MITSUBISHI ELECTRIC

AC Servo System

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-J5

MR-J5 Servo amplifier Model

MR-J5-10_ to MR-J5-25K_
MR-J5-60_4_ to MR-J5-25K_4_
MR-J5W2-22_ to MR-J5W2-1010_
MR-J5W3-222_, MR-J5W3-444_

Safety Instructions and Precautions for AC Servos

M

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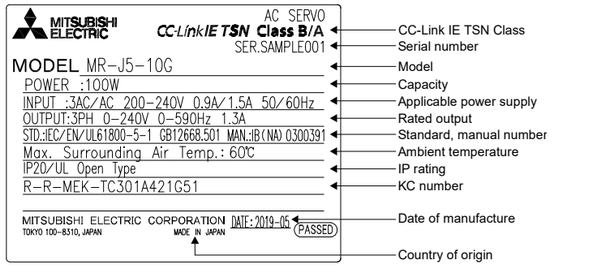
Specifications are subject to change without notice.
Compliance with the indicated global standards and regulations is current as of the release date of this installation guide.
The original instructions for Europe are in English.

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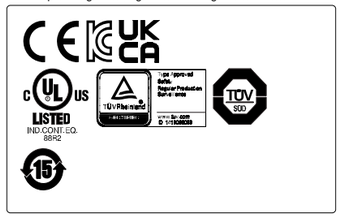
Contents of the package
Unpack the product and check the rating plate to see if the servo amplifier is as you ordered.

Contents	Quantity
Servo amplifier	1
MELSERVO-J5 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 - J5W2 - 22G -

Series

Number of axes

Symbol	Number of axes
	1
W2	2
W3	3

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
350	3.5
500	5
700	7
12K	12
17K	17
25K	25

Symbol	Rated output [kW]		
	A-axis	B-axis	C-axis
22	0.2	0.2	
44	0.4	0.4	
77	0.75	0.75	
1010	1	1	
222	0.2	0.2	0.2
444	0.4	0.4	0.4

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
A	General-purpose interface
G	Network
B	SSCNET III/H

Software special 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 MELSERVO-J5 series safely, read MR-J5 User's Manual carefully.

1.1 MELSERVO-J5 relevant manuals

This installation guide explains how to mount MR-J5 servo amplifiers. You can also check it with our website for free.
http://www.mitsubishielectric.com/fa/
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-J5 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 MR-J5 User's Manual.

1.3 Terms related to safety

1.3.1 IEC 61800-5-2 Stop function
STO function (Refer to IEC 61800-5-2:2016 4.2.3.2 STO.) The MR-J5 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. The servo amplifiers without the CN8 connector do not support this function. STO function does not support Stop category 1 and 2 for IEC/EN 60204-1.

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-J5 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-J5 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), IEC/EN 60204-1 (Stop category)
- ISO/EN ISO 13849-1:2015 Category 3 PL e, IEC/EN IEC 62061:2021 maximum SIL 3, IEC/EN 61800-5-2 (STO)

2.3 Correct use

Use the MR-J5 servo amplifiers within specifications. Refer to MR-J5 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 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.

(2) 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.

(3) 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)

(4) 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/E *1
MR-J5-10_/MR-J5-20_/MR-J5-40_/MR-J5-60_(4)_/MR-J5-70_/MR-J5-100_(4)_/MR-J5-200_(4)_(T)/MR-J5-350_4_	14: a *3	14	14	14: a *3
MR-J5-200_ (S)	12: b *3			
MR-J5-350_				12: b *3
MR-J5-500_	10: c *3			8: d *3
MR-J5-700_	8: d *3			
MR-J5-12K_	4: e		12: i	4: e
MR-J5-17K_	2: f	14: k	10: i	2: f
MR-J5-25K_	1/0: j		10: l	2/0: o
MR-J5-500_4_	14: a *3	14	14	12: b *3
MR-J5-700_4_	12: b *3			10: c *3
MR-J5W_-_	14: a *3			14
MR-J5-12K_4_	8: g	14: k	14: m	8: g
MR-J5-17K_4_	6: h		12: i	6: h
MR-J5-25K_4_	4: n		12: l	4: n

*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.

