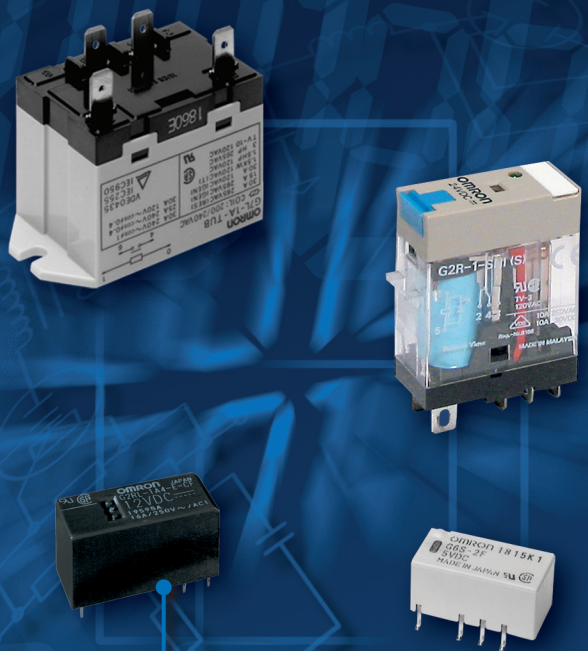
Electronic Components



Relays Electromechanical

Relays Electromechanical | Relays Microelectronic | Switches | Connectors | Sensors | Fiber Optic

OMRON
ELECTRONIC COMPONENTS

Omron Electronic Components LLC

Stability and Experience

With over 70 years experience, Omron continues to apply the latest technologies providing you with innovative efficient control component solutions. Our wide range of relays, switches, sensors, and connectors allows our customers to streamline vendor lists and reduce the cost of procurement.

Quality First

Our commitment, your benefit

Omron makes a conscious choice to relentlessly pursue quality. Our quality engineers are part of the design and manufacturing process from the start. We design and evaluate at the component level, test and adjust during manufacturing, and examine every physical, mechanical, and electrical aspect of each final product before it leaves the factory.

Customer Support

Omron's sales engineers, inside sales representatives, and customer service staff have experience with all types of electronic applications. No matter what the application or volume, we will find just the right component for your project.

Broad Product Offering

Relays:
- MOS FET
- Low Signal
- RF/HF
- RF MEMS
- Power PCB
- Automotive
- General-Purpose
- Solid State

Switches:
- Snap Action
- Tactile
- DIP
- Dome Array
- Thumbwheel
- Rocker

Sensors:
- Flow
- Pressure
- Tilt
- Vibration

Connectors:
- FPC
- Industrial
- PCB

Fiber Optic:
- Tosa/Rosa
- Tx/Rx Module
- Splitters
- MLA

Additional information can be found at www.components.omrom.com, or by calling us at: 847.882.2288 Monday through Friday 7:30 AM until 6:00 PM CST. Our inside sales staff will be ready to provide you with detailed product information, technical design support, or the location of your local Omron sales office or authorized distributor.



