

# PRECAUTIONS IN USING THE LC4H SERIES

## 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) 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.

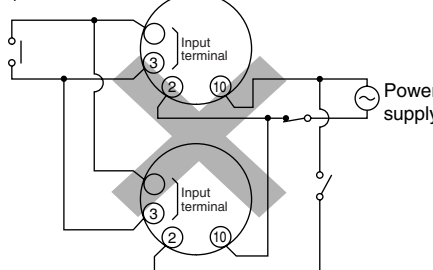
### 2. Input connections (except LC4H-S/AC type)

The power circuit has no 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)

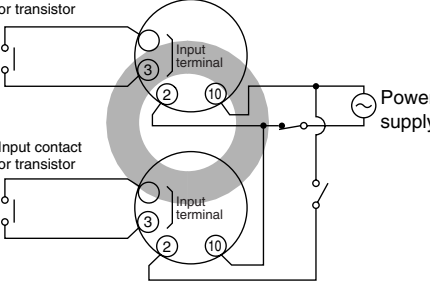
Input contact or transistor



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

(Fig. B)

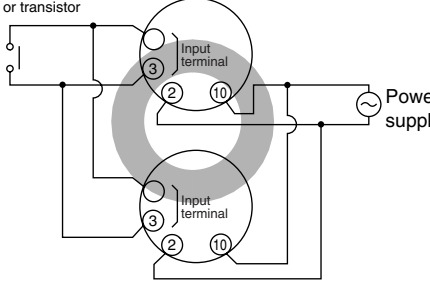
Input contact or transistor



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)

Input contact or transistor

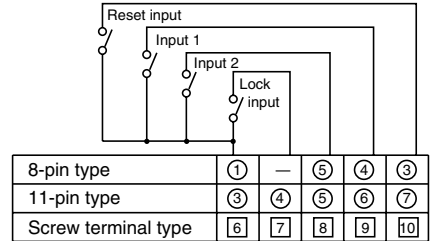


### 3. Input and output

#### 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.



Note: The LC4H-W does not have the lock input ④, ⑦.

##### (2) Non-contact point input

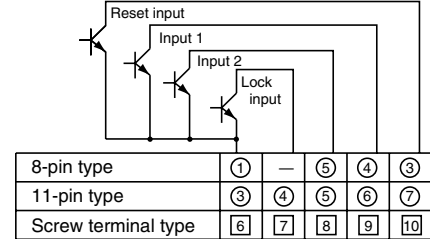
Connect with an open collector. Use transistors whose characteristics satisfy the criteria given below.

$V_{CE0} = 20 \text{ V min.}$

$I_C = 20 \text{ mA min.}$

$I_{CBO} = 6 \mu\text{A max.}$

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



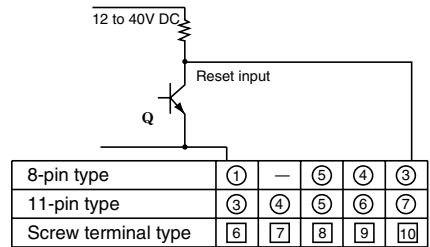
Note: The LC4H-W does not have the lock input ④, ⑦.

\* The short-circuit impedance should be less than 1 k $\Omega$ .

[When the impedance is 0  $\Omega$ , 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 k $\Omega$ .

\* 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.



(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.

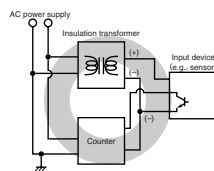
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3) The LC4H series use power supply without a transformer (power and input terminals are not insulated). In connecting various kinds of input signals, therefore, use a power transformer in which the primary side is separated from the ungrounded secondary side as shown in Fig. A, for the power supply for a sensor and other input devices so that short-circuiting can be prevented.

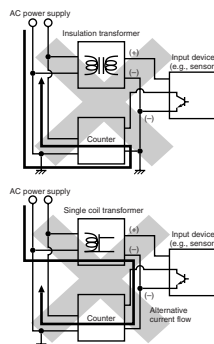
Once the wiring to be used is completely installed and prior to installing this counter, confirm that there is complete insulation between the wires connected to the power terminals (2 each) and the wires connected to each input terminal. If the power and input lines are not insulated, a short-circuit 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



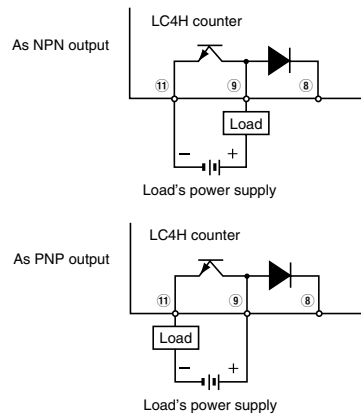
(Fig. B) Bad example



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.

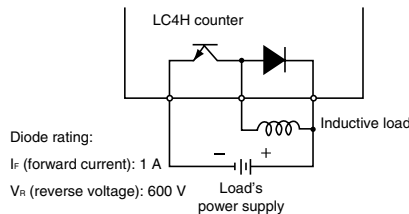
5) Transistor output

(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)



Diode rating:

$I_F$  (forward current): 1 A

$V_R$  (reverse voltage): 600 V

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.

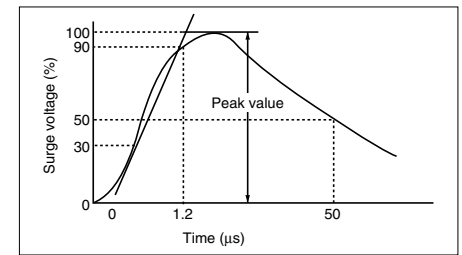
## 5. Conditions of usage

- 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

## • Surge wave form

$\pm (1.2 \times 50)$  ms uni-polar full wave voltage]



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

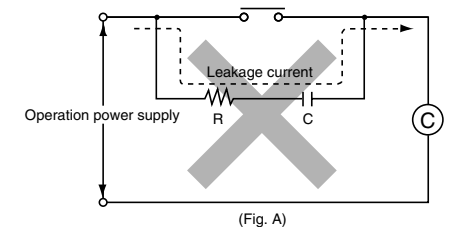
Pulse width: 1 μs, 50 ns

Polarity: ±

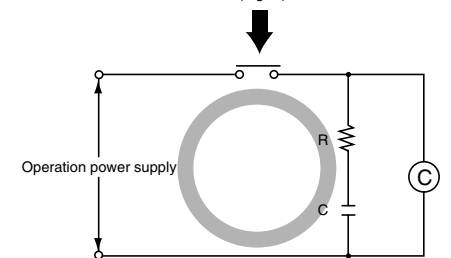
Cycle: 100 cycles/second

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.

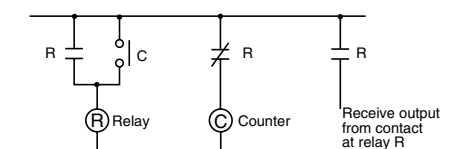


(Fig. A)



(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.



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## 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 IP E t t	Incorrect DIP switch setting.		Restart unit (correct DIP switch settings)	
E t t - 0 0	Malfunctioning CPU.	OFF	Enter reset, RESET key, or restart unit.	The values at start-up before the CPU malfunction occurred.
E t t - 0 1	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.