

NPS SERIES

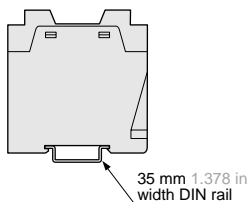
ON / OFF Input Sensor Controller



Multi-functional slim sensor controller

DIN rail mounting

Mountable on 35 mm 1.378 in DIN rail by one-push. It reduces mounting space and mounting operations.

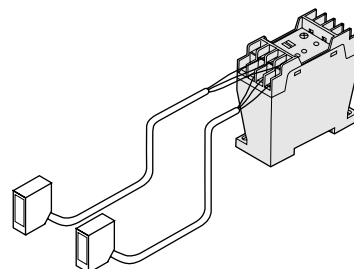


Two outputs: contact and non-contact

Useful for various applications because the controller has two outputs, relay contact and NPN open-collector transistor output. (NPS-C7 and NPS-CT7 only)

Connects two sensors **NPS-C7W**

Two sensors can be connected, and two independent outputs are generated.

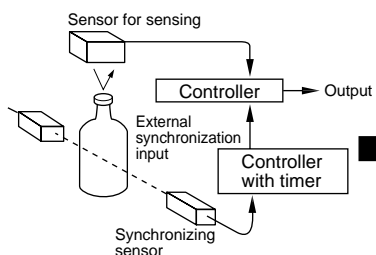


Edge trigger **NPS-CT7**

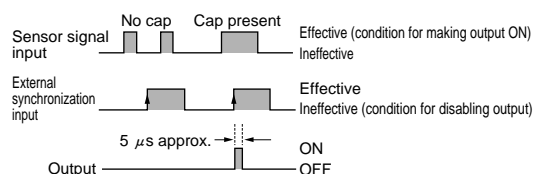
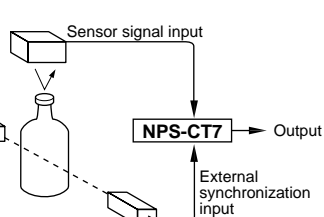
Synchronized input is possible at either the rising or the falling edge of the external synchronization signal. With this, now only one controller suffices where earlier two were required in applications, such as, detecting presence of bottle caps.

Example: Detecting presence of cap on bottle

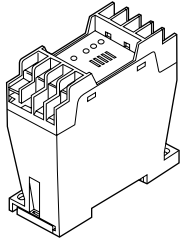
• Conventional method



• Using NPS-CT7



ORDER GUIDE

Type	Appearance	Model No.	Supply voltage	Power supply for sensor	Output	External synchronization function	Timer function
General use		NPS-C7	100 to 240 V AC ± 10 %	12 V DC ± 10 % 150 mA max.	<ul style="list-style-type: none"> • Relay contact 1c • NPN open-collector transistor 	Gate trigger	_____
High-performance		NPS-CT7		12 V DC ± 10 % 130 mA max.		Gate trigger and edge trigger	Three function selectable timer
Two sensor connection		NPS-C7W		12 V DC ± 10 % 120 mA max.	Relay contact 1c two outputs	_____	_____

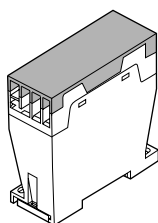
ON / OFF Input
NPS

Analog Input
CA2 CA

Power Supply
PS-18V-U

Accessory

- **NPS-CV** (Protection cover)



SPECIFICATIONS

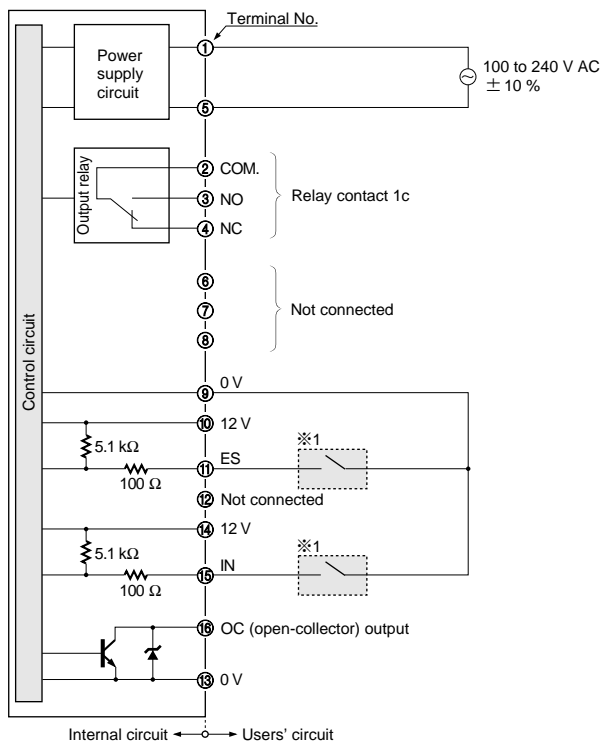
Type		DIN rail mounting		
		General use	High-performance	Two sensor connection
Item	Model No.	NPS-C7	NPS-CT7	NPS-C7W
Applicable sensors		Photoelectric sensor, inductive proximity sensor, etc., with NPN transistor output or relay output		
Supply voltage		100 to 240 V AC \pm 10 %		
Power consumption		6 VA or less		
Power supply for sensor	Voltage	12 V DC \pm 10 % (incorporated with short-circuit protection)		
	Current	150 mA	130 mA	120 mA
Output	Relay contact 1c	<ul style="list-style-type: none"> Switching capacity: 250 V 3 A AC (resistive load) Electrical life: 100,000 switching operations or more (rated load)(at 1,800 operations/hour) Mechanical life: 10 million switching operations or more (at 36,000 operations/hour) 	NPN open-collector transistor <ul style="list-style-type: none"> Maximum sink current: 100 mA or less Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current) 	Relay contact 1c <ul style="list-style-type: none"> Switching capacity: 250 V 3 A AC (resistive load) Electrical life: 100,000 switching operations or more (rated load)(at 1,800 operations/hour) Mechanical life: 10 million switching operations or more (at 36,000 operations/hour)
	Output operation	Switchable normal operation or inverse operation		
Response time		Relay contact: 10 ms approx., NPN open-collector transistor: 5 μ s or less		10 ms approx.
Indicators	Power	Red LED (lights up when the power is ON)		
	Output (Note)	Red LED (lights up when the output is ON)		
	Sensor signal input	_____	Red LED (lights up when the sensor signal input is effective)	_____
	External synchronization input	_____	Red LED (lights up when the external synchronization input is effective)	_____
External synchronization function		Gate trigger	Gate trigger and edge trigger	_____
Timer function		_____	Three function selectable timer (Delay time: switchable either 40 ms to 1 sec. or 0.4 sec. to 10 sec.)	_____
Environmental resistance	Ambient temperature	- 10 to + 50 °C + 14 to + 122 °F (No dew condensation or icing allowed), Storage: - 30 to + 70 °C - 22 to + 158 °F		
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH		
	Noise immunity	Power line: 1,500 Vp, and 0.5 μ s pulse width (with noise simulator)		
	Voltage withstandability	1,500 V AC for one min. between the power and the output terminals		
	Insulation resistance	10 M Ω , or more, with 500 V DC megger between the power and the output terminals		
	Vibration resistance	10 to 55 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each		
Shock resistance	100 m/s ² acceleration (10 G approx.) in X, Y and Z directions for two times each			
Material		Enclosure: ABS, Terminal block: PBT (Glass fiber reinforced)		
Connecting method		Terminal block		
Weight		160 g approx.		
Accessories		Short bar: 1 pc., NPS-CV (Protection cover): 1 pc., Short-circuit protection plate: 1 pc. Adjusting screwdriver: 1 pc. (NPS-CT7 only)		

Note: In **NPS-C7W**, two output indicators, Sensor 1 output indicator and Sensor 2 output indicator, have been incorporated.

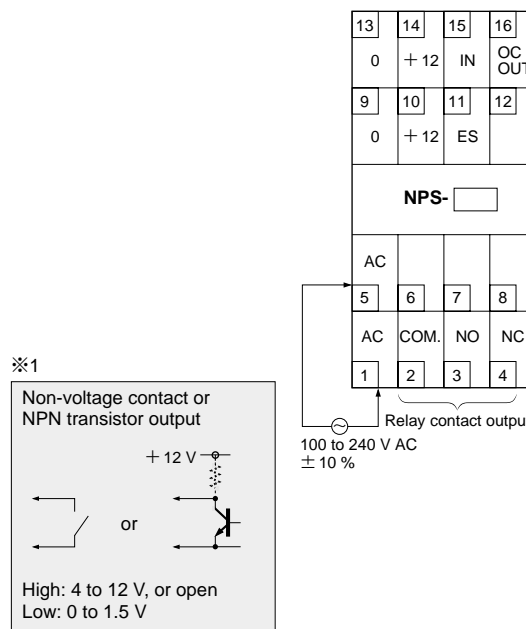
I/O CIRCUIT AND WIRING DIAGRAMS

NPS-C7 NPS-CT7

I/O circuit diagram



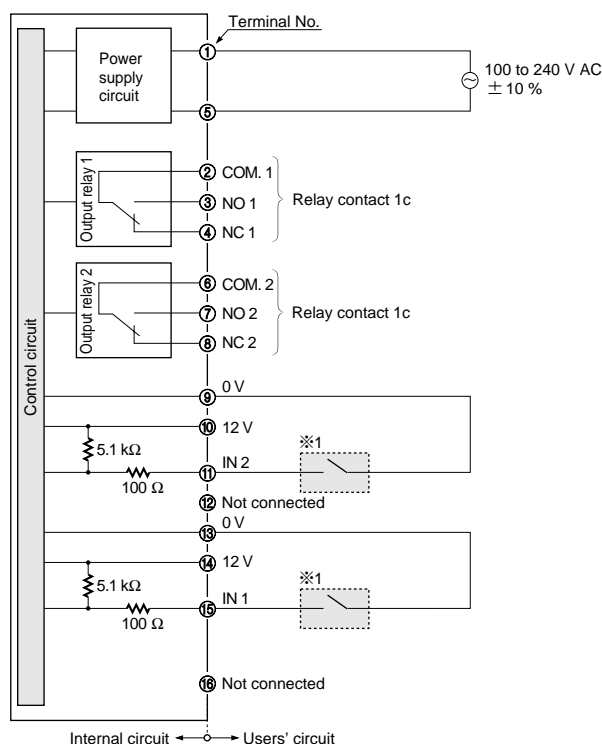
Terminal arrangement diagram



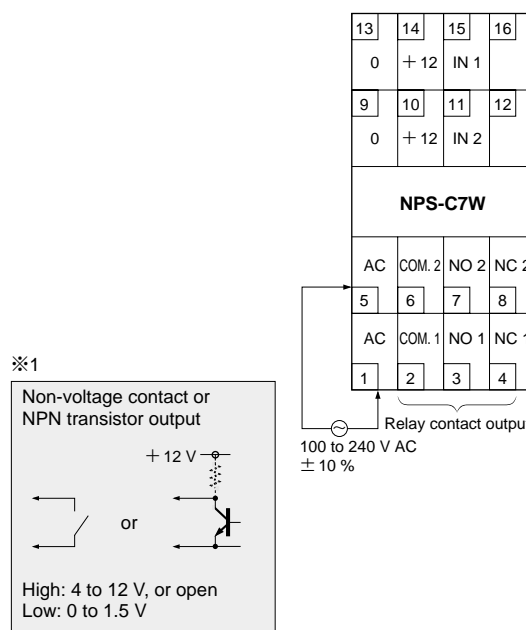
Note: Response time of the NPN open-collector transistor output of **NPS-C7** and **NPS-CT7** is 5 μ s. If a relay or a micro-switch (mechanical contact) is connected, its bounce may result in output chattering. Take care of this aspect, especially when the timer function is used.

NPS-C7W

I/O circuit diagram



Terminal arrangement diagram



ON / OFF Input
NPS

Analog Input
CA

CA2

Power Supply
PS-18V-U

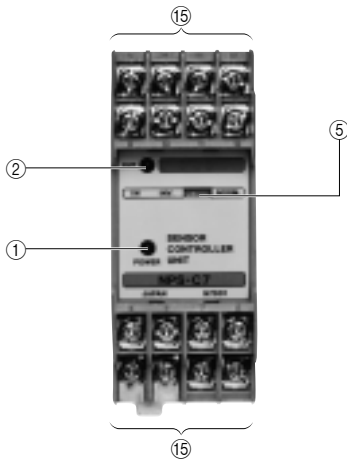
PRECAUTIONS FOR PROPER USE



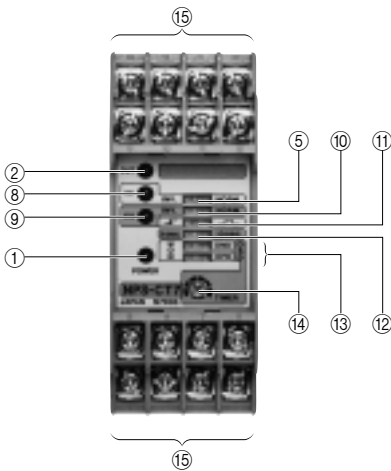
This product is not a safety controller. It does not possess control functions needed for accident prevention or safety maintenance.

Functional description

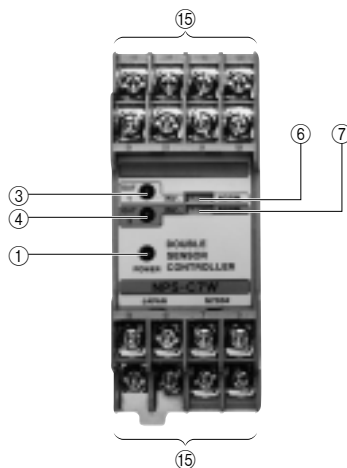
NPS-C7



NPS-CT7



NPS-C7W

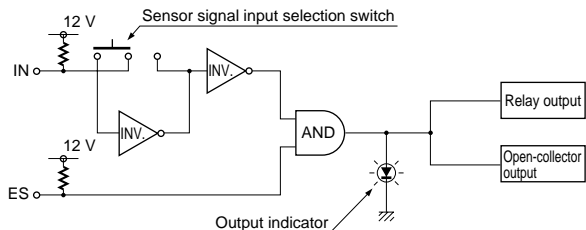


	Description	Function
①	Power indicator (Red LED)	Lights up when the power is ON
②	Output indicator (Red LED)	Lights up when the output is ON.
③	Sensor 1 output indicator (Red LED)	
④	Sensor 2 output indicator (Red LED)	
⑤	Sensor signal input selection switch	<p>Selects the output operation.</p> <p>INV. <input type="checkbox"/> NORM. <input checked="" type="checkbox"/></p> <p>INV.: The output is ON when the sensor signal input is High. NORM.: The output is ON when the sensor signal input is Low.</p>
⑥	Sensor 1 output operation mode switch	<p>Selects the output operation.</p> <p>INV. <input type="checkbox"/> NORM. <input checked="" type="checkbox"/></p>
⑦	Sensor 2 output operation mode switch	<p>INV.: The output is ON when the sensor signal input is High. NORM.: The output is ON when the sensor signal input is Low.</p>
⑧	Sensor signal input indicator (Red LED)	<p>Indicates the state of the sensor signal input. The operation differs according to the mode set with ⑤ Sensor signal input selection switch.</p> <p>INV.: Lights up when the sensor signal input is High. NORM.: Lights up when the sensor signal input is Low.</p>
⑨	External synchronization input indicator (Red LED)	<p>Indicates the state of the external synchronization input.</p> <p>Lights up when the external synchronization input does not disable the output.</p>
⑩	External synchronization operation mode switch	<p>Selects the operation of external synchronization.</p> <p>INV. <input type="checkbox"/> NORM. <input checked="" type="checkbox"/></p> <p>INV.: The output is neglected when the external synchronization input is High. NORM.: The output is neglected when the external synchronization input is Low.</p>
⑪	Gate / Edge trigger operation mode switch	<p>Selects Gate trigger or Edge trigger.</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> : Effective at the instant the external synchronization input is applied. <input checked="" type="checkbox"/> : Effective over the period for which the external synchronization input is applied.</p>
⑫	Delay time selection switch	<p>Selects the delay time.</p> <p>1 sec. <input type="checkbox"/> 10 sec. <input checked="" type="checkbox"/></p> <p>1 sec.: Variable from 40 ms approx. to 1 sec. approx. 10 sec.: Variable from 0.4 sec. approx. to 10 sec. approx.</p>
⑬	Timer operation mode switch	<p>Selects the timer operation.</p> <p>A Ineffective B ON-delay C OFF-delay D ONE SHOT</p> <p><input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/></p>
⑭	Timer adjuster	Set the delay time.
⑮	Terminal block	

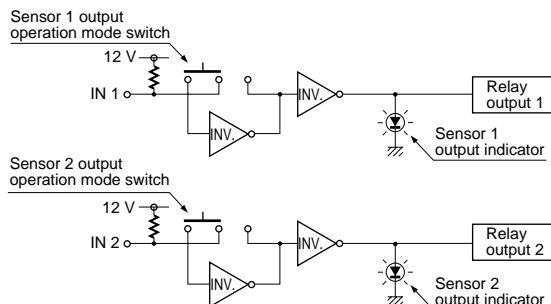
PRECAUTIONS FOR PROPER USE

Block diagrams (The diagrams below explain NPS's operation in a simple manner. The actual circuits may differ slightly.)

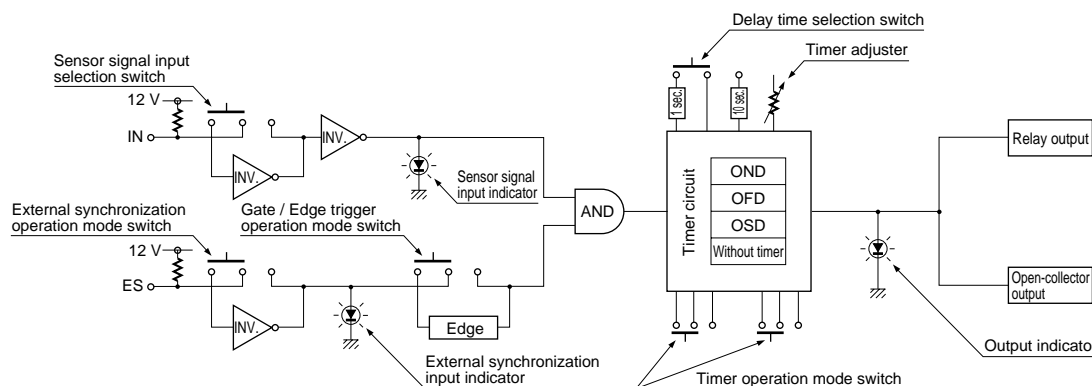
NPS-C7



NPS-C7W



NPS-CT7



Timer functions (NPS-CT7 only)

- NPS-CT7 has three types of convenient built-in timer functions.

ON-delay (OND)

<Function>: Neglects short output signals.
 <Application>: As only long signals are extracted, this function is useful for detecting if a line is choked or for sensing only objects taking a long time to travel.

OFF-delay (OFD)

<Function>: Extends the output signal for a fixed period of time.
 <Application>: This function is useful if the output signal is so short that the connected device cannot respond.

ONE SHOT (OSD)

<Function>: Outputs a fixed width signal upon sensing.
 <Application>: This function is useful when the input specifications of the connected device require a signal of fixed width. Of course, it is also useful for extending a short width signal to a desired width.

Selection switch and timer operation

Switch setting		Sensor signal input	Output operation	Sensor signal input	
Sensor signal input selection	Timer operation selection			High	Low
NORM.	OND	Input not inverted normal operation	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
INV.	OND	Input inverted normal operation	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
NORM.	OND	Input not inverted ON-delay	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
INV.	OND	Input not inverted OFF-delay	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
NORM.	OND	Input not inverted ONE SHOT	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
INV.	OND	Input inverted normal operation	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
NORM.	OND	Input inverted ON-delay	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
INV.	OND	Input inverted OFF-delay	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON
NORM.	OND	Input inverted ONE SHOT	ON	ON	ON
	OFD		OFF	OFF	OFF
	OSD		ON	OFF	OFF
	OND		OFF	ON	ON
	OFD		ON	OFF	OFF
	OSD		OFF	ON	ON

Timer period: T = Switchable, either 40 ms approx. to 1 sec. approx., or 0.4 sec. approx. to 10 sec. approx.

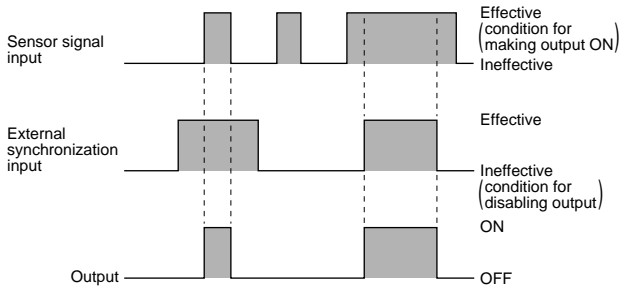
Various other applications are possible.

PRECAUTIONS FOR PROPER USE

External synchronization function (NPS-C7, NPS-CT7 only)

• Gate trigger

The output is disabled when the external synchronization input is Low [mode selection switch on NORM. (Note)] or is High [mode selection switch on INV. (Note)].



Note: Since NPS-C7 is not incorporated with the selection switch, the output is disabled only when the external synchronization input is Low.

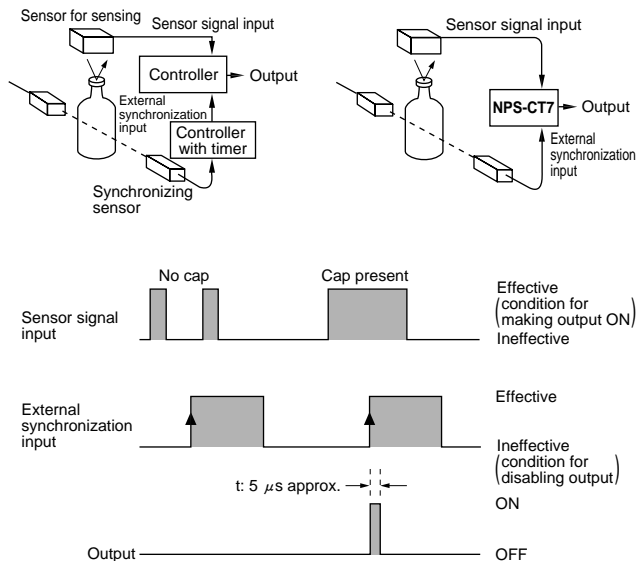
• Edge trigger (NPS-CT7 only)

The sensor signal is judged at the instant the external synchronization input rises up or falls down. This sensor is ideal for cap presence detection that would have required two controllers in the past.

Example: Detecting presence of cap on bottle

<Conventional>

<NPS-CT7>



Note: As the output time 't' is only 5 μs approx., extend it by using the OFF-delay timer or the ONE SHOT timer.

Mounting

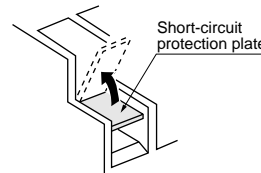
- To mount NPS with screws, use M4 screws. The tightening torque should be 0.78 N·m or less.

Wiring

- Make sure that the power supply is off while wiring.
- Verify that the supply voltage variation is within the rating.

• Short-circuit protection plate

The short-circuit protection plate is attached to terminal No. 1 to prevent AC short-circuit. Flip the plate up, connect the wire to terminal No. 1, and then flip it down.

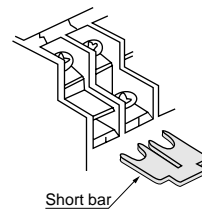
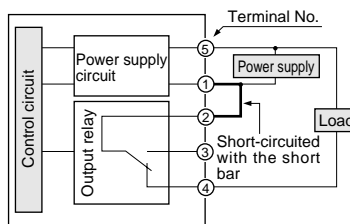


• Short bar

The short bar saves wiring when a common power supply is used for the AC supply terminal and the load supply of the relay contact output.

The short bar is attached between the terminal Nos. 1 and 2 at the time of shipment from our factory. To use a separate power supply for the output relay, make sure to remove it.

Typical wiring diagram



• Dimensions of suitable crimp terminals

Unit: mm in

Y-shaped type	Round type
(When crimped)	(When crimped)

Note: Use crimp terminals having insulation sleeves.
Recommended crimp terminal: Nominal size 1.25-3

- NPS-C7 and NPS-CT7 do not incorporate a short-circuit protection at the NPN open-collector transistor output. Do not connect them directly to a power supply or a capacitive load.
- The response time of the NPN open-collector transistor output of NPS-C7 or NPS-CT7 is 5 μs. If a relay or a micro-switch (mechanical contact) is connected, take care since its bounce may result in output chattering.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.

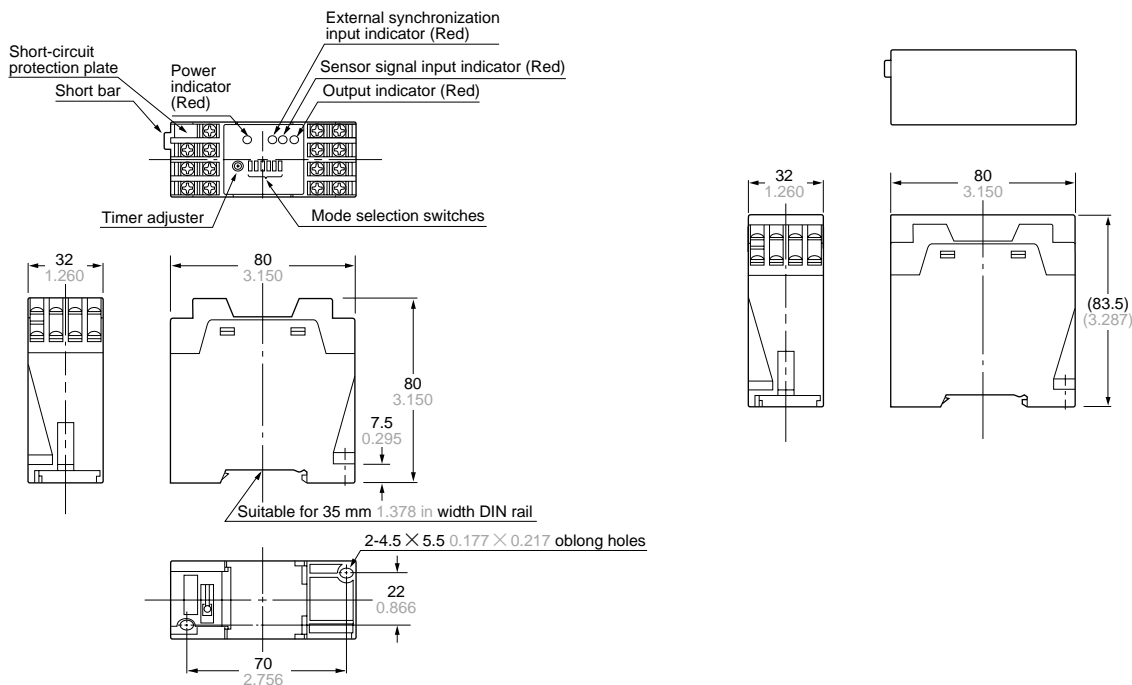
Others

- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Avoid dust, dirt, and steam.
- Take care that the controller does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.

DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

NPS-□

Assembly dimensions with attached protection cover



- Notes: 1) The above drawing illustrates the dimensions of **NPS-CT7**.
The dimensions of **NPS-C7** and **NPS-C7W** are identical to those given above.
2) The front panel of each model is different.
Refer to p.850 for more details of the front panels.

ON / OFF Input	NPS
Analog Input	CA
Power Supply	PS-18V-U