

DC Power Relays (60-A, 100-A Models)

G9EA-1

DC Power Relays Capable of Interrupting High-voltage, High-current Loads

- A compact relay capable of switching 400-V 60-A/100-A DC loads. (Capable of interrupting 600 A at 300 VDC max.)
- The switching section and driving section are gas-injected and hermetically sealed, allowing these compact relays to interrupt high-capacity loads. The sealed construction also requires no arc space, saves space, and helps ensure safe applications.
- Downsizing and optimum design allow no restrictions on the mounting direction.
- Terminal Cover and DIN Track Adapters are also available for industrial applications.
- UL/CSA standard UL508 approved.



NEW

Model Number Structure

Model Number Legend

G9EA-□-□-□-□
1 2 3 4

1. Number of Poles

1: 1 pole

2. Contact Form

Blank: SPST-NO

3. Coil Terminals

B: M3.5 screw terminals

Blank: Lead wire output

4. Special Functions

CA: High-current conduction (100 A)

Ordering Information

List of Models

Models	Terminals		Contact form	Rated coil voltage	Model
	Coil terminals	Contact terminals			
Switching/current conduction models	Screw terminals	Screw terminals	SPST-NO	12 VDC	G9EA-1-B
	Lead wires			24 VDC	G9EA-1
High-current conduction models	Screw terminals			48 VDC	G9EA-1-B-CA
	Lead wires			60 VDC	G9EA-1-CA
				100 VDC	

- Note:** 1. Relays come with two M5 screws for the main terminals (contacts).
2. Relays with coil terminals and screw terminals come with two M3.5 screws.

Specifications

■ Ratings

Coil

Rated voltage	Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Maximum voltage (See note 3.)	Power consumption
12 VDC	417 mA	28.8 Ω	75% max. of rated voltage	8% min. of rated voltage	130% of rated voltage	Approx. 5 W
24 VDC	208 mA	115.2 Ω				
48 VDC	102 mA	469.3 Ω				
60 VDC	86.2 mA	695.7 Ω				Approx. 5.2 W
100 VDC	53.6 mA	1,864 Ω				Approx. 5.4 W

- Note:** 1. The figures for the rated current and coil resistance are for a coil temperature of 23°C and have a tolerance of $\pm 10\%$.
 2. The figures for the operating characteristics are for a coil temperature of 23°C.
 3. The figure for the maximum voltage is the maximum voltage that can be applied to the relay coil for period of 10 minutes at an ambient temperature of 23°C. It does not apply to continuous operation.

Contacts

Item	Resistive load	
	G9EA-1(-B)	G9EA-1(-B)-CA
Rated load	60 A at 400 VDC, 100 A at 120 VDC	30 A at 400 VDC
Rated carry current	60 A	100 A
Maximum switching voltage	400 V	400 V
Maximum switching current	100 A	30 A

■ Characteristics

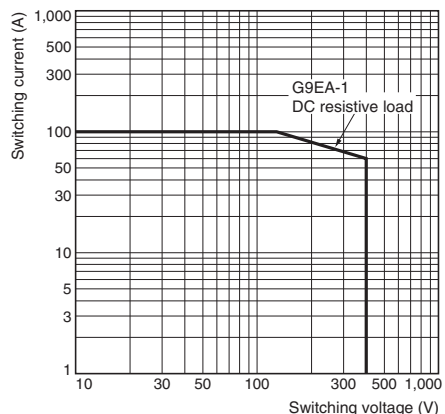
Item		G9EA-1(-B)	G9EA-1(-B)-CA
Contact resistance (See note 2.)		30 m Ω max. (0.6 m Ω typical)	10 m Ω max. (0.3 m Ω typical)
Contact voltage drop		0.1 V max. (for a carry current of 60 A)	0.1 V max. (for a carry current of 100 A)
Operate time		50 ms max.	
Release time		30 ms max.	
Insulation resistance (See note 3.)	Between coil and contacts	1,000 M Ω min.	
	Between contacts of the same polarity	1,000 M Ω min.	
Dielectric strength	Between coil and contacts	2,500 VAC, 1 min	
	Between contacts of the same polarity	2,500 VAC, 1 min	
Impulse withstand voltage (See note 4.)		4,500 V	
Vibration resistance	Destruction	10 to 55 to 10 Hz, 0.75-mm single amplitude (Acceleration: 2.94 to 88.9 m/s ²)	
	Malfunction	10 to 55 to 10 Hz, 0.75-mm single amplitude (Acceleration: 2.94 to 88.9 m/s ²)	
Shock resistance	Destruction	490 m/s ²	
	Malfunction	196 m/s ²	
Mechanical endurance (See note 5.)		200,000 ops. min.	
Electrical endurance (See note 6.)		120 VDC, 100 A, 3,000 ops. min.	400 VDC, 30 A, 1,000 ops. min.
		400 VDC, 60 A, 3,000 ops. min.	120 VDC, 30 A, 2,500 ops. min.
		400 VDC, 30 A, 30,000 ops. min.	—
Short-time carry current		100 A (10 min)	150 A (10 min)
Maximum interruption current		600 A at 300 VDC (5 times)	—
Overload interruption		180 A at 400 VDC (100 times min.)	100 A at 120 VDC (150 times min.)
Reverse polarity interruption		—60 A at 200 VDC (1,000 times min.)	—
Ambient operating temperature		—40 to 70°C (with no icing or condensation)	
Ambient operating humidity		5% to 85%	
Weight		Approx. 310 g	

- Note:** 1. The above values are initial values at an ambient temperature of 23°C unless otherwise specified.
 2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.
 3. The insulation resistance was measured with a 500-VDC megohmmeter.
 4. The impulse withstand voltage was measured with a JEC-212 (1981) standard impulse voltage waveform (1.2 $\times$ 50 μ s).
 5. The mechanical endurance was measured at a switching frequency of 3,600 operations/hr.
 6. The electrical endurance was measured at a switching frequency of 60 operations/hr.

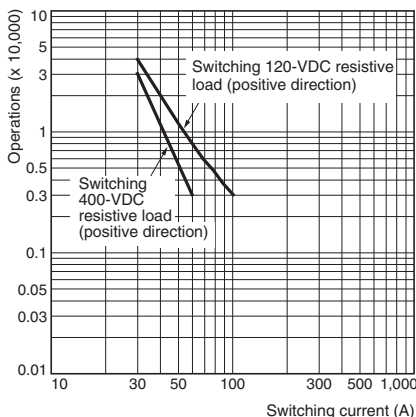
Engineering Data

■ G9EA-1(-B) Switching/Current Conduction Models

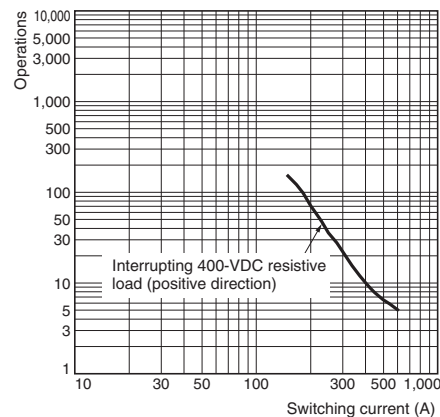
Maximum Switching Capacity



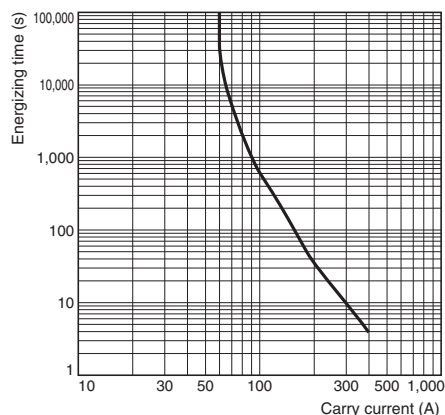
Electrical Endurance (Switching Performance)



Electrical Endurance (Interruption Performance)