RoHS COMPLIANT



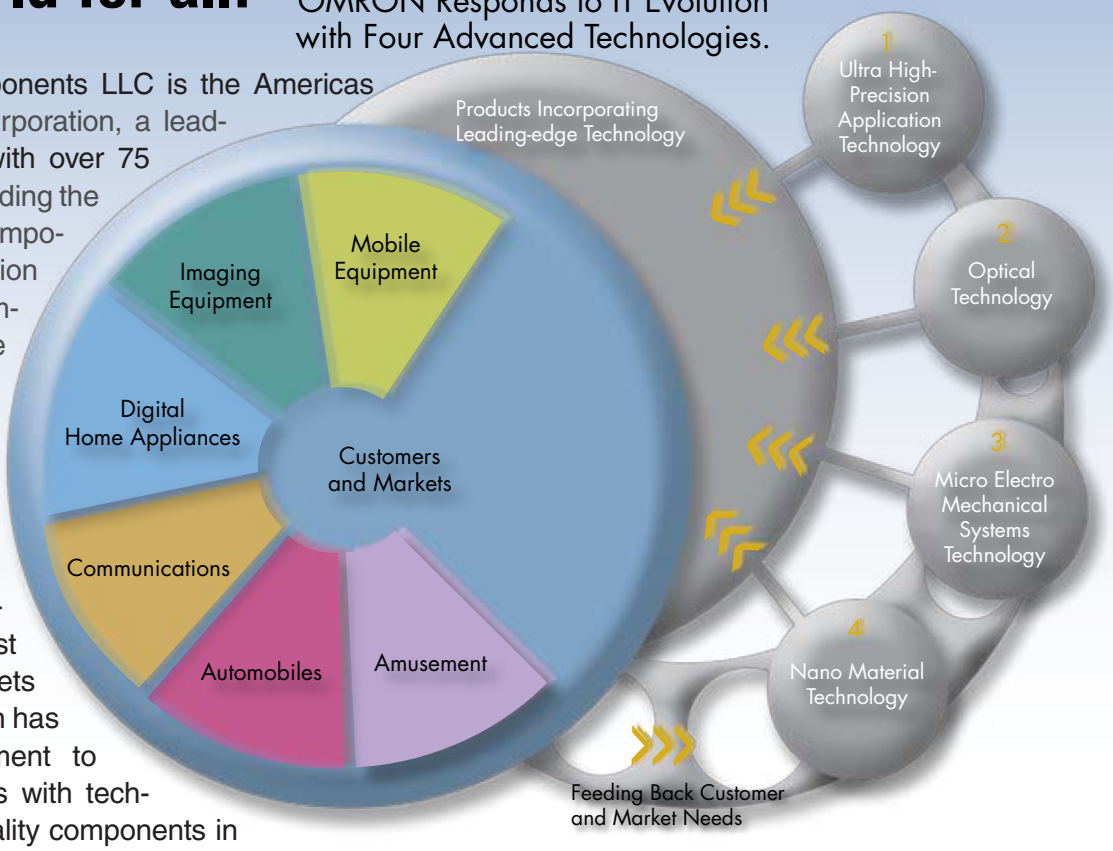
OMRON
ELECTRONIC COMPONENTS

At work for a better life... a better world for all!

CORE TECHNOLOGIES:

OMRON Responds to IT Evolution with Four Advanced Technologies.

Omron Electronic Components LLC is the Americas subsidiary of Omron Corporation, a leading global corporation with over 75 years experience of providing the market with electronic components, industrial automation controls, automotive components, and healthcare products. Our broad product offering can be found in applications for the communications, transportation, medical, HVAC, appliance, industrial automation, consumer electronics, and test & measurement markets around the world. Omron has an unfaltering commitment to supporting its customers with technically superior, high quality components in their current and emerging markets.



In order to provide more value to customers, OMRON has worked to further strengthen our four leading-edge technologies in the electronic components business.

Ultra High-Precision Application Technology

The first is an ultra-precise replication technology that is accurate down to a single micrometer. This technology is indispensable to optical communications, optical displays, illumination, high-frequency devices and subminiature mechanical devices.

Optical Technology

The second is optical control technology, which uses the wave nature of light to efficiently control the direction of light movement. Omron's technology supports the continuing evolution of Passive Optical Networks (PON), Video Over Fiber devices and IT devices used for data communication.

Micro Electro Mechanical Systems Technology

The third is micro-electro-mechanical systems (MEMS) technology, which helps support the Digital age by allowing materials to be processed with micrometer- to nanometer-level precision. This contributes to the micro-miniaturization of mobile devices, consumer applications, industrial
applications, automobile applications and biotechnology-related products. Omron's state-of-the-art chip foundry includes 8" MEMS wafer fabrication.

Nano Material Technology

The fourth is nano-material technology, which is used to develop materials at the molecular level. Omron continues to incorporate nano-materials in to its new, state-of-the art components.

