

High Power PCB Relay for Automotive and DC12 V Applications

G8PM Relay

High Load Relay for Motor/Resistive/Lamp Control Applications

- Can replace Mini ISO Plug-in type relay
- Small size & High heat resistance enable for usage in engine room
- Can support 60 A Fuse
- PIP reflow compliant
- Temperature range -40°C to +125°C
- Latching model available



Model Number Legend

■Single Stable Model

G8PM-□□□□□
1 2 3 4 5

1. Number of Contact Poles

1: 1-pole

2. Contact Form

A: SPST (1 Form A)

3. Contact structure

W: Double contact

4. Protective structure

7: Flux tight (Open vent hole) (RT II IEC61810)

5. Special function

R: Pin in paste compliant type

■Latching Model

G8PM-□□□□□□□
1 2 3 4 5 6 7

1. Functional classification

K: 2-winding latching

2. Number of Contact Poles

1: 1-pole

3. Contact Form

A: SPST (1 Form A)

4. Contact structure

Blank: Single contact

5. Protection structure

7: Flux tight (Open vent hole) (RT II IEC61810)

6. Polarity of coil

Blank: Normal polarity, positive voltage on Terminal 3 & 6

1: Reversed polarity, negative voltage on Terminal 3 & 6

7. Special function

R: Pin in paste compliant type

Application Examples

- DC motor/resistive/lamp application control
- Automotive DC applications (Smart Junction Box, Main power, Radiator fan, EPS, DC/DC converter, Head lamp, etc.)

Ordering Information

■Single Stable Model

Classification	Contact form	Protective structure	Rated coil voltage (V)	Model	Minimum Packing unit (Tube packing)
Single Stable	SPST 1 Form A double contact	Flux tight (open vent hole) (RT II IEC61810)	DC12	G8PM-1AW7R DC12	1200 pcs. / box (40 pcs. x 30 tubes)

■Latching Model

Classification	Contact form	Protective structure	Rated coil voltage (V)	Model	Minimum Packing unit (Tube packing)
2-winding latching	SPST 1 Form A single contact	Flux tight (open vent hole) (RT II IEC61810)	DC12	G8PM-K1A7R DC12 G8PM-K1A71R DC12	1200 pcs. / box (40 pcs. x 30 tubes)

Note. Above models are not certificated for the safety standards of UL or CSA, etc.

Ratings

●Coil

Classification	Rated voltage (V)	Rated current (mA)		Coil resistance (Ω)		Must-operate voltage (V)	Must-release voltage (V)	Permissible voltage Range (V)	Rated Power consumption (mW)		Model
Single Stable	DC12	53.3		225		7.2 Max.	0.8 Min.	10 to 16	640		G8PM-1AW7R DC12
2-winding latching		(Set)	(Reset)	(Set)	(Reset)	(Set)	(Reset)	10 to 16	(Set coil)	(Reset coil)	G8PM-K1A7R DC12
		210	268	57.2	44.8	7.2 Max.	7.2 Max.	10 to 16	2520	3210	G8PM-K1A71R DC12

Note 1. The rated current and coil resistance are measured at a coil temperature of 20°C with a tolerance of $\pm 10\%$.

Note 2. The operating characteristics are measured at a coil temperature of 20°C.

●Contacts

Classification		Single Stable	Latching
Item	Model	G8PM-1AW7R DC12	G8PM-K1A7R DC12
			G8PM-K1A71R DC12
Contact type		Double	Single
Contact material		Ag-alloy (Cd-free)	
Maximum carrying current *1	20°C	60 A, DC14 V, Continuous/ 81 A, DC14 V, 1 Hour/ 120 A, DC14 V, 2 Min.	40 A, DC14 V, Continuous/ 54 A, DC14 V, 1 Hour/ 81 A, DC14 V, 2 Min.
	125°C	40 A, DC14 V, Continuous/ 70 A, DC14 V, 30 Min.	20 A, DC14 V, Continuous/ 46 A, DC14 V, 30 Min.
Max. switching current *2		150 A Inrush, 80 A break	100 A Inrush, 40 A Break
Min. switching current		DC12 V, 0.1 A	DC12 V, 1 A

*1. Measured with reference connection conditions as below,

T1.6 mm FR4 epoxy PCB (Double-sided), Trace: T140 μm x L50 mm x W13.2 mm, Cable: 6 mm^2

The time limitation doesn't guarantee the repeated current carrying. Please confirm the performance with the specific conditions.

*2. Measured 100 operations with the resistive load at room temperature.

Characteristics

Classification		Single Stable	Latching
Item		G8PM-1AW	G8PM-K1A7R/G8PM-K1A71R
Contact resistance (See *1.)		Typ. 2.5 mΩ, max. 50 mΩ	Typ. 3.0 mΩ, max. 50 mΩ
Operate time		10 ms max. (DC12 V, not including bounce time)	15 ms max. (DC12 V, not including bounce time)
Release time		5 ms max. (DC12 V)	15 ms max. (DC12 V)
Insulation resistance (See *2.)	Between coil and contacts	100 MΩ min.	
	Between contacts of the same polarity	100 MΩ min.	
Dielectric strength	Between coil and contacts	AC500 V 1 min	
	Between contacts of the same polarity	AC500 V 1 min	
Vibration resistance	Destruction	33 Hz, 45 m/s ²	
	Malfunction	10 to 500 Hz, 45 m/s ² (detection time 10 μs min)	
Shock resistance	Destruction	1,000 m/s ² (pulse duration: 6 ms)	
	Malfunction	100 m/s ² (pulse duration: 11 ms, detection time: 10 μs)	
Mechanical endurance (See *3.)		1,000,000 ops. min.	
Electrical endurance (See *4.)	Resistive Load	45 A, DC14 V, 100,000 operations min. (1 s ON/1 s OFF)	40 A, DC14 V, 100,000 operations min. (1 s ON/1 s OFF)
	Lamp Load	100 A Inrush/ 20 A break, DC14 V, 100,000 operations min. (1 s ON/9 s OFF)	60 A Inrush/ 12 A break, DC14 V, 100,000 operations min. (1 s ON/9 s OFF)
Ambient operating temperature		-40 to 125°C (without freezing or condensation)	
Ambient operating humidity		35% to 85%RH	
Weight		Approx. 7.6 g	Approx. 7.0 g

Note. The above values are initial values at an ambient temperature of +20°C unless otherwise specified.

*1. The contact resistance was measured with 10 A at DC12 V using the voltage drop method.

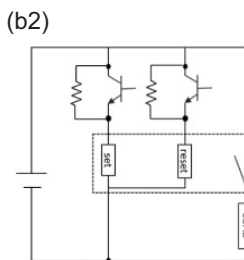
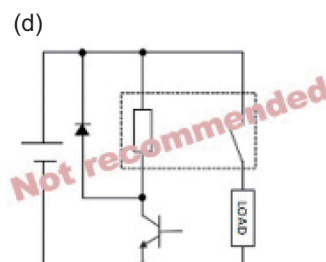
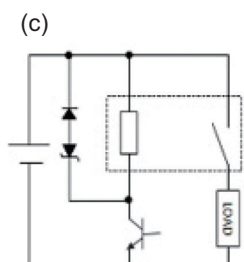
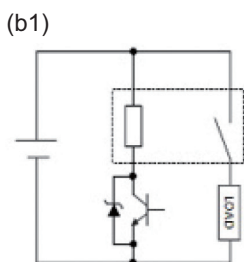
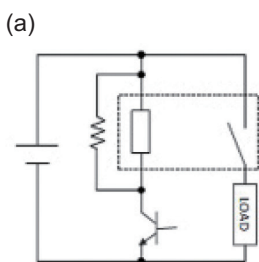
*2. The insulation resistance was measured with a DC500 V megohmmeter.

*3. The mechanical endurance was measured at a switching frequency of 18,000 operations/hr.

*4. Please connect N.O. terminal to the +BATT side on Electrical use and connect surge suppression element in parallel with between coil based on recommended circuit.

Recommended circuit: (a), (b), (c)

Not-recommended circuit: (d)



Note 1.

OMRON recommends coil driver circuit (b) and (c) for coil surge suppression. However the circuit (d) is not recommended because it may negatively affect the durability performance.

Note 2.

OMRON recommends to install a surge voltage protection on both of set coil and reset coil of the latching relay, due to the large coil current (Reference components:
Resistor withstanding 10 W or Zener diode cutting over 30 V.)

Reference Technical Data

■Single Stable Model

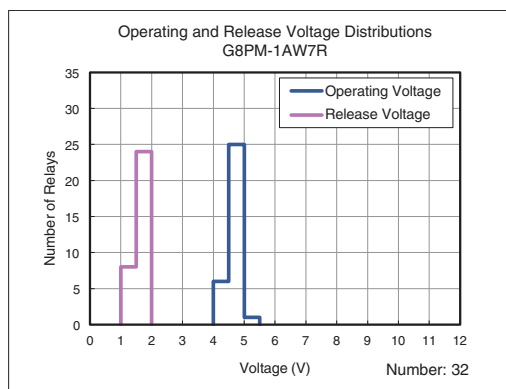
●Actual Electrical performance (reference)

Model	Application	Load voltage	Inrush current	Steady current	Break current	Inductance	Ambient temperature	Switching frequency		Required cycles (min.)
		(V)	(A)	(A)	(A)	(mH)	(°C)	On (s)	Off (s)	Total
G8PM-1AW7R DC12	Radiator Fan	13.5	80	30	30		-40 to 110	3.0	8.0	156,000
G8PM-1AW7R DC12	Lamp	14.0	100	20	20	-	-40 to 110	0.5	5.5	156,000
G8PM-1AW7R DC12	Resistive	14.0	50	10	10	-	25	2.0	5.0	1,000,000
G8PM-1AW7R DC12	Fuel pump	14.7	50	10	10	-	25	2.0	5.0	1,000,000
G8PM-1AW7R DC12	Starter Motor	14.5	150	50	50	0.16	-40 to 110	3.0	9.0	156,000

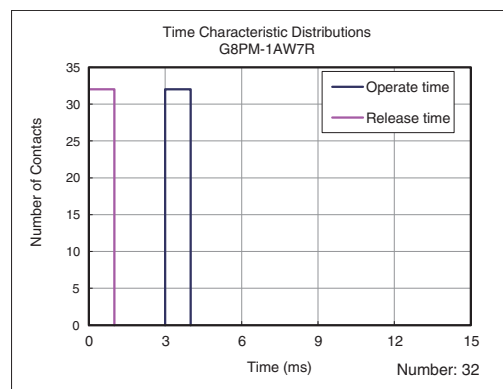
●Overcurrent (reference)

Model	Load & Coil voltage	Current	Fuse rating	Type	Ambient temperature	Overcurrent time	Result
	(V)	(A)	(A)		(°C)	(s)	
G8PM-1AW7R DC12	14	81.0	60	Micro	25	3,600	Passed
G8PM-1AW7R DC12	14	120.0	60	Micro	25	120	Passed
G8PM-1AW7R DC12	14	75.0	60	Case Fuse	85	1,800	Passed
G8PM-1AW7R DC12	14	111.0	60	Case Fuse	85	60	Passed
G8PM-1AW7R DC12	14	333.0	60	Case Fuse	85	1	Passed

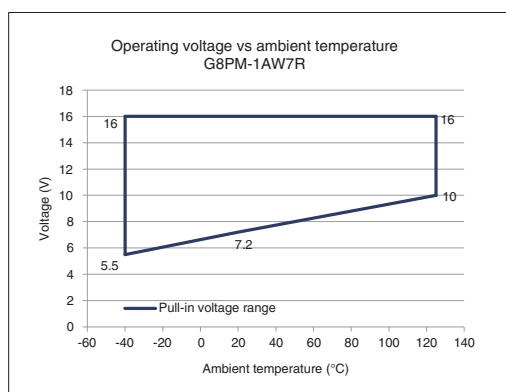
●Operating Voltage and Release Voltage Distributions (Number of Relays × Voltage)



●Time Characteristic Distributions (Number of Contacts × Time (ms))

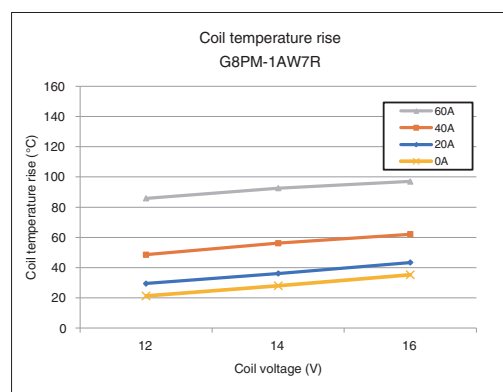


●Operating voltage vs ambient temperature (Cold start)

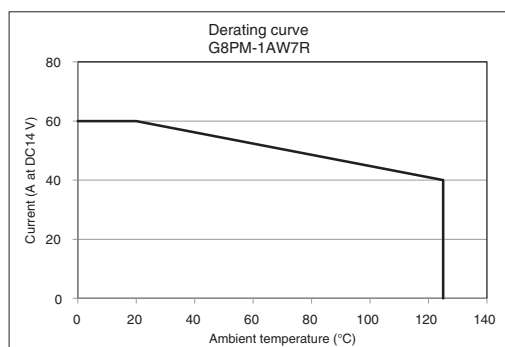


●Coil temperature rise [degC] at 20°C

(For using under a higher ambient temperature, please select the proper current carrying condition to avoid a possible excessive temperature rising.)



●Derating curve



■Latching Model

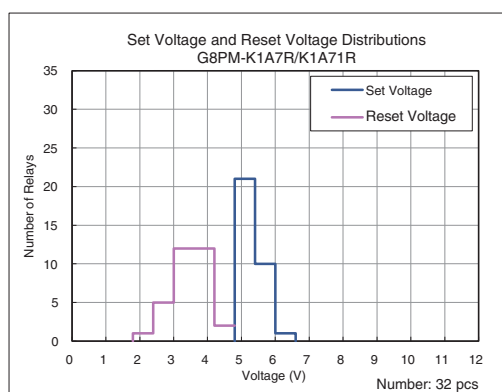
●Actual Electrical performance (reference)

Model	Application	Load voltage	Inrush current	Steady current	Break current	Inductance	Ambient temperature	Switching frequency		Required cycles (Min.)
		(V)	(A)	(A)	(A)			On (s)	Off (s)	
G8PM-K1A7R DC12	Resistor	14.0	40	40	40	-	20	1.0	1.0	100,000
G8PM-K1A7R DC12	Lamp	14.0	60	12	12	-	20	1.0	9.0	100,000
G8PM-K1A7R DC12	Radioator fan	14.0	50	20	20	0.4	20	2.0	6.0	100,000

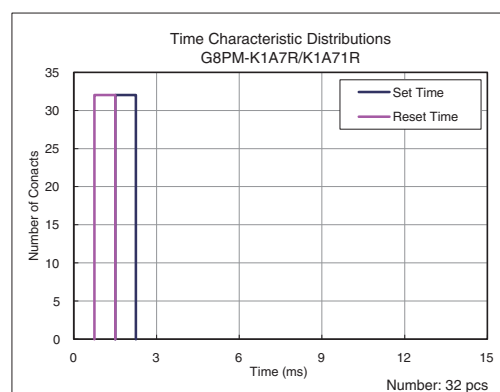
●Overcurrent (reference)

Model	Load & Coil voltage	Current	Fuse rating	Type	Ambient temperature	Overcurrent time	Result
	(V)	(A)	(A)		(°C)	(s)	
G8PM-K1A7R DC12	14	54.0	40	Micro	23	3,600	Go
G8PM-K1A7R DC12	14	240.0	40	Micro	23	1	Go
G8PM-K1A7R DC12	14	46.0	40	Micro	125	1,800	Go
G8PM-K1A7R DC12	14	70.0	40	Micro	125	60	Go
G8PM-K1A7R DC12	14	206.0	40	Micro	125	1	Go

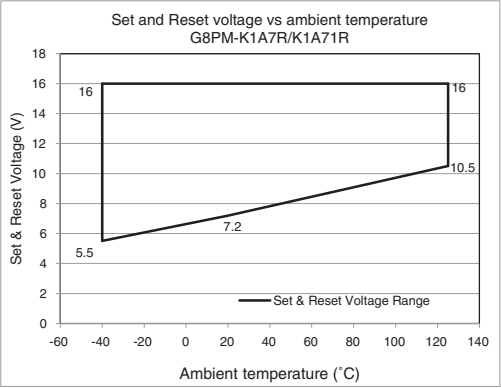
●Set Voltage and Reset Voltage Distributions (Number of Relays × Voltage)



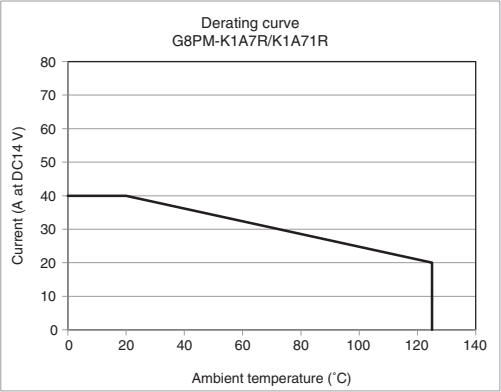
●Time Characteristic Distributions (Number of Contacts × Time)



●Set and Reset voltage vs ambient temperature
(Cold start)



●Derating curve

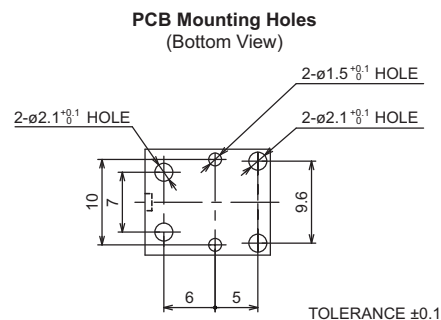
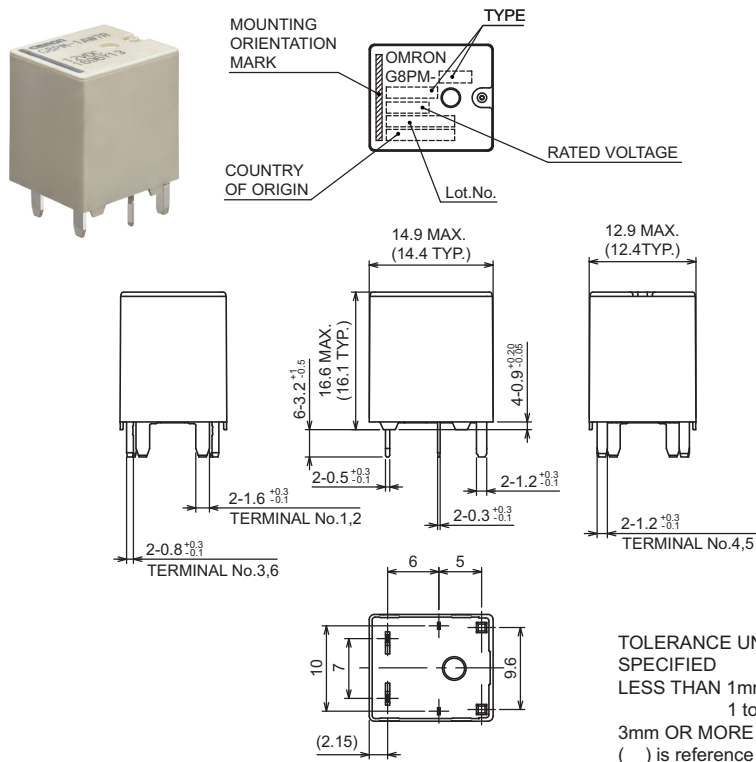


Dimensions

CAD Data Please visit our website, which is noted on the last page.

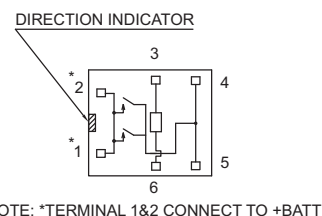
(Unit: mm)

G8PM-1AW



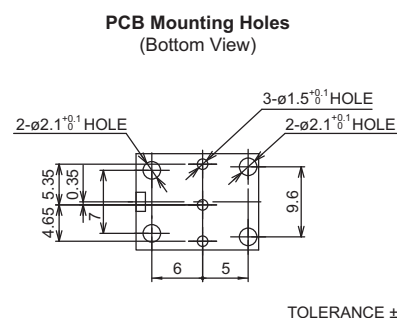
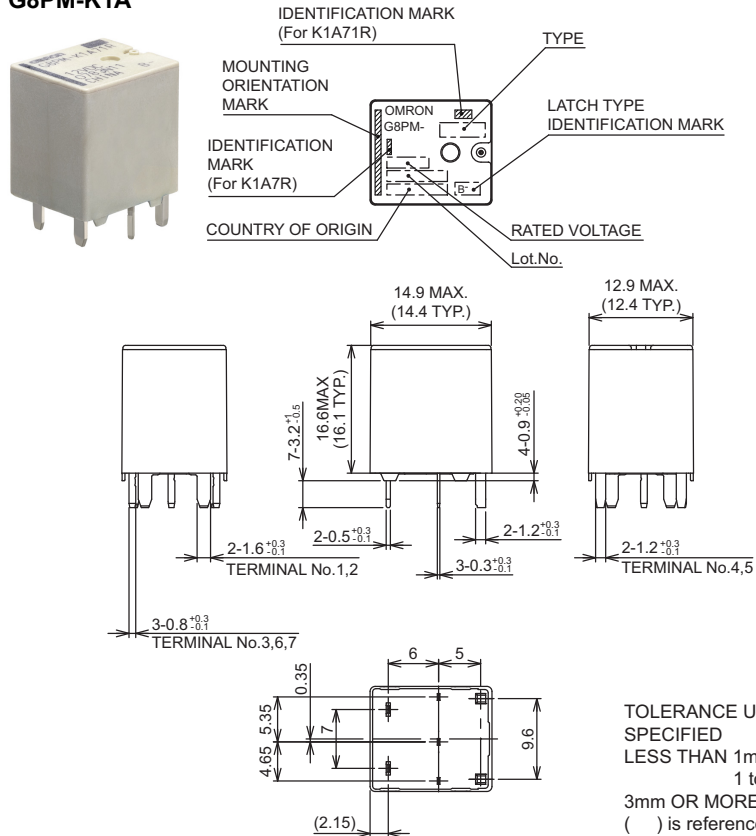
*Please study & choose other appropriate hole diameters if confirmed the diameter values recommended above don't work with the soldering process.

Terminal Arrangement/ Internal Connections (Bottom View)



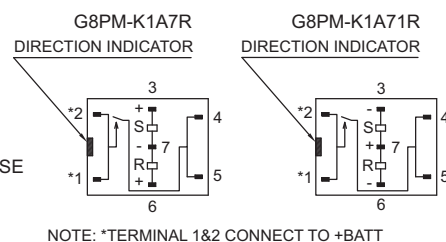
CAD Data

G8PM-K1A



*Please study & choose other appropriate hole diameters if confirmed the diameter values recommended above don't work with the soldering process.

Terminal Arrangement/ Internal Connections (Bottom View)



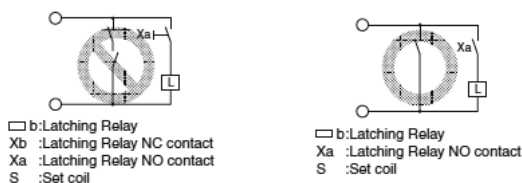
CAD Data

Precautions

●Please refer to “Safety Precautions for All Automotive Relays” for correct use.

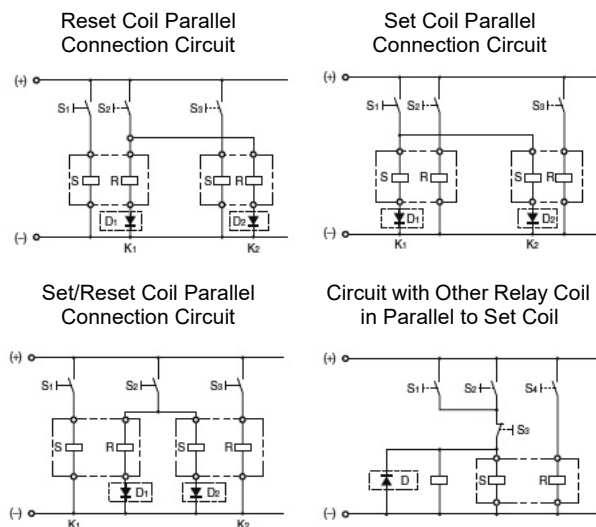
Correct Use

1. Coil Polarity for DC-operated Latching Relays
Check the catalog for the terminal numbers and polarity of applied power to correctly connect the Relay. Applying voltage with reversed polarity to DC-operated Latching Relays may result in malfunctions, set failure, or reset failure.
2. Drive Circuit
Energizing due to self-contact may prevent normal latching.
Do not use Latching Relays in the following type of circuit. Use the type of circuit shown in the following figure.



3. Applying Voltage Simultaneously to Set and Reset Coils
Do not apply voltage at the same time to the set and reset coils. Simultaneously applying voltage to the set and reset coils for an extended period may result in abnormal coil heating, fire, or incorrect operation.
4. DC Input Circuit Design
Reverse voltage of a Relay coil or solenoid may cause operation failure if other Relay coils or solenoids are connected in parallel to the set coil or reset coil. As a countermeasure, change the circuit or connect diodes as shown in the following figures.

Circuit Precautions



Please check each region's Terms & Conditions by region website.

OMRON Corporation

Device & Module Solutions Company

Regional Contact

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<https://components.omron.com/ap>

Korea

<https://components.omron.com/kr>

Europe

<https://components.omron.com/eu>

China

<https://components.omron.com.cn>

Japan

<https://components.omron.com/jp>

5. Degradation over Time of Latching Relay Holding Ability
If a Magnetic Latching Relay is used left set for an extended period, changes over time will degrade the magnetic force, and the reduction in holding ability may cause the set status to be released. This is also because of the properties of semi-hard magnetic material, and the rate of degradation over time depends on the ambient environment (e.g., temperature, humidity, vibration, and presence or absence of external magnetic fields). Perform maintenance at least once a year by resetting, applying the rated voltage again, and then setting.
6. Mounting Latching Relays
Operate the Latching Relay so that the vibration and shock from other devices (e.g., Relays) on the same panel or board generated when setting or resetting do not exceed the catalog values. Exceeding the values may cause the set or reset state to be released.
Latching Relays are shipped in the reset status, but abnormal vibration or shock may cause them to change to the set status. Be sure to apply a reset signal before using the Latching Relay.

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[G8PM-K1A71R DC12](#) [G8PM-K1A7R DC12](#)