Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Panasonic
ideas for life

'06–'07

LH2H Hour Meters

Timers/Time Switches/Counters/Hour Meters

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

Matsushita Electric Works, Ltd.

Panasonic
ideas for life

DIN HALF SIZE
HOUR METER

LH2H
Hour Meters

Panel mounting type
One-touch installation type

Panel mounting type
Installation frame type

PC board mounting type

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

Features

1. 8.7 mm Character Height (previously 7 mm .343 inch)
Easy-to-read character height increased from 7 mm to 8.7 mm .276 inch to .343 inch.

2. Plenty of Digits

3. 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

4. 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.

5. 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.

6. Screw Terminals Designed for Safety
Built in finger protection.

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

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

9. Input Methods
1) Non-voltage input method
2) Voltage input method
3) Free voltage input method

10. 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).

11. Compliant with UL, c-UL and CE marking.

Product chart

Installation type \ 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 77°F)			

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 77°F)
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 +14 to +131°F (without frost or dew)
Storage temperature		–25 to +65°C –13 to +149°F (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 Noise terminal voltage (EMS)EN61000-6-2 Static discharge immunity RF electromagnetic field immunity EFT/B immunity Conductivity noise immunity Power frequency magnetic field 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 (90 MHz) EN61000-4-4 2 kV (power supply line) EN61000-4-6 10 V/m AM modulation (0.15 MHz to 80 MHz) 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).

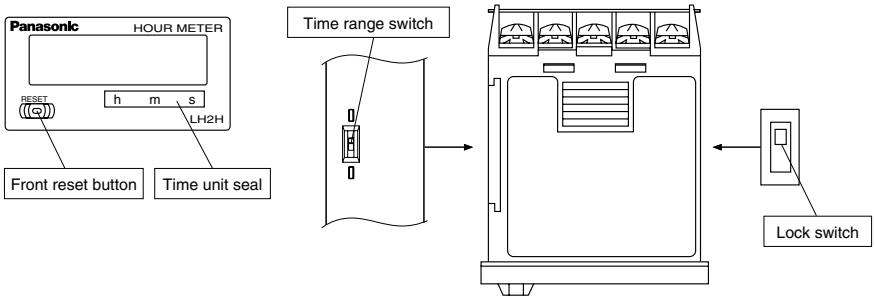
3. Time range switch (See chart on right).

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.

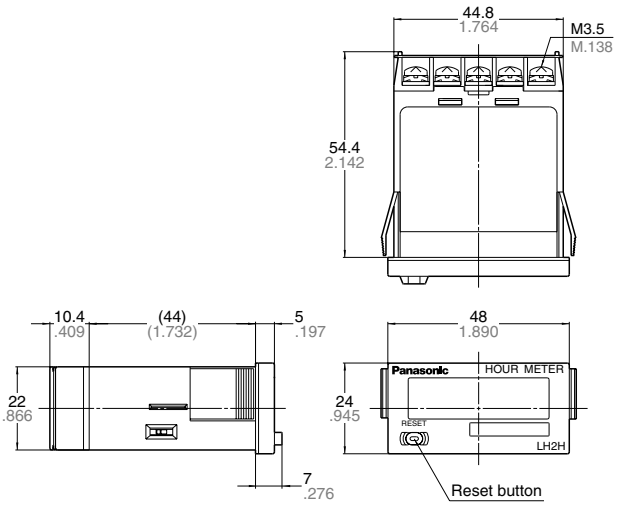
Dimensions

mm inch
General tolerance: ±1.0 ±.039

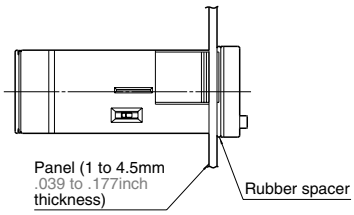
1. Panel mounting type

• External dimensions

1) One-touch installation type



• Panel installation diagram

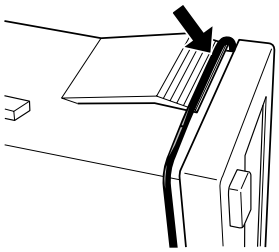


Note) When installing to a 4.5 mm .177 inch thick panel, remove the rubber spacer first.

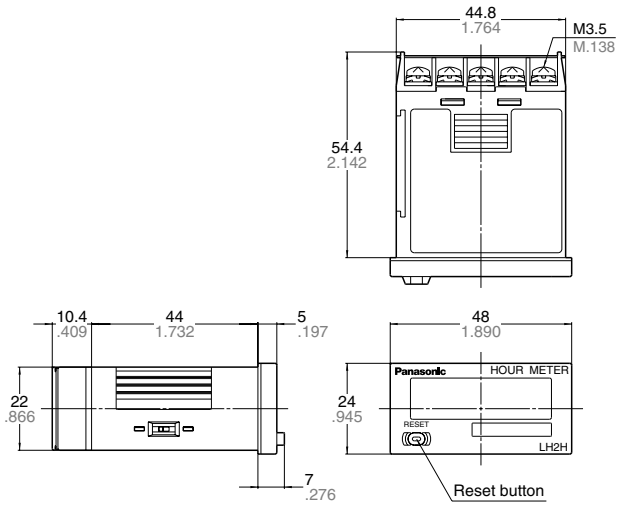
When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.

To prevent the installation spring from pinching the rubber gasket:

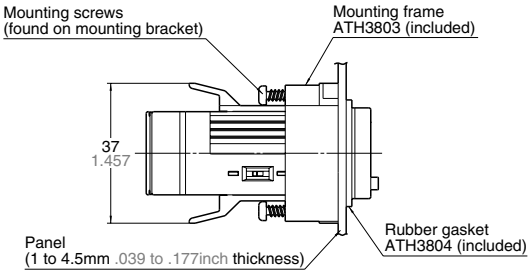
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation spring is not pinching the rubber gasket, and then insert and fix the installation spring in place from the rear of the timer unit.



2) Installation frame type

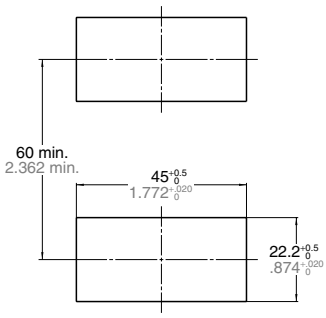


• Panel mounting diagram

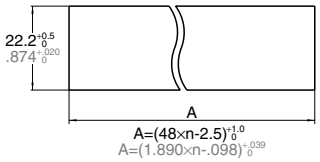


• Panel cut-out dimensions

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



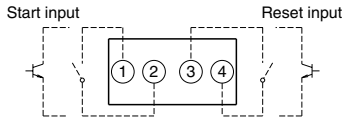
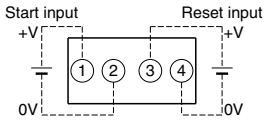
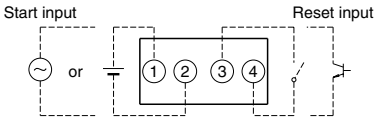
• For connected installation (sealed installation)
(Only installation frame type.)



Notes) 1. Suitable installation panel thickness is 1 to 4.5 mm .039 to .177 inch.
2. Waterproofing will be lost when installing repeatedly (sealed installation).

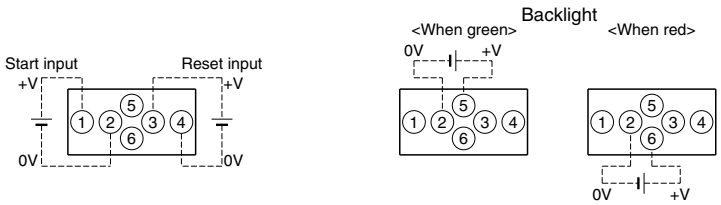
• Terminal layout and wiring diagrams

1) Standard type

Non voltage input type	Voltage input type	Free voltage input type
		

②-④ are connected internally.

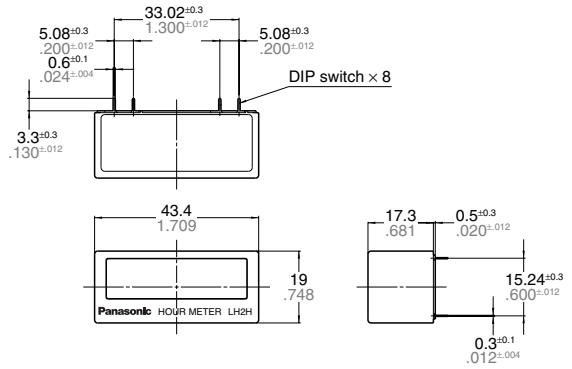
2) Backlight type

Voltage input type


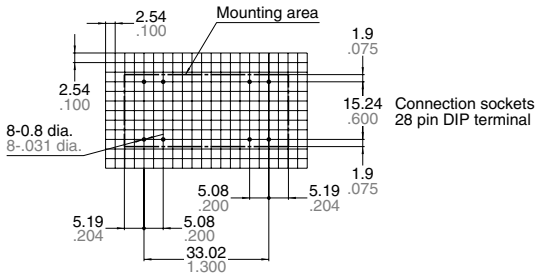
2. PC board mounting type

General tolerance: ±1.0 ±.039 mm inch

• External dimensions



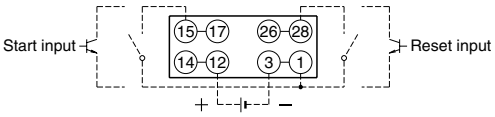
PC board pattern (BOTTOM VIEW)



General tolerance: ±0.1 ±.004

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

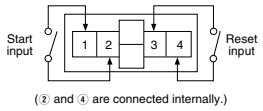
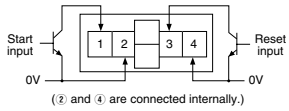
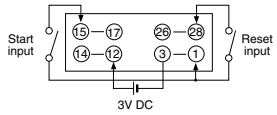
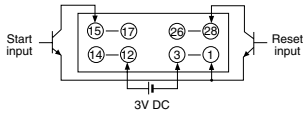
• Terminal layout and wiring diagrams



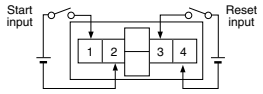
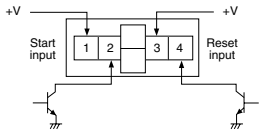
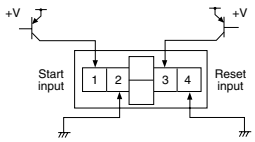
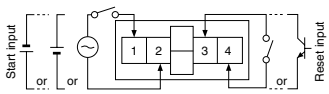
①-③, ⑫-⑭, ⑮-⑰ and ㉖-㉘ are connected internally.
An external power supply is required.

Input method

1. Standard type

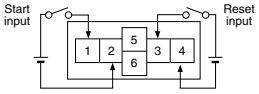
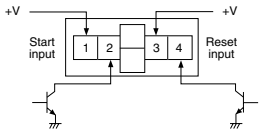
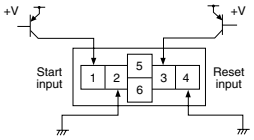
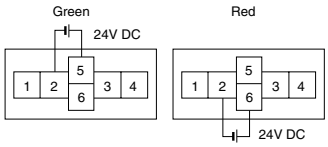
Non-voltage input type			
Panel mounting type		PC board mounting type	
Contact input	Transistor input NPN transistor	Contact input	Transistor input NPN transistor
 (② and ④ are connected internally.)	 (② and ④ are connected internally.)		

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.

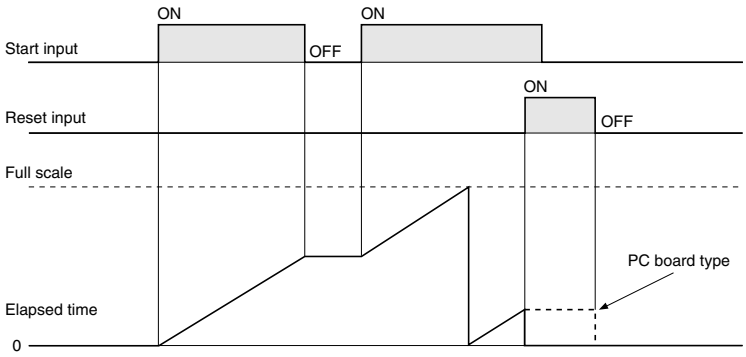
2. Backlight type

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. 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. 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 ⑮ to ⑰ and ㉖ to ㉘ 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 32.808 ft. for parallel wires of 2 mm²). 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 572°F 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 32.808 ft. for parallel wires of 2 mm²).

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.

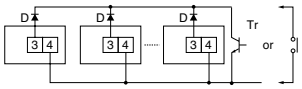
4) When inputting a reset with an open collector of a transistor, use a transistor for small signals in which ICBO is 1 μA or less and always input with no voltage.

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)

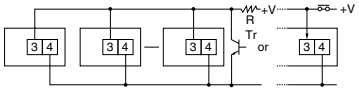
Non-voltage input type



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.)

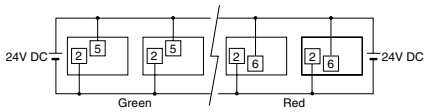
Voltage input type



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.

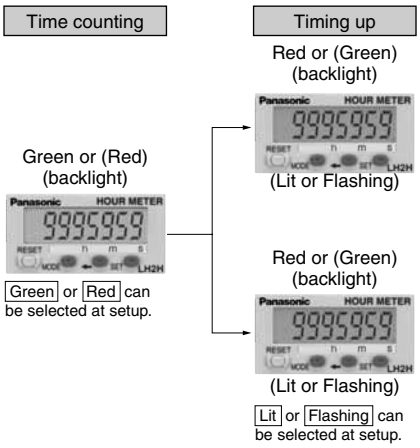
Panasonic
ideas for life

PRESET HOUR METER

LH2H Hour Meter

Features

1. Preset function equipped in half size (24 × 48 mm 0.945 × 1.890 inch).
2. Display has backlight for instant recognition.



3. 8.7 mm 0.343 inch Character Height (previously 7 mm 0.276 inch)
Easy-to read character height increased from 7 mm to 8.7 mm 0.276 inch to 0.343 inch.

4. Plenty of Digits

5. 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
6. Conforms to IP66 Protective Construction (Front panel surface)
Weatherproofing supported by using optional mounting bracket and rubber gasket
7. Includes reassuring lock mode and lock switch to prevent erroneous operation.
8. Screw terminals are constructed to protect fingers to ensure safety.
9. Compliant with UL, c-UL and CE marking.

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

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 +14 to +131°F }
	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/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 +14 to +131°F (without frost or dew)
	Storage temperature	–25 to +65°C –13 to +149°F (without frost or dew)
	Ambient humidity	35 to 85% RH (non-condensing)
Protective construction		IP66 (front panel with mounting bracket and rubber gasket)

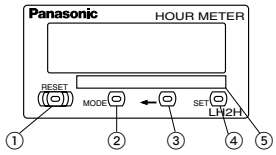
* The factory default preset value is set to 0.1.

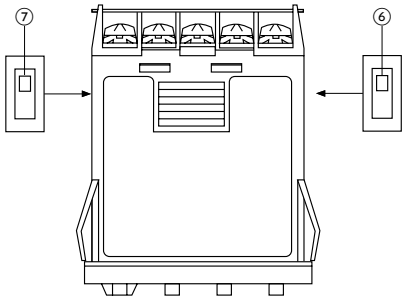
Applicable standard

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.

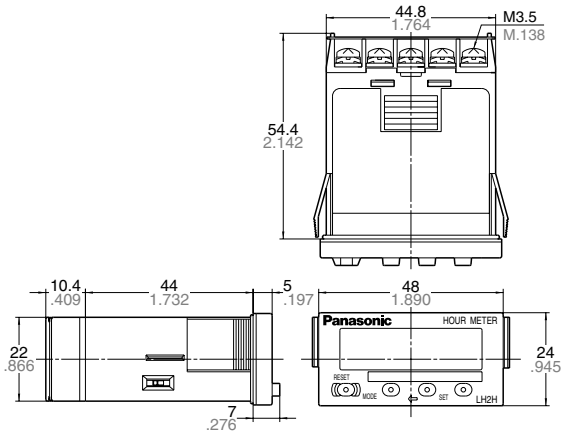
		LH2HP-FEW-DHK-B-DC24V	LH2HP-FEW-HMK-B-DC24V
⑥	Lock switch (unit display 1)	(Terminal block side) ↕ (LCD side)	OFF⁕ ↕ ON
⑦	Time range switch (unit display 2)	(Terminal block side) ↕ (LCD side) 0 to 999999.9h⁕ ↕ 0 to 3999d23.9h	(Terminal block side) ↕ (LCD side) 0 to 9999h59.9m⁕ ↕ 0 to 999h59m59s

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.

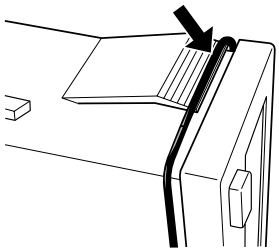
Dimensions

mm inch
General tolerance: ±1.0 ±.039

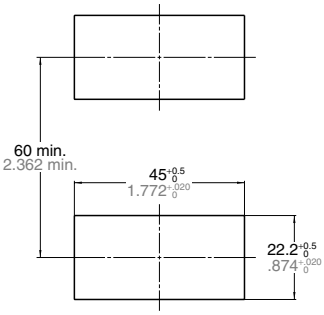
• External dimensions



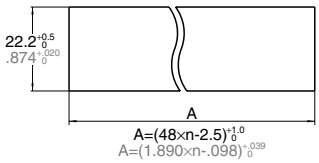
When installing the one-touch installation type model, make sure that the installation spring does not pinch the rubber gasket.
To prevent the installation spring from pinching the rubber gasket:
1. Set the rubber gasket on both ends of the installation spring (left and right).
2. Confirm that the installation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



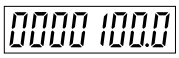
Notes: 1. Suitable installation panel thickness is 1 to 4.5 mm 0.39 to 0.177 inch.
2. Waterproofing will be lost when installing repeatedly (sealed installation).

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.

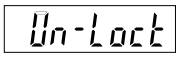
2) Pressing the setting key moves the flashing digit left by one. Following the highest digit it returns to the lowest digit and each time the digit setting key is pressed it moves one to the left.
3) Pressing the set key increases the value by one. (After 9 it returns to 0 and then changes to 1, 2, 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.

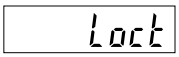
1) Pressing the set key while holding down the mode key takes you to the lock mode.

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”.)

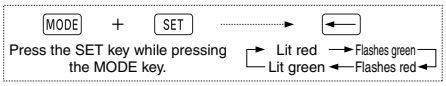
4) Pressing the front panel reset key sets the content displayed and returns you to regular operation mode.

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.

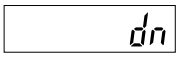
4. Time counting direction setting mode

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”.



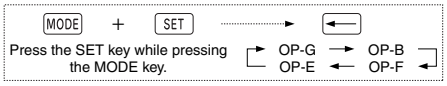
(Example showing “dn”)

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

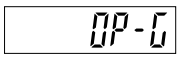
Note: You will not be returned to regular operation mode if you do not press the front panel reset key.

5. Operation mode

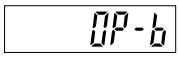
This sets the operation mode.



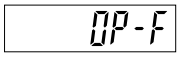
1) Pressing the SET key four times while holding down the MODE key takes you to the operation setting mode.
2) The display reads “OP-G” (Totalizing ON delay) after entering the operation setting mode.



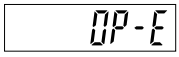
3) Pressing the setting key causes the display to change as follows:
OP-B (Signal ON delay)



OP-F (Signal flicker)

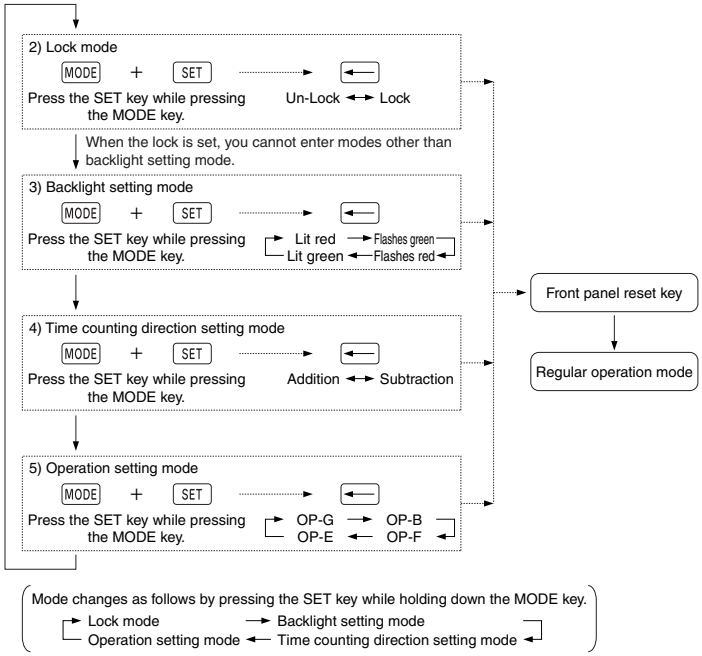


OP-E (Pulse ON delay)



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.

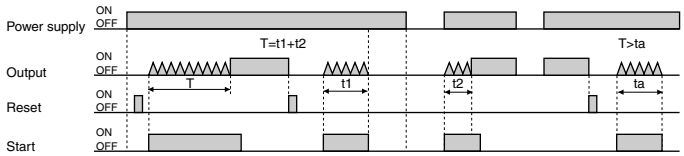
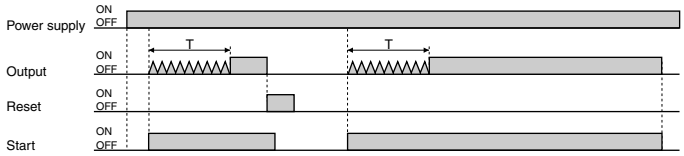
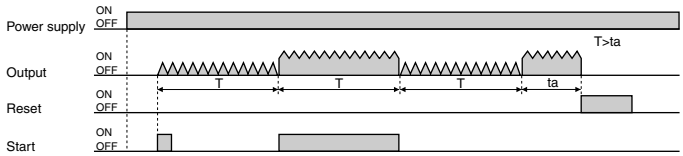
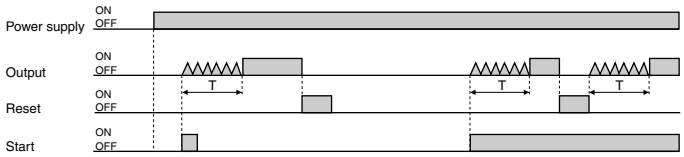
	Preset value	Elapsed value	Output change
Lock mode	×	×	×
Backlight setting mode	×	×	×
Time counting direction setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF
Operation setting mode	×	Addition: “0” Subtraction: “Preset value”	ON→OFF

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.	

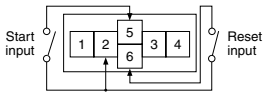
Cautions for use

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

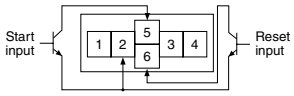
I_C = Min. 20 mA

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.



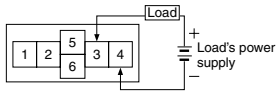
(3) Input wiring

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

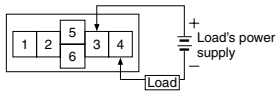
2) Output connection

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

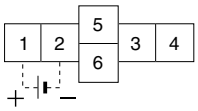
4. Terminal connection

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

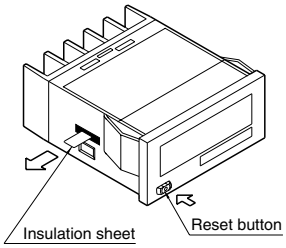
PRECAUTIONS IN USING THE LH2H SERIES

Cautions for use

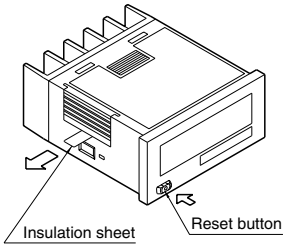
1. Insulation sheet

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)**



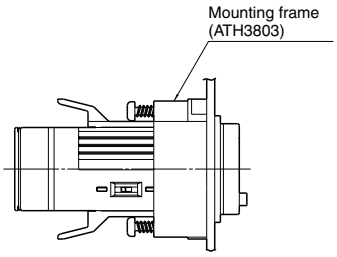
- **LH2H hour meter (installation frame type)**



2. Waterproof construction

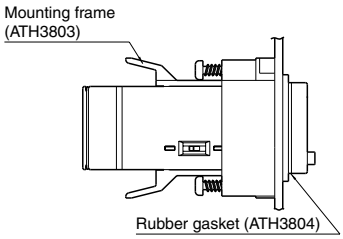
- **LH2H hour meter (installation frame type)**

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

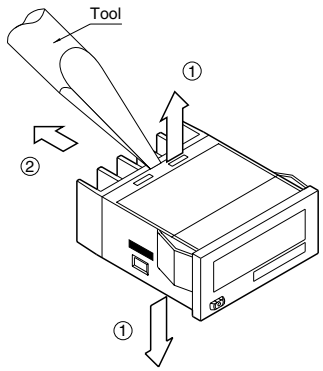
1) In places where the temperature changes drastically.
2) In places where humidity is high and there is the possibility of dew.
(When dew forms the display may vanish and other display errors may occur.)

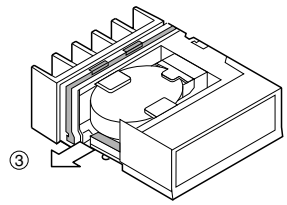
4. Conditions of use

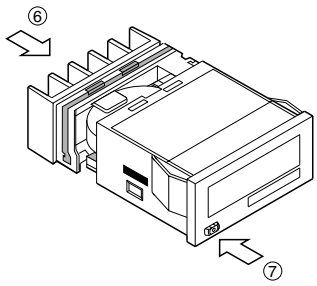
1) Do not use on places where there is flammable or corrosive gas, lots of dust, presence of oil, or where the unit might be subject to strong vibrations or shocks.
2) Since the cover is made of polycarbonate resin, do not use in places where the unit might come into contact with or be exposed to environments 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.

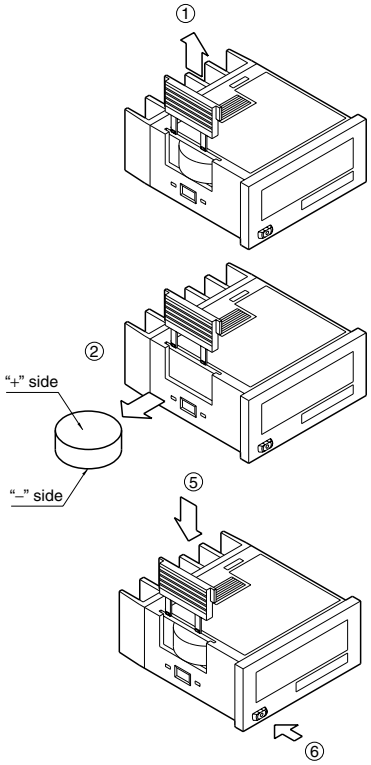






For LH2H hour meter
(installation frame type)

(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.



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).

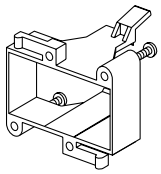
⚠ Warning

- 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

HOUR METERS SELECTOR CHART

Types		DIN 48 × 48 size Hour Meters				
Name of product		TH14 Hour Meters	TH24 Hour Meters	TH40 Hour Meters	TH50 Hour Meters	TH70 Hour Meters
Appearance		 TH14 series	 TH24 series	 TH40 series	 TH50 series	 TH70 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	0 to 9999.9 min	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	Zero reset for minute unit time monitoring	For monitoring accumulated hours on DC line
Driving method		AC motor	AC motor	AC motor	AC motor	DC quartz motor
Counting direction		Addition (UP)	Addition (UP)	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	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 DC, 24 V DC
	Frequency	50/60Hz (common)	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	Synchronizing with power supply frequency	According to quartz oscillation frequency
Min. counting unit		0.1 h	0.1 h	0.1 h	0.1 min	0.1 h
Reset input		—	Manual reset	Manual reset	Manual reset	—
Max. power consumption		Approx. 1.5 W	Approx. 1.5 W	Approx. 1.5 W	Approx. 1.5 W	Approx. 1.5 W
Weight		145 g 5.115 oz	150 g 5.291 oz	160 g 5.644 oz	150 g 5.291 oz	170 g 5.997 oz
Remarks		—	The TH50 series displays time in minute.	—	—	The unit with a reset function is also available. (Manufacturing after receiving an order)
		The TH14, 24, 40, 50, 63, and 64 series have numbers at the end of the part number that indicate the voltage required as follows: 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 panel is equipped at the front.				
Page		P. 168	P. 168	P. 170	P. 172	P. 176

Types		DIN 24 × 48 size Hour Meters		DIN 24 × 48 size Hour Meters	
Name of product		TH63 Hour Meters	TH64 Hour Meters	LH2H Hour Meters	LH2H Preset Hour Meters
Appearance Front section of part number		 TH63 series	 TH64 series	  Panel mounting type PC board mounting type	 ATH3
Counting range		0 to 99999.9 hours	0 to 9999.9 hours	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)
Features		For controlling total integrated hours	With zero reset function For controlling measured integrated hours	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
Driving method		AC motor	AC motor	Quartz oscillation type	Quartz oscillation type
Counting direction		Addition (UP)	Addition (UP)	Addition (UP)	Addition or subtraction
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	Flush mounting type: Unnecessary (Built-in battery) PC board mounting type: 3 V DC (Battery is externally installed.)	24 V DC
	Frequency	50/60Hz (common)	50/60Hz (common)	—	—
Counting integral/ Counting max. speed		Synchronizing with power supply frequency	Synchronizing with power supply frequency	±100 ppm (25°C)	±0.01% ±50 ms in case of power on start ±0.01% ±30 ms in case of input signal start
Min. counting unit		0.1 h	0.1 h	0.1 h, 0.1 min, 1 s	0.1 h, 0.1 min, 1 s
Reset input		—	Manual reset	Push button and external reset input terminal	Push button and external reset input terminal
Max. power consumption		Approx. 1.5 W	Approx. 1.5 W	—	Max. 1.5 W
Weight		80 g 2.822 oz	90 g 3.174 oz	Flush mounting type: 55 g 1.940 oz PC board mounting type: 15 g .529 oz	50 g 1.764 oz
Remarks		The numbers at the end of the part number indicate voltage. (See the remarks above.)		—	—
Page		P. 174	P. 174	P. 148	P. 156

Types		DIN 52 × 52 size Hour Meters		TH Hour Meter: Round type
Name of product		TH13 Hour Meter	TH23 Hour Meter	DC Hour Meter
Appearance		 TH13 series	 TH23 series	 TH8 series
Counting range		0 to 99999.9 hours	0 to 9999.9 hours	0 to 9999.9 hours
Features		For controlling total integrated hours	With zero reset function For controlling measured integrated hours	Driven on DC power
Driving method		AC motor	AC motor	Ceramic oscillation + AC motor
Counting direction		Addition (UP)	Addition (UP)	Addition (UP)
Power	Voltage	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	12 V DC, 24 V DC
	Frequency	50 Hz or 60 Hz	50 Hz or 60 Hz	—
Counting integral/ Counting max. speed		Synchronizing with power supply frequency	Synchronizing with power supply frequency	±0.2% (25°C)
Min. counting unit		0.1 h	0.1 h	0.1 h
Reset input		—	Manual reset	—
Max. power consumption		Approx. 1.5 W	Approx. 1.5 W	Approx. 1.5 W
Weight		130 g 4.586 oz	135 g 4.762 oz	170 g 5.997 oz
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. 166	P. 166	P. 178

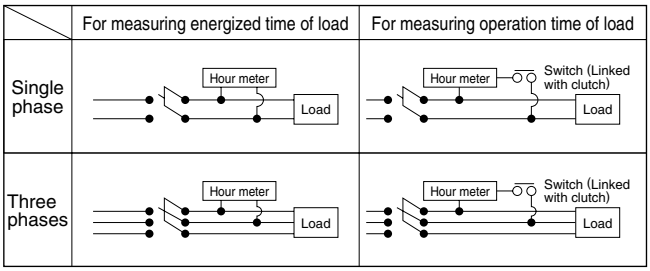
PRECAUTIONS IN USING THE HOUR METERS

1. Frequency setting

Frequency is specified for AC motor-driven hour meters. Before installing, be sure to check your local power frequency.

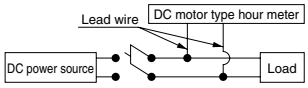
2. Connections

• 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.

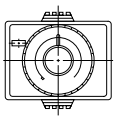
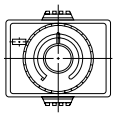
6. Acquisition of CE marking

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)

DISCONTINUED MODELS AND RECOMMENDED SUBSTITUTES

Timers

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

Discontinued models	Recommended substitutes	Attachment
CHP-NF (Exposed type Round plug-in/ vertical type)  CHP-NF	PM4H-F  PM4HF-	Attachment frame AT7821 should be used. * External dimensions, however, differ. In addition, the reset method changes from voltage input to non-voltage input.
CHP-SD  CHP-SD-	PM4H-SD  PM4HSD-	With exposed attachment, terminal base ATC180041 should be used. * External dimensions and contact capacity, however, differ. In addition, with the PM4H-SD: 1) (1) to (8) have no internal connection, and 2) the input (star) changes to 1a.
PM48A  PM48A-	PM4H-A  PM4HA-	With exposed attachment, terminal base ATC180041 should be used.
PM48  PM48	PM4H-S  PM4HS-	With exposed attachment, terminal base ATC180031 should be used.
PM48M  PM48M-	PM4H-M  PM4HM-	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
PM48F  PM48F-	PM4H-F  PM4HF-	With exposed attachment, terminal base ATC180031 for F8 type and F8R type ATC180041 for F11R type.
PM48SD  PM48SD	PM4H-SD  PM4HSD	With exposed attachment, terminal base ATC180031 should be used.

Timers

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

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

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

Counters

Discontinued models	Recommended substitutes	Attachment
MC electromagnetic counters  MC6	LC4H  LC4H LC4H-L	The size and attachment method are different. The input method is different. (Voltage input → non-voltage input)
LC48 (Relay type: 8-pin / Tr type: 11-pin)  LC48	LC4H (Relay type: 8-pin / Tr type: 11-pin)  LC4H LC4H-L	
LC48W (11-pin)  LC48W	LC4H-W (11-pin)  LC4H-W	
EM48S (8-pin)  EM48S	LC4H (8-pin)  LC4H LC4H-L	
EM72S (Screw terminal)  EM72S	LC4H (Screw terminal)  LC4H LC4H-L	The size is different. □72 ⇩ □48
LC24 Panel-mounting type  • One-touch installation type LC24	LC2H Panel-mounting type  • One-touch installation type  • Installation frame type LC2H	The both one-touch installation type and installation frame type are available.
LC24 PC board mounting type  LC24	LC2H PC board mounting type  LC2H	

Hour meters

Discontinued models	Recommended substitutes	Attachment
 TH11* TH12*	 TH141S TH142S	Body Round type (attachment hole ϕ45) ⇩ Square type (attachment hole □45)
 TH21* TH22*	 TH241S TH242S	Body Square type (attachment hole □47) ⇩ Square type (attachment hole □45)
TH30  TH30	LT4H (~999.9 h)  LT4H	The size and attachment method are different. The input method is different. (Voltage input → non-voltage input)
	LT4H-W (~9999 h)  LT4HW	
LH24 Panel-mounting type  • One-touch installation type LH24	LH2H Panel-mounting type  • One-touch installation type  • Installation frame type LH2H	The both one-touch installation type and installation frame type are available.
LH24 PC board mounting type  LH24	LH2H PC board mounting type  LH2H	

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

FOREIGN SPECIFICATIONS OVERVIEW

1. International Standards

IEC standard

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

2. North America

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.

LISTING MARK

Fig. 1

RECOGNITION MARK

Fig. 2

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.

Certification

Fig. 3

Component Acceptance

Fig. 4

Fig. 5

Fig. 6

3. Europe

EN standard

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

(1) Germany

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

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

4. Shipping Standards

(1) Lloyd’s Register of Shipping

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