Multifunction LCD Digital Timer/Counter/Tachometer

TC-Pro482×××

- Highly visible display with backlit negative transmissive LCD
- Visual alert when output status changes
- PNP/NPN switchable DC-voltage input
- Finger-safe terminals (screw terminal block models)
- Three-language instruction manual
- Applied to connect PC/HMI

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Model Number Structure

### List of Models

<table>
<thead>
<tr>
<th>Output type</th>
<th>Supply voltage</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact output</td>
<td>100–240 VAC</td>
<td>TC-Pro482SRA (-D)</td>
</tr>
<tr>
<td></td>
<td>24 VDC/24 VAC</td>
<td>TC-Pro482SRD (-D)</td>
</tr>
<tr>
<td>Transistor output</td>
<td>100–240 VAC</td>
<td>TC-Pro482STA (-D)</td>
</tr>
<tr>
<td></td>
<td>24 VDC/24 VAC</td>
<td>TC-Pro482STD (-D)</td>
</tr>
</tbody>
</table>

Note: The model with communication must be used with cable.

### Model Number Legend

TC-Pro 482 1 2 3 4

1. **Communication**
   - S: Standard (no communication)
   - C: Communication

2. **Output type**
   - R: Contact
   - T: Transistor

3. **Supply voltage**
   - A: 100V–240VAC
   - D: 4VDC, 4VAC

4. **Mounting method**
   - None: Flush mounting
   - D: DIN track mounting

### Accessories (Order Separately)

<table>
<thead>
<tr>
<th>Name</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-pin Female D-sub cable for RS-232 connector, 1.5m Cable</td>
<td>CAB-090A232</td>
</tr>
<tr>
<td>9-pin Female D-sub cable for RS-485 connector, 1.5m Cable</td>
<td>CAB-090A485</td>
</tr>
<tr>
<td>9-pin Female D-sub cable for RS-422 connector, 1.5m Cable</td>
<td>CAB-090A422</td>
</tr>
<tr>
<td>9-pin male D-sub adapter for CAB-090A232/CAB-090A485/CAB-090A422</td>
<td>ADP-090401</td>
</tr>
<tr>
<td>9-pin Female D-sub cable for RS-232 connector, 1.5m Cable</td>
<td>CAB-090B232</td>
</tr>
<tr>
<td>9-pin Female D-sub cable for RS-485 connector, 1.5m Cable</td>
<td>CAB-090B485</td>
</tr>
<tr>
<td>9-pin Female D-sub cable for RS-422 connector, 1.5m Cable</td>
<td>CAB-090B422</td>
</tr>
<tr>
<td>Mounting Track</td>
<td>0F-A</td>
</tr>
<tr>
<td>Panel Protective Cover</td>
<td>SVF-A</td>
</tr>
<tr>
<td>Communication Protective Cover</td>
<td>TTL-11</td>
</tr>
</tbody>
</table>

Note: CAB-090A232/485/422 is used for Flush mounting products
CAB-090B232/485/422 is used for DIN track mounting products
Specifications

## Ratings (For Timing)

<table>
<thead>
<tr>
<th>Item</th>
<th>TC-Pro482□□□-□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Digital timer/counter/tachometer</td>
</tr>
<tr>
<td>Rated supply voltage</td>
<td>100~240VAC (50/60Hz), 24VAC (50/60Hz), 24VDC (permissible ripple:20% (p-p) max.)</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>85% to 110% rated supply voltage (24VDC; 90% to 110%)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Approx. 6.2VA at 264VAC, Approx. 5.1VA at 26.4VAC, Approx. 2.4W at 24VDC</td>
</tr>
<tr>
<td>Mounting method</td>
<td>Flush mounting, DIN track mounting</td>
</tr>
<tr>
<td>External connections</td>
<td>Screw terminals</td>
</tr>
<tr>
<td>Terminal screw tightening torque</td>
<td>0.5 N•m Max.</td>
</tr>
<tr>
<td>Display</td>
<td>7-segment, LCD display Present value: 9-mm-high characters, white Set value: 4-mm-high characters, white</td>
</tr>
<tr>
<td>Digits</td>
<td>6 digits</td>
</tr>
<tr>
<td>Time range</td>
<td>999.999s (0.001-s unit), 9999.99s (0.01-s unit), 99999.9s (0.1-s unit) 999999s (1-s unit), 9999min59s (1-s unit), 9999.9min (0.1-min unit), 99999min (1-min unit), 99999h59min (1-min unit), 999999h (1-h unit)</td>
</tr>
<tr>
<td>Timer mode</td>
<td>Elapsed time (UP), Remaining time (down) (selectable)</td>
</tr>
<tr>
<td>Input signals</td>
<td>Signal, reset, gate</td>
</tr>
<tr>
<td>Input method</td>
<td>※ No-voltage input/voltage input (switchable) ◆ No-voltage input ON impedance: 1kΩ max. (leakage current: 5~20 mA at 0Ω) ON residual voltage: 3V max. OFF impedance: 100kΩ min. ◆ Voltage Input High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input resistance: approx. 4.7 kΩ)</td>
</tr>
<tr>
<td>Signal, Reset, Gate</td>
<td>Minimum input signal width: 1 or 20 ms (selectable, same setting for all inputs)</td>
</tr>
<tr>
<td>Power reset</td>
<td>Minimum power-opening time: 0.5 s (except A-3, b-1 and F mode)</td>
</tr>
<tr>
<td>Reset system</td>
<td>Power reset (except A-3, b-1 and F mode), external and manual reset</td>
</tr>
<tr>
<td>Sensor waiting time</td>
<td>250 ms max. (control output is turned OFF and no input is accepted during sensor waiting time)</td>
</tr>
<tr>
<td>Output modes</td>
<td>A, A-1, A-2, A-3, b, b-1, d, E, F, Z, ton or toff</td>
</tr>
<tr>
<td>One-shot output time</td>
<td>0000.01~9999.99s</td>
</tr>
<tr>
<td>Output method</td>
<td>Relay/Transistor output</td>
</tr>
<tr>
<td>Control output</td>
<td>SPDT contact output: 5A at 250 VAC, resistive load (cosΦ=1) Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) Transistor output: NPN open collector, max. 100mA at 30 VDC Residual voltage: 1.5 VDC max. (approx. 1V) Output category according to EN60947-5-1 for timers with Contact outputs (AC-15; 250V 3A / AC-13; 250V 5A / DC-13; 30V 0.5A) Output category according to EN60947-5-2 for timers with Transistor outputs (DC-13; 30V 100 mA) NEMA B300 Pilot Duty, 1/4 HP 5-A resistive load at 120 VAC, 1/3 HP 5-A resistive load at 240 VAC</td>
</tr>
<tr>
<td>External power supply</td>
<td>12VDC (15%), 80mA</td>
</tr>
<tr>
<td>Key protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Memory backup</td>
<td>EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min.</td>
</tr>
</tbody>
</table>
## Ratings (For Counting)

<table>
<thead>
<tr>
<th>Item</th>
<th>TC-Pro482□□□-□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification</td>
<td>Digital timer</td>
</tr>
<tr>
<td>Supported configurations</td>
<td>1-stage counter, 2-stage counter, total counter, batch counter, dual counter, and tachometer (selectable)</td>
</tr>
<tr>
<td>Rated supply voltage</td>
<td>100~240VAC (50/60Hz), 24VAC (50/60Hz), 24VDC (permissible ripple: 20% (p-p) max.)</td>
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<tr>
<td>Operating voltage range</td>
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<tr>
<td>Mounting method</td>
<td>Flush mounting, DIN track mounting</td>
</tr>
<tr>
<td>External connections</td>
<td>Screw terminals</td>
</tr>
<tr>
<td>Terminal screw tightening torque</td>
<td>0.5 N•m Max.</td>
</tr>
<tr>
<td>Display</td>
<td>7-segment, LCD display</td>
</tr>
<tr>
<td></td>
<td>Present value: 9-mm-high characters, white</td>
</tr>
<tr>
<td></td>
<td>Set value: 4-mm-high characters, white</td>
</tr>
<tr>
<td>Digits</td>
<td>6 digits, PV/SV (-99,999~999,999)</td>
</tr>
<tr>
<td>Input method</td>
<td>CP1, CP2, reset1, and reset 2</td>
</tr>
<tr>
<td>Max. counting speed</td>
<td>30 Hz or 5kHz (selectable, ON/OFF ratio 1:1), common setting for CP1 and CP2</td>
</tr>
<tr>
<td>Input mode</td>
<td>Increment, decrement, command, individual, and quadrature</td>
</tr>
</tbody>
</table>

| Input method                           | ※ No-voltage input/voltage input (switchable) |
|                                       | ◆ No-voltage input |
|                                       | ON impedance: 1kΩ max. (leakage current: 5~20 mA when 0Ω) |
|                                       | ON residual voltage: 3V max. |
|                                       | OFF impedance: 100kΩ min. |
|                                       | ◆ Voltage Input |
|                                       | High(logic) level: 4.5 to 30 VDC |
|                                       | Low(logic) level: 0 to 2 VDC |
|                                       | (Input resistance: approx. 4.7 kΩ) |

| Reset input                            | Minimum input signal width: 1/20 ms (selectable, same setting for all inputs) |
| Reset system                           | External, manual, and automatic reset (internal according to C,R,P and Q mode operation) |
| One-shot output time                   | 000.001~9999.99s |
| Output method                          | Relay/transistor output |

| Control output                         | SPDT contact output: 5A at 250 VAC, resistive load (cosΦ=1) |
|                                       | Minimum applied load: 10 mA at 5 VDC (failure level: P, reference value) |
|                                       | Transistor output: NPN open collector, max. 100mA at 30 VDC |
|                                       | Residual voltage: 1.5 VDC max. (approx. 1V) |
|                                       | Output category according to EN60947-5-1 for timers with Contact outputs |
|                                       | (AC-15; 250V 3A / AC-13; 250V 5A / DC-13; 30V 0.5A) |
|                                       | Output category according to EN60947-5-2 for timers with Transistor outputs |
|                                       | (DC-13; 30V 100 mA) |
|                                       | NEMA B300 Pilot Duty, 1/4 HP 5-A resistive load at 120 VAC, 1/3 HP 5-A resistive load at 240 VAC |

| External power supply                   | 12VDC (15%), 80mA |
| Key protection                          | Yes |
| Prescaling function                     | Yes (000.001~9999.999) |
| Decimal point adjustment                | Yes (rightmost 3 digits) |
| Sensor waiting time                     | 250 ms max. (Control output is turned OFF and no input is accepted during sensor waiting time.) |
| Memory backup                           | EEPROM (overwrites: 100,000 times min.) that can store data for 10 years min. |
| Ambient temperature                     | Operating: -10 to 55°C (with no icing or condensation) |
|                                       | Storage: -25 to 65°C (with no icing or condensation) |
| Ambient humidity                        | 25% to 85% |
| Case color                              | Flush mode: black, DIN track mode: gray-black |
| Attachments                             | Waterproof packing, flush mounting adapter |
## Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>TC-Pro482□□□-□</th>
</tr>
</thead>
</table>
| Life expectancy | Mechanical: 10,000,000 operations min.  
|               | Electrical: 100,000 operations min. (5 A at 250 VAC, resistance load) |
| EMC           | (EMI) EN61326  
|               | Emission Enclosure: EN55011  
|               | Emission AC mains: EN55011  
|               | (EMS) EN61326  
|               | Immunity ESD: EN61000-4-2  
|               | Immunity RF-interference: EN61000-4-3  
|               | Immunity Conducted Disturbance: EN61000-4-6  
|               | Immunity Burst: EN61000-4-4  
|               | Immunity Surge: EN61000-4-5  
|               | Immunity voltage Dip/interruption: EN61000-4-11 |
| Weight        | Approx. 168g           |
Nomenclature

- **Reset Indicator**
- **Control Output Indicator**
- **Present Value (character height: 9 mm)**
- **Time Unit Display (If the time range is 0 min, 0.0 min, 0 h, 0.0 h, 0h0 min, this display flashes to indicate timing operation)**
- **Set Value (character height: 4 mm)**
- **The First Setting Key**
- **The Second Setting Key**
- **The Third Setting Key**
- **The Fourth Setting Key**
- **The Fifth Setting Key**
- **The Sixth Setting Key**
- **Reset Key (resets present value and output)**
- **Mode Key (changes modes and setting items)**
- **Key Protection Indicator (the preset value is OFF)**
- **Set Value (Range) A, B Display**

### Reset Operation by Reset Key

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Reset operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-stage/2-stage</td>
<td>Resets the present value and outputs</td>
</tr>
<tr>
<td>Total counter</td>
<td>Resets the present value and outputs When the total count value is displayed, resets the present value, the total count value, and outputs.</td>
</tr>
<tr>
<td>Batch counter</td>
<td>Resets the present value and OUT1 When the batch count value is displayed, resets the present value, the batch count value, and outputs.</td>
</tr>
<tr>
<td>Dual counter</td>
<td>Resets the CP1 present value, CP2 present value, dual count value and outputs</td>
</tr>
<tr>
<td>tachometer</td>
<td>Maintains the measured value and outputs</td>
</tr>
</tbody>
</table>
■ Block Diagram

![Block Diagram Image]

■ I/O Functions (Timer/Twin Timer)

<table>
<thead>
<tr>
<th>Input</th>
<th>Start signal</th>
<th>Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stops timing in A-2 and A-3 (power ON delay) modes</td>
<td>Reset present value (in elapsed time mode, the present value returns to 0; in remaining time mode, the present value returns to the set value)</td>
</tr>
<tr>
<td></td>
<td>Starts timing in other modes</td>
<td>Count inputs are not accepted and control output turns OFF while reset input is ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reset indicator is lit while reset input is ON.</td>
</tr>
</tbody>
</table>

| Gate   | Inhibits timer operation          | Outputs take place according to designated operating mode when timer reaches corresponding set value. |

| Outputs | Control output (OUT) | Outputs take place according to designated operating mode when timer reaches corresponding set value. |

Note: Two control outputs can be used.

■ I/O Functions (2-Stage Timer)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Start signal</th>
<th>Starts timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Outputs | Forecast value setting | Control output (OUT2) | Turn ON when the present value reaches the set value. |
|         | Forecast setting       | Forecast output (OUT1) | Turn ON when the present value reaches the forecast value. |
|         | Absolute value setting | Control output 2 (OUT2) | Turn ON when the present value reaches the set value 2. |
|         |                        | Control output 1 (OUT1) | Turn ON when the present value reaches the set value 1. |

<table>
<thead>
<tr>
<th>Gate</th>
<th>Inhibits timer operation</th>
</tr>
</thead>
</table>
### I/O Functions (Counter)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>CP1, CP2</th>
</tr>
</thead>
</table>
|        | In general (except for dual counter mode)  
|        | Reads counting signals  
|        | Increment, decrement, command, individual, and quadrature inputs accepted.  
|        | When used as a dual counter  
|        | Reads CP1 count signals with CP1 input and CP2 count signals with CP2 input.  
|        | Increment signals can be input. |
| Reset or Reset 1 | |
|        | In general (except for dual counter mode)  
|        | Resets present value and outputs  
|        | Counting can not be performed during reset/reset 1 input  
|        | The 3 reset indicator is lit during reset input.  
|        | When used as a dual counter  
|        | Resets CP1 present value  
|        | Counting for CP1 input can not be performed during reset 1 input.  
|        | The reset indicator is lit during reset 1 input. |
| Total Reset or Reset 2 (see note 2.) | |
|        | When used as 1-stage/2-stage counter  
|        | Does not operate (Not used).  
|        | When used as a total and present counter  
|        | Resets the total count value  
|        | Hold the total count value at 0 during total reset input  
|        | When used as a batch counter  
|        | Reset the batch count value and batch output (OUT1)  
|        | Holds the batch count value at 0 during total reset 2 input  
|        | When used as a dual counter  
|        | Resets the CP2 present value  
|        | Counting for CP2 input can not be performed during reset 2 input |

<table>
<thead>
<tr>
<th>Output</th>
<th>Control output (OUT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outputs take place according to designated output mode when corresponding preset is reached.</td>
</tr>
</tbody>
</table>

Note:
1. In increment mode or increment/decrement mode, the present value returns to 0, in decrement mode, the present value returns to the set value with 1-stage models, and returns to set value 2 with 2-stage models.
2. The reset indicator will not be lit when the total reset or reset 2 input is ON.

### I/O Functions (Tachometer)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>CP1, CP2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reads counting signals. (CP2 input is not used)</td>
</tr>
<tr>
<td></td>
<td>RE塞尔1, RE塞尔2</td>
</tr>
</tbody>
</table>
|        | Holds the measurement value and outputs. (CP2 input is not used)  
|        | The reset indicator is lit during hold. |
| Outputs | OUT1, OUT2 |
|        | Outputs signals according to the specified output mode when a set value is reached. |
Operating Procedures

■ Timer/Twin Timer/2-stage Timer Selection Mode

Power ON

Note: when the mode is changed to timer/twin timer/2-stage timer selection mode, the present value is reset and output turns OFF.
# Communication Format Function Selection Mode

- **Power ON**

- **Run mode**
  - **Communication Format Function Selection Mode**
  - **Transmission Speed**
    - Set the transmission speed with the `key`
    - Transmission speed: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 bps
  - **Parity Check**
    - Set the parity check with the `key`
    - (NONE) (ODD) (EVEN)
  - **Date bit**
    - Set the date bit with the `key`
    - (8 bit) (7 bit)
  - **Stop bit**
    - Set the stop bit with the `key`
    - (1 bit) (2 bit)
  - **Station address**
    - Set the Station address (HEX) with the `key`
    - (01) (FF)
  - **Communication on/off**
    - Set communication on/off with the `key`
    - (ON) (OFF)

Note: The communication format function is not performed for the model without the communication function.
Key Protection Setting Mode

Note: the forecast setting value is not changed if the mode is switched to K/P setting mode and returned to Run Mode during operation.

When key protection switch is set to ON, it is possible to prevent setting errors by prohibiting the use of certain operation keys by specifying the key protection level (KP1 to KP-5). The key protection indicator is lit while the key protection switch is set to ON.

<table>
<thead>
<tr>
<th>Level</th>
<th>Meaning</th>
<th>Changing mode (see note)</th>
<th>Switching display during operation</th>
<th>Reset key</th>
<th>Up/down key</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP-1 (default setting)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>KP-2</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>KP-3</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KP-4</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KP-5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: Changing mode to Timer/Twin Timer/2-Stage Timer selection mode (MODE + 3 min.), Communication Format Function Mode (MODE + 3 min.), and Basic Function setting (MODE 3s min.)
Timer Function

### Setting for Timer Function

**Power ON**

For details on operation in run mode, refer to page 13.

Note:
1. If the mode is switched to the timer function setting mode during operation, operation will continue.
2. Changes mode to settings in timer function setting mode are enabled for the first time when the mode is changed to run mode, the timer is reset (time initialized and output turned OFF).

#### Run mode

- **Time range**
  - Display on LCD: (Elapsed time) (Remaining time)
  - Set the time range with key
  - For details, refer to time range list.

