



MITSUBISHI ELECTRIC
General-Purpose AC Servo
MELSERVO-JN Series

MR-JN-10A/MR-JN-20A/MR-JN-40A
MR-JN-10A1/MR-JN-20A1

Instructions and Cautions for Safe Use of AC Servos

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1. About the manual

1.1 MELSERVO-JN relevant manual
This installation guide explains how to mount MR-JN servo amplifiers. 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-JN servo amplifiers for engineers of machinery manufacturers and machine operators. For detailed information of the products, refer to "MR-JN_A Servo Amplifier Instruction Manual".

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 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 physical damage.

2.1 Professional engineer

Only professional engineers should mount MR-JN servo amplifiers. Here, professional engineers should meet the all conditions below.
(1) Persons who took a proper training of related work of electrical equipment or persons who can avoid risk based on past experience.

(2) Persons who have read and familiarized himself/herself with this installation guide.

2.2 Applications of the device
MR-JN servo amplifiers comply with the following standards.
IEC/EN 61800-5-1, IEC/EN 61800-3

2.3 Correct use

Always use the MR-JN servo amplifiers within specifications (voltage, temperature, etc. Refer to "MR-JN_A Servo Amplifier 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 maximum for capacitor discharging. Do not touch the unit and terminals immediately after power off.

2.3.1 Selection of peripheral equipment and wire
The followings are selected based on IEC/EN 61800-5-1, UL 508C, and CSA C22.2 No. 14.

(1) Local wiring
The following table shows the stranded wires [AWG] rated at 75 °C/60 °C.

Servo amplifier	75 °C/60 °C stranded wires [AWG]			
	(Note 2) L1/L2/L3(φ)	P+/-C	(Note 1, 2) UV/W(φ)	P/C
MR-JN-10A(1)/MR-JN-20A(1)/MR-JN-40A	14/14	14/14	(Note 3) 14/14	14/14

- Note
- Select wire sizes depending on the rated output of the servo motors. The values in the table are sizes based on the rated output of the servo amplifiers.
 - The following shows the PE terminal specifications of the servo amplifier.
Screw size: M4
Tightening torque: 1.2 [N·m]
Recommended crimp terminal: R2-4 (JST)
Crimping tool: YPT-60-21 (JST)
 - To wire with the servo motor, use LE-CSM (option). To extend the wiring, use the AWG14 wire size.

(2) Selection example of MCCB and fuse
Use a fuse (T class) or the molded-case circuit breaker (UL 489 Listed MCCB) indicated in the table below. 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 "MR-JN_A Servo Amplifier Instruction Manual".

Servo amplifier	Molded-case circuit breaker (240 V AC)	Fuse (300 V)
MR-JN-10A	NF50-SVFU-SA (50 A frame 5 A)	10 A
MR-JN-20A/MR-JN-10A1	NF50-SVFU-10A (50 A frame 10 A)	15 A
MR-JN-40A/MR-JN-20A1	NF50-SVFU-15A (50 A frame 15 A)	20 A

(3) Power supply
This servo amplifier can be supplied from star-connected supply with grounded neutral point of overvoltage category set forth in IEC/EN 60664-1 and shown in the table of section 8.1. However, when you use the neutral point for single phase supply, a reinforced insulating transformer is required in the power input section. 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 cabinet. Do not connect two grounding cables to the same protective earth (PE) terminal. Always connect cables to the terminals one-to-one. If using an earth-leakage current breaker, always ground the protective earth (PE) terminal of the servo amplifier to prevent an electric shock. This product can cause a DC current in the protective earthing conductor. To protect direct/indirect contact using an earth-leakage current breaker (RCD), only an RCD of type B can be used for the power supply side of the product.

2.3.2 EU compliance
The MR-JN servo amplifiers are designed to comply with the following directions to meet requirements for mounting, using, and periodic technical inspections: EMC directive (2014/30/EU) and Low-voltage directive (2014/35/EU).

(1) EMC requirement
MR-JN servo amplifiers comply with category C3 in accordance with IEC/EN 61800-3. Install an EMC filter and surge protector on the primary side of the servo amplifier. As for I/O signal wires (max. length 10 m) and encoder cables (max. length 50 m), use shielded wires and ground the shields. The following shows recommended products.

EMC filter: Soshin Electric HF3000A-UN series

Surge protector: Okaya Electric Industries RSPD series

MR-JN servo amplifiers are not intended to be used on a low-voltage public network which supplies domestic premises; Radio frequency interference is expected if it is used on such a network. The installer shall provide a guide for installation and use, including recommended mitigation devices. To avoid the risk of crosstalk to signal cables, the installation instructions shall either recommend that the power interface cable be segregated from signal cables.

(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 (2014/30/EU and 2014/35/EU). For the copy of Declaration of Conformity, contact your local sales office.

2.3.3 USA/Canada compliance
This servo amplifier is designed in compliance with UL 508C and CSA C22.2 No. 14.

- Installation
The minimum cabinet size is 150% of the MR-JN 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 a metal cabinet. Additionally, mount the servo amplifier on a cabinet that the protective earth based on the standard of IEC/EN 60204-1 is correctly connected. For environment, the units should be used in open type (UL 50) and overvoltage category shown in table in section 8.1. The servo amplifier needs to be installed at or below of pollution degree 2. For connection, use only copper wires.
- 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.
- Overload protection characteristics
The MR-JN servo amplifiers have servo motor overload protective function. (It is set on the basis (full load current) of 120% rated current of the servo amplifier.)
- Over-temperature protection for motor
Motor Over temperature sensing is not provided by the drive. Integral thermal protection(s) is necessary for motor. Refer to chapter 4 for details of the proper connections.
- Branch circuit protection
For installation in the 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 열용량 (열)이 적기 때문에 기기 사용 시 먼 매사 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-JN servo amplifiers.

- Only qualified personnel and professional engineers should perform system installation.
- When mounting, installing, and using the MELSERVO MR-JN servo amplifier, always observe applicable standards and directives in the country.

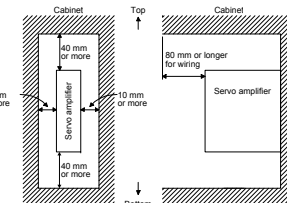
2.5 Disposal
Disposal of unusable or irreparable devices should always occur in accordance with the applicable country-specific waste disposal regulations. (Example: European Waste 16 02 04)

3. Mounting/dismounting

Installation direction and clearances

CAUTION 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.

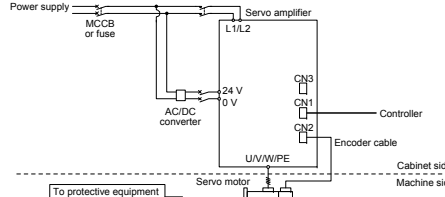


4. Electrical Installation and configuration diagram

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 Connecting a servo motor of the wrong axis to U, V, W, or CN2 of the servo amplifier may cause a malfunction.

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



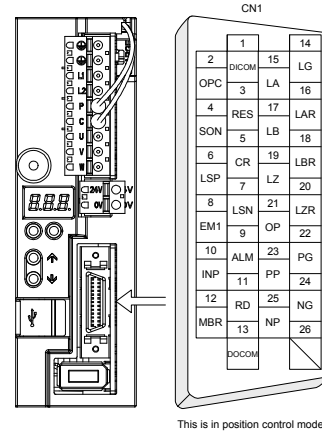
Note. Please use a thermal sensor, etc. for thermal protection of the servo motor.

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

HF-KN/HF-KP series servo motors (Mfg.: Mitsubishi Electric)

5. Signals

The following shows CN1 connector signals as a typical example. For the other connector details, refer to "MR-JN_A Servo Amplifier Instruction Manual".



This is in position control mode.

6. Maintenance and service

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

6.1 Inspection items
It is recommended that the following points periodically be checked.

- Check servo motor bearings, brake section, etc. for unusual noise.
- Check the cables and the like for scratches or cracks. Perform periodic inspection according to operating conditions.
- Check that the connectors are securely connected to the servo motor.
- Check that the wires are not coming out from the connector.
- Check for dust accumulation on the servo amplifier.
- Check for unusual noise generated from the servo amplifier.
- Check the servo motor shaft and coupling for connection.
- Make sure that the emergency stop circuit operates properly such that an operation can be stopped immediately and a power is shut off by the emergency stop switch.

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

Part name	Life guideline
Smoothing capacitor	(Note) 10 years
Relay	Number of power-on times and forced stop times: 100,000 in total

Note. 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 (40 °C surrounding air temperature or less).

7. Transportation and storage

CAUTION

- Transport the products correctly according to their mass.
- Stacking in excess of the limited number of product packages is not allowed.
- Install the product in a load-bearing place of servo amplifier and servo motor in accordance with the instruction manual.
- Do not put excessive load on the machine.
- Do not hold the lead wire of the built-in regenerative resistor when transporting the servo amplifier.

When you keep or use the product, please fulfill the following environment.

Item	Environment
Ambient temperature	Operation: 0 to 55 Class 3K3 (IEC/EN 60721-3-3) Transportation (Note): -20 to 65 Class 2K4 (IEC/EN 60721-3-2) Storage (Note): -20 to 65 Class 1K4 (IEC/EN 60721-3-1)
Ambient humidity	Operation, transportation, storage: 5 %RH to 90 %RH
Vibration resistance	Test condition: 10 Hz to 57 Hz with constant amplitude of 0.075 mm 57 Hz to 150 Hz with constant acceleration of 9.8 m/s ² to IEC/EN 61800-5-1 (Test Fc of IEC 60068-2-6) Operation: 5.9 m/s ² Transportation (Note): Class 2M5 (IEC/EN 60721-3-2) Storage: Class 1M2 (IEC/EN 60721-3-2)
Pollution degree	2
IP rating	IP20 (IEC/EN 60529)
Altitude	Operation, storage: 10000 m or less above sea level Transportation: 10000 m or less above sea level

Note. In regular transport packaging

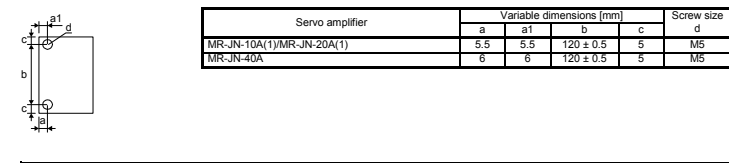
8. Technical data

8.1 MR-JN servo amplifier

Item	MR-JN-10A/MR-JN-20A/MR-JN-40A	MR-JN-10A1/MR-JN-20A1
Power supply	Main circuit (line voltage): 1-phase 200 V AC to 230 V AC, 50 Hz/60 Hz Control circuit: 24 V DC Interface (SELV): 24 V DC	1-phase 100 V AC to 120 V AC, 50 Hz/60 Hz
Control method	Sine-wave PWM control, current control method	
Pollution degree	2 (IEC/EN 60664-1)	
Overvoltage category	III (IEC/EN 60664-1)	
Protective class	I (IEC/EN 61800-5-1)	
Short-circuit current rating (SCCR)	100 kA	

8.2 Dimensions/mounting hole process drawing

Servo amplifier	Variable dimension table [mm]			Mass [kg]
	W	H	D	
MR-JN-10A(1)/MR-JN-20A(1)	40	130	135	0.6
MR-JN-40A	50	130	135	0.7



Servo amplifier	Variable dimensions [mm]				Screw size
	a	a1	b	c	
MR-JN-10A(1)/MR-JN-20A(1)	5.5	5.5	120 ± 0.5	5	M5
MR-JN-40A	6	6	120 ± 0.5	5	M5

[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 are 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]
- 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.
 - 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.
 - Even during the term of warranty, the repair cost will be charged on you in the following cases.
 - a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
 - a failure caused by any alteration, etc. to the Product made on your side without our approval
 - 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
 - a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
 - any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
 - 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
 - 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
 - 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 loss in opportunity and secondary loss from warranty liability
Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:
(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

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.

Warning plate
The following shows an example of warning plate.

WARNING 警告

- NEVER OR ELECTRIC SHOCK. DO NOT TOUCH UNIT AND WIRING IMMEDIATELY AFTER POWER OFF. CAPACITOR DISCHARGE TIME IS APPROX 15 MINUTES.
- NE PAS TOUCHER L'APPAREIL IMMEDIATEMENT APRÈS L'ARRÊT DE L'ALIMENTATION ÉLECTRIQUE. LE CAPACITEUR SE DÉCHARGE. LE TEMPS APPROXIMATIF EST DE 15 MINUTES.
- 電撃の恐れあり。電源切断直後にもケーブルや端子部を触れないこと。コンデンサ放電時間15分。
- ALWAYS CONNECT PROTECTIVE EARTH (PE) FOR PROTECTION AGAINST SHOCK.
- TOUJOURS BRANCHER LA TERRE (PE) AU CONDUCTEUR DE PROTECTION.
- 必ず接地線を。请务必進行線保護線（PE）に接続してください。接地線の接続は必ず行ってください。
- DO NOT TOUCH HEATKING.
- NE PAS TOUCHER LE DISPOSITIF THERMIQUE.
- 加熱部には触れないこと。高温の恐れあり。
- ONLY 5 TYPE RCD IS ALLOWED.
- SEUL LE TYPE 5 DE DISPOSITIF À SENSIBILITÉ DE 5 mA EST AUTORISÉ.
- 只有5类型的（漏電保护器）RCD允许。
- 只有5mA灵敏度的漏电保护器才可以使用。
- REFER TO MANUAL BEFORE INSTALLATION OR SERVICING.
- HÉRI DE CONSULTER LE MANUEL D'INSTALLATION AVANT L'INSTALLATION OU L'ENTRETIEN.
- 在安装及维护前，请参考手册。
- 配線と保守サービスの前に、マニュアルを参照すること。

Model
The following describes what each block of a model name indicates. Not all combinations of the symbols are available.

