MITSUBISHI ELECTRIC

General-Purpose AC Servo

MELSERVO-J2-Super Series

400VAC Compatible

MODEL

MR-J2S-□A4/B4

SERVO AMPLIFIER
SUPPLEMENTARY INSTRUCTION MANUAL

The corresponding manuals indicated below are required to use the 400VAC Compatible Servo.

● MR-J2S-60A4 to 22KA4

Manual Name	Manual N0.
MR-J2S-□A Servo Amplifier Instruction Manual	SH(NA)030006
Servo Motor Instruction Manual	SH(NA)3181

● MR-J2S-60B4 to 22KB4

Manual Name	Manual N0.
MR-J2S-□B Servo Amplifier Instruction Manual	SH(NA)030007
Servo Motor Instruction Manual	SH(NA)3181

D

● 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".

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

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

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

In this Instruction Manual, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".
After reading this 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 10 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 masses.
- 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.
- 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	[℃]	0 to +55 (non-freezing)	0 to +40 (non-freezing)	
		[°F]	32 to 131 (non-freezing)	32 to 104 (non-freezing)	
	In storage	[℃]	−20 to +65 (non-freezing)	−15 to +70 (non-freezing)	
		[°F]	−4 to 149 (non-freezing)	5 to 158 (non-freezing)	
Ambient humidity	During operation		90%RH or less (non-condensing)	80%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	HC-SFS524 to 1524	X, Y : 24.5
				HC-SFS2024 · 3524	X : 24.5 Y : 49
				HC-SFS5024 · 7024	X : 24.5 Y : 29.4
				HA-LFS6014 to 12K14 HA-LFS701M4 to 15K1M4 HA-LFS11K24 to 22K24	X : 11.7 Y : 29.4
				HA-LFS15K14 · 22K14 HA-LFS22K1M4	X, Y : 9.8
		[ft/s^2]	19.4 or less	HC-SFS524 to 1524	X, Y : 80
				HC-SFS2024 · 3524	X : 80 Y : 161
				HC-SFS5024 · 7024	X : 80 Y : 96
				HA-LFS6014 to 12K14 HA-LFS701M4 to 15K1M4 HA-LFS11K24 to 22K24	X : 38.4 Y : 96.5
				HA-LFS15K14 · 22K14 HA-LFS22K1M4	X, Y : 32

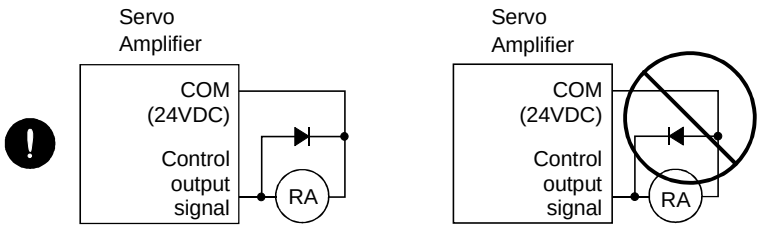
Note. Except the servo motor with reduction gear.

- 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.
- 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 emergency stop (EMG) 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

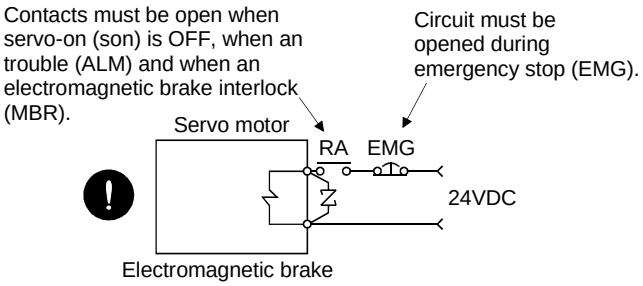
⚠ CAUTION

- 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.
- 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 emergency stop (EMG).



- 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

- This product is not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to forestall serious accidents when it is used in facilities where a breakdown in the product is likely to cause a serious accident.

⚠ 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
- Home position setting in the absolute position detection system
- Write to the EEP-ROM due to device changes

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.

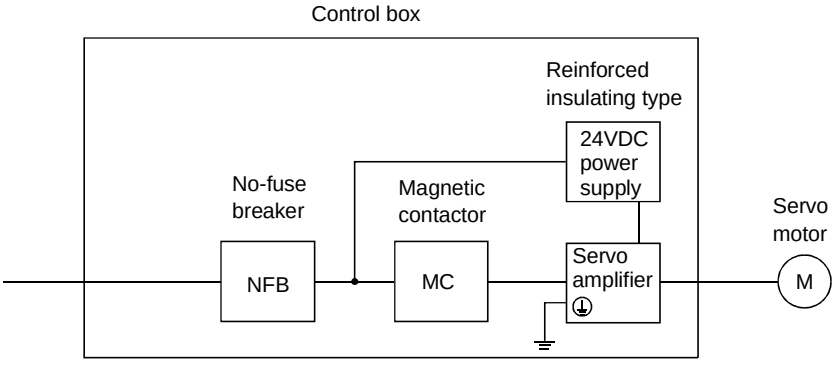
2. PRECAUTIONS FOR COMPLIANCE

(1) Servo amplifiers and servo motors used

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

Servo amplifier :MR-J2S-60A4 to MR-J2S-22KA4
MR-J2S-60B4 to MR-J2S-22KB4
HC-SFS □4
Servo motor :HA-LFS □4

(2) Configuration



(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 used under the conditions of the overvoltage category III set forth in IE60664-1, a reinforced insulating transformer is not required in the power input section.
Unit shall be supplied from a three phase earthed neutral system.

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

(5) Grounding

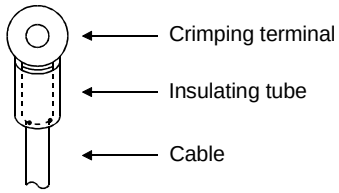
(a) To prevent an electric shock, always connect the protective earth (PE) terminals (marked ⏚) of the servo amplifier to the protective earth (PE) of the control box.

(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.

(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 6.2.2.

(b) The sizes of the cables described in Section 6.2.1 meet the following requirements. To meet the other requirements, follow Table 5 and Appendix C in EN60204-1.

- Ambient temperature: 40 (104) [℃ (℉)]
- 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-J2S-60A4 to MR-J2S-22KA4
MR-J2S-60B4 to MR-J2S-22KB4
HC-SFS □4
Servo motor :HA-LFS □4

(2) Installation

Install a fan of 100CFM (2.8m^3/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 10 minutes after power-off.

Servo amplifier	Discharge time [min]
MR-J2S-60A4/B4	1
MR-J2S-100A4/B4	2
MR-J2S-200A4/B4	2
MR-J2S-350A4/B4	5
MR-J2S-500A4/B4	5
MR-J2S-700A4/B4	8
MR-J2S-11KA4/B4	4
MR-J2S-15KA4/B4	6
MR-J2S-22KA4/B4	8

(5) Options and auxiliary equipment

Use UL/C-UL standard-compliant products.

(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.

(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 MELSERVO Servo Motor Instruction Manual are required if you use this servo for the first time. Always purchase them and use this servo safely.

Relevant manuals

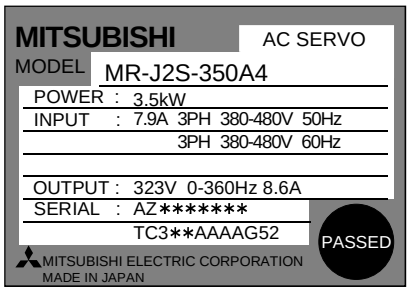
Manual name	Manual No.
MELSERVO-J2-Super Series To Use the AC Servo Safely	IB(NA)0300010
MR-J2S-□A Servo Amplifier Instruction Manual	SH(NA)030006
MR-J2S-□B Servo Amplifier Instruction Manual	SH(NA)030007
MELSERVO Servo Motor Instruction Manual	SH(NA)3181
EMC Installation Guidelines	IB(NA)67310

CONTENTS

1. INTRODUCTION

1.1 Model code definition

(1) Rating plate



(2) Model

MR–J2S– □ □ 4 □

Series

Special specification

Symbol	Special specification
None	Standard
-PX	This symbol is affixed to indicate that the 11kW to 22kW servo amplifier does not need the external regenerative resistor equipped as standard because the regenerative brake option (MR-RB6B-4 · MR-RB60-4 · MR-RB6K-4), brake unit (FR-BU) or power regeneration converter (FR-RC) is purchased.

Three-phase 380 to 480VAC power supply feature

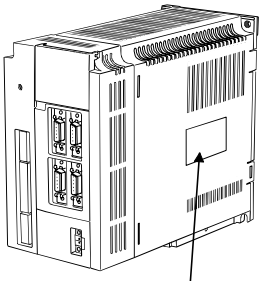
Servo amplifier type

Symbol	Type
A	General-purpose interface
B	SSCNET compatible

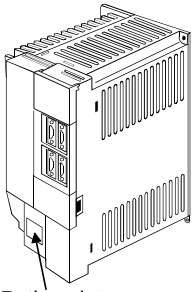
Rated output

Symbol	Rated output [kW]
60	0.6
100	1
200	2
350	3.5
500	5
700	7
11K	11
15K	15
22K	22

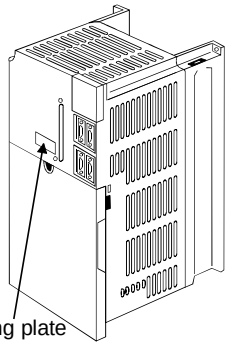
MR-J2S-200A4/B4 or less



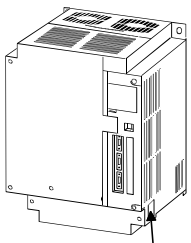
MR-J2S-350A4/B4 · 500A4/B4



MR-J2S-700A4/B4



MR-J2S-11KA4/B4 to 22KA4/B4



1.2 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 and the models with reduction gears.

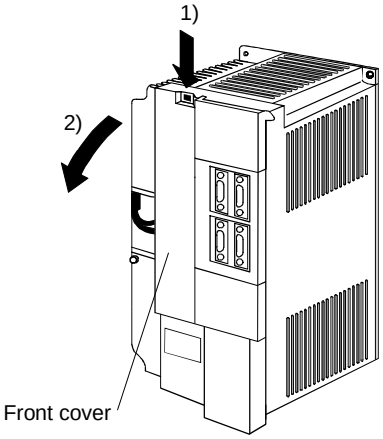
Servo amplifier	Servo motors			
	HC-SFS□	HA-LFS□		
		(Note 2) 1000r/min	1500r/min	2000r/min
MR-J2S-60A4/B4	524			
MR-J2S-100A4/B4	1024			
MR-J2S-200A4/B4	1524・2024			
MR-J2S-350A4/B4	3524			
MR-J2S-500A4/B4	5024			
MR-J2S-700A4/B4	7024	6014	(Note 2) 701M4	
MR-J2S-11KA4/B4		8014・12K14	11K1M4	11K24
MR-J2S-15KA4/B4		15K14	15K1M4	(Note 1) 15K24
MR-J2S-22KA4/B4		20K14・25K14	(Note1) 22K1M4	22K24

Note 1. These servo amplifiers may not be connected depending on the production time of the servo amplifier. Refer to Appendix.
2. Consult us since the servo amplifier to be used with any of these servo motors is optional.

1.3 Removal and reinstallation of the front cover

(1) For 3.5k • 5kW

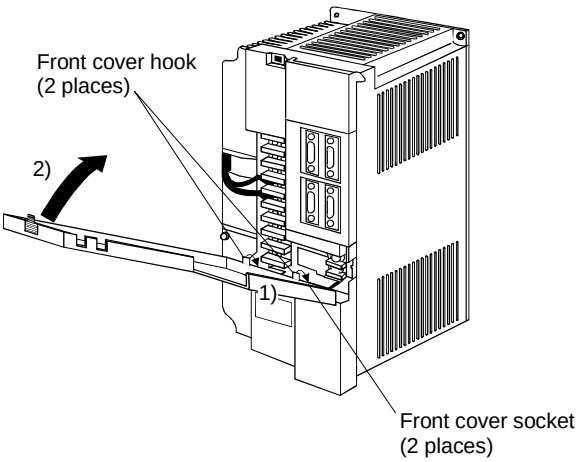
Removal of the front cover



1) Hold down the removing knob.

2) Pull the front cover toward you.

Reinstallation of the front cover

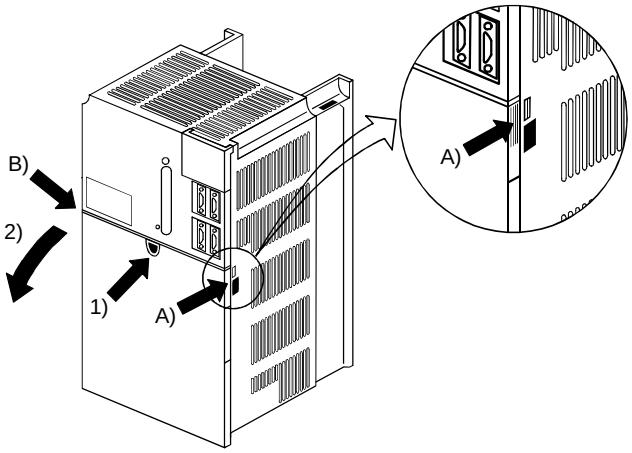


1) Insert the front cover hooks into the front cover sockets of the servo amplifier.

2) Press the front cover against the servo amplifier until the removing knob clicks.

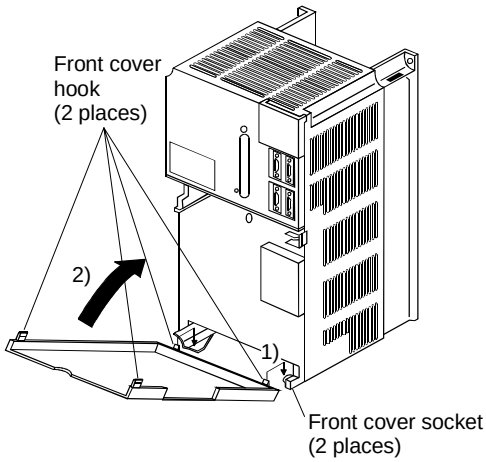
(2) 7kW

Removal of the front cover



1) Push the removing knob A) or B), and put you finger into the front hole of the front cover.
2) Pull the front cover toward you.

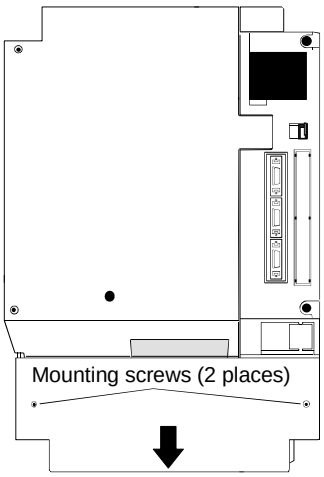
Reinstallation of the front cover



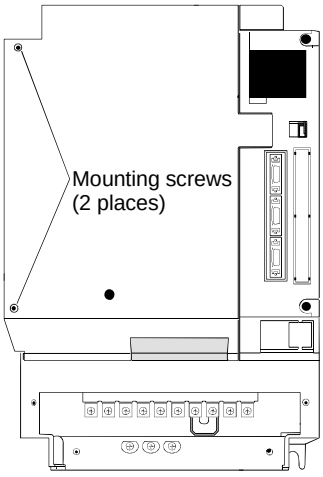
1) Insert the two front cover hooks at the bottom into the sockets of the servo amplifier.
2) Press the front cover against the servo amplifier until the removing knob clicks.

(3) For 11k to 22kW

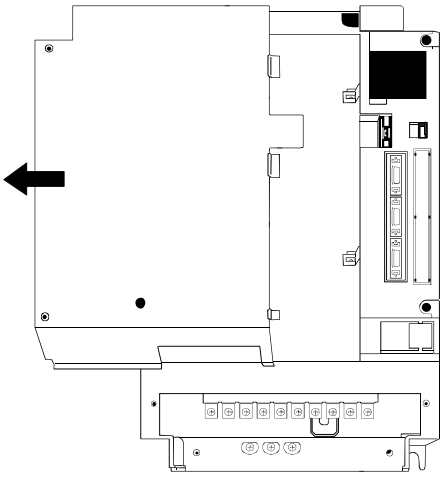
Removal of the front cover



1) Remove the front cover mounting screws (2 places) and remove the front cover.

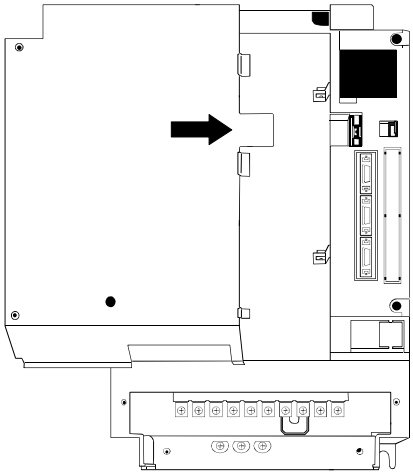


2) Remove the front cover mounting screws (2 places).

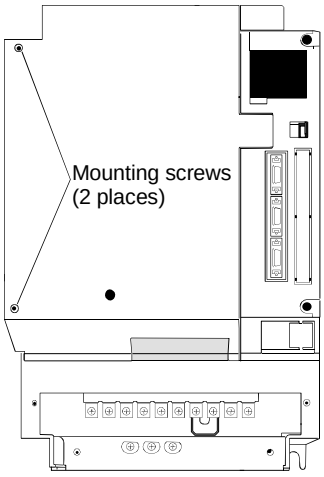


3) Remove the front cover by drawing it in the direction of arrow.

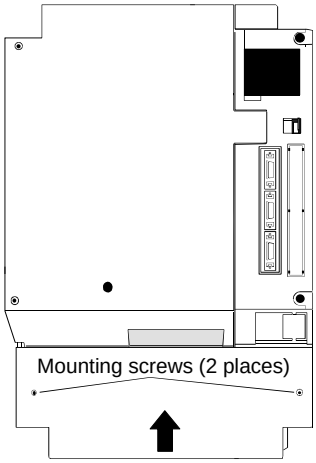
Reinstallation of the front cover



1) Insert the front cover in the direction of arrow.



2) Fix it with the mounting screws (2 places).



3) Fit the front cover and fix it with the mounting screws (2 places).

1.4 Installation

⚠ CAUTION	・Stacking in excess of the limited number of products is not allowed. ・Install the equipment to incombustibles. Installing them directly or close to combustibles will led to a fire. ・Install the equipment in a load-bearing place in accordance with this Instruction Manual. ・Do not get on or put heavy load on the equipment to prevent injury. ・Use the equipment within the specified environmental condition range. ・Provide an adequate protection to prevent screws, metallic detritus and other conductive matter or oil and other combustible matter from entering the servo amplifier. ・Do not block the intake/exhaust ports of the servo amplifier. Otherwise, a fault may occur. ・Do not subject the servo amplifier to drop impact or shock loads as they are precision equipment. ・Do not install or operate a faulty servo amplifier. ・When the product has been stored for an extended period of time, consult Mitsubishi.

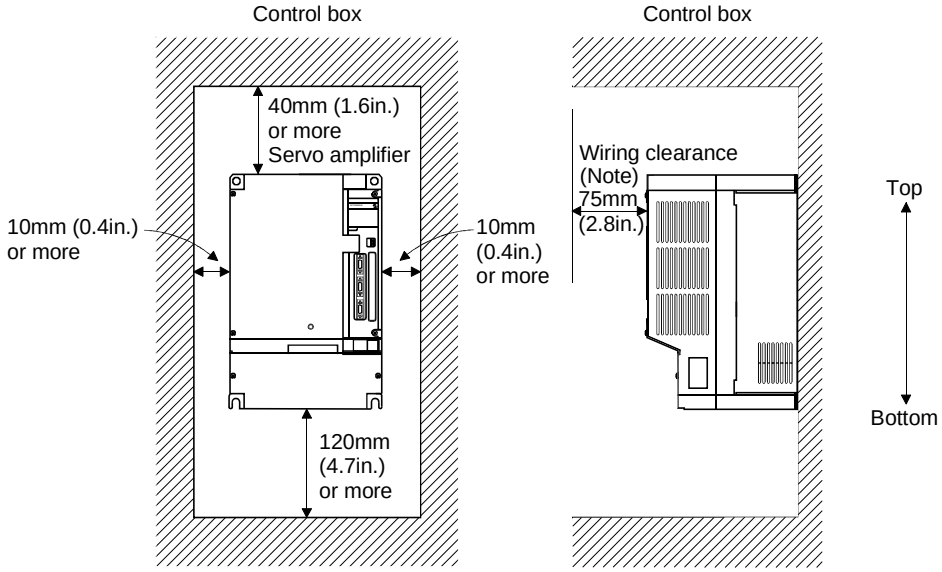
1.4.1 Environmental conditions

Environment			Conditions
Ambient temperature	During operation	[℃]	0 to +55 (non-freezing)
		[℉]	32 to +131 (non-freezing)
	In storage	[℃]	−20 to +65 (non-freezing)
		[℉]	−4 to +149 (non-freezing)
Ambient humidity	During operation		90%RH or less (non-condensing)
	In storage		
Ambience			Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt
Altitude			Max. 1000m (3280 ft) above sea level
Vibration		[m/s^2]	5.9 [m/s^2] or less
		[ft/s^2]	19.4 [ft/s^2] or less

1.4.2 Installation direction and clearances

⚠ CAUTION	▪ The equipment must be installed in the specified direction. Otherwise, a fault may occur. ▪ Leave specified clearances between the servo amplifier and control box inside walls or other equipment.

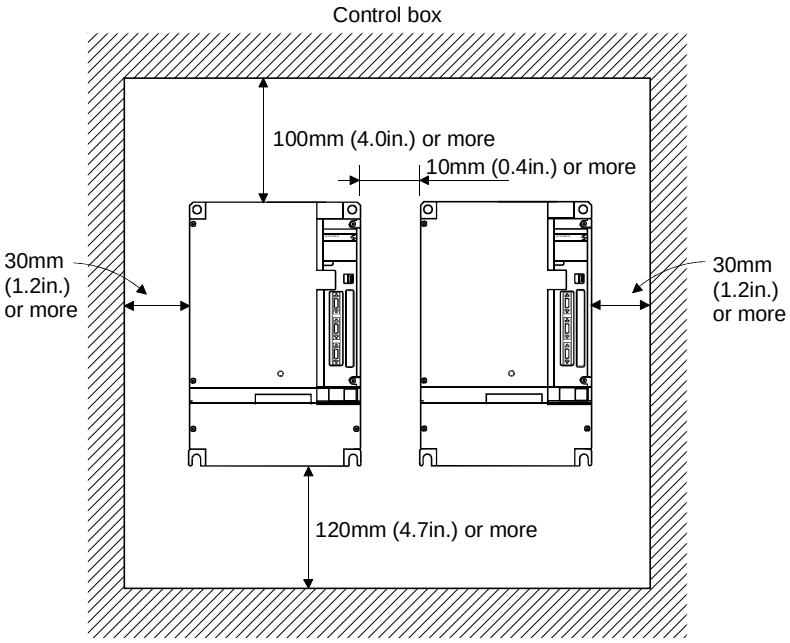
(1) Installation of one servo amplifier



Note: 70mm with 7kW or more

(2) Installation of two or more servo amplifiers

Leave a large clearance between the top of the servo amplifier and the internal surface of the control box, and install a fan to prevent the internal temperature of the control box from exceeding the environmental conditions.



(3) Others

When using heat generating equipment such as the regenerative brake option, install them with full consideration of heat generation so that the servo amplifier is not affected.

Install the servo amplifier on a perpendicular wall in the correct vertical direction.

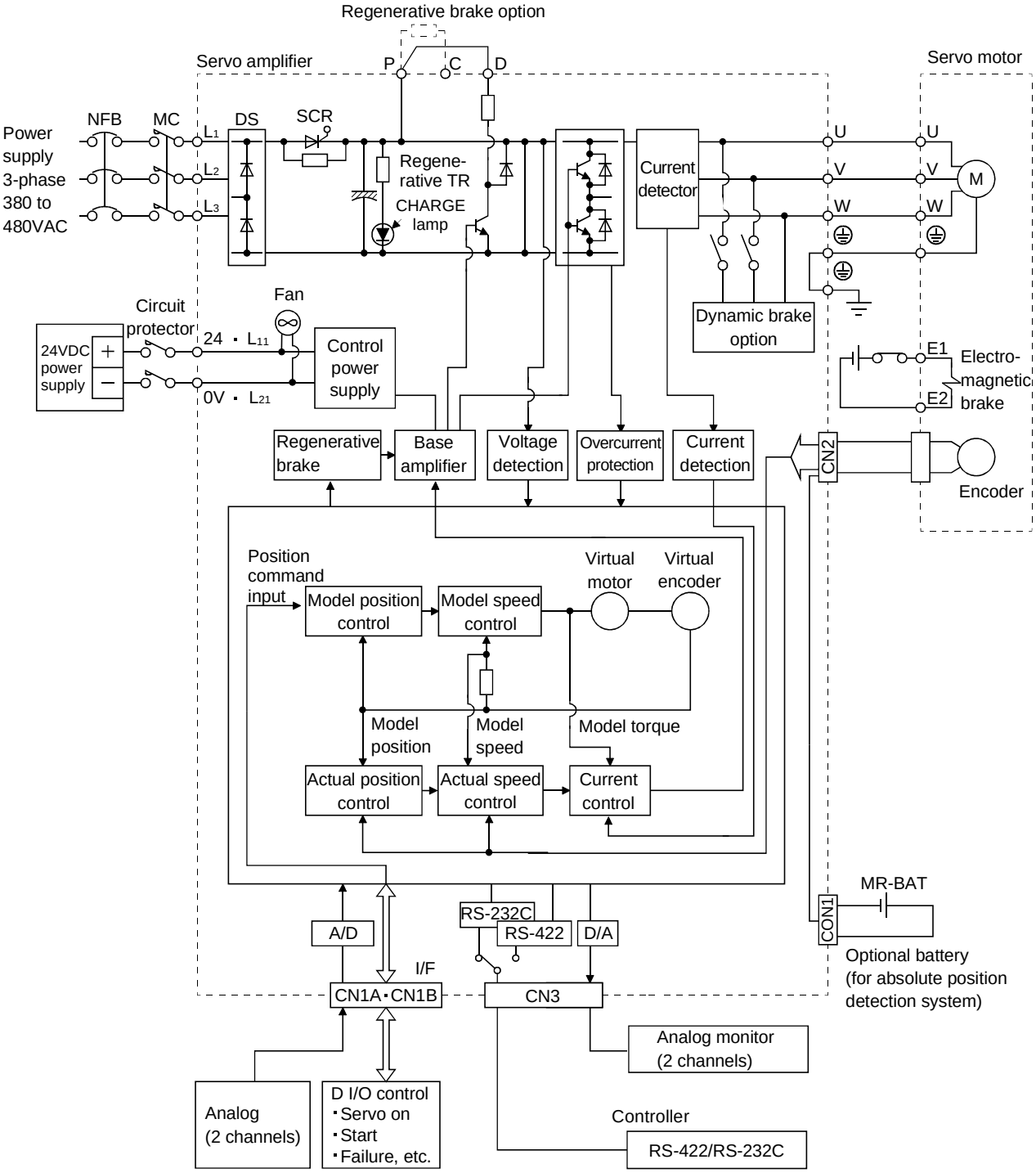
MEMO

2.MR-J2S- □ A4 SERVO AMPLIFIER

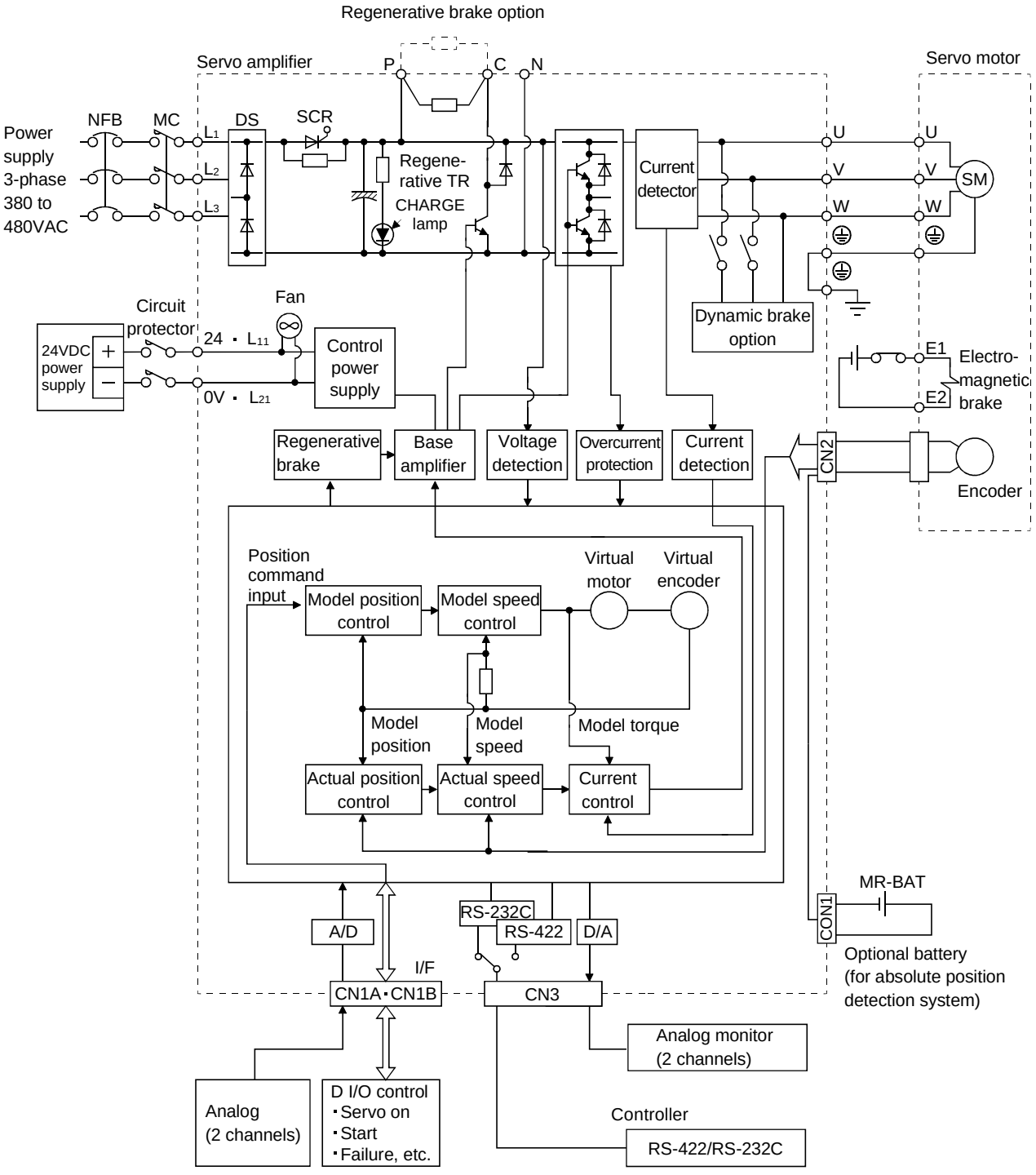
2.1 Function block diagram

The function block diagram of this servo is shown below.

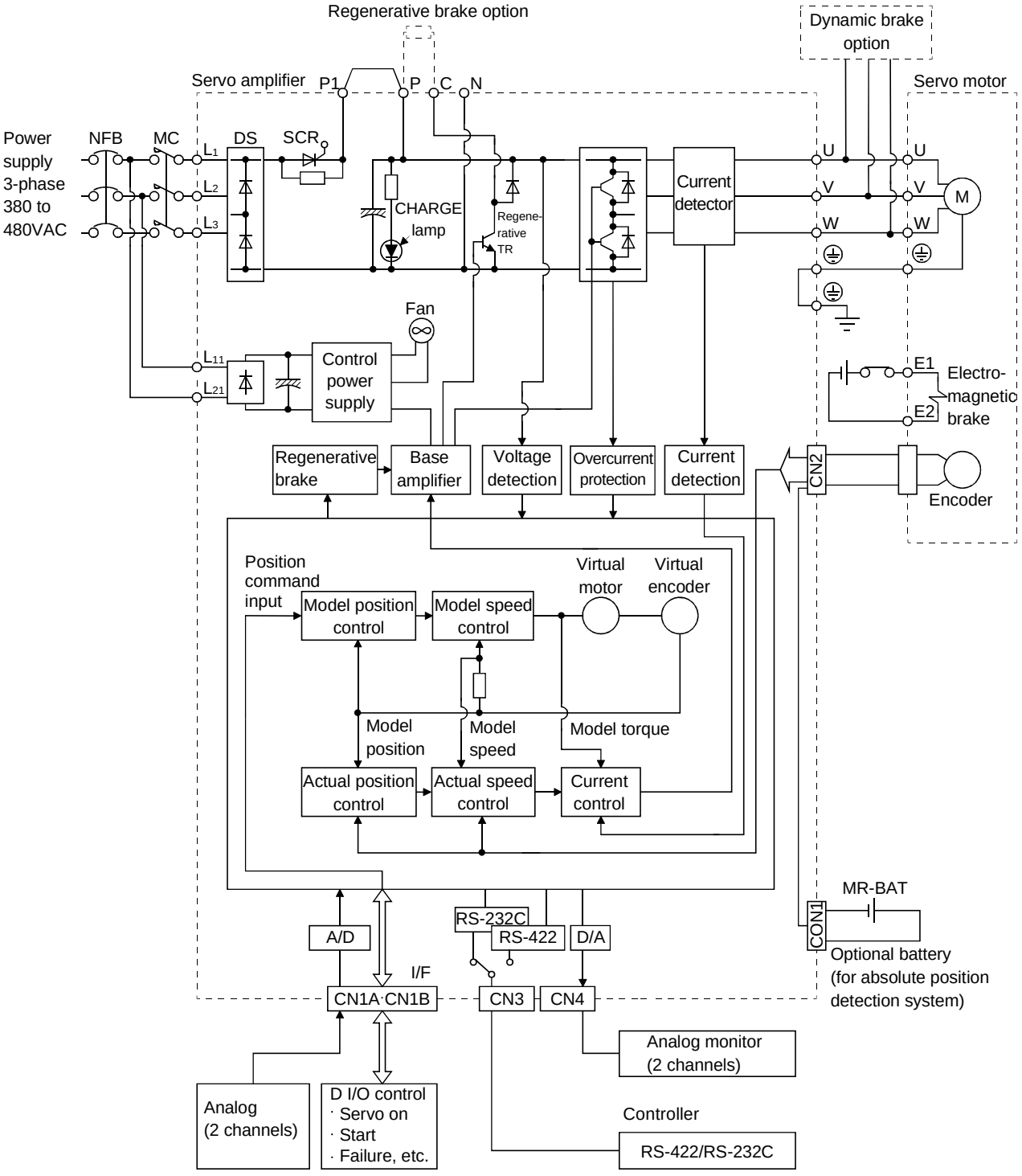
(1) MR-J2S-200A4 or less



(2) MR-J2S-350A4 to 700A4



(3) MR-J2S-11KA4 to 22KA4



2.2 Servo amplifier standard specifications

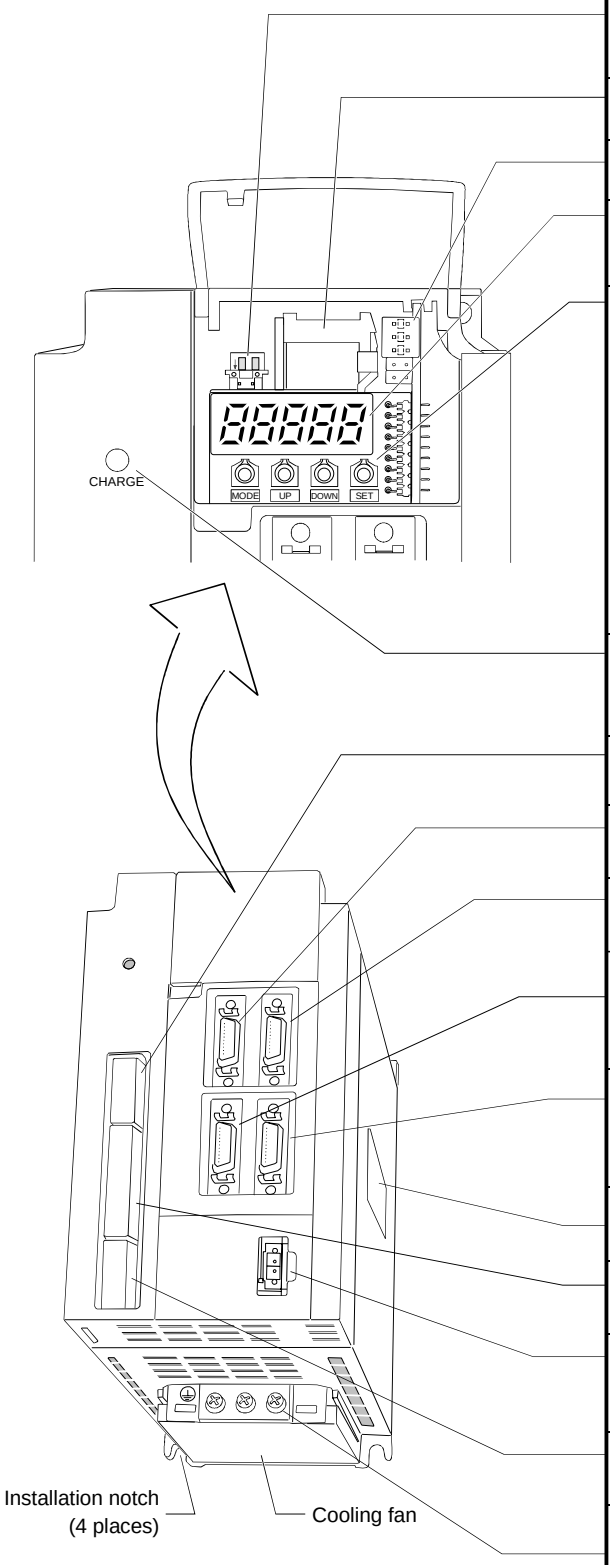
Item \ Servo Amplifier MR-J2S-□				60A4	100A4	200A4	350A4	500A4	700A4	11KA4	15KA4	22KA4
Power supply	Voltage/frequency			3-phase 380 to 480VAC, 50/60Hz								
	Permissible voltage fluctuation			3-phase 323 to 528VAC, 50/60Hz								
	Permissible frequency fluctuation			Within ±5%								
	Power supply capacity			Refer to Section5.2								
Control circuit power supply	Voltage and frequency			24VDC ±15%						1-phase 380 to 480VAC, 50/60Hz		
	Allowable voltage fluctuation									1-phase 232 to 528VAC, 50/60Hz		
	Allowable frequency fluctuation									Within ±5%		
	Power supply equipment capacity											
	Power supply capacity			25 W						50 W		
Control system				Sine-wave PWM control, current control system								
Dynamic brake				Built-in						External option		
Protective functions				Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection								
Structure				Self-cooled, open (IP00)	Force-cooling, open (IP00)							
Environment	Ambient temperature	During operation	[℃]	0 to +55 (non-freezing)								
			[°F]	32 to +131 (non-freezing)								
		In storage	[℃]	−20 to +65 (non-freezing)								
			[°F]	−4 to +149 (non-freezing)								
	Ambient humidity	During 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								
				19.4 [ft/s^2] or less								
Mass			[kg]	2.1	2.2	2.2	5	5	7.2	15	16	20
			[lb]	4.6	4.9	4.9	11	11	15.9	33.1	35.3	44.1

2.3 Parts identification

POINT

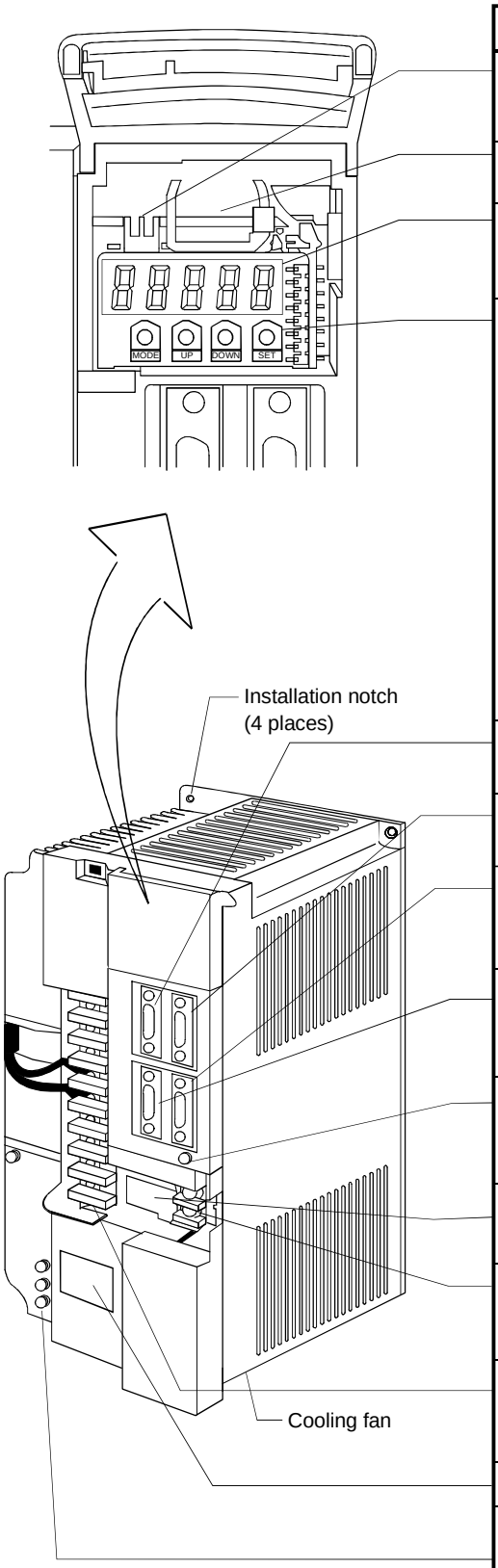
- The servo amplifier is shown without the front cover. For removal of the front cover, refer to section 1.3.

(1) MR-J2S-200A4 or less



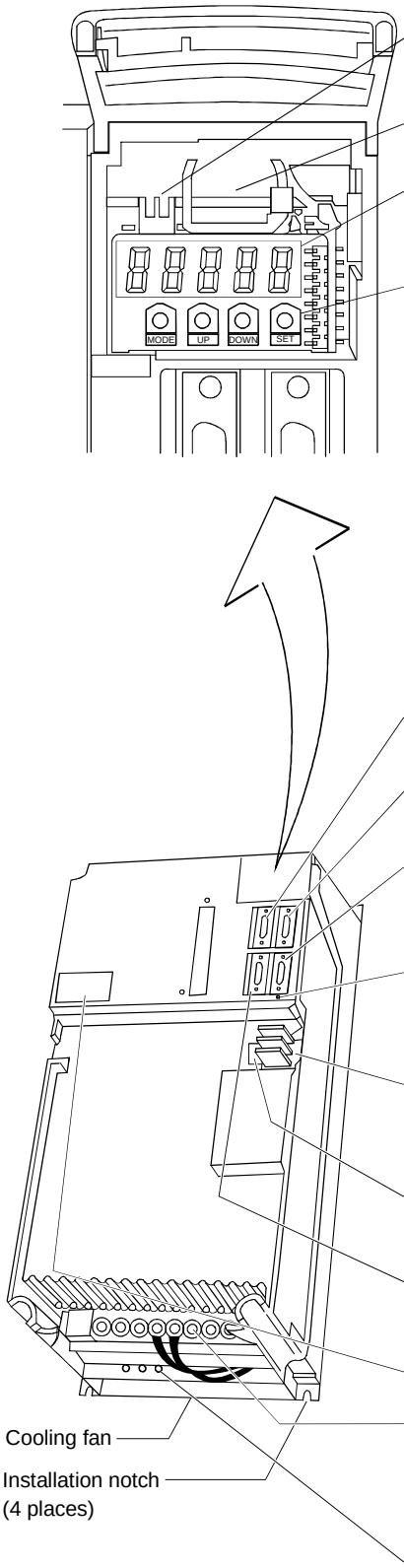
Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□A Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Jumper pin (JP11) for switching between sink and source Used to switch between sink and source.	Section2.5.3
Display The 5-digit, seven-segment LED shows the servo status and alarm number.	MR-J2S-□A Servo Amplifier Instruction Manual
Operation section Used to perform status display, diagnostic, alarm and parameter setting operations. MODE UP DOWN SET Used to set data. Used to change the display or data in each mode. Used to change the mode.	
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.	
Main circuit connector (CNP1) Used to connect the input power supply.	Section2.5.2 Chapter4
I/O signal connector (CN1A) Used to connect digital I/O signals.	MR-J2S-□A Servo Amplifier Instruction Manual
I/O signal connector (CN1B) Used to connect digital I/O signals.	
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section2.5.1 MR-J2S-□A Servo Amplifier Instruction Manual
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	MR-J2S-□A Servo Amplifier Instruction Manual
Name plate	Section1.1
Regeneration connector (CNP2) Used to connect the regenerative brake option.	Section2.5.2 Chapter4
Control circuit power supply connector (CN4) Used to connect the control circuit power supply and regenerative brake option.	
Motor power supply connector (CNP3) Used to connect the servo motor.	
Protective earth (PE) terminal (⏚) Ground terminal.	Section2.5.1 Section2.6.2 MR-J2S-□A Servo Amplifier Instruction Manual

(2) MR-J2S-350A4 • 500A4



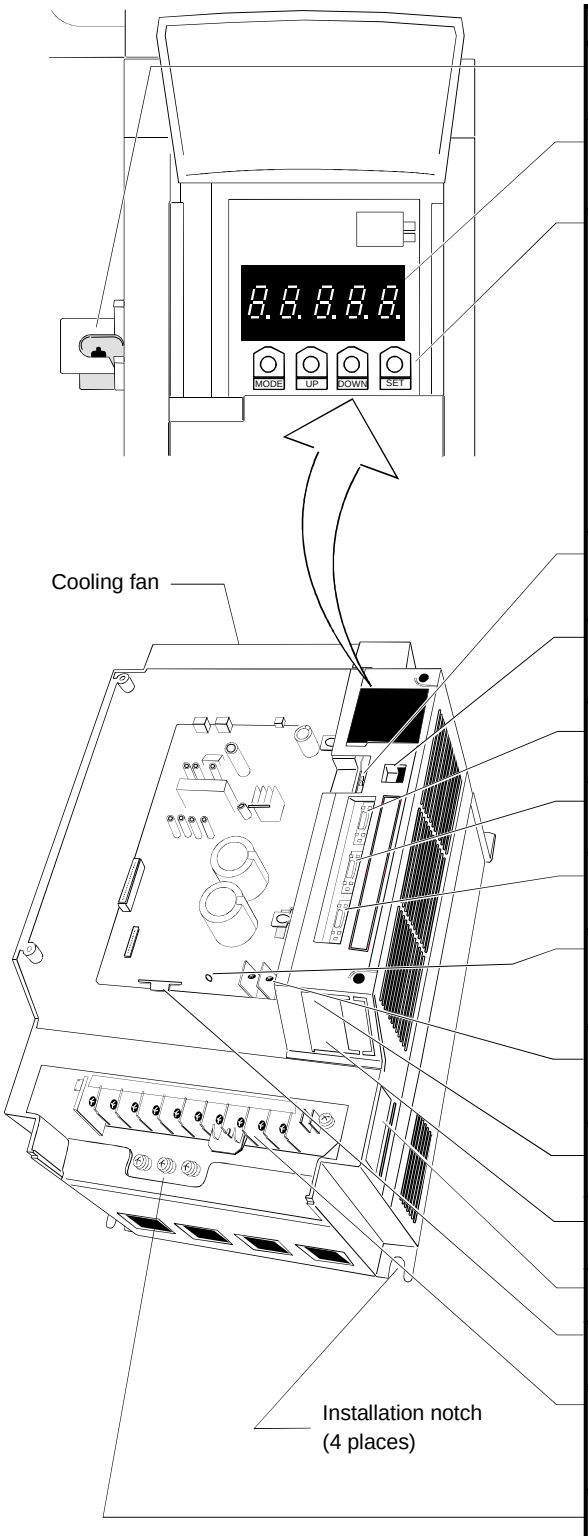
Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□A Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Display The 5-digit, seven-segment LED shows the servo status and alarm number.	
Operation section Used to perform status display, diagnostic, alarm and parameter setting operations. MODE UP DOWN SET Used to set data. Used to change the display or data in each mode. Used to change the mode.	
I/O signal connector (CN1A) Used to connect digital I/O signals.	
I/O signal connector (CN1B) Used to connect digital I/O signals.	
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section2.5.1 MR-J2S-□A 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.	
Jumper pin (JP11) for switching between sink and source Used to switch between sink and source.	Section2.5.3
Control circuit terminal block (TE2) Used to connect the control circuit power supply and regenerative brake option.	Section2.5.2 Chapter4
Main circuit terminal block (TE1) The input power supply, regenerative brake option and servo motor.	
Name plate	Section1.1
Protective earth (PE) terminal (⏚) Ground terminal.	Section2.5.1 Section3.6.2 MR-J2S-□A4 Servo Amplifier Instruction Manual

(3) MR-J2S-700A4



Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□A Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Display The 5-digit, seven-segment LED shows the servo status and alarm number.	
Operation section Used to perform status display, diagnostic, alarm and parameter setting operations. MODE UP DOWN SET Used to set data. Used to change the display or data in each mode. Used to change the mode.	
I/O signal connector (CN1A) Used to connect digital I/O signals.	
I/O signal connector (CN1B) Used to connect digital I/O signals.	
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	
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 and regenerative brake option.	Section2.5.2 Chapter4
Jumper pin (JP11) for switching between sink and source Used to switch between sink and source.	Section2.5.3
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section2.5.1 MR-J2S-□A4 Servo Amplifier Instruction Manual
Name plate	Section1.1
Main circuit terminal block (TE1) The input power supply, regenerative brake option and servo motor.	Section2.5.2 Chapter4
Protective earth (PE) terminal (⏚) Ground terminal.	Section2.5.1 Section2.6.2 MR-J2S-□A4 Servo Amplifier Instruction Manual

(4) MR-J2S-11KA4 to 22KA4



Name/Application	Reference
Battery holder Contains the battery for absolute position data backup.	MR-J2S-□A Servo Amplifier Instruction Manual
Display The 5-digit, seven-segment LED shows the servo status and alarm number.	
Operation section Used to perform status display, diagnostic, alarm and parameter setting operations. MODE UP DOWN SET Used to set data. Used to change the display or data in each mode. Used to change the mode.	
Battery connector (CON1) Used to connect the battery for absolute position data backup.	
Monitor output terminal (CN4) Used to output monitor values as analog signals for two channels.	
Communication connector (CN3) Used to connect a command device (RS232C)	
I/O signal connector (CN1A) Used to connect digital I/O signals.	Section2.5.1 MR-J2S-□A Servo Amplifier Instruction Manual
I/O signal connector (CN1B) Used to connect digital I/O signals.	
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.	Section2.5.2 Chapter 4
Maker adjusting connector (CON2) Keep this connector open.	
Jumper pin (JP11) for switching between sink and source Used to switch between sink and source.	Section2.5.3
Name plate	Section1.1
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section2.5.1 MR-J2S-□A Servo Amplifer Instruction Manual
Main circuit terminal block (TE1) Used to connect the input power supply, regenerative brake option and servo motor.	Section2.5.2 Chapter4
Protective earth (PE) terminal (⏚) Ground terminal.	Section2.5.1 Section3.6.2 MR-J2S-□A Servo Amplifer Instruction Manual

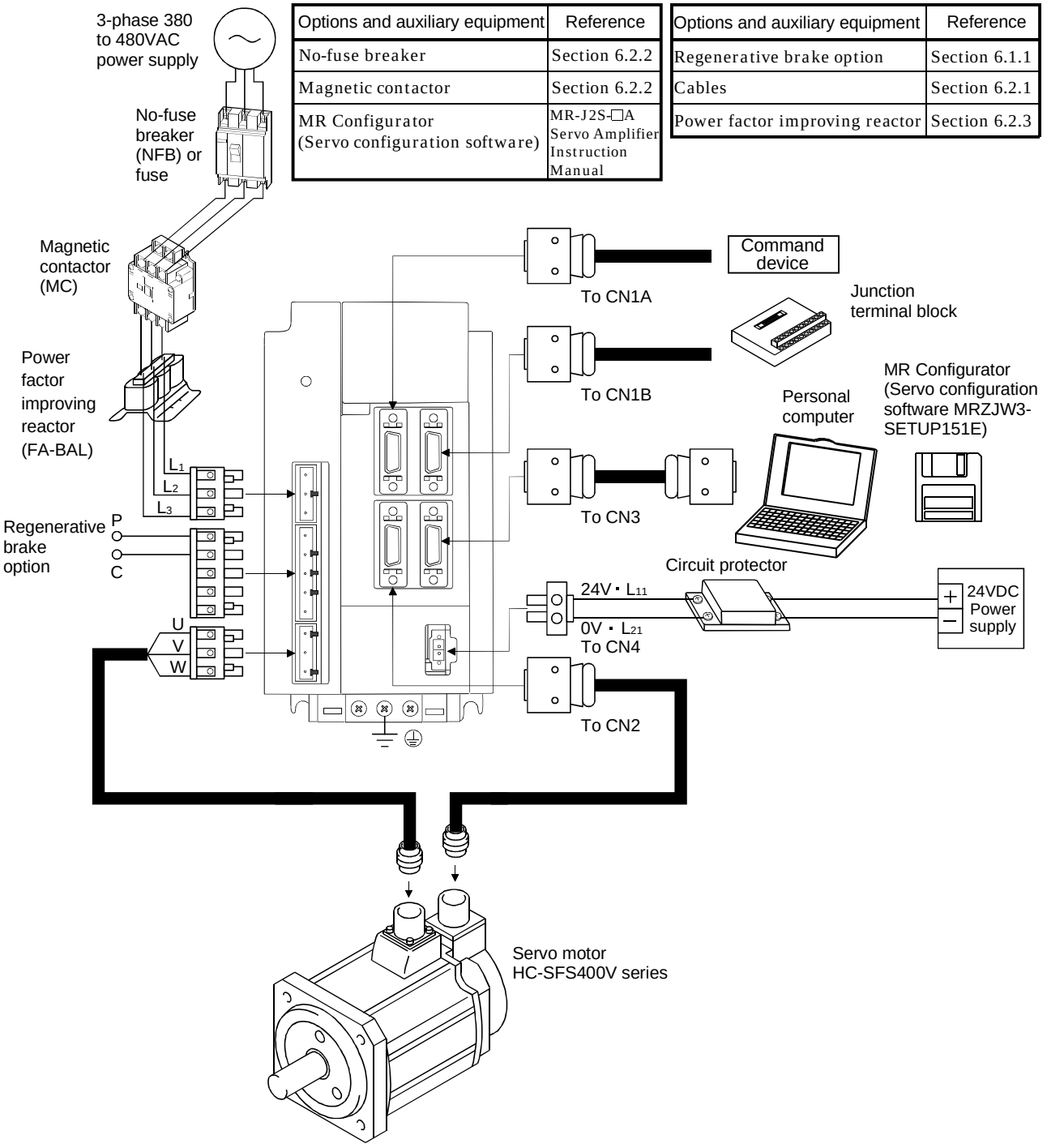
2.4 Servo system with auxiliary equipment

> **WARNING** To prevent an electric shock, always connect the protective earth (PE) terminal (terminal marked ⏚) of the servo amplifier to the protective earth (PE) of the control box.

(1) MR-J2S-200A4 or less

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□A Servo Amplifier Instruction Manual

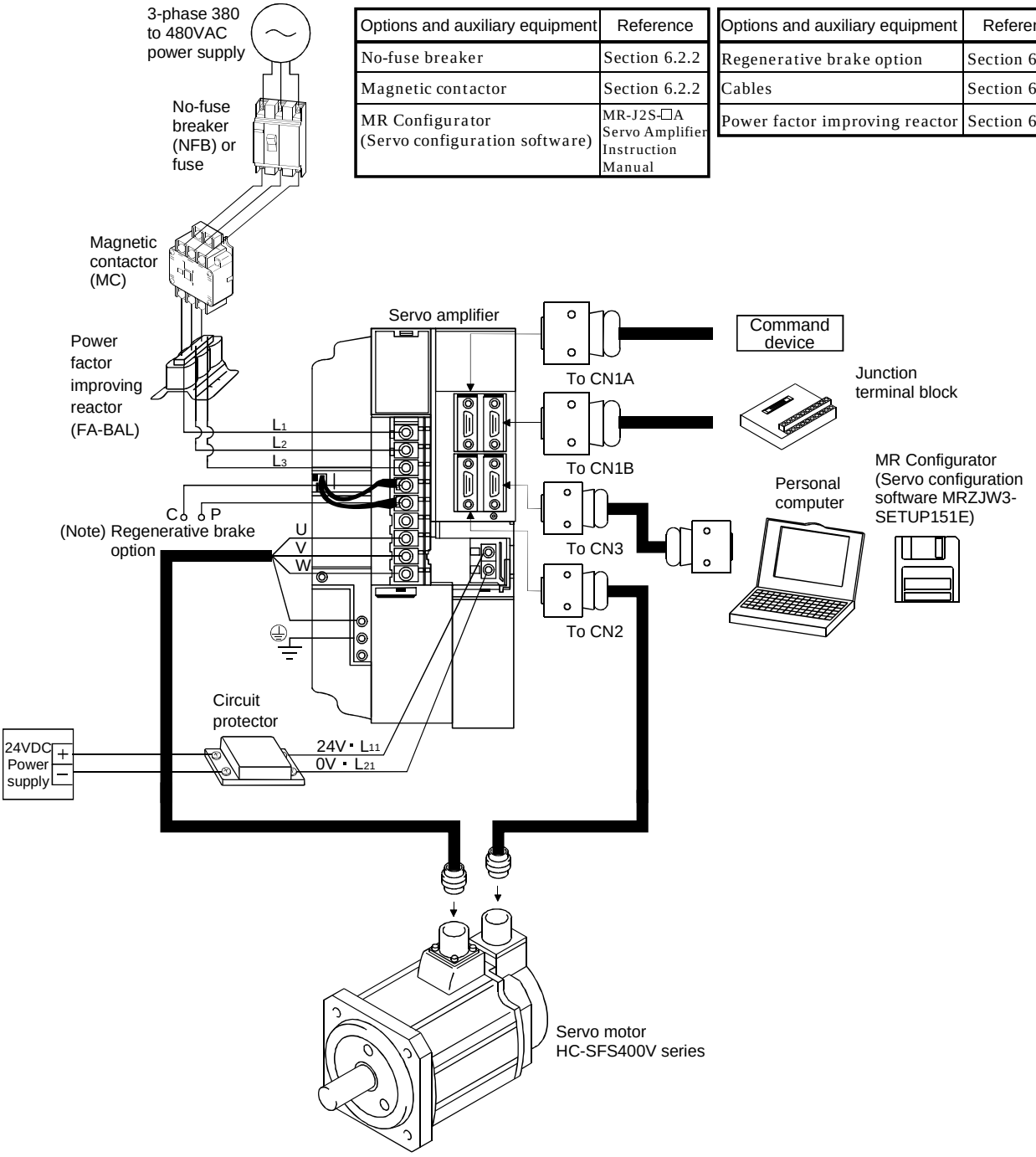
Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3



(2) MR-J2S-350A4 • 500A4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□A Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3

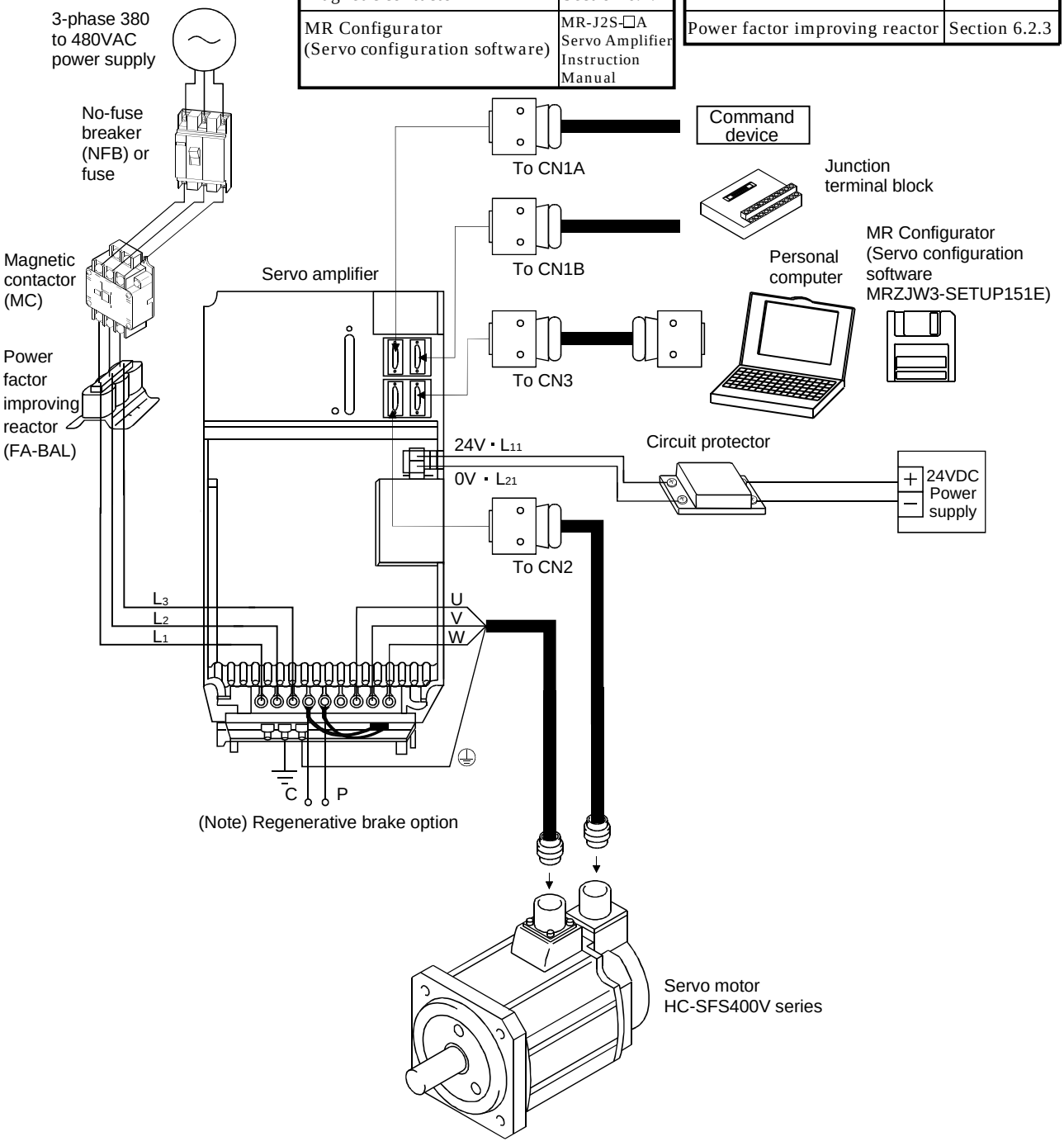


Note. When using the regenerative brake option, remove the lead wires of the built-in regenerative brake resistor.

(3) MR-J2S-700A4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□A Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3

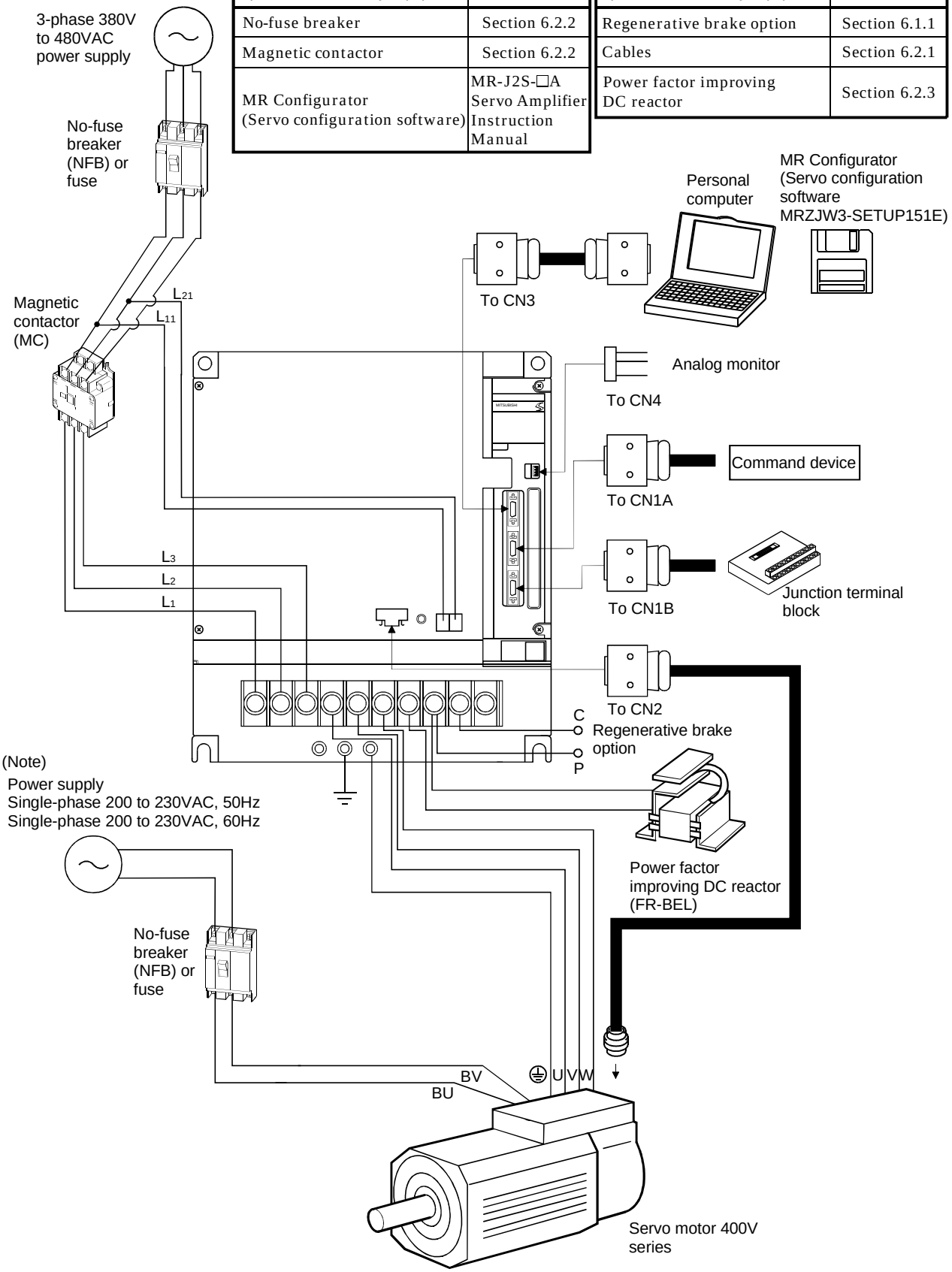


Note. When using the regenerative brake option, remove the lead wires of the built-in regenerative brake resistor.

(4) MR-J2S-11KA4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□A Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving DC reactor	Section 6.2.3

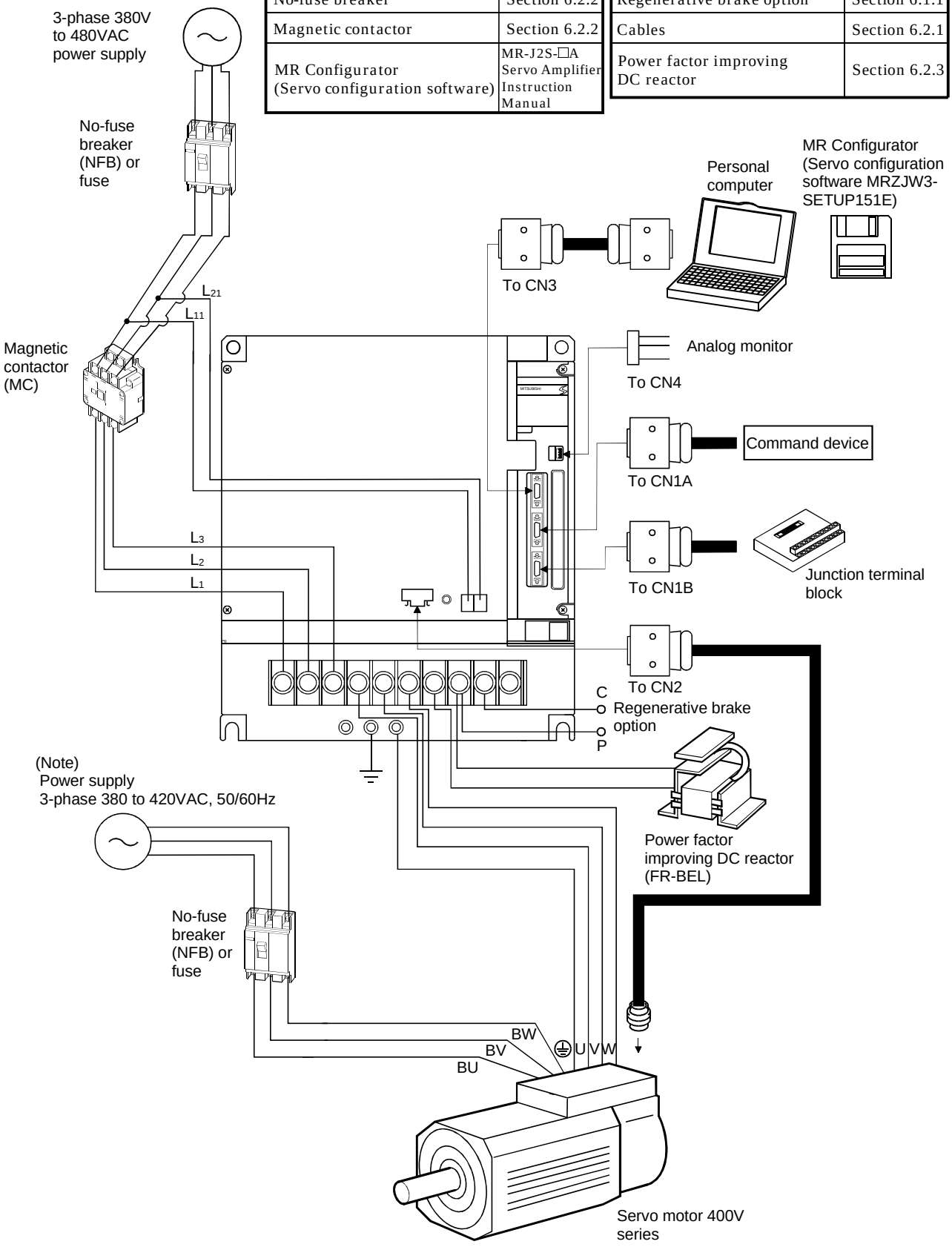


Note. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.

(5) MR-J2S-15KA4 • 22KA4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□A Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving DC reactor	Section 6.2.3



Note. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.

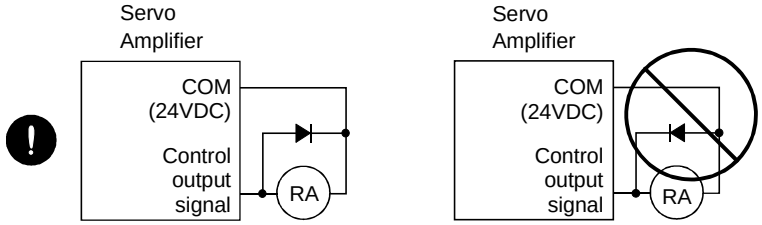
2.5 Signals and wiring

⚠ 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 10 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 emergency stop (EMG) 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-H 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.

POINT

- CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a failure. Connect them correctly.

2.5.1 Connectors and signal arrangements

POINT

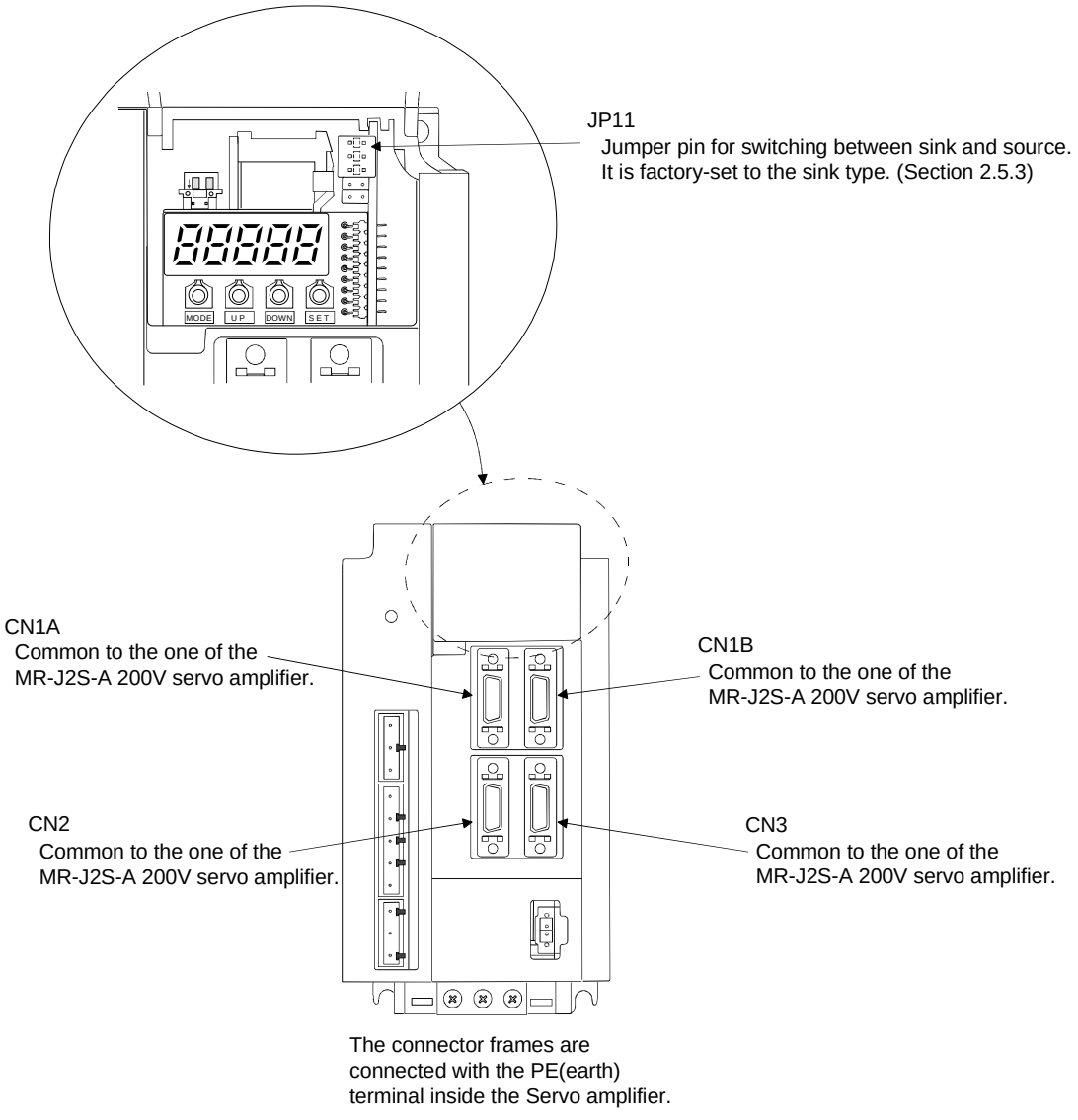
- The pin configurations of the connectors are as viewed from the cable connector wiring section.
- Refer to Technical Data for Each Servo Amplifier for CN1A, CN1B, CN2 and CN3 signal assignment.

Indicates signal layout compatibility between the connectors.

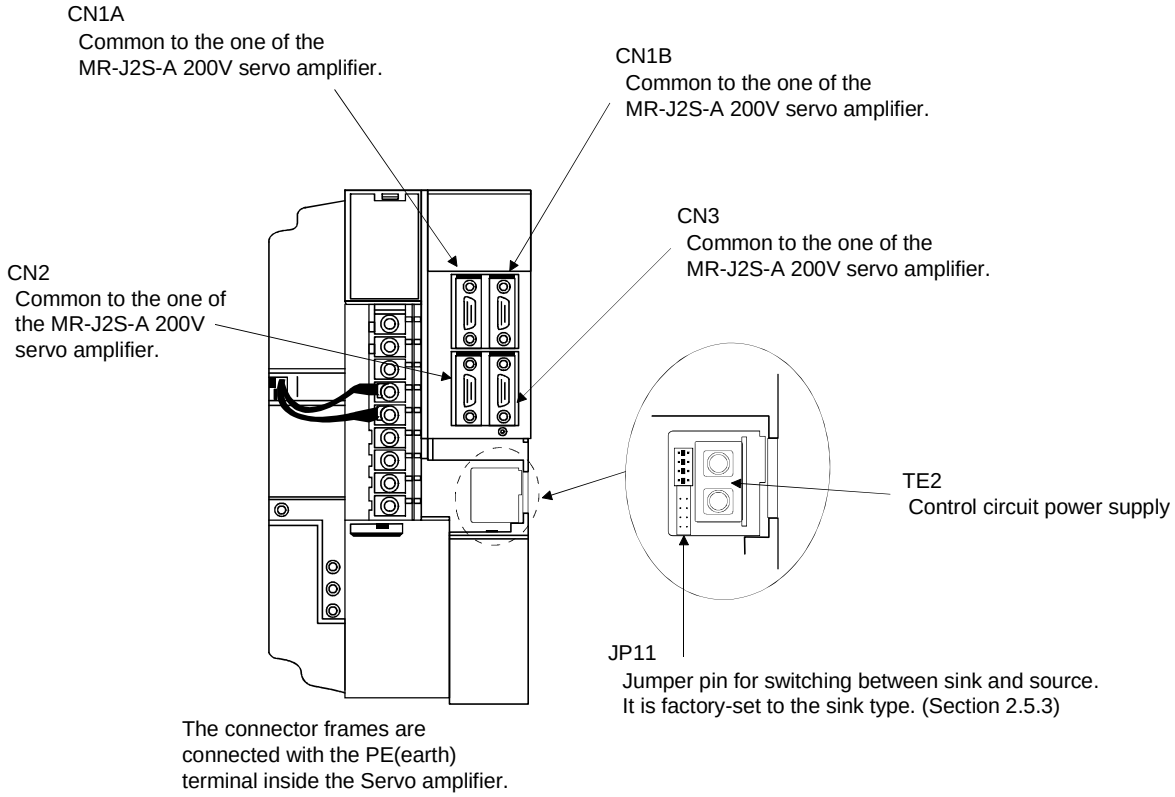
Servo amplifier	CN1A	CN1B	CN2	CN3
MR-J2S-60A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-100A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-200A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-350A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-500A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-700A4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	←
MR-J2S-11KA4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	(Note)
MR-J2S-15KA4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	(Note)
MR-J2S-22KA4	Common to the one of the MR-J2S-A 200V servo amplifier.	←	←	(Note)

Note. Refer to this section (4).

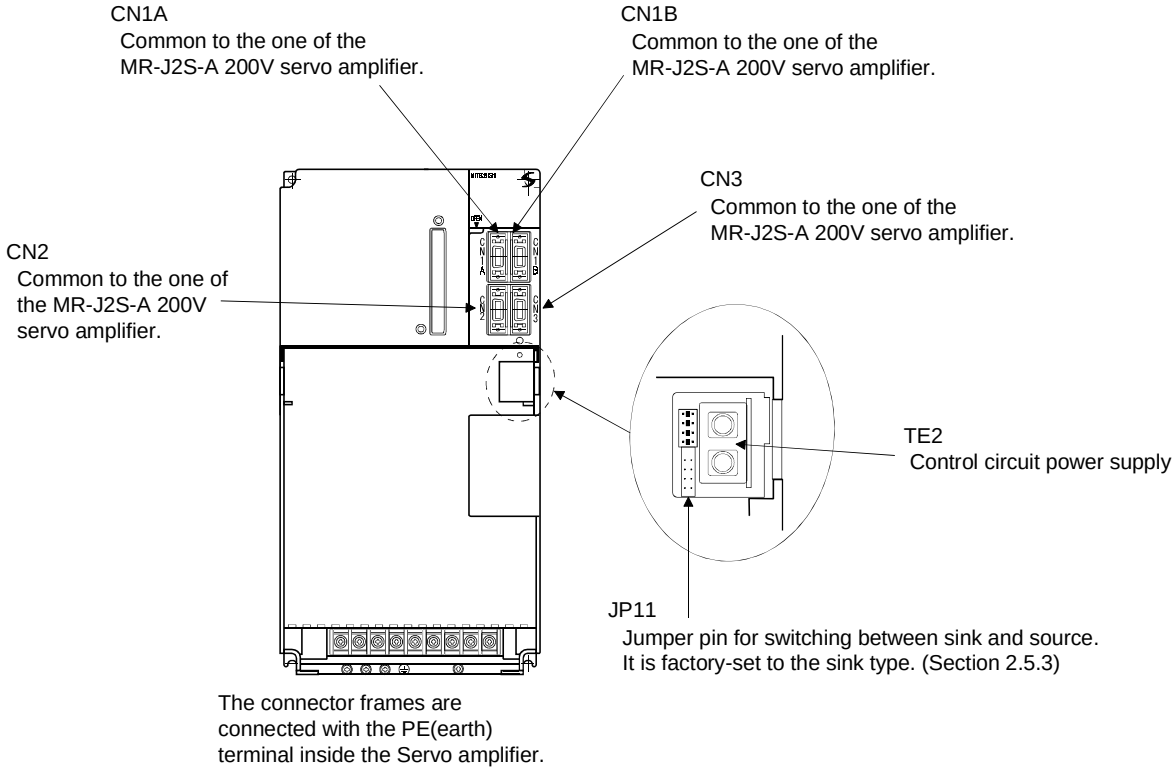
(1) MR-J2S-200A4 or less



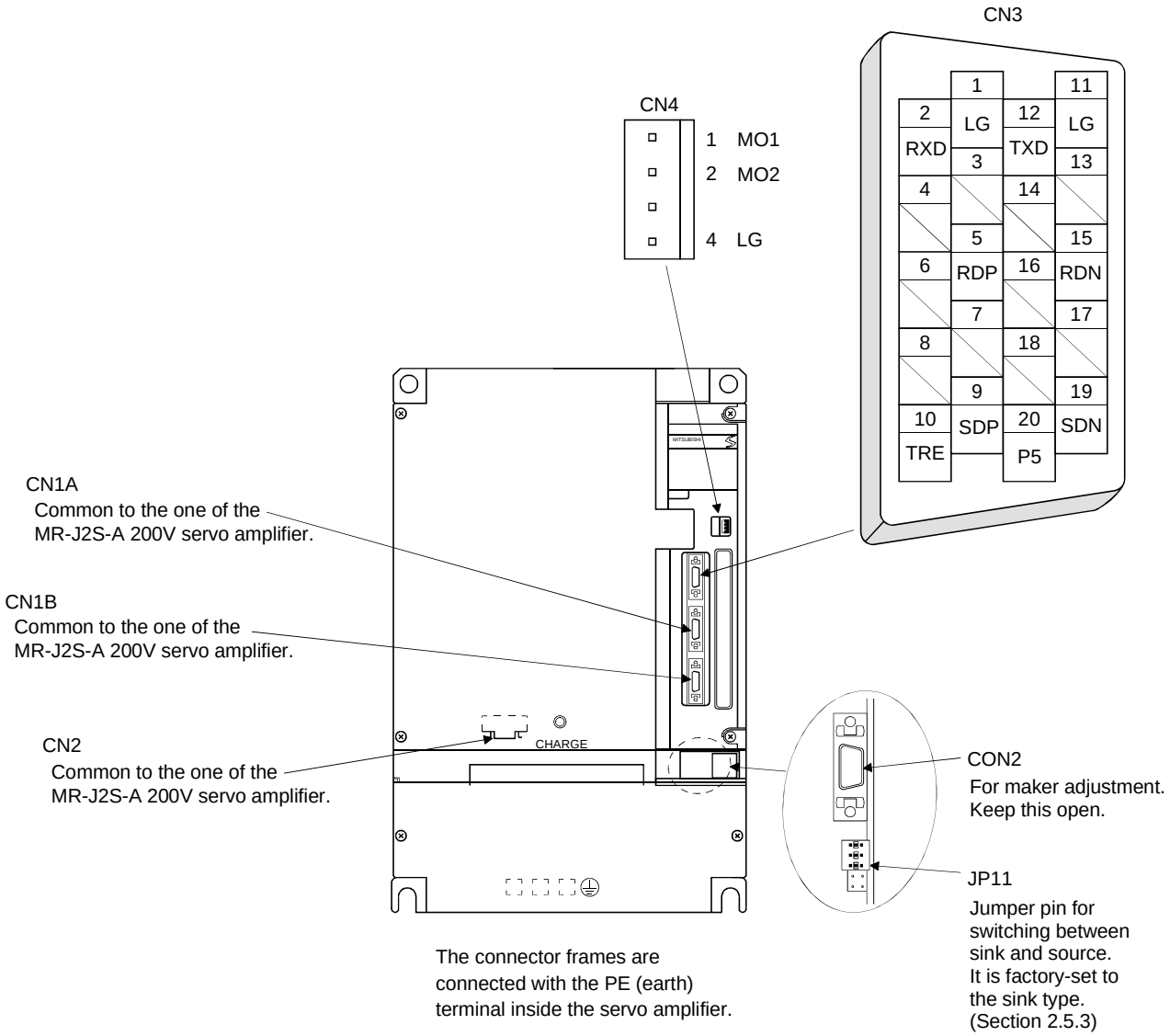
(2) MR-J2S-350A4 • 500A4



(3) MR-J2S-700A4



(4) MR-J2S-11KA to 22KA4



2.5.2 Input power supply circuit

⚠ WARNING	・Insulate the connections of the power supply terminals to prevent an electric shock.

⚠ CAUTION	・When the servo amplifier has become faulty, switch power off on the amplifier power side. Continuous flow of a large current may cause a fire. ・Use the trouble (ALM) to switch power off. Otherwise, a regenerative brake transistor fault or the like may overheat the regenerative brake resistor, causing a fire. ・Connect the wires to the correct phase terminals (U, V, W) of the servo amplifier and servo motor. Otherwise, the servo motor will operate improperly. ・Do not connect AC power supply directly to the servo motor. Otherwise, a fault may occur.

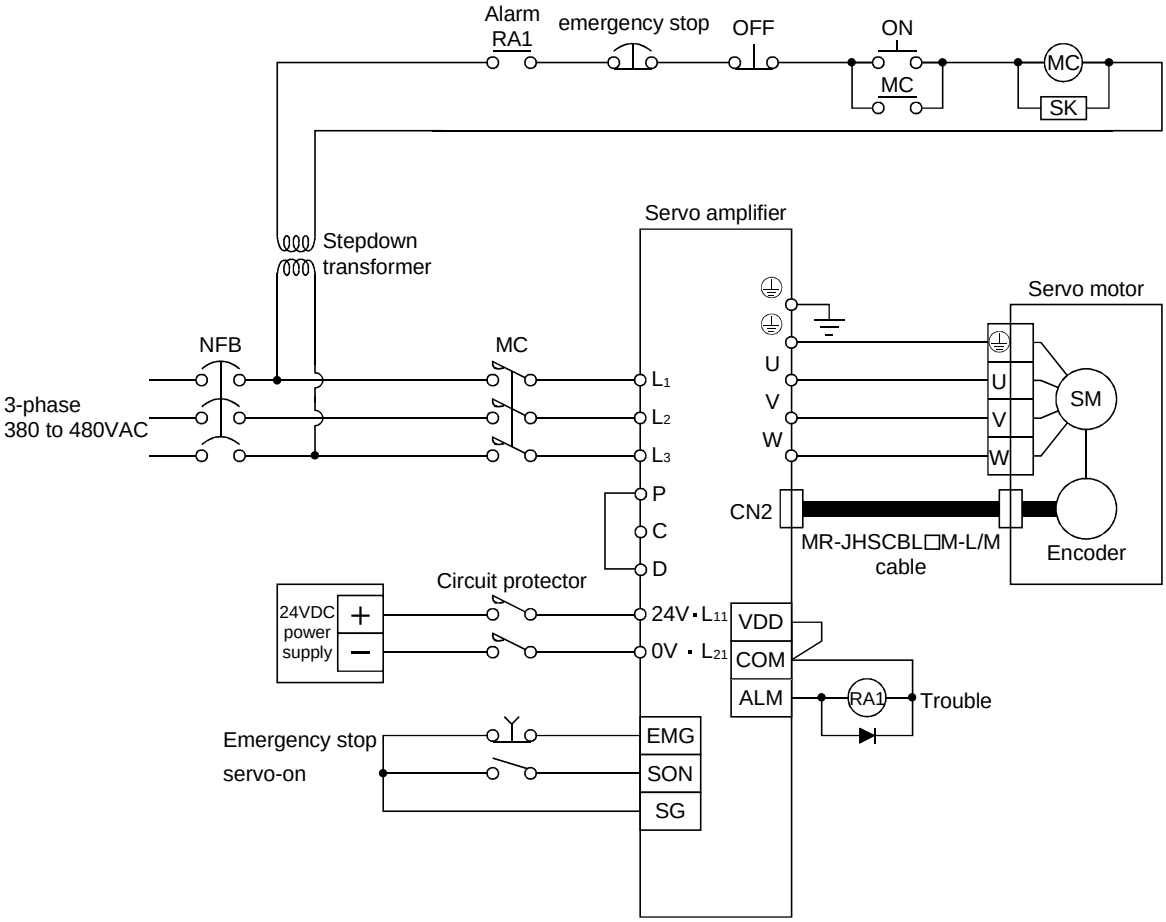
POINT

・Do not apply the test lead bars or like of a tester directly to the pins of the connectors supplied with the servo motor. Doing so will deform the pins, causing poor contact.

