

MITSUBISHI ELECTRIC
General-Purpose AC Servo

MELSERVO-J3W Series

MR-J3W-0303BN6
MR-J3W-22B to MR-J3W-1010B
Instructions and Cautions for
Safe Use of AC Servo

Country/Region	Sales office	Tel/Fax
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel: +1-847-478-2100 Fax: +1-847-478-2283
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel: +49-2102-486-0 Fax: +49-2102-486-1120
China	Mitsubishi Electric Automation (China) Ltd. Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Shanghai, China	Tel: +86-21-2322-3030 Fax: +86-21-2322-3000
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea	Tel: +82-2-3660-6810 Fax: +82-2-3664-8372/8375

2.1 Professional engineer
Only professional engineers should mount MR-J3W servo amplifiers. Professional engineers should meet the all conditions below.
Here, professional engineers should mean
(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.

2.2 Applications of the devices
MR-J3W servo amplifiers comply with the following standards.
• IEC/EN 61800-5-1, IEC/EN 61800-3, IEC/EN 60204-1

2.3 Correct use
Always use the MR-J3W servo amplifiers within specifications (voltage, temperature, etc. Refer to the servo amplifier instruction manual for details.). 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 It takes 15 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. 14.
(1) Local wiring and crimping tool
The following table shows the stranded wires (AWG) rated at 75 °C/160 °C.

Servo amplifier	75 °C/160 °C stranded wires (AWG)			U/V/W/φ (Note 1)
	L1/L2/L3 (φ)	L1/L1/L21	P+C	
MR-J3W-0303BN6	16/ (Note 3)			16/
MR-J3W-22B	14/14 (Note 2)	14/14	14/14	14/14

Note
1. 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.
2. Use the crimp terminal specified as below for the PE terminal of the servo amplifier.
Crimp terminal: FVDZ-4
Tool: YNT-1614
Manufacturer: JST (Japan Solderless Terminals)
3. This value is of 24/0/PM/φ for MR-J3W-0303BN6.

(2) Selection example of MCCB and fuse
Use a fuse (Class T) or a molded-case circuit breaker (UL 489 Listed MCCB) indicated in the table below. The Class T fuses and molded-case circuit breakers in the table are selected examples based on rated I/O of the servo amplifiers. 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 the servo amplifier instruction manual.

Power supply specification	Circuit protector
Main circuit power supply (24 V DC)	MR-J3W-0303BN6
Main circuit power supply (48 V DC)	CP30-BA TP-TM 5A
Main circuit power supply (24 V AC)	CP30-BA TP-TM 10A
Servo amplifier (Note)	Molded-case circuit breaker (240 V AC)
MR-J3W-22B (T)	NF50-SVP-U-SA (50 A frame 5 A)
MR-J3W-22B (S)/MR-J3W-44B (T)/MR-J3W-77B (T)	NF50-SVP-U-SA (50 A frame 10 A)
MR-J3W-44B (S)/MR-J3W-1010B	NF50-SVP-U-SA (50 A frame 15 A)
MR-J3W-77B (S)	NF50-SVP-U-SA (50 A frame 20 A)

Note: "S" means 1-phase 200 V AC power input and "T" means 3-phase 200 V AC power input in the table.

(3) Power supply
This servo amplifier can be supplied from star-connected supply with grounded neutral point of overvoltage category III (overvoltage category II for MR-J3W-0303BN6) set forth in IEC/EN 60664-1. However, when you use the neutral point for single phase supply, a reinforced insulating transformer is required in the power input section.
For the interface power supply, use an external 24 V DC power supply with reinforced insulation on I/O terminals. In case of MR-J3W-0303BN6, use DC power supplies of reinforced insulation type to main circuit, control circuit, and UL listed (recognized) 48 V DC/24 V DC power supplies which can generate more than 1.2 A/2.4 A per axis.
(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. Even when using an earth-leakage current breaker, always ground the protective earth (PE) terminal of the servo amplifier to prevent an electric shock. This product can cause a DC current in the protective earthing conductor. To protect direct/indirect contact using an earth-leakage current breaker (RCD), only an RCD of type B can be used for the power supply side of the product.

