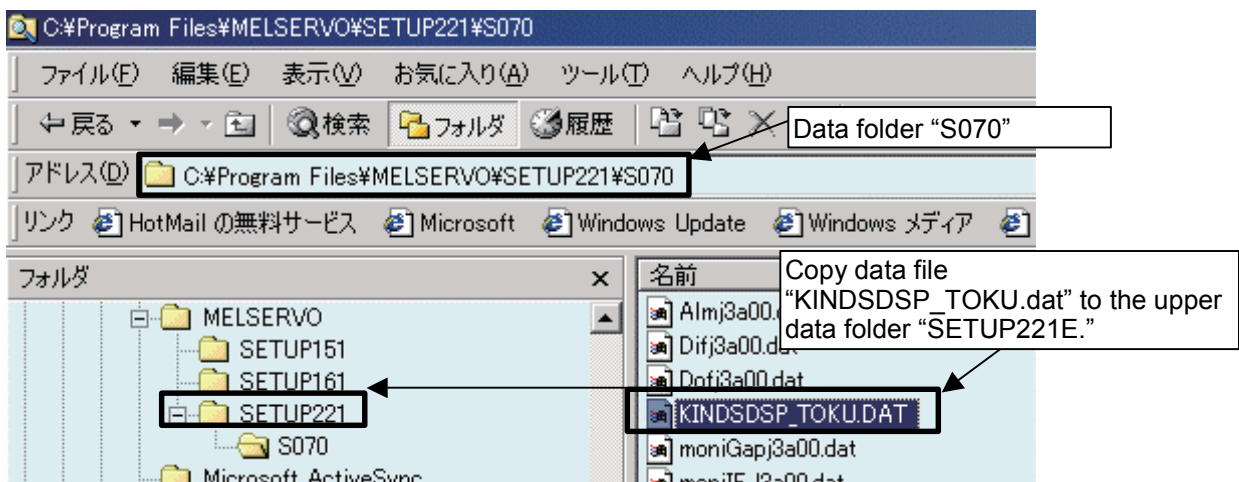
MR Configurator (English version): MRZJW3-SETUP221E Version C1 or later  
MR Configurator version upgrades are available free of charge at MELFANSweb.  
Internet address: <http://www.mitsubishielectric.co.jp/melfansweb>

- Follow the procedures below once the environment is prepared.

(These tasks should be performed by a user having Administrator (computer management) attributes.)

(a) Verify that the data folder “S070” exists under C:\Program Files\MELSERVO\SETUP221E.

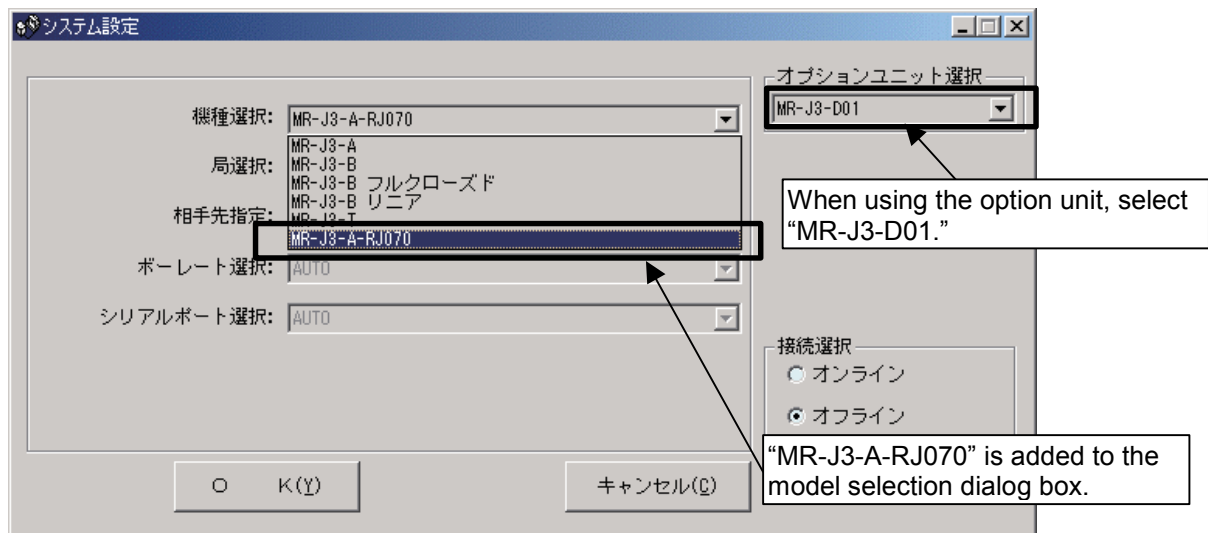
(b) Copy the data file “KINDSDSP\_TOKUDAT” in the data folder “S070” to C:\Program Files\MELSERVO\SETUP221E.



### 10.2 Special servo amplifier selection method

Start MR Configurator and select a model under “System settings.”

(The selected model will be stored. Thus, selecting the model is not necessary at the next start-up.)



### 10.3 Operation method

The special contents added to MR Configurator by the procedures in the previous page are only the following specifications added to MR-J3-□A□-RJ070. Use the same operation methods as those for the standard servo amplifiers.

#### <Special contents>

- Parameter settings
- Monitor display (batch display, I/O I/F display and option unit I/F display)
- Alarm display