

MELSERVO-J2-Jr Series

MR-J2-03A5
MR-J2-03B5
MR-J2-03C5

Instructions and Cautions for Safe Use of AC Servos

If this is the first time for you to use the MELSERVO-J2-Jr Series, the optionally available MR-J2-03 □5 Servo Amplifier Instruction Manual and MELSERVO Servo Motor Instruction Manual are required. Always purchase them and use the MR-J2-Jr Series safely.

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MITSUBISHI ELECTRIC CORPORATION

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● 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".

	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
	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, switch power off and wait for more than 15 minutes. Then, confirm the voltage is safe with voltage tester. Otherwise, you may get an electric shock.	
• Connect the servo amplifier 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 servo amplifier and servo motor until they have been installed. Otherwise, you may get 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, you may get an electric shock.	
• To avoid an electric shock, insulate the connections of the power supply terminals.	

2. To prevent fire, note the following

⚠ CAUTION	
• Install the servo amplifier and servo motor on incombustible material. Installing them directly or close to combustibles will lead to a fire.	
• Always connect a circuit protector between the main circuit power supply and power input connector (CNP1) of the servo amplifier, and configure the wiring to be able to shut down the power supply on the side of the servo amplifier's power supply. If a circuit protector is not connected, continuous flow of a large current may cause a fire when the servo amplifier malfunctions.	
• Provide adequate protection to prevent screws and other conductive matter, oil and other combustible matter from entering the servo amplifier and servo motor.	
• Always connect a molded-case circuit breaker to the power supply of the servo amplifier.	

3. To prevent injury, note the following

⚠ CAUTION	
• Only the voltage specified in the Instruction Manual should be applied to each terminal. Otherwise, a burst, damage, etc. may occur.	
• Connect the terminals correctly to prevent a burst, damage, etc.	
• Ensure that polarity (+, -) is correct. Otherwise, a burst, damage, etc. may occur.	
• During power-on or for some time after power-off, do not touch or close a parts (cable etc.) to the servo motor. Their temperatures may be high and you may get burnt or a parts may be damaged.	
• During operation, never touch the rotating parts of the servo motor. Doing so can cause injury.	

4. Additional instructions

The following instructions should also be fully noted. Incorrect handling may cause a fault, injury, electric shock, 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 the cables, shaft or encoder.	
• Do not hold the front cover to transport the servo amplifier. The servo amplifier may drop.	
• Install the servo amplifier in a load-bearing place in accordance with the Instruction Manual.	
• Do not climb or stand on servo equipment. Do not put heavy objects on equipment.	
• The controller and servo motor must be installed in the specified direction.	
• Leave specified clearances between the servo amplifier and control enclosure walls or other equipment.	
• Do not install or operate the servo amplifier and servo motor which has been damaged or has any parts missing.	
• Do not block intake and exhaust areas of the servo amplifier. Doing so may cause faults.	
• Do not drop or strike servo amplifier or servo motor. Isolate from all impact loads.	
• Use the servo amplifier and servo motor under the following environmental conditions.	

Item	Environment		
		Servo amplifier	Servo motor
Ambient temperature	Operation	[C] 0 to 55 (non-freezing)	0 to 40 (non-freezing)
		[F] 32 to 131 (non-freezing)	32 to 104 (non-freezing)
Storage	[C] -20 to 65 (non-freezing)	-15 to 70 (non-freezing)	
	[F] -4 to 149 (non-freezing)	5 to 158 (non-freezing)	
Ambient humidity	Operation	90%RH or less (non-condensing)	80%RH or less (non-condensing)
	Storage	90%RH or less (non-condensing)	
Ambience	Indoors (no direct sunlight) Free from corrosive gas, flammable gas, oil mist, dust and dirt		
Altitude	Max. 1000m (3280 ft) above sea level		
(Note) Vibration	[m/s ²]	5.9 or less	HC-AQ Series X·Y : 19.6
	[ft/s ²]	19.4 or less	HC-AQ Series X·Y : 64

Note. Except the servo motor with reduction gear.

