MITSUBISHI ELECTRIC

General-Purpose AC Servo

MELSERVO-J3 Series

MR-J3-10□to MR-J3-22K□
MR-J3-10□1 to MR-J3-40□1
MR-J3-60□4 to MR-J3-22K□4
MR-J3-DU30K□・MR-J3-DU37K□
MR-J3-DU30K□4 to MR-J3-DU55K□4
MR-J3-CR55K(4)

Instructions and Cautions for Safe Use of AC Servos

AN

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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)-0300077-AN(2509)IP

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1. INTRODUCTION

1.1 Introduction to the manuals

To use the MELSERVO-J3 series safely, read each instruction manual carefully.
If this is the first time for you to use the MELSERVO-J3 Series, read the following manuals before use. Please read them all carefully to use the MELSERVO-J3 Series safely.

Manual	Servo amplifier (drive unit)							
	MR-J3-A (MR-J3-DUA)	MR-J3-B (MR-J3-DUB)	MR-J3-B-RJ004	MR-J3-B-RJ006	MR-J3-T	MR-J3-T/ MR-J3-D01	MR-J3-□S	MR-J3-B-RJ080W
MELSERVO Servo Motor Instruction Manual Vol.2 SHNA030041	○	○		○	○	○	○	
MR-J3-□A Servo Amplifier Instruction Manual SHNA030038	○							
MR-J3-□B Servo Amplifier Instruction Manual SHNA030051		○	○					○
MR-J3-□B-RJ004 Instruction Manual SHNA030054			○					
MR-J3-□B-RJ006 Servo Amplifier Instruction Manual SHNA030056				○				
MR-J3-□T Servo Amplifier Instruction Manual SHNA030058					○			
MR-J3-□T/ MR-J3-D01 Servo Amplifier Instruction Manual SHNA030061						○		
MR-J3-□S Instruction Manual SHNA030084							○	
MR-J3-□B-RJ080W Instruction Manual SHNA030079 (Note)								○

Note. This manual will be created.

1.2 Contents of the packing

After unpacking, check the rating plate to confirm that the converter unit and servo amplifier (drive unit) you received are as you ordered.

(1) Converter unit

Contents	Quantity
Converter unit	1
Eyebolt	2
Magnet contactor control connector	1

Contents	Quantity
Digital I/O connector	1
MELSERVO-J3 Series Instructions and Cautions for Safe Use of AC Servos (This guide)	1

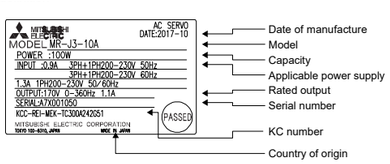
(2) Servo amplifier (drive unit)

Contents	Quantity
Servo amplifier (drive unit)	1
Servo amplifier power connector CNP1 • CNP2 • CNP3 (Note 1)	1 each
CC-Link communication connector CN1 (Note 3)	1
Connection lever for servo amplifier power connector (Note 1)	1
Bus bar (Note 4)	2
Eyebolt (Note 4)	2
MELSERVO-J3 Series Instructions and Cautions for Safe Use of AC Servos (This guide)	1
Mounting screw for servo amplifier front cover (M4 × 14) (Note 2)	1
Mounting screw for servo amplifier cooling fan cover (M4 × 40) (Note 2)	2
Short-circuit connector CN8 (Note 5)	1

Note 1. It is the accessories of the servo amplifier 3.5kW or less.
2. It is the accessories of the servo amplifier of 11k to 22kW.
3. It is the accessories of the MR-J3-□T servo amplifier only.
4. It is the accessories of the drive unit 30kW or more.
5. It is the accessories of the MR-J3-□S servo amplifier only.

1.3 Model code definition

(1) Rating plate



(2) Model code

The following describes what each block of a model name indicates. Note that not all the combinations of the symbols exist.

(a) Converter unit

MR-J3-CR □□

Series name: Applicable drive unit capacity

Symbol	Applicable drive unit capacity [kW]
55K	30 to 55

Power supply

Symbol	Power supply
None	3-phase 200VAC
4	3-phase 400VAC

(b) Servo amplifier (drive unit)

MR-J3- □□□□□-□□

Series name

Rated output

Symbol	Rated output [kW]	Symbol	Rated output [kW]
10	0.1	700	7
20	0.2	11K	11
40	0.4	15K	15
60	0.6	22K	22
70	0.75	(Note) DU30K	30
100	1	(Note) DU37K	37
200	2	(Note) DU45K	45
350	3.5	(Note) DU55K	55
500	5		

Note. Drive units are used for 30kW or more.

Power supply

Symbol	Power supply
None	3-phase 200 to 230VAC 1-phase 200 to 230VAC
1	1-phase 100 to 120VAC
4	3-phase 380 to 480VAC

N: For Mitsubishi tracking purposes
S: Drive Safely supported
Corresponding

Symbol	Corresponding
A	General-purpose interface
B	SSCNET III
T	CC-Link Corresponding Built-in Positioning Function

Software special specification
Blank, Jn, Sn, or Un (n = 00 to 999)

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

1.4 Regulation/legislation marking

An example of regulation/legislation marking is shown below.

