JY997D73501C Side B

MITSUBISHI ELECTRIC

Side A JAPANESE

Side B ENGLISH

Programmable Controller
MELSEC iQ-F

MELSEC iQ-F FX5-CCL-MS

Hardware Manual

FX5

Manual Number	JY997D73501
Revision	C
Date	July 2018

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: Phillips is a registered trademark of Phillips Screw Company.
The company name and the product name to be described in this manual are the registered trademarks or trademarks of each company.

Effective July 2018
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 (CC-Link)	SH-081793ENG	Describes the functions of the CC-Link system master/intelligent device module.
MELSEC iQ-F FX5U User's Manual (Hardware)	JY997D55301	Explains FX5U CPU module specification details for I/O, wiring, installation, and maintenance.
MELSEC iQ-F FX5UC User's Manual (Hardware)	JY997D61401	Explains FX5UC CPU module specification details for I/O, 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 EC Directive (EMC Directive) and UL standards (UL, cUL)*1. Further information can be found in the following manual.
→ **MELSEC iQ-F FX5 User's Manual (CC-Link)**
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-CCL-MS modules manufactured in June 2017 or later (manufacturer's serial number: 1760001) comply with the UL standards (UL, cUL).

Attention
This product is designed for use in industrial applications.

1. Outline

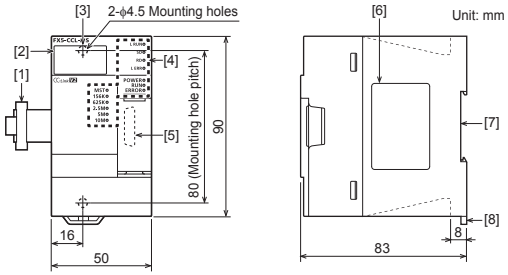
FX5-CCL-MS type CC-Link system master/intelligent device module (hereinafter referred to as FX5-CCL-MS) is an intelligent function module for connecting to a CC-Link network as a master station or an intelligent device station.

1.1 Incorporated Items

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

Product	FX5-CCL-MS type CC-Link system master/intelligent device module
Included Items	FX2NC-100MPCB power cable: (1 m, three wire)
	Terminating resistor for Ver. 1.10 compatible CC-Link dedicated cable (2 terminating resistors) 110Ω 1/2 W (color cable: brown, brown and brown)
	Dust proof protection sheet (1 sheet)
	Hardware manual (This manual)

1.2 External Dimensions, Part Names



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

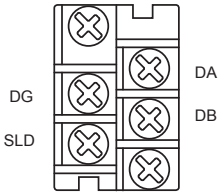
[1] Extension cable
[2] Dot matrix LED
[3] Direct mounting hole: 2 holes of ϕ4.5 (mounting screw: M4 screw)
[4] Operation status display LEDs
[5] Extension connector (for next module)
[6] Name plate
[7] DIN rail mounting groove (DIN rail: DIN 46277, 35 mm wide)
[8] DIN rail mounting hook
[9] Pullout 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
		Off	Data link not performed
SD	Green	On	Data being sent*1
		Off	Data not sent
RD	Green	On	Data being received*1
		Off	Data not received
L ERR	Red	On	A data link error has occurred at own station.
		Flashing	Terminating resistor is not connected. Or, communication is unstable due to the influence of noise.
		Off	Normal operation
POWER	Green	On	Power on
		Off	Power off
RUN	Green	On	Normal operation
		Off	A hardware error or a watchdog timer error has occurred.
ERROR	Red	On	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.
		Flashing	A station with a data link error was detected. Or, the station number set for a remote station is already in use
		Off	Normal operation
MST	Green	On	Operating as a master station
		Off	Operating as an intelligent device station
B RATE 156K / 625K / 2.5M / 5M / 10M	Green	On	Operating at the indicated transmission speed
		All off	Transmission speed auto-tracking (When succeeded, the LED of the followed transmission speed turns on.)
Dot matrix LED	Orange	-	Displays the station number set in the module or details of the test mode.

*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
DB	
DG	Data ground
SLD	Shield

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) of the CPU module to be used.
  Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), 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 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.
- 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 following precautions.
  Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Tightening torque should follow the specifications in the manual.
  - Tighten the screws using a Phillips-head screwdriver No.2 (shaft diameter 6 mm or less). Make sure that the screwdriver does not touch the partition part of the terminal block.

WIRING 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 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 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 systems.

3.1 Applicable Cable

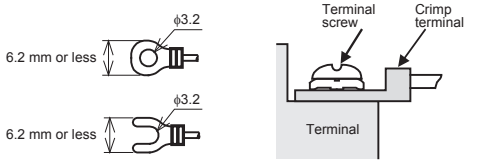
3.1.1 CC-Link connection terminal block

1) Suitable wiring

Diameter	Type	Material	Temperature rating
AWG 22 to 16	Strand wire	Copper wire	75°C or more

2) Wire end treatment and tightening torque
The size of the terminal screws is M3.
The end disposal of the cable shows below.
Tighten the terminal to a torque of 0.42 to 0.58 N•m. Do not tighten terminal screws with a torque outside the above-mentioned range.
Failure to do so may cause equipment failures or malfunctions.

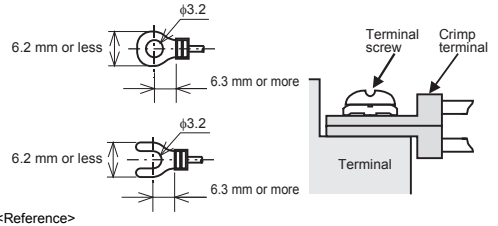
- When one wire is connected to one terminal



<Reference>

Terminal Manufacturer	Type No.	Certification	Pressure Bonding Tool
J.S.T.MFG.CO.,LTD.	FV1.25-B3A FV2-MS3	UL Listed	YA-1 (J.S.T.MFG.CO.,LTD.)

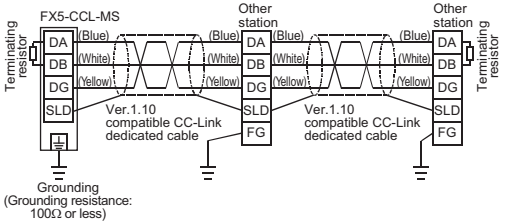
- When two wires are connected to one terminal



<Reference>

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.)

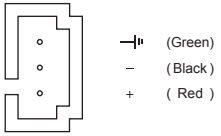
3.2 CC-Link Wiring



3.3 Power Connector

For further information on the power supply wiring and power cable, refer to the following manual.

→ **MELSEC iQ-F FX5 User's Manual (CC-Link)**

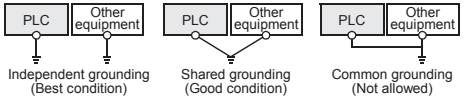


3.4 Grounding

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 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.

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.
- To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.

DESIGN PRECAUTIONS ⚠**CAUTION**

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

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
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 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	

4.3 Power Supply Specifications

Items		Specifications
External power supply	Power supply voltage	24 V DC +20%, -15%
	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

Items		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*1 • Intelligent device station: 1*2
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
Maximum number of connectable stations (master station)*3		• Remote I/O stations: 14 maximum (The total number of I/O points of remote I/O station is 448 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)
Number of occupied stations (intelligent device station)		1 to 4 stations (The number of stations can be changed using the engineering tool.)
Maximum number of link points per system (master station)*3	CC-Link Ver. 1	Remote I/O (RX, RY): 896 points (Remote I/O station: 448 points*4 + remote device station + intelligent device station: 448 points) • Remote register (RWw): 56 points • Remote register (RWr): 56 points
	CC-Link Ver. 2	Remote I/O (RX, RY): 896 points (Remote I/O station: 448 points*4 + remote device station + intelligent device station: 448 points) • Remote register (RWw): 112 points • Remote register (RWr): 112 points
Number of link points by the number of occupied stations		Refer to List of link points by number of occupied stations
Communication method		Broadcast polling method
Synchronization method		Frame synchronization method
Encoding method		NRZI method
Network topology		Bus (RS-485)
Transmission format		HDLC compliant
Error control system		CRC ($X^{16} + X^{12} + X^5 + 1$)
Connection cable		Ver.1.10 compatible CC-Link dedicated cable
Transmission distance		1200 m maximum (varies depending on the transmission speed.)
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.

*3 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 User's Manual (CC-Link)**

*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 FX5U User's Manual (Hardware)**
→ **MELSEC iQ-F FX5UC User's Manual (Hardware)**

- List of link points by number of occupied stations*1

Item			CC-Link Ver. 1	CC-Link Ver. 2 extended cyclic setting			
				Single	Double	Quadruple	Octuple
Number of link points by the number of occupied stations	1 station occupied	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)
		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
	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)
		Remote register (RWw)	8 points	8 points	16 points	32 points	64 points
		Remote register (RWr)	8 points	8 points	16 points	32 points	64 points
	3 stations occupied	Remote I/O (RX, RY)	96 points (80 points)	96 points (80 points)	160 points (144 points)	320 points (304 points)	—
		Remote register (RWw)	12 points	12 points	24 points	48 points	—
		Remote register (RWr)	12 points	12 points	24 points	48 points	—
	4 stations occupied	Remote I/O (RX, RY)	128 points (112 points)	128 points (112 points)	224 points (208 points)	448 points (—)	—
		Remote register (RWw)	16 points	16 points	32 points	64 points (—)	—
		Remote register (RWr)	16 points	16 points	32 points	64 points (—)	—

The values in parenthesis are the number of available points in the intelligent device station.

*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 User's Manual (CC-Link)**

Warranty

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.

⚠ 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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