



MR-J4 Servo amplifier
MR-J4-60_4 to MR-J4-22K_4

Instructions and Cautions for
Safe Use of AC Servos

Table with 4 columns: Country/Region, Sales office, Tel/Fax, and contact information for various countries including USA, Brazil, Germany, UK, Italy, Spain, France, Czech Republic, Poland, Russia, South Africa, China, Taiwan, Korea, Singapore, Thailand, Indonesia, India, and Australia.

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Contents of the package
Unpack the product and check the rating plate to see if the servo motor is as you ordered.

Table with 2 columns: Servo amplifier, Quantity. Shows MELSERVO-J4 Series Instructions and Cautions for Safe Use of AC Servos (This guide) with quantity 1.

Rating plate diagram showing an example of a rating plate with fields for Model, Power, Output, Standard, Ambient temperature, IP rating, and KC certification number.

Warning plate diagram with Japanese and English text. Includes symbols for 'Warning' and 'Caution' and instructions regarding power, heat, and safety.

1. About the manuals
1.1 MELSERVO MR-J4 relevant manuals
This installation guide explains how to mount MR-J4 servo amplifiers. You can also check it with our website for free.

2. About safety
This chapter explains safety of users and machine operators. Please read the chapter carefully before mounting the equipment. In this installation guide, the specific warnings and cautions levels are classified as follows.

WARNING and CAUTION symbols with text explaining that incorrect handling may cause hazardous conditions, resulting in death or severe injury, or medium or slight injury to personnel or may cause physical damage.

2.1 Professional engineer
Only professional engineers should mount MR-J4 servo amplifiers. Here, professional engineers should meet the all conditions below.

2.2 Applications of the devices
MR-J4 servo amplifiers comply with the following safety standards. ISO/EN ISO 13849-1 Category 3 PL d, IEC/EN 62061 SIL CL 2, IEC/EN 61800-5-2 SIL 2 (STO), IEC/EN 61800-5-1, IEC/EN 61800-3, IEC/EN 60204-1

2.3 Correct use
Always use the MR-J4 servo amplifiers within specifications (voltage, temperature, etc. Refer to each instruction manual for details.) Mitsubishi Electric Co. accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

WARNING symbol with text: Takes 15 minutes for capacitor discharging. Do not touch the unit and terminals immediately after power off.

2.3.1 Peripheral device and power wiring
The followings are selected based on IEC/EN 61800-5-1, UL 508C, and CSA C22.2 No.14.
(1) Power Wiring (local wiring and crimping tool)

Table: Servo amplifier wire sizes. Columns include Servo amplifier model, L1/L2/L3, N-, P+, C, U/V/W/PE, and U/V/W/PE (Note 3).

Note: 1. To connect these models to a terminal block, be sure to use the screws that come with the terminal block. 2. Alphabetical in the table indicate crimping tools. Refer to the following table for the crimp terminals and crimping tools.

Table: Recommended crimp terminals. Columns include Symbol, Crimp terminal (Note), Body, Head, and Manufacturer.

Note: Some crimp terminals may not be mounted depending on the size. Make sure to use the recommended ones or equivalent ones.

(2) Selection example of MCCB and fuse
When a servo amplifier is protected by T class fuses or circuit breaker having an interrupting rating not less than 10 kA effective voltage and 480 V maximum, use T class fuses or molded-case circuit breaker (UL489 Listed MCCB) as the following table.

Table: Selection example of MCCB and fuse. Columns include Servo amplifier, Molded-case circuit breaker (480 V AC), and Fuse (600 V).

(3) Power supply
This servo amplifier can be used on the condition of overvoltage category III set forth in IEC/EN 60664-1. For the interface power supply, use an external 24 V DC power supply with reinforced insulation on I/O terminals.

(4) Grounding
To prevent an electric shock, always connect the protective earth (PE) terminal (marked with a lightning bolt symbol) of the servo amplifier to the protective earth (PE) of the cabinet.

2.3.2 EU compliance
The MR-J4 servo amplifiers are designed to comply with the following directions to meet requirements for mounting, using, and periodic technical inspections: Machinery directive (2006/42/EC), EMC directive (2004/108/EC), and Low-voltage directive (2006/95/EC).

2.3.3 USA/Canada compliance
This servo amplifier is designed in compliance with UL 508C and CSA C22.2 No.14.
(1) Installation
The minimum cabinet size is 150% of each MR-J4 servo amplifier's volume. Also, design the cabinet so that the ambient temperature in the cabinet is 55 °C or less.

(2) 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.
(3) Overload protection characteristics
The MR-J4 servo amplifiers have solid-state servo motor overload protection. (It is set on the basis (full load current) of 120% rated current of the servo amplifier.)

2.3.4 South Korea compliance
This product complies with the Radio Wave Law (KC mark). However, some applications are being processed. For the situation of compliance, contact your local sales office. Please note the following to use the product.

2.4 General cautions for safety protection and protective measures
Observe the following items to ensure proper use of the MELSERVO MR-J4 servo amplifiers.
(1) For safety components and installing systems, only qualified personnel and professional engineers should perform.

2.5 Residual risk
(1) Be sure that all safety related switches, relays, sensors, etc., meet the required safety standards.
(2) Perform all risk assessments and safety level certification to the machine or the system as a whole.

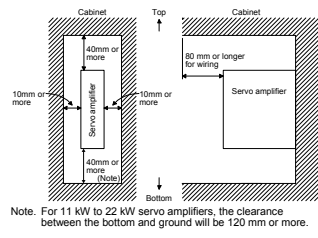
(5) Separate the wiring for safety function from other signal wirings. (ISO 13849-1 Table F.1 No.1)
(6) Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).
(7) Keep the required clearance/creepage distance depending on voltage you use.

2.6 Disposal
Disposal of unusable or irreparable devices should always occur in accordance with the applicable country-specific waste disposal regulations. (Example: European Waste 16 02 14)

2.7 Lithium battery transportation
To transport lithium batteries, take actions to comply with the instructions and regulations such as the United Nations (UN), the International Civil Aviation Organization (ICAO), and the International Maritime Organization (IMO).

3. Mounting/dismounting
Installation direction and clearances

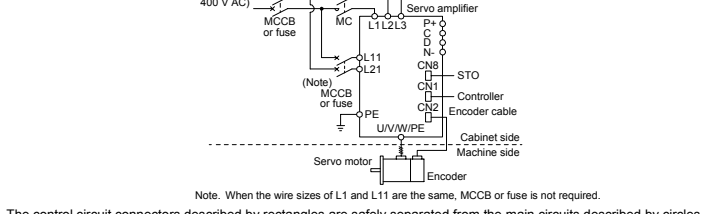
CAUTION symbol with text: The devices must be installed in the specified direction. Not doing so may cause a malfunction. Mount the servo amplifier on a cabinet which meets IP54 in the correct vertical direction to maintain pollution degree 2.



4. Electrical installation and configuration diagram
CAUTION symbol with text: Turn off the molded-case circuit breaker (MCCB) to avoid electrical shocks or damages to the product before starting the installation or wiring.

CAUTION symbol with text: The installation complies with IEC/EN 60204-1. The voltage supply to machines must be 20 ms of immunity to instantaneous power failures as specified in IEC/EN 60204-1.

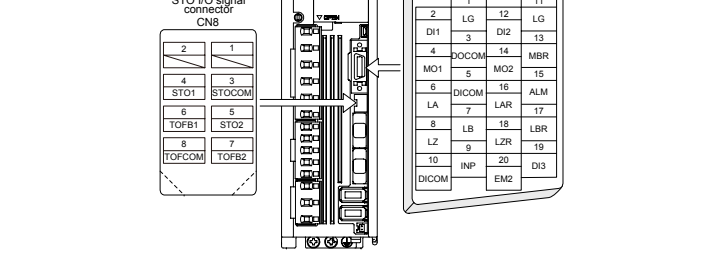
The following shows representative configuration examples to conform to the IEC/EN/UL/CSA standards.



The control circuit connectors described by rectangles are safely separated from the main circuits described by circles. The connected motors will be limited as follows.

(1) HG/HF/HCA series servo motors (Mfg.: Mitsubishi Electric)
(2) Using a servo motor complied with IEC60034-1 and Mitsubishi Electric encoder (OBA, OSA)

5. Signals
5.1 Signal
The following shows MR-J4-60B4 signals as a typical example. For other servo amplifiers, refer to each servo amplifier instruction manual.