2. COMPLIANCE WITH THE CE/UKCA MARKING

2.1 What are CE/UKCA marking?

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

The EMC directive also applies to the converter units and the servo amplifiers (drive units), and they are designed to comply with the EMC directive. The EMC directive also applies the converter units and the servo amplifiers (drive units)-incorporated machines and equipment. This requires the EMC filters to be used with the converter units and the servo amplifiers (drive units)-incorporated machines and equipment to comply with the EMC directive. For specific EMC directive conforming methods, refer to the EMC Installation Guidelines (IB(NA)67310).

(2) For Declaration of Conformity (DoC)

We declare that the converter units and the servo amplifiers (drive units) 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.

2.2 For compliance

Be sure to perform an appearance inspection of every unit before installation. In addition, have a final performance inspection on the entire machine/system, and keep the inspection record.

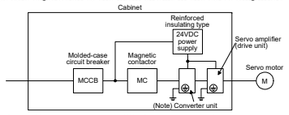
(1) Converter units, servo amplifiers (drive units) and servo motors used

Use the converter units, servo amplifiers (drive units) and servo motors which standard product.

Converter unit : MR-J3-CR55K • MR-J3-CR55K4
Servo amplifier : MR-J3-10□ to MR-J3-22K□ • MR-J3-10□1 to MR-J3-40□1
MR-J3-60□4 to MR-J3-22K□4
Drive unit : MR-J3-DU30K□ • MR-J3-DU37K□ • MR-J3-DU30K□4 to MR-J3-DU55K□4
Servo motor : HF-MP□ • HF-KP□ • HF-SP□ • HF-SP□4 • HC-RP□ • HC-UP□
HC-LP□ • HA-LP□ • HA-LP□4 • HF-JP□ • HF-JP□4

(2) Structure

The control circuit provides safe separation to the main circuit in the servo amplifier.



Note. Servo amplifiers of 22kW or less do not have a converter unit.

(3) Environment

(a) Operate the converter unit and servo amplifier (drive unit) at pollution degree 2 or1 set forth in EN 60664-1. For this purpose, install the servo amplifier in a cabinet which is protected against water, oil, carbon, dust, dirt, etc. (IP54).

(b) Environment

Item			Environment
(Note 1) Ambient Temperature	Operation	[°C]	(Note 2) 0 to 55
		[°F]	32 to 131
	Storage, Transportation	[°C]	−20 to 65
		[°F]	−4 to 149

Item		Environment
Ambient Humidity	Operation,Storage, Transportation	90% RH or less
Maximum Altitude	Operation,Storage	1000m or less
	Transportation	10000m or less

Note 1. Ambient temperature is the internal temperature of the cabinet.
2. The servo amplifier 200V 3.5kW or less and 100V 400W or less can be mounted closely. In this case, keep the ambient temperature within 0 to 45°C (32 to 113°F) or use the servo amplifier with 75% or less of the effective load ratio.

(4) Power supply

(a) This converter unit and servo amplifier (drive unit) can be supplied from star-connected supply with earthed neutral point of overvoltage category III set forth in EN 60664-1. However, when using the neutral point of 400V system for 1-phase supply, a reinforced insulating transformer is required in the power input section.

(b) For the interface power supply, use a 24VDC power supply with reinforced insulation on I/O terminals.

(5) Grounding

(a) To prevent an electric shock, the protective earth (PE) terminal (marked ⏚) of the converter unit, servo amplifier (drive unit) must be connected to the protective earth (PE) of the cabinet.

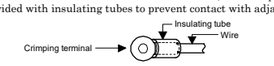
(b) Do not connect two ground cables to the same protective earth (PE) terminal. Always connect cables to the terminals one-to-one.



(c) If an earth leakage circuit breaker is used, always earth the protective earth (PE) terminal of the servo amplifier to prevent an electric shock.

(6) Wiring and Installation

(a) The wires to be connected to the terminal block of the converter unit, servo amplifier (drive unit) must have crimping terminals provided with insulating tubes to prevent contact with adjacent terminals.



(b) Use the servo motor side power connector which complies with the EN.
The EN compliant power connector sets are available as options.

(c) The converter unit and servo amplifier (drive unit) must be installed in the metal cabinet.

(7) Peripheral devices, options

(a) Use the molded-case circuit breaker and magnetic contactor models which are EN compliant products given in the MR-J3-□ Servo Amplifier Instruction Manual.
Use a type B earth-leakage current breaker (RCD). When it is not used, provide insulation between the servo amplifier and other device by double insulation or reinforced insulation, or install a transformer between the main power supply and servo amplifier (drive unit).

(b) The sizes of the wires given in the MR-J3-□ Servo Amplifier Instruction Manual meet the following conditions. For use in any other conditions, follow Table 6 and Annex D EN 60204-1.
- Ambient temperature : 40°C (104°F)
- Sheath : PVC (polyvinyl chloride)
- Installation on wall surface or open cable tray

(c) Use the EMC filter for noise reduction.

(8) Performing EMC tests

When EMC tests are run on a machine/device into which the converter unit and servo amplifier (drive unit) has been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has satisfied the operating environment/electrical equipment specifications. For the other EMC directive guidelines on the converter unit and servo amplifier (drive unit), refer to the EMC Installation Guidelines(IB(NA)67310). MR-J3 Series are not intended to be used on a low-voltage public network which supplies domestic premises: radio frequency interference is expected if used on such a network. The installer shall provide a guide for Installation and use, including recommended mitigation devices.

