IB(NA)-0800599-D Side B

MITSUBISHI ELECTRIC

Side A JAPANESE

Side B ENGLISH

Programmable Controller
MELSEC iQ-F

MELSEC iQ-F FX5-ENET/IP

Hardware Manual

FX5

Manual Number	IB(NA)-0800599
Revision	D
Date	April 2021

This manual describes the part names, dimensions, installation, and specifications of the product. Before use, read this manual and manuals of relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions.
And, store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.
Registration:
The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies. In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

Effective April 2021
Specifications are subject to change without notice.

Safety Precautions (Read these precautions before use.)

This manual classifies the safety precautions into two categories:
⚠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.

Depending on the circumstances, procedures indicated by ⚠CAUTION may also cause severe injury.
It is important to follow all precautions for personal safety.

Associated Manual

Manual name	Manual No.	Description
MELSEC iQ-F FX5 User's Manual (Ethernet Communication)	JY997D56201	Describes the functions of the general-purpose Ethernet.
MELSEC iQ-F FX5 User's Manual (SLMP)	JY997D56001	Describes the functions of the SLMP communication.
MELSEC iQ-F FX5 User's Manual (BACnet)	SH-082218ENG	BACnet functions of the Ethernet module.
MELSEC iQ-F FX5-ENET/IP User's Manual	SH-082027ENG	Describes the functions of the FX5-ENET/IP.
MELSEC iQ-F FX5UJ User's Manual (Hardware)	SH-082206ENG	Describes the FX5UJ CPU module specification details for I/O, wiring, installation, and maintenance.
MELSEC iQ-F FX5U User's Manual (Hardware)	JY997D55301	Describes the FX5U CPU module specification details for I/O, wiring, installation, and maintenance.
MELSEC iQ-F FX5UC User's Manual (Hardware)	JY997D61401	Describes the FX5UC CPU module specification details for I/O, wiring, installation, and maintenance.
MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks)	JY997D55801	Describes the specifications of instructions and functions that can be used in programs.

How to obtain manuals
For the necessary product manuals or documents, consult with your local Mitsubishi Electric representative.

Applicable standards

FX5-ENET/IP comply with the EC Directive (EMC Directive) and UL standards (UL, cUL). Further information can be found in the following manual.
→ **MELSEC iQ-F FX5-ENET/IP User's Manual**
Regarding the standards that relate to the CPU module, please refer to either the product catalog or consult with your local Mitsubishi Electric representative.

Attention
This product is designed for use in industrial applications.

1. Outline

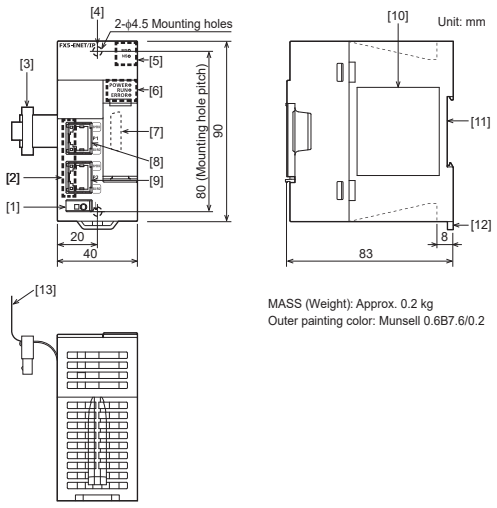
FX5-ENET/IP Ethernet module (hereinafter referred to as FX5-ENET/IP) is an intelligent function module for connecting to a EtherNet/IP network and general-purpose Ethernet.

1.1 Incorporated Items

Check that the following product and items are included in the package:

Product	FX5-ENET/IP Ethernet module
Included Items	Dust proof protection sheet (1 sheet)
	Hardware manual [Japanese /English] (This manual)
	Hardware manual [Chinese]

1.2 External Dimensions, Part Names



MASS (Weight): Approx. 0.2 kg
Outer painting color: Munsell 0.6B7.6/0.2

[1] External ground terminal (Spring clamp terminal block)
[2] Link status display LEDs
[3] Extension cable
[4] Direct mounting hole: 2 holes of ϕ4.5 (mounting screw: M4 screw)
[5] Module/network status display LEDs
[6] Operation status display LEDs
[7] Extension connector (for next module)
[8] Modular jack for P1 (RJ-45) (with cap)
[9] Modular jack for P2 (RJ-45) (with cap)
[10] Name plate
[11] DIN rail mounting groove (DIN rail: DIN 46277, 35 mm wide)
[12] DIN rail mounting hook
[13] Pullout tab

