MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI ELECTRIC SERVO SYSTEM

MELSERVO-J4

Model

MR-CV11K to MR-CV55K/MR-CV11K4 to MR-CV75K4/
MR-CR55K/MR-CR55K4/MR-J4-DU700_ to MR-J4-DU37K_/
MR-J4-DU700_4 to MR-J4-DU55K_4

J

Instructions and Cautions for Safe Use of AC Servos

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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)-0300228-J(2503)MEE

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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.

(1) Converter unit

Contents	Quantity
Converter unit	1
Eyebolt (55 kW or more)	2
Connector set (Note)	1
MR-CV/MR-CR/MR-J4-DU Instructions and Cautions for Safe Use of AC Servos (this guide)	1

(2) Drive unit

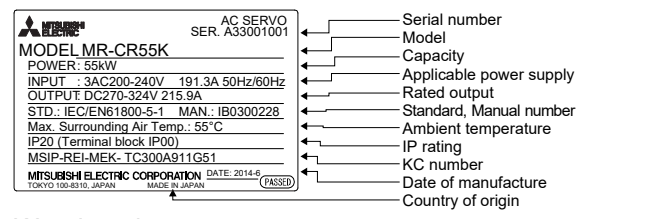
Contents	Quantity
Drive unit	1
Bus bar (30 kW or more)	2
Eyebolt (30 kW or more)	2
MR-CV/MR-CR/MR-J4-DU Instructions and Cautions for Safe Use of AC Servos (this guide)	1

Note. A connector set for CN23 is packed together with MR-CV. A connector set for CN1 is packed together with MR-CR.

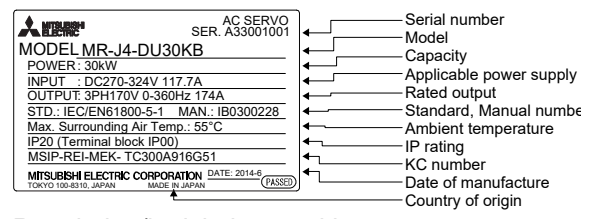
Rating plate

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

Converter unit



Drive unit



Warning plate

An example of warning plate is shown below.



Regulation/legislation marking

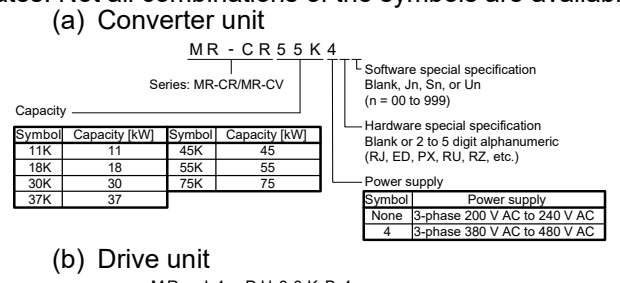
An example of regulation/legislation marking is shown below.

CE 15 UK CA

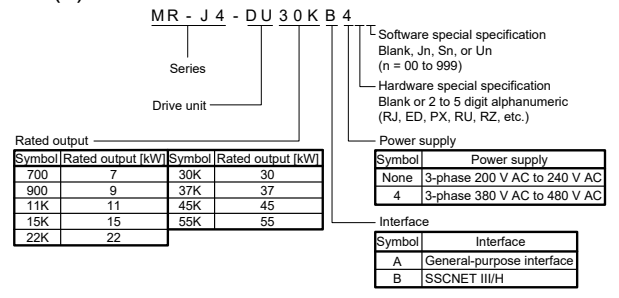
Model

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

(a) Converter unit



(b) Drive unit



1. About the manuals

To use the MELSERVO-J4 series safely, read each instruction manual carefully.
Converter units and drive units are written as servo amplifiers in this guide under certain circumstances.

1.1 MELSERVO-J4 relevant manuals

This installation guide explains how to mount MR-J4 servo amplifiers. You can also check it with our website for free.
http://www.mitsubishielectric.com/fa/
If you have any questions about the operation or programming of the equipment described in this guide, contact your local sales office.
In addition, when you mount a protective device, specific technical skills which are not detailed in the guide will be required.

1.2 Purpose of this guide

This installation guide explains the safe operation of MR-J4 servo amplifiers for engineers of machinery manufacturers and machine operators. This installation guide does not explain how to operate machines in which safety servo system is, or will be integrated. For detailed information of the products, refer to each servo amplifier instruction manual.

