Panasonic
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’06–’07

S1DXM Timers

Timers/Time Switches/Counters/Hour Meters

Timers/Time Switches/Counters/Hour Meters
ARCT1B274E ’06.10

Matsushita Electric Works, Ltd.

Panasonic
ideas for life

MULTI-RANGE ANALOG TIMER

S1DXM-A/M Timers

UL File No.: E122222
C-UL File No.: E122222

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

FEATURES

1. Multiple functions built in
The operation mode and time range can be switched by using the MODE and RANGE switches on the front panel.
2. Part number consolidation
1) The lineup consists of 64 easy-to-choose models.
2) An operation mode fixed type (S1DXM-A) and 4-operation mode switching type (S1DXM-M) are available.
3. Cadmium-free contacts used
To eliminate environmentally harmful chemical substances, relays with cadmium-free contacts are used.
4. Economically priced
1) Prices set to lower costs.
2) Further cost reduction when used with HJ Relay terminal socket.
5. CE marking supported
UL and C-UL approved.

PRODUCT TYPES

1. S1DXM-A multi-range timer
No MODE switch, Operation mode (fixed): Power ON-delay

Operating voltage	Time range	Timed-out 2 Form C	Timed-out 4 Form C
		Part number	Part number
12V DC	0.05 s to 10 min	S1DXM-A2C10M-DC12V	S1DXM-A4C10M-DC12V
	0.2 s to 30 min	S1DXM-A2C30M-DC12V	S1DXM-A4C30M-DC12V
	0.5 s to 60 min	S1DXM-A2C60M-DC12V	S1DXM-A4C60M-DC12V
	0.05 min to 10 hr	S1DXM-A2C10H-DC12V	S1DXM-A4C10H-DC12V
24V DC	0.05 s to 10 min	S1DXM-A2C10M-DC24V	S1DXM-A4C10M-DC24V
	0.2 s to 30 min	S1DXM-A2C30M-DC24V	S1DXM-A4C30M-DC24V
	0.5 s to 60 min	S1DXM-A2C60M-DC24V	S1DXM-A4C60M-DC24V
	0.05 min to 10 hr	S1DXM-A2C10H-DC24V	S1DXM-A4C10H-DC24V
24V AC	0.05 s to 10 min	S1DXM-A2C10M-AC24V	S1DXM-A4C10M-AC24V
	0.2 s to 30 min	S1DXM-A2C30M-AC24V	S1DXM-A4C30M-AC24V
	0.5 s to 60 min	S1DXM-A2C60M-AC24V	S1DXM-A4C60M-AC24V
	0.05 min to 10 hr	S1DXM-A2C10H-AC24V	S1DXM-A4C10H-AC24V
100 to 120V AC	0.05 s to 10 min	S1DXM-A2C10M-AC120V	S1DXM-A4C10M-AC120V
	0.2 s to 30 min	S1DXM-A2C30M-AC120V	S1DXM-A4C30M-AC120V
	0.5 s to 60 min	S1DXM-A2C60M-AC120V	S1DXM-A4C60M-AC120V
	0.05 min to 10 hr	S1DXM-A2C10H-AC120V	S1DXM-A4C10H-AC120V
200 to 220V AC	0.05 s to 10 min	S1DXM-A2C10M-AC220V	S1DXM-A4C10M-AC220V
	0.2 s to 30 min	S1DXM-A2C30M-AC220V	S1DXM-A4C30M-AC220V
	0.5 s to 60 min	S1DXM-A2C60M-AC220V	S1DXM-A4C60M-AC220V
	0.05 min to 10 hr	S1DXM-A2C10H-AC220V	S1DXM-A4C10H-AC220V
220 to 240V AC	0.05 s to 10 min	S1DXM-A2C10M-AC240V	S1DXM-A4C10M-AC240V
	0.2 s to 30 min	S1DXM-A2C30M-AC240V	S1DXM-A4C30M-AC240V
	0.5 s to 60 min	S1DXM-A2C60M-AC240V	S1DXM-A4C60M-AC240V
	0.05 min to 10 hr	S1DXM-A2C10H-AC240V	S1DXM-A4C10H-AC240V

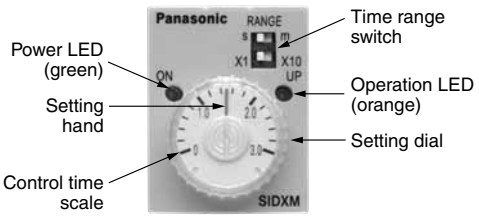
2. S1DXM-M multi-range timer

With MODE switch, Operation mode (switchable): Power ON-delay, Power Flicker ON start, Power Flicker OFF start, Power One-shot

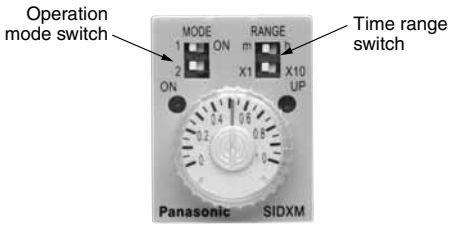
Operating voltage	Time range	Timed-out 2 Form C	Timed-out 4 Form C
		Part number	Part number
12V DC	0.05 s to 10 min	S1DXM-M2C10M-DC12V	S1DXM-M4C10M-DC12V
	0.2 s to 30 min	S1DXM-M2C30M-DC12V	S1DXM-M4C30M-DC12V
	0.5 s to 60 min	S1DXM-M2C60M-DC12V	S1DXM-M4C60M-DC12V
	0.05 min to 10 hr	S1DXM-M2C10H-DC12V	S1DXM-M4C10H-DC12V
24V DC	0.05 s to 10 min	S1DXM-M2C10M-DC24V	S1DXM-M4C10M-DC24V
	0.2 s to 30 min	S1DXM-M2C30M-DC24V	S1DXM-M4C30M-DC24V
	0.5 s to 60 min	S1DXM-M2C60M-DC24V	S1DXM-M4C60M-DC24V
	0.05 min to 10 hr	S1DXM-M2C10H-DC24V	S1DXM-M4C10H-DC24V
24V AC	0.05 s to 10 min	S1DXM-M2C10M-AC24V	S1DXM-M4C10M-AC24V
	0.2 s to 30 min	S1DXM-M2C30M-AC24V	S1DXM-M4C30M-AC24V
	0.5 s to 60 min	S1DXM-M2C60M-AC24V	S1DXM-M4C60M-AC24V
	0.05 min to 10 hr	S1DXM-M2C10H-AC24V	S1DXM-M4C10H-AC24V
100 to 120V AC	0.05 s to 10 min	S1DXM-M2C10M-AC120V	S1DXM-M4C10M-AC120V
	0.2 s to 30 min	S1DXM-M2C30M-AC120V	S1DXM-M4C30M-AC120V
	0.5 s to 60 min	S1DXM-M2C60M-AC120V	S1DXM-M4C60M-AC120V
	0.05 min to 10 hr	S1DXM-M2C10H-AC120V	S1DXM-M4C10H-AC120V
200 to 220V AC	0.05 s to 10 min	S1DXM-M2C10M-AC220V	S1DXM-M4C10M-AC220V
	0.2 s to 30 min	S1DXM-M2C30M-AC220V	S1DXM-M4C30M-AC220V
	0.5 s to 60 min	S1DXM-M2C60M-AC220V	S1DXM-M4C60M-AC220V
	0.05 min to 10 hr	S1DXM-M2C10H-AC220V	S1DXM-M4C10H-AC220V
220 to 240V AC	0.05 s to 10 min	S1DXM-M2C10M-AC240V	S1DXM-M4C10M-AC240V
	0.2 s to 30 min	S1DXM-M2C30M-AC240V	S1DXM-M4C30M-AC240V
	0.5 s to 60 min	S1DXM-M2C60M-AC240V	S1DXM-M4C60M-AC240V
	0.05 min to 10 hr	S1DXM-M2C10H-AC240V	S1DXM-M4C10H-AC240V

PART NAMES

S1DXM-A



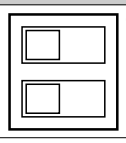
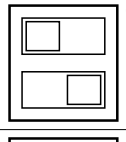
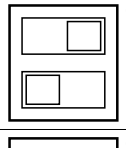
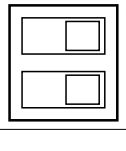
S1DXM-M

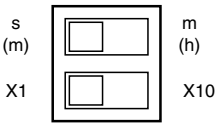


- [RANGE] Time range switch
  (4 different time ranges can be switched.)
  10M type: 1 s/10 s/1 min/10 min
  30M type: 3 s/30 s/3 min/30 min
  60M type: 6 s/60 s/6 min/60 min
  10H type: 1 min/10 min/1 hr/10 hr

- [MODE] Operation mode switch
  (4 different operation modes can be switched.)
  Power ON-delay
  Power Flicker OFF start
  Power Flicker ON start
  Power One-shot

OPERATION MODE AND TIME RANGE SETTING

Operation mode	Operation mode switch
Power ON-delay	
Power Flicker OFF start	
Power Flicker ON start	
Power One-shot	

Time range switch


The time setting can be switched among 4 ranges each for 4 types for an interval between 0.05 seconds and 10 hours.

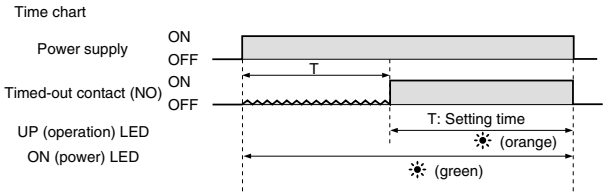
Notes: 1. The product is factory shipped with all settings on the OFF side (left).
2. Do not operate the switches with a sharp-edged object such as a knife blade.
3. The power must be turned off when setting the time range or operation mode. Operating the switches with the power on is a cause of breakdown and malfunction.
4. Use a force of under 5 N to operate the DIP switches when setting the time range and operation mode.

OPERATION MODE

1. S1DXM-A multi-range timer

Power ON-delay operation

• When power is turned on, the output contact operates after the set time. The output contact remains on until the power is turned off.

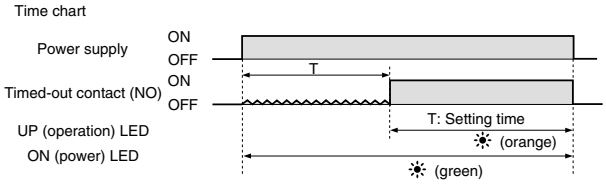


2. S1DXM-M multi-range timer

Power ON-delay operation

[MODE] switch 1: OFF, switch 2: OFF

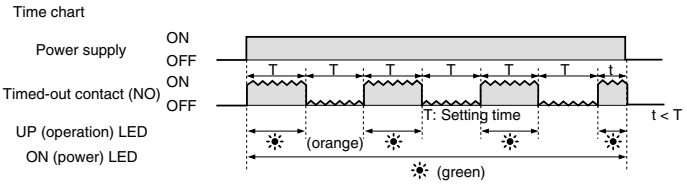
• When power is turned on, the output contact operates after the set time. The output contact remains on until the power is turned off.



Power Flicker ON start operation

[MODE] switch 1: ON, switch 2: OFF

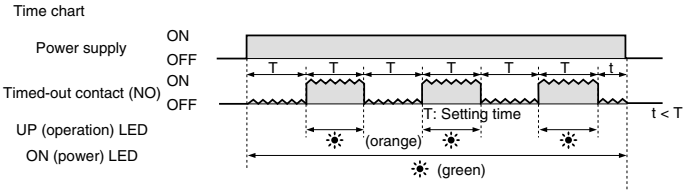
• When power is turned on, the output contact operates repeatedly at the set time. The output contact outputs at the same time power turns on.



Power Flicker OFF start operation

[MODE] switch 1: OFF, switch 2: ON

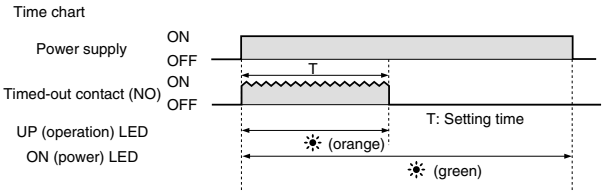
• When the power is turned on, the output contacts repeatedly operate at the set time. The output contact begins from the off state.



Power One-shot operation

[MODE] switch 1: ON, switch 2: ON

When power is turned on, the output contact performs the on operation at the same time power turns on, only for the set time.



TIME RANGE SETTING

Type		Time scale		Time unit		Min. scale	Max. scale	Setting range			
S1DXM-A	10M type	X1	X10	s	m	0.05	1	0.05 to 1s	0.5 to 10s	0.05 to 1m	0.5 to 10m
	30M type			s	m	0.2	3	0.2 to 3s	2 to 30s	0.2 to 3m	2 to 30m
	60M type			s	m	0.5	6	0.5 to 6s	5 to 60s	0.5 to 6m	5 to 60m
	10H type			m	h	0.05	1	0.05 to 1m	0.5 to 10m	0.05 to 1h	0.5 to 10h
S1DXM-M	10M type	X1	X10	s	m	0.05	1	0.05 to 1s	0.5 to 10s	0.05 to 1m	0.5 to 10m
	30M type			s	m	0.2	3	0.2 to 3s	2 to 30s	0.2 to 3m	2 to 30m
	60M type			s	m	0.5	6	0.5 to 6s	5 to 60s	0.5 to 6m	5 to 60m
	10H type			m	h	0.05	1	0.05 to 1m	0.5 to 10m	0.05 to 1h	0.5 to 10h

Note: The time setting range is the combination of the time scale (X1 or X10) on the dial and the time unit (s, m, or h).
Example: When dial reads 1, time scale is X1 and time units is seconds, then it is 1 second.

ORDERING INFORMATION

Ex. S1DXM- [A] [2C] [30M] — [DC24V]

Operation mode	Control output arrangement	Time range	Operating voltage*
A M	2C: Timed-out 2 Form C 4C: Timed-out 4 Form C	10M: 0.05 s to 10 min 30M: 0.2 s to 30 min 60M: 0.5 s to 60 min 10H: 0.05 min to 10 hr	DC12V: 12 V DC DC24V: 24 V DC AC24V: 24 V AC AC120V: 100 to 120 V AC AC220V: 200 to 220 V AC AC240V: 220 to 240 V AC

* For other operating voltage types, please consult us.

SPECIFICATIONS

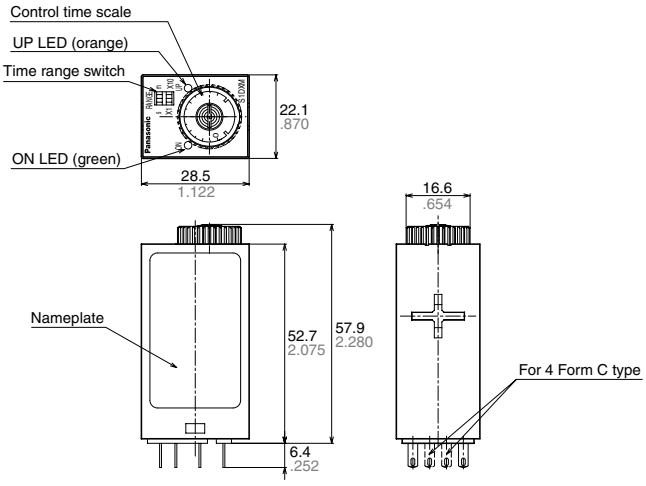
Item			Specifications					
Rating	Rated operating voltage		24VAC	100 to 120VAC	200 to 220VAC	220 to 240VAC	12VDC	24VDC
	Rated frequency		50/60Hz common				—	
	Rated power consumption		Max. 3 VA (at 24 VAC)	Max. 3 VA (at 100 VAC)	Max. 3 VA (at 200 VAC)	Max. 3 VA (at 220 VAC)	Max. 2 W (at 12 VDC)	Max. 2 W (at 24 VDC)
		During time delay	Approx. 3mA	Approx. 3mA	Approx. 3mA	Approx. 3mA	Approx. 5mA	Approx. 3mA
		After time delay	Approx. 80mA	Approx. 20mA	Approx. 13mA	Approx. 13mA	Approx. 70mA	Approx. 40mA
	Rated control capacity		Timed -out 2 Form C: 7A 250V AC (resistive load)					
			Timed -out 4 Form C: 5A 250V AC (resistive load)					
	Operation mode		S1DXM-A Power on delay operation fixed (Power display: ON/green; Operation display (when output is on): UP/orange)					
			S1DXM-M 4 switchable operations: Power ON-delay/Power Flicker OFF start/Power Flicker ON start/Power One-shot (Power display: ON/green; Operation display (when output is on): UP/orange)					
Time accuracy*1	Operating time fluctuation & Power off time change error		Max. ±1 %, (power off time change at the range of 0.1 s to 1 h), 1 s range: Max. ±1 % and 10 ms*2					
	Voltage error		Max. ±1 % (at the operating voltage changes between –20 to +10%), 1 s range: Max. ±1 % and 10 ms*2					
	Temperature error		Max. ±5% (at 20°C ambient temp. at the range of –10 to +50°C +14 to +122°F)					
	Setting error		Max. ±10%, 1 s range: Max. ±10% and 20 ms					
Contact	Contact arrangement		Timed-out 2 Form C, Timed-out 4 Form C					
	Contact resistance (Initial value)		Max. 100mΩ (at 1A, 6V DC)					
	Contact material		Timed-out 2 Form C type: Silver alloy, Au plating					
			Timed-out 4 Form C type: Silver alloy, Au plating					
Life	Mechanical (constant)		Min. 10^7					
	Electrical (constant)		2×10^5 (at rated control capacity)					
Mechanical	Vibration resistance	Functional	10 to 55Hz: 1 cycle/min double amplitude of 0.25mm (10min on 3 axes)					
		Destructive	10 to 55Hz: 1 cycle/min double amplitude of 0.375mm (1h on 3 axes)					
	Shock resistance	Functional	Min. 98m/s² (4 times on 3 axes)					
		Destructive	Min. 980m/s² (5 times on 3 axes)					
Electrical	Allowable operating voltage range		80 to 110% of rated operating voltage					
	Reset time		Max. 0.1s					
	Insulation resistance (Initial value)		Between live and dead metal parts, between input and output, between contact sets, between contacts Min. 100 MΩ (at 500 V DC megger)					
	Breakdown voltage (Initial value)		Between live and dead metal parts: 2,000 Vrms for 1 min Between input and output: 2,000 Vrms for 1 min Between contact sets: 2,000 Vrms for 1 min Between contacts: 1,000 Vrms for 1 min					
	Max. temperature rise		70°C 158°F					
Operating conditions	Ambient temperature		–10 to 50°C +14 to 122°F					
	Ambient humidity		35 to 85% RH (non-condensing)					
	Air pressure		860 to 1060 hPa					
	Ripple rate		DC type only, transmission wave rectification (ripple rate: approx. 48%)*3					
	Mass (Weight)		Approx. 45 g					
	Protective construction		IEC standard: IP40 (IP50 when using ADX18008 protective cover)					

Notes: *1. Unspecified measuring conditions are rated operating voltage (in case of DC type, ripple rate of 5% or less), ambient temp. 20°C 68°F, and power off time 1 second.
*2. Power one-shot 1 s range: +2% and 10 ms
*3. When using with a transmission wave rectification, vibration resistance and shock resistance properties worsen compared to when using a stabilized power supply.

DIMENSIONS

mm inch

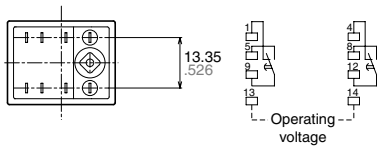
1. S1DXM-A



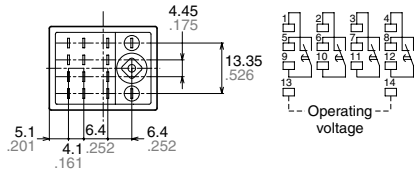
Tolerance: ±0.5 ±.020

Terminal layouts and Wiring diagram

Timed-out 2 Form C type

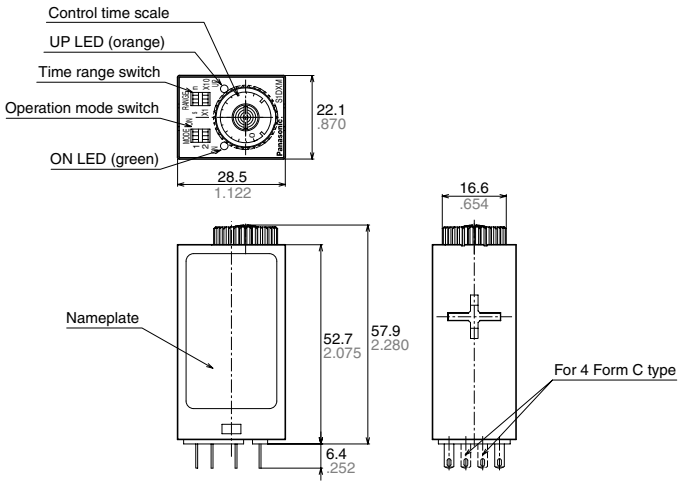


Timed-out 4 Form C type



* For the DC operating type, terminal 14 is "+" and terminal 13 is "–".

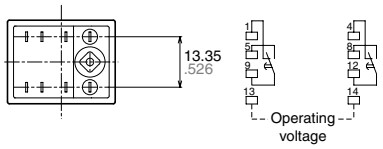
2. S1DXM-M



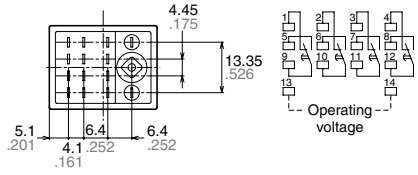
Tolerance: ±0.5 ±.020

Terminal layouts and Wiring diagram

Timed-out 2 Form C type



Timed-out 4 Form C type



* For the DC operating type, terminal 14 is "+" and terminal 13 is "–".

APPLICABLE STANDARD

Safety standard	EN61812-1	Pollution Degree 2/Overvoltage Category II (2 Form C type); Pollution Degree 1/Overvoltage Category II (4 Form C type)
EMC	(EMI)EN61000-6-4	
	Radiation interference electric field strength	EN55011 Group1 ClassA
	Noise terminal voltage	EN55011 Group1 ClassA
	(EMS)EN61000-6-2	
	Static discharge immunity	EN61000-4-2 4 kV contact 8 kV air
	RF electromagnetic field immunity	EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz) 10 V/m pulse modulation (895 MHz to 905 MHz)
	EFT/B immunity	EN61000-4-4 2 kV (power supply line) 1 kV (signal line)
	Surge immunity	EN61000-4-5 1 kV (power line)
	Conductivity noise immunity	EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz)
	Power frequency magnetic field immunity	EN61000-4-8 30 A/m (50 Hz)
	Voltage dip/Instantaneous stop/Voltage fluctuation immunity	EN61000-4-11 10 ms, 30% (rated voltage) 100 ms, 60% (rated voltage) 1,000 ms, 60% (rated voltage) 5,000 ms, 95% (rated voltage)

Precautions during usage

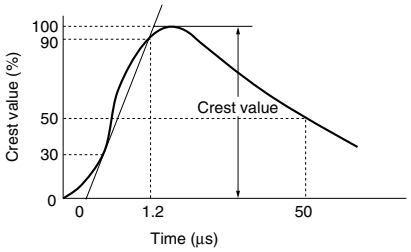
1. Reset periods

After unscheduled operations have been completed, or if the timer operation power supply has been turned off at any time during operation, a reset period of at least 0.1 seconds should be allowed before resuming operation.

2. External surge protection

External surge protection may be required if the following values are exceeded. Otherwise, the internal circuit will be damaged. 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.

• Single-pole, full-wave voltage for surge waveform [±(1.2 × 50) μs]



Operation voltage	Surge voltage
100 to 120V AC, 200 to 220V AC	4,000V
12V DC, 24V DC	1,000V

Since the main body cover and knob are made of polycarbonate resin, prevent contact with organic solvents such as methyl alcohol, benzine and thinner, or strong alkali materials such as ammonia and caustic soda.

3. Terminal wiring

Make sure that terminals are wired carefully and correctly, referring to the terminal layout and wiring diagrams. Particularly, since the DC type has polarity, do not operate it with reverse polarity.

4. Assembly

1) When installing, use a terminal socket or socket intended for the HC/HJ relay. For adjacent installations, be sure to first verify the installation conditions of the terminal sockets or sockets you will be using.

2) Use the separately-sold dedicated socket leaf holding clip to secure terminal sockets and sockets to the timer unit. The conditions of use for dedicated socket leaf holding clip will differ depending on the terminal socket or socket you will be using. Therefore, please test under actual conditions before putting into operation.

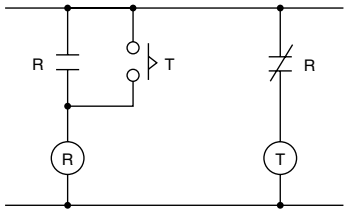
3) If terminals are to be soldered directly, please hand solder with a 30 to 60 W solder iron with a tip temperature of 300°C for no more than 3 seconds. Automatic soldering should be avoided.

4) A flux-tight construction is not used with this timer, so be careful that flux or cleaning fluid does not get inside the case.

5) To assure that characteristics are maintained, do not remove the case.

5. Long Continuous Current Flow

Long continuous current flow through the timer 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. (Refer to the circuit diagram below when using a safety circuit for continuous operation.)



6. Phase synchronization using AC load

If the turning on of the timer output relay is synchronized to the AC power supply phase, there may be times when the service life is shortened because of electrical factors, or when a locking phenomenon (defective relay return) occurs because of contact point welding or a shift in the contact relay. Check the operation using the actual timer.

7. Acquisition of CE marking

Please abide by the conditions below when using in applications that comply with EN61812-1.

1) Overvoltage category II, pollution level 2 (2 Form C type)
   Overvoltage category II, pollution level 1 (4 Form C type)

2) The load connected to the output contact should have basic insulation. This timer is protected with basic insulation and can be double-insulated to meet EN/IEC requirements by using basic insulation on the load.

3) Please use a power supply that is protected by an overcurrent protection device which complies with the EN/IEC standard (example: 250 V 1 A fuse, etc.).

4) You must use a terminal socket or socket for the installation. Do not touch the terminals or other parts of the timer when it is powered. When installing or un-installing, make sure that no voltage is being applied to any of the terminals.

5) Do not use this timer as a safety circuit. For example when using a timer in a heater circuit, etc., provide a protection circuit on the machine side.

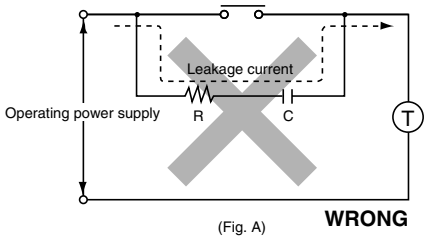
8. Others

1) When setting the time, the dial should be kept within the range indicated on the dial face. The “0” marking on the dial indicates the minimum time during which the control time can be varied (it does not indicate 0 seconds).

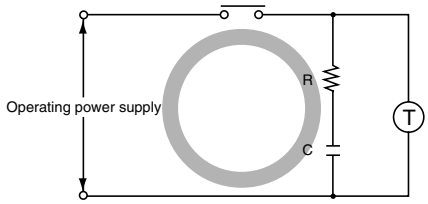
2) Do not rotate the knob past the stopper.

3) Turn off the power before changing the DIP switch settings. Changing the DIP switch with the power on can cause breakdown.

4) When connecting the operating power supply, make sure that no leakage current enters the timer. For example, when performing contact protection, if set up like that of fig. A, leaking current will pass through C and R, enter the timer, and cause incorrect operation. The fig. B shows the correct setup.



(Fig. A)

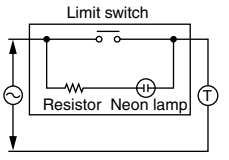


(Fig. B)

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 value below shall be connected in series with the lamp.

100 to 120V AC operating type:
Min. 33kΩ

200 to 220V AC operating type:
Min. 82kΩ



Example of limit switches with lamp.
VL with lamp, Vertical type with lamp, ML with lamp.

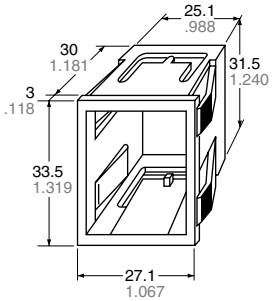
S1DXM-A/M/S1DX COMMON OPTIONS

ACCESSORY Note: Accessories are the same as those for the S1DX timer.

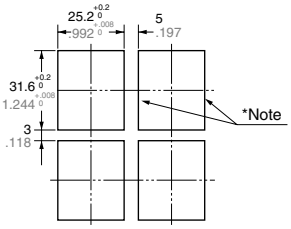
• Mounting frame

ADX18002 (Titanium-gray)
ADX18006 (Gray)
ADX18007 (Black)

Appearance

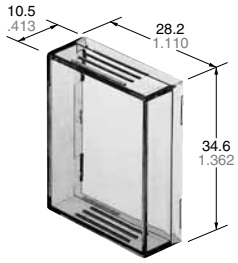


Panel cutout dimensions



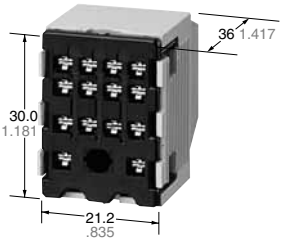
Board thickness 1 to 3 mm
Note: Make sure the holes area stays as right angles.

• Protective cover



ADX18008

• Cap block

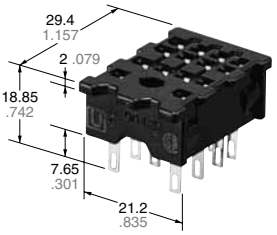


ADX18011

• Cap

ADX18004

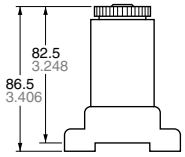
• Socket



ADX18003

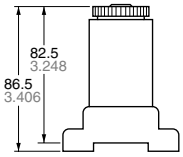
TERMINAL SOCKET

• HC2 slim DIN terminal socket



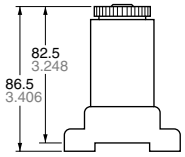
HC2-SFD-S

• HC2 DIN high terminal socket



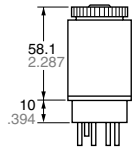
HC2-SFD-K

• HC4 DIN high terminal socket



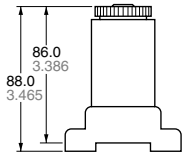
HC4-SFD-K

• HC4 socket



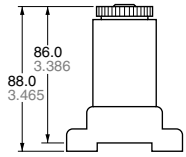
HC4-SS-K

• HJ2 terminal socket



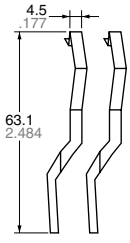
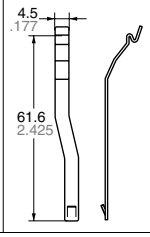
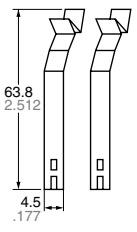
HJ2-SFD/HJ2-SFD-S

• HJ4 terminal socket

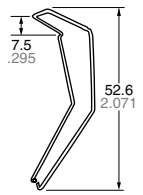


HJ4-SFD/HJ4-SFD-S

SOCKET LEAF HOLDING CLIP

ADX18001		ADX18012		AD68002	
Figure	Dimensions	Figure	Dimensions	Figure	Dimensions
					
(2 pieces per set)		(2 pieces per set)		(2 pieces per set)	

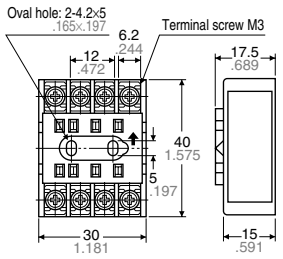
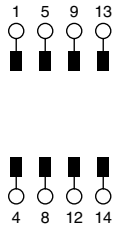
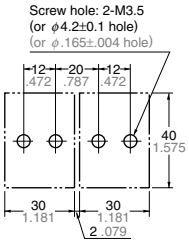
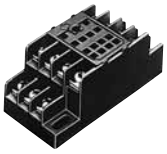
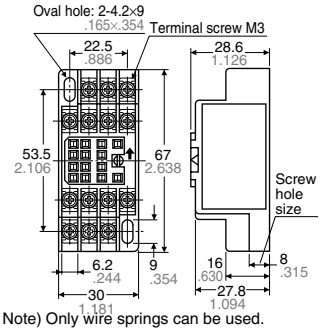
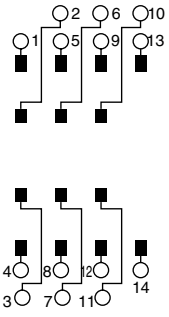
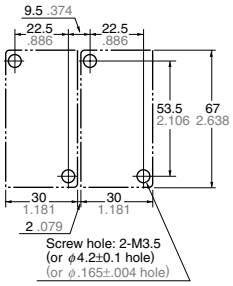
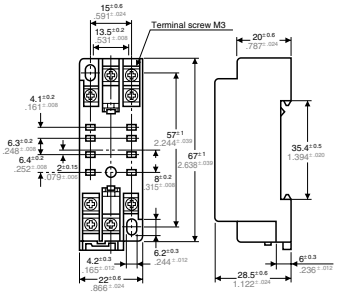
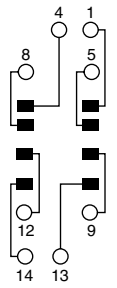
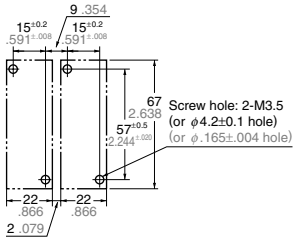
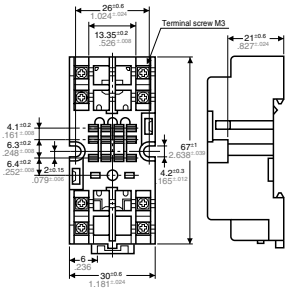
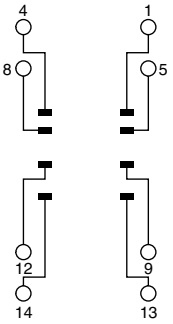
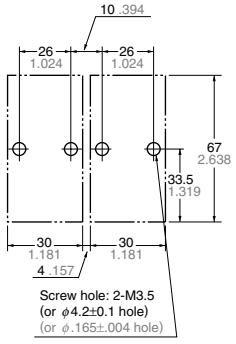
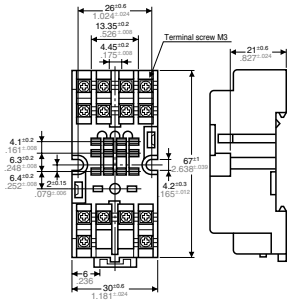
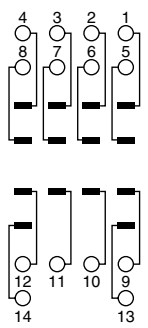
SOCKET LINE HOLDING CLIP FOR S1DXM-A/M

ADX28005
Dimensions


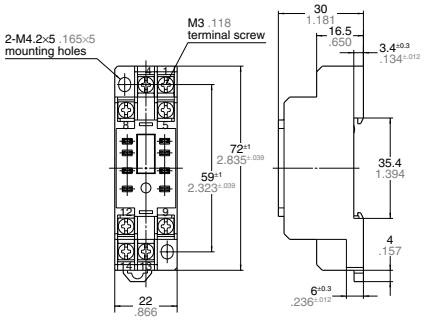
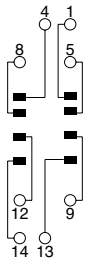
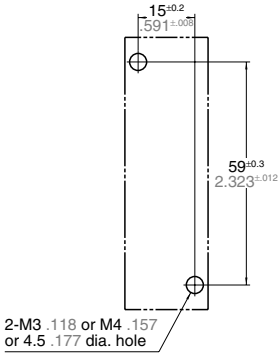
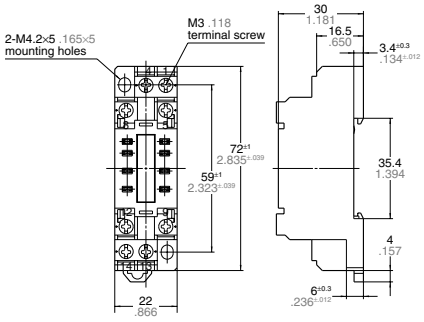
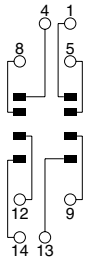
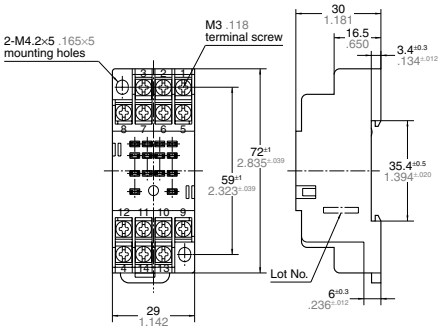
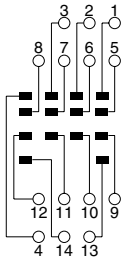
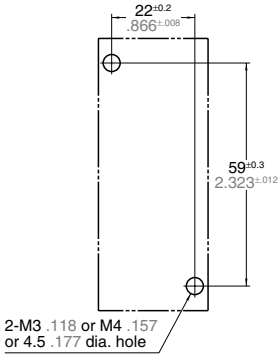
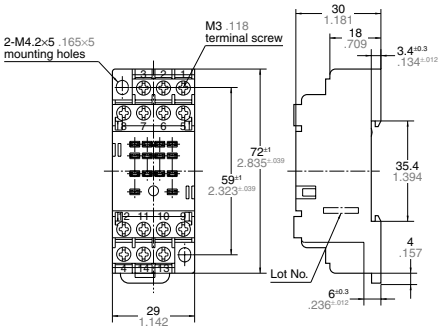
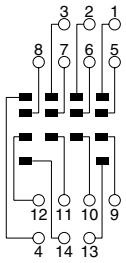
Terminal socket	Type	Application			
		ADX18001	ADX18012	AD68002	ADX28005
For HC relay	HC2-SFD-S	—	—	○	○
	HC2-SFD-K	○	—	Δ	○
	HC4-SFD-K	○	—	Δ	○
For HJ relay	HJ2-SFD	—	○	—	—
	HJ2-SFD-S	—	○	—	—
	HJ4-SFD	—	Δ	—	—
	HJ4-SFD-S	—	Δ	—	—

Note: The triangles indicate that removal will be slightly difficult when installed laterally in succession.

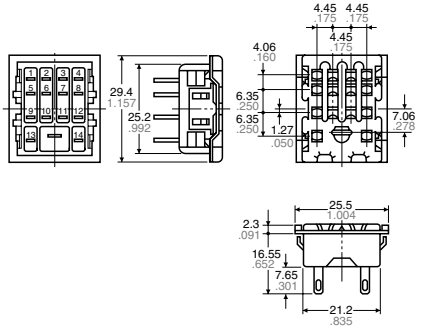
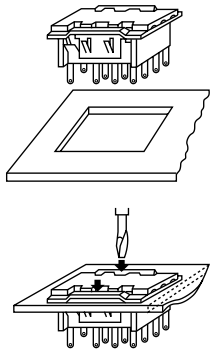
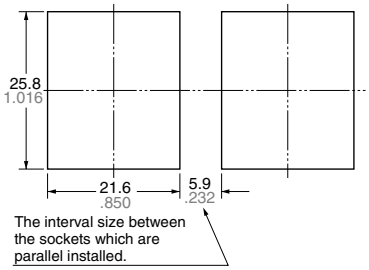
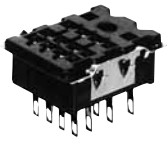
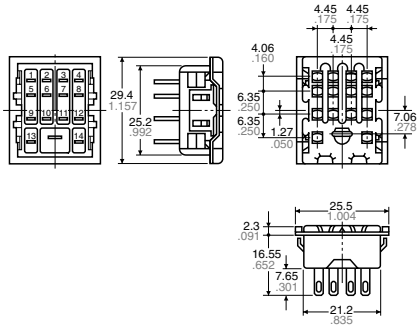
HC relay terminal sockets

	Name/Part No.	Dimensions	Terminal layout	Mounting hole dimensions	Applicable timers S1DX(2c) S1DXM(2c)	Applicable timers S1DX(4c) S1DXM(4c)
For general rails	• Terminal socket, HC 2-pin  HC2-SF-K	 Note) Only wire springs can be used. (Plate springs cannot be used.)		 Drilling size of panel holes for installing the terminal sockets parallel	Available	Not available
	• High terminal socket, HC 1-, 2- and 4-pin  HC4-HSF-K	 Note) Only wire springs can be used. (Plate springs cannot be used.)		 Drilling size of panel holes for installing the terminal sockets parallel	Available	Available
For DIN rails	• Slim DIN terminal socket, HC2  HC2-SFD-S				Available	Not available
	• DIN high terminal socket, HC2  HC2-SFD-K			 Drilling size of panel holes for installing the terminal sockets parallel	Available	Not available
	• DIN high terminal socket, HC4  HC4-SFD-K				Available	Available

HJ relay terminal sockets

Name/Part No.	Dimensions	Terminal layout	Mounting hole dimensions	Applicable timers	
				S1DX(2c) S1DXM(2c)	S1DX(4c) S1DXM(4c)
• HJ2 terminal socket  HJ2-SFD				Available	Not available
• HJ2 terminal socket (Finger protect type)  HJ2-SFD-S				Available	Not available
• HJ4 terminal socket  HJ4-SFD				Available	Available
• HJ4 terminal socket (Finger protect type)  HJ4-SFD-S				Available	Available

Sockets

Name/Order No.	Dimensions	Mounting hole dimensions	Applicable timers	
			S1DX(2c) S1DXM(2c)	S1DX(4c) S1DXM(4c)
• Socket, HC 2-pin  HC2-SS-K	• The difference between the HC2 and HC4 sockets is only the number of the pins. Their appearances and sizes are the same.  General tolerance: ±0.5	• The thickness of applicable chassis plates ranges from 1.0 to 2.0 mm. • To install the socket easily, insert the socket top surface into the drilled holes and press the two points on the fastening plate indicated by arrows as shown in the fig. below.   Dimensional tolerance of machining: ±0.1 ±.004	Available	Not available
• Socket, HC 4-pin  HC4-SS-K			Available	Available

• Sockets for PC board
HC2 – Socket for PC board: AP3825K
HC4 – Socket for PC board: AP3845K

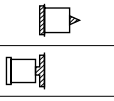
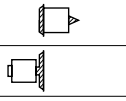
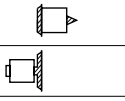
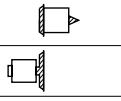
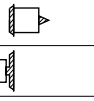
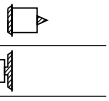
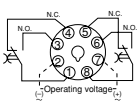
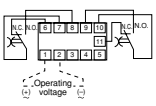
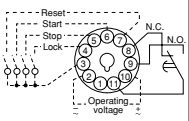
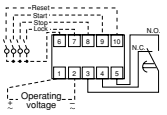
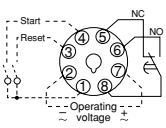
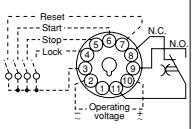
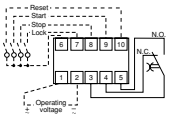
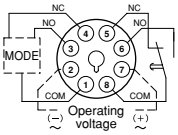
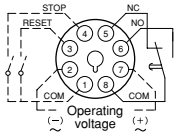
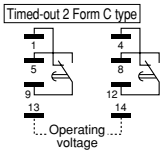
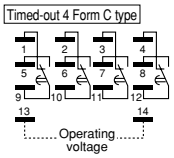
TIMERS CHART

		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)	Surface mount/Flush mount	  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	
	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

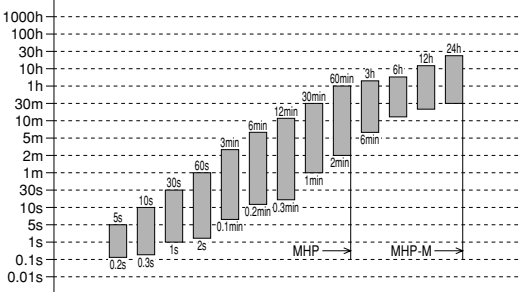
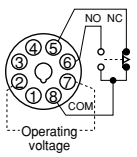
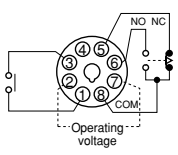
Operation mode	Power ON-delay	Pulse ON-delay Pulse Flicker Pulse ON-Flicker Differential ON/OFF-delay (1)(2) Signal OFF-delay Pulse One-shot Pulse One-cycle	Power ON-delay	Power ON-delay Power Flicker Power ON-flicker Power One-shot Power One-cycle (with instantaneous contact)	Star-Delta	Power OFF-delay
	CR oscillation counting timer					
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 Each model has various time ranges. See the product lists before ordering.	1000h 100h 30h 10h 1h 30m 10m 5m 2m 1m 30s 10s 5s 1s 0.1s 0.01s 4 time ranges selectable	500h 16 time ranges selectable 0.1s			100s 4 time ranges selectable 0.2s	10min 3 time ranges selectable 10s 0.04min 3 time ranges selectable 0.04s
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 ⅄-△ 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	5A	3A
Control output (resistive) 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	⅄ side: Timed-out 1 Form A △ 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	±1% (power off time change at the range of 0.1s to 1h)	±0.3%	±0.3%	±0.3%	±0.3%	±0.3%
Time accuracy: Temperature error	±2% (at 20°C ambient temp. at the range of −10 to +50°C)	±2%	±2%	±2%	±2%	±2%
Time accuracy: Voltage error	±1% (at the operating voltage changes between 85 to 110%)	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
Time accuracy: Setting error	±5%	±5%	±5%	±5%	±5%	±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
Life (Min. operation): Electrical	10^5	10^5	10^5	10^5	10^5	10^5
Terminal layouts and wiring diagrams	Pin type T.D: Timed-out 2 Form C INST: Timed-out 1 Form C, instantaneous 1 Form C * Selected by front switch	Pin type Screw terminal type	Pin type Screw terminal type	Pin type Screw terminal type	Pin type No instantaneous contact Pin type With instantaneous contact	Pin type Screw terminal type
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
	CR oscillation counting timer	Quartz oscillation counting timer				Output with contact CR oscillation counting timer
Major uses	For repetitive ON/OFF operation	Suitable for super-high accurate, digital setting				For highly accurate time setting
Time range Each model has various time ranges. See the product lists before ordering.	1000h, 100h, 30h, 10h, 1h, 30m, 10m, 5m, 2m, 1m, 30s, 10s, 5s, 1s, 0.1s, 0.01s 500h 16 time ranges selectable 0.1s	999.9h 8 time ranges selectable 0.05s	999.9h 8 time ranges selectable 0.05s	9999h 8 time ranges selectable 0.08s	9990h 0.01s	10h, 30min, 60min, 10min 3s, 0.2s, 0.5s, 0.05s
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 5A	(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
Control output (resistive) 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	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%
Time accuracy: Temperature error	±2%					±5%
Time accuracy: Voltage error	±0.5%					±1%
Time accuracy: Setting error	±5%					±10%
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
Life (Min. operation) Electrical	10^5	10^5 / 10^7	10^5 / 10^7	10^5 / 10^7	10^5	2×10^5
Terminal layouts and Wiring diagrams	Pin type  Screw terminal type 	11-Pin 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

Operation mode	Power ON-delay Power flicker Power One-shot Power One-cycle Output with contact	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
	CR oscillation counting timer	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 Each model has various time ranges. See the product lists before ordering.	1000h, 100h, 30h, 10h, 1h, 30m, 10m, 5m, 2m, 1m, 30s, 10s, 5s, 1s, 0.1s, 0.01s 60h, 30h, 10h, 3h, 1h, 30m, 10m, 3m, 1m, 30s, 10s, 3s, 1s, 0.1s, 0.05s 0.5s, 1s, 3s, 5s, 10s, 30s, 60s, 3min, 10min, 30min, 60min, 3h, 0.1s, 0.2s, 0.5s, 0.1min, 0.5min, 1min, 3min, 0.1h	500h 16 time ranges selectable 0.1s	500h 16 time ranges selectable 0.1s	30h, 10h, 3h, 1h, 30min, 10min, 3min, 1min, 30s, 10s, 3s, 1s, 0.5s, 0.15s, 0.05s 1.5h, 1.5min, 1.5s, 9min, 9s 4 time ranges selectable
Model/Product Name	**S1DX Timer**	**PM5S-A** **Multi-range analog timer**	**PM5S-S** **Multi-range analog timer**	**PM5S-M** **Multi-range analog timer**	**PMH Timer**
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.	A multitimer is provided with the front operation slide switch by using the special C-MOSIC inside pulse oscillation counting method.
Control output (resistive) — Current	7A, 5A, 3A 2 Form C type 4 Form C type	5A	5A	5A	7A
Control output (resistive) — 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%
Time accuracy — Temperature error	±5%	±2%	±2%	±2%	±5%
Time accuracy — Voltage error	±1%	±0.5%	±0.5%	±0.5%	±0.5%
Time accuracy — 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
Life (Min. operation) — Electrical (resistive)	2×10^5	10^5	10^5	10^5	2×10^5
Wiring diagrams	Timed-out 2 Form C type Operating voltage Timed-out 4 Form C type Operating voltage				NC, NO, NC, COM, COM (−) Operating voltage (+)
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	
		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		
	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

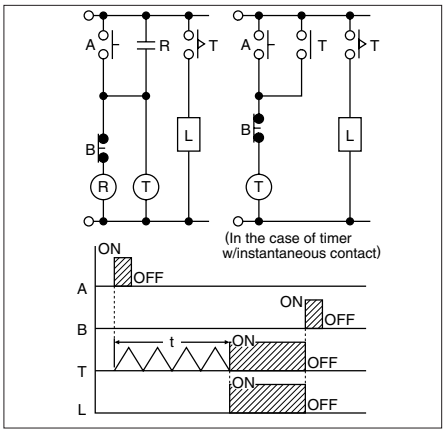
ON-DELAY TIMER BASIC CIRCUIT

(Symbols)

Self-resetting switch	Relay NO contact
Holding switch	Relay NC contact
Ⓡ Relay	Timer delay NO contact
Ⓣ Timer	Timer delay NC contact
Ⓛ Load	Timer instantaneous NO contact
Timer in work	Timer instantaneous NC contact

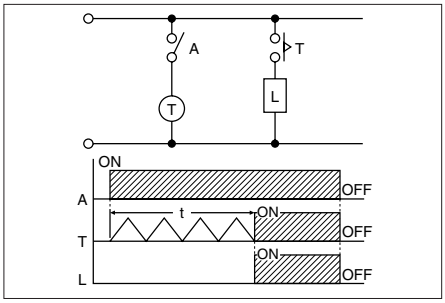
1. Delay Operation (Instantaneous input)

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.



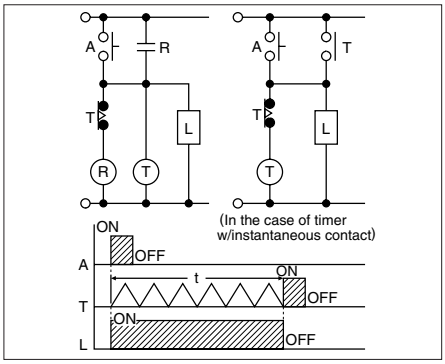
2. Delay Operation (Continuous input)

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.



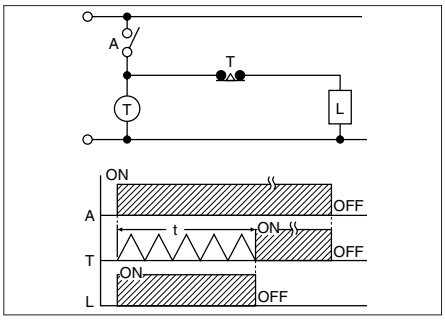
3. Fixed Time Operation (Instantaneous input)

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



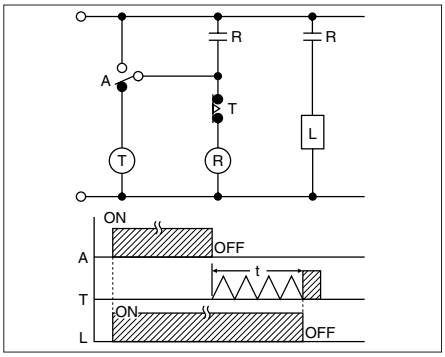
4. Fixed Time Operation (Continuous input)

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.



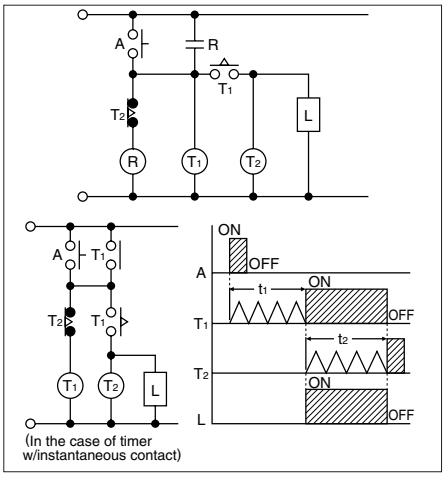
5. Delay Reset Operation

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.



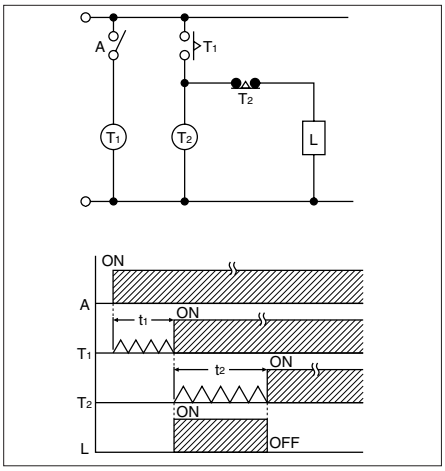
6. Fixed Time Operation after Delay Time is Set (Instantaneous input)

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).



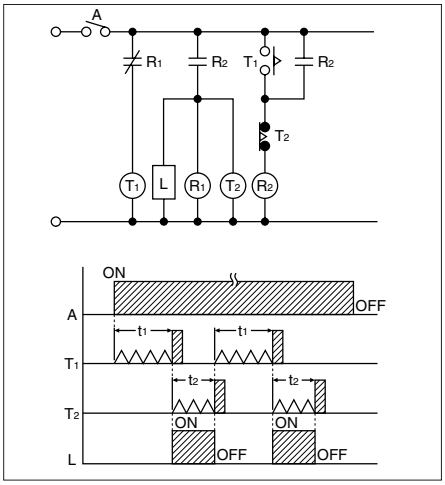
7. Fixed Time Operation after Delay Time is Set (Continuous input)

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

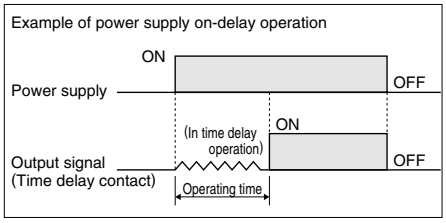
When switch A is pressed, load L is turned ON after t1-time elapses and load L is turned OFF after t2-time elapses, and thereafter the t1 and t2 operations are repeated. This repetitive operation stops when switch A is turned OFF.



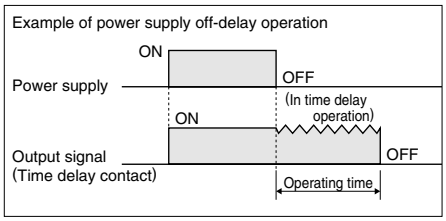
TIMER-RELATED TERMINOLOGY

• 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.

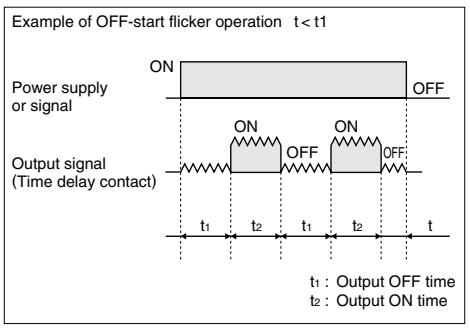
• On-delay Operation (Time delay operation)
The on-delay operation is an operation to give output when preset time expires after a predetermined input is given to the power supply circuit or input circuit. On-delay operation includes power supply on-delay operation and signal on-delay operation.



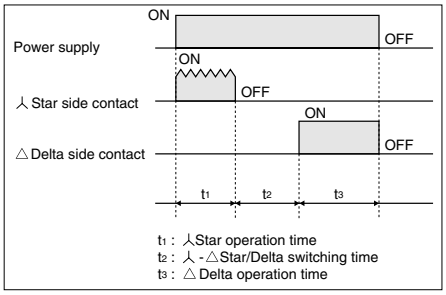
• Off-delay Operation (Time delay resetting)
The off-delay operation is an operation to turn OFF output when preset time expires after a predetermined input is given to the power supply circuit or input circuit, and at the same time output signal is given and predetermined input is turned OFF. Off-delay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

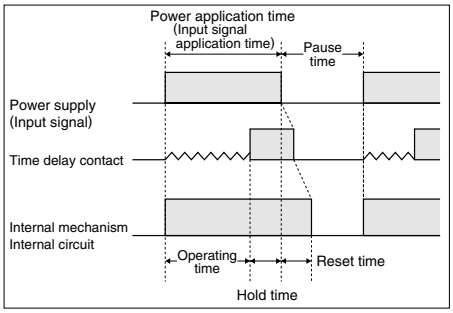
• Operating Time
The operating time means the time which elapses between the addition of predetermined input to the power supply circuit and input circuit and the completion of operation for preset time.

• 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±2°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 ±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.

• 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	$\pm \frac{1}{2} \times \frac{Tmax. - Tmin.}{TMs} \times 100$ (%)	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		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
TMx_1: Average of operation time at such voltage as maximizes deviation from TM in allowable voltage range.
TMx_2: Average of operation time at such temperature as maximizes deviation from TM in allowable temperature range.
TMx_3: 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

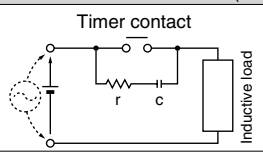
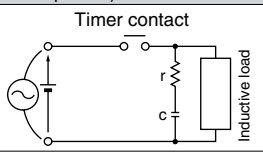
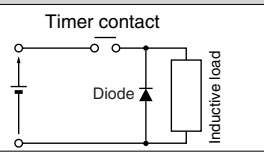
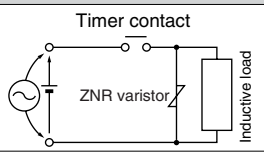
Means the limit value that shows the durability against momentary abnormal voltage resulting from lightning or switching a conductive load. The surge waveform is represented by the standard impulsive voltage waveform at ±(1.2 × 50) μs or ±(1 × 40) μs.

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.

		CR circuit (r: resistor c: capacitor)		Diode circuit	Varistor circuit
Circuit					
Application	AC	(see note.)	Available	Not available	Available
	DC	Available	Available	Available	Available
Features/Notes		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.		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)	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.
		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.	—		
Device Selection		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.		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.	—

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.

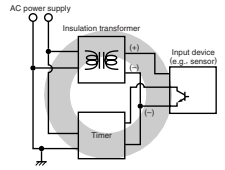
Type of load	Inrush current
Resistive load	Steady state current
Solenoid load	10 to 20 times the steady state current
Motor load	5 to 10 times the steady state current
Incandescent lamp load	10 to 15 times the steady state current
Mercury lamp load	1 to 3 times the steady state current
Sodium vapor lamp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

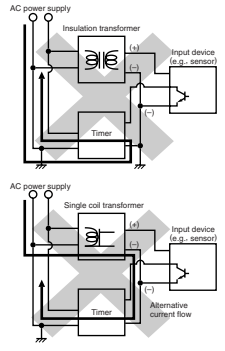
3. Connection of input

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.

(Fig. A) Good example



(Fig. B) Bad example

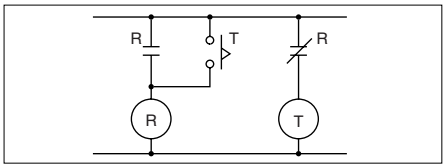


Do not use a single coil transformer (e.g., Sly-Duck). Otherwise, the internal circuit of the timer will be short-circuited as shown in Fig. B resulting in breakdown.

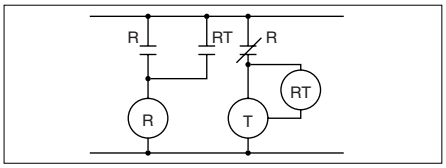
4. Long Continuous Current Flow

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

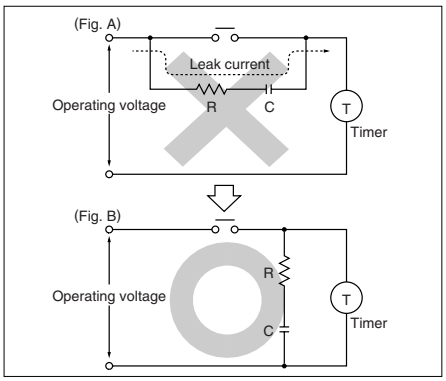


(2) When using non-contact output



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.



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

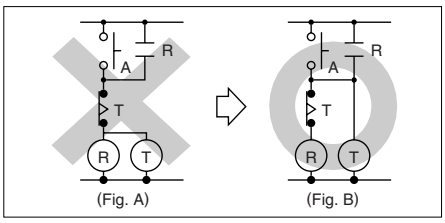
6. Power off time

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).



(Fig. A) (Fig. B)

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) 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.

The effective countermeasures include:

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.

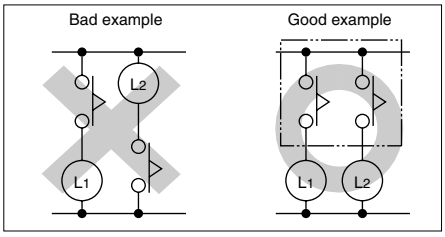
3) Make sure that no induced voltage and residual voltage are applied between the power pins on the timer after the power switch is turned OFF.

(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.

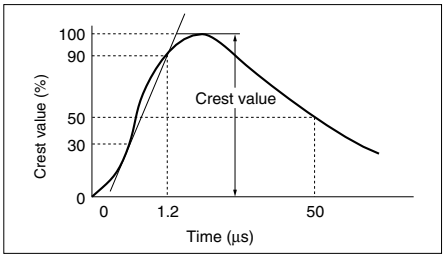
2) In order to maintain the characteristics, do not remove the timer cover (case).

5. Superimposed surge of power supply

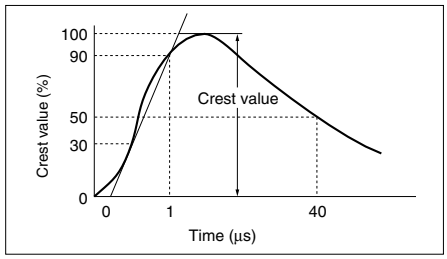
For the superimposed surge of power supply, the standard waveform (±1.2 × 50μs or ±1 × 40μs) is taken as the standard value for surge-proof voltage. (The positive and negative voltages are applied each three or five times between the power pins.)

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 [±(1.2 × 50) μs]



• Single-pole, full-wave voltage for surge waveform [±(1 × 40) μs]



• PMH [±(1 × 40) μs]

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°C +14°F to +122°F (+55°C +131°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, benzine, 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.

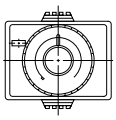
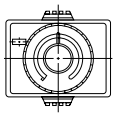
9. Others

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.

DISCONTINUED MODELS AND RECOMMENDED SUBSTITUTES

Timers

Discontinued models	Recommended substitutes	Attachment
MHP-NS (Exposed type Square plug-in/ horizontal type)  MHP-NS-	MHP-N (Exposed type Round plug-in/ vertical type)  MHP-N-	Terminal base AT8-RFD should be used.
MHP-M (Exposed type Round plug-in/ horizontal type)  MHP-M-	MHP-NM (Exposed type Round plug-in/ vertical type)  MHP-NM-	Terminal base AT8-RFD should be used.
MHP-YC (Embedded type With attachment frame)  MHP-YC-	MHP-N (Exposed type Without attachment frame)  MHP-N-	Attachment frame AT7821 should be used.
MHP-YM (Embedded type With attachment frame)  MHP-YM-	MHP-NM (Exposed type Without attachment frame)  MHP-NM-	Attachment frame AT7831 should be used.
CHP-N (Exposed type with attachement frame type)  CHP-N-	PM4H-S PMH  PM4HS- PMH-	The external dimension and contact capacity are different.
CHP-N (Exposed type without attachment frame type)  CHP-N-	PM4H-S PMH  PM4HS- PMH-	The external dimension and contact capacity are different.
CHP-NF (Exposed type without attachment frame type)  CHP-NF-	PM4H-F  PM4HF-	* External dimensions, however, differ. In addition, the reset method changes from voltage input to non-voltage input.

Discontinued models	Recommended substitutes	Attachment
CHP-NF (Exposed type Round plug-in/ vertical type)  CHP-NF	PM4H-F  PM4HF-	Attachment frame AT7821 should be used. * External dimensions, however, differ. In addition, the reset method changes from voltage input to non-voltage input.
CHP-SD  CHP-SD-	PM4H-SD  PM4HSD-	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.
PM48A  PM48A-	PM4H-A  PM4HA-	With exposed attachment, terminal base ATC180041 should be used.
PM48  PM48	PM4H-S  PM4HS-	With exposed attachment, terminal base ATC180031 should be used.
PM48M  PM48M-	PM4H-M  PM4HM-	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
PM48F  PM48F-	PM4H-F  PM4HF-	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
PM48SD  PM48SD	PM4H-SD  PM4HSD	With exposed attachment, terminal base ATC180031 should be used.

Timers

Discontinued models	Recommended substitutes	Attachment
PM48W  PM48W	PM4H-W  PM4HW-	With exposed attachment, terminal base ATC180031 should be used.
PMH-M  PMH-M-	PM4H-M/PM4S  PM4HM-/PM4S-	The external dimension and contact capacity are different.
CDX Time relay  CDX	S1DXM-A Timer/ S1DX Timer  S1DXM-/S1DX-	
PDX Timer  PDX	S1DXM-A Timer/ S1DX Timer  S1DXM-/S1DX-	
VHP digital high-power timer  VHP	QM4H digital timer  QM4H	The size is different. Compact size ⇩ DIN48
QM48S (8-pin)  QM48S	QM4H (8-pin)  QM4H	
QM72S (Screw terminal)  QM72S	QM4H (8-pin)  QM4H	The size is different. □72 ⇩ □48

Discontinued models	Recommended substitutes	Attachment
LT48 (8-pin)  LT48	LT4H (8-pin)  LT4H LT4H-L	
LT48W (8-pin)  LT48W	LT4H-W (8-pin)  LT4HW	
DIN rail socket (8-pin)  ATC18003	DIN rail socket (8-pin)  ATC180031	
DIN rail socket (11-pin)  ATC18004	DIN rail socket (11-pin)  ATC180041	

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. □72 ⇩ □48
LC24 Panel-mounting type  • One-touch installation type LC24	LC2H Panel-mounting type  • 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 ϕ45) ⇩ Square type (attachment hole □45)
 TH21* TH22*	 TH241S TH242S	Body Square type (attachment hole □47) ⇩ Square type (attachment hole □45)
TH30  TH30	LT4H (~999.9 h)  LT4H	The size and attachment method are different. The input method is different. (Voltage input → non-voltage input)
	LT4H-W (~9999 h)  LT4HW	
LH24 Panel-mounting type  • One-touch installation type LH24	LH2H Panel-mounting type  • 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

LISTING MARK

Fig. 1

RECOGNITION MARK

Fig. 2

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.

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 $\phi \fallingdotseq 0.4$) 250V2A (COS $\phi \fallingdotseq 0.4$) 250V7A(COS $\phi \fallingdotseq 1.0$)	"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 $\phi \fallingdotseq 1.0$)	"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)	—	—	

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	E122222 (C-UL)	5A250V AC PILOT DUTY C300	
		100mA 30V DC		100mA 30V DC	
LC4H-W	E122222	3A250V AC PILOT DUTY C300	E122222 (C-UL)	3A250V AC PILOT DUTY C300	
		100mA 30V DC		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.)