# G9KC

## PCB Power Relays

## 480 VAC 40 A 4-pole High Power Relay with Low Contact Resistance





- Low initial contact resistance: 6 mΩ max.
- 4-pole 40 A switching with compact size:
  W35 mm x L58 mm x H47 mm
- Contact gap: 4.0 mm min.*
- High short circuit capacity conformed to IEC62955
  ($I_{nc}$=10 kA, $I_n$≤32 A)
- Low coil power consumption:
  approx. 613 mW with holding voltage 35%
- Auxiliary contact conformed to IEC60947-4-1 mirror contact requirement

* Applicable to products manufactured on or after October 31, 2025.

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

## Model Number Legend

**G9KC-□□**
1 2

1. Main Contact Form
   4A: 4PST-NO (Form A)
2. Auxiliary Contact Form
   None: No Auxiliary contact
   1B: SPST-NC (Form B)

## Application Examples

- EV Charging Station
- Inverter for Solar and Energy Storage
- Uninterruptible Power Supply

## Ordering Information

| Type | Contact form | Enclosure rating | Terminal shape | Model | Rated coil voltage (V) | Minimum packing unit |
|---|---|---|---|---|---|---|
| Standard | 4PST-NO (4a) | Flux protection | PCB terminals | **G9KC-4A** | 12 VDC<br>24 VDC | 45 pcs/box |
| | 4PST-NO (4a) + SPST-NC (1b) | | | **G9KC-4A1B** | | |

**Note:** When ordering, add the rated coil voltage to the model number.
Example: G9KC-4A 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 | 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. | 5% min. | 110% | Approx. 5,000<br>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.** Use this relay with coil voltage reduction.
*1. Power consumption with holding voltage is approx. 613 mW (when applying holding voltage at 35%). Please confirm the details on *Coil Voltage Reduction (holding voltage) after Relay Operation* on page 6.



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## ●Contacts

| Item | | G9KC-4A | G9KC-4A1B |
|---|---|---|---|
| Contact type | Main contact | Double break | |
| | Auxiliary contact | --- | Single break |
| Contact material | Main contact | Ag Alloy (Cd free) | |
| | Auxiliary contact | --- | Ag + Au plating |
| Rated load (resistive) | Main contact | 480VAC 40A / 277VAC 32A | |
| | Auxiliary contact | --- | 1 A at 277 VAC, 1 A at 30 VDC |
| Rated carry current | Main contact | 40 A | |
| | Auxiliary contact | --- | 1 A |
| Max. switching voltage | Main contact | 480 VAC | |
| | Auxiliary contact | --- | 277 VAC, 30 VDC |
| Max. switching current | Main contact | 40 A | |
| | Auxiliary contact | | 1 A |

## Characteristics

| Item | | G9KC-4A, G9KC-4A1B |
|---|---|---|
| Contact resistance *1 | | Main contact: 6 mΩ max. (Refer to *Engineering Data* on page 3.)<br>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 | Between coil & main contacts: 5,000 VAC, 50/60 Hz for 1 min<br>Between coil & auxiliary contact: 2,000 VAC, 50/60 Hz for 1 min |
| | Between contacts of the same polarity | Between open main contacts: 2,000 VAC, 50/60 Hz for 1 min<br>Between open auxiliary contacts: 1,000 VAC, 50/60 Hz for 1min |
| | Between contacts of different polarity | Between main contact sets: 5,000 VAC, 50/60 Hz for 1 min<br>Between main contact and auxiliary contact:<br>5,000 VAC, 50/60 Hz for 1 min |
| Impulse withstand voltage | Between coil and contacts | Main contact: 10 kV (1.2 x 50 μs)<br>Auxiliary contact: 2.5 kV (1.2 x 50 μs) |
| Vibration resistance | Destruction | 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) |
| | Malfunction | Excitation: 10 to 55 to 10 Hz, 0.15 mm single amplitude<br>(0.3 mm double amplitude) |
| Shock resistance | Destruction | 735 m/s$^2$ |
| | Malfunction | Excitation: 25 m/s$^2$ |
| Durability | Mechanical | G9KC-4A: 1,000,000 operations min (at 10,800 operations/h)<br>G9KC-4A1B: 100,000 operations min (at 10,800 operations/h) |
| | Electrical (Resistive) *4 | Main contact: 32 A at 277 VAC 50,000 operations min.<br>40 A at 480 VAC 30,000 operations min.<br>Auxiliary contact: 1 A at 277 VAC 100,000 operations min.<br>1 A at 30 VDC 100,000 operations min.<br>(Switching frequency: 1 second ON - 9 seconds OFF) |
| Failure rate (M level) (Reference value) *5 | | Main contact: 100 mA at 24 VDC<br>Auxiliary contact: 10 mA at 5 VDC |
| Use conditions | Coil holding voltage *6 | 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% RH |
| Weight | | Approx. 220 g |