1.3 Terms related to safety

1.3.1 IEC 61800-5-2 Stop function

STO function (Refer to IEC 61800-5-2: 2007 4.2.2.2 STO.)
MR-J4 servo amplifiers have the STO function. The STO function shuts down energy to servo motors, thus removing torque. This function electronically cuts off power supply in the servo amplifier. 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 to personnel or may cause physical damage.

2.1 Professional engineer

Only professional engineers should mount MR-J4 servo amplifiers.
Here, professional engineers should meet 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-J4 servo amplifiers are used to drive servo motors, and comply with the standards shown below.
ISO/EN ISO 13849-1: 2015 Category 3 PL e, IEC/EN IEC 62061:2021 maximum SIL 3, IEC/EN 61800-5-2 (STO), 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
MR-J4 servo amplifiers can be used with the MR-D30 functional safety unit, MR-J3-D05 safety logic unit, or safety PLCs. For combinations of the servo amplifiers and MR-D30, refer to "MR-D30 Instruction Manual". For combinations of the servo amplifiers and MR-J3-D05, refer to each servo amplifier instruction manual.

2.3 Correct use

Use the MR-J4 servo amplifiers within specifications. Refer to each instruction 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
- If you need to get close to the moving parts of the machine for inspection or others, ensure safety by confirming the power off, etc. Otherwise, it may cause an accident.
- It takes 20 minutes maximum for capacitor discharging. Do not touch the unit and terminals immediately after power off.

2.3.1 Selection of peripheral equipment and wire

The followings are selected based on IEC/EN 61800-5-1, UL 508C, and CSA C22.2 No. 274.

(1) Local wiring and crimping tool

The following table shows the stranded wire sizes [AWG] and the crimp terminal symbols rated at 75 ˚C/60 ˚C.

Table 1. Recommended wire

Converter unit	75 ˚C/60 ˚C stranded wire [AWG] (Note 2) L1/L2/L3 ⏚ (Note 3)	L11/L21	L+/L-
MR-CV11K (Note 1)	8: h/6: i	14: g/14: g	Exclusive Bus Bar
MR-CV18K (Note 1)	4: q/2: -		
MR-CV30K (Note 1)	2: n/1/0: j		
MR-CV37K (Note 1)	1/0: j/1/0: j		
MR-CV45K (Note 1)	1/0: j/-: -		
MR-CV55K (Note 1)	3/0: k/-: -		
MR-CV11K4 (Note 1)	10: l/10: l		
MR-CV18K4 (Note 1)	8: h/6: i		
MR-CV30K4 (Note 1)	6: m/4: e		
MR-CV37K4 (Note 1)	4: e/2: n		
MR-CV45K4 (Note 1)	4: e/2: n		
MR-CV55K4 (Note 1)	2: n/1/0: -		
MR-CV75K4 (Note 1)	1/0: j/-: -		
MR-CR55K (Note 1)	2 × 2/0: d (Note 4)/ 2 × 2/0: -		
MR-CR55K4 (Note 1)	2: c/1/0: -		

Drive unit	75 ˚C/60 ˚C stranded wire [AWG] (Note 2) L11/L21	L+/L-	U/V/W/⏚ (Note 3)
MR-J4-DU700 (Note 1)	14: g/14: g	Exclusive Bus Bar	8: o/6: m
MR-J4-DU900 (Note 1)			4:e/2:n
MR-J4-DU11K (Note 1)			4: e/2: n
MR-J4-DU15K (Note 1)			2: n/1/0: j
MR-J4-DU22K (Note 1)			1/0: j/-: -
MR-J4-DU30K (Note 1)			2/0: d/2/0: -
MR-J4-DU37K (Note 1)			2 × 2/0: d (Note 4)/ -: -
MR-J4-DU700_4 (Note 1)			10: p/10: p
MR-J4-DU900_4 (Note 1)			8: o/6: m
MR-J4-DU11K_4 (Note 1)			8: o/6: m
MR-J4-DU15K_4 (Note 1)			6: m/6: m
MR-J4-DU22K_4 (Note 1)			4: e/2: n
MR-J4-DU30K_4 (Note 1)			3: f/2: f
MR-J4-DU37K_4 (Note 1)			2: f/1: c
MR-J4-DU45K_4 (Note 1)			1/0: d/1/0: -
MR-J4-DU55K_4 (Note 1)			1/0: d/2/0: -

