

# Autonics

## LCD Display Counter/Timer

### CX SERIES

#### INSTRUCTION MANUAL



Thank you for choosing our Autonics product.  
Please read the following safety considerations before use.

### Safety Considerations

- ※ Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ※ Safety considerations are categorized as follows.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.

※ The symbols used on the product and instruction manual represent the following  
 ▲ symbol represents caution due to special circumstances in which hazards may occur.

### Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g., nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/discard prevention device, etc.)  
Failure to follow this instruction may result in personal injury, fire, or economic loss.
- The unit must be installed on a device panel before use.**  
Failure to follow this instruction may result in electric shock.
- Do not connect, repair, or inspect the unit while connected to a power source.**  
Failure to follow this instruction may result in electric shock.
- Do not disassemble or modify the unit. Please contact us if necessary.**  
Failure to follow this instruction may result in electric shock or fire.

### Caution

- Do not use the unit outdoors.**  
Failure to follow this instruction may result in shortening the life cycle of the unit, or electric shock.
- When connecting the power input and relay output cables, use AWG20 (0.05mm<sup>2</sup>) cables and make sure to tighten the terminal screw bolt above 0.74 to 0.90N·m.**  
Failure to follow this instruction may result in fire due to contact failure.
- Use the unit within the rated specifications.**  
Failure to follow this instruction may result in shortening the life cycle of the unit, or fire.
- Do not use loads beyond the rated switching capacity of the relay contact.**  
Failure to follow this instruction may result in fire or explosion.
- Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat, vibration, or impact may be present.**  
Failure to follow this instruction may result in fire or explosion.
- Keep dust and wire residue from flowing into the unit, contact melt, contact failure, relay broken, or fire.**  
Failure to follow this instruction may result in fire or product damage.

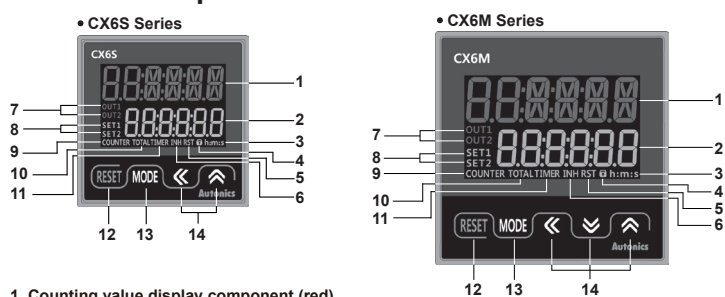
### Manual

For more information about counter/timer, refer to user manual.  
Visit our website ([www.autonics.com](http://www.autonics.com)) and download it.

### Ordering Information

CX	6	S	-	1P	F
Signal input method	No mark	Selectable voltage input (PNP), no-voltage input (NPN)			
Power supply	F	Free voltage input			
Output	4	24VAC 50/60Hz, 24-48VDC			
Size	1P	1-stage setting			
Display digit	2P	2-stage setting			
Item	S	DIN W48×H48mm			
	M	DIN W72×H72mm			
	6	999999 (6-digit)			
	CX	LCD Display Counter/Timer			

### Unit Description



- Counting value display component (red)**  
RUN mode: Displays counting value for counter operation or time progress value for timer operation.  
Function setting mode: Displays parameter.
- Setting value display component (green)**  
RUN mode: Displays setting value.  
Function setting mode: Displays parameter setting value.
- Time unit indicator (h:m:s):** Turns ON for time unit for timer.
- Key lock indicator (LK):** Turns ON for key lock setting.
- Reset input indicator (RST):** Turns ON for reset key input or reset signal input.
- INH indicator (INH)**  
For selectable voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□), it turns ON for INHIBIT input signal. (In case of CX6S Series and timer mode, it turns ON for INH/INH signal input.)  
For free voltage input model (CX6□-□□□ F), it turns ON for INB/INH input signal for timer.
- Output indicator (OUT1, OUT2):** Turns ON for the dedicated control output ON.
- SV checking and changing indicator (SET, SET1, SET2) (green)**  
Turns ON when checking and changing SV.
- COUNTER indicator (COUNTER):** Turns ON for counter operation.
- TOTAL indicator<sup>※1</sup> (TOTAL)**  
In case of TOTAL counter display mode, it turns ON with the COUNTER indicator.
- TIMER indicator (TIMER)**  
In case of signal ON start, max. ±0.01% ±0.00s  
1: Flashes (progressing time) or Turns ON (stopping time) for timer operation.
- RESET key**  
RUN mode: Function setting mode  
Press the **[RESET]** key to reset the counting value and turn OFF the output.  
TOTAL counter display mode<sup>※1</sup>: Press the **[RESET]** key to reset the counting value of TOTAL counter.
- MODE key**  
RUN mode: Hold the **[MODE]** key over 3 sec to enter function setting mode.  
Press the **[MODE]** key over 3 sec to return RUN mode.  
Function setting mode: Hold the **[MODE]** key over 1 sec to return RUN mode.  
Changing SV mode: Press the **[MODE]** key to save SV and return RUN mode.
- ▲/▼ key**  
RUN mode: Press the **▲/▼** key to change SV and move SV (SET, SET1, SET2) digits.  
Changing SV mode: Press the **▲/▼** key to change digits.  
Changing SV mode: Increases or Decreases SV.  
Function setting mode: Changes the settings.

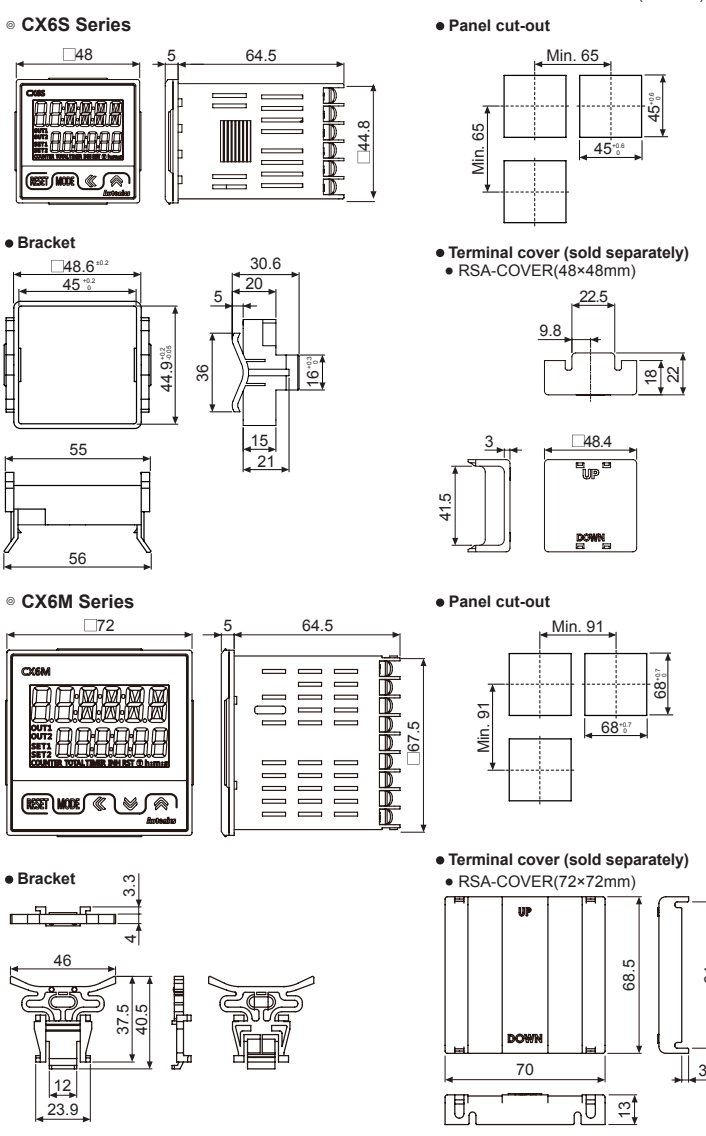
※1: For selectable voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□).

### Specifications

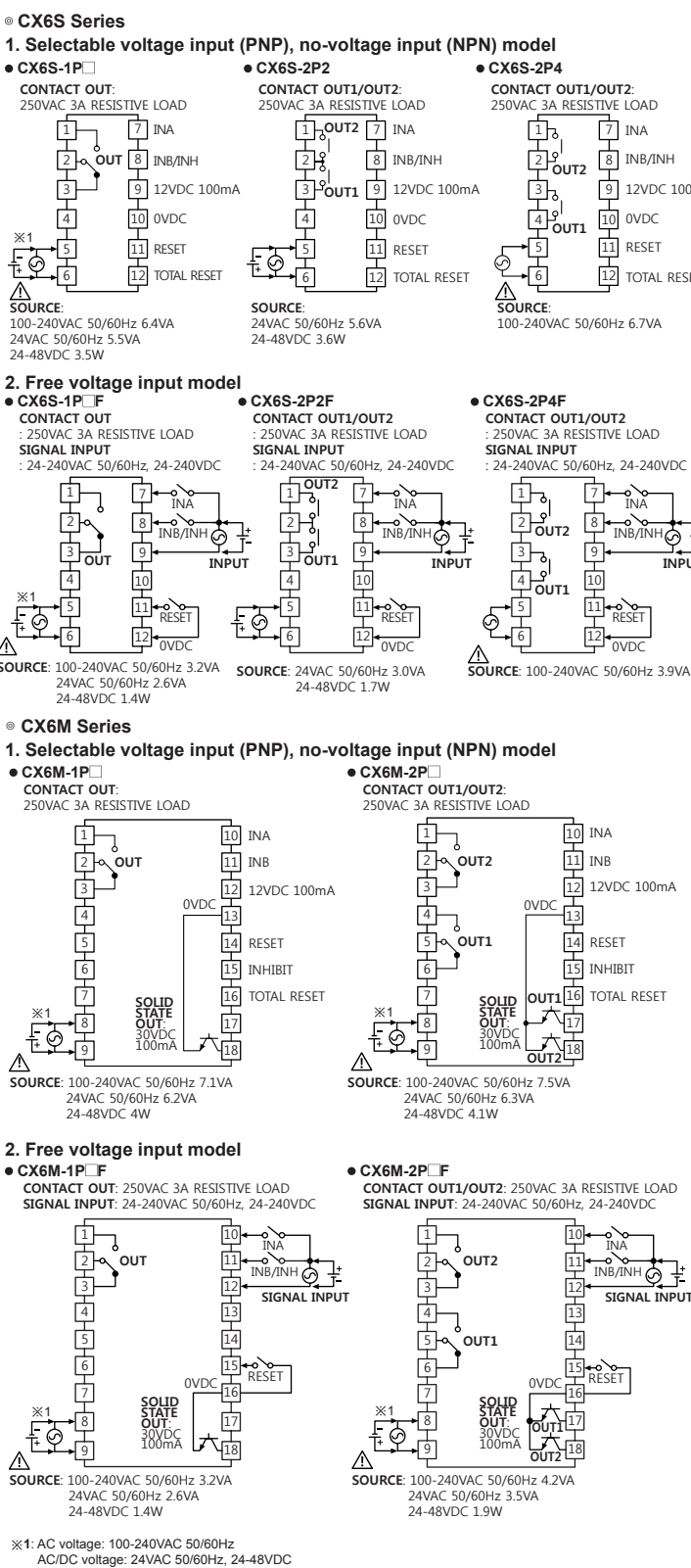
Model	CX6S-1P□□	CX6S-2P□□	CX6M-1P□□	CX6M-2P□□
Display digits	6-digit	7-digit (1st, 2nd digits of counting value display: red, setting value display: green)	7×13mm	5×9mm
Character size (W×H)	4.5×10mm	3.5×7mm		
Power supply	AC voltage: 100-240VAC~50/60Hz	24VAC~50/60Hz, 24-48VDC	Max. 6.7VA	Max. 7.1VA
Permissible voltage range	90 to 110% of rated voltage		Max. 3.2VA	Max. 3.2VA
AC voltage	CX6□-□□□	AC: Max. 5.5VA	AC: Max. 5.6VA	AC: Max. 6.2VA
AC/DC voltage	CX6□-□□□	DC: Max. 3.5W	DC: Max. 3.6W	DC: Max. 4.1W
AC/DC voltage	CX6□-□□□	AC: Max. 2.8VA	AC: Max. 3.0VA	AC: Max. 2.6VA
AC/DC voltage	CX6□-□□□	DC: Max. 1.4W	DC: Max. 1.7W	DC: Max. 1.4W
Max. INA/INB counting speed	CX6□-□□□	Selectable 1cps/30cps/300cps/1kcps/5kcps		
Counting range	CX6□-□□□	999999, 9999.99, 9999.99, 9999.99, 99m59.99s, 99m59.99s, 99m59.99s, 99m59.99s, 99m59.99s, 99m59.99s		
Scale	CX6□-□□□	Decimal point up to fifth digit		
Min. signal width	CX6□-□□□	RESET, TOTAL RESET signal: Selectable 1ms/20ms		
Time range	CX6□-□□□	RESET signal: 25ms		
Operation mode	CX6□-□□□	Up, Down		
Min. signal width	CX6□-□□□	INA, INHIBIT, RESET, TOTAL RESET signal: Selectable 1ms/20ms		
Repeat error	CX6□-□□□	[CX6□-□□□] In case of power ON start: max. ±0.01% ±0.05s		
Set error	CX6□-□□□	In case of signal ON start: max. ±0.01% ±0.03s		
Voltage error	CX6□-□□□	[CX6□-□□□] In case of power ON start: max. ±0.01% ±0.08s		
Temp. error	CX6□-□□□	In case of signal ON start: max. ±0.01% ±0.08s		
Selectable voltage input (PNP) or no-voltage input (NPN)	CX6□-□□□	[Voltage input (PNP)] input impedance: 10kΩ, [No-voltage input (NPN)] input impedance: 1kΩ, [No-voltage input (NPN)] short-circuit residual voltage: max. 2VDC		
[Free voltage input]-INA (START), INB (INHIBIT) input	CX6□-□□□	[Free voltage input]-INA (START), INB (INHIBIT) input [H]: 24-240VDC~24-240VAC~50/60Hz, [L]: 0-10VDC/VAC		
[No-voltage input]-RESET input	CX6□-□□□	[No-voltage input]-RESET input short-circuit residual voltage: max. 1kΩ, short-circuit residual voltage: max. 2V		
One-shot output time	CX6□-□□□	0.01 to 99.99s setting		
Contact	CX6□-□□□	Type: SPDT (1c): 1A SPST (1a): 2A SPDT (1c): 1 SPDT (1c): 2		
Capacity	CX6□-□□□	Max. 250VAC~3A resistive load		
Control output	CX6□-□□□	Type: NPN open collector: 1NPN open collector: 2		
State	CX6□-□□□	Max. 30VDC~100mA		
External power supply	CX6□-□□□	Max. 12VDC~±10%, 100mA		
Memory retention	CX6□-□□□	Approx. 10 years (non-volatile memory)		
Insulation resistance	CX6□-□□□	Over 100MΩ (at 500VDC megger)		
Dielectric strength	CX6□-□□□	2,000VAC 50/60Hz for 1 min		
Noise immunity	CX6□-□□□	Square-wave noise by noise simulator (pulse width 1μs) ±2kV		
AC voltage	CX6□-□□□	Square-wave noise by noise simulator (pulse width 1μs) ±500V		
Mechanical	CX6□-□□□	0.75mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 1 hour		
Vibration	CX6□-□□□	0.5mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 minutes		
Shock	CX6□-□□□	300m/s <sup>2</sup> (approx. 30G) in each X, Y, Z direction for 3 times		
Relay life	CX6□-□□□	100m/s <sup>2</sup> (approx. 10G) in each X, Y, Z direction for 3 times		
Protection structure	CX6□-□□□	Min. 5,000,000 operations		
Environment	CX6□-□□□	Min. 100,000 operations		
Ambient temp.	CX6□-□□□	Front part: IP50 (IEC standard)		
Ambient humi.	CX6□-□□□	-10 to 55°C, storage: -25 to 65°C		
Approval	CX6□-□□□	35 to 85%RH, storage: 35 to 85%RH		

- ※1: For selectable voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□).
- ※2: The weight includes packaging. The weight in parenthesis is for unit only.
- ※Environment resistance is rated at no freezing or condensation.
- ※The above specifications are subject to change and some models may be discontinued without notice.

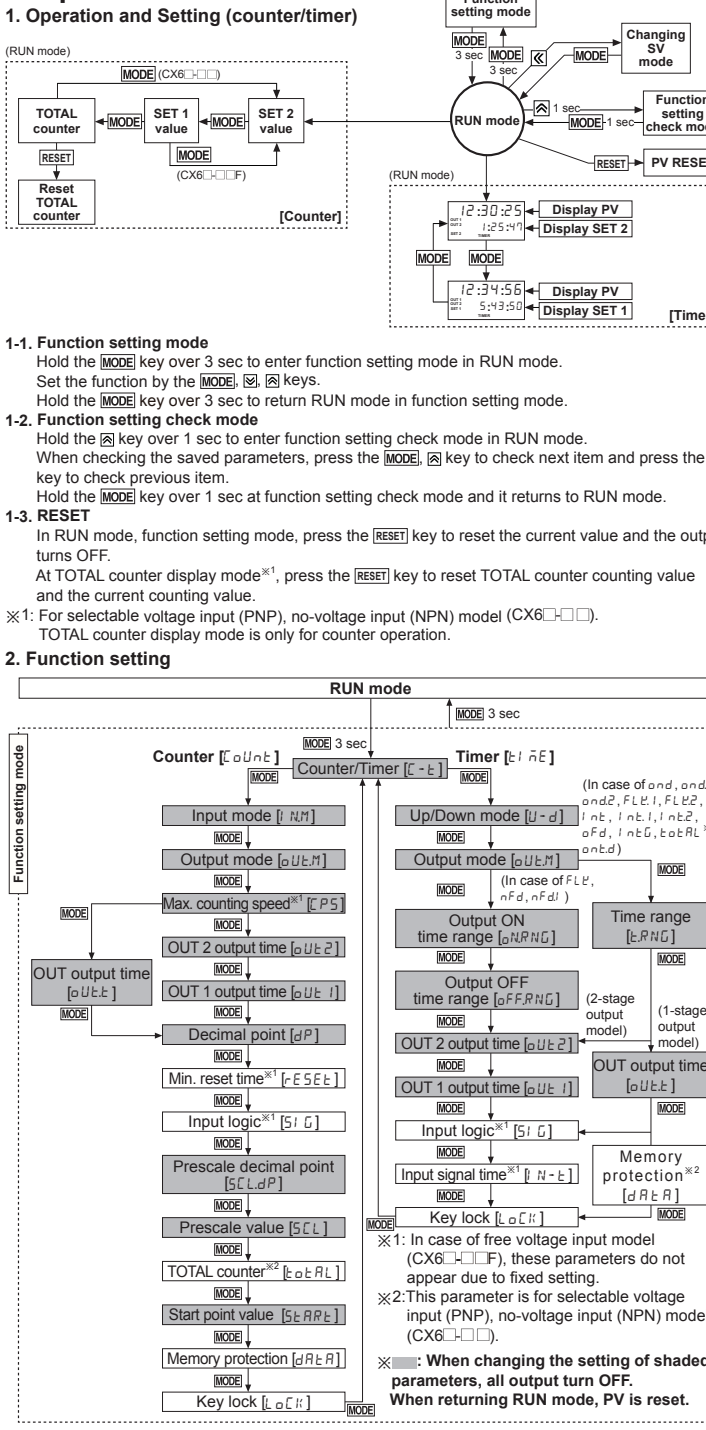
### Dimensions



### Connections



### Operations

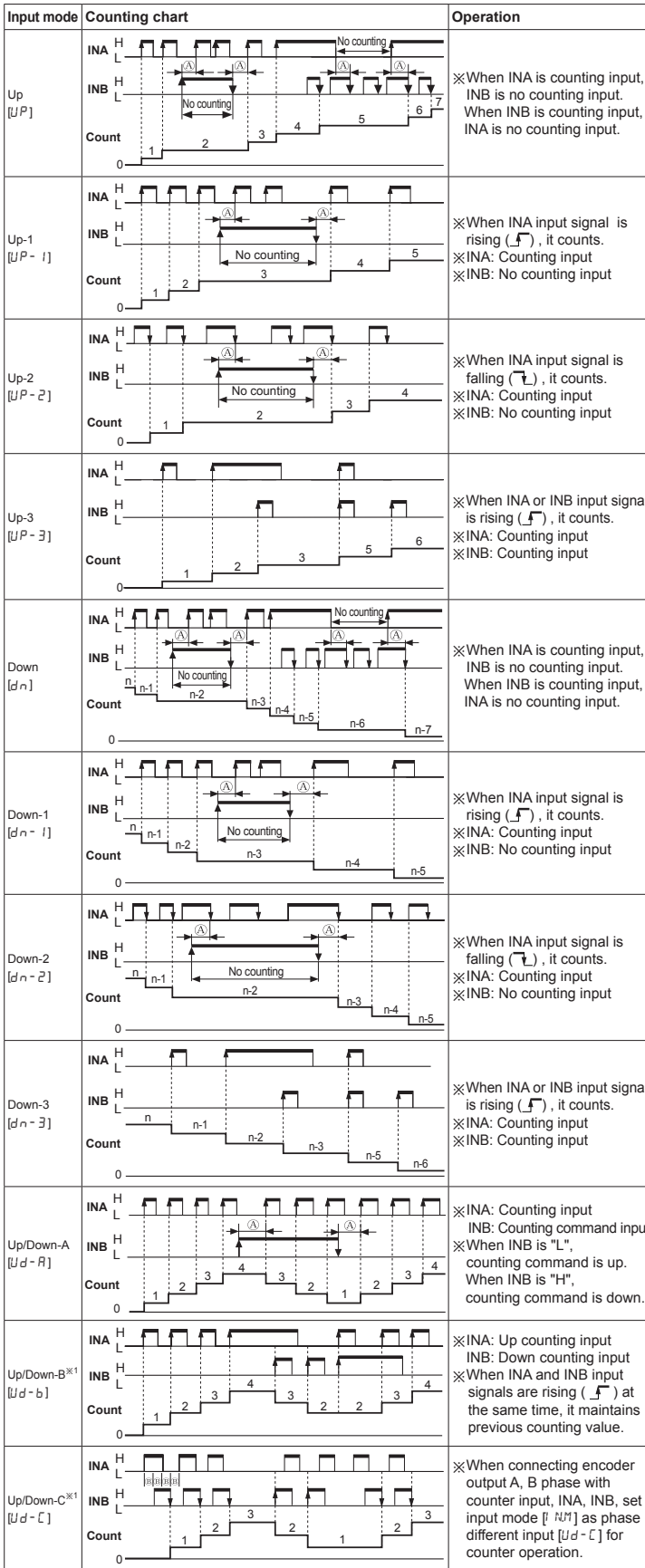


### Counter Mode

Parameter	Parameter setting
Counter/Timer [C-1]	CoUnb ← t1 nE ※CoUnb: Counter t1 nE: Timer
Input mode [I nI]	UP ← UP-1 ← UP-2 ← UP-3 ← dn ← dn-1 Ud ← C n1 ← Ud-R n1 ← Ud-R ← dn-3 ← dn-2
Output mode [oU nI]	• Input mode is UP, UP-1, UP-2, UP-3 or dn, dn-1, dn-2, dn-3. F ← n1 ← n2 ← n3 ← P ← n4 ← n5 ← n6 • Input mode is Ud-R, Ud-b n1, Ud-C n1 F ← n1 ← n2 ← n3 ← P ← n4 ← n5 ← n6 • If max. counting speed is 5kcps, and output mode is d, max. counting speed is automatically changed as 30cps, factory default.
Max. counting speed <sup>※1</sup> [P5]	30 ← 300 ← 1k ← 5k ← 1 • Max. counting speed is 1:1. It is applied for INA, or INB input as same. • When output mode is d, set max. counting speed one among 1cps, 30cps, 300cps, or 1kcps.
OUT 2 output time <sup>※3</sup> [oU nI]	• Set one-shot output time of OUT 2. • Setting range: 00.01 to 99.99 sec • When output mode is F, n1, n5, t, d, this parameter does not appear. (fixed as HOLD)
OUT 1 output time <sup>※3</sup> [oU nI]	• Set one-shot output time of OUT 1. • Setting range: 00.01 to 99.99 sec, Hold • When 1st digit is flashing, press the <b>[▲]</b> key once and HoL d appears. • When output mode is F, n1, n5, t, d, this parameter does not appear. (fixed as HOLD)
OUT output time <sup>※3</sup> [oU nI]	• Setting range: 00.01 to 99.99 sec • When output mode is F, n1, n5, t, d, this parameter does not appear. (fixed as HOLD)
Decimal point <sup>※4</sup> [dP]	• Decimal point is applied to PV and SV.
Min. reset time <sup>※5</sup> [rESEt]	1 ← 20, unit: ms • Set min. width of external reset signal input.
Input logic <sup>※6</sup> [S1 G]	nPn: No-voltage input, nPn: Voltage input
Prescale decimal point <sup>※7</sup> [SCLdP]	• Decimal point of prescale should not set smaller than decimal point [dP].
Prescale value [SCL]	• Setting range: 0.00001 to 9999.9 • Setting range of prescale is linked with prescale decimal point [SCLdP] setting.
TOTAL counter <sup>※8</sup> [t oU nI]	o n ← oFF • Setting range of start point value is linked with decimal point [dP] setting. (0.00000 to 999999) • When input mode is dn, dn-1, dn-2, this parameter does not appear. • When total count function is ON, this parameter does not appear. <sup>※9</sup>
Start point value [St nPn]	• Setting range: 0.00000 to 999999 • When input mode is dn, dn-1, dn-2, this parameter does not appear. • When total count function is ON, this parameter does not appear. <sup>※9</sup>
Memory protection [dR nI]	CLr ← rEC • CLr: Resets the counting value when power OFF. • rEC: Maintains the counting value when power OFF. (memory protection)
Key lock [Lo nI]	LoFF ← LoC 1 LoC 1: Locks <b>[▲]</b> key, key lock indicator turns ON LoC 2: Locks <b>[▼]</b> key, key lock indicator turns ON LoC 3: Locks <b>[▲]</b> key, key lock indicator turns ON

- ※1: For voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□).
- ※2: For free voltage input model (CX6□-□□□ F), these parameters do not appear due to fixed setting.
- ※3: For 1-stage setting model (CX6□-1P□□□), oU nI does not appear.
- ※4: Decimal point and prescale decimal point  
-Decimal point: Set the decimal point for display value regardless of prescale value.  
-Prescale decimal point: Set the decimal point for prescale value of counting value regardless of display value.

### Input mode



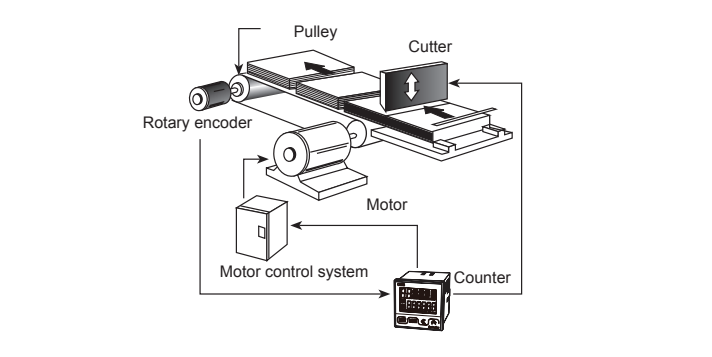
- ※1: For selectable voltage input (PNP), no-voltage input (NPN) model.
- ※A: over min. signal width, B: over 1/2 of min. signal width.  
If the signal is smaller than these width, it may cause counting error (±1).

Character	Voltage input (PNP)	No-voltage input (NPN)	Counting speed	Min. signal width
H	5-30VDC	Short	1cps	500ms
L	0-2VDC	Open	30cps	16.7ms
			300cps	1.67ms
			1kcps	0.5ms
			5kcps	0.1ms

### Prescale function

This function is to set and display calculated unit for actual length, liquid, position, etc. It is called "prescale value" for measured length, liquid, or position, etc. per 1 pulse. For example, when moving L the desired length to be measured, and P, the number of pulses per 1 revolution of a rotary encoder, occurs, prescale value is L/P.

E.g.) Positioning control by counter and encoder



[Diameter (D) of pulley connected with encoder=22mm, the number of pulses by 1 rotation of encoder=1,000]  
 \*Prescale value  

$$= \pi \times \text{Diameter (D) of pulley} = 3.1416 \times 22 = 0.069mm/pulse$$
 The number of pulses by 1 rotation of encoder = 1000  
 Set decimal point [P5] as [-----], prescale decimal point [SCLdP] as [-----], and prescale value [SCL] as [0.069] at function setting mode.  
 It is available to control conveyor position by 0.1mm unit.

### Timer Mode

Parameter	Parameter setting value
Counter/Timer [C-1]	CoUnb ← t1 nE ※CoUnb: Counter t1 nE: Timer
Up/Down mode [U nI]	UP ← dn • UP: Time progresses from '0' to the setting time. • dn: Time progresses from the setting time to '0'.
Output mode [oU nI]	o n d ← o n d 1 ← o n d 2 ← FLEt ← FLEt 1 ← FLEt 2 ← i n t ← i n t 1 o n t d ← o n t d R n1 ← i n t o ← nF d 1 ← nF d ← oF d ← i n t o n 2
Time range [r nI]	999.999 ← 999.99 ← 9999.9 ← 99999 ← 99.5999 ← 999.599
output ON TIME range [o nI nI] <sup>※1</sup> , output OFF TIME range [oF nI nI] <sup>※2</sup>	9999.99 ← 9999.59 ← 99.59.59 ← 9999.99 ← 9999.59
OUT 2 output time <sup>※3</sup> [oU nI]	• Set one-shot output time of OUT 2. • Setting range: 00.01 to 99.99 sec, Hold • When 1st digit is flashing, press the <b>[▲]</b> key once and HoL d appears.
OUT 1 output time <sup>※3</sup> [oU nI]	• Set one-shot output time of OUT 1. • Setting range: 00.01 to 99.99 sec, Hold • When 1st digit is flashing, press the <b>[▲]</b> key once and HoL d appears.
OUT output time <sup>※3</sup> [oU nI]	• Setting range: 00.01 to 99.99 sec, Hold • When 1st digit is flashing, press the <b>[▲]</b> key once and HoL d appears.
Input logic <sup>※6</sup> [S1 G]	nPn: No-voltage input, nPn: Voltage input
Input signal time <sup>※6</sup> [r nI]	1 ← 20, unit: ms • Set min. width of INA, INHIBIT, RESET, TOTAL RESET signal
Memory protection [dR nI]	CLr ← rEC • CLr: Resets the counting value when power OFF. • rEC: Maintains the counting value when power OFF. (memory protection)
Key lock [Lo nI]	LoFF ← LoC 1 LoC 1: Locks <b>[▲]</b> key, key lock indicator turns OFF LoC 2: Locks <b>[▼]</b> key, key lock indicator turns ON LoC 3: Locks <b>[▲]</b> key, key lock indicator turns ON

- ※1: For selectable voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□).
- ※2: In case of 2-stage setting model (CX6□-2P□□□).
- ※3: When output mode is o n d, o n d 1, o n d 2, FLEt, FLEt 1, FLEt 2, i n t, i n t 1, i n t 2, oF d, i n t o, oF d, i n t o n 2, set time range [r nI].
- ※4: When output mode is FLEt, nF d, nF d 1, set output ON TIME range [o nI nI] and output OFF TIME range [oF nI nI].
- ※5: In case of 1-stage setting model (CX6□-1P□□□), oU nI output time does not appear.
- ※6: In case of free voltage input model (CX6□-□□□ F), this parameter does not appear due to fixed setting.

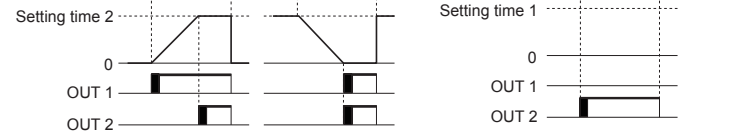
### 2. Timer '0' time setting

One-shot output (0.01 to 99.99 sec) One-shot output Retained output

### 2-1. Timer output mode for '0' time setting [o n d, i n t, o n d 2, nF d, nF d 1]

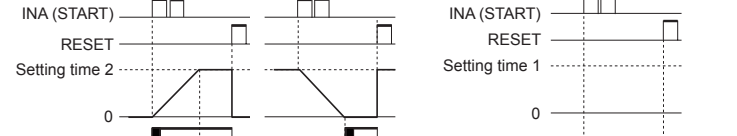
### 2-2. Operations by output mode ('0' time setting)

- A. OND (Signal ON Delay) mode [o n d]
- Set '0' for setting time 1.
  - Set '0' for setting time 2.



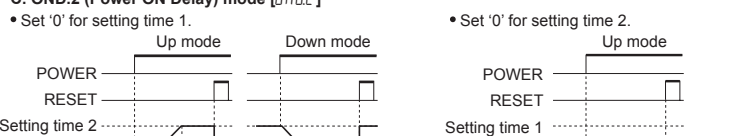
### B. OND.1 (Signal ON Delay 1) mode [o n d 1]

- Set '0' for setting time 1.
- Set '0' for setting time 2.



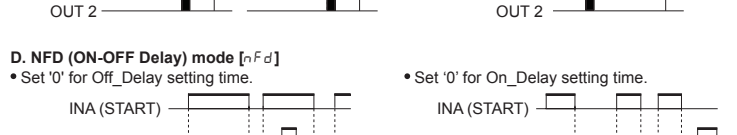
### C. OND.2 (Power ON Delay) mode [o n d 2]

- Set '0' for setting time 1.
- Set '0' for setting time 2.



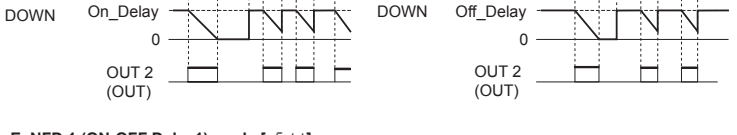
### D. NFD (ON-OFF Delay) mode [nF d]

- Set '0' for Off\_Delay setting time.
- Set '0' for On\_Delay setting time.



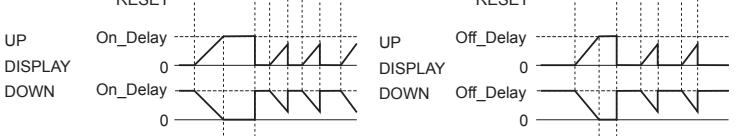
### E. NFD.1 (ON-OFF Delay1) mode [nF d 1]

- Set '0' for Off\_Delay setting time.
- Set '0' for On\_Delay setting time.



### F. NFD.2 (ON-OFF Delay2) mode [nF d 2]

- Set '0' for Off\_Delay setting time.
- Set '0' for On\_Delay setting time.



### Factory Default

Parameter	Factory default CX6□-□□□	Factory default CX6□-□□□ F
INA	Ud-C	F
oU nI	Ud-C	F
CP5	30	30
oU nI 2 (oU nI 2 <sup>※1</sup> )	HoL d (fixed)	HoL d (fixed)
oU nI 1 <sup>※1</sup>	00.10	00.10
dP	-----	-----
rESEt	20ms	---
S1 G	nPn	---
5CLdP	-----	-----
5CL	000000	000000
oU nI 2 <sup>※2</sup>	oFF	---
5ERR	000000	000000
dR nI	CLr	CLr
U-d	UP	UP
oU nI 3 <sup>※3</sup>	o n d	o n d
oU nI 2 (oU nI 2 <sup>※1</sup> )	HoL d	HoL d
oU nI 1 <sup>※1</sup>	00.10	00.10
5RNG	999999s	999999s
S1 G <sup>※2</sup>	nPn	---
I n t	20ms	---
LoC n	LoFF	LoFF
SET1	1000	1000
SET2	5000	5000

- ※1: For 1-stage setting model (CX6□-1P□□□), oU nI 2 does not appear. The output time of oU nI 2 is displayed as oU nI 2.
- ※2: For selectable voltage input (PNP), no-voltage input (NPN) model (CX6□-□□□ F).

### Cautions During Use

- Power ON/OFF**  
The inner circuit voltage rises within 100ms after supplying the power to the unit.  
The inner circuit voltage falls within 500ms after cutting the power to the unit.  
The input is unavailable at this period.  
Be sure that the inner circuit voltage drops within 500ms after turning OFF the power.
- In case of 24VAC, 24-48VDC model, power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.**
- Input signal line**  
① Shorten the cable from the sensor to the unit