Up/Down Counter/Timer

DIN size W72 × H72, W48 × H96, W144 × H72mm COUNTER/TIMER

Features

- Easy to select 36 kinds of input operation mode or 20 output operation modes by internal DIP switch.
- Counting speed Up grade:
  1cps / 30cps / 2kcps / 5kcps
- Wide range of input power supply:
  100~240VAC 50/60Hz, 12~24VDC (Option)
- Built-in a microcomputer
- Display the set function of decimal point

⚠️ Please read “Caution for your safety” in operation manual before using.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Single preset</th>
<th>FX4</th>
<th>FX6</th>
<th>FX4H</th>
<th>———</th>
<th>———</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Double preset</td>
<td>FX4-2P</td>
<td>FX6-2P</td>
<td>FX4H-2P</td>
<td>FX4L-2P</td>
<td>FX6L-2P</td>
</tr>
<tr>
<td></td>
<td>Indication</td>
<td>FX4-1</td>
<td>FX6-1</td>
<td>FX4H-1</td>
<td>FX4L-1</td>
<td>FX6L-1</td>
</tr>
<tr>
<td>Digit</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digit size</td>
<td>W8 × H14mm</td>
<td>W4 × H8mm</td>
<td>W6 × H10mm</td>
<td>W8 × H14mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>100<del>240VAC 50/60Hz, 12</del>24VDC (option)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable voltage range</td>
<td>90 ~ 110% of rated voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Power consumption | • Indicator: Approx. 6VA (240VAC 60Hz), Approx. 2.7W (24VDC)  
  • Single preset: Approx. 7VA (240VAC 60Hz), Approx. 3.3W (24VDC)  
  • Double preset: Approx. 8VA (240VAC 60Hz), Approx. 3.8W (24VDC) |       |       |       |       |       |
| Max. counting speed for CP1, CP2 | 1cps/30cps/2kcps/5kcps selectable by internal DIP switch |       |       |       |       |       |
| Input | CP1, CP2 input (INHIBIT) | Input logic is selectable  
  [Voltage input] Input impedance: 5.4kΩ, "H" level: 5~30VDC, "L" level: 0~2VDC  
  [No-voltage input] Impedance at short-circuit: Max. 1kΩ, Residual voltage at short-circuit: Max. 2VDC, Impedance at open-circuit: Min. 100kΩ |       |       |       |       |       |
|       | RESET input   |       |       |       |       |       |
|       | INHIBIT input |       |       |       |       |       |
| Min. input signal width | RESET input |       |       |       |       |       |
|       | Approx. 20ms  |       |       |       |       |       |
| Control output | Contact Type | Single preset type: SPDT (1c), Double preset type: SPDT (1c), 2nd output SPDT (1c) |       |       |       |       |
|       | Capacity      | 250VAC 3A at resistive load |       |       |       |       |
|       | Solid-state Type | Single preset type: 1 NPN open collector  
  Double preset type: 1st output 1 NPN open collector, 2nd output 1 NPN open collector |       |       |       |       |
|       | Capacity      | 30VDC Max. 100mA Max. |       |       |       |       |
| Memory retention | 10 years (when using non-volatile semiconductor memory) |       |       |       |       |       |
| External sensor power | 12VDC ±10% 50mA Max. |       |       |       |       |       |
| Ambient temperature | -10 ~ +55°C (at non-freezing status) |       |       |       |       |       |
| Storage temperature | -25 ~ +65°C (at non-freezing status) |       |       |       |       |       |
| Ambient humidity | 35 ~ 85% RH |       |       |       |       |       |
## Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FX4</th>
<th>FX6</th>
<th>FXH</th>
<th>FX4L</th>
<th>FX6L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation resistance</td>
<td></td>
<td></td>
<td>Min. 100MΩ (at 500VDC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td></td>
<td></td>
<td>2000VAC 50/60Hz for 1 minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise strength</td>
<td>AC</td>
<td>DC</td>
<td>±2kV the square wave noise (pulse width 1μs) by the noise simulator</td>
<td>±500V the square wave noise (pulse width 1μs) by the noise simulator</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>Mechanical</td>
<td>0.75mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 1 hour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malfunction</td>
<td>Mechanical</td>
<td>0.5mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 10 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>Mechanical</td>
<td>300m/s² (Approx. 30G) in X, Y, Z directions for 3 times</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay life cycle</td>
<td>Mechanical</td>
<td>Min. 10,000,000 operations</td>
<td>Min. 10,000 operations at 250VAC 2A (resistive load)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>FX4  : Approx. 295g</td>
<td>FX6  : Approx. 305g</td>
<td>FXH  : Approx. 325g</td>
<td>FX4L : Approx. 353g</td>
<td>FX6L : Approx. 455g</td>
</tr>
<tr>
<td>FX4–2P</td>
<td>FX6–2P : Approx. 315g</td>
<td>FX6–1 : Approx. 265g</td>
<td>FX4H–2P : Approx. 353g</td>
<td>FX4H–1 : Approx. 297g</td>
<td>FX6–2P : Approx. 550g</td>
</tr>
<tr>
<td>FX4–1 : Approx. 260g</td>
<td>FX6–1 : Approx. 265g</td>
<td>FX4H–1 : Approx. 297g</td>
<td>FX4H–2P : Approx. 353g</td>
<td>FX4H–1 : Approx. 297g</td>
<td>FX6–1 : Approx. 461g</td>
</tr>
</tbody>
</table>

*Qualification mark for FX4, FX4–1, FX6, FX6–1.

## Connections

- **FX–2P**
  - 8: INHIBIT (CP1)
  - 9: CP1
  - 10: CP2
  - 11: INHIBIT (CP2)
  - 12: SOLID STATE OUT
  - 13: OUT2
  - 14: OUT
  - 15: +12V, 50mA
  - 16: CONTACT OUT
  - 17: 250VAC 2A RESISTIVE LOAD

- **FX**
  - 8: INHIBIT (CP1)
  - 9: CP1
  - 10: CP2
  - 11: INHIBIT (CP2)
  - 12: OUT2
  - 13: OUT
  - 14: +12V, 50mA
  - 15: CONTACT OUT
  - 16: 250VAC 2A RESISTIVE LOAD

- **FXH–2P**
  - 8: INHIBIT (CP1)
  - 7: CP1
  - 6: CP2
  - 5: INHIBIT (CP2)
  - 4: SOLID STATE OUT
  - 3: OUT2
  - 2: OUT1
  - 1: +12V, 50mA
  - 10: CONTACT OUT
  - 11: 250VAC 2A RESISTIVE LOAD

- **FXH–1**
  - 8: INHIBIT (CP1)
  - 7: CP1
  - 6: CP2
  - 5: INHIBIT (CP2)
  - 4: SOLID STATE OUT
  - 3: OUT2
  - 2: OUT1
  - 1: +12V, 50mA
  - 10: CONTACT OUT
  - 11: 250VAC 2A RESISTIVE LOAD

- **FXL–2P**
  - 13: INHIBIT (CP1)
  - 14: CP1
  - 15: CP2
  - 16: INHIBIT (CP2)
  - 17: OUT2
  - 18: OUT1
  - 19: +12V, 50mA
  - 20: CONTACT OUT
  - 21: 250VAC 2A RESISTIVE LOAD

- **FXL–1**
  - 13: INHIBIT (CP1)
  - 14: CP1
  - 15: CP2
  - 16: INHIBIT (CP2)
  - 17: OUT2
  - 18: OUT1
  - 19: +12V, 50mA
  - 20: CONTACT OUT
  - 21: 250VAC 2A RESISTIVE LOAD

*CP2(INHIBIT) : Time hold terminal when using for timer.
*It is operated by power ON start type when using for timer.
**Dimensions**

- FX series
  - Pannel cut-out
  - Unit: mm

- FXH series
  - Pannel cut-out
  - Unit: mm

- FXL series
  - Pannel cut-out
  - Unit: mm

**Input connections**

- Input logic: No-voltage input (NPN)
  - Solid-state input (Standard input sensor: NPN output type sensor)
  - Contact input

- Contact input
  - Counting speed: 1 or 30cps setting (Counter)

- Input logic: voltage input (PNP)
  - Solid-state input (Standard input sensor: PNP output type sensor)
  - Contact input

- Contact input
  - Counting speed: 1 or 30cps setting (Counter)

*CP1, CP2 (INHIBIT), RESET input*
Input logic selection

**FX series**
Input logic is changeable by input logic selection switch located at the one-side of case.
- No voltage input (NPN)
- Voltage input (PNP)

**FXL series**
Input logic is changeable by input logic selection switch located at the terminal block.
- No voltage input (NPN)
- Voltage input (PNP)

**FXH series**
Input logic is changeable by input logic selection switch (SW3) located at inside of the case.
- No voltage input (NPN)
- Voltage input (PNP)

*Please be sure to turn power OFF before changing input logic.

Input & output connections

In case of operating the load by power supply of the sensor

- Please select proper capacity of load, because total value of load capacity and current consumption should not be exceed current capacity. (Max. 50mA)

How to count by external power supply
This unit counting when "H" level (5~30VDC) is applied at CP1 or CP2 ("Low": 0~2VDC)

Using 2 counters with one sensor
- It is available to use 2 counters with one sensor.
- The power of sensor must be connected to only one of counter.
Selection by DIP switches

- **72 x 72 DIP switch position**
- **48 x 96 DIP switch position**
- **144 x 72 DIP switch position**

**Max. counting speed**

<table>
<thead>
<tr>
<th>SW2</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON 1 2</td>
<td>1cps</td>
</tr>
<tr>
<td>ON 1 2</td>
<td>30cps</td>
</tr>
<tr>
<td>ON 1 2</td>
<td>2k cps</td>
</tr>
<tr>
<td>ON 1 2</td>
<td>5k cps</td>
</tr>
</tbody>
</table>

**Counter/Timer**

<table>
<thead>
<tr>
<th>SW2</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON 3</td>
<td>Counter</td>
</tr>
<tr>
<td>ON 3</td>
<td>Timer</td>
</tr>
</tbody>
</table>

**Up/Down mode**

<table>
<thead>
<tr>
<th>SW1</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON 4</td>
<td>Down mode</td>
</tr>
<tr>
<td>ON 4</td>
<td>Up mode</td>
</tr>
</tbody>
</table>

**Memory retention**

<table>
<thead>
<tr>
<th>SW2</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON 4</td>
<td>Power reset (Non memory)</td>
</tr>
<tr>
<td>OFF 4</td>
<td>Memory</td>
</tr>
</tbody>
</table>

**Example of F output operation mode**

- Reset
- 2nd preset
- 1st preset
- 0
- 0.5sec.

- One-shot output
- Hold output

- 1st output
- 2nd output
## Input operation (Counter)

<table>
<thead>
<tr>
<th>Input mode (SW1)</th>
<th>No-voltage input type (NPN)</th>
<th>Voltage input type (PNP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON 4 OFF 4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Up/Down-A Command input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON 2 OFF 3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Counting value</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>cp1 H L</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>cp2 H L</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Up/Down-B Individual input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON 2 OFF 3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Counting value</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>cp1 H L</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>cp2 H L</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Up/Down-C Phase difference input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON 2 OFF 3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Counting value</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>cp1 H L</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>cp2 H L</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Up mode

- **Up input**

### Down mode

- **Down input**

* : Over Min. signal width, @ : Over 1/2 of Min. signal width.
Counting miss by one (±1) is occurred if the signal width of @ or @ is less than min. signal width.
# Time setting mode (timer)

<table>
<thead>
<tr>
<th>SW1</th>
<th>4Digit</th>
<th>6Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1 2 3</td>
<td>99.99sec</td>
</tr>
<tr>
<td>B</td>
<td>1 2 3</td>
<td>999.9sec</td>
</tr>
<tr>
<td>C</td>
<td>1 2 3</td>
<td>9999sec</td>
</tr>
<tr>
<td>D</td>
<td>1 2 3</td>
<td>99min 59sec</td>
</tr>
<tr>
<td>E</td>
<td>1 2 3</td>
<td>999.9min</td>
</tr>
<tr>
<td>F</td>
<td>1 2 3</td>
<td>99hour 59min</td>
</tr>
<tr>
<td>G</td>
<td>1 2 3</td>
<td>999.9hour</td>
</tr>
<tr>
<td>H</td>
<td>1 2 3</td>
<td>9999hour</td>
</tr>
</tbody>
</table>

## Counting function (Indication model)

- **Up mode**
  - Reset
  - +Display value
  - 0

- **Up / Down - A, B, C mode**
  - Reset
  - +Display value
  - 0

- **Down mode**
  - Reset
  - +Display value
  - 0

- **Up / Down - D, E, F mode**
  - Reset
  - +Display value
  - 0

## Decimal point setting

Display the decimal point.

- **Changing the decimal point**
  - Factory default

- **It returns to decimal point setting status if pressing RESET button for over 3sec. in RUN mode.**
- **When "dp" is flickering, one touch the Reset button.**
- **If pressing one of digital switch buttons (1, 2) in decimal point setting mode, decimal point will be moved to Up (+) direction.**
- **It returns to RUN mode if no RESET button or digital switch is applied for 60sec. in decimal point setting status.**
- **The decimal point setting is existed in indication type.**
## Output operation mode

<table>
<thead>
<tr>
<th>Output mode (SW1)</th>
<th>Up mode</th>
<th>Down mode</th>
<th>Operation after count up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td>The display value continues until Reset signal applied and the output is held.&lt;br&gt;• 1st self-holding output and 2nd output is held until Reset signal applied.&lt;br&gt;• When using 1st output as one-shot output, it will return after operating for 0.5sec.</td>
</tr>
<tr>
<td><strong>N</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
<td>The display value and output will be held until Reset input is applied.</td>
</tr>
<tr>
<td><strong>C</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image5.png" alt="Diagram" /></td>
<td><img src="image6.png" alt="Diagram" /></td>
<td>The display returns to initial status and 2nd output will be reset after one-shot time.&lt;br&gt;• 1st self-holding output will be OFF after one-shot output time of 2nd output.&lt;br&gt;• 1st one-shot output will be reset after operating 0.5sec., and it is not related to 2nd output.</td>
</tr>
<tr>
<td><strong>R</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image7.png" alt="Diagram" /></td>
<td><img src="image8.png" alt="Diagram" /></td>
<td>The display value will be held until 2nd output is OFF, then reset.&lt;br&gt;• 1st hold output will be OFF after one-shot time of 2nd output.&lt;br&gt;• 1st one-shot output will be reset after operating 0.5sec., and it is not related to 2nd output.</td>
</tr>
<tr>
<td><strong>K</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image9.png" alt="Diagram" /></td>
<td><img src="image10.png" alt="Diagram" /></td>
<td>The display value continues until Reset signal applied.&lt;br&gt;• 1st hold output will be OFF after one-shot time of 2nd output.&lt;br&gt;• 1st one-shot output will be reset after operating 0.5sec., and it is not related to 2nd output.</td>
</tr>
<tr>
<td><strong>P</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image11.png" alt="Diagram" /></td>
<td><img src="image12.png" alt="Diagram" /></td>
<td>The display value is held during 2nd output one-shot time, counting process is returned to reset start status as soon as 2nd output ON.&lt;br&gt;• 1st hold output will be OFF after one-shot time of 2nd output.&lt;br&gt;• 1st one-shot output will be reset after operating 0.5sec., and it is not related to 2nd output.</td>
</tr>
<tr>
<td><strong>Q</strong>&lt;br&gt;ON 5 6 7 OFF</td>
<td><img src="image13.png" alt="Diagram" /></td>
<td><img src="image14.png" alt="Diagram" /></td>
<td>The display continues until 2nd output is OFF.&lt;br&gt;• 1st hold output will be OFF after one-shot time of 2nd output.&lt;br&gt;• 1st one-shot output will be reset after operating 0.5sec., not related to 2nd output.</td>
</tr>
<tr>
<td><strong>S</strong>&lt;br&gt;Counter ON 5 6 7 OFF</td>
<td><img src="image15.png" alt="Diagram" /></td>
<td><img src="image16.png" alt="Diagram" /></td>
<td>Up, Up/Down—A, B, C input mode&lt;br&gt;• OUT1 is ON when (Display value) &gt; (1st preset value)&lt;br&gt;• OUT2 is ON when (Display value) &gt; (Double preset value)&lt;br&gt;Down, Up/Down—D, E, F input mode&lt;br&gt;• OUT1 is ON when (Display value) &lt; (1st preset value)&lt;br&gt;• OUT2 is ON when (Display value) &lt; (Zero)</td>
</tr>
<tr>
<td><strong>S</strong>&lt;br&gt;Timer ON 5 6 7 OFF</td>
<td><img src="image17.png" alt="Diagram" /></td>
<td><img src="image18.png" alt="Diagram" /></td>
<td>When it is used as Timer, 1st output and 2nd output are flickering repeatedly.</td>
</tr>
</tbody>
</table>
Proper usage

Reset

- Reset
  In case of changing the input mode after supplying the
  power, please provide an external reset or manual reset.
  If reset is not executed, the counter will be working
  in previous mode.
- Reset signal width
  To guarantee proper reset, the signal must be supplied
  for a minimum of min. 20ms regardless it the signal
  comes from a contact or a solid-state input.

Minimum count signal width

- Assume duty cycle (ON/OFF) of 1:1 period.
- Minimum signal width 30cps : Min. 16.7ms
  2kcps : Min. 0.25ms

Maximum counting speed

This is the maximum count speed when the duty cycle (ON/OFF) of input signal is 1:1. If duty cycle
is not 1:1, the maximum count speed will be slower.
Width of ON and OFF signals must always be
larger than the minimum signal width.
If either ON or OFF signal is shorter than minimum
signal width, this product may not respond.

Power

The inner circuit voltage starts to rise up for the
first 100ms after power on, the input may not work
at this time. And also the inner circuit voltage drops
down for the last 500ms after power off, the input
may not work at this time.

INHIBIT (Only Timer)

- INHIBIT mode is active when SW1 turns ON.
  (Time Hold)
- When it is necessary to stop time while the
timer is progressing, the INHIBIT mode can be
used.
- When the INHIBIT input is turned off, time is
  progressing again.

How to use the sticker

The below sticker can be found inside the box.
Use the sticker according to application as follow:

<table>
<thead>
<tr>
<th>COUNTER</th>
<th>mm</th>
<th>inch</th>
<th>m</th>
<th>hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMER</td>
<td>sec</td>
<td>cm</td>
<td>sec</td>
<td>cm</td>
</tr>
</tbody>
</table>

Ex1) Measurement of length by
the rotary encoder

 Please put black dot.

Ex2) Timer [F mode]

 Please put black dot.

Error display

Error signal | Error description | Returning method
--------------|------------------|------------------
Err0          | Zero set state   | Change the set value
to non zero state

* There is no Error display function in indication type.
* When Error is displayed, the output continues OFF
state.