OMRON ELECTRONIC COMPONENTS

RELAYS:

Omron is one of the most recognized world leaders in relay design and manufacturing. Omron delivers innovative control components that allow customers to reduce product size, add more function capability, and assemble product more cost effectively. As a world class manufacturer, the company provides local technical support and global logistics coordination to expertly facilitate design in one country, fabrication in another, and on-time delivery wherever product is needed. Omron's comprehensive quality commitment means improved manufacturing yields, reduced field failures, on-time product launches, and a reputation for product reliability.

PCB Power Relays

Omron's power relays set the standards for industry, providing switching capacity of up to 30A in a variety of contact configurations. Long life spans are assured, even with the most arduous of loads.

Applications

- White goods
- Heating, Ventilation
- Security, Emergency lighting (Building control)
- Industrial Automation

PCB Signal Relays Omron supplies one of the widest ranges of signal relays and is at the forefront of development in specialist products, RF switching and surface mount technology.

Applications

- Telecom, ADSL, Test line access
- Automotive, Audio, Satellite Navigation
- Security, Alarm systems
- Test & Measurement Equipment

Solid State Relays

Omron's line of Solid State Relays are suited to applications that demand long life and high reliability where fast response and high switching rates are required. AC and DC solid state devices are available in current ratings from 1A to up to 40A.

Applications

- HVAC, Refrigeration
- Lighting
- Small Industrial Controls

General Purpose Relays

With switching capabilities from micro amps to 60A in a variety of contact configurations and meeting global industry standards such as UL, CSA, VDE and CE mark, there is an Omron relay to suit every application.

Applications

- HVAC
- Building Control
- Industrial



***Example of the highly automated equipment Omron uses to manufacture it's high precision relays.**

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Omron Electronic Components, LLC

Terms and Conditions of Sales

I. GENERAL

1. Definitions: The words used herein are defined as follows.
   (a) Terms: These terms and conditions
   (b) Seller: Omron Electronic Components LLC and its subsidiaries
   (c) Buyer: The buyer of Products, including any end user in section III through VI
   (d) Products: Products and/or services of Seller
   (e) Including: Including without limitation
2. Offer: Acceptance: These Terms are deemed part of all quotations, acknowledgments, invoices, purchase orders and other documents, whether electronic or in writing, relating to the sale of Products by Seller. Seller hereby objects to any Terms proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
3. Distributor: Any distributor shall inform its customer of the contents after and including section III of these Terms.

II. SALES

1. Prices; Payment: All prices stated are current, subject to change without notice by Seller. Buyer agrees to pay the price in effect at the time the purchase order is accepted by Seller. Payments for Products received are due net 30 days unless otherwise stated in the invoice. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice.
2. Discounts: Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (a) the invoice is paid according to Seller's payment terms and (b) Buyer has no past due amounts owing to Seller.
3. Interest: Seller, at its option, may charge Buyer 1.5% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
4. Orders: Seller will accept no order less than 200 U.S. dollars net billing.
5. Currencies: If the prices quoted herein are in a currency other than U.S. dollars, Buyer shall make remittance to Seller at the then current exchange rate most favorable to Seller; provided that if remittance is not made when due, Buyer will convert the amount to U.S. dollars at the then current exchange rate most favorable to Seller available during the period between the due date and the date remittance is actually made.
6. Governmental Approvals: Buyer shall be responsible for all costs involved in obtaining any government approvals regarding the importation or sale of the Products.
7. Taxes: All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Seller.
8. Financial: If the financial position of Buyer at any time becomes unsatisfactory to Seller, Seller reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Seller may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. Cancellation; Etc: Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
10. Force Majeure: Seller shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. Shipping; Delivery: Unless otherwise expressly agreed in writing by Seller:
    (a) 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;
    (b) Delivery and shipping dates are estimates only; and
    (c) Seller will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. 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.

