



General-Purpose AC Servo

MELSERVO-J3 Series

SSCNET III Fully Closed Loop Control

MODEL

MR-J3-□B-RJ006

SERVO AMPLIFIER

INSTRUCTION MANUAL

● Safety Instructions ●

(Always read these instructions before using the equipment.)

Do not attempt to install, operate, maintain or inspect the servo amplifier and servo motor until you have read through this Instruction Manual, Installation guide, Servo motor Instruction Manual and appended documents carefully and can use the equipment correctly. Do not use the servo amplifier and servo motor until you have a full knowledge of the equipment, safety information and instructions.

In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".



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




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


Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

What must not be done and what must be done are indicated by the following diagrammatic symbols:



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



: Indicates what must be done. For example, grounding is indicated by .

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".

After reading this installation guide, always keep it accessible to the operator.

1. To prevent electric shock, note the following:

WARNING

- Before wiring or inspection, switch power off and wait for more than 15 minutes. Then, confirm the voltage is safe with voltage tester. Otherwise, you may get an electric shock.
- Connect the servo amplifier and servo motor to ground.
- Any person who is involved in wiring and inspection should be fully competent to do the work.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, you may get an electric shock.
- Operate the switches with dry hand to prevent an electric shock.
- The cables should not be damaged, stressed, loaded, or pinched. Otherwise, you may get an electric shock.
- During power-on or operation, do not open the front cover of the servo amplifier. You may get an electric shock.
- Do not operate the servo amplifier with the front cover removed. High-voltage terminals and charging area are exposed and you may get an electric shock.
- Except for wiring or periodic inspection, do not remove the front cover even of the servo amplifier if the power is off. The servo amplifier is charged and you may get an electric shock.

2. To prevent fire, note the following:

CAUTION

- Do not install the servo amplifier, servo motor and regenerative brake resistor on or near combustibles. Otherwise a fire may cause.
- When the servo amplifier has become faulty, switch off the main servo amplifier power side. Continuous flow of a large current may cause a fire.
- When a regenerative brake resistor is used, use an alarm signal to switch main power off. Otherwise, a regenerative brake transistor fault or the like may overheat the regenerative brake resistor, causing a fire.

3. To prevent injury, note the follow

CAUTION

- Only the voltage specified in the Instruction Manual should be applied to each terminal, Otherwise, a burst, damage, etc. may occur.
- Connect the terminals correctly to prevent a burst, damage, etc.
- Ensure that polarity (+, -) is correct. Otherwise, a burst, damage, etc. may occur.
- Take safety measures, e.g. provide covers, to prevent accidental contact of hands and parts (cables, etc.) with the servo amplifier heat sink, regenerative brake resistor, servo motor, etc. since they may be hot while power is on or for some time after power-off. Their temperatures may be high and you may get burnt or a parts may damaged.
- During operation, never touch the rotating parts of the servo motor. Doing so can cause injury.

4. Additional instructions

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

(1) Transportation and installation

⚠ CAUTION

- Transport the products correctly according to their weights.
- Stacking in excess of the specified number of products is not allowed.
- Do not carry the servo motor by the cables, shaft or encoder.
- Do not hold the front cover to transport the servo amplifier. The servo amplifier may drop.
- Install the servo amplifier in a load-bearing place in accordance with the Instruction Manual.
- Do not climb or stand on servo equipment. Do not put heavy objects on equipment.
- The servo amplifier and servo motor must be installed in the specified direction.
- Leave specified clearances between the servo amplifier and control enclosure walls or other equipment.
- Do not install or operate the servo amplifier and servo motor which has been damaged or has any parts missing.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.
- Do not drop or strike servo amplifier or servo motor. Isolate from all impact loads.
- When you keep or use it, please fulfill the following environmental conditions.

Environment		Conditions		
		Servo amplifier	Servo motor	
Ambient temperature	During operation	[°C]	0 to +55 (non-freezing)	0 to +40 (non-freezing)
		[°F]	32 to 131 (non-freezing)	32 to 104 (non-freezing)
	In storage	[°C]	-20 to +65 (non-freezing)	-15 to +70 (non-freezing)
		[°F]	-4 to 149 (non-freezing)	5 to 158 (non-freezing)
Ambient humidity	In operation	90%RH or less (non-condensing)		
	In storage	90%RH or less (non-condensing)		
Ambience		Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt		
Altitude		Max. 1000m (3280 ft) above sea level		
(Note) Vibration	[m/s ²]	5.9 or less	HF-MP Series HF-KP Series	X • Y : 49
			HF-SP 52 to 152 HF-SP 51 • 81 HC-RP Series HC-UP 72 • 152	X • Y : 24.5
			HF-SP 202 • 352 HF-SP 121 • 201 HC-UP 202 to 502	X : 24.5 Y : 49
			HF-SP 301 • 421 HF- SP 502 • 702	X : 24.5 Y : 29.5
			HA-LP601 to 12K1 HA-LP701M to 15K1M HA-LP502 to 22K2 HA-LP8014 • 12K14 HA-LP11K1M4 • 15K1M14 HA-LP11K24 to 22K24	X : 11.7 Y : 29.4
			HA-LP15K1 to 25K1 HA-LP22K1M HA-LP15K14 • 20K14 HA-LP22K1M4	X • Y : 9.8

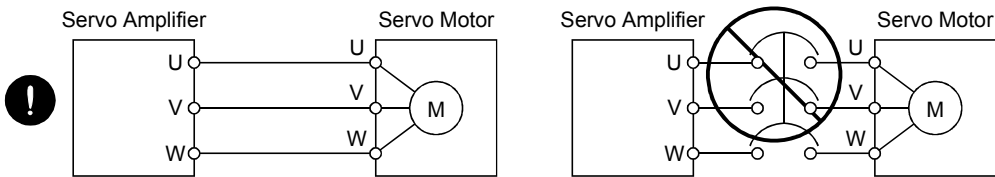
Note. Except the servo motor with reduction gear.

- Securely attach the servo motor to the machine. If attach insecurely, the servo motor may come off during operation.
- The servo motor with reduction gear must be installed in the specified direction to prevent oil leakage.
- Take safety measures, e.g. provide covers, to prevent accidental access to the rotating parts of the servo motor during operation.
- Never hit the servo motor or shaft, especially when coupling the servo motor to the machine. The encoder may become faulty.
- Do not subject the servo motor shaft to more than the permissible load. Otherwise, the shaft may break.
- When the equipment has been stored for an extended period of time, consult Mitsubishi.

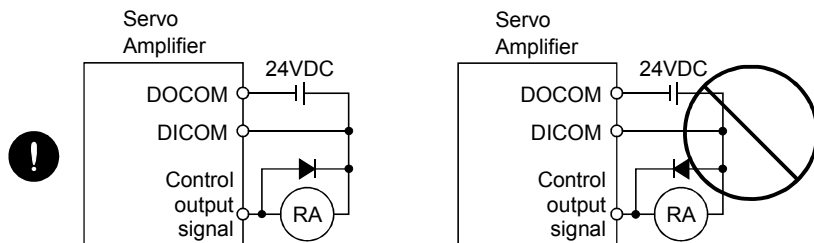
(2) Wiring

⚠ CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may misoperate.
- Do not install a power capacitor, surge absorber or radio noise filter (FR-BIF option) between the servo motor and servo amplifier.
- Connect the output terminals (U, V, W) correctly. Otherwise, the servo motor will operate improperly.
- Connect the servo motor power terminal (U, V, W) to the servo motor power input terminal (U, V, W) directly. Do not let a magnetic contactor, etc. intervene.



- Do not connect AC power directly to the servo motor. Otherwise, a fault may occur.
- The surge absorbing diode installed on the DC output signal relay of the servo amplifier must be wired in the specified direction. Otherwise, the forced stop (EM1) and other protective circuits may not operate.



(3) Test run adjustment

⚠ CAUTION

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.
- The parameter settings must not be changed excessively. Operation will be insatiable.

(4) Usage

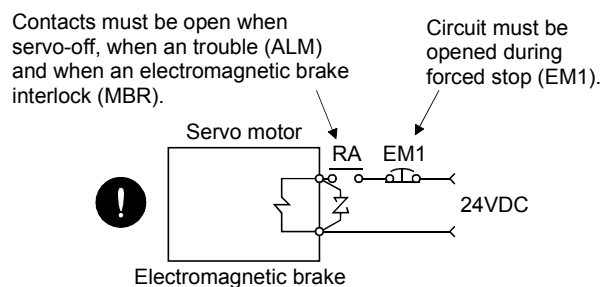
⚠ CAUTION

- Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.
- Any person who is involved in disassembly and repair should be fully competent to do the work.
- Before resetting an alarm, make sure that the run signal of the servo amplifier is off to prevent an accident. A sudden restart is made if an alarm is reset with the run signal on.
- Do not modify the equipment.
- Use a noise filter, etc. to minimize the influence of electromagnetic interference, which may be caused by electronic equipment used near the servo amplifier.
- Burning or breaking a servo amplifier may cause a toxic gas. Do not burn or break a servo amplifier.
- Use the servo amplifier with the specified servo motor.
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- For such reasons as service life and mechanical structure (e.g. where a ballscrew and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.

(5) Corrective actions

⚠ CAUTION

- When it is assumed that a hazardous condition may take place at the occur due to a power failure or a product fault, use a servo motor with electromagnetic brake or an external brake mechanism for the purpose of prevention.
- Configure the electromagnetic brake circuit so that it is activated not only by the servo amplifier signals but also by an external forced stop (EM1).



- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly (design the machine so that it is secured against hazard if restarted).

(6) Maintenance, inspection and parts replacement

 **CAUTION**

- With age, the electrolytic capacitor of the servo amplifier will deteriorate. To prevent a secondary accident due to a fault, it is recommended to replace the electrolytic capacitor every 10 years when used in general environment.
Please consult our sales representative.

(7) General instruction

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

● About processing of waste ●

When you discard servo amplifier, a battery (primary battery), and other option articles, please follow the law of each country (area).



FOR MAXIMUM SAFETY

- These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or under water relays, contact Mitsubishi.
- These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.



EEP-ROM life

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

- Write to the EEP-ROM due to parameter setting changes
- Write to the EEP-ROM due to device changes

Precautions for Choosing the Products

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

COMPLIANCE WITH EC DIRECTIVES

1. WHAT ARE EC DIRECTIVES?

The EC directives were issued to standardize the regulations of the EU countries and ensure smooth distribution of safety-guaranteed products. In the EU countries, the machinery directive (effective in January, 1995), EMC directive (effective in January, 1996) and low voltage directive (effective in January, 1997) of the EC directives require that products to be sold should meet their fundamental safety requirements and carry the CE marks (CE marking). CE marking applies to machines and equipment into which servo amplifiers have been installed.

(1) EMC directive

The EMC directive applies not to the servo units alone but to servo-incorporated machines and equipment. This requires the EMC filters to be used with the servo-incorporated machines and equipment to comply with the EMC directive. For specific EMC directive conforming methods, refer to the EMC Installation Guidelines (IB(NA)67310).

(2) Low voltage directive

The low voltage directive applies also to servo units alone. Hence, they are designed to comply with the low voltage directive.

This servo is certified by TUV, third-party assessment organization, to comply with the low voltage directive.

(3) Machine directive

Not being machines, the servo amplifiers need not comply with this directive.

2. PRECAUTIONS FOR COMPLIANCE

(1) Servo amplifiers and servo motors used

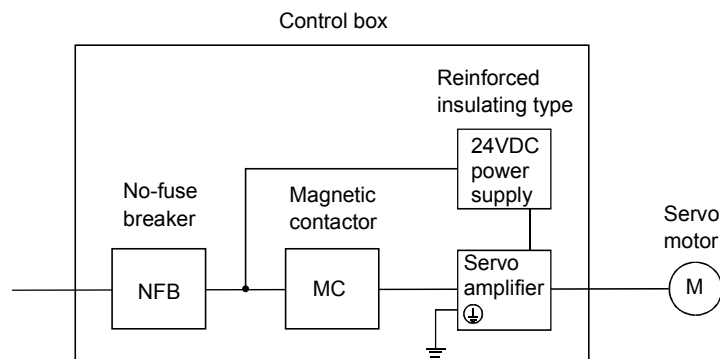
Use the servo amplifiers and servo motors which comply with the standard model.

Servo amplifier :MR-J3-10B-RJ006 to MR-J3-22KB-RJ006
MR-J3-10B1-RJ006 to MR-J3-40B1-RJ006
MR-J3-11KB4-RJ006 to MR-J3-22KB4-RJ006

Servo motor :HF-MP□
HF-KP□
HF-SP□
HC-RP□
HC-UP□
HC-LP□
HA-LP□
HA-LP□4

(2) Configuration

The control circuit provide safe separation to the main circuit in the servo amplifier.



(3) Environment

Operate the servo amplifier at or above the contamination level 2 set forth in IEC60664-1. For this purpose, install the servo amplifier in a control box which is protected against water, oil, carbon, dust, dirt, etc. (IP54).

(4) Power supply

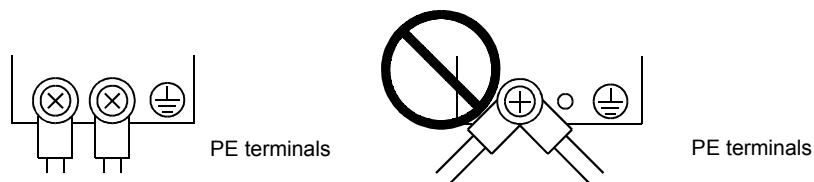
(a) This servo amplifier can be supplied from star-connected supply with earthed neutral point of overvoltage category III set forth in IEC60664-1. However, when using the neutral point of 400V system for single phase supply, a reinforced reinforced insulating transformer is required in the power input section.

(b) When supplying interface power from external, use a 24VDC power supply which has been insulation-reinforced in I/O.

(5) Grounding

(a) To prevent an electric shock, always connect the protective earth (PE) terminals (marked \oplus) of the servo amplifier to the protective earth (PE) of the control box.

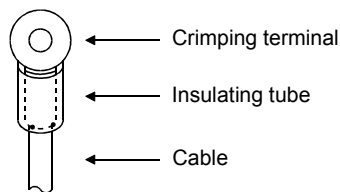
(b) Do not connect two ground cables to the same protective earth (PE) terminal. Always connect the cables to the terminals one-to-one.



(c) If a leakage current breaker is used to prevent an electric shock, the protective earth (PE) terminals of the servo amplifier must be connected to the corresponding earth terminals.

(6) Wiring

(a) The cables to be connected to the terminal block of the servo amplifier must have crimping terminals provided with insulating tubes to prevent contact with adjacent terminals.



(b) Use the servo motor side power connector which complies with the EN Standard. The EN Standard compliant power connector sets are available from us as options. (Refer to Section 11.9 of the MR-J3-□B Servo Amplifier Instruction Manual)

(7) Auxiliary equipment and options

- (a) The no-fuse breaker and magnetic contactor used should be the EN or IEC standard-compliant products of the models described in Section 11.12 of the MR-J3-□B Servo Amplifier Instruction Manual. Use a type B (Note) breaker. When it is not used, provide insulation between the servo amplifier and other device by double insulation or reinforced insulation, or install a transformer between the main power supply and servo amplifier.

Note. Type A: AC and pulse detectable

Type B: Both AC and DC detectable

- (b) The sizes of the cables described in Section 11.11 of the MR-J3-□B Servo Amplifier Instruction Manual meet the following requirements. To meet the other requirements, follow Table 5 and Appendix C in EN60204-1.

- Ambient temperature: 40 (104) [°C (°F)]
- Sheath: PVC (polyvinyl chloride)
- Installed on wall surface or open table tray

- (c) Use the EMC filter for noise reduction.

(8) Performing EMC tests

When EMC tests are run on a machine/device into which the servo amplifier has been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has satisfied the operating environment/electrical equipment specifications.

For the other EMC directive guidelines on the servo amplifier, refer to the EMC Installation Guidelines (IB(NA)67310).

CONFORMANCE WITH UL/C-UL STANDARD

(1) Servo amplifiers and servo motors used

Use the servo amplifiers and servo motors which comply with the standard model.

Servo amplifier :MR-J3-10B-RJ006 to MR-J3-22KB-RJ006
 MR-J3-10B1-RJ006 to MR-J3-40B1-RJ006
 MR-J3-11KB4-RJ006 to MR-J3-22KB4-RJ006

Servo motor :HF-MP□
 HF-KP□
 HF-SP□
 HC-RP□
 HC-UP□
 HC-LP□
 HA-LP□
 HA-LP□4

(2) Installation

Install a fan of 100CFM (2.8m³/min) air flow 4 in (10.16 cm) above the servo amplifier or provide cooling of at least equivalent capability.

(3) Short circuit rating

This servo amplifier conforms to the circuit whose peak current is limited to 5000A or less. Having been subjected to the short-circuit tests of the UL in the alternating-current circuit, the servo amplifier conforms to the above circuit.

(4) Capacitor discharge time

The capacitor discharge time is as listed below. To ensure safety, do not touch the charging section for 15 minutes after power-off.

Servo amplifier MR-J3-□-RJ006	Discharge time [min]
10B · 20B	1
40B · 60B · 10B1 · 20B1	2
70B	3
40B1	4
100B	5
200B · 350B	9
500B · 700B	10
11KB(4)	4
15KB(4)	6
22KB(4)	8

(5) Options and auxiliary equipment

Use UL/C-UL standard-compliant products.

This servo amplifier is UL/C-UL-listed when using the fuses indicated in the following table. When the servo amplifier must comply with the UL/C-UL Standard, be sure to use these fuses.

Servo amplifier MR-J3-□-RJ006	Fuse			Servo amplifier MR-J3-□-RJ006	Fuse		
	Class	Current [A]	Voltage [V]		Class	Current [A]	Voltage [V]
10B (1) • 20B	T	10	AC250	11KB4	T	100	AC600
40B • 20B1		15		15KB4		150	
60B to 100B • 40B1		20		22KB4		175	
200B		40					
350B		70					
500B		125					
700B		150					
11KB		200					
15KB		250					
22KB		350					

(6) Attachment of a servo motor

For the flange size of the machine side where the servo motor is installed, refer to “CONFORMANCE WITH UL/C-UL STANDARD” in the Servo Motor Instruction Manual (Vol.2).

(7) About wiring protection

For installation in United States, branch circuit protection must be provided, in accordance with the National Electrical Code and any applicable local codes.

For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code and any applicable provincial codes.

<<About the manuals>>

This Instruction Manual and the following Servo Amplifier/Servo Motor Instruction Manuals are required if you use the General-Purpose AC servo MR-J3-B for the first time. Always purchase them and use the MR-J3-B safely.

Relevant manuals

Manual name	Manual No.
MELSERVO-J3 Series MR-J3-□B Servo Motor Instruction Manual	SH(NA)030051
MELSERVO-J3 Series To Use the AC Servo Safely	IB(NA)0300077
MELSERVO Servo Motor Instruction Manual Vol.2	SH(NA)030041
EMC Installation Guidelines	IB(NA)67310

This Instruction Manual describes the functions unique to the fully closed loop control compatible servo amplifier MR-J3-□B-RJ006. Therefore, when using the MR-J3-□B-RJ006, refer to the SSCNET III Compatible MR-J3-□B Servo Amplifier Instruction Manual as well. However, the following items are not described in this Instruction Manual. For details of these items, refer to the MR-J3-□B Servo Amplifier Instruction Manual.

Item	MR-J3-□B Servo Amplifier Instruction Manual
INSTALLATION	CHAPTER 2
STARTUP	CHAPTER 4
GENERAL GAIN ADJUSTMENT	CHAPTER 6
SPECIAL ADJUSTMENT FUNCTIONS	CHAPTER 7
CHARACTERISTICS	CHAPTER 10
OPTIONS AND AUXILIARY EQUIPMENT	CHAPTER 11

MEMO

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1. FUNCTIONS AND CONFIGURATION

1 FUNCTIONS AND CONFIGURATION

1.1 Overview

This Instruction Manual explains the product that imports a position Feed back signal from a load side encoder, such as a linear encoder, to the MR-J3-□B servo amplifier to perform fully closed loop control.

A control mode has the semi closed loop control, dual feedback control and fully closed loop control. The control modes can be changed by the parameter setting.

For the features of each control mode, refer to Section 1.2 in this manual.

[Items changed from those of the standard model (MR-J3-□B)]

- (a) The Mitsubishi serial interface compatible or ABZ-phase pulse train interface compatible linear encoder is used to detect the position feedback signal of the load side encoder.
- (b) In addition to the fully closed loop control that feeds back the position signal of the load side encoder, a dual feedback control that feeds back a signal composed of the load side encoder's position feedback signal and the motor position feedback signal has been added as an extended function.
- (c) Function to switch pulse output between the load side encoder and motor end encoder

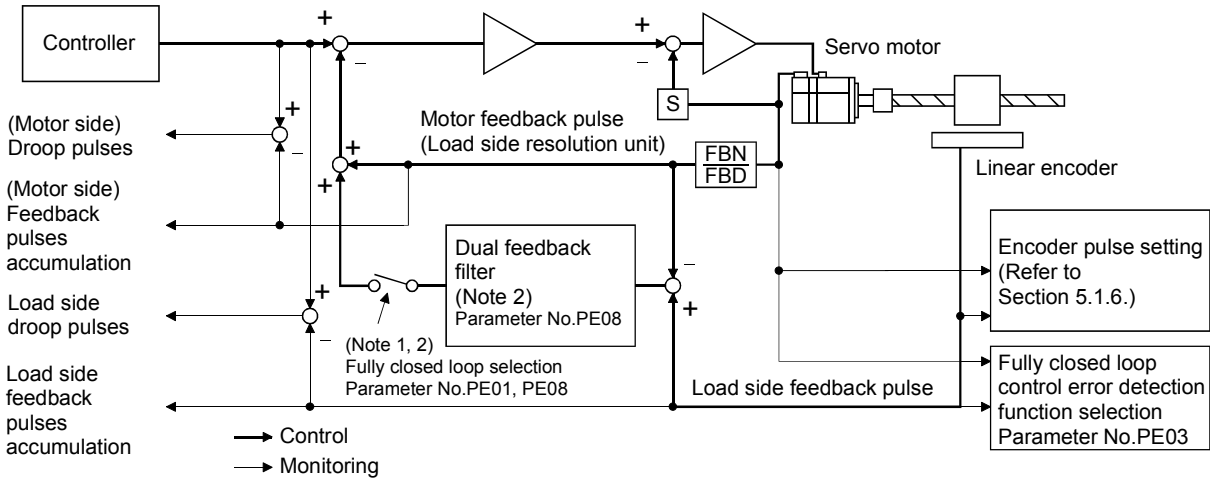
[Functions deleted from the standard model (MR-J3-□B)]

- (a) Speed * torque control
- (b) Motor-less operation (test operation)

1. FUNCTIONS AND CONFIGURATION

1.2 Control Block Diagram

A fully closed loop control block diagram is shown below. The fully closed loop system is controlled in the load side encoder unit.



Note. 1. Switching between semi closed loop control and fully closed loop control can be performed by changing the setting of parameter No. PE01.

When semi closed loop control is selected, a control is always performed on the bases of the position data of the motor encoder independently of whether the motor is at a stop or running.

- When parameter No. PE01 "fully closed loop system" is valid, dual Feed back control in which the motor Feed back signal and load side encoder Feed back signal are combined by the dual Feed back filter in parameter No. PE08 is performed. In this case, fully closed loop control is performed when the motor is at a stop, and semi closed loop control is performed when the motor is operating to improve control performance. When "4500" is set as the filter value of parameter No. PE08, fully closed loop control is always performed.

The following table shows the functions of each control mode.

Control Mode	Item	Description
Semi closed loop control	Feature	Position is controlled according to the motor end data.
	Advantage	Since this control is insusceptible to machine influence (such as machine resonance), the gains of the servo amplifier can be raised and the settling time shortened.
	Disadvantage	If the motor end is at a stop, the machine end may be vibrating or the machine end accuracy not obtained.
Dual Feed back control	Feature	Position is controlled according to the motor end data and machine end data.
	Advantage	Control is performed according to the motor end data during operation, and according to the machine end data at a stop in sequence to raise the gains during operation and shorten the settling time. A stop is made with the machine end accuracy.
	Disadvantage	Since this control is susceptible to machine resonance or other influences, the gains of the servo amplifier do not rise and the settling time increases.
Fully closed loop control	Feature	Position is controlled according to the machine end data.
	Advantage	The machine end accuracy is obtained not only at a stop but also during operation.
	Disadvantage	Since this control is susceptible to machine resonance or other influences, the gains of the servo amplifier do not rise and the settling time increases.

1. FUNCTIONS AND CONFIGURATION

1.3 Servo Amplifier Standard Specifications

(1) 200VAC class, 100VAC class

Item		Servo Amplifier MR-J3-□-RJ006		10B	20B	40B	60B	70B	100B	200B	350B	500B	700B	11KB	15KB	22KB	10B1	20B1	40B1	
		Power supply	Voltage/frequency	3-phase or 1-phase 200 to 230VAC, 50/60Hz							3-phase 200 to 230VAC, 50/60Hz							1-phase 100V to 120VAC, 50/60Hz		
Permissible voltage fluctuation	3-phase or 1-phase 200 to 230VAC: 170 to 253VAC							3-phase 170 to 253VAC							1-phase 85 to 132VAC					
Permissible frequency fluctuation	Within ±5%																			
Power supply capacity	Refer to Section 10.2 "MR-J3-□B Servo Amplifier Instruction Manual"																			
Inrush current	Refer to Section 10.5 "MR-J3-□B Servo Amplifier Instruction Manual"																			
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 10.5 "MR-J3-□B Servo Amplifier Instruction Manual"																		
Interface power supply	Voltage, frequency	DC24V±10%																		
	Power supply capacity	(Note 1) 150mA or more																		
Load side encoder interface	Serial interface	Mitsubishi high-speed serial communication																		
	Pulse train interface	Input signal	ABZ-phase differential input signal																	
		Minimum phase differential	200ns																	
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 brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection																			
Structure	Self-cooled, open (IP00)						Force-cooling, open (IP00)									Self-cooled, open (IP00)				
Environment	Ambient temperature	During 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																		
	Ambient	Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt																		
Altitude	Max. 1000m (3280ft) above sea level																			
Vibration	5.9 [m/s ²] 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	18	19	0.8	0.8	1.0			
	[lb]	1.8	1.8	2.2	2.2	3.1	3.1	5.071	5.071	10.1	13.7	39.68	39.68	41.88	1.8	1.8	2.2			

Note 1. 150mA 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.

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

1. FUNCTIONS AND CONFIGURATION

(2) 400VAC class

Item		Servo Amplifier MR-J3□-RJ006		11KB4	15KB4	22KB4
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 capacity		Refer to Section 10.2			
	Inrush current		Refer to Section 10.5			
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		45W			
	Inrush current		Refer to Section 10.5			
Interface power supply	Voltage, frequency		DC24V±10%			
	Power supply capacity		(Note) 150mA or more			
Load side encoder interface	Serial interface		Mitsubishi high-speed serial communication			
	Pulse train interface	Input signal	ABZ-phase differential input signal			
		Minimum phase differential	200ns			
Control System		Sine-wave PWM control, current control system				
Dynamic brake		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 brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection				
Structure		Force-cooling, open (IP00)				
Environment	Ambient temperature	During 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				
	Ambient	Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt				
Altitude	Max. 1000m (3280ft) above sea level					
Vibration	5.9 [m/s ²] or less					
Mass			[kg]	18	18	19
			[lb]	39.68	39.68	41.88

Note. 150mA 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.

1. FUNCTIONS AND CONFIGURATION

1.4 Function List

The following table lists the functions of this servo. For details of the functions, refer to the reference field.

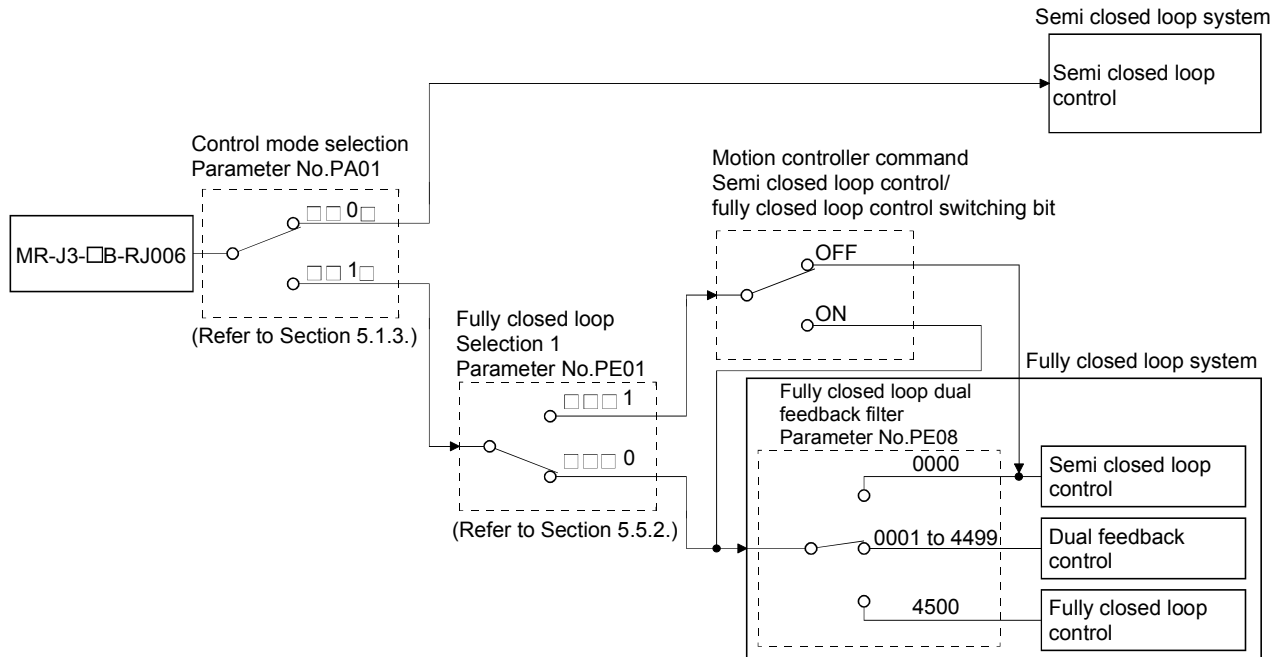
Function	Description	Reference
High-resolution encoder	High-resolution encoder of 262144 pulses/rev is used as a servo motor encoder.	
Absolute position detection system	Merely setting a home position once makes home position return unnecessary at every power-on.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
Gain changing function	You can switch between gains during rotation and gains during stop or use an external signal to change gains during operation.	
Advanced vibration suppression control	This function suppresses vibration at the arm end or residual vibration.	
Adaptive filter II	Servo amplifier detects mechanical resonance and sets filter characteristics automatically to suppress mechanical vibration.	
Low-pass filter	Suppresses high-frequency resonance which occurs as servo system response is increased.	
Machine analyzer function	Analyzes the frequency characteristic of the mechanical system by simply connecting a servo configuration software-installed personal computer and servo amplifier. MR Configurator (servo configuration software) MRZJW3-SETUP221E is necessary for this function.	
Machine simulation	Can simulate machine motions on a personal computer screen on the basis of the machine analyzer results. MR Configurator (servo configuration software) MRZJW3-SETUP221E is necessary for this function.	
Gain search function	Personal computer changes gains automatically and searches for overshoot-free gains in a short time. MR Configurator (servo configuration software) MRZJW3-SETUP221E is necessary for this function.	
Slight vibration suppression control	Suppresses vibration of ± 1 pulse produced at a servo motor stop.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
Auto tuning	Automatically adjusts the gain to optimum value if load applied to the servo motor shaft varies. Higher in performance than MR-J2-Super series servo amplifier.	
Brake until	Used when the regenerative brake option cannot provide enough regenerative power. Can be used the 5kW or more servo amplifier.	
Return converter	Used when the regenerative brake option cannot provide enough regenerative power. Can be used the 5kW or more servo amplifier.	
Regenerative brake option	Used when the built-in regenerative brake resistor of the servo amplifier does not have sufficient regenerative capability for the regenerative power generated.	
Alarm history clear	Alarm history is cleared.	
Output signal (DO) forced output	Output signal can be forced on/off independently of the servo status. Use this function for output signal wiring check, etc.	
Test operation mode	JOG operation • positioning operation • DO forced output. However, MR Configurator (servo configuration software) MRZJW3-SETUP221E is necessary for positioning operation.	
Analog monitor output	Servo status is output in terms of voltage in real time.	
MR configurator (Servo configuration software)	Using a personal computer, parameter setting, test operation, status display, etc. can be performed.	

1. FUNCTIONS AND CONFIGURATION

1.5 Selecting Procedure of Control Mode

1.5.1 Control mode configuration

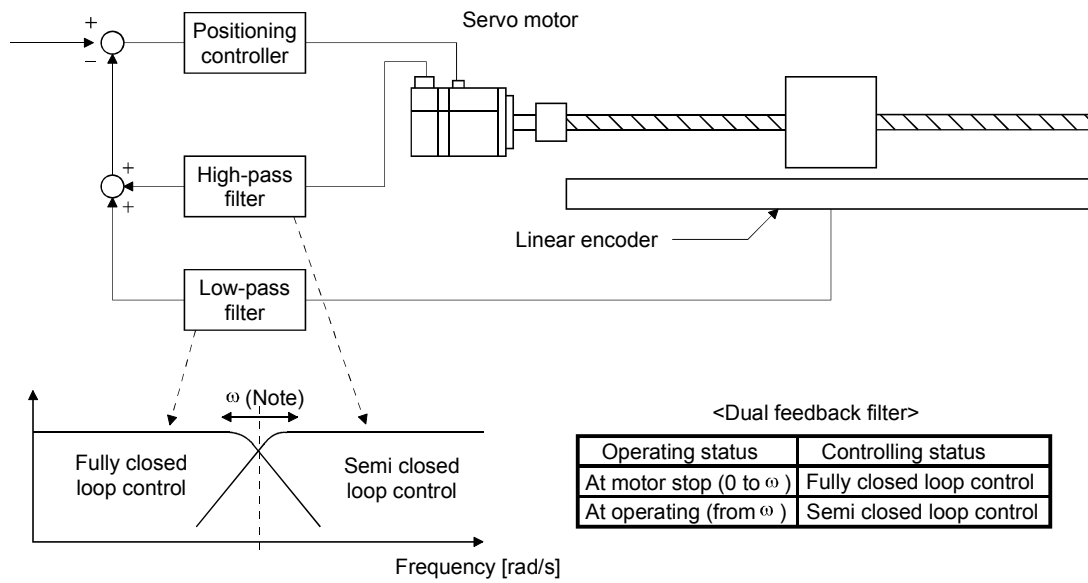
In this servo, a semi closed loop system or fully closed loop system can be selected as a control system. Also, on the fully closed loop system, the semi closed loop control, fully closed loop control and dual feedback control can be switched by the parameter No.PE08 settings.



1. FUNCTIONS AND CONFIGURATION

1.5.2 Dual feedback filter equivalent block diagram

A dual feedback filter equivalent block diagram on the dual feedback control is shown below.





Note. ω (a dual feedback filter band) is set by parameter No.PE08.

1. FUNCTIONS AND CONFIGURATION

1.6 Model Code Definition

(1) Rating plate

MITSUBISHI		AC SERVO
MODEL	MR-J3-10B-RJ006	
POWER : 100W		
INPUT : 0.9A 3PH+1PH 200-230V 50Hz		
3PH+1PH 200-230V 60Hz		
1.3A 1PH 200-230V 50/60Hz		
OUTPUT: 170V 0-360Hz 1.1A		
SERIAL : A34230001		
 MITSUBISHI ELECTRIC CORPORATION MADE IN JAPAN		

← Model
 ← Capacity
 ← Applicable power supply
 ← Rated output current
 ← Serial number

(2) Model

MR-J3-□□□□

Series

Fully closed loop control symbol

Symbol	Standard regeneration brake resistor	
	0.1kW to 7kW	11kW to 2kW
RJ006	Built-in (No built-in for 0.1kW)	Standard attachment
RZ006	No attachment	

Power supply

Symbol	Power supply
None (Note 1)	3-phase or 1-phase 200 to 230VAC
(Note 2) ₁	1-phase 100 to 120VAC
4	3-phase 380 to 480VAC

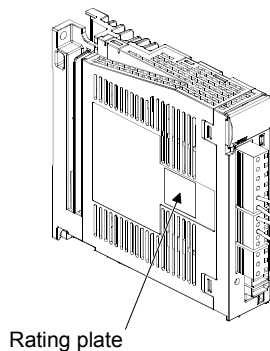
Note 1. 1-phase 200V to 230V is supported by 750W or less.
 Note 2. 1-phase 100V to 120V is supported by 400W or less.

SSCNET III compatible

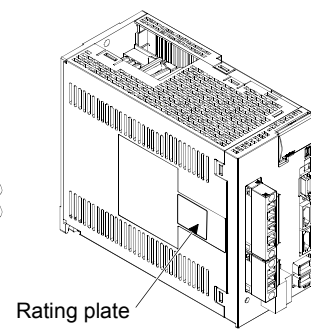
Rated output

Symbol	Rated output [kW]	Symbol	Rated output [kW]
10	0.1	350	3.5
20	0.2	500	5
40	0.4	700	7
60	0.6	11k	11
70	0.75	15k	15
100	1	22k	22
200	2		

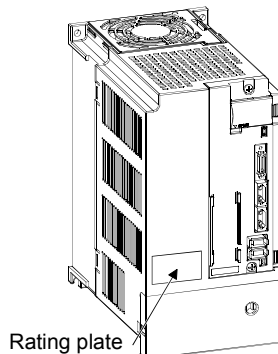
MR-J3-100B-RJ006 or less



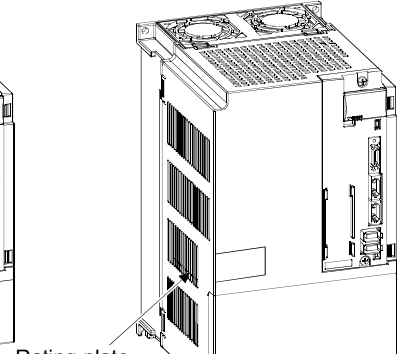
MR-J3-200B-RJ006 350B-RJ006



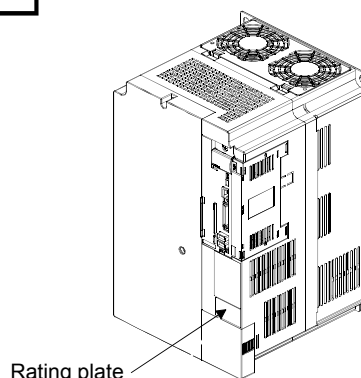
MR-J3-500B-RJ006



MR-J3-700B-RJ006



MR-J3-11KB(4)-RJ006 or more



1. FUNCTIONS AND CONFIGURATION

1.7 Combination with Servo Motor

The following table lists combinations of servo amplifiers and servo motors. The same combinations apply to the models with electromagnetic brakes.

Servo amplifier	Servo motors						
	HF-KP□	HF-MP□	HF-SP□		HC-RP□	HC-UP□	HC-LP□
			1000r/min	2000r/min			
MR-J3-10B (1) -RJ006	053 · 13	053 · 13					
MR-J3-20B (1) -RJ006	23	23					
MR-J3-40B (1) -RJ006	43	43					
MR-J3-60B-RJ006			51	52			52
MR-J3-70B-RJ006	73	73				72	
MR-J3-100B-RJ006			81	102			102
MR-J3-200B-RJ006			121 · 201	152 · 202	103 · 153	152	152
MR-J3-350B-RJ006			301	352	203	202	202
MR-J3-500B-RJ006			421	502	353 · 503	352 · 502	302
MR-J3-700B-RJ006				702			

Servo amplifier	Servo motors		
	HA-LP□		
	1000r/min	1500r/min	2000r/min
MR-J3-500B-RJ006			502
MR-J3-700B-RJ006	601	701M	702
MR-J3-11KB-RJ006	801 · 12K1	11K1M	11K2
MR-J3-15KB-RJ006	15K1	15K1M	15K2
MR-J3-22KB-RJ006	20K1 · 25K1	22K1M	22K2

Servo amplifier	Servo motors		
	HA-LP□		
	1000r/min	1500r/min	2000r/min
MR-J3-11KB4-RJ006	8014 · 12K14	11K1M4	11K24
MR-J3-15KB4-RJ006	15K14	15K1M4	15K24
MR-J3-22KB4-RJ006	20K14	(Note) 22K1M4	22K24


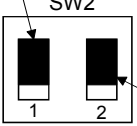
Note. These servo motors may be connected depending on the production time of the servo amplifier. Please refer to app 6.

1. FUNCTIONS AND CONFIGURATION

1.8 Structure

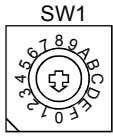
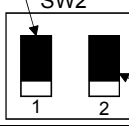
1.8.1 Parts identification

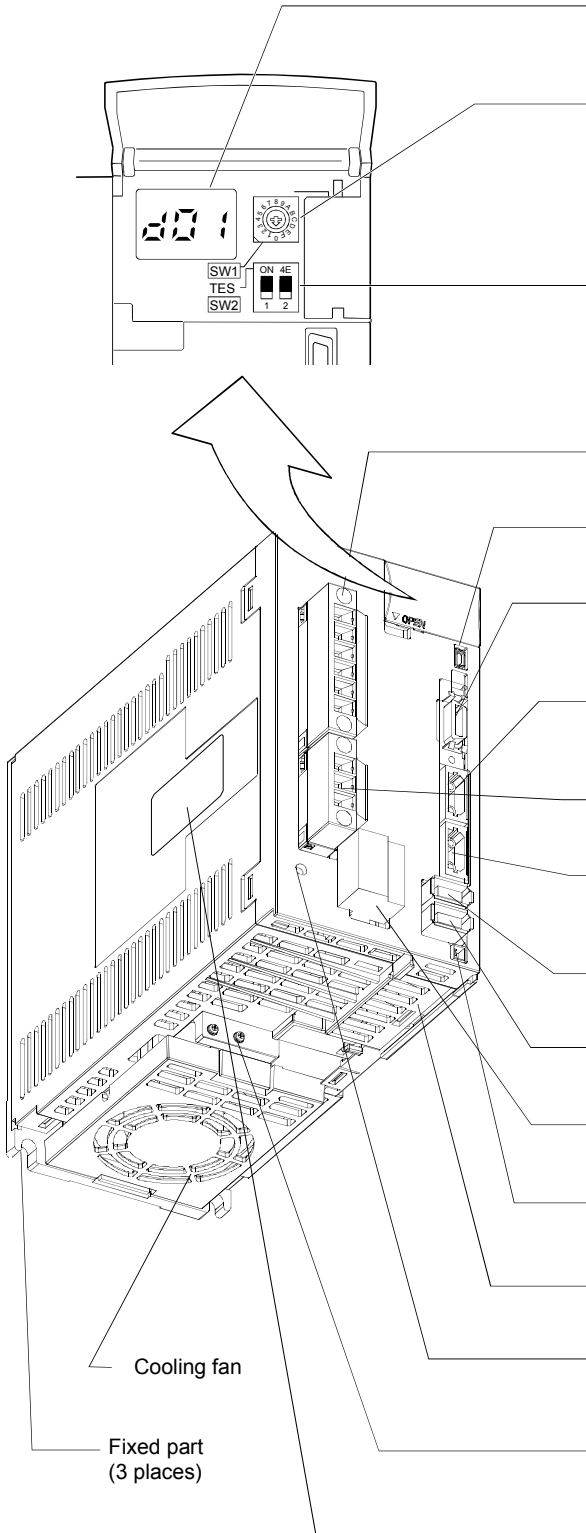
(1) MR-J3-100B-RJ006 or less

Name/Application	Detailed Explanation	
Display The 3-digit, seven-segment LED shows the servo status and alarm number.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.	
Rotary axis setting switch (SW1) SW1  Used to set the axis No. of servo amplifier.		
Test operation select switch (SW2-1) SW2  Used to perform the test operation mode by using MR Configurator (Setup software). Spare (Be sure to set to the "Down" position).		
Main circuit power supply connector (CNP1) Connect the input power supply.		
USB communication connector (CN5) Connect with the personal computer.		
I/O signal connector (CN3) Used to connect digital I/O signals. More over an analog monitor is output		
Control circuit connector (CNP2) Connect the control circuit power supply/regenerative brake option.		
SSCNET III cable connector (CN1A) Used to connect the servo system controller or the front axis servo amplifier.		
SSCNET III cable connector (CN1B) Used to connect the rear axis servo amplifier. For the final axis, puts a cap.		
Motor power supply connector (CNP3) Connect the servo motor.		
Motor encoder connector (CN2) Used to connect the servo motor encoder.		
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.		
Connector for manufacturer setting Not used for this servo amplifier.		
Load side encoder connector (CN2L) Connect the load side encoder.		Chapter 3
Battery holder Not used for this servo amplifier.		
Protective earth (PE) terminal (⊕) Ground terminal.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.	
Name plate		

1. FUNCTIONS AND CONFIGURATION

(2) MR-J3-200B-RJ006 • MR-J3-350B-RJ006

Name/Application	Detailed Explanation
Display The 3-digit, seven-segment LED shows the servo status and alarm number.	
Rotary axis setting switch (SW1)  Used to set the axis No. of servo amplifier.	
Test operation select switch (SW2-1)  Used to perform the test operation mode by using MR Configurator (Setup software). Spare (Be sure to set to the "Down" position).	
Main circuit power supply connector (CNP1) Connect the input power supply.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
USB communication connector (CN5) Connect with the personal computer.	
I/O signal connector (CN3) Used to connect digital I/O signals. More over an analog monitor is output	
SSCNET III cable connector (CN1A) Used to connect the servo system controller or the front axis servo amplifier.	
Motor power supply connector (CNP3) Connect the servo motor.	
SSCNET III cable connector (CN1B) Used to connect the rear axis servo amplifier. For the final axis, puts a cap.	
Motor encoder connector (CN2) Used to connect the servo motor encoder.	
Load side encoder connector (CN2L) connect the load side encoder.	
Control circuit connector (CNP2) Connect the control circuit power supply/regenerative brake option.	
Connector for manufacturer setting (CN4) Not used for this servo amplifier.	
Battery holder Not used for this servo amplifier.	
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.	
Protective earth (PE) terminal (⊕) Ground terminal.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
Name plate	

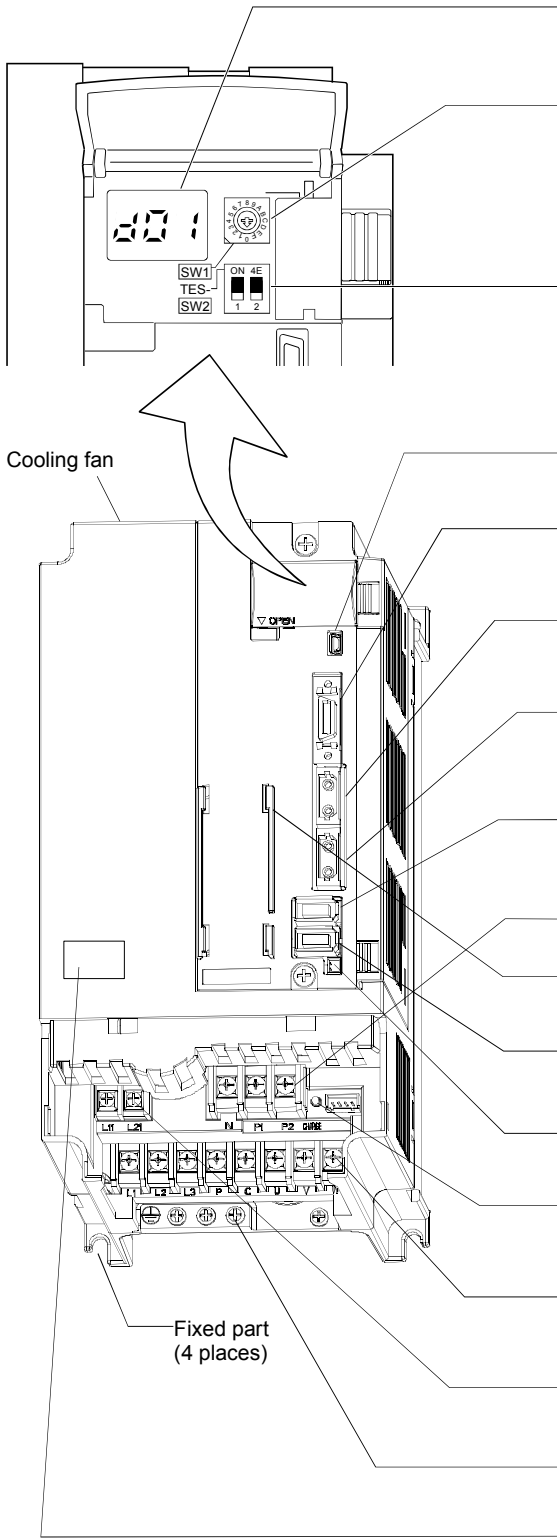


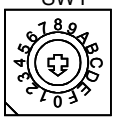
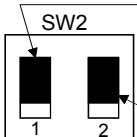
1. FUNCTIONS AND CONFIGURATION

(3) MR-J3-500B-RJ006

POINT

- The servo amplifier is shown without the front cover. For removal of the front cover, refer to Section 1.8.2.