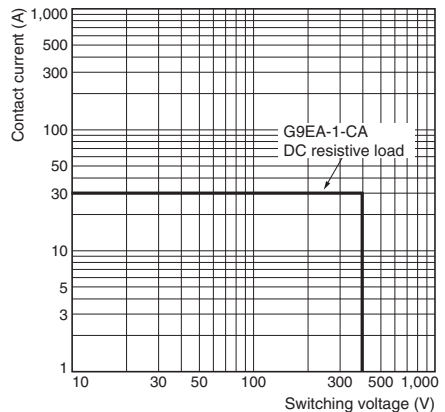


Carry Current vs Energizing Time

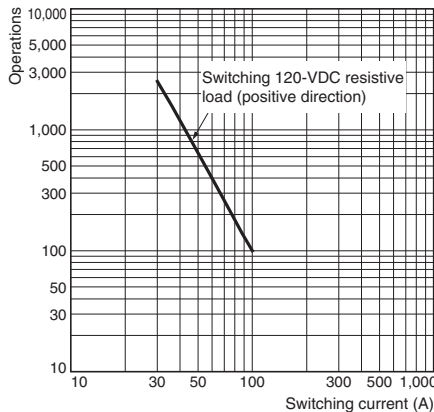


■ G9EA-1(-B)-CA High-current Conduction Models

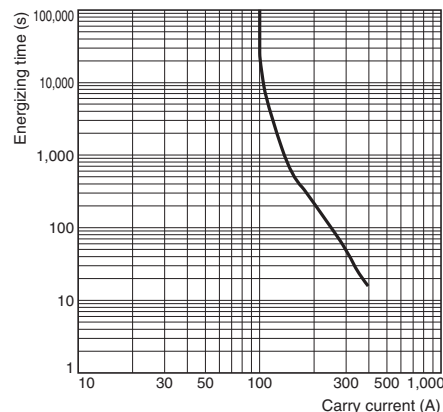
Maximum Switching Capacity



Electrical Endurance (Switching Performance)

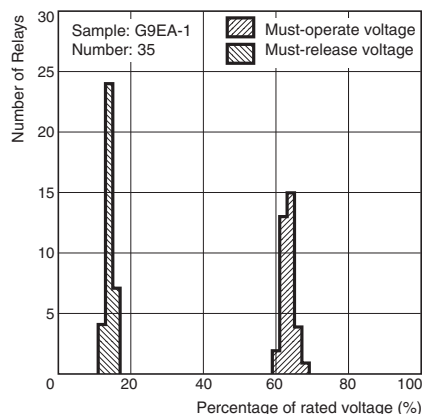


Carry Current vs Energizing Time

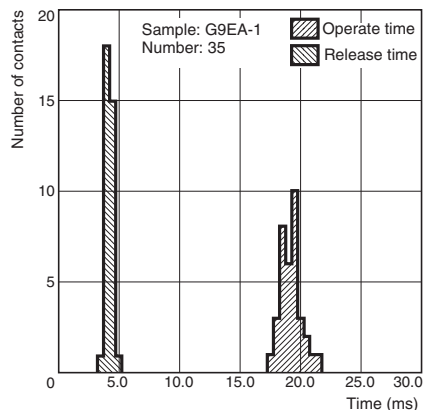


■ All G9EA-1 Models

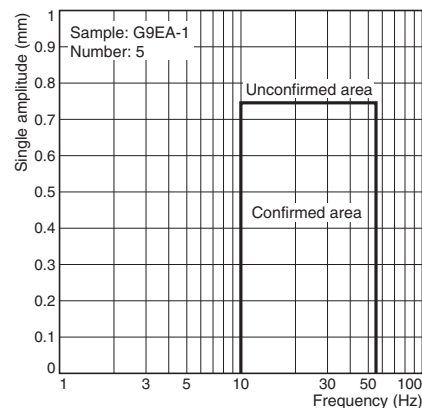
Must-operate Voltage and Must-release Voltage Distributions



