

PMH Timers

Timers/Time Switches/Counters/Hour Meters



UL File No.: E59504 CSA File No.: LR39291



Features

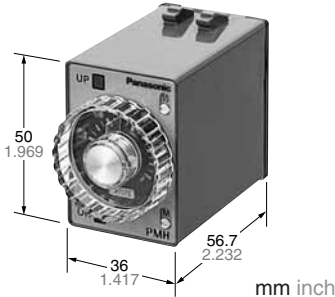
1. Various time range 4 ranges in each type

Type	Button position			
10min type	1S	10S	1M	10M
30min type	3S	30S	3M	30M
10h type	1M	10M	1H	10H
30h type	3M	30M	3H	30H

2. 2 output types available PMH type: Relay Timed-out 2 Form C

3. Indicator LED is provided for operation

4. UL/CSA recognized type available for PMH timers



RoHS Directive compatibility information
<http://www.nais-e.com/>

Specifications

Type	PMH Timers	
	AC operating type	DC operating type
Rated operating voltage	100 to 120V, 200 to 240V	12V, 24V
Rated frequency	50/60Hz common	—
Rated power consumption	Max. 3VA	Max. 2W
Rated control capacity	7A 250V AC (resistive load)	
Time accuracy (max.)	Operating time fluctuation & Power off time change error	
	[Except 1s range] : ±0.5%	
	[1s range] : ±(0.5%+10ms)	
	(power off time change at the range of 0.1 s to 1h)	
Time accuracy (max.)	Temperature error	
	±5%	
	Voltage error	
	[Except 1s range] : ±0.5%	
[1s range] : ±(0.5%+10ms)		
Setting error		±10% (Full-scale value)
Output arrangement		
Timed-out 2 Form C		
Contact resistance (Initial value)		
Max. 50mΩ (By voltage drop 6V DC 1A)		
Expected life (min. operations)	Mechanical (contact)	
	5 × 10 ⁷	
Expected life (min. operations)	Electrical (contact)	
	2 × 10 ⁵ (at rated control capacity)	
Allowable operating voltage range		
80 to 110% of rated operating voltage		
Insulation resistance (Initial value)		
Min. 100MΩ		
Between input and output		
Between contact sets (At 500V DC)		
Between contacts		
Breakdown voltage (Initial value)		
2000Vrms for 1min Between input and output		
2000Vrms for 1min Between contact sets		
1000Vrms for 1min Between contact		
Min. power off time		
100ms		
Vibration resistance	Functional	
	10 to 55Hz: 1 cycle/min double amplitude of 0.5mm (10min on 3 axes)	
Vibration resistance	Destructive	
	10 to 55Hz: 1 cycle/min double amplitude of 0.75mm (1h on 3 axes)	
Shock resistance	Functional	
	Min. 98m/s ² (4 times on 3 axes)	
Shock resistance	Destructive	
	Min. 980m/s ² (5 times on 3 axes)	
Max. temperature rise		
55°C 131°F		
Ambient temperature		
-10 to 50°C +14 to 122°F		
Ambient humidity		
Max. 85% RH (non-condensing)		
Power supply ripple		Full-wave rectified (Approx. 48%)

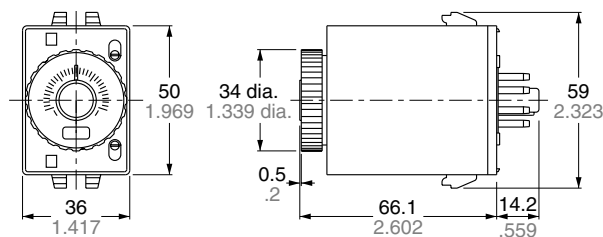
Product types

ORDERING INFORMATION

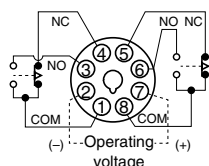
Ex. **PMH** — **10M** — **AC120V**

Timer type	Time range					Rated operating voltage
	PMH Timer	10M	0.05 to 1s	0.5 to 10s	0.05 to 1min	
30M		0.15 to 3s	1.5 to 30s	0.15 to 3min	1.5 to 30min	
10H		0.05 to 1min	0.5 to 10min	0.05 to 1h	0.5 to 10h	
30H		0.15 to 3min	1.5 to 30min	0.15 to 3h	1.5 to 30h	

Dimensions



Terminal layouts and Wiring diagrams

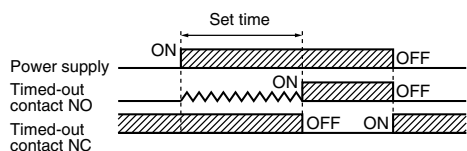


▲▲▲ : Timed cut contact
 ○○ : Instantaneous contact
 Note: For the DC type, the No. 2 terminal becomes (-).

Operation

T: Set time

Power ON-delay

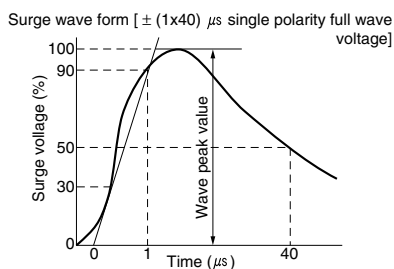


Notes : • Set time should be greater than min. operation time.

- Once power is cut off or the timing operation is completed, min. power off time of 0.1s is needed to start the operation again.
- Do not change the set time during operation. When changing set time, cut off power and set the time.

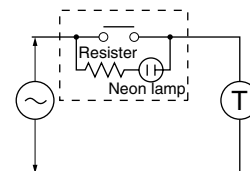
Cautions

1. Prevent using the timer in such places where flammable or corrosive gas is generated, a lot of dust exists, oil is splashed or considerable shock and vibration occur.
2. Since the main body cover is made of polycarbonate resin, prevent contact with organic solvents such as methyl alcohol, benzene and thinner, or strong alkali materials such as ammonia and caustic soda. In order to maintain the characteristics of the timer, do not remove the case. Install in accordance with the intended use. Furthermore, do not loosen the 4 screws in the base section.
3. External surge protection may be required if the following values are exceeded. Otherwise, the internal circuit will be damaged.










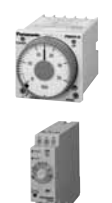
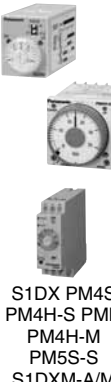
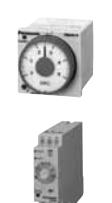

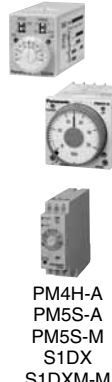
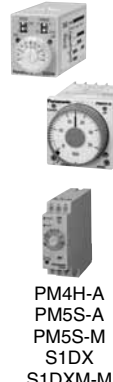








Operating voltage	Surge voltage
100 to 120V AC	4,000V
200 to 240V AC or 200 to 220V AC	4,000V
12V DC	500V
24V DC	500V

4. Do not attempt to turn the setting knob beyond the stops.
5. When a contact switch having an operation indicating lamp (lamp equipped limit switch, etc.) is used to apply power to the timer, a resistor having a value equal to or greater than the values given below should be connected in series with the lamp.
 AC 120V type: Max. 33kΩ
 AC 220V type: Max. 82kΩ



The following Limit Switches with lamps can be used:
 VL with lamps, Vertical type with lamp, ML with lamp







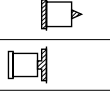
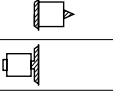
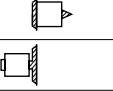
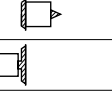
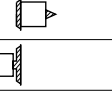
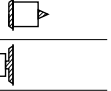
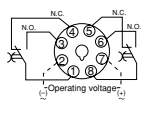
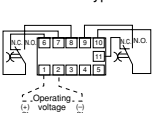
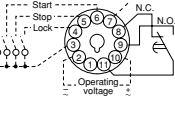
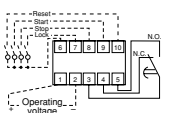
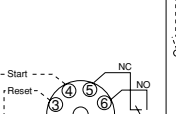
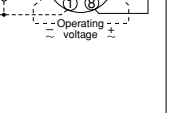
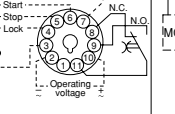
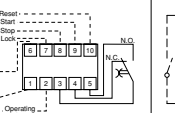
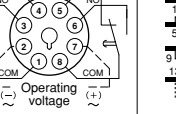
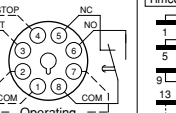
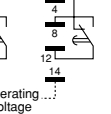
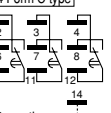
TIMERS CHART

		Multiple operation	ON-delay	OFF-delay	Twin	Flicker	One-shot	Star delta	One-cycle	Integration
Digital quartz timer	Surface mount/Flush mount	 LT4H LT4H-L LT4H-W	 LT4H LT4H-L QM4H	 LT4H (Signal) LT4H-L	 LT4H-W	 LT4H LT4H-L	 LT4H LT4H-L			 LT4H LT4H-L
	Multi-range analog timer (CR oscillation)	 PM4H-A PM5S-A	 S1DX PM4S PM4H-S PMH PM4H-M PM5S-S S1DXM-A/M	 PM4H-A (Signal) PM4H-F PM5S-A (Signal) PM5S-M (Signal)	 PM4H-W	 PM4H-A PM5S-A PM5S-M S1DX S1DXM-M	 PM4H-A PM5S-A PM5S-M S1DX S1DXM-M	 PM4H-SD/SDM	 S1DX	
Multi-range analog timer (CR oscillation)	Relay terminal socket		 S1DX S1DXM-A/M			 S1DX S1DXM-M	 S1DX S1DXM-M			 S1DX
	PC board mount		 S1DX							
Motor drive timer	Surface mount/Flush mount		 MHP MHP-M							

TIMERS SELECTOR CHART

Operation mode		Power ON-delay	Pulse ON-delay Pulse Flicker Pulse ON-Flicker Differential ON/OFF-delay (1)(2) Signal OFF-delay Pulse One-shot Pulse One-cycle	Power ON-delay	Power ON-delay Power Flicker Power ON-flicker Power One-shot Power One-cycle (with instantaneous contact)	Star-Delta	Power OFF-delay
Major uses		For time control for short or long time	For time control for short or long time	For time control for short or long time	For self holding circuit	For SD motor start-up	For all uses of power OFF-delay
Time range		<p>Each model has various time ranges. See the product lists before ordering.</p>					
Model/Product Name		PM4S Multi-range analog timer	PM4H-A Multi-range analog timer	PM4H-S Multi-range analog timer	PM4H-M Multi-range analog timer	PM4H-SD/SDM Star-Delta timer	PM4H-F8/-F8R/-F11R OFF-delay timer
Features		An affordable new series timers	16 time ranges are selectable. 1s to 500h (Max. range) is controlled. 8 operation modes available.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit. 5 operation modes (with instantaneous contact) available.	4 time ranges are selectable. 2s to 100s (Max. range) is controlled in one unit. 5 time ranges selectable for the Δ - Δ switching times.	Multiple time ranges are selectable. Power-OFF delay of max. 10 min. is controlled.
Control output (resistive)	Current	7A 5A 3A	5A	5A	5A	5A	3A
	Voltage	250 V AC	250 V AC	250 V AC	250 V AC	250 V AC	250 V AC
Mounting method							
Mounting parts		Terminal block, cap	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame
Rated operating voltage		100 to 120 V AC, 200 to 240 V AC, 12 V DC 24 V DC	100 to 240 V AC, 48 to 125V DC, 24 V AC/DC, 12 V DC (other models)	100 to 240 V AC, 48 to 125V DC, 24 V AC/DC, 12 V DC (other models)	100 to 240 V AC, 48 to 125V DC, 24 V AC/DC, 12 V DC (other models)	100 to 240 V AC, 24 V AC (other models)	100 to 120 V AC, 200 to 240 V AC, 12 V DC, 24 V DC, 24 V AC (other models)
Arrangement		T.D: Timed-out 2 Form C INST: Timed-out 1 Form C, instantaneous 1 Form C Selected by front switch	Timed-out 2 Form C	Timed-out 2 Form C	Timed-out 1 Form C Instantaneous 1 Form C	Δ side: Timed-out 1 Form A Δ side: Timed-out 1 Form A Instantaneous: 1 Form A	Timed-out 2 Form C Timed-out 1 Form C [F8R type]
Time accuracy	Operation time fluctuation	$\pm 1\%$ (power off time charge at the range of 0.1s to 1h)	$\pm 0.3\%$	$\pm 0.3\%$	$\pm 0.3\%$	$\pm 0.3\%$	$\pm 0.3\%$
	Temperature error	$\pm 2\%$ (at 20°C ambient temp. at the range of -10 to +50°C)	$\pm 2\%$	$\pm 2\%$	$\pm 2\%$	$\pm 2\%$	$\pm 2\%$
	Voltage error	$\pm 1\%$ (at the operating voltage changes between 85 to 110%)	$\pm 0.5\%$	$\pm 0.5\%$	$\pm 0.5\%$	$\pm 0.5\%$	$\pm 0.5\%$
	Setting error	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$
Min. power off time		100 ms	100 ms	100 ms	100 ms	500 ms	—
Life (Min. operation)	Mechanical	10^7	2×10^7	2×10^7	2×10^7	2×10^7	10^7
	Electrical	10^5	10^5	10^5	10^5	10^5	10^5
Terminal layouts and wiring diagrams		<p>Pin type</p> <p>Screw terminal type</p> <p>T.D: Timed-out 2 Form C INST: Timed-out 1 Form C, instantaneous 1 Form C * Selected by front switch</p>	<p>Pin type</p> <p>Screw terminal type</p>	<p>Pin type</p> <p>Screw terminal type</p>	<p>Pin type</p> <p>Screw terminal type</p>	<p>Pin type No instantaneous contact</p> <p>Pin type With instantaneous contact</p>	<p>Pin type</p> <p>Screw terminal type</p>
Available standards		UL/c-UL, CE	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD
Page		P. 13	P. 17	P. 17	P. 17	P. 23	P. 25

TIMERS SELECTOR CHART

Operation mode		Power OFF-start cyclic	Power ON delay (1) Power ON delay (2) Signal ON delay Signal OFF delay Pulse One-shot Pulse ON-delay Signal Flicker Totalizing ON-delay	Power ON delay (1) Power ON delay (2) Signal ON delay Signal OFF delay Pulse One-shot Pulse ON-delay Signal Flicker Totalizing ON-delay	ON-start flicker OFF-start flicker Delay one-shot	Power ON-delay	Power ON-delay Power flicker Power One-shot
Major uses		CR oscillation counting timer For repetitive ON/OFF operation	Quartz oscillation counting timer Suitable for super-high accurate, digital setting				CR oscillation counting timer For highly accurate time setting
Time range		1000h 100h 30h 10h 1h 30m 10m 5m 2m 1m 30s 10s 5s 1s 0.1s 0.01s	999.9h 8 time ranges selectable	999.9h 8 time ranges selectable	9999h 8 time ranges selectable	9990h	10min 30min 60min 10h 3s
Model/Product Name		 PM4H-W Analog multi-range cyclic twin timer	 LT4H Digital timer	 LT4H-L Digital timer	 LT4H-W Digital timer	 QM4H Timer	 S1DXM-A/M Timer
Features		16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit.	Bright and easy-to-read display Simple operation Short body	Economically price. Display is a bright reflective-type LCD.	Bright and easy-to-read display Simple operation Wide time setting range	Possible to set and change the time with front digit switches easily during the power off. Furthermore single unit has a time range of 0.01s to 9990hrs!!	With a large transparent dial. This timer can be attached both on the DIN rails and panel.
Control output (resistive)	Current	7A 5A 3A	(Relay output type) 5A (Transistor output type) 100mA	(Relay output type) 5A (Transistor output type) 100mA	(Relay output type) 5A (Transistor output type) 100mA	5A	7A 2 Form C type 5A 4 Form C type
	Voltage	250 V AC	250 V AC 30 V DC	250 V AC 30 V DC	250 V AC 30 V DC	250 V AC 30 V DC	250 V AC
Mounting method							
Mounting parts		Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap block, mounting frame, fitting sockets, protective cover
Rated operating voltage		100 to 240 V AC, 48 to 125V DC, 24 V AC/DC, 12 V DC (other models)	100 to 240 V AC 24 V AC 12 to 24 V DC (other models)	100 to 240 V AC 24 V AC 12 to 24 V DC (other models)	100 to 240 V AC 24 V AC 12 to 24 V DC (other models)	100 to 240 V AC/DC 12 to 48 V AC/DC (other models)	100 to 120 V AC, 200 to 220 V AC, 12 V DC, 24 V DC (other models)
Arrangement		Timed-out 2 Form C	(Relay output type) Timed-out 1 Form C (Transistor output type) Timed-out 1 Form A	(Relay output type) Timed-out 1 Form C (Transistor output type) Timed-out 1 Form A	(Relay output type) Timed-out 1 Form C (Transistor output type) Timed-out 1 Form A	T.D. mode: Time delay 2C INST. mode: Time delay 1C and instantaneous 1C (Use MODE switch on front)	Timed-out 2 Form C Timed-out 4 Form C
Time accuracy	Operation time fluctuation	±0.3%	±(0.005% + 50 ms) in case of power on start ±(0.005% + 20 ms) in case of reset or input signal start	±(0.005% + 50 ms) in case of power on start ±(0.005% + 20 ms) in case of reset or input signal start	±(0.005% + 80 ms) in case of power on start ±(0.005% + 20 ms) in case of reset or input signal start	±(0.01% + 0.05 s) in case of power on start ±0.005% ±0.03 s (G type only)	±1% ±5% ±1% ±10%
	Temperature error	±2%					
	Voltage error	±0.5%					
	Setting error	±5%					
Min. power off time		300 ms	500 ms	500 ms	500 ms	100 ms	100 ms
Life (Min. operation)	Mechanical	2 × 10 ⁷	2 × 10 ⁷	2 × 10 ⁷	2 × 10 ⁷	2 × 10 ⁷	10 ⁷
	Electrical	10 ⁵	10 ⁵ 10 ⁷	10 ⁵ 10 ⁷	10 ⁵ 10 ⁷	10 ⁵ 10 ⁷	2 × 10 ⁵
Terminal layouts and Wiring diagrams		Pin type  Screw terminal type 	11-Pin type  Screw terminal type 	 Screw terminal type 	11-Pin type  Screw terminal type 	QM4H-S type  QM4H-G type 	Timed-out 2 Form C type  Timed-out 4 Form C type 
Available standards		UL/CSA, CE, LLOYD	UL/c-UL, CE	UL/c-UL, CE	UL/c-UL, CE	UL/c-UL, CE	UL/c-UL, CE
Page		P. 29	P. 34	P. 34	P. 41	P. 50	P. 57

TIMERS SELECTOR CHART

Operation mode		Power ON-delay Power flicker Power One-shot Power One-cycle	Pulse ON-delay Pulse Flicker Pulse ON-Flicker Signal OFF-delay Pulse One-shot Pulse One-cycle	Power ON-delay	Pulse ON-delay Pulse Flicker Pulse ON-flicker Signal OFF-delay Pulse One-shot Pulse One-cycle (with instantaneous contact)	Power ON-delay
		Output with contact	CR oscillation counting timer		CR oscillation counting timer	CR oscillation counting timer
Major uses		For highly accurate time setting	For time control for short or long time	For time control for short or long time	For self holding circuit	For time ranges selection
Time range	1000h	<p>Each model has various time ranges. See the product lists before ordering.</p>				
	100h					
30h						
1h						
30m						
10m						
5m						
2m						
1m						
30s						
10s						
5s						
1s						
0.1s						
0.01s						
Model/Product Name	<p>S1DX Timer</p>		<p>PM5S-A Multi-range analog timer</p>	<p>PM5S-S Multi-range analog timer</p>	<p>PM5S-M Multi-range analog timer</p>	<p>PMH Timer</p>
	Features		With a large transparent dial. This timer can be attached both on the DIN rails and panel.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled. 6 operation modes available.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit. 6 operation modes (with instantaneous contact) available.
Control output (resistive)	Current	7A 5A 3A	5A	5A	5A	7A
	Voltage	250 V AC	250 V AC	250 V AC	250 V AC	250 V AC
Mounting method						
Mounting parts		Terminal block, cap block, mounting frame, fitting sockets, protective cover	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, cap, panel cover, rubber gasket, mounting frame	Terminal block, socket, cap, mounting frame, protective cover
Rated operating voltage		100 to 120 V AC, 200 to 220 V AC, 12 V DC, 24 V DC, 48 V DC, 100 to 110 V DC (other models)	24 to 240V AC/DC	24 to 240V AC/DC	24 to 240V AC/DC	100 to 120 V AC, 200 to 240 V AC, 12 V DC, 24 V DC, 48 V DC, 100 to 110 V DC (other models)
Arrangement		Timed-out 2 Form C Timed-out 4 Form C	Timed-out 2 Form C	Timed-out 2 Form C	Timed-out 1 Form C Instantaneous 1 Form C	Timed-out 2 Form C
Time accuracy	Operation time fluctuation	±1%	±0.3%	±0.3%	±0.3%	±0.5%
	Temperature error	±5%	±2%	±2%	±2%	±5%
	Voltage error	±1%	±0.5%	±0.5%	±0.5%	±0.5%
	Setting error	±10%	±10%	±10%	±10%	±10%
Min. power off time		100 ms	100 ms	100 ms	100 ms	100 ms
Life (Min. operation)	Mechanical	10 ⁷	2 × 10 ⁷	2 × 10 ⁷	2 × 10 ⁷	5 × 10 ⁷
	Electrical (resistive)	2 × 10 ⁵	10 ⁵	10 ⁵	10 ⁵	2 × 10 ⁵
Wiring diagrams						
Available standards		UL/CSA, CE, LLOYD	UL/C-UL	UL/C-UL	UL/C-UL	UL/CSA, LLOYD
Page		P. 63	P. 73	P. 73	P. 73	P. 80

TIMERS SELECTOR CHART

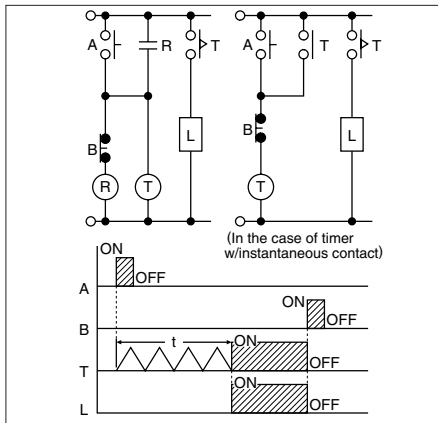
Operation mode		Power ON-delay	
Major uses		Motor timer	
Major uses		Suitable for high accurate, long time uses	
Time range			
Each model has various time ranges. See the product lists before ordering.			
Model/Product Name		 MHP Timer	 MHP-M Timer
Features		A motor timer with high accuracy. With a movable point and instantaneous contact (for the MHP-M)	
Control output (resistive)	Current	7A 5A 3A	5A
	Voltage	250 V AC	250 V AC
Mounting method		 	
Mounting parts		Terminal block, socket, cap, mounting frame, protective cover	
Rated operating voltage		100 V AC, 200 V AC (other models)	
Arrangement		Timed-out 1 Form C	Timed-out 1 Form C Instantaneous 1 Form A
Time accuracy	Operation time fluctuation	±2%	
	Temperature error	—	
	Voltage error	—	
	Setting error	—	
Min. power off time		300 ms	
Life (Min. operation)	Mechanical	10 ⁷	
	Electrical (resistive)	4 × 10 ⁵	
Wiring diagrams			
Available standards		UL/CSA, LLOYD	UL/CSA, LLOYD
Page		P. 82	P. 82

ON-DELAY TIMER BASIC CIRCUIT

(Symbols)	
	Self-resetting switch
	Holding switch
	Relay
	Load
	Timer in work
	Relay NO contact
	Relay NC contact
	Timer delay NO contact
	Timer delay NC contact
	Timer instantaneous NO contact
	Timer instantaneous NC contact

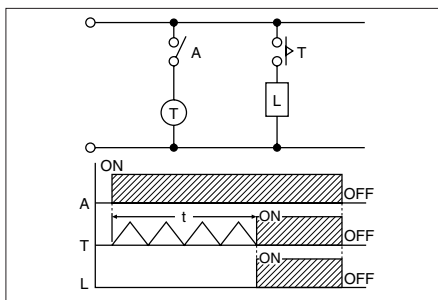
1. Delay Operation (Instantaneous input)

When control switch A is pressed, timer T starts immediately and after t-time elapses, load L is turned ON. When B is pressed, timer T is reset and load L is turned OFF.



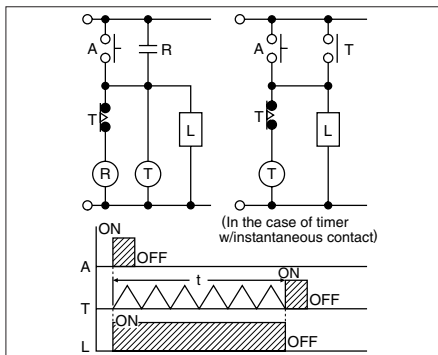
2. Delay Operation (Continuous input)

When switch A is pressed, after t-time elapsed, the timer contact closes and load L is turned ON. When switch A is opened, the timer is reset and the load is turned OFF.



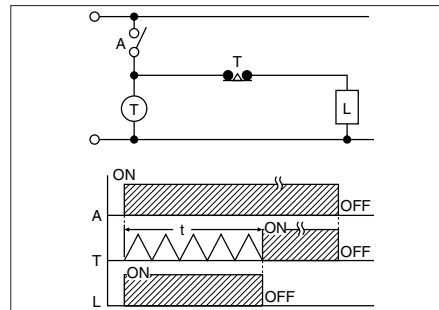
3. Fixed Time Operation (Instantaneous input)

When control switch A is pressed, load L is immediately turned ON, and after t-time elapses, load L is turned OFF.



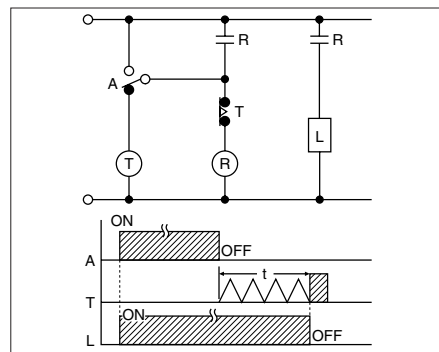
4. Fixed Time Operation (Continuous input)

When switch A is closed, load L is turned ON and after t-time elapses, the load is turned OFF. When switch A is opened, timer T is reset and load L is turned OFF.



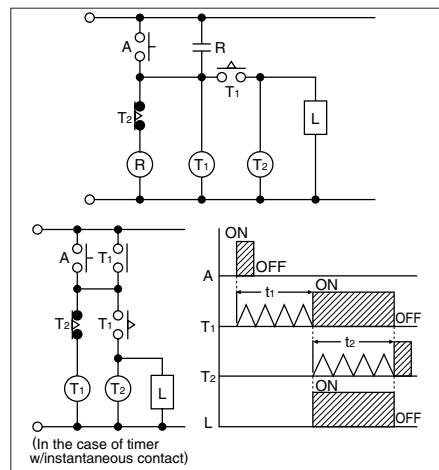
5. Delay Reset Operation

When contact A is reversed, load L is immediately turned ON. When contact A is returned to normal state, load L is turned OFF after t-time elapses. This circuit is used when the power supply is kept ON at all times or used for off-delay-like application. However, it can not be used as off-delay timer at the time of power failure.



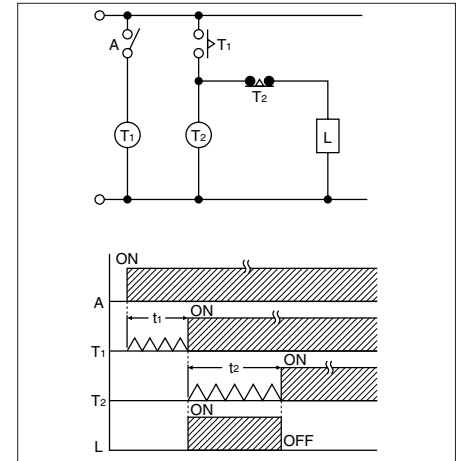
6. Fixed Time Operation after Delay Time is Set (Instantaneous input)

When control switch A is pressed, load L is turned ON after t1-time elapses, and load L is turned OFF after t2-time elapses. This circuit is used for the case of instantaneous input (one pulse).



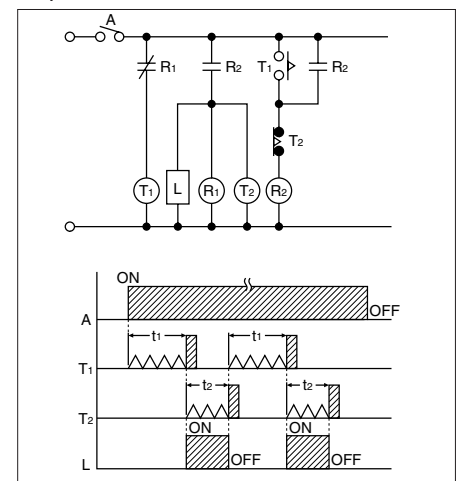
7. Fixed Time Operation after Delay Time is Set (Continuous input)

When switch A is pressed, load L is turned ON after t1-time elapses and load L is turned OFF after t2-time elapses.



8. Repetitive Operation

When switch A is pressed, load L is turned ON after t1-time elapses and load L is turned OFF after t2-time elapses, and thereafter the t1 and t2 operations are repeated. This repetitive operation stops when switch A is turned OFF.



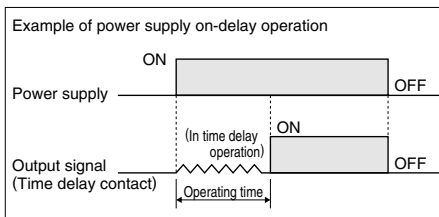
TIMER-RELATED TERMINOLOGY

• What is the timer?

The timer is a relay having such an output (with or without contact) which electrically closes (turns ON) or opens (turns OFF) the circuit after a preset time elapses when electrical or mechanical input is given.

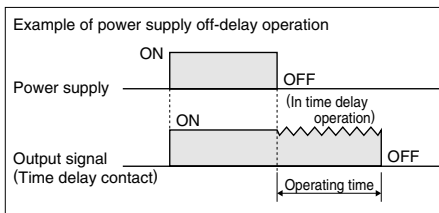
• On-delay Operation (Time delay operation)

The on-delay operation is an operation to give output when preset time expires after a predetermined input is given to the power supply circuit or input circuit. On-delay operation includes power supply on-delay operation and signal on-delay operation.



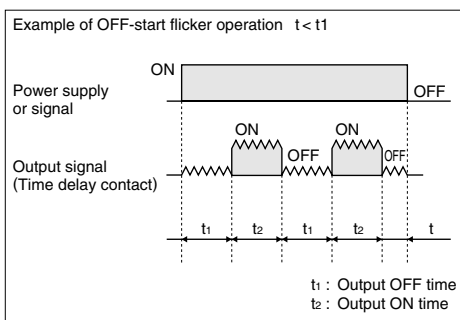
• Off-delay Operation (Time delay resetting)

The off-delay operation is an operation to turn OFF output when preset time expires after a predetermined input is given to the power supply circuit or input circuit, and at the same time output signal is given and predetermined input is turned OFF. Off-delay operation includes power supply off-delay operation and signal off-delay operation.



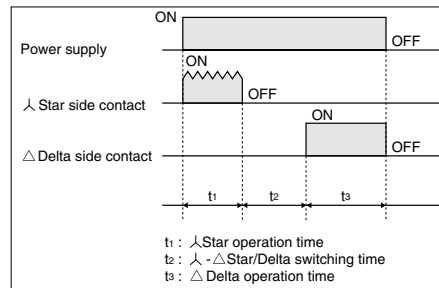
• Flicker Operation

The flicker operation is an operation to repeat output ON/OFF action according to preset ON time and OFF time while a predetermined input is given to the power supply circuit or input circuit. Flicker operation includes OFF-start flicker operation and ON-start flicker operation.



• Star (∧)/Delta (Δ) Operation

This operation controls the time in the star connection used for star-delta starting which is conducted for starting a cage induction motor and the time for switching the star connection over to delta connection.



• Preset Time

The preset time is the control time set by setting time-variable timer.

• Operating Time

The operating time means the time which elapses between the addition of predetermined input to the power supply circuit and input circuit and the completion of operation for preset time.

• Hold Time

It means the time which elapses between the completion of operation for preset time and the start of resetting.

• Pause Time

It means the time elapses between the start of operation for preset time and the addition of input required again for the power supply circuit or input circuit. Timer does not perform normal function unless this pause time is set longer than the timer reset time.

• Resetting

It means that the operation returns to the state before starting while the timer is in operation for preset time or after it completes the operation for preset time. Resetting during the operation for preset time is referred to as halfway resetting.

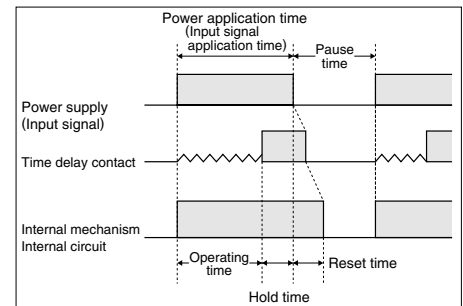
• Reset Time

It means the time elapses between shut-off of input to the power supply circuit or input of reset signal and the completion of resetting.

Timer resetting function shares the reset of contact, reset of mechanical parts such as pointer etc., reset of parts in internal circuit such as capacitor etc., and the value at which all of these parts complete their resetting operation is regarded as reset time. If timer is used for a pause time shorter than specified reset time, the operation time expires earlier than preset, unexpected instantaneous operation takes place or the operation is failed, thus making it impossible

to expect the normal operation.

Therefore, be sure to set the timer pause time longer than the specified reset time.



• Minimum Power Application Time

It means the minimum time during which power must be supplied in order to operate timer normally, in the case of power supply off-delay timer.

• Fluctuation of Operating Time

It means the irregularity in operating time caused when timer is set at specified time and the operation is repeated under the same conditions. It is also referred to as repetitive error.

• Voltage Error

It means the difference between the operating time at the rated voltage and that within the allowable voltage range.

• Temperature Error

It means the difference between the operating time at the temperature of $20 \pm 2^\circ\text{C}$ and that within the allowable temperature range.

• Set Error

It means the difference between the set time and the time which actually elapses. It is also referred to as setting error.

The set error of an analog timer is the rate to the full-scale value. If the set error is $\pm 5\%$, it becomes equivalent to an error of maximum ± 5 hours on the assumption that 100 hours is set in the range of 100 hours. The error produced when 10 hours is set is also equivalent to an error of maximum ± 5 hours. As far as the set error is concerned, digital timer is by far exact. Select a digital timer for the case when accuracy is required.

When using an analog type multi-range timer for setting of long time, the setting procedure stated as follows minimizes the error. For example, if you want to set 8 hours in the range of 10 hours, first set the pointer to such a graduation where the actual operating time should become as close to 8 seconds as possible in the range of 10 seconds. Then, reset the range to 10 hours, leaving the pointer set at the graduation as it is.

TIMER-RELATED TERMINOLOGY

• Pause Time Error

It means the difference between the operating time to a fixed pause time and the operating time to a pause time that varies. The pause time characteristics are the main characteristics of CR timer (timer exploiting charge and discharge of capacitor C and resistance R).

If the oscillation count timer (timer which comprises an oscillation circuit composed of CR and quartz and is operated by a counting circuit inside IC or micro-computer which counts the reference signal) is used, the pause time error becomes almost negligible owing to its principles of operation. Accordingly, the description about these characteristics may be omitted for the oscillation count timer.

• Equation for Each Error and Measurement Conditions

The operation time shall be measured, in principle, for retention time of 0.5 second and halt time of 1 second.

The measurement shall be repeated five times except for the initial test. The equation for each error and the measurement conditions are shown in the table below:

Item	Equation	Measurement conditions		
		Set value Ts (Note 1)	Supply voltage	Ambient temperature
(1) Fluctuation in operation time	$\pm \frac{1}{2} \times \frac{T_{\max.} - T_{\min.}}{TMs} \times 100 (\%)$	Full-scale value	Rated voltage	20±2°C 68±36°F (Note 2)
(2) Voltage error	$\frac{TMx_1 - TM}{TMs} \times 100 (\%)$		Fluctuation range of allowable voltage of power supply (Note 3)	
(3) Temperature error	$\frac{TMx_2 - TM}{TMs} \times 100 (\%)$		Rated voltage	-10 to 50°C +14 to 122°F (Note 4)
(4) Set error	$\frac{TM - Ts}{TMs} \times 100 (\%)$	1/3 or more of full-scale value	Rated voltage	20±2°C 68±36°F (Note 2)
(5) Pause time error	$\frac{TMx_3 - TM}{TMs} \times 100 (\%)$	Full-scale value		

Note 1: For digital timers, the set value Ts shall be optional.

Note 2: If no question arises from evaluation results, 13-35°C is acceptable.

Note 3: The measurement may be performed in other specified voltage ranges.

Note 4: The measurement may be performed in other specified temperature ranges.

TM: Average of measured values for operation time

Ts: Set value

TMs: Full-scale value. For digital timers, any arbitrary scale-value may be used.

Tmax: Maximum of measured values for operation time

Tmin: Minimum of measured values for operation time

TMx₁: Average of operation time at such voltage as maximizes deviation from TM in allowable voltage range.

TMx₂: Average of operation time at such temperature as maximizes deviation from TM in allowable temperature range.

TMx₃: Average of operation time at such pause time (in the range from the specified reset time to 1 hour) as maximizes deviation from TM.

• Functional Vibration Resistance

Means such a vibration as occurs in the range where the contact closed with that vibration during the use of the timer remains closed for the specified time (3 or 1 msec.) minimum.

• Destructive Vibration Resistance

Means such a vibration as occurs in the range where no part is damage with that vibration during the transportation or use of the timer and the operation characteristics are maintained.

• Functional Shock Resistance

Means such a shock as occurs in the range where the contact closed with that shock during the use of the timer remains closed for the specified time (1 ms) minimum.

• Destructive Shock Resistance

Means such a shock as occurs in the range where no part is damaged with that shock during the transportation or use of the timer and the operation characteristics are maintained.

• Mechanical life

Means the durability that is achieved when the control output is performed in the no-load state.

• Electrical life

Means the durability that is achieved when the specified voltage and current loads are individually applied to the control output while being turned ON and OFF. Generally, the life of the timer is represented by the number of times the control output is performed. When a load is connected to the control output, the term of "electrical life" is used. When no load is connected to the control output, the term of "mechanical life" is used. The electrical life is shorter than the mechanical life, and becomes longer as the load decreases. The life of the timer is made longer by connecting a relay or a similar part rather than directly switching a large load with the control output.

• Rated power consumption

Means the power that is consumed when the rated operation voltage is applied to the power circuit.
(Rated power consumption = rated voltage × current consumption)

• Rated control capacity

Means the reference value that is used to determine the performance of the switching part of the load. This value is represented by the combination of voltage and current.

• Contact resistance

Means the combined resistance that consists of the contact resistance between contacts, and the conductor resistance of pins and contact springs.

• Insulation resistance

Means the resistance between a contact or a conductive pin like the pin to which the operation voltage is applied, and a dead pin or a non-conductive metallic part like the time case, the base, or a retaining screw; or the resistance between contacts.

• Withstand voltage

Means the limit value that does not cause breakdown when high voltage is applied for one minute to the same location as measured for insulation resistance. The detectable leak current is normally 10 mA. In special cases, however, it may be 1mA or 3 mA.

• Withstand surge voltage

Means the limit value that shows the durability against momentary abnormal voltage resulting from lightning or switching a conductive load. The surge waveform is represented by the standard impulsive voltage waveform at ±(1.2 × 50) μs or ±(1 × 40) μs.

PRECAUTIONS IN USING THE TIMERS

Cautions for circuits

1. Protective circuit for timer contact

In the circuit that switches an inductive load, a contact failure may occur at a contact point due to surge or inrush current resulting from that switching. Therefore, it is recommended that the following protective circuit be used to protect the contact point.

Circuit	CR circuit (r: resistor c: capacitor)		Diode circuit	Varistor circuit
Application	AC DC	(see note.) Available	Available Available	Not available Available
Features/Notes	<p>If the load is a relay or solenoid, the release time lengthens. Effective when connected to both contacts if the power supply voltage is 24 or 48 V and the voltage across the load is 100 to 200 V.</p> <p>If the load is a timer, leakage current flows through the CR circuit causing faulty operation. Note: If used with AC voltage, be sure the impedance of the load is sufficiently smaller than that of the c and r.</p>		<p>The diode connected in parallel causes the energy stored in the coil to flow to the coil in the form of current and dissipates it as joule heat at the resistance component of the inductive load. This circuit further delays the release time compared to the CR circuit. (2 to 5 times the release time listed in the catalog)</p>	<p>Using the rated voltage characteristics of the varistor, this circuit prevents excessively high voltages from being applied across the contacts. This circuit also slightly delays the release time.</p>
Device Selection	<p>As a guide in selecting r and c, c: 0.5 to 1 μF per 1 A contact current r: 0.5 to 1 Ω per 1 V contact voltage Values vary depending on the properties of the load and variations in timer characteristics. Capacitor c acts to suppress the discharge the moment the contacts open. Resistor r acts to limit the current when the power is turned on the next time. Test to confirm. Use a capacitor with a breakdown voltage of 200 to 300 V. Use AC type capacitors (non-polarized) for AC circuits.</p>		<p>Use a diode with a reverse breakdown voltage at least 10 times the circuit voltage and a forward current at least as large as the load current. In electronic circuits where the circuit voltages reverse breakdown voltage of about 2 to 3 times the power supply voltage.</p>	—

2. Type of Load and Inrush Current

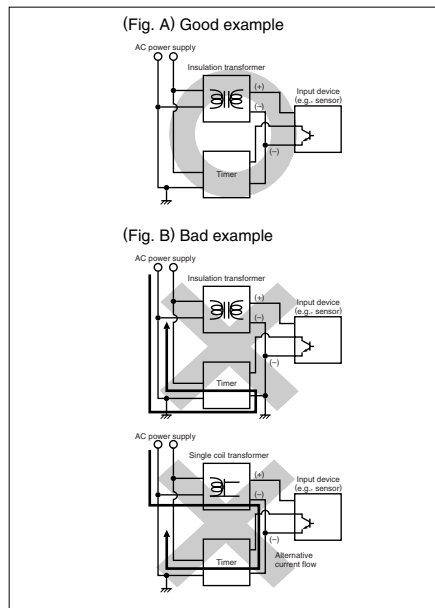
The type of load and its inrush current characteristics, together with the switching frequency are important factors which cause contact welding. Particularly for loads with inrush currents, measure the steady state current and inrush current and use a relay or magnet switch which provides an ample margin of safety. The table below shows the relationship between typical loads and their inrush currents.

Type of load	Inrush current
Resistive load	Steady state current
Solenoid load	10 to 20 times the steady state current
Motor load	5 to 10 times the steady state current
Incandescent lamp load	10 to 15 times the steady state current
Mercury lamp load	1 to 3 times the steady state current
Sodium vapor lamp load	1 to 3 times the steady state current
Capacitive load	20 to 40 times the steady state current
Transformer load	5 to 15 times the steady state current

When you want large load and long life of the timer, do not control the load direct with a timer. When the timer is designed to use a relay or a magnet switch, you can acquire the longer life of the timer.

3. Connection of input

The PM4H and LT4H series use power supply without a transformer (power and input terminals are not insulated). In connecting various kinds of input signals, therefore, use a power transformer in which the primary side is separated from the ungrounded secondary side as shown in Fig. A, for the power supply for a sensor and other input devices so that short-circuiting can be prevented.

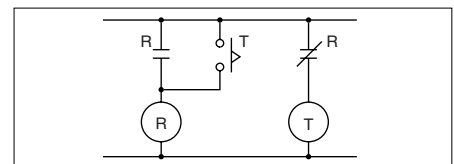


Do not use a single coil transformer (e.g., Sly-Duck). Otherwise, the internal circuit of the timer will be short-circuited as shown in Fig. B resulting in breakdown.

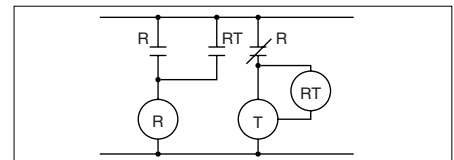
4. Long Continuous Current Flow

Long continuous current flow through the timer (approx. one month or longer) cause generation of heat internally, which degrade the electronic parts. Use the timer in combination with a relay and avoid long continuous current flow through the timer.

(1) When using contact output

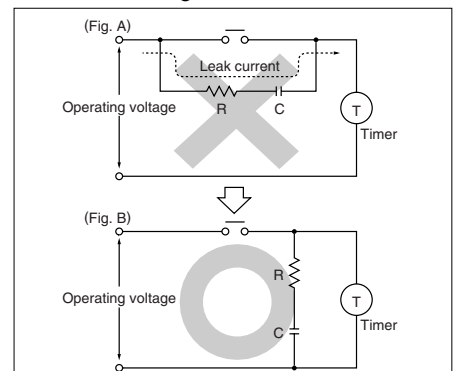


(2) When using non-contact output



5. Leakage current

1) For connecting and disconnecting operating voltage to the timer, a circuit should be used, which will prevent the flow of leakage current. For example, a circuit for contact protection as shown in Fig. A. will permit leakage current flow through R and C, causing erroneous operation of the timer. Instead, the circuit shown in Fig. B should be used.



PRECAUTIONS IN USING THE TIMERS

2) If the timer is directly switched with a non-contact element, leak current may flow into the timer and cause it to malfunction.

6. Power off time

If the operation voltage for the timer is turned ON after the limit time operation is completed or before the limit time is reached, the Power off time longer than the timer restoration time must be secured.

7. Suicide circuit

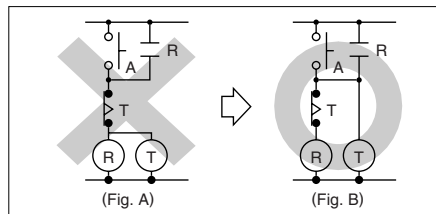
If the timer is restored immediately after the specified time is reached, the circuit must be configured so that the restoration time of the timer can be secured sufficiently.

If the power circuit for the timer is turned OFF with the timer contact, a suicide circuit may be configured (Fig. A). In order to settle the problem with this potential suicide circuit, the circuit must be designed so that the timer is turned OFF after the self-retention circuit is completely released (Fig. B).

tion:

(1) If an AC load is switched in synchronized phases:
Locking or welding is liable to occur due to contact transposition. Check this with the actual system.

(2) If a load is switched very frequently:
If a load which generates arcs when a contact is switched is turned ON and OFF very frequently, nitrogen and oxygen in air are combined due to arc energy and then HNO_3 is produced. This may corrode metallic materials.



8. Electrical life

The electrical life varies depending on the load type, the switching phase, and the ambient atmosphere. In particular, the following cases require careful attention:

1. Using an arc-extinguishing circuit;
2. Decreasing the switching frequency; and
3. Decreasing the humidity in the ambient atmosphere.

Cautions for use (common for all models)

1. Pin connections

Correctly connect the pins while seeing the terminal layout/wiring diagram. In particular, the DC type, which has polarities, does not operate with the polarities connected reverse. Any incorrect connection can cause abnormal heating or ignition.

2. Connection to operation power supply

1) Supply voltage must be applied at a time through a switch, a relay, and other parts. If the voltage is applied gradually, the specified time may be reached regardless of its value or the power supply may not be reset.

2) The operation voltage for the DC type must be at the specified ripple percentage or less. The average voltage must fall within the allowable operation voltage range.

Rectification type	Ripple percentage
Single-phase, full-wave	Approx. 48%
Three-phase, full-wave	Approx. 4%
Three-phase, half-wave	Approx. 17%

Note: Refer to the ripple percentage of each timer.

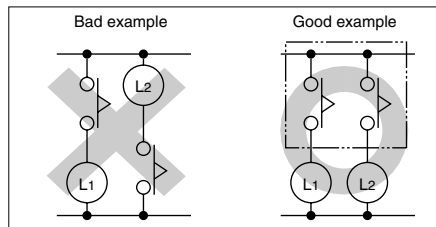
3) Make sure that no induced voltage and residual voltage are applied between the power pins on the timer after the power switch is turned OFF.

(If the power line is wired in parallel with the high-voltage and motor lines, induced voltage may be produced between the power pins.)

3. Control output

1) The load for the control output must be used within the load capacity specified in the rated control capacity. If it is used exceeding the rated value, the life is greatly shortened.

2) The following connection might result in short circuit between the heteropolar contacts in the timer.



4. Installing the timer

1) To install the timer, use the dedicated pin bracket or socket (cap). Avoid connecting the pins on the timer by directly soldering them.

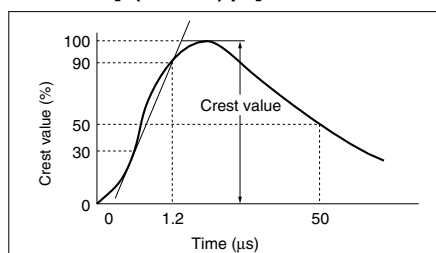
2) In order to maintain the characteristics, do not remove the timer cover (case).

5. Superimposed surge of power supply

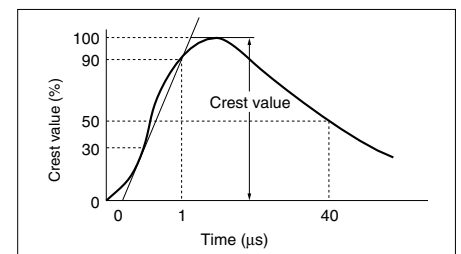
For the superimposed surge of power supply, the standard waveform ($\pm 1.2 \times 50\mu\text{s}$ or $\pm 1 \times 40\mu\text{s}$) is taken as the standard value for surge-proof voltage. (The positive and negative voltages are applied each three or five times between the power pins.)

For the standard values for the PM4H, LT4H and S1DX type timers, see the respective items in "Cautions for use."

• Single-pole, full-wave voltage for surge waveform [$\pm(1.2 \times 50) \mu\text{s}$]



• Single-pole, full-wave voltage for surge waveform [$\pm(1 \times 40) \mu\text{s}$]



• PMH [$\pm(1 \times 40) \mu\text{s}$]

Voltage type	Surge voltage
AC type (Except for 24V AC)	4,000V
12V DC, 24V DC, 24V AC	500V
48V DC	1,000V
100 to 110V DC	2,000V

If external surge occurs exceeding the specified value, the internal circuit may break down. In this case, use a surge absorption element. The typical surge absorption elements include a varistor, a capacitor, and a diode. If a surge absorption element is used, use an oscilloscope to see whether or not the foreign surge exceeding the specified value appears.

6. Changing the set time

Do not change the set time when the limit time operation is in progress. However, this is possible only with the motor-driven type timer if the set time is shorter than the remaining time. For changing the set time on the digital timer (LT4H series), see the relevant item in "Cautions for use."

PRECAUTIONS IN USING THE TIMERS

7. Operating environment

1) Use the timer within the ambient temperature range from -10°C to $+50^{\circ}\text{C}$ ($+14^{\circ}\text{F}$ to $+122^{\circ}\text{F}$ ($+55^{\circ}\text{C}$ $+131^{\circ}\text{F}$ for the LT4H series) and at ambient humidity of 85% RH maximum.

2) Avoid using the timer in a location where inflammable or corrosive gas is generated, the timer is exposed to much dust and other foreign matter water or oil is splashed on the timer or vibrations or shocks are given to the timer.

3) The timer cover (case), the knobs, and the dials are made of polycarbonated resin. Therefore, prevent the timer from being exposed to organic solvents such as methyl alcohol, benzene, and thinner, strong acid substances such as

caustic soda, and ammonia and avoid using the timer in atmosphere containing any of those substances.

4) If the timer is used where noises are emitted frequently, separate the input signal elements (such as a sensor), the wiring for the input signal line, and the timer as far as possible from the noise source and the high power line containing noises.

8. Checking the actual load

In order to increase the reliability in the actual use, check the quality of the timer in the actual usage.

9. Others

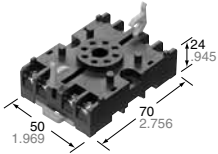
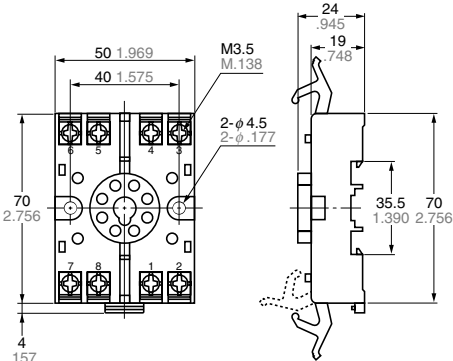
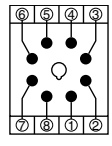
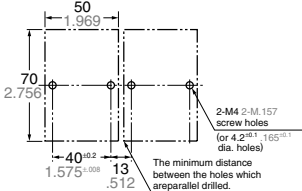
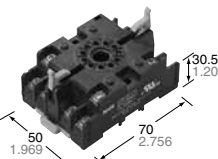
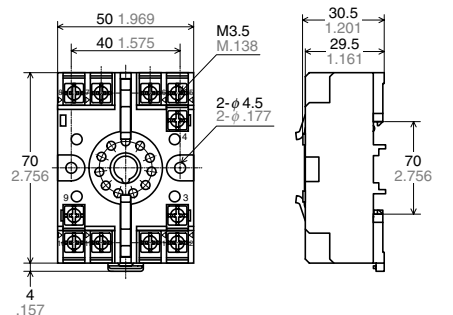
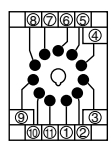
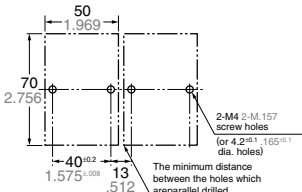
1) If the timer is used exceeding the ratings (operation voltage and control capacity), the contact life, or any other

specified limit, abnormal heat, smoke, or ignition may occur.

2) If any malfunction of the timer is likely to affect human life and properties, give allowance to the rated values and performance values. In addition, take appropriate safety measures such as a duplex circuit from the viewpoint of product liabilities.

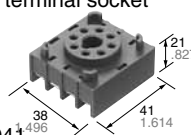
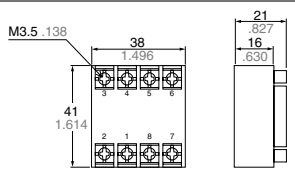
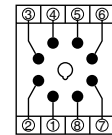
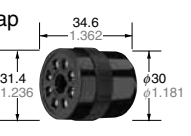
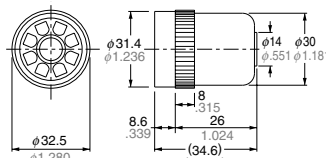
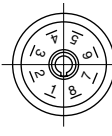
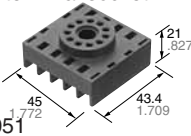
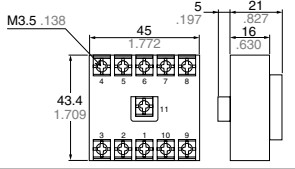
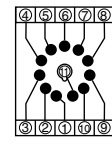
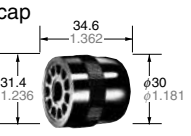
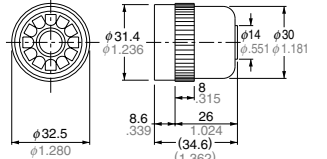
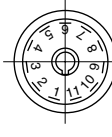
DIN SIZE TIMERS COMMON OPTIONS

Terminal sockets (Unit: mm inch, Tolerance: $\pm 1 \pm .039$)

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
PM4H-S PM4H-M PM4H-SD PM4H-F8 PM4H-F8R PM4H-W LT4H LT4H-L LT4H-W QM4H PM4S (8-pin type)	<ul style="list-style-type: none"> DIN rail socket (8-pin)  <p>ATC180031</p>		 <p>Note: Terminal No. on the main body are identical to those on the terminal socket.</p>	
PM4H-A PM4H-F11R LT4H LT4H-W (11-pin type)	<ul style="list-style-type: none"> DIN rail socket (11-pin)  <p>ATC180041</p>		 <p>Note: Terminal No. on the main body are identical to those on the terminal socket.</p>	

Note: The socket's numbering system matches that of the timer terminals.

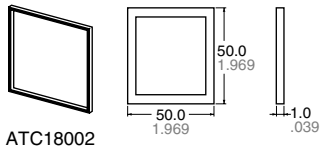
Sockets (Unit: mm inch, Tolerance: $\pm 1 \pm .039$)

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
PM4H-S PM4H-M PM4H-SD PM4H-F8 PM4H-F8R PM4H-W LT4H LT4H-L LT4H-W (8-pin type) PM4S QM4H	<ul style="list-style-type: none"> Rear terminal socket  <p>AT78041</p>			—
8P cap LT4H-L LT4H-W (8-pin type) PM4S QM4H	<ul style="list-style-type: none"> 8P cap  <p>AD8-RC</p>			—
PM4H-A PM4H-F11R LT4H LT4H-W (11-pin type)	<ul style="list-style-type: none"> Rear terminal socket  <p>AT78051</p>			—
11P cap	<ul style="list-style-type: none"> 11P cap  <p>AT8-DP11</p>			—

Note: The terminal socket's numbering system matches that of the timer terminals.

MOUNTING PARTS

• Rubber gasket

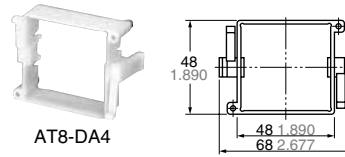


ATC18002

Applicable for PM4H series and LT4H series

The rubber gasket is enclosed in the PM4H (screw terminal type) and the LT4H series.

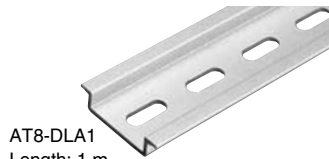
• Mounting frame



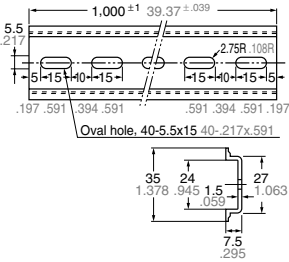
AT8-DA4

Applicable for PM4H series LT4H series and QM4H series

• Mounting rails (Applicable for DIN and IEC standards)



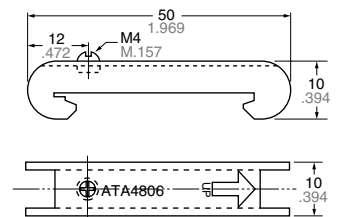
AT8-DLA1
Length: 1 m
aluminum



• Fastening plate



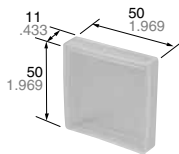
ATA4806



For holding DIN rails

• Protective cover for DIN 48 size: LT4H, QM4H series

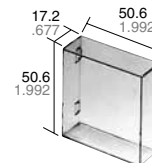
Flexible type



AQM4803

• Protective cover for DIN 48 size: QM4H series

Hard type



AQM4801

Accessories

PM4H series

• Panel cover (Black)

PM4H-A



ATC18011

PM4H-S



ATC18012

PM4H-M



ATC18013

PM4H-W



ATC18014

PM4H-SD



ATC18015

PM4H-F



ATC18016

LT4H series

• Panel cover (Black)

LT4H



ATL58011

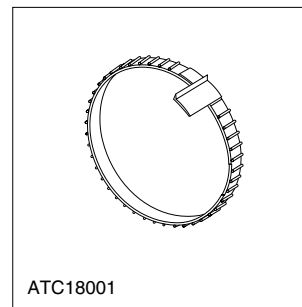
LT4H-W



ATL68011

The black panel cover is also available so that you can change the appearance of the panel by changing the panel cover. The color of the standard panel cover is ash gray.

• Set ring



ATC18001

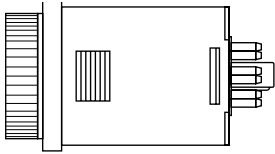
When you control the fixed time range, the setting rings (a set of 2 pcs.) make it easy to do the time setting and keep the time range all the time. (Excluding PM4H-W)

INSTALLING DIN SIZE TIMER

Installations

1. Surface mount

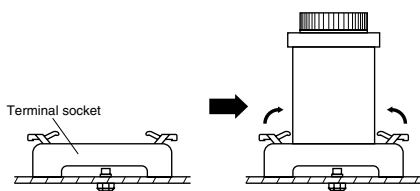
1) For the timers of PM4H and LT4H series, use the pin type timer. With the PM4S and QM4H series, only pin-type timers are available.



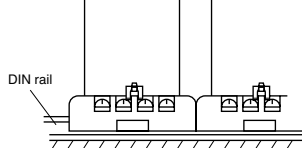
- 2) Put the terminal socket on the board directly or put it on the DIN rail (Fig. 1).
- 3) Insert the timer into the terminal socket and fix it with clip (Fig. 2)
- 4) On DIN rail mounting, mount the timer on the DIN rail tightly to get the proper dimension (Fig. 3).

(Fig. 1)

(Fig. 2)



(Fig. 3)

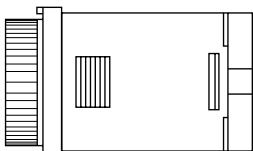


5) 8-pin type should be connected with terminal socket (AT8-DF8K). 11-pin type should be connected with terminal socket (AT8-DF11K).

6) DIN rail (AT8-DLA1) is also available (1 m).

2. Flush mount

1) For the timers of PM4H and LT4H series, it is recommended to use the built-in screw terminal type for flush mount. (Mounting frame and rubber gasket are provided when timer is shipped.)

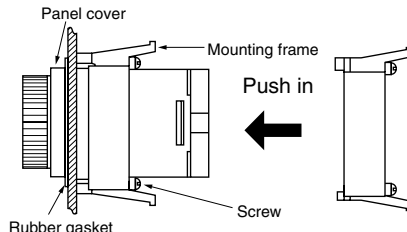


If the pin type is used, the mounting frame (AT8-DA4) and rubber gasket (ATC18002 for surface waterproofing) that are available at extra costs are necessary. If the pin connection socket is the 8-pin type, use the 8P cap (AD8-RC); or if it is the 11-pin type, use the 11P cap (AT8-DP11).

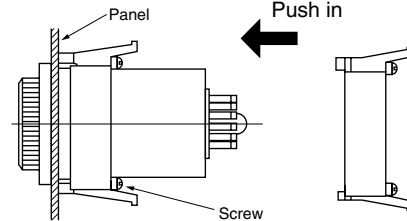
2) How to mount the timer

From the panel front, pass the timer through the square hole. Fit the mounting frame from the rear, and then push it in so that the clearance between the mounting frame and the panel surface is minimized. In addition, lock the mounting frame with a screw.

• Screw terminal type



• Pin type



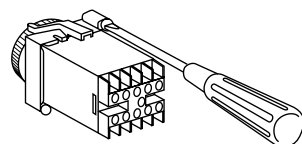
3) Caution in mounting the timer

• PM4H, and LT4H series

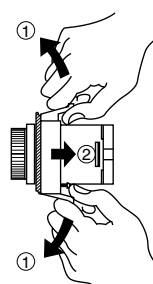
(a) If the PM4H and the LT4H series are used as the waterproof types, tighten the reinforcing screws on the mounting frames so that the timers, the rubber gaskets, and the panel surfaces are tightly contacted with each other. (Tighten the two screws with uniform force and make sure that there is no rattling. If the screws are tightened too excessively, the mounting frame may come off.)

(b) If the timer is installed with the panel cover and the rubber gasket removed, the waterproofing characteristic is lost.

4) Installation
Loosen the screws on the mounting frame, spread the edge of frame and remove it.



Pull the mounting frame backward while spreading out its hooks with your thumbs and index fingers.

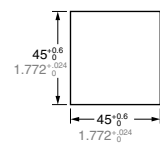


5) Correctly connect the pins while seeing the pin connection diagram.

Tighten the terminal screws with a torque of 0.8 N·cm or less. The screws are M3.5. (screw-tightened terminal type)

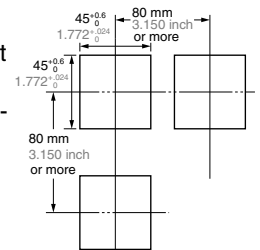
6) If the pin type is used, the rear terminal block (ATC78041) or the 8P cap (AD8-RC) is necessary to connect the pins. For the 11-pin type, use the rear terminal block (ATC78051) or the 11P cap (AT8-DP11) and avoid directly soldering the round pins on the timer.

7) Panel cutout dimensions

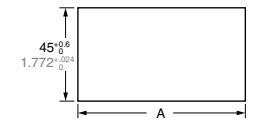


The standard panel cutout dimensions are shown in the left figure. (Panel thickness: 1 to 5 mm .039 to .197 inch)

8) Although the timers can be mounted adjacent to each other in this case, it is recommended to arrange the mounting holes as shown in the right figure to facilitate attaching and detaching the mounting frame.

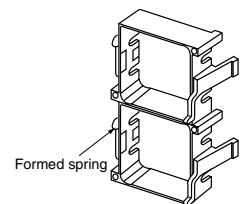
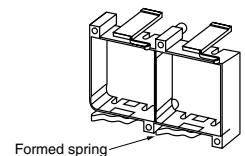


9) Adjacent mounting
Although the timers can be mounted adjacent to each other, remember that the panel surface of PM4H or LT4H series timer will lose its water-resistant effect. (Panel thickness: 1 to 5 mm .039 to .197 inch)



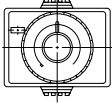



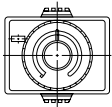























$$A = (48 \times n - 2.5)^{+0.6} \text{ (mm)}$$

When lining up the timers horizontally, set the frames in such a position so the formed spring areas are at the top and bottom. When lining up the timers vertically, set the frames in such a position so the formed spring areas are at the right and left.












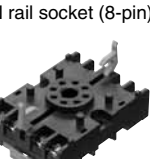














DISCONTINUED MODELS AND RECOMMENDED SUBSTITUTES
















Timers













Discontinued models	Recommended substitutes	Attachment	Discontinued models	Recommended substitutes	Attachment
MHP-NS (Exposed type Square plug-in/ horizontal type) 	MHP-N (Exposed type Round plug-in/ vertical type) 	Terminal base AT8-RFD should be used.	CHP-NF (Exposed type Round plug-in/ vertical type) 	PM4H-F 	Attachment frame AT7821 should be used. * External dimensions, however, differ. In addition, the reset method changes from voltage input to non-voltage input.
MHP-NS-	MHP-N-		CHP-NF	PM4HF-	
MHP-M (Exposed type Round plug-in/ horizontal type) 	MHP-NM (Exposed type Round plug-in/ vertical type) 	Terminal base AT8-RFD should be used.	CHP-SD 	PM4H-SD 	With exposed attachment, terminal base ATC180041 should be used. * External dimensions and contact capacity, however, differ. In addition, with the PM4H-SD: 1) (1) to (8) have no internal connection, and 2) the input (star) changes to 1a.
MHP-M-	MHP-NM-		CHP-SD-	PM4HSD-	
MHP-YC (Embedded type With attachment frame) 	MHP-N (Exposed type Without attachment frame) 	Attachment frame AT7821 should be used.	PM48A 	PM4H-A 	With exposed attachment, terminal base ATC180041 should be used.
MHP-YC-	MHP-N-		PM48A-	PM4HA-	
MHP-YM (Embedded type With attachment frame) 	MHP-NM (Exposed type Without attachment frame) 	Attachment frame AT7831 should be used.	PM48 	PM4H-S 	With exposed attachment, terminal base ATC180031 should be used.
MHP-YM-	MHP-NM-		PM48	PM4HS-	
CHP-N (Exposed type with attachment frame type) 	PM4H-S PMH 	The external dimension and contact capacity are different.	PM48M 	PM4H-M 	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
CHP-N-	PM4HS- PMH-		PM48M-	PM4HM-	
CHP-N (Exposed type without attachment frame type) 	PM4H-S PMH 	The external dimension and contact capacity are different.	PM48F 	PM4H-F 	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
CHP-N-	PM4HS- PMH-		PM48F-	PM4HF-	
CHP-NF (Exposed type without attachment frame type) 	PM4H-F 	* External dimensions, however, differ. In addition, the reset method changes from voltage input to non-voltage input.	PM48SD 	PM4H-SD 	With exposed attachment, terminal base ATC180031 should be used.
CHP-NF-	PM4HF-		PM48SD	PM4HSD	

Timers

Discontinued models	Recommended substitutes	Attachment	Discontinued models	Recommended substitutes	Attachment
PM48W 	PM4H-W 	With exposed attachment, terminal base ATC180031 should be used.	LT48 (8-pin) 	LT4H (8-pin) 	
PM48W PMH-M 	PM4H-W- PM4H-M/PM4S 	The external dimension and contact capacity are different.	LT48 LT48W (8-pin) 	LT4H LT4H-L LT4H-W (8-pin) 	
PMH-M- CDX Time relay 	PM4HM-/PM4S- S1DXM-A Timer/ S1DX Timer 		LT48W LT48W (8-pin) 	LT4HW LT4H-W (8-pin) 	
CDX PDX Timer 	S1DXM-A Timer/ S1DX Timer 		ATC18003 DIN rail socket (8-pin) 	ATC180031 DIN rail socket (8-pin) 	
PDX VHP digital high-power timer 	S1DXM-A Timer/ S1DX Timer 		ATC18004 DIN rail socket (11-pin) 	ATC180041 DIN rail socket (11-pin) 	
VHP QM48S (8-pin) 	QM4H digital timer QM4H (8-pin) 	The size is different. Compact size ↓ DIN48			
QM48S QM72S (Screw terminal) 	QM4H QM4H (8-pin) 	The size is different. □72 ↓ □48			
QM72S	QM4H				

In some cases, the specifications of the recommended substitutes are not exactly the same as those of the discontinued model. Please confirm the specifications before using the recommended substitutes.

Counters		
Discontinued models	Recommended substitutes	Attachment
MC electromagnetic counters  MC6	LC4H  LC4H LC4H-L	The size and attachment method are different. The input method is different. (Voltage input → non-voltage input)
LC48 (Relay type: 8-pin Tr type: 11-pin)  LC48	LC4H (Relay type: 8-pin Tr type: 11-pin)  LC4H LC4H-L	
LC48W (11-pin)  LC48W	LC4H-W (11-pin)  LC4H-W	
EM48S (8-pin)  EM48S	LC4H (8-pin)  LC4H LC4H-L	
EM72S (Screw terminal)  EM72S	LC4H (Screw terminal)  LC4H LC4H-L	The size is different. <input type="checkbox"/> 72 ↓ <input type="checkbox"/> 48
LC24 Panel-mounting type  <ul style="list-style-type: none"> • One-touch installation type LC24 	LC2H Panel-mounting type   <ul style="list-style-type: none"> • One-touch installation type • Installation frame type LC2H 	The both one-touch installation type and installation frame type are available.
LC24 PC board mounting type  LC24	LC2H PC board mounting type  LC2H	

Hour meters		
Discontinued models	Recommended substitutes	Attachment
 TH11* TH12*	 TH141S TH142S	Body Round type (attachment hole $\phi 45$) ↓ Square type (attachment hole $\square 45$)
 TH21* TH22*	 TH241S TH242S	Body Square type (attachment hole $\square 47$) ↓ Square type (attachment hole $\square 45$)
TH30  TH30	LT4H (~999.9 h)  LT4H LT4H-W (~9999 h)  LT4HW	The size and attachment method are different. The input method is different. (Voltage input → non-voltage input)
LH24 Panel-mounting type  <ul style="list-style-type: none"> • One-touch installation type LH24 	LH2H Panel-mounting type   <ul style="list-style-type: none"> • One-touch installation type • Installation frame type LH2H 	The both one-touch installation type and installation frame type are available.
LH24 PC board mounting type  LH24	LH2H PC board mounting type  LH2H	

In some cases, the specifications of the recommended substitutes are not exactly the same as those of the discontinued model. Please confirm the specifications before using the recommended substitutes.

FOREIGN SPECIFICATIONS OVERVIEW

1. International Standards

IEC standard

International Electrotechnical Commission

By promoting international cooperation toward all problems and related issues regarding standardization in the electrical and electronic technology fields, the IEC, a non-governmental organization, was started in October, 1908, for the purpose of realizing mutual understanding on an international level. To this end, the IEC standard was enacted for the purpose of promoting international standardization.

2. North America

UL (Underwriters Laboratories Inc.)

This is a non-profit testing organization formed in 1894 by a coalition of U.S. fire insurance firms, which tests and approves industrial products (finished products). When electrical products are marketed in the U.S., UL approval is mandated in many states, by state law and city ordinances. In order to obtain UL approval, the principal parts contained in industrial products must also be UL-approved parts.

UL approval is divided into two general types. One is called "listing" (Fig. 1), and applies to industrial products (finished products). Under this type of approval, products must be approved unconditionally. The other type is called "recognition" (Fig. 2), and is a conditional approval which applies to parts and materials.

LISTING MARK



Fig. 1

RECOGNITION MARK



Fig. 2

Certification



Fig. 3

Component Acceptance



Fig. 4



Fig. 5



Fig. 6

CSA (Canadian Standards Association)

This was established in 1919 as a non-profit, non-governmental organization aimed at promoting standards. It sets standards for industrial products, parts, and materials, and has the authority to judge electrical products to determine whether they conform to those standards. The CSA is the ultimate authority in the eyes of both the government and the people in terms of credibility and respect. Almost all states and provinces in Canada require CSA approval by law, in order to sell electrical products. As a result, electrical products exported from Japan to Canada are not approved under Canadian laws unless they have received CSA approval and display the CSA mark. Approval is called "certification", and products and parts which have been approved are called "certified equipment", and display the mark shown in Fig. 3. The mark shown in Fig. 4 is called the "Component Acceptance" mark, and indicates conditional approval which is applicable to parts. The C-UL mark shown in Fig. 5 (finished products) and Fig. 6 (parts) indicates that the product has been tested and approved in UL laboratories, based on UL and CSA standards, through mutual approval activities.

3. Europe

EN standard

European Standards/Norme Europeennee (France)/Europaishe Norm (Germany)

Abbreviation for European Standards. A unified standard enacted by CEN/CENELEC (European Standards Committee/European Electrical Standards Committee). EU and EFTA member nations employ the content of the EN standards into their own national standards and are obligated to abolish those national standards that do not agree with the EN standards.

(1) Germany



VDE (Verband Deutscher Elektrotechniker)

The VDE laboratory was established mainly by the German Electric Technology Alliance, which was formed in 1893. It carries out safety experiments and passes approval for electrical devices and parts. Although VDE certification is not enforced under German law, punishment is severe should electrical shock or fire occur; therefore, it is, in fact, like an enforcement.



TÜV (Technischer Überwachungs-Verein)

TÜV is a civilian, non-profit, independent organization that has its roots in the German Boiler Surveillance Association, which was started in 1875 for the purpose of preventing boiler accidents. A major characteristic of TÜV is that it exists as a combination of 14 independent organizations (TÜV Rheinland, TÜV Bayern, etc.) throughout Germany. TÜV carries out inspection on a wide variety of industrial devices and equipment, and has been entrusted to handle electrical products, as well, by the government. TÜV inspection and certification is based mainly on the VDE standard. TÜV certification can be obtained from any of the 14 TÜVs throughout Germany and has the same effectiveness as obtaining VDE certification.

4. Shipping Standards

(1) Lloyd's Register of Shipping



Standards from the Lloyd's Register shipping association based in England. These standards are safety standards for environmental testing of the temperature and vibration tolerances of electrical components used for UMS (unmanned machine rooms in marine vessels) applications. These standards have become international standards for control equipment in all marine vessel applications. No particular action is taken to display the conformation to these standards on the products.

5. Pilot Duty

One of the specifications in the “UL508 Industrial Control Equipment” regulations at UL (Underwriters Laboratories Inc.), has to do with the grade of contact control capacity by NEMA (National Electrical Manufacturers Association) standards. By obtaining both UL and CSA approval for this grade, the product becomes authorized publicly.

Pilot Duty A300

AC applied voltage [V]	Electrification current [A]	Input power [A]	Breaker power [A]	[VA]	
				During input	During breaker
120	10	60	6	7,200	720
240		30	3	7,200	720

Pilot Duty B300

AC applied voltage [V]	Electrification current [A]	Input power [A]	Breaker power [A]	[VA]	
				During input	During breaker
120	5	30	3	3,600	360
240		15	1.5	3,600	360

Pilot Duty C300

AC applied voltage [V]	Electrification current [A]	Input power [A]	Breaker power [A]	[VA]	
				During input	During breaker
120	2.5	15	1.5	1,800	180
240		7.5	0.7	1,800	180

FOREIGN SPECIFICATIONS

TIMER

Products Name	Recognized by UL Standards		Certified by CSA Standards		Lloyd's Register Standards		Remarks	
	File No.	Recognized rating	File No.	Certified rating	File No.	Certified rating		
PM4S	E43149	5A250VAC PILOT DUTY C300	E43149 (C-UL)	5A250VAC PILOT DUTY C300	—	—		
PM4H-A PM4H-S PM4H-M PM4H-SD PM4H-W	E122222	5A250VAC PILOT DUTY C300	LR39291	5A250VAC PILOT DUTY C300	98/10004	5A 250V AC (resistive)		
PM4H-F	E122222	3A250VAC PILOT DUTY C300	LR39291	3A250VAC PILOT DUTY C300	98/10004	3A 250V AC (resistive)		
LT4H LT4H-L LT4H-W	E122222	5A250VAC PILOT DUTY C300 100mA30VDC	E122222 (C-UL)	5A250VAC PILOT DUTY C300 100mA30VDC	—	—		
QM4H	E43149	5A250VAC PILOT DUTY C300	E43149 (C-UL)	5A250VAC PILOT DUTY C300	—	—		
PMH	E59504	7A1/6HP125VAC 7A1/6HP250VAC 3A30VDC PILOT DUTY C300	LR39291	7A1/6HP125VAC 7A1/6HP250VAC 3A30VDC PILOT DUTY C300	88/10123	125V3.5A (COS $\phi \approx 0.4$) 250V2A (COS $\phi \approx 0.4$) 250V7A (COS $\phi \approx 1.0$)	"The standard models conform to the UL/CSA standard. (To place an order, you do not need to specify the tailing character [9] of each item number.)" The standard models conform to the LLOYD standard.	
MHP MHP-M	E59504	5A250VAC	LR39291	5A250VAC	88/10123	250V5A (COS $\phi \approx 1.0$)	"The standard models conform to the UL/CSA standard. (To place an order, you do not need to specify the tailing character [9] of each item number.)"	
S1DXM-A/M (Relay output)	2C	E122222	7A125VAC 6A250VAC 1/6HP125, 250VAC PILOT DUTY C300	LR39291	7A125VAC 6A250VAC 1/6HP125, 250VAC PILOT DUTY C300	98/10004	7A 250V AC (resistive)	
	4C	E122222	5A250VAC 1/10HP125, 250VAC PILOT DUTY C300	LR39291	5A250VAC 1/10HP125, 250VAC PILOT DUTY C300	98/10004	5A 250V AC (resistive)	
S1DX (Relay output)	2C	E122222	7A125VAC 6A250VAC 1/6HP125, 250VAC PILOT DUTY C300	LR39291	7A125VAC 6A250VAC 1/6HP125, 250VAC PILOT DUTY C300	98/10004	7A 250V AC (resistive)	
	4C	E122222	5A250VAC 1/10HP125, 250VAC PILOT DUTY C300	LR39291	5A250VAC 1/10HP125, 250VAC PILOT DUTY C300	98/10004	5A 250V AC (resistive)	
PM5S-A PM5S-S PM5S-M	E59504 (C-UL)	5A250VAC PILOT DUTY C300	E59504 (C-UL)	5A250VAC PILOT DUTY C300	—	—		

Accessories

Products Name	Recognized by UL Standards		Certified by CSA Standards		Lloyd's Register Standards		Remarks
	File No.	Recognized rating	File No.	Certified rating	File No.	Certified rating	
Common mounting tracks for timers	E59504	10A250VAC AT8-RFD (AT78039) 7A250VAC AT8-DF8L (ATA48211) 8P cap was an approved as an option. AD8-RC (AD8013)	LR39291	10A250VAC AT8-RFD (AT78039) 7A250VAC AT8-DF8L (ATA48211) 8P cap was an approved as an option. AD8-RC (AD8013)	—	—	
	E148103	AT8-DF8K (ATC180031) AT8-DF11K (ATC180041) AT8-R8K (AT78041) AT8-R11K (AT78051)	E148103 (C-UL)	AT8-DF8K (ATC180031) AT8-DF11K (ATC180041) AT8-R8K (AT78041) AT8-R11K (AT78051)	—	—	

FOREIGN SPECIFICATIONS

Counters

Product name	UL recognized		CSA certified		Remarks
	File No.	Approved ratings	File No.	Approved ratings	
LC4H LC4H-L LC4H-S	E122222	5A250V AC PILOT DUTY C300 100mA 30V DC	E122222 (C-UL)	5A250V AC PILOT DUTY C300 100mA 30V DC	
LC4H-W	E122222	3A250V AC PILOT DUTY C300 100mA 30V DC	E122222 (C-UL)	3A250V AC PILOT DUTY C300 100mA 30V DC	
LC2H	E122222	24-240 V AC/DC 4.5-30 V DC 3 V DC	E122222 (C-UL)	24-240 V AC/DC 4.5-30 V DC 3 V DC	
LC2H preset	E122222	24-240 V AC/DC 4.5-30 V DC 3 V DC	E122222 (C-UL)	24-240 V AC/DC 4.5-30 V DC 3 V DC	

Hour Meters

Product name	UL recognized		CSA certified		Remarks
	File No.	Approved ratings	File No.	Approved ratings	
TH13 · TH23 series	E42876	115-120, 220, 240V AC	LR39291	115-120, 220, 240V AC	• For UL-recognized and CSA-certified products, specify "U" at the end of the part No.
TH14 · TH24 series	E42876	12, 24, 48, 100, 110, 115-120, 200, 220, 240V AC	LR39291	12, 24, 48, 100, 110, 115-120, 200, 220, 240V AC	• Only black panel-mounting type UL-recognized and CSA-certified. • For UL-recognized and CSA-certified products, specify "U" at the end of the product code. • Panel-mounting silver type not UL-recognized nor CSA-certified.
TH63 · 64 series	E42876	12, 24, 48, 100, 110, 115-120, 200, 220, 240V AC	LR39291	12, 24, 48, 100, 110, 115-120, 200, 220, 240V AC	• Standard products are UL-recognized and CSA-certified.
LH2H	E122222	24-240 V AC/DC 4.5-30 V DC 3 V DC	E122222 (C-UL)	24-240 V AC/DC 4.5-30 V DC 3 V DC	• Standard products are UL-recognized and CSA-certified.
LH2H preset	E122222	24-240 V AC/DC 4.5-30 V DC 3 V DC	E122222 (C-UL)	24-240 V AC/DC 4.5-30 V DC 3 V DC	• Standard products are UL-recognized and CSA-certified.
TH8 series	E42876	12 V DC 24 V DC	E42876 (C-UL)	12 V DC 24 V DC	• Standard products are UL-recognized and CSA-certified.

Accessories

Product name	UL-recognized		CSA certified		Remarks
	File No.	Rating	File No.	Rating	
Common counter fixtures	E59504	10A250V AC AT8-RFD (AT78039) 7A250V AC AT8-DF8L (ATA48211) 8P cap CSA-certified as option. AD8-RC (AD8013)	LR26550	10A250V AC AT8-RFD (AT78039) 7A250V AC AT8-DF8L (ATA48211) 8P cap UL-listed as option. AD8-RC(AD8013)	
	E148103	AT8-DF8K (ATC180031) AT8-DF11K (ATC180041) AT8-R8K (AT78041) AT8- R11K (AT78051)	E148103 (C-UL)	AT8-DF8K (ATC180031) AT8-DF11K (ATC180041) AT8-R8K (AT78041) AT8- R11K (AT78051)	

CE MARKINGS OVERVIEW

Counter, Hour Meter conforming to EN/IEC standards

The Timer, Counter, Hour Meter shown below conform to both EN and IEC standards, and may display the CE markings.

Product classification	Product name	EMC directives	Low-voltage directives
Timers	LT4H	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LT4H-L	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LT4H-W	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	PM4H	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	S1DX	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	S1DXM-A/M	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	PM4S	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	PM5S	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	QM4H	EN 61000-6-4/EN 61000-6-2	EN 61010-1
Time Switch	A-TB72	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	A-TB72Q	EN 61000-6-4/EN 61000-6-2	EN 61812-1
Counters	LC4H	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LC4H-L	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LC4H-S	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LC4H-W	EN 61000-6-4/EN 61000-6-2	EN 61812-1
	LC2H	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	LC2H preset	EN 61000-6-4/EN 61000-6-2	—
Hour Meters	TH13	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH23	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH14	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH24	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH40	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH50	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH63	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	TH64	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	LH2H	EN 61000-6-4/EN 61000-6-2	EN 61010-1
	LH2H preset	EN 61000-6-4/EN 61000-6-2	—
	TH8	EN 61000-6-4/EN 61000-6-2	—

What are EN standards?

An abbreviation of Norme Europeenne (in French), and called European Standards in English. Approval is by vote among the CEN/CENELEC member countries, and is a unified standards limited to EU member countries, but the contents conform to the international ISO/IEC standards.

If the relevant EN standard does not exist, it is necessary to obtain approval based on the relevant IEC standard or, if the relevant IEC standard does not exist, the relevant standard from each country, such as VDE, BS, SEMKO, and so forth.

CE markings and EC directives

The world's largest single market, the European Community (EC) was born on 1 January 1993 (changing its name to EU in November 1993. It is now always expressed as EU, apart from EC directives.) EU member country products have always had their quality and safety guaranteed according to the individual standards of each member country. However, the standards of each country being different prevented the free flow of goods within the EU. For this reason, in order to eliminate non-tariff barriers due to these standards, and to maximize the merits of EU unification, the EC directives were issued concomitant to the birth of the EU.

The EN standards were established as universal EU standards in order to facilitate EU directives. These standards were merged with the international IEC standards and henceforth reflect the standards in all countries. Also, the CE markings show that products conform to EC directives, and guarantee the free flow of products within the EC.

Appropriate EC directives for control equipment products

The main EC directives that are to do with machinery and electrical equipment are the machinery directive, the EMC directive, the low voltage directive, and the telecom directive. Although these directives have already been issued, the date of their enactment is different for each one. The machinery directive was 1 January 1995. The EMC directive was 1 January 1996, and the low voltage directive was enacted from 1 January 1997. The telecom directive was established by the separate CTR (Common Technology References.)