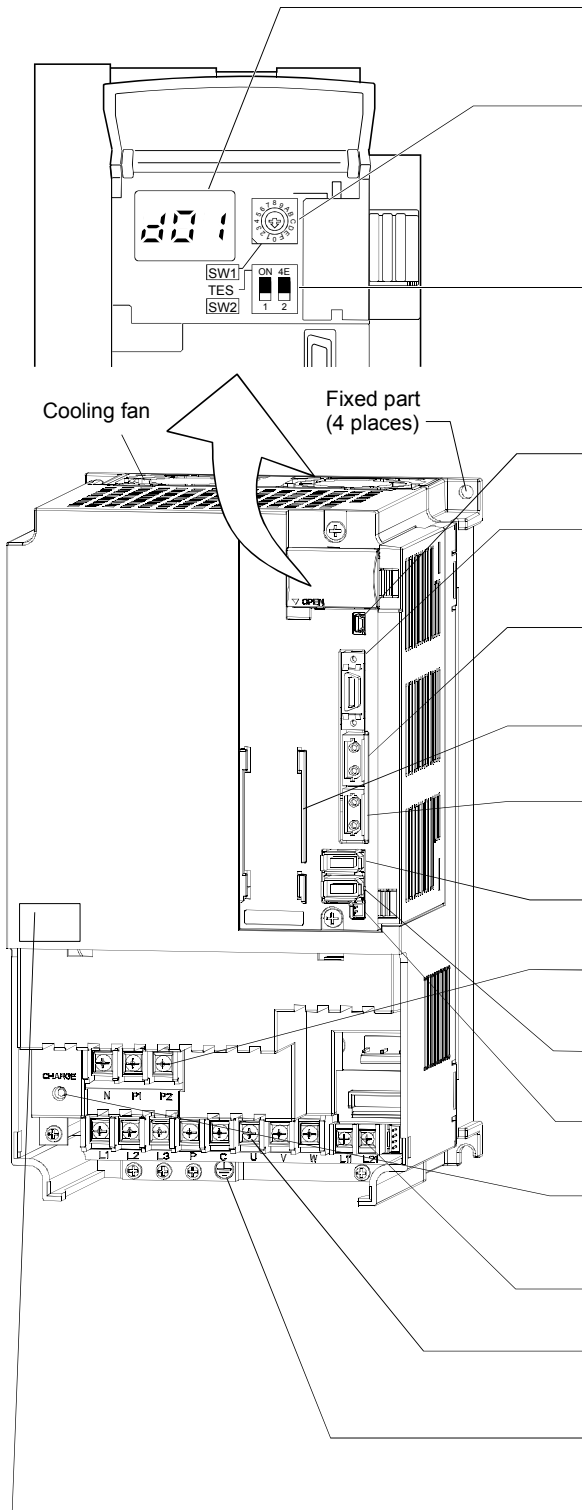
Name/Application	Detailed Explanation	
Display The 3-digit, seven-segment LED shows the servo status and alarm number.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.	
Rotary axis setting switch (SW1)  Used to set the axis No. of servo amplifier.		
Test operation select switch (SW2-1) Used to perform the test operation mode by using MR Configurator (Setup software). Spare (Be sure to set to the "Down" position). 		
USB communication connector (CN5) Connect with the personal computer.		
I/O signal connector (CN3) Used to connect digital I/O signals. More over an analog monitor is output		
SSCNET III cable connector (CN1A) Used to connect the servo system controller or the front axis servo amplifier.		
SSCNET III cable connector (CN1B) Used to connect the rear axis servo amplifier. For the final axis, puts a cap.		
Motor encoder connector (CN2) Used to connect the servo motor encoder.		
DC reactor terminal block (TE3) Used to connect the DC reactor.		
Battery holder Not used for this servo amplifier.		
Load side encoder connector (CN2L) Connect the load side encoder.		Section 3
Connector for manufacturer setting (CN4) Not used for this servo amplifier.		
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.		
Main circuit terminal block (TE1) Used to connect the input power supply and servo motor.		Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
Control circuit terminal block (TE2) Used to connect the control circuit power supply.		
Protective earth (PE) terminal (⊕) Ground terminal.		
Name plate		

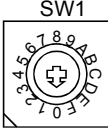

1. FUNCTIONS AND CONFIGURATION

(4) MR-J3-700B-RJ006

POINT

- The servo amplifier is shown without the front cover. For removal of the front cover, refer to Section 1.8.2.



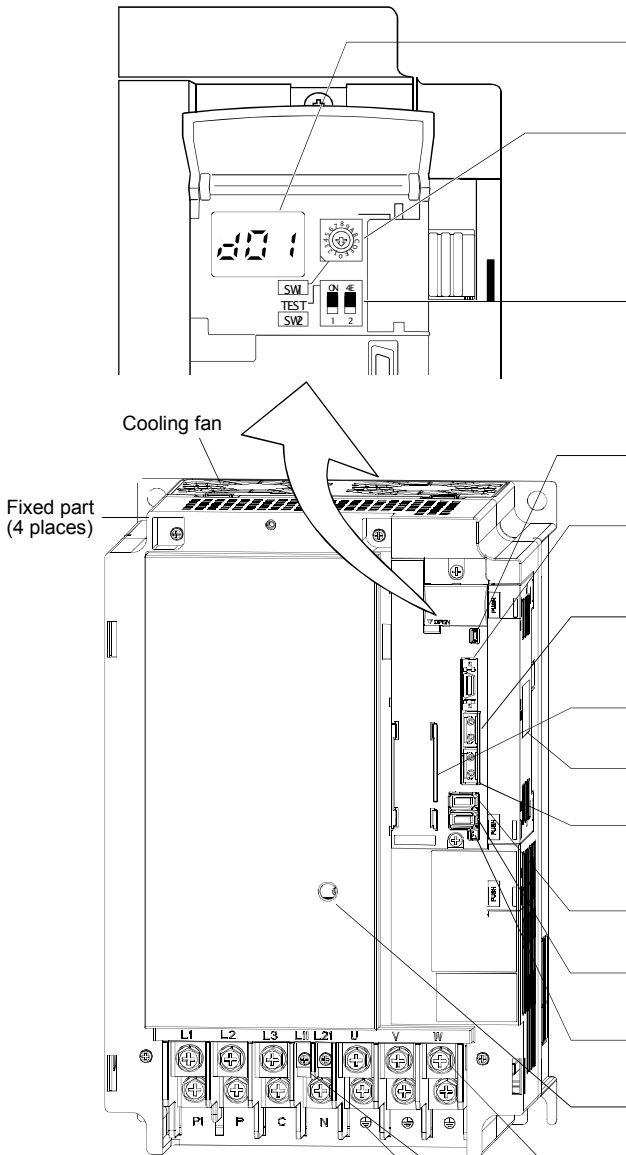
Name/Application	Detailed Explanation	
Display The 3-digit, seven-segment LED shows the servo status and alarm number.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.	
Rotary axis setting switch (SW1) SW1  Used to set the axis No. of servo amplifier.		
Test operation select switch (SW2-1) SW2  Used to perform the test operation mode by using MR Configurator (Setup software). Spare (Be sure to set to the "Down" position).		
USB communication connector (CN5) Connect with the personal computer.		
I/O signal connector (CN3) Used to connect digital I/O signals. More over an analog monitor is output		
SSCNET III cable connector (CN1A) Used to connect the servo system controller or the front axis servo amplifier.		
Battery holder Contains the battery for absolute position data backup.		Refer to the MR-J3-□B Servo Amplifier Instruction Manual.
SSCNET III cable connector (CN1B) Used to connect the rear axis servo amplifier. For the final axis, puts a cap.		
Motor encoder connector (CN2) Used to connect the servo motor encoder.		
DC reactor terminal block (TE3) Used to connect the DC reactor.		Chapter 3
Load side encoder connector (CN2L) Connect hte load side encoder.		
Connector for manufacturer setting (CN4) Not used for this servo amplifier.	Refer to the MR-J3-□B Servo Amplifier Instruction Manual.	
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.		
Control circuit terminal block (TE2) Used to connect the control circuit power supply.		
Main circuit terminal block (TE1) Used to connect the input power supply and servo motor.		
Protective earth (PE) terminal (⊕) Ground terminal.		
Name plate		

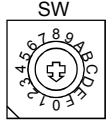
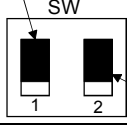
1. FUNCTIONS AND CONFIGURATION

(5) MR-J3-11KB (4)-RJ006 or more

POINT

- The servo amplifier is shown without the front cover. For removal of the front cover, refer to Section 1.8.2.



Name/Application	Detailed Explanation
Display	The 3-digit, seven-segment LED shows the servo status and alarm number.
Rotary axis setting switch (SW1)	Used to set the axis No. of servo amplifier.
	<p>SW</p> <p>Used to set the axis No. of servo amplifier.</p>
	<p>Test operation select switch (SW2-1)</p> <p>Used to perform the test operation mode by using MR Configurator (Setup software).</p> <p>Spare (Be sure to set to the "Down" position).</p>
USB communication connector (CN5)	Connect with the personal computer.
I/O signal connector (CN3)	Used to connect digital I/O signals. More over an analog monitor is output
SSCNET III cable connector (CN1A)	Used to connect the servo system controller or the front axis servo amplifier.
Battery holder	Not used for this servo amplifier.
Name plate	
SSCNET III cable connector (CN1B)	Used to connect the rear axis servo amplifier. For the final axis, puts a cap.
Motor encoder connector (CN2)	Used to connect the servo motor encoder.
Load side encoder connector (CN2L)	Connect the load side encoder.
Connector for manufacturer setting (CN4)	Not used for this servo amplifier.
Charge lamp	Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.
Main circuit terminal block (TE)	Used to connect the input power supply, servo motor and regenerative brake option.
Control circuit terminal block (TE2)	Used to connect the control circuit power supply.
Protective earth (PE) terminal (⊕)	Ground terminal.

Refer to the MR-J3-□B Servo Amplifier Instruction Manual.


Refer to the MR-J3-□B Servo Amplifier Instruction Manual.

Chapter 3

Refer to the MR-J3-□B Servo Amplifier Instruction Manual.

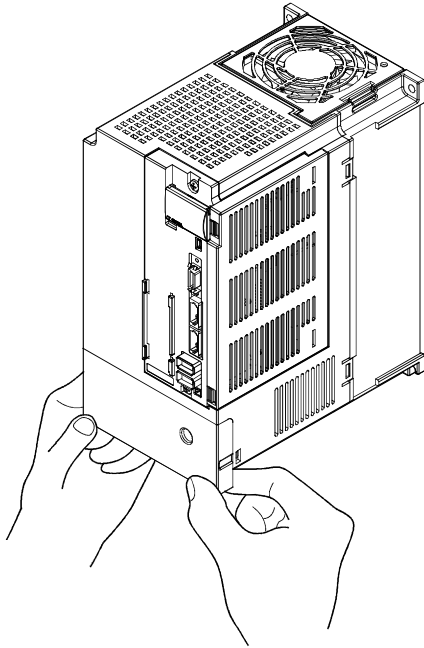
1. FUNCTIONS AND CONFIGURATION

1.8.2 Removal and reinstallation of the front cover

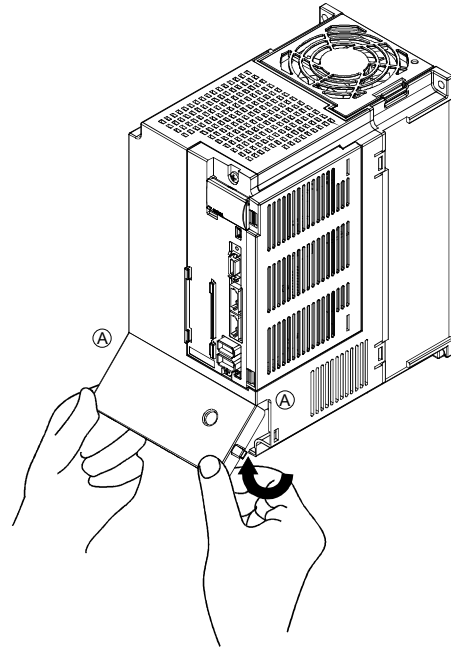
 **CAUTION** ▪ Before removing or reinstalling the front cover, make sure that the charge lamp is off more than 15 minutes after power off. Otherwise, you may get an electric shock.

(1) For 5kW · 7kW

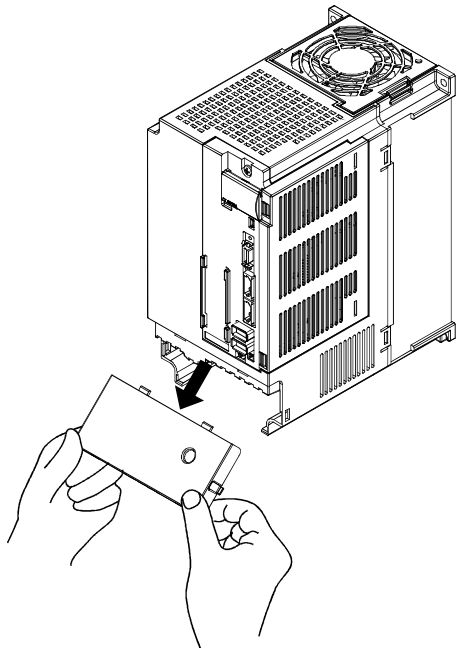
Removal of the front cover



Hold the ends of lower side of the front cover with both hands.



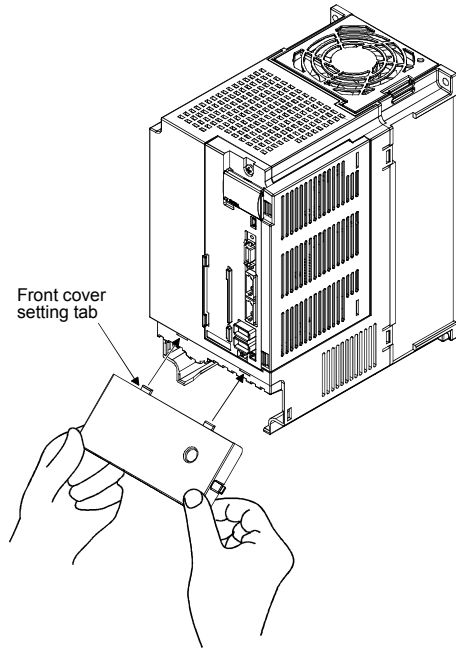
Pull up the cover, supporting at point A.



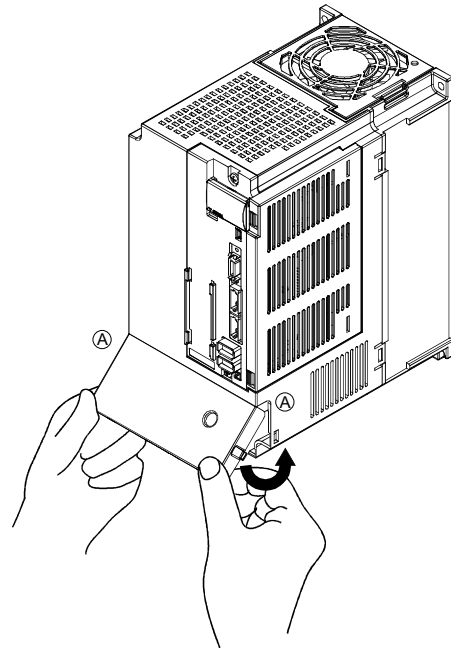
Pull out the front cover to remove.

1. FUNCTIONS AND CONFIGURATION

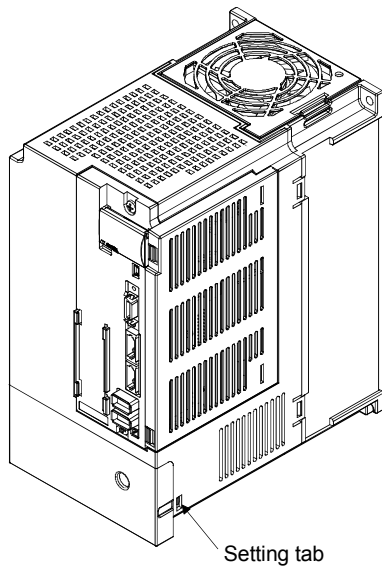
Reinstallation of the front cover



Insert the front cover setting tabs into the sockets of servo amplifier (2 places).



Pull up the cover, supporting at point A.

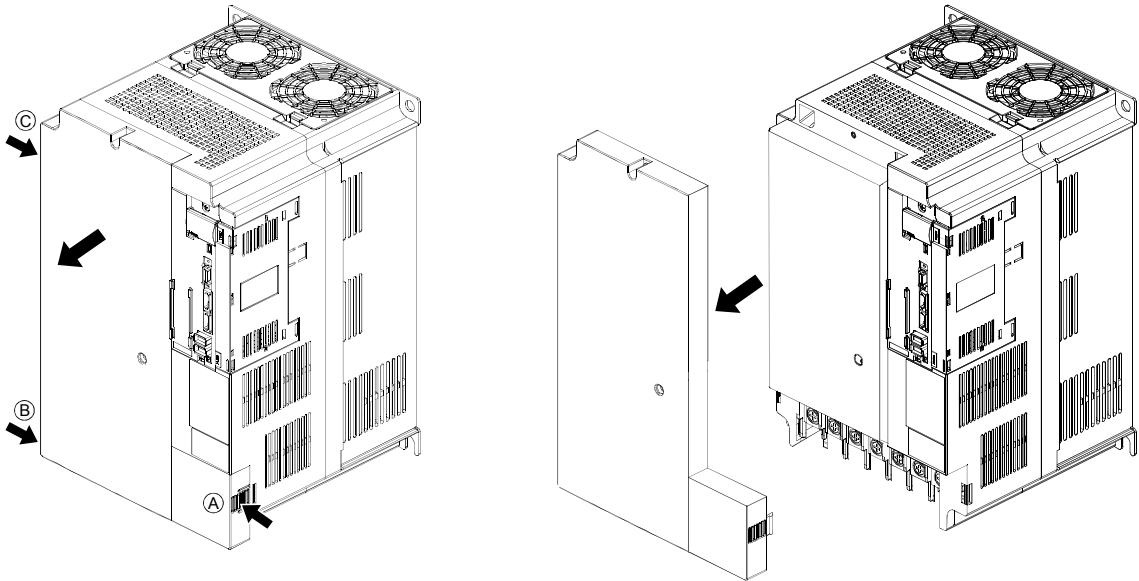


Push the setting tabs until they click.

1. FUNCTIONS AND CONFIGURATION

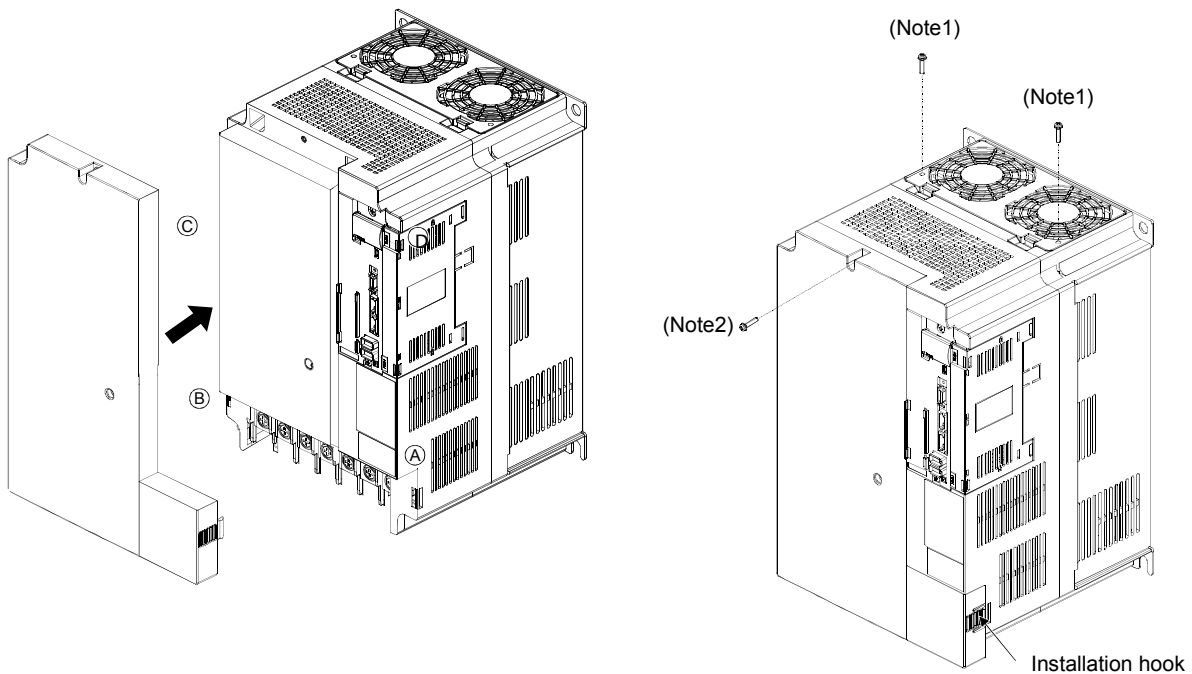
(2) 11kW or more

Removal of the front cover



- 1) Press the removing knob on the lower side of the front cover (A and B) and release the installation hook.
- 2) Press the removing knob of C and release the external hook.
- 3) Pull it to remove the front cover.

Reinstallation of the front cover



- 1) Fit the front cover installation hooks on the sockets of body cover (A to D) to reinstall it.
- 2) Push the front cover until hearing the clicking noise of the installation hook.

Note 1. The fan cover can be locked with enclosed screws (M4 × 40).

2. If drilling approximately $\phi 4$ of a hole on the front cover, the front cover can be locked on the body with an enclosed screw (M4 × 40).

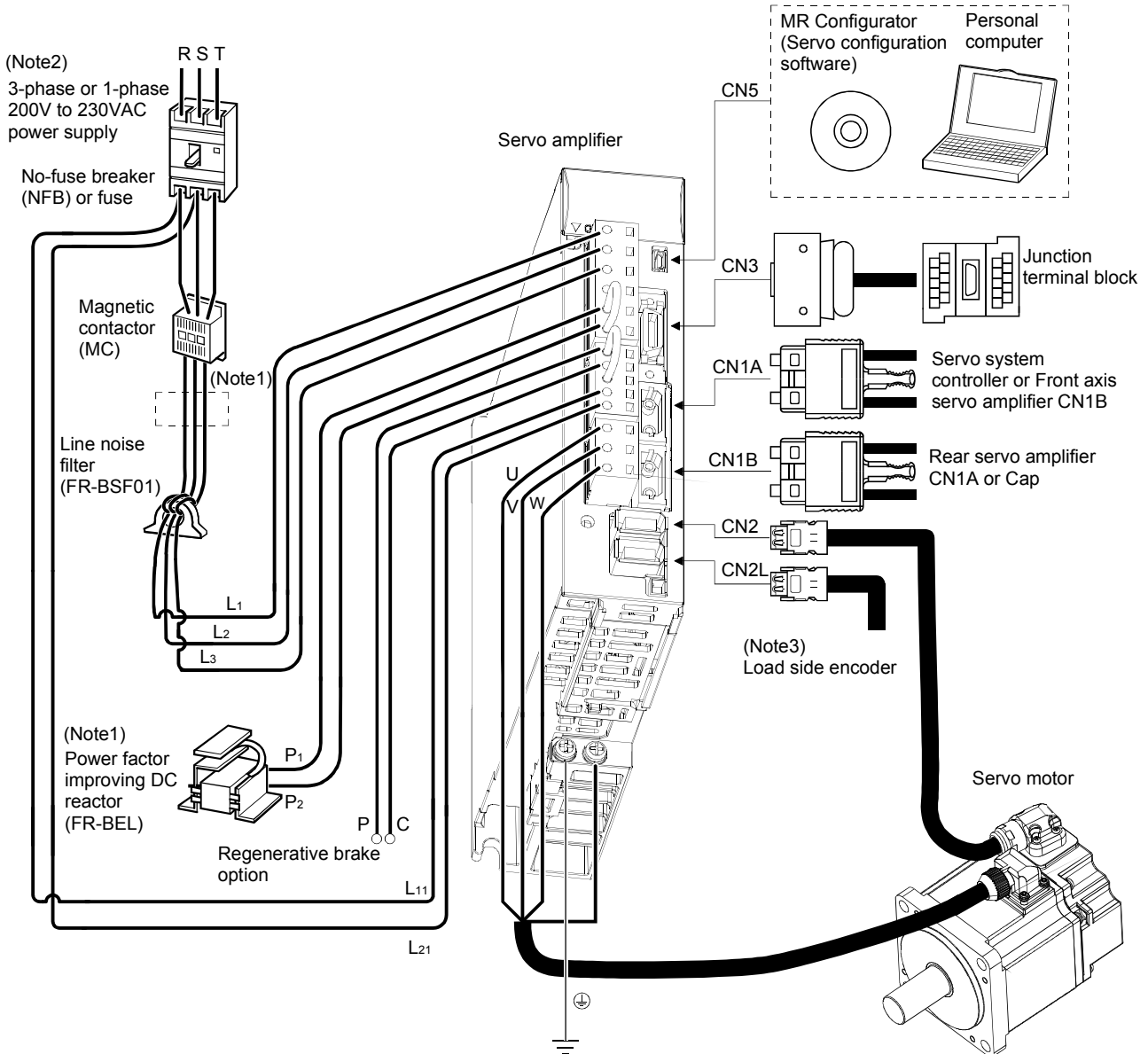
1. FUNCTIONS AND CONFIGURATION

1.9 Configuration Including Auxiliary Equipment

POINT
<ul style="list-style-type: none"> Equipment other than the servo amplifier and servo motor are optional or recommended products.

(1) MR-J3-100B-RJ006 or less

(a) For 3-phase or 1-phase 200V to 230VAC



Note 1. The AC reactor can also be used. In this case, the DC reactor cannot be used.

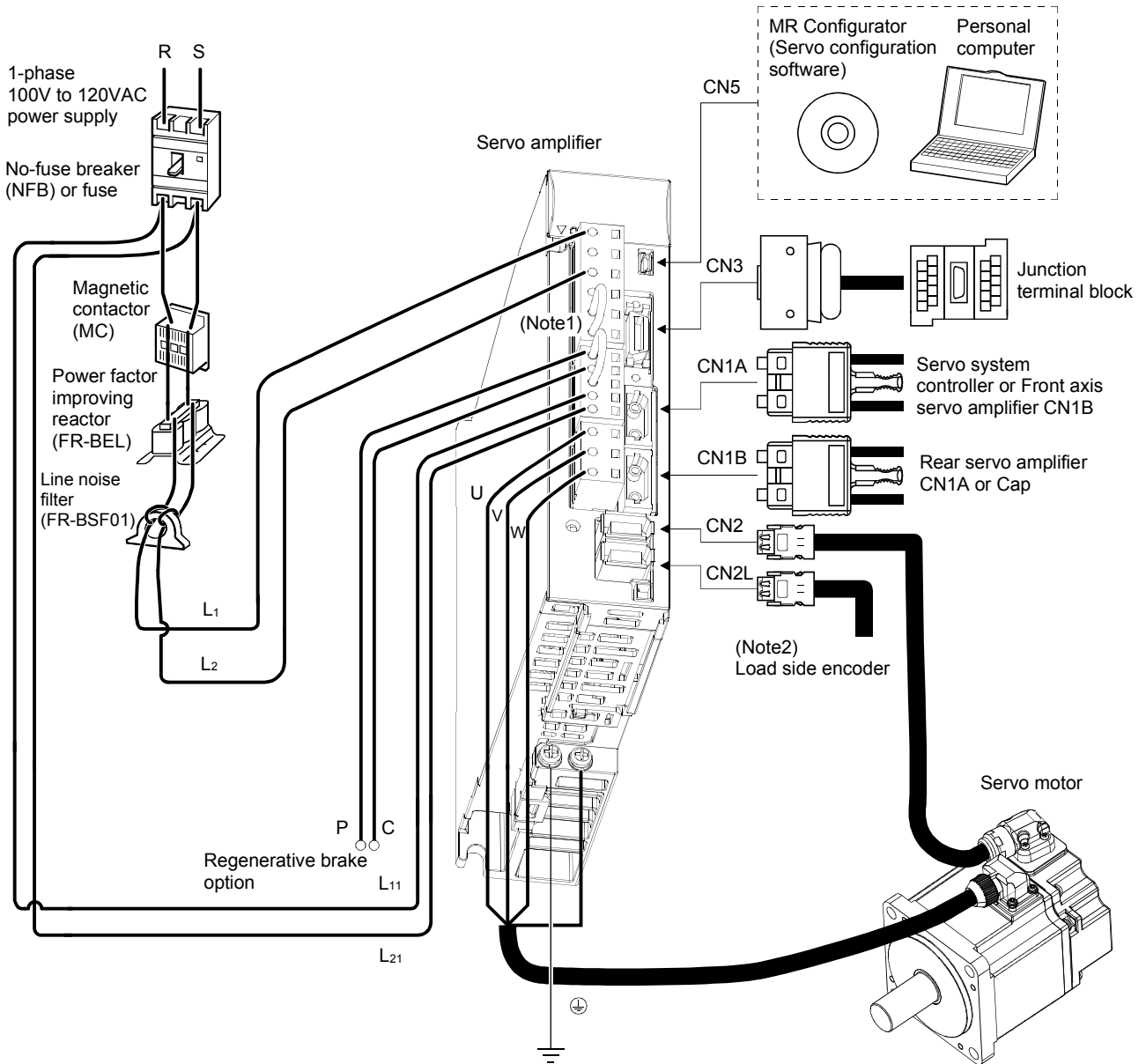
2. A 1-phase 200V to 230VAC power supply may be used with the servo amplifier of MR-J3-70B-RJ006 or less.

For 1-phase 200V to 230VAC, connect the power supply to L1 · L2 and leave L3 open.

3. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

(b) For 1-phase 100V to 120VAC

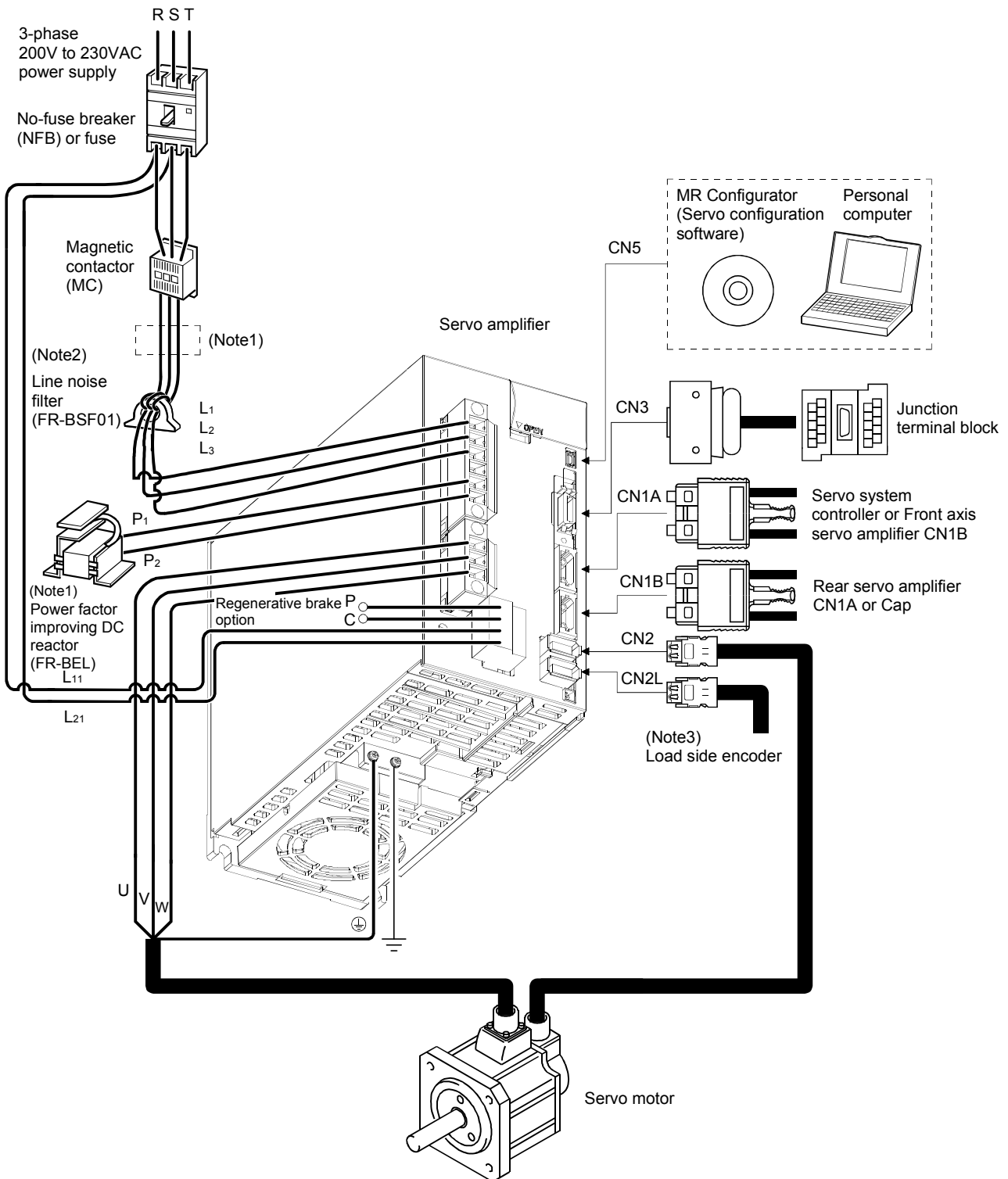


Note 1. The power factor improving DC reactor cannot be used.

2. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

(2) MR-J3-200B-RJ006 • MR-J3-350B-RJ006



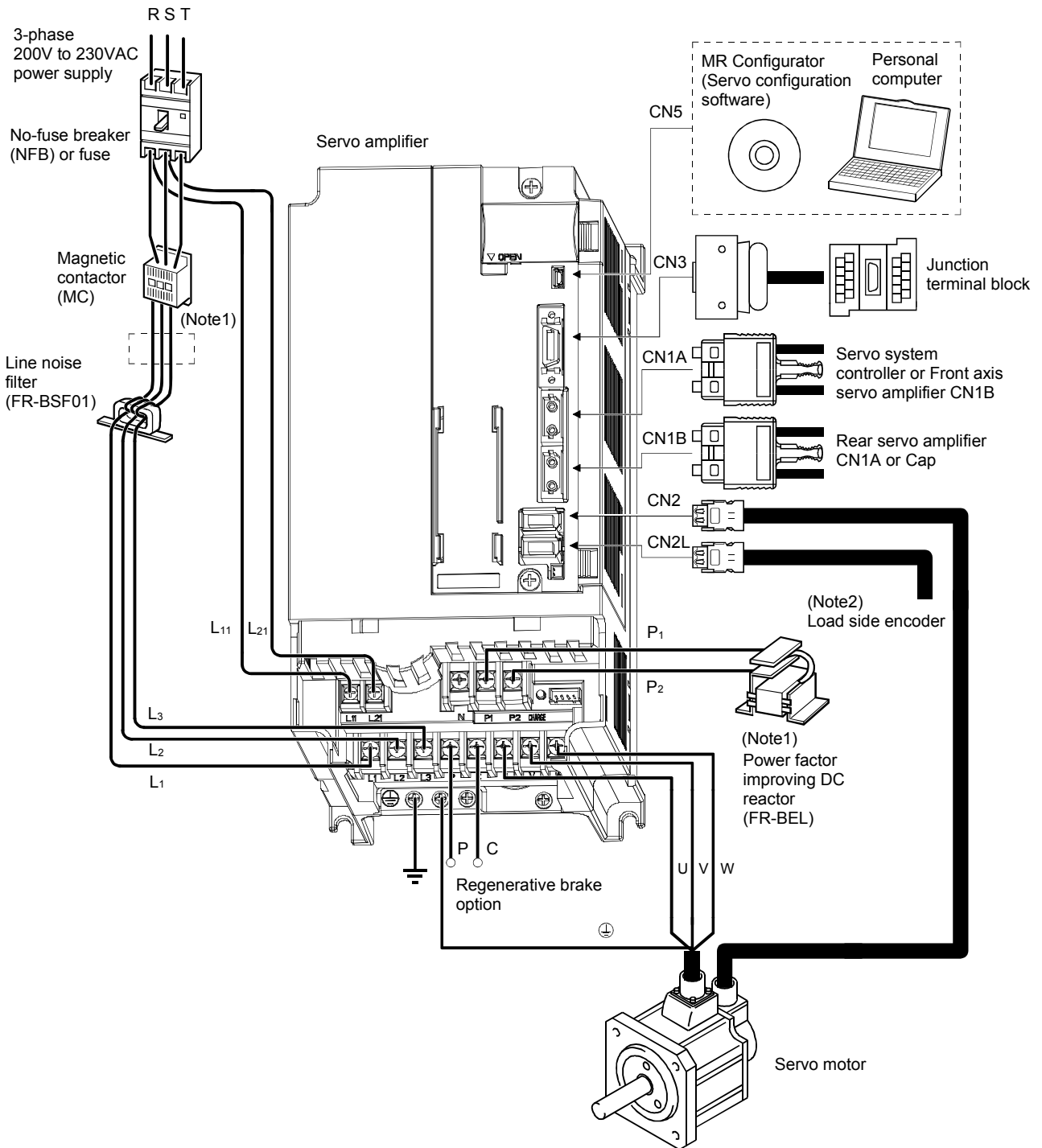
Note 1. The AC reactor can be also used. In this case, the DC reactor cannot be used.

2. For MR-J3-350B-RJ006, use FR-BLF.

3. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

(3) MR-J3-500B-RJ006

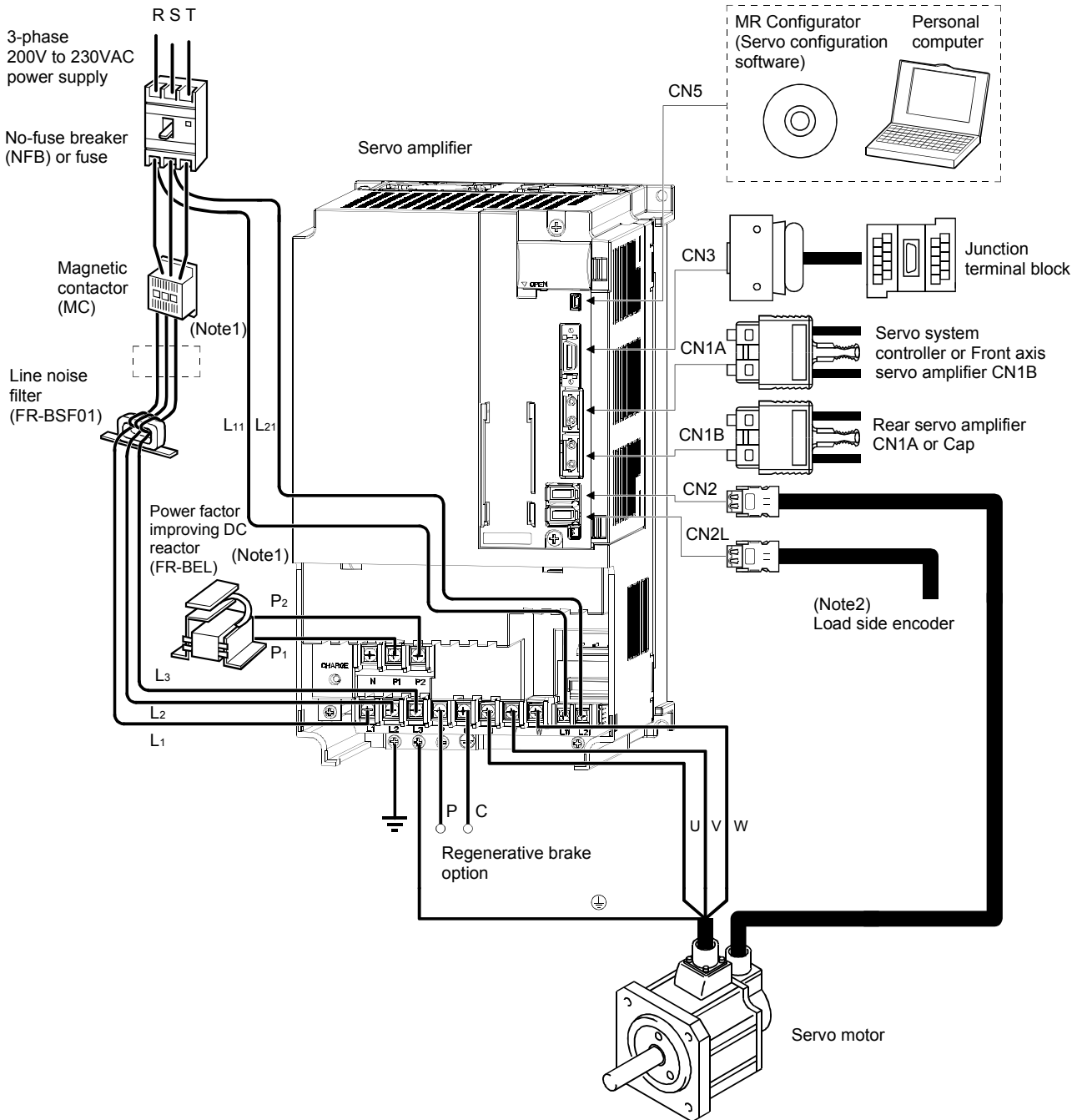


Note 1. The AC reactor can be also used. In this case, the DC reactor cannot be used.

2. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

(4) MR-J3-700B-RJ006

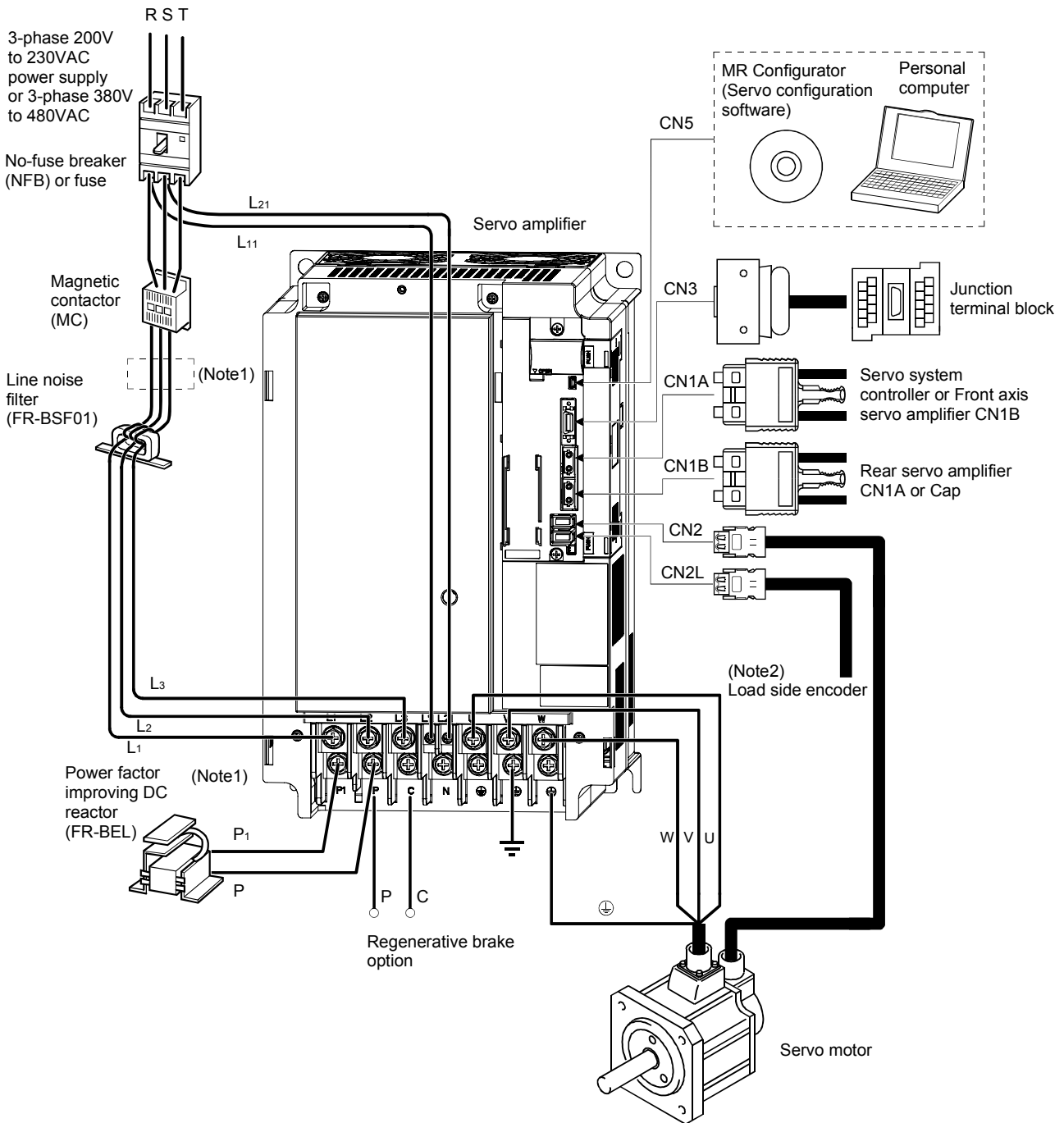


Note 1. The AC reactor can be also used. In this case, the DC reactor cannot be used.

2. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

(5) MR-J3-11KB(4)-RJ006 or more



Note 1. The AC reactor can also be used. In this case, the DC reactor cannot be used.

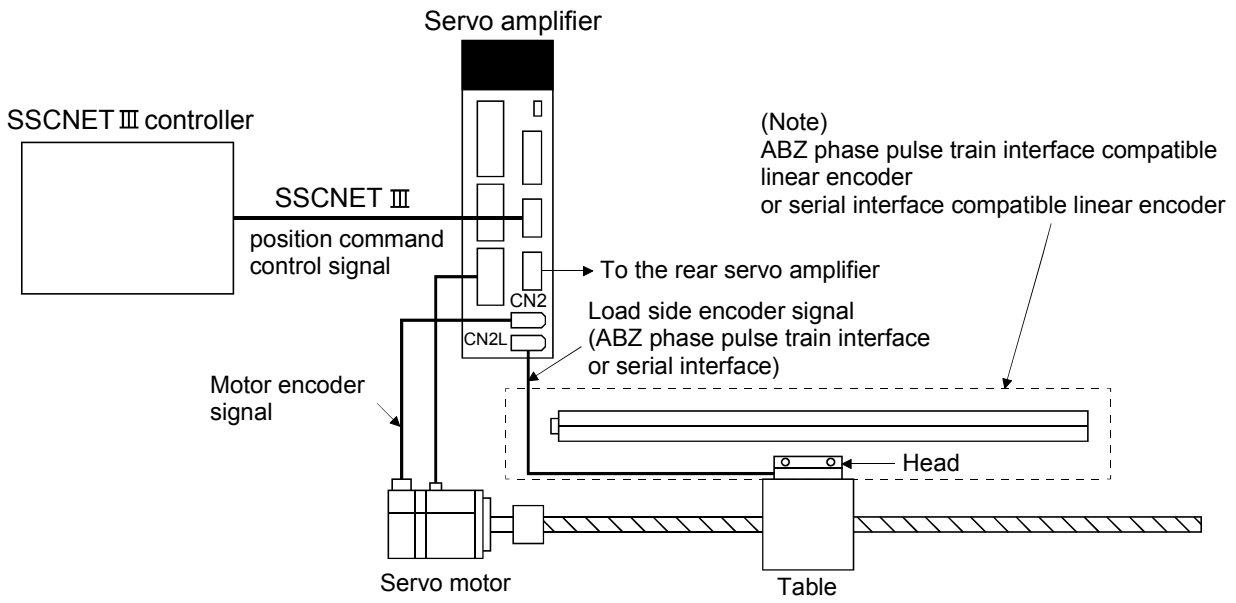
2. For the configuration of the ABZ-phase pulse train interface or serial communication specification linear encoder/rotary encoder, refer to Section 1.10.

1. FUNCTIONS AND CONFIGURATION

1.10 System Configuration

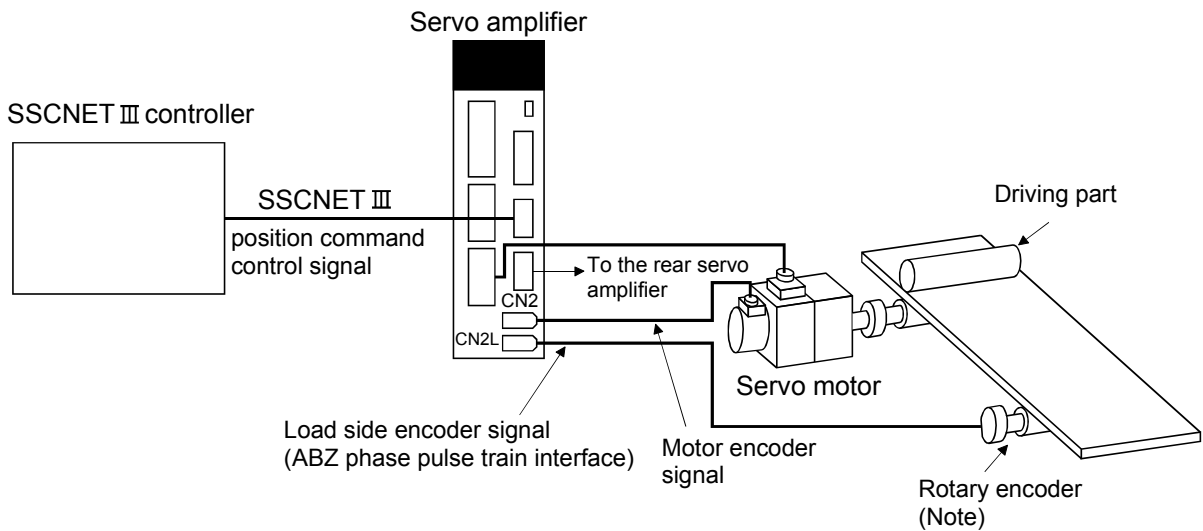
POINT	<ul style="list-style-type: none"> For details of configuration with peripheral devices, refer to the MR-J3-□B Servo Amplifier Instruction Manual.
--------------	---

(1) For a linear encoder



Note. Applicable for the absolute position system when an absolute position linear encoder is used.
In that case, a battery (MR-J3BAT) is not required.