3. 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.)

4. CONFORMANCE WITH UL/cUL STANDARD

This servo amplifier complies with UL 508C and CSA C22.2 No.274 standard.
Refer to section 1.3 (2) for the servo amplifier model names described in the tables and figures.

(1) Converter units, servo amplifiers (drive units) and servo motors used

Use the converter units, servo amplifiers (drive units) and servo motors which standard product.

Servo amplifier	Servo motor							
	HF-KP	HF-MP	HF-SP	HC-RP	HC-UP	HC-LP	HA-LP	HF-JP
MR-J3-10□(1)	053 • 13	053 • 13						
MR-J3-20□(1)	23	23						
MR-J3-40□(1)	43	43						
MR-J3-60□			51 • 52			52		53
MR-J3-70□	73	73			72			
MR-J3-100□			81 • 102			102		73 • 103
MR-J3-200□			121 • 201 • 152 • 202	103 • 153	152	152		153 • 203
MR-J3-350□			301 • 352	203	202	202		353
MR-J3-500□			421 • 502	353 • 503	352 • 502	302	502	503
MR-J3-700□			702				601 • 701M • 702	703
MR-J3-11K□							801 • 12K1 • 11K1M • 11K2	903 • 11K1M
MR-J3-15K□							15K1 • 15K1M • 15K2	15K1M
MR-J3-22K□							20K1 • 22K1 • 22K1M • 22K2	

Servo amplifier	Servo motor		
	HF-SP	HA-LP	HF-JP
MR-J3-60□4	524		534
MR-J3-100□4	1024		734 • 1034
MR-J3-200□4	1524 • 2024		1534 • 2034
MR-J3-350□4	3524		3534
MR-J3-500□4	5024		5034
MR-J3-700□4	7024	6014 • 7014M4	7034
MR-J3-11K□4		8014 • 12K1 • 11K1M4 • 11K24	9034 • 11K1M4
MR-J3-15K□4		15K14 • 15K1M4 • 15K24	15K1M4
MR-J3-22K□4		20K14 • 22K1M4 • 22K24	

Converter unit	Drive unit	Servo motor HA-LP
MR-J3-CR55K	MR-J3-DU30K□	30K1 • 30K1M • 30K2
	MR-J3-DU37K□	37K1 • 37K1M • 37K2
MR-J3-CR55K4	MR-J3-DU30K□4	25K14 • 30K14 • 30K1M4 • 30K24
	MR-J3-DU37K□4	37K14 • 37K1M4 • 37K24
	MR-J3-DU45K□4	45K1M4 • 45K24
	MR-J3-DU55K□4	50K1M4 • 55K24

(2) Installation

⚠CAUTION
- The regenerative resistor supplied with 11kW to 22kW servo amplifiers does not have a protective cover. Touching the resistor (including wiring/ screw hole area) may cause a burn injury and electric shock. Even if the power was shut-off, be careful until the bus voltage discharged and the temperature decreased because of the following reasons.
- It may cause a burn injury due to very high temperature without cooling.
- It may cause an electric shock due to charged capacitor of the servo amplifier.

The MR-J3 series have been approved as the products which have been installed in the electrical enclosure. The minimum enclosure size is based on 150% of each MR-J3 combination. And also, design the enclosure so that the ambient temperature in the enclosure is 55°C (131°F) or less. The servo amplifier must be installed in the metal cabinet. For environment, the units should be used in open type (UL 50) and overvoltage category III or lower. The converter unit and servo amplifier (drive unit) need to be installed at or below of pollution degree 2. For connection, use copper wires.

(3) 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.

(4) Flange

Mount the servo motor on a flange which has the following size or produces an equivalent or higher heat dissipation effect.

Flange size [mm]	Servo motor						
	HF-MP HF-KP	HF-SP	HC-RP	HC-UP	HC-LP	HA-LP	HF-JP
250 × 250 × 6	053 • 13 • 23						
250 × 250 × 12	43	51 • 81 52(4) to 152(4)	103 to 203		52 to 152		53(4) to 203(4)
300 × 300 × 12	73						
300 × 300 × 20		121 • 201 202(4) • 352(4)			202 • 302		
550 × 550 × 30			353 • 503	72 • 152			353(4) • 503(4)
650 × 650 × 35		301 • 421 502(4) • 702(4)		202 to 502		601(4) to 12K1(4) 701M(4) to 15K1M(4) 502 to 22K2 11K24 to 22K24	703(4) • 903(4) 11K1M(4) • 15K1M(4)
950 × 950 × 35						15K1(4) to 37K1(4) 22K1M to 37K1M 22K1M4 to 50K1M4 30K2 • 37K2 30K24 to 55K24	

(5) About wiring protection

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

(6) Options, peripheral devices

Use the UL/cUL Standard-compliant products.
Use the molded-case circuit breaker (UL489 Listed MCCB) or a Class T fuse indicated in the table below.

