



## MELSEC iQ-F FX5-CCL-MS

## Hardware Manual



Manual Number	JY997D73501
Revision	G
Date	October 2023

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.

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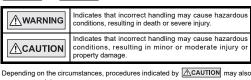
Effective October 2023

Specifications are subject to change without notice

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Safety Precautions (Read these precautions before use.) This manual classifies the safety precautions into two categories:

**MARNING** and **MCAUTION** 



cause severe injury. It is important to follow all precautions for personal safety

#### acceipted Man

Associated Manual				
Manual name	Manual No.	Description		
MELSEC iQ-F FX5 CC-Link System Master/Intelligent Device Module User's Manual	SH-081793ENG	Describes the functions of the CC-Link system master/intelligent device module.		
MELSEC iQ-F FX5S/ FX5UJ/FX5U/FX5UC User's Manual (Hardware)	SH-082452ENG	Describes the details of hardware of the CPU module, including performance specifications, wiring, installation, and maintenance.		

#### How to obtain manuals

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

## Applicable standards

FX5-CCL-MS complies with the EU Directive (EMC Directive), UL standards (UL, cUL) 1 and UKCA marking. Further information can be found in the following manual.

# ... → MELSEC iQ-F FX5 CC-Link System Master/Intelligent Device Module

Regarding the standards that relate to the CPU module, please refer to either the product catalog or consult with your local Mitsubishi Electric representative.

1 FX5-CCI\_MS modules macrificial in the product catalog or consult with your local Mitsubishi Electric representative.

serial number: 1760001) comply with the UL standards (UL, cUL)

Termina

J.S.T.MF

Attention
This product is designed for use in industrial applications

#### 1. Outline

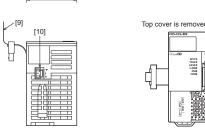
FX5-CCL-MS type CC-Link system master/intelligent device module (hereinafter referred to as FX5-CCL-MS) is an intelligent function module for connecting to a CC-Link network as a master station or an intelligent device station.

## 1.1 Incorporated Items

uct and items are included in the nackage

Check that the following product and items are included in the package.		
Product	FX5-CCL-MS type CC-Link system master/intelligent device module	
	FX2NC-100MPCB power cable: (1 m, three wire)	
Included Items	Terminating resistor for Ver. 1.10 compatible CC-Link dedicated cable (2 terminating resistors) 110 $\Omega$ 1/2 W (color cable: brown, brown and brown)	
	Dust proof protection sheet (1 sheet)	
	Hardware manual [Japanese /English] (This manual)	
	Hardware manual [Chinese]	

1.2 External Dimensions, Part Names 2-\phi4.5 Mounting holes -[5] <u>£</u> 8, <sub>\_</sub>16\_



MASS (Weight): Approx. 0.3 kg Outer painting color: Munsell 0.6B7.6/0.2

Unit: mm

-[7]

-[8]

18

- [2] Dot matrix LED
- Direct mounting hole: 2 holes of  $\phi 4.5$  (mounting screw: M4 screw)
- [4] Operation status display LEDs [5] Extension connector (for next module)
- [6] Name plate [7] DIN rail mounting groove (DIN rail: DIN 46277, 35 mm wide)
- DIN rail mounting hook
- [9] Pullout tab
- [10] Power connector
- [11] CC-Link connection terminal block

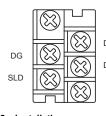
## 1.3 Indications of LEDs

	LED display	LED color	Status	Indication
	L RUN	Green	On	Data link in progress
	L KON Green	Off	Data link not performed	
	SD	Green	On	Data being sent*1
_	05		Off	Data not sent
	RD Green	On	Data being received <sup>*1</sup>	
	11.5	0.00	Off	Data not received