(2) For a rotary encoder



Note. Not applicable for the absolute position system.
For the ABZ-phase differential output rotary encoder, refer to Section 3.3.

2. SIGNALS AND WIRING

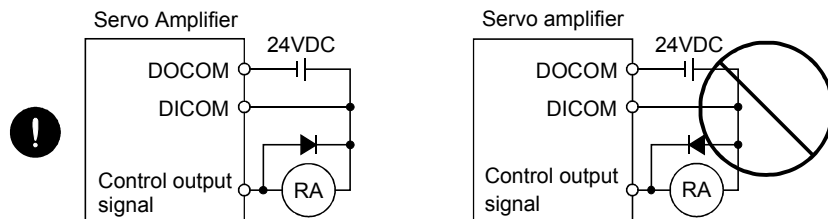
2. SIGNALS AND WIRING

WARNING

- Any person who is involved in wiring should be fully competent to do the work.
- Before starting wiring, switch power off, then wait for more than 15 minutes, and after the charge lamp has gone off, make sure that the voltage is safe in the tester or like. Otherwise, you may get an electric shock.
- Ground the servo amplifier and the servo motor securely.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, you may get an electric shock.
- The cables should not be damaged, stressed excessively, loaded heavily, or pinched. Otherwise, you may get an electric shock.

CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may misoperate, resulting in injury.
- Connect cables to correct terminals to prevent a burst, fault, etc.
- Ensure that polarity (+, -) is correct. Otherwise, a burst, damage, etc. may occur.
- The surge absorbing diode installed to the DC relay designed for control output should be fitted in the specified direction. Otherwise, the signal is not output due to a fault, disabling the forced stop (EM1) and other protective circuits.



- Use a noise filter, etc. to minimize the influence of electromagnetic interference, which may be given to electronic equipment used near the servo amplifier.
- Do not install a power capacitor, surge suppressor or radio noise filter (FR-BIF option) with the power line of the servo motor.
- When using the regenerative brake resistor, switch power off with the alarm signal. Otherwise, a transistor fault or the like may overheat the regenerative brake resistor, causing a fire.
- Do not modify the equipment.
- During power-on, do not open or close the motor power line. Otherwise, a malfunction or faulty may occur.

2. SIGNALS AND WIRING

2.1 Precautions For This Chapter

The following items are not described in this chapter. Since these descriptions are the same as those of MR-J3-□B Servo Amplifier, refer to the MR-J3-□B Servo Amplifier Instruction Manual.

Item	MR-J3-□B Servo Amplifier Instruction Manual
Explanation of power supply system	Section 3.3
Signal (device) explanations	Section 3.5
Interfaces	Section 3.7 (excluding the internal connection diagram)
SSCNET III cable connection	Section 3.9
Connection of servo amplifier and servo motor	Section 3.10
Servo motor with electromagnetic brake	Section 3.11
Control axis selection	Section 3.13

2.2 Input Power Supply Circuit



CAUTION

- When the servo amplifier has become faulty, switch power off on the servo amplifier power side. Continuous flow of a large current may cause a fire.
- Use the trouble signal to switch main circuit power supply off. Otherwise, a regenerative brake transistor fault or the like may overheat the regenerative brake resistor, causing a fire.
- During power-on, do not open or close the motor power line. Otherwise, a malfunction or faulty may occur.

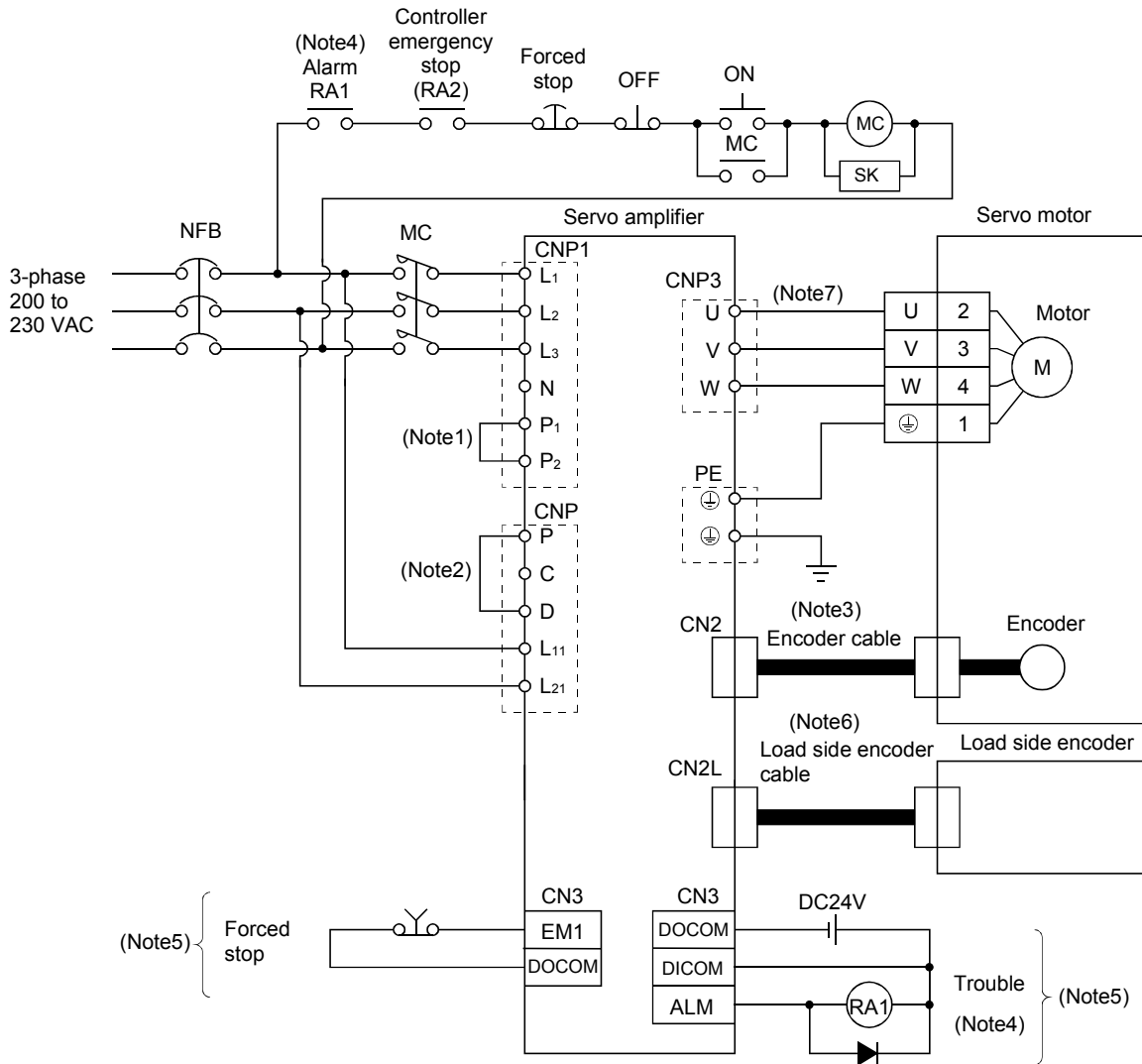
POINT

- Even if alarm has occurred, do not switch off the control circuit power supply. When the control circuit power supply has been switched off, optical module does not operate, and optical transmission of SSCNETIII communication is interrupted. Therefore, the servo amplifier on the rear axis displays "AA" at the indicator and turns into base circuit shut-off. The servo amplifier stops with starting dynamic brake.
- For details of each signal, refer to Section 3.3 of the MR-J3-□B Servo Amplifier Instruction Manual.

Wire the power supply/main circuit as shown below so that power is shut off and the servo-on command turned off as soon as an alarm occurs, a servo forced stop is made valid, or a controller forced stop is made valid. A no-fuse breaker (NFB) must be used with the input cables of the main circuit power supply.

2. SIGNALS AND WIRING

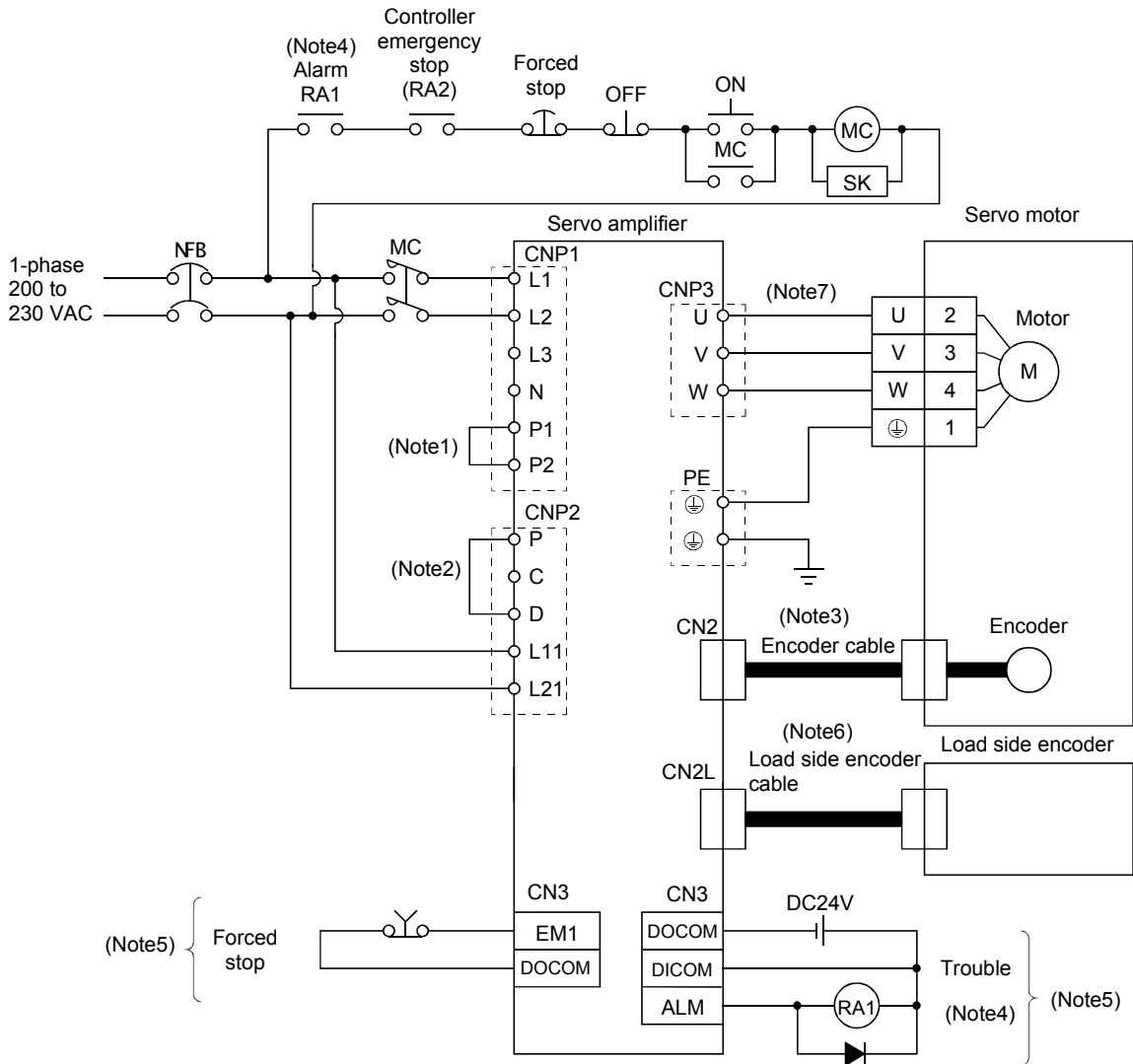
(1) For 3-phase 200V to 230VAC power supply to MR-J3-10B-RJ006 to MR-J3-350B-RJ006



- Note 1. Always connect P₁-P₂. (Factory-wired.) When using the power factor improving DC reactor, refer to Section 11.10 of the MR-J3-□B Servo Amplifier Instruction Manual.
2. Always connect P-D. (Factory-wired.) When using the regenerative brake option, refer to Section 11.2 of the MR-J3-□B Servo Amplifier Instruction Manual.
3. For the encoder cable, use of the option cable is recommended. Refer to Section 11.1 of the MR-J3-□B Servo Amplifier Instruction Manual for selection of the cable.
4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.
5. For the sink I/O interface. For the source I/O interface, refer to Section 3.7 of the MR-J3-□B Servo Amplifier Instruction Manual.
6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.
7. For details of connection of the servo amplifier and servo motor, refer to Section 3.10 of the MR-J3-□B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

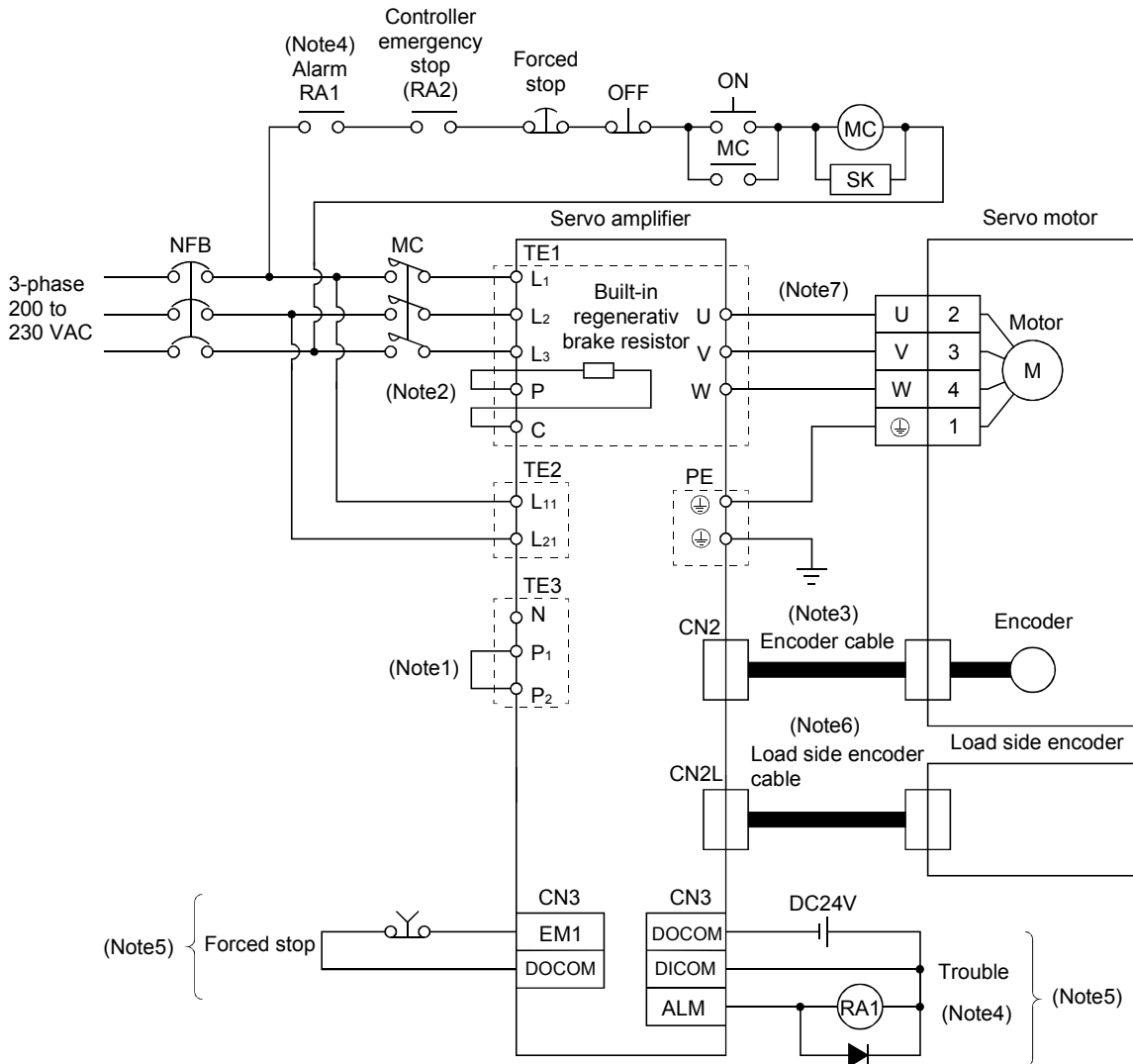
(2) For 1-phase 200 to 230VAC power supply to MR-J3-10B-RJ006 to MR-J3-70B-RJ006



- Note 1. Always connect P₁-P₂. (Factory-wired.) When using the power factor improving DC reactor, refer to Section 11.10 of the MR-J3-□B Servo Amplifier Instruction Manual.
2. Always connect P-D. (Factory-wired.) When using the regenerative brake option, refer to Section 11.2 of the MR-J3-□B Servo Amplifier Instruction Manual.
3. For the encoder cable, use of the option cable is recommended. Refer to Section 11.1 of the MR-J3-□B Servo Amplifier Instruction Manual for selection of the cable.
4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.
5. For the sink I/O interface. For the source I/O interface, refer to Section 3.7 of the MR-J3-□B Servo Amplifier Instruction Manual.
6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.
7. For details of connection of the servo amplifier and servo motor, refer to Section 3.10 of the MR-J3- B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

(3) For MR-J3-10B1-RJ006 to MR-J3-40B1-RJ006



Note 1. Always connect P₁-P₂. (Factory-wired.) The power factor improving DC reactor cannot be used.

2. Always connect P-D. (Factory-wired.) When using the regenerative brake option, refer to Section 11.2 of the MR-J3-□B Servo Amplifier Instruction Manual.

3. For the encoder cable, use of the option cable is recommended. Refer to Section 11.1 of the MR-J3-□B Servo Amplifier Instruction Manual for selection of the cable.

4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.

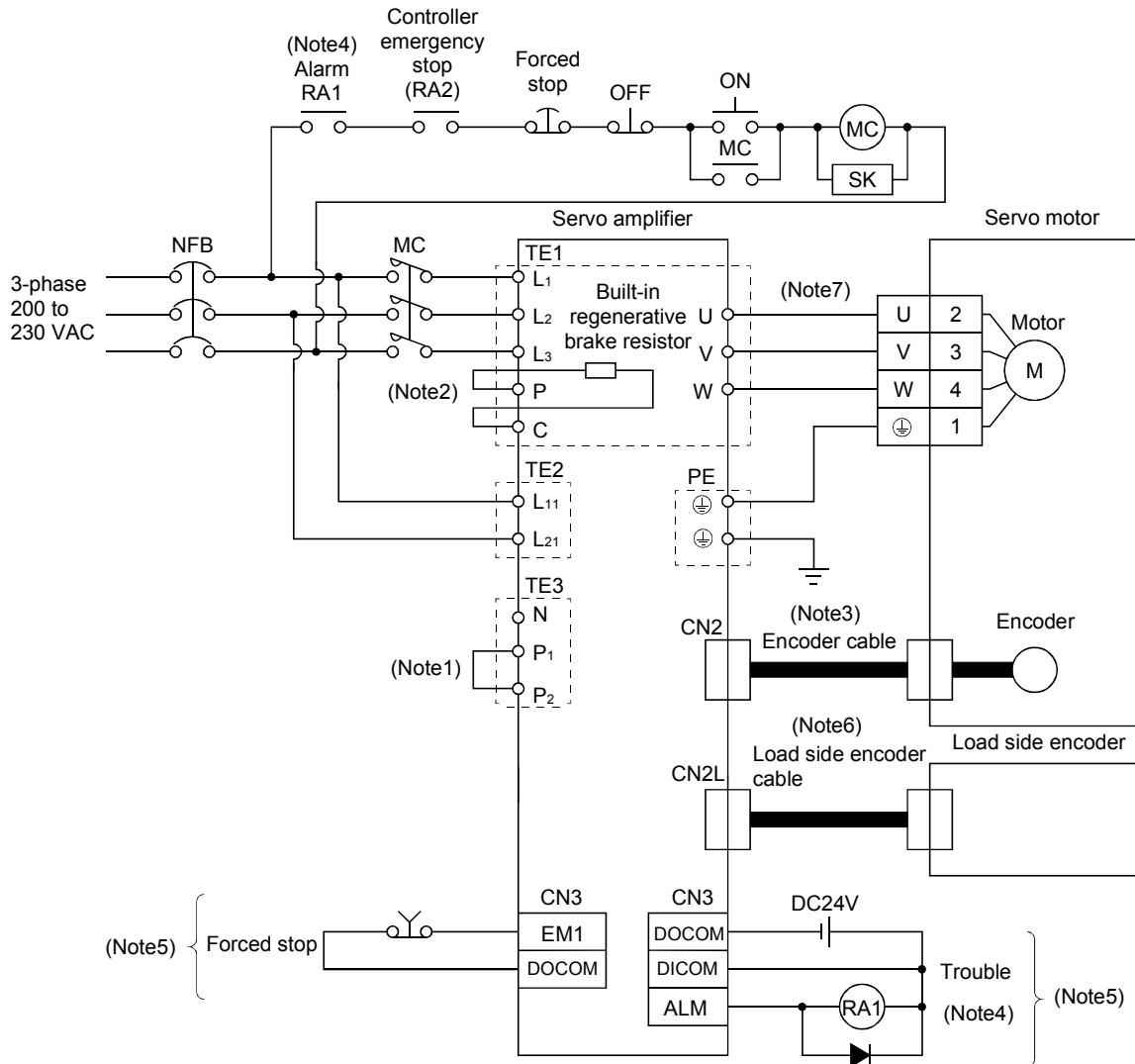
5. For the sink I/O interface. For the source I/O interface, refer to Section 3.7 of the MR-J3-□B Servo Amplifier Instruction Manual.

6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.

7. For details of connection of the servo amplifier and servo motor, refer to Section 3.10 of the MR-J3- B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

(4) MR-J3-500B-RJ006 • MR-J3-700B-RJ006



Note 1. Always connect P₁-P₂. (Factory-wired.) When using the power factor improving DC reactor, refer to Section 11.10 of the MR-J3-□B Servo Amplifier Instruction Manual.

2. When using the regenerative brake option, refer to Section 11.2 of the MR-J3-□B Servo Amplifier Instruction Manual.

3. For the encoder cable, use of the option cable is recommended. Refer to Section 11.1 of the MR-J3-□B Servo Amplifier Instruction Manual for selection of the cable.

4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.

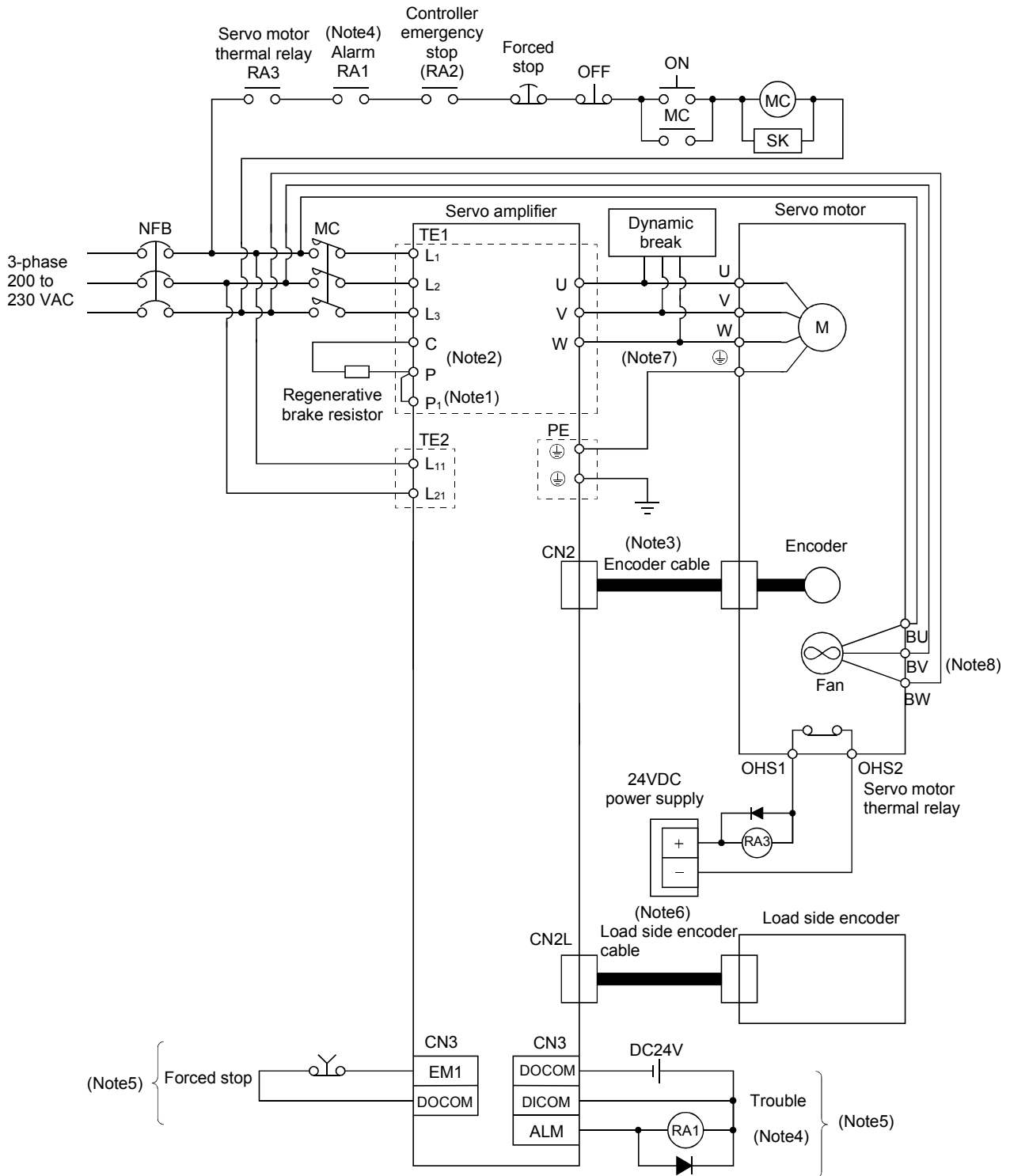
5. For the sink I/O interface. For the source I/O interface, refer to Section 3.7 of the MR-J3-□B Servo Amplifier Instruction Manual.

6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.

7. For details of connection of the servo amplifier and servo motor, refer to Section 3.10 of the MR-J3-□B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

(5) MR-J3-11KB-RJ006 to MR-J3-22KB-RJ006

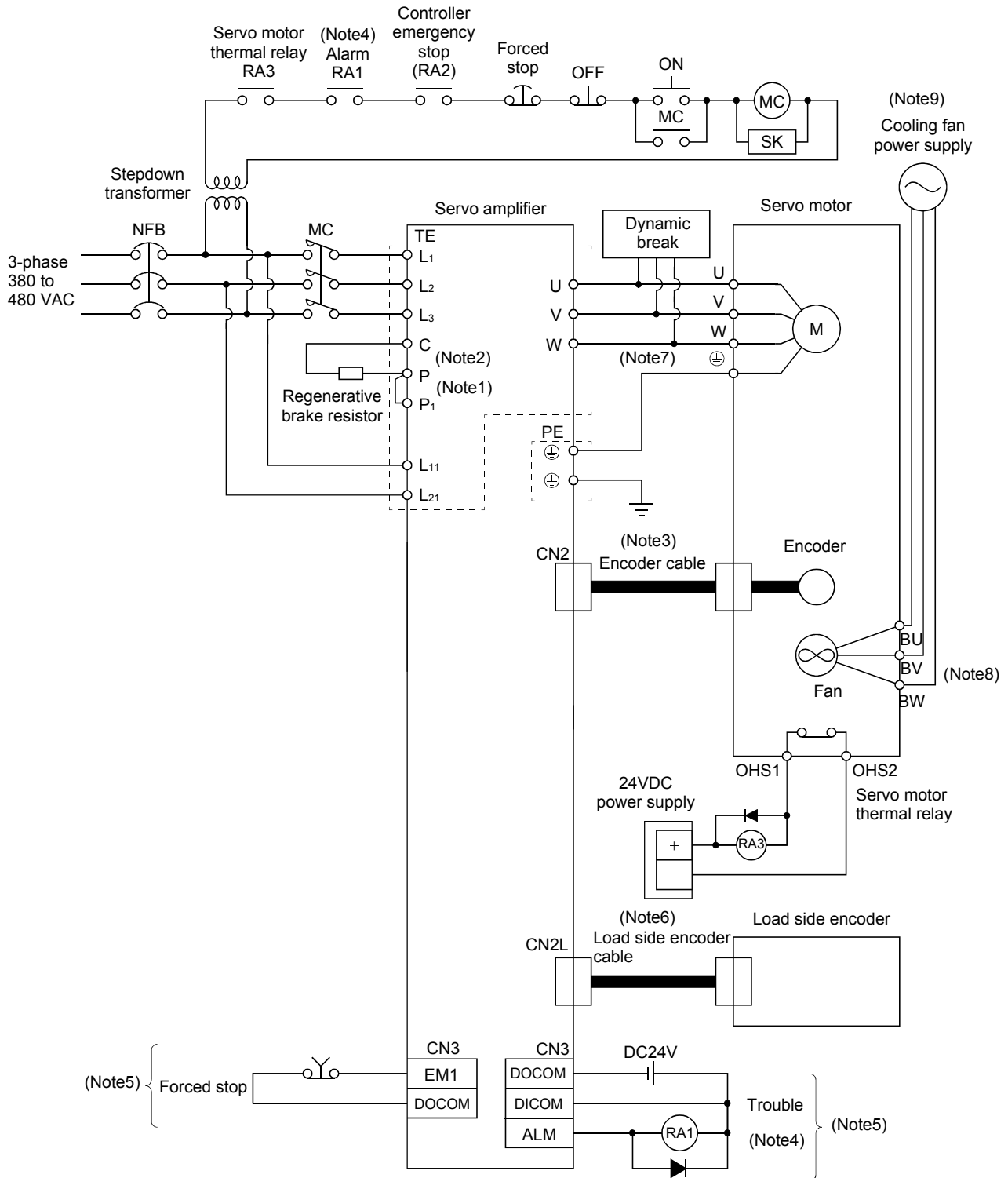


2. SIGNALS AND WIRING

- Note 1. Always connect P-P1. (Factory-wired.) When using the power factor improving DC reactor, refer to Chapter 11 of the MR-J3-□B Servo Amplifier Instruction Manual.
2. Connect the regenerative brake resistor. When using a regenerative brake option for the MR-J3-□B-RJ006 servo amplifier, refer to Chapter 11 of the MR-J3-□B-RJ006 Servo Amplifier Instruction Manual.
The regenerative brake resistor is not attached to the servo amplifiers of MR-J3-11KB(4)-RZ006 to MR-J3-22KB(4)-RZ006 as those of MR-J3-11KB(4)-PX to MR-J3-22KB(4)-PX. Therefore, when using the regenerative brake option for MR-J3-□B-RZ006 servo amplifier, refer to Section 11.2 (4) (d) MR-J3-11KB(4)-PX to MR-J3-22KB(4)-PX (when using the regenerative brake options) of the MR-J3-□B Servo Amplifier Instruction Manual.
 3. The use of optional cable is recommended for the connection between the servo amplifier and servo motor. For the selection of the cable, refer to Chapter 11 of the MR-J3-□B Servo Amplifier Instruction Manual.
 4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.
 5. For the sink I/O interface. For the source I/O interface, refer to Chapter 3 of the MR-J3-□B Servo Amplifier Instruction Manual.
 6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.
 7. For details of connection of the servo amplifier and servo motor, refer to Section 3.10 of the MR-J3-□B Servo Amplifier Instruction Manual.
 8. There is no BW if HA-LP11K2 is used.

2. SIGNALS AND WIRING

(6) MR-J3-11KB4-RJ006 to MR-J3-22KB4-RJ006



2. SIGNALS AND WIRING

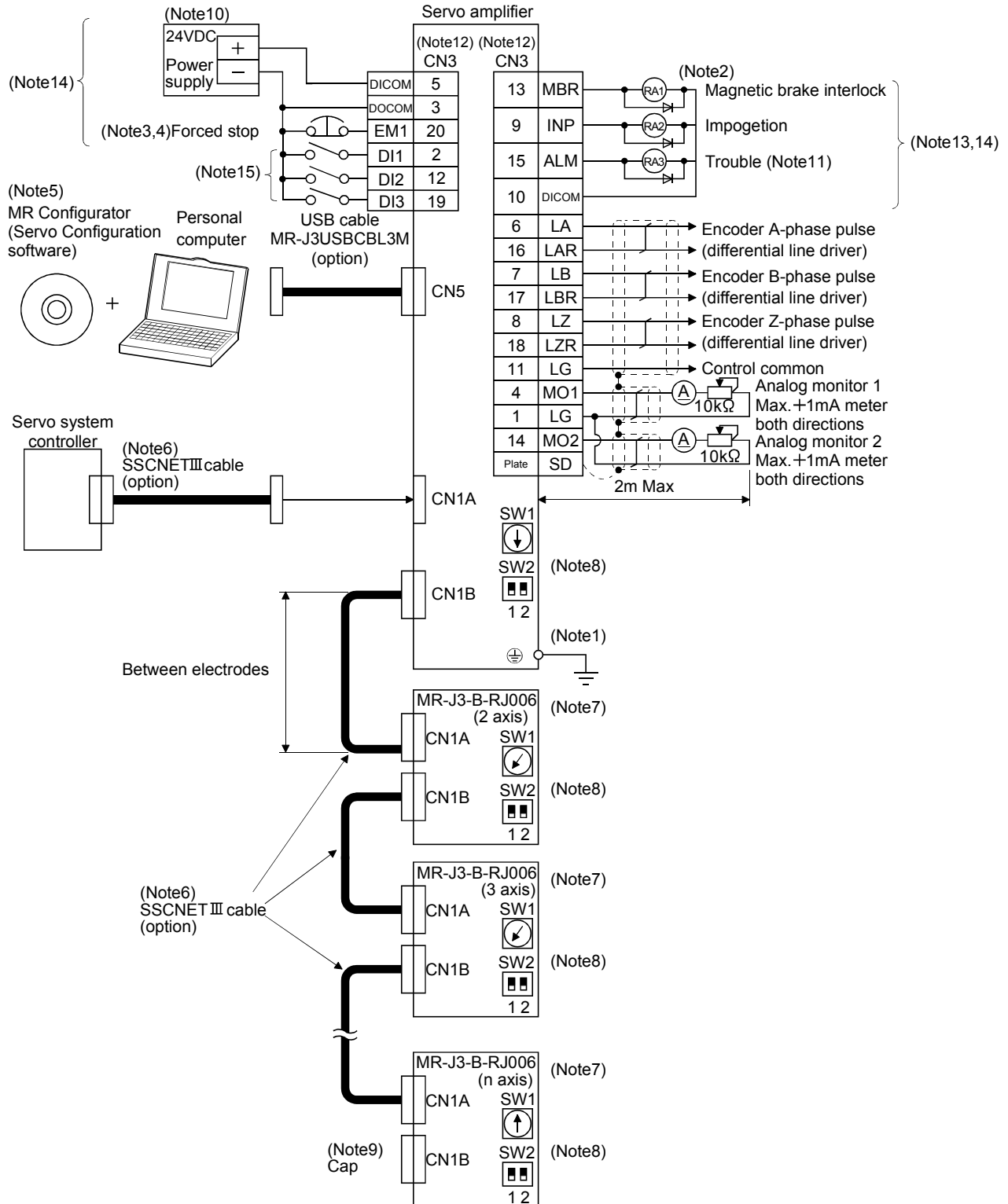
- Note 1. Always connect P-P1. (Factory-wired.) When using the power factor improving DC reactor, refer to Chapter 11 of the MR-J3-□B Servo Amplifier Instruction Manual.
2. Connect the regenerative brake resistor. When using a regenerative brake option for the MR-J3-□B-RJ006 servo amplifier, refer to Chapter 11 of the MR-J3-□B-RJ006 Servo Amplifier Instruction Manual.
The regenerative brake resistor is not attached to the servo amplifiers of MR-J3-11KB(4)-RZ006 to MR-J3-22KB(4)-RZ006 as those of MR-J3-11KB(4)-PX to MR-J3-22KB(4)-PX. Therefore, when using the regenerative brake option for MR-J3-□B-RZ006 servo amplifier, refer to Section 11.2 (4) (d) MR-J3-11KB(4)-PX to MR-J3-22KB(4)-PX (when using the regenerative brake options) of the MR-J3-□B Servo Amplifier Instruction Manual.
 3. The use of optional cable is recommended for the connection between the servo amplifier and servo motor. For the selection of the cable, refer to Chapter 11 of the MR-J3-□B Servo Amplifier Instruction Manual.
 4. If deactivating output of trouble (ALM) with parameter change, configure up the power supply circuit which switches off the magnetic contactor after detection of alarm occurrence on the controller side.
 5. For the sink I/O interface. For the source I/O interface, refer to Chapter 3 of the MR-J3-□B Servo Amplifier Instruction Manual.
 6. For connection of the servo amplifier and linear encoder, a cable compatible with the linear encoder of a manufacturer to be used is required. For selection of the cable, refer to Chapter 3.
 7. There is no BW if HA-LP11K24 is used.
 8. For the cooling fan power supply, refer to (3) (b) in Section 3.10 of the MR-J3-□B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

2.3 I/O Signal Connection Example

POINT

▪ For details of each signal, refer to Chapter 3 of the MR-J3-□B Servo Amplifier Instruction Manual.



2. SIGNALS AND WIRING

Note 1 To prevent an electric shock, always connect the protective earth (PE) terminal (terminal marked \oplus) 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 be faulty and will not output signals, disabling the forced stop (EM1) and other protective circuits.
3. If the controller does not have an forced stop (EM1) function, always install a forced stop switch (Normally closed).
4. When starting operation, always turn on the forced stop (EM1). (Normally closed contacts) By setting "□1□□" in DRU parameter No.PA04 of the drive unit, the forced stop (EM1) can be made invalid.
5. Use MRZJW3-SETUP 221E.
6. For the distance between electrodes of SSCNETIII cable, refer to the following table.

Cable	Cable model name	Cable length	Distance between electrodes
Standard code inside panel	MR-J3BUS □ M	0.15m to 3m	20m
Standard cable outside panel	MR-J3BUS □ M-A	5m to 20m	
Long-distance cable	MR-J3BUS □ M-B	30m to 50m	50m

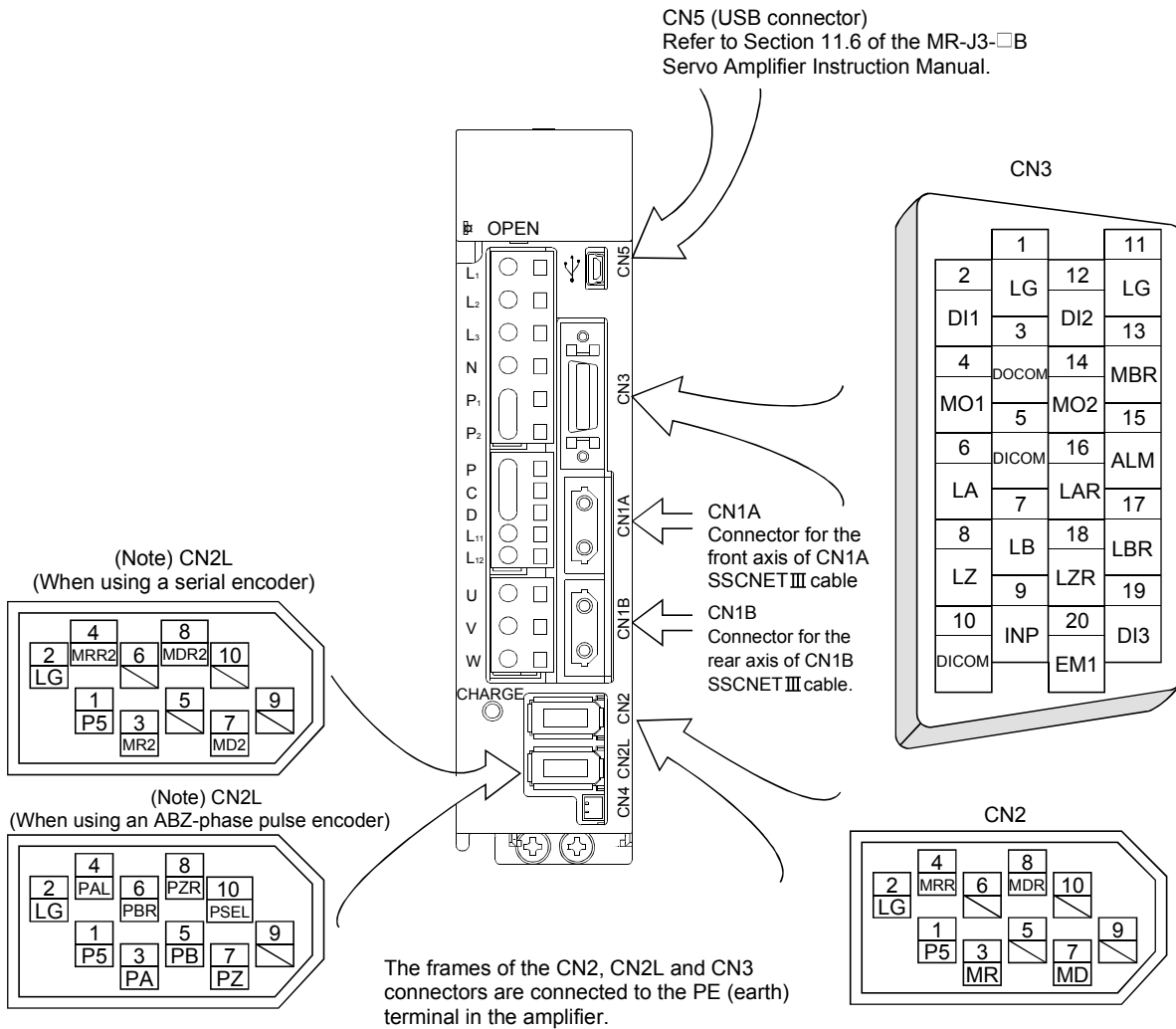
7. The wiring of the second and subsequent axes is omitted.
8. Up to eight axes (n = 1 to 8) may be connected. Refer to Section 3.13 of the MR-J3-□B Servo Amplifier Instruction Manual for setting of axis selection.
9. Make sure to put a cap on the unused CN1A * CN1B.
10. Supply 24VDC±10% 150mA current for interfaces from the outside. 150mA is the value applicable when all I/O signals are used. The current capacity can be decreased by reducing the number of I/O points. Refer to Section 3.7.2 (1) of the MR-J3-□B Servo Amplifier Instruction Manual that gives the current value necessary for the interface.
11. Trouble (ALM) turns on in normal alarm-free condition. When this signal is switched off (at occurrence of an alarm), the output of the programmable controller should be stopped by the sequence program.
12. The pins with the same signal name are connected in the servo amplifier.
13. The signal can be changed by parameter No.PD07, PD08, PD09.
14. For the sink I/O interface. For the source I/O interface, refer to Section 3.7.3 of the MR-J3-□B Servo Amplifier Instruction Manual.
15. Devices can be assigned for DI1 * DI2 * DI3 with controller setting. For devices that can be assigned, refer to the controller instruction manual. The following devices can be assigned for Q172HCPU * Q173HCPU * QD75MH.
 - DI1: upper stroke limit (FLS)
 - DI2: lower stroke limit (RLS)
 - DI3: Proximity dog (DOG)

2. SIGNALS AND WIRING

2.4 Connector and Signal Arrangements

POINT	
	<ul style="list-style-type: none"> The pin configurations of the connectors are as viewed from the cable connector wiring section.

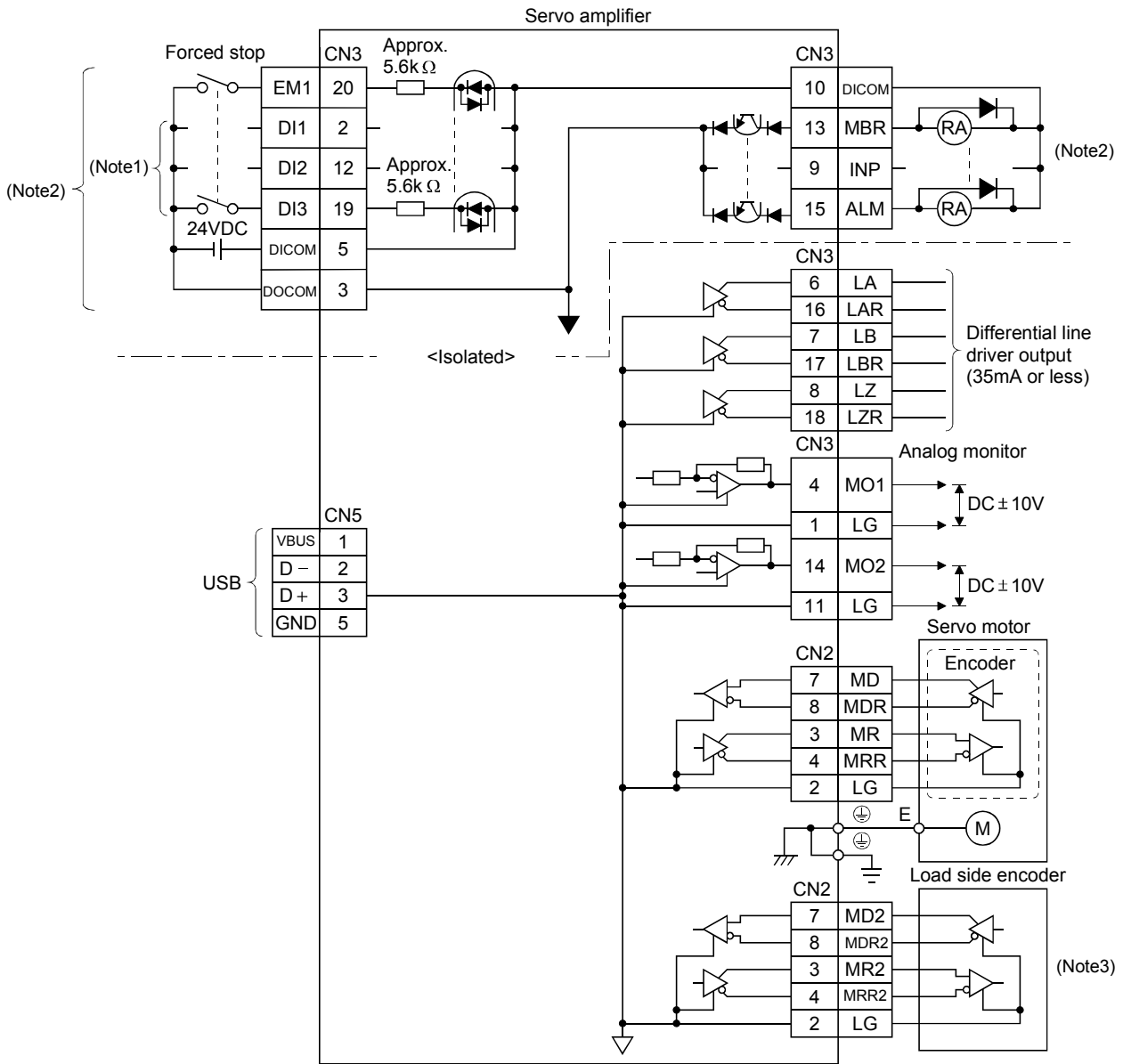
The servo amplifier front view shown is for MR-J3-20B-RJ006 or less. For the appearances and connector layouts of other servo amplifiers, refer to the outline drawings of servo amplifier in Chapter 6.



Note. The figures of connectors manufactured by 3M are shown above. When using any other connector, refer to Section 11.1 of the MR-J3-□B Servo Amplifier Instruction Manual.

2. SIGNALS AND WIRING

2.5 Internal Connection Diagram

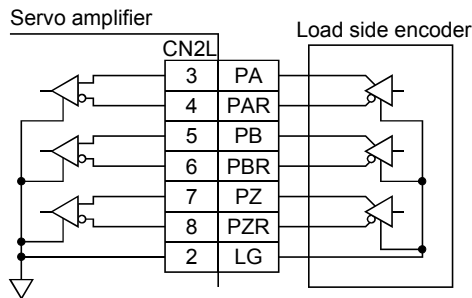


Note 1. Signal can be assigned for these pins with host controller setting.

For contents of signals, refer to the instruction manual of host controller.

2. For the sink I/O interface. For the source I/O interface, refer to Section 3.7 of the MR-J3-□B Servo Amplifier Instruction Manual.

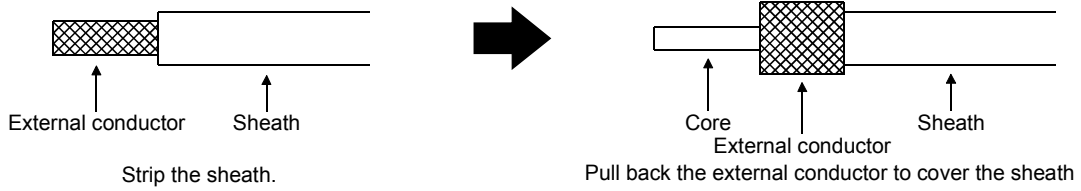
3. The connection diagram for the ABZ-phase pulse train specification linear encoder is shown below.