Table 2. Recommended crimp terminals

Symbol	Servo amplifier-side crimp terminals		Manufacturer
	Crimp terminal *2	Applicable tool	
a	R2-4	YHT-2210	JST (J.S.T. Mfg. Co., Ltd.)
b	3.5-R4	YHT-2210	
c	R5.5-4	YHT-2210	
d	8-4NS, R8-5	YHT-8S, YA-4	
e	FVD22-6	YF-1	
f *1	38-6	YF-1	
g	FVD8-6	YF-1	
h	FVD14-6	YF-1	
i	FVD5.5-6	YNT-1210S	
j *1	R60-8	YF-1	
k	FVD2-4	YNT-1614	
l	FVD5.5-8	YNT-1210S	
m	FVD2-6	YNT-1614	
n *1	R22-8	YF-1	
o *1	CB70-S8	YF-1	

*1 Coat the crimping part with an insulation tube.
*2 Some crimp terminals may not be mounted depending on the size. Make sure to use the recommended ones or equivalent ones.

(5) Selection example of MCCB and fuse
Use UL recognized semiconductor fuses, Class T, J, CC fuses, or molded-case circuit breaker (UL 489 Listed MCCB) as the following table. The semiconductor fuses, Class T, J, CC fuses, and molded-case circuit breakers in the table are selected examples based on rated I/O of the servo amplifiers and are also suitable for protection of output servo motor conductors. 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, Class T, J, CC fuses, or molded-case circuit breaker than those listed in the table. To select different semiconductor fuses, Class T, J, CC fuses, and molded-case circuit breakers from those listed in the table, refer to "MR-J5 User's Manual (Hardware)".

Servo amplifier (200 V class) *1	Molded-case circuit breaker (240 V AC)		Semiconductor fuse (700 V) SCCR 100 kA	Class T, J, CC fuses (600 V) SCCR 5 kA
	Rated current [A]	SCCR [kA]		
MR-J5-10_	15	14 or 50 *4	170M1408 (10 A)	3 A *3
MR-J5-20_				6 A *3
MR-J5-40_/MR-J5-60_ (T)/MR-J5-70_ (T)/MR-J5W2-22_ (T)				10 A *3
MR-J5-60_ (S)/MR-J5-100_ (T)/MR-J5W2-22_ (S)/MR-J5W2-44_ (T)/MR-J5W3-222_ (T)			170M1409 (16 A)	10 A *3
MR-J5-70_ (S)				15 A
MR-J5W2-44_ (S) /MR-J5W2-77_ (T)/ MR-J5W2-1010_/ MR-J5W3-222_ (S)/MR-J5W3-444_ (T)			170M1412 (32 A)	15 A
MR-J5-100_ (S)				20 A
MR-J5-200_ (T)				25 A
MR-J5-200_ (S)/MR-J5-350_	20		170M1413 (40 A)	35 A
MR-J5W2-77_ (S)/MR-J5W3-444_ (S)				15 A
MR-J5-500_	30	14 *5	170M1415 (63 A)	45 A
MR-J5-700_	40		170M1416 (80 A)	60 A
MR-J5-12K_	- *2	- *2	170M1418 (125 A)	
MR-J5-17K_	- *2	- *2	170M1419 (160 A)	
MR-J5-25K_	- *2	- *2	170M1421 (250 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.
*3 For MR-J5-10_ to MR-J5-60_, the minimum cabinet size is 6188 cm³.
*4 When selecting from Mitsubishi Electric molded-case circuit breakers, use NF50-SVFU (14 kA) or NF125-SVU (50 kA).
*5 When selecting from Mitsubishi Electric molded-case circuit breakers, use NF50-SVFU (14 kA).