2.3.2 EU compliance
The MR-J3W servo amplifiers are designed to comply with the following directions to meet requirements for mounting, using, and periodic technical inspections: EMC directive (2014/30/EU) and Low-voltage directive (2014/35/EU).
(1) EMC requirement
MR-J3W servo amplifiers comply with category C3 in accordance with EN 61800-3. As for I/O wires (max. length 10 m) 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 for input and output of the servo amplifier. The following shows recommended products.

EMC filter: Soshin Electric HF3000A-UN series
Surge protector: Okaya Electric Industries RSPD series
Line noise filter: Mitsubishi Electric FR-BLF

MR-J3W Series are not intended to be used on a low-voltage public network which supplies domestic premises; Radio frequency interference is expected if it is used on such a network. The installer shall provide a guide for installation and use, including recommended mitigation devices. To avoid the risk of cross-talk to signal cables, the installation instructions shall either recommend that the power interface cable be segregated from signal cables. Use the DC power supply installed with the amplifiers in the same cabinet. Do not connect the other electric devices to the DC power supply.
(2) For Declaration of Conformity (DoC)
Hereby, MITSUBISHI ELECTRIC EUROPE B.V., declares that the servo amplifiers are in compliance with the necessary requirements and standards (2014/30/EU and 2014/35/EU). 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. 14.

(1) Installation
The minimum cabinet size is 150% of each MR-J3W 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. In addition, the servo amplifier must be installed in a cabinet whose protective earth is correctly connected, in compliance with the IEC/EN 60204-1 standard. For environment, the units should be used in open type (UL 50) and overvoltage category shown in table in section 8.1. The servo amplifier needs to be installed at or below of pollution degree 2. For connection, use only copper wires.
(2) Short-circuit current rating (SCCR)
Suitable For Use On A Circuit Capable Of Delivering Not More Than 100 kA rms Symmetrical Amperes, 500 Volts Maximum (Not More Than 5 kA rms Symmetrical Amperes at 48 V DC for MR-J3W-0303BN6).
(3) Overload protection characteristics
The MR-J3W servo amplifiers have the servo motor overload protective function. (It is set on the basis (full load current) of 120% rated current of the servo amplifier.)
(4) Over-temperature protection for motor
Motor Over temperature sensing is not provided by the drive. Integral thermal protection(s) is necessary for the servo motor. Refer to chapter 4 for details of the proper connections.
(5) Branch circuit protection
For installation in the 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.

2.3.4 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.)
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.

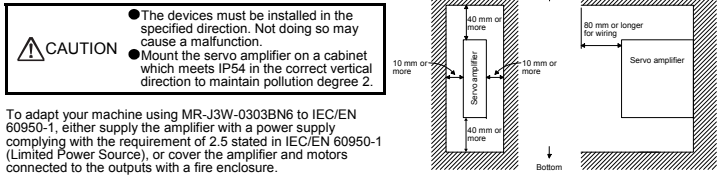
2.4 General cautions for safety protection and protective measures
Observe the following items to ensure proper use of the MR-J3W servo amplifiers.
(1) For safety components and installing systems, only qualified personnel and professional engineers should perform.
(2) When mounting, installing, and using the MELSERVO MR-J3W servo amplifier, always observe applicable standards and directives in the instruction manual.
(3) The item about noises of the test notices in the manuals should be observed.

2.5 Residual risk
(1) 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.
(2) Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).
(3) 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). MR-BAT is lithium metal batteries contain ER17330. MR-J3BAT contains a lithium metal battery. ER6. MR-BAT and MR-J3BAT are not subject to the dangerous goods (Class 9) of the UN Recommendations.

3. Mounting/dismounting
Installation direction and clearances

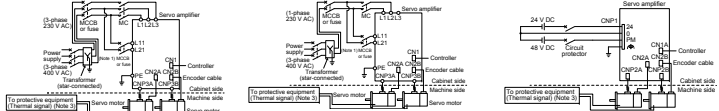


To adapt your machine using MR-J3W-0303BN6 to IEC/EN 60950-1, either supply the amplifier with a power supply complying with the requirement of 2.5 stated in IEC/EN 60950-1 (Limited Power Source), or cover the amplifier and motors connected to the outputs with a fire enclosure.