Note 1. To connect these models to a terminal block, be sure to use the screws that come with the terminal block.
2. The alphabetical letters in the table indicate the symbols of the recommended crimp terminals. Refer to Table 2 for recommended crimp terminals.
3. Optional cables provided by Mitsubishi Electric and Mitsubishi Electric System Service Co., Ltd. are available. Select wire sizes depending on the rated output of the servo motors. The values in the table are sizes based on rated output of the servo amplifiers.
4. When the rated current is less than 175 A, 2/0: d can also be used.

Table 2. Recommended crimp terminal

Symbol	Servo amplifier-side crimp terminals: Crimp terminal (Note 2)	Applicable tool	Manufacturer
a	FVD5.5-10	YNT-1210S	JST (J.S.T. Mfg. Co., Ltd.)
b	FVD22-10	YF-1/E-4	
c (Note 1)	R38-10	YPT-60-21	
		YF-1/E-4	
d (Note 1)	R60-10	YPT-60-21	
		YF-1/E-4	
e	FVD22-8	YF-1/E-4	
f (Note 1)	R38-8	YPT-60-21	
		YF-1/E-4	
g	FVD2-4	YNT-1614	

Symbol	Servo amplifier-side crimp terminals: Crimp terminal (Note 2)	Applicable tool	Manufacturer
h	FVD8-5	YF-1/E-4	JST (J.S.T. Mfg. Co., Ltd.)
i	FVD14-5	YF-1/E-4	
j (Note 1)	60-S8	YF-1/E-4	
k (Note 1)	80-10	YF-1/E-4	
l	FVD5.5-5	YNT-1210S	
m	FVD14-8	YF-1/E-4	
n	FVD38-8	YF-1/E-4	
o	FVD8-8	YF-1/E-4	
p	FVD5.5-8	YNT-1210S	
q (Note 1)	22-S5	YF-1/E-4	

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

(2) Selection example of MCCB and fuse

Use a fuse (T class) or the molded-case circuit breaker (UL 489 Listed MCCB) indicated in the table below. The T class fuses and molded-case circuit breakers in the table are 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 T class fuses or molded-case circuit breaker than ones in the table. For selecting ones other than Class T fuses and molded-case circuit breakers below, refer to each servo amplifier instruction manual.

Converter unit	Molded-case circuit breaker (240 V AC)	Fuse (300 V)
MR-CV11K	NF100-CVFU-60A (100 A frame 60 A)	80 A
MR-CV18K	NF100-CVFU-100A (100 A frame 100 A)	150 A
MR-CV30K	NF225-CVFU-150A (225 A frame 150 A)	225 A
MR-CV37K	NF225-CVFU-200A (225 A frame 200 A)	300 A
MR-CV45K	NF225-CWU-225A (225 A frame 225 A)	350 A
MR-CV55K	NF400-SKW-300A (400 A frame 300 A)	400 A
MR-CR55K	NF225-CWU-175A (225 A frame 175 A)	300 A

Converter unit	Molded-case circuit breaker (480 V AC)	Fuse (600 V)
MR-CV11K4	NF100-HRU-30A (100 A frame 30 A)	40 A
MR-CV18K4	NF100-HRU-50A (100 A frame 50 A)	80 A
MR-CV30K4	NF100-HRU-80A (100 A frame 80 A)	150 A
MR-CV37K4	NF100-HRU-100A (100 A frame 100 A)	150 A
MR-CV45K4	NF250-SVU-125A (250 A frame 125 A)	200 A
MR-CV55K4	NF250-SVU-150A (250 A frame 150 A)	225 A
MR-CV75K4	NF250-SVU-200A (250 A frame 200 A)	300 A
MR-CR55K4	NF125-SVU-125A (125 A frame 125 A)	200 A

(3) Power supply

This servo amplifier can be used on the condition of overvoltage category III set forth in IEC/EN 60664-1. For the interface power supply, use an external 24 V DC power supply with reinforced insulation on I/O terminals.