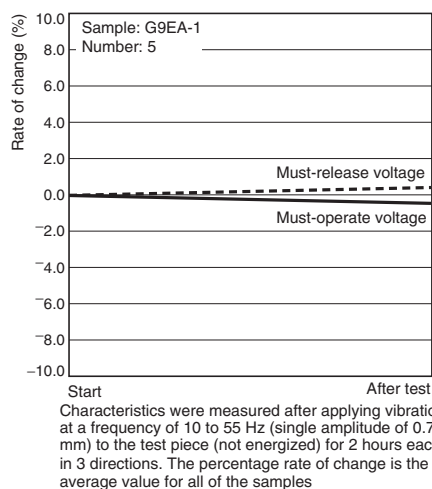
Time Characteristic Distributions



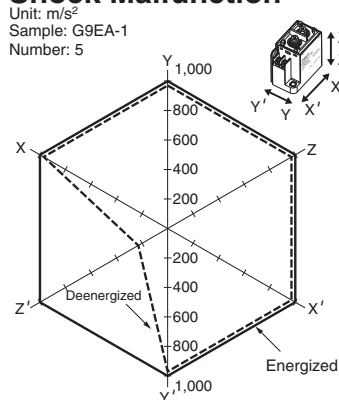
Vibration Malfunction



Vibration Resistance

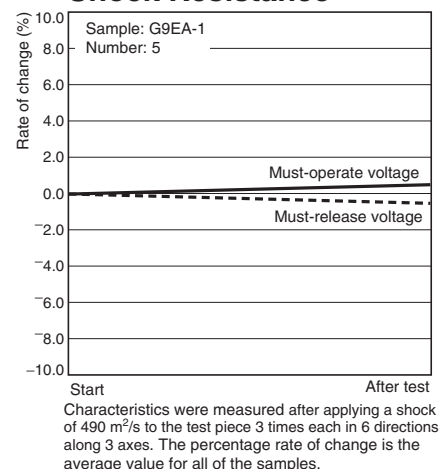


Shock Malfunction



The value at which malfunction occurred was measured after applying shock to the test piece 3 times each in 6 directions along 3 axes.

Shock Resistance

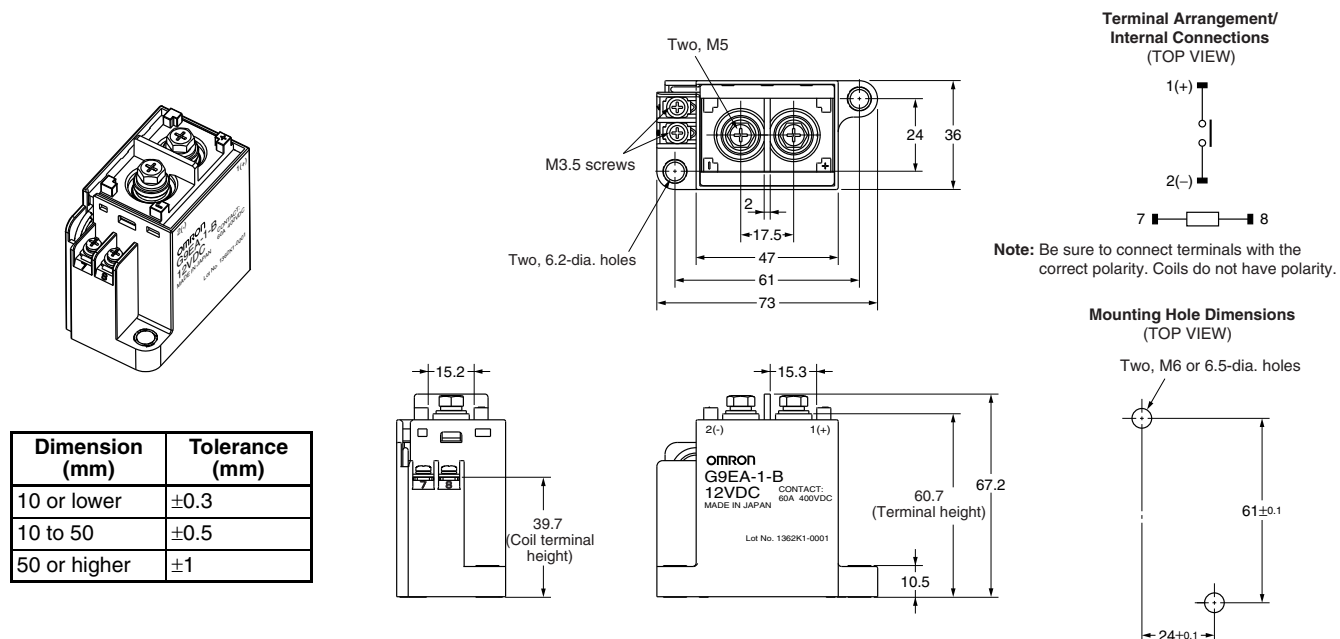


Dimensions

Note: All units are in millimeters unless otherwise indicated.

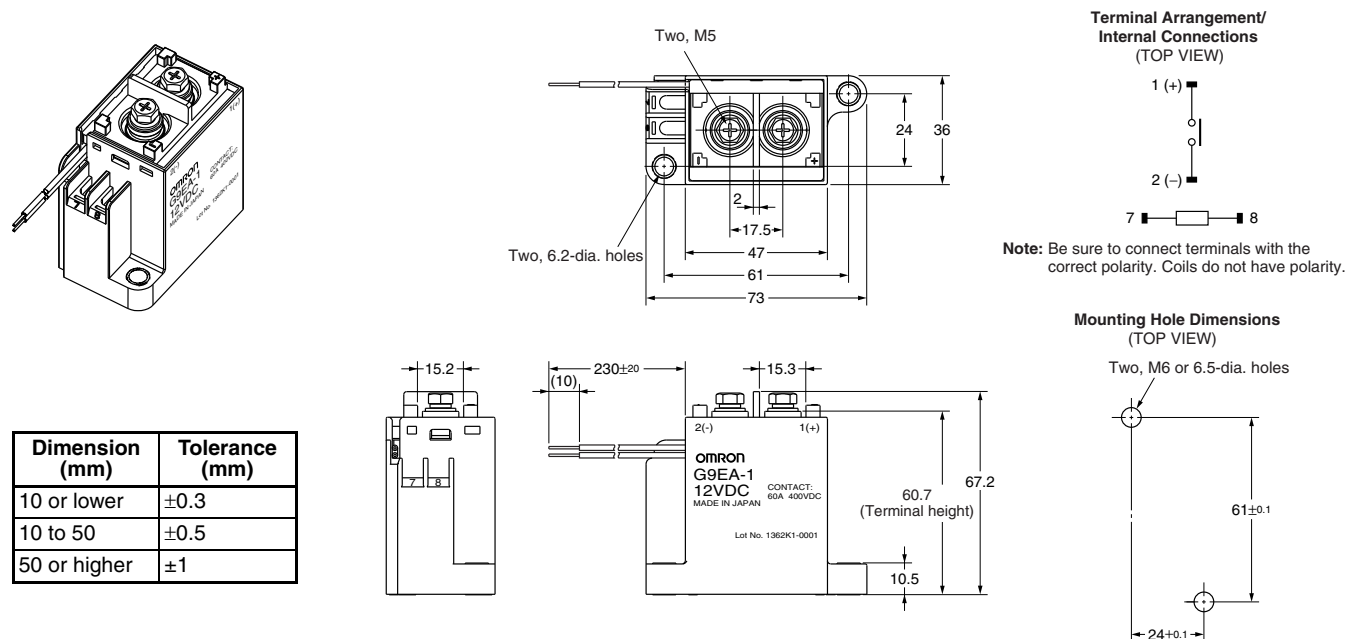
Models with Screw Terminals

G9EA-1-B(-CA)



Models with Lead Wires

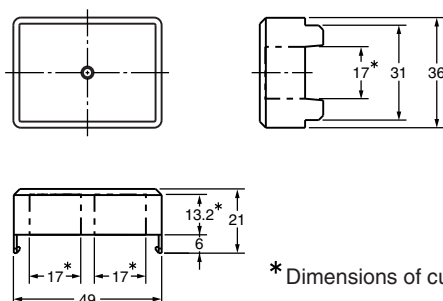
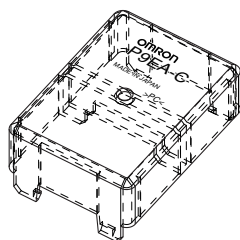
G9EA-1(-CA)



Options

Terminal Cover

P9EA-C



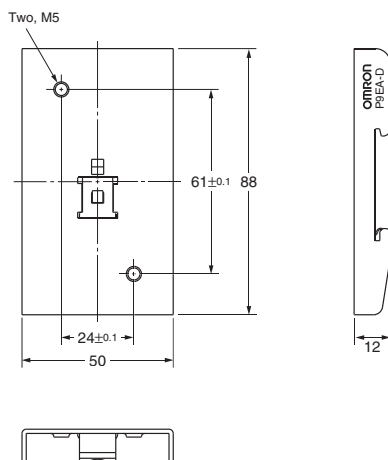
Note: Be sure to remove the cutouts for wiring that are located in the wiring outlet direction before installing the Terminal Cover.

Dimension (mm)	Tolerance (mm)
10 or lower	± 0.3
10 to 50	± 0.5
50 or higher	± 1

* Dimensions of cutouts for wiring.

DIN Track Adapter

P9EA-D



Dimension (mm)	Tolerance (mm)
10 or lower	± 0.3
10 to 50	± 0.5
50 or higher	± 1

Precautions

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

■ 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 G9EA and G9EC Relays' contacts 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. These Relays contain pressurized gas. 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 the Relay in a 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. Using a diode alone will reduce the switching characteristics.
18. Do not tighten the screws to a torque exceeding 11 N·m for the M8 screws and 5 N·m for the M5 screws.
Overtightening the contact terminals will reduce the switching performance and damage the product.
19. Be sure to use the screws provided with the product for wiring coil terminals and contact terminals. The specified tightening torque cannot be achieved with different screws and may result in abnormal heat generation when energized.

The coil's power consumption can be reduced by using in combination with a semiconductor circuit. Consult your OMRON representative for details.

Recommended Wire Size

Model	Size
G9EA-1(-B)	14 to 22 mm ²
G9EA-1(-B)-CA	22 to 38 mm ²

Note: Use flexible leads.

MEMO

Omron Electronic Components, LLC

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 - Products:** Products and/or services of Seller
 - Including:** Including without limitation
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 - All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Products shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Products until the full purchase price is paid by Buyer;
 - Delivery and shipping dates are estimates only; and
 - Seller will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
- Claims:** Any claim by Buyer against Seller for shortage or damage to the Products occurring before delivery to the carrier or any claim related to pricing or other charges must be presented in detail in writing to Seller within 30 days of receipt of shipment.

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- Use with Attention:** The followings are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible use of any Product, nor to imply that any use listed may be suitable for any Product:
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- Use in consumer Products or any use in significant quantities.
 - Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - Systems, machines, and equipment that could present a risk to life or property.
- Prohibited Use:** NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
 - Motorized Vehicle Application:** USE OF ANY PRODUCT/S FOR A MOTORIZED VEHICLE APPLICATION MUST BE EXPRESSLY STATED IN THE SPECIFICATION BY SELLER.
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- Errors And Omissions:** The information on Seller's website or in other documentation has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.
- Export Controls:** Buyer shall comply with all applicable laws, regulations and licenses regarding (a) export of the Products or information provided by Seller; (b) sale of Products to forbidden or other proscribed persons or organizations; (c) disclosure to non-citizens of regulated technology or information.

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- Assignment:** Buyer may not assign its rights hereunder without Seller's written consent.
- Law:** These Terms are governed by Illinois law (without regard to conflict of laws). Federal and state courts in Cook County, Illinois have exclusive jurisdiction for any dispute hereunder.
- Amendment:** These Terms constitute the entire agreement between Buyer and Seller relating to the Products, and no provision may be changed or waived unless in writing signed by the parties.
- Severability:** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision.

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1. **Suitability for Use.** Seller shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in Buyer's application or use of the Product. At Buyer's request, Seller will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
 - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
 - (ii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - (iii) Use in consumer products or any use in significant quantities.
 - (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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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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