

Instructions and Cautions for Safe Use of AC Servos

Table with columns for Country/Region, Sales office, Tel/Fax, and Mitsubishi Electric Automation details for USA, Germany, China, and Korea.

2.3 Correct use
Use the MR-J4 servo amplifiers within specifications. Refer to each instruction manual for specifications such as voltage, temperature, etc.

WARNING: It takes 15 minutes maximum for capacitor discharging. Do not touch the unit and terminals immediately after power off.

2.3.1 Peripheral device and power wiring
The following 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)
The following table shows the stranded wire sizes [AWG] and the crimp terminal symbols rated at 75 °C/60 °C.

Table 1. Recommended wires and Table 2. Recommended crimp terminals. Includes columns for Servo amplifier, Wire size, and Crimp terminal.

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

(2) Selection example of MCCB and fuse
Use 1 class fuses or molded-case circuit breaker (UL 489 Listed MCCB) as the following table. The T class fuses and molded-case circuit breakers in the table are selected examples based on rated I/O of the servo amplifiers.

Table showing selection examples for MCCB and fuses for various servo amplifier models and classes.

Table showing selection examples for MCCB and fuses for 400V class servo amplifiers.

(3) Power supply
This category III (overvoltage category III) for 1-phase star servo amplifiers, MR-J4-03A6, and MR-J4W2-0303B6 set forth in IEC/EN 60664-1. For the inter-connection power supply, use a separate 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 ⚡) of the servo amplifier to the protective earth (PE) of the cabinet. Do not connect two grounding cables to the same protective earth (PE) terminal.

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 (2014/30/EU), and Low-voltage directive (2014/35/EU).

(1) EMC requirement
MR-J4 servo amplifiers comply with category C3 in accordance with EN 61800-3. As for I/O wires (max. length 10 m. However, 3 m for STO cable for CN8), and encoder cables (max. length 50 m), use shielded wires and ground the shields.

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 (Not More Than 5 kA rms Symmetrical Amperes, 48 Volts Maximum for MR-J4-03A6 and MR-J4W2-0303B6). For SCCR when using a Type E Combination motor controller, refer to each servo amplifier instruction manual.

(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.)
(4) Over-temperature protection for motor
Motor Over temperature sensing is not provided by the drive. Integral thermal protection(s) is necessary for motor and refer to chapter 4 for the proper connection.

2.3.4 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) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

- 2.4 General cautions for safety protection and protective measures
Observe the following items to ensure proper use of the MR-J4 servo amplifiers.
(1) Safety components and installing systems, only qualified personnel and professional engineers should perform.
(2) When mounting, installing, and using the MR-J4 servo amplifier, always observe standards and directives applicable in the country.

- (4) Only qualified personnel are authorized to install, start-up, repair or service the machines in which these components are installed. Only trained engineers should install and operate the equipment. (ISO 13849-1 Table F.1 No. 5)
(5) Separate the wiring for safety observation 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).

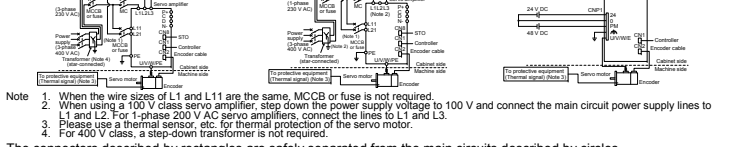
3. Mounting/dismounting
Installation direction and clearances
The devices must be installed in the specified direction. Not doing so may cause a malfunction.

CAUTION: Turn off the molded-case circuit breaker (MCCB) to avoid electrical shocks or damages to the product before starting the installation or wiring. Includes diagrams showing cabinet dimensions and mounting clearances.

To adapt your machine using MR-J4-03A6 or MR-J4W2-0303B6 to IEC/EN 60950-1, either supply the amplifier with a power supply complying with the requirement of 2.5 stated in IEC/EN 60950-1 (Limited Power Source), or cover the amplifier and motors completely to the outputs with a fire enclosure.

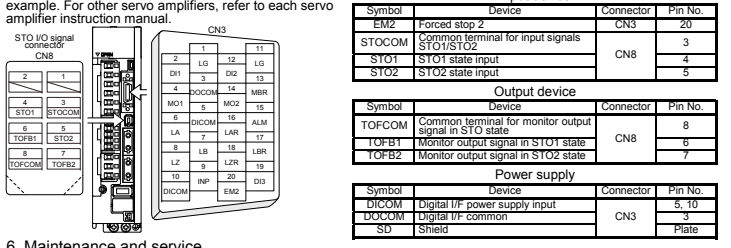
CAUTION: Turn off the molded-case circuit breaker (MCCB) to avoid electrical shocks or damages to the product before starting the installation or wiring. Includes text about installation compliance with IEC/EN 60204-1.

The following shows representative configuration examples to conform to the IEC/EN/UL/CSA standards.
(1) 3-phase input for MR-J4 1-axis (2) 1-phase input for MR-J4 1-axis (3) Main circuit 48 V DC input for MR-J4 1-axis servo amplifier



The connectors described by rectangles are specially separated from the main circuits described by circles. The connected motors will be limited as follows:
(1) HG/HF/HCH/CA series servo motors (Mfg.: Mitsubishi Electric)
(2) Using a servo motor complied with IEC 60034-1 and Mitsubishi Electric encoder (OBA, OSA)

5.1 Signal
The following shows MR-J4-10B signals as a typical example. For other servo amplifiers, refer to each servo amplifier instruction manual.



6. Maintenance and service
6.1 Inspection items
It is recommended that the following points periodically be checked.
(1) Check for loose terminal block screws. (Except for MR-J4-03A6 and MR-J4W2-0303B6)

WARNING: To avoid an electric shock, only qualified personnel should attempt inspections. For repair and parts replacement, contact your local sales office.

Table showing life guidelines for Servo amplifier, Smoothing capacitor, Relay, Cooling fan, and Battery life.

7. Transportation and storage
Transport the products correctly according to their mass. Do not fold the front cover to transport the servo amplifier. Otherwise, it may drop. For detailed information on transportation and handling of the battery, refer to the servo amplifier instruction manual.

CAUTION: Do not touch the front cover to transport the servo amplifier. Otherwise, it may drop. Includes text about transportation and storage requirements.

Table showing environmental conditions for Servo amplifier, including Ambient temperature, Humidity, Vibration resistance, Pollution degree, and Altitude.

8. Technical data
8.1 MR-J4 servo amplifier

Table with columns for Item, Main circuit (line voltage), Control circuit (line voltage), Control method, Safety observation function, Response performance, Pollution degree, Mission time, Overvoltage category, Protective class, and Short-circuit current rating.

Note: 1. For the use in US/Canada, constitute a branch circuit including the power supply which endures SCCR of 5 kA minimum in the industrial cabinet.
2. For MR-J4A, -RJ, 283 V DC to 340 V DC are also supported.
3. Servo amplifiers manufactured with SIL 3 requirements. However, MR-J4A, -JR, -J4, -J4B, -J4C, -J4D, -J4E, -J4F, -J4G, -J4H, -J4I, -J4J, -J4K, -J4L, -J4M, -J4N, -J4O, -J4P, -J4Q, -J4R, -J4S, -J4T, -J4U, -J4V, -J4W, -J4X, -J4Y, -J4Z, -J4AA, -J4AB, -J4AC, -J4AD, -J4AE, -J4AF, -J4AG, -J4AH, -J4AI, -J4AJ, -J4AK, -J4AL, -J4AM, -J4AN, -J4AO, -J4AP, -J4AQ, -J4AR, -J4AS, -J4AT, -J4AU, -J4AV, -J4AW, -J4AX, -J4AY, -J4AZ, -J4BA, -J4BB, -J4BC, -J4BD, -J4BE, -J4BF, -J4BG, -J4BH, -J4BI, -J4BJ, -J4BK, -J4BL, -J4BM, -J4BN, -J4BO, -J4BP, -J4BQ, -J4BR, -J4BS, -J4BT, -J4BU, -J4BV, -J4BW, -J4BX, -J4BY, -J4BZ, -J4CA, -J4CB, -J4CC, -J4CD, -J4CE, -J4CF, -J4CG, -J4CH, -J4CI, -J4CJ, -J4CK, -J4CL, -J4CM, -J4CN, -J4CO, -J4CP, -J4CQ, -J4CR, -J4CS, -J4CT, -J4CU, -J4CV, -J4CW, -J4CX, -J4CY, -J4CZ, -J4DA, -J4DB, -J4DC, -J4DD, -J4DE, -J4DF, -J4DG, -J4DH, -J4DI, -J4DJ, -J4DK, -J4DL, -J4DM, -J4DN, -J4DO, -J4DP, -J4DQ, -J4DR, -J4DS, -J4DT, -J4DU, -J4DV, -J4DW, -J4DX, -J4DY, -J4DZ, -J4EA, -J4EB, -J4EC, -J4ED, -J4EE, -J4EF, -J4EG, -J4EH, -J4EI, -J4EJ, -J4EK, -J4EL, -J4EM, 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