(4) Grounding

To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the servo amplifier to the protective earth (PE) of the 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. Where a residual current-operated protective (RCD: earth-leakage current breaker) device is used for protection in case of direct or indirect contact, only an RCD of Type B is allowed on the supply side of this 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-J4 servo amplifiers comply with EN/BS EN IEC 61800-3. As for I/O wires (max. length 10 m. However, 3 m for STO cable for CN8.) and encoder cables (max. length 50 m), use shielded wires and ground the shields. Install an EMC filter and surge protector on the primary side of the servo amplifier. In addition, use a line noise filter for outputs of the servo amplifiers. The following shows recommended products.

EMC filter: Soshin Electric HF3000A-UN series, TF3000C-TX series, COSEL FTB series
Surge protector: Okaya Electric Industries RSPD series Line noise filter: Mitsubishi Electric FR-BIF

MR-J4 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 508C and CSA C22.2 No. 274.

(1) Installation

The minimum cabinet size is 150 % of each MR-J4 servo amplifier's volume. Also, design the cabinet so that the ambient temperature in the cabinet is 55 ˚C or less. The servo amplifier must be installed in a metal cabinet. Additionally, mount the servo amplifier on a cabinet that the protective earth based on the standard of IEC/EN 60204-1 is correctly connected. For environment, the units should be used in open type (UL 50) and overvoltage category shown in table in chapter 8. The servo amplifier needs to be installed at or below pollution degree 2. Use only copper wires or copper bus bars for wiring.

(2) Short-circuit current rating (SCCR)

Suitable For Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts Maximum.

(3) 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 (MR-CR55K(4) and 30 kW or more of MR-J4-DU)

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. Use a distance greater than 30 m between the product and third party sensitive radio communications.

2.4 General cautions for safety protection and protective measures

Observe the following items to ensure proper use of the MR-J4 servo amplifiers.

(1) For safety components and installing systems, only qualified personnel and professional engineers should perform.
(2) When mounting, installing, and using the MR-J4 servo amplifier, always observe standards and directives applicable in the country.

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 modules 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 adjust 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 observation 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)

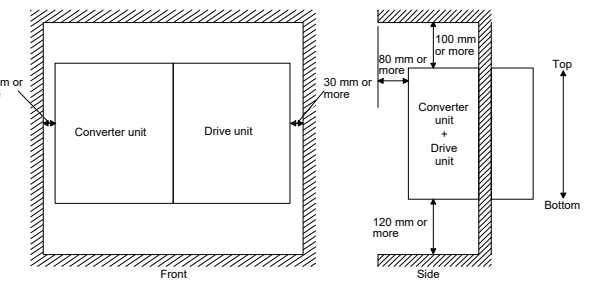
2.7 Lithium battery transportation

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, MR-BAT6V1, and MR-BAT6V1BJ) 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

⚠CAUTION
- The devices must be installed in the specified direction. Not doing so may cause a malfunction.
- Mount the servo amplifier on a cabinet which meets IP54 in the correct vertical direction to maintain pollution degree 2.



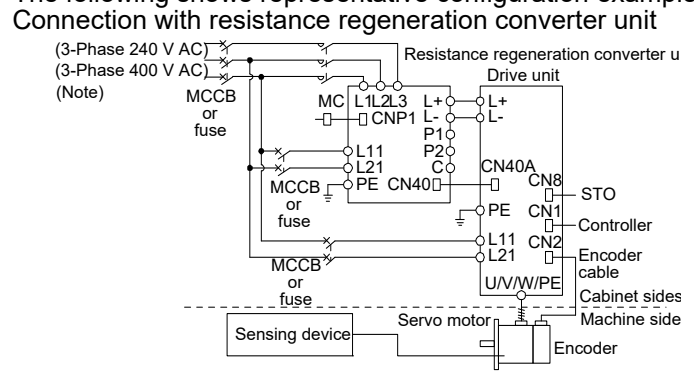
4. Electrical Installation and configuration diagram