III. PRECAUTIONS

1. Suitability: IT IS THE BUYER'S SOLE RESPOINSIBILITY TO ENSURE THAT ANY OMRON PRODUCT IS FIT AND SUFFICIENT FOR USE IN A MOTORIZED VEHICLE APPLICATION. BUYER SHALL BE SOLELY RESPONSIBLE FOR DETERMINING APPROPRIATENESS OF THE PARTICULAR PRODUCT WITH RESPECT TO THE BUYER'S APPLICATION INCLUDING (A) ELECTRICAL OR ELECTRONIC COMPONENTS, (B) CIRCUITS, (C) SYSTEM ASSEMBLIES, (D) END PRODUCT, (E) SYSTEM, (F) MATERIALS OR SUBSTANCES OR (G) OPERATING ENVIRONMENT. Buyer acknowledges that it alone has determined that the Products will meet their requirements of the intended use in all cases. Buyer must know and observe all prohibitions of use applicable to the Product/s.
2. 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:
   (a) Outdoor use, use involving potential chemical contamination or electrical interference.
   (b) Use in consumer Products or any use in significant quantities.
   (c) 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.
   (d) Systems, machines, and equipment that could present a risk to life or property.
3. 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.
4. Motorized Vehicle Application: USE OF ANY PRODUCT/S FOR A MOTORIZED VEHICLE APPLICATION MUST BE EXPRESSLY STATED IN THE SPECIFICATION BY SELLER.
5. Programmable Products: Seller shall not be responsible for the Buyer's programming of a programmable Product.

IV. WARRANTY AND LIMITATION

1. Warranty: Seller's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Seller (or such other period expressed in writing by Seller). SELLER MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT ALL OTHER WARRANTIES, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS.
2. Buyer Remedy: Seller's sole obligation hereunder shall be to replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product or, at Seller's election, to repay or credit Buyer an amount equal to the purchase price of the Product; provided that there shall be no liability for Seller or its affiliates unless Seller's analysis confirms that the Products were correctly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Seller before shipment.
3. Limitation on Liability: SELLER AND ITS AFFILIATES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. FURTHER, IN NO EVENT SHALL LIABILITY OF SELLER OR ITS AFFILITATES EXCEED THE INDIVIDUAL PRICE OF THE PRODUCT ON WHICH LIABILITY IS ASSERTED.
4. Indemnities: Buyer shall indemnify and hold harmless Seller, its affiliates and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Seller is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products.

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1. Intellectual Property: The intellectual property embodied in the Products is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Buyer (at its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
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1. Waiver: No failure or delay by Seller in exercising any right and no course of dealing between Buyer and Seller shall operate as a waiver of rights by Seller.
2. Assignment: Buyer may not assign its rights hereunder without Seller's written consent.
3. 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.
4. 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.
5. Severability: If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision.

Certain Precautions on Specifications and Use

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.

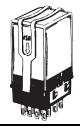
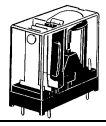
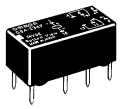
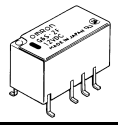
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2. Programmable Products. Seller shall not be responsible for the user's programming of a programmable product, or any consequence thereof.
3. Performance Data. Performance data given in this publication is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Seller's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to Seller's Warranty and Limitations of Liability.
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5. Errors and Omissions. The information in this publication has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors, or omissions.
6. RoHS Compliance. Where indicated, our products currently comply, to the best of our knowledge as of the date of this publication, with the requirements of the European Union's Directive on the Restriction of certain Hazardous Substances ("RoHS"), although the requirements of RoHS do not take effect until July 2006. These requirements may be subject to change. Please consult our website for current information.

MEMO

Electromechanical Relays

Technical Information

Relay Classification

Model	Mounting	Enclosure Ratings	Features
LY 	Discrete	Unsealed	Designed for manual soldering
G2R 		Semi-sealed	Design inhibits flux intrusion into the casing at the terminals during soldering.
G6A 		Fully sealed	Sealed resin casings and covers, limiting damage from corrosive atmospheres.
G6S 	Surface mounting		Surface mounting relays permit automatic reflow soldering.

