



MITSUBISHI ELECTRIC
General-Purpose AC Servo

MELSERVO Large-Capacity Servo

MR-HP30KA/55KA4
MR-J2S-□A(4)/B(4)
MR-H□AN(4)/BN(4)
Instructions and Cautions for Safe Use of AC Servos

If this is the first time for you to use the MELSERVOLarge-Capacity Servo, the optionally available Servo Amplifier Instruction Manual and MELSERVO Servo Motor Instruction Manual are required. Always purchase them and use the MELSERVO safely. (Refer to Section 1.1)

Production of the MELSERVO-H servo amplifier was discontinued in December 2006.

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HEAD OFFICE: TOKYO BLDG MARUNOUCHI TOKYO 100-8310
Printed in Japan
Specifications are subject to change without notice.

● Safety Instructions ●

(Please read the instructions carefully before using the equipment.)

Install, and peruse all this guide and attached documents before the drive and maintenance and the check. After that, use these correctly. Use it after it is skilled of the knowledge of the equipment, information on safety, and all of notes.

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

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

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

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

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

1. To prevent electric shock, note the following

	WARNING
<ul style="list-style-type: none"> Before wiring or inspection, turn off the power and wait 20 minutes or more until the charge lamp goes off. Then, confirm the voltage between P and N is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the converter unit and servo amplifier whether the charge lamp is off or not. Connect the converter unit, 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 converter unit, 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 converter unit and servo amplifier. You may get an electric shock. Do not operate the converter unit and servo amplifier with the front cover removed. High-voltage terminals and charging area are exposed and you may get an electric shock. 	

	WARNING
<ul style="list-style-type: none"> Except for wiring or periodic inspection, do not remove the front cover even if the power is off. The servo amplifier is charged and you may get an electric shock. To avoid an electric shock, insulate the connections of the power supply terminals. 	

2. To prevent fire, note the following

	CAUTION
<ul style="list-style-type: none"> Install the converter unit and servo amplifier, servo motor and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to a fire. Always connect a magnetic contactor between the main circuit power supply and L₁, L₂, and L₃ of the converter unit, and configure the wiring to be able to shut down the power supply on the side of the converter unit power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause a fire when the converter unit, servo amplifier malfunctions. When a regenerative resistor is used, use an alarm signal to switch main power off. Otherwise, a regenerative transistor fault or the like may overheat the regenerative resistor, causing a fire. 	

3. To prevent injury, note the following

	CAUTION
<ul style="list-style-type: none"> 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 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 be damaged. During operation, never touch the rotating parts of the servo motor. Doing so can cause injury. 	

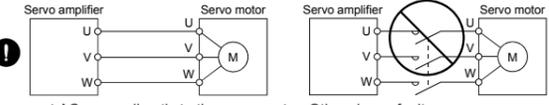
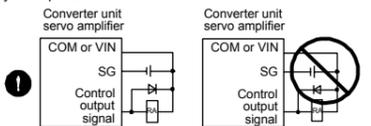
4. Additional instructions

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

(1) Transportation and installation

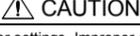
	CAUTION
<ul style="list-style-type: none"> Transport the products correctly according to their weights. Stacking in excess of the specified number of products is not allowed. Do not carry the servo motor by the cables, shaft or encoder. Do not hold the front cover to transport the converter unit and servo amplifier. The converter unit and servo amplifier may drop. Install the converter unit and 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 converter unit, servo amplifier and servo motor must be installed in the specified direction. Leave specified clearances between the converter unit, servo amplifier and control enclosure walls or other equipment. Do not install or operate the converter unit, servo amplifier and servo motor which has been damaged or has any parts missing. Do not block the intake and exhaust areas of the servo amplifier and servo motor which has a cooling fan. Doing so may cause faults. Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the converter unit, servo amplifier, and servo motor. Do not drop or strike the converter unit, servo amplifier, and servo motor as they are precision equipment. When storing or using the converter unit, servo amplifier and servo motor, comply with the environmental conditions given in the servo amplifier Instruction Manual and servo motor Instruction Manual. Securely attach the servo motor to the machine. If attach insecurely, the servo motor may come off during operation. 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, contact your local sales office. When treating the converter unit and servo amplifier, be careful not hit to edged parts of units. When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products. 	