5.2 I/O device
Input device

Table: Input device connections. Columns: Device, Connector, Pin No. Includes STO1, STO2, STO0M, STO1M, STO2M.

Table: Output device connections. Columns: Device, Connector, Pin No. Includes STO1, STO2.

Table: Power supply connections. Columns: Device, Connector, Pin No. Includes D1COM, D2COM, SD.

6. Maintenance and service
CAUTION symbol with text: To avoid an electric shock, only qualified personnel should attempt inspections. For repair and parts replacement, contact your local sales office.

CAUTION symbol with text: Do not perform insulation resistance test on the servo amplifier. Otherwise, it may cause a malfunction. Do not disassemble and/or repair the equipment on customer side.

6.1 Inspection items
It is recommended that the following points periodically be checked.
(1) Check for loose terminal block screws. Retighten any loose screws.

Table: Servo amplifier tightening torque. Columns: Servo amplifier, L1, L2, L3, N-, P3, P4, P+, C, L11, L21, U, V, W, PE.

- (2) Servo motor bearings, brake section, etc. for unusual noise.
(3) Check the cables and the like for scratches or cracks. Perform periodic inspection according to operating conditions.
(4) Check that the connectors are securely connected to the servo motor.
(5) Check that the wires are not coming out from the connector.
(6) Check for dust accumulation on the servo amplifier.
(7) Check for unusual noise generated from the servo amplifier.
(8) Check the servo motor shaft and coupling for connection.

6.2 Parts having service lives
Service life of the following parts are listed below. However, the service lives vary depending on operation and environment. If any fault is found in the parts, they must be replaced immediately regardless of their service lives. For parts replacement, please contact your local sales office.

Table: Parts having service lives. Columns: Part name, Life guideline. Includes Smoothing capacitor, Relay, Cooling fan, (Note 1) Rotary servo motor battery backup time, (Note 2) Battery life.

- 1. The data-holding time by the battery using MR-BATV1SET. Replace the batteries within three years since the operation start whether the power supply of the servo amplifier is on/off. If the battery is used out of specification, [AL_25 Absolute position erased] may occur. For other batteries, refer to each servo amplifier instruction manual.
2. The quality of the batteries degrades by the storage condition. The battery life is 5 years from the production date regardless of the connection status.
3. The characteristic of smoothing capacitor is deteriorated due to ripple currents, etc. 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 (20 °C surrounding air temperature or less).
4. The power-on time ratio 25% is equivalent to 8 hours power on for a weekday and off for a weekend.

CAUTION symbol with text: Transport the products correctly according to their mass. Stacking in excess of the limited number of product packages is not allowed. Do not hold the front cover to transport the servo amplifier. Otherwise, it may drop. Install the servo amplifier and servo motor in a load-bearing place in accordance with the instruction manual. Do not get on or put heavy load on the equipment. For detailed information on the option battery's transportation and handling refer to the instruction manual.

Table: Environmental conditions. Columns: Ambient temperature, Ambient humidity, Vibration load, Pollution degree, IP rating, Altitude. Includes environmental limits and test values.

8. Technical data
8.1 MR-J4 servo amplifier

Table: Technical data for MR-J4 servo amplifier. Columns: Item, Details. Includes Power supply, Control method, Safety function, Average probability of dangerous failures per hour, Mission time, Response performance, Pollution degree, Overvoltage category, Protection class, Short-circuit current rating.

Table: Servo amplifier dimensions. Columns: Servo amplifier, Variable dimension table (mm), Mass [kg]. Includes dimensions W, H, D, U, V, W.

Table: Mounting hole dimensions. Columns: Servo amplifier, Variable dimensions (mm), Screw size. Includes dimensions a, a1, b, c, d, d1.

9. Check list for user documentation

Mitsubishi Electric logo and MR-J4 installation checklist for manufacturer/installer. Lists 5 items to be checked before operation, including safety, documentation, and wiring.

[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.

[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").

[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 for the Product and the caution label and the caution label affixed to the Product.

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.

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 the 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 other 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.