

INSTALLATION GUIDE

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: +1-847-478-2253
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi Electric Platz 1, 40682 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 N-Dower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea	Tel: +82-2-3660-9510 Fax: +82-2-3664-5372/8335
Japan	Mitsubishi Electric Corporation Tokyo Building, 2-7-3, Marunouchi, Chiyoda-ku, Tokyo 100-8310, Japan	Tel: +81-3-3218-2111

2. About safety

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

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

2.1 Professional engineer

Only professional engineers should mount MR-D01. Here, professional engineers should meet all the conditions below.

- Persons who took a proper training of related work of electrical equipment or persons who can avoid risk based on past experience.
- Persons who have read and familiarized himself/herself with this installation guide.

2.2 Correct use

Use MR-D01 within specifications. Refer to chapter 7 of this installation guide for specifications such as voltage, temperature, etc.
 Mitsubishi Electric Co. accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

WARNING	● If you need to get close to the moving parts of the machine for inspection or others, ensure safety by confirming the power off, etc. Otherwise, it may cause an accident.
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2.2.1 Selection of peripheral equipment and wire

For details of MCCB, fuses, and wire selections of servo amplifiers on which MR-D01 is mounted, refer to each instruction manual or specification of the servo amplifiers.
 MR-D01 has a part for grounding on the frame (FG). Fix the metal part FG of MR-D01 with a screw to ground.

2.2.2 Europe/UK compliance

The CE/UKCA marking proves the compliance of the servo product with the essential requirements specified in the relevant EU Directives and UK Regulations, and this marking also applies to machines and equipment incorporating servos.

(1) EMC requirement

The servo amplifiers on which MR-D01 comply with EN/BS EN IEC 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 200 V class and for output of 400 V class servo amplifiers. In addition, use a line noise filter for outputs of the 11 kW and 15 kW of 400 V class servo amplifiers. The following shows recommended products.
 EMC filter: Soshin Electric HF3000A-UN series, TF3000C-TX series, COSEL FTB series
 Surge protector: Okaya Electric Industries RSPD series Line noise filter: Mitsubishi Electric FR-BLF MELSERVO Series are not intended to be used on a low-voltage network which supplies domestic premises; electromagnetic interference is expected if used on such a network.
 The installer shall provide a guide for installation and use, including recommended mitigation devices. To avoid the risk of crosstalk to signal cables, the installation instructions shall either recommend that the power interface cable be segregated from signal cables.

(2) For Declaration of Conformity (DoC)

We declare that the servo amplifiers are in compliance with EC directives (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.

2.2.3 USA/Canada compliance

The servo amplifiers on which MR-D01 is mounted are designed in compliance with UL 508C and CSA C22.2 No. 274.

(1) Installation

The minimum cabinet size is 150 % of each MR-J4 servo amplifier's volume including MR-D01. Also, design the cabinet so that the ambient temperature in the cabinet is 55 °C or less. MR-D01 and servo amplifier must be installed in a metal cabinet. Additionally, mount the servo amplifier on a cabinet that the protective earth based on the standard of IEC/EN 60204-1 is correctly connected. For environment, the units should be used in open type (UL 50) and overvoltage category III or lower. MR-D01 and servo amplifier needs to be installed at or below pollution degree 2. For connection, use only copper wires.

(2) Short-circuit current rating (SCCR)

Each servo amplifier on which MR-D01 is mounted has checked with a short-circuit test.

(3) Motor overload and Over temperature protection

The overload protection of the servo motor does not include a thermal memory function, and is not speed sensitive. The servo amplifier cannot detect overheating of the servo motor. The servo motors are protected by the servo motor overheat protection function of the servo amplifier on which MR-D01 (a protection characteristic based on 120 % of the rated current). To provide the servo motor with overheat protection, use a magnetic contactor (electromagnetic switch) with a thermal relay. Alternatively, install a thermal sensor or equivalent equipment near the rating plate of the servo motor to check that the servo motor temperature is under 105 °C with sensing device. (Refer to Chapter 4)

(4) Capacitor discharge

It takes 15 minutes for capacitor discharging of the servo amplifier on which MR-D01 is mounted. Do not touch the unit and terminals immediately after power off.

(5) Branch circuit protection

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

2.2.4 South Korea compliance

Products that bear the KC mark comply with the Radio Wave Law. Please note the following to use the product.
 이 기기는 업무용 (A급) 전자파 적합 기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
 (The product is for business use (Class A) and meets the electromagnetic compatibility requirements. The seller and the user must note the above point, and use the product in a place except for home.)
 In addition, use a ferrite core and line noise filter for inputs and outputs.

2.3 General cautions for safety protection and protective measures

Observe the following items to ensure proper use of the servo amplifiers on which MR-D01 is mounted.

- Only qualified personnel and professional engineers should perform system installation.
- When mounting, installing, and using them, always observe standards and directives applicable in the country.
- They fulfill the requirements to conducted emissions at the main connections in the frequency range from 150 kHz to 30 MHz. (Bases for the evaluation: Product standard IEC/EN 61800, adjustable speed electrical power drive systems, Part 3: EMC)

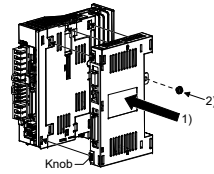
2.4 Disposal

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)

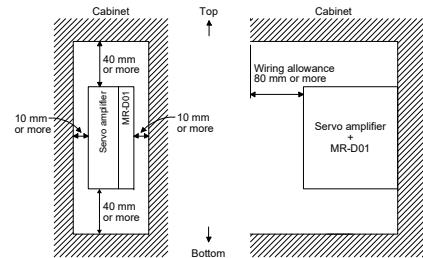
3. Mounting/dismounting

CAUTION	● The devices must be installed in the specified direction. Not doing so may cause a malfunction. ● Mount the servo amplifier on a cabinet which meets IP54 in the correct vertical direction to maintain pollution degree 2. ● The regenerative resistor supplied with 11 kW to 22 kW 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.
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The following shows an example of mounting procedures of a 200 V class 100 W servo amplifier. For details of other servo amplifiers, refer to each instruction manual or specification of the servo amplifiers on which MR-D01 is mounted.