(2) Wiring

	CAUTION
<ul style="list-style-type: none"> Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly. Do not install a power capacitor, surge absorber or radio noise filter (FR-BIF (-H) option) between the servo motor and servo amplifier. Connect the wires to the correct phase terminals (U, V, W) of the servo amplifier and servo motor. Not doing so may cause unexpected operation. Connect the servo motor power terminal (U, V, W) to the servo motor power input terminal (U, V, W) directly. Do not let a magnetic contactor, etc. intervene. 	
	
<ul style="list-style-type: none"> 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 converter unit and servo amplifier must be wired in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate. 	
	

	CAUTION
<ul style="list-style-type: none"> When the cable is not tightened enough to the terminal block (connector) of the converter unit and servo amplifier, the cable or terminal block (connector) may generate heat because of the poor contact. Be sure to tighten the cable with specified torque. Use the connection conductors that come with the servo amplifier between the P-N junction of the converter module and the P-N junction of the servo amplifier. Do not use any material other than connection conductors that come with the servo amplifier. Doing so can cause failure of the servo amplifier. Connect the CN5A of the converter module to the CN5A of the servo amplifier with the protection coordination cable (MR-J2HBUS□M). The failure of the connection disables the servo-on. 	

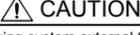
(3) Test run adjustment

	CAUTION
<ul style="list-style-type: none"> 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 instable. 	

(4) Usage

	CAUTION
<ul style="list-style-type: none"> 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 converter unit and 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 converter unit and servo amplifier. Burning or breaking a converter unit and servo amplifier may cause a toxic gas. Do not burn or break a converter unit and servo amplifier. Use the converter unit and servo amplifier with the specified servo motor. 	

(5) Corrective actions

	CAUTION
<ul style="list-style-type: none"> Design a machine to configure a braking system external to the servo amplifier so that the servo amplifier is secured against hazardous conditions when it stops or fails. 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
<ul style="list-style-type: none"> With age, the electrolytic capacitor of the converter unit and 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 contact your local sales office. 	

(7) General instruction

To illustrate details, the equipment in the diagrams of this guide 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 guide and instruction manual.

SOUTH KOREA COMPLIANCE

This product complies with the Radio Wave Law (KC mark). Please note the following to use the product.

이 기기는 업무용 (A급) 전자파적합기로서 판매 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

(The product is for business use (Class A) and meets the electromagnetic compatibility requirements. The seller and the user must note the above point, and use the product in a place except for home.)

1. INTRODUCTION

1.1 Introduction to the manuals

If this is the first time for you to use this servo, the optionally available Servo Amplifier Instruction Manual (see the list below) and Servo Motor Instruction Manual are required. Please read them all carefully to use this servo.

(1) MR-J2S-□A	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-J2S-□A Servo Amplifier Instruction Manual	SH(NA)030006
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181
(2) MR-J2S-□A4	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-J2S-□A Servo Amplifier Instruction Manual	SH(NA)030006
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181
(3) MR-J2S-□B	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-J2S-□B Servo Amplifier Instruction Manual	SH(NA)030007
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181
(4) MR-J2S-□B4	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-J2S-□B Servo Amplifier Instruction Manual	SH(NA)030007
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181
(5) MR-H□AN/AN4	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-H□AN Servo Amplifier Instruction Manual	SH(NA)3190
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181

(6) MR-H□BN/BN4	Manual name	Manual No.
	MR-HP□A□ Converter Unit Instruction Manual	SH(NA)030024
	MR-H□BN Servo Amplifier Instruction Manual	SH(NA)3192
	MELSERVO Servo Motor Instruction Manual	SH(NA)3181

1.2 Contents of the packing

After unpacking, check the rating plate to confirm that the converter unit and servo amplifier you received are as you ordered.