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

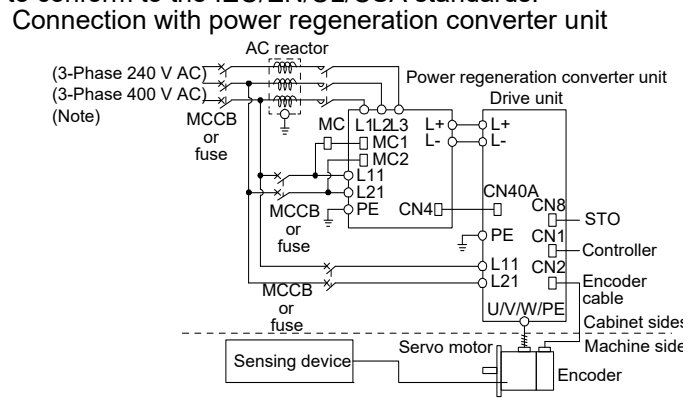
⚠CAUTION
- The installation complies with IEC/EN 60204-1. The voltage supply to machines must be 20 ms or more of tolerance against instantaneous power failure as specified in IEC/EN 60204-1.
- Connecting a servo motor of the wrong axis to U, V, W, or CN2_ of the servo amplifier may cause a malfunction.
- Securely connect the cables in the specified method and tighten them with the specified torque. Otherwise, the servo motor may operate unexpectedly.

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

Connection with resistance regeneration converter unit



Connection with power regeneration converter unit



Note. Supply neutral needs to be earthed.

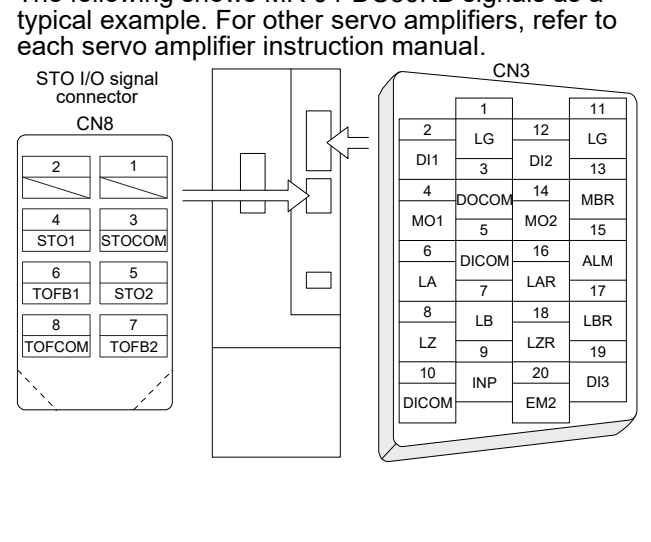
The connectors described by rectangles are safely separated from the main circuits described by circles.
The connected motors will be limited as follows.

(1) HG/HF/HC/HA series servo motors (Mfg.: Mitsubishi Electric)
(2) Using a servo motor complied with IEC 60034-1 and Mitsubishi Electric encoder (OBA, OSA)

5. Signals

5.1 Signal

The following shows MR-J4-DU30KB signals as a typical example. For other servo amplifiers, refer to each servo amplifier instruction manual.



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

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

6.1 Inspection items

It is recommended that the following points periodically be checked.

(1) Check for loose terminal block screws. Retighten any loose screws.

Tightening torque: [N•m]

Drive unit/converter unit	L1	L2	L3	P1	P2	C	L+	L-	L11	L21	U	V	W	PE
MR-J4-DU700_/MR-J4-DU900_/MR-J4-DU11K_/ MR-J4-DU15K_/MR-J4-DU22K_/MR-J4-DU700_4/ MR-J4-DU900_4/MR-J4-DU11K_4/MR-J4-DU15K_4/ MR-J4-DU22K_4/MR-J4-DU30K_4/MR-J4-DU37K_4							3.0		1.2		6.0			
MR-J4-DU30K_/MR-J4-DU37K_/MR-J4-DU45K_4/ MR-J4-DU55K_4											12.0			
MR-CV11K_/MR-CV18K_/MR-CV11K_4/ MR-CV18K_4	2.0													2.0
MR-CV30K_/MR-CV37K_/MR-CV45K_/ MR-CV30K_4/MR-CV37K_4/MR-CV45K_4/ MR-CV55K_4/MR-CV75K_4	6.0													6.0
MR-CV55K	12.0													12.0
MR-CR55K/MR-CR55K4	12.0													

(2) Check 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 operating methods and environment. If any fault is found in the parts, they must be replaced immediately regardless of their service life. For parts replacement, please contact your local sales office.

