Side B

Side A JAPANESE

Side B ENGLISH

MITSUBISHI ELECTRIC

Programmable Controller

MELSEC iQ-F

MELSEC iQ-F FX5 Motion Module

Hardware Manual

FX5

Manual Number	BCN-B62008-427
Revision	B
Date	September 2022

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.
Trademarks:
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 September 2022
Specifications are subject to change without notice.

When Using a Switching Hub with CC-LINK IE TSN

To connect modules on CC-Link IE TSN, a dedicated TSN switching hub may be required depending on parameter settings or the network topology used.
For details, refer to the following manual.
→**MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)**

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.

Relevant Manuals

Manual name	Manual No.	Description
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)	IB-0300251ENG	Explains Motion module/Simple Motion module specifications, functions list and wiring.
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Application)	IB-0300253ENG	Explains Motion module/Simple Motion module functions, programming and troubleshooting.
MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Advanced Synchronous Control)	IB-0300255ENG	Functions, programming and buffer memory for the synchronous control of the Motion module/ Simple Motion module.
MELSEC iQ-F FX5 Motion Module User's Manual (CC-Link IE TSN)	IB-0300568ENG	Functions, parameter settings, troubleshooting, and buffer memories of the CC-Link IE TSN network.
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)	SH-082452ENG	Explains the details of hardware of the FX5 CPU module, including performance specifications, wiring, installation, and maintenance.
GX Works3 Operating Manual	SH-081215ENG	System configuration, parameter settings, and online operations (common to simple project and structured project) of GX Works3.

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

Standards

FX5-40SSC-G or FX5-80SSC-G is compliant with the EC Directive (EMC Directive), UL standards (UL, cUL), and UKCA marking.
For details, refer to the following manual.
→ **MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)**
For the standards that relate to the CPU modules, refer to the product catalog or consult your local Mitsubishi representative.

Attention
This product is designed for use in industrial applications.

1. Overview

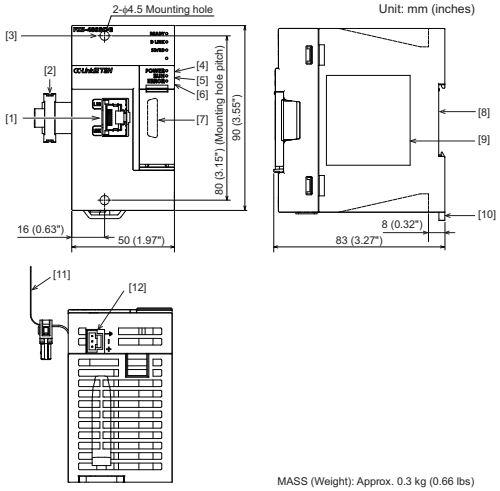
FX5-40SSC-G or FX5-80SSC-G type Motion module is an intelligent function module applicable to CC-Link IE TSN network.
FX5-40SSC-G or FX5-80SSC-G can perform positioning control by servo moter via CC-Link IE TSN network applied drive unit.
For positioning control, refer to the following manual.
→ **MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)**
→ **MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Application)**
For synchronous control, refer to the following manual.
→ **MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Advanced Synchronous Control)**

1.1 Packing list

Check that the following module and accessories are included in the package:

Product	Module
Accessories	• FX2NC-100MPCB Power supply cable (1 m) × 1 cable • Dust proof sheet × 1 sheet • Hardware manual [Japanese/English] (This manual) • Hardware manual [Chinese]

1.2 External dimensions and part names



MASS (Weight): Approx. 0.3 kg (0.66 lbs)
Outer painting color: Munsell 0.6B7.6/0.2

[1] Modular jack (RJ45) (with cap)
[2] Extension cable
[3] Direct mounting hole: 2 holes of ϕ4.5 (0.18") (mounting screw: M4 screw)
[4] POWER LED
[5] RUN LED
[6] ERROR LED
[7] Extension connector (for next module)
[8] DIN rail mounting groove (DIN rail: DIN46277, 35 mm (1.38") wide)
[9] Rating plate
[10] DIN rail mounting hook
[11] Pullout tab
[12] Power supply connector

1.3 Power and status LED

□: OFF, ■: ON, ◆: Flashing
(Flashing interval ON: 200 ms/OFF: 200 ms)

LED display		Description
READY LED	■	PLC READY ON
	□	PLC READY OFF
POWER LED	■	Power on
	□	Power off
RUN LED	■	Operating normally
	□	Error
ERROR LED	■	Error
	◆	200 ms interval: Error 500 ms interval: A data link faulty station detected
	□	Operating normally
D LINK LED	■	Data link (cyclic transmission being performed)
	◆	Data link (cyclic transmission stopped)
	□	Data link not performed (disconnection)
SD/RD LED	■	Data*1 being sent or received
	□	Data*1 neither sent nor received
L ER LED	■	Abnormal data received
	□	Normal data received
LINK LED	■	Link-up
	□	Link-down

*1 Data of cyclic transmission and transient transmission in CC-Link IE TSN are included.

Error status can be determined by status of the RUN LED and the ERR LED.
When multiple errors occur, the error status is displayed in the order of major, moderate, and minor.

RUN LED	ERR LED	Error status	Description
Off	On, flashing	Major error	An error such as hardware failure or memory failure. The module stops operating.
On	Flashing	Moderate error	An error, such as parameter error, which affect module operation. The module stops operating.
On	On	Minor error	An error such as communication, positioning control, and program error. The module continues operating.

2. Installation

INSTALLATION PRECAUTIONS ⚠WARNING

- Completely turn off the externally supplied power used in the system before installing or removing the module. Not doing so could result in electric shocks, an operation failure or damage to the module.

INSTALLATION PRECAUTIONS ⚠CAUTION

- Never try to disassemble or modify the modules. It may cause product failure, operation failure, injury or fire.
- Use the programmable controller in an environment that meets the general specifications in the manual supplied with the CPU module. Using the programmable controller in an environment outside the range could result in electric shock, fire, operation failure, and damage to or deterioration of the product.
- Do not directly touch the module's conductive parts and electronic components. Doing so may could cause an operation failure or give damage to the module.
- Lock the control panel and prevent access to those who are not certified to handle or install electric equipment.

2.1 Installation location

The product connects on the right side of CPU module or extension module.
For further information of installation arrangements, refer to the following manual.
→ **MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)**

2.2 Installation

The product is mounted by the following method.
- Installing directly (with M4 screws)
- DIN rail mounting

For further information on mounting, refer to the following manual.
→ **MELSEC iQ-F FX5S/FX5UJ/FX5U/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.

WIRING PRECAUTIONS ⚠CAUTION

- Securely connect the connector to the module. Poor contact may cause malfunction.
- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to malfunction of the programmable controller caused by abnormal data written to the programmable controller 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 100mm away from the main circuit, high-voltage line, load line or power line.
- For Ethernet cables to be used in the system, select the ones that meet the specifications in the user's manual for the module used. If not, normal data transmission is not guaranteed.

3.1 Connector and cable to be used

3.1.1 Cable

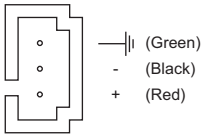
For wiring, use Ethernet cables that meet the following standards.

Communication speed	Ethernet cable	Standard
1Gbps	Category 5e or higher, straight cables (double shielded, STP)	• IEEE 802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (Category 5e)
100Mbps	Category 5 or higher, straight cable (double shielded, STP)	• IEEE 802.3 (100BASE-TX) • ANSI/TIA/EIA-568-B (Category 5)

3.1.2 Power connector

For details on power supply wiring and a power cable, refer to the following manual.

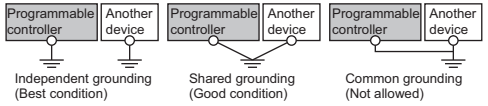
→ **MELSEC iQ-F FX5 Motion Module/Simple Motion Module User's Manual (Startup)**



3.2 Grounding

Observe the following:

- Provide grounding with a ground resistance of 100 Ω or less.
- Provide independent grounding when possible.
  If independent grounding cannot be provided, provide "shared grounding" as shown below.
  For details, refer to the following manual.
  →**MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)**



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

4. Specifications

DESIGN PRECAUTIONS ⚠WARNING

- Make sure to set up the following safety circuits outside the programmable controller to ensure safe system operation even during external power supply problems or programmable controller 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 programmable controller 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 programmable controller 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 external 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 programmable controller. Doing so may cause fire, equipment failures, or malfunctions.
  For repair, please consult 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 AND STORAGE PRECAUTIONS ⚠CAUTION

- The product is a precision instrument. During transportation, avoid any impacts. Failure to do so may cause failures in the product.

4.1 Applicable CPU module

Model name	Applicability
FX5U CPU module	Ver. 1.230 or later
FX5UC CPU module	Ver. 1.230 or later

4.2 Applicable software package

Model	Version
GX Works3	Ver. 1.072A or later

4.3 General specifications

General specifications other than the following are same as those of a CPU module to be connected.
For the general specification of the CPU modules, refer to the following manual.
→ **MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)**

Items	Specifications	
Operating ambient temperature	0 to 55 °C	
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
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 5 ms.
	Power consumption	5.8 W
	Power fuse	1 A
Internal power supply	PLC power supply	Not used.

4.5 Performance specifications

Items		Specifications	
		FX5-40SSC-G	FX5-80SSC-G
Number of controlled axes		4 axes	8 axes
Operation cycle		0.500 ms/1.000 ms/2.000 ms/4.000 ms	
Flash memory (Flash ROM) write count		Up to 100000 times	
Number of occupied I/O points		8 points	
Station type		Master station	
Station number		Master station: 0	
Number of connectable modules		Master station: 4 modules*1	
Maximum number of link points per network	RX	8K points (8192 points, 1K bytes)	
	RY	8K points (8192 points, 1K bytes)	
	RWr	1K points (1024 points, 2K bytes)	
	RWw	1K points (1024 points, 2K bytes)	
Maximum number of link points per station*2	RX	8K points (8192 points,1K bytes)	
	RY	8K points (8192 points,1K bytes)	
	RWr	1K points (1024 points, 2K bytes)	
	RWw	1K points (1024 points, 2K bytes)	
Communication speed		• 1 Gbps • 100 Mbps*3	
Minimum synchronization cycle		500.00 µs	
CC-Link IE TSN Class		B	
CC-Link IE TSN Protocol version		• 2.0*3*4 • 1.0	
Maximum number of connectable stations per network		21*5 • Motion control stations: 4 stations • Standard stations: 16 stations	25*5 • Motion control stations: 8 stations • Standard stations: 16 stations
Maximum number of connectable modules per network		21*5*6 • Device stations (Motion control stations): 4 modules • Device stations (Standard stations):16 modules	25*5*6 • Device stations (Motion control stations): 8 modules • Device stations (Standard stations):16 modules
Station-based data assurance		21 stations*5	25 stations*5
Connection cable		Refer to the following. 3.1.1 Cable	
Overall cable distance	Line topology	2000 m (when 21 stations*5 are connected)	2400 m (when 25 stations*5 are connected)
	Others	Depends on the system configuration.	
Maximum station-to-station distance		100 m	
Network number setting range		1 to 239	
Network topology		Line topology, star topology (Coexistence of line topology and star topology is also possible.)	
Communication method		Time sharing method	
Transient transmission capacity		Maximum 1920 bytes	

*1 The sum of the Motion modules and a single FX5-CCLGN-MS (master station).

*2 The maximum number of points for all link devices may not be used simultaneously depending on the number of device stations, or the number of points and assignments of the link devices that are set in the "Network Configuration Settings" of the "Basic Settings".

*3 This setting can be used for the firmware version "1.002" or later.

*4 Even for a firmware version "1.002" or later of the Motion module, when the CC-Link IE TSN Protocol version of the remote station is 1.0, the Motion module may operate with the CC-Link IE TSN Protocol version 1.0.

*5 Including the master station.

*6 When connecting multiple master stations, such as the FX5-40/80SSC-G and the FX5-CCLGN-MS, which use device station parameters for the CPU module, the total number of device modules must be less than or equal to the number of device station parameter files that can be saved in the CPU module. For details on the number of device station parameter files that can be saved in the CPU module, refer to the following.

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

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FX5SSCG-U-HW