Autonics

Counter/Timer
CT SERIES
INSTRUCTION MANUAL

CE c(UL)us

CTY Series   CTS Series   CTM Series

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

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※Safety considerations are categorized as follows:
⚠Warning Failure to follow these instructions may result in serious injury or death.
⚠Caution Failure to follow these instructions may result in personal injury or product damage.
※The symbols used on the product and instruction manual represent the following
⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning

1. 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 fire, personal injury, or economic loss.
2. Install on a device panel to use.
   Failure to follow this instruction may result in electric shock or fire.
3. Do not connect, repair, or inspect the unit while connected to a power source.
   Failure to follow this instruction may result in electric shock or fire.
4. Check 'Connections' before wiring.
   Failure to follow this instruction may result in fire.
5. Do not disassemble or modify the unit.
   Failure to follow this instruction may result in electric shock or fire.

⚠ Caution

1. When connecting, the power/sensor input and relay output, use AWG 20(0.50mm²) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90N·m.
   Failure to follow this instruction may result in fire or malfunction due to contact failure.
2. Use the unit within the rated specifications.
   Failure to follow this instruction may result in fire or product damage.
3. Use dry cloth to clean the unit, and do not use water or organic solvent.
   Failure to follow this instruction may result in electric shock or fire.
4. 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 fire or explosion.
5. Keep metal chip, dust, and wire residue from flowing into the unit.
   Failure to follow this instruction may result in fire or product damage.

■ Manual

For the detail information and instructions, please refer to user manual and user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, homepage).
Visit our homepage (www.autonics.com) to download manuals.

■ Ordering Information

| CT | 6 | M | – | 2P | 4 | T |

Communication	No-mark	None
	T	RS485 communication output
Power supply	2	24VAC 50/60Hz, 24-48VDC
	4	100-240VAC 50/60Hz
Output	1P	1-stage preset
	2P	2-stage preset
	I[*1]	Indicator
Size	S	DIN W48×H48mm
	Y	DIN W72×H36mm
	M	DIN W72×H72mm
Display digit	4	9999 (4-digit)
	6	999999 (6-digit)
Item	CT	Counter/Timer

※1: CT4S model does not support indicator type.

■ Unit Description

• CTS Series
• CTM Series
• CTY Series

Model	Display	Note
CT6Y-1P	PS2→PS	PS1, OUT1 LEDs
CT6S-1P	PS2→OUT2	
CT4S-1P	PS2→OUT2	
CT6M-1P		
CT6Y-I		
CT6S-I	PS2→PS	PS1, OUT1, OUT2 LEDs
CT6M-I		

※CT4S model does not support indicator type.

1. **Counting value display component (red)**: RUN mode: Displays counting value for counter operation or time progress value for timer operation. Function setting mode: Displays setting item.
2. **Setting value display component (yellow-green)**: RUN mode: Displays setting value. Function setting mode: 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)**: Flashes (progressing time) or Turns ON (stoping time) for timer operation.
6. **Preset value checking and 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. **RST key** RUN mode: Press the RST key to reset the counting value. BATCH counter mode: Press the RST key to reset the batch counting value.
9. **MD key** RUN mode: Hold the MD key over 3 sec. to enter function setting mode(parameter setting). Hold the MD key over 3 sec. to enter function setting mode(communication setting). Function setting mode: Press the MD key to select function setting mode parameter. Hold the MD key over 3 sec. to return RUN mode.
10. **ꕔ 🔼 🔽 key**
    1) ꕔ key RUN mode: Press the ꕔ key to enter preset mode. Preset mode: Press the ꕔ key to move preset digits.
    2) 🔼 🔽 key RUN mode: Hold the 🔼 key over 1 sec. to enter Function setting check mode. Preset mode: Used for increasing or decreasing preset value. Function setting mode: Changes the settings. Function setting check mode: Press the 🔽 key to move the previous parameter. Press the 🔼 key to move the next parameter.
11. **BA key** RUN mode: Press the RST key to enter BATCH counter mode.
12. **BATCH output indicator (BA.O) (red)**
13. **BATCH preset value checking and changing indicator (BA.S) (yellow-green)**: Turns ON when checking and changing BATCH preset value.

■ Connections

Be sure that connection is varied by supporting RS485 communication.

• CTS Series
• CTY Series

※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, homepage).

■ Specifications

Series		CTS		CTY	CTM
Model	1-stage preset	CT4S-1P□□	CT6S-1P□□	CT6Y-1P□□	CT6M-1P□□
	2-stage preset	CT4S-2P□□	CT6S-2P□□	CT6Y-2P□□	CT6M-2P□□
	Indicator		CT6S-I□□	CT6Y-I□□	CT6M-I□□
Display digits		4-digit	6-digit	6-digit	6-digit
Display method		7 segment (counting value: red, setting value: yellow-green) LED method
Character size(W×H)	Counting value	6.5×10mm	4.5×10mm	4.2×9.5mm	6.6×13mm
	Setting value	4.5×6mm	3.5×7mm		5×9mm
Power supply	AC voltage	100-240VAC~ 50/60Hz
	AC/DC voltage	24VAC~ 50/60Hz, 24-48VDC═
Permissible voltage range		90 to 110% of rated voltage
Power consumption	AC voltage	Max. 12VA
	AC/DC voltage	AC: Max. 10VA, DC: Max. 8W
Counter	INA/INB Max. counting speed	Selectable 1cps/30cps/1kcps/5kcps/10kcps
	Counting range	-999 to 9999 -99999 to 999999
	Scale	Decimal Decimal point up to fifth digit point up to third digit
	Min. signal width	RESET signal: Selectable 1ms/20ms
Timer	Time range	999.999s, 9999.99s, 99999.9s, 999999s, 99m59.99s, 999m59.9s, 9999m59s, 99999.9, 99999m59s, 99999.9m, 999999m, 99h59m59s, 9999h59m, 99999h9m
	Operation method	Count up, Count down, Count Up/Down
	Min. signal width	INA, INH, RESET signal: Selectable 1ms/20ms INA, RESET, INHIBIT, BATCH RESET signal: Selectable 1ms/20ms
	Repeat error	
	Set error	In case of power ON start: max. ±0.01% ±0.05s
	Voltage error	In case of signal start: Max. ±0.01% ±0.03s
	Temp. error	
Input method		Selectable voltage input or no-voltage input [Voltage input]-input impedance: 5.4kΩ, [H]: 5-30VDC═, [L]: 0-2VDC [No-voltage input]-short-circuit impedance: Max. 1kΩ, short-circuit residual voltage: Max. 2VDC
One-shot output time		Max. 99.99s

Control output

		Standard	Comm.	Standard	Comm.	Standard	Comm.
Contact output	Type	1-stage	SPDT(1c): 1		SPDT(1c): 1		SPDT(1c): 1
		2-stage	SPST(1a): 2		SPST(1a), SPDT(1c): 1		SPDT(1a): 1, SPDT(1c): 1
	Capacity	250VAC~ 5A resistive load		250VAC~ 3A resistive load		250VAC~ 5A resistive load	
Solid state output (NPN open collector)	Type	1-stage		1		1	
		2-stage		2		2	3
	Capacity	Max. 30VDC═, 100mA					
External power supply		Max. 12VDC═ ±10%, 100mA
Memory retention		Approx. 10 years (non-volatile memory)
Insulation resistance		Over 100MΩ (at 500VDC megger)
Dielectric strength		2,000VAC 50/60Hz for 1 min.
Noise immunity		Square-wave noise by noise simulator (pulse width 1μs) ±2kV
Vibration	Mechanical	0.75mm amplitude at frequency of 10 to 55Hz (for 1 min.) in each X, Y, Z direction for 1 hour
	Malfunction	0.5mm amplitude at frequency of 10 to 55Hz (for 1 min.) in each X, Y, Z direction for 10 minutes
Shock	Mechanical	300m/s² (approx. 30G) in each X, Y, Z direction for 3 times
	Malfunction	100m/s² (approx. 10G) in each X, Y, Z direction for 3 times
Relay life cycle	Mechanical	Min. 10,000,000 operations
	Malfunction	Min. 100,000 operations
Protection structure		IP65 (front part, IEC standard)
Environmental	Ambient temp.	-10 to 55°C, storage: -25 to 65°C
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH
Approval		
Weight[*1]		Approx. 212g (approx. 159g)		Approx. 228g (approx. 140g)		Approx. 322g (approx. 252g)

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

■ Communication Specifications

• Interface

Comm. protocol	Modbus RTU with 16-bit CRC
Connection type	RS485
Application standard	Compliance with EIA RS485
Max. connection	31 units (address: 1 to 127)
Comm. type	Two-wire half duplex
Synchronous method	Asynchronous
Comm. distance	Max. 800m
Comm. speed	2400, 4800, 9600(factory default), 19200, 38400bps
Comm. response time	5 to 99ms (factory default: 20ms)
Start bit	1-bit (fixed)
Data bit	8-bit (fixed)
Parity bit	None(factory default), Even, Odd
Stop bit	1, 2-bit (factory default: 2-bit)

※It is recommended to use Autonics communication converter: SCM-WF48 (Wi-Fi to RS485-USB wireless communication converter, sold separately), SCM-US48I (USB to RS485 converter, sold separately), SCM-38I (RS232C to RS485 converter, sold separately).
※Please use twisted pair wire, which is suitable for RS485 communication, for SCM-WF48, SCM-US48I and SCM-38I.

■ Dimensions

(unit: mm)

○ CTS Series
○ CTY Series
○ CTM Series

■ Input Logic Selection

CTS Series
1. The power must be cut off.
2. Squeeze toward ① and pull toward ② as the figure. (CTS/CTY Series)
3. Select input logic switch (SW1) inside Counter/Timer.
4. Push a case in the opposite direction of ②.
5. Then supply the power to counter/timer.

Turn OFF the power before changing input logic (PNP/NPN)

※How to change input logic
Power OFF → change settings → power ON → press RST key or input signal (min. 20ms)

■ Basic Operations (Counter/Timer/Communication)

1. Operations and functions

※1: If no key is touched for 60 sec., the counter will return to RUN mode without being restored.

1-1. Change of preset (Counter/Timer)
Even if changing the preset value, preset control will continue. In addition, the preset value could be set to 0 and the ouput of 0 preset value turns ON. According to the output mode, preset value could not be set to 0. (When setting to 0, preset value "0" will flash 3 times.)

In RUN mode, press the ꕔ key to enter preset mode. 'PS1' indicator turns ON and first digit of preset value flashes.

Press the 🔽 or 🔼 keys to set the desired value (example, '60'). Press the MD key to enter the PS2 setting mode.

Press the 🔽 or 🔼 keys to set the desired value (example, '200'). Press the MD key to return RUN mode.

1-2. Function setting check mode
Setting value of function setting mode can be confirmed using the 🔼 and 🔽 keys.

1-3. Switching display function in preset indicator
Setting value 1(PS1) and setting value 2(PS2) are displayed each time pressing MD key in dual preset mode. (In timer, it is available for setting value 1.)

1-4. Reset
In RUN mode or function setting mode, if pressing RST key or applying the signal to the RESET terminal on the back side, present value will be reset and output will maintain off status. When selecting voltage input (PNP), short no.10 and no.12 terminals or when selecting no-voltage input (NPN), short no.11 and no.12 terminals to reset.

2. Flow chart for function setting mode

※1: Indicator
※2: Output type
※When changing the setting of shaded parameters, all output turn OFF. When returning RUN mode, PV is reset.

※If changing Parameter group1 setting value, display value and output are reset.
※Parameter 2 group is not available to non-communication models.

■ Counter Mode

1. Parameter setting
(MD key: Moves the settings, 🔼, 🔽 key: Changes the settings)

Parameter	Setting
Counter/Timer [C·t]	CoUn ↔ tI AE ※CoUn: Counter tI AE: Timer
Input mode [I n]	Input mode is UP, UP-1, UP-2 or d n, d n-1, d n-2, Ud-A, Ud-b, Ud-C...
Output mode [oUt2]	Input mode is Ud-A, Ud-b, Ud-C... ※If max. counting speed is 5kcps, and output mode is d, max. counting speed is automatically changed as 30cps, factory default.
Indication mode [dSPA]	※In case of the indicator type, indicate mode selection [dSPA] is disabled. ※It is the added function to set the preset value when selecting Hold.
Max. counting speed [CPS]	※Max. counting speed is when duty ratio of INA or INB input signal ratio is 1:1. It is applied for INA, or INB input as same. ※Set one-shot output time of OUT2.
OUT2 output time [oUt2]	※Setting range: 00.01 to 99.99sec. ※When input mode is F, n, 5, t, d, oUt2 does not appear. (fixed as HOLD)
OUT1 output time [oUt1]	※Set one-shot output time of OUT1. ※When 1st digit is flashing, press the ꕔ key once and Hold appears.
OUT output time [oUt2]	※Setting range: 00.01 to 99.99sec. ※When input mode is F, n, 5, t, d, oUt2 does not appear. (fixed as HOLD)
Decimal point [dP]	6-digit type / 4-digit type ※Decimal point is applied to counting value and setting value.
Min. reset time [nt]	↔ 20, unit: ms ※Set min. width of external reset signal input.
Input logic [5I G]	nPn: No-voltage input, PnP: Voltage input ※Check input logic value (PNP, NPN).
Prescale decimal point [5CdP]	6-digit type / 4-digit type ※Setting value of prescale should not be smaller than decimal point [dP].
Prescale value [5CL]	Setting range of prescale value 6-digit type: 0.00001 to 99999.9, 4-digit type: 0.001 to 999.9
Start point value [5trt]	※Setting range (linked with decimal point [dP]): 6-digit type: 0.00001 to 99999.9, 4-digit type: 0.001 to 999.9 ※When input mode is dn, dn-1, dn-2, start point value does not appear.
Memory protection [CLr - rEC]	CLr: Resets the counting value when power OFF. rEC: Maintains the counting value when power OFF. (memory protection)
Key lock [LoC£]	LoFF: Unlock keys, key lock indicator turns OFF LoC1: Locks RST key, key lock indicator turns ON LoC2: Locks ꕔ, 🔼, 🔽 keys, key lock indicator turns ON LoC3: Locks RST, ꕔ, 🔼, 🔽 keys, key lock indicator turns ON

※1: For 1-stage preset model, oUt1 does not appear. The output time of oUt2 is displayed as oUt1.
- Decimal point and operation
- Decimal point: Set the decimal point for display value regardless of counting value.
- Prescale decimal point: Set the decimal point for prescale value of counting value regardless of decimal point of display value.

2. Input mode

Input mode	Counting chart	Operation
UP [Up]		※When INA is counting input, INB is no counting input. When INB is counting input, INA is no counting input.
UP-1 [Up-1]		※When INA input signal is rising, it counts. ※INA: Counting input ※INB: No counting input
UP-2 [Up-2]		※When INA input signal is falling, it counts. ※INA: Counting input ※INB: No counting input
dn [Down]		※When INA is counting input, INB is no counting input. When INB is counting input, INA is no counting input.
dn-1 [Down-1]		※When INA input signal is rising, it counts. ※INA: Counting input ※INB: No counting input
dn-2 [Down-2]		※When INA input signal is falling, it counts. ※INA: Counting input ※INB: No counting input
Ud-A [Up/Down-A]		※INA: Counting input ※INB: Counting command up ※When INB is "L", counting command is up. When INB is "H", it is counting command is down.
Ud-b[*1] [Up/Down-B]		※INA: Counting input ※INB: Counting command down ※When INA and INB input signals are rising at the same time, it maintains previous counting value.
Ud-C[*1] [Up/Down-C]		※When connecting encoder output A, B phase with counter input, INA, INB, set input mode [Ud-C] for counter operation.

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

Character	Voltage input (PNP)	No-voltage input (NPN)
H	5-30VDC═	Short
L	0-2VDC	Open

Counting speed	Min. signal width
1cps	500ms
30cps	16.7ms
1kcps	0.5ms
5kcps	0.1ms

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

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

・Prescale value

$$= \frac{\pi \times \text{Diameter (D) of pulley}}{\text{The number of pulses by 1 rotation of encoder}}$$

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

$$= 0.069mm/pulse$$

Set decimal point[dP] as [------], prescale decimal point [5CdP] as [------], prescale value [5CL] as [0.069] at function setting mode. It is available to control conveyer position by 0.1mm unit.

■ Timer Mode

1. Parameter setting
(MD key: Moves the settings, 🔼, 🔽 key: Changes the settings)

Parameter	Setting
Counter/Timer [C·t]	CoUn ↔ tI AE ※CoUn: Counter ※tI AE: Timer
Time range [HoUr/M n/5EC]	6-digit type / 4-digit type
Up/Down mode [U-d]	UP ↔ dn ※UP: Time progresses from '0' to the setting time. ※dn: Time progresses from the setting time to '0'.
Indication mode [dSPA]	totRL ↔ HoLd ※Used for the indicator type only. ※It is added that the feature which set the setting time when selecting HoLd or ontd
Memory protection [CLr - rEC]	CLr: Reset time value when power is off. rEC: Memorizes time value at the moment of power off.
Output mode [ond]	ond ↔ ond1 ↔ ond2 ↔ FLE ↔ FLE1 ↔ FLE2 ↔ nFd ↔ nFd1
OUT2 output time [oUt2]	※Set one-shot output time of OUT2. ※Setting range: 00.01 to 99.99sec., Hold. ※When 1st digit is flashing, press the ꕔ key once and Hold appears.
OUT1 output time [oUt1]	※Set one-shot output time of OUT1. ※Setting range: 00.01 to 99.99sec., Hold. ※When 1st digit is flashing, press the ꕔ key once and Hold appears.
OUT output time [oUt2]	※Setting range: 00.01 to 99.99sec., Hold. ※When 1st digit is flashing, press the ꕔ key once and Hold appears.
Input logic [5I G]	nPn: No-voltage input, PnP: Voltage input ※Check input logic value(PNP, NPN).
Input signal time [I nt]	↔ 20, unit: ms ※CTS/CTY: Set min. width of INA, INH, RESET signal. ※CTM: Set min. width of INA, RESET, INHIBIT, BATCH RESET signal.
Key lock [LoC£]	LoFF: Unlock keys, key lock indicator turns OFF LoC1: Locks RST key, key lock indicator turns ON LoC2: Locks ꕔ, 🔼, 🔽 keys, key lock indicator turns ON LoC3: Locks RST, ꕔ, 🔼, 🔽 keys, key lock indicator turns ON

※1: When input mode is FLE1, FLE2, I nt6 and ond, ond1, ond2 of 1-stage preset model, oUt1 does not appear. The output time of oUt2 is displayed as oUt1.
※2: I nt2 mode is available only for 2-stage preset model.

2. Timer '0' time setting
2-1. Timer output mode for '0' time setting
2-2. Operations by output mode ('0' time setting)

A. OND (Signal ON Delay) mode [ond]
B. OND.1 (Signal ON Delay 1) mode [ond.1]
C. OND.2 (Power ON Delay) mode [ond2]
D. NFD (ON-OFF Delay) mode [nFd]
E. NFD.1 (ON-OFF Delay1) mode [nFd1]

■ Factory Default

Parameter	Factory default	Parameter	Factory default
Counter	In	Ud-C	5I G	nPn
	oUt2	d	5CL	20
	dSPA	totRL	5CdP	6-digit type: ------ 4-digit type: ----
	CPS	30	5trt	6-digit type: 000000 4-digit type: 0.000
	oUt2(oUt1)	Hold (fixed)	5trt	000000
	dP	---	CLr	
Timer	HoUr/M n/5EC	6-digit type: 0.001s-999.999s 4-digit type: 0.001 to 9.999s	oUt2(oUt1)	Hold
	U-d	UP	I nt	00.10
	dSPA	totRL	5I G	nPn
	oUt2(oUt1)	ond	I nt	00.10
General	LoCE	LoFF		
Comm.	PS1	1000		
	PS2	5000		
	Addr	01	5tP	2
	bPS	96	PrtY	nonE
	nonE		CoAY	EnA

■ Error Display and Output Operation

Error Display	Error description	Troubleshooting
ErroD	Counting error occurs.	Change the setting value anything but 0.

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

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. 24-48VDC, 24VAC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Use the product, 0.1 sec after supplying power.
4. When supplying or turning off the power, use a switch or etc. to avoid chattering.
5. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
6. In case of contact input, set count speed to low speed mode (1cps or 30cps) to operate. If set to high speed mode (1k, 5k, 10kcps), counting error occurs due to chattering.
7. Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and signal line closely, use line filter at power line or shielded signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.
8. This product may be used in the following environments. ①Indoors (in the environment condition rated in 'Specifications') ②Altitude max. 2,000m ③Pollution degree 2 ④Installation category II

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door/Area Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connectors/Sockets
- Temperature Controllers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers
- Temperature/Humidity Transducers
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO₂, Nd: YAG)
- Laser Welding/Cutting System

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