Compliance with EC directives (CE Marking)

This machine is designed to meet all mandatory requirements of Directive 2006/95/EC (EMC) and Directive 2004/108/EC (LVD). To ensure the CE marking is present, the product shall be installed and used in accordance with the instructions given in the user’s manual. The product shall be installed in a dry, well-ventilated environment. The installation environment shall meet the following requirements:
- Ambient temperature: 0°C to 55°C
- Relative humidity: 5% to 95%
- Altitude: up to 2000 meters
- Pollution degree: 2

Requirement for Compliance with EMC directive

This machine is intended for use in a controlled environment where the maximum interference emission levels are the same as or lower than those specified in the Low Voltage Directive (LVD).

Attention

This machine is designed for use in industrial applications.

Specifications

- Power supply: 24V DC, 12V DC, 5V DC
- Current consumption: 0.12kA, 0.22kA, 1.5kA, 3.3kA
- Terminal block: JY997D36701
- Dimensions: DIN 46277, 35mm (1.38") width

Installation precautions

- Make sure to review the installation procedures thoroughly.
- Do not attempt to install or remove the machine without proper training.
- Always wear appropriate personal protective equipment.
- Ensure that the product is installed in a well-ventilated area.
- Do not install the product in an area where it will be exposed to direct sunlight.

2.2 Connection to the PLC

Connect the machine to the PLC using a 9-pin (1-key) D-sub connector conforming to MIL-C-83503. Use a connector that is compatible with the PLC to be connected. Make sure to refer to the PLC user’s manual for further details.

2.3 Wiring

1) Make sure to review the installation procedures thoroughly.
2) Do not attempt to install or remove the machine without proper training.
3) Always wear appropriate personal protective equipment.
4) Ensure that the product is installed in a well-ventilated area.
5) Do not install the product in an area where it will be exposed to direct sunlight.

4. Specifications

- Input: 5V DC, 12V DC, 24V DC
- Output: 0.12kA, 0.22kA, 1.5kA, 3.3kA
- Terminal block: JY997D36701
- Dimensions: DIN 46277, 35mm (1.38") width

4.3 Performance Specifications

- Input: 5V DC, 12V DC, 24V DC
- Output: 0.12kA, 0.22kA, 1.5kA, 3.3kA
- Terminal block: JY997D36701
- Dimensions: DIN 46277, 35mm (1.38") width

4.4 Application

- Power supply: 24V DC, 12V DC, 5V DC
- Current consumption: 0.12kA, 0.22kA, 1.5kA, 3.3kA
- Terminal block: JY997D36701
- Dimensions: DIN 46277, 35mm (1.38") width

CAUTION

- Do not install the product in an area where it will be exposed to direct sunlight.
- Ensure that the product is installed in a well-ventilated area.
- Always wear appropriate personal protective equipment.

Mitsubishi Electric Corporation

FX3U-2HC

Manual No.

User’s Manual

FX3U Series

*1. The version number can be checked by reading the last three digits of the machine number.

*2. Up to two special function units/blocks in total can be connected to the machine.

*3. If the version number is lower than 001, contact Mitsubishi Electric for further information.

*4. For further information on installation arrangements, refer to the following manuals:

- "The MELSEC iQ-F FX5UC User’s Manual (Hardware)"
- "The MELSEC iQ-F FX5UC User’s Manual (Software)"
- "The MELSEC iQ-F FX5UC User’s Manual (Manual)"

*5. The company names, system names and product names mentioned in this manual may be subject to change without notice.

*6. Specifications are subject to change without notice.

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*5. The company names, system names and product names mentioned in this manual may be subject to change without notice.

*6. Specifications are subject to change without notice.
Compliance with EC directives (CE Marking)

This product does not guarantee that all electronic module products are identical. The electronic module can be used on the basis of the following standards:

- EN 61508:2010
- EN 61730-2-1
- IEC 61508:2010
- IEC 61158-7-2
- EN 61158-6-2

Requirements for Compliance with EMC directive

The equipment shown in the diagram: The product is tested through testing of the identified product. The product must be certified before being labeled with the CE Mark in accordance with the Electromagnetic Compatibility (EMC) Directive (2014/30/EU)

Attention

This product is designed for use in industrial applications.

Type: Programmable Controller (Open Type Equipment)

Model: FX3U-2HC

Area voltage: 24 V DC*1

Precautions

1.1 Outline

The FX3U-2HC has two outputs per output. When the counter value coincides with the output value, the corresponding output is set on. This output is driven at the setting frequency of 0.7 to 10 kHz (0.2 kHz to 1 kHz for 24V DC and 0.22kHz to 1.5 kHz for 5V DC). No output is set if the output value is greater than the SET value. The output value is changed by pressing the SET button, and this output is set on.

1.2 Differentiators

Solderless contact: HU-400S, (Made by DDK Ltd.)

1.3 Outline

Housing: HU-400S2-001

1.4 External Dimensions, Pin Names, and Terminal Layout

1.5 Precautionary Notes

• Power frequency magnetic field
• High-energy surge (ESD)

2. Installation, Connect to the PLC

2.1 Connection to Input/Output Connectors

- 3.5 Input terminals, 3.6 Input terminals, 3.7 Input terminals, 3.8 Input terminals

3. Wiring

3.1 Wiring:


3.2 Wiring

Make sure the wiring diagram (Fig. A) onto the DIN rail.

4. Specifications

4.1 General Specifications

4.2 Power Supply Specifications

Units: V (DC) for 24V DC power supply, A (DC) for 24V DC power supply.

4.3 Performance Specifications

5. Application

5.1 Application

- 5.1.1 DIN Rail Mounting

6. Installation Precautions

- 6.1 Installation Precautions

7. Troubleshooting

8. Appendix

9. Glossary
5. Buffer Memories (BFM)

5.1 Buffer memory List

- When using a 32-bit FROM/TO instruction (BFM #29 to #34), set the two-byte data to be written into BFM #29 as 4-byte data.

Note:
- The usage of a 32-bit FROM/TO instruction is recommended.
- Depending on the instruction used, the execution time of the instruction may vary.
- Be sure to check the timing requirements before using the instruction.
- All bit references are little endian.

5.2.1 Counter module (BFM #25, #24) [Special function block No. 11]

- bit counter places the current value on the counter register.

5.2.2 Ring counter (BFM #15, #55) [Upper R/W]

- The counter can be used for counting up to 16384.

5.2.3 Counter mode (BFM #1, #41) [BFM #0 BFM #40]

- The counter mode is shown in the upper right table. (Default value: K0)

5.2.4 Command (BFM #4, #44) [Lower R/W]

- The identification number for the FX3U-2HC unit is K4020.

5.2.5 Error status in the FX3U-2HC can be checked by reading the contents of b0 to b15

- The error status is shown in the lower right table.

5.2.6 Data processing program

- The following programs are the examples of error processing.

5.2.7 Counter current code (BFM #1, #20, #21, #22, #23, #24)

- The currently available counter code is that showing the code in the upper right table. (Default value: K0)

5.2.8 Maximum count value (BFM #5, #23, #24, #25, #26, #27)

- The maximum count value is shown in the upper right table. (Default value: K65536)

5.2.9 Terminal value (BFM #7, #15, #16, #18, #19)

- The terminal value is shown in the upper right table. (Default value: K65536)

6. Example Program

Please refer to the following program as a guide whenever you use the FX3U-2HC unit.

- These programs are the examples of error processing.

7. Preliminary checks

1) Check that the I/O wiring and extension cable of the FX3U-2HC are properly connected and that the relay contacts are functioning correctly.

2) Please use the two-byte data to be written into BFM #29 as 4-byte data.

3) Be sure to check the timing requirements before using the instruction.

8. Diagnostics

- MITSUBISHI ELECTRIC CORPORATION

9. Reference (CH1 System Block Diagram)
5. Buffer Memories (BFM)

5.1 Buffer Memory List

<table>
<thead>
<tr>
<th>Buffer Memory</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFM 10-48</td>
<td>16-bit counter output</td>
<td>-</td>
</tr>
<tr>
<td>BFM 50-67</td>
<td>8-bit counter output</td>
<td>-</td>
</tr>
<tr>
<td>BFM 68-125</td>
<td>32-bit counter output</td>
<td>-</td>
</tr>
<tr>
<td>BFM 126-192</td>
<td>16-bit counter input</td>
<td>-</td>
</tr>
<tr>
<td>BFM 193-255</td>
<td>8-bit counter input</td>
<td>-</td>
</tr>
</tbody>
</table>

5.2 Buffer Memory Access

5.2.1 Counter mode (BFM 80-CH1, 88-CH2)

- Set the counter mode by using the TO instruction.
- For more information, refer to the Subsection 5.2.1.7.

5.2.2 Ring length (BFM 83, 86, 93, 96)

- The ring length is set using the TO instruction.
- If the ring length is exceeded, the counter value is reset.
- For more information, refer to the Subsection 5.2.1.7.

5.2.3 Comparison value (BFM 81, 91, 89, 99)

- The comparison value is set using the TO instruction.
- The comparison value is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.4 Counter current value (BFM 21, 20, 61, 60)

- The current value is set using the TO instruction.
- The current value is compared with the comparison value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.5 Data store (BFM 90, 92, 93, 94)

- The data store is set using the TO instruction.
- The data store is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.6 Count up/down (BFM 22, 23, 24, 25)

- The count up/down is set using the TO instruction.
- The count up/down is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.7 Counter enable (BFM 82, 90, 88, 97)

- The counter enable is set using the TO instruction.
- The counter enable is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.8 Maximum count value (BFM 84, 92, 89, 95)

- The maximum count value is set using the TO instruction.
- The maximum count value is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.9 Counter compare value (BFM 81, 91, 89, 99)

- The counter compare value is set using the TO instruction.
- The counter compare value is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

5.2.10 Error status (BFM 29)

- The error status is set using the TO instruction.
- The error status is compared with the current value.
- For more information, refer to the Subsection 5.2.1.7.

6. Example Program

<table>
<thead>
<tr>
<th>Step Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Read the current value of CH1 and CH2.</td>
</tr>
<tr>
<td>2</td>
<td>Set the counter mode to the desired mode.</td>
</tr>
<tr>
<td>3</td>
<td>Set the ring length to the desired value.</td>
</tr>
<tr>
<td>4</td>
<td>Set the comparison value to the desired value.</td>
</tr>
<tr>
<td>5</td>
<td>Set the data store to the desired value.</td>
</tr>
<tr>
<td>6</td>
<td>Set the count up/down to the desired value.</td>
</tr>
<tr>
<td>7</td>
<td>Set the counter enable to the desired value.</td>
</tr>
<tr>
<td>8</td>
<td>Set the maximum count value to the desired value.</td>
</tr>
<tr>
<td>9</td>
<td>Set the counter compare value to the desired value.</td>
</tr>
<tr>
<td>10</td>
<td>Set the error status to the desired value.</td>
</tr>
</tbody>
</table>

Note: This example is written for CH1 and CH2 only.

For more information, refer to the Subsection 5.2.1.7.

Reference (CH1 System Block Diagram)

This manual contains no industrial property rights of any kind, and this product has been manufactured under strict quality control. However, Mitsubishi Electric Corporation shall not be held responsible for any problems involving industrial property rights which may arise as a result of using the customer-made control system.

MITSUBISHI ELECTRIC CORPORATION

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

For safe use

* This product has been manufactured as a general-purpose product for general industries, and has not been designed or manufactured to be incorporated in nuclear power, electric power, aerospace, medicine or passenger movement vehicles, or utilized in applications requiring extremely high reliability of safety, precision, reliability or passenger's safety, cannot be used for such purposes.

* This product has been manufactured under strict quality control as a general-purpose product for general industries. However, Mitsubishi Electric Corporation shall not be held responsible for any problems involving industrial property rights which may arise as a result of using the customer-made control system.
Compliance with EC directives (CE Marking)

This product complies with all the applicable directives. Please check the specifications of the product before use, read the manual and the manuals of all other products as necessary. For the latest information, please visit the Mitsubishi Electric website.

If any product is to be used in an environment that is subject to severe conditions, such as in cases of high temperature, humidity, vibration, or shock, or where corrosion or erosion is likely to occur, the customer must make sure to consult the Mitsubishi Electric dealer or representative in advance.

The company names, system names and product names mentioned in this manual are for reference purposes only and do not indicate any claims to ownership or license rights.

1. Specifications

1.1 General Specifications

- Programmable Controller Type
- User's Manual
- MELSEC iQ-F FX5U
- Instruction Edition

1.2 Major Features of the FX 3U-2HC

- Function Block (FB) for I/O expansion
- User-defined functions
- Built-in memory (16k words)
- High-speed input/output processing
- High-speed counter
- Timer
- Pulse generator
- Support for 3-axis motor control

1.3 Specifications

- Power Supply Specifications
  - AC 100V to 240V, 50/60Hz
  - DC 24V
- Current Consumption
  - Main Unit: 3.5A (when all I/O points are active)
  - Extension Unit: 0.5A (when all I/O points are active)
- Ambient Temperature Range
  - -10°C to 55°C
- Humidity Range
  - 90% RH or less (non-condensing)
- Operating Environment
  - Benoni, Panama, and other areas of harsh environments

2. Installation, Connect to the PLC

2.1 Connection to the PLC

- For connection to an FX3UC Series PLC or FX2NC Series PLC, an FX2NC-CNV-IF or FX3UC-1PS-5V is required.
- For connection to an FX5U or FX5UC PLC, an FX5-CNV-BUS or FX5-CNV-BUSC is necessary to connect the FX 3U-2HC to the PLC.

2.2 Wiring

- Wiring of the wiring phase is necessary so that it is less than 10 meters to allow the controller to function properly.
- Wiring of the wiring phase is necessary so that it is less than 10 meters to allow the controller to function properly.

3. Wiring

3.1 Connection to input/output connectors

- For connection to FX3U, FX5UC, or FX3UC Series PLCs, refer to section 1.4.1
- For connection to FX5U or FX5UC PLCs, refer to section 1.4.2
- For connection to FX3UC Series PLCs, refer to section 1.4.1

4. Specifications

4.1 General Specifications

- Power Supply Specifications
  - AC 100V to 240V, 50/60Hz
  - DC 24V
  - Current Consumption
    - Main Unit: 3.5A (when all I/O points are active)
    - Extension Unit: 0.5A (when all I/O points are active)
  - Ambient Temperature Range
    - -10°C to 55°C
  - Humidity Range
    - 90% RH or less (non-condensing)
  - Operating Environment
    - Benoni, Panama, and other areas of harsh environments

4.2 Power Specifications

- Time Specifications
  - Units (driving power) power supply status
    - Main supply (24V DC)
    - Extension supply (24V DC)

5. Precautions

- When a dielectric withstand test of this product is performed, ground all terminals of the PLC to the cabinet to prevent electrical shock.
- When using 24V DC for PRESET or DISABLE signals, connect to the 24V power source. Do not use 5V DC.
- Do not bundle the main circuit line together with or lay it close to the main control line, including connector covers.
- Our model and our model's wiring are not suited for high-frequency power line. As a guideline, lay the control line at least 100mm (3.94") or more from the main control line.
- The grounding wire size should be AWG 22-20 (0.3-0.5 mm²).
- The grounding wire should be AWG 22-20 (0.3-0.5 mm²). The grounding wire should be AWG 22-20 (0.3-0.5 mm²).
5. Buffer Memories (BFM)

5.1 Buffer memory List

<table>
<thead>
<tr>
<th>No.</th>
<th>BFM No.</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BFM 0</td>
<td>Top command</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>BFM 1</td>
<td>Count permit</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>BFM 2</td>
<td>Count direction</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>BFM 3</td>
<td>Count direction</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>BFM 4</td>
<td>Preset value</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>BFM 5</td>
<td>Preset prohibit</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>BFM 6</td>
<td>Compare value</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>BFM 7</td>
<td>Compare value</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>BFM 8</td>
<td>Compare value</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>BFM 9</td>
<td>Compare value</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>BFM 10</td>
<td>Next compare value</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>BFM 11</td>
<td>Next compare value</td>
<td>0</td>
</tr>
</tbody>
</table>

5.2 Control mode settings (BFM 0)

- **Counter mode**
  - **BFM 0 bit 30**: Set when the comparison value is written. (1000) counts upward, (0001) counts downward.
  - **BFM 0 bit 31**: Set when the count direction is switched.

5.3 Counting mode registers (BFM 1, 2, 3)

- **BFM 1**: Upper 16 bits of the current value.
- **BFM 2**: Upper 16 bits of the next compare value.
- **BFM 3**: Lower 16 bits of the current value.
- **BFM 4**: Lower 16 bits of the next compare value.

5.4 Count value registers (BFM 5, 6, 7, 8)

- **BFM 5**: Upper 16 bits of the compare value.
- **BFM 6**: Lower 16 bits of the compare value.
- **BFM 7**: Upper 16 bits of the compare value.
- **BFM 8**: Lower 16 bits of the compare value.

5.5 Compare set value registers (BFM 9, 10, 11)

- **BFM 9**: Upper 16 bits of the next compare value.
- **BFM 10**: Lower 16 bits of the next compare value.

5.6 Set value registers (BFM 12, 13, 14, 15)

- **BFM 12**: Upper 16 bits of the preset value.
- **BFM 13**: Lower 16 bits of the preset value.
- **BFM 14**: Upper 16 bits of the compare value.
- **BFM 15**: Lower 16 bits of the compare value.

5.7 Counter comparison registers (BFM 16, 17, 18, 19)

- **BFM 16**: Upper 16 bits of the preset value.
- **BFM 17**: Lower 16 bits of the preset value.
- **BFM 18**: Upper 16 bits of the compare value.
- **BFM 19**: Lower 16 bits of the compare value.

5.8 Error status registers (BFM 20, 21, 22, 23)

- **BFM 20**: Upper 16 bits of the error status.
- **BFM 21**: Lower 16 bits of the error status.
- **BFM 22**: Upper 16 bits of the error status.
- **BFM 23**: Lower 16 bits of the error status.

5.9 Other registers (BFM 24, 25, 26, 27, 28)

- **BFM 24**: Upper 16 bits of the other register.
- **BFM 25**: Lower 16 bits of the other register.
- **BFM 26**: Upper 16 bits of the other register.
- **BFM 27**: Lower 16 bits of the other register.
- **BFM 28**: Upper 16 bits of the other register.

5.10 Setting value registers (BFM 29)

- **BFM 29**: Upper 16 bits of the setting value.
- **BFM 30**: Lower 16 bits of the setting value.

6. Example Program

Please refer to the appendices for a guide whenever you use the FX2N-2HC unit. Other instructions to read the current value of the counter status can be added in the program as needed.

7. Preliminary checks

1) Check that the CH1 wiring and connection of the CH1-PLC are properly connected.
2) Set the PLC to RUN mode.
3) Press the PLC RUN switch to enter the RUN mode.
4) Check that the PLC is properly powered.
5) Check that the PLC is properly connected to the computer.

8. Diagnostics

**WARNING**

- Do not disassemble or repair the product. This may result in a malfunction.
- Do not touch the product during use.

9. Reference (CH1 System Block Diagram)

- For the PLC specifications, refer to the Mitsubishi FX2N Series PLC manual.