(1) Converter unit

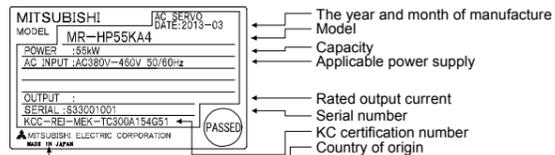
Contents	Quantity
Converter unit	1
Instructions and Cautions for Safe Use of AC Servos (This guide)	1

(2) Servo amplifier

Contents	Quantity
Servo amplifier	1
Instructions and Cautions for Safe Use of AC Servos (This guide)	1

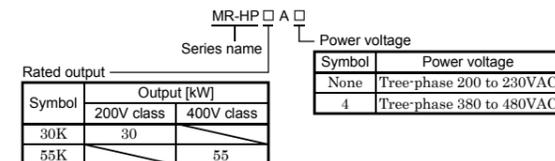
1.3 Model code definition

(1) Rating plate



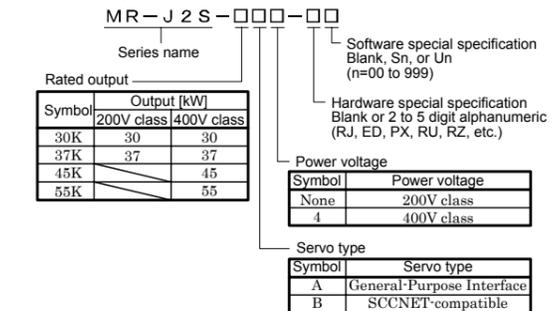
(2) Model code

(a) Converter unit

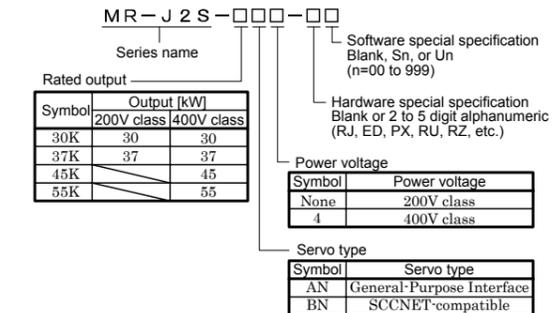


(b) Servo amplifier

• MELSERVO-J2-Super Series



• MELSERVO-H Series



2. COMPLIANCE WITH CE MARKING

2.1 What is CE marking?

The CE marking is mandatory and must be affixed to specific products placed on the European Union. When a product conforms to the requirements, the CE marking must be affixed to the product. The CE marking also applies to machines and equipment incorporating servos. When you need a copy of Declaration of Conformity of CE marking, contact your local sales office.

(1) EMC directive

The EMC directive applies to the servo units alone. This servo is designed to comply with the EMC directive. The EMC directive also applies the 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).

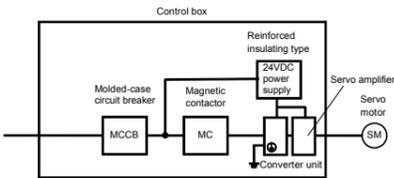
- (2) Low voltage directive
The low voltage directive applies also to servo units alone. This servo is designed to comply with the low voltage directive.

2.2 For compliance

Be sure to perform an appearance inspection of every unit before installation. In addition, have a final performance inspection on the entire machine/system, and keep the inspection record.

- (1) Converter unit, servo amplifier and servo motors used
Use the converter unit, servo amplifier and servo motors which standard product. MELSERVO-H series does not conform to a EC directives.
- Converter unit
:MR-HP30KA
:MR-HP55KA4
- Servo amplifier
:MR-J2S-30K□ • MR-J2S-37K□
:MR-J2S-30K□4 to MR-J2S-55K□4
- Servo motor
:HA-LFS□

(2) Structure

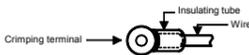


- (3) Environment
Operate converter unit and servo amplifier at or above Pollution degree 2 set forth in 60664-1. For this purpose, install converter unit and servo amplifier in a control box which is protected against water, oil, carbon, dust, dirt, etc. (IP54).

- (4) Power supply
(a) Operate converter unit and servo amplifier to meet the requirements of the overvoltage category III set forth in 60664-1.
(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, the protective earth (PE) terminal (marked ⊕) of the servo amplifier must be connected 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 cables to the terminals one-to-one.
(c) If an earth leakage circuit breaker is used, always earth the protective earth (PE) terminal of the servo amplifier to prevent an electric shock.

- (6) Wiring
(a) The wires 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 as options.
(c) The tension permissible value concerning the terminal block TE1, TE2-1, and TE2-2 is 350N.

- (7) Peripheral devices, options
(a) Use the molded-case circuit breaker and magnetic contactor models which are IEC Standard-compliant products given in the each Instruction Manual.
(b) The sizes of the wires given in the each Instruction Manual meet the following conditions. For use in any other conditions, follow Table 5 and Annex C of EN60204-1.
• Ambient temperature : 40°C (104°F)
• Sheath : PVC (polyvinyl chloride)
• Installation on wall surface or open cable tray

- (c) Use the EMC filter for noise reduction.
(8) Performing EMC tests
When EMC tests are run on a machine/device into which this servo 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 converter unit and servo amplifier, refer to the EMC Installation Guidelines (IB(NA)67310).
- Large-Capacity Servo are not intended to be used on a low-voltage public network which supplies domestic premises;
- radio frequency interference is expected if used on such a network.
The installer shall provide a guide for Installation and use, including recommended mitigation devices.

3. CONFORMANCE WITH UL/CUL STANDARD

- (1) Converter unit, servo amplifier and servo motors used
Use the converter unit and servo amplifier and servo motors which standard product. MELSERVO-H series does not conform to a UL/CUL Standard.

Converter unit	Servo amplifier	Servo motor					
		HA-LFS□		HA-LF□			
		1000r/min	1500r/min	2000r/min	1000r/min	1500r/min	2000r/min
MR-HP30KA	MR-J2S-30KA/B	30K1	30K1M	30K2			
	MR-J2S-37KA/B	37K1	37K1M	37K2			
	MR-H30KAN/BN				30K1	30K1M	30K2
	MR-H37KAN/BN				37K1	37K1M	37K2
MR-HP55KA4	MR-J2S-30KA/B4	25K14	30K1M4	30K24			
	MR-J2S-37KA/B4	30K14	37K1M4	37K24			
	MR-J2S-45KA/B4	37K14	45K1M4	45K24			
	MR-J2S-55KA/B4	45K1M4	55K1M4	55K24			
MR-HP55KA4	MR-H30KAN4/BN4				30K14	30K1M4	30K24
	MR-H37KAN4/BN4				37K14	37K1M4	37K24
	MR-H45KAN4/BN4				45K1M4	45K24	
	MR-H55KAN4/BN4				55K1M4	55K24	

- (2) Installation
Large-Capacity Servo has been approved as the products which have been installed in the electrical enclosure. The minimum enclosure size is based on 150 of each MR-J3 combination. And also, design the enclosure so that the ambient temperature in the enclosure is 55°C (131°F) or less. The servo amplifier must be installed in the metal cabinet. For environment, the units should be used in open type (UL 50) and overvoltage category III or lower. The converter unit and servo amplifier need to be installed at or below of pollution degree 2. For connection, use copper wires.

- (3) Short-circuit current rating (SCCR)
Suitable For Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts Maximum.

- (4) Flange
Mount the servo motor on a flange which has the following size or produces an equivalent or higher heat dissipation effect.

Flange size (mm(in))	HA-LFS □	
	950×950×35 (37.40×37.40×1.38)	25K14 • 30K1 • 37K1 • 30K1M • 37K1M • 30K2 • 37K2 30K14 • 37K14 • 30K1M4 • 37K1M4 • 45K1M4 • 50K1M4 30K24 • 37K24 • 45K24 • 55K24

- (5) Capacitor discharge time
The capacitor discharge time is as follows. To ensure safety, do not touch the charging section for 20 minutes after power-off.

Converter unit	Servo amplifier	Discharge time (min)
MR-HP30KA	MR-J2S-30K□ MR-H30K□	20
	MR-J2S-37K□ MR-H37K□	
	MR-J2S-30K□4 MR-H30K□4	
MR-HP55KA4	MR-J2S-37K□4 MR-H37K□4	20
	MR-J2S-45K□4 MR-H45K□4	
	MR-J2S-55K□4 MR-H55K□4	
	MR-J2S-30K□4 MR-H30K□4	

- (6) Options, peripheral devices
Use the UL/CUL Standard-compliant products.
Use the molded-case circuit breaker (UL489 Listed MCCB) indicated in the table below.

Servo amplifier	Molded-case circuit breaker (Note)	
	Current	Voltage AC
200V class	MR-J2S-30KA/B MR-H30KAN/BN	400 frame 250A
	MR-J2S-37KA/B MR-H37KAN/BN	400 frame 300A
400V class	MR-J2S-30KA/B4 MR-H30KAN4/BN4	225 frame 150A
	MR-J2S-37KA/B4 MR-H37KAN4/BN4	225 frame 175A
	MR-J2S-45KA/B4 MR-H45KAN4/BN4	225 frame 225A
	MR-J2S-55KA/B4 MR-H55KAN4/BN4	400 frame 250A

Note. Listed no-fuse breakers are for when the power factor improving reactor is not used.

