MITSUBISHI ELECTRIC

General-Purpose AC Servo

MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO

Sensing Module
Model
MR-MT2010
MR-MT2100
MR-MT2200
MR-MT2300
MR-MT2400

Installation Guide

E

Country/Region	Sales office	Tel
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0
China	Mitsubishi Electric Automation (China) Ltd. Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Shanghai, China	Tel : +86-21-2322-3030
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 7F to 9F, Gangseo Hangang Xl-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul, Korea	Tel : +82-2-6103-9474
Japan	Mitsubishi Electric Corporation Tokyo Building, 2-7-3, Marunouchi, Chiyoda-ku, Tokyo 100-8310, Japan	Tel : +81-3-3218-2111

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HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

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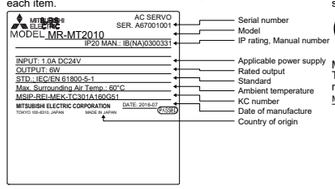
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Specifications are subject to change without notice.
Compliance with the indicated global standards and regulations is current as of the release date of this installation guide.
The original instructions for Europe are in English.

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

Contents	Quantity
Sensing module	1
Sensing Module Installation Guide (This guide)	1

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



Regulation/legislation marking
An example of regulation/legislation marking is shown below.

Model
The following describes what each block of a model name indicates.

M R - M T 2 0 1 0
Series
Unit

Symbol	Type name
2010	SSCNET III/H head module
2100	I/O module
2200	Pulse I/O module
2300	Analog I/O module
2400	Encoder I/F module

1. About the manuals

To use the sensing module safely, read "Sensing module instruction manual" carefully.

1.1 Sensing modules relevant manuals

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

1.2 Purpose of this guide

This installation guide explains the safe operation of sensing modules for engineers of machinery manufacturers and machine operators. For detailed information of the products, refer to each "Sensing Module 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.

⚠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 sensing modules.
Here, professional engineers should meet all the conditions below.

(1) Persons who took a proper training of related work of electrical equipment or persons who can avoid risk based on past experience.

(2) Persons who have read and familiarized himself/herself with this installation guide.

2.2 Applications of the devices

Sensing modules comply with the following standards.
• IEC/EN 61800-3/GB 12668.3/KN 61800-3 (KS C 9800-3), IEC/EN 60204-1

2.3 Correct use

Use the sensing modules within specifications. Refer to "Sensing Module Instruction Manual" for specifications such as voltage, temperature, etc. Mitsubishi Electric Co. accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

⚠WARNING
- If you need to get close to the moving parts of the machine for inspection or others, ensure safety by confirming the power off, etc. Otherwise, it may cause an accident.

2.3.1 Peripheral device

The followings are selected based on UL 508C, and CSA C22.2 No. 274.

(1) Power supply
Sensing modules can be used under the conditions of the overvoltage category II.
For the interface power supply, use an external 24 V DC power supply with reinforced insulation on I/O terminals.

2.3.2 Europe/UK compliance

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

(1) EMC requirement
Sensing modules comply with EN/BS EN IEC 61800-3. As for I/O wires (max. length 10 m.) and encoder cables (max. length 30 m), use shielded wires and ground the shields.
Sensing modules are not intended to be used on a low-voltage network which supplies domestic premises; electromagnetic interference is expected if used on such a network. The installer shall provide a guide for installation and use, including recommended mitigation devices. To avoid the risk of crosstalk to signal cables, the installation instructions shall either recommend that the power interface cable be segregated from signal cables. Install the DC power supply for I/O signals of the sensing modules in the same cabinet. Do not connect the other electric devices to the DC power supply.

(2) For Declaration of Conformity (DoC)
We declare that the sensing modules are in compliance with EC directives (EMC directive (2014/30/EU) and RoHS directive (2011/65/EU, (EU) 2015/863)) and applicable regulations of the UK. For the copy of Declaration of Conformity, contact your local sales office.

2.3.3 USA/Canada compliance

This sensing module is designed in compliance with UL 508C and CSA C22.2 No. 274.

(1) Installation
The minimum cabinet size is 150 % of volume of each sensing module. Also, design the cabinet so that the ambient temperature in the cabinet is 60 °C or less. The sensing module must be installed in the metal cabinet. Additionally, mount the sensing module on a cabinet that the protective earth based on the standard of IEC/EN 60204-1 is correctly connected. For environment, the units should be used in open type (UL 50) and overvoltage category shown in table in section 8.1. The sensing module needs to be installed at or below pollution degree 2. For connection, use copper wires.

(2) Short-circuit current rating (SCCR)
SCCR of sensing modules requires support at the branch circuit protection devices (fuse and circuit breaker, etc.). Selection of the branch circuit protection devices is dependent on the external power supply.

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

2.3.4 South Korea compliance

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.)

2.4 General cautions for safety protection and protective measures

Observe the following items to ensure proper use of the sensing modules.

(1) For safety components and installing systems, only qualified personnel and professional engineers should perform.

(2) When mounting, installing, and using the sensing module, always observe standards and directives applicable in the country.

2.5 Residual risk

(1) 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)

(2) Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).

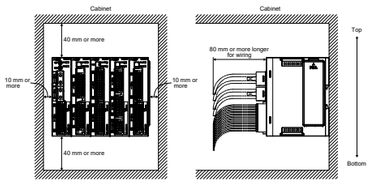
(3) Keep the required clearance/creepage distance depending on voltage you use.

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)

3. Installation direction and clearances

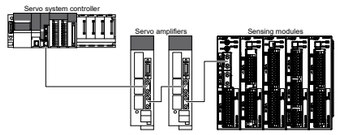
⚠CAUTION
- The devices must be installed in the specified direction. Not doing so may cause a malfunction.
- Mount the sensing module on a cabinet which meets IP54 in the correct vertical direction to maintain pollution degree 2.



4. Configuration diagram

⚠CAUTION
- Securely connect the cables in the specified method. Otherwise, the servo motor may operate unexpectedly.

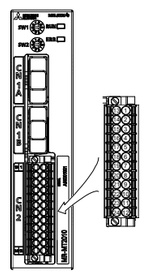
The following shows configuration examples of sensing modules.
Sensing modules are connected to the servo system controller by SSCNET III/H communication. Sensing modules can be connected to the same network system with the SSCNET III/H interface servo amplifier.



5. Signals

The following shows MR-MT2010 signals as a typical example. For other sensing modules, refer to each "Sensing Module Instruction Manual".

5.1 Signal



Pin No.	Symbol	Symbol	Pin No.
13	DI1	DI2	1
14	DI3	DI4	2
15	DI5	DI6	3
16	DI7	DI8	4
17	DI9	DI10	5
18	DI11	DI12	6
19	DICOM	DICOM	7
20	DO1	DO2	8
21	DOCOM(-)	DOCOM(-)	9
22	CTL(+)	DOCOM(-)	10
23	24V(+)	24G	11
24	FG	FG	12

5.2 I/O device

Symbol	Device	Connector	Pin No.
DI1 to DI12	Digital input	CN2	1 to 6/13 to 18
DO1/DO2	Digital output		8/20
DICOM	Common terminal for input signals		7/19
DOCOM(-)	Common terminal for output signals		9/10/21
24V(+)/24G	Control circuit power supply		11/23
FG	Grounding		12/24

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 the cables and the like for scratches or cracks. Perform periodic inspection according to operating conditions.

(2) Check that the wires are not coming out from the connector.

(3) Check for dust accumulation on the sensing module.

(4) Check for unusual noise generated from the sensing module.

7. Transportation and storage

⚠CAUTION
- Transport the products correctly according to their mass.
- Stacking in excess of the limited number of product packages is not allowed.
- Install the product in a load-bearing place of sensing module in accordance with the instruction manual.
- Do not put excessive load on the machine.

