DIN W72×H72, W48×H96, W144×H72mm Counter/Timer

▣ Features

- 36 input modes and 20 output modes
- Counting speed: 1cps/30cps/2kcps/5kcps
- Selectable voltage input (PNP) or No voltage input (NPN)
- Addition of Up/Down input mode
- Wide range of power supply: 100-240VAC 50/60Hz
  12-24VAC 50/60Hz, 12-24VDC universal
- Selectable Counter/Timer by internal DIP switch
- Various time range
- Built-in Microprocessor

Please read "Caution for your safety" in operation manual before using.

c UL us

▣ Ordering Information

FX **4** **H** — **2P**

Output	No mark	1-stage preset
	2P	2-stage preset
	I	Indicator
Size	L	DIN W144×H72mm
	H	DIN W48×H96mm
	No mark	DIN W72×H72mm
Digit	4	9999 (4-digit)
	6	999999 (6-digit)
Item	FX	Counter/Timer

▣ Specifications

Model	1-stage preset		**FX4**	**FX6**	**FX4H**	—	—
	2-stage preset		**FX4-2P**	**FX6-2P**	**FX4H-2P**	**FX4L-2P**	**FX6L-2P**
	Indicator		**FX4-I**	**FX6-I**	**FX4H-I**	**FX4L-I**	**FX6L-I**
Digit			4-digit	6-digit	4-digit	4-digit	6-digit
Digit size			W8×H14mm	W4×H8mm	W6×H10mm	W8×H14mm	
Power supply	AC voltage		100-240VAC 50/60Hz				
	AC/DC voltage		12-24VAC 50/60Hz, 12-24VDC				
Allowable voltage range			90 to 110% of rated voltage				
Power consumption	AC voltage		• Indicator: Max. 6VA • 1-stage preset: Max. 7VA • 2-stage preset: Max. 8VA (100-240VAC 50/60Hz)				
	AC/DC voltage		• Indicator: Max. 5.8VA • 1-stage preset: Max. 6.8VA • 2-stage preset: Max. 7.6VA (12-24VAC 50/60Hz) • Indicator: Max. 2.7W • 1-stage preset: Max. 3.3W • 2-stage preset: Max. 3.8W (12-24VDC)				
Max. counting speed for CP1, CP2			Selectable 1cps/30cps/2kcps/5kcps by internal DIP switch				
Min. input signal width	INHIBIT input		Approx. 20ms				
	RESET input						
Input	CP1, CP2 input (INHIBIT)		Input logic is selectable [Voltage input] Input impedance: Max. 5.4kΩ, [H]: 5-30VDC, [L]: 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						
One-shot output time			• 1-stage preset: 0.05 to 5sec • 2-stage preset: 1st. output 0.5sec fixed, 2nd. output: 0.05 to 5sec				
Control output	Contact	Type	• 1-stage preset: SPDT (1c), • 2-stage preset: 1st. output SPDT (1c), 2nd. output SPDT (1c)				
		Capacity	250VAC 3A at resistive load				
	Solid state	Type	• 1-stage preset: 1 NPN open collector • 2-stage preset: 1st. output 1 NPN open collector, 2nd. output 1 NPN open collector				
		Capacity	Max. 30VDC, 100mA				
Memory protection			Approx. 10 years (when using non-volatile semiconductor memory)				
External sensor power			Max. 12VDC±10% 50mA				
Environment	Ambient temperature		-10 to 55℃, storage: -25 to 65℃				
	Ambient humidity		35 to 85%RH, storage: 35 to 85%RH				
Insulation resistance			Over 100MΩ (at 500VDC megger)				
Dielectric strength			2,000VAC 50/60Hz for 1 minute				
Noise immunity	AC voltage		±2kV the square wave noise (pulse width: 1μs) by the noise simulator				
	DC voltage		±500V the square wave noise (pulse width: 1μs) by the noise simulator				

※Environment resistance is rated at no freezing or condensation.

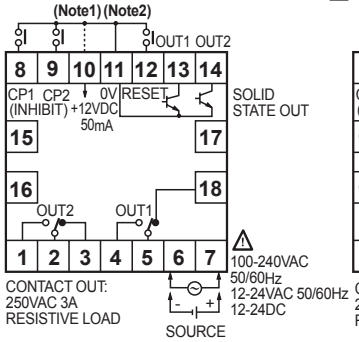
■ Specifications

Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 1 hour				
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 min				
Shock	Mechanical	300m/s² (approx. 30G) in each X, Y, Z direction for 3 times				
	Malfunction	100m/s² (approx. 10G) in each X, Y, Z direction for 3 times				
Relay life cycle	Mechanical	Min. 10,000,000 operations				
	Electrical	Min. 100,000 operations (at 250VAC 3A resistive load)				
Approval		c UL us (except for AC/DC voltage type)				
Weight※1		FX4: Approx. 385g (approx. 249g) FX4-2P: Approx. 396g (approx. 258g) FX4-I: Approx. 353g (approx. 216g)	FX6: Approx. 395g (approx. 259g) FX6-2P: Approx. 398g (approx. 262g) FX6-I: Approx. 351g (approx. 214g)	FX4H: Approx. 349g (approx. 234g) FX4H-2P: Approx. 375g (approx. 261g) FX4H-I: Approx. 321g (approx. 206g)	FX4L-2P: Approx. 651g (approx. 467g) FX4L-I: Approx. 593g (approx. 400g)	FX6L-2P: Approx. 678g (approx. 494g) FX6L-I: Approx. 586g (approx. 404g)

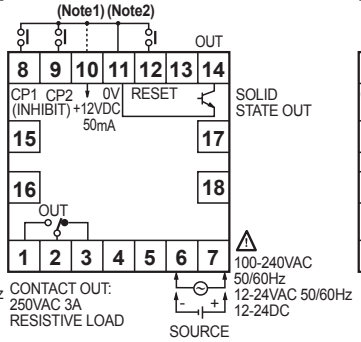
※1: The weight includes packaging. The weight in parenthesis is for unit only.

■ Connections

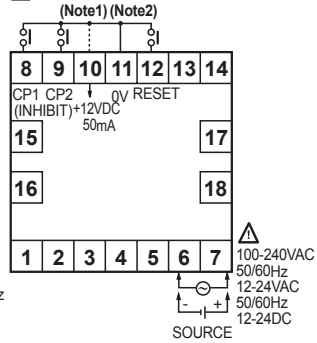
● **FX□-2P**



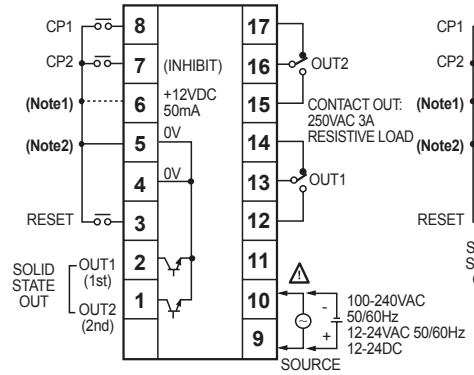
● **FX□**



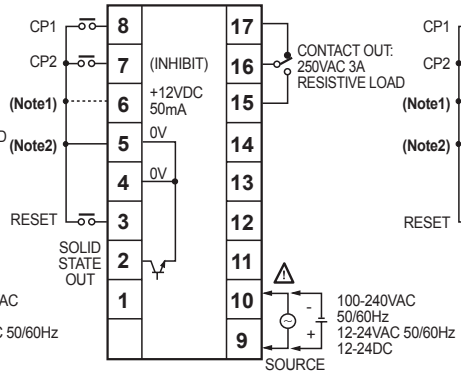
● **FX□-I**



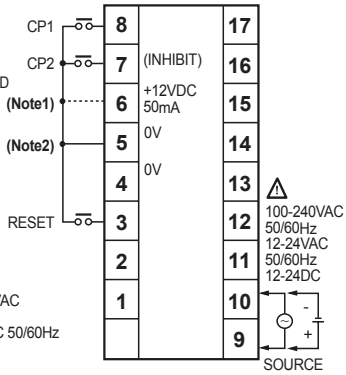
● **FX4H-2P**



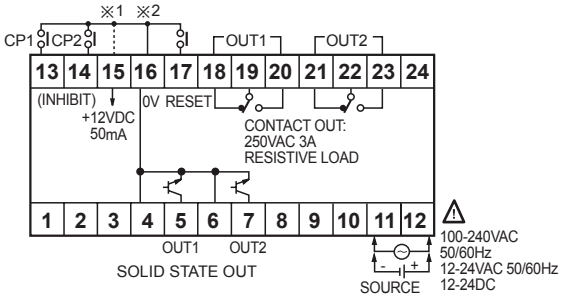
● **FX4H**



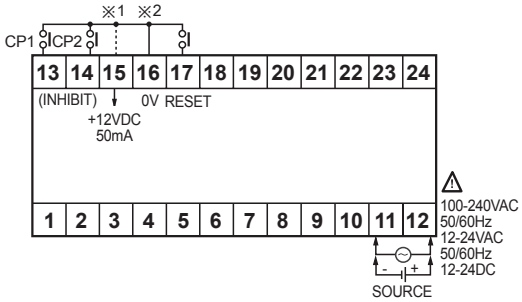
● **FX4H-I**



● **FX□L-2P**



● **FX□L-I**



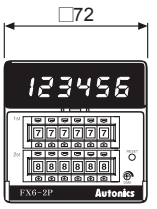
※ CP2 (INHIBIT): Time hold terminal when using for timer.
※ It is operated by power ON start type when using for timer.

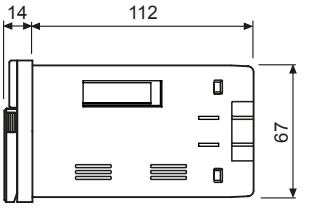
※1: Connection for PNP input
※2: Connection for NPN input

▣ Dimensions

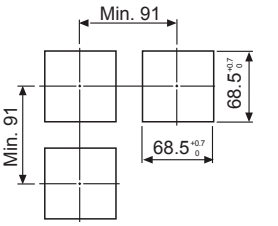
(unit: mm)

● FX Series



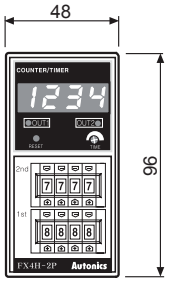


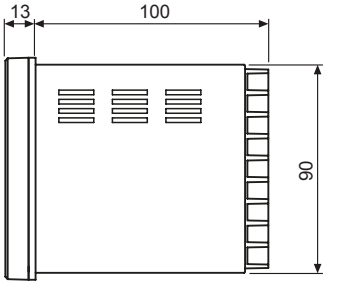
● Panel cut-out



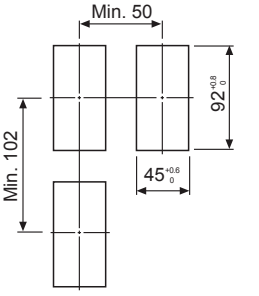
● FXH Series

(unit: mm)



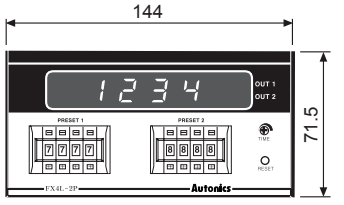


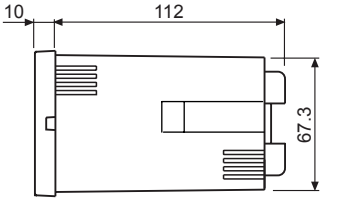
● Panel cut-out



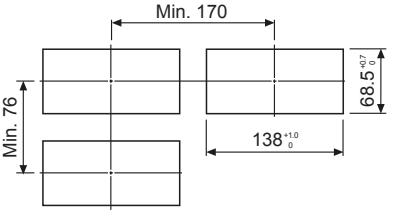
● FXL Series

(unit: mm)





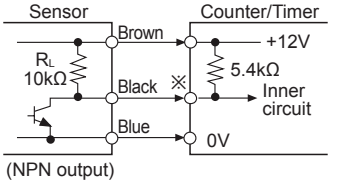
● Panel cut-out



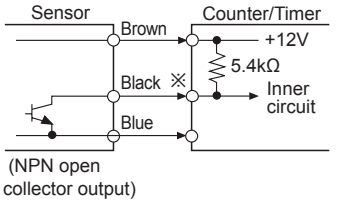
▣ Input Connections

◎ No-voltage input (NPN) (factory default)

● Solid-state input (standard sensor: NPN output type sensor)



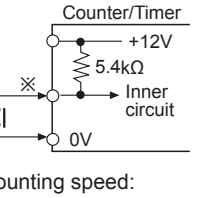
(NPN output)



(NPN open collector output)

※CP1, CP2 (INHIBIT), RESET input

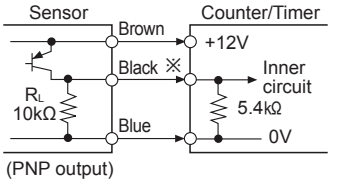
● Contact input



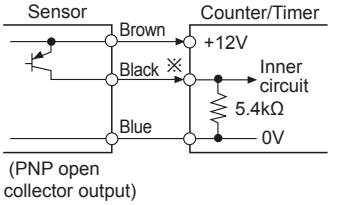
※Counting speed:
1 or 30cps setting (counter)

◎ Voltage input (PNP)

● Solid-state input (standard sensor: PNP output type sensor)



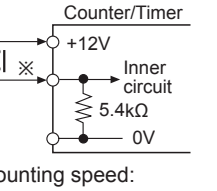
(PNP output)



(PNP open collector output)

※CP1, CP2 (INHIBIT), RESET input

● Contact input



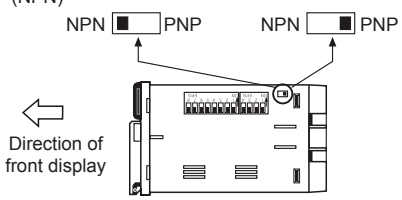
※Counting speed:
1 or 30cps setting (counter)

▣ 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-voltageinpu (NPN)

(NPN) F ■ S

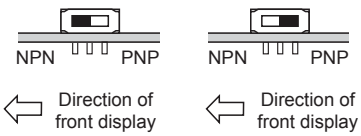
• Voltage input (PNP)

F ■ S (PNP)

● FXH Series

Input logic is changeable by input logic selection switch (SW3) located at inside of the case.

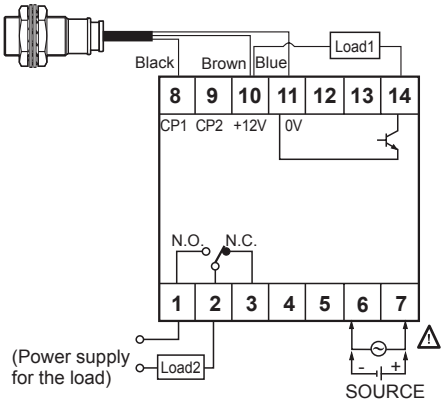
• No-voltage input (NPN) • Voltage input (PNP)



※**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

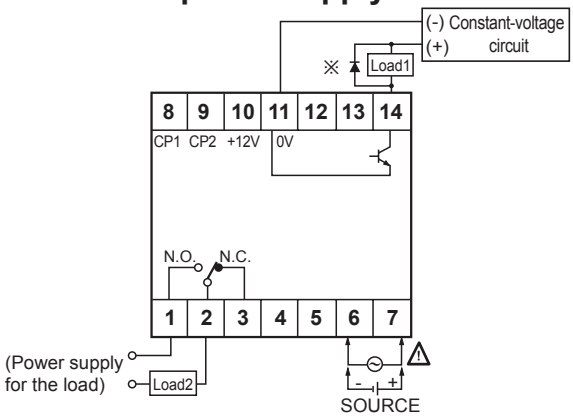


● Please select proper capacity of load, because total value of load capacity and current consumption should not be exceed current capacity. (Max. 50mA)

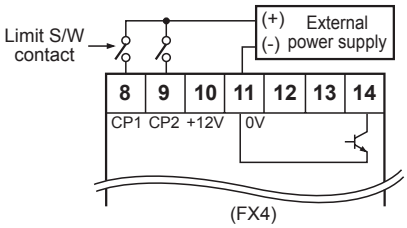
◎ How to count by external power supply

This unit starts to count when "High" level (5-30VDC) is applied at CP1 or CP2 after selecting PNP.
("Low" level: 0-2VDC)

◎ In case of operating the load by external power supply

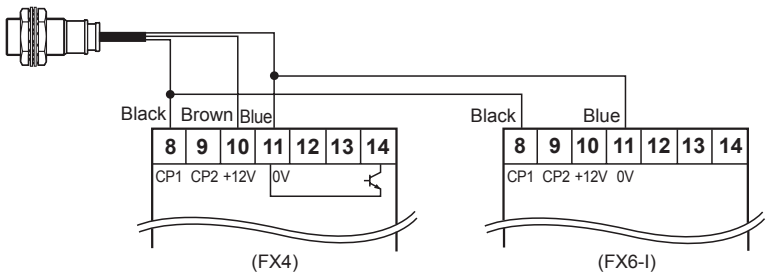


● The capacity of the load must not be exceed max. 30VDC, max. 100mA of the switching capacity of the transistor.
● Please do not supply the reverse polarity voltage.
※Please connector the surge absorber (Diode) at both terminals of the load, in case of using the inductive load. (Relay, etc.)



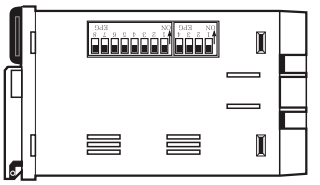
◎ Using 2 counters with one sensor

Please connect as the power of sensor is supplied from only one of counters and design input logic with same way.

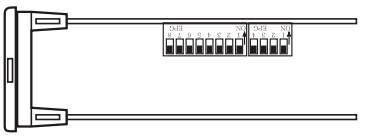


▣ Description Of Inner DIP Switches

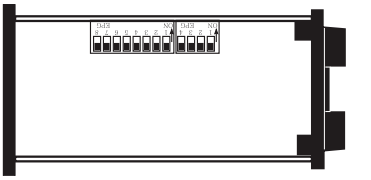
● **FX Series**

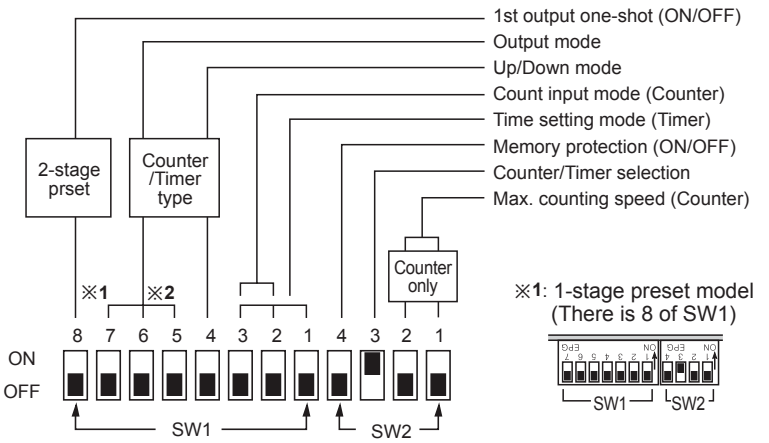


● **FXH Series**



● **FXL Series**





※**1**: 1-stage preset model
(There is 8 of SW1)

※**2**: Indication model
(There is 5, 6, 7, 8 of SW1)

● **Max. counting speed**

SW2	Functions
1 2 ON OFF	1cps
1 2 ON OFF	30cps
1 2 ON OFF	2kcps
1 2 ON OFF	5kcps

● **Conter/Timer selection**

SW2		Functions
3	ON OFF	Conter
	ON OFF	Timer

● **Memory protection**

SW2		Functions
4	ON OFF	Disable the memory protection
	ON OFF	Enable the memory protection

● **Up/Down mode selection**

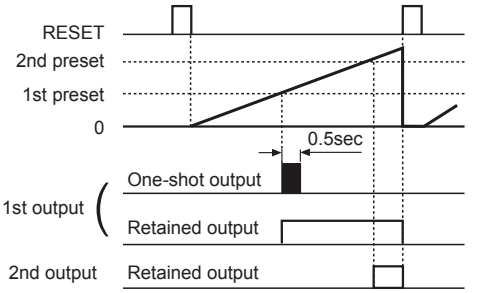
SW1		Functions
4	ON OFF	Down mode
	ON OFF	Up mode

● **1st output one-shot (ON/OFF)**

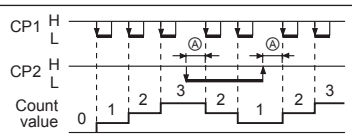
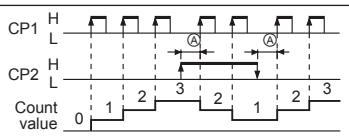
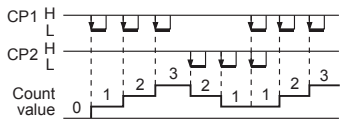
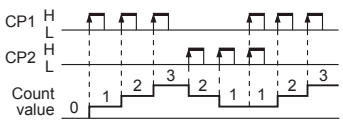
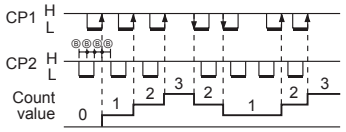
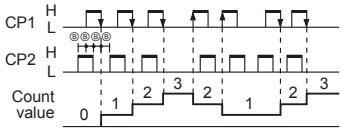
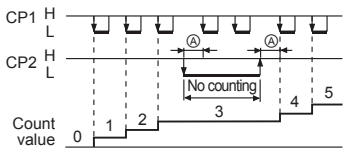
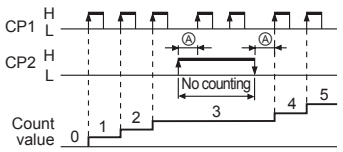
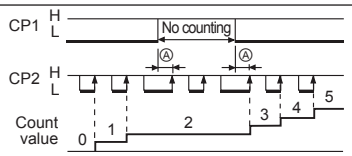
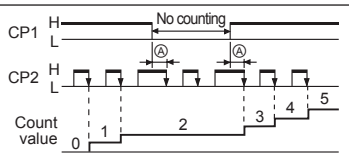
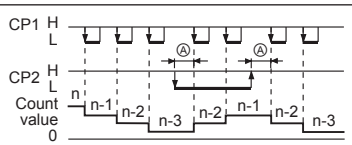
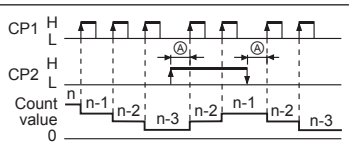
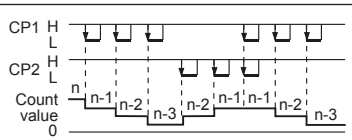
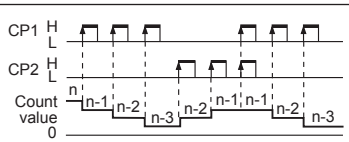
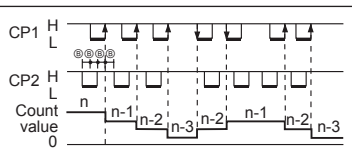
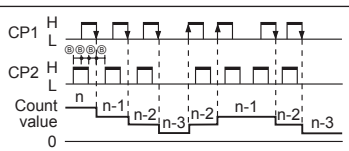
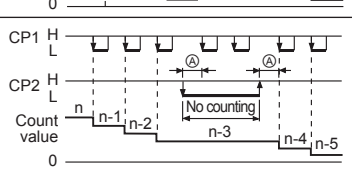
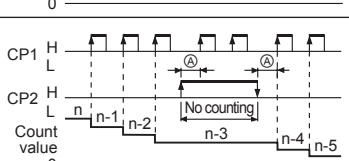
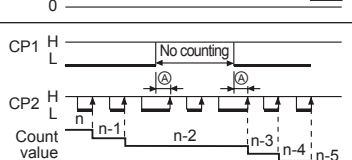
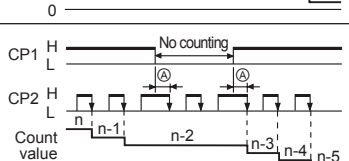
SW1		Functions
8	ON OFF	1st output: One-shot output
	ON OFF	1st output: Retained output

※This mode selects a one-shot output (0.5sec fixed) or retained output (until 2nd output turns off) for 1st output in the 2-stage preset coaunter.

※Example of F output operation mode



▣ Input Operation (Counter)

Input mode		SW1	No-voltage input type (NPN)	Voltage input type (PNP)
Up mode	Up/Down-A (Command input)	4 ON OFF; 2 3 ON OFF		
	Up/Down-B (Individual input)	2 3 ON OFF		
	Up/Down-C (Phase difference input)	2 3 ON OFF		
	Up (Count up input)	2 3 ON OFF		
				
Down mode	Up/Down-D (Command input)	4 ON OFF; 2 3 ON OFF		
	Up/Down-E (Individual input)	2 3 ON OFF		
	Up/Down-F (Phase difference input)	2 3 ON OFF		
	Down (Count down input)	2 3 ON OFF		
				

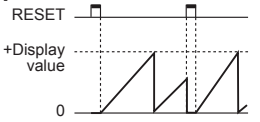
※Ⓐ: Over min. signal width, Ⓑ: Over 1/2 of min. signal width.
If the signal width of Ⓐ or Ⓑ is less than min. signal width, ±1 of count error occurs.

▣ Time Setting Mode (Timer)

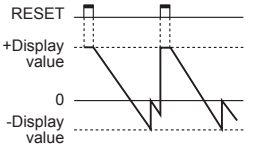
SW1		4-digit	6-digit
A	1 2 3 ON OFF	99.99sec	99999.9sec
B	1 2 3 ON OFF	999.9sec	999999sec
C	1 2 3 ON OFF	9999sec	99min 59.99sec
D	1 2 3 ON OFF	99min 59sec	999min 59.9sec
E	1 2 3 ON OFF	999.9min	9999.9min
F	1 2 3 ON OFF	99hour 59min	99hour 59min 59sec
G	1 2 3 ON OFF	999.9hour	9999hour 59min
H	1 2 3 ON OFF	9999hour	99999.9hour

▣ Counting Operation Of Indication Type (Counter)

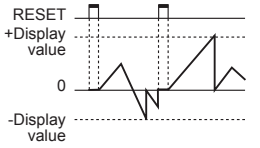
● **Up mode**



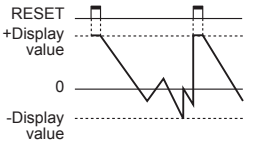
● **Down mode**



● **Up / Down-A, B, C mode**

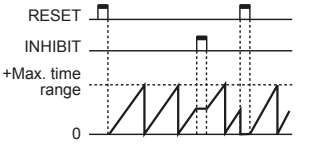


● **Up / Down-D, E, F mode**

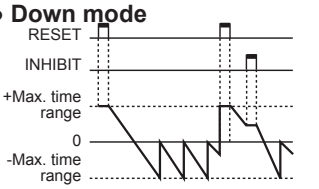


▣ Time Operation Of Indication Type (Timer)

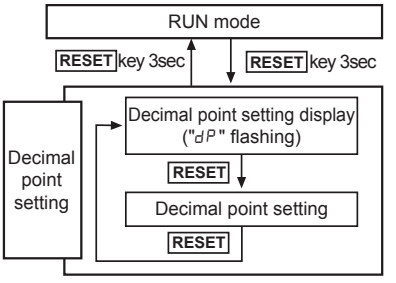
● **Up mode**



● **Down mode**



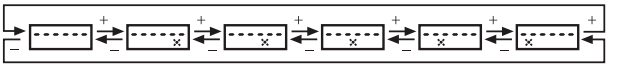
▣ Setting Function Of Decimal Point



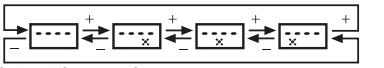
※It advances to "Decimal point setting mode" if press RESET key for 3sec
※It returns to RUN mode by press RESET key for 3sec in "Decimal point setting mode".
※It returns to RUN mode if no RESET button or digital switch (Dual-setting digital switch for dual preset type) is applied for 60sec in the "Decimal point setting mode".
※The decimal point setting does not exist in indicator.

● **Decimal point setting**

• The decimal point setting of 6-digits indicator



• The decimal point setting of 4-digits indicator



※Existing decimal point setting is displayed when entering into decimal point setting mode.
※If pressing one of digital switch (2nd preset type: 2nd preset digital switch) Up (+) buttons in decimal point setting mode, decimal point will be moved to Up (+) direction.
If pressing one of digital switch (2nd preset type: 2nd preset digital switch) Down (-) buttons, decimal point will be moved to Down (-) direction.

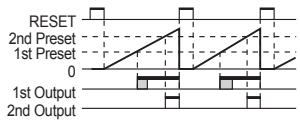
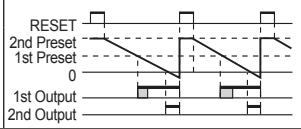
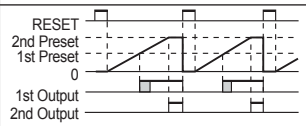
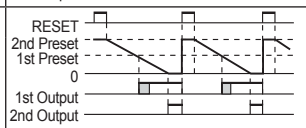
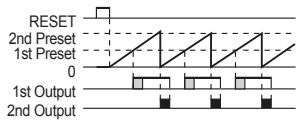
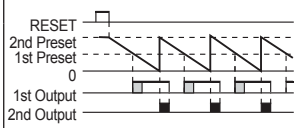
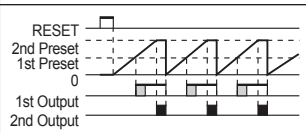
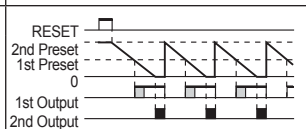
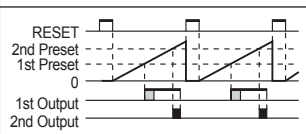
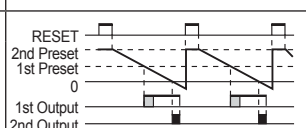
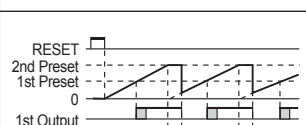
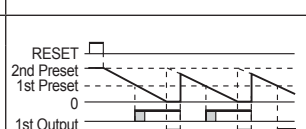
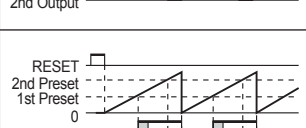
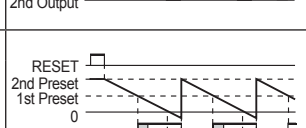
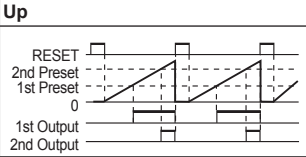
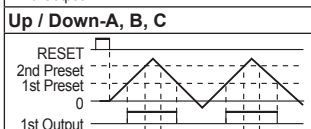
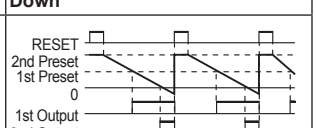
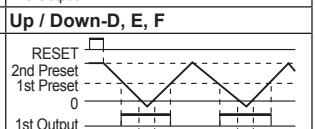
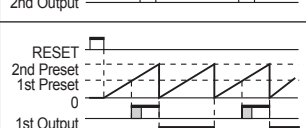
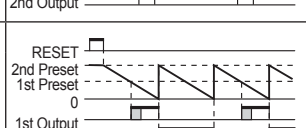
▣ Output Operation Mode

■ ← One-shot output **(0.05 to 5sec)** of 2nd output

Retained output
One-shot output (0.5sec) of 1st output

Retained output

※The output of 1-stage preset type is operated at the status of the second output mode

Output mode (SW1)	4 ON OFF **Up mode**	4 ON OFF **Down mode**	Operation after count up
	Up, Up / Down-A, B, C	**Down, Up / Down-D, E, F**	
F 5 6 7 ON OFF			The display value continues until Reset signalapplied and the output is held. • 1st retained output and 2nd output are maintained until Reset signal is applied. • When using 1st output as one-shot output, it will return after operating for 0.5sec
N 5 6 7 ON OFF			The display value and output will be held until Reset input is applied.
C 5 6 7 ON OFF			The display value will be Reset Start status as soon as it reaches to 2nd setting value. • 1st retained output will be OFF after 2nd one-shot output. • 1st one-shot output will be reset after operating 0.5sec, and it is not related to 2nd output.
R 5 6 7 ON OFF			Display value will be maintained until 2nd output is Off, then it will be reset. • 1st retained output will be OFF after 2nd one-shot output. • 1st one-shot output will be reset after operating 0.5sec, and it is not related to 2nd output.
K 5 6 7 ON OFF			The display value continues until Reset signalapplied. • 1st retained output will be OFF after 2nd one-shot output. • 1st one-shot output will be reset after operating 0.5sec, and it is not related to 2nd output.
P 5 6 7 ON OFF			The display value will be Reset Start status as soon as it reaches to 2nd setting value. • 1st retained output will be OFF after 2nd one-shot output. • 1st one-shot output will be reset after operating 0.5sec, and it is not related to 2nd output.
Q 5 6 7 ON OFF			The display continues until 2nd output is OFF. • 1st retained output will be OFF after 2nd one-shot output. • 1st one-shot output will be reset after operating 0.5sec not related to 2nd output.
S Counter 5 6 7 ON OFF	**Up**  **Up / Down-A, B, C** 	**Down**  **Up / Down-D, E, F** 	• Up, Up/Down-A, B, C input mode - OUT1 is ON when (Display value) ≥ (1st setting value) - OUT2 is ON when (Display value) ≥ (Dual setting value) • Down, Up/Down-D, E, F input mode - OUT1 is ON when (Display value) ≤ (1st setting value) - OUT2 is ON when (Display value) ≤ (Zero)
S Timer 5 6 7 ON OFF			When it is used as Timer, 1st output and 2nd output are flashing repeatedly.

※One-shot output time is set by front TIME adjuster.

▣ Proper Usage

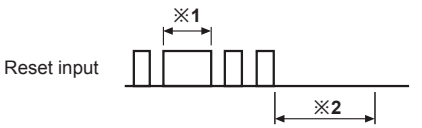
◎ Reset

● 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

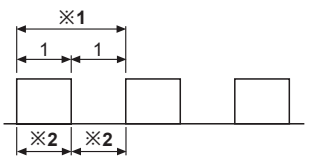
To guarantee proper reset, the signal must be supplied for a minimum of **min. 20ms** regardless the signal comes from a contact or a solid-state input.



※1: In case of a contact reset, contact chattering will not affect the reset as long as it is applied for a minimum of 20ms.

※2: Input signal at CP1 & CP2 must be applied for a minimum of 50ms after the reset is removed.

◎ Mini. count signal width

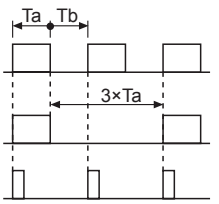


※1: Please make duty ratio (ON/OFF) as 1:1.

※2: Min. signal width
- 1cps: Min. 500ms
- 30cps: Min. 16.7ms
- 2kcps: Min. 0.25ms
- 5kcps: Min. 0.1ms

◎ Max. counting speed

This is a response speed per 1 sec when the duty ratio (ON/OFF) of input signal is 1:1. If the duty ratio is not 1:1, the width between ON and OFF should be over min. signal width and the response speed will getting slower against input signal. If either ON or OFF signal is shorter than minimum signal width, this product may not respond.



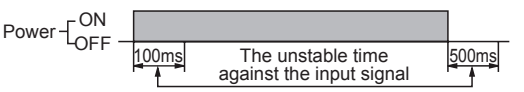
Ta (ON width) and Tb (OFF width) needed to be over min.signal width.

Max. counting speed is 1/2 value of rated spec. when duty ratio is 1:3.

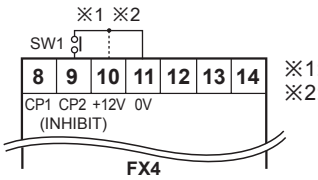
It can not respond if it is smaller than min. singal width (Ta).

◎ 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.

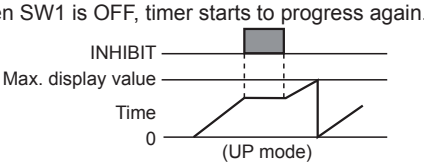


◎ INHIBIT (For timer)



※1: Connection for PNP
※2: Connection for NPN

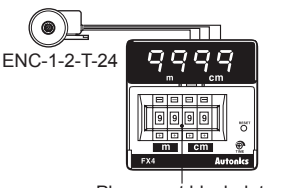
- INHIBIT mode is active when SW1 turns ON. (Time Hold)
- When power is applied, it starts to progress and INHIBIT mode is used to stop the time is under the progress at the moment.
- When SW1 is OFF, timer starts to progress again.



◎ How to use the sticker

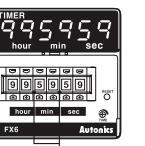
The below sticker can be found inside the box.
Use the sticker according to application as follow;

E.g. 1) Measurement of length by the rotary encoder



Please put black dot.

E.g. 2) Timer [F mode]

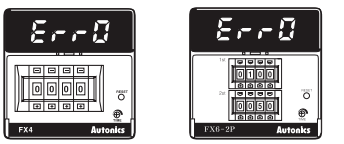


Please put black dot.

◎ Error display

Error signal	Error description	Returning method
Err0	When 2nd setting value is 0	Change the setting value to non zero status
	When 2nd setting value is smaller than 1st setting value	Make 2nd setting value bigger than 1st setting value

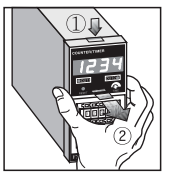
※There is no Error display function in indication type.
※There is no Error function in indicator.
※When Error is display, the OUTPUT continues OFF state.
※1st output maintains OFF status by 1st setting value as 0.



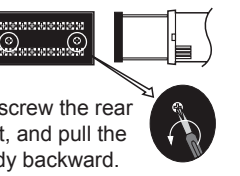
◎ Case & DIP switch detachment

● FXH Series

① Push down the front guide.
② Pull out the front guide.



● FXL Series



Unscrew the rear bolt, and pull the body backward.

※Please be careful of the injury caused by tools.