



PROGRAMMABLE CONTROLLERS

MELSEC-F

FX_{2N}

FX2N-4DA SPECIAL FUNCTION BLOCK

USER'S GUIDE

JY992D65901E

This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX2N-4DA special function block and should be read and understood before attempting to install or use the unit.

Further information can be found in the FX PROGRAMMING MANUAL(II) and FX0N/FX1N/FX2N/FX2NC/FX3U/FX3UC SERIES HARDWARE MANUAL.

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Notes on the Symbols Used in this Manual

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- 1) Indicates that the identified danger **WILL** cause physical and property damage.



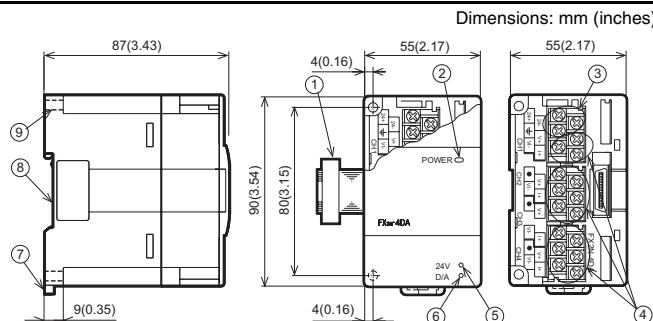
- 2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.

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1. INTRODUCTION

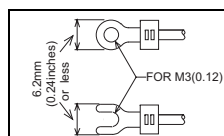
- The FX2N-4DA analog special function block has four analog output channels. The output channels take a digital value and output an equivalent analog signal. This is known as a D/A conversion. The FX2N-4DA has a maximum resolution of 12 bits.
- The selection of voltage or current based input/output is by user wiring. Analog ranges of -10 to 10V DC (resolution: 5mV), and/or 0 to 20mA (resolution: 20μA) maybe selected independently for each channel.
- The FX2N-4DA can connected to the FX0N/FX1N/FX2N/FX2NC/FX3U/FX3UC series Programmable Controllers (PLC).
- Data transfer between the FX2N-4DA and the main unit is completed buffer memory exchange. There are 32 buffer memories (each of 16 bits) in the FX2N-4DA.
- The FX2N-4DA occupies 8 I/O points on the FX2N expansion bus. The 8 I/O points can be allocated from either inputs or outputs. The FX2N-4DA draws 30mA from the 5V rail of the main unit or powered extension unit.

2. EXTERNAL DIMENSIONS AND PARTS



- Weight: Approx. 0.3 kg (0.66 lbs)
 - Accessory: Special block number label
- ① Extension cable
 - ② Power indicator lamp (LED)
5 V power is supplied from the programmable controller to light this indicator lamp.
 - ③ Power supply terminals
(Screw terminal: M3 (0.12))
 - ④ Analog output terminals
(Screw terminals: M3 (0.12))
 - ⑤ 24V power indicator lamp (LED) 24V DC power is supplied to the terminals of the FX2N-4DA to light this indicator lamp.
 - ⑥ D/A conversion indicator lamp (LED)
Flashes at a high speed if D/A conversion is performing without a problem.
 - ⑦ Hook for DIN rail
 - ⑧ Groove for DIN rail mounting
(Width of DIN rail: 35 mm 1.38")
 - ⑨ Hole for direct mounting (2-φ4.5) (0.18)

Handling of crimp-style terminal



- Be sure to use the crimp-style terminals that satisfy the dimensional requirements shown in the left figure.
- Apply 0.5 to 0.8 N·m torque to tighten the terminals. Firmly tighten the terminals to prevent abnormal operation.

3. CONNECTION WITH PLC

The FX_{2N}-4DA unit can be connected to the PLCs as follows. Restrictions apply to the maximum number of connectable units, depending on the DC24V/DC5V Power Supply capacities and the Main Unit/Special Function Unit types. For details, refer to the respective PLC manual.

FX_{2N}/FX_{3U} : The maximum connectable units is 8.

FX3UC^{†1} : The maximum connectable units is 8.
To connect the FX2N-4AD with the FX3UC main unit, FX2NC-CNV-IF or FX3UC-1PS-5V is required.

FX2NC : The maximum connectable units is 4.
To connect the FX2N-4DA with the FX2NC main unit, FX2NC-CNV-IF is required.

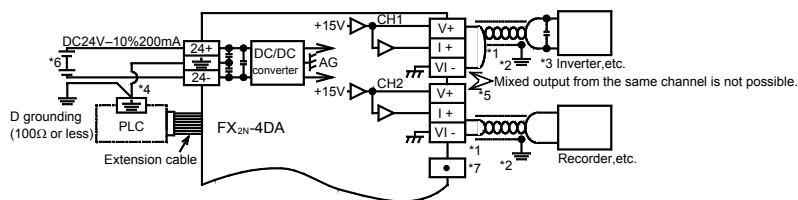
FX_{1N} : The maximum connectable units is 8.

FX0N : The maximum connectable units is 4.

*1 Up to 7 units can be connected to an FX3UC-32MT-LT PLC.

4. WIRING

The terminal layout shown below may differ from the actual layout. For the correct terminal layout, refer to section 2 External Dimensions and Parts.



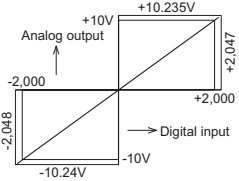
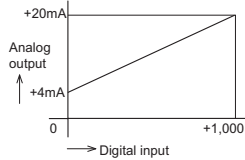
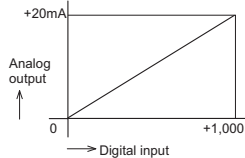
- *1: Use a twisted pair shielded cable for the analog output. This cable should be wired away from power lines or any other lines which could induce noise.
- *2: Apply 1-point grounding at the load side of the output cable (grounding: 100Ω or less).
- *3: If electrical noise or a voltage ripple exists at the output, connect a smoothing capacitor of 0.1 to 0.47μF, 25V.
- *4: Connect the  terminal on the FX2N-4DA with the  terminal on the main unit of the PLC.
- *5: Shorting the voltage output terminal or connecting the current output load to the voltage output terminal may damage the FX2N-4DA.
- *6: The 24V DC service power of the PLC can also be used.
- *7: Do not connect any unit to the unused terminal .

5. SPECIFICATIONS

5.1 General specifications

Item	Specification
General specifications	Same as those for the main unit
Dielectric withstand voltage	500V AC, 1min (between all terminals and ground)

5.2 Performance specification

Item	Centigrade	Fahrenheit
Analog output range	-10V DC to +10V DC (External load resistance: 2kΩ to 1MΩ).	DC 0mA to +20mA (External load resistance: 500Ω).
Digital input	16 bits, binary, with sign (Effective bits for numeric value: 11 bits and sign bit (1 bit))	16 bits, binary, with sign (Effective bits for numeric value: 10 bits)
Resolution	5mV (10V × 1/2000)	20μA (20mA × 1/1000)
Total accuracy	±1% (at full scale of +10V)	±1% (at full scale of +20mA)
Conversion speed	2.1ms for 4 channels (Change in the number of channels used will not change the conversion speed.)	
Isolation	Photo-coupler isolation between analog and digital circuits. DC/DC converter isolation of power from main unit. No isolation between analog channels.	
External power supply	24V DC ±10% 200mA	
Number of occupied I/O points	The analog block occupies 8 I/O points. (can be either inputs or outputs)	
Power consumption	5V, 30mA (Internal power supply from MPU or powered extension unit)	
I/O characteristics (Default: mode 0) Follow the procedure described in section 8 to change	Mode 0 (Voltage output: -10V to +10V) At load resistance of 10kΩ	Mode 1 (Current output: +4mA to +20mA) At load resistance of 250Ω
		
	Mode 2 (Current output: 0mA to +20mA) At load resistance of 250Ω	
	Command sent from the programmable controller can change the mode. The voltage/current output mode selected will determine the output terminals used.	

6. ALLOCATION OF BUFFER MEMORIES (BFM)

Data is transmitted between the FX2N-4DA and the main unit via buffer memories (16-bit 32-point RAM).

BFM	Description
#0 E	Output mode select. Factory setting H0000
#1	Output data (Signed 16 bits binary: actual value 11 bits + sign) #1: CH1, #2: CH2, #3: CH3, #4: CH4
#2	
#3	
#4	Data holding mode. Factory setting H0000
#5 E	
#6, #7	Reserved

Buffer memories marked "W" can be written to using the T0 instruction in the main unit.

The status of BFM #0, #5, and #21, (marked E) will be written to EEPROM, therefore the set values will be retained even after turning off the power.

- 1) [BFM #0] Output mode select: The value of BFM #0 switches the analog output between voltage and current on each channel. It takes the form of a 4 digit hexadecimal number. The first digit will be the command for channel 1 (CH1), and the second digit for channel 2 (CH2) etc. The numeric values of these four digits respectively represent the following items:

H 

- O = 0: Sets the voltage output mode (-10 V to +10 V).
O = 1: Sets the current output mode (+4 mA to 20 mA).
O = 2: Sets the current output mode (0 mA to +20 mA).

Switching the output mode resets the I/O characteristics to the factory-default characteristics. Refer to the performance specifications described in section 4.

Example: H2110

- CH1 : Voltage output (-10 V to +10 V)
CH2 and CH3 : Current output (+4 mA to +20 mA)
CH4 : Current output (0 mA to +20 mA)

- 2) [BFM #1, #2, #3 and #4]: Output data channels CH1, CH2, CH3, and CH4
BFM #1: Output data of CH1 (Initial value: 0) BFM #2: Output data of CH2 (Initial value: 0)
BFM #3: Output data of CH3 (Initial value: 0) BFM #4: Output data of CH4 (Initial value: 0)



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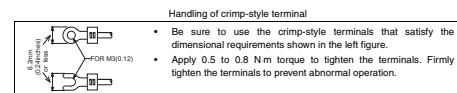
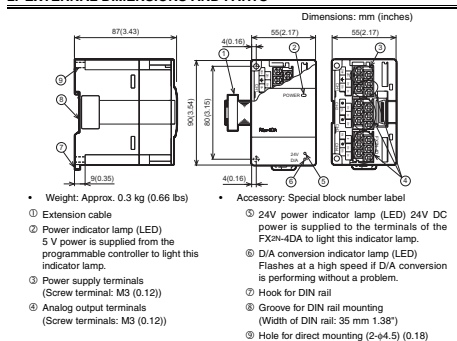
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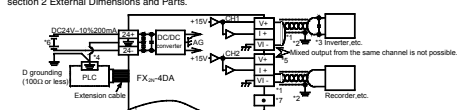
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	Digital input	Digital input

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H 0 0 0 0
CH4 CH3 CH2 CH1

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