Part name	Life guideline
Smoothing capacitor	10 years (Note 3)
Relay	Number of power-on, forced stop and controller forced stop times: 100,000 times Number of on and off for STO: 100,000 times
Cooling fan	10,000 hours to 30,000 hours (2 years to 3 years)
Battery backup time (Note 1)	Approximately 20,000 hours (equipment power supply: off, ambient temperature: 20 ˚C)
Battery life (Note 2)	5 years from date of manufacture

Note 1. The time is for using MR-J4 servo amplifier with a rotary servo motor using MR-BAT6V1SET or MR-BAT6V1BJ. For details and other battery backup time, refer to each instruction manual.
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. 68 STO diagnosis error] is displayed on the LED of the servo amplifier.

7. Transportation and storage

⚠CAUTION
- Transport the products correctly according to their mass.
- Stacking in excess of the limited number of product packages is not allowed.
- Do not hold the front cover, cables, or connectors when carrying the servo amplifier. Otherwise, it may drop.
- For detailed information on transportation and handling of the battery, refer to the servo amplifier instruction manual.
- Install the product in a load-bearing place of servo amplifier and servo motor in accordance with the instruction manual.
- Do not put excessive load on the machine.

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

Item			Environment
Ambient temperature	Operation	[°C]	0 to 55 Class 3K3 (IEC/EN 60721-3-3)
	Transportation (Note)	[°C]	-20 to 65 Class 2K12 (IEC/EN 60721-3-2)
	Storage (Note)	[°C]	-20 to 65 Class 1K4 (IEC/EN 60721-3-1)
Ambient humidity	Operation, transportation, storage		5 %RH to 90 %RH
Vibration resistance	Test condition		10 Hz to 57 Hz with constant amplitude of 0.075 mm 57 Hz to 150 Hz with constant acceleration of 9.8 m/s² to IEC/EN 61800-5-1 (Test Fc of IEC 60068-2-6)
	Operation		5.9 m/s²
	Transportation (Note)		Class 2M3 (IEC/EN 60721-3-2)
	Storage		Class 1M2 (IEC/EN 60721-3-2)
Pollution degree			2
IP rating			IP20 (IEC/EN 60529), Terminal block IP00
			Open type (UL 50)
Altitude	Operation, storage		Max. 2000 m
	Transportation		Max. 10000 m

Note. In regular transport packaging

8.Technical data

8.1 Converter unit

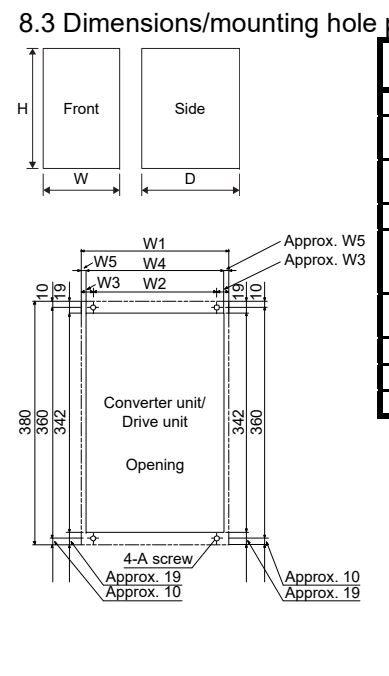
Item		MR-CR 55K	CV 11K	CV 18K	CV 30K	CV 37K	CV 45K	CV 55K	CR 55K4	CV 11K4	CV 18K4	CV 30K4	CV 37K4	CV 45K4	CV 55K4	CV 75K4
Output	Rated voltage	270 V DC to 324 V DC							513 V DC to 648 V DC							
	Rated current [A]	215.9	41	76	144	164	198	238	113.8	21	38	72	82	99	119	150
Power supply	Main circuit (line voltage) Voltage, Frequency	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							
	Main circuit (line voltage) Current [A]	191.3	35	65	107	121	148	200	100.7	18	35	61	70	85	106	130
	Control circuit (line voltage)	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz, 0.3 A							1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz, 0.2 A							
	Interface (SELV)	24 V DC ± 10 % (required current capacity: MR-CR_, 150 mA; MR-CV_, 350 mA)														
Pollution degree		2 (IEC/EN 60664-1)														
Overvoltage category		3-phase 200 V AC/400 V AC: III (IEC/EN 60664-1)														
Protective class		I (IEC/EN 61800-5-1)														
Short-circuit current rating (SCCR)		100 kA														

