

MELSEC MX Controller (MX-F model) Hardware Manual

Thank you for purchasing this product.

Manual number	IB(NA)-0800698-B
Date	January 2025

© 2024 MITSUBISHI ELECTRIC CORPORATION

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. In this manual, the safety precautions are classified into two levels: **▲ WARNING** and **▲ CAUTION**.

▲ WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
▲ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under **▲ CAUTION** may lead to serious consequences. Observe the precautions of both levels because they are important for personal and system safety.

For details on the safety precautions for the MELSEC IQ-F series modules such as intelligent function modules and expansion adapters, refer to the manuals for each product.

INSTALLATION PRECAUTIONS

▲ WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product. Use the product within the generic environment specifications described in this manual.
- Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl₂, H₂S, SO₂ or NO₂), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

STARTUP AND MAINTENANCE PRECAUTIONS

▲ WARNING

- Do not touch any terminal while power is on. Doing so may cause electric shock or malfunctions.
- Before cleaning or retightening terminals, cut off all phases of the power supply externally. Failure to do so may result in electric shock.
- Before modifying the program, performing forced output, or running or stopping the controller while the system is running, read through this manual carefully, and ensure complete safety. An operation error may damage the machinery or cause accidents.
- Do not change the program in the controller from two or more peripherals at the same time (such as from an engineering tool and a GOT). Doing so may cause destruction or malfunction of the controller program.
- Correctly use the clock data retaining battery as described in the MELSEC MX Controller (MX-F Model) User's Manual.
 - Do not use it for purposes other than those specified.
 - Correctly connect the battery.
 - Do not charge, disassemble, heat, short-circuit, solder, swallow, incinerate, throw the battery into the fire, or reverse the polarity of the battery. Also, do not apply excessive force (including vibration, shock, and drop) to the battery.
 - Do not store or use the battery at high temperatures or in places exposed to direct sunlight.
 - Do not expose contents such as liquid to water, bring them close to fire, or touch them directly.
 - Always use the FX3U-32BL specified by Mitsubishi Electric for replacement.
- When a battery error occurs (SM52 is on), follow the instructions in this manual. Incorrect handling of the battery may cause heat excessive generation, bursting, ignition, liquid leakage or deformation, and lead to injury, fire or failures and malfunction of facilities and other equipment.

STARTUP AND MAINTENANCE PRECAUTIONS

▲ CAUTION

- Do not disassemble or modify the controller. Doing so may cause fire, equipment failures, or malfunctions. For repair, contact your local Mitsubishi Electric representative.
- After the first use of the product, do not insert/remove the SD memory card into/from the controller more than 500 times. Exceeding the limit may cause malfunction.
- Make sure to turn off the power before connecting or removing connection cables such as extension cables. Failure to do so may cause device failures or malfunctions.
- Make sure to turn off the power before installing or removing the following devices. Failure to do so may cause device failures or malfunctions.
 - Peripherals, expansion adapters, connector conversion adapters
 - Extension modules, connector conversion modules
 - Batteries
- Do not use the chemicals for cleaning.
- If there is the possibility of touching the controller system inside a control panel in maintenance, make sure to discharge to avoid the influence of static electricity.
- Since there are risks such as burn injuries, please do not touch the surface of the equipment with bare hands when it is operating in an environment which exceeds ambient temperature of 40°C.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) 25cm or more away in all directions from the controller system. Failure to do so may cause malfunction.
- After power-off, wait for one second or more, then turn on the power. If the interval between power-off and on is insufficient, the module may not start up.

COMPUTER CONNECTION PRECAUTIONS

▲ WARNING

- The controller is a non-insulated type. Also, the functional ground terminal of the power supply terminal and the FG metal fitting on the bottom of the product are conductive to the RJ45 connector shell (P1, P2) and USB connector shell inside the controller. Depending on how peripherals are connected, the external power supply may be short-circuited. Therefore, never ground the +24V side. In addition, be careful with the USB cable because the connector shell and SG (24G) may have been short-circuited in the cable.

SECURITY PRECAUTIONS

▲ WARNING

- To maintain the security (confidentiality, integrity, and availability) of the controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from unreliable networks or devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

TRANSPORTATION PRECAUTIONS

▲ CAUTION

- When transporting a controller with an optional battery, make sure to power on the controller before transportation, and check that SM52 is off and the battery life. If the controller is transported with SM52 on or a battery that has reached the end of its life, the backup data may not be properly retained during transportation.
- Since the controller system is a precision device, use a dedicated packaging box or anti-vibration pallet during transportation to avoid impacts exceeding the general specifications described in this manual. Failure to do so may cause a failure of the controller system. After transportation, check the operation of the controller system and check mounting parts or others for damage.
- When transporting lithium batteries, follow required transportation regulations. (For details on the regulated products, refer to the MELSEC MX Controller (MX-F Model) User's Manual.)
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the controller system. Prevent the entry of fumigant residues into the controller system or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

DISPOSAL PRECAUTIONS

▲ CAUTION

- When disposing of this product, treat it as industrial waste.
- When disposing of batteries, separate them from other wastes according to the local regulations. For details on battery regulations in EU member states, refer to the MELSEC MX Controller (MX-F Model) User's Manual.)

MANUAL

Make sure to read the following detailed manual before using this product.

Manual name	Manual number	Description
MELSEC MX Controller (MX-F Model) User's Manual	SH-082634ENG	Hardware of the controller, including performance specifications, wiring, installation, and maintenance

COMPLIANCE WITH EU DIRECTIVE (CE MARKING)

This product complies with the EU Directive, however, this document does not guarantee that a mechanical system including this product will comply with the EU Directive. Compliance to the EMC Directive and LVD (Low Voltage Directive) of the entire mechanical system should be checked by the user/manufacturer. For details, please consult your local Mitsubishi Electric representative. For cautions regarding compliance with the EMC Directive, refer to the MELSEC MX Controller (MX-F Model) User's Manual.

REQUIREMENT FOR LOW VOLTAGE DIRECTIVE (LVD) COMPLIANCE

The following product has shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Low Voltage Directive (2014/35/EU) when used as directed by the appropriate documentation.

Product compatibility

Target product: MXF100-Y16R

Compliance with LVD (Low Voltage Directive)	Remarks
EN IEC 61010-2-201, EN 61010-1	The product has been assessed as a component for fitting in a suitable control panel which satisfies the requirements of EN IEC 61010-2-201 and EN 61010-1.

Precautions

- When using hazardous voltage (30VAC (effective value)/42.4VAC (peak value) and a voltage less than 30VAC/DC between adjacent commons of relay output terminals, do not handle the output terminals used for less than 30VAC/DC as touchable parts.
- Do not wire two or more wires or ferrules to one terminal. (If the wiring with two or more wires is needed, take an appropriate action such as adding an external terminal block.)
- For wires or ferrules to be used for the wiring applied with 30VAC or higher, use the products with insulating sleeves.
- Cutoff devices such as a breaker or a circuit protector must be installed in accordance with the following precautions.
 - Use a cutoff device that complies with EN 60947-1 or EN 60947-3 standards.
 - Place the cutoff device so that it can be operated easily.
 - Indicate that the cutoff device is for this product.
- For external connection ports excluding AC output terminals, use an external power supply that complies with the SELV defined by EN IEC 61010-2-201.
- Use the controller system, which is open-type device, while installed in conductive shielded control panels in a general industrial environment. For the control panel, use the product having sufficient strength, fire protectiveness, and protection degree IP20 or higher to an installation environment.

COMPLIANCE WITH UL AND cUL STANDARDS

Products that comply with UL and cUL standards

For products that comply with UL and cUL standards, contact your local Mitsubishi Electric representative.

Requirements for compliance with UL and cUL standards

Requirements for compliance with UL and cUL standards are the same as those for the precautions to comply with the Low Voltage Directive in the EU Directive (CE marking). In addition, external connection ports, excluding AC output terminals, the power must be supplied from a circuit that complies with the SELV circuit and LIM (Limited Energy Circuit), or UL 1310 Class 2.

1. Product Overview

1.1 Packing list

The following items are included in the package of the controller and I/O module. Before use, check that all the items are included.

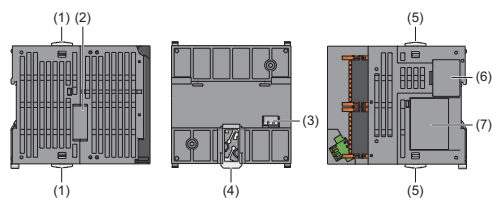
Controller

Model	Item	Quantity
MXF100-8-N32, MXF100-8-P32	Controller	1
MXF100-16-N32, MXF100-16-P32	Safety Guidelines	1

I/O module

Model	Item	Quantity
MXF100-X32, MXF100-Y32N, MXF100-Y32P, MXF100-Y16R, MXF100-H32N, MXF100-H32P	Module	1
	Safety Guidelines	1

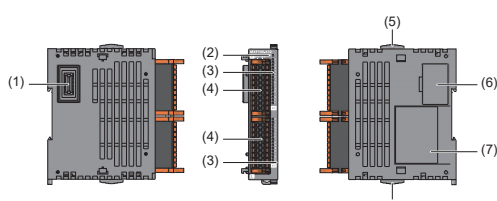
Side, back



No.	Name
(1)	Expansion adapter connecting hook
(2)	Expansion adapter connector cover
(3)	FG metal fitting
(4)	DIN rail mounting hook
(5)	Extension module connecting hook
(6)	Extension connector cover
(7)	Nameplate ¹

¹ Products that do not have the nameplates are not covered by the warranty.

I/O module

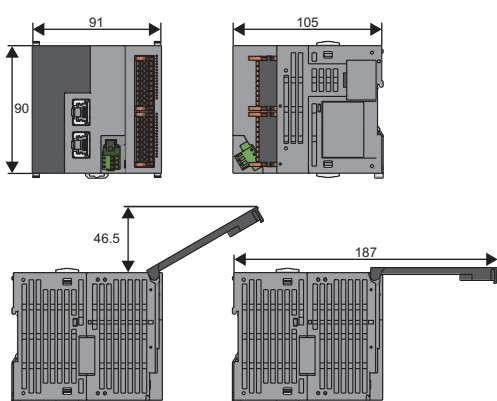


No.	Name
(1)	Extension connector
(2)	PWR/POWER LED
(3)	I/O display LED
(4)	I/O terminals
(5)	Extension module connecting hook
(6)	Extension connector
(7)	Nameplate ¹

¹ Products that do not have the nameplates are not covered by the warranty.

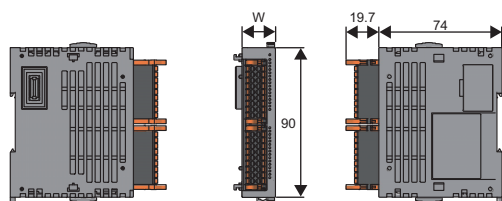
1.3 External dimensions and weight

Controller



Model	Weight (kg)
MXF100-8-N32, MXF100-8-P32	0.45
MXF100-16-N32, MXF100-16-P32	

I/O module



Product	Model	W (mm)	Weight (kg)
Input module	MXF100-X32	20.1	0.15
Output module	MXF100-Y32N, MXF100-Y32P	20.1	
	MXF100-Y16R	30.7	
I/O module	MXF100-H32N, MXF100-H32P	20.1	

2. Installation (General Specifications)

2.1 General specifications

Item	Specifications												
Operating ambient temperature ¹	0 to 55°C, non-freezing												
Storage ambient temperature	-25 to 75°C, non-freezing												
Operating ambient humidity	5 to 95%RH, non-condensing ²												
Storage ambient humidity	5 to 95%RH, non-condensing												
Vibration resistance ^{3,4}	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Constant acceleration</th> <th>Half amplitude</th> <th>Number of sweeps</th> </tr> </thead> <tbody> <tr> <td>Installed on DIN rail</td> <td>5 to 8.4Hz</td> <td>—</td> <td>1.75mm</td> </tr> <tr> <td></td> <td>8.4 to 150Hz</td> <td>4.9m/s²</td> <td>—</td> </tr> </tbody> </table>	Frequency	Constant acceleration	Half amplitude	Number of sweeps	Installed on DIN rail	5 to 8.4Hz	—	1.75mm		8.4 to 150Hz	4.9m/s ²	—
Frequency	Constant acceleration	Half amplitude	Number of sweeps										
Installed on DIN rail	5 to 8.4Hz	—	1.75mm										
	8.4 to 150Hz	4.9m/s ²	—										
Shock resistance ³	147m/s ² , Action time: 11ms, 3 times by half-sine pulse in each direction X, Y, and Z												
Noise immunity	By noise simulator at noise voltage of 1000Vp-p, noise width of 1μs and period of 30 to 100Hz												
Withstand voltage ⁵	500VAC for one minute or 1.5kVAC for one minute												
Insulation resistance ⁵	10MΩ or higher by 500VDC insulation resistance tester												
Grounding	Ground resistance of 100Ω or less <Common grounding with a heavy electrical system is not allowed.> ⁶												
Operating atmosphere	No corrosive gases, flammable gases, less conductive dust												
Operating altitude ⁷	0 to 2000m												
Installation location	Inside a control panel ⁸												
Overvoltage category ⁹	II or less												
Pollution degree ¹⁰	2 or less												

¹ There is input/output derating. For details, refer to the input/output derating curve (Section 3.7).

² When used in a low-temperature environment, use in an environment with no sudden temperature changes. When there are sudden temperature changes because of opening/closing of the control panel or other reasons, condensation may occur, which may cause a fire, fault, or malfunction. Use an air conditioner in dehumidifier mode to prevent condensation.

³ The criterion is shown in IEC 61131-2.

⁴ When the system has equipment whose specification values are lower than above mentioned vibration resistance specification values, the vibration resistance specification of the whole system is corresponding to the lower specification.

⁵ The withstand voltage and insulation resistance are listed in the following table.

Functional ground terminal	Terminal	Withstand voltage	Insulation resistance
Controller	Power supply terminal (DC power supply)	500VAC for one minute	10MΩ or higher by 500VDC insulation resistance tester
	Input terminal (24VDC)		
	Output terminal (transistor)	Module with transistor output circuit	
	Output terminal (relay)	Module with relay output circuit	
Expansion adapter	Terminal of expansion adapter	500VAC for one minute	10MΩ or higher by 500VDC insulation resistance tester

⁶ For grounding, refer to Section 3.3.

⁷ The controller cannot be used at a pressure higher than the atmospheric pressure to avoid damage.

⁸ The controller system is assumed to be installed in an environment equivalent to indoor.

⁹ This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

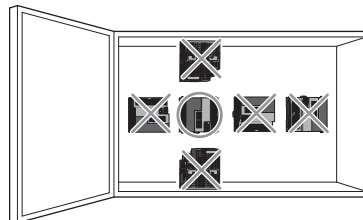
¹⁰ This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution degree 2 is when only non-conductive pollution occurs. Temporary conductivity caused by condensation must be expected occasionally.

2.2 Installation positions

Install the controller in an environment conforming to the general specifications (Section 2.1) and installation precautions.

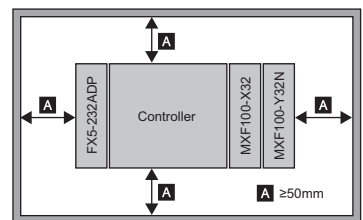
Installation positions in a control panel

To prevent temperature rise, do not mount the controller on the floor or ceiling, or in the vertical direction. Always mount the controller horizontally on the wall as shown in the following figure.



Layout in control panel

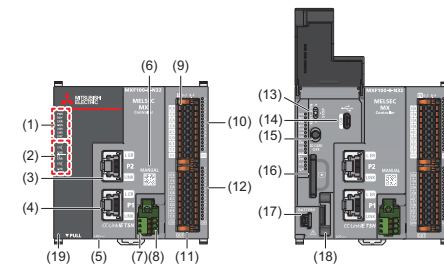
Keep a space of at least 50mm between the controller and other devices or structure. Also, separate the controller from high-voltage lines, high-voltage devices, and power devices when possible. Failure to do so may cause fire, equipment failures or malfunctions.



1.2 Part names

Controller

Front



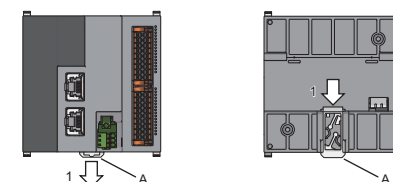
No.	Name
(1)	Operation status display LED
	PWR LED On when the power is on
	RDY LED •RDY LED—ERROR LED status
	ERROR LED On—off: Normal operation
	PRUN LED On during program execution
	USER LED On when the annunciator (F) is on
	CARD LED On when the card can be used or cannot be removed
	FUNC LED Flashing during execution
(2)	Operation status display LED (operating status of P1, P2)
	ERR LED On or flashing when an error occurs
	STS LED Always on
	D LINK LED On during cyclic transmission
(3)	Ethernet port (P2)
	L ER LED • On: Abnormal data received
	• Off: Normal data received
	LINK LED • On: Link-up
	• Flashing: Data being sent or received
	• Off: Link-down
(4)	Ethernet port (P1)
	L ER LED • On: Abnormal data received
	• Off: Normal data received
	LINK LED • On: Link-up
	• Flashing: Data being sent or received
	• Off: Link-down
(5)	LOT number
(6)	Two-dimensional code for web manual
(7)	Test terminal
(8)	Controller power terminal block
	⊕ indicates the functional ground terminal.
(9)	Input terminal block
(10)	Input display LED
(11)	Output terminal block
(12)	Output display LED
(13)	RUN/STOP/RESET switch
(14)	USB port
(15)	SD CARD OFF button
(16)	SD memory card slot
(17)	Battery connector
	▲ is a mark that indicates the need to check the battery installation and replacement procedures when using a battery.
(18)	Battery compartment
(19)	Top cover

2.3 Installing on DIN rail

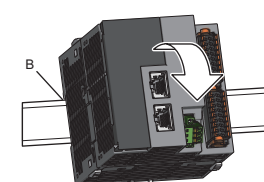
The controller can be installed on a 35mm wide DIN rail. Some extension devices must be installed on the controller system before they are installed in the control panel. The battery can be replaced without removing the controller system.

Installation method

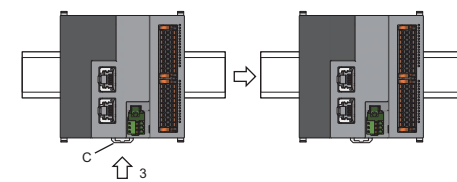
- Push out the DIN rail mounting hook (A in the figure).



- Fit the upper edge of the DIN rail mounting groove (B in the figure) onto the DIN rail.



- Lock the DIN rail mounting hook (C in the figure) while pressing the product against the DIN rail.



3. Specifications and Examples of External Wiring

DESIGN PRECAUTIONS

WARNING

- Configure safety circuits external to the controller system to ensure that the entire system operates safely even when a fault occurs in the external power supply or the controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured external to the controller system.
 - Note that when the controller detects an error, such as a watchdog timer error, during self-diagnosis, all outputs are turned off. Also, when an error that cannot be detected by the controller occurs in an input/output control block, output control may be disabled. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
 - Outputs may remain on or off due to a failure of a component such as a relay, transistor, and triac in an output circuit. For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
- When modifying data of a running controller system, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification, parameter change, forced output, or operating status change) of a running controller system, read the relevant manuals carefully and ensure that the operation is safe before proceeding. Improper operation may damage machines or cause accidents.
- In an output circuit, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- For the operating status of each station after a communication failure, refer to manuals relevant to the network. Failure to do so may result in an accident due to an incorrect output or malfunction.

WIRING PRECAUTIONS

WARNING

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Connect the power supply wiring to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the controller will burn out.
- The temperature rating of the cable should be 80°C or more. It may differ depending on the extension devices. For details, refer to the user's manual of the extension device used.
- Make sure to follow the precautions for wiring. Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
 - For the disposal size of the cable end, follow the dimensions described in this manual.
 - Twist the end of the stranded wire to prevent loose wires.
 - Do not solder plate the ends of the cable.
 - Do not connect wires other than the specified size or more than the specified number of wires.
 - Fix the wires so that external forces are not directly applied to the terminal block or the wire connection part.

WIRING PRECAUTIONS

CAUTION

- Ground the controller system (ground resistance of 100Ω or less) as described in this manual.
- Do not apply force to the terminal block, I/O connector, communication connector, and communication cable during use. Doing so may cause disconnection or malfunction.
- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to malfunction of the controller caused by abnormal data written to the controller due to the effects of noise:
 - Do not bundle the power line, control line and communication cables together with or lay them close to the main circuit, high-voltage line, load line or power line. Keep a distance of 100mm or more between them.
 - Ground the shield of the shielded wire or shield cable at one point on the controller system. However, do not use common grounding with heavy electrical systems.
 - Ground the shield of the analog input/output cable in accordance with the manuals of each model. However, do not use common grounding with heavy electrical systems.

3.1 Cable end treatment and tightening torque

M2.5 is used as the screw size for terminal block mounting screw.
 Use a tightening torque of 0.15 to 0.2 N·m. Do not tighten terminal screws with torque beyond the specified range.
 Doing so may cause failures or malfunctions.
 The cable ends should be treated as shown below.

Wire size

Power terminal block			
Number of wires connected per terminal	Wire size	Ferrule with insulation sleeve	Ferrule without insulation sleeve
One wire	22 to 16 AWG (0.3 to 1.5mm ²)		22 AWG (0.3mm ²)

*1 Use of a solid wire or stranded wire is not recommended.

I/O terminal block

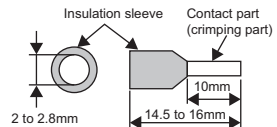
I/O terminal block			
Number of wires connected per terminal	Wire size	Ferrule with insulation sleeve	Ferrule without insulation sleeve
One wire	22 to 16 AWG (0.3 to 1.5mm ²)		22 AWG (0.3mm ²)

*1 Use of a solid wire or stranded wire is not recommended.

Cable end treatment

When using a ferrule (recommended)

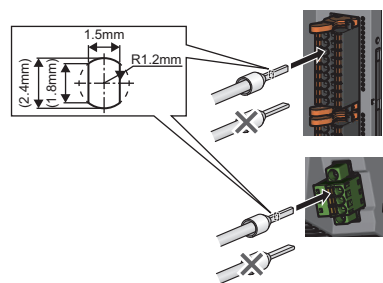
To attach a ferrule to a wire, use a tool for the ferrule.
 For the wire strip length, follow the specification of the ferrule. If the wire strip length is too long, it may result in electric shock or short circuit between adjacent terminals because the conductive part is exposed from the terminal block toward the front. If the wire strip length is too short, it may result in the unstable connection to the spring clamp terminal part.
 When a ferrule with insulation sleeve is used, it is difficult to insert the wire into the insulation sleeve depending on the thickness of the wire sheath. Therefore, select the proper wire according to the external dimensions.



The following table lists the ferrules and tools compatible with the terminal block. Use of items that are not listed in the following table may result in ferrule getting stuck to the terminals. Before use, carefully check that the ferrule can be removed.
 Use the ferrules and tools compatible with UL/cUL certification as recommended by the terminal manufacturer.
 <Compatible products>

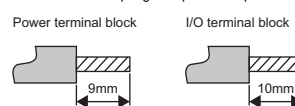
Manufacturer	Model	Wire size	AWG	Crimping tool
Phoenix Contact GmbH & Co. KG	Al 0.34-10 TQ	0.34mm ²	22	CRIMPFOX 6
	Al 0.5-10 WH	0.5mm ²	20	
	Al 0.75-10 GY	0.75mm ²	18	
	A 0.5-10	0.5mm ²	20	
	A 0.75-10	0.75mm ²	18	
	A 1-10	1.0mm ²	18	
	A 1.5-10	1.5mm ²	16	

Check that the size of the ferrule and its insertion direction are correct to prevent the ferrule from getting stuck in or the terminal block damage.
 Ensure that the cross-sectional shape of the ferrule after processing is smaller than the size in the figure below, even including an error in processing. For the correct insertion direction, refer to the figure below.



When not using a ferrule

Strip off the length of the sheath from the cable end shown below. When connecting with stranded wires, ensure that the wires do not separate.
 • Power terminal block: 9mm
 • I/O terminal block: 10mm
 If the wire strip length is too long, it may result in electric shock or short circuit between adjacent terminals because the conductive part is exposed from the terminal block toward the front. If the wire strip length is too short, it may result in the unstable connection to the spring clamp terminal part.



Connecting and disconnecting the cable

Spring clamp terminal block is the push-in type, therefore, wiring without a tool is possible by simply inserting the connecting terminal into the terminal block.
 However, the push-in type does not support stranded wire, and a tool is required for connecting cables.

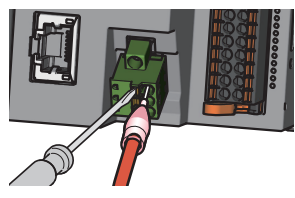
Power terminal block

Connecting the cable

Fully insert a wire or a wire with the ferrule into a wire insertion opening. If the wire cannot be inserted with this procedure, fully insert the wire or ferrule while pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5mm.
 After inserting the wire, pull it lightly to check that it is securely clamped.

Disconnecting the cable

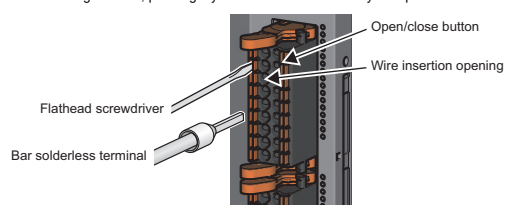
While pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5mm, disconnect the wire or wire with the ferrule.



I/O terminal block

Connecting the cable

Fully insert a wire or a wire with the ferrule into a wire insertion opening. If the wire cannot be inserted with this procedure, fully insert the wire or ferrule while pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5mm.
 After inserting the wire, pull it lightly to check that it is securely clamped.



Disconnecting the cable

While pushing the open/close button with a flathead screwdriver having a tip width of 2.0 to 2.5mm, disconnect the wire or wire with the ferrule.

3.2 Power supply specifications and external wiring

Power supply specifications (controller)

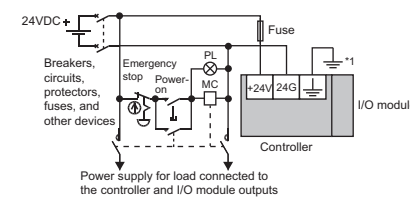
Item	Specifications
Rated voltage	24VDC
Voltage fluctuation range	+20%, -15%
Allowable instantaneous power failure time	5ms or less (at 24V)
Power fuse	125V, 3.15A time-lag fuse
Inrush current	100A, 0.06ms or less 4.0A, 350ms or less
Power consumption	Controller alone: 13.6W or less Maximum configuration for connection to the controller: 32.0W or less (external 24VDC power supply of extension devices is not included)
24VDC built-in power supply capacity	500mA
5VDC built-in power supply capacity	720mA

Current consumption (I/O module)

Item	Specifications						
	MXF100-X32	MXF100-Y32N	MXF100-Y32P	MXF100-Y16R	MXF100-H32N	MXF100-H32P	MXF100-H32P
Current consumption	5VDC 120mA	120mA	120mA	100mA	120mA	120mA	100mA
	24VDC 0mA	200mA	200mA	100mA	100mA	100mA	100mA

Example of external wiring

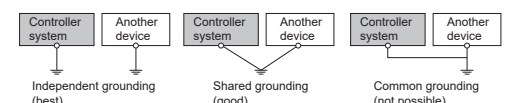
24VDC power is supplied to the controller. For details on the wiring work, refer to Section 3.1.



*1 Ground resistance of 100Ω or less
 For details, refer to Section 3.3.

3.3 Grounding

- Perform the following:
 - Provide a ground resistance of 100Ω or less.
 - Ground the controller independently when possible.
 - If the controller cannot be grounded independently, perform the "shared grounding" shown below.
- Use the thickest possible ground wire.
- Bring the grounding point close to the controller system as much as possible so that the ground cable can be shortened.



3.4 Input specifications and external wiring

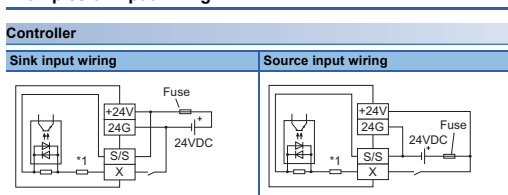
Input specifications (24VDC input type)

Controller		
Item	Specifications	Specifications
Number of input points	MXF100-8-N32 MXF100-16-N32 MXF100-8-P32 MXF100-16-P32	16 points
Connection type		Spring clamp terminal block
Input type		Sink/source
Input signal voltage		24VDC +20%, -15%
Input impedance		4.3kΩ
Input signal current		5.3mA/24VDC
ON input sensitivity current		3.5mA or more
Off input sensitivity current		1.5mA or less
Input signal type	Sink	No-contact input NPN open collector transistor
	Source	No-contact input PNP open collector transistor
Indication of input operation		LED turns on when input is on.

I/O module

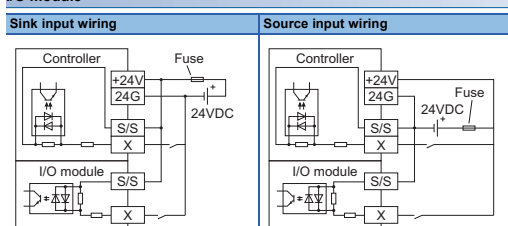
I/O module		
Item	Specifications	Specifications
Number of input points	MXF100-H32N MXF100-H32P MXF100-X32	16 points 32 points
Connection type		Spring clamp terminal block
Input type		Sink/source
Input signal voltage		24VDC +20%, -15%
Input impedance		5.6kΩ
Input signal current		4.0mA/24VDC
ON input sensitivity current		3.0mA or more
Off input sensitivity current		1.5mA or less
Input signal type	Sink	No-contact input NPN open collector transistor
	Source	No-contact input PNP open collector transistor
Indication of input operation		LED turns on when input is on.

Examples of input wiring



*1 Input impedance

I/O module



3.5 Transistor output specifications and external wiring

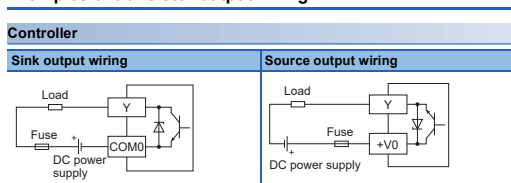
Output specifications

Controller		
Item	Specifications	Specifications
Number of output points	MXF100-8-N32 MXF100-16-N32 MXF100-8-P32 MXF100-16-P32	16 points
Connection type		Spring clamp terminal block
Output type	MXF100-8-N32 MXF100-16-N32	Transistor/sink output
	MXF100-8-P32 MXF100-16-P32	Transistor/source output
External power supply		5-30VDC
Maximum load (resistive load)		Y00 to Y03: 0.3A/point Y04 or later: 0.1A/point
Open circuit leakage current		0.1mA/30VDC
Voltage drop when on		Y00 to Y03: 1.0V or less Y04 or later: 1.5V or less
Response time		Y00 to Y03: 2.5μs or less/10mA or more (5-24VDC) Y04 or later: 0.2ms or less/100mA or more (24VDC)
Indication of output operation		LED turns on when output is on.

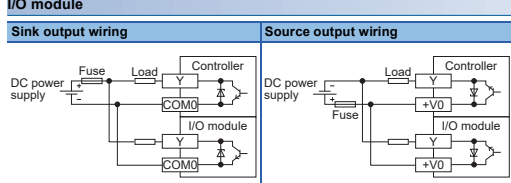
I/O module

I/O module		
Item	Specifications	Specifications
Number of output points	MXF100-H32N MXF100-H32P	16 points
	MXF100-Y32N MXF100-Y32P	32 points
Connection type		Spring clamp terminal block
Output type	MXF100-Y32N MXF100-H32N	Transistor/sink output
	MXF100-Y32P MXF100-H32P	Transistor/source output
External power supply		5-30VDC
Maximum load (resistive load)		0.1A/point
Open circuit leakage current		0.1mA/30VDC
Voltage drop when on		1.5V or less
Response time		0.2ms or less/100mA or more (24VDC)
Indication of output operation		LED turns on when output is on.

Examples of transistor output wiring



I/O module

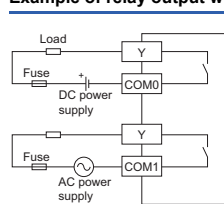


3.6 Relay output specifications and external wiring

Output specifications

Output specifications	
Item	Specifications
Number of output points	MXF100-Y16R
Connection type	16 points
External power supply	Spring clamp terminal block
Indication of output operation	30VDC or less 240VAC or less (250VAC or less when the product does not require CE, UL, and cUL standards)
Maximum load (resistive load)	LED turns on when output is on. 2A/point The total load current of resistive loads per common terminal should be the following value. • 8 output points/common terminal: 4A or less
Minimum load	5VDC, 2mA (reference values)
Response time	On → Off Off → On
	Approx. 10ms

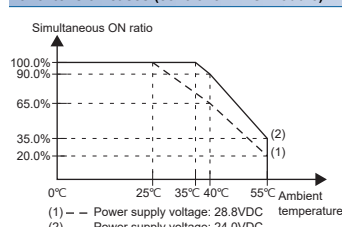
Example of relay output wiring



3.7 Input/output derating curve

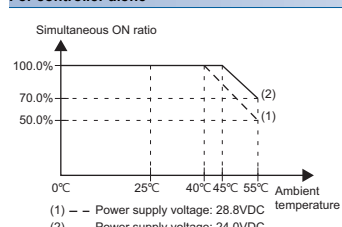
The derating curve below shows the simultaneous ON ratio of inputs or outputs of the available controller and I/O module with respect to the ambient temperature and power supply voltage. Use the controller within the simultaneous input or output ON ratio range shown in the figure.
 When using the controller with an I/O module, apply the I/O derating described in "For extension cases (controller + I/O module)" below to the controller and the I/O module.
 When using only a controller, apply the I/O derating described in "For controller alone" below to the controller.
 The simultaneous ON ratio refers to how many points of the input and output of each module can be turned on simultaneously. For the MXF100-16-N32 with the simultaneous ON ratio 35%, up to 35% (5 points) of the 16 input points and up to 35% (5 points) of the 16 output points can be turned on simultaneously.

For extension cases (controller + I/O module)



- The simultaneous ON ratio of each spring clamp terminal block is shown above.
- If the power supply voltage is greater than 24VDC, refer to (1).
- If the power supply voltage is 24VDC or less, refer to (2).
- To comply with UL and cUL standards, refer to (1) regardless of the power voltage. Also, when the ambient temperature is 40°C or lower, ensure the simultaneous ON ratio is 65% or lower.

For controller alone



- The simultaneous ON ratio of each spring clamp terminal block is shown above.
- If the power supply voltage is greater than 24VDC, refer to (1).
- If the power supply voltage is 24VDC or less, refer to (2).
- To comply with UL and cUL standards, refer to (1) regardless of the power voltage.

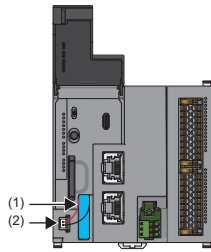
4. Terminal Layout

□ : Indicates that the terminals are connected to each other in the controller or I/O module.

MXF100-8-N32 MXF100-16-N32	MXF100-8-P32 MXF100-16-P32	MXF100-X32 ^{*1}	MXF100-Y32N																																																																																																																													
<table border="1"> <tr><td>Input</td><td>X00 X08</td></tr> <tr><td></td><td>X01 X09</td></tr> <tr><td></td><td>X02 X0A</td></tr> <tr><td></td><td>X03 X0B</td></tr> <tr><td></td><td>X04 X0C</td></tr> <tr><td></td><td>X05 X0D</td></tr> <tr><td></td><td>X06 X0E</td></tr> <tr><td></td><td>X07 X0F</td></tr> <tr><td></td><td>S/S S/S</td></tr> <tr><td>Output</td><td>Y00 Y08</td></tr> <tr><td></td><td>Y01 Y09</td></tr> <tr><td></td><td>Y02 Y0A</td></tr> <tr><td></td><td>Y03 Y0B</td></tr> <tr><td></td><td>Y04 Y0C</td></tr> <tr><td></td><td>Y05 Y0D</td></tr> <tr><td></td><td>Y06 Y0E</td></tr> <tr><td></td><td>Y07 Y0F</td></tr> <tr><td></td><td>COM0 COM0</td></tr> </table>	Input	X00 X08		X01 X09		X02 X0A		X03 X0B		X04 X0C		X05 X0D		X06 X0E		X07 X0F		S/S S/S	Output	Y00 Y08		Y01 Y09		Y02 Y0A		Y03 Y0B		Y04 Y0C		Y05 Y0D		Y06 Y0E		Y07 Y0F		COM0 COM0	<table border="1"> <tr><td>Input</td><td>X00 X08</td></tr> <tr><td></td><td>X01 X09</td></tr> <tr><td></td><td>X02 X0A</td></tr> <tr><td></td><td>X03 X0B</td></tr> <tr><td></td><td>X04 X0C</td></tr> <tr><td></td><td>X05 X0D</td></tr> <tr><td></td><td>X06 X0E</td></tr> <tr><td></td><td>X07 X0F</td></tr> <tr><td></td><td>S/S S/S</td></tr> <tr><td>Output</td><td>Y00 Y08</td></tr> <tr><td></td><td>Y01 Y09</td></tr> <tr><td></td><td>Y02 Y0A</td></tr> <tr><td></td><td>Y03 Y0B</td></tr> <tr><td></td><td>Y04 Y0C</td></tr> <tr><td></td><td>Y05 Y0D</td></tr> <tr><td></td><td>Y06 Y0E</td></tr> <tr><td></td><td>Y07 Y0F</td></tr> <tr><td></td><td>+V0 +V0</td></tr> </table>	Input	X00 X08		X01 X09		X02 X0A		X03 X0B		X04 X0C		X05 X0D		X06 X0E		X07 X0F		S/S S/S	Output	Y00 Y08		Y01 Y09		Y02 Y0A		Y03 Y0B		Y04 Y0C		Y05 Y0D		Y06 Y0E		Y07 Y0F		+V0 +V0	<table border="1"> <tr><td>F Input</td><td>X00 X08</td></tr> <tr><td></td><td>X01 X09</td></tr> <tr><td></td><td>X02 X0A</td></tr> <tr><td></td><td>X03 X0B</td></tr> <tr><td></td><td>X04 X0C</td></tr> <tr><td></td><td>X05 X0D</td></tr> <tr><td></td><td>X06 X0E</td></tr> <tr><td></td><td>X07 X0F</td></tr> <tr><td></td><td>S/S S/S</td></tr> <tr><td>L Input</td><td>X10 X18</td></tr> <tr><td></td><td>X11 X19</td></tr> <tr><td></td><td>X12 X1A</td></tr> <tr><td></td><td>X13 X1B</td></tr> <tr><td></td><td>X14 X1C</td></tr> <tr><td></td><td>X15 X1D</td></tr> <tr><td></td><td>X16 X1E</td></tr> <tr><td></td><td>X17 X1F</td></tr> <tr><td></td><td>S/S S/S</td></tr> <tr><td>L Output</td><td>Y00 Y08</td></tr> <tr><td></td><td>Y01 Y09</td></tr> <tr><td></td><td>Y02 Y0A</td></tr> <tr><td></td><td>Y03 Y0B</td></tr> <tr><td></td><td>Y04 Y0C</td></tr> <tr><td></td><td>Y05 Y0D</td></tr> <tr><td></td><td>Y06 Y0E</td></tr> <tr><td></td><td>Y07 Y0F</td></tr> <tr><td></td><td>COM1 COM1</td></tr> </table>	F Input	X00 X08		X01 X09		X02 X0A		X03 X0B		X04 X0C		X05 X0D		X06 X0E		X07 X0F		S/S S/S	L Input	X10 X18		X11 X19		X12 X1A		X13 X1B		X14 X1C		X15 X1D		X16 X1E		X17 X1F		S/S S/S	L Output	Y00 Y08		Y01 Y09		Y02 Y0A		Y03 Y0B		Y04 Y0C		Y05 Y0D		Y06 Y0E		Y07 Y0F		COM1 COM1
Input	X00 X08																																																																																																																															
	X01 X09																																																																																																																															
	X02 X0A																																																																																																																															
	X03 X0B																																																																																																																															
	X04 X0C																																																																																																																															
	X05 X0D																																																																																																																															
	X06 X0E																																																																																																																															
	X07 X0F																																																																																																																															
	S/S S/S																																																																																																																															
Output	Y00 Y08																																																																																																																															
	Y01 Y09																																																																																																																															
	Y02 Y0A																																																																																																																															
	Y03 Y0B																																																																																																																															
	Y04 Y0C																																																																																																																															
	Y05 Y0D																																																																																																																															
	Y06 Y0E																																																																																																																															
	Y07 Y0F																																																																																																																															
	COM0 COM0																																																																																																																															
Input	X00 X08																																																																																																																															
	X01 X09																																																																																																																															
	X02 X0A																																																																																																																															
	X03 X0B																																																																																																																															
	X04 X0C																																																																																																																															
	X05 X0D																																																																																																																															
	X06 X0E																																																																																																																															
	X07 X0F																																																																																																																															
	S/S S/S																																																																																																																															
Output	Y00 Y08																																																																																																																															
	Y01 Y09																																																																																																																															
	Y02 Y0A																																																																																																																															
	Y03 Y0B																																																																																																																															
	Y04 Y0C																																																																																																																															
	Y05 Y0D																																																																																																																															
	Y06 Y0E																																																																																																																															
	Y07 Y0F																																																																																																																															
	+V0 +V0																																																																																																																															
F Input	X00 X08																																																																																																																															
	X01 X09																																																																																																																															
	X02 X0A																																																																																																																															
	X03 X0B																																																																																																																															
	X04 X0C																																																																																																																															
	X05 X0D																																																																																																																															
	X06 X0E																																																																																																																															
	X07 X0F																																																																																																																															
	S/S S/S																																																																																																																															
L Input	X10 X18																																																																																																																															
	X11 X19																																																																																																																															
	X12 X1A																																																																																																																															
	X13 X1B																																																																																																																															
	X14 X1C																																																																																																																															
	X15 X1D																																																																																																																															
	X16 X1E																																																																																																																															
	X17 X1F																																																																																																																															
	S/S S/S																																																																																																																															
L Output	Y00 Y08																																																																																																																															
	Y01 Y09																																																																																																																															
	Y02 Y0A																																																																																																																															
	Y03 Y0B																																																																																																																															
	Y04 Y0C																																																																																																																															
	Y05 Y0D																																																																																																																															
	Y06 Y0E																																																																																																																															
	Y07 Y0F																																																																																																																															
	COM1 COM1																																																																																																																															
MXF100-Y32P	MXF100-H32N	MXF100-H32P	MXF100-Y16R																																																																																																																													
<table border="1"> <tr><td>F Output</td><td>Y00 Y08</td></tr> <tr><td></td><td>Y01 Y09</td></tr> <tr><td></td><td>Y02 Y0A</td></tr> <tr><td></td><td>Y03 Y0B</td></tr> <tr><td></td><td>Y04 Y0C</td></tr> <tr><td></td><td>Y05 Y0D</td></tr> <tr><td></td><td>Y06 Y0E</td></tr> <tr><td></td><td>Y07 Y0F</td></tr> <tr><td></td><td>+V0 +V0</td></tr> </table>	F Output	Y00 Y08		Y01 Y09		Y02 Y0A		Y03 Y0B		Y04 Y0C		Y05 Y0D		Y06 Y0E		Y07 Y0F		+V0 +V0	<table border="1"> <tr><td>Input</td><td>X00 X08</td></tr> <tr><td></td><td>X01 X09</td></tr> <tr><td></td><td>X02 X0A</td></tr> <tr><td></td><td>X03 X0B</td></tr> <tr><td></td><td>X04 X0C</td></tr> <tr><td></td><td>X05 X0D</td></tr> <tr><td></td><td>X06 X0E</td></tr> <tr><td></td><td>X07 X0F</td></tr> <tr><td></td><td>S/S S/S</td></tr> <tr><td>Output</td><td>Y00 Y08</td></tr> <tr><td></td><td>Y01 Y09</td></tr> <tr><td></td><td>Y02 Y0A</td></tr> <tr><td></td><td>Y03 Y0B</td></tr> <tr><td></td><td>Y04 Y0C</td></tr> <tr><td></td><td>Y05 Y0D</td></tr> <tr><td></td><td>Y06 Y0E</td></tr> <tr><td></td><td>Y07 Y0F</td></tr> <tr><td></td><td>+V0 +V0</td></tr> </table>	Input	X00 X08		X01 X09		X02 X0A		X03 X0B		X04 X0C		X05 X0D		X06 X0E		X07 X0F		S/S S/S	Output	Y00 Y08		Y01 Y09		Y02 Y0A		Y03 Y0B		Y04 Y0C		Y05 Y0D		Y06 Y0E		Y07 Y0F		+V0 +V0	<table border="1"> <tr><td>Input</td><</tr></table>	Input																																																																							
F Output	Y00 Y08																																																																																																																															
	Y01 Y09																																																																																																																															
	Y02 Y0A																																																																																																																															
	Y03 Y0B																																																																																																																															
	Y04 Y0C																																																																																																																															
	Y05 Y0D																																																																																																																															
	Y06 Y0E																																																																																																																															
	Y07 Y0F																																																																																																																															
	+V0 +V0																																																																																																																															
Input	X00 X08																																																																																																																															
	X01 X09																																																																																																																															
	X02 X0A																																																																																																																															
	X03 X0B																																																																																																																															
	X04 X0C																																																																																																																															
	X05 X0D																																																																																																																															
	X06 X0E																																																																																																																															
	X07 X0F																																																																																																																															
	S/S S/S																																																																																																																															
Output	Y00 Y08																																																																																																																															
	Y01 Y09																																																																																																																															
	Y02 Y0A																																																																																																																															
	Y03 Y0B																																																																																																																															
	Y04 Y0C																																																																																																																															
	Y05 Y0D																																																																																																																															
	Y06 Y0E																																																																																																																															
	Y07 Y0F																																																																																																																															
	+V0 +V0																																																																																																																															
Input																																																																																																																																

5. Battery Replacement Procedure

When the battery voltage is low while the power is on, SM51 and SM52 turn on. The clock data can be retained for about one month after the LED turns on. However, the drop in battery voltage may not be detected immediately. Therefore, prepare a new battery and replace the battery with the new one promptly. The following shows the battery replacement procedure.



1. Turn on the controller for 10 minutes or more.
2. Turn the power supply off.
3. Open the top cover on the front of the controller.
4. Disconnect the battery connector (2) from the connector of the controller.
5. Remove the battery from the battery compartment (1).
6. Insert a new battery into the battery compartment (1).
7. Connect the battery connector (2) to the connector in the correct orientation.
8. Close the top cover on the front of the controller.
9. Turn on the controller.
10. Using the engineering tool, check that SM51 (Battery low latch) is off. If SM51 is off, the battery has been replaced successfully. If SM51 is on, the battery may not be installed properly. Repeat the procedure from step 3. If SM51 still remains on, the possible cause is a failure of the battery. Perform the procedure with a different battery. After replacing the battery, check that it is safe and then set the controller to RUN to check that the clock data is being retained correctly. If the clock data was not retained correctly, reset the clock.

Precautions

- When disconnecting the battery connector, hold the battery connector and pull it straight out so that the battery cable is not damaged. If the battery connector is pulled out by holding the battery cable or at an angle, the connector on the controller may be damaged.
- When closing the top cover on the front of the controller, be careful not to pinch the battery cable. Pinching the battery cable may break it.
- The capacitor holds the clock data for three minutes by powering on the controller for 10 minutes or more. The clock data will be lost if the battery is removed for more than three minutes. Therefore, replace the battery quickly. Note that if the time the controller is powering on is short, the holding time of the clock data will be proportionally shortened.

CONDITIONS OF USE FOR THE PRODUCT

- (1) MELSEC controller system ("the PRODUCT") shall be used in conditions:
 - i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
 - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.
- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.

MITSUBISHI ELECTRIC SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY THE PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI ELECTRIC USER'S INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR THE PRODUCT.

("Prohibited Application")

Prohibited Applications include, but not limited to, the use of the PRODUCT in:

 - Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
 - Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
 - Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above restrictions, Mitsubishi Electric may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi Electric and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi Electric representative in your region.
- (3) Mitsubishi Electric shall have no responsibility or liability for any problems involving controller system trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

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. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual. Specifications subject to change without notice.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG. 2-7-3, MARUNOUCHI, CHIYODAI-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN