2. WIRING

**PNP output encoders**

- **Phase A**
  - **Input 1**
    - **1 edge count**
      - **Signal level**
        - **50 Hz**
      - **Pulse shape**
        - **MAX. frequency**
        - **25 kHz**
        - **12.5 kHz**
      - **Output**
        - **Input 2**
          - **2 edge count**
            - **4 edge count**
  - **Phase B**
    - **Input 1**
      - **Output**
        - **Input 2**
          - **2 edge count**
            - **4 edge count**

### 3. SPECIFICATIONS

#### 3.1 General specifications

- **Performance specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-phase input</td>
<td>2-edge input</td>
</tr>
<tr>
<td>Input signal</td>
<td>Signal level</td>
</tr>
<tr>
<td>MAX. frequency</td>
<td>50 kHz</td>
</tr>
<tr>
<td>Pulse shape</td>
<td>25 kHz</td>
</tr>
<tr>
<td>12.5 kHz</td>
<td></td>
</tr>
</tbody>
</table>

**Counting specification**

- **Format**
  - Automatic UP/DOWN: when the input mode is UP/DOWN, the output is determined by a PLC command.
  - 16-bit counter: when the input mode is 16-bit, the output is determined by the contents of the PLC.
- **Range**
  - When 32-bit is specified: 2,147,483,648 to +2,147,483,647
  - When 16-bit is specified: 65,535 (upper limit can be specified)
- **Comparison Type**
  - Each output is set when the present value of the counter matches with the compare value (which is transferred from the PLC), and is switched OFF by a reset command from the PLC.
  - **Output**
    - **Input 1**
      - **Output capacity**
      - **Occupancy**
      - **Input 2**
        - **Output capacity**

### 3.2 Performance specifications

- **1-phase input**
  - **2-edge input**
    - **1 edge count**
      - **4 edge count**
      - **Input signal**
        - **Signal level**
        - **50 Hz**
      - **Pulse shape**
        - **MAX. frequency**
        - **25 kHz**
        - **12.5 kHz**
      - **Output**
        - **Input 2**
          - **2 edge count**
            - **4 edge count**

**Counting specification**

- **Format**
  - Automatic UP/DOWN: when the input mode is UP/DOWN, the output is determined by a PLC command.
  - 16-bit counter: when the input mode is 16-bit, the output is determined by the contents of the PLC.
- **Range**
  - When 32-bit is specified: 2,147,483,648 to +2,147,483,647
  - When 16-bit is specified: 65,535 (upper limit can be specified)
- **Comparison Type**
  - Each output is set when the present value of the counter matches with the compare value (which is transferred from the PLC), and is switched OFF by a reset command from the PLC.
  - **Output**
    - **Input 1**
      - **Output capacity**
      - **Occupancy**
      - **Input 2**
        - **Output capacity**

### 3.3 Buffer memories (BFM)

- **BFM 01 Counter mode (K1 to K11)**
  - **Count mode**
    - **2 edge input**
      - **1 edge count**
        - **2 edge count**
          - **4 edge count**
  - **BFM 02 Input (Both inputs)**
    - **Input 1**
      - **Input 2**
        - **Input signal**
          - **Signal level**
          - **50 Hz**
        - **Pulse shape**
          - **MAX. frequency**
          - **25 kHz**
          - **12.5 kHz**
        - **Output**
          - **Input 2**
            - **2 edge count**
              - **4 edge count**

**BFM 01 Buffer memories (K0 to K11)**

- **BFM 02 Buffer memories (K0 to K11)**
  - **Hardware UP/DOWN (K0, K9)**
  - **Software UP/DOWN (K0, K10)**

**BFM 02 Buffer memories (K0 to K11)**

- **BFM 03 Buffer memories (K0 to K11)**
  - **Hardware UP/DOWN (K0, K9)**
  - **Software UP/DOWN (K0, K10)**

**BFM 03 Buffer memories (K0 to K11)**

- **BFM 04 Buffer memories (K0 to K11)**
  - **Hardware UP/DOWN (K0, K9)**
  - **Software UP/DOWN (K0, K10)**
1. INTRODUCTION

The FX2N-1HC, FX2NC, FX3U, FX3UC series PLC has a special function block called FX2N-1HC. The FX2N-1HC occupies 8 points of I/O on the FX2N, FX2NC, FX3U, FX3UC expansion bus. The 8 points are available as inputs and outputs for a FX2N-1HC special function block, which is dedicated to high-speed counting operations.

Further information can be found in the FX PROGRAMMING MANUAL and FX 2N, FX2NC, FX3U, FX3UC SERIES HARDWARE MANUAL.

Additional details are also available in the FX USER’S GUIDE.

2. WIRING

- **Differential-Line-Driver output encoders**
  - Power supply for output 5V DC 90mA (Internal power supply from main unit or powered extension unit).
  - Input signal: 5V DC 20mA (Input signal current)
  - Pulse shape: NPN, PNP
  - Differential-Line-Driver output encoders (AM2D3031 or equivalent) and open collector output encoders are available for the FX2N-1HC.
  - When the source output signal is input to a differential-line encoder, the output signals are in phase (PHASE A, PHASE B).

- **6-bit/16-bit counting**
  - Counting range: 0 to 5,117,651 for 6-bit, 0 to 65,535 for 16-bit.
  - UP/DOWN mode: 1-phase 1-input mode or 1-phase 2-input mode.
  - Counting modes: UP, DOWN, UP/DOWN, ADD, SUBTRACT.

3. SPECIFICATIONS

3.1 General specifications

- **Performance specifications**
  - General specifications (excluding the following) Same as those for the FX 2N main unit.
  - Pulse shape: NPN, PNP
  - Differential-Line-Driver output encoders (AM2D3031 or equivalent) and open collector output encoders are available for the FX2N-1HC.
  - Counting range: 0 to 5,117,651 for 6-bit, 0 to 65,535 for 16-bit.
  - UP/DOWN mode: 1-phase 1-input mode or 1-phase 2-input mode.
  - Counting modes: UP, DOWN, UP/DOWN, ADD, SUBTRACT.

- **Input specifications**
  - Phase A, Phase B, PRESET, DISABLE (XP24), (XD24) • Grounded terminal
  - Phase A, Phase B, PRESET, DISABLE (XP24), (XD24) • Connected with output
  - Pulse shape: NPN, PNP
  - Differential-Line-Driver output encoders (AM2D3031 or equivalent) and open collector output encoders are available for the FX2N-1HC.
  - Counting range: 0 to 5,117,651 for 6-bit, 0 to 65,535 for 16-bit.
  - UP/DOWN mode: 1-phase 1-input mode or 1-phase 2-input mode.
  - Counting modes: UP, DOWN, UP/DOWN, ADD, SUBTRACT.

4.3 Buffer memories (BFM)

- **BFM #0 (00H, 01H)**
  - Hardware UP/DOWN (K8, K9)
  - Software UP/DOWN (K10, K11)

- **BFM #1 (02H, 03H)**
  - 1-phase 2-input (add/subtract pulse) K6 K7
  - 2-phase counter (K0 to K5)

- **BFM #2 (04H, 05H)**
  - 1-phase 1-input counter (K8 to K11)
  - 16-bit binary counter handles only positive values from 0 to 65,535.

- **BFM #3 (06H, 07H)**
  - 16-bit binary counter handles only positive values from 0 to 65,535.
  - Changes to the upper limit value from the lower limit value to the upper limit value.

- **BFM #4 (08H, 09H)**
  - UP/DOWN command (1-phase 1-input mode)
  - Write / Read (BFM #1, #2, #3)

- **BFM #5 (0AH, 0BH)**
  - UP/DOWN command (1-phase 2-input mode)
  - Write / Read (BFM #1, #2, #3)

- **BFM #6 (0CH, 0DH)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #7 (0EH, 0FH)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #8 (10H, 11H)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #9 (12H, 13H)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #10 (14H, 15H)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #11 (16H, 17H)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #12 (18H, 19H)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #13 (1AH, 1BH)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #14 (1CH, 1DH)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

- **BFM #15 (1EH, 1FH)**
  - UP/DOWN command (2-phase input)
  - Write / Read (BFM #1, #2, #3)

5. Pulling the wiring diagram from the FX2N manual for more detailed information.
FX2N-1HC SPECIAL FUNCTION BLOCK

USER'S GUIDE

JY92206401H

1. INTRODUCTION
The hardware high-speed counter block is a 2-phase 10 kHz high-speed counter. It is a special function block for the FX2N, FX2NC, FX3U, FX3UC expansion bus. The 8 points FROM/TO instruction transfers the PLC data (i.e. parameters, comparing value and present value).

Further information can be found in the FX PROGRAMMING MANUAL and FX 2N, FX2NC, FX3U, FX3UC SPECIAL FUNCTION BLOCKS.

2. WIRING

2.1 Connection diagram

A LED
B terminal (M3 (0.12) screws)

3. SPECIFICATIONS

3.1 General specifications

Perform the dielectric withstand voltage test between the GND terminal and all the other terminals short-circuited.

3.2 Performance specifications

Item
1-phase input
2-phase input

<table>
<thead>
<tr>
<th>Input signal</th>
<th>1-phase input</th>
<th>2-phase input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal level</td>
<td>50 Hz</td>
<td>25 kHz</td>
</tr>
<tr>
<td>Pulse shape</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

4. Troubleshooting

If the software UPDOWD count value is more than the upper limit value, the counter value will overflow.

5. Settings

The counter mode is selected from the PLC. As shown below, values between K0 and K11 are written to the memory of the PLC. When a value is written, the contents of the PLC will be set to actual values. If using on NPN output encoder please take care to match the polarity of the terminals of the encoder to those of the FX2N-1HC.

The following settings are performed to set the counter mode:

1) BFM #0 Counter mode (K0 to K11)

Contents

For more information, please refer to the FX PROGRAMMING MANUAL and FX 2N, FX2NC, FX3U, FX3UC SPECIAL FUNCTION BLOCKS.

Note: The FX2N-1HC occupies 8 points of I/O on the FX2N, FX2NC, FX3U, FX3UC expansion bus. The 8 points are used to transfer the PLC data (i.e. parameters, comparing value and present value).

The hardware high-speed counter block is a 2-phase 50 kHz high-speed counter. It is a special function block for the FX2N, FX2NC, FX3U, FX3UC expansion bus. The 8 points can be allocated to either inputs or outputs.

The source of the input signal should be a 1 or 2-phase encoder. A 5V, 12V, or 24V power source can be used. An analog input command input (FX:SET) and a counter prohibited command input (BFM#0) are also available.

The FX2N-1HC has two outputs. When the counter value coincides with an output comparison value, the accessible outputs will be 0. The output transitions are arbitrarily triggered so that either output of the block will be activated.

Various counter modes, such as 1-phase or 2-phase, 16-bit or 32-bit, can be selected using commands from the PLC. The FX2N-1HC unit is used only after setting these mode parameters.

1.1 External dimensions

Mass (length): Approx. 0.3 kg (6.6 lb)
Dimensions: mm (inches)

Accessories: On the instruction sheet special block number identification.

2.2 Performance specifications

Item
1-phase input
2-phase input

<table>
<thead>
<tr>
<th>Format</th>
<th>Automatic UP/DOWN (when on 2-phase input mode, UP/DOWN is determined by a PLC command or an input terminal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>When 32-bit is used: K-2,147,483,648 to +2,147,483,647</td>
</tr>
<tr>
<td></td>
<td>When 16-bit is specified: K-32,768 to +32,767 (upper limit is 2,147,483,647)</td>
</tr>
</tbody>
</table>

3.3 Buffer memories (BFM)

<table>
<thead>
<tr>
<th>BFM#0</th>
<th>Counter mode (K0 to K11)</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>#30</td>
<td>Model identification code K4010</td>
<td></td>
</tr>
<tr>
<td>#29</td>
<td>Error status</td>
<td></td>
</tr>
<tr>
<td>#26</td>
<td>Compare results</td>
<td></td>
</tr>
<tr>
<td>#25</td>
<td>Minimum count value</td>
<td></td>
</tr>
<tr>
<td>#24</td>
<td>Maximum count value</td>
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<td>#23</td>
<td>#22 Maximum count value</td>
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<tr>
<td>#1</td>
<td>Maximum count value</td>
<td></td>
</tr>
<tr>
<td>#0</td>
<td>Maximum count value</td>
<td></td>
</tr>
</tbody>
</table>

4. Troubleshooting

If both phase A and phase B inputs are received at the same time, the counter value will overflow.

5. Settings

The counter mode is selected from the PLC. As shown below, values between K0 and K11 are written to the memory of the PLC. When a value is written, the contents of the PLC will be set to actual values. When setting this value use a TOP (pulsed) instruction use BFM0002 (initial pulse) to drive the TO reduction. A continuous command is not allowed.

1) BFM #0 Counter mode (K0 to K11), BFM #1 DOWN command

Contents

For more information, please refer to the FX PROGRAMMING MANUAL and FX 2N, FX2NC, FX3U, FX3UC SPECIAL FUNCTION BLOCKS.

Note: The FX2N-1HC occupies 8 points of I/O on the FX2N, FX2NC, FX3U, FX3UC expansion bus. The 8 points can be allocated to either inputs or outputs.

The source of the input signal should be a 1 or 2-phase encoder. A 5V, 12V, or 24V power source can be used. An analog input command input (FX:SET) and a counter prohibited command input (BFM#0) are also available.

The FX2N-1HC has two outputs. When the counter value coincides with an output comparison value, the accessible outputs will be 0. The output transitions are arbitrarily triggered so that either output of the block will be activated.

Various counter modes, such as 1-phase or 2-phase, 16-bit or 32-bit, can be selected using commands from the PLC. The FX2N-1HC unit is used only after setting these mode parameters.

1.1 External dimensions

Mass (length): Approx. 0.3 kg (6.6 lb)
Dimensions: mm (inches)

Accessories: On the instruction sheet special block number identification.

2.2 Performance specifications

Item
1-phase input
2-phase input

<table>
<thead>
<tr>
<th>Item</th>
<th>1-phase input</th>
<th>2-phase input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase A</td>
<td>Phase B</td>
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3) The counter works correctly only when data such as the counter mode (set with a pulse command), count (BFM #4 b0), preset (BFM #4 b4), and output (BFM #4 b2, b1) prohibits. Reset the YH/YS comparison output before you start.

4. When b3=ON, YS output is reset if YH output is set, and YH output is reset if YS output is set. When b3=OFF, YH and YS output act independently, and do not reset each other.

5. Unless b2 is set to ON, YH (hardware compare output) does not turn ON. Unless b1 is set to ON, YS (software compare output) does not turn ON. These store the maximum and minimum value reached by the counter. If the power is turned off, the stored data is cleared.

6) Counter current value (BFM #21, 20)

7) Terminal status (BFM #27)

8) Comparison status (BFM #26)

9) Ring length (BFM #3, #2)

10) Error status

Error status in the FX-1NC special function block can be checked by reading the contents of b0 to b7 of BFM #29 to auxiliary relays of the PLC.

- Set when any of b1 to b7 is ON.
- Set when the value of the ring length is written incorrectly (other than K2 to K55,356).
- Set when the preset value is written incorrectly.
- Set when the compare value is written incorrectly.
- Set when the ring length is written in correctly.
- Set when the counter overflows the upper limit.
- Set when the counter overflows the lower limit.
- Set when the BFM #4 b8 (clock pulse enable) is written in correctly.
- Set when the counter mode (BFM #4 b9) is written in correctly.
- Set when outside of K0 to K11

There are error flags can be set by writing b8 of BFM #4.

11) BFM #15, #14 Comparison value for YS output

Comparison data

D: Matched

<: Set value < current value

=: Set value = current value

>: Set value > current value

R: Error flag reset

P: Preset allowed

M: Mutual reset

O: Output allowed

4. K1000

3. UP/DOWN direction should be specified for 1-phase counter. The ring length can be specified when a 16-bit value is written into BFM #3 and #2. These store the maximum and minimum value reached by the counter. If the power is turned off, the stored data is cleared.

5.1 Preliminary checks

1. K11 is written into BFM #0 of special function block No. 2. The counter input is in 16-bit mode. Please use a pulse command for this initialization.

2. BFM #32 is for reading only. Write commands from the programmable controller are ignored.

3. K254 is written into BFM #21 and #20 (current). Data becomes valid when b4 of BFM #4 is set to ON, and the PRESET input terminal changes from OFF to used as the initial value when the counter starts to count.

4. When transferring counter data to/from this special function block, always use the 32-bit forms of the data.

5. Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

6. SYSTEM BLOCK DIAGRAM

6. OUTPUTS

- Two-stage transistor output
- One-stage transistor output

6.3 POWER SUPPLIES

Power supplies are subject to change without notice.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
2) BF#3, #2 Ring length

Stores the data that specifies the length of the ring counter (default: H55,536).

3) BF#4 Command

• When you are writing a positive value between K32,768 and K65,535, the data should be treated as a complement value stored in the registers of the PLC cannot be used.

4) BF#3, #2 Ring length

These store the maximum and minimum value reached by the counter. If the power is turned off, the current value becomes 0.

5) BF#13, #12 Comparison value for YH output, BF#15, #14 Comparison value for YS output

• The initial counter value can also be set by writing the data directly into BF#21 and #20 (current value). Data becomes valid when b4 of BF#4 is set to ON, and PRESET input terminal changes from OFF to used as the initial value when the counter starts to count.

6) BF#01, #0 Preset data

• Data is used as the Initial value when the counter starts to count.

7) BF#05, #0 Ring length

These store the maximum and minimum value reached by the counter. If the power is turned off, the current value becomes 0.

8) BF#07, #6 Undefined

• In the above example, X02 is written into BF#13 and #12 (original specification). BF#13 is 2-byte/32-bit memory, while BF#12 is 1-byte/16-bit memory. BF#13 = 0, BF#12 = 100. Permissible values: 12 to H55,536.

Note: Write counter data with (D) TO

• Counter data is always handled as a pair from top 32-bit data in this special function block. 16/32-bit complement value is used, so the right limit of the PLC cannot be used.

• When you are writing a positive value between H32,768 and H55,535, the data should be treated as a complement value even when the ring counter's right limit is exceeded.

• When transferring counter data from this special function block, always see the 32-bit format of the FROM/TO instructions (D) FROM, (D) TO.

9) BF#26 for reading only. Write commands from the programmable controller are ignored.

10) BF#29 Error status

Error status in the FX3-1HC can be checked by reading the contents of D0 to D7 of BF#29 to auxiliary relays of the PLC.

There are 10 error flags that can be read by reading bit 0 of BF#4.

10) BF#29 Error status

Error status in the FX3-1HC can be checked by reading the contents of D0 to D7 of BF#29 to auxiliary relays of the PLC.

There are 10 error flags that can be read by reading bit 0 of BF#4.

Error checking

The following LEDs on the main panel of the FX3-1HC may help you to troubleshoot the unit:

• When A1 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A8 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A1 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A8 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A1 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A8 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A1 is OFF and A is a normal input circuit, the input circuit is normal.

• The upper and lower limit of the counter is not exceeded.

• When A8 is OFF and A is a normal input circuit, the input circuit is normal.
2) BFH #3, #2 Ring length

3) BFM #4 Command

4) BFM #1, #0 Preset data

5) BFH #13, #12 Comparison value for YH output, BFH #15, #14 Comparison value for YS output

6) Counter current value (BFH #21, #20)

7) Maximum count value (BFH #23, #22)

8) Comparison of current value (BFH #26)

9) Terminal status (BFH #27)

10) BFH #29 Error status

11) Model identification code number BFH #30

4. EXAMPLE PROGRAM

Please use the following program as a guide whenever you use the FX2N-1HC unit. Other instructions to set the compare value for YS output (not necessary if YS output is used).

5. DIAGNOSTICS

5.1 Preliminary checks

5.2 Error checking

The following LEDs on the main panel of the FX2N-1HC may help you to troubleshoot the unit.

6. SYSTEM BLOCK DIAGRAM

Note: This symbol mark is for China only.

含有的有害物质的名称及含量

本产品中含有下表所列的有害物质。含有的有害物质按照下列表示。

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

If in doubt at any stage during the installation of the FX2N-1HC 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-1HC please consult your local Mitsubishi Electric representative.

This manual contains no intellectual property rights or any other rights other than intellectual property rights which may occur as a result of using the contents noted in this manual.

Guidelines for the safety of the user and protection of the FX2N-1HC special function block

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

If in doubt about the operation or use of the FX2N-1HC please consult your local Mitsubishi Electric representative.

In case of damage or failure the FX2N-1HC cannot be repaired. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

When creating the FX2N-1HC software and hardware design, Mitsubishi Electric has taken into consideration the installation and use of this product. In case of damage or failure due to an incorrect installation or use, Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

This manual contains no intellectual property rights or any other rights other than intellectual property rights which may occur as a result of using the contents noted in this manual.

Specifications are subject to change without notice.
1. INTRODUCTION

The hardware high-speed counter block is a 2-phase 50 kHz high-speed counter. It is a special function block for the FX2N, FX3N, FX3U, FX3UC series PLC.

1.1 External dimensions

Mass (weight): Approx. 0.3 kg (0.66 lbs) Dimensions: min (inches)
Accessories: On the sheet labels special block number identification.

1.2 Specifications

General specifications (including the following) Same as those for the FX2N main unit

3. SPECIFICATIONS

3.1 General specifications

Perform the dielectric withstand voltage test between the GND terminal and all the other terminals short-circuited.

Item

Specifications

3.2 Performance specifications

Item

Specifications

4. WIRING

2 inputs

4.1 Command

Chart #1

4.2 Outputs

Chart #2

PNP output encoders

Differential-Line-Driver (AM26C31 or equivalent) and open collector output encoders are available for the FX2N-1HC block for the FX2N, FX2NC, FX3U, FX3UC series PLC.

The FX-2N occupies 68 points of the FX2N, FX3N, FX3U, FX3UC expansion models. The remaining points can be allocated from either inputs or outputs.

The source of your input signal should be a 1 or 2 phase encoder. A 5V, 12V, or 24V power source can be used. Always assign command input (FXRESET) and a count prohibit input command (SB A-L) is also available.

The FX-2N has two outputs. When the counter value coincides with an output compare value (which is transferred from the PLC), and is switched ON by a defined instruction.

When applying the Differential-Line-Driver encoder (AM26C31) or equivalent to FX-1HC, connect the encoder output with the 5V DC terminal as shown in the left figure.

Connect other terminals as shown in the PNP output encoder figure above.

3.3 Buffer memories (BFM)

BFM #0

The contents of BFM #1 to BFM #31 can be written to buffer memory BFM #0 from the PLC. When a value is written to BFM #0, the contents of BFM #1 to BFM #31 are written to the output.

The counter mode is selected from the PLC. As shown below, values between K0 and K11 are written to buffer memory BFM #0 from the PLC. When a value is written to BFM #0, the contents of BFM #1 to BFM #11 are written to the output.

- 16-bit modulo counter

A 16-bit binary counter handles only positive values from 0 to 65,535. Changes to zero from the lower limit value or to the upper limit value from zero when overflows occur, the upper limit value is determined by BFM #3 K11.

- 1-phase 1-input counter (K0 to K11)

a) 32-bit modulo counter

A 32-bit binary counter which executes UP/DOWN counting will change from the upper limit value to the lower limit value when overflow occurs. Both the upper and lower limit values are fixed to the upper limit value to the lower limit value to the lower limit value to the upper limit value to the lower limit value.

b) 16-bit modulo counter

A 16-bit binary counter handles only positive values from 0 to 65,535. Changes to zero from the lower limit value or to the upper limit value from zero when overflows occur, the upper limit value is determined by BFM #3 K11.

c) 1-phase 1-input counter (K0 to K11)

- Hardware UP/DOWN

- Software UP/DOWN (K10, K11)

- BFM #0

- BFM #1

- BFM #2

- BFM #3

- BFM #4

- BFM #5

- BFM #6

- BFM #7

- BFM #8

- BFM #9

- BFM #10

- BFM #11

- BFM #12

- BFM #13

- BFM #14

- BFM #15

- BFM #16

- BFM #17

- BFM #18

- BFM #19

- BFM #20

- BFM #21

- BFM #22

- BFM #23

- BFM #24

- BFM #25

- BFM #26

- BFM #27

- BFM #28

- BFM #29

- BFM #30

- BFM #31

3.4 Counter mode

4.3 Extension

5. ACCESSORIES

Mounting hole 2-4.5 (0.18)
Extension cable and connector
UP LED
DN (Down) LED
aLED
bLED
POWER LED
a, b terminal (M3 (0.12) screws)
PRESET terminal (M3 (0.12) screws)

6. SUPPORT

FAQs

7. EXPLANATIONS

Using the solderless termination

1. Mounting the block

2. Wiring the block

3. Diagnosing the block

4. Repairing the block
When '0' (OFF)
When '1' (ON)
Error status
BFM#26
When '0' (OFF)
When writing a positive value between K32,768 and K65,535, the data should be treated as a complement value stored in the registers of the PLC cannot be used.

3) BFM #4 Command

• When you are writing a positive value between K32,768 and K65,535, the data should be treated as a complement value stored in the registers of the PLC cannot be used.

4) BFM #1, #0 Present Data

• Data to be used as the initial value when the start command is given and PRESET input terminal is disabled.

5) BFM #13, #12 Comparison value for YH output, BFM #15, #14 Comparison value for YS output

• After comparing the current value of the counter with the value written in BFM #13 and BFM #14, the hardware and software comparison in the FX-1NCU contacts the comparison result.

6) YH output will not turn ON if you use PRESET or the TO instruction to set the current value equal to the comparison value. When latch OFF 0 when only a match occurs by the counter of input pulses.

7) The YH comparison operation takes about 300μs, and if match occurs, the output pulse occurs.

8) Counter current value (BFM #21, 20)

The current value of the counter is read by the PLC. It will not be the correct value during the process of reading the current value of the counter. It can be correctly displayed by writing a 32-bit value into the appropriate BFM from the PLC.

5. DIAGNOSTICS

5.1 Preliminary checks

1) Check that the wiring and extension cable of the FX-1NCU are properly connected.

2) 5V power is supplied from the main or extension units for the FX2N-1HC. Check that there is no power overload from this and other extension blocks.

3) UP/DOWN direction should be specified for 1-phase or 2-phase (K11 correspond to 32-bit and K12 to 16-bit) input software determined UP/DOWN counter.

4) No.2. The counter input is 16-bit 1-phase. Please use the instructions to read the current value of the counter, status etc. can be added as required.

5.2 Error checking

The following LEDs on the main panel of the FX-1NCU may help you to troubleshoot the unit.

- A1: Does not change (D) input is 0000 F.F.F. If a change is not detected by the encoder
- A2: Changing (D) input is not coming up (UP or DOWN). If a change is not detected by the encoder
- B: The LED lights up when the PRESET terminal is off or the BFM terminal is off.
- YH: YH output
- YS: YS output

You can check the error status by reading the content of BFM #29 to the PLC.

6. SYSTEM BLOCK DIAGRAM

This manual contains no industrial property rights or any rights of any other kind, nor does it confer any rights of any other kind, nor does it confer any rights of any other kind, nor does it confer any rights of any other kind.

This manual is written by and for the user and protection of the FX-1NCU and FX2N-1HC special function block.

Mitsubishi Electric will accept no responsibility for the suitability for your specific application.