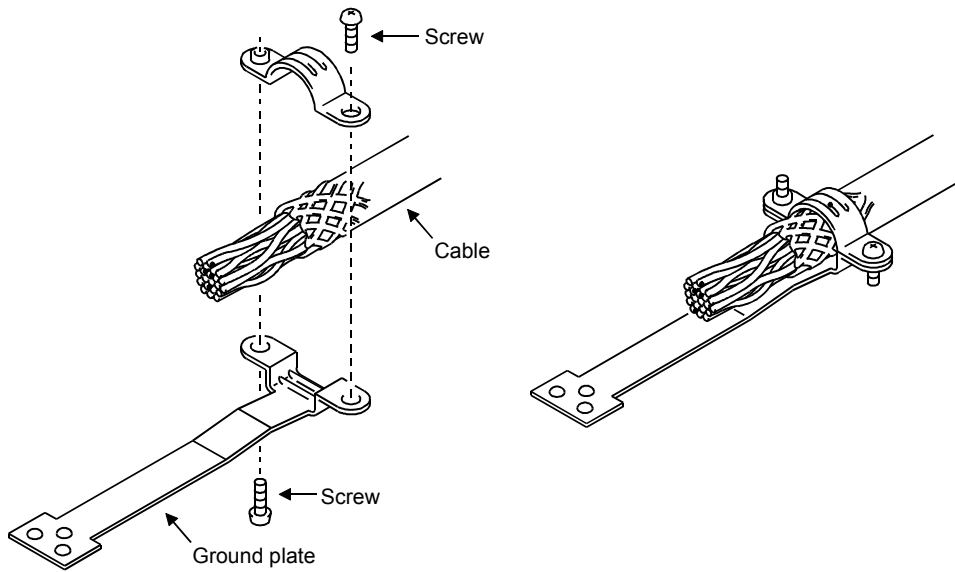
2. SIGNALS AND WIRING

2.6 Treatment of Cable Shield External Conductor

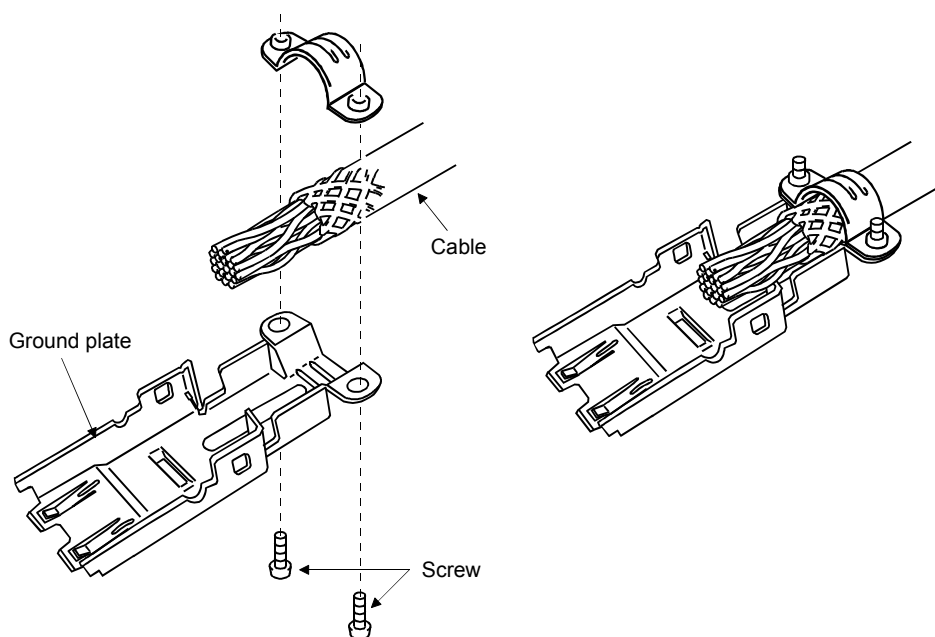
In the case of the CN2, CN2L and CN3 connectors, securely connect the shielded external conductor of the cable to the ground plate as shown in this section and fix it to the connector shell.



(1) For CN3 connector (3M connector)



(2) For CN2 and CN2L connector (3M or Molex connector)



3. LOAD SIDE ENCODER

3. LOAD SIDE ENCODER

POINT
<ul style="list-style-type: none"> ▪ Always use the load side encoder cable introduced in this section. If the other products are used, a faulty may occur. ▪ For details of the load side encoder specifications, performance and assurance, contact each encoder manufacturer.

3.1 Compatible Linear Encoder List

Scale Type		Maker	Model	Resolution	Rated Speed (Note 1)	Effective Measurement Length (Maximum)	Communication System	Absolute Position System
Mitsubishi serial interface compatibility	Absolute type	Mitutoyo	AT343A	0.05 μ m	2.0m/s	3000mm	2 wire type	○
			AT543A-SC		2.5m/s	2200mm		
			ST741A	0.5 μ m	4.0m/s	3000mm		
	Incremental type	Heidenhain	LC491M	0.05 μ m	2.0m/s	2040mm	4 wire type	○
		Sony Manufacturing System Corporation	SL710 +PL101R/RH +MJ830 or MJ831	0.2 μ m (Note)	6.4m/s	3000mm	2 wire type	×
			SH13 +MJ830 or MJ831	0.005 μ m (Note)	1.4m/s	1240mm		×
		Renishaw	RGH26P	5.0 μ m	4.0m/s	70000mm	2 wire type	×
			RGH26Q	1.0 μ m	3.2m/s			×
			RGH26R	0.5 μ m	1.6m/s			×
		Heidenhain	LIDA485 +APE391M	0.005 μ m (20/4096 μ m)	4.0m/s	30040mm	4 wire type	×
LIDA487 +APE391M	6040mm							
ABZ phase differential output	Incremental type	Not specified		Permissible resolution range	Encoder dependent	Encoder dependent	Differential 3 pair type	×

Note. Varies depending on the setting of the interpolator (MJ830/MJ831: Manufactured by Sony Manufacturing Systems Corporation).

POINT
<ul style="list-style-type: none"> ▪ When the linear encoder is incorrectly installed, an alarm or a positioning mismatch may occur. In this case, refer to the following general checking points for the linear encoder to confirm the installation, etc. <ol style="list-style-type: none"> (a) Check that the gap between the head and scale is proper. (b) Check the scale head for rolling and yawing (looseness of scale head section). (c) Check the scale surface for contamination and scratches. (d) Check that the vibration and temperature are within the operating range. (e) Check that the speed is within the permissible range without overshooting.

3. LOAD SIDE ENCODER

3.2 Mitsubishi Serial Interface Compatible Linear Encoder

3.2.1 Mitutoyo Corporation make linear scales (Absolute type)

(1) Specifications

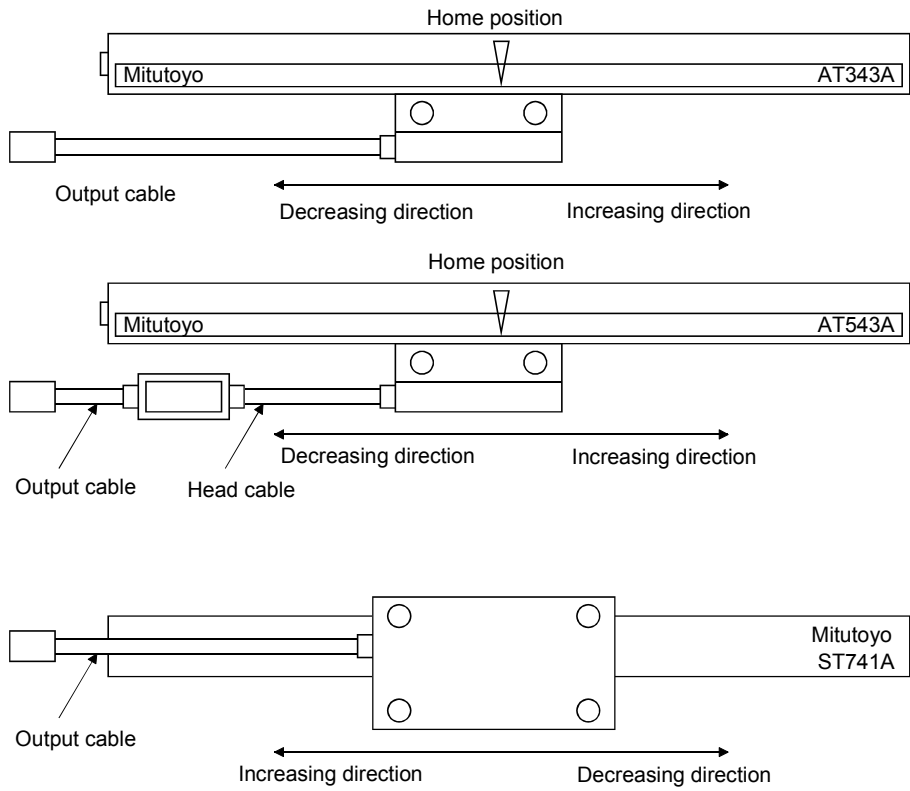
POINT	<ul style="list-style-type: none"> When the absolute position system is configured, the MR-J3BAT battery is not required.
-------	--

Item	Specifications		
Model	AT343A-□□□	AT543A-□□□-SC (Note)	ST741A-□□□
System	Capacitive, photoelectric, combined type		Magnetic induction type
Effective measurement length	100 to 3000mm	100 to 2200mm	100 to 3000mm
Resolution	0.05μm		0.5μm
Indication accuracy (20°C)	100 to 1500mm: 3+3L/1000μm 1600mm to 3000mm: 5+5L/1000μm L: Effective measurement length	100 to 2200mm: 3+3L/1000μm L: Effective measurement length	8+ (5L/1000) μm L: Effective measurement length
Supply power voltage	5V±5%		5V±10%
Current consumption	Max.250mA	Max.270mA	
Rated response speed	2.0m/s	2.5m/s	4.0m/s
Maximum response speed	2.0m/s	2.5m/s	4.0m/s
Operating temperature range	0 to 45°C (non-freezing)	0 to 50°C (non-freezing)	
Operating humidity range	20 to 80%RH (non-condensing)		
Storage temperature range	-20 to 70°C (non-freezing)		
Storage humidity range	20 to 80%RH (non-condensing)		
Dust tightness · water tightness	IP53 or equivalent (in the indication method given in the instruction manual of the Mitutoyo make linear scale)		IP65 or equivalent (Detection head part only)
Vibration resistance	100m/s ² (55 to 2000Hz)	195m/s ² (55 to 2000Hz)	300m/s ²
Shock resistance	150m/s ² (1/2sin, 11ms)	340m/s ² (1/2sin, 11ms)	500m/s ²
Sliding force	5N or less	4N or less	
Output signal	Serial communication compatibility		
Output cable	Mitutoyo make option Part No. 09BAA598A to C:0.2, 2, 3m	Supplied as standard Head cable 2m+output cable 3m	Supplied as standard Head cable 1m
Load side encoder cable	MR-EKCB□M-H (Option manufactured by Mitsubishi Electric) When fabricating, refer to Section (4) (a), (b).		06ACF117A: 5m 06ACF117B: 10m (Mitutoyo make option) When fabricating, refer to Section (4) (c).

Note. For AT543A-□□□-HC/-HL/-HR, contact with MITUTOYO CORPORATION.

3. LOAD SIDE ENCODER

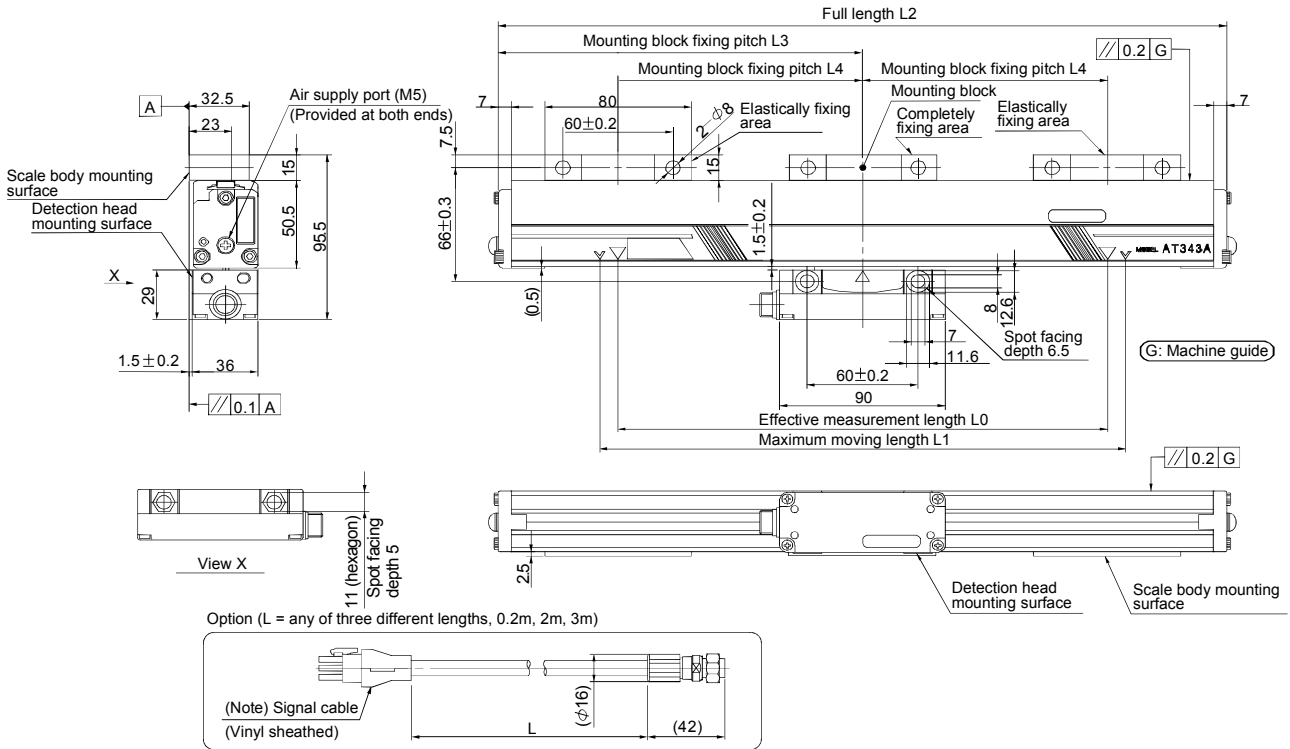
(2) Linear scale unit structure



3. LOAD SIDE ENCODER

(3) Outline drawings (a) AT343A

[Unit: mm]



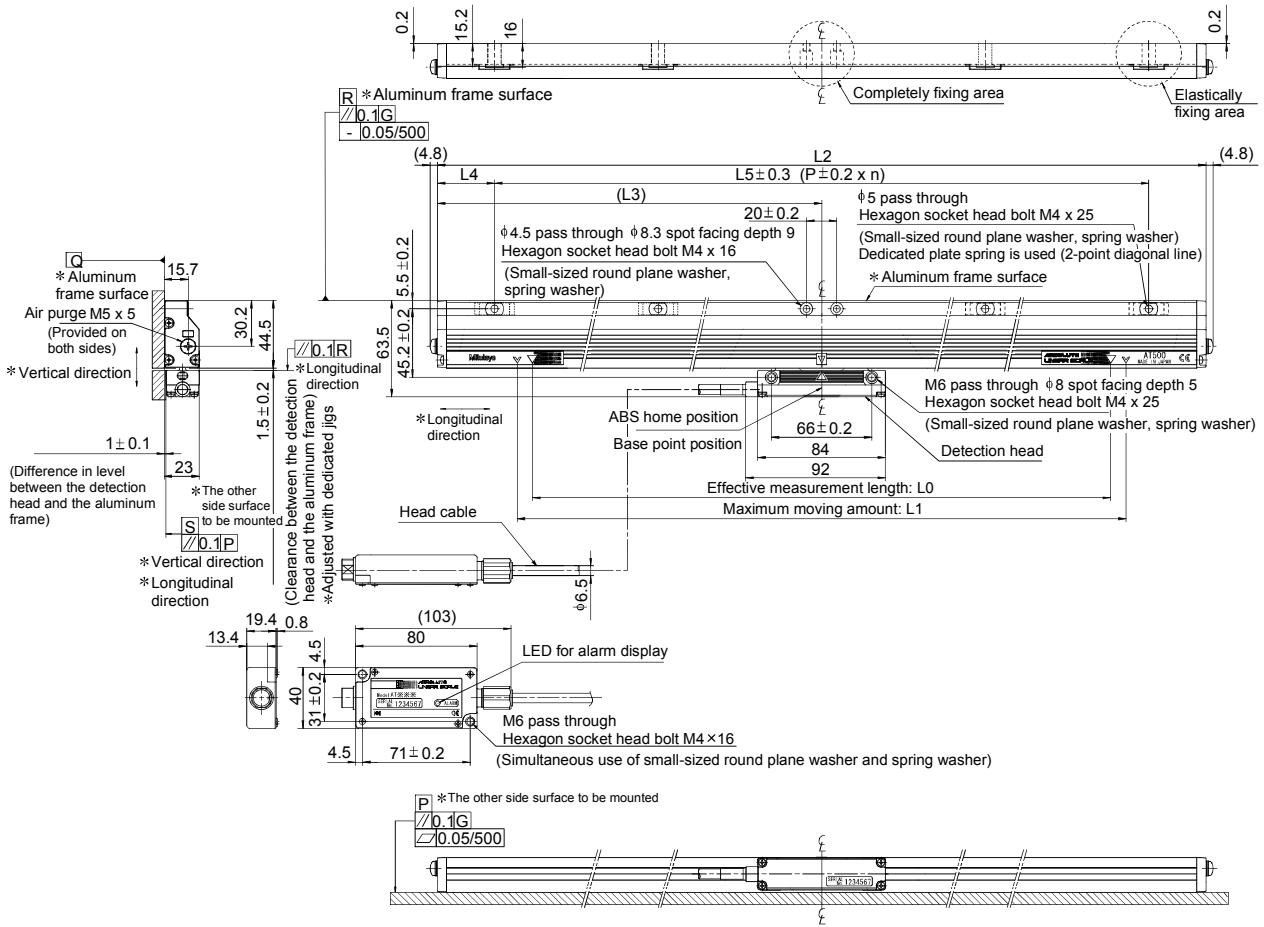
Note. The signal cable is an option manufactured by Mitutoyo. (Part. No. 09BAA598A to C: 0.2m, 2m, 3m)

Model	Effective Measurement Length L0	Maximum Moving Length L1	Full Length L2	Mounting Block Fixing Pitch		Number of Mounting Blocks (pcs.)	Model	Effective Measurement Length L0	Maximum Moving Length L1	Full Length L2	Mounting Block Fixing Pitch		Number of Mounting Blocks (pcs.)
				L3	L4						L3	L4	
AT343A-100	100	120	230	65	100	2	AT343A-1100	1100	1160	1270	635	275	5
AT343A-150	150	170	280	65	150		AT343A-1200	1200	1260	1370	685	300	
AT343A-200	200	220	330	65	200		AT343A-1300	1300	1360	1470	735	325	
AT343A-250	250	270	380	65	250		AT343A-1400	1400	1460	1570	785	350	
AT343A-300	300	330	440	220	150	AT343A-1500	1500	1560	1670	835	375		
AT343A-350	350	380	490	245	175	AT343A-1600	1600	1690	1800	900	400		
AT343A-400	400	430	540	270	200	AT343A-1700	1700	1790	1900	950	425		
AT343A-450	450	480	590	295	225	AT343A-1800	1800	1890	2000	1000	450		
AT343A-500	500	540	650	325	250	AT343A-2000	2000	2100	2210	1105	335	7	
AT343A-600	600	650	760	380	300	AT343A-2200	2200	2300	2410	1205	370		
AT343A-700	700	760	870	435	350	AT343A-2400	2400	2500	2610	1305	400		
AT343A-750	750	810	920	460	375	AT343A-2500	2500	2600	2710	1355	315	9	
AT343A-800	800	860	970	485	400	AT343A-2600	2600	2700	2810	1405	325		
AT343A-900	900	960	1070	535	450	AT343A-2800	2800	2900	3010	1505	350		
AT343A-1000	1000	1060	1170	585	500	AT343A-3000	3000	3050	3210	1605	375		

3. LOAD SIDE ENCODER

(b) AT543A-SC

[Unit: mm]

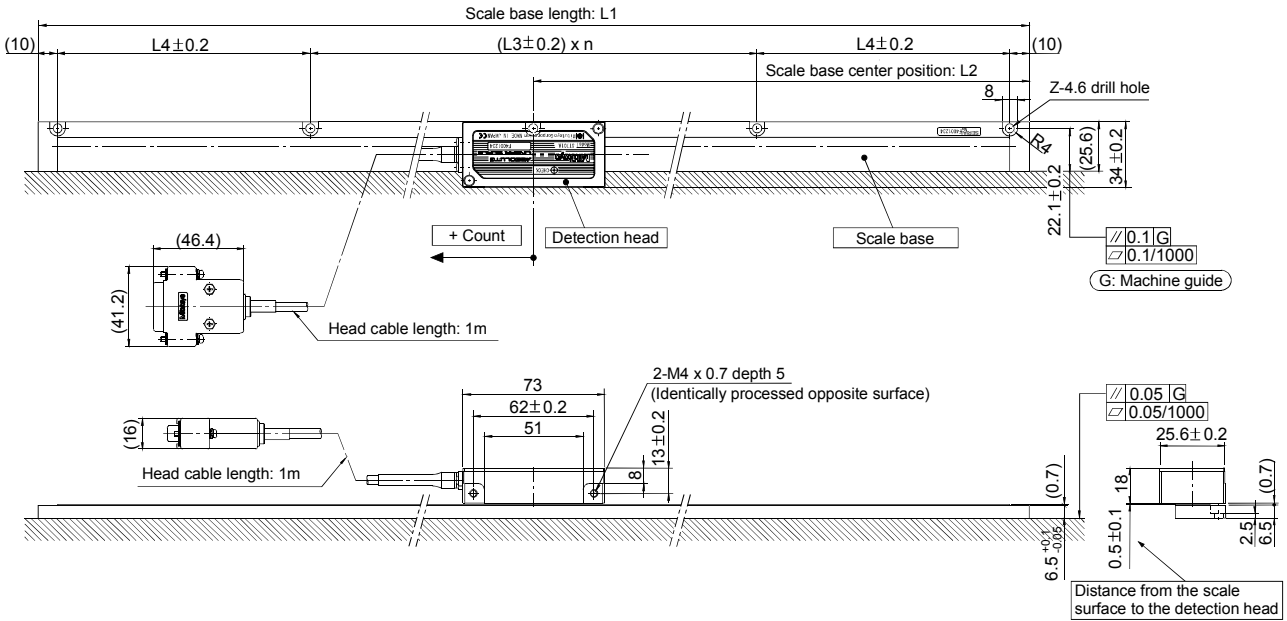


Model	Effective Measurement Length $L0$	L1	L2	L3	L4	L5	P	N [pcs]	Model	Effective Measurement Length $L0$	L1	L2	L3	L4	L5	P	N [pcs]
AT543A-100-SC	100	120	225	112.5	37.5	150	75	2	AT543A-1100-SC	1100	1120	1225	612.5	87.5	1050	175	6
AT543A-200-SC	200	220	325	162.5	37.5	250	125	2	AT543A-1200-SC	1200	1220	1325	616.5	62.5	1200	200	6
AT543A-300-SC	300	320	425	212.5	37.5	350	175	2	AT543A-1300-SC	1300	1320	1425	712.5	112.5	1200	150	8
AT543A-400-SC	400	420	525	262.5	62.5	400	200	2	AT543A-1400-SC	1400	1420	1525	762.5	62.5	1400	175	8
AT543A-500-SC	500	520	625	312.5	62.5	500	125	4	AT543A-1500-SC	1500	1520	1625	812.5	112.5	1400	175	8
AT543A-600-SC	600	620	725	362.5	62.5	600	150	4	AT543A-1600-SC	1600	1620	1725	862.5	62.5	1600	200	8
AT543A-700-SC	700	720	825	412.5	62.5	700	175	4	AT543A-1800-SC	1700	1820	1925	962.5	87.5	1750	175	10
AT543A-800-SC	800	820	925	462.5	62.5	800	200	4	AT543A-2000-SC	2000	2020	2125	1062.5	62.5	2000	200	10
AT543A-900-SC	900	920	1025	512.5	62.5	900	150	6	AT543A-2200-SC	2200	2220	2325	1162.5	112.5	2100	175	12
AT543A-1000-SC	1000	1020	1125	562.5	37.5	1050	175	6									

3. LOAD SIDE ENCODER

(c) ST741A

[Unit: mm]



Model	Effective Measurement Length	Maximum moving Length	L1	L2	L3	n	L4	Z	Model	Effective Measurement Length	Maximum moving Length	L1	L2	L3	n	L4	Z
ST741A-100A	100	110	180	90	80	200	—	3	ST741A-1600A	1600	1610	1680	840	200	6	230	9
ST741A-200A	200	210	280	140	130		—		ST741A-1700A	1700	1710	1780	890		80	8	1
ST741A-300A	300	310	380	190	180		—		ST741A-1800A	1800	1810	1880	940		130		
ST741A-400A	400	410	480	240	230		80	—	ST741A-1900A	1900	1910	1980	990		230	10	3
ST741A-500A	500	510	580	290	—		130	5	ST741A-2000A	2000	2010	2080	1040		80		
ST741A-600A	600	610	680	340	—		180	—	ST741A-2100A	2100	2110	2180	1090		130	12	5
ST741A-700A	700	710	780	390	—		230	7	ST741A-2200A	2200	2210	2280	1140		180		
ST741A-800A	800	810	880	440	—		80	—	ST741A-2300A	2300	2310	2380	1190		230	14	7
ST741A-900A	900	910	980	490	—		130	4	ST741A-2400A	2400	2410	2480	1240		80		
ST741A-1000A	1000	1010	1080	540	—		180	—	ST741A-2500A	2500	2510	2580	1290		130	1	5
ST741A-1100A	1100	1110	1180	590	—		230	7	ST741A-2600A	2600	2610	2680	1340		180		
ST741A-1200A	1200	1210	1280	640	—		80	—	ST741A-2700A	2700	2710	2780	1390		230	1	7
ST741A-1300A	1300	1310	1380	690	—		130	6	ST741A-2800A	2800	2810	2880	1440		80		
ST741A-1400A	1400	1410	1480	740	—		180	—	ST741A-2900A	2900	2910	2980	1490		130	1	7
ST741A-1500A	1500	1510	1580	790	—		—	9	ST741A-3000A	3000	3010	3080	1540		180		

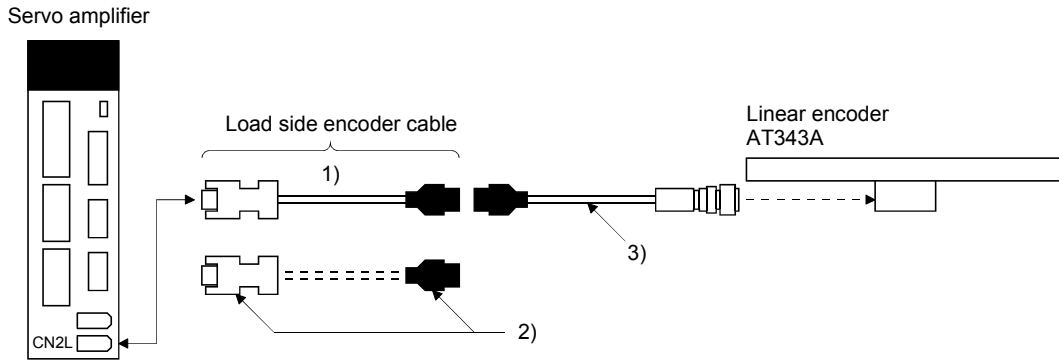
3. LOAD SIDE ENCODER

(4) Load side encoder cable

(a) For AT343A

1) Cable composition

Prepare a cable based on the following structure diagram.

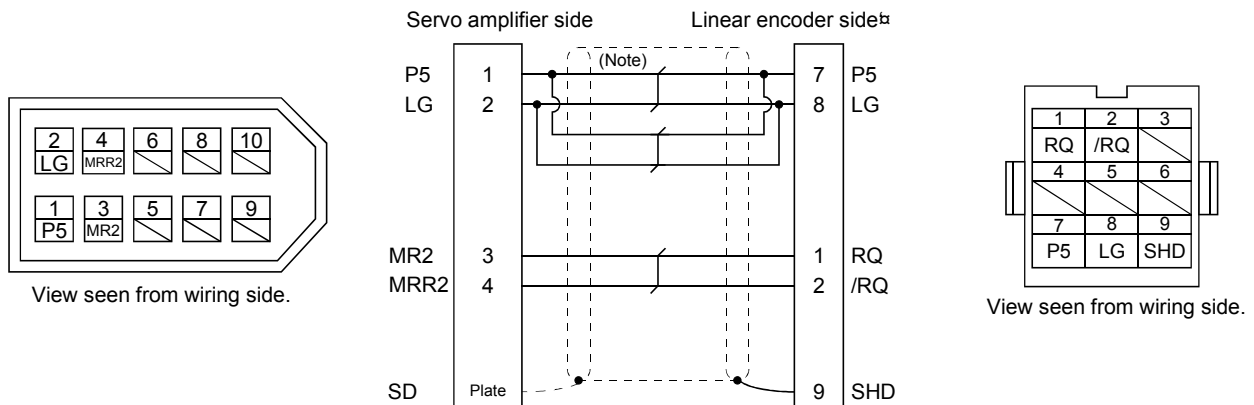


	Cable	
	Load side encoder cable	Output cable
When using an optional cable	1) MR-EKCBL □M-H (Option manufactured by Mitsubishi Electric Corporation) 2m * 5m * 10m (Refer to Section 3.4.)	3) Option manufactured by MITUTOMO CORPORATION (Note) (This should be prepared by the customer.) Part No. 09BAA598A: 0.2m Part No. 09BAA598B: 2m Part No. 09BAA598C: 3m
When producing a load side encoder cable	2) Connector set MR-ECNM (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	

Note. For details, contact with MITUTOYO CORPORATION.

2) Production of load side encoder cable

Produce the load side encoder cable using MR-EKCBL □M-H (10m or less) or MR-ECNM as shown below. The load side encoder cable can be produced as the length of max. 30m. The following diagram shows a connecting example of more than 5m to 10m.



Note. The following table shows the cable size to be used and the number of paired connections of LG and L5.

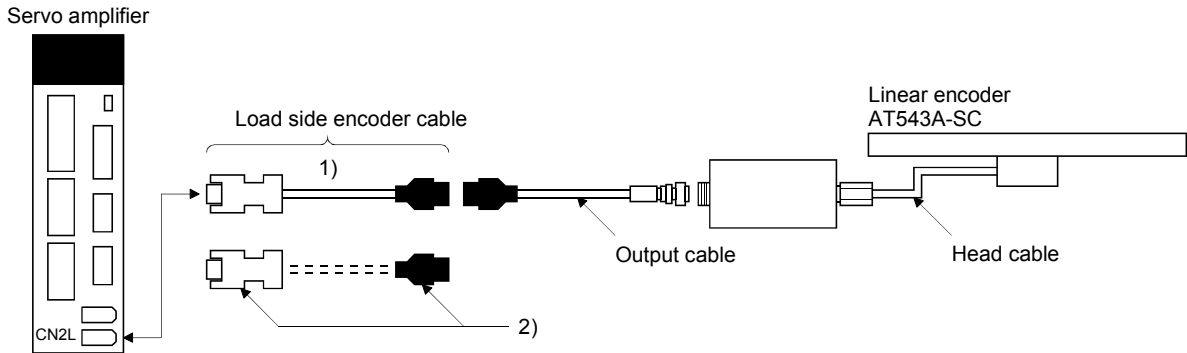
Wiring length	Number of LG and P5 connections (when the output cable is 3m or less)	Cable size
to 5m	1-pair	AWG22
to 10m	2-pair	
to 20m	4-pair	
to 30m	6-pair	

3. LOAD SIDE ENCODER

(b) For AT543A-SC

1) Cable composition

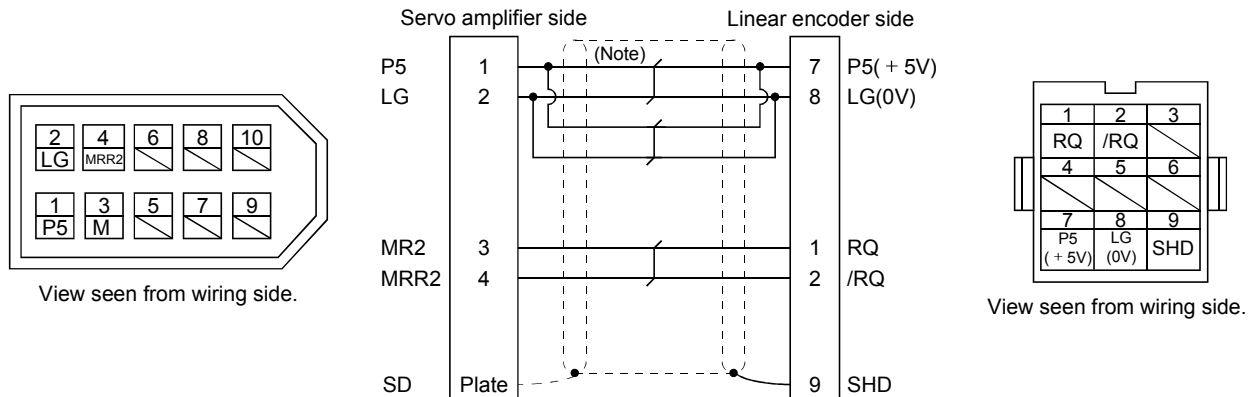
Prepare a cable based on the following structure diagram.



	Cable		
	Load side encoder cable	Output cable	Head cable
When using an optional cable	1) MR-EKCBL&drsquareM-H (Option manufactured by Mitsubishi Electric Corporation) 2m * 5m * 10m (Refer to Section 3.4.)	Accessories for linear encoder Cable length: 3m	Accessories for linear encoder Cable length: 2m
When producing a load side encoder cable	2) Connector set MR-ECNM (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)		

2) Production of load side encoder cable

Produce the load side encoder cable using MR-EKCBL&drsquareM-H (10m or less) or MR-ECNM as shown below. The load side encoder cable can be produced as the length of max. 30m. The following diagram shows a connecting example of more than 5m to 10m.



Note. The following table shows the cable size to be used and the number of paired connections of LG and L5.

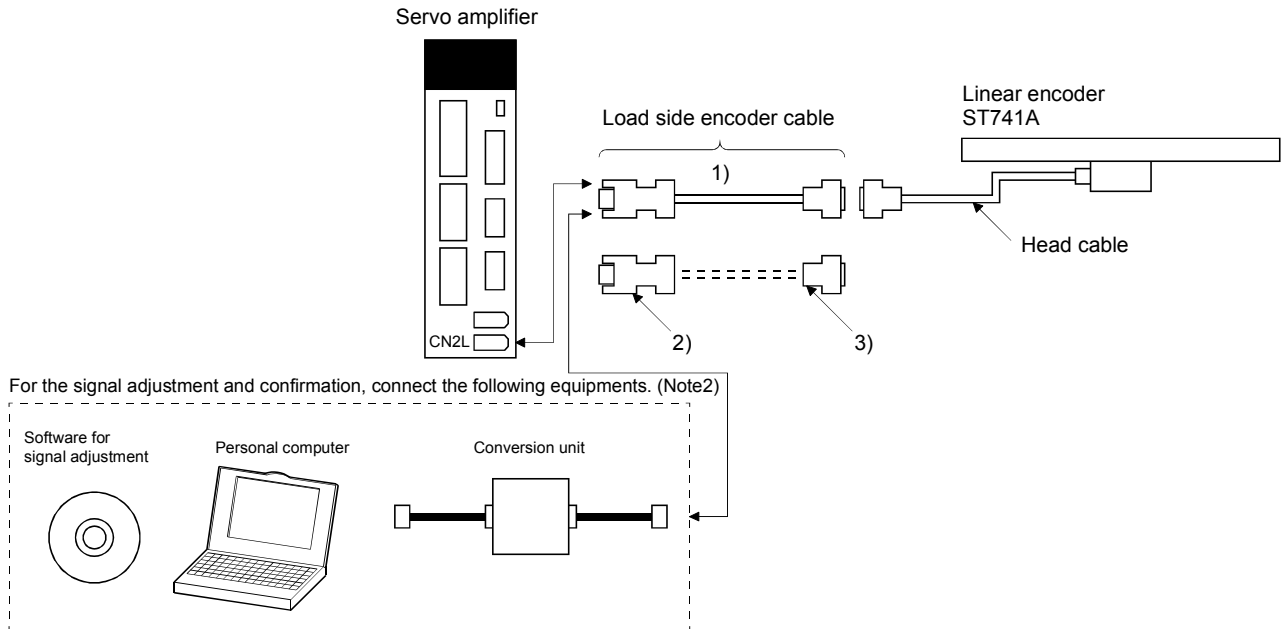
Wiring length	Number of LG and P5 connections (when the output cable is 3m or less)	Cable size
to 5m	1-pair	AWG22
to 10m	2-pair	
to 20m	4-pair	
to 30m	6-pair	

3. LOAD SIDE ENCODER

(c) For ST741

1) Cable structure

Prepare a cable based on the following structure diagram.



	Cable	
	Load side encoder cable	Head cable
When using an optional cable	1) Option manufactured by MITUTOYO CORPORATION (This should be prepared by the customer.) (Note 1) Part No.06ACF117A: 5m Part No.06ACF117B: 10m	
When producing a load side encoder cable	2) Connector set MR-J3CN2 (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	3) Junction connector (This should be prepared by the customer.) D-SUB (female) 15 Pin shell: HDAB-15S Plug case: HDA-CTH (manufactured by HIROSE ELECTRIC CO., LTD)

Note 1. For details, contact with MITUTOYO CORPORATION.

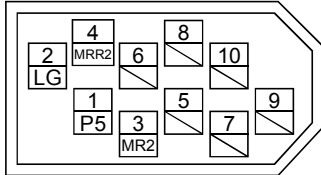
2. When mounting ST741A, a personal computer (with RS-232C port) for the signal adjustment and confirmation, and a software and conversion unit for signal adjustment are required. For details, contact with MITUTOYO CORPORATION.

3. LOAD SIDE ENCODER

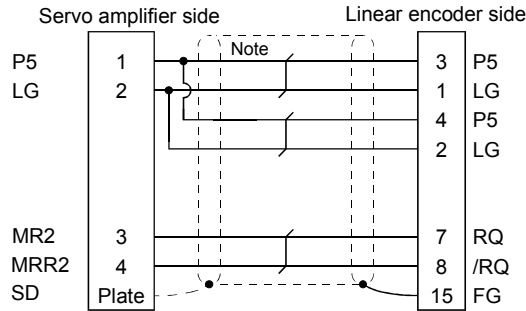
2) Production of load side encoder cable

Produce the load side encoder cable using MR-J3CN2 or a junction connector as shown below. The load side encoder cable can be produced as the length of max. 30m. The following diagram shows a connecting example of more than 5m to 10m.

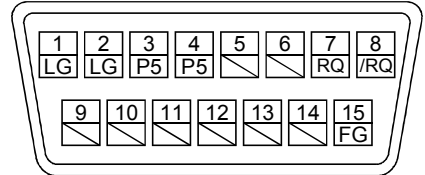
Connector set (option)
 MR-J3CN2
 Receptacle: 36210-0100JL
 Shell kit: 36310-3200-008
 (3M or equivalent)



View seen from wiring side.



Shell : HDAB-15S
 Shield cover HDA-CTH
 (HIROSE ELECTRIC or equivalent)



View seen from wiring side.

Note. The following table shows the cable size to be used and the number of paired connections of LG and L5.

Wiring length	Number of LG and P5 connections (when the head cable is 1m or less)	Cable size
to 5m	1-pair	AWG22
to 10m	2-pair	
to 20m	3-pair	
to 30m	4-pair	

3. LOAD SIDE ENCODER

3.2.2 Heidenhain make linear encoder

(1) Specifications

POINT	<ul style="list-style-type: none"> When the absolute position system is configured, the MR-J3BAT battery is not required.
-------	--

(a) Absolute type

Item	Specifications
Model	LC491M
System	Photoelectric scanning system
Effective measurement length	70 to 2040mm
Resolution	0.05 μ m
Accuracy grade (20°C)	$\pm 5\mu$ m $\pm 3\mu$ m (up to effective measurement length 1240)
Supply power voltage	5V $\pm 5\%$ on the linear encoder side
Current consumption	Max.300mA
Rated response speed	2.0m/s
Maximum response speed	2.0m/s
Operating temperature range	0 to 50°C (non-freezing)
Storage temperature range	-20 to 70°C (non-freezing)
Dust tightness · water tightness	IP53 (when mounted according to the manual of the Heidenhain make linear encoder) IP64 (when filled with compressed air)
Vibration resistance	100m/s ² (DINIEC 68-2-6) without mounting spur 150m/s ² (DINIEC 68-2-6) with mounting spur
Shock resistance	150m/s ² (DINIEC 68-2-6) (11ms)
Required feeding force	5N or less
Output signal	Serial communication compatibility
Output cable	337 439- $\times \times$ (17 pin coupling), 367 425-0 \times (20 pins), etc.
Load side encoder cable	Use the Heidenhain make connection cable. When fabricating, refer to Section (4).

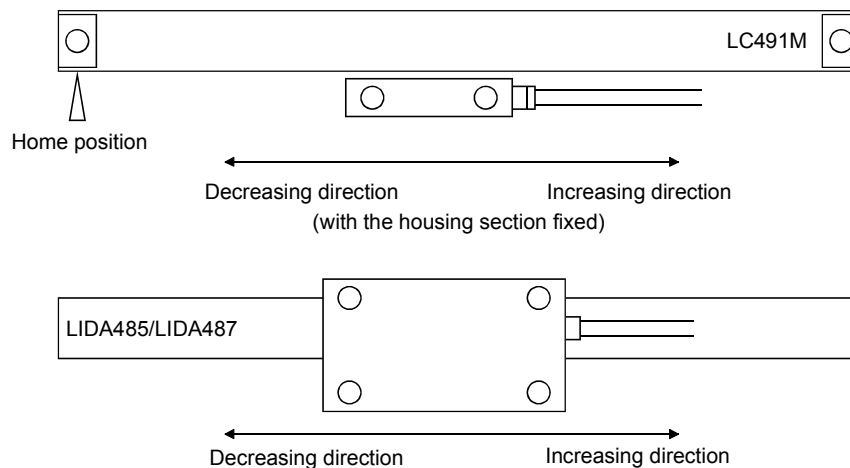
3. LOAD SIDE ENCODER

(b) Incremental type

Item	Specifications		
Model	LIDA485	LIDA487	
Serial interface conversion unit type name			APE391M
System	Photoelectric scanning system		
Effective measurement length	140 to 30040mm	240 to 6040mm	
Resolution	0.05 μ m (20/4095 μ m) Resolution ratio of APE391M: 4096		
Accuracy grade (20°C)	\pm 5 μ m		
Supply power voltage	5V \pm 5%		
Current consumption	Max.200mA		Max.160mA
Rated response speed	4.0m/s		
Maximum response speed	8.0m/s		
Input signal			to 1V _{pp}
Maximum available input frequency			400kHz
Operating temperature range	0 to 50°C (non-freezing)		
Storage temperature range	-20 to 70°C (non-freezing)		
Dust tightness · water tightness	IP50		
Vibration resistance	100m/s ² (IEC 60 068-2-6) (55 to 2000Hz)		100m/s ²
Shock resistance	500m/s ² (IEC 60 068-2-27) (11ms)		200m/s ²
Output signal	Serial communication compatible (Z-phase information included) (Note)		
Output cable	Head cable (standard accessory) 3m + Serial interface conversion unit (option manufactured by Heidenhain (APE391M) 0.5m		
Load side encoder cable	366 419- \times \times (Option manufactured by Heidenhain) When fabricating, refer to Section (5).		

Note. When the linear encoder home position (reference mark) does not exist, a home position return cannot be made.

(2) Linear encoder unit structure



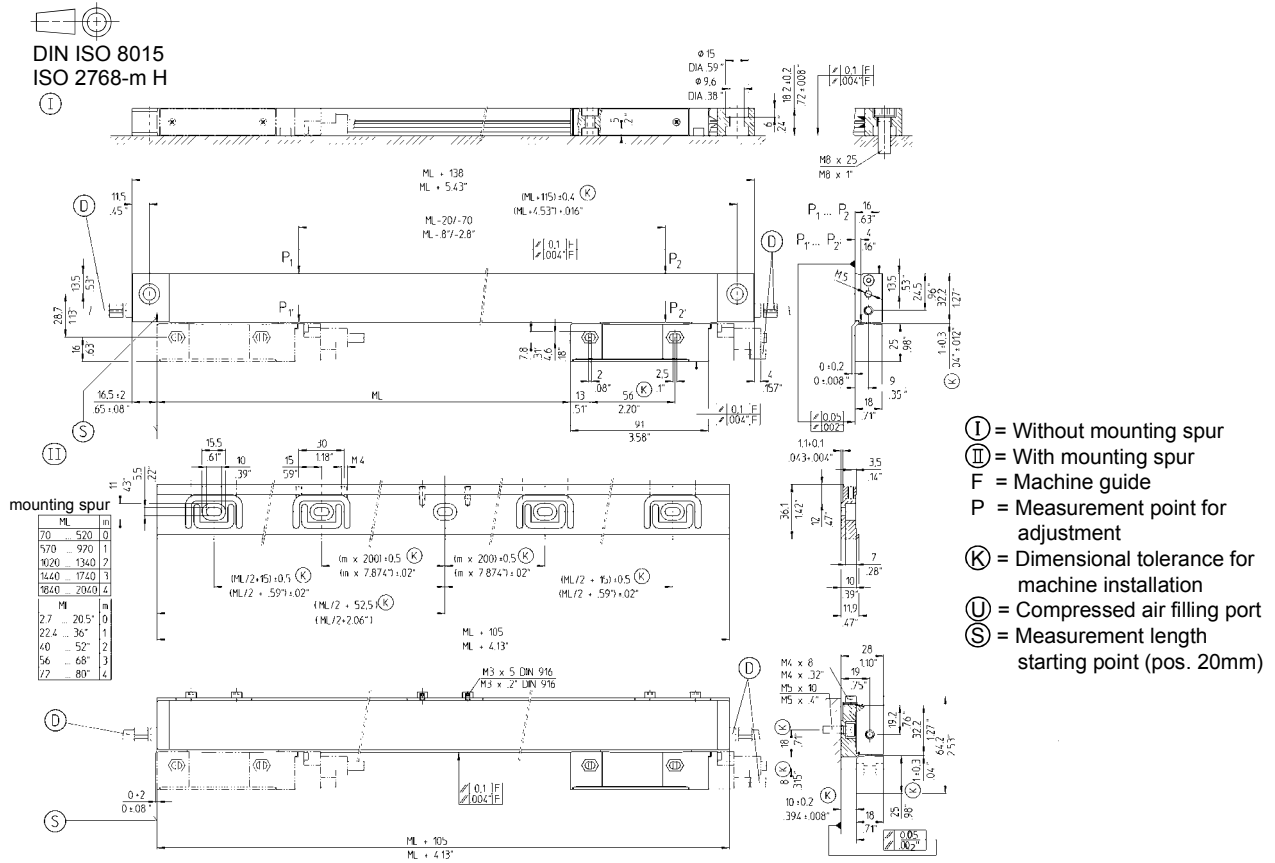
3. LOAD SIDE ENCODER

(3) Outline Drawings

POINT
▪ For the outline drawings of LIDA485, contact with HEIDENHAIN CORPORATION.