- 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.
- For safety of personnel, always cover rotating and moving parts.
- Never hit the servo motor or shaft, especially when coupling the servo motor to the machine. The encoder may become faulty.
- 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 servo amplifier, be careful about the edged parts such as the corners of the servo amplifier.
- The servo amplifier must be installed in the metal cabinet (control box).
- 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 between the servo motor and servo amplifier.	
• Connect the wires to the correct phase terminals (U, V, W) of the servo amplifier and servo motor. Otherwise, the servo motor does not operate properly.	
• 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.	
• Do not connect AC power directly to the servo motor. Otherwise, a fault may occur.	
• 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.	

(3) Test run adjustment

⚠ CAUTION	
• Before operation, check the parameter settings. Improper settings may cause some machines to perform unexpected operation.	
• The parameter settings must not be changed excessively. Operation will be instable.	

(4) Usage

⚠ CAUTION	
• Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.	
• 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 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.	
• Use the servo amplifier with the specified servo motor.	
• The electromagnetic brake on the servo motor is designed to hold the motor shaft and should not be used for ordinary braking.	
• For such reasons as service life and mechanical structure (e.g. where a ball screw and the servo motor are coupled via a timing belt), the electromagnetic brake may not hold the motor shaft. To ensure safety, install a stopper on the machine side.	

(5) Corrective actions

⚠ CAUTION	
• When it is assumed that a hazardous condition may 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.

When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly (design the machine so that it is secured against hazard if restarted).

(6) Maintenance, inspection and parts replacement

⚠ CAUTION	
• With age, the electrolytic capacitor 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.	

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

SOUTH KOREA COMPLIANCE

This product complies with the Radio Wave Law (KC mark). Please note the following to use the product. 이 기기는 업무용 (A급) 전자파적합기기로서 판매 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.)

1 INTRODUCTION

1.1 Introduction to the manuals

If this is the first time for you to use the MELSERVO-J2-Jr series, the manuals of the following numbers are required. Always purchase them and use the MELSERVO-J2-Jr series safely.

Model	Manual	Servo Amplifier Instruction Manual	Servo Motor Instruction Manual	EMC Guidelines
MR-J2-03A5		SH(NA)3200	SH(NA)3181 (Ver-D or later)	IB(NA)67310
MR-J2-03B5		SH(NA)030005		
MR-J2-03C5		SH(NA)3209		

1.2 Contents of the packing

After unpacking, check the rating plate to confirm that the servo amplifier you received are as you ordered.

Contents	Quantity
Servo Amplifier	1
Earth (E) terminal AERSBAN-JR	1
M4 screw	3
MELSERVO-J2-Jr Series Instructions and Cautions for Safe Use of AC Servos (This guide)	1
CNP1 connector 5557-08R (Molex make)	1
CNP1 terminal 5556 (Molex make)	10

1.3 Model code definition

(1) Rating plate

MITSUBISHI AC SERVO
MODEL MR-J2-03A5 DATE:2013-03
POWER : 30W
DC INPUT : 24V
OUTPUT : 2.4A
SERIAL : S33001001 CM
KCC-REI-MEK-TC300A167652
PASSED

(2) Model

MR-J2-03□5-□□

Series name

Rated output 30[W] Applicable Servo Motor HC-AQ0135 HC-AQ0235 HC-AQ0335

Corresponding

Symbol	Corresponding
A	General-purpose interface
(Note) B	SSCNET
C	Positioning functions built-in

Note. BH is also available for particular customers.

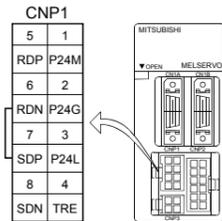
Software special specification Blank, Sn, or Un (n=00 to 999)

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

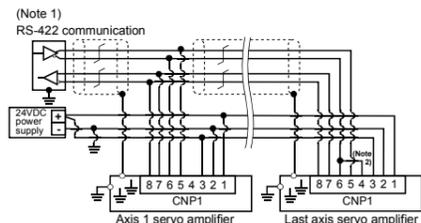
24VDC power supply specification

1.4 Connection of CNP1 connector (packed with the servo amplifier)

(1) Signal arrangement



(2) Connection diagram



- Note: 1. Cannot be used with the MR-J2-03B5.
2. Connect when the servo amplifier is the last axis.

2. COMPLIANCE WITH CE MARKING

2.1 What is CE marking?

The CE marking is mandatory and must be affixed to specific products placed on the European Union. When a product conforms to the requirements, the CE marking must be affixed to the product. The CE marking also applies to machines and equipment incorporating servos. When you need a copy of Declaration of Conformity of CE marking, contact your local sales office.

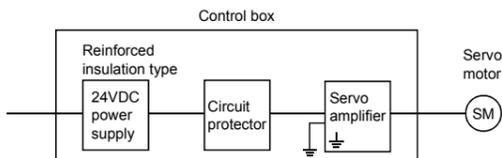
EMC directive

The EMC directive applies to the servo units alone. This servo is designed to comply with the EMC directive. The EMC directive also applies the servo-incorporated machines and equipment. This requires the EMC filters to be used with the servo-incorporated machines and equipment to comply with the EMC directive. For specific EMC directive conforming methods, refer to the EMC Installation Guidelines (IBNA)67310.

2.2 Precautions 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. The standard models of the servo amplifier and servo motor comply with the EN standard.

(1) Structure



(2) Environment

Operate the servo amplifier at pollution degree 2 or 1 set forth in EN 60664-1. For this purpose, install the servo amplifier in a control box which is protected against water, oil, carbon, dust, dirt, etc. (IP54).

(3) Power supply

Use a 24VDC power supply which has been insulation-reinforced in I/O.

(4) Grounding

To prevent an electric shock, fit the supplied earth terminal (E) to the servo amplifier and always connect it to the earth (E) of the control box.

(5) Auxiliary equipment and options

(a) Use the following circuit protector.

Servo amplifier	Circuit protector
MR-J2-03C5	CP-30BA 1P 1-M5A

Note. Use the operation characteristic of "mid-speed type".

(b) The sizes of the cables described in the MELSERVO-J2-Jr Series Servo Amplifier Instruction Manual meet the following requirements. To meet the other requirements, follow Table 5 and Appendix C in EN 60204-1.

- Ambient temperature: 40 (104) [°C (°F)]
- Sheath : PVC (polyvinyl chloride)
- Installed on wall surface or open cable tray

(6) Performing EMC tests

When EMC tests are run on a machine/device into which the servo amplifier has been installed, it must conform to the electromagnetic compatibility (immunity/emission) standards after it has satisfied the operating environment/electrical equipment specifications. For the other EMC directive guidelines on the servo amplifier, refer to the "EMC Installation Guidelines".

- MR-J2-Jr 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 CONFORMANCE WITH UL/cUL STANDARD

This servo amplifier complies with UL 508C and CSA C22.2 No.14 standard.

Refer to section 1.3 (2) for the servo amplifier model names described in the tables and figures.

The standard models of the servo amplifier and servo motor comply with the UL/cUL standard.

When using 24VDC power supply, options and auxiliary equipment, use those which conform to the UL/cUL standard.

(1) 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.

Servo Amplifier	Wires [mm ²]	Crimping terminal	Applicable tool	Manufacturer name
	P24M • P24G • P24L •			
MR-J2-03□5	AWG18 or AWG20	5556	57026-5000(for UL1007)/ 57027-5000(for UL1015)	Molex

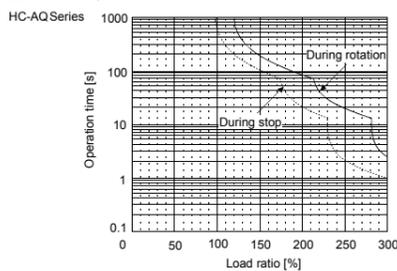
(2) Terminal block tightening torque

Servo amplifier	Tightening torque [N * m] [(lb * in)]
	PE
MR-J2-03□5	1.2 (10.6)

(3) Overload protection characteristics

An electronic thermal relay is built in the servo amplifier to protect the servo motor, servo amplifier 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.

Servo amplifier MR-J2-Jr series have servo motor overload protection. (The motor full load current is 115% rated current.)



(4) Over-temperature protection for motor

Motor Over temperature sensing is not provided by the drive.

(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 Canada Electrical Code and any applicable provincial codes.

(6) Installation

The MR-J2-Jr 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 (control box). For environment, the units should be used in open type (UL 50). The converter unit and servo amplifier (drive unit) need to be installed at or below of pollution degree 2. For connection, use copper wires.

(7) 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.

(8) Capacitor discharge time

To ensure safety, do not touch the charging section for 15 minutes after power-off.

4 INSPECTION

⚠ WARNING

- Before starting maintenance and/or inspection, make sure that the charge lamp is off more than 15 minutes after power-off. Then, confirm that the voltage is safe in the tester or the like. Otherwise, you may get an electric shock.
- Any person who is involved in inspection should be fully competent to do the work. Otherwise, you may get an electric shock. For repair and parts replacement, contact your safes representative.

⚠ CAUTION

- Do not perform insulation resistance test on the servo amplifier 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.

- Check the servo motor bearings, brake section, etc. for unusual noise.
- Check the cables and the like for scratches and cracks. Perform periodic inspection according to operating conditions.
- Check the servo motor shaft and coupling for misalignment.

(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.

	Part name	Life guideline
Servo amplifier	Smoothing capacitor	10 years
	Relay	Number of power-on and number of emergency stop times: 100,000 times
Servo motor	Bearings	20,000 to 30,000 hours
	Encoder	20,000 to 30,000 hours

(a) Smoothing capacitor

Affected by ripple currents, etc. and deteriorates in characteristic. The life of the capacitor greatly depends on ambient temperature and operating conditions. The capacitor will reach the end of its life in 10 years of continuous operation in normal air-conditioned environment (surrounding air temperature of 40°C (104°F) or less).

(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) Servo motor Bearings

When the servo motor is run at rated speed under rated load, change the bearings in 20,000 to 30,000 hours as a guideline. This differs on the operating conditions. The bearings must also be changed if unusual noise or vibration is found during inspection.

5. ALARMS AND WARNINGS

5.1 Alarms

⚠ CAUTION

- When any alarm has occurred, eliminate its cause, ensure safety, then reset the alarm, and restart operation. Otherwise, injury may occur.

Indication	Name	Indication	Name	Indication	Name
10	Undervoltage	24	Motor output ground fault	37	Parameter error
11	Board error1	31	Overspeed	50	Overload1
12	Memory error1	32	Overcurrent	51	Overload2
13	Clock error	33	Overvoltage	52	Error excessive
15	Memory error2	34	CRC error	61	Operation alarm
16	Encoder error1	35	Command pulse frequency error	8A	Serial communication time-out
17	Board error2	36	Transfer error	8E	Serial communication error
18	Board error3			8S	Watchdog
20	Encoder error2				

5.2 Warnings

Indication	Name	Indication	Name	Indication	Name
90	Home position incomplete warning	E1	Overload warning	E7	Controller emergency stop warning
96	Home position setting warning	E4	Parameter warning	E9	Main circuit off warning
98	Software limit warning	E6	Servo forced stop warning		

EEP-ROM life

The number of write times to the EEPROM, which stores parameter settings, etc., is limited to 100,000. If the total number of the following operations exceeds 100,000, the servo amplifier may fail when the EEPROM reaches the end of its useful life.

- Writing to the EEPROM due to parameter setting changes.
- Home position setting in the absolute position detection system.

Warranty

1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]

The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

- You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged. However, it will not be charged if we are responsible for the cause of the failure.
- This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
- Even during the term of warranty, the repair cost will be charged on you in the following cases:
 - : a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
 - : a failure caused by any alteration, etc. to the Product made on your side without our approval
 - : a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
 - : a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
 - : any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
 - : a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
 - : a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
 - : any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

- We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
- Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.

Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

- For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.
- Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used. In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used. We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.