- **Timer mode**
  - (Elapsed time) (Remaining time)
  - Set the timer mode with key

- **Output mode**
  - Set the output mode with key
  - (A) (A-1) (A-2) (A-3) (b) (b-1) (d) (E) (F) (Z)

- **Output time**
  - Set the output time with key
  - (20ms) (1ms)
  -Hold / 0000.01 to 9999.99: output hold/0000.01~9999.99 (if the output time is set to 0000.00, Hold is displayed.) Displayed for A, A-1, A-2, A-3, b and b-1 only.

- **Input signal width**
  - Set the input signal width with key.
  - (20ms) (1ms)

- **NPN / PNP input mode**
  - Set the NPN/PNP input mode with key
  - (NPN input) (PNP input)

- **K/P level**
  - Set the K/P level with key.
  - (kp-1) (kp-2) (kp-3) (kp-4) (kp-5)
Operation in Run Mode

When the output mode is not Z.

Set the six digital values with the corresponding keys.

When the output mode is Z.

Present value and Set value (output mode≠Z)
These items are displayed when the power is turned ON. The present value is displayed in the main display and the set value is displayed in the sub-display. The values displayed will be determined by the setting mode for the time range and timer mode in function setting mode.

Present value and ON duty ratio (output mode=Z)
The present value is displayed in the main display and the ON duty ratio is displayed in the sub-display. "A"and" Range " light at the same time. Set the ON duty ratio used in ON/OFF duty adjustable flicker mode (Z) as percentage.

If a cycle time is set, cycle control can be performed in ON/OFF duty adjustable flicker mode simply by changing the ON duty ratio.

ON time = cycle time×ON duty ratio(%)/100

Example:
If the cycle time is 30s, the ON duty ratio is 31%, the ON time is given by the following:
30(s) ×31(%)/100=9.3(s)

Present value and Cycle Time (output mode=Z)
The present value is displayed in the main display and the cycle time is displayed in the sub-display. ("B"and" Range " light at the same time.) Set the cycle time used in ON/OFF duty adjustable flicker mode (Z).
■ Explanation of functions

Time range (timr)
Set the range to be timed in the range 000.000s to 999999h.

Timer Mode (timm)
Set either the elapsed time (UP) or remaining time (DOWN) mode.

Output Mode (outm)
Set the output mode. The possible setting are A, A-1, A-2, A-3, b, b-1, d, E, F and Z. For details on output mode operation, refer to “timing charts”.

Output time (otim)
When using one-shot output, set the output time (0000.01~ 9999.99s). One-shot output can be used only if the selected output mode A, A-1, A-2, A-3, b or b-1. If the output time is set to 0000.00s, hold is displayed and the output is held.

Input signal width (iflt)
Set the minimum signal input width (20ms or 1ms) for signal, reset, and gate inputs.

NPN / PNP Input Mode (imod)
Select NPN input (no-voltage input) or PNP (voltage input) as the input format. The same setting is used for all external inputs. For details on input connection, refer to “input connections” on page 46.

Key Protection Level (kypt)
When the key protection switch is ON, it is possible to prevent setting error by prohibiting the use of certain operation keys by specifying K/P level (KP-1 to KP-5). For details, please refer to “Key Protection Setting Mode” on page 11.
Twin Timer Function

■ Twin Timer Function Setting

Run mode

For details on operation in run mode, refer to page 16.

Note:
1. If the mode is switched to the twin timer function setting mode during operation, operation will continue.
2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode, the timer is reset (time initialized and output turned OFF).

Twin timer function setting mode

Set OFF time range with [1] key

For details, refer to time range list.

Set ON time range with [1] key

for details, refer to time range list.

Set the twin timer mode with [1] key

(Elapsed time) (Remaining time)

Set ON / OFF start mode with [1] key

(flicker OFF start) (flicker ON start)

Set the input signal width with [1] key.

(20ms) (1ms)

Set the NPN/PNP input mode with [1] key

( NPN input ) ( PNP input )

Set the K/P level with [1] key.

(KP-1) (KP-2) (KP-3) (KP-4) (KP-5)

<table>
<thead>
<tr>
<th>Display</th>
<th>Set Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01s ~ 9999.99s (default)</td>
<td></td>
</tr>
<tr>
<td>0.1s ~ 99999s</td>
<td></td>
</tr>
<tr>
<td>1s ~ 999999s</td>
<td></td>
</tr>
<tr>
<td>0min 01s ~ 9999min 59s</td>
<td></td>
</tr>
<tr>
<td>0.1min ~ 99999.9min</td>
<td></td>
</tr>
<tr>
<td>1min ~ 999999min</td>
<td></td>
</tr>
<tr>
<td>0h 01min ~ 9999h 59min</td>
<td></td>
</tr>
<tr>
<td>0.1h ~ 99999.9h</td>
<td></td>
</tr>
<tr>
<td>1h ~ 999999h</td>
<td></td>
</tr>
<tr>
<td>0.001s ~ 999.999s</td>
<td></td>
</tr>
</tbody>
</table>

See note 1

See note 2

3s min.

3s min.
## Operation in Run Mode

### Operation in Run Mode

The present value is displayed in the main display and the OFF Set Time is displayed in the sub-display. "A" and "Range" light at the same time.

### Present value and OFF Set Time

The present value is displayed in the main display and the OFF Set Time is displayed in the sub-display. "B" and "Range" light at the same time.

## Explanation of functions

### OFF Time range (timr)
Set the range to be timed in the range 000.000s to 999999h.

### ON Time range (timr)
Set the range to be timed in the range 000.000s to 999999h.

### Timer Mode (timm)
Set either the elapsed time (UP) or remaining time (DOWN) mode.

### ON/OFF Start Mode (totm)
Set either the flicker OFF start or flicker ON start.
For details on start mode, refer to "timing charts".

### Input signal width (iflt)
Set the minimum signal input width (20ms or 1ms) for signal, reset, and gate inputs.

### NPN / PNP Input Mode (imod)
Select NPN input (no-voltage input) or PNP (voltage input) as the input format. The same setting is used for all external inputs. For details on input connection, refer to "input connections" on page 46.

### Key Protection Level (kypt)
When the key protection switch is ON, it is possible to prevent setting error by prohibiting the use of certain operation keys by specifying K/P level (KP-1 to KP-5).
2-Stage Timer Function

■ 2-stage Function Setting

For details on operation in run mode, refer to page 18.

Note:
1. If the mode is switched to the 2-stage timer function setting mode during operation, operation will continue.
2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode, the timer is reset (time initialized and output turned OFF).

<table>
<thead>
<tr>
<th>Time range list</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>0.01s ~ 9999.99s (default)</td>
</tr>
<tr>
<td>0.1s ~ 99999.9s</td>
</tr>
<tr>
<td>0min 01s ~ 9999min 59s</td>
</tr>
<tr>
<td>0.1min ~ 99999.9min</td>
</tr>
<tr>
<td>1min ~ 999999min</td>
</tr>
<tr>
<td>0h 01min ~ 9999h 59min</td>
</tr>
<tr>
<td>0.1h ~ 999999h</td>
</tr>
<tr>
<td>1h ~ 999999h</td>
</tr>
<tr>
<td>0.001s ~ 999.999s</td>
</tr>
</tbody>
</table>
Operation in Run Mode

When the forecast value is selected

- **Present value**
- **Set value**

Set “set value” with the corresponding keys.

Set “forecast set value” with the corresponding keys.

When the absolute value is selected

- **Present value**
- **Set value 1**

Set “set value 1” with the corresponding keys.

Set “set value 2” with the corresponding keys.
■ Explanation of functions

Forecast / Absolute Value (set1)
For details, refer to the following figure.

Time Range (timr)
Set the range to be timed in the range 000.000s to 999999h.

Output Mode (outm)
Set the output mode. The possible setting are A and F-1
For details on output mode operation, refer to “timing charts”.

Input signal width (iflt)
Set the minimum signal input width (20ms or 1ms) for signal, reset, and gate inputs.

NPN / PNP Input Mode (imod)
Select NPN input (no-voltage input) or PNP (voltage input) as the input format. The same setting is used for all external inputs. For details on input connection, refer to “input connections” on page 46.

Key Protection Level (kypt)
When the key protection switch is ON, it is possible to prevent setting error by prohibiting the use of certain operation keys by specifying K/P level (KP-1 to KP-5). For details, refer to “Key Protection Setting Mode” on page .

Forecast value Setting

Example: F-1 Mode

1. OUT1 (forecast output) turns ON when the present value reaches the forecast value.
   forecast value = set value-forecast set value
   The forecast set value is used to set the deviation for the set value.
2. OUT2 (control output) turns ON when the present value reaches the set value.
3. If the forecast set value >= set value, OUT1 (forecast output) turns ON as soon as timing starts.

Absolute value Setting

Example: F-1 Mode

1. OUT1 (control output 1) turns ON when the present value reaches the set value 1.
2. OUT2 (control output 2) turns ON when the present value reaches the set value 2.


## Counter Function

For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode, the counter is reset (the preset value is initialized and output turned OFF).

### (See note 3) when using as a dual counter:

**Dual counter calculating mode**

Note: Displayed for output modes other than K-2, D, L and H only.

### See note 4

Note: Displayed for output modes other than K-2, D, L and H only.

### Note 5:

Note: Displayed only when the input mode is UP/DOWN A, B or C.

### See note 6

Note 5: displayed only when the input mode is UP/DOWN A, B or C.

### Input signal width

NPN / PNP input mode

---

### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
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### Input signal width

NPN / PNP input mode

---

### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
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### Input signal width

NPN / PNP input mode

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### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
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### Input signal width

NPN / PNP input mode

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### Decimal point position

Prescale value

NPW / PNP input mode

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### Key protection level

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For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
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### See note 6

Note 5: displayed only when the input mode is UP/DOWN A, B or C.

### Input signal width

NPN / PNP input mode

---

### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
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### Input signal width

NPN / PNP input mode

---

### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
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Note: Displayed only when the input mode is UP/DOWN A, B or C.

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### Input signal width

NPN / PNP input mode

---

### Decimal point position

Prescale value

NPW / PNP input mode

---

### Key protection level

---

For details on operation in run mode, refer to page 23.

Note:
1. If the mode is switched to counter function setting mode during operation, operation will continue.
2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode, the counter is reset (the preset value is initialized and output turned OFF).

### (See note 3) when using as a dual counter:

**Dual counter calculating mode**

Note: Displayed for output modes other than K-2, D, L and H only.

### See note 4

Note: Displayed for output modes other than K-2, D, L and H only.

### Note 5:

Note: Displayed only when the input mode is UP/DOWN A, B or C.

### See note 6

Note 5: displayed only when the input mode is UP/DOWN A, B or C.
Explanation of functions

Input mode (cntm)
Set increment mode (UP) or decrement mode (DOWN) or increment/decrement mode (UP/DOWN A, UP/DOWN B, UP/DOWN C) as the input mode.

Dual count calculating mode (calm)
When using a dual counter, select ADD (addition) or SUB (subtraction) as the calculation method for the dual count value. SUB mode can be used only when K-2, D, L or H is selected as the output mode with 6-digit models.
ADD: Dual count value = CP1 PV + CP2 PV
SUB: Dual count value = CP1 PV - CP2 PV

Output mode (outm)
Set the way that control output for the present value is output. The possible settings are N, F, C, R, K-1, P, Q, A, K-2, D, L and H.

One-shot output 2 time (otm2)
Set one-shot output time for control output (OUT2) when using as a 2-stage counter or batch counter. (0.000.001 to 999.999) One-shot output can be used only when C, R, K-1, P, Q, A or K-2 is selected as the output mode.

One-shot output 1 time (otm1)
Set one-shot output time (0.000.001 to 999.999) for control output (OUT1) when using as 2-stage counter. One-shot output can be used only when D, L or H is selected as the output mode. If the output time is set to 0.00, HOLD is displayed, and outputs are held. HOLD can not be set when the output mode is K-2.

Counting speed (cnts)
Set the maximum counting speed (30Hz/5KHz) for CP1 and CP2 inputs together. If contacts are used for input signal, set the counting speed to 30Hz. Processing to eliminate chattering is performed for this setting.

Input signal width (iftt)
Set Reset input signal width (20ms/1ms) for reset/reset1 and total reset/reset2 inputs together. If contacts are used for input signals, set the counting speed to 20ms. Processing to eliminate chattering is performed for this setting.

Decimal point position (dp)
Decide the decimal point position for the present value, CP1/CP2 present values, set value (SV1, SV2), total count value and dual count set value.

Prescale value (pscl)
Pulses input to the counter are converted according to the specified prescale value. (Setting range: 0.001~99.999)
Example: To display the feed distance for systems that output 25 pulses for a feed length of 0.5m in the form □□.□□m:
1. Set the decimal point position to 2 decimal places
2. Set the prescale value to 0.03

NPN/PNP input mode (imod)
Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs.
Operation in Run Mode

Set values for each digit as required with the keys.

1-stage Counter

- Present value: Shows present count value
- Set value (Set value 1, 2): Set the set value.
  - When the present value reaches the set value, signals are output according to the specified output mode.

2-stage Counter

- Present value
- Set value 1
- Present value
- Set value 2

Total Counter

- Present value
- Present value/ Set value: Same as 1-stage counter
- Total count value
- Total count value: Shows the present total count value

Batch Counter

- Present value
- Set value
- Batch count value
- Batch count set value: set the batch count set value. When batch count value reaches the batch count set value, batch output (OUT1) turns ON.

Dual Counter

- Dual count value
- Dual count set value: When the dual count value reaches the dual count set value, signals are output according to the specified output mode.
- CP1/CP2 present value:
  - Show the present count values for CP1 and CP2 present values respectively.
Tachometer Function

For details on operation in run mode, refer to page 25.

Note: 1. If the mode is switched to the tachometer function setting mode during operation, operation will continue.

2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the counter is reset (measured value initialized and output turned OFF) on returning to run mode.

The characters displayed in reverse video are the initial values.

Set each setting item with the Key.

Output mode

Counting speed

Decimal point position

Prescale value

Average processing

Auto-zero time

Startup time

NPN / PNP input mode

Key protect level

For details on operation in run mode, refer to page 25.

Note: 1. If the mode is switched to the tachometer function setting mode during operation, operation will continue.

2. Changes made to settings in function setting mode are enabled for the first time when the mode is changed to run mode. Also, when settings are changed, the counter is reset (measured value initialized and output turned OFF) on returning to run mode.

The characters displayed in reverse video are the initial values.

Set each setting item with the Key.


■ Explanation of Tachometer Functions

Tachometer output mode (totm)
Set the output method for control output based on the OUT1/OUT2 set value. Upper and lower limit (HI-LO), area (AREA), upper (HI-HI), and lower limit (LO-LO) can be set.

Counting speed (cnts)
Set the maximum counting speed (30Hz/10KHz) for CP1 input. If contacts are used for input signals, set the counting speed to 30Hz. Processing to eliminate chattering is performed for this setting.

Decimal point position (dp)
Decide the decimal point position for the measurement value, OUT1 set value, and OUT2 set value.

Prescale value (pscl)
It is possible to display the rate of rotation or the speed of a device or machine to which the TC-Pro482 is mounted by converting input pulses to a desired unit. If this prescaling function is not used, the input frequency (Hz) will be displayed. The relationship between display and input is determined by the following equation. Set the prescale value according to the unit to be displayed. Displayed value = input pulse frequency × prescale value

1. Displaying rotation rate

<table>
<thead>
<tr>
<th>Display unit</th>
<th>Prescale value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpm</td>
<td>1/N × 60</td>
</tr>
<tr>
<td>rps</td>
<td>1/N</td>
</tr>
</tbody>
</table>

N: number of pulses per revolution
Example: in order to display the rate of rotation for a machine that outputs 10 pulses per revolution in the form □□□.□□□rpm:
1. Set the decimal point position to 3 decimal places
2. Using the formula, set the prescale value to 6

2. Displaying speed

<table>
<thead>
<tr>
<th>Display unit</th>
<th>Prescale value</th>
</tr>
</thead>
<tbody>
<tr>
<td>m/min</td>
<td>πd × 1/N × 60</td>
</tr>
<tr>
<td>m/s</td>
<td>πd × 1/N</td>
</tr>
</tbody>
</table>

N: number of pulses per revolution
d: diameter of rotating body
πd: circumference

Average processing (aug)
Flickering display and output chattering can be prevented using average processing (simple averaging). Average processing can be set to one of four levels: no average processing, 2 times (i.e., the average of 2 measurement values), 4 times, 8 times. The measurement cycle will be equal to the sampling cycle (100ms) multiplied by the average processing setting (i.e., the number of time). Average processing enables fluctuating input signals to be displayed stably. Set the optimum number of times for the application.

Auto-zero time (autz)
It is possible to set the TC-Pro482 so that if there is no pulse for a certain time the display is force-set to 0. This time is called the auto-zero time. Set the auto-zero time to a time slightly longer than the estimated interval between input pulses and within the setting range (00.01~99.99s). It will not be possible to make accurate measurements if the auto-zero time is set to a time shorter than the input pulse cycle. Setting a time that is too long may also result in problems, such as a time-lag between rotation stopping and the alarm turning ON.

Startup time (stmr)
In order to prevent undesired output resulting from unstable input immediately after the power supply is turned ON, it is possible to prohibit measurement for a set time (00.00~99.99s), the startup time. It can also be used to stop measurement and disable output until the rotating body reaches the normal rate of rotation, after the power supply to the TC-Pro482 and rotating body are turned ON at the same time.

NPN/PNP input mode (imod)
Select either NPN input (no-voltage input) or PNP input (voltage input) as the input format. The same setting is used for all external inputs.
### Operation in Run Mode

Set values for each digit as required with the keys.

- Displays the currently measured value.
- Set OUT1 set value and OUT2 set value.
- The measurement value is compared to OUT1 set value and OUT2 set value and output is made according to the selected output mode.

OUT1/OUT2 set value

Set OUT1 set value and OUT2 set value. The measurement value is compared to OUT1 set value and OUT2 set value and output is made according to the selected output mode.
Sequence Charts

■ Timer Operation

Either one-shot output or sustained output can be selected

Output mode A: signal ON delay 1 (timer resets when power comes ON)

Timing starts when the start signal goes ON.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF. The control output is controlled using a sustained or one-shot time period.

Output is instantaneous when setting is 0.
Start signal input is disabled during timing.

Output mode A-1: signal ON delay 2 (timer resets when power comes ON)

Timing starts when the start signal goes ON, and is reset when the start signal goes OFF.
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF. The control output is controlled using a sustained or one-shot time period.

Output is instantaneous when setting is 0.
Start signal input is disabled during timing.

Output mode A-2: Power ON delay 1 (timer resets when power comes ON)

Timing starts when the reset signal goes OFF. The start signal disables the timing function (i.e., same function as the gate input).
The control output is controlled using a sustained one-shot time period.

Output is instantaneous when setting is 0.

Output mode A-3: Power ON delay 2 (timer does not reset when power comes ON)

Timing starts when the reset signal goes OFF. The start signal disables the timing function (i.e., same function as the gate input).
The control output is controlled using a sustained one-shot time period.

Output is instantaneous when setting is 0.
Output mode b: Repeat cycle 1 (timer resets when power comes ON)

Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Output mode b-1: Repeat cycle 2 (timer does not reset when power comes ON)

Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (OFF at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Normal output operation will not be possible if the set time is too short.
Set the value to at least 100ms (contact output type).
Start signal input is disabled during timing.

Normal output operation will not be possible if the set time is too short.
Set the value to at least 100ms (contact output type).
Start signal input is disabled during timing.
Output mode d: Signal OFF delay (Timer resets when power comes ON.)

The control output is ON when the start signal is ON (except when the power is OFF or the reset is ON.)
The timer is reset when the time is up.

Basic Operation
- Power
- Start signal input
- Timing
- Output

Output functions only during start signal input when setting is 0. Start signal input is disabled during timing.

Output mode E: Interval (timer resets when power comes ON)

Timing starts when the start signal comes ON. The control output is reset when time is up. While the start signal is ON, the timer starts when power comes ON or when the reset input goes OFF.

Basic Operation
- Power
- Start signal input
- Timing
- Output

Instantaneous output is disabled when setting is 0.

Output mode F: Cumulative (timer does not reset when power comes ON.)

Timing is enabled by start signal (timing is stopped when the start signal is OFF or when the power is OFF). A sustained control output is used.

Basic Operation
- Power
- Start signal input
- Timing
- Output

Output is instantaneous when setting is 0.

Z mode: ON/OFF - duty adjustable flicker

Timing starts when the reset signal goes ON. The status of the control output is reversed when time is up (ON at start).
While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

Basic Operation
- Power
- Start signal input
- Timing
- Output

Normal output operation will not be possible if the set time is too short.
Set the value to at least 100ms (contact output type). Start signal input is disabled during timing.

Z mode:
Output quantity can be adjusted by changing the cycle time set in the adjustment level to 1 and by changing the ON duty (%) set value.
Set value shows the ON duty(%) and can be set to a value between 0 and 100 (%). When the cycle time is 0, the output will always be OFF.
When the cycle time is not 0 and when ON duty has been set to 0(%), the output will always be OFF. When ON duty has been set to 100 (%), the output will always be ON.
### Twin Timer Operation

#### Output Mode toff: flicker OFF start

Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (OFF at start). While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

**Basic Operation**

<table>
<thead>
<tr>
<th>Power</th>
<th>Start signal input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Normal output operation will not be possible if the ON/OFF time is too short. Set the value to at least 100ms (contact output type). Start signal input is disabled during timing.

#### Output Mode ton: flicker ON start

Timing starts when the start signal goes ON. The status of the control output is reversed when time is up (ON at start). While the start signal is ON, the timer starts when the power comes ON or when the reset input goes OFF.

**Basic Operation**

<table>
<thead>
<tr>
<th>Power</th>
<th>Start signal input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Normal output operation will not be possible if the ON/OFF time is too short. Set the value to at least 100ms (contact output type). Start signal input is disabled during timing.
### 2-Stage Timer Operation

**A Mode: Signal ON delay (Timer resets when power comes ON.)**
Timing starts when the start signal turns ON. While the start signal is ON, the timer starts when the power turns ON or when the reset input turns OFF. A sustained control output is used. Timing stops when the time is up.

**Basic Operation**
- Power
- Start signal input
- Forecast output (Control output1)
- Forecast output (Control output2)
- OUT 1
- OUT 2

The names in parentheses are used for the absolute value setting. Output is instantaneous when the set value is 0. Start signal input is disabled during timing.

### F-1 Mode: Cumulative (Timer does not reset when power comes ON.)
Timing is enabled by start signal (timing is stopped when the start signal is OFF or when the power is OFF). A sustained control output is used. Timing continues even after the time is up.

**Basic Operation**
- Power
- Start signal input
- Forecast output (Control output1)
- Forecast output (Control output2)
- OUT 1
- OUT 2

The names in parentheses are used for the absolute value setting. Output is instantaneous when the set value is 0.
Input Modes and Present Value (Counter)

<table>
<thead>
<tr>
<th>UP (increment) Mode</th>
<th>DOWN (decrement) mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP1: Count Input; CP2: Prohibit (gate) Input</td>
<td></td>
</tr>
<tr>
<td>CP1 H</td>
<td>L</td>
</tr>
<tr>
<td>CP2 H</td>
<td>L</td>
</tr>
<tr>
<td>Present Value</td>
<td>1</td>
</tr>
<tr>
<td>Note: Input CP2 while CP1 is &quot;L&quot;</td>
<td></td>
</tr>
<tr>
<td>CP1 H</td>
<td>L</td>
</tr>
<tr>
<td>CP2 H</td>
<td>L</td>
</tr>
<tr>
<td>Present Value</td>
<td>1</td>
</tr>
<tr>
<td>Note: Input CP1 while CP2 is &quot;H&quot;</td>
<td></td>
</tr>
</tbody>
</table>

UP / DOWN A command input mode

UP / DOWN B individual input mode

UP / DOWN C Quadrature input mode

Note:
1. If the configuration selection is set to dual count, CP1 and CP2 input will operate in the same way as the count input (CP1) of UP (increment) mode.
2. The meaning of the H and L symbols in the tables is explained below.

<table>
<thead>
<tr>
<th>Input method symbol</th>
<th>No-voltage (NPN input)</th>
<th>Voltage input (PNP input)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Short-circuit 4.5–30VDC</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>OPEN 0–2VDC</td>
<td></td>
</tr>
</tbody>
</table>
### Input/Output Mode Setting (Counter)

Operation for 1-stage models is the same as that for OUT2.

When using a 2-stage model as a 1-stage counter, or dual counter, total counter, OUT1 and OUT2 turn ON and OFF simultaneously.

<table>
<thead>
<tr>
<th>Output mode setting</th>
<th>Output mode</th>
<th>Operation after count completion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td><strong>UP</strong></td>
<td>The outputs and present value display are held until reset/reset1 is input.</td>
</tr>
<tr>
<td></td>
<td><strong>DOWN</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>UP/DOWN A, B, C</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F</strong></td>
<td><strong>UP</strong></td>
<td>The present value display continues to increase/decrease. The outputs are held until reset/reset1 is input.</td>
</tr>
<tr>
<td></td>
<td><strong>DOWN</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>UP/DOWN A, B, C</strong></td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td><strong>UP</strong></td>
<td>As soon as the count value reaches SV, the present value display returns to the reset start status. The present value display does not show the present value upon count-up. The outputs repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.</td>
</tr>
<tr>
<td></td>
<td><strong>DOWN</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>UP/DOWN A, B, C</strong></td>
<td></td>
</tr>
<tr>
<td><strong>R</strong></td>
<td><strong>UP</strong></td>
<td>The present value display returns to the reset start status after the one-shot output time. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.</td>
</tr>
<tr>
<td></td>
<td><strong>DOWN</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>UP/DOWN A, B, C</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. The full scale (FS) for TC-Pro 6-digit models is 999999.
2. When the present value reaches 999999, it returns to 0.
3. Counting can not be performed during reset/reset1 input.
4. If reset/reset1 is input while one-shot output is ON, one-shot output turns OFF.
5. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.
<table>
<thead>
<tr>
<th>Output mode setting</th>
<th>Output mode</th>
<th>Operation after count completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP</td>
<td>DOWN</td>
</tr>
<tr>
<td>K-1</td>
<td>The present value display continues to increase/decrease. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>The present value display does not change during the one-shot output time, but the actual count returns to the reset status. The outputs return to the one-shot start state and repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>The present value continues to increase/decrease for the one-shot output time, but returns to the reset start status after the one-shot output time has elapsed. The outputs repeat one-shot operation. OUT1 self-holding output turns OFF after the OUT2 one-shot output time. The OUT1 one-shot output time is independent of OUT2.</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>The present value display and OUT1 self-holding output is held until reset/reset1 is input. OUT1 and OUT2 are independent.</td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. The full scale (FS) for TC-Pro 6-digit models is 999999.
2. When the present value reaches 999999, it returns to 0.
3. Counting can not be performed during reset/reset1 input.
4. If reset/reset1 is input while one-shot output is ON, one-shot output turns OFF.
5. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.
Multifunction LCD Digital Timer/Counter/Tachometer

The one-shot output time can be set in the range 0.01s to 9999.99s.

Output mode

<table>
<thead>
<tr>
<th>UP/DOWN A, B, C</th>
<th>Operation after count completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td>The display continues to increase/decrease until the overflow or underflow value is reached. One-shot output only.</td>
</tr>
<tr>
<td>D</td>
<td>The display continues to increase/decrease until the overflow or underflow value is reached. The outputs are ON while the count is equal.</td>
</tr>
<tr>
<td>L</td>
<td>The display continues to increase/decrease until the overflow or underflow value is reached. OUT1 is held while the present value is less than or equal to set value 1. OUT2 is held while the present value is less than or equal to set value 2.</td>
</tr>
<tr>
<td>H</td>
<td>The display continues to increase/decrease until the overflow or underflow value is reached. OUT1 is held while the present value is less than or equal to set value 1. OUT2 is held while the present value is less than or equal to set value 2. Note: H mode is available for 2-stage models only.</td>
</tr>
</tbody>
</table>

Note:
1. Counting cannot be performed during reset/reset 1 input.
2. If reset/reset 1 is input while one-shot output is ON, one-shot output turns OFF.
3. Do not use the counter function in applications where the count may be completed (again) while one-shot output is ON.
**Total Operation**

TC-Pro48 has a total counter, separate from the 1-stage present counter, for counting the total accumulated value.

- the total counter continues to count the total accumulated value when the present value is reset using reset/reset 1 input (reset key).
- the total count value is reset when the total reset/reset 2 input is turned ON. If the reset key is pressed while the total count value is reset. The present value is also reset at this time.
- the counting range of the total counter is -99,999 to 999,999 (-999 to 9,999). The total count value returns to 0 when it reaches the full scale limit.

**Batch Counter Operation**

TC-Pro48 has a batch counter, separate from the 1-stage present counter, for counting the number of times the count value returns to 0 when it reaches the full scale limit.

- The batch counter continues after count completion.
- Batch output is held until batch counter reset is input.
- When the batch counter reset input is turned ON, the batch count value is reset, and batch output turns OFF.
- If the reset key is pressed while the batch count value is displayed, the batch count value is reset and batch output turns OFF. The present value is also reset at this time.

**Note:**
1. The batch count value is held at 0 during batch counter reset input.
2. If the batch count set is 0, batch count will be performed but there will be no batch output.
3. The batch count value returns to 0 when it reaches 999,999.
4. Once batch input has been turned ON, it will return to the ON state after power interruptions.
5. If the batch count set value is changed from a value that is greater than the batch count value to one that is less, batch output will turn ON.
Operation (Dual Counter)

1. Using the dual counter allows the count from 2 inputs to be added or subtracted and the result displayed. It is possible to specify a set value for which output turns ON when the set value matches the added or subtracted result.
2. OUT1 and OUT2 turn ON and OFF simultaneously.

<table>
<thead>
<tr>
<th>Dual Count Calculating Mode = ADD</th>
<th>Dual Count Calculating Mode = SUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual count value = CP1 PV + CP2 PV</td>
<td>Dual count value = CP1 PV - CP2 PV</td>
</tr>
</tbody>
</table>

Note: the above is for when the output mode is N. Note: the above is for when the output mode is K-2. SUB mode can be used only when K-2, D, L or H is selected as the output mode with 6-digit models.

◆ the operation after count completion for the dual counter value is determined by the output mode.
◆ the CP1 present value is reset when reset 1 input is turned ON and the CP2 present value is reset when reset 2 input is turned ON.
◆ if the reset key is pressed while the dual count value, CP1 present value or CP2 present value is displayed, all of the present values are reset and outputs turn OFF. At this time, counting is not possible for CP1 or CP2 input.

Note:
1. Counting is not possible for CP1 during reset 1 input. CP2 will not be affected. The dual count value will be calculated based on a CP1 present value of 0.
2. Counting is not possible for CP2 during reset 2 input. CP1 will not be affected. The dual count value will be calculated based on a CP2 present value of 0.
3. The counting range for dual count value is -99,999 to 999,999.

Reset Function List

<table>
<thead>
<tr>
<th>Function</th>
<th>1-stage/2-stage counter</th>
<th>Total counter</th>
<th>Batch counter</th>
<th>Dual counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen displayed in run mode</td>
<td>Present value/set value(1,2)</td>
<td>Present value/set value</td>
<td>Present value/set value</td>
<td>Present value/set value/ batch count set value</td>
</tr>
<tr>
<td>Reset/reset 1</td>
<td>Present value and output reset</td>
<td>Present value and output reset</td>
<td>Present value and output reset</td>
<td>Only the CP1 present value is reset</td>
</tr>
<tr>
<td>Total reset/ reset 2</td>
<td>No effect</td>
<td>Only the total count value is reset</td>
<td>Batch count value and batch output reset</td>
<td>Only the CP2 present value is reset</td>
</tr>
<tr>
<td>Reset key</td>
<td>Present value and output reset</td>
<td>Present value and total count value, and output reset</td>
<td>Present value, batch count value, output and batch output reset</td>
<td>CP1 present value, CP2 present value, dual count value, and output reset</td>
</tr>
</tbody>
</table>
### Output Mode Settings (Tachometer)

#### Upper and lower limit (HI-LO)
- **OUT2 set value**
- **Measurement value**
- **OUT1 set value**

**ON condition for OUT1**: Measurement value ≤ OUT1 set value
**ON condition for OUT2**: Measurement value ≥ OUT2 set value

#### Area (AREA)
- **OUT2 set value**
- **Measurement value**
- **OUT1 set value**

**ON condition for OUT1**: Measurement value < OUT1 set value
**ON condition for OUT2**: Measurement value > OUT2 set value

#### Output mode setting

<table>
<thead>
<tr>
<th>Condition</th>
<th>OUT1 set value</th>
<th>OUT2 set value</th>
<th>OUT1 set value &gt; OUT2 set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON condition for OUT1</td>
<td>OUT set value ≤ Measurement value ≤ OUT2 set value</td>
<td>OUT set value &gt; Measurement value &gt; OUT2 set value</td>
<td></td>
</tr>
<tr>
<td>ON condition for OUT2</td>
<td>Measurement value &lt; OUT1 set value</td>
<td>Measurement value &gt; OUT2 set value</td>
<td>Measurement value &gt; OUT1 set value</td>
</tr>
</tbody>
</table>

#### (Upper-limit) (HI-HI)
- **OUT2 set value**
- **Measurement value**
- **OUT1 set value**

**ON condition for OUT1**: measurement value ≥ OUT1 set value
**ON condition for OUT2**: measurement value ≥ OUT2 set value

#### (Lower-limit) (LO-LO)
- **OUT2 set value**
- **Measurement value**
- **OUT1 set value**

**ON condition for OUT1**: Measurement value ≤ OUT1 set value
**ON condition for OUT2**: Measurement value ≤ OUT2 set value
Dimensions

Note: all units are in millimeters unless otherwise indicated.

Dimensions without Flush Mounting Adapter

Dimensions with Flush Mounting Adapter

Panel Cutouts

Note:
1. The mounting panel thickness should be 1.5 mm.
2. To allow easier operability, it is recommended that adapters are mounted so that the gap between sides with hooks is at least 20 mm.
Dimensions

Note: all units are in millimeters unless otherwise indicated.

Dimensions without DIN Track Mounting Adapter

Dimensions without DIN Track Mounting Adapter (with communication)
Installation & Accessories

Waterproof Packing PR-43
Flush Mounting Adapter BK-6
End Plate CABC-44
Mounting Track 0F-A (order separately)

ADP-090401 adapter changing 4 into 9 PIN (special between 232, 485 and 422, order separately)
Panel Protective Cover SVF-A (order separately)
Communication Protective Cover TTL-11 (order separately)
Input Connections

**Signal, Reset, and Gate Input**

![Internal circuit diagram]

**No-voltage Input Signal Levels**

<table>
<thead>
<tr>
<th>No-contact input</th>
<th>Short-circuit level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transistor ON</td>
</tr>
<tr>
<td></td>
<td>Residual voltage: 3V max.</td>
</tr>
<tr>
<td></td>
<td>Impedance when ON: 1KΩ min. (the leakage current is 5 to 20 mA when the impedance is 0 Ω )</td>
</tr>
<tr>
<td></td>
<td>Open level</td>
</tr>
<tr>
<td></td>
<td>Transistor OFF</td>
</tr>
<tr>
<td></td>
<td>Impedance when OFF: 100KΩ min.</td>
</tr>
<tr>
<td>Contact input</td>
<td>Use contact which can adequately switch 5 mA at 10V.</td>
</tr>
<tr>
<td></td>
<td>The DC voltage must be 30VDC.</td>
</tr>
</tbody>
</table>

**No-voltage Inputs (NPN Input)**

*Open Collector (connection to NPN open collector output sensor)*

![Diagram showing Open Collector connection]

When SW is pressed, the transistor is ON that shows the input has response.

*Voltage Inputs (connection to a voltage output sensor)*

![Diagram showing Voltage Inputs connection]

When SW is pressed, the transistor is ON that shows the input has response.

*Contact Input*

![Diagram showing Contact Input]

SW is pressed, that shows input the input has response.
Two-wire Sensor

Leakage current: 1.5 mA max.
Switching capacity: 5 mA min.
Residual voltage: 3 VDC max.
Operating voltage: 10 VDC

Voltage inputs (PNP inputs)

No-contact Input (PNP Transistor) (Connection to NPN open collector output sensor)

No-contact Inputs (PNP Transistor) (connection to a voltage output sensor)

Contact Input

SW is pressed, that shows the input has response.
Safety Precautions

⚠️ Caution
 ✓ Do not use the product where corrosive or volatile gases are present, or there may occasionally be a risk of explosion.
 ✓ Usable life of output relay is determined by switch condition. According the actual usage, use product within its rated load and electrical life expectancy. If using product beyond its life expectancy, its contacts may become fused or there may be a risk of fire.
 ✓ Do not disassemble, repair, or modify the product. Doing so may result in electric shock, fire, or malfunction.
 ✓ Do not allow metal objects or conductive wires to enter the product, which may result in electric shock, fire, or malfunction.

Power Supplies
For the power supply of an input device, use an isolating transformer with the primary and the secondary winding not grounded.

![Diagram of power supplies](image)

Make sure that the voltage applied is within the specified range, otherwise the internal elements of Timer may be damaged. Do not touch the input terminals while power is supplied, and so touching the input terminals with power supplied may result in electric shock. When turning the power ON and OFF, input signal reception is possible, unstable, or impossible. Turn the power ON and OFF using a relay with a rated capacity of 10A minimum to prevent contact deterioration due to inrush current caused by turning the power ON and OFF. Be sure that the power voltage can be immediately reached to the supply voltage value by relays or switches, otherwise it can not be reset or timing error.

Power Failure Backup
All data is stored in the EEPROM when there is a power failure. The EEPROM can be overwritten more than 100,000 times.

Input and Output
When connecting relay and transformer as an external signal input device, it is necessary to pay attention to the following points to prevent the short circuit because of the hidden current flowing to the power supply. If a relay or transistor connected to two or more timers, those input terminals must be connected correctly, otherwise it can cause short circuit.

Incorrect
The contact or transistor as an external input signal

![Incorrect diagram](image)

Correct
Don’t connect the unattached power switch as below, and without considering whether the timer is different or not.

![Correct diagram](image)

Response time when resetting
The following table shows the delay from when the reset signal is input until the output is turned OFF.

<table>
<thead>
<tr>
<th>Min. reset signal width</th>
<th>Output delay time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ms</td>
<td>0.8~1.2ms</td>
</tr>
<tr>
<td>20ms</td>
<td>15~25ms</td>
</tr>
</tbody>
</table>
Transistor Output
The transistor output of TC-Pro is insulated from the internal circuitry by a photocoupler, so the transistor output can be used as both NPN and PNP output. The diode connected to the collector of the output transistor is used to absorb inverted voltage that is generated when an inductive load is connected to TC-Pro.
The transistor output of TC-Pro is insulated from the internal circuitry by a photocoupler, so the transistor output can be used as both NPN and PNP output. The diode connected to the collector of the output transistor is used to absorb inverted voltage that is generated when an inductive load is connected to TC-Pro.

Changing the set values
When changing the set value during a timing operation, the output will turn ON if the set value is changed as follows because of the use of a constant read-in system:
Elapsed time(up) mode: present value≥set value
Remaining time(DOWN) mode: elapsing time≥ set value(the present value is set to 0)
Note: when in the remaining time mode, the amount the set value is changed is added to or subtracted from the present value.

Connection
Make sure that wiring is correct.

Mounting
Tighten two mounting screws on the adapter. Tighten them alternately, a little at a time, so as to keep them at an equal tightness.
TC-Pro panel surface is water-resistant. In order to prevent the internal circuit from water penetration through the space between the TC-Pro and operating panel, attach a waterproof packing between TC-Pro and installation panel and secure the waterproof packing with the BK-62 flush-mounting adapter.

Operation environment
✓ Use the product within the rating specified for submerging in water and exposure to oil.
✓ Do not use in location affected by excessive vibration or shock.
✓ Do not use the product in locations subject to dust, corrosive gases, or direct sunlight.
✓ Separate the input signal devices, input signal cables, and the product from the source of noise or high-tension cables producing noise.
✓ Separate the product from the source of static electricity when using the product in an environment where a large amount of static electricity is produced (e.g. forming compounds, powders, or fluid materials being transported by pipe).
✓ Organic solvents (such as paint thinner), as well as very acidic or basic solutions might damage the outer casing of the TC-Pro.
✓ Use the product within the rating specified for temperature and humidity.
✓ Do not use the product in locations where condensation may occur due to high humidity or where temperature changes are severe.
✓ Store at the specified temperature. If TC-Pro has been stored at a temperature of less than -10°C, allow TC-Pro to stand at room temperature for at least 3 hours before use.

Insulation
There is basic insulation between power supply and output terminals. Input and output terminals are connected to devices without exposed charged parts.
Input and output terminals are connected to devices with basic insulation that is suitable for the maximum operating voltage.
Additional Information (Using the operation keys)

■ Timer Operation

Timer

Twin Timer

2-Stage Timer

Power ON

Run Mode

Function setting mode

- Time range
- Timer mode
- Output mode
- Output time
- Input signal width
- NPN/PNP input mode
- Key protection level

Timer (except for Z mode)

PV/SV

Timer (Z mode)

PV/ON duty ratio

PV/cycle time

PV/ON set time

PV/OFF set time

3s min.

3s min.

Note: For details on the above flowcharts, refer to page 12 (timer function), or page 15 (twin timer function).

■ Twin Timer Operation

Timer

Twin Timer

2-Stage Timer

Power ON

Run Mode

Function setting mode

- OFF time range
- ON time range
- Timer mode
- ON/OFF start mode
- Input signal width
- NPN/PNP input mode
- Key protection level

PV/ON set time

PV/OFF set time

3s min.

3s min.

Note: For details on the above flowcharts, refer to page 17. (2-stage timer operation)

■ 2-Stage Timer Operation

Timer

Twin Timer

2-Stage Timer

Power ON

Run Mode

Function setting mode

- Forecast/absolute value
- Time range
- Output mode
- Input signal width
- NPN/PNP input mode
- Key protection level

Forecast value

Absolute value

Set value

Set value 1

Set value 2

Forecast set value

Set value

Forecast set value

Set value

Set value 1

Set value 2

Note: For details on the above flowcharts, refer to page 17. (2-stage timer operation)
■ Counter Operation

- Input mode
- Dual count calculating mode
- Output mode
- One-shot output time
- One-shot output 2 time
- One-shot output 1 time
- Counting speed
- Input signal width
- Decimal point position
- Prescale value
- NPN/PNP input mode
- Key protection level

Function setting mode

Power ON

Run mode

1-stage counter
- Present value, set value

2-stage counter
- Present value, set value 1
- Present value, set value 2

Total counter
- Present value, set value
- Total set value

Batch counter
- Present value, set value
- Batch count value, batch count set value

Dual counter
- Dual count value, dual count set value
- CP1 present value, CP2 present value

Present value, set value 1

Present value, set value 2

Total set value

Communication setting mode

Transmission speed
- Parity check
- Date bit
- Stop bit
- Station address (HEX)

Communication OFF

Key protection switch

Function configuration selection

3s min.
## Tachometer Operation

- **Power ON**
- **Function setting mode**
  - Tachometer output mode
    - Counting speed
    - Decimal point position
    - Prescale value
    - Average processing
    - Auto-zero time
    - Startup time
    - NPN/PNP input mode
    - Key protection level
- **Run mode**
  - Measurement value
  - OUT1 set value
- **Communication setting mode**
  - Transmission speed
  - Parity check
  - Date bit
  - Stop bit
  - Station address (HEX)
  - Communication OFF
- **Communication OFF**
  - Key protection switch
  - Function configuration selection
List of Settings

■ Timer/Twin Timer/2-Stage Timer Selection Mode

Fill in your set values in the set value column of the following tables and utilize the tables for quick reference.

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer/Twin Timer/2-Stage Timer Selection</td>
<td>func</td>
<td>tim/twin/pst</td>
<td>tmt</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

■ Settings for Timer Operation

Run mode when output mode is not Z

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set value</td>
<td>---</td>
<td>0000.00~9999.99 (Time range: -.-s)</td>
<td>0000.00</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>00000.0~99999.9 (Time range: --.s)</td>
<td>00000.0</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: ----s)</td>
<td>0000000.0</td>
<td>min:s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: --.min)</td>
<td>000000.0</td>
<td>min</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>00000000~99999999 (Time range: ----.s)</td>
<td>0000000.0</td>
<td>h:min</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000.0~99999999 (Time range: ----.h)</td>
<td>0000000.0</td>
<td>h</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>00000000~99999999 (Time range: ----.---)</td>
<td>0000000.0</td>
<td>s</td>
<td>---</td>
</tr>
</tbody>
</table>

Present value | --- | Same as set value | Same as left | Same as left |

Run mode when output mode is Z

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle time</td>
<td>---</td>
<td>0000.00~9999.99 (Time range: -.-s)</td>
<td>0000.00</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>00000.0~99999.9 (Time range: --.s)</td>
<td>00000.0</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: ----s)</td>
<td>000000.0</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: --.min)</td>
<td>000000.0</td>
<td>min:s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: --.h)</td>
<td>000000.0</td>
<td>h</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: ----.s)</td>
<td>000000.0</td>
<td>h</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000000~9999999 (Time range: ----.h)</td>
<td>0000000.0</td>
<td>s</td>
<td>---</td>
</tr>
</tbody>
</table>

Present value | --- | Same as cycle time above | Same as left | Same as left |

ON duty ratio | --- | 0~100 | 0 | % |

Present value | --- | Same as cycle time above | Same as left | Same as left |
### Function Setting Mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time range</td>
<td>timr</td>
<td>--.--s/--.--s/---s/----s/--min:--s/---.--s/----.--min/---min/--h:--min/----h/---h/.---s</td>
<td>--.--s</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Timer mode</td>
<td>timm</td>
<td>up/down</td>
<td>up</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Output mode</td>
<td>outm</td>
<td>a/a-1/a-2/a-3/b/b-1/d/e/f/l/z</td>
<td>a</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Output time</td>
<td>otim</td>
<td>hold/0000.01~9999.99</td>
<td>hold s</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Input signal width</td>
<td>iflt</td>
<td>20ms/1ms</td>
<td>20ms</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NPN/PNP input mode</td>
<td>imod</td>
<td>npn/pnp</td>
<td>npn</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Key protect level</td>
<td>kyp</td>
<td>kp-1/kp-2/kp-3/kp-4/kp-5</td>
<td>kp-1</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

### Settings for Twin Timer Operation

#### Run mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF set time</td>
<td></td>
<td>0000.00~9999.99 (Time range: --.--s)</td>
<td>0000.00</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>00000.00~99999.99 (Time range: --.--s)</td>
<td>000000.00</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0000000~9999999 (Time range: --.--s)</td>
<td>0000000</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>000000~9999999 (Time range: --.--s)</td>
<td>0000000</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>000000~9999999 (Time range: --.--s)</td>
<td>0000000</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0000000~99999999 (Time range: --.--s)</td>
<td>0000000</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>Present value</td>
<td></td>
<td>Same as OFF time above</td>
<td>Same as left</td>
<td>Same as left</td>
<td></td>
</tr>
<tr>
<td>ON duty ratio</td>
<td></td>
<td>Same as OFF time above</td>
<td>Same as left</td>
<td>Same as left</td>
<td></td>
</tr>
<tr>
<td>Present value</td>
<td></td>
<td>Same as OFF time above</td>
<td>Same as left</td>
<td>Same as left</td>
<td></td>
</tr>
</tbody>
</table>