Servo amplifier (converter unit • drive unit)		Molded-case circuit breaker (Note)		Fuse	
		Current	Voltage AC [V]	Current [A]	Voltage AC [V]
MR-J3-10□(1) • 20□		50A frame 5A	240	10	300
MR-J3-40□ • 60□(4)		50A frame 10A		15	
MR-J3-60□ to 100□ • 40□1		50A frame 15A		20	
MR-J3-200□		50A frame 20A		40	
MR-J3-350□		50A frame 30A		70	
MR-J3-500□		50A frame 50A		125	
MR-J3-700□		100A frame 75A		150	
MR-J3-11K□		100A frame 100A		200	
MR-J3-15K□		225A frame 125A		250	
MR-J3-22K□		225A frame 175A		350	
MR-J3-CR55K	MR-J3-DU30K□	400A frame 250A		500	
	MR-J3-DU37K□	400A frame 300A		600	
MR-J3-60□4		50A frame 5A	600Y/347	10	600
MR-J3-100□4		50A frame 10A		15	
MR-J3-200□4		50A frame 15A		25	
MR-J3-350□4		50A frame 20A		35	
MR-J3-500□4		50A frame 30A		50	
MR-J3-700□4		50A frame 40A		65	
MR-J3-11K□4		60A frame 60A		100	
MR-J3-15K□4		100A frame 75A		150	
MR-J3-22K□4		225A frame 125A		175	
MR-J3-CR55K4	MR-J3-DU30K□4	225A frame 125A		250	
	MR-J3-DU37K□4	225A frame 150A		300	
	MR-J3-DU45K□4	225A frame 175A		400	
	MR-J3-DU55K□4	400A frame 225A		450	

Note. Listed molded-case circuit breaker are for when the power factor improving reactor is not used.

(7) Capacitor discharge time

The capacitor discharge time is as follows. To ensure safety, do not touch the charging section for 15 minutes (20 minutes in case drive unit is 30kW or more) after power-off.

Servo amplifier (drive unit)	Discharge time (min)
MR-J3-10□ • 20□	1
MR-J3-40□ • 60□(4) • 10□1 • 20□1	2
MR-J3-70□	3
MR-J3-40□1	4
MR-J3-100□(4)	5
MR-J3-200□(4) • 350□	9

Servo amplifier (drive unit)	Discharge time (min)
MR-J3-350□4 • 500□(4) • 700□(4)	10
MR-J3-11K□(4)	4
MR-J3-15K□(4)	6
MR-J3-22K□(4)	8
MR-J3-DU30K□ • DU37K□ • DU30K□4 • DU37K□4 • DU45K□4 • DU55K□4	20

(8) Selection example of wires

To comply with the UL/cUL Standard, use UL-approved copper wires rated at 60/75°C (140/167°F) for wiring.
The following table shows the stranded wire sizes [AWG] and the crimping terminal symbols rated at 60°C (140°F). The sizes and the symbols rated at 75°C (167°F) are shown in the brackets.

Servo amplifier (drive unit)	Converter unit	(Note 3) Stranded wires [AWG]			
		L1 • L2 • L3 • ⏚	L11 • L21	U • V • W • P1 • P2 • ⏚	P • P2 • C
MR-J3-10□(1) to 40□(1) • 60□ • 70□		14(14)	16(16)	(Note 4) 14(14)	14(14)
MR-J3-100□ • 200□		12(12)		12(12)	
MR-J3-350□		10(10): a(a)		10(10): a(a)	14(14): g(g)
(Note 1) MR-J3-500□		8(8): b(b)	16(16): h(h)	8(8): b(b)	12(12): a(a)
(Note 1) MR-J3-700□		6(6): c(c)		6(6): d(c)	10(10): j(j)
(Note 1) MR-J3-11K□		4(4): d(d)	16(16): g(g)	2(3): e(d)	
(Note 1) MR-J3-15K□		1(0): f(p)		−(1): −(p)	10(10): k(k)
(Note 1) MR-J3-22K□		−(1): −(j)		−(2/0): −(u)	10(10): r(r)
(Note 1) MR-J3-DU30K□	MR-J3-CR55K	1/0(1/0): e(e)	14(14)		
(Note 1) MR-J3-DU37K□		2/0(2/0): −(u)			
MR-J3-60□4		14(14)	16(16)	14(14)	14(14)
MR-J3-100□4					
MR-J3-200□4		14(14): g(g)	16(16): h(h)	14(14): g(g)	14(14): g(g)
MR-J3-350□4		10(12): a(a)		10(12): a(a)	
(Note 1) MR-J3-500□4		8(10): b(b)		8(8): b(b)	12(12): a(a)
(Note 1) MR-J3-700□4		6(8): c(b)	16(16): g(g)	6(6): d(c)	10(10): j(j)
(Note 1) MR-J3-11K□4		4(6): m(m)		4(6): n(m)	10(10): k(k)
(Note 1) MR-J3-15K□4		2(4): e(e)		2(3): p(n)	
(Note 1) MR-J3-22K□4		1(2): f(n)		1(2): p(n)	10(10): r(r)
(Note 1) MR-J3-DU30K□4	MR-J3-CR55K4	1/0(1/0): −(e)	14(14)		
(Note 1) MR-J3-DU37K□4		2/0(2/0): −(u)			
(Note 1) MR-J3-DU45K□4		−(2): (t)		−(1/0): −(e)	
(Note 1) MR-J3-DU55K□4					

