Solid-state timer

H3RN

Ultra-slim Timer for G2R Relay Socket

- Pin configuration compatible with G2R Relay and mounts to the P2R/P2RF Socket.
- Standard multiple time ranges and multiple operating modes.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.

Model Number Structure

■ Model Number Legend

H3RN-□□
1 2

1. Output
1: SPDT
2: DPST-NO

2. Time Range
None: Short-time range (0.1 s to 10 min)
1: Long-time range (0.1 min to 10 hrs)

Ordering Information

■ List of Models

Supply voltage	Time-limit contact	Short-time range model (0.1 s to 10 min)	Long-time range model (0.1 min to 10 h)
24 VAC; 12, 24 VDC	SPDT	H3RN-1	H3RN-11
	DPST-NO	H3RN-2	H3RN-21

Note: Specify both the model number and supply voltage when ordering.
Example: H3RN-1 24 VAC
└ Supply voltage

■ Accessories (Order Separately)

Connecting Socket

Timer	Track mounting/Front connecting socket	Back connecting socket
H3RN-1/-11	P2RF-05-E	P2R-057P
H3RN-2/-21	P2RF-08-E	P2R-087P

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Specifications

■ Ratings

Item	H3RN-1/H3RN-2	H3RN-11/H3RN-21
Time ranges	0.1 s to 10 min (1 s, 10 s, 1 min, or 10 min max. selectable)	0.1 min to 10 h (1 min, 10 min, 1 h, or 10 hrs max. selectable)
Rated supply voltage (See note 2.)	24 VAC (50/60 Hz); 12, 24 VDC	
Pin type	Plug-in	
Operating mode	ON-delay, interval, flicker OFF-start, or flicker-ON start selectable by DIP switch	
Operating voltage range	85% to 110% of rated supply voltage (12 VDC: 90% to 110% of rated supply voltage) (See note 1.)	
Reset voltage	10% max. of rated supply voltage	
Power consumption	24 VAC: Relay ON: approx. 0.8 VA (0.6 W) at 24 VAC, 60 Hz Relay OFF: approx. 0.6 VA (0.4 W) at 24 VAC, 60 Hz 12 VDC: Relay ON: approx. 0.5 W at 12 VDC Relay OFF: approx. 0.2 W at 12 VDC 24 VDC: Relay ON: approx. 0.6 W at 24 VDC Relay OFF: approx. 0.3 W at 24 VDC	
Control outputs	3 A at 250 VAC, resistive load ($\cos\phi$ = 1) (G6B-2□14P-FD-US used) The minimum applicable load is 10 mA at 5 VDC (P reference value).	

Note: 1. When using the H3RN in any place where the ambient temperature is more than 50°C, supply 90% to 110% of the rated voltages (12 VDC: 95% to 110% of the rated voltage).

2. Refer to *Safety Precautions for All Times* when combining the Timer with an AC 2-wire proximity sensor.

■ Characteristics

Item	H3RN-1/H3RN-2	H3RN-11/H3RN-21
Accuracy of operating time	±1% FS max. (1 s range: ±1%±10 ms max.)	
Setting error	±15%±50 ms FS max.	
Reset time	Min. power-opening time: 12, 24 VDC: 0.1 s max. (including halfway reset) 24 VAC: 0.5 s max. (including halfway reset)	
Influence of voltage	±2% FS max.	
Influence of temperature	±2% FS max.	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between operating circuit and control output, or contacts of different poles) 1,000 VAC, 50/60 Hz for 1 min (between non-continuous contacts)	
Vibration resistance	Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 1 h each in 3 directions Malfunction: 10 to 55 Hz, 0.5-mm single amplitude for 10 min each in 3 directions	
Shock resistance	Destruction: 300 m/s^2 Malfunction: 100 m/s^2	
Ambient temperature	Operating: −10°C to 55°C (with no icing) Storage: −25°C to 65°C (with no icing)	
Ambient humidity	Operating: 35% to 85%	
Life expectancy	Mechanical: 10,000,000 operations min. (under no load at 1,800 operations/h) Electrical: 100,000 operations min. (3 A at 250 VAC, resistive load at 1,800 operations/h)	
Impulse withstand voltage	Between power terminals: 1 kV	
Noise immunity	±1.5 kV, square-wave noise by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise)	
Static immunity	Destruction: 8 kV Malfunction: 4 kV	
Degree of protection	IP40 (Terminal screw sections are excluded.)	
Weight	Approx. 18 g	
EMC	(EMI) EN61812-1 Emission Enclosure: EN55011 Group 1 class A Emission AC Mains: EN55011 Group 1 class A (EMS) EN61812-1 Immunity ESD: EN61000-4-2: 6 kV contact discharge (level 3), 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: IEC61000-4-3:10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power-line (level 3), 2 kV I/O signal-line (level 4) Immunity Surge: IEC51000-4-5: 1 kV line to line (level 3), 2 kV line to ground (level 3)	
Approved standards	UL508, CSA C22.2 No. 14 Conforms to EN61812-1, IEC60664-1 4 kV/2. Output category according to IEC60947-5-1.	

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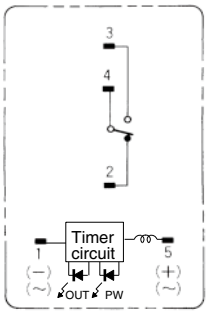
Connections

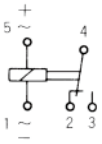
■ Connection

H3RN-1/H3RN-11

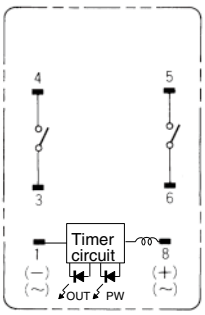


Bottom View

DIN Indication

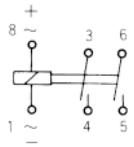


H3RN-2/H3RN-21



Bottom View

DIN Indication

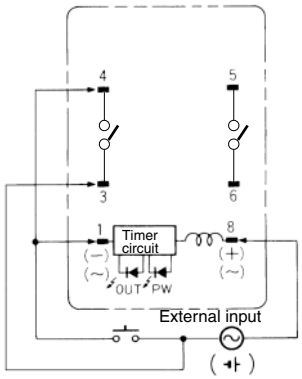


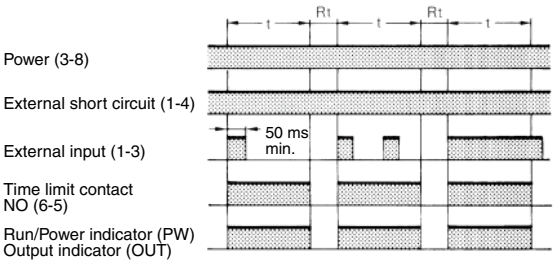
Pulse Operation

A pulse output for a certain period can be obtained with a random external input signal.

Use the H3RN in interval mode as shown in the following timing charts.

H3RN-2/H3RN-21





Note: t: Set time
Rt: Reset time

⚠ Caution

Be careful when connecting wires.

Mode	Terminals
Pulse operation	Power supply between 3 and 8 Short-circuit between 4 and 1 Input signal between 3 and 1
Operating mode; interval and all other modes	Power supply between 1 and 8

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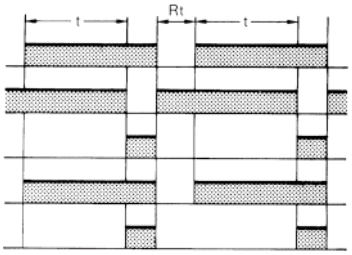
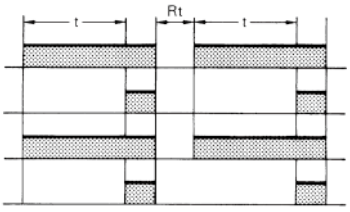
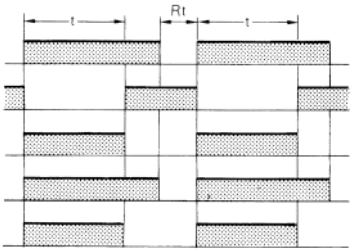
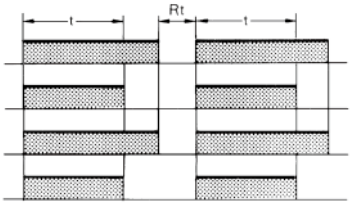
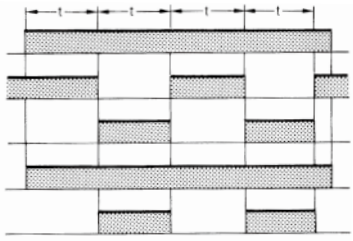
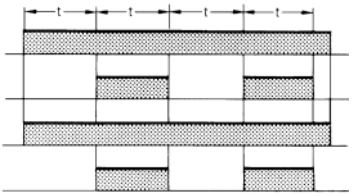
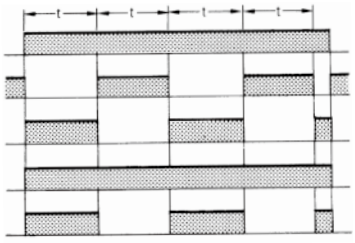
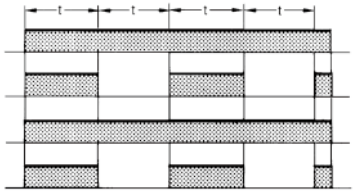
Operation

■ Timing Chart

Operating mode	Timing chart	
	H3RN-1/H3RN-11	H3RN-2/H3RN-21
ON-delay Power t Output	Power (1-5) Time limit contact NC (4-2) Time limit contact NO (4-3) Run/Power indicator (PW) Output indicator (OUT) 	Power (1-8) Time limit contact NO (4-3, 5-6) Run/Power indicator (PW) Output indicator (OUT) 
Interval Power t Output	Power (1-5) Time limit contact NC (4-2) Time limit contact NO (4-3) Run/Power indicator (PW) Output indicator (OUT) 	Power (1-8) Time limit contact NO (4-3, 5-6) Run/Power indicator (PW) Output indicator (OUT) 
Flicker OFF-start Power t Output	Power (1-5) Time limit contact NC (4-2) Time limit contact NO (4-3) Run/Power indicator (PW) Output indicator (OUT) 	Power (1-8) Time limit contact NO (4-3, 5-6) Run/Power indicator (PW) Output indicator (OUT) 
Flicker ON-start Power t Output	Power (1-5) Time limit contact NC (4-2) Time limit contact NO (4-3) Run/Power indicator (PW) Output indicator (OUT) 	Power (1-8) Time limit contact NO (4-3, 5-6) Run/Power indicator (PW) Output indicator (OUT) 

Note: t: Set time
Rt: Reset time

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■ DIP Switch Settings

The 1-s range and ON-delay mode for H3RN-1/-2, 1-min range and ON-delay mode for H3RN-11/-21 are factory-set before shipping.

Time Ranges

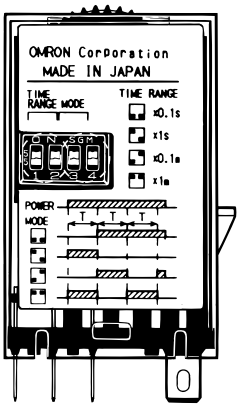
Model	Time range	Time setting range	Setting	Factory-set
H3RN-1, H3RN-2	1 s	0.1 to 1 s		Yes
	10 s	1 to 10 s		No
	1 min	0.1 to 1 min		No
	10 min	1 to 10 min		No
H3RN-11, H3RN-21	1 min	0.1 to 1 min		Yes
	10 min	1 to 10 min		No
	1 h	0.1 to 1 h		No
	10 h	1 to 10 h		No

Note: The left two DIP switch pins are used to select the time ranges.

Operating Modes

Operating mode	Setting	Factory-set
ON-delay		Yes
Interval		No
Flicker OFF-start		No
Flicker ON-start		No

Note: The right two DIP switch pins are used to select the operating modes.



Nomenclature

Run/Power Indicator (Green)
(Lit: Power ON)

Output Indicator (Orange)
(Lit: Output ON)

Main Dial
Set the desired time according to time range selectable by DIP switch.

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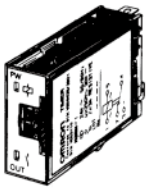
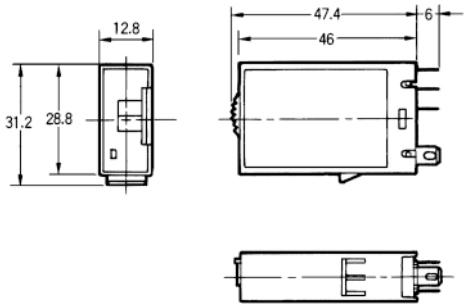
Dimensions

Note: All units are in millimeters unless otherwise indicated.

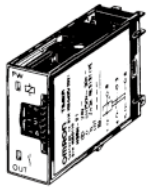
■ Timers

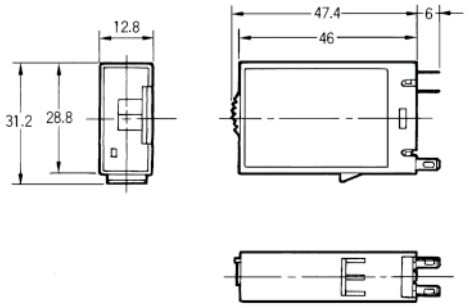
H3RN-1/H3RN-11 Front Mounting





H3RN-2/H3RN-21 Front Mounting

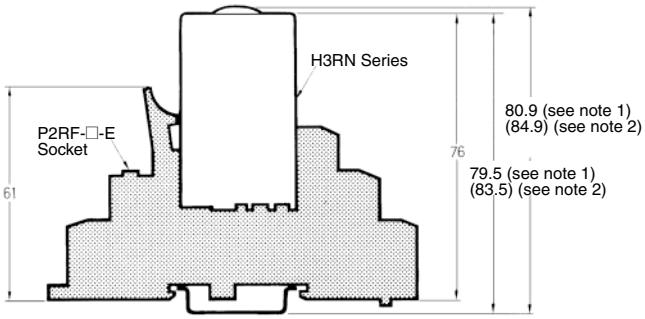




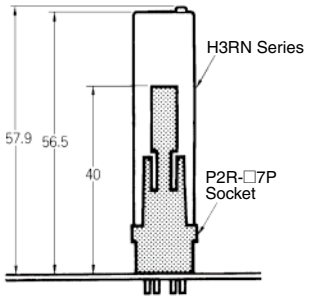
Mounting Height

Use the P2RF-□-E or P2R-□7P to mount the H3RN. When ordering any one of these sockets, replace "□" with "05" for SPDT or "08" for DPST-NO.
The P2RF-□ cannot be used because the hook is a different shape.

P2RF-□-E



P2R-□7P



Note: 1. The value shown indicates the dimension for the P2RF-05-E with the PFP-□N Mounting Rail. The value is 71.5 mm when using the PFP-N□2.
2. The value shown in parentheses indicates the dimension for the P2RF-08-E with the PFP-□N Mounting Rail. The value is 75.5 mm when using the PFP-N□2.

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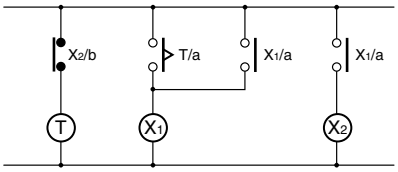
Safety Precautions

■ Correct Use

When using the H3RN in any place where the ambient temperature is more than 50°C, supply 90% to 110% of the rated voltages (at 12 VDC: 95% to 110%).

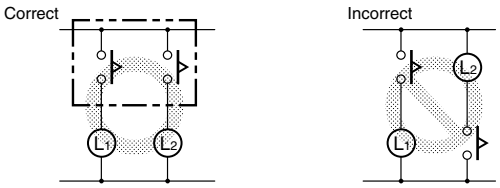
Do not leave the H3RN in time-up condition for a long period of time (for example, more than one month in any place where the ambient temperature is high), otherwise the internal parts may become damaged. Therefore, the use of the H3RN with a relay as shown in the following circuit diagram is recommended.



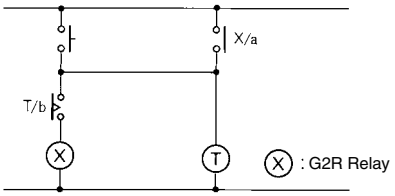
ⓧ : Auxiliary relay such as G2R Relay

The H3RN must be disconnected from the socket when setting the DIP switch, otherwise the user may touch a terminal imposed with a high voltage and get an electric shock.

Do not connect the H3RN as shown in the following circuit diagram on the right hand side, otherwise the H3RN's internal contacts different from each other in polarity may become short-circuited.

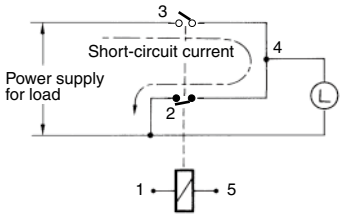


Use the following safety circuit when building a self-holding circuit with the H3RN and an auxiliary relay, such as a G2R Relay, in combination.



In the case of the above circuit, the H3RN will be in pulse operation. Therefore, if the circuit shown on page 3 is used, no auxiliary relay will be required.

Do not use the SPDT contact in a circuit which may cause short-circuiting at three points (otherwise, short-circuiting of the power supply may occur) because the SPDT contact of H3RN-1/-11 is composed of an SPST-NC contact.



Do not set to the minimum setting in the flicker modes, otherwise the contact may be damaged.

Do not use the H3RN in places where there is excessive dust, corrosive gas, or direct sunlight.

Make sure that there is a space of 3 mm or more between any H3RN Models next to each other. (When using the P2RF-□-E Socket, a space of 3 mm or more will be secured.) If a space of 3 mm or more is not secured, the ambient temperature must be less than 50°C.

The internal parts may become damaged if a supply voltage other than the rated ones is imposed on the H3RN.

■ Precautions for EN61812-1 Conformance

The H3RN as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied.

Handling

Do not touch the DIP switch while power is supplied to the H3RN.

Before dismounting the H3RN from the socket, make sure that no voltage is imposed on any terminal of the H3RN.

Wiring

Basic insulation is ensured between the H3RN's operating circuit and control output.

Basic insulation: Overvoltage category III, pollution degree 2 (with a clearance of 3.0 mm and a creepage distance of 3.0 mm at 240 VAC)

The clearance from the edge of the P2R-087P Socket to internal, current-carrying metal parts is 1.3 mm. Position the H3RN to provide the necessary clearance for the voltage used.
When using the P2RF-□-E or P2R-057P Socket, basic insulation is ensured in the mounted condition for a voltage of 250 VAC max.

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

In the interest of product improvement, specifications are subject to change without notice.

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Safety Precautions for All Timers

Refer to the *Safety Precautions* for individual Timers for precautions specific to each Timer.

⚠ WARNING

The following Timers contain lithium batteries that are not explosion proof.

1. Timers with Built-in Batteries: H5L
   The Timer contains a lithium battery, which may occasionally ignite or rupture. Do not disassemble, deform under pressure, heat to 100°C or higher, or incinerate the Timer.
2. Timers with Replaceable Batteries: Y92S-20 (for H5CN-M)
   The battery may occasionally rupture, ignite, or leak fluid. Do not short the positive and negative terminals. Do not charge, disassemble, deform under pressure, or throw the battery into a fire. If a non-specified battery is used, the battery may leak fluid or rupture, occasionally resulting in equipment failure or minor injury. Use only the specified battery.

⚠ CAUTION

The following Timers contain lithium batteries that are explosion proof.

Timers with Built-in Batteries: H5BR, H5AN-4DM, H5S, H5F, and H4KV

The Timer contains a lithium battery, which may occasionally ignite or rupture. Do not disassemble, deform under pressure, heat to 100°C or higher, or incinerate the Timer.

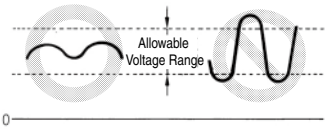
■ Precautions for Safe Use

Operating Environment

- Use the Timer within the ratings specified for ambient operating temperature and ambient operating humidity for each model.
- Store the Timer with the specified temperature range for each model. If the Timer has been stored at a temperature of less than −10°C, allow the Timer to stand at room temperature for at least 3 hours before using it.
- Use the Timer within the performance specified for water and oil exposure for each model.
- Do not use the Timer in locations subject to shock and vibration. Long-term usage in such locations may damage the Timer due to stress.
  Magnetic contactors generate a shock of 1,000 to 2,000 m/s^2 when switching a load. When mounting to DIN Track, separate magnetic contactors from the Timer so that the Timer is not subjected to vibration and shock. Use anti-vibration rubber.
- Do not use the Timer in locations subject to excessive dust, corrosive gases, or direct sunlight.
- Do not use organic solvents (such as paint thinner or benzine), strong alkalis, or strong acids because they will damage the external finish of the Timer.
- Separate the input devices, input wiring, and Timer as far as possible from sources of noise and power lines carrying noise.
- When using the Timer in environments subject to large amounts of static electricity (e.g., pipes carrying molding materials, powders, or fluid materials), separate the Timer as far as possible from the sources of static electricity.
- Do not remove the external case from the Timer.
- Do not use the Timer in locations where condensation may occur due to high humidity or sudden temperature changes. Condensation inside the Timer may result in malfunction or damage to Timer elements.
- The life of internal parts may be reduced if Timers are mounted in close proximity to each other.
- Resin and rubber parts (e.g., rubber packing) may deteriorate, shrink, or harden depending on the operating environment (e.g., subjected to corrosive gases, ultraviolet light, or high temperatures). We recommend periodic inspection and replacement.
- Normal operation may not be possible in locations subject to sulfidizing gas, such as in sewer systems or waste incinerators. OMRON does not market any Timers or other control devices for operation in atmospheres containing sulfidizing gas. Seal the Timer so that sulfidizing gas will not enter it. If sealing is not possible, OMRON does provide special Timers with improved resistance to sulfidizing gas. Ask your OMRON representative for details.

Power Supply

- Be sure that the voltage applied is within the specified range, otherwise the internal elements of the Timer may be damaged.
- Install a switch or circuit breaker that allows the operator to immediately turn OFF the power, and label it to clearly indicate its function.
- Maintain voltage fluctuations in the power supply within the specified range.



- Use a commercial power supply for the power supply voltage input to models with AC inputs.
  Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the Timer may result in ignition or burning. Do not use an inverter output for the power supply of the Timer.
- The Timers listed below cannot be directly turned ON and OFF by using an AC 2-wire proximity sensor to turn the Timer's power supply ON and OFF.
  Use the following countermeasure when using an AC 2-wire proximity sensor with the Timer. (The power supply circuit in the Timer uses half-wave rectification. Only a half AC wave is supplied to the proximity sensor, which may cause operation to be unstable.)

  Applicable Models

  H3Y, H3YN, H3RN, H3CA-8, RD2P, and H3CR(-A, -A8, -AP, -F, and -G)

  Countermeasure

  Wire through a relay and use the relay contacts to turn the power supply ON and OFF.

  Confirm the stability of operation after making the connections.
- Install protective measures (such as earth leakage breakers, wiring breakers, or fuses) on the power supply side according to any applicable laws or regulations.

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Correctly Handling Input Signals

Malfunction due to noise may occur if input wiring is placed in the same duct or conduit as power lines or high-voltage lines. Separate input wiring from power lines and wire them in a separate system. Also, use shielded cables, use metal conduits, and keep wiring distances as short as possible.

Timers with Relays

- Do not connect a load that exceeds contact ratings, such as the switching capacity (contact voltage or contact current). Insulation faults, contact welding, contact faults, and other failures to achieve specified performance may occur and the relay may be damaged or may burn.
- Continued use with deteriorated performance may ultimately result in insulation breakdown between circuits or relay burning. The life of the built-in relay is greatly affected by switching conditions. Before using the Timer, test operation under actual application conditions and confirm that the switching frequency presents no problems in performance.
- Electrical life depends on the type of load, switching frequency, and ambient environment. Observe the following precautions when using the Timer. When switching a DC load, contact transfer may cause the contacts to stick or may cause contact failure. Confirm applicability and consider using a surge absorbing element. When switching at high frequencies, heat generated by arcing may cause contacts to melt or may cause metal corrosion. Consider connecting an arc absorbing element, reducing the switching frequency, or lowering the humidity.
- The surge current depends on the type of load, which also affects contact switching frequency and the number of operations. Check the rated current and the surge current, and design the circuits with sufficient margin.

Resistive load	Solenoid load	Motor load	Incandescent lamp load
Rated current	10 to 20 times the rated current	5 to 10 times the rated current	10 to 20 times the rated current

Sodium light loads	Capacitor loads	Transformer loads	Mercury light loads
1 to 3 times the rated load	20 to 40 times the rated load	5 to 15 times the rated load	1 to 3 times the rated load

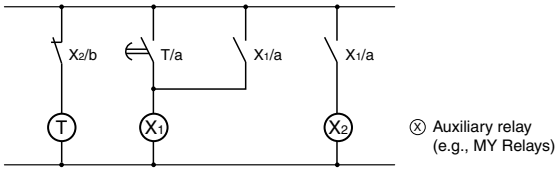
- Arcing when switching and relay heating may result in ignition or explosion. Do not use the Timer in atmospheres subject to inflammable or explosive gases.
- Contact faults may occur. Do not use the Timer in atmospheres subject to sulfidizing gas, chloride gas, or silicon gas.
- The switching capacity for DC voltage loads is lower than that for AC voltage loads.

Timers with Non-contact Outputs

- Short faults or open faults may occur due to destruction of the output element. Do not use the Timer for a load that exceeds the rated output current.
- Short faults or open faults may occur due to destruction of the output element from reverse electromotive force. When using the Timer for a DC inductive load, always connect a diode as a countermeasure against reverse electromotive force.

Other Precautions

- Confirm that you have the correct model before using it.
- Be sure that all terminals are wired correctly.
- Always test the output status with a tester before using a Timer with a built-in keep relay (e.g., the H3CR-H and H3DE-H). Shock resulting from dropping the Timer during transport or handling may cause the output contacts to reverse or to be in a neutral status.
- Leaving the Timer with outputs ON at a high temperature for a long time may hasten the degradation of internal parts (such as electrolytic capacitors). Use the Timer in combination with relays and avoid leaving the Timer with the output turned ON for an extended period of time (e.g., for more than a month).
  Reference Example (Use the Timer as shown below.)



- Be sure that only a qualified worker (e.g., an electrical engineer) performs electrical work for the Timer.

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

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