FX2N-4DA SPECIAL FUNCTION BLOCK
USER'S GUIDE

This manual contains text, diagrams, and explanations that 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. Further information can be found in the FX PROGRAMMING MANUAL, FX2N SERIES HARDWARE MANUAL.

1 INTRODUCTION

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

2 EXTERNAL DIMENSIONS AND PARTS

- **Weight**: Approx. 0.3 kg (0.6 lb)
- **Power supply terminals**: 5 V power is supplied from the programmable controller to light this indicator lamp.
- **External Power Supply**: 24 V DC ±10%, 200 mA
- **Number of occupied I/O points**: 8 points from the FX2N-4DA analog special function block can be either inputs or outputs.
- **Power Consumption**: 30mA (Internal power supply from MPU or powered extension unit)

3 INSTALLATION AND WIRING

- **Digital input signals**: The digital input signals are for the D/A conversion. The output data of the FX2N-4DA is transmitted to the D/A converter.
- **Analog input signals**: The analog input signals are for the D/A conversion. The input voltage or current is converted to a digital value and transmitted to the MPU.

4 SPECIFICATIONS

- **Power supply**: 24 V DC ±10%, 200 mA
- **Number of occupied I/O points**: 8 points from the FX2N-4DA analog special function block can be either inputs or outputs.
- **Power consumption**: 30mA (Internal power supply from MPU or powered extension unit)
- **I/O characteristics**: Follow the procedure described in section 2 to change the I/O characteristics.
- **Command sent from the programmable controller**: The command sent from the programmable controller will change the mode of the voltage/current output mode selected will determine the output terminals used.

5 ALLOCATION OF BUFFER MEMORIES (BFM)

- **BFM #5**: Offset data setting command: Changes offset and gain values of channels CH1 through CH4 by writing 1 to the corresponding Hex digits of BFM #8 or #9. The current values will be valid until this command is output.
- **BFM #6**: Gain data setting command: Changes offset and gain values of channels CH1 through CH4 by writing 1 to the corresponding Hex digits of BFM #8 or #9. The current values will be valid until this command is output.
- **BFM #7**: Initialization: When K1 is written in BFM #20, all values will be initialized to the factory-settings.

---

This document provides a comprehensive guide for the FX2N-4DA analog special function block, covering its installation, wiring, specifications, and buffer memory allocation. It is essential for proper installation and operation, ensuring compatibility with the FX2N main unit and programmable controller. For detailed configurations and further technical specifications, consult the FX PROGRAMMING MANUAL and FX2N SERIES HARDWARE MANUAL.
INTRODUCTION

- The FX2N-4DA analog special function block has four output channels. The output channels take a digital value and output an equivalent analog signal. This is called a D/A conversion. The FX2N-4DA has maximum resolution of 12 bits (±625µV).
- The selection of voltage or current based output is by user wiring. Analog ranges of +10 to 10V DC (resolution: 5mV), or 0 to 20mA (resolution: 20µA) maybe selected independently for each channel.
- Data transfer between the FX2N and the FX2N-4DA main unit by is buffer memory exchange. There are 32 buffer memories (each of 16 bits) in the FX2N-4DA.
- The FX2N-4DA occupies 8 points of I/O on the FX2N expansion bus. The 8 points can be allocated from either inputs or outputs. The FX2N-4DA draws 30mA from the 5V rail of the FX2N main unit or powered extension unit.

**SPECIFICATIONS**

**Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>DC 24V ±10%</td>
</tr>
<tr>
<td>Input current</td>
<td>90mA</td>
</tr>
<tr>
<td>Operating environment</td>
<td>Temp. range: 0 to 55°C, Humidity: 90% or less</td>
</tr>
<tr>
<td>Storage environment</td>
<td>Temp. range: -25 to 85°C, Humidity: 93% or less</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Width: 2.1ms for 4 channels (Change in the number of channels used will not change the conversion speed.)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 0.3 kg (0.66 lbs)</td>
</tr>
<tr>
<td>Accessory: Special function block number label</td>
<td>Yes</td>
</tr>
<tr>
<td>Accessory: Special block number label</td>
<td>Yes</td>
</tr>
<tr>
<td>Additional buffer memory</td>
<td>No</td>
</tr>
<tr>
<td>Additional memory</td>
<td>No</td>
</tr>
<tr>
<td>Number of occupied I/O points</td>
<td>8 points from the data of the FX2N-4DA (either inputs or outputs)</td>
</tr>
</tbody>
</table>

**Electrical wiring**

- Use a twisted-pair shielded cable for the analog output. This cable should be twisted tightly without power lines or other lines which may cause noise.
- Apply 1-point grounding at the load side of the output cable (please refer to the specification for 1000µV or less).
- If electrical noise or a voltage ripple exists at the output, connect a smoothing capacitor of 0.1 to 0.47µF, 25V.

**Environmental specifications**

- Same as those for the FX2N main unit.
- Voltage: 50V AC, time: between all terminals and ground.

**Performance specifications**

- Analog output range: +10V to +10V DC (External load resistance: 250Ω). The FX2N-4DA draws 30mA from the 5V rail of the FX2N main unit or powered extension unit.
- Digital input: 16 bits, binary, with sign (Effective bits for numeric value: 11 bits and sign bit (1 bit)).
- Resolution: 1µA (20mA/1MΩ).
- Total accuracy: 1% (full scale of +10V). 1% (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: 1000V (AC 50Hz) between analog and digital inputs.
- DC-DC converter isolation of power from FX2N main unit.

**I/O characteristics**

- (Default: mode 0) Follow the procedure described in section 2 to change the mode.

**Connection to programmable controller**

- Various analog special function blocks are controlled by buffer memories marked "W". The status of BFM #4, #5, and #6, (marked E) will be written to EEPROM, therefore the set values will be retained even after turning off the power.

**Installation and 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.

**Delivery contents**

- FX2N-4DA analog special function block
- 4 digital input terminals
- 4 analog output terminals
- 16-bit, binary, with sign (Effective bits for numeric value: 11 bits and sign bit (1 bit)).
- Resolution: 1µA (20mA/1MΩ).
- Total accuracy: 1% (full scale of +10V). 1% (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: 1000V (AC 50Hz) between analog and digital inputs.
- DC-DC converter isolation of power from FX2N main unit.

**External dimensions and parts**

- Width: 100mm (3.94in)
- Depth: 56mm (2.20in)
- Height: 73mm (2.87in)
- Weight: 0.18kg (0.40lb)

**Environment**

- Temp. range: 0 to 55°C
- Humidity: 90% or less
**INTRODUCTION**

- The FX2N-4DA analog special function block has four output channels. The output channels take a digital value and output an equivalent analog signal. This is called a DA conversion. The FX2N-4DA has maximum resolution of 12 bits.
- The selection of voltage or current based output is by user wiring. Analog ranges of 10 to 10V DC (resolution: 5V/1000), or 0 to 20mA (resolution: 20µA) may be selected independently for each channel. Data transfer between the FX2N-4DA and the FX2N main unit is by buffer memory exchange. There are 32 buffers (each of 16 bits) in the FX2N-4DA.
- The FX2N-4DA occupies 8 points of I/O on the FX2N expansion bus. The 8 points can be allocated from either inputs or outputs. The FX2N-4DA draws 30mA from the 5V rail of the FX2N main unit or powered extension unit.

**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 wound 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 (close to 3, grounding 100Ω or less).
3. If an 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 control terminal of the programmable controller.
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 programmable controller can also be used.
7. Do not connect any unit to the unused terminal.

**ENVIROMENTAL SPECIFICATIONS**

- Operating environment: 0°C to 55°C (32°F to 131°F), 90% or less relative humidity (non-condensing).
- Storage environment: -20°C to 70°C (-4°F to 158°F), 90% or less relative humidity (non-condensing).
- Power supply: 24V DC, 100mA.
- Dimensions: 102 x 56 x 24 mm (4 x 2.2 x 0.9 in)
- Weight: Approx. 0.3 kg (0.65 lbs)

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog output range</td>
<td>10V DC to 10V DC (External output) 20VmV to 20VDC (External load resistance: 2kΩ to 1MΩ)</td>
</tr>
<tr>
<td>Digital input</td>
<td>16 bits, binary, with sign (Effective bits for numeric value: 11 bits and sign (bit 1))</td>
</tr>
<tr>
<td>Resolution</td>
<td>-20 bit (100µV)</td>
</tr>
<tr>
<td>Conversion speed</td>
<td>±0.05% (at full scale of 10V) ±0.1% (at full scale of ±20mA)</td>
</tr>
<tr>
<td>Isolation</td>
<td>±2000V (between analog and digital circuits) ±500V (between power supply and analog circuit) ±500V (between digital and analog circuits)</td>
</tr>
<tr>
<td>External power supply</td>
<td>24V DC ±10%, 200mA</td>
</tr>
</tbody>
</table>

**IO CHARACTERISTICS**

| IO characteristics (Default: mode 0) | Follow the procedure described in section 2 to change |
| Output mode | Command sent from the programmable controller changes the configuration of the voltage/current output mode selected will determine the output terminals used. |
| 0V | 0mA to +20mA |
| ±20V | ±20mA |
| D/A conversion indicator lamp (LED) | 24V power is supplied from the programmable controller to light this indicator lamp. |

**HALF-PAGE FEATURES:**

- The FX2N-4DA occupies 8 points of I/O on the FX2N expansion bus. The 8 points can be allocated from either inputs or outputs. The FX2N-4DA draws 30mA from the 5V rail of the FX2N main unit or powered extension unit.
- Power supply terminals: (Screw terminals: M3 (0.12))
- Analog output terminals: (Screw terminals: M3 (0.12))

**APPLICATION EXAMPLES:**

- Example: H0101 CH1 Voltage output (+10V to +10V) CH2 CH3 and CH4 Current output (+4mA to +20mA) CH5 Data holding mode: CH1 CH2 CH3 CH4 CH5 Output setting command: H0011 CH1 CH2 CH3 CH4 CH5 Output holding command: H0010 CH1 CH2 CH3 CH4 CH5
If the Fx2n-4da does not operate properly, check the following items:

1. Check the external wiring. Refer to section 3 of this manual.
2. Check the status of the POWER indicator lamp (LED) of the Fx2n-4da.
3. Check or confirm the connection of exter. On or off: Check connection of external conn. Also check the 5V power supply capacity.
4. Check status of the 24V power indicator lamp (LED) of the Fx2n-4da.
5. Check the status of the D/A conversion indicator lamp (LED) of the Fx2n-4da.
6. Check the external load resistance connected to each analog output terminal does not exceed the capacity of the Fx2n-4da. (Voltage output: 24V ±1% | current output: 50mA).
7. Check the output voltage or current using a voltmeter or ammeter, and confirm that the output meets the I/O characteristics. If the output does not meet the I/O characteristics, adjust the offset and gain again. Refer to section 8.

Guidelines for the safety of the user and protection of the Fx2n-4da special function block

- This manual has been written to be understood by trainee and competent personnel. This is defined by the European directive for machinery, low voltage and EMC.
- If doubt at any stage during the installation of the Fx2n-4da always consult a professional.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to provide legal advice. Mitsubishi Electric reserves the right to change the information as necessary.

Attention: The identification code for a special block is read using the FROM command. The identification code for the Fx2n-4da unit is K3020. The MPU can use this facility in the program to identify the specific block before commencing any data transfer from and to the special block.

CAUTION REGARDING OPERATION

1. Check whether the output wiring and/or expansion cables are properly connected on Fx2n-4da analog special function block.
2. Check that the Fx2n system configuration rules have not been broken, i.e. the number of blocks does not exceed 8 and the total system I/O is equal to or less than 256 I/O.
3. Ensure that the correct output mode has been selected for the application.
4. Check that there is no power overload on either the 5V or 24V power source, remember the loading on the Fx2n MPU or a powered extension unit varies according to the number of block/e special function block connected.
5. Put the main processing unit into RUN.
6. After turning on or off the 24V power for analog signals, the analog output may fluctuate for approximately 1 second. This is due to time delays in the power supply from the MPU or differences in start time. For this reason, be sure to take preventive measures so that this output fluctuation will not affect the external units.

Example of preventive measures:

- Use a relay to connect the 5V or 24V power supply after the Fx2n-4da is turned on or off.
- When X010 and X011 are on, transfer will not be executed, therefore the destination data value will not be changed.

ADJUSTMENT OF I/O CHARACTERISTICS

Adjustment of I/O Characteristics

To adjust the I/O characteristics, set the offset and gain of the Fx2n-4da either using push button switches connected to input terminals of the programmable controller or using the forced on/off function of a programming panel. To change the offset and gain, change the conversion constants of the Fx2n-4da. Mating of the analog input is not needed for adjustment, however a program should be created to test the results.

Operation procedure

1. Turn off the power of the MPU, and then connect the Fx2n-4da. After that, write the I/O lines of the Fx2n-4da.
2. Set the MPU to STOP, and turn on the power. Write the above program then switch the MPU to RUN.
3. Analog values will be sent from D2 (BFM #3), D3 (BFM #4), and D0 (BFM #1), D1 (BFM #2) to the respective output channels of the Fx2n-4da. When the MPU is in STOP, the analog values set before stopping the MPU will remain output. (The output will be held.)
4. When the MPU is in STOP, the offset values can also be output. For a detailed description, refer to Section 6.

The standard characteristics (factory default) are shown by the solid lines in the figure below. These characteristics can be adjusted according to the conditions of the user's system.

The standard characteristics (factory default) are shown by the solid lines in the figure below. These characteristics can be adjusted according to the conditions of the user's system.

Operation example

For the following program, CH1 and CH2 of the Fx2n-4da connected to special block position No. 1 are used as voltage output channels, CH3 as a current output channel (-10mA to +10mA), and CH4 as a current output channel (0mA to +20mA). When the MPU is in STOP, the output will be held. In addition, the status information is used.

Outline of FROM and TO commands:

For a detailed description, refer to the FX Programming Manual.

- From/(FROM)
  - FROM K1 K30 TO D4 K1
  - FROM M8002 TO K30 K1

- To/(TO)
  - TO K1 K30 K1
  - TO K1 K30 K1

Digital input

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

Analog input

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

Analog data cutoff circuit

- This circuit is used to cut off the analog data when the I/O characteristics are changed.

External analog unit

- This unit is used to connect an external analog unit to the Fx2n-4da analog special function block.
**ADJUSTMENT OF I/O CHARACTERISTICS**

The standard characteristics (factory default) are shown by the solid lines in the figure below. These characteristics can be adjusted according to the conditions of the user's system.

**ADJUSTMENT OF I/O CHARACTERISTICS**

- **Gain value**: Analog output value when the digital input is +7,000
- **Offset value**: Analog output value when the digital input is 0

When the slope of the I/O characteristic line is steep: Slight changes to the digital input will greatly increase or reduce the analog output.

When the slope of the I/O characteristic line is gentle: Slight changes to the digital input will not always change the analog output.

Note: The resolution (minimum possible change of analog output) of the FX2N-4DA is fixed.

**Outline of FROM and TO commands**

- **FROM**
  - m1: Special unit or block number (K0 to K7, numbered from the MPU)
  - m2: Buffer memory head address (K0 to K31)

- **TO**
  - n: Number of transfer points (K0 to K31 to K16 for 32-bit command)

**TROUBLESHOOTING**

- If the FX2N-4DA does not operate properly, check the following items:
  1. Check the external wiring. Refer to section 3 of this manual.
  2. Check the status of the POWER indicator lamp (LED) of the FX2N-4DA.

If the FX2N-4DA is turned off or is not properly powered, turn it on again. Also check the 5 V power supply capacity.

- Check status of the 24 V power indicator lamp (LED) of the FX2N-4DA.
  - Off: Supply 24 VDC to the FX2N-4DA.

If the FX2N-4DA is turned off, correct the 24 V power supply conditions. Also check the 5 V power supply capacity.

- Check the status and the D/A conversion indicator lamp (LED) of the FX2N-4DA.
  - Flash: S/A conversion is normal.

- Off: The ambient conditions are not suitable for the FX2N-4DA, or the FX2N-4DA is defective.

- Check the external load resistance connected to each analog output terminal does not exceed the capacity of the FX2N-4DA (I/O module voltage/current output). Specified value: 1 kΩ/5 mA.

- Check the output voltage or current value using a voltmeter or ammeter, and confirm that the output meets the I/O characteristics. If the output does not meet the I/O characteristics, adjust the offset and gain again. Refer to section 8.

Guidelines for the safety of the user and protection of the FX2N-4DA special function block

- This manual has been used to be written by trained and competent personnel. This is defined by the European directive for machinery, low voltage and EMC.

- If in doubt at any stage during the installation of the FX2N-4DA always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX2N-4DA please consult the nearest Mitsubishi Electric distributor.

- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric does not accept any responsibility for actual use of the product based on these illustrative examples.
If the FX-2N-4DA does not operate properly, check the following items.

① Check the external wiring. Refer to section 3 of this manual.
② Check status of the POWER indicator lamp (LED) of the FX-2N-4DA.
③ Check if off. Check connection of extension cable. Also check the 5 V power supply capacity.
④ Check status of the 24 V power indicator lamp (LED) of the FX-2N-4DA.
⑤ Check the status of the D/A conversion indicator lamp (LED) of the FX-2N-4DA.
⑥ Flash S/A conversion is normal.
⑦ Check off. The ambient conditions are not suitable for the FX-2N-4DA, or the FX-2N-4DA is defective.
⑧ Check that the external load resistance connected to each analog output terminal does not exceed the capacity of the FX-2N-4DA voltage output (2.0 mA) or current output (30 mA). Be sure to take preventive measures so that this output fluctuation will not affect the external units.
⑨ Check the output voltage or current value using a voltmeter or ammeter, and confirm that the output meets the I/O characteristics. If the output does not meet the I/O characteristics, adjust the offset and gain again. Refer to section 8.

Guidelines for the safety of the user and protection of the FX-2N-4DA special function block

This manual has been written to be used by trained and competent personnel. This is defined by the European directive for machinery, low voltage, and EMC.

If in doubt at any stage of the installation of the FX-2N-4DA always consult a professional electrical engineer who is qualified and trained to the local and national standards. If in doubt about the operation or use of the FX-2N-4DA please consult the nearest Mitsubishi Electric distributor.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to provide a practical demonstration. Mitsubishi Electric does not accept any responsibility for actual use of the product based on these illustrative examples.
**Introduction**

The FX2N-4DA analog special function block has four output channels. The output channels take a digital value and output an equivalent analog signal. This is called a DA conversion. The FX2N-4DA has a maximum resolution of 12 bits.

The selection of voltage or current based output is by user wiring. Analog ranges of 10 to 10V DC (resolution: 5V) and 0 to 20mA (resolution: 20µA) may be selected independently for each channel.

Data transfer between the FX2N-4DA and the FX2N main unit is by buffer memory exchange. There are 32 buffer memories (each of 16 bits) in the FX2N-4DA.

The FX2N-4DA occupies 8 points of I/O in the FX2N expansion bus. The 8 points can be allocated from either inputs or outputs. The FX2N-4DA draws 30mA from the 5V rail of the FX2N main unit or powered extension unit.

**Specifications**

- **IO points:** 8 points taken from the FX2N-4DA analog output bus (can be either inputs or outputs)
- **Power consumption:** 30mA (external power supply from MPU or powered extension unit)

**Environmental Specifications**

- Outdoor temperature: -10°C to 55°C
- Operation temperature: 0°C to 55°C
- Humidity: 85% or less
- Power supply: 24V DC ±10% 200mA

**Performance Specifications**

- **Analog output range:** 10V DC to 10V DC (External output) 0V DC to 20mA (External load resistance: 250Ω to 1000Ω)
- **Resolution:** 5V (50mA) or 10V (20mA)
- **Total accuracy:** ±1% (full scale of ±10V) ±1% (full scale of ±20mA)
- **Conversion speed:** 1µs (for 4 channels)

**Connection to Programmable Controller**

Various analog inputs controlled by buffer memories marked "I" can be written to using the TO instruction in the MPU. The status of BFM #5, #6, and #7 (marked E) will be written to EEPROM, therefore the set values will be retained even after turning off the power.

**Installation and Wiring**

- **Power supply:** 24V DC ±10% 200mA
- **IO points:** 8 points taken from the FX2N-4DA analog output bus (can be either inputs or outputs)

**In-Unit Memory Storage**

- **BFM #0:** Offset/gain setting command
- **BFM #1:** Output data (CH1) Initial value
- **BFM #2:** Output data (CH2) Initial value
- **BFM #3:** Output data (CH3) Initial value
- **BFM #4:** Output data (CH4) Initial value

- **BFM #5:** Data holding mode
  - When corresponding output data (BFM #5) is set, the offset and gain values will be automatically set to 0 and the gain data to +20,000.

- **BFM #6:** Offset/gain setting command
  - Changes offset and gain values of channels CH1 through CH4 by writing 1 to the corresponding hex digit of BFM #9 of #9.

- **BFM #7:** Offset/gain setting command
  - Changes offset and gain values of channels CH1 through CH4 by writing 0 to the corresponding hex digit of BFM #9 of #9.

**I/O Characteristics**

- **Input range:** 0 to 20mA
- **Output range:** -10V to +10V

**Specifications**

- **BFM Description**
  - **BFM #0:** Offset/gain setting command
  - **BFM #1:** Output data (CH1) Initial value
  - **BFM #2:** Output data (CH2) Initial value
  - **BFM #3:** Output data (CH3) Initial value
  - **BFM #4:** Output data (CH4) Initial value
  - **BFM #5:** Data holding mode

- **Connection to Programmable Controller**
  - Various analog inputs controlled by buffer memories marked "I" can be written to using the TO instruction in the MPU.

- **Buffer memories marked "W" can be written using the TI instruction in the MPU.

- **BFM #5:** Data holding mode
  - The status of BFM #5, #6, and #7 (marked E) will be written to EEPROM, therefore the set values will be retained even after turning off the power.

**External Dimensions and Parts**

- **Weight:** Approx. 0.3 kg (0.66 lbs)
- **External dimensions:** A (Width of DIN rail: 35 mm 1.38")

**User's Guide**

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. Further information can be found in the FX PROGRAMMING MANUAL, FX0 SERIES HARDWARE MANUAL.
If the Fx2n-4DA does not operate properly, check the following items:

1. Check the external wiring. Refer to section 3 of this manual.
2. Check status of the POWER indicator lamp (LED) of the Fx2n-4DA.
   - On or flashing: Check connection of extension cable. Also check the 5 V power supply capacity.
3. Check status of the 24 V power indicator lamp (LED) of the Fx2n-4DA.
   - Off: Supply 24 VDC (+10%) to the Fx2n-4DA.
   - Flash: S/A conversion is normal.
   - Off and flashing: The ambient conditions are not suitable for the Fx2n-4DA, or the Fx2n-4DA is defective.
4. Check that the external load resistance connected to each analog output terminal does not exceed the capacity of the Fx2n-4DA.
5. Check the output voltage or current using a voltmeter or ammeter, and confirm that the output meets the I/O characteristics. If the output does not meet the I/O characteristics, adjust the offset and gain again. Refer to section 5.
6. To test the withstand voltage of the Fx2n-4DA, connect all the terminals to the grounding terminal.

Guidelines for the safety of the user and protection of the Fx2n-4DA special function block

- This manual has been written to be used by trained and competent personnel. It is designed by the European Union for machinery, low voltage and EMC.
- If in doubt at any stage of the installation of the Fx2n-4DA always consult a professional electrical engineer who is qualified and trained in the local and national standards. If in doubt about the operation or use of the Fx2n-4DA please consult the nearest Mitsubishi Electric distributor.
- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as the result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not as an instruction to the reader. Mitsubishi Electric disclaims any responsibility for actual use of the product based on these illustrative examples.

If BFM #20 (the identification code for a special block) is read using the FRM0 command, the identification code for the Fx2n-4DA unit is K3020. The MPU can use this facility in the program to identify the special block before commencing any data transfer from and to the special block.

Note: BFM # is marked (E).:

- Values of BFM #0 to #5, and #30 (E) are stored in EEPROM memory of the Fx2n-4DA. BFM #0 to #17 are copied to EEPROM when the gain/offset setting command BFM #6 is used. Also, BFM #0 causes resetting of the EEPROM memory. The EEPROM has a life of about 10,000 cycles (changes), so do not use programs which frequently change these BFM.
- A mode change of BFM #0 automatically involves a change of the corresponding offset and gain values. Because of the time needed to write the new values to the internal EEPROM memory, a delay of 3 s is required between instructions changing BFM #0 and instructions writing to the corresponding BFM #0 through BFM #17.

Therefore, a delay time should be used before writing to BFM #0 through BFM #17.

Operation and Program Example

If the factory-set I/O characteristics are not changed and the status information is not used, you can operate the Fx2n-4DA using the following simple program. For the FRM0 and TO commands, refer to the FX Programming Manual. CH1 and CH2: Voltage output (+10 V to 10 V). CH3: Current output (+4 mA to +20 mA). CH4: Current output (0 mA to +20 mA).

Operation procedure

1. Turn off the power of the MPU, and then connect the Fx2n-4DA. After that, set the I/O lines of the Fx2n-4DA.
2. Set the MPU to STOP, and then turn on the power. Write the data above the program then switch the MPU to RUN.
3. Analog values will be sent from D0 (BFM #1), D1 (BFM #2), D2 (BFM #3), and D3 (BFM #4) to the respective output of the Fx2n-4DA. When the MPU is in STOP, the analog values set before stopping the MPU will remain output. (The output will be held.)
4. When the MPU is in STOP, the offset value can also be output. For a detailed description, refer to Section 5.

Program example

For the following program, CH1 and CH2 of the Fx2n-4DA are connected to special block position No. 1. They are used as voltage output channels. CH3 is a current output channel (+4 mA to +20 mA) and CH4 is a current output channel (0 mA to +20 mA). When the MPU is in STOP, the output will be held. In addition, the status information used is output.

<table>
<thead>
<tr>
<th>BFM</th>
<th>Name</th>
<th>Bit</th>
<th>Status when bit is set to “1” (turned on)</th>
<th>Status when bit is set to “0” (turned off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>b0</td>
<td>Error</td>
<td></td>
<td>Error if any of b1 through b4 is turned on</td>
<td>No error</td>
</tr>
<tr>
<td>b1</td>
<td>G/1G</td>
<td></td>
<td>G/1G error</td>
<td>Offset/Gain data normal</td>
</tr>
<tr>
<td>b2</td>
<td>Power supply</td>
<td></td>
<td>Power supply failure</td>
<td>Off</td>
</tr>
<tr>
<td>b3</td>
<td>Hardware error</td>
<td></td>
<td>Hardware error</td>
<td>Non-defective hardware</td>
</tr>
<tr>
<td>b4</td>
<td>Range error</td>
<td></td>
<td>The digital input/output value is outside the specified range.</td>
<td>The input/output value is in the specified range.</td>
</tr>
<tr>
<td>b5</td>
<td>A/G/O-problem status</td>
<td></td>
<td>BFM #20 is not set to “1”.</td>
<td>Adjustable status (BFM #21 = 1)</td>
</tr>
</tbody>
</table>

If setting is through b5 through b9, b13 through b15 are not defined.

BFM #21 (The identification code for a special block) is read using the FRM0 command. The identification code for the Fx2n-4DA unit is K3020. The MPU can use this facility in the program to identify the special block before commencing any data transfer from and to the special block.

Specifications are subject to change without notice.