MITSUBISHI ELECTRIC



Side B



FX₃U-4AD INSTALLATION MANUAL



Manual Number	JY997D20701
Revision	J
Date	October 2022

This manual describes the part names, dimensions, mounting, and specifications of the product. Before use, read this manual and the manuals of all relevant of the product. Before use, read this manual and the manuals of all relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions. Store this manual in a safe place so that it can be taken out and read whenever necessary. Always forward it to the end user. Registration: Phillips is a registered trademark of Phillips Screw Company. 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 'TM' or '®' are not specified in this manual.

Effective October 2022 Specifications are subject to change without notice

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Safety Precautions (Read these precautions before use.)

ual classifies the safety precautions into two categories:

MARNING and **MCAUTION**

	<u>^</u>WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.	
2	^ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.	
Depending on the circumstances, procedures indicated by ACAUTION may also			

cause severe injury.

It is important to follow all precautions for personal safety

Associated Manuals

Manual name	Manual No.	Description		
FX3s/FX3G/FX3GC/ FX3U/FX3UC Series User's Manual - Analog Control Edition	ASUC Series JY997D16701 MODEL CODE: 09R619 Describes specifications for for FX3S/FX3G/FX3GC/FX3GC/FX3GC/SUC Series JY997D16601 MODEL CODE: 09R617 Describes PLC programmi basic/applied instructions a devices.			
FX3S/FX3G/FX3GC/ FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition				
FX3G Series User's Manual - Hardware Edition	JY997D31301 MODEL CODE: 09R521	Explains the FX3G Series PLC specifications for I/O, wiring, installation, and maintenance.		
FX3GC Series User's Manual - Hardware Edition	JY997D45401 MODEL CODE: 09R533	Explains the FX3GC Series PLC specifications for I/O, wiring, installation, and maintenance.		
FX3U Series User's Manual - Hardware Edition	JY997D16501 MODEL CODE: 09R516	Explains the FX _{3U} Series PLC specifications for I/O, wiring, installation, and maintenance.		
FX3UC Series User's Manual - Hardware Edition	JY997D28701 MODEL CODE: 09R519	Explains the FX3UC Series PLC specifications for I/O, wiring, installation, and maintenance.		
MELSEC iQ-F FX5S/ FX5UJ/FX5U/FX5UC User's Manual (Hardware)	SH-082452ENG MODEL CODE: 09R584	Describes the details of hardware of the FX5 CPU module, including performance specifications, wiring, installation, and maintenance.		

How to obtain manuals

For product manuals or documents, consult with the Mitsubishi Electric dealer from who you purchased your product.

Certification of UL, cUL standards

UL, cUL File Number: E95239

MELSEC FX3U series manufactured

Compliance with EC directive (CE Marking)

This note does not guarantee that an entire mechanical module produced in accordance with the contents of this note will comply with the following standards. Compliance to EMC directive and LVD directive for the entire mechanical module should be checked by the user / manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Requirement for Compliance with EMC directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (2014/30/EU) when used as directed by the appropriate documentation.

This product is designed for use in industrial applications.

Models: MELSEC FX3U series manufactured from February 1st, 2006 FX3U-4AD					
Standard		Remark			
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	Compliance with all relev EMI Radiated Emission Conducted Emission	ant aspects of the standard. EMS Radiated electromagnetic fiel Fast transient burst Electrostatic discharge High-energy surge Voltage drops and interruption Conducted RF Power frequency magnetic fie			

tion for EC Directive

The FX3U-4AD have been found to be compliant to the European standards in the aforesaid manual and directive. However, for the very best performance from what are in fact delicate measuring and controlled output device Mitsubishi Electric would like to make the following points;

As analog devices are sensitive by nature, their use should be considered carefully. For users of proprietary cables (integral with sensors or actuators), these users should follow those manufacturers installation requirements.

Mitsubishi Electric recommend that shielded cables should be used. If NO other EMC protection is provided, then users may experience temporary loss or accuracy between ±10% in very heavy industrial areas.

However, Mitsubishi Electric suggest that if adequate EMC precautions are followed for the users complete control system, users should expect accuracy as specified in this manual.

• Sensitive analog cable should not be laid in the same trunking or cable

- conduit as high voltage cabling. Where possible users should run analog cables separately.
- cables separately.

 Good cable shielding should be used. Ground the shield of the twisted shielded cable at one point on the PLC side.

 When reading analog values, EMC accuracy can be improved out by averaging the readings. This can be achieved either through functions on the special function block for analog input or through a users program in the FX3U Series PLC main unit.

 Please use FX3U-4AD while installed in a shielded enclosure. For the details, refer to the following manual.

 Refer to the FX3G Series User's Manual Hardware Edition

eler to the following manual.

→ Refer to the FX3G Series User's Manual - Hardware Edition

→ Refer to the FX3G Series User's Manual - Hardware Edition

→ Refer to the FX3U Series User's Manual - Hardware Edition

→ Refer to the FX3U Series User's Manual - Hardware Edition

→ Refer to the FX3UC Series User's Manual - Hardware Edition

→ Refer to the MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual

Note for compliance with EN61131-2:2007

- General note on the use of the power supply cable.

 The FX3U-4AD unit requires that the cable used for power supply is 30m or less. When an external power supply is used, attach a ferrite core to the power cable and
- make 2 turns around (Ferrite core used in Mitsubishi Electric's test E04SR401938 manufactured by SEIWA ELECTRIC MFG. CO., LTD.)

Compliance with UKCA marking

The requirements for compliance with UKCA marking are the same as that with EC directive (CE marking).

1. Outline

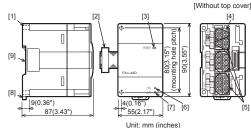
The FX3U-4AD special function block for analog input converts four analog input values (voltage, current) to digital values and transfers those digital values to the PLC main unit.

1.1 Incorporated Items

Product	FX3U-4AD special function block for analog input
	Special unit/block No. label

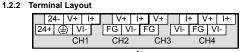
Dust proof sheet × 1
 Installation manual (This manual)

1.2 External Dimensions, Part Names, and Terminal Layout 1.2.1 External Dimensions and Part Names



MASS(Weight): Approx. 0.2kg(0.44lbs)

- [1] Direct mounting hole:2 holes of \$\phi 4.5 (0.18") (mounting screw: M4 screw)
- Extension cable
- [3]
- POWER LED (green): Lit while 5V DC power is supplied from PLC.
- Terminal block for power supply (24V DC) (M3 terminal screw) Terminal block for analog input
- [6]
- 24V LED (red): Lit while 24V DC power is supplied properly to terminals [24+] and [24-]. A/D LED (red): Flashes (at high speed) during A/D conversion
- [7]
- DIN rail mounting hook [9] DIN rail mounting groove (35 mm (1.38") wide)



Left side of the product (Extension cable side)

Installation

NSTALLATION **ACAUTION** RECAUTIONS

- Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition). 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, malfunctio

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

 Do not touch the conductive parts of the product directly.

 Doing so may cause device failures or malfunctions.

 Install the product securely using a DIN rail or mounting screws.

 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.

 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.

 Be sure to remove the dust proof sheet from the PLC's ventilation slits when
- Be sure to remove the dust proof sheet from the PLC's ventilation slits who installation work is completed Failure to do so may cause fire, equipment failures or malfunctions
- Connect extension cables securely to their designated connectors. Loose connections may cause malfunctions.

2.1 Arrangements

The product connects on the right side of an PLC main unit or extension units/blocks

(including special function units/blocks).

For connection to FX3cC/FX3uC Series PLC or FX2NC Series PLC extension block,
FX2NC-CNV-IF or FX3uC-IPS-5V is required.

For connection to FX5U/FX5UC PLC, FX5-CNV-BUS or FX5-CNV-BUSC is required.

For connection to FASU/FASUU FLC, FAS-UNV-BUS OF FAX-UNV-BUS OF RAV-UNV-BUS OF RA

2.2 Mounting

- The product is mounted by the following method.
- Direct mounting

2.2.1 Direct Mounting

The product can be mounted with M4 screws by using the direct mounting holes. Refer to the External Dimensions (section 1.2) for the product's mounting hole

An interval space between each unit of 1 to 2 mm (0.04" to 0.08") is necessary.

- For further information of direct installation, also refer to the following manual.

 → Refer to the FX3G Series User's Manual Hardware Edition
 - → Refer to the FX3GC Series User's Manual Hardware Edition
 → Refer to the FX3U Series User's Manual Hardware Edition → Refer to the FX3UC Series User's Manual - Hardware Edition
 → Refer to the MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual

2.2.2 DIN Rail Mounting

The product can be mounted on a DIN rail (DIN46227, 35mm width).

 Fit the upper edge of the DIN rail mounting groove (fig. A) onto the DIN rail. 2) Press the product against the DIN rail.



Connect the extension cable (fig. B) to the main unit, input/output extension unit/block, and special function unit/block on

For the details of the extension cable connection, refer to the following manual.

→ Refer to the FX3G Series User's

→ Refer to the FX3G Series User's
Manual - Hardware Edition
→ Refer to the FX3GC Series User's
Manual - Hardware Edition
→ Refer to the FX3U Series User's
Manual - Hardware Edition
→ Refer to the FX3US Series User's
Manual - Hardware Edition
→ Refer to the FX3UC Series User's
Manual - Hardware Edition
→ Refer to the MELSEC ioF FXSSIJ/FXSUJ/FX5U/FX5U/User's Manual (Hardware)

3. Wiring

MARNING RECAUTIONS

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.

RECAUTIONS

Make sure to observe the following precautions in order to preve malfunctions under the influence of noise:

1) Do not bundle the power line or twisted shielded cable together with or law 1) Do not bundle the power line or twisted shielded cable together with or lay it close to the main circuit, high-voltage line or load line. Otherwise, noise disturbance and/or surge induction are likely to take place. As a guideline, lay the control line 100mm (3.94*) or more away from the main circuit, high-voltage line, or load line.
2) Ground the shield wire or shield of the shielded cable at one point on the

PLC. However, do not use common grounding with heavy electrical

Make sure to properly wire to the terminal blocks in accordance with th following precautions. 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

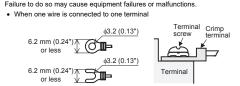
described in the manual

Tightening torque should follow the specification in the manual. Tighten the screws using a Phillips-head screwdriver No.2 (shaft diamete 6mm (0.24") or less). Make sure that the screwdriver does not touch the partition part of the terminal block.

3.1 Applicable Cable and Terminal 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 0.5 to 0.8N·m

Do not tighten terminal screws with a torque outside the abovementioned range



φ3.2 (0.13") 6.2 mm (0.24") or less Terminal Crimp screw 6.3 mm (0.25") or more φ3.2 (0.13") 6.2 mm (0.24") or less 6.3 mm (0.25") or more

3.2 Power Supply Wiring

For the power supply wiring, refer to the following manual. → Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series User's Manual
 - Analog Control Edition

3.3 Wiring of Analog Input For the terminal layout, refer to Subsection 1.2.2 FX3U-4AD supply wiring 24V DC *1 +**_** (Ground resistance: 100Ω or less) Using current input ch□ V+ VI-Using voltage input |+

ch□ : □ represents the channel

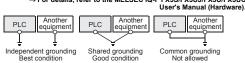
- *1 For FX3G/FX3U/FX5U PLC (AC power type), the 24V DC service power supply is also available
- *2 The [FG] terminal and the [(1)] terminal are connected internally There is no "FG" terminal for ch1. When using ch1, connect directly to the
- *3 Use a 2-core twisted shield wire for analog input line, and separate it from other power lines or inductive lines *4 For the current input, short-circuit the [V+] terminal and the [I+] terminal.

*5 If there is voltage ripple in the input voltage or there is noise in the external wiring, connect a capacitor of approximately 0.1 to 0.47µF 25 V. 3.4 Grounding

Grounding should be performed as stated below • The grounding resistance should be 100Ω or less.

Independent grounding should be performed for best results.
 When independent grounding is not performed, perform "shared grounding" of the following figure.

→ For details, refer to the FX3G Series User's Manual - Hardware Edition. → For details, refer to the FX3G Series User's Manual - Hardware Edition. → For details, refer to the FX3U Series User's Manual - Hardware Edition. → For details, refer to the FX3UC Series User's Manual - Hardware Edition.
→ For details, refer to the MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC



- The grounding wire size should be AWG 14 (2 mm²). The grounding point should be close to the PLC, and all grounding wire should be as short as possible.
- 4. Specifications STARTUP AND

⚠CAUTION

Do not disassemble of modify the FLC.
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.

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

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.

⚠CAUTION

4.1 Applicable PLC

STORAGE PRECAUTIONS

Model name	Applicability
FX3G Series PLC	Ver. 1.00 or later (from first production) Up to 8 blocks can be extended
FX3GC Series PLC*1	Ver. 1.40 or later (from first production) Up to 8 blocks can be extended
FX3U Series PLC	Ver. 2.20 or later (from first production) Up to 8 blocks can be extended
FX3UC Series PLC*1	Ver. 1.30 or later (from the production manufactured in August, 2004 with SER No. 48□□□□) Up to 8 blocks can be extended*2
FX5U PLC*3	Ver. 1.000 or later (from first production) Up to 8 blocks can be extended
FX5UC PLC*3	Ver. 1.000 or later (from first production) Up to 6 blocks can be extended

The version number can be checked by monitoring D8001 as the last three digits

- *1 An FX2NC-CNV-IF or FX3UC-1PS-5V is necessary to connect the FX3U-4AD with the FX3GC/FX3UC PLC.
- *2 Up to 7 units can be connected to the FX3UC-32MT-LT(-2) PLC. *3 An FX5-CNV-BUS or FX5-CNV-BUSC is necessary to connect the FX3U-4AD

with the FX5U/FX5UC PLC. 4.2 General Specifications

For the general specifications other than the following, refer to the manual of the PLC main unit. The items other than the following are equivalent to those of the PLC main unit

The other than the following are equivalent to lose of the FEC main onto the FX36 Series User's Manual - Hardware Edition.

→ For details, refer to the FX36C Series User's Manual - Hardware Edition.

→ For details, refer to the FX30 Series User's Manual - Hardware Edition. → For details, refer to the FX3UC Series User's Manual - Hardware Edition.
→ For details, refer to the MELSEC iQ-F FX5S/FX5UJ/FX5U/FX5UC User's Manual

		(Hardware).		
Item	Specification			
Dielectric withstand voltage	500V AC for one minute	Between all terminals and ground terminal of PLC		
Insulation resistance	5MΩ or higher by 500V DC insulation resistance tester	main unit		

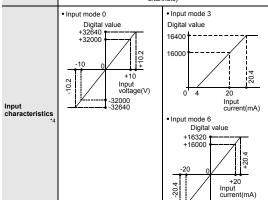
.5 Fower Supply Specifications				
Item	Specification			
A/D conversion circuit driving power	24V DC ±10%, 90mA (24V DC power is supplied from the power connector.)			
CPU driving power	5V DC, 110mA (5V DC power is supplied from the internal power supply of main unit.)			

4.4 Performance Specifications

Item	Description			
item	Voltage input	Current input		
Analog input range	-10 to +10V DC (Input resistance: 200 kΩ)	-20 to +20mA, 4 to 20mA DC (Input resistance: 250Ω)		
Offset*1	-10 to +9V*2	-20 to +17mA*3		
Gain ^{*1}	-9 to +10V*2	-17 to +30mA*3		
Maximum absolute input	±15V	±30mA		
Digital output	With sign, 16bits, binary	With sign, 15bits, binary		
Resolution	0.32mV (20V/64000)	1.25µA (40mA/32000)		
Total accuracy	±0.3% (±60mV) for full scale of 20V (when ambient temperature is 25°C±5°C) ±0.5% (±100mV) for full scale of 20V (when ambient)	±0.5% (±200μA) for full scale of 40mA (when ambient temperature is 25°C±5°C and a current of -20 mA to +20 mA is input) Same when input is 4mA to 20mA ±1.0% (±400μA) for full scale of 40mA (when ambient		

a current of -20 mA to +20 mA Same when input is 4mA to 20mA is input) 500μs × number of selected channels (If channels use the digital filter(s): 5ms × number of selected channels) A/D conversio

ature is 0°C to 55°C)



Channels are not insulated from each other Occupied 8 point (Count either the input or output points of the PLC.) *1 Change the offset and gain values to change the input characteristics. However, the resolution doesn't change even when the offset and gain values change. When the analog value direct indication is enabled in the input mode 2, 5, or 8, the offset value and the gain value don't change.

- *2 The offset and the gain should satisfy the following condition: $1V \leq (Gain Offset) \leq 7.5V$
- *3 The offset and the gain should satisfy the following condition: 3mA ≤ (Gain Offset) ≤ 30mA

power supply unit

*4 The input characteristics vary depending on the input mode to be used. For the details of the input characteristics, refer to the following manual

→ Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series User's Manual - Analog Control Edition

The photo-coupler insulates the analog input area from the PLC. The DC-DC converter insulates the analog input area from the

4.5 Input characteristics

The input characteristics in each input mode are as follows. For the details of the input characteristics, refer to the following manual.

→ Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series User's Man

	A LOCAL TO THE LABOUR ASSULATE		alog Control Edition	
Input mode	Input mode	Analog input range	Digital output range	
0	Voltage input mode	-10 to +10V	-32000 to +32000	
1	Voltage input mode	-10 to +10V	-4000 to +4000	
2	Voltage input mode Analog value direct indication	-10 to +10V	-10000 to +10000	
3	Current input mode	4 to 20mA	0 to 16000	
4	Current input mode	4 to 20mA	0 to 4000	
5	Current input mode Analog value direct indication	4 to 20mA	4000 to 20000	
6	Current input mode	-20 to +20mA	-16000 to +16000	
7	Current input mode	-20 to +20mA	-4000 to +4000	

「电器电子产品有害物质限制使用标识要求」的表示方式

-20 to +20mA

-20000 to +20000

Current input mode Analog value direct indicatior



temperature is 25°C+5°C and

16000 16320

analog input area from the PLC.

Note: This symbol mark is for China only.

含有有害6物质的名称,含有量,含有部品 本产品中所含有的有害6物质的名称,含有量,含有部品如下表

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ı	部件名称					j 害物质		
			铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴 二苯醚 (PBDE)
	可编程	外壳	0	0	0	0	0	0
-	控制器	印刷基板	×	0	0	0	0	0

本表格依据ST/T 11364的规定编制。

基于中国标准法的参考规格:GB/T15969.2

规定的限量要求以下。 ※:表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

〇:表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572

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Regardless of the gratis warranty term, Mitsubishi shall not be liable for compe (1) Damages caused by any cause found not to be the responsibility of Mitsubishi

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 Loss in opportunity, lost profits incurred to the user by Failures of Mitsubish products.
 Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
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♠ 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 Mitchick License.
- 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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