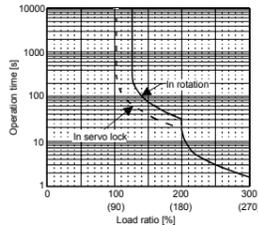
- (7) About wiring protection
For installation in United States, branch circuit protection must be provided, in accordance with the National Electrical Code and any applicable local codes. For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code and any applicable provincial codes.

- (8) Selection example of wires
To comply with the UL/CUL Standard, use UL-approved copper wires rated at 60/75°C (140/167 °F) for wiring.

Converter unit	Servo amplifier	Cables (mm ²)		
		L1 • L2 • L3 • ⊕	L11 • L21	U • V • W • P1 • P2 • ⊕
MR-HP30KA	MR-J2S-30K□ MR-H30K□	50(AWG1/0)	2(AWG14)	60(AWG2/0)
	MR-J2S-37K□ MR-H37K□	60(AWG2/0)		80(AWG3/0)
	R-J2S-30K□4 MR-H30K□4	22(AWG4)		30(AWG2)
MR-HP55KA4	MR-J2S-37K□ 4MR-H37K□4	30(AWG2)	2(AWG14)	38(AWG2)
	MR-J2S-45K□4 MR-H45K□4	38(AWG2)		50(AWG1/0)
	MR-J2S-55K□4 MR-H55K□4	50(AWG1/0)		60(AWG2/0)

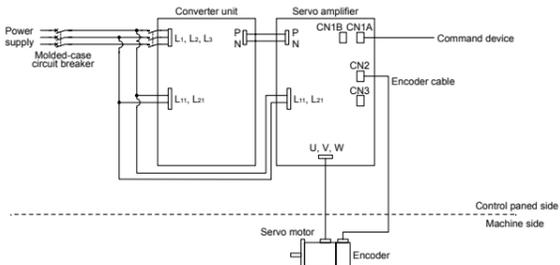
Converter unit	Servo amplifier	Cables (mm ²)	
		P • C	OHS1 • OHS2 • BU • BV • BW
MR-HP30KA	MR-J2S-30K□ MR-H30K□	5.5(AWG10)	1.25(AWG16)
	MR-J2S-37K□ MR-H37K□		
	R-J2S-30K□4 MR-H30K□4		
MR-HP55KA4	MR-J2S-37K□ 4MR-H37K□4	5.5(AWG10)	1.25(AWG16)
	MR-J2S-45K□4 MR-H45K□4		
	MR-J2S-55K□4 MR-H55K□4		

- (9) Overload Protection Characteristics
An electronic thermal relay is built in the servo amplifier and converter unit to protect the servo amplifier, converter unit and servo motor from overloads. The operation characteristics of the electronic thermal relay are shown below. It is recommended to use an unbalanced torque-generated machine, such as a vertical motion shaft, so that unbalanced torque is not more than 70% of the rated torque. When using MR-H□AN(4)/BN(4) in low noise mode, the value of the rate of load becomes a number in 0.
Large-Capacity Servo has each solid-state servo motor overload protection. (The motor full load current is 115% rated current.)



- (10) Over-temperature protection for motor
Motor Over temperature sensing is not provided by the drive.

- (11) Figure configuration
Configuration diagram of MR-J2S series to conform with UL/CUL Standard is shown below.



4. INSPECTION

⚠ WARNING

- Before starting maintenance and/or inspection, turn off the power and wait 20 minutes or more until the charge lamp goes off. Then, confirm the voltage between P and N is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the converter unit and servo amplifier whether the charge lamp is off or not.
- Any person who is involved in inspection should be fully competent to do the work. Otherwise, you may get an electric shock. For repair and parts replacement, contact your safes representative.

⚠ CAUTION

- Do not test servo with a megger (measure insulation resistance), or it may become faulty.
- Do not disassemble and/or repair the equipment on customer side.

- (1) Inspection
It is recommended to make the following checks periodically:
- Check for loose terminal block screws. Retighten any loose screws.
 - Check the servo motor bearings, brake section, etc. for unusual noise.
 - Check the cables and the like for scratches and cracks. Perform periodic inspection according to operating conditions.
 - Check the servo motor shaft and coupling for misalignment.

