Total Counter/Time Counter
H7GP/H7HP

High-visibility, IP66/NEMA4 Protection Total Counter/Time Counter Range

- IP66 (JEM standard IP66G: oil resistance) and NEMA4 protection standards.
- Switch between NPN and PNP operation.
- Both external and manual resets provided.
- Finger-protection terminal block cover prevents electrical shocks conforming to VDE0106/100.
- Conforms to EMC standards (EN61326).
- Conforms to IEC standards, and approved by UL and CSA.
- Wide power supply range.
- Six-language instruction manual provided.

H7□P Series

H7GP

- 6-digit total counter
- 6-digit time counter
- DIN 48 x 24

H7HP

- 6-digit total counter/time counter
- 8-digit total counter
- DIN 72 x 36

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Total Counter/Time Counter

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Total Counter/Time Counter (DIN 48 x 24)
H7GP

Compact Total Counters and Time Counters with Easy-to-read Displays and IP66G/ NEMA4 Water and Oil Resistance

- High-visibility, negative transmissive LCD display with 8.5-mm-high characters and built-in red LED backlight at low power consumption.
- Compact (80 mm) body.

Model Number Structure

■ Model Number Legend

H7GP-□□□
1 2 3

1. **Classification**
   C: Total counter
   T: Time counter
2. **Supply Voltage**
   None: 100 to 240 VAC
   D: 12 to 24 VDC
3. **Case Color of Front Section**
   None: Light gray (Munsell 5Y7/1)
   B: Black

Ordering Information

■ List of Models

Supply voltage	6-digit total counter		6-digit time counter	
	Light gray	Black	Light gray	Black
100 to 240 VAC	H7GP-C	H7GP-CB	H7GP-T	H7GP-TB
12 to 24 VDC	H7GP-CD	H7GP-CDB	H7GP-TD	H7GP-TDB

Specifications

■ Ratings

Item		6-digit total counter		6-digit time counter	
		H7GP-C	H7GP-CD	H7GP-T	H7GP-TD
Rated supply voltage		100 to 240 VAC (50/60 Hz)	12 to 24 VDC (see note 1)	100 to 240 VAC (50/60 Hz)	12 to 24 VDC (see note 1)
External power supply		50 mA at 12 VDC	---	50 mA at 12 VDC	---
Operating voltage range		85% to 110% of rated supply voltage			
Power consumption		100 to 240 VAC: 6.5 VA max. 12 to 24 VDC: 0.6 W max.			
Dimensions		48 x 24 x 80 mm (W x H x D)			
Mounting method		Flush mounting			
External connections		Screw terminals			
Degree of protection		Panel surface: JEM IP66G and NEMA Type 4 (indoors)			
Display		7-segment, negative transmissive LCD (with red backlight)			
Digits		6 digits (8.5-mm-high characters)			
Input mode		Up (increment)		Accumulative	
Max. counting speeds		30 Hz or 5 kHz (selected via DIP switch)		---	
Counting range		0 to 999999		---	
Time specification		---		0.1 to 99999.9 h/1 s to 99 h 59 min 59 s	
Timing accuracy		---		±100 ppm (-10°C to 55°C)	
Memory backup		EEP-ROM: 200,000 operations min.			
Input	Input signals	Count, reset, and key protection (see note 2)		Start, reset, and key protection (see note 2)	
	Input method	No-voltage input (NPN transistor input) or voltage input (PNP transistor input) (selected via DIP switch)			
	Count, reset, start	No-voltage input (NPN transistor input) Short-circuit (ON) impedance: 1 KΩ max. Short-circuit (ON) residual voltage: 2 VDC max. Open (OFF) impedance: 100 kΩ min. Voltage input (PNP transistor input) Short-circuit (ON) impedance: 1 KΩ max. ON voltage: 9 to 24 VDC OFF voltage: 5 VDC max. Open (OFF) impedance: 100 kΩ min.			
	Key protection	No-voltage input (NPN transistor input) Short-circuit (ON) impedance: 1 KΩ max. Short-circuit (ON) residual voltage: 0.5 VDC max. Open (OFF) impedance: 100 kΩ min.			
Input response speed	Reset	20 or 1 ms (automatically switched according to counting speed)		20 ms	
	Start	---		20 ms	
	Key protection	Approx. 1 s		Approx. 1 s	
Reset system		External and manual resets			

Note: 1. Contains 20% ripple (p-p) max.

2. Only a non-voltage input (NPN transistor) is possible for the key protection input. Switching between the NPN and PNP input methods does not affect the key protection input, i.e., a PNP input cannot be used.

■ Characteristics

Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between current-carrying terminal and exposed non-current-carrying metal parts (AC model) 1,000 VAC, 50/60 Hz for 1 min between current-carrying terminal and exposed non-current-carrying metal parts (DC model) 2,000 VAC, 50/60 Hz for 1 min between power terminals and control input terminals (AC model) 1,000 VAC, 50/60 Hz for 1 min between power terminals and control input terminals (DC model)
Impulse withstand voltage	3 kV (between power terminals) (1 kV for 12-to-24-VDC models) 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) (1.5 kV for 12-to-24-VDC models)
Noise immunity	±1.5 kV (between AC power terminals), ±480 V (between DC power terminals), ±480 V (between input terminals); square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Display: Malfunction:8 kV Destruction:15 kV DIP switch: Malfunction:4 kV Destruction:8 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude, four cycles each in three directions (8 minutes per cycle) Malfunction: 10 to 55 Hz with 0.5-mm single amplitude, four cycles each in three directions (8 minutes per cycle)
Shock resistance	Destruction: 294 m/s^2 each in three directions Malfunction: 196 m/s^2 each in three directions
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
EMC	(EMI) EN61326 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (according to EN61000-6-2) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 2 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 1 kV line to lines (power and output lines) (level 2); 2 kV line to ground (power and output lines) (level 3) Immunity Voltage Dip/Interruption: EN61000-4-11: 0.5 cycle, 100% (rated voltage)
Approved standards	UL508, CSA22.2 No.14, conforms to EN61010-1, VDE0106/P100
Case color	Rear section: Gray smoke; Front section: 5Y7/1 (light gray) or N1.5 (black)
Weight	Approx. 76 g

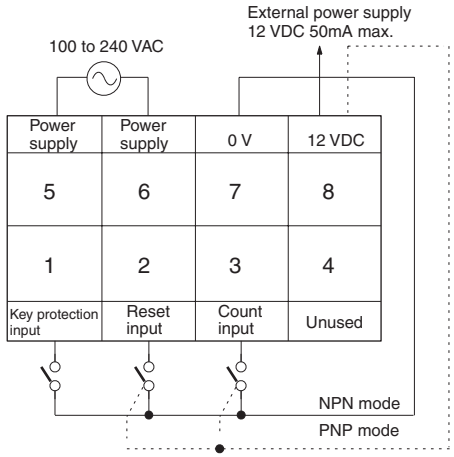
Connections

■ Terminal Arrangement

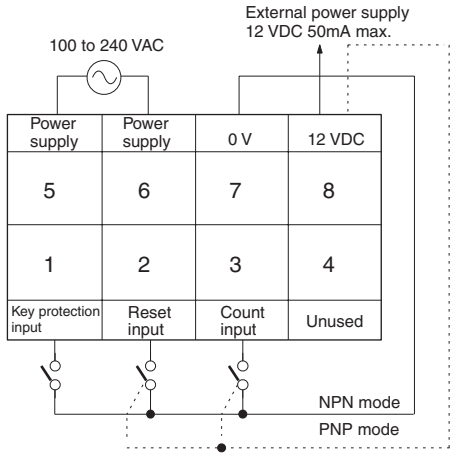
Note: Non-contact input is also available.

AC Models

H7GP-C

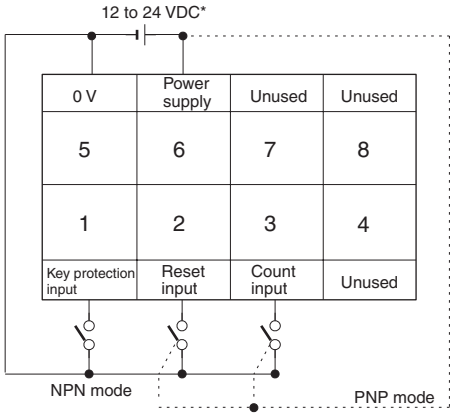


H7GP-T

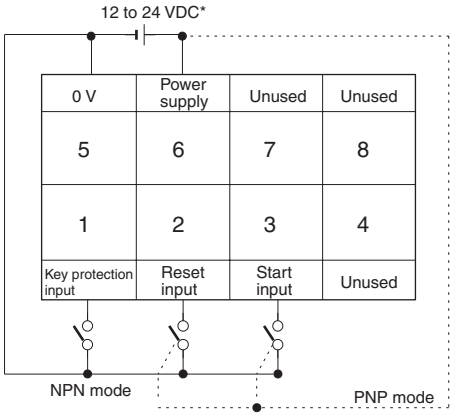


DC Models

H7GP-CD



H7GP-TD



*An external 24VDC power supply can be used, eg. OMRON S8VS or S82K.

Operation

■ DIP Switch Settings

Set all DIP switches before mounting the Counter to a control panel. All switches are set toward the display panel before shipping.

H7GP-C/-CD

Switch	Item	Function	
3 (On right side from front)	Input mode (note 1)	Display side	NPN
		Terminal side	PNP
4 (On left side from front)	Counting speed (note 1)	Display side	30 Hz
		Terminal side	5 kHz

H7GP-T/-TD

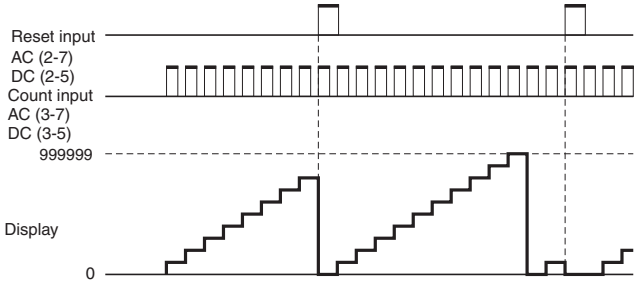
Switch	Item	Function	
3 (On right side from front)	Input mode (note 1)	Display side	NPN
		Terminal side	PNP
4 (On left side from front)	Time range (note 1)	Display side	99999.9h (note 2)
		Terminal side	99 h 59 min 59 s

Note: 1. When the setting has been changed, turned power off and on to continue. The display will show “0” when the power is turned back on.

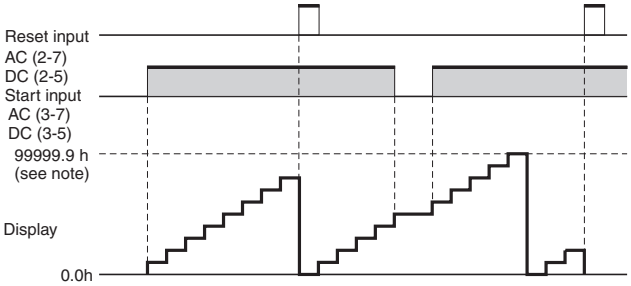
2. The decimal point will flash every second when “99999.9 h” is set.

■ Operating Modes

Total Counters

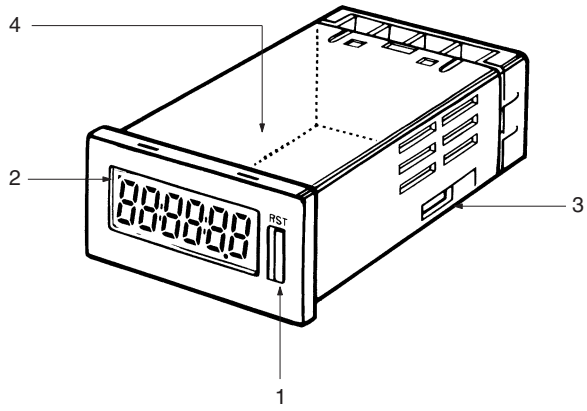


Time Counters



Note: Display values are shown for full scale set to 99999.9 h.

Nomenclature

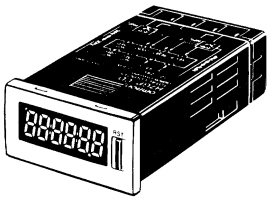


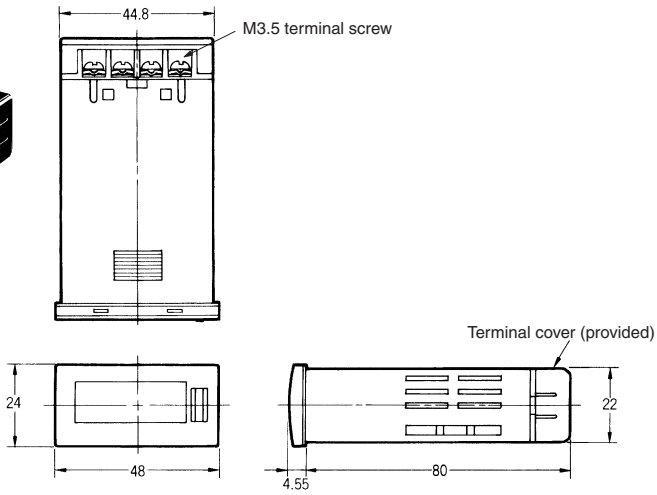
1. **Reset Key**
   Resets the count value, but will not operate while the keys are protected.
2. **Key Protection Indicator**
   Lit while the keys are protected. (Reset Key is disabled.).
3. **NPN/PNP DIP Switch**
   (Count or start with reset)
   When the setting has been changed, turned power off and on to continue. The display will show "0" when the power is turned back on. See below for details.
4. **Counting Speed DIP Switch (H7GP-C)**
   Time Range DIP Switch (H7GP-T)
   When the setting has been changed, turned power off and on to continue. The display will show "0" when the power is turned back on. Refer to *DIP Switch Setting* for details.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

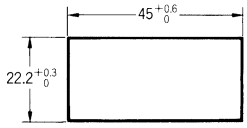
H7GP-C
H7GP-T





Panel Cutouts

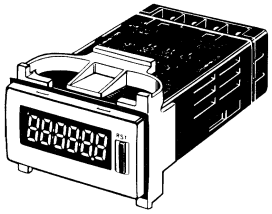
Panel cutouts are as shown below (according to DIN43700).

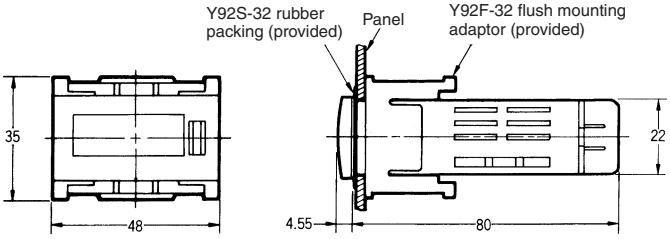


Note: 1. The mounting panel thickness should be 1 to 6 mm.

2. Water resistance will be lost if Counters are mounted side-by-side.

With Flush Mounting Bracket





Total Counter/Time Counter (DIN 72 x 36)
H7HP

Compact Total Counters and Time Counters with Easy-to-read Displays and IP66G/ NEMA4 Water and Oil Resistance

- Large, easy-to-read displays: 15-mm-high characters for 6-digit models; 12-mm-high characters for 8-digit models.
- High-visibility, negative transmissive LCD display with built-in red LED backlight at low power consumption.
- Compact (66 mm) body.
- Switch 6-digit models between total counter and time counter operation.

Model Number Structure

■ Model Number Legend

H7HP-□□□□
1 2 3 4

1. **Classification**
   A: Total counter/time counter
   C: Total counter
2. **Digits**
   None: 6 digits
   8: 8 digits
3. **Supply Voltage**
   None: 100 to 240 VAC
   D: 12 to 24 VDC
4. **Case Color**
   None: Light gray (Munsell 5Y7/1)
   B: Black

Ordering Information

■ List of Models

Supply voltage	6-digit total counter/time counter		8-digit total counter	
	Light gray	Black	Light gray	Black
100 to 240 VAC	H7HP-A	H7HP-AB	H7HP-C8	H7HP-C8B
12 to 24 VDC	H7HP-AD	H7HP-ADB	H7HP-C8D	H7HP-C8DB

Specifications

■ Ratings

Item		6-digit total counter/time counter		8-digit total counter	
		H7HP-A	H7HP-AD	H7HP-C8	H7HP-C8D
Rated supply voltage		100 to 240 VAC (50/60 Hz)	12 to 24 VDC (see note 1)	100 to 240 VAC (50/60 Hz)	12 to 24 VDC (see note 1)
External power supply		50 mA at 12 VDC	---	50 mA at 12 VDC	---
Operating voltage range		85% to 110% of rated supply voltage			
Power consumption		100 to 240 VAC: 6.5 VA max. 12 to 24 VDC: 0.6 W max.			
Dimensions		72 x 36 x 66 mm (W x H x D)			
Mounting method		Flush mounting			
External connections		Screw terminals			
Degree of protection		Panel surface: IEC IP66 (JEM standard IP66G) and NEMA Type 4 (indoors)			
Display		7-segment, negative transmissive LCD (with red backlight)			
Digits		6 digits (15-mm-high characters)		8 digits (12-mm-high characters)	
Function		Total counter/time counter (selected via DIP switch)		Total counter	
Input mode		Up/down (individual) (total counter), or accumulative (time counter)		Up/down (individual)	
Max. counting speeds		30 Hz or 5 kHz (selected via DIP switch)			
Counting range		-99999 to 999999		-9999999 to 99999999	
Time specification		0.1 to 99999.9 h/1 s to 99 h 59 min 59 s		---	
Timing accuracy		±100 ppm (-10°C to 55°C)		---	
Memory backup		EEP-ROM: 200,000 operations min.			
Input	Input signals	Count 1 (increment), count 2 (decrement), reset, and key protection (see note 2)			
	Input method	No-voltage input (NPN transistor input) or voltage input (PNP transistor input) (selected via DIP switch)			
	Count, start, gate, reset	No-voltage input (NPN transistor input) Short-circuit (ON) impedance: 1 KΩ max. Short-circuit (ON) residual voltage: 2 VDC max. Open (OFF) impedance: 100 kΩ min. Voltage input (PNP transistor input) Short-circuit (ON) impedance: 1 KΩ max. ON voltage: 9 to 24 VDC OFF voltage: 5 VDC max. Open (OFF) impedance: 100 kΩ min.			
	Key protection	No-voltage input (NPN transistor input) Short-circuit (ON) impedance: 1 KΩ max. Short-circuit (ON) residual voltage: 0.5 VDC max. Open (OFF) impedance: 100 kΩ min.			
Input response speed	Reset	Time counter: 20 ms; total counter: 20 ms or 1 ms (automatically switched according to counting speed)			
	Start	Time counter: 20 ms			
	Key protection	Approx. 1 s		Approx. 1 s	
Reset system		External and manual resets			

Note: 1. Contains 20% ripple (p-p) max.

2. Only a non-voltage input (NPN transistor) is possible for the key protection input. Switching between the NPN and PNP input methods does not affect the key protection input, i.e., a PNP input cannot be used.

■ Characteristics

Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between current-carrying terminal and exposed non-current-carrying metal parts (AC model) 1,000 VAC, 50/60 Hz for 1 min between current-carrying terminal and exposed non-current-carrying metal parts (DC model) 2,000 VAC, 50/60 Hz for 1 min between power terminals and control input terminals (AC model) 1,000 VAC, 50/60 Hz for 1 min between power terminals and control input terminals (DC model)
Impulse withstand voltage	3 kV (between power terminals) (1 kV for 12-to-24-VDC models) 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts) (1.5 kV for 12-to-24-VDC models)
Noise immunity	±1.5 kV (between AC power terminals), ±480 V (between DC power terminals), ±480 V (between input terminals); square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)
Static immunity	Display: Malfunction: 8 kV Destruction: 15 kV DIP switch: Malfunction: 4 kV Destruction: 8 kV
Vibration resistance	Destruction: 10 to 55 Hz with 0.75-mm single amplitude, four cycles each in three directions (8 minutes per cycle) Malfunction: 10 to 55 Hz with 0.5-mm single amplitude, four cycles each in three directions (8 minutes per cycle)
Shock resistance	Destruction: 294 m/s^2 each in three directions Malfunction: 196 m/s^2 each in three directions
Ambient temperature	Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
EMC	(EMI) E61326 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61326 Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Immunity RF-interference: EN61000-4-3: 10 V/m (Amplitude-modulated, 80 MHz to 1 GHz) (level 3); 10 V/m (Pulse-modulated, 900 MHz ±5 MHz) (level 3) Immunity Conducted Disturbance: EN61000-4-6: 10 V (0.15 to 80 MHz) (according to EN61000-6-2) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3); 2 kV I/O signal-line (level 4) Immunity Surge: EN61000-4-5: 1 kV line to lines (power and output lines) (level 2); 2 kV line to ground (power and output lines) (level 3) Immunity Voltage Dip/Interruption: EN61000-4-11: 0.5 cycle, 100% (rated voltage)
Approved standards	UL508, CSA22.2 No.14, conforms to EN61010-1, VDE0106/P100
Case color	Rear section: Gray smoke; Front section: 5Y7/1 (light gray) or N1.5 (black)
Weight	Approx. 106 g

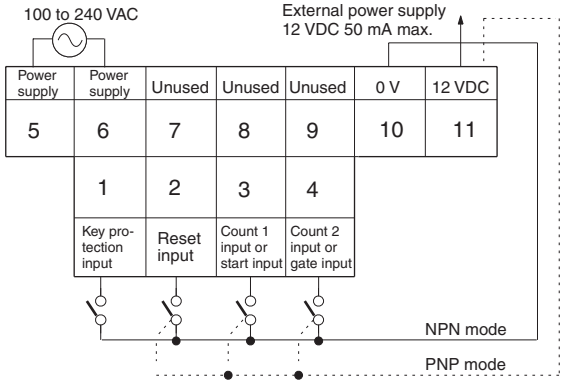
Connections

■ Terminal Arrangement

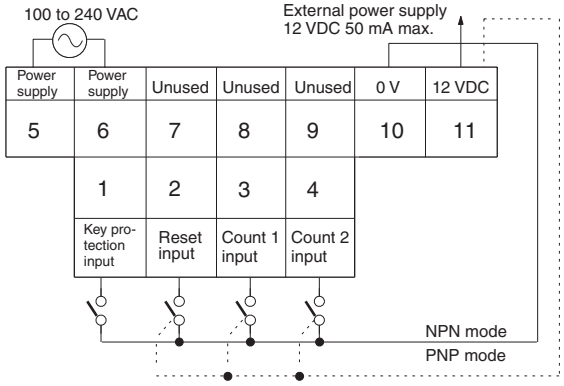
Note: 1. Incremented for count 1 (CP1) inputs; decremented for count 2 (CP2) inputs.
2. Non-contact input is also available.

AC Models

H7HP-A

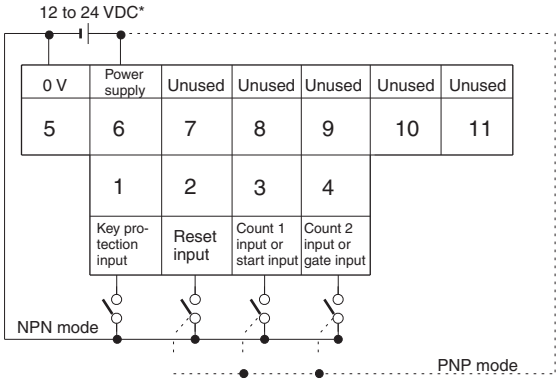


H7HP-C8

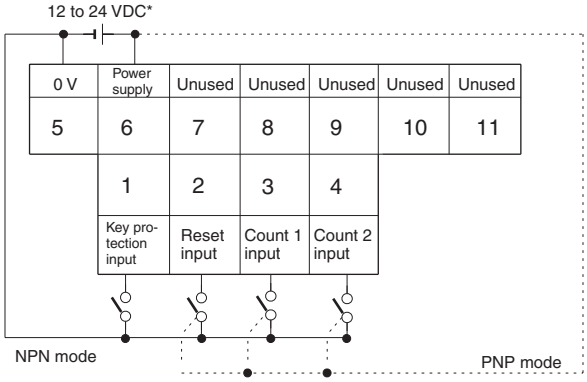


DC Models

H7HP-AD



H7HP-C8D



*An external 24VDC power supply can be used, eg. OMRON S8VS or S82K.

Operation

■ DIP Switch Settings

Switches 1 to 4 are all set to OFF before shipping.

H7HP-A/-AD

Pin no.	Item	OFF	ON
1	Function	Total counter	Time counter
2	Counting speed	30 Hz	5 kHz
	Time range	99999.9 h	99 h 59 min 59 s
3	Input mode (note)	NPN	PNP
4	Unused	---	---

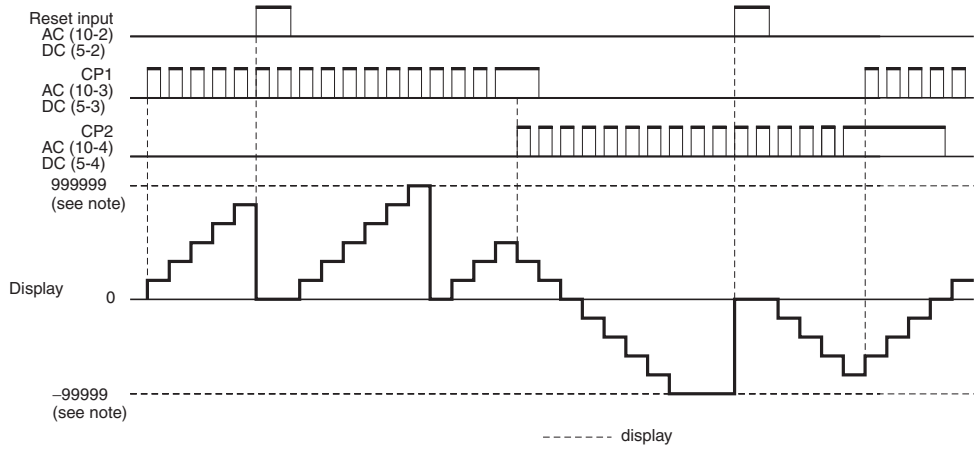
H7HP-C8/-C8D

Pin no.	Item	OFF	ON
1	Unused	---	---
2	Counting speed	30 Hz	5 kHz
3	Input mode (note)	NPN	PNP
4	Unused	---	---

Note: When the setting has been changed, turned power off and on to continue. The display will show “0” when the power is turned back on.

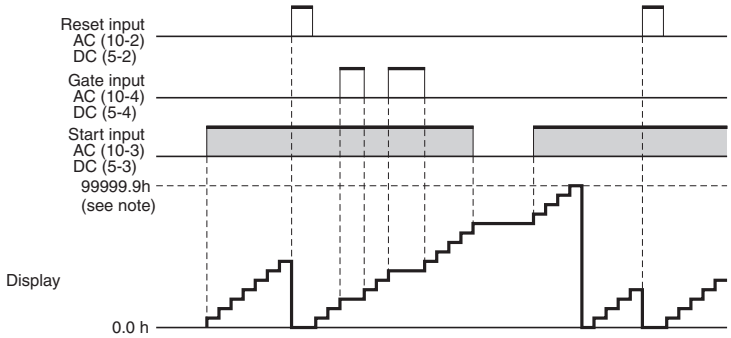
■ Operating Modes

Total Counters



Note: Display values are shown for a 6-digit model.

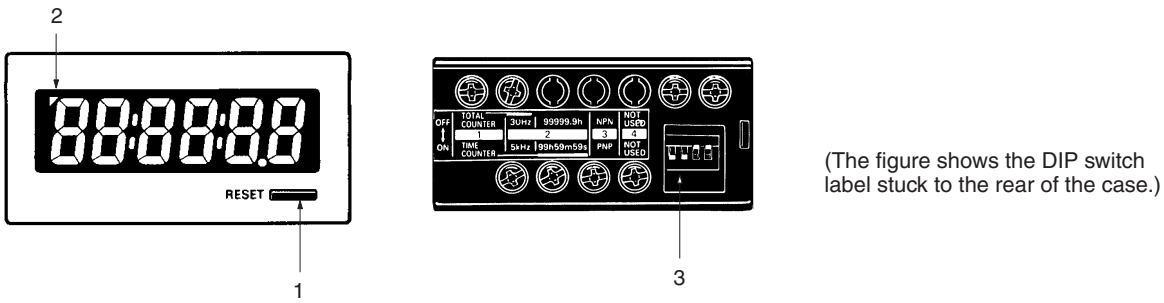
Time Counters



Note: 1. Display values are shown for full scale set to 99999.9 h.

2. Gate input is available only when H7HP-A settings are made.

Nomenclature



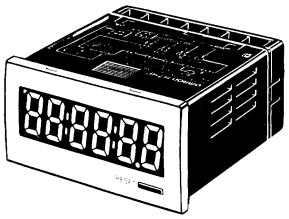
(The figure shows the DIP switch label stuck to the rear of the case.)

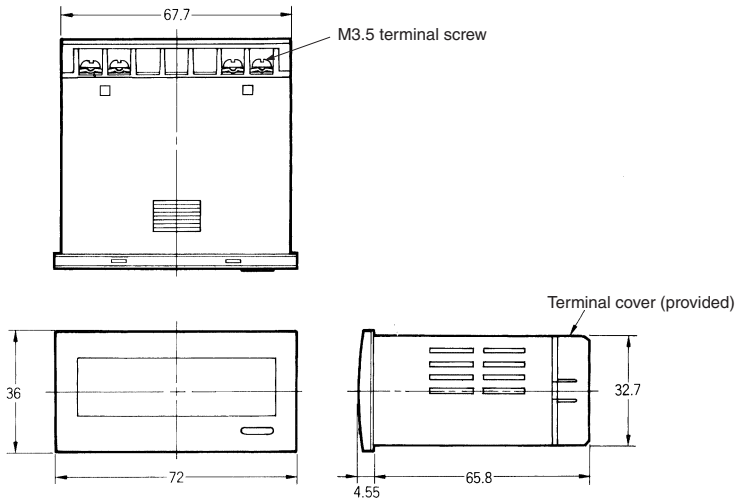
1. **Reset Key**
   Resets the count value, but will not operate while the keys are protected.
2. **Key Protection Indicator**
   Lit while the keys are protected (Reset Key is disabled.).
3. **DIP Switch**
   Use to change a setting. Refer to *DIP Switch Settings* for details.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

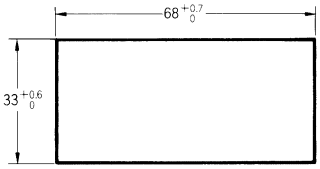
H7HP-A
H7HP-C8





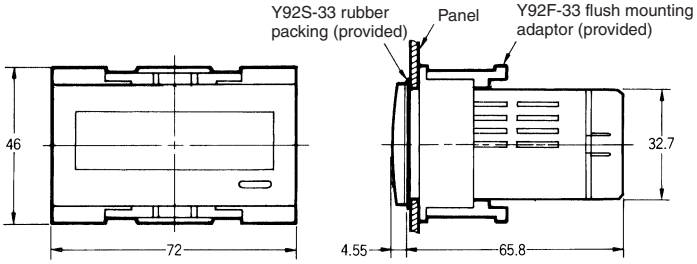
Panel Cutouts

Panel cutouts are as shown below (according to DIN43700).



Note: 1. The mounting panel thickness should be 1 to 6 mm.
2. Water resistance will be lost if Counters are mounted side-by-side.

With Flush Mounting Bracket



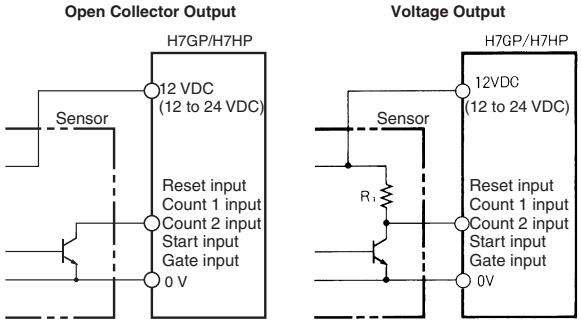
Common to all H7□P

■ Input Connections

Note: The undermentioned is common for all H7GP/H7HP models.

No-voltage Input (NPN Input Mode)

Reset, Count 1, Count 2, Start, and Gate Inputs

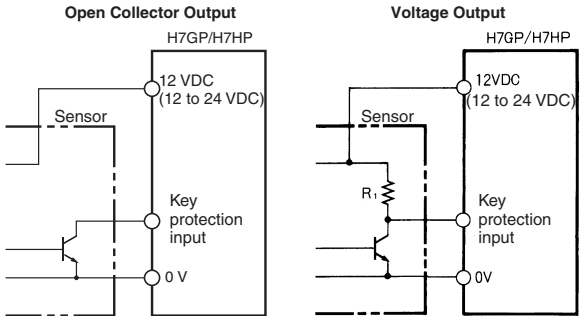


Reset, Count 1, Count 2, Start, and Gate Inputs Specification

Short-circuit (ON) impedance:	1 kΩ max.
Short-circuit (ON) residual voltage:	2 VDC max.
Current flow for 0-Ω short-circuit:	Approx. 2 mA
Open (OFF) impedance:	100 kΩ min.

Note: Two-wired sensors cannot be used.

Key Protection Input



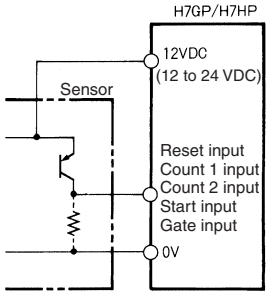
Key Protection Inputs Specification

Short-circuit (ON) impedance:	1 kΩ max.
Short-circuit (ON) residual voltage:	0.5 VDC max.
Current flow for 0-Ω short-circuit:	Approx. 0.5 mA
Open (OFF) impedance:	100 kΩ min.

Note: Two-wired sensors cannot be used.

Voltage Input (PNP Input Mode)

Reset, Count 1, Count 2, Start, and Gate Inputs



Reset, Count 1, Count 2, Start, and Gate Inputs Specification

Short-circuit (ON) impedance:	1 kΩ max.
ON voltage:	9 to 24 VDC
OFF voltage:	5 VDC max.
Open (OFF) impedance:	100 kΩ min.

Note: Two-wired sensors cannot be used.

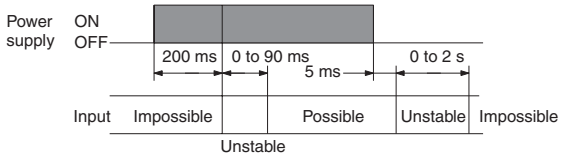
Precautions (Common)

Note: The undermentioned is common for all H7GP/H7HP models.

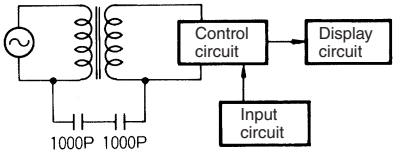
Power Supplies

When turning the power ON and OFF, input signal reception is possible, unstable, or impossible as shown in the diagram below.

Apply the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value immediately.



Although the H7GP/H7HP power supply (primary side) is isolated from control circuits (secondary side) by a transformer, the primary and secondary sides of the transformer are linked by a capacitor, making it possible for high-frequency components to leak to the secondary side. Take adequate precautions against electrical shock. Do not connect input circuits to exposed parts (such as the machine body) and be sure that the power supply is turned off before wiring.



Self-diagnostic Function

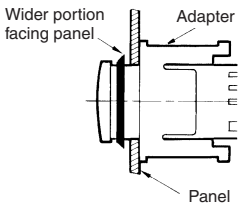
The following displays will appear if an error occurs.

Display	Error	Correction
----	-99999 max. (H7HP, 6-digit model) -99999999 max. (H7HP, 8-digit model)	Press RST Key or reset input
E1	CPU	Press RST Key or turn power OFF and then ON
E2	Memory	

Flush Mounting

The panel surface is water-resistive (conforming to NEMA 4 and IP66). In order to prevent the internal circuit from water penetration through the space between the counter and operating panel, attach a rubber packing between the counter and operating panel and secure the rubber packing with the Y92F-3□ flush-mounting adaptor.

Be sure the rubber packing is installed in the correct direction. The wider portion must be facing the panel when installed, as shown in the following illustration. Using a flat-head screwdriver, press in the Mounting Adapter until it cannot be pressed in any further in order to ensure water-resistive performance.



Other

Water resistance may deteriorate depending on the environment. Periodically check water resistance.

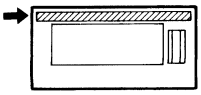
Oil resistance is not applicable to all types of oil. Be sure to test any specific oils before actual application.

Labels

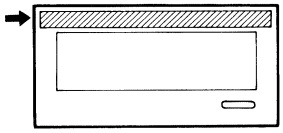
Unit labels are included with the H7GP/H7HP and DIP switch labels are included with the H7HP. Attach these labels as shown in the following illustrations.

Unit Labels

H7GP

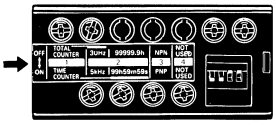


H7HP



DIP Switch Labels

H7HP



Accessories

The accessories listed in the following table are included with the H7GP/H7HP. Be sure you understand the use of these accessories and use them correctly.

Name	H7GP	H7HP
Rubber packing	Y92S-32	Y92S-33
Flush mounting adaptor	Y92F-32	Y92F-33

Degree of Protection

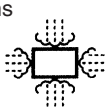
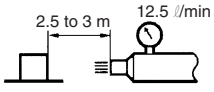
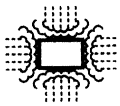
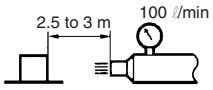
IP - 6 6 G

- Protection Specification Code (International Protection) (IEC529)
- Protection against solid foreign objects
- Protection against harmful ingress of water
- Japan Electrical Manufacturers Association's standards (JEM1030)
  Protection against oil

Protection Against Solid Foreign Objects

Grade	Protection	Criteria
5	Dust protected 	Limited ingress of dust permitted (no harmful deposit).
6	Dust-tight 	Totally protected against ingress of dust.

Protection Against Harmful Ingress of Water

Grade	Protection	Criteria	Examination method
5	Housing jets from all directions 	Protected against low-pressure jets of water from all directions; limited ingress permitted.	Spray water from all directions for one minute per m2 of external surface area and for a total time of no less than 3 minutes using the test device shown below.  Discharging nozzle dia.: 6.3
6	Strong hosing jets from all directions 	Protected against strong jets of water, e.g. for use on ship-decks; limited ingress permitted.	Spray water from all directions for one minute per m2 of external surface area and for a total time of no less than 3 minutes using the test device shown below.  Discharging nozzle dia.: 12.5

JEM Standards
Protection Against Oil

Grade	Protection	Criteria	Criteria
F	Oilproof	Protected against improper operation due to oil drops or spray from any direction.	No penetration of oil to the extent of interfering with proper operation after dropping the specified cutting oil on a test device for 48 hours at a rate of 0.5 ℓ per hour.
G	Oil resistant	Protected against penetration of oil drops or spray from any direction.	No penetration of oil after dropping the specified cutting oil on a test device for 48 hours at a rate of 0.5 ℓ per hour.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. M049-E2-04