

○ ON time

The period of time during a required voltage is being applied to the timer or Start Signal.

○ OFF time

The period of time between the moment that resetting begins and the moment that the operating voltage is applied to the operating circuit. Therefore, the OFF time of the timer is larger than the resetting time.

○ Operating time

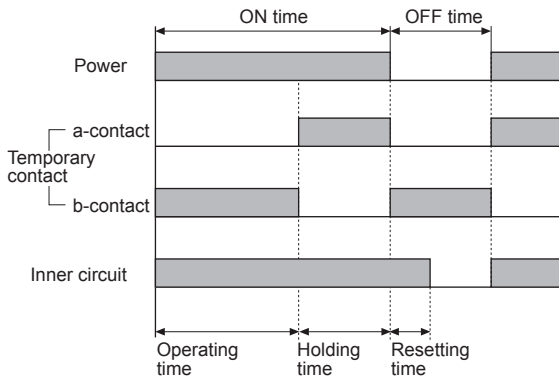
The period of time from ON time to the time convert b-contact to a-contact.

○ Holding time

The period of time from temporary b-contact acts to return.

○ Resetting time

The period of time after the power is cut until the return of the timer to its initial state.



(Figure a) Time temporary work chart

Resetting time is indicated on the specification of each series. When the timer is operated less than indicated OFF time, the timer running time will be short or will not work. Therefore, OFF time should be longer than resetting time.

○ Self-reset

Turn off the power to reset. Called Power Reset.

○ Electrical reset

To reset timer by applying a required voltage to the reset circuit.

○ Manual reset

To mechanically reset the timer by manual operation.

○ Timer error

Hour timer is represented by 5 articles, imbalance of operating time, set error, power of properties, effect of ambient temperature, and characterizes of OFF time. But, sometimes almost unaffected items are not listed in the individual specifications.

● Repeat error

Error occurs when after set at random times, repeat an action under the same conditions. Repeat error is calculated by following formula, and the number of calculation should be more than 5 times.

$$\text{Repeat error} = \pm \frac{1}{2} \times \frac{T_{\max} - T_{\min}}{TMs} \times 100 (\%)$$

- Tmax: Maximum value of operating times measured at the same time
- Tmin: Minimum value of operating times measured at the same time
- TMs: Maximum scale time
(TMs is a set value in the case of a digital timer)

● Setting error

Difference between the actual operation time and scale time.

Measurement position can be any position as long as it is set to 1/5 min. of the maximum scale time.

$$\text{Setting error} = \pm \frac{TM - TS}{TMs} \times 100 (\%)$$

- TM: Average value of measured times (min. 5 times)
- TS: Set time (any scale time)
- TMs: Maximum scale time
(TMs is a set value in the case of the digital timer)

● Influence of voltage

Fluctuation range about operating time when the current of operating power is fluctuating within allowable current fluctuation range.

$$\text{Influence of voltage} = \pm \frac{TM \times 1 - TM1}{TMs} \times 100 (\%)$$

- TMx1: The average current time when the TM1 deviation is maximum within allowable voltage fluctuation range.
- TM1: Average value of operating times at rated voltage.
- TMs: Maximum setting time
(TMs is a set value in the case of the digital timer.)

● OFF time characteristics

A change in operating time when the operating time is a given OFF time are changed.

$$\text{OFF time characteristics} = \pm \frac{TM \times 3 - TM3}{TMs} \times 100 (\%)$$

- TMx3: Average value of operating times measured with an OFF time that causes the maximum deviation from TMx3 within the specified OFF time range of 1 hour from the specified setting time.
- TM3: Average value of operating times measured with 1 second OFF time
- TMs: Maximum setting time
(TMs is a set value in the case of the digital timer.)

OFF time characteristics are determined by the charging and discharging of a capacitor and resistor used in combination as an electronic timer. The characteristics vary by ±1.5 to ±5%.

(A)	Photoelectric Sensors
(B)	Fiber Optic Sensors
(C)	Door/Area Sensors
(D)	Proximity Sensors
(E)	Pressure Sensors
(F)	Rotary Encoders
(G)	Connectors/ Sockets
(H)	Temperature Controllers
(I)	SSRs / Power Controllers
(J)	Counters
(K)	Timers
(L)	Panel Meters
(M)	Tacho / Speed / Pulse Meters
(N)	Display Units
(O)	Sensor Controllers
(P)	Switching Mode Power Supplies
(Q)	Stepper Motors & Drivers & Controllers
(R)	Graphic/ Logic Panels
(S)	Field Network Devices
(T)	Software

Technical Description

● Influence of temperature

It converts and displays the effect that the change of temperature affects to the operating time in the range of the ambient temperature to the change of operating time.

$$\text{Influence of temperature} = \pm \frac{\text{TMx2}-\text{TM2}}{\text{TMs}} \times 100 (\%)$$

TMx2: Average value of operating time measured at a temperature which causes the maximum deviation from TM2 within the ambient temperature range.

TM2: Average value of operating times measured at 20°C.

TMs: Maximum setting time (TMs is a set value in the case of the digital timer.)

◎ Contact organization

● SPST (Single Pole Single Throw)

Organized one COM and one a-contact or b-contact. Indicates as SPST (1a) or SPST (1b).

● SPDT (Single Pole Double Throw)

Organized one COM and one a-contact and one b-contact. Indicates as SPDT (1a1b) or SPDT (1c).

● DPST (Double Pole Single Throw)

Organized two COMs and two a-contact or b-contact. Indicates as DPST (2a) or DPST (2b).

● DPDT (Double Pole Double Throw)

Organized two COMs and two a-contact and two b-contact. Indicates as DPDT (2a2b) or DPDT (2c).

SPST (1a) (Single Pole Single Throw)	
SPST (1b) (Single Pole Single Throw)	
SPDT (1a1b) or SPDT (1c) (Single Pole Double Throw)	
DPST (2a) (Double Pole Single Throw)	
DPST (2b) (Double Pole Single Throw)	
DPDT (2a2b) or DPDT (2c) (Double Pole Double Throw)	

◎ Symbols at internal connection diagram

Title	Symbol	Description
a-contact		Normally open contact when no relay input is applied
b-contact		Normally closed contact when no relay input is applied
c-contact		a-contact and b-contact are contacted at one line. b-contact is located right hand side or up side.
Time-limit operation		Instantaneous returning contact = ① is a-contact, ② is b-contact
Manually operation		Automatic returning contact = display push button switch control contact, ① is a-contact, ② is b-contact
Relay		Electromagnetic relay
LED		Used to indicate the operating state of the timer.