

TC-V Series

Digital Tachometers

This tachometer is provided with a large display that is easy to read in a small DIN 48 body.

Bright character display is with a large red LED and a character height of 10 mm, which makes it easy to read from a distance and at an angle.

In addition, a green LED is used for preset values to differentiate from measurement values.

Setting of preset values to 0 settings with individual setting keys for digits has the feel of digital switches, and operation is simple.

Basic function settings are made with digital switches; detailed settings are selected with digit keys, so operation is easy.



CE Marking complied

Merits

●Key protection to lock keys individually

Key protection can be set for individual keys to prevent a malfunction or tampering.

●Battery-less memory retention

EEPROM is used to retain values in memory, so there is no need for battery maintenance.

●Removable terminals

Maintenance has been reduced via terminals that can be removed. After wiring, the terminal cover provides a safe surface for worry-free use.

●Free power source for the AC type

The source voltage for the AC type covers from AC85-264 V; the power source cannot be selected.

●IP65 Protective structure

The front cover panel uses sheet keys, so operation with wet or dirty hands can be done worry-free. A front cover is also provided as an option to enhance the protective structure.

●Designed in compliance with CE and UL

●Prescaling

Prescaling that can convert the speed and flow for the speed of revolution into units of time for the workload is provided.

●Stable display

Time settings can be made during measurement to stabilize the display when high speeds are used. You can choose 0.2/0.5/1.0/2.0s

●High-speed response

The measurement input for this class complies with high speeds at 20 kcps.

●High precision

Cycle measurement is used in measurement format to obtain a high degree of precision at low speeds.

●Revolution halt is already at 0

Halt determination times that are already displayed as 0 after revolution halt can be selected from 0.2/0.5/1.0/2.0/6.0 s.

●Equipped with output

A single preset type is also offered. It complies with revolution control.

●With zero halt

Unneeded 0s for higher digits are not displayed.

List of Models

Category	Model Number	Number of Digits	Source Voltage	Sensor Source Voltage DC24V 60mA	Price
Digital tachometer with single preset	TC-V6S	6	AC	●	
	TC-V6S-C		DC		
Digital tachometer for dedicated display	TC-V6		AC	●	
	TC-V6-C		DC		

Accessories: Installation Frame

Model number system

TC-V6 -

C : DC power
 Blank: AC power
S : Single preset
 Blank: Dedicated display
6 : 6-digit
 Series Name

General Specifications

Item	Specification	
	AC power	DC power
Source voltage	AC100~240V	DC12~24V
Permitted power fluctuation	AC85~264V	DC10~26.4V
Power consumption	Approx. 11 VA	Approx. 4 W
Sensor power	DC24V (20~28V) 60mA (less than 10%p-p ripple)	_____
Memory Backup upon Power Failure	EEPROM Writing Up to 100,000 times Memory Duration 10 years	
Ambient temperature	-10~50°C	
Storage temperature	-20~70°C (with no freezing)	
Ambient humidity	35~85%RH (with no dewing)	
Withstand voltage	AC 2kV for one minute (for AC input, 0 V, and relay interconnection) (for the DC type, 0 V, and relay interconnection only)	
Vibration resistance	Durable	Displacement amplitude 0.5 mm Frequency 10-55 Hz along three axes
	No malfunction	Displacement amplitude 0.35 mm Frequency 10-55 Hz along three axes
Impact resistance	Durable	490 m/s ² 11 ms along three axes
	No malfunction	98 m/s ² 11 ms along three axes
Noise resistance	AC power ±1.5 kV between terminals (pulse width 1 of μs and rise time 1 of ns)	DC power ±1.0 kV between terminals (pulse width 1 of μs and rise time 1 of ns)
Protective structure	IP65 (front panel only)	
Weight	Approx. 150g	Approx. 110g
Terminals	Conforming wiring	0.25~1.65mm ²
	Conforming crimped contact	R1.25-3
	Permitted torque	0.5Nm

Performance Specifications

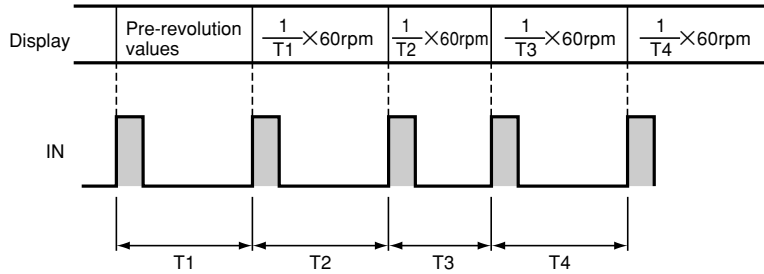
Item	Specification
Category	Tachometer
Setting	Single with alarm output/without (separate model number)
Number of digits	6 digits
Display	Display of settings: red LED Character height 10 mm preset settings: green LED character height 7 mm
Operational format	Cycle measurement
Set items	Speed of revolution only
Basic setting range	10~999999 rpm (when prescaling is 1)
Prescaling	$M \times 10^{-n} = 10^{-9} \sim 999999$ $1 \leq M \leq 999999$, $0 \leq n \leq 9$
Measurement precision	±0.013% excluding selection of low-speed input (10 Hz) (±0.1% during low-speed input)
Setting duration	0.2/0.5/1.0/2.0s
Input	Input logic: Negative logic (no-load input) / Positive logic (load input)
	Input resistance: Positive logic 15 kΩ Negative logic 3.3 kΩ (AC power)/1.8 kΩ (DC power)
	Input voltage: "L" 0~3 V "H" 7~30 V
Setting input response	Max. signal amplitude 5 ms
External reset	No-volt output: NPN open collector output
*Output	24 V 100 mA Withstand pressure 35 V Residual voltage less than 1.5 V
	Relay output: 1 transformer relay AC220V 2A (resistance load)
*Output mode	Compared output / Retained output
Key protection	Setting of arbitrary keys possible
Installation	Exclusively for embedding (terminal block connection)

*means that items do not apply to devices for designated display.

Measurement operations

1) Display of the speed of revolution for one revolution/pulse

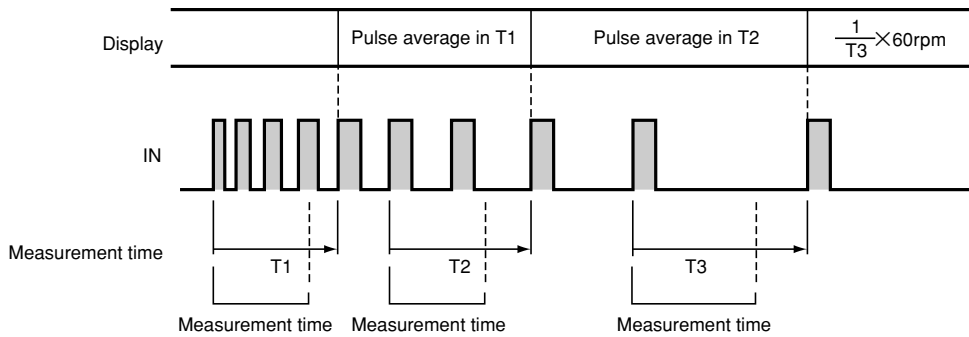
The reciprocal ($\frac{1}{T}$) of the IN input cycle (T sec) is multiplied by 60 and displayed as the speed of revolution.



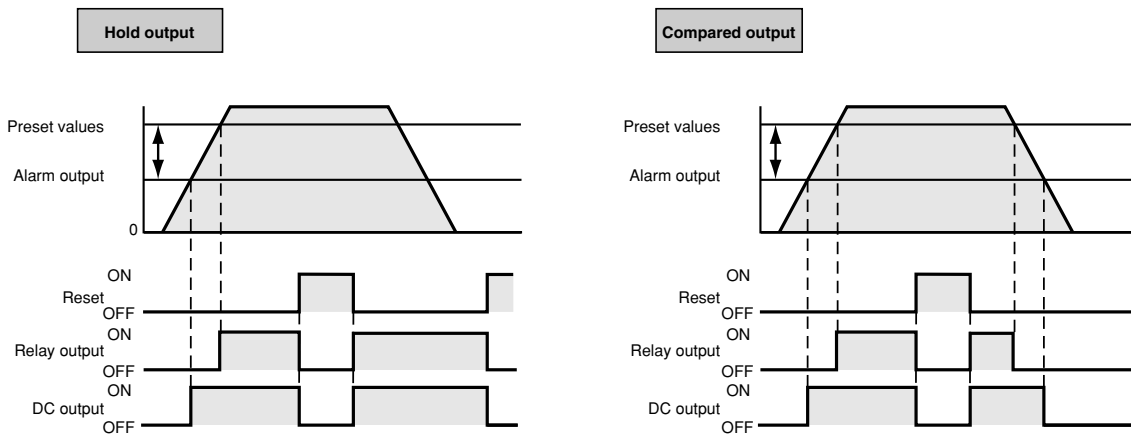
The range for count input 1 P/R is 10~999999 rpm during prescaling.

2) Measurement time

This item is used for revolution at high speeds and to stabilize display. Displays the average of a pulse as entered in the measurement time; when outside the measurement time, the display is updated with each input pulse.



Output operations chart (only for devices with output)

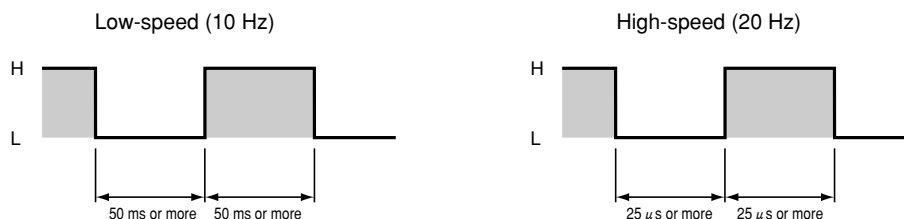


↑↓ : Alarm settings

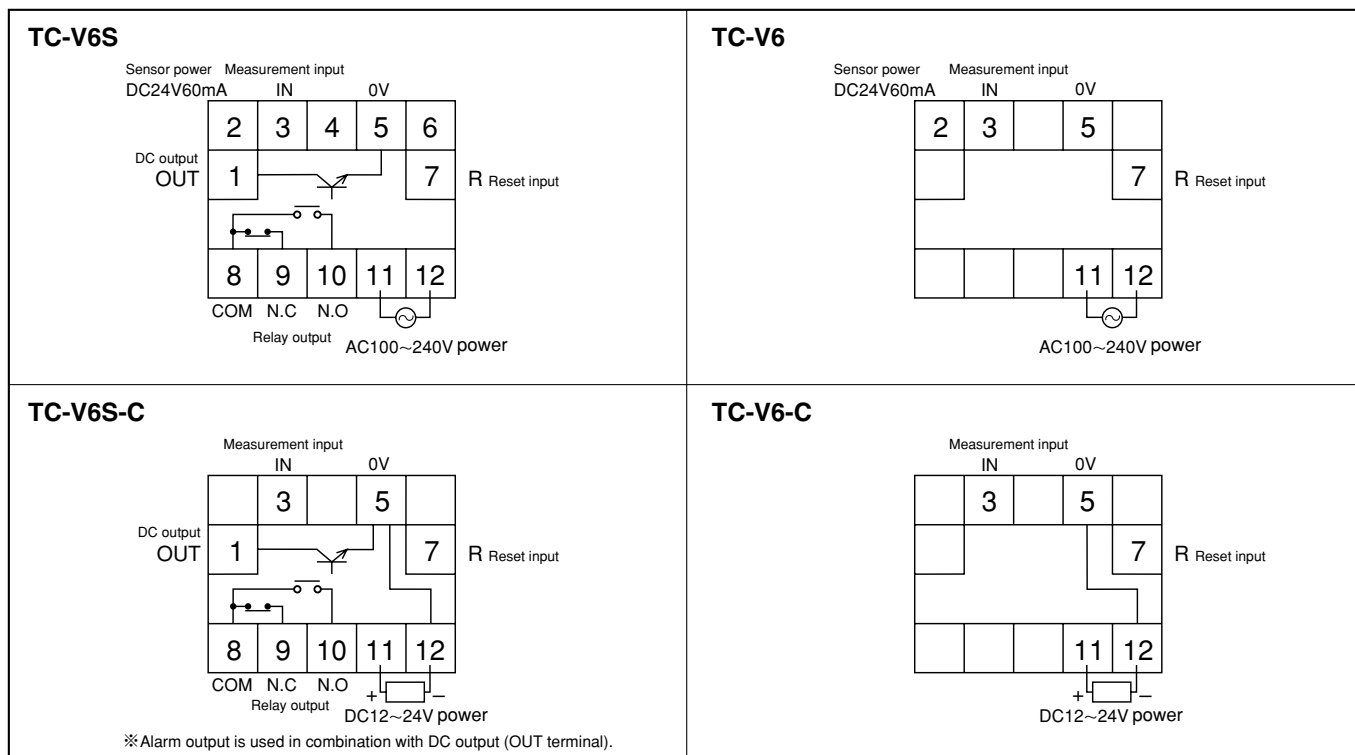
When alarm settings are 0, DC output is the same as in output operations for relay output.

- Alarm settings should be smaller values than preset values. Performing alarm setting with values that exceed preset values will result in measurement values of 0; alarm output (DC output) will come ON.

Input single pulse width

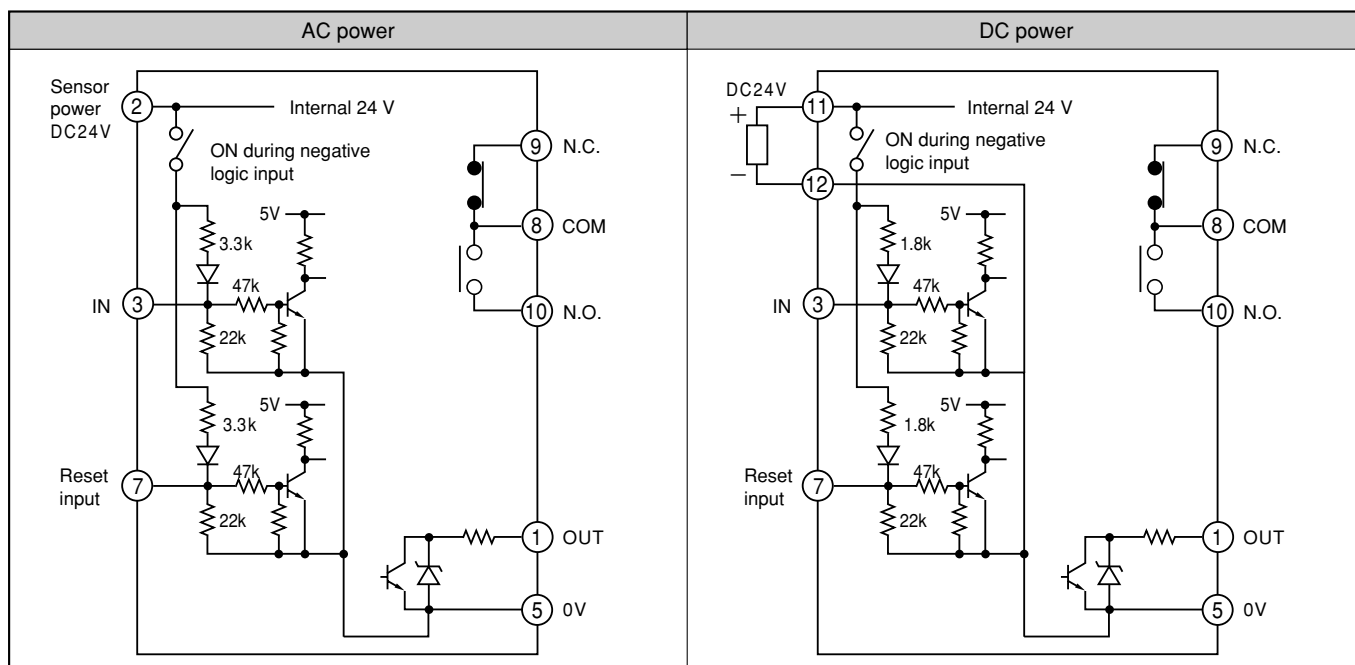


Wiring Diagrams



Do not connect any of the terminals for the DC input.

I/O Circuit Diagrams



Input Wiring Examples (Measurement input/Reset input)

Digital Tachometers

TC-V

TC-4L

TC-4I

TC-4

TC-4B

TC-4S

Proximity switch with NPN open collector output	Proximity switch with voltage output or PNP open collector output
<p>● Input logic: Negative logic: (no-volt input) ($n\bar{E}L$)</p> <p>Recommended proximity switch: APS□-□-N/E</p>	<p>● Input logic: Negative logic: (voltage input) (P_{o5})</p> <p>Recommended proximity switch: APS□-□-E2</p>
DC 2-wire proximity switch	Rotary encoder
<p>● Input logic: Negative logic (no-volt input) ($n\bar{E}L$)</p> <p>Recommended proximity switch: APS□-□-Z ※With the DC type, please supply source voltage above 20 V.</p>	<p>● Input logic: Arranged with encoder output and set as positive or negative logic</p> <p>Recommended proximity switch: TRD-J□-S TRD-N□-S</p>
Switch or relay	
<p>● Input logic: Negative logic (no-volt input) ($n\bar{E}L$)</p> <p>● Measurement input response: 10 Hz (Dip switch 1 ON)</p>	<p>● Input logic: Positive logic (voltage input) (P_{o5})</p> <p>● Measurement input response: 10 Hz (Dip switch 1 ON)</p>

※There is no DC power source. Use a separate external power source.

Output Wiring Examples

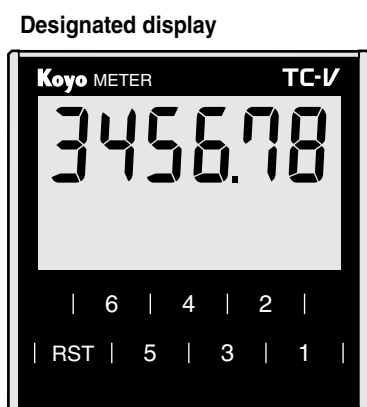
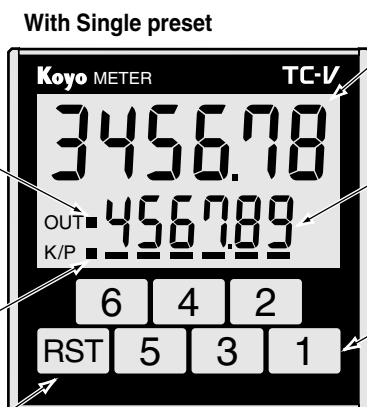
NPN open collector output	Relay output

Front Panel Layout and Description

- ① **Output (red)**
- Operating mode
Lit when output is ON.
Blinks when alarm output is ON.

- ② **Key protection (red)**
- Operating mode
Blinks when key protection is ON (only when the key is ON).
 - Setup Mode
Displays key protection settings.

- ⑥ **RST key**
- Operating mode
Turns output OFF.
 - Setup mode
Allows selection of set items.



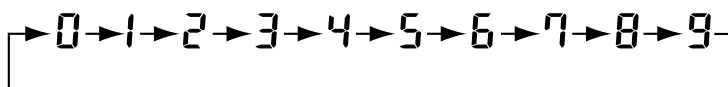
- ③ **Measurement value (red)**
- Operating mode
Displays measurement values.
 - Setup mode
Displays setting parameters.
- ④ **Preset values (green)**
- Operating mode
Displays preset values.
 - Setup mode
Displays set items.
- ⑤ **Digit keys**
- Operating mode
Allows changes in preset values for the operating mode.
 - Setup mode
Allows selection of setting parameters.

- The Designated Display panel has several lamps that differ with respect to the Single Preset Counter:
 - ① **Output display** / ② **Protection Display**
 - None
 - ④ **Preset values**
 - Not displayed in Operating mode.
 - ⑤ **Digit keys** / ⑥ **RST keys**
 - Disabled in Operating mode.

■ Key Operation

1. Changing preset values (Single preset only)

Press a digit key once to increase the corresponding digit by one:



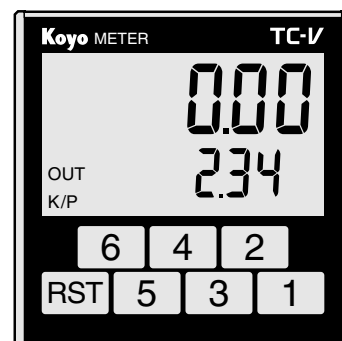
After removing your finder from the key, the settings will be verified after about one second.

2. Output OFF (Single preset only)

Press the **RST** key to reset to turn output OFF (Response time 0.1s). When output is ON, pressing the **RST** key will turn output OFF.

3. Protecting the keys (Single preset only)

Protection of individual keys can be set with operating keys. When Key protection is set in Operating mode, pressing a set key will cause the corresponding LED for the key pushed to blink in order to indicate that operation has been disabled. As the factory setup, Key protection in Setup mode is completely disabled, so just turning Dip switch 7 ON with power supplied will disable all keys.



Example:

When the counter is preset to "123"

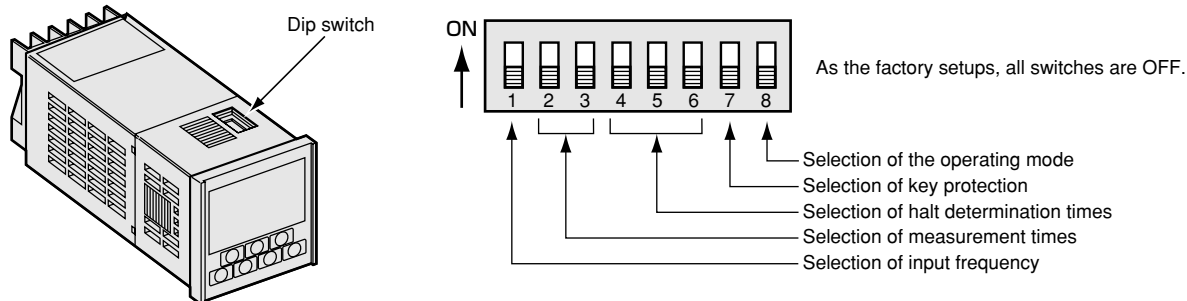
Press the **1** key and the display changes to 124

Press the **2** key and the display changes to 134

Press the **3** key and the display changes to 234

Configure dip switches

- Use the dip switch on the top of the counter to configure various parameters and operation mode.
- Configure dip switches with power off. Operation with power up will have no effect.
- When dip switches are re-configured, you must press the Reset key in operating mode to reset the count values.



Input frequency

The input frequency is selected with Dip switch 1.

ON		Input frequency	SW1	
		10Hz	ON	
OFF		20kHz	OFF	※Factory setup

Measurement times

The measurement times are selected with Dip switches 2 and 3.

ON		Measurement times	SW2	SW3	
		0.2s	OFF	OFF	※Factory setup
		0.5s	OFF	ON	
		1.0s	ON	OFF	
OFF		2.0s	ON	ON	

With the cycle measurement format, the display will change as pulses are input, and the display may vary during high revolutions.

The average of the pulse input in the measurement time can be displayed with setting of the measurement time to stabilize the display during high revolutions.

Halt determination times

The halt determination times are selected with Dip switches 4, 5, and 6.

ON		Suspension determination times	SW4	SW5	SW6	
		6.0s(10)	OFF	OFF	OFF	※Factory setup
		2.0s(30)	OFF	OFF	ON	
		1.0s(60)	OFF	ON	OFF	
		0.5s(120)	OFF	ON	ON	
OFF		0.2s(300)	ON	OFF	OFF	

Items in parentheses are maximum revolutions for 1 P/R.

After the halt determination time is set once measurement input is OFF, the function will display 0.

When setting the halt determination time at 1 P/R to 0.2 s, be aware that the maximum revolutions will be 300 rpm.

Key protection

With Dip switch 7, [Do not protect keys] can be selected to take effect for keys set in Setup mode using [Protect keys]. Setting for keys to protect can be performed in Setup mode. As the factory setups, [Do not protect keys] is set.

ON		Key protection	SW7	
		Settings in Setup mode take effect	ON	
OFF		Do not	OFF	※Factory setup

With the Designated display type, this should be OFF.

Operating mode

The operating mode is selected with Dip switch 8.

ON		Operating mode	SW8	
		Setup mode	ON	
OFF		Run mode	OFF	※Factory setup

Setup Mode

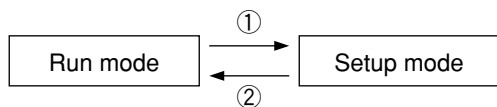
Settings that cannot be selected with dip switches can be set in Setup mode.

Items that can be configured in Setup Mode

- 1) Prescaling — Prescaling values (10⁻⁹~999999) are set.
- 2) Input logic — Positive or negative logic
- 3) Output mode — Compared/Retained
- 4) Decimal place — Any digit can be set for display of the decimal point.
- 5) Alarm output — Offset values can be set with respect to preset values.
0~999999
- 6) Resetting key protection — Setting to disable the reset key can be performed.
- 7) Protecting digit keys — Setting to disable any digit key can be performed.

※With a Dedicated Display Tachometer, items 3), 5), 6), and 7) are skipped.

1. Switching Between Setup mode and Run mode

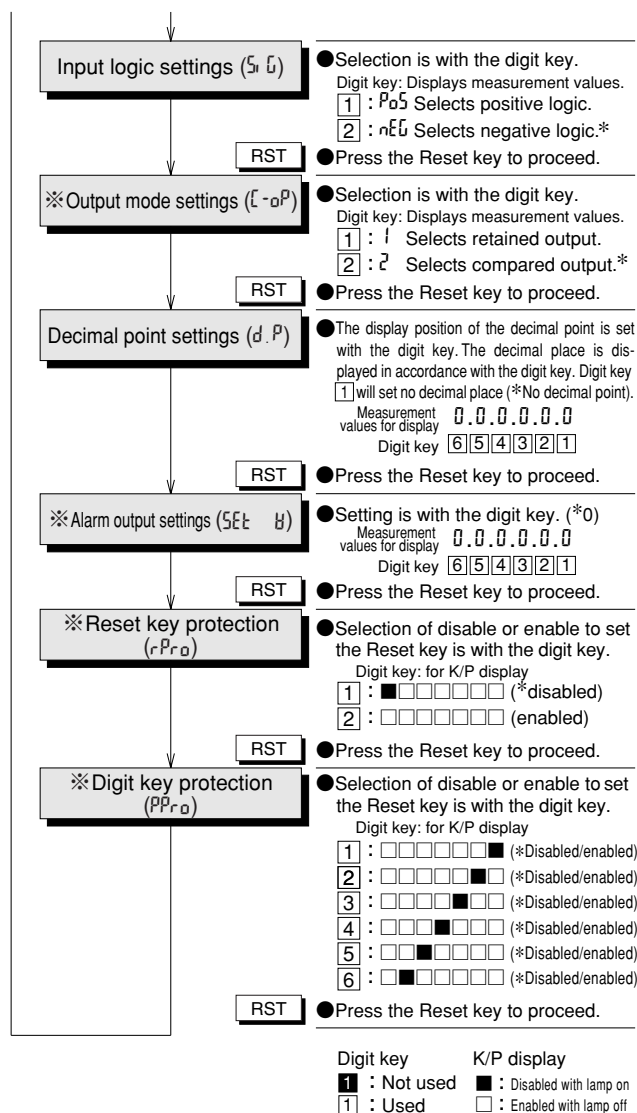
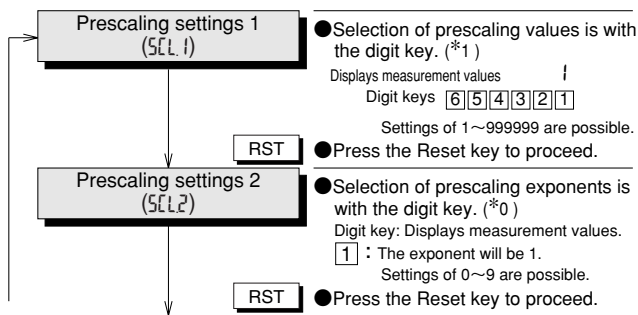


- ① Setting Dip switch 8 to ON and turning on the power will start the Setup mode.
- ② Setting Dip switch 8 to OFF and turning on the power will start the Run mode.

2. Operations in Setup mode

In Setup mode, the settings can be initialized using the menu as follows:

*Represents the factory setup.



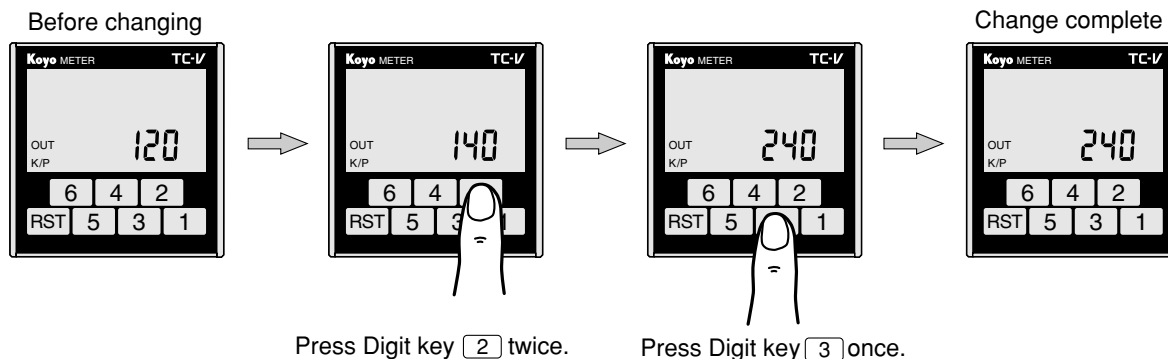
- With the Designated display tachometer, items marked with an ※ are skipped.
- Setting parameters are rendered effective by pressing the Reset key and proceeding to the next step.
- Key protection settings are rendered effective with Dip switch 7 as well as an AND condition. To begin protection, turn Dip switch 7 ON.

Operational Example

Run mode

Changing preset values

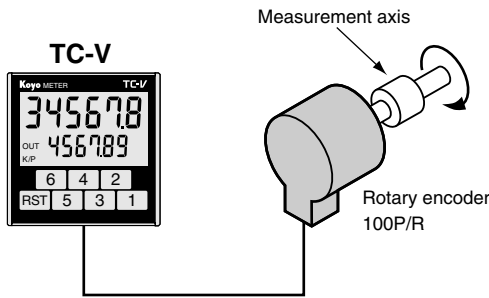
1. Change the preset value from 120 to 240.



Digital Tachometers
TC-V
TC-4L
TC-41
TC-4
TC-4B
TC-4S

Setting Example for Display of the Speed of Revolution

When using a rotary encoder for 100 pulses/revolution, the speed of revolution can be displayed. A measurement time of 1.0 s will be used to stabilize the display during high revolutions. In addition, the decimal place will be after the first digit with the half determination time of 1.0 s.



Calculation of prescaling values

With the tachometer, prescaling is 1 for 1 pulse/revolution. Accordingly, prescaling for 100P/R is

$$\frac{1}{100} = 0.01$$

Prescaling setting is done with the exponent and mantissa such that

$$0.01 = 1 \times 10^{-2}$$

Set items

Set items	Contents
Measurement time	1.0s
Halt measurement time	1.0s
Prescaling exponent	1
Prescaling mantissa	-2

1. Setting the dip switch

Turn OFF the power, then operate the dip switch.

① Select the Measurement time of 1.0 s.



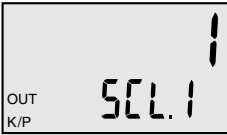
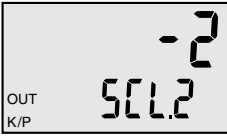
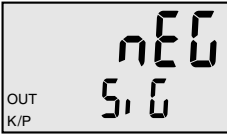
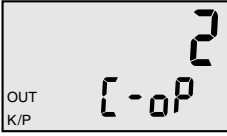

② Select the half measurement time of 1.0 s.



2. Switching to Setup mode

Turn Dip switch 8 ON and then turn power ON.

3. Changing setting contents

- ① The setting screen for the **Prescaling mantissa** is displayed. These values are initial values. Press the **(RST)** key to proceed. 
- ② The setting screen for the **Prescaling exponent** is displayed. Press the **(1)** key twice and “-2” is set. Press the **(RST)** key to proceed. 
- ③ The setting screen for **Input logic** is displayed. These values are initial values. Press the **(RST)** key to proceed. 
- ④ The setting screen for **Output mode** is displayed. These values are initial values. Press the **(RST)** key to proceed. 
- ⑤ The setting screen for the **Decimal point** is displayed. Press the **(2)** key and the decimal point will be displayed between the first and second digit. Press the **(RST)** key and the setting parameters will be written. Setting is complete after this step. 

4. Switching to Run mode

Turn the power OFF after completing setting in Setup mode and turn Dip switch 8 OFF (Run mode) (When power is OFF, setting contents from Setup mode are written).

5. Starting Run mode

Be sure to turn power ON after changing settings in Setup mode and press the **(RST)** key to reset count values.

Error Codes

Common Errors

Error	Error Type	Error Details	Corrective Action
E01	Overflow Error	Data to display exceeds the display range.	Enter measurement values in normal ranges and the device will automatically recover (review settings for prescaling and the decimal point).
E02	Underflow Error	The position of data to display drops below the display range.	
E04	Over Input Frequency	The input frequency exceeds 20 kHz.	Lower the input frequency.
E21	Memory Data Error	Preset/set values and Setup mode items have changed.	Press the Reset key to eliminate the error display. Measurement values and timekeeping values will be set to 0, preset and set values will be 5000, and Setup mode parameters will be set to factory setups.

Option

Option	Model Number	Details
Rubber Packing	KC-48P	Prevents water from entering the control panel with installation between the installation panel and TC-V.
Front Cover	KC-48C	Protects the front panel from dirt and the like. Material: Soft silicone rubber Key operation can be performed with the front cover as-is.

Precautions

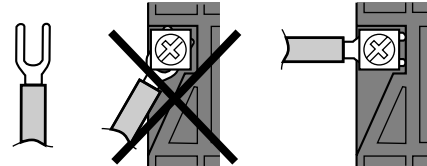
●Precautions for Use

- (1) With the DC power source, the 0-V terminal ⑫ and the input common 0-V terminal ⑤ are internally short-circuited.
- (2) Apply the rated voltage in one instant, not by gradually raising the voltage.
- (3) Always use negative input logic to set the DC 2-wire proximity switch.
- (4) During counting, changes to preset values will take effect about one second after key input of the change. In subtraction mode, key input takes effect when the count is reset Valid preset valve will be saved in the memory of loss of power.
- (5) It is recommended to use a sheet included in the package to keep the setups for the future maintenance.
- (6) Use in the following environments should be avoided:
 - A location where the ambient temperature is above 50°C or below 10°C.
 - A location where the ambient humidity is above 85% or abrupt temperature changes may cause condensation.
 - A location with dust, iron fillings, corrosive gasses, or the like.
 - A location exposed to direct sunlight.
 - A location with significant vibrations or impact.
- (7) When conducting testing of insulation withstand voltage, insulation resistance, or the like, detach the control circuit from the main body.
- (8) When power is interrupted, writing to the internal EEPROM will take place. The number of times EEPROM writing can be performed is less than 100,000, so avoid use with frequent power source operation.

●Precautions for Wiring

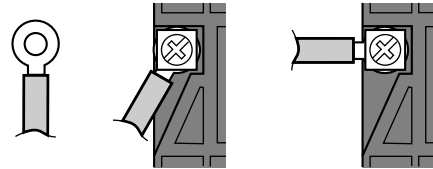
- Keep the wires away from power line.
- With regard to use in locations where extensive noise is generated, keep the TC-V tachometer and wires away from the noise source to the extent possible.
- Empty terminals are not to be used as relay terminals.
- For connection, use of crimped contacts is recommended. When wiring the 1 and 7 terminals, do not install fork-shaped crimped contacts at an angle. Use a round crimped contact for angled installation.

Fork-shaped crimped contacts



For angled installation, connection with the contact is insufficient. Like in the illustration above, install the contact perpendicular to the horizontal.

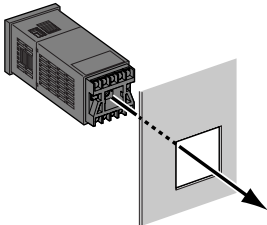
Round crimped contact



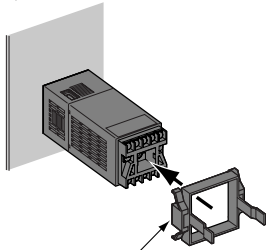
Installation and Removal of the Main Body

●Installation

- ① Insert the main body through the panel installation port.

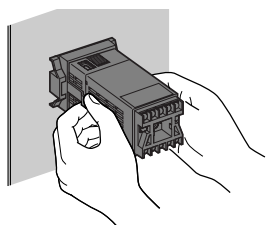


- ② From the rear, mount the installation frame.



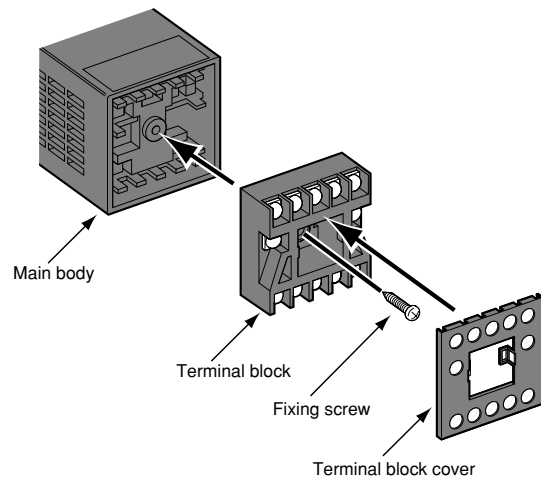
Installation frame: Can be installed vertically or horizontally.

●Removal



- ① Holding the tabs, spread them 2~3 mm.
- ② While keeping the tabs spread, pull the device towards you.

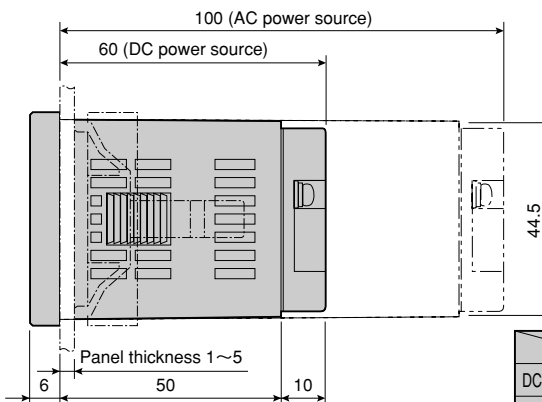
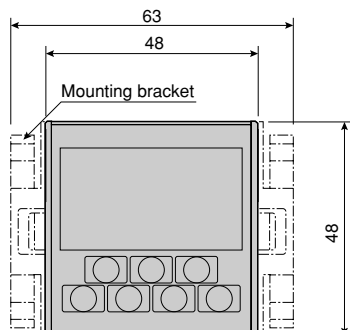
●Installation of the Terminal Block and Terminal Cover



- Do not use a screw other than the one used to fix the terminal block during shipping.
- Maintain a permitted torque of 0.3 Nm.
- Install the terminal block after wiring is complete.

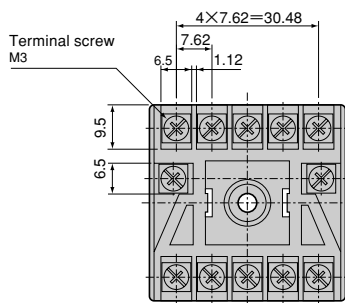
External Dimensions

(in mm)



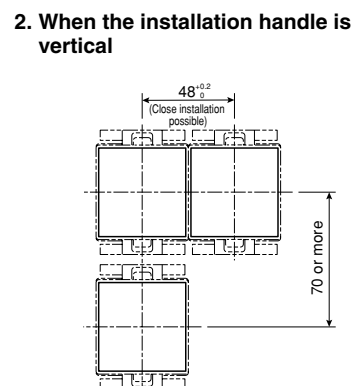
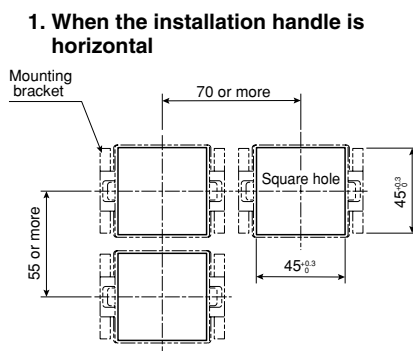
	Depth
DC power source	66mm
AC power source	106mm

Detailed Diagram of the Terminal Block



Complying wiring: 0.25-1.65 mm²
 Complying crimped contact: R1.25-3
 Permitted torque: 0.5 Nm

Boring Dimensions for Installation



Digital Tachometers
TC-V
TC-4L
TC-4I
TC-4
TC-4B
TC-4S