Servo amplifier (drive unit)	Converter unit	Stranded wires [AWG]			
		B1 • B2	BU • BV • BW	OHS1 • OHS2	
MR-J3-10□(1) to 40□(1) • 60□ • 70□		16(16)			
MR-J3-100□ • 200□					
(Note 1) MR-J3-350□					
(Note 1) MR-J3-500□			(Note 2) 14(14)	(Note 2) 16(16)	
(Note 1) MR-J3-700□					
(Note 1) MR-J3-11K□		14(14)	16(16)		
(Note 1) MR-J3-15K□					
(Note 1) MR-J3-22K□					
(Note 1) MR-J3-DU30K□	MR-J3-CR55K				
(Note 1) MR-J3-DU37K□					
MR-J3-60□4		16(16)			
MR-J3-100□4					
MR-J3-200□4					
MR-J3-350□4					
(Note 1) MR-J3-500□4			(Note 2) 14(14)	(Note 2) 16(16)	
(Note 1) MR-J3-700□4					
(Note 1) MR-J3-11K□4					
(Note 1) MR-J3-15K□4		14(14)	16(16)		
(Note 1) MR-J3-22K□4					
(Note 1) MR-J3-DU30K□4					
(Note 1) MR-J3-DU37K□4	MR-J3-CR55K4				
(Note 1) MR-J3-DU45K□4		16(16)			
(Note 1) MR-J3-DU55K□4					

Note 1. To connect these models to a terminal block, be sure to use the screws that come with the terminal block.
2. For the servo motor with a cooling fan.
3. The alphabetical letters in the table indicate the symbols of the recommended crimp terminals. Refer to the following table for recommended crimp terminals.
4. To wire the servo amplifier and a HF-MP • KP servo motor, use the MR-PWS1CBL (option). To extend the wiring, use the AWG14 wire size.

Table: Recommended crimping terminals

Symbol	Servo amplifier side crimping terminals				
	(Note 2) Crimping terminal	Applicable tool			Manufacturer
		Body	Head	Dice	
a	FVD5.5-4	YNT-1210S	YNE-38	DH-112 • DH-122 DH-113 • DH-123	JST
(Note 1) b	8-4NS	YHT-8S			
C	FVD14-6	YF-1 • E-4			
D	FVD22-6				
(Note 1) e	38-6	YPT-60-21 YF-1 • E-4	YET-60-1	TD-112 • TD-124	
(Note 1) f	R60-8	YPT-60-21 YF-1 • E-4	YET-60-1	TD-113 • TD-125	
G	FVD2-4	YNT-1614			
H	FVD2-M3				
J	FVD5.5-6	YNT-1210S			
K	FVD5.5-8				
L	FVD8-6	YF-1 • E-4	YNE-38	DH-111 • DH-121 DH-112 • DH-122 DH-113 • DH-123	
M	FVD14-8				
N	FVD22-8				
(Note 1) p	R38-8	YPT-60-21 YF-1 • E-4	YET-60-1	TD-112 • TD-124	
Q	FVD2-6	YNT-1614			
R	FVD5.5-10	YNT-1210S			
S	FVD22-10	YF-1 • E-4	YNE-38	DH-113 • DH-123	
(Note 1) t	R38-10	YPT-60-21 YF-1 • E-4	YET-60-1	TD-112 • TD-124	
(Note 1) u	R60-10	YPT-60-21 YF-1 • E-4	YET-60-1	TD-113 • TD-125	

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

(9) Terminal tightening torque

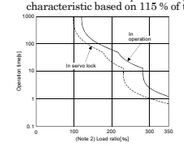
⚠CAUTION
- Securely connect the cables in the specified method and tighten them with the specified torque.

Servo amplifier	Tightening torque [N • m]													
	L1	L2	L3	N	P1	P2	P	C	L11	L21	U	V	W	PE
MR-J3-10□(1) to 60□ to 100□ • 60□4 • 100□4 • 200□(4)											0.6			1.2
MR-J3-200□4T • 350□	0.6													
MR-J3-350□4 • 500□(4) • 700□(4)	1.2								0.8		1.2			
MR-J3-11K□(4) • 15K□(4)	3.0								3.0		3.0			
MR-J3-22K□(4)	6.0								6.0		6.0			

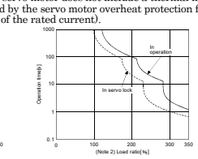
Drive unit Converter unit	Tightening torque [N • m]										
	L1	L2	L3	P1	C	L+	L−	L11	L21	U V W	PE
MR-J3-DU30K□ • DU37K□ • DU45K□4 • DU55K□4	12.0					3.0		1.2		12.0	
MR-J3-DU30K□4 • DU37K□4	6.0										
MR-J3-CR55K(4)	12.0										12.0

(10) Overload protection characteristics

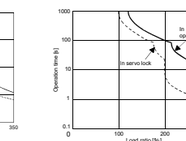
An electronic thermal relay is built in the servo amplifier to protect the servo motor, converter unit, servo amplifier (drive unit) and servo motor power line from overloads. The operation characteristics of the electronic thermal relay are shown below. It is recommended to use an unbalanced torque-generated machine, such as a vertical motion shaft, so that unbalanced torque is not more than 70% of the rated torque. When you carry out adhesion mounting of the servo amplifier, make circumference temperature into 0 to 45°C (32 to 113°F) or use it with 75% or less of effective load torque.
The overload protection of the servo motor does not include a thermal memory function, and is not speed sensitive. The servo motors are protected by the servo motor overheat protection function of the servo amplifiers (a protection characteristic based on 115 % of the rated current).



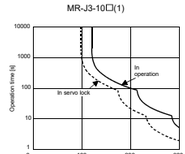
MR-J3-10□(1)



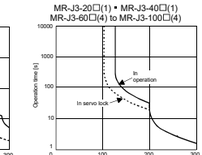
MR-J3-20□(1) • MR-J3-40□(1)
MR-J3-60□(4) to MR-J3-100□(4)



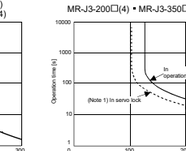
MR-J3-200□(4) • MR-J3-350□(4)



MR-J3-500□(4) • MR-J3-700□(4)



MR-J3-11K□(4) to MR-J3-22K□(4)



MR-J3-DU30K□(4) to MR-J3-DU37K□(4)
MR-J3-DU54K□4 to MR-J3-DU55K□4
Converter unit MR-J3-CR55K□(4)

Note 1. The thermal relay protection characteristics for servo lock are not applied to MR-J3-CR55K(4).
2. The operation time at the load ratio of 300 to 350% applies when the maximum torque of HF-KP servo motor is increased to 350%.

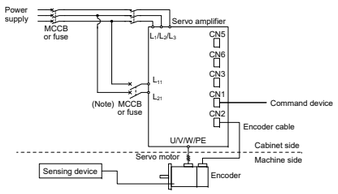
(11) Over-temperature protection for motor

The servo amplifier cannot detect overheating of the servo motor.
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 3(12))

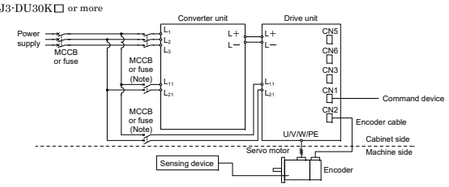
(12) Figure configuration

Representative configuration example to conform to the UL/cUL standard is shown below. The earth wiring is excluded from the figure configuration.

(a) MR-J3-22K□(4) or less



(b) MR-J3-DU30K□ or more



Note. When the wire sizes of L_1 and L_{11} are the same, MCCB or fuse is not required.

The control circuit connectors described by rectangles are safely separated from the main circuits described by circles.

5. INSPECTION

⚠ 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.
- Before starting maintenance and/or inspection, turn off the power and wait 15 minutes or more (wait more than 20 minutes in the case of the drive unit is 30kW or more) until the charge lamp goes off. Then, confirm the voltage between P(+) and N(−) (between L+ and L− in the case of the drive unit is 30kW or more) is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the servo amplifier (converter unit), whether the charge lamp is off or not.
- To avoid the risk of electric shock, only qualified personnel should attempt inspections. For repair and parts replacement, contact your local sales office.

⚠ CAUTION

- Do not perform insulation resistance test on the servo amplifier (drive unit) as damage may result.
- Do not disassemble and/or repair the equipment on customer side.

(1) Inspection

It is recommended to make the following checks periodically.

(a) Check for loose terminal block screws. Retighten any loose screws.
(b) Check the cables and the like for scratches and cracks. Perform periodic inspection according to operating conditions.
(c) Check that the connector is securely connected to the servo amplifier.
(d) Check that the wires are not coming out from the connector.
(e) Check for dust accumulation on the servo amplifier.
(f) Check for unusual noise generated from the servo amplifier.

(2) Life

The following parts must be changed periodically as listed below. If any part is found faulty, it must be changed immediately even when it has not yet reached the end of its life, which depends on the operating method and environmental conditions.
For use in the atmosphere having much oil mist, dust, etc., clean and inspect every three months.
For parts replacement, please contact your sales representative.

	Part name	Standard life
Converter unit and Servo amplifier (drive unit)	Smoothing capacitor	10 years
	Relay	Number of power-on and number of emergency stop times: 100,000 times
	Cooling fan	10,000 to 30,000 hours (2 to 3 years)
	Absolute position battery	Refer to the MR-J3-□ Servo Amplifier Instruction Manual.

(a) Smoothing capacitor

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). 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.

(b) Relays

Their contacts will wear due to switching currents and contact faults occur. Relays reach the end of their life when the cumulative number of power-on and emergency stop times is 100,000, which depends on the power supply capacity

(c) Converter unit and servo amplifier (drive unit) cooling fan

The cooling fan bearings reach the end of their life in 10,000 to 30,000 hours. Normally, therefore, the fan must be changed in a few years of continuous operation as a guideline.
It must also be changed if unusual noise or vibration is found during inspection.

6. ALARMS AND WARNINGS

For details on each type of alarms or warnings, refer to each servo amplifier technical instruction.

7. COMPLIANCE WITH STANDARDS

MR-J3 servo amplifiers comply with the following standards.
IEC/EN/KN 61800-3/GB 12668.3

8. SPECIFICATIONS

8.1 Functional safety

Model		MR-J3-□BS(1-4)
Safety performance	Safety sub-function	STO (IEC/EN 61800-5-2)
	Satisfied standards	EN ISO 13849-1 PL d (category 3), EN IEC 62061, EN 61508 SIL 2
	Mean time to dangerous failure (MTTFd)	100 [years]
	Diagnostic coverage (DC)	90 [%]
	Probability of dangerous Failure per Hour (PFH)	1.01×10^{-7} [1/h]
	Mission time (T_M) (Note)	$T_M = 20$ [years]

Note. The performance of special proof tests within the mission time of the product is regarded as not necessary.

● Safety Instructions ●

Please read the instructions carefully before using the equipment.

Install, and peruse all this guide and attached documents before the drive and maintenance and the check. After that, use these correctly. Use it after it is skilled of the knowledge of the equipment, information on safety, and all of notes. In this guide, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight injury to personnel or may cause physical damage.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety. What must not be done and what must be done are indicated by the following diagrammatic symbols.

: Indicates what must not be done. For example, "No Fire" is indicated by .

: Indicates what must be done. For example, grounding is indicated by .

In this guide, instructions at a lower level than the above, instructions for other functions, and so on are classified into "POINT". After reading this guide, always keep it accessible to the operator.

1. To prevent electric shock, note the following

⚠ WARNING

- Before wiring or inspection, turn off the power and wait 15 minutes or more (wait more than 20 minutes in the case of the drive unit is 30kW or more) until the charge lamp goes off. Then, confirm the voltage between P(+) and N(−) (between L+ and L− in the case of the drive unit is 30kW or more) is safe with a voltage tester and others to prevent an electric shock. In addition, always confirm from the front of the servo amplifier (converter unit), whether the charge lamp is off or not.
- Connect the converter unit and servo amplifier (drive unit) and servo motor to ground.
- Any person who is involved in wiring and inspection should be fully competent to do the work.
- Do not attempt to wire the converter unit and servo amplifier (drive unit) and servo motor until they have been installed. Otherwise, it may cause an electric shock.
- Operate the switches with dry hand to prevent an electric shock.
- The cables should not be damaged, stressed loaded, or pinched. Otherwise, it may cause an electric shock.
- During power-on or operation, do not open the front cover. Otherwise, it may cause an electric shock.
- Do not operate the converter unit and servo amplifier (drive unit) with the front cover removed. High-voltage terminals and charging area are exposed and it may cause an electric shock.
- Except for wiring or periodic inspection, do not remove the front cover even if the power is off. The converter unit and servo amplifier (drive unit) are charged and it may cause an electric shock.
- To prevent an electric shock, always connect the protective earth (PE) terminal (marked ⏚) of the converter unit and servo amplifier (drive unit) to the protective earth (PE) of the cabinet.
- When using a residual current device (RCD), select type B.
- To avoid an electric shock, insulate the connections of the power supply terminals.

2. To prevent fire, note the following

⚠ CAUTION

- Install the converter unit and servo amplifier (drive unit), servo motor and regenerative resistor on incombustible material. Installing them directly or close to combustibles will lead to smoke or a fire.
- Always connect a magnetic contactor between the main circuit power supply and L_1, L_2, and L_3 of the converter unit, servo amplifier, and configure the wiring to be able to shut down the power supply on the side of the converter unit, servo amplifier's power supply. If a magnetic contactor is not connected, continuous flow of a large current may cause smoke or a fire when the converter unit or servo amplifier (drive unit) malfunctions.
- Always connect a molded-case circuit breaker, or a fuse to each servo amplifier between the power supply and the main circuit power supply (L_1, L_2, and L_3) of the servo amplifier (including converter unit), in order to configure a circuit that shuts down the power supply on the side of the servo amplifier's power supply. If a molded-case circuit breaker or fuse is not connected, continuous flow of a large current may cause smoke or a fire when the servo amplifier malfunctions.
- When a regenerative resistor is used, use an alarm signal to switch main power off. Otherwise, a regenerative transistor malfunction or the like may overheat the regenerative resistor, causing smoke or a fire.
- Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the converter unit, servo amplifier (drive unit) and servo motor.

3. To prevent injury, note the following

⚠ CAUTION

- Only the voltage specified in the instruction manual should be applied to each terminal, Otherwise, a burst, damage, etc. may occur.
- Connect the terminals correctly to prevent a burst, damage, etc.
- Ensure that polarity (+, −) is correct. Otherwise, a burst, damage, etc. may occur.
- Take safety measures, e.g. provide covers, to prevent accidental contact of hands and parts (cables, etc.) with the converter unit and servo amplifier (drive unit) heat sink, regenerative resistor, servo motor, etc. since they may be hot while power is on or for some time after power-off. Their temperatures may be high and you may get burnt or a parts may damaged.
- During operation, never touch the rotating parts of the servo motor. Otherwise, it may cause injury.

4. Additional instructions

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

(1) Transportation and installation

⚠ CAUTION

- Transport the products correctly according to their mass.
- Stacking in excess of the specified number of products is not allowed.
- Do not carry the servo motor by holding the cables, shaft, encoder or connector.
- Do not hold the front cover to transport the converter unit and servo amplifier (drive unit). The converter unit and servo amplifier (drive unit) may drop.
- Install the converter unit and servo amplifier (drive unit) in a load-bearing place in accordance with the instruction manual.
- Do not get on or put heavy load on the equipment. Otherwise, it may cause injury.
- The converter unit, servo amplifier (drive unit) and servo motor must be installed in the specified direction.
- Leave specified clearances between the converter unit, servo amplifier (drive unit) and control enclosure walls or other equipment.
- Do not install or operate the converter unit, servo amplifier (drive unit) and servo motor which has been damaged or has any parts missing.

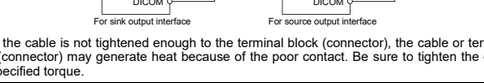
⚠ CAUTION

- Do not block the intake and exhaust areas of the converter unit, servo amplifier (drive unit) and servo motor with a cooling fan. Otherwise, it may cause a malfunction.
- Do not drop or strike converter unit, servo amplifier (drive unit) and servo motor. Isolate from all impact loads.
- When storing or using the converter unit, servo amplifier (drive unit) and servo motor, comply with the environmental conditions given in the Servo Amplifier Instruction Manual and Servo Motor Instruction Manual.
- Securely attach the servo motor to the machine. If attach insecurely, the servo motor may come off during operation.
- The servo motor with reduction gear must be installed in the specified direction to prevent oil leakage.
- Take safety measures, e.g. provide covers, to prevent accidental access to the rotating parts of the servo motor during operation.
- Never hit the servo motor or shaft, especially when coupling the servo motor to the machine. Otherwise, the encoder may malfunction.
- Do not subject the servo motor shaft to more than the permissible load. Otherwise, the shaft may break.
- When the equipment has been stored for an extended period of time, contact your local sales office.
- When treating the converter unit and servo amplifier (drive unit) be careful about the edged parts such as the corners of the converter unit and servo amplifier (drive unit).
- The converter unit and servo amplifier (drive unit) must be installed in the metal cabinet.
- When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine are used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.

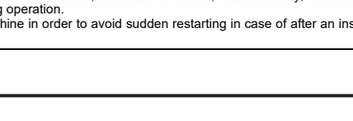
(2) Wiring

⚠ CAUTION

- Wire the equipment correctly and securely. Otherwise, the servo motor may operate unexpectedly.
- Do not install a power capacitor, surge killer or radio noise filter (FR-BIF (-H) option) between the servo motor and servo amplifier (drive unit).
- Connect the servo amplifier (drive unit) power output (U, V, and W) to the servo motor power input (U, V, and W) directly. Not doing so may cause unexpected operation.
- Connect the servo motor power terminal (U, V, W) to the servo motor power input terminal (U, V, W) directly. Do not let a magnetic contactor, etc. intervene. Otherwise, it may cause a malfunction.



- Do not connect AC power directly to the servo motor. Otherwise, it may cause a malfunction.
- The surge absorbing diode installed to the DC relay for control output should be fitted in the specified direction. Otherwise, the emergency stop and other protective circuits may not operate.



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

(3) Test run adjustment

⚠ CAUTION

- Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.
- Never make a drastic adjustment or change to the parameter values as doing so will make the operation unstable.
- Do not get close to moving parts during the servo-on status.

(4) Usage

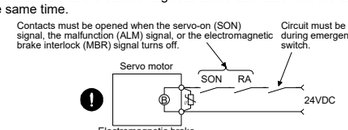
⚠ CAUTION

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

(5) Corrective actions

⚠ CAUTION

- When it is assumed that a hazardous condition may take place at the occur due to a power failure or a product fault, use a servo motor with electromagnetic brake or an external brake mechanism for the purpose of prevention.
- Configure a circuit so that the electromagnetic brake activates with the external emergency stop switch at the same time.



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

(6) Maintenance, inspection and parts replacement

⚠ CAUTION

- With age, the electrolytic capacitor of the converter unit and servo amplifier (drive unit) will deteriorate. To prevent a secondary accident due to a fault, it is recommended to replace the electrolytic capacitor every 10 years when used in general environment. Please contact your local sales office.
- When using a converter unit and servo amplifier (drive unit) whose power has not been turned on for a long time, contact your local sales office.

(7) General instruction

- To illustrate details, the equipment in the diagrams of this guide and instruction manual may have been drawn without covers and safety guards. When the equipment is operated, the covers and safety guards must be installed as specified. Operation must be performed in accordance with this guide and instruction manual.

● DISPOSAL OF WASTE ●

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

⚠ EEP-ROM life

The number of write times to the EEP-ROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier and/or converter unit may fail when the EEP-ROM reaches the end of its useful life.

- Writing to the EEP-ROM due to parameter setting changes
- Home position setting in the absolute position detection system
- Writing to the EEP-ROM due to device changes

Battery transportation

MR-J3BAT contains a lithium metal battery, ER6. MR-J3BAT is not subject to the dangerous goods (Class 9) of the UN Recommendations.
To transport lithium metal batteries and lithium metal batteries contained in equipment by means of transport subject to the UN Recommendations, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO).
To transport the batteries, check the latest standards or the laws of the destination country and take actions.
For more information, contact your local sales office.

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.

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.