1.3 Indications of LEDs

LED display		LED color	Status	Indication
MS		Green	On	Data communication possible
			Flashing	No parameter setting
			Off	Power failure occurred
		Red	On	Moderate error or major error
			Flashing	Minor error
			Off	Power failure occurred
NS		Green	On	Data communications being performed
			Flashing	Failed to establish connection
			Off	Power failure occurred
		Red	Flashing	Connection time out
			Off	Power failure occurred
POWER		Green	On	Power on
			Off	Power off or module failure
RUN		Green	On	Normal operation
			Off	Error
ERROR		Red	On	Minor error or major error
			Flashing	Moderate error or major error
			Off	Normal operation
P1, P2	SPEED	Green	On	Link-up (100 Mbps)
			Off	Link-up (10 Mbps)
	SD/RD	Green	On	Data being sent or received
			Flashing	
			Off	Data not transmitted or received

2. Installation

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 the User's Manual (Hardware) for the CPU module to be used.
  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.

INSTALLATION PRECAUTIONS ⚠CAUTION

- Do not touch the conductive parts of the product directly.
  Doing so may cause device failures or malfunctions.
- When drilling screw holes or wiring, make sure that cutting and wiring debris do not enter the ventilation slits of the PLC.
  Failure to do so may cause fire, equipment failures or malfunctions.
- The dust proof sheet should be affixed to the ventilation slits before installation and wiring work to block foreign objects such as cutting and wiring debris. However, when the installation work is completed, make sure to remove the sheet to provide adequate ventilation.
  Failure to do so may cause fire, equipment failures or malfunctions.
- Install the product on a flat surface.
  If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
- Install the product securely using a DIN rail or mounting screws.
- Connect the extension cables securely to their designated connectors.
  Loose connections may cause malfunctions.

For further information on mounting, refer to the following manual.
→ **MELSEC iQ-F FX5UJ User's Manual (Hardware)**
→ **MELSEC iQ-F FX5U User's Manual (Hardware)**
→ **MELSEC iQ-F FX5UC User's Manual (Hardware)**

3. Wiring

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.
- The temperature rating of the cable should be 80℃ or more.
- Make sure to properly wire to the spring clamp terminal block in accordance with the following precautions.
  Failure to do so may cause electric shock, equipment failures, a shortcircuit, wire breakage, malfunctions, or damage to the product.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Twist the ends of stranded wires and make sure that there are no loose wires.
  - Do not solder-plate the electric wire ends.
  - Do not connect more than the specified number of wires or electric wires of unspecified size.
  - Affix the electric wires so that neither the terminal block nor the connected parts are directly stressed.

WIRING PRECAUTIONS ⚠CAUTION

- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to malfunction of the PLC caused by abnormal data written to the PLC due to the effects of noise:
  - Do not bundle the communication cables together with or lay them close to the main circuit, high-voltage line, load line or power line. As a guideline, lay the power line, control line and communication cables at least 100 mm away from the main circuit, high-voltage line, load line or power line.
- Install module so that excessive force will not be applied to terminal blocks, or communication cables.
  Failure to do so may result in wire damage/breakage or PLC failure.

3.1 Connector to be used and cable

3.1.1 Pin configuration

The pin configuration of RJ45 type modular jack on FX5-ENET/IP is as follows:

Pin No.	Signal	Contents
1	TP0+	Data 0 send and receive (+ side)
2	TP0-	Data 0 send and receive (- side)
3	TP1+	Data 1 send and receive (+ side)
4	TP2+	Data 2 send and receive (+ side)
5	TP2-	Data 2 send and receive (- side)
6	TP1-	Data 1 send and receive (- side)
7	TP3+	Data 3 send and receive (+ side)
8	TP3-	Data 3 send and receive (- side)

3.1.2 Cables to be used

Use Ethernet cable that meets the following standards.

Ethernet standard	Specifications
100BASE-TX	Category 5 or higher (STP cable*1)
10BASE-T	Category 3 or higher (STP/UTP cable*1)

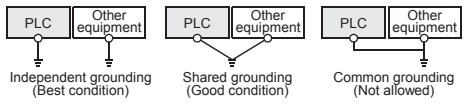
*1 Shielded twisted pair cable.

A straight/cross cable can be used.

