MITSUBISHI ELECTRIC

AC Servo System

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-JET

MR-JET Servo amplifier
Model
MR-JET-10G_ to MR-JET-300G_
MR-JET-60G4_ to MR-JET-700G4_

Safety Instructions and Precautions for AC Servos

F

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Specifications are subject to change without notice.
Compliance with the indicated global standards and regulations is current as of the release date of this installation guide.
The original instructions for Europe are in English.

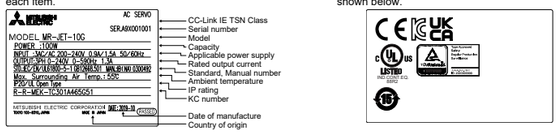
IB(NA)-0300492ENG-F(2503)

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

Contents	Quantity
Servo amplifier	1
MR-JET Series Safety Instructions and Precautions for AC Servos (This guide)	1

Rating plate
The following shows an example of rating plate for explanation of each item.



Regulation/legislation marking
An example of regulation/legislation marking is shown below.

Warning plate
The following shows an example of warning plate.



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

MR-JET-10G -

Series

Rated output

Symbol	Rated output [kW]
10	0.1
20	0.2
40	0.4
60	0.6
70	0.75
100	1
200	2
300	3
350	3.5
500	5
700	7

Power supply

Symbol	Power supply
None	3-phase or 1-phase 200 V AC to 240 V AC
4	3-phase 380 V AC to 480 V AC

Interface

Symbol	Interface
G	Network (Ethernet Type)

Software specification
Blank, Jn, Sn, Un, Nn, etc.
(1 to 6 digit alphanumeric)

Hardware special specification
Blank or 2 to 5 digit alphanumeric
(RJ, ED, PX, RU, RZ, etc.)

1. About the manuals

To use the MR-JET series safely, read MR-JET User's Manual carefully.

1.1 MR-JET relevant manuals

This installation guide explains how to mount MR-JET servo amplifiers.
If you have any questions about the operation and 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-JET servo amplifiers for engineers of machinery manufacturers and machine operators. For detailed information of the products, refer to MR-JET User's 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.

In this installation guide, cautionary items such as precautions that may lead to property damages, and instructions for other functions are classified as "POINT".

2.1 Professional engineer

Only professional engineers should mount MR-JET servo amplifiers.
Here, professional engineers should meet all the 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 and operating manuals for the protective devices (e.g. light curtain) connected to the safety control system.

2.2 Applications of the devices

MR-JET servo amplifiers are used to drive servo motors, and comply with the standards shown below.
• IEC/EN 61800-5-1/GB 12668.501, IEC/EN 61800-3/GB 12668.3/KN 61800-3 (KS C 9800-3)

2.3 Correct use

Use the MR-JET servo amplifiers within specifications. Refer to MR-JET User's Manual for specifications such as voltage, temperature, etc. 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	●Risk of electrical shock. Do not touch drive unit and terminals immediately after power-off. Allow approx. 15 minutes for capacitor to discharge.

2.3.1 Peripheral device and power wiring

The followings are selected based on IEC/EN/UL 61800-5-1, and CSA C22.2 No. 274.

(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.

Table 1. Recommended wires

Servo amplifier *2	75 °C stranded wire [AWG] *4			
	L1/L2/L3/⏚	L11/L21	P+/C	U/V/W/⏚ *1
MR-JET-10G_/MR-JET-20G_/MR-JET-40G_/MR-JET-70G_/MR-JET-100G_/MR-JET-200G_(T)	14: a *3		14	14: a *3
MR-JET-200G_ (S)/MR-JET-300G_	12: b *3			
MR-JET-60G4_/MR-JET-100G4_/MR-JET-200G4_/MR-JET-350G4_	14: a *3	14		12: b *3
MR-JET-500G4_				
MR-JET-700G4_	12: b *3			10: c *3

Table 2.
Recommended crimp terminals

Symbol	Servo amplifier-side crimp terminals		Manufacturer
	Crimp terminal	Applicable tool	
a	R2-4	YHT-2210	JST (J.S.T. Mfg. Co., Ltd.)
b	3.5-4	YHT-2210	
c	R5.5-4	YHT-2210	

*1 Optional cables provided by Mitsubishi Electric and Mitsubishi Electric System Service Co., Ltd. are available. The wire sizes can be selected based on the rated current of the servo motors. The values in the table are sizes based on rated output of the servo amplifiers.
*2 "(S)" means 1-phase 200 V AC power input and "(T)" means 3-phase 200 V AC power input in the table.
*3 The crimp terminals are used only for grounding
*4 The alphabetical letters in the table indicate the symbols of the recommended crimp terminals. Refer to Table 2 for recommended crimp terminals.

(2) Selection example of MCCB and semiconductor fuse
Use the semiconductor fuses or the molded-case circuit breakers shown in the following table. The semiconductor fuses and molded-case circuit breakers in the table are selection examples based on rated I/O of the servo amplifiers and are suitable for output servo motor conductor protection. The maximum rating of the servo motor branch short-circuit/ground-fault protective device can be selected based on the rated input current of the servo amplifier. When you select a smaller capacity servo motor to connect it to the servo amplifier, you can also use smaller capacity semiconductor fuses or molded-case circuit breaker than those listed in the table. For the selection of the semiconductor fuses and the molded-case circuit breakers that are not shown in the following table, refer to "MR-JET User's Manual (Hardware)".

Servo amplifier (200 V class) *1	Molded-case circuit breaker (240 V AC) SCCR 50 kA	Semiconductor fuse (700 V) SCCR 100 kA *2
MR-JET-10G_/MR-JET-20G_/MR-JET-40G_/MR-JET-70G_ (T)	NF125-SVU-15A (125 A frame 15 A)	170M1408 (10 A)
MR-JET-70G_ (S)/MR-JET-100G_ (T)	NF125-SVU-15A (125 A frame 15 A)	170M1409 (16 A)
MR-JET-100G_ (S)/MR-JET-200G_ (T)	NF125-SVU-15A (125 A frame 15 A)	170M1412 (32 A)
MR-JET-200G_ (S)/MR-JET-300G_	NF125-SVU-20A (125 A frame 20 A)	170M1413 (40 A)

*1 "(S)" means 1-phase 200 V AC power input and "(T)" means 3-phase 200 V AC power input in the table.
*2 For the use under the conditions of UL Listed, select a semiconductor fuse.

Servo amplifier (400 V class)	Molded-case circuit breaker (480 V AC) SCCR 30 kA	Semiconductor fuse (700 V) SCCR 100 kA
MR-JET-60G4_/MR-JET-100G4_	NF125-SVU-15A (125 A frame 15 A) *1	170M1408 (10 A)
MR-JET-200G4_	NF125-SVU-15A (125 A frame 15 A) *1	170M1409 (16 A)
MR-JET-350G4_	NF125-SVU-15A (125 A frame 15 A) *1	170M1412 (32 A)
MR-JET-500G4_	NF125-SVU-20A (125 A frame 20 A) *1	170M1413 (40 A)
MR-JET-700G4_	NF125-SVU-30A (125 A frame 30 A) *1	170M1414 (50 A)

*1 For the use under the conditions of UL Listed, select a semiconductor fuse.

(3) Power supply
This servo amplifier can be supplied from star-connected supply with grounded neutral point of overvoltage category III. 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.
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.



(5) Motor overload and Over temperature protection
The overload protection of the servo motor does not include a thermal memory function, and is not speed sensitive. The servo amplifier cannot detect overheating of the servo motor. The servo motors are protected by the servo motor overheat protection function of the servo amplifiers (a protection characteristic based on 120 % of the rated current). To provide the servo motor with overheat protection, use a magnetic contactor (electromagnetic switch) with a thermal relay. Alternatively, install a thermal sensor or equivalent equipment near the rating plate of the servo motor to check that the servo motor temperature is under 105 °C with sensing device. (Refer to Chapter 4)

2.3.2 Europe/UK compliance

The CE/UKCA marking proves the compliance of the servo product with the essential requirements specified in the relevant EU Directives and UK Regulations, and this marking also applies to machines and equipment incorporating servos.

(1) EMC requirement
MR-JET servo amplifiers comply with EN/BS EN IEC 61800-3. As for I/O wires (max. length 10 m), motor cables and encoder cables (max. length 50 m), use shielded wires and ground the shields. Install the surge protector on the primary side of the EMC filter. The recommended products are as follows:
EMC filter: COSEL FSB Series or Soshin Electric HF3000C-SZB series
Surge protector: Okaya Electric Industries RSPD series
Line noise filter: Mitsubishi Electric FR-BIF
MR-JET Series are not intended to be used on a low-voltage network which supplies domestic premises; electromagnetic interference is expected if 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. Install the DC power supply for I/O signals of the servo amplifiers in the same cabinet. Do not connect the other electric devices to the DC power supply.

(2) For Declaration of Conformity (DoC)
We declare that the servo amplifiers are in compliance with EC directives (Machinery directive (2006/42/EC), EMC directive (2014/30/EU), Low-voltage directive (2014/35/EU), and RoHS directive (2011/65/EU, (EU) 2015/863)) and applicable regulations of the UK. 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 61800-5-1 and CSA C22.2 No. 274.

(1) Installation
The minimum cabinet size is 150 % of each MR-JET 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. 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 pollution degree 2. For connection, use copper wires.

(2) Short-circuit current rating (SCCR)
Suitable For Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 240 Volts Maximum for 200 V AC servo amplifiers, or Not More Than 100 kA rms Symmetrical Amperes, 480 Volts Maximum for 400 V AC servo amplifiers.

(3) 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 Canadian Electrical Code and any applicable provincial codes.

2.3.4 South Korea compliance

Products that bear the KC mark comply with the Radio Wave Law. 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.
(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.)
In addition, use an EMC filter, surge protector, ferrite core, and line noise filter on the primary side for inputs. Use a ferrite core and line noise filter for outputs.
The self-declaration of conformity for the applicable models can be checked on the website at the address where the "KC number" of the rated nameplate is in the "KC number" field of the URL below.
https://www.rra.go.kr/selform/KC number

2.4 General cautions for safety protection and protective measures

Observe the following items to ensure proper use of the MR-JET servo amplifiers.

(1) Only qualified personnel and professional engineers should perform the installation of systems.

(2) When mounting, installing, and using the MR-JET servo amplifier, always observe the standards and directives applicable in the respective countries.

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.

(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) Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).

(5) 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)

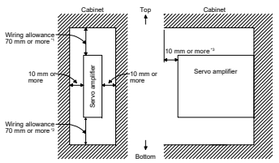
2.7 Lithium battery transportation

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 batteries (MR-BAT6V1SET-B and MR-BAT6V1) are assembled batteries from two batteries (lithium metal battery CR17335A) which are not subject to the dangerous goods (Class 9) of the UN Recommendations.

3. Mounting/dismounting

Installation direction and clearances

POINT
●To prevent malfunction, install the servo amplifier in the specified direction.
●Mount the servo amplifier on a cabinet which meets IP54 in the correct vertical direction to maintain pollution degree 2.



*1 For MR-JET-60G4_ to MR-JET-700G4_, keep 40 mm or more for wiring.
*2 For MR-JET-60G4_ to MR-JET-350G4_, keep 40 mm or more for wiring.
*3 For MR-JET-60G4_ to MR-JET-700G4_, keep 80 mm or more for wiring.

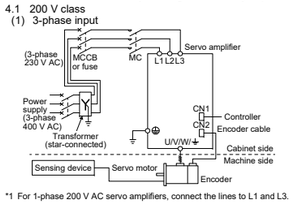
4. Electrical Installation and configuration diagram

POINT
●The installation complies with IEC/EN 60204-1. The voltage supply to machines must be 20 ms or more of tolerance against instantaneous power failure as specified in IEC/EN 60204-1.
●To prevent unexpected movement of the servo motor, securely connect the wire with the specified method and torque.

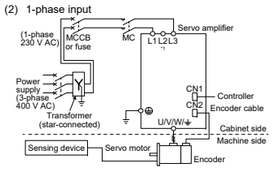
The following shows representative configuration examples to conform to the IEC/EN/UL/CSA standards.
The connectors described by rectangles are safely separated from the main circuits described by circles.

4.1 200 V class

(1) 3-phase input

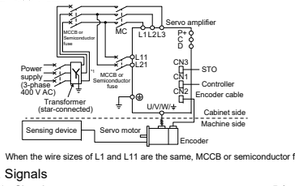


(2) 1-phase input



*1 For 1-phase 200 V AC servo amplifiers, connect the lines to L1 and L3.

4.2 400 V class

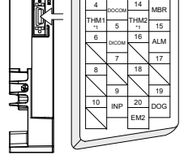


*1 When the wire sizes of L1 and L11 are the same, MCCB or semiconductor fuse is not required.

5. Signals

5.1 Signal

The following shows MR-JET-10G signals as a typical example. For other servo amplifiers, refer to "MR-JET User's Manual (Hardware)".



The top surface of the servo amplifier.

*1 Available on servo amplifiers with firmware version B2 or later.

5.2 I/O device

Input device

Symbol	Device	Connector	Pin No.
EM2	Forced stop 2	CN3	20
LSP	Forward rotation stroke end		2
LSN	Reverse rotation stroke end		12
DOG	Proximity dog		19

Output device

Symbol	Device	Connector	Pin No.
MBR	Electromagnetic brake interlock	CN3	13
INP	In-position		9
ALM	Malfunction		15

Power supply

Symbol	Device	Connector	Pin No.
DICOM	Digital I/F power supply input	CN3	5
DOCOM	Digital I/F common		3
SD	Shield		Plate

6. Maintenance and service

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.

(1) Check for loose screws on the protective earth (PE) terminal. Retighten any loose screws. (tightening torque: 1.2 N•m)

(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.

(9) 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 operation 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	10 years *3
Relay	Number of power-on, forced stop and controller forced stop times: 100,000 times
Cooling fan	50,000 hours to 70,000 hours (7 years to 8 years)
Battery backup time *1	Approximately 20,000 hours (equipment power supply: off, ambient temperature: 20 °C)
Battery life *2	5 years from date of manufacture

*1 When MR-JET servo amplifier is being used in combination with a rotary servo motor that requires battery to configure an absolute position detection system, and if being used with MR-BAT6V1SET-B. For details and other battery backup time, refer to "MR-JET User's Manual (Hardware)".
*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.
*3 The service life of the capacitor is 10 years under continuous operation in air-conditioned environments (ambient temperatures of 40 °C or less at altitudes of up to 1000 m and 30 °C or less at altitudes of over 1000 m and up to 2000 m).
The characteristic of smoothing capacitor is deteriorated due to ripple currents, etc. The service life of the capacitor greatly varies depending on ambient temperatures and operating conditions.

7. Environment

Transport the products correctly according to their mass.
For detailed information on transportation and handling of the battery, refer to "MR-JET User's Manual (Hardware)".
Install the product in a load-bearing place of servo amplifier and servo motor in accordance with the User's manual.
Do not put excessive load on the machine.

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

	Operation	Transportation	Storage
Ambient temperature	0 °C to 55 °C (non-freezing) Class 3K3 (IEC 60721-3-3)	-25 °C to 70 °C (non-freezing) Class 2K12 (IEC 60721-3-2)	-25 °C to 70 °C (non-freezing) Class 1K4 (IEC 60721-3-1)
Ambient humidity	5 %RH to 95 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)	5 %RH to 95 %RH (non-condensing)
Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust		
Altitude/ atmospheric pressure	Altitude: Max. 2000 m *1	Transportation conditions: Overland/sea transportation, or transporting by an airplane whose cargo compartment is pressurized at 700 hPa or higher	Atmospheric pressure: 700 hPa to 1060 hPa (Equivalent to altitudes from -400 m to 3000 m)
Vibration resistance	Under intermittent vibration: 10 Hz to 57 Hz, displacement amplitude 0.075 mm 57 Hz to 150 Hz, acceleration amplitude 9.8 m/s² Class 3M1 (IEC 60721-3-3) Under continuous vibration (X, Y, Z axes): 10 Hz to 55 Hz, acceleration amplitude 5.9 m/s² Class 2M3 (IEC 60721-3-2)	2 Hz to 9 Hz, displacement amplitude (single amplitude) 7.5 mm 9 Hz to 200 Hz, acceleration amplitude 20 m/s² Class 2M3 (IEC 60721-3-2)	2 Hz to 9 Hz, displacement amplitude (single amplitude) 1.5 mm 9 Hz to 200 Hz, acceleration amplitude 5 m/s² Class 1M2 (IEC 60721-3-1)

*1 For the restrictions on the use of this product at altitude exceeding 1000 m, refer to MR-JET User's Manual (Hardware).

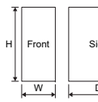
8. Specifications

8.1 MR-JET servo amplifier

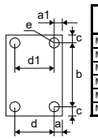
Item		MR-JET-10G_/MR-JET-20G_/MR-JET-40G_/MR-JET-70G_/MR-JET-100G_/MR-JET-200G_	MR-JET-300G_	MR-JET-60G4_/MR-JET-100G4_/MR-JET-200G4_/MR-JET-350G4_/MR-JET-500G4_/MR-JET-700G4_
Power supply	Line voltage	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz /60 Hz	3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	Main circuit: 3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz Control circuit: 1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Interface (SELV)	24 V DC (required current capacity: 300 mA)		
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)		
Enclosure		Open type, IP20 *1		
Short-circuit current rating (SCCR)		100 kA		

*1 The certification of TÜV Rheinland for MR-JET-60G4_ to MR-JET-350G4_ is IP00.

8.2 Dimensions/mounting hole process drawing



Servo amplifier	Variable dimensions [mm]			Mass [kg]
	W	H	D	
MR-JET-10G_/MR-JET-20G_/MR-JET-40G_	40	168	205	0.8
MR-JET-70G_/MR-JET-100G_	60	168	205	1.6
MR-JET-200G_/MR-JET-300G_	80	168	205	2.1
MR-JET-60G4_/MR-JET-100G4_	60	172	195	1.6
MR-JET-200G4_	90	172	195	2.2
MR-JET-350G4_	90	172	195	2.3
MR-JET-500G4_	130	250	200	5.1
MR-JET-700G4_	130	250	200	5.3



Servo amplifier	Variable dimensions [mm]						Screw size
	a	a1	b	c	d	d1	e
MR-JET-10G_/MR-JET-20G_/MR-JET-40G_	6.8	6.8	183 ± 0.5	6.5			M5
MR-JET-70G_/MR-JET-100G_	6.8	6.8	183 ± 0.5	6.5	40 ± 0.5		M5
MR-JET-200G_/MR-JET-300G_	6.8	6.8	183 ± 0.5	6.5	60 ± 0.5		M5
MR-JET-60G4_/MR-JET-100G4_	12	12	156 ± 0.5	6	42 ± 0.3		M5
MR-JET-200G4_/MR-JET-350G4_	6	6	156 ± 0.5	6	78 ± 0.3		M5
MR-JET-500G4_/MR-JET-700G4_	6	6	235 ± 0.5	7.5	118 ± 0.5	118 ± 0.5	M5

9. Check list for user documentation

MITSUBISHI ELECTRIC

MR-JET installation checklist for manufacturer/installer

The following items must be satisfied by the initial test operation at least. The manufacturer/installer must be responsible for checking the standards in the items.
Maintain and keep this checklist with related documents of machines to use this for periodic inspection.

1. Is it based on directive/standard applied to the machine? Yes [ ], No [ ]
2. Is directive/standard contained in Declaration of Conformity (DoC)? Yes [ ], No [ ]
3. Does the protection instrument conform to the category required? Yes [ ], No [ ]
4. Are electric shock protective measures (protective class) effective? Yes [ ], No [ ]

Checking the items will not be instead of the first test operation or periodic inspection by professional engineers.

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]
For terms of warranty, please contact your original place of purchase.
[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 and user manual for the Product and the caution label affixed to the Product.
(3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
1. a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
2. a failure caused by any alteration, etc. to the Product made on your side without our approval
3. 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
4. a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
5. any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
6. 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
7. 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
8. 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 AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in AC Servo, and a backup or fail-safe function should operate on an external system to AC Servo when any failure or malfunction occurs.
(2) Our 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.
(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.