Cat. No. Y103-E1-03

OMRON

Counters
SELECTION GUIDE

Global Optimum Design
Intuitive Operation
Enhanced Visibility

Preset Counter
New Phase
H7CX

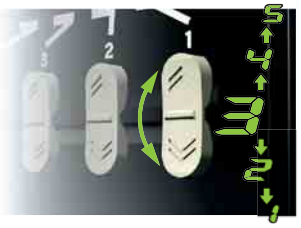
Five-configuration in one body

Five in one package; Can be configured to various types of dedicated counters intended for production control purpose.

H7CX develops a new phase

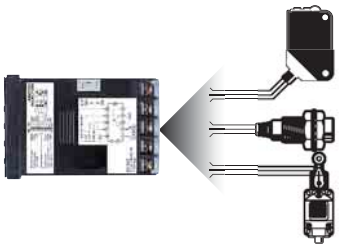
Backlit negative LCD.

With this technology, higher visibility can be realized both in dark and sunny area.



Ergonomic keys make operation easy.

Ergonomic rocker keys enable you to change setting values up-and down-ward with ease.(4-digit models)



NPN/PNP switchable DC voltage input.

Various input devices can be connected such as no -voltage inputs(contact), voltage inputs, or two -wired sensors without any concerns.

DIP switch makes set up easy.

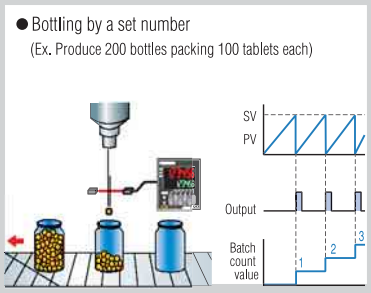
When using the H7CX in basic applications, it can be set up simply by using the mechanical DIP switch on the body top side.

Programable PV color visualizes count up.

It alerts a count-up visually by means of changing PV display color from red to green or vice versa, enabling you to check the output status from a remote point.

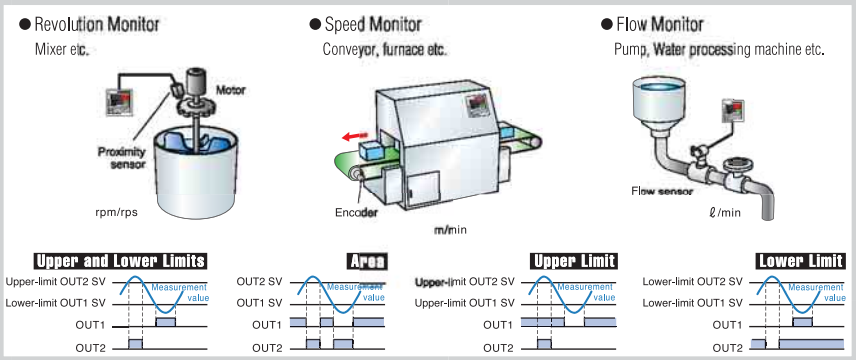
Safety Design.

UL-listed obtained on condition, in addition to conforming to Global standard for safety and EMC.It is suited to all industrial environments(field wiring Capable)in the USA.Finger-safe terminal incorporated.



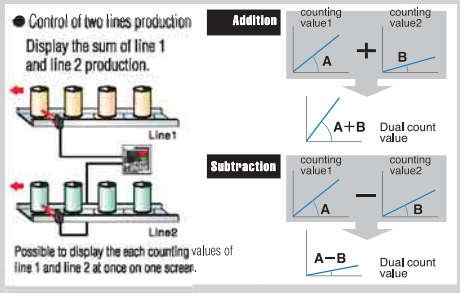
Batch Counter

On top of a preset counter, H7CX operates as batch counter(with output) which counts the number of count-up.



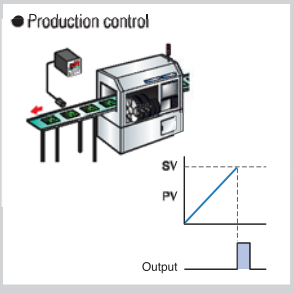
Tachometer

Display revolution number, speed, flow volume and so on. Alarm output turns ON according to the measurement value.



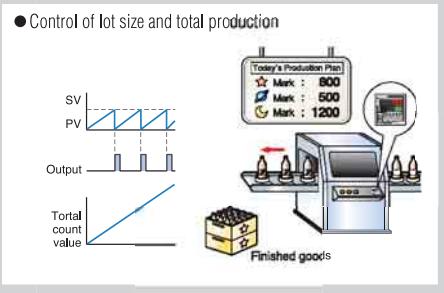
Dual Counter

Two counters in one body to count two objectives, respectively. Contorl output will be activated according to the result of adding/subtracting the counting value 1 and counting value 2.



Preset Counter

Control output will be activated when counter reaches the set value. Two-stage models also available.



Total and Preset Counter.

While using the preset counter, it is possible to switch the display to monitor the total count value.

in Preset Counter Field.

FIRST in the world:

Preset Counter & Timer combined in one body in "G" format FIRST

Double display: PV & SV, in "G" format FIRST

Serial communication in "G" format FIRST

The H8GN, with the world's smallest dimensions of 48×24 mm (1/32-DIN size or "**G**" format), facilitates easier system design and installation and helps enhance performance for downsizing or systemization. An intuitive operability reduces setup time. The H8GN helps pursue a higher productivity on shop floor.

Preset Counter/Timer

G-FORMAT

FIRST in the world:

Preset Counter & Timer combined in one body in "G" format FIRST
Double display: PV & SV, in "G" format FIRST
Serial communication in "G" format FIRST

Save Effort

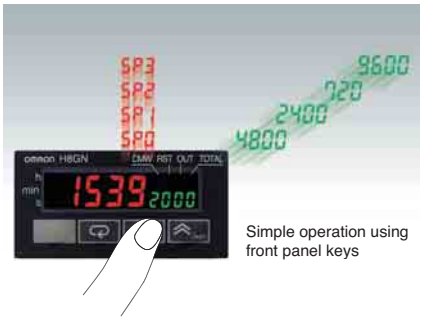
Save the time required to setup for a process.

More efficient management through a system integration.

Simplified operation.

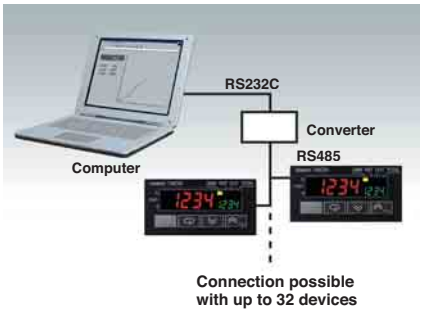
SV-Bank Function

Enables presetting up to four set values and changing one to another with a simple operation on a front panel key. This feature helps reduce the setup time required to change between processes.



Communications Function Facilitating Data Management

The H8GN Series includes a model with serial communications. It can be connected up to 32 devices or computers.



Save Space

Help downsizing of control panel, both in footprint and volume.

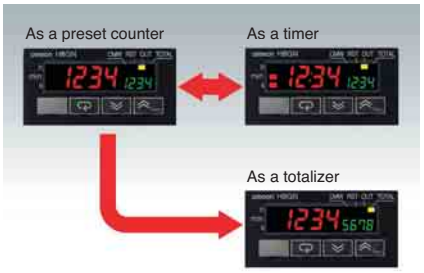
Greater space utilization is also achieved by its versatility.

World's Smallest Size for Downsizing of Control Panels

A compact and short body of DIN 48×24×83 mm

Triple in one - features total and preset counter functions as well as timer

Switching between preset counter (4 digits) and timer (4 digits) possible. While using the preset counter, it is possible to switch the display to monitor the totalizing count value (8 digits). This feature eliminates the need for more than one device to enable saving space.



Save Energy

Reduced power consumption using backlit negative transmissive LCD.

Environment-friendly design without batteries.

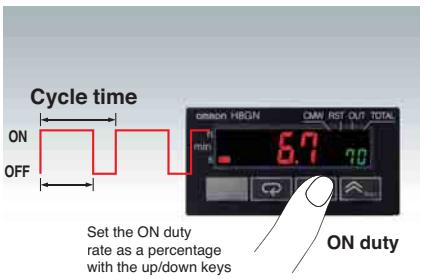
Fine adjustable control.

LED-like LCD Double Display. Programs saved without using batteries

Both PV and SV can be viewed on a large, high-visibility negative-transmissive LCD.

Equipped with ON/OFF-duty Adjustable Flicker Mode

ON/OFF duty adjustable flicker mode that can be used to perform cyclic control is available for timer operation. This feature allows fine adjustment of control output and saves energy.



A Variety of OMRON Counters

Counters

Solid-state Counters

Preset Counters

Control output is turned ON when the present value has reached the preset value.

H8GN		●24 x 48 mm
H7CX		●48 x 48 mm
H7BR		●72 x 72 mm
H7CN		●48 x 48 mm
H7AN		●72 x 72 mm
H7S		●33 x 10 mm

Totalizing Counters

Present value is displayed with no control output.

H7GP		●24 x 48 mm
H7HP		●36 x 72 mm
New H7E		●24 x 48 mm
H7CN-T		●48 x 48 mm
H7AN-T		●72 x 72 mm

Dedicated Counters for Special Applications

The following Counters incorporate dedicated control functions for special applications.

K3NC		●48 x 96 mm
H8BM		●72 x 72 mm
H8PS		●96 x 96 mm
H8PR		●96 x 192 mm

Electromagnetic Counters

Totalizing Counters

CSK CSKE	

● Compact preset counter/timer with communications function.	● Three-functions in one: timer/preset counter/totalizing counter ● SV-bank function ● Backlit negative-transmissive LCD display
● General-purpose preset counter with intuitive operation and enhanced visibility.	● Five-functions in one: 1-stage/2-stage counter, totalizing counter,batch counter, dual counter, tachometer ● PV display color change function
● General-purpose counter that is ideal for a wide range of applications including numerical control and quantity control.	● One-stage preset model ● Two-stage preset model
● Compact, simple counter that incorporates the H7AN's main functions.	● LED display ● Preset model
● Incorporates switches that can be used in combinations for selecting versatile functions according to the application.	● One-stage preset model ● LED display ● Two-stage preset model
● Counter modules incorporate a BCD I/O function and allow data communications with peripheral devices.	● Basic Counter Unit ● Multi-stage Counter Unit
● Easy-to-see, compact totalizing counter/timer meets IP66G requirements, thus resisting water and oil.	● Beige and black body types available
● Easy-to-see totalizing counter/timer is 36 x 72 mm in size and meets IP66G requirements, thus resisting water and oil.	● Six-digit totalizing counter/time counter ● Eight-digit totalizing counter ● Beige and black body types available
● Compact, economical totalizer with high visibility.	● Backlit LCD Display ● Time counter ● Total counter ● Digital tachometer ● Beige and black body types available
● Easy-to-see, simple totalizing counter.	● LED display
● Versatile, easy-to-use totalizing counters.	● Multi-digit (i.e., 4-, 6-, and 8-digit) models ● LED display
● Up/Down Counting Meter Ideal for high-speed operations at 50 kHz.	● LED display ● BCD output model ● Five-stage comparative ● Communications output model ● output model
● Multi-maintenance Counter One Unit works as nine counters or timers and is ideal for machine maintenance control.	● Three-stage ● preset model
● Cam Positioner Economical counter for angle control allows the use of mechanical cams.	
● Cam Positioner Ideal for 360-degree rotation angle control.	

● Variety of Compact High-performance Electromagnetic Counters	● CSK and CSKE models are not listed in the ● Selection Guide. Refer to individual datasheets.

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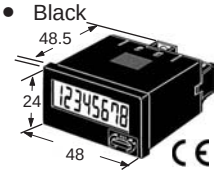
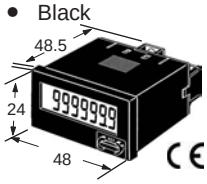
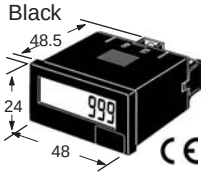
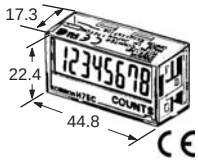
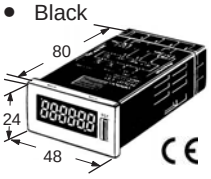
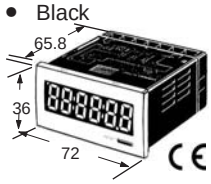
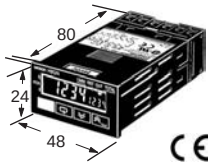
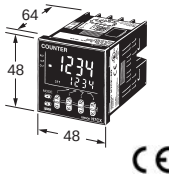
Selection Guide

Classification	Self-powered Total Counter	Self-powered Time Counter	Self-powered Tachometer	PCB-mounting Counter
Model	New H7EC	New H7ET	New H7ER	New H7E□-N□P
Appearance	• Beige • Black 	• Beige • Black 	• Beige • Black 	
Counting mode	Up type	Up type	Up type	Up type
Supply voltage	Backlight model: 24 VDC (only for backlight) No-backlight model: Self-powered	Backlight model: 24 VDC (only for backlight) No-backlight model: Self-powered	Backlight model: 24 VDC (only for backlight) No-backlight model: Self-powered	3 VDC
Number of digits displayed	8	7	4 or 5	7 or 8
Display	7-segment, LCD with or without backlight	7-segment, LCD with or without backlight	7-segment, LCD with or without backlight	7-segment, LCD
Counting speed	PNP/NPN universal DC voltage input and no-voltage input: 30 Hz or 1 kHz (switchable) AC/DC multi-voltage input: 20 Hz	---	1 kHz with the 4-digit model 10 kHz with the 5-digit model	30 Hz or 1 kHz
Time range	---	0.0 h to 999999.9 h/ 0.0 h to 3999 d 23.9 h or 0 s to 999 h 59 m 59 s/ 0.0 m to 9999 h 59.9 m	---	---
Control input	No-voltage input, voltage input (PNP/NPN universal DC voltage input, AC/DC multi-voltage input)	No-voltage input, voltage input (PNP/NPN universal DC voltage input, AC/DC multi-voltage input)	No-voltage input, voltage input (PNP/NPN universal DC voltage input)	No-voltage input
Reset system	External (reset time: 0.02 s) and manual reset	External (reset time: 0.02 s) and manual reset	---	External (reset time: 0.02 s), Power-OFF (0.5 s)
Power consumption	Approx. 0.3 W (backlight model)	Approx. 0.3 W (backlight model)	Approx. 0.3 W (backlight model)	---
Control output	---	---	---	---
Power source for external supply	---	---	---	---
Terminal connection method	Screw, optional wire-wrap	Screw, optional Wire-wrap	Screw, optional wire-wrap	Direct mounting on PC Board or mounting on 28-pin socket
EMC standards	Conforms to EN61326	Conforms to EN61326	Conforms to EN61326	Conforms to EN61326
Weight	Backlight model: Approx. 65 g No-backlight model: Approx. 60 g	Backlight model: Approx. 65 g No-backlight model: Approx. 60 g	Backlight model: Approx. 65 g No-backlight model: Approx. 60 g	Approx. 20 g
Safety standards	UL, CSA, LR, conforms to EN61010-1, conforms to VDE0106/P100, CE marking	UL, CSA, LR, conforms to EN61010-1, conforms to VDE0106/P100, CE marking	UL, CSA, LR, conforms to EN61010-1, conforms to VDE0106/P100, CE marking	UL, CSA, CE marking
Cat. No.	M064	M064	M064	M064

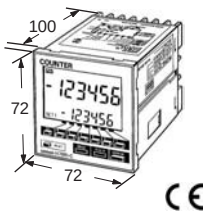
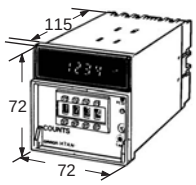
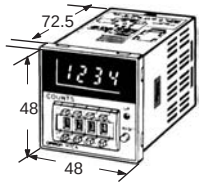
Note Refer to the relevant datasheet.

Selection Guide

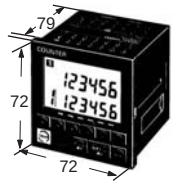
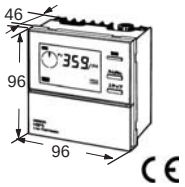
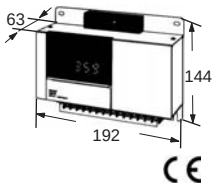
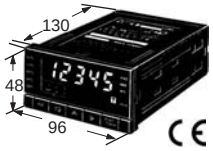
Classification	Total Counter/Time Counter (DIN 48 x 24)	Total Counter/Time Counter (DIN 72 x 36)	Preset Counter/Timer	Preset Counter/Tachometer
Model	H7GP	H7HP	H8GN	H7CX
Appearance	• Beige • Black 	• Beige • Black 	• Black 	• Black 
Counting mode	Up type	Reversible type	Up/Down/Reversible type	Up/Down/Reversible type
Supply voltage	100 to 240 VAC (50/60 Hz), 12 to 24 VDC	100 to 240 VAC (50/60 Hz), 12 to 24 VDC	24 VDC	100 to 240 VAC (50/60 Hz), 24 VAC (50/60 Hz) /12 to 24 VDC, 12 to 24 VDC
Number of digits displayed	6	6 or 8	PV: 4 digits SV: 4 digits When total count value is displayed: 8 digits	4 or 6
Display	7-segment, negative transmissive LCD with red backlight	7-segment, negative transmissive LCD with red backlight	7-segment, negative transmissive LCD with backlight	7-segment, negative transmissive LCD with backlight
Counting speed	30 Hz/5 kHz	30 Hz/5 kHz	30 Hz/5 kHz	30 Hz/5 kHz, 30 Hz/10 kHz for tachometer
Time range	0.1 to 99999.9 h/ 1 s to 99 h 59 m 59 s	0.1 to 99999.9 h/ 1 s to 99 h 59 m 59 s	0.001 s to 9999 h	---
Control input	No-voltage input or DC voltage input (switchable)	No-voltage input or DC voltage input (switchable)	No-voltage input	No-voltage input or DC voltage input (switchable)
Reset system	External and manual resets Reset time: 0.02 s (time counter), 0.02 s or 0.001 s (total counter)	External and manual resets Reset time: 0.02 s (time counter), 0.02 s or 0.001 s (total counter)	External (reset time: 0.001 s, 0.02 s selectable), power-OFF (0.5 s), and manual	External (reset time: 0.001 s, 0.02 s selectable), manual, and automatic resets.
Power consumption	Approx. 6.5 VA Approx. 0.6 W	Approx. 6.5 VA Approx. 0.6 W	1.5 W max.	Approx. 9.2 VA (at 264 VAC), Approx. 3.7 W (at 12 VDC)
Control output	---	---	Contact output: SPDT 3 A at 250 VAC/30 VDC, resistive load (cosϕ=1)	Contact output: 3 A at 250 VAC/30 VDC, resistive load (cosϕ=1) Transistor output: NPN open collector: 100 mA at 30 VDC max.; residual voltage: 1.5 VDC max.
Power source for external supply	50 mA at 12 VDC	50 mA at 12 VDC	---	100 mA at 12 VDC
Terminal connection method	Screw	Screw	Screw	Screw Socket (P2CF, P3G)
EMC standards	Conforms to EN61326	Conforms to EN61326	Conforms to EN61326	Conforms to EN61326
Weight	Approx. 76 g	Approx. 106 g	Approx. 80 g	Approx. 140 g
Safety standards	UL, CSA, conforms to EN61010-1, CE marking	UL, CSA, conforms to EN61010-1, CE marking	UL, CSA, LR, conforms to EN61010-1, conforms to VDE0106/P100, CE marking	UL, CSA, conforms to EN61010-1, conforms to VDE0106/P100, CE marking
Cat. No.	M049	M049	M065	M070

Note Refer to the relevant datasheet.

Selection Guide

Classification	Preset Counter		
Model	H7BR	H7AN	H7CN
Appearance		 Types with backup power supply function for memory protection also available	 Types with backup power supply function for memory protection also available
Counting mode	Up/Down/Reversible type	Up/Down/Reversible type	Up/Down/Reversible type
Supply voltage	100 to 240 VAC (50/60 Hz), 24 VAC/12 to 24 VDC	100 to 240 VAC (50/60 Hz), 12 to 24 VDC	100 to 240 VAC (50/60 Hz), 12 to 48 VDC
Number of digits displayed	6	2, 4, 6, or 8	4
Display	7-segment, LCD with backlight	7-segment, LEDs Indicators: Count-in and count-up indicators	7-segment, LEDs Indicator: Count-up indicator
Counting speed	30Hz/1 kHz/5 kHz/10 kHz	30 Hz/3 kHz/5 kHz	Contact input and solid-state input: 30 Hz Solid-state input: 5 kHz
Control input	No-voltage input, DC voltage input	DC voltage input	No-voltage input
Reset system	External (reset time 0.001 s, 0.02 s selectable), manual, and automatic resets	External (reset time: 0.02 s), Power-OFF (0.5 s), manual, and automatic resets	External (reset time: 0.02 s), Power-OFF (0.5 s), manual, and automatic resets
Power consumption	Approx. 10 VA (at 50 Hz, 240 VAC) Approx. 6 W (at 24 VDC)	Approx. 10 VA (at 240 VAC, 50 Hz) Approx. 5 W (at 24 VDC)	Approx. 12 VA (at 240 VAC 50 Hz) Approx. 2.5 W (at 48 VDC)
Control output	Contact: 3 A at 250 VAC, resistive load ($\cos\phi$ = 1); Transistor output: Open collector: 100 mA max. at 30 VDC max,; residual voltage: 2 VDC max.	Contact output: SPDT (DPST-NO for double-preset counter) 250 VAC 3 A $\cos\phi$ = 1 (resistive load) Solid-state output: Open collector 30 VDC max. 100 mA max. (Both outputs can be produced simultaneously.)	Contact output: SPDT 250 VAC 3 A $\cos\phi$ = 1 (resistive load) Solid-state output: Open collector 30 VDC max. 100 mA max.
Power source for external supply	160 mA at 12 VDC ±10%; 80 mA at 24 VDC ±10%	80 mA at 12 VDC ±10%	---
Terminal connection method	Screw	Screw	Socket (P2CF, P3G)
EMC standards	Conforms to EN61326	---	---
Weight	Approx. 270 g	Approx. 360 g	Approx. 150 g
Safety standards	UL, CSA, conforms to EN61010-1, CE marking	UL, CSA	UL, CSA
Cat. No.	M009	M001	M004

Note Refer to the relevant datasheet.

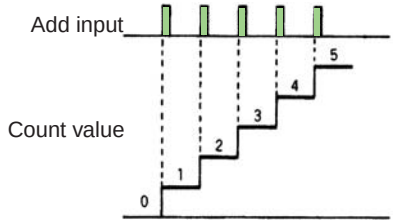
Classification	Multi-maintenance Counter	Cam Positioner		Up/Down Counting Meter
Model	H8BM	H8PS	H8PR	K3NC
Appearance				
Counting mode	Up type	---	---	Up/Down type
Supply voltage	24 VDC	24 VDC	100 to 240 VAC (50/60 Hz)	100 to 240 VAC (50/60 Hz); 12 to 24 VDC
Number of digits displayed	6	3 (0° to 359°)	3 (0° to 359°)	5
Display	7-segment, LCD with back-light	7-segment, LCD with back-light	7-segment, LEDs	7-segment, LEDs
Counting speed	30 Hz	330 min^{-1} {rpm}	833 min^{-1} {rpm}	Non-voltage contact (30 Hz max.)
Control input	DC voltage input	Accepts input from a special absolute encoder	Accepts input from a special absolute encoder	No-voltage input
Reset system	External (reset time: 0.1 s) and manual resets	---	---	External reset (reset time: 0.016 s max.)
Power consumption	Approx. 1.8 W (at 24 VDC)	Approx. 4 W	Approx. 10 W (at 240 VAC, 50 Hz)	15 VA max. (max. AC load with all indicators lit) 10 W max. (max. DC load with all indicators lit)
Control output	Open-collector output: 30 VDC max. 100 mA max.	Solid-state output: Open collector 30 VDC max. 100 mA max.	Solid-state output: Open collector 30 VDC max. 100 mA max.	Contact: 5 A at 250 VAC/5 A at 30 VDC, resistive load ($\cos\phi$ = 1); 1.5 A at 250 VAC/ 1.5 A at 30 VDC, inductive load ($\cos\phi$ =0.4, L/R=7 ms) Min. applicable load; 10 mA at 5 VDC Transistor output: 12 to 24 VDC $^{+10\%}/_{-15\%}$, 50 mA max.
Power source for external supply	---	(To rotary encoder)	(To rotary encoder)	80 mA at 12 VDC±10%
Terminal connection method	Screw	Screw	Screw	Screw
EMC standards	---	Conforms to EN61326	Conforms to EN61326	Conforms to EN61326
Weight	Approx. 290 g	Approx. 300 g	Approx. 1.3 kg	Approx. 400 g
Safety standards	UL, CSA	UL, CSA, CE marking	UL, CSA, conforms to EN61010-1, CE marking	UL, CSA, conforms to EN61010-1, CE marking
Cat. No.	M042	M041	M040	N089

Note Refer to the relevant datasheet.

Glossary

Addition-type (Up/Incrementing) counter

A counter having an add input and thus capable of counting in an ascending order.



Ambient temperature (operating)

The ambient temperature at which a device can be used in the continuously operated state.

Ambient temperature (storage)

The ambient temperature at which a device without power applied, may be stored safely.

Automatic reset

To automatically return the counter to the “0” state after the lapse of a given time.

Counting capacity

The maximum value up to which the counter can count. The counting capacity is usually expressed in decimal digits.

Count-up

The point in time or the state in which the output section of the counter operates when the number of counts reaches the preset value.

Dielectric strength

The maximum voltage a dielectric can withstand without being damaged.

Electromagnetic reset

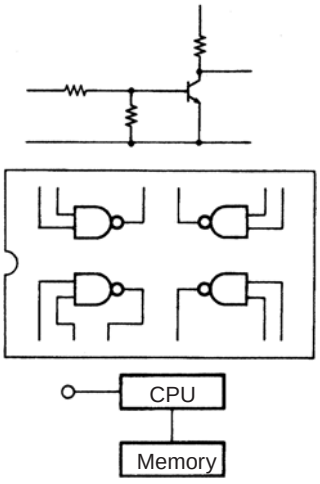
To electromagnetically reset the counter by applying a reset signal.

Electromagnetic counter

A counter which performs counting by energizing or de-energizing the built-in electromagnet.

Electronic counter

A counter which mainly consists of transistors, ICs, micro-computers, etc.



Electrical life expectancy

The life expectancy of a counter when the control output is operated to switch a specified voltage/current load connected to the control output.

External reset

To reset the counter by a required signal applied from an external source to the reset input signal terminals of the counter.

Holding output

The control output of the counter without a self-resetting function. The output is continuously held as long as the counter is not reset by the power, external, manual, or electromagnetic reset.

Humidity

The ambient humidity at which a device can be used for continuous operation.

Insulation resistance

The resistance offered by an insulating material to the flow of current resulting from a DC voltage.

Life expectancy (mechanical)

The life expectancy of a counter when the control output of the counter is operated without a load.

Manual reset

To mechanically reset the counter by manual means.

Maximum counting speed

The maximum counting speed at which the display or output section of the counter operates accurately without miscounting. The maximum counting speed is expressed in units of counts per second (cps).

Memory protective function during power failure

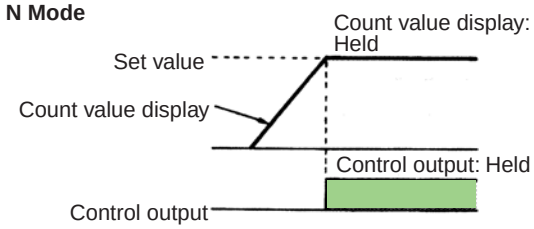
The function by which the number of counts at the time of a power failure is memorized until power is again applied to the counter.

Operating mode

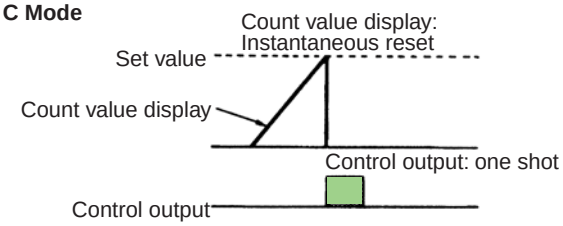
Control output patterns or display patterns that appear when counted up to the value set by the preset counter.

Examples:

N Mode



C Mode



Operating voltage range

The allowable fluctuation range of the voltage required to operate a device (e.g. control and signal voltage).

One-shot output

A counter control output of fixed duration which can be reset by a self-reset.

ONOFF ratio

The ratio of the ON signal time of a given input signal to the OFF signal time of the same input signal. The maximum counting speed of each counter is determined by a counting input signal with an ON-OFF ratio of 1:1.

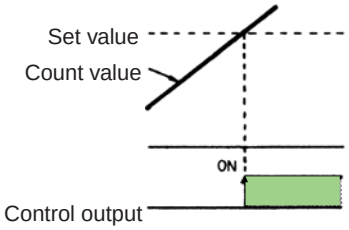
Power consumption

The maximum wattage used by a device within its operating range at the specified temperature and humidity.

Depending on the internal power circuit system of the model, both apparent power and active power are indicated for the AC power supply. Refer to the apparent power when designing a transformer.

Preset solid-state counter

A counter whose control output operates when it counts up to the set value and which employs a semiconductor circuit for the counting element.

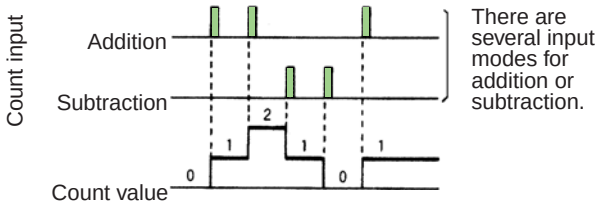


Reset

To restore the counting, display and output sections of the counter, to their initial states.

Reversible-type counter

A counter with the capability of counting in an ascending or descending order, depending on the up-down inputs. Also called an up-down counter.



Power reset

To reset the counter by cutting off the operating supply voltage.

Self-reset

To reset the counter by a signal generated by internal circuitry.

Shock resistance (destruction)

The threshold of shock beyond which an abnormality is expected to occur in the appearance or function of a device.

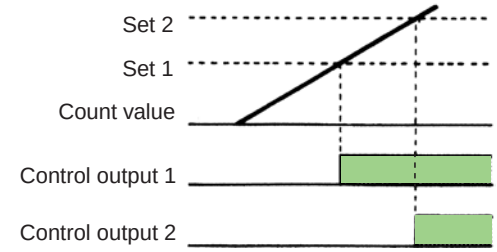
Shock resistance (malfunction)

The threshold of shock beyond which a device can be longer operate properly according to prescribed ratings.

Stage

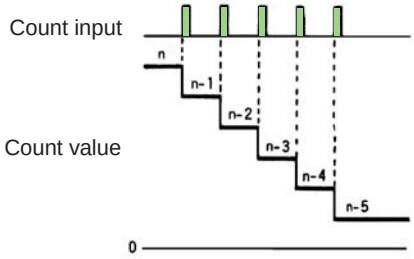
Number of preset values that correspond with the number of control outputs.

Example: Two-stage Counter



Subtraction-type (Down/Decrementing) counter

A counter with a subtract input and thus capable of counting in descending order.



Totalizing counter

A counter which indicates the total value of the counting inputs and is not provided with a control output.

Vibration resistance (destruction)

The threshold of vibration beyond which an abnormality is expected to occur in the appearance or function of a device.

Vibration resistance (malfunction)

The threshold of shock beyond which a device can be longer operate properly by satisfying the prescribed ratings.

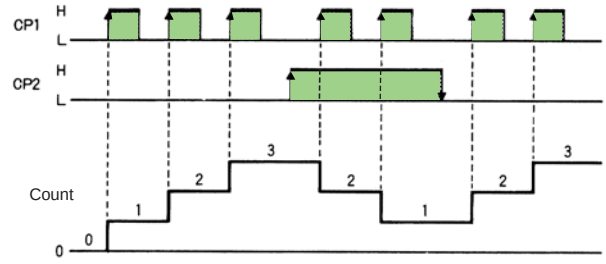
Glossary

Counting Function

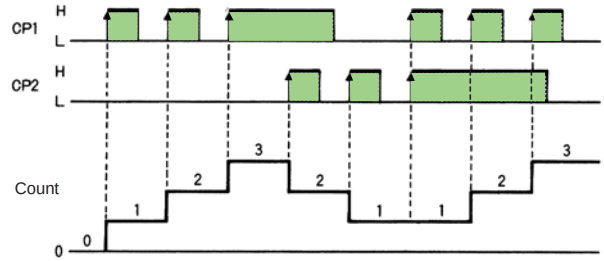
Refer to the following timing charts for the input modes of the incremental, decrementing, and up/down (or reversible-type) Counters.

Up/Down

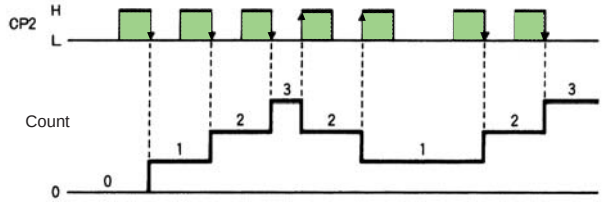
Up/Down A Command Input



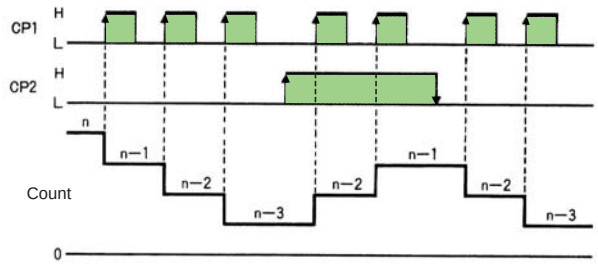
Up/Down B Individual Input



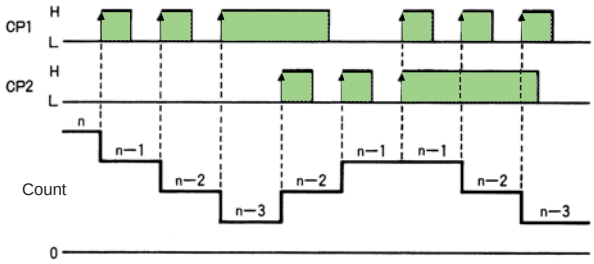
Up/Down C Quadrature Input



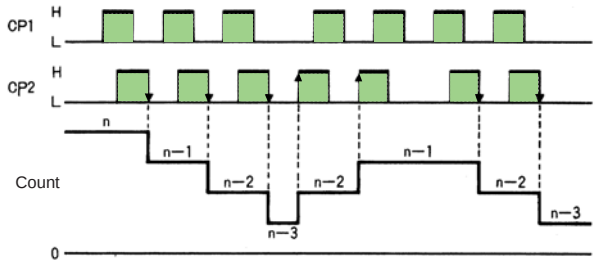
Up/Down D Command Input



Up/Down E Individual Input



Up/Down F Quadrature Input



■ Inrush Current

"---" indicates a constant current and therefore the corresponsing values are omitted from the table. All the values are approximate values and shold therefore only be used as a guide.

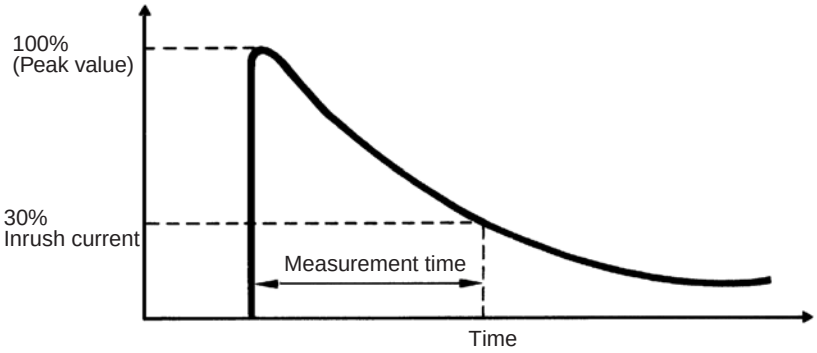
Counters

Model	Voltage	Applied voltage	Inrush current (peak value)	Time (see note)
H7CX-A11/-AW	100 to 240 VAC	264 VAC	5.8 A	0.7 ms
H7CX-A11D1/-AWD1	24 VAC/12 to 24 VDC	26.4 VAC	10.4 A	1.2 ms
H7CX-AD	12 to 24 VDC	26.4 VAC	6 A	1.2 ms
H7BR	100 to 240 VAC	264 VAC	11.3 A	5 ms
	24 VAC/12 to 24 VDC	26.4 VAC	10 A	2 ms
H7AN	100 to 240 VAC	264 VAC	16 A	1 ms
	100 VDC	110 VDC	8 A	2 ms
	48 VDC	52.8 VDC	5 A	3 ms
	12 to 24 VDC	26.4 VDC	15 A	2 ms
H7CN	100 to 240 VAC	264 VAC	700 mA	2 ms
	12 to 48 VDC	52.8 VDC	1.5 A	1 ms
H7E	---	---	---	---
H8BM	24 VDC	26.4 VDC	2 A	20 ms
H72A	200 to 240 VAC	---	---	---
	100 to 120 VDC	---	---	---
	24 VDC	26.4 VDC	100 mA	3 ms
	12 VDC	13.2 VDC	1.5 A	3 ms
CSK	All models	---	---	---

Cam Positioner

Model	Voltage	Applied voltage	Inrush current (peak value)	Time (see note)
H8PS	24 VDC	26.4 VDC	1.1 A	10 ms
H8PR	100 to 240 VAC	264 VAC	15 A	1 ms

Note The time of the inrush current is measured as shown in the following figure.



■ Precautions

Refer to the precautions for the individual products as well.

⚠ Caution

Products with Built-in Lithium Batteries
The H7S, H7BR, H7AN-M, and H8PR-□□ have built-in batteries. Do not disassemble the products, deform them with pressure, or subject to heat at more than 100×C, otherwise the battery may explode or burn.

⚠ Caution

Products with Replaceable Lithium Batteries
The Y92S-20 (for the H7CN(-M)) and the Y92S-36 (for the New H7E) are replaceable lithium batteries. Do not short the positive and negative poles, recharge or disassemble, or dispose in a fire, otherwise the battery may explode, burn, or leak liquid.

Operation

Operating Environment

- When using the Counter, make sure that the ambient temperature and humidity are within the permissible ranges.
- When storing the Counter, make sure that the storage temperature and humidity are within the permissible ranges. Before supplying power to a Counter that has been kept at a temperature of –10°C or below, leave the Counter at room temperature for at least three hours.
- Be sure to operate the Counter within its permissible vibration, shock, water, and oil resistance ranges.
- Do not use the Counter in places with excessive dust, corrosive gas, or direct sunlight.
- When using the Counter in places with sources of excessive static electricity, such as places with molding materials and powders, and where liquids are being transported, separate the Counter from these sources.
- Keep away organic solvents, such as paint thinner and benzine, strong alkalis, and strong acids from the Counter, to protect the coverings of the Counter from damage.
- Do not remove the coverings of the Counter.

Input Signal Processing

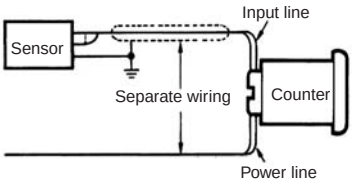
Do not wire the input line of the Counter alongside power lines or high-tension lines in the same conduit.

Isolate the input line from power lines or high-tension lines, otherwise the Counter may malfunction due to inductive noise generated from the power lines or high-tension lines.

Use shielded wire or metal conduits as much as possible.

Keep input signal lines as short as possible.

The above points are most important for Electronic Counters operating at high speed.



Output

Relay Output Model

Check that the switching current and voltage are within the rated ranges with the load connected. Make sure that the relay is not overloaded. Otherwise, the relay may not maintain its performance characteristics, such as insulation resistance. Moreover, the relay may burn, receive damage, or cause contact weld or contact failures.

The life of a built-in relay greatly varies with the switching condition. Before use, conduct an appropriate life test on some samples of the relay under actual switching conditions and make sure that the relay has no performance problem. If a deteriorated output relay is used continuously, the built-in relay may burn or cause circuit dielectric breakdowns.

Do not use the Counter in places with explosive or flammable gas, otherwise the switching arc or heat radiation of the relay may result in a fire or explosion.

Solid-state Output Model

Check that the output current is within the rated range with the load connected. Damage to the output element may result in a short- or open-circuit malfunction.

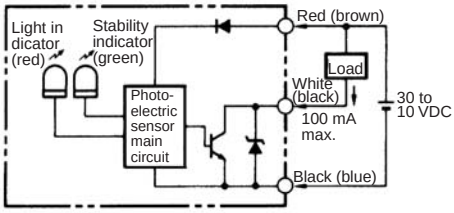
If a DC inductive load is used, be sure to connect a diode or suppress the counter-electromotive voltage, otherwise the output element may be damaged and result in a short- or open-circuit malfunction.

Connection

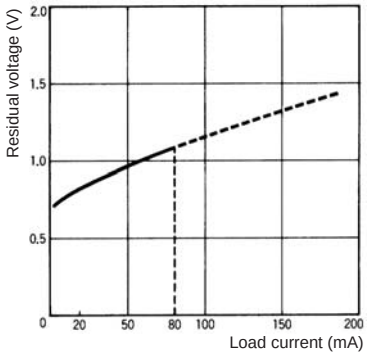
Input

Consider the residual voltage of the input sensor and make sure that the input conditions of the Counter conform with the rated conditions.

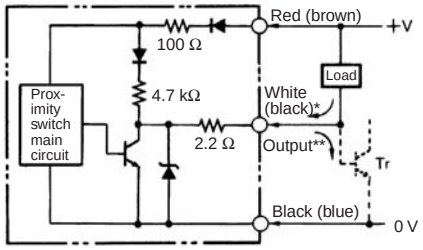
Connection Example with Photoelectric Sensor: E3X-A11



Note The residual voltage is the voltage between the output and 0-V lines when the transistor is ON (i.e., the total voltage between both edges of the transistor and diode bridge).

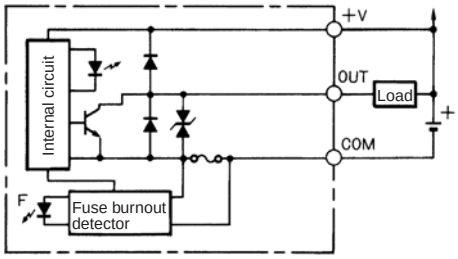


Connection Example with Proximity Switch: E2EX□E



*200 mA max. (load current)
**Output with T_1 connected.

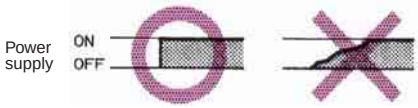
Connection Example with Programmable Controller: C200H-OD411/OD211/OD213/OD212



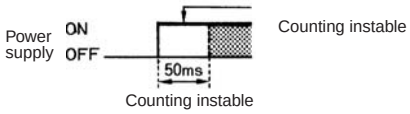
The C200H-OD211 has no fuse burnout detector.
The C200H-OD411 or C200H-OD211 has no Zener diode.

Power Supply

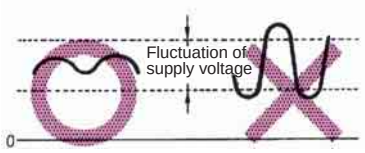
1. Supply all power instantly to the Counter through a switch or relay.



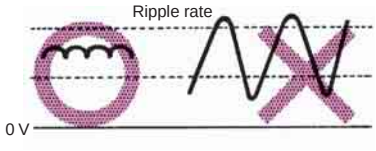
2. The Counter requires 50 ms for stable operation after power is supplied if the Counter is other than the H7GP or H7HP, which requires 250 ms for stable operation after power is supplied. Do not input any signal before the Counter is in stable operation.



3. Make sure that the fluctuation of the supply voltage is within the permissible range.



4. Make sure that the ripple rate of the supply voltage is within the permissible range if DC is supplied.



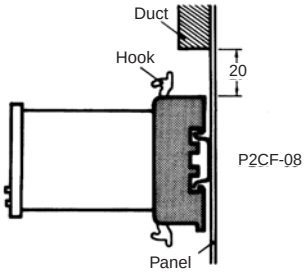
5. Make sure that the load current of the control output is within the permissible range, otherwise the relay or transistor used for the Counter may be damaged.

Mounting

Although the Counter can be mounted in any direction, it is recommended that the Counter be mounted horizontally and securely.

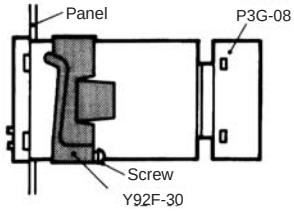
- Surface Mounting

  When mounting two or more Counters vertically with P2CF Sockets, make a space of approximately 20 mm on the top and bottom of each P2CF Socket so that the hooks of the P2CF Socket can be moved easily.

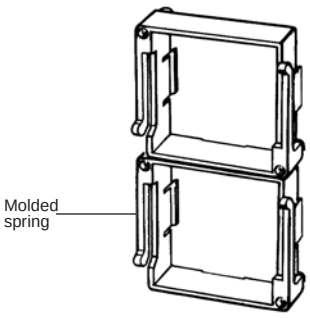


- Flush Mounting

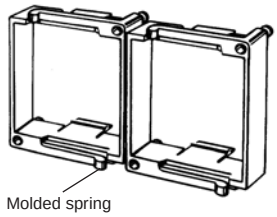
  To mount the Counter to a panel with the Y92F-30 Flush-mounting Bracket, insert the front part of the Counter into the square hole of the panel, attach the Y92F-30 to the rear end of the Counter, and press the Y92F-30 towards the panel and reduce the space between the panel and Y92F-30 as much as possible. Then secure the Y92F-30 with the screw of the Y92F-30.



To mount two or more Counters vertically side by side with Y92F-30 Flush-mounting Brackets, locate the Y92F-30 Flush-mounting Brackets so that the molded springs of each Y92F-30 are located on the left and right of the Y92F-30.

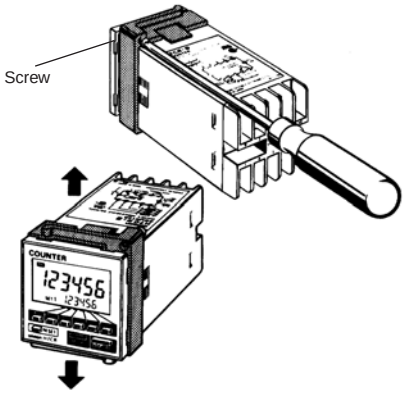


To mount two or more Counters horizontally side by side with Y92F-30 Flush-mounting Brackets, locate the Y92F-30 Flush-mounting Brackets so that the molded springs of each Y92F-30 are located on the top and bottom of the Y92F-30.



Dismounting

To dismount the Y92F-30 Flush-mounting Bracket from the Counter, loosen the screw of the Y92F-30 and move both hooks upwards and downwards respectively.



Others

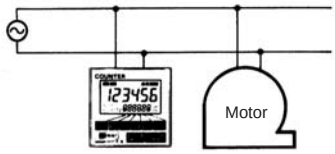
- Refer to the following to carry out dielectric strength, impulse voltage, and insulation resistance tests of the electric circuitry and non-charged metal parts of the Counter that has been mounted to a control panel.
  1. Electrically isolate the Counter from the electric circuitry of the control panel by disconnecting the socket or external wires from the Counter.
  2. Short-circuit all the terminals of the Counter, which will prevent the internal circuit of the Counter from damage that may be caused by a machine or component in the control panel with poor dielectric strength or insulation resistance.
- The impulse voltage test of the power terminals is carried out in conformity with the Japanese JEC-210 standards before shipping. Use a surge absorber, AC MP, or oil capacitor that has a capacity of 0.1 to 1 μF if there is an impulse voltage outside a range from –1.2 x 50 to 1.2 x 50 μs.
- The Counter reads input signals anytime. The Counter can be set so that it will read input signals when it is reset if it is the H7AN-R□. Be aware that the Counter will have an output signal if the data input change coincides with Counter input.
- Do not tighten any terminal screw excessively.
- Counter-electromotive voltage is generated by any inductive load that is turned on or off. For the purpose of surge absorption, when using the Counter to switch an electromagnetic device, such as a solenoid valve, apply a diode if the electromagnetic device is in DC circuitry and a surge absorber if the electromagnetic device is in AC circuitry, otherwise Counter damage or malfunctioning may result.

Troubleshooting

Refer to the following for the troubleshooting of the Counter if the Counter malfunctions or has errors.

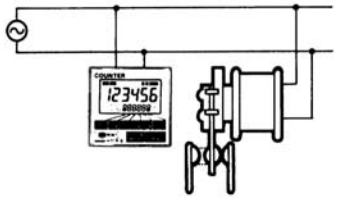
1. The following may result if a heavy inductive load, such as a high-capacity motor or solenoid, shares the power line connected to the Counter or is present near the Counter.
   - The Counter may count up or down without any input signal.
   - The power supply circuit of the Counter may be damaged.

   To prevent this, keep the motor or solenoid away from the Counter or connect a noise filter to the power supply circuit.



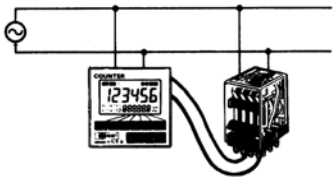
2. The following may result if a device with contacts generating arcs shares the power line connected to the Counter or is present near the Counter.
   - The Counter may count up or down without any input signal.

   To prevent this, connect an arc suppressor to the device.

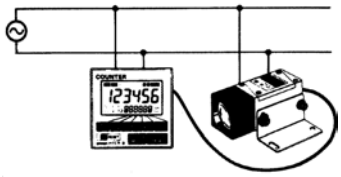


3. The following may result if the input device has a relay without highly reliable contacts.
   - The Counter may not count up or down when the contacts are activated.

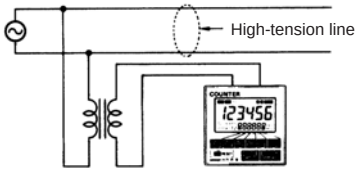
To prevent this, replace the relay with one that has highly reliable contacts.



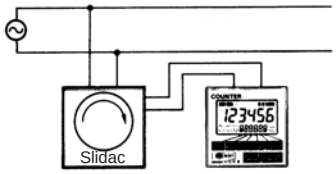
4. The following may result if the input signal line is excessively long.
   - The power line connected to the Counter may cause the Counter to count up or down.
     To prevent this, refer to page page 10, *Input Signal Processing.*
   - The residual voltage may make it impossible for the Counter to check the interval between input signals, thus obstructing the counting operation of the Counter.
     To prevent this, make the input signal line as short as possible and insert a 0.01- to 0.1-µF capacitor into the signal line close to the signal input terminal of the Counter.



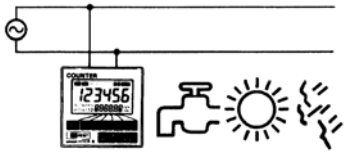
5. The following may result if the power line is close to a high-tension line.
   - The high-tension line may cause the Counter to count up or down.
     To prevent this, refer to page 10, Input Signal Process*ing.*



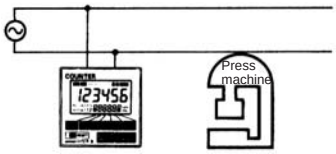
6. The following may result if the supply voltage is imposed gradually.
   - The Counter may not operate normally or the Counter displays an inaccurate value.
     To prevent this, supply all power instantly to the Counter through a switch or relay.



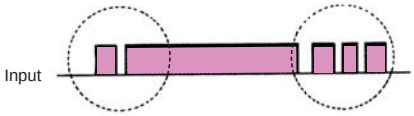
7. The following may result if the Counter is used for a long time in a place with excessive dust, direct sunlight, or sprayed water or oil that affects the Counter.
   - The Counter may not count up properly or operate normally and the coverings of the Counter is deformed.
     To prevent this, protect the Counter from water, oil, dust, and sunlight. A hard front cover will protect the Counter from dust and drops of water.



8. The following may result if the Counter is used in a place with excessive or continuous vibration or shock.
   - Contact chattering may cause sequencing errors.
   - The built-in parts of the Counter may malfunction due to the stress imposed on the built-in parts.
     To prevent this, reduce the vibration by putting a rubber cushion under the vibration source. Do not mount the Counter directly to the vibration source.

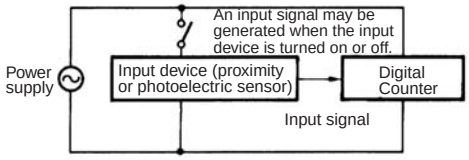


9. The following may result if the Counter is in high-speed counting operation with relay input signals.
   - The Counter may count more than the actual number of input signals.
     To prevent this, set the counting speed to 30 Hz (cps).

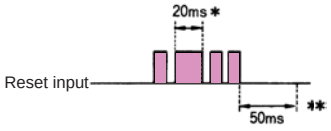


Contact chattering is counted.

10. If the proximity or photoelectric sensor used as the input device is turned on or off while supply voltage is imposed on the Counter, excessive pulses may be generated from the input device and input to the Counter.



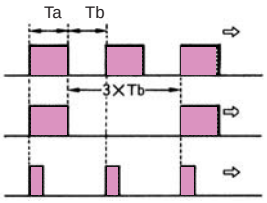
11. If the count input is a transistor input at a speed of 30 Hz (cps) maximum, setting the maximum counting speed to 30 Hz (cps) will improve the noise immunity of the Counter.
12. The Counter can be reset with a reset signal, which must be 20 ms long minimum, from the relay or transistor regardless of the maximum counting speed or input method of the Counter.



* The reset signal with distorted waves or chattering waves is acceptable as long as the reset signal is stable for 20 ms minimum.

** The CP1 and CP2 can be input if it passes 50 ms after the reset signal input is completed.

13. The maximum counting speed is the response speed of the Counter when signals with the minimum permissible signal width are input at an ON-to-OFF ratio of 1:1.
If the ratio is not 1:1, the minimum signal width must be higher than the combined specified value for the ON width and OFF width. The response speed will thus be lower.
If the width of each signal or interval between adjacent signals is less than the minimum permissible signal width, the Counter will not respond even for an input signal that is less than the maximum counting speed.

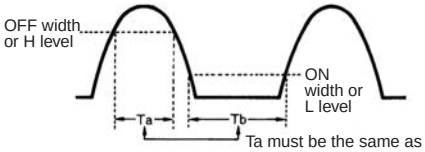


Ta (ON width) and Tb (OFF width) must be more than the minimum permissible signal width.
30 cps: 16.7 ms; 1 kps: 0.5 ms

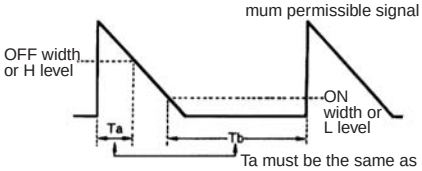
The maximum counting speed is 1/2 of the rated value if the on-to-off ratio is 1:3.

The Counter does not respond because Ta is less than the minimum permissible signal width.

14. If transistor input signals are other than square-wave signals, such as sine-wave, triangular-pulse, or saw-tooth-pulse signals, all the ON and OFF widths or H- and L-level periods must be more than the minimum permissible signal width.



Ta must be the same as or more than the minimum permissible signal width and so must Tb.



Ta must be the same as or more than the minimum permissible signal width and so must Tb.

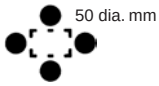
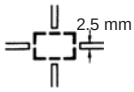
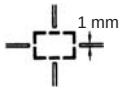
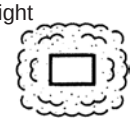
■ Enclosure Ratings

IP - □□□
1 2 3

Protection Specification Code (International Protection) (IEC529)

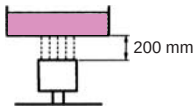
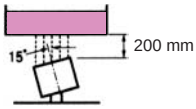
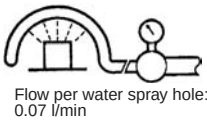
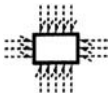
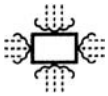
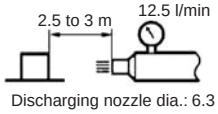
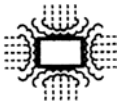
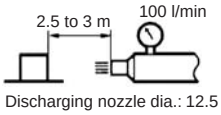
1. IEC Standards (IEC 529)

Protection Against Solid Foreign Objects

Grade	Protection	Criteria
0		No protection
1		Full penetration of 50-mm diameter of sphere not allowed. Contact with hazardous parts not permitted.
2		Full penetration of 12.5-mm diameter of sphere not allowed. The jointed test linger shall have adequate clearance from hazardous parts.
3		The access probe of 2.5-mm diameter shall not penetrate.
4		The access probe of 1.0-mm diameter shall not penetrate.
5	Dust protected 	Limited ingress of dust permitted (no harmful deposit).
6	Dust-tight 	Totally protected against ingress of dust.

2. IEC Standards

Protection Against Harmful Ingress of Water

Grade	Protection	Criteria	Examination method
0	No particular protection	No protection	No test
1	Rain 	Protected against vertically falling drops of water.	Spray water downwards invertical direction for 10 minutes using a water-dripping test device. 
2	Rain 	Protected against vertically falling drops of water with enclosure tilted 15° from the vertical.	Tilt by 15° and spray water for 10 minutes (2.5 minutes in each direction) using a water-dripping test device. 
3	Rain 	Protected against sprays to 60° from the vertical.	Spray water up to 60° in both directions from the vertical axis for 10 minutes using the test device shown below. 
4	Water splash from all directions 	Protected against water splashed from all directions; limited ingress permitted.	Spray water from all directions for 10 minutes using the test device shown below. 
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 m^2 of external surface area and for a total time of no less than 3 minutes using the test device shown below. 
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 m^2 of external surface area and for a total time of no less than 3 minutes using the test device shown below. 
7	Temporary immersion (see note 1) 	Protected against the effects of immersion between 15 cm and 1 m.	Submerge for 30 minutes at the depth of 1 m (if the device is located lower than 850 mm). 
8	Continuous immersion (see note 2) 	Protected against long periods of immersion under pressure.	Test according to the conditions agreed upon between the manufacturer and user.

3. JEM (Japan Electrical Manufacturers Association Standards) Standards (JEM 1030)

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.

NEMA (National Electrical Manufactures Association)

Conversion from NEMA to IEC529 (Reverse conversion is not possible.)

NEMA250	IEC529
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54

NEMA250	IEC529
4, 4X	IP56
5	IP52
6, 6P	IP67
12, 12K	IP52
13	IP54

Note Based on the Appendix A of the NEMA Standard. Classification of the NEMA enclosure rating differs from that of the IEC529 in corrosion resistance, rust resistance, and watertightness.

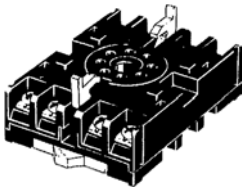
Accesories (Order Separately)

■ Sockets

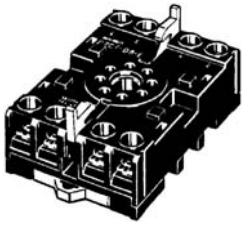
Model	Type	Number of pins	Applicable Sockets	
			Front	Back
H7CX	H7CX-A11□	11	P2CF-11-□	P3GA-11
H7CN	H7CN-A□ H7CN-B□ H7CN-□M	11	P2CF-11-□	P3GA-11
	Other H7CN	8	P2CF-08-□	P3G-08
H72A	---	11	P2CF-11-□	P3GA-11

Front-connecting Sockets

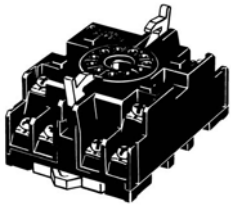
P2CF-08



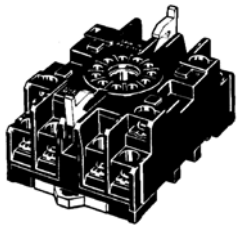
P2CF-08-E (Finger Safe Terminal Type)
Conforming to VDE0106/P100



P2CF-11

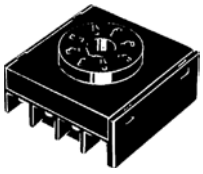


P2CF-11-E (Finger Safe Terminal Type)
Conforming to VDE0106/P100

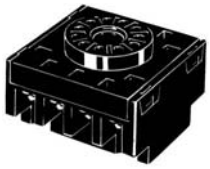


Back-connecting Sockets

P3G-08

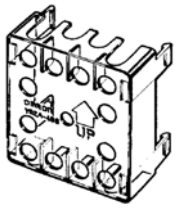


P3GA-11



Finger Safe Terminal Cover

Y92A-48G
(Attachment for P3G-08/P3GA-11 Socket)



Accesories (Order Separately)

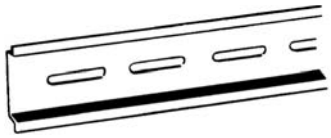
■ Hold-down Clips

For Rectangular Sockets

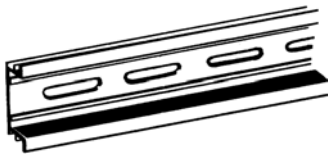
- PYC-A1
- PHC-12
- PTC-1
- Y92H-3
- Y92H-4

■ Mounting Accessories

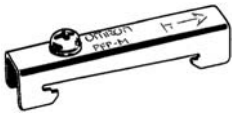
Support Track
PFP-100N
PFP-50N



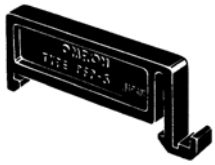
Support Track
PFP-100N2



End Plate
PFP-M



Spacer
PFP-S

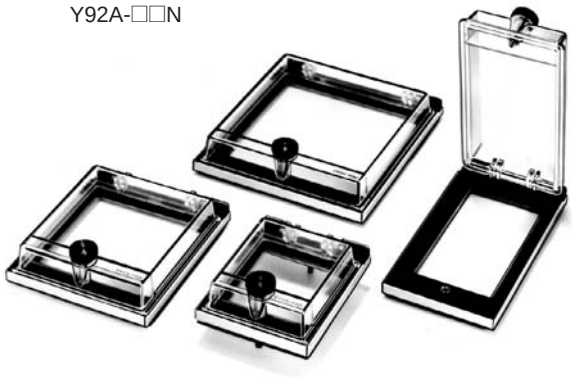


■ Watertight Covers

Y92A-□□N

Model	Y92A-96N	Y92A-72N	Y92A-49N	Y92A-48N
Size	96 x 96 mm	72 x 72 mm	48 x 96 mm	48 x 48 mm
Enclosure ratings	IP66 or NEMA4 (indoors)			
Applicable Counters	H8PS, H7BR, H8BM, H7AN, H7CN			

Y92A-□□N



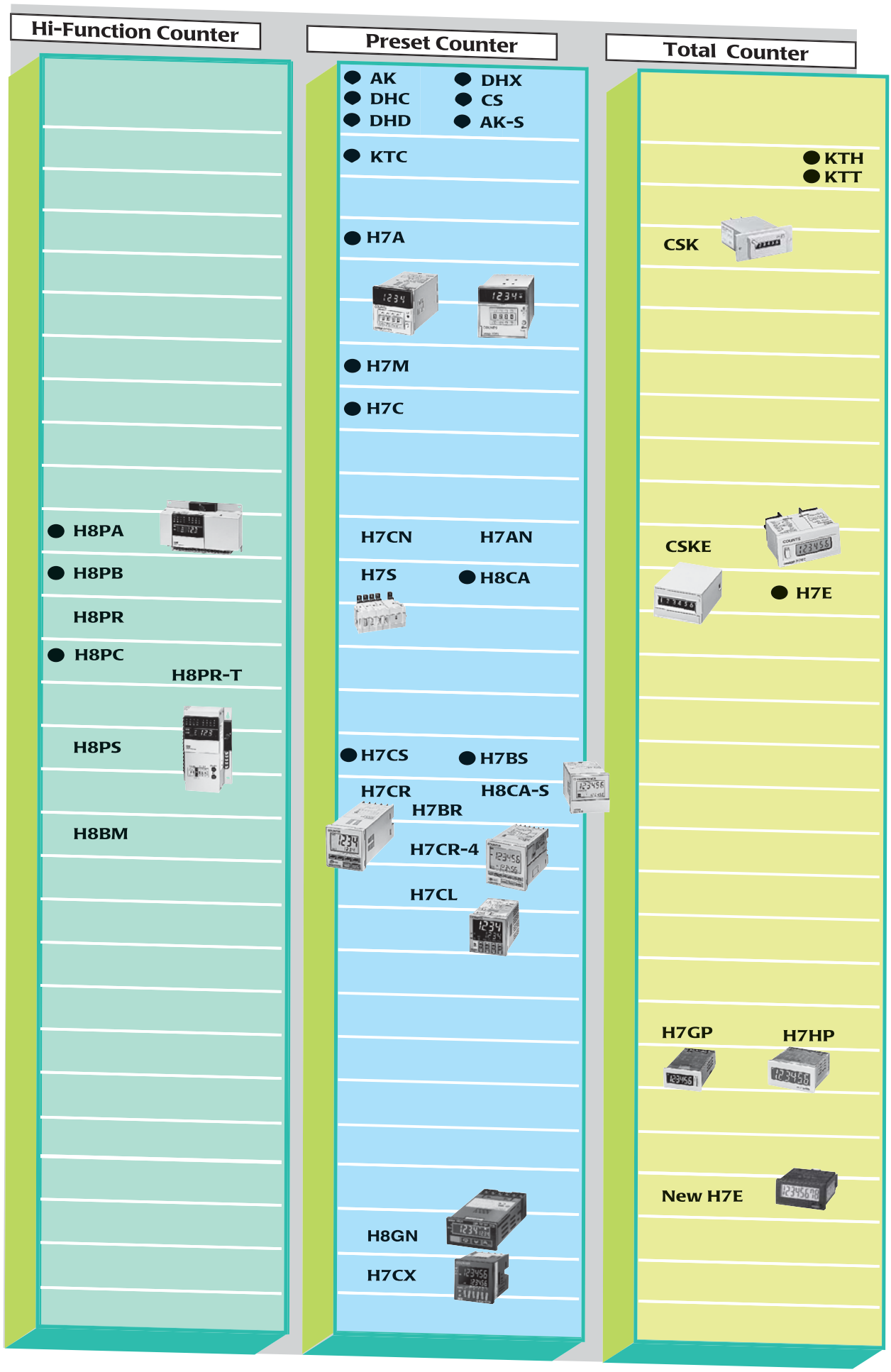
Discontinued Models

Production is constantly being re-organized to deal with different models that can be used for the same applications, and models that have not been ordered for some time due to changing needs. Models for which production has been discontinued and their recommended alternative models are listed in the table below.

Note Before using recommended alternative models, confirm specifications and other items with the relevant documentation.

Name	Model	Recommended alternative models	Scheduled to be discontinued	Remarks
Miniature Counter	AK	H7CX	End of March 1996	DC input signals are used instead of AC input signals. Therefore, a relay-employed sequential circuit is required. The mounting and external dimensions are different.
Electromagnetic Counter	CS	Not available	End of March 1997	---
Electronic Counter	H7CL	H7CX	End of March 2004	The wiring and operating method are different.
	H7CR	H7CX	End of March 2004	---
Electronic Counter/Timer	H8CA-S	H7CX	End of March 2004	The dimensions, wiring, operating characteristics, and operating method are different.
Solid-state Unit Counter	H7S	Not available	End of March 2004	---

History of OMRON Counter



●:Production discontinued (as of March 2003)

Note: Some of products are not released overseas.