

# KT-V Series

## Features

HMI

SENSOR

ENCODER

COUNTER

INFORMATION

## Digital Timer

- The KT-V series has a compact DIN48 size with an easy-to-see large display.
- With characters represented by bright large red LEDs, 12 mm high characters can be clearly seen from a distance and an angle.
- The green LED is used for the set value to differentiate it from the measured values.
- The set value can be easily set to using the setting key corresponding to each digit, like using a digital switch.
- The TC-V series can be easily operated owing to a selection method that uses DIP switches for basic functional setting and the digit keys for detailed setting.



## Features

### Protection Functions for Each Key

Key protection can be set for each key to prevent unintended operation.

### Retentive Memory without Battery Backup

An EEPROM is used for memory storage and a battery that does not require maintenance is used.

### Removable Terminal Block

This removable terminal block improves maintenance. After wiring, the terminal block cover enhances safety.

### Power Source for High-capacity Sensor

The AC type has a built-in 24 V DC, 60mA power source for sensors. Sensors such as encoders and proximity sensors can be connected to the counter.

### Multi-voltage Power Supply for AC Type

The AC type covers supply voltages of 85 to 264 V AC and can be used for any power source.

### Various Time Range

The 10 time ranges cover from 0.001 sec to 9,999 hr.

### For Various Applications Using 5 Operation Modes

Delay On, delay OFF, one-shot, integrating, and flicker can be set as the operation mode.

### Key Protection Function to Prevent Malfunction

The KT-V series has a built-in key protection function so that settings are not changed if the key is pressed by mistake during operation.

### Elapsed Time / Remaining Time Display

As the time display, the elapsed time and the remaining time can be selected.

### Protection Fulfilling IP65

Sheet keys are used for the front panel, which enables users to safely operate the device even with wet or unclean hands.

### Conformity to CE and UL

CE marking compliant and UL standard (UL508) certified product.

## Model Number List

Model Number	Digit	Power Source	Power Source for Sensors 24 V DC, 60 mA	Price
KT-V4S	4	AC	●	Open
KT-V4S-C		DC	—	Open

(Accessories) Mounting frame




KT-V 4 S -

- Series Classification
- Number of digits to display  
4 : 4 digits
- Output format  
S : With output
- Power source type  
Blank : AC power  
C : DC power

KT-V

# KT-V Series

## Specifications

P L C H M I SENSOR ENCODER COUNTER INFORMATION 

Electronic Counter

Tachometer

Digital Timer

Programmable Cam

KT-V

### General Specifications

Items	Rating	
	AC Power	DC Power
Supply Voltage	100 to 240 V AC	12 to 24 V DC
Allowable Power Range	85 to 264 V AC	10 to 26.4 V DC
Power Consumption	Approx. 11 VA	Approx. 4 W
Power Source for Sensors	24 V DC (20 to 28 V) 60 mA (Ripple noise: 10% p-p or lower)	—
Power Failure Memory	EEPROM Number of overwrite cycles: 100,000 cycles or more Storage time: 10 years	
Ambient Temperature	-10 to 50°C	
Storage Temperature	-20 to 70°C (No freezing)	
Ambient Humidity	35 to 85%RH (No condensation)	
Withstand Voltage	2 kV AC 1 min (AC input, 0 V, between relay contacts) (DC power supply type: 0 V, only between relay contacts)	
Vibration Resistance	Endurance	Displacement amplitude: 0.5 mm, frequency: 10 to 55 Hz, 3 axial directions
	Malfunction	Displacement amplitude: 0.35 mm, frequency: 10 to 55 Hz, 3 axial directions
Impact Resistance	Endurance	490 m/s <sup>2</sup> 11 ms, 3 axial directions
	Malfunction	98 m/s <sup>2</sup> 11 ms, 3 axial directions
Noise Resistance	Between power supply terminals ±1.5 kV (Pulse width 1 μs, start-up 1 ns)	Between power supply terminals ±1.0 kV (Pulse width 1 μs, start-up 1 ns)
Protective Structure	IP65 (Only the front panel part)	
Weight	Approx. 150 g	Approx. 110 g
Terminal Block	Conforming cable	0.25 to 1.65 mm <sup>2</sup>
	Conforming crimp terminal	R1.25-3
	Allowable tightening torque	0.5 Nm

### Performance Specifications

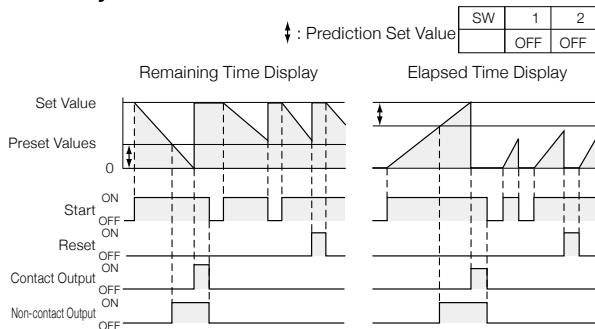
Items	Rating
Type	Timer
Timing System	On delay/Off delay/One-shot/Integrating/Flicker (With prediction output)
Digit	4 digits
Display	Timing value display: Red LED, height of characters 12 mm. Set value display: Green LED, height of characters 7 mm
Time Range	0.001 s to 9.999 s/0.01 s to 99.99 s/0.1 s to 999.9 s/1 s to 9,999 s/1 s to 99 min 59 s/1 min to 9,999 min /1 h to 9,999 h/1 min to 99 h 59 min/0.1 min to 999.9 min/0.1 h to 999.9 h
Display Format	Elapsed time display / Remaining time display
Timer Accuracy	0.013% or ±15 ms (Whichever is larger)
Input	Input logic: Negative logic (No-voltage input)/Positive logic (Voltage input)
	Input resistance: Positive logic 15 kΩ Negative logic 3.3 kΩ (AC power)/1.8 kΩ (DC power)
	Input voltage: "L" 0 to 3 V "H" 7 to 30 V
Start Input Response	15 ms/5 ms/1 ms or less
External Reset	Minimum signal width: 5 ms
Output	Non-contact output: NPN open collector output, 24 V 100 mA, withstand voltage: 35 V, residual voltage: 1.5 V or lower
	Contact output: 1 transfer (1 c), 220 V AC 2 A (Resistance load)
Output Time (Flicker)	Variable from 10 to 9,990 ms, every 10 ms
Key Protection	Any key setting is enabled.
Installation Method	Dedicated to embedded installation (Terminal block connection)

# KT-V Series

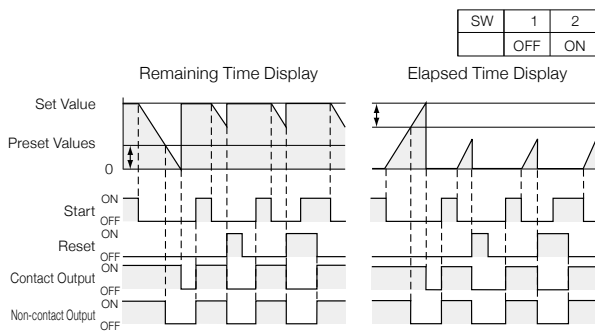
## Output Operation

### Output Operation Chart

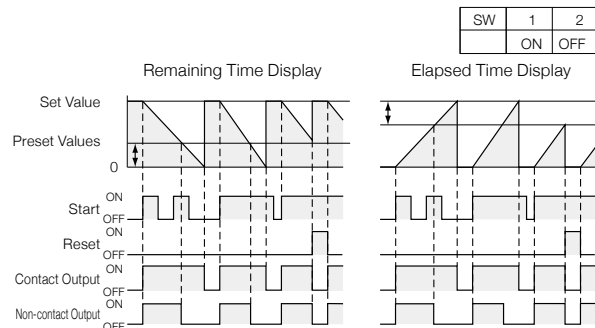
#### On Delay



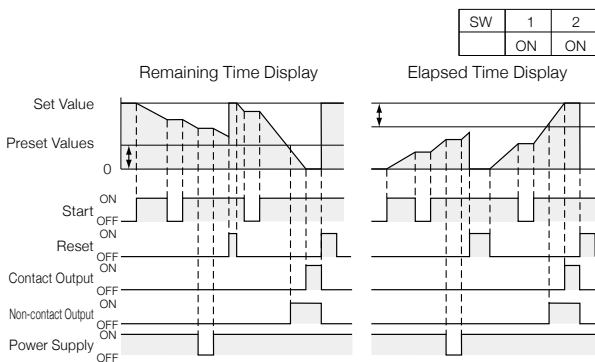
#### Off Delay



#### One-shot

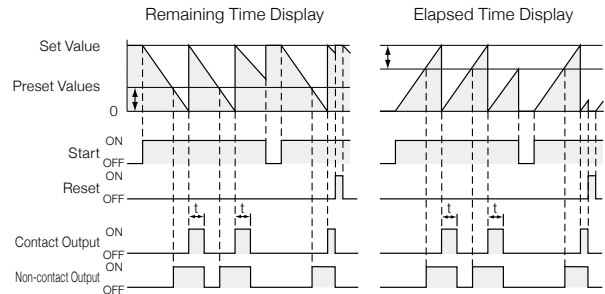


#### Integrating



#### Flicker

Flickering is set in the setup mode.



The output time "t" can be changed from 10 to 9,990 ms (100 ms before shipment).

↑↓ : Prediction Set Value When the prediction set value is "0," non-contact output becomes the same as the output operation of contact output.

The prediction set value should be smaller than the set value. If the prediction setting value exceeds the set value, the prediction output (non-contact output) turns ON (or OFF) simultaneously with the start of the timer operation.



HMI

SENSOR

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INFORMATION

Electronic Counter

Tachometer

Digital Timer

Programmable Cam

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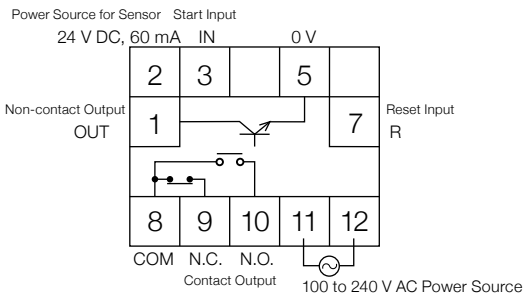
# KT-V Series Connection

- PLC
- HMI
- SENSOR
- ENCODER
- COUNTER
- INFORMATION

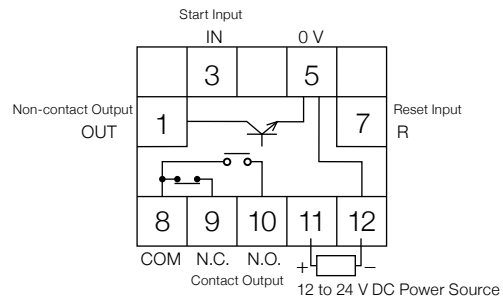
- Electronic Counter
- Tachometer
- Digital Timer
- Programmable Cam

## Terminal Connection Diagrams

### KT-V4S



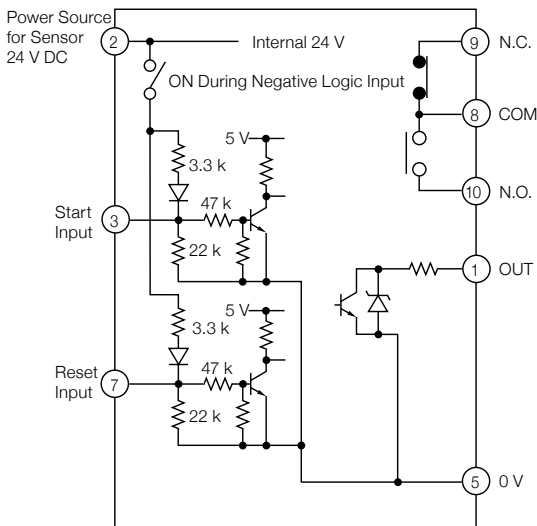
### KT-V4S-C



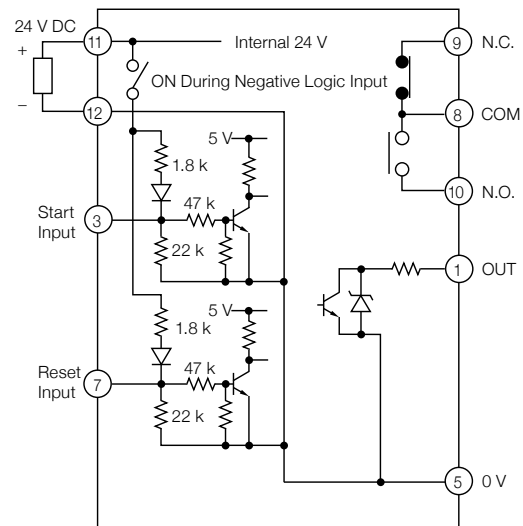
- \* Non-contact output (OUT terminal) is also used for prediction output.
- \* Do not connect anything to unconnected terminals.

## Input/Output Circuit Diagrams

### AC Power








### DC Power



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# KT-V Series

## Connection

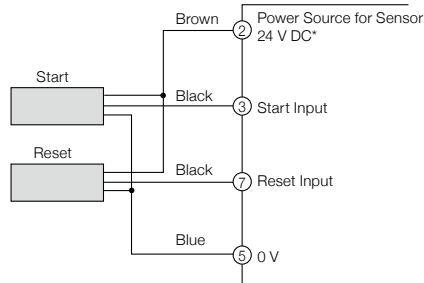
-  HMI
-  SENSOR
-  ENCODER
-  COUNTER
-  INFORMATION

- Electronic Counter
- Tachometer
- Digital Timer
- Programmable Cam

### Input Connection Examples

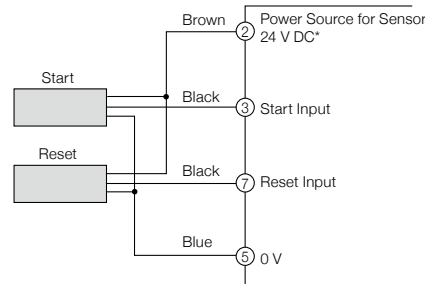
#### NPN Open Collector Output Proximity Sensor

- Input logic: Negative logic (No-voltage input) (nE<sub>U</sub>)  
 《Recommended proximity sensor: APS□-□-N/E》



#### Voltage Output or PNP Open Collector Output Proximity Sensor

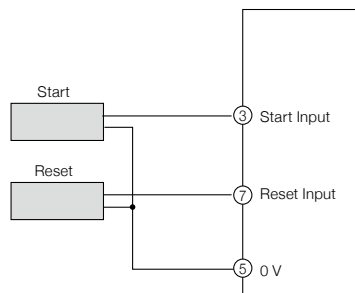
- Input logic: Positive logic (Voltage input) (P<sub>o</sub>5)  
 《Recommended proximity sensor: APS□-□-E2》



#### 2-wire DC System Proximity Sensor

- Input logic: Negative logic (No-voltage input) (nE<sub>U</sub>)  
 《Recommended proximity sensor: APS□-□-Z》

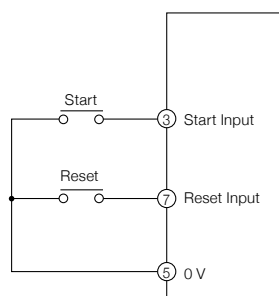
\* In the case of the DC power source type, the supply voltage should be not less than 20 V.



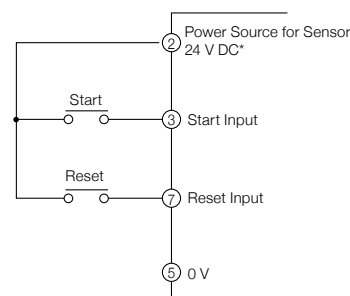
#### Switch Relay

- Input logic: Negative logic (No-voltage input) (nE<sub>U</sub>)  
 - Start input response: 15 ms

\* Because there is large input current, this connection is recommended.



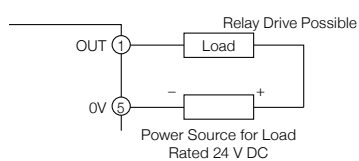
- Input logic: Positive logic (Voltage input) (P<sub>o</sub>5)  
 - Start input response: 15 ms



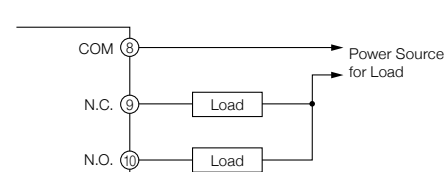
\* There is no power source for sensors in the case of the DC power source type. Use a separate external power source.

### Output Connection Examples

#### NPN Open Collector Output



#### Contact Output



# KT-V Series

## Each Part Name and Function

- PLC
- HMI
- SENSOR
- ENCODER
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- INFORMATION

- Electronic Counter
- Tachometer
- Digital Timer
- Programmable Cam

### Panel Explanation

#### ① Output display (Red)

- Operation mode  
Lights up when the output is ON.  
Blinks when the prediction output is ON.

#### ② Protection display (Red)

- Operation mode  
Blinks when the key is protected.  
(Only when the key is ON)
- Setup mode  
Displays the set contents of key protection.

#### ⑦ RST key

- Operation mode  
Resets the discrete value.  
(0 in increment mode, preset value in decrement mode)
- Setup mode  
Select the setting item.



Time Range	Timing / Set Value Display	Unit Display
□□□□s	0 to 9999	s
□□□□m	0 to 9999	m
□□□□h	0 to 9999	h
□□m□□s	0:00 to 99:59	m:s
□□h□□m	0:00 to 99:59	h:m

#### ③ Discrete value display (Red)

- Operation mode  
Displays the discrete value.
- Setup mode  
Displays the set contents.

#### ④ Unit display

- Operation mode  
Display the units of time.  
h: hour / m: minute / s: second

#### ⑤ Set value display (Green)

- Operation mode  
Displays the set value.
- Setup mode  
Displays the setting item.

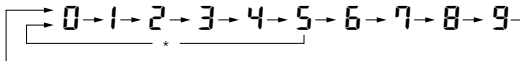
#### ⑥ Digit key

- Operation mode  
Changing the set value  
\* If approx. 1 sec passes without any key input after the set value has been changed, the set value becomes effective.
- Setup mode  
Selects the set contents.

### Key Operation

#### 1. Changes the preset value

Every time a digit key is pressed, 1 is added to the preset value of the corresponding digit.



Approx. 1 second after a digit key is released, the set value is entered.

\* In the case of digit of sexagesimal scale display :   
(Minute) (Second)  
(Hour) (Minute)

Example: When the counter is "123"

- Press the 1 key and the 124
- Press the 2 key and the 134
- Press the 3 key and the 234



#### 2. Resetting the timing value

If the [RST] key is pressed (response time is 0.1 s), the timing value is reset. If the [RST] key is pressed, the timing value becomes the set value in the remaining time display mode and "0" in the passage display mode.

#### 3. Key protection

The key protection can be individually set for each operation key. If a key for which the key protection is set is pressed in the run mode, the LED corresponding to the pressed key blinks to notify that the operation is prohibited.

Since the protection is set to all keys before shipment, if the power is supplied when DIP switch 7 is ON, operation of all keys is prohibited.

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# KT-V Series

## Each Part Name and Function



HMI



SENSOR



ENCODER



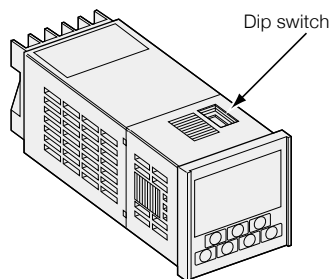
COUNTER



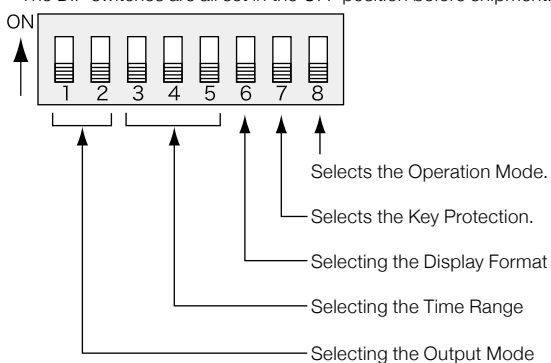
INFORMATION

### DIP Switch Setting

- Use the DIP switches at the top of the timer for setting.
- Before operating the DIP switches, be sure that the power is turned off. The switches do not respond to setting changes while the power is on.
- When a DIP switch is changed, be sure to press the [RST] key in the operation mode to reset the count value.



\* The DIP switches are all set in the OFF position before shipment.



### Output Mode

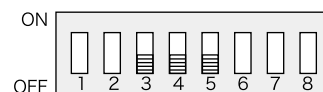
Select the output mode with DIP switches 1 and 2. The flicker mode that is not included in the items is selected in the setup mode.



Operation	SW1	SW2
Integrating	ON	ON
One-shot	ON	OFF
Delay OFF	OFF	ON
Delay On	OFF	OFF

### Time Range

Select the time range with DIP switches 3, 4, and 5. The time range that is not included in the items is selected in the setup mode.



Time Range	SW3	SW4	SW5
□□h□□m	ON	ON	ON
□□□□h	ON	ON	OFF
□□□□m	ON	OFF	ON
□□m□□s	ON	OFF	OFF
□□□□s	OFF	ON	ON
□□□.□s	OFF	ON	OFF
□□.□□s	OFF	OFF	ON
□.□□□s	OFF	OFF	OFF

### Display Format

Select the display format with DIP switch 6.



Display Format	SW6
Elapsed Time Display	ON
Remaining Time Display	OFF

### Key Protection

Select whether to engage the key protection or not with DIP switch 7. To engage protection, after setting each key in the setup mode, set DIP switch 7 in the ON position and supply the power again to enable the protection. All keys are set for protection before shipment.



Key Protection	SW7
Use	ON
Not Use	OFF

### Operation Mode

Select the setup mode and the operation mode with DIP switch 8.



Operation Mode	SW8
Setup Mode	ON
Operation Mode	OFF

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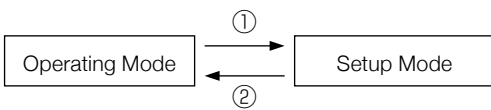
### Setup Mode

Make settings that cannot be selected with the DIP switches, in the setup mode.

#### Setup Mode Setting Items

- (1) Start input response ..... 1/5/15 ms
- (2) Input logic ..... Positive logic, negative logic
- (3) Output mode ..... Flicker mode, DIP switch
- (4) Time range ..... 0.0 minute /0.0 time, DIP switch
- (5) Output time ..... Set the output time of the flicker mode from 10 to 9,990 ms (in unit of 10 ms).
- (6) Prediction output ..... Set the offset value for the set value.
- (7) Reset key protection ..... Set the lock for the reset key.
- (8) Digit key protection ..... Set the lock for the digit keys.

#### Switching Between the Setup Mode and the Operation Mode



- ① When DIP switch 8 is in the ON position and the power is turned on, the setup mode starts.
- ② When the DIP switch 8 is in the OFF position and the power is turned on, the operation mode starts.

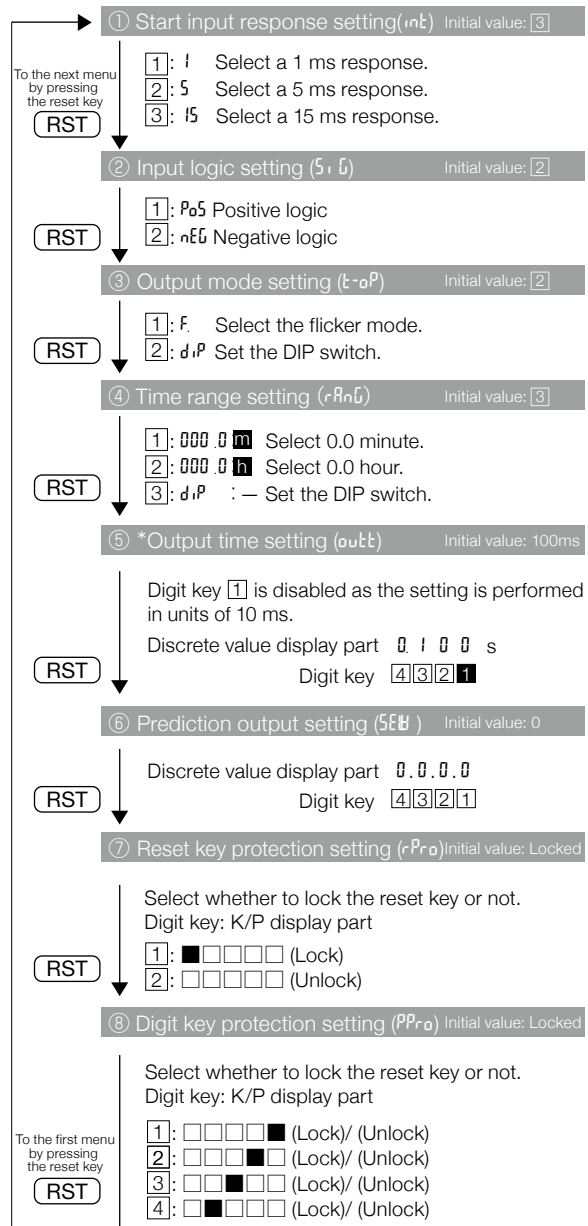
#### Operation of the Setup Mode

Initialize the setup mode using the menu as shown in the table on the right. (Use the digit keys for all settings.)

- Other than the flicker mode, skip the setting items with an \* mark.
  - When the default setting is changed in the setup mode, be sure to press the [RST] key in the operation mode to reset the timing value.
  - The set contents become effective when moving to the next menu via the [RST] key.
  - The key protection setting becomes effective in AND conditions from DIP switch 7.
- If you want to make the protection effective, set DIP switch 7 in the ON position.

Digit key 1 : Not use  
1 : Use

K/P display part ■ : Lit when disabled  
□ : Enabled when out





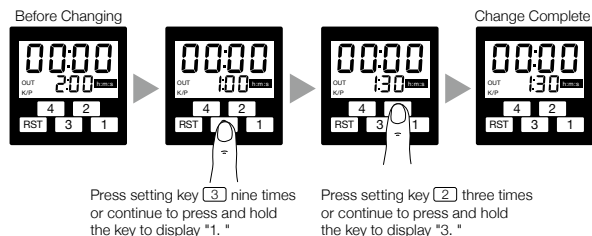
# KT-V Series

## Example of Operation

### Operation Mode

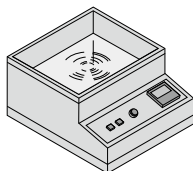
#### Changes the Preset Value

Change the preset value from "2:00" to "1:30". The preset value becomes effective approx. 1 second after the change is made.



### Washing Time Control

If the start switch is pressed, washing is performed for the set time.



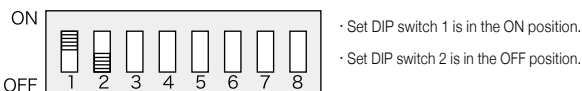
Setting item

Setting Item	Contents
Output Mode	One-shot
Time Range	□□minute□□second
Display Format	Remaining time display
Key Protection	Reset key <input type="checkbox"/> Prohibition Second key <input type="checkbox"/>

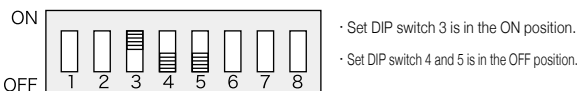
#### 1. Setting DIP switches

Turn the power off before operating the DIP switches.

① Select the output mode and one-shot.



② Select the time range: □□min □□sec



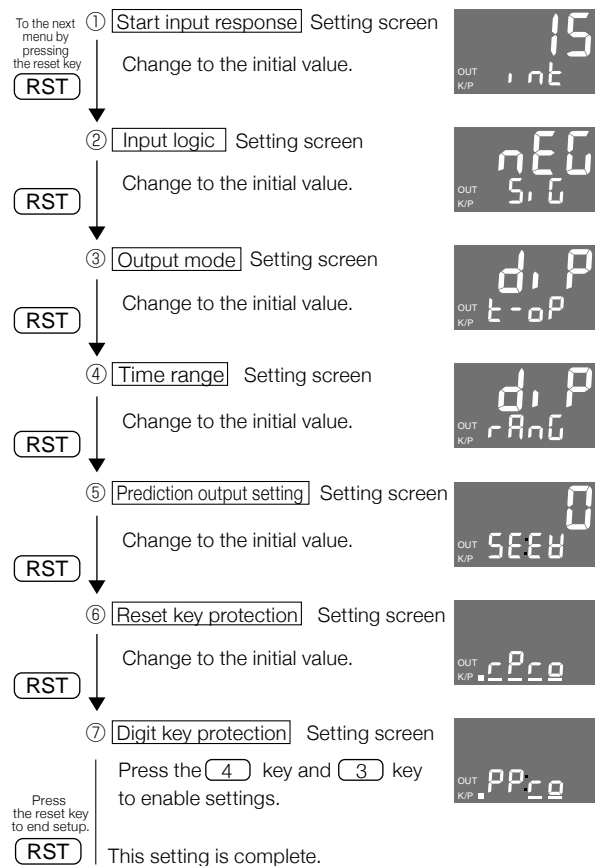
③ Select the key protection.



#### 2. Switching to the setup mode

Set DIP switch 8 in the ON position, and turn the power on.

#### 3. Change the set contents



#### 5. Switching to the operation mode

When setup is completed in the setup mode, turn the power off, set DIP switch 8 in the OFF position (to the operation mode) and turn ON the power.

#### 6. Start the operation mode

When the setting is changed in the setup mode, be sure to press the [RST] key after turning the power ON to reset the timing value.



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# KT-V Series

## Error Code Display/Option

PLC HMI SENSOR ENCODER **COUNTER** INFORMATION 

Electronic Counter

Tachometer

**Digital Timer**

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### Common Errors

Error Code	Error Name	Error details	Corrective Action
E21	Memory data error	Preset value / Set value and the contents of the setup mode changed.	Press the [RST] key and delete the error indication. The measured value and the timing value become "0", the preset value and the set value become "5000", and the contents of the setup mode revert back to the preshipment defaults.

### Option

Option	Model Number	Contents	Price
Rubber Gasket	KC-48P	If installed between the installation panel and KT-V, it prevents the intrusion of water into the control panel.	Open
Front Cover	KC-48C	If installed to the front panel, it protects the counter from exposure to dirt, etc. Material: Soft silicon rubber Key operation is enabled with the front cover installed.	Open

# KT-V Series

## Precautions

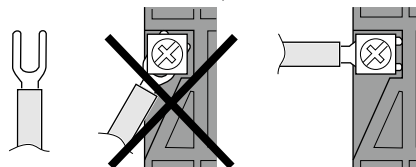
### Precautions in Use

- (1) The power source 0 V terminal ⑫ and the input common 0 V terminal ⑤ of the DC type are internally short-circuited.
- (5) Rather than gradually increasing the supply voltage, apply the rated voltage at once using a switch or relay.
- (3) When using the 2-wire DC system proximity sensor, set the input logic to negative logic.
- (4) If the preset value / set value is changed during measurement / timing, the changed value becomes effective approx. 1 second after key input.
- (5) Enter the set contents of the DIP switches and the setup mode in the data sheet attached to the main body and keep it for maintenance.
- (6) Do not use the counter in the following environments.
  - Any place where the ambient temperature exceeds 50°C or falls to -10°C or lower.
  - Any place where the ambient humidity exceeds 85% or condensation occurs due to rapid temperature change.
  - Any place that is exposed to dust, iron powder, and corrosive gas.
  - Any place that is exposed to sunlight.
  - Any place where there are large vibrations or shocks.
- (7) When performing a dielectric voltage test or insulation resistance test, separate the main body from the control circuit.
- (8) When the power is shut down, the internal EEPROM is written. Since the number of writing cycles in the EEPROM is not more than 100,000, do not use the tachometer by highly frequent power source operations.

### Cautions in Wiring

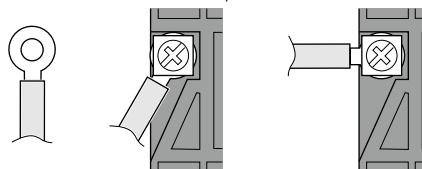
- Wire cables separately from power lines.
- When using the counter in a place where a lot of noise is generated, separate the main body of the KT-V and the wiring from the noise sources as far as possible.
- Do not use an unused terminal as a relay terminal.
- It is recommended to use a crimp terminal for connections.
- When wiring the cable to the terminals ① and ⑦, if the crimp terminal has a fork shape, do not attach it diagonally. For diagonal attachment, use a round crimp terminal.

In the Case of a Forked Crimp Terminal



If the crimp terminal is diagonally attached, the contact with the terminal becomes insufficient. Therefore, attach the crimp terminal horizontally from the side as shown in the figure above.

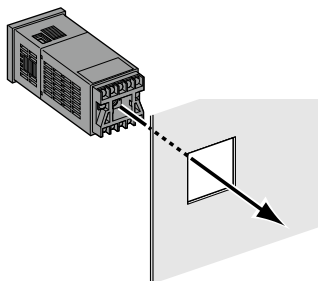
In the Case of a Round Crimp Terminal



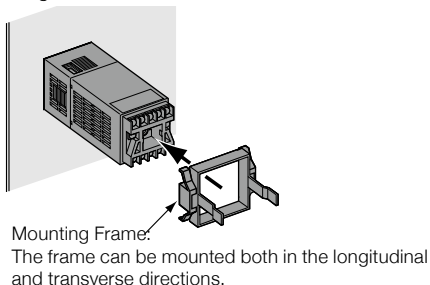
### How to Mount and Remove the Main Body

#### How to Mount the Main Body

- ① Insert the main body into the attachment bore of the panel.

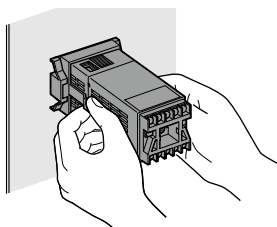


- ② Attach the mounting frame from the backside.



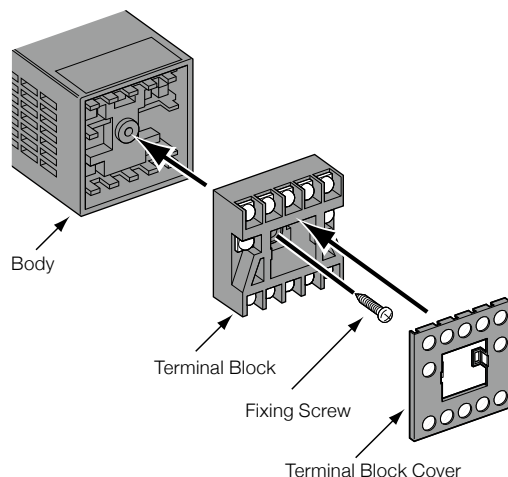
#### How to Remove the Main Body

- ① Pinch the levers to spread them 2 to 3 mm outwards.
- ② Pull out the frame while the levers are spread.



#### How to Mount the Terminal Block and the Terminal Block Cover

- As the screw for anchoring the terminal block, only use the anchoring screw used in shipping.
- Make sure that the allowable tightening torque is 0.3 Nm.
- Mount the terminal block cover after the wiring is completed.



KT-V

# KT-V Series

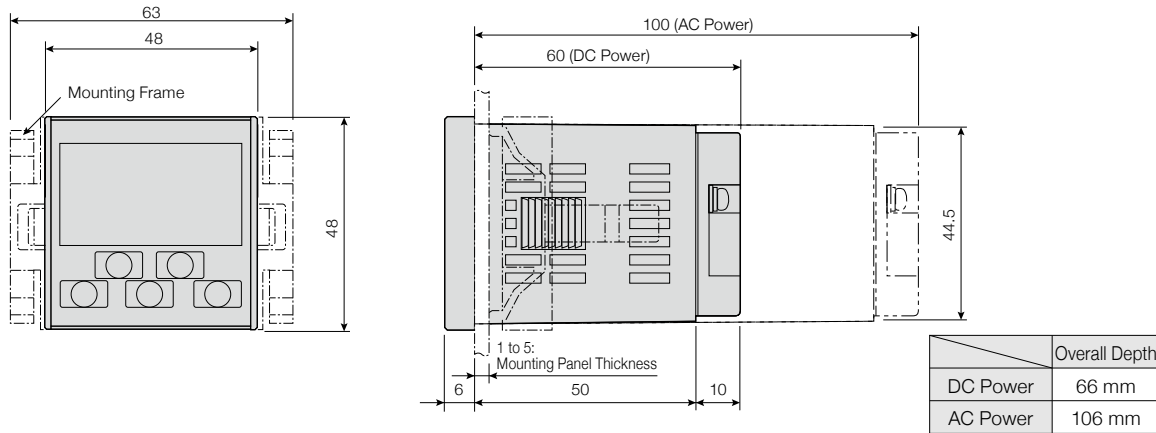
## Dimensions

- PLC
- HMI
- SENSOR
- ENCODER
- COUNTER
- INFORMATION

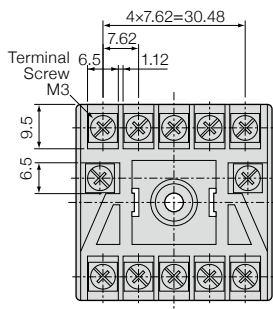
- Electronic Counter
- Tachometer
- Digital Timer
- Programmable Cam

### Dimensions (Unit: mm)

#### Main Body of the KT-V

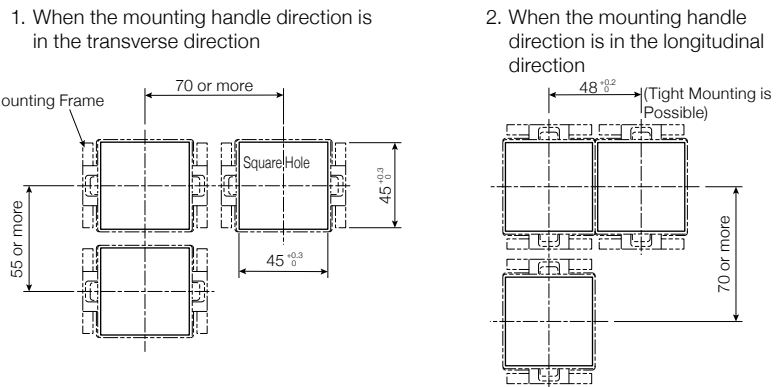


#### Terminal Block Detail Drawing



Conforming cable size : 0.25 to 1.65 mm<sup>2</sup>  
 Conforming crimp terminal : R1.25-3  
 Allowable tightening torque: 0.5 Nm

#### Panel-cut Dimensions for Embedded Installation



KT-V