3.2 Grounding

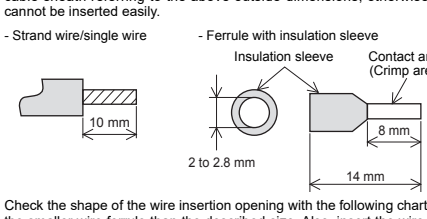
Ground the PLC as stated below.

- Perform class D grounding. (Grounding resistance: 100 Ω or less)
- Ground the PLC independently if possible.
  If the PLC cannot be grounded independently, perform the "Shared grounding" shown below.
  For details, refer to the following manual.
  → **MELSEC iQ-F FX5UJ User's Manual (Hardware)**
  → **MELSEC iQ-F FX5U User's Manual (Hardware)**
  → **MELSEC iQ-F FX5UC User's Manual (Hardware)**



- Bring the grounding point close to the PLC as much as possible so that the ground cable can be shortened.

3.2.1 Grounding of FX5-ENET/IP



Terminal name	Content
⏚FG (Ground terminal)	Perform class D grounding. (Grounding resistance: 100 Ω or less)

The connection destination for the FG terminal of FX5-ENET/IP is a spring clamp terminal block. To connect to the terminal block, there are two ways: by using single wires/strand wires or by using ferrules. Make sure to properly connect in accordance with the following specifications.

- Ferrules
  The following table shows wire ferrules and its associated tools compatible with the terminal block. The shape of the wire ferrule differs depending on the crimp tool to be used, use the reference product. If the product other than referenced products is used, the wire ferrule cannot be removed. Sufficiently confirm that the wire ferrule can be removed before use.
  <Reference product>

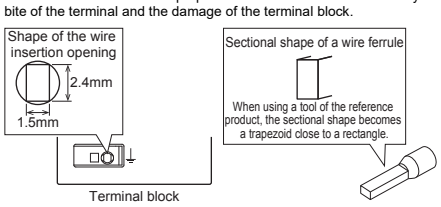
Manufacturer	Sleeve	Ferrules model	Suitable wiring size	Crimp tool
PHOENIX CONTACT GmbH & Co. KG	Ferrules with insulation sleeve	AI 0.25-8 YE	0.25 mm²	CRIMPFOX 6
		AI 0.34-8 TQ	0.3, 0.34 mm²	
		AI 0.5-8 WH	0.5 mm²	
		AI 0.75-8 GY	0.75 mm²	
	Ferrules without insulation sleeve	A 0,25-7	0.25 mm²	
		A 0,34-7	0.3, 0.34 mm²	
		A 0,5-8	0.5 mm²	
		A 0,75-8	0.75 mm²	
		AI 1.0-8	1.0 mm²	
		AI 1.5-7	1.25, 1.5 mm²	

No. of wire per terminal		One wire
Wire size	Single wire, Strand wire (Material: Copper wire)	AWG24 to 16 (0.2 to 1.5 mm²)
	Ferrules with insulation sleeve	AWG23 to 19 (0.25 to 0.75 mm²)
	Ferrules without insulation sleeve	AWG23 to 16 (0.25 to 1.5mm²)
Temperature rating		80℃ or more

- Wire end treatment
  Strip the cable about 10 mm from the tip to connect a wire ferrule at the striped area. Failure to do so may result in electric shock due to the conductive part. If the wire strip length is too short, it may result in the poor contact to the spring clamp terminal part.
  When using a wire ferrule with an insulating sleeve, choose a wire with proper cable sheath referring to the above outside dimensions, otherwise the wire cannot be inserted easily.

- Strand wire/single wire　- Ferrule with insulation sleeve

Check the shape of the wire insertion opening with the following chart, and use the smaller wire ferrule than the described size. Also, insert the wire with care so that the wire ferrule is in proper orientation. Failure to do so may cause the bite of the terminal and the damage of the terminal block.



- Connecting a cable
  - When ferrules with insulation sleeve are used
    Insert a wire with the ferrule with insulation sleeve into the wire insertion opening and push the wire.
  - When stranded wires and solid wires are used
    Push the open/close button of the terminal block with a flathead screwdriver. While pushing the open/close button, insert the wire into the insertion opening until the wire reaches the back, and then release the open/close button.

  Then, pull the wire lightly and check that it is clamped securely.
  <Reference>

Manufacturer	Model
PHOENIX CONTACT GmbH & Co. KG	SZS 0.4×2.5 VDE

- Disconnection of the cable
  Push the open/close button of the wire to be disconnected with a flathead screwdriver. Pull out the wire with the open/close button pushed.

