



Model number

TC-4A-V



Features

- Tachometer
- 4 decade devices
- LED indicator, red
- Counter frequency up to 10 kHz
- Power supply for pulse generator
- 8 adjustable operating modes
- Surface or built-in mounting
- Protection degree IP64 in accordance with DIN EN 60529 (front only)
- Shock resistance in accordance with DIN EN 60068-2-27
- Vibration resistance in accordance with DIN EN 60068-2-6

Technical data

General specifications

| | |
|--------------|---|
| Data storage | 10 years, EEPROM |
| Programming | via toggle switches and rotary switches |

Indicators/operating means

| | |
|-------------------|----------------------------|
| Type | 7-segment LED display, red |
| Number of decades | 4 |
| Display value | digit height 14,2 mm |
| Display interval | 1 ... 9999 |
| Decimal point | freely adjustable |
| Scale factor | 0.1 or 1 |
| Reset | external |

Electrical specifications

| | |
|----------------------------------|-------------------------------------|
| Operating voltage | 90 ... 126 V AC 195 ... 264 V AC |
| Power consumption P ₀ | 14 VA |

Input

| | |
|--------------------|---|
| Counting frequency | 10 Hz / 10 kHz |
| Impedance | 2,3 kOhm (positive logic) |
| Voltage | low: 0 ... 6 V DC high: 16 ... 30 V DC |

Output

| | |
|-------------------------|-----------------------------|
| Linearity | ± 3 % |
| Transistor | - |
| Analogue voltage output | available: 0/2 ... 10 V DC |
| Analogue current output | available: 0/4 ... 20 mA |
| Ripple | < 20 mV |
| Sensor supply | 24 V DC , 50 mA Ripple: 3 % |

Delay times

| | |
|--------------------------------|----------|
| Reset | |
| External | ≤ 30 ms |
| Time delay before availability | ≤ 0,5 ms |
| Jumpering time | ≤ 0,5 ms |

Ambient conditions

| | |
|---------------------|-------------------------------|
| Ambient temperature | -10 ... 50 °C (263 ... 323 K) |
| Storage temperature | -20 ... 70 °C (253 ... 343 K) |
| Relative humidity | 45 ... 90 % (non condensing) |

Mechanical specifications

| | |
|------------|---|
| Connection | screw terminals max. core cross-section 0.34 ... 1.5 mm ² |
| Mass | approx. 450 g |
| Dimensions | 96 x 48 x 105 mm |

Function

Tachometers are pulse-controlled time measuring devices.

In contrast to standard tachometers, which count the incoming pulses within a peak time, these tachometers evaluate the period of time between two consecutive input pulses (cyclic method). The period of time is assigned an adjustable multiplication factor and converted into a rotational speed in rpm or a velocity, depending on the mode of operation.

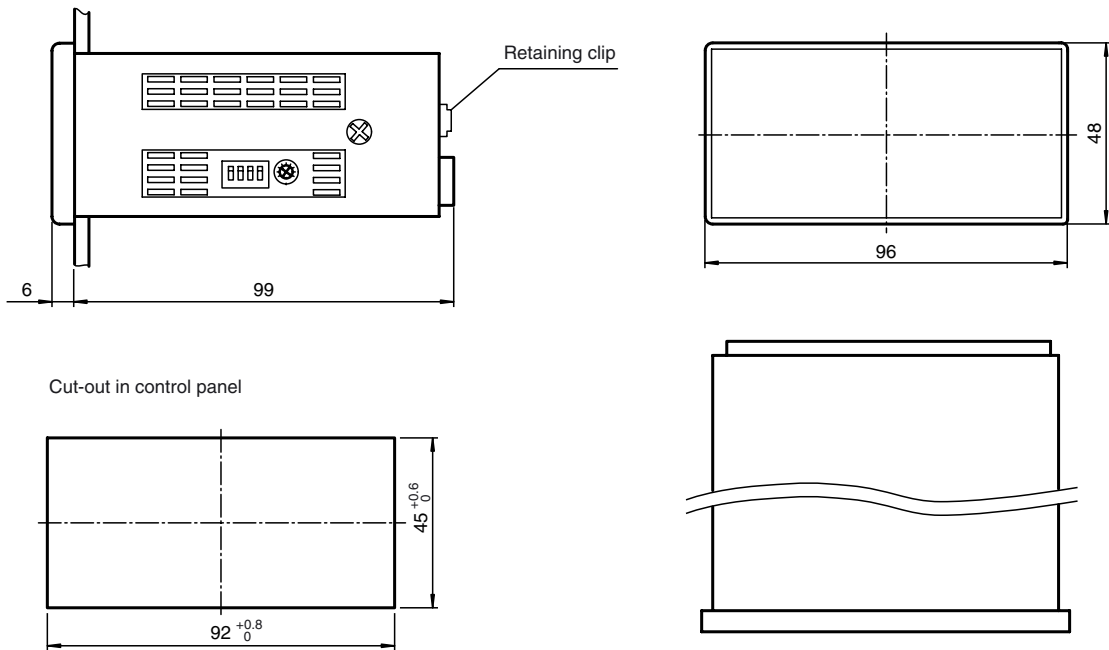
Advantage:

The cyclic method requires only one pulse per revolution and a maximum of two revolutions, in order to determine the rotational speed with high accuracy.

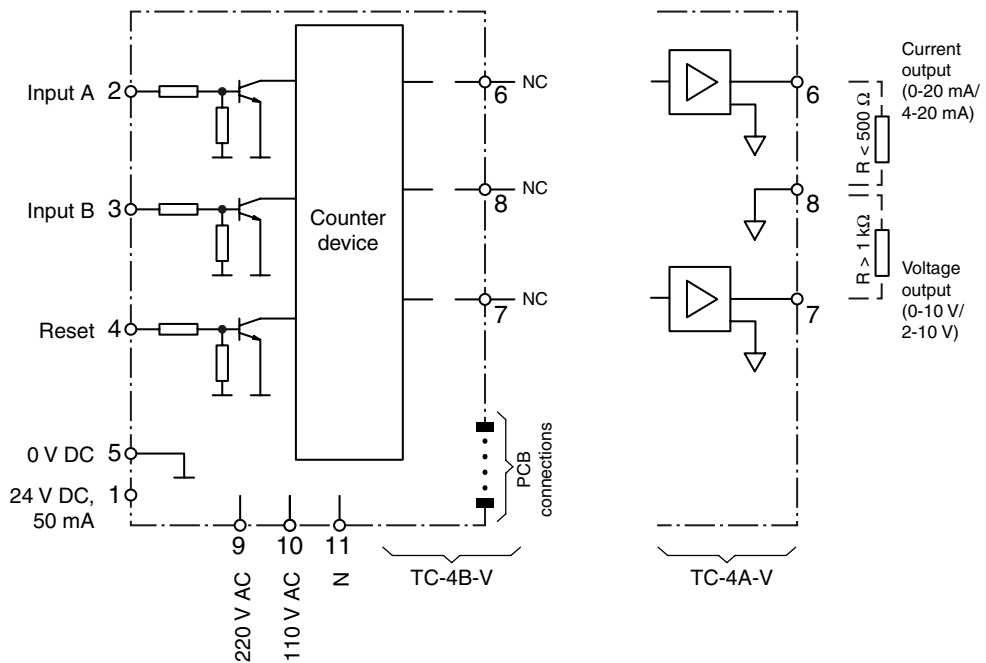
$$\text{rotational speed} = 1 / T \times 60 \text{ min}^{-1}$$

T = time between two pulses
min⁻¹ = revolutions/minute

Indicating / Operating means / Dimensions

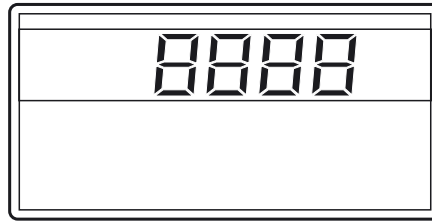


Electrical connection



Notes

Operating and display elements, front view



Operating and display elements, rear view

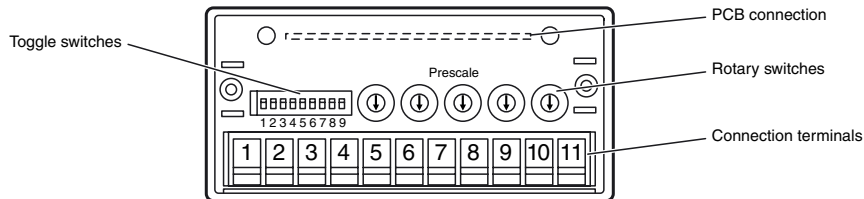


Table 1: Function of flip switches on the rear side (TC-4A, TC-4W-V)

| Switch | Funktion | TC-4A-V, TC-4W-V | | TC-41-V | | TC-4B-V | |
|--------|--------------------------------|-------------------|--------------------------------------|-------------------------------|-------------------------------|-------------|--------------|
| | | Position ON | Position OFF | Position ON | Position OFF | Position ON | Position OFF |
| 1 | Counting frequency | 10 Hz | 10 kHz | 10 Hz | 10 kHz | 10 Hz | 10 kHz |
| 2 | Shift in the decimal point | See table 2 | | See table 2 | | See table 2 | |
| 3 | | See table 3 | | See table 3 | | See table 3 | |
| 4 | Selection of mode of operation | See table 3 | | 60 ... 9999 min ⁻¹ | 10 ... 9999 min ⁻¹ | See table 3 | |
| 5 | | See table 3 | | NC | | See table 3 | |
| 6 | | See table 3 | | NC | | See table 3 | |
| 7 | Measurement cycles | See table 4 | | See table 4 | | See table 4 | |
| 8 | | See table 4 | | See table 4 | | See table 4 | |
| 9 | Output current range TC-4A-V | 0 ... 20 mA | 4 ... 20 mA | | | | |
| | Output function TC-4W-V | Continuous signal | Wipe function or comparator function | | | | |

Table 2: Shift in the decimal point

| Switch | 9999 | 999.9 | 99.99 | 9.999 |
|--------|------|-------|-------|-------|
| 2 | OFF | ON | OFF | ON |
| 3 | OFF | OFF | ON | ON |

Table 3: Operating modes

| Switch No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------------|-----|-----|-----|-----|-----|-----|-----|----|
| 4 | OFF | ON | OFF | ON | OFF | ON | OFF | ON |
| 5 | OFF | OFF | ON | ON | OFF | OFF | ON | ON |
| 6 | OFF | OFF | OFF | OFF | ON | ON | ON | ON |

Table 4: Number of measurement cycles

| Switch No. | 1 | 10 | 100 | 100 |
|------------|-----|-----|-----|-----|
| 7 | OFF | ON | OFF | ON |
| 8 | OFF | OFF | ON | ON |

Application note:

Short measurement times reduce the accuracy of the measurement if the input frequency fluctuates. The display jumps around and is difficult to read. If the number of measurement cycles is increased to 10 or 100, the average of the measurement value is taken and the display becomes more accurate and readable.

Table 5: Function of lateral flip switches (TC-4A-V)

Toggle switches



| Switch | | | | Number of measuring periods per second (input frequency) | Output voltage $R_{min} = 1\text{ k}\Omega$ | Output current | |
|--------|-----|-----|-----|--|--|--|---|
| 1 | 2 | 3 | 4 | | | 9 ON 0 ... 20 mA $R_{max} = 500\ \Omega$ | 9 OFF 4 ... 20 mA $R_{max} = 500\ \Omega$ |
| ON | ON | OFF | OFF | 10 ... 100 Hz | 1 ... 10 V | 2 ... 20 | 4 ... 20 |
| OFF | OFF | ON | OFF | 10 ... 1000 Hz | 0.1 ... 10 V | 0.2 ... 20 | 4 ... 20 |
| OFF | OFF | OFF | ON | 100 ... 10000 Hz | 0.1 ... 10 V | 0.2 ... 20 | 4 ... 20 |

Table 6: Function of lateral flip switches (TC-41-V)

Toggle switches



Switch 2 has no function

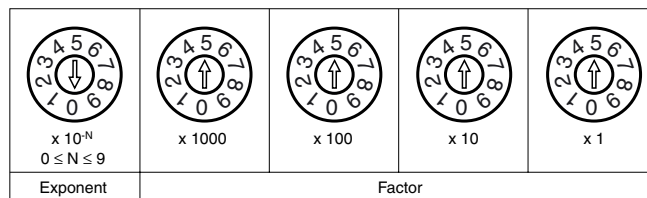
| Switch | | Input level |
|--------|---|---|
| 1 | 2 | |
| ON | | 5 V DC, 2.2 k Ω , low: 0 ... 1.5 V DC, high: 2.5 ... 30 V DC |
| OFF | | 24 V DC, 2.2 k Ω , low: 0 ... 6 V DC, high: 16 ... 30 V DC |

Input level IN2, Input impedance 10 k Ω
 > 0.3 V_{SS} to 100 Hz
 > 2.0 V_{SS} to 1 kHz
 > 20 V_{SS} to 10 kHz

Please note: Use no more than one single input. Connecting both inputs at the same time will result in improper functionality.

Function of the rotary switch on the rear side (TC-4A-V, TC-4W-V, TC-4B-V, TC-41-V)

Adjustment of the multiplication factor



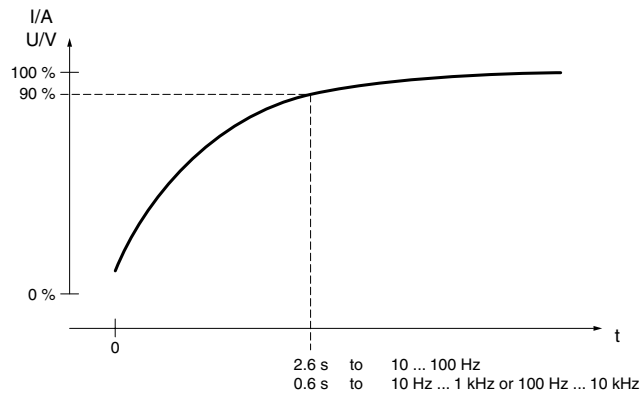
Display = Measured value x Factor x 10^N

Potentiometer P1 (TC-4A-V, TC-4W-V)

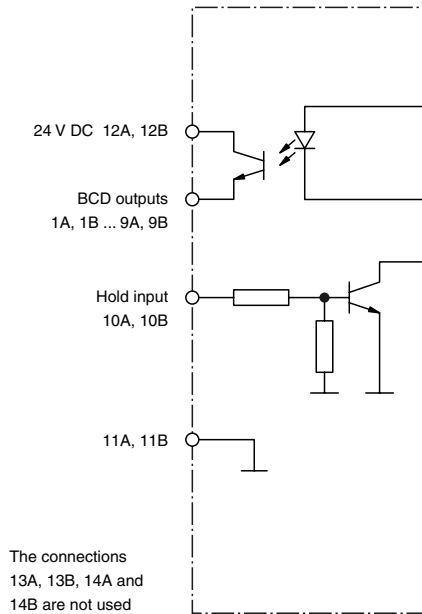
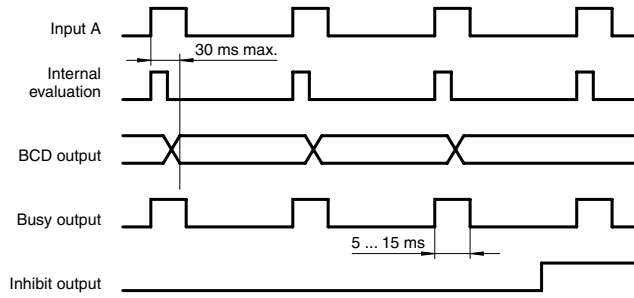
The following can be set with potentiometer P1:
 TC-4A-V: Adjusting the analog output value ($\pm 5\%$)
 TC-4W-V: Startup bypass time (1 ... 10 s)



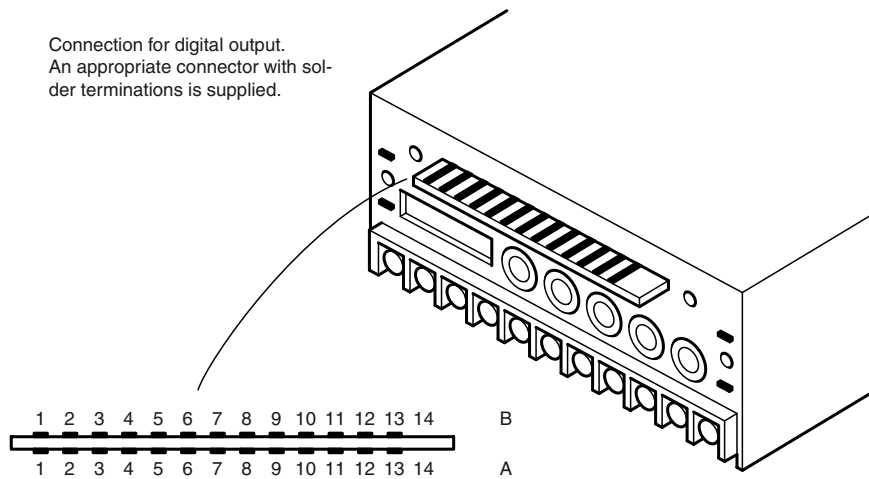
Step response of analog outputs (TC-4A-V)



Digital inputs and outputs (TC-4B-V)



Connection for digital output.
An appropriate connector with solder terminations is supplied.

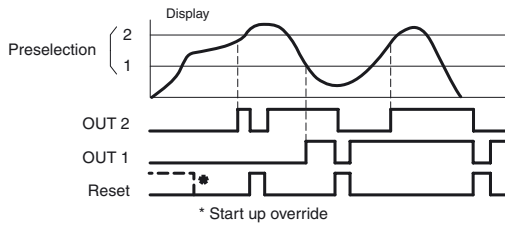


| Number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------------------------|----------|---------|----|---------|----|---------|----|---------|----|--------|-------|-----|---------|----|----|
| Designation on printed circuit board | B | 1 A | 1B | 2A | 2B | 3A | 3B | 4 A | 4B | Busy | Hold | 0 V | 24 V DC | NC | NC |
| | A | 1C | 1D | 2C | 2D | 3C | 3D | 4C | 4D | Busy | Hold | 0 V | 24 V DC | NC | NC |
| Meaning of signals | top B | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | Busy | Hold | 0 V | 24 V DC | NC | NC |
| | bottom A | 4 | 8 | 4 | 8 | 4 | 8 | 4 | 8 | Busy | Hold | 0 V | 24 V DC | NC | NC |
| | | Digit 1 | | Digit 2 | | Digit 3 | | Digit 4 | | Output | Input | 0 V | Input | | |

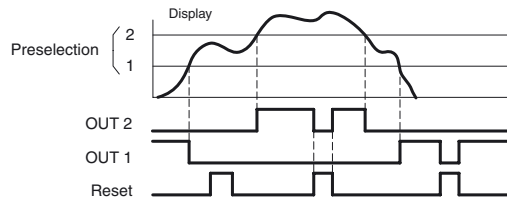
Relay functions (TCW-4W-V)

Mode 1:

Switch 9 = ON
Continuous signal output

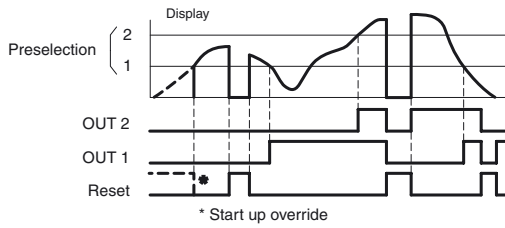


Switch 9 = OFF
Comparator output

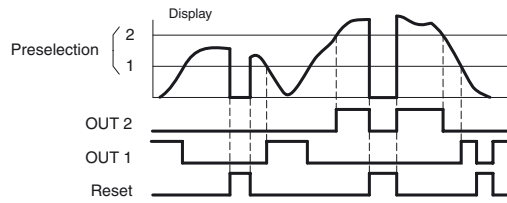


Mode 2-7:

Switch 9 = ON
Continuous signal output

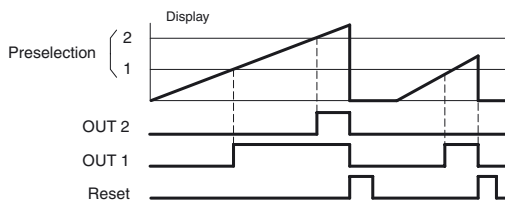


Switch 9 = OFF
Comparator output

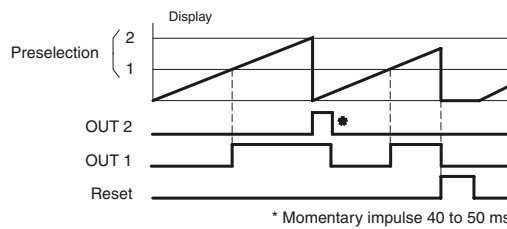


Mode 8:

Switch 9 = ON
Continuous signal output



Switch 9 = OFF
Momentary impulse output



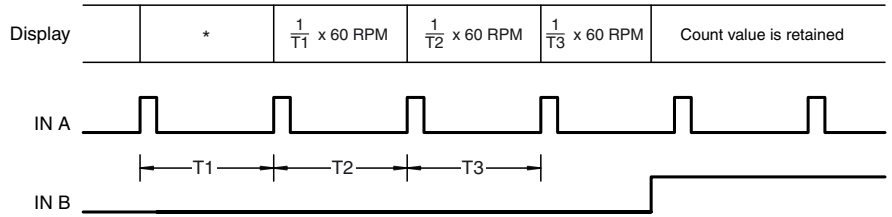
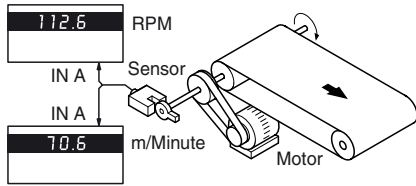
* Momentary impulse 40 to 50 ms

Operating modes

1. Rotation rate measurement

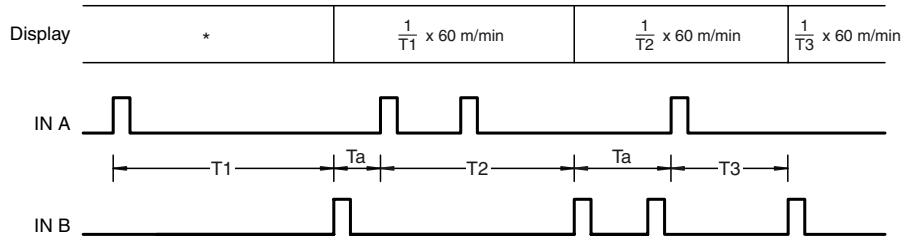
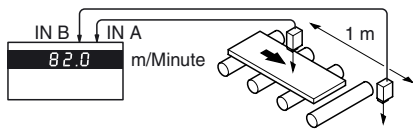
Example:

1 pulse/revolution, 1 measurement cycle, multiplication factor = 1, results in a display range of 10 ... 9999 RPM
 $T1 \leq 6s, f_{Input} \geq 0,16 Hz = 10 \text{ 1/min}$



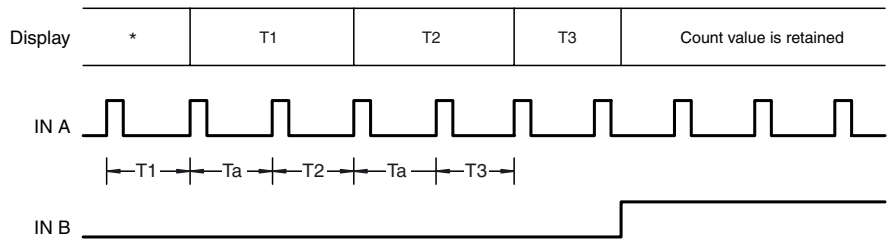
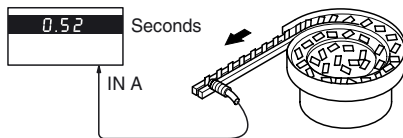
2. Speed

$10 \text{ ms} \leq T1 \leq 6 \text{ sec}$
 $Ta \geq 30 \text{ ms}$



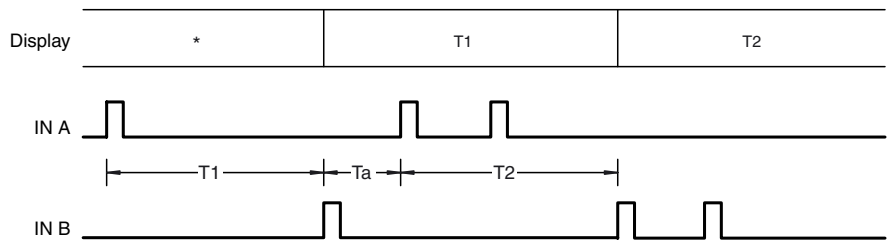
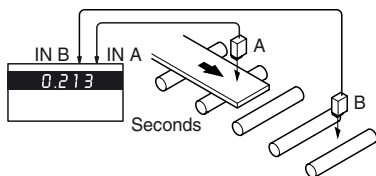
3. Cycle times

$10 \text{ ms} \leq T1 \leq 140 \text{ sec}$
 $Ta \geq 30 \text{ ms}$



4. Time differences

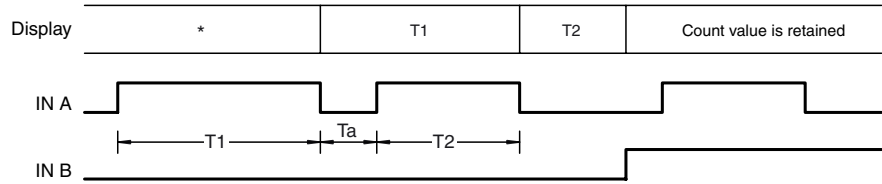
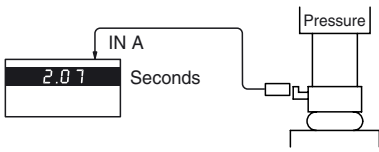
$10 \text{ ms} \leq T1 \leq 140 \text{ sec}$
 $Ta \geq 30 \text{ ms}$



Operating modes

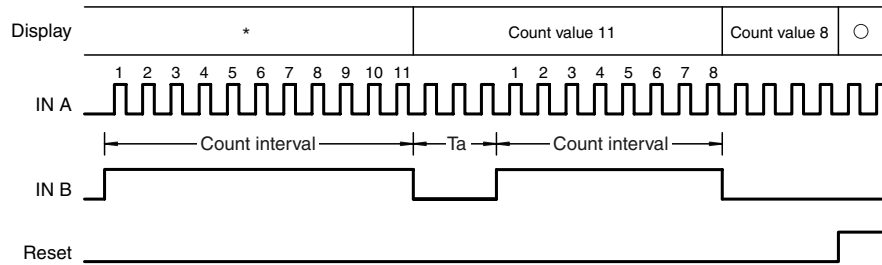
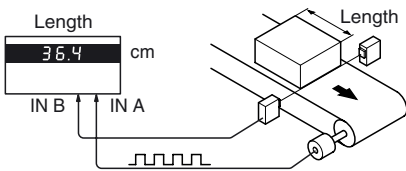
5. Time span

$10\text{ ms} \leq T1 \leq 140\text{ sec}$
 $Ta \geq 30\text{ ms}$



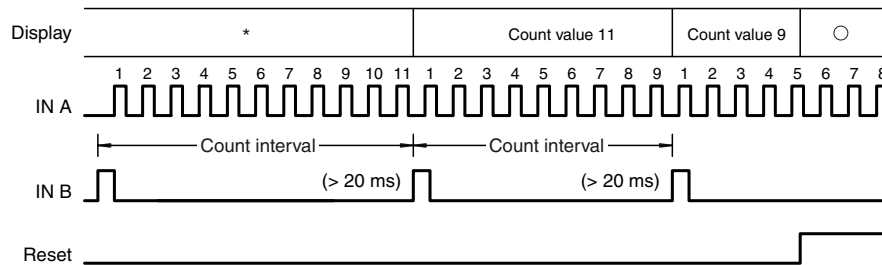
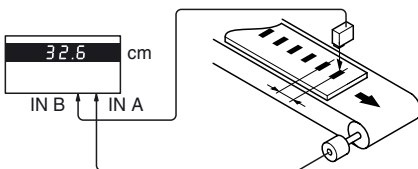
6. Pulse count A

Pulses at IN A are counted as long as IN B is at logic 1
 $T \geq 1\text{ ms}$
 $Ta \geq 20\text{ ms}$



7. Pulse count B

The pulses at IN A are counted between two pulses at IN B



8. Pulse count C

The pulses at IN A are counted, logic 1 at IN B results in input pulse suppression