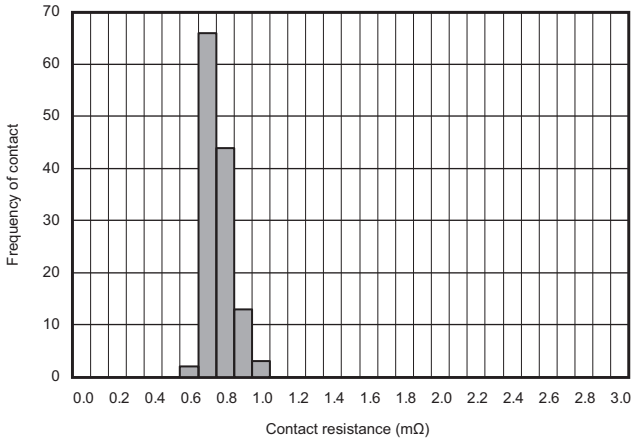
**Note:** The values given above are initial values at 23°C.

*1. Measurement conditions: The main contact complies with the 5 VDC, 40 A (after 3 minutes) voltage drop method, and the auxiliary contact complies with the 5 VDC, 1 A voltage drop method.
*2. Measurement conditions: Applied rated coil voltage, no contact bouncing.
*3. Measurement conditions: Measured with a 500 VDC megohmmeter at the same point as the dielectric strength was measured.
*4. Dielectric strength after electrical durability test
Between coil & main contacts: 5,000 VAC 50/60 Hz for 1 min
Between coil & auxiliary contact: 2,000 VAC 50/60 Hz for 1 min
Between open main contacts: 1,500 VAC 50/60 Hz for 1 min
Between open auxiliary contacts: 700 VAC 50/60 Hz for 1 min
Between main contact sets: 2,000 VAC 50/60 Hz for 1 min
Between main contact and auxiliary contact: 2,000 VAC 50/60Hz for 1 min
*5. The value was measured at a switching frequency of 180 operations/minute.
*6. For the detail regarding holding voltage usage, please refer to *Coil Voltage Reduction (holding voltage) after Relay Operation* on page 6.


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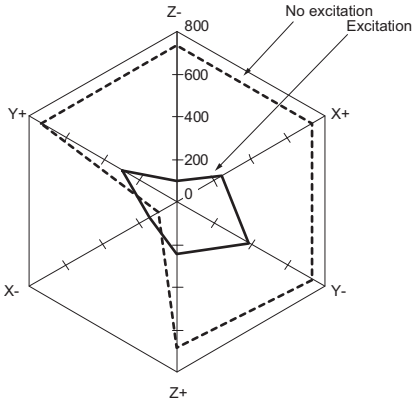
# Engineering Data

## ●Contact resistance

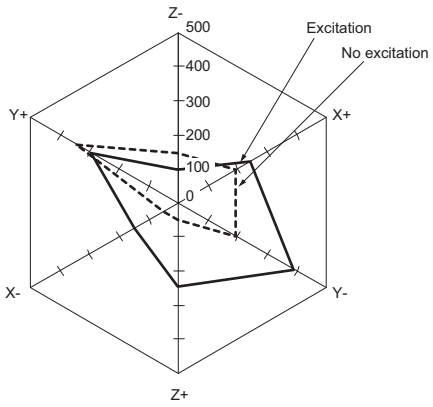



## ●Malfunction shock resistance

### G9KC-4A



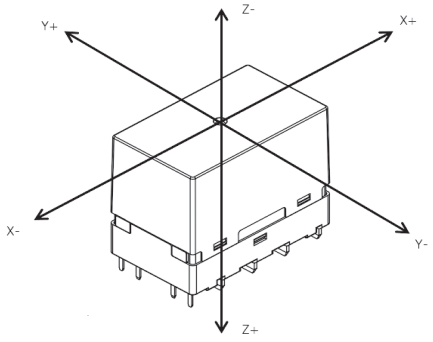

### G9KC-4A1B




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





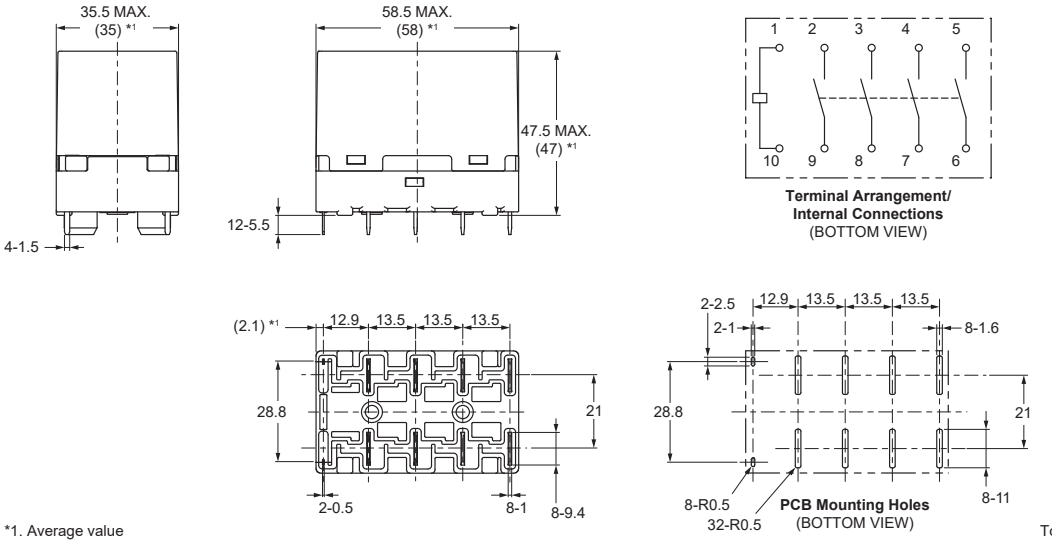

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# Dimensions

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)**

## G9KC-4A

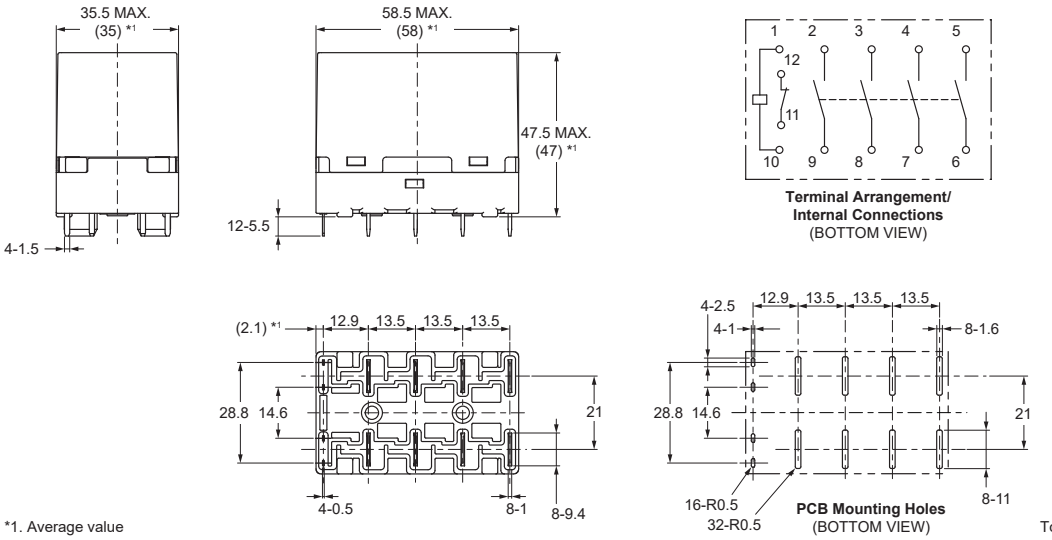



*1. Average value

Tolerance: ±0.1

CAD Data

## G9KC-4A1B




*1. Average value

Tolerance: ±0.1

CAD Data



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# Approval Standard

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

| Model | Contact form | Coil ratings | Contact ratings | Number of test operations |
|---|---|---|---|---|
| G9KC-4A | 4a | 12, 24 VDC *1 | 480 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 277 VAC 40 A (Resistive) 85°C | 30,000 |
| G9KC-4A1B | 4a | 12, 24 VDC *1 | 480 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 277 VAC 40 A (Resistive) 85°C | 30,000 |
| | 1b | 12, 24 VDC *1 | 277 VAC 1 A (Resistive) 85°C | 100,000 |
| | | | 30 VDC 1 A (Resistive) 85°C | 100,000 |

*1. Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

### EN/IEC, TÜV Certificated: (Certificate No. R50624494)

| Model | Contact form | Coil ratings | Contact ratings | Number of test operations |
|---|---|---|---|---|
| G9KC-4A | 4a | 12, 24 VDC *1 | 480 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 480 VAC 40 A (Resistive) 85°C | 30,000 |
| G9KC-4A1B | 4a | 12, 24 VDC *1 | 480 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 480 VAC 40 A (Resistive) 85°C | 30,000 |
| | 1b | 12, 24 VDC *1 | 277 VAC 1 A (Resistive) 85°C | 100,000 |
| | | | 30 VDC 1 A (Resistive) 85°C | 100,000 |

*1. Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

### CQC Certificated: (Certificate No. CQC24002430461)

| Model | Contact form | Coil ratings | Contact ratings | Number of test operations |
|---|---|---|---|---|
| G9KC-4A | 4a | 12, 24 VDC *1 | 277 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 480 VAC 40 A (Resistive) 85°C | 30,000 |
| G9KC-4A1B | 4a | 12, 24 VDC *1 | 277 VAC 32 A (Resistive) 85°C | 50,000 |
| | | | 480 VAC 40 A (Resistive) 85°C | 30,000 |
| | 1b | 12, 24 VDC *1 | 277 VAC 1 A (Resistive) 85°C | 100,000 |
| | | | 30 VDC 1 A (Resistive) 85°C | 100,000 |

*1. Holding voltage of 35% (after applying rated voltage to coil for 0.1 seconds)

| | | |
|---|---|---|
| **Creepage distance (requirement value)** | | 8 mm min. (Between main contacts and coil) |
| **Clearance (requirement value)** | | 6.3 mm min. (Between main contacts and coil) |
| **Insulation material group** | | IIIa |
| **Type of insulation** | **between contacts and coil** | Basic (480 V, OV-cat.III, Pollution degree 3) (Main contact) |
| | **between open contacts** | Micro disconnection at 480 V and Full disconnection at 277 V (Main contact) |
| **Rated insulation system** | | 277 V / 480 V (Main contact) |
| **Rated voltage system** | | 277 V / 480 V (Main contact) |
| **Category of protection (IEC61810-1)** | | RTII |
| **Flammability class (UL94)** | | V-0 |
| **Coil insulation system (UL)** | | Class F |

### Compliant Standard

IEC62955:2018

Main contact: 9.11.2.3 a) + 9.11.2.2

Main contact: 9.11.2.3 b) + 9.11.2.3 c)

$I_p$ = 2.6 kA, $I^2t$ = 6.5 $kA^2s$ ($I_n \leq 32$ A, $I_{nc}$ and $I_{\Delta c}$ = 10 kA)

$I_m$ = 500 A, U = 277/480 VAC



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# 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

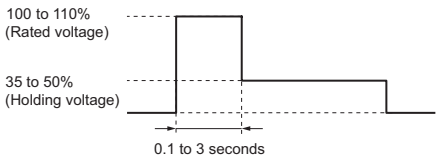
### ●Drop

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

## Precautions for Correct Use

### ●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 (DC12)<br>115 Ω (DC24) | Approx. 5 to 6 W |
| Holding voltage | 35 to 50% | | Approx. 0.6 to 1.3 W |

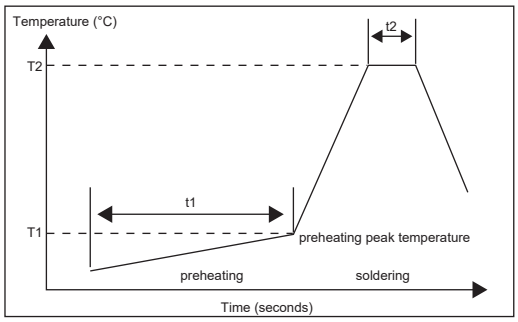
✻ The coil resistances were measured at a coil temperature of 23°C with tolerances of ± 10%.

### ●Diode Connection for Operating Coil

- The coil has no polarity. Connect the diodes in the reverse polarity of the voltage applied to the coil.
- Use diodes with a reverse withstand voltage of 10 times or more than the coil rated voltage, and a forward current of at least the coil rated current.

### ●PCB Terminal Soldering

- Perform soldering under the following conditions.
  (1) Solder bath
  Conduct at 280°C for 20 seconds or less.
  (2) Flow solder mounting
  Mount using the following temperature profile.




| T1 preheating peak temperature (°C) | T2 soldering temperature (°C) | t1 preheating time | t2 soldering time |
|---|---|---|---|
| 120 | 260 | 40 s or less. | 5 s or less. |

- It is not possible to wash relay as this is not fully sealed type.

### ●Assembly

- Assemble relays in an environment with less amount of dust and harmful gases.
- 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 220 g. Be careful of the strength of PCB. To reduce soldering crack due to heat stress, use both sides through hole PCB.

### ●Electrical Endurance

- This relay's electrical endurance specification is based on our company's standard test procedure with resistive loads. Relays intended for use with remove; types of drive circuits PWM, capacitive, resistive dropper etc.), types of loads (e.g. capacitive or inductive), and switching cycles (duty and operation timing) must be tested to confirm suitability to the actual intended application.
- The final failure mode is failure to break the circuit. In such a case, burning may extend to surrounding components.
  Implement safety circuits and other measures to minimize the risk of mechanical failure.

### ●Micro Load

- The main contact of the relay is suitable for high capacity opening and closing applications. Do not use it for opening and closing of minor loads, such as for signal applications.


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