

Autonics

COUNTER/TIMER CTS SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

- Please keep these instructions and review them before using this unit.
- Please observe the cautions that follow:
 - Warning** Serious injury may result if instructions are not followed.
 - Caution** Product may be damaged, or injury may result if instructions are not followed.
- The following is an explanation of the symbols used in the operation manual.
 - Caution: Injury or danger may occur under special conditions.

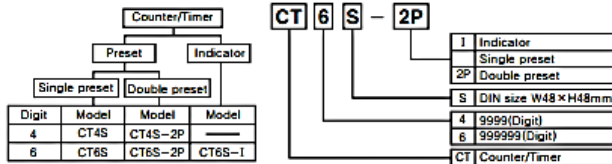
Warning

- In case of using this unit with machineries(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information required.
- This unit must be mounted on Panel.
- It may give an electric shock.
- Do not connect terminals when it is power on.
- It may give an electric shock.
- Do not disassemble and modify this unit, when it requires. If needs, please contact us.
- It may give an electric shock and cause a fire.

Caution

- This unit shall not be used outdoors.
- It might shorten the life cycle of the product or give an electric shock.
- When wire connection, No.20AWG(0.50mm²) should be used and screw bolt on terminal block with 0.74N·m to 0.90N·m strength.
- It may result in malfunction or fire due to contact failure.
- Please observe specification rating.
- It might shorten the life cycle of the product and cause a fire.
- Do not use the load beyond rated switching capacity of Relay contact.
- It may cause insulation failure, contact melt, contact failure, relay broken, fire etc.
- In cleaning the unit, do not use water or an organic solvents.
- It might cause an electric shock or fire that will result in damage to the product.
- Do not use this unit at place where there are flammable or explosive gas, humidity, direct ray of the sun, radiant heat, vibration, impact etc.
- It may cause explosion.
- Do not inflow dust or wire dregs into inside of this unit.
- It may cause a fire or mechanical trouble.

Ordering information

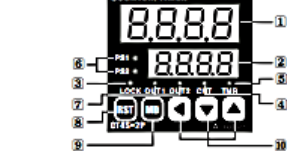


Specifications

Series		CTS	
Digit		4	6
Model	Single preset Double preset Indicator	CT4S CT4S-2P	CT6S CT6S-2P
Power supply	AC power DC power	100-240VAC 50/60Hz 24-60VDC	
Allowable voltage range		90 to 110% of rated voltage(AC power type) 24-60VDC	
Power consumption	AC power DC power	Indicator: Approx. 9VA, Single preset: Double preset: Approx. 10VA Indicator & Single preset: Approx. 5W, Double preset: Approx. 6W	
CPS of INA, INB		Selectable 1cps, 30cps, 1kcps, 5kcps, 10kcps	
Min. input signal width	Counter Timer	Reset input: Selectable 1ms or 20ms INA, INH, Reset signal: Selectable 1ms or 20ms	
Input		Selectable voltage input or No-voltage input [Voltage input] Input impedance is 5.4kΩ, "H" level: 5-30VDC, "L" level: 0-2VDC [No-voltage input] Short-circuit impedance: Max. 1kΩ Residual voltage: Max. 2VDC, Open-circuit impedance: Min. 100kΩ	
One-shot output		10 / 50 / 100 / 200 / 500 / 1000 / 2000 / 5000ms	
Control output	Con-tact	Single preset type: SPDT(1c) Double preset type: SPST(1a) for first & second output NO: 250VAC 3A resistive load, NC: 250VAC 2A resistive load	
	Solid-state	NPN open collector Max. 30VDC, Max. 100mA	
Memory retention		10 years	
External sensor power		12VDC ±10%, 100mA Max.	
Ambient temperature		-10 to 55°C (at non-freezing status)	
Storage temperature		-25 to 65°C (at non-freezing status)	
Ambient humidity		35 to 85%RH	
Timer	Repeat error	Power ON start: ±0.01% ±0.05sec Signal start: ±0.01% ±0.03sec	
	Set error		
Insulation resistance	Dielectric strength	2000VAC 50/60Hz for 1 minute	
	Noise strength(MAC power)	±2kV the square wave noise(pulse width:1μs) by the noise simulator	
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 1 hour	
	Shock	300m/s ² (Approx. 30G) 3 times at X, Y, Z direction	
Relay life cycle	Mechanical	100m/s ² (Approx. 10G) 3 times at X, Y, Z direction	
	Electrical	Min. 10,000,000 times	
Protection	IP65(Front panel only)		
	AC power	CT4S: Approx. 155g CT4S-2P: Approx. 162g	CT6S: Approx. 155g CT6S-2P: Approx. 162g CT6S-I: Approx. 136g
	DC power	CT4S: Approx. 152g CT4S-2P: Approx. 159g	CT6S: Approx. 152g CT6S-2P: Approx. 159g CT6S-I: Approx. 133g

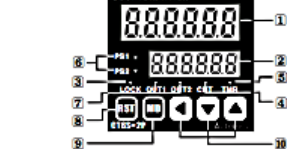
Front panel Identification

4 Digit

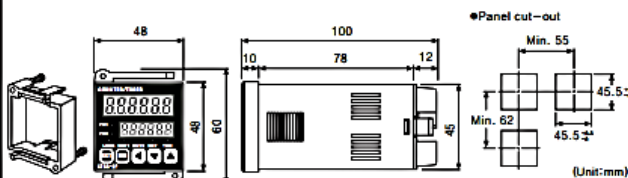


- Display for processing value(RED LED)
Counting value(Counter)/Processing time(Timer)
Setting symbols
LED height: 11mm for 4digit, 10mm for 6digit
 - Preset value display(Yellow-Green LED)
Preset value(Counter)/Preset time(Timer) and setting symbols
LED height: 8mm for 4digit, 7mm for 6digit
 - LOCK: Key lock indication
 - CNT: Indication the operation of counter
 - TMR: Indication the operation of timer
-LED flickers when the timer is processing
-LED turns on when the processing time stops
 - PS1, PS2: Check preset value and display change of it
 - OUT1, OUT2: Indicating operation of output
 - Reset key
 - Mode key
 - Set key
- * There is no ⑤, ⑥ LED in CT6S-I.
PS2 will be changed to PS and OUT2 is OUT.
There is no PS1, OUT1 LED in CT4S, CT6S.

6 Digit

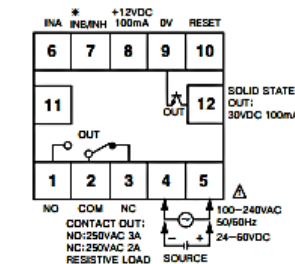


Dimensions

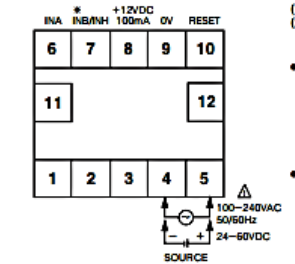


Connections

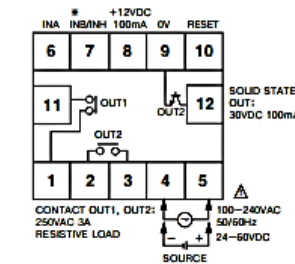
OCT4S, CT6S



OCT6S-I

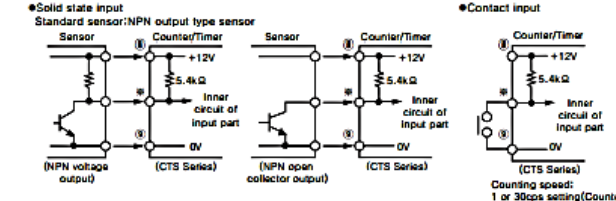


OCT4S-2P, CT6S-2P

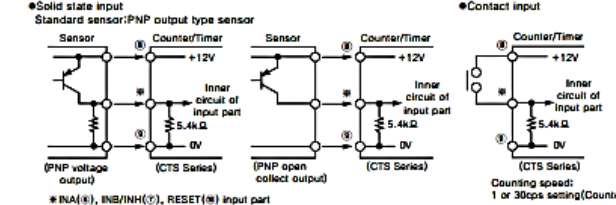


Input connection

Input logic: No-voltage input(NPN)

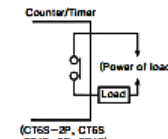


Input logic: Voltage input(PNP)

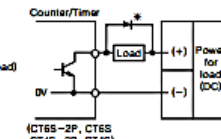


Output connection

Contact output



Solid state output

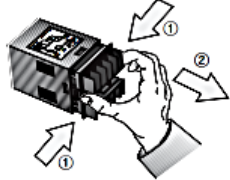


Solid state output connection

- Use proper load and power for load not to exceed ON/OFF capacity (30VDC Max. 100mA max.) of solid state output.
- Be sure not apply reverse polarity of power.
- When use inductive load(Relay etc), surge absorber(Diode, Varistor etc) must be connected between both side of the load.

Input logic selection

1. The power must be cut off.
2. Detach the case from body.



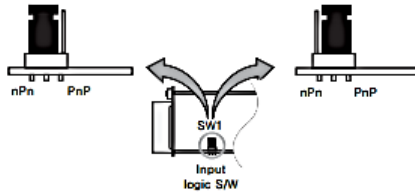
*Case detachment
After push toward ① and pull toward ② as like picture.

** Please check if the power cut off!! **

3. Select input logic by using input logic S/W inside of Counter/Timer.

●Select No-voltage input(NPN)

●Select voltage input(PNP)



4. Please assemble opposite way of the case detachment.
5. Then apply the power to Counter/Timer.

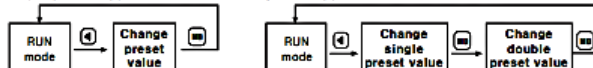
Error code display

Error display	Errors	Output status	How to return
E r r 1	CPU error	Double preset type:OUT1, OUT2 are OFF Single preset type:OUT is OFF	[RST] key, RESET input

Change of preset value in Counter operation

○Change the preset value in the single preset type(CT6S, CT4S)

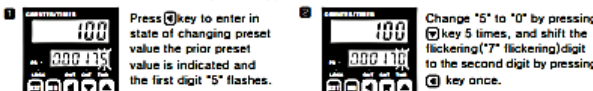
○Change the preset value in the double preset type(CT6S-2P, CT4S-2P)



※ If the input signal in while changing preset value, it controls the output and the counting function.
In state of changing preset value if no key is touched for 60 sec., the timer will return to the RUN mode. After change the preset value as "0", there is [key] input or RESET input, the output will be maintained as OFF.

(But in state of the output mode is "T", if change single preset value as "0", the single output will be maintained as ON.)

○How to change in the single preset type:To change the set value from 175 to 180

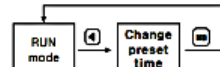


*Whenever [key] is pressed in the state changing preset value, the flickering digit shifts from the right to the left.



Change of preset value in Timer operation

○Change preset time in case of the output mode is not FLK



※ In state of changing preset value, if no key is touched for 60 sec., the timer will return to the RUN mode.

○In the change the LoFF time from 30sec. to 50sec. and the LoOn time from 40sec. to 20sec. (Output mode : FLK, Time range : tr-2)



*Whenever [key] is pressed in the changing mode of the preset time, the flickers digit shifts from the right to the left.



※ When use CT4S-2P/CT6S-2P as Timer, unable to use it as double preset.

How to set Lock key

Be sure to set the lock mode in order to protect malfunction by unauthorized keypad.

LoFF (LOCK OFF) : Cancellation of the lock mode

LoL1 (LOCK LEVEL 1) : Lock [key] key

LoL2 (LOCK LEVEL 2) : Lock [key] & [key] & [key] key

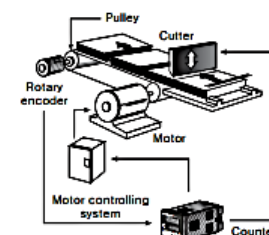
LoL3 (LOCK LEVEL 3) : Lock [key] & [key] & [key] & [key] key

Prescale function

This function is to set and indicate calculated unit for actual length, liquid measure, position etc. It is called "Prescale value" for measured length, measured liquid, measured position, etc per 1 pulse.

For example) Pulse number P is number of pulses per 1 revolution of rotary encoder. L is the desired length to be measured. Prescale value is desired length L/pulse number P generated by the rotary encoder. It is the length measured per 1 pulse.

○Control length by the counter and the rotary encoder



[Diameter of the Pulley connected with the encoder is 22mm, pulse number of encoder per 1 revolution:1000]

$$\text{Prescale value} = \frac{\pi \times \text{Diameter of the Pulley}(D)}{\text{Pulse numbers per 1 revolution of the encoder}}$$

$$= \frac{3.1416 \times 22}{1000}$$

$$= 0.069\text{mm/pulse}$$

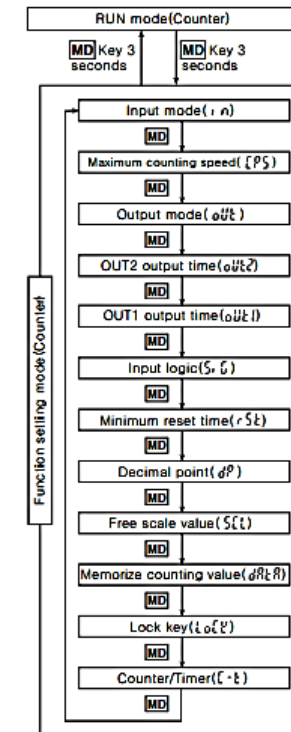
It is possible to control conveyor as 0.1mm unit to set 0.069 for Prescale value by pressing setting key in state of prescale value setting in function setting mode. Decimal point should be set the first decimal place in function setting mode.

Factory specification

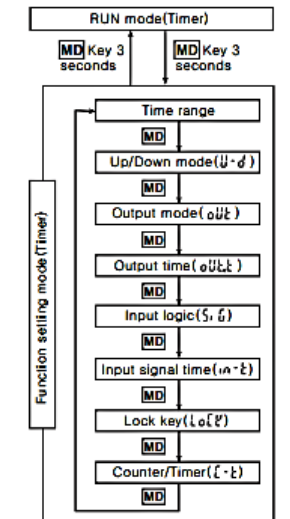
Set item	Model	Double preset model (CT6S-2P, CT4S-2P)	Single preset model (CT6S, CT4S)	Indicator model (CT6S-I)
Input mode		Up/Down-C(U/D-C)		
Output mode		F		
OUT1		100ms		
OUT2(OUT)		Hold		
CPS		30cps		
Min. reset time		20ms		
Decimal point		Non decimal point		
Prescale value		6digit indication model(CT6S-2P, CT6S, CT6S-I) : 1.000 4digit indication model(CT4S-2P, CT4S) : 1.00		
Counting memory		CLR(Power reset)		
Time range		6digit indication model(CT6S-2P, CT6S, CT6S-I) : 0.01s-9999.99s 4digit indication model(CT4S-2P, CT4S) : 0.01s-99.99s		
Up/Down mode		U(UP)		
Output mode		OND(ON Delay)		
Output time		Hold		
Input signal mode		20ms		
Input method		No-voltage input(NPN)		
Lock key		LoFF (Lock OFF)		
Counter/Timer		Counter		

Change operation mode(Counter/Timer)

○Operation in Counter



○Operation in Timer



※ After selecting Timer in Counter/Timer of Counter function setting mode, if press MD for more than 3sec., it will move to Timer RUN mode.
After select Counter in Counter/Timer of Timer function setting mode, if press MD for more than 3sec., it will move to Counter RUN mode.
※ If press MD for more than 3sec. in RUN mode, it will move to function setting mode.
If press MD for more than 3sec. in function setting mode, it will move to RUN mode.
If no key touched more than 60sec., it will move to RUN mode.

Setting of counter function modes

Setting mode	How to set (▲, ▼)
Input mode (i n)	U → d → Ud → R → Ud → b → Ud → C Ud-A, B, C will be fixed in the input mode, if output mode is S, T, D.
Maximum counting speed (CPs)	1 → 30 → 12 → 52 → 102 Counting speed is that of one by one (1:1) duty ratio of INA or INB input signal, and it is applied in INA or INB at the same time. In case of setting D in output mode, 5Kcps and 10Kcps are not indicated in the display.
Output mode (out)	Up or Down input mode F → n → [r] → y → p → q → R Up / Down-A, B, C input mode F → n → [r] → y → p → q → R → S → t → d
OUT2 output time (out2)	10 → 50 → 100 → 200 → 500 → 1000 → 2000 → 5000 Unit:ms
OUT2 output time (out2)	10 → 50 → 100 → 200 → 500 → 1000 → 2000 → 5000 → Hold Unit:ms
Input logic (S, D)	It indicates according to position, and it can't set by (▲) & (▼) key. Voltage input: P n P No-voltage input: n P n
Min. reset time (r s t)	1 → 20 Min. external RESET signal width (Unit:ms)
Decimal point (d p)	In case of CT6S-2P, CT6S, CT6S-I In case of CT4S-2P, CT4S
Prescale value (S f l)	Key: Shift the flickering digit Key: Change the prescale value Set range of prescale value: 0.001 to 99.999 (CT6S-2P, CT6S, CT6S-I), 0.01 to 9.99 (CT4S-2P, CT4S) Prescale value: It is actual value of length and position, liquid measure from counting input of 1 pulse
Memorize counting value (d r e t)	Key: Power reset for counting value. (Reset counting value when power off) Key: Memory for counting value (Memory of counting value when power off)
Lock key (Lo c k)	Lo. off → Lo. 1 → Lo. 2 → Lo. 3
Counter/Timer (C - t)	Lo. n → Counter Lo. n → Timer

- *There is no "OUT1 output time" in single preset model (CT6S, CT4S), "OUT2 output time" will be replaced as "OUT output time (out2)".
- *In case of setting output mode as "F", "N", if counting value reach at preset value. Output will be held. So there is no "OUT2 output time" in function setting mode.
- *If set "S, T, D" as the output mode, input will fixed one from Ud-A, Ud-B, Ud-C. If change input mode to Up/Down, it needs to change another mode, not S.T.D.
- *When it is in function setting mode, no external input signal will be accepted and the output will stay in the OFF state.
- *When selecting the "D" output mode and if 1kcps is used, the output may not operate normally because of respond time of the contact. Therefore, in this case be sure to use the solid state output.
- *In state of maximum counting speed is 5kcps or 10kcps, if change output mode to "D", the maximum counting speed will be changed to 1cps.
- *There are no output mode and output time setting mode of function setting mode in CT6S-I series.

Input operation mode for counter

Input mode	Counting chart	Notice
U (Up)		INA: Counting input INB: No counting input (Limit counting input of INA) *When INA is L, please set no counting (INA: H → L) or turn off no counting (INB: L → H)
d (Down)		INA: Counting input INB: No counting input (Limit counting input of INA) *When INA is L, please set no counting (INA: H → L) or turn off no counting (INB: L → H)
Ud-A (Up/Down-A) Command input		INA: No counting input (Limit counting input of INB) INB: Counting input (Limit counting input of INA) N=preset value When INA is L, please set no counting (INA: H → L) or turn off no counting (INB: L → H)
Ud-b (Up/Down-B) Individual input		INA: Counting value input INB: Up/Down counting command input When INA is L, counting Up When INB is H, counting Down
Ud-C (Up/Down-C) Phase difference input		INA: Counting Up input INB: Counting Down input When INA and INB applied L → H, it will remain previous counting value.

Counter operation of CT6S-I (Indication only)

Input type	Voltage input (PNP)	Contact input (NPN)
H	5-30VDC	Short circuit
L	0-2VDC	Open

Input mode	Counting chart
In case of input mode is Up	
In case of input mode is Down	
In case of the input mode is command input (Ud-A), Individual input (Ud-b), Phase difference input (Ud-C)	

Output operation mode for counter

Output mode	Input mode	Operation
One-shot output (OUT1 output)	Up	After counting up, the display value increases or decreases until the reset signal is applied, and OUT1 and OUT2 holds "on" state. One-shot output of OUT1 operates regardless to OUT2.
One-shot output (OUT2 output)	Down	After counting down, the display value increases or decreases until the reset signal is applied, and OUT1 and OUT2 holds "on" state. One-shot output of OUT1 operates regardless to OUT2.
Hold output	Up/Down A, B, C	The display value resets at the same time counting up. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Coincidence output	Up/Down A, B, C	After counting up, display value resets after one shot time of OUT2. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Up	Up	After counting up, the display value increases or decreases until the reset signal is applied. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Down	Down	After counting down, the display value increases or decreases until the reset signal is applied. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Up/Down A, B, C	Up/Down A, B, C	After counting up, display value is held for One-shot time of OUT2 counting operation starts again when OUT2 turns on, when OUT2 turns off, display value indicates counted value for ON time of OUT2 and increases or decreases. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Up/Down A, B, C	Up/Down A, B, C	After counting up, display value increases or decreases for One-shot time of OUT2. Hold output of OUT1 turns off after One-shot time of OUT2. One-shot output of OUT1 operates regardless to OUT2.
Up/Down A, B, C	Up/Down A, B, C	After counting up, display value is held until applying the reset signal. One-shot output of OUT1 operates regardless to OUT2. OUT2 returns automatically after One-shot time.
Up/Down A, B, C	Up/Down A, B, C	OUT1 and OUT2 keeps ON state in following condition: Display value ≥ Preset 1 Display value ≥ Preset 2
Up/Down A, B, C	Up/Down A, B, C	OUT1 keeps OFF state when display value is smaller than Preset 1 value, but if Preset 2 is "0", OUT1 keeps ON state. OUT2 keeps ON state when display value is equal or larger than Preset 2.
Up/Down A, B, C	Up/Down A, B, C	When display value is equal to set value (Preset 1 or Preset 2) only, OUT1 or OUT2 output keeps ON state.

*Output of single preset type is operating the same as OUT2 of double preset type.

Setting of timer function modes

Set menu

How to set (▲, ▼)

Time range

•CT6S-2P, CT6S, CT6S-I

•CT4S-2P, CT4S

UP/DOWN mode (U, D)

Output mode (OUT)

Output time (OUT)

Input logic (I, L)

Input signal time (I, L)

Lock key (Lock)

COUNTER/TIMER (C, T)

When setting the function mode, no external input signal will be accepted and the output will stay in the OFF state.

* In case of output mode is FLK, INT, OFD, there is no output time setting in the function setting mode.

* In the indicator type (CT6S-I), there are no the output mode and the output time setting mode (OUT1, OUT2) in the function setting mode.

* Control output operates as OUT2 in the double preset type (CT6S-2P, CT4S-2P), and out1 always keeps "OFF" status.

* When in the function setting mode, if no key is touched for 60 sec. the timer will return to RUN mode.

Timer range

•CT6S-2P, CT6S, CT6S-I		•CT4S-2P, CT4S	
Time range	Function setting mode	Time range	Function setting mode
0.01s - 9999.99s	Counting display	0.01s - 99.99s	Counting display
0.1s - 99999.9s	Presel display	0.1s - 999.9s	Presel display
1s - 999999s		1s - 9999s	
0.01s - 99m59.99s		1s - 99m59s	
0.1s - 99m59.9s		0.1m - 999.9m	
0.1m - 99999.9m		1m - 9999m	
1m - 999999m		1m - 99h59m	
1s - 99h59m59s		1h - 9999h	
1m - 9999m59m			

Timer output operation mode

Output mode

Time chart

Operation

Signal ON Delay (POWER RESET)

POWER ON DELAY (POWER HOLD)

FLICKER 1 (POWER RESET): One-shot output

FLICKER 2 (POWER HOLD): One-shot output

SIGNAL ON DELAY (POWER RESET)

POWER ON DELAY (POWER HOLD)

FLICKER 1 (POWER RESET)

FLICKER 2 (POWER HOLD)

FLICKER 1 (POWER RESET): One-shot output

FLICKER 2 (POWER HOLD): One-shot output

INTERVAL (POWER/SIGNAL RESET)

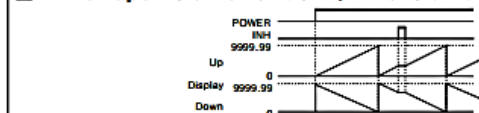
INTERVAL 1 (POWER RESET)

SIGNAL OFF DELAY (POWER RESET)

* POWER RESET: There is no memory retention. (Initialize the indicating value)

* POWER HOLD: There is memory retention. (It memorizes the indicating value when power cut off and displays the indicating value as initial value)

Timer operation of CT6S-I (Indication only)



Caution

- The power ON/OFF
 - Power voltage rises for 100ms after power on and falls for 700ms after power off. Therefore be sure to apply input signal after 100ms and power turns on again after 700ms when power turns off.
 - When apply the power into CTS series, please apply the power in an instant by using Sensor or Relay.
 - Input signal line
 - Use as short a cable from the sensor to this unit as possible.
 - Use shielded cable for long input line.
 - Wire as separating input line from the power line.
 - Selection of input method
 - Be sure to change the input method after power off.
 - Contact count input (When it is used as Counter)
 - If apply contact input at high speed mode (1k, 5k, 10k), it may miscout by chattering. Therefore set low speed mode (1 or 30cps) at contact input.
 - When test dielectric voltage and insulation resistance of the control panel with this unit installed.
 - Please isolate this unit from the circuit of control panel.
 - Please make all terminals of this unit short-circuited.
 - Do not use this unit at below places.
 - Place where there are severe vibration or impact.
 - Place where strong alkalis or acids are used.
 - Place where there are direct ray of the sun
 - Place where strong magnetic field or electric noise are generated.
 - Installation environment
 - It shall be used indoor
 - Altitude Max. 2000m
 - Pollution Degree 2
 - Installation Category II
- * It may cause malfunction if above instructions are not followed.

Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHOMETER SPEED/PULSE METER
- DISPLAY UNIT
- PROXIMITY SENSOR
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM

Autonics Corporation
http://www.autonics.net

HEAD QUARTER :
41-5, Yongdang-ro, Ulsan-si, Ulsan-si, Gyeongnam, Korea 626-847

INTERNATIONAL SALES :
512 Ansong Bldg., 410-13, Shin-dong, Guro-gu, Seoul, Korea 152-070

TEL: 82-2-2679-6585 / FAX: 82-2-2679-6556
E-mail: sales@autonics.net

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