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

Item			Environment
Ambient temperature	Operation	[°C]	0 to 60 Class 3K3 (IEC/EN 60721-3-3)
	Transportation (Note)	[°C]	-20 to 65 Class 2K12 (IEC/EN 60721-3-2)
	Storage (Note)	[°C]	-20 to 65 Class 1K4 (IEC/EN 60721-3-1)
Ambient humidity	Operation, transportation, storage		5 %RH to 90 %RH
Vibration resistance	Test condition		10 Hz to 57 Hz with constant amplitude of 0.075 mm 57 Hz to 150 Hz with constant acceleration of 9.8 m/s² to IEC/EN 61800-5-1 (Test Fc of IEC 60068-2-6)
	Operation		5.9 m/s²
	Transportation (Note)		Class 2M3 (IEC/EN 60721-3-2)
	Storage		Class 1M2 (IEC/EN 60721-3-2)
Pollution degree			2
IP rating			IP20 (IEC/EN 60529) Open type (UL 50)
Altitude	Operation, storage		Max. 2000 m
	Transportation		Max. 10000 m

Note. In regular transport packaging

8. Technical data

8.1 MR-MT2010

Item		Specification
Control circuit power supply input	Voltage	24 V DC
	Permissible voltage fluctuation	24 V DC ± 10 %
	Rated current [A]	1.0
DI	Points	12
	Input type	Photocoupler insulation, 24 V sink/source input
DO	Points	2
	Output method	Photocoupler insulation, 24 V sink output
Mass [kg]		0.2

8.2 MR-MT2100

Item		Specification
DI	Points	16
	Input type	Photocoupler insulation, 24 V sink/source input
DO	Points	16
	Output method	Photocoupler insulation, 24 V sink/source output (Note)
Mass [kg]		0.2

Note. The source output is usable when MR-MT2010 with software version A1 or later is connected.

8.3 MR-MT2200

Item		Specification
Number of pulse input/output channels		Output: 2/Input: 2/Input and output: 1 each (selective)
Pulse output	Output signal	Differential output/open collector output
	Output pulse train	Forward/reverse rotation pulse train, Signed pulse train, A-phase/B-phase pulse train
Pulse input	Input signal	Differential input
	Input pulse train	Forward/reverse rotation pulse train, Signed pulse train, A-phase/B-phase pulse train
DI	Points	14 (7 each axis)
	Input type	Photocoupler insulation, 24 V sink/source input
DO	Points	6 (3 each axis)
	Output method	Photocoupler insulation, 24 V sink/source output
Mass [kg]		0.2

8.4 MR-MT2300

Item		Specification
Analog input	Points	4
	Input voltage range	DC -10 V to +10 V/DC -5 V to +5 V (selective)
Analog output	Points	4
	Output voltage range	DC -10 V to +10 V
Mass [kg]		0.2

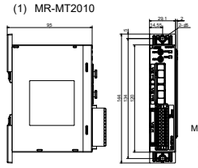
8.5 MR-MT2400

Item	Specification
Encoder communication format	SSI
Mass [kg]	0.2

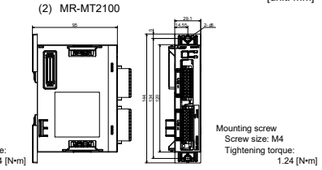
8.6 Dimensions/mounting hole process drawing

[unit: mm]

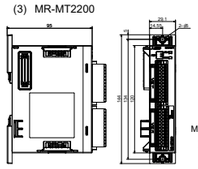
(1) MR-MT2010



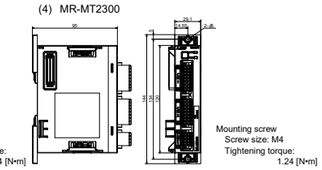
(2) MR-MT2100



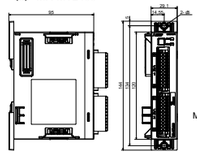
(3) MR-MT2200



(4) MR-MT2300



(5) MR-MT2400



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.