

Side



MELSEC iQ-F FX5-8AD

Hardware Manual

JY997D73901E



Manual Number	JY997D73901
Revision	E
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**

<u></u> MARNING	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, precedures indicated by ACAUTION 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 Analog Module User's Manual	SH-081802ENG	Explains multiple input module (voltage input, current input, thermocouple and resistance temperature detector).	
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.	

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

Applicable standards

Applicable standards

FX5-8AD complies with the EU Directive (EMC Directive), UL standards (UL, cUL) and UKCA marking. Further information can be found in the following manual.

MELSEC IQ.F FX5 Analog Module 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 FX5-8AD multiple input module (hereinafter called FX5-8AD) can convert 8 points

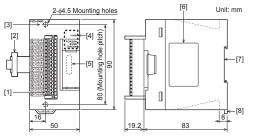
of analog input values (voltage input, current input, thermocouple and resistance temperature detector) into digital values.

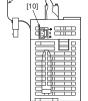
1.1 Incorporated Items

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

	- 1 0
Product	FX5-8AD multiple input module
	FX2NC-100MPCB power cable: (1 m, three wire)
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. 0.3 kg Outer painting color: Munsell 0.6B7.6/0.2

[1] Terminal block

- (Spring clamp terminal block) [2] Extension cable
 [3] Direct mounting hole: 2 holes of \$\phi4.5\$
- [6] Name plate
 [7] DIN rail mounting groove
 (DIN rail: DIN 46277, 35 mm wide)
 [8] DIN rail mounting hook (mounting screw: M4 screw)
 [4] Operation status display LEDs
- [9] Pullout tab [10] Power connector [5] Extension connector (for next module)

1.3 Indications of LEDs

LED display	LED color	Status	Indication
POWER	POWER Green		Power on
TOWLK	Gleen	Off	Power off or module failure
		On	Normal operation
RUN	Green	Flashing	Offset/gain setting mode
		Off	Error
	ERROR Red		Minor error or major error
ERROR			Moderate error or major error
		Off	Normal operation
		On	Process alarm or rate alarm issued
ALM	Red	Flashing	Input signal error or disconnection detection detected
		Off	Normal operation

1.4 Terminal Layout

CH1	FA/TC+ B/TC-	b/VI+
CHI	_B/TC-	COM
CLIA	A/TC+ B/TC-	b/VI+
СП2	_B/TC-	COM
CLIA	A/TC+ B/TC-	b/VI+
СПЗ	_B/TC-	COM
СПЛ	A/TC+ B/TC-	b/VI+
СП4	_B/TC-	COM
CHE	A/TC+ B/TC-	b/VI+
СПЭ	LB/TC-	COM
СН6	A/TC+ B/TC-	b/VI+
СПО	_B/TC-	COM
CH7	FA/TC+ B/TC-	b/VI+
		COM
СПО	A/TC+ B/TC-	b/VI+
СПО	LB/TC-	COM

For further information on terminal, refer to the following manual. ightarrow MELSEC iQ-F FX5 Analog Module User's Manual

2. Installation

INSTALLATION **MARNING** RECAUTIONS

- 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 produc
- 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, C12, 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, malfunctions deterioration or demanae may occur.

deterioration or damage may occur.		
INSTALLATION	ACALITICAL	
PRECAUTIONS		

- 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 d 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 installati 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 shee 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 boathereby 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.

→ MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

3. Wiring

WIRING PRECAUTIONS

<u>∧</u> 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 properly wire to the spring clamp terminal block in accordanc with the following precautions. Failure to do so may cause electric shock, equipment failures, a short-circui wire breakage, malfunctions, or damage to the product.
- The disposal size of the cable end should follow the dimensions describe in the manual.
- Twist the ends of stranded wires and make sure that there are no loose wire
- 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 connecte parts are directly stressed.

WIRING PRECAUTIONS **⚠**CAUTION

- 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.
- power line.

 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.

 Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
- To terminal blocks or power connectors, connect circuits isolated from hazardous voltage by double/reinforced insulation.

3.1 Applicable Cable

3.1.1 Spring clamp terminal block 1) Suitable wiring

No. of	Wire siz	ze	Temperature	
wire per terminal	Single wire, Strand wire (Material: Copper wire)	Ferrules with insulation sleeve	rating	
One wire	AWG24 to 16 (0.2 to 1.5 mm ²)	AWG23 to 19 (0.25 to 0.75 mm ²)	80°C or more	

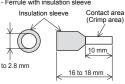
2) Wire end treatment

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 or short circuit between adjacent terminals because the conductive part. If the wire strip length is too short, it may result in the poor contact to the spring clamp

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 sle





The following table shows wire ferrules and tools for wire ferrules compatible with the terminal block. Use of items other than these may result in not being able to remove the wire ferrule, so carefully check that the wire ferrule can be

	Manufacturer	Model	Wire size	Crimp tool
	PHOENIX CONTACT GmbH & Co. KG	AI 0.5-10 WH	0.5 mm ²	
		AI 0.75-10 GY	0.75 mm ²	CRIMPFOX 6
		A 1.0-10	1.0 mm ²	
		A 1.5-10	1.5 mm ²	

3) 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.

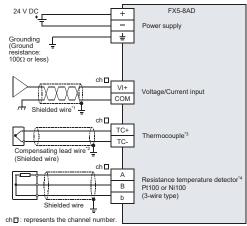
41101010100		
	Manufacturer	Model

necting a cable he open/close button of the wire to be disconnected with a flathead screwdriver. Pull out the wire with the open/close button pushed

SZS 0.4×2.5 VDE

3.2 Example of Input Wiring

PHOENIX CONTACT GmbH & Co. KG



- *1 For analog input wiring, use shielded twisted-pair cables (double-core type). Separate them from other power lines or lines which are sensitive to induction.
- *2 When using a thermocouple, use specified compensating lead wi
- *3 Use insulated thermocouple types. *4 When using a resistance temperature detector use lead wires of equal low
- 3.2.1 Power connector

following manual.

For further information on the power supply wiring and power cable, refer to the → MELSEC iQ-F FX5 Analog Module User's Manua

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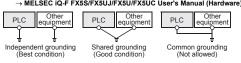
3.3 Grounding

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" 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 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.

DESIGN PRECAUTIONS **∴CAUTION**

Simultaneously turn on and off the power supplies of the CPU module and

STARTUP AND

⚠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

TRANSPORTATION

Please contact a certified electronic waste disposal company for th nentally safe recycling and disposal of your device

∴CAUTION

⚠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	
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 FX5-8AD to the FX5UC

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 voltage	500 V AC for 1 minute	Between all terminals and	
Insulation resistance	- · · · · · · · · · · · · · · · · · · ·		

s.5 Fower 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 5 ms.		
	Current consumption	100 mA		
Internal power supply	Power supply voltage	24 V DC		
	Current consumption	40 mA		

4.4 Performance Specifications

	Items	Specifications
Number of an	alog input points	8 points (8 channels)
	Voltage/Current	1 ms/ch*1
Conversion speed	Thermocouple/ Resistance temperature detector	40 ms/ch
Isolation meth	nod	Between input terminal and PLC: Photocoupler Between input terminal and channels: Non-isolation
Number of occupied I/O points		8 points

*1 In the case of 2CH conversion mode, conversion speed is 1 ms/2ch.

4.5 Voltage/current input specifications

	оргоничения			
Analog input voltage	-10 to +10 V DC (input resistance 1 MΩ)			
Analog input current	-20 to +20 mA DC (input resistance 250 Ω)			
Digital output value	16-bit signed binary (-32000 to +32000)			
	Analog input range		Digital output value	Resolution
	Voltage	0 to 10 V	0 to 32000	312.5 μV
		0 to 5 V	0 to 32000	156.25 μV
Input characteristics,		1 to 5 V	0 to 32000	125 μV
resolution*1		-10 to +10 V	-32000 to +32000	312.5 μV
		0 to 20 mA	0 to 32000	625 nA
	Current	4 to 20 mA	0 to 32000	500 nA
		-20 to +20 mA	-32000 to +32000	625 nA
Accuracy (accuracy for the full scale digital output value)				
Absolute maximum	Voltage: ±15 V, Current: ±30 mA			

*1 For the input characteristic, refer to the following

MELSEC iQ-F FX5 Analog Module User's M

4.6 Thermocouple input specifications				
	Items	Specifications		
Usable thermocouple		K, J, T, B, R, S		
Resolution		K, J, T: 0.1℃ (0.1 to 0.2°F) B, R, S: 0.1 to 0.3℃ (0.1 to 0.6°F)		
Temperature measuring range		K: -200 to +1200°C (-328.0 to +2192.0°F) J: -40 to +750°C (-40.0 to +1382.0°F) T: -200 to +350°C (-328.0 to +662.0°F) B: 600 to 1700°C (1112.0 to 3092.0°F) R: 0 to 1600°C (32.0 to 2912.0°F) S: 0 to 1600°C (32.0 to 2912.0°F)		
Digital output value (16-bit signed binary)		K: -2000 to +12000 (-3280 to +21920) J: -400 to +7500 (-400 to +13820) T: -2000 to +3500 (-3280 to +6620) B: 6000 to 17000 (11120 to 30920) R: 0 to 16000 (320 to 29120) S: 0 to 16000 (320 to 29120)		
Accuracy*1	Ambient temperature 25±5℃	K: ±3.5°C (-200°C to -150°C) K: ±2.5°C (-150°C to -100°C) K: ±1.5°C (-100°C to +1200°C) J: ±1.2°C T: ±3.5°C (-200°C to -150°C) T: ±2.5°C (-150°C to -100°C) T: ±1.5°C (-100°C to +350°C) B: ±2.3°C B: ±2.3°C S: ±2.5°C		
	Ambient temperature -20 to 55℃	K: ±8.5°C (-200°C to -150°C) K: ±7.5°C (-150°C to -100°C) K: ±6.5°C (-100°C to +1200°C) J: ±3.5°C T: ±5.2°C (-200°C to -150°C) T: ±4.2°C (-150°C to -100°C) T: ±3.1°C (-100°C to +350°C) B: ±6.5°C S: ±6.5°C		

*1 To stabilize the accuracy, warm-up (supply power) the system for 30 minutes or

4.7 Resistance temperature detector input specifications				
	Items	Specifications		
Usable resistance temperature detector*1		Pt100, Ni100		
Resolution		0.1℃ (0.2°F)		
Temperature measuring range		Pt100: -200 to +850°C (-328 to +1562°F) Ni100: -60 to +250°C (-76 to +482°F)		
Digital output value (16-bit signed binary)		Pt100: -2000 to +8500 (-3280 to +15620) Ni100: -600 to +2500 (-760 to +4820)		
Accuracy	Ambient temperature 25±5℃	Pt100: ±0.8°C Ni100: ±0.4°C		
	Amhient temperature	P±100: +2.4°C		

Ni100: ±1.2℃

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(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 light
 before using the product for special purposes such as nuclear power, electric
 power, aerospace, medicine or passenger movement vehicles, consult with
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