Construction

■ SEALING

Unsealed

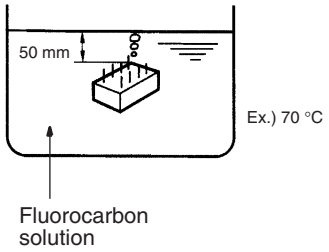
Relays of this type are intended for manual soldering. No measures are taken against penetration of flux and cleaning solvent into the relay. This type of relay cannot be immersion-cleaned.

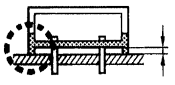
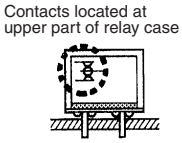
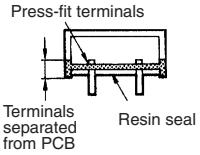
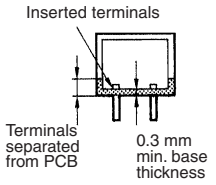
Semi-Sealed

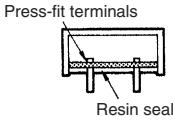
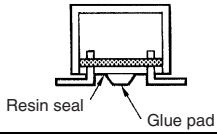
Special design construction prevents flux from penetrating into the relay housing, for example, due to capillary action up the terminals when the relay is soldered onto a PCB. This type of relay also cannot be immersion-cleaned.

Fully Sealed

Fully sealing prevents not only flux, but also cleaning solvent from penetrating into the relay housing. Therefore, this type of relay can be immersion-cleaned. Relays are each tested before being shipped. The relay is immersed in fluorocarbon solution for 1 minute, at a temperature of 70°C +5°C/-0°C, to see if gases escape from the relay. The following figure illustrates the test conditions.



Classification	Unsealed		Semi-Sealed	
Construction				
Features	Terminals are separated from PCB surface when relay is mounted.	Contacts are positioned away from base.	Terminals are pressed into base.	Terminals are inserted into base 0.3 mm min. thick.
Automatic flux application	Poor	Poor	Good	Good
Automatic soldering	Poor	Poor	Good	Good
Automatic cleaning	Poor	Poor	Poor	Poor
Manual soldering	Good	Good	Good	Good
Penetration of dust	Fair		Fair	
Penetration of corrosive gas	Poor		Poor	

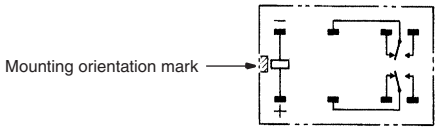
Classification	Fully Sealed	Surface Mounting
Construction		
Features	Terminals, base, and case are sealed.	Terminal and base, as well as the base and casing, are sealed.
Automatic flux application	Good	Good
Automatic soldering	Good	Good
Automatic cleaning	Good	Good
Manual soldering	Good	Good
Penetration of dust	Good	Good
Penetration of corrosive gas	Fair	Fair

Operation

■ Single-side Stable Relays (Standard/Non-latching)

The contacts of this simple type of relay momentarily turn ON and OFF, depending on the energized state of the coil.

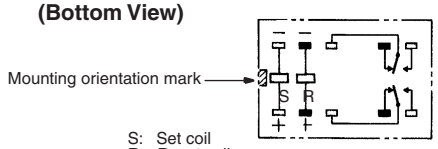
Terminal Arrangement/ Internal Connections (Bottom View)



■ Dual Coil, Latching Relays

This latching relay has two coils: set and reset. It can retain the ON or OFF states even when a pulsating voltage is supplied, or when the voltage is removed.

Terminal Arrangement/ Internal Connections (Bottom View)

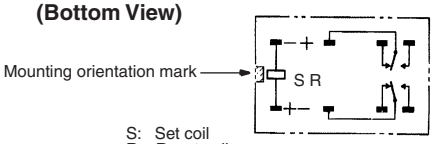


S: Set coil
R: Reset coil

■ Single Coil, Latching Relays

Unlike the dual coil latching relay, the single-winding latching relay has only one coil. This coil, however, serves as both the set and reset coils, depending on the polarity (direction) of current flow. When current flows through the coil in the forward direction, it functions as a set coil; when current flows through the coil in the reverse direction, it functions as a reset coil.

Terminal Arrangement/ Internal Connections (Bottom View)



S: Set coil
R: Reset coil

■ Built-in Diode

A diode is built into some relays, wired in parallel with the coil to absorb the counterelectromotive force (counter emf) generated by the coil.

■ Built-in Operation Indicator

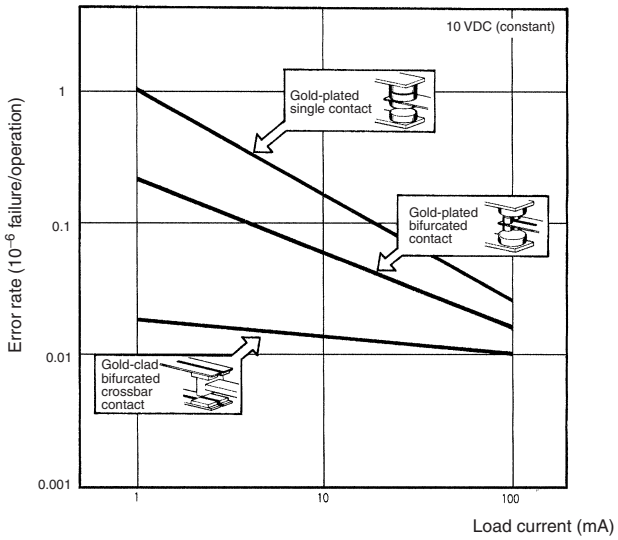
Some relays are provided with a light-emitting diode (LED), wired in parallel with the coil. This permits a fast-check of the relay's operating status.

Contact Styles

Contact ratings are generally indicated according to resistive loads and inductive loads (cosϕ = 0.4 or L/R = 7 ms). Contact shape and material are also shown to guide the customer in selection of a model suitable for the intended load and required service life.

When used at extremely low loads, the failure rate differs according to the contact material and contact method, as shown in the figure. For example, in comparing a single contact point with a bifurcated contact point, the bifurcated contact model has higher parallel redundancy and will therefore exhibit a lower failure rate.

Example



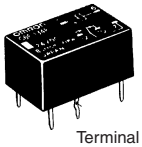
Terminals

■ Straight PCB Terminals

PCB terminals are normally straight.

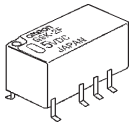
Self-clinching (S-shaped) PCB Terminals

Some relays have terminals that are bent into an “S” shape. This secures the PCB relay to the PCB prior to soldering, helping the terminals stay in their holes and keeping the relay level.

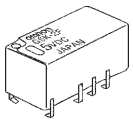


Terminal

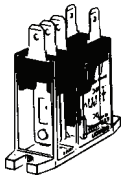
Gull-wing SMT terminal



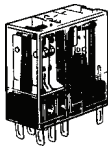
"Inside L" SMT terminal



Quick-connect terminal

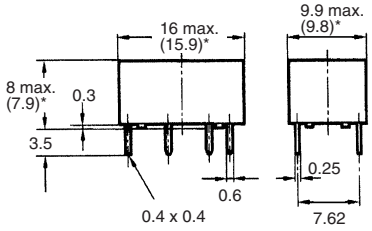


Plug-in terminal



Dimensions

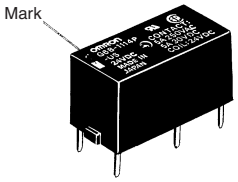
For miniature relays, the maximum dimensions and the average values ( ) marked with an asterisk are provided to aid the customer in designing.



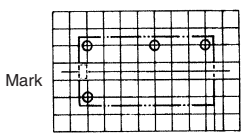
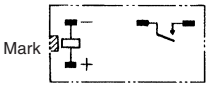
*Average value

■ Mounting Orientation Mark

On the top of all OMRON relