Autonics

Programmable Digital Counters / Timers

CT Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Communication function supported (communication model): RS485 (Modbus RTU)
- One-shot output time setting range: 0.01 sec to 99.99 sec by setting per 10ms

[Counter]

- Prescale value setting range: 6-digit model: 0.00001 to 99999.9 /
  4-digit model: 0.001 to 999.9
- Various input / output modes (9 input /11 output modes)
- BATCH counter, count Start Point (counting initial value) setting function

[Timer]

- Various output modes (13 modes)
- Various time setting range: 6-digit model: 0.001 sec to 99999.9 hour /
  4-digit model: 0.001 sec to 9999 hour
- '0' time setting function
- Selectable timer memory retention function for indicator model.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. 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 / disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.

02. Do not use the unit in the place where flammable / explosive / corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.
Failure to follow this instruction may result in explosion or fire.

03. Install on a device panel to use.
Failure to follow this instruction may result in fire or electric shock.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

06. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. When connecting the power / sensor input, relay output and communication, use AWG 20 (0.50 mm^2) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.
Failure to follow this instruction may result in fire or malfunction due to contact failure.

02. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.

03. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.

04. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'.
  Otherwise, it may cause unexpected accidents.
- Power supply should be insulated and limited voltage / current or Class 2, SELV power supply device.
- Use the product, 0.1 sec after supplying power.
- When supplying or turning off the power, use a switch or etc. to avoid chattering.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- When the counter is operating, in case of contact input, set count speed to low speed mode (1 cps or 30 cps) to operate. If set to high speed mode (1 k, 5 k, 10 kcps), counting error occurs due to chattering.
- Use twisted pair wire for communication line.
- Keep away from high voltage lines or power lines to prevent inductive noise.
  In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
  Do not use near the equipment which generates strong magnetic force or high frequency noise.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 2
  - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

CT	❶	❷	-	❸	❹	❺

❶ Display digits
4: 4-digit
6: 6-digit

❷ Size
S: DIN W 48 × H 48 mm
Y: DIN W 72 × H 36 mm
M: DIN W 72 × H 72 mm

❸ Output
1P: 1-stage preset
2P: 2-stage preset
I: indicator

❹ Power supply
2: 24 VAC~ ± 10 % 50 / 60 Hz,
24 - 48 VDC⎓ ± 10 %
4: 100 - 240 VAC~ ± 10 % 50 / 60 Hz

❺ Communication
No mark: none
T: RS485 communication output

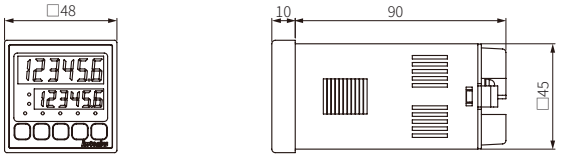
Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

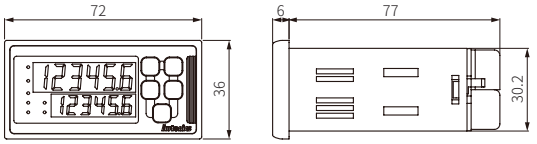
Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.

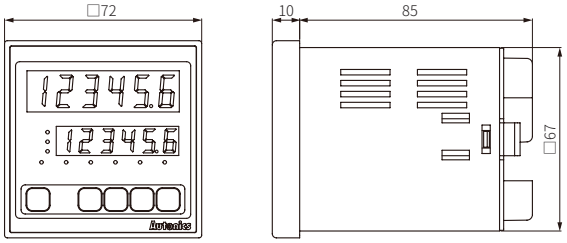
■ CTS



■ CTY

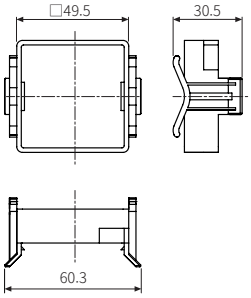


■ CTM

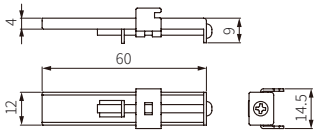


■ Bracket

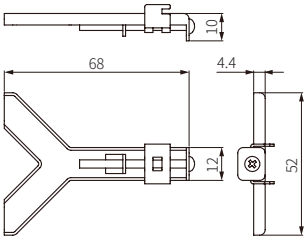
• CTS



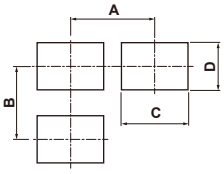
• CTY



• CTM



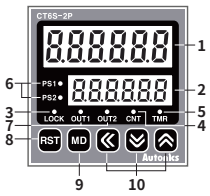
■ Panel cut-out



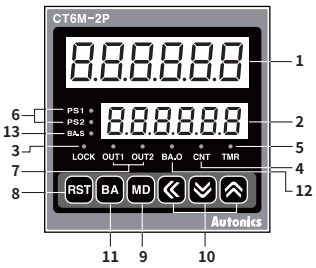
	A	B	C	D
CTS	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$
CTY	≥ 91	≥ 40	$68^{+0.7}_{0}$	$31.5^{+0.5}_{0}$
CTM	≥ 91	≥ 91	$68^{+0.7}_{0}$	$68^{+0.7}_{0}$

Unit Descriptions

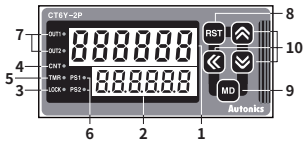
• CTS



• CTM



• CTY



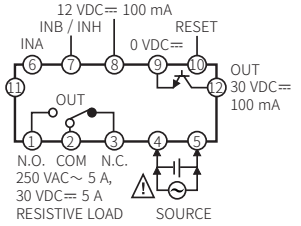
No.	Part name	Name plate	Function
1	Counting value display part (red)	-	RUN mode: Displays counting value, time progress value Parameter 1, 2 group: Displays setting item
2	Setting value display part (green)	-	RUN mode: Displays setting value Parameter 1, 2 group: Displays setting content
3	Key LOCK indicator	LOCK	Turns ON for key LOCK setting
4	Counter indicator	CNT	Turns ON for counter operation
5	Timer indicator	TMR	In timer operation - Flashes: time progress / turns ON: stopping time
6	Preset value checking, changing indicator	PS1, PS2	Turns ON when checking and changing preset value
7	Output indicator	OUT1, OUT2	Turns ON for the dedicated control output ON
8	RESET key	[RST]	Counting value RESET, BATCH counting value RESET
9	MODE key	[MD]	RUN mode ↔ Parameter 1, 2 group Move to the next when the parameter setting
10	Setting key	[◀]	Enter preset value change mode and move digits
		[▼], [▲]	Preset value of preset value change mode and setting content of parameter 1, 2 group Enter function setting check mod and move check items
11	BATCH key	[BA]	Enter BATCH counter indication mode
12	BATCH output indicator (red)	BA.O	Turns ON when BATCH output ON
13	BATCH setting value checking, changing indicator (green)	BA.S	Turns ON when checking and changing BATCH setting value

Connections

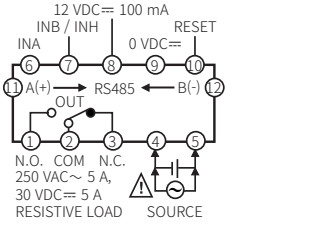
• Counter operation: If INHIBIT signal is applied, count input will be prohibited.
Timer operation: If INHIBIT signal is applied, time progressing will stop.(HOLD)
• SOURCE: 100 - 240 VAC~ 50 / 60 Hz 12 VA
24 VAC~ 50 / 60 Hz 10 VA, 24 - 48 VDC⎓ 8 W

■ CTS

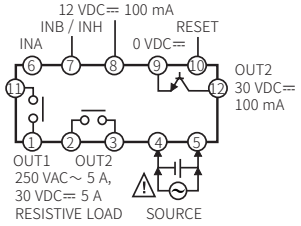
• **1-stage preset, standard model (CT□S-1P□)**



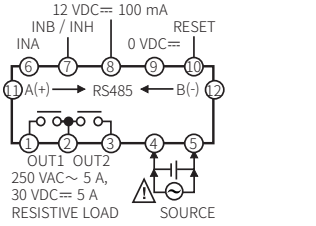
• **1-stage preset, comm. model (CT□S-1P□T)**



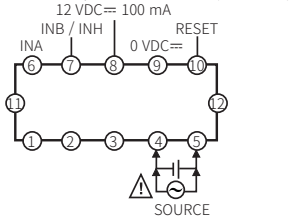
• **2-stage preset, standard model (CT□S-2P□)**



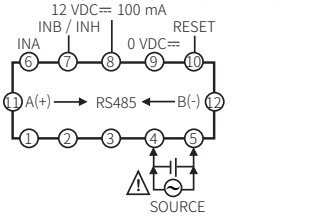
• **2-stage preset, comm. model (CT□S-2P□T)**



• **Indicator, standard model (CT6S-I□)**

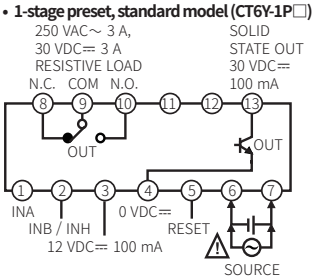


• **Indicator, comm. model (CT6S-I□T)**

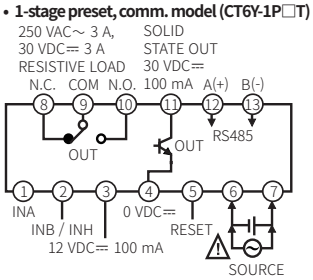


■ CTY

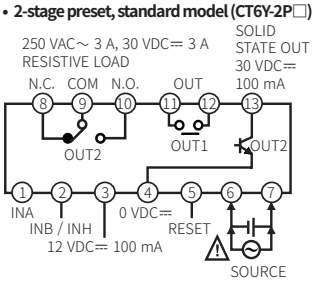
• 1-stage preset, standard model (CT6Y-1P□)



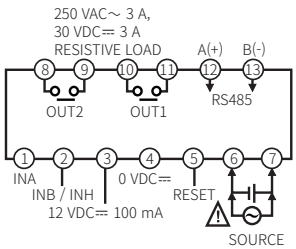
• 1-stage preset, comm. model (CT6Y-1P□T)



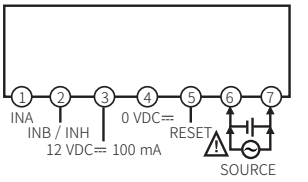
• 2-stage preset, standard model (CT6Y-2P□)



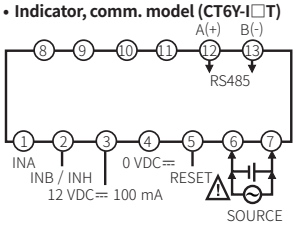
• 2-stage preset, comm. model (CT6Y-2P□T)



• Indicator, standard model (CT6Y-I□)

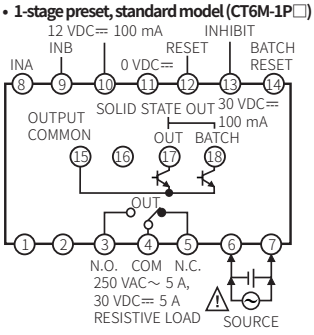


• Indicator, comm. model (CT6Y-I□T)

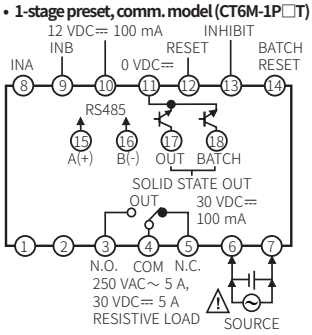


■ CTM

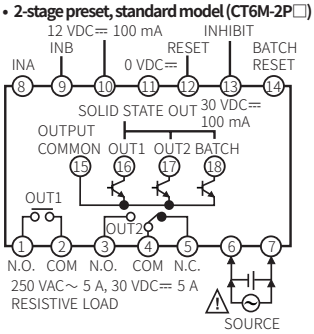
• 1-stage preset, standard model (CT6M-1P□)



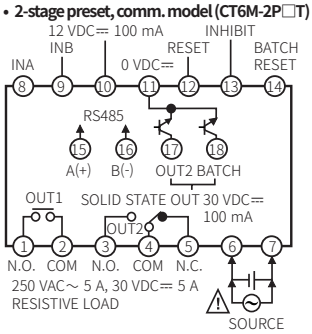
• 1-stage preset, comm. model (CT6M-1P□T)



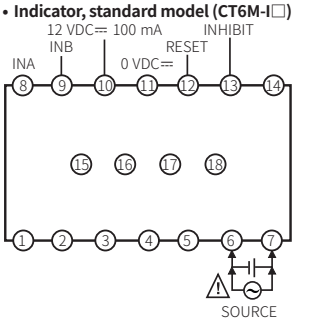
• 2-stage preset, standard model (CT6M-2P□)



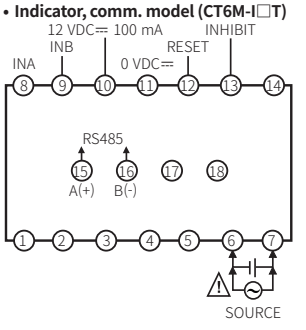
• 2-stage preset, comm. model (CT6M-2P□T)



• Indicator, standard model (CT6M-I□)



• Indicator, comm. model (CT6M-I□T)



Specifications

Model	CTS□-□□□		CTY□-□□□	CTM□-□□□
Display digits	4-digit	6-digit	6-digit	6-digit
Display method	7-segment (counting value: red, setting value: green) LED			
Character size	W × H (unit: mm)			
Counting value	6.5 × 10	4.5 × 10	4.2 × 9.5	6.6 × 13
Setting value	4.5 × 8	3.5 × 7	3.5 × 7	5 × 9
Counter	Count up, count down, count up / down			
Counting range[01]	-999 to 9999	-99999 to 999999		
Timer	Count up, count down			
Error	Repeat / SET / voltage / Temp. - Power ON Start: ≤ ± 0.01 % ± 0.05 sec Signal ON Start: ≤ ± 0.01 % ± 0.03 sec			
Input logic	Voltage input (PNP) - input impedance: 5.4 kΩ, [H]: 5 - 30 VDC⎓, [L]: 0 - 2 VDC⎓ No-voltage input (NPN) - short-circuit impedance: ≤ 1 kΩ, short-circuit residual voltage: ≤ 2 VDC⎓			
One-shot output time	0.01 to 99.99 s			
Product components	Product, instruction manual			
Bracket	Mounted		× 2	× 2
Unit weight (packaged)	≈ 159 g (≈ 212 g)		≈ 140 g (≈ 228 g)	≈ 252 g (≈ 322 g)
Approval	CE cULus EAC			

01) It varies depending on the setting of decimal points.

Model	CTS□-□□□	CTY□-□□□	CTM□-□□□
Contact control output	Relay		
Type (1-stage)	SPDT (1c) × 1	SPDT (1c) × 1	SPDT (1c) × 1
Type (2-stage)	SPST (1a) × 2	Standard: SPST (1a) × 1, SPDT (1c) × 1 Communication: SPST (1a) × 2	SPST (1a) × 1, SPDT (1c) × 1
Capacity	250 VAC~ 5 A, 30 VDC⎓ 5 A resistive load	250 VAC~ 3 A, 30 VDC⎓ 3 A resistive load	250 VAC~ 5 A, 30 VDC⎓ 5 A resistive load
Solid-state control output	NPN open collector		
Type (1-stage)	Standard: × 1, Communication: -	Standard: × 1, Communication: × 1	Standard: × 2, Communication: × 2
Type (2-stage)	Standard: × 1, Communication: -	Standard: × 1, Communication: -	Standard: × 3, Communication: × 2
Capacity	≤ 30 VDC⎓, 100 mA	≤ 30 VDC⎓, 100 mA	≤ 30 VDC⎓, 100 mA

Voltage	AC voltage type	AC / DC voltage type
Power supply	100 - 240 VAC~ ± 10 % 50 / 60 Hz	24 VAC~ ± 10 % 50 / 60 Hz, 24 - 48 VDC⎓ ± 10 %
Power consumption	≤ 12 VA	AC: ≤ 10 VA, DC: ≤ 8 W
External power supply	≤ 12 VDC⎓ ± 10 % 100 mA	
Memory retention	≈ 10 years (non-volatile semiconductor memory type)	
Insulation resistance	≥ 100 MΩ (500 VDC⎓ megger)	
Dielectric strength	2,000 VAC~ 50 / 60 Hz for 1 minute	
Noise immunity	± 2 kV square wave noise (pulse width: 1 μs) by the noise simulator	± 500 V square wave noise (pulse width: 1 μs) by the noise simulator
Vibration	0.75 mm double amplitude at frequency of 10 to 55 Hz (for 1 minute) in each X, Y, Z direction for 1 hour	
Vibration (malfunction)	0.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 minute) in each X, Y, Z direction for 10 min	
Shock	300 m/s² (≈ 30 G) in each X, Y, Z direction for 3 times	
Shock (malfunction)	100 m/s² (≈ 10 G) in each X, Y, Z direction for 3 times	
Relay life cycle	Mechanical: ≥ 1,000,000 operations Electrical: ≥ 100,000 operations	
Ambient temperature	-10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)	
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)	
Protection rating	IP65 (front part, IEC standard)	

Communication Interface

■ RS485

Comm. protocol	Modbus RTU (16-bit CRC)
Application standard	Compliance with EIA RS485
Max. connection	31-unit (address: 1 to 127)
Comm. synchronous method	Asynchronous
Comm. method	2-wire half duplex
Comm. distance	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 19,200 / 38,400 bps
Comm. response time	5 to 99 ms (default: 20 ms)
Start bit	1-bit (fixed)
Data bit	8-bit (fixed)
Parity bit	None (default), Even, Odd
Stop bit	1-bit, 2-bit (default)
EEPROM life cycle	≈ 1,000,000 operations (Erase / Write)

Software

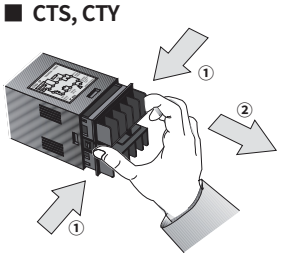
Download the installation file and the manuals from the Autonics website.

■ DAQMaster

It is the comprehensive device management program for Autonics' products, providing parameter setting, monitoring and data management.

Detach the Case

■ **CTS, CTY**



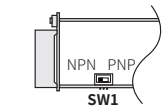
- Press to direction ① and pull toward direction ② for detaching the case and contents.

⚠ **Caution: Turn OFF the power before detaching the case.**

Select Input Logic

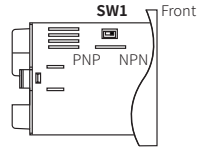
- For CTS, CTY, detach the case and proceed the settings. See the 'Detach the Case'.
- The position of internal switch varies depending on the each model.
- How to change the settings:
  power OFF → change settings → power ON → press [RESET] key or input the RESET signal (≥ 20 ms) to the external terminal.

■ **CTS, CTY**



NPN	PNP
■	■

■ **CTM**



NPN	PNP
■	■

Mode Setting

RUN	[◀]	→	**Preset value change mode**	[MD]	→ RUN
	[MD] 3 sec	→	**Parameter 1 group**	[MD] 3 sec	→
	[MD] 5 sec	→	**Parameter 2 group**	[MD] 3 sec	→
	[▲] 1 sec	→	**Function setting check mode** 01)	[MD] 1 sec	→
	[RST] or terminal input	→	**Reset**	Auto	→
	[BA]	→	**BATCH counter indication mode** 02)	[MD]	→

01) Use [▲], [▼] key to check the parameter setting.
In 2-stage preset model, 1-stage preset value and 2-stage preset value are displayed each time when pressing [MD] key. In timer, it is available for the output operation mode: OND, OND.1, OND.2.

02) For CT6M-1P / 2P model only. Press [◀] key to set BATCH counter setting value.

Preset Value Change Mode

Even if the mode of preset value change, input operation and output control will continue. The preset value could be set to 0 and the output of 0 preset value occurs.

- The preset value could not be set to 0 depending on the output operation mode. (When setting to 0, the value of setting value display part flashes 3 times.)
- If no key is touched for 60 sec, the product will return to RUN mode without being restored.
- E.g.: To set 1-stage preset value = 180, 2-stage preset value = 200
  1. Press [◀] key to enter preset value change mode. PS1 indicator turns ON and 1 digit of preset value flashes.
  2. Use [◀], [▲], [▼] key to set 1-stage preset value = 180.
  3. Press [MD] key to enter 2-stage preset value change mode.
  4. Use [◀], [▲], [▼] key to set 2-stage preset value = 200.
  5. Press [MD] key to return RUN mode.

Reset

In RUN mode, if pressing [RST] key or applying the signal to RESET terminal on the back side, present value will be reset.
For RESET signal terminals based on the input method, refer to the 'Connections' and the following table.
The output maintains OFF state.

Model	Input logic	
	No-voltage (NPN)	Voltage (PNP)
CTS	Short no. 9, 10 terminals	Short no. 8, 10 terminals
CTY	Short no. 4, 5 terminals	Short no. 3, 5 terminals
CTM	Short no. 11, 12 terminals	Short no. 10, 12 terminals

Error Display and Output Operation

- When error occurs, the output turns OFF.
- When setting 1-stage preset value = 0, OUT1 output turns OFF.
  In case of 2-stage preset value < 1-stage preset value, OUT1 output is ignored and only OUT2 output operates.
- Indicator model does not have error display function.

Display	Description	Troubleshooting
Err0	Preset value = 0	Change the preset value anything but 0.

Parameter Setting

- Some parameters are activated / deactivated depending on the model or setting of other parameters. Refer to the description of each parameter.
- If changing the setting value of parameter 1 group via communication, reset display value, and output.
- [MD] key: Saves current setting value and moves to the next parameter.
  [◀] key: Checks fixed value / Changes setting digits.
  [▲], [▼] key: Changes setting values.

■ Parameter 1 group (counter)

Parameter		Mark	Defaults	Setting range	Display condition
C1-1	Counter / timer 01)	C-t	CoUn	**COUN: counter**, TIME: timer	-
C1-2	Input operation mode 01)	In	Ud-C	UD-C: phase different input , UP, UP-1, UP-2, DN, DN-1, DN-2, UD-A: command input, UD-B: individual input	-
C1-3	Output operation mode 01)	oUt.M	F	[Preset setting model] F, N, C, R, K, P, Q, A, S*, T*, D*	*C1-2 input operation mode: UD-A, UD-B, UD-C
C1-4	Indication mode 01)	dSP.M	totAL	[Indicator model] HOLD, TOTAL • HOLD : You can set the PRESET value.	C1-2 input operation mode: UP, UP-1, UP-2, DN, DN-1, DN-2
C1-5	Max. counting speed 01)	CPS	30	30, 1K, 5K, 10K, 1 cps • Max. counting speed is when duty ratio of INA or INB input signal is 1:1. It is applied for INA, or INB input as same.	C1-3 output operation mode 02)
C1-6	OUT2 output time 01) 03)	oUt2	Hold	[2-stage preset setting model] 0.01 to 99.99 sec, Hold	C1-3 output operation mode: C, R, K, P, Q, A 04)
C1-7	OUT1 output time 01) 03)	oUt1	00.10	[2-stage preset setting model] 0.01 to 99.99 sec, Hold • When 10^1 digit is flashing, press [◀] key once and Hold appears.	C1-3 output operation mode: F, N, C, R, K, P, Q, A 04)
C1-8	OUT output time 01) 03)	oUt.t	Hold	[1-stage preset setting model] 0.01 to 99.99 sec, Hold	C1-3 output operation mode: C, R, K, P, Q, A 04)
C1-9	Counting value / preset value decimal point 01)	dP	------	[6 digit model] ------, -----.-, ----.--, ---.---, --.----, -.-----	-
			----	[4 digit model] ----, ---.-, --.--, -.---	
C1-10	Min. RESET time	rSt	20	1, 20 ms	-
C1-11	Input logic	SIG	nPn	NPN, PNP • Set the same as settings of input logic selection switch.	-
C1-12	Prescale decimal point 01) 05)	SC.dP	-.-----	[6 digit model] -.-----, -----.-, ----.--, ---.---, --.----	-
			-.---	[4 digit model] -.---, ---.-, --.--.	
C1-13	Prescale value 01)	SCL	1.00000	[6 digit model] 0.00001 to 99999.9	-
			1.000	[4 digit model] 0.001 to 999.9	-
C1-14	Start Point value 01) 06)	Strt	000000	[6 digit model] 0.00000 to 999999	C1-2 input operation mode: UD-C, UP, UP-1, UP-2, UD-A, UD-B
			0000	[4 digit model] 0.000 to 9999	
C1-15	Memorize counting value	dAtA	CLr	CLR: Resets counting value when power is off. REC: Memorizes counting value at the moment of power off. (memory retention)	-
C1-16	Key lock	LoCK	L.oFF	L.OFF: Unlock key LOCK, key LOCK indicator OFF LOC.1: Locks [RST] key, key LOCK indicator ON LOC.2: Locks [◀], [▼], [▲] key, key LOCK indicator ON LOC.3: Locks [RST], [◀], [▼], [▲] key, key LOCK indicator ON	-

01) When the setting value of the parameter is changed, all outputs are OFF and reset the current value when returning to the RUN mode.
02) C1-3 Output operation mode: in case of D, 1, 30, 1k cps selectable.
C1-5 Max. counting speed: 5k, 10k cps & C1-3 Output operation mode: When D is set, the max. counting speed is automatically changed to 30 cps.
03) In case of 1-stage preset model, C1-7 OUT1 output time is not displayed, C1-6 OUT2 output time is displayed as OUT.T.
04) For other output operation modes, Hold is fixed.
05) It can not be set smaller than the digits of C1-9 Counting value / preset value decimal point.
06) The setting range is connected to the C1-9 Counting value / preset value decimal point.

■ Parameter 1 group (timer)

Parameter		Mark	Defaults	Setting range	Display condition
T1-1	Counter / timer[01]	C-t	CoUn	COUN: counter, **TIME: timer**	-
T1-2	Time range[01]	SEC	• Refer to the table below.[02]		-
T1-3	UP / DOWN mode[01]	U-d	UP	UP: 0 → setting time DN: setting time → 0	-
T1-4	Indication mode[01]	dSP.n	totAL	[Indicator model] TOTAL, HOLD, ONT.D: On time display • HOLD, ONT.D : You can set the PRESET value.	-
T1-5	Memorize counting value	dAtA	CLr	[Indicator model] CLR: Resets counting value when power is off. REC: Memorizes counting value at the moment of power off. (memory retention)	-
T1-6	Output operation mode[01]	oUt.n	ond	OND, OND.1, OND.2, FLK, FLK.1, FLK.2, INT, INT.1, INT.2[03], OFD, NFD, NFD.1, INTG	-
T1-7	OUT2 output time[01]	oUt2	HoLd	[2-stage preset setting model] 0.01 to 99.99 sec, Hold • When 10^1 digit is flashing, press [◀] key once and Hold appears.	T1-6 output operation mode[04]
T1-8	OUT1 output time[01]	oUt1	00.10	[2-stage preset setting model] 0.01 to 99.99 sec, Hold • When 10^1 digit is flashing, press [◀] key once and Hold appears.	
T1-9	OUT output time[01]	oUt.t	HoLd	[1-stage preset setting model] 0.01 to 99.99 sec, Hold • When 10^1 digit is flashing, press [◀] key once and Hold appears.	
T1-10	Input logic	SIG	nPn	NPN, PNP • Set the same as settings of input logic selection switch.	-
T1-11	Input signal time	Int	20	1, 20 ms • CTS / CTY : min. signal width of INA, INH, RESET signal • CTM : min. signal width of INA, RESET, INHIBIT, BATCH RESET signal	-
T1-12	Key lock	LoCK	L.oFF	L.OFF: Unlock key LOCK, key LOCK indicator OFF LOC.1: Locks [RST] key, key LOCK indicator ON LOC.2: Locks [◀], [▼], [▲] key, key LOCK indicator ON LOC.3: Locks [RST], [◀], [▼], [▲] key, key LOCK indicator ON	-

01) When the setting value of the parameter is changed, all outputs are OFF and reset the current value when returning to the RUN mode

02) [6-digit model] setting range

Counting value display part	SEC (defaults)	SEC	SEC	SEC	M S	M S
Setting display part	999.999	9999.99	99999.9	999999	9959.99	99959.9
Range	0.001s to 999.999s	0.01s to 9999.99s	0.1s to 99999.9s	1s to 999999s	0.01s to 99m59.99s	0.1s to 999m59.9s

Counting value display part	M S	MIN	MIN	H M S	H M	HOUR
Setting display part	999959	99999.9	999999	995959	999959	99999.9
Range	1s to 9999m59s	0.1m to 99999.9m	1m to 999999m	1m to 99h59m59s	1m to 9999h59m	0.1h to 99999.9h

[4-digit model] setting range

Counting value display part	SEC (defaults)	SEC	SEC	SEC	M S	MIN	MIN	H M	HOUR
Setting display part	9.999	99.99	999.9	9999	9959	999.9	9999	9959	9999
Range	0.001s to 9.999s	0.01s to 99.99s	0.1s to 999.9s	1s to 9999s	1s to 99m59s	0.1m to 999.9m	1m to 9999m	1m to 99h59m	1h to 9999h

03) Appears for 2-stage preset model only

04) In case of T1-6 Output operation mode: FLK.1, FLK.2, INTG, or T1-6 Output operation mode of 1-stage preset model: OND, OND.1, OND.2, T1-8 OUT1 output time is not displayed, T1-7 OUT2 output time is displayed as OUT.T.

■ Parameter 2 group (communication)

• Only for RS485 communication model.

Parameter		Mark	Defaults	Setting range	Display condition
2-1	Comm. address	Addr	001	1 to 127 • Do not set the same address during multi-comm.	-
2-2	Comm. speed	bPS	96	24: 2,400, 48: 4,800, 96: 9,600, 192: 19,200, 384: 38,400 bps	-
2-3	Parity bit	PrtY	nonE	NONE, EVEN, ODD	-
2-4	Stop bit	StP	2	1, 2 bit	-
2-5	Response waiting time	rSUt	20	16 to 99 ms	2-2 Comm. speed: 24
				8 to 99 ms	2-2 Comm. speed: 48
				5 to 99 ms	2-2 Comm. speed: 96, 192, 384
2-6	Comm. write	CoMY	EnA	ENA: enable, DISA: disable	-

Output Operation Mode

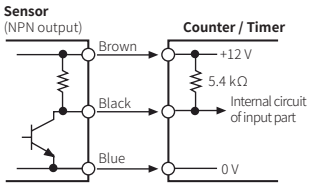
For the detailed timing chart for operation output mode, refer to the manual.

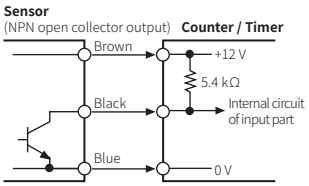
Input Connections

• Input: INA, INB / INH, RESET, INHIBIT, BATCH RESET
• Max. counting speed in the contact input: 1 or 30 cps setting (counter)

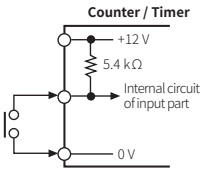
■ No-voltage (NPN) input

• Solid-state input



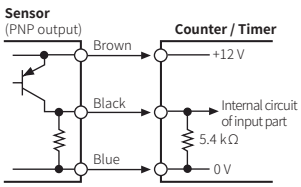


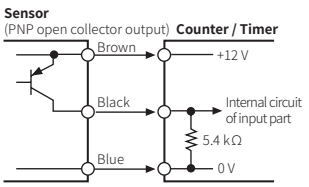
• Contact input



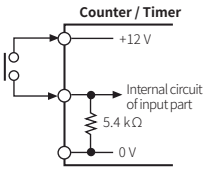
■ Voltage (PNP) input

• Solid-state input



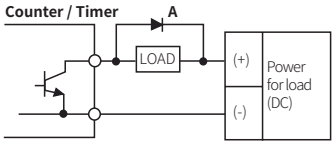


• Contact input



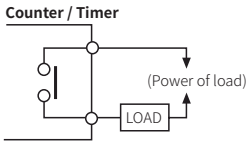
Output Connections

• Solid-state output



A: When using inductive load (relay etc.), surge absorber (diode, varistor etc.) must be connected between both sides of the load.

• Contact output



Description of Function

■ Switching display in setting display part

1-stage preset value and 2-stage preset value are displayed each time when pressing [MD] key in 2-stage preset model.

- In timer, it is available for output operation mode: OND, OND.1, OND.2 only.

■ BATCH counter

Counting value display part: BATCH counter value, setting display part: BATCH counter setting value is displayed.

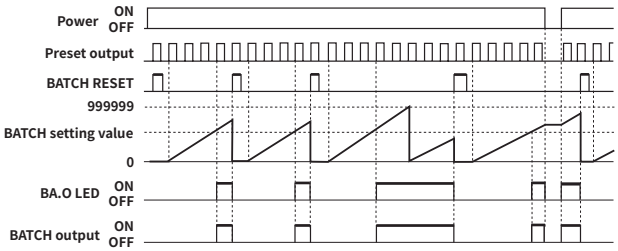
In counter operation, count the number of reaching value of CT6M-1P□□ to preset value, and CT6M-2P□□ to 2-stage preset value.

In timer operation, count the number of reaching setting time.

- Output operation mode: in case of FLK, count the number of reaching T.off setting time and T.on setting time

• BATCH counter operation

BATCH counting value is increasing until BATCH reset signal applied. BATCH counting value will be circulated when it is over 999999.



• BATCH RESET

If pressing [RST] key on the front side or the signal to BATCH RESET terminal on the back side panel, BATCH counting value will be reset and BATCH output maintains OFF state.

- When selecting voltage input (PNP), short terminals 10 and 14, or when selecting no-voltage input (NPN), short terminals 11 and 14 to reset.

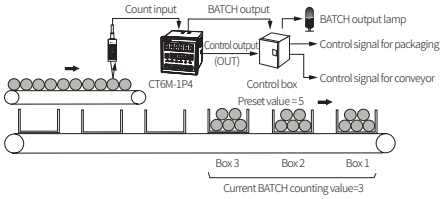
• Applications

[counter]

In case, put 5 products in a box then pack the boxes when they reaches to 200.

- PRESET = 5, BATCH = 200

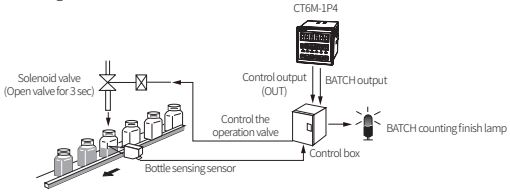
: When the count value of counter reaches to the preset value 5, the control output (OUT) will be on, and at this time the count value of the BATCH counter will be increased by 1.
The control box which is received the control output (OUT) repeatedly controls conveyor to move the full box and to place the next empty box for standby.
When the BATCH counting value reaches to 200, BATCH output will be ON. Then the control box stops conveyor and provides a control signal for packing.



[timer]

Fills milk into the bottle for 3 sec when 500 bottles are filled

- Setting time = 3 sec, BATCH = 500



■ Start Point (counter)

This function is that start at initial value set at Start Point value.

- When reset is applied, the present value is initialized to Start Point value.
- After Count Up at output operation mode: C, R, P, Q, present value starts at Start Point value.

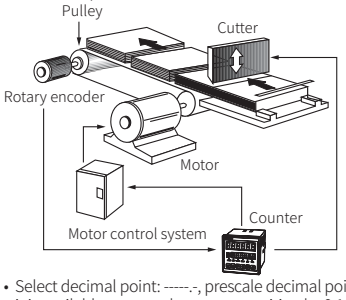
■ Prescale (counter)

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.

- 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.

• Application

Diameter of pulley connected with encoder is 22 mm, the number of pulses by 1 rotation of encoder is 1,000



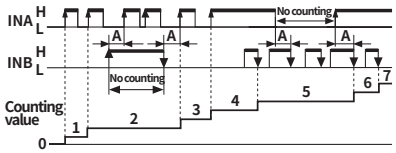
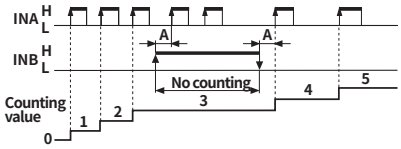
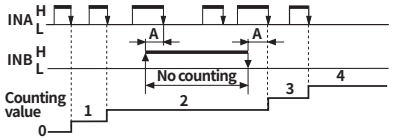
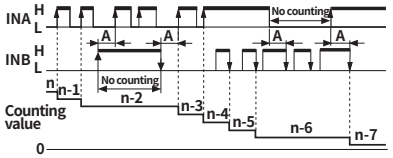
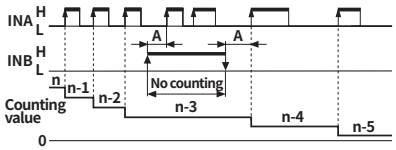
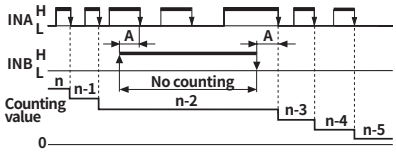
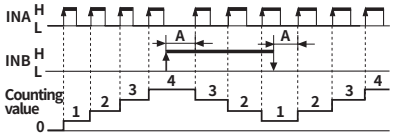
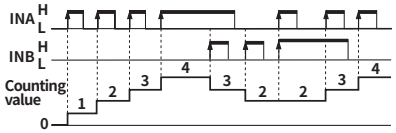
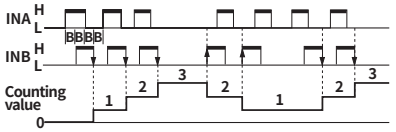
$$\text{●Prescale value} = \frac{\pi \times \text{Diameter of pulley}}{\text{The number of pulses by 1 rotation of encoder}} = \frac{3.1416 \times 22}{1000} = 0.069 \text{ mm / pulse}$$

- Select decimal point: -----.-, prescale decimal point: ---.--- and set prescale value: 0.069, it is available to control conveyor position by 0.1 mm unit.

Counter Operation

■ Input operation mode

Rising: ⌐ / Falling: ¬

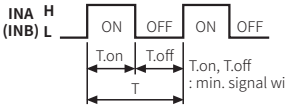
Mode	Counting chart[01]	Operation description
UP		• INA: Counting input INB: No counting input • INB: Counting input INA: No counting input
UP - 1		When INA input signal is rising, it counts. • INA: Counting input INB: No counting input
UP - 2		When INA input signal is falling, it counts. • INA: Counting input INB: No counting input
DN		• INA: Counting input INB: No counting input • INB: Counting input INA: No counting input
DN-1		When INA input signal is rising, it counts. • INA: Counting input INB: No counting input
DN-2		When INA input signal is falling, it counts. • INA: Counting input INB: No counting input
UD-A : command input		INB: In case of L, count up INB: In case of H, count down • INA: Counting input INB: Counting command input
UD-B : individual input		When INA and INB input signals are rising at the same time, it maintains previous counting value. • INA: Up counting input INB: Down counting input
UD-C : phase different input		When connecting encoder output A, B phase with counter input INA and INB, set input operation mode as UD-C.

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

- Min. signal width by counting speed

Counting speed [cps[01]]	Min. signal width [ms]
1	500
30	16.7
1 k	0.5
5 k	0.1
10 k	0.05

01) 1 cps = 1 Hz



- H,L of the counting chart

Input logic / Character	Voltage input (PNP)	No-voltage input (NPN)
H	5 - 30 VDC⎓	Short
L	0 - 2 VDC⎓	Open

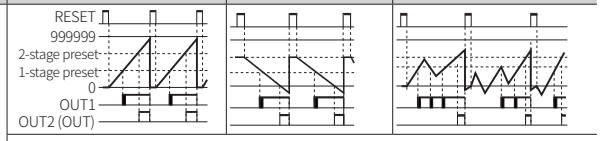
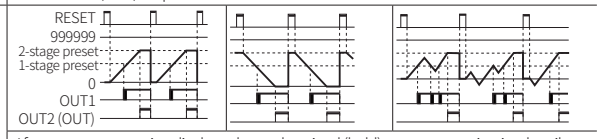
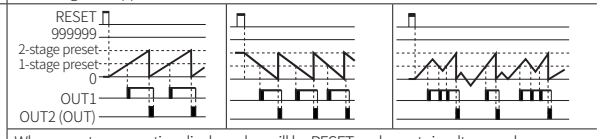
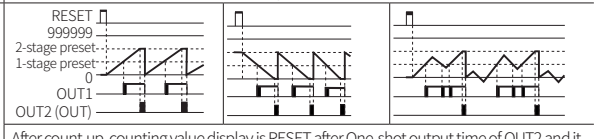
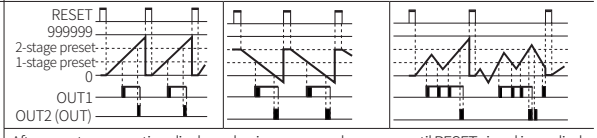
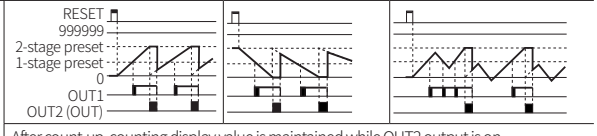
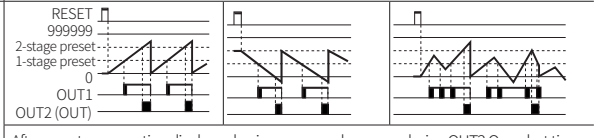
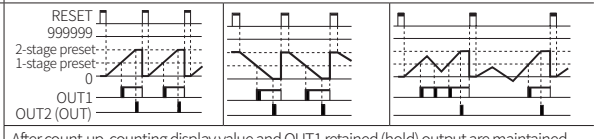
■ Output operation mode

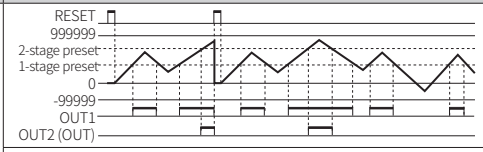
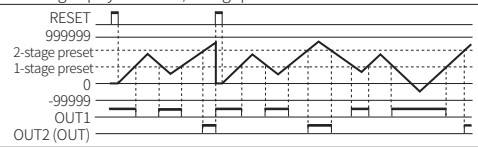
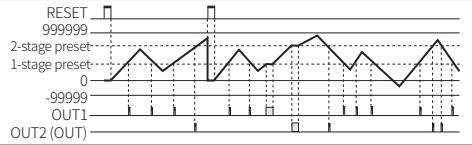
Out output of 1-stage preset model operates as same with the OUT2 output of 2-stage preset model.
OUT1 output of 2-stage preset model is operated One-shot output or retained (Hold) output. (except S, T, D of input operation mode)
OUT1 output could be set to 0 in all modes and 0 value output turns ON.
OUT2 output could not set to 0 in output operation mode: C, R, P, Q.

• Output type

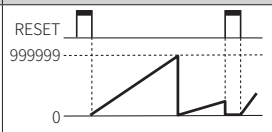
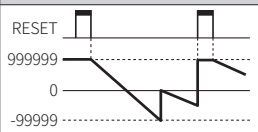
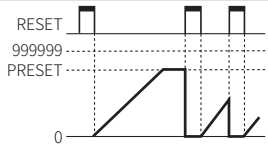
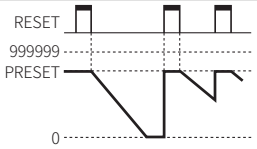
One-shot output
Retained (hold) output

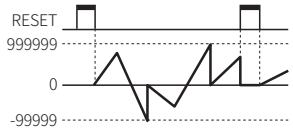
One-shot output Retained (hold) output Coincidence output

Mode	Output operation description in input operation mode		
	UP, UP - 1 / 2	DN, DN - 1 / 2	UD - A / B / C
F			
	After count-up, counting display value increases or decreases until RESET signal is applied and retained (hold) output is maintained.		
N			
	After count-up, counting display value and retained (hold) output are maintained until RESET signal is applied.		
C			
	When count-up, counting display value will be RESET and count simultaneously. OUT1 retained (hold) output will be OFF after OUT2 One-shot output time. • The One-shot output time of OUT1 is regardless of OUT2.		
R			
	After count-up, counting value display is RESET after One-shot output time of OUT2 and it counts simultaneously. OUT1 retained (hold) output will be OFF after OUT2 One-shot output time. • The One-shot output time of OUT1 is regardless of OUT2.		
K			
	After count-up, counting display value increases or decreases until RESET signal is applied. OUT1 retained (hold) output will be OFF after OUT2 One-shot output time. • The One-shot output time of OUT1 is regardless of OUT2.		
P			
	After count-up, counting display value is maintained while OUT2 output is on. Counting value is internally RESET and counts simultaneously. When OUT2 is OFF, displays counting value while OUT2 is ON, and it increases or decreases. OUT1 retained (hold) output will be OFF after OUT2 One-shot output time. • The One-shot output time of OUT1 is regardless of OUT2.		
Q			
	After count-up, counting display value increases or decreases during OUT2 One-shot time. OUT1 retained (hold) output will be OFF after OUT2 One-shot output time. • The One-shot output time of OUT1 is regardless of OUT2.		
A			
	After count-up, counting display value and OUT1 retained (hold) output are maintained until RESET input is applied. • The One-shot output time of OUT1 is regardless of OUT2.		

Mode	Output operation description in input operation mode
	UD - A / B / C
S	
	OUT1 / 2 keep ON state in following condition: Counting display value ≥ 1 / 2-stage preset value
T	
	OUT1 output is off: counting display value ≥ 1-stage preset value. OUT1 keeps ON state when 1-stage preset value = 0. OUT2 keeps ON state in following condition: counting display value ≥ 2-stage preset value
D	
	OUT1 / 2 are ON only when counting display value = 1 / 2-stage preset value. • When setting 1 kcps for counting speed, solid state contact output should be used. When using contact output, it is difficult to execute normal output operation due to contact reaction time.

■ Counter operation of indicator model

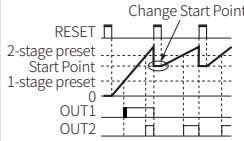
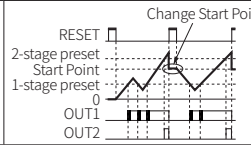
Mode	Counting chart and output operation description	
	Input operation mode = UP, UP - 1 / 2	Input operation mode = DN, DN - 1 / 2
TOTAL		
	Counting value increases or decreases until RESET input is applied. When input is over max. / min. counting value, it displays 0.	
	When applying RESET input, displays 0.	When applying RESET input, displays 999999.
HOLD		
	Counting value increases or decreases until RESET input is applied.	
	When input is reaching PRESET, the display value is hold. When applying RESET input, displays 0.	When input is reaching 0, the display value is hold. When applying RESET input, displays PRESET value.

Mode	Input operation mode = UD - A / B / C
-	

■ Output operation for other conditions

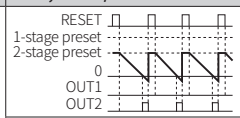
01. Output operation for the relation of Start Point value, PRESET value

• Output operation description: 2-stage preset value > Start Point = 1-stage preset value
OUT1 occurs when RESET OFF.
• Output operation description: 2-stage preset value > Start Point > 1-stage preset value

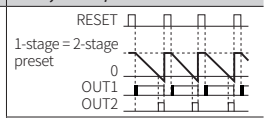
Mode	Counting chart and output operation description	
	Input operation mode = UP, UP - 1 / 2	Input operation mode = UD - A / B / C
F		
	OUT1 does not execute. OUT2 occurs when reaching 2-stage preset value.	Count down and OUT1 occurs when reaching 1-stage preset value.

02. 1-stage preset value ≥ 2-stage preset value (input operation mode: DN, DN-1, DN-2)

• Output operation description:
1-stage preset value > 2-stage preset value

Mode	Input operation mode = DN, DN - 1 / 2
F	
	OUT1 does not execute.

• Output operation description:
1-stage preset value = 2-stage preset value

Mode	Input operation mode = DN, DN - 1 / 2
F	
	OUT1 occurs when RESET OFF.

Timer Operation

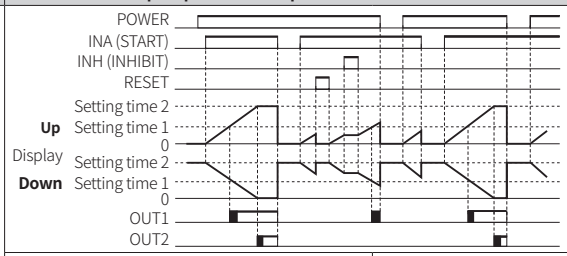
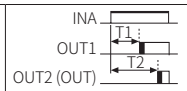
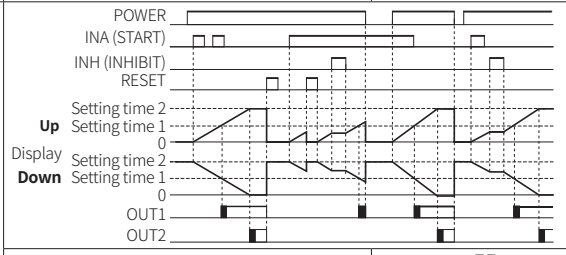
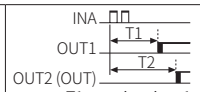
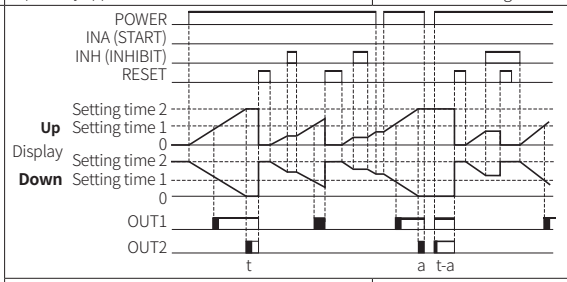
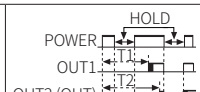
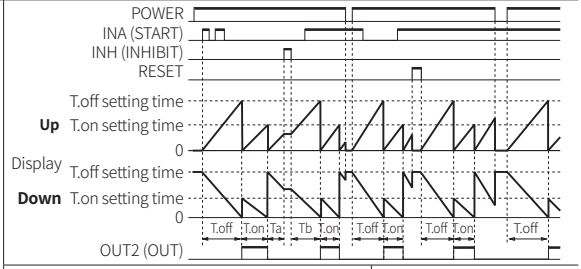
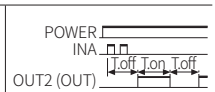
■ Output operation mode

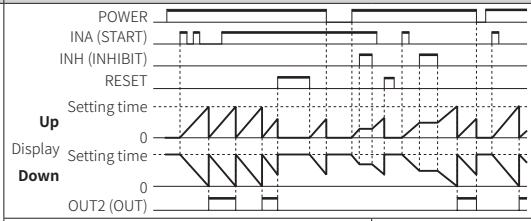
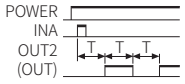
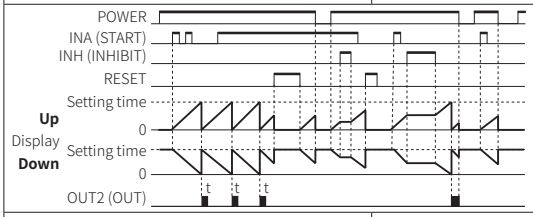
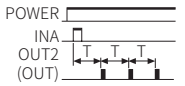
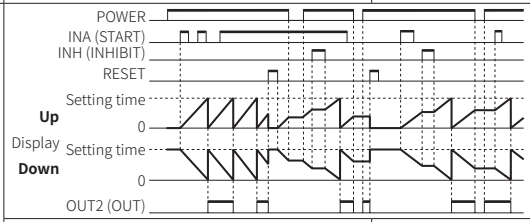
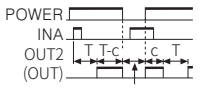
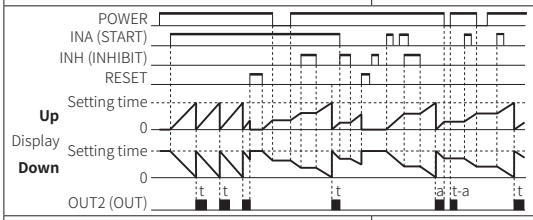
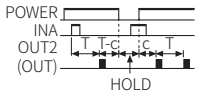
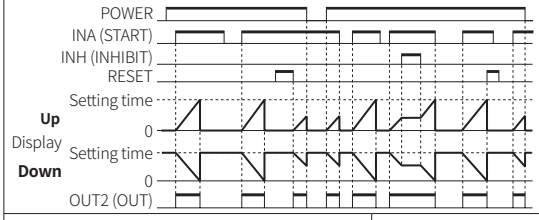
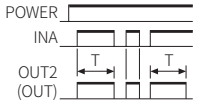
Power reset: There is no memory retention.
Initialize the display value and output state when power on again.
Power hold: There is memory retention.
Memorize the display value at the moment of power off, restoring the memorized display value and output state when power on gain.

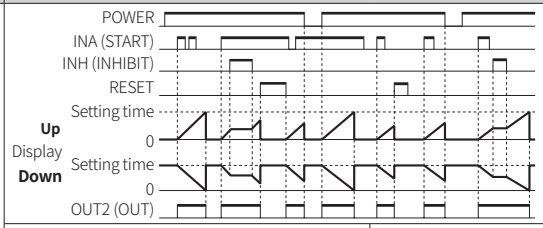
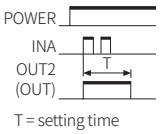
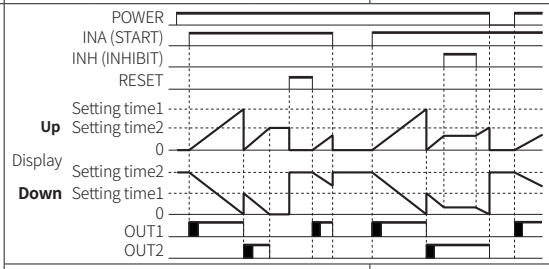
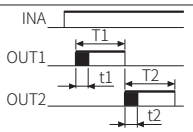
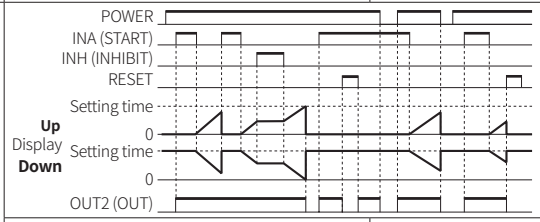
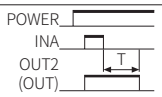
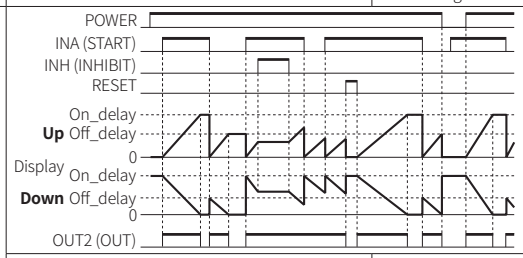
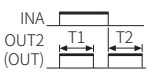
• Output type

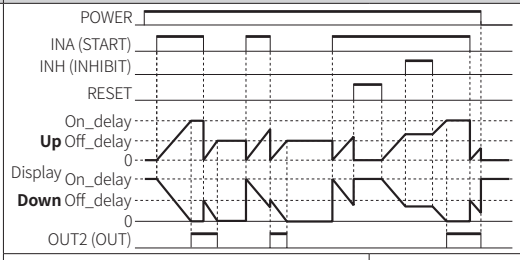
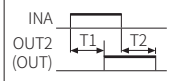
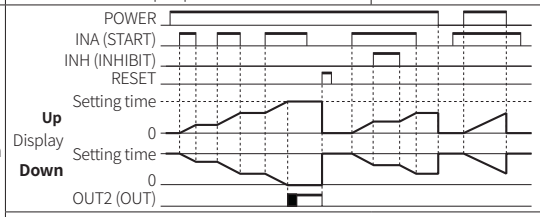
One-shot output
Retained (hold) output

One-shot output Retained (hold) output

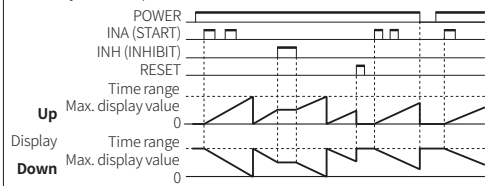
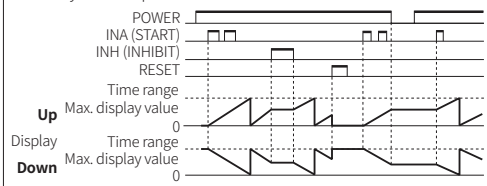
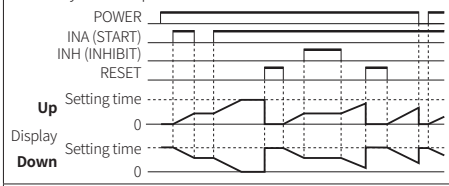
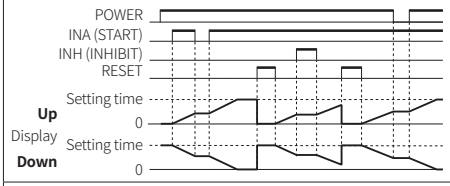
Mode	Time chart and output operation description
OND (Signal on delay)	 • Power reset Time starts when INA input is ON. Time is RESET during INA input is OFF. When INA input is ON: Power on time start operates, Reset off time start operates.  T1 = setting time 1 T2 = setting time 2
OND.1 (Signal on delay 1)	 • Power reset Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. Only the first signal is valid in case INA input signal is repeatedly applied.  T1 = setting time 1 T2 = setting time 2
OND.2 (Power on delay)	 • Power hold Power on time start (no INA function) Time is RESET when RESET is ON. Time starts when RESET ON → OFF.  T1 = setting time 1 T2 = setting time 2
FLK (Flicker)	 • Power reset Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. Output turns OFF from INA input turn ON to T.off setting time, turns ON for the T.on setting time repeatedly. In case of using the contact output, min. setting time must be set over 100 ms.  Ta + Tb = T.off T.off, T.on must be set individually

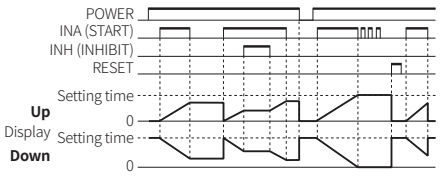
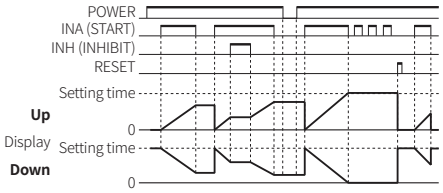
Mode	Time chart and output operation description
FLK.1 (Flicker 1)	 • Power reset, retained (hold) output Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. Only the first signal is valid in case INA input signal is repeatedly applied. In case of using the contact output, min. setting time must be set over 100 ms.  T = setting time  • Power reset, One-shot output Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. Only the first signal is valid in case INA input signal is repeatedly applied. In case of using the contact output, min. setting time must be set over 100 ms.  T = setting time
FLK.2 (Flicker 2)	 • Power hold, retained (hold) output Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. Control output will be reversed when it reaches to setting time. But, at the initial Start, OUT2 control output is OFF. n case of using the contact output, min. setting time must be set over 100 ms.  T = setting time  • Power hold, One-shot output Time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. In case of using the contact output, min. setting time must be set over 100 ms.  T = setting time
INT (Interval)	 • Power reset Control output turns ON and time starts when INA signal turns ON. Time is RESET when INA input is OFF. When INA input is ON: Power on time start operates, Reset off time start operates. When reaching the setting time, Auto reset is activated. Control output is ON when Time is progressing.  T = setting time

Mode	Time chart and output operation description
INT.1 (Interval 1)	 • Power reset Control output turns ON and time starts when INA input is ON. When INA input is ON: Power on time start operates, Reset off time start operates. When reaching the setting time, Auto reset is activated. Control output is ON when Time is progressing. INA input is ignored while time is progressing.  T = setting time
INT.2 (Interval 2)	 • Power reset Time starts when INA input is ON. OUT1 is ON during T1 (hold) or t1 time. RESET when INA input is OFF. When reaching the setting time 1, the progressed time is reset. OUT2 is ON during T2 (hold) or t2 time. • Output turns OFF when reaching the setting time even if One-shot time is longer than the setting time.  T1 = setting time 1 T2 = setting time 2 t1 = One-shot 1 t2 = One-shot 2
OFD (Signal off delay)	 • Power reset If INA input is ON, control output remains ON. (except when power is off and reset is on) When INA input is OFF, time progresses. When reaching the setting time, Auto reset is activated.  T = setting time
NFD (On-Off delay)	 • Power reset 1) When INA input is ON, output is ON and time is progressing, then output is OFF after On_Delay time. 2) When INA input is OFF, output is ON and time is progressing, then output is OFF after Off_Delay time. If INA input is OFF within On_Delay time, step 2 starts again. If INA input is ON within Off_Delay time, step 1 starts again.  T1 = On_delay time T2 = Off_delay time

Mode	Time chart and output operation description
NFD.1 (On-Off delay 1)	 • Power reset 1) When INA input turns ON, time progresses and output turns ON after On_Delay time. 2) When INA input turns OFF, time progresses and output turns OFF after Off_Delay time. If INA input turns OFF within On_Delay time, output will turn ON and step2 operate. If INA input turns ON within Off_Delay time, output will turn OFF and step1 operate.  T1 = On_delay time T2 = Off_delay time
INTG (Integration time)	 • Power reset Time is progressing during INA input is ON. Time stops during INA input is OFF. Control output is ON when reaching the setting time.

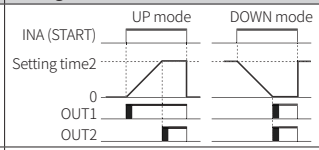
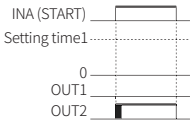
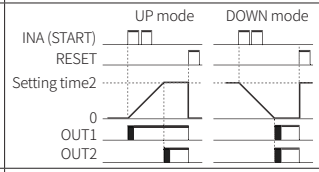
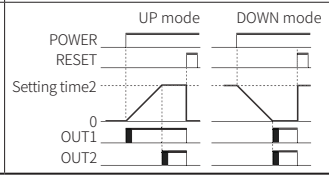
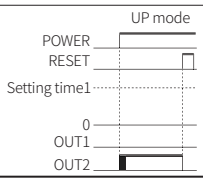
■ Timer operation of indicator model

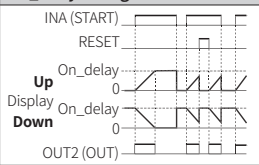
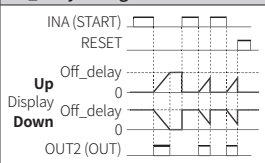
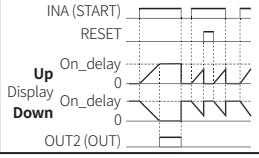
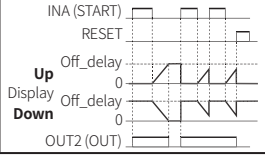
Mode	Time chart and output operation description
TOTAL	• Memory retention parameter = CLR  • Memory retention parameter = REC  Time starts when INA input is ON. Time is initialized when RESET input is ON. Time stops during INHIBIT input is ON.
HOLD	• Memory retention parameter = CLR  • Memory retention parameter = REC  Time starts during INA input is ON. Time stops during INA input is OFF. When time reaches the setting time, time progress stops and is flashed. When RESET input is ON, progressed time is initialized.

Mode	Time chart and output operation description
ONT.D (On time display)	• Memory retention parameter = CLR  • Memory retention parameter = REC  • ON time indication mode of INA input Time reset start operates when INA input turns ON. Time progress stops while INA input is OFF. If progress time is greater than setting time when INA input turns off, display value flashes and operation stops until reset signal is applied.

■ 0 time setting

- It is available to set in output operation mode: OND, OND.1, OND.2, NFD, NFD.1.
- Output type

Mode	Time chart at 0 time setting and operation description	
	Setting time 1 = 0	Setting time 2 = 0
OND		
OND.1		
OND.2		

Mode	Time chart at 0 time setting and operation description	
	Off_delay setting time = 0	On_delay setting time = 0
NFD		
NFD.1		

■ Setting when 1-stage preset value > 2-stage preset value

- Output operation mode: OND, OND.1, OND.2
  UP mode: OUT1 output does not turn ON.
  DOWN mode: OUT1 output does not turn ON.
  In 1-stage preset value = 2-stage preset value, when Start signal is applied, OUT1 turns ON immediately.

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

11 segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

12 segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z

16 segment			
0	0	I	I
1	1	J	J
2	2	K	K
3	3	L	L
4	4	M	M
5	5	N	N
6	6	O	O
7	7	P	P
8	8	Q	Q
9	9	R	R
A	A	S	S
b	B	T	T
C	C	U	U
d	D	V	V
E	E	W	W
F	F	X	X
G	G	Y	Y
H	H	Z	Z