

- Tachometers
- 4 decade devices
- LED indicator, red
- Counting frequency up to 10 kHz



Order code

TC-4A-V

TC-4B-V

TC-41-V

TC-4W-V

Technical data

General data

Preselection

Data storage

Controls and displays

Type

Number of decade devices

Digit height

Display range

Decimal point

Scaling factor

Preselection setting

Inputs

Counting frequency

Input impedance

Input voltage

Delay times

External reset

Hold Input

Readiness delay

Bridging delay

Outputs

Analogue voltage output

Analogue current output

Linearity

Ripple

Transistor output

Relay output

Operating modes

Electrical data

Voltage

Power consumption

Power supply for sensor

Ambient conditions

Ambient temperature

Storage temperature

Relative air humidity

Mechanical data

Weight

Dimensions (L x H x D)

Accessory (ordered separately)

Connection

Maximum permissible core cross-section

–
10 years, EEPROM

red LED

4

14.2 mm

1 ... 9999

freely adjustable

0.1 or 1

–

10 Hz/10 kHz

2.3 k Ω
(positive logic)
low: 0 ... 6 V DC
high: 16 ... 30 V DC ≤ 30 ms

–

 ≤ 0.5 ms ≤ 0.5 ms

see table 5

see table 5

 ± 3 % < 20 mV

–

–

see page 66

90 ... 126 V AC
195 ... 264 V AC

14 VA

24 V DC, 50 mA
Ripple ≤ 3 %

-10 ... 50 °C

-20 ... 70 °C

45 ... 90 % (non-
condensing)

approx. 450 g

96 x 48 x 105 mm

cover SH 96

screw terminals

0.34 ... 1.5 mm²–
10 years, EEPROM

red LED

4

14.2 mm

1 ... 9999

freely adjustable

0.1 or 1

–

10 Hz/10 kHz

2.3 k Ω
(positive logic)
low: 0 ... 6 V DC
high: 16 ... 30 V DC ≤ 30 ms ≤ 30 ms ≤ 0.5 ms ≤ 0.5 ms

–

–
–
–
–
PNP, normally closed
collector, 15 mA

–

see page 66

90 ... 126 V AC
195 ... 264 V AC

14 VA

24 V DC, 50 mA
Ripple ≤ 3 %

-10 ... 50 °C

-20 ... 70 °C

45 ... 90 % (non-
condensing)

approx. 450 g

96 x 48 x 105 mm

cover SH 96

screw terminals

0.34 ... 1.5 mm²–
10 years, EEPROM

red LED

4

14.2 mm

1 ... 9999

freely adjustable

0.1 or 1

–

10 Hz/10 kHz

selectable
(see table 6)
low: 0 ... 6 V DC
high: 16 ... 30 V DC ≤ 30 ms

–

 ≤ 0.5 ms ≤ 0.5 ms

–

–

–

–

–

–

see page 66

90 ... 126 V AC
195 ... 264 V AC

14 VA

24 V DC, 50 mA
Ripple ≤ 3 %

-10 ... 50 °C

-20 ... 70 °C

45 ... 90 % (non-
condensing)

approx. 450 g

96 x 48 x 105 mm

cover SH 96

screw terminals

0.34 ... 1.5 mm²two
10 years, EEPROM

red LED

4

14.2 mm

1 ... 9999

freely adjustable

0.1 or 1

with toggle switches

10 Hz/10 kHz

2.3 k Ω
(positive logic)
low: 0 ... 6 V DC
high: 16 ... 30 V DC ≤ 30 ms

–

 ≤ 0.5 ms ≤ 0.5 ms

–

–

–

–

–

2 x 250 V AC, 2 A
see page 66 f90 ... 126 V AC
195 ... 264 V AC

14 VA

24 V DC, 50 mA
Ripple ≤ 3 %

-10 ... 50 °C

-20 ... 70 °C

45 ... 90 % (non-
condensing)

approx. 450 g

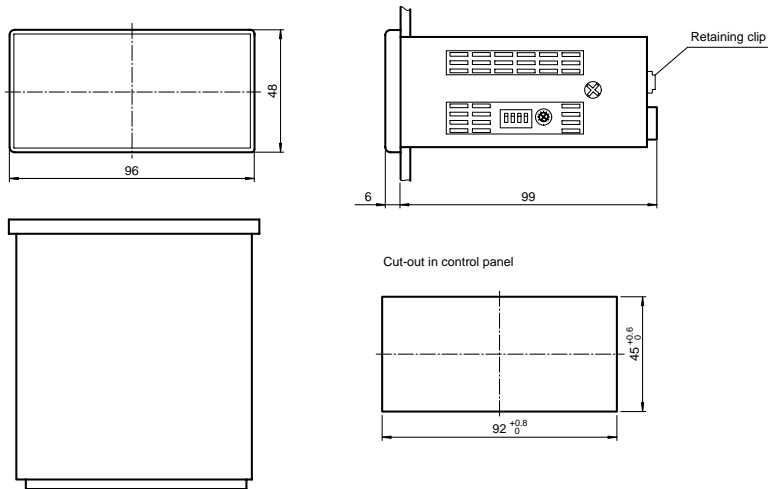
96 x 48 x 105 mm

cover SH 96

screw terminals

0.34 ... 1.5 mm²

TC-4A-V
 TC-4B-V
 TC-4W-V
 TC-41-V



Other features

- Power Supply for pulse generator
- 8 selectable operating modes
- Built-in installation or surface mounting
- Protection class 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

Operating principle

Tachometers are pulse-controlled time measuring devices.

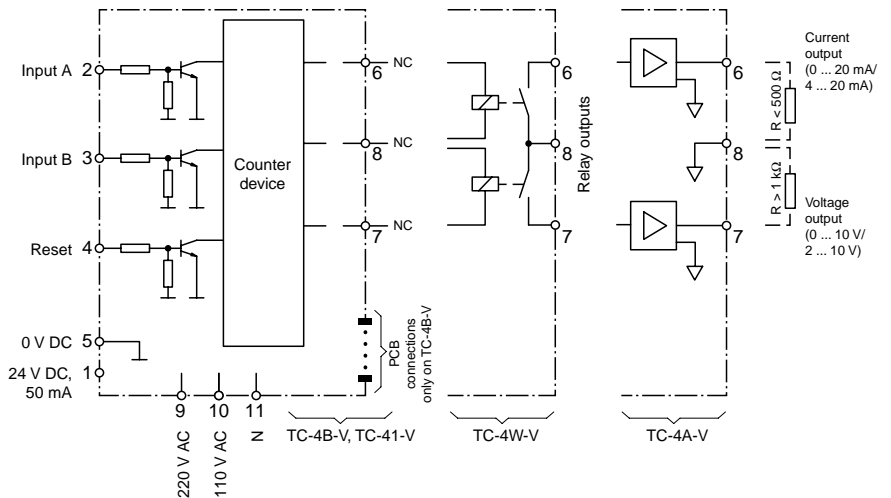
In contrast to standard tachometers, which count the incoming pulses within a peak time, these tachometers evaluate the period of time between two consecutive input pulses (cyclic method). The period of time is assigned an adjustable multiplication factor and converted into a rotational speed in rpm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

The 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.

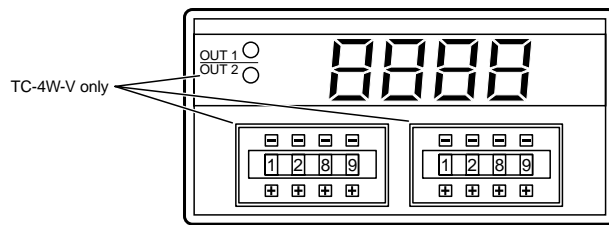
$$\text{Rotational speed} = 1 / T \times 60 \text{ min}^{-1}$$

T = Time between two pulses
 min⁻¹ = Revolutions/minute

Electrical connection



Issue date 14.06.2000



Controls and indicators, rear view

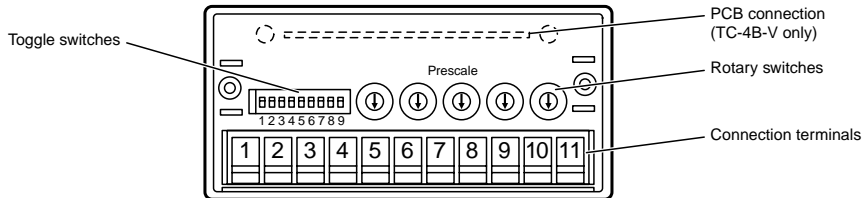


Table 1: Function of the toggle switch on the back of the unit (TC-4A, TC-4W-V)

Switch	Function	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	To shift the decimal point	see table 2		see table 2		see table 2	
3							
4	Selection of operating mode	see table 3		60 ... 9999 min ⁻¹	10 ... 9999 min ⁻¹	see table 3	
5				NC			
6				NC			
7	Measuring cycles	see table 4		see table 4		see table 4	
8							
9	Output current range TC-4A-V	0 ... 20 mA	4 ... 20 mA	see table 4		see table 4	
	Output function TC-4W-V	Continuous signal	Momentary impulse or comparator function				

Table 2: Shift of 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

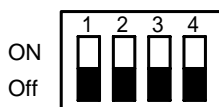
Table 4: Number of measuring cycles

Switch/No.	1	10	100	100
7	OFF	ON	OFF	ON
8	OFF	OFF	ON	ON

Note on application:

Short measuring times with fluctuating input frequency reduce measuring accuracy. The indicator becomes irregular and difficult to read. If the number of measuring cycles is increased to 10 or 100, the measured value is averaged and the indication is more accurate and readable.

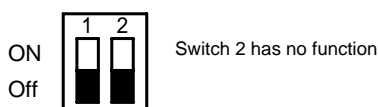
Toggle switches



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 the toggle switches (TC-41-V) on the side of the unit

Toggle switches



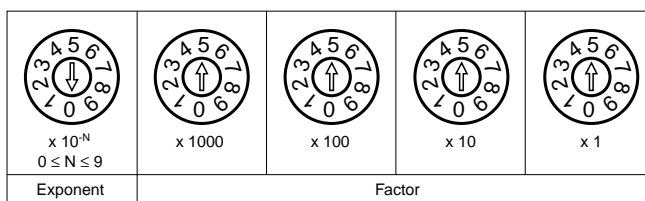
Switch		Input level
1	2	
ON		5 V DC, 2.2 k Ω , low: 0 ... 1.5 V DC, high: 2.5 ... 30 V DC
OFF		24 V DC, 2.2 k Ω , low: 0 ... 6 V DC, high: 16 ... 30 V DC

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

Caution: Only use one input. The simultaneous connection of both inputs leads to malfunction.

The function of the rotary switches on the back of the unit (TC-4A-V, TC-4W-V, TC-4B-V, TC-41-V)

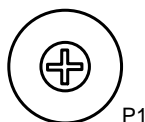
Setting the multiplication factor

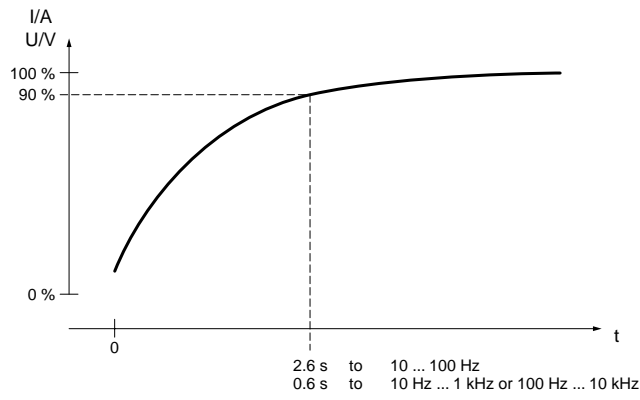


Display = Measured value x Factor x 10^N

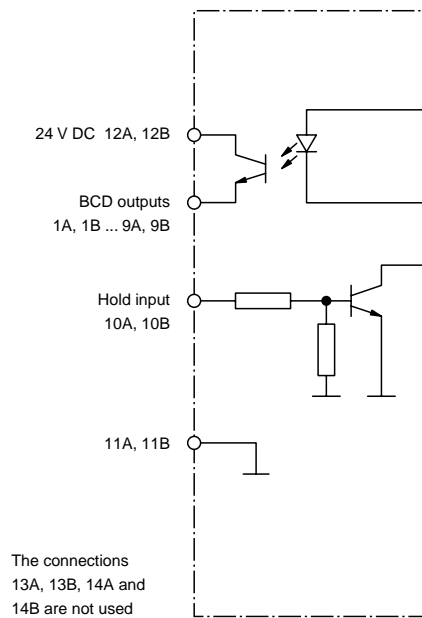
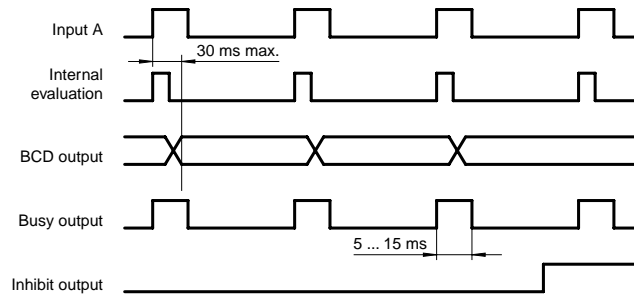
Potentiometer P1 (TC-4A-V, TC-4W-V)

The following is set with the potentiometer P1:
 TC-4A-V: Adjustment of the analogue output value ($\pm 5\%$)
 TC-4W-V: Start up/bridging delay (1 ... 10 s)

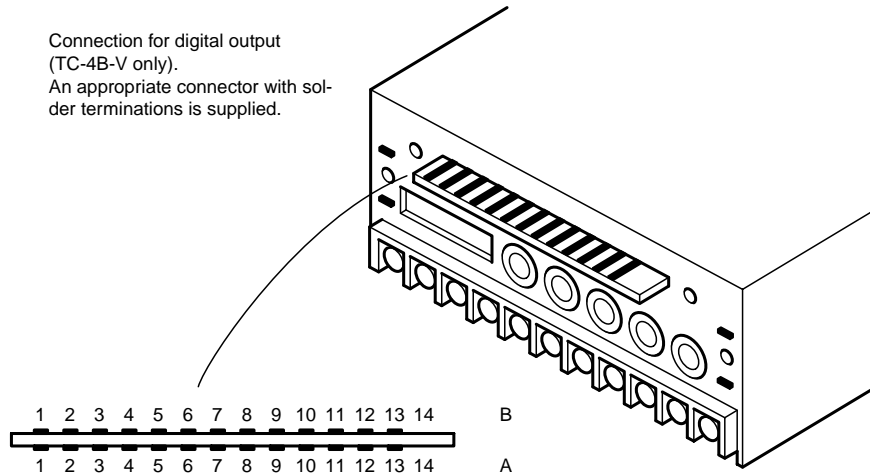




Digital outputs and inputs (TC-4B-V)



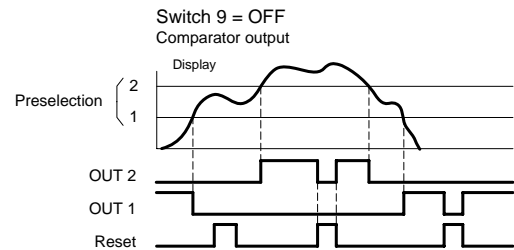
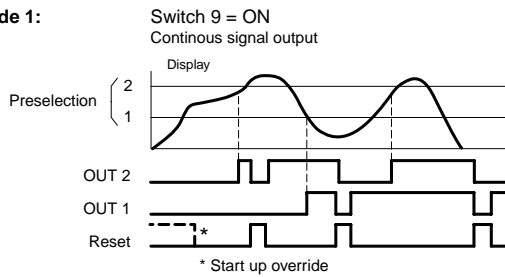
Connection for digital output
(TC-4B-V only).
An appropriate connector with solder
terminations is supplied.



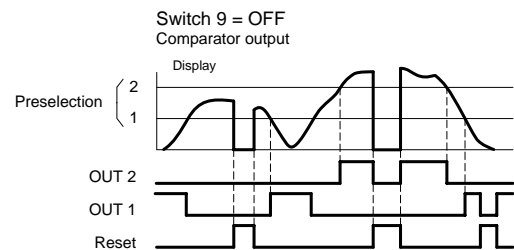
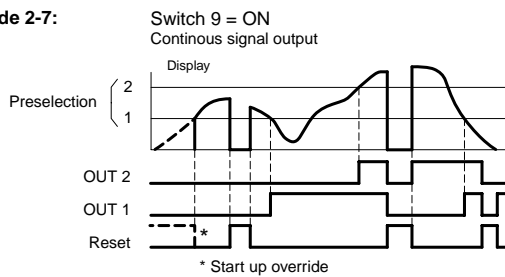
Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Identification on circuit board	B	1A	1B	2A	2B	3A	3B	4A	4B	Busy	Hold	0 V	24 V DC	NC	NC
	A	1C	1D	2C	2D	3C	3D	4C	4D	Busy	Hold	0 V	24 V DC	NC	NC
Meaning of the signals	above B	1	2	1	2	1	2	1	2	Busy	Hold	0 V	24 V DC	NC	NC
	below A	4	8	4	8	4	8	4	8	Busy	Hold	0 V	24 V DC	NC	NC
		Digit 1		Digit 2		Digit 3		Digit 4		Output	Input	0 V	Input		

Relay functions (TCW-4W-V)

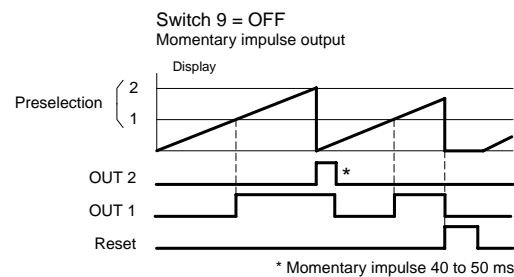
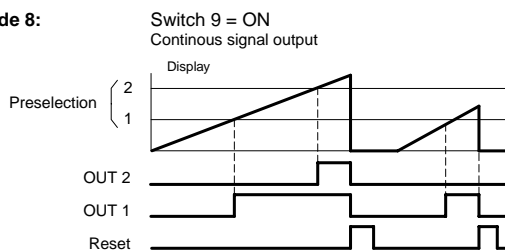
Mode 1:



Mode 2-7:



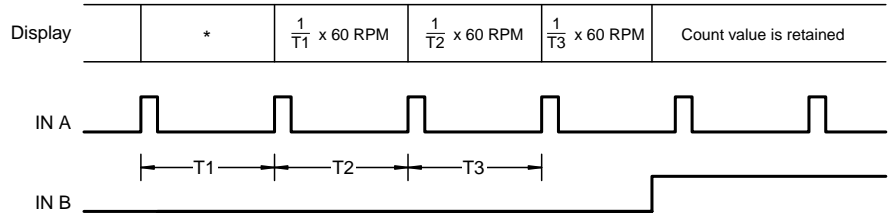
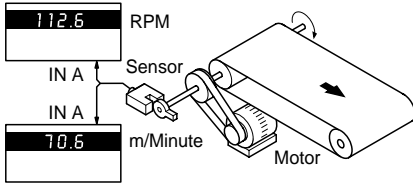
Mode 8:



1. Rotation rate measurement

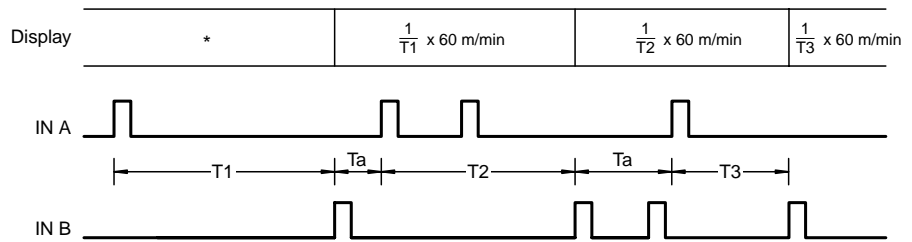
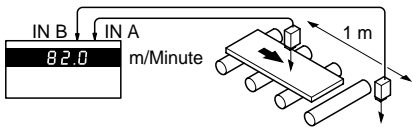
Example:

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



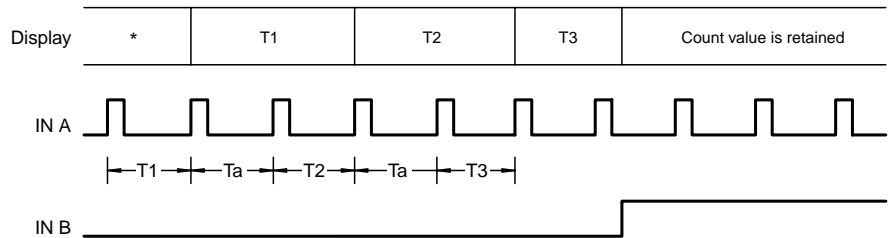
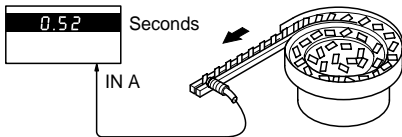
2. Speed

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



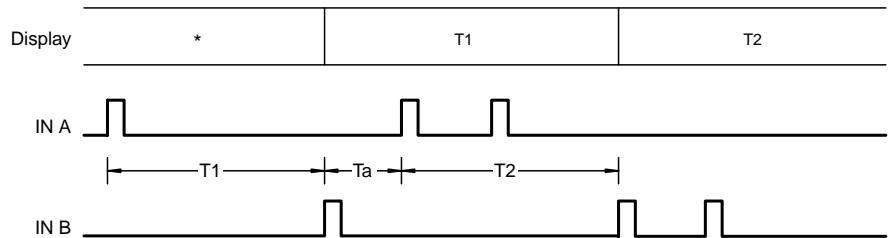
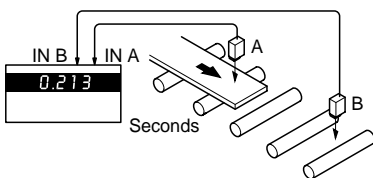
3. Cycle times

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



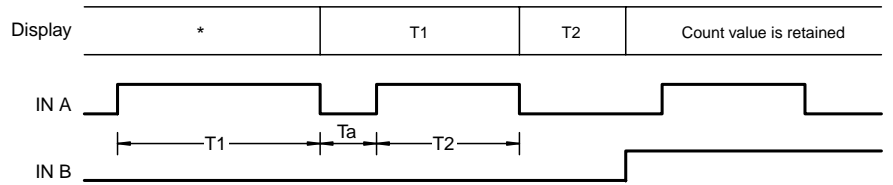
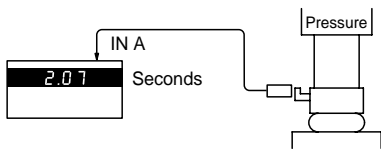
4. Time differences

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



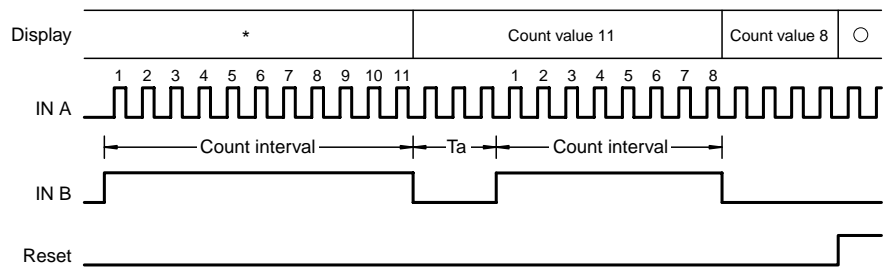
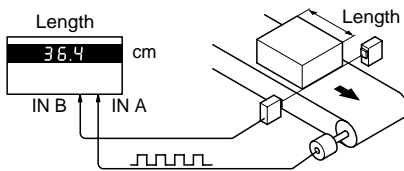
5. Time span

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



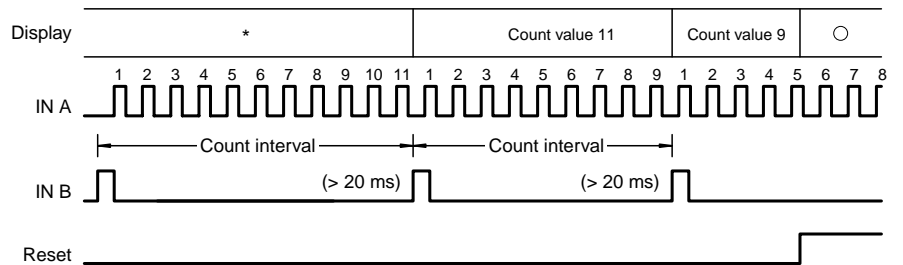
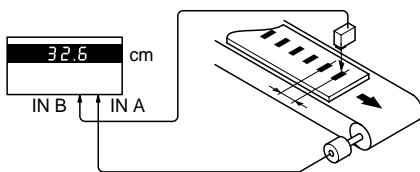
6. Pulse count A

Pulses at IN A are counted as long as IN B 1 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

