



Programmable Controller
MELSEC iQ-F

MELSEC iQ-F FX5-3A-BD Hardware Manual



Manual number	IB(NA)-0800748
Revision	A
Date	April 2026

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.

Specifications are subject to change without notice.

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SAFETY PRECAUTIONS

(Read these precautions before use.)

If the product is used in a manner not specified by Mitsubishi Electric, the protection provided by the product may be impaired.

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 (Application)	JY997D55401	Describes the basic knowledge required for program design, functions of the CPU module, devices/labels, and parameters.
MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)	SH-082452ENG	Describes the details of hardware of the FX5 CPU module, including performance specifications, wiring, installation, and maintenance.

For the necessary product manuals or documents, contact your local Mitsubishi Electric representative. Or, access the following URL and download the data.
www.mitsubishielectric.com/fa/ref/ref.html?kisyu=plc&manual=download_all

APPLICABLE STANDARDS

The FX5-3A-BD complies with the EU Directive (EMC Directive) and UKCA marking. Further information can be found in the following manual.

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

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

Attention

Use this product in a general industrial environment.

1. Outline

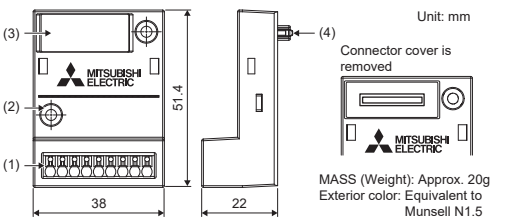
The FX5-3A-BD analog expansion board (hereinafter referred to as "FX5-3A-BD") is an expansion board that adds two analog inputs and one analog output.

1.1 Incorporated items

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

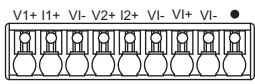
Item	Quantity
FX5-3A-BD analog expansion board	1
Tapping screw for expansion board mounting (M3 × 8)	2
Safety Guidelines	1

1.2 External dimensions, part names



No.	Name
(1)	Spring clamp terminal block
(2)	Mounting hole (2 holes of φ3.2)
(3)	Connector cover
(4)	Connector for CPU module

1.3 Terminal layout



Signal name	Function
V1+	CH1 voltage input
I1+	CH1 current input
VI-	Common
V2+	CH2 voltage input
I2+	CH2 current input
VI-	Common
VI+	CH3 voltage/current output
VI-	Common
•	Do not wire this terminal.

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

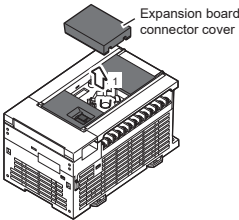
- Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions.
- When drilling screw holes or wiring, make sure that cutting and wiring debris do not enter the ventilation slits of the programmable controller. Failure to do so may cause fire, equipment failures or malfunctions.
- Connect the expansion board and expansion adapter securely to their designated connectors. Loose connections may cause malfunctions.
- Make sure to affix the expansion board with tapping screws. Tightening torque should follow the specifications in the manual. If the screws are tightened outside of the specified torque range, poor connections may cause malfunctions.
- Work carefully when using a screwdriver such as installation of the product. Failure to do so may cause damage to the product or accidents.

For further information on mounting, refer to the following manual.
└─J─MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual (Hardware)

2.1 Connection method

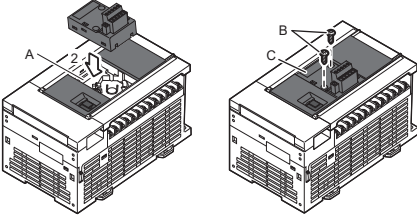
This section describes how to connect the FX5-3A-BD to the CPU module.

1. Remove the expansion board connector cover from the front face of the CPU module.



2. Connect the FX5-3A-BD to the expansion board connector (A in the figure).
3. Fix the FX5-3A-BD (C in the figure) with provided M3 tapping screws (B in the figure) to the CPU module.

- Tightening torque: 0.3 to 0.6N·m



Precautions

- Before connecting or disconnecting the expansion board, always turn off the power. Failure to do so may cause failure of the product.
- Before wiring, always fix the FX5-3A-BD with screws while ensuring that the power of the CPU module is turned off. Otherwise, the product may not operate correctly.

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 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 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.
 - 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

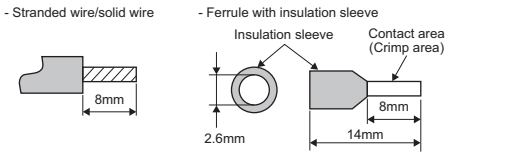
- When drilling screw holes or wiring, make sure that cutting and wiring debris do not enter the ventilation slits of the product and programmable controller.
- Failure to do so may cause fire, equipment failures or malfunctions.
- Make sure to observe the following precautions in order to prevent any 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 analog I/O wire together with or lay them close to the main circuit line, high-voltage line, or load line. Otherwise, noise disturbance and/or surge line induction are likely to take place. As a guideline, lay the power line and analog I/O wire at least 100mm away from the main circuit line, high-voltage line, or load line.
 - Ground the shield of the analog I/O wire on both sides of the cable. Do not use common grounding with heavy electrical systems.
 - Do not wire vacant terminals externally. Doing so may damage the product.
 - When using the product in a severe noise environment, implement external noise countermeasures, such as surge absorbers and ferrite cores.

3.1 Applicable wire

Suitable wiring		
Number of wires connected per terminal	Wire size Solid wire, stranded wire	Ferrule with insulation sleeve
One wire	22 to 18 AWG	20 to 18 AWG

Wire end treatment

Strip the cable about 10mm from the tip to connect a ferrule at the stripped area. If the wire strip length is too long, it may result in electric shock or short circuit between adjacent terminals because the conductive part is exposed from the terminal block toward the front. If the wire strip length is too short, it may result in the unstable connection to the spring clamp terminal part.
When a ferrule with insulation sleeve is used, it is difficult to insert the wire into the insulation sleeve depending on the thickness of the wire sheath. Therefore, select the proper wire according to the external dimensions.



<Reference product>

Manufacturer	Model	Wire size	Crimp tool
Weidmüller Interface GmbH & Co. KG	H0.5/14 OR	20 AWG (0.5mm ²)	PZ 6/5
	H0.75/14T HBL	18 AWG (0.75mm ²)	

<Connectable product>

Manufacturer	Model	Wire size	Crimp tool
PHOENIX CONTACT GmbH & Co. KG	AI 0.5-8 WH	20 AWG (0.5mm ²)	CRIMPFOX6
	AI 0.75-8 GY	18 AWG (0.75mm ²)	

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 solid wires and stranded 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 name of a flathead screwdriver
Weidmüller Interface GmbH & Co. KG	SDIS 0.4×2.5×75
PHOENIX CONTACT GmbH & Co. KG	SZS 0.4×2.5 VDE

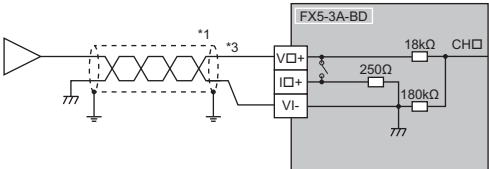
Disconnecting a cable

Pull out the wire with the open/close button pushed using a flathead screwdriver.

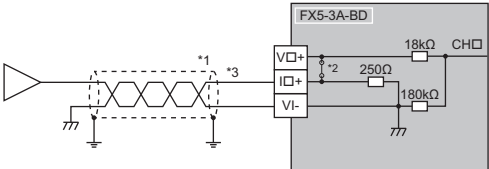
3.2 Example of wiring

Analog input wiring

- Voltage input



- Current input



V□+, I□+, CH□: □ represents the channel number.

For the FX5-3A-BD, use channel 1 and 2.

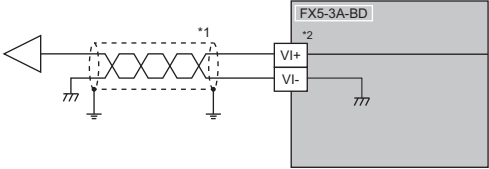
- *1 For analog input wiring, use shielded twisted-pair cables (double-core type). Separate them from other power lines or lines which are susceptible to induction.
- *2 For current input, the "V□+" and "I□+" terminals do not need to be connected. Set the current input range in the parameter settings of the engineering tool.
- *3 In severe-noise environments, install a ferrite core to the analog cable within approximately 200mm from the terminal block on the FX5-3A-BD side, and loop the cable once through the ferrite core. (Ferrite core used in test by Mitsubishi Electric: E04SR401938 manufactured by SEIWA ELECTRIC MFG. CO., LTD.)

Precautions

- Before connecting or disconnecting the expansion board, always turn off the power. Failure to do so may cause failure of the product.
- Before wiring, always fix the FX5-3A-BD with screws while ensuring that the power of the CPU module is turned off. Otherwise, the product may not operate correctly.

Analog output wiring

- Voltage/current output



- *1 For analog output wiring, use shielded twisted-pair cables (double-core type). Separate them from other power lines or lines which are susceptible to induction.
- *2 When setting voltage output and current output, set the output range in the parameter settings of the engineering tool.

Precautions

- Before connecting or disconnecting the expansion board, always turn off the power. Failure to do so may cause failure of the product.
- Before wiring, always fix the FX5-3A-BD with screws while ensuring that the power of the CPU module is turned off. Otherwise, the product may not operate correctly.

4.5 Performance specifications

Analog input specifications

Item	Specifications		
Number of analog input points	2 points (2 channels)		
Digital output	12-bit binary value		
Analog input voltage	0 to +10VDC (input resistance 198kΩ)		
Analog input current	0 to +20mADC (input resistance 250Ω)		
Input characteristics, resolution ^{1,2}	Analog input range	Digital output value	Resolution
	Voltage 0 to 10V	0 to 4000	2.5mV
	Current 0 to 20mA	0 to 4000	5μA
	4 to 20mA	0 to 3200	5μA
Accuracy (accuracy for the full scale of the digital output value)	Ambient temperature 25±5°C: Within ±0.5% (±20 digits) Ambient temperature 0 to 55°C: Within ±1.0% (±40 digits) Ambient temperature -20 to 0°C: Within ±1.5% (±60 digits)		
Absolute maximum input	Voltage: -0.5V/+15V, current: -2mA/+30mA		

- *1 For further information on the input characteristics, refer to the following manual.
└─J─MELSEC iQ-F FX5 User's Manual (Application)
- *2 There is a dead band around the 0mA input in which the digital output may not accurately reflect the analog input.

Analog output specifications

Item	Specifications			
Number of analog output points	1 point (1 channel)			
Digital input	12-bit binary value			
Analog output voltage	0 to +10VDC (external load resistance value 1k to 1MΩ)			
Analog output current	0 to +20mADC (external load resistance value 0 to 500Ω)			
Output characteristics, resolution ¹	Analog output range		Resolution	
	Voltage	0 to 10V	0 to 4000	2.5mV
	Current	0 to 20mA	0 to 4000	5μA
		4 to 20mA	0 to 3200	5μA
Accuracy (accuracy for the full scale of the analog output value)	Ambient temperature 25±5°C: Within ±0.5% (voltage ±50mV, current ±100μA)			
	Ambient temperature 0 to 55°C: Within ±1.0% (voltage ±100mV, current ±200μA)			
	Ambient temperature -20 to 0°C: Within ±1.5% (voltage ±150mV, current ±300μA)			

- *1 For further information on the output characteristics, refer to the following manual.
└─J─MELSEC iQ-F FX5 User's Manual (Application)

Common specifications

Item	Specifications
Conversion speed ^{*1}	1.5ms maximum
Isolation method	Between I/O terminal and programmable controller: Not insulated Between I/O terminal and channels: Not insulated
Number of occupied I/O points	0 points (This number is not related to the maximum number of I/O points of the programmable controller.)

- *1 Data is updated at every operation cycle.

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
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.

MITSUBISHI ELECTRIC CORPORATION

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