Servo amplifier (400 V class)	Molded-case circuit breaker (480 V AC)		Semiconductor fuse (700 V) SCCR 100 kA	Class T, J, CC fuses (600 V) SCCR 5 kA
	Rated current [A]	SCCR [kA]		
MR-J5-60_4_	15	10 *2	170M1408 (10 A)	6 A
MR-J5-100_4_				10 A
MR-J5-200_4_			170M1409 (16 A)	10 A
MR-J5-350_4_			170M1412 (32 A)	20 A
MR-J5-500_4_			170M1413 (40 A)	25 A
MR-J5-700_4_	20	30 *3	170M1414 (50 A)	30 A
MR-J5-12K_4_	- *1	- *1	170M1416 (80 A)	
MR-J5-17K_4_	- *1	- *1	170M1418 (125 A)	
MR-J5-25K_4_	- *1	- *1	170M1418 (125 A)	

*1 For the use under the conditions of UL Listed, select a semiconductor fuse.
*2 When selecting from Mitsubishi Electric molded-case circuit breakers, use NF100-HRU (10 kA).
*3 When selecting from Mitsubishi Electric molded-case circuit breakers, use NF125-SVU (30 kA).

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-J5 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. In addition, use a line noise filter BRE series for inputs and outputs of the 12 kW and 17 kW of 200 V class servo amplifiers. The recommended products are as follows:
EMC filter: COSEL FSB Series or Soshin Electric HF3000C-SZB series
Surge protector: Okaya Electric Industries RSPD series, Soshin Electric LT-CN-WS series
Line noise filter: Mitsubishi Electric FR-BIF, Kitagawa Industries BRE Series
MR-J5 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-J5 servo amplifier's volume. Also, design the cabinet so that the ambient temperature in the cabinet is 60 °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

2.3.5 China compliance

(1) China RoHS
The following is stated in Chinese according to the national standard for the restriction of the use of hazardous substances in electrical and electronic products.

含有有害十物质的名称，含有量，含有部品
关于本公司产品的十种有害物质的含有状况和环境保护使用期限标识的内容，如下表所示。

部件名称		产品中有害物质的名称及含有的信息表										环境保护使用期限标识 *2
		有害物质（物质名称/阈值/基准）*1										
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	PBB	PBDE	DEHP	DBP	BBP	DIBP	
		阈值：镉：0.01 wt%（100 ppm）、镉以外：0.1 wt%（1000 ppm）										
伺服放大器	电路板组件	×	○	○	○	○	○	○	○	○	○	15
	散热片	×	○	○	○	○	○	○	○	○	○	
	树脂壳体	○	○	○	○	○	○	○	○	○	○	
	金属板、螺丝	○	○	○	○	○	○	○	○	○	○	

*1 ○：表示该有害物质在该部件所有均质材料中的含量均不超出电器电子产品有害物质限制使用国家标准要求。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出电器电子产品有害物质限制使用国家标准要求。

*2 15 在中国制造/销售的产品中含有特定有害物质的标志。只要能遵守本产品在安全和使用方面的注意事项，从生产日算起的年限以内，不会对环境污染，人体，财产产生深刻的影响。

2.4 General cautions for safety protection and protective measures

Observe the following items to ensure proper use of the MR-J5 servo amplifiers.

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

(2) When mounting, installing, and using the MR-J5 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) 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 13849-1:2015 Table F.1 No. 5)

(5) Separate the wiring for safety sub-function from other signal wirings. (ISO 13849-1:2015 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)

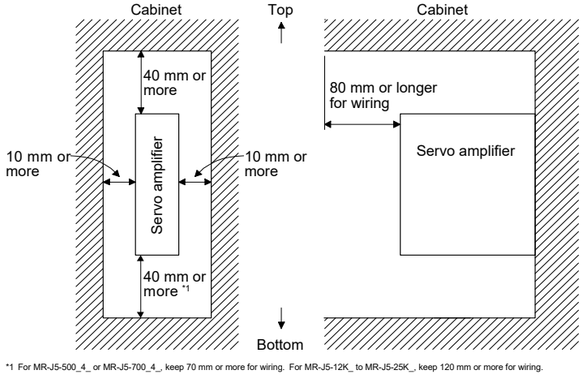
2.7 Lithium battery transportation

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 batteries (MR-BAT6V1SET_ and MR-BAT6V1) are assembled from two batteries (lithium metal battery CR17335A), which are not classified as dangerous goods (Class 9) under the United Nations Recommendations on the Transport of Dangerous Goods.

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. ●The IP rating of the regenerative resistor supplied with the servo amplifier of 12 kW to 25 kW is IP00. Take appropriate safety measures according to the device configuration.



*1 For MR-J5-500_4_ or MR-J5-700_4_, keep 70 mm or more for wiring. For MR-J5-12K_ to MR-J5-25K_, keep 120 mm or more for wiring.

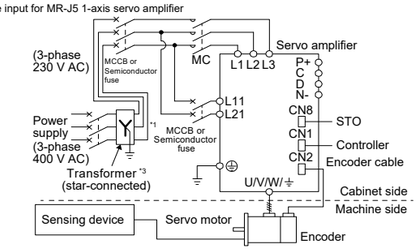
4. Electrical Installation and configuration diagram

POINT

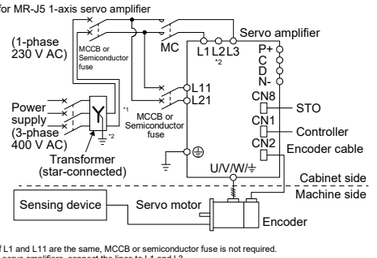
- The installation complies with IEC/EN 60204-1. The voltage supply to machines must be 20 ms or more of tolerance against instantaneous power failure as specified in IEC/EN 60204-1.
- To prevent unexpected movement of the servo motor, securely connect the wire with the specified method and torque.

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.

(1) 3-phase input for MR-J5 1-axis servo amplifier



(2) 1-phase input for MR-J5 1-axis servo amplifier



*1 When the wire sizes of L1 and L11 are the same, MCCB or semiconductor fuse is not required.
*2 For 1-phase 200 V AC servo amplifiers, connect the lines to L1 and L3.
*3 For 400 V class, a step-down transformer is not required.

Connectable motors are limited as follows:

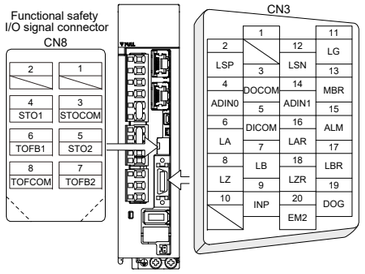
(1) Servo motors manufactured by Mitsubishi Electric (HK/LM/TM series)

(2) Other servo motors complying with IEC 60034-1 which are used with a Mitsubishi Electric serial interface-compatible encoder or with an A/B/Z-phase differential output type encoder

5. Signals

5.1 Signal

The following shows MR-J5-10G signals as a typical example. For other servo amplifiers, refer to "MR-J5 User's Manual (Hardware)".



5.2 I/O device

Input device

Symbol	Device	Connector	Pin No.
EM2	Forced stop 2	CN3	20
STOCOM	Common terminal for input signals STO1/STO2	CN8	3
STO1	STO1 state input		4
STO2	STO2 state input		5

Output device

Symbol	Device	Connector	Pin No.
TOFCOM	Common terminal for monitor output signal in STO state	CN8	8
TOFB1	Monitor output signal in STO1 state		6
TOFB2	Monitor output signal in STO2 state		7

5.3 Signals and STO state

The following table shows the STO1 and STO2 states when the power is on in normal state and STO1 and STO2 are on (closed) or off (opened).

STO1	STO2	Monitoring STO1 state	Monitoring STO2 state
OFF	OFF	ON (STO state)	ON (STO state)
OFF	ON	ON (STO state)	OFF (STO release)
ON	OFF	OFF (STO release)	ON (STO state)
ON	ON	OFF (STO release)	OFF (STO release)

6. Maintenance, service and trouble shooting

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 terminal block screws. Retighten any loose screws.

Servo amplifier	Tightening torque [N•m]															
	L1	L2	L3	N-	P3	P4	P4A	P+	C	D	L11	L21	U	V	W	⏚
MR-J5-10_/MR-J5-20_/MR-J5-40_/MR-J5-60_(4)_/ MR-J5-70_/MR-J5-100_(4)_/MR-J5-200_(4)_/ MR-J5-350_(4)_/MR-J5-500_(4)_/MR-J5-700_(4)_																1.2
MR-J5W_-_																
MR-J5-12K_(4)_/MR-J5-17K_(4)_	3.0												1.2			3.0
MR-J5-25K_(4)_	6.0												1.2			6.0

(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	Total number of power-ons, stops by a dynamic brake, and forced stops: 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-J5 1-axis 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 either MR-BAT6V1SET or MR-BAT6V1SET-A. For details and other battery backup time, refer to "MR-J5 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 If a 3-phase power supply is used, 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.

6.3 Trouble shooting for STO

When the input signals status (STO1 / STO2) do not same, and the fault detected by the diagnostic function, the alarm number [AL. 068 STO diagnosis error] is displayed on the LED of the servo amplifier.

7. Environment

Transport the products correctly according to their mass.
For detailed information on transportation and handling of the battery, refer to "MR-J5 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 60 °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	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-J5 User's Manual (Hardware).

8. Specifications

8.1 MR-J5 servo amplifier

Item		MR-J5-10_/MR-J5-20_/MR-J5-40_/ MR-J5-60_/MR-J5-70_/MR-J5-100_/ MR-J5-200_/MR-J5W2-22_/ MR-J5W2-44_/MR-J5W2-77_/ MR-J5W3-222_/MR-J5W3-444_	MR-J5-350_/MR-J5-500_/ MR-J5-700_/MR-J5-12K_/ MR-J5-17K_/MR-J5-25K_/ MR-J5W2-1010_	MR-J5-60_4_/MR-J5-100_4_/ MR-J5-200_4_/MR-J5-350_4_/ MR-J5-500_4_/MR-J5-700_4_/ MR-J5-12K_4_/MR-J5-17K_4_/ MR-J5-25K_4_
Power supply	Main circuit (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	3-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Control circuit (line voltage)	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz		1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz
	Interface (SELV)	24 V DC (required current capacity: MR-J5-_A_ 500 mA; MR-J5-_G_ 300 mA; MR-J5W2-_G_ 350 mA; MR-J5W3-_G_ 450 mA; MR-J5-_B_ 300 mA; MR-J5W2-_B_ 350 mA; MR-J5W3-_B_ 450 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 (The IP rating of the terminal block for the MR-J5-500_ to MR-J5-25K_ is IP10.)		
Short-circuit current rating (SCCR)		100 kA		

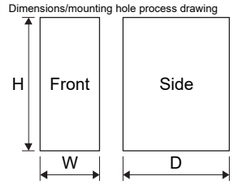
*1 The certification of TÜV Rheinland for MR-J5-10G-H_ to MR-J5-700G-H_, MR-J5-60G4-H_ to MR-J5-350G4-H_, MR-J5-12K_, MR-J5-17K_, and MR-J5-25K_ is IP00.

8.2 Functional safety

Item		Specifications	
		MR-J5-_G(4)_/MR-J5-_A(4)_/MR-J5-_A(4)-RJ_/ MR-J5-_B(4)_/MR-J5-_B(4)-RJ_/MR-J5W_-_B_	MR-J5-_G(4)-RJ_/MR-J5W_-_G_
Safety sub-function		STO (IEC/EN 61800-5-2)	
Safety performance	Standards	EN ISO 13849-1:2015 Category 3 PL e, IEC 61508 SIL 3, EN IEC 62061:2021 maximum SIL 3, EN 61800-5-2	EN ISO 13849-1:2015 Category 4 PL e, IEC 61508 SIL 3, EN IEC 62061:2021 maximum SIL 3, EN 61800-5-2
	Response performance	8 ms or less (STO input off → energy shut off)	
	Test pulse input (STO) *1	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: Up to 1 ms	
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)	MTTFd ≥ 100 [years] (750a)
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]	DC = Medium, 96.5 [%]
	Probability of dangerous Failure per Hour (PFH)	PFH = 6.4×10^{-8} [1/h]	PFH = 3×10^{-8} [1/h]
	Mission time (T_M) *2	T_M = 20 [years]	

*1 A test pulse is a signal which instantaneously turns off a signal to the servo amplifier at a constant period for external circuit to selfdiagnose.
*2 The performance of special proof tests within the mission time of the product is regarded as not necessary, however, the diagnostic interval is suggested as at least one test per three months for Category 3 PL e, SIL 3 on IEC 61800-5-2:2016.

8.3 Dimensions/mounting hole process drawing



Servo amplifier	Variable dimensions [mm]			Mass [kg]
	W	H	D	
MR-J5-10_/MR-J5-20_/MR-J5-40_	40	172	135	0.8
MR-J5-60_	40	172	170	1.0
MR-J5-70_/MR-J5-100_	60	172	185	1.4
MR-J5-200_/MR-J5-350_	90	172	195	2.2
MR-J5-500_	105	250	200	3.7
MR-J5-700_	170	300	200	6.2
MR-J5-12K_/MR-J5-17K_	220	400	260	12.7
MR-J5-25K_	260	400	260	18.1
MR-J5W2-22_/MR-J5W2-44_	60	172	195	1.5
MR-J5W2-77_/MR-J5W2-1010_	85	172	195	1.9
MR-J5W3-222_/MR-J5W3-444_	75	172	195	1.8
MR-J5-60_4_/MR-J5-100_4_	60	172	195	1.6
MR-J5-200_4_	90	172	195	2.2
MR-J5-350_4_	90	172	195	2.3
MR-J5-500_4_	130	250	200	5.2
MR-J5-700_4_	130	250	200	5.4
MR-J5-12K_4_/MR-J5-17K_4_	220	400	260	12.7
MR-J5-25K_4_	260	400	260	18.1

Servo amplifier	Variable dimensions [mm]						Screw size
	a	a1	b	c	d	d1	f
MR-J5-10_/MR-J5-20_/MR-J5-40_/ MR-J5-60_	6	6	156 ± 0.5	6			M5
MR-J5-60_4_/MR-J5-70_/ MR-J5-100_(4)_	12	12	156 ± 0.5	6	42 ± 0.3		M5
MR-J5-200_(4)_/MR-J5-350_(4)_	6	6	156 ± 0.5	6	78 ± 0.3		M5
MR-J5W2-22_/MR-J5W2-44_	6	6	156 ± 0.5	6			M5
MR-J5W2-77_/MR-J5W2-1010_	6	6	156 ± 0.5	6	73 ± 0.3		M5
MR-J5W3-222_/MR-J5W3-444_	6	6	156 ± 0.5	6	63 ± 0.3		M5
MR-J5-500_	6	6	235 ± 0.5	7.5	93 ± 0.5	93 ± 0.5	M5
MR-J5-700_	5	5	285 ± 0.5	7.5	160 ± 0.5	160 ± 0.5	M5
MR-J5-500_4_/MR-J5-700_4_	6	6	235 ± 0.5	7.5	118 ± 0.5	118 ± 0.5	M5
MR-J5-12K_(4)_/MR-J5-17K_(4)_	12	12	380 ± 0.5	10	196 ± 0.5	196 ± 0.5	M5
MR-J5-25K_(4)_	12	12	376 ± 0.5	12	236 ± 0.5	236 ± 0.5	M10

9. Check list for user documentation

MITSUBISHI ELECTRIC

MR-J5 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 [ ]
5. Is the STO function checked (test of all the shut-off wiring)? 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.