DC Power Relays

G9EK-1

Gasless High-capacity DC Power Relay that achieves carbon neutrality.

- Achieves 500 VDC, 120 A high capacity with bidirectional switching performance without the need of gas filling and sealed structure of the switching section.
- A compact relay (64.2 x 86 x 47.7 mm (H x W x L)) capable of switching 500 A at 400 VDC max.
- Achieves industry-leading* low power consumption. Contributes to energy saving of customer's system.
- Vibration and impact resistant performance that can be installed in mobility.
- Approved UL Standard.

* Based on OMRON investigation in October 2024

Refer to "**DC Power Relays Common Precautions**".

Model Number Legend

G9EK-□-□-□-□
1 2 3 4

1. Number of Poles
1: 1 pole

2. Contact Form
Blank: SPST-NO

3. Special Functions
Blank: Standard
U: Low voltage operation

4. Approved standard
Blank: Standard
UTU: UL approved standard type

List of Models

Models	Terminals		Contact form	Coil rated voltage	Model
	Coil terminals	Contact terminals			
Switching/current conduction models	Connector	Screw terminals	SPST-NO	12 VDC	G9EK-1-U
	Connector	Screw terminals	SPST-NO	12 VDC	G9EK-1-UTU

Note: 1. Mating Connector Part No.6098-2456, 6098-0593 (SUMITOMO)

Ratings

●Coil

Item / Model	Rated voltage	Rated current (mA)	Coil resistance (Ω)	Must-operate voltage (V)	Must-release voltage (V)	Maximum voltage (V)	Power consumption (W)
G9EK-1-U	12 VDC	333	36	6.5 Max	0.6 Min	16	Approx. 4
G9EK-1-UTU	12 VDC	250	48	9.0 Max	0.6 Min	16	Approx. 3

Note: 1. The figures for the rated current and coil resistance are for a coil temperature of 23°C and have a tolerance of ±10%
Note: 2. The figures for the operating characteristics are for a coil temperature of 23°C
Note: 3. The figures for the maximum voltage that can be applied to the relay coil and at 23°C within 10 minutes.

●Contacts

Item	G9EK-1-U / G9EK-1-UTU
Rated load (resistive load)	120 A at 500 VDC
Rated carry current	120 A
Maximum switching voltage	500 VDC
Maximum switching current	120 A

Characteristics

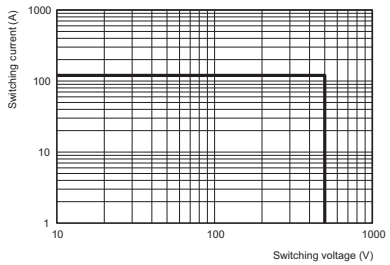
Item		Model: G9EK-1-U / G9EK-1-UTU
Contact resistance *1		30 mΩ max. (0.4 mΩ typical)
Contact voltage drop		0.2 V max. (for a current of 120 A)
Operate time		50 ms max. (Coil rated voltage not including bounce time)
Release time		30 ms max. (Coil rated voltage without absorb coil surge)
Insulation resistance *2	**Between coil and contacts**	1000 MΩ min.
	Between contacts of the same polarity	1000 MΩ min.
Dielectric strength	**Between coil and contacts**	2500 VAC 1 min
	Between contacts of the same polarity	2500 VAC 1 min
Impulse withstand voltage *3		4000 V
Vibration resistance	**Destruction**	33 Hz Acceleration: 45 m/s^2
	Malfunction	10 to 500 Hz Acceleration: 45 m/s^2
Shock resistance	**Destruction**	490 m/s^2 (pulse duration: 11 ms)
	Malfunction (Energized)	980 m/s^2 (pulse duration: 11 ms detection time: 10 μs)
	Malfunction (De-energized)	107.8 m/s^2 (pulse duration: 11 ms detection time: 10 μs)
Mechanical endurance *4		200,000 ops. min.
Electrical endurance (resistive load) *5		(1) 120 A at 500 VDC (1000 operations min.) (2) 60 A at 500 VDC (6000 operations min.)
Short-time carry current		Refer the Carry Current vs Energizing Time Graph
Maximum interruption current		500 A at 400 VDC (1 operations min.)
Ambient operating temperature		-40 to 70°C (without freezing or condensation)
Ambient operating humidity		5% to 85%
Weight (Including accessories)		Approx.340 g / Approx.310 g

Note: Unless otherwise specified, the above values are the initial values at an ambient temperature of 23°C and ambient pressure of 1 atm. In addition, these are values obtained under each condition in a single test, and do not guarantee values that can be obtained under combined conditions of each rating value and performance value (for example, maximum interruption after electrical endurance, maximum interruption after mechanical endurance, etc.).
*1. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.
*2. The insulation resistance was measured with a 1000-VDC megohmmeter.
*3. The impulse withstand voltage was measured with a JEC-212 (1981) standard impulse voltage waveform (1.2 x 50 μs).
*4. The mechanical endurance was measured at a switching frequency of 3,600 operations/hr.
*5. The electrical endurance was measured at a switching frequency of 60 operations/hr.
The switching performance and interruption performance were measured with varistor connected to absorb coil surge.

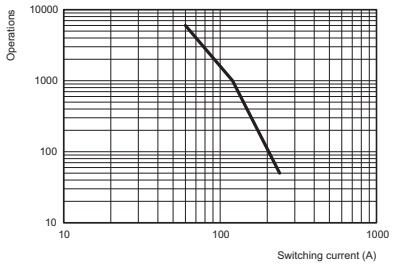
Engineering Data

G9EK-1-U Switching/Current Conduction Models

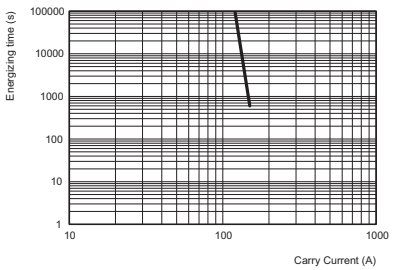
●Maximum Switching Capacity



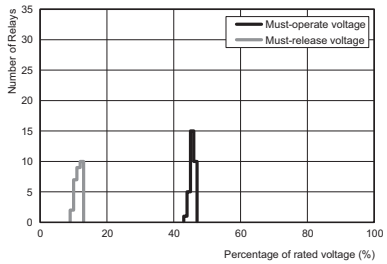
●Electrical Endurance (Switching Performance)



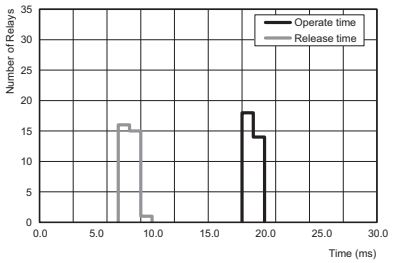
●Carry Current vs Energizing Time



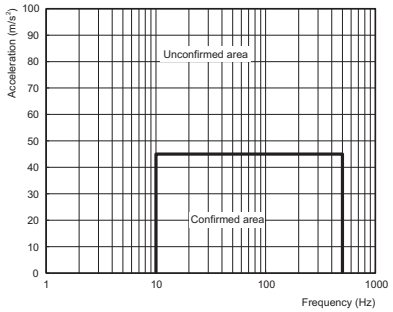
●Must-operate Voltage and Must-release Voltage Distributions



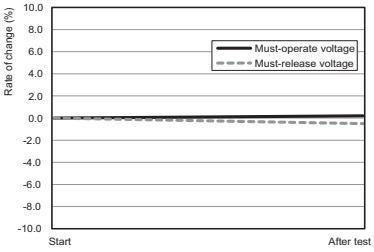
●Time Characteristic Distributions



●Vibration Malfunction

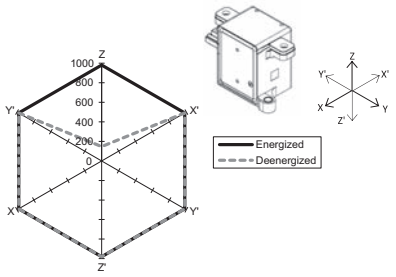


●Vibration Resistance

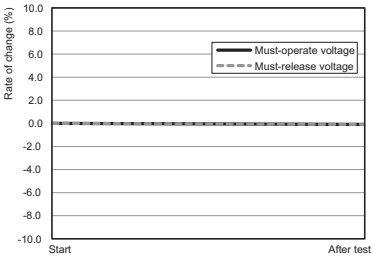


Characteristics are measured after vibration at the frequency of 33Hz, 45m/s² is applied to the test piece (not energized) in vertical direction for 4 hours and in each left, right, front and back directions for 2 hours.

●Shock Malfunction



●Shock Resistance

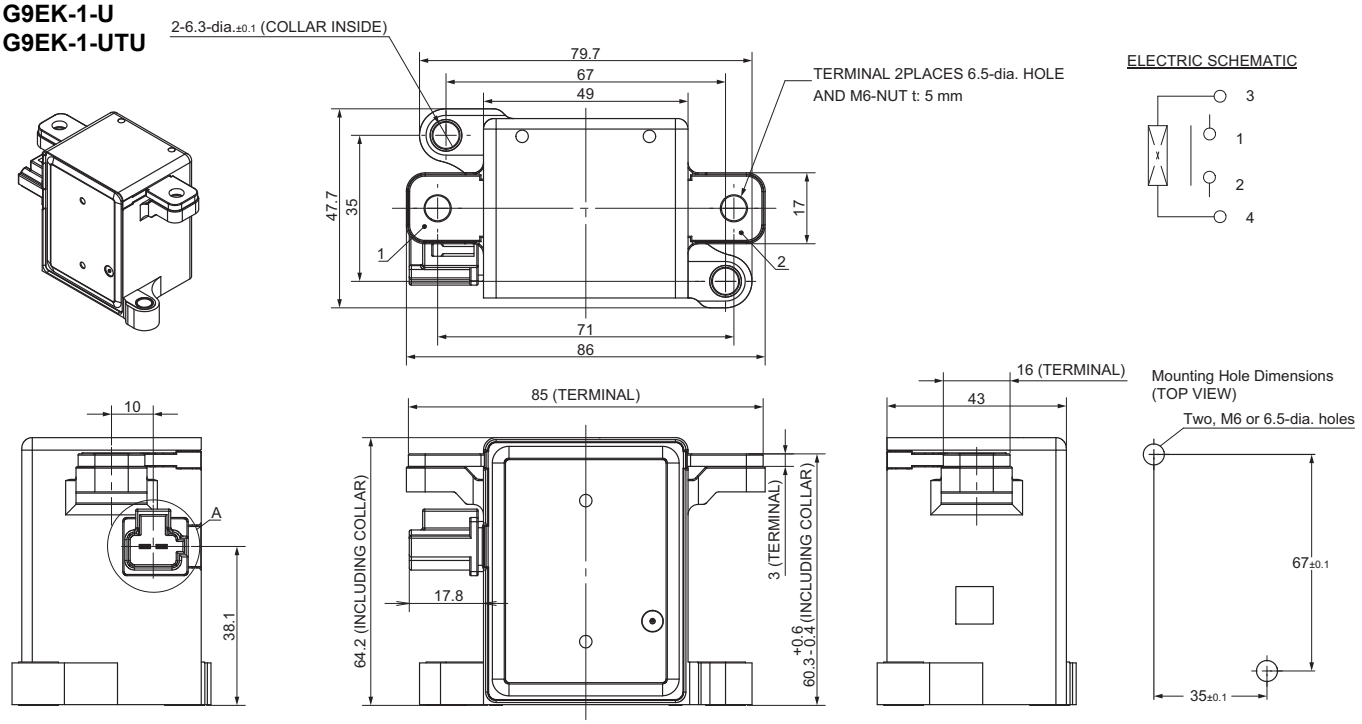


Characteristics were measured after applying a shock of 490 m/s² to the test piece 3 times each in 6 directions along 3 axes. The percentage rate of change is the average value for all of the samples.

G9EK-1

Dimensions (Unit: mm)

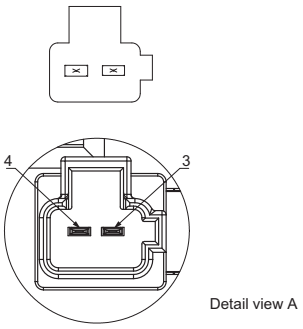
G9EK-1-U
G9EK-1-UTU



TOLERANCE UNLESS SPECIFIED

DIMENSION	TOLERANCE
10 or lower	±0.3
10 to 50 mm	±0.5
50 or higher	±1

MATING CONNECTOR
SUMITOMO 6098-2456, 6098-0593



Detail view A

Approval Standard

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

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G9EK-1-UTU	SPST-NO(1a)	12 VDC	500 VDC 60A (Resistive)	6,000
			500 VDC 120A (Resistive)	1,000

Safety Precautions for DC Power Relays

⚠ WARNING

Take measures to prevent contact with charged parts when using the Relay for high voltages.

This relay is a high-voltage and high-current type. Do not apply a contact voltage or current in excess of the rated values given in the data sheet. Do not exceed the specified number of switching operations. Otherwise, it may result in abnormal heat generation, smoke generation, or fire. Use only within the specified operating conditions.

Precautions for Correct Use

Refer to the relevant catalog for common precautions.

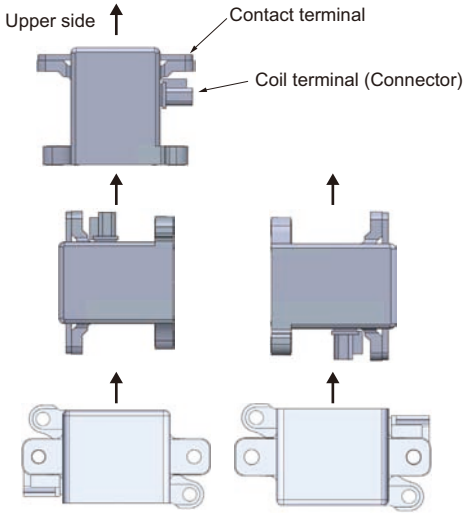
1. Be sure to tighten all screws to the appropriate torque given below. Loose screws may result in burning due to abnormal heat generation during energization.
   - M8 screws: 8.82 to 9.80 N·m
   - M6 screws: 3.92 to 4.90 N·m
   - M5 screws: 1.57 to 2.35 N·m
   - M4 screws: 0.98 to 1.37 N·m
   - M3.5 screws: 0.75 to 1.18 N·m
2. The contacts of G9EA, G9EC, G9EH, and G9EJ relays have polarity. Be sure to perform connections with the correct polarity. If the contacts are connected with the reverse polarity, the switching characteristics specified in this document cannot be assured.
3. Do not drop or disassemble this Relay. Not only may the Relay fail to meet the performance specifications, it may also result in damage, electric shock, or burning.
4. Do not use these Relays in strong magnetic fields of 800 A/m or higher (e.g., near transformers or magnets). The arc discharge that occurs during switching may be bent by the magnetic field, resulting in flashover or insulation faults.
5. This Relay is a device for switching high DC voltages. If it is used for voltages exceeding the specified range, it may not be possible to interrupt the load and burning may result. In order to prevent fire spreading, use a configuration in which the current load can be interrupted in the event of emergencies.
   In order to ensure safety of the system, replace the Relay on a regular basis.
6. If the Relay is used for no-load switching, the contact resistance may increase and so confirm correct operation under the actual operating conditions.
7. G9EA, G9EC, and G9EH relays are pressurized-gas injected products. Even in applications with low switching frequencies, the ambient temperature and heat caused by arc discharge in the contacts may allow permeation of the sealed gas, resulting in arc interruption failure.
   In order to ensure safety of the system, replace Relays on a regular basis.
8. Do not use or store G9EA, G9EC, and G9EH relays in vacuum. Doing so will accelerate deterioration of the sealing.
9. With this Relay, if the rated voltage (or current) is continuously applied to the coil and contacts, and then turned OFF and immediately ON again, the coil temperature, and consequently the coil resistance, will be higher than usual. This means that the must operate voltage will also be higher than usual, exceeding the rated value (“hot start”). In this case, take the appropriate countermeasures, such as reducing the load current or restricting the energizing time or ambient operating temperature.
10. The ripple percentage for DC relays can cause fluctuations in the must-operate voltage or humming. For this reason, reduce the ripple percentage in full-wave rectified power supply circuits by adding a smoothing capacitor. Ensure that the ripple percentage is less than 5%.
11. Ensure that a voltage exceeding the specified maximum voltage is not continuously applied to the coil. Abnormal heating in the coil may shorten the lifetime of the insulation coating.
12. Do not use the Relay at a switching voltage or current greater than the specified maximum values. Doing so may result in arc discharge interruption failure or burning due to abnormal heating in the contacts.
13. The contact ratings are for resistive loads. The electrical endurance with inductive loads is inferior to that of resistive loads. Confirm correct operation under the actual operating conditions.
14. Do not use the Relay in locations where water, solvents, chemicals, or oil may come in contact with the case or terminals. Doing so may result in deterioration of the case resin or abnormal heating due to corrosion or contamination of the terminals. Also, if electrolyte adheres to the output terminals, electrolysis may occur between the output terminals, resulting in corrosion of the terminals or wiring disconnections.
15. Be sure to turn OFF the power and confirm that there is no residual voltage before replacing the Relay or performing wiring.
16. The distance between crimp terminals or other conductive parts will be reduced and insulation properties will be lowered if wires are laid in the same direction from the contact terminals. Use insulating coverings, do not wire in the same direction, and take other measures as required to maintain insulation properties.
17. Use either a varistor, or a diode plus Zener diode as a protective circuit against reverse surge in the relay coil. (Each relay type uses a different voltage method such as Varistor voltage and Zener voltage, so please contact OMRON sales representative. Please perform adequate performance tests with your equipment.)
    Using a diode alone will reduce the switching characteristics.
18. When wiring a G9EA/G9EC/G9EH relay to the coil/contact terminals, be sure to use screws provided with these products. The specified tightening torque cannot be achieved with different screws and may result in abnormal heat generation when energized.
19. When wiring a G9EK relay to the contact terminals, use screws which are longer than 8mm + the thickness of the material being fastened + the washer of the screw. Apply torque after the screws are placed.
20. When wiring to the contact terminals, avoid overloading the terminals and wires.

Recommended Wire Size

Model	Model Size
G9EK-1-U	30 mm^2 or more
G9EK-1-UTU	30 mm^2 or more
G9EA-1(-B)	14 to 22 mm^2
G9EA-1(-B)-CA	22 to 38 mm^2
G9EC-1(-B)	38 to 60 mm^2
G9EH-1	100 mm^2 or more
G9EJ-1-E	3.5 to 5.5 mm^2

Note: Use flexible leads.

21. G9EK is limited for mounting direction due to the specification of operation voltage.
    Do not use in any other direction except as indicated in below chart. There is a risk of reduced operational lifetime for failuret to observe this warning.



22. Durability will vary depending on the customer's usage environment and conditions. Even if the number of opening and closing cycles is small, if the product is used under complex conditions, be sure to check the actual product or contact your OMRON sales.

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

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Device & Module Solutions Company

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