CTT Series - Digital Counter / Timer / Tachometer

Features

- Can operate as a digital counter, timer, combination timer + counter or tachometer
- Accepts voltage and non-voltage inputs from a wide variety of NPN, PNP, or dry contact sensors
- Selectable counting speeds from 1 to 10,000 cycles per second
- Multiple transistor and relay outputs can operate as momentary or maintained
- Double-line, 6-digit, 2-color LCD display
- Easy configuration with externally accessible DIP switches or the lockable keypad
- Display decimal point selection
- Available in 100-240VAC and 24VDC powered models
- UL508 listed (E311366), cULus, CE marked

A lot of functionality in one powerful little unit!

The CTT series is an extremely versatile multi-function device that is easily configured for operation as a digital counter, timer, combination timer + counter, or tachometer. Both voltage and non-voltage inputs are accepted from a wide variety of sensor types with NPN, PNP, or dry contact outputs. The first output on the CTT is a single-pole, single-throw relay and NPN transistor that operate concurrently. The second CTT output can be ordered as either a single-pole, double throw relay or NPN transistor. Parameters are easily set using the externally accessible DIP switches or the lockable keypad. The double-line, 6-digit, two-color LCD display shows the counter, timer, or tachometer present values, setting values and menu parameters during set-up. Additional individual indicators are provided for inputs, outputs and functions. The standard 1/16 DIN size, with included panel mounting clip and gasket, make panel mounting a snap. The CTT is available in 100-240VAC and 24VDC powered models.

Counter Functions

<table>
<thead>
<tr>
<th>1-Stage</th>
<th>2-Stage</th>
<th>Batch</th>
<th>Total</th>
<th>Dual</th>
</tr>
</thead>
</table>

Counter Input Modes

- Up
- Down
- Up / Command Down
- Up/Down
- Quadrature
- Addition
- Subtraction

Counter Output Modes

Select from eleven (11) different output modes (F, N, C, R, K, P, Q, A, S, I, D)

Timer Functions (Up or Down)

- Signal On Delay 1
- Signal On Delay 2
- Signal Off Delay
- Signal On
- Power On Delay
- Power On Delay Hold
- Repeat Cycle
- Repeat Cycle Hold

Counter/Timer/Tachometer Functions

Timer + Counter

- Signal On Delay 1
- Signal On Delay 2
- Signal Off Delay
- Signal On
- Power On Delay
- Power On Delay Hold
- Repeat Cycle
- Repeat Cycle Hold

Counter Input Modes

- Up
- Down

Counter Output Modes

Select from eight (8) different output modes (F, N, C, R, K, P, Q, A)

Timer Functions (Up or Down)

- Signal On Delay 1
- Repeat Cycle
- Signal On Delay 2
- Repeat Cycle Hold
- Signal Off Delay
- Repeat Cycle 2
- Signal On
- Signal Cumulate
- Power On Delay
- Signal Twin On-Start
- Power On Delay Hold
- Signal Twin Off-Start

Tachometer Output Modes

Select from four (4) different output modes
- 2Lo/1Lo
- 2Lo/1Hi
- 2Hi/1Lo
- 2Hi/1Hi

Visit www.automationdirect.com to download the free comprehensive CTT Series manual.
CTT Series - Digital Counter / Timer / Tachometer

Digital Counter / Timer / Tachometer

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Pcs/Pkg</th>
<th>Wt (lb)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTT-AN-D24</td>
<td>Counter / Timer / tachometer, Output 1 NPN &amp; SPST relay, 24 VDC powered, panel mounting clip is included*</td>
<td>1</td>
<td>0.4</td>
<td>$69.00</td>
</tr>
<tr>
<td>CTT-AN-A120</td>
<td>Counter / Timer / tachometer, Output 1 NPN &amp; SPST relay, 100-264 VAC powered, panel mounting clip is included*</td>
<td>1</td>
<td>0.4</td>
<td>$69.00</td>
</tr>
<tr>
<td>CTT-1C-D24</td>
<td>Counter / Timer / tachometer, Output 1 NPN &amp; SPST relay, Output 2 SPDT relay, 24 VDC powered, panel mounting clip is included*</td>
<td>1</td>
<td>0.4</td>
<td>$69.00</td>
</tr>
<tr>
<td>CTT-1C-A120</td>
<td>Counter / Timer / tachometer, Output 1 NPN &amp; SPST relay, Output 2 SPDT relay, 100-264 VAC powered, panel mounting clip is included*</td>
<td>1</td>
<td>0.4</td>
<td>$69.00</td>
</tr>
</tbody>
</table>

* Spare panel clips part number PANEL-16

Digital Counter / Timer / Tachometer General Specifications

<table>
<thead>
<tr>
<th>Input Power Requirements</th>
<th>100 to 240 VAC 50/60 Hz</th>
<th>24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation Voltage Range</td>
<td>85 to 264 VAC</td>
<td>21.6 to 26.4 VDC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Less than 10VA</td>
<td></td>
</tr>
<tr>
<td>Power Source</td>
<td>12VDC ±10%, 100mA</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>Double-line, 6-digit LCD display (SV = 8mm, PV = 6mm)</td>
<td></td>
</tr>
<tr>
<td>Input Signal</td>
<td>NPN ON impedance 1K ohm max. ON residual voltage: 2V max. NPN 4.5 to 30VDC, low level: 0 to 2VDC</td>
<td></td>
</tr>
<tr>
<td>Output 1</td>
<td>Relay: SPST max. 250VAC, 5A (resistive load), 4A (inductive load); Transistor: NPN open collector. When 100mA @ 30VDC, residual voltage = 1.5VDC max</td>
<td></td>
</tr>
<tr>
<td>Output 2</td>
<td>CTT-1C-xxx Relay: SPDT max. 250VAC, 5A (resistive load), 4A (inductive load)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CTT-AN-xxx Transistor: NPN open collector. When 100mA @ 30VDC residual voltage = 1.5VDC max</td>
<td></td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>Mechanical 10,000,000 operations (frequency 18,000 operations/hr)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electrical 1000,000 operations (frequency 900 operations/hr)</td>
<td></td>
</tr>
<tr>
<td>Output Switching Time</td>
<td>2 milliseconds max</td>
<td></td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>2000VAC 50/60Hz for 1 minute</td>
<td></td>
</tr>
<tr>
<td>Vibration Resistance</td>
<td>Without damage: 10 – 55Hz, amplitude = 0.75mm, 3 axes for 2 hours</td>
<td></td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>Without damage: drop 4 times, 300m/s² 3 edges, 6 surfaces and 1 corner</td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>+32°F to +122°F (0°C to +50°C)</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-4°F to +149°F (-20°C to +65°C)</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>2000m or less</td>
<td></td>
</tr>
<tr>
<td>IP Rating</td>
<td>IP 66 (with proper enclosure installation)</td>
<td></td>
</tr>
<tr>
<td>Case Materials</td>
<td>Case = ABS Plastic, Lens = Polycarbonate</td>
<td></td>
</tr>
<tr>
<td>Ambient Humidity</td>
<td>35% to 85% RH (non-condensing)</td>
<td></td>
</tr>
<tr>
<td>Memory Backup upon Power Failure</td>
<td>EEPROM writing up to 100,000 times; Memory duration: 10 years</td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>Conforming Wiring 0.25-1.05mm² (24 to 16 AWG)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permitted Torque 0.5Nm (0.369 ft/lbs)</td>
<td></td>
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<tr>
<td>Agency Approvals</td>
<td>UL508 listed (E311366), cULus, CE marked</td>
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Wiring

CTT-1C-D24

CTT-AN-D24

CTT-1C-A120

CTT-AN-A120
CTT Series - Digital Counter / Timer / Tachometer

Display, Indicators & Keys

![Diagram of CTT Series - Digital Counter / Timer / Tachometer]

**CTT Series Dimensions**

<table>
<thead>
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**LCD Display and Indicators**

<table>
<thead>
<tr>
<th>Indicator</th>
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<tr>
<td>RST 1/2</td>
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<tr>
<td>K/P 1/2</td>
<td>Light on when key-protected mode is enabled</td>
</tr>
<tr>
<td>OUT 1/2</td>
<td>Light on when output is executing</td>
</tr>
<tr>
<td>H M S</td>
<td>Hour, minute, second, unit of timer, displayed in Timer function</td>
</tr>
<tr>
<td>TOTAL</td>
<td>&quot;Total Counting Mode&quot; in Counter function</td>
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- **PV (Present Value) display**
- **SV (Set Value) display**
- **Timer function indicator**
- **Counter function indicator**
- **Tachometer function indicator**
- **Special function indicator**
- **Lock key**
- **Reset key**
- **Mode and number shift key**
- **Up/Down key**

*Prices as of April 16, 2014. Check Web site for most current prices.*

CTT Series - Digital Counter / Timer / Tachometer

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CTT Series - Digital Counter / Timer / Tachometer

Counter Performance Specifications

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<th>Counter Functions</th>
<th>1-Stage Counting, 2-Stage Counting, Batch Counting, Total Counting, Dual Counting (See descriptions below)</th>
</tr>
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<tbody>
<tr>
<td>Input Modes</td>
<td>Counting Up, Counting Down, Counting Up / Command Counting Down, Counting Up / Counting Down, Quadrature, Addition, Subtraction (see descriptions below)</td>
</tr>
<tr>
<td>Timer Precision</td>
<td>Power On start max 0.01% 0.05 sec. Signal start max 0.01% 0.03 sec</td>
</tr>
<tr>
<td>Start Input Response</td>
<td>Less than 15ms / 5ms / 1ms</td>
</tr>
<tr>
<td>External Reset</td>
<td>Minimum reset input signal width 1ms or 20ms (selectable)</td>
</tr>
<tr>
<td>Output Duration (flicker)</td>
<td>10-9990ms variable every 10ms</td>
</tr>
<tr>
<td>Number of Digits</td>
<td>6 digits on each line</td>
</tr>
<tr>
<td>Display</td>
<td>Current values: red LED, character height 8mm; Preset value: green LED character height 6mm</td>
</tr>
</tbody>
</table>

Counter Functions

1-Stage Counting

A single count setting value SV is available in 1-Stage Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

2-Stage Counting

In 2-Stage Counting, count setting value SV1 controls Output 1 and count setting value SV2 controls Output 2. Outputs will turn ON momentarily or will be maintained ON depending on the output mode selected.

Batch Counting

In Batch Counting, count setting value SV controls Output 2 which will turn ON momentarily or will be maintained ON depending on the output mode selected. Count setting value BATCH SV controls Output 1 which will be maintained ON.

Total Counting

A single count setting value SV is available in Total Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

Dual Counting

A single count setting value SV is available in Dual Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

Counter Input Modes

Counting Up

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will increment the count present value PV by 1. Turning ON the input signal at CP2 will prohibit the input signal at CP1 from incrementing the PV.

Counting Down

With the input signal ON at input CP1, each trailing edge of the input signal at CP2 will increment the count present value PV by 1. Turning OFF the input signal at CP1 will prohibit the input signal at CP1 from incrementing the PV.
CTT Series - Digital Counter / Timer / Tachometer

**Counting down**

<table>
<thead>
<tr>
<th>CP1: Counter input prohibited</th>
<th>CP2: Counter input prohibited</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Counting Down**

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will decrement the count present value PV by 1. Turning ON the input signal at CP2 will prohibit the input signal at CP1 from decrementing the PV.

With the input signal ON at input CP1, each trailing edge of the input signal at CP2 will decrement the count present value PV by 1. Turning OFF the input signal at CP1 will prohibit the input signal at CP2 from decrementing the PV.

**Counting up / Command Counting Down**

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will increment the count present value PV by 1.

With the input signal ON at input CP2, each leading edge of the input signal at CP1 will decrement the count present value PV by 1.

**Counting up / Counting Down**

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.

Each leading edge of the input signal at CP2 will decrement the count present value PV by 1.

**Quadrature**

When the quadrature input signal at CP1 leads the input signal at CP2, the trailing edge of CP2 will increment the count present value PV by 1.

When the quadrature input signal at CP2 leads the input signal at CP1, the leading edge of CP2 will decrement the count present value PV by 1.

**Addition**

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.

**Subtraction**

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.

Each leading edge of the input signal at CP2 will decrement the count present value PV by 1.
CTT Series - Digital Counter / Timer / Tachometer

### Timer Performance Specifications

<table>
<thead>
<tr>
<th>Timer Functions</th>
<th>Signal On Delay 1, Signal On Delay 2, Signal Off Delay, Signal On, Power On Delay, Power On Delay Hold, Repeat Cycle, Repeat Cycle Hold, Repeat Cycle 2, Signal Twin On Start, Signal Twin Off Start (See time charts below).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Digits</strong></td>
<td>6 digits on each line</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>Present values: red LED, character height 8mm; Set value: green LED, character height: 6mm</td>
</tr>
<tr>
<td><strong>Time Range</strong></td>
<td><strong>Setting</strong></td>
</tr>
<tr>
<td>sec.</td>
<td>0.01 – 9,999.99</td>
</tr>
<tr>
<td>sec.</td>
<td>1 – 999,999.9</td>
</tr>
<tr>
<td>min., sec.</td>
<td>0.01 – 9,999.99</td>
</tr>
<tr>
<td>min., sec.</td>
<td>1 – 999,999.9</td>
</tr>
<tr>
<td>min.</td>
<td>1 – 999,999.9</td>
</tr>
<tr>
<td>hr., min., sec.</td>
<td>1 – 999,999.9</td>
</tr>
<tr>
<td>hr., min.</td>
<td>1 – 999,999.9</td>
</tr>
<tr>
<td>hr.</td>
<td>1 – 999,999.9</td>
</tr>
</tbody>
</table>

### Display
- Elapsed time / remaining time

### Timer
- Power ON start max ±0.01% ±0.05 sec
- Signal start max ±0.01% ±0.03 sec

### Start Input Response
- Less than 15ms / 5ms / 1ms

### External Reset
- Minimum reset input signal width 1ms or 20ms (selectable)

### Output Duration (flicker)
- 10-9990ms variable every 10ms

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### Timing Charts

#### Signal On Delay 1 (Signal On Delay 1)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter [on-delay] or by DIP switch 2). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter ([output pulse width]) or will be maintained ON if the output pulse width parameter ([output pulse width]) is set to 0.00. The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter ([reset pulse width]) or DIP Switch 8.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

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CTT Series - Digital Counter / Timer / Tachometer

**Signal On Delay 2 (Sond2)**

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter \( \text{t modE} \) or by DIP switch 2). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter \( \text{t out1} \) or will be maintained ON if the output pulse width parameter \( \text{t out1} \) is set to 0.00. The trailing edge of the “start” signal will turn OFF the outputs and reset the timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \( \text{rtSr} \) or DIP Switch 8.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

---

**Signal Off Delay (Soffd)**

With power applied to the CTT, the leading edge of the input signal at START will immediately turn ON the outputs. The trailing edge of the “start” signal will begin the timing period setting value SV (timing up or down based on parameter \( \text{t modE} \) or by DIP switch 2). At the end of the timing period both outputs will turn OFF. The leading edge of a “start” signal applied during a previously initiated timing period will reset the timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \( \text{rtSr} \) or DIP Switch 8.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

---

**Signal On (Son)**

With power applied to the CTT, the leading edge of the input signal at START will immediately turn ON the outputs and begin the timing period setting value SV (timing up or down based on parameter \( \text{t modE} \) or by DIP switch 2). The trailing edge of the “start” signal has no effect on the outputs or timing period. At the end of the timing period both outputs will turn OFF and the timing period will reset. The leading edge of a “start” signal applied during a previously initiated timing period will not reset the timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \( \text{rtSr} \) or DIP Switch 8.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.
CTT Series - Digital Counter / Timer / Tachometer

Power On Delay (Pond)

When power is applied to the CTT, the timing period setting value SV will begin (timing up or down based on parameter (\( t_{\text{modE}} \)). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter (\( t_{\text{out1}} \)) or will be maintained ON if the output pulse width parameter (\( t_{\text{out1}} \)) is set to 0.00.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter (\( t_{\text{rtSr}} \)).

The leading edge of a “pause” input signal at GATE or signal at START will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) or “start” signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

Power On Delay HOLD (PondH)

When power is applied to the CTT, the timing period setting value SV will begin (timing up or down based on parameter (\( t_{\text{modE}} \)). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter (\( t_{\text{out1}} \)) or will be maintained ON if the output pulse width parameter (\( t_{\text{out1}} \)) is set to 0.00.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter (\( t_{\text{rtSr}} \)).

The leading edge of a “pause” input signal at GATE or signal at START will pause the timing period after it has been started. The timing period will continue after the trailing edge of the “pause” (Gate) or “start” signal.

When power is removed, both outputs will turn OFF. The last state of the outputs and the last value of the current timing period will be “stored” in eeprom when power is removed. When power is reapplied the outputs will return to their last state and timing will resume from the last value of the timing period.
CTT Series - Digital Counter / Timer / Tachometer

Repeat Cycle

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter \( t\ mode \)). At the end of the timing period, the timing period will reset and repeat automatically.

If the output pulse width parameter \( tout1 \) is set to 0.00 both outputs will turn ON at the end of the first timing period, turn OFF at the end of the next timing period, turn ON at the end of the next timing period, etc.

If the output pulse width parameter \( tout1 \) is set to >0.00 both outputs will turn ON momentarily for the time set in the output pulse width parameter \( tout1 \) at the beginning of each timing period.

Repeat Cycle HOLD

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter \( t\ mode \)). At the end of the timing period, the timing period will reset and repeat automatically.

If the output pulse width parameter \( tout1 \) is set to 0, both outputs will turn ON at the end of the first timing period, turn OFF at the end of the next timing period, turn ON at the end of the next timing period, etc.

If the output pulse width parameter \( tout1 \) is set to >0.00, both outputs will turn ON momentarily for the time set in the output pulse width parameter \( tout1 \) at the beginning of each timing period.

The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The ‘reset’ signal minimum pulse width is set by reset pulse width parameter \( rtSr \). The leading edge of a new “start” signal is necessary to restart the cycle.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.
Repeat Cycle 2 (\texttt{rCy2})

With power applied to the CTT, the leading edge of the input signal at \texttt{START} will begin the timing period timing up or down based on parameter \texttt{t\_modE}. At the end of the timing period, the timing period will reset and repeat automatically.

Both outputs will turn ON at the beginning of the first timing period and turn OFF when the timing period reaches time period setting \texttt{SV2}. The outputs will turn ON again when the time period reaches time period setting \texttt{SV1}.

The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at \texttt{RST1} will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \texttt{rtSr}. The leading edge of a new “start” signal is necessary to restart the cycle.

The leading edge of a “pause” input signal at \texttt{GATE} will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

Signal Cumulate (\texttt{SCum})

With power applied to the CTT, the leading edge of the input signal at \texttt{START} will begin the timing period setting value \texttt{SV} timing up or down based on parameter \texttt{t\_modE}. The trailing edge of the “start” signal will pause the timing period. The leading edge of a subsequent “start” signal will resume timing from the last value of the timing period. At the end of the timing period both outputs will turn ON.

The leading edge of a “reset” input signal at \texttt{RST1} will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \texttt{rtSr}.

The leading edge of a “pause” input signal at \texttt{GATE} will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF. The last state of the outputs and the last value of the current timing period will be “stored” when power is removed. When power is reapplied the outputs will return to their last state and timing will resume from the last value of the timing period by the leading edge of a new “start” signal.
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Signal Twin ON-Start (Ston)

With power applied to the CTT, the leading edge of the input signal at START will turn ON the outputs and begin the timing period timing up or down based on parameter \(t\), when the timing period reaches time setting SV2 the outputs will turn OFF and the period will reset and restart automatically. When the time period now reaches time setting SV1 the outputs will turn ON again and the time period will reset and repeat automatically.

The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \(r\). The leading edge of a new “start” signal is necessary to restart the cycle.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.

Signal Twin OFF-Start (StoFF)

With power applied to the CTT, the leading edge of an input signal at START will begin the timing period timing up or down based on parameter \(t\). When the timing period reaches time setting SV1 the outputs will turn ON and the time period will reset and restart automatically. When the time period now reaches time setting SV2 the outputs will turn OFF again and the time period will reset and repeat automatically.

The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter \(r\). The leading edge of a new “start” signal is necessary to restart the cycle.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.
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Tachometer Performance Specifications

<table>
<thead>
<tr>
<th>Output Modes</th>
<th>2Lo1Lo, 2Lo1Hi, 2Hi1Lo, and 2Hi1Hi (See tachometer output mode charts below).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Digits</td>
<td>6 digits on each line</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>1Hz, 30Hz, 200Hz, 1kHz, 5kHz, 10kHz</td>
</tr>
<tr>
<td>Display</td>
<td>Present values: red LED, character height: 8mm; Set value: green LED, character height: 6mm</td>
</tr>
<tr>
<td>Timer Precision</td>
<td>Power ON start Max ± 0.01% ±0.05 sec, Signal start Max ±0.01% ±0.03</td>
</tr>
<tr>
<td>Start Input Response</td>
<td>Less than 15ms / 5ms / 1ms</td>
</tr>
<tr>
<td>External Reset</td>
<td>Minimum reset input width 1ms or 20ms (selectable)</td>
</tr>
<tr>
<td>Output Duration (Flicker)</td>
<td>10-9990ms variable every 10ms</td>
</tr>
</tbody>
</table>

Tachometer Output Mode Charts

Counter Example:

Using the counter feature of the CTT to count the total number of pieces in a box to signal a conveyor to advance to the next station.
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Timer Example:
A basic Timer used to control the clamp time of a compression model press. When the operator signals, the mold is loaded with material. When a start button is pressed, the hydraulic cylinder closes the press to make a limit switch which starts the CTT timing. Upon completion of the timer cycle, Output 1 is turned on and the press is opened by the hydraulic cylinder.

Tachometer Example:
Using PSCALE to convert pulses into engineering units
The PSCALE feature of the CTT is very useful in converting the pulsed signal from an encoder or sensor into a usable unit of measurement.
For example, if connecting a proximity switch to the CTT to monitor the speed of a motor using a sensing gear, there is a simple calculation to convert the pulses from the sensor to Motor RPMs.
Using the following formula, you can calculate a PSCALE value to change a pulse signal into RPMs. First, obtain the pulses per revolution (ppr) or number of teeth on the sensing gear.

For example, in the illustration below, there are 38 teeth on the gear or 38 ppr. If the gear is coupled directly to the motor, this is all that is required to perform the calculation.
PSCALE = 60/38
PSCALE = 1.579
With the PSCALE set to 1.579 for every 38 input cycles the CTT will display a value of 1.