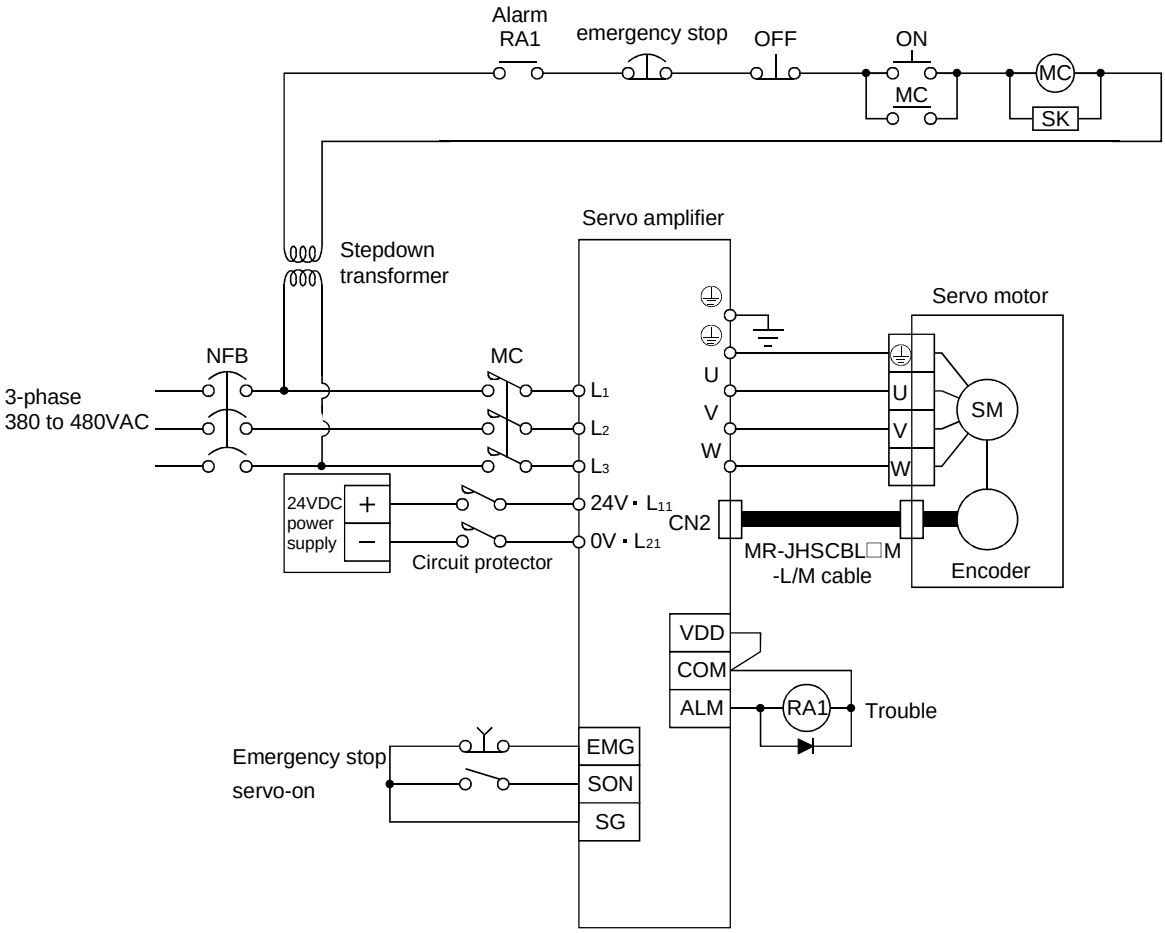
(1) Connection example

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

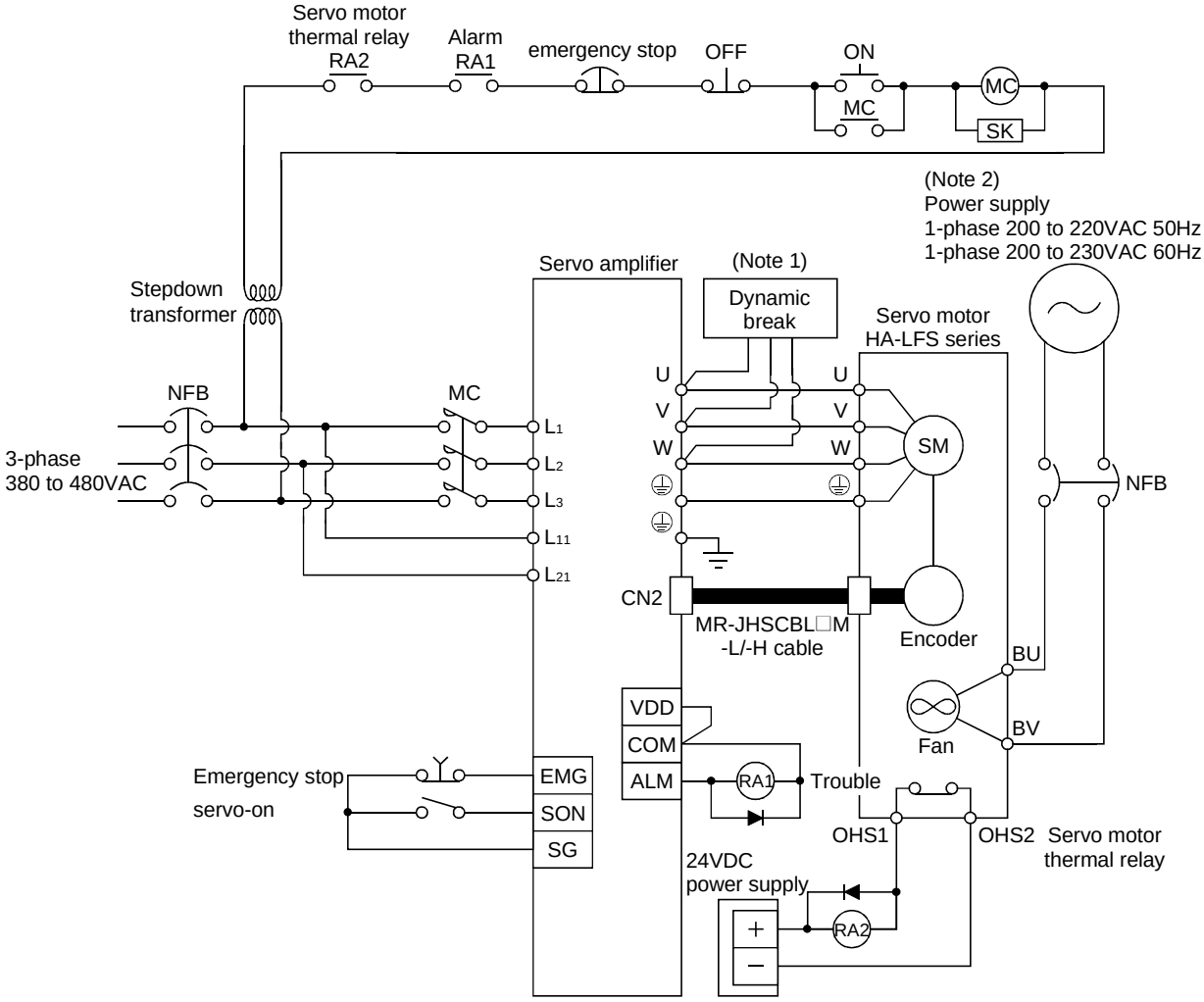
(a) MR-J2S-200A4 or less



(b) MR-J2S-350A4 to 700A4

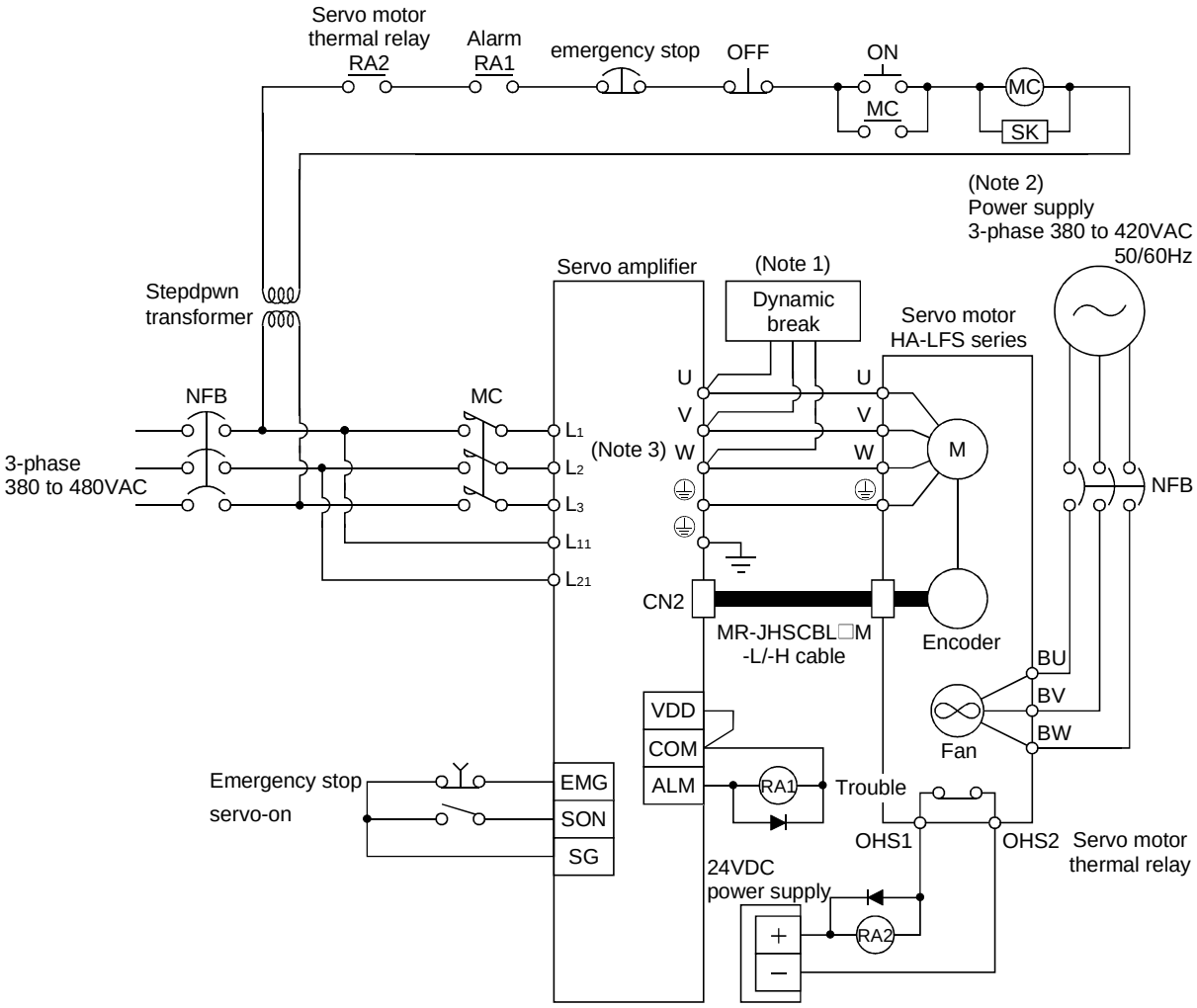


(c) MR-J2S-11KA4

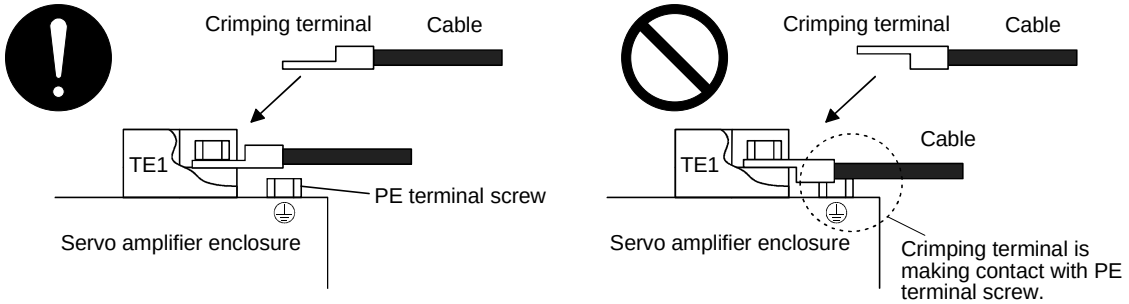


Note 1. When using the external dynamic break, refer to section 6.1.4.
2. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.

(d) MR-J2S-15KA4 • 22KA4



Note 1. When using the external dynamic break, refer to section 6.1.4.
2. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.
3. When the U/V/W cable is wired to TE1 in the MR-J2S-22KA4, the crimping terminal may make contact with the PE terminal screw depending on the orientation of the crimping terminal. Wire the cable, paying attention to the orientation of the crimping terminal.



(2) Servo amplifier terminals

The positions and signal arrangements of the terminal blocks change with the capacity of the servo amplifier. Refer to Chapter 4.

(a) MR-J2S-200A4 or less

Symbol	Signal	Description
L_1 L_2 L_3	Main circuit power supply	Supply L_1, L_2 and L_3 with three-phase 380 to 480VAC, 50/60Hz power.
U V W	Servo motor output	Connect to the servo motor power supply terminals (U, V, W).
24V• L_{11} 0V• L_{21}	Control circuit power supply	Supply the 24VDC power. Connect the positive side to 24V/L_{11} and the negative side to 0V/L_{21}.
P C D	Regenerative brake option	When using the regenerative brake option, be sure to remove the wiring across P-D before connecting it across P-C. Refer to Section 6.1.1 for details.
⏚	Protective earth (PE)	Connect this terminal to the protective earth (PE) terminals of the servo motor and control box for grounding.

(b) MR-J2S-350A4 • 700A4

Symbol	Signal	Description
L_1 L_2 L_3	Main circuit power supply	Supply L_1, L_2 and L_3 with three-phase 380 to 480VAC, 50/60Hz power.
U V W	Servo motor output	Connect to the servo motor power supply terminals (U, V, W).
24V• L_{11} 0V• L_{21}	Control circuit power supply	Supply the 24VDC power. Connect the positive side to 24V/L_{11} and the negative side to 0V/L_{21}.
P C	Regenerative brake option	The connection across P-C is made at the time of shipment (servo amplifier built-in regenerative brake resistor). When using the regenerative brake option, be sure to remove the wiring across P-C before connecting it across P-C. Refer to Section 6.1.1 for details.
P N	Brake unit	When using the regeneration converter or the brake unit, be sure to remove the wiring across P-C before connecting it across P-N. Refer to Section 6.1.2 for details.
⏚	Protective earth (PE)	Connect this terminal to the protective earth (PE) terminals of the servo motor and control box for grounding.

(c) MR-J2S-11KA4 to 22KA4

Symbol	Signal	Description
L_1 L_2 L_3	Main circuit power supply	Supply L_1, L_2 and L_3 with three-phase 380 to 480VAC, 50/60Hz power.
U V W	Servo motor output	Connect to the servo motor power supply terminals (U, V, W).
L_{11} L_{21}	Control circuit power supply	Supply L_{11} and L_{21} with single-phase 380 to 480VAC, 50/60Hz power.
P C	Regenerative brake option	When using the attached regenerative brake resistor or regenerative brake option, connect it across P-C. Refer to Section 6.1.1 for details.
P N	Brake unit	When using the regeneration converter or the brake unit, be sure to remove the wiring across P-C before connecting it across P-N. Refer to Section 6.1.2 for details.
⏚	Protective earth (PE)	Connect this terminal to the protective earth (PE) terminals of the servo motor and control box for grounding.
P_1 P	Power factor improving DC reactors	P_1-P are connected before shipment. When connecting a power factor improving DC reactor, remove the short bar across P_1-P. Refer to Section 6.2.4 for details.

(3) Power-on sequence

(a) Power-on procedure

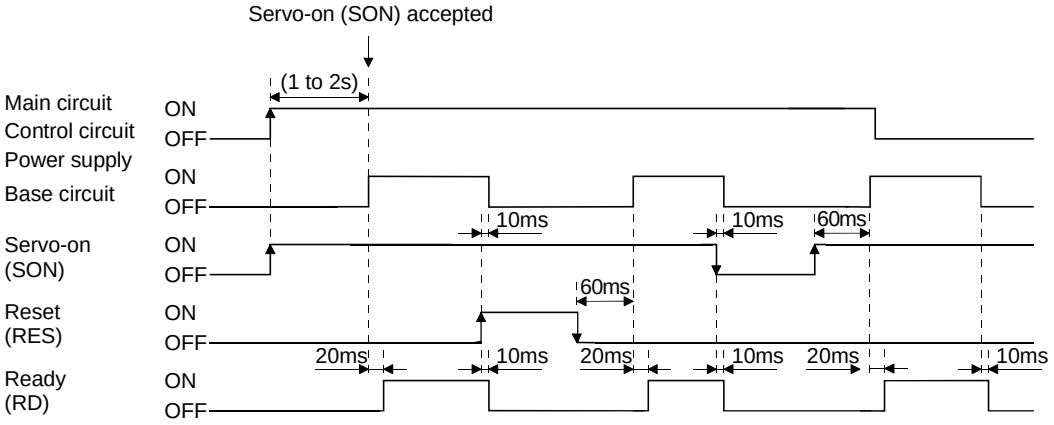
1) Always wire the power supply as shown in above Section 2.5.2(1) using the magnetic contactor with the main circuit power supply (three-phase 400V: L1, L2, L3). Configure up an external sequence to switch off the magnetic contactor as soon as an alarm occurs.

2) Switch on the control circuit power supply L11, L21 simultaneously with the main circuit power supply or before switching on the main circuit power supply. If the main circuit power supply is not turned on in the servo-on state, a warning is shown at the display. However, after the main circuit is turned on, the warning disappears and the servo amplifier will operate properly.

3) The servo amplifier can accept the servo-on (SON) about 1 to 2s after the main circuit power supply is switched on. Therefore, when SON is switched on simultaneously with the main circuit power supply, the base circuit will switch on in about 1 to 2s, and the ready (RD) will switch on in further about 20ms, making the servo amplifier ready to operate. (Refer to paragraph (b) in this section.)

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

(b) Timing chart

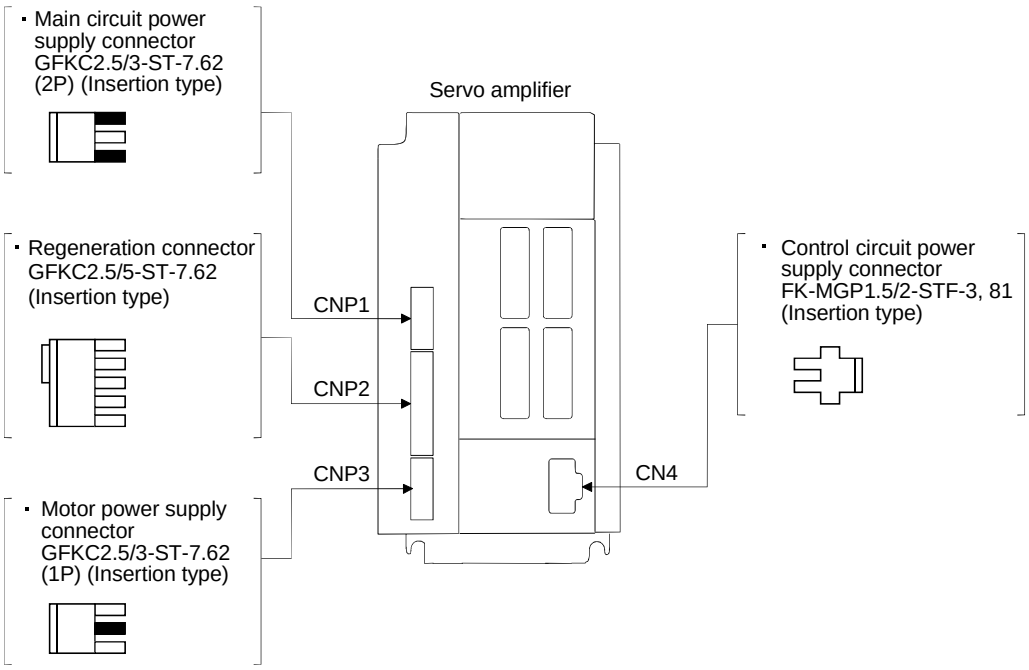


Power-on timing chart

(4) Connectors

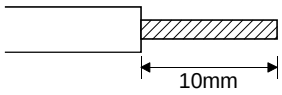
POINT
・The following applies to the MR-J2S-200A4 or less. For the other connectors and MR-J2S-350A4 and more servo amplifiers, refer to the 200V series servo amplifier instruction manual.

The following connectors are required for wiring to CN1P, CN2P, CN3P and CN4. The connectors are supplied as standard. (Phoenix make)



Servo amplifier connectors (CNP1, CNP2, CNP3, CN4) wiring method

(a) Termination of the cables



Use the cable after stripping the sheath and twisting the core. The core must be 10mm ((1mm) long. At this time, take care to avoid a short caused by the loose wires of the core and the adjacent pole. Do not solder the core as it may cause a contact fault. (Cable size: 0.2 to 2.5mm^2)Alternatively, a bar terminal may be used to put the wires together.(Phoenix contact make)

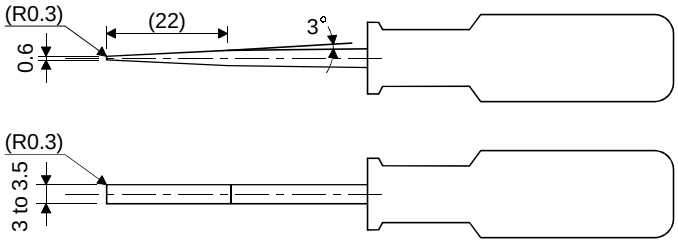
Cable size		Bar terminal type	Crimping tool	Maker
[mm^2]	AWG	For 1 cable		
1.309	16	AI1.5-10BK	CRIMPFOX-UD6	Phoenix Contact
2.081	14	AI2.5-10BU	CRIMPFOX-UD6	Phoenix Contact

(b) Inserting the cable into the connector

・Applicable flat-blade screwdriver dimensions

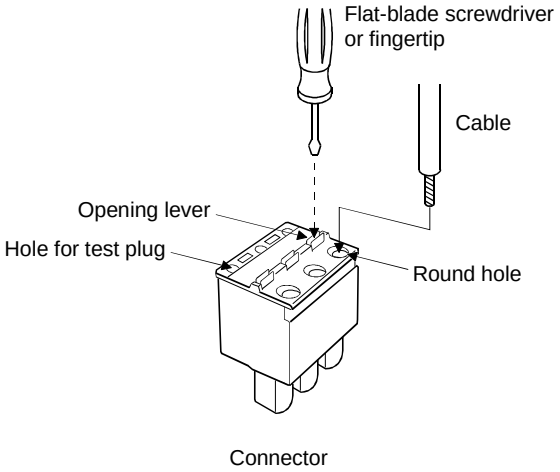
Always use the screwdriver shown here to do the work.

[Unit: mm]



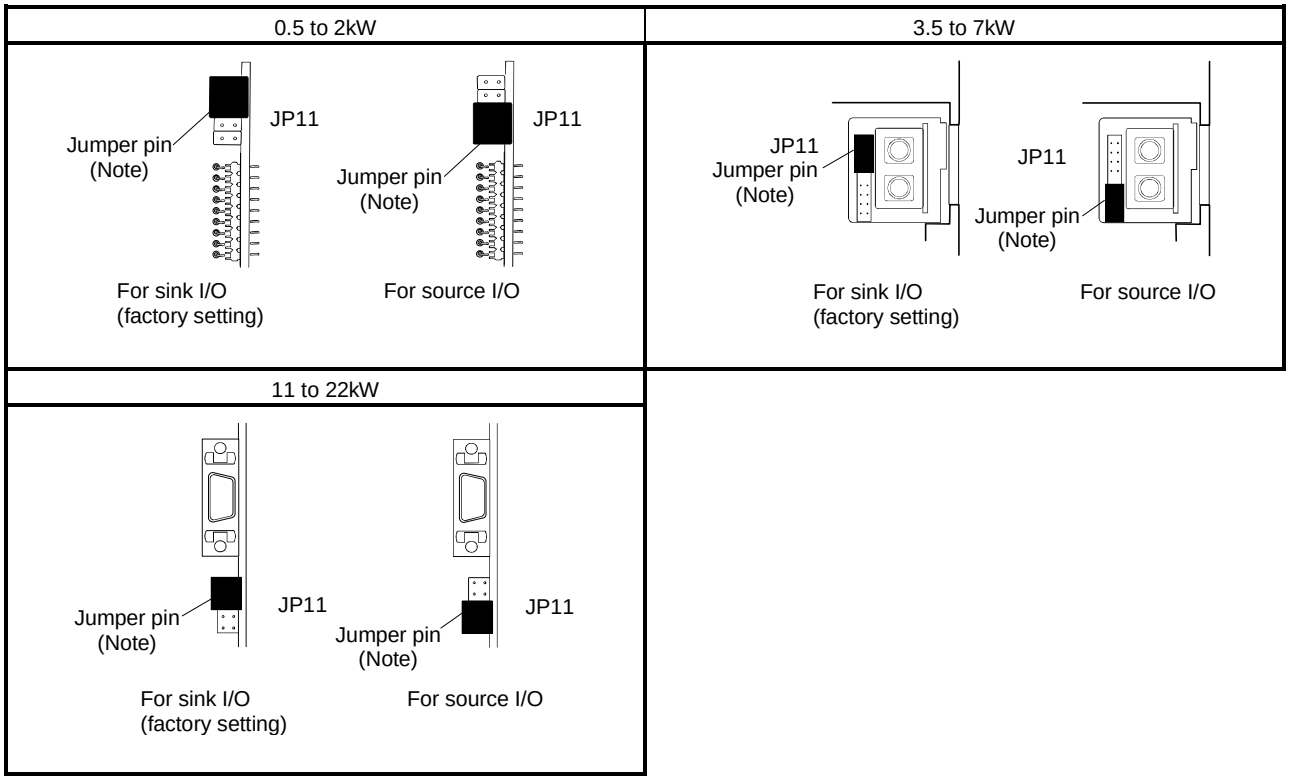
・Insertion of cable into connector

Push the opening lever with a flat-blade screwdriver or your fingertip, and insert the core of the cable 10mm into the round hole. When inserting the cable, push it 10mm into the hole securely. Releasing the opening lever connects the cable. After insertion, make sure that there are no loose wires coming out of the hole. Such wires can cause a short circuit.



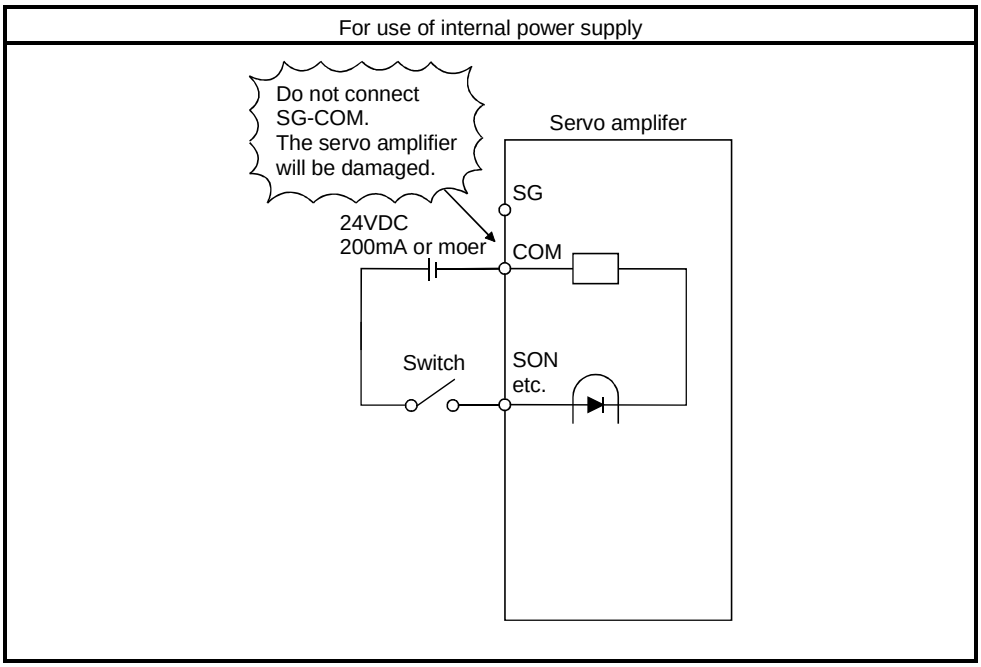
2.5.3 Source interface

The MR-J2S 400V allows connection to the source type interface. When using the source I/O interface, set the jumper pin JP11 (white) as shown in the following figure. Never change the jumper pin setting with power on, since it can cause a failure. The internal power supply (VDD) cannot be used. Always use the external power supply.

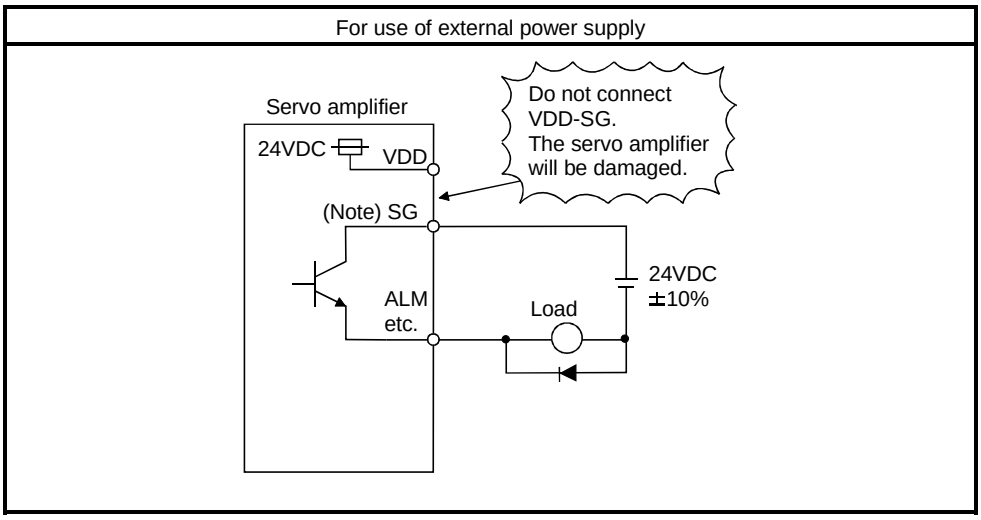


Note. The jumper pin is actually white, though it is shown black for convenience of explanation.

(1) Source input interface



(2) Source output interface

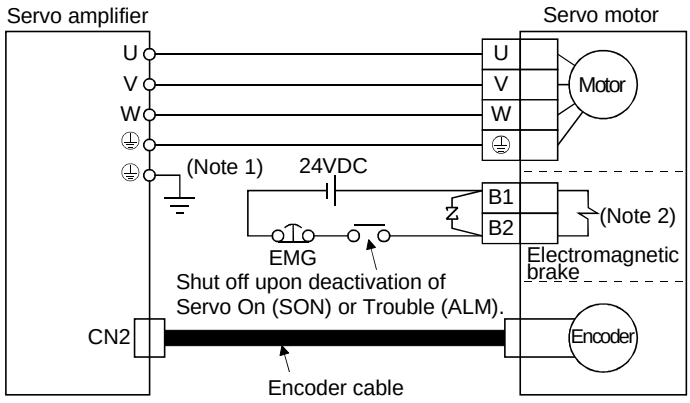


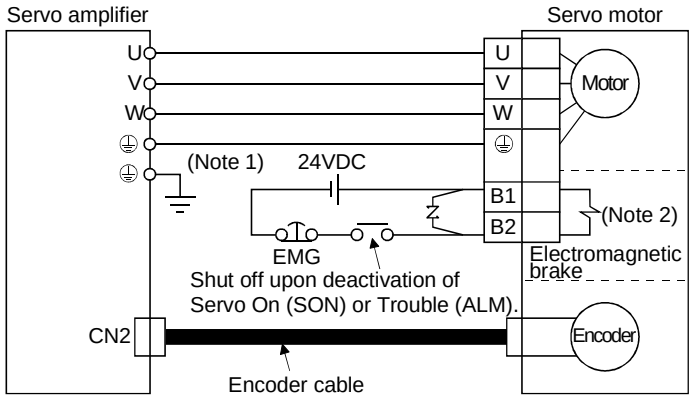
Note. For source output, the SG pin acts as a power supply. Do not connect SG to the VDD/COM terminal. The servo amplifier will be damaged.

2.6 Connection of servo amplifier and servo motor

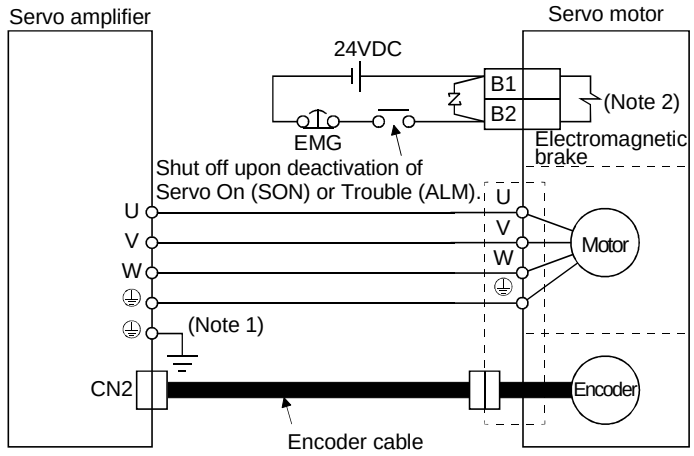
2.6.1 Connection diagram

The following table lists wiring methods according to the servo motor types. Use the connection diagram which conforms to the servo motor used. For cables required for wiring, refer to Section 6.2.1. For the signal layouts of the connectors, refer to Section 6.2.1.
For the servo motor connector, refer to Chapter 3 of the Servo Motor Instruction Manual.

<table>
<tr><th>Servo motor</th><th>Connection diagram</th></tr>
<tr><td>HC-SFS2024(B) to 7024(B)</td><td> 

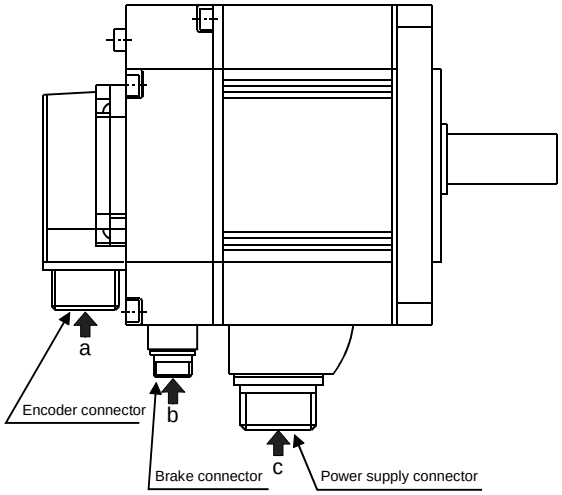
Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box.
2. This circuit applies to the servo motor with electromagnetic brake.</td></tr>
<tr><td>HC-SFS524(B) to 1524(B)</td><td> 

Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box.
2. This circuit applies to the servo motor with electromagnetic brake.</td></tr>
</table>

Servo motor	Connection diagram
HA-LFS701M4(B) HA-LFS11K1M4(B) to 22K1M4(B) HA-LFS11K24(B) to 22K24(B)	 Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box. 2. This circuit applies to the servo motor with electromagnetic brake.

2.6.2 I/O terminals

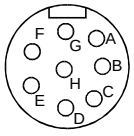
(1) HC-SFS series



Servo motor	Servo motor side connectors		
	For power supply	For encoder	Electromagnetic brake connector
HC-SFS524(B) to 1524(B) HC-SFS534(B) to 1534(B)	CE05-2A22-23PD-B	MS3102A20-29P	The connector for power is shared.
HC-SFS2024(B) to 5024 (B)	CE05-2A24-10PD-B		MS3102A10SL-4P
HC-SFS7024(B)	CE05-2A32-17PD-B		

Power supply connector signal arrangement

CE05-2A22-23PD-B

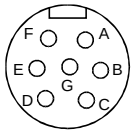


View c

Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)
E	
F	
G	(Note) B1
H	(Note) B2

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

CE05-2A24-10PD-B

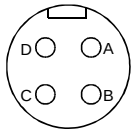


View c

Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)
E	(Note) B1
F	(Note) B2
G	

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

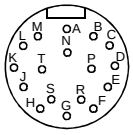
CE05-2A32-17PD-B



Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)

Encoder connector signal arrangement

MS3102A20-29P



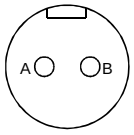
View a

Pin	Signal
A	MD
B	MDR
C	MR
D	MRR
E	
F	BAT
G	LG
H	
J	

Pin	Signal
K	
L	
M	
N	SD
P	
R	LG
S	P5
T	

Electromagnetic brake connector signal arrangement

MS3102A10SL-4P

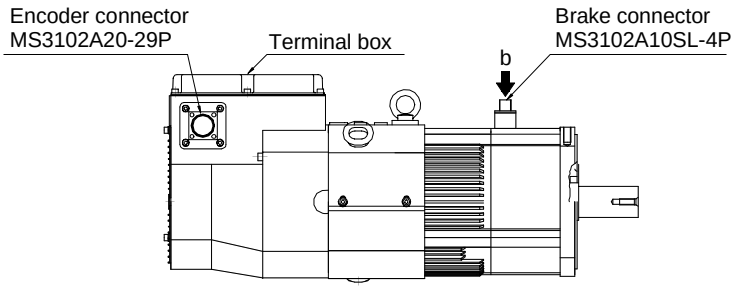


View b

Pin	Signal
A	(Note)B1
B	(Note)B2

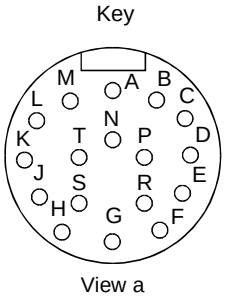
Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

(2) HA-LFS Series



Encoder connector signal arrangement

MS3102A20-29P

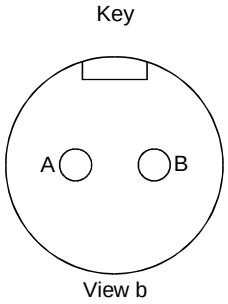


Pin	Signal
A	MD
B	MDR
C	MR
D	MRR
E	
F	BAT
G	LG
H	
J	

Pin	Signal
K	
L	
M	
N	SHD
P	
R	LG
S	P5
T	

Electromagnetic brake connector signal arrangement

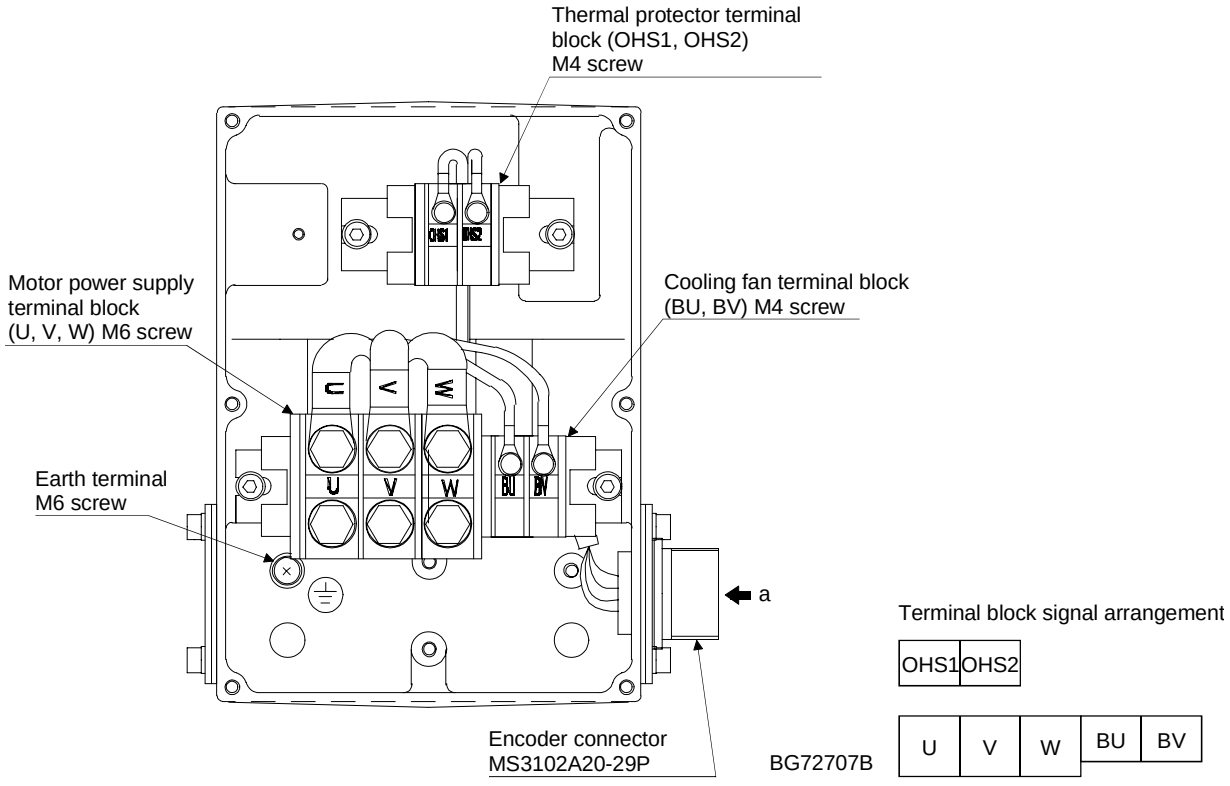
MS3102A10SL-4P



Pin	Signal
A	(Note)B1
B	(Note)B2

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

Terminal box inside (HA-LFS11K24・HA-LFS701M4)



Terminal block signal arrangement

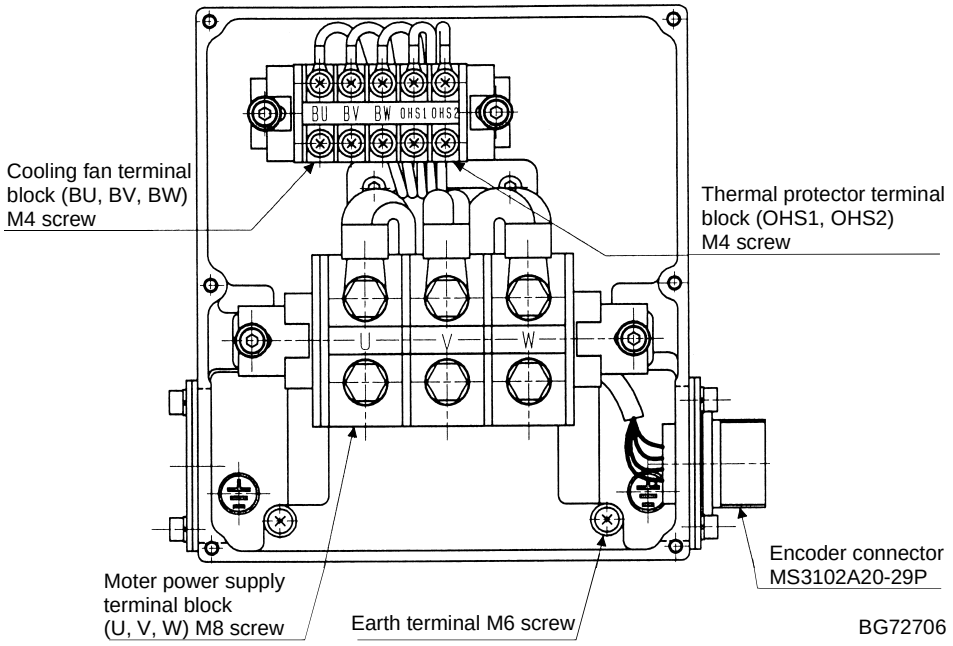
OHS1	OHS2

U	V	W	BU	BV

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS11K24	M6
HA-LFS701M4	

Terminal box inside (HA-LFS15K24・HA-LFS22K24・HA-LFS11K1M4・HA-LFS15K1M4)



Terminal block signal arrangement

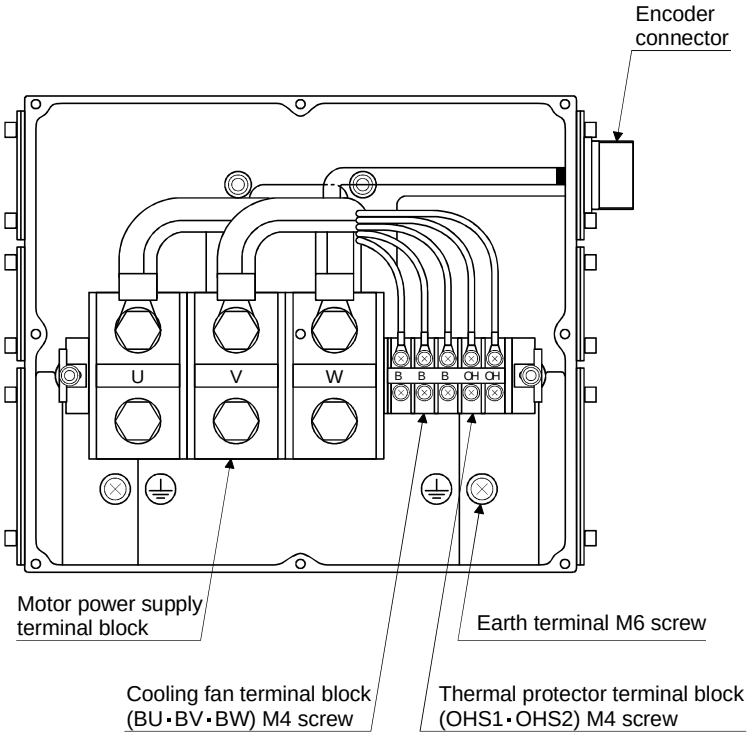
BU	BV	BW	OHS1	OHS2

U	V	W

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS15K24	M8
HA-LFS22K24	
HA-LFS11K1M4	
HA-LFS15K1M4	

Terminal box inside (HA-LFS22K1M4)



Terminal block signal arrangement

U	V	W	BU	BV	BW	OHS1	OHS2

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS22K1M4	M8

<table>
<tr><th>Signal Name</th><th>Abbreviation</th><th>Description</th></tr>
<tr><td>Power supply</td><td>U・V・W</td><td>Connect to the motor output terminals (U, V, W) of the servo amplifier.</td></tr>
<tr><td>Cooling fan</td><td>(Note)
BU・BV・BW</td><td>Supply power which satisfies the following specifications.
HA-LFS11K24/HA-LFS701M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>single-phase 200 to 220VAC, 50Hz
single-phase 200 to 230VAC, 60Hz</td></tr><tr><td>Power consumption [W]</td><td>42(50Hz)/54(60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12(50Hz)/0.25(60Hz)</td></tr></table>
HA-LFS15K24/22K24/11K1M4/15K1M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>Three-phase 380 to 420VAC, 50Hz/60Hz</td></tr><tr><td>Power consumption [W]</td><td>55(50Hz)/75(60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12(50Hz)/0.11(60Hz)</td></tr></table>
HA-LFS22K1M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>Three-phase 380 to 460VAC, 50Hz/60Hz</td></tr><tr><td>Power consumption [W]</td><td>65 (50Hz) / 85 (60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12 (50Hz) / 0.14 (60Hz)</td></tr></table></td></tr>
<tr><td>Motor thermal relay</td><td>OHS1・OHS2</td><td>OHS1-OHS2 are opened when heat is generated to an abnormal temperature.
Max. rating: 125VAC/VDC , 3A or 250VAC/VDC, 2A
Min. rating: 6VAC/VDC, 0.15A</td></tr>
<tr><td>Earth terminal</td><td>  </td><td>For grounding, connect to the earth of the control box via the earth terminal of the servo amplifier.</td></tr>
</table>

Note. There is no BW when the HA-LFS11K24/HA-LFS701M4 is used.

2.7. Parameter

POINT

- The parameters of each servo amplifier are basically the same as those of the 200V series servo amplifier. This section describes the differences in parameters between each servo amplifier and 200V series servo amplifier.

<table>
<tr><th>No.</th><th>Symbol</th><th>Name and function</th><th>Initial value</th><th>Unit</th></tr>
<tr><td>0</td><td>*STY</td><td>Control mode, regenerative brake option selection

[ ][ ][0][ ]
Refer to MR-J2S-□A Servo Amplifier Instruction Manual.

Selection of regenerative brake option
00: Regenerative brake option or regenerative brake option is not used with 7kW or less servo amplifier
Supplied regenerative brake resistors or regenerative brake option is used with 11kW or more servo amplifier
01: FR-RC-H□, FR-BU-H□
0E: When regenerative brake resistors or regenerative brake option supplied to 11kW or more are cooled by fans to increase capability
80: MR-RB3H-4
81: MR-RB5H-4
82: MR-RB3G-4
83: MR-RB5G-4
84: MR-RB34-4
85: MR-RB54-4
86: MR-RB1L-4
87: MR-RB3M-4</td><td>0000</td><td></td></tr>
<tr><td>17</td><td>MOD</td><td>Analog monitor output

[0][ ][0][ ]

<table>
<tr><th>Setting</th><th>Analog monitor 2 (MO2)</th><th>Analog monitor 1 (MO1)</th></tr>
<tr><td>0</td><td colspan="2">Servo motor speed (±8V/max. speed)</td></tr>
<tr><td>1</td><td colspan="2">Torque (±8V/max. torque)</td></tr>
<tr><td>2</td><td colspan="2">Motor speed (+8V/max. speed)</td></tr>
<tr><td>3</td><td colspan="2">Torque (+8V/max. torque)</td></tr>
<tr><td>4</td><td colspan="2">Current command (±8V/max. current command)</td></tr>
<tr><td>5</td><td colspan="2">Command pulse frequency (±10/500 kpps)</td></tr>
<tr><td>6</td><td colspan="2">Droop pulses (±10V/128 pulses)</td></tr>
<tr><td>7</td><td colspan="2">Droop pulses (±10V/2048 pulses)</td></tr>
<tr><td>8</td><td colspan="2">Droop pulses (±10V/8192 pulses)</td></tr>
<tr><td>9</td><td colspan="2">Droop pulses (±10V/32768 pulses)</td></tr>
<tr><td>A</td><td colspan="2">Droop pulses (±10V/131072 pulses)</td></tr>
<tr><td>B</td><td colspan="2">Bus voltage (+8V/800V)</td></tr>
</table>
</td><td>0100</td><td></td></tr>
</table>

2.8 Troubleshooting

POINT

- This section provides the alarms which are different in definition from those of the servo amplifiers of 200VAC system and less.

Display	Name	Definition	Cause	Action
AL.10	Undervoltage	Power supply voltage dropped below 280VAC.	1. Power supply voltage is low.	Review the power supply.
			2. There was an instantaneous control power failure of 60ms or longer.	
			3. Shortage of power supply capacity caused the power supply voltage to drop at start, etc.	
			4. Power was restored after the bus voltage had dropped to 380VDC. (Main circuit power switched on within 5s after it had switched off.)	
			5. Faulty parts in the servo amplifier Checking method Alarm (AL.10) occurs if power is switched on after disconnection of all cables but the control circuit power supply cables.	Change the servo amplifier.
AL.30	Regenerative alarm	Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded.	1. Wrong setting of parameter No. 0	Set correctly.
			2. Built-in regenerative brake resistor or regenerative brake option is not connected.	Connect correctly
			3. High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. Checking method Call the status display and check the regenerative load ratio.	1. Reduce the frequency of positioning. 2. Use the regenerative brake option of larger capacity. 3. Reduce the load.
			4. Power supply voltage rose above 535VAC.	Review power supply
			5. Built-in regenerative brake resistor or regenerative brake option faulty.	Change servo amplifier or regenerative brake option.
		Regenerative transistor fault	6. Regenerative transistor faulty. Checking method 1) The regenerative brake option has overheated abnormally. 2) The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option.	Change the servo amplifier.

Display	Name	Definition	Cause	Action
AL.33	Overvoltage	Converter bus voltage exceeded 800VDC.	1. Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected.	1. Change lead. 2. Connect correctly.
			2. Regenerative transistor faulty.	Change servo amplifier
			3. Wire breakage of built-in regenerative brake resistor or regenerative brake option	1. For wire breakage of built-in regenerative brake resistor, change servo amplifier. 2. For wire breakage of regenerative brake option, change regenerative brake option.
			4. Capacity of built-in regenerative brake resistor or regenerative brake option is insufficient.	Add regenerative brake option or increase capacity.
			5. Power supply voltage high.	Review the power supply.

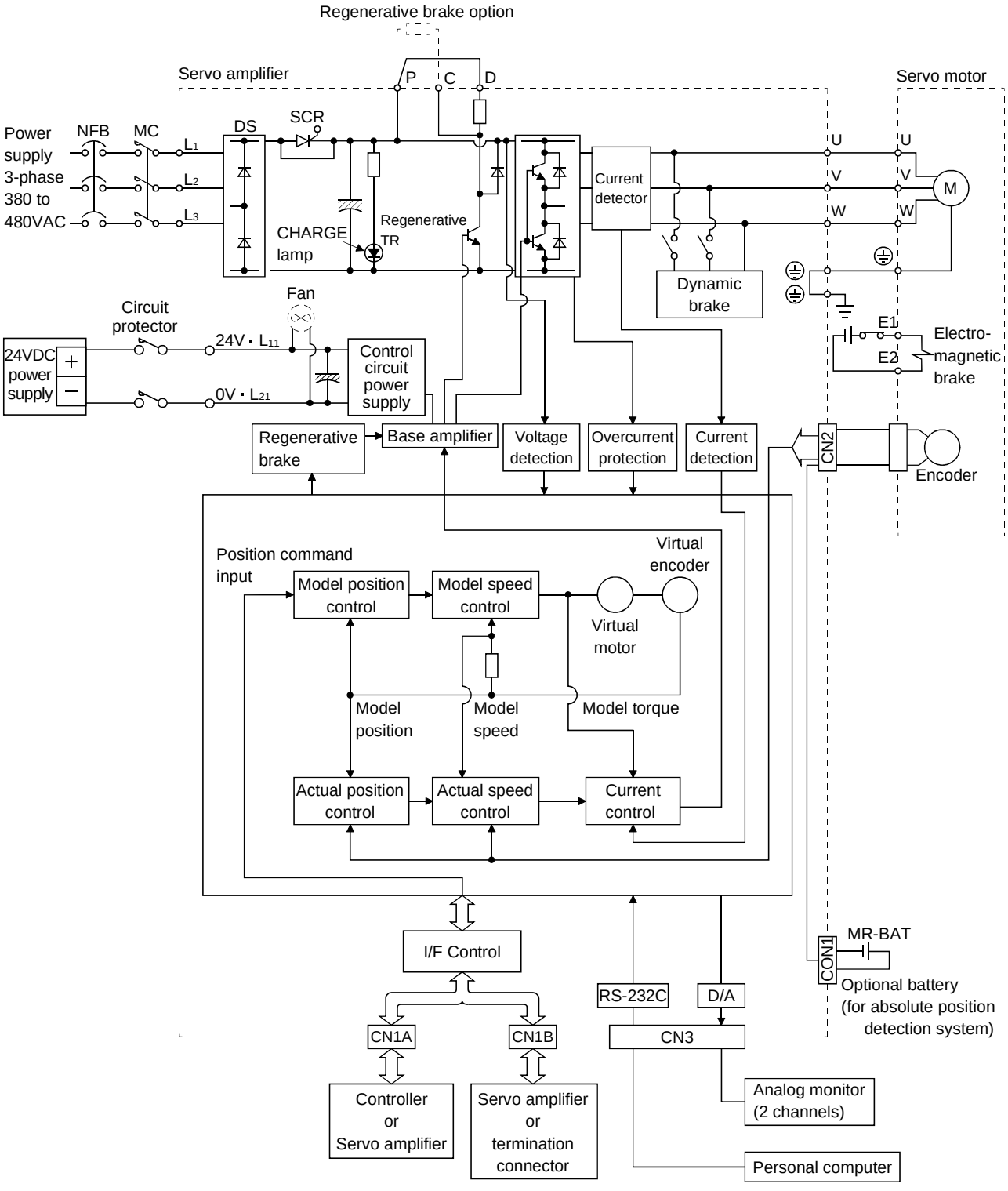
MEMO

3. MR-J2S- □ B4 SERVO AMPLIFIER

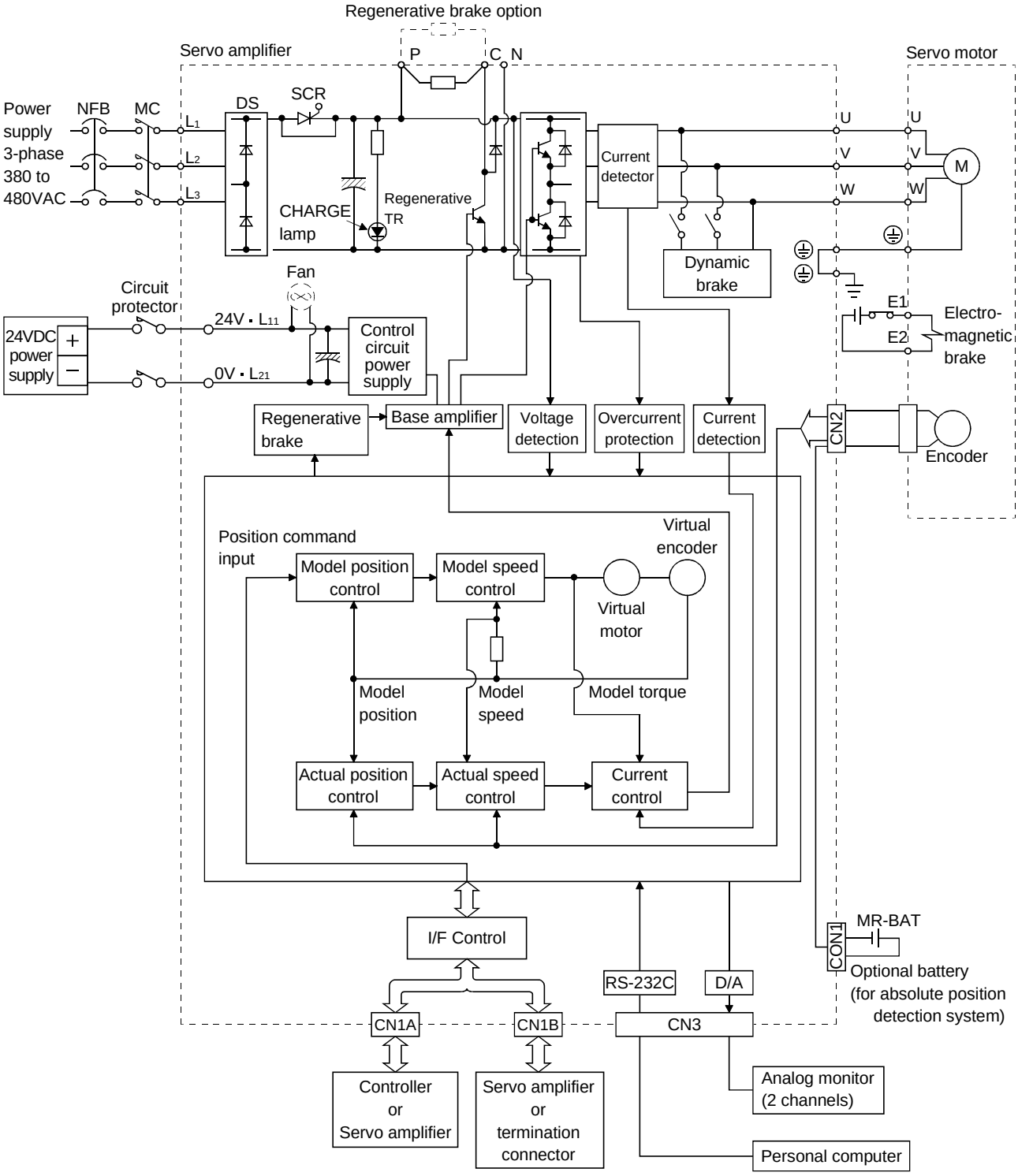
3.1 Function block diagram

The function block diagram of this servo is shown below.

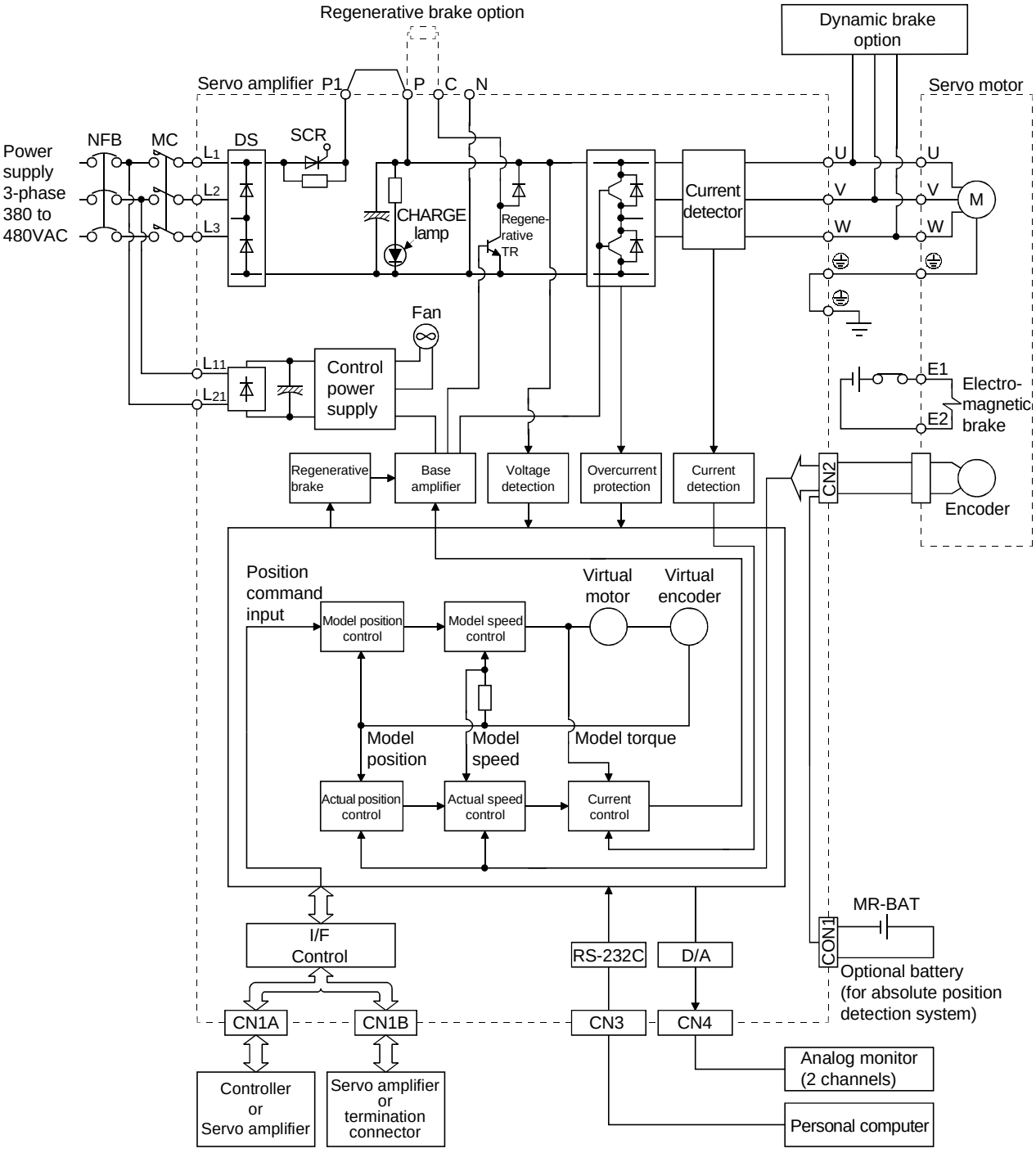
(1) MR-J2S-200B4 or less



(2) MR-J2S-350B4 to 700B4



(3) MR-J2S-11KB4 to 22KB4



3.2 Servo amplifier standard specifications

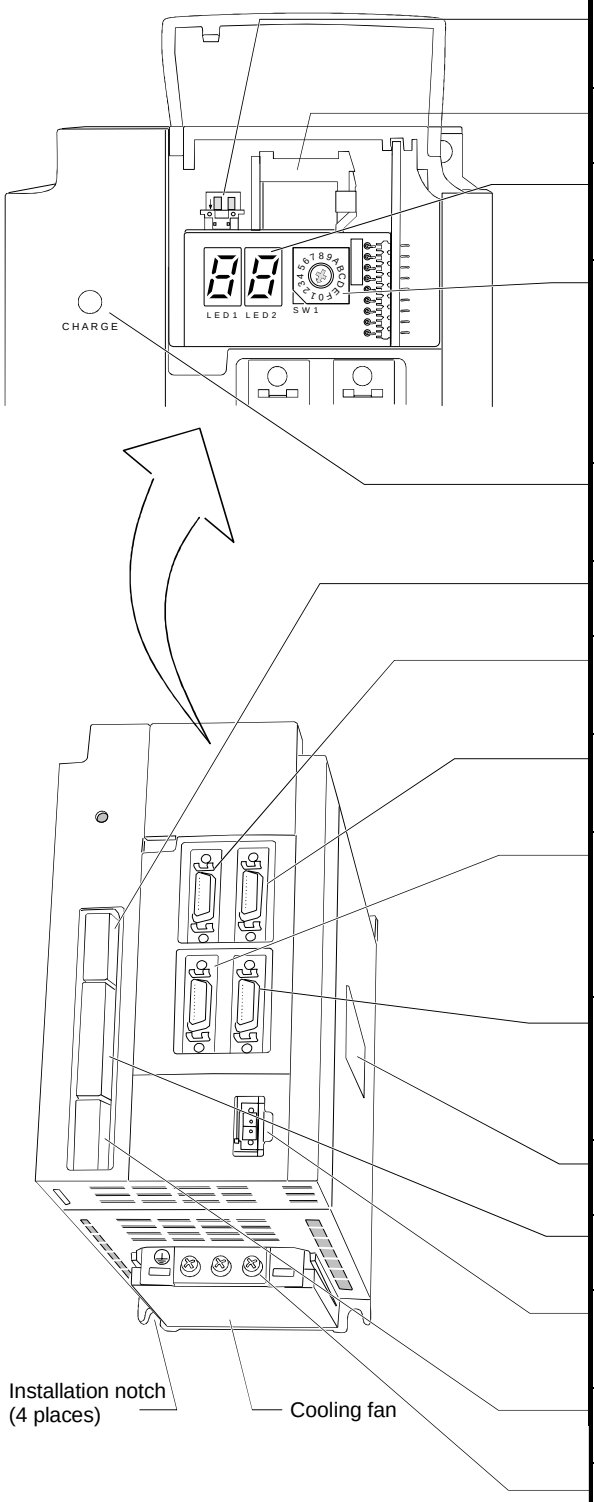
Item \ Servo Amplifier MR-J2S-□				60B4	100B4	200B4	350B4	500B4	700B4	11KB4	15KB4	22KB4
Power supply	Voltage/frequency			3-phase 380 to 480VAC, 50/60Hz								
	Permissible voltage fluctuation			3-phase 323 to 528VAC, 50/60Hz								
	Permissible frequency fluctuation			Within ±5%								
	Power supply capacity			Refer to Section5.2								
Control circuit power supply	Voltage and frequency			24VDC ±15%						1-phase 380 to 480VAC, 50/60Hz		
	Allowable voltage fluctuation									1-phase 232 to 528VAC, 50/60Hz		
	Allowable frequency fluctuation									Within ±5%		
	Power supply equipment capacity											
	Power supply capacity			25 W						50 W		
Control system				Sine-wave PWM control, current control system								
Dynamic brake				Built-in						External option		
Protective functions				Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal relay), servo motor overheat protection, encoder error protection, regenerative brake error protection, undervoltage, instantaneous power failure protection, overspeed protection, excessive error protection								
Structure				Force-cooling, open (IP00)								
Environment	Ambient temperature	Operation	[℃]	0 to +55 (non-freezing)								
			[℉]	32 to +131 (non-freezing)								
		Storage	[℃]	−20 to +65 (non-freezing)								
			[℉]	−4 to +149 (non-freezing)								
	Ambient humidity	Operation		90%RH or less (non-condensing)								
		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								
				19.4 [ft/s^2] or less								
Mass			[kg]	2.1	2.2	2.2	5	5	7.2	15	16	20
			[lb]	4.6	4.9	4.9	11	11	15.9	33.1	35.3	44.1

3.3 Parts identification

POINT

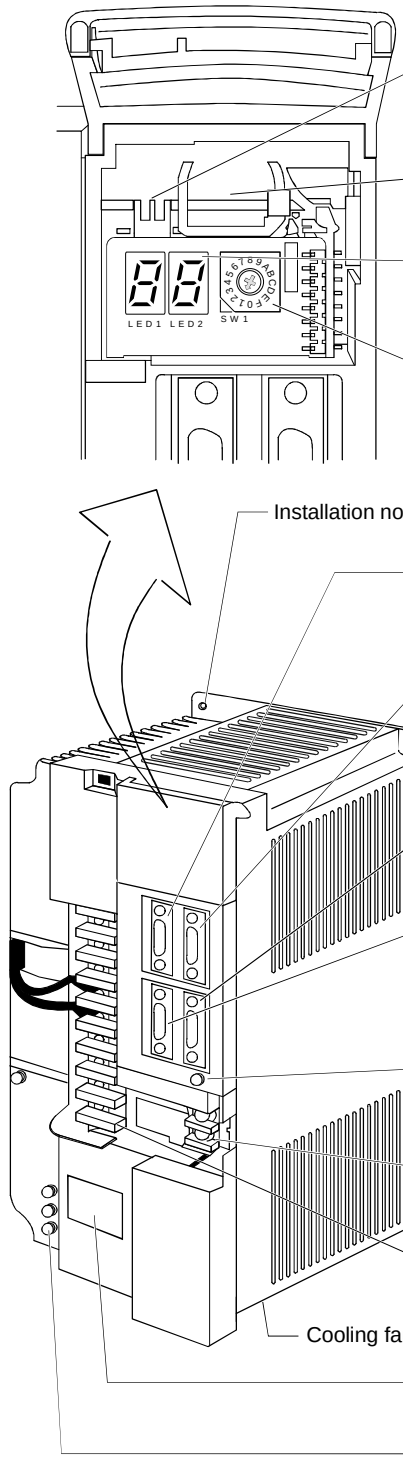
- The servo amplifier is shown without the front cover. For removal of the front cover, refer to Section 1.3

(1) MR-J2S-200B4 or less



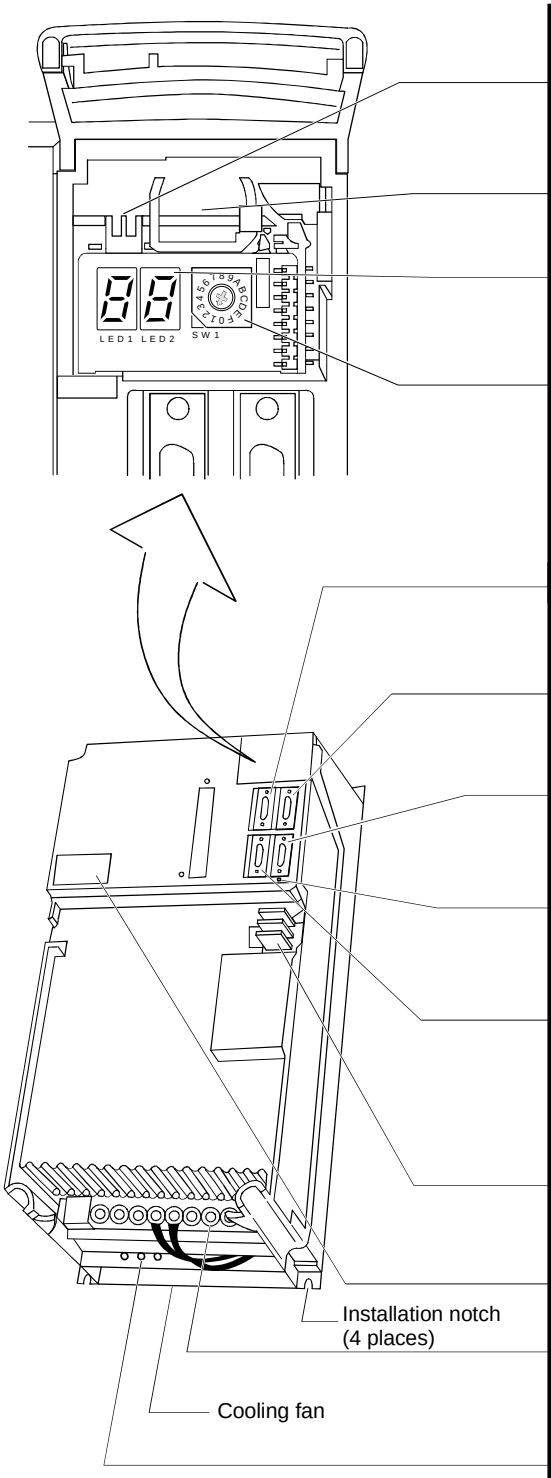
Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□B Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Display The two-digit, seven-segment LED shows the servo status and alarm number.	MR-J2S-□B Servo Amplifier Instruction Manual
Axis select switch (CS1) CS1 Used to set the axis number of the 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 connector (CNP1) Used to connect the input power supply.	Section 3.5.2 Chapter 4
Bus cable connector (CN1A) Used to connect the servo system controller or preceding axis servo amplifier.	MR-J2S-□B Servo Amplifier Instruction Manual
Bus cable connector (CN1B) Used to connect the subsequent axis servo amplifier or termination connector (MR-A-TM).	
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section 3.5.1 MR-J2S-□B Servo Amplifier Instruction Manual
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	MR-J2S-□B Servo Amplifier Instruction Manual
Rating plate	Section 1.1
Regeneration connector (CNP2) Used to connect the regeneration brake option.	Section 3.5.2 Chapter 4
Control circuit power supply connector (CN4) Used to connect the control circuit power supply and regenerative brake option.	
Motor power supply connector (CNP3) Used to connect the servo motor.	
Protective earth (PE) terminal (⏚) Ground terminal.	Section 3.5.1 Section 3.6.2 MR-J2S-□B Servo Amplifier Instruction Manual

(2) MR-J2S-350B4 • 500B4



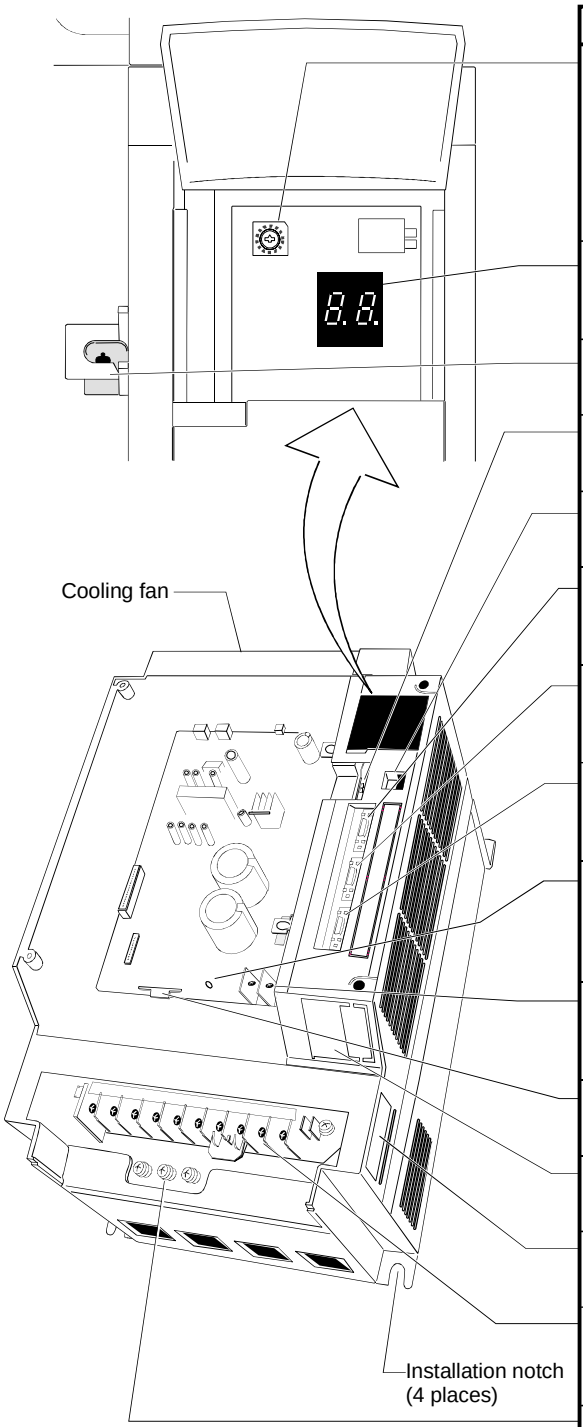
Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□B Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Display The two-digit, seven-segment LED shows the servo status and alarm number.	
Axis select switch (CS1) CS1  Used to set the axis number of the servo amplifier.	
Bus cable connector (CN1A) Used to connect the servo system controller or preceding axis servo amplifier.	
Bus cable connector (CN1B) Used to connect the subsequent axis servo amplifier or termination connector (MR-A-TM).	
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section 3.5.1 MR-J2S-□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.	Section 3.5.2 Chapter 4
Main circuit terminal block (TE1) Used to connect the input power supply, regenerative brake option and servo motor.	
Rating plate	Section 1.1
Protective earth (PE) terminal (⏚) Ground terminal.	Section 3.5.1 Section 3.6.2 MR-J2S-□B Servo Amplifier Instruction Manual

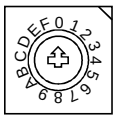
(3) MR-J2S-700B4



Name/Application	Reference
Battery connector (CON1) Used to connect the battery for absolute position data backup.	MR-J2S-□B Servo Amplifier Instruction Manual
Battery holder Contains the battery for absolute position data backup.	
Display The two-digit, seven-segment LED shows the servo status and alarm number.	
Axis select switch (CS1) CS1 Used to set the axis number of the servo amplifier.	
Bus cable connector (CN1A) Used to connect the servo system controller or preceding axis servo amplifier.	
Bus cable connector (CN1B) Used to connect the subsequent axis servo amplifier or termination connector (MR-A-TM).	
Communication connector (CN3) Used to connect a command device (RS-422/RS232C) and output analog monitor data.	
Charge lamp Lit to indicate that the main circuit is charged. While this lamp is lit, do not reconnect the cables.	
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section 3.5.1 MR-J2S-□B Servo Amplifier Instruction Manual
Control circuit terminal block (TE2) Used to connect the control circuit power supply.	Section 3.5.2 Chapter 4
Rating plate	Section 1.1
Main circuit terminal block (TE1) Used to connect the input power supply, regenerative brake option and servo motor.	Section 3.5.2 Chapter 4
Protective earth (PE) terminal (⏚) Ground terminal.	Section 3.5.1 Section 3.6.2 MR-J2S-□B Servo Amplifier Instruction Manual

(4) MR-J2S-11KB4 to 22KB4



Name/Application	Reference
Axis select switch (CS1) CS1  Used to set the axis number of the servo amplifier.	MR-J2S-□B Servo Amplifier Instruction Manual
Display The two-digit, seven-segment LED shows the servo status and alarm number.	
Battery holder Contains the battery for absolute position data backup.	
Battery connector (CON1) Used to connect the battery for absolute position data backup.	
Monitor output terminal (CN4) Used to output monitor values on two channels in the form of analog signals.	
Communication connector (CN3) Used to connect a personal computer (RS-232C) .	
Bus cable connector (CN1A) Used to connect the servo system controller or preceding axis servo amplifier.	
Bus cable connector (CN1B) Used to connect the subsequent axis servo amplifier or termination connector (MR-A-TM).	
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.	Section3.5.2 Chapter 4
Encoder connector (CN2) Connector for connection of the servo motor encoder.	Section2.5.1 MR-J2S-□B Servo Amplifier Instruction Manual
I/O signal connector (CON2) Used to connect digital I/O signals.	Section2.5.1 MR-J2S-□B Servo Amplifier Instruction Manual
Rating plate	Section1.1
Main circuit terminal block (TE1) Used to connect the input power supply, regenerative brake option and servo motor.	Section2.5.2 Chapter 4
Protective earth (PE) terminal (⏚) Ground terminal.	Section2.5.1 Section3.6.2 MR-J2S-□B Servo Amplifier Instruction Manual

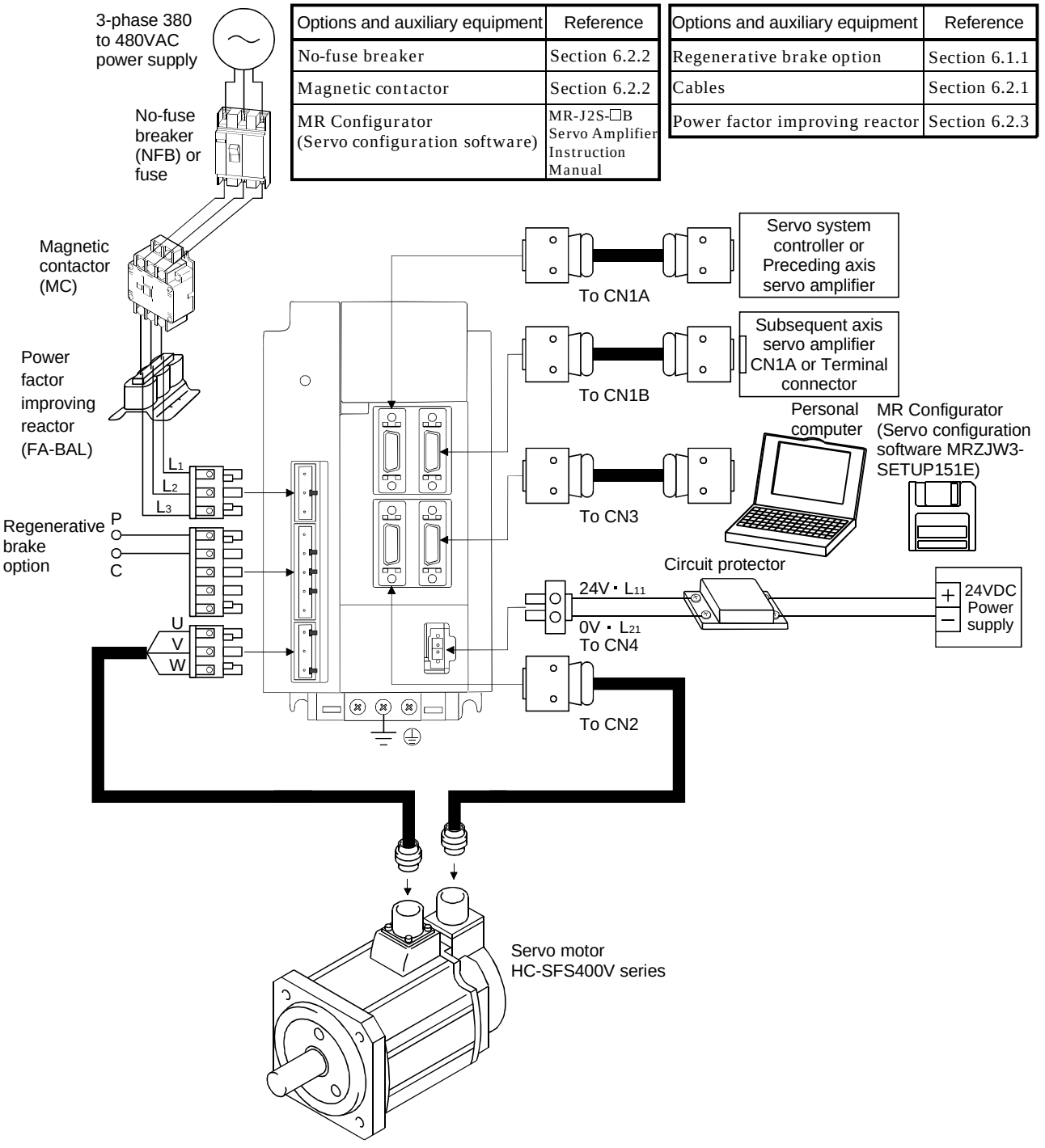
3.4 Servo system with auxiliary equipment

⚠ WARNING	To prevent an electric shock, always connect the protective earth (PE) terminal (terminal marked ⏚) of the servo amplifier to the protective earth (PE) of the control box.

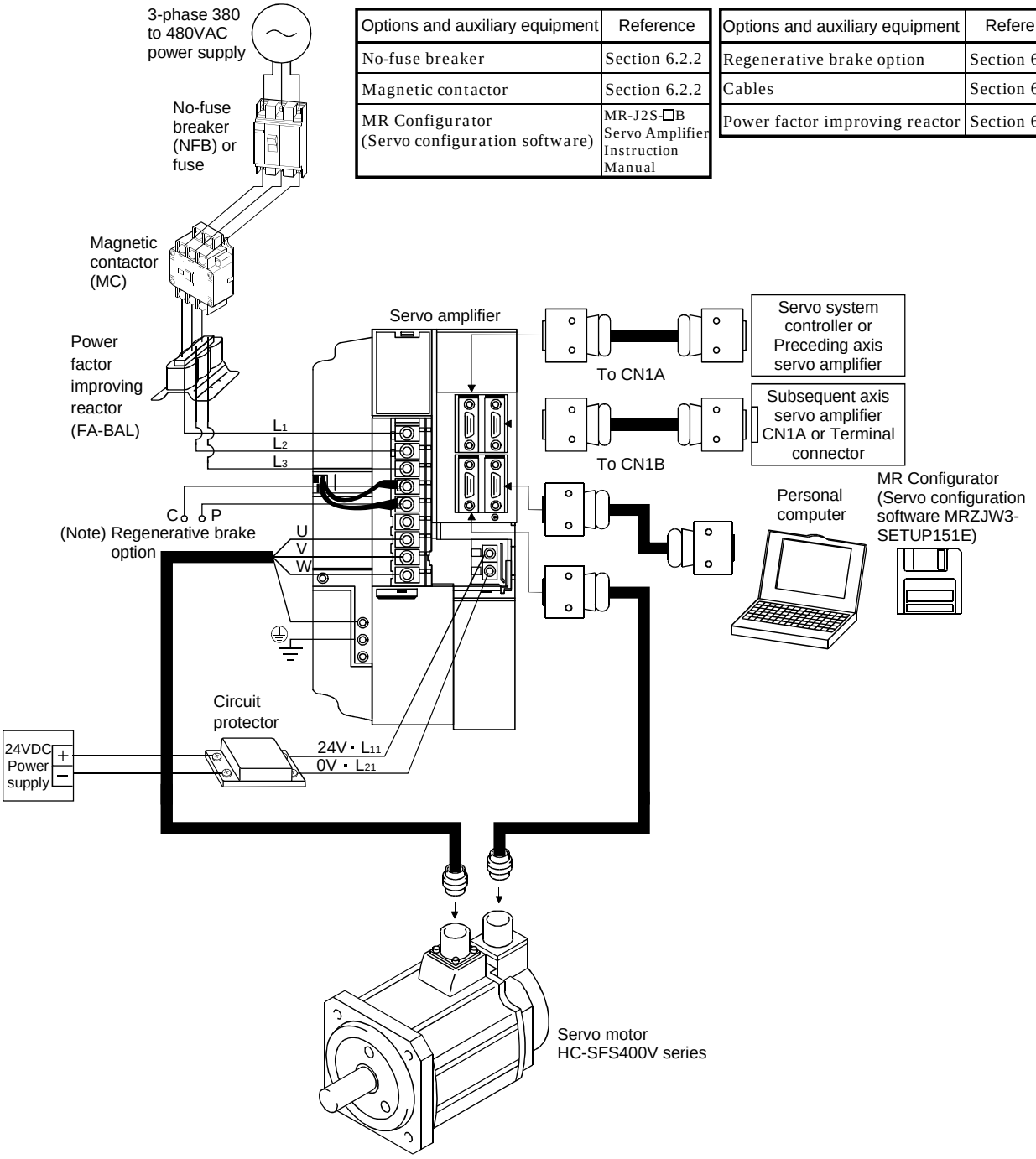
(1) MR-J2S-200B4 or less

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□B Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3



(2) MR-J2S-350B4 • 500B4



Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□B Servo Amplifier Instruction Manual

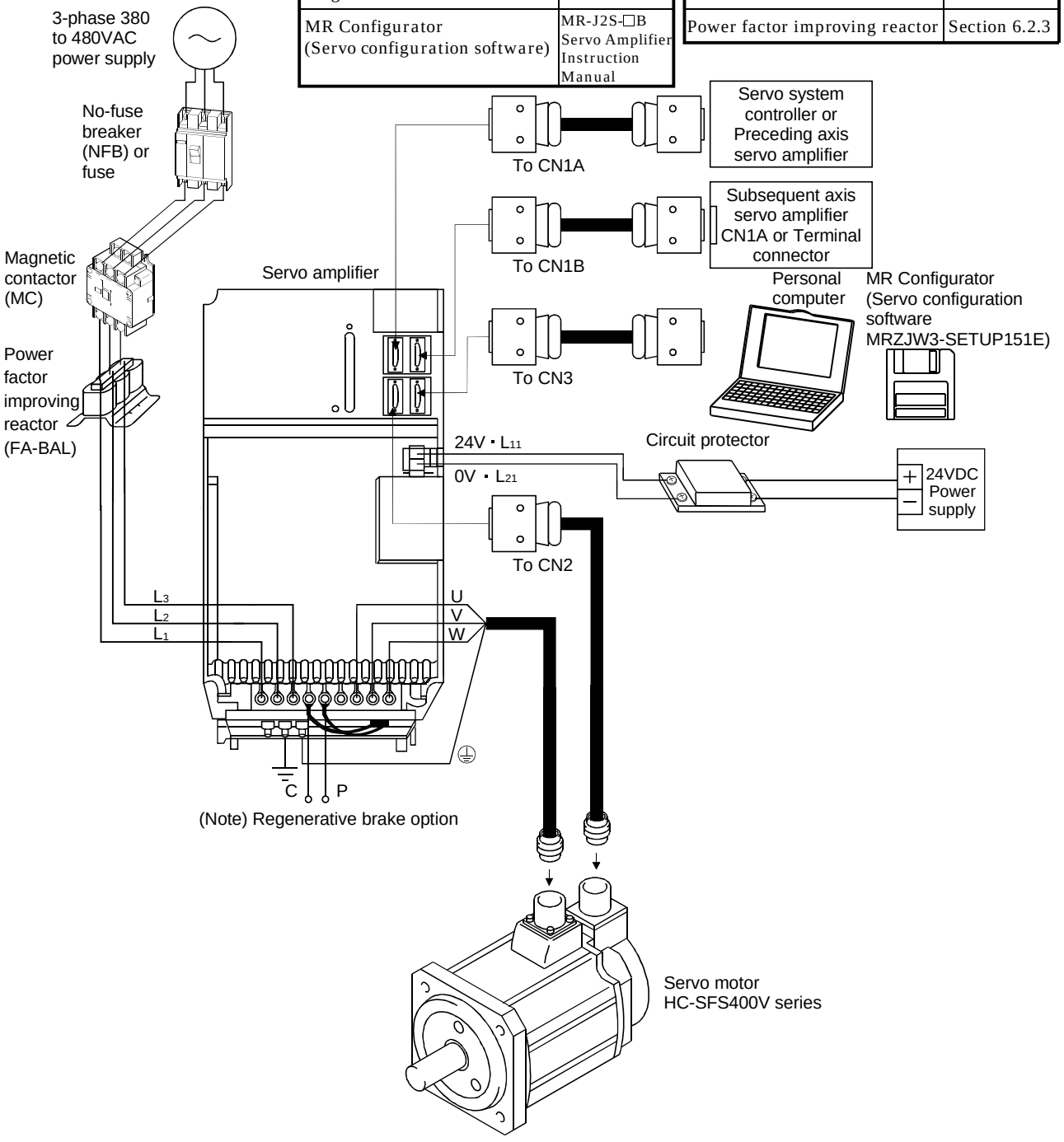
Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3

Note. When using the regenerative brake option, remove the lead wires of the built-in regenerative brake resistor.

(3) MR-J2S-700B4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□B Servo Amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving reactor	Section 6.2.3

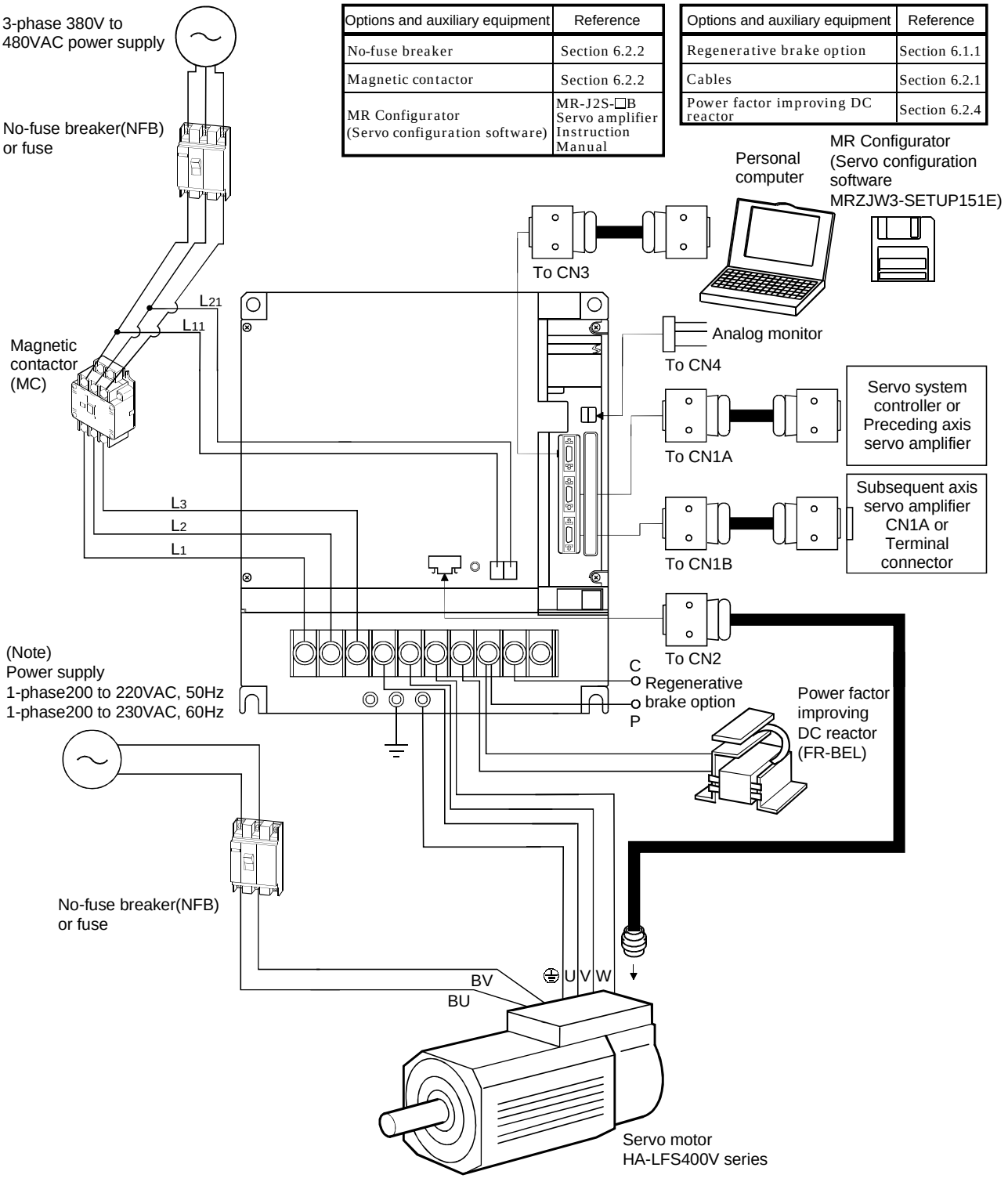


Note. When using the regenerative brake option, remove the lead wires of the built-in regenerative brake resistor.

(4) MR-J2S-11KB4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□B Servo amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving DC reactor	Section 6.2.4

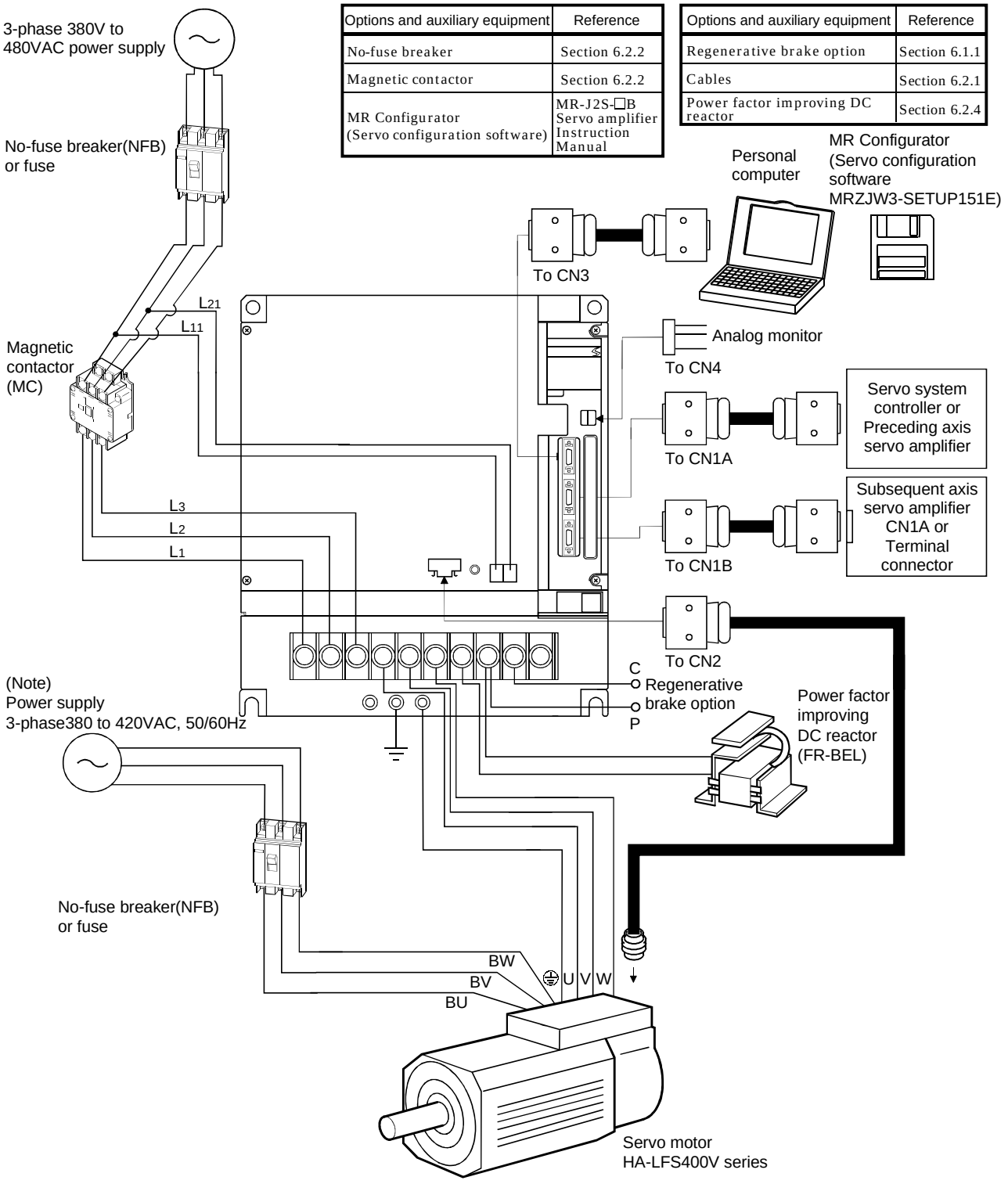


Note. The power supply of the servo motor cooling fan differs in specifications from the main circuit power supply.

(5) MR-J2S-15KB4 · 22KB4

Options and auxiliary equipment	Reference
No-fuse breaker	Section 6.2.2
Magnetic contactor	Section 6.2.2
MR Configurator (Servo configuration software)	MR-J2S-□B Servo amplifier Instruction Manual

Options and auxiliary equipment	Reference
Regenerative brake option	Section 6.1.1
Cables	Section 6.2.1
Power factor improving DC reactor	Section 6.2.4



Note. The power supply of the servo motor cooling fan differs in specifications from the main circuit power supply.

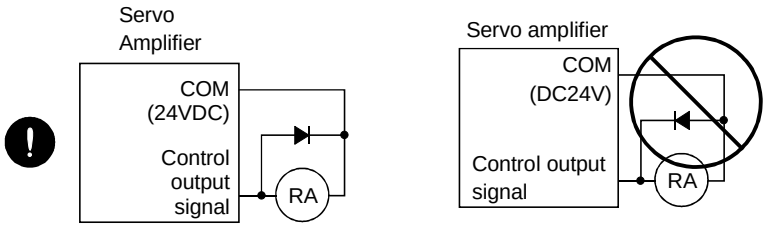
3.5 Signals and wiring

⚠ 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 10 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 emergency stop (EMG) 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-H 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.

POINT

- CN1A, CN1B, CN2 and CN3 have the same shape. Wrong connection of the connectors will lead to a failure. Connect them correctly.

3.5.1 Connectors and signal arrangements

POINT

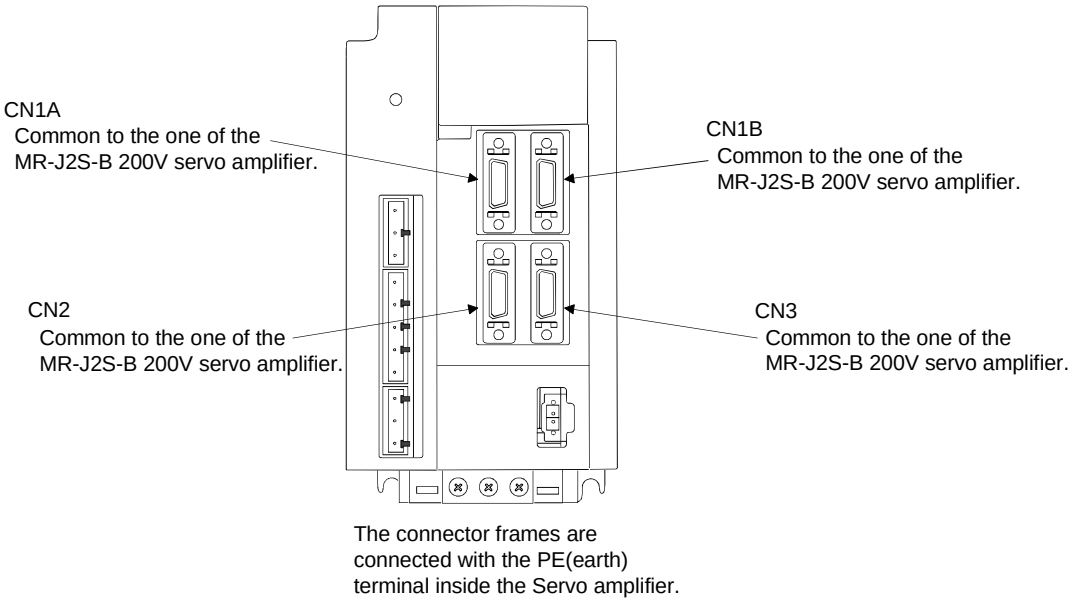
- The pin configurations of the connectors are as viewed from the cable connector wiring section.
- Refer to the corresponding Servo Amplifier Instruction Manual CN1A, CN1B, CN2 and CON2 signal assignment.

Indicates signal layout compatibility between the connectors.

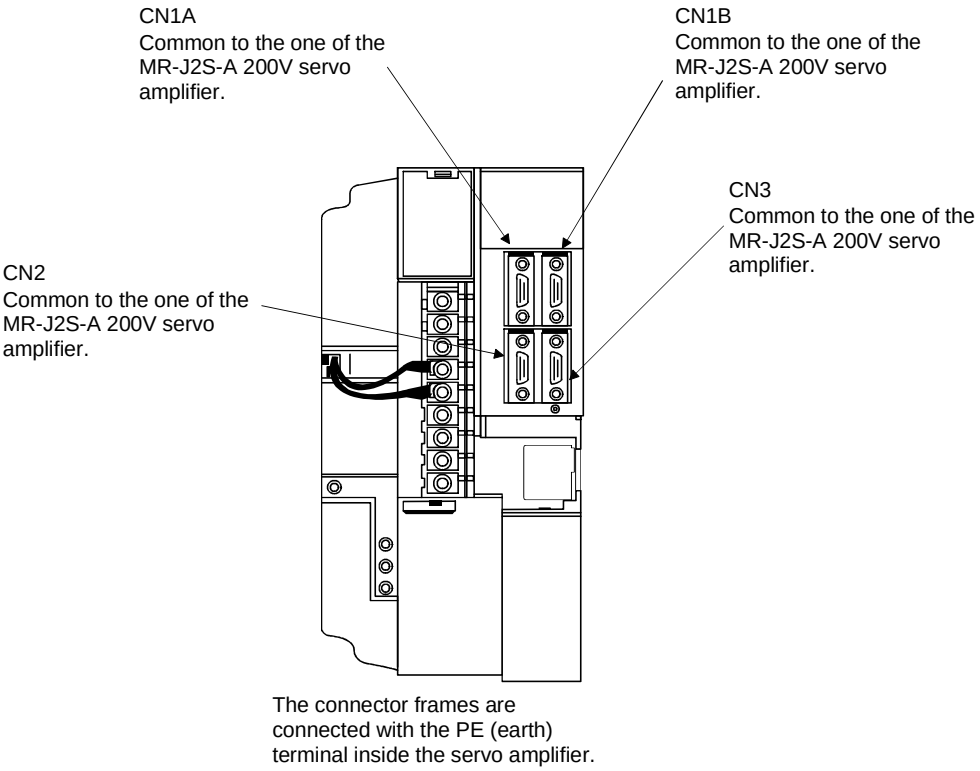
Servo amplifier	CN1A	CN1B	CN2	CN3
MR-J2S-60B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-100B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-200B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-350B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-500B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-700B4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	←
MR-J2S-11KB4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	(Note)
MR-J2S-15KB4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	(Note)
MR-J2S-22KB4	Common to the one of the MR-J2S-B 200V servo amplifier.	←	←	(Note)

Note. Refer to the following figure.

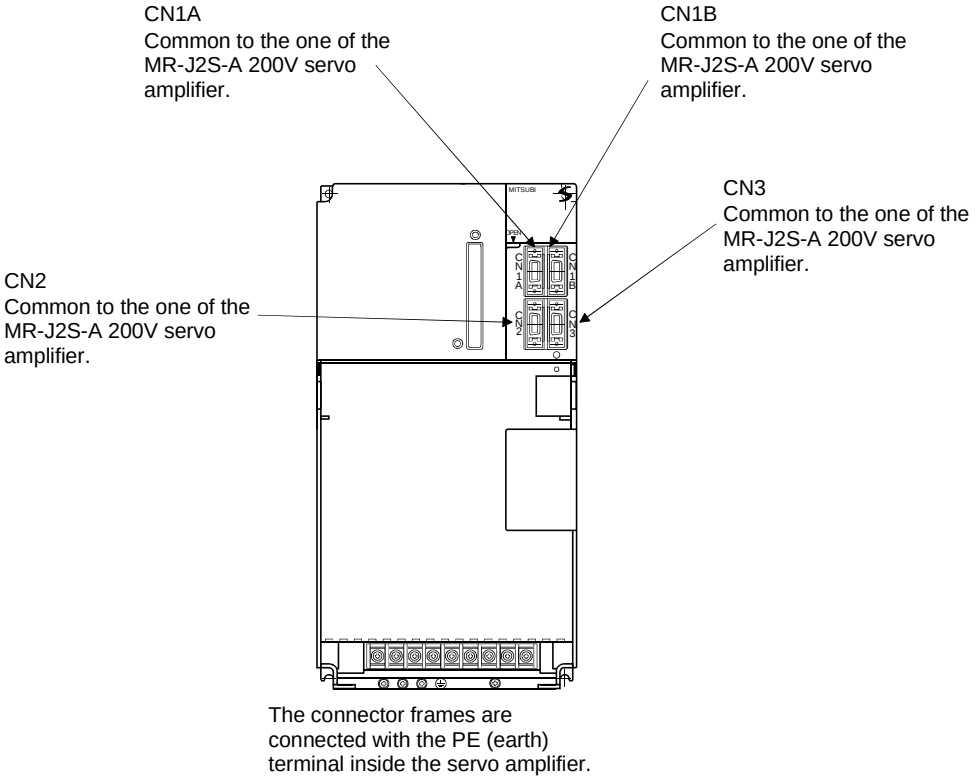
(1) MR-J2S-200B4 or less



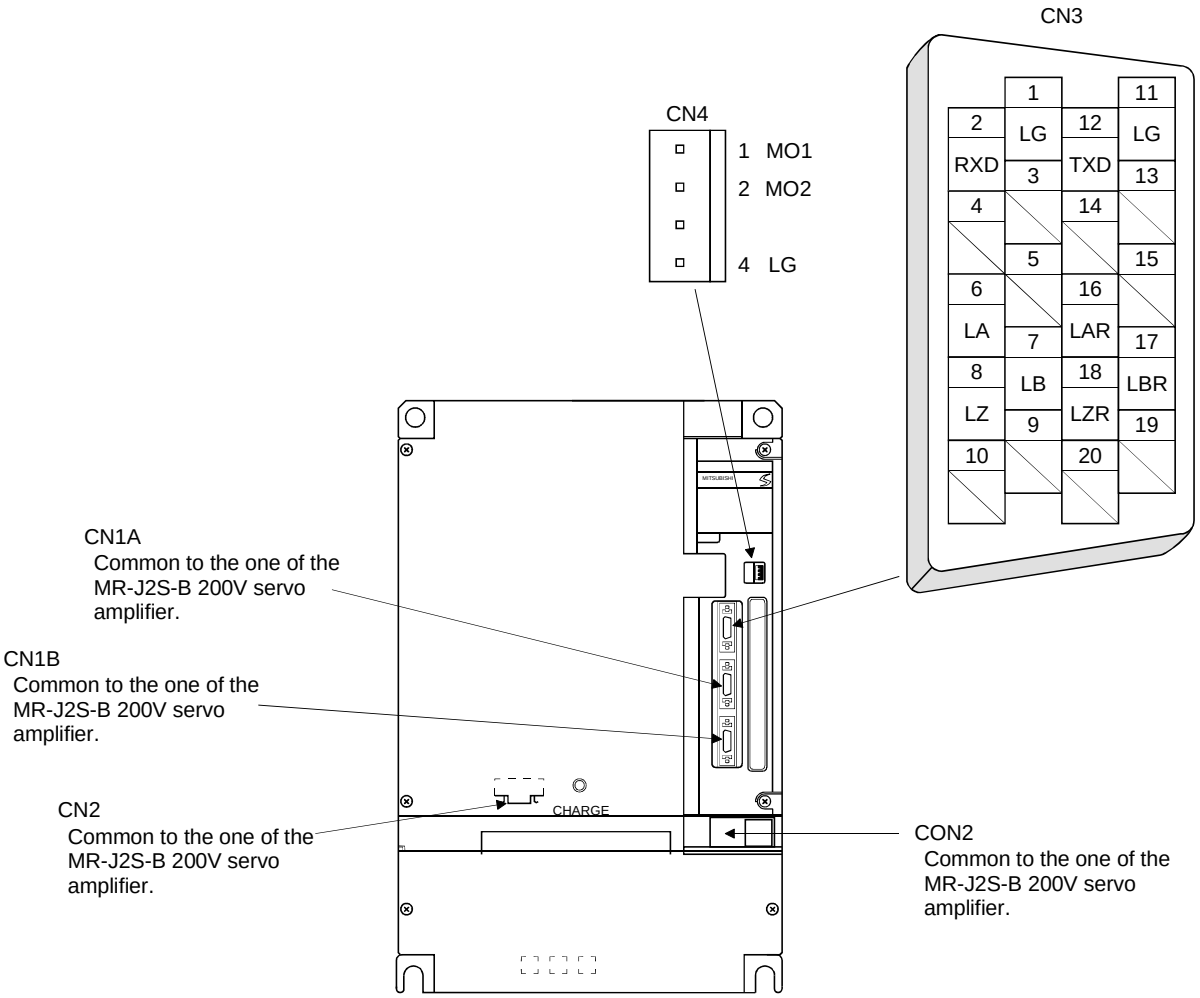
(2) MR-J2S-350A4 · 500A4



(3) MR-J2S-700A4



(4) MR-J2S-11KB4 to 22KB4



3.5.2 Input power supply circuit

⚠ WARNING	・Insulate the connections of the power supply terminals to prevent an electric shock.

⚠ CAUTION	・When the servo amplifier has become faulty, switch power off on the amplifier power side. Continuous flow of a large current may cause a fire. ・Use the trouble (ALM) to switch power off. Otherwise, a regenerative brake transistor fault or the like may overheat the regenerative brake resistor, causing a fire. ・Connect the wires to the correct phase terminals (U, V, W) of the servo amplifier and servo motor. Otherwise, the servo motor will operate improperly. ・Do not connect AC power supply directly to the servo motor. Otherwise, a fault may occur.

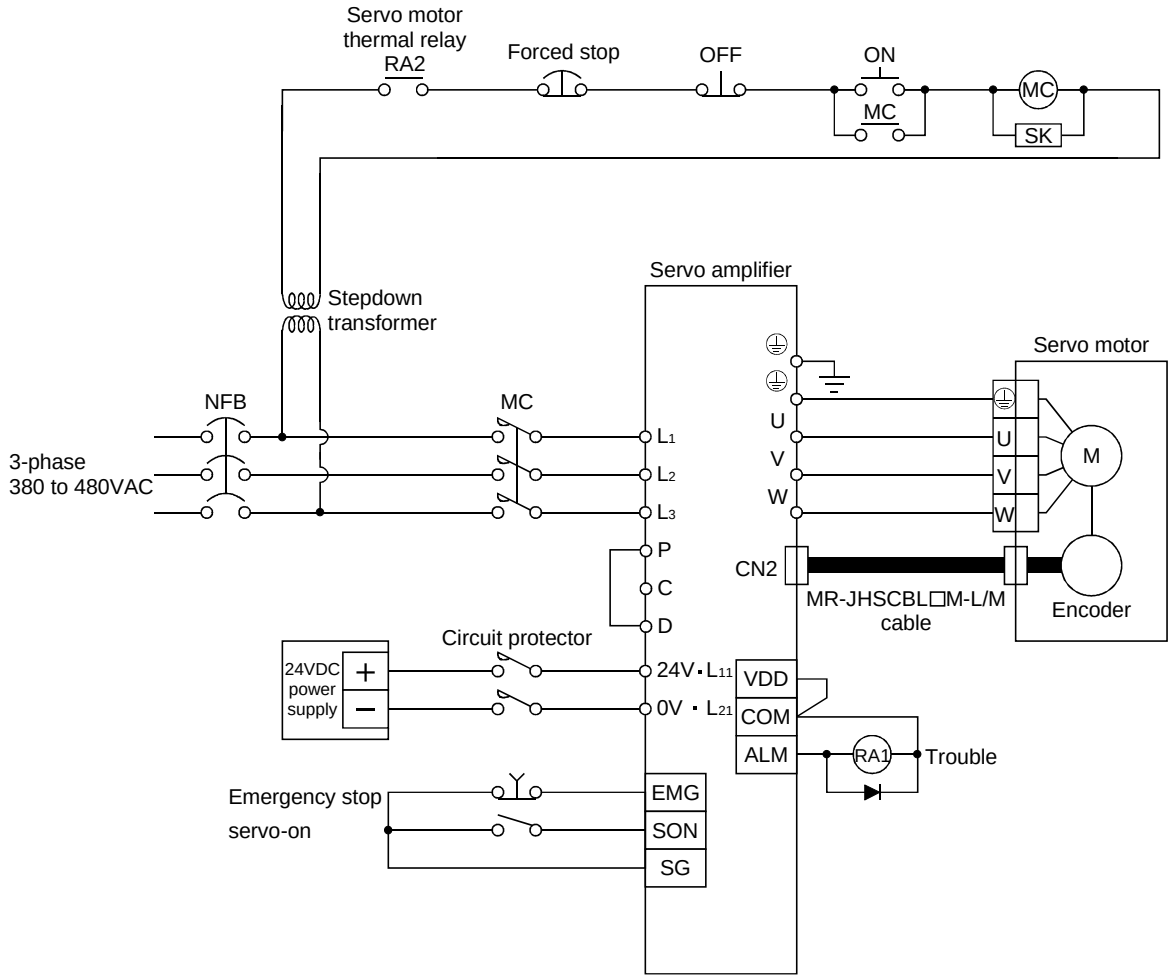
POINT

・Do not apply the test lead bars or like of a tester directly to the pins of the connectors supplied with the servo motor. Doing so will deform the pins, causing poor contact.

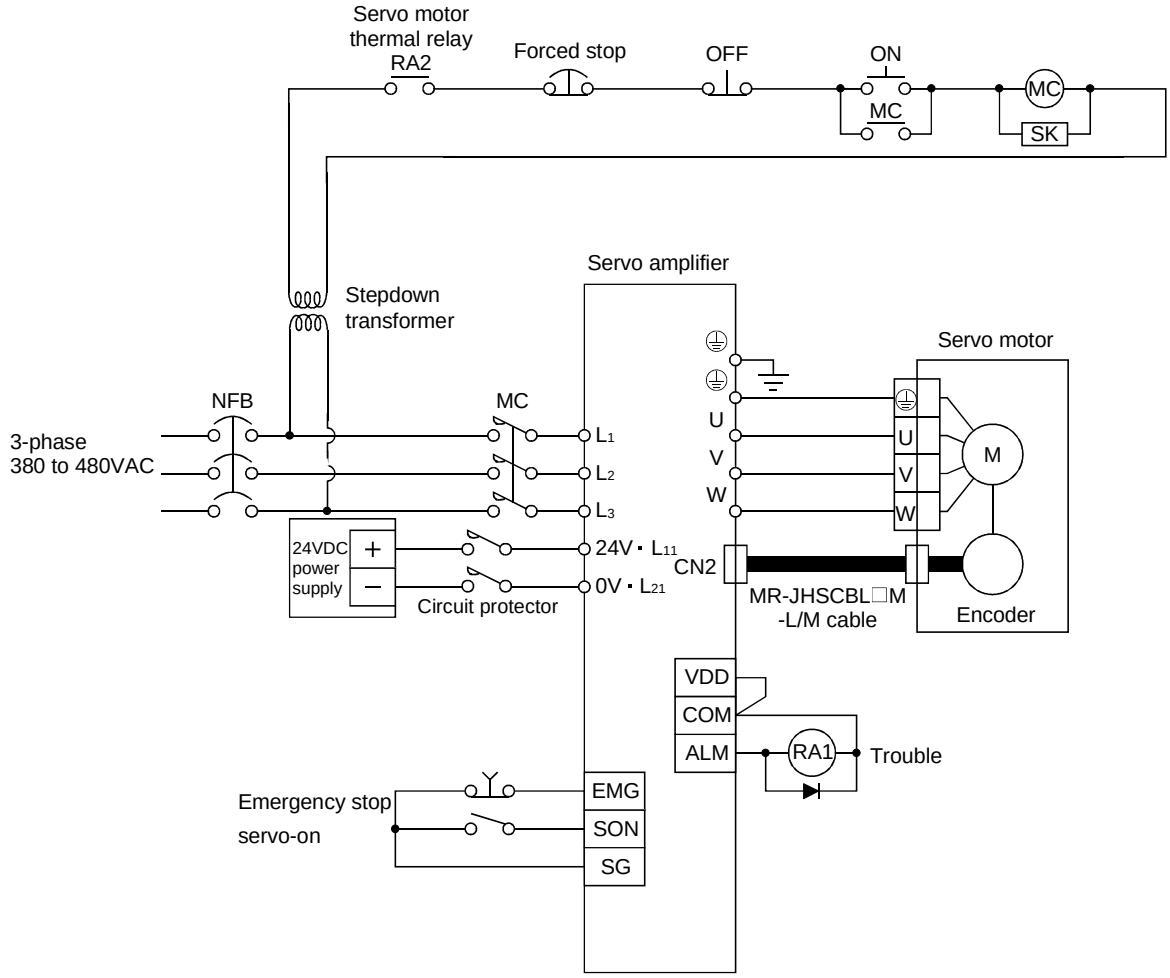
(1) Connection example

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

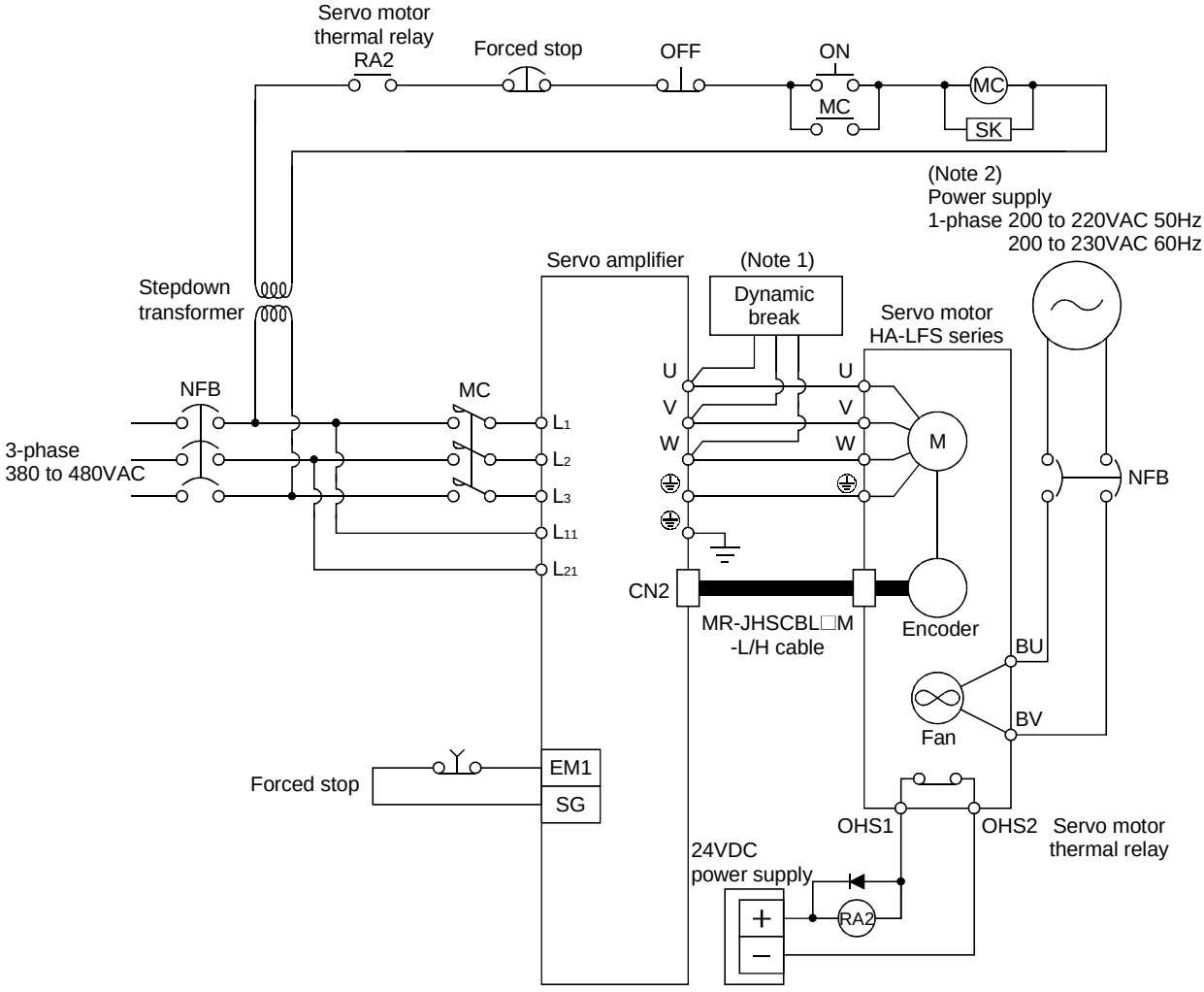
(a) MR-J2S-200B4 or less



(b) MR-J2S-350A4 to 700A4

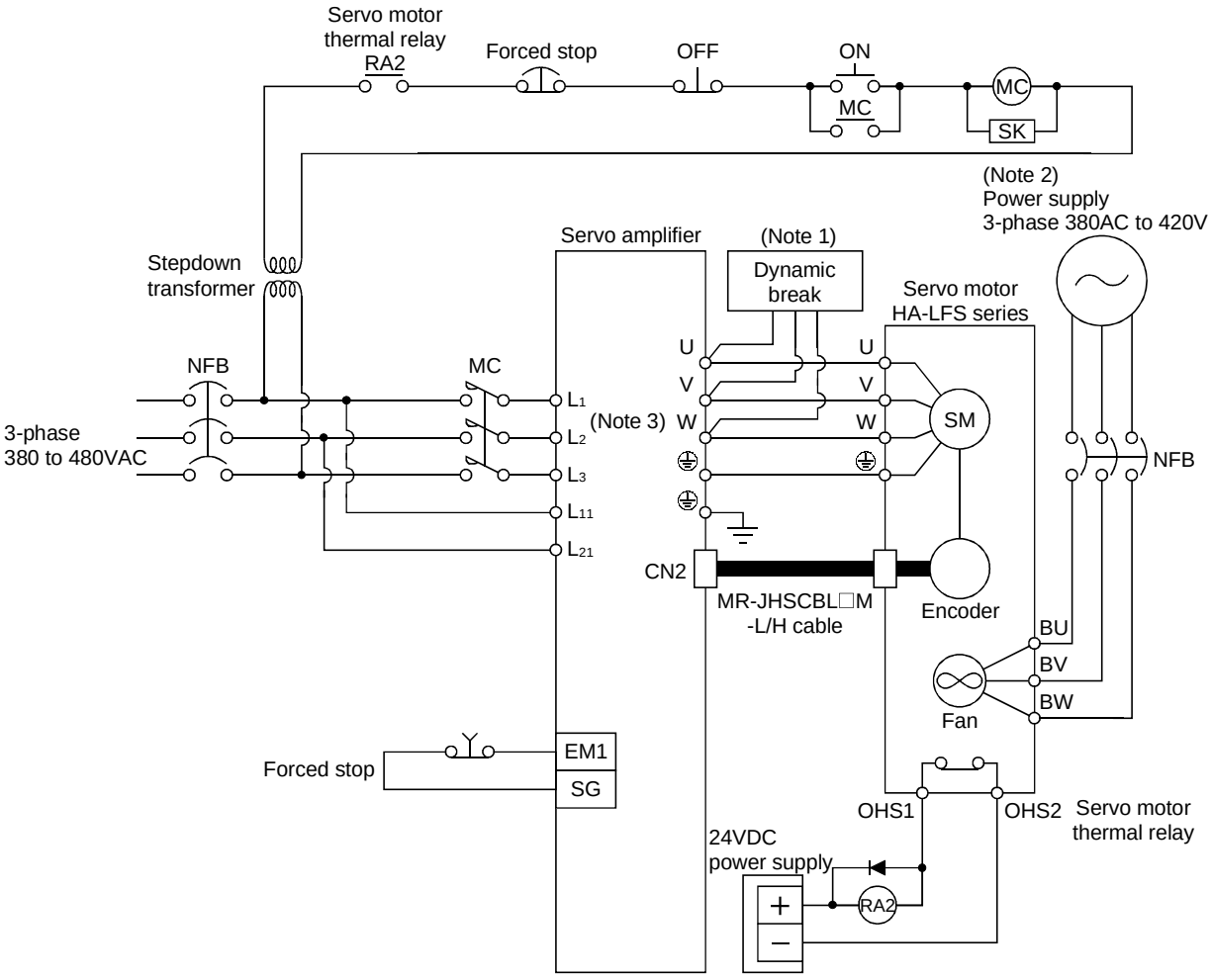


(c) MR-J2S-11KB4

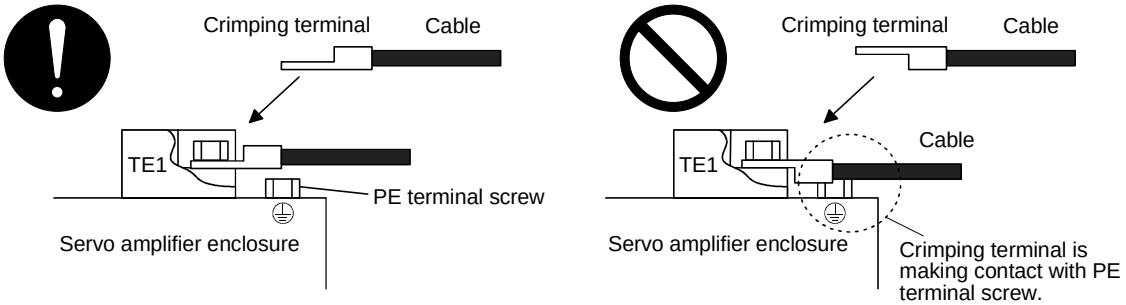


Note 1. When using the external dynamic break, refer to section 6.1.4.
2. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.

(d) MR-J2S-15KB4 · 22KB4



Note 1. When using the external dynamic break, refer to section 6.1.4.
2. The specification of the power supply for the servomotor cooling fan is different from that of the power supply for the main circuit.
3. When the U/V/W cable is wired to TE1 in the MR-J2S-22KB4, the crimping terminal may make contact with the PE terminal screw depending on the orientation of the crimping terminal. Wire the cable, paying attention to the orientation of the crimping terminal.



(2) Servo amplifier terminals

The positions and signal arrangements of the terminal blocks change with the capacity of the servo amplifier. Refer to Chapter 4.

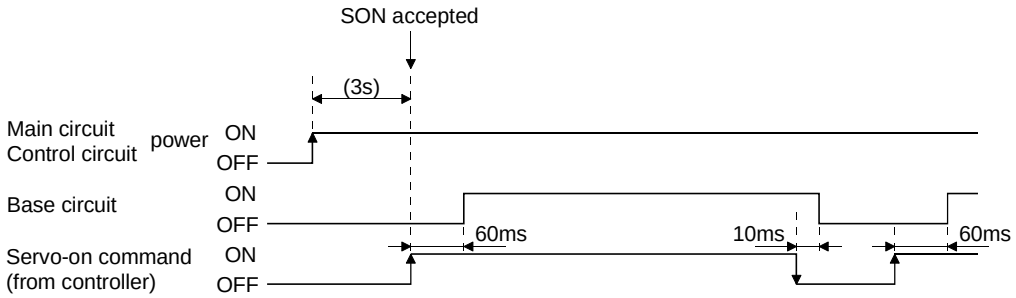
Symbol	Signal	Description
L_1 L_2 L_3	Main circuit power supply	Supply L_1, L_2 and L_3 with three-phase 380 to 480VAC, 50/60Hz power.
U V W	Servo motor output	Connect to the servo motor power supply terminals (U, V, W).
L_{11} L_{21}	Control circuit power supply	Supply L_{11} and L_{21} with single-phase 380 to 480VAC, 50/60Hz power.
P C	Regenerative brake option	The servo amplifier built-in regenerative brake resistor is not connected at the time of shipment. When using the regenerative brake option, wire it across P-C. Refer to Section 6.1.1 for details.
P N	Brake unit	When using the regenerative converter or brake unit, always remove the wiring across P-C, and then connect the regenerative converter or brake unit across P-N. Refer to Sections 7.1.2 for details.
⏚	Protective earth (PE)	Connect this terminal to the protective earth (PE) terminals of the servo motor and control box for grounding.
P_1 P	Power factor improving DC reactors	P_1-P are connected before shipment. When connecting a power factor improving DC reactor, remove the short bar across P_1-P. Refer to Section 6.2.4 for details.

(3) Power-on sequence

(a) Power-on procedure

1) Always wire the power supply as shown in above Section 3.5.2(1) using the magnetic contactor with the main circuit power supply (three-phase 400V: L_1, L_2, L_3). Configure up an external sequence to switch off the magnetic contactor as soon as an alarm occurs.
2) Switch on the control circuit power supply L_{11}, L_{21} simultaneously with the main circuit power supply or before switching on the main circuit power supply. If the main circuit power supply is not on, the display shows the corresponding warning. However, by switching on the main circuit power supply, the warning disappears and the servo amplifier will operate properly.
3) The servo amplifier can accept the servo-on command within 3s the main circuit power supply is switched on. (Refer to paragraph (b) in this section.)

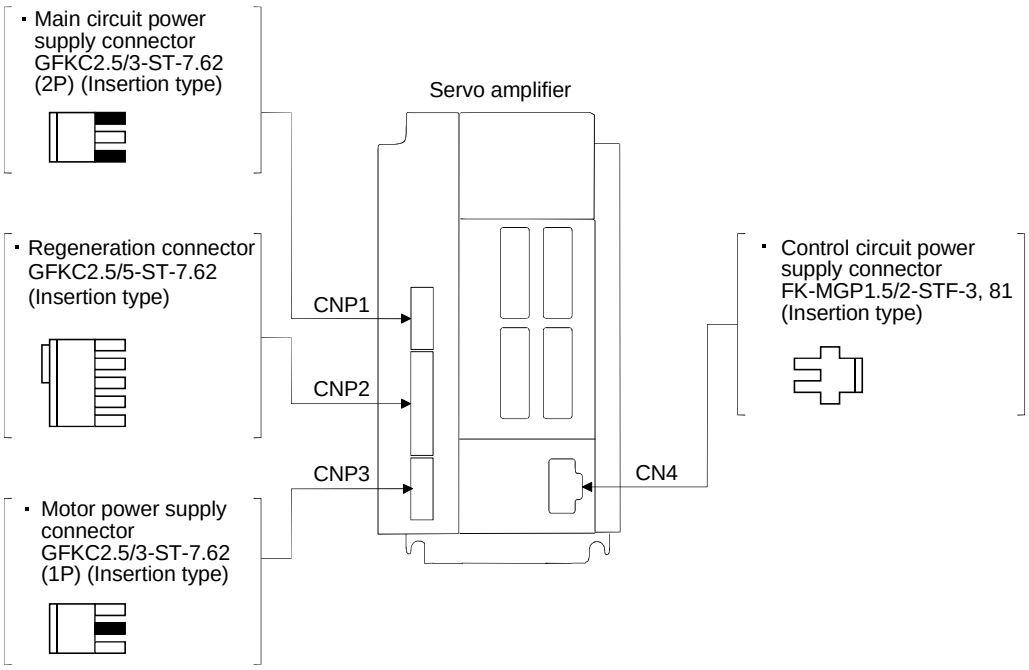
(b) Timing chart



(4) Connectors

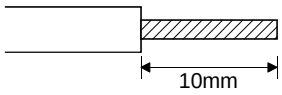
POINT
・The following applies to the MR-J2S-200B4 or less. For the other connectors and MR-J2S-350B4 and more servo amplifiers, refer to the 200V series servo amplifier instruction manual.

The following connectors are required for wiring to CN1P, CN2P, CN3P and CN4. The connectors are supplied as standard. (Phoenix make)



Servo amplifier connectors (CNP1, CNP2, CNP3, CN4) wiring method

(a) Termination of the cables



Use the cable after stripping the sheath and twisting the core. The core must be 10mm ((1mm) long. At this time, take care to avoid a short caused by the loose wires of the core and the adjacent pole. Do not solder the core as it may cause a contact fault. (Cable size: 0.2 to 2.5mm^2)
Alternatively, a bar terminal may be used to put the wires together.(Phoenix contact make)

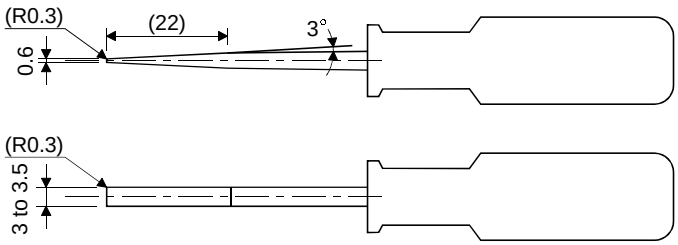
Cable size		Bar terminal type	Crimping tool	Maker
[mm^2]	AWG	For 1 cable		
1.309	16	AI1.5-10BK	CRIMPFOX-UD6	Phoenix Contact
2.081	14	AI2.5-10BU	CRIMPFOX-UD6	Phoenix Contact

(b) Inserting the cable into the connector

・Applicable flat-blade screwdriver dimensions

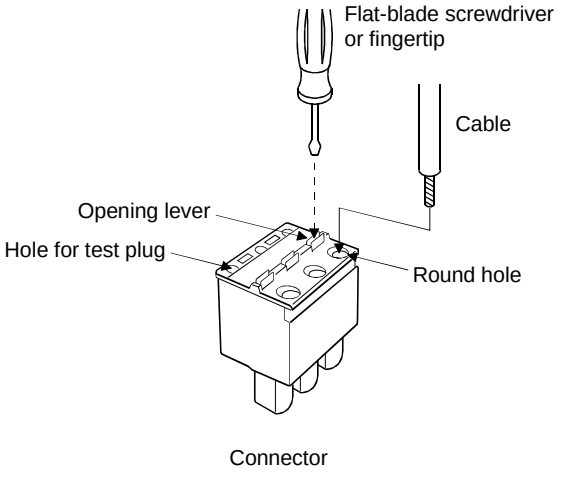
Always use the screwdriver shown here to do the work.

[Unit: mm]



・Insertion of cable into connector

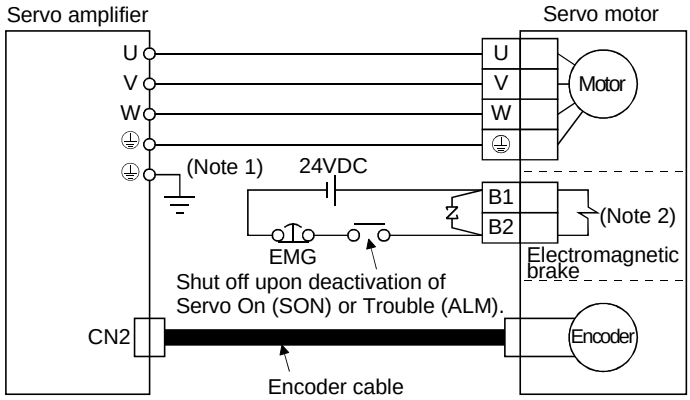
Push the opening lever with a flat-blade screwdriver or your fingertip, and insert the core of the cable 10mm into the round hole. When inserting the cable, push it 10mm into the hole securely. Releasing the opening lever connects the cable. After insertion, make sure that there are no loose wires coming out of the hole. Such wires can cause a short circuit.

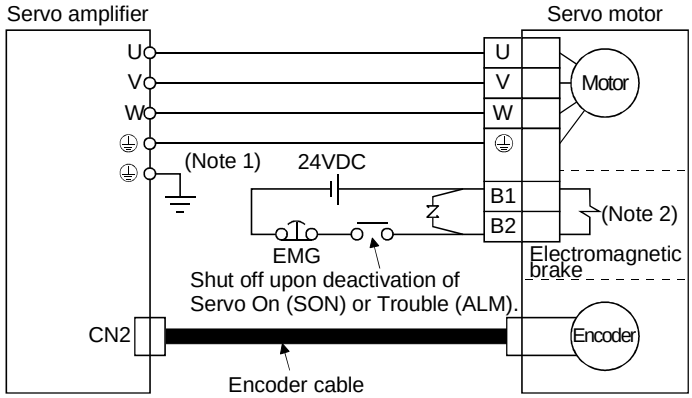


3.6 Connection of servo amplifier and servo motor

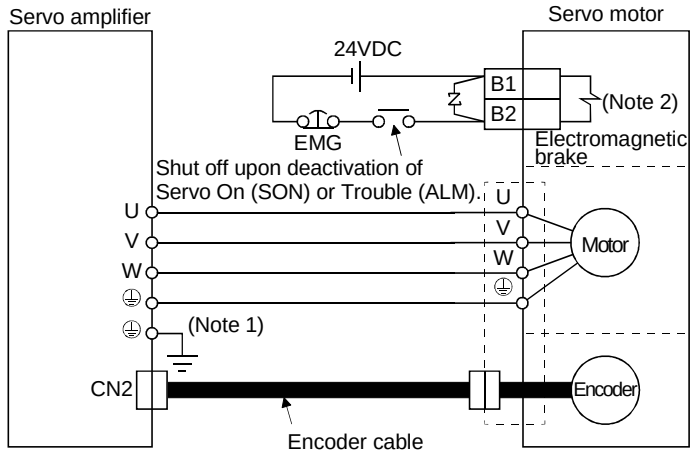
3.6.1 Connection diagram

The following table lists wiring methods according to the servo motor types. Use the connection diagram which conforms to the servo motor used. For cables required for wiring, refer to Section 6.2.1. For the signal layouts of the connectors, refer to Section 3.6.2.
For the servo motor connector, refer to Chapter 3 of the Servo Motor Instruction Manual.

<table>
<tr><th>Servo motor</th><th>Connection diagram</th></tr>
<tr><td>HC-SFS2024(B) to 7024(B)</td><td> 

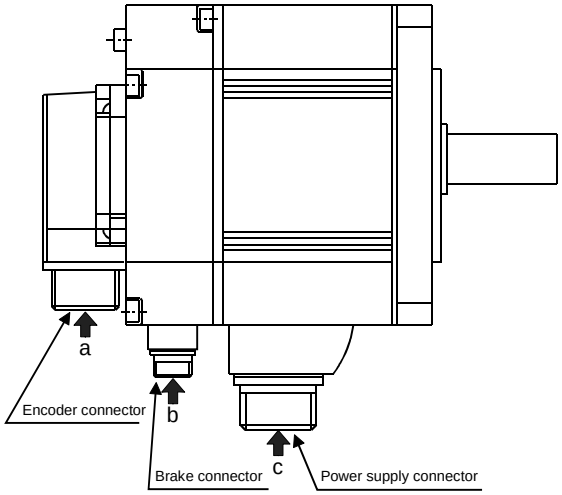
Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box.
2. This circuit applies to the servo motor with electromagnetic brake.</td></tr>
<tr><td>HC-SFS524(B) to 1524(B)</td><td> 

Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box.
2. This circuit applies to the servo motor with electromagnetic brake.</td></tr>
</table>

Servo motor	Connection diagram
HA-LFS701M4(B) HA-LFS11K1M4(B) to 22K1M4(B) HA-LFS11K24(B) to 22K24(B)	 Note 1. To prevent an electric shock, always connect the protective earth (PE) terminal of the servo amplifier to the protective earth (PE) of the control box. 2. This circuit applies to the servo motor with electromagnetic brake.

3.6.2 Servo motor terminals

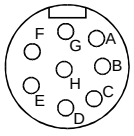
(1) HC-SFS series



Servo motor	Servo motor side connectors		
	For power supply	For encoder	Electromagnetic brake connector
HC-SFS524(B) to 1524(B) HC-SFS534(B) to 1534(B)	CE05-2A22-23PD-B	MS3102A20-29P	The connector for power is shared.
HC-SFS2024(B) to 5024 (B)	CE05-2A24-10PD-B		MS3102A10SL-4P
HC-SFS7024(B)	CE05-2A32-17PD-B		

Power supply connector signal arrangement

CE05-2A22-23PD-B

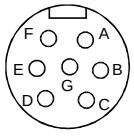


View c

Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)
E	
F	
G	(Note) B1
H	(Note) B2

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

CE05-2A24-10PD-B

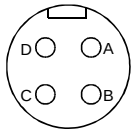


View c

Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)
E	(Note) B1
F	(Note) B2
G	

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

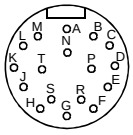
CE05-2A32-17PD-B



Pin	Signal
A	U
B	V
C	W
D	⏚ (Earth)

Encoder connector signal arrangement

MS3102A20-29P



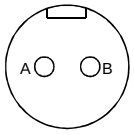
View a

Pin	Signal
A	MD
B	MDR
C	MR
D	MRR
E	
F	BAT
G	LG
H	
J	

Pin	Signal
K	
L	
M	
N	SD
P	
R	LG
S	P5
T	

Electromagnetic brake connector signal arrangement

MS3102A10SL-4P

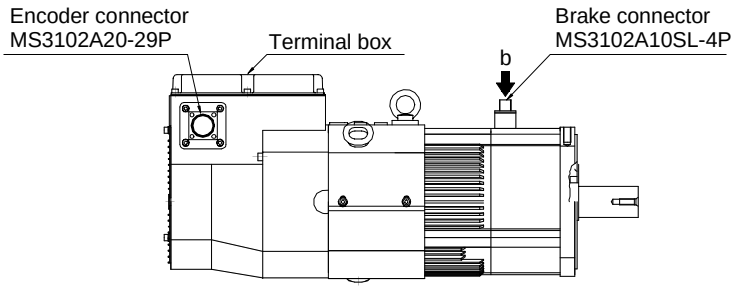


View b

Pin	Signal
A	(Note)B1
B	(Note)B2

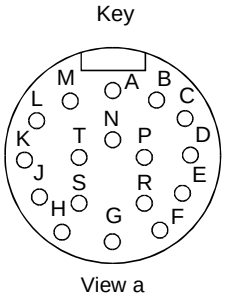
Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

(2) HA-LFS Series



Encoder connector signal arrangement

MS3102A20-29P

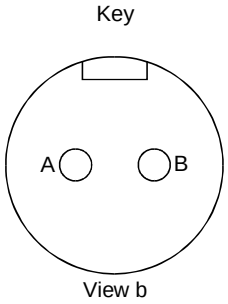


Pin	Signal
A	MD
B	MDR
C	MR
D	MRR
E	
F	BAT
G	LG
H	
J	

Pin	Signal
K	
L	
M	
N	SHD
P	
R	LG
S	P5
T	

Electromagnetic brake connector signal arrangement

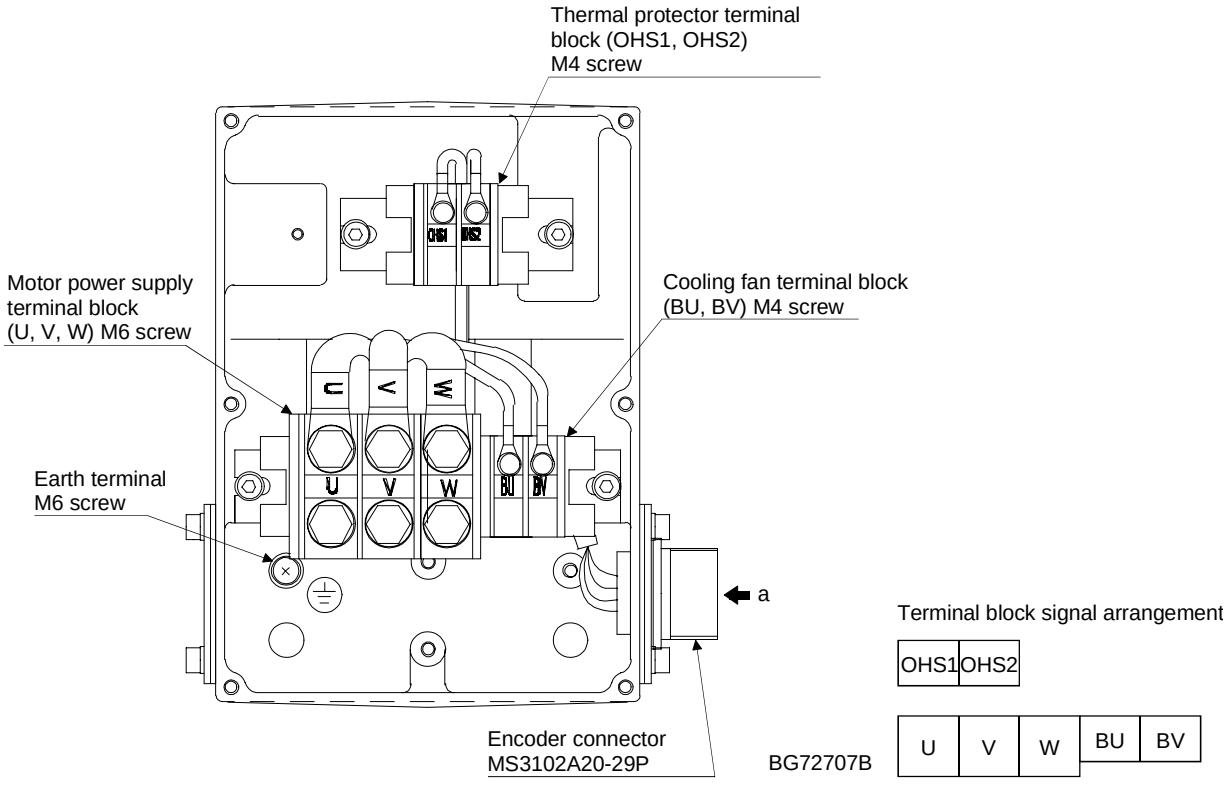
MS3102A10SL-4P



Pin	Signal
A	(Note)B1
B	(Note)B2

Note: For the motor with electromagnetic brake, supply electromagnetic brake power (24VDC). There is no polarity.

Terminal box inside (HA-LFS11K24・HA-LFS701M4)



Terminal block signal arrangement

OHS1	OHS2

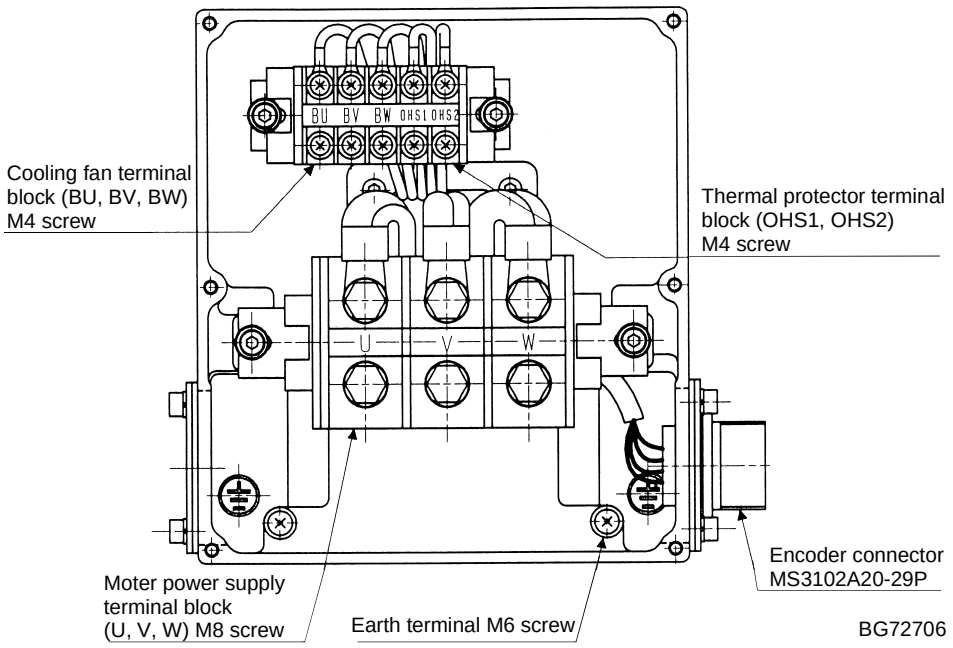
BG72707B

U	V	W	BU	BV

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS11K24	M6
HA-LFS701M4	

Terminal box inside (HA-LFS15K24・HA-LFS22K24・HA-LFS11K1M4・HA-LFS15K1M4)



Terminal block signal arrangement

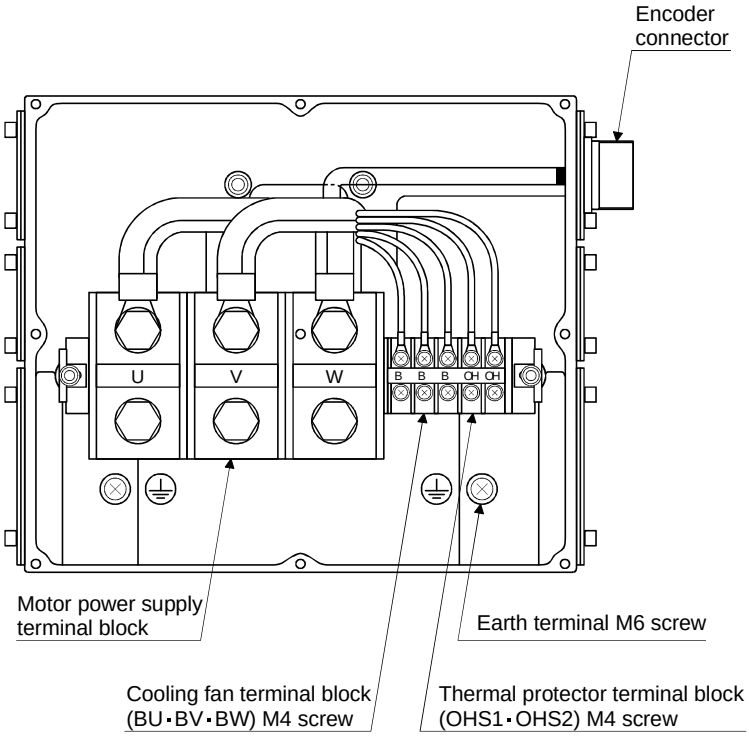
BU	BV	BW	OHS1	OHS2

U	V	W

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS15K24	M8
HA-LFS22K24	
HA-LFS11K1M4	
HA-LFS15K1M4	

Terminal box inside (HA-LFS22K1M4)



Terminal block signal arrangement

U	V	W	BU	BV	BW	OHS1	OHS2

Power supply connection screw size

Servo motor	Power supply connection screw size
HA-LFS22K1M4	M8

<table>
<tr><th>Signal Name</th><th>Abbreviation</th><th>Description</th></tr>
<tr><td>Power supply</td><td>U・V・W</td><td>Connect to the motor output terminals (U, V, W) of the servo amplifier.</td></tr>
<tr><td>Cooling fan</td><td>(Note)
BU・BV・BW</td><td>Supply power which satisfies the following specifications.
HA-LFS11K24/HA-LFS701M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>single-phase 200 to 220VAC, 50Hz
single-phase 200 to 230VAC, 60Hz</td></tr><tr><td>Power consumption [W]</td><td>42(50Hz)/54(60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12(50Hz)/0.25(60Hz)</td></tr></table>
HA-LFS15K24/22K24/11K1M4/15K1M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>Three-phase 380 to 420VAC, 50Hz/60Hz</td></tr><tr><td>Power consumption [W]</td><td>55(50Hz)/75(60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12(50Hz)/0.11(60Hz)</td></tr></table>
HA-LFS22K1M4
<table><tr><th>Item</th><th>Description</th></tr><tr><td>Voltage/frequency</td><td>Three-phase 380 to 460VAC, 50Hz/60Hz</td></tr><tr><td>Power consumption [W]</td><td>65 (50Hz) / 85 (60Hz)</td></tr><tr><td>Rated current [V]</td><td>0.12 (50Hz) / 0.14 (60Hz)</td></tr></table></td></tr>
<tr><td>Motor thermal relay</td><td>OHS1・OHS2</td><td>OHS1-OHS2 are opened when heat is generated to an abnormal temperature.
Max. rating: 125VAC/VDC , 3A or 250VAC/VDC, 2A
Min. rating: 6VAC/VDC, 0.15A</td></tr>
<tr><td>Earth terminal</td><td>  </td><td>For grounding, connect to the earth of the control box via the earth terminal of the servo amplifier.</td></tr>
</table>

Note. There is no BW when the HA-LFS11K24/HA-LFS701M4 is used.

3.7 Parameter

POINT

- The parameters of each servo amplifier are basically the same as those of the 200V series servo amplifier. This section describes the differences in parameters between each servo amplifier and 200V series servo amplifier.

No.	Symbol	Name and function	Initial value	Unit
2	*REG	Regenerative brake resister 0 □ □ □ Selection of regenerative brake option 00: Regenerative brake option or regenerative brake option is not used with 7kW or less servo amplifier Supplied regenerative brake resistors or regenerative brake option is used with 11kW or more servo amplifier 01: FR-RC-H□, FR-BU-H□ 0E: When regenerative brake resistors or regenerative brake option supplied to 11kW or more are cooled by fans to increase capability 80: MR-RB3H-4 81: MR-RB5H-4 82: MR-RB3G-4 83: MR-RB5G-4 84: MR-RB34-4 85: MR-RB54-4 86: MR-RB1L-4 87: MR-RB3M-4 Refer to MR-J2S-□B Servo Amplifier Instruction Manual.	0000	
22	MOD	Analog monitor output 0 □ 0 □	0100	

Setting	Analog monitor 2 (MO2)	Analog monitor 1 (MO1)
0	Servo motor speed (±8V/max. speed)	
1	Torque (±8V/max. torque)	
2	Motor speed (+8V/max. speed)	
3	Torque (+8V/max. torque)	
4	Current command (±8V/max. current command)	
5	Command speed (±8/max. speed)	
6	Droop pulses (±10V/128 pulses)	
7	Droop pulses (±10V/2048 pulses)	
8	Droop pulses (±10V/8192 pulses)	
9	Droop pulses (±10V/32768 pulses)	
A	Droop pulses (±10V/131072 pulses)	
B	Bus voltage (+8V/800V)	

3.8 Troubleshooting

POINT

- Alarms different from those occurring to the 200VAC servo amplifiers are described.

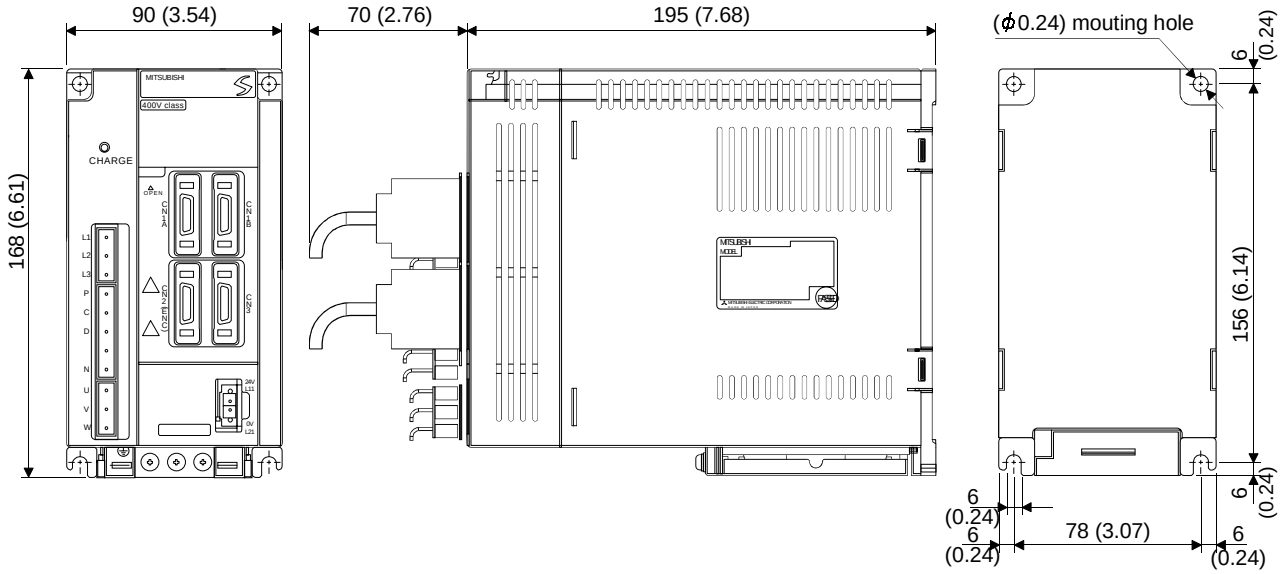
Display	Name	Definition	Cause	Action
10	Undervoltage	Power supply voltage dropped below 280VAC.	1. Power supply voltage is low.	Review the power supply.
			2. There was an instantaneous control circuit power failure of 60ms or longer.	
			3. Shortage of power supply capacity caused the power supply voltage to drop at start, etc.	
			4. Power was restored after the bus voltage had dropped to 380VDC. (Main circuit power switched on within 5s after it had switched off.)	
			5. Faulty parts in the servo amplifier Checking method Alarm (10) occurs if power is switched on after CN1A, CN1B and CN3 connectors are disconnected.	Change the servo amplifier.
30	Regenerative alarm	Permissible regenerative power of the built-in regenerative brake resistor or regenerative brake option is exceeded.	1. Parameter No. 2 setting error	Set correctly.
			2. Built-in regenerative brake resistor or regenerative brake option is not connected.	Connect correctly
			3. High-duty operation or continuous regenerative operation caused the permissible regenerative power of the regenerative brake option to be exceeded. Checking method Call the status display and check the regenerative load ratio.	1. Reduce the frequency of positioning. 2. Use the regenerative brake option of larger capacity. 3. Reduce the load.
			4. Power supply voltage rose above 535VAC.	Review power supply
			5. Built-in regenerative brake resistor or regenerative brake option faulty.	Change servo amplifier or regenerative brake option.
		Regenerative transistor fault	6. Regenerative transistor faulty. Checking method 1) The regenerative brake option has overheated abnormally. 2) The alarm occurs even after removal of the built-in regenerative brake resistor or regenerative brake option.	Change the servo amplifier.

Display	Name	Definition	Cause	Action
33	Overvoltage	Converter bus voltage exceeded 800VDC.	1. Lead of built-in regenerative brake resistor or regenerative brake option is open or disconnected.	1. Change lead. 2. Connect correctly.
			2. Regenerative transistor faulty.	Change servo amplifier
			3. Wire breakage of built-in regenerative brake resistor or regenerative brake option	1. For wire breakage of built-in regenerative brake resistor, change servo amplifier. 2. For wire breakage of regenerative brake option, change regenerative brake option.
			4. The regenerative transistor is broken.	Change the servo amplifier.
			5. Power supply voltage high.	Review the power supply.

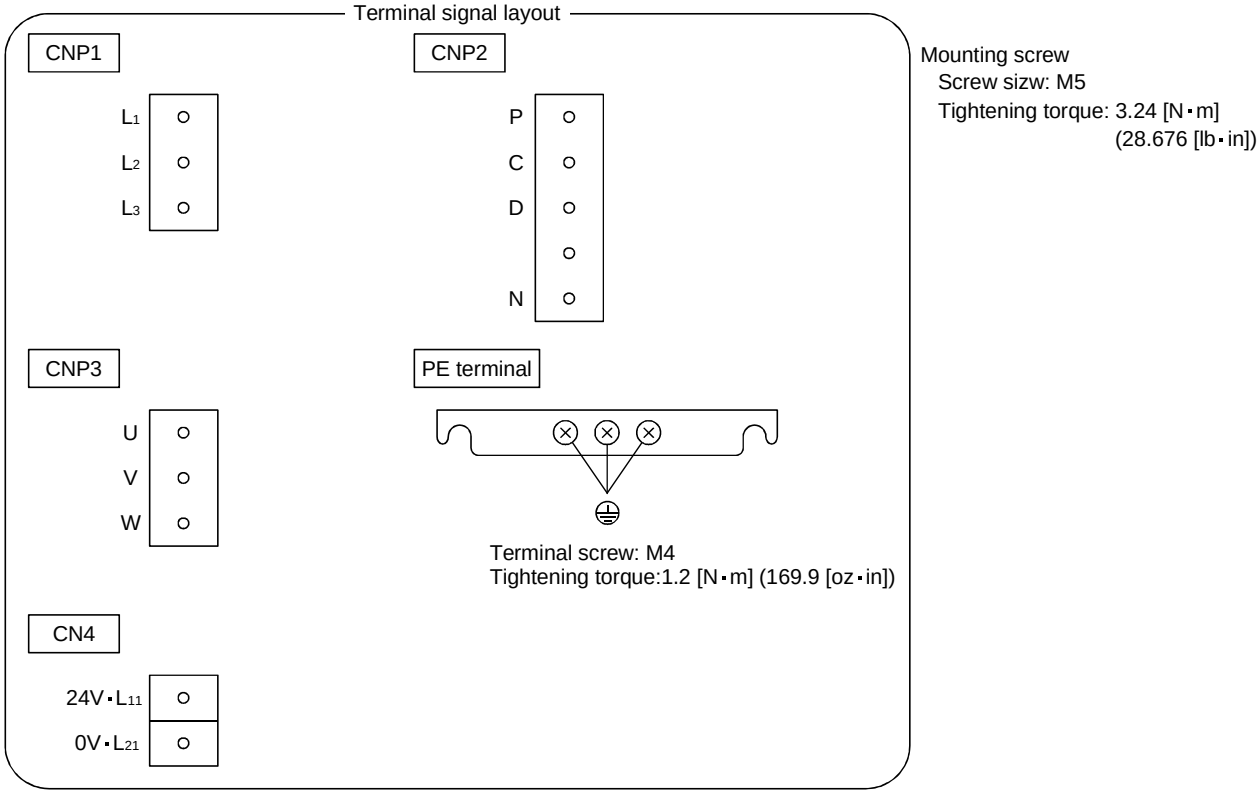
4. OUTLINE DIMENSION DRAWINGS

(1) MR-J2S-60A4/B4 to MR-J2S-200A4/B4

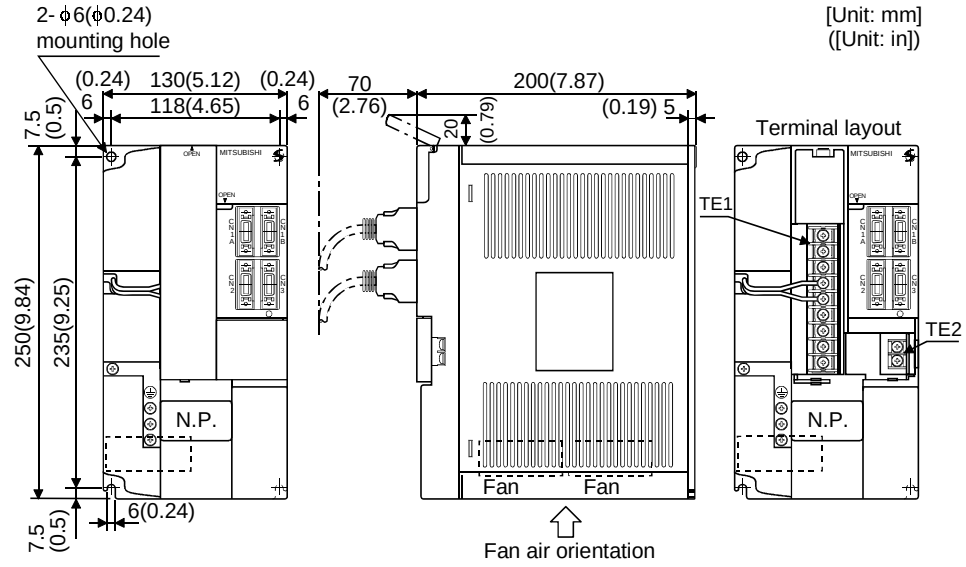
[Unit: mm]
([Unit: in])



Servo amplifier	Mass [kg] ([lb])
MR-J2S-60A4/B4	2.1 (4.6)
MR-J2S-100A4/B4	
MR-J2S-200A4/B4	2.2 (4.9)



(2) MR-J2S-350A4/B4 • 500A4/B4



Servo amplifier	Mass [kg] ([lb])
MR-J2S-350A4/B4	5 (11)
MR-J2S-500A4/B4	

Terminal signal layout

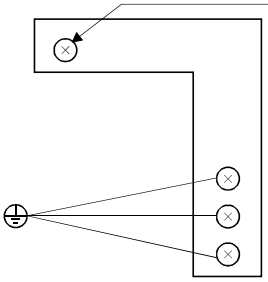
TE1

L_1
L_2
L_3
C
P
N
U
V
W

Terminal screw : M4
Tightening torque : 1.2 [N•m]
(169.9 [oz•in])

PE terminals

Built-in regenerative brake resistor lead terminal fixing screw



Terminal screw : M4
Tightening torque : 1.2 [N•m]
(169.9 [oz•in])

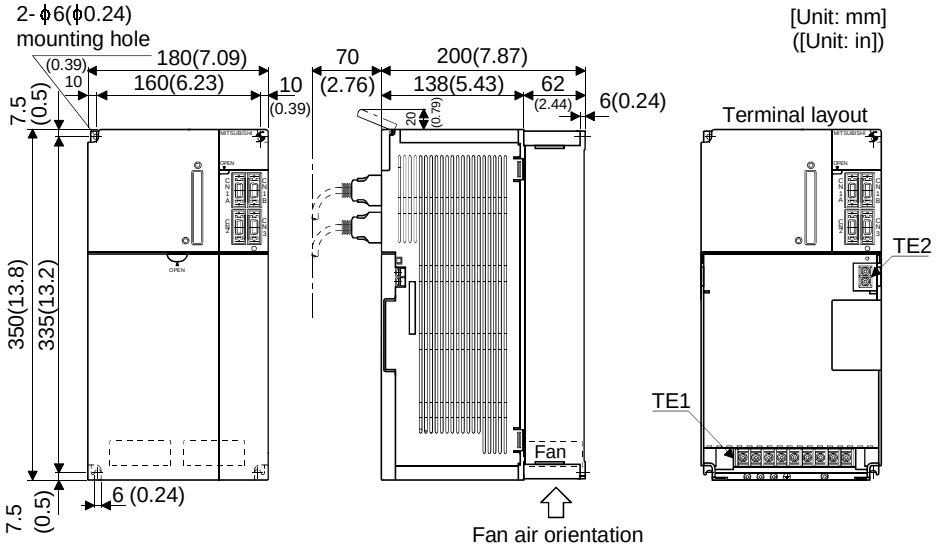
Mounting screw
Screw sizw: M5
Tightening torque: 3.24 [N•m]
(28.676 [lb•in])

TE2

24_V • L_{11}
0_V • L_{21}

Terminal screw : M3.5
Tightening torque : 1.0 [N•m]
(141.6 [oz•in])

(3) MR-J2S-700A4/B4



Servo amplifier	Mass [kg]([lb])
MR-J2S-700A4/B4	7.2(15.9)

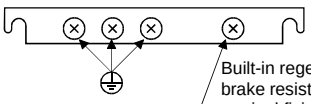
Terminal signal layout

TE1

L_1	L_2	L_3	C	P	N	U	V	W

Terminal screw : M4
Tightening torque : 1.2 [N・m](10[lb・in])

PE terminals



Built-in regenerative brake resistor lead t erminal fixing screw

Terminal screw : M4
Tightening torque : 1.2 [N・m]
(10[lb・in])

TE2

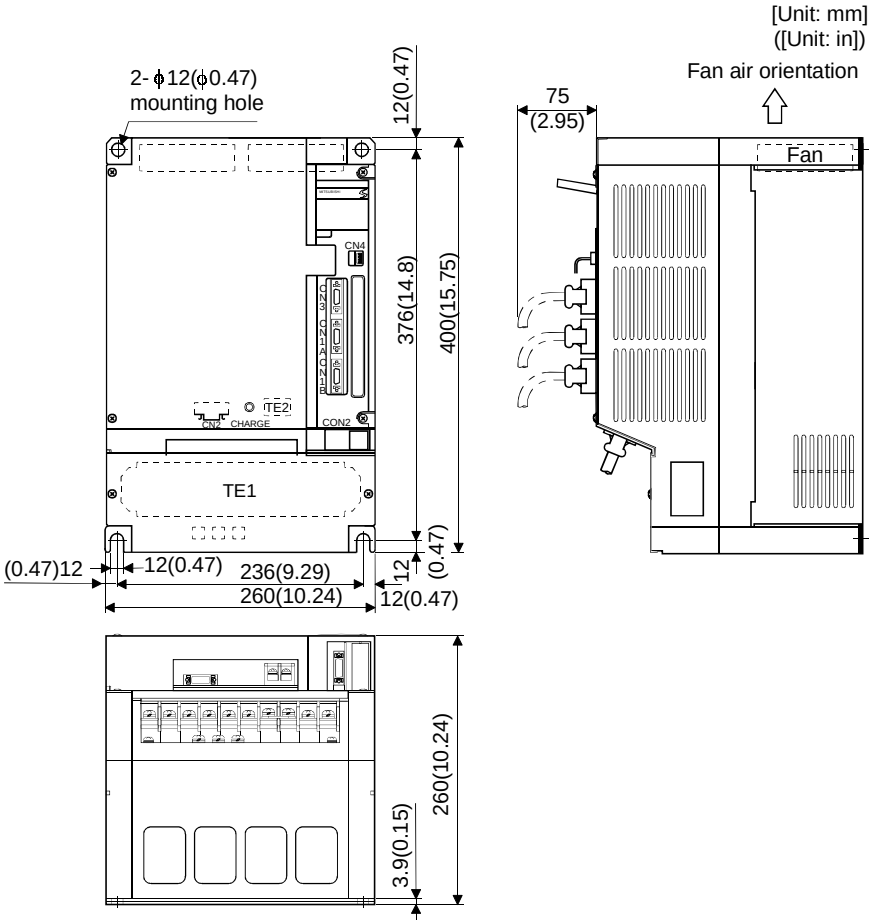
L_{11}
L_{21}

Terminal screw : M3.5
Tightening torque : 0.8 [N・m](7[lb・in])

Mounting screw
Screw sizw: M5
Tightening torque: 3.24 [N・m]
(28.676 [lb・in])

(4) MR-J2S-11KA4/B4 · 15KA4/B4

[Unit: mm]
([Unit: in])



Servo amplifier	Mass [kg]([lb])
MR-J2S-11KA4/B4	15(33.1)
MR-J2S-15KA4/B4	16(35.3)

Terminal signal layout

TE1

L_1	L_2	L_3	U	V	W	P_1	P	C	N

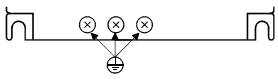
Terminal screw : M6
Tightening torque : 3.0[N·m] (26[lb·in)]
For the recommended crimp terminal, refer to Section 8.1.1.

TE2

L_{11}	L_{21}

Terminal screw : M4
Tightening torque : 1.2[N·m] (10[lb·in])

PE terminal

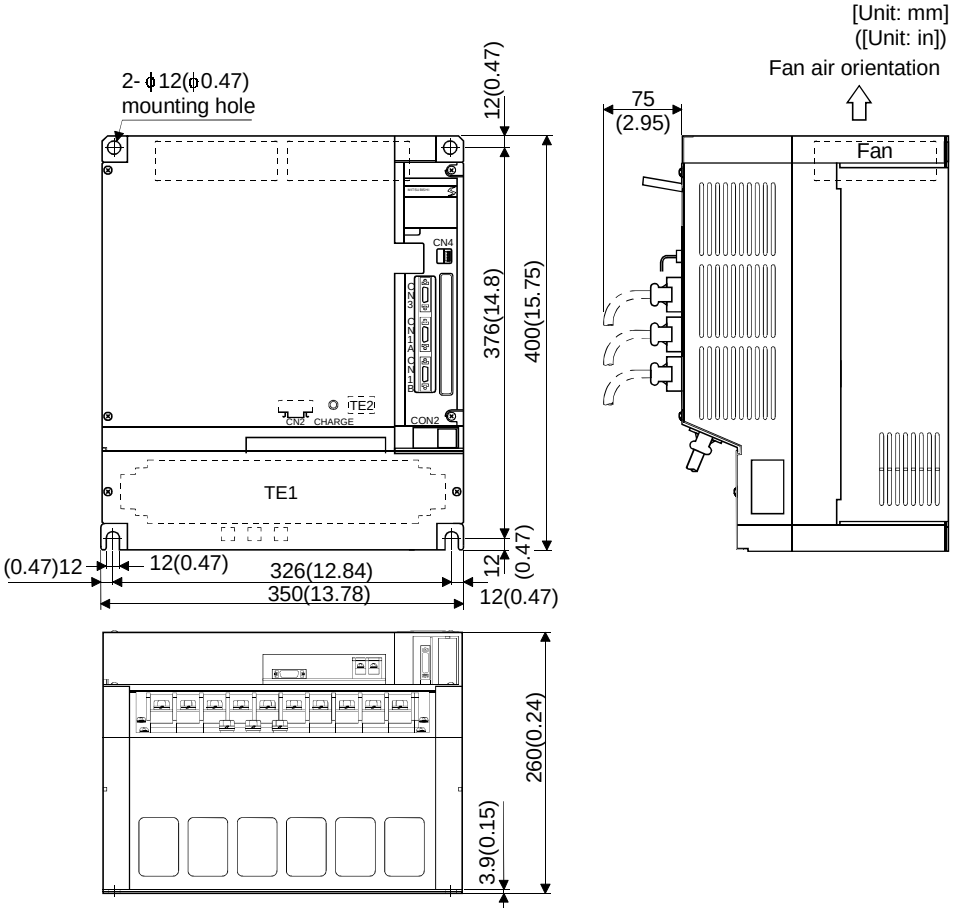


Terminal screw : M6
Tightening torque : 6.0[N·m]
(52[lb·in)]

Mounting screw
Screw sizw: M10
Tightening torque:
26.5[N·m] (234.545[lb·in])

(5) MR-J2S-22KA4/B4

[Unit: mm]
([Unit: in])



Servo amplifier	Mass [kg]([lb])
MR-J2S-22KA4/B4	20(44.1)

Terminal signal layout

TE1

L_1	L_2	L_3	U	V	W	P_1	P	C	N

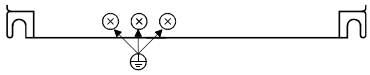
Terminal screw : M8
Tightening torque : 6.0[N・m] (52[lb・in)]
For the recommended crimp terminal, refer to Section 8.2.1.

TE2

L_{11}	L_{21}

Terminal screw : M4
Tightening torque : 1.2[N・m] (10[lb・in)]

PE terminal



Terminal screw : M8
Tightening torque : 6.0[N・m] (52[lb・in)]

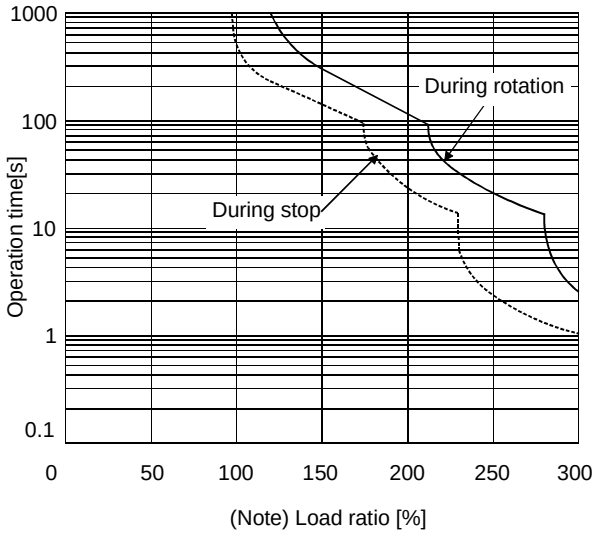
Mounting screw
Screw sizw: M10
Tightening torque:
26.5[N・m] (234.545[lb・in])

MEMO

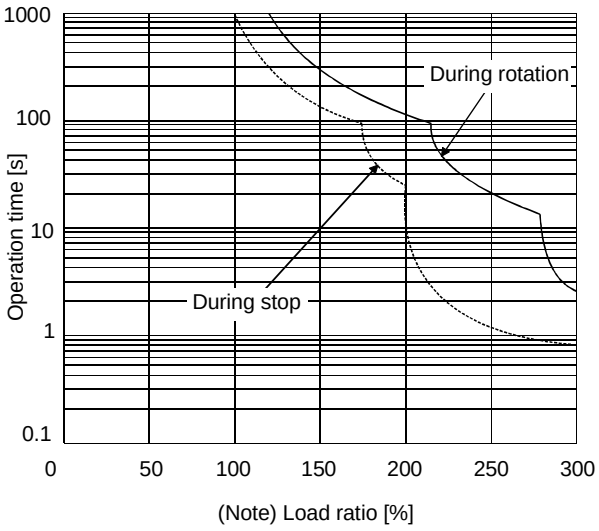
5. CHARACTERISTICS

5.1 Overload protection characteristics

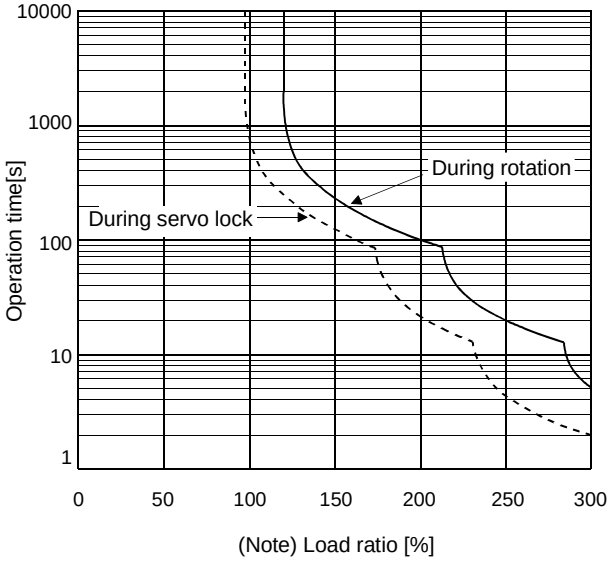
An electronic thermal relay is built in the servo amplifier to protect the servo motor and servo amplifier from overloads. Overload 1 alarm (AL.50) occurs if overload operation performed is above the electronic thermal relay protection curve shown in any of Figs 5.1. Overload 2 alarm (AL.51) occurs if the maximum current flew continuously for several seconds due to machine collision, etc. Use the equipment on the left-hand side area of the continuous or broken line in the graph.
In a machine like the one for vertical lift application where unbalanced torque will be produced, it is recommended to use the machine so that the unbalanced torque is 70% or less of the rated torque.



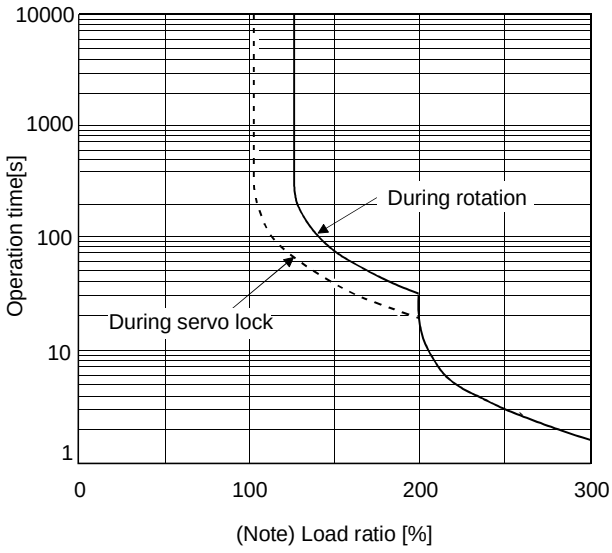
a. MR-J2S-60A4/B4 · MR-J2S-100A4/B4



b. MR-J2S-200A4/B4 · MR-J2S-350A4/B4



c. MR-J2S-500A4/B4 · MR-J2S-700A4/B4



d. MR-J2S-11KA4/B4 to MR-J2S-22KA4/B4

Note. If the servo motor is stopped or low-speed (30r/min or less) operation is performed at an abnormally high duty with torque more than 100% of the rating being generated, the servo amplifier may fail even in a status where the electronic thermal relay protection is not activated.

Fig 5.1 Electronic thermal relay protection characteristics

5.2 Power supply equipment capacity and generated loss

(1) Amount of heat generated by the servo amplifier

Table 5.1 indicates servo amplifiers' power supply capacities and losses generated under rated load. For thermal design of an enclosure, use the values in Table 5.1 in consideration for the worst operating conditions. The actual amount of generated heat will be intermediate between values at rated torque and servo off according to the duty used during operation. When the servo motor is run at less than the maximum speed, the power supply capacity will be smaller than the value in the table, but the servo amplifier's generated heat will not change.

Table 5.1 Power supply capacity and generated heat per servo amplifier at rated output

Servo amplifier	Servo motor	(Note 1) Power supply capacity[kVA]		(Note 2) Servo amplifier-generated heat[W]		Area required for heat dissipation	
		Without power factor improvement reactor	With power factor improvement reactor	At rated torque	With servo off	[m^2]	[ft^2]
MR-J2S-60A4/B4	HC-SFS524	1.0	0.9	40	15	0.8	8.6
MR-J2S-100A4/B4	HC-SFS1024	1.7	1.5	50	15	1.0	10.8
MR-J2S-200A4/B4	HC-SFS1524	2.5	2.1	90	20	1.8	19.4
	HC-SFS2024	3.5	2.8	90	20	1.8	19.4
MR-J2S-350A4/B4	HC-SFS3524	5.5	4.5	130	20	2.7	29.1
MR-J2S-500A4/B4	HC-SFS5024	7.5	6.2	195	25	3.9	41.9
MR-J2S-700A4/B4	HC-SFS7024	10.0	8.7	300	25	6.0	64.6
	HA-LFS701M4	10.0	8.7	300	25	6.0	64.6
MR-J2S-11KA4/B4	HA-LFS11K24	16.0	13.6	530	45	11.0	118.4
	HA-LFS11K1M4	16.0	13.6	530	45	11.0	118.4
MR-J2S-15KA4/B4	HA-LFS15K24	22.0	18.6	640	45	13.0	139.0
	HA-LFS15K1M4	22.0	18.6	640	45	13.0	139.0
MR-J2S-22KA4/B4	HA-LFS22K24	33.0	27.2	850	55	17.0	183.0
	HA-LFS22K1M4	33.0	27.2	850	55	17.0	183.0

Note 1. Note that the power supply capacity will vary according to the power supply impedance.

2. Heat generated during regeneration is not included in the servo amplifier-generated heat.

5.3 Dynamic brake characteristics

Fig. 5.2 shows the pattern in which the servo motor comes to a stop when the dynamic brake is operated. Use Equation 5.1 to calculate an approximate coasting distance to a stop. The dynamic brake time constant τ varies with the servo motor and machine operation speeds. (Refer to Fig. 5.3)

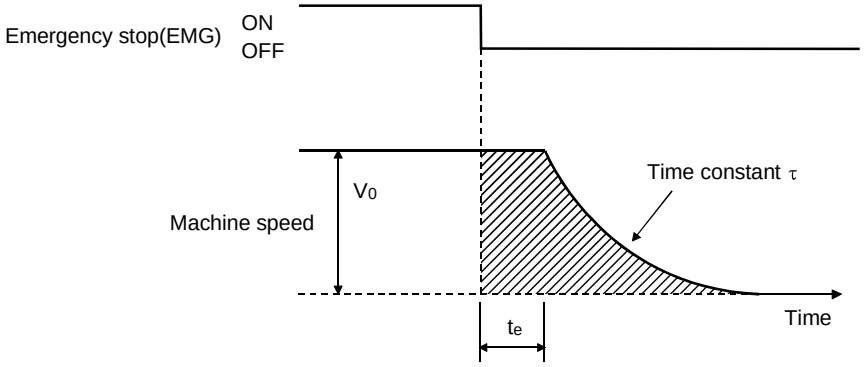
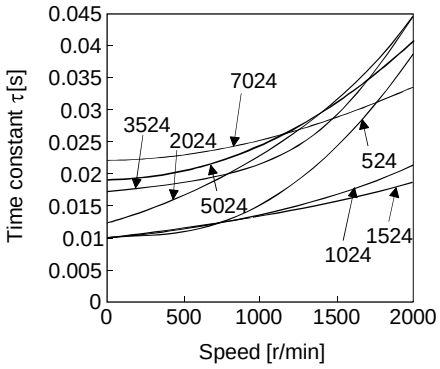


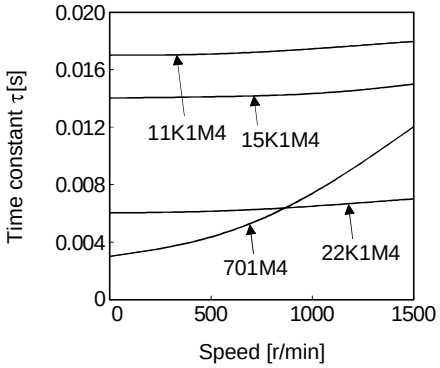
Fig. 5.2 Dynamic brake operation diagram

$$L_{max} = \frac{V_0}{60} \cdot \left\{ te + \tau \left(1 + \frac{J_L}{J_M} \right) \right\} \quad \text{..... (5.1)}$$

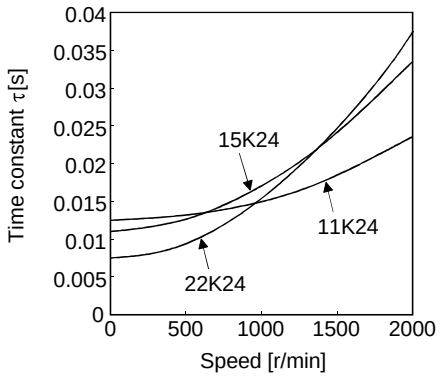
L_{max} : Maximum coasting distance .....[mm][in]
V_0 : Machine rapid feedrate ..... [mm/min][in/min]
J_M : Servo motor inertial moment.....[kg · cm²][oz · in²]
J_L : Load inertia moment converted into equivalent value on servo motor shaft.....[kg · cm²][oz · in²]
τ : Brake time constant .....[s]
te : Delay time of control section.....[s]
For 5kW or less, there is internal relay delay time of about 30ms.
With 11kW or larger capacities equipped with an external dynamic brake, the delay of the external relay and the delay of the electromagnetic contactor inside the external dynamic brake amount to about 100ms.



a.HC-SFS series



b.HA-LFS 1500r/min series



c.HC-LFS 2000r/min series

Fig. 5.3 Dynamic brake time constant

Use the dynamic brake at a load inertia moment smaller than that shown in the table below.
If the value is exceeded, the dynamic brake may burn. If there is a possibility that the load inertia moment may exceed the value, contact Mitsubishi.

Servo amplifier	Load inertia moment ratio [times]
MR-J2S-60A4/B4	30
MR-J2S-100A4/B4	
MR-J2S-200A4/B4	
MR-J2S-350A4/B4	16
MR-J2S-500A4/B4	15
MR-J2S-700A4/B4	
MR-J2S-11KA4/B4 to MR-J2S-22KA4/B4	(Note) 30

Note. The value assumes that the external dynamic brake is used.

5.4 Inrush currents at power-on of main circuit and control circuit

The following table indicates the inrush currents (reference value) that will flow when the maximum permissible voltage (528VAC) is applied at the power supply capacity of 2500kVA and the wiring length of 1m.

Servo Amplifier	Inrush Currents (A0-p)	
	Main circuit power supply (L_1, L_2, L_3)	Control circuit power supply (L_{11}, L_{21})
MR-J2S-60A4/B4	57A (Attenuated to approx. 0A in 20ms)	(Note) Depends on the connected power supply.
MR-J2S-100A4/B4		
MR-J2S-200A4/B4		
MR-J2S-350A4/B4	65A (Attenuated to approx. 0A in 20ms)	
MR-J2S-500A4/B4		
MR-J2S-700A4/B4	60A (Attenuated to approx. 20A in 20ms)	
MR-J2S-11KA4/B4	325A (Attenuated to approx. 20A in 20ms)	45A (Attenuated to approx. 0A in several ms)
MR-J2S-15KA4/B4		
MR-J2S-22KA4/B4		

Note. Control circuit power supply does not contain a inrush current restriction resistor. The value depends on the characteristics of the connected 24VDC power supply.

Since large inrush currents flow in the power supplies, always use no-fuse breakers and magnetic contactors. (Refer to Section 6.2.2.)
When circuit protectors are used, it is recommended to use the inertia delay type that will not be tripped by an inrush current.

.6. OPTIONS AND AUXILIARY EQUIPMENT

> **⚠ WARNING** ・Before connecting any option or auxiliary equipment, make sure that the charge lamp is off more than 10 minutes after power-off, then confirm the voltage with a tester or the like. Otherwise, you may get an electric shock.

> **⚠ CAUTION** ・Use the specified auxiliary equipment and options. Unspecified ones may lead to a fault or fire.

> POINT
> ・This section describes options exclusively for the 400V system. For options shared with the 200V system, refer to the technical data for each servo amplifier.

6.1 Options

6.1.1 Regenerative brake options

> **⚠ CAUTION** ・The specified combinations of regenerative brake options and servo amplifiers may only be used. Otherwise, a fire may occur.

(1) Combination and regenerative power

The power values in the table are resistor-generated powers and not rated powers.

Servo amplifier	Regenerative power[W]								
	Built-in regenerative brake resistor	MR-RB1L-4 [270Ω]	MR-RB3M-4 [120Ω]	MR-RB3H-4 [80Ω]	MR-RB5H-4 [80Ω]	MR-RB3G-4 [47Ω]	(Note) MR-RB5G-4 [47Ω]	MR-RB34-4 [26Ω]	(Note) MR-RB54-4 [26Ω]
MR-J2S-60A4/B4	30	100							
MR-J2S-100A4/B4	100		300						
MR-J2S-200A4/B4	100			300	500				
MR-J2S-350A4/B4	100					300	500		
MR-J2S-500A4/B4	130					300	500		
MR-J2S-700A4/B4	170							300	500

Note. Always install a cooling fan.

Servo amplifier	(Note) Regenerative power[W]			
	Supplied regenerative brake resistor	MR-RB6B-4 [20Ω]	MR-RB60-4 [12.5Ω]	MR-RB6K-4 [10Ω]
MR-J2S-11KA4/B4	500 (800)	500 (800)		
MR-J2S-15KA4/B4	850 (1300)		850 (1300)	
MR-J2S-22KA4/B4	850 (1300)			850 (1300)

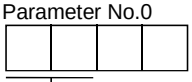
Note. Values in parentheses assume the installation of a cooling fan.

(2) Parameter setting

When the accessory regenerative resistor or regenerative brake option is used, there is no need to change parameters. However, if the accessory regenerative resistor or regenerative brake option is cooled with a fan for increased regeneration performance, parameters must be changed.

(a) MR-J2S-□A4

Parameter No.0

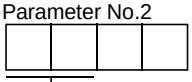


Selection of regenerative brake option

00: • The regenerative brake option is not used with a 7kW or smaller servo amplifier.
• Supplied regenerative brake resistors or regenerative brake option are used with a 11kW or larger servo amplifier.
01: FR-RC-H□, FR-BU-H□
0E: When regenerative brake resistors or regenerative brake option supplied for a 11kW or larger servo amplifier is cooled by fans to increase the capacity
80: MR-RB3H-4
81: MR-RB5H-4
82: MR-RB3G-4
83: MR-RB5G-4
84: MR-RB34-4
85: MR-RB54-4
86: MR-RB1L-4
87: MR-RB3M-4

(b) MR-J2S-□B4

Parameter No.2



Selection of regenerative

00: • The regenerative brake option is not used with a 7kW or smaller servo amplifier.
• Supplied regenerative brake resistors or regenerative brake option are used with a 11kW or larger servo amplifier.
01: FR-RC-H□, FR-BU-H□
0E: When regenerative brake resistors or regenerative brake option supplied for a 11kW or larger servo amplifier is cooled by fans to increase the capacity
80: MR-RB3H-4
81: MR-RB5H-4
82: MR-RB3G-4
83: MR-RB5G-4
84: MR-RB34-4
85: MR-RB54-4
86: MR-RB1L-4
87: MR-RB3M-4

(3) Losses of servo motor and servo amplifier in regenerative mode

The following table lists the efficiencies and other data of the servo motor and servo amplifier in the regenerative mode.

Servo amplifier	Inverse efficiency[%]	Capacitor charging[J]
MR-J2S-60A4/B4	85	11
MR-J2S-100A4/B4	80	18
MR-J2S-200A4/B4	85	40
MR-J2S-350A4/B4	85	40
MR-J2S-500A4/B4	90	45
MR-J2S-700A4/B4	90	70
MR-J2S-11KA4/B4	90	120
MR-J2S-15KA4/B4	90	170
MR-J2S-22KA4/B4	90	250

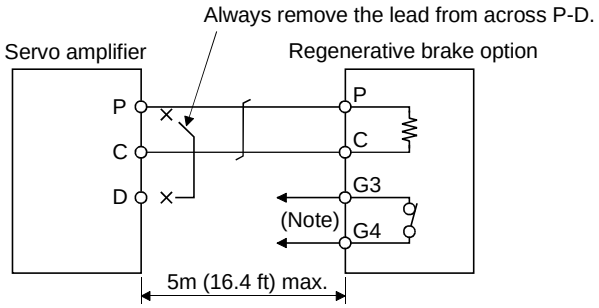
(4) Connection of the regenerative brake option

The regenerative brake option will be 100 degrees higher in temperature than the ambient temperature. Fully examine heat dissipation, installation position, used cables, etc. before installing the option. For wiring, use flame-resistant cables and keep them clear of the regenerative brake option body. Always use twisted cables of max. 5m(16.4ft) length for connection with the servo amplifier.

(a) MR-J2S-200A4/B4 or less

Always remove the wiring from across P-D and fit the regenerative brake option across P-C.

The G3 and G4 terminals act as a thermal protector. G3-G4 open when the regenerative brake option overheats abnormally.

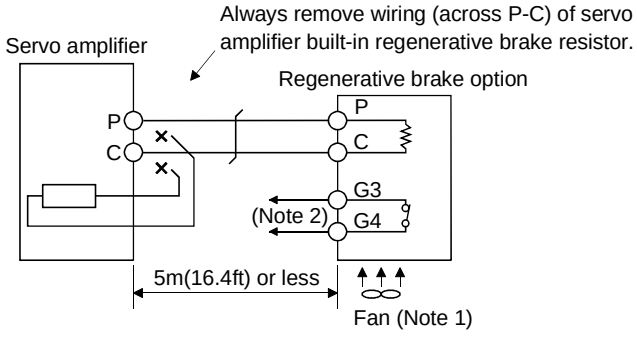


Note. Make up a sequence which will switch off the magnetic contactor (MC) when abnormal heating occurs.
G3-G4 contact specifications
Maximum voltage: 120V AC/DC
Maximum current: 0.5A/4.8VDC
Maximum capacity: 2.4VA

(b) MR-J2S-350A4/B4 to MR-J2S-700A4/B4

Always remove the wiring (across P-C) of the servo amplifier built-in regenerative brake resistor and fit the regenerative brake option across P-C.

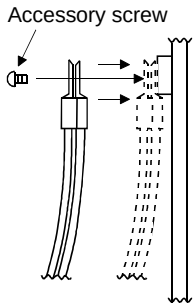
The G3 and G4 terminals act as a thermal protector. G3-G4 open when the regenerative brake option overheats abnormally.



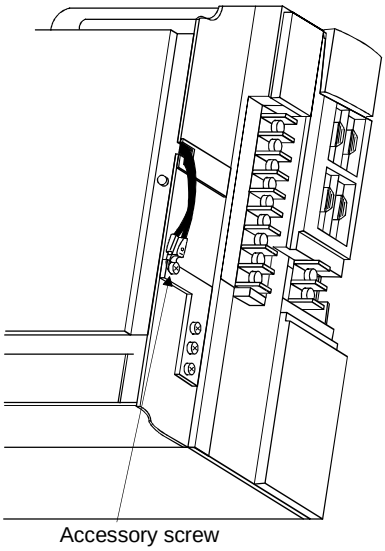
Note 1. When using the MR-RB5G-4, MR-RB54-4, forcibly cool it with a cooling fan (1.0m³/min, 92 or so).
2. Make up a sequence which will switch off the magnetic contactor (MC) when abnormal heating occurs.
G3-G4 contact specifications
Maximum voltage: 120V AC/DC
Maximum current: 0.5A/4.8VDC
Maximum capacity: 2.4VA

When using the regenerative brake resistor option, remove the servo amplifier's built-in regenerative brake resistor terminals (across P-C), fit them back to back, and secure them to the frame with the accessory screw as shown below.

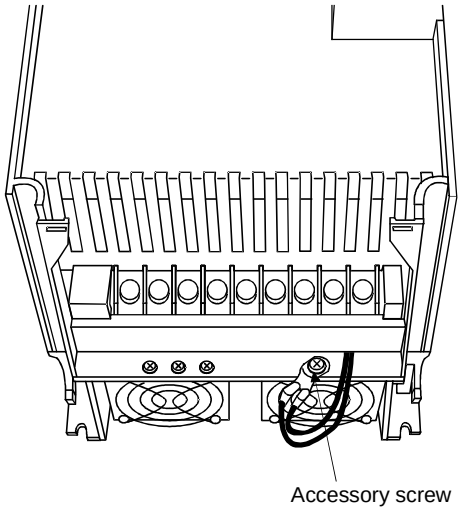
Mounting method



For MR-J2S-500A4/B4

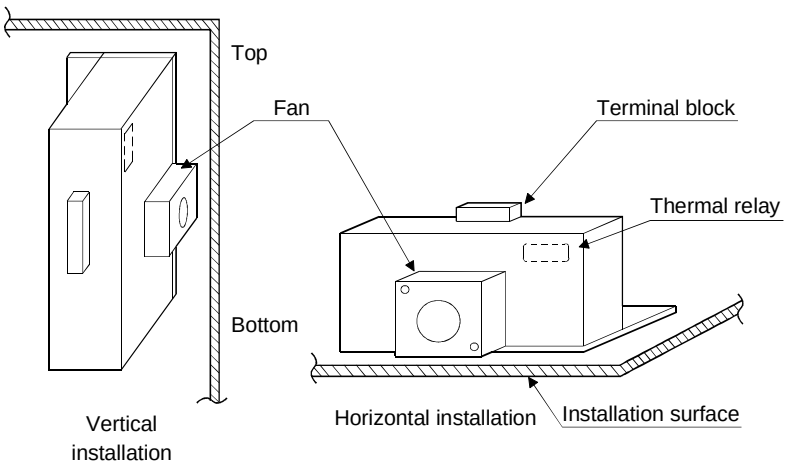


For MR-J2S-700A4/B4

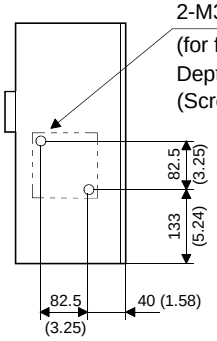


For the MR-5G-4, MR-RB54-4 install the cooling fan as shown.

[Unit : mm(in)]



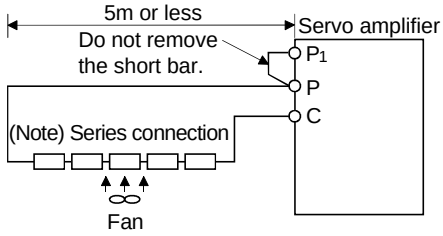
Fan installation screw hole dimensions



Recommended fan:
Toyo Denki's TL396A or equivalent

(c) MR-J2S-11KA4/B4 to MR-J2S-22KA4/B4 (With a system using accessory regenerative resistor)

To use a regenerative resistor for the servo amplifier, the specified number of resistors (4 or 5 resistors) must be connected in series. If they are connected in parallel or in less than the specified number, the servo amplifier may become faulty and/or the regenerative brake resistors burn. Install the resistors at intervals of about 70mm. Cooling the resistors with fans (1.0m^3/min, □92 (about two fans) improves the regeneration capability. In this case, set "0E □□" in parameter No. 0.



Note. The number of resistors connected in series depends on the resistor type. Install a thermal sensor or like to configure a circuit that will shut off the main circuit power at abnormal overheat.

Servo Amplifier	Regenerative Brake Resistor	Regenerative Power [W]		Resistance [Ω]	Number of Resistors
		Normal	Cooling		
MR-J2S-11KA4/B4	GRZG400-5Ω	500	800	20	4
MR-J2S-15KA4/B4	GRZG400-2.5Ω	850	1300	12.5	5
MR-J2S-22KA4/B4	GRZG400-2Ω	850	1300	10	5

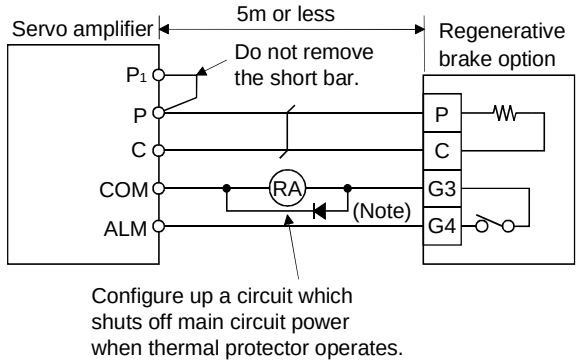
(d) MR-J2S-11KA4-PX/B4-PX to MR-J2S-22KA4-PX/B4-PX (when using the regenerative brake option)

The MR-J2S-11KA4-PX/B4-PX to MR-J2S-22KA4-PX/B4-PX servo amplifiers are not supplied with regenerative brake resistors. When using any of these servo amplifiers, always use the MR-RB6B-4, 60-4 or 6K-4 regenerative brake option.

These regenerative brake options are the ones that have encased the supplied regenerative brake resistors. When using any of these regenerative brake options, make the same parameter setting as when using the supplied regenerative brake resistor.

Cooling the regenerative brake option with fans improves regenerative capability.

The G3 and G4 terminals are for the thermal protector. When the regenerative brake option is abnormally overheated, continuity is broken across G3-G4.

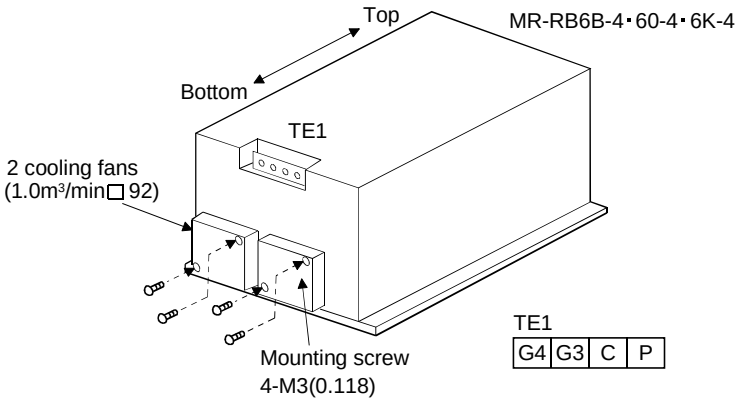


Note. Specifications of contact across G3-G4

Maximum voltage : 120V AC/DC
Maximum current : 0.5A/4.8VDC
Maximum capacity : 2.4VA

Servo Amplifier	Regenerative Brake Option Model	Resistance [Ω]	Regenerative Power [W]	
			Without Fans	With Fans
MR-J2S-11KA4-PX/B4-PX	MR-RB6B-4	20	500	800
MR-J2S-15KA4-PX/B4-PX	MR-RB60-4	12.5	850	1300
MR-J2S-22KA4-PX/B4-PX	MR-RB6K-4	10	850	1300

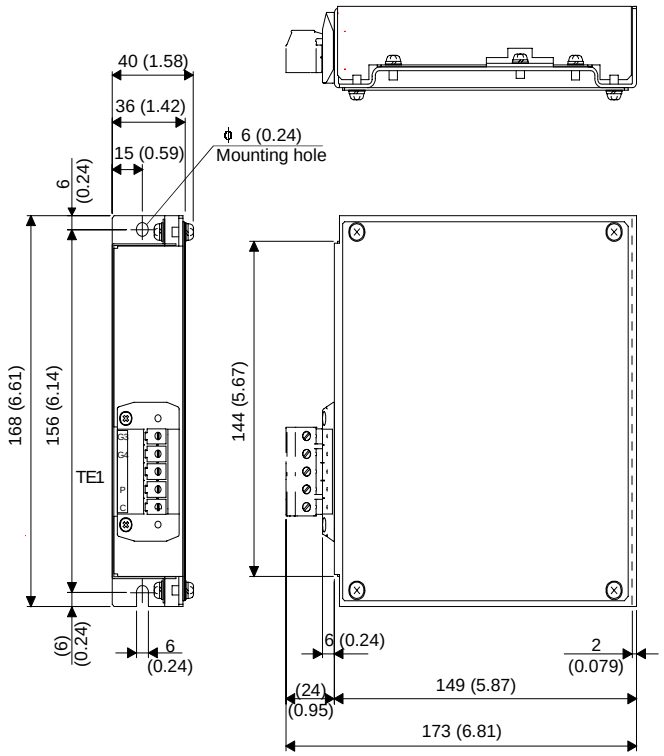
When using fans, install them using the mounting holes provided in the bottom of the regenerative brake option. Set parameter No. 0 to "0E □□" in the case of the MR-J2S-□A4, or parameter No. 2 to "□□0E" in the case of the MR-J2S-□B4.



(5) Outline drawing

(a) MR-RB1L-4

[Unit: mm(in)]



・Terminal block

G3
G4
P
C

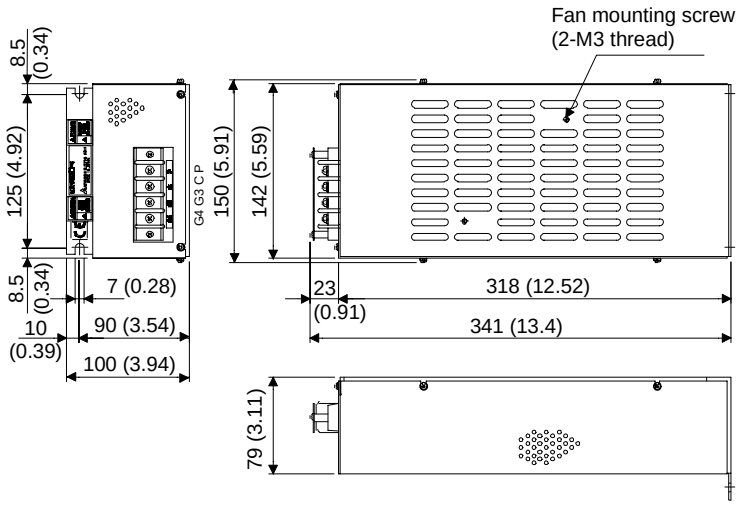
Terminal screw: M3
Tightening torque: 0.5 to 0.6 [N・m]
(4.43 to 5.31 [lb・in])

・Mounting screw
Screw: M5
Tightening torque: 3.24 [N・m] (28.68[lb・in])

Regenerative brake option	Mass	
	[kg]	[lb]
MR-RB1L-4	1.1	2.43

(b) MR-RB3M-4・MR-RB3H-4・MR-RB3G-4・MR-RB34-4

[Unit: mm(in)]



・Terminal block

P
C
G3
G4

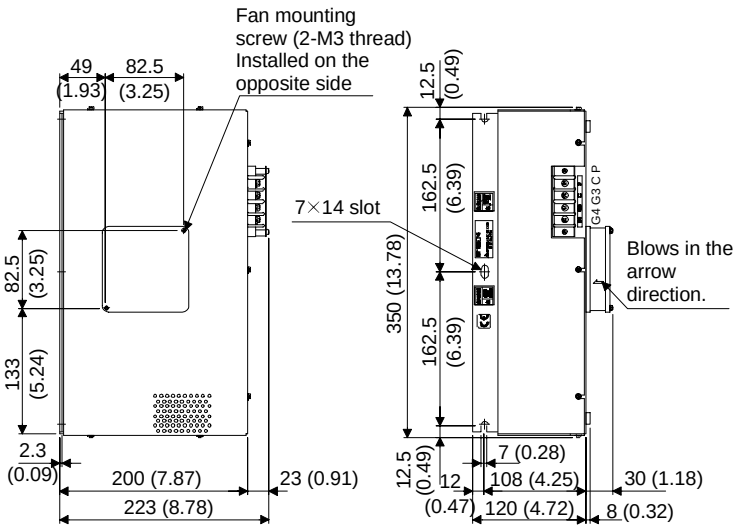
Terminal screw: M4
Tightening torque: 1.2 [N・m]
(10.6 [lb・in])

・Mounting screw
Screw: M6
Tightening torque: 5.4 [N・m] (47.8[lb・in])

Regenerative brake option	Mass	
	[kg]	[lb]
MR-RB3M-4	2.9	6.4
MR-RB3H-4		
MR-RB3G-4		
MR-RB34-4		

(c) MR-RB5H-4・MR-RB5G-4・MR-RB54-4

[Unit: mm(in)]



・Terminal block

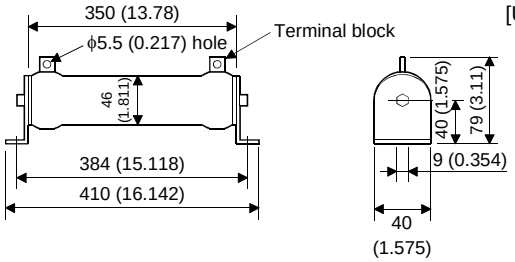
P
C
G3
G4

Terminal screw: M4
Tightening torque: 1.2 [N・m]
(10.6 [lb・in])

・Mounting screw
Screw: M6
Tightening torque: 5.4 [N・m] (47.8[lb・in])

Regenerative brake option	Mass	
	[kg]	[lb]
MR-RB5H-4	5.6	12.3
MR-RB5G-4		
MR-RB54-4		

(d) GRZG400-5Ω・GRZG400-2.5Ω・GRZG400-2Ω (standard accessories)

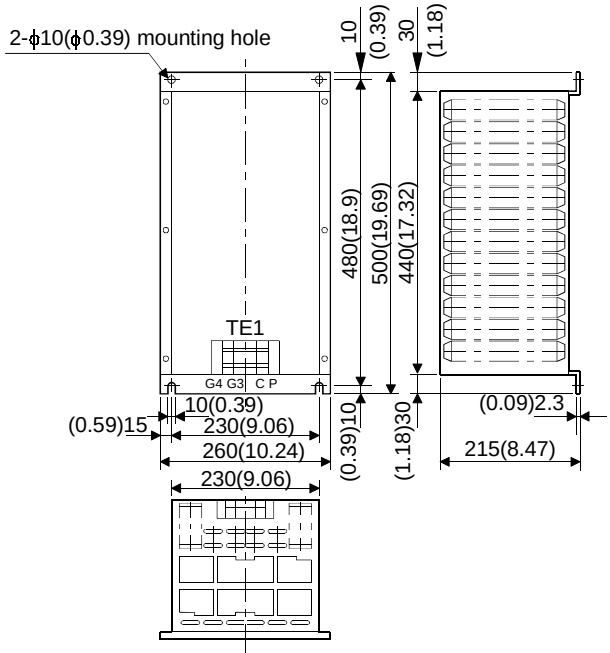


[Unit: mm (in)]

・Mounting screw
Screw: M8
Tightening torque: 13.2 [N・m](116.83 [lb・in])

(e) MR-RB6B-4・MR-RB60-4・MR-RB6K-4

[Unit: mm (in)]



・Terminal block

G4	G3	C	P

Terminal screw: M5
Tightening torque: 2.0 [N・m](17 [lb・in])

・Mounting screw
Screw: M8
Tightening torque: 13.2 [N・m](116.83 [lb・in])

Regenerative brake option	Mass	
	[kg]	[lb]
MR-RB6B-4	10	22.0
MR-RB60-4	11	24.3
MR-RB6K-4	11	24.3

6.1.2 Brake unit

POINT

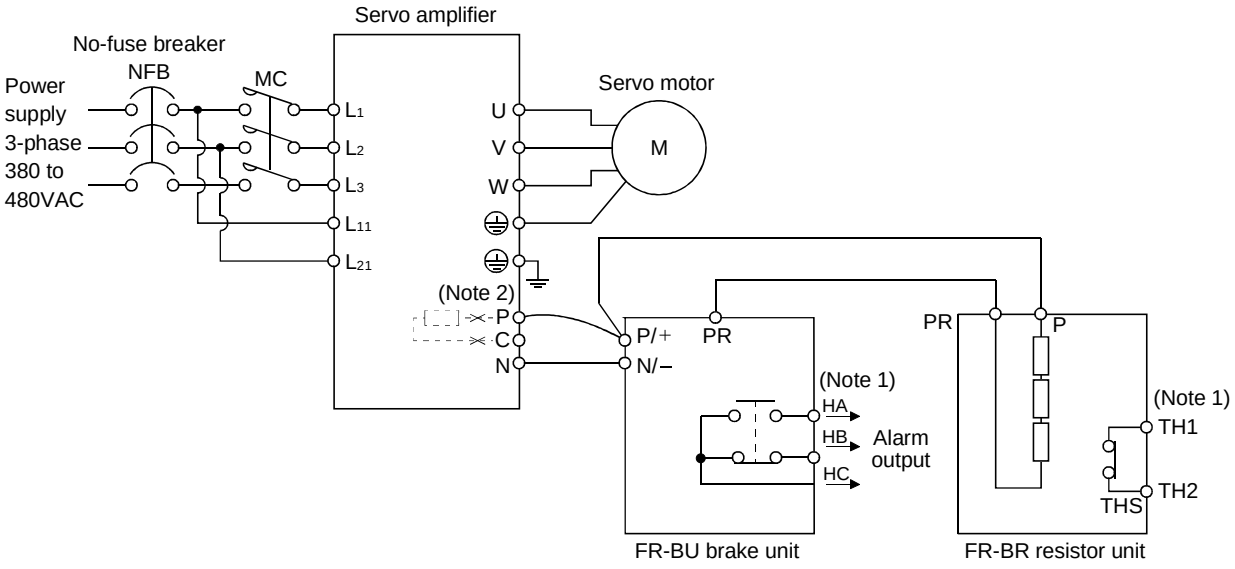
- The brake unit and resistor unit of other than 400V class are not applicable to the servo amplifier.
- The brake unit and resistor unit of the same capacity must be combined. The units of different capacities may result in damage.
- The brake unit and resistor unit must be installed on a vertical surface in the vertical direction. If they are installed in the horizontal direction or on a horizontal surface, a heat dissipation effect reduces.
- The temperature of the resistor unit casing rises to higher than 100℃. Do not cause cables and combustibles to make contact with the casing.

The brake unit is the integration of the regenerative control and resistor and is connected to the bus (across P-N) of the servo amplifier. As compared to the MR-RB regenerative brake option, the brake unit can return larger power. Hence, use the this brake unit when the MR-RB cannot provide sufficient regenerative brake capability.
Set parameter No. 0 to "01 □□" in the case of the MR-J2S-□A4, or parameter No. 2 to "□□01" in the case of the MR-J2S-□B4.

(1) Selection

Brake unit	Resistor unit	Permissible Continuous Power [kw]	Max. Instantaneous Power [kw]	Applicable Servo Amplifier
FR-BU-H15K	FR-BR-H15K	0.99	16.5	MR-J2S-500A4/B4 MR-J2S-700A4/B4
FR-BU-H30K	FR-BR-H30K	1.99	33.4	MR-J2S-11KA4/B4 MR-J2S-15KA4/B4
FR-BU-H55K	FR-BR-H55K	3.91	66.8	MR-J2S-22KA4/B4

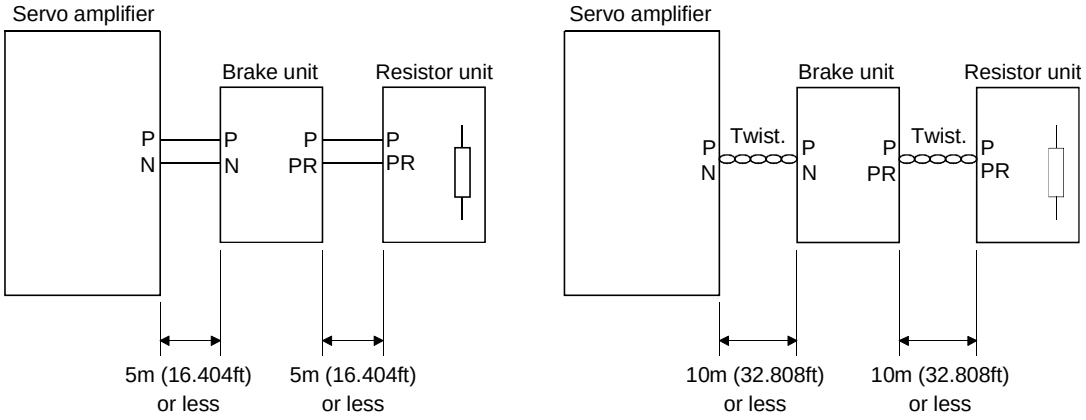
(2) Connection example



Note 1. Make up the external sequence to switch the power off when an alarm occurs or when the thermal relay is actuated.
2. For 7kW or less servo amplifier, always remove the wiring (across P-C) of built-in regenerative brake resistor.

The cables between the servo amplifier and brake unit and between the resistor unit and brake unit should be as short as possible. The cables longer than 5m(16.404ft) should be twisted. If twisted, the cables must not be longer than 10m(32.808ft).

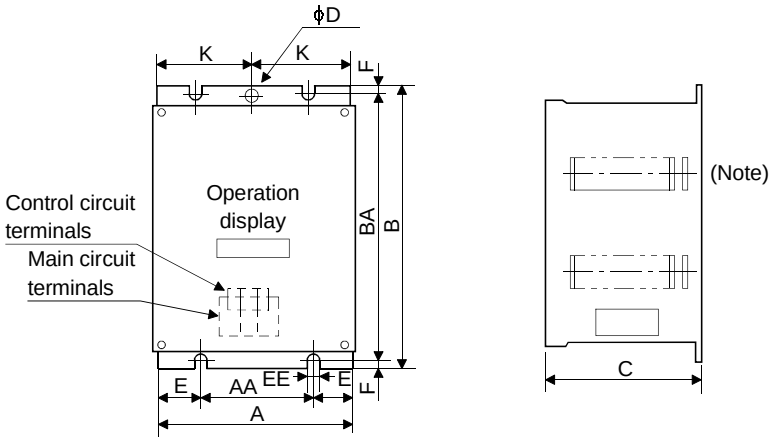
The cable size should be equal to or larger than the recommended size. See the brake unit instruction manual. You cannot connect one set of brake unit to two servo amplifiers or two sets of brake units to one servo amplifier.



(3) Outside dimensions

(a) Brake unit (FR-BU)

[Unit : mm(in)]

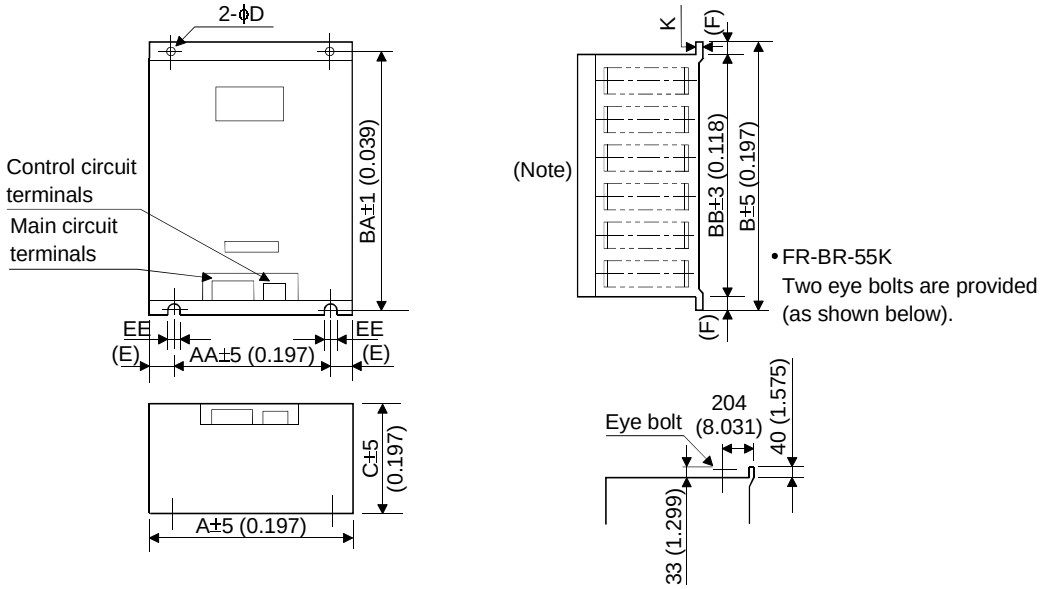


Note. Ventilation ports are provided in both side faces and top face. The bottom face is open.

Brake Unit	A	AA	B	BA	C	D	E	EE	K	F	Approx. Mass [kg(lb)]
FR-BU-H15K FR-BU-H30K	160 (6.299)	90 (3.543)	240 (9.446)	225 (10.039)	128 (5.039)	6 (0.236)	33.5 (1.319)	6 (0.236)	78.5 (3.091)	7.5 (0.295)	3.2 (7.055)
FR-BU-H55K	265 (10.433)	145 (5.71)	240 (9.45)	225 (8.86)	128 (5.04)		58.6 (2.31)	6 (0.236)		7.5 (0.295)	5.8 (12.787)

(b) Resistor unit (FR-BR)

[Unit : mm(in)]



Note. Ventilation ports are provided in both side faces and top face. The bottom face is open.

Resistor Unit Model	A	AA	B	BA	BB	C	D	E	EE	K	F	Approx. Mass [kg(lb)]
FR-BR-H15K	170 (6.693)	100 (3.937)	450 (17.717)	432 (17.008)	410 (16.142)	220 (8.661)	6 (0.236)	35 (1.378)	6 (0.236)	1.6 (0.063)	20 (0.787)	15 (66.139)
FR-BR-H30K	340 (11.389)	270 (10.63)	600 (23.622)	582 (22.913)	560 (22.047)	220 (8.661)	10 (0.394)	35 (1.378)	10 (0.394)	2 (0.079)	20 (0.787)	30 (33.069)
FR-BR-H55K	480 (18.898)	410 (16.142)	700 (27.559)	670 (26.378)	620 (24.409)	450 (17.717)	12 (0.472)	35 (1.378)	12 (0472)	3.2 (0.126)	40 (1.575)	70 (154.323)

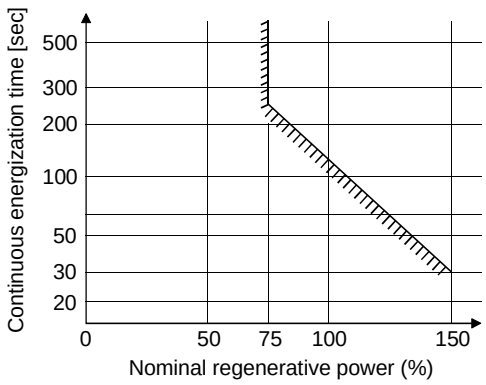
6.1.3 Power regeneration converter

Set parameter No. 0 to "0E ☐☐" in the case of the MR-J2S-☐A4, or parameter No. 2 to "☐☐ 0E" in the case of the MR-J2S-☐B4.

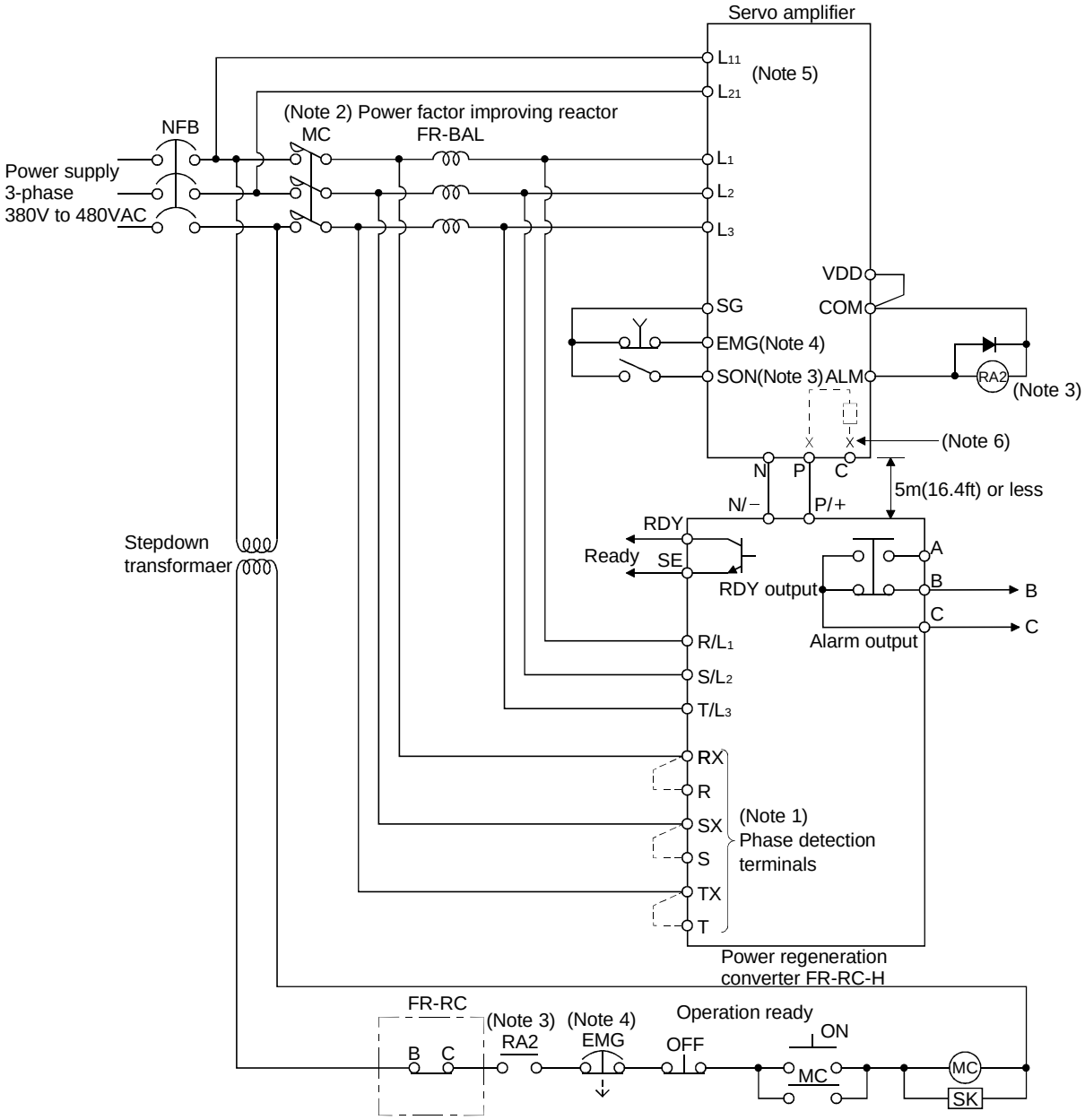
(1) Selection

The converters can continuously return 75% of the nominal regenerative power.

Power regeneration converter	Nominal Regenerative Power (kW)	Servo Amplifier
FR-RC-H15K	15	MR-J2S-500A4/B4 MR-J2S-700A4/B4
FR-RC-H30K	30	MR-J2S-11KA4/B4 MR-J2S-15KA4/B4
FR-RC-H55K	55	MR-J2S-22KA4/B4



(2) Connection example

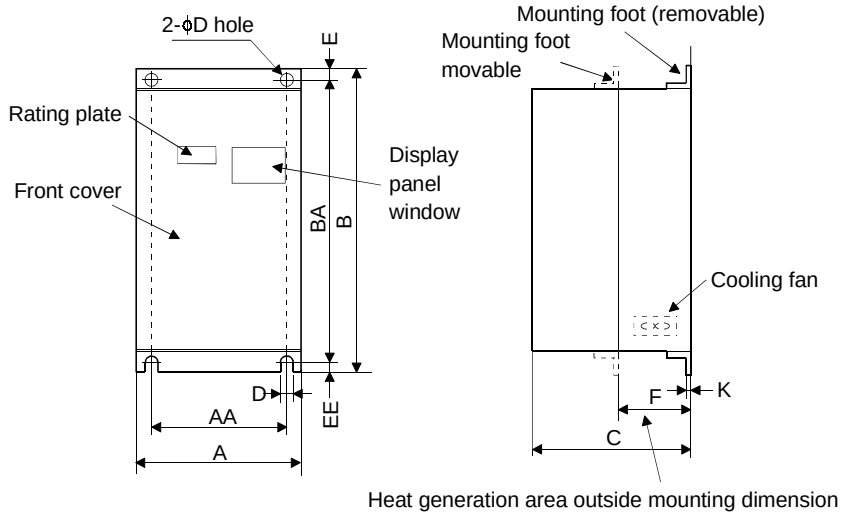


Note 1. To disconnect the phase detection terminals, install short bars across RX and R, across SX and S, and across TX and T. FR-RC does not operate without these short bars.

2. For the power factor improving reactor (FR-BAL) to be used, refer to the Power Regeneration Converter FR-RC Instruction Manual (IB(NA)66330). In this case, do not use the power factor improving DC reactor (FR-BEL) with the FR-BAL.
3. Not provided for MR-J2S-☐B4
4. EM1 with MR-J2S-☐B4
5. For the 7kW or less servo amplifier, the control circuit power supply is 24VDC.
6. For 7kW or less servo amplifier, always remove the wiring (across P-C) of built-in regenerative brake resistor.

(3) Outside dimensions of the power regeneration converters

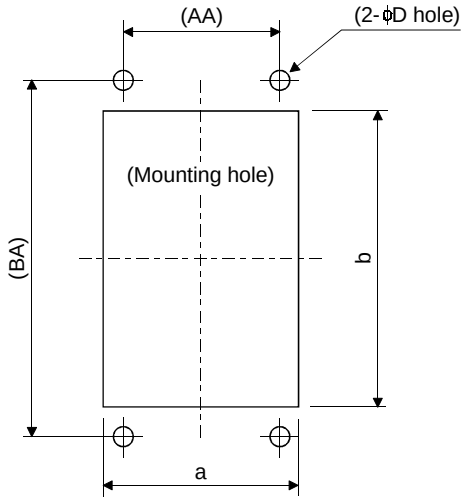
[Unit : mm(in)]



Power regeneration converter	A	AA	B	BA	C	D	E	EE	K	F	Approx. Mass [kg(lb)]
FR-RC-H15K	340 (13.386)	270 (10.630)	600 (23.622)	582 (22.913)	195 (7.677)	10 (0.394)	10 (0.394)	8 (0.315)	3.2 (0.126)	90 (3.543)	31 (68.343)
FR-RC-H30K											33 (72.75)
FR-RC-H55K	480 (18.898)	410 (16.142)	700 (27.559)	670 (26.378)	250 (9.843)	12 (0.472)	15 (0.591)	15 (0.591)	3.2 (0.126)	135 (5.315)	56 (123.459)

(4) Mounting hole machining dimensions

When the power regeneration converter is fitted to a totally enclosed type box, mount the heat generating area of the converter outside the box to provide heat generation measures. At this time, the mounting hole having the following dimensions is machined in the box.



[Unit : mm(in)]

Model	A	B	D	AA	BA
FR-RC-H15K	330 (12.992)	562 (22.126)	10 (0.394)	270 (10.630)	582 (22.913)
FR-RC-H30K					
FR-RC-H55K	470 (18.504)	642 (25.276)	12 (0.472)	410 (16.142)	670 (26.378)

6.1.4 External dynamic brake

POINT

- Configure up a sequence which switches off the contact of the brake unit after (or as soon as) it has turned off the servo on (son) at a power failure or failure.
- For the braking time taken when the dynamic brake is operated, refer to Section 5.3.
- The brake unit is rated for a short duration. Do not use it for high duty.

The dynamic brake is designed to bring the servo motor to a sudden stop when a power failure occurs or the protective circuit is activated.

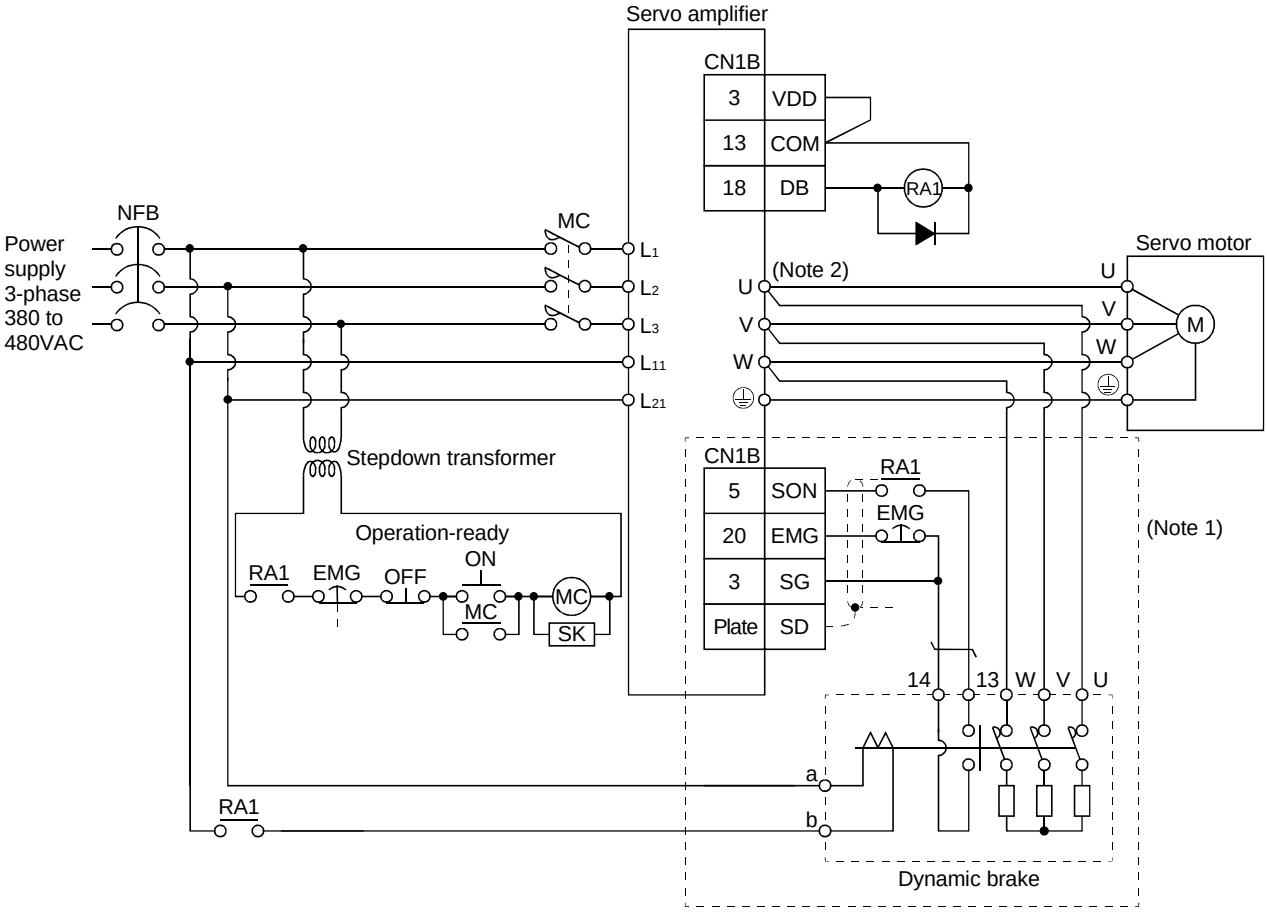
(1) Selection of dynamic brake

Servo amplifier	Dynamic brake
MR-J2S-11KA4/B4	DBU-11K-4
MR-J2S-15KA4/B4	DBU-22K-4
MR-J2S-22KA4/B4	

(2) Parameter setting

Set parameter No. 0 to "0E □□ " in the case of the MR-J2S- □ A4, or parameter No. 2 to " □□ 0E" in the case of the MR-J2S- □ B4.

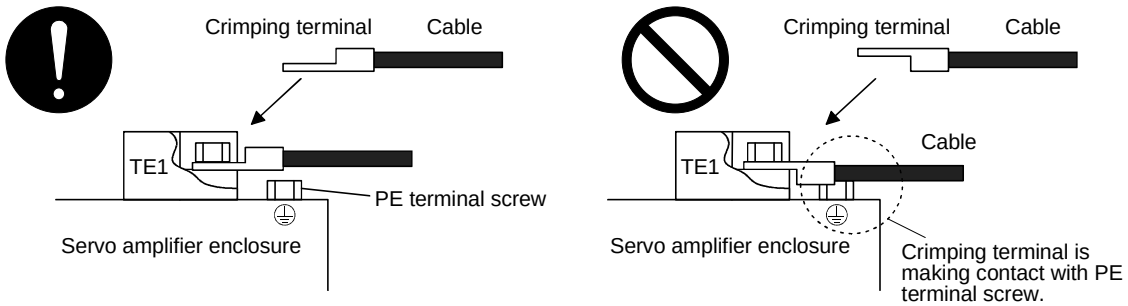
(3) Connection example



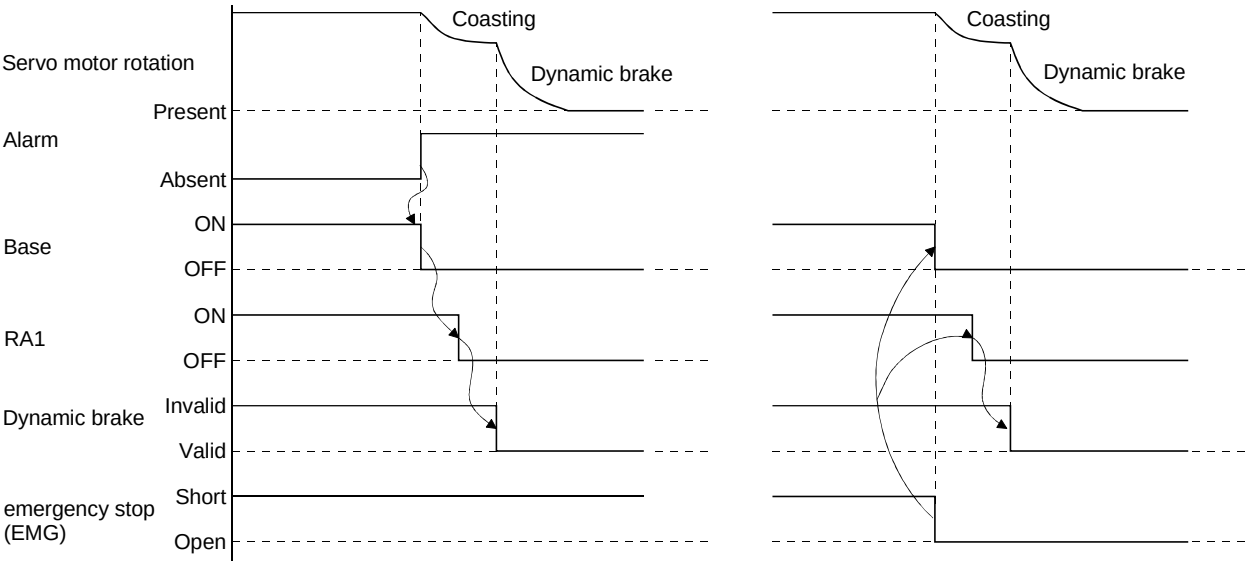
Note 1. The dashed line indicates portions for MR-J2S- A4. For connection of MR-J2S- B4, see the MR-J2S- B servo amplifier Instruction Manual (SH(NA)030007).

Dynamic Brake	Wire[mm^2]	
	a・b	U・V・W
DBU-11K-4	2	5.5
DBU-22K-4	2	5.5

2. When the dynamic brake cable is wired to TE1 in the MR-J2S-22KA4/B4, the crimping terminal may make contact with the PE terminal screw depending on the orientation of the crimping terminal. Wire the cable, paying attention to the orientation of the crimping terminal.



(4) Timing chart



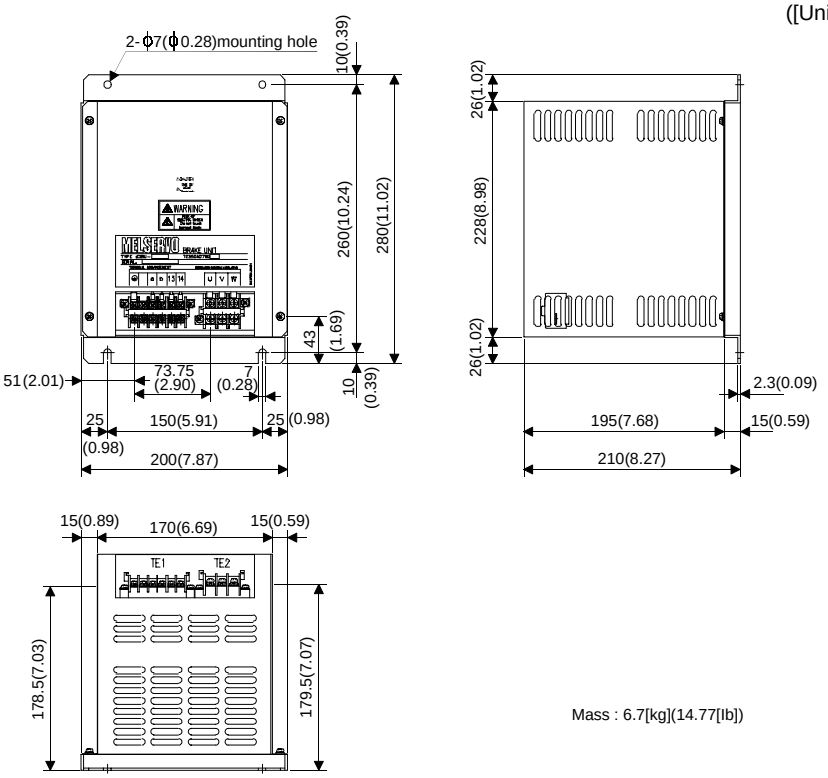
a. Timing chart at alarm occurrence

b. Timing chart at emergency stop (EMG) validity

(5) Outline dimension drawing

DBU-11K-4 · DBU-22K-4

[Unit: mm]
([Unit: in])



Mass : 6.7[kg](14.77[lb])

Terminal block

TE1

⏚		a	b	13	14

Screw : M3.5

Tightening torque : 0.8[N·m](7[lb·in])

TE2

U	V	W

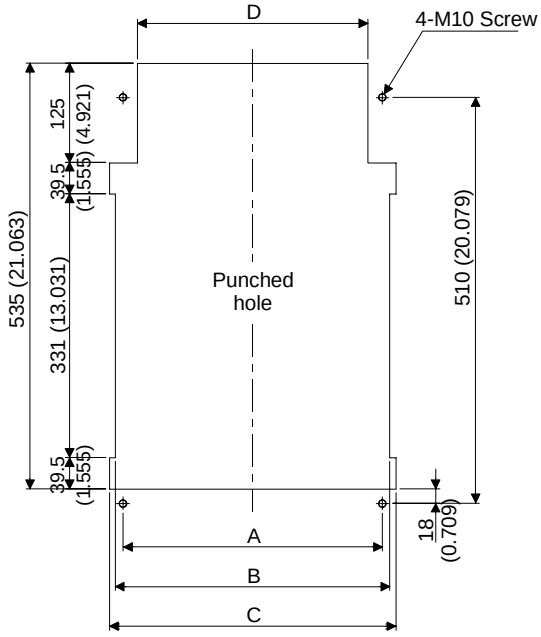
Screw : M4

Tightening torque : 1.2[N·m](11[lb·in])

6.1.5 Heat sink outside mounting attachment (MR-JACN)

Use the heat sink outside mounting attachment to mount the heat generation area of the servo amplifier in the outside of the control box to dissipate servo amplifier-generated heat to the outside of the box and reduce the amount of heat generated in the box, thereby allowing a compact control box to be designed.
In the control box, machine a hole having the panel cut dimensions, fit the heat sink outside mounting attachment to the servo amplifier with the fitting screws (4 screws supplied), and install the servo amplifier to the control box.
The environment outside the control box when using the heat sink outside mounting attachment should be within the range of the servo amplifier operating environment conditions.

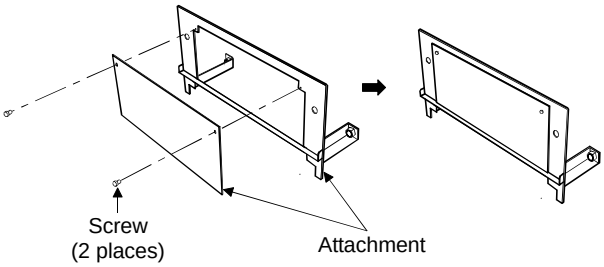
(1) Panel cut dimensions



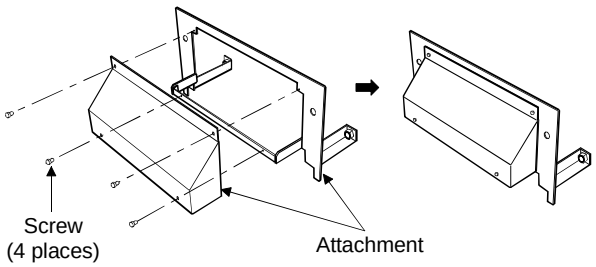
[Unit: mm(in)]

Changeable dimension / Model	A	B	C	D	Servo amplifier
MR-JACN15K	236 (9.291)	255 (10.039)	270 (10.63)	203 (7.992)	MR-J2S-11K □ MR-J2S-15K □
MR-JACN22K	326 (12.835)	345 (13.583)	360 (14.173)	290 (11.417)	MR-J2S-22K □

(2) How to assemble the attachment for a heat sink outside mounting attachment

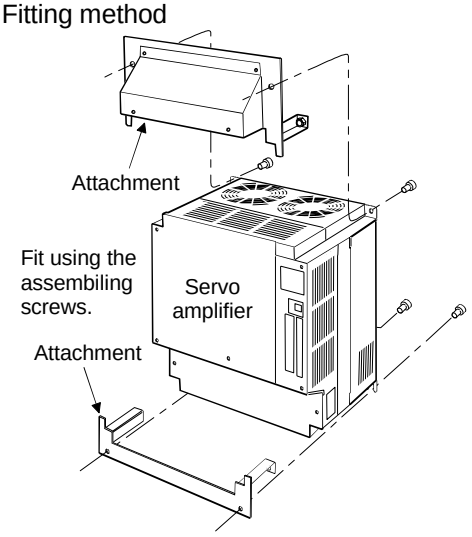


MR-JACN15K

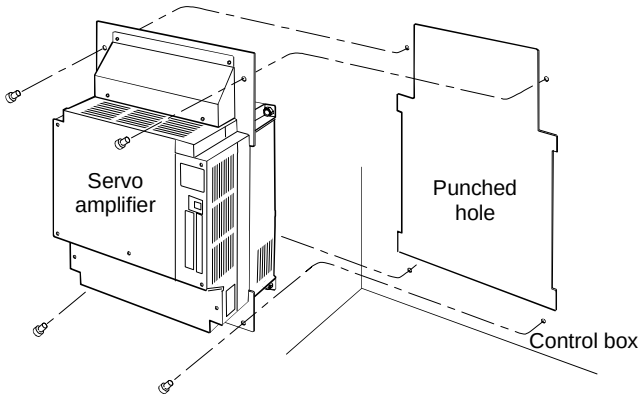


MR-JACN22K

(3) Fitting method



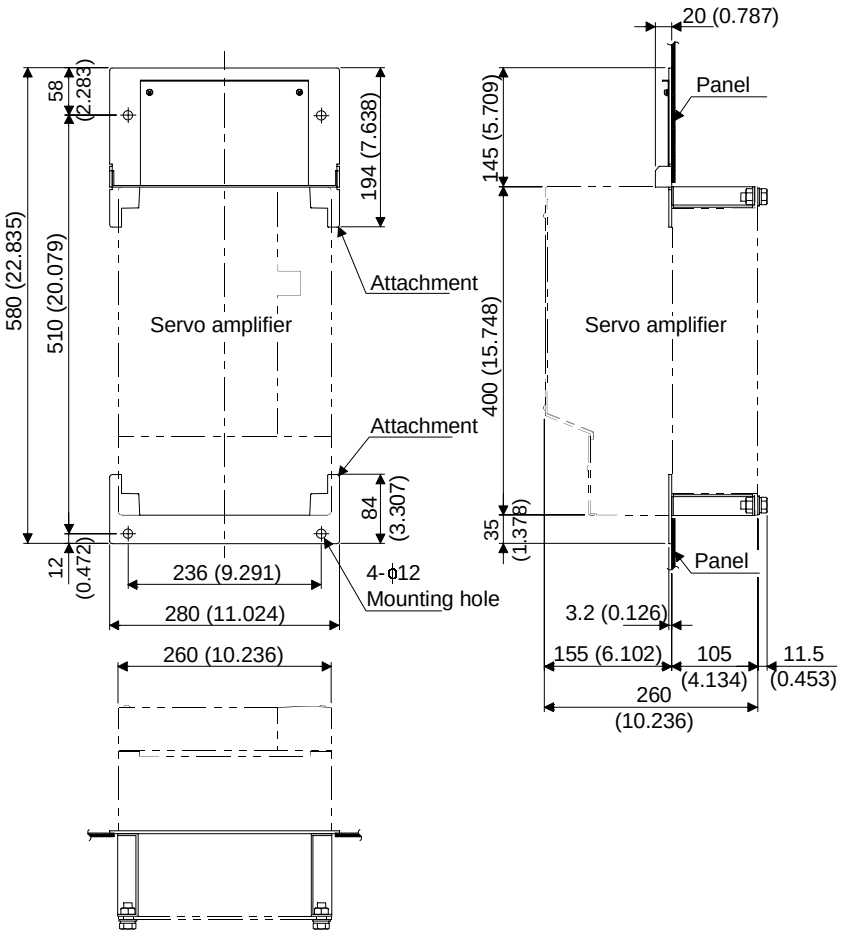
a. Assembling the heat sink outside mounting attachment



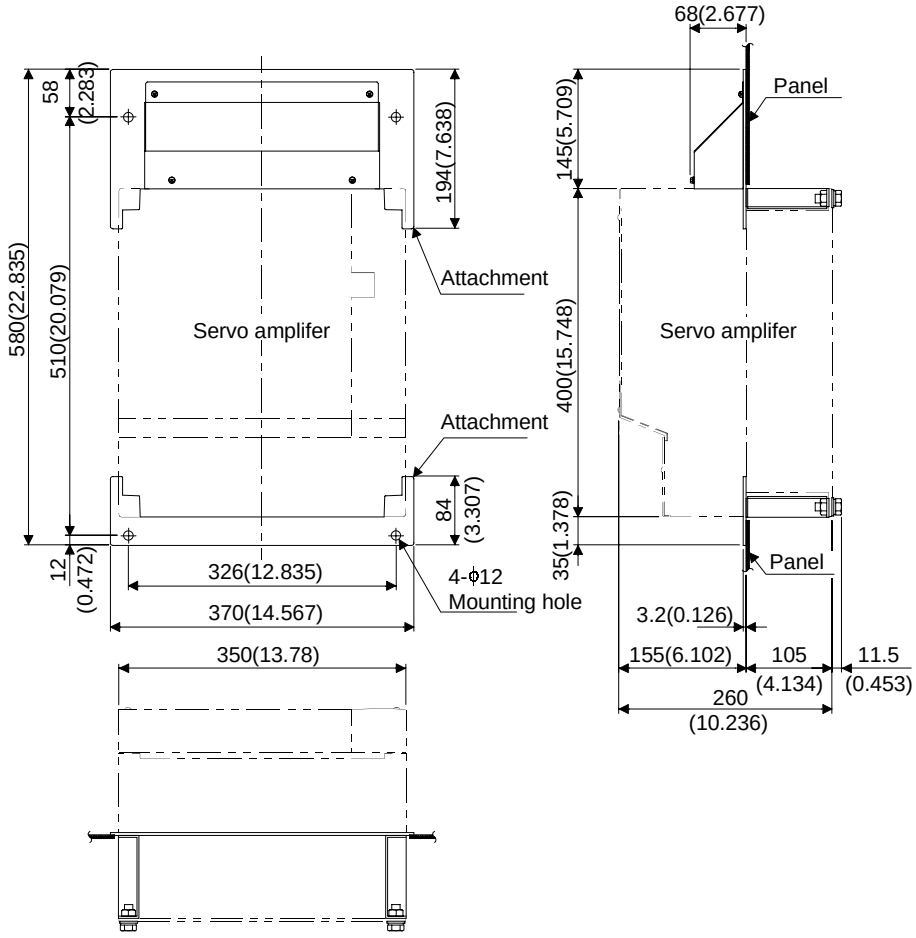
b. Installation to the control box

(4) Outline dimension drawing

(a) MR-JACN15K (MR-J2S-11K □, MR-J2S-15K □)



(b) MR-JACN22K (MR-J2S-22K □)



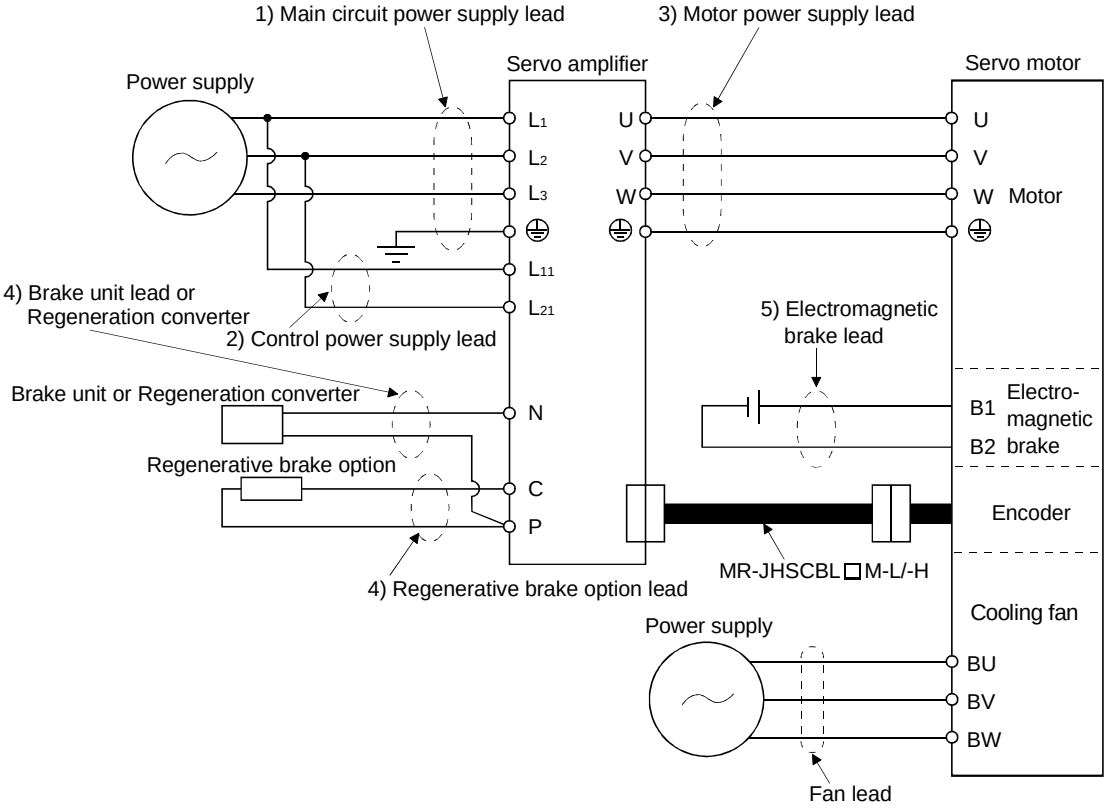
6.2 Auxiliary equipment

Always use the devices indicated in this section or equivalent. To comply with the EN Standard or UL/C-UL (CSA) Standard, use the products which conform to the corresponding standard.

6.2.1 Recommended wires

(1) Wires for power supply wiring

The following diagram shows the wires used for wiring. Use the wires given in this section or equivalent.



The following table 6.1 • 6.2 lists wire sizes. The wires used assume that they are 600V vinyl wires and the wiring distance is 30m(98.4ft) max. If the wiring distance is over 30m(98.4ft), choose the wire size in consideration of voltage drop.

The alphabets (a, b, c) in the table correspond to the crimping terminals (Table 6.2) used to wire the servo amplifier.

To comply with the UL/C-UL (CSA) Standard, use UL-recognized copper wires rated at 60℃ (140℉) or more for wiring.

Table 6.1 Recommended wires (Without power factor improvement reactor)

Servo amplifier	(Note 1) Wires [mm^2]					
	1) L_1・L_2・L_3・⏚	2) L_{11}・L_{21}	(Note 2) 3) U・V・W・P_1・P・⏚	4) P・C・N	5) B1・B2	6) BU・BV・BW
MR-J2S-60A4/B4	2 (AWG14) :a	1.25 (AWG16)	1.25 (AWG16) :a	2(AWG14) :a	1.25(AWG16)	
MR-J2S-100A4/B4						
MR-J2S-200A4/B4			2 (AWG14) :a			
MR-J2S-350A4/B4	3.5 (AWG12) :b		3.5 (AWG12) :b			
MR-J2S-500A4/B4	5.5 (AWG10) :b		5.5 (AWG10) :b			
MR-J2S-700A4/B4						
MR-J2S-11KA4/B4	8 (AWG8) :c		8 (AWG8) :c	3.5 (AWG12) :b	2 (AWG14)	2 (AWG14)
MR-J2S-15KA4/B4	14 (AWG6) :d		22 (AWG4) :e	5.5 (AWG10) :b		
MR-J2S-22KA4/B4						

Note 1. For the crimping terminals and applicable tools, refer to table 6.3

2. "P1" is not provided for 7kW or less.

Use wires 4) of the following sizes with the brake unit (FR-BU) and power regeneration converter (FR-RC).

Model	Wires[mm^2]
FR-BU-H15K	3.5(AWG12)
FR-BU-H30K	
FR-BU-H55K	8(AWG8)

Table 6.2 Recommended crimping terminals

Symbol	Servo amplifier side crimping terminals		
	Crimping terminal	Applicable tool	Maker name
a	32959	47387	AMP
b	32968	59239	
c	FVD8-5	Body YF-1・E-4 Head YNE-38 Dice DH-111・DH-121	Japan Solderless Terminal
d	FVD14-6	Body YF-1・E-4 Head YNE-38 Dice DH-112・DH-122	
e	FVD22-6	Body YF-1・E-4 Head YNE-38 Dice DH-113・DH-123	

6.2.2 No-fuse breakers, magnetic contactors

Always use one no-fuse breaker and one magnetic contactor with one servo amplifier.

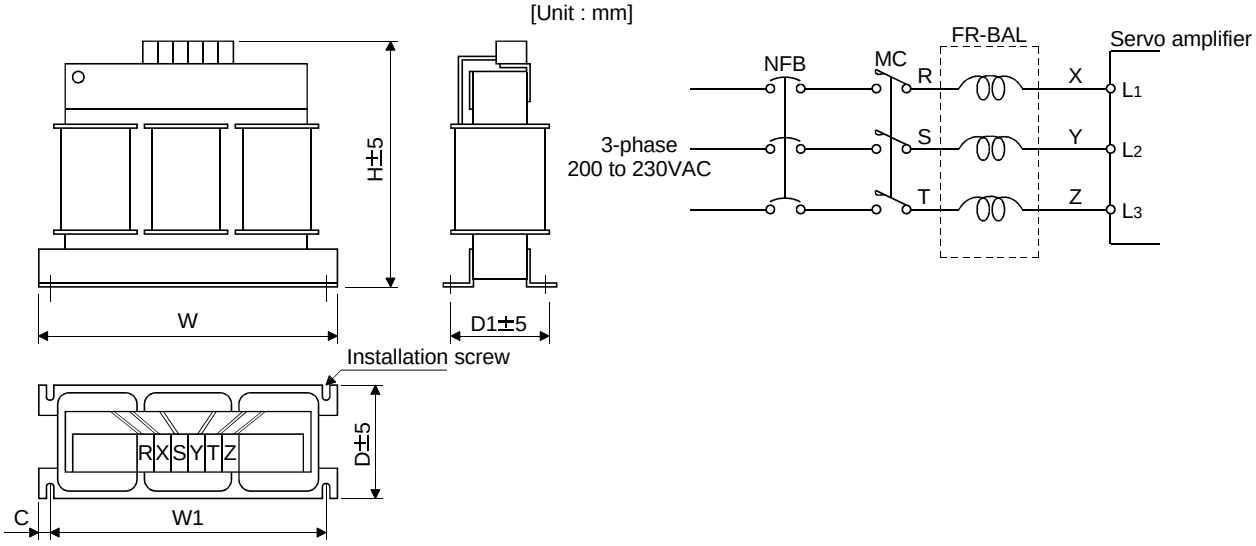
Servo amplifier	No-fuse breaker		Magnetic contactor
	Without power factor improvement reactor	With power factor improvement reactor	
MR-J2S-60A4/B4	30A frame 5A	30A frame 5A	S-N10
MR-J2S-100A4/B4	30A frame 10A	30A frame 10A	S-N10
MR-J2S-200A4/B4	30A frame 15A	30A frame 15A	S-N10
MR-J2S-350A4/B4	30A frame 20A	30A frame 20A	S-N18
MR-J2S-500A4/B4	30A frame 30A	30A frame 30A	S-N18
MR-J2S-700A4/B4	50A frame 40A	50A frame 30A	S-N20
(Note) MR-J2S-11KA4/B4	60A frame 30A	50A frame 50A	S-N25
(Note) MR-J2S-15KA4/B4	100A frame 75A	60A frame 60A	S-N35
(Note) MR-J2S-22KA4/B4	225A frame 125A	100A frame 100A	S-N65

Note. Use the power factor improvement DC reactor.

6.2.3 Power factor improving reactors

The input power factor is improved to be about 90%.

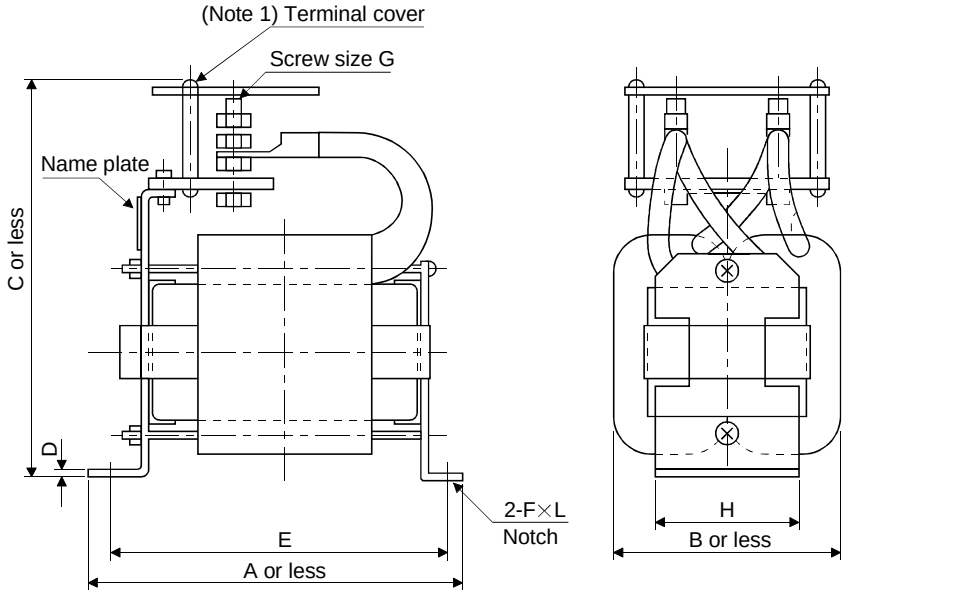
[Unit : mm]

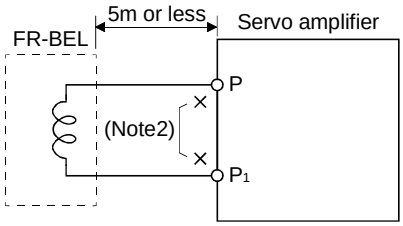


Servo amplifier	Model	Dimensions [mm (in)]						Mounting screw size	Terminal screw size	Mass [kg (lb)]
		W	W1	H	D	D1	C			
MR-J2S-60A4/B4	FR-BAL-H1.5K	160 (6.3)	145 (5.71)	140 (5.51)	87 (3.43)	70 (2.76)	7.5 (0.3)	M4	M3.5	5.3 (11.68)
MR-J2S-100A4/B4	FR-BAL-H2.2K	160 (6.3)	145 (5.71)	140 (5.51)	91 (3.58)	75 (2.95)	7.5 (0.3)	M4	M3.5	5.9 (13.01)
MR-J2S-200A4/B4	FR-BAL-H3.7K	220 (8.60)	200 (7.87)	190 (7.48)	90 (3.54)	70 (2.76)	10 (0.39)	M5	M3.5	8.5 (18.74)
MR-J2S-350A4/B4	FR-BAL-H7.5K	220 (8.66)	200 (7.87)	192 (7.56)	120 (4.72)	100 (3.94)	10 (0.39)	M5	M4	14 (30.87)
MR-J2S-500A4/B4	FR-BAL-H11K	280 (11.02)	255 (10.04)	226 (8.89)	130 (5.12)	100 (3.94)	12.5 (0.49)	M6	M5	18.5 (40.79)
MR-J2S-700A4/B4	FR-BAL-H15K	295 (11.61)	270 (10.62)	244 (9.61)	130 (5.12)	110 (4.33)	12.5 (0.49)	M6	M5	27 (59.5)
MR-J2S-11KA4/B4	FR-BAL-H15K	295 (11.61)	270 (10.62)	244 (9.61)	130 (5.12)	110 (4.33)	12.5 (0.49)	M6	M5	27 (59.5)
MR-J2S-15KA4/B4	FR-BAL-H22K	290 (11.41)	240 (9.75)	269 (10.59)	199 (7.84)	170 (6.69)	25 (0.98)	M8	M8	Approx. 35 (Approx. 77.16)
MR-J2S-22KA4/B4	FR-BAL-H30K	290 (11.41)	240 (9.75)	290 (11.42)	219 (8.62)	190 (7.48)	25 (0.98)	M8	M8	Approx. 43 (Approx. 94.79)

6.2.4 Power factor improving DC reactors

The input power factor is improved to be about 95%.





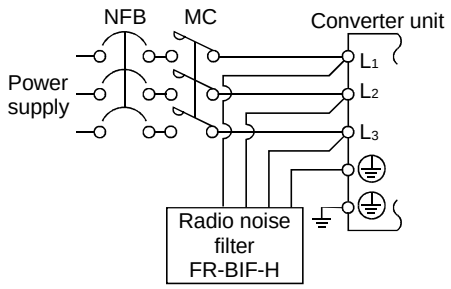
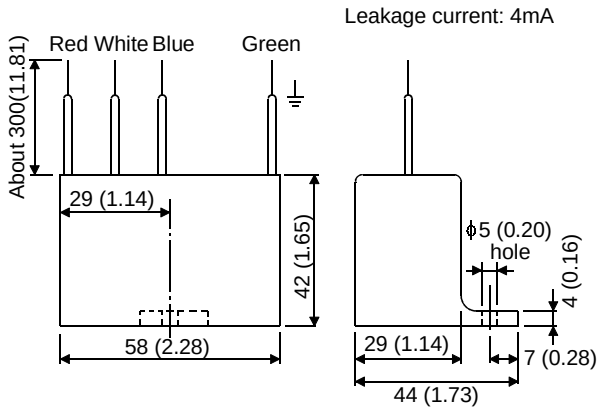
Note1. Fit the supplied terminal cover after wiring.

2. When using the DC reactor, remove the short-circuit bar across P-P1.

Servo amplifier	Power factor improving DC reactors	Dimensions [mm (in)]									Terminal screw size	Mass [kg (lb)]	Used wire [mm^2]
		A	B	C	D	E	F	L	G	H			
MR-J2S-11KA	FR-BEL-H15K	170 (6.69)	93 (3.66)	160 (6.29)	2.3 (0.09)	155 (6.10)	6 (0.24)	14 (0.55)	6 (0.24)	56 (2.21)	M5	3.7 (8.16)	8(AWG8)
MR-J2S-15KA	FR-BEL-H22K	185 (7.28)	119 (4.69)	171 (6.73)	2.6 (0.10)	165 (6.49)	7 (0.28)	15 (0.59)	6 (0.24)	70 (2.76)	M6	5.0 (11.02)	22(AWG4)
MR-J2S-22KA	FR-BEL-H30K	185 (7.28)	119 (4.69)	189 (7.44)	2.6 (0.10)	165 (6.49)	7 (0.28)	15 (0.59)	6 (0.24)	70 (2.76)	M6	6.7 (14.77)	

6.2.5 Radio noise filter

This filter is effective in suppressing noises radiated from the power supply side of the servo amplifier especially in 10MHz and lower radio frequency bands. The FR-BIF-H is designed for the input only.

Connection diagram	Outline drawing (Unit: mm) ([Unit: in.])
	

6.2.6 Leakage current breaker

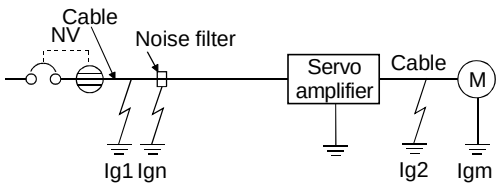
(1) Selection method

High-frequency chopper currents controlled by pulse width modulation flow in the AC servo circuits. Leakage currents containing harmonic contents are larger than those of the motor which is run with a commercial power supply.

Select a leakage current breaker according to the following formula, and ground the servo amplifier, servo motor, etc. securely.

Make the input and output cables as short as possible, and also make the grounding cable as long as possible (about 30cm (11.8 in)) to minimize leakage currents.

$$\text{Rated sensitivity current} \geq 10 \cdot \{Ig1+Ign+Iga+K \cdot (Ig2+Igm)\}\ [mA] \quad \ldots\ldots (6.1)$$



K: Constant considering the harmonic contents

Leakage current breaker		K
Type	Mitsubishi products	
Models provided with harmonic and surge reduction techniques	NV-SP NV-SW NV-CP NV-CW NV-HW	1
General models	BV-C1 NFB NV-L	3

Ig1: Leakage current on the electric channel from the leakage current breaker to the input terminals of the servo amplifier (Found from Fig. 6.1.)

Ig2: Leakage current on the electric channel from the output terminals of the servo amplifier to the servo motor (Found from Fig. 6.1.)

Ign: Leakage current when a filter is connected to the input side (4.4mA per one FR-BIF or FR-BIF-H)

Igm: Leakage current of the servo motor (Found from Table 6.3.)

Table 6.3 Servo Motor's Leakage Current Example (lgm)

Servo Motor Output [kW]	Leakage Current[mA]
0.6	2.5
1	
2	
3.5	1.3
5	
7	5
11	1.7
15	
22	

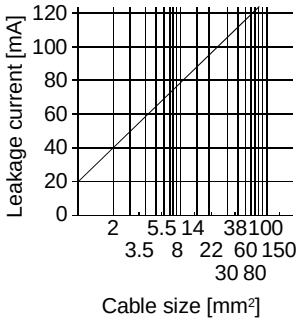


Fig.6.1 Leakage Current Example (lg1, lg2) for CV Cable Run in Metal Conduit

6.2.7 Circuit protector

Use the circuit protector with the control circuit power supply (24V-L_{11}, 0V-L_{21}) of the MR-J2S-700A4/B4 or less.

Servo amplifier	Circuit protector
MR-J2S-60A4/B4	CP30-BA2P1M3A
MR-J2S-100A4/B4	
MR-J2S-200A4/B4	
MR-J2S-350A4/B4	
MR-J2S-500A4/B4	
MR-J2S-700A4/B4	

6.2.8 EMC filter

For compliance with the EMC directive of the EN Standard, it is recommended to use the following filter: Some EMC filters are large in leakage current.

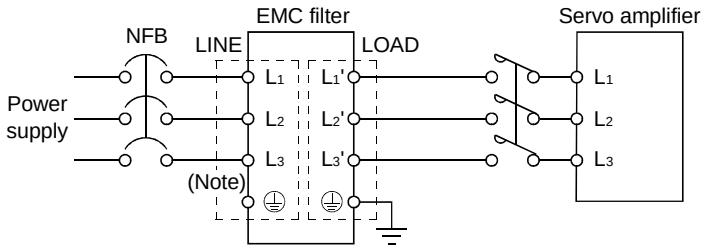
(1) Combination with the servo amplifier

Servo amplifier	Recommended filter		Mass [kg]([lb])
	(Note 1) Model	(Note 2) Leakage current [mA]	
MR-J2S-350A4/B4 to MR-J2S-700A4/B4	TF3020C-TX	5.5	6(13.23)
MR-J2S-11KA4/B4	TF3030C-TX		7.5(16.54)
MR-J2S-15KA4/B4	TF3040C-TX		12.5(27.56)
MR-J2S-22KA4/B4	TF3060C-TX		

Note 1. Soshin Electric

2. This leakage current value is 350mA when one phase becomes open in a three-phase neutral point (N) grounded power supply.

(2) Connection example

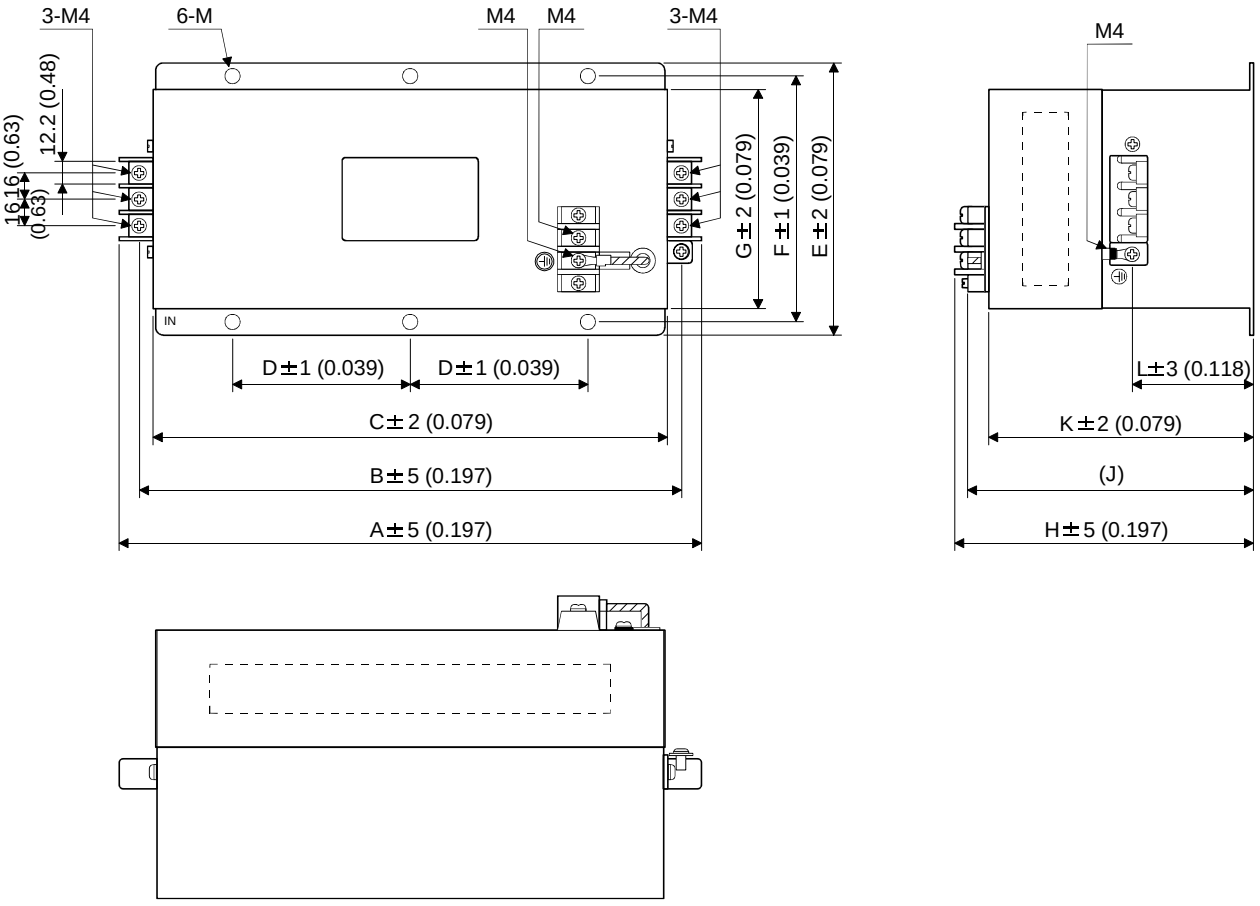


Note. Connect when the power supply has earth.

(3) Outline drawing

TF3020C-TX・TF3030C-TX

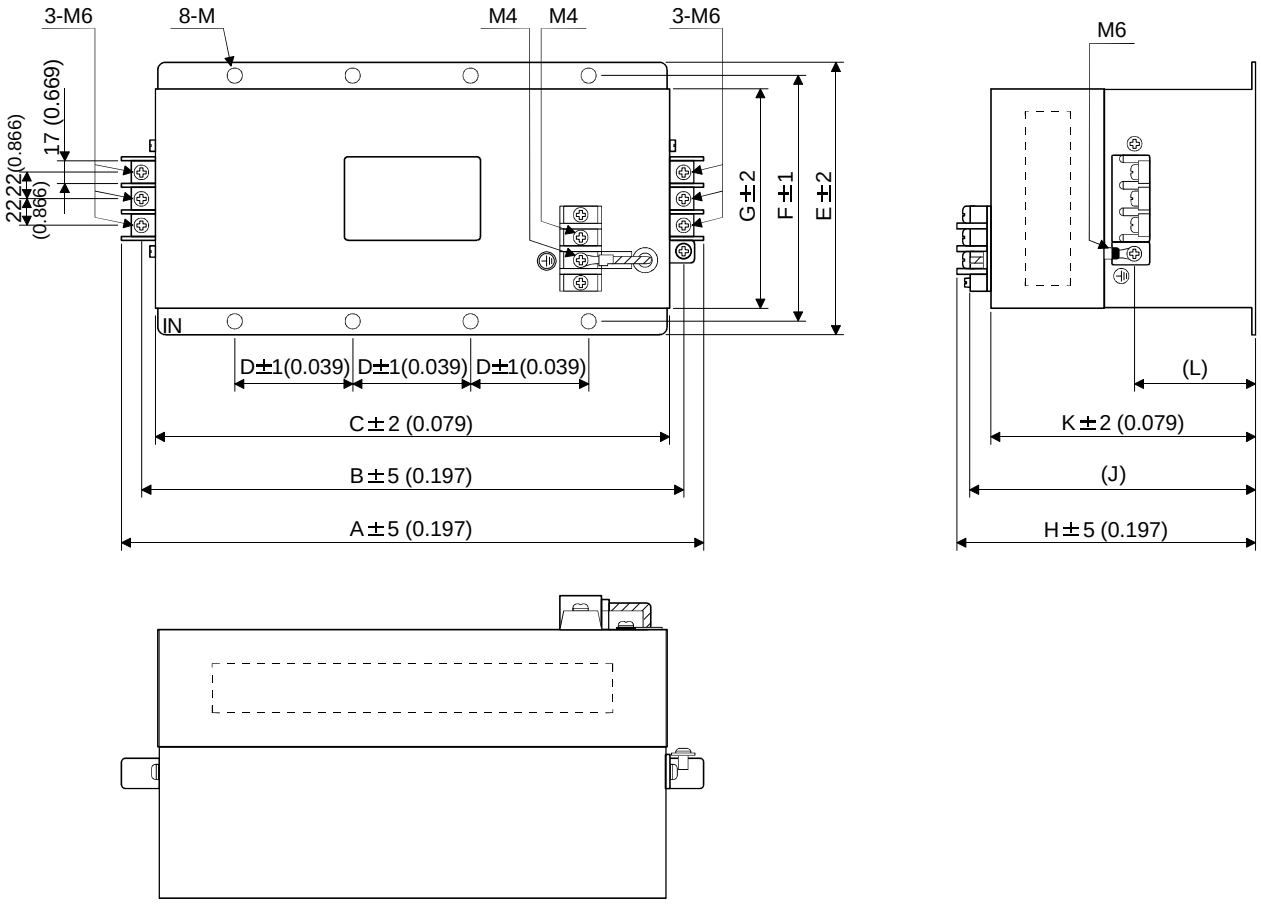
[Unit: mm(in)]



Model Name	Dimensions [mm] [(in)]											
	A	B	C	D	E	F	G	H	J	K	L	M
TF3020C-TX TF3030C-TX	332 (13.071)	308 (12.126)	290 (11.417)	100 (3.937)	155 (6.102)	140 (5.512)	125 (4.921)	170 (6.693)	160 (6.299)	150 (5.906)	67.5 (2.657)	R3.25 (0.128) Length 8 (0.315) (For M6)

TF3040C-TX · TF3060C-TX

[Unit: mm(in)]



Model Name	Dimensions [mm] [(in)]											
	A	B	C	D	E	F	G	H	J	K	L	M
TF3040C-TX TF3060C-TX	438 (17.244)	412 (16.22)	390 (15.354)	100 (3.937)	175 (6.89)	160 (6.29)	145 (5.71)	200 (7.874)	190 (7.48)	180 (7.087)	91.5 (3.602)	R3.25 (0.128) Length 8 (0.315) (For M6)

App. 1 Combinations of Servo Amplifiers and Servo Motors

The servo amplifier software version compatible with the servo motor is indicated in the parentheses.
The servo amplifier whose software version is not indicated can be used independently of the version.

Servo motor	Servo amplifier (Software version)	
	MR-J2S-□A4	MR-J2S-□B4
HA-LFS11K1M4	MR-J2S-11KA4	MR-J2S-11KB4 (Version A3 or later)
HA-LFS15K1M4	MR-J2S-15KA4	MR-J2S-15KB4 (Version A3 or later)
HA-LFS22K1M4	MR-J2S-22KA4 (Version A2 or later)	MR-J2S-22KB4 (Version A5 or later)
HA-LFS11K24	MR-J2S-11KA4	MR-J2S-11KB4 (Version A3 or later)
HA-LFS15K24	MR-J2S-15KA4 (Version A3 or later)	MR-J2S-15KB4 (Version A6 or later)
HA-LFS22K24	MR-J2S-22KA4	MR-J2S-22KB4 (Version A3 or later)
HC-SFS524	MR-J2S-60A4	MR-J2S-60B4
HC-SFS1024	MR-J2S-100A4	MR-J2S-100B4
HC-SFS1524	MR-J2S-200A4	MR-J2S-200B4
HC-SFS2024	MR-J2S-200A4	MR-J2S-200B4
HC-SFS3524	MR-J2S-350A4	MR-J2S-350B4
HC-SFS5024	MR-J2S-500A4	MR-J2S-500B4
HC-SFS7024	MR-J2S-700A4	MR-J2S-700B4

App. 2 Auxiliary Equipment Maker List

Maker	Contact	Auxiliary Equipment Name
SOSHIN ELECTRIC CO., LTD.	USA SOSHIN ELECTRONICS OF AMERICA INC. 1625 West Campbell Ave, Campbell, CA95008, USA TEL 408-370-1911 EUROPE SOSHIN ELECTRIC CO., LTD. Europe Liaison Office Westerbachstrasse 32 D-61476 Kronberg im Taunus, Germany in NGK Europe GmbH TEL 49-6173-993107 HONG KONG SOSHIN ELECTRONICS (HK) LIMITED Unit 1006, 10/F., Carnavon Plaza, 20 Carnavon Road, Tsim Sha Tsui, Kowloon, Hong Kong TEL 852-2731-6143	EMC filter

REVISIONS

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

Print data	*Manual number	Revision
Apr., 2003	SH(NA)030026-A	First edition
Aug., 2003	SH(NA)030026-B	Addition of servo amplifiers MR-J2S-60A4, 100A4, 200A4 and 700A4 Addition of servo motors HC-SFS524(B), 1024(B), 1524(B), 2024(B), 7024(B), HA-LFS6014(B) and 701M4(B) Safety Instructions: Sentence addition to 1. To prevent electric shock COMPLIANCE WITH EC DIRECTIVES: Changing of Servo amplifier to start with MR-J2S-60A4 in 2. (1) CONFORMANCE WITH UL/C-ULL STANDARD: Changing of Servo amplifier to start with MR-J2S-60A4 in (1) Section 1.3: Addition of (2) Section 2.1: Addition of (1) MR-J2S-200A4 or less Section 2.3: Addition of (1) and (3) Section 2.4: Addition of (1) and (3) Section 2.5.1: Addition of (1) and (3) Section 2.5.2 (1), (2): Changing of (a) title to MR-J2S-700A4 or less Section 2.5.2: Addition of (4) Section 2.6.1: Servo motor reexamination Section 2.6.2 (1): Reexamination Section 2.6.2 (2): Terminal box inside diagram changing and addition Addition of the case of HA-LFS22K1M4 to cooling fan Section 2.7: Addition of Regenerative brake option selection 80, 81, 84 and 85 to parameter No. 0 Section 3.6.2: HA-LFS11K24 terminal box inside diagram changing Chapter 4: Addition of (1) MR-J2S-60A4 to 200A4 Addition of (3) MR-J2S-700A4 Section 5.1: Addition of a. MR-J2S-60A4 to 200A4 Addition of b. MR-J2S-700A4 Section 5.3: Addition of dynamic brakes HC-SFS524(B), SFS1024(B), 1524(B), 2024(B), 7024(B) Addition of dynamic brakes HA-LFS6014(B) and 701M4(B) Section 5.4: Inrush current addition Section 6.1.1: Addition of (1), (2) MR-RB3H-4, MR-RB5H-4, MR-RB34-4 and MR-RB54-4 Addition of (4) (a) MR-J2S-200A4 or less Addition of (5) MR-RB3H-4, MR-RB5H-4, MR-RB34-4 and MR-RB54-4 Section 6.1.2: Addition of (1) MR-J2S-700A4 Section 6.1.3: Addition of (1) MR-J2S-700A4 Section 6.2.6: Addition of servo motor output 0.6, 1, 2 and 7 Section 6.2.8: EMC filter addition
Oct., 2003	SH(NA)030026-C	Reexamination of Servo Configuration software representation COMPLIANCE WITH EC DIRECTIVES 2. (1): Change to MR-J2S-60B4 in Servo amplifier 2. (3) (4): Change to IEC60664-1 CONFORMANCE WITH UL/C-UL STANDARD (1): Change to MR-J2S-60B4 in Servo amplifier (4): Addition of MR-J2S-60B4, 100B4, 200B4, 350B4, 500B4 and 700B4

Print data	*Manual number	Revision
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