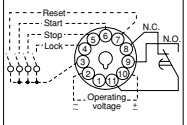
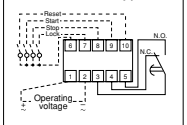
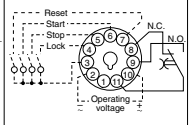
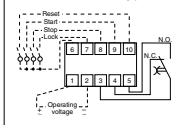
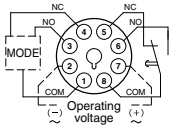
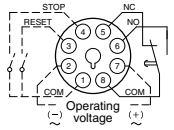
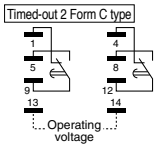
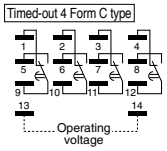
Panasonic

General Catalog

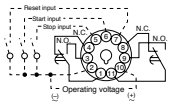
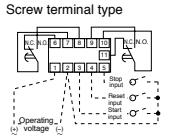
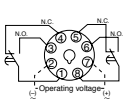
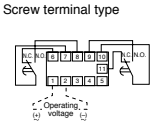
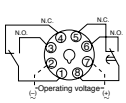
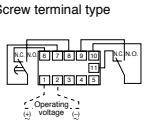
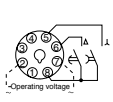
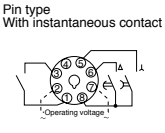
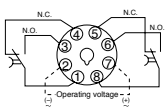
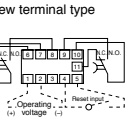
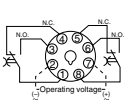
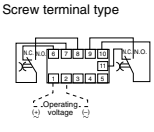
TIMERS, COUNTERS, HOUR METERS, TIME SWITCHES

TIMERS CHART OVERVIEW

		Multiple operation	ON-delay	OFF-delay	Twin	Flicker	One-shot	Star delta	Integration
Digital quartz timers		 LT4H LT4H-W	 LT4H  QM4H	 LT4H (Signal)	 LT4H-W	 LT4H	 LT4H		 LT4H
Multi-range analog timer (CR oscillation)		 PM4H-A	  S1DX PM4H-S PM4H-M S1DXM-A/M		 PM4H-W	  PM4H-A S1DXM-M	  PM4H-A S1DXM-M	 PM4H-SD/SDM	
	Relay terminal socket		 S1DXM-A/M			 S1DXM-M	 S1DXM-M		

Model/Product Name		 **LT4H Digital timer**	 **LT4H-W Digital timer**	 **QM4H Timer**	 **S1DXM-A/M Timer**
Operation mode		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
		Quartz oscillation counting timer			Output with contact CR oscillation counting timer
Major uses		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	9999h 8 time ranges selectable 0.05s	9990h 0.01s	10h 30min 60min 10min 0.2s 0.5s 3s 0.05s
Features		Bright and easy-to-read display Simple operation Short body	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	(Relay output type) 5A; (Transistor output type) 100mA	(Relay output type) 5A; (Transistor output type) 100mA	5A	7A (2 Form C type); 5A (4 Form C type)
	Voltage	250 V AC; 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 block, mounting frame, fitting sockets, protective cover
Rated operating voltage		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		(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	±(0.005% + 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%
	Temperature error				±5%
	Voltage error				±1%
	Setting error				±10%
Min. power off time		500 ms	500 ms	100 ms	100 ms
Life (Min. operation)	Mechanical	2×10^7	2×10^7	2×10^7	10^7
	Electrical	10^5 — 10^7	10^5 — 10^7	10^5	2×10^5
Terminal layouts and Wiring diagrams		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/c-UL, CE	UL/c-UL, CE	UL/c-UL, CE	UL/c-UL, CE

TIMERS SELECTOR CHART

Model/Product Name		 **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**	 **PM4H-W Analog multi-range cyclic twin timer**
Operation mode		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	Power OFF-start cyclic
		CR oscillation counting timer					CR oscillation counting timer
Major uses		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	For repetitive ON/OFF operation
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		100s 4 time ranges selectable 0.2s	10min 3 time ranges selectable 0.04min 10s 3 time ranges selectable 0.04s	500h 16 time ranges selectable 0.1s
Features		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 Y-Δ switching times.	Multiple time ranges are selectable. Power-OFF delay of max. 10 min. is controlled.	16 time ranges are selectable. 1s to 500h (Max. range) is controlled in one unit.
Control output (resistive)	Current	7A 5A 3A 5A	5A	5A	5A	3A	5A
	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, 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, panel cover, rubber gasket, mounting frame
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, 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)	100 to 240 V AC 48 to 125V DC, 24 V AC/DC 12 V DC (other models)
Arrangement		Timed-out 2 Form C	Timed-out 2 Form C	Timed-out 1 Form C Instantaneous 1 Form C	Y side: Timed-out 1 Form A Δ side: Timed-out 1 Form A Instantaneous: 1 Form A	Timed-out 2 Form C Timed-out 1 Form C [F8R type]	Timed-out 2 Form C
Time accuracy	Operation time fluctuation	±0.3%	±0.3%	±0.3%	±0.3%	±0.3%	±0.3%
	Temperature error	±2%	±2%	±2%	±2%	±2%	±2%
	Voltage error	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	Setting error	±5%	±5%	±5%	±5%	±5%	±5%
Min. power off time		100 ms	100 ms	100 ms	500 ms	—	300 ms
Life (Min. operation)	Mechanical	2×10^7	2×10^7	2×10^7	2×10^7	10^7	2×10^7
	Electrical	10^5	10^5	10^5	10^5	10^5	10^5
Terminal layouts and wiring diagrams		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 	Pin type  Screw terminal type 
Available standards		UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD	UL/CSA, CE, LLOYD

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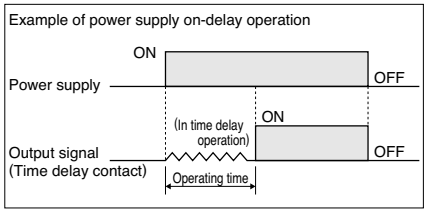
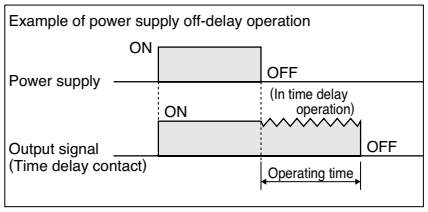
• What is a timer?
The timer is a relay having such an output (with or without contact) which electrically closes (turns ON) or opens (turns OFF) the circuit after a preset time elapses when electrical or mechanical input is given.

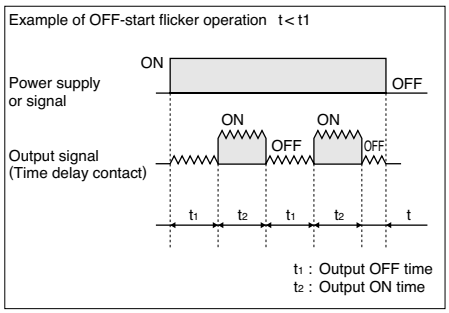
• On-delay Operation (Time delay operation)
The on-delay operation is an operation to give output when preset time expires after a predetermined input is given to the power supply circuit or input circuit. On-delay operation includes power supply on-delay operation and signal on-delay operation.



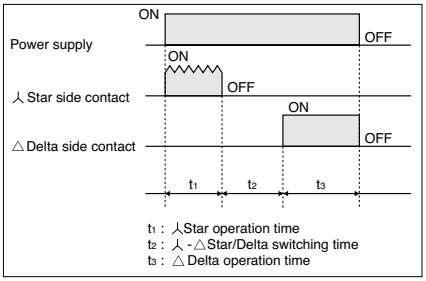
• Off-delay Operation (Time delay resetting)
The off-delay operation is an operation to turn OFF output when preset time expires after a predetermined input is given to the power supply circuit or input circuit, and at the same time output signal is given and predetermined input is turned OFF. Off-delay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

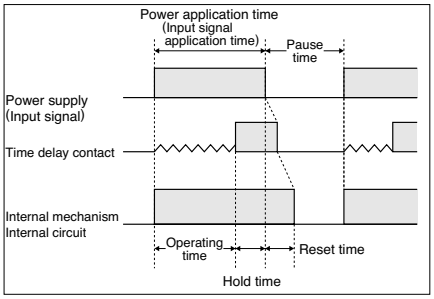
• Operating Time
The operating time means the time which elapses between the addition of predetermined input to the power supply circuit and input circuit and the completion of operation for preset time.

• 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	Set value Ts (Note 1)	Supply voltage	Ambient temperature
(1) Fluctuation in operation time	$\pm\frac{1}{2}\times\frac{Tmax.-Tmin.}{TMs}\times100$ (%)	Full-scale value	Rated voltage	20±2°C (Note 2)
(2) Voltage error	$\frac{TMx_1-TM}{TMs}\times100$ (%)		Fluctuation range of allowable voltage of power supply (Note 3)	
(3) Temperature error	$\frac{TMx_2-TM}{TMs}\times100$ (%)		Rated voltage	–10 to 50°C (Note 4)
(4) Set error	$\frac{TM-Ts}{TMs}\times100$ (%)	1/3 or more of full-scale value		20±2°C (Note 2)
(5) Pause time error	$\frac{TMx_3-TM}{TMs}\times100$ (%)	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 voltagexcurrent 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.

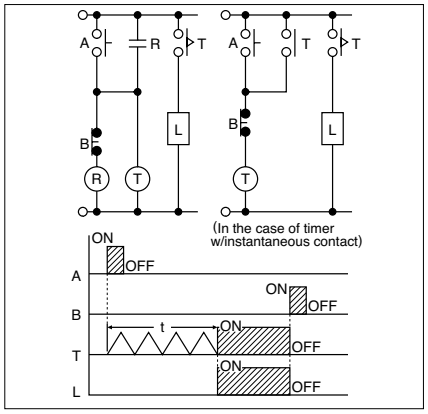
• Withstand voltage
Means the limit value that does not cause breakdown when high voltage is applied for one minute to the same location as measured for insulation resistance. The detectable leak current is normally 10 mA. In special cases, however, it may be 1mA or 3 mA.

• 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 ±(1.2x50) µs or ±(1x40) µs.

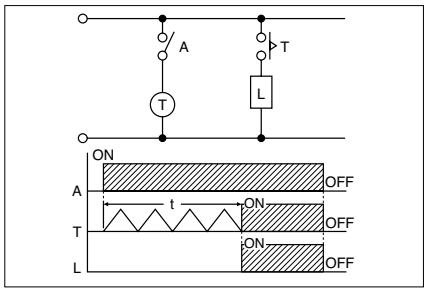
(Symbols)

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

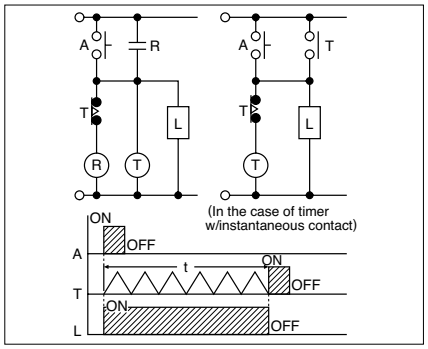
1. Delay Operation (Instantaneous input)
When control switch A is pressed, timer T starts immediately and after t-time elapses, load L is turned ON. When B is pressed, timer T is reset and load L is turned OFF.



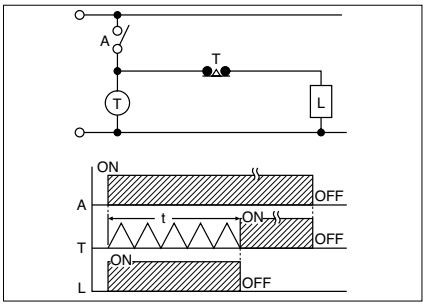
2. Delay Operation (Continuous input)
When switch A is pressed, after t-time elapsed, the timer contact closes and load L is turned ON. When switch A is opened, the timer is reset and the load is turned OFF.



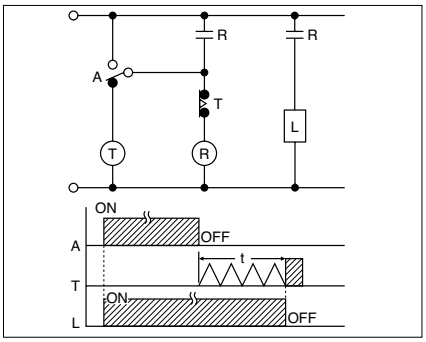
3. Fixed Time Operation (Instantaneous input)
When control switch A is pressed, load L is immediately turned ON, and after t-time elapses, load L is turned OFF.



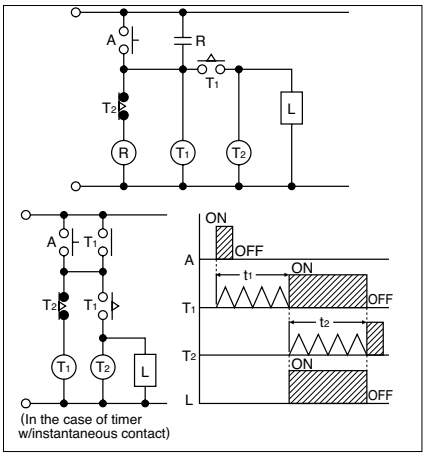
4. Fixed Time Operation (Continuous input)
When switch A is closed, load L is turned ON and after t-time elapses, the load is turned OFF. When switch A is opened, timer T is reset and load L is turned OFF.



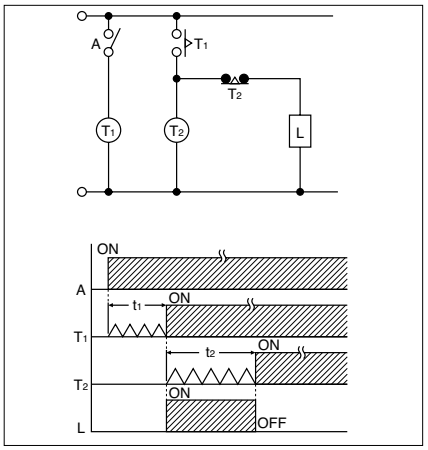
5. Delay Reset Operation
When contact A is reversed, load L is immediately turned ON. When contact A is returned to normal state, load L is turned OFF after t-time elapses.
This circuit is used when the power supply is kept ON at all times or used for off-delay-like application.
However, it can not be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



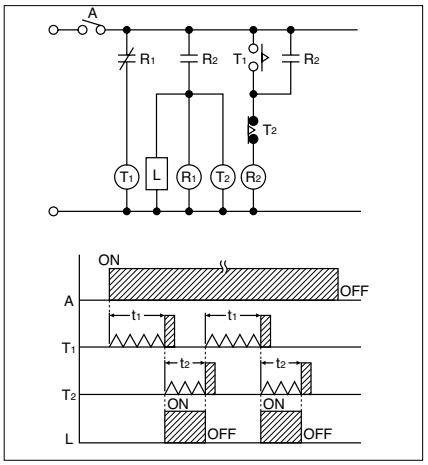
6. Fixed Time Operation after Delay Time is Set (Instantaneous input)
When control switch A is pressed, load L is turned ON after t1-time elapses, and load L is turned OFF after t2-time elapses. This circuit is used for the case of instantaneous input (one pulse).



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.



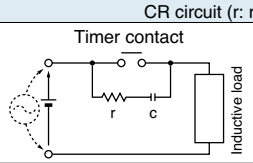
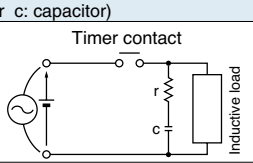
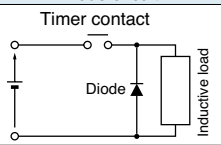
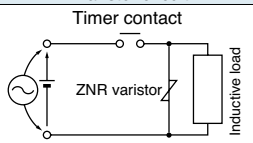
8. Repetitive Operation
When switch A is pressed, load L is turned ON after t1-time elapses and load L is turned OFF after t2-time elapses, and thereafter the t1 and t2 operations are repeated. This repetitive operation stops when switch A is turned OFF.



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		Timer contact 	Timer contact 	Timer contact 	Timer contact 
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.

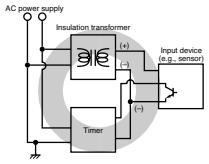
Type of load	Inrush current
Resistive load	Steady state current
Solenoid load	10 to 20 times the steady state current
Motor load	5 to 10 times the steady state current
Incandescent lamp load	10 to 15 times the steady state current
Mercury lamp load	1 to 3 times the steady state current
Sodium vapor lamp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

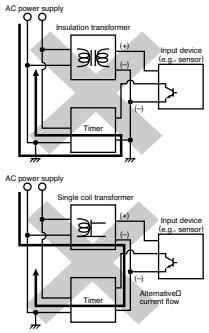
3. Connection of input

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

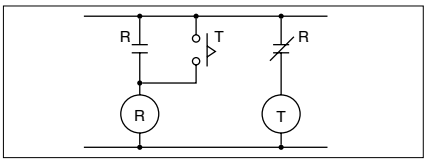


Do not use a single coil transformer (e.g., Sly-Duck). Otherwise, the internal circuit of the timer will be short-circuited as shown in Fig. B resulting in breakdown.

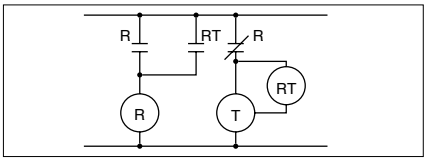
4. Long Continuous Current Flow

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

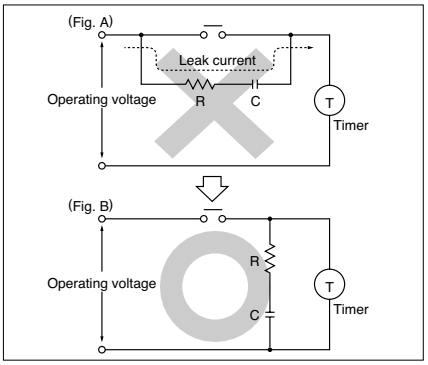


(2) When using non-contact output



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.

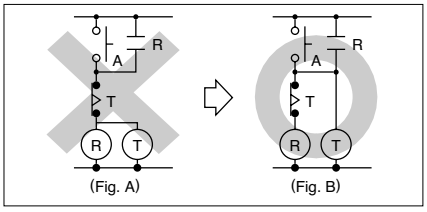
6. Power off time

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).



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;
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.

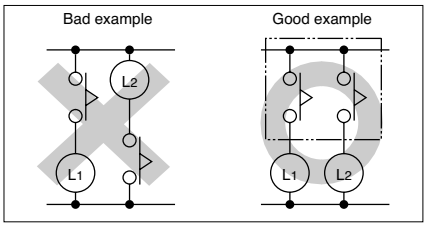
3) Make sure that no induced voltage and residual voltage are applied between the power pins on the timer after the power switch is turned OFF.

(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.

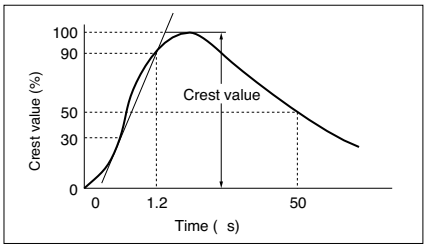
2) In order to maintain the characteristics, do not remove the timer cover (case).

5. Superimposed surge of power supply

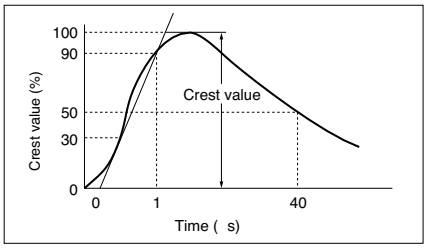
For the superimposed surge of power supply, the standard waveform (±1.2x50µs or ±1x40µs) is taken as the standard value for surge-proof voltage. (The positive and negative voltages are applied each three or five times between the power pins.)

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 [±(1.2x50) µs]



• Single-pole, full-wave voltage for surge waveform [±(1x40) µs]



• PMH [±(1x40) 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."

7. Operating environment

1) Use the timer within the ambient temperature range from –10°C to +50°C (+55°C 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.

Pin type

Screw terminal type

LT4H

DIN 48 Size Digital Timer

Features

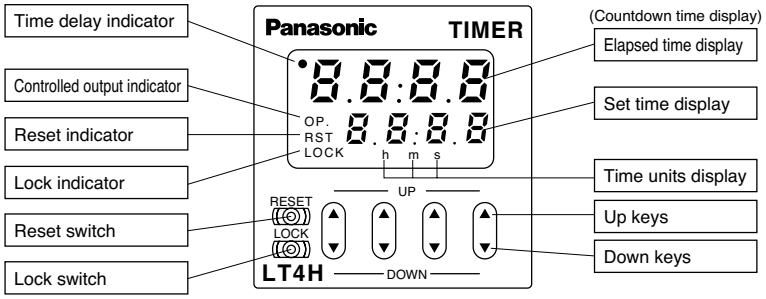
- **Bright and Easy-to-Read Display**
  A brand new bright 2-color back light LCD display. The easy-to-read screen in any location makes checking and setting procedures a cinch.
- **Short Body of only 64.5 mm (screw terminal type) or 70.1 mm (pin type)**
  With a short body, it is easy to install in even narrow control panels.
- **Simple Operation**
  Seesaw buttons make operating the unit even easier than before.
- **Conforms to IP66's Weather Resistant Standards**
  The water-proof panel keeps out water and dirt for reliable operation even in poor environments.
- **Screw terminal (M3.5) and Pin Types are Both Standard Options**
  The two terminal types are standard options to support either front panel installation or embedded installation.
- **Changeable Panel Cover**
  Also offers a black panel cover to meet your design considerations.
- **Compliant with UL, c-UL and CE, UL File No.: E122222 C-UL File No.: E122222**

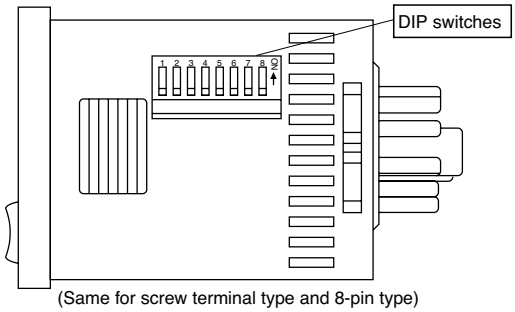
Product types

Time range	Operating mode	Output	Operating voltage	Power down insurance	Terminal type	Part number
	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 (8 modes)	Relay (1 c)	100 to 240 V AC		8 pins	LT4H8-AC240V
					11 pins	LT4H-AC240V
					Screw terminal	LT4H-AC240VS
			24 V AC		8 pins	LT4H8-AC24V
					11 pins	LT4H-AC24V
					Screw terminal	LT4H-AC24VS
			12 to 24 V DC		8 pins	LT4H8-DC24V
					11 pins	LT4H-DC24V
					Screw terminal	LT4H-DC24VS
			100 to 240 V AC		8 pins	LT4HT8-AC240V
					11 pins	LT4HT-AC240V
					Screw terminal	LT4HT-AC240VS
			24 V AC		8 pins	LT4HT8-AC24V
					11 pins	LT4HT-AC24V
					Screw terminal	LT4HT-AC24VS
			12 to 24 V DC		8 pins	LT4HT8-DC24V
					11 pins	LT4HT-DC24V
					Screw terminal	LT4HT-DC24VS

* A rubber gasket (ATC18002) and a mounting frame **(AT8-DA4)** are included.

Part names





(Same for screw terminal type and 8-pin type)

Specifications

Item \ Type			Relay output type		Transistor output type	
			AC type AC/DC type	DC type	AC type AC/DC type	DC type
Rating	Rated operating voltage		100 to 240 V AC, 24 V AC, 24 V AC/DC	12 to 24 V DC	100 to 240 V AC, 24 V AC, 24 V AC/DC	12 to 24 V DC
	Rated frequency		50/60 Hz common	—	50/60 Hz common	—
	Rated power consumption		Max. 10 V A	Max. 3 W	Max. 10 V A	Max. 3 W
	Rated control capacity		5 A, 250 V AC (resistive load)		100 mA, 30 V DC	
	Time range		9.999 s, 99.99 s, 999.9 s, 9999 s, 99 min 59 s, 999.9 min, 99 h 59 min, 999.9 h (selected by DIP switch)			
	Time counting direction		Addition (UP)/Subtraction (DOWN) (2 directions selectable by DIP switch)			
	Operation mode		A (Power ON delay 1), A2 (Power ON delay 2), B (Signal ON delay), C (Signal OFF delay), D (Pulse one-shot), E (Pulse ON delay), F (Signal Flicker), G (Totalizing ON delay) (selectable by DIP switch)			
	Start/Reset/Stop input		Min. input signal width: 1 ms, 20 ms (2 directions by selected by DIP switch) (The 8-pin type does not have a stop input.)			
	Lock input		Min. input signal width: 20 ms (The 8-pin type does not have a lock input.)			
	Input signal		Open collector input Input impedance: Max. 1 kΩ; Residual voltage: Max. 2 V Open impedance: 100kΩ or less, Max. energized voltage: 40V DC			
	Indication		7-segment LCD (LT4H, LT4H-L common), Elapsed value (backlight red LED), Setting value (backlight yellow LED)			
	Power failure memory method		EEP ROM (Min. 10^5 overwriting)			
Time accuracy (max.)	Operating time fluctuation		± (0.005 % + 50 ms) in case of power on start ± (0.005 % + 20 ms) in case of input signal start		[Operating voltage: 85 to 110% Temperature: –10 to +55°C Min. input signal width: 1ms]	
	Temperature error					
	Voltage error					
	Setting error					
Contact	Contact arrangement		Timed-out 1 Form C		Timed-out 1 Form A (Open collector)	
	Contact resistance (Initial value)		100 mΩ (at 1 A 6 V DC)		—	
	Contact material		Ag alloy/Au flash		—	
Life	Mechanical (contact)		Min. $2x10^7$ ope. (Except for switch operation parts)		—	
	Electrical (contact)		$1.0x10^5$ ope. (At rated control voltage)		Min. 10^7 ope. (At rated control voltage)	
Electrical	Allowable operating voltage range		85 to 110 % of rated operating voltage			
	Breakdown voltage (Initial value)		2,000 Vrms for 1 min: Between live and dead metal parts (11-pin) 2,000 Vrms for 1 min: Between input and output 1,000 Vrms for 1 min: Between contacts		2,000 Vrms for 1 min: Between live and dead metal parts (Pin type) 2,000 Vrms for 1 min: Between input and output	
	Insulation resistance (Initial value)		Min. 100 MΩ: Between live and dead metal parts Between input and output (At 500V DC) Between contacts		Min. 100 MΩ: Between live and dead metal parts Between input and output (At 500V DC)	
	Operating voltage reset time		Max. 0.5s			
	Temperature rise		Max. 65° C (under the flow of nominal operating current at nominal voltage)		—	
Mechanical	Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min single amplitude of 0.35 mm (10 min on 3 axes)			
		Destructive	10 to 55 Hz: 1 cycle/min single amplitude of 0.75 mm (1 h on 3 axes)			
	Shock resistance	Functional	Min. 98 m/s^2 (4 times on 3 axes)			
		Destructive	Min. 294 m/s^2 (5 times on 3 axes)			
Operating conditions	Ambient temperature		–10° C to 55° C			
	Ambient humidity		Max. 85 % RH (non-condensing)			
	Air pressure		860 to 1,060 h Pa			
	Ripple rate		—	20 % or less	—	20 % or less
Connection			8-pin/11-pin/screw terminal			
Protective construction			IP66 (front panel with rubber gasket)			

Applicable standard

Safety standard	EN61812-1	Pollution Degree 2/Overvoltage Category II
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)

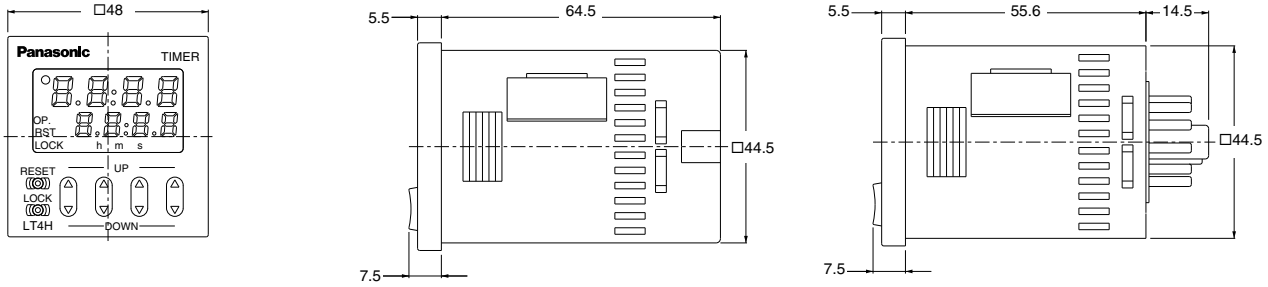
Dimensions

(units: mm)
Tolerance: ±1.0

• LT4H digital timer

Screw terminal type
(Flush mount)

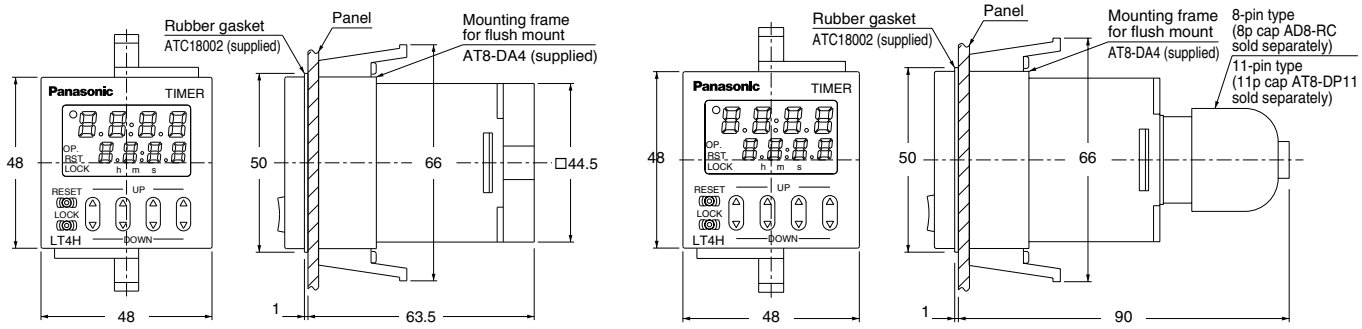
Pin type
(Flush mount/Surface mount)



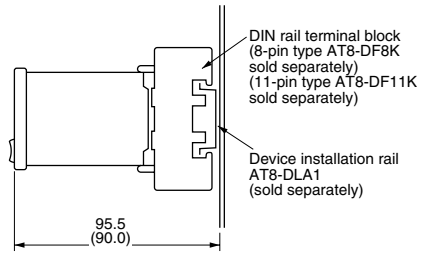
• Dimensions for embedded installation (with adapter installed)

Screw terminal type

Pin type



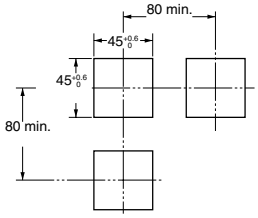
• Dimensions for front panel installations



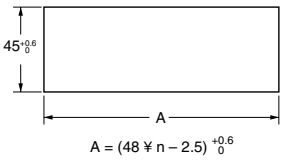
( ) dimension is for 8-pin type.

• Installation panel cut-out dimensions

The standard panel cut-out dimensions are shown below. Use the mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• For connected installations



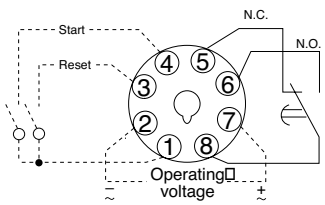
$A = (48 \text{ ¥ } n - 2.5)\ ^{+0.6}_{0}$

Note) 1: The installation panel thickness should be between 1 and 5 mm.
2: For connected installations, the waterproofing ability between the unit and installation panel is lost.

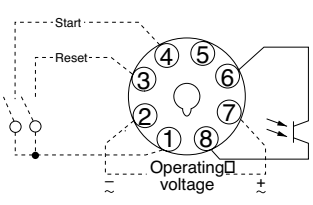
Terminal layouts and wiring diagrams

• 8-pin type

Relay output type

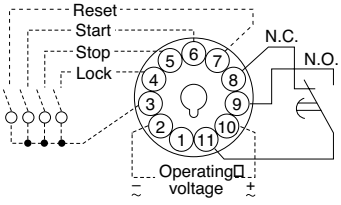


Transistor output type

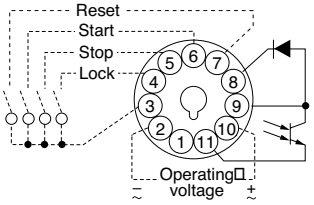


• 11-pin type

Relay output type

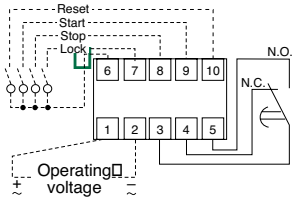


Transistor output type

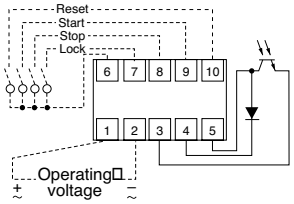


• Screw terminal type

Relay output type



Transistor output type



Note) For connecting the output leads of the transistor output type, refer to 5) Transistor output on page 26.

Setting the operation mode, time range and time

Setting procedure 1) Setting the operation mode and time range

Set the operation mode and time range with the DIP switches on the side of the LT4H timer.

DIP switches

	Item	DIP switch	
		OFF	ON
1	Operation mode	Refer to table 1	
2			
3			
*4	Minimum input reset, start, and stop signal width	20 ms	1 ms
5	Time delay direction	Addition	Subtraction
6	Time range	Refer to table 2	
7			
8			

* The 8-pin type does not have the stop input, so that the dip switch can be changed over between reset and start inputs. The signal range of the lock input is fixed (minimum 20 ms).

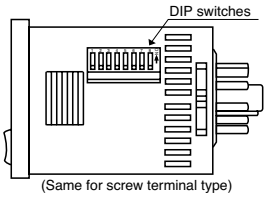


Table 1: Setting the operation mode

DIP switch No.			Operation mode
1	2	3	
ON	ON	ON	A: Power on delay 1
OFF	OFF	OFF	A2: Power on delay 2
ON	OFF	OFF	B: Signal on delay
OFF	ON	OFF	C: Signal off delay
ON	ON	OFF	D: Pulse One shot
OFF	OFF	ON	E: Pulse On delay
ON	OFF	ON	F: Signal Flicker
OFF	ON	ON	G: Totalizing On delay

Table 2: Setting the time range

DIP switch No.			Time range
6	7	8	
ON	ON	ON	0.001 s to 9.999 s
OFF		OFF	0.01 s to 99.99 s
ON	OFF	OFF	0.1 s to 999.9 s
OFF	ON	OFF	1 s to 9999 s
ON	ON	OFF	0 min 01 s to 99 min 59 s
OFF	OFF	ON	0.1 min to 999.9 min
ON	OFF	ON	0 h 01 min to 99 h 59 min
OFF	ON	ON	0.1 h to 999.9 h

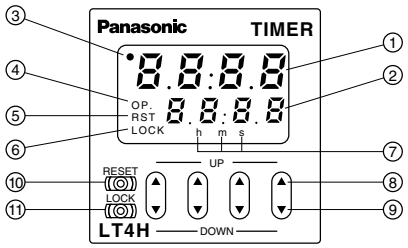
Notes: 1) Set the DIP switches before installing the timer.
2) When the DIP SW setting is changed, turn off the power once.
3) The DIP switches are set as ON before shipping.

Setting procedure 2) Setting the time

Set the set time with the keys (UP and DOWN keys) on the front of the LT4H timer.

Front display section

1 Elapsed time display
2 Set time display
3 Time delay indicator
4 Controlled output indicator
5 Reset indicator
6 Lock indicator
7 Time units display



8 UP keys
Changes the corresponding digit of the set time in the addition direction (upwards)

9 DOWN keys
Changes the corresponding digit of the set time in the subtraction direction (downwards)

10 RESET switch
Resets the elapsed time and the output

11 LOCK switch
Locks the operation of all keys on the unit

• Changing the set time

1. It is possible to change the set time with the up and down keys even during time delay with the timer. However, be aware of the following points.

1) If the set time is changed to less than the elapsed time with the time delay set to the addition direction, time delay will continue until the elapsed time reaches full scale, returns to zero, and then reaches the new set time. If the set time is changed to a time above the elapsed time, the time delay will continue until the elapsed time reaches the new set time.

2) If the time delay is set to the subtraction direction, time delay will continue until "0" regardless of the new set time.

2. If the set time is changed to "0," the unit will operate differently depending on the operation mode.

1) If the operation mode is set to A (power on delay 1) or A2 (power on delay 2), the output will turn on when the power supply is turned on. However, the output will be off while reset is being input.

2) In the other modes, the output turns on when the start is input. When the operation mode is C (signal off delay), D (Pulse one shot), or F (Signal flicker), only when the start input is on does the output turn on. Also, when the reset is being input, the output is off.

• Power failure memory

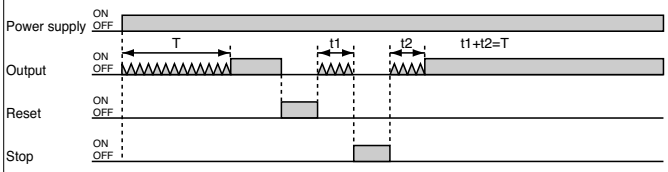
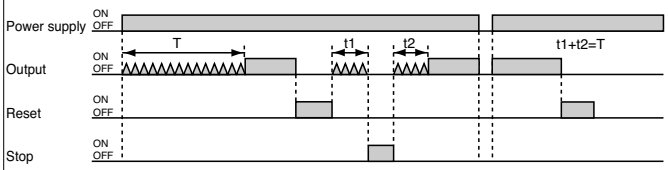
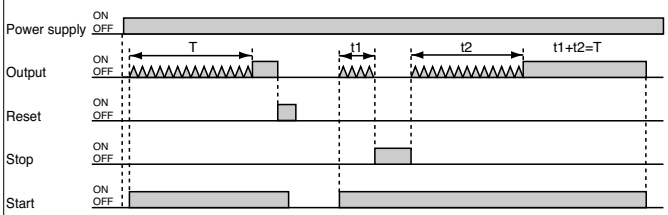
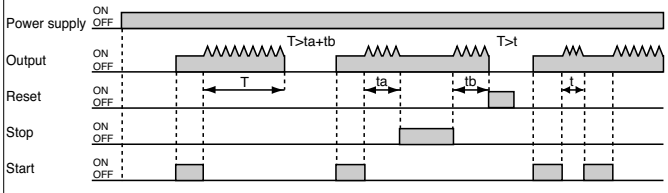
The EEPROM is used for power failure memory. It has a life of Min. 10^5 over-writings. The EEPROM is overwriting with the following timing.

Output mode	Overwrite timing
Power ON delay (2) A2	When power is OFF
Addition G	Change of preset value or start, reset input When power is OFF after being ON
Other modes	When power is OFF after changing preset value

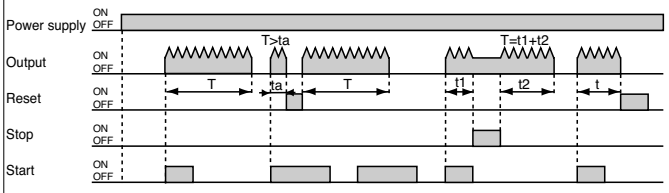
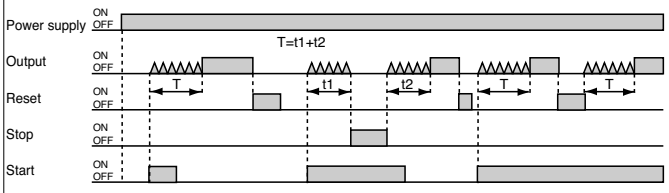
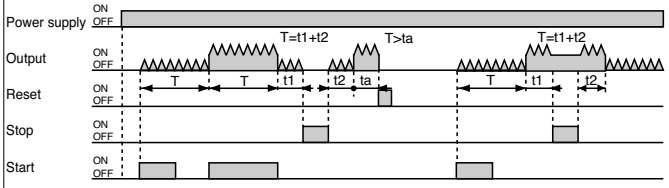
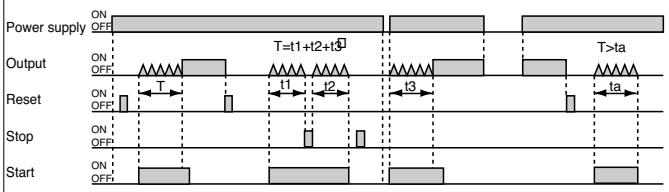
* Be aware that the contents of EEPROM for all modes will be overwritten when power is turned OFF during input to external lock terminals 4 to 3 and 7 to 6. Such an action does not exist by doing lock operation from the front.

Operation mode

T: Set time t1, t2, t3, ta<T

Operation type	Explanation	Time chart
Power on delay (1) Ⓐ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. (1: ON, 2: ON, 3: ON) • Clears elapsed time value and starts time delay at power ON. • After timer completion, stops at the display of the set value (addition), or stops at "0" (subtraction). • Ignores start input. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF.	
Power on delay (2) Ⓐ2	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. (1: OFF, 2: OFF, 3: OFF) • Elapsed time value does not clear at power ON. (power outage countermeasure function) • The output remains ON even after the power is cut and restarted. • After timer completion, stops at the display of the set value (addition), or stops at "0" (subtraction). • Ignores start input. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF.	
Signal on delay Ⓑ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. (1: ON, 2: OFF, 3: OFF) • Clears elapsed time value at power ON. • Time delay starts at start ON and elapsed time value or output resets at start OFF. • Instantaneous time delay start at reset OFF and power ON while start is ON. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF. • In order to have the time delay start at power ON or reset at power OFF, short out the start input beforehand.	
Signal off delay Ⓒ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. (1: OFF, 2: ON, 3: OFF) • Clears elapsed time value at power ON. • Output control ON at start ON and time delay start at start OFF. • Elapsed time value clears when start goes ON again during time delay. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF.	

Notes: 1) Each signal input (start, reset, stop, and lock) is applied by shorting their input terminal to the common terminal (terminal 1 for the 8-pin type, terminal 3 for the 11-pin type, and terminal for the screw terminal type).
2) The 8-pin type does not have a stop input or lock input.

Operation type	Explanation	Time chart
Pulse One-shot Ⓓ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. • Clears elapsed time value at power ON. • Time delay starts and output control ON at start ON. • Turns output control OFF and clears elapsed time value at time-up. • Ignores start input during time delay. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF. • In order to have the time delay start at power ON or reset at power OFF, short out the start input beforehand.	
Pulse On delay Ⓔ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. • Clears elapsed time value at power ON. • Time delay starts at start ON. • Ignores start input during time delay. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF. • In order to have the time delay start at power ON or reset at power OFF, short out the start input beforehand.	
Signal Flicker Ⓕ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. • Clears elapsed time value at power ON. • Time delay starts at start ON. • Ignores start input during time delay. • Output control reverses, elapsed time value clears, and timer delay starts at timer completion. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF. • In order to have the time delay start at power ON or reset at power OFF, short out the start input beforehand.	
Totalizing On delay Ⓖ	• Set the operation mode section of the DIP switches (no.'s 1, 2, and 3) on the side of the timer as shown. • Elapsed time value does not clear at power ON. (power outage countermeasure function) • The output remains ON even after the power is off and restarted. • Stops delay time operation at stop ON. Restarts delay time operation at stop OFF.	

1	2	3
ON	ON	OFF

1	2	3
OFF	OFF	ON

1	2	3
ON	OFF	ON

1	2	3
OFF	ON	ON

Notes: 1) Each signal input (start, reset, stop, and lock) is applied by shorting their input terminal to the common terminal (terminal 1 for the 8-pin type, terminal 3 for the 11-pin type, and ter-6minal 6 for the screw terminal type).
2) The 8-pin type does not have a stop input or lock input.

8-pin type

11-pin type

Screw terminal type

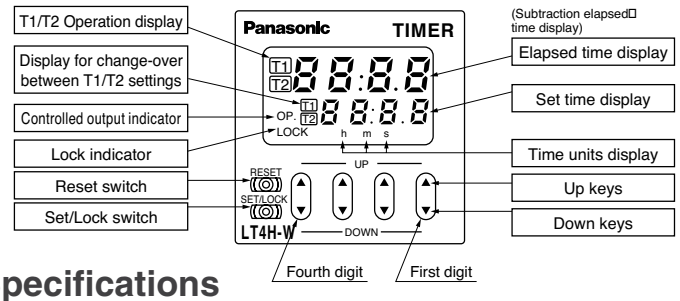
LT4H-W

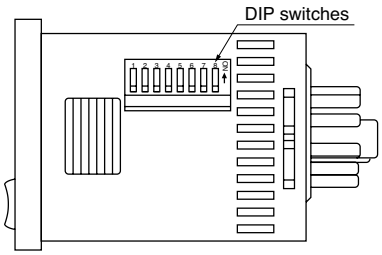
DIN 48 Size Digital Timer

- **Wide time range**
  The operation time range covers from 0.01 sec. to 9999 hours.
  The individual setting can be performed on each of 1 and 2 timers.
  99.99s 99min59s 99h59min
  999.9s 999.9min 999.9h
  9999s 9999h
- **Short Body of only 64.5 mm (screw terminal type) or 70.1 mm (pin type)**
  With a short body, it is easy to install in even narrow control panels.
- **Bright and Easy-to-Read Display**
  A brand new bright 2-color back light LCD display. The easy-to-read screen in any location makes checking and setting procedures a cinch.
- **Simple Operation**
  Seesaw buttons make operating the unit even easier than before.
- **Conforms to IP66's Weather Resistant Standards**
  The water-proof panel keeps out water and dirt for reliable operation even in poor environments.
- **Screw terminal (M3.5) and Pin Types are Both Standard Options**
  The two terminal types are standard options to support either front panel installation or embedded installation.
- **Changeable Panel Cover**
  Also offers a black panel cover to meet your design considerations.
- **Compliant with UL, c-UL and CE, UL File No.: E122222, C-UL File No.: E122222**

Product types

Time range	Operating mode	Output	Operating voltage	Power down insurance	Terminal type	Part number
99.99s 999.9s 9999s 99min59s 999.9min 99h59min 999.9h 9999h	Pulse input: • Delayed one shot • OFF-start flicker • ON-start flicker Integrating input: • Delayed one shot • OFF-start flicker • ON-start flicker	Relay (1 c)	100 to 240 V AC	Available	8 pins	LT4HW8-AC240V
					11 pins	LT4HW-AC240V
					Screw terminal	LT4HW-AC240VS
			24 V AC		8 pins	LT4HW8-AC24V
					11 pins	LT4HW-AC24V
					Screw terminal	LT4HW-AC24VS
			12 to 24 V DC		8 pins	LT4HW8-DC24V
					11 pins	LT4HW-DC24V
					Screw terminal	LT4HW-DC24VS
		Transistor (1 a)	100 to 240 V AC		8 pins	LT4HWT8-AC240V
					11 pins	LT4HWT-AC240V
					Screw terminal	LT4HWT-AC240VS
			24 V AC		8 pins	LT4HWT8-AC24V
					11 pins	LT4HWT-AC24V
					Screw terminal	LT4HWT-AC24VS
			12 to 24 V DC		8 pins	LT4HWT8-DC24V
					11 pins	LT4HWT-DC24V
					Screw terminal	LT4HWT-DC24VS





(Same for 8-pin and screw terminal type)

Specifications

Item		Type	Relays output type		Transistor output type	
			AC type	DC type	AC type	DC type
Rating	Rated operating voltage			12 to 24 V DC	100 to 240V AC, 24V AC	12 to 24 V DC
	Rated frequency		50/60 Hz common		50/60 Hz common	—
	Rated power consumption		Max. 10 V A	Max. 3 W	Max. 10 V A	Max. 3 W
	Rated control capacity		5 A, 250 V AC			
	Time range		99.99s, 999.9s, 9999s, 99min59s, 999.9min, 99h59min, 999.9h, 9999h (selected by DIP switch)			
	Time counting direction					
	Operation mode		Pulse input: Delayed one shot, OFF-start flicker or ON-start flicker Integrating input: Delayed one shot, OFF-start flicker or ON-start flicker			
	Start/Reset/Stop input		Min. input signal width: 1 ms, 20 ms (2 directions by selected by DIP switch) (The 8 pin type does not have a stop input.)			
	Lock input		Min. input signal width: 20 ms (The 8-pin type does not have a lock input.)			
	Input signal		Open collector input Input impedance: Max. 1 kΩ; Residual voltage: Max. 2V Open impedance: 100 kΩ or less, Max. energized voltage: 40 V DC			
	Indication					
	Power failure memory method		EEP ROM (Min. 10^5 overwriting)			
Time accuracy (max.)	Operating time fluctuation Temperature error Voltage error Setting error		± (0.005% + 50 ms) in case of power on start ± (0.005% + 20 ms) in case of input signal start		[Operating voltage: 85% to 110% Temperature: –10°C to +55°C Min. input signal width: 1ms]	
Contact	Contact arrangement		Timed-out 1 Form C		Timed-out 1 Form A (Open collector)	
	Contact resistance (Initial value)		100 mΩ (at 1 A 6 V DC)		—	
	Contact material		Ag alloy/Au flash		—	
Life	Mechanical (contact)		Min. $2x10^7$ ope. (Except for switch operation parts)		—	
	Electrical (contact)		Min. 10^5 ope. (At rated control voltage)		Min. 10^7 ope. (At rated control voltage)	
Electrical	Allowable operating voltage range		85 to 110 % of rated operating voltage			
	Breakdown voltage (Initial value)		2,000 Vrms for 1 min: Between live and dead metal parts (11-pin type only) 2,000 Vrms for 1 min: Between input and output 1,000 Vrms for 1 min: Between contacts		2,000 Vrms for 1 min: Between live and dead metal parts (Pin type only) 2,000 Vrms for 1 min: Between input and output	
	Insulation resistance (Initial value)		Min. 100 MΩ: Between live and dead metal parts Between input and output (At 500V DC) Between contacts		Min. 100 MΩ: Between live and dead metal parts Between input and output (At 500V DC)	
	Operating voltage reset time					
	Temperature rise		Max 65° C (under the flow of nominal operating current at nominal voltage)		—	
Mechanical	Vibration resistance	Functional	10 to 55 Hz: 1 cycle/ min single amplitude of 0.35 mm (10 min on 3 axes)			
		Destructive	10 to 55 Hz: 1 cycle/ min single amplitude of 0.75 mm (1 h on 3 axes)			
	Shock resistance	Functional	Min. 98 m/s² (4 times on 3 axes)			
		Destructive	Min. 294 m/s² (5 times on 3 axes)			
Operating conditions	Ambient temperature		–10° C to 55° C			
	Ambient humidity		Max. 85 % RH (non-condensing)			
	Air pressure		860 to 1,060 h Pa			
	Ripple rate		—	20 % or less	—	20 % or less
Connection			8-pin/11-pin/screw terminal			
Protective construction			IP66 (front panel with rubber gasket)			

Applicable standard

Safety standard	EN61812-1	Pollution Degree 2/Overvoltage Category II
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)

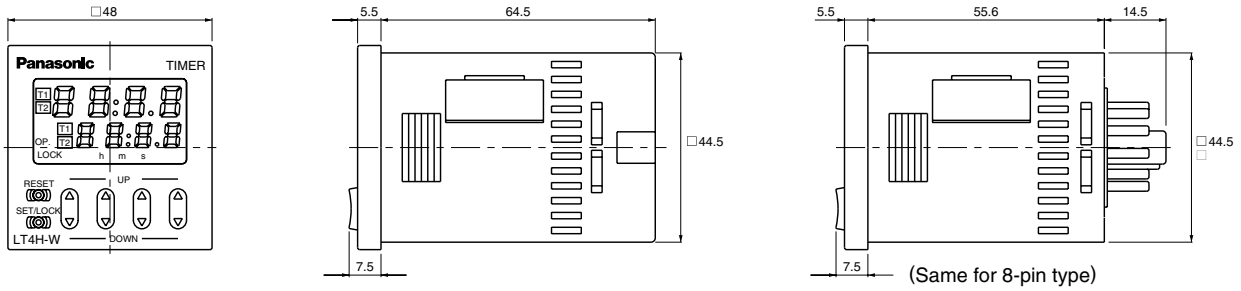
Dimensions

(units: mm)
Tolerance: ±1.0

• LT4H-W digital timer

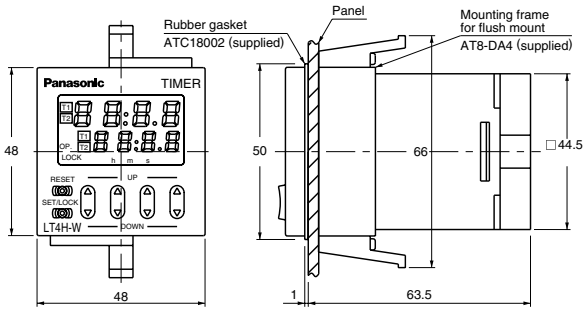
Screw terminal type
(Flush mount)

Pin type
(Flush mount/Surface mount)

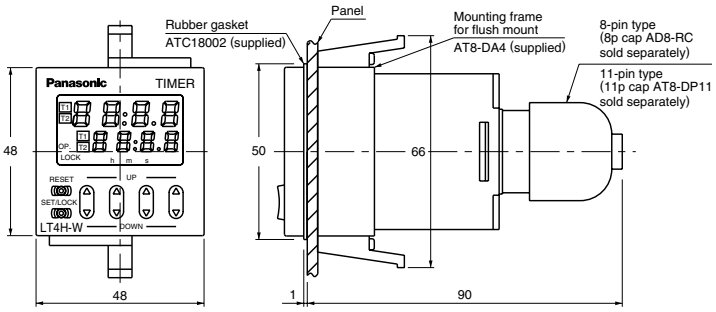


• Dimensions for flush mount (with adapter installed)

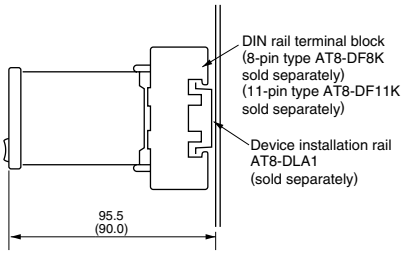
Screw terminal type



Pin type



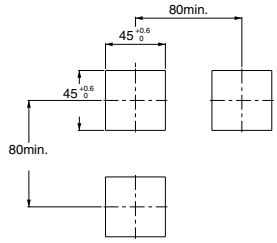
• Dimensions for front panel installations



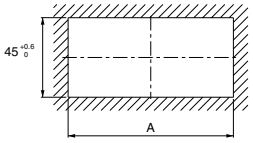
( ) dimension is for 8-pin type.

• Installation panel cut-out dimensions

The standard panel cut-out dimensions are shown below. Use the mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• For connected installations



When n timers are continuously installed, the dimension (A) is calculated according to the following formula (n: the number of the timers to be installed):

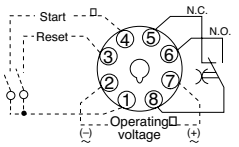
$A=(48 \times n - 2.5)^{+0.6}_{0}$

Note) 1: The installation panel thickness should be between 1 and 5 mm.
2: For connected installations, the waterproofing ability between the unit and installation panel is lost.

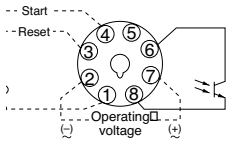
Terminal layouts and wiring diagrams

• 8-Pin type

Relay output type

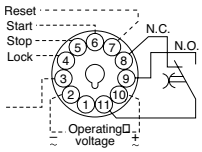


Transistor output type

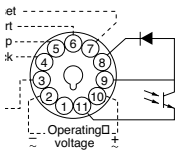


• 11-Pin type

Relay output type

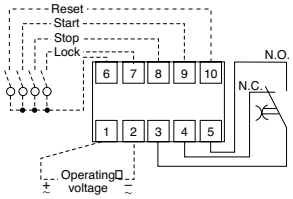


Transistor output type

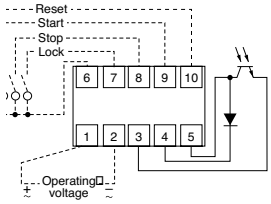


• Screw terminal type

Relay output type



Transistor output type



Note) For connecting the output leads of the transistor output type, refer to 5) Transistor output on page 26.

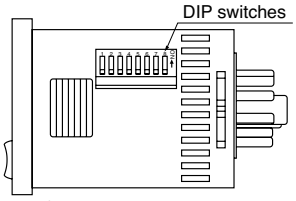
Setting the operation mode and time range

Setting procedure 1) Setting the time range (Timer T_1/Timer T_2)

Set the time range with the DIP switches on the side of the LT4H-W timer.

	Item	DIP switch	
		OFF	ON
1	Time range (Timer T_1)	Refer to table 1	
2			
3			
*4	Minimum input reset, start, and stop signal width	20 ms	1 ms
5	Time delay direction	Addition	Subtraction
6	Time range (Timer T_2)	Refer to table 2	
7			
8			

* The 8-pin type does not have the stop input, so that the DIP switch can be changed over between reset and start inputs. The signal range of the lock input is fixed (minimum 20 ms).



(same for screw terminal type and 8-pin type.)

Table 1: Setting the time range (Timer T_1)

DIP switch No.			Time range
1	2	3	
ON	ON	ON	0.01 s to 99.99 s
OFF	OFF	OFF	0.1 s to 999.9 s
ON	OFF	OFF	1 s to 9999 s
OFF	ON	OFF	0 min 01 s to 99 min 59 s
ON	ON	OFF	0.1 min to 999.9 min
OFF	OFF	ON	0 h 01 min to 99 h 59 min
ON	OFF	ON	0.1 h to 999.9 h
OFF	ON	ON	1 h to 9999 h

Table 2: Setting the time range (Timer T_2)

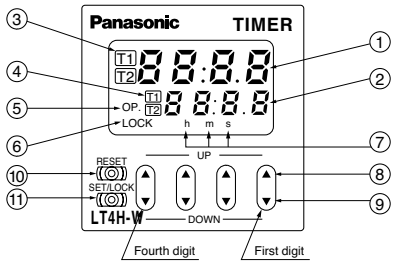
DIP switch No.			Time range
6	7	8	
ON	ON	ON	0.01 s to 99.99 s
OFF	OFF	OFF	0.1 s to 999.9 s
ON	OFF	OFF	1 s to 9999 s
OFF	ON	OFF	0 min 01 s to 99 min 59 s
ON	ON	OFF	0.1 min to 999.9 min
OFF	OFF	ON	0 h 01 min to 99 h 59 min
ON	OFF	ON	0.1 h to 999.9 h
OFF	ON	ON	1 h to 9999 h

Notes: 1) Set the DIP switches before installing the timer.
2) When the DIP SW setting is changed, turn off the power once.
3) The DIP switches are set as ON before shipping.

Setting procedure 2) Setting the operation mode

Set the operation mode with the keys on the front of the LT4H-W timer.

1 Elapsed time display
2 Set time display
3 T_1/T_2 operation indicator
4 T_1/T_2 setting value selectable indicator
5 Controlled output indicator
6 Lock indicator
7 Time units display

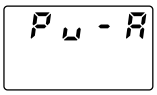


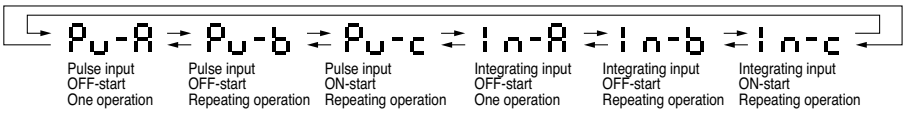
8 UP keys
Changes the corresponding digit of the set time in the addition direction (upwards)
9 DOWN keys
Changes the corresponding digit of the set time in the subtraction direction (downwards)
10 RESET switch
Resets the elapsed time and the output
11 SET/LOCK switch
Changes over the display between T_1/T_2 settings, sets the operation mode, checks the operation mode and locks the operation of each key (such as up, down or reset key).

1) Setting or changing the operation mode

(1) When the UP or DOWN key at the first digit is pressed with the SET/LOCK switch pressed, the mode is changed over to the setting mode.
(2) Now release the SET/LOCK switch.
(3) The operation mode in the setting mode is changed over sequentially in the left or right direction by pressing the UP or DOWN key at the first digit, respectively.

Ex: Setting operation mode display (PULSE-A example)





(4) The operational mode displayed at present is set by pressing the RESET switch, and the display returns to the normal condition.

2) Setting (changing) the time

(1) Pressing the SET/LOCK key switches the set value display between T1 and T2. Display the timer (T1 or T2) which is to be set (or changed).
(2) After displaying the timer (T1 or T2) which is to be set, press the UP or DOWN key to change the time.

• Checking the operation mode

When the UP or DOWN key at the second digit is pressed with the SET/LOCK switch pressed, the operational mode can be checked.
The display returns to the normal condition after indicating the operational mode for about two seconds. (While the display indicates the operational mode for about two seconds, the other indicators continue to operate normally.)

• Setting the lock

When the UP or DOWN key at the fourth digit is pressed with the SET/LOCK switch pressed, all keys on the unit are locked.
The timer does not accept any of UP, DOWN and RESET keys.
To release the lock setting, press the UP or DOWN key at the fourth digit again with the set/lock switch pressed.
* Operational mode, adding and subtracting and minimum input signal range cannot be set at T_1 and T_2, respectively.

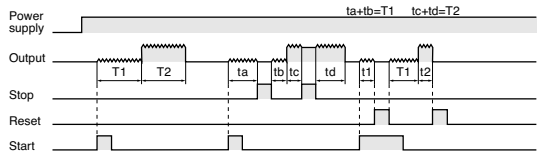
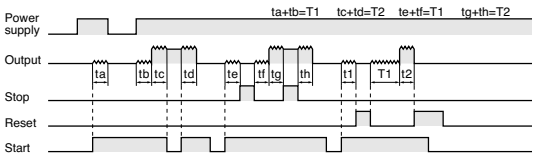
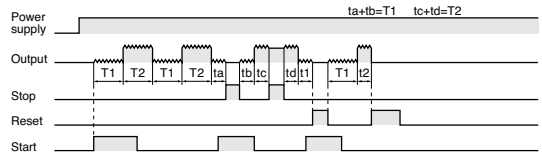
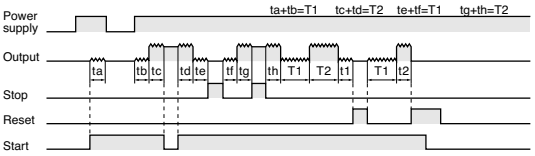
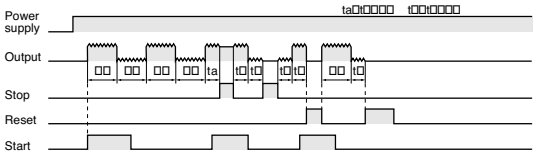
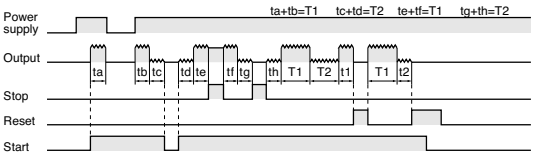
• Changing over the T_1/T_2 setting display

The T1/T2 setting display is changed over by pressing the SET/LOCK switch. (This operation gives no effect on the other operations. The set time and elapsed time (residual time) at T_1 are linked with those at T_2.)

• Changing the set time

1) It is possible to change the set time with the UP and DOWN keys even during time delay with the timer. However, be aware of the following points.
(1) If the set time is changed to less than the elapsed time with the time delay set to the addition direction, time delay will continue until the elapsed time reaches full scale, returns to zero, and then reaches the new set time. If the set time is changed to a time above the elapsed time, the time delay will continue until the elapsed time reaches the new set time.
(2) If the time delay is set to the subtraction direction, time delay will continue until "0" regardless of the new set time.
2) When the set times at T_1 and T_2 are set to 0, the output becomes ON only while the start input is carried out. However, while the reset input is carried out, the output becomes OFF.

Operation mode

	PULSE : Pulse input	INTEGRATION : Integrating input
PULSE A Delayed one shot	PULSE A OFF-start/1 operation $t_1<T_1$, $t_2<T_2$  • Elapsed value cleared when power is turned on. • Time limit start initiated when start input goes on; start input ignored if time limit interval is in progress. • Elapsed value cleared when one operation has been completed.	INTEGRATION A OFF-start/1 operation $t_1<T_1$, $t_2<T_2$  • Elapsed value not cleared when power is turned on (power failure backup function). • When power is turned back on, same status is maintained for output as that previous to power going off. • Elapsed value cleared when one operation has been completed.
OFF-start flicker B	PULSE B OFF-start/repeating operation $t_1<T_1$, $t_2<T_2$  • Elapsed value cleared when power is turned on. • Time limit start initiated when start input goes on; start input ignored if time limit interval is in progress.	INTEGRATION B OFF-start/repeating operation $t_1<T_1$, $t_2<T_2$  • Elapsed value not cleared when power is turned on (power failure backup function). • When power is turned back on, same status is maintained for output as that previous to power going off.
C ON-start flicker	ON-start/repeating operation $t_1<T_1$, $t_2<T_2$  • Elapsed value cleared when power is turned on. • Time limit start initiated when start input goes on; start input ignored if time limit interval is in progress.	ON-start/repeating operation $t_1<T_1$, $t_2<T_2$  • Elapsed value not cleared when power is turned on (power failure backup function). • When power is turned back on, same status is maintained for output as that previous to power going off.
	• The pulse input mode starts the operation by starting the start input. • When using the unit by starting it with the power on, short-circuit the start terminal (8-pin: 1 to 4, 11-pin: 3 to 6 and screw terminal: 6 to 9).	• The integrating input mode is operated by the integrated time of the start input. In other word, the timer operates only when the start input is performed. • When the elapsed value is cleared by the reset input, the output is reset. • When using the unit by starting it with the power on, short-circuit the start terminal (8-pin: 1 to 4, 11-pin: 3 to 6 and screw terminal: 6 to 9).
	• Each signal input such as start, reset, stop and lock inputs is applied by short-circuiting its input terminal and common terminal (8-pin type: terminal 1, 11-pin type: terminal 3 and screw terminal: terminal) 6 respectively. • The 8-pin type does not have a stop input or lock input.	

1. Terminal wiring

1) When wiring the terminals, refer to the terminal layout and wiring diagrams and be sure to perform the wiring properly without errors.

2) When using the instrument with an flush mounting, the screw-down terminal type is recommended. For the pin type, use either the rear terminal block (AT78041) or the 8P cap (AD8-RC) for the 8-pin type, and the rear terminal block (AT78051) or the 11P cap (AT8-DP11) for the 11-pin type. Avoid soldering directly to the round pins on the unit. When using the instrument with a front panel installation, use the DIN rail terminal block (AT8-DF8K) for the 8-pin type and the DIN rail terminal block (AT8-DF11K) for the 11-pin type.

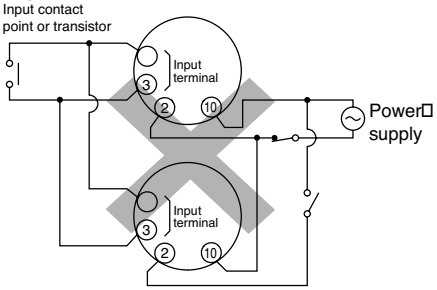
3) After turning the unit off, make sure that any resulting induced voltage or residual voltage is not applied to power supply terminals 2 through 7 (8-pin type) 2 through 10 (11-pin type) or 1 and 2 (screw terminal type). (If the power supply wire is wired parallel to the high voltage wire or power wire, an induced voltage may be generated between the power supply terminals.)

4) Have the power supply voltage pass through a switch or relay so that it is applied at one time. If the power supply is applied gradually, the counting may malfunction regardless of the settings, the power supply reset may not function, or other such unpredictable occurrence may result.

2. Input connections

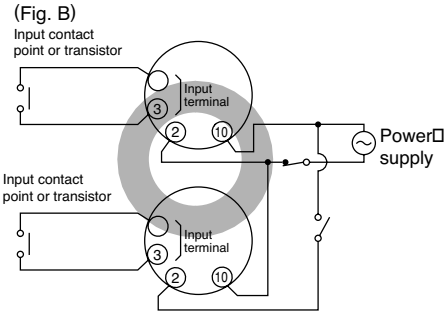
The power circuit has no transformer (power and input terminals are not insulated). When an input signal is fed to two or more timers at once, do not arrange the power circuit in an independent way. If the timer is powered on and off independently as shown in Fig. A, the timer's internal circuitry may get damaged.Be careful never to allow such circuitry. (Figs. A, B and C show the circuitry for the 11-pin type.)

(Fig. A)



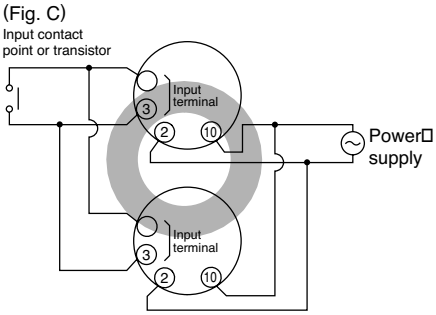
If independent power circuitry must be used, keep the input contacts or transistors separate from each other, as shown in Fig. B.

(Fig. B)



When power circuitry is not independent, one input signal can be fed to two or more counters at once, as shown in Fig. C.

(Fig. C)

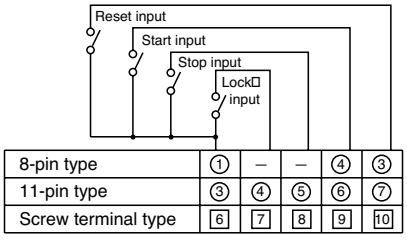


3. Input and output

1) Signal input type

(1) Contact point input

Use highly reliable metal plated contacts. Since the contact point's bounce time leads directly to error in the timer operations, use contacts with as short a bounce time as possible. Also, select a minimum input signal width of 20 ms.



8-pin type	①	–	–	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

(2) Non-contact point input

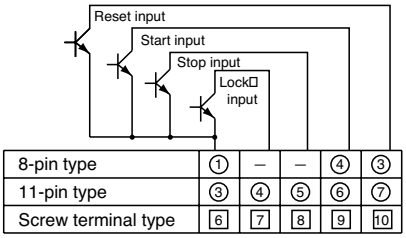
Connect with an open collector. Use transistors whose characteristics satisfy the criteria given below.

V_{CEO} = 20 V min.

I_C = 20 mA min.

I_{CBO} = 6μA max.

Also, use transistors with a residual voltage of less than 2 V when the transistor is on.



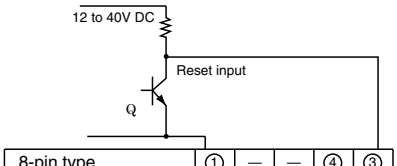
8-pin type	①	–	–	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

* The short-circuit impedance should be less than 1 kΩ.

[When the impedance is 0 Ω, the current coming from the start input and stop input terminals is approximately 12 mA, and from the reset input and lock input terminals is approximately 1.5 mA.]

Also, the open-circuit impedance should be more than 100 kΩ.

* As shown in the diagram below, from a non-contact point circuit (proximity switches, photoelectric switches, etc.) with a power supply voltage of between 12 and 40 V, the signal can be input without using an open collector transistor. In the case of the diagram below, when the non-contact point transistor Q switches from off to on (when the signal voltage goes from high to low), the signal is input.



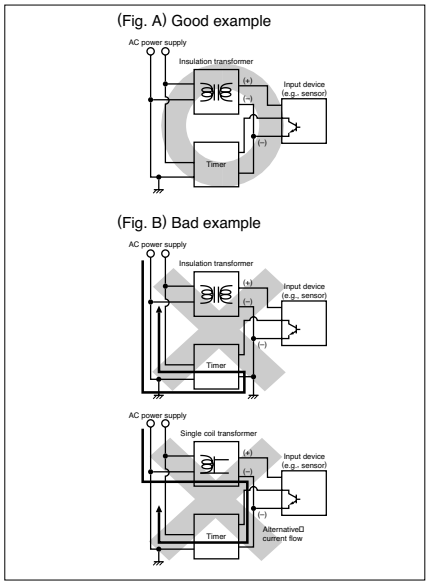
8-pin type	①	–	–	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

(The above example is for reset input)

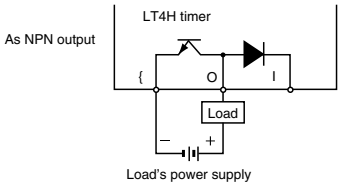
2) The input mode and output mode change depending on the DIP switch settings. Therefore, before making any connections, be sure to confirm the operation mode and operation conditions currently set.

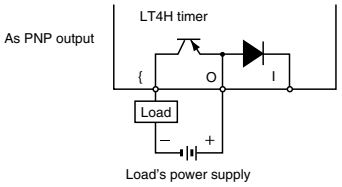
3) The LT4H series use power supply without a transformer (power and input terminals are not insulated). In connecting various kinds of input signals, therefore, use a power transformer in which the primary side is separated from the ungrounded secondary side as shown in Fig. A, for the power supply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

Once the wiring to be used is completely installed and prior to installing this timer, confirm that there is complete insulation between the wires connected to the power terminals (2 each) and the wires connected to each input terminal. If the power and input lines are not insulated, a short-circuit may occur inside the timer and result in internal damage.
In addition, when moving your equipment to a new installation location, confirm that there is no difference in environmental conditions as compared to the previous location.



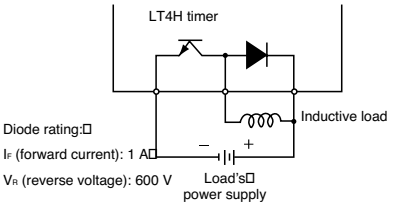
4) The input signal is applied by the shorting of each input terminal with the common terminal (terminal 1 for 8-pin types, terminal 3 for 11-pin types and terminal 6 for screw terminal types). Never connect other terminals or voltages higher than 40V DC, because it may destroy the internal circuitry.
5) Transistor output
(1) Since the transistor output is insulated from the internal circuitry by a photocoupler, it can be used as an NPN





Note: With the 8-pin type, there is no diode between points 8 and 9..

output or PNP (equal value) output. (The above example is 11-pin type)



(2) Use the diode connected to the output transistor's collector for absorbing the reverse voltage from induced loads.
6) When wiring, use shielded wires or metallic wire tubes, and keep the wire lengths as short as possible.
7) For the load of the controlled output, make sure that it is lower than the rated control capacity.

4. Operation of LT4H digital timer

1) Turning on and off the power supply while operating in A2* (Power on delay 2) or G (Totalizing On delay) will result in a timer error to be generated due to the characteristics of the internal circuitry. Therefore, use the start input or stop input.
* Not related to the start input.
2) When controlling the timer by turning on the power supply, use only A (Power on delay 1) or A2 (Power on delay 2). Use of other modes in this situation will result in timer errors. When using the other modes, control the timer with the start input or stop input.

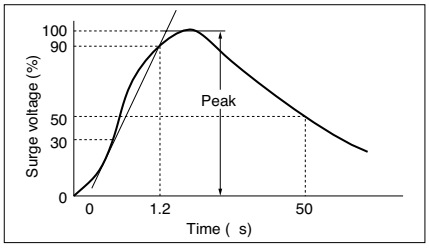
5. Operation mode and time range setting

The operation mode and time range can be set with the DIP switches on the side of the timer. Make the DIP switch settings before installing the timer on the panel.
The operation mode of LT4H-W series can be set with the keys and switches on the front of the timer.

Operating voltage	Surge voltage (peak value)
AC type	6,000V
DC type 24V AC type	1,000V

• Surge wave form

[± (1.2x50) μs uni-polar full wave voltage]

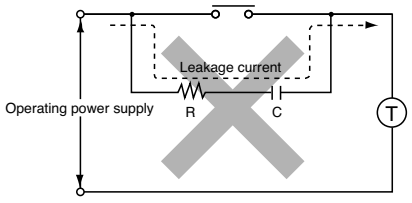


6. Conditions of usage

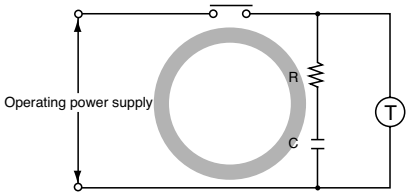
1) Avoid locations subject to flammable or corrosive gases, excessive dust, oil, vibrations, or excessive shocks.
2) Since the cover of the timer is made of polycarbonate resin, avoid contact with

	Power supply terminals		Input terminals
	AC type	DC type 24V AC type	
Noise voltage	1,500V	1,000V	600V

or use in environments containing methyl alcohol, benzene, thinners, and other organic solvents; and ammonia, caustic sodas, and other alkaline substances.
3) If power supply surges exceed the values given below, the internal circuits may become damaged. Be sure to use surge absorbing element to prevent this from happening.
4) Regarding external noise, the values below are considered the noise-resistant voltages. If voltages rise above these values, malfunctions or damage to the internal circuitry may result, so take the necessary precautions.
Noise wave form (noise simulator)
Rise time: 1 ns



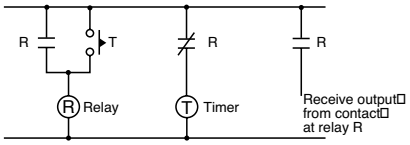
(Fig. A)



(Fig. B)

Pulse width: 1 µs, 50 ns
Polarity: ±
Cycle: 100 cycles/second

5) 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 unit, and cause incorrect operation. The fig. B shows the correct setup.



6) Long periods of continuous operation in the time-up completed condition (one month or more) will result in the weakening of the internal electrical components from the generated heat and, therefore, should be avoided. If you do plan to use the unit for such continuous operation, use in conjunction with a relay as shown in the circuit in the diagram below.

7. Acquisition of CE marking

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

1) Overvoltage category III, pollution level 2

2) This timer employs a power supply without a transformer, so the power and input signal terminals are not insulated.
(1) When a sensor is connected to the input circuit, install double insulation on the sensor side.
(2) In the case of contact input, use dual-insulated relays, etc.

3) 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.

4) 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.).

5) 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.

6) 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.

7. Self-diagnosis function

If a malfunction occurs, one of the following displays will appear.

Display	Contents	Output condition	Restoration procedure	Preset values after restoration
E r r - 0 0	Malfunctioning CPU.	OFF	Enter reset input, RESET key, or restart unit.	The values at start-up before the CPU malfunction occurred.
E r r - 0 1	Malfunctioning memory. See note.			0

Note: Includes the possibility that the EEPROM's life has expired.

QM4H

DIN 48 Size
Digital Timer

Features

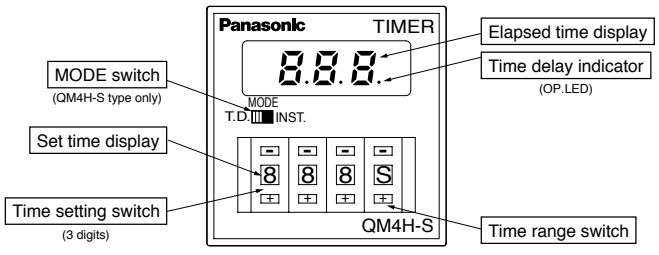
- Possible to set and change the time and the time range even when the power is off.
- Furthermore single unit has a time range of 0.01s to 9990hrs.
- [QM4H-S Type]
  It can select the mode with MODE switch.
  T.D. MODE: Time delay 2C (2 Form C)
  INST. MODE: Time delay 1C (1 Form C)
  Instantaneous 1C (1 Form C)
  [QM4H-G Type]
  Reset and stop signal input enable to external control.
- Compliant with UL, c-UL and CE.

Product types

Product name	Time delay direction	Time range	Operating mode	Contact arrangement	Operating voltage	Part number
S Type QM4H digital timer	Addition	0.01s/0.1s/1s/0.1min/ 1min/0.1h/1h/10h (8 time ranges)	Power ON delay	T.D. mode: Time delay 2C INST. mode: Time delay 1C and Instantaneous 1C (Use MODE switch on front)	12 to 48 V AC/DC	QM4HS-U2C-48V
					100 to 240 V AC/DC	QM4HS-U2C-240V
G Type QM4H digital timer			Power ON delay (with reset and stop terminals)	Time delay 1C	12 to 48 V AC/DC	QM4HG-U1C-48V
					100 to 240 V AC/DC	QM4HG-U1C-240V

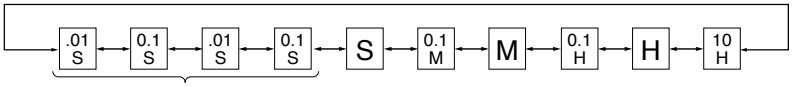
Note: Time delay directional subtraction types are also available by order

Part names



Time range settings

Time range switch	.01 S	0.1 S	S	0.1 M	M	0.1 H	H	10 H
Operating time range	0.01s to 9.99s	0.1s to 99.9s	1s to 999s	0.1min. to 99.9min	1min. to 999min	0.1h to 99.9h	1h to 999h	10h to 9990h



Note that there are two settings with the same range.

Changing the time setting

• It is possible to use the up and down keys to change the time setting even during timer delay. However, attention should be paid to the following.

1) When the time setting is shorter than the elapsed time, and timer delay is set in the plus direction, the time setting will return to "0" after the timer delay reaches full-scale, timer delay will be performed up to the changed time setting, and time up will be reached.
2) When timer delay is set in the minus direction, timer delay will be performed up to "0" regardless of the time, even if the time setting is shorter than the elapsed time, and time up will be reached.

Specifications

Item \ Type			QM4H-S		QM4H-G	
Rating	Rated operating voltage		12 to 48 V AC/DC and 100 to 240 V AC/DC			
	Rated power consumption	12 to 48 V AC/DC	During time delay	12 V DC, 48 V DC: Max. 1.5W 12 V AC, 48 V AC: Max. 3.0 VA	During time delay	12 V DC, 48 V DC: Max. 1.0W 12 V AC, 48 V AC: Max. 2.0 VA
			After time delay	12 V DC, 48 V DC: Max. 2.5W 12 V AC, 48 V AC: Max. 5.0 VA	After time delay	12 V DC, 48 V DC: Max. 1.5W 12 V AC, 48 V AC: Max. 3.5 VA
		100 to 240 V AC/DC	During time delay	100 V DC, 240 V DC: Max. 1.5W 100 V AC, 240 V AC: Max. 3.0 VA	During time delay	100 V DC, 240 V DC: Max. 1.0W 100 V AC, 240 V AC: Max. 2.5 VA
			After time delay	100 V DC, 240 V DC: Max. 2.0W 100 V AC, 240 V AC: Max. 4.0 VA	After time delay	100 V DC, 240 V DC: Max. 1.8W 100 V AC, 240 V AC: Max. 3.2 VA
	Rated frequency		50/60 Hz common (at AC)			
	Rated control capacity		5 A, 250V AC (resistive load)			
	Time range		0.01s to 9990h, Selection of 8 range: 0.01s/0.1s/1s/0.1min/1min/0.1h/1h/10h			
	Operation mode		Power ON delay		Power ON delay (with reset and stop terminals)	
	Min. input signal width		—		20ms (Reset and Stop inputs)*4	
Time accuracy*1	Operating time fluctuation		±(0.01%+0.05s) in case of power on start ±(0.005%+0.03s) in case of input reset start*2 Operating voltage: 85 to 110% V Temperature: –10 to +55°C (20°C) Stopped time: 0.1 sec to 1 hour			
	Temperature error					
	Setting error					
	Voltage error					
Contact	Contact arrangement		T.D. mode: Time delay 2C INST. mode: Time delay 1C and Instantaneous 1C (Use MODE switch on front)		Time delay 1C	
	Contact material		Silver alloy			
Life*3	Mechanical (contact)		Min. 10^7			
	Electrical (contact)		Min. 10^5 (at rated control vltage)			
Electrical	Allowable operating voltage range		85 to 110% of rated operating voltage			
	Breakdown voltage (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)			
	Insulation resistance (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			
	Reset time		Max. 0.1s			
Mechanical	Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min. single amplitude of 0.25 mm (10 min on 3 axes)			
		Destructive	10 to 55 Hz: 1 cycle/min. single amplitude of 0.375 mm (1h on 3 axes)			
	Shock resistance	Functional	98 m/s² (4 times on 3 axes)			
		Destructive	980 m/s² (5 times on 3 axes)			
Operating conditions	Ambient temperature		–10°C to 55°C			
	Ambient humidity		Min. 35 to 85% RH (non-condensing)			
	Air pressure		860 to 1060 hPa			
Others	Mass (Weight)		Approx. 130 g		Approx. 120 g	
	Available standards		UL, c-UL, CE			
	Operating display		LED (red), During time delay: blinking, After time delay: OFF			

Notes: 1. Unspecified measuring conditions are rated operating voltage (in case of DC type, ripple rate of 5% or less), ambient temp. 20°C, and stop time 1 second.
2. Reset start applies to QM4H-G type.
3. Excluding switches
4. Note that if the QM4H-G type is set to zero "0" and a STOP signal is input, output will begin when the power is turned on.
5. The protective structure on the AQM4801 is IP50, and IP64 for the AQM4803.

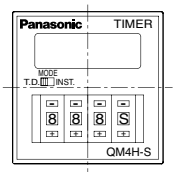
Applicable standard

Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category II
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)
	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)

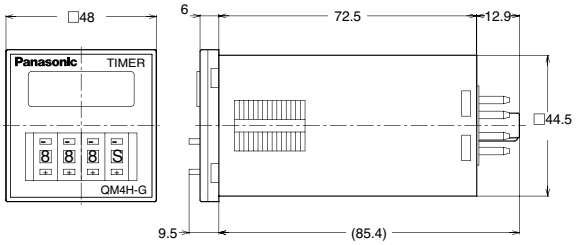
Dimensions

(units: mm)
Tolerance: ±1.0

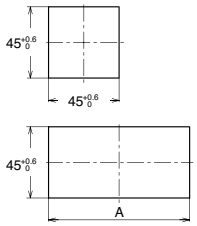
• S Type



• G Type

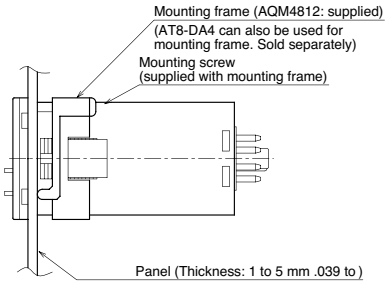


Panel cut-out dimensions



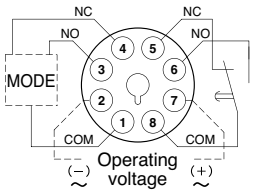
Dimensions A when n products are installed continuously:
A = (48∗n–2.5 +0.6 0)

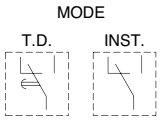
Panel Mounting Diagram



Terminal layouts and Wiring diagrams

• QM4H-S Type



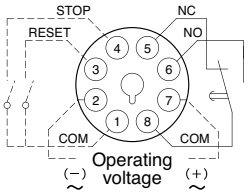


TD mode: Time delay 2C
INST mode:
Time delay 1C and Instantaneous 1C
*Use MODE switch on front

Notes:
1. Operating voltage signs in parentheses ( ) indicate the polarity of the DC type.
2.  is a time delay contact.

 is an instantaneous contact.

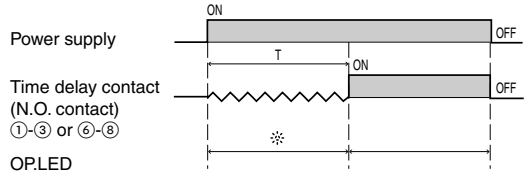
• QM4H-G Type



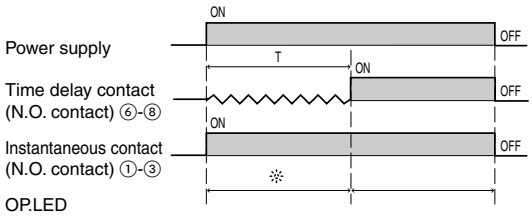
Operation mode

• QM4H-S Type

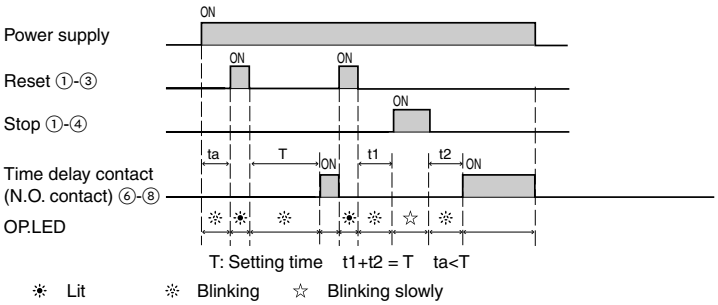
1) T.D. mode



2) INST. mode



• QM4H-G Type



* Set the reset inputs ① to ③ and stop inputs ① to ④ to 20 ms or higher.

* When shorting a signal, please set the inter-terminal resistance to 1 kΩ or less, and the inter-terminal residual voltage to 2 V or less.
When releasing, please set the inter-terminal resistance to 100 kΩ or greater.

Precautions in using the QM4H

1. Avoid locations subject to flammable or corrosive gases, excessive dust, oil, vibrations, or excessive shocks.

2. Since the main-unit is made of polycarbonate resin, avoid contact with or use in environments containing methyl alcohol, benzene, thinners, and other organic solvents; and ammonia, caustic sodas, and other alkaline substances.

3. Power supply superimposed surge protector

Although a surge protector will withstand standard-waveform voltage with the values in the next table, anything above this will destroy the internal circuit. You should therefore use a surge absorber.

12 to 48 V AC/DC	100 to 240 V AC/DC
1,000 V	6,000 V

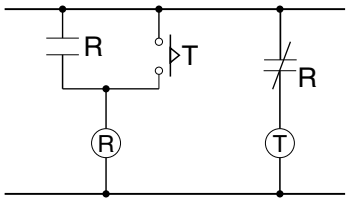
• Surge waveform
[±(1.2×50) μs uni-polar full wave voltage]

4. In order to maintain the characteristics, do not remove the timer case.

5. When installing the panel, use the supplied AQM4812 main-unit mounting frame. Note that the ATA4811 is also available for sale separately.

6. If you change the operating voltage, be sure not to allow leak current into the timer.

7. Avoid leaving the unit powered continuously. Leaving the unit powered up with output set to ON continuously for a long period of time (about 1 month or more) will wear out the electronic components. If you will be keeping it powered continuously, combine with a relay to create the circuit shown below:



Compliance with the CE marking

• When using in applications to which EN61010-1/IEC61010-1 applies, abide by the following conditions.

1) Ambient conditions
• Overvoltage category II, pollution level 2
• Indoor use
• Acceptable temperature and humidity range: –10 to +55°C, 30 to 85%RH (with no condensation at 20°C)
• Under 2000 m elevation

2) Use the unit in a location that matches the following conditions.
• There is minimal dust and no corrosive gas.
• There is no combustible or explosive gas.
• There is no mechanical vibration or impacts.
• There is no exposure to direct sunlight.
• Located away from large-volume electromagnetic switches and power lines with large electrical currents.

3) Connect a breaker that conforms to EN60947-1 or EN60947-3 to the voltage input section.

4) Applied voltage should be protected with an overcurrent protection device (example: T 1A, 250 V AC time lag fuse) that conforms to the EN/IEC standards.

S1DXM-A/M

Multi-Range Analog Timer

Features

- **Multiple functions built in**
  The operation mode and time range can be switched by using the MODE and RANGE switches on the front panel.
- **Short Body of only 57.9mm**
- **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.
- **Cadmium-free contacts used**
  To eliminate environmentally harmful chemical substances, relays with cadmium-free contacts are used.
- **CE marking supported**
  UL and C-UL approved, UL File No.: E122222 C-UL File No.: E122222, UL File No.: E122222, C-UL File No.: E122222

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

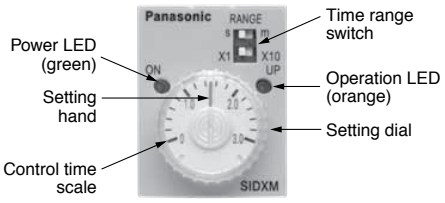
2. S1DXM-M multi-range timer

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

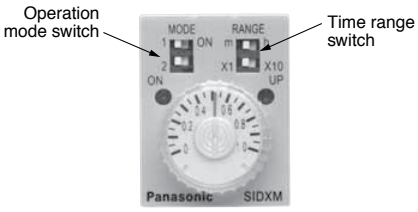
Operating voltage	Time range	Timed-out 2 Form C	Timed-out 4 Form C
		Part number	Part number
12V DC	0.05 s to 10 min	S1DXM-M2C10M-DC12V	S1DXM-M4C10M-DC12V
	0.2 s to 30 min	S1DXM-M2C30M-DC12V	S1DXM-M4C30M-DC12V
	0.5 s to 60 min	S1DXM-M2C60M-DC12V	S1DXM-M4C60M-DC12V
	0.05 min to 10 hr	S1DXM-M2C10H-DC12V	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



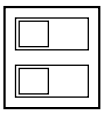
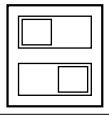
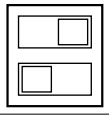
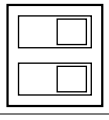
S1DXM-M

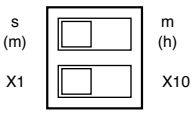


- [RANGE] Time range switch
  (4 different time ranges can be switched.)
  10M type: 1 s/10 s/1 min/10 min
  30M type: 3 s/30 s/3 min/30 min
  60M type: 6 s/60 s/6 min/60 min
  10H type: 1 min/10 min/1 hr/10 hr

- [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


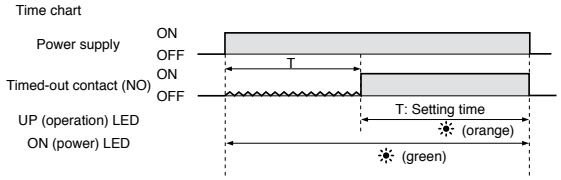
The time setting can be switched among 4 ranges each for 4 types for an interval between 0.05 seconds and 10 hours.

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

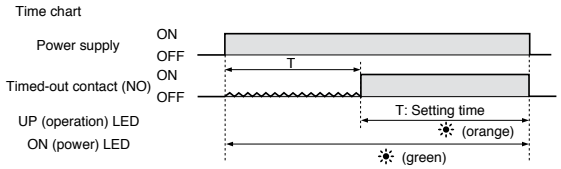
1. S1DXM-A multi-range timer
Power ON-delay operation

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



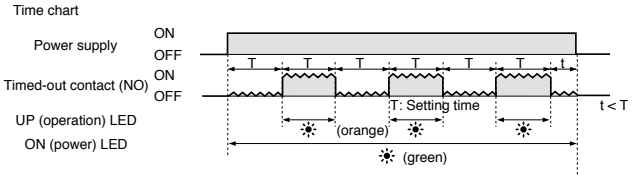
2. S1DXM-M multi-range timer
Power ON-delay operation
[MODE] switch 1: OFF, switch 2: OFF

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



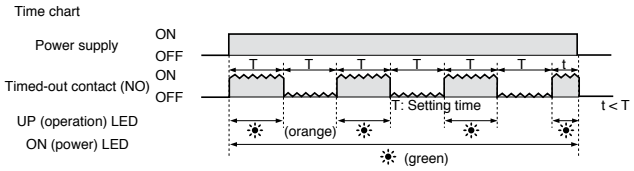
Power Flicker OFF start operation
[MODE] switch 1: OFF, switch 2: ON

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



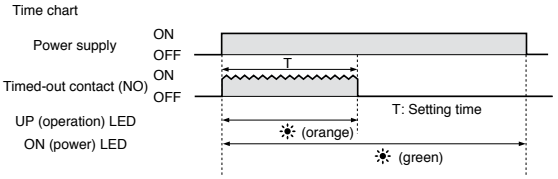
Power Flicker ON start operation
[MODE] switch 1: ON, switch 2: OFF

• 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 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

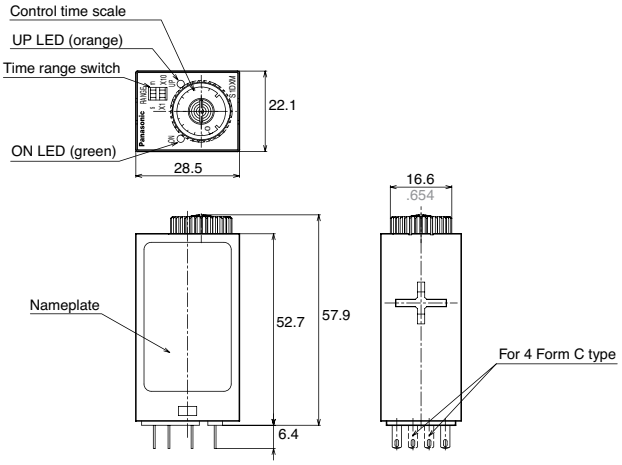
Item			Specifications					
Rating	Rated operating voltage		24VAC	100 to 120VAC	200 to 220VAC	220 to 240VAC	12VDC	24VDC
	Rated frequency		50/60Hz common				—	
	Rated power consumption		Max. 3 VA (at 24 VAC)	Max. 3 VA (at 100 VAC)	Max. 3 VA (at 200 VAC)	Max. 3 VA (at 220 VAC)	Max. 2 W (at 12 VDC)	Max. 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. 40m
	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)					
	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					
Operating conditions	Ambient temperature		–10 to 50°C					
	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, 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 sup

Dimensions

in mm

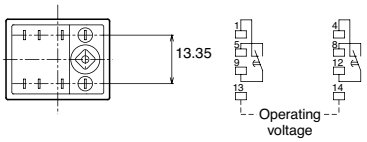
1. S1DXM-A



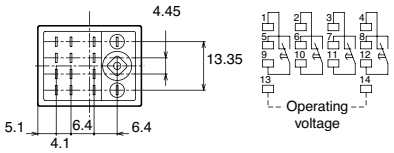
Tolerance: ±0.5

Terminal layouts and Wiring diagram

Timed-out 2 Form C type

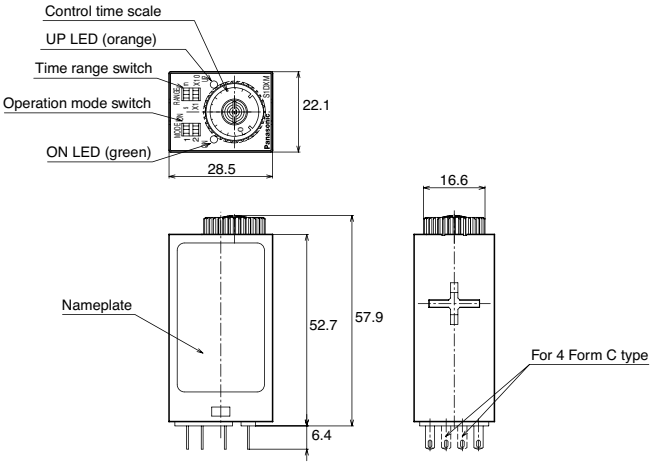


Timed-out 4 Form C type



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

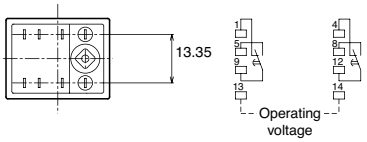
2. S1DXM-M



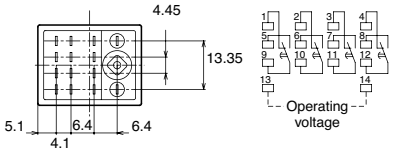
Tolerance: ±0.5

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

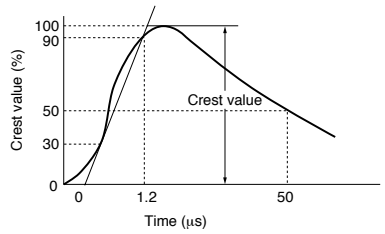
1. Reset periods

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.

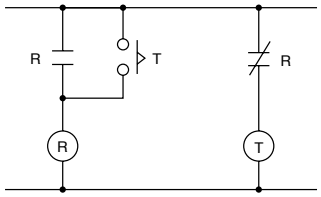
3) If terminals are to be soldered directly, please hand solder with a 30 to 60 W solder iron with a tip temperature of 300°C for no more than 3 seconds. Automatic soldering should be avoided.

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 uninstalling, 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.

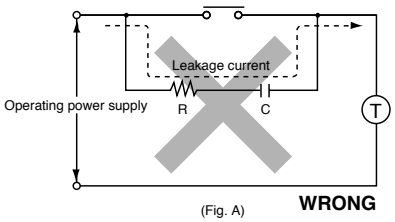
8. Others

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).

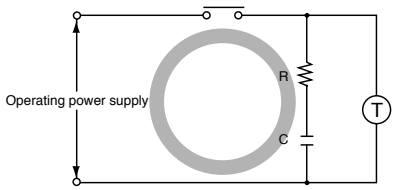
2) Do not rotate the knob past the stopper.

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) **WRONG**

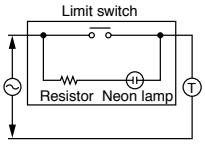


(Fig. B) **CORRECT**

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.

Screw terminal type

PM4H-A/S/M

DIN48 SIZE Multi-Range Analog Timer

Features

- 100-240V AC free-voltage input, 48-125V DC type available
- Short body – 62.5mm (screw terminal type)
- Front panel of IP65 type is protected against water-splash and dust
- Built-in screw terminals: Screw terminal type is used for easy wiring and reducing additional cost for accessories.
- 0 setting instantaneous output operation
- Multiple time ranges – 1 s to 500 h (Max.)
- 8 different operation modes: (PM4H-A)
- Compliant with UL/CSA, CE and LLOYD
- UL File No.: E122222 CSA File No.: LR39291

Product types

Type	Operation mode	Contact arrangement	Time range	Protective construction	Rated operating voltage	Terminal type	Part number
PM4H-A	8 operation modes • Pulse ON-delay • Pulse Flicker • Pulse ON-flicker • Differential ON/OFF-delay (1) (2) • Signal OFF-delay • Pulse One-shot • Pulse One-cycle	Relay Timed-out 2 Form C	16 selectable ranges 1s to 500h	IP65	100 to 240V AC	11 pins	PM4HA-H-AC240VW
						Screw terminal	PM4HA-H-AC240VSW
					48 to 125V DC	11 pins	PM4HA-H-DC125VW
						Screw terminal	PM4HA-H-DC125VSW
					24V AC/DC	11 pins	PM4HA-H-24VW
						Screw terminal	PM4HA-H-24VSW
					12V DC	11 pins	PM4HA-H-DC12VW
						Screw terminal	PM4HA-H-DC12VSW
				IP50	100 to 240V AC	11 pins	PM4HA-H-AC240V
						Screw terminal	PM4HA-H-AC240VS
					48 to 125V DC	11 pins	PM4HA-H-DC125V
						Screw terminal	PM4HA-H-DC125VS
					24V AC/DC	11 pins	PM4HA-H-24V
						Screw terminal	PM4HA-H-24VS
					12V DC	11 pins	PM4HA-H-DC12V
						Screw terminal	PM4HA-H-DC12VS
PM4H-S	Power ON-delay	Relay Timed-out 2 Form C		IP65	100 to 240V AC	8 pins	PM4HS-H-AC240VW
						Screw terminal	PM4HS-H-AC240VSW
					48 to 125V DC	8 pins	PM4HS-H-DC125VW
						Screw terminal	PM4HS-H-DC125VSW
					24V AC/DC	8 pins	PM4HS-H-24VW
						Screw terminal	PM4HS-H-24VSW
					12V DC	8 pins	PM4HS-H-DC12VW
						Screw terminal	PM4HS-H-DC12VSW
				IP50	100 to 240V AC	8 pins	PM4HS-H-AC240V
						Screw terminal	PM4HS-H-AC240VS
					48 to 125V DC	8 pins	PM4HS-H-DC125V
						Screw terminal	PM4HS-H-DC125VS
					24V AC/DC	8 pins	PM4HS-H-24V
						Screw terminal	PM4HS-H-24VS
					12V DC	8 pins	PM4HS-H-DC12V
						Screw terminal	PM4HS-H-DC12VS
PM4H-M	5 operation modes (With instantaneous contact) • Power ON-delay • Power Flicker • Power ON-flicker • Power One-shot • Power One-cycle	Relay Timed-out 1 Form C Instantaneous 1 Form C		IP65	100 to 240V AC	8 pins	PM4HM-H-AC240VW
						Screw terminal	PM4HM-H-AC240VSW
					48 to 125V DC	8 pins	PM4HM-H-DC125VW
						Screw terminal	PM4HM-H-DC125VSW
					24V AC/DC	8 pins	PM4HM-H-24VW
						Screw terminal	PM4HM-H-24VSW
					12V DC	8 pins	PM4HM-H-DC12VW
						Screw terminal	PM4HM-H-DC12VSW
				IP50	100 to 240V AC	8 pins	PM4HM-H-AC240V
						Screw terminal	PM4HM-H-AC240VS
					48 to 125V DC	8 pins	PM4HM-H-DC125V
						Screw terminal	PM4HM-H-DC125VS
					24V AC/DC	8 pins	PM4HM-H-24V
						Screw terminal	PM4HM-H-24VS
					12V DC	8 pins	PM4HM-H-DC12V
						Screw terminal	PM4HM-H-DC12VS

If you use this timer under harsh environment, please order above sealed type (IP65 type).
IP65 type — Protection dust and water jet splay on the front face.

Time range

Scale \ Time unit		sec	min	hrs	10h
1	Control time range	0.1s to 1s	0.1 min to 1 min	0.1h to 1h	1.0h to 10h
5		0.5s to 5s	0.5 min to 5 min	0.5h to 5h	5h to 50h
10		1.0s to 10s	1.0 min to 10 min	1.0h to 10h	10h to 100h
50		5s to 50s	5 min to 50 min	5h to 50h	50h to 500h

Note: 0 setting is for instantaneous output operation.

PM4H-A/PM4H-S/PM4H-M
All types of PM4H timer have multi-time range.
16 time ranges are selectable.
1s to 500h (Max. range) is controlled.

Specifications

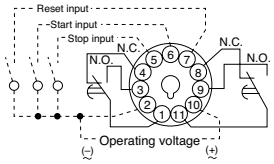
Item \ Type			PM4H-A	PM4H-S	PM4H-M
Rating	Rated operating voltage		100 to 240V AC, 48 to 125V DC, 12V DC, 24V AC/DC		
	Rated frequency		50/60Hz common (AC operating type)		
	Rated power consumption		Approx. 10VA (100 to 240V AC) Approx. 2.5VA (24V AC) Approx. 1.5W (12V DC, 24V DC, 48 to 125V DC)		
	Rated control capacity		5A 250V AC (resistive load)		
	Operating mode		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)
	Time range		1s to 500h (Max.) 16 time ranges switchable		
Time accuracy 1*, 2*	Operating time fluctuation		±0.3% (power off time change at the range of 0.1s to 1h)		
	Setting error		±5% (Full-scale value)		
	Voltage error		±0.5% (at the operating voltage changes between 85 to 110%)		
	Temperature error		±2% (at 20°C ambient temp. at the range of –10 to +50°C)		
Contact	Contact arrangement		Timed-out 2 Form C		Timed-out 1 Form C Instantaneous 1 Form C
	Contact resistance (Initial value)		Max. 100mΩ (at 1A 6V DC)		
	Contact material		Silver alloy		Au flash on Silver alloy
Life	Mechanical (contact)		2×10^7		
	Electrical (contact)		10^5 (at rated control capacity)		
Electrical function	Allowable operating voltage range		85 to 110% of rated operating voltage (at 20°C coil temp.)		
	Insulation resistance (Initial value)		Min. 100MΩ	Between live and dead metal parts Between input and output Between contacts of different poles Between contacts of same pole	(At 500V DC)
	Breakdown voltage (Initial value)		2,000Vrms for 1 min Between live and dead metal parts 2,000Vrms for 1 min Between input and output 2,000Vrms for 1 min Between contacts of different poles 1,000Vrms for 1 min Between contacts of same pole		
	Min. power off time		100ms		
	Max. temperature rise		55°C		65°C
Mechanical function	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. $98m/s^2$ (4 times on 3 axes)		
		Destructive	Min. $980m/s^2$ (5 times on 3 axes)		
Operating condition	Ambient temperature		–10 to +50°C		
	Ambient humidity		30 to 85%RH (at 20°C , non-condensing)		
	Atmospheric pressure		860 to 1,060hPa		
	Ripple factor (DC type)		20%		
Others	Protective construction		IP65 on front panel (using rubber gasket ATC18002) <only for IP65 type>		
	Weight		100g (Pin type)		
			110g (Screw terminal type)		

Note: 1) Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage (within 5% ripple factor for DC), 20°C ambient temperature, and 1s power off time.
2) For the 1s range, the tolerance for each specification becomes ±10ms.

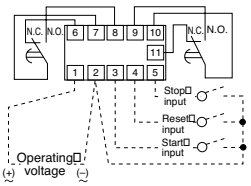
Terminal layouts and wiring diagrams

PM4H-A

Pin type
• Timed-out 2 Form C

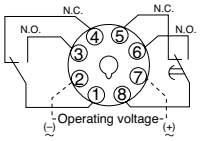


Screw terminal type
• Timed-out 2 Form C

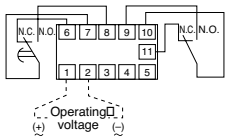


PM4H-M

Pin type
• Timed-out 1 Form C
• Instantaneous 1 Form C

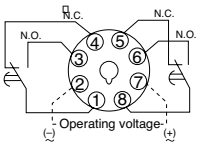


Screw terminal type
• Timed-out 1 Form C
• Instantaneous 1 Form C

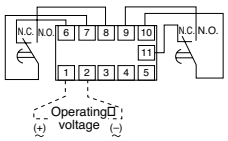


PM4H-S

Pin type
• Timed-out 2 Form C



Screw terminal type
• Timed-out 2 Form C



1) DC Type

Type	Pin	Screw terminal
PM4H-A	Connect the terminal b to negative (–), and the terminal j to positive (+).	Connect the terminal 2 to negative (–), and the terminal 1 to positive (+).
PM4H-S PM4H-M	Connect the terminal b to negative (–), and the terminal g to positive (+).	

2) Contact

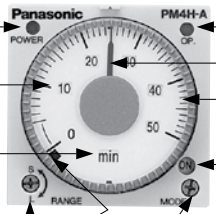
3) Voltage should not be applied to the various inputs (reset, start, and stop) of the PM4H-A multi-range timer. These inputs should be input without voltage.

Part names

PM4H-S

Time range selector
16 time settings selectable
(1 s to 500 h)
1s 5s 10s 50s
1min 5min 10min 50min
1h 5h 10h 50h
10h 50h 100h 500h

PM4H-A



Power indicator LED
Time indicator window
Time unit indicator
Output indicator LED
Hand
Set dial
Operation mode indicator

Instantaneous output area
When the hand is in this area, instantaneous operation starts.

Operation mode selector
Selectable from 8 operation modes
ON : Pulse ON-delay
FL : Pulse Flicker
FO : Pulse ON-flicker
OF1 : Differential ON/OFF-delay (1)
SF : Signal OFF-delay
OS : Pulse One-shot
OF2 : Differential ON/OFF-delay (2)
OC : Pulse One-cycle

PM4H-M

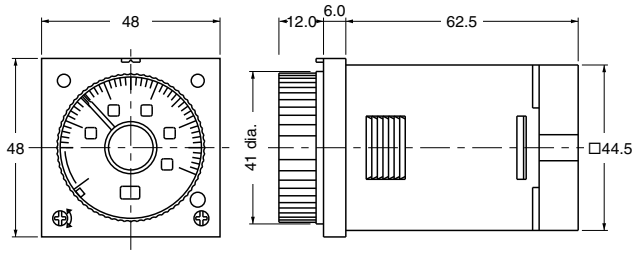
Operation mode selector
Selectable from
5 operation modes
ON : Power ON-delay
FL : Power flicker
FO : Power ON-flicker
OS : Power One-shot
OC : Power One-cycle

Dimensions

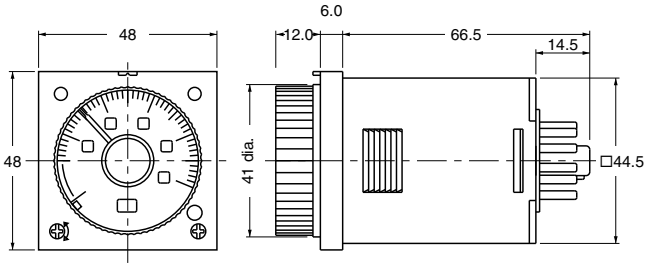
mm
Tolerance: ±0.5

• PM4H-□

Screw terminal type
(Flush mount)

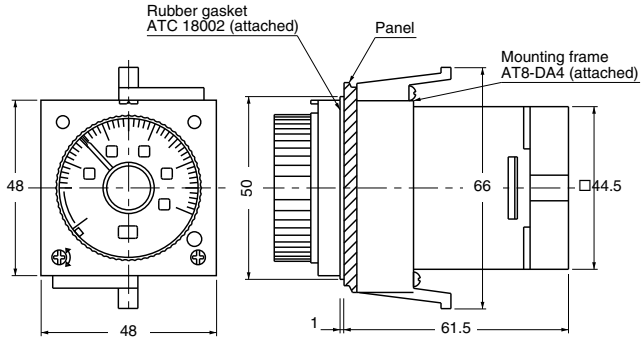


Pin type
(Flush mount/Surface mount)

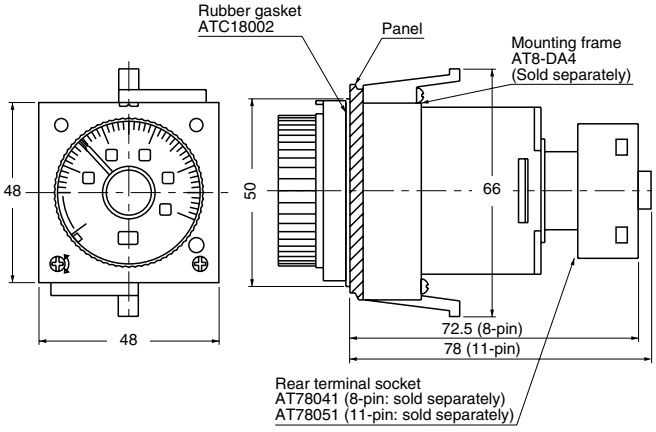


• Panel mount dimensions (with mounting frame)

Screw terminal type

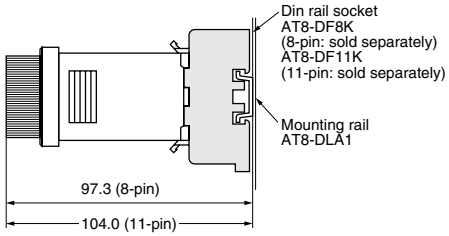


Pin type



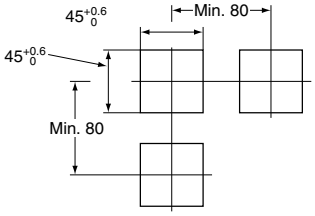
• Surface mount dimensions

Pin type

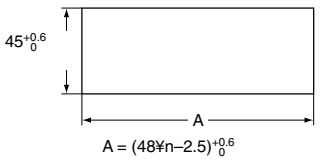


• Panel cutout dimensions

Standard cutout dimensions are shown below.
Use mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• Adjacent mounting

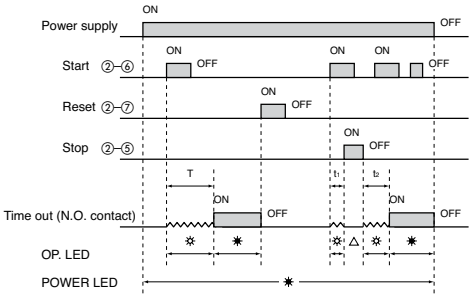
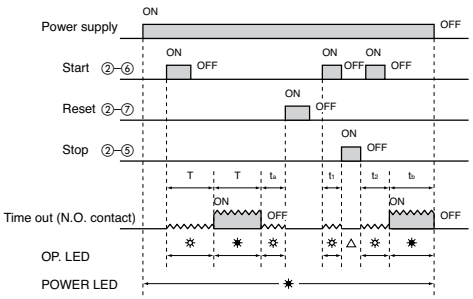
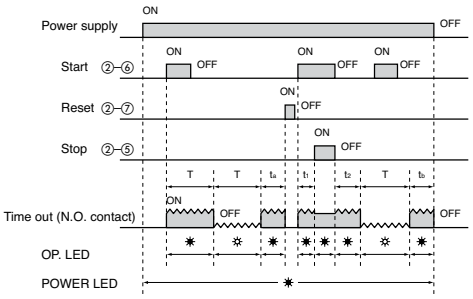
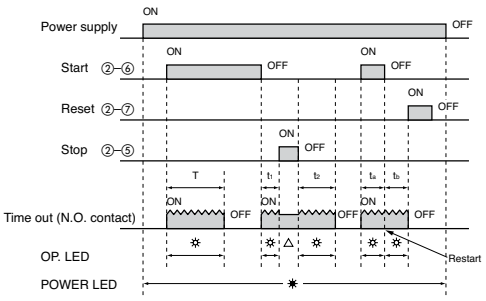
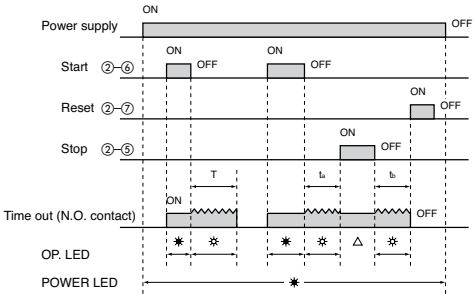


Note) 1. The proper thickness of mounting panel is between 1 to 5mm.
2. Adjacent mount is less water-resistant.

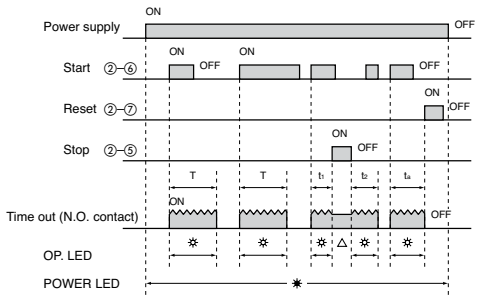
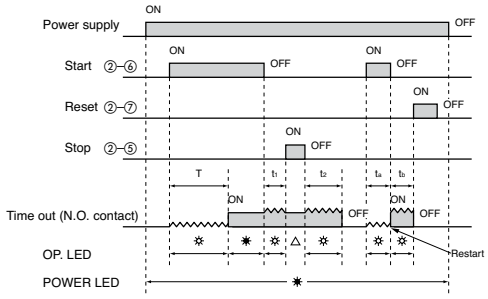
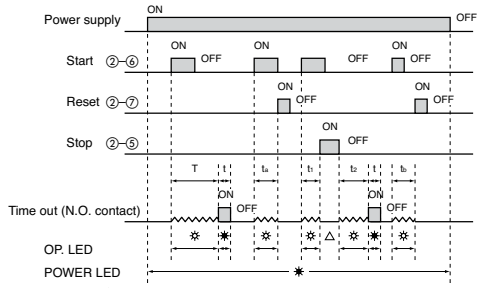
Operation mode

PM4H-A

(✷ LED lighting ✲ LED flickering□
T: Setting time t_1, t_2, t_a, t_b<T t_1+t_2=T)

Operation type	Explanation	Time chart
ON	• If using a time-limit start when the power is turned on, and a reset when the power is turned off, pins 2 to 6 (screw-tightening pins 2 and 3 should be shorted ahead of time. • Turn the operation mode selector switch to the (ON) position. If pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output will go on after the set time has elapsed. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting
Pulse Flicker (FL)	• If using a time-limit start when the power is turned on, and a reset when the power is turned off, pins 2 to 6 (screw-tightening pins 2 and 3) should be shorted ahead of time. • Turn the operation mode selector switch to the (FL) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the limited time interval begins, and the output goes on after the set time has elapsed. After the output has gone on, it goes off when the set time has elapsed, and this process is subsequently repeated. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting
Pulse ON-flicker (FO)	• If using a time-limit start when the power is turned on, and a reset when the power is turned off, pins 2 to 6 (screw-tightening pins 2 and 3) should be shorted ahead of time. • Turn the operation mode selector switch to the (FO) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output goes on, and after the set time has elapsed, it goes off. This process is subsequently repeated. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	
Differential ON/OFF-delay (1) (0F1)	• Turn the operation mode selector switch to the (0F1) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output goes on, and after the set time has elapsed, it goes off. Also, when pins 2 to 6 are released (the start input goes off), the output goes on, and after the set time has elapsed, it goes off. If the status of pins 2 to 6 (screw-tightening pins 2 and 3) changes during the time-limit interval (the start input goes from on to off, or from off to on), the time-limit interval is restarted from the point at which the change took place. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting
Signal OFF-delay (SF)	• Turn the operation mode selector switch to the (SF) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output goes on, and when pins 2 to 6 (screw-tightening pins 2 and 3) are released (the start input is turned off), the time limit interval begins. After the set time has elapsed, the output goes off. If start input is entered at any point during the time limit interval, the time limit interval is reset. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting

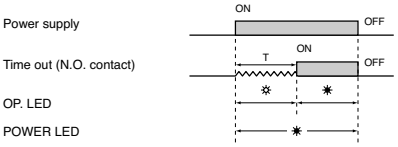
Note: Keep 0.1s or more for power off time.
Keep 0.05s or more for start, stop, reset input time.

Operation type	Explanation	Time chart
Pulse One-shot (0S)	• If using a time-limit start when the power is turned on, and a reset when the power is turned off, pins 2 to 6 (screw-tightening pins 2 and 3) should be shorted ahead of time. • Turn the operation mode selector switch to the (0S) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output goes on for the set time limit interval. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting
Differential ON/OFF-delay (2) (0F2)	• Turn the operation mode selector switch to the (0F2) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the time limit interval begins, and after the set time interval has elapsed, the output goes on. Also, when pins 2 to 6 are released (the start input goes off), the time limit interval begins, and after it has elapsed, the output goes off. If the status of pins 2 to 6 (screw-tightening pins 2 and 3) changes during the time-limit interval (the start input goes from on to off, or from off to on), the time limit interval is restarted from the point at which the change took place. If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 △Note: ✷ LED lighting or No LED lighting
Pulse One-cycle (0C)	• If using a time-limit start when the power is turned on, and a reset when the power is turned off, pins 2 to 6 (screw-tightening pins 2 and 3) should be shorted ahead of time. • Turn the operation mode selector switch to the (0C) position. When pins 2 to 6 (screw-tightening pins 2 and 3) are shorted (the start input is turned on) with the power supply on, the output goes on after the set time limit interval has elapsed. After it has gone on, it goes off after one pulse (approximately 0.8 seconds). If the power supply is turned off, or pins 2 to 7 (screw-tightening pins 2 to 4) are shorted (the reset input is turned on), a reset is carried out. Note) During time-limited operation, the time-limited operation is stopped while the pins 2 to 5 (screw-tightening pins 2 to 5) are being shorted (the stop input is on). When the pins are released, time-limited operation resumes.	 One pulse time (t): Approx. 0.8s △Note: ✷ LED lighting or No LED lighting

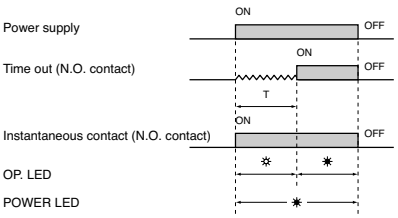
Note: Keep 0.1s or more for power off time. Keep 0.05s or more for start, stop, reset input time.

(✷ LED lighting ✲ LED flickering□ T: Setting time)

PM4H-S

Operation type	Explanation	Time chart
Power ON-delay	Time limit contact relay. When the power supply is turned on, the output goes on after the set time interval has elapsed. When the power supply is turned off, a reset is carried out.	

PM4H-M

Operation type	Explanation	Time chart
Power ON-delay (ON) **Power Flicker** (FL) **Power ON-flicker** (FO) **Power One-shot** (0S) **Power One-cycle** (0C)	Turn the operation mode selector switch to display the various operations. When the power supply is turned on, the time limit interval begins, and operation is carried out. When the power supply is turned off, a reset is carried out.	Power ON-delay 

Note: Keep 0.1s or more for power off time. PM4H-M timers do not have each input which is start, reset and stop.

PM4H-SD/SDM

DIN48 Size Analog Star (⅄) - Delta (△) Timers

Features

- Select four types of time ranges between 0.2 s and 100 s on a single unit.
- Short body – 66.5mm (screw terminal type)
- Select between five types of time ranges between 0.04 s and 0.7 s for the ⅄-Δ switching times.
- There is a ⅄-Δ switching indicator so you can check the operation at a glance
- The AC free power supply and shorter body make it easier to use.
- Compliant with UL, CSA, CE and LLOYD, UL File No.: E122222, CSA File No.: LR39291

Specifications

Item			Type: PM4H-SD/SDM
Rating	Rated operating voltage		100 to 240V AC, 24V AC
	Rated frequency		50/60Hz common
	Rated power consumption		Approx. 6VA (100 to 240V AC), Approx. 1.4VA (24V AC)
	Rated control capacity		5A 250V AC (resistive load)
	Operation mode		⅄-Δ star-delta switching (Power ON-delay)
	⅄ operation control time range		2s to 100s, 4 time ranges switchable
	⅄-Δ switching time		0.04, 0.1, 0.3, 0.5, 0.7s (5 time range selectable)
Time accuracy 1*, 2*	Operation time fluctuation		±0.3% (power off time change at the range of 0.5s to 1h)
	Setting error		±5% (Full-scale value)
	Voltage error		±0.5% (at the operating voltage changes between 85 to 110%)
	Temperature error		±2% (at 20°C ambient temp. at the range of –10 to +50°C)
Contact	Contact arrangement		Star (⅄) side: Timed-out 1 Form A, Delta (Δ) side: Timed-out 1 Form A Instantaneous: 1 Form A (Instantaneous for PM4H-SDM type only)
	Contact resistance (Initial value)		Max. 100mΩ (at 1A 6V DC)
	Contact material		Au flash on Silver alloy
Life	Mechanical (contact)		2×10^7
	Electrical (contact)		10^5 (at rated control capacity)
Electrical function	Allowable operating voltage range		85 to 110% of rated operating voltage (at 20°C coil temp.)
	Insulation resistance (Initial value)		Min. 100MΩ (At 500V DC) Between live and dead metal parts Between input and output Between contacts of different poles *3 Between contacts of same pole
	Breakdown voltage (Initial value)		2,000Vrms for 1 min Between live and dead metal parts 2,000Vrms for 1 min Between input and output 2,000Vrms for 1 min Between contacts of different poles *3 1,000Vrms for 1 min Between contacts of same pole
	Min. power off time		500ms
	Max. temperature rise		65°C
Mechanical function	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. 294m/s² (4 times on 3 axes)
		Destructive	Min. 980m/s² (5 times on 3 axes)
Operating condition	Ambient temperature		–10 to +50°C
	Ambient humidity		Max. 85%RH (non-condensing)
	Atmospheric pressure		860 to 1,060hPa
Others	Protective construction		IP65 on front panel (using rubber gasket ATC18002) <only for IP65 type>
	Weight		100g (Pin type), 110g (Screw terminal type)

Notes: 1* Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage, 20°C ambient temperature, and 1s power off time.
2* For the 2s range, the tolerance for each specification becomes ±10ms.
3* Between contacts of different poles for PM4H-SDM type only.

Time range

Time range / Time range unit	Operating (s)	⅄-Δ switching time (s)
2	0.2 to 2	0.04
10	1 to 10	0.1
		0.3
20	2 to 20	0.5
100	10 to 100	0.7

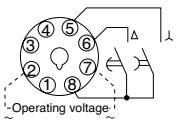
Product types

Type	Operation mode	Contact arrangement	Time range	Protective construction	Rated operating voltage	Terminal type	Part number
PM4H-SD Star (⅄)-Delta (Δ) switching	Star (⅄)-Delta (Δ) switching	Relay Timed-out ⅄ side: 1 Form A Δ side: 1 Form A	4 selectable ranges over 2s to 100s (⅄-Δ switching time: 0.04, 0.1, 0.3, 0.5, 0.7s)	IP65	100 to 240V AC	8 pins	PM4HSD-S-AC240VW
						Screw terminal	PM4HSD-S-AC240VSW
					24V AC	8 pins	PM4HSD-S-AC24VW
						Screw terminal	PM4HSD-S-AC24VSW
PM4H-SDM Star (⅄)-Delta (Δ) switching (Instantaneous contact)		Relay Timed-out ⅄ side: 1 Form A Δ side: 1 Form A Instantaneous: 1 Form A			100 to 240V AC	8 pins	PM4HSDM-S-AC240VW
						Screw terminal	PM4HSDM-S-AC240VSW
					24V AC	8 pins	PM4HSDM-S-AC24VW
						Screw terminal	PM4HSDM-S-AC24VSW
PM4H-SD Star (⅄)-Delta (Δ) switching		Relay Timed-out ⅄ side: 1 Form A Δ side: 1 Form A		IP50	100 to 240V AC	8 pins	PM4HSD-S-AC240V
						Screw terminal	PM4HSD-S-AC240VS
					24V AC	8 pins	PM4HSD-S-AC24V
						Screw terminal	PM4HSD-S-AC24VS
PM4H-SDM Star (⅄)-Delta (Δ) switching (Instantaneous contact)		Relay Timed-out ⅄ side: 1 Form A Δ side: 1 Form A Instantaneous: 1 Form A			100 to 240V AC	8 pins	PM4HSDM-S-AC240V
						Screw terminal	PM4HSDM-S-AC240VS
					24V AC	8 pins	PM4HSDM-S-AC24V
						Screw terminal	PM4HSDM-S-AC24VS

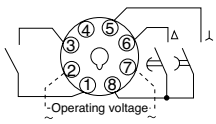
Terminal layouts and wiring diagrams

Pin type

• No instantaneous contact



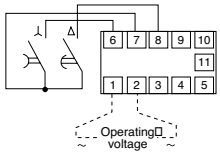
• With instantaneous contact



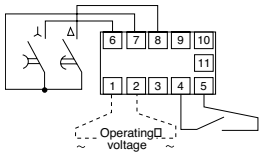
⑤—⑧: ⅄ side time-delay contact
⑥—⑧: △ side time-delay contact
①—③: Instantaneous contact (PM4H-SDM type)

Screw terminal type

• No instantaneous contact



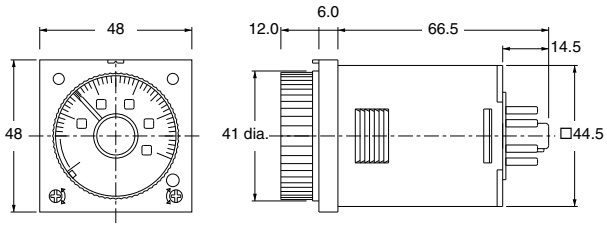
• With instantaneous contact



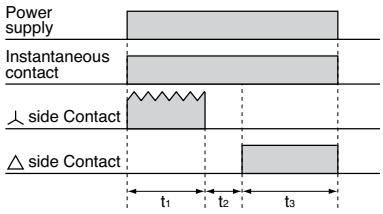
6—7: ⅄ side time-delay contact
8—7: △ side time-delay contact
4—5: Instantaneous contact (PM4H-SDM type)

Dimensions

mm



Operation



t1: ⅄ operation time (⅄ indicator LED lights)
t2: ⅄ – △ switching time
t3: △ operation time (△ indicator LED lights)

PM4H-F

DIN48 Size Analog Multi-Range Power Off-Delay Timers

Features

- Switch operation times between three types of time ranges of 1 s to 10 s and 1 min to 10 min.
- Short body – 62.5mm (screw terminal type)
- Instantaneous reset available.
- The shorter body makes it easier to use.
- Compliant with UL, CSA, CE and LLOYD, UL File No.: E122222, CSA File No.: LR39291

Specifications

Item \ Type			PM4H-F8	PM4H-F8R	PM4H-F11R
Rating	Rated operating voltage		100 to 120V AC, 200 to 240V AC, 24V AC, 12V DC, 24V DC		
	Rated frequency		50/60Hz common (AC operating type)		
	Rated power consumption		Approx. 1.6VA (100 to 120V AC, 200 to 240V AC), Approx. 2.3VA (24V AC) Approx. 1.1W (12V DC, 24V DC)		
	Rated control capacity		3A 250V AC (resistive load)		
	Operation mode		Power OFF-delay	Power OFF-delay (with reset)	
	Time range		1s to 10s: 3 range switchable 1 min to 10 min: 3 range selectable		
Time accuracy 1*, 2*	Operation time fluctuation		0.3%		
	Setting error		5% (Full-scale value)		
	Voltage error		0.5% (at the operating voltage changes between 85 to 110%)		
	Temperature error		2% (at 20C ambient temp. at the range of –10 to +50C)		
Contact	Contact arrangement		Timed-out 2 Form C	Timed-out 1 Form C	Timed-out 2 Form C
	Contact resistance (Initial value)		Max. 100mΩ (at 1A 6V DC)		
	Contact material		Au flash on Silver alloy		
Life	Mechanical (contact)		10^7		
	Electrical (contact)		10^5 (at rated control capacity)		
Electrical function	Allowable operating voltage range		85 to 110% of rated operating voltage (at 20C coil temp.), 90 to 110% (DC Type)		
	Insulation resistance (Initial value)		Min. 100MΩ (At 500V DC) Between live and dead metal parts Between input and output Between contacts of different poles *3 Between contacts of same pole		
	Breakdown voltage (Initial value)		1,500Vrms for 1 min Between live and dead metal parts 1,500Vrms for 1 min Between input and output 1,000Vrms for 1 min Between contacts of different poles *3 750Vrms for 1 min Between contacts of same pole		
	Min. power supply width		s range type: 100ms min range type: 2s		
	Min. reset time		———	50ms	
	Max. temperature rise		55C		
Mechanical function	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 (1hr on 3 axes)		
	Shock resistance	Functional	Min. 98m/s^2 (4 times on 3 axes)		
		Destructive	Min. 980m/s^2 (5 times on 3 axes)		
Operating condition	Ambient temperature		–10 to +50C		
	Ambient humidity		30 to 85%RH (non-condensing)		
	Atmospheric pressure		860 to 1,060hPa		
	Ripple factor (DC type)		20%		
Others	Protective construction		IP65 on front panel (using rubber gasket ATC18002) <only for IP65 type>		
	Weight		100g (Pin type), 110g (Screw terminal type)		

Notes: 1 Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage (within 5% ripple factor for DC), 20°C ambient temperature.

2* For the 1s range, the tolerance for each specification becomes ±10ms. When the power goes on, in rush current (0.3A) flows. Cautions should be taken. The minimum power supplying time after forced reset input is 2s or more.

3* Between contacts of different pools for PM4H-F8, PM4H-F11R types only.

Time range

Time range unit / Time range	s range type	min range type
1	0.04s to 1s	0.04 min to 1 min
5	0.2s to 5s	0.2 min to 5 min
10	0.4s to 10s	0.4 min to 10 min

Product types

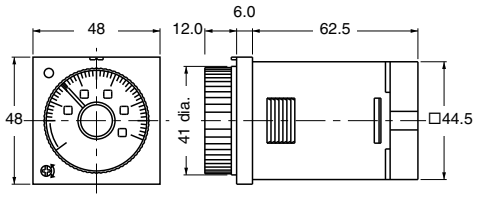
Type	Operation mode	Contact arrangement	Time range	Protective construction	Rated operating voltage	Terminal type	Part number
PM4H-F8	Power OFF-delay (without reset)	Relay Timed-out 2 Form C	3 selectable time ranges over 1s to 10s	IP65	100 to 120V AC	8 pins	PM4HF8-S-AC120VW
					200 to 240V AC	8 pins	PM4HF8-S-AC240VW
					24V AC	8 pins	PM4HF8-S-AC24VW
					12V DC	8 pins	PM4HF8-S-DC12VW
					24V DC	8 pins	PM4HF8-S-DC24VW
			3 selectable time ranges over 1 min to 10 min		100 to 120V AC	8 pins	PM4HF8-M-AC120VW
					200 to 240V AC	8 pins	PM4HF8-M-AC240VW
					24V AC	8 pins	PM4HF8-M-AC24VW
					12V DC	8 pins	PM4HF8-M-DC12VW
					24V DC	8 pins	PM4HF8-M-DC24VW
			3 selectable time ranges over 1s to 10s	IP50	100 to 120V AC	8 pins	PM4HF8-S-AC120V
					200 to 240V AC	8 pins	PM4HF8-S-AC240V
					24V AC	8 pins	PM4HF8-S-AC24V
					12V DC	8 pins	PM4HF8-S-DC12V
					24V DC	8 pins	PM4HF8-S-DC24V
			3 selectable time ranges over 1 min to 10 min		100 to 120V AC	8 pins	PM4HF8-M-AC120V
					200 to 240V AC	8 pins	PM4HF8-M-AC240V
					24V AC	8 pins	PM4HF8-M-AC24V
					12V DC	8 pins	PM4HF8-M-DC12V
					24V DC	8 pins	PM4HF8-M-DC24V
PM4H-F8R	Power OFF-delay (with instantaneous reset)	Relay Timed-out 1 Form C	3 selectable time ranges over 1s to 10s	IP65	100 to 120V AC	8 pins	PM4HF8R-S-AC120VW
					200 to 240V AC	8 pins	PM4HF8R-S-AC240VW
					24V AC	8 pins	PM4HF8R-S-AC24VW
					12V DC	8 pins	PM4HF8R-S-DC12VW
					24V DC	8 pins	PM4HF8R-S-DC24VW
			3 selectable time ranges over 1 min to 10 min		100 to 120V AC	8 pins	PM4HF8R-M-AC120VW
					200 to 240V AC	8 pins	PM4HF8R-M-AC240VW
					24V AC	8 pins	PM4HF8R-M-AC24VW
					12V DC	8 pins	PM4HF8R-M-DC12VW
					24V DC	8 pins	PM4HF8R-M-DC24VW
			3 selectable time ranges over 1s to 10s	IP50	100 to 120V AC	8 pins	PM4HF8R-S-AC120V
					200 to 240V AC	8 pins	PM4HF8R-S-AC240V
					24V AC	8 pins	PM4HF8R-S-AC24V
					12V DC	8 pins	PM4HF8R-S-DC12V
					24V DC	8 pins	PM4HF8R-S-DC24V
			3 selectable time ranges over 1 min to 10 min		100 to 120V AC	8 pins	PM4HF8R-M-AC120V
					200 to 240V AC	8 pins	PM4HF8R-M-AC240V
					24V AC	8 pins	PM4HF8R-M-AC24V
					12V DC	8 pins	PM4HF8R-M-DC12V
					24V DC	8 pins	PM4HF8R-M-DC24V

Type	Operation mode	Contact arrangement	Time range	Protective construction	Rated operating voltage	Terminal type	Part number
PM4H-F11R	Power OFF-delay (with instantaneous reset)	Relay Timed-out 2 Form C	3 selectable time ranges over 1s to 10s	IP65	100 to 120V AC	11 pins	PM4HF11R-S-AC120VW
						Screw terminal	PM4HF11R-S-AC120VSW
					200 to 240V AC	11 pins	PM4HF11R-S-AC240VW
						Screw terminal	PM4HF11R-S-AC240VSW
					24V AC	11 pins	PM4HF11R-S-AC24VW
						Screw terminal	PM4HF11R-S-AC24VSW
					12V DC	11 pins	PM4HF11R-S-DC12VW
						Screw terminal	PM4HF11R-S-DC12VSW
					24V DC	11 pins	PM4HF11R-S-DC24VW
						Screw terminal	PM4HF11R-S-DC24VSW
				IP50	100 to 120V AC	11 pins	PM4HF11R-S-AC120V
						Screw terminal	PM4HF11R-S-AC120VS
					200 to 240V AC	11 pins	PM4HF11R-S-AC240V
						Screw terminal	PM4HF11R-S-AC240VS
					24V AC	11 pins	PM4HF11R-S-AC24V
						Screw terminal	PM4HF11R-S-AC24VS
					12V DC	11 pins	PM4HF11R-S-DC12V
						Screw terminal	PM4HF11R-S-DC12VS
					24V DC	11 pins	PM4HF11R-S-DC24V
						Screw terminal	PM4HF11R-S-DC24VS
			3 selectable time ranges over 1 min to 10 min	IP65	100 to 120V AC	11 pins	PM4HF11R-M-AC120VW
						Screw terminal	PM4HF11R-M-AC120VSW
					200 to 240V AC	11 pins	PM4HF11R-M-AC240VW
						Screw terminal	PM4HF11R-M-AC240VSW
					24V AC	11 pins	PM4HF11R-M-AC24VW
						Screw terminal	PM4HF11R-M-AC24VSW
					12V DC	11 pins	PM4HF11R-M-DC12VW
						Screw terminal	PM4HF11R-M-DC12VSW
					24V DC	11 pins	PM4HF11R-M-DC24VW
						Screw terminal	PM4HF11R-M-DC24VSW
				IP50	100 to 120V AC	11 pins	PM4HF11R-M-AC120V
						Screw terminal	PM4HF11R-M-AC120VS
					200 to 240V AC	11 pins	PM4HF11R-M-AC240V
						Screw terminal	PM4HF11R-M-AC240VS
					24V AC	11 pins	PM4HF11R-M-AC24V
						Screw terminal	PM4HF11R-M-AC24VS
					12V DC	11 pins	PM4HF11R-M-DC12V
						Screw terminal	PM4HF11R-M-DC12VS
					24V DC	11 pins	PM4HF11R-M-DC24V
						Screw terminal	PM4HF11R-M-DC24VS

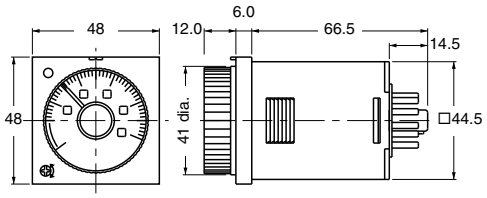
Dimensions

mm
Tolerance: ±0.5

• Screw terminal type (Flush mount)

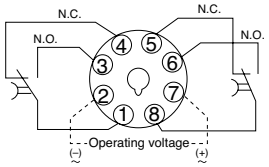


• Pin type (Flush mount/surface mount)



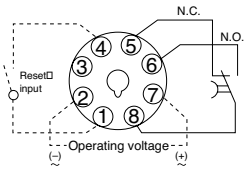
Terminal layouts and wiring diagrams

- **PM4H-F8 (without reset input)**
  Pin type
  Time-out 2 Form C



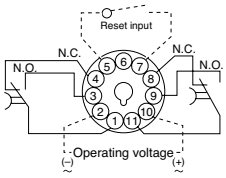
Screw-tightening pin type
The PM4H-F11R should be used for the time-limit 2C.

- **PM4H-F8R (with reset input)**
  Pin type
  Time-out 1 Form C, with reset input

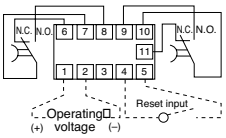


Screw-tightening pin type
The PM4H-F11R should be used for the time-limit 1C and to connect reset input.

- **PM4H-F11R (with reset input)**
  Pin type
  Time-out 2 Form C, with reset input

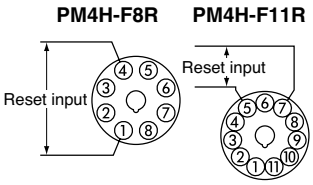


Screw terminal type
Time-out 2 Form C, with reset input



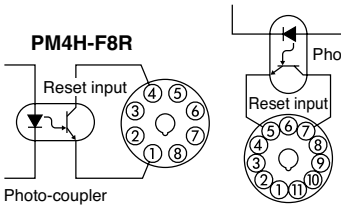
PM4H-F (with reset) input conditions

1. Contact input (pin type example)



Use a contact with good contact reliability for the input. Contact bounce can lead to erroneous operation of the timer, so use a contact with short bounce time. Make the resistance between terminals for a short circuit less than 1kΩ. Make the resistance between terminals for an open circuit greater than 100k-ohms.

2. Non-contact input (pin type example)

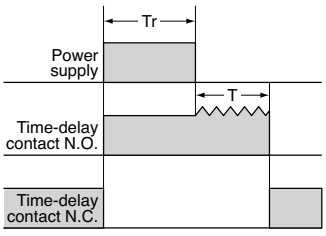


Be sure to use a photo-coupler for non-contact input.

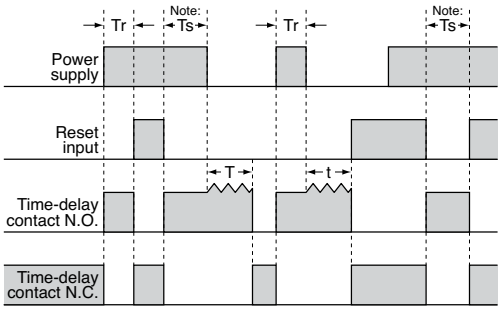
Check that Vce = 0.6V Max. when ON.

Operation

• PM4H-F8 (without reset input)



• PM4H-F8R/F11R (with reset input)



PM4H-W

DIN48 Size Analog Multi-Range Cyclic Twin Timers

Features

- A single twin timer unit that repeats (variable) ON/OFF.
- Short body – 62.5mm (screw terminal type)
- Multiple ranges with a 0.1 s to 500 h time specification on a single unit.
- The output ON/OFF operation is indicated by red and green LED's. It's easy to check the operation at a glance.
- The AC free power supply and shorter body make it easier to use.
- A new screw terminal type has been added to the conventional pin type.
  Wiring can be done easily with a screwdriver.
- Compliant with UL, CSA, CE and LLOYD, UL File No.: E122222, CSA File No.: LR39291

Specifications

Item \ Type			PM4H-W
Rating	Rated operating voltage		100 to 240V AC, 48 to 125V DC, 12V DC, 24V AC/DC
	Rated frequency		50/60Hz common (AC operating type)
	Rated power consumption		Approx. 10VA (100 to 240V AC) Approx. 2.5VA (24V AC) Approx. 1.5W (12V DC, 24V DC, 48 to 125V DC)
	Rated control capacity		5A 250V AC (resistive load)
	Operation mode		Cyclic (OFF-start/Twin operation)
	Time range		1s to 500h 16 time ranges switchable (T_1, T_2 time setting individually)
Time accuracy 1*, 2*	Operation time fluctuation		±0.3% (power off time change at the range of 0.3s to 1h)
	Setting error		±5% (Full-scale value)
	Voltage error		±0.5% (at the operating voltage changes between 85 to 110%)
	Temperature error		±2% (at 20°C ambient temp. at the range of –10 to +50°C)
Contact	Contact arrangement		Timed-out 2 Form C
	Contact resistance (Initial value)		Max. 100mΩ (at 1A 6V DC)
	Contact material		Silver alloy
Life	Mechanical (contact)		2×10^7
	Electrical (contact)		10^5 (at rated control capacity)
Electrical function	Allowable operating voltage range		85 to 110% of rated operating voltage (at 20°C coil temp.)
	Insulation resistance (Initial value)		Min. 100MΩ Between live and dead metal parts Between input and output Between contacts of different poles Between contacts of same pole (At 500V DC)
	Breakdown voltage (Initial value)		2,000Vrms for 1 min Between live and metal parts 2,000Vrms for 1 min Between input and output 2,000Vrms for 1 min Between contacts of different poles 1,000Vrms for 1 min Between contacts of same pole
	Min. power off time		300ms
	Max. temperature rise		55°C
Mechanical function	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)
Operating condition	Ambient temperature		–10 to +50°C
	Ambient humidity		30 to 85%RH (non-condensing)
	Atmospheric pressure		860 to 1,060hPa
	Ripple factor (DC type)		20%
Others	Protective construction		IP65 on front panel (using rubber gasket ATC18002) <only for IP65 type>
	Weight		120g (Pin type), 130g (Screw terminal type)

Notes: 1* Unless otherwise specified, the measurement conditions at the maximum scale time standard are specified to be the rated operating voltage (within 5% ripple factor for DC), 20°C ambient temperature, and 1s power off time.
2* For the 1s range, the tolerance for each specification becomes ±10ms.

Time range

All types of PM4H-W timer have multi-time range.
16 time ranges are selectable.
1s to 500h (Max. range) is controlled.

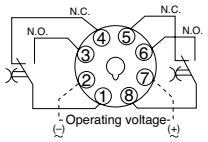
Scale \ Time unit		sec	min	hrs	10h
1	Control time range	0.1s to 1s	0.1 min to 1 min	0.1h to 1h	1.0h to 10h
5		0.5s to 5s	0.5 min to 5 min	0.5h to 5h	5h to 50h
10		1.0s to 10s	1.0 min to 10 min	1.0h to 10h	10h to 100h
50		5s to 50s	5 min to 50 min	5h to 50h	50h to 500h

Product types

Type	Operating mode	Contact arrangement	Time range	Protective structure	Rated Operating voltage	Terminal type	Part number
PM4H-W Twin timer	Cyclic (OFF-start, Twin)	Relay Timed-out 2 Form C	16 selectable ranges (1s to 500h)	IP65	100 to 240V AC	8 pins	PM4HW-H-AC240VW
						Screw terminal	PM4HW-H-AC240VSW
					48 to 125V DC	8 pins	PM4HW-H-DC125VW
						Screw terminal	PM4HW-H-DC125VSW
					24V AC/DC	8 pins	PM4HW-H-24VW
						Screw terminal	PM4HW-H-24VSW
					12V DC	8 pins	PM4HW-H-DC12VW
						Screw terminal	PM4HW-H-DC12VSW
				IP50	100 to 240V AC	8 pins	PM4HW-H-AC240V
						Screw terminal	PM4HW-H-AC240VS
					48 to 125V DC	8 pins	PM4HW-H-DC125V
						Screw terminal	PM4HW-H-DC125VS
					24V AC/DC	8 pins	PM4HW-H-24V
						Screw terminal	PM4HW-H-24VS
					12V DC	8 pins	PM4HW-H-DC12V
						Screw terminal	PM4HW-H-DC12VS

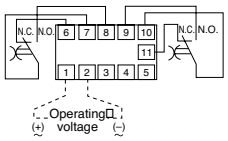
Terminal layouts and wiring diagrams

Pin Type



Screw terminal type

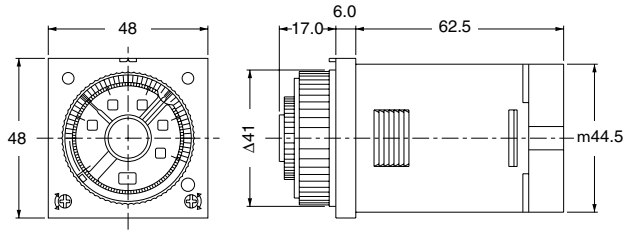
Cyclic timed-out relay contact: 2C



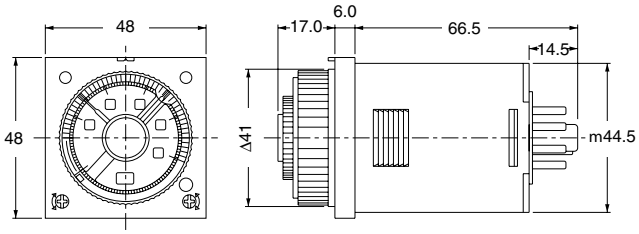
Dimensions

mm
Tolerance: ±0.5

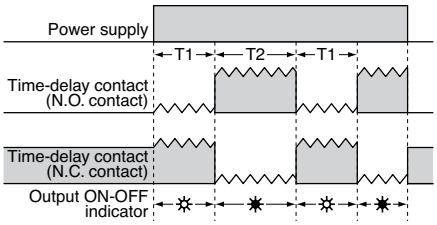
• Screw terminal type: M3.5



• Pin type



Operation



☼: Output OFF indicator (green)
✷: Output ON indicator (orange)
T1: OFF set time
T2: ON set time

1. Operation method

1) Operation mode setting
[PM4H-A type]

8 operation modes are selectable with operation mode selector.
Turn the operation mode selector with screw driver.
Operation mode is shown up through the window above the mode selector. The marks are ⓞⓝ, ⓕⓛ, ⓕⓞ, ⓞⓕ1, ⓢⓕ, ⓞⓢ, ⓞⓕ2, ⓞⓒ.
Turn the mode selector to the mark until you can check by clicking sound.
Confirm the mode selector position if it is correct.
If the position is not stable, the timer might mis-operate.

2) Time range setting
[PM4H series common]

16 time ranges are selectable between 1s to 500h.
Turn the time range selector with the screw driver.
Clockwise turning increases the time range, and Counter-clockwise turning decrease the time range.
Confirm the range selector position if it is correct.
If the position is not stable, the timer might mis-operate.

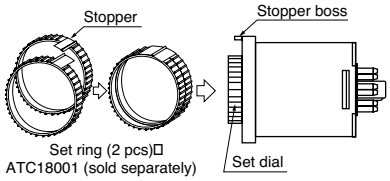
3) Time setting [common]

To set the time, turn the set dial to a desired time within the range.
Instantaneous output will be on when the dial is set to “0”.
When the instantaneous output is used, the dial should be set under “0” range. (Instantaneous output area)
When power supply is on, the time range, setting time and operation mode cannot be changed.
Turn off the power supply or a reset signal is applied to set the new operation mode.
If the position is not stable, the timer might mis-operate.

2. How to use “Set ring” [PM4H series common]

1) Fixed time setting

Set the desired time and put 2 set rings together.
Insert the rings into stopper to fix the time.

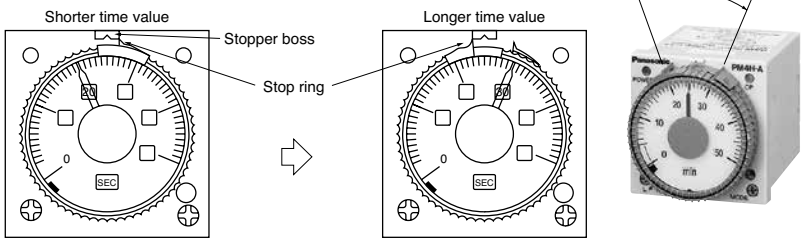


2) Time range setting

Example: Time range 20s to 30s.

① Shorter time value setting
Set the dial to 20s.
Place the stop ring at the right side of stopper.

② Longer time value setting
Set the dial to 30s.
Place the stop ring at the left side of stopper.



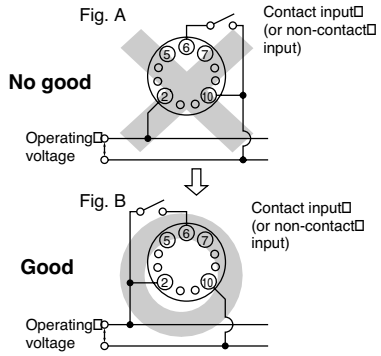
Note) The stoppers for the lower limit setting set ring and the upper limit setting set ring face the opposite directions.

Applicable standard (PM4H series common)

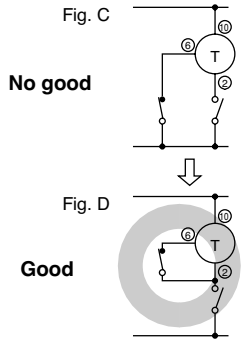
Safety standard	EN61812-1	Pollution Degree 2/Overvoltage Category III
EMC	(EMI)EN61000-6-4	
	Radiation interference electric field strength	EN55011 Group1 ClassA
	Noise terminal voltage	EN55011 Group1 ClassA
	(EMS)EN61000-6-2	
	Static discharge immunity	EN61000-4-2 4 kV contact 8 kV air
	RF electromagnetic 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)

1. Input connections (PM4H-A type)

1) Be sure not to use terminal ⑩ as the



common terminal of the input signal as shown in Fig. A. Otherwise, the internal circuit of the timer may be damaged. Use



terminal ② as the common terminal as shown in Fig. B.

If the circuits is connected as in Fig. C, the internal circuits must be broken. Be sure to connect the circuit as in Fig. D.

2) When one input signal is simultaneously applied to more than one timer, be sure to avoid the wiring shown in

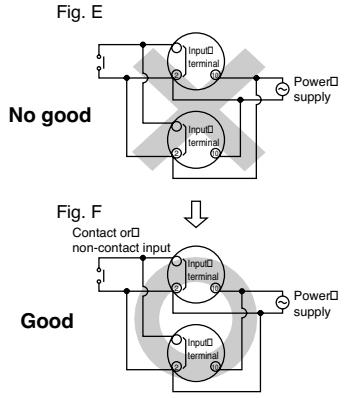


Fig. E. Otherwise, the short-circuit current will flow and cause damage. Be sure to align the polarity of the power supply as shown in Fig. F.

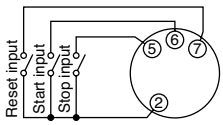
3) Terminal ②-⑥ (screw terminal 2-3) should be connected as the start input. Connect terminals ②-⑦ (screw terminal 2-4) for reset signal input. Connect terminals ②-⑤ (screw terminal 2-5) for stop signal input. Be sure not to connect with other terminals and apply excessive voltage. The internal circuit will be damaged.

4) The input wiring other than the power supply circuit should avoid these conditions, high-voltage wiring and parallel wiring with power wire. Wire in short with using the shielding wire or metal wiring tube.

5) For start, reset and stop input, use gold-plated contact with high reliability. Since contact bouncing causes errors in the start, use an input contact less bounce time.

6) Keep the minimum signal input time over 0.05 s.

2. Input signal conditions

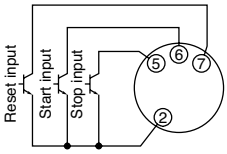


(PM4H-A type)

1) Connection of contact input (Pin type example

Use gold-plated contacts with high-reliability. The bounce time at the contacts causes errors in the timer operation time. Accordingly, use start input contact whose bounce time is short. The resistance when shorted should be less than 1kΩ, and when open resistance should be more than 100kΩ.

For the screw terminal type, connect the terminal 2 to the each input signal.



2) Connection of non-contact input (Pin type example)

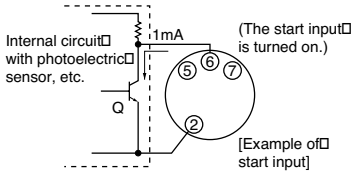
(open-collector)

Apply the open-collector connection. The characteristics of the transistor used must be V_{CEO}=10V or more, I_C=10mA or more, and I_{CBO}=6μA or less. Additionally, the input impedance must be 1kΩ or less, and the residual voltage must be 0.6V or less.

For the screw terminal type, connect the terminal 2 to the each input signal.

3) Connection of non-contact input (Pin type example)

(voltage input)



Even if the open collector is not used, input is also possible from the non-contact circuit of 6 to 30V DC. In this case, the start input is turned on when the signal is turned from H to L.

The residual voltage must be 0.6V or less when Q is on. On the AC type, an insulated transformer is required as the power supply for the photoelectric sensor, etc. (power supply for the input devices).

Note: Keep the minimum input signal time of each signal to 0.05s or more.

3. Checking the contacts before use (PM4H-F only)

When the power ON time is less than the minimum power application time, the contacts may remain in an ON state, so the state of the contacts should be checked before use. When the contacts are in an ON state, activating them once will return them to their normal state (the OFF state after time-out). (Be aware that relay characteristics may result in the contacts being in that same ON state if exposed to excessive vibration and impact during transport.)

4. Time setting

To set the time, turn the set dial to a desired time within the range.

Instantaneous output will be on when the dial is set to “0”.

When the instantaneous output is used, the dial should be set under “0” range. (Instantaneous output area)

Note) When power supply is on, the time range, setting time and operation mode cannot be changed.

Turn off the power supply or a reset signal is applied to set the new operation mode.

If the position is not stable, the timer might mis-operate.

5. Superimposed surge of power supply (PM4H series common)

For the superimposed surge of power supply, the standard waveform is taken as the standard value for surge-proof voltage.

If external surge occurs exceeding the specified value, the internal circuit may break down. In this case, use a surge absorption element.

Operation voltage	Surge voltage
100 to 240V AC 100 to 120V AC 200 to 240V AC 48 to 125V DC	4,000V
12V DC, 24V DC 24V AC/DC	500V

The positive and negative voltages are applied each five times between the power pins.

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. Acquisition of CE marking

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

1) Overvoltage category III, pollution level 2

2) This timer employs a power supply without a transformer, so the power and input signal terminals are not insulated. (PM4H-A only)

(1) When a sensor is connected to the input circuit, install double insulation on the sensor side.

(2) In the case of contact input, use dual-insulated relays, etc.

3) 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.

4) 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.).

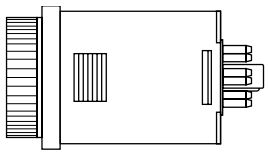
5) You must use a terminal socket or socket for the installation. Do not touch the terminals or other parts of the timer when it is powered. When installing or un-installing, make sure that no voltage is being applied to any of the terminals.

6) 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.

Installations

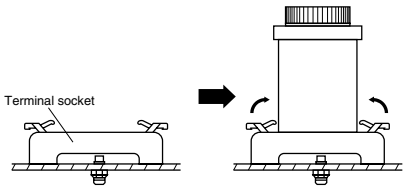
1. Surface mount

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

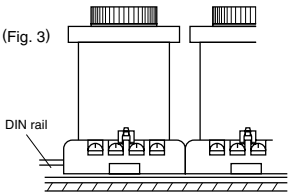


2) Put the terminal socket on the board directly or put it on the DIN rail (Fig. 1).
3) Insert the timer into the terminal socket and fix it with clip (Fig. 2)
4) On DIN rail mounting, mount the timer on the DIN rail tightly to get the proper dimension (Fig. 3).

(Fig. 1) (Fig. 2)



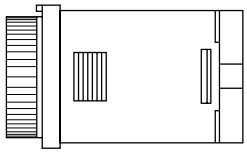
(Fig. 3)



5) 8-pin type should be connected with terminal socket (AT8-DF8K). 11-pin type should be connected with terminal socket (AT8-DF11K).
6) DIN rail (AT8-DLA1) is also available (1 m).

2. Flush mount

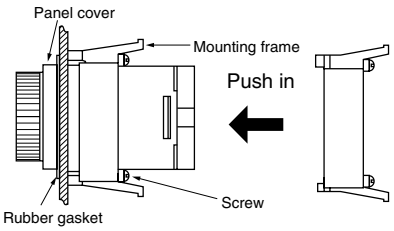
1) For the timers of PM4H and LT4H series, it is recommended to use the built-in screw terminal type for flush mount. (Mounting frame and rubber gasket are provided when timer is shipped.)



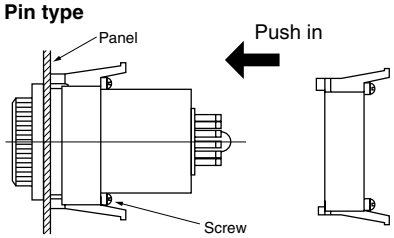
If the pin type is used, the mounting frame (AT8-DA4) and rubber gasket (ATC18002 for surface waterproofing) that are available at extra costs are necessary. If the pin connection socket is the 8-pin type, use the 8P cap (AD8-RC); or if it is the 11-pin type, use the 11P cap (AT8-DP11).

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

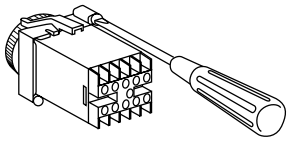
• Screw terminal type



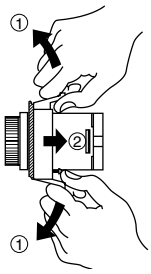
• Pin type



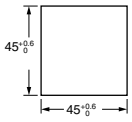
3) Caution in mounting the timer
• PM4H, and LT4H series
ⓐ If the PM4H and the LT4H series are used as the waterproof types, tighten the reinforcing screws on the mounting frames so that the timers, the rubber gaskets, and the panel surfaces are tightly contacted with each other. (Tighten the two screws with uniform force and make sure that there is no rattling. If the screws are tightened too excessively, the mounting frame may come off.)
ⓑ If the timer is installed with the panel cover and the rubber gasket removed, the waterproofing characteristic is lost.
4) Installation
Loosen the screws on the mounting frame, spread the edge of frame and remove it.



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

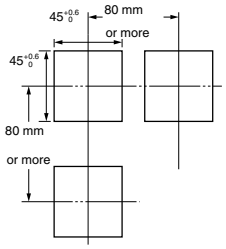


5) Correctly connect the pins while seeing the pin connection diagram.
Tighten the terminal screws with a torque of 0.8 N·cm or less. The screws are M3.5. (screw-tightened terminal type)
6) If the pin type is used, the rear terminal block (ATC78041) or the 8P cap (AD8-RC) is necessary to connect the pins. For the 11-pin type, use the rear terminal block (ATC78051) or the 11P cap (AT8-DP11) and avoid directly soldering the round pins on the timer.
7) Panel cutout dimensions

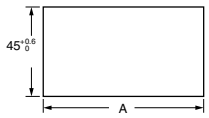


The standard panel cutout dimensions are shown in the left figure. (Panel thickness: 1 to 5 mm)

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

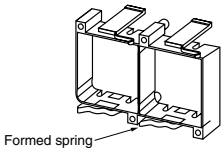


9) Adjacent mounting
Although the timers can be mounted adjacent to each other, remember that the panel surface of PM4H or LT4H series timer will lose its water-resistant effect. (Panel thickness: 1 to 5 mm)

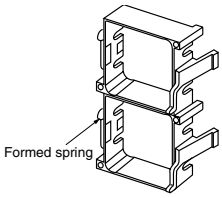


$A = (48 \times n - 2.5)^{+0.6}_{0}$ (mm)

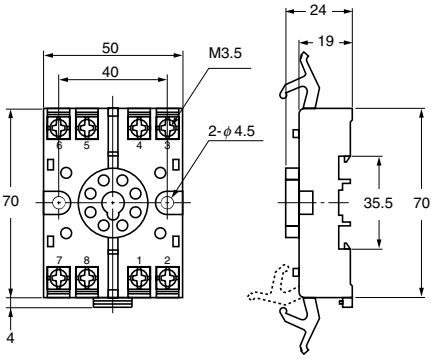
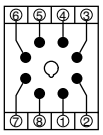
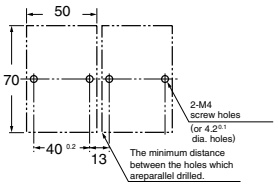
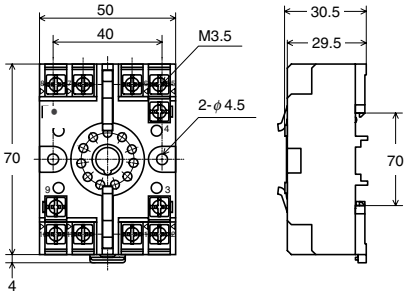
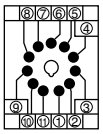
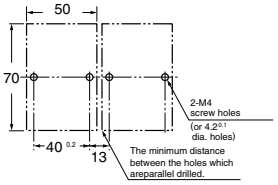
When lining up the timers horizontally, set the frames in such a position so the formed spring areas are at the top and bottom.



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

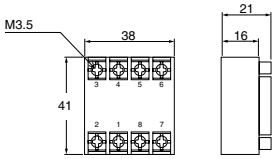
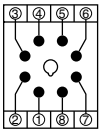
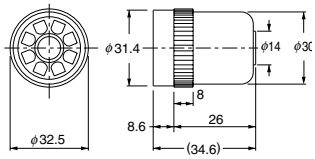
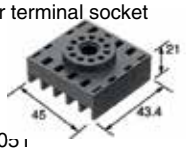
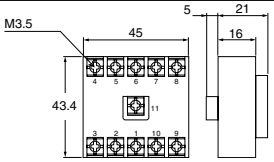
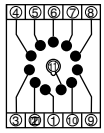
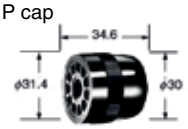
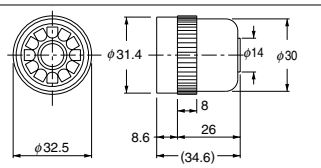
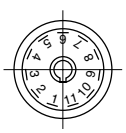


Terminal sockets (Unit: mm, Tolerance: ±1)

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
PM4H-S PM4H-M PM4H-SD PM4H-F8 PM4H-F8R PM4H-W LT4H LT4H-W QM4H (8-pin type)	• DIN rail socket (8-pin)  ATC180031		 Note: Terminal No. on the main body are identical to those on the terminal socket.	
PM4H-A PM4H-F11R LT4H LT4H-W (11-pin type)	• DIN rail socket (11-pin)  ATC180041		 Note: Terminal No. on the main body are identical to those on the terminal socket.	

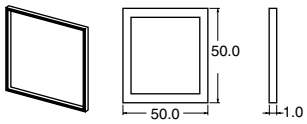
Note: The socket's numbering system matches that of the timer terminals.

Sockets (Unit: mm, Tolerance: ±1)

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
PM4H-S PM4H-M PM4H-SD PM4H-F8 PM4H-F8R PM4H-W LT4H LT4H-W (8-pin type) QM4H	• Rear terminal socket  AT780 . .			—
	• 8P cap  AD8-RC			—
PM4H-A PM4H-F11R LT4H LT4H-W (11-pin type)	• Rear terminal socket  AT780 . .			—
	• 11P cap  AT8-DP11			—

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

• Rubber gasket



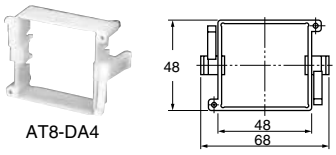
ATC18002

Applicable for PM4H series and LT4H series

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

• Mounting frame

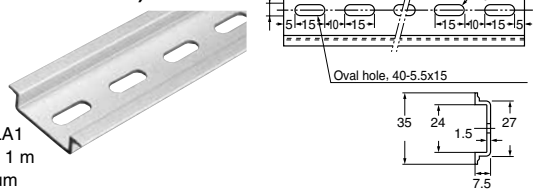
mm



AT8-DA4

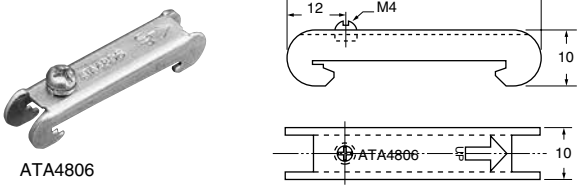
Applicable for PM4H series LT4H series and QM4H series

• Mounting rails (Applicable for DIN and IEC standards)



AT8-DLA1
Length: 1 m
aluminum

• Fastening plate

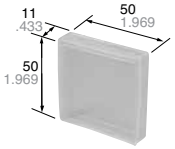


ATA4806

For holding DIN rails

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

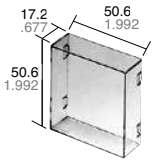
Flexible type



AQM4803

• Protective cover for DIN 48 size: QM4H series

Hard type



AQM4801

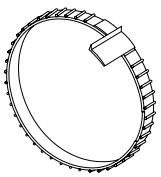
Accessories

PM4H series

• Panel cover (Black)

PM4H-A  ATC18011	PM4H-S  ATC18012	PM4H-M  ATC18013
PM4H-W  ATC18014	PM4H-SD  ATC18015	PM4H-F  ATC18016

• Set ring



ATC18001

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

LT4H series

• Panel cover (Black)

LT4H  ATL58011	LT4H-W  ATL68011

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

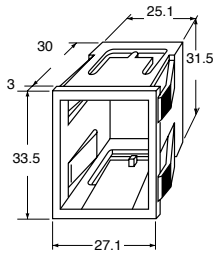
Accessories Note: Accessories are the same as those for the S1DX timer.

mm

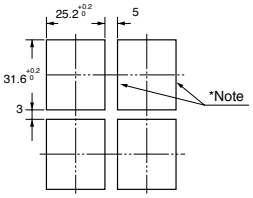
• Mounting frame

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

Appearance

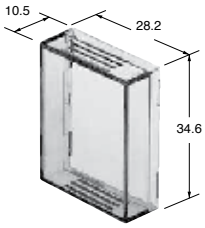


Panel cutout dimensions



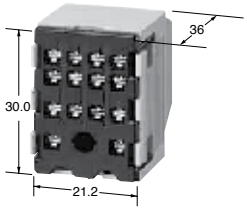
Board thickness 1 to 3 mm
Note: Make sure the holes area stays as right angles.

• Protective cover



ADX18008

• Cap block

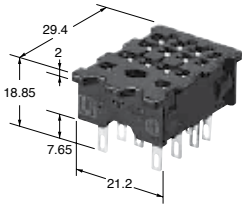


ADX18011

• Cap

ADX18004

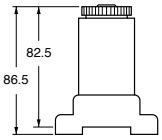
• Socket



ADX18003

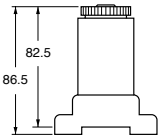
Terminal Socket

• HC2 slim DIN terminal socket



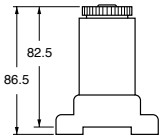
HC2-SFD-S

• HC2 DIN high terminal socket



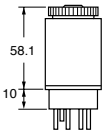
HC2-SFD-K

• HC4 DIN high terminal socket



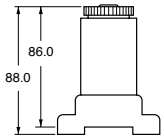
HC4-SFD-K

• HC4 socket



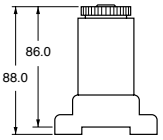
HC4-SS-K

• HJ2 terminal socket



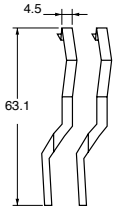
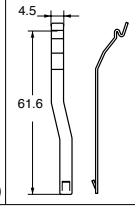
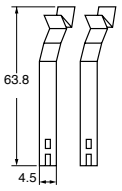
HJ2-SFD/HJ2-SFD-S

• HJ4 terminal socket

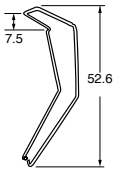


HJ4-SFD/HJ4-SFD-S

Socket Leaf Holding Clip

18012				AD68002	
Figure	Dimensions	Figure	Dimensions	Figure	Dimensions
					
(2 pieces per set)		(2 pieces per set)		(2 pieces per set)	

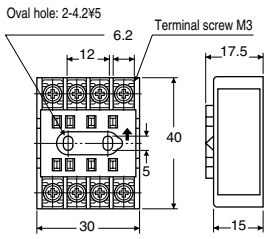
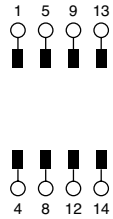
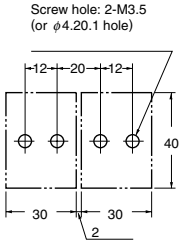
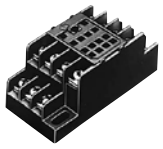
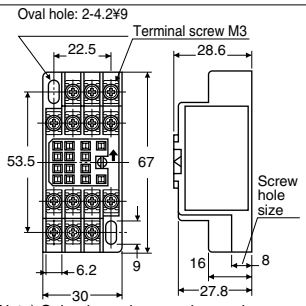
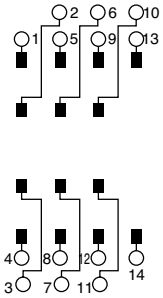
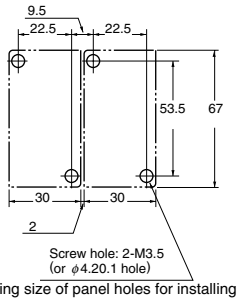
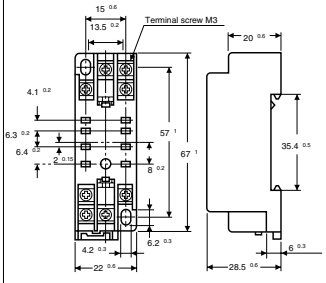
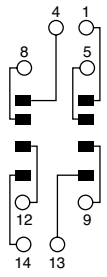
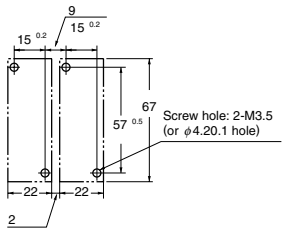
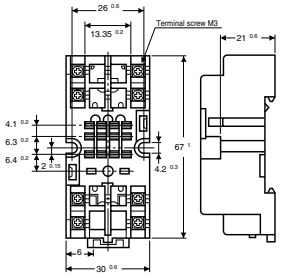
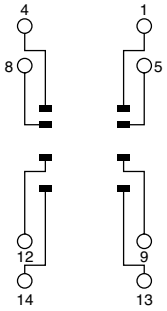
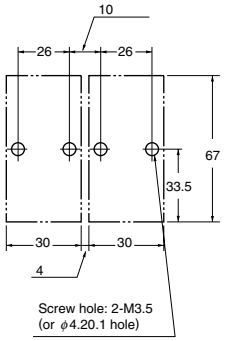
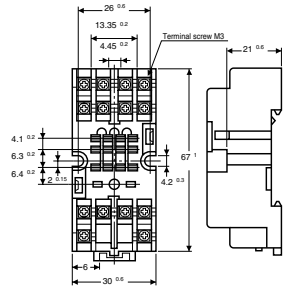
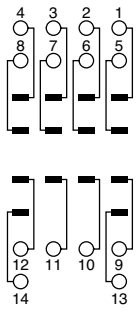
Socket Line Holding Clip for S1DXM-A/M

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	—	—

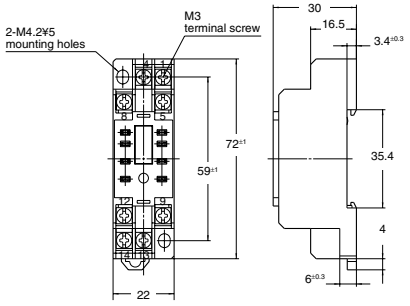
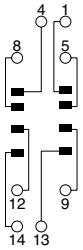
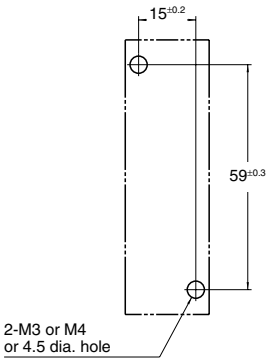
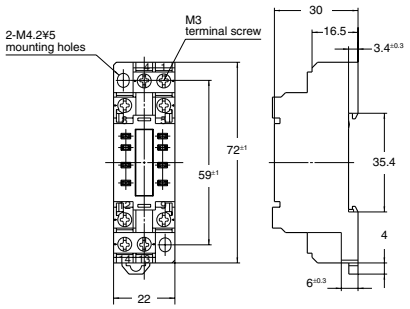
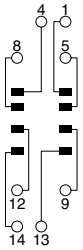
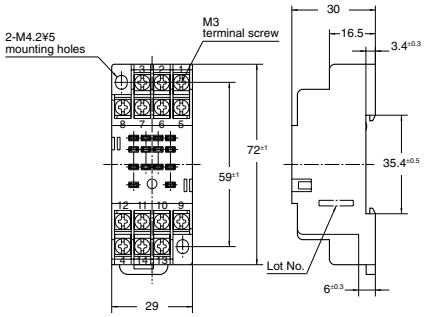
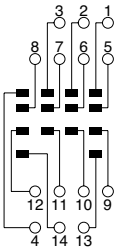
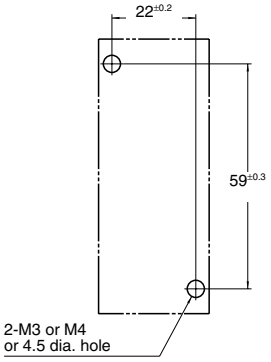
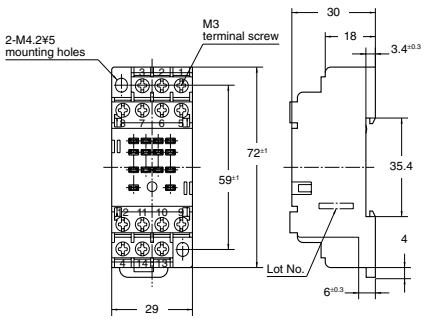
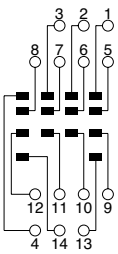
Note: The triangles indicate that removal will be slightly difficult when installed laterally in succession.

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

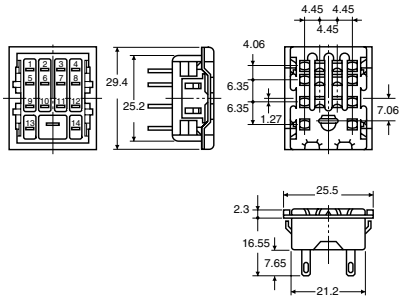
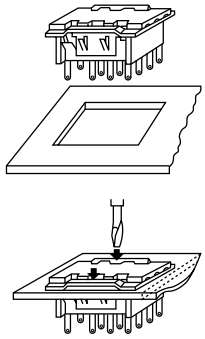
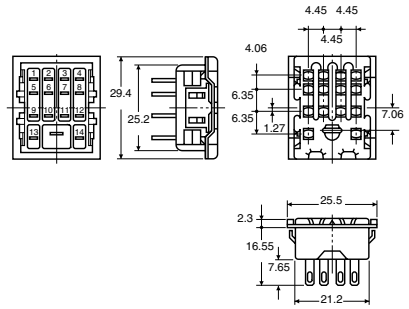
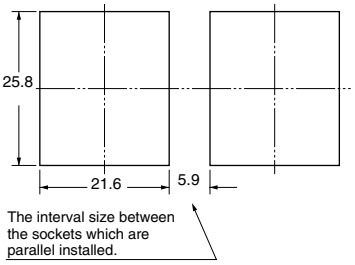
mm

HJ relay terminal sockets

Name/Part No.	Dimensions	Terminal layout	Mounting hole dimensions	Applicable timers S1DX(2c) S1DXM(2c)	Applicable timers 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

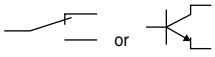
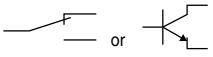
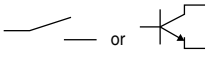
mm

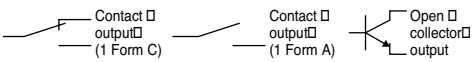
Sockets

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. 	Available	Not available
• Socket, HC 4-pin  HC4-SS-K		 Dimensional tolerance of machining: ±0.1	Available	Available

mm

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

	Electronic counters				
Appearance	 Flush mounting type PC board mounting type AEL3	 AEL3	 4-digit display 6-digit display	 4-digit display 6-digit display	
Name of product	**LC2H Counter**	**LC2H Counter**	**LC4H Counter**	**LC4H-S Counter**	**LC4H-W Counter**
Type	Total counter	Preset counter	Preset counter	Preset counter	Preset counter
Input mode/Input method	UP type	UP, DOWN type	UP, DOWN, and DIR (multi-mode)/DIP switch	UP, DOWN, and DIR (multi-mode)/DIP switch	UP, DOWN, and DIR (multi-mode) 2 modes selectable/DIP switch
Features	8.7 mm tall 8-digit display Bright 2-color back light	8.7 mm tall 8-digit display Preset function equipped in half size Display has backlight for instant recognition	Bright and easy-to-read display Simple operation Short body Conforms to IP66's weather resistant standards	Bright and easy-to-read display Simple operation Pre-scale function Built-in power supply for high-capacity sensor (100 to 240 V AC type) Conforms to IP66's weather resistant standards	Bright and easy-to-read display Simple operation Upper and lower limit settings are available. Conforms to IP66's weather resistant standards
Rated operating voltage	Flush mounting type: Unnecessary (Built-in battery) PC board mounting type: 3 V DC (Battery in externally installed)	24 V DC	100 to 240 V AC 24 V AC, 12 to 24 V DC	100 to 240 V AC	100 to 240 V AC 24 V AC 12 to 24 V DC
Number of digits (counter capacity)	8-digit 0 9 9 9 9 9 9 9 9	8-digit 0 9 9 9 9 9 9 9 9	4-digit 6-digit 0 0 9 9 9 9 9 9 9 9 9 9	4-digit 6-digit 0 9 9 9 9 9 9 9 9 9	6-digit 0 9 9 9 9 9 9
Counter/Indication	Zero-suppress function (LCD)	Zero-suppress function (LCD)	7-segment LCD Counter value (backlight red LED) Setting value (backlight yellow LED)	7-segment LCD Counter value (backlight red LED) Setting value (backlight yellow LED)	7-segment LCD Counter value (backlight red LED) Setting value (backlight yellow LED)
Counting speed	Flush mounting type: 2kHz/30Hz (Changeable by a switch) PC board mounting type: 2kHz/30Hz (Different type)	30Hz/5kHz switchable	30Hz/5kHz	30Hz/5kHz	30Hz/5kHz
Input	Counting (signal) input and reset input • Input by short-circuiting or opening contacts • Open collector input • Voltage input	Counting (signal) input and reset input • Input by short-circuiting or opening contacts • Open collector input	2-input (multi-mode) and reset input • Input by short-circuiting or opening contacts. • Open collector input	2-input (multi-mode) and reset input • Input by short-circuiting or opening contacts. • Open collector input	2-input (multi-mode) and reset input • Input by short-circuiting or opening contacts. • Open collector input
Reset (Reset input specifications conform to those of counting input)	• Front reset button and external reset input terminal • External reset dip terminal	• Manual reset with and external terminal and front reset key • Manual reset types inside one-short output models	• Manual reset with and external terminal and front reset key • Manual reset types inside one-short output models	• Manual reset with and external terminal and front reset key • Manual reset types inside one-short output models	• Manual reset with and external terminal and front reset key • Manual reset types inside one-short output models
Preset	—	• Counter number setting with key switches	• Operation mode setting with dip switches • Counter number setting with key switches	• Operation mode setting with dip switches • Counter number setting with key switches	• Output mode setting with dip switches • Counter number setting with key switches
Control output	—				
Power supply output	—	—	—	External power supply 12 V DC 100 mA max. (AC type only)	—
Options	Flush mounting type (No need for easy installation type) Mounting frame, rubber gasket	Mounting frame, rubber gasket	11 pin plug-in (terminal block, socket) 8 pin plug-in (terminal block, socket)	11 pin plug-in (terminal block, socket)	11 pin plug-in (terminal block, socket)
Available standards	UL/C-UL	UL/C-UL	UL/C-UL	UL/C-UL	UL/C-UL



Types of counters

1. Electro preset counter
The counter is equipped with semiconductor counting circuitry. When the counter counts up to a preset number, its output circuit sends a signal.

2. Electro magnetic counter
A magnet is magnetized and demagnetized to drive the dial and count up numbers.

Rating

1. Rated operating voltage
The voltage is applied to start the counter.

Countings

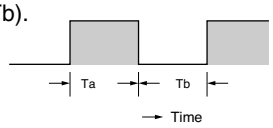
1. Pulse
This is a voltage or current signal sent at intermittent time intervals.

2. Count
Pulses are used to count up and down.

3. Miss-count
This happens if the number of pulses does not correspond to the number of counts.

4. Hertz
This unit of counting speed is used to give the number of counts per one second.

5. Make ratio
This is the ratio of ON time (Ta) to OFF time (Tb).



6. Maximum counting speed
Suppose that the counter is operated with an input pulse of a make ratio of 1. The highest counting speed is the peak of a range in which the output circuit can send signals without mis-counting. The speed is expressed in units of Hz (cps: counts per a second).

7. Over count
Counting continues beyond a preset number.

8. Recount
When counting is up, the counter display resets to zero and counting restarts.

9. Down count
Numbers are counted down one by one from a preset number.

10. Up count
Numbers are counted up one by one from zero.

11. Up/down count
Numbers are counted up or down depending on input conditions.

12. Rejection (gate) input
This signal is used to keep the counter from counting.

Outputs

1. Count up
When a preset number is reached, the output circuit sends a signal.

2. Retained output
The output is held until a reset signal is sent.

3. One Shot output
This output has a specified width of time.

Resettings

1. Reset
The counting process, display and output sections are all brought back to the initial status.

2. Power off reset
The operating voltage is turned off to reset the counter.

3. Manual reset
The counter is manually reset.

4. Remote reset
A signal is sent from a remote point to the reset terminal so as to reset the counter.

5. Automatic reset
When counting is up, internal circuitry is activated to automatically reset the counter.

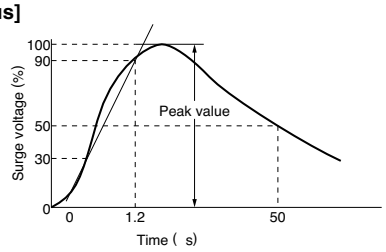
6. Reset signal width
This is the time during which the power is off so as to reset the counter or during which an external (manual) reset signal is sent.

7. Reset time
This is the time from the moment a reset signal is sent to the instant the counter is ready to start counting again.

Others

1. Function of memorizing condition
Counting data up until the operating voltage is turned off can be stored in memory. When the power is reactivated, the data can be reproduced.

2. Anti-surge
The strength against power voltage surge is determined by applying a single-pole full-wave voltage (several hundred to several thousand volt wave for ±(1.2x50) μs) acrosss the control power terminals.
Surge waveform
[Single-pole full-wave voltage for ±(1.2x50) μs]

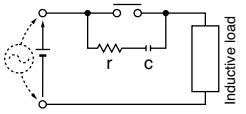
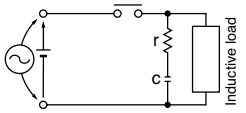
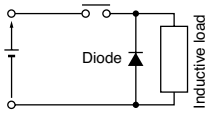
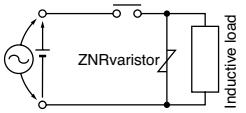


3. Noise immunity
This is the strength against external noise. Relay noise tests, noise simulator tests, etc. are conducted.

Cautions for circuits

1. Protective circuit for counter 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.

<table>
<tr><td colspan="2" rowspan="2">Circuit</td><td colspan="2">CR circuit (r: resistor c: capacitor)</td><td>Diode circuit</td><td>Varistor circuit</td></tr>
<tr><td>Counter contact
 
</td><td>Counter contact
 
</td><td>Counter contact
 
</td><td>Counter contact
 
</td></tr>
<tr><td rowspan="2">Application</td><td>AC</td><td>(see note.)</td><td>Available</td><td>Not available</td><td>Available</td></tr>
<tr><td>DC</td><td>Available</td><td>Available</td><td>Available</td><td>Available</td></tr>
<tr><td colspan="2" rowspan="2">Features/Others</td><td colspan="2">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.</td><td rowspan="2">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)</td><td rowspan="2">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.</td></tr>
<tr><td>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 CR circuit.</td><td>—</td></tr>
<tr><td colspan="2">Device Selection</td><td colspan="2">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 counter 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.</td><td>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.</td><td>—</td></tr>
</table>

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.

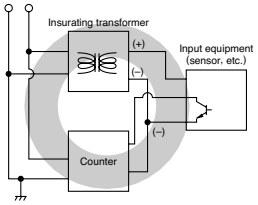
Type of load	Inrush current
Resistive load	Steady state current
Solenoid load	10 to 20 times the steady state current
Motor load	5 to 10 times the steady state current
Incandescent lamp load	10 to 15 times the steady state current
Mercury lamp load	1 to 3 times the steady state current
Sodium vapor lamp 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 counter, do not control the load direct with a counter. When the counter is designed to use a relay or a magnet switch, you can acquire the longer life of the counter.

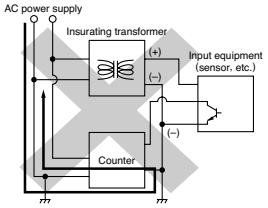
3. Connection of input (Except for LC4H-S/AC type)

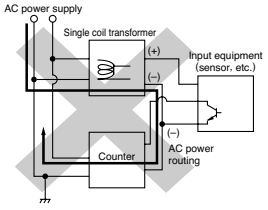
The LC4H series use power supply without a transformer (power and input terminals are not insulated). In connecting various kinds of input signals, therefore, use a power transformer in which the primary side is separated from the ungrounded secondary side as shown in Fig. A, for the power supply for a sensor and other input devices so that short-circuiting can be prevented.
Do not use a single coil transformer (e.g., Sly-Duck). Otherwise, the internal circuit of the counter will be short-circuited as shown in Fig. B resulting in breakdown.

(Fig. A) Good



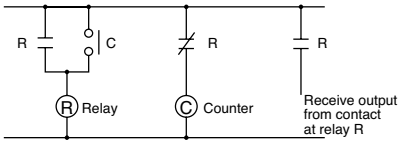
(Fig. B) No good





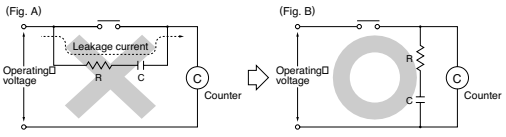
4. Long continuous current flow

Avoid keeping the counter on for a long period of time (over one month). Otherwise heat is generated and accumulated inside the counter, which may deteriorate its electronic parts. If the counter must be kept on for a long period of time, a relay is added. See the circuit diagram below.



5. Leakage current

1) For connecting operating voltage to the counter, 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 counter. Instead, the circuit shown in Fig. B should be used.



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

Cautions for use (common for all models)

1. Terminal 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 operating voltage

1)Apply the entire supply voltage through a switch, relay or other contact.
2) The operating voltage for the DC type must be at the specified ripple percentage or less. The average voltage must fall within the allowable operating voltage range.

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

3) Make sure that no induced voltage and residual voltage are applied between the power terminals on the counter 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) Keep the load capacity below the counter's rated control capacity. If used above the rating, the counter's service life may shorten. With the transistor output type counters, transistors may be damaged.

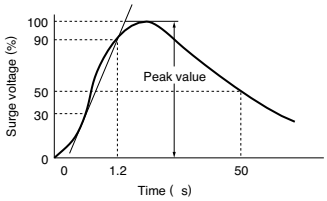
4. Installing the counter

1) To install the counter, use the dedicated pin bracket or socket (cap). Avoid connecting the pins on the counter by directly soldering them.
2) In order to maintain the characteristics, do not remove the counter cover (case).

5. Superimposed surge of power supply

For the superimposed surge of power supply, the standard waveform (±1.2x50µs or ±1x40µs) 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 LC4H type counters, see the respective items in „Cautions for use."

• Single-pole, full-wave voltage for surge waveform [±(1.2x50) µs]



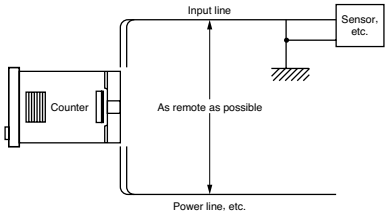
If external surge occurs exceeding the specified value, the internal circuit may break down. In this case, use a surge absorption element. The typical surge absorption elements include a varistor, a capacitor, and a diode. If a surge absorption element is used, use an oscilloscope to see whether or not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

6. Signal input

The counter's signal input comes in two ways. One is by opening and closing the input terminal. The other is by applying a specified H-level or L-level voltage to the input terminal.
For an input sensor's residual voltage, input impedance, input voltage level and other signal input conditions, see the ratings for each type of product.

7. Operating environment

1) For the ambient operating temperature and humidity, see the ratings for each type of product.
2) Avoid using the counter in a location where inflammable or corrosive gas is generated, the counter is exposed to much dust and other foreign matter; water or oil is splashed on the counter; or vibrations or shocks are given to the counter.
3) The counter cover (case), the knobs, and the dials are made of polycarbonated resin. Therefore, prevent the counter 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 counter in atmosphere containing any of those substances.
4) If the counter 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 counter 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 counter in the actual usage.

9. Others

1) If the counter is used exceeding the ratings (operating voltage and control capacity), the contact life, or any other specified limit, abnormal heat, smoke, or ignition may occur.
2) The LC2H series counter, incorporates a lithium battery.
Never disassemble the lithium battery or throw it into fire because this may affect humans and facilities. The lithium battery must be disposed of as an incombustible like other used batteries.
3) If any malfunction of the counter 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.

Pin type

Screw terminal type

LC4H

DIN 48 SIZE LCD ELECTRONIC COUNTER

Features

- **Bright and Easy-to-Read Display**
  A brand new bright 2-color backlight LCD display. The easy-to-read screen in any location makes checking and setting procedures a cinch.
- **Short Body of only 64.5 mm (screw type) or 70.1 mm (pin type)**
  With a short body, it easily installs in even narrow control panels.
- **Simple Operation**
  Seesaw buttons make operating the unit even easier than before.
- **Conforms to IP66's Weather Resistant Standards**
  The water-proof panel keeps out water and dirt for reliable operation even in poor environments.
- **Screw terminal and Pin Type are Both Standard Options**
  The two terminal types are standard options to support either front panel installation or embedded installation.
- **Changeable Panel Cover**
  Also offers a black panel cover to meet your design considerations.
- **4-digit or 6-digit display**
  Two sizes of displays are offered for you to choose the one that suits your needs.
- **Compliant with UL, c-UL and CE, UL File No.: E122222, C-UL File No.: E122222**

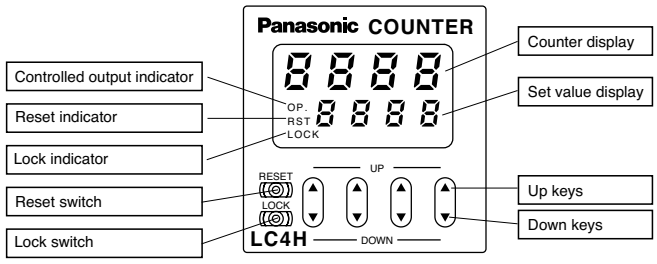
Product types

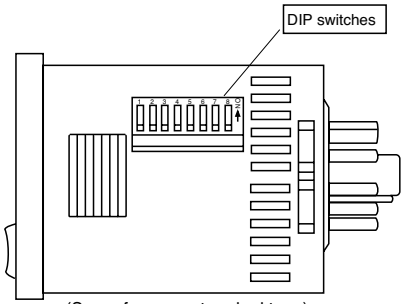
Digit	Count speed	Output mode	Output	Operating voltage	Power down insurance	Terminal type	Part number
4	30 Hz (cps)/ 5 KHz (Kcps) switchable	• Maintain output/ hold count • Maintain output/ over count I • Maintain output/ over count II • One shot/over count • One shot/recount I • One shot/recount II • One shot/hold count (7 modes)		100 to 240 V AC	Available	8 pins	LC4H8-R4-AC240V
						11 pins	LC4H-R4-AC240V
						Screw terminal	LC4H-R4-AC240VS
				24 V AC		8 pins	LC4H8-R4-AC24V
						11 pins	LC4H-R4-AC24V
						Screw terminal	LC4H-R4-AC24VS
				12 to 24 V DC		8 pins	LC4H8-R4-DC24V
						11 pins	LC4H-R4-DC24V
						Screw terminal	LC4H-R4-DC24VS
			Transistor (1a)	100 to 240 V AC		8 pins	LC4H8-T4-AC240V
						11 pins	LC4H-T4-AC240V
						Screw terminal	LC4H-T4-AC240VS
				24 V AC		8 pins	LC4H8-T4-AC24V
						11 pins	LC4H-T4-AC24V
						Screw terminal	LC4H-T4-AC24VS
				12 to 24 V DC		8 pins	LC4H8-T4-DC24V
						11 pins	LC4H-T4-DC24V
						Screw terminal	LC4H-T4-DC24VS
6			Relay (1c)			8 pins	LC4H8-R6-AC240V
						11 pins	LC4H-R6-AC240V
						Screw terminal	LC4H-R6-AC240VS
				24 V AC		8 pins	LC4H8-R6-AC24V
						11 pins	LC4H-R6-AC24V
						Screw terminal	LC4H-R6-AC24VS
				12 to 24 V DC		8 pins	LC4H8-R6-DC24V
						11 pins	LC4H-R6-DC24V
						Screw terminal	LC4H-R6-DC24VS
			Transistor (1a)	100 to 240 V AC		8 pins	LC4H8-T6-AC240V
						11 pins	LC4H-T6-AC240V
						Screw terminal	LC4H-T6-AC240VS
				24 V AC		8 pins	LC4H8-T6-AC24V
						11 pins	LC4H-T6-AC24V
						Screw terminal	LC4H-T6-AC24VS
				12 to 24 V DC		8 pins	LC4H8-T6-DC24V
						11 pins	LC4H-T6-DC24V
						Screw terminal	LC4H-T6-DC24VS

* A rubber gasket (ATC18002) and a mounting frame (AT8-DA4) are included.

Part names

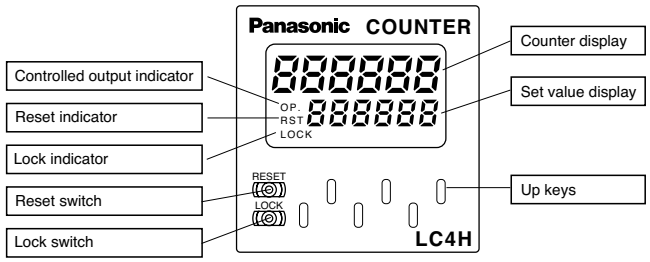
• 4-digit display type

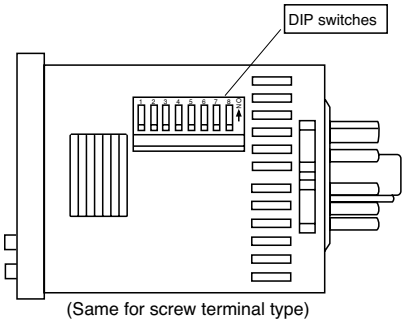




(Same for screw terminal type)

• 6-digit display type





(Same for screw terminal type)

Specifications

Item			Relay output type		Transistor output type	
			AC type	DC type	AC type	DC type
Rating	Rated operating voltage		100 to 240 V AC, 24 V AC	12 to 24 V DC	100 to 240 V AC, 24 V AC	12 to 24 V DC
	Rated frequency		50/60 Hz common	—	50/60 Hz common	—
	Rated power consumption		Max. 10 V A	Max. 3 W	Max. 10 V A	Max. 3 W
	Rated control capacity		5 A 250 V AC (resistive load)		100 mA 30 V DC	
	Input mode		Addition (UP)/Subtraction (DOWN)/Direction (DIR)/Individuality (IND)/Phase (PHASE) 5 modes selectable by DIP switch			
	Max. counting speed		30 Hz/5 kHz (selectable by DIP switch)			
	Counting input (Input 1, 2)		Min. input signal width: 16.7 ms at 30 Hz/0.1 ms at 5 kHz, ON time: OFF time = 1:1			
	Reset input		Min. input signal width: 1 ms, 20 ms (selected by DIP switch)			
	Lock input		Min. input signal width: 20 ms			
	Input signal		Contact or Open collector input/Input impedance: 1 kΩ or less, Input residual voltage: 2 V or less, Open impedance: 100 kΩ or more, Max. energized voltage: 40 V DC			
	Output mode		HOLD-A/HOLD-B/HOLD-C/SHOT-A/SHOT-B/SHOT-C/SHOT-D (7 modes selectable by DIP switch)			
	One shot output time		Approx. 1 s			
	Indication		7-segment LCD, Counter value (backlight red LED), Setting value (backlight yellow LED)			
	Digit		4-digit display type –999 to 9999 (–3 digits to +4 digits) (0 to 9999 for setting) 6-digit display type –99999 to 999999 (–5 digits to 6 digits) (0 to 999999 for setting)			
	Memory		EEP-ROM (Overwriting times: 10^5 ope. or more)			
Contact	Contact arrangement		1 Form C		1 Form A (Open collector)	
	Initial contact resistance		100 mΩ (at 1 A 6 V DC)		—	
	Contact material		Ag alloy/Au flush		—	
Life	Mechanical (contact)		$2x10^7$ ope. (Except for switch operation parts)		—	
	Electrical (contact)		10^5 ope. (At rated control voltage)		10^5 ope. (At rated control voltage)	
Electrical	Allowable operating voltage range		85 to 110 % of rated operating voltage			
	Break down voltage (Initial value)		Between live and dead metal parts: 2,000 Vrms for 1 min (11-pin type) Between input and output: 2,000 Vrms for 1 min Between open contacts: 1,000 Vrms for 1 min		Between live and dead metal parts: 2,000 Vrms for 1 min (11-pin type) Between input and output: 2,000 V AC for 1 min	
	Insulation resistance (At 500 V DC) (Initial value)		Between live and dead metal parts: Min. 100 MΩ (11-pin type) Between input and output: Min. 100 MΩ Between open contact: Min. 100 MΩ		Between live and dead metal parts: Min. 100 MΩ (11-pin type) Between input and output: Min. 100 MΩ	
	Temperature rise		Max. 65° C (under the flow of nominal operating current at nominal voltage)			
Mechanical	Vibration resistance	Functional	10 to 55 Hz (1 cycle/min), single amplitude: 0.35 mm (10 min on 3 axes)			
		Destructive	10 to 55 Hz (1 cycle/min), single amplitude: 0.75 mm (1 h on 3 axes)			
	Shock resistance	Functional	Min. 98 m/s² (4 times on 3 axes)			
		Destructive	Min. 294 m/s² (5 times on 3 axes)			
Operating conditions	Ambient temperature		–10° C to 55° C			
	Ambient humidity		Max. 85 % RH (non-condensing)			
	Air pressure		860 to 1,060 h Pa			
	Ripple rate		—	20 % or less	—	20 % or less
Connection			8-pin/11-pin/screw terminal			
Protective construction			IP66 (front panel with a rubber gasket)			

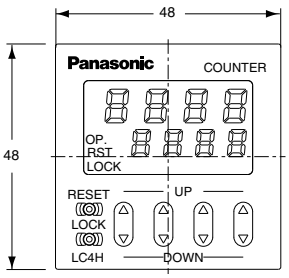
Applicable standard

Safety standard	EN61812-1	Pollution Degree 2/Overvoltage Category II
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)

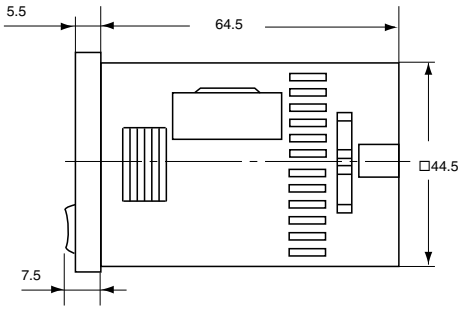
Dimensions

mm
General tolerance: ±1.0

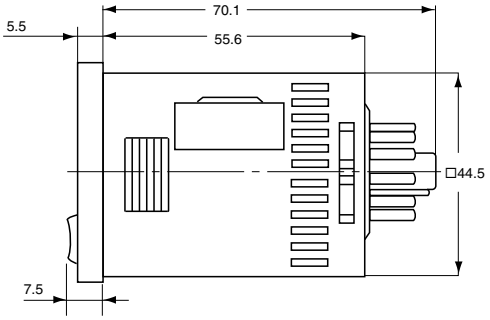
• 4-digit display type



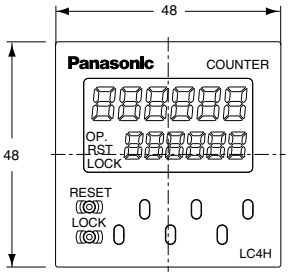
Screw terminal type: M3.5
(Flush mount)



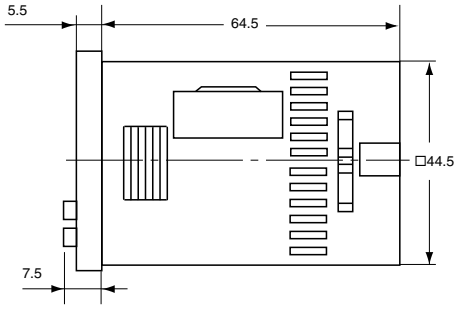
Pin type
(Flush mount/Surface mount)



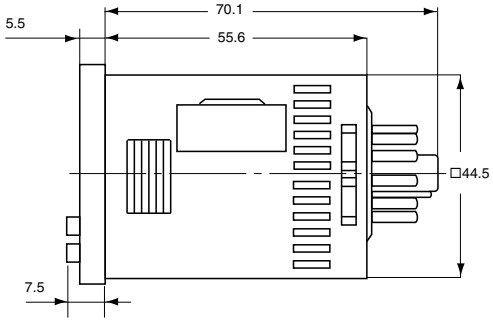
• 6-digit display type



Screw terminal type: M3.5
(Flush mount)

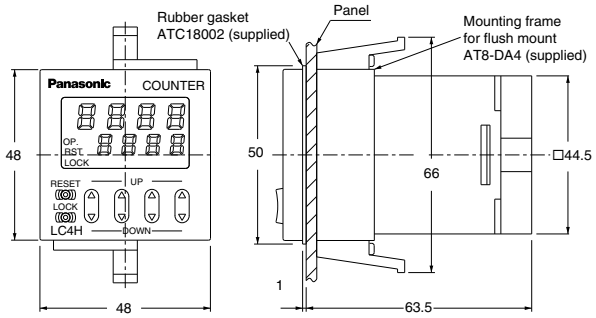


Pin type
(Flush mount/Surface mount)

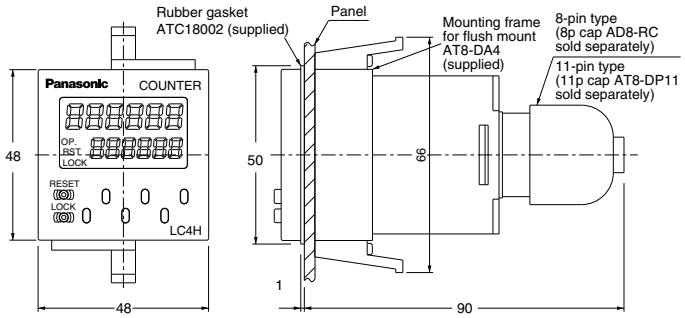


• Dimensions for flush mounting (with adapter installed)

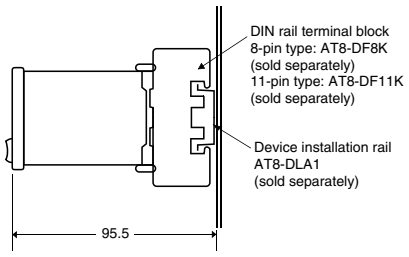
Screw terminal type: M3.5



Pin type



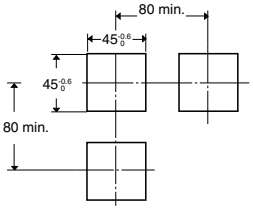
• Dimensions for front panel installations



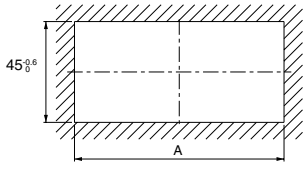
( ) Dimensions for 8-pin type.

• Installation panel cut-out dimensions

The standard panel cut-out dimensions are shown below. Use the mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• For connected installations



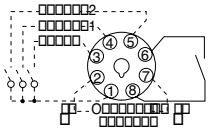
$A = (48 \times n - 2.5)^{-0.6}_{0}$

Note 1: The installation panel thickness should be between 1 and 5 mm.
Note 2: For connected installations, the waterproofing ability between the unit and installation panel is lost.

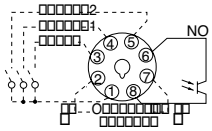
Terminal layouts and wiring diagrams

• 8-pin type

Relay output type

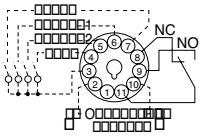


Transistor output type

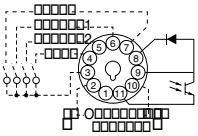


• 11-pin type

Relay output type

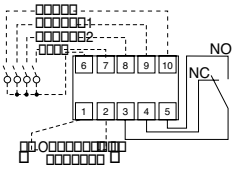


Transistor output type

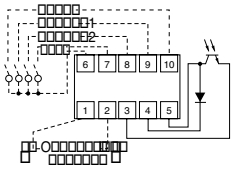


• Screw terminal type

Relay output type



Transistor output type



Note) For connecting the output leads of the transistor output type, refer to 5) Transistor output on page 90.

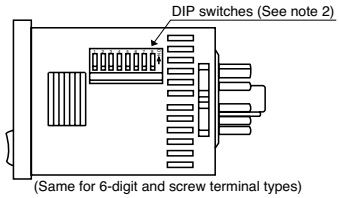
Setting the operation mode and set value

Setting procedure 1) Setting the operation mode (input mode and output mode)

Set the input and output modes with the DIP switches on the side of the counter.

DIP switches

	Item	DIP switch OFF	DIP switch ON
1	Output mode	Refer to table 1	
2			
3			
4	Minimum reset input signal width	20 ms	1 ms
5	Maximum counter speed	30 Hz	5 kHz
6	Input mode	Refer to table 2	
7			
8			



(Same for 6-digit and screw terminal types)

Table 1: Setting the output mode

DIP switch No. 1	2	3	Output mode
ON	ON	ON	SHOT-A
OFF	OFF	OFF	SHOT-B
ON	OFF	OFF	SHOT-C
OFF	ON	OFF	SHOT-D
ON	ON	OFF	HOLD-A
OFF	OFF	ON	HOLD-B
ON	OFF	ON	
OFF	ON	ON	— (See note 1)

Table 2: Setting the input mode

DIP switch No. 6	7	8	
ON	ON	ON	Addition input
OFF	OFF	OFF	Subtraction input
ON	OFF	OFF	Directive input
OFF	ON	OFF	Independent input
ON	ON	OFF	Phase input
OFF	OFF	ON	— (See note 1)
ON	OFF	ON	(See note 1)
OFF	ON	ON	— (See note 1)

Notes: 1) The counter and set value displays will display DIP Err.
2) Set the DIP switches before installing the counter on the panel.
3) When the DIP SW setting is changed, turn off the power once.
4) The DIP switches are set as ON before shipping.

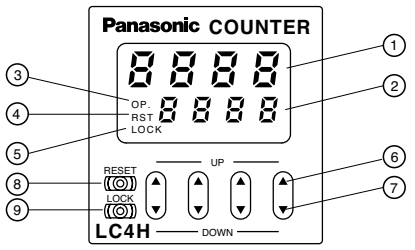
Setting procedure 2) Setting the set value

Set the set value with the UP and DOWN keys on the front of the counter.

Front display section

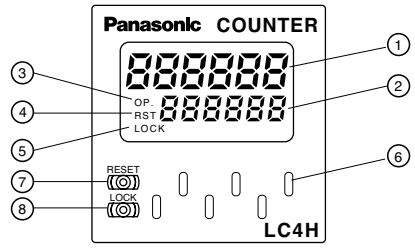
• 4-digit display type

1 Counter display
2 Set value display
3 Controlled output indicator
4 Reset indicator
5 Lock indicator
6 UP keys
Changes the corresponding digit of the set value in the addition direction (upwards).
7 DOWN keys
Changes the corresponding digit of the set value in the subtraction direction (downwards).
8 RESET switch
Resets the counting value and the output.
9 LOCK switch
Locks the operation of all keys on the counter.



• 6-digit display type

1 Counter display
2 Set value display
3 Controlled output indicator
4 Reset indicator
5 Lock indicator
6 UP keys
Changes the corresponding digit of the set value in the addition direction (upwards).
7 RESET switch
Resets the counting value and the output.
8 LOCK switch
Locks the operation of all keys on the counter.



• Changing the set value

1. It is possible to change the set value with the up and down keys (4-digit type only) even during counting. However, be aware of the following points.

1) If the set value is changed to less than the count value with counting set to the addition direction, counting will continue until it reaches full scale (9999 with the 4-digit type and 999999 with the 6-digit type), returns to zero, and then reaches the new set value. If the set value is changed to a value above the count value, counting will continue until the count value reaches the new set value.

2) Suppose that the counter is preset to count down. Whether a preset count-down value is smaller or larger than the count value, the counter counts down to "0(Zero)".

2. If the set value is changed to "0," the unit will not complete count-up. It starts counting up when the counting value comes to "0 (Zero)" again.

1) Up-count (addition) input when counting is set to the addition direction, counting will continue until full scale is reached (9999 with the 4-digit type and 999999 with the 6-digit type), return to zero, and then complete count-up.

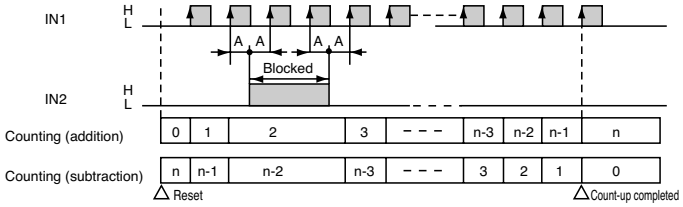
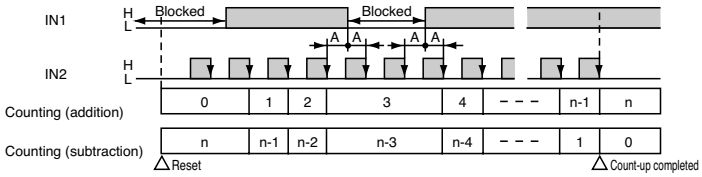
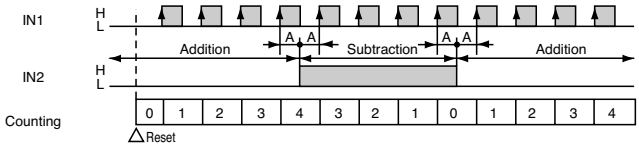
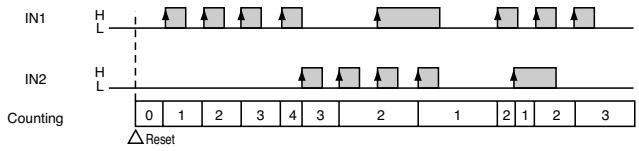
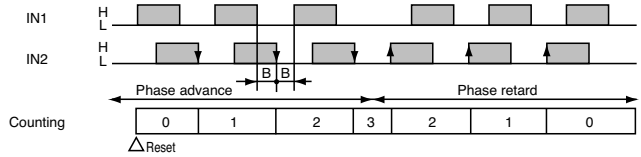
2) Down-count (subtraction) input when counting is set to the subtraction direction, counting will continue until full scale is reached (-999 with the 4-digit type and -99999 with the 6-digit type), and then the display will change to - - - - with the 4-digit type and - - - - - - with the 6-digit type. The counting value does not become "0" and so the counter does not count up.

3) For directive, independent, and phase input, when the counting value increases or decreases from the value „0" and then returns back to the value „0," count-up is completed.

Operation modes

1. Input mode: For the input mode, you can choose one of the following five modes

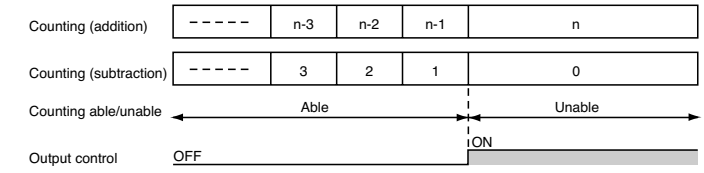
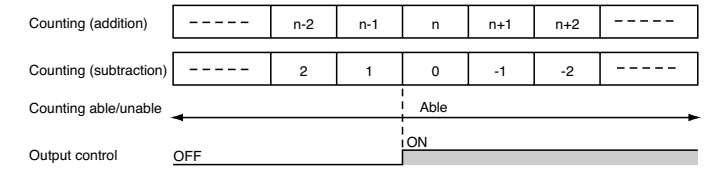
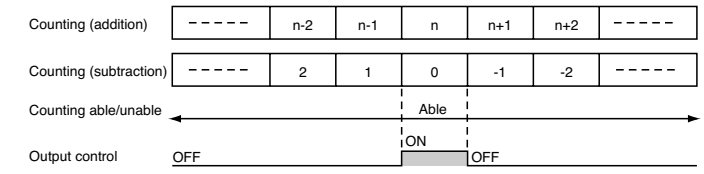
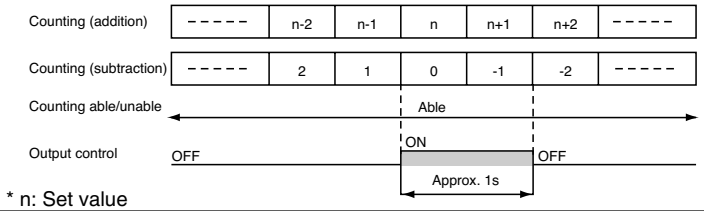
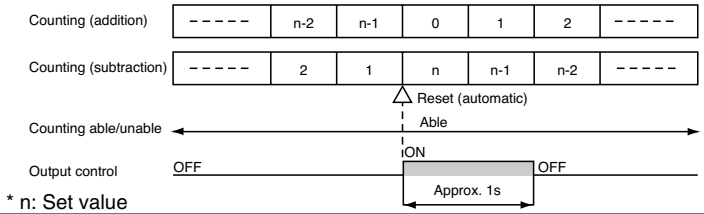
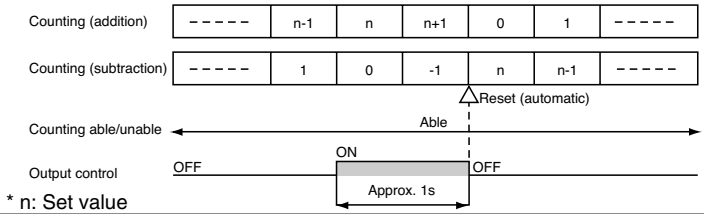
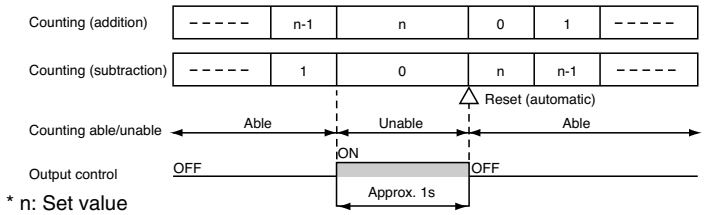
- Addition UP
- Subtraction DOWN
- Directive DIR
- Independent IND
- Phase PHASE

Input mode	Operation	*Minimum input signal width 30 Hz: 16.7 ms; 5 kHz: 0.1 ms
Addition UP	IN1 or IN2 works as an input block (gate) for the other input.	• Example where IN1 is the count counting and IN2 is the input block (gate). 
Subtraction DOWN		• Example where IN2 is the counting input and IN1 is the input block (gate).  * "A" must be more than the minimum input signal width.
Directive DIR	IN1 is the counting input and IN2 is the addition or subtraction directive input. IN2 adds at L level and subtracts at H level.	 * "A" must be more than the minimum input signal width.
Independent IND	IN1 is addition input and IN2 is subtraction input.	 * IN1 and IN2 are completely independent, so there is no restriction on signal timing.
Phase PHASE	Addition when the IN1 phase advances beyond IN2, and subtraction when the IN2 phase advances beyond IN1.	 * "B" must be more than the minimum input signal width.

2. Output mode

For the output mode, you can choose one of the following seven modes

- Maintain output/hold count HOLD-A
- Maintain output/over count I HOLD-B
- Maintain output/over count II HOLD-C
- One shot/over count SHOT-A
- One shot/recount I SHOT-B
- One shot/recount II SHOT-C
- One shot/hold count SHOT-D

Output mode	Operation	(Example when input mode is either addition or subtraction)
Maintain output Hold count HOLD-A	Output control is maintained after count-up completion and until resetting. During that time, the count display does not change from that at count-up completion.	 * n: Set value
Maintain output Over count I HOLD-B	Output control is maintained after count-up completion and until resetting. However, counting is possible despite completion of count-up.	 * n: Set value
Maintain output Over count II HOLD-C	Output control is maintained after count-up completion and until the next signal enters. However, counting is possible despite completion of count-up.	 * n: Set value
One shot Over count SHOT-A	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up.	 * n: Set value
One shot Recount I SHOT-B	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up. However, reset occurs simultaneous with completion of count-up. While output is being maintained, restarting of the count is not possible.	 * n: Set value
One shot Recount II SHOT-C	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up. However, reset occurs simultaneous with output OFF.	 * n: Set value
One shot Hold count SHOT-D	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). During that time, the count display does not change from that at count-up completion. Reset occurs simultaneous with output OFF.	 * n: Set value

11 Pin type

Screw terminal type

LC4H-S

DIN 48 SIZE
LCD ELECTRONIC COUNTER

Features

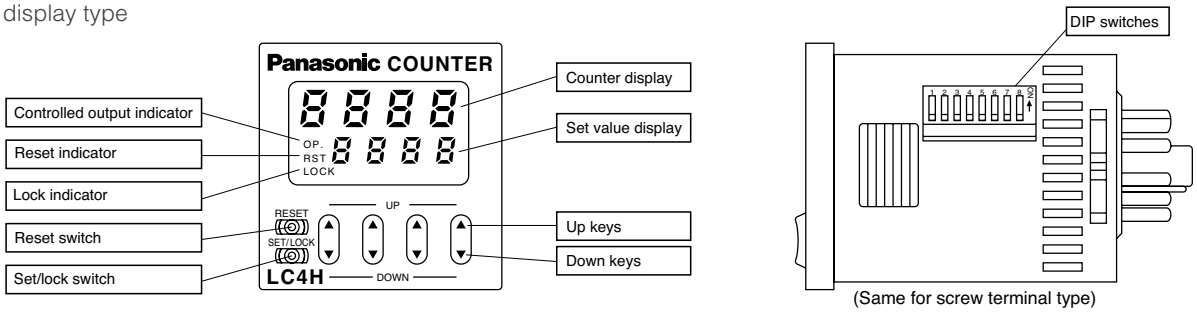
- **Bright and Easy-to-Read Display**
  A brand new bright 2-color backlight LCD display. The easy-to-read screen in any location makes checking and setting procedures a cinch.
- **Easy to use, simple operation, simple settings**
- Operation modes (input/output modes) can be set easily, using DIP switches on the side panel.
- Values can be set easily, using key switches on the front panel.
- **Pre-scaling function provided**
  A pre-scaling function enables conversion of lengths and volumes to any desired values, and displays the results.
- **Built-in power supply for high-capacitance sensor**
  An internal power supply drives a 12 VDC, 100 mA high-capacitance sensor.
  (AC power supply types only)
  Photoelectric switches, proximity switches and encoders can be directly connected.
- **Dual-path AC sensor can be connected.**
- **Basic insulation between the power supply and the input terminal (only for the sensor type model with power supply)**
  There is no need for caution when connecting between terminals.
- **Conforms to IP66's Weather Resistant Standards**
  The water-proof panel keeps out water and dirt for reliable operation even in poor environments.
- **4-digit or 6-digit display**
  Two sizes of displays are offered for you to choose the one that suits your needs.
- **Screw terminal and Pin Type are Both Standard Options**
  The two terminal types are standard options to support either front panel installation or embedded installation.
- **Compliant with UL, c-UL and CE, UL File No.: E122222 C-UL File No.: E122222**

Product types

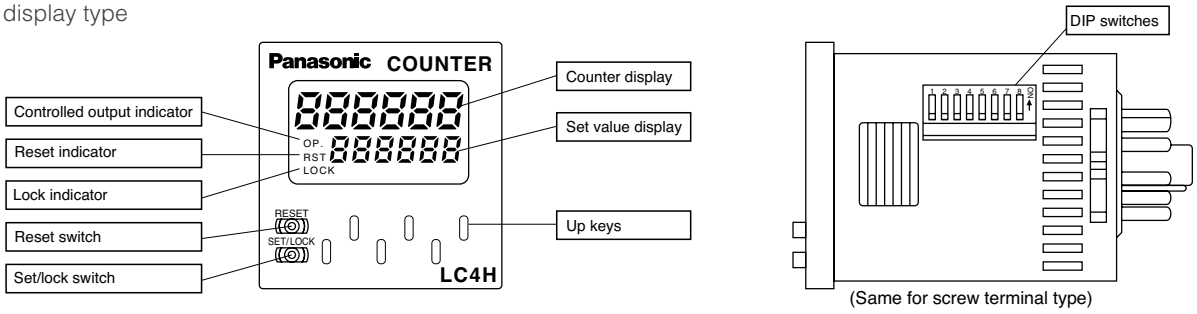
Digit	Count speed	Output	Operation voltage	Power down insurane	Additional function	Terminal	P/N
4	30 Hz (cps) 5 kHz (kcps) switchable	Relay	100-240 V AC with 12V DC power supply	Available	Scale Factor	11 Pin	LC4H-PS-R4-AC240V
					Scale Factor	Screw	LC4H-PS-R4-AC240VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-PSV-R4-AC240V
					Scale Factor / Voltage Signal Input	Screw	LC4H-PSV-R4-AC240VS
			12-24 V DC / 24 V AC		Scale Factor	11 Pin	LC4H-S-R4-24V
					Scale Factor	Screw	LC4H-S-R4-24VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-SV-R4-24V
					Scale Factor / Voltage Signal Input	Screw	LC4H-SV-R4-24VS
		Transistor			Scale Factor	11 Pin	LC4H-S-T4-24V
					Scale Factor	Screw	LC4H-S-T4-24VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-SV-T4-24V
					Scale Factor / Voltage Signal Input	Screw	LC4H-SV-T4-24VS
6		Relay	100-240 V AC with 12V DC power supply		Scale Factor	11 Pin	LC4H-PS-R6-AC240V
					Scale Factor	Screw	LC4H-PS-R6-AC240VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-PSV-R6-AC240V
					Scale Factor / Voltage Signal Input	Screw	LC4H-PSV-R6-AC240VS
			12-24 V DC / 24 V AC		Scale Factor	11 Pin	LC4H-S-R6-24V
					Scale Factor	Screw	LC4H-S-R6-24VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-SV-R6-24V
					Scale Factor / Voltage Signal Input	Screw	LC4H-SV-R6-24VS
		Transistor			Scale Factor	11 Pin	LC4H-S-T6-24V
					Scale Factor	Screw	LC4H-S-T6-24VS
					Scale Factor / Voltage Signal Input	11 Pin	LC4H-SV-T6-24V
					Scale Factor / Voltage Signal Input	Screw	LC4H-SV-T6-24VS

Part names

• 4-digit display type



• 6-digit display type



Specifications

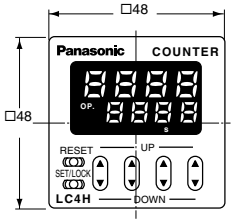
Item			Relay output type		Transistor output type
			AC type	DC/AC type	DC/AC type
Rating	Rated operating voltage		100 to 240 V	12 to 24 V DC/24 V AC	12 to 24 V DC/24 V AC
	Rated frequency		50/60 Hz common		
	Rated power consumption		Max. 10 V A	Max. 3 W	
	Rated control capacity		5 A 250 V AC (resistive load)		100 mA, 30 V DC
	Input mode				
	Max. counting speed		30 Hz, 5 kHz (selectable by DIP switches)		
	Counting input (input 1, input 2)		16.7 ms at 30 Hz/0.1 ms at 5 kHz ON time: OFF time = 1:1		
	Reset input		Min. input signal width: 1 ms, 20 ms (selected by DIP switches)		
	Lock input		Min. input signal width: 20 ms		
			Contact, Open collector input/DC two-wire system sensor Input impedance: 1 kΩ or less, Input residual voltage: 2 V or less, Open impedance: 100 kΩ or less, Max. energized voltage: 40 V DC		
	Output mode		HOLD-A, HOLD-B, HOLD-C, SHOT-A, SHOT-B, SHOT-C, SHOT-D, 7 modes selectable by DIP switches		
	One shot output time		1 s, 0.5s, 0.2s, 0.1s, 0.05, 0.01s		
	Indication		7-segment LCD, Counter value (backlight red LED), Setting value (backlight yellow LED)		
	Digit		4-digit display type –999 to 9999 (0 to 9999 for setting) 6-digit display type –99999 to 999999 (0 to 999999 for setting)		
	Decimal point		Can be set to three digits		
	Pre-scaling		0.001 to 9.999 (4-digit type), 0.001 to 99.999 (6-digit type)		
	Memory		EEP-ROM (Overwriting times: 10^5 ope. or more)		
	Power for senser		12 V DC (±10%) 100 mA Max.	—	
Contact	Contact arrangement		1 Form C		1 Form A (Open collector)
	Initial contact resistance		100 mΩ (at 1 A 6 V DC)		—
	Contact material		Ag alloy/Au flush		—
Life	Mechanical (contact)		$2x10^7$ ope. (Except for switch operation parts)		
	Electrical (contact)		10^5 ope. (At rated control voltage)		
Electrical	Operating voltage range		85 to 264 V AC	10.8 to 26.4 V DC, 20.4 to 26.4 V AC	
	Initial withstand voltage		Between live and dead metal parts: 2,000 Vrms for 1 min (pin type) Between input and output: 2,000 Vrms for 1 min		
	Initial insulation resistance (At 500 V DC)		Between live and dead metal parts: Min. 100 MΩ (pin type) Between input and output: Min. 100 MΩ		
	Temperature rise		Max. 65° C (under the flow of nominal operating current at nominal voltage)		
Mechanical	Vibration resistance	Functional	10 to 55 Hz (1 cycle/min), single amplitude: 0.35 mm (10 min on 3 axes)		
		Destructive	10 to 55 Hz (1 cycle/min), single amplitude: 0.75 mm (1 h on 3 axes)		
	Shock resistance	Functional	Min. 98 m/s^2 (4 times on 3 axes)		
		Destructive	Min. 294 m/s^2 (5 times on 3 axes)		
Operating conditions	Ambient temperature		–10° C to 55° C		
	Ambient humidity		Max. 85 % RH (non-condensing)		
	Air pressure		860 to 1,060 h Pa		
Connection			11-pin/screw terminal		
Protective construction			IP66 (front panel with a rubber gasket)		

Applicable standard

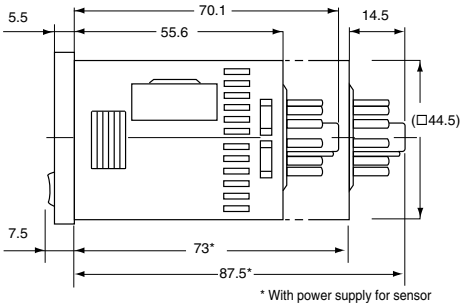
Safety standard	EN61812-1	Pollution Degree 2 / Overvoltage Category II
EMC	(EMI)EN61000-6-4 Radiation interference electric field strength Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Surge immunity Conductivity noise immunity Power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

Dimensions

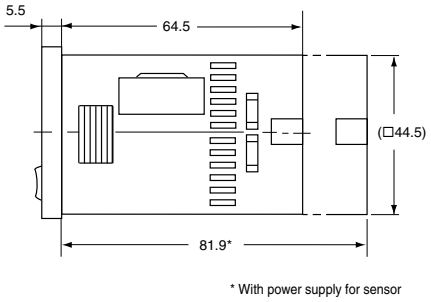
mm General tolerance: ±1.0



Pin type (Flush mount/Surface mount)



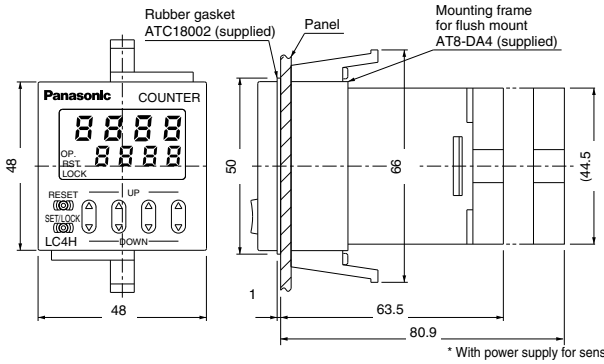
Screw terminal type: M3.5 (Flush mount)



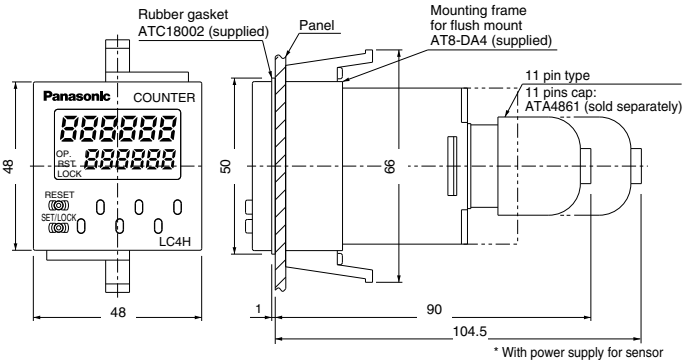
(* 6-digit display type has the same dimensions.)

• Dimensions for flush mounting (with adapter installed)

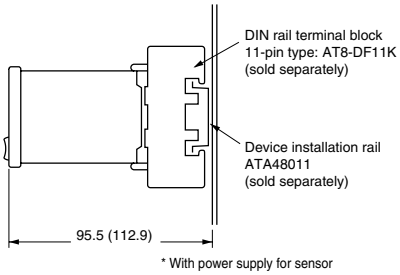
Screw terminal type



Pin type

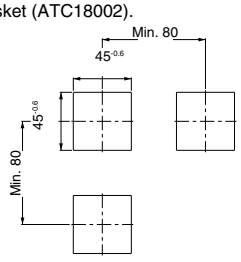


• Dimensions for front panel installations

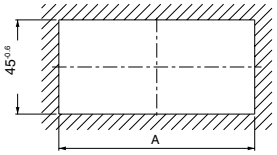


• Installation panel cut-out dimensions

The standard panel cut-out dimensions are shown below. Use the mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• For connected installations



When n units are attached in a continuous series, the dimension of (A) is:

$A = (48 \times n - 2.5)\ ^{-0.6}_{0}$

Note 1: The installation panel thickness should be between 1 and 5 mm.

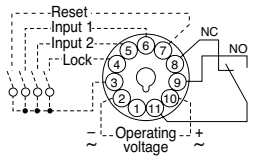
Note 2: For connected installations, the waterproofing ability between the unit and installation panel is lost.

Terminal layouts and wiring diagrams

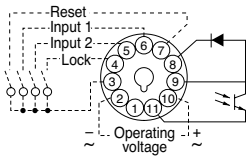
• Pin type

* With power supply for sensor

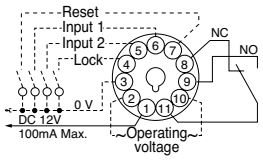
Relay output type



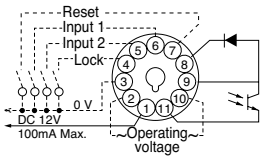
Transistor output type



Relay output type



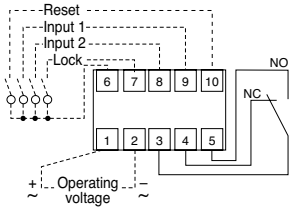
Transistor output type



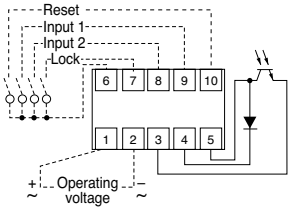
• Screw terminal type

* With power supply for sensor

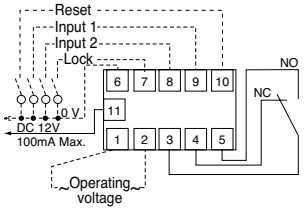
Relay output type



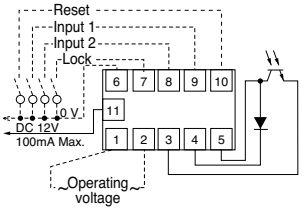
Transistor output type



Relay output type



Transistor output type



Note) For connecting the output leads of the transistor output type, refer to 5) Transistor output on page 90.

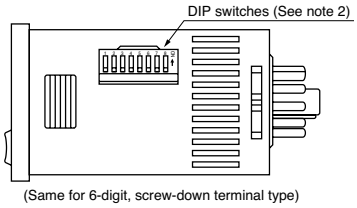
Setting the operation mode and counter

Setting procedure 1) Setting the operation mode (input mode and output mode)

Set the input and output modes with the DIP switches on the side of the counter.

DIP switches

	Item	DIP switch	
		OFF	ON
1	Output mode	Refer to table 1	
2			
3			
4	Minimum reset input signal width	20 ms	1 ms
5	Maximum counter setting	30 Hz	5 kHz
6	Input mode	Refer to table 2	
7			
8			



(Same for 6-digit, screw-down terminal type)

Table 1: Setting the output mode

DIP switch No.			Output mode
1	2	3	
ON	ON	ON	SHOT-A
OFF	OFF	OFF	SHOT-B
ON		OFF	SHOT-C
OFF	ON	OFF	SHOT-D
ON	ON	OFF	HOLD-A
OFF	OFF	ON	HOLD-B
ON	OFF	ON	HOLD-C
OFF	ON	ON	— (See note 1)

Table 2: Setting the input mode

DIP switch No.			Input mode
6	7	8	
ON	ON	ON	Addition input
OFF	OFF	OFF	Subtraction input
ON	OFF	OFF	Directive input
OFF	ON		Independent input
ON	ON	OFF	Phase input
OFF	OFF	ON	— (See note 1)
ON	OFF	ON	— (See note 1)
OFF	ON	ON	— (See note 1)

Notes:1) The counter and set value displays will display DIP Err.
2) Set the DIP switches before installing the counter on the panel.
3) When the DIP SW setting is changed, turn off the power once.
4) The DIP switches are set as ON before shipping.

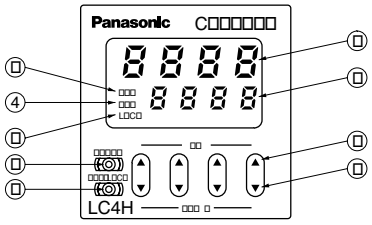
Setting procedure 2) Setting the set value

Set the set value with the UP and DOWN keys on the front of the counter.

Front display section

• 4-digit display type

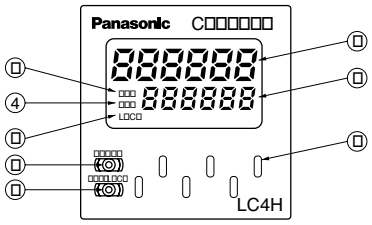
1 Counter display
2 Set value display
3 Controlled output indicator
4 Reset indicator
5 Lock indicator
6 UP keys
Changes the corresponding digit of the set value in the addition direction (upwards)



7 DOWN keys
Changes the corresponding digit of the set value in the subtraction direction (downwards)
8 RESET switch
Resets the counting value and the output
9 SET/LOCK switch
This is used to handle pre-scaling values, one-shot times, decimal point position settings, and key lock operations (to disable Up key, Down key, and Reset key operations).

• 6-digit display type

1 Counter display
2 Set value display
3 Controlled output indicator
4 Reset indicator
5 Lock indicator



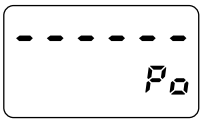
6 UP keys
Changes the corresponding digit of the set value in the addition direction (upwards)
7 RESET switch
Resets the counting value and the output
8 SET/LOCK switch
This is used to handle pre-scaling values, one-shot times, decimal point position settings, and key lock operations (to disable Up key, Down key, and Reset key operations).

Setting procedure 3) Setting the input mode

The input mode is set using the key switch in the [Display] section on the front of the counter.

• Decimal point position setting mode

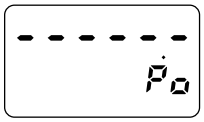
1 Holding down the [SET/LOCK] key, press the key for the second digit to access the decimal point position setting mode.



Example 6-digit type
Decimal point position setting mode display
(Example shows default value displayed)

2 When the setting mode has been accessed, release the [SET/LOCK] key.

3 The decimal point is set using the [UP] and [DOWN] keys to specify the 2nd, 3rd, and 4th digits (this applies only to 4-digit models).(The 1st digit is set using the [UP] key or [DOWN] key in settings where there is no decimal point (this applies only to 4-digit models).)



Example 6-digit type
Example shows 2nd digit displayed using [UP] key

4 Press the [RESET] key to set the displayed decimal point position and return to normal operation.

• Setting the pre-scaling value

1 Holding down the [SET/LOCK] key, press the key for the first digit to access the pre-scaling value setting mode.

Example) 4-digit type

Example) 6-digit type

Pre-scaling value setting mode displayed
(Example shows default values displayed)

2 When the setting mode has been accessed, release the [SET/LOCK] key.

3 Use the [UP] or [DOWN] key to set the pre-scaling value (this applies only to 4-digit models).

Select either: 0.001 to 9.999 (4-digit) or 0.001 to 99.999 (6-digit)

4 Press the [RESET] key to set the displayed pre-scaling value and return to normal operation.

• Setting the one-shot output time

1 Holding down the [SET/LOCK] key, press the key for the third digit to access the one-shot output time setting mode.

Example 6-digit type
One-shot output time setting mode displayed
(Example shows default value displayed)

2 When the setting mode has been accessed, release the [SET/LOCK] key.

3 Each time the 1st-digit [UP] key is pressed, the one-shot output time changes in the following sequence, moving to the right:

→ 1 s → 0.5 s → 0.2 s → 0.1 s → 0.05 s → 0.01 s ┐

(With a 4-digit type, the [DOWN] key can also be used to move to the left.)

4 Press the [RESET] key to set the displayed one-shot output time and return to normal operation.

Changing the set value

1. It is possible to change the set value with the up and down keys (4-digit type only) even during counting. However, be aware of the following points.

1) If the set value is changed to less than the count value with counting set to the addition direction, counting will continue until it reaches full scale (9999 with the 4-digit type and 999999 with the 6-digit type), returns to zero, and then reaches the new set value. If the set value is changed to a value above the count value, counting will continue until the count value reaches the new set value.

2) Suppose that thew counter is preset to count down. Whether a preset count-down value is smaller or larger than the count value, the counter counts down to "0 (zero)".

2. If the set value is changed to "0," the unit will not complete count-up. It starts counting up when the counting value comes to "0 (zero)" again.

1) Up-count (addition) input
When counting is set to the addition direction, counting will continue until full scale is reached (9999 with the 4-digit type and 999999 with the 6-digit type), return to zero, and then complete count-up.

2) Down-count (subtraction) input
When counting is set to the subtraction direction, counting will continue until full scale is reached (-999 with the 4-digit type and -99999 with the 6-digit type), and then the display will change to with the 4-digit type and with the 6-digit type.
The counting value does not become "0 (zero)" and so the counter does not count up.

3) Directive, independent, and phase inputs.
The counting value is counted up or down to any number other than "0" once. When it comes to "0 (zero)" again, the counter starts counting up.

Cautions for use

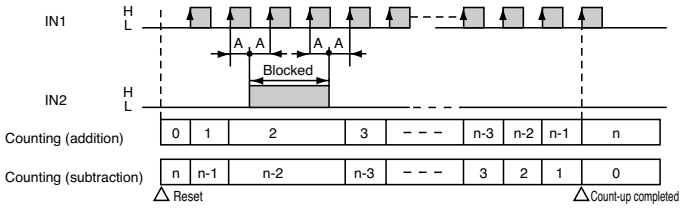
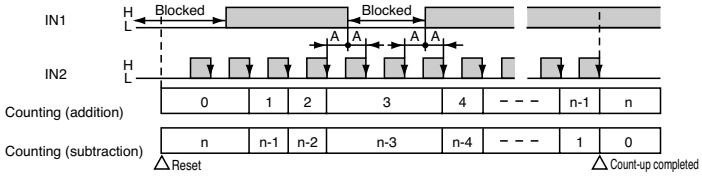
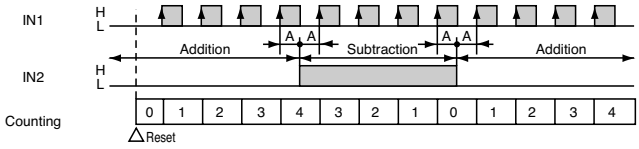
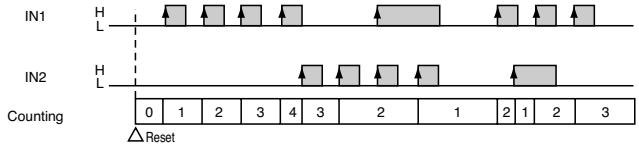
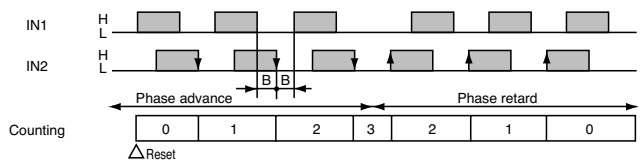
For more information regarding the cautions for use of LC4H series counter, refer to page 89 "PRECAUTIONS IN USING THE LC4H SERIES".

Operation mode

1. Input mode

For the input mode, you can choose one of the following five modes

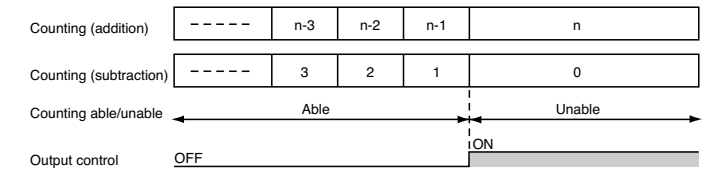
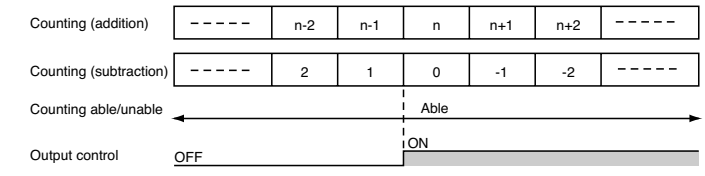
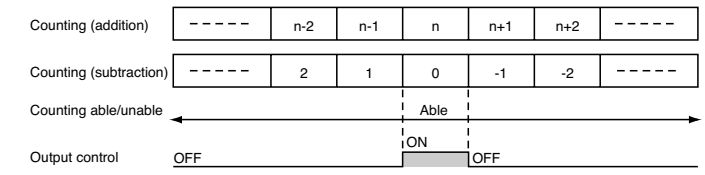
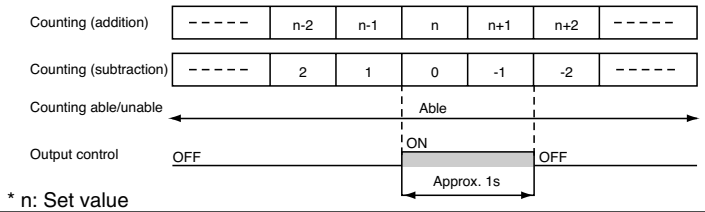
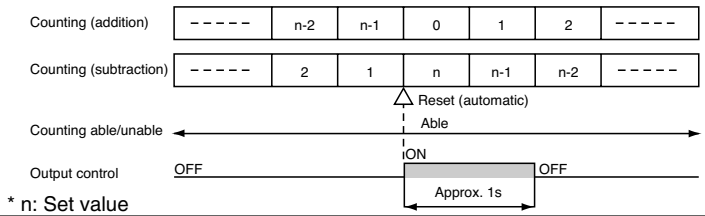
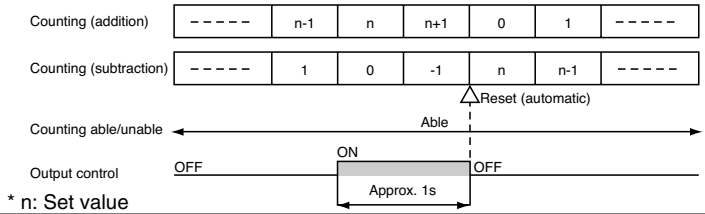
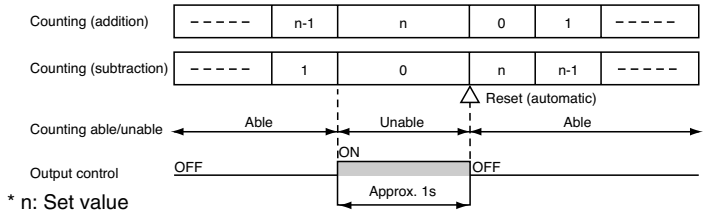
- Addition UP
- Subtraction DOWN
- Directive DIR
- Independent IND
- Phase PHASE

Input mode	Operation	*Minimum input signal width 30 Hz: 16.7 ms; 5 kHz: 0.1 ms
Addition UP	IN1 or IN2 works as an input block (gate) for the other input.	• Example where IN1 is the counting input and IN2 is the input block (gate). 
Subtraction DOWN		• Example where IN2 is the counting input and IN1 is the input block (gate).  * “A” must be more than the minimum input signal width.
Directive DIR	IN1 is the counting input and IN2 is the addition or subtraction directive input. IN2 adds at L level and subtracts at H level.	 * “A” must be more than the minimum input signal width.
Independent IND	IN1 is addition input and IN2 is subtraction input.	 * IN1 and IN2 are completely independent, so there is no restriction on signal timing.
Phase PHASE	Addition when the IN1 phase advances beyond IN2, and subtraction when the IN2 phase advances beyond IN1.	 * “B” must be more than the minimum input signal width.

2. Output mode

For the output mode, you can choose one of the following seven modes

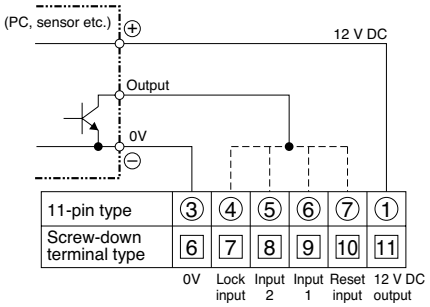
- Maintain output/hold count HOLD-A
- Maintain output/over count I HOLD-B
- Maintain output/over count II HOLD-C
- One shot/over count SHOT-A
- One shot/recount I SHOT-B
- One shot/recount II SHOT-C
- One shot/hold count SHOT-D

Output mode	Operation	(Example when input mode is either addition or subtraction)
Maintain output Hold count HOLD-A	Output control is maintained after count-up completion and until resetting. During that time, the count display does not change from that at count-up completion.	 * n: Set value
Maintain output Over count I HOLD-B	Output control is maintained after count-up completion and until resetting. However, counting is possible despite completion of count-up.	 * n: Set value
Maintain output Over count II HOLD-C	Output control is maintained after count-up completion and until the next signal enters. However, counting is possible despite completion of count-up.	 * n: Set value
One shot Over count SHOT-A	Output control is maintained after count-up completion for one shot output time. Counting is possible despite completion of count-up.	 * n: Set value
One shot Recount I SHOT-B	Output control is maintained after count-up completion for one shot output time. Counting is possible despite completion of count-up. However, reset occurs simultaneous with completion of count-up. While output is being maintained, restarting of the count is not possible	 * n: Set value
One shot Recount II SHOT-C	Output control is maintained after count-up completion for one shot output time. Counting is possible despite completion of count-up. However, reset occurs simultaneous with output OFF.	 * n: Set value
One shot Hold count SHOT-D	Output control is maintained after count-up completion for one shot output time. During that time, the count display does not change from that at count-up completion. Reset occurs simultaneous with output OFF.	 * n: Set value

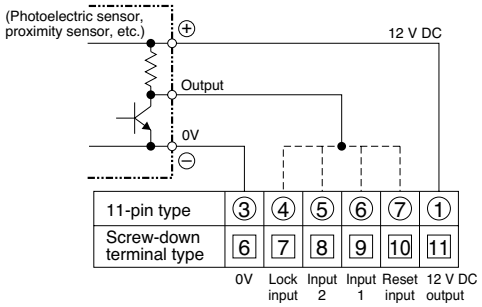
Input connections

• Signal input type

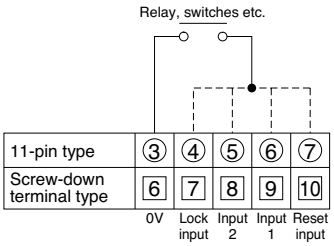
1) Open collector



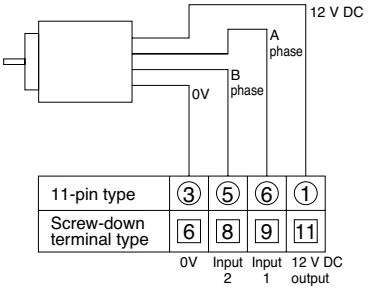
2) For voltage output



3) Contact input



4) For a rotary encoder

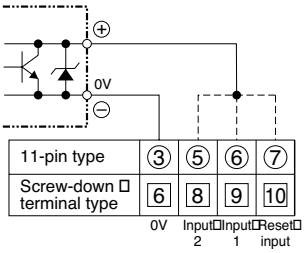


Input 1, input 2, and reset input specifications
- Impedance during short-circuit: 1 kΩ max. (At 0 Ω, the outflow current is approximately 12 mA.)
- Residual voltage during short-circuit: 2 V max.
- Impedance when released: 100 kΩ min.
- Max. applied voltage: 40 VDC max.

Lock input specifications
- Impedance during short-circuit: 1 kΩ max. (At 0 Ω, the outflow current is approximately 1.5 mA.)
- Residual voltage during short-circuit: 2 V max.
- Impedance when released: 100 kΩ min.
- Max. applied voltage: 40 DVC max.
- The contact relay should be one which can open/close 5 V, 1.5 mA.

* There is no 12 V DC with 12 - 24 V DC/24 V AC types.

5) For a dual-line sensor



Dual-line sensor specifications
- Leakage current: 1.5 mA max.
- Breaker capacitance: 5 mA min.
- Residual voltage: 3.0 V max.
- Usable voltage: Runs on 10 VDC

* If a dual-line sensor is connected to a 12 - 24 VDC/24 VAC type, 24 VDC (21.6 to 26.4 VDC) and 24 VAC (21.6 to 26.4 VAC) should be applied to the power supply voltage of the counter.

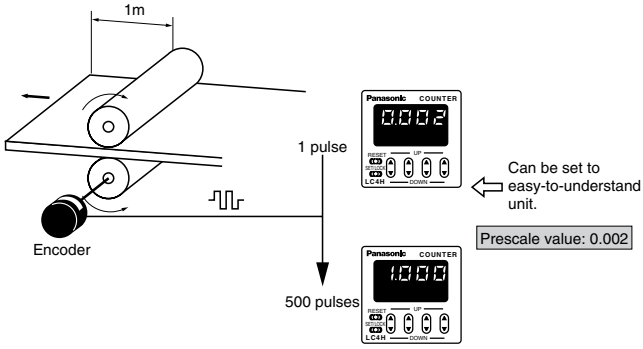
What is the prescale function?

The prescale function converts the count into an actual value (amount) and displays it.

Example

For a device that outputs 500 pulses when 1 m has been fed:

1. Set decimal position to the last 3rd place.
2. Set the prescale value to 0.002 (1/500).



11-pin type

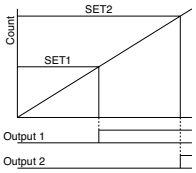
Screw terminal type

LC4H-W

DIN 48 SIZE
LCD ELECTRONIC COUNTER

Features

› **Two-stage presetting (upper and lower limits)**



› **Short Body of only 64.5 mm (screw type) or 70.1 mm (pin type)**
With a short body, it easily installs in even narrow control panels.

› **Bright and Easy-to-Read Display**
A brand new bright 2-color backlight LCD display. The easy-to-read screen in any location makes checking and setting procedures a cinch.

› **Simple Operation**
Seesaw buttons make operating the unit even easier than before.

› **Conforms to IP66's Weather Resistant Standards**
The water-proof panel keeps out water and dirt for reliable operation even in poor environments.

› **Screw terminal and Pin Type are Both Standard Options**
The two terminal types are standard options to support either front panel installation or embedded installation.

› **Changeable Panel Cover**
Also offers a black panel cover to meet your design considerations.

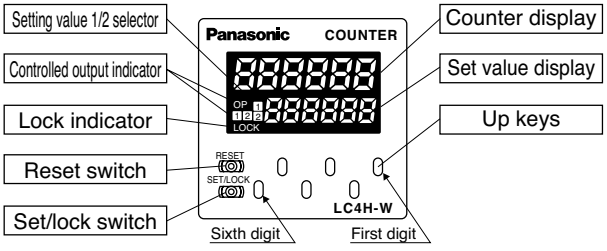
› **Compliant with UL, c-UL and CE, UL File No.: E122222, C-UL File No.: E122222**

Product types

Digit	Count speed	Output mode		Output	Operating voltage	Power down insurance	Terminal type	Part number
		Output 1	Output 2					
6	30 Hz (cps)/ 5 KHz (Kcps) switchable	• Maintain output/over count I • Maintain output/over count II • Maintain output/over count III • One shot/over count (4 modes)	• Maintain output/hold count • Maintain output/over count I • Maintain output/over count II • Maintain output/over count III • One shot/over count • One shot/recount I • One shot/recount II • One shot/hold count (8 modes)	Relay (1a+1a)	100 to 240 V AC	Available	11 pins	LC4H-W-R6-AC240V
							Screw terminal	LC4H-W-R6-AC240VS
					24V AC		11 pins	LC4H-W-R6-AC24V
							Screw terminal	LC4H-W-R6-AC24VS
					12 to 24 V DC		11 pins	LC4H-W-R6-DC24V
							Screw terminal	LC4H-W-R6-DC24VS
				Transistor (1a+1a)	100 to 240 V AC		11 pins	LC4H-W-T6-AC240V
							Screw terminal	LC4H-W-T6-AC240VS
					24V AC		11 pins	LC4H-W-T6-AC24V
							Screw terminal	LC4H-W-T6-AC24VS
					12 to 24 V DC		11 pins	LC4H-W-T6-DC24V
							Screw terminal	LC4H-W-T6-DC24VS

* A rubber gasket (ATC18002) and a mounting frame (AT8-DA4) are included.

Part names



: Used to set the corresponding digits for the count-up mode.

: Used to reset counting and its output.

SET/LOCK key : Used to select between the Setting 1 display and Setting 2 display and to lock the keys (UP and RESET keys not responsive to touch). Used also to set and confirm the input mode.

Specifications

Item			Relay output type		Transistor output type	
			AC type	DC type	AC type	DC type
Rating	Rated operating voltage		100 to 240 V AC 24 V AC	12 to 24 V DC	100 to 240 V AC 24 V AC	12 to 24 V DC
	Rated frequency		50/60 Hz common	—	50/60 Hz common	—
	Rated power consumption		Max. 10 V A	Max. 3 W	Max. 10 V A	Max. 3 W
	Rated control capacity		3 A, 250 V AC (resistive load)		100 mA, 30 V DC	
	Input mode		Addition (UP)/Subtraction (DOWN)/Direction (DIR)/Individuality (IND)/Phase (PHASE) (5 modes selectable by DIP switch)			
	Counting speed		30 Hz(cps)/5 KHz(cps) (selectable by DIP switch)			
	Counting input (Input 1, 2)		Min. input signal width: 16.7 ms at 30 Hz(cps)/0.1 ms at 5 KHz(cps) ON time: OFF time = 1:1			
	Reset input		Min. input signal width: 1 ms, 20 ms (selected by DIP switch)			
	Input signal		Contact or Open collector input/Input impedance: 1 kΩ or less, Input residual voltage: 2 V or less, Open impedance: 100 kΩ or more, Max. energized voltage: 40 V DC			
	Output mode		Output 1. HOLD-B, C, D SHOT-A (4 modes) Output 2. HOLD-A, B, C SHOT-A, B, C, D (8 modes) (selectable by DIP switch)			
	One shot output time		Approx. 1 s			
	Indication		7-segment LCD, Counter value (backlight red LED), Setting value (backlight yellow LED)			
	Digit		–99999 to 999999 (–5 digits to 6 digits) (0 to 999999 for setting)			
	Memory		EEP-ROM (Overwriting times: 10^5 ope. or more)			
Contact	Contact arrangement		1 Form A + 1 Form A		1 Form A + 1 Form A (Open collector)	
	Contact resistance (Intial value)		100 mΩ (at 1 A 6 V DC)		—	
	Contact material		Ag alloy/Au flush		—	
Life	Mechanical (contact)		Min. $2x10^7$ ope.		—	
	Electrical (contact)		Min. 10^5 ope. (At rated control voltage)		Min. 10^7 ope. (At rated control voltage)	
Electrical	Allowable operating voltage range		85 to 110 % of rated operating voltage			
	Break down voltage (Initial value)		Between live and dead metal parts: 2,000 Vrms for 1 min (pin type) Between input and output: 2,000 Vrms for 1 min Between open contacts: 1,000 Vrms for 1 min		Between live and dead metal parts: 2,000 Vrms for 1 min Between input and output: 2,000 V AC for 1 min	
	Insulation resistance (At 500 V DC) (Initial value)		Between live and dead metal parts: Min. 100 MΩ (pin type) Between input and output: Min. 100 MΩ Between open contact: Min. 100 MΩ		Between live and dead metal parts: Min. 100 MΩ (pin type) Between input and output: Min. 100 MΩ	
	Temperature rise		Max. 65°C (under the flow of nominal operating current at nominal voltage)		—	
Mechanical	Vibration resistance	Functional	10 to 55 Hz (1 cycle/min), single amplitude: 0.35 mm (10 min on 3 axes)			
		Destructive	10 to 55 Hz (1 cycle/min), single amplitude: 0.75 mm (1 h on 3 axes)			
	Shock resistance	Functional	Min. 98 m/s^2 (4 times on 3 axes)			
		Destructive	Min. 294 m/s^2 (5 times on 3 axes)			
Operating conditions	Ambient temperature		–10°C to 55°C			
	Ambient humidity		Max. 85 % RH (non-condensing)			
			860 to 1,060 h Pa			
	Ripple rate		—	20 % or less		20 % or less
Connection			11-pin/screw terminal			
Protective construction						

Applicable standard

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

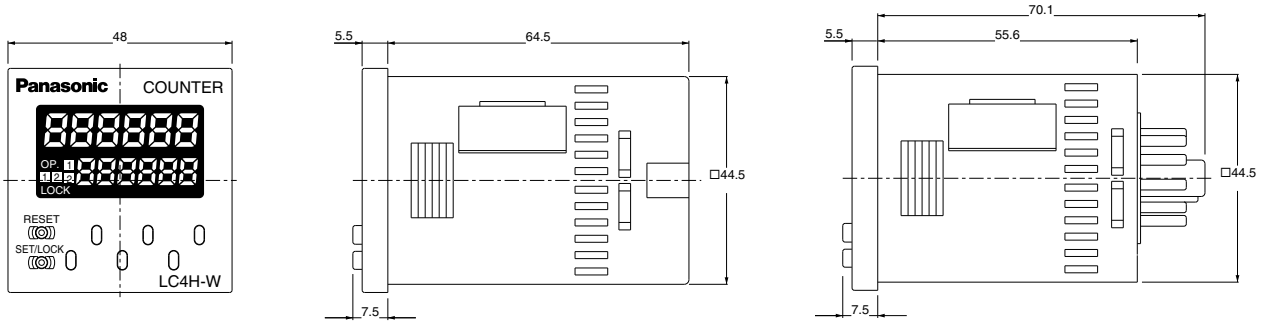
Dimensions

mm
General tolerance: ±1.0

• LC4H-W electrical counter

Screw terminal type
(Flush mount): M3.5

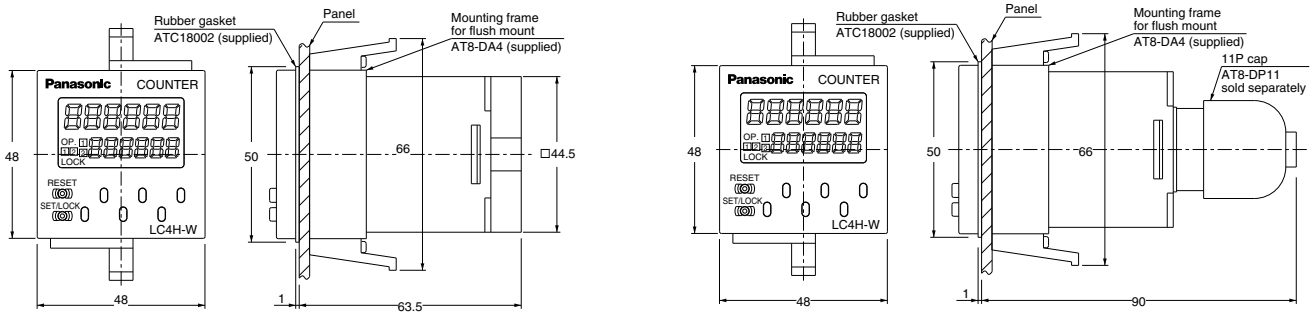
Pin type
(Flush mount/Surface mount)



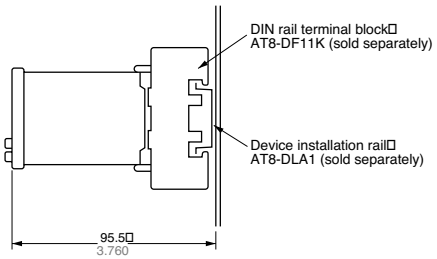
• Dimensions for flush mounting (with adapter installed)

Screw terminal type

Pin type

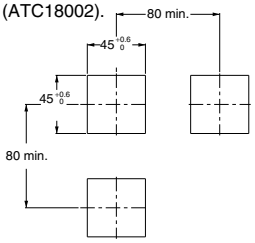


• Dimensions for front panel installations

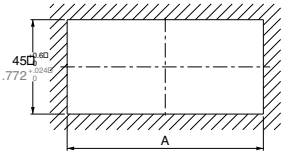


• Installation panel cut-out dimensions

The standard panel cut-out dimensions are shown below. Use the mounting frame (AT8-DA4) and rubber gasket (ATC18002).



• For connected installations



When n units are attached in a continuous □ series, the dimension of (A) is:

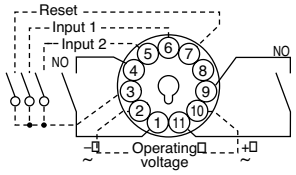
$A = (48 \times n - 2.5)\ ^{+0.6}_{0}$□

Note 1): The installation panel thickness should be between 1 and 5 mm.
2): For connected installations, the waterproofing ability between the unit and installation panel is lost.

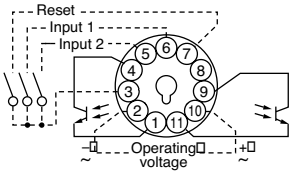
Terminal layouts and wiring diagrams

• Pin type

Relay output type

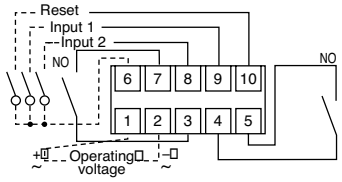


Transistor output type

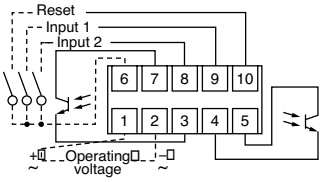


• Screw terminal type

Relay output type



Transistor output type



Note) For connecting the output leads of the transistor output type, refer to 5) Transistor output on page 90.

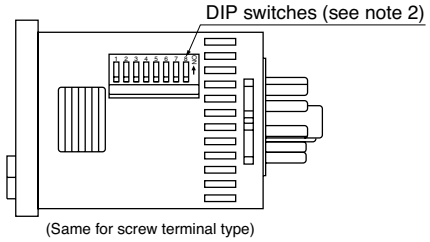
Setting the operation mode and counter

Setting procedure 1) Setting the output mode (output 1, 2)

Set the output 1 and output 2 with the DIP switches on the side of the counter.
The minimum input signal width and maximum counting speed for the reset are set at the same time.

DIP switches

	Item	OFF	ON
1	Output mode Output 1	Refer to table 1	
2			
3			
4	Minimum reset input signal width	20ms	1ms
5	Maximum counter setting	30Hz	5kHz
6	Output mode Output 2	Refer to table 2	
7			
8			



(Same for screw terminal type)

Table 1

DIP swith No. 1	2	3	Output mode (Output 1)
ON	ON	ON	— (See note 1)
OFF	OFF	OFF	HOLD–B
ON	OFF	OFF	HOLD–C
OFF	ON	OFF	HOLD–D
ON	ON	OFF	SHOT–A
OFF	OFF	ON	— (See note 1)
ON	OFF	ON	— (See note 1)
OFF	ON	ON	— (See note 1)

Table 2

DIP swith No. 6	7	8	Output mode (Output 2)
ON	ON	ON	HOLD–A
OFF	OFF	OFF	HOLD–B
ON	OFF	OFF	HOLD–C
OFF	ON	OFF	HOLD–D
ON	ON	OFF	SHOT–A
OFF	OFF	ON	SHOT–B
ON	OFF	ON	SHOT–C
OFF	ON	ON	SHOT–D

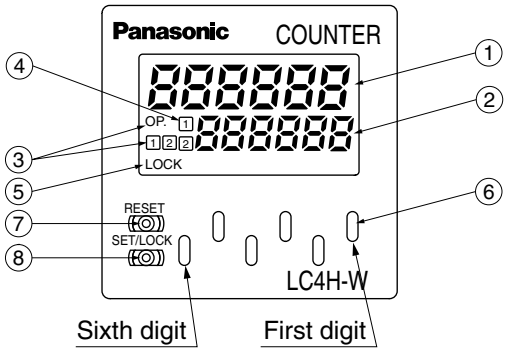
Notes:1) The counter and set value displays will display DIP Err.
2) Set the DIP switches before installing the counter on the panel.
3) When the DIP SW setting is changed, turn off the power once.
4) The DIP switches are set as ON before shipping.

Setting procedure 2) Setting the set value

Set the set value with the UP keys on the front of the counter.

1 Counter display
2 Set value display
3 Controlled output indicator
4 Setting 1/2 selection display (*Note)
5 Lock indicator

*Note:
Pressing the [SET/LOCK] key switches the display between the set value 1 and 2 displays.
Display either set value [1] or [2], and set the value.



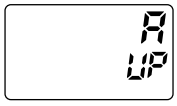
6 UP keys
[Changes the corresponding digit of the set value in the addition direction (upwards)]
7 RESET switch
Resets the counting value and the output
8 SET/LOCK switch
Used to select between the Setting 1 display and Setting 2 display, to set and confirm the input mode, and to lock the keys (UP and RESET keys not responsive to touch).

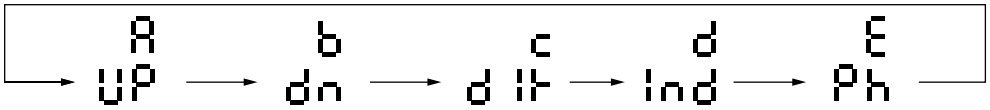
Procedure 3) Setting the input mode

Set the input mode using the key and switch in the front display section on the counter front.

(1) Hold down the SET/LOCK key and press the UP key for the first digit. The setting mode is accessed.
(2) Now release the SET/LOCK key.
(3) Press the UP key for the first digit and the input position changes counterclockwise.

Example)
Input mode displayed
(UP: addition mode)





(4) Press the RESET key and the input mode being displayed is set. The display then goes back to normal.

• Checking the input mode
Hold down the SET/LOCK key and press the UP key for the second digit. The input mode is displayed for about 2 seconds and then the display goes back to normal. (During these 2 seconds, all operations other than the display are being performed.)

• Locking the keys
Hold down the SET/LOCK key and press the UP key for the sixth digit. The keys will lock. This means that the UP and RESET keys do not respond to touch. To unlock the keys,hold down the SET/LOCK key and press the UP key for the sixth digit again.
* The input mode, maximum counting speed and minimum reset signal width cannot be preset independently for Setting 1 and Setting 2.

• Selecting the Setting 1 or Setting 2 display
Press the SET/LOCK key and the display changes between Setting 1 and Setting 2. (This operation does not affect overall operation.)

• Changing the setting
1. While the counter is working, the UP key can be used to change the setting. Keep the following points in mind, however.
1) Suppose that a preset count-up value is smaller than the displayed count value. The counter counts up to the full scale mark (999999), goes back to „0“, and counts up again to the preset number. When the preset count-up value is larger than the displayed count value, the counter counts up to the preset value.
2) Suppose that the counter is preset to count down. Whether a preset count-down value is smaller or larger than the count value, the counter counts down to „0“.

2. When the preset value is „0“, the counter does not start in the count-up mode. It starts counting up when the count value comes to „0“ again.
1) Up-count input
The counter counts up to the full scale mark (999999), goes back to „0“ and starts counting up again.
2) Down-count input
The counter counts down to the full scale mark (–99999) and the display reads – – – – – .
The count value does not become „0“ and so the counter does not count up.
3) Direction input, individual input, and phase input
The preset value is counted up or down to any number other than „0“ once. When it comes to „0“ again, the counter starts counting up.

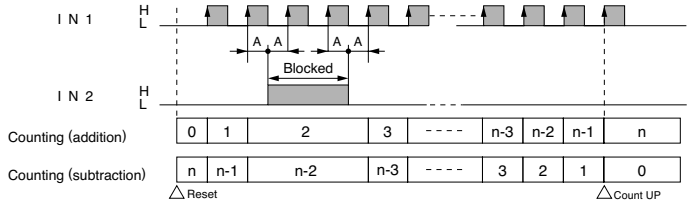
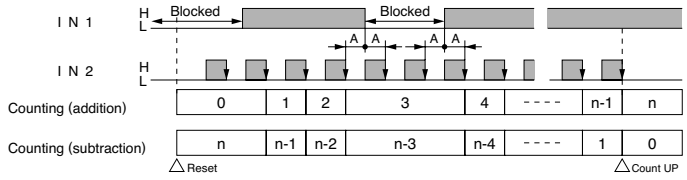
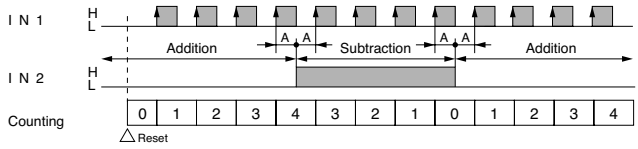
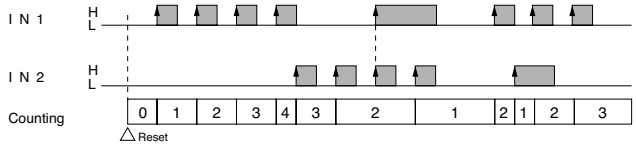
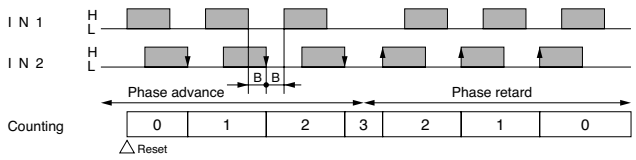
Operation modes

1. Input mode

1) For the input mode, you can choose one of the following five modes.

- Addition UP
- Subtraction DOWN
- Directive DIR
- Independent IND
- Phase PHASE

2) After the counter has been reset, setting 2 is displayed in the count-down mode. „0“ appears instead in all other modes.

Input mode	Operation	*Minimum input signal width 30 Hz: 16.7 ms; 5 kHz: 0.1 ms
Addition UP	IN1 or IN2 works as an input block (gate) for the other input.	• Example where IN1 is the counting input and IN2 is the input block (gate). 
Subtraction DOWN		• Example where IN2 is the counting input and IN1 is the input block (gate).  * “A” must be more than the minimum input signal width. *n: Set value 2
Directive DIR	IN1 is the counting input and IN2 is the addition or subtraction directive input. IN2 adds at L level and subtracts at H level.	 * “A” must be more than the minimum input signal width. *n: Set value 2
Independent IND	IN1 is addition input and IN2 is subtraction input.	 * IN1 and IN2 are completely independent, so there is no restriction on signal timing.
Phase PHASE	Addition when the IN1 phase advances beyond IN2, and subtraction when the IN2 phase advances beyond IN1.	 * “B” must be more than the minimum input signal width.

2. Output mode

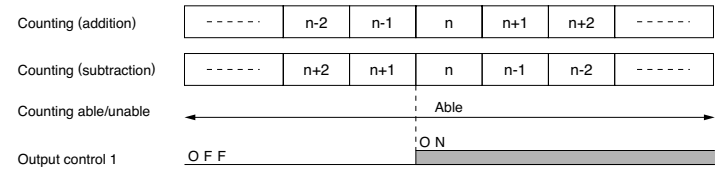
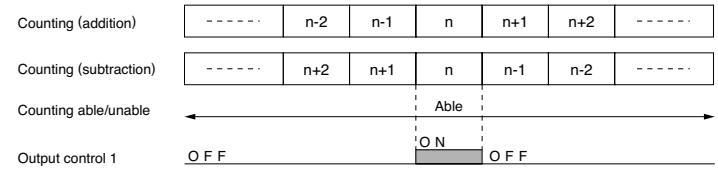
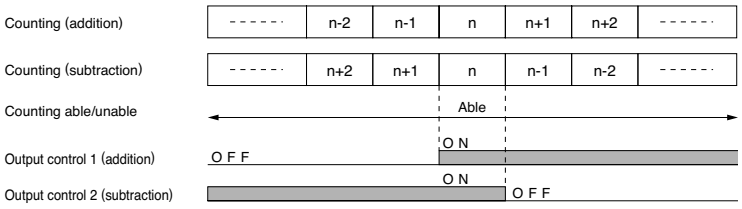
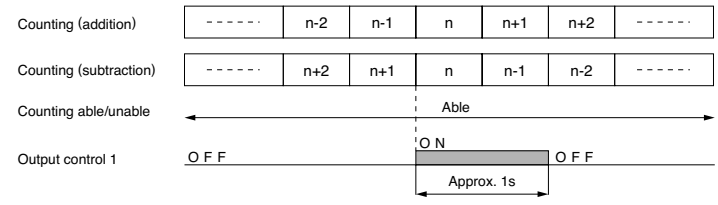
For the set value 1, you can choose one of the following four modes.

- Maintain output/over count I HOLD-B
- Maintain output/over count II HOLD-C
- Maintain output/over count III HOLD-D
- One shot/over count SHOT-A

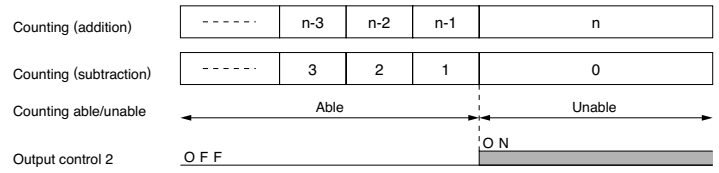
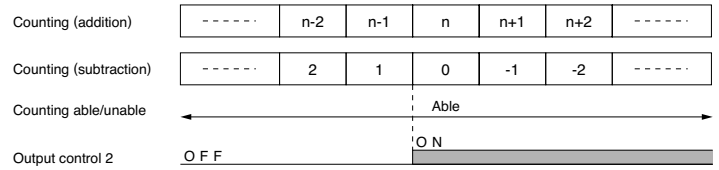
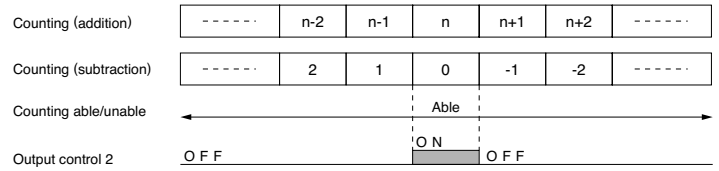
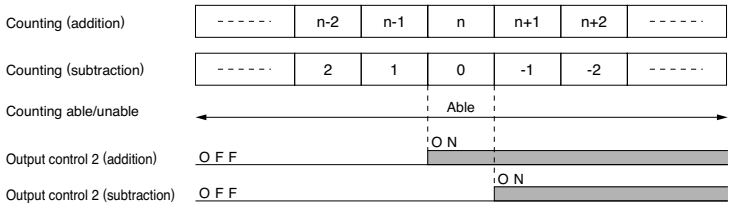
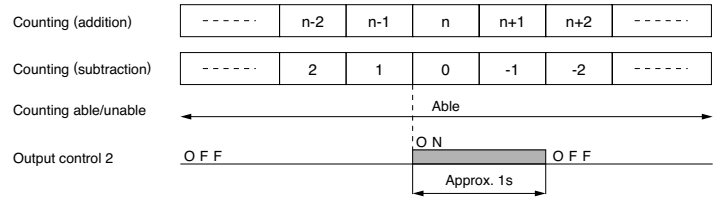
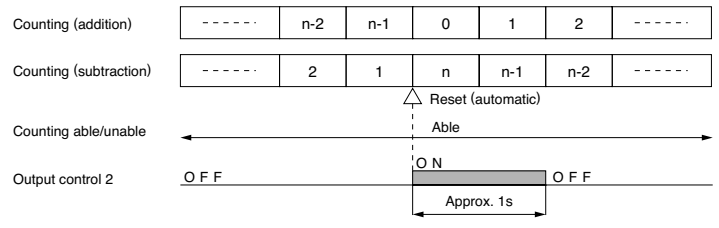
For the set value 2, you can choose one of the following eight modes.

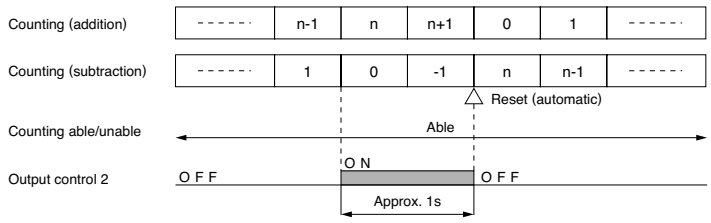
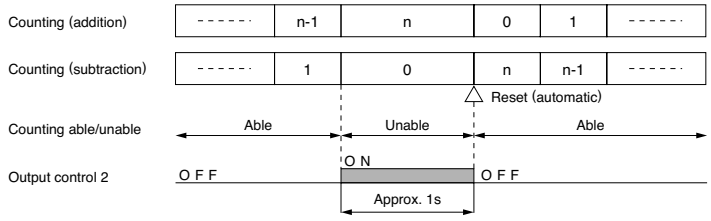
- Maintain output/hold count HOLD-A
- Maintain output/over count I HOLD-B
- Maintain output/over count II HOLD-C
- Maintain output/over count III HOLD-D
- One shot/over count SHOT-A
- One shot/recount I SHOT-B
- One shot/recount II SHOT-C
- One shot/hold count SHOT-D

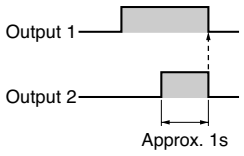
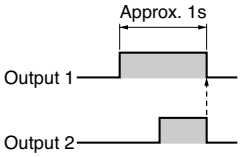
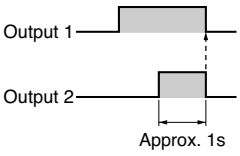
• Output mode for set value 1

Output mode	Operation	(Example when input mode is either addition or subtraction)
Maintain output Over count I HOLD-B	Output control is maintained after count-up completion and until resetting. However, counting is possible despite completion of count-up.	 * n: Set value 1
Maintain output Over count II HOLD-C	Output control is maintained after count-up completion and until the next signal enters. However, counting is possible despite completion of count-up.	 * n: Set value 1
Maintain output Over count III HOLD-D	If the count value is greater than or equal to the preset value when counting up, the control output is held. The count operation is possible anyway.	 * n: Set value 1
One shot Over count SHOT-A	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up.	 * n: Set value 1

• Output mode for set value 2

Output mode	Operation	(Example when input mode is either addition or subtraction)
Maintain output Hold count HOLD-A	Output control is maintained after count-up completion and until resetting. During that time, the count display does not change from that at count-up completion.	 * n: Set value 2
Maintain output Over count I HOLD-B	Output control is maintained after count-up completion and until resetting. However, counting is possible despite completion of count-up.	 * n: Set value 2
Maintain output Over count II HOLD-C	Output control is maintained after count-up completion and until the next signal enters. However, counting is possible despite completion of count-up.	 * n: Set value 2
Maintain output Over count III HOLD-D	If the count value is greater than or equal to the preset value when counting up, the counter starts counting up again. The count operation is possible anyway.	 * n: Set value 2
One shot Over count SHOT-A		 * n: Set value 2
One shot Recount I SHOT-B	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up. However, reset occurs simultaneous with completion of count-up. While output is being maintained, restarting of the count is not possible.	 * n: Set value 2

Output mode	Operation	(Example when input mode is either addition or subtraction)
One shot Recount II SHOT-C	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). Counting is possible despite completion of count-up. However, reset occurs simultaneous with output OFF.	 * n: Set value 2
One shot Hold count SHOT-D	Output control is maintained after count-up completion for a fixed time (approx. 1 sec). During that time, the count display does not change from that at count-up completion. Reset occurs simultaneous with output OFF.	 * n: Set value 2

		Output mode for set value 1		
		HOLD-C HOLD-D	HOLD-B	SHOT-A
Output mode for set value 2	SHOT-A	As usual (this combination unchanged)	As usual (this combination unchanged)	
	SHOT-B			
	SHOT-C SHOT-D			

Note) When control output 1 is on, the output mode of setting 2 (SHOT-A, B, C, D) is also on and output 1 changes as shown in the above table.

3. Count-up

(1) In control output 1, when the count value is equal to the preset value 1, it is counted. (However, if the output mode of the preset value 1 is HOLD-D, it is counted when the count value is greater than or equal to the preset value 1, regardless of the input mode.)

(2) In control output 2, when the count value is equal to 0 in the count-down input mode, it is counted. In the other modes, when the count value is equal to the preset value 2, it is counted. (However, if the output mode of the preset value 2 is HOLD-D, it is counted when the count value is greater than or equal to the preset value 2, regardless of the input mode.)

(3) It is not counted even when the counting conditions are satisfied right after resetting. It can be counted from when the count value changes.

Precautions during usage

1. Terminal wiring

1) When wiring the terminals, refer to the terminal layout and wiring diagrams and be sure to perform the wiring properly without errors.

2) When using the instrument with an flush mounting, the screw-down terminal type is recommended. For the pin type, use either the rear terminal block (AT78041) or the 8P cap (AD8-RC) for the 8-pin type, and the rear terminal block (AT78051) or the 11P cap (AT8-DP11) for the 11-pin type. Avoid soldering directly to the round pins on the unit. When using the instrument with a front panel installation, use the DIN rail terminal block (AT8-DF8K) for the 8-pin type and the DIN rail terminal block (AT8-DF11K) for the 11-pin type.

3) After turning the counter off, make sure that any resulting induced voltage or residual voltage is not applied to power supply terminals 2 through 7 (8-pin type), 2 through 10 (11-pin type) 1 or 2 and (screw terminal type). (If the power supply wire is wired parallel to the high voltage wire or power wire, an induced voltage may be generated between the power supply terminals.)

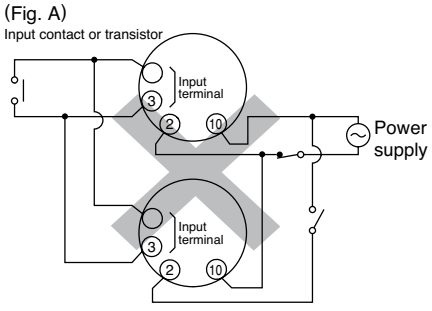
4) Have the power supply voltage pass through a switch or relay so that it is applied at one time. If the power supply is applied gradually, the counting may malfunction regardless of the settings, the power supply reset may not function, or other such unpredictable occurrence may result.

2. Input connections (except LC4H-S/AC type)

The power circuit has no transformer without a transformer (power and input terminals are not insulated). When an input signal is fed to two or more counters at once, do not arrange the power circuit in an independent way.

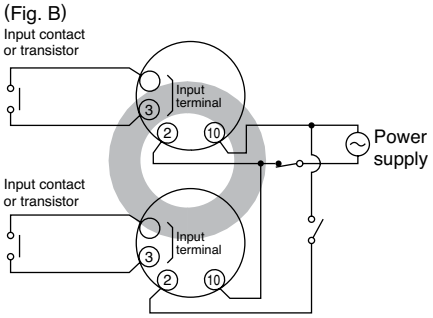
If the counter is powered on and off independently as shown in Fig. A, the counter's internal circuitry may get damaged. Be careful never to allow such circuitry. (Figs. A, B and C show the circuitry for the 11-pin type.)

(Fig. A)



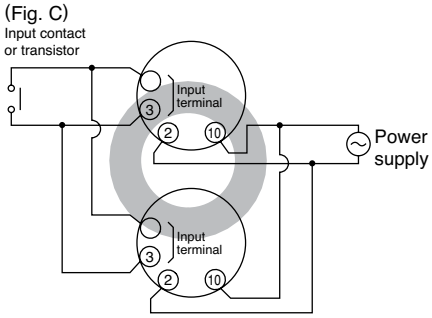
If independent power circuitry must be used, keep the input contacts or transistors separate from each other, as shown in Fig. B.

(Fig. B)



When power circuitry is not independent, one input signal can be fed to two or more counters at once, as shown in Fig. C.

(Fig. C)

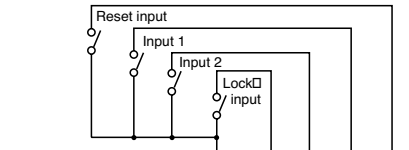


3. Input and output

1) Signal input type

(1) Contact point input

Use highly reliable metal plated contacts. Since the contact point's bounce time leads directly to error in the count value, use contacts with as short a bounce time as possible. In general, select Input 1 and Input 2 to have a maximum counting speed of 30 Hz and to be reset with a minimum input signal width of 20 ms.



8-pin type	①	–	⑤	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

Note: The LC4H-W does not have the lock input 8, 7.

(2) Non-contact point input

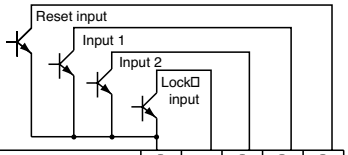
Connect with an open collector. Use transistors whose characteristics satisfy the criteria given below.

V_{CEO} = 20 V min.

I_C = 20 mA min.

I_{CBO} = 6μA max.

Also, use transistors with a residual voltage of less than 2 V when the transistor is on.



8-pin type	①	–	⑤	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

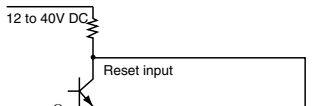
Note: The LC4H-W does not have the lock input 8, 7.

* The short-circuit impedance should be less than 1 kΩ.

[When the impedance is 0 Ω, the current coming from the input 1 and input 2 terminals is approximately 12 mA, and from the reset input and lock input terminals is approximately 1.5 mA.]

Also, the open-circuit impedance should be more than 100 kΩ.

* As shown in the diagram below, from a non-contact point circuit (proximity switches, photoelectric switches, etc.) with a power supply voltage of between 12 and 40 V, the signal can be input without using an open collector transistor. In the case of the diagram below, when the non-contact point transistor Q switches from off to on (when the signal voltage goes from high to low), the signal is input.



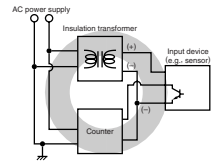
8-pin type	①	–	⑤	④	③
11-pin type	③	④	⑤	⑥	⑦
Screw terminal type	6	7	8	9	10

(The above example is for reset input)

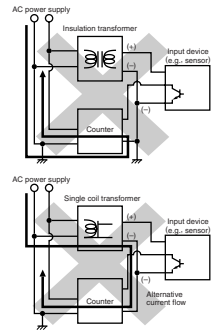
2) The input mode and output mode change depending on the DIP switch settings. Therefore, before making any connections, be sure to confirm the operation mode and operation conditions currently set.

3) The LC4H 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.
Once the wiring to be used is completely installed and prior to installing this counter, confirm that there is complete insulation between the wires connected to the power terminals (2 each) and the wires connected to each input terminal. If the power and input lines are not insulated, a short-circuit may occur inside the counter and result in internal damage.
In addition, when moving your equipment to a new installation location, confirm that there is no difference in environmental conditions as compared to the previous location.
(except LC4H-S/AC type)

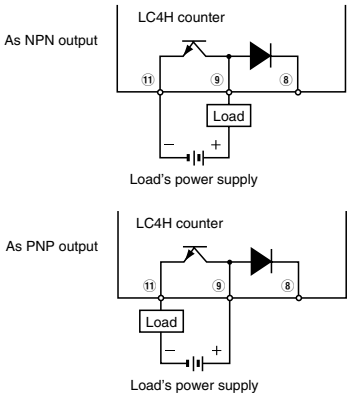
(Fig. A) Good example



(Fig. B) Bad example

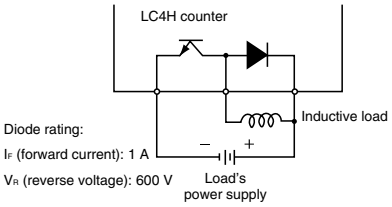


4) The input signal is applied by the shorting of each input terminal with the common terminal (terminal ① for 8-pin type, terminal ③ for 11-pin type and terminal 6 for screw terminal types). Never connect other terminals or voltages higher than 40 V DC , because it may destroy the internal circuitry.
5) Transistor output
(1) Since the transistor output is insulated from the internal circuitry by a photocoupler, it can be used as an NPN output or PNP (equal value) output. (The above example is 11-pin type)



Note: With the LC4H 8-pin type and the LC4H-W, there is no diode between points ⑧ and ⑨.

(2) Use the diode connected to the output transistor's collector for absorbing the reverse voltage from induced loads. (LC4H only)

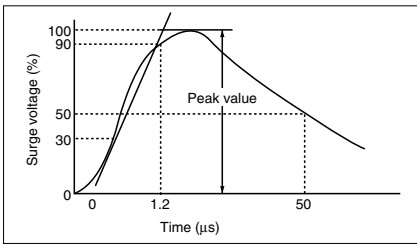


6) When wiring, use shielded wires or metallic wire tubes, and keep the wire lengths as short as possible.

4. Output mode setting
The output mode can be set with the DIP switches on the side of the counter. Make the DIP switch settings before installing the counter on the panel.

5. Conditions of usage
1) Avoid locations subject to flammable or corrosive gases, excessive dust, oil, vibrations, or excessive shocks.
2) Since the cover of the unit is made of polycarbonate resin, avoid contact with or use in environments containing methyl alcohol, benzene, thinners, and other organic solvents; and ammonia, caustic sodas, and other alkaline substances.
3) If power supply surges exceed the values given below, the internal circuits may become damaged. Be sure to use surge absorbing element to prevent this from happening.
4) Regarding external noise, the values

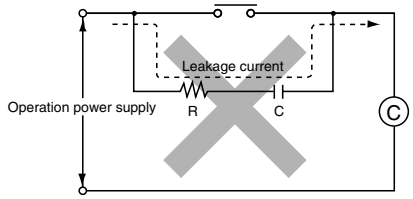
Operating voltage	Surge voltage (peak value)
AC type	6,000V
DC type 24V AC type	1,000V



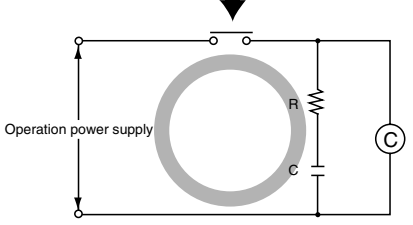
below are considered the noise-resistant voltages. If voltages rise above these values, malfunctions or damage to the internal circuitry may result, so take the necessary precautions.
Noise wave form (noise simulator)

	Power supply terminals		Input terminals
	AC type	DC type 24V AC type	
Noise voltage	1,500V	1,000V	600V

Rise time: 1 ns
Pulse width: 1 µs, 50 ns
Polarity: ±
Cycle: 100 cycles/second
5) When connecting the operation power supply, make sure that no leakage current enters the counter. For example, when performing contact protection, if set up like that of diagram A, leaking current will pass through C and R, enter the unit, and cause incorrect operation. Diagram B shows the correct setup.

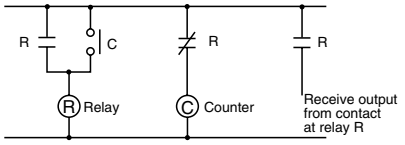


(Fig. A)



(Fig. B)

6) Long periods of continuous operation in the count-up completed condition (one month or more) will result in the weakening of the internal electrical components from the generated heat and, therefore, should be avoided. If you do plan to use the unit for such continuous operation, use in conjunction with a relay as shown in the circuit in the diagram below.



6. Self-diagnosis function

If a malfunction occurs, one of the following displays will appear.

Display	Contents	Output condition	Restoration procedure	Preset values after restoration
– – – – or – – – – – –	Minimum value went below –999 or –99999. See note 1.	No change	Enter reset or RESET key.	No change
d IFEr	Incorrect DIP switch setting.		Restart unit (correct DIP switch settings)	
Er - 00	Malfunctioning CPU.	OFF	Enter reset, RESET key, or restart unit.	The values at start-up before the CPU malfunction occurred.
Er - 01	Malfunctioning memory. See note 2.			0

Note 1: When the counter value goes below the minimum value during any of the subtraction, directive, independent, or phase input modes.
Note 2: Includes the possibility that the EEPROM's life has expired.

7. Compliance with the CE marking

When using in applications to which EN61812-1 applies, abide by the following conditions.

- Overvoltage category II, pollution level 2 (for sensor type model with power supply)

1. Connections between the power supply and input/output have basic insulation. Use a device with basic insulation to connect to the I/O terminals.
   (for sensor type model without power supply)

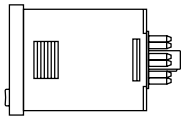
1) This counter employs a power supply without a transformer, so the power and input signal terminals are not insulated.
   (1) When a sensor is connected to the input circuit, install double insulation on the sensor side.
   (2) In the case of contact input, use dual-insulated relays, etc.
- The load connected to the output contact should have basic insulation.
  This counter is protected with basic insulation and can be double-insulated to meet EN/IEC requirements by using basic insulation on the load.
- Applied voltage should be protected with an overcurrent protection device (example: 250 V 1A fuse, etc.) that conforms to the EN/IEC standards.

2) You must use a terminal block or socket for installing the pin-type counter. Do not touch the terminal section or other parts of the timer unit while an electric current is applied. Before installation or removal, confirm that there is no voltage being applied to any of the terminals.
3) Do not use this timer with a safety circuit. For example, when using a timer in a heater circuit, etc., provide a protection circuit on the machine side.

Installation methods

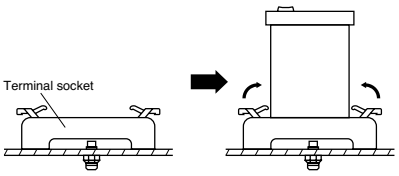
1. Surface mount

1) For the counters of LC4H series, use the pin type counter.

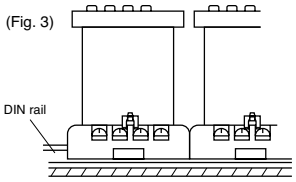


2) Put the terminal socket on the board directly or put it on the DIN rail (Fig. 1).
3) Insert the counter into the terminal socket and fix it with clip (Fig. 2)
4) On DIN rail mounting, mount the counter on the DIN rail tightly to get the proper dimension (Fig. 3).

(Fig. 1) (Fig. 2)



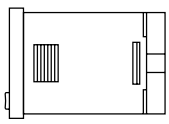
(Fig. 3)



5) 8-pin type should be connected with terminal socket AT8-DF8K. 11-pin type should be connected with terminal socket AT8-DF11K.
6) DIN rail (AT8-DLA1) is also available (1 m).

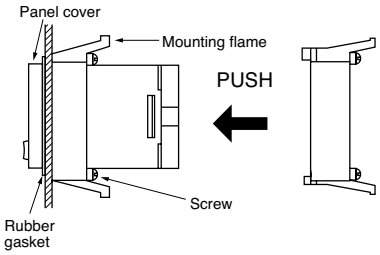
2. Flush mount

1) For the counters of LC4H series, it is recommended to use the built-in screw terminal type for flush mount. (Mounting frame and rubber gasket are provided when counter is shipped.)

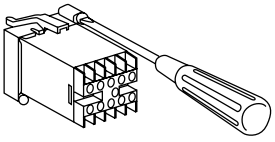


2) How to mount the counter
From the panel front, pass the counter through the square hole. Fit the mounting frame from the rear, and then push it in so that the clearance between the mounting frame and the panel surface is minimized. In addition, lock the mounting frame with a screw.

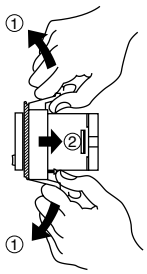
• LC4H series



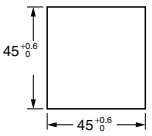
3) Caution in mounting the counter
• LC4H series
a) If the LC4H series are used as the waterproof types (IEC IP66), tighten the reinforcing screws on the mounting frames so that the counters, the rubber gaskets, and the panel surfaces are tightly contacted with each other. (Tighten the two screws with uniform force and make sure that there is no rattling. If the screws are tightened too excessively, the mounting frame may come off.)
b) If the counter is installed with the panel cover and the rubber gasket removed, the waterproofing characteristic is lost.
4) Removal
Loosen the screws on the mounting frame, spread the edge of frame and remove it.



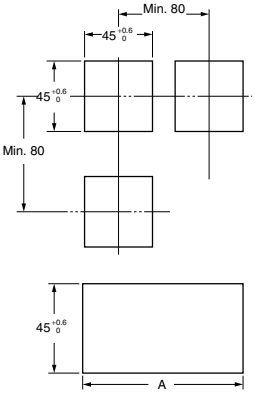
Pull the mounting frame backward while spreading out its hooks with your thumbs and index fingers.



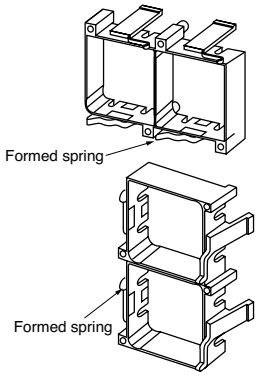
5) Correctly connect the terminals while seeing the terminal layout and wiring diagram.
6) If the pin type is used, the rear pin-bracket (AT8-RR) or the 8P cap (AD8-RC) is necessary to connect the pins. For the 11-pin type, use the 11P cap (AT8-DP11) and avoid directly soldering the round pins on the counter.
7) Panel cutout dimensions



The standard panel cutout dimensions are shown in the left figure. (Panel thickness: 1 to 5 mm)
8) Although the counters can be mounted adjacent to each other in this case, it is recommended to arrange the mounting holes as shown in the figure to facilitate attaching and detaching the mounting frame.



9) Adjacent mounting
Although the counters can be mounted adjacent to each other, remember that the panel surface of LC4H series counter will lose its water-resistant effect. (Panel thickness: 1 to 5 mm)
$A = (48xn - 2.5)^{+0.6}_{0}$
When lining up the counters horizontally, set the frames in such a position so the formed spring areas are at the top and bottom.
When lining up the counters vertically, set the frames in such a position as the formed spring areas are at the right and left.



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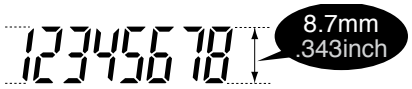
LC2H

DIN Half Size LCD Counter

Features

› **8.7 mm Character Height (previously 7 mm)**
Easy-to-read character height increased from 7mm to 8.7 mm.



Plenty of Digits

3. Counting Speed Switchable

› **Counting Speed Switchable between 2 kHz and 30 Hz**

› **Panel Mounting Type Features**
2 Installation Methods
Comes with very easy one-touch installation type and also installation frame type that uses the bracket on the timer/counter. Choose a method that suits the application.

› **Battery replacement Easy on Environment**
To replace battery simply remove body for the one-touch installation type, and remove battery lid for the installation frame type.

› **Screw Terminals Designed for Safety**
Built in finger protection

› **Panel Covers Replaceable**
(Standard color is ash gray.)
Change the panel design by replacing with a black panel cover.

› **Conforms to IP66 Protective Construction (Only Installation frame type.) (Front panel surface)**

› **Input Methods**
1) Non-voltage input method
2) Voltage input method
3) Free voltage input method

› **Backlight Type Added to Series and Now 2-color Switchable (green/red)**
Easy viewing even in dark places and switchable between green and red (Voltage input type.)

› **Compliant with UL, CSA, CE and LLOYD, UL File No.: E122222, CSA File No.: LR39291**

Product chart

Type / Installation type		Standard type			Backlight type
		Non-voltage input type	Voltage input type (4.5 to 30 V DC)	Free voltage input type (24 to 240 V AC/DC)	Voltage input type (4.5 to 30 V DC)
Panel mounting type	One-touch installation type	○	○	○	○
	Installation frame type	○	○	○	○
PC board mounting type		○	—	—	—

Product types

1. Panel mounting type

1) One-touch installation type

1 Standard type

No. digits	Counting speed	Front reset	Input method	Part No.
8 digits	2 kHz/30 Hz switchable	Yes	Non-voltage input type	LC2H-FE-2KK
			Voltage input type (4.5 to 30 V DC)	LC2H-FE-DL-2KK
	30 Hz		Free voltage input type (24 to 240 V AC/DC)	LC2H-FE-FV-30

Note) Please ask us about types without front resetting.

2 Backlight type

No. digits	Counting speed	Front reset	Input method	Part No.
8 digits	2 kHz/30 Hz switchable	Yes	Voltage input type (4.5 to 30 V DC)	LC2H-FE-DL-2KK-B

2) Installation frame type

1 Standard type

No. digits	Counting speed	Front reset	Input method	Part No.
8 digits	2 kHz/30 Hz switchable	Yes	Non-voltage input type	LC2H-F-2KK
			Voltage input type (4.5 to 30 V DC)	LC2H-F-DL-2KK
	30 Hz		Free voltage input type (24 to 240 V AC/DC)	LC2H-F-FV-30

Note) Please ask us about types without front resetting.

2 Backlight type

No. digits	Counting speed	Front reset	Input method	Part No.
8 digits	2 kHz/30 Hz switchable	Yes	Voltage input type (4.5 to 30 V DC)	LC2H-F-DL-2KK-B

2. PC board mounting type

No. digits	Counting speed	Front reset	Input method	Part No.
8 digits	2 kHz	No	Non-voltage input type	LC2H-C-2K-N
	30 Hz			LC2H-C-30-N

Specifications

1. Panel mounting type

Item \ Type		Standard type		Backlight type	Standard type
		Non-voltage input	Voltage input		Free voltage type
No. digits		8 digits			
External power supply		Not required (built-in battery)			
Max. counting speed		2 kHz/30 Hz (Switchable by switch)			30 Hz (Note 2)
Count input	Min. input signal width (ON: OFF = 1:1)	0.25 ms/16.7 ms (Switchable by switch)			16.7 ms
	Input method (signal)	Non-voltage input using contacts or open collector connection	High level: 4.5 to 30 V DC Low level: 0 to 2 V DC		High level: 24 to 240 V AC/D Low level: 0 to 2.4 V AC/D
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	Approx. 4.7 kΩ		—
	Residual voltage	Max. 0.5 V	—		—
Reset input	Min. input signal width	200 ms			
	Input method (signal)	Non-voltage input using contacts or open collector connection	High level: 4.5 to 30 V DC Low level: 0 to 2 V DC		Non-voltage input us contacts or open colle connection
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	Appox. 4.7 kΩ		When shorted: Max. 10 kΩ When open: Max. 750 kΩ
	Residual voltage	Max 0.5 V	—		Max. 0.5 V
Display method		7-segment LCD		7-segment LCD With green/red backlight	7-segment LCD
Breakdown voltage (initial)		Between charged and uncharged parts: 1,000 V AC for 1 minute.			Between charged a uncharged parts: 2,0 AC for 1 minute.
Insulation resistance (initial)		Min. 100 MΩ (measured at 500 V DC) Measurement location same as for break down voltage.			
Backlight power		—		24 V DC (±10%)	—
Protective construction (Note 3)		IEC Standard IP66 (only panel front: when using rubber gasket)			
Accessories (Note 3)		Rubber gasket, mounting bracket			
Battery life		7 years (at 25°C) Note 1			6 years (at 25°C)

Notes) 1. The value given for battery life is calculated based on continuous operation (count input signal ON/OFF = 1:1), therefore, this value is not guaranteed. Also, battery life is decreased 30% when operation is continuous with 2 kHz count inputting in 2 kHz mode.
2. Operation is at 25 Hz when using 24 V AC.
3. Only for installation frame type.

LC2H

2. PC board mounting type

Item \ Type		PC board mounting type	
Input method		Non DC voltage input	
No. digits		8 digits	
Rated operation voltage		3 V DC	
Allowable operation voltage range		2.7 to 3.3 V DC	
Current consumption		Max. 30 μA (max. 250 μA during reset input)	
Max. counting speed		2 kHz	30 Hz
Count input	Min. input signal width (ON: OFF = 1:1)	0.25 ms	16.7 ms
	Input method	Non-voltage input using contacts or open collector connection	
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	
	Residual voltage	Max. 0.5 V	
Reset input	Min. input signal width	10 ms	
	Input method	Non-voltage input using contacts or open collector connection	
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	
	Residual power	Max. 0.5 V	
Break down voltage (initial)		Between charged and uncharged parts: 1,000 V AC for 1 minute.	
Insulation resistance (initial)		Min. 100 MΩ (measured at 500 V DC) Measurement location same as for break down voltage.	

3. Common

Item \ Type		Panel mounting/PC board mounting types
Vibration resistance	Functional	10 to 55 Hz (1 cycle/min.), single amplitude: 0.15 mm (10 min. on 3 axes)
	Destructive	10 to 55 Hz (1 cycle/min.), single amplitude: 0.375 mm (1 hr. on 3 axes)
Shock resistance	Functional	Min. 98 m/s² (4 times on 3 axes)
	Destructive	Min. 294 m/s² (5 times on 3 axes)
Operation temperature		–10 to +55°C (without frost or dew)
Storage temperature		–25 to +65°C (without frost or dew)
Ambient humidity		35 to 85% RH (non-condensing)

Applicable standard

Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category III
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)
	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)

Part names

1. Front reset button

This button resets the count value. It does not work when the lock switch is ON. Be aware that battery life will decrease if this switch is used frequently.

2. Lock switch (Refer to chart on right.)

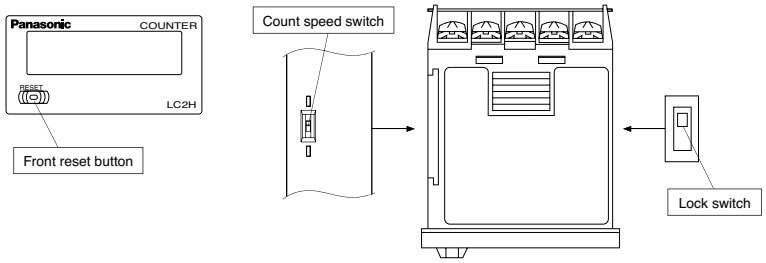
Disable the front reset button.

Note) Turn ON at the LCD side (reset disabled) and OFF at the terminal block side (reset enabled).

3. Count speed switch (Refer to chart on right.)

Use this switch to switch the count speed between 30 Hz and 2 kHz. (On the non-voltage and voltage input types, 30 Hz is on the LCD side and 2 kHz is on the terminal block side. Fixed at 30 Hz for free voltage input type.)

Note) You must press the front reset button when you change the count speed switch setting. Confirm, however, that the Lock Switch is OFF (front switches operable).



	Non-voltage input/voltage input	Free voltage input
Lock switch (Unit display 1)	(Terminal block side) ↕ (LCD side) ; OFF✻ ↕ ON	
Count speed switch (Unit display 2)	(Terminal block side) ↕ (LCD side) ; 2k Hz ↕ 30Hz✻	– (Fixed at 30 Hz)

Notes) 1. ✻Default setting when shipped.
2. Make the switch setting before installing to panel.

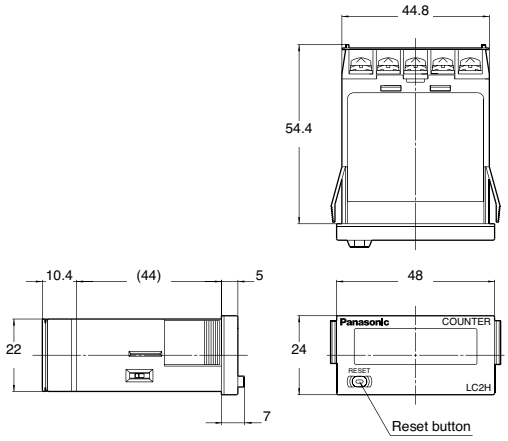
Dimensions

mm
General tolerance: ±1.0

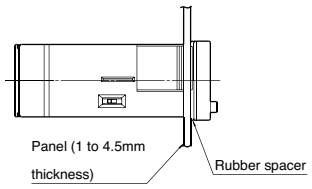
1. Panel mounting type

• External dimensions

1) One-touch installation type



• Panel installation diagram

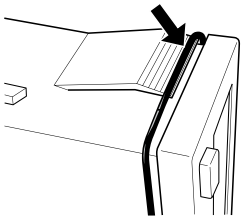


Note) When installing to a 4.5 mm thick panel, remove the rubber spacer first.

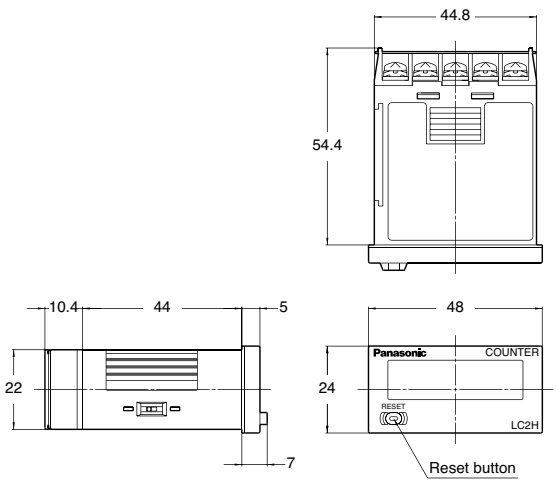
When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.

To prevent the installation spring from pinching the rubber gasket:

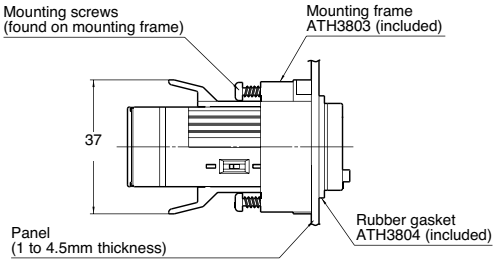
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation spring is not pinching the rubber gasket, and then insert and fix the installation spring in place from the rear of the timer unit.



2) Installation frame type

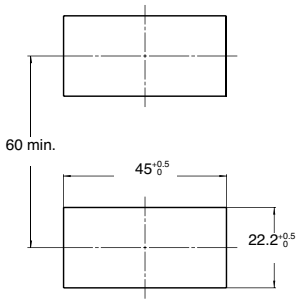


• Panel mounting diagram

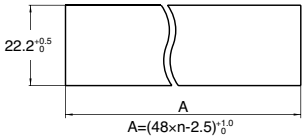


• Panel cut-out dimensions

The standard panel cut-out is shown below.
Use the mounting frame (ATH3803) and the rubber packing (ATH3804).
(Only installation frame type.)



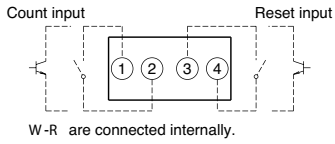
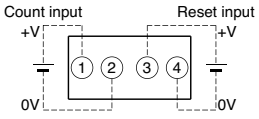
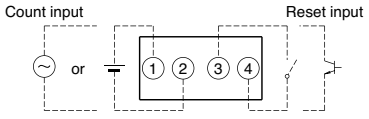
• For connected installation (sealed installation) (Only installation frame type.)



Notes) 1. Suitable installation panel thickness is 1 to 4.5 mm.
2. Waterproofing will be lost when installing repeatedly (sealed installatio

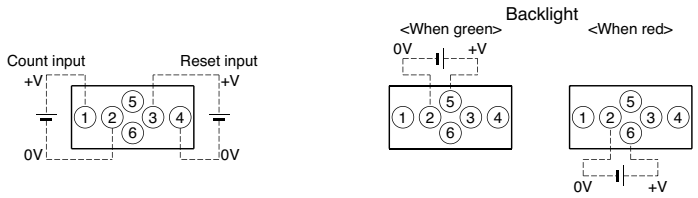
• Terminal layout and wiring diagrams

1) Standard type

Non voltage input type	Voltage input type	Free voltage input type
		

2) Backlight type

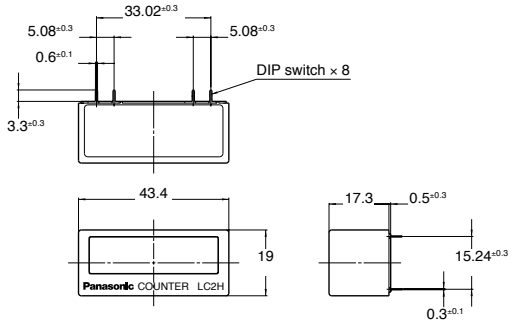
Voltage input type



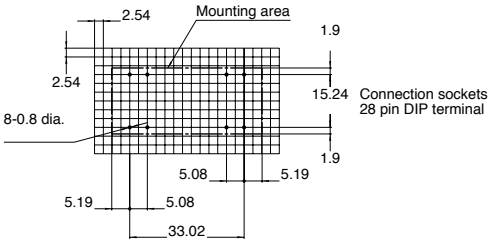
2. PC board mounting type

General tolerance: ±1.0 mm

• External dimensions



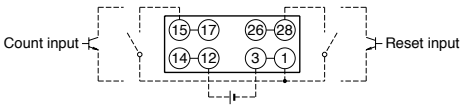
PC board pattern (BOTTOM VIEW)



General tolerance: ±0.1

Note: The AXS212811K is recommended as a compatible connection socket.

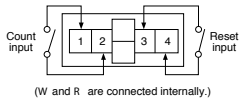
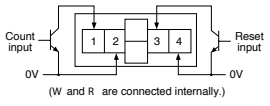
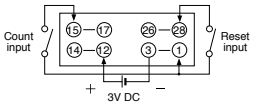
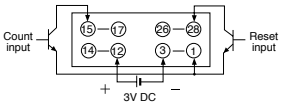
• Terminal layout and wiring diagrams



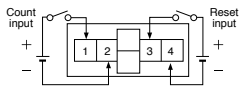
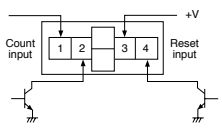
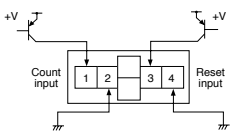
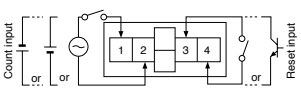
Q -E , } -w , e -t and S -F are connected internally.
An external power supply is required.

Input method

1. Standard type

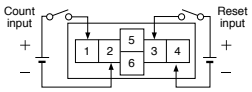
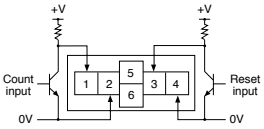
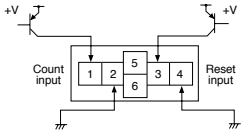
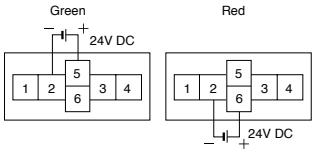
Non-voltage input type			
Panel mounting type		PC board mounting type	
Contact input	Transistor input NPN transistor	Contact input	Transistor input NPN transistor
			

Notes) 1. When using contact input, since current flow is small from terminals ① and ③ on the panel mounting type and terminals ⑮ to ⑰ and ㉖ to ㉘ on the PC board mounting type, please use relays and switches with high contact reliability.
2. When using transistor input, use the following as a guide for which transistors (Tr) to use for inputting. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)

Voltage input type			Free voltage input type
Contact input	Transistor input		
	NPN transistor	PNP transistor	
			

Notes) 1. ② and ④. (The input and reset circuits are functionally insulated.)
2. When using transistor (Tr) input, use the right as a guide. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)
3. Be aware that the application of voltage that exceeds the voltage range of the H level to the count input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.

2. Backlight type

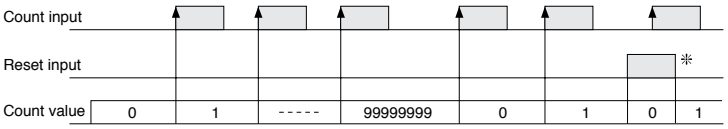
Voltage input type			Backlight connection
Contact input	Transistor input		
	NPN transistor	PNP transistor	
			

Notes) 1. Do not reverse the polarities when connecting the DC voltage for the backlight.
2. ② and ④. (The input and reset circuits are functionally insulated.)
3. When using transistor (Tr) input, use the right as a guide. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)
4. Be aware that the application of voltage that exceeds the voltage range of the H level to the count input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.

Explanation of operation

1. Counting takes place when the count input signal is ON.
2. Counting resumes again when the count value reaches 99999999 (full scale value) and then returns to “0” with a new count input.
3. No measurement takes place when a reset is input.
1) When reset is ON, resetting takes place and the count becomes “0”.
2) Press the front reset button when you want to reset manually (only panel installation type).

Note) Be aware that battery life will decrease if the count input or reset input are left ON.



Note) ⁎Count becomes “1” when the reset input is turned OFF while the count signal is being input.

Cautions for use

1. Non-voltage input type
For both panel mounting and PC board mounting types

1) Never apply voltage to the non-voltage input type. This will damage the internal elements. Also, since there is a possibility of erroneous operation, do not connect in parallel the inputs of a non-voltage input type and another counter from a single input signal.
2) Since the current flow is very small from the count input and reset input terminals (① and ③ on the panel mounting type and terminals ⑮ to ⑰ and ㉖ to ㉘ on the PC board mounting type) please use relays and switches with high contact reliability.
3) When inputting with an open collector of a transistor, use a transistor for small signals in which ICBO is 1 μA or less and always input with no voltage.
4) When wiring, try to keep all the input lines to the count and reset inputs as short as possible and avoid running them together with high voltage and power transmission lines or in a power conduit. Also, malfunctions might occur if the floating capacitance of these wires exceeds 500 pF (10 m for parallel wires of 2 mm^2). When using 2 kHz mode, use with a wiring floating capacitance of 120 pF (3 m for parallel wires of 2 mm^2). In particular, when using shielded wiring, be careful of the capacitance between wires.

PC board mounting type

1) For external power supply use manganese dioxide or lithium batteries (CR type: 3V).
2) Always reset after external power is applied and confirm that the display reads "0".
3) Make the wiring from the battery to the counter unit as short as absolutely possible. Also, be careful of polarity.
4) Calculate battery life with the following formula.

t = A/I
t: battery life [h]
I: LC2H current consumption [mA]
A: battery capacity until minimum operation voltage is reached [mAh]

5) Hand solder to the lead terminal. Do not dip solder. With the tip of the soldering iron at 300°C perform soldering within 3 seconds (for 30 to 60 W soldering iron).

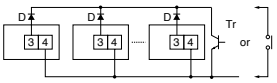
2. Voltage input type

1) Be aware that applying more than 30 V DC to count input terminals ① and ②, and reset input terminals ③ and ④ will cause damage to the internal elements.
2) For external resetting use H level (application of 4.5 to 30 V DC) between reset terminals ③ and ④ of the rear terminals. In this case, connect + to terminal ③ and – to terminal ④. This is the valid polarity; therefore, the counter will not work if reversed.
3) When wiring, try to keep all the input lines to the count and reset inputs as short as possible and avoid running them together with high voltage and power transmission lines or in a power conduit. Also, malfunctions might occur if the floating capacitance of these wires exceeds 500 pF (10 m for parallel wires of 2 mm^2).

3. Free voltage input type

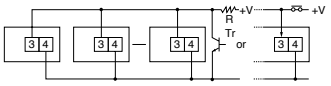
1) Use count input terminals ① and ② for free voltage input and reset terminals ③ and ④ for non-voltage input.
2) Be aware that the application of voltage that exceeds the voltage range of the H level to the count input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.
3) Since the current flow is very small from reset input terminal ③, please use relays and switches with high contact reliability.
4) When inputting a reset with an open collector of a transistor, use a transistor for small signals in which ICBO is 1 μA or less and always input with no voltage.
5) To reset externally, short reset input terminals ③ and ④ on the rear.
6) Input uses a high impedance circuit; therefore, erroneous operation may occur if the influence of induction voltage is present. If you plan to use wiring for the input signal that is 10 m or longer (wire capacitance 120 pF/m at normal temperature), we recommend the use of a CR filter or the connection of a bleeder resistor.

4. How to reset multiple panel mounting type counters all at once (input is the same for count)
Non-voltage input type



Notes) 1. Use the following as a guide for choosing transistors used for input (Tr).
Leakage current < 1 μA
2. Use as small a diode (D) as possible in the forward voltage so that the voltage between terminals 3 and 4 during reset input meets the standard value (0.5 V).
(At IF = 20 μA, forward voltage 0.1 and higher.)

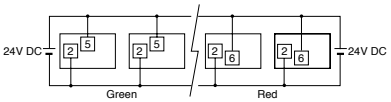
Voltage input type



Note) Make sure that H (reset ON) level is at least 4.5 V.

5. Backlight luminance

To prevent varying luminance among backlights when using multiple Backlight types, please use the same backlight power supply.



6. Environment for use

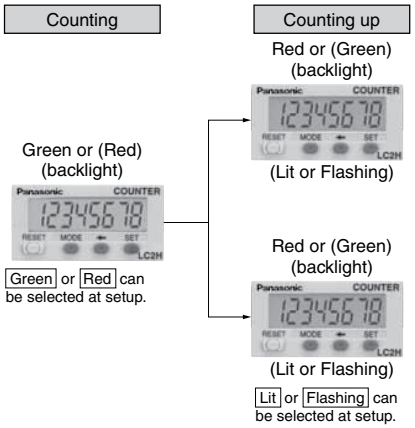
1) Ambient conditions
• Overvoltage category II, pollution level 2
• Indoor use
• Acceptable temperature and humidity range: –10 to +55°C, 35 to 85%RH (with no condensation at 20°C)
• Under 2000 m elevation
2) Use the main unit in a location that matches the following conditions.
• There is minimal dust and no corrosive gas.
• There is no combustible or explosive gas.
• There is no mechanical vibration or impacts.
• There is no exposure to direct sunlight.
• Located away from large-volume electromagnetic switches and power lines with large electrical currents.
3) Connect a breaker that conforms to EN60947-1 or EN60947-3 to the voltage input section.
4) Applied voltage should be protected with an overcurrent protection device (example: T 1A, 250 V AC time lag fuse) that conforms to the EN/IEC standards. (Free voltage input type)

LC2H

Preset Counters

Features

- **Preset function equipped in half size (24 x 48 mm).**
- **Display has backlight for instant recognition.**



- **8.7 mm Character Height (previously 7 mm)**
  Easy-to read character height increased from 7 mm to 8.7 mm.

Plenty of Digits

3. Counting Speed Switchable

- **Counting Speed Switchable between 30 Hz and 5 kHz**
- **Conforms to IP66 Protective Construction (Front panel surface)**
  Weatherproofing supported by using optional mounting frame and rubber gasket
- **Includes reassuring lock mode and lock switch to prevent erroneous operation.**
- **Screw terminals are constructed to protect fingers to ensure safety.**
- **Compliant with UL, c-UL and CE.**

Product types

No. digits	Counting speed	Output mode	Output	Operating voltage	Part No.	
8 digits	30 Hz/5 kHz switchable	• Maintain output/hold count • Maintain output/over count • One shot/over count • One shot/recount	Transistor (1a)	24 V DC	LC2HP-FEW-B-DC24V	
Options		Mounting frame		Use for waterproofing (front panel surface)		ATH3803
		Rubber gasket				ATH3804

Note: Mounting frame and rubber gasket are not included.

Specifications

Item		Descriptions
Rating	Rated operating voltage	24 V DC
	Rated power consumption	Max. 1.5 W
	Rated control capacity	100 mA 30 V DC
	Input mode	Addition/Subtraction (selectable by front switch)
	Max. counting speed	30 Hz/5 kHz (selectable by slide switch on side)
	Counting input	Min. input signal width: 16.7 ms at 30 Hz/0.1 ms at 5 kHz, ON time : OFF time = 1 : 1
	Reset input	Min. input signal width: Min. 30 ms
	Input signal	• Non-voltage input using contacts or open-collector connection • Input impedance; when shorted: Max. 1 kΩ, when open: Min. 100 kΩ • Residual voltage: Max. 2 V
	Output mode	• Maintain output/hold count • Maintain output/over count • One shot/over count • One shot/recount (Selectable by front switch)
	Display method	7-segment LCD (Switch between red and green for backlight, and between lit and flashing for count up.)
	Digit	–9999999 to 99999999 (–7 digits to +8 digits) (0 to 99999999 for preset value)
	Memory	EEP-ROM (Overwriting times: 10^5 operations or more)
Contact arrangement		1 Form A (Open collector)
Electrical life (contact)		10^7 operations (at rated control voltage)
Electrical	Allowable operating voltage range	85 to 110% of rated operating voltage
	Break down voltage (Initial value)	Between input and output: 1,500 V AC, for 1 min.
	Insulation resistance (Initial value)	Between input and output: 100 MΩ (at 500 V DC)
Mechanical	Functional vibration resistance	10 to 55 Hz (1 cycle/min), Single amplitude: 0.15 mm (10 min. on 3 axes)
	Destructive vibration resistance	10 to 55 Hz (1 cycle/min), Single amplitude: 0.375 mm (1 hr. on 3 axes)
	Functional shock resistance	Min. 98 m/s² (4 times on 3 axes)
	Destructive shock resistance	Min. 294 m/s² (5 times on 3 axes)
Operating conditions	Operation temperature	–10 to 55°C (without frost or dew)
	Storage temperature	–25 to +65°C (without frost or dew)
	Ambient humidity	30 to 85% RH (at 25°C, non-condensing)
Protective construction		IP66 (front panel with mounting bracket and rubber gasket)

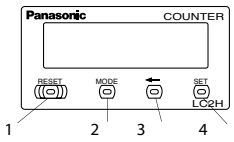
* The factory default preset value is set to 1000000.

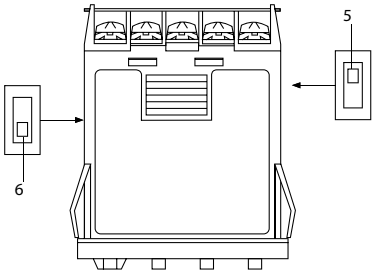
Applicable standard

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)
	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)

Part names

1. Front reset key
This key resets the count value. It does not work when the lock switch is ON.
2. Mode key
Use to switch between each mode.
3. Setting key
Used to set digits of preset values or set each mode.
4. Set key
Use to set preset values or to switch between modes.
5. Lock switch
Disable the operation of the front panel reset key and the mode key. With the lock switch on, [Lock] is displayed for about two seconds when the reset key or mode switch is operated.
6. Count speed switch
Use this switch to switch the count speed between 30 Hz and 5 kHz.





❊: Default setting when shipped.

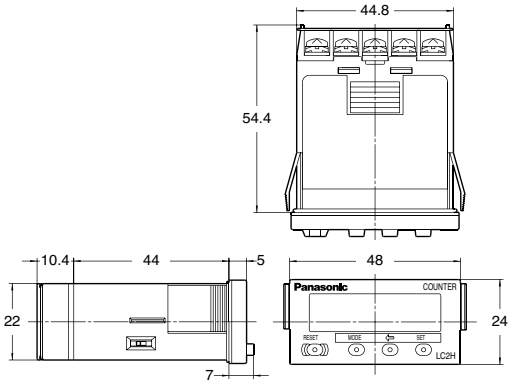
5	Lock switch (unit display 1)	(Terminal block side) ↕ (LCD side)	OFF❊ ↕ ON
6	Count speed switch (unit display 2)	(Terminal block side) ↕ (LCD side)	5kHz ↕ 30Hz❊

Notes: 1. Make the switch setting before installing to panel.
2. Please turn the power off if you change the setting of the count speed switch when the power is on. The setting will become valid when the power is turned back on.

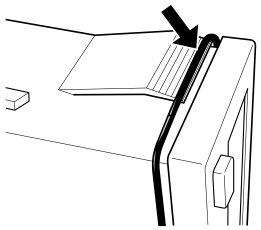
Dimensions

mm
General tolerance: ± 1.0

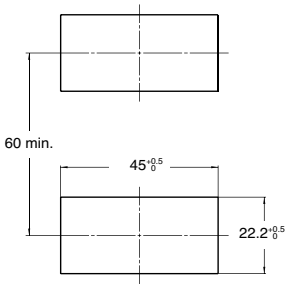
• External dimensions



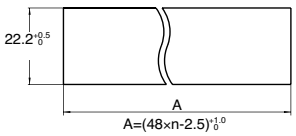
When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.
To prevent the installation spring from pinching the rubber gasket:
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation spring is not pinching the rubber gasket, and then insert and fix the installation spring in place from the rear of the timer unit.



• Panel cut out dimensions
The standard panel cut out is shown below.
Use the mounting bracket (ATH3803) and the rubber gasket (ATH3804).
(Only installation frame type)



• When installing repeatedly (sealed installation) (Only installation frame type)

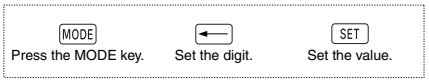


Notes: 1. Suitable installation panel thickness is 1 to 4.5 mm.
2. Waterproofing will be lost when installing repeatedly (sealed installation).

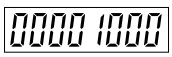
How to set

1. Preset value setting mode

This is the mode for setting preset values.



1) Pressing the MODE key takes you to the preset value setting mode.


Sample display in preset value setting mode (when preset value is 1000)

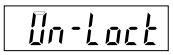
2) Pressing the setting key moves the flashing digit left by one. Following the highest digit it returns to the lowest digit and each time the digit setting key is pressed it moves one to the left.
3) Pressing the set key increases the value by one. (After 9 it returns to 0 and then changes to 1, 2, 3, etc.)
4) Pressing the front panel reset key sets the displayed preset value and returns you to the regular operation mode.
5) In the preset value setting mode if you do not operate the digit setting key or the set key for ten seconds or more you will be returned to regular operation. In this case the preset value will not change.

2. Lock mode

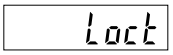
This mode prohibits everything except the preset value setting mode.

1) Pressing the set key while holding down the mode key takes you to the lock mode.

2) The display reads “Un-Lock” after entering the lock mode (initial setting).


Display after entering lock mode (Example showing “Un-Lock”.)

3) Pressing the setting key changes the display between “ Lock” and “Un-lock”.


(Example showing “ Lock”.)

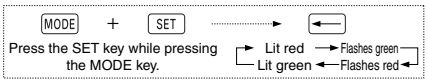
4) Pressing the front panel reset key sets the content displayed and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

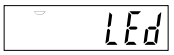
5) When the lock mode display reads “ Lock”, you will not be able to move to the backlight setting mode, the input setting mode, or the output setting mode.

3. Backlight setting mode

This is the mode for setting the backlight during count up.



1) Pressing the SET key two times while holding down the MODE key takes you to the backlight setting mode.
2) The display in the backlight setting mode reads “ LEd”


Display after entering the backlight setting mode.

3) The LED backlight will be red (initial setting).

4) The backlight changes from flashing green to flashing red to lit green and to lit red with each press of the setting key.
5) Pressing the front panel reset key sets the current backlight color and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

4. Input setting mode

This is the mode for setting addition or subtraction.

1) Pressing the SET key three times while holding down the MODE key takes you to the input setting mode.
2) The display after entering the input setting mode reads “ UP” (initial setting).


Display after entering input setting mode (Example showing “UP”)

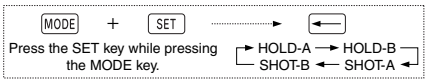
3) Pressing the setting key changes the display to “dn” (subtraction) and pressing it again changes it to “UP” (addition). The display alternates between “dn” and “UP”


(Example showing “dn”)

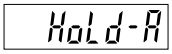
4) Pressing the front panel reset key sets the content displayed and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

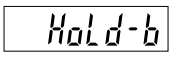
5. Output setting mode
This sets the operation mode.



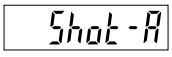
1) Pressing the SET key four times while holding down the MODE key takes you to the output setting mode.
2) The display reads “HoLd-A” (initial setting) after entering the output setting mode.



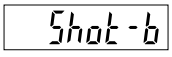
3) Pressing the setting key causes the display to change as follows:
HOLD-B (Output maintain/over count I)



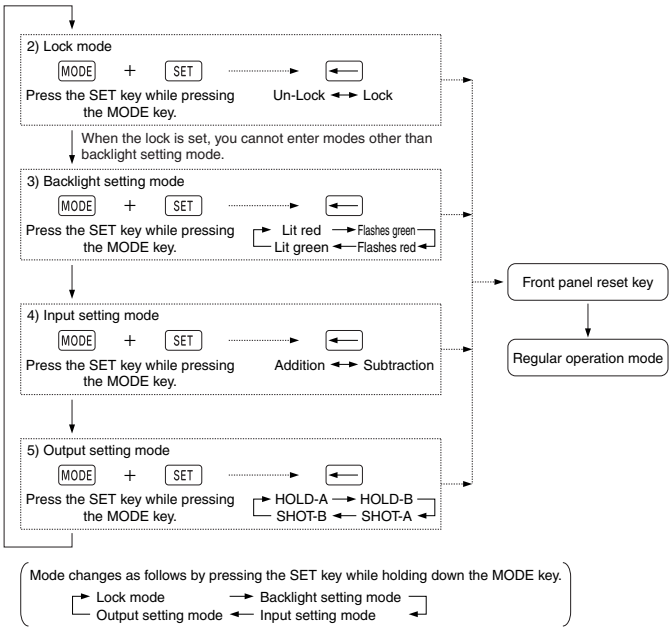
SHOT-A (One shot/over count)



SHOT-B (One shot/recount I)



HOLD-A (Output maintain/hold count)
4) Pressing the front panel reset key sets the display content and returns you to regular operation mode.
Note: You will not be returned to regular operation mode if you do not press the front panel reset key.



Please be aware that after doing a front panel reset key and returning to regular operation mode, the preset values, count value and output will be as shown in this table.

	Preset value	Count value	Output change
Lock mode	×	×	×
Backlight setting mode	×	×	×
Input setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF
Output setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF

Note: “×” sign: No change

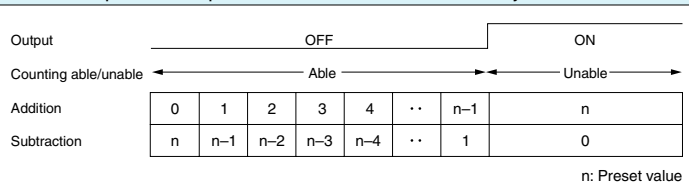
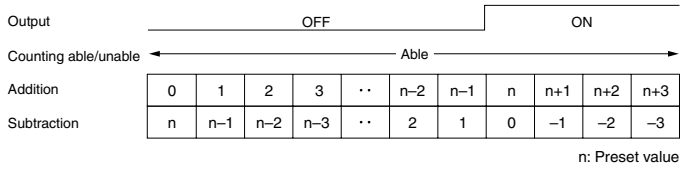
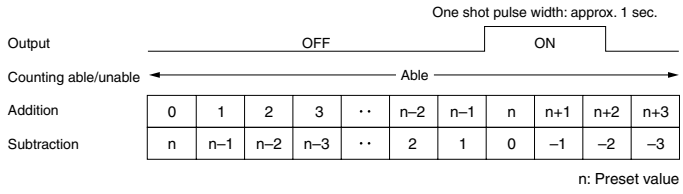
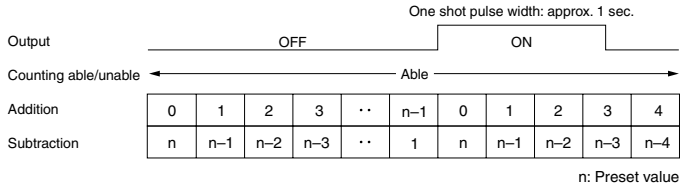
Changing the preset value

1. It is possible to change the preset value even during counting. However, be aware of the following points.
1) If the preset value is changed to less than the count value with counting set to the addition direction, counting will continue until it reaches full scale, returns to zero, and then reaches the new preset value. If the preset value is changed to a value above the count value, counting will continue until the count value reaches the new preset value.
2) Suppose that the counter is preset to count down. Whether a preset count down value is smaller or larger than the count value, the counter counts down to “0 (zero)”.
2. If the preset value is changed to “0”, the counter will not complete count-up. It starts counting up when the counting value comes to “0 (zero)” again.
1) Addition (up-count) input when counting is set to the addition direction, counting will continue until full scale is reached, return to zero, and then complete count-up.
2) Subtraction (down-count) input when counting is set to the subtraction direction, counting will continue until full scale “–9999999” is reached, and then the display will change to “ ▫ ▫ ▫ ▫ ▫ ▫ ▫ ▫ ”.

Compliance with the CE marking

• EMC Directive (89/336/EEC)
The LC2H Preset Counter conforms to the EMC Directive as a simple counter.
Applicable standards: EN61000-6-4, EN61000-6-2

Operation mode

Output mode	Operation	Example when input mode is either addition or Subject:ubtraction
Output maintain/ hold count HOLD-A	Output control is maintained after count-up completion and until resetting. During that time, the count display does not change from that at count-up completion.	
Output maintain/ over count I HOLD-B	Output control is maintained after count-up completion and until resetting. However, counting is possible despite completion of count-up.	
One shot/ over count SHOT-A	Output control is maintained after count-up completion for a fixed time (approx. 1 sec.). Counting is possible despite completion of count-up.	
One shot/ recount I SHOT-B	Output control is maintained after count-up completion for a fixed time (approx. 1 sec.). Counting is possible despite completion of count-up. However, reset occurs simultaneous with completion of count-up. While output is being maintained, restarting of the count is not possible.	

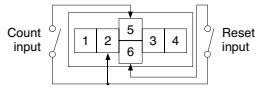
Cautions for use

1. Input and output connection

1) Input connection

(1) Contact input

Use highly reliable metal plated contacts. Since the contact's bounce time leads directly to error in the count value, use contacts with as short a bounce time as possible. In general, select input to have a maximum counting speed of 30 Hz.



(2) Non-contact input (Transistor input)

Connect with an open collector. Use transistors whose characteristics satisfy the criteria given below.

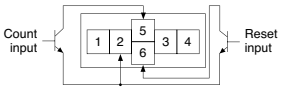
VCEO = Min. 20 V
IC = Min. 20 mA
ICBO = Max. 6 μA

Also, use transistors with a residual voltage of less than 2 V when the transistor is on.

* The short-circuit impedance should be less than 1 kΩ.

(When the impedance is 0 Ω, the current coming from the count input terminal is approximately 5 mA and from the reset input terminal is approximately 1.5 mA.)

Also, the open-circuit impedance should be more than 100 kΩ.



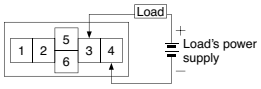
(3) Input wiring

When wiring, use shielded wires or metallic wire tubes, and keep the wire lengths as short as possible.

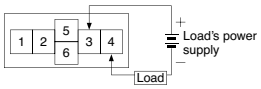
2) Output connection

Since the transistor output of counter is insulated from the internal circuitry by a photo-coupler, it can be used as an NPN output or PNP (equal value) output.

As NPN output



As PNP output



2. Self-diagnosis function

If a malfunction occurs, one of the following displays will appear.

Display	Contents	Output condition	Restoration procedure	Preset values after restoration
Err-00	Malfunctioning CPU	OFF	Enter front reset key or restart counter	The preset value at start-up before the CPU malfunction occurred.
Err-01	Malfunctioning memory*			0

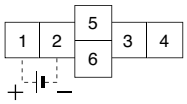
* Includes the possibility that the EEP-ROM's life has expired.

3. Terminal connection

1) When wiring the terminals, refer to the terminal layout and wiring diagrams and be sure to perform the wiring properly without errors.

An external power supply is required in order to run the main unit.

Power should be applied between terminals (1) and (2). Terminal (1) acts as the positive connection and terminal (2) as the negative.



Operating voltage

2) After turning the counter off, make sure that any resulting induced voltage or residual voltage is not applied to power supply terminals (1) through (2). (If the power supply wire is wired parallel to the high voltage wire or power wire, an induced voltage may be generated at the power supply terminal.)

3) Have the power supply voltage pass through a switch or relay so that it is applied at one time.

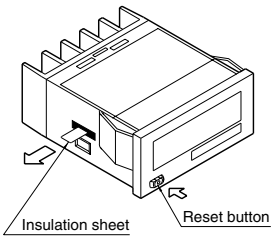
Cautions for use

1. Insulation sheet

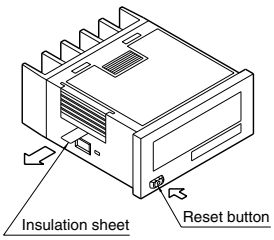
Before using a panel mounting type, please pull and remove the insulation sheet from the side of the product in the direction of the arrow.

In consideration that the product might be stored for long periods without being used, an insulation sheet is inserted before shipping. Remove the insulation sheet and press the front reset button.

• LC2H total counter (one-touch installation type)



• LC2H total counter (installation frame type)



2. Waterproof construction

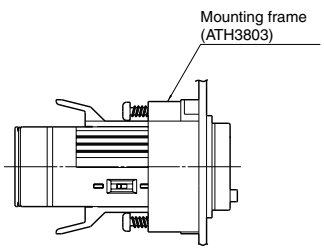
• LC2H total counter (installation frame type)

The operation part of the panel installation type (installation frame type) is constructed to prevent water from entering the unit and a rubber gasket is provided to prevent water from entering the gap between the unit and the panel cutout.

There must be sufficient pressure applied to the rubber gasket to prevent water from entering.

Be sure to use the mounting reinforcement screws when installing the mounting frame (ATH3803).

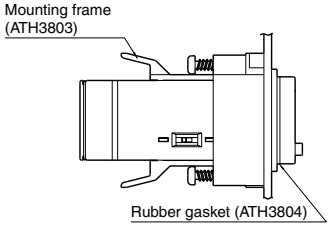
Note: The one-touch installation type is not waterproof.



• LC2H preset counter

1) The front plate will not be waterproof when this product is installed on a panel. To make the front plate waterproof, please install the following.

When using the waterproof type (IP66: panel front only), install the counter to the front plate with mounting frame ATH3803 (sold separately) and rubber gasket ATH3804 (sold separately). Be sure to tighten using mounting screws.



When installing the mounting frame and rubber gasket please remove the pre-attached o-ring.

2) Panel installation order
   (1) Remove o-ring.
   (2) Place rubber gasket.
   (3) Insert counter into panel.
   (4) Insert mounting frame from the rear.
   (5) Secure with mounting screws (two locations)

3. Do not use in the following environments

1) In places where the temperature changes drastically.

2) In places where humidity is high and there is the possibility of dew.
(When dew forms the display may vanish and other display errors may occur.)

4. Conditions of use

1) Do not use on places where there is flammable or corrosive gas, lots of dust, presence of oil, or where the unit might be subject to strong vibrations or shocks.

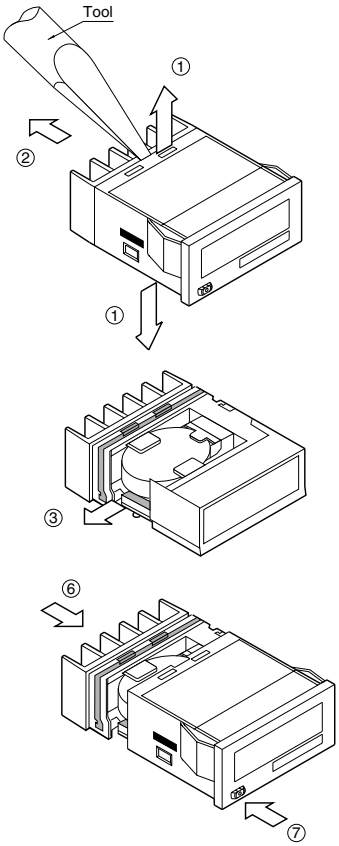
2) Since the cover is made of polycarbonate resin, do not use in places where the unit might come into contact with or be exposed to environments that contain organic solvents such as methyl alcohol, benzene and thinner, or strong alkali substances such as ammonia and caustic soda.

5. Cautions regarding battery replacement

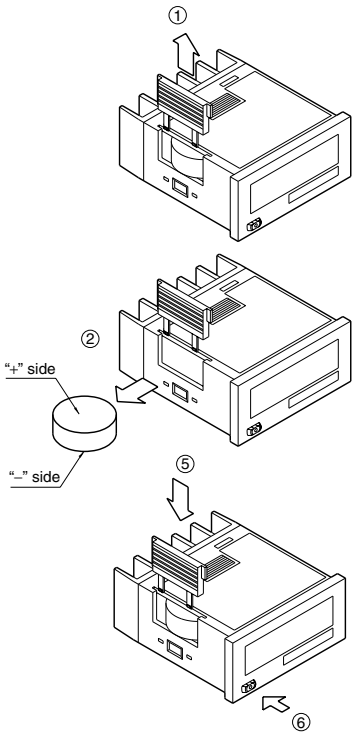
1) Remove wiring before replacing the battery. You may be electrocuted if you come into contact to a part where high voltage is applied.

2) Make sure you are not carrying a static electric charge when replacing the battery.

3) Battery replacement procedure
   For LC2H total counter (one-touch installation type)
   (1) Remove the up/down hook of the case using a tool.
   (2) Pull the unit away from the case.
   (3) Remove the battery from the side of the unit. Do not touch the display or other parts.
   (4) Before inserting wipe clean the surface of the new battery.
   (5) Insert the new battery with the "+" and "–" sides in the proper position.
   (6) After replacing the battery, return the unit to the case. Verify that the hook of the case has properly engaged.
   (7) Before using, press the reset button on the front.



For LC2H total counter
(installation frame type)
(1) Remove the battery cover from the case.
(2) Remove the battery from the side of the case. The battery will come loose if you put the battery side face down and lightly shake the unit.
(3) Before inserting wipe clean the surface of the new battery.
(4) Insert the new battery with the "+" and "–" sides in the proper position.
(5) After replacing the battery, return the battery cover to the case. Verify that the hook of the battery cover is properly engaged.
(6) Before using press the reset button on the front.



6. Terminal connection
Tighten the terminal screws with a torque of 0.8 N·cm or less.

Types		DIN 24 × 48 size Hour Meters		DIN 52 × 52 size Hour Meters	
Name of product		LH2H Hour Meters	LH2H Preset Hour Meters	TH 13 Hour Meter	TH23 Hour Meter
Appearance					
Front section of part number		Panel mounting type / PC board mounting type	ATH3	TH13 series	TH23 series
Counting range		Flush mounting type: 0 to 999999.9 hours/0 to 3999 days 23.9 hours (selectable) 0 to 999 hours 59 min 59 sec/0 to 9999 hours 59.9 min (selectable) PC board mounting type: 0 to 999999.9 hours/9999 hours 59.9 min (different type)	0 to 999999.9 hours/ 0 to 3999 days 23.9 hours (selectable) 0 to 999 hours 59 min 59 sec/ 0 to 9999 hours 59.9 min (selectable)	0 to 99999.9 hours	0 to 9999.9 hours
Features		Big 7-digit display, 8.7 mm tall display Bright, 2-color back light (voltage input type) Plenty of input methods • Non-voltage input, Voltage input, free voltage input	Preset function equipped in half size	For controlling total integrated hours	With zero reset function For controlling measured integrated hours
Driving method		Quartz oscillation type	Quartz oscillation type	AC motor	AC motor
Counting direction		Addition (UP)	Addition or subtraction	Addition (UP)	Addition (UP)
Power	Voltage	Flush mounting type: Unnecessary (Built-in battery) PC board mounting type: 3 V DC (Battery is externally installed.)	24 V DC	100 V AC, 200 V AC, 110 V AC, 115 to 120 V AC, 220 V AC, 240 V AC	100 V AC, 200 V AC, 110 V AC, 115 to 120 V AC, 220 V AC, 240 V AC
	Frequency	—	—	Hz or 60 Hz	50 Hz or 60 Hz
Counting integral/ Counting max. speed		±100 ppm (25°C)	±0.01% ±50 ms in case of power on start ±0.01% ±30 ms in case of input signal start	Synchronizing with power supply frequency	Synchronizing with power supply frequency
Min. counting unit		0.1 h, 0.1 min, 1 s	0.1 h, 0.1 min, 1 s	0.1 h	0.1 h
Reset input		Push button and external reset input terminal	Push button and external reset input terminal	—	Manual reset
Max. power consumption		—	Max. 1.5 W	Approx. 1.5 W	Approx. 1.5 W
Weight		Flush mounting type: 55 g PC board mounting type: 15 g	50 g	130 g	135 g
Remarks		—	—	Both the TH13 and 23 series have numbers at the end of the part number that indicate the voltage and frequency required. The third number from the front of the part number indicates the required voltage as follows: 4:100 V, 5:200 V, 6:110 V, 7:115 V (for 50 Hz only) or 115 V to 120 V (for 60 Hz only), 8:220 V, 9:240 V The fourth number from the front of the part number indicates the required frequency as follows: 5:50 Hz. 6:60 Hz Ex.) The part number for the TH13 series of 220 V & 50 Hz specification is TH1385.	
Page		P. 116	P. 122	P. 131	P. 131

Types		DIN 48 × 48 size Hour Meters		
Name of product		TH14 Hour Meter	TH24 Hour Meter	TH40 Hour Meters
Appearance				
		TH14 series	TH24 series	TH40 series
Counting range		0 to 99999.9 hours	0 to 9999.9 hours	Reset side 0 to 9999.9 hours Without reset side 0 to 99999.9 hours
Features		For controlling total integrated hours	With zero reset function For controlling measured integrated hours	Composite function for total accumulated hours monitoring and measuring each zero reset
Driving method		AC motor	AC motor	AC motor
Counting direction		Addition (UP)	Addition (UP)	Addition (UP)
Power	Voltage	12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC	12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC	12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC
	Frequency	50/60Hz (common)	50/60Hz (common)	50/60Hz (common)
Counting integral/ Counting max. speed		Synchronizing with power supply frequency	Synchronizing with power supply frequency	Synchronizing with power supply frequency
Min. counting unit		0.1 h	0.1 h	0.1 h
Reset input		—	Manual reset	Manual reset
Max. power consumption		Approx. 1.5 W	Approx. 1.5 W	Approx. 1.5 W
Weight		145 g	150 g	160 g
Remarks		—	The TH50 series displays time in minute.	—
		The TH14, 24, 40, 63, and 64 series have numbers at the end of the part number that indicate the voltage required as follow 1:100 V, 2:200 V, 3:12 V, 4:24 V, 5:48 V, 6:110 V, 7:115 to 120 V, 8:220 V, 9:240 V, Ex.) The part number of the TH24 series with 220 V is TH248. When “S” is specified at the end of the part number, a silver pane		
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Types		DIN 24 × 48 size Hour Meters	
Name of product		TH63 Hour Meters	TH64 Hour Meter
Appearance			
Front section of part number		TH63 series	TH64 series
Counting range		0 to 99999.9 hours	0 to 9999.9 hours
Features		For controlling total integrated	With zero reset function For controlling measured integrated hours
Driving method		AC motor	AC moto
Counting direction		Addition (UP)	Addition
Power	Voltage	12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC	12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC
	Frequency	50/60Hz (common)	50/60Hz (c
Counting integral/ Counting max. speed		Synchronizing with power supply frequency	Synchronizing with power supply frequency
Min. counting unit		0.1 h	0.1
Reset input		—	Manual reset
Max. power consumption		Approx. 1.5 W	Approx.
Weight		80 g	90 g
Remarks		The numbers at the end of the part number indicate voltage. (See the remarks above.)	
Page		P. 137	P. 137

Types		TH Hour Meter: Round type
Name of product		TH8 DC Hour Meter
Appearance		
		TH8 series
Counting range		0 to 9999.9 hours
Features		Driven on DC power
Driving method		Ceramic oscillation + AC motor
Counting direction		Addition (UP)
Power	Voltage	12 V DC, 24 V DC
	Frequency	—
Counting integral/ Counting max. speed		±0.2% (25°C)
Min. counting unit		0.1 h
Reset input		—
Max. power consumption		Approx. 1.5 W
Weight		170 g
Remarks		—
Page		P. 139

Panel mounting type
One-touch installation type

LH2H

DIN HALF SIZE HOUR METER

Features

› **8.7 mm Character Height (previously 7 mm)**
Easy-to-read character height increased from 7 mm to 8.7 mm.

Plenty of Digits

› **Select by switch between two time ranges in a single meter.**
0 to 999999.9h/0 to 3999d23.9h switchable
0 to 999h59m59s/0 to 9999h59.9m switchable

› **Panel Mounting Type Features 2 Installation Methods**
Comes with very easy one-touch installation type and also installation frame type that uses the frame on the timer/counter. Choose a method that suits the application.

› **Battery Replacement Easy on Environment**
To replace battery simply remove body for the one-touch installation type, and remove battery lid for the installation frame type.

› **Screw Terminals Designed for Safety**
Built in finger protection.

› **Panel Covers Replacable (Standard color is ash gray.)**
Change the panel design by replacing with a black panel cover.

› **Conforms to IP66 Protective Construction (Only installation frame type.) (Front panel surface)**

› **Input Methods**
1) Non-voltage input method
2) Voltage input method
3) Free voltage input method

› **Backlight Type Added to Series and Now 2-color Switchable (green/red)**
Easy viewing even in dark places and switchable between green and red (Voltage input type).

› **Compliant with UL, c-UL and CE marking**

Product chart

Type / Installation type		Standard type			Backlight type
		Non-voltage input type	Voltage input type (4.5 to 30 V DC)	Free voltage input type (24 to 240 V AC/DC)	Voltage input type (4.5 to 30 V DC)
Panel mounting type	One-touch installation type	○	○	○	○
	Installation frame type	○	○	○	○
PC board mounting type		○	—	—	—

Product types

1. Panel mounting type

1) One-touch installation type

1 Standard type

No. digits	Measurement time range	Front reset	Input method	Part No.
7 digits	0 to 999999.9h/0 to 3999d23.9h switchable	Yes	Non-voltage input type	LH2H-FE-DHK
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-FE-HMK
	0 to 999999.9h/0 to 3999d23.9h switchable		Voltage input type (4.5 to 30 V DC)	LH2H-FE-DHK-DL
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-FE-HMK-DL
	0 to 999999.9h/0 to 3999d23.9h switchable		Free voltage input type (24 to 240 V AC/DC)	LH2H-FE-DHK-FV
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-FE-HMK-FV

2 Backlight type

No. digits	Measurement time range	Front reset	Input method	Part No.
7 digits	0 to 999999.9h/0 to 3999d23.9h switchable	Yes	Voltage input type (4.5 to 30 V DC)	LH2H-FE-DHK-DL-B
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-FE-HMK-DL-B

2) Installation frame type

1 Standard type

No. digits	Measurement time range	Front reset	Input method	Part No.
7 digits	0 to 999999.9h/0 to 3999d23.9h switchable	Yes	Non-voltage input type	LH2H-F-DHK
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-F-HMK
	0 to 999999.9h/0 to 3999d23.9h switchable		Voltage input type (4.5 to 30 V DC)	LH2H-F-DHK-DL
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-F-HMK-DL
	0 to 999999.9h/0 to 3999d23.9h switchable		Free voltage input type (24 to 240 V AC/DC)	LH2H-F-DHK-FV
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-F-HMK-FV

2 Backlight type

No. digits	Measurement time range	Front reset	Input method	Part No.
7 digits	0 to 999999.9h/0 to 3999d23.9h switchable	Yes	Voltage input type (4.5 to 30 V DC)	LH2H-F-DHK-DL-B
	0 to 999h59m59s/0 to 9999h59.9m switchable			LH2H-F-HMK-DL-B

2. PC board mounting type

No. digits	Measurement time range	Front reset	Input method	Part No.
7 digits	0 to 999999.9h	No	Non-voltage input type	LH2H-C-H-N
	0 to 9999h59.9m			LH2H-C-HM-N

Specifications

1. Panel mounting type

Item \ Type		Standard type		Backlight type	Standard type
		Non-voltage input	Voltage input		Free voltage type
No. digits		7 digits			
External power supply		Not required (built-in battery)			
Measurement time range		0 to 999999.9h/0 to 3999d23.9h (Switchable by switch) 0 to 999h59m59s/0 to 9999h59.9m (Switchable by switch) Separate product type			
Start input	Min. input signal width	200 ms			
	Input method (signal)	Non-voltage input using contacts or open collector connection	High level: 4.5 to 30 V DC Low level: 0 to 2 V DC		High level: 24 to 240 V AC/DC Low level: 0 to 2.4 V AC/DC
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	Approx. 4.7 kΩ		—
	Residual voltage	Max. 0.5 V	—		—
Reset input	Min. input signal width	100 ms			
	Input method (signal)	Non-voltage input using contacts or open collector connection	High level: 4.5 to 30 V DC Low level: 0 to 2 V DC		Non-voltage input using contacts or open collector connection
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	Appox. 4.7 kΩ		When shorted: Max. 10 kΩ When open: Max. 750 kΩ
	Residual voltage	Max 0.5 V	—		Max. 0.5 V
Display method		7-segment LCD		7-segment LCD With green/red backlight	7-segment LCD
Breakdown voltage (initial)		Between charged and uncharged parts: 1,000 V AC for 1 minute.			Between charged and uncharged parts: 2,000 V AC for 1 minute.
Insulation resistance (initial)		Min. 100 MΩ (measured at 500 V DC) Measurement location same as for break down voltage.			
Backlight power		—		24 V DC (±10%)	—
Protective construction (Note)		IEC Standard IP66 (only panel front: when using rubber gasket)			
Accessories (Note)		Rubber gasket, mounting bracket			
Battery life		10 years (at 25°C)			

Note) Only for installation frame type.

2. PC board mounting type

Item \ Type		PC board mounting type	
Input method		Non DC voltage input	
No. digits		7 digits	
Rated operation voltage		3 V DC	
Allowable operation voltage range		2.7 to 3.3 V DC	
Current consumption		Max. 20 μA (max. 200 μA during reset input)	
Measurement time range		0 to 999999.9h	0 to 9999h59.9m
Start input	Min. input signal width	200 ms	
	Input method	Non-voltage input using contacts or open collector connection	
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	
	Residual voltage	Max. 0.5 V	
Reset input	Min. input signal width	10 ms	
	Input method	Non-voltage input using contacts or open collector connection	
	Input impedance	When shorted: Max. 10 kΩ When open: Max. 750 kΩ	
	Residual power	Max. 0.5 V	
Break down voltage (initial)		Between charged and uncharged parts: 1,000 V AC for 1 minute.	
Insulation resistance (initial)		Min. 100 MΩ (measured at 500 V DC) Measurement location same as for break down voltage.	

3. Common

Item \ Type		Panel mounting/PC board mounting types
Time accuracy		±100 ppm (25°C)
Vibration resistance	Functional	10 to 55 Hz (1 cycle/min.), single amplitude: 0.15 mm (10 min. on 3 axes)
	Destructive	10 to 55 Hz (1 cycle/min.), single amplitude: 0.375 mm (1 hr. on 3 axes)
Shock resistance	Functional	Min. 98 m/s² (4 times on 3 axes)
	Destructive	Min. 294 m/s² (5 times on 3 axes)
Operation temperature		–10 to +55°C (without frost or dew)
Storage temperature		–25 to +65°C (without frost or dew)
Ambient humidity		35 to 85% RH (non-condensing)

Applicable standard

Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category III
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 (90 MHz)
	EFT/B immunity	EN61000-4-4 2 kV (power supply 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)

Part names

1. Front reset button

Reset the elapsed time. It does not work when the lock switch is ON. Be aware that battery life will decrease if this switch is used frequently.

2. Lock switch (Refer to chart on right.)

Disable the front reset button.

Note) Turn ON at the LCD side (reset disabled) and OFF at the terminal block side (reset enabled).

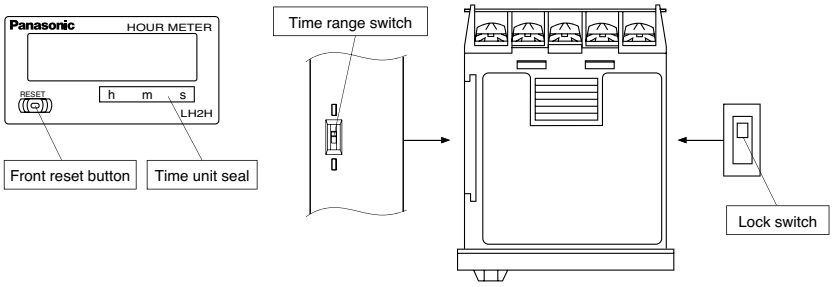
3. Time range switch (See chart on right).

Switch the time range.

Note) Always press the front reset button when operating the time range switch.

4. Time unit sticker

Unit seals are included in the package. Affix them in accordance with the time range.



	0 to 999999.9h/0 to 3999d23.9h	0 to 999h59m59s/0 to 9999h59.9m
Lock switch (Unit display 1)	(Terminal block side) ↕ (LCD side) ▯ OFF✳ ↕ ON	
Count speed switch (Unit display 2)	(Terminal block side) ↕ (LCD side) ▯ 0 to 999999.9h✳ ↕ 0 to 3999d23.9h	(Terminal block side) ↕ (LCD side) ▯ 0 to 9999h59.9m✳ ↕ 0 to 999h59m59s

Notes) 1. ✳Default setting when shipped.
2. Make the switch setting before installing to panel.

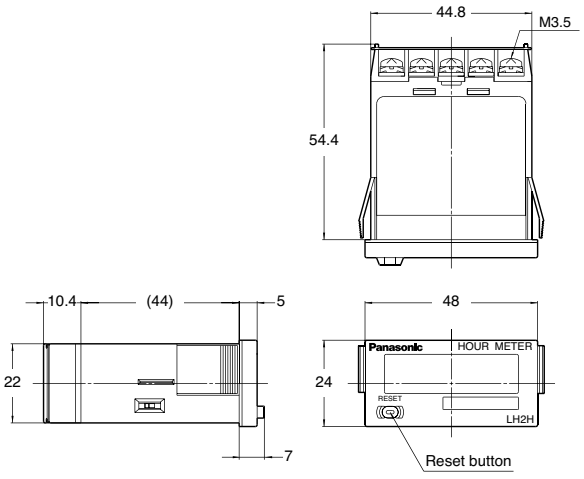
Dimensions

mm
General tolerance: ±1.0

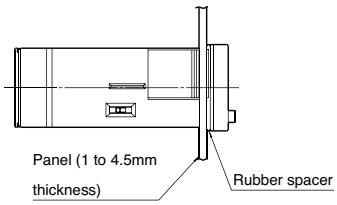
1. Panel mounting type

• External dimensions

1) One-touch installation type



• Panel installation diagram

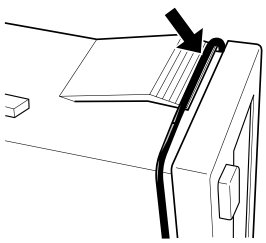


Note) When installing to a 4.5 mm thick panel, remove the rubber spacer first.

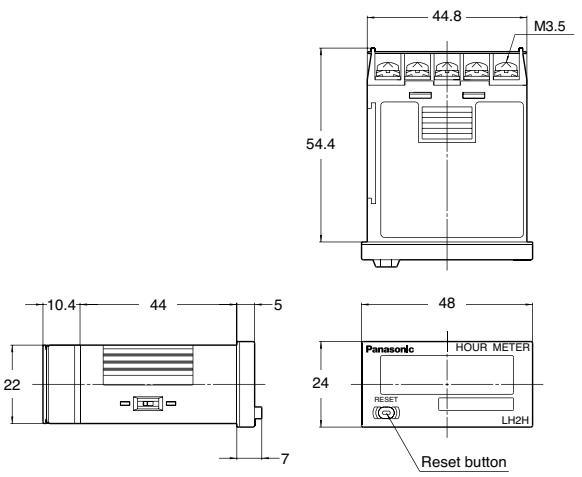
When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.

To prevent the installation spring from pinching the rubber gasket:

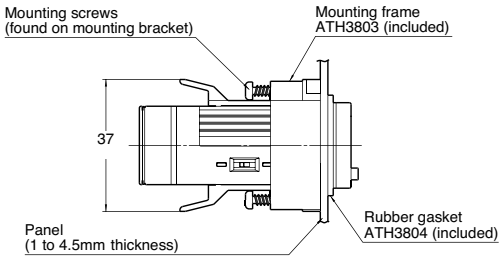
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation spring is not pinching the rubber gasket, and then insert and fix the installation spring in place from the rear of the timer unit.



2) Installation frame type

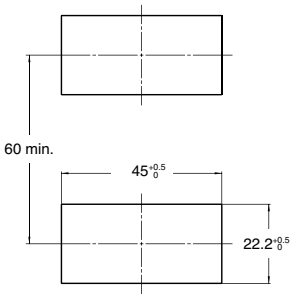


• Panel mounting diagram

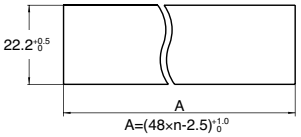


• Panel cut-out dimensions

The standard panel cut-out is shown below.
Use the mounting frame (ATH3803) and the rubber packing (ATH3804).
(Only installation frame type.)



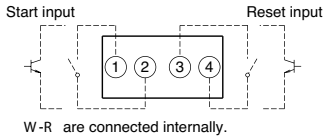
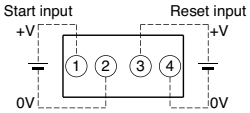
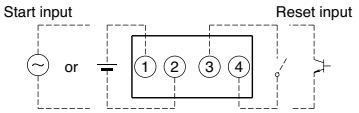
• For connected installation (sealed installation) (Only installation frame type.)



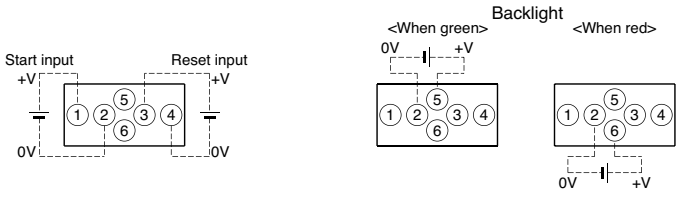
Notes) 1. Suitable installation panel thickness is 1 to 4.5 mm.
2. Waterproofing will be lost when installing repeatedly (sealed installation).

• Terminal layout and wiring diagrams

1) Standard type

Non voltage input type	Voltage input type	Free voltage input type
		

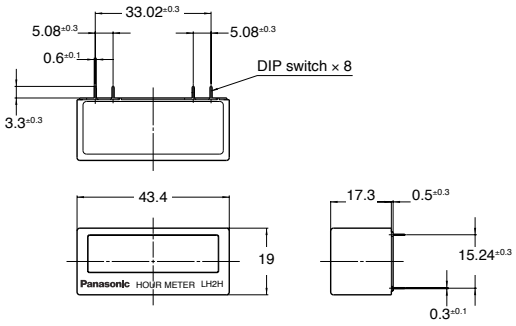
2) Backlight type

Voltage input type


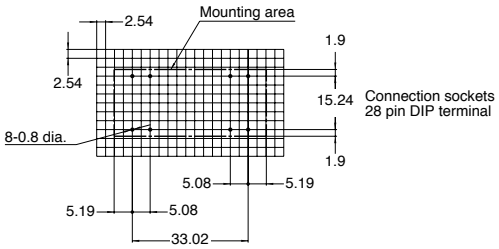
2. PC board mounting type

General tolerance: ±1.0 mm

• External dimensions



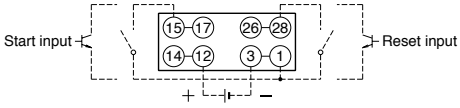
PC board pattern (BOTTOM VIEW)



General tolerance: ±0.1

Note: The AXS212811K is recommended as a compatible connection socket.

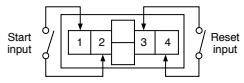
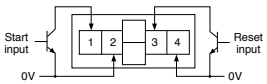
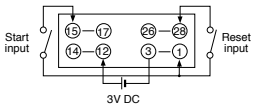
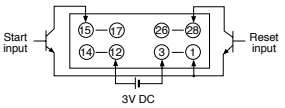
• Terminal layout and wiring diagrams



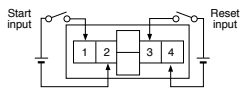
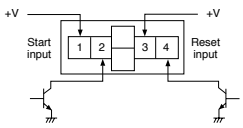
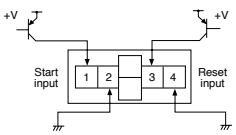
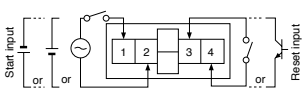
Q -E , } -w , e -t and S -F are connected internally.
An external power supply is required.

Input method

1. Standard type

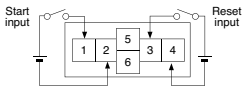
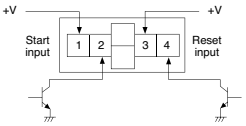
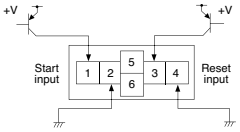
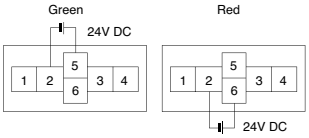
Non-voltage input type			
Panel mounting type		PC board mounting type	
Contact input	Transistor input NPN transistor	Contact input	Transistor input NPN transistor
 (W and R are connected internally.)	 (W and R are connected internally.)		

Notes) 1. When using contact input, since current flow is small from terminals ① and ③ on the panel mounting type and terminals ⑮ to ⑰ and ㉖ to ㉘ on the PC board mounting type, please use relays and switches with high contact reliability.
2. When using transistor input, use the following as a guide for which transistors (Tr) to use for inputting. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)

Voltage input type			Free voltage input type
Contact input	Transistor input		
	NPN transistor	PNP transistor	
			

Notes) 1. ② and ④ (The input and reset circuits are functionally insulated.)
2. When using transistor (Tr) input, use the right as a guide. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)
3. Be aware that the application of voltage that exceeds the voltage range of the H level to the count input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.

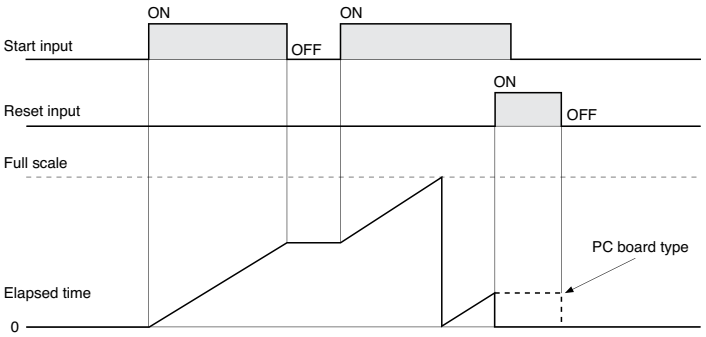
2. Backlight type

Voltage input type			Backlight connection
Contact input	Transistor input		
	NPN transistor	PNP transistor	
			

Notes) 1. Do not reverse the polarities when connecting the DC voltage for the backlight.
2. ②and④. (The input and reset circuits are functionally insulated.)
3. When using transistor (Tr) input, use the right as a guide. (Collector withstand voltage ≧ 50 V, leakage current < 1 μA)
4. Be aware that the application of voltage that exceeds the voltage range of the H level to the count input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.

Explanation of operation

1. Time measuring takes place when the start input is ON.
2. When the elapsed (measured) time reaches full scale it returns to “0”, and then measuring starts again from “0”.
3. When reset input is ON, the display becomes “0”. You cannot measure during reset input.
For PC board mounting type the display disappears while the reset input is ON; however, the display reads “0” when the reset input turns OFF.
4. Press the front reset button if you want to perform a manual reset (for panel installation type)



Cautions for use

1. Non-voltage input type

For both panel mounting and PC board mounting types

1) Never apply voltage to the non-voltage input type. This will damage the internal elements.

2) Since the current flow is very small from the start input and reset input terminals (1 and 3 on the panel mounting type and terminals e to t and S to F on the PC board mounting type) please use relays and switches with high contact reliability. When inputting with an open collector of a transistor, use a transistor for small signals in which ICBO is 1 µA or less and always input with no voltage.

3) When wiring, try to keep all the input lines to the start and reset inputs as short as possible and avoid running them together with high voltage and power transmission lines or in a power conduit. Also, malfunctions might occur if the floating capacitance of these wires exceeds 500 pF (10 m for parallel wires of 2 mm^2). In particular, when using shielded wiring, be careful of the capacitance between wires.

PC board mounting type

1) For external power supply use manganese dioxide or lithium batteries (CR type: 3V).

2) Always reset after external power is applied and confirm that the display reads "0".

3) Make the wiring from the battery to the hour meter unit as short as absolutely possible. Also, be careful of polarity.

4) Calculate battery life with the following formula.

$t = A/I$

t: battery life [h]

I: LH2H current consumption [mA]

A: battery capacity until minimum operation voltage is reached [mAh]

5) Hand solder to the lead terminal. Do not dip solder. With the tip of the soldering iron at 300°C perform soldering within 3 seconds (for 30 to 60 W soldering iron).

2. Voltage input type

1) Be aware that applying more than 30 V DC to start input terminals 1 and 2 , and reset input terminals 3 and 4 will cause damage to the internal elements.

2) For external resetting use H level (application of 4.5 to 30 V DC) between reset terminals 3 and 4 of the rear terminals. In this case, connect + to terminal 3 and – to terminal 4 . This is the valid polarity; therefore, the hour meter will not work if reversed.

3) When wiring, try to keep all the input lines to the start and reset inputs as short as possible and avoid running them together with high voltage and power transmission lines or in a power conduit. Also, malfunctions might occur if the floating capacitance of these wires exceeds 500 pF (10 m for parallel wires of 2 mm^2).

3. Free voltage input type

1) Use start input terminals 1 and 2 for free voltage input and reset terminals 3 and 4 for non-voltage input.

2) Be aware that the application of voltage that exceeds the voltage range of the H level to the start input terminal, and the application of voltage to the reset input terminal, can cause damage to the internal elements.

3) Since the current flow is very small from reset input terminal 3 , please use relays and switches with high contact reliability.

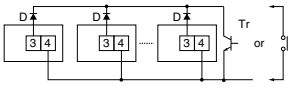
4) When inputting a reset with an open collector of a transistor, use a transistor for small signals in which ICBO is 1 µA or less and always input with no voltage.

5) To reset externally, short reset input terminals 3 and 4 on the rear.

6) Input uses a high impedance circuit; therefore, erroneous operation may occur if the influence of induction voltage is present. If you plan to use wiring for the input signal that is 10 m or longer (wire capacitance 120 pF/m at normal temperature), we recommend the use of a CR filter or the connection of a bleeder resistor.

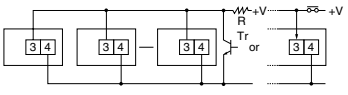
4. How to reset multiple panel mounting type counters all at once (input is the same for count)

Non-voltage input type



Notes) 1. Use the following as a guide for choosing transistors used for input (Tr). Leakage current < 1 µA
2. Use as small a diode (D) as possible in the forward voltage so that the voltage between terminals 3 and 4 during reset input meets the standard value (0.5 V). (At IF = 20 µA, forward voltage 0.1 and higher.)

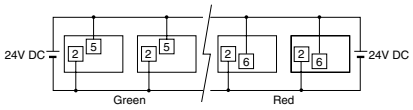
Voltage input type



Note) Make sure that H (reset ON) level is at least 4.5 V.

5. Backlight luminance

To prevent varying luminance among backlights when using multiple Backlight types, please use the same backlight power supply.



6. Acquisition of CE marking

Please abide by the conditions below when using in applications that comply with EN 61010-1/IEC 61010-1

1) Ambient conditions

• Overvoltage category II, pollution level 2

• Indoor use

• Acceptable temperature and humidity range: –10 to +55°C, 35 to 85%RH (with no condensation at 20°C)

• Under 2000 m elevation

2) Use the main unit in a location that matches the following conditions.

• There is minimal dust and no corrosive gas.

• There is no combustible or explosive gas.

• There is no mechanical vibration or impacts.

• There is no exposure to direct sunlight.

• Located away from large-volume electromagnetic switches and power lines with large electrical currents.

3) Connect a breaker that conforms to EN60947-1 or EN60947-3 to the voltage input section.

4) Applied voltage should be protected with an overcurrent protection device (example: T 1A, 250 V AC time lag fuse) that conforms to the EN/IEC standards. (Free voltage input type)

7. Terminal connection

Tighten the terminal screws with a torque of 0.8 N·cm or less.

Panel mounting type
One-touch installation type

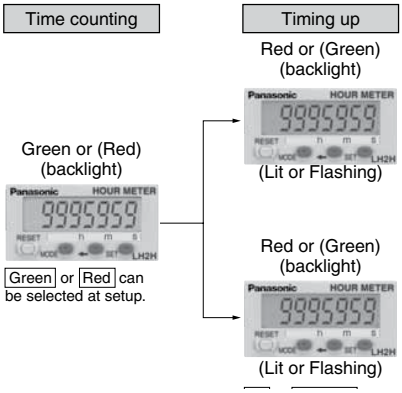
LH2H

PRESET HOUR METERS

Features

› **Preset function equipped in half size**
(24 x 24 mm).

› **Display has backlight for instant recognition**



› **8.7 mm Character Height (previously 7 mm)**
Easy-to read character height increased from 7 mm to 8.7 mm.

Plenty of Digits

3. Select by switch between two time

› **Select by switch between two time ranges in a single meter**
0 to 999999.9h/0 to 3999d23.9h Selectable
0 to 999h59m59s/0 to 9999h59.9m Selectable

› **Conforms to IP66 Protective Construction (Front panel surface)**
Weatherproofing supported by using optional mounting bracket and rubber gasket

› **Includes reassuring lock mode and lock switch to prevent erroneous operation**
Screw terminals are constructed to protect fingers to ensure safety.

› **Compliant with UL, c-UL and CE marking**

Product types

No. digits	Measurement time range	Operation mode	Output	Operating voltage	Part No.	
7 digits	0 to 999999.9h/ 0 to 3999d23.9h selectable	G (Totalizing ON delay) B (Signal ON delay) F (Signal flicker) E (Pulse ON delay)	Transistor (1a)	24 V DC	LH2HP-FEW-DHK-B-DC24V	
	0 to 999h59m59s/ 0 to 9999h59.9m selectable				LH2HP-FEW-HMK-B-DC24V	
Options		Mounting frame		Use for waterproofing (front panel surface)		ATH3803
		Rubber gasket				ATH3804

Note: Mounting frame and rubber gasket are not included.

Specifications

Item		Descriptions
Rating	Rated operating voltage	24 V DC
	Rated power consumption	Max. 1.5 W
	Rated control output	100 mA 30 V DC
	Time counting direction	Addition or Subtraction (selectable by front switch)
	Measurement time range	0 to 999999.9h/0 to 3999d23.9h (selectable by slide switch on side) 0 to 999h59m59s/0 to 9999h59.9m (selectable by slide switch on side)
	Start input	Min. input signal width: Min. 30 ms
	Reset input	Min. input signal width: Min. 30 ms
	Input signal	• Non-voltage input using contacts or open-collector connection • Input impedance; when shorted: Max. 1 kΩ, when open: Min. 100 kΩ • Residual voltage: Max. 2 V
	Operation mode	Totalizing ON delay, Signal ON delay, Signal flicker, Pulse ON delay (selectable by front switch)
	Display method	7-segment LCD (Switch between red and green for backlight, and between lit and flashing for time up.)
	Power failure emory	EEP-ROM (Overwriting times: 10^5 operations or more)
Time accuracy	Operating time fluctuation	±0.01% ±50 ms in case of power on start ±0.01% ±30 ms in case of input signal start [Rated operating voltage: 85 to 110% Ambient temperature: –10 to +55°C]
	Voltage error	
	Temperature error	
	Setting error	
Contact arrangement		1 Form A (Open collector)
Electrical life (contact)		10^7 operations (at rated control voltage)
Electrical	Allowable operating voltage range	85 to 110% of rated operating voltage
	Break down voltage (Initial value)	Between input and output: 1,500 V AC, for 1 min.
	Insulation resistance (Initial value)	Between input and output: 100 MΩ (at 500 V DC)
Mechanical	Functional vibration resistance	10 to 55 Hz (1 cycle/min), Single amplitude: 0.15 mm (10 min. on 3 axes)
	Destructive vibration resistance	10 to 55 Hz (1 cycle/min), Single amplitude: 0.375 mm (1 hr. on 3 axes)
	Functional shock resistance	Min. 98 m/s^2 (4 times on 3 axes)
	Destructive shock resistance	Min. 294 m/s^2 (5 times on 3 axes)
Operating conditions	Operation temperature	–10 to 55°C (without frost or dew)
	Storage temperature	–25 to +65°C (without frost or dew)
	Ambient humidity	35 to 85% RH (non-condensing)
Protective construction		IP66 (front panel with mounting bracket and rubber gasket)

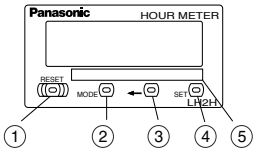
* The factory default preset value is set to 0.1.

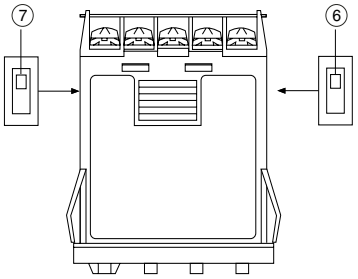
Applicable standard

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)
	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)

Part names

1. Front reset key
This key resets the elapsed value. It does not work when the lock switch is ON.
2. Mode key
Use to set preset values or to switch between each mode.
3. Setting key
Used to set digits of preset values or set each mode.
4. Set key
Use to set preset values or to switch between modes.
5. Time unit seal
Unit seals are included in the package. Affix them in accordance with the time range.
6. Lock switch
Disable the operation of the front panel reset key and the mode key. With the lock switch on, Lock is displayed for about two seconds when the reset key or mode switch is operated.
7. Time range switch
Switch the time range.





※: Default setting when shipped.

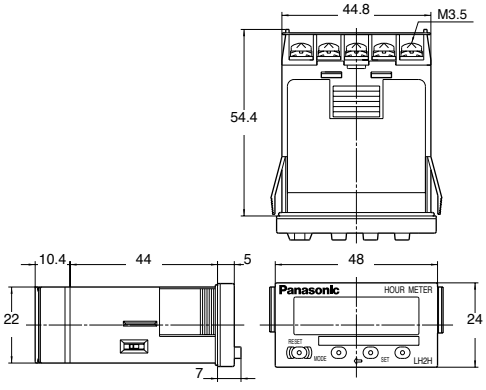
		LH2HP-FEW-DHK-B-DC24V	LH2HP-FEW-HMK-B-DC24V
⑥	Lock switch (unit display 1)	(Terminal block side) ↕ (LCD side)	OFF※ ↕ ON
⑦	Time range switch (unit display 2)	(Terminal block side) ↕ (LCD side) 0 to 999999.9h※ ↕ 0 to 3999d23.9h	(Terminal block side) ↕ (LCD side) 0 to 9999h59.9m※ ↕ 0 to 999h59m59s

Notes: 1. Make the switch setting before installing to panel.
2. Please turn the power off if you change the setting of the time range switch when the power is on. The setting will become valid when the power is turned back on.

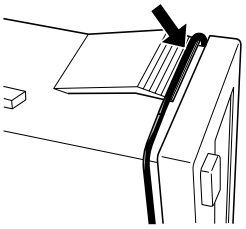
Dimensions

mm
General tolerance: ±1.0

• External dimensions

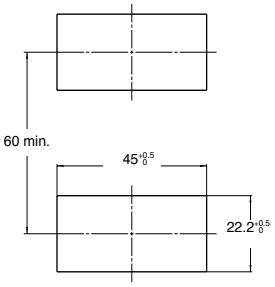


When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.
To prevent the installation spring from pinching the rubber gasket:
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation spring is not pinching the rubber gasket, and then insert and fix the installation spring in place from the rear of the timer unit.

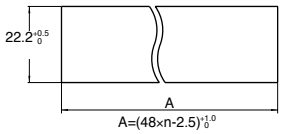


• Panel cut out dimensions

The standard panel cut out is shown below.
Use the mounting frame (ATH3803) and the rubber gasket (ATH3804).
(Only installation frame type)



• For connected installation (sealed installation) (Only installation frame type)



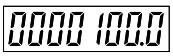
Notes: 1. Suitable installation panel thickness is 1 to 4.5 mm.
2. Waterproofing will be lost when installing repeatedly (sealed installation).

How to set

1. Preset value setting mode

This is the mode for setting preset values.

1) Pressing the MODE key takes you to the preset value setting mode.


Sample display in preset value setting mode (when preset value is 100.0h)

* The factory default preset value is set to 1.0.

2) Pressing the setting key moves the flashing digit left by one. Following the highest digit it returns to the lowest digit and each time the digit setting key is pressed it moves one to the left.

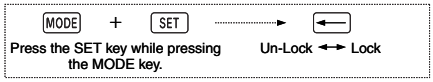
3) Pressing the set key increases the value by one. (After 9 it returns to 0 and then changes to 1, 2, 3, etc.)

4) Pressing the front panel reset key sets the displayed preset value and returns you to the regular operation mode.

5) In the preset value setting mode if you do not operate the digit setting key or the set key for ten seconds or more you will be returned to regular operation. In this case the preset value will not change.

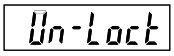
2. Lock mode

This mode prohibits everything except the preset value setting mode.

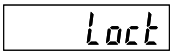


1) Pressing the set key while holding down the mode key takes you to the lock mode.

2) The display reads “Un-Lock” after entering the lock mode (initial setting).


Display after entering lock mode (Example showing “Un-Lock”.)

3) Pressing the setting key changes the display between “ Lock” and “Un-lock”.


(Example showing “ Lock”.)

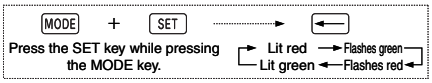
4) Pressing the front panel reset key sets the content displayed and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

5) When the lock mode display reads “ Lock”, you will not be able to move to the backlight setting mode, the time counting direction setting mode, or the operation setting mode.

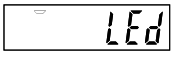
3. Backlight setting mode

This is the mode for setting the backlight during time up.



1) Pressing the SET key two times while holding down the MODE key takes you to the backlight setting mode.

2) The display in the backlight setting mode reads “ LEd”


Display after entering the backlight setting mode.

3) The LED backlight will be red (initial setting).

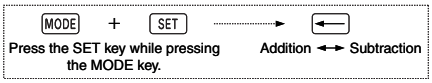
4) The backlight changes from flashing green to flashing red to lit green and to lit red with each press of the setting key.

5) Pressing the front panel reset key sets the current backlight color and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

4. Time counting direction setting mode

This is the mode for setting addition or subtraction.



1) Pressing the SET key three times while holding down the MODE key takes you to the time counting direction setting mode.

2) The display after entering the time counting direction setting mode reads “ UP” (initial setting).


Display after entering time counting direction setting mode (Example showing “UP”)

3) Pressing the setting key changes the display to “dn” (subtraction) and pressing it again changes it to “UP” (addition). The display alternates between “dn” and “UP”.

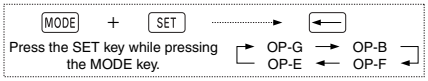

(Example showing “dn”)

4) Pressing the front panel reset key sets the content displayed and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

5. Operation mode

This sets the operation mode.

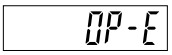


1) Pressing the SET key four times while holding down the MODE key takes you to the operation setting mode.
2) The display reads “OP-G” (Totalizing ON delay) after entering the operation setting mode.

3) Pressing the setting key causes the display to change as follows:
OP-B (Signal ON delay)

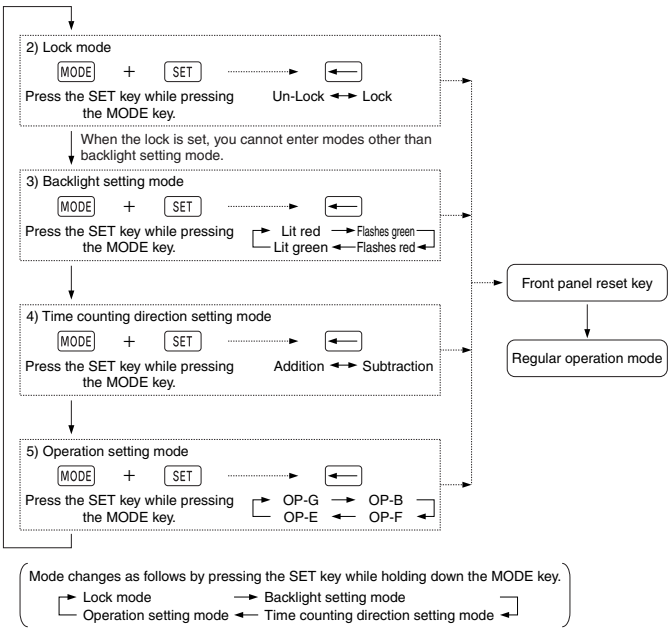
OP-F (Signal flicker)

OP-E (Pulse ON delay)



OP-G (Totalizing ON delay)
4) Pressing the front panel reset key sets the display content and returns you to regular operation mode.

Note: You will not be returned to regular operation mode if you do not press the front panel reset key.



Please be aware that after doing a front panel reset key and returning to regular operation mode, the preset values, elapsed value and output will be as shown in this table.

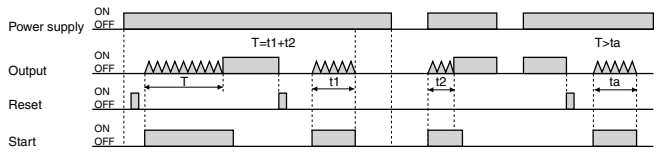
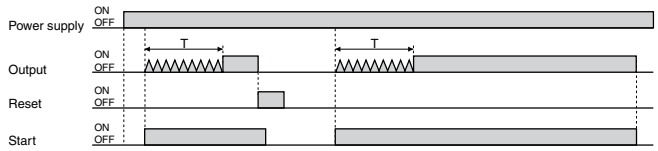
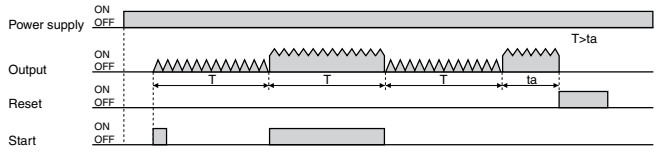
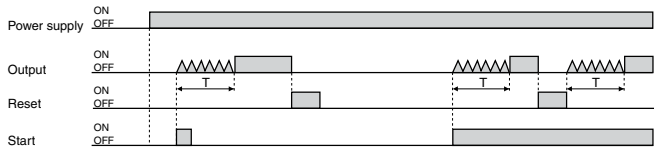
	Preset value	Elapsed value	Output change
Lock mode	×	×	×
Backlight setting mode	×	×	×
Time counting direction setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF
Operation setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF

Note: “×” sign: No change

Changing the set time (preset value)

1. It is possible to change the set time even during time delay with the timer. However, be aware of the following points.
1) If the set time is changed to less than the elapsed time (elapsed value) with the time delay set to the addition direction, time delay will continue until the elapsed time reaches full scale, returns to “0 (zero)”, and then reaches the new set time.
If the set time is changed to a time above the elapsed time, the time delay will continue until the elapsed time reaches the new set time.
2) If the time delay is set to the subtraction direction, time delay will continue until “0 (zero)” regardless of the new set time.
2. If the set time is changed to “0 (zero)”, the hour meter will operate differently depending on the operation mode.
In the G (Totalizing ON delay), B (Signal ON delay), and E (Pulse ON delay) modes, the output turns ON when the start input is ON. However, the output will be OFF while reset is being input.
In the F (Signal flicker) mode, the flicker operation will not work even if start input is turned ON.

Operation mode

Operation mode	Explanation	Time chart
Totalizing ON delay Ⓖ	• Elapsed value does not clear at power ON. (Power outage countermeasure function) • The output remains ON even after the power is OFF and restarted.	
Signal ON delay Ⓑ	• Clears elapsed value at power ON. • Time delay starts at start ON and output resets at start OFF. • Time delay starts at reset OFF and power ON while start is ON.	
Signal Flicker Ⓕ	• Clears elapsed value at power ON. • Time delay starts at start ON. • After timer completion, control output reverses, elapsed value clears, and time delay starts. • Ignores start input during time delay.	
Pulse ON delay Ⓔ	• Clears elapsed value at power ON. • Time delay starts at start ON. • After timer completion, control output is ON. • Ignores start input during time delay.	

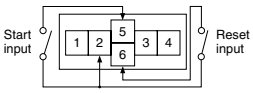
Cautions for use

1. Input and output connection

1) Input connection

(1) Contact input

Use highly reliable metal plated contacts. Since the contact's bounce time leads directly to error in the timer operating time, use contacts with as short a bounce time as possible.



(2) Non-contact input (Transistor input)

Connect with an open collector. Use transistors whose characteristics satisfy the criteria given below.

V_{CEO} = Min. 20 V

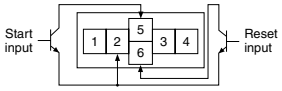
I_C = Min. 20 mA

I_{CBO} = Max. 6 μA

Also, use transistors with a residual voltage of less than 2 V when the transistor is on.

* The short-circuit impedance should be less than 1 kΩ.

(When the impedance is 0 Ω, the current coming from the start input terminal is approximately 5 mA and from the reset input terminal is approximately 1.5 mA.) Also, the open-circuit impedance should be more than 100 kΩ.



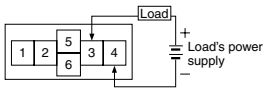
(3) Input wiring

When wiring, use shielded wires or metallic wire tubes, and keep the wire lengths as short as possible.

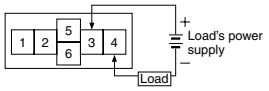
2) Output connection

Since the transistor output of hour meter is insulated from the internal circuitry by a photo-coupler, it can be used as an NPN output or PNP (equal value) output.

As NPN output



As PNP output



2. Self-diagnosis function

If a malfunction occurs, one of the following displays will appear.

Display	Contents	Output condition	Restoration procedure	Preset values after restoration
Err-00	Malfunctioning CPU	OFF	Enter front reset key or restart hour meter	Preset value at start-up before the CPU malfunction occurred
Err-01	Malfunctioning memory*			0

* Includes the possibility that the EEP-ROM's life has expired.

3. Power failure memory

The EEP-ROM is overwriting with the following timing.

Operation mode	Overwrite timing
G (Totalizing ON delay) mode	Change of preset value or when power is OFF after start and reset input turns ON
Other modes	When power is OFF after changing preset value

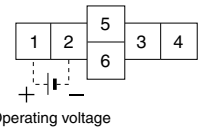
4. Terminal connection

1) When wiring the terminals, refer to the terminal layout and wiring diagrams and be sure to perform the wiring properly without errors.

Tighten the terminal screws with a torque of 0.8 N·cm or less. The screws are M3.5.

An external power supply is required in order to run the main unit.

Power should be applied between terminals (1) and (2). Terminal (1) acts as the positive connection and terminal (2) as the negative.



Operating voltage

2) After turning the hour meter off, make sure that any resulting induced voltage or residual voltage is not applied to power supply terminals (1) through (2). (If the power supply wire is wired parallel to the high voltage wire or power wire, an induced voltage may be generated at the power supply terminal.)

3) Have the power supply voltage pass through a switch or relay so that it is applied at one time.

Compliance with the CE marking

• EMC Directive (89/336/EEC)

The LH2H Preset Hour Meter conforms to the EMC Directive as a simple hour meter.

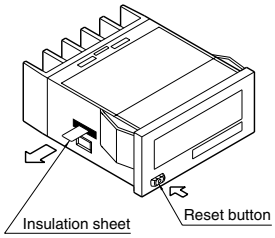
Applicable standards: EN61000-6-4, EN61000-6-2

Cautions for use

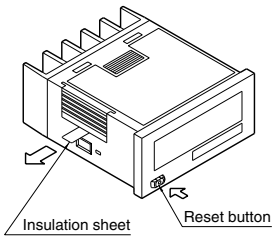
1. Insulation sheet

Before using a panel mounting type, please pull and remove the insulation sheet in the direction of the arrow.
In consideration that the product might be stored for long periods without being used, an insulation sheet is inserted before shipping. Remove the insulation sheet and press the front reset button.

• LH2H hour meter (one-touch installation type)



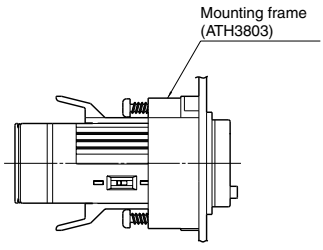
• LH2H hour meter (installation frame type)



2. Waterproof construction

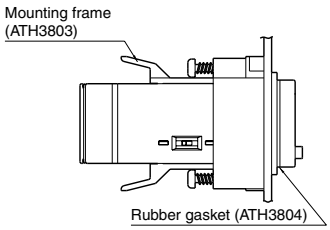
• LH2H hour meter (installation frame type)

The operation part of the panel installation type (installation frame type) is constructed to prevent water from entering the unit and a rubber gasket is provided to prevent water from entering the gap between the unit and the panel cutout.
There must be sufficient pressure applied to the rubber gasket to prevent water from entering.
Be sure to use the mounting screws when installing the mounting frame (ATH3803).
Note: The one-touch installation type is not waterproof.



• LH2H preset hour meter

1) When using the waterproof type (IP66: panel front only), install the hour meter to the front plate with mounting frame ATH3803 (sold separately) and rubber gasket ATH3804 (sold separately). Be sure to tighten using mounting screws.



When installing the mounting frame and rubber gasket please remove the pre-attached o-ring.

2) Panel installation order
   (1) Remove o-ring.
   (2) Place rubber gasket.
   (3) Insert hour meter into panel.
   (4) Insert mounting frame from the rear.
   (5) Secure with mounting screws (two locations)

3. Do not use in the following environments

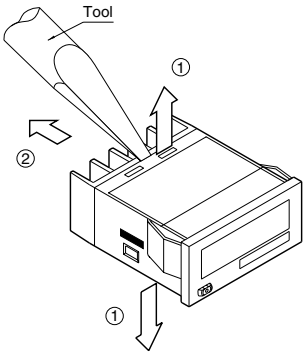
1) In places where the temperature changes drastically.
2) In places where humidity is high and there is the possibility of dew.
(When dew forms the display may vanish and other display errors may occur.)

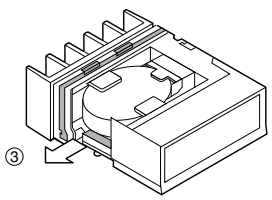
4. Conditions of use

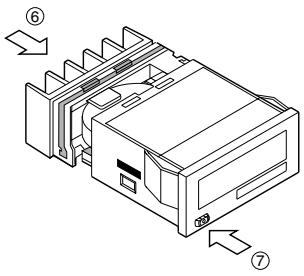
1) Do not use on places where there is flammable or corrosive gas, lots of dust, presence of oil, or where the unit might be subject to strong vibrations or shocks.
2) Since the cover is made of polycarbonate resin, do not use in places where the unit might come into contact with or be exposed to environments that contain organic solvents such as methyl alcohol, benzene and thinner, or strong alkali substances such as ammonia and caustic soda.

5. Cautions regarding battery replacement

1) Remove wiring before replacing the battery. You may be electrocuted if you come into contact to a part where high voltage is applied.
2) Make sure you are not carrying a static electric charge when replacing the battery.
3) Battery replacement procedure
   For LH2H hour meter (one-touch installation type)
   (1) Remove the up/down hook of the case using a tool.
   (2) Pull the unit away from the case.
   (3) Remove the battery from the side of the unit. Do not touch the display or other parts.
   (4) Before inserting wipe clean the surface of the new battery.
   (5) Insert the new battery with the "+" and "–" sides in the proper position.
   (6) After replacing the battery, return the unit to the case. Verify that the hook of the case has properly engaged.
   (7) Before using, press the reset button on the front.

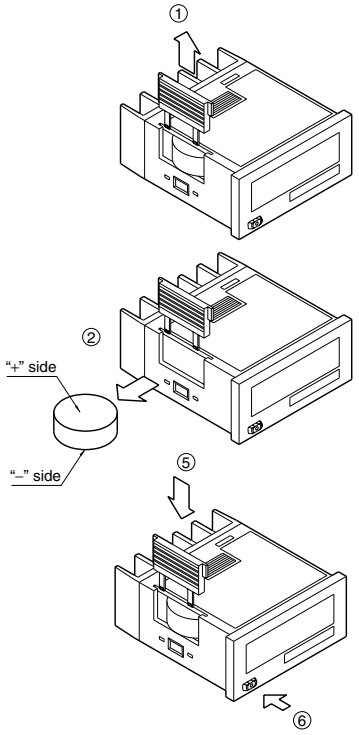






For LH2H hour meter
(installation frame type)

(1) Remove the battery cover from the case.
(2) Remove the battery from the side of the case. The battery will come loose if you put the battery side face down and lightly shake the unit.
(3) Before inserting wipe clean the surface of the new battery.
(4) Insert the new battery with the "+" and "–" sides in the proper position.
(5) After replacing the battery, return the battery cover to the case. Verify that the hook of the battery cover is properly engaged.
(6) Before using press the reset button on the front.



TH23 series (with reset function)

TH13 series (without reset function)

TH13 / TH23

HOUR METER

Features

- **High-performance compact synchronous motor**
  The accurately turning motor is employed to provide for longer period of measurement.
- **Compact and stylish**
- **Easier wiring**
  The flat terminals (#187) are quick and easy to connect.
- **Rotary indicator**
  The rotary indicator makes one turn every 2 minutes for monitoring.
- **Compliant with UL, CSA and CE, UL File No.: E42876 CSA File No.: LR39291**

Typical applications

Maintenance management of machine tools, automated machines, control panels, forming machines, medical equipment, generators, compressors, water treatment facilities, presses, motors, etc.

Product types

Type	Operating voltage	Part number		Operating voltage	Part number	
		50Hz	60Hz		50Hz	60Hz
TH13 types (without reset button)	100V AC	TH1345	TH1346	115V AC (115 to 120V AC)	TH1375	TH1376
	200V AC	TH1355	TH1356	220V AC	TH1385	TH1386
	110V AC	TH1365	TH1366	240V AC	TH1395	TH1396
TH23 types (with reset button)	100V AC	TH2345	TH2346	115V AC (115 to 120V AC)	TH2375	TH2376
	200V AC	TH2355	TH2356	220V AC	TH2385	TH2386
	110V AC	TH2365	TH2366	240V AC	TH2395	TH2396

Note) The 115 to 120V AC, 220V AC and 240V AC types are UL-recognized and CSA-certified. For those products, specify “U” at the end of the part number when ordering.

Specifications

Rated operating voltage		100V AC, 200V AC, 110V AC, 115 to 120V AC, 220V AC, 240V AC	
Allowable operating voltage range		85 to 115% of rated operating voltage	
Rated frequency		50 Hz, 60 Hz (other model)	
Counting range		0 to 99999.9 hours (TH13 series) 0 to 9999.9 hours (TH23 series)	
Minimum time display		0.1 hours (6 min)	
Rated power consumption		Approx. 1.5 W	
Insulation resistance (Initial value)		Min. 100 MΩ, Between live and dead metal parts (at 500V DC)	
Breakdown voltage (Initial value)		2,000 Vrms, Between live and dead metal parts	
Max. temperature rise		55°C	
Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min double amplitude of 0.5 mm (10 min on 3 axes)	
Shock resistance	Functional	Min. 98 m/s² {10 G} (4 times on 3 axes)	
	Destructive	Min. 980 m/s² {100 G} (5 times on 3 axes)	
Ambient temperature		–10 to +50°C	
Ambient humidity		Max. 85% RH (non-condensing)	
Weight		135 g	130 g

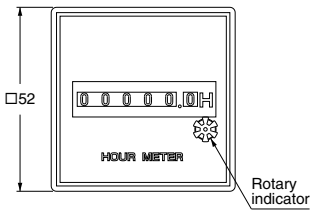
Applicable standard

Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category II
EMC	(EMI)EN61000-6-4 Radiation interference electric field strength Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Surge immunity Conductivity noise immunity Power frequency magnetic field immunity Voltage dip/Instantaneous stop/Voltage fluctuation immunity	EN55011 Group1 ClassA EN55011 Group1 ClassA EN61000-4-2 4 kV contact 8 kV air EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz) 10 V/m pulse modulation (895 MHz to 905 MHz) EN61000-4-4 2 kV (power supply line) EN61000-4-5 1 kV (power line) EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz) EN61000-4-8 30 A/m (50 Hz) 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)

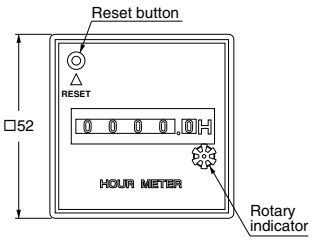
Dimensions

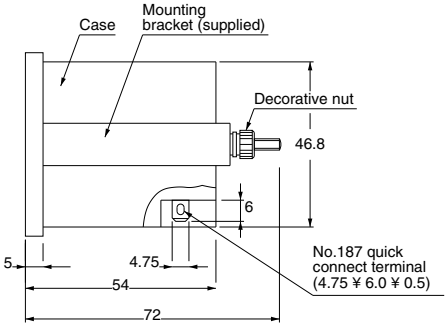
mm
General tolerance: ±1.0

• TH13 series



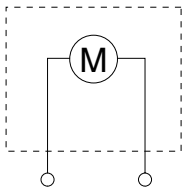
• TH23 series





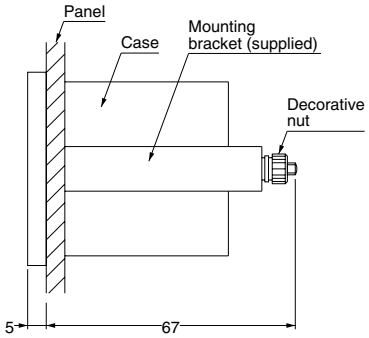
(TH13 and TH23 series common)

Wiring diagram

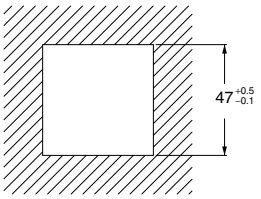


Operating power supply

Panel mounting



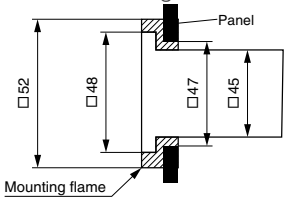
• Panel cutout dimensions



Replacing the TH13/23 series with the TH14/24 series

The TH13/TH23 series hour meter are interchangeable with the TH14/24 series hour meter. Use the specified mounting frame because of a different setup method. It is advisable to introduce the TH14/24 series hour meters for the first time.

DIN48 size and mounting frame setup



Mounting frame
(sold separately):
TH1400020


Silver panel


Black panel

TH24 series (with reset button)


Silver panel


Black panel

TH14 series (without reset button)

TH14 / TH24

DIN 48 SIZE HOUR METER

Features

- **High-performance compact syncronous motor**
  The accurately turning motor is employed to provide for longer period of measurement.
- **Common for 50/60 Hz power frequency**
- A lever is used to select 50 Hz or 60 Hz. There is no need to rearrange the control panel and other signal destinations.
- **Dimensions as per DIN 43700 standard**
- The units are in the 48x48 DIN standard size. They can be fitted in panels and give refined metallic appearance.
- **Easier wiring**
  The flat terminals (#187) are quick and easy to connect.
- **Rotary indicator**
  The rotary indicator makes one turn every 2 minutes for monitoring.
- **Compliant with UL, CSA and CE, UL File No.: E42876 CSA File No.: LR39291**

Typical applications

Maintenance management of machine tools, automated machines, control panels, forming machines, medical equipment, generators, compressors, water treatment facilities, presses, motors, etc.

Product types

Type	Operating voltage	Part number		Operating voltage	Part number		Operating voltage	Part number	
		Silver panel	Black panel		Silver panel	Black panel		Silver panel	Black panel
TH14 series (without reset button)	100V AC	TH141S	TH141	24V AC	TH144S	TH144	115 to 120V AC	TH147S	TH147
	200V AC	TH142S	TH142	48V AC	TH145S	TH145	220V AC	TH148S	TH148
	12V AC	TH143S	TH143	110V AC	TH146S	TH146	240V AC	TH149S	TH149
TH24 series (with reset button)	100V AC	TH241S	TH241	24V AC	TH244S	TH244	115 to 120V AC	TH247S	TH247
	200V AC	TH242S	TH242	48V AC	TH245S	TH245	220V AC	TH248S	TH248
	12V AC	TH243S	TH243	110V AC	TH246S	TH246	240V AC	TH249S	TH249

Note) Only the black-panel type is UL-recognized and CSA-certified. For this type, specify “U” at the end of the part number when ordering.

Specifications

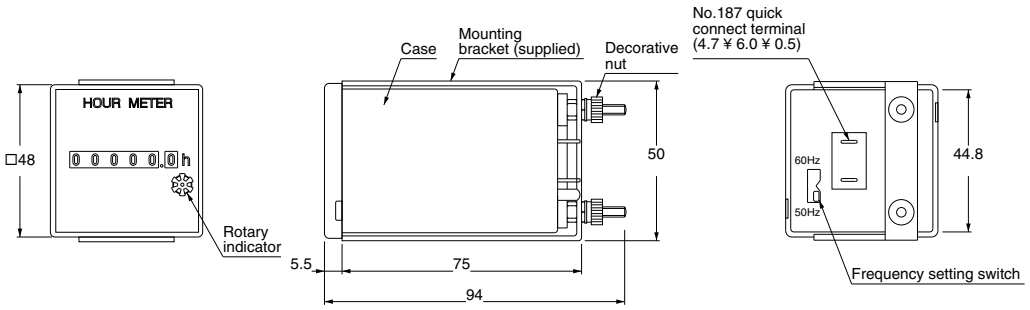
Rated operating voltage		12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC
Allowable operating voltage range		85 to 115% of rated operating voltage
Rated frequency		50/60 Hz (selectable by switch)
Counting range		0 to 99999.9 hours (TH14 series) 0 to 9999.9 hours (TH24 series)
Minimum time display		0.1 hours (6 min)
Rated power consumption		Approx. 1.5 W
Insulation resistance (Initial value)		Min. 100 MΩ; Between live and dead metal parts (At 500V DC)
Breakdown voltage (Initial value)		2,000 Vrms Between live and dead metal parts
Max. temperature rise		55°C
Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min double amplitude of 0.5 mm (10 min on 3 axes)
Shock resistance	Functional	Min 98 m/s^2 {10 G} (4 times on 3 axes)
	Destructive	Min 980 m/s^2 {100 G} (5 times on 3 axes)
Ambient temperature		–10 to +50°C
Ambient humidity		Max. 85% RH (non-condensing)
Weight		145 g (TH14 series) / 150 g (TH24 series)

Applicable standard

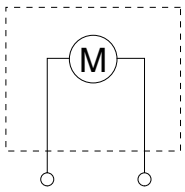
Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category II
EMC	(EMI)EN61000-6-4 Radiation interference electric field strength Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Surge immunity Conductivity noise immunity Power frequency magnetic field immunity Voltage dip/Instantaneous stop/Voltage fluctuation immunity	EN55011 Group1 ClassA EN55011 Group1 ClassA EN61000-4-2 4 kV contact 8 kV air EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz) 10 V/m pulse modulation (895 MHz to 905 MHz) EN61000-4-4 2 kV (power supply line) EN61000-4-5 1 kV (power line) EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz) EN61000-4-8 30 A/m (50 Hz) 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)

Dimensions (TH14 and TH24 series common)

mm
General tolerance: ±1.0



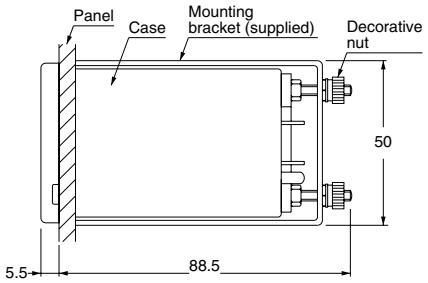
Wiring diagram



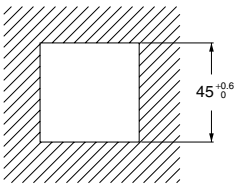
Operating power supply

Panel mounting

mm



• Panel cutout dimensions



Black panel

TH40

DIN 48
DUAL INDICATOR
HOUR METER

Features

- **Upgraded composite function**
  Specified-period measurement and total-time measurement can be monitored on a single hour meter.
- **High-performance compact syncronous motor**
  The accurately turning motor is employed to provide for longer period of measurement.
- **Common for 50/60 Hz power frequency**
  A lever is used to select 50 Hz or 60 Hz. There is no need to rearrange the control panel and other signal destinations.
- **Dimensions as per DIN 43700 standard**
  The units are in the 48x48 DIN standard size. They can be fitted in panels and give refined metallic appearance.
- **Easier wiring**
  The flat terminals (#187) are quick and easy to connect.
- **Rotary indicator**
  The rotary indicator makes one turn every 2 minutes for monitoring.
- **Compliant with CE.**

Product types

Type	Operating voltage	Part number		Operating voltage	Part number		Operating voltage	Part number	
		Silver panel	Black panel		Silver panel	Black panel		Silver panel	Black panel
TH40 series	100V AC	TH401S	TH401	24V AC	TH404S	TH404	115 to 120V AC	TH407S	TH407
	200V AC	TH402S	TH402	48V AC	TH405S	TH405	220V AC	TH408S	TH408
	12V AC	TH403S	TH403	110V AC	TH406S	TH406	240V AC	TH409S	TH409

Specifications

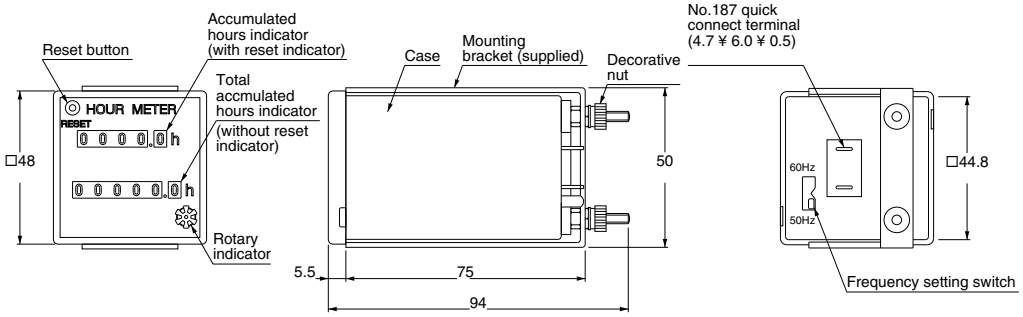
Rated operating voltage		12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC
Allowable operating voltage range		85 to 115% of rated operating voltage
Rated frequency		50/60 Hz (selectable by switch)
Counting range		0 to 9999.9 hours (upper side) ... with reset indicator 0 to 99999.9 hours (lower side) ... without reset indicator
Minimum time display		0.1 hours (6 min)
Rated power consumption		Approx. 1.5 W
		Min. 100 MΩ; Between live and dead metal parts (At 500V DC)
Breakdown voltage (Initial value)		2,000 Vrms Between live and dead metal parts
Max. temperature rise		55°C
Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min double amplitude of 0.5 mm (10 min on 3 axes)
Shock resistance	Functional	Min 98 m/s² {10 G} (4 times on 3 axes)
	Destructive	Min 980 m/s² {100 G} (5 times on 3 axes)
Ambient temperature		–10 to +50°C
Ambient humidity		Max. 85% RH (non-condensing)
Weight		160 g

Applicable standard

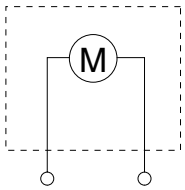
Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category II
EMC	(EMI)EN61000-6-4 Radiation interference electric field strength Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Surge immunity Conductivity noise immunity Power frequency magnetic field immunity Voltage dip/Instantaneous stop/Voltage fluctuation immunity	EN55011 Group1 ClassA EN55011 Group1 ClassA EN61000-4-2 4 kV contact 8 kV air EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz) 10 V/m pulse modulation (895 MHz to 905 MHz) EN61000-4-4 2 kV (power supply line) EN61000-4-5 1 kV (power line) EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz) EN61000-4-8 30 A/m (50 Hz) 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)

Dimensions

mm
General tolerance: ±1.0



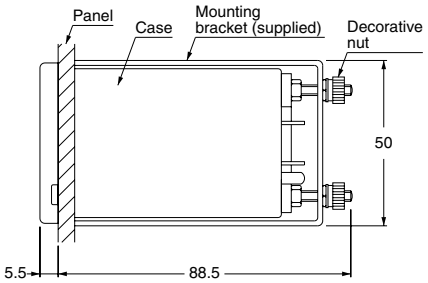
Wiring diagram



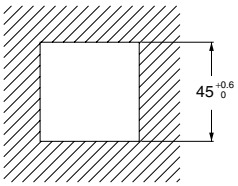
Operating power supply

Panel mounting

mm



• Panel cutout dimensions



TH23 series (with reset function)

TH13 series (without reset function)

TH63 / TH64

DIN HALF SIZE HOUR METER

Features

- **Compact to save panel space**
  The 24x48 mm hour met ers are just half the DIN 48x48 standard size. They help save the panel space.
- **Reset button**
  The hour meters can be reset to zero (TH64 series).
- **Wide-ranging measurement display**
  The measurement can be displayed from 0.1 hour up to 99999.9 hours (TH63 series). The dial size is the same as that of 48x48 DIN size hour meters (TH14 and TH24 series).
- **Easy to install**
  The flat terminals (#187) are used for easier wiring. There is no need to undo the lock spring.
- **High-performance sync motor with 50/60 Hz selector**
  The noise-resistant, accurately turning motor is employed to provide for longer period of measurement. The power frequency can be selected for 50 or 60 Hz.
- **Rotary indicator**
  The rotary indicator makes one turn every 72 seconds for monitoring.
- **Compliant with UL, CSA and CE.**

Typical applications

Management of small generators and food processing machines; hour counting for leased equipment; maintenance management of various equipment, etc.

Product types

Type	Operating voltage	Part number	Operating voltage	Part number		
TH63 series (without reset button)	100V AC	TH631	24V AC	TH634	115 to 120V AC	TH637
	200V AC	TH632	48V AC	TH635	220V AC	TH638
	12V AC	TH633	110V AC	TH636	240V AC	TH639
TH64 series (with reset button)	100V AC	TH641	24V AC	TH644	115 to 120V AC	TH647
	200V AC	TH642	48V AC	TH645	220V AC	TH648
	12V AC	TH643	110V AC	TH646	240V AC	TH649

Specifications

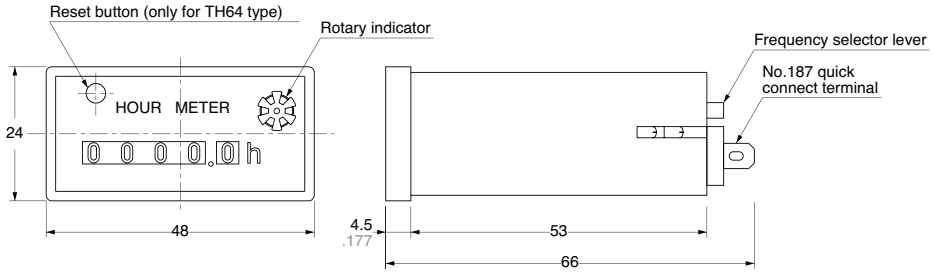
Rated operating voltage		12 V AC, 24 V AC, 48 V AC, 100 V AC, 110 V AC, 115 to 120 V AC, 200 V AC, 220 V AC, 240 V AC
Allowable operating voltage range		85 to 115% of rated operating voltage
Rated frequency		50/60 Hz (selectable by switch)
Counting range		0 to 99999.9 hours (TH63 series) 0 to 9999.9 hours (TH64 series)
Minimum time display		0.1 hours (6 min)
Rated power consumption		Approx. 1.5 W
Insulation resistance (Initial value)		Min. 100 MΩ, Between live and dead metal parts (At 500 V DC)
Breakdown voltage (Initial value)		2,000 Vrms, Between live and dead metal parts
Max. temperature rise		55°C
Vibration resistance	Functional	10 to 55 Hz: 1 cycle/min double amplitude of 0.5 mm (10 min on 3 axes)
Shock resistance	Functional	Min 98 m/s² {10 G} (4 times on 3 axes)
	Destructive	Min 980 m/s² {100 G} (5 times on 3 axes)
Ambient temperature		–10 to +50°C
Ambient humidity		Max. 85% RH (non-condensing)
Weight		Approx. 80 g

Applicable standard

Safety standard	EN61010-1	Pollution Degree 2/Overvoltage Category II
EMC	(EMI)EN61000-6-4 Radiation interference electric field strength Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Surge immunity Conductivity noise immunity Power frequency magnetic field immunity Voltage dip/Instantaneous stop/Voltage fluctuation immunity	EN55011 Group1 ClassA EN55011 Group1 ClassA EN61000-4-2 4 kV contact 8 kV air EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz) 10 V/m pulse modulation (895 MHz to 905 MHz) EN61000-4-4 2 kV (power supply line) EN61000-4-5 1 kV (power line) EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz) EN61000-4-8 30 A/m (50 Hz) 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)

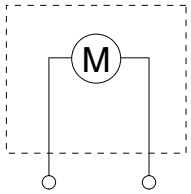
Dimensions

mm
General tolerance: ±0.5



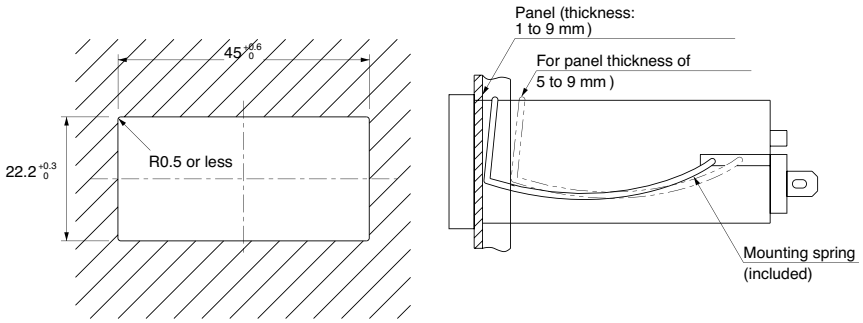
Wiring diagram

mm



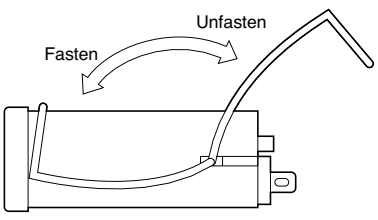
Operating power supply

• Panel cutout dimensions



Mounting

1. Cut a $22.2^{+0.3}_{0}$ × $45^{+0.6}_{0}$ mm opening in the panel.
2. Swing the mounting spring to the rear of the hour meter and fit the hour meter into the panel opening. (There is no need to detach the mounting spring from the hour meter.) If the panel is 5 to 9 mm thick, move the mounting spring to the other hole toward the rear of the hour meter.
3. Swing the mounting spring to the front of the hour meter to secure the hour meter to the panel.
4. Wire the supplied quick connectors and connect to the hour meter. Be sure to use the supplied insulating sleeves to cover the connectors.



TH8

DIN HALF SIZE HOUR METER

Features

- **IP66 waterproof construction**
  The front panel surface keeps water and dust out. Perfect for use in rough conditions.
- **Includes operation light (LED)**
  The operation LED illuminates so you can quickly verify operation status.
- **Compliant with UL, c-UL and CE.**

Product type

Installation	Measurement time	Operation light	Rated voltage	Part No.
Panel installation	0 to 9999.9 hours	LED illuminates while operating.	12 V DC	TH833C
			24 V DC	TH834C

Note: Products are UL and c-UL certified as standard. (Suffix "U" is not required ON part numbers when ordering.)

Specifications

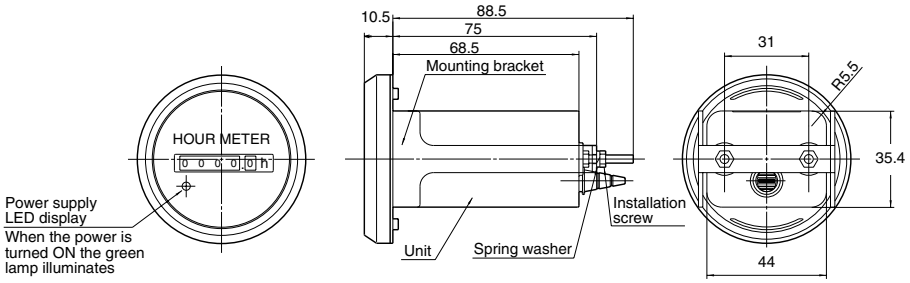
Item \ Type		TH833C	TH834C
Rating	Rated voltage	12 V DC	24 V DC
	Usage voltage range	10.2 to 15.6 V DC	20.4 to 31.2 V DC
	Measurement time	0 to 9999.9 hours	
	Min. measurement time	0.1 hour (6 min.)	
	Power consumption	Approx. 1.5 W (With rated voltage applied at 25°C)	
Electrical characteristics	Insulation resistance (initial)	Min. 100 MΩ between charged and uncharged parts (measured at 500 V DC)	
	Breakdown voltage (initial)	Between charged and uncharged parts: 2,000 V AC for 1 minute.	
	Temperature rise	Max. 55°C (measured at rated voltage and resistance law)	
Mechanical characteristics	Functional vibration resistance	10 to 55 Hz (1 cycle/min.) Single amplitude: 0.35 mm (10 min. ON 3 axes)	
	Functional shock resistance	Min. 98 m/s² (4 times ON 3 axes)	
	Destructive vibration resistance	Min. 980 m/s² (5 times ON 3 axes)	
Usage conditions	Operation temperature	–20°C to +60°C (Without due and frost)	
	Ambient humidity	35 to 85% RH (relative humidity) (non-condensing)	
	Power supply ripple	Approx. 48% or less (single phase, all-wave rectification)	
Protective construction		IP66 (front panel with a rubber gasket)	

Applicable standard

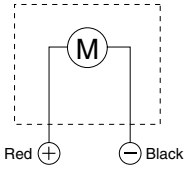
EMC	(EMI)EN61000-6-4	
	Radiation interference electric field strength	EN55011 Group1 ClassA
	Noise terminal voltage	EN55011 Group1 ClassA
	(EMS)EN61000-6-2	
	Static discharge immunity	EN61000-4-2 4 kV contact 8 kV air
	RF electromagnetic field immunity	EN61000-4-3 10 V/m AM modulation (80 MHz to 1 GHz)
	EFT/B immunity	EN61000-4-4 2 kV (power supply 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)

Dimensions and part names (unit: mm)

Tolerance: ±1.0

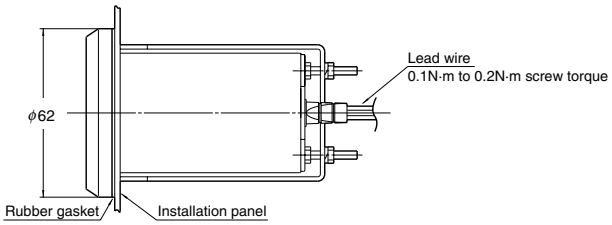


Wiring diagram

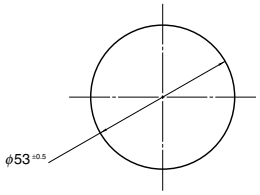


Operation voltage

Panel installation diagram



Panel cutout dimensions



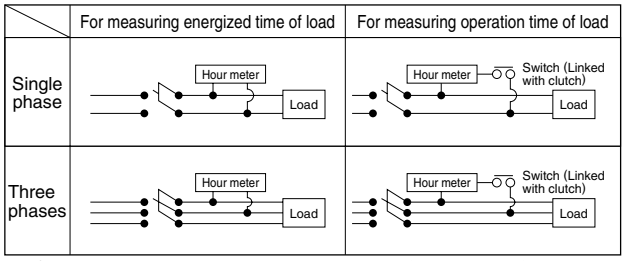
(Unit: mm)

1. Frequency setting

Frequency is specified for AC motor-driven hour meters. Before installing, be sure to check your local power frequency.

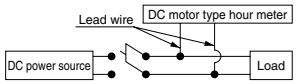
2. Connections

• TH13,23,14,24,40,50,63,64



Note) Make the connection with the accompanying flat connector first and then with the hour meter's terminal (#187). In such case, be sure to cover the connection with the accompanying insulating sleeve.

• TH70, TH8



Note) Solder the lead wires in position.

3. Safety precautions

Do not use the hour meters in the following places.

- Where ambient temperature is below –10° or above +50°C
- In wet, dusty or gaseous environments
- Where exposed to vibrations and shocks
- Outdoors, or where exposed to rain or direct sunlight

4. Compliant with CE.

- LH2H

  Ambient conditions:

  Overvoltage category III, contamination factor 2, indoor use. Ambient temperature and humidity –10 and +55°C and 35% to 85%RH respectively.

- TH13, 23, 14, 24, 40, 50, 63, 64

  Ambient conditions:

  Overvoltage category II, contamination factor 2, indoor use. Ambient temperature and humidity –10 and +50°C and below 85%RH respectively.

5. Reset-type hour meter

- Precautions for use

  If the number indications are off before use, press the reset button and confirm that all zeroes ("0") are displayed.

- Resetting caution

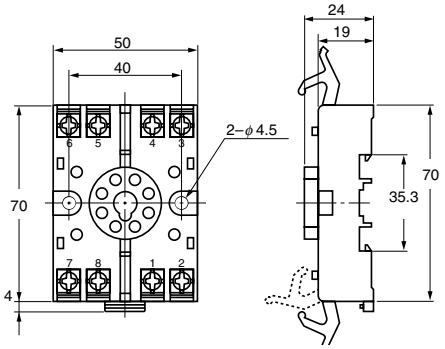
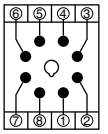
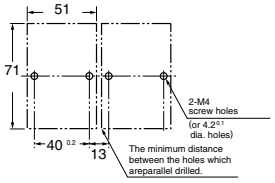
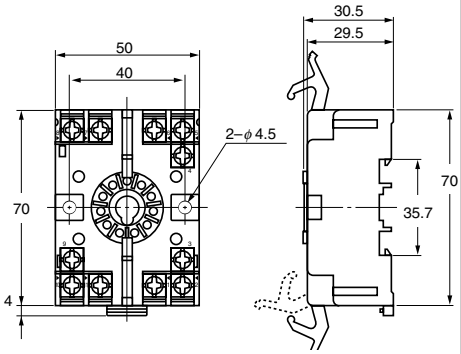
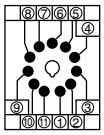
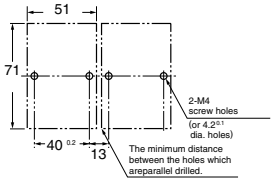
  Exercise due caution as an insufficient amount of pressure on the reset button may result in abnormal readings.

6. Acquisition of CE marking

Please abide by the conditions below when using in applications that comply with EN 61010-1/IEC 61010-1

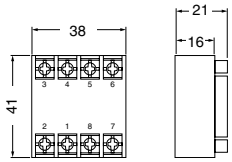
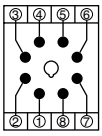
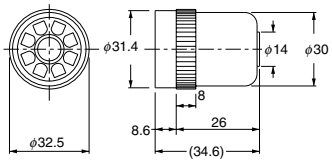
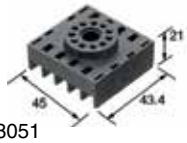
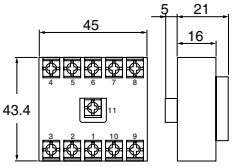
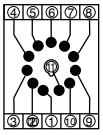
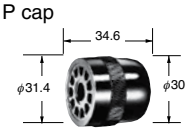
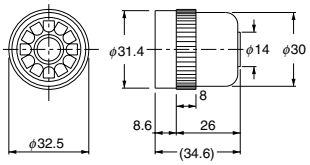
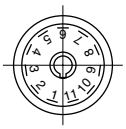
1) Ambient conditions
   - Overvoltage category II, pollution level 2
   - Indoor use
   - Acceptable temperature and humidity range: -10 to +55°C, 35 to 85%RH (with no condensation at 20°C)
   - Under 2000 m elevation
2) Use the main unit in a location that matches the following conditions.
   - There is minimal dust and no corrosive gas.
   - There is no combustible or explosive gas.
   - There is no mechanical vibration or impacts.
   - There is no exposure to direct sunlight.
   - Located away from large-volume electromagnetic switches and power lines with large electrical currents.
3) Connect a breaker that conforms to EN60947-1 or EN60947-3 to the voltage input section.
4) Applied voltage should be protected with an overcurrent protection device (example: T 1A, 250 V AC time lag fuse) that conforms to the EN/IEC standards. (Free voltage input type)

Terminal sockets (Unit: mm Tolerance: ±1)

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
LC4H (8-pin type)	• DIN rail socket (8-pin)  ATC180031		 Note: Terminal No. on the main body are identical to those on the terminal socket.	
LC4H LC4H-S LC4H-W (11-pin type)	• DIN rail socket (11-pin)  ATC180041		 Note: Terminal No. on the main body are identical to those on the terminal socket.	

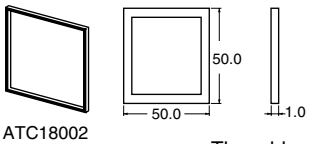
Note: The terminal numbers on the counter are identical to those on the terminal socket.

Sockets

Type	Appearance	Dimensions	Terminal wiring (Top view)	Mounting hole dimensions
LC4H (8-pin type)	• Rear terminal socket  AT78041			—
	• 8P cap  AD8-RC			—
LC4H LC4H-S LC4H-W (11-pin type)	• Rear terminal socket  AT78051			—
	• 11P cap  AT8-DP11			—

Note: The terminal numbers on the counter are identical to those on the socket.

• Rubber gasket



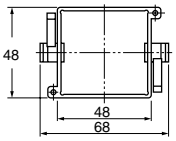
ATC18002

Applicable for LC4H series

The rubber gasket is enclosed in the LC4H series.

• Mounting frame

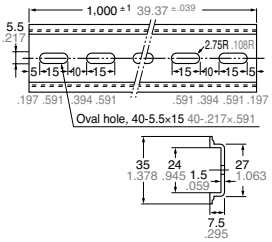
AT8-DA4



Applicable for LC4H series

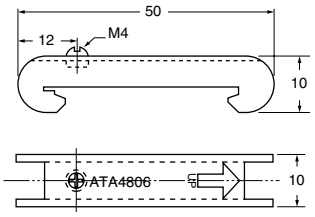
• Mounting rails (Applicable for DIN and IEC standards)

AT8-DLA1
Length: 1 m
aluminum



• Fastening plate

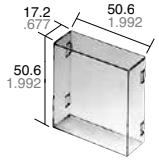
ATA4806



For holding DIN rails

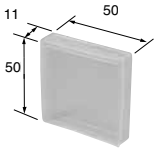
• Protective cover for DIN 48 size

Hard type



AQM4801

Flexible type



AQM4803

• Panel cover (Black)

LC4H Panel cover (4 digits)	LC4H Panel cover (6 digits)	LC4H-S Panel cover (4 digits)	LC4H-S Panel cover (6 digits)	LC4H-W Panel cover (6 digits)
				
AEL58011	AEL58012	AEL58013	AEL58014	AEL68011

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

Options

1. Accessories (for LC2H total counter)
Panel cover (black)

Part No.: AEL3801
You can change the design of the front panel by replacing it with this black panel cover. The counter comes with an ash gray panel cover as standard.
Note: No panel cover accessory (black) is available for the LC2H preset counter.

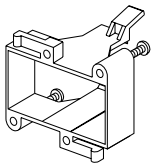
2. Lithium battery (3 V)

Part No.: ATH3802
Packaged with the LC2H (excluding the PC board mounting type).

⚠ Warning

- Make sure the "+" and "–" polarities are positioned correctly.
- Do not throw the old battery into a fire, short circuit it, take it apart, or allow it to come into contact with heat.
- The battery is not rechargeable.

3. Installation parts
Mounting frame
(Suitable for installation frame type LC2H total counter and LC2H preset counter)



Part No.: ATH3803
Packaged with the mounting bracket type LC2H total counter

Rubber gasket
(Suitable for installation bracket type LC2H total counter and LC2H preset counter)

Part No.: ATH3804
Packaged with the mounting bracket type LC2H total counter

Options

1. Accessories (for LH2H hour meter)
Panel cover (black)

Part No.: ATH3801
You can change the design of the front panel by replacing it with this black panel cover. The counter comes with an ash gray panel cover as standard.
Note: No panel cover option (black) is available for the LH2H preset hour meter.

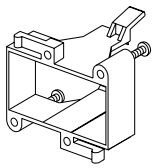
2. Lithium battery (3 V)

Part No.: ATH3802
Packaged with the LH2H (excluding the PC board mounting type).

⚠ Warning

- Make sure the "+" and "–" polarities are positioned correctly.
- Do not throw the old battery into a fire, short circuit it, take it apart, or allow it to come into contact with heat.
- The battery is not rechargeable.

3. Installation parts
Mounting frame
Suitable for installation frame type LH2H hour meter and LH2H preset hour meter



Part No.: ATH3803
Packaged with the mounting bracket type LH2H hour meter

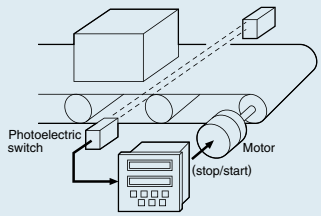
Rubber gasket
Suitable for installation frame type LH2H hour meter and LH2H preset hour meter

Part No.: ATH3804
Packaged with the mounting bracket type LH2H hour meter

The highly accurate, reliable counters can be controlled from the front panel and are suitable for a wide range of applications.

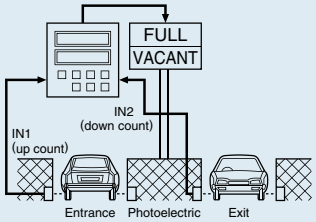
Typical Counter Applications

DOWN and HOLD-A modes
for shipment quantity counting



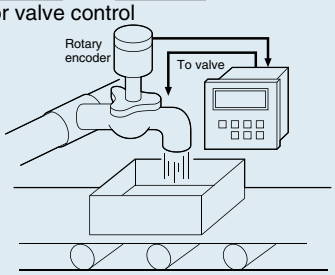
Shipment quantities are counted to control the conveyor line flow.

IND and HOLD-C modes
for parking lots



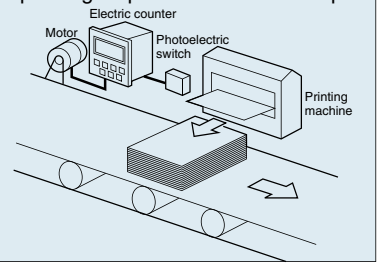
Incoming and outgoing cars are counted to switch the FULL and VACANT signs.

PHASE and HOLD-A modes
for valve control



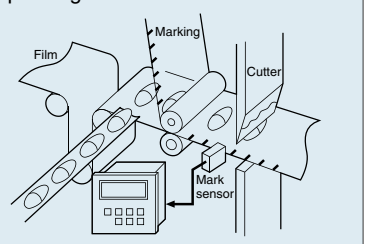
Rotary encoder signals are counted to control a valve aperture.

UP and SHOT-A modes
for packing a specified number of copies



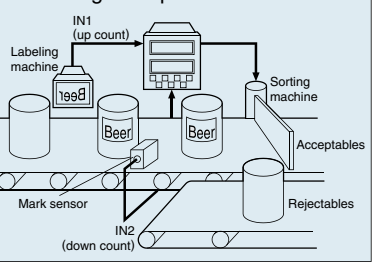
Printed matter is counted to package a specified number of copies.

UP and SHOT-B modes
for packing medicine tablets



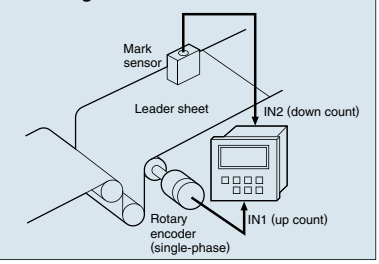
Medicine tablets are packed in specified quantities.

UP and SHOT-C modes
for counting acceptables



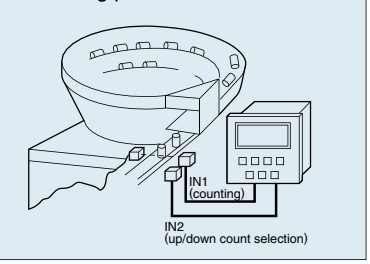
Labeled cans alone are counted up. Rejected cans are not counted.

UP and SHOT-D modes
for winding leader sheet



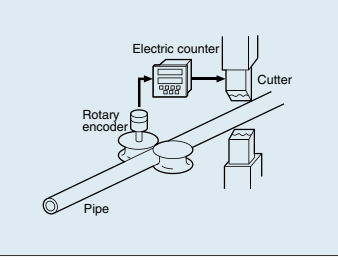
Extra leader sheet that is now wound is counted by a rotary encoder and a color detecting sensor.

DIR input mode
for controlling part stocks



Incoming and outgoing parts are counted to keep parts feeders well-stocked.

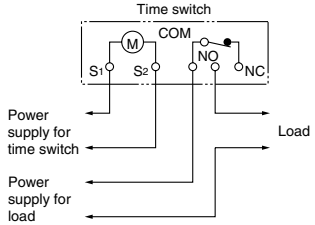
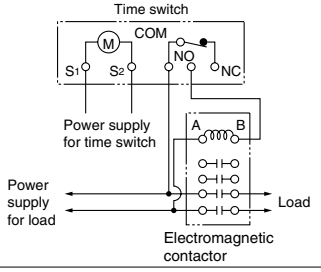
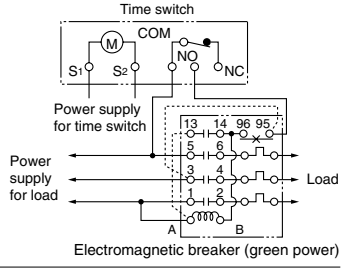
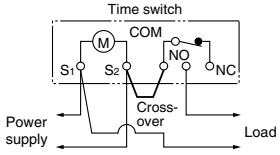
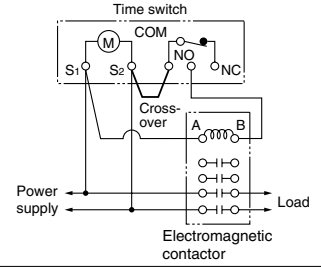
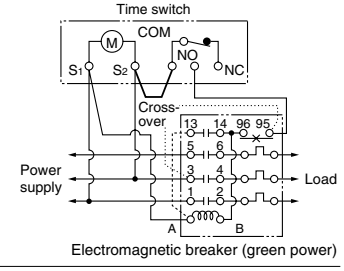
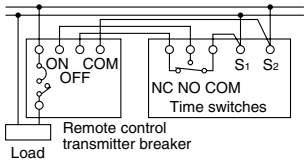
PHASE input mode for sizing



Teamed up with a rotary encoder, the counter is used to control the cutting length of pipes.

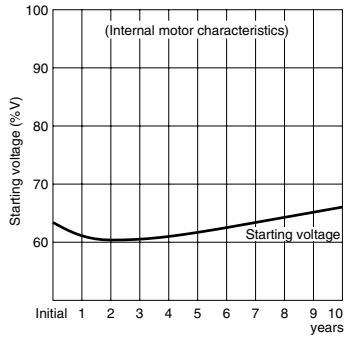
Types	TB5	TB62	TB72
Name of product	High performance analog type time switches	Digital time switch	Flat time switches
Appearance			
Program cycle	› Daily type › weekly type	› Weekly type	› Minutes
Features	› DIN rail mount › DIN module size › 15 minutes interval setting (Daily) › 2 hours interval setting (Weekly) › Power supply indication LED lamp › 3 state terminal (COM-NO-NC) › Metal setting pin › ON-OFF-AUTO switch › EN50178, DIN57633 conformed	› Standard housing 35 x 90 x 61mm in line with DIN 43880 - 2 TE › Two models: 1-circuit and 2-circuit types › Weekly programming › Switching function: ON - AUTO - OFF › Automatic changeover standard time/daylight saving time for Europe, UK and the USA › Vacation mode › Running reserve for 6 years (in case of power failure) › 50 programs › Minimum switching interval: 1 minute › Manual override key ON/OFF on the front › Manual operation can be locked out › Reset key › LED operation display › Cover can be swung open › Cover can be secured › Output: Relay 1c, 250V AC, 16A › Rated operating voltage: 230V AC, 50/60Hz › Mounting method: Wall mounting, DIN rail	› Setting elements integrated at 15 minute intervals › Quick mountable › ON settings are colored
Driving method	› Quartz motor › AC synchronous motor	› Quartz oscillation	› Quartz motor › AC motor type
Rated frequency	50-60Hz	50-60Hz	50-60Hz
Rated voltage	220 to 240VAC	230VAC	100 to 240VAC
Weight	160g	100g/120g	100g/120g

Connection Methods

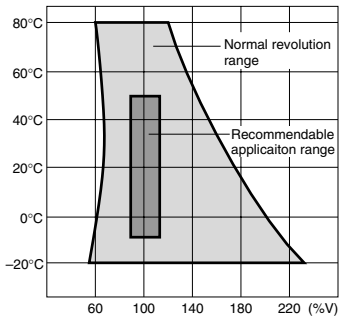
	When time switches are directly controlled	When the electromagnetic breaker and contactor are used in combination	
		Single-phase	3-phase
If the power supplies for the time switches and the load are separate			
If the same power supply is used for the time switches and the load (Connect a crossover between S2 and COM.)			
Example of connecting the time switches and remote control transmitter breaker (The output from the time switches is a stand-alone circuit, and is applied to 1C.)			

Data

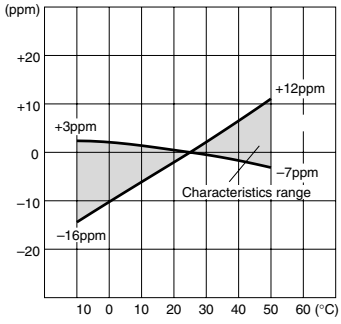
1. Life characteristics
Applied for AC motor type.



2. Normal motor reyolution characteristics
Applied for AC motor type.



3. Temperature characteristics of quartz oscillation accuracy
Applied for quartz power-failure compensation type.

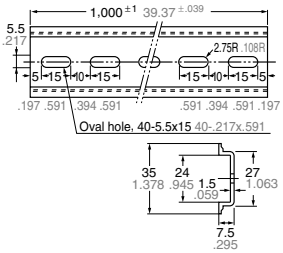


A-TB TIME SWITCHES COMMON OPTIONS

Mounting parts (Unit: mm inch, Tolerance: ±1 ±.039)

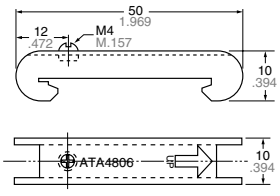
• Mounting rails (Applicable for DIN and IEC standards)

AT8-DLA1
Length: 1 m
aluminum



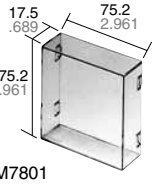
• Fastening plate

ATA4806



For holding DIN rails

• Protective cover for DIN 72 size
For ATB72

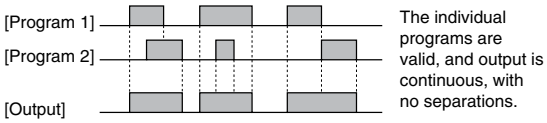


AQM7801

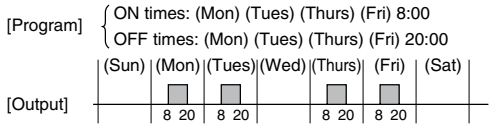
PRECAUTIONS IN USING THE A-TB TIME SWITCHES

Precautions when setting the program

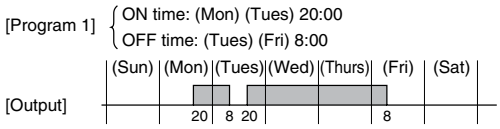
1) If two or more programs are set so that they overlap



2) If the same program is specified for multiple days, specifying multiple days when the ON time is specified the same time setting to be entered for multiple days, at one time.



3) When setting a program that extends over two or more days (multi-day program), setting the ON and OFF times separately for all of the days to which that time applies enables multiple days to be specified at one time.



4) In the pulse setting mode, if a pulse width of 61 or more seconds is set for 23 : 59, the output will be cut off at 0 : 00.00", and operation will not be carried over to subsequent days. If a separate program has been specified for 0 : 00, however, output will be continuous, without interruption.
5) When the "Mode Change" switch is set to the "TIMER1 (2)" mode, no output operation is carried out based on the program; instead, the previous status is maintained. For this reason, the "Mode Change" switch should always be returned to the "TIME" mode when operation has been completed.
6) Entering any one of the settings listed below will cause a setting error, and no writing will be carried out even when the [WRITE] button is pressed. The location in error will flash.
If this happens, correct the setting for the location where the problem has occurred, and press the [WRITE] button again.

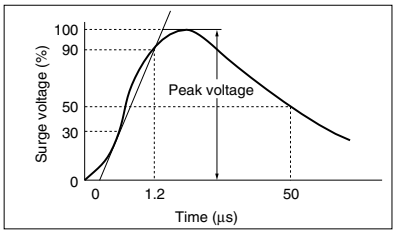
- A setting has not been entered for the day, time, minute, or another parameter.
- The day, time, and minute settings entered for the ON and OFF times are exactly the same.
- The number of days is different for the ON and OFF times.

Precautions concerning handling methods and usage

1) Use the time switch in ambient temperatures of –10°C to +50°C .
2) Use the time switch in ambient humidities of 85% R.H. or less.
3) Prevent using the time switch in such places where inflammable or corrosive gas is generated, much dust exists, oil is splashed and considerable shock and vibration occur.

4) Since the main body cover is made of polycarbonate resin, prevent contact with organic solvents such as methyl alchohol, benzine and thinner, or strong alkali materials such as ammonia and caustic soda.
5) External surge protection may be required if the following values are exceeded. Otherwise, the internal circuit will be damaged.

Surge waveform
[Unipolar full wave voltage of ±(1.2×50) μs]

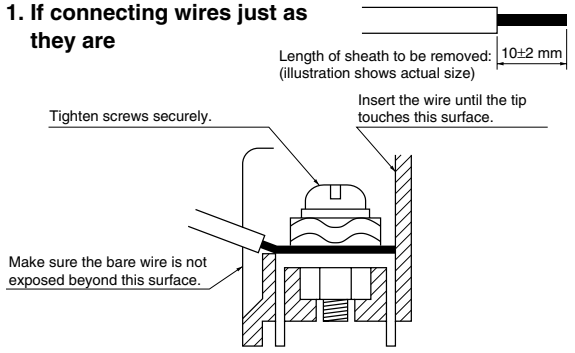


6) Provide chattering absorbing circuit to control the circuit in which chattering is a problem.
7) Provide circuit breaker, fuse or other protective devices for the side of power supply.
8) The power failure compensation function provides compensation if power is supplied continuously to the time switches. The internal battery is fully charged, but if the battery capacitance has dropped because of natural discharging, or if the battery has discharged completely, there may be times when the switch does not operate immediately when the power is turned on. If this happens, check to make sure that the clock is operating normally immediately after the power is turned on, and then set the clock to the proper time.

Precautions concerning wiring

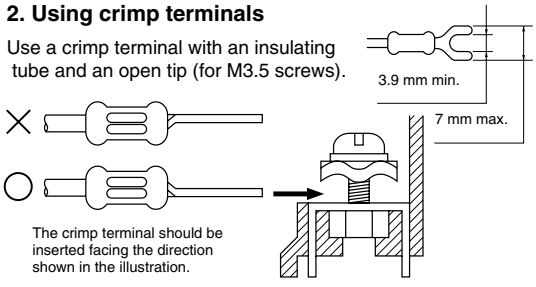
Connections should be made using wiring of ϕ1 to ϕ1.6, or 1.25 to 2 mm^2, with a 600V vinyl insulating sheath.

1. If connecting wires just as they are



2. Using crimp terminals

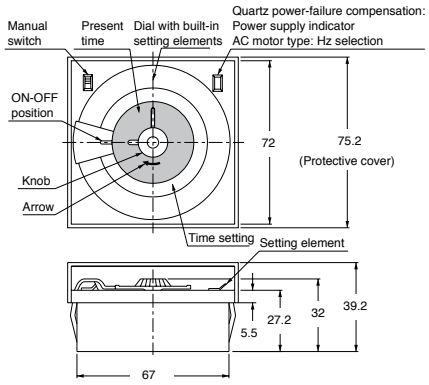
Use a crimp terminal with an insulating tube and an open tip (for M3.5 screws).



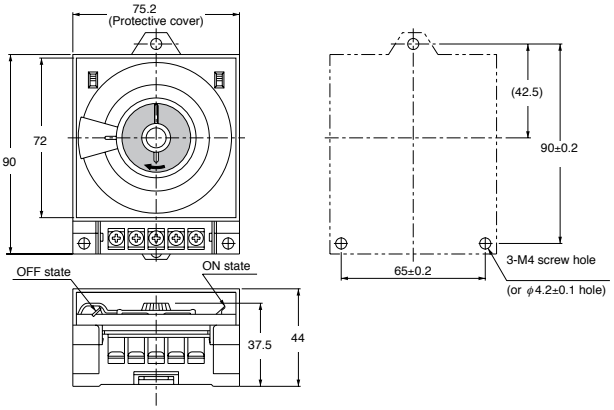
Dimensions

mm

• Flush mounting type

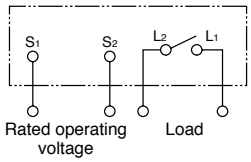


• Surface mounting type: M3.5

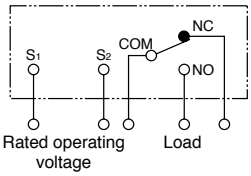


Terminal layouts and wiring diagrams

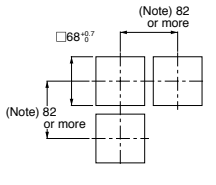
• Flush mounting type
(1 Form A)



• Surface mounting type
(1 Form C)



• Panel cutout dimensions



Panel thickness: 1.0 to 4.5mm
(Note) Minimum pitch for close mounting

Precautions during usage

1. Output setting

• ON setting: Turn the setting element inward, and red mark appear around the dial.

• OFF setting: Turn the setting element outward, and the above red mark will disappear.

• Turn the setting element sufficiently until the click action is felt.

2. Clock setting

• Be sure to turn the knob at the clock center in the arrow direction to set the clock to the present time. (The dial also turns together with the clock.) Be sure to prevent reverse turning.

• do not turn the dial to set the clock.

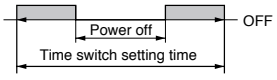
3. Attachment

• Insert the time switch from the front of the attachment panel.
(One-touch system: Panel attachment model)

• Either use 3.8 or M4 wood screws for attachment, or use DIN rails with a width of 35 mm (ATA48011). (Direct-attachment model)

4. Contact relay operation if the power fails

• Contact relays remain closed while the power is off.



5. Power failure compensation (ATB75 series)

• An internal Ni-NH battery is provided to compensate for power failures, but the power supply should be left on as much as possible. Turning the power supply on and off shortens the service life of the battery.

• After continuous charging for 48 hours, the battery provides 200 hours of power failure compensation. The internal battery is fully charged, but if the battery capacitance has dropped because of natural discharging, or if the battery has discharged completely, there may be times when the switch does not operate immediately when the power is turned on. If this happens, set the clock to the proper time after the power has been back on for three to four hours.

• Secondary batteries are a valuable commodity which can be recharged. They cannot be replaced, but if being discarded after use, please make sure they are recycled if possible.
When discarding the battery, turn off the power supply to the time switches, and use radio pliers to disassemble the overall connections and remove the battery.

6. Precautions concerning wiring

With panel attachment models, wiring should be connected by soldering it directly, or using the #187 flat connecting probe provided as an accessory.

7. Compliance with the CE marking

Abide by the following installation conditions and cautions in order to satisfy EN61812-1 requirements.

• Overvoltage category II, pollution level 2

• Wiring

The voltage applied to the timer should be protected with an overcurrent protection device (example: T 1A, 250 V AC time lag fuse) that conforms to the EN/IEC standards.

• Installation and removal

(1) Panel-mounted models are timers for installing on the surface of the control panel. Store the terminal section inside the control panel.

(2) Direct-mounted models are timers for installing inside the control panel. Do not touch the terminal section or other parts of the timer unit while an electric current is applied.

(3) Before installation or removal, confirm that there is no voltage being applied to any of the terminals.

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

8. Refer to page 91 for information on other matters.

TB5

High Performance Analog Type Time Switches

Features

- DIN rail mount
- DIN module size
- 15 minutes interval setting (Daily)
- 2 hours interval setting (Weekly)
- Power supply indication LED lamp
- 3 state terminal (COM-NO-NC)
- Metal setting pin
- ON-OFF-AUTO switch
- EN50178, DIN57633 conformed

Applications

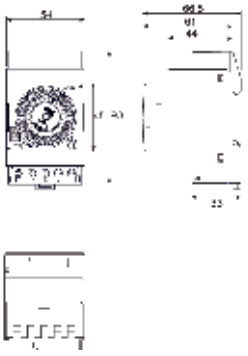
- Lighting Fixture
- Sign board
- Factory facility
- Vending machines
- Pool facility
- Lagoon pump
- Automatic irrigation
- Automated feeding station

Product Types

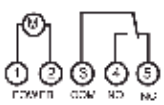
Model No.	Product name	Rated voltage	Power failure backup
TB5560187NJ	Analogue type daily TIME SWITCH (with power failure backup)	220-240VAC	300 hours
TB5630187NJ	Analogue type weekly TIME SWITCH (with power failure backup)	220-240VAC	300 hours
TB5590185NJ	Analogue type daily TIME SWITCH	230VAC	–
TB5640185NJ	Analogue type weekly TIME SWITCH	230VAC	–
TB55603777NJ	Cable cover and wall mounting bracket		

Dimensions

TB5560187



Circuit Diagram

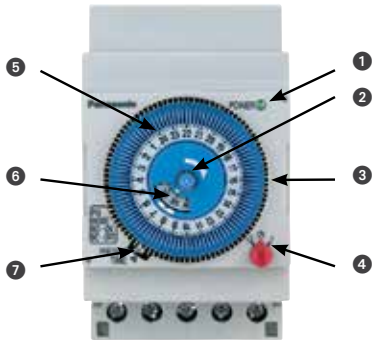


Specifications

Model No.	TB5560187NJ	TB5630187NJ	TB5590185NJ	TB5640185NJ
Program Cycle	Daily Type	Weekly Type	Daily Type	Weekly Type
Driving Method	Quartz motor		AC synchronous motor	
Rated Voltage	220-240VAC		230VAC	
Allowable Operating Voltage	-15% bis +10% of rated voltage			
Rated Frequency	50-60Hz		50Hz	
Power Consumption	2W		2W	
Time Indication	Daily dial	Weekly dial	Daily dial	Weekly dial
Power Supply Indicator	Green LED		Red LED	
Number of Circuit	1-circuit			
Circuit Configuration	Seperated Circuit (NO voltage-applied contact output)			
Contact Configuration	Single Pole, Double-through (⎓) :μ-gap)			
Manual ON/OFF	with ON-AUTO-OFF Switch			
Switching Capacity				
Resistive Load (cosø=1)	250VAC 16A			
Inductive Load (cosø=0,6)	250VAC 3A			
Setting System	Built-in Pin Setting (inside: ON, Outside: OFF)			
Minimum Setting Unit	15 minutes	2 hours	15 minutes	2 hours
Number of Operation	96 / Day	84 / Week	96 / Day	84 / Week
Running Reserve	300 hours at 20°C (Ni-Cd battery built-in)		–	
Charging Time	about 72 hours		–	
Time Accuracy	±15 sec. / month (at 25°C)		Same as AC frequency	
Working Ambient Temperature	-20°C bis +55°C			
Working Ambient Humidity	-85%RH or less			
Degree of Protection	IP 20 as per EN60529			
Protection Class	Class II as per EN60335-1 if installed as directed			
Pollution Degree	2			
Overvoltage Category	III			
Wiring Terminal Capacity	1 ~ 2,5mm²			
Weight	160g		160g	
Option Parts	TB55603777 / Terminal cover and mounting plate for wall mounting			

Parts Identification The figure shows TB556 series

❶ Power supply indication lamp.
Quartz motor type: GREEN
Synchronous motor type: RED
❷ Time adjust knob.
❸ Setting pin.
❹ ON-AUTO-OFF switch
❺ Main dial.
24 hour dial (TB556 • TB559)
1 week dial (TB563 • TB564)
❻ Sub-dial
60 min dial (TB556 • TB559)
24 hour dial (TB563 • TB564)
❼ Present time index.
❽ DIN rail fixture.



Operating instructions

1. Set all setting pins to the outside of the dial.

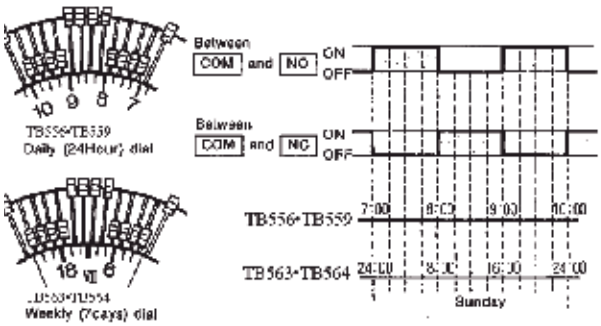
2. Time adjust knob.

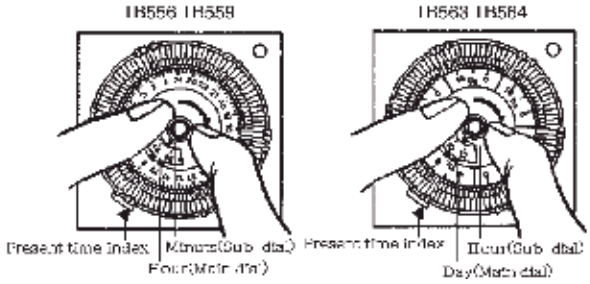
Caution:
During this operation, do not operate the setting pins located near the present time index. Before operating these pins, turn the Time adjust knob to move them away of the present time.

Example:
The time chart corresponding to the pin setting is shown below.

3. Adjust the present time.
Turn the Time adjust knob in the arrow direction.

Caution:
unneccessary reverse rotation results in malfunctions.





4. Set the ON-AUTO-OFF switch.
The load can be turned ON and OFF independent of the program by operating the ON-AUTO-OFF switch.

	Between COM and NO	Between COM and NC
	Permanently ON	Permanently OFF
	Permanently OFF	Permanently ON
	ON and OFF independent of the program	

5. Charging battery (TB556 · TB563).
- Supply AC power to the time switch. The battery will be automatically recharged.
- If the battery is charged for 3 days , 300-hour power failure will be backed-up.
(When it is charged for one hour, approx. 4-hour power failure will be compensated for.)
- Frequent power failure and long-power failure exceeding the compensation time will shorten the battery life.

- Quartz motortype (TB556 • TB563) contains Nickel-Cadmium battery. The battery must be recycled or disposed of properly.

Safety Instructions

1. All operations serving transport, installation, commissioning, troubleshooting and maintenance are to be carried out by skilled technical personnel in accordance with the relevant safety regulations and standards.
2. Avoid using the time switch except for the environment condition shown in specifications. Indoor use only.
3. Load capacity differs , depending on the type of load. 8See specifications).
4. Protect the citcuit with a fuse or breaker at the power supply, in accordance with the relevant regulations.
5. Synchronous motor type (TB559 • TB564) are not provided with running reserve function. When the time error occurs due to power failure, readjust the present time.
6. Make wiring connections, using isnulated wire (1,0 to 2.5 mm²).
Flexibles codes conductors 1,0 to 2,5mm²).
Fixed wiring conductors 1,5 to 2,5mm².
7. After wiring, check that wiring connections are all correct.

TB6210187
with cover open

TB6210187
1 circuit

TB6220187
2 circuits

TB62

Digital Time Switch

Features

- Standard housing 35 x 90 x 61mm in line with DIN 43880 - 2 TE
- Two models: 1-circuit and 2-circuit types
- Weekly programming
- Switching function: ON - AUTO - OFF
- Automatic changeover standard time/daylight saving time for Europe, UK and the USA
- Vacation mode
- Running reserve for 6 years (in case of power failure)
- 50 programs
- Minimum switching interval: 1 minute
- Manual override key ON/OFF on the front
- Manual operation can be locked out
- Reset key
- LED operation display
- Cover can be swung open
- Cover can be secured
- Output: Relay 1c, 250V AC, 16A
- Rated operating voltage: 230V AC, 50/60Hz
- Mounting method: Wall mounting, DIN rail

Product types

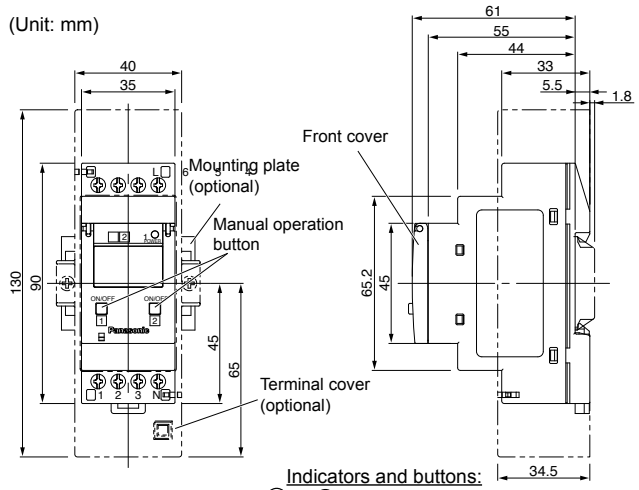
Model numbers	Description	Operating voltage	Running reserve
TB6210187	Digital time switch, weekly programming, 1 circuit	220-240VAC	6 years
TB6220187	Digital time switch, weekly programming, 2 circuits	220-240VAC	6 years
TB62203777	Terminal cover and mounting plate for wall mounting		

Technical Data

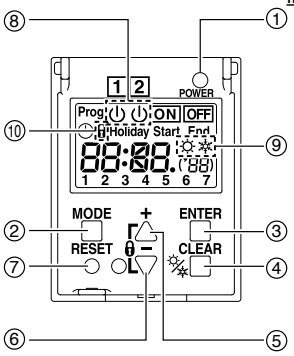
Model number	TB6210187	TB6220187
Type	1 BRTU according to EN60730-2-7	
Program cycle	Weekly	
Operating voltage	220-240VAC (-15% to +10% of the operating voltage)	
Frequency	50-60Hz	
Power consumption	2W	
Switching capacity		
Resistive load (cosΦ=1)	16A / 250VAC	
Inductive load (cosΦ=0,7)	8A / 250VAC	
Number of circuits	1	2
Number of circuits	1 relay contact output	2 relay contact outputs
Contact type	1 changeover contact	2 changeover contacts
Driving method	Quartz oscillation	
Memory capacity	50 programs	50 programs/circuit
Minimum switching interval	1 minute	
Manual switching	Override function	
Changeover, standard time/daylight saving time	Yes	
Time accuracy	±15 seconds/month (at 25°C)	
Running reserve	6 years for clock memory and program (lithium battery)	
Ambient temperature	-20°C to +55°C	
Humidity	Max. 85%	
Applicable wire	Max. 2.5mm²	
Weight	100g	120g
Protection degree	Protection degree II when mounted properly	
	IP20 according to EN60529	
Pollution degree	3	
Overvoltage category	III	

Dimensions, Part names

(Unit: mm)



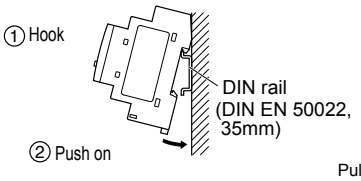
Indicators and buttons:



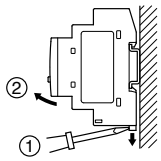
① Power
② MODE
③ ENTER
④ CLEAR, ☼/❄
⑤ +
⑥ −
⑦ RESET
⑧ Output
I : ON
O : OFF
⑨ ☼ : Summer time
❄ : Winter time
⑩ Manual button locked

Mounting

● DIN rail mounting



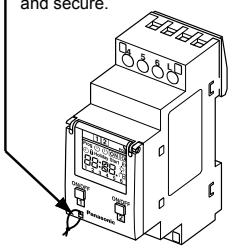
● Removal



Pull down DIN rail attachment lever to release. Lift.

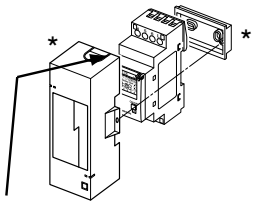
● Secure front cover

Thread wire, etc. through hole and secure.



● Direct mounting

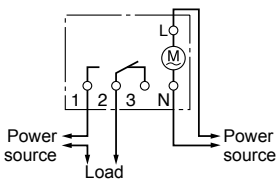
TB6220377 ((optional parts) *)
1 terminal cover, 1 mounting plate



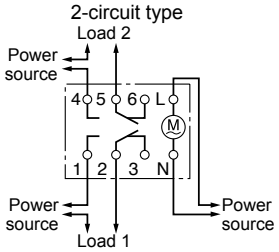
CAUTION: Minimize the wire hole to ensure class II construction.

Connection diagram

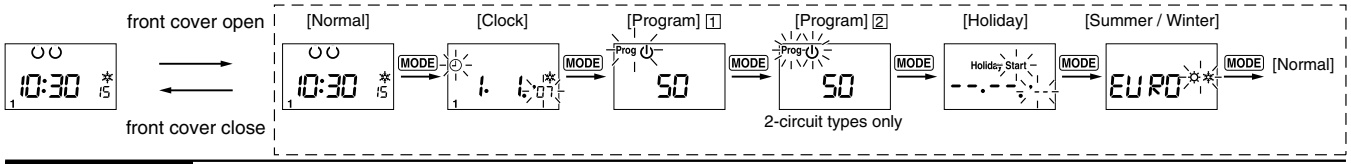
1-circuit type



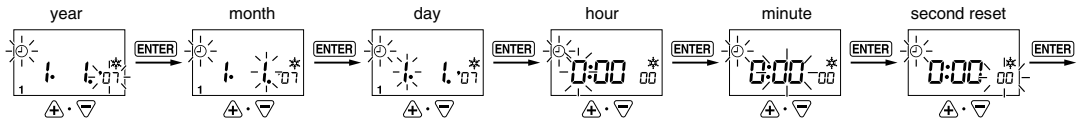
2-circuit type



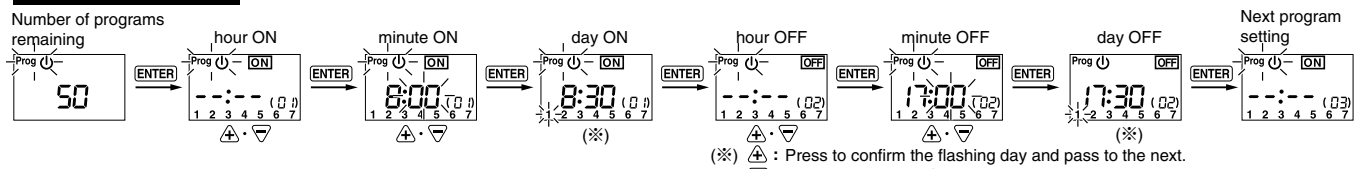
MODE Press "MODE" to set the clock, select the program, make holiday settings and set summer or winter time.



Clock setting

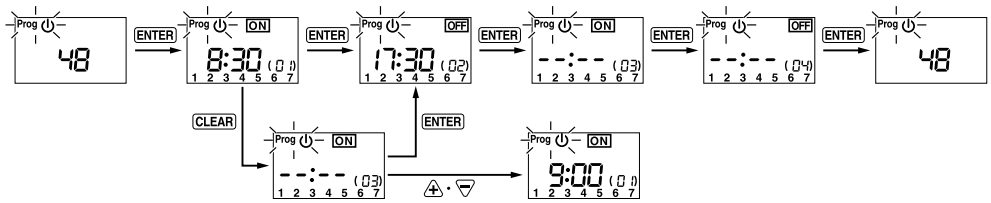


Program setting



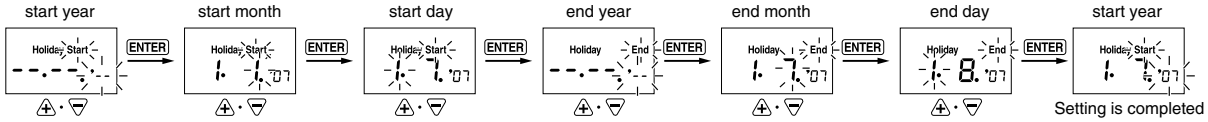
(※) : Press to confirm the flashing day and pass to the next.
: Press to ignore the flashing day and pass to the next.

■ Review, add, clear or change program.



Holiday setting

This function allows you to cancel ON programs for the holidays specified.



Setting is completed

Summer / Winter time setting

Preset time in following table.

Preset time in following table.

Preset time in following table.

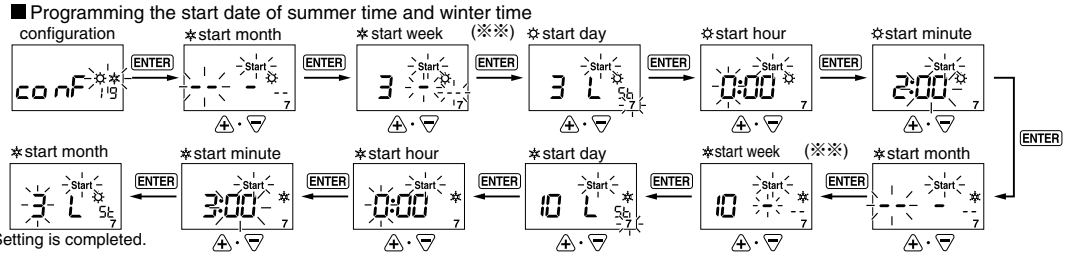
Program start date of summer and winter time. See below.

: Press in normal mode to switch between summer and winter time.

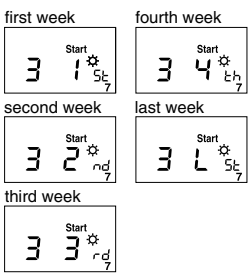
■ Preset time

	Summer time start date	Winter time start date
EURO	Last Sunday in March at 2AM	Last Sunday in October at 3AM
UK	Last Sunday in March at 1AM	Last Sunday in October at 2AM
USA	Second Sunday in March at 2AM	First Sunday in November at 2AM

■ Programming the start date of summer time and winter time

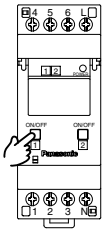


(※※) week indication

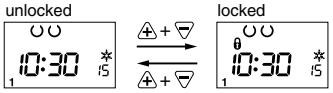


Manual operation

The manual operation button can be operated when the front cover is closed.
Press the manual operation button for 1 second to switch between manual and programmed operation.



θ: Function to lock out manual operation
+ : Press these buttons simultaneously to activate or deactivate the lock.



TB72

Flat Time Switches

Features

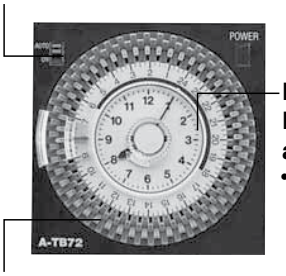
- **DIN72 size smart time switch**
  Flush mounting type is as thin as 32mm and depth in the box is less than 21.7mm
- Easy to read directly readable clock.
- Load can be turned on and off every 15 minutes with the 96 setting elements.
- Quartz power-failure compensation type commonly usable over 100 to 240V AC.
- Complies with CE marking

Product types

Type	Rated operating voltage	Flush mounting type	Surface mounting type
AC motor type	100V AC	A-TB72-D-HR1A-100V	A-TB72-DD-HR1C-100V
	110V AC	A-TB72-D-HR1A-110V	A-TB72-DD-HR1C-110V
	120V AC	A-TB72-D-HR1A-120V	A-TB72-DD-HR1C-120V
	200V AC	A-TB72-D-HR1A-200V	A-TB72-DD-HR1C-200V
	220V AC	A-TB72-D-HR1A-220V	A-TB72-DD-HR1C-220V
	240V AC	A-TB72-D-HR1A-240V	A-TB72-DD-HR1C-240V
Quartz power-failure compensation type	100 to 240V AC	A-TB72-Q-HR1A-ACF	A-TB72-QD-HR1C-ACF

Part names

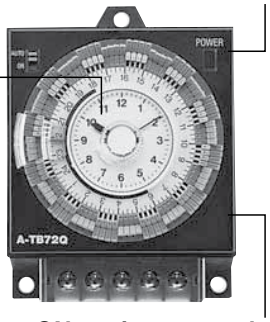
Manural switch
• Auto and manual modes are selectable for control.



Easy-to-read. Directly readable clock.
• Present time is trimmable every 1 minute.

Setting elements integrated at 15 minute intervals throughout the clock circumference.
• Load can be turned on and off every 15 minutes (maximum 48 ON and OFF actions per day), allowing minute daily time control.

Power status indicator: quartz power-failure compensation type.
Frequency switchable: AC motor types.



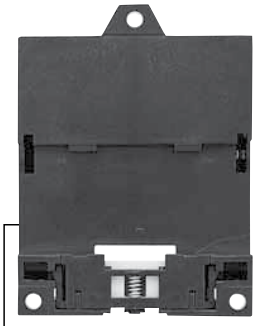
ON settings are colored on the dial.
• Operation setting times are found at a glance with red indicator.

Complies with CE marking

Power supply terminals
Load terminals

Space-saving.
Depth in the box is less than 21.7mm.
(including the panel thickness.)

Quick mountable.



DIN rail mounting possible

Specifications

Types	**Drive system**		AC motor type	Quartz power-failure compensation quartz motor type
	Voltage		100V AC, 110V AC, 120V AC 200V AC, 220V AC, 240V AC	100 to 240V AC
Rating	**Frequency**		50/60Hz (Switchable)	50/60Hz (Common)
	Power consumption		1.5W or less	1W or less
	Load	**Circuit**	Input/output separate circuit	
		Manual ON/AUTO	Manual switch provided	
		Capacity (Resistive load)	15A 250V AC	
	Setting	**System**	Built-in setting element swing type	
		Minimum unit	15-minute intervals	
		Ninimum range	15 minutes	
		No. of setting	Max. 48 (ON/OFF)	
	Power failure compensation		—	200 hours or more (at 25°C)
Time accuracy	**Clock accuracy**		Synchronous with power supply frequency	Monthly error: Within ±15 seconds (at 25°C)
	ON clock accuracy		±5 min. (at 25°C), not including time synchronization errors	
Contact specifications	**Contact arrangement**		Flush mounting type: 1 Form A, Surface mounting type: 1 Form C	
	Contact type		Solder/tab common terminal: Flush mounting type, Crimp terminal or bare wires: Surface mounting type	
	Contact material		Silver alloy	
Life	**Mechanical life (contact)**		10^5 times or more	
	Electrical life (at rated load)		2×10^4 times or more (ON/OFF)	
Electrical characteristics	**Allowable operating voltage range**		85 to 115% of rated voltage	80 to 110% of rated voltage
	Insulation resistance (initial)		More than 100MΩ between charged and uncharged sections More than 100MΩ between contacts (at 500V DC megger)	
	Dielectric strength (initial)		Between charged and uncharged sections: 1,500V AC/1 min. Between contacts : 1,000V AC/1 min.	
	Surge resistance		Surge voltage 7,000V (±1.2×50μs one time)	
	Noise resistance		Noise simulator 2,000V	Noise simulator 1,000V
	Temperature rise		60°C or less (at 25°C)	
Mechanical characteristics	**Malfunctional vibration**		10 to 55Hz (amplitude: 0.3mm) for 10 minutes in each vertical, horizontal and lateral direction	
	Destructive vibration		16.7Hz (amplitude: 4.0mm) for 1 hour in each vertical, horizontal and lateral direction	
	Malfunctional shock		49m/s² {5G} or more, 4 times in each vertical, horizontal and lateral direction	
	Destructive shock		490m/s² {50G} or more, 5 times in each vertical, horizontal and lateral direction	
Ambient conditions	**Ambient operating temperature**		–10°C to +50°C	
	Ambient operating humidity		45 to 85% RH (non-condensing)	
Weight ( ) denotes Surface mounting type			120g (190g)	100g (170g)

Note) Protective cover is provided on A-TB72.

Applicable standard

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

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.

North America

LISTING MARK

Fig. 1

RECOGNITION MARK

Fig. 2

UL (Underwiters 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.

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.

• ENEC mark

The ENEC mark, approved by certifying authorities in Europe, is for electronic products. It can be displayed when a product is compliant with the European safety standard (EN standard). Device switches that display the ENEC mark can be freely distributed in the European Economic Area.

• 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.

Shipping Standards

• 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

Timers

Products name		UL (Recognized)		CSA (Certified)		Lloyd's Register Standards		Remarks
		File No. (Standard No.)	Rating	File No. (Standard No.)	Rating	File No. (Standard No.)	Rating	
PM5S-A/S/M PM4S		E43149	5A250VAC PILOT DUTY C300	E43149 (C-UL)	5A250VAC PILOT DUTY C300	—	—	
PM4H-A PM4H-S PM4H-M PM4H-SD/SDM 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$\phi \fallingdotseq 0.4$)	Products complying with UL and CSA standards have model numbers ending with "9".
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)	

Counters

Products name	UL (Recognized)		CSA (Certified)		Remarks
	File No. (Standard No.)	Rating	File No. (Standard No.)	Rating	
LC4H LC4H-L LC4H-S	E122222	5A250V AC PILOT DUTY C300 100mA 30V DC	E122222 (C-UL)	5A250V AC PILOT DUTY C300 100mA 30V DC	
LC4H-W	E122222	3A250V AC PILOT DUTY C300 100mA 30V DC	E122222 (C-UL)	3A250V AC PILOT DUTY C300 100mA 30V DC	
LC2H	E122222	24 to 240 V AC/DC 4.5-30 V DC 3 V DC	E122222 (C-UL)	24 to 240 V AC/DC 4.5-30 V DC 3 V DC	

Hour Meters

Products name	UL (Recognized)		CSA (Certified)		Remarks
	File No. (Standard No.)	Rating	File No. (Standard No.)	Rating	
TH13 and TH23 series	E42876	115 to 120, 220, 240V AC	LR39291	115 to 120, 220, 240V AC	• For UL-recognized and CSA-certified products, specify “U” at the end of the model No.
TH14 and TH24 series	E42876	12, 24, 48, 100, 110, 115 to 120, 200, 220, 240V AC	LR39291	12, 24, 48, 100, 110, 115 to 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 model No. • Panel-mounting silver type: Not UL-recognized nor CSA-certified
TH63 and TH64 series	E42876	12, 24, 48, 100, 110, 115 to 120, 200, 220, 240V AC	LR39291	12, 24, 48, 100, 110, 115 to 120, 200, 220, 240V AC	• Standard products are UL-recognized and CSA-certified.
LH2H	E122222	24 to 240 V AC/DC 4.5 to 30 V DC 3 V DC	E122222 (C-UL)	24 to 240 V AC/DC 4.5 to 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

Products name	UL (Recognized)		CSA (Certified)		Remarks
	File No. (Standard No.)	Rating	File No. (Standard No.)	Rating	
Common mounting parts for timers	E59504	10A250VAC AT8-RFDUL (AT78039) 7A250VAC AT8-DF8L (ATA48211) 8P cap was an approved as an option. AD8-RC (AD8013)	LR39291	10A250VAC AT8-RFDUL (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)	
Common mounting parts for counter	E59504	10A250V AC AT8-RFD (AT78039) 7A250V AC AT8-DF8L (ATA48211) 8P cap was an approved as an option. AD8-RC (AD8013)	LR26550	10A250V AC AT8-RFD (AT78039) 7A250V AC 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)	

Product classification	Product name	EMC directives	Low-voltage directives
Timers	LT4H	EN61000-6-4/EN61000-6-2	EN61812-1
	LT4H-L		
	LT4H-W		
	PM4H		
	S1DX		
	S1DXM-AM		
	PM5S-A/S/M		
	PM4S		
	QM4H		EN61010-1
Time Switch	A-TB72	EN61000-6-4/EN61000-6-2	EN61812-1
	A-TB72Q		
Counters	LC4H	EN61000-6-4/EN61000-6-2	EN61812-1
	LC4H-L		
	LC4H-S		
	LC4H-W		
	LC2H		EN61010-1
	LC2H preset		—
Hour Meters	TH13	EN61000-6-4/EN61000-6-2	EN61010-1
	TH23		
	TH14		
	TH24		
	TH40		
	TH50		
	TH63		
	TH64		
	LH2H		
	LH2H preset		—
	TH8		

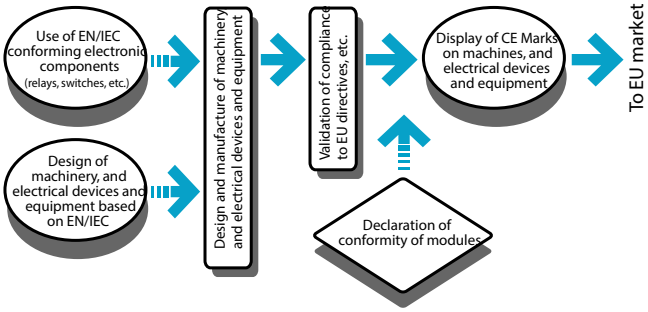
Note: For detailed information about the compliance conditions, see CE marking under PRECAUTIONS IN USING (Common).

■ 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 and applied 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. Panasonic Electric Works is committed to providing products that are acceptable to the European market.

■ From validation of CE Mark compliance to sales within the EU



■ 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 R & TTE directive (R & TTE: Radio equipment and Telecommunications Terminal Equipment). Initial day of enforcement depends upon directive: Machinery Directive January 1st, 1995; EMC Directive January 1st, 1996; Low Voltage Directive, January 1st, 1997; and R&TTE Directive, April 8th, 2000.

• Machinery directive

Machinery that is supplied to the market is to have no adverse effects on the health or safety of people if the machine is properly installed, maintained, and used only as intended. These considerations determine the necessary safety requirements. With some exceptions, the directive covers mainly machine tools and injection mold equipment, automated machinery, construction equipment, and other industrial machinery, but it also covers some household machinery products that have hazardous moving parts.

• ECM directive

Before electric and electronic equipment can be sold, it must conform to EMC (electromagnetic compatibility) requirements. Effectively, such equipment must neither be a source of EMI (electromagnetic interference), nor malfunction owing to extraneous EMS (electromagnetic susceptibility). As well as products such as television and radio, mobile phones and personal computers, regulated products that emit electromagnetic waves include NC machinery and machine tools which use solenoids and motors, and items such as robot controllers. So, not only must equipment not emit electromagnetic waves that have a powerful external effect, it is also required to be immune to influence from extraneous electromagnetic waves.

• Low voltage directive

To be eligible for sale in various countries, electrical products that use relatively low voltage (AC 50 to 1,000 V; DC 75 to 1,500 V) must conform to the basic requirements that are stipulated for the country. This directive is in legal force in each country with the effect that only products conforming to the stipulations of the directive can be sold. It is applicable to nearly every type of electrical product and device including domestic appliances and office equipment.

• R & TTE directive

This directive applies to all terminal equipment that is directly or indirectly connected to public lines and all communications equipment that sends or receives radio transmissions. Fax machines, modems, and other wireless devices are also included within its broad scope.

To stipulate more detailed technical specifications, EN regulations and common technical standards known as CTR are also applied. In this way, the directive regulates the particular needs of the R&TTE field that cannot be covered by the Low Voltage Directive or the EMC Directive.

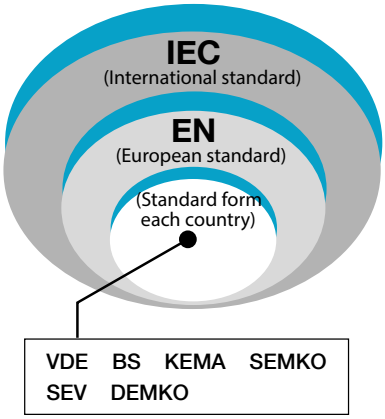
■ What are EN standards?

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.

■ Types of standard and accreditation institutions

The 25 members of the EU and four countries in the EFTA are obliged to adopt EN regulations as applicable national standards. Consequently, a DOW (latest date of withdrawal of conflicting national standards) is decided and, during the stipulated period, a signatory nation must withdraw any national standards that are in conflict with EN regulations.



■ Conformity to standards

If there is no applicable EN standard (or HD document), products must conform either to standards based on IEC or, if there is no IEC standard, to standards applicable in particular countries such as VDE, BS, and SEMKO.

■ Relationship with ISO9000

Each EC directive stipulates, as one of the conditions for display of the CE mark, that the each factory producing the marked products has a proper policy regarding quality assurance. The ISO9000 series (ISO9001 and ISO9002) has become a widespread national standard for factory quality assurance systems.

ISO9001 Quality assurance system for design, development, monitoring, manufacturing, inspection, installation, and service
ISO9002 Quality assurance system for manufacturing, inspection, and service

The automation control products of Panasonic Electric Works are manufactured in facilities that are verified to have excellent quality assurance systems based on compliance with ISO9000 Series standards issued by an internationally recognized accreditation and certification body.

3 Year Warranty

Panasonic Electric Works offers a wide product range from one source, from individual components to complete systems. Technology support for advice, design-in, installation and commissioning by our qualified application engineers round off the Panasonic service profile.

Human machine interfaces

Our compact size, bright and easy-to-read human machine interfaces can be used to visualize inspection results. Touch panels can even replace the standard keypad if you so desire.

UV curing systems

Aicure **UJ30** is a LED curing system that quickly hardens UV-sensitive resins such as adhesives, ink and coatings. Its cutting edge LED technology is especially suited for precise, high-intensity curing.

ACD components

Components such as **Eco-POWER METERS**, timers/counters, temperature controllers, limit switches and fans round off our wide factory automation product range.

Sensors

As a pioneering manufacturer of sensors, Panasonic provides high performance sensors for a wide range of applications, facilitating factory automation in various types of production lines, such as those used for the manufacturing of semiconductors.

Laser Markers

Panasonic Laser Markers are ideal for non-contact, permanent labeling of most materials, e.g. metal, plastics, glass, paper, wood and leather. Several CO_2 laser marking systems and a unique FAYb fiber laser marker can be easily integrated into existing production systems for a great variety of marking tasks.

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