

MR-J4 Multi-axis Servo amplifier

MR-J4W2-22B to MR-J4W2-1010B
MR-J4W3-222B and MR-J4W3-444B

Instructions and Cautions for Safe Use of AC Servos

C

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2. COMPLIANCE WITH CE MARKING

This servo amplifier is designed to comply with EN61800-3 and EN61800-5-1 standard.

2.1 What is CE marking?

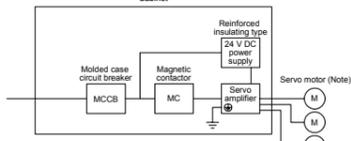
The CE marking is mandatory and must be affixed to specific products placed on the European Union. When a product conforms to the requirements, the CE marking must be affixed to the product. The CE marking also applies to machines and equipment incorporating servos.

- 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.
- Low voltage directive**
The low voltage directive applies also to servo units alone. This servo is designed to comply with the low voltage directive.
- Machinery directive (Compliance scheduled)**
The MR-J4 series servo amplifiers comply with the safety component laid down in the Machinery directive. Do not allow using the machine until the machine in which this servo amplifier is mounted is declared to comply with the machinery 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.

- Servo amplifiers and servo motors used**
Use servo amplifiers and servo motors which standard product.
Servo amplifier: MR-J4W2-22B, MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B, MR-J4W3-222B, MR-J4W3-444B
Servo motor: HG-MR_, HG-KR_, HG-SR_
- Structure**
To comply with the CE marking, configure each equipment as follows.



Note: This shows the MR-J4 3-axis servo amplifier. Two servo motors are connected for the MR-J4 2-axis servo amplifier.

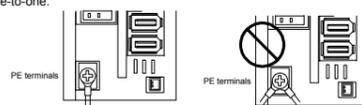
- Environment**
 - Operate the servo amplifier at pollution degree 2 or 1 set forth in EN 61800-5-1. For this purpose, install the servo amplifier in a cabinet which is protected against water, oil, carbon, dust, dirt, etc. (IP54).
 - Use the equipment under the following environment.

Item	Operation		Environment	
	[°C]	[°F]	[°C]	[°F]
(Note) Ambient temperature	Operation	0 to 55 (non-freezing)	32 to 131 (non-freezing)	
	Storage	-20 to 65 (non-freezing)		
	Transportation	-4 to 149 (non-freezing)		
Ambient humidity	Operation, Storage, Transportation	90%RH or less (non-condensing)		
	Altitude	Operation, Storage, Transportation	1000 m or less 10000 m or less	

Note: Ambient temperature is the internal temperature of the cabinet.

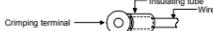
- Power supply**
 - This servo amplifier can be supplied from star-connected supply with grounded neutral point of overvoltage category III set forth in EN 61800-5-1. However, when using the neutral point of 400 V system for single phase supply, a reinforced insulating transformer is required in the power input section.
 - The control circuit provides safe separation to the main circuit in the servo amplifier. For the interface power supply, use a 24 V DC power supply with reinforced insulation on I/O terminals.

- Grounding**
 - To prevent an electric shock, always connect the protective earth (PE) terminal of the CNP3 connector of the servo amplifier for grounding. Connect the grounding lead wire from the servo motor to the protective earth (PE) terminal of the servo amplifier terminal block, and then connect the wire from the servo amplifier to the ground via the protective earth (PE) of the cabinet.
 - Do not connect two ground cable to the same protective earth (PE) terminal. Always connect cables to the terminals one-to-one.



- If a leakage current breaker is used, always ground the protective earth (PE) terminal of the servo amplifier to prevent an electric shock.

- Wiring**
 - 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.



- Use the servo motor-side power connector which complies with EN. The EN compliant power connector sets are available from us as options.
- The servo amplifier must be installed in the metal cabinet.

- Peripheral devices, options**
 - Use the molded case circuit breaker and magnetic contactor models which are EN Standard-compliant products given in the MR-J4 Series Servo Amplifier Instruction Manual. Use a residual current device (RCD) of type B as necessary. When it is not used, provide insulation between the servo amplifier and other device by double insulation or reinforced insulation, or install a transformer between the main power supply and the servo amplifier. Refer to Chapter 3 (7) for the compliance with molded case circuit breaker and fuse.
 - The sizes of the wires given in the MR-J4 Series Servo Amplifier Instruction Manual meet the following conditions. For use in any other conditions, follow Table 6 and Annex D of EN 60204-1.
 - Ambient temperature: 40 °C (104 °F)
 - Insulator: PVC (polyvinyl chloride)
 - Route the wires on wall surface or open cable tray.
 - Use shielded wires for the power wires.
 - Use the HF3000A-UN series EMC filter manufactured by Soshin Electric.
 - Use a RSPD-250-U4 surge protector manufactured by Okaya Electric Industries.

- Performing EMC tests**
When EMC tests are run on a machine/device into which the servo amplifier has been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has satisfied the operating environment/electrical equipment specifications.

- Short circuit rating (SCCR: Short Circuit Current Rating)**
We confirmed in the short-circuit test that this servo amplifier is suitable for use in a circuit rated at 100 kA RMS or less, and maximum voltage 500 V.

- Configuration diagram**
Refer to Chapter 3 (8) for the compliance with configuration diagram.

3. COMPLIANCE WITH UL/CSA STANDARD

For the situation of safety certification, contact your local sales office.
This servo amplifier is designed to comply with UL 508C and CSA C22.2 No.14 standard.

- Servo amplifiers and servo motors used**
Use servo amplifiers and servo motors which standard product.

Servo amplifier	Servo motor		
	HG-MR	HG-KR	HG-SR
MR-J4W2-22B	053/13/23		
MR-J4W2-44B	053/13/23/43		
MR-J4W2-77B			51/52
MR-J4W2-1010B	43/73		51/52/81/102
MR-J4W3-222B	053/13/23		
MR-J4W3-444B	053/13/23/43		

- Installation**
The MR-J4 series have been approved as the products which have been installed in a cabinet. The minimum cabinet size is based on 150% of each MR-J4 combination. And also, design the cabinet so that the ambient temperature in the cabinet is 55 °C (131 °F) or less. The servo amplifier must be installed in the metal cabinet. To ensure safety, do not touch the charging section for 15 minutes after power-off.

Item	Environment	
	Operation	[°C] / [°F]
(Note) Ambient temperature	Operation	0 to 55 (non-freezing)
	Storage, Transportation	32 to 131 (non-freezing)
	Storage, Transportation	-20 to 65 (non-freezing)
Ambient humidity	Operation, Storage, Transportation	90%RH or less (non-condensing)
	Altitude	Operation, Storage, Transportation

Note: Ambient temperature is the internal temperature of the cabinet.

- Short circuit rating (SCCR: Short Circuit Current Rating)**
We confirmed in the short-circuit test that this servo amplifier is suitable for use in a circuit rated at 100 kA RMS or less, and maximum voltage 500 V.

- Overload protection characteristics**
Servo amplifier MR-J4W series has solid-state servo motor overload protection for each axis. (It is set on the basis (full load current) of 120% rated current of the servo amplifier.)

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

Servo amplifier	Wire (AWG)			
	(Note 1) L1/L2/L3/⊕	L11/L21	P+/C/D	U/V/W/⊕
MR-J4W2-22B				
MR-J4W2-44B				
MR-J4W2-77B		14		(Note 2)
MR-J4W2-1010B				
MR-J4W3-222B				
MR-J4W3-444B				

- Note 1. Use the crimping terminal specified as below for the PE terminal of the servo amplifier.
Crimping terminal: FVD2-4
Tool (body): YNT-1614
Manufacturer: JST
Tightening torque: 1.2 [N·m]
- Note 2. The wire size depends on the servo motor characteristics.

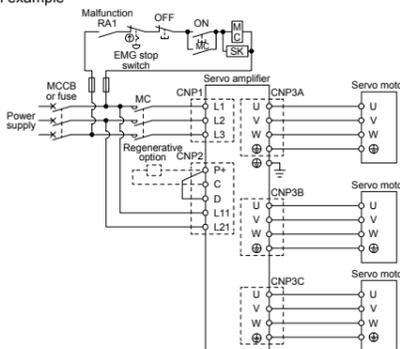
- About wiring protection**
For installation in United States, branch circuit protection must be provided, in accordance with the National Electrical Code and any applicable local codes.
For installation in Canada, branch circuit protection must be provided, in accordance with the Canada Electrical Code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

- Options, peripheral devices**
Use the UL/CSA Standard-compliant products.
Use the molded case circuit breaker (UL489 Listed MCCB) or a Class T fuse indicated in the table below.

Servo motor total output	Molded case circuit breaker		Fuse	
	Current	Voltage AC [V]	Current [A]	Voltage AC [V]
400 W or less	50 A frame 5 A	240	10	300
From over 400 W to 900 W	50 A frame 10 A		15	
From over 900 W to 1.6 kW	50 A frame 15 A		20	
From over 1.6 kW to 2 kW	50 A frame 20 A		30	

Servo motor total output	Molded case circuit breaker		Fuse	
	Current	Voltage AC [V]	Current [A]	Voltage AC [V]
400 W or less	50 A frame 5 A	240	10	300
From over 400 W to 900 W	50 A frame 10 A		15	
From over 900 W to 1.2 kW	50 A frame 15 A		20	

- Connection example**



- Power supply**
The control circuit provides safe separation to the main circuit in the servo amplifier.

	Connector/terminal
Main circuit	CNP1 · CNP2 · CNP3A · CNP3B · CNP3C
Control circuit	CN1A · CN1B · CN2A · CN2B · CN2C · CN3 · CN4 · CN5 · CN8

4. COMPLIANCE WITH KC MARK

For the situation of compliance, contact your local sales office.
Note the following when using the product in South Korea.

이 기기는 업무용 (A급) 전자파적합기기로서 판 매자 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.)

5. INSPECTION

WARNING

- Before starting maintenance and/or inspection, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.
- To avoid an electric shock, only qualified personnel should attempt inspections. For repair and parts replacement, contact your local sales office.

CAUTION

- 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.

- Inspection**
It is recommend that the following points periodically be checked.
 - Check for loose terminal block screws. Retighten any loose screws.
 - Check the cables and the like for scratches and cracks. Inspect them periodically according to operating conditions especially when the servo motor is movable.
 - Check that the connector is securely connected to the servo amplifier.
 - 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.

- Parts having service lives**
Service lives of the following parts are listed below. However, the service lives vary depending on operating methods 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.

Part name	Life guideline	
Smoothing capacitor	10 years	
Relay	Number of power-on and number of emergency stop times: 100,000 times Number of on and off for STO: 1,000,000 times	
Cooling fan	50,000 hours to 70,000 hours (7 years to 8 years)	
(Note 1) Battery backup time	Rotary servo motor	Approximately 40,000 hours/2 axes, 30,000 hours/3 axes, or 10,000 hours/8 axes (equipment power supply: off, ambient temperature: 20 °C (68 °F))
	Direct drive motor	Approximately 10,000 hours/2 axes, 7,000 hours/3 axes, or 2,000 hours/8 axes (equipment power supply: off, ambient temperature: 20 °C (68 °F))
(Note 2) Battery life	5 years from date of manufacture	

- Note 1. The data-holding time using five batteries of MR-BAT6V1 on condition that the power supply of the servo amplifier is off. Replace the batteries within 3 years since the operation start whether the power supply of the servo amplifier is on/off.
- Note 2. Quality of the batteries degrades by the storage condition. The battery life is 5 years from the production date regardless of the connection status.

- 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 (40 °C (104 °F) surrounding air temperature or less).
- Relays**
Contact faults will occur due to contact wear arisen from switching currents. Relays reach the end of their lives when the power is turned on and emergency stop occurs 100,000 times in total, or when the STO has been turned on and off 1,000,000 times while the servo motor is stopped under servo-off state. However, the lives of relays may depend on the power supply capacity.
- Servo amplifier cooling fan**
The cooling fan bearings reach the end of their life in 50,000 hours to 70,000 hours. Normally, therefore, the cooling fan must be changed in seven or eight years of continuous operation as a guideline. It must also be changed if unusual noise or vibration is found during inspection. The life indicates under the yearly average ambient temperature of 40 °C (104 °F), free from corrosive gas, flammable gas, oil mist, dust and dirt.

6. ALARM/WARNING

For details on each type of alarms or warnings, refer to MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting).

DISPOSAL OF WASTE

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

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).

EER-ROM life

The number of write times to the EER-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 may malfunction when the EER-ROM reaches the end of its useful life.

- Write to the EER-ROM due to parameter setting changes
- Write to the EER-ROM due to device changes

1.1 Introduction to the manuals

If this is the first time for you to use the MELSERVO-J4 Series, read the following manuals before use. Please read them all carefully to use the MELSERVO-J4 Series safely.

Manual name	Manual No.
MELSERVO-J4W-B Servo Amplifier Instruction Manual	SH(NA)030105
MELSERVO-J4 Servo Amplifier Instruction Manual (Troubleshooting)	SH(NA)030109
MELSERVO Servo Motor Instruction Manual (Vol.3)(Note1)	SH(NA)030113
MELSERVO Linear Servo Motor Instruction Manual (Note 2)	SH(NA)030110
MELSERVO Linear Encoder Instruction Manual (Note 2, 4)	SH(NA)030111
MELSERVO Direct Drive Motor Instruction Manual (Note 3)	SH(NA)030112

- It is necessary for using a rotary servo motor.
- It is necessary for using a linear servo motor.
- It is necessary for using a direct drive motor.
- It is necessary for using a fully closed loop system (available in the future).

1.2 Contents of the packing

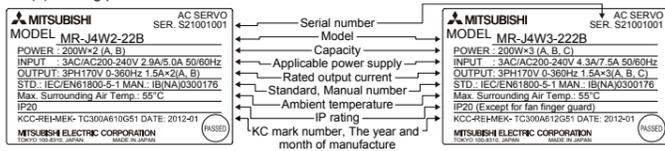
Unpack the product and check the rating plate to see if the servo motor is as you ordered.

Contents	Quantity
Servo amplifier	1
Servo amplifier power supply connector CNP1/CNP2/CNP3A/CNP3B/CNP3C (Note)	1 each
Open tool for servo amplifier power supply connector	1
MELSERVO-J4 Series Instructions and Cautions for Safe Use of AC Servos (This installation guide)	1
Short-circuit connector CN8	1

Note: CNP3C is for MR-J4 3-axis servo amplifier.

1.3 Model code definition

(1) Rating plate



MR-J4 2-axis servo amplifier

MR-J4 3-axis servo amplifier

(2) Model

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

Series		Rated output	
Symbol	Number of axis	Symbol	Rated output [kW]
W2	2	22	0.2
W3	3	44	0.4
		77	0.75
		1010	1
		222	0.2
		444	0.4

Safety Instructions

Please read the instructions carefully before using the equipment.

To use the equipment correctly, do not attempt to install, operate, maintain, or inspect the equipment until you have read through this installation guide and appended documents carefully. Do not use the servo amplifier and servo motor until you have a full knowledge of the equipment, safety information and instructions.

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

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.

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 installation guide, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT".

After reading this installation guide, keep it accessible to the operator.

1. To prevent electric shock, note the following

WARNING

- Before wiring and inspections, turn off the power and wait for 15 minutes or more until the charge lamp turns off. Otherwise, an electric shock may occur. In addition, when confirming whether the charge lamp is off or not, always confirm it from the front of the servo amplifier.
- Ground the servo amplifier and servo motor securely.
- Any person who is involved in wiring and inspection should be fully competent to do the work.
- Do not attempt to wire the servo amplifier and servo motor until they have been installed. Otherwise, it may cause an electric shock.
- Do not operate switches with wet hands. Otherwise, it may cause an electric shock.
- The cables should not be damaged, stressed loaded, or pinched. Otherwise, it may cause an electric shock.
- 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.
- When using a residual current device (RCD), select the type B.
- To avoid an electric shock, insulate the connections of the power supply terminals.

2. To prevent fire, note the following

CAUTION

- Install the 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 power supply and the main circuit power supply (L1, L2, and L3) of the servo amplifier, in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause a fire when the servo amplifier malfunctions.
- When using the regenerative resistor, switch power off with the alarm signal. Not doing so may cause a fire when a regenerative transistor malfunctions or the like may overheat the regenerative resistor.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.
- Always connect a molded case circuit breaker to the power supply of the servo amplifier.

3. To prevent injury, note the following

CAUTION

- Only the voltage specified in the Instruction Manual should be applied to each terminal. Otherwise, a burst, damage, etc. may occur.
- Connect cables to correct terminals. Otherwise, a burst, damage, etc. may occur.
- Ensure that polarity (+/-) is correct. Otherwise, a burst, damage, etc. may occur.
- The servo amplifier heat sink, regenerative resistor, servo motor, etc. may be hot while power is on or for some time after power-off. Take safety measures, e.g. provide covers, to prevent accidental contact of hands and parts (cables, etc.) with them. Otherwise, it may cause a burn injury and parts damaged.

4. Additional instructions

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

(1) Transportation and installation

CAUTION

- Transport the products correctly according to their mass.
- Stacking in excess of the limited number of product packages is not allowed.
- 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.
- The equipment must be installed in the specified direction.
- Leave specified clearances between the servo amplifier and cabinet walls or other equipment.
- Do not install or operate the servo amplifier and servo motor which have been damaged or have any parts missing.
- When you keep or use it, please fulfill the following environment.

Item		Environment	
Ambient temperature	Operation	[°C]	0 to 55 (non-freezing)
		[°F]	32 to 131 (non-freezing)
	Storage	[°C]	-20 to 65 (non-freezing)
		[°F]	-4 to 149 (non-freezing)
Ambient humidity	Operation	90% RH or less (non-condensing)	
	Storage		
Ambience		Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust and dirt	
Altitude		Max. 1000 m above sea level	
Vibration		5.9 m/s ² or less at 10 Hz to 55 Hz (directions of X, Y, and Z axes)	

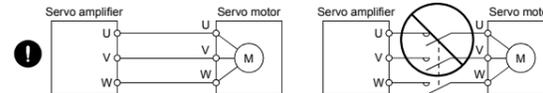
CAUTION

- Do not block the intake and exhaust areas of the servo amplifier. Otherwise, it may cause a malfunction.
- Do not drop or strike the servo amplifier or servo motor. Isolate them from all impact loads.
- When the equipment has been stored for an extended period of time, contact your local sales office.
- When handling the servo amplifier, be careful about the edged parts such as corners of the servo amplifier.
- The servo amplifier must be installed in the metal cabinet.

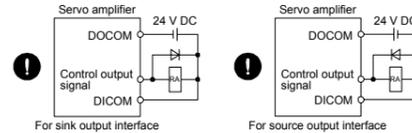
(2) Wiring

CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Do not install a power capacitor, surge killer or radio noise filter (FR-BIF option) on the servo amplifier output side.
- To avoid a malfunction, connect the wires to the correct phase terminals (U, V, and W) of the servo amplifier and servo motor.
- Connect the servo amplifier power output (U, V, and W) to the servo motor power input (U, V, and W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.



- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.



- When the cable is not tightened enough to the terminal block, the cable or terminal block may generate heat because of the poor contact. Be sure to tighten the cable with specified torque.

(3) Test run and adjustment

CAUTION

- 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

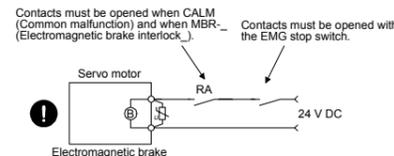
CAUTION

- Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.
- Do not disassemble, repair, or modify the equipment.
- Before resetting an alarm, make sure that the run signal of the servo amplifier is off in order to prevent a sudden restart. Otherwise, it may cause an accident.
- Use a noise filter, etc. to minimize the influence of electromagnetic interference. Electromagnetic interference may be given to electronic equipment used near the servo amplifier.
- Burning or breaking a servo amplifier may cause a toxic gas. Do not burn or break a servo amplifier.
- Use the servo amplifier with the specified servo motor.
- The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.
- For such reasons as service life and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.

(5) Corrective actions

CAUTION

- When it is assumed that a hazardous condition may occur due to a power failure or product malfunction, use a servo motor with an electromagnetic brake or external brake to prevent the condition.
- Configure an electromagnetic brake circuit so that it is activated also by an external EMG stop switch.



- When any alarm has occurred, eliminate its cause, ensure safety, and deactivate the alarm before restarting operation.
- Design the machine in order to avoid sudden restarting after an instantaneous power failure.

(6) Maintenance, inspection and parts replacement

CAUTION

- With age, the electrolytic capacitor of the servo amplifier will deteriorate. To prevent a secondary accident due to a malfunction, it is recommend that the electrolytic capacitor be replaced every 10 years when it is used in general environment.

(7) General instruction

- To illustrate details, the equipment in the diagrams of this installation 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 installation guide and Instruction Manual.

[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 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

- 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.
- 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

- 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.

- 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.