

KT-V4S-D KT-V4S-C-D

Operation Manual

Thank you for purchasing **Koyo KT-V** series timer.
Please read this operation manual carefully before installing or operating the counter.
We recommend to keep this manual in appropriate place for your future use. We also recommend to include this manual in the package when you re-sell or export after installing on any machine or equipment.

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KOYO ELECTRONICS INDUSTRIES CO.,LTD.

■ Safety Consideration

To minimize the risk of potential safety problem, read this section carefully before installing or operating this counter. Equipment damage or serious injury to personnel can result from failure to read or follow "WARNINGS" and "CAUTIONS" in this section.

WARNING Failure to follow instruction under this "WARNING" mark may result in serious injury to personnel or severe damage to equipment.

CAUTION Failure to follow instruction under this "CAUTION" mark may result in injury to personnel or damage to equipment.

Indication legend This symbol indicates a general prohibition.
 This symbol indicates an enforcement or an instruction.

[Use Environment and Conditions]

⚠ WARNINGS

- Do not use counters in inflammable or explosive atmospheres. This can cause injuries or fire.
- Do not use this product for applications involving human safety. Use is specified for application where a possible failure or erroneous operation will not cause immediate danger to humans.

⚠ CAUTIONS

- Please use and store the product in the range of the environment (vibrations, impacts, temperature, moisture, etc.) specified in the specifications. Otherwise, fire or damage to the product may be caused.
- Please understand the product before using it.

[Installation and Wiring]

⚠ WARNINGS

- Use the product only with the power supply voltage listed in the specifications. Otherwise, fire, electric shock, or accidents may be caused.
- Avoid incorrect wiring, as this can cause fire or accidents.

⚠ CAUTIONS

- Execute wiring and installation as specified in the specifications. Otherwise, fire or accidents may be caused.
- Execute wiring according to a method which prevents stress onto the wiring. Otherwise, fire or accidents may be caused.
- Execute wiring with the power supply switched off. Otherwise, electric shock or accidents may be caused.
- Use only the specified screws to fix the terminal block. Otherwise, fire or accidents may be caused.

[Use Method]

⚠ WARNINGS

- Do not touch the terminals while they are energized. This may cause electric shock or accidents because of erroneous operation.
- Do not place the product close to inflammable matter. This may cause fire.
- Use the product only according to the methods specified in the specifications. Otherwise, injuries or accidents may be caused.
- Do not insert screwdrivers or other metal objects into ventilation holes. This may cause electric shock or accidents.
- Set value change during operation can cause severe accidents by switching the output to ON at a not intended set value because of a mistake in the operation procedure. Operation shall be executed by an authorized person within the scope where the safety of humans and equipment is assured.

⚠ CAUTIONS

- Do not insert foreign objects into the openings of the product. This can cause electric shock or accidents.
- Do not block the ventilation openings. This will lead to rising temperatures in the body and can cause fire or accidents.

[Maintenance]

⚠ CAUTIONS

- Do not try to disassemble or repair the product. This can cause fire, electric shock, or accidents.
- Execute maintenance and inspections with the power supply switched off. Electric shock is to be feared when the work is executed with the power supply switched on.

[Discarding]

⚠ WARNINGS

- When discarding the product, please treat it as industrial waste. Bursting is to be feared, and fire or bodily injury may be caused.

■ CE Marking

This product conforms to both the Low Voltage and EMC Directives under conditions described below.



(1) Low Voltage Directives

Applicable standard — EN61010-1

It requires an appropriate basic insulation on the load which is connected the relay output, when switching voltage of the relay output is above 150V.

(2) EMC Directives

Applicable standard — EMI: EN55011
EMS: EN50082-2 *

* If the product is with DC power supply, it requires a EMI/EMC filter (MR-2021) installed on the power supply.

■ UL-Recognized

Note that the product with DC power supply is UL-Recognized only with class II power supply.

■ General specifications

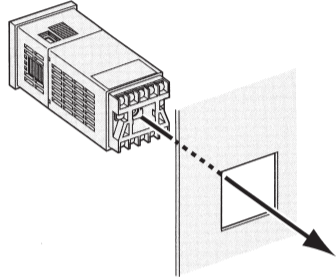
Item	Rating	
	AC power supply type	DC power supply type
Rated power supply voltage	AC100-240V	DC12-24V
Permissible power supply voltage fluctuation range	AC85-264V	DC10-26.4V
Power consumption	About 11 VA	About 4 W
Sensor power supply	DC24V (20-28V)60mA	—
	Ripple and noise: 10% p-p or less	
Memory in case of power failure	EEPROM Rewriting for 100,000 times or less Memory time: 10 years	
Ambient temperature	-10 to 50°C	
Storage temperature	-20 to 70°C (no ice formation)	
Ambient humidity	35 to 85% RH (no condensation)	
Withstand voltage	AC 2 kV for 1 minute (between AC input, 0 V, and relay contacts) (For DC power supply types only between 0 V and relay contacts)	
Vibration resistance	Durability	Displacement amplitude 0.5 mm, vibration frequency 10 to 55 Hz, in all three directions
	Erroneous operation	Displacement amplitude 0.35 mm, vibration frequency 10 to 55 Hz, in all three directions
Shock resistance	Durability	490 m/s (about 50 G) for 1 ms in all three directions
	Erroneous operation	98 m/s (about 10 G) for 1 ms in all three directions
Noise resistance	AC power supply: ±1.5 kV between the power supply terminals (pulse width: 1 μs, rise: 1 ns)	DC power supply: ±1.0 kV between the power supply terminals (pulse width: 1 μs, rise: 1 ns)
	Protection construction IP65 (only the front panel)	
Weight	173 g	124 g
	Applicable wire	0.25~1.65mm ²
Terminal block	Applicable crimp terminals	R1.25-3
	Permissible tightening torque	0.5Nm (5Kgfcm)

■ Performance specifications

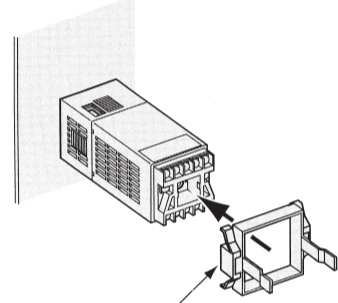
Item	Specifications
Type	ON-delay/OFF-delay/One-shot/Product/Flicker (with alarm output)
Number of digits	4 digits
Display device	Current value: Red LED High 12mm Preset value: Green LED High 7mm
Range of time	0.001s~9.999s
	0.01s ~99.99s
	0.1s ~999.9s
	1s ~9999s
	1s ~99min59s
	1min ~9999min
	1h ~9999h
	1min ~99h59min 0.1min~999.9min 0.1h ~999.9h
Display selection	The current time or The remaining time
Timer accuracy	0.013%±15ms (Apply greater value)
Input	Input logic: Negative logic (no voltage input)/Positive logic (voltage input)
	Input resistance: Positive logic 15kΩ Negative logic 3.3kΩ (AC power supply type) /1.8kΩ (DC power supply type)
	Input voltage: "L" 0 to 3V, "H" 7 to 30V
Response time of start input	15ms/5ms/1ms or less
External reset	Min. signal width 5ms
Output	DC output: NPN open collector output 24V, 100mA, withstand voltage 35V, residual voltage 1.5V or less
	Relay output: 1 transfer contact, AC 220V, 2A (resistance load)
Output time (Flicker)	Variable from 10 to 9990ms every 10ms
Key protection	Any desired key can be set
Installation method	Only embedded installation (terminal block connection)

■ Installing Counter

① Insert the timer into the panel mounting hole.

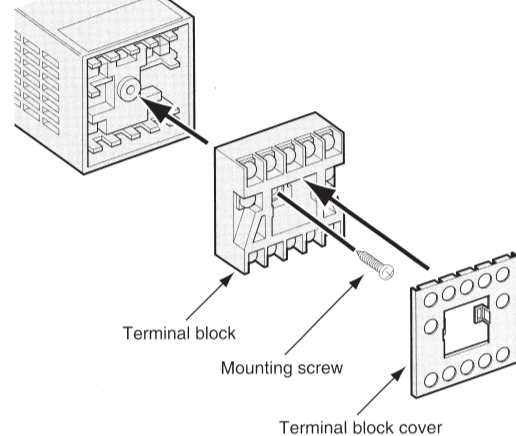


② Install the mounting frame from the rear.



Mounting frame: Installation is possible horizontally or vertically.

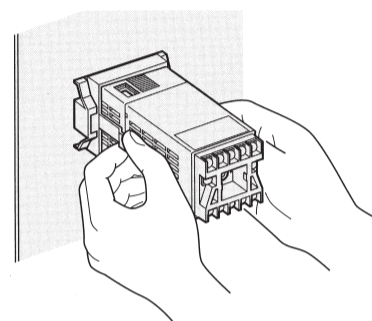
■ Mounting terminal block and terminal block cover



CAUTION Use only the enclosed screw to fix the terminal block. Observe the permissible tightening torque of 0.3 Nm (3 kgfcm) Otherwise, fire or accidents may be caused.

Install the terminal block cover after completion of wiring.

■ Removal of the timer



① Grab the levers and pull them outward by 2 or 3 mm.
② Hold the levers pulled and pull them towards you.

■ Panel description

① Output LED (red)

- Run mode
This lights when output is ON.
It flashes when alarm output is ON.

② Protection LED (red)

- Run mode
This flashes when it is in key protect mode. (only at the time of key ON)
- Setup mode
It indicates key protect configuration.

⑦ RST key

- Run mode
The current value is reset. (0 when displaying the current time, preset value when displaying the remaining time)
- Setup mode
Select what is setup.



③ Current value LED (red)

- Run mode
It indicates the current value.
- Setup mode
It indicates the setup configuration.

④ Set value LED (red)

- Run mode
It indicates the set value.
h : hour , m : minute , s : second

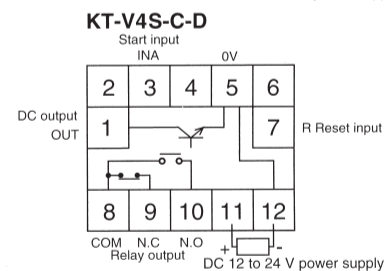
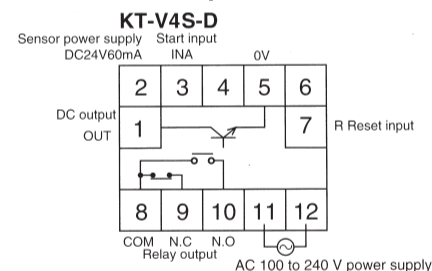
⑤ Preset value LED (green)

- Run mode
It indicates the preset value.
- Setup mode
It indicates what is setting up.

⑥ Digit keys

- Run mode
After changing the preset value, the preset value becomes effective after a condition of no key input has lasted for about one second.
- Setup mode
The setting contents are selected.

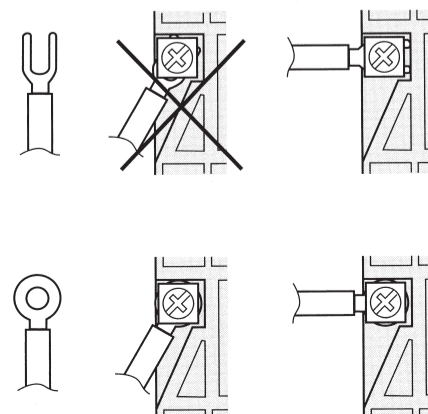
■ Terminal description



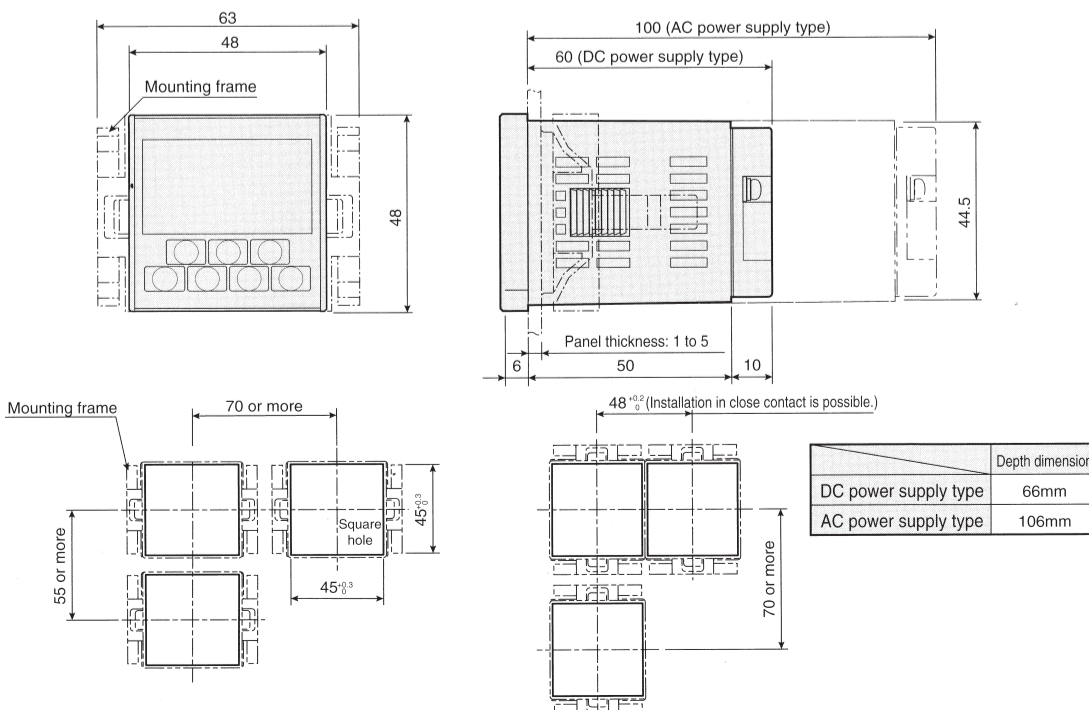
* Prediction output is used together with DC output (OUT terminal).

■ Caution for wiring

- Keep the wires away from power lines.
- Keep the **KT-V** timer away from the place where there is heavy noise.
- Do not use unused terminal pins for any other purpose.
- Do not use a folk-shape clamp when installing the wire in diagonal position, use a round-shape clamp, as shown below.

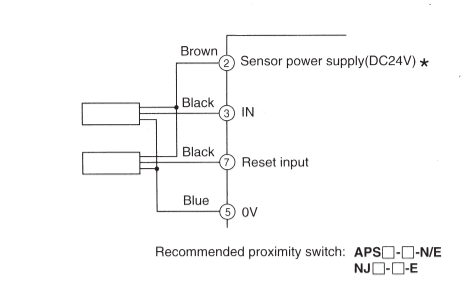


■ Dimensions (in mm)

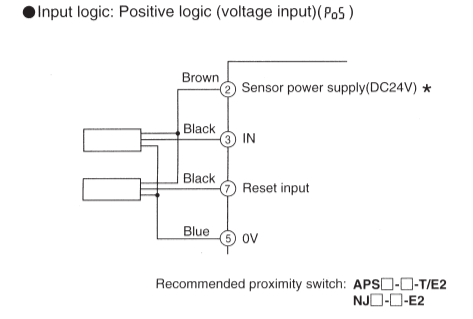


Input connection examples

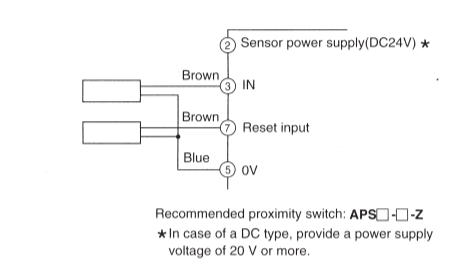
In case of an NPN open collector output type proximity switch



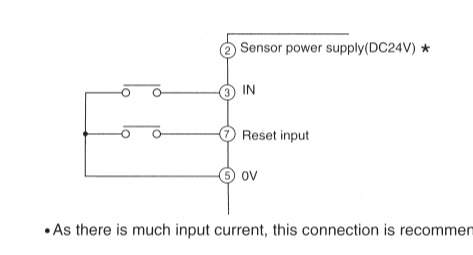
In case of a voltage output type or a PNP open collector output type proximity switch



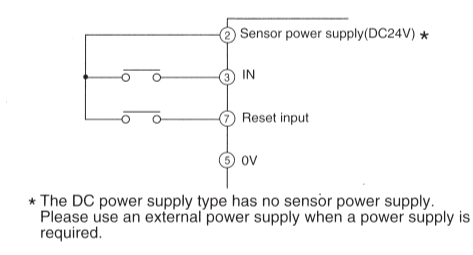
In case of a DC two-wire type proximity switch



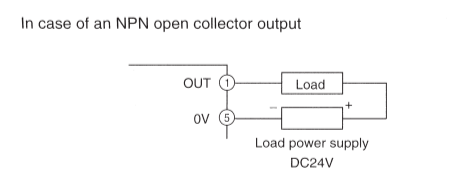
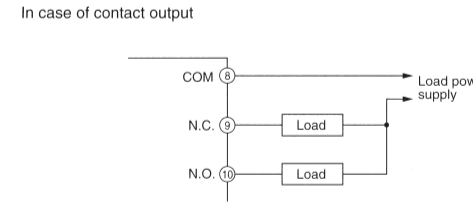
In case of a switch or relay



Input logic: Positive logic (voltage input)
Response time of start input : 15ms



Output connection examples



Key operation

1. Change of the Preset Value
Each time a digit key is pressed, the corresponding digit of the preset value is incremented by one.

0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9

The set value becomes effective about one second after each digit switch is released.

※ An example for digit sexagesimal

Example: When the present setting is "123"
When the key [1] is pressed: 124
When the key [2] is pressed: 134
When the key [3] is pressed: 234

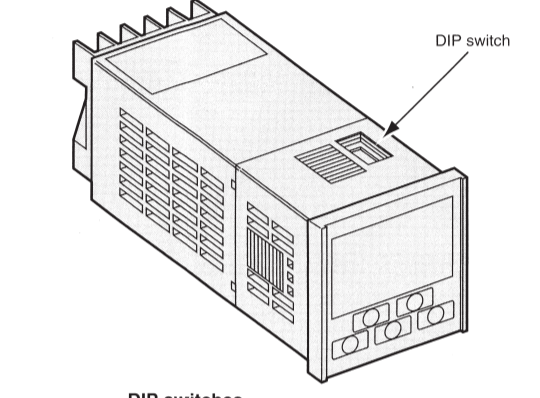
2. Current Value Resetting
The current value is reset by pressing the reset key (response time: 0.1s).

When the key [RST] is pressed while the current value is "10": "0" will be obtained displaying the current time.
The preset value will be obtained displaying the remaining time.

3. Key Protection
When the DIP switch 7 is set to ON, the reset key and the digit keys are prohibited. When a prohibited key is pressed, the LED corresponding to the key flashes. For key protection, select the key to be prohibited in setup mode and set the DIP switch 7 to ON. At the time of shipping, key protection in setup mode is prohibited for all keys, so that prohibition for all keys is possible just by setting the DIP switch 7 to ON.

DIP switch setting

- Setting is executed with the DIP switches on top of the timer.
 - Operate the DIP switches when the power is switched off.
 - Operation in energized condition is not effective.
- When a DIP switch has been changed, press the [RST] key in run mode to reset the current value.



DIP switches

ON ↑

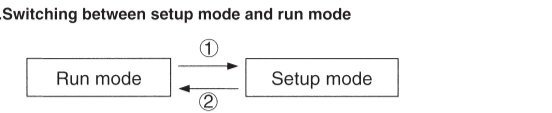
All switches are set to OFF at the time of shipping.

CAUTION: The DIP switches are very small. Operate them with the tip of a mechanical pencil or a small screwdriver and do not apply excessive force, as this can cause trouble.

Function	Position (○ : ON / ● : OFF)								Operation
	1	2	3	4	5	6	7	8	
Output mode selection	●	●	○	○	○	○	○	○	ON-delay
	●	○	○	○	○	○	○	○	OFF-delay
	○	●	○	○	○	○	○	○	One-shot
	○	○	○	○	○	○	○	○	Accumulation
Time range selection	○	○	○	○	○	○	○	○	□.□□□sec
	○	○	○	○	○	○	○	○	□□.□□sec
	○	○	○	○	○	○	○	○	□□□.□sec
	○	○	○	○	○	○	○	○	□□□□sec
	○	○	○	○	○	○	○	○	□□min□□sec
	○	○	○	○	○	○	○	○	□□□□min
	○	○	○	○	○	○	○	○	□□□□hour
	○	○	○	○	○	○	○	○	□□hour□□min
Display selection	○	○	○	○	○	○	○	○	the current time
Key protection	○	○	○	○	○	○	○	○	the remaining time
	○	○	○	○	○	○	○	○	Key protection
Operation mode selection	○	○	○	○	○	○	○	○	No key protection
	○	○	○	○	○	○	○	○	Setup mode
	○	○	○	○	○	○	○	○	Run mode

Setup mode

- Settings which can not be set by DIP switches are set in this setup mode.
- Setup mode setting items**
- Response time of start input — 1 / 5 / 15ms
 - Input logic — Positive logic, negative logic
 - Output mode — Flicker mode, DIP switches
 - Range of time — 00 min / 00 hour, DIP switches
 - Output time — Setting of the flicker mode output time as 10 to 9990 ms (in units of 10 ms)
 - Prediction output — An offset value is set in regard to the preset value.
 - Reset key protection — Reset key prohibition is set.
 - Digit key protection — Prohibition of any digit key can be set.



- Setup mode is reached when the power is switched on with DIP switch 8 set to ON.
 - Run mode is reached when the power is switched on with DIP switch 8 set to OFF.
- 2. Setup mode operation**
Execute initial setting by the menu method as shown in the following table. An asterisk (*) indicates the factory default.

Setting for response time of start input (rnt)

Digit keys: Current value indication section
[1]: Selection of 1 ms response
[2]: Selection of 5 ms response
[3]: Selection of 15 ms response *

Input logic settings (s, l)

Digit keys: Current value indication section
[1]: P05 Selection of positive logic
[2]: nE0 Selection of negative logic *

Output mode setting (l - oP)

Digit keys: Current value indication section
[1]: F Selection of Flicker mode
[2]: d, P Selection with DIP switch *

Time range selection (r - RnG)

Digit keys: Current value indication section
[1]: 0000 Select 0.0 min.
[2]: 0000 Select 0.0 hour.
[3]: d, P Selection with DIP switch *

***Output time setting (out t)**

Digit keys: Current value indication section
[4][3][2][1] Variable from 10 to 9990 ms

Alarm output setting (SEtB)

Current value indication section: 0000
Digit keys: [4][3][2][1]

Reset key protection setting (rPr o)

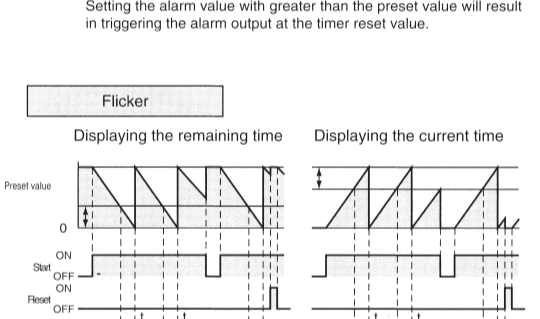
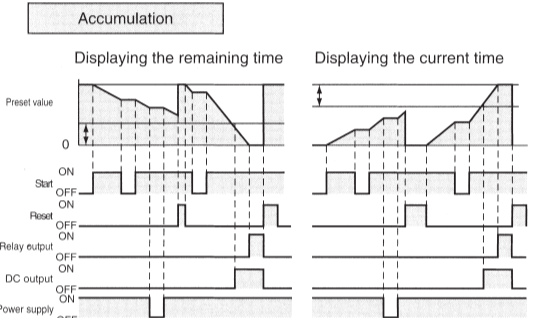
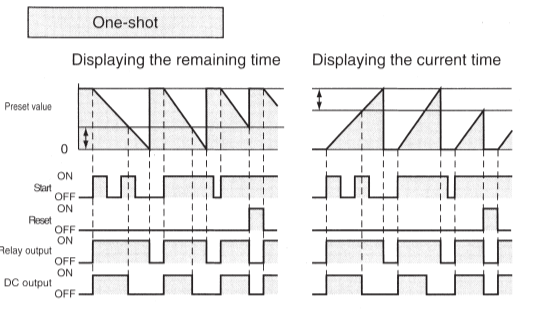
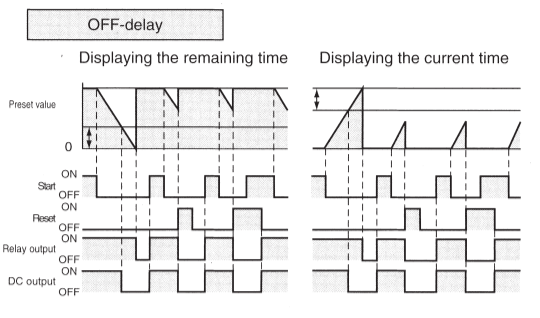
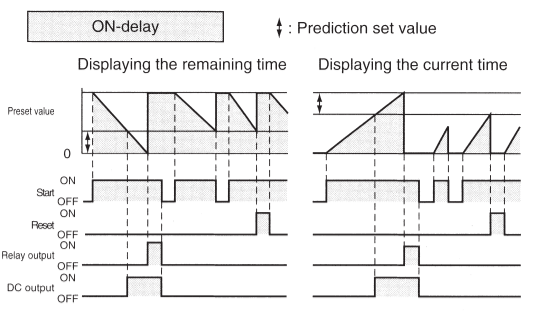
Digit keys: K/P indication section
[1]: Disabled when lit (*Disabled)
[2]: Enabled when not lit (Enabled)

Digit key protection setting (PPr o)

Digit keys: K/P indication section
[1]: Disabled when lit (*Disabled)/(Enabled)
[2]: Enabled when not lit (*Disabled)/(Enabled)
[3]: Disabled when lit (*Disabled)/(Enabled)
[4]: Enabled when not lit (*Disabled)/(Enabled)

- It skips setting items with * mark except flicker mode.
- When the initial setting is changed in setup mode, the current value must be reset in run mode by pressing the [RST] key.
- The setting contents become effective when the [RST] key is pressed to go to the next menu.

Timer output mode



Error indication

E21 Memory data error

Cancellation method : Press the RST (reset) key to delete the error indication.
The count value will become "0", the set value will become "5000", and the setup mode contents will become the shipping defaults.
Use after input of the set values requiring change.

Caution items

- The 0 V terminal (2) of the DC type power supply and the input common 0 V terminal (5) are short-circuited inside the timer.
- Do not increase the power supply voltage gradually, but use a switch, a relay, etc. to impress the entire rated voltage at once.
- When a DC 2-wire type proximity switch is used, set the input logic to negative logic for use.
- When the current value is changed during counting, the change becomes effective about one second after key input.
- Enter the setting contents for the DIP switches and the setup mode into the enclosed recording chart for maintenance and keep this chart at a secure place.
- Avoid use in the following environments.
 - Locations with an ambient temperature above 50°C or below -10°C.
 - Locations with an ambient humidity over 85% or where condensation can be caused by rapid temperature changes.
 - Locations with dust, iron powder, corrosive gas, etc.
 - Locations exposed to direct sunlight.
 - Locations with strong vibrations or shocks.
- For testing of insulation withstand voltage, insulation resistance, etc., first separate the KT-V from the control circuits.
- It saves the data in EEPROM when the power is shut down. The EEPROM can only be written for less than 100,000 times.

Use these tables to keep your settings in record.

DIP switch settings (mark selected items by "○")

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

Setup mode (mark selected items by "○")

Item	Setting
Response time of start input	1 5 15
Input logic	P05 nE0
Output mode	d, P F
Output time	
Range of time	
Reset key protection	Disabled Enabled
Digit key protection	1 2 3 4 (Mark disabled with "○")