### Function setting mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF time range</td>
<td>oftr</td>
<td>--.--s/--.--s/---s/----s/--min:--s/---.--s/----.--min/---min/--h:--min/----h/---h/.---s</td>
<td>--.--s</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ON time range</td>
<td>ontr</td>
<td>--.--s/--.--s/---s/----s/--min:--s/---.--s/----.--min/---min/--h:--min/----h/---h/.---s</td>
<td>--.--s</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Timer mode</td>
<td>timm</td>
<td>up/down</td>
<td>up</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ON/OFF start mode</td>
<td>totm</td>
<td>toff/ton</td>
<td>toff</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Input signal width</td>
<td>iflt</td>
<td>20ms/1ms</td>
<td>20ms</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NPN/PNP input mode</td>
<td>imod</td>
<td>npn/pnp</td>
<td>npn</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Key protection level</td>
<td>kyp</td>
<td>kp-1/kp-2/kp-3/kp-4/kp-5</td>
<td>kp-1</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
## Settings for 2-Stage Timer Operation

### Run mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set value</strong></td>
<td>---</td>
<td>0000.00~9999.99 (Time range: -.-s)</td>
<td>0000.00</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>00000.0~99999.9 (Time range: -s)</td>
<td>000000</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000:00~99999.9 (Time range: -min-s)</td>
<td>0000:00</td>
<td>min:s</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>000000.0~999999.9 (Time range: -min)</td>
<td>000000</td>
<td>min</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>000000~99999 (Time range: -h-min)</td>
<td>000000</td>
<td>h</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>---</td>
<td>0000:00~99999 (Time range: -h)</td>
<td>000000</td>
<td>h</td>
<td>---</td>
</tr>
<tr>
<td>Present value setting</td>
<td>---</td>
<td>000.000~999.999 (Time range: -h)</td>
<td>000.000</td>
<td>s</td>
<td>---</td>
</tr>
<tr>
<td>Present value</td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td>Present setting value</td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td>Present value</td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td><strong>Set value 1</strong></td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td>Present value</td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td><strong>Set value 2</strong></td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
<tr>
<td>Present value</td>
<td>---</td>
<td>Same as the present value of the set value above</td>
<td>Same as left</td>
<td>Same as left</td>
<td>---</td>
</tr>
</tbody>
</table>

### Function setting mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>forecast/absolute value</td>
<td>setl</td>
<td>ofst/abs</td>
<td>ofst</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Time range</td>
<td>timr</td>
<td>--.--s/-.-/-----s/-min--s/--.--min/ ----min/--h--min/----h/-.--h/---s</td>
<td>--.--s</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Output mode</td>
<td>outm</td>
<td>a/f-1</td>
<td>a</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Input signal width</td>
<td>iflt</td>
<td>20ms/1ms</td>
<td>20ms</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NPN/PNP input mode</td>
<td>imod</td>
<td>npn/pnp</td>
<td>npn</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
List of Settings

Fill in your set values in the set value column of the following tables and utilize the tables for quick reference.

**Key protection switch mode**

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key protection selection</td>
<td>kp</td>
<td>off/on</td>
<td>off</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**Communication setting mode**

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission speed</td>
<td>baud</td>
<td>12/24/48/96/144/192/288/384/576</td>
<td>96</td>
<td>Bps</td>
<td></td>
</tr>
<tr>
<td>Parity Check</td>
<td>pari</td>
<td>none/odd/even</td>
<td>none</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Date bit</td>
<td>data</td>
<td>8bit/7bit</td>
<td>8bit</td>
<td>bits</td>
<td></td>
</tr>
<tr>
<td>Stop bit</td>
<td>stop</td>
<td>1bit/sbit</td>
<td>1bit</td>
<td>bit</td>
<td></td>
</tr>
<tr>
<td>Station address (Hex)</td>
<td>addr</td>
<td>01 to ff</td>
<td>01</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Communication OFF</td>
<td>cosh</td>
<td>on/off</td>
<td>on</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**1-stage Counter/2-Stage Counter/Total Counter/Batch Counter/ Dual Counter / Tachometer Selection Mode**

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration selection</td>
<td>func</td>
<td>1cnt/2cnt/tcnt/bcnt/dcnt/taco</td>
<td>1cnt</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**Setting for Counter Operation**

**Run Mode**

**1-stage counter**

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present value</td>
<td>---</td>
<td>-99999~999999</td>
<td>000000</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Set value</td>
<td></td>
<td>000000~999999 (For conditions other than those described in note 1.)</td>
<td>000000</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-99999~999999 (See note 1.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 2-stage counter

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen 1</td>
<td>Present value</td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set value 1</td>
<td>---</td>
<td>(For conditions other than those described in note 1.) 000000~999999</td>
<td>000000</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen 2</td>
<td>Present value</td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set value 2</td>
<td>---</td>
<td>(For conditions other than those described in note 1.) 000000~999999</td>
<td>000000</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Total and preset counter

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen 1</td>
<td>Present value</td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set value 1</td>
<td>---</td>
<td>(For conditions other than those described in note 1.) 000000~999999</td>
<td>000000</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen 2</td>
<td>Total count value</td>
<td>---</td>
<td>-999999~999999</td>
<td>000000</td>
<td>---</td>
</tr>
</tbody>
</table>

## Batch counter

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen 1</td>
<td>Present value</td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set value 1</td>
<td>---</td>
<td>(For conditions other than those described in note 1.) 000000~999999</td>
<td>000000</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>---</td>
<td>-999999~999999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen 2</td>
<td>Batch count value</td>
<td>---</td>
<td>000000~999999</td>
<td>000000</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Batch count set value</td>
<td>---</td>
<td>000000~999999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Multifunction LCD Digital Timer/Counter/Tachometer

### Dual counter

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
</table>
| Screen 1
| Dual count value        | ---                                                | -99999~99999  |       |           |
| Dual count set value    | ---                                                | 000000~999999 |       |           |
|                         | (For conditions other than those described in note 2.) |               |       |           |
|                         | (See note 2.)                                      |               |       |           |
| Screen 2
| CP1 Present value       | ---                                                | -99999~99999  |       |           |
|                         | (For conditions other than those described in note 1.) |               |       |           |
|                         | (See note 1.)                                      |               |       |           |

Note:
1. The input mode is increment/decrement mode and the output mode is K-2, D, L, or H.
2. The dual count calculating mode is subtraction mode and the output mode is K-2, D, L, or H.

### Function setting mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input mode</td>
<td>cntm</td>
<td>up</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See note 1.)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Dual count calculating mode</td>
<td>caln</td>
<td>add/sub</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See note 1.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output mode</td>
<td>outm</td>
<td>n</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See note 2.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-shot output time</td>
<td>otim</td>
<td>000.001~999.999</td>
<td>000.500</td>
<td>s</td>
</tr>
<tr>
<td></td>
<td>(See note 2.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-shot output 2 time</td>
<td>otm2</td>
<td>000.001~999.999</td>
<td>000.500</td>
<td>s</td>
</tr>
<tr>
<td>One-shot output 1 time</td>
<td>otm1</td>
<td>hold/000.001~999.999</td>
<td>hold</td>
<td>s</td>
</tr>
<tr>
<td></td>
<td>(See note 3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting speed</td>
<td>cnts</td>
<td>30Hz/5KHz</td>
<td>30hz</td>
<td>---</td>
</tr>
<tr>
<td>Input signal width</td>
<td>iflt</td>
<td>20ms/1ms</td>
<td>20ms</td>
<td>---</td>
</tr>
<tr>
<td>Decimal point position</td>
<td>dp</td>
<td>----/----/----/----</td>
<td>----</td>
<td>---</td>
</tr>
<tr>
<td>Prescale value</td>
<td>pscl</td>
<td>000.001~999.999</td>
<td>001.000</td>
<td>---</td>
</tr>
<tr>
<td>NPN/PNP Input mode</td>
<td>imod</td>
<td>NPN/PNP</td>
<td>NPN</td>
<td>---</td>
</tr>
<tr>
<td>Key protection level</td>
<td>kypt</td>
<td>kp-1/kp-2/kp-3/kp-4/kp-5</td>
<td>kp-1</td>
<td>---</td>
</tr>
</tbody>
</table>

Note:
1. The setting range varies with the output mode.
2. The setting range varies with the model and the input mode.
3. HOLD can not be set when the output mode is K-2.
### Setting for tachometer operation

#### Run mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement value</td>
<td>---</td>
<td>000000~999999</td>
<td>000000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>OUT1 set value</td>
<td>---</td>
<td>000000~999999</td>
<td>000000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>OUT2 set value</td>
<td>---</td>
<td>000000~999999</td>
<td>000000</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

#### Function setting mode

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>parameter</th>
<th>Setting range</th>
<th>Default value</th>
<th>Unit</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachometer output mode</td>
<td>totm</td>
<td>hilo/area/hihi/lolo</td>
<td>hilo</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Counting speed</td>
<td>cnts</td>
<td>30Hz/10KHz</td>
<td></td>
<td>----</td>
<td>---</td>
</tr>
<tr>
<td>Decimal point position</td>
<td>dp</td>
<td>----/--.---.--.--/-.---</td>
<td>001.000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Prescale value</td>
<td>pscl</td>
<td>000.001~999.999</td>
<td>001.000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Average processing</td>
<td>aug</td>
<td>off/2/4/8</td>
<td>off</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Auto-zero time</td>
<td>autz</td>
<td>00.01~99.99</td>
<td>99.99</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>Startup time</td>
<td>stmr</td>
<td>00.01~99.99</td>
<td>00.00</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>NPN/PNP Input time</td>
<td>imod</td>
<td>NPN/PNP</td>
<td>NPN</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Key protect level</td>
<td>krypt</td>
<td>kp-1/kp-2/kp-3/kp-4/kp-5</td>
<td>kp-1</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>
Comparison Table: