JY997D40901C Side B

MITSUBISHI ELECTRIC

Side A JAPANESE

Side B ENGLISH

Programmable Controller
MELSEC-F

FX3U-8AV-BD

USER'S MANUAL

FX 3U

Manual Number	JY997D40901
Revision	C
Date	December 2017

This manual describes the part names, dimensions, mounting, and specifications 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:
The company and product name described in this manual are registered trademarks or the trademarks of their respective companies.

Effective December 2017
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 medium or slight personal injury or physical 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 Manuals

Manual name	Manual No.	Description
FX3U Series User's Manual - Hardware Edition	JY997D16501 MODEL CODE: 09R516	Explains the FX3U Series PLC specification details for I/O, wiring, installation, and maintenance.
FX3UC Series User's Manual - Hardware Edition	JY997D28701 MODEL CODE: 09R519	Explains the FX3UC Series PLC specification details for I/O, wiring, installation, and maintenance.
FX3S/FX3G/FX3GC/ FX3U/FX3UC Series Programming Manual -Basic&Applied Instruction Edition	JY997D16601 MODEL CODE: 09R517	Describes PLC programming for basic/applied instructions and devices.

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

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 information please consult with your nearest Mitsubishi product provider.
Regarding the standards that comply with the main unit, please refer to either the FX series product catalog or consult with your nearest Mitsubishi product provider.

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.

Attention
This product is designed for use in industrial applications.

Type: Programmable Controller (Open Type Equipment)
Models: MELSEC FX3U series manufactured
from August 1st, 2010 FX3U-8AV-BD

Standard	Remark
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

1. Introduction

The FX3U-8AV-BD is an expansion board equipped with eight analog set points which can be used as an analog timer.

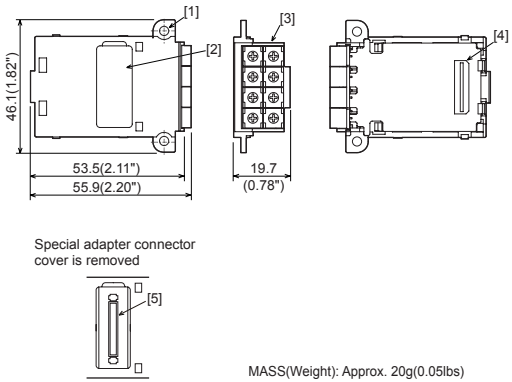
1.1 Incorporated Items

Check to ensure the following product and items are included in the package

Included Item	
FX3U-8AV-BD	1 unit
Trimmer layout label	1 sheet
M3 tapping screws for installation	2 pcs
Manuals (Japanese version, English version)	1 manual each

1.2 External Dimensions and Part Names

Unit: mm(inches)



MASS(Weight): Approx. 20g(0.05lbs)

[1] Mounting holes(2- ϕ3.2 (0.13"))
[2] Special adapter connector cover
[3] Analog volume
[4] Main unit connector
[5] Special adapter connector

1.3 Trimmer Layout

VR0	VR1
VR2	VR3
VR4	VR5
VR6	VR7

2. Installation

INSTALLATION PRECAUTIONS ⚠WARNING

- Make sure to shut down all phases of the power supply externally before installing.
  Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS ⚠CAUTION

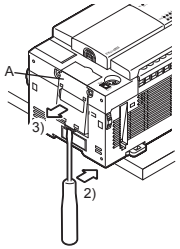
- Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition).
  Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), flammable gas, vibration or impacts, or expose 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.
- Use screwdrivers carefully when performing installation work, thus avoiding accident or product damage.
- 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.
- Do not touch the conductive parts of the product directly.
  Doing so may cause device failures or malfunctions.
- Connect the extension board securely to their designated connectors.
  Loose connections may cause malfunctions.

2.1 Installation Method

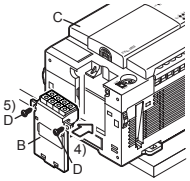
The following section describes the installation method to the FX3U/FX3UC-32MT-LT(-2) Series PLC.

2.1.1 FX3U Series PLC

1) Power off the PLC.
   Disconnect all the cables connected to the PLC.
   Demount the PLC from the DIN rail.
2) Using a flat head screwdriver as shown in the figure on the right, lift the dummy expansion board cover (fig. A) making sure not to damage the circuit board or electronic parts.
3) Remove the dummy expansion board cover (fig. A) perpendicularly away from the main unit.

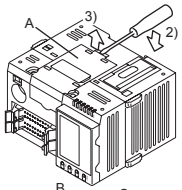


4) Make sure the expansion board (fig. B) is in parallel with the main unit (fig. C) and attach it to the expansion board connector.
5) Fix the expansion board (fig. B) to the main unit (fig. C) using the provided M3 tapping screws (fig. D).
   Tightening torque: 0.3 to 0.6 N•m

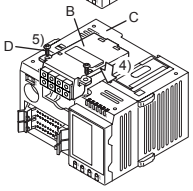


2.1.2 FX3UC-32MT-LT(-2) Series PLC

1) Power off the PLC.
   Disconnect all the cables connected to the PLC.
   Demount the PLC from the DIN rail.
2) Using a flat head screwdriver as shown in the figure on the right, lift the dummy expansion board cover (fig. A) making sure not to damage the circuit board or electronic parts.
3) Remove the dummy expansion board cover (fig. A) perpendicularly away from the main unit.



4) Make sure the expansion board (fig. B) is in parallel with the main unit (fig. C) and attach it to the expansion board connector.
5) Fix the expansion board (fig. B) to the main unit (fig. C) using the provided M3 tapping screws (fig. D).
   Tightening torque: 0.3 to 0.6 N•m



3. Specification

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 AND STORAGE 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.

3.1 Applicable PLC

Model name	Applicability
FX3U Series PLC	Ver. 2.70 and later
FX3UC-32MT-LT(-2) PLC	Ver. 2.70 and later

3.2 General Specifications

Items other than the following are equivalent to those of the PLC main unit.
For general specifications, refer to the manual of the PLC main unit.
→ **Refer to the FX3U Series User's Manual - Hardware Edition.**
→ **Refer to the FX3UC Series User's Manual - Hardware Edition.**

3.3 Power Supply Specification

Item	Specification
5V DC power supply (mA)	20mA (5V DC power is supplied internally from the main unit.)

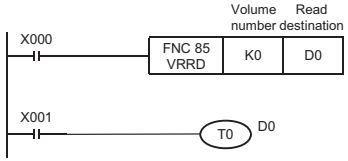
3.4 Performance Specification

Item	Specification
Analog volume points	8 points
Instruction	VRRD(FNC 85) Volume Read VRSC(FNC 86) Volume Scale
Digital conversion value	VRRD instruction: 0 to 255 VRSC instruction: 0 to 10

4. Program Example

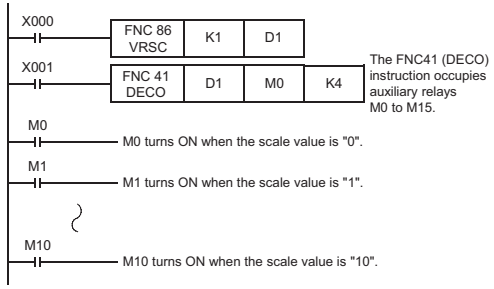
For details on the VRRD and VRSC instruction, refer to the following manuals.
→ **Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual.**

1) Example in which the read analog value is used as the set value of an analog timer. (VRRD instruction)
The analog value of the variable analog potentiometer No.0 is converted into binary 8-bit data, and the value in the range from 0 to 255 is transferred to D0.
The value of D0 is used as the set value of a timer



When a value larger than 255 is required as the set value of a timer, the read value multiplied by a constant by the FNC22 (MUL) instruction can be set indirectly as the timer constant.

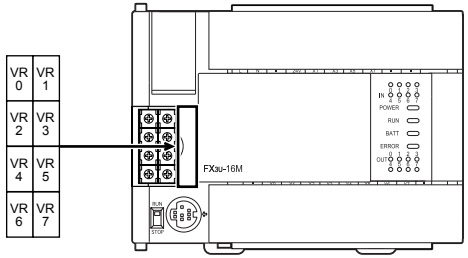
2) Example in which the scale value is used as a rotary switch. (VRSC instruction)
Either one among auxiliary relays M0 to M10 turns ON in accordance with the scale value in the range from 0 to 10 of the specified variable analog potentiometer.



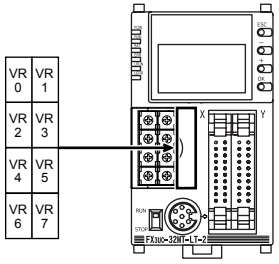
5. Trimmer Layout Label

The trimmer layout label is adhere it in a position where it can be seen easily for quick reference (as shown in the figure below).

- In the case of FX3U Series PLC



- In the case of FX3UC-32MT-LT(-2) PLC



6. Caution On Use

- Only one analog volume expansion board can be used per main unit.
- The communication function is not available at ch1 when VRRD or VRSC instruction is used in the program in FX3U/FX3UC PLCs.

「电器电子产品有害物质限制使用标识要求」的表示方式

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，含有部品如下表所示。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
可编程控制器	外壳	○	○	○	○	○	○
	印刷基板	×	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。

○: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。

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

JY997D40901C Side B

MITSUBISHI ELECTRIC

Side A JAPANESE

Side B ENGLISH

Programmable Controller
MELSEC-F

FX3U-8AV-BD

USER'S MANUAL

Manual Number	JY997D40901
Revision	C
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Associated Manuals

Manual name	Manual No.	Description
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Requirement for Compliance with EMC directive

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Attention
This product is designed for use in industrial applications.

Type: Programmable Controller (Open Type Equipment)
Models: MELSEC FX3U series manufactured
from August 1st, 2010 FX3U-8AV-BD

Standard	Remark
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

1. Introduction

The FX3U-8AV-BD is an expansion board equipped with eight analog set points which can be used as an analog timer.

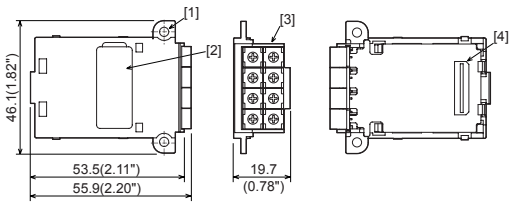
1.1 Incorporated Items

Check to ensure the following product and items are included in the package

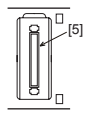
Included Item	
FX3U-8AV-BD	1 unit
Trimmer layout label	1 sheet
M3 tapping screws for installation	2 pcs
Manuals (Japanese version, English version)	1 manual each

1.2 External Dimensions and Part Names

Unit: mm(inches)



Special adapter connector cover is removed



MASS(Weight): Approx. 20g(0.05lbs)

[1] Mounting holes(2- ϕ3.2 (0.13"))
[2] Special adapter connector cover
[3] Analog volume
[4] Main unit connector
[5] Special adapter connector

1.3 Trimmer Layout

VR0	VR1
VR2	VR3
VR4	VR5
VR6	VR7

2. Installation

INSTALLATION PRECAUTIONS ⚠WARNING

- Make sure to shut down all phases of the power supply externally before installing.
  Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS ⚠CAUTION

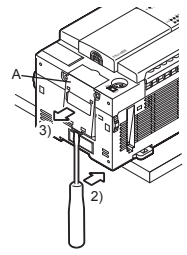
- Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition).
  Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl_2, H_2S, SO_2 or NO_2), flammable gas, vibration or impacts, or expose 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.
- Use screwdrivers carefully when performing installation work, thus avoiding accident or product damage.
- 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.
- Do not touch the conductive parts of the product directly.
  Doing so may cause device failures or malfunctions.
- Connect the extension board securely to their designated connectors.
  Loose connections may cause malfunctions.

2.1 Installation Method

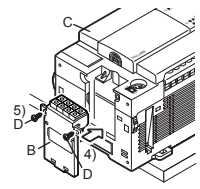
The following section describes the installation method to the FX3U/FX3UC-32MT-LT(-2) Series PLC.

2.1.1 FX3U Series PLC

1) Power off the PLC.
   Disconnect all the cables connected to the PLC.
   Demount the PLC from the DIN rail.
2) Using a flat head screwdriver as shown in the figure on the right, lift the dummy expansion board cover (fig. A) making sure not to damage the circuit board or electronic parts.
3) Remove the dummy expansion board cover (fig. A) perpendicularly away from the main unit.

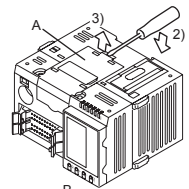


4) Make sure the expansion board (fig. B) is in parallel with the main unit (fig. C) and attach it to the expansion board connector.
5) Fix the expansion board (fig. B) to the main unit (fig. C) using the provided M3 tapping screws (fig. D).
   Tightening torque: 0.3 to 0.6 N•m



2.1.2 FX3UC-32MT-LT(-2) Series PLC

1) Power off the PLC.
   Disconnect all the cables connected to the PLC.
   Demount the PLC from the DIN rail.
2) Using a flat head screwdriver as shown in the figure on the right, lift the dummy expansion board cover (fig. A) making sure not to damage the circuit board or electronic parts.
3) Remove the dummy expansion board cover (fig. A) perpendicularly away from the main unit.



4) Make sure the expansion board (fig. B) is in parallel with the main unit (fig. C) and attach it to the expansion board connector.
5) Fix the expansion board (fig. B) to the main unit (fig. C) using the provided M3 tapping screws (fig. D).
   Tightening torque: 0.3 to 0.6 N•m

3. Specification

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 AND STORAGE 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.

3.1 Applicable PLC

Model name	Applicability
FX3U Series PLC	Ver. 2.70 and later
FX3UC-32MT-LT(-2) PLC	Ver. 2.70 and later

3.2 General Specifications

Items other than the following are equivalent to those of the PLC main unit.
For general specifications, refer to the manual of the PLC main unit.
→ **Refer to the FX3U Series User's Manual - Hardware Edition.**
→ **Refer to the FX3UC Series User's Manual - Hardware Edition.**

3.3 Power Supply Specification

Item	Specification
5V DC power supply (mA)	20mA (5V DC power is supplied internally from the main unit.)

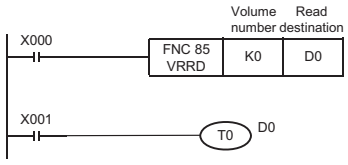
3.4 Performance Specification

Item	Specification
Analog volume points	8 points
Instruction	VRRD(FNC 85) Volume Read VRSC(FNC 86) Volume Scale
Digital conversion value	VRRD instruction: 0 to 255 VRSC instruction: 0 to 10

4. Program Example

For details on the VRRD and VRSC instruction, refer to the following manuals.
→ **Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual.**

1) Example in which the read analog value is used as the set value of an analog timer. (VRRD instruction)
   The analog value of the variable analog potentiometer No.0 is converted into binary 8-bit data, and the value in the range from 0 to 255 is transferred to D0.
   The value of D0 is used as the set value of a timer



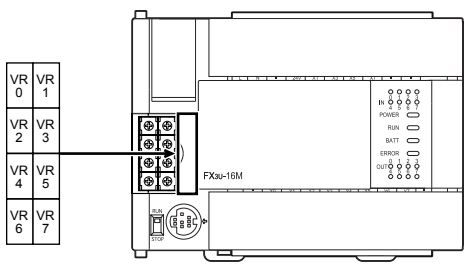
When a value larger than 255 is required as the set value of a timer, the read value multiplied by a constant by the FNC22 (MUL) instruction can be set indirectly as the timer constant.

2) Example in which the scale value is used as a rotary switch. (VRSC instruction)
   Either one among auxiliary relays M0 to M10 turns ON in accordance with the scale value in the range from 0 to 10 of the specified variable analog potentiometer.

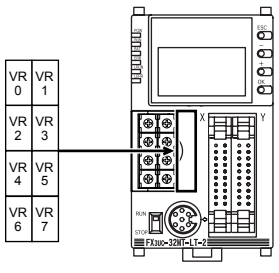
5. Trimmer Layout Label

The trimmer layout label is adhere it in a position where it can be seen easily for quick reference (as shown in the figure below).

- In the case of FX3U Series PLC



- In the case of FX3UC-32MT-LT(-2) PLC



6. Caution On Use

- Only one analog volume expansion board can be used per main unit.
- The communication function is not available at ch1 when VRRD or VRSC instruction is used in the program in FX3U/FX3UC PLCs.

「电器电子产品有害物质限制使用标识要求」的表示方式

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，含有部品如下表所示。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
可编程控制器	外壳	○	○	○	○	○	○
	印刷基板	×	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。

○: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。

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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