(a) LC491M (Absolute type)

[Unit: mm]

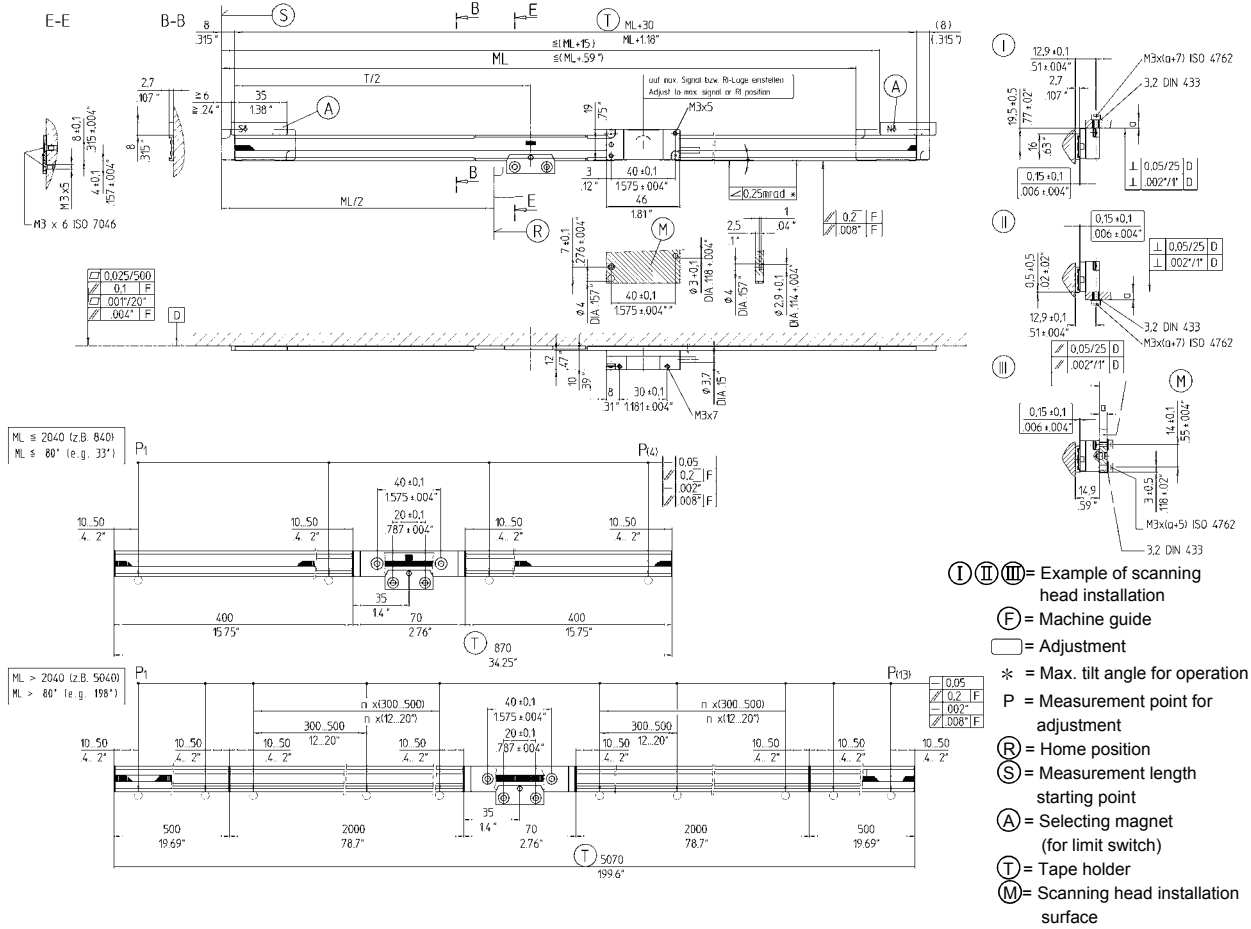


- Ⓡ = Without mounting spur
- Ⓡ = With mounting spur
- F = Machine guide
- P = Measurement point for adjustment
- Ⓚ = Dimensional tolerance for machine installation
- Ⓢ = Compressed air filling port
- Ⓢ = Measurement length starting point (pos. 20mm)

3. LOAD SIDE ENCODER

(b) LIDA487 (Incremental type)

[Unit: mm]



3. LOAD SIDE ENCODER

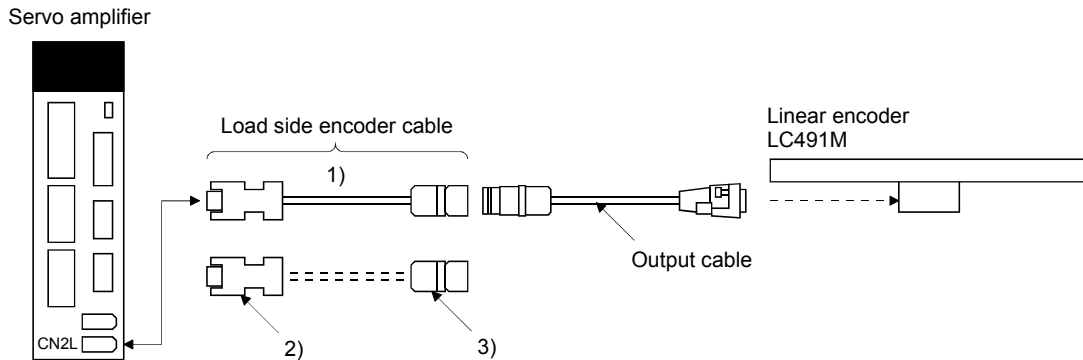
(4) Load side encoder cable

(a) For LC491M (Absolute type)

POINT
<ul style="list-style-type: none"> This linear encoder is of four-wire type. When using any of these encoder, set parameter No. PC26 to "1 □ □ □" to select the four-wire type.

1) Cable structure

Prepare a cable based on the following structure diagram.



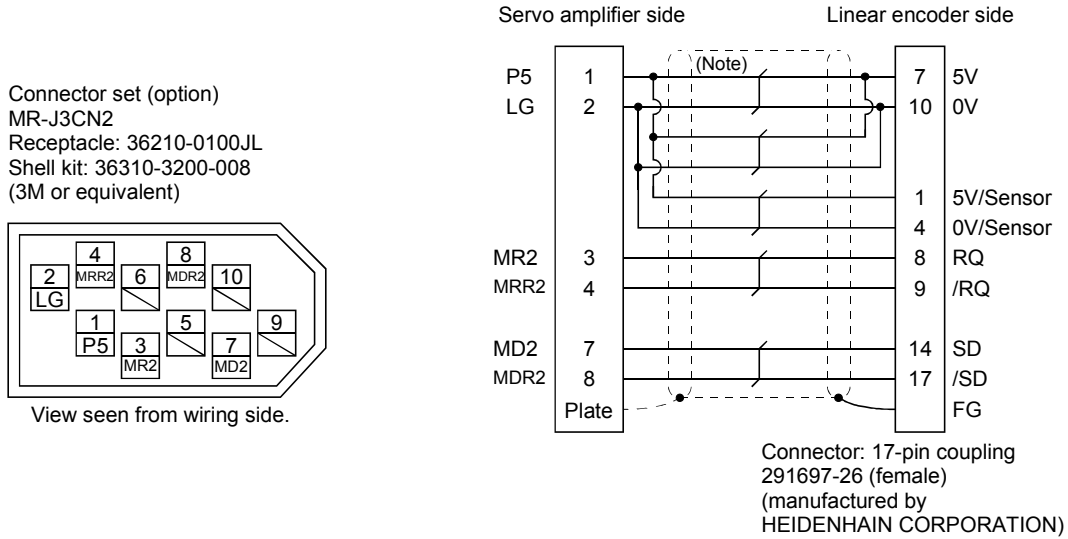
	Cable	
	Load side encoder cable	Output cable
When using an optional cable	1) Option manufactured by HEIDENHAIN CORPORATION (This should be prepared by the customer.) (Note)	
When producing a load side encoder cable	2) Connector set MR-J3CN2 (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	3) Junction connector (This should be prepared by the customer.) 17-pin coupling (female) 291697-26 (manufactured by HEIDENHAIN CORPORATION)
		4) 337 439- × × . × . × □m (manufactured by HEIDENHAIN CORPORATION) (This should be prepared by the customer.)

Note. For details, contact with HEIDENHAIN CORPORATION.

3. LOAD SIDE ENCODER

2) Production of load side encoder cable

Produce the load side encoder cable using MR-J3CN2 or a junction connector as shown below. The load side encoder cable can be produced as the length of max. 30m. The following diagram shows a connecting example of more than 5m to 10m.



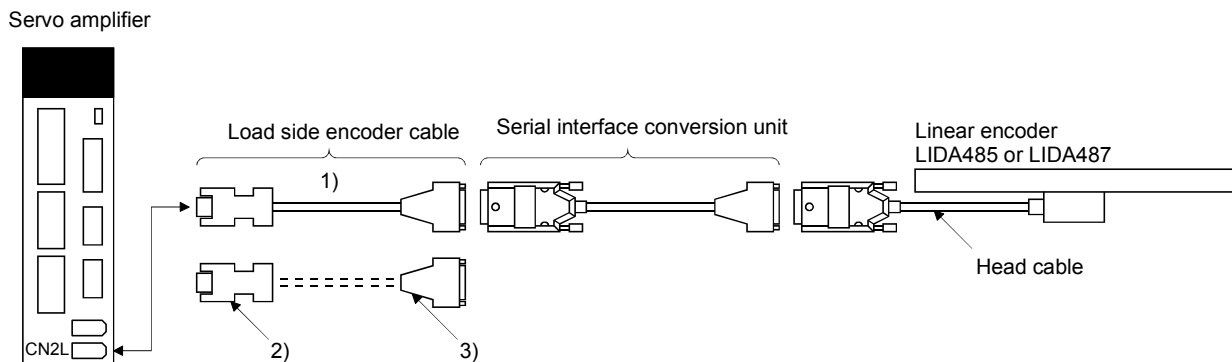
Note. The following table shows the cable size to be used and the number of paired connections of LG and L5.

Wiring length	Number of LG and P5 connections (when the output cable is 1m or less)	Cable size
to 5m	2-pair	AWG22
to 10m	3-pair	
to 20m	5-pair	
to 30m	7-pair	

(b) For LIDA485 or LIDA487 (Incremental type)

1) Cable structure

Prepare a cable based on the following structure diagram.



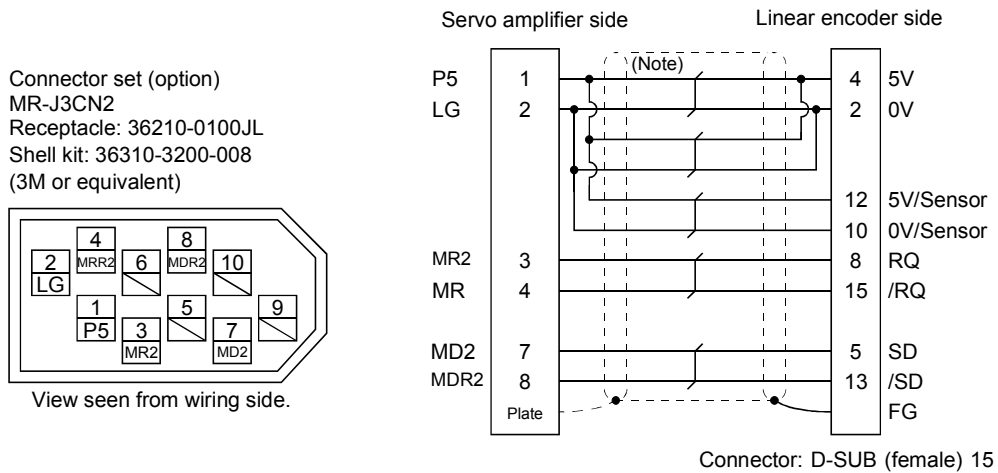
3. LOAD SIDE ENCODER

	Cable		
	Load side encoder cable	Serial interface conversion unit	Head cable
When using an optional cable	1) Option manufactured by HEIDENHAIN CORPORATION 366 419-×××××□m (This should be prepared by the customer.) (Note)		APE391M Cable length: 0.5m (manufactured by HEIDENHAIN CORPORATION)
When producing a load side encoder cable	2) Connector set MR-J3CN2 (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	3) Junction connector (This should be prepared by the customer.) D-SUB15 pin (female)	Accessories for linear encoder Cable length: 3m

Note. For details, contact with HEIDENHAIN CORPORATION.

2) Production of load side encoder cable

Produce the load side encoder cable using MR-J3CN2 or a junction connector as shown below. The load side encoder cable can be produced as the length of max. 30m. The following diagram shows a connecting example of more than 5m to 10m.



Note. The following table shows the cable size to be used and the number of paired connections of LG and L5.

Wiring length	Number of LG and P5 connections	Cable size
to 5m	2-pair	AWG22
to 10m	3-pair	
to 20m	6-pair	
to 30m	8-pair	

3. LOAD SIDE ENCODER

3.2.3 Sony Manufacturing Systems Corporation make linear encoder (Incremental type)

(1) Specifications

Item	Specifications			
	MJ830/MJ831	SL710+PL101-R/RH	MJ830/MJ831	SH13
Interpolator model	MJ830/MJ831	SL710+PL101-R/RH	MJ830/MJ831	SH13
Linear encoder model	Magnetic detection system		Optical detection system	
System	Magnetic detection system		Optical detection system	
Effective measurement length	50 to 3000mm		70 to 1240mm	
Resolution	Min. 0.2 μ m (Note 1)		Min. 0.005 μ m (Note 1)	
Accuracy	\pm 10 μ m		\pm 3 μ m A3 \pm 5 μ m A5	
Supply power voltage	MJ830: 5V (4.5 to 5.5V) MJ831: 12 to 24V (11 to 32V)		5V (4.5 to 5.5V) (Note 1)	
Power consumption	Max.3W		Max.3W	
Rated response speed	6.4 m/s		1.4 m/s	
Maximum response speed	6.4 m/s		2.0 m/s	
Operating temperature range	0 to 55°C (non-freezing)	0 to 45°C (non-freezing)	0 to 55°C (non-freezing)	0 to 45°C (non-freezing)
Storage temperature range	-20 to 65°C (non-freezing)	-20 to 50°C (non-freezing)	-20 to 65°C (non-freezing)	-10 to 60°C (non-freezing)
Dust tightness · water tightness	No protective structure	IP50 (PL101R), IP64 (PL101RH)	No protective structure	IP53(in accordance with the mounting in the manual of the Sony Precision Technology make linear encoder)
Vibration resistance	9.6m/s ² 5 to 800Hz	20m/s ² 50 to 2000Hz	9.6m/s ² 5 to 800Hz	98m/s ² (30 to 1000Hz, 30 minutes)
Shock resistance	980m/s ² 11ms	980m/s ² 11ms	980m/s ² 11ms	294m/s ² (11ms, three directions XYZ, three times each)
Output signal	Serial communication compatibility (Z phase data included) (Note 2)		Serial communication compatibility (Z phase data included) (Note 2)	
Output extension cable	CK-T1□		CR4-05NNT0□, CR4-10NNT01 (10m)	
Connection cable	Refer to 4) in this Section and fabricate the cable		Refer to 4) in this Section and fabricate the cable	

Note 1. Changes depending on the setting of the interpolator.

2. A home position return cannot be made if there is no linear encoder home position (reference mark).

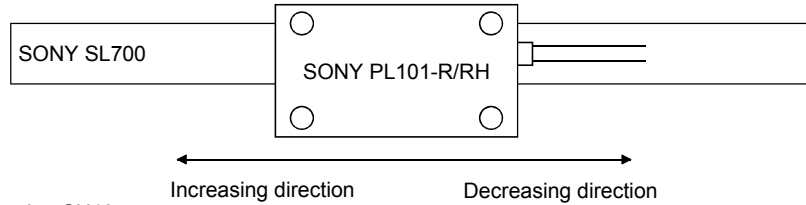
3. LOAD SIDE ENCODER

(2) Linear encoder unit structure

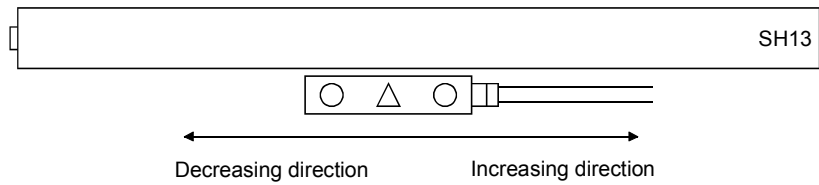
Note that the increasing/decreasing directions change depending on the interpolator (MJ830/MJ831) settings. The following figure shows the moving direction when the MODE switch of the interpolator (MJ830/MJ831) is set to 5.

Always set an linear encoder home position (reference mark).

For using PL101-R/RH, SL700

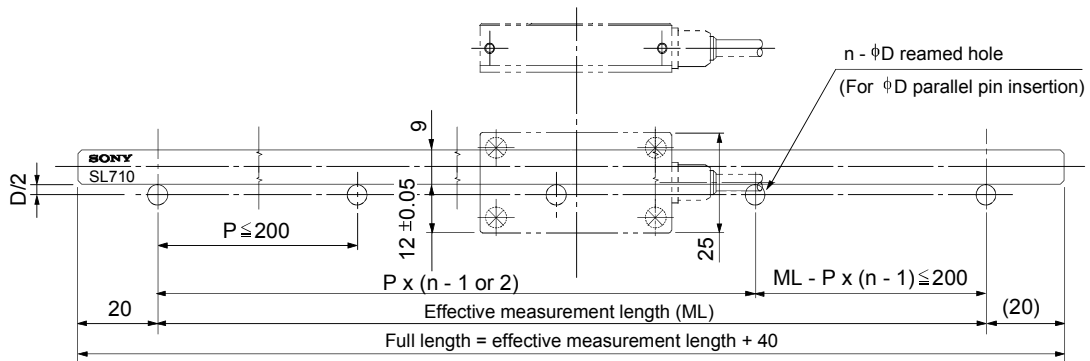


For using SH13



(3) Outline drawing (a) SL710

[Unit: mm]

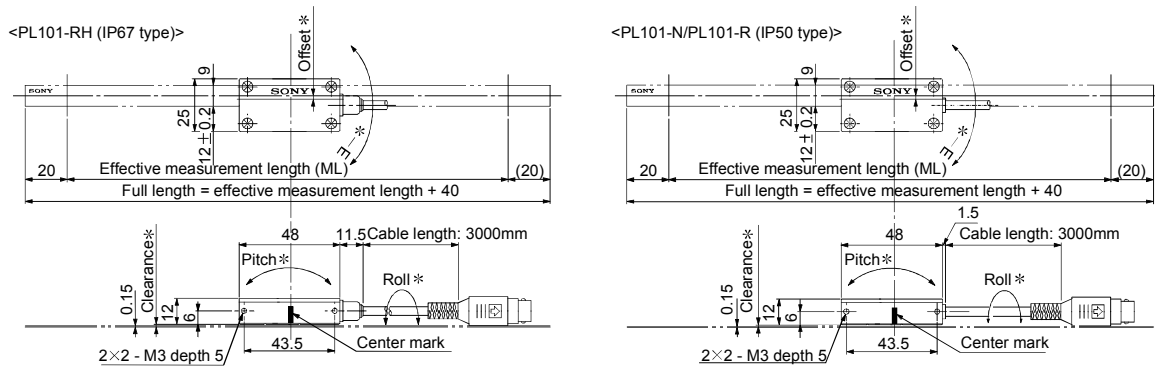


Mount the scale on a non-magnetic material.
When mounting it on a magnetic material, provide
a non-magnetic layer of 3mm or more.

3. LOAD SIDE ENCODER

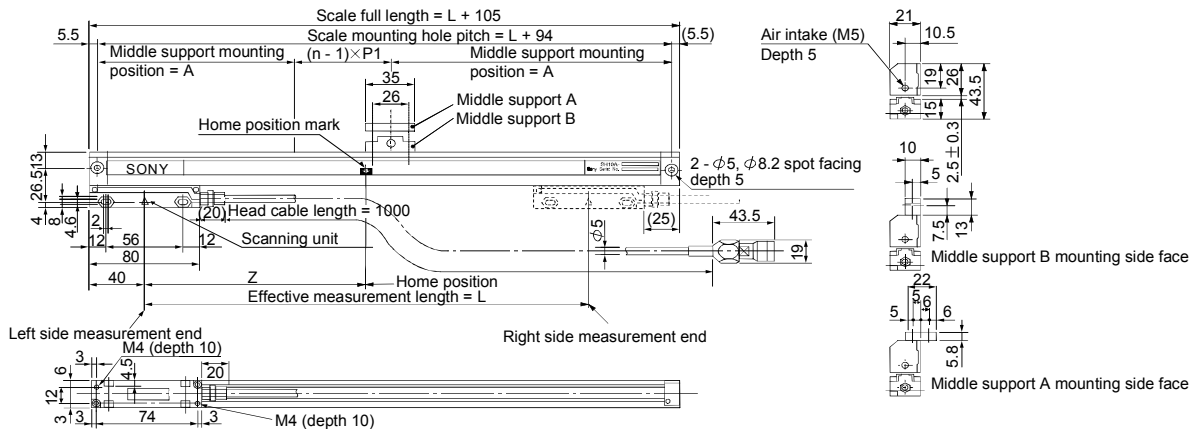
(b) PL101

[Unit: mm]



(c) SH13

[Unit: mm]

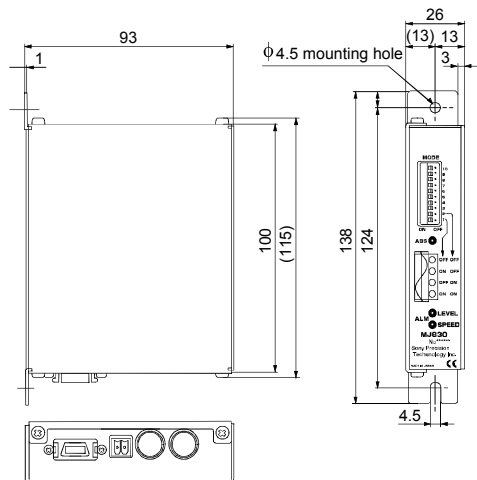


SH13		007	012	017	022	027	032	037	042	047	052	057	062	067	072	077	082	092	102	114	124	
Effective measurement length	L	mm	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820	920	1020	1140	1240
Middle support	n											1	1	1	1	1	1	1	1	2	2	2
Middle support mounting hole	A	mm										307	322	357	382	407	432	457	507	380	420	450
Middle support mounting hole	P1	mm																		354	394	434
Home position	Z	mm	35	60	85	110	135	160	185	210	235	260	285	310	335	360	385	410	460	510	570	620

3. LOAD SIDE ENCODER

(d) MJ830/MJ831

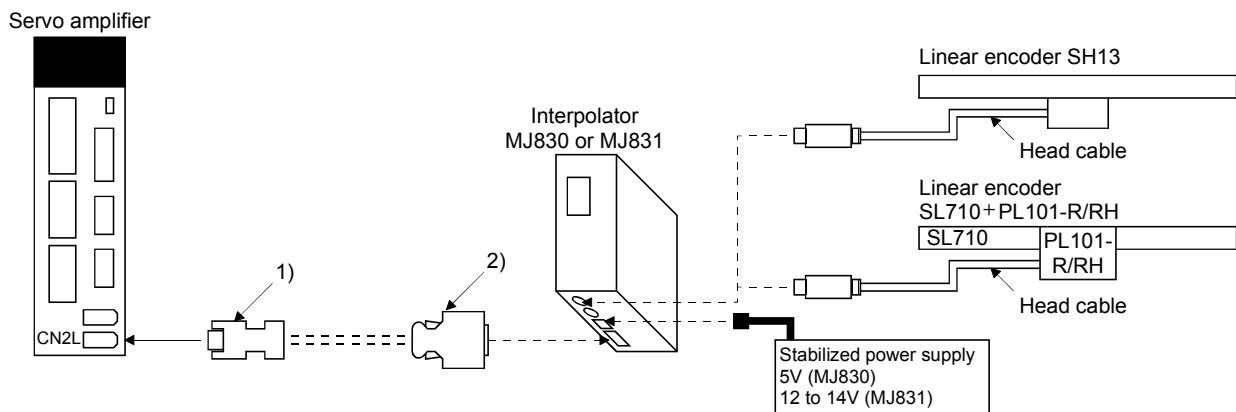
[Unit: mm]



(4) Load side encoder

1) Cable structure

Prepare a cable based on the following structure diagram.



Linear encoder	Cable		Interpolator (This should be prepared by the customer.)
	Load side encoder cable (Note)	Head cable	
SL710+PL101-R/RH	1) Connector set MR-J3CN2 (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	2) Connector for Interpolator (This should be prepared by the customer.) Connector: 10114-3000VE Shell kit: 10314-52F0-008 (3M or equivalent)	Accessories for linear encoder Cable Length PL101-R: 0.3m PL101-RH: 3m
SH13			Accessories for linear encoder Cable length: 1m

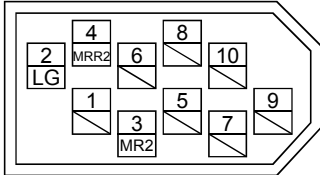
Note. Produce an encoder cable. An optional cable is not provided

3. LOAD SIDE ENCODER

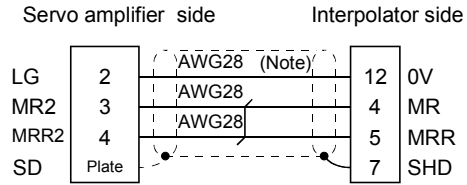
2) Production of load side encoder cable

Produce the load side encoder cable using MR-J3CN2 or a connector for interpolator as shown below. The load side encoder cable can be produced as the length of max. 30m. Supply linear encoder power from external.

Connector set (option)
 MR-J3CN2
 Receptacle: 36210-0100JL
 Shell kit: 36310-3200-008
 (3M or equivalent)



View seen from wiring side.



Connector: 10114-3000VE
 : 10314-52F0-008
 (3M or equivalent)

Note. Connect the LG of the servo amplifier to the 0V of the load side encoder.

In addition, it is not necessary to increase the number of connections according to the wiring length.

3. LOAD SIDE ENCODER

3.2.4 Renishaw make linear encoder (Incremental type)

(1) Specifications

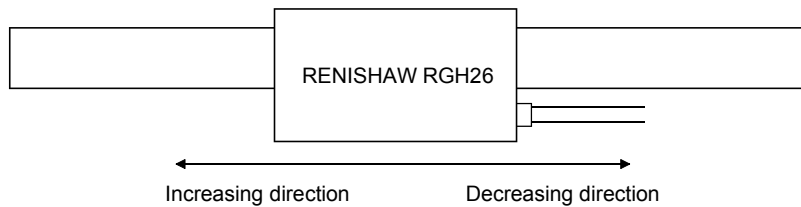
Item	Specifications		
	RGH26P	RGH26Q	RGH26R
Model	RGH26P	RGH26Q	RGH26R
System	Optical system		
Effective measurement length	Maximum length 70000mm		
Resolution	5μm	1μm	0.5μm
Accuracy (20°C)	±3μm/m (when compensation is made between two points)		
Supply power voltage	5V±5%		
Current consumption	Max.230mA		
Rated response speed (Note 1)	4.0m/s	3.2m/s	1.6m/s
Maximum response speed	5.0m/s	4.0m/s	2.0m/s
Operating temperature range	0 to 55°C (non-freezing)		
Operating humidity range	10 to 90%RH (non-condensing)		
Storage temperature range	-20 to 70°C (non-freezing)		
Dust tightness · water tightness	IP50		
Vibration resistance	100m/s ² (55 to 2000Hz)		
Shock resistance	1000m/s ² (1/2sin, 11ms)		
Output signal	Serial communication compatibility (Z phase data included, serial communication of reference mark data is also is made) (Note 3)		
Output cable	Renishaw make N-15 PIN Dtype Dtype plug (0.5m)		
Load side encoder cable	Refer to 4) in this Section and fabricate the cable.		

Note. 1. Use at the rated speed or less.

2. A home position return cannot be made if there is no linear encoder home position (reference mark).

(2) Linear encoder unit structure

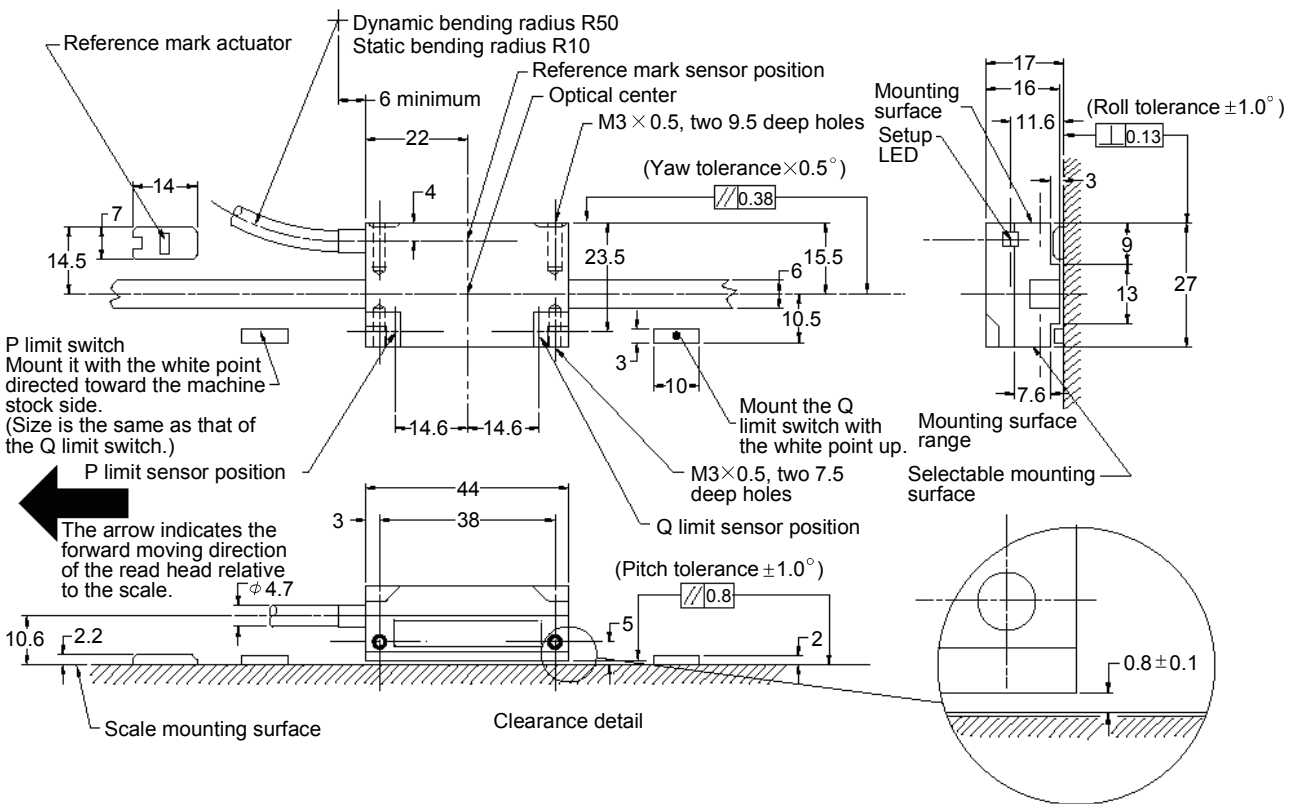
Always set an linear encoder home position (reference mark).



3. LOAD SIDE ENCODER

(3) RGH26P, RGH26Q, RGH26R outline drawing

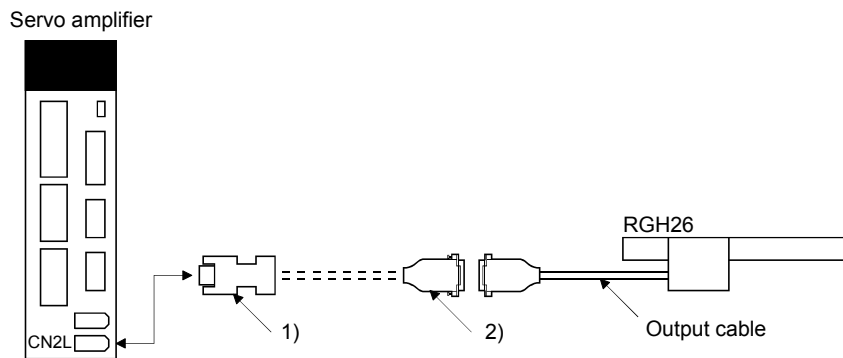
[Unit: mm]



(4) Load side encoder cable

1) Cable structure

Prepare a cable based on the following structure diagram.



Cable	
Load side encoder cable	Output cable
1) Connector set (Option manufactured by Mitsubishi Electric Corporation) (Refer to Section 3.4.)	2) Junction connector (This should be prepared by the customer.) D-SUB15 pin (female)
	Accessories for linear encoder Cable Length 0.5m

Note. Produce an encoder cable. An optional cable is not provided

3. LOAD SIDE ENCODER

2) Production of load side encoder cable

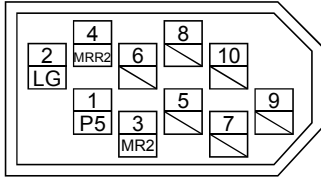
Produce the load side encoder cable using MR-J3CN2 or a junction connector as shown below. The load side encoder cable can be produced as the length of max. 30m.

Connector set (option)

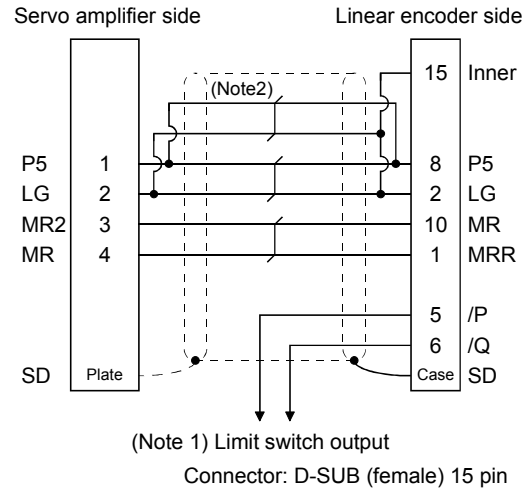
MR-J3CN2

Receptacle: 36210-0100JL

Shell kit: 36310-3200-008
(3M or equivalent)



View seen from wiring side.



Note 1. A limit switch output signal can be connected. For details, contact with Renishaw plc.

2. The following table shows the cable size to be used and the number of paired connections of LG and L5.

Wiring length	Number of LG and P5 connections (when the output cable is 0.5m or less)	Cable size
to 5m	1-pair	AWG22
to 10m	2-pair	
to 20m	4-pair	
to 30m	6-pair	

3. LOAD SIDE ENCODER

3.3 ABZ-phase Differential Output Load Side Encoder

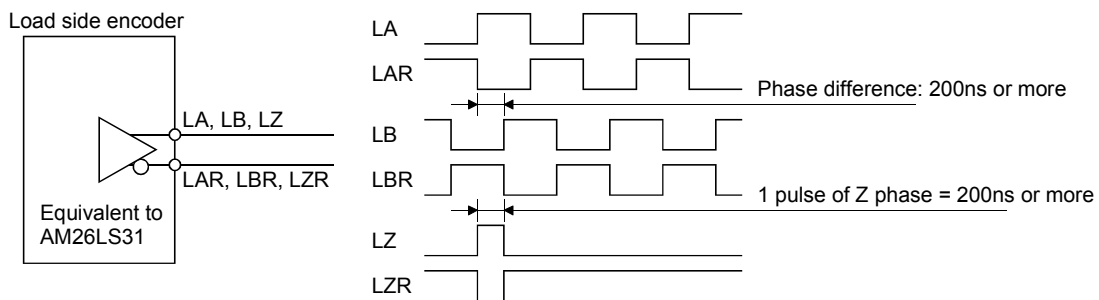
This section describes the connection of the ABZ-phase differential output load side encoder. Prepare the MR-J3CN2 connector set for the load side encoder cable and produce it according to the wiring diagram in (3) of this section.

(1) ABZ-phase differential output load side encoder specifications

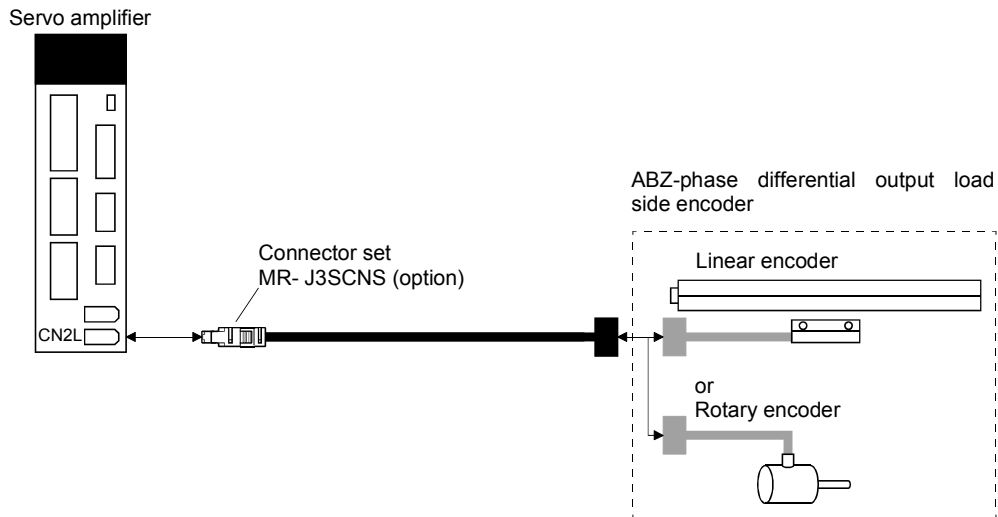
Each signal of the A-, B- and Z-phase of the load side encoder is provided in the differential line driver output. It cannot be provided in the collector output.

The phase differences of the A- and B-phase pulses and the pulse width of the Z-phase pulse need to be 200ns or more.

The load side encoder without the Z phase cannot make a home position return.



(2) Connection of servo amplifier and ABZ-phase differential output load side encoder



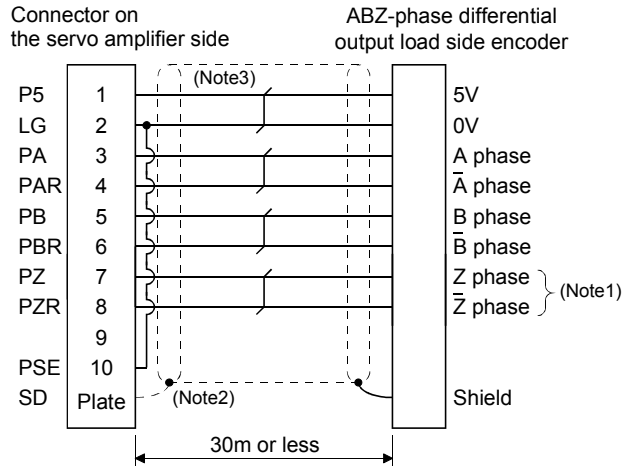
3. LOAD SIDE ENCODER

(3) Internal wiring diagram

For production of the load side encoder cable, use a cable durable against the long period of flexing action. Even though the cable length is max. 30m for the RS-422 communication, the length may be shortened due to the power supply voltage drop or the specifications of linear encoder.

A connection example is shown below. For details, contact with the encoder manufacturer.

1) When the consumption current of the load side encoder is 350mA or less



Note 1. For the load side encoder without Z phase, set parameter No.PC27 to "□ 1 □ □".

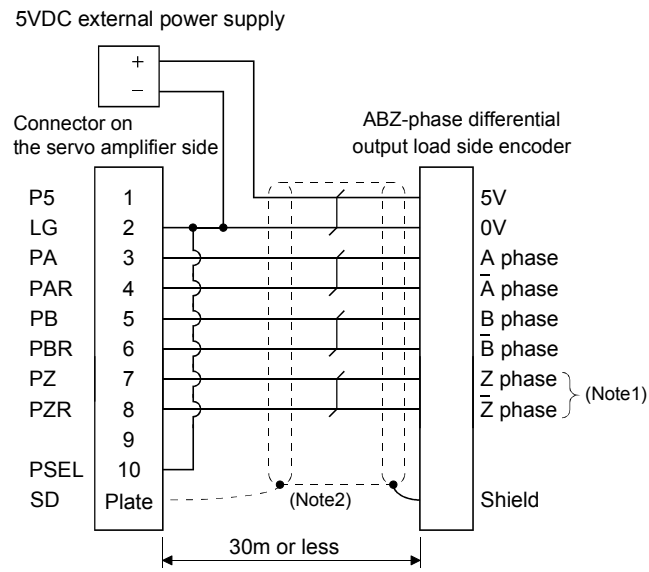
2. Securely connect a shield cable to the plate (ground plate) in the connector.

3. The following table shows the cable size to be used and the number of paired connections of LG and L5 when the consumption current of the load side encoder is 350mA. When the consumption current of the load side encoder is 350mA or less, the paired connections can be decreased.

Wiring length	Number of LG and P5 connections	Cable size
to 5m	2-pair	AWG22
to 10m	3-pair	
to 20m	6-pair	
to 30m	8-pair	

3. LOAD SIDE ENCODER

2) When the consumption current of the load side encoder is more than 350mA



Note 1. For the load side encoder without Z phase, set parameter No.PC27 to "□ 1 □ □".

2. Securely connect a shield cable to the plate (ground plate) in the connector.

3. LOAD SIDE ENCODER

3.4 Mitsubishi Optional Cable • Connector Sets

3.4.1 MR-EKCBL□M-H

(1) Model explanations

Model : MR - E K C B L □ M - H
 □ Long flex life

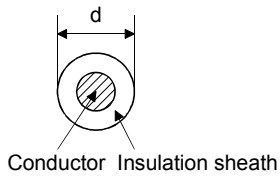
Symbol	Cable length [m]
2	2
5	5
10	10

(2) Cable structure

The table shows this optional cable structure.

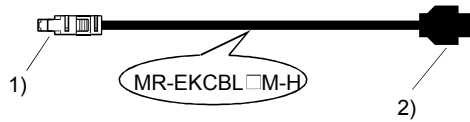
Protective Structure	Flex Life	Length [m]	Core size [mm ²]	Number of Cores	Characteristics of one core			(Note 2) Finishing OD [mm]	Wire model
					Structure □ [Wires/mm]	Conductor resistance [Ω/mm]	Insulation coating ODd [mm] (Note 1)		
IP20	Long flex	2 • 5 • 10	0.2mm ²	12 (6 pairs)	40/0.08	105 or less	0.88	7.2	(Note 3) A14B2339 6P

Note 1. d is as shown below:



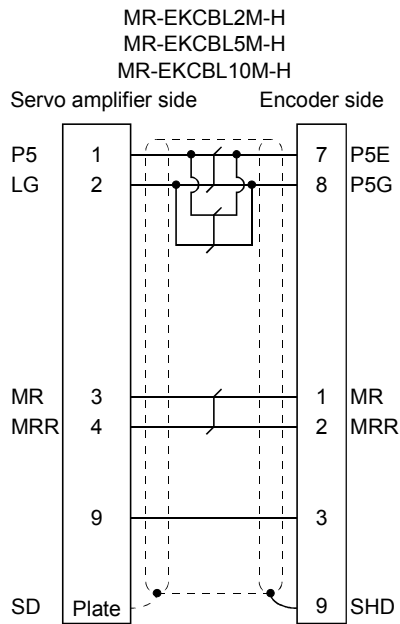
- 2. Standard OD. Max. OD is about 10% greater.
- 3. Purchased from Toa Electric Industry.

3. LOAD SIDE ENCODER



Cable Model	1) CN2 Connector	2) Junction Connector
MR-EKCBL □ M-H	<p>Connector set: 54599-1019 (Molex or equivalent)</p> <p>(Note) Signal layout</p> <p>View seen from wiring side.</p> <p>Note. Keep open the pins shown with . Especially, pin 10 is provided for manufacturer adjustment. If it is connected with any other pin, the servo amplifier cannot operate normally.</p>	<p>Housing: 1-172161-9 Connector pin: 170359-1 (Tyco Electronics or equivalent) Cable clamp: MTI-0002 (Toa Electric Industries)</p> <p>Signal layout</p> <p>View seen from wiring side.</p>



(3) Internal wiring diagram



3. LOAD SIDE ENCODER

3.4.2 MR-ECNM

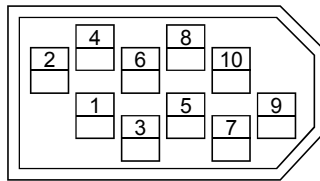
The following shows the connector combination for this connector set.

Parts/Tool	Description
Connector set	<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>MR-ECNM</p> <p>For CN2 connector Connector set: 54599-1019 (Molex)</p> <p>Junction connector Housing: 1-172161-9 Connector pin: 170359-1 (Tyco Electronics or equivalent) Cable clamp: MTI-0002 (Toa Electric Industries)</p>

3.4.3 MR-J3CN2

The following shows the details of this connector set.

Connector set (option)
MR-J3CN2
Receptacle: 36210-0100JL
Shell kit: 36310-3200-008
(3M or equivalent)



View seen from wiring side.

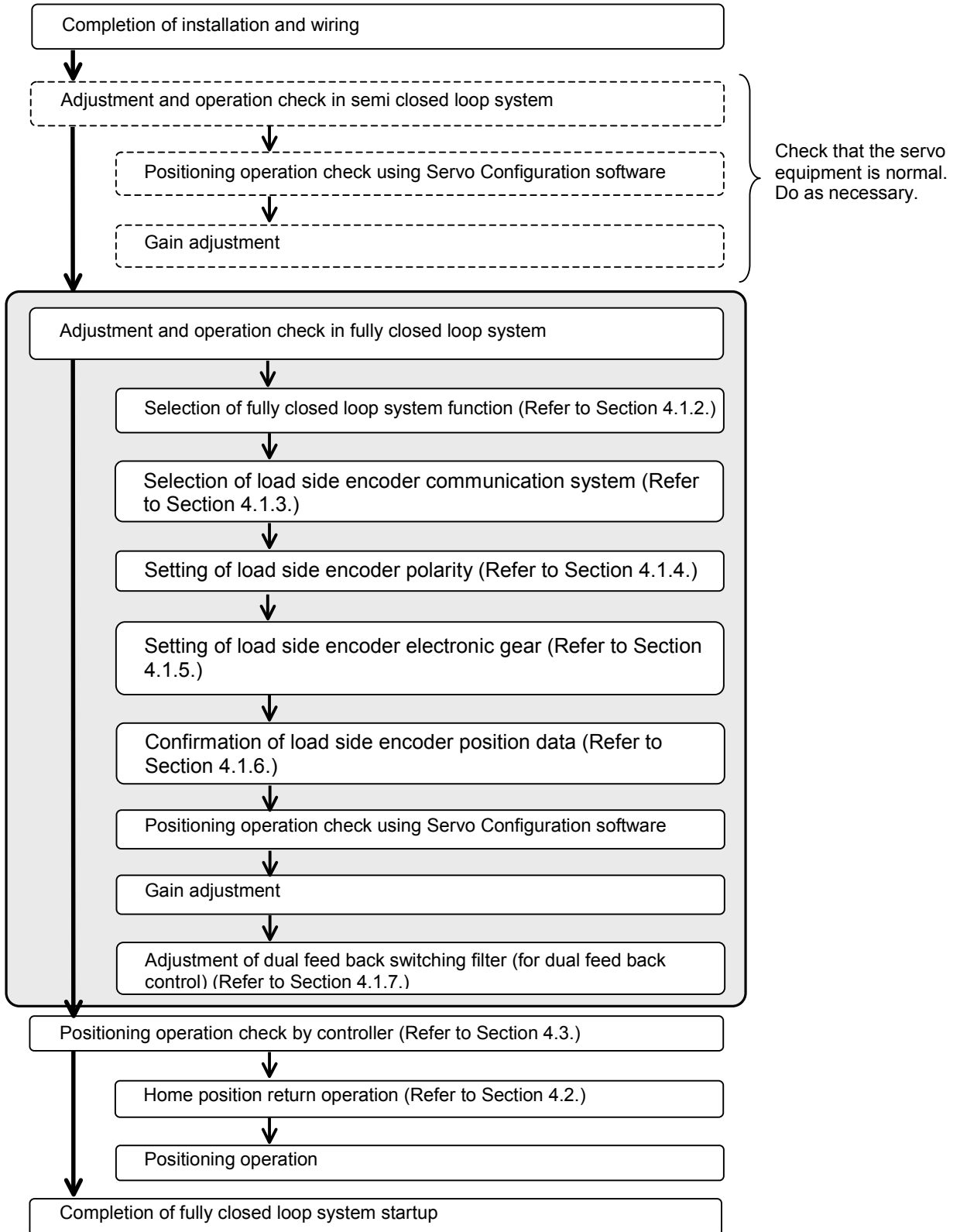
4. OPERATION AND FUNCTIONS

4 OPERATION AND FUNCTIONS

4.1 Startup

4.1.1 Startup procedure

Start up the fully closed loop system in the following procedure.



4. OPERATION AND FUNCTIONS

4.1.2 Selection of fully closed loop system

By setting parameter No.PA01, PE01 and the control command of controller, the following operations can be made.

Parameter No. PA01	Parameter No. PE01	Semi closed loop cotrol/fully closed loop control change command	Command unit	Control method	Absolute position system
□□0□ semi closed loop system	/	/	Motor encoder unit	Semi closed loop control	○
□□1□ fully closed loop system			Load side encoder unit	Dual feed back control (fully closed loop control)	○ (Note)
□□□0	OFF	Semi closed loop control		×	
	ON	Dual feed back control (fully closed loop control)		×	
□□□1					

Note. Applicable when the load side encoder is set as the absolute position encoder.

(1) Control mode selection

Select a control mode.

Parameter No. PA01

0	0	□	0
---	---	---	---

Control mode selection
0: Semi closed loop system
1: Fully closed loop system

Set value	Control mode	Control unit
□□0□	Semi closed loop system	Motor side resolution unit
□□1□	Fully closed loop system	Load side resolution unit

(2) Semi closed loop control/fully closed loop control selection

Select the semi closed loop control/fully closed loop control.

Parameter No. PE01

0	0	0	□
---	---	---	---

Fully closed loop control selection
0: Always fully closed loop control
1: Selection using the control command of controller

Selection using the control command of controller	Control method
OFF	Semi closed loop control
ON	Fully colsed loop cotrol

When parameter No.PA01 control configuration is set to "□□1□" (fully closed loop system), this setting is enabled.

4. OPERATION AND FUNCTIONS

4.1.3 Selection of load side encoder communication system

The communication system change depending on the load side encoder type.
Refer to 3.1 for the communication system of the load side encoder.
Select the cable to be connected to CN2L connector in parameter No.PC26.

Parameter No. PC26

	1	0	0
--	---	---	---

Load side encoder cable communication system selection
0: 2-wire type
1: 4-wire type
If the setting is incorrect, the load side encoder error1 (70) or load side encoder error2 (71) occurs.

4.1.4 Setting of load side encoder polarity



Do not set a wrong value in the encoder direction of parameter No.PC27 (encoder pulse count polarity selection). An abnormal operation and a machine collision may occur if a wrong value is set, which cause a fault and parts damaged.