#### LED display LED color Indication Status On A data link error has occurred at own station. erminating resistor is not connected L ERR Or, communication is unstable due to the Red of noise Off Normal operation On Power on POWER Green Off Power off On lormal operation RUN A hardware error or a watchdog timer error Off as occurred. The error on all the stations was detected, two or more master stations are connected on the same line, settings are incorrect, a cable is disconnected or a transmission path is affected by noise. **ERROR** Red A station with a data link error was detected. Or the station number set for a remote station lashii already in use On Operating as a master station MST Green Off Operating as an intelligent device station 156K perating at the indicated transmission speed 625K On B RATE 2.5M Green 5M Transmission speed auto-tracking (When succeeded, the LED of the followed All off 10M ansmission speed turns on.) Displays the station number set in the module Dot matrix LED Orange

\*1 The LEDs may look dimly lit or off depending on the communication status.

## 1.4 Terminal Layout (CC-Link connection terminal block)



	Terminal name	Description
	DA	Sending or receiving data
DA	DB	Conding of 160elving data
DB	DG	Data ground
טט	SLD	Shield

or details of the test mode

## 2. Installation

RECAUTIONS /!\WARNING	NSTALLATION PRECAUTIONS	<b>_</b> MARNING
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Make sure to cut off all phases of the power supply externally before attemptin 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) of 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 o impacts, or expose it to high temperature, condensation, or rain and wind.

If the product is used in such conditions, electric shock, fire, malfunction deterioration or damage may occur.

## INSTALLATION PRECAUTIONS

## **ACAUTION**

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.

#### INSTALLATION **⚠**CAUTION RECAUTIONS

- The dust proof sheet should be affixed to the ventilation slits befor installation and wiring work to block foreign objects such as cutting and wirin 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 boar 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 FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

## 3. Wiring

#### VIRING PRECAUTIONS **<u>∧</u>** WARNING

- Make sure to cut off all phases of the power supply externally befor attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
- Make sure to attach the terminal cover, provided as an accessory, before turning on the power or initiating operation after installation or wiring work.
- Failure to do so may cause electric shock. Make sure to wire the screw terminal block in accordance with the follo
- Failure to do so may cause electric shock, equipment failures, a short-circu wire breakage, malfunctions, or damage to the product.
- The disposal size of the cable end should follow the dimensions describe in the manual.
- Tightening torque should follow the specifications in the manual.
- Tighten the screws using a Phillips-head screwdriver No.2 (shaft diamete 6 mm or less). Make sure that the screwdriver does not touch the partition part of the terminal block.

#### /IRING PRECAUTIONS **∴**CAUTION

- Install module so that excessive force will not be applied to terminal blocks Failure to do so may result in wire damage/breakage or PLC failure.
- Make sure to observe the following precautions in order to prevent an damage to the machinery or accidents due to malfunction of the PLC cause by abnormal data written to the PLC due to the effects of noise:
- Do not bundle the power line and 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.
  - Ground the shield of the shielded wire or shielded cable at one point on the PLC. However, do not use common grounding with heavy electrical

## 3.1 Applicable Cable

#### 3.1.1 CC-Link connection terminal block 1) Suitable wiring

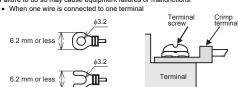
The end disposal of the cable shows below

Туре

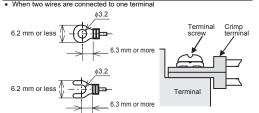
Material Temperature rating Strand wire Copper wire 2) Wire end treatment and tight The size of the terminal screws is M3

Tighten the terminal to a torque of 0.42 to 0.58 N•m. Do not tighten termina

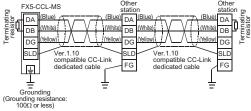
screws with a torque outside the above-mentioned range Failure to do so may cause equipment failures or malfunctions.



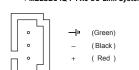
al Manufacturer	Type No.	Certification	Pressure Bonding Tool	PRECAUTIONS	/ WARNIN
FG.CO.,LTD.	FV1.25-B3A		VΔ-1	PRECAUTIONS	2.500
		III Lieted		<ul> <li>For the operating status</li> </ul>	of each station after
	FV2-MS3			manuals relevant to th	
				communication failure ma	av result in an accident



Terminal Manufacturer	Type No.	Certification	Pressure Bonding Tool
J.S.T.MFG.CO.,LTD.	FV1.25-B3A	UL Listed	YA-1 (J.S.T.MFG.CO.,LTD.)
2.2 CC Link Wining			



For further information on the power supply wiring and power cable, refer to the → MELSEC iQ-F FX5 CC-Link System Master/Intelligent Device Module



## 3.4 Grounding

Ground the PLC as stated below.

Perform class D grounding. (Grounding resistance: 100  $\Omega$  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 FXSS/FXSUJ/FX5U/FX5UC User's Manual (Hardware)

Other

Other PLC Other equipment PLC Other equipment Independent grounding (Best condition) Shared grounding (Good condition) Common grounding (Not allowed)

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

**A WADNING** 

## 4. Specification DESIGN

PI	RECAUTIONS Z: VIARATING
•	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 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) 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 a 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.

- NG r a communication failure, refer to t output or malfunction due to
- 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.
- 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 communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction. DESIGN **⚠**CAUTION RECAUTIONS

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

# ECURITY PRECAUTIONS **<u>^</u>**MARNING 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 the 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

**⚠CAUTION** RECAUTIONS Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

## **∴CAUTION**

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

## 4.1 Applicable CPU Module

Model name	Applicability
FX5UJ CPU module	From first production
FX5U CPU module	Ver. 1.050 or later
FX5UC CPU module*1	Ver. 1.050 or later

\*1 FX5-CNV-IFC or FX5-C1PS-5V is necessary to connect FX5-CCL-MS to the FX5UC CPU module.

## 4.2 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 FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

Items Specifications Dielectric withstand 500 V AC for 1 minute voltage Between all terminals and 10 MO or higher by 500 V DC Insulation

4.3 Power Supply Specifications			
	Items	Specifications	
	Power supply voltage	24 V DC +20%, -15%	
External power supply	Allowable instantaneous power failure time	Operation continues when the instantaneous power failure is shorter than 1 ms.	
	Current consumption	100 mA	

# 4.4 Performance Specifications

CC-Link applicable version	Ver. 2.00 (Ver. 1.10 also supported.)
Station type	Master station or intelligent device station
Station number	Master station: 0     Intelligent device station: 1 to 64
Connectable station type (master station)	Remote I/O station, remote device station and intelligent device station (local station and standby master station cannot be connected)
Number of connectable units	One unit of each station type can be connected to a CPU module.  • Master station: 1 <sup>11</sup> • Intelligent device station: 1 <sup>22</sup>
Transmission speed	Master station:156 kbps/625 kbps/2.5 Mbps/ 5 Mbps/10 Mbps     Intelligent device station:156 kbps/625 kbps/ 2.5 Mbps/5 Mbps/10 Mbps/Auto-tracking
	FX5UJ CPU module  Remote I/O stations: 6 maximum (The total number of I/O points of remote I/O station is 192 or less.)  The total number of remote device stations + intelligent device stations: 8 maximum (For each case and intelligent the control of the station of the control of the station of the control of the station of the statio

Maximum number of connectable stations (master station)\*3

total number of I/O points are 256 points or less) FX5U/FX5UC CPU module

Remote I/O stations: 14 maximum (The total number of I/O points of remote I/O station s 448 or less.)

is 446 or less..)
The total number of remote device stations + intelligent device stations: 14 maximum (For each remote device station, intelligent device station, the total number of I/O points are 448 points or less) to 4 stations (The number of stations can be changed using the engineering tool.) FX5UJ CPU module
Remote I/O (RX, RY): 448 points Remote I/O (K., YY). 449 points <sup>4</sup> + remote device station + intelligent device station: 256 points)
Remote register (RWW): 32 points
Remote register (RWY): 32 points
Remote I/O (RW, RY). 899 points
Remote I/O (RX, RY).

Link Ver. 1 Maximum numbe of link points per system

(master station)\*3

Transmission distance

(Remote I/O station: 448 points\* 4+ remote destation + intelligent device station: 448 points)
Remote register (RWw): 56 points Remote register (RWr): 56 points FX5UJ CPU module Remote I/O (RX RY): 448 points (Remote I/O station: 192 points "4 + remote device station + intelligent device station: 256 points) Remote register (RWW): 64 points Remote register (RWW): 64 points (RUIVSE): 64 points CC-Link Ver. 2 Remote register (RWr): 64 points
 FX5U/FX5UC CPU module
 Remote I/O (RX, RY): 896 points

nending on the transmission speed )

(Remote I/O station: 448 points<sup>14</sup> + remote device station + intelligent device station: 448 points)

Remote register (RWw): 112 points

Remote register (RWr): 112 points Number of link points by the Refer to List of link points by number of occupied number of occupied stations stations Communication method Broadcast polling method Synchronization method Frame synchronization method Encoding method Network topology Bus (RS-485) Transmission forma HDLC complian Error control system CRC (X<sup>16</sup> + X<sup>12</sup> + X<sup>5</sup> + 1) Connection cable Ver.1.10 compatible CC-Link dedicated cabl

Number of occupied I/O points 8 points \*1 When FX5-CCL-MS is being used as the master station, FX3U-16CCL-M cannot be used. \*2 When FX5-CCL-MS is being used as the the intelligent device station, FX3U-64CCL cannot be used.

1200 m maximum

64CCL cannot be used.

The number of stations and points that can be used differs depending on the version of the CPU module used. For details, refer to the following manual.

→ MELSEC IQ-F FX5 CC-Link System Master/Intelligent Device Module User's Manual \*4 The number of available remote I/O points per system varies depending on the

number of I/O points of the extension devices. For the limit of I/O points, refer to the following manual. → MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

#### List of link points by number of occupied stations CC-Link Ver. 2 extended cyclic sett CC-Link

				Ver. 1	Single	Double	Quadruple	Octuple
Number of link points by the number of occupied stations			Remote I/O (RX, RY)	32 points (16 points)	32 points (16 points)	32 points (16 points)	64 points (48 points)	128 points (112 points)
	1 sta occu		Remote register (RWw)	4 points	4 points	8 points	16 points	32 points
			Remote register (RWr)	4 points	4 points	8 points	16 points	32 points
	d stations	2 stations occupied	Remote I/O (RX, RY)	64 points (48 points)	64 points (48 points)	96 points (80 points)	192 points (176 points)	384 points (368 points)
	2 stat occu		Remote register (RWw)	8 points	8 points	16 points	32 points	64 points
	numbero		Remote register (RWr)	8 points	8 points	16 points	32 points	64 points
	its by the		Remote I/O (RX, RY)	96 points (80 points)	96 points (80 points)	160 points (144 points)	320 points (304 points)	-
	Yiii occu		Remote register (RWw)	12 points	12 points	24 points	48 points	_
	Number o		Remote register (RWr)	12 points	12 points	24 points	48 points	ı
			Remote I/O (RX, RY)	128 points (112 points)	128 points (112 points)	224 points (208 points)	448 points (—)	-
	4 stat		Remote register (RWw)	16 points	16 points	32 points	64 points (—)	_
			Remote register (RWr)	16 points	16 points	32 points	64 points (—)	ı
	The volu	oo ir	norontho	seie are the	number of	ovojloblo r	ointo in the	intolligent

\*1 The number of points that can be used differs depending on the version of the CPU module used. For details, refer to the following manual.

→ MELSEC iQ-F FX5 CC-Link System Master/Intelligent Device Module.

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.

## Warranty

Exclusion of loss in opportunity and secondary loss from warranty liability Exclusion of loss in opportunity and secondary loss from warranty liability
Regardless of the grafts 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.

# 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

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