# Self-powered Tachometer
# H7ER

• Revolutions displayed up to five digits.
• Dual revolution display according to encoder resolution used; 1000 s$^{-1}$/1000 min$^{-1}$ or 1000.0 s$^{-1}$ /1000.0 min$^{-1}$
• Switchable dual revolution display type available (-NV1 models); extended up to 10000 min$^{-1}$

CE c$\text{UL}$us CSA

# Model Number Structure

## ■ Model Number Legend

H7ER - N ☐ ☐ - ☐ ☐
     1  2   3  4

**1. Count Input**
  None: No-voltage input
  V: PNP/NPN universal DC voltage input

**2. Number of Digits**
  None: 4 digits
  1: 5 digits

**3. Case Color**
  None: Light gray
  B: Black

**4. Display**
  None: 7-segment LCD without backlight
  H: 7-segment LCD with backlight

# Ordering Information

## ■ Tachometers

| Count input | Display | Max. revolutions displayed (applicable encoder resolution) | | | |
|---|---|---|---|---|---|
| | | 1000 s$^{-1}$ (1 pulse/rev.), 1000 min$^{-1}$ (60 pulse/rev.) | | 1000.0 s$^{-1}$ (10 pulse/rev.), 1000.0 min$^{-1}$ (600 pulse/rev.) ←→ 10000 min$^{-1}$ (60 pulse/rev.) (switchable) | |
| | | Light-gray body | Black body | Light-gray body | Black body |
| PNP/NPN universal DC voltage input | 7-segment LCD with backlight | H7ER-NV-H | H7ER-NV-BH | H7ER-NV1-H | H7ER-NV1-BH |
| | 7-segment LCD | H7ER-NV | H7ER-NV-B | H7ER-NV1 | H7ER-NV1-B |
| No-voltage input | 7-segment LCD | H7ER-N | H7ER-N-B | --- | --- |

## ■ Accessories (Order Separately)

| | | |
|---|---|---|
| **Lithium Battery** | Y92S-36 | |
| **Wire-wrap Terminal (Set of two Terminals)** | Y92S-37 | |
| **Compact Flush Mounting Bracket (See note.)** | Y92F-35 | |
| **Flush Mounting Adapter** | 26 mm × 45.3 mm | Y92F-75 |
| | 27.5 mm × 52.5 mm | Y92F-76 |
| | 24.8 mm × 48.8 mm | Y92F-77B |

**Note:** The New H7E models are supplied with a Y92F-34 Mounting Bracket.

# Specifications

## ■ General

| Item | H7ER-NV-□<br>H7ER-NV-□H | H7ER-N-□ | H7ER-NV1-□<br>H7ER-NV1-□H |
|---|---|---|---|
| Operating mode | Up type | | |
| Mounting method | Flush mounting | | |
| External connections | Screw terminals, Wire-wrap Terminals (see note 3) | | |
| Display | 7-segment LCD with or without backlight, zero suppression (character height: 8.6 mm) (see note 4) | | |
| Number of digits | 4 | | 5 |
| Count input | PNP/NPN universal DC voltage input | No-voltage input | PNP/NPN universal DC voltage input |
| Max. counting speed | 1 kHz | | 10 kHz |
| Max. revolutions displayed (see note 5) | 1,000 s$^{-1}$ (When encoder resolution of 1 pulse/rev is used.)<br>1,000 min$^{-1}$ (When encoder resolution of 60 pulse/rev is used.) | | 1,000.0 s$^{-1}$ (When encoder resolution of 10 pulse/rev is used.)<br>1,000.0 min$^{-1}$ (When encoder resolution of 600 pulse/rev is used.)<br>←−→ 10,000 min$^{-1}$ (When encoder resolution of 60 pulse/rev is used.)<br>(Switchable with switch) |
| Attachment | Waterproof packing, flush mounting bracket, revolution unit labels (see note 5) | | |
| Approved standard | UL863, CSA C22.2 No.14, Lloyds<br>Conforms to EN61010-1/IEC61010-1 (Pollution degree2/overvoltage category III)<br>Conforms to VDE0106/P100 | | |

**Note: 1.** Reset is not available.
   **2.** When there is no input, the display will be 0.0 or 0.
   **3.** Separately ordered Wire-wrap Terminals (Y92S-37) are required.
   **4.** Only PNP/NPN Universal DC voltage input models have a backlight.
   **5.** "rpm", "rps", "s$^{-1}$" and "min$^{-1}$" labels are included.

## ■ Ratings

| Item | H7ER-NV□-□<br>H7ER-NV□-□H | H7ER-N-□ |
|---|---|---|
| Supply voltage | Backlight model: 24 VDC (0.3 W max.) (for backlight lit)<br>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<br>Low (logic) level: 0 to 2 VDC<br>(Input impedance: Approx. 4.7 kΩ) | No voltage input<br>Maximum short-circuit impedance: 10 kΩ max.<br>Short-circuit residual voltage: 0.5 V max.<br>Minimum open impedance: 750 kΩ min. |
| Max. counting speed | 4-digit models:1 kHz<br>5-digit models:10 kHz | 1 kHz |
| Minimum signal width | 10 kHz: 0.05 ms<br>1 kHz:  0.5 ms | |
| Terminal screw tightening torque | 0.98 N·m max. | |
| Ambient temperature | Operating: -10°C to 55°C (with no condensation or icing)<br>Storage:   -25°C to 65°C (with no condensation or icing) | |
| Ambient humidity | Operating: 25% to 85% | |

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# ■ Characteristics

| Item | H7ER-NV□-□<br>H7ER-NV□-□H | H7ER-N-□ |
|---|---|---|
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts, and between the backlight power supply and count input terminals/reset terminals for backlight models | 100 MΩ min. (at 500 VDC) between current-carrying metal parts and exposed non-current-carrying metal parts |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts and between the backlight power supply and count input terminals/reset terminals for backlight models | 1,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and exposed non-current-carrying metal parts |
| **Impulse withstand voltage** | 4.5 kV between current-carrying terminal and exposed non-current-carrying metal parts | |
| **Noise immunity** | Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise) | |
| | ±600 V (Between count input terminals)<br>±480 V (Between the backlight power supply terminals for backlight models) | ±500 V (Between count input terminals) |
| **Static immunity** | ±8 kV (malfunction) | |
| **Vibration resistance** | Malfunction: 0.15-mm single amplitude at 10 to 55 Hz for 10 min each in 3 directions<br>Destruction: 0.375-mm single amplitude at 10 to 55 Hz for 2 hrs each in 3 directions | |
| **Shock resistance** | Malfunction: 200 m/s$^2$ 3 times each in 6 directions<br>Destruction: 300 m/s$^2$ 3 times each in 6 directions | |
| **EMC** | (EMI) EN61326<br>Emission Enclosure: EN55011 Group 1 class B<br>(EMS) EN61326<br>Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2)<br>8 kV air discharge (level 3)<br>Immunity RF-interference from AM Radio Waves:<br>EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3)<br>Immunity RF-interference from Pulse-modulated Radio Waves:<br>EN61000-4-3: 10 V/m (900 MHz ± 5 MHz) (level 3)<br>Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (level 3)<br>Immunity Burst: EN61000-4-4: 2 kV power line (level 3)<br>2 kV I/O signal line (level 4) | |
| **Degree of protection** | Front panel: IP66, NEMA4 with waterproof packing<br>Terminal block: IP20 | |
| **Weight (see note)** | No-backlight model: Approx. 60 g<br>Backlight model: Approx. 65 g | |

**Note:** Weight includes waterproof packing and flush mounting bracket.

# ■ Reference Value

| Item | Value | Note |
|---|---|---|
| Battery life | 7 years min. with continuous input at 25°C (lithium battery) | The battery life is calculated according to the conditions in the left column and therefore is not a guaranteed value. Use these value as reference for maintenance or replacement. |

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# Connections

## ■ Terminal Arrangement

Bottom view: View of the Tachometer rotated horizontally 180°

**Backlight Model**



Backlight
24 VDC

Pulse
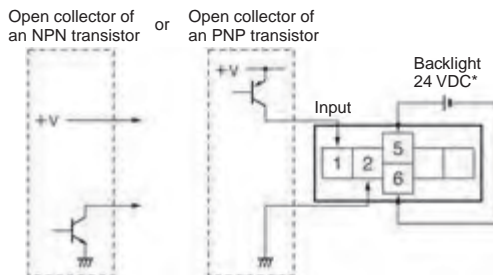input

**No-backlight Model**



Pulse
input
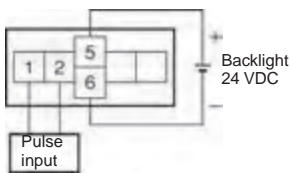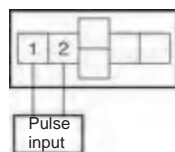
## ■ Connections

### H7ER Tachometer

**Note:** Select input transistors according to the following:
Dielectric strength of the collector ≥ 50 V
Leakage current < 100 μA (1 μA for no-voltage input model)

**PNP/NPN Universal DC Voltage Input Models With Backlight**
Transistor Input

Open collector of an NPN transistor    or    Open collector of an PNP transistor

+V

Input

Backlight 24 VDC*



*Recommended power supply; eg. OMRON S8VS

**No-voltage Input Model**
Transistor Input (Open Collector of an NPN Transistor)

Open collector of an NPN transistor

Input

0V
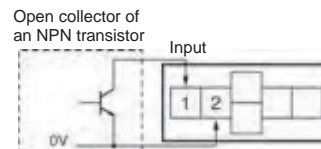


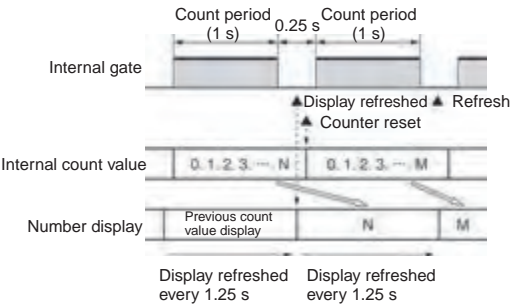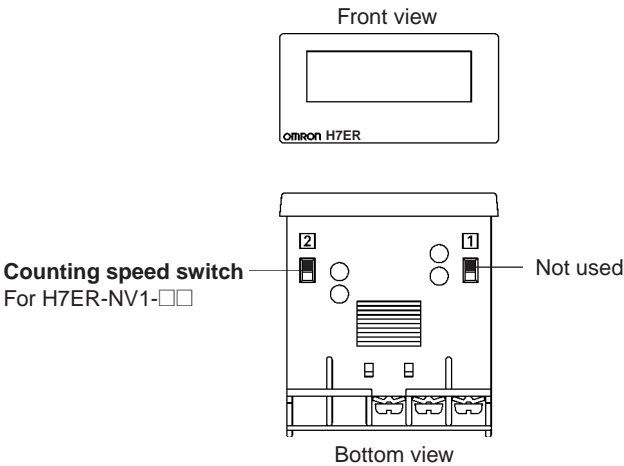**PNP/NPN Universal DC Voltage Input Models Without Backlight**
Transistor Input

Open collector of an NPN transistor    or    Open collector of an PNP transistor

+V

Input
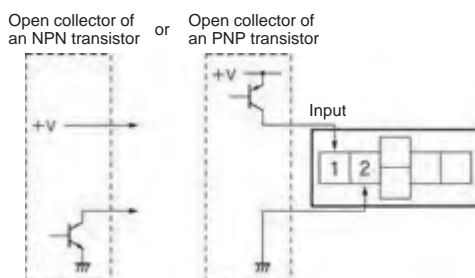
# Operation

## ■ Operating Modes

**H7ER Tachometer**

Incrementing Operation
Within Unit Time (Up)



# Nomenclature

Front view



**Counting speed switch**
For H7ER-NV1-□□

Not used

Bottom view

## Counting Speed Switch Settings and Unit Label Application

| Model | Counting speed switch setting (see note) | Max. revolutions displayed | Applicable encoder resolution | Applicable unit label |
|---|---|---|---|---|
| **H7ER-NV1-□□** | Front panel — Concave side | 10000 min⁻¹ (default setting) | 60 pulse/rev. | "min⁻¹" or "rpm" |
| | Concave side — Terminal block | 1000.0 min⁻¹ | 600 pulse/rev. | "min⁻¹" or "rpm" |
| | | 1000.0 s⁻¹ | 10 pulse/rev. | "s⁻¹" or "rps" |
| **H7ER-N-□** **H7ER-NV-□□** | No setting is required | 1000 min⁻¹ | 60 pulse/rev. | "min⁻¹" or "rpm" |
| | | 1000 s⁻¹ | 1 pulse/rev. | "s⁻¹" or "rps" |

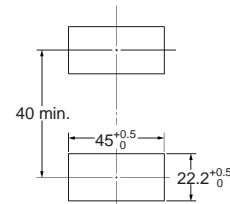**Note:** Perform switch setting before mounting to a control panel.

# Dimensions

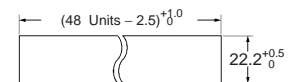**Note:** All units are in millimeters unless otherwise indicated.

**H7ER-N**
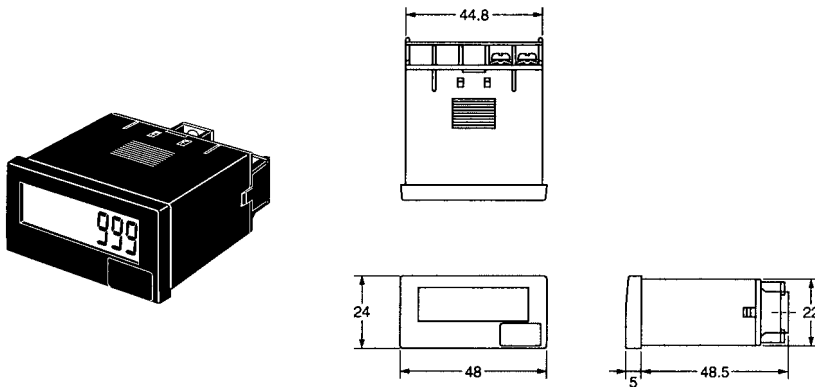
**Panel Cutout**
Separate mounting

$45^{+0.5}_{0}$

40 min.

$22.2^{+0.5}_{0}$

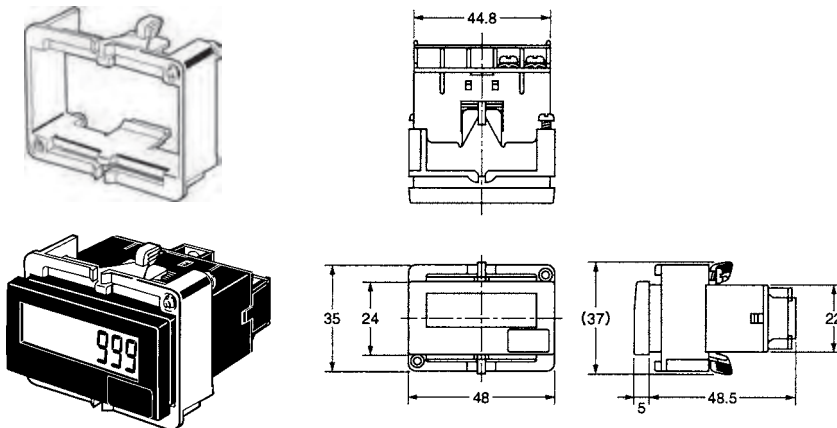Dense mounting

$(48 \text{ Units} - 2.5)^{+1.0}_{0}$

$22.2^{+0.5}_{0}$

Waterproofing is not possible
for dense mounting

**Dimensions with 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.