POINT

- Parameter No.PC27 (encoder pulse count polarity selection) is not related to parameter No.PA14 (rotation direction selection). Make sure to set the parameter according to the relationships between servo motor and linear encoder • rotary encoder.
- Do not set a wrong value in the encoder direction of parameter No.PC27 (encoder pulse count polarity selection). During the positioning operation, a fully closed loop control error (42) may occur.

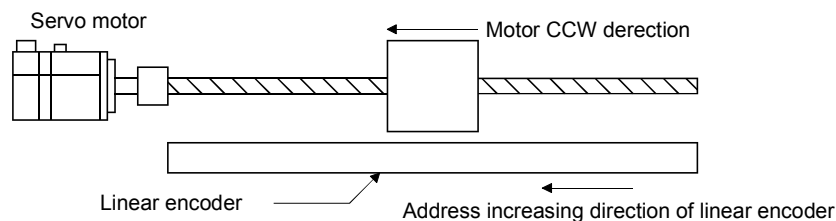
(1) Parameter setting method

Set the load side encoder polarity to be connected to CN2L connector in order to match the CCW direction of servo motor and the increasing direction of load side encoder feedback.

Parameter No.PC27

0	0	0	
---	---	---	--

Load side encoder pulse count polarity selection
0: Load side encoder pulse increasing direction in the servo motor CCW
1: Load side encoder pulse decreasing direction in the servo motor CCW



(2) How to confirm the load side encoder feedback direction

For the may to confirm the load side encoder feedback direction, refer to 4.1.6.

4. OPERATION AND FUNCTIONS

4.1.5 Setting of feed back pals electronic gear

POINT
<ul style="list-style-type: none"> If setting a wrong value in the feedback pulse electronic gear (parameter No. PE04, PE05, PE34, PE35), a parameter error (37) and an abnormal operation may occur. Also, a fully closed loop control error (42) may occur during the positioning operation.

The numerator (parameter No. PE04, PE34) and denominator (parameter No. PE05, PE35) of the electronic gear are set to the motor side encoder pulse. Set the electronic gear so that the number of motor encoder pulses per motor revolution is converted to the number of load side encoder pulses. The relational expression is shown below.

$$\frac{\text{Parameter No. PE04} \times \text{Parameter No. PE34}}{\text{Parameter No. PE05} \times \text{Parameter No. PE35}} = \frac{\text{Number of load side encoder pulses per servo motor revolution}}{\text{Number of motor encoder pulses per servo motor revolution}}$$

Select the load side encoder so that the number of load side encoder pulses per servo motor revolution is within the following range.

$$4096 (2^{12}) \leq \text{Number of load side encoder pulses per servo motor revolution} \leq 67108864 (2^{26})$$

(1) When the servo motor is directly coupled with a ballscrew and the linear encoder resolution is 0.05μm

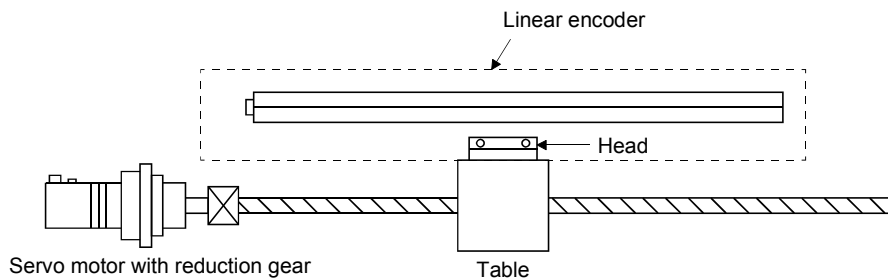
Condition

Servo motor resolution: 262144 pulse/rev

Servo motor reduction ratio: 1/11

Ballscrew lead: 20mm

Linear encoder resolution: 0.05μm



Number of linear encoder pulses per ball screw revolution is calculated.

Number of linear encoder pulses per ball screw revolution

$$= \text{Ballscrew lead} / \text{Linear encoder resolution}$$

$$= 20\text{mm} / 0.05\mu\text{m} = 400000 \text{ pulse}$$

$$\frac{1) \text{ Parameter No. PE04} \times 2) \text{ Parameter No. PE34}}{3) \text{ Parameter No. PE05} \times 4) \text{ Parameter No. PE35}} = \frac{400000}{262144} \times \frac{1}{11} = \frac{1) 3125}{3) 22528} \times \frac{2) 1}{4) 1}$$

4. OPERATION AND FUNCTIONS

(2) Setting example when using the rotary encoder for the load side encoder of roll feeder

Condition

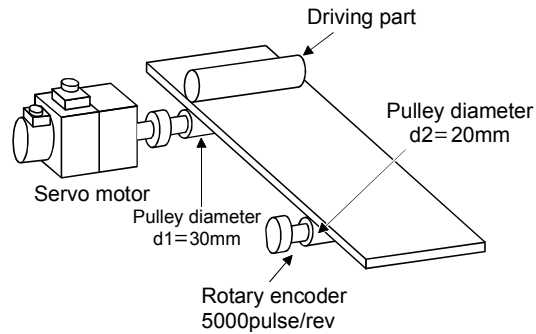
Servo motor resolution: 262144pulse/rev

Pulley diameter on the servo motor side: 30mm

Pulley diameter on the servo motor side: 20mm

Rotary encoder resolution: 5000pulse/rev

(20000 pulse/rev after multiplication by 4)



When the pulley diameters or reduction ratios differ, consider that in calculation.

For the rotary encoder, make calculation using the number of pulses multiplied by 4.

$$\frac{1) \text{ Parameter No. PE04} \times 2) \text{ Parameter No. PE05}}{3) \text{ Parameter No. PE34} \times 4) \text{ Parameter No. PE35}} = \frac{20000 \times 30}{262144 \times 20} = \frac{1) 1875}{3) 16384} \times \frac{2) 1}{4) 1}$$

4. OPERATION AND FUNCTIONS

4.1.6 Confirmation of load side encoder position data

Check the load side encoder mounting and parameter settings for any problems.

POINT
<ul style="list-style-type: none"> Depending on the check items, the Servo Configuration software may be used. <p>Refer to 4.6 for the data displayed on the Servo Configuration software.</p>

When checking the following items, the fully closed loop control mode must be set. For the setting of control mode, refer to Section 4.1.2.

No.	Check Item	Checking Method/Description
1	Read of load side encoder position data	With the load side encoder in a normal state (mounting, connection, etc.), the load side cumulative feedback pulses value is counted normally when the load side encoder is moved.
2	Read of load side encoder scale home position (reference mark, Z phase)	With the linear encoder home position (reference mark, Z phase) of the load side encoder in a normal condition (mounting, connection, etc.), the value of load side encoder information 1 is cleared to 0 when the linear encoder home position (reference mark, Z phase) is passed through by moving the load side encoder.
3	Confirmation of load side encoder feedback direction (Setting of load side encoder polarity)	Confirm that the directions of the feedback pulse accumulation of motor encoder (after gear) and the load side feedback pulse accumulation are matched by moving the device (load side encoder) manually in the servo off status. If mismatched, reverse the polarity.
4	Setting of load side encoder electronic gear	<p>When the servo motor and load side encoder operate synchronously, the motor side cumulative feedback pulses (after gear) and load side cumulative feedback pulses are matched and increased.</p> <p>If mismatched, review the setting of fully closed loop control feedback electronic gear (parameter No. PE04, PE05, PE34, PE35) with the following method.</p> <ol style="list-style-type: none"> 1) Check the motor side cumulative feedback pulses (before gear). 2) Check the load side cumulative feedback pulses. 3) Check that the ratio of above 1) and 2) has been that of the feedback electronic gear.

4. OPERATION AND FUNCTIONS

4.1.7 Setting of fully closed loop dual feedback filter

With the initial value (setting = 10) set in parameter No. PE08, make gain adjustment by auto tuning, etc. as in semi closed loop control.

While observing the servo operation waveform with the graph function, etc. of the Servo Configuration software, adjust the dual feed back filter.

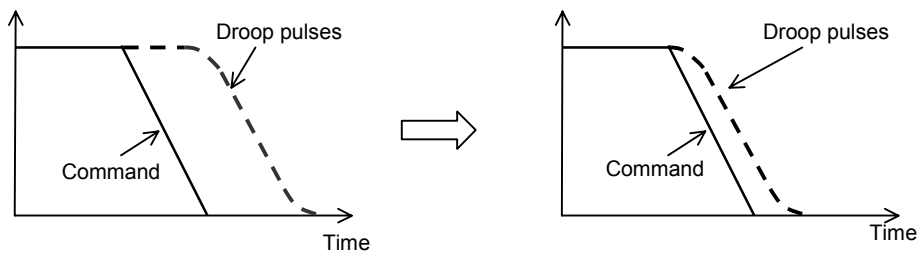
The dual feed back filter operates as described below depending on the setting.

Parameter No. PE08 setting value	Control mode	Vibration	Settling time
0	Semi closed loop		
1 to 4499	Dual feedback	Hard-to-occur to Easy-to-occur	Longer to Shorter
4500	Fully closed loop		

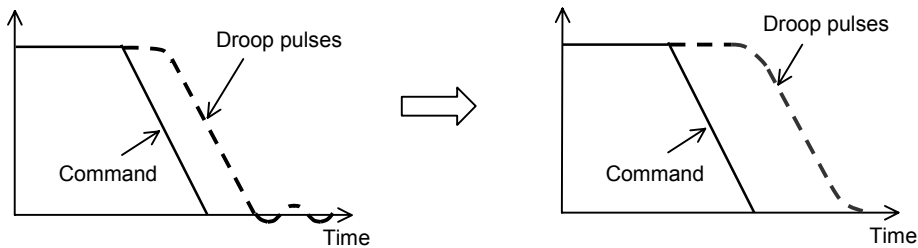
Increasing the dual feed back filter setting shortens the settling time, but increases motor vibration since the motor is more likely to be influenced by the load side encoder vibration.

The maximum setting of the dual feed back filter should be less than half of the PG2 setting.

Reduction of settling time: Increase the dual feed back filter setting.



Suppression of vibration: Decrease the dual feed back filter setting.



4. OPERATION AND FUNCTIONS

4.2 Home Position Return Operation

4.2.1 General precautions

Home position return operation is all performed according to the load side encoder feedback data, independently of the load side encoder type. It is irrelevant to the Z-phase position of the motor encoder.

In the case of a home position return using a dog signal, the scale home position (reference mark) must be passed through when an incremental type linear encoder is used, or the Z phase be passed through when a rotary encoder is used, during a period from a home position return start until the dog signal turns off.

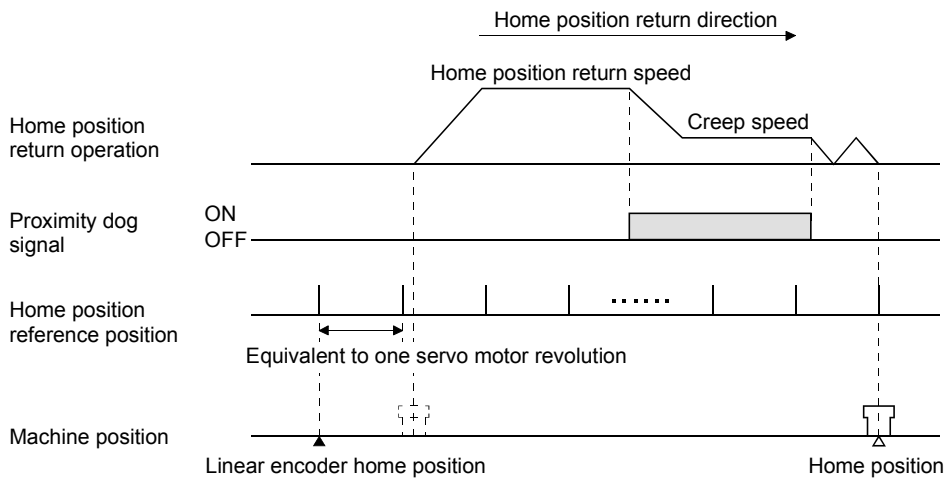
4.2.2 Load side encoder types and home position return methods

(1) About proximity dog type home position return using absolute linear encoder

When an absolute linear encoder is used, the home position reference position is the position per servo motor revolution to the linear encoder home position (absolute position data = 0).

In the case of a proximity dog type home position return, the nearest position after proximity dog OFF is the home position.

The linear encoder home position may be set in any position.



4. OPERATION AND FUNCTIONS

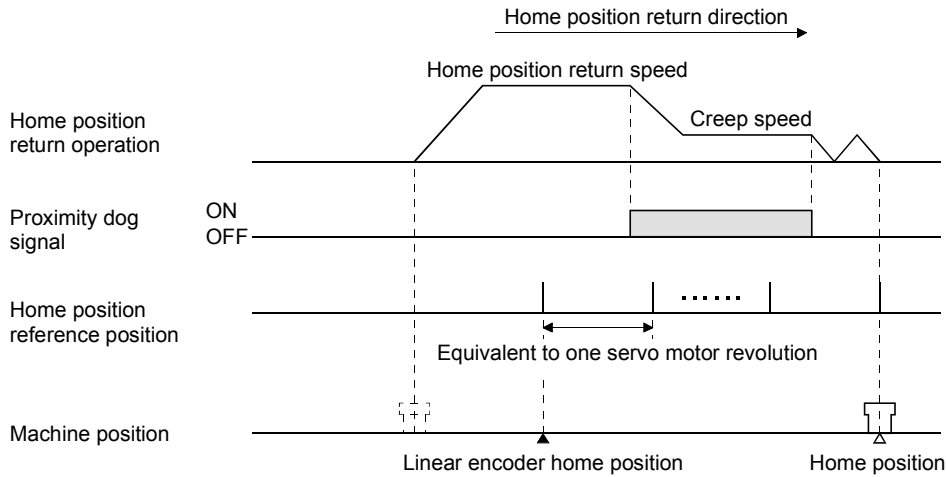
(2) About proximity dog type home position return using incremental linear encoder

(a) When the linear encoder home position (reference mark) exists in the home position return direction

When an incremental linear encoder is used, the home position is the position per servo motor revolution to the Linear encoder home position (reference mark) passed through first after a home position return start.

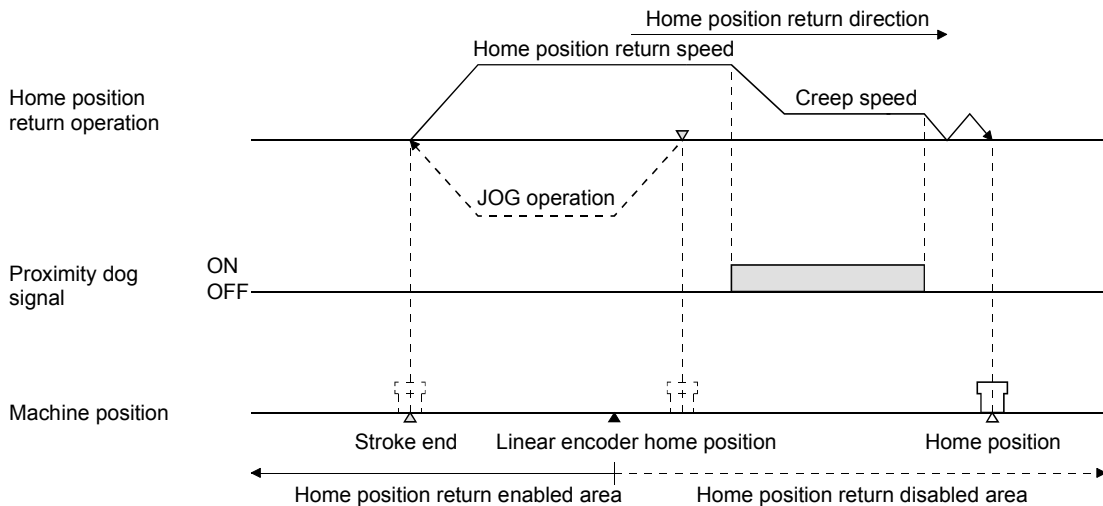
In the case of a proximity dog type home position return, the nearest position after proximity dog OFF is the home position.

Set one linear encoder home position in the full stroke, and set it in the position that can always be passed through after a home position return start.



(b) When the linear encoder home position does not exist in the home position return direction

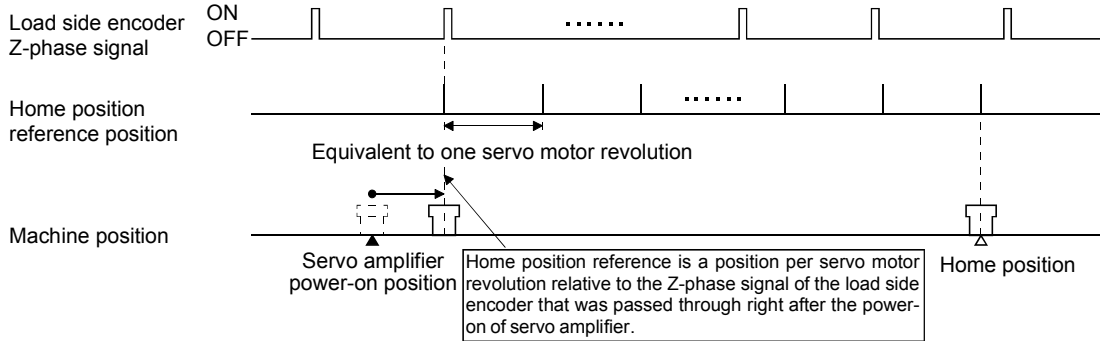
If a home position return is started at the position where the linear encoder home position (reference mark) does not exist in the home position return direction, a home position return error occurs in the controller, the error definition changes depending on the controller type. When starting a home position return at the position where the linear encoder home position (reference mark) does not exist in the home position return direction, move the axis up to the stroke end on the side opposite to the home position return direction by jog operation, etc. of the controller once, then make a home position return.



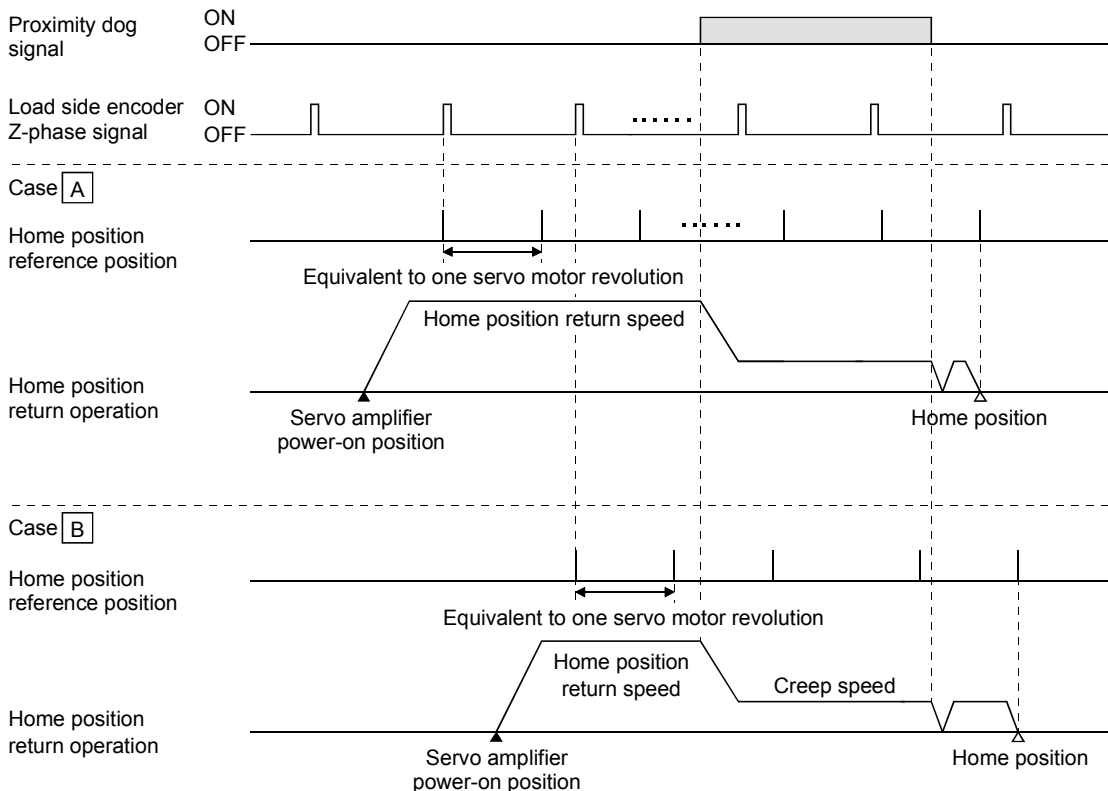
POINT
<ul style="list-style-type: none"> ▪ To execute a home position return securely, start a home position return after moving the axis to the opposite stroke end by jog operation, etc. of the controller. ▪ To execute a home position return securely, start a home position return after moving the axis to the opposite stroke end by jog operation, etc. of the controller. A home position return cannot be made if the incremental linear encoder does not have a linear encoder home position (reference mark). Always provide a linear encoder home position (reference mark). (One place in the fully stroke)

4. OPERATION AND FUNCTIONS

- (3) About dog type home position return when using the ABZ-phase pulse train specification rotary encoder
 The home position using a ABZ-phase pulse train specification rotary encoder as a load side encoder is as described below. It is the position per servo motor revolution, starting at the position where the Z phase of the load side encoder is passed through first after power-on of the servo amplifier.



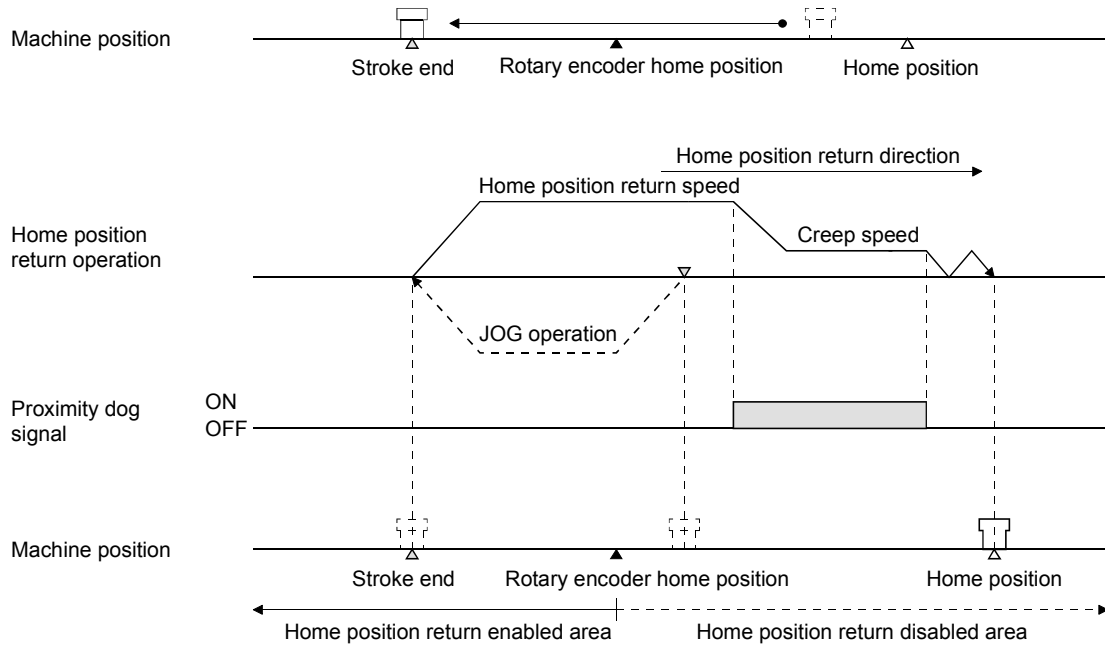
The home position reference position is set relative to the Z phase position of the load side encoder that is passed through first after power-on of the servo amplifier.
 In Case A and Case B where the power-on position differs as shown below, the power-on position must be noted since the axis cannot stop at the same home position return position.



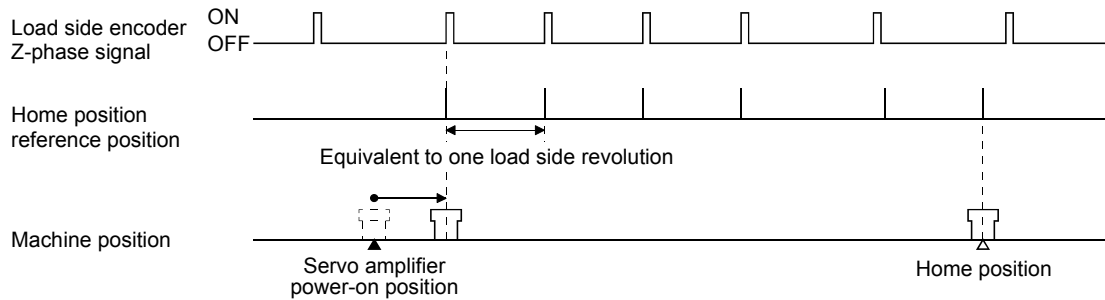
4. OPERATION AND FUNCTIONS

To always make a home position return to the same position, perform the following operation.

Once move the rotary encoder to the stroke end opposite to the home position return direction with the JOG operation of controller, etc. and then perform a home position return.



- (4) About dog type home position return when using the rotary encoder of a serial communication servo motor
 The home position for when using the rotary encoder of a serial communication servo motor for the load side encoder is at the load side Z-phase position.



4. OPERATION AND FUNCTIONS

(5) About data setting type (Common to all load side encoders)

In the data setting type home position return method, pass through a scale home position (reference mark) and the Z-phase signal of the rotary encoder, and then make a home position return.

When the machine has no distance of one motor encoder revolution until the Z phase of the rotary encoder is passed through, a home position return can be made by changing the parameter No. PC17 (home position setting condition selection) setting if the home position is not yet passed through.

4. OPERATION AND FUNCTIONS

4.3 Operation from Controller

The fully closed loop control compatible amplifier can be used with any of the following controllers.

Classification	Model	Remarks
Motion controller	Q172HCPU/Q173HCPU	Speed control (II) instructions (VVF, VVR) cannot be used.

Note: An absolute type linear scale is required to configure an absolute position system.

The battery (MR-J3BAT) need not be fitted to the servo amplifier.

4.3.1 Operation from controller

Positioning operation from the controller is basically performed like the MR-J3-□B servo amplifier.

4.3.2 Controller setting (Motion controller)

When using fully closed loop system, make the following setting.

Set the other servo parameters and control parameters as in the MR-J3-□B servo amplifier.

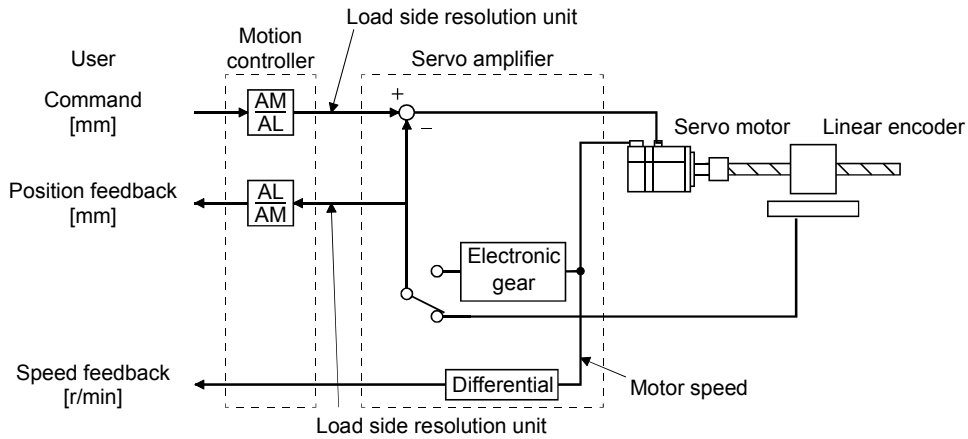
Parameter No.PA01, PC17, PC26, PC27, PE01, PE03 to PE05, PE34 and PE35 are written to the servo amplifier and then are enabled using any of the methods indicated by ○ in Parameter valid conditions.

Parameter No.PE06 to PE08 are enabled at setting regardless of the valid conditions.

Setting Item		Parameter valid conditions		Settings
		Controller reset	Power OFF→ON	Motion controller Q172HCPU/Q173H CPU
Command resolution				Load side encoder resolution unit
Servo parameters	MR-J3-□B-RJ006 Fully closed loop servo Amplifier setting			MR-J3-B fully closed loop
	Motor setting			Automatic setting
	Serial encoder cable selection (parameter No. PC26, PC27)	×	○	Set the items as required.
	Home position setting condition selection (parameter No. PC17)	○	○	
	Fully closed loop selection (parameter No. PA01, PE01)	×	○	
	Fully closed loop selection 2 (parameter No. PE03)	○	○	
	Fully closed loop control error detection speed difference error detection level (parameter No. PE06)	Valid at setting regardless of the valid conditions		
	Fully closed loop control error detection position difference error detection level (parameter No. PE07)			
	Fully closed loop electronic gear numerator (parameter No. PE04, PE34)	×	○	
	Fully closed loop electronic gear denominator (parameter No. PE05, PE35)	×	○	
Dual F/B filter (parameter No. 67)	Valid at setting regardless of the valid conditions			
Positioning control parameters	Unit setting	mm/inch/degree/pulse		
	Moving distance per pulse (AL, AM) Moving distance per revolution (AL) Unit multiplying factor (AM)	For the setting methods, refer to (1), (2).		

4. OPERATION AND FUNCTIONS

(1) When using a linear encoder (unit setting: mm)



Calculate the number of pulses (AM) and movement amount (AL) of the linear encoder per ball screw revolution in the following conditions.

Ball screw lead: 20mm

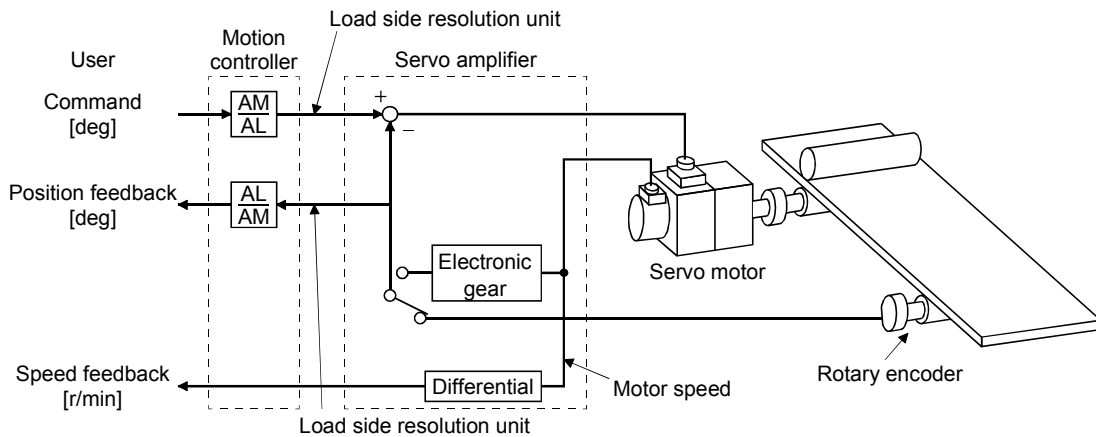
Linear encoder resolution: 0.05 μ m

Number of linear encoder pulses (AM) per ball screw revolution

= Ball screw lead/linear encoder resolution=20mm/0.05 μ m=400000pulse

$$\frac{\text{Number of pulses per revolution [pulse] (AM)}}{\text{Movement amount per revolution [mm] (AL)}} = \frac{400000\text{pulse}}{20\text{mm}} = \frac{40000}{20000}$$

(2) When using a rotary encoder (unit setting: deg)



Calculate the number of pulses (AM) and movement amount (AL) of the rotary encoder per ball screw revolution in the following conditions.

Resolution of rotary encoder = Load side resolution: 20000pulse/rev

$$\frac{\text{Number of pulses per revolution [pulse] (AM)}}{\text{Movement amount per revolution [deg] (AL)}} = \frac{20000\text{pulse}}{360\text{deg}} = \frac{20000}{360}$$

4. OPERATION AND FUNCTIONS

4.4 Functions

4.4.1 Fully closed loop control error detection

If fully closed loop control becomes instable for some reason, the speed at servo motor end may increase abnormally.

The fully closed loop control error detection function is a protective function designed to pre-detect it and stop operation.

The fully closed loop control error detection function has two different detection methods, speed difference and position difference, and errors are detected only when the corresponding functions are made valid by setting Fully closed loop function selection (parameter No. PE03).

The detection level setting can be changed using the parameters (No. PE06, PE07).

(1) Parameters

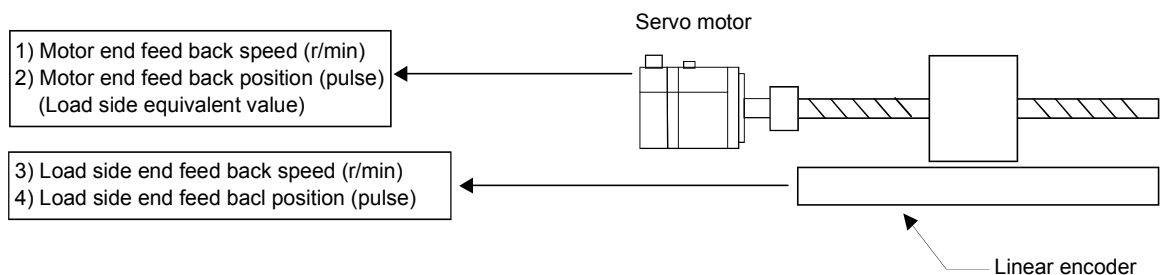
The fully closed loop control error detection function is selected.

Parameter No. PE03

0	0	0	
---	---	---	--

Fully closed loop control error detection function selection
0: Invalid
1: Speed difference error detection
2: Position difference error detection
3: Speed difference error/position deviation error detection

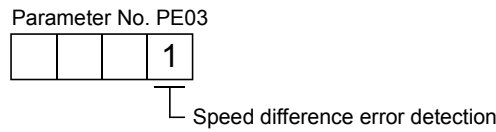
(2) Fully closed loop control error detection function



4. OPERATION AND FUNCTIONS

(a) Speed difference error detection

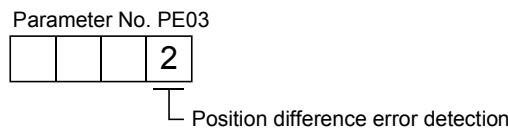
Set "□□□1" in parameter No. PE03 to make the speed deviation error detection valid.



Comparing the motor side feedback speed (1)) and load side feedback speed (3)), if the difference is not less than the set value (1 to the permissible speed r/min) of parameter No. PE06 (fully closed loop control speed deviation error detection level), the function generates an alarm (fully closed loop control error detection 42) and stops. The initial value of parameter No. PE06 is 400r/min. Change the set value as required.

(b) Position difference error detection

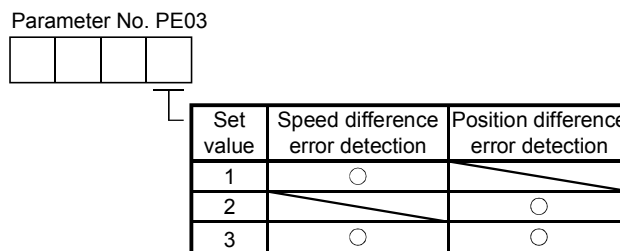
Set "□□□2" in parameter No. PA03 to make the position deviation error detection valid.



Comparing the motor side feedback position (2)) and load side feedback position (4)), if the difference is not less than the set value (1 to 20000kpulse) of parameter No. PE07 (fully closed loop control position deviation error detection level), the function generates an alarm (fully closed loop control error detection 42) and stops. The initial value of parameter No. PE07 is 100kpulse. Change the set value as required.

(c) Detecting multiple difference errors

When setting parameter No. PE03 as shown below, multiple difference errors can be detected. For the error detection method, refer to (a) and (b) in this section.



4.4.2 Auto tuning function

The auto tuning function is the same as that of the MR-J3-□ B servo amplifier. For full information, refer to the MR-J3-□ B Servo Amplifier Instruction Manual.

4.4.3 Machine analyzer function

The machine analyzer function of the Servo Configuration software is the same as that of the MR-J3-□ B servo amplifier.

For full information, refer to the MR-J3-□ B Servo Amplifier Instruction Manual.

This function is activated by the feedback of the motor encoder. It is irrelevant to the load side encoder.

4. OPERATION AND FUNCTIONS

4.4.4 Test operation

Test operation can be performed by combining the Servo Configuration software that runs on the personal computer and the servo amplifier.

This servo amplifier cannot use motor-less operation.

For details on the test operation, refer to the MR-J3-□ B Servo Amplifier Instruction Manual.

Function	Item	Usability	Remarks
Test operation	Jog operation	Usable	Performed by the feedback of the motor encoder. It is irrelevant to the load side encoder.
	Positioning operation	Usable	In the setting of parameter No.PA01, the operations can be set in the motor encoder unit resolution unit or the load side encoder resolution unit.
	Program operation	Usable	In the setting of parameter No.PE01, semi closed loop control/fully closed loop control can be set. However, the semi closed loop control is always set only if parameter No.PE01 is set to "□□□ 1". For details, refer to Section 4.1.2.
	Output signal (DO) forced output	Usable	Same as the MR-J3-□ B servo amplifier function.
	Motor-less operation	Unusable	Not supported.

4. OPERATION AND FUNCTIONS

4.5 Absolute Position Detection System under Fully Closed loop System

POINT	▪ When using a rotary encoder, the absolute position system cannot be configured.

An Absolute type linear encoder is necessary to configure an absolute position detection system under fully closed loop control using a linear encoder.

In this case, the encoder battery (MR-J3BAT) need not be installed to the servo amplifier.

Make setting to make Absolute position detection valid in the servo parameter (Parameter No. PA03). The system can be used in the following limited conditions.

(1) Using conditions

- 1) Use an absolute type linear encoder with the load side encoder.
- 2) Select Always fully closed loop (Parameter No. PA01 = 1 , Parameter No. PE01 = 0).

(2) Absolute position detection range using encoder

Encoder Type	Absolute Position Detection Enabled Range
Linear encoder (Serial Interface)	Movable distance range of scale (within 32-bit absolute position data)

(3) Alarm detection

The absolute position-related alarm (25) and warnings (92, 9F) are not detected.

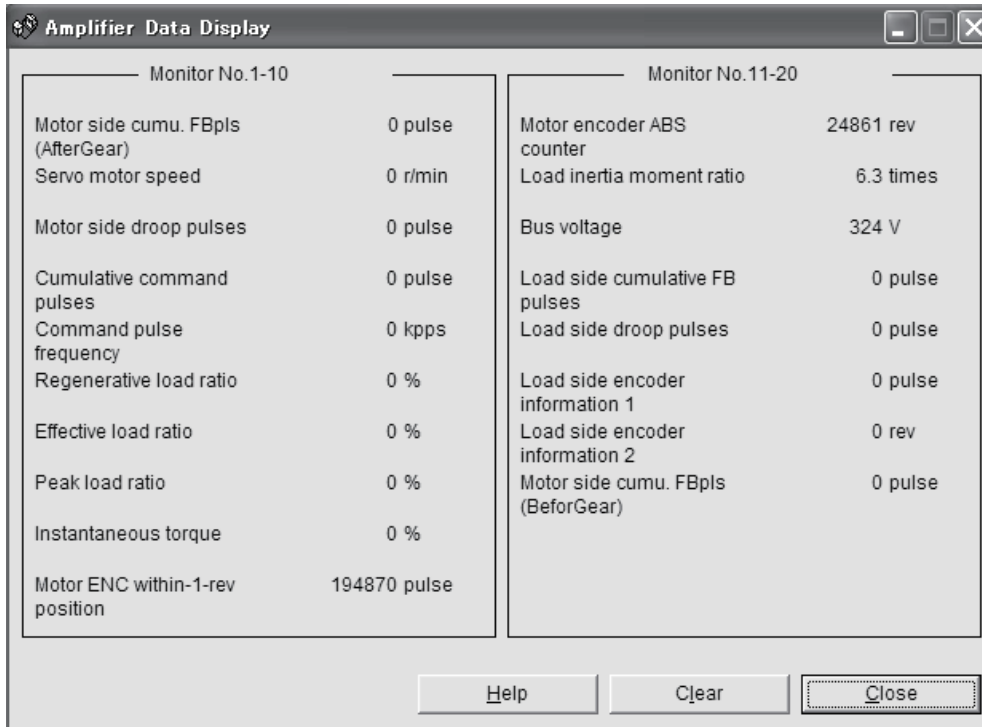
4. OPERATION AND FUNCTIONS

4.6 About MR Configurator

Using MR Configurator can confirm if the parameter setting is normal or if the servo motor and the load side encoder operate properly.

(1) Batch monitor display

Select "MR-J3-B fully closed loop" in the system setting of the setup menu.



Name	Explanation	Unit
Motor side cumulative feedback pulses (after gear)	Feedback pulses from the servo motor encoder are counted and displayed. (Load side encoder unit) When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse
Servo motor speed	The servo motor speed is displayed. It is displayed rounding off 0.1r/min unit. The "-" symbol is indicated for reverse.	r/min
Motor side droop pulses	Droop pulses of the difference counter between a motor side position and a command are displayed. The "-" symbol is indicated for reverse.	pulse
Cumulative command pulses	Position command input pulses are counted and displayed. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse command.	pulse
Command pulse frequency	The frequency of position command input pulses is counted and displayed. The "-" symbol is indicated for reverse command.	kpps
Regenerative load ratio	The proportion of regenerative powers to permissive regenerative powers is indicated in percentage. Permissive regenerative powers differ according to the absence or presence of a regenerative option. Set parameter No.PA02 correctly according to the regenerative option.	%
Effective load ratio	The continuous effective load torque is displayed. The effective value is displayed considering a rated torque as 100%.	%

4. OPERATION AND FUNCTIONS

Name	Explanation	Unit
Peak load ratio	The maximum occurrence torque is displayed. The maximum value for the past 15 seconds is displayed considering a rated torque as 100%.	%
Instantaneous occurrence torque	The instantaneous occurrence torque is displayed. The value of torque being occurred is displayed in real time considering a rated torque as 100%.	%
Position in motor side 1-revolution	The position in servo motor side 1-revolution is displayed in the encoder pulse unit. When the value exceeds the maximum number of pulses, it resets to 0. When the servo motor rotates in the CCW direction, the value is added.	pulse
Motor side absolute position counter	The movement amount from the home position (0) is displayed as multi-revolution counter value of the absolute position encoder in the absolute position encoder system.	rev
Load inertia moment ratio	The estimated value of the servo motor shaft conversion load inertia moment ratio to the servo motor inertia moment is displayed.	times
Bus voltage	The voltage (across P-N) of main circuit converter is displayed.	V
Load side cumulative feedback pulses	Feedback pulses from the load side encoder are counted and displayed. When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse
Load side droop pulses	Droop pulses of the difference counter between a load side position and a command are displayed. The "-" symbol is indicated for reverse.	pulse
Load side encoder information 1	The position in load side encoder 1-revolution is displayed. For an incremental linear scale, the Z-phase counter is displayed. The value is counted up from 0 based on the home position (reference mark). It is displayed in load side encoder pulse unit. For an absolute position linear scale, the encoder absolute position is displayed.	pulse
Load side encoder information 2	Multi-revolution counter of the load side encoder is displayed. (for using a rotary encoder)	rev
Motor side cumulative feedback pulses (before gear)	Feedback pulses from the servo motor encoder are counted and displayed. (Motor encoder unit) When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse

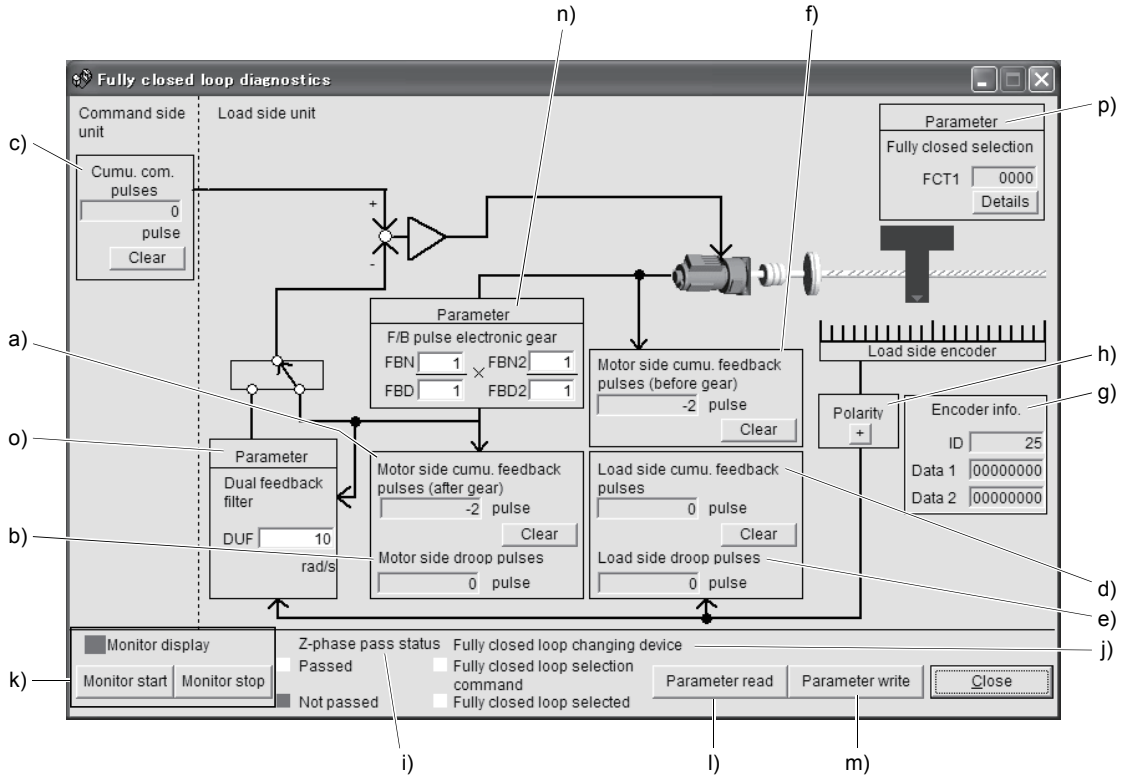
4. OPERATION AND FUNCTIONS

(2) Fully closed loop diagnostic screen

Select the fully closed loop diagnostics of the diagnostics menu.

Click "Monitor start" to constantly read the monitor display items from the amplifier. Then, click "Monitor stop" to stop reading.

Click "Parameter read" to read the parameter items from the amplifier, and then click "Parameter write" to write them.

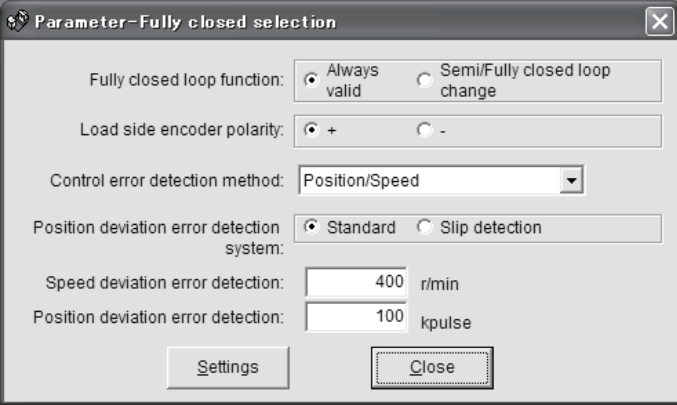


Symbol	Name	Explanation	Unit
a)	Motor side cumu. feedback pulses (after gear)	Feedback pulses from the servo motor encoder are counted and displayed. (Load side encoder unit) When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse
b)	Motor side droop pulses	Droop pulses of the difference counter between a motor side position and a command are displayed. The "-" symbol is indicated for reverse.	pulse
c)	Cumu. Com. pulses	Position command input pulses are counted and displayed. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse command.	pulse
d)	Load side cumu. feedback pulses	Feedback pulses from the load side encoder are counted and displayed. When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse
e)	Load side droop pulses	Droop pulses of the difference counter between a load side position and a command are displayed. The "-" symbol is indicated for reverse.	pulse
f)	Motor side cumu. feedback pulses (before gear)	Feedback pulses from the servo motor encoder are counted and displayed. (Motor encoder unit) When the set value exceeds 999999999, it starts with 0. Click "Clear" to reset the value to 0. The "-" symbol is indicated for reverse.	pulse

4. OPERATION AND FUNCTIONS

Symbol	Name	Explanation	Unit
g)	Encoder information	The load side encoder information is displayed. The display contents differ depending on the load side encoder type. <ul style="list-style-type: none"> • ID: The ID No. of the load side encoder is displayed. • Data 1: For the incremental type linear encoder, the counter from powering ON is displayed. For the absolute position type linear encoder, the absolute position data is displayed. • Data 2: For the incremental type linear encoder, the distance (number of pulses) from the reference mark (Z phase) is displayed. For the absolute position type linear encoder, "00000000" is displayed. 	
h)	Polarity	A polarity is indicated as " + " or " - " according to the load side encoder polarity specified in parameter No.PC27. For address increasing direction in the motor CCW, it is indicated as " + " and for address decreasing direction in the motor CCW, as " - ".	
i)	Z-phase pass status	If the fully closed loop system is "Invalid", the Z-phase pass status of the motor encoder is displayed. If the fully closed loop system is "Valid" or "Semi closed loop control/fully closed loop control switching", the Z-phase pass status of the load side encoder is displayed.	
j)	Fully closed loop changing device	Only if the fully closed loop system is "Semi closed loop control/fully closed loop control switching", the device is displayed. The state of the semi closed loop control/fully closed loop control switching bit and the inside state during selection are displayed.	
k)	Monitor display	Click the "Monitor start" button to start monitoring. Click the "Monitor stop" button to stop monitoring.	
l)	Parameter read	Click the "Parameter read" button to read all the parameter settings that can be set and displayed on this window from the servo amplifier and display them.	
m)	Parameter write	Click the "Parameter write" button to write the all parameter settings set and displayed on this window to the servo amplifier.	
n)	Parameter (Feedback pulse electronic gear)	The feedback pulse electronic gears (parameter No.PE04, PE05, PE34, PE35) are displayed/set for motor encoder pulses in this parameter. (Refer to Section 4.1.5.) For details of each parameter, refer to Section 5.5.2.	
o)	Parameter (Dual feedback filter)	The band of dual feedback filter (parameter No.PE08) is displayed/set in this parameter. For details of parameter, refer to Section 5.5.2.	

4. OPERATION AND FUNCTIONS

Symbol	Name	Explanation	Unit
p)	Parameter (fully closed loop selection)	<p>The parameter for the fully closed loop control is displayed/set. Click "Details" button to display the "Parameter – Fully closed selection" window.</p>  <ol style="list-style-type: none"> 1) Fully closed loop function (Parameter No.PE01) Select "Always valid" or "Semi/Fully closed loop change" for the fully closed loop control function. 2) Load side encoder polarity (Parameter No.PC27) Select " + (encoder pulse increasing direction in the servo motor CCW)" or " - (encoder pulse decreasing direction in the servo motor CCW)" for the encoder pulse count polarity. 3) Control error detection method (Parameter No.PE03) Select "Invalid", "Speed (speed deviation error detection)", "Position (position deviation error detection)" or "Position/Speed (speed deviation error/position deviation error)" for the fully closed loop control error detection function. 4) Position deviation error detection system (Parameter No.PE03) Select "Standard (always position difference detection system)" or "Slip detection (stopping position difference detection system)" for a detection condition regarding the fully closed loop control error and the position difference error of the detection function. 5) Speed deviation error detection (Parameter No. PE06) Set the speed deviation error detection level to be used in the fully closed loop control error detection function. 6) Position deviation error detection (Parameter No.PE07) Set the position deviation error detection level to be used in the fully closed loop control error detection function. <p>For details of each parameter, refer to Section 5.3.2 and 5.5.2. Click "Settings" to set the functions. Click "Close" to end the window.</p>	

5. PARAMETERS

5. PARAMETERS



CAUTION

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

POINT

- This chapter describes the parameters unique to the fully closed loop control compatible servo amplifier MR-J3-□B-RJ006. For the same parameters as those of MR-J3-□B servo amplifier, refer to Chapter 5 of the MR-J3-□B Servo Amplifier Instruction Manual.

In the MR-J3-B-RJ006 servo amplifier, the parameters are classified into the following groups on a function basis.

Parameter Group	Main Description
Basic setting parameters (No. PA□□)	When using this servo amplifier in the position control mode, make basic setting with these parameters.
Gain/filter parameters (No. PB□□)	Use these parameters when making gain adjustment manually.
Extension setting parameters (No. PC□□)	When changing settings such as analog monitor output signal or encoder electromagnetic brake sequence output, use these parameters.
I/O setting parameters (No. PD□□)	Use these parameters when changing the I/O signals of the servo amplifier.
Extension control parameters (No. PE□□)	Use this parameter when selecting a function in the fully closed loop system.

When using this servo in the position control mode, mainly setting the basic setting parameters (No. PA□□) allows the setting of the basic parameters at the time of introduction.

5.1 Basic Setting Parameters (No.PA□□)

POINT

- Parameter whose symbol is preceded by * is made valid with the following conditions.
 - * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset.
 - ** : Set the parameter value, switch power off once, and then switch it on again.
- Never change parameters for manufacturer setting.

5. PARAMETERS

5.1.1 Parameter list

No.	Symbol	Name	Initial Value	Unit	Reference
PA01	**STY	Control mode	0000h		Section 5.1.3
PA02	**REG	Regenerative brake option	0000h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PA03	*ABS	Absolute position detection system	0000h		Section 5.1.4
PA04	*AOP1	Function selection A-1	0000h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PA05		For manufacturer setting	0		
PA06			1		
PA07			1		
PA08	ATU	Auto tuning	0001h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PA09	RSP	Auto tuning response	12		
PA10	INP	In-position range	100	pulse	Section 5.1.5
PA11		For manufacturer setting	1000.0	%	
PA12			1000.0	%	
PA13			0000h		
PA14	*POL	Rotation direction selection	0		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PA15	*ENR	Encoder output pulses	4000	pulse/rev	Section 5.1.6
PA16	*ENR2	Encoder output pluses	0		
PA17		For manufacturer setting	0000h		
PA18			0000h		
PA19	*BLK	Parameter write inhibit	000Fh		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual

5. PARAMETERS

5.1.2 Parameter write inhibit

Parameter			Initial Value	Unit	Setting Range
No.	Symbol	Name			
PA19	*BLK	Parameter write inhibit	000Fh		Refer to the text.

POINT
<ul style="list-style-type: none"> This parameter is made valid when power is switched off, then on after setting, or when the controller reset has been performed.

In the factory setting, this servo amplifier allows changes to the basic setting parameter, gain/filter parameter, extension setting parameter, I/O setting parameter and extension control parameter settings. With the setting of parameter No. PA19, write can be disabled to prevent accidental changes.

The following table indicates the parameters which are enabled for reference and write by the setting of parameter No. PA19. Operation can be performed for the parameters marked ○ .

Parameter No. PA19 Setting	Setting Operation	Basic Setting Parameters No. PA □□	Gain/Filter Parameters No. PB □□	Extension Setting Parameters No. PC □□	I/O Setting Parameters No. PD □□	Extension Control Parameters No. PE □□
0000h	Reference	○				
	Write	○				
000Bh	Reference	○	○	○		
	Write	○	○	○		
000Ch	Reference	○	○	○	○	
	Write	○	○	○	○	
000Fh (initial value)	Reference	○	○	○	○	○
	Write	○	○	○	○	○
100Bh	Reference	○				
	Write	Parameter No. PA19 only				
100Ch	Reference	○	○	○	○	○
	Write	Parameter No. PA19 only				

5. PARAMETERS

5.1.3 Selecting a control mode

Parameter			Initial Value	Unit	Setting Range
No.	Symbol	Name			
PA01	**STY	Control mode	0000h		Refer to the text.

POINT
<ul style="list-style-type: none"> This parameter value and switch power off once, then switch it on again to make that parameter setting valid.

Select a control mode.

The initial value of this parameter is set to "□ □ 0 □" (semi closed loop system).

When using the fully closed loop system, make sure to set the value to "□ □ 1 □". In this case, the value can be set to the fully closed loop system by the parameter No. PE01 setting and the semi closed loop system/fully closed loop system switching bit of the motion controller command. (Refer to Section 1.5.)

Parameter No. PA01

0	0	□	0
---	---	---	---

Control mode selection
 0: Semi closed loop system
 1: Fully closed loop system

5.1.4 Using absolute position detection system

Parameter			Initial Value	Unit	Setting Range
No.	Symbol	Name			
PA03	*ABS	Absolute position detection system	0000h		Refer to the text.

POINT
<ul style="list-style-type: none"> This parameter is made valid when power is switched off, then on after setting, or when the controller reset has been performed. This parameter cannot be used in the speed control mode.

Set this parameter when using the absolute position detection system in the position control mode.

Parameter No. PA03

0	0	0	□
---	---	---	---

Selection of absolute position detection system (refer to Chapter 12 of the MR-J3-□B Servo Amplifier Instruction Manual)
 0: Used in incremental system
 1: Used in absolute position detection system

5. PARAMETERS

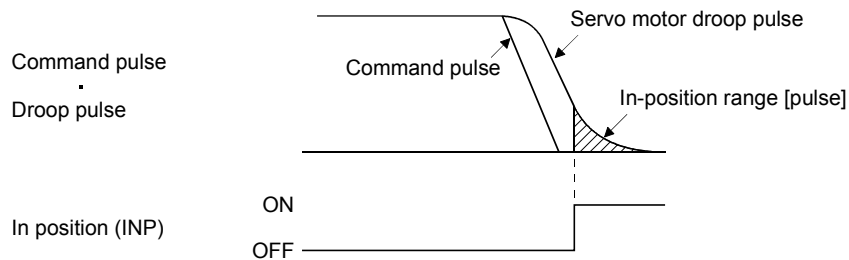
5.1.5 In-position range

Parameter			Initial Value	Unit	Setting Range
No.	Symbol	Name			
PA10	INP	In-position range	100	pulse	0 to 65535

POINT
▪ This parameter cannot be used in the speed control mode.

Set the range, where In position (INP) is output, in the command pulse unit.

For the semi closed loop system, set it in the motor encoder unit. For the fully closed loop system, set it in the load side encoder unit.



5.1.6 Encoder output pulse

Parameter			Initial Value	Unit	Setting Range
No.	Symbol	Name			
PA15	*ENR	Encoder output pulse	4000	pulse/rev	1 to 65535
PA16	*ENR2	Encoder output pulse 2	0		0 to 65535

POINT
▪ This parameter is made valid when power is switched off, then on after setting, or when the controller reset has been performed.

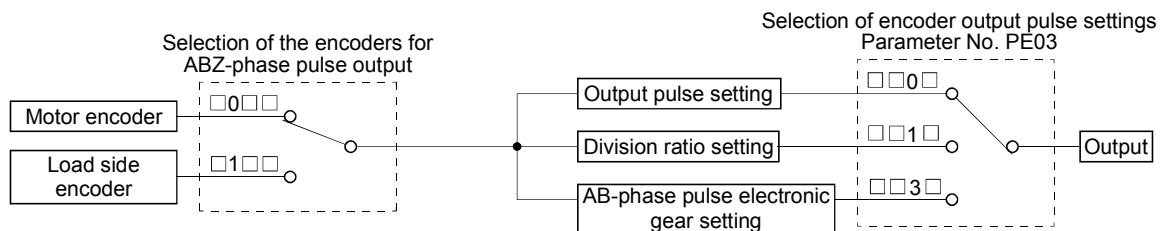
Used to set the encoder pulses (A-phase, B-phase) output by the servo amplifier.

Set the value 4 times greater than the A-phase or B-phase pulses.

You can use parameter No. PC03 to choose the output pulse setting or output division ratio setting.

The number of A/B-phase pulses actually output is 1/4 times greater than the preset number of pulses.

The maximum output frequency is 4.6Mpps (after multiplication by 4). Use this parameter within this range.



5. PARAMETERS

(1) For output pulse designation

Set "□□0□" (initial value) in parameter No. PC03. When parameter No.PC03 has been set to "□1□□", the parameter error (37) occurs.

Set the number of pulses per servo motor revolution.

Output pulse = set value [pulses/rev]

For instance, set "5600" to Parameter No. PA15, the actually output A/B-phase pulses are as indicated below:

$$A \cdot B\text{-phase output pulses} = \frac{5600}{4} = 1400[\text{pulse}]$$

(2) For output division ratio setting

Set "□□1□" in parameter No. PC03.

The number of pulses per servo motor revolution is divided by the set value.

Output pulse = $\frac{\text{Resolution per servo motor revolution}}{\text{Set value}}$ [pulses/rev]

For instance, set "8" to Parameter No. PA15, the actually output A/B-phase pulses are as indicated below:

$$A \cdot B\text{-phase output pulses} = \frac{262144}{8} \cdot \frac{1}{4} = 8192[\text{pulse}]$$

(3) For output electronic gear ratio setting

Set "□□3□" in parameter No. PC03.

The resolution per servo motor revolution is set by parameter No.PA15, PA16.

Output pulse = Resolution per servo motor revolution $\times \frac{\text{Set value of parameter No.PA15}}{\text{Set value of parameter No.PA16}}$ [pulses/rev]

For instance, set "3" to Parameter No. PA15 and "32" to Parameter No.PA16, the actually output A/B-phase pulses are as indicated below:

$$A \cdot B\text{-phase output pulses} = 262144 \times \frac{3}{32} \times \frac{1}{4} = 6144 [\text{pulse}]$$

5. PARAMETERS

5.2 Gain/Filter Parameters (No. PB□□)

POINT
<ul style="list-style-type: none"> ▪ The gain/filter parameter (No. PB □ □) is the same as that of MR-J3 □ B servo amplifier. For details, refer to the MR-J3- □ B Servo Amplifier Instruction Manual. ▪ Parameter whose symbol is preceded by * is made valid with the following conditions. * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset.

No.	Symbol	Name	Initial Value	Unit	Reference
PB01	FILT	Adaptive tuning mode (Adaptive filter II)	0000h		Chapter 5 of the MR-J3- □ B Servo Amplifier Instruction Manual
PB02	VRFT	Vibration suppression control filter tuning mode (Advanced vibration suppression control)	0000h		
PB03		For manufacturer setting	0		
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	times	
PB07	PG1	Model loop gain	24	rad/s	
PB08	PG2	Position loop gain	37	rad/s	
PB09	VG2	Speed loop gain	823	rad/s	
PB10	VIC	Speed integral compensation	33.7	ms	
PB11	VDC	Speed differential compensation	980		
PB12		For manufacturer setting	0		
PB13	NH1	Machine resonance suppression filter 1	4500	Hz	
B14	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	0000		
PB18	LPF	Low-pass filter	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			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	times	
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			0.00		
PB37			100		
PB38			0.0		
PB39			0.0		
PB40			0.0		
PB41			1125		

5. PARAMETERS

No.	Symbol	Name	Initial Value	Unit	Reference
PB42		For manufacturer setting	1125		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PB43			0004h		
PB44			0.0		
PB45			0000h		

5. PARAMETERS

5.3 Extension Setting Parameters (No. PC□□)

POINT
<ul style="list-style-type: none"> ▪ Parameter whose symbol is preceded by * is made valid with the following conditions. * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset. ** : Set the parameter value, switch power off once, and then switch it on again.

5.3.1 Parameter list

No.	Symbol	Name	Initial Value	Unit	Reference
PC01	*ERZ	Error excessive alarm level	3	rev	Section 5.3.2
PC02	MBR	Electromagnetic brake sequence output	0	ms	Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC03	*ENRS	Encoder output pulses selection	0000h		
PC04	**COP1	Function selection C-1	0000h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC05	**COP2	Function selection C-2	0000h		
PC06		For manufacturer setting	0000h		
PC07	ZSP	Zero speed	50	r/min	Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC08		For manufacturer setting	0		
PC09	MOD1	Analog monitor output 1	0000h		Section 5.3.2
PC10	MOD2	Analog monitor output 2	0001h		
PC11	MO1	Analog monitor 1 offset	0	mV	Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC12	MO2	Analog monitor 2 offset	0	mV	
PC13		For manufacturer setting	0	pulse	
PC14			0	10000 pulse	
PC15			0		
PC16			0000h		
PC17	**COP4	Function selection C-4	0000h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC18		For manufacturer setting	0000h		
PC19			0000h		
PC20			0000h		
PC21	*BPS	Alarm history clear	0000h		Chapter 5 of the MR-J3-□ B Servo Amplifier Instruction Manual
PC22		For manufacturer setting	0000h		
PC23			0000h		
PC24			0000h		
PC25			0000h		
PC26	**COP8	Function selection C-8	0100h		Section 5.3.2
PC27	**COP9	Function selection C-9	0000h		
PC28			0000h		
PC29			0000h		
PC30			0000h		
PC31			0000h		
PC32			0000h		

5. PARAMETERS

5.3.2 List of details

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range																										
PC01	*ERZ	<p>Error excessive alarm level</p> <p>This parameter cannot be used in the speed control mode.</p> <p>Set error excessive alarm level with rotation amount of servo motor.</p> <p>When selecting the fully closed loop control, set it in the virtual 1-revolution pulse unit.</p>	3	rev	1 to 200																										
PC03	*ENRS	<p>Encoder output pulse selection</p> <p>Use to select the, encoder output pulse direction and encoder pulse output setting.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px; text-align: center;">0</td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> </tr> </table> <p style="margin-left: 20px;">Encoder pulse output phase changing Changes the phases of A, B-phase encoder pulses output .</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <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 style="text-align: center;">0</td> <td> A phase B phase </td> <td> A phase B phase </td> </tr> <tr> <td style="text-align: center;">1</td> <td> A phase B phase </td> <td> A phase B phase </td> </tr> </tbody> </table> <p style="margin-left: 20px;">Encoder output pulse setting selection (Note)</p> <p style="margin-left: 20px;">0: Output pulse designation (When parameter No. PC03 is set to "□□1□□", the parameter error (37) occurs.)</p> <p style="margin-left: 20px;">1: Division ratio setting</p> <p style="margin-left: 20px;">3: AB-phase pulse electronic gear setting (The electronic gear is set in parameter No. PA15, PA16.)</p> <p style="margin-left: 20px;">Selection of the encoders for ABZ-phase pulse output (Note)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2">Set value</th> <th colspan="2">Control mode</th> </tr> <tr> <th>Semi closed loop system (□□0□ in parameter No. PA01)</th> <th>Fully closed loop system (□□1□ in parameter No. PA01)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 Motor encoder</td> <td colspan="2" style="text-align: center;">Motor encoder (in the motor encoder unit)</td> </tr> <tr> <td style="text-align: center;">1 Load side encoder</td> <td style="text-align: center;">Parameter error (37)</td> <td style="text-align: center;">Load side encoder (in the load side encoder)</td> </tr> </tbody> </table> </div> <p>Note. For details, refer to Section 5.1.6.</p>	0				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	Set value	Control mode		Semi closed loop system (□□0□ in parameter No. PA01)	Fully closed loop system (□□1□ in parameter No. PA01)	0 Motor encoder	Motor encoder (in the motor encoder unit)		1 Load side encoder	Parameter error (37)	Load side encoder (in the load side encoder)	0000h		Refer to Name and function column.
0																															
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1 Load side encoder	Parameter error (37)	Load side encoder (in the load side encoder)																													

5. PARAMETERS

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range																																										
PC09	MOD1	<p>Analog monitor 1 output Used to selection the signal provided to the analog monitor 1 (MO1) output. (Refer to Section 5.3.3)</p> <div style="border: 1px solid black; display: inline-block; padding: 2px;"> <table style="border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> </tr> </table> </div> <p style="margin-left: 40px;">└─ Analog monitor 1 (MO1) output selection</p> <table border="1" style="margin-left: 40px; border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="width: 10%;">Setting</th> <th>Item</th> </tr> </thead> <tbody> <tr><td>00</td><td>Servo motor speed ($\pm 8V/\text{max. speed}$)</td></tr> <tr><td>01</td><td>Torque ($\pm 8V/\text{max. torque}$)</td></tr> <tr><td>02</td><td>Servo motor speed ($+8V/\text{max. speed}$)</td></tr> <tr><td>03</td><td>Torque ($+8V/\text{max. torque}$)</td></tr> <tr><td>04</td><td>Current command ($\pm 8V/\text{max. current command}$)</td></tr> <tr><td>05</td><td>Speed command ($\pm 8V/\text{max. speed}$) Speed conversion of command pulse for position control, speed command for speed control, and no output for torque control</td></tr> <tr><td>06</td><td>Motor side droop pulses ($\pm 10V/100$ pulses) (Note)</td></tr> <tr><td>07</td><td>Motor side droop pulses ($\pm 10V/1000$ pulses) (Note)</td></tr> <tr><td>08</td><td>Motor side droop pulses ($\pm 10V/10000$ pulses) (Note)</td></tr> <tr><td>09</td><td>Motor side droop pulses ($\pm 10V/100000$ pulses) (Note)</td></tr> <tr><td>0D</td><td>Bus voltage ($\pm 8V/400V$)</td></tr> <tr><td>10</td><td>Load side droop pulses ($\pm 10V/100$ pulses) (Note)</td></tr> <tr><td>11</td><td>Load side droop pulses ($\pm 10V/1000$ pulses) (Note)</td></tr> <tr><td>12</td><td>Load side droop pulses ($\pm 10V/10000$ pulses) (Note)</td></tr> <tr><td>13</td><td>Load side droop pulses ($\pm 10V/100000$ pulses) (Note)</td></tr> <tr><td>14</td><td>Load side droop pulses ($\pm 10V/1000000$ pulses) (Note)</td></tr> <tr><td>15</td><td>Motor side · load side position difference ($\pm 10V/100000$ pulses)</td></tr> <tr><td>16</td><td>Motor side · Eload side speed difference ($\pm 8V/\text{Max.speed}$)</td></tr> </tbody> </table> <p>Note. Output in the load side encoder unit for the fully closed loop control and in the motor encoder unit for the semi closed loop control.</p>	0	0			Setting	Item	00	Servo motor speed ($\pm 8V/\text{max. speed}$)	01	Torque ($\pm 8V/\text{max. torque}$)	02	Servo motor speed ($+8V/\text{max. speed}$)	03	Torque ($+8V/\text{max. torque}$)	04	Current command ($\pm 8V/\text{max. current command}$)	05	Speed command ($\pm 8V/\text{max. speed}$) Speed conversion of command pulse for position control, speed command for speed control, and no output for torque control	06	Motor side droop pulses ($\pm 10V/100$ pulses) (Note)	07	Motor side droop pulses ($\pm 10V/1000$ pulses) (Note)	08	Motor side droop pulses ($\pm 10V/10000$ pulses) (Note)	09	Motor side droop pulses ($\pm 10V/100000$ pulses) (Note)	0D	Bus voltage ($\pm 8V/400V$)	10	Load side droop pulses ($\pm 10V/100$ pulses) (Note)	11	Load side droop pulses ($\pm 10V/1000$ pulses) (Note)	12	Load side droop pulses ($\pm 10V/10000$ pulses) (Note)	13	Load side droop pulses ($\pm 10V/100000$ pulses) (Note)	14	Load side droop pulses ($\pm 10V/1000000$ pulses) (Note)	15	Motor side · load side position difference ($\pm 10V/100000$ pulses)	16	Motor side · Eload side speed difference ($\pm 8V/\text{Max.speed}$)	0000h		Refer to Name and function column.
0	0																																														
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00	Servo motor speed ($\pm 8V/\text{max. speed}$)																																														
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PC10	MOD2	<p>Analog monitor 2 output Used to selection the signal provided to the analog monitor 2 (MO2) output. (Refer to Section 5.3.3)</p> <div style="border: 1px solid black; display: inline-block; padding: 2px;"> <table style="border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> </tr> </table> </div> <p style="margin-left: 40px;">└─ Analog monitor 2 (MO2) output selection The settings are the same as those of the analog monitor 1 output. For details, refer to the parameter No.PC09.</p>	0	0			0001h		Refer to Name and function column.																																						
0	0																																														

5. PARAMETERS

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range				
PC26	** COP8	<p>Function selection C-8 Used to select the communication system of the serial interface encoder cable to be connected to the CN2L connector.</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px; text-align: center;">1</td> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px; text-align: center;">0</td> </tr> </table> <p style="margin-left: 20px;"> Load side encoder cable communication system selection 0: 2-wire type 1: 4-wire type If the setting is incorrect, the load side encoder error1 (70) or load side encoder error2 (71) occurs. </p>		1	0	0	0100h		Refer to Name and function column
	1	0	0						
PC27	** COP9	<p>Function Selection C-9 Polarity of the encoder connected to the CN2L connector and the Z-phase connection judgment of the ABZ-phase input interface encoder are selected.</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px;"></td> </tr> </table> <p style="margin-left: 20px;"> Selection of encoder pulse count polarity 0: Encoder pulse increasing direction on the servo motor CCW 1: Encoder pulse decreasing direction on the servo motor CCW Selection of ABZ-phase input interface encoder Z-phase connection judgment function Alarm judgment function without the Z-phase connection is selected when the ABZ-phase input interface encoder is connected. 0: Alarm valid If not connected, the encoder error 2 (71) occurs. 1: Alarm invalid Even if not connected, the encoder error 2 (71) does not occur. </p>	0		0		0000h		Refer to Name and function column
0		0							

5. PARAMETERS

5.3.3 Analog monitor

The servo status can be output to two channels in terms of voltage. The servo status can be monitored using an ammeter.

(1) Setting

Change the following digits of parameter No. PC09, PC10:

Parameter No. PC09

0	0		
---	---	--	--

Analog monitor (MO1) output selection
(Signal output to across MO1-LG)

Parameter No. PC10

0	0		
---	---	--	--

Analog monitor (MO2) output selection
(Signal output to across MO2-LG)

Parameters No. PC11 and PC12 can be used to set the offset voltages to the analog output voltages. The setting range is between -999 and 999 mV.

Parameter No.	Description	Setting range [mV]
PC11	Used to set the offset voltage for the analog monitor 1 (MO1).	-999 to 999
PC12	Used to set the offset voltage for the analog monitor 2 (MO2).	

(2) Set content

The servo amplifier is factory-set to output the servo motor speed to analog monitor 1 (MO1) and the torque to analog monitor (MO2). The setting can be changed as listed below by changing the parameter No. PC14 and PC12 value:

Refer to (3) for the measurement point.

Setting	Output item	Description	Setting	Output item	Description
00	Servo motor speed		01	Torque (Note 2)	
02	Servo motor speed		03	Torque (Note 2)	
04	Current command		05	Speed command	

5. PARAMETERS

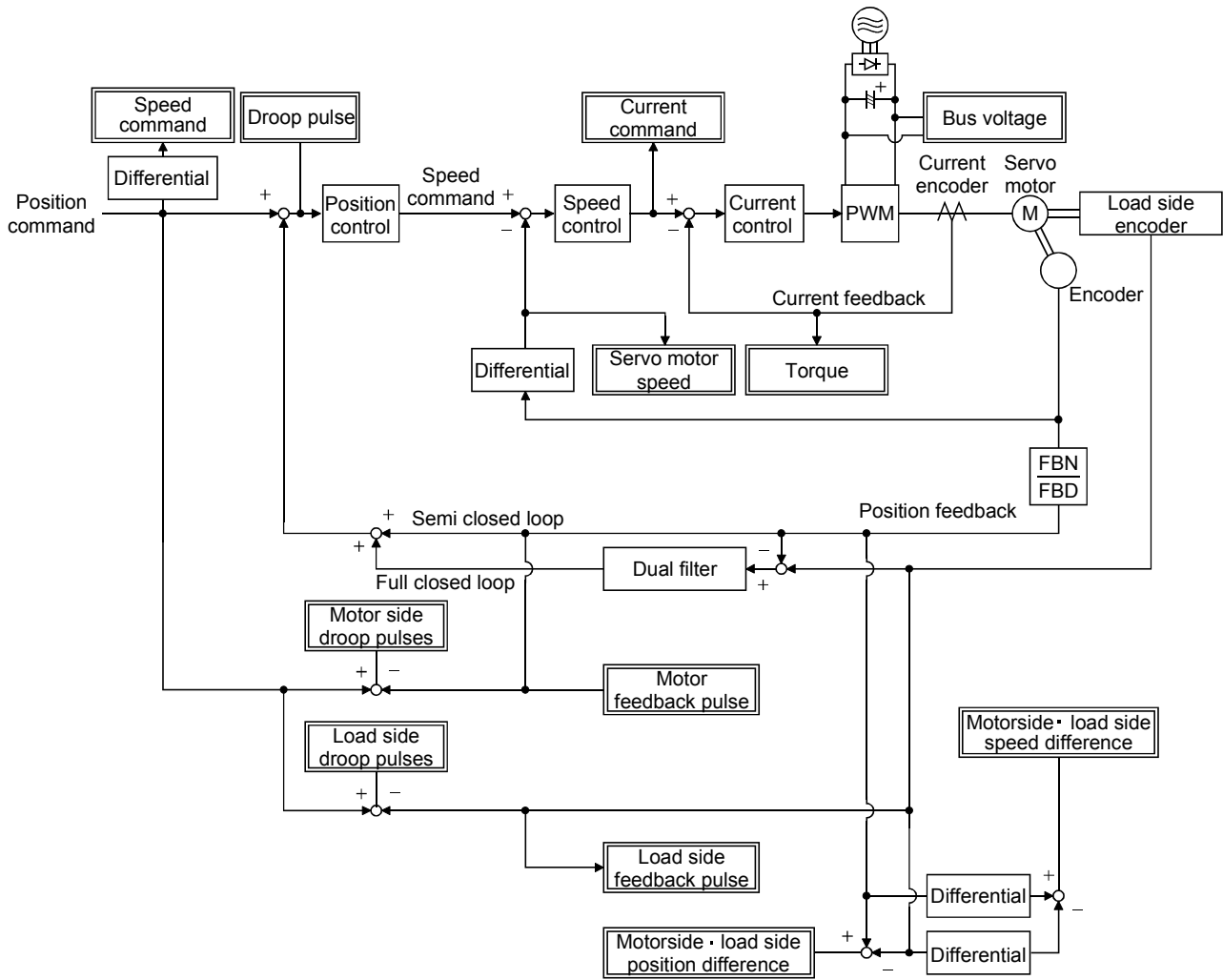
Setting	Output item	Description	Setting	Output item	Description
06	Motor side droop pulses (Note 1) ($\pm 10\text{V}/100$ pulses)		07	Motor side droop pulses (Note 1) ($\pm 10\text{V}/1000$ pulses)	
08	Motor side droop pulses (Note 1) ($\pm 10\text{V}/10000$ pulses)		09	Motor side droop pulses (Note 1) ($\pm 10\text{V}/100000$ pulses)	
0D	Bus voltage		10	Load side droop pulses (Note 1) ($\pm 10\text{V}/100$ pulses)	
11	Motor side droop pulses (Note 1) ($\pm 10\text{V}/1000$ pulses)		12	Load side droop pulses (Note 1) ($\pm 10\text{V}/10000$ pulses)	
13	Load side droop pulses (Note 1) ($\pm 10\text{V}/100000$ pulses)		14	Load side droop pulses (Note 1) ($\pm 10\text{V}/1\text{M}$ pulses)	
15	Motor side * load side position deviation (Note 1) ($\pm 10\text{V}/10\text{M}$ pulses)		16	Motor side * load side speed deviation	

Note 1. Output in the load side encoder unit for the fully closed loop control and in the motor encoder unit for the semi closed loop control.

2. Outputs 8V at the maximum torque.

5. PARAMETERS

(3) Analog monitor block diagram (fully closed loop)



5. PARAMETERS

5.4 I/O Setting Parameters (No. PD□□)

POINT
<ul style="list-style-type: none"> ▪ Parameter whose symbol is preceded by * is made valid with the following conditions. * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset.

5.4.1 Parameter list

No.	Symbol	Name	Initial Value	Unit	Reference
PD01		For manufacturer setting	0000h		Chapter 5 of the MR-J3- □ B Servo Amplifier Instruction Manual
PD02			0000h		
PD03			0000h		
PD04			0000h		
PD05			0000h		
PD06			0000h		
PD07	*D01	Output signal device selection 1 (CN3-pin 13)	0005h		
PD08	*D02	Output signal device selection 2 (CN3-pin 9)	0004h		
PD09	*D03	Output signal device selection 3 (CN3-pin 15)	0003h		
PD10		For manufacturer setting	0000h		
PD11			0004h		
PD12			0000h		
PD13			0000h		
PD14	*D0P3	Function selection D-3	0000h		
PD15		For manufacturer setting	0000h		
PD16			0000h		
PD17			0000h		
PD18			0000h		
PD19			0000h		
PD20			0000h		
PD21			0000h		
PD22			0000h		
PD23			0000h		
PD24			0000h		
PD25			0000h		
PD26			0000h		
PD27			0000h		
PD28			0000h		
PD29			0000h		
PD30			0000h		
PD31			0000h		
PD32			0000h		

5. PARAMETERS

5.5 Extension Control Parameters (No. PE □□)

POINT
<ul style="list-style-type: none"> ▪ Parameter whose symbol is preceded by * is made valid with the following conditions. * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset. ** : Set the parameter value, switch power off once, and then switch it on again.

5.5.1 Parameter list

No.	Symbol	Name	Initial Value	Unit	
PE01	**FCT1	Fully closed loop selection 1	0000h		
PE02		For manufacturer setting	0102h		
PE03	*FCT2	Fully closed loop selection 2	0003h		
PE04	**FBN	Fully closed loop feedback pulse electronic gear numerator 1	1		
PE05	**FBD	Fully closed loop feedback pulse electronic gear denominator 1	1		
PE06	BC1	Fully closed loop control position deviation error detection level	400		r/min
PE07	BC2	Fully closed loop control speed deviation error detection level	100		kpulse
PE08	DUF	Fully closed loop dual feedback filter	10		rad/s
PE09		For manufacturer setting	0000h		
PE10	FCT3	Fully closed loop selection 3	0000h		
PE11		For manufacturer setting	0		
PE12			40		
PE13			FFFEh		
PE14			0111h		
PE15			20		
PE16			0000h		
PE17			0000h		
PE18			0000h		
PE19			0000h		
PE20			0000h		
PE21			0000h		
PE22			0000h		
PE23			0000h		
PE24			0000h		
PE25			0000h		
PE26			0000h		
PE27			0000h		
PE28			0000h		
PE29			0000h		
PE30			0000h		
PE31			0000h		
PE32			0000h		
PE33			0000h		
PE34	**FBN2	Fully closed loop feedback pulse electronic gear numerator 2	1		
PE35	**FBD2	Fully closed loop feedback pulse electronic gear denominator 2	1		
PE36		For manufacturer setting	0.0		
PE37			0.00		

5. PARAMETERS

No.	Symbol	Name	Initial Value	Unit
PE38	/	For manufacturer setting	0.00	/
PE39			0000h	
PE40			0000h	

5.5.2 List of details

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range										
PE01	**FCT1	<p>Fully closed loop Selection 1 Select the semi closed loop control/fully closed loop control.</p> <p>Parameter No. PE01</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;"> </td> </tr> </table> <p style="margin-left: 40px;">Fully closed loop control selection 0: Always fully closed loop control 1: Selection using the control command of controller</p> <table border="1" style="margin-left: 40px; width: 150px;"> <thead> <tr> <th style="width: 50%;">Selection using the control command of controller</th> <th style="width: 50%;">Control method</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Semi closed loop control</td> </tr> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">Fully closed loop control</td> </tr> </tbody> </table> <p style="margin-left: 40px;">When parameter No.PA01 control configuration is set to "□□1□" (fully closed loop system), this setting is enabled.</p>	0	0	0		Selection using the control command of controller	Control method	OFF	Semi closed loop control	ON	Fully closed loop control	0000h		Refer to Name and function column.
0	0	0													
Selection using the control command of controller	Control method														
OFF	Semi closed loop control														
ON	Fully closed loop control														
PE03	**FCT2	<p>Fully closed loop Selection 2 Set the fully closed loop control error detection function, position deviation error detection system and fully closed loop control error reset.</p> <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 20px; text-align: center;"> </td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;"> </td> <td style="width: 20px; text-align: center;"> </td> </tr> </table> <p style="margin-left: 40px;">Fully closed loop control error detection function selection 0: Invalid 1: Speed deviation error detection 2: Position deviation error detection 3: Speed deviation error/position deviation error detection</p> <p style="margin-left: 40px;">Position deviation error detection system selection Selects a detection condition regarding the fully closed loop control error and the position deviation error of the detection function. 0: Standard position deviation detection system (constant detection) 1: Position deviation detection system at stop (detected with command set to 0)</p> <p style="margin-left: 40px;">Fully closed loop control error reset selection Selects an alarm reset condition from the controller when the fully closed loop control error detection (42) occurs. 0: Reset disabled (reset by powering OFF enabled) 1: Reset enabled</p>		0			0003h		Refer to Name and function column.						
	0														
PE04	**FBN	<p>Fully closed loop control feedback pulse electronic gear 1 numerator Used to set the numerator of the electronic gear to the motor encoder pulse. Set the electronic gear so that the number of pulses for one servo motor revolution is converted to the resolution of the load side encoder.</p>	1		1 to 65535										
PE05	**FBD	<p>Fully closed loop control feedback pulse electronic gear 1 denominator Used to set the denominator of the electronic gear to the motor encoder pulse. Set the electronic gear so that the number of pulses for one servo motor revolution is converted to the resolution of the load side encoder.</p>	1		1 to 65535										

5. PARAMETERS

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range				
PE06	BC1	Fully closed loop control speed deviation error detection level Used to set the speed deviation error detection level of the fully closed loop control error detection. Valid/invalid of this function can be selected in parameter No.PE03(FCT2). Note. If the software version is A0, an alarm error (37) occurs when a value exceeding the permissible speed is set. If the software version is B0, the alarm error (37) does not occur when a value exceeding the permissible speed is set, and the value is set within the permissible speed.	400	r/min	1 to 50000 (Note)				
PE07	BC2	Fully closed loop control position deviation error detection level Used to set the position deviation error detection level of the fully closed loop control error detection. Valid/invalid of this function can be selected in parameter No.PE03(FCT2).	100	kpulse	1 to 20000				
PE08	DUF	Fully closed loop dual feedback filter Used to set the band of the dual feedback filter. For the dual feedback filter, refer to Section 1.5.2.	10	rad/s	0 to 4500				
PE09		For manufacturer setting Do not change this value by any means.	0000h						
PE10	FCT3	Fully closed loop Selection 3 Used to set the monitor information of the controller. <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;">0</td> <td style="width: 20px; height: 20px;">0</td> </tr> </table> </div> <div> <p>— Droop pulse monitor setting for controller display Sets the encoder to be used for the droop pulse monitor for controller display. 0: Motor encoder 1: Load side encoder 2: FDifference between the motor side and load side For the semi closed loop control, the motor encoder is used regardless of the settings.</p> <p>— Feedback pulse accumulation monitor setting for controller display Sets the encoder to be used for the feedback pulse accumulation monitor for controller display. 0: Motor encoder 1: Load side encoder For the semi closed loop control, the motor encoder is used regardless of the settings.</p> </div> </div>			0	0	0000h		Refer to Name and function column.
		0	0						
PE11		For manufacturer setting	0						
PE12		Do not change this value by any means.	40						
PE13			FFFEh						
PE14			0111h						
PE15			20						
PE16			0000h						
PE17			0000h						
PE18			0000h						
PE19			0000h						
PE20			0000h						
PE21			0000h						
PE22			0000h						
PE23			0000h						
PE24			0000h						
PE25			0000h						
PE26			0000h						
PE27			0000h						
PE28			0000h						

5. PARAMETERS

No.	Symbol	Name and Function	Initial Value	Unit	Setting Range
PE29		For manufacturer setting Do not change this value by any means.	0000h		
PE30			0000h		
PE31			0000h		
PE32			0000h		
PE33			0000h		
PE34	**FBN2	Fully closed loop control feedback pulse electronic gear 2 numerator Used to set the numerator of the electronic gear to the motor encoder pulse. Set the electronic gear so that the number of pulses for one servo motor revolution is converted to the resolution of the load side encoder. When the set value is "0 (initial value)", it is identified as "1" inside.	1		0 to 32767
PE35	**FBD2	Fully closed loop control feedback pulse electronic gear 2 denominator Used to set the denominator of the electronic gear to the motor encoder pulse. Set the electronic gear so that the number of pulses for one servo motor revolution is converted to the resolution of the load side encoder. When the set value is "0 (initial value)", it is identified as "1" inside.	1		0 to 32767
PE36		For manufacturer setting Do not change this value by any means.	0.0		
PE37			0.00		
PE38			0.00		
PE39			0000h		
PE40			0000h		

6. TROUBLESHOOTING

6. TROUBLESHOOTING

POINT
<ul style="list-style-type: none"> Alarms and warnings are basically the same as those of MR-J3-□B servo amplifier. This chapter describes the contents different from those of MR-J3-□B servo amplifier. As soon as an alarm occurs, make the Servo off status and interrupt the main circuit power. Remedies for warnings are the same as those of MR-J3-□B servo amplifier. Refer to Chapter 8 of the MR-J3-□B Servo Amplifier Instruction Manual.

If an alarm has occurred, refer to this chapter and remove its cause.

6.1 Alarms and Warning List

When a fault occurs during operation, the corresponding alarm or warning is displayed. Refer to Section 6.2 of this manual and Section 8.2 of the MR-J3-□B Servo Amplifier Instruction Manual at an alarm occurrence and Section 6.3 of this manual and Section 8.3 of the MR-J3-□B Servo Amplifier Instruction Manual at a warning occurrence, and then take the appropriate action. When an alarm occurs, the ALM turns OFF. After its cause has been removed, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column. The alarm is automatically canceled after removing the cause of occurrence.

	Display	Name	Alarm deactivation		
			Power OFF→ON	Error reset	CPU reset
Alarms	10	Undervoltage	○	○	○
	12	Memory error 1(RAM)	○	△	△
	13	Clock error	○	△	△
	15	Memory error 2(EEP-ROM)	○	△	△
	16	Encoder error 1 (At power on)	○	△	△
	17	Board error	○	△	△
	19	Memory error 3(Flash-ROM)	○	△	△
	1A	Motor combination error	○	△	△
	20	Encoder error 2	○	△	△
	24	Main circuit error	○	○	○
	28	Linear encoder error 2	○	△	△
	2A	Linear encoder error 1	○	△	△
	30	Regenerative error	(Note1) ○	(Note1) ○	(Note1) ○
	31	Overspeed	○	○	○
	32	Overcurrent	○	△	△
	33	Overvoltage	○	○	○
	34	Receive error 1	○	(Note2) ○	○
	35	Command frequency alarm	○	○	○
	36	Receive error 2	○	○	○
	37	Parameter error	○	△	△
	42	Fully closed loop control error detection	○	(Note3) ○	(Note3) ○
	45	Main circuit device overheat	(Note1) ○	(Note1) ○	(Note1) ○
	46	Servo motor overheat	(Note1) ○	(Note1) ○	(Note1) ○
	47	Cooling fan alarm	○	△	△
	50	Overload 1	(Note1) ○	(Note1) ○	(Note1) ○
	51	Overload 2	(Note1) ○	(Note1) ○	(Note1) ○
	52	Error excessive	○	○	○
	70	Load side encoder error 1	○	△	△
71	Load side encoder error 2	○	△	△	
8A	USB communication time-out	○	○	○	
8E	USB communication error	○	○	○	
888	Watchdog	○	△	△	

	Display	Name
Warnings	96	Home position setting error
	E0	Excessive regeneration warning
	E1	Overload warning 1
	E4	Parameter warning
	E6	Servo forced stop warning
	E7	Controller emergency stop warning
	E8	Cooling fan speed reduction warning
	E9	Main circuit off warning
	EC	Overload warning 2
	ED	Output watt excess warning

Note1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

2. In some controller communication status, the alarm factor may not be removed.

3. Set parameter No.PE03 to "1 □ □ □" to deactivate.

6. TROUBLESHOOTING

6.2 Remedies for Alarms



CAUTION

- When any alarm has occurred, eliminate its cause, ensure safety, then reset the alarm, and restart operation. Otherwise, injury may occur.
- As soon as an alarm occurs, mark Servo-off and power off the main circuit and control circuit.

POINT

- When any of the following alarms has occurred, do not deactivate the alarm and resume operation repeatedly. To do so will cause the servo amplifier/servo motor to fail. Remove the cause of occurrence, and leave a cooling time of more than 30 minutes before resuming operation. To protect the main circuit elements, any of these servo alarms cannot be deactivated from the servo system controller until the specified time elapses after its occurrence. Judging the load changing condition until the alarm occurs, the servo amplifier calculates this specified time automatically.
 - Regenerative error (30)
 - Overload 1 (50)
 - Overload 2 (51)
- The alarm can be deactivated by switching power off, then on or by the error reset command ▪ CPU reset from the servo system controller. For details, refer to Section 8.1.

When an alarm occurs, the trouble (ALM) switches off and the dynamic brake is operated to stop the servomotor. At this time, the display indicates the alarm No.

The servo motor comes to a stop. Remove the cause of the alarm in accordance with this section. MR Configurator may be used to refer to the cause.

Display	Name	Definition	Cause	Action
10	Undervoltage	Refer to Chapter 8 of the MR-J3-□ B Servo Amplifier Instruction Manual		
12	Memory error 1 (RAM)			
13	Clock error			
15	Memory error 2 (EEP-ROM)			
16	Encoder error 1 (At power on)			
17	Board error 2			
19	Memory error 3 (Flash ROM)			
1A	Motor combination error			
20	Encoder error 2			
24	Main circuit error			

6. TROUBLESHOOTING

Display	Name	Definition	Cause	Action
28	Linear encoder error 2	The margin of linear encoder deteriorated.	1. The temperature of linear encoder is high.	Check the temperature of linear encoder and contact with the linear encoder manufacturer.
			2. The signal level of linear encoder has dropped.	Check the installation of the linear encoder.
2A	Linear encoder error 1	An alarm is output from the linear encoder.	1. The speed of linear encoder has exceeded the range of use.	Change the speed of linear encoder within the range of use.
			2. Noise entered.	Take the noise reduction measures.
			3. Alarm of the linear encoder	Contact with the linear encoder manufacturer.
			4. Defective installation positions of the scale and head	Adjust the positions of the scale and head.
30	Regenerative alarm	Refer to Chapter 8 of the MR-J3-□ B Servo Amplifier Instruction Manual		
31	Overspeed			
32	Overcurrent			
33	Overload			
34	Receive error 1			
35	Command frequency error			
36	Receive error 2			
37	Parameter error	Parameter setting is wrong.	1. Servo amplifier fault caused the parameter setting to be rewritten.	Change the servo amplifier.
			2. There is a parameter whose value was set to outside the setting range by the controller.	Change the parameter value to within the setting range.
			3. The number of write times to EEPROM exceeded 100,000 due to parameter write, etc.	Change the servo amplifier.
42	Linear fully closed loop control error detection	A fully closed loop control error has occurred.	1. The resolution of the load side encoder differs from the setting value.	Review the settings of parameter No. PE04, PE05 (fully closed loop control feedback pulse electronic gear).Check the installation of the load side encoder.
			2. Mismatch of the load side encoder installation direction	Check the installation direction of the load side encoder.Review the encoder pulse count polarity selection in parameter No. PC27
			3. The position deviation exceeded the detection level.	Review the operation conditions.Review the setting of parameter No. PE07 (fully closed loop control position deviation error detection level) as required.
			4. The speed deviation exceeded the detection level.	Review the operation conditions.Review the setting of parameter No. PE06 (fully closed loop control speed deviation error detection level) as required.
45	Main circuit device overheat	Refer to Chapter 8 of the MR-J3-□ B Servo Amplifier Instruction Manual		
46	Servo motor overheat			
47	Cooling fan alarm			
50	Overload 1			
51	Overload 2			
52	Error excessive			

6. TROUBLESHOOTING

Display	Name	Definition	Cause	Action
70	Load side encoder error 1	An error occurs in the communication between the load side encoder and the servo amplifier.	1. The connector CN2L is disconnected.	Connect correctly.
			2. Faulty of the load side encoder cable	Repair or change the cable.
			3. Wrong wiring of the load side encoder cable	Review the wiring connection.
			4. The load side encoder cable type (2-wire, 4-wire) selection was wrong in the parameter setting.	Correct the setting in the fourth digit of parameter No. PC26 (encoder cable communication system selection).
			5. The startup timing is slow.(For the load side encoder with the external power supply input)	Turn on the external power supply, and then turn on the control power supply of servo amplifier.
			6. The power supply voltage dropped.(For the load side encoder with the external power supply input)	Check the power supply capacity and voltage.
71	Load side encoder error 2	An error occurs in the communication between the load side encoder and the servo amplifier.	1. Faulty of the load side encoder cable	Repair or change the cable.
			2. Wrong wiring of the load side encoder cable	Review the wiring connection.
			3. The power supply voltage dropped.(For the load side encoder with the external power supply input)	Check the power supply capacity and voltage.
			4. The load side encoder cable type (2-wire, 4-wire) selection was wrong in the parameter setting.	Correct the setting in the fourth digit of parameter No. PC26 (encoder cable communication system selection).
			5. When using the load side encoder without Z phase, the alarm judgment at the Z-phase disconnection was not made invalid in the parameter.	For the load side encoder without Z phase, set parameter No.PC27 to "□ 1 □ □".
8A	USB communication time-out error	Refer to Chapter 8 of the MR-J3-□ B Servo Amplifier Instruction Manual		
8E	USB communication error			
(Note) 888	Watchdog			

Note. At power-on, "888" appears instantaneously, but it is not an error.

6. TROUBLESHOOTING

6.3 Detailed Explanation of Linear Encoder Error 1 (2A)

If the cause of Linear encoder error 1(2A) occurrence is not identified, confirm the details shown on the following table according to the alarm detailed information for the alarm history display of MR Configurator, and then contact with the linear encoder manufacturer.

Detail Information Bit	Linear Encoder Error 1 (2A) Details			
	Mitutoyo	Sony Manufacturing Systems Corporation	Heidenhain	Renishaw
Bit7	Optical overspeed	—	Overspeed error	—
Bit6	ROM · RAM error	—	—	Overspeed
Bit5	EEPROM error	Encoder alarm	EEPROM error	—
Bit4	CPU error	—	CPU error	—
Bit3	Capacitive error	—	ABS data error	—
Bit2	Photoelectric error	—	INC data error	—
Bit1	Photoelectric · capacitive data mismatch	Encoder warning	Scale level error INC/ABS data mismatch error —	Level error
Bit0	Initialization error	—	Initialization error	—

As an example, the following describes the detailed information when Linear encoder error 1(2A) occurs in the linear encoder AT343A manufactured by MITUTOYO CORPORATION.

Seq No.	Alarm No.	Alarm Name	Time(hour)	Detail(hex)
0	AL2A	Scale error 1	134	44
1	No alarm			
2	No alarm			
3	No alarm			
4	No alarm			
5	No alarm			

Alarm details : 44h

In this case, the alarm detailed information of Linear encoder error 1(2A) is "44". This numeral is indicated in hexadecimal number. Convert "44" of hexadecimal number to a binary-coded form as shown below.