- Remove the cap of CN7 connector of the servo amplifier, and push the four corners of the side of MR-D01 simultaneously to the servo amplifier until the four knobs click so that CN7 is connected straight.
- Tighten the metal part FG with the enclosed installing screw (M4 × 6).

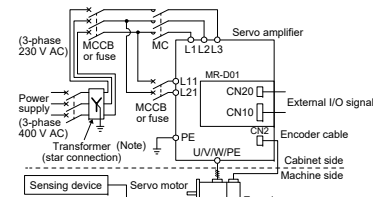


4. Electrical installation and configuration diagram

WARNING	● Turn off the molded-case circuit breaker (MCCB) to avoid electrical shocks or damages to the product before starting the installation or wiring.
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CAUTION	● Securely connect the cables in the specified method and tighten them with the specified torque. Otherwise, the servo motor may operate unexpectedly.
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The following shows a representative configuration example. The connectors described by rectangles are safely separated from the main circuits described by circles.
 For 3-phase 230 V AC input



Note. Supply neutral needs to be earthed.

5. Maintenance and service

This chapter explains servo amplifiers on which MR-D01 is mounted.

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

It is recommended that the following points periodically be checked.

- Check for loose terminal screws of the servo amplifier. Retighten any loose screws.
- Check servo motor bearings, brake section, etc. for unusual noise.
- Check the cables and the like for scratches or cracks. Perform periodic inspection according to operating conditions.
- Check that the connectors are securely connected to the servo motor.
- Check that the wires are not coming out from the connector.
- Check for dust accumulation on the servo amplifier.
- Check for unusual noise generated from the servo amplifier.
- Check the servo motor shaft and coupling for connection.
- 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.

5.2 Parts having service lives

MR-D01 has no parts for replacement.

6. Transportation and storage

CAUTION	● Transport the products correctly according to their mass. ● Stacking in excess of the limited number of product packages is not allowed. ● Install the equipment in a load-bearing place in accordance with each instruction manual or specification of the servo amplifiers on which MR-D01 is mounted. ● Do not put excessive load on the machine.
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When you keep or use it, please fulfill the following environment.

Item	Environment
Ambient temperature	Operation [°C] 0 to 55 Class 3K3 (IEC/EN 60721-3-3)
	Transportation (Note) [°C] -20 to 65 Class 2K12 (IEC/EN 60721-3-2)
	Storage (Note) [°C] -20 to 65 Class 1K4 (IEC/EN 60721-3-1)
Ambient humidity	Operation, transportation, storage 5 %RH to 90 %RH
	Test condition 10 Hz to 57 Hz with amplitude of 0.075 mm 57 Hz to 150 Hz with constant acceleration of 9.8 m/s ² (Test Fz of IEC 60668-2-6)
Vibration resistance	Operation 5.9 m/s ²
	Transportation (Note) Class 2M3 (IEC/EN 60721-3-2)
	Storage Class 1M2 (IEC/EN 60721-3-2)
Pollution degree	2
IP rating	Mounted on a servo amplifier: IP20 (IEC/EN 60529)
	MR-D01 (single): IP00 (IEC/EN 60529)
Altitude	Open type (UL 50) 1000 m or less
	Transportation 10000 m or less

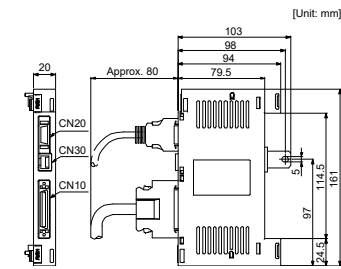
Note. In regular transport packaging

7. Technical data

7.1 MR-D01

Item	Description
Model	MR-D01
Function	Additional digital input/output, additional analog input/output, external digital display connection
Digital input	Photocoupler insulator 24 V DC (external supply) Sink/source compatible, internal limit resistor: 5.6 kΩ
Digital output	16 points, photocoupler insulator, open collector 24 V DC (external supply) Sink/source compatible, permissible current: 40 mA or less, inrush current: 100 mA or less
Analog input	2 channel input voltage: -10 V to +10 V DC, internal resistor: 12 kΩ, resolution: 12 bits
Analog output	2 channel input voltage: -12 V to +12 V DC, maximum output current: 1 mA, resolution: 12 bits
+15 V output for analog input signal	Available as analog input signal power supply Output voltage: +15 V, permissible current: 30 mA
Accessory	Fixing screw (M4) × 1
Mass	140

7.2 Dimensions



8. Compliance with standards

MR-D01 complies with the following standard.
 IEC/EN 61800-3/GB 12668.3/KN 61800-3 (KS C 9800-3)

[Warranty]

- 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]

- 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
- 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.
- 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.
- 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:
 - Damages caused by any cause found not to be the responsibility of Mitsubishi products.
 - Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
 - Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
 - Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.
- Change of Product specifications**
 Specifications listed in our catalogs, manuals or technical documents may be changed without notice.
- Application and use of the Product**
 - 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.
 - 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.