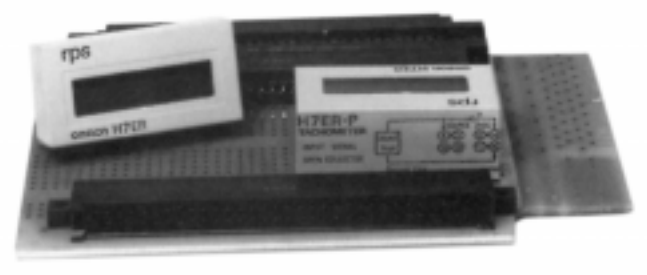
OMRON

PC Board-Use Counter

H7E-P

Miniature Counter for PC Board Usage

- LSI with built-in digital filter ensures excellent noise immunity
- Machine insertable
- Can be mounted on 28-pin IC socket
- Totalizing counter, time counter and tachometer available



Ordering Information

■ TOTALIZING COUNTERS

Operating mode	UP type	
Display	LCD digital, 5.1 mm (0.2 in) high	
Reset system	External (electrical) reset, power-OFF reset	
Number of digits	7	
Count input	No-voltage (solid-state) input	No-voltage (contact, solid-state) input
Max. counting speed	1 kcps	30 cps
Mounting style	Mounts directly on PCB, or with 28-pin IC socket	
Part number	**H7EC-P**	**H7EC-LP**

■ TIME COUNTER

Operating mode	UP type
Display	LCD digital, 5.1 mm (0.2 in) high
Reset system	External (electrical) reset, power-OFF reset
Number of digits	7 (0.0 to 999999.9 h)
Count input	No-voltage (contact, solid-state) input
Mounting style	Mounts directly on PCB, or with 28-pin IC socket
Part number	**H7ET-P**

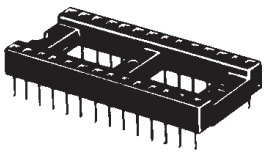
■ DIGITAL TACHOMETERS

Operating mode	UP type		
Display	LCD digital, 5.1 mm (0.2 in) high		
Reset system	Automatic (No external or manual reset)		
Number of digits	4		5
Count input	No-voltage (solid-state) input	DC voltage input	
Max. counting speed	1 kcps		10 kcps
Applicable encoder resolution	1 pulse/rev		60 pulses/rev
Max. revolutions displayed	1,000 rps		10,000 rpm
Mounting style	Mounts directly on PCB, or with 28-pin IC socket		
Part number	**H7ER-P**	**H7ER-VP**	**H7ER-V2P**

■ ACCESSORIES

Connecting socket

Description	**Part number**
28-pin (standard quality)	**XR2A-2801-N**



Specifications

■ RATINGS

Supply voltage	3 VDC
Operating voltage range	90 to 110% of supply voltage
Current consumption	Models H7EC-❑P and H7ER-P: 20 μA max. (at 3 VDC, 25°C/77°F) Model H7ET-❑❑P: 15 μA max. (at 3 VDC, 25°C/77°F)
Input*	DC Voltage input: 4.5 to 30 VDC at "High" (logic) level 0 to 2 VDC at "Low" (logic) level (input impedance: approx. 4.7 kΩ) No-voltage input: Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 500 kΩ min.
Max. counting speed**	H7EC-P (1 kcps): Minimum signal width 0.5 ms H7EC-LP (30 cps): Minimum signal width 16.7 ms H7ER-P, -VP (1 kcps): Minimum signal width 0.5 ms H7ER-V2P (10 kcps): Minimum signal width 0.05 ms
Reset time	External reset types: 20 ms Power-OFF type reset time: 100 ms (with 0 V residual voltage at power OFF)
Gate time (H7ER only)	1 second

* The maximum voltages allowed on the input, count or gate terminals are as follows:
No-voltage models: 3 VDC
DC voltage models: 30 VDC

** ON/OFF ratio 1:1

Approved by the following standards

UL

CSA

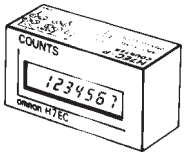
CE (EMC)

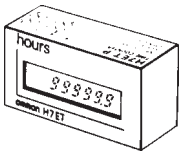
■ CHARACTERISTICS

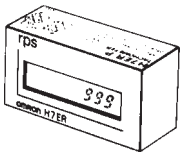
Noise immunity	±200 V between input terminals with square-wave noise applied by noise simulator
Vibration	Mechanical durability: 10 to 55 Hz; 0.75 mm (0.03 in) double amplitude Malfunction durability: 10 to 55 Hz; 0.3 mm (0.02 in) double amplitude
Shock	Mechanical durability: Approx. 30 G Malfunction durability: Approx. 10 G
Ambient temperature	Operating: -10° to 55°C (14° to 131°F) Storage: -25° to 65°C (-13° to 149°F)
Humidity	35 to 85% RH
Weight	Approx. 20 g (1.25 oz)

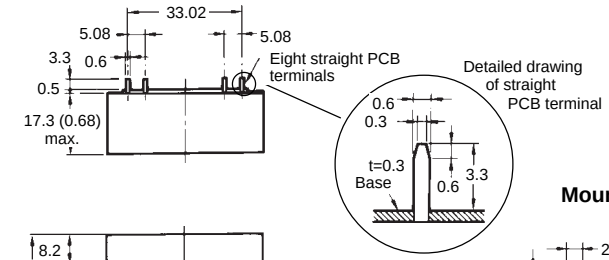
Dimensions

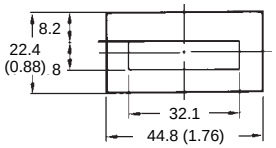
Unit: mm (inch)

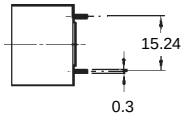




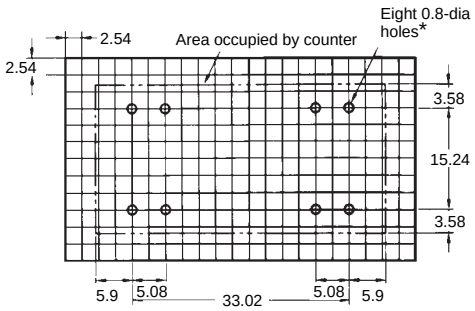








Mounting footprint

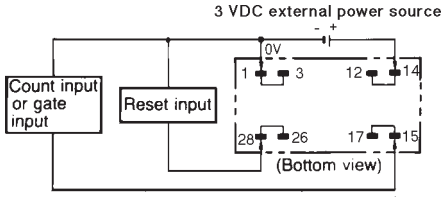


Note: Mounting hole dimensions conform to the pin pitch of a standard 28-pin IC socket.

*When machine inserting the H7E❑-❑P, the mounting holes must be 1.2 mm diameter.

Connections

■ H7EC-P, H7EC-PL, H7ET-P



Power supply

All H7E❑-❑P models require a 3 VDC external power source. When designing a circuit, plan the power wiring connections to be within 50 mm (1.97 in). Refer to the connection diagrams above for proper wiring polarity.

The life expectancy of a battery power source can be calculated by the following formula:

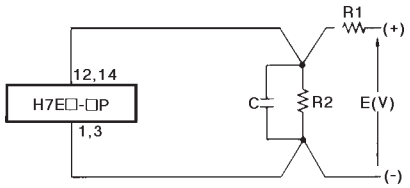
$$t = 1000\ A/Ic$$

where,

t: life expectancy of battery (h)
A: battery capacity (mAh)
Ic: current consumed by H7E❑-❑P (μA)

Voltage division of power source circuit

When necessary, the voltage from the battery may be divided by resistances:



When doing so, however, ensure that the following equation balances:

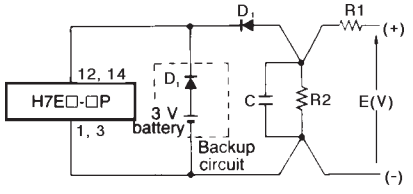
$$E\ (V) \times R_2 / (R_1 + R_2) = 3V$$

Allow a current high enough to flow through R_1 so that the H7E❑-❑P receives adequate current.

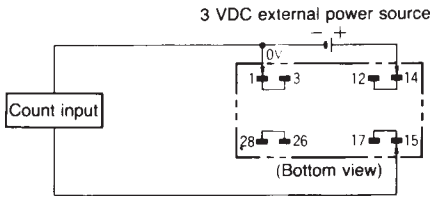
C is a film capacitor, of about 0.1 μF, and is intended to absorb noise superposed from the power lines.

Keep wiring between the H7E❑-❑P and R_2 as short as possible, within 50 mm (1.97 in).

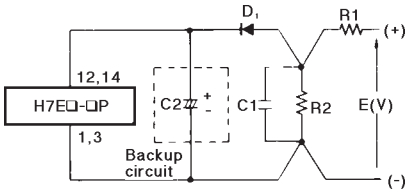
Backup circuit for protection against power failure



■ H7ER-P, H7ER-VP, H7ER-V2P



Use a diode (Di) having a forward voltage as small as possible (0.1 V max. at I_F of 1 mA). Determine the ratio of R_1 to R_2 in accordance with the forward voltage of the diode to be used. Be aware that when the supply voltage of power source E has dropped to less than the voltage of the backup circuit, the battery discharges. To protect the circuit against a momentary power failure, an aluminum electrolyte capacitor can also be used in place of a battery, as shown below:



When the capacitor is used, its backup time can be calculated by the following formula*:

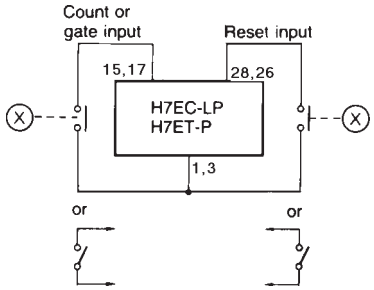
$$t = C(V_1 - V_2)/Ic$$

where,

t: Backup time (s)
C: Capacitance (μF)
V_1: Supply voltage before power failure (V)
V_2: Minimum operating voltage of H7E❑-❑P (V)
Ic: H7E❑-❑P current consumption (μA)

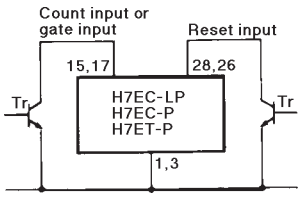
* In all applications which require the counter to maintain the accumulated display for a longer time, increase the capacitance to an appropriate value.

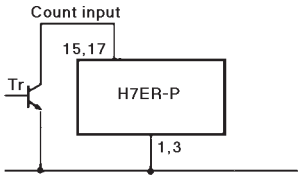
Input connection
Contact input

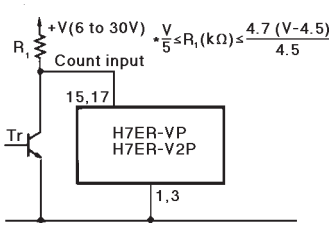


■ SOLID-STATE INPUT OF OPEN-COLLECTOR TRANSISTOR

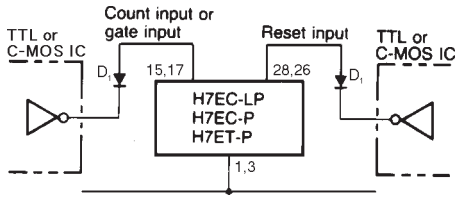
By open-collector transistor

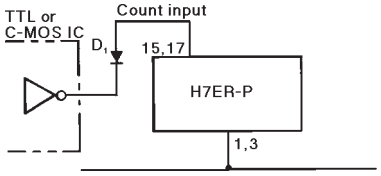


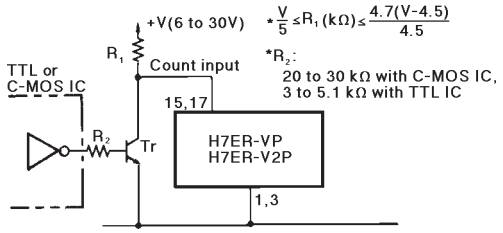




By TTL or C-MOS IC







Use a transistor for input that satisfies the following conditions:

Collector breakdown voltage ≥ (Circuit voltage) x 1.2
Leakage current < 5 μA
Amplification factor (hFE)≥ 50

Use diode (Di) having a forward voltage as small as possible (0.1 V max. at I_F of 20 μA).

Operations

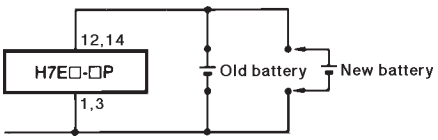
PCB counter power source

Wiring polarity must be carefully observed in order to prevent permanent damage to the counter. The 28-pin socket has no provision for preventing the insertion of the counter in a reversed position. Exercise caution when inserting the counter in the socket, to prevent reversed polarity.

Replacing battery

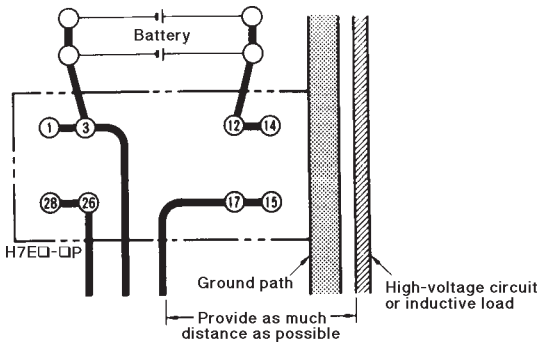
To prevent unwanted reset when replacing the battery, connect the new battery before disconnecting the old one. Otherwise, the voltage supplied to the counter circuit drops, causing the present count value to reset.

When designing the circuit board, providing two extra terminals for battery connection will make the switch much simpler. See the schematic diagram below:



Wiring

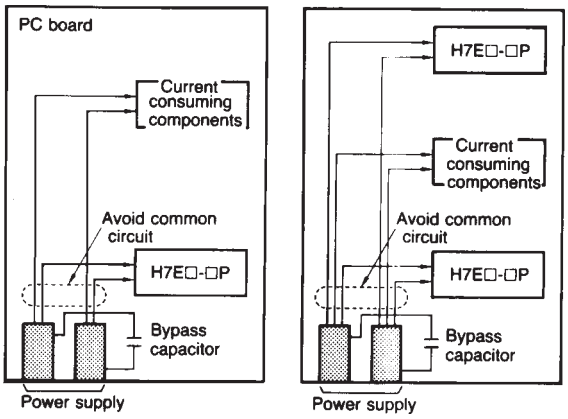
Do not route the count, gate or reset input wiring in the vicinity of, or in parallel to the wiring of high-voltage or inductive load circuits (such as motors and relays). Also, keep the wiring as short as possible.



■ GENERAL INFORMATION

The terminals are solder-plated. Finish soldering the terminals within 5 seconds, at a solder iron tip temperature of 250°±10°C (482°F±50°F). Since the counter is not flux-tight, do not use flux when soldering. Avoid automatic and dip soldering. Manually solder the counter onto a PC board, and avoid cleaning as much as possible.

When mounting the counter on a PC board with components which consume higher current than the counter, place the counter in the vicinity of the power supply. Avoid placing the counter in a circuit with power-consuming components. Above all, never place the count input circuit in a circuit common to power-consuming components.



NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches, divide by 25.4.

OMRON

Omron Europe B.V. EMA-ISD, tel:+31 23 5681390, fax:+31 23 5681397, http://www.eu.omron.com/ema

Cat. No. GC CN4A 6/98/26M Specifications subject to change without notice. Printed in the U.S.A.