	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
44h =	0	1	0	0	0	1	0	0

The digits for bit6 and bit2 are "1". Check the details of the bit being "1" in Table 6.1. In this case, the occurrences of ROM · RAM error (bit6) and Photoelectric error (bit2) are identified.

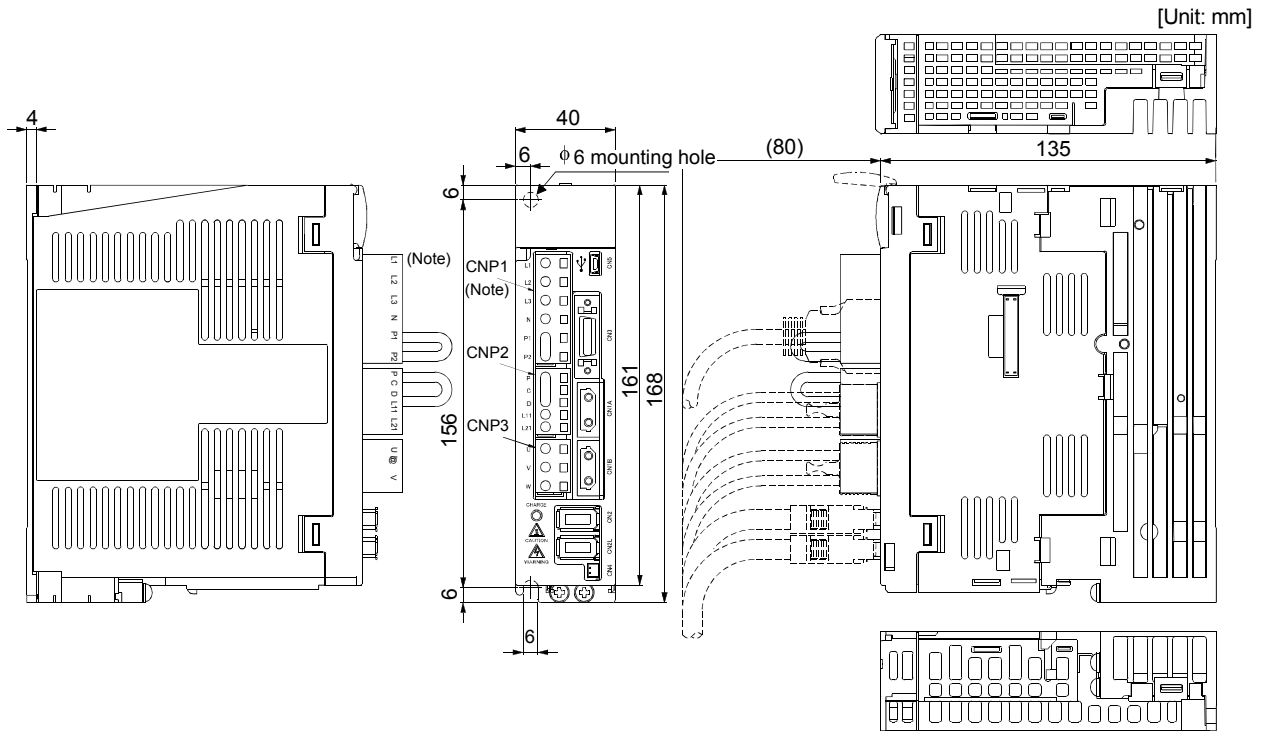
7. OUTLINE DRAWINGS

7. OUTLINE DRAWINGS

POINT

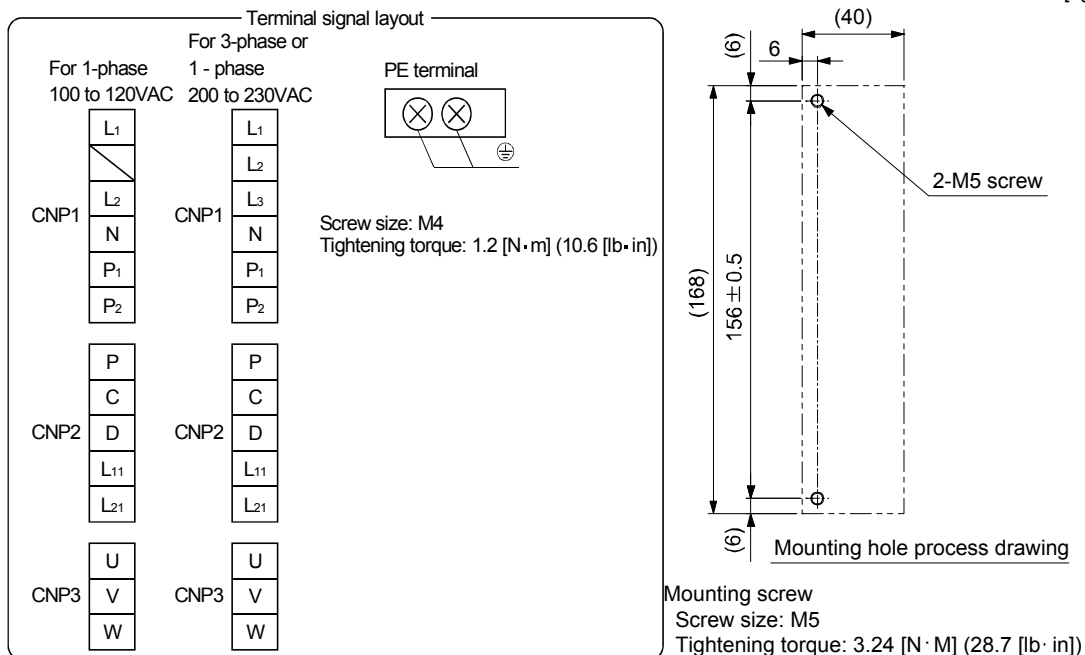
- For the outline drawings of connectors, refer to Section 9.2 of the MR-J3-□B Servo Amplifier Instruction Manual. For the connector for CN2L, refer to the outline drawings of the connector for CN2 since it is the same as that for CN2.

- (1) MR-J3-10B-RJ006 • MR-J3-20B-RJ006
 MR-J3-10B1-RJ006 • MR-J3-20B1-RJ006



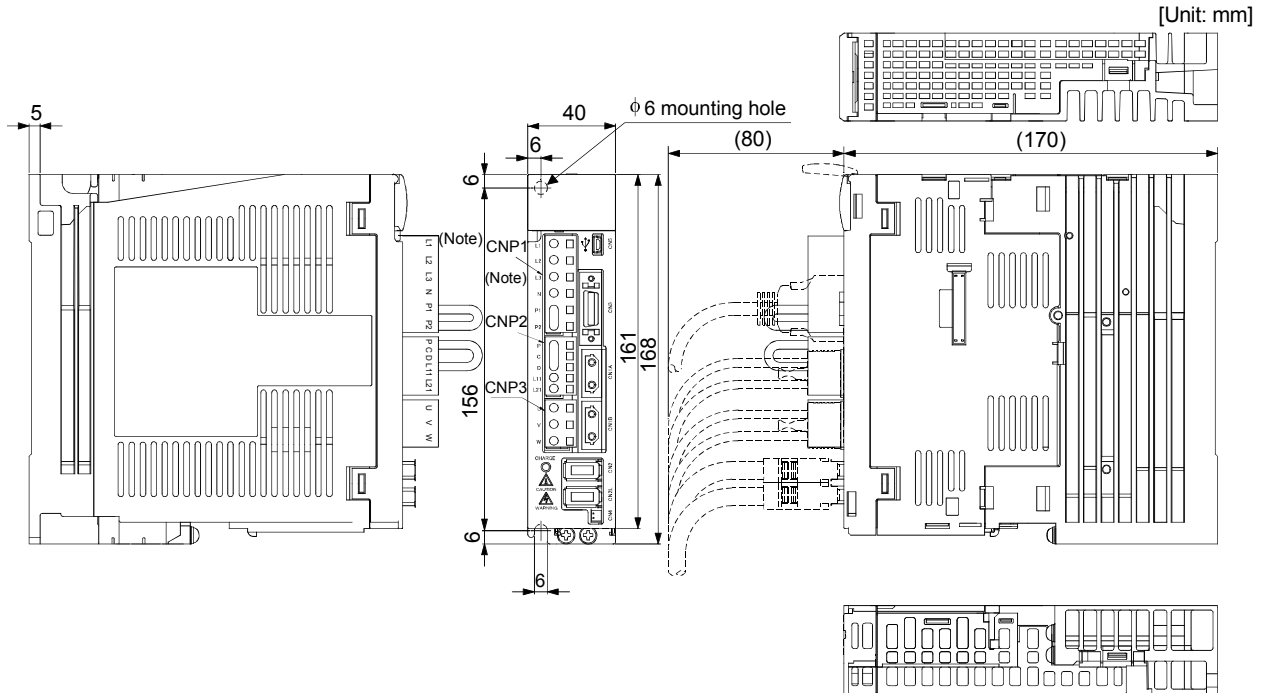
Note. This data applies to the 3-phase or 1-phase 200 to 230VAC power supply models.
 For a single-phase, 100 to 120VAC power supply, refer to the terminal signal layout.

Mass: 0.8 [kg] (1.76 [lb])



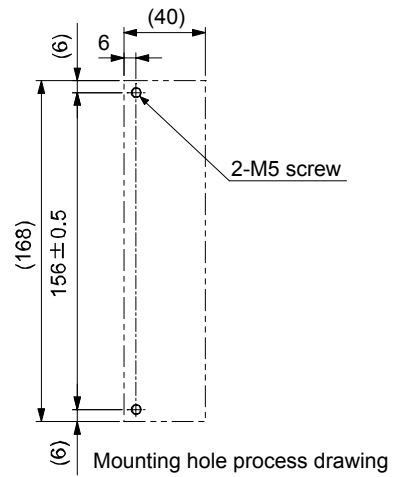
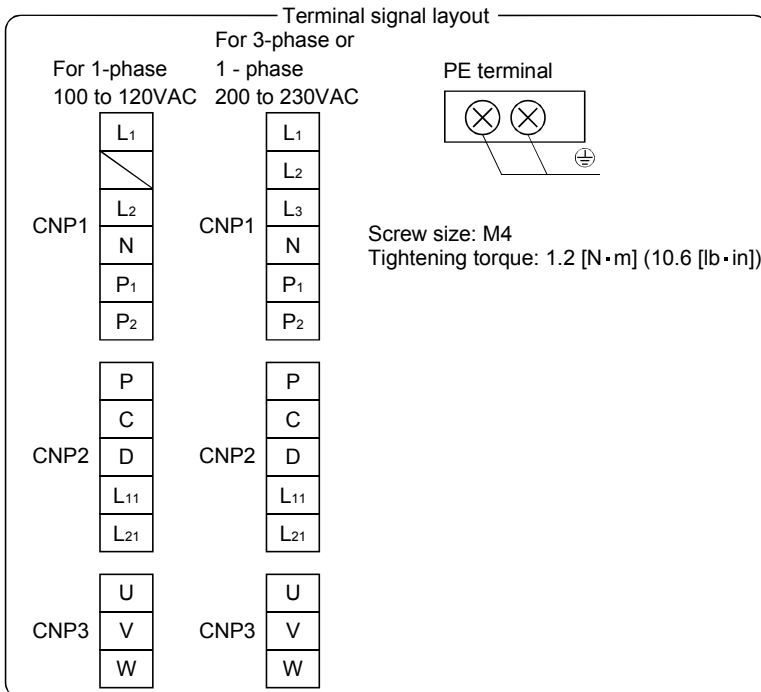
7. OUTLINE DRAWINGS

(2) MR-J3-40B-RJ006 • MR-J3-60B-RJ006
MR-J3-40B1-RJ006



Note. This data applies to the 3-phase or 1-phase 200 to 230VAC power supply models.
For a single-phase, 100 to 120VAC power supply, refer to the terminal signal layout.

Mass: 1.0 [kg] (2.21 [lb])

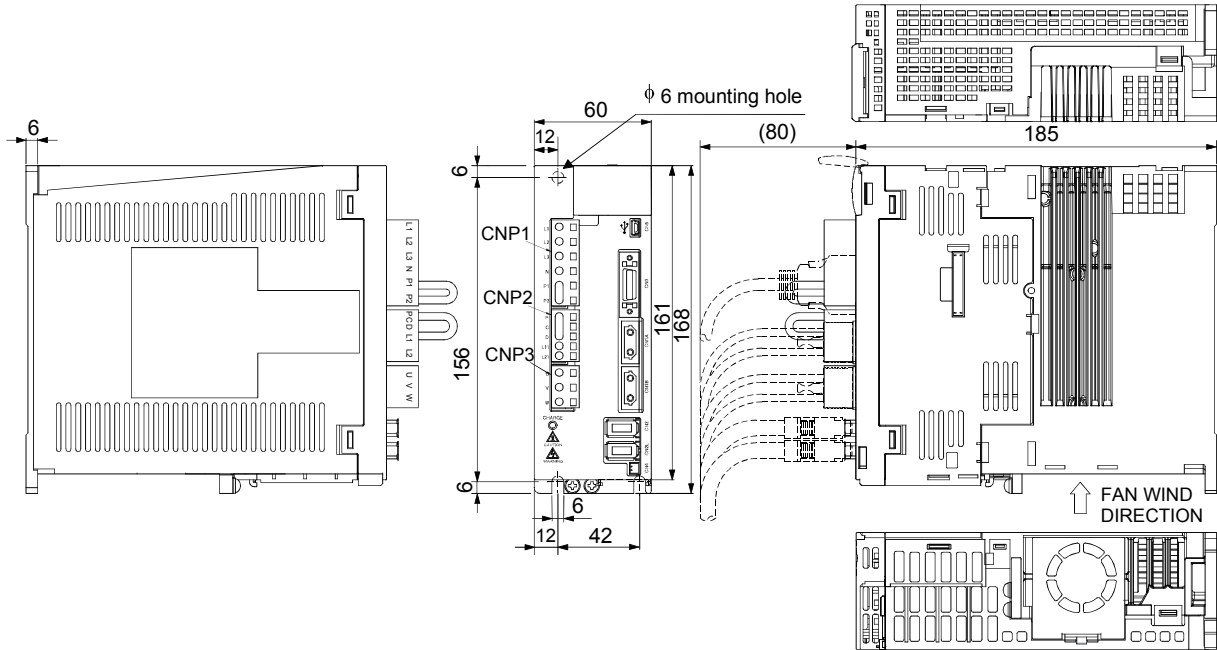


Mounting screw
Screw size : M5
tightening torque : 3.24 [N·m] (28.7[in])

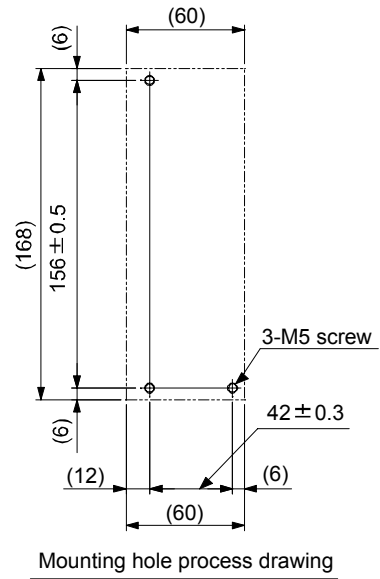
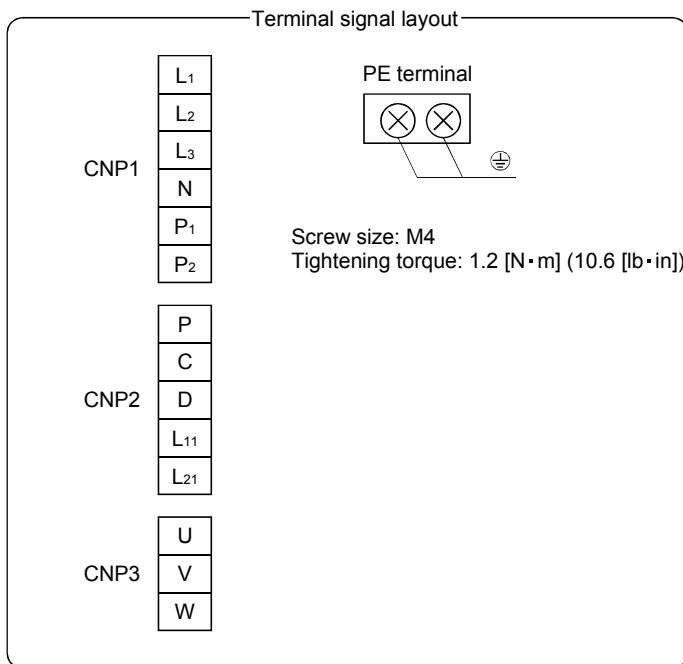
7. OUTLINE DRAWINGS

(3) MR-J3-70B-RJ006 • MR-J3-100B-RJ006

[Unit: mm]



Mass: 1.4 [kg] (3.09 [lb])

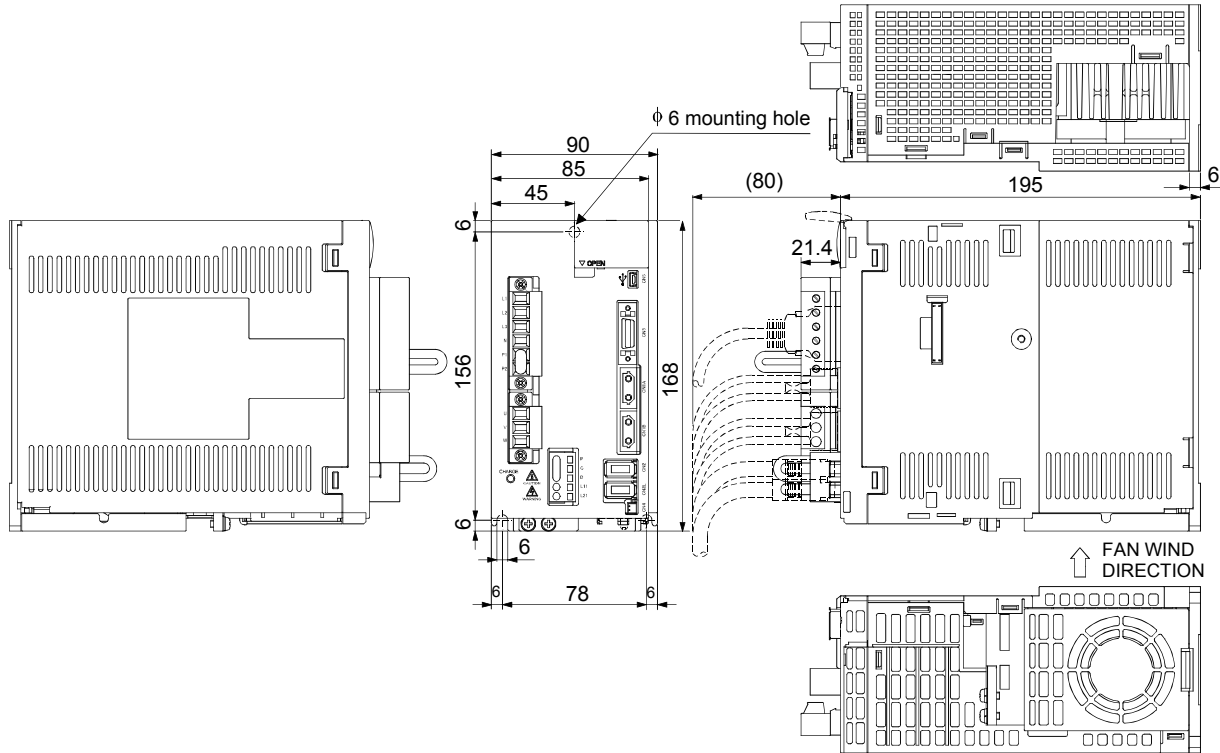


Mounting screw
Screw size : M5
Tightening torque : 3.24 [N·m] (28.7 [lb·in])

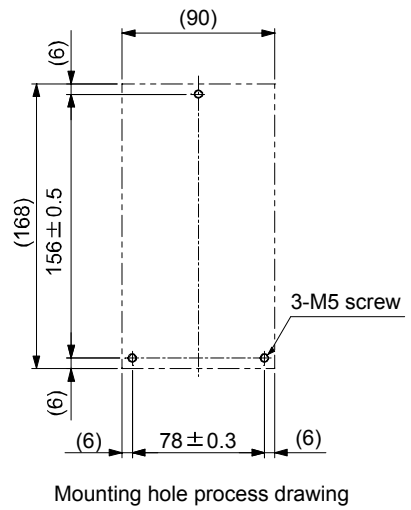
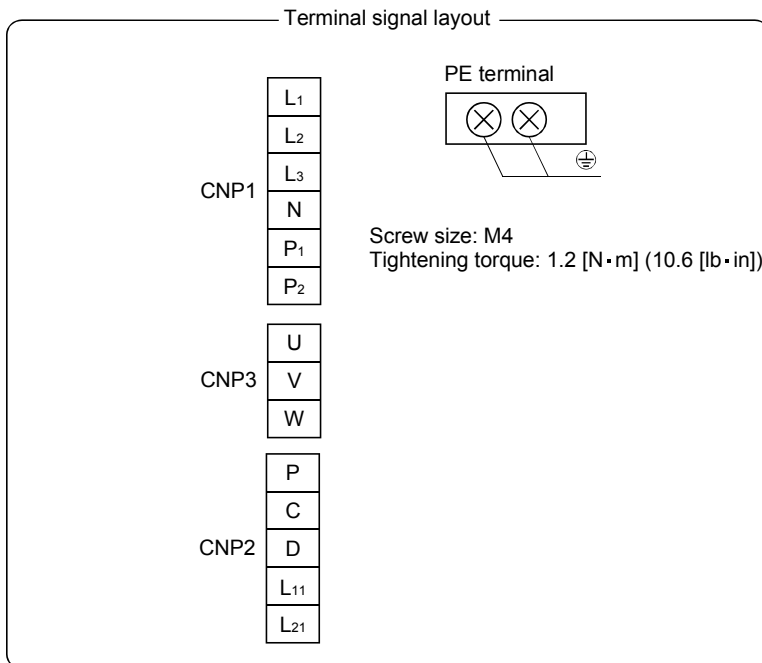
7. OUTLINE DRAWINGS

(4) MR-J3-200B-RJ006 • MR-J3-350B-RJ006

[Unit: mm]



Mass: 2.3 [kg] (5.07 [lb])

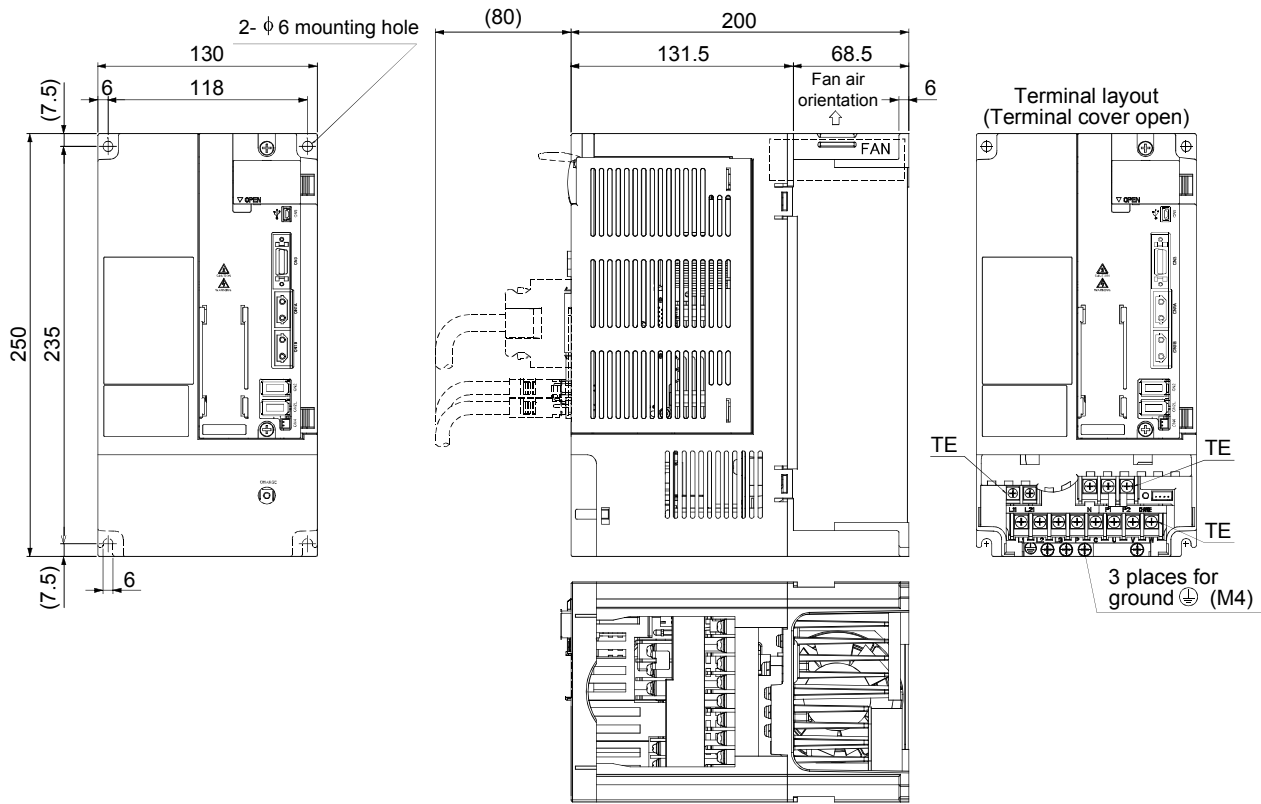


Mounting screw
Screw size : M5
Tightening torque : 3.24 [N·m] (28.7[lb·in])

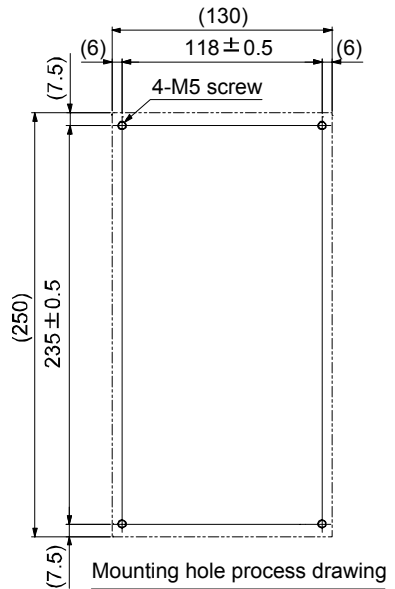
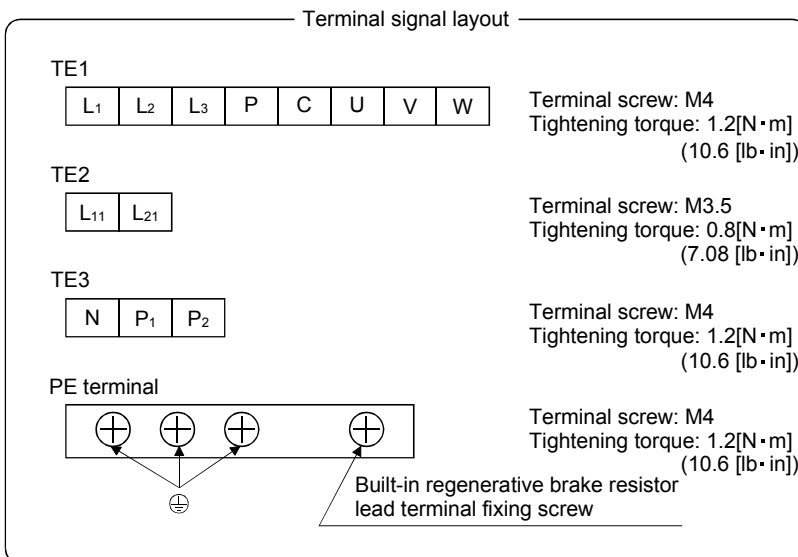
7. OUTLINE DRAWINGS

(5) MR-J3-500B-RJ006

[Unit: mm]



Mass: 4.6 [kg] (10.1 [lb])

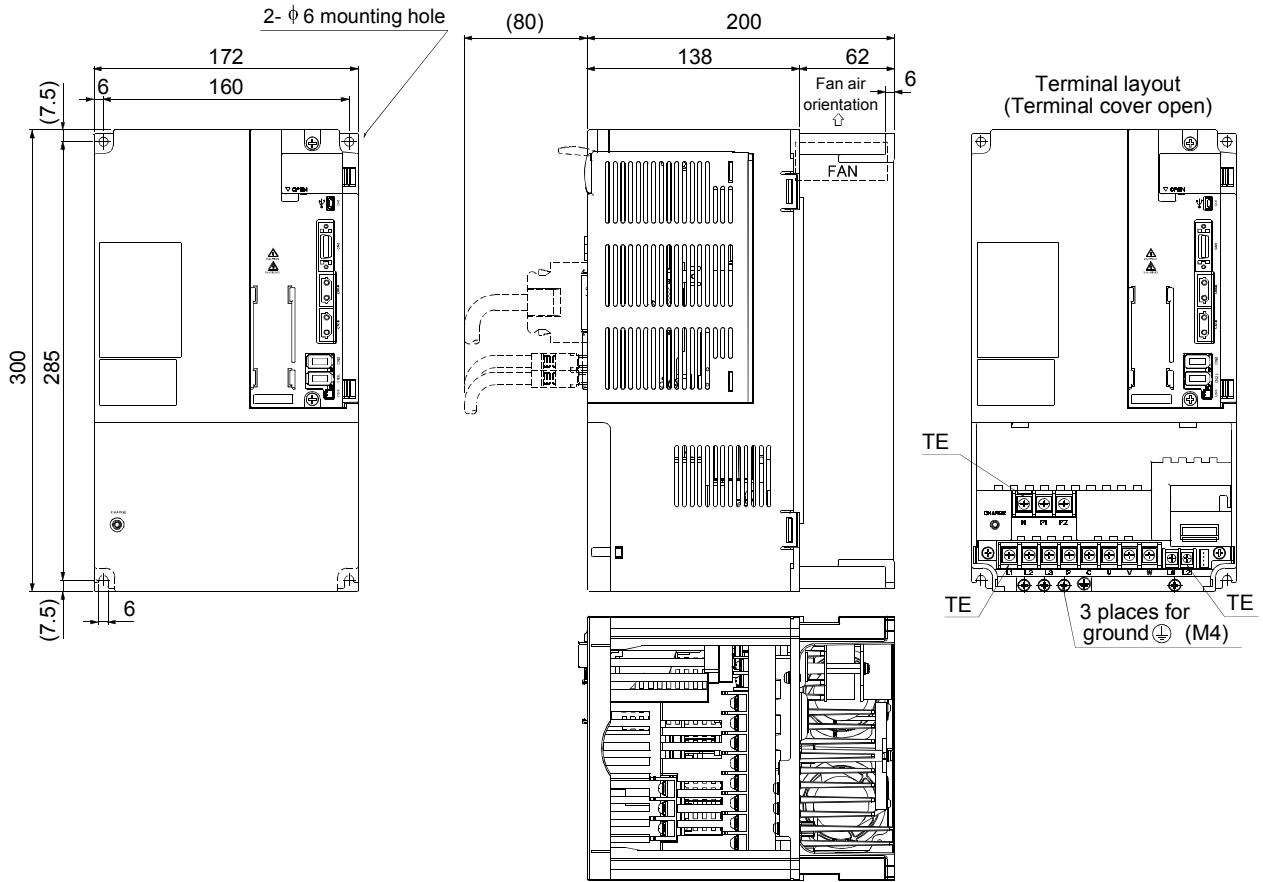


Mounting screw
Screw size : M5
Tightening torque : 3.24 [N·m] (28.7[lb·in])

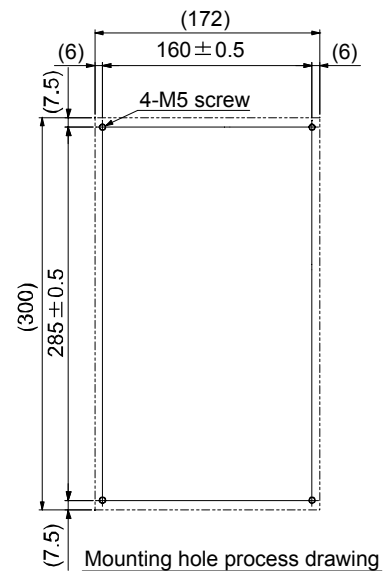
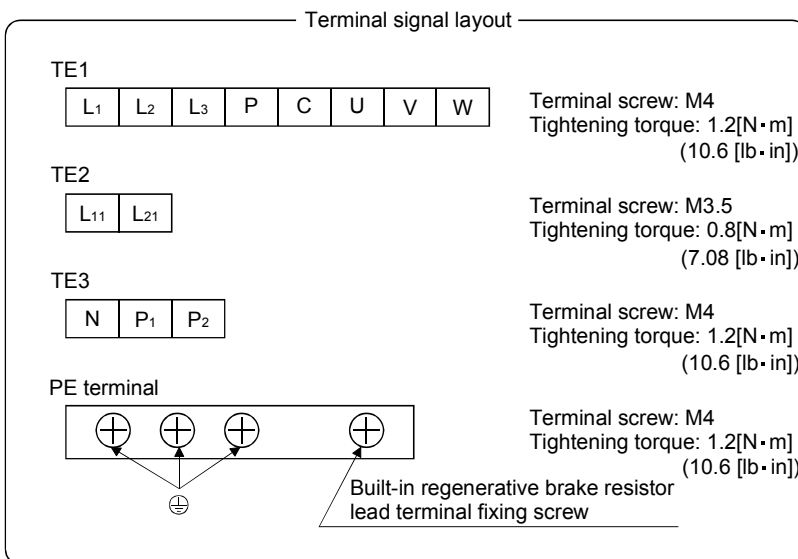
7. OUTLINE DRAWINGS

(6) MR-J3-700B-RJ006

[Unit: mm]



Mass: 6.2 [kg] (13.7[lb])

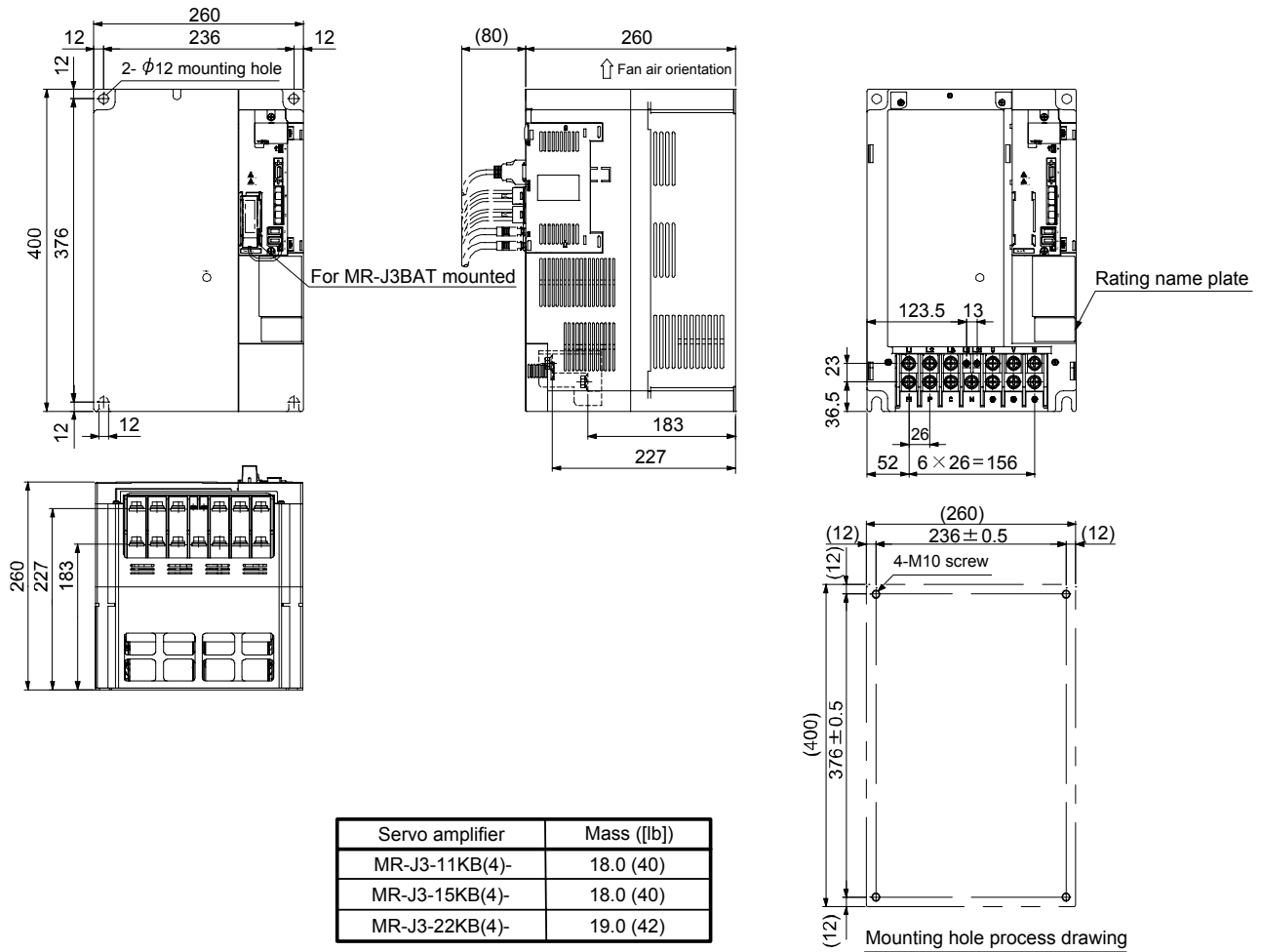


Mounting screw
Screw size: M5
Tightening torque: 3.24[N·m] (28.7[lb·in])

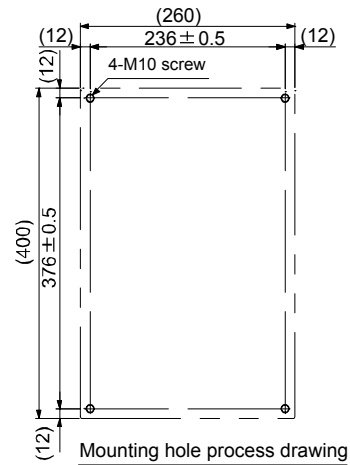
7. OUTLINE DRAWINGS

(7) MR-J3-11KB(4)-RJ006 to 22KB(4)-RJ006

[Unit: mm]



Servo amplifier	Mass ([lb])
MR-J3-11KB(4)-	18.0 (40)
MR-J3-15KB(4)-	18.0 (40)
MR-J3-22KB(4)-	19.0 (42)



Terminal signal layout

L ₁	L ₂	L ₃	L ₁₁	L ₂₁	U	V	W
P ₁	P	C	N	\oplus	\oplus	\oplus	

		L ₁ · L ₂ · L ₃ · U · V · W · P ₁ · P · C · N	L ₁₁ · L ₂₁	\oplus
MR-J3-11KB(4)-RJ006	Terminal screw	M6	M4	M6
MR-J3-15KB(4)-RJ006	Tightening torque [N · m]	3.0	1.2	6.0
MR-J3-22KB(4)-RJ006	Terminal screw	M8	M4	M8
	Tightening torque [N · m]	6.0	1.2	6.0

Mounting screw

Servo amplifier	Terminal screw	Tightening torque [N · m] ([lb · in])
MR-J3-11KB(4)-RJ006	M10	26.5 (234.5)
MR-J3-15KB(4)-RJ006		
MR-J3-22KB(4)-RJ006		

Appendix

App 1. Parameter List

POINT
<ul style="list-style-type: none"> ▪ Parameter whose symbol is preceded by * is made valid with the following conditions. * : Set the parameter value, switch power off once after setting, and then switch it on again, or perform the controller reset. ** : Set the parameter value, switch power off once, and then switch it on again.

Basic setting parameters (PA □□)		
No.	Symbol	Name
PA01	**STY	Control mode
PA02	**REG	Regenerative brake option
PA03	*ABS	Absolute position detection system
PA04	*AOP1	Function selection A-1
PA05 to PA07		For manufacturer setting
PA08	ATU	Auto tuning
PA09	RSP	Auto tuning response
PA10	INP	Control mode, regenerative brake option selection
PA11 to PA13		For manufacturer setting
PA14	*POL	Rotation direction selection
PA15	*ENR	Encoder output pulses
PA16	*ENR2	Encoder output pluses
PA17		For manufacturer setting
PA18		
PA19	*BLK	Parameter write inhibit

Gain/filter parameters (PB □□)		
No.	Symbol	Name
PB01	FILT	Adaptive tuning mode (Adaptive filter II)
PB02	VRFT	Vibration suppression control filter tuning mode (Advanced vibration suppression control)
PB03		For manufacturer setting
PB04	FFC	Feed forward gain
PB05		For manufacturer setting
PB06	GD2	For manufacturer setting Ratio of load inertia moment to servo motor inertia moment
PB07	PG1	Model loop gain
PB08	PG2	Position loop gain
PB09	VG2	Speed loop gain
PB10	VIC	Speed integral compensation
PB11	VDC	Speed differential compensation
PB12		For manufacturer setting
PB13	NH1	Machine resonance suppression filter 1
PB14	NHQ1	Notch form selection 1
PB15	NH2	Machine resonance suppression filter 2
PB16	NHQ2	Notch form selection 2
PB17		For manufacturer setting
PB18	LPF	Low-pass filter
PB19	VRF1	Vibration suppression control vibration frequency setting
PB20	VRF2	Vibration suppression control resonance frequency setting
PB21		For manufacturer setting
PB22		
PB23	VFBF	Low-pass filter selection
PB24	*MVS	Slight vibration suppression control selection
PB25		For manufacturer setting
PB26	*CDP	Gain changing selection
PB27	CDL	Gain changing condition
PB28	CDT	Gain changing time constant
PB29	GD2B	Gain changing ratio of load inertia moment to servo motor inertia moment
PB30	PG2B	Gain changing position loop gain
PB31	VG2B	Gain changing speed loop gain
PB32	VICB	Gain changing speed integral compensation
PB33	VRF1B	Gain changing vibration suppression control vibration frequency setting
PB34	VRF2B	Gain changing vibration suppression control resonance frequency setting
PB35 to PB45		For manufacturer setting

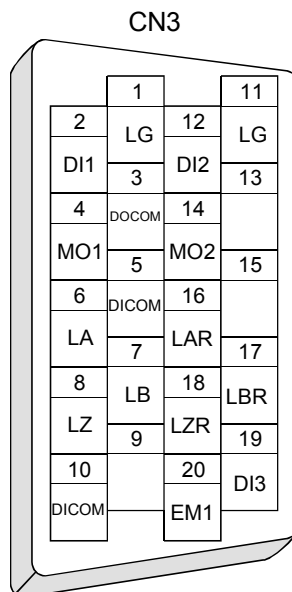
Appendix

Extension setting parameters (PC □□)		
No.	Symbol	Name
PC01	*ERZ	Error excessive alarm level
PC02	MBR	Electromagnetic brake sequence output
PC03	*ENRS	Encoder output pulses selection
PC04	**COP1	Function selection C-1
PC05	**COP2	Function selection C-2
PC06		For manufacturer setting
PC07	ZSP	Zero speed
PC08		For manufacturer setting
PC09	MOD1	Analog monitor output 1
PC10	MOD2	Analog monitor output 2
PC11	MO1	Analog monitor 1 offset
PC12	MO2	Analog monitor 2 offset
PC13 to PC16		For manufacturer setting
PC17	**COP4	Function selection C-4
PC18 to PC20		For manufacturer setting
PC21	*BPS	Alarm history clear
PC22 to PC25		For manufacturer setting
PC26	**COP8	Function selection C-8
PC27	**COP9	Function selection C-9
PC28 to PC32		For manufacturer setting

I/O setting parameters (PD □□)		
No.	Symbol	Name
PD01 to PD06		For manufacturer setting
PD07	*D01	Output signal device selection 1 (CN3-pin 13)
PD08	*D02	Output signal device selection 2 (CN3-pin 9)
PD09	*D03	Output signal device selection 3 (CN3-pin 15)
PD10 to PD13		For manufacturer setting
PD14	*D0P3	Function selection D-3
PD15 to PD32		For manufacturer setting

Extension Control Parameters (PE □□)		
No.	Symbol	Name
PE01	**FCT	Fully closed loop selection 1
PE02		For manufacturer setting
PE03	*FCT2	Fully closed loop selection 2
PE04	**FBN	Fully closed loop feedback pulse electronic gear numerator 1
PE05	**FBD	Fully closed loop feedback pulse electronic gear denominator 1
PE06	BC1	Fully closed loop control position deviation error detection level
PE07	BC2	Fully closed loop control speed deviation error detection level
PE08	DUF	Fully closed loop dual feedback filter
PE09		For manufacturer setting
PE10	FCT3	Fully closed loop selection 3
PE11 to PE33		For manufacturer setting
PE34	**FBN2	Fully closed loop feedback pulse electronic gear numerator 2
PE35	**FBD2	Fully closed loop feedback pulse electronic gear denominator 2
PE36 to PE40		For manufacturer setting

App 2. Signal Layout Recording Paper



App 3. Combination of Servo Amplifier and Servo Motor

The servo amplifier software versions compatible with the servo motors are indicated in the parentheses. The servo amplifiers whose software versions are not indicated can be used regardless of the versions.

Servo motor	Servo amplifier (Software version)	Servo motor	Servo amplifier (Software version)
HF-KP053	MR-J3-10B-RJ006	HC-RP103	MR-J3-200B-RJ006
	MR-J3-10B1-RJ006	HC-RP153	MR-J3-200B-RJ006
HF-KP13	MR-J3-10B-RJ006	HC-RP203	MR-J3-350B-RJ006
	MR-J3-10B1-RJ006	HC-RP353	MR-J3-500B-RJ006
HF-KP23	MR-J3-20B-RJ006	HC-RP503	MR-J3-500B-RJ006
	MR-J3-20B1-RJ006	HC-UP72	MR-J3-70B-RJ006
HF-KP43	MR-J3-40B-RJ006	HC-UP152	MR-J3-200B-RJ006
	MR-J3-40B1-RJ006	HC-UP203	MR-J3-350B-RJ006
HF-KP73	MR-J3-70B-RJ006	HC-UP352	MR-J3-500B-RJ006
HF-SP52	MR-J3-60B-RJ006	HC-UP502	MR-J3-500B-RJ006
HF-SP102	MR-J3-100B-RJ006	HC-LP52	MR-J3-60B-RJ006
HF-SP152	MR-J3-200B-RJ006	HC-LP102	MR-J3-100B-RJ006
HF-SP202	MR-J3-200B-RJ006	HC-LP152	MR-J3-200B-RJ006
HF-SP352	MR-J3-350B-RJ006	HC-LP202	MR-J3-350B-RJ006
HF-SP502	MR-J3-500B-RJ006	HC-LP302	MR-J3-500B-RJ006
HF-SP702	MR-J3-700B-RJ006	HF-SP301	MR-J3-350B-RJ006
HF-SP51	MR-J3-60B-RJ006	HF-SP421	MR-J3-500B-RJ006
HF-SP81	MR-J3-100B-RJ006	HA-LP502	MR-J3-500B-RJ006
HF-SP121	MR-J3-200B-RJ006	HA-LP601	MR-J3-700B-RJ006
HF-SP201	MR-J3-200B-RJ006	HA-LP701M	MR-J3-700B-RJ006
HF-MP053	MR-J3-10B-RJ006	HA-LP702	MR-J3-700B-RJ006
	MR-J3-10B1-RJ006	HA-LP8014	MR-J3-11KB4-RJ006
HF-MP13	MR-J3-10B-RJ006	HA-LP11K1M4	MR-J3-11KB4-RJ006
	MR-J3-10B1-RJ006	HA-LP11K24	MR-J3-11KB4-RJ006
HF-MP23	MR-J3-20B-RJ006	HA-LP12K14	MR-J3-11KB4-RJ006
	MR-J3-20B1-RJ006	HA-LP15K1M4	MR-J3-15KB4-RJ006
HF-MP43	MR-J3-40B-RJ006	HA-LP15K14	MR-J3-15KB4-RJ006
	MR-J3-40B1-RJ006	HA-LP15K24	MR-J3-15KB4-RJ006
HF-MP73	MR-J3-70B-RJ006	HA-LP20K14	MR-J3-22KB4-RJ006
HA-LP801	MR-J3-11KB-RJ006	HA-LP22K1M4	MR-J3-22KB4-RJ006 (Note)
HA-LP12K1	MR-J3-11KB-RJ006	HA-LP22K24	MR-J3-22KB4-RJ006
HA-LP11K1M	MR-J3-11KB-RJ006		
HA-LP11K2	MR-J3-11KB-RJ006		
HA-LP15K1	MR-J3-15KB-RJ006		
HA-LP15K1M	MR-J3-15KB-RJ006		
HA-LP15K2	MR-J3-15KB-RJ006		
HA-LP20K1	MR-J3-22KB-RJ006		
HA-LP25K1	MR-J3-22KB-RJ006		
HA-LP22K1M	MR-J3-22KB-RJ006		
HA-LP22K2	MR-J3-22KB-RJ006		

Note. For the servo amplifier software versions compatible with these servo motors, contact our company.

REVISIONS

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

Print Data	*Manual Number	Revision
Mar, 2006	SH(NA)030056-A	First edition

MODEL	
MODEL CODE	



MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG MARUNOUCHI TOKYO 100-8310