4. Specification

DESIGN PRECAUTIONS ⚠WARNING

- Make sure to set up the following safety circuits outside the PLC to ensure safe system operation even during external power supply problems or PLC failure. Otherwise, malfunctions may cause serious accidents.
  - Most importantly, set up the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits).
  - Note that when the CPU module 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 CPU module 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.
- For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.
- Construct an interlock circuit in the program so that the whole system always operates on the safe side before executing the control (for data change) of the PLC in operation. Read the manual thoroughly and ensure complete safety before executing other controls (for program change, parameter change, forcible output and operation status change) of the PLC in operation. Otherwise, the machine may be damaged and accidents may occur due to erroneous operations.
- Especially, when a remote programmable controller is controlled by an external device, immediate action cannot be taken if a problem occurs in the programmable controller due to a communication failure. To prevent this, configure an interlock circuit in the program, and determine corrective actions to be taken between the external device and CPU module in case of a communication failure.
- If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.

DESIGN PRECAUTIONS ⚠CAUTION

- Simultaneously turn on and off the power supplies of the CPU module and extension modules.

SECURITY PRECAUTIONS ⚠WARNING

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

STARTUP AND MAINTENANCE PRECAUTIONS ⚠CAUTION

- Do not disassemble or modify the PLC.
  Doing so may cause fire, equipment failures, or malfunctions.
  For repair, contact your local Mitsubishi Electric representative.
- Do not drop the product or exert strong impact to it.
  Doing so may cause damage.

DISPOSAL PRECAUTIONS ⚠CAUTION

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

TRANSPORTATION PRECAUTIONS ⚠CAUTION

- The product is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications by using dedicated packaging boxes and shock-absorbing palettes.
  Failure to do so may cause failures in the product. After transportation, verify operation of the product and check for damage of the mounting part, etc.

4.1 Applicable CPU module

Model name	Applicability*2
FX5UJ CPU module	From first production
FX5U CPU module	Ver. 1.110 or later
FX5UC CPU module*1	Ver. 1.110 or later

*1 FX5-CNV-IFC or FX5-C1PS-5V is necessary to connect FX5-ENET/IP to the FX5UC CPU module.

*2 Available functions differ depending on the version of the CPU module. For details, refer to the following manual.
→ **MELSEC iQ-F FX5-ENET/IP User's Manual**

4.2 Applicable Software Package

Software	Applicability
GX Works3*1	FX5UJ CPU module: Ver. 1.060N or later FX5U/FX5UC CPU module: Ver. 1.050C or later
EtherNet/IP Configuration Tool for FX5-ENET/IP*2	Ver. 1.00A or later

*1 Available functions differ depending on the version of the software. For details, refer to the following manual.
→ **MELSEC iQ-F FX5-ENET/IP User's Manual**

*2 Contact your local Mitsubishi Electric representative for information on how to obtain the EtherNet/IP Configuration Tool for FX5-ENET/IP.

4.3 General Specifications

The items other than the following are equivalent to those of the CPU module.
For the general specification, refer to the following manual.
→ **MELSEC iQ-F FX5UJ User's Manual (Hardware)**
→ **MELSEC iQ-F FX5U User's Manual (Hardware)**
→ **MELSEC iQ-F FX5UC User's Manual (Hardware)**

Items	Specifications	
Dielectric withstand voltage	500 V AC for 1 minute	Between all terminals and ground terminal
Insulation resistance	10 MΩ or higher by 500 V DC insulation resistance tester	

4.4 Power Supply Specifications

Items		Specifications
Internal power supply	Power supply voltage	24 V DC
	Current consumption	110 mA

4.5 Performance Specifications

For performance specifications other than the following, refer to MELSEC iQ-F FX5-ENET/IP User's Manual.

Items	Specifications
Protocol type	EtherNet/IP communication
	MELSOFT connection*1
	SLMP server (3E/1E frames)*1
	Socket communication
	Simple CPU communication *1
	BACnet/IP*1
Number of ports	2*2
Number of occupied I/O points	8 points
Number of connectable units	1 module

*1 When each protocol is used, the version applicable to each of the CPU module, FX5-ENET/IP and software is necessary. For details, refer to the following manual.
→ **MELSEC iQ-F FX5-ENET/IP User's Manual**

*2 Since the IP address is shared by two ports, only one address can be set.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN