FXM/FXH Series

DIN W72×H72, W48×H96mm Counter/Timer

▣ Features

- Counting speed: 1cps/30cps/2kcps/5kcps
- Selectable voltage input (PNP) method or no-voltage input (NPN) method
- Input mode: Up, Down, Up/Down
- Power supply: 100-240VAC 50/60Hz
- Dot for Decimal Point / Hour. Min. Second by RESET key
- Selectable Counter/Timer by internal DIP switch
- [Counter]
  20 input modes/18 output modes
- [Timer]
  16 output modes
  Various time setting range - 8-digit model: 0.01 sec to 99999 hour 59.9 min /
                              6-digit model: 0.1 sec to 99999.9 hour /
                              4-digit model: 0.01 sec to 9999 hour
- Output: Indicator, 1-stage setting, 2-stage setting

Upgrade

Shaded parts(■) are changed and added functions from previous FX/FXH Series.

⚠ **Please read "Safety considerations" in operation manual before using.**

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▣ Ordering Information

FX	4	H	—	2P	4

Power supply	
4	100-240VAC 50/60Hz
Output	
1P	1-stage setting
2P	2-stage setting
I	Indicator
Size	
H	DIN W48×H96mm
M	DIN W72×H72mm
Display digit	
4	9999 (4-digit)
6	999999 (6-digit)
8	99999999 (8-digit)
Item	
FX	Counter/Timer

▣ Specifications

| Model	1-stage setting	FX4H-1P4	FX4M-1P4	FX6M-1P4	FX8M-1P4
	2-stage setting	FX4H-2P4	FX4M-2P4	FX6M-2P4	—
	Indicator	—	FX4M-I4	FX6M-I4	FX8M-I4
Display digit		4-digit		6-digit	8-digit
Character size (W×H)		6×10mm		4×8mm	3.8×7.6mm
Power supply		100-240VAC~ 50/60Hz			
Permissible voltage range		90 to 110% of rated voltage			
Power consumption		● 1-stage: Max. 4.6VA ● 2-stage: Max. 5.8VA ● Indicator: Max. 3.8VA			
Max. counting speed of CP1/CP2		Selectable 1cps/30cps/2kcps/5kcps (DIP switch)			
Return time		Max. 500ms			
Min. signal width		INHIBIT, RESET: approx. 20ms			
Input method		Selectable voltage input (PNP) method or no-voltage input (NPN) method [Voltage input (PNP) method]-input impedance: max. 10.8kΩ, [H]: 5-30VDC⎓, [L]: 0-2VDC [No-voltage input (NPN) method]-short-circuit impedance: max. 470Ω , short-circuit residual voltage: max. 1VDC, open-circuit impedance: min. 100kΩ			
One-shot output time		● 1-stage: 0.05 to 5 sec ● 2-stage: 1st setting 0.5 sec fixed, 2nd setting 0.05 to 5 sec			
Control output	Contact	Type	● 1-stage: Instantaneuos SPDT (1c) ● 2-stage: OUT1-Instantaneuos SPDT (1c), OUT2-Instantaneuos SPDT (1c)		
		Capacity	250VAC~ 3A resistive load		
	Solid state	Type	● 1-stage: 1 NPN open collector ● 2-stage: OUT1-1 NPN open collector, OUT2-1 NPN open collector		
		Capacity	● Load voltage: Max. 30VDC⎓ ● Load current: Max. 100mA ● Residual voltage: Max. 1VDC⎓		
Relay life cycle	Mechanical		Min. 5,000,000 operations		
	Electrical		Min. 100,000 operations (250VAC 3A resistive load)		
Repeat/Set/Voltage/Temp. error		Max. ±0.01% ±0.05 sec			
Insulation resistance		Over 100MΩ (at 500VDC megger)			
External power supply		Max. 12VDC⎓ ±10% 50mA			
Memory retention		Approx. 10 years (non-volatile memory)			
Dielectric strength		2,000VAC 50/60Hz for 1 min (between all terminals and case)			
Noise immunity		±2kV the square wave noise (pulse width 1μs) by noise simulator			

Up/Down Counter/Timer

■ Specifications

Model	1-stage setting	**FX4H-1P4**	**FX4M-1P4**	**FX6M-1P4**	**FX8M-1P4**
	2-stage setting	**FX4H-2P4**	**FX4M-2P4**	**FX6M-2P4**	—
	Indicator	—	**FX4M-I4**	**FX6M-I4**	**FX8M-I4**
Vibration	Mechanical	0.75mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 1 hour			
	Malfunction	0.5mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 minutes			
Shock	Mechanical	300m/s^2 (approx. 30G) in each X, Y, Z direction for 3 times			
	Malfunction	100m/s^2 (approx. 10G) in each X, Y, Z direction for 3 times			
Environ-ment	Ambient temp.	-10 to 55℃, storage: -25 to 65℃			
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH			
Protection structure		IP20 (front part, IEC standard)			
Approval		CE $_c\mathbf{N}_{us}$			
Weight[※1]	1-stage setting	Approx. 245g (approx. 180g)			
	2-stage setting	Approx. 265g (approx. 200g)			
	Indicator	Approx. 225g (approx. 160g)			

※1: The weight includes packaging. The weight in parenthesis is for unit only.
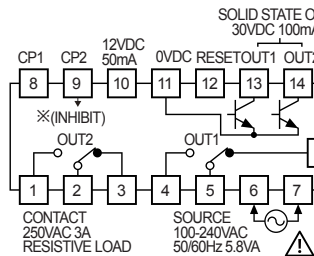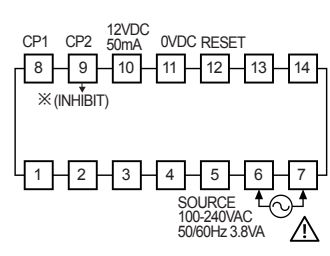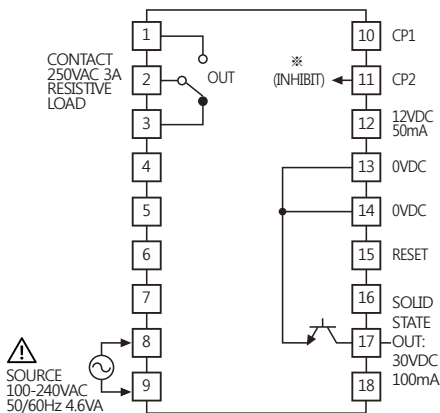※Environment resistance is rated at no freezing or condensation.

■ Connections

● **FX□M-1P4**
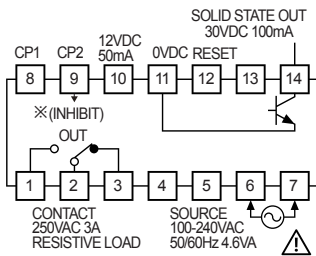
● **FX□M-2P4**
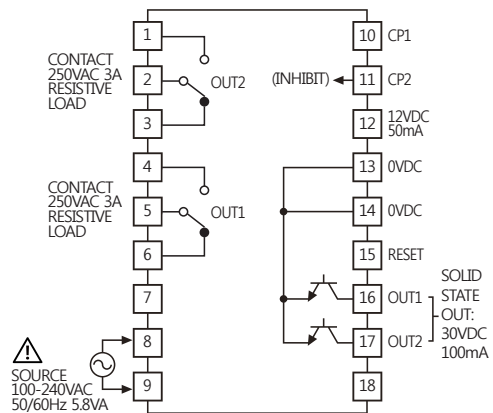

● **FX□M-I4**

● **FX4H-1P4**

● **FX4H-2P4**

※INHIBIT: In case of timer mode, this terminal is for time hold.
  (voltage input (PNP): connect with 12VDC, no-voltage input (NPN): connect with 0VDC)
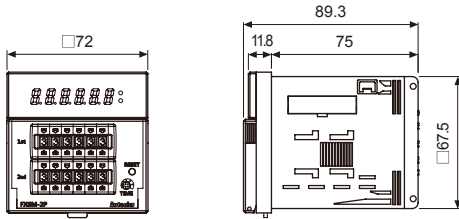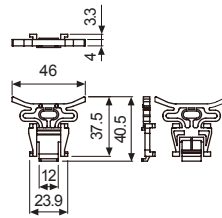
FXM/FXH Series

▣ Dimensions

※Nameplate design is changed and rear length is shorten than previous.

(unit: mm)

◎ FXM Series

□72
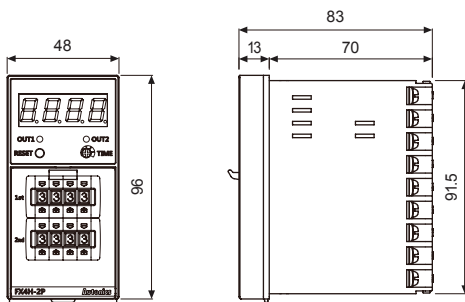
89.3
11.8 | 75
67.5
□67.5

● Bracket

3.3
4
46
37.5
40.5
12
23.9

● Panel cut-out

Min. 90
Min. 90
68 $^{+0.7}_{0}$
68 $^{+0.7}_{0}$

◎ FXH Series

48
96

83
13 | 70
91.5

● Bracket

3.3
4
46
37.5
40.5
12
23.9

● Panel cut-out

Min. 65
Min. 115
92 $^{+0.8}_{0}$
45 $^{+0.6}_{0}$
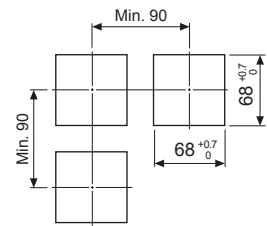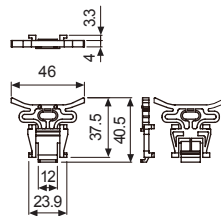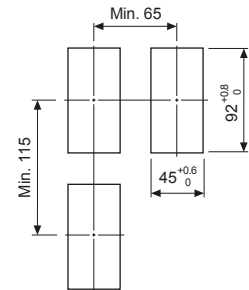
▣ Input Connections

◎ Voltage input (PNP)

● **Solid-state input (standard sensor: PNP output type sensor)**
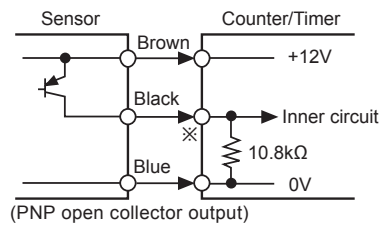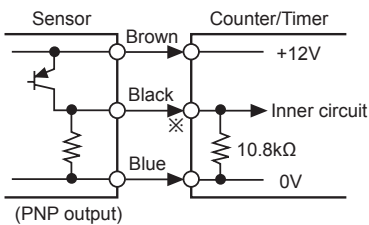
Sensor		Counter/Timer
Brown	+12V
Black	Inner circuit
※	10.8kΩ
Blue	0V

(PNP output)

Sensor		Counter/Timer
Brown	+12V
Black	Inner circuit
※	10.8kΩ
Blue	0V

(PNP open collector output)

● **Contact input**

※	Counter/Timer
	+12V
	Inner circuit
10.8kΩ
	0V
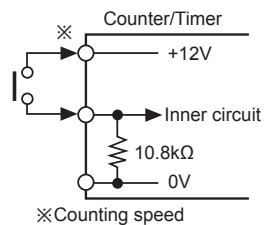
※Counting speed
: Set as 1 or 30cps

※CP1, CP2 (INHIBIT), RESET input part

◎ No-voltage input (NPN)

● **Solid-state input (standard sensor: NPN output type sensor)**
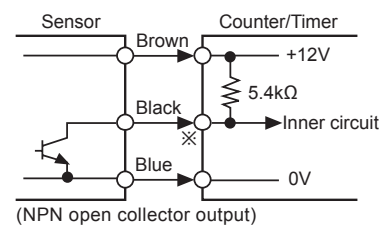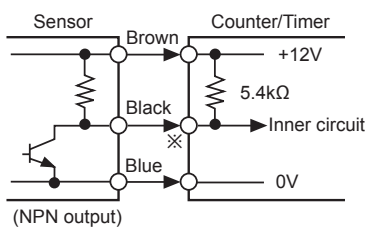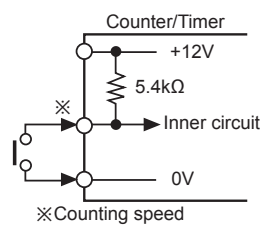
Sensor		Counter/Timer
Brown	+12V
	5.4kΩ
Black	Inner circuit
※	
Blue	0V

(NPN output)

Sensor		Counter/Timer
Brown	+12V
	5.4kΩ
Black	Inner circuit
※	
Blue	0V

(NPN open collector output)

● **Contact input**

	Counter/Timer
	+12V
	5.4kΩ
※	Inner circuit
	0V

※Counting speed
: Set as 1 or 30cps

※CP1, CP2 (INHIBIT), RESET input part

■ Input & Output Connections

◎ When operation load by sensor power

PR18-5DP

8	9	10	11	12	13	14

CP1 CP2 +12VDC 0VDC

N.O. N.C. COM

1	2	3	4	5	6	7

(power for operating load) Load2 SOURCE
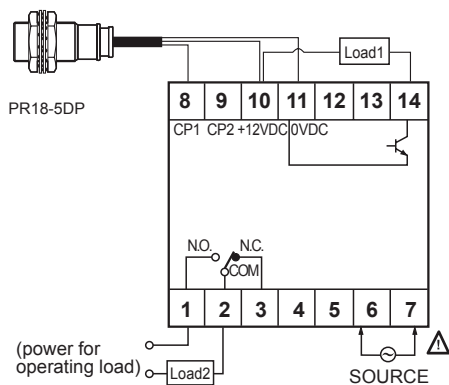
- The sum of operating current capacity of load 1 and sensor should not be over external power capacity (50mA).

◎ When operating load by external power

(+)Constant-voltage circuit (-)

Load1

8	9	10	11	12	13	14

CP1 CP2 +12VDC 0VDC

N.O. N.C. COM

| 1	2	3	4	5	6	7

(power for operating load) Load2 SOURCE
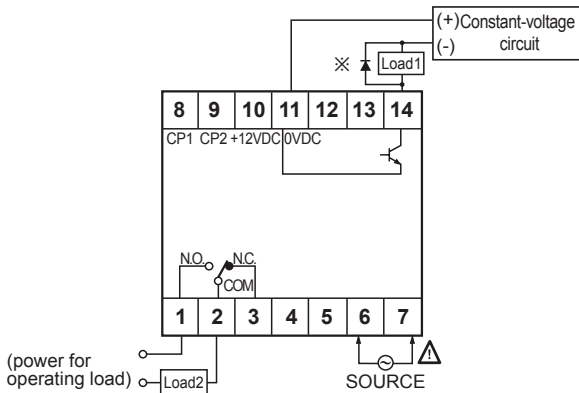
- The capacity of load 1 should not be over transistor switching capacity (max. 30VDC, 100mA)
- Do not supply the reverse polarity power.
※when using inductive load (relay, etc.), connector surge absorber at both ends of the load 1

◎ How to count by external power supply

This unit starts to count when [H] (5-30VDC) is applied at CP1 or CP2 after selecting PNP.

Limit switch contact (+) External (-) power supply

8	9	10	11	12	13	14

CP1 CP2 +12VDC 0VDC

(FX4M)
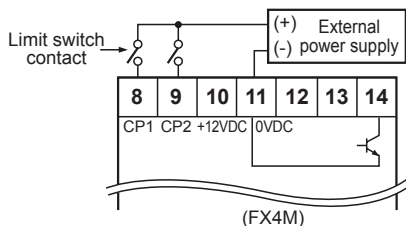
◎ Using 2 counters with one sensor

Please connect as the power of sensor is supplied from only one of counters and design input logic with same way.
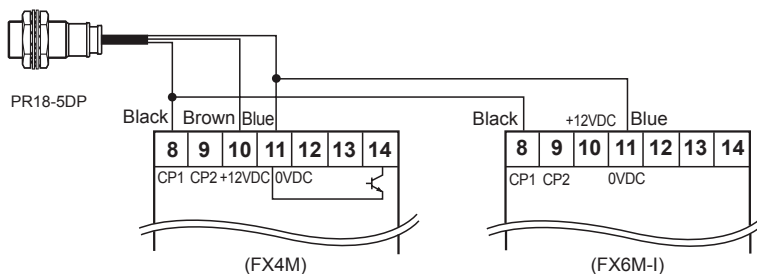
PR18-5DP

Black Brown Blue

8	9	10	11	12	13	14

CP1 CP2 +12VDC 0VDC

(FX4M)

Black +12VDC Blue

8	9	10	11	12	13	14

CP1 CP2 0VDC

(FX6M-I)

FXM/FXH Series

■ DIP Switch Setting

◎ FXM Series

- One-shot of OUT1
- Output operation mode
- Up/Down mode
- Input operation mode (counter)
- Time range (timer)
- Memory backup
- Counter/Timer
- Max. counting speed (counter)
- Input logic (NPN/PNP)

Counter/Timer

◎ FXH Series

	8	7	6	5	4	3	2	1		5	4	3	2	1	
ON											■				Factory default
OFF	■	■	■	■	■	■	■	■		■		■	■	■	

SW1 ———— SW2
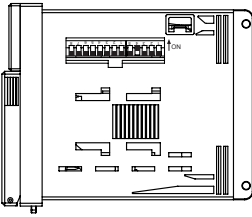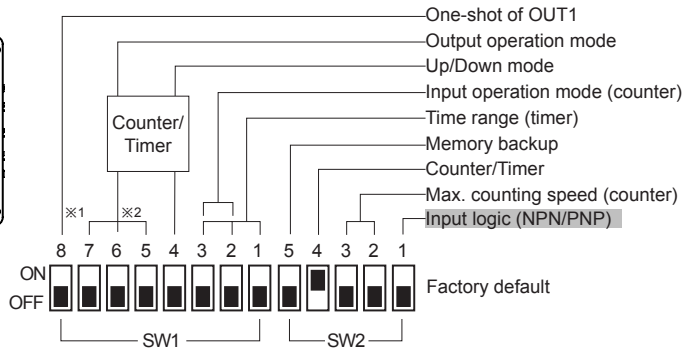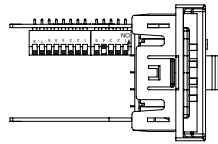
※1: Only 2-stage setting model has no. 8 of SW1.
※2: Indicator model does not have no. 5, 6, 7, 8 of SW1.

● Input logic (CP1, CP2, INHIBIT, RESET input)

SW2		Function
1	ON ■ / OFF □	NPN (no-voltage input)
	ON □ / OFF ■	PNP (voltage input)

● Max. counting speed (counter)

SW2	ON OFF ■■ (3 2)	ON OFF ■■ (3 2)	ON OFF ■■ (3 2)	ON OFF ■■ (3 2)
Function	1cps	30cps	2kcps	5kcps

● Counter/Timer

SW2		Function
4	ON ■ / OFF □	Counter mode
	ON □ / OFF ■	Timer mode

● Memory backup

SW2		Function
5	ON ■ / OFF □	No memory backup
	ON □ / OFF ■	Memory backup

● Up/Down mode

SW1		Function
4	ON ■ / OFF □	Down mode
	ON □ / OFF ■	Up mode

● Time range (timer)

SW1 (3 2 1)	4-digit	6-digit	8-digit
ON OFF ■■■	99.99sec	99999.9sec	999999.99sec
ON ■ OFF ■■	999.9sec	999999sec	9999999.9sec
ON ■ OFF ■	9999sec	99min 59.99sec	99999999sec
ON ■■ OFF ■	99min 59sec	999min 59.9sec	99999min 59.9sec
ON ■ OFF ■■	999.9min	99999.9min	9999999.9min
ON ■ ■ OFF ■	99hour 59min	99hour 59min 59sec	999hour 59min 59.9sec
ON ■■ OFF ■	999.9hour	9999hour 59min	9999hour 59min 59sec
ON ■■■ OFF	9999hour	99999.9hour	99999hour 59.9min

● One-shot output of OUT1

SW1		Function
8	ON ■ / OFF □	One-shot output of OUT1
	ON □ / OFF ■	Self-holding output of OUT1

※This function is for setting one-shot output (0.5 sec fixed) or self-holding output (until OUT2 turns OFF) of OUT1 at 2-stage setting model.

※Example of output operation mode F

RESET
2nd setting
1st setting
0.5 sec
One-shot output
OUT1
Self-holding output
OUT2 (OUT)
Self-holding output
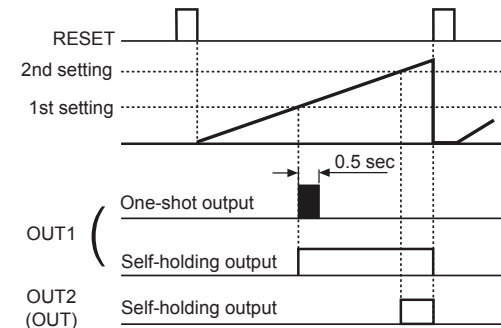
■ Input Operation Mode (Counter)

※CP: Clock Pulse

Input mode		SW1	Voltage input (PNP) method	No-voltage input (NPN) method
Up mode ON 4 OFF ■	Up/Down-A (command input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count 0 1 2 3 2 1 2 3	CP1, CP2, Count 0 1 2 3 2 1 2 3
	Up/Down-B (individual input)	ON ■ 3 2 OFF ■	CP1, CP2, Count 0 1 2 3 2 1 1 2 3	CP1, CP2, Count 0 1 2 3 2 1 1 2 3
	Up/Down-C (phase difference input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count 0 1 2 3 2 1 2 3 (BBBB)	CP1, CP2, Count 0 1 2 3 2 1 2 3 (BBBB)
	Up (adding input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count 0 1 2 3 (No counting) 4 5 / CP1 (No counting), CP2, Count 0 1 2 3 4 5	CP1, CP2, Count 0 1 2 3 (No counting) 4 5 / CP1 (No counting), CP2, Count 0 1 2 3 4 5
Down mode ON ■ 4 OFF	Up/Down-D (command input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-2 n-3 0	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-2 n-3 0
	Up/Down-E (individual input)	ON ■ 3 2 OFF ■	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-1 n-2 n-3 0	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-1 n-2 n-3 0
	Up/Down-F (phase difference input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-2 n-3 0 (BBBB)	CP1, CP2, Count n n-1 n-2 n-3 n-2 n-1 n-2 n-3 0 (BBBB)
	Down (subtracting input)	ON ■ 3 2 OFF ■ ■	CP1, CP2, Count n n-1 n-2 n-3 (No counting) n-4 n-5 0 / CP1 (No counting), CP2, Count n n-1 n-2 n-3 n-4 n-5 0	CP1, CP2, Count n n-1 n-2 n-3 (No counting) n-4 n-5 0 / CP1 (No counting), CP2, Count n n-1 n-2 n-3 n-4 n-5 0

※A: over min. signal width, B: over than 1/2 of min. signal width. If the signal is smaller than these width, it may cause counting error (±1).

Side index:
(A) Photoelectric Sensors
(B) Fiber Optic Sensors
(C) Door/Area Sensors
(D) Proximity Sensors
(E) Pressure Sensors
(F) Rotary Encoders
(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets
(H) Temperature Controllers
(I) SSRs / Power Controllers
(J) Counters
(K) Timers
(L) Panel Meters
(M) Tacho / Speed / Pulse Meters
(N) Display Units
(O) Sensor Controllers
(P) Switching Mode Power Supplies
(Q) Stepper Motors & Drivers & Controllers
(R) Graphic/ Logic Panels
(S) Field Network Devices
(T) Software

FXM/FXH Series

◉ Output Operation Mode

One-shot output of OUT2 (0.05 to 5 sec)	Self-holding output / One-shot output of OUT1 (0.5 sec fixed)	Self-holding output

| Output mode (SW1)	ON 4 OFF Up mode — Up, Up/Down-A, B, C	ON 4 OFF Down mode — Down, Up/Down-D, E, F	Operation
F — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value increases or decreases until reset signal input is applied and self-holding output is maintained.
N — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value and self-holding output are maintained until reset signal input is applied.
C — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	When count-up, counting display value is reset and it counts simultaneously. Self-holding output of OUT1 turns OFF after one-shot output time of OUT2. One-shot output time of OUT1 is regardless of OUT2 output.
R — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value is reset after one-shot output time of OUT2 and it counts simultaneously. Self-holding output of OUT1 turns OFF after one-shot output time of OUT2. One-shot output time of OUT1 is regardless of OUT2 output.
K — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value increases or decreases until reset signal input is applied. Self-holding output of OUT1 turns OFF after one-shot output time of OUT2. One-shot output time of OUT1 is regardless of OUT2 output.
P — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value is maintained while OUT2 output is ON. Counting value is internally reset and it counts simultaneously. When OUT2 output is OFF, displays counting value while OUT2 output is ON, and it increases or decreases. Self-holding output of OUT1 turns OFF after one-shot output time of OUT2.
Q — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	After count-up, counting display value increases or decreases during one-shot time of OUT2. Self-holding output of OUT1 turns OFF after one-shot output time of OUT2. One-shot output time of OUT1 is regardless of OUT2 output.
S Counter mode — ON 7 6 5 / OFF	**Up**: RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT) — **Up/Down-A, B, C**: RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	**Down**: RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT) — **Up/Down-D, E, F**: RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	● Up, Up/Down-A, B, C input mode : OUT1 output maintains ON when counting display value is larger or equal than 1st setting value. OUT2 output maintains ON when counting display value is larger or equal than 2nd setting value. ● Down, Up/Down-D, E, F input mode : OUT1 output maintains ON when counting display value is smaller or equal than 1st setting value. OUT2 output maintains ON when counting display value is smaller or equal than 2nd setting value.
S Timer mode — ON 7 6 5 / OFF	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	RESET, 2nd setting, 1st setting, 0, OUT1, OUT2 (OUT)	OUT1 and OUT2 turns OFF→ON→OFF repeatedly (flicker).

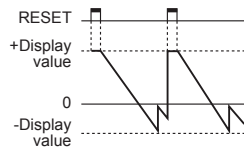※Set one-shot output time by front TIME volume switch.

■ Counting & Time Operation For Indicator (FX□M-I4)

◎ Counting operation

● **Input mode: Up**
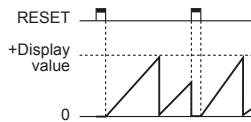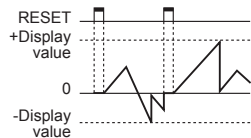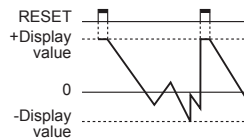

● **Input mode: Down**
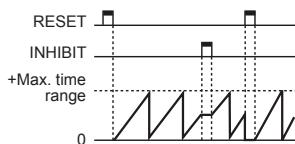

● **Input mode: Up / Down-A, B, C**

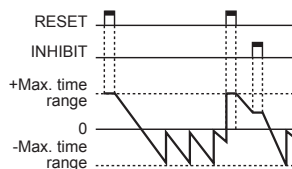● **Input mode: Up / Down-D, E, F**
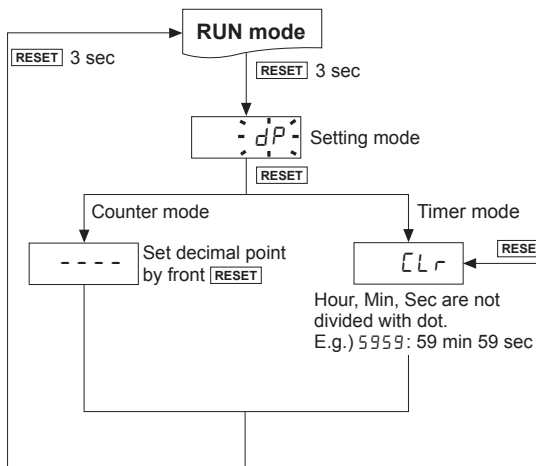

◎ Time operation

● **Up mode**

● **Down mode**

■ Dot For Decimal Point / Hour. Min. Second

※In run mode, hold the RESET key for over 3 sec, and it enters setting mode [dP].

※In setting mode, hold the RESET key for over 3 sec, and it saves the setting and returns to RUN mode.

※If there is no RESET key input for 60 sec when entering setting mode, it returns to RUN mode.

Counter mode

- - - - Set decimal point by front RESET

Timer mode

CLr Hour, Min, Sec are not divided with dot. E.g.) 5959 : 59 min 59 sec

SEt Hour, Min, Sec are divided with dot. E.g.) 0.59.59 : 59 min 59 sec

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels

(S) Field Network Devices

(T) Software

FXM/FXH Series

■ 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.
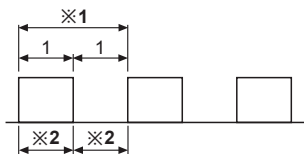
● Reset signal width
It is reset perfectly when the reset signal is applied during **min. 20ms** regardless of the contact input & solid-state input.
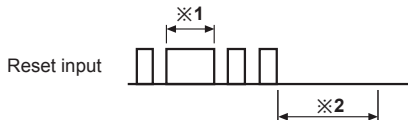
Reset input

※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.
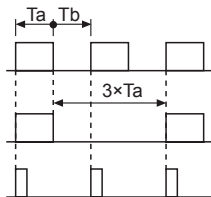
◎ Min. count signal width

※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 min. 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. signal width (Ta).

◎ Error

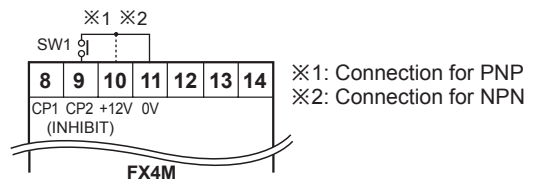| Display	Error	Troubleshooting
$Err0$	Setting value is 0.	Change the setting value anything but 0.

※If error occurs, the output turns OFF.
※In case of 2-stage setting model, error displays when 2nd setting value is 0 (zero).
※1st setting value is set as 0 (zero), OUT1 maintains OFF. 2nd setting value is smaller than 1st setting value, 1st setting value is ignored and only OUT2 output operates.
※Indicator model does not have error display function.

◎ INHIBIT (for timer)

※1 ※2
SW1

| 8	9	10	11	12	13	14
CP1	CP2	+12V	0V			
(INHIBIT)						

FX4M

※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.

INHIBIT
Max. display value
Time
0
(UP mode)
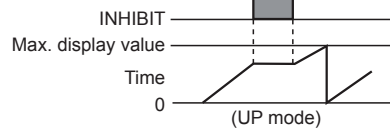
◎ Power
● The inner circuit voltage rises within 100ms after supplying the power to the unit. The input may be unavailable at this period. Be sure that the inner circuit voltage drops within 500ms after turning OFF the power.
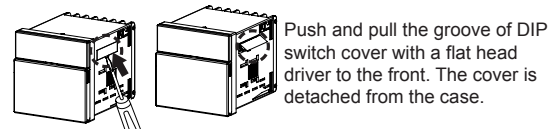
Power — ON / OFF
100ms — Unstable time for input signal — 500ms
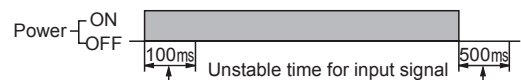
● Use the unit within the rated power supply. When supplying or cutting the power, use a switch not to occur chattering.
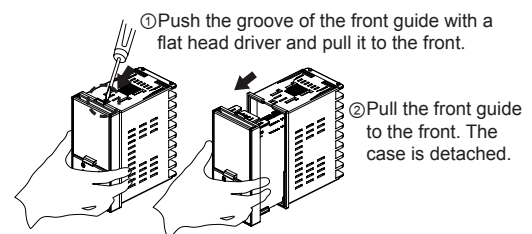
Power — ON / OFF   Power — ON / OFF

◎ Detaching Case or DIP Switch Cover
※Turn OFF the power before detaching the case or DIP switch cover.

● FXM Series

Push and pull the groove of DIP switch cover with a flat head driver to the front. The cover is detached from the case.

● FXH Series

①Push the groove of the front guide with a flat head driver and pull it to the front.

②Pull the front guide to the front. The case is detached.

⚠ Be sure not to be wounded when using a tool.

Autonics