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 immunity to instantaneous power failures 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.

The following shows representative configuration examples to conform to the IEC/EN/UL/CSA standards.
(1) 3-phase input for MR-J3W servo (2) 1-phase input for MR-J3W servo (3) Main circuit 48 V DC input for MR-J3W servo amplifier

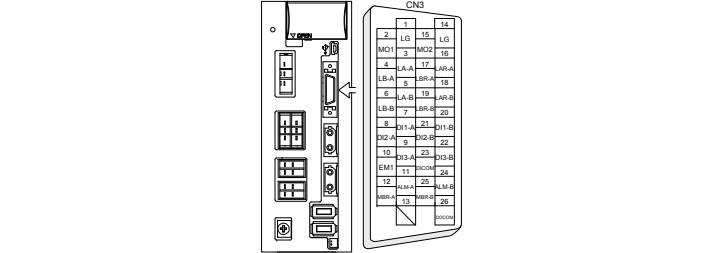


Note
1. When the wire sizes of L1 and L11 are the same, MCCB or fuse is not required.
2. For 1-phase 200 V AC servo amplifiers, connect the lines to L1 and L2.
3. Please use a thermal sensor, etc. for thermal protection of the servo motor.

The connectors described by rectangles are safely separated from the main circuits described by circles. The connected servo motors will be limited as follows.
(1) HG/HF series servo motors (Mfg.: Mitsubishi Electric)
(2) Using a servo motor complied with IEC 60034-1 and Mitsubishi Electric encoder (OBA, OSA)

5. Signals

The following shows MR-J3W-22B signals as a typical example. For other servo amplifiers, refer to the servo amplifier instruction manual.



6. Maintenance and service

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 PE terminals (tightening torque: 1.2 N·m). Retighten any loose screws. (Except for MR-J3W-0303BN6).
(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	(Note 3) 10 years
Relay	Number of power-on, forced stop, and controller forced stop times: 100,000 times
Cooling fan	10,000 hours to 30,000 hours (2 years to 3 years)
(Note 1) Battery backup time	Approximately 20,000 hours (equipment power supply; 0°C ambient temperature; 20 °C)
(Note 2) Battery life	5 years from date of manufacture

Note
1. Time to hold data by a battery with power off. This varies depending on the number of axes for backup. Replace the batteries within three years since the operation start regardless of the power supply of the servo amplifier on/off. If the battery is used out of specification, the absolute position erased alarm (α5) may occur.
2. Quality of the batteries degrades by the storage condition. The battery life is 5 years from the production date regardless of the connection status.
3. The characteristic of smoothing capacitor is deteriorated due to ripple currents, etc. 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 (40 °C surrounding air temperature or less).

7. Transportation and storage

CAUTION
● Transport the products correctly according to their size and mass.
● Stacking in excess of the limited number of product packages is not allowed.
● Do not hold the front cover to transport 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 the product, please fulfill the following environment.

Item	Environment
Ambient temperature	Operation (Transportation (Note)) [°C] 0 to 55 Class 3K3 (IEC/EN 60721-3-3) -20 to 85 Class 2K4 (IEC/EN 60721-3-2) Storage (Note) [°C] -20 to 85 Class 1K4 (IEC/EN 60721-3-1)
Ambient humidity	Operation, transportation, storage 5 %RH to 90 %RH
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/s ² to IEC/EN 61800-5-1 (Test Fc of IEC 60068-2-6)
Vibration resistance	Operation 5.9 m/s ² Transportation (Note) Storage Class 2M3 (IEC/EN 60721-3-2) Class 1M2 (IEC/EN 60721-3-2)
Pollution degree	IP20 (IEC/EN 60529), terminal block: IP00
IP rating	Open type (UL 50)
Altitude	Operation, storage 1000 m or less above sea level Transportation 10000 m or less above sea level