8.2 Drive unit

Item		MR-J4-DU 700_	900_	11K_	15K_	22K_	30K_	37K_	700_4	900_4	11K_4	15K_4	22K_4	30K_4	37K_4	45K_4	55K_4
Output	Rated voltage	3-phase 170 V AC, 360 Hz							3-phase 323 V AC, 360 Hz								
	Rated current [A]	37	54	68	87	126	174	204	17	25	32	41	63	87	102	131	143
Power supply	Main circuit	The main circuit power of the drive unit is supplied by the converter unit.															
	Control circuit (line voltage)	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz, 0.3 A							1-phase 380 V AC to 480 V AC, 50 Hz/60 Hz, 0.2 A								
	Interface (SELV)	24 V DC ± 10 % (required current capacity: MR-J4-DU_A_, 500 mA; MR-J4-DU_B_, 300 mA)															
Control method		Sine-wave PWM control, current control method															
Safety sub-function		STO (IEC/EN 61800-5-2)															
Compliance with standards (Note 1)		EN ISO 13849-1: 2015 Category 3 PL e, IEC 61508 SIL 3, EN IEC 62061:2021 maximum SIL 3, and EN 61800-5-2															
Mean time to dangerous failure (MTTFd)		MTTFd ≥ 100 [years] (314a)															
Diagnostic coverage (DC)		DC = Medium, 97.6 [%]															
Probability of dangerous failures per hour (PFH)		PFH = 6.4×10^{-9} [1/h]															
Mission time (T_M) (Note 2)		T_M = 20 [years]															
Response performance		8 ms or less (STO input off → energy shut off)															
Pollution degree		2 (IEC/EN 60664-1)															
Overvoltage category		3-phase 200 V AC/400 V AC: III (IEC/EN 60664-1)															
Protective class		I (IEC/EN 61800-5-1)															
Short-circuit current rating (SCCR)		100 kA															

Note 1. Servo amplifiers manufactured in August 2015 or later comply with SIL 3 requirements.
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



Converter unit/drive unit	Variable dimensions [mm] W	H	D	Mass [kg]
MR-CR55K/MR-CR55K4	300	380	300	22
MR-CV11K/MR-CV18K/ MR-CV11K4/MR-CV18K4	90	380	270	7.0
MR-CV30K/MR-CV37K/MR-CV45K/ MR-CV30K4/MR-CV37K4/MR-CV45K4	150	380	300	10.7
MR-CV55K/MR-CV55K4/MR-CV75K4	300	380	300	26.5
MR-J4-DU700_/ MR-J4-DU900_/ MR-J4-DU11K_/MR-J4-DU700_4/ MR-J4-DU900_4/MR-J4-DU11K_4	150	380	300	9.9
MR-J4-DU15K_/MR-J4-DU22K_ MR-J4-DU15K_4 /MR-J4-DU22K_4	240	380	300	15.2
MR-J4-DU30K_/MR-J4-DU37K_	300	380	300	21
MR-J4-DU30K_4/MR-J4-DU37K_4	240	380	300	16
MR-J4-DU45K_4/MR-J4-DU55K_4	300	380	300	19

Converter unit/Drive unit	Variable dimensions [mm] W1	W2	W3	W4	W5	Screw size A
MR-CR55K/MR-CR55K4/ MR-J4-DU30K_/MR-J4-DU37K_/ MR-J4-DU45K_4/MR-J4-DU55K_4	300	260	20	281	9.5	M6
MR-CV11K/MR-CV18K/ MR-CV11K4/MR-CV18K4	90	-	45	82	4	M5
MR-CV30K/MR-CV37K/ MR-CV45K/MR-CV30K4/ MR-CV37K4/MR-CV45K4/ MR-J4-DU700_/MR-J4-DU900_/ MR-J4-DU11K_/MR-J4-DU700_4/ MR-J4-DU900_4/MR-J4-DU11K_4	150	60	45	142	4	M5
MR-CV55K/MR-CV55K4/MR-CV75K4	300	180	60	282	9	M5
MR-J4-DU15K_/MR-J4-DU22K_/ MR-J4-DU15K_4/MR-J4-DU22K_4/ MR-J4-DU30K_4/MR-J4-DU37K_4	240	120	60	222	9	M5

9.Check list for user documentation

MITSUBISHI ELECTRIC

MR-CV/MR-CR/MR-J4-DU 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.