- (2) Life
The following parts must be changed periodically as listed below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and environmental conditions.
For use in the atmosphere having much oil mist, dust, etc., clean and inspect every three months.
For parts replacement, please contact your sales representative.

	Part name	Standard life
converter unit servo amplifier	Smoothing capacitor	10 years
	Relay	Number of power-on and number of forced stop times: 100,000 times
	Cooling fan	10,000 to 30,000 hours (2 to 3 years)
	Absolute position battery unit	Refer to Servo amplifier Instruction Manual.
Servo motor	Bearings	20,000 to 30,000 hours
	Encoder	20,000 to 30,000 hours
	Oil seal	5,000 hours

- (a) Smoothing capacitor
Affected by ripple currents, etc. and deteriorates in characteristic. The life of the capacitor greatly depends on ambient temperature and operating conditions. The capacitor will reach the end of its life in 10 years of continuous operation in normal air-conditioned environment (Surrounding air temperature of 40°C (104°F) or less).

- (b) Relays
Their contacts will wear due to switching currents and contact faults occur. The relay becomes longevity by the power supply turning on frequency and 100,000 times of the forced stop frequency. However, this value changes by the difference of the power supply capacity.

- (c) Converter unit and servo amplifier cooling fan
The cooling fan bearings reach the end of their life in 10,000 to 30,000 hours. Normally, therefore, the fan must be changed in a few years of continuous operation as a guideline. It must also be changed if unusual noise or vibration is found during inspection.

- (d) Servo motor bearings
When the servo motor is run at rated speed under rated load, change the bearings in 20,000 to 30,000 hours as a guideline. This differs on the operating conditions. The bearings must also be changed if unusual noise or vibration is found during inspection.

- (e) Servo motor oil seal
Must be changed in 5,000 hours of operation at rated speed as a guideline. This differs on the operating conditions. These parts must also be changed if oil leakage, etc. is found during inspection.

5. ALARMS AND WARNINGS

Indication	Name	Definition
A.10	Under voltage	Power supply voltage dropped.
A.12	Memory error 1	RAM or ROM memory fault
A.13	Clock error	Printed board fault
A.15	Memory error 2	EEP-ROM fault
A.30	Regenerative error	Permissible regenerative power of the built-in regenerative resistor or regenerative option is exceeded.
A.33	Overvoltage	Converter bus voltage rose unusually.
A.37	Parameter error	A set value of the parameter is abnormal.
A.45	Main circuit device overheat	Main circuit device overheat
A.50	Overload 1	Load exceeded overload protection characteristic of drive unit.
A.51	Overload 2	Machine collision or the like caused max. output current to flow successively for several seconds.
8888	Watchdog	CPU parts faulty
A.E0	Excessive regenerative warning	There is a possibility that regenerative power may exceed permissible regenerative power of built-in regenerative resistor or regenerative option.
A.E1	Overload warning	There is a possibility that overload alarm 1 or 2 may occur.
A.E9	Main circuit off warning	Servo was switched on with main circuit power off.

- (2) Servo amplifier
This section provides the alarms which are different in definition from those of the servo amplifiers of 22kW and less.

Indication	Name	Definition
AL.1b	Converter RD off	Servo on (SON) signal switched on when the ready (RD) of the converter was off.

● DISPOSAL OF WASTE ●

Please dispose a servo amplifier, battery (primary battery) and other options according to your local laws and regulations.

⚠ EEP-ROM life

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier 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

Battery transportation

The revision (Edition 44) of the Dangerous Goods Rule of the International Air Transport Association (IATA) went into effect on January 1, 2003 and was enforced immediately. In this rule, "provisions of the lithium and lithium ion batteries" were revised to tighten the restrictions on the air transportation of batteries. However, since the battery used for this servo amplifier (drive unit) is not dangerous goods (Class9), air transportation of 24 or less batteries is outside the range of the restrictions. Air transportation of more than 24 batteries requires packing compliant with the Packing Standard 903. When a self-certificate is necessary for battery safety tests, contact your local sales office.

Precautions for Choosing the Products

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

Warranty

1. Warranty period and coverage
We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

[Term]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

- (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.
(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
(iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
(vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
(vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
(viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

- (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

- (1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.

- (2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used. In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used. We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.