G9KD

PCB Power Relays

High-Capacity Power Relay Capable of Switching up to 1,500 VDC, 150 A*

∗150 A breaking up to a maximum of 1,000 VDC

- Max. switching voltage 1,500 VDC, rated carry/max. breaking current 150 A (at 70°C)/100 A (at 85°C)
- Capable of 12 kV high withstand voltage (between coil and contact)
- Contact gap: 6.0 mm minimum
- Low initial contact resistance ≤4 mΩ
- Auxiliary contact option conformed to mirror contact structure defined in IEC/EN60947-4-1

⚠ **Refer to the *Precautions* on page 6.**

Model Number Legend

G9KD-□□□
1 2 3

1. **Number of Poles**
   1: 1-pole
2. **Main Contact Form**
   A: SPST-NO (1a)
3. **Auxiliary Contact Form**
   1B: SPST-NC (1b)
   None: No Auxiliary contact

Application Examples

- Energy Storage System
- V2X (V2H, V2B, etc.)
- EV Charging Station

Ordering Information

Type	Contact form	Enclosure rating	Terminal Shape	Model	Rated coil voltage (V)	Minimum packing unit
Standard	SPST-NO (1a)	Flux protection	PCB terminals	G9KD-1A	12 VDC 24 VDC	36pcs/box
	SPST-NO + SPST-NC (1a1b)			G9KD-1A1B		

Note: When ordering, add the rated coil voltage to the model number.
Example: G9KD-1A DC12
└ Rated coil voltage

Both the coil voltage on the product case and the packing will be marked as □□ VDC.

Ratings

●Coil

Item Rated voltage (V)	Rated current (mA)	Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V)	Max. voltage (V)	Power consumption (mW)
			% of rated voltage			
12 VDC	Approx. 417	28.8	75% max. *1	5% min.	110%	Approx. 5,000 Approx. 613 *1
24 VDC	Approx. 208	115				

Note: 1. The rated current and resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
Note: 2. The operation characteristic are measured at a coil temperature of 23°C.
Note: 3. The maximum permissible voltage is the maximum value of the fluctuation range of the relay coil operating power supply and was measured at an ambient temperature of 23°C.
Note: 4. Be sure to use this relay at holding voltage.
∗1. Coil consumption when holding voltage is used is approximately 613 mW (at 35% holding voltage).
For details, please refer to *Coil Voltage Reduction (Holding Voltage) after Relay Operation* on page 6.

●Contacts

Item		G9KD-1A	G9KD-1A1B
Contact type	Main contact	Double break	
	Auxiliary contact	—	Single
Contact material	Main contact	Ag Alloy (Cd free)	
	Auxiliary contact	—	Ag + Au plating
Rated load (resistive load)	Main contact	1,000 VDC 50 A/1,000 VDC 100 A/1,500 VDC 40 A (at 85°C) 1,000 VDC 150 A (breaking only) (at 70°C)	
	Auxiliary contact	—	30 VDC 1 A
Rated carry current	Main contact	100 A (at 85°C)/150 A (at 70°C)	
	Auxiliary contact	—	1A
Max. switching voltage	Main contact	1,500 VDC	
	Auxiliary contact	—	30 VDC
Max. switching current	Main contact	150 A	
	Auxiliary contact	—	1A

Characteristics

Item		G9KD-1A, G9KD-1A1B
Contact resistance *1		Main contact: 4 mΩ max. (refer to Engineering Data on page 3) Auxiliary contact:100 mΩ max.
Operate time *2		50 ms max.
Release time *2		30 ms max.
Insulation resistance *3		1,000 MΩ min.
Dielectric strength	Between coil and contacts	Main contact: 5,500 VAC, 50/60 Hz for 1 min Auxiliary contact: 2,000 VAC, 50/60 Hz for 1 min
	Between contacts of the same polarity	Main contact: 2,000 VAC, 50/60 Hz for 1 min Auxiliary contact: 1,000 VAC, 50/60 Hz for 1 min
	Between contacts of different polarity	Between main contact and auxiliary contact: 5,500 VAC, 50/60 Hz for 1 min
Impulse withstand voltage	Between coil and contacts	Main contact: 12 kV (1.2 × 50 μs) Auxiliary contact: 2.5 kV (1.2 × 50 μs)
Vibration resistance	Destruction	10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
	Malfunction	10 to 55 to 10 Hz, 0.15 mm single amplitude (0.3 mm double amplitude)
Shock resistance	Destruction	735 m/s^2
	Malfunction	25 m/s^2
Durability	Mechanical	G9KD-1A: 500,000 operations min. (at 10,800 operations/h) G9KD-1A1B: 100,000 operations min. (at 10,800 operations/h)
	Electrical (Resistive)	Main contact: 1,000 VDC 50 A at 85°C; 6,000 operations 1,000 VDC 100 A at 85°C; 20 operations 1,500 VDC 40 A at 85°C; 1 operation 1,000 VDC 150 A at 70°C (breaking only); 1 operation Auxiliary contact: 30 VDC 1 A at 85°C; 100,000 operations (Switching frequency: 1 second ON - 9 seconds OFF)
Failure rate (M level) (Reference value) *4		Main contact: 24 VDC 100 mA Auxiliary contact: 5 VDC 10 mA
Use conditions	Coil holding voltage *5	35% to 50% of rated coil voltage
	Ambient operating temperature	-40°C to +85°C (with no icing or condensation)
	Ambient operating humidity	5% to 85%
Weight		Approx. 265 g

Note: The values given above are initial values at 23°C. (Except Electrical Durability)

✻1. Measurement conditions: Main contact 40 A at 5 VDC (after 3 minutes) using the voltage drop method. Auxiliary contact 1 A at 5 VDC using the voltage drop method.

✻2. Measurement conditions: Applied rated coil voltage, no contact bouncing.

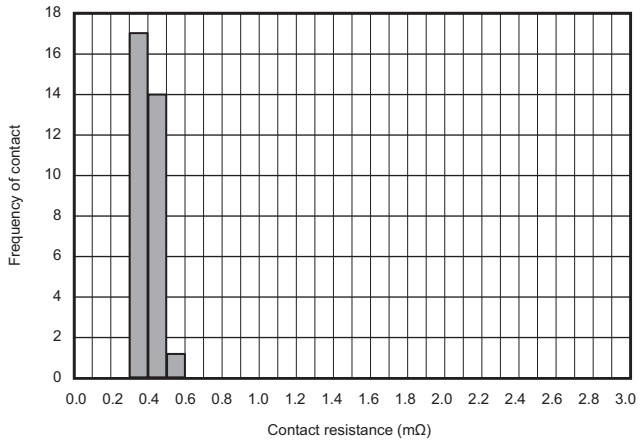
✻3. Measurement conditions: Measured with a 1,000 VDC megohmmeter for main contact or a 500 VDC megohmmeter for auxiliary contact at the same point as the dielectric strength was measured.

✻4. The value was measured at a switching frequency of 180 operations/ minute.

✻5. For the detail regarding holding voltage usage, please refer to ●*Coil Voltage Reduction (Holding Voltage) after Relay Operation* on page 6.

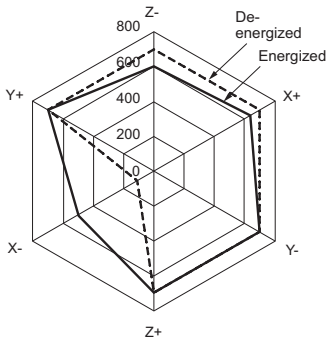
Engineering Data

●Contact resistance

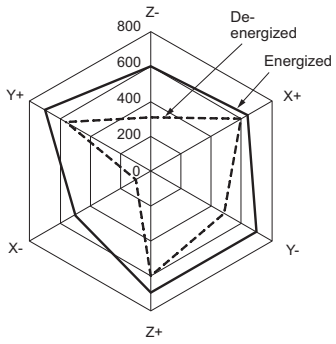


●Shock Malfunction

G9KD-1A



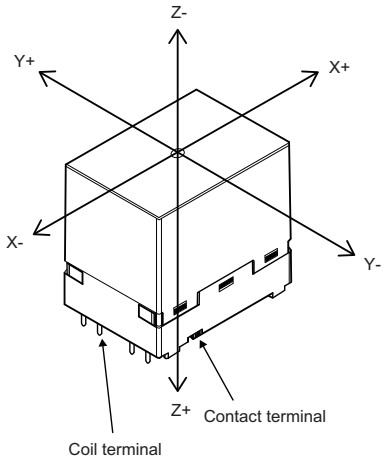
G9KD-1A1B



Measurement :Measure the value of contact malfunction happening by applying 3 axes with 6 directions 3 times each. The energized voltage is within the range of the rated holding voltage.

Standard value:Excitation 25 m/s^2

Shock direction



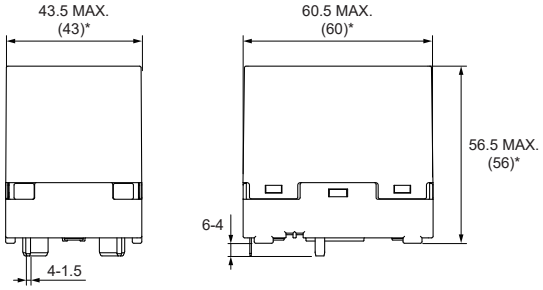
G9KD

Dimensions

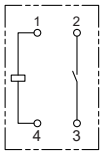
CAD Data marked products, 2D drawings and 3D CAD models are available.
For CAD information, please visit our website, which is noted on the last page.

(Unit: mm)

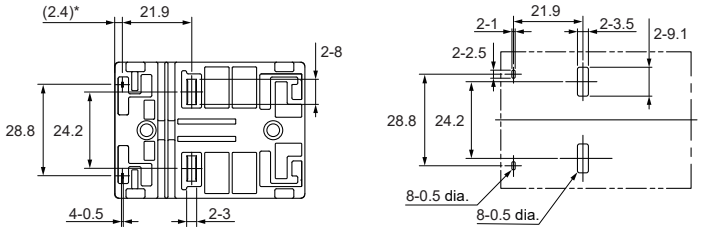
G9KD-1A



Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)



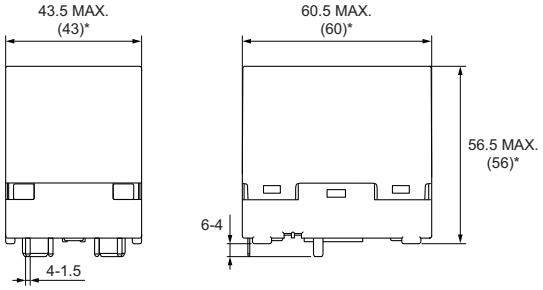
PCB Mounting Holes
(BOTTOM VIEW)
Dimensional tolerance is ±0.1 mm.



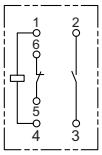
* Average value

CAD Data

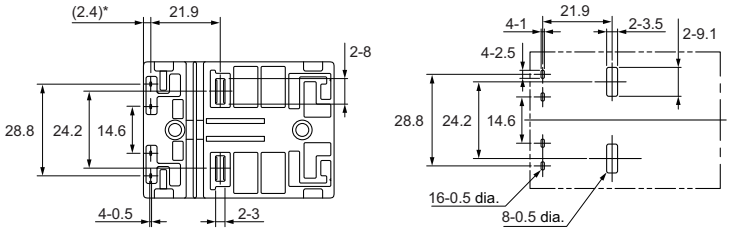
G9KD-1A1B



Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)



PCB Mounting Holes
(BOTTOM VIEW)
Dimensional tolerance is ±0.1 mm.



* Average value

CAD Data

Approval Standard

The approval rating values for overseas standards are different from the performance values determined individually confirm the values before use.

UL/C-UL Certificated: (File No.E41515)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G9KD-1A G9KD-1A1B	SPST-NO(1a)	12 VDC, 24 VDC *	1,000 VDC 50 A (Resistive) at 85°C	6,000
			1,000 VDC100 A (Resistive) at 85°C	20
			1,000 VDC 150 A (Resistive) at 70°C (breaking only)	1
			1,500 VDC 40 A (Resistive) at 85°C	1
	SPST-NC(1b)	12 VDC, 24 VDC *	30 VDC 1 A (Resistive) at 85°C	100,000

✻Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

EN/IEC, TÜV Certificated: (Certificate No.R 50699445)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G9KD-1A G9KD-1A1B	SPST-NO(1a)	12 VDC, 24 VDC *	1,000 VDC 50 A (Resistive) at 85°C	6,000
			1,000 VDC 100 A (Resistive) at 85°C	20
			1,000 VDC 150 A (Resistive) at 70°C (breaking only)	1
			1,500 VDC 40 A (Resistive) at 85°C	1
	SPST-NC(1b)	12 VDC, 24 VDC *	30 VDC 1 A (Resistive) at 85°C	100,000

✻Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

CQC Certificated: (Certificate No.CQC25002490047)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G9KD-1A G9KD-1A1B	SPST-NO(1a)	12 VDC, 24 VDC *	1,000 VDC 50 A (Resistive) at 85°C	6,000
			1,000 VDC 100 A (Resistive) at 85°C	20
			1,000 VDC 150 A (Resistive) at 70°C (breaking only)	1
			1,500 VDC 40 A (Resistive) at 85°C	1
	SPST-NC(1b)	12 VDC, 24 VDC *	30 VDC 1 A (Resistive) at 85°C	100,000

✻Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

Insulation data		
Creepage distance		
- between coil and main contact		25 mm min.
- between main contact and auxiliary contact		25 mm min.
Clearance		
- between coil and main contact		14 mm min.
- between main contact and auxiliary contact		14 mm min.
Type of insulation		
- between coil and main contact		Basic insulation
- between main contact and auxiliary contact		Basic insulation
- between coil and auxiliary contact		Functional insulation
Type of interruption		Micro disconnection
Conditions of insulation data		
Material group of insulation		IIIa
Pollution degree (external environment of the relay)		3
Rated insulation voltage	Main contact	1,500 V (DC only)
	Auxiliary contact	30 V
Overvoltage category	Altitude up to 2,000 m	III
Other data		
Category of protection (IEC61810-1)		RTII
Flammability class (UL94)		V-0
Coil insulation system (UL1446)		Class F

Precautions

Please refer to "Safety Precautions for All PCB Relays" for correct use.

⚠Warning

As this relay is a high-voltage and high-current type, there is a risk of abnormal heat generation, smoke generation or fire if you use the relay with a contact voltage, current, or for a number of times beyond the specified range. Use only within the specified ranges.

If the power is switched on when the connections are insufficient, there is a risk of abnormal heat generation. Do not connect and use clips and sockets on individual relays.

If the power is switched on when the connections are insufficient, there is a risk of abnormal heat generation. Please install and use relays under recommended conditions.

Precautions for Safe Use

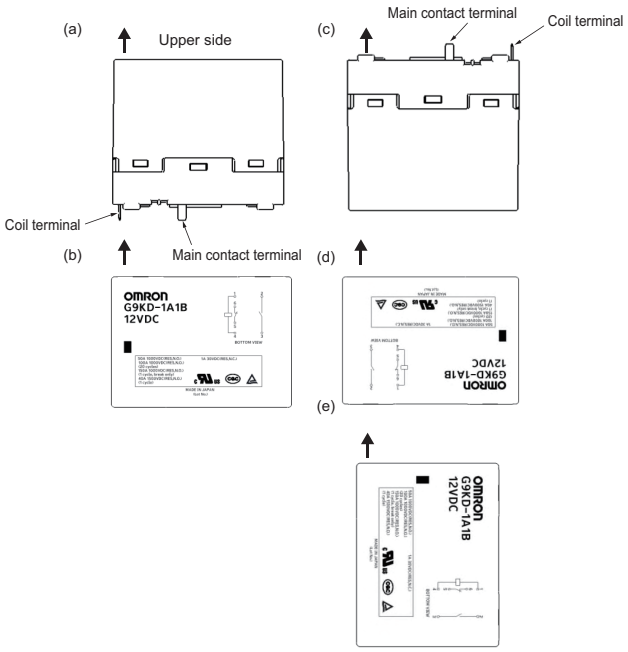
●Drop

- Do not use relays that have been dropped as they may not function properly.

Precautions for Correct Use

●Mounting Direction

- The relay is limited for mounting direction due to the specification of operation voltage and electrical durability. Do not use in any other direction except as indicated in below chart. There is a risk of reduced operational lifetime for failure to observe this warning.

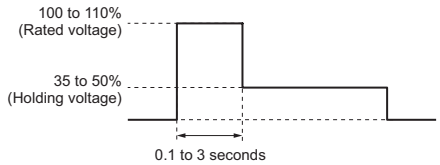


●Relay Service Life

- These relays must be used for high DC voltages. The final failure mode is failure to break the circuit. In a worst-case

●Coil Voltage Reduction (Holding Voltage) after Relay Operation

- Use this relay with coil voltage reduction.
- Apply the rated voltage for 0.1 to 3 seconds to the coil first.
- The range of coil rated voltage must be set as 100 to 110%, and holding voltage must be 35 to 50%. Do not exceed the ranges due to the change of coil voltage change and so on.

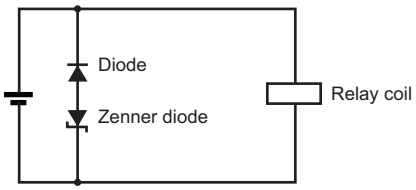


	Applied coil voltage	Coil resistance ✻	Coil power consumption
Rated voltage	100 to 110%	28.8 Ω (12 VDC) 115 Ω (24 VDC)	Approx. 5 to 6 W
Holding voltage	35 to 50%		Approx. 0.6 to 1.3 W

✻The coil resistances were measured at a coil temperature of 23°C with tolerances of ± 10%.

●Diode Connection for Operating Coil

- Connect diode and zener diode to the coil (refer to the picture below).
  Diode is for coil surge absorption. Ensure to include zener diode as there is a possibility of any influence for switching capability when only using diodes.
- Coil has no polarity. Connect the diodes in the reverse polarity of the voltage applied to the coil.
- The recommended zener diode voltage is 3 times that of the rated coil voltage.



●PCB Terminal Soldering

- Perform soldering under the following conditions.
  Preheat at 120°C for 60 seconds and dip in solder bath at 290°C for up to 20 seconds.
- It is not possible to wash relay as this is not fully sealed type.

●Assembly

- To reduce the risk of specification deterioration, assemble relays in a dust free, low humidity and non-corrosive gas environment.
- Using the relay under high temperature, high humidity, or harmful gas may deteriorate its performance characteristics due to condensation or corrosive materials, resulting in failure or burn damage to the relay.
- This product weight is about 265 g. Be careful of the strength of PCB. To reduce soldering crack due to heat stress, use both sides through hole PCB.
  scenario, burning may extend to surrounding components. Do not use these relays outside of the specified ratings and

service life, or for any application other than high DC voltages. Implement safety circuits and other safety measures to minimize the risk in case of the unlikely event of a failure.

- In a low-humidity or low-temperature (negative) environment, the life cycle may vary as a result of high voltage and large-current opening and closing. Therefore, be sure to check on the actual machine.
- The coil drive circuit, ambient environment, switching frequency, or load conditions (e.g., inductive load or capacitor load) may reduce the service life and possibly lead to failure to break. Always confirm the service life in the actual equipment.

●Micro load

- This is a power relay for high power switching. Do not use for micro loads such as signal switching.

●Mounting interval

- A mounting interval of 30 mm minimum is recommended for this relay. This is based on OMRON's evaluation results and serves as a guideline for ensuring stable product operation. In environments where sufficient cooling is ensured (e.g., by fans), more flexible placement may be possible. Additionally, mutual magnetic interference may cause changes in the relay's characteristics. In actual design, be sure to verify performance using the actual equipment before use.

●The Effects of Magnetic Fields from Permanent Magnets

- This product contains permanent magnets, which may generate magnetic fields that can interfere with nearby electronic components or sensors. When designing, pay close attention to the distance and placement relative to magnetically sensitive components (e.g., current sensors, magnetic sensors etc.).
  Due to the effects of magnetic fields varying depending on the operating environment and characteristics of surrounding components, ensure to perform thorough evaluations beforehand.

●Field wiring connections

- For field wiring connections, select the cross-sectional area according to the load current.
  As a standard, use cables, wires, or busbars at least the size of the cross-sectional areas shown in the following table. Insufficient it may cause burning due to abnormal heating of the wire.

Max Current [A]	AWG Size	Cross-sectional area [mm^2]
32	10	5.3
50	8	8.4
65	6	13.3
85	4	21.2
115	2	33.6
130	1	42.4
150	1/0	53.5

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

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Device & Module Solutions Company

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