

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

Instructions and Cautions for Safe Use of AC Servos

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.

2.1 Professional engineer
Only professional engineers should mount MR-J4 servo amplifiers. Here, professional engineers should meet the all conditions below.
(1) A person who has received training
Please note if you can take a proper engineering training at your local Mitsubishi Electric office. Contact your local sales office for schedules and locations.
(2) A person who can access to operating manuals for the protective devices (e.g. light curtain) connected to the safety control system. A person who have read and familiarized himself/herself with the manuals.

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 (STO), IEC/EN 61800-5-1, IEC/EN 61800-3, IEC/EN 60204-1
In addition, MR-J4 servo amplifiers can be used with the MR-J3-D05 safety logic unit or safety PLCs.

2.3 Correct use
Always use MR-J4 servo amplifiers with specificiations (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 It 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
(1) Local wiring and crimping tool
Use only copper wires rated at 60 °C/75 °C for wiring. The following table shows the wire sizes (AWG) and the crimp terminal symbols rated at 75 °C.

Servo amplifier		L1/L2/L3 ⊕	L1/L2/L1	P+/-	U/V/W/ ⊕ (Note 3)
MR-J4-60_4/MR-J4-100_4		14	14	14	14
MR-J4-200_4					
MR-J4-350_4					
MR-J4-500_4 (Note 1)		14: b	14: b	12: a	
MR-J4-700_4 (Note 1)			10: d		
MR-J4-11K_4 (Note 1)			14: e	8: t	
MR-J4-15K_4 (Note 1)			12: d	6: c	
MR-J4-22K_4 (Note 1)			6: g	4: f	

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

3. Select wire sizes depending on the rated output of the servo motors. The values in the table are sizes based on rated output of the servo amplifiers.

Table: Recommended crimp terminals

Symbol	Servo amplifier-side crimp terminals			Manufacturer
	Crimp terminal (Note)	Applicable tool	Body	
a	FVD5-5,4	YNT-1210S		
b	FVD2-4	YNT-1614		
c	FVD14-8	YF-1	YNE-38	DH-1220H-112
d	FVD5-5,6	YNT-1210S		
e	FVD2-6	YNT-1614		JST
f	FVD8-6	YF-1	YNE-38	DH-1210H-111
g	FVD14-8	YF-1	YNE-38	DH-1220H-112
h	FVD5-5,8	YNT-1210S		
i	FVD22-8	YF-1	YNE-38	DH-1230H-113

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 value and 480 V maximum, use T class fuses or molded-case circuit breaker (UL480 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. When you select a smaller capacity servo motor to connect it to the servo amplifier, you can also use smaller capacity T class fuses or molded-case circuit breaker than ones in the table. For selecting ones other than Class T fuses and molded-case circuit breakers below, refer to each servo amplifier instruction manual.

Servo amplifier	Molded-case circuit breaker (480 V AC)	Fuse (600 V)
MR-J4-60_4	NE100-HRU-5A (100 A frame 5 A)	10 A
MR-J4-100_4	NE100-HRU-5A (100 A frame 5 A)	10 A
MR-J4-200_4	NE100-HRU-10A (100 A frame 10 A)	15 A
MR-J4-350_4	NE100-HRU-10A (100 A frame 10 A)	20 A
MR-J4-500_4	NE100-HRU-15A (100 A frame 15 A)	30 A
MR-J4-700_4	NE100-HRU-20A (100 A frame 20 A)	40 A
MR-J4-11K_4	NE100-HRU-30A (100 A frame 30 A)	60 A
MR-J4-15K_4	NE100-HRU-40A (100 A frame 40 A)	80 A
MR-J4-22K_4	NE100-HRU-60A (100 A frame 60 A)	125 A

(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 ⊕) of the servo amplifier to the protective earth (PE) of the control circuit. Do not connect grounding cables to the main protective earth (PE) terminal. Always connect cables to the terminals one-to-one.

If using a leakage circuit breaker, always ground the protective earth (PE) terminal of the servo amplifier to prevent an electric shock. Only an RCD (earth-leakage current breaker) of type B can be used for the power supply side of the product.

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).

(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), connect them to a shielded ground. Use a EMC filter and surge protector on the primary side. The following shows recommended products. EMC filter: OMEKA series, Surge protector: OMEKA Electric Industries RSPD-250-U4 series

(2) For Declaration of Conformity (DoC)
Hereby, MITSUBISHI ELECTRIC EUROPE B.V., declares that the servo amplifiers are in compliance with the necessary requirements and standards (2006/42/EC, 2004/108/EC and 2006/95/EC). You can obtain the copy of Declaration of Conformity from our website.

2.3.3 USA/Canada compliance
This servo amplifier is designed in compliance with UL 508C and CSA C22.2 No.14 standards. Refer to MR-J4 Servo Amplifier Instruction Manuals for details of UL/CSA standards.

(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. The servo amplifier must be installed in the metal cabinet. Environment is open type (UL 50) and overvoltage category III. The servo amplifier needs to be installed at or below protection degree 2. Use copper conductors only.

(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.)

(4) Over-temperature protection for motor
This Drive Does Not Provide Motor Overtemperature Protection.

(5) Capacitor discharge time
Requires 15 minutes for capacitor discharging. Do not touch the unit and terminals immediately after power off.

(6) Branch circuit 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.

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) 전자파전파기기로서 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.)

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) When mounting, installing, and using the MELSERVO MR-J4 servo amplifier, always observe standards and directives applicable in the country.

(3) The MR-J4 servo amplifiers in the manual's policies should be observed.

(4) The MR-J4 servo amplifiers fulfill the requirements to conducted emissions at the main connections in the frequency range from 150 kHz to 30 MHz. (Bases for the evaluation: Product standard IEC/EN 61800, adjustable speed electrical power drive systems, Part 3: EMC)

2.5 Residual risk

(1) Be sure that all safety related switches, relays, sensors, etc., meet the required safety standards.

(2) All assessments and safety level certification to the machine or the system as a whole.

(3) If the upper and lower power module in the servo amplifier are shorted and damaged simultaneously, the servo motor may make a half revolution at a maximum.

(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)

1. About the manuals

1.1 MELSERVO-J4 relevant manuals

This installation guide explains how to mount MR-J4 servo amplifiers. You can also check it with our website for free.

<http://www.mitsubishielectric.com/mfa/>

If you have any questions about the operation or programming of the equipment described in this guide, contact your local sales office.

In addition, when you mount a protective device, specific technical skills which are not detailed in the guide will be required.

1.2 Purpose of this guide

This installation guide explains the safe operation of MR-J4 servo amplifiers for engineers of machinery manufacturers

and machine operators. This installation guide does not explain how to operate machines in which safe servo system is,

or will be integrated. For detailed information of the products, refer to each servo amplifier instruction manual.

1.3 Terms related to safety

1.3.1 IEC 61800-5-2 Stop function

The MR-J4 servo amplifiers have the STO function. The STO function shuts down energy to servo motors, thus removing torque. This function electronically cuts off power supply in the servo amplifier.

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.

(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

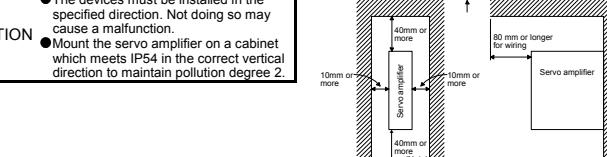
Disposal of unusable or irreparable devices should always occur in accordance with the applicable country-specific waste disposal regulations. (Example: European Waste 16 02 14)

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). The battery options (MR-BATV61SET and MR-BAT6V1) are assembled batteries from lithium metal battery CR1735A which are not subject to the dangerous goods (Class 9) of the UN Recommendations.

3. Mounting/dismounting

Installation direction and clearances



Note: For 11 kW to 22 kW servo amplifiers, the clearance between the bottom and ground will be 120 mm or more.

4. Electrical Installation and configuration diagram

WARNING Turn off the molded-case circuit breaker (MCCB) to avoid electrical shocks or damages to the product before starting the installation or wiring.

CAUTION The installation complies with IEC/EN 60204-1. The voltage supply to machines must be 20 ms of immunity to instantaneous