OMRON

Solid-state Counter

H8CA-S

DIN-sized (48 x 48 mm) Solid-state Counter with Timer Functions

- Easier operation due to improved front panel
- Counter and timer function modes switch-selectable
- Large easy-to-read 6-digit LCD
- Non-significant zeroes suppressible from the preset or count value display
- Power supply voltages freely selectable within a range of 24 to 240 V for the AC-operated models, and 12 to 120 V for the DC-operated models

Ordering Information

Power supply	Output	No voltage input (short/open circuit)		Voltage input (high/low voltage)	
		30 cps	1 kcps	30 cps	1 kcps
AC (24 to 240 VAC)	**Contact**	H8CA-SAL	H8CA-SAH	H8CA-SALV	H8CA-SAHV
	Solid-state	H8CA-SALS	H8CA-SAHS	H8CA-SALVS	H8CA-SAHVS
DC (12 to 120 VDC)	**Contact**	H8CA-SDL	H8CA-SDH	H8CA-SDLV	H8CA-SDHV
	Solid-state	H8CA-SDLS	H8CA-SDHS	H8CA-SDLVS	H8CA-SDHVS

Mounting method	Surface/Flush mounting
Operating function	Preset counter/timer (selectable)
Operating system	Counter: select from three input modes (command input, individual input, phase difference input) Timer: time-limit operation, integrating operation
Operating mode	Select from four operating modes. (N, F, C, R)
Backup power supply for memory protection	Yes (approx. 10 years at 20°C)
Display	7-segment LCD, 8-mm high
No. of digits	6 (Counter: 0 to 999999, Timer: 0.00 to 9999.99 s/0.0 to 99999.9 min/0.0 to 99999.9 h)
External connection	Socket
Input signal	Counter function: count and reset inputs Timer function: start, reset and gate inputs

Accessories (Order Separately)

Name		Model
Flush Mounting Adapter		Y92F-30
Mounting Track	**50 cm (ℓ) x 7.3 mm (t)**	PFP-50N
	1 m (ℓ) x 7.3 mm (t)	PFP-100N
	1 m (ℓ) x 16 mm (t)	PFP-100N2
End Plate		PFP-M
Spacer		PFP-S
Track Mounting/Front Connecting Socket	**---**	P2CF-11
	Finger safe type	P2CF-11-E
Back Connecting Socket	**---**	P3GA-11
	Finger safe type	P3GA-11 with Y92A-48G (see note)

Note: Y92A-48G is a finger safe terminal cover which is attached to the P3GA-11 Socket.

Specifications

■ Ratings

Supply voltage	24 to 240 VAC, 50/60 Hz 12 to 120 VDC (Contains 20% ripple (p-p) max.)
Operating voltage range	90 to 110% of rated voltage
Power consumption	Approx. 2.2 VA (at 240 VAC, 50Hz) (see note 1); Approx. 1.4 VA (at 100 VAC); Approx. 1 W (at 120 VDC) (see note 1); Approx. 0.8 W (at 100 VDC); Approx. 0.7 W (at 12 VDC)
Max. counting speeds of count input (in counter function mode)	30 cps (contact and solid-state inputs) Minimum pulse width: 16.7 ms (ON/OFF ratio: 1:1) 1 kcps (solid-state input) Minimum pulse width: 0.5 ms (ON/OFF ratio: 1:1)
Reset system	External reset (common to contact and solid-state inputs) and manual reset Minimum reset signal width: 20 ms Reset time following signal application: 0.05 s
Start and gate response time (in timer function)	Start and gate response time (common to contact and solid-state inputs): L-model: 16.7 ms H-model: 0.5 ms
Count and reset inputs for counter function/Start and gate inputs for timer function	No-voltage input (see note 2) Maximum short-circuit impedance: 1 kΩ max. Short-circuit residual voltage: 0.5 V max. (1.3 V max.) Minimum open impedance: 100 kΩ min. Voltage input: 5 to 30 VDC at “High” level 0 to 2 VDC at “Low” level INPUT impedance: Approx. 4.7 kΩ
Control output	Contact output type: SPDT 3 A 250 VAC cosφ = 1 (resistive load) Solid-state output type: Open collector 100 mA max. 30 VDC max.

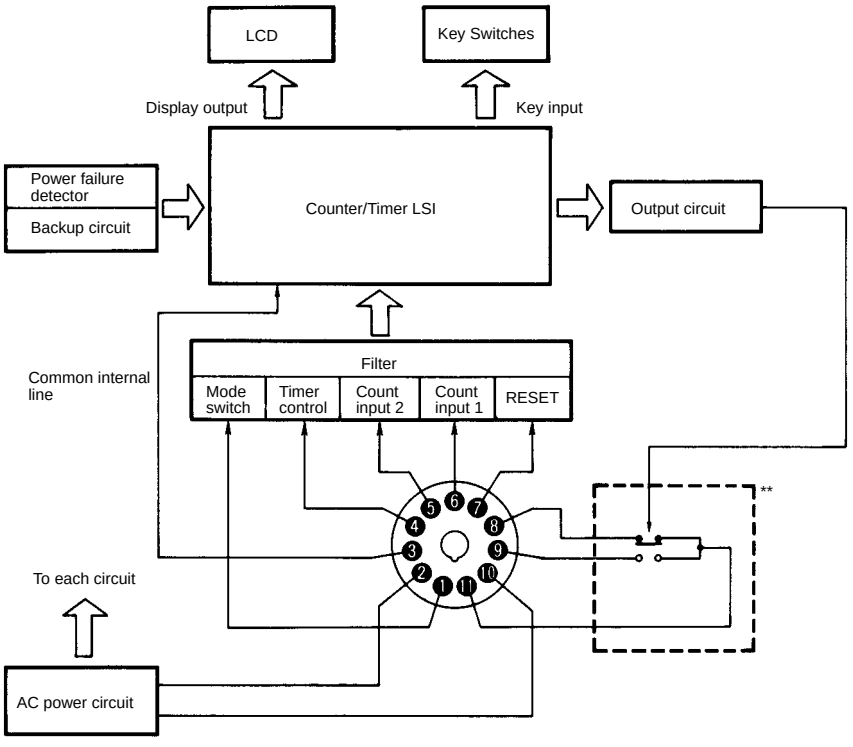
Note: 1. When power is applied, there is an inrush current of 3.7 A at 240 VAC, and 2.3 A at 120 VDC, for approx. 0.5 ms.

2. When using no-voltage input the source current output from each input terminals is 2 mA max.

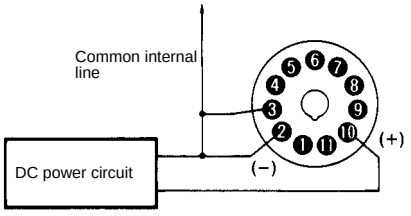
■ Characteristics

In timer function mode	**Repeat accuracy**	±0.05%±0.05 s max.
	Setting error	±0.1%±0.05 s max.
	Variation due to voltage change	±0.05%±0.05 s max.
	Variation due to temperature change	
Insulation resistance		100 MΩ min. at 500 VDC
Dielectric strength		1,500 VAC 50/60 Hz for 1 minute
Impulse withstand voltage		3 kV (between power terminals) 4.5 kV (between current-carrying terminal and exposed non-current-carrying metal parts)
Noise immunity		±1.2 kV (between power terminals), ±500 V (between input terminals), square-wave noise by noise simulator
Static immunity		Malfunction: 8 kV
Vibration resistance		Destruction: 10 to 55 Hz, 0.75 mm total amplitude Malfunction: 10 to 55 Hz, 0.3 mm total amplitude
Shock resistance		Destruction: 300 m/s^2 (approx. 30 G) Malfunction: 100 m/s^2 (approx. 10 G)
Ambient temperature		Operating: –10°C to 55°C (with no icing) Storage: –25°C to 65°C (with no icing)
Ambient humidity		35% to 85%
Life expectancy		Mechanical: 10 million operations min. Electrical: 100,000 operations min. (250 VAC 3 A resistive load)
Approved standards		UL508, CSA C22.2 No.14
Case color		Light grey (Munsell 5Y 7/1)
Weight		Approx. 130 g

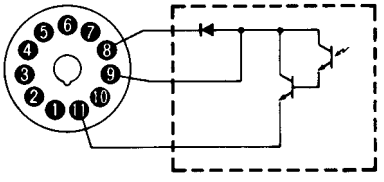
Block Diagram



With DC Power Supply



With Solid-state Output

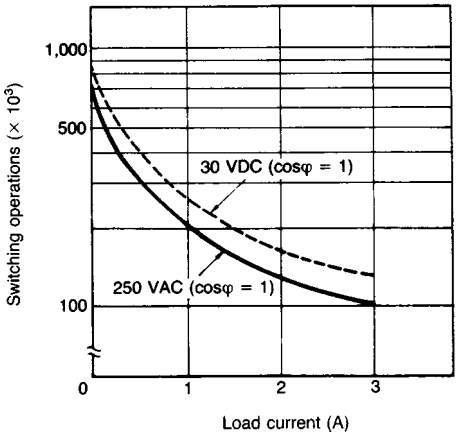


The power source and input circuits for the AC power models are not insulated.

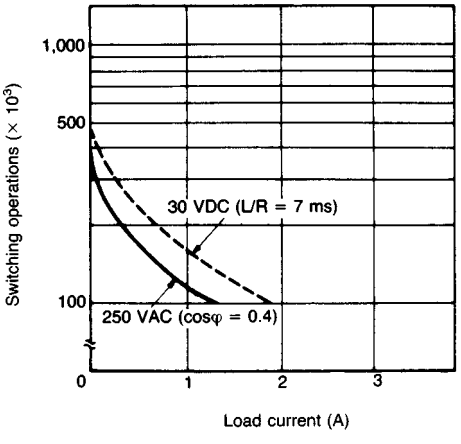
Engineering Data

Electrical Life Expectancy

(Resistive load)

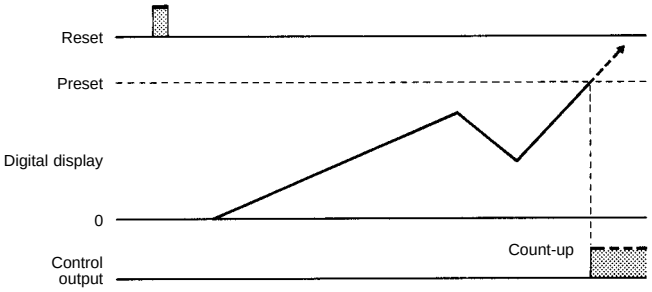


(Inductive load)

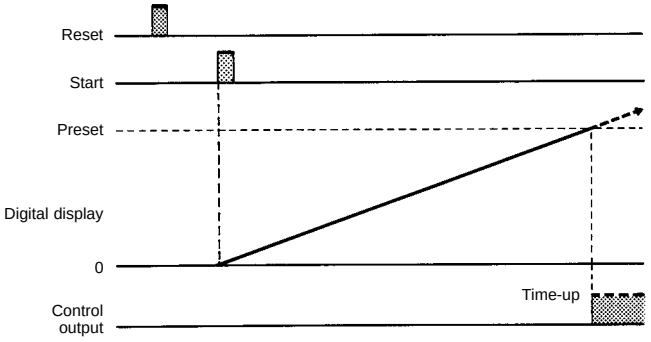


Timing Charts/Operation Mode

Operations in Counter Mode



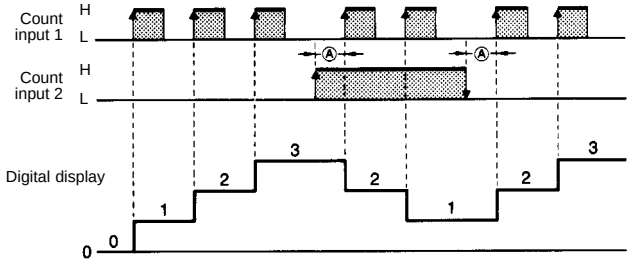
Operations in Timer Mode



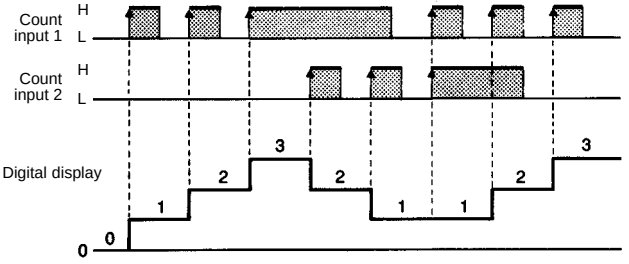
Input Mode

In the chart below, (A) is the minimum signal width, and (B) must be more than half of (A); with (B) set to less than half the minimum signal width, a count error of ±1 count may occur.

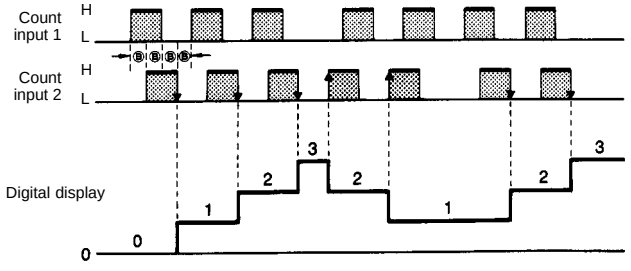
Up/Down A Command Input



Up/Down B Individual Input



Up/Down C Phase Difference Input



Note: 1. No-voltage input type

H: If the Counter is a contact input model, the contact turns ON.
If the Counter is a solid-state input model, the open-collector transistor is in the ON state.

L: If the Counter is a contact input model, the contact turns OFF.
If the Counter is a solid-state input model, the open-collector transistor is in the OFF state.

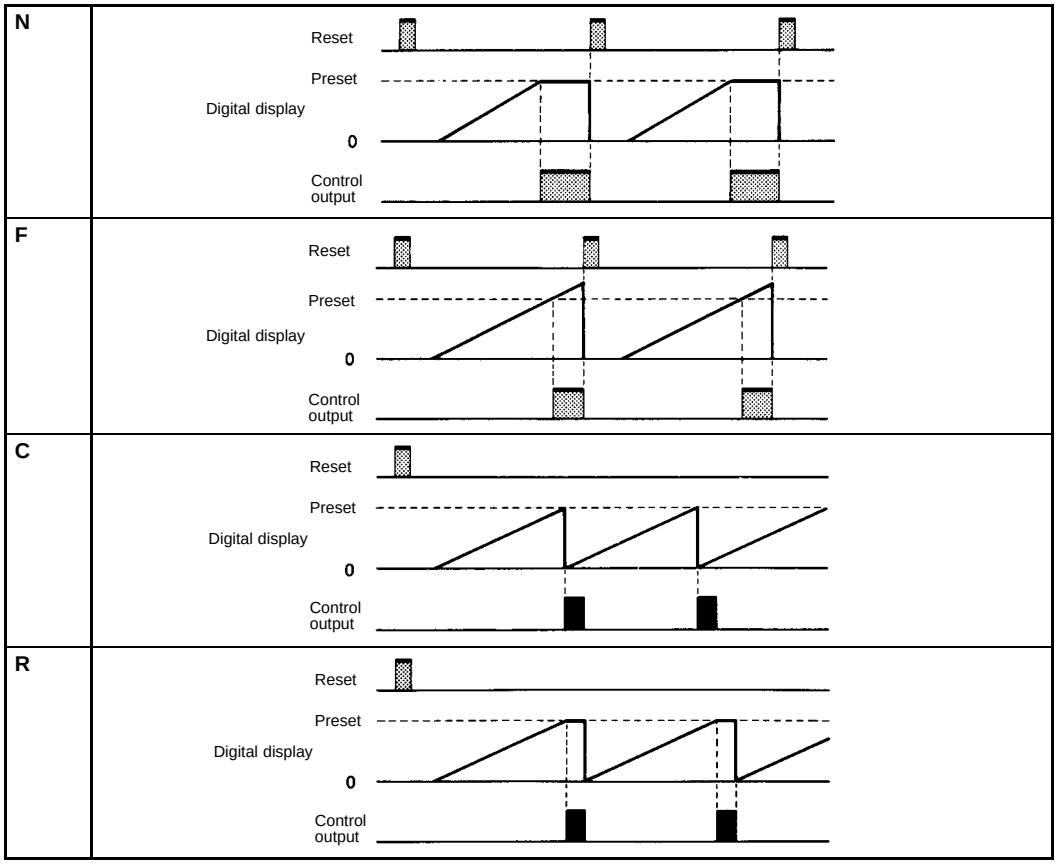
2. Voltage input type
Input signal voltage at “High” level is 5 to 30 V, while at “Low” level, 0 to 2 V.

Functions of Count Inputs

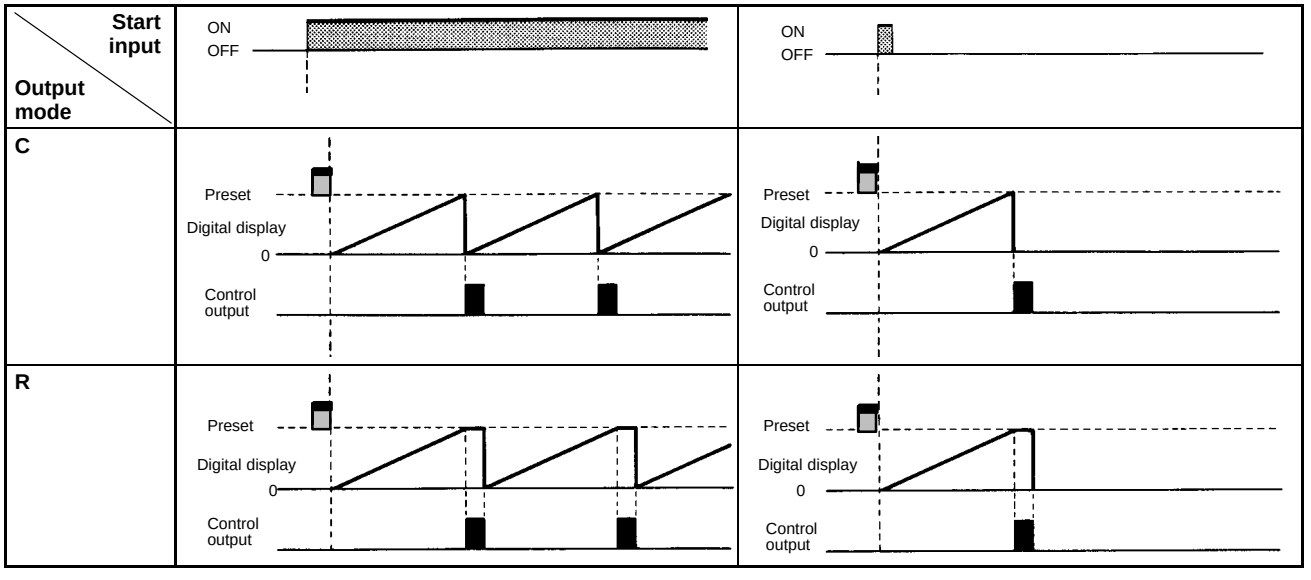
Input	Counter A mode	Counter B mode	Counter C mode	Timer
Count input 1	Count input: The count value is incremented by one when CP2 becomes “LOW” level. The count value is decremented by one when CP2 becomes “HIGH” level.	Incrementing count input	Phase difference input: The count value is incremented by one when phase of CP2 is delayed with respect to phase of CP1. The count value is decremented by one when phase of CP2 is advanced with respect to phase of CP1.	Start input
Count input 2	Incrementing/decrementing control	Decrementing count input		Gate input

Operations in Both Counter and Timer Modes

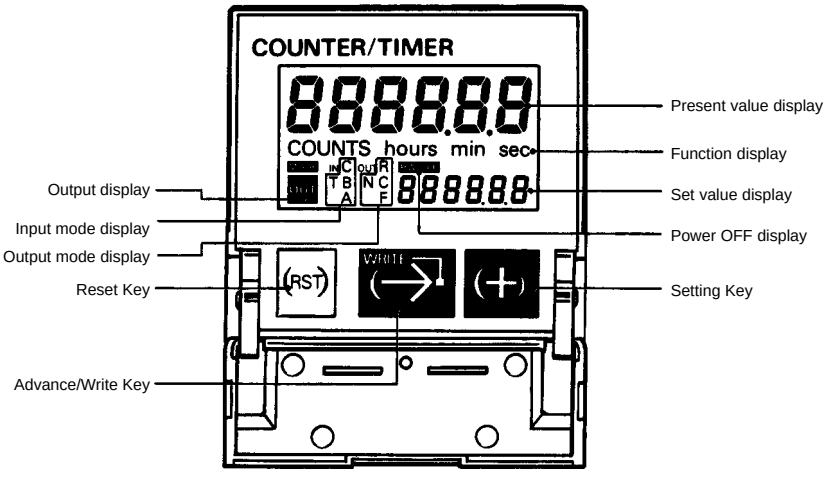
Note: In the C mode, the final total is not displayed because internal count circuit is reset as soon as counting is finished.



Note: 1. The displayed numeric value is incremented by the start input in the timer mode.
2. In the C mode, the final total is not displayed because the internal count circuit is reset as soon as counting is finished.
3. The operation in the timer mode differs due to the difference of the start input. (The operations in the N and F modes are the same.)



Nomenclature



Key Functions:

RST

Reset Key:
Resets the Present value display and the output.

+

Setting Key:
Sets the set value. Selects timer or counter function, and input and output modes.

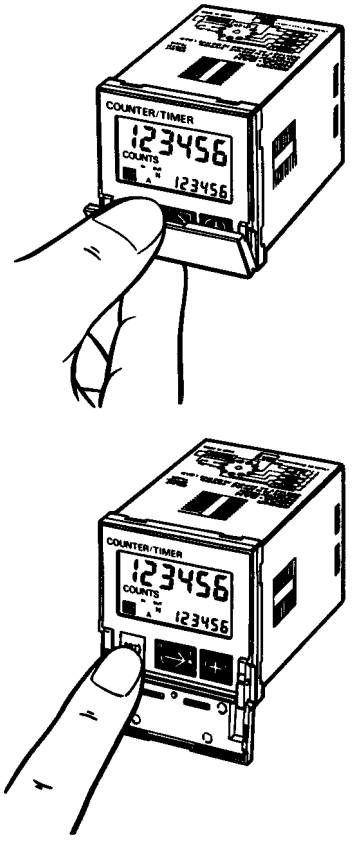
WRITE

Write Key:
Selects the function and mode, and writes. Normally used to write, or advance one column when setting the set value.

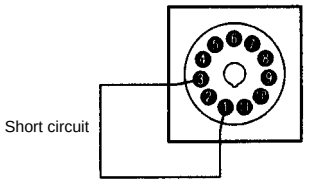
Programming

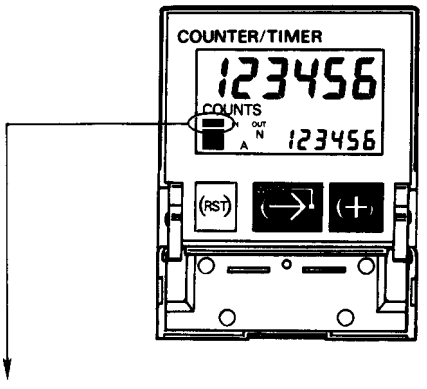
Function Selection

Select timer or counter function in advance. It is not necessary for power to be ON to set this function. When the H8CA-S is shipped, it is set to counter function, input mode “A,” output mode “N,” and preset value 1.



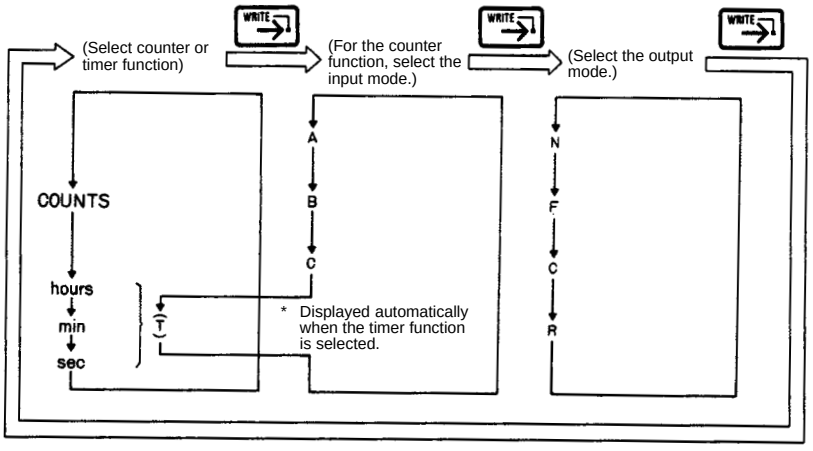
1. Terminals 1 and 3 are connected. (It is only necessary to connect these terminals when selecting the function.)





MODE is lit. The function, input mode, or output mode display will be blinking. (The Power OFF display will stop blinking when power comes ON.)

2. Press the Setting Key to select counter or timer function, input mode, and output mode. The characters below will flash when the Setting Key is pressed.



- Press the Setting Key until the desired function appears.
- Press the Write Key to write the desired input mode.

- Press the Setting Key until the desired input mode appears.
- Press the Write Key to write the desired input mode.

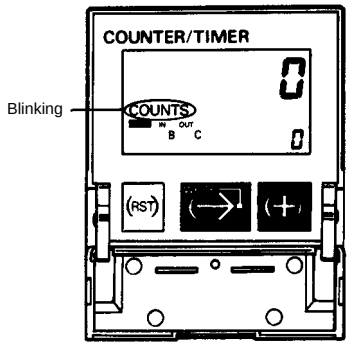
- Press the Setting Key until the desired output mode appears.
- Press the Write Key to write the desired output mode.

Examples

1. Selecting the Counter Function with Input Mode "A" and Output Mode "N" (Terminals 1 and 3 Connected)

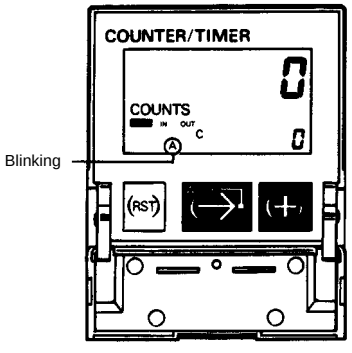
"MODE" lights on the display

"COUNTS" will begin blinking when the Setting Key is pressed. (Press the Keys until the desired place is reached.)



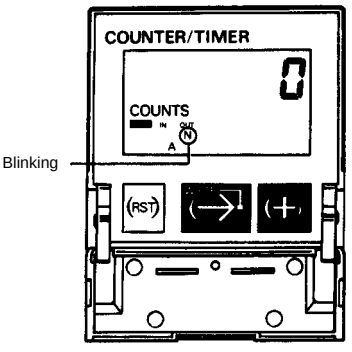
Press the Write Key. "COUNTS" will stop blinking and one of the input modes will begin blinking.

Press the Setting Key until input mode "A" begins blinking.



Press the Write Key. "A" will stop blinking an one of the output modes will begin blinking.

Press the Setting Key until output mode "N" begins blinking.

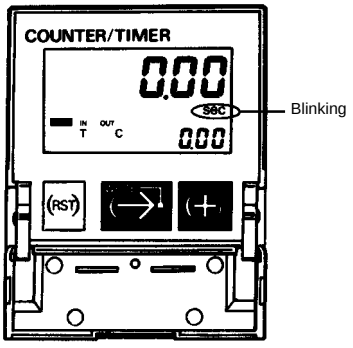


Disconnect terminals 1 and 3 before setting values. When terminals 1 and 3 are disconnected, the "MODE" display will turn OFF and output mod "N" will stop blinking.

Always disconnect terminals 1 and 3 when finished selecting the function. Values cannot be preset if terminals 1 and 3 are connected.

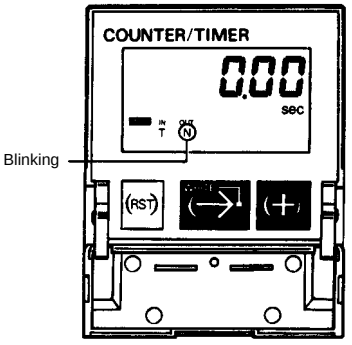
2. Selecting the Timer Function with "sec" and Output Mode "N" (Terminals 1 and 3 Connected)

If set for timer, "sec" will begin blinking when the Setting Key is pressed. (Press the Keys until the desired place is reached.)



Press the Write Key. "sec" will stop blinking and one of the output modes will begin blinking. The INPUT MODE will automatically enter "T."

Press the Setting Key until input mode "N" begins blinking.

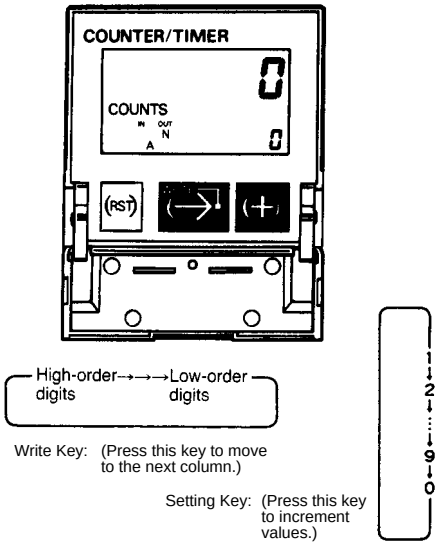


Disconnect terminals 1 and 3 before setting values. When terminals 1 and 3 are disconnected, the "MODE" display will turn OFF and output mode "N" will stop blinking.

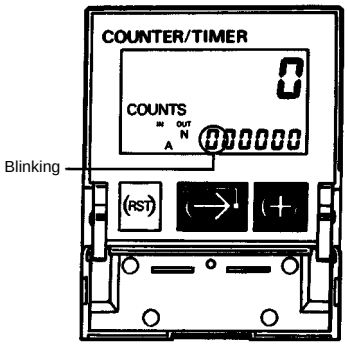
Always disconnect terminals 1 and 3 when finished selecting the function. Values cannot be preset if terminals 1 and 3 are connected.

Presetting Values

Preset values after selecting the function. Values can be preset whether the power supply is ON or OFF.

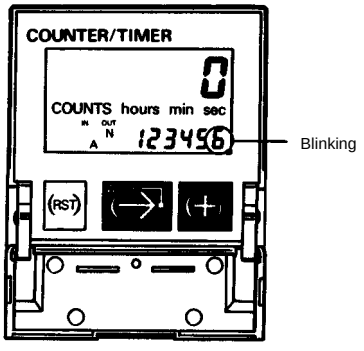


Press the Write Key until the desired digit begins blinking.



Press the Setting Key to set the desired value.

Continue pressing the Write and Setting Keys until the smallest digit has been set.

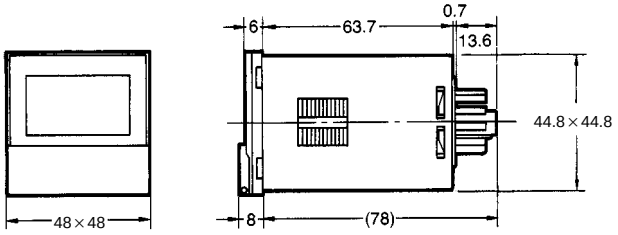


To complete presetting, press the Write Key so that no place on the display is blinking.

*Preset unnecessary higher digits at 0. (i.e. 000015)

Note: The output will go ON if the set value is 0 (0.0 or 0.00) and the displayed count is also 0 (0.0 or 0.00). In this case, press reset after presetting, and the output will go OFF.

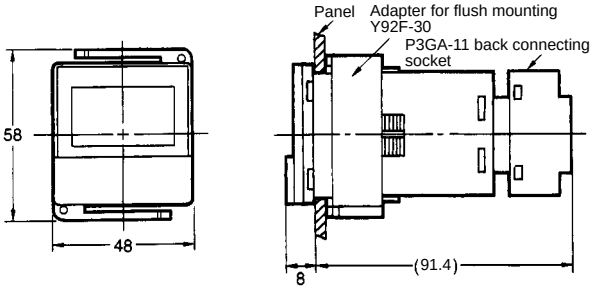
Dimensions



■ Accessories (Order Separately)

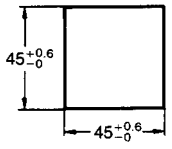
Adapter for Flush Mounting

Y92F-30

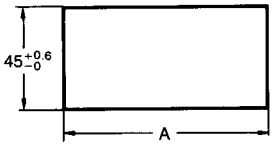


Panel Cutout

The standard panel cutout is as below.
(Panel cutout conforms to DIN43700)



Panel cutout for side-by-side mounting of two or more units

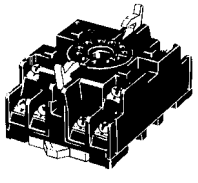


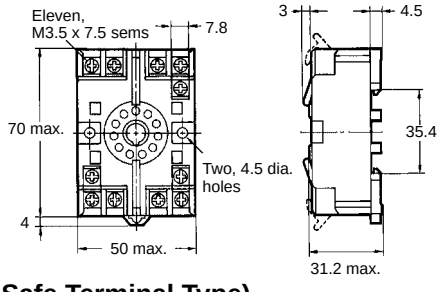
When mounting n Counters in line, dimension A can be calculated from following formula.

$A = (48n - 2.5)\ ^{+1}_{-0}$

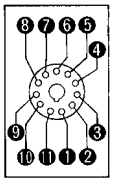
Track Mounting/Front Connecting Socket

P2CF-11

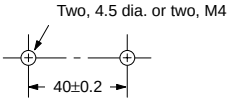




Terminal Arrangement/ Internal Connections (Top View)

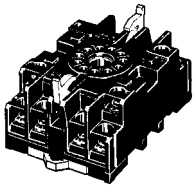


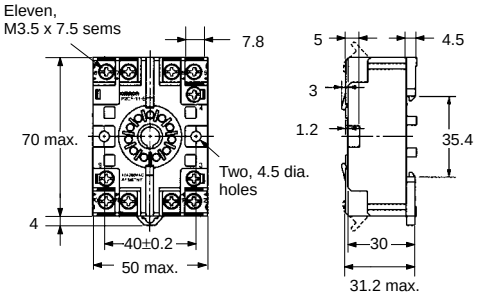
Surface Mounting Holes



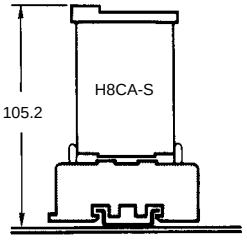
P2CF-11-E (Finger Safe Terminal Type)

Conforming to VDE0106/P100





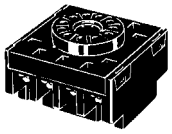
Mounting Height of Counter with Socket

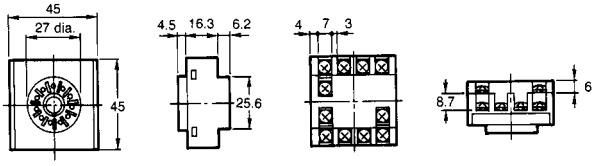


P2CF-11
P2CF-11-E

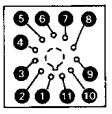
Back Connecting Socket

P3GA-11



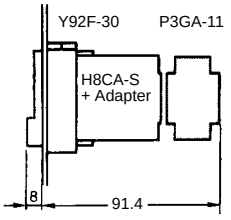


Terminal Arrangement



(Bottom view)

Mounting Depth of Counter with Socket

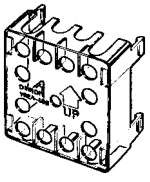


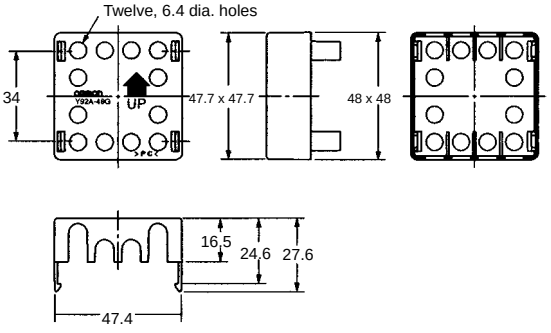
Finger Safe Terminal Cover

Conforming to VDE0106/P100

Y92A-48G

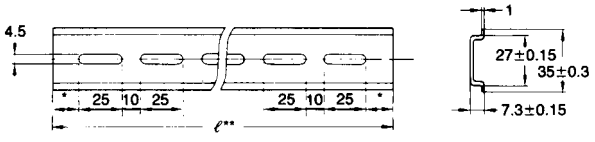
(Attachment for P3GA-11 Socket)



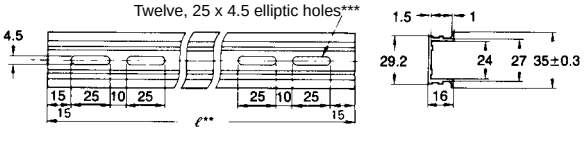


Mounting Track/End Plate/Spacer

PFP-100N/PFP-50N Mounting Track



PFP-100N2 Mounting Track



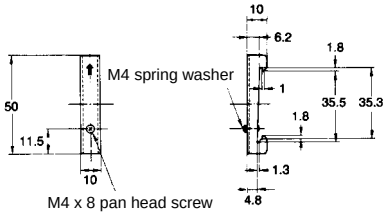
* This dimension is 15 mm on both ends in the case of PFP-100N but on one end in the case of PFP-50N.

** The length ℓ of each mounting track is shown in this table.

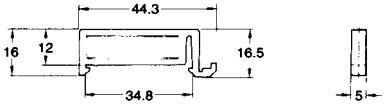
PFP-100N	1 m
PFP-50N	50 cm
PFP-100N2	1 m

*** A total of 12-25 x 4.5 elliptic holes are provided with 6 holes cut from each end of the track at a pitch of 10 mm between holes.

PFP-M End Plate

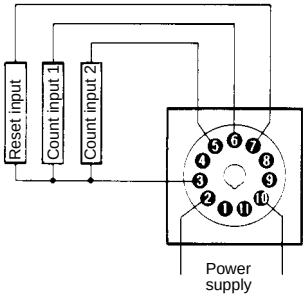


PFP-S Spacer



Connections

Counter Function Mode

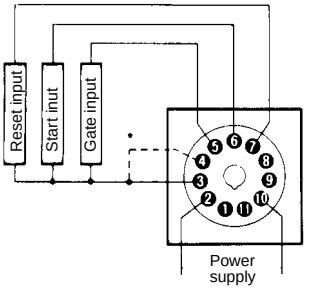


Note: When the control power supply is DC, terminals (2) and (3) are internally connected.

Mode Switch Terminals ((1) & (3))

When these terminals are shot-circuited, set the input and output modes with the Reset Key, not the Setting Key.

Timer Function Mode



Note: When the control power supply is DC, terminals (2) and (3) are internally connected.

* Check the operating status of terminals (3) and (4) (see table below) before connecting or disconnecting them.

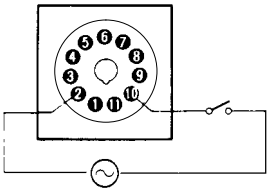
Timer Control Terminals [(4) & (3)]

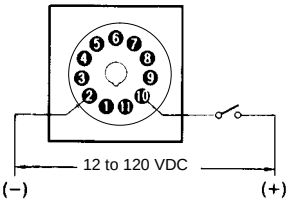
Be sure these terminals are not connected when using H8CA-S as a Counter. These terminals are used as shown below only when H8CA-S functions as a timer.

Terminals (4) & (3)	Operation
Short-circuited	Timer operation temporarily interrupted when power failure occurs in control power supply
Open	Timer operation continues even when power failure occurs in control power supply

Power Supply Connection

Connect power supply across terminals (2) and (10) and apply one of the specified voltages. (Pay special attention to the polarity when using a DC-operated model.)



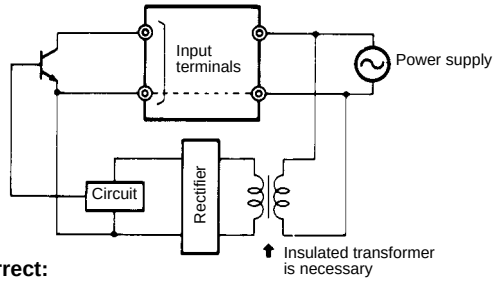


⚠ Caution

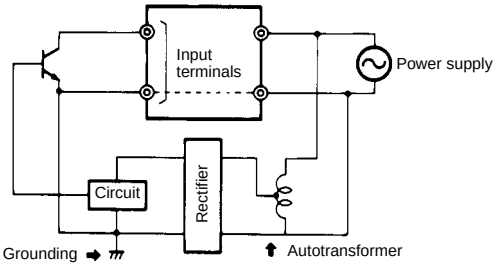
Do not touch the input terminals while power is supplied to the H8CA-S; otherwise you will feel electric shock because the Counter does not have any power transformer built in. Use of a model rated at a low DC voltage is recommended when the Counter is to be installed at a location where the input terminals are easily accessible.

Note: When connecting external signal input contacts and transistors, use a power supply having a power transformer whose primary and secondary circuits are isolated from each other with the secondary circuit not grounded, for the input devices, to prevent current feedback and short-circuiting.

Correct:



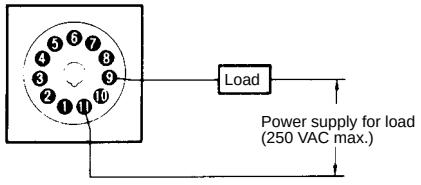
Incorrect:



Note: Do not arrange the peripheral circuits of the Counter in either way, as the internal circuit may be destroyed, rendering the Counter non-operable.
To input a signal from a single input contact to several H8CA-Ss at the same time, be sure to connect the terminals of the same numbers in parallel.

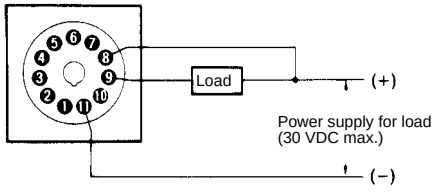
Load Circuit (Control Output) Connection

Contact Output Type



Note: The load is turned on when the set count or time is up.

Solid-state Output Type



Note: 1. The load is turned on when the set count or time is up.
2. Be sure to connect terminal (8) when an inductive load is connected.

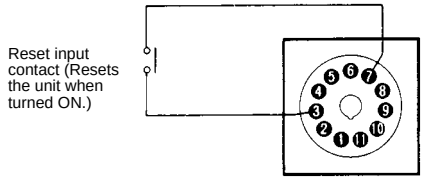
Output Delay Time

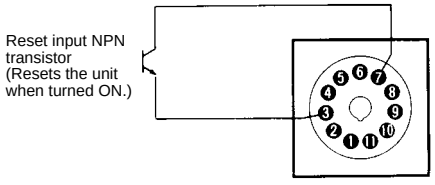
The output delay time is the time from the application of the count input signal of the preset value until the generation of control output. The delay time differs depending on counting speed and model of control output used, as shown in the table below.

Type of control output	Max. counting speed or rated time		Output delay time
Contact output	30 cps	Common to hours, minutes and seconds	30 ms max.
	1 kcps		10 ms max.
Solid-state output	30 cps		20 ms max.
	1 kcps		2 ms max.

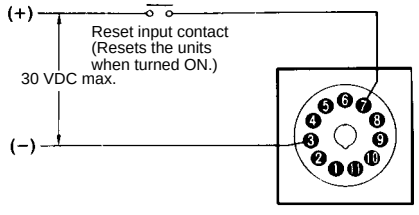
Reset Input Connection

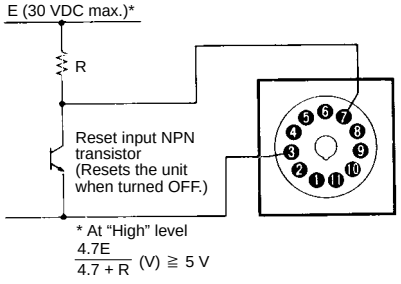
No-voltage Input Type

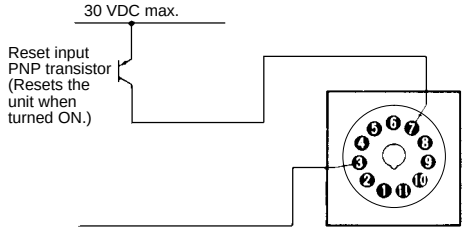


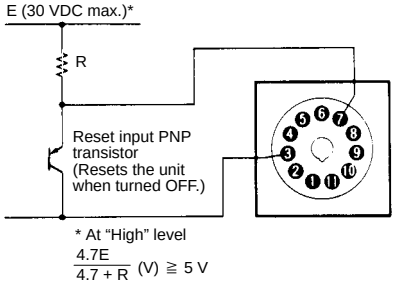


Voltage Input Type



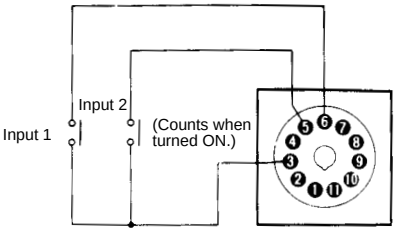


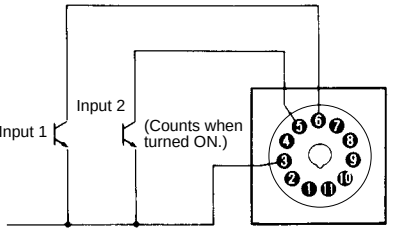




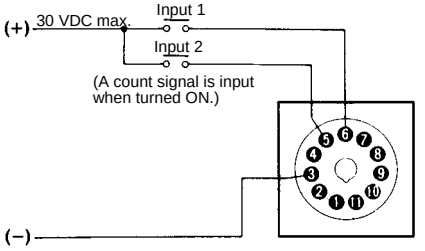
Count Input Connection

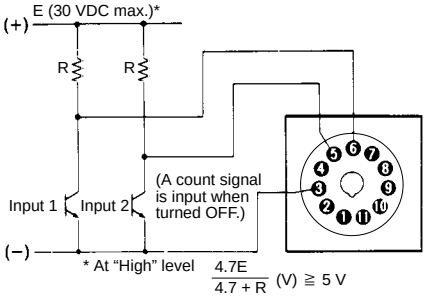
No-voltage Input Type

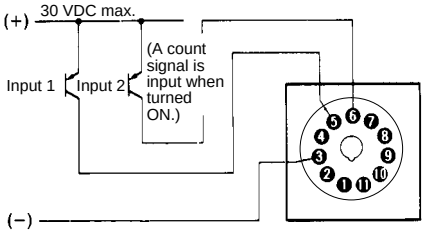


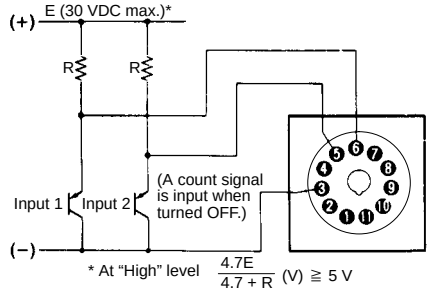


Voltage Input Type







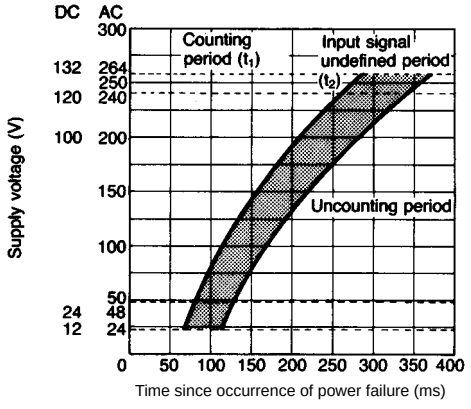


Precautions

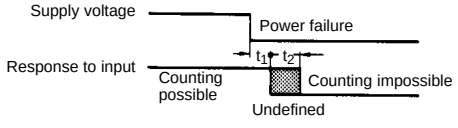
Power Failure Detection

The H8CA-S is capable of detecting and indicating a power failure on the display. Before power application or when a power failure occurs, the "PW OFF" display flickers indicating that the control power supply is off.

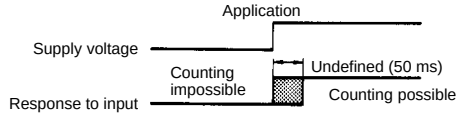
Relation Among t_1, t_2, and Supply Voltage



When a power failure occurs, there is a period during which the Counter does not respond to the input signal, as shown below, because of lag in the rise in the internal circuit voltage.



Likewise, on power application, there is a period during which the Counter does not respond to the input signal, as shown below because of a lag in the rise in the internal circuit voltage.



Operation and Display

"OUT" is displayed when counting or timing is completed.

When "MODE" lights on display, terminals 1 and 3 are connected. In this case, it is not possible to preset values. Be sure to disconnect the terminals.

The H8CA-S used "regular read format," so the preset values can be changed whether power is ON or OFF.

When changing the preset value during timer or Counter operation, a signal will be output when the new value is the same as the displayed value.

The front panel keys operate at a touch. Do not press the keys with excessive force or tools such as a screwdriver. Press only with fingers.

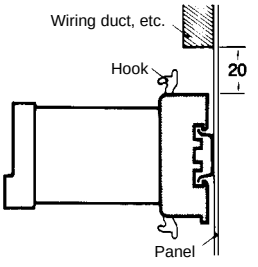
After presetting values, part of the display might be blinking. The H8CA-S will operate normally in this condition, but press the Write Key so that characters do not blink.

Mounting

There is no limitation in mounting direction. However, avoid mounting the unit at an angle.

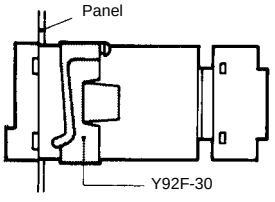
Surface Mounting
P2CF-11 Front Connecting Socket

When a number of the H8CA-S are mounted in a vertical line or when an H8CA-S is mounted close to an obstacle such as a wiring duct, be sure to provide a separation of approx. 20 mm between adjacent units or between the unit and the obstacle to allow room for engagement and disengagement of hooks as shown below.



Flush Mounting
Y92F-30 Adapter for Flush Mounting

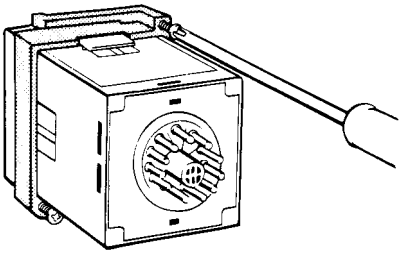
Insert the H8CA-S into a square-cut hole from the front of the mounting panel; insert the adapter from the rear of the H8CA-S until the clearance between the panel surface and the adapter is minimized. Then secure the H8CA-S with two screws onto the panel.



By attaching the P3GA-11 back connecting socket to a flush mounted H8CA-S, wiring can be performed in the same manner as the front connecting socket.

Dismounting

To dismount an H8CA-S flush mounted with a Y92F-30 adapter, loosen the two screws of the adapter, pry up the top and bottom hooks of the adapter and pull the H8CA-S out from the front of the panel.



⚠ Caution

The H8CA-S has a built-in lithium battery. Be sure to dispose of the old H8CA-S properly, as lithium batteries are likely to explode if incinerated.

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. M008-E1-1C **In the interest of product improvement, specifications are subject to change without notice.**

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