

Self-powered Total Counter New H7EC

- Eight-digits, counting range 0 to 99999999.
- Dual input speed: 30 Hz ↔ 1 kHz (except for AC/DC multi-voltage input models)



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Model Number Structure

Model Number Legend

Note: Some configurations are not available.

H7EC - N -

1 2 3

1. Count Input

- None: No-voltage input
- V: PNP/NPN universal DC voltage input
- FV: AC/DC multi-voltage input

2. Case Color

- None: Light gray
- B: Black

3. Display

- None: 7-segment LCD without backlight
- H: 7-segment LCD with backlight

Note: Estimates can be provided for coatings and other specifications that are not given in the datasheet. Ask your OMRON representative for details.

Ordering Information

Total Counters

| Count input | Max. counting speed | Display | Model | |
|--|----------------------------|------------------------------|-----------------|------------|
| | | | Light-gray body | Black body |
| PNP/NPN universal DC voltage input (4.5 to 30 VDC) | 30 Hz ↔ 1 kHz (switchable) | 7-segment LCD with backlight | H7EC-NV-H | H7EC-NV-BH |
| | | 7-segment LCD | H7EC-NV | H7EC-NV-B |
| AC/DC multi-voltage input (24 to 240 VAC/VDC) | 20 Hz | 7-segment LCD | H7EC-NFV | H7EC-NFV-B |
| No-voltage | 30 Hz ↔ 1 kHz (switchable) | 7-segment LCD | H7EC-N | H7EC-N-B |

Accessories (Order Separately)

| Name | Model |
|---|---------|
| Compact Flush Mounting Bracket | Y92F-35 |
| Flush Mounting Bracket (See note 1) | Y92F-34 |
| Wire-wrap Terminal (set of two Terminals) | Y92S-37 |
| Lithium Battery (See note 2) | Y92S-36 |
| Waterproof Packing (See note 1) | Y92S-32 |

Note: 1. Provided with H7EC. (Order additional Brackets separately as required.)

2. Built into H7EC. Order replacements using the above model number before the service life expires.

Specifications

■ General

| Item | H7EC-NV-□ H7EC-NV-□H | H7EC-NFV-□ | H7EC-N-□ |
|----------------------|---|---------------------------|------------------|
| Operating mode | Up type | | |
| Mounting method | Flush mounting | | |
| External connections | Screw terminals, optional Wire-wrap Terminals (see note 1) | | |
| Reset | External/Manual reset | | |
| Number of digits | 8 | | |
| Count input | PNP/NPN universal DC voltage input | AC/DC multi-voltage input | No-voltage input |
| Display | 7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) (see note 2) | | |
| Max. counting speed | 30 Hz/1 kHz | 20 Hz | 30 Hz/1 kHz |
| Case color | Light gray or black (-B models) | | |
| Attachment | Waterproof packing, Y92F-34 Flush Mounting Bracket | | |
| Approved standard | UL863, CSA C22.2 No.14, Lloyds Conforms to EN61010-1/IEC61010-1 (Pollution degree2/overvoltage category III) Conforms to VDE0106/P100 | | |

- Note:** 1. Separately ordered Wire-wrap Terminals (Y92S-37) are required.
2. Only PNP/NPN universal DC voltage input models (-H models) have a backlight.

■ Ratings

| Item | H7EC-NV-□ H7EC-NV-□H | H7EC-NFV-□ | H7EC-N-□ |
|----------------------------------|---|---|---|
| Supply voltage | Backlight model: 24 VDC (0.3 W max.) (only for backlight) No-backlight model: Not required (powered by built-in battery) | Not required (powered by built-in battery) | |
| Count input | High (logic) level: 4.5 to 30 VDC Low (logic) level: 0 to 2 VDC (Input impedance: Approx. 4.7 kΩ) | High (logic) level: 24 to 240 VAC/VDC, 50/60 Hz Low (logic) level: 0 to 2.4 VAC/VDC, 50/ 60 Hz | No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min. |
| Reset input | | No voltage input Maximum short-circuit impedance: 10 kΩ max. Short-circuit residual voltage: 0.5 V max. Minimum open impedance: 750 kΩ min. | |
| Max. counting speed (see note) | 30 Hz or 1 KHz (Switchable with switch) | 20 Hz | 30 Hz or 1 KHz (Switchable with switch) |
| Minimum signal width | 20 Hz: 25 ms 30 Hz: 16.7 ms 1 KHz: 0.5 ms | | |
| Reset system | External reset and manual reset: Minimum signal width of 20 ms | | |
| Terminal screw tightening torque | 0.98 N·m max. | | |
| Ambient temperature | Operating: -10°C to 55°C (with no condensation or icing) Storage: -25°C to 65°C (with no condensation or icing) | | |
| Ambient humidity | Operating 25% to 85% | | |

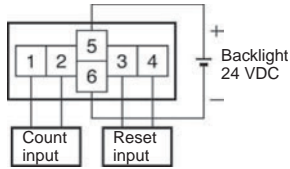
Note: ON/OFF ratio 1:1

Connections

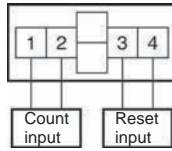
Terminal Arrangement

Bottom view: View of the Total Counter rotated horizontally 180°

Backlight Model



No-backlight Model

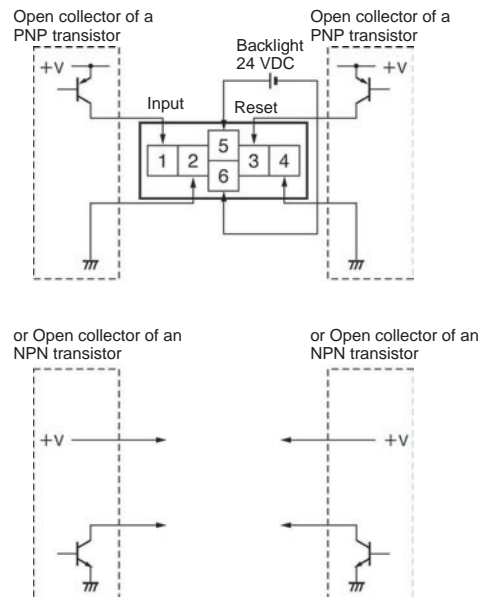
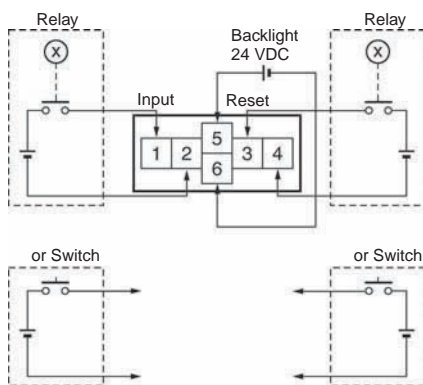


Connections

H7EC Total Counter

PNP/NPN Universal DC Voltage Input Model With Backlight

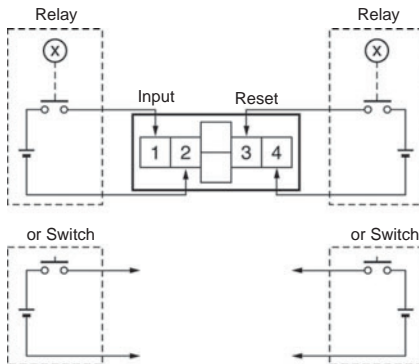
1. Contact Input (Input by a Relay or Switch Contact)
2. Solid-state Input



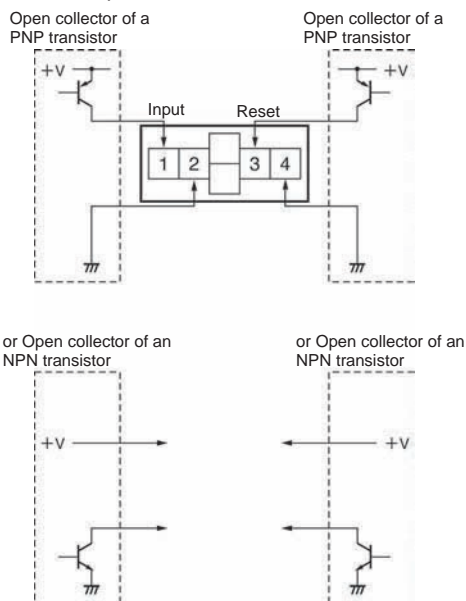
- Note:**
1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.
 2. Select input transistors according to the following:
 Dielectric strength of the collector ≥ 50 V
 Leakage current $< 100 \mu\text{A}$

PNP/NPN Universal DC Voltage Input Model Without Backlight

1. Contact Input (Input by a Relay or Switch Contact)



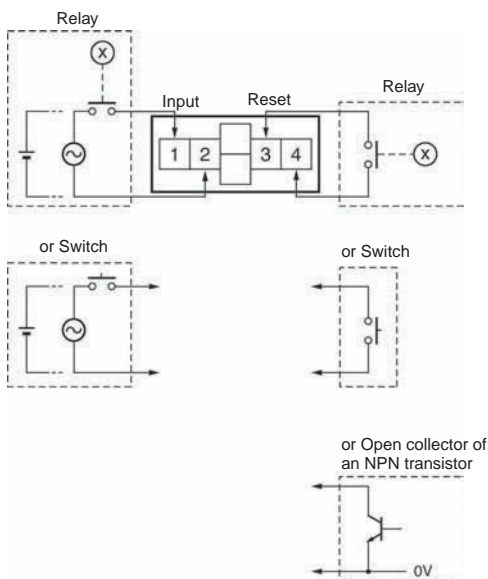
2. Solid-state Input



Note: 1. Terminals 2 and 4 (input circuit and reset circuit) are functionally isolated.

2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current $< 100 \mu\text{A}$

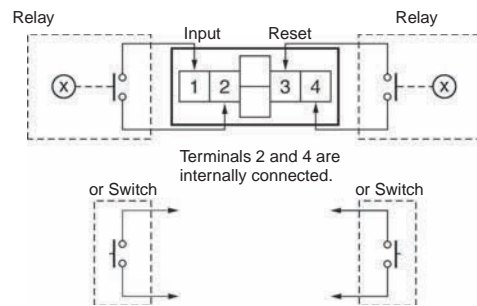
AC/DC Multi-voltage Input Model



Note: Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current $< 1 \mu\text{A}$

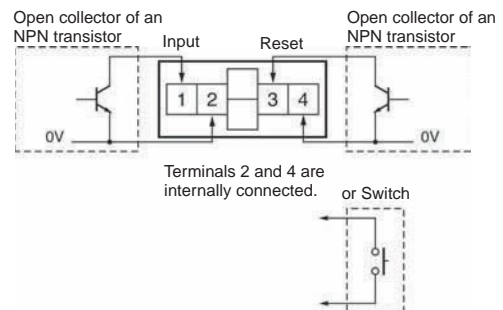
No-voltage Input Model

1. Contact Input (Input by a Relay or Switch Contact)



Note: Use Relays and Switches that have high contact reliability because the current flowing from terminals 1 or 3 is small. It is recommended that OMRON's G3TA-1A/ID be used as the SSR.

2. Solid-state Input (Open Collector Input of an NPN Transistor)



Note: 1. Residual voltage in the output section of Proximity Sensors or Photoelectric Sensors becomes less than 0.5 V because the current flowing from terminals 1 or 3 is small thus allowing easy connection.

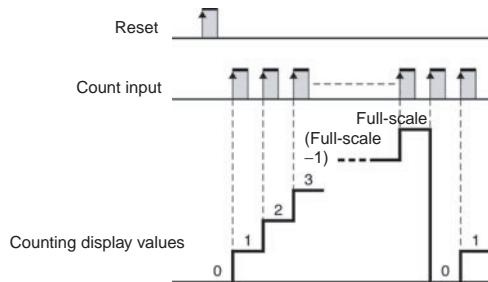
2. Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current $< 1 \mu\text{A}$

Operation

■ Operating Modes

H7EC Total Counter

Incrementing Operation (Up)



Nomenclature

Front view

Reset Key

Reset the count value. Not operable under key-protect.

Counting speed switch

For all models except for H7EC-NFV-□. If the counting speed setting is changed, the present value will not be held and so press the Reset Key on the front panel.

| Setting (see note) | Counting speed |
|--------------------|-------------------------|
| Front panel | 30 Hz (default setting) |
| Terminal block | 1 kHz |

Key-protect Switch

The Reset Key is not operable while the key-protect switch is set to ON.

| Setting (see note) | Key-protect |
|--------------------|-----------------------|
| Front panel | OFF (default setting) |
| Terminal block | ON |

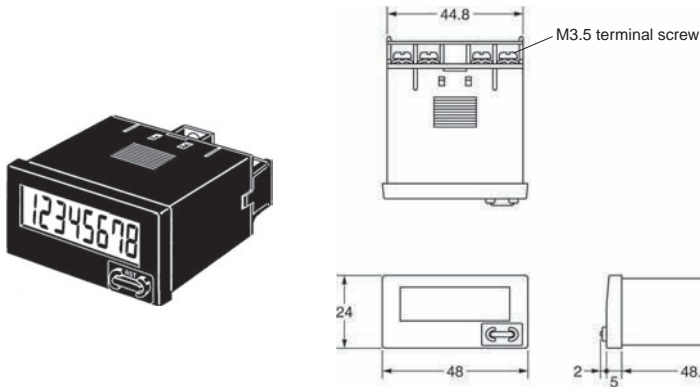
Bottom view

- Note:**
1. Perform switch setting before mounting to a control panel.
 2. If the counting speed setting is changed, the present value will not be held. Press the Reset Key on the front panel.
 3. Key protection is used to prohibit operating the Reset Key. The reset input terminals will still be functional.

Dimensions

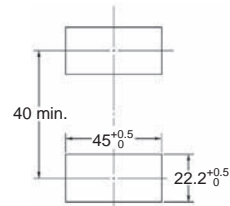
Note: All units are in millimeters unless otherwise indicated.

H7EC-N

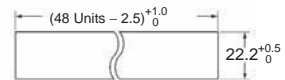


Panel Cutout

Separate mounting

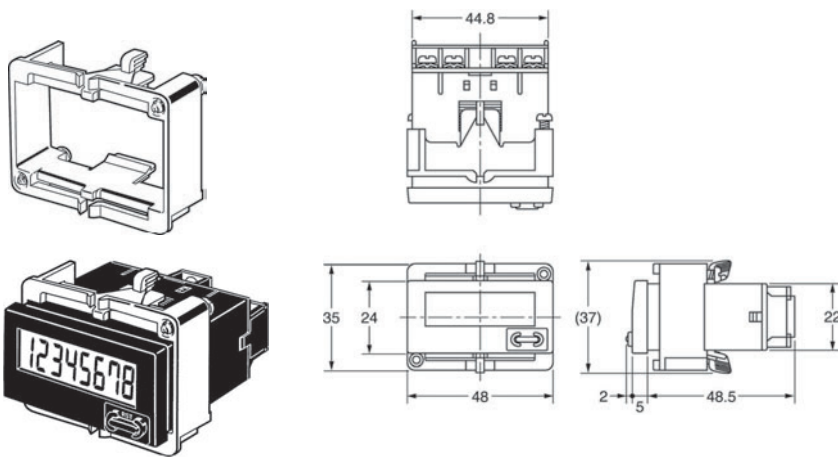


Dense mounting



Waterproofing is not possible for dense mounting

Dimensions with Y92F-34 Flush Mounting Bracket



- When mounting, insert the Counter into the cutout, insert the adapter from the back and push in the Counter while making the gap between the front panel and the cutout panel as small as possible. Use screws to secure the Counter. If waterproofing is desired, insert the waterproof packing.
- When several Counters are installed, ensure that the ambient temperature will not exceed specifications.
- The appropriate thickness of the panel is 1 to 5 mm.

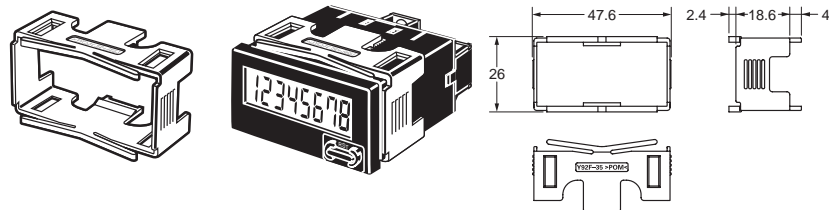
Note: A Compact Flush Mounting Bracket (Y92F-35) can also be used. Refer to *Accessories* for details.

Accessories (Order Separately) (Common)

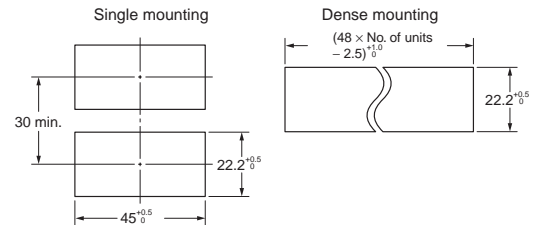
■ New H7E (Except for PCB-mounting Counter)

The New H7E models are supplied with a mounting bracket (Y92F-34) and nut. Additionally, the Y92F-75/-76/-77B Flush Mounting Adapters shown here allow the New H7E models to be fitted to existing panel cutouts.

Y92F-35 Compact Flush Mounting Bracket



Panel Cutout

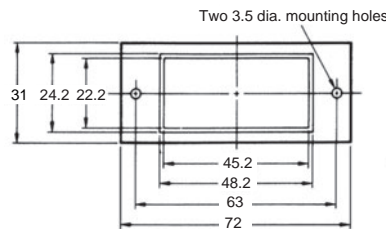
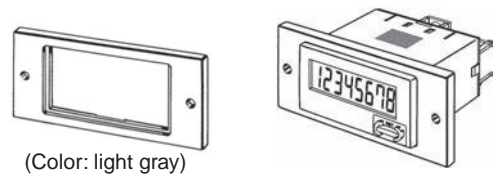


Degree of protection (front): IP40 (not waterproof)
The DIP switch of the H7E□-N can be operated in mounted condition. Vibration resistance and shock resistant are the same level as the H7E□-N series.

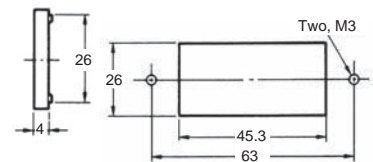
- The minimum mounting interval is 30 mm.
Note: An interval of 40 mm is recommended for easier wiring.
- Do not allow the ambient temperature of the H7E□-N to exceed the specifications (55°C).
- Mounting is possible onto panels with a thickness of 1 to 5 mm.

Y92F-75 Flush Mounting Adapter for 26 × 45.3 Rectangular Cutout

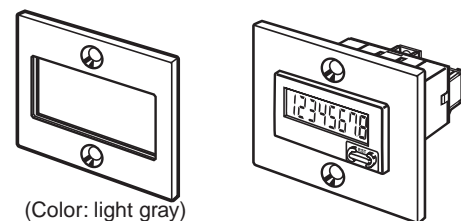
Use mounting bracket supplied with the Counter



Panel Cutout

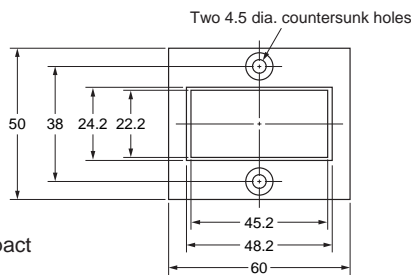


Y92F-76 Flush Mounting Adapter for 27.5 × 52.5 Rectangular Cutout

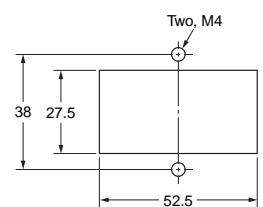


Use the Y92F-76 together with the Y92F-35 Compact Flush Mounting Bracket.

Do not use the Flush Mounting Adapter supplied with the Counter.

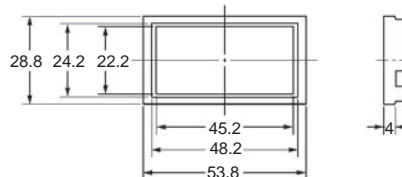
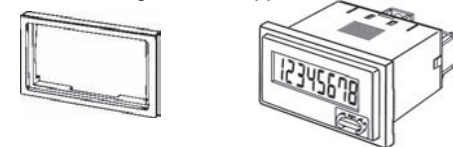


Panel Cutout



Y92F-77B Flush Mounting Adapter for 24.8 × 48.8 Rectangular Cutout

Use mounting bracket supplied with the Counter

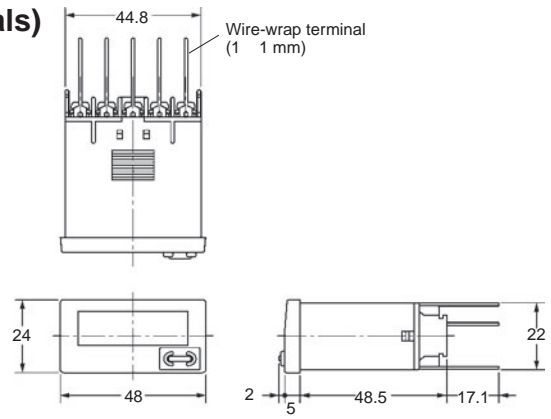
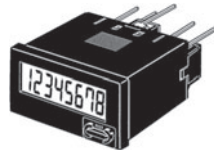


Panel cutout



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

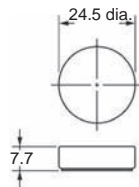
Y92S-37 Wire-wrap Terminal (Set of Two Terminals)



When using the Wire-wrap Terminal, be sure to use the correct wires and peripheral devices. (The correct wires, bits and sleeves are shown in the table on the right.)

| Wire | Bit | Sleeve | Wrapped state |
|-------|-----|--------|---------------|
| AWG22 | 2-A | 2-B | Normal |
| AWG24 | 1-A | 1-B | Normal |
| AWG26 | 3-A | 1-B | Normal |

Y92S-36 Lithium Battery (3 V)



Precautions (Common)

Refer to *Safety Precautions for All Counters*.

■ New H7E (Except for PCB-mounting Counter)

⚠ WARNING

This product has a built-in lithium battery. Do not short-circuit the + and – terminals, charge, disassemble, deform, or expose the battery to fire. The battery may explode (break), catch fire, or cause liquid leakage.

Do not use any battery other than the specified one (Y92S-36). Using another battery may cause liquid leakage or breakage, resulting in malfunction or injury.

⚠ CAUTION

If a voltage other than the rated one is applied, internal elements may be damaged.

Do not use the Counter in the following places:

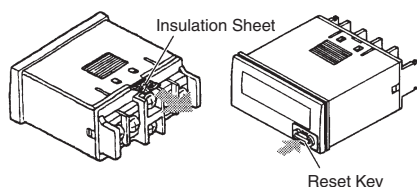
- Locations subject to direct sunlight.
- Locations subject to corrosive gases.
- Locations subject to dust.

Before Use

Be sure to remove this sheet before attempting to use the product.

- An insulation sheet has been inserted to maintain the quality of the Totalizer in the event of a long period without use. Be sure to remove this sheet before attempting to use the product.

Remove the insulation sheet and press the Reset Key on the front panel of the Counter. (With the H7ER-N,-NV(-H),-NV1(-H), models, "0" or "0.0" will be displayed after 1 s.)

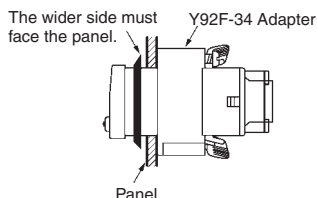


- Switch settings on the Counter must be performed before mounting it to a control panel.
- Do not use the Counter in the following locations:
 - Locations subject to severe changes in temperature.
 - Locations subject to condensation as the result of high humidity.

Mounting Precautions for Flush Mounting

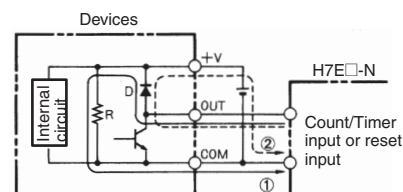
Although the operating section is watertight (conforming to NEMA4, IP66), rubber packing is provided to avoid water leakage through the gap between the Counter and panel cutout. Unless this rubber packing is tightly squeezed on, water may permeate inside the panel. Therefore, be sure to tighten the screws for fixing the Y92F-34 Flush Mounting Bracket. (Excessive tightening may also deform the rubber packing.)

Screw for the Flush Mounting Bracket



Reset Input and Count/Timer Input

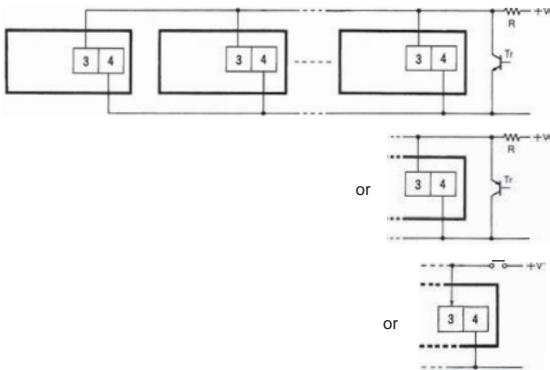
- The H7E operates using its built-in Battery. If the H7E is connected to a device that has +V and OUT terminals that are connected with a diode as shown in the circuit diagram, the circuit indicated by the arrow 1 or 2 will be formed when the device is turned OFF. As a result, the H7E may be reset or count by one. It is recommended that such devices not be connected to the H7E.



- If an excessive voltage is applied to the count/timer input or reset input terminals, the internal elements may be damaged. Ensure that the following voltages are not exceeded:
 - PNP/NPN universal voltage input model: 30 VDC
 - AC/DC voltage input model:
 - At count/timer input: 240 VAC (peak voltage: 338V)
240 VDC
 - At reset input: No voltage can be applied. (No-voltage input)
 - No-voltage input model: No voltage can be applied.
- Avoid wiring close to high-tension or large-current lines.
- Do not remove the outer case when voltage is being applied to the power supply terminals or the input terminals.
- The input for the H7E□-NFV-□ is a high-impedance circuit and so influence from an induced voltage may result in malfunction. Therefore, when the input signal wiring is longer than 10 m (line capacitance of 120 pF/m, at room temperature), it is recommended that a CR filter or a bleeder resistor is connected.

Count Input, Timer Input or Reset Input to More than One H7E Counter at a Time

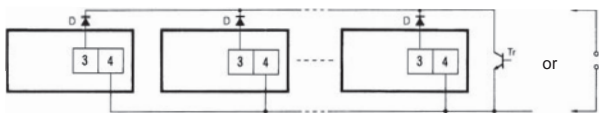
- PNP/NPN Universal DC Voltage Input



Note: H (Reset ON) level must be 4.5 V minimum.

$$H = \frac{4.7 (k\Omega)/N + V}{4.7 (k\Omega)/N + R}$$

- No-voltage Input

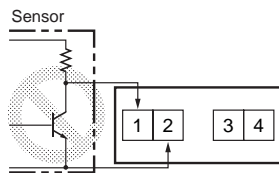


- Note:**
1. The leakage current of the transistor used for input must be less than 1 μ A.
 2. The forward voltage of the diode must be as low as possible (i.e., 0.1 V maximum with an I_F of 20 μ A) so that the voltage between terminals 3 and 4 will be 0.5 V when the reset input is ON.

Input and Power Supply

No-voltage Input Models

- Do not impose voltage on the Counter if the Counter is a model that operates with no-voltage input, otherwise the internal circuit of the Counter may be damaged. Do not connect any single input signal in parallel to Counter models operating with no-voltage input and those operating with voltage input, otherwise the Counters may malfunction.
- When connecting a sensor to the Counter that operates with no-voltage input, make sure that the sensor has open collector output.



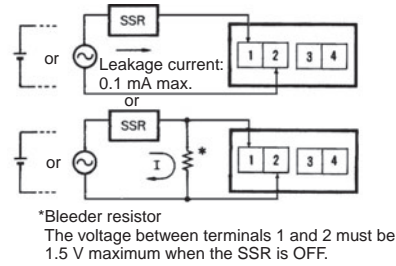
- When connecting an open collector input from a transistor to the Counter that operates with no-voltage input, make sure that the leakage current of the transistor is 1 μ A maximum.

No-voltage Input and PNP/NPN Universal DC Voltage Input Models

- The operation of the Counter may be affected if the capacitance of input lines exceeds 500 pF (about 10 m, with parallel wires of 2 x 2 mm). Keep all wires as short as possible. When using shielded wire, line capacitance may occur.

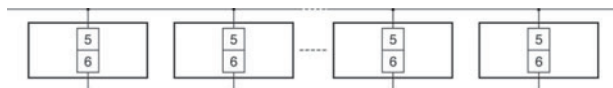
AC/DC Multi-voltage Input Models

- When connecting count/timer input from an SSR to the Counter that operates with AC/DC voltage input, use OMRON's G3TA-IA/ID SSR (for DC) whose leakage current is 0.1 mA max. or connect a bleeder resistor in parallel to the input circuit of the Counter.



Backlight Power Supply

- To reduce variation in the brightness of the backlight when using more than one H7E with a backlight, use the same power supply for all the backlights.



- When connecting the DC power supply for the backlights, be sure to connect the polarities correctly.

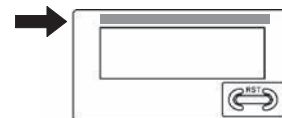
Input Verification with the H7ET Time Counter

(When the time range is not set to 0s to 999h59min59s)

The decimal point of the LCD blinks every other second while an input signal is being applied. If the decimal point is not blinking, the input signal is not being received correctly. Check the input signal connections.

Unit Label for Time Counter and Tachometer

A unit label has been packed with the Counter. Use in accordance with the application.



Battery Replacement

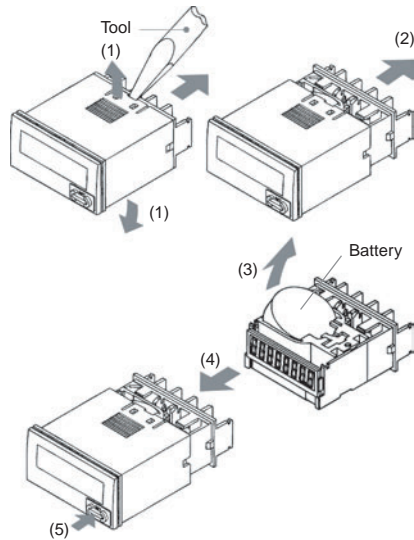
Remove the wiring when replacing the Battery. Do not come in contact with any item to which high voltage is being applied. Doing so may result in electric shock.

Before changing the Battery, the person should ensure that they are not carrying any static electric charge.

Procedure for replacing the Battery (refer to the diagrams below):

1. Using the tool, pry open the lift-tab on the case. (1)
2. Pull the body out of its outer case. (2)
3. Lift the Battery up by the edge and remove it. (3)
When removing the Battery, do not come in contact with the display area or any internal parts.
4. Wipe the back of the new Battery before inserting it.
5. Ensure that the + and - terminals are correctly oriented.
6. After replacing the Battery, re-insert the body into its case. (4)
Check that the case is securely held in by the lift-tab.

7. Press the Reset Key before use (not necessary for H7ER-N,-NV,-NV1). (5)



EN/IEC Standards

The count or timer input, reset input, and backlight power supply terminals of the no-voltage input or PNP/NPN universal DC voltage input models (H7E□-N,-N1, H7E□-NV(-H),-NV1(-H)) are not isolated.

A SELV power supply conforming to Appendix H of IEC61010-1 should be used for the count or timer input, reset input and backlight power supply terminals. A SELV power supply is a power supply for which the input and output have double or reinforced insulation, and for which the output voltage is 30 Vrms with 42.4 V peak or 60 VDC max. (Only the H7E□-NV□-H has a backlight.)

The terminals for count or timer input and reset input for AC/DC multi-voltage input models have basic insulation.

Connect the reset input terminals to a device that does not have exposed current-carrying parts and has basic insulation for 240 VAC.

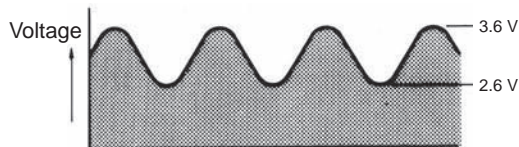
Others

If the indicator keeps flickering or is OFF, the internal battery may be close to the end of its service life. In such a case, it is suggested that the battery be replaced.

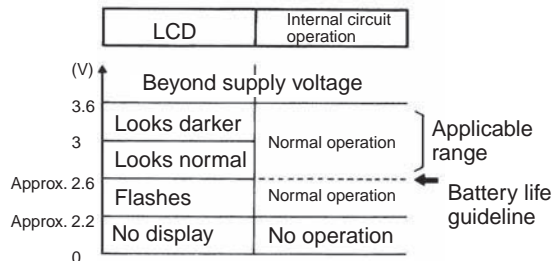
■ PCB-mounting Counter

Power Supply

- Use the power supply within the applicable range indicated by the following waveform, while considering the ripple and voltage fluctuations of the circuit power source.



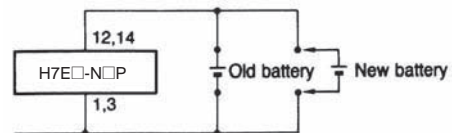
- The H7E□-N□P changes its mode as shown below depending on the applied supply voltage.



Battery Replacement

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.

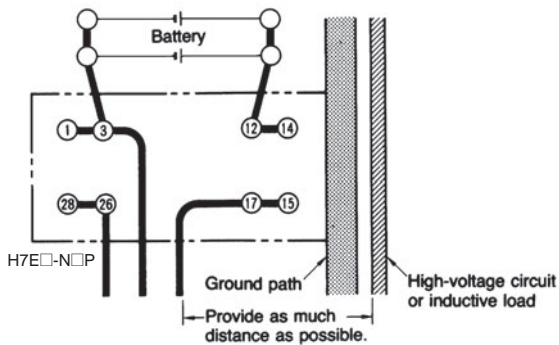
When designing the circuit board, providing two extra terminals for battery connection will make the switch must simpler. See the schematic diagram below:



Wiring polarity must be carefully observed, in order to prevent permanent damage to the Counters. Exercise caution when inserting the Counter in the socket, to prevent reversed polarity.

Inputs

Do not route the wiring of the count, timer, or reset inputs 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.



Be careful not to apply voltages exceeding the following values to the count, timer, or reset terminals, otherwise the internal circuit may be damaged.

No-voltage input: 3 VDC

General Information

Finish soldering under the conditions below.

Solder the terminals within 5 seconds, at a solder iron tip temperature of $250^{\circ}\text{C} \pm 10^{\circ}\text{C}$ when using lead solder, and within 3 seconds, at a solder iron tip temperature of $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$ when using lead-free solder.

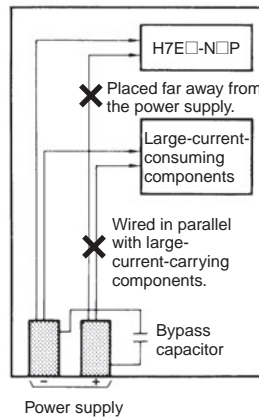
Since the Counter is not flux-tight, do not use flux when soldering.

Avoid automatic and dip soldering. Manually solder the Counter onto a PC board, and avoid cleaning as much as possible.

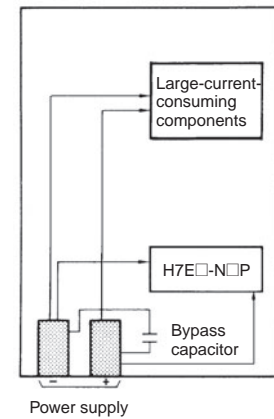
When mounting the Counter on a PC board with components which consume higher current than the H7E□-N□P, observe the following precautions.

1. Minimize the wiring (less than 50 mm) from the H7E□-N□P to the power supply section.
2. Avoid placing the H7E□-N□P power, timer, counter, or reset input circuit in parallel with circuits that consume large currents, particularly on the positive side.

PC Board (Bad Example)



PC Board (Good Example)



When using the Counter in an environment where the Counter is subject to frequent occurrences of vibration or shock, or when mounting the Counter facing downwards or sideways, it is suggested that the Counter be directly soldered to a PCB instead of using sockets.

To Conform to EN/IEC Standards

Input terminals have no insulation from power supply terminals. The power supply terminals must be supplied from a SELV source in accordance with IEC61010-1 Annex H. SELV (separated extra-low voltage) source is a power supply having double or reinforced insulation between the primary and the secondary circuit and having output voltage of 30 V rms max. and 42.4 V peak max. or 60 VDC max.

Cleaning

To prevent damage, the exterior of the Counter must not be exposed to organic solvents (3.g. paint thinner or benzene), strong alkalis, or strong acids.

Others

- No user-serviceable parts.
- Return to OMRON for all repairs.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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