Note: In regular transport packaging

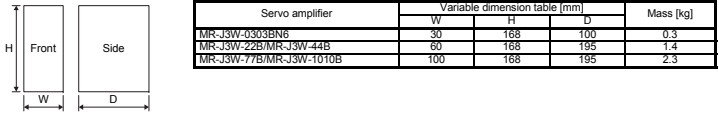
8. Technical data

8.1 MR-J3W servo amplifier

Item	MR-J3W-22B/MR-J3W-44B/ MR-J3W-77B/MR-J3W-222B	MR-J3W-1010B	MR-J3W-0303BN6
Power supply	Main circuit (line voltage) 3-phase or 1-phase 200 V AC to 230 V AC, 50 Hz/60 Hz Control circuit (line voltage) 1-phase 200 V AC to 230 V AC, 50 Hz/60 Hz Interface (SELV) 24 V DC (required current capacity: 350 mA)	3-phase 200 V AC to 230 V AC, 50 Hz/60 Hz 24 V DC (required current capacity: 350 mA)	48 V DC or 24 V DC 24 V DC
Position degree	2 (IEC/EN 60664-1)		
Control method	Sine-wave PWM control, current control method		
Pollution degree	2 (IEC/EN 60664-1)		
Overvoltage category	1-phase; II (IEC/EN 60664-1), 3-phase; III (IEC/EN 60664-1)		
Protective class	I (IEC/EN 61800-5-1)		
Short-circuit current rating (SCCR)	100 kA		5 kA (Note)

Note: For the use in US/Canada, constitute a branch circuit including the power supply which endures SCCR of 5 kA minimum in the industrial cabinet.

8.2 Dimensions/mounting hole process drawing



Servo amplifier	Variable dimensions (mm)					Screw Size
	a	a1	b	c	d	
MR-J3W-0303BN6	6	6	156 ± 0.5	6		M5
MR-J3W-22B/MR-J3W-44B	6	6	156 ± 0.5	6	48 ± 0.3	M5
MR-J3W-77B/MR-J3W-1010B	6	6	156 ± 0.5	6	88 ± 0.3	M5

[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]
(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.
(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
(iii) 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
(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
(vi) 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
(vii) 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
(viii) 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 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.
(2) 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.



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.

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG MARUNOUCHI TOKYO 100-8310

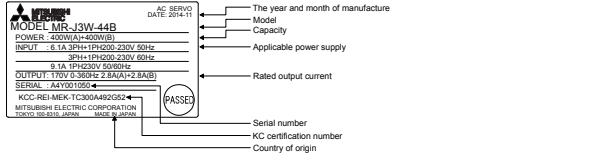
IB/(NA)0300148-L(1605)/MEE Printed in Japan This guide uses recycled paper. Specifications are subject to change without notice.

Copyright©2008 Mitsubishi Electric Corporation All Right Reserved.

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

Contents	Quantity
Servo amplifier	1
MELSERVO-J3W Series Instructions and Cautions for Safe Use of AC Servos (this guide)	1

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



Warning plate
The following shows an example of warning plate. The following describes what each block of a model name indicates. Not all combinations of the symbols are available.

Model	Series	L: Software special specification Blank, 00, 99, or UH (n = 00 to 999)	H: Hardware special specification Blank or 2 to 5 digit alphanumeric (R, U, ED, P, R, KZ, etc.)	B: Power supply	S: Power supply
MR-J3W-22B					
Rated output	Symbol	Rated output [kW]	Symbol	A-axis	B-axis
	0303	0.03	0303	22	0.2
	04	0.4	04	44	0.4
	077	0.75	077	77	0.75
	1010	1	1010	1	1

1. About the manual

1.1 MELSERVO-J3W relevant manuals
This installation guide explains how to mount MR-J3W servo amplifiers. You can also check it with our website for free. <http://www.mitsubishielectric.com/ia/>
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-J3W servo amplifiers for engineers of machinery manufacturers and machine operators. For detailed information of the products, refer to each servo amplifier instruction manual.

2. About safety

This chapter explains safety of users and machine operators. Please read the chapter carefully before mounting the equipment. In this installation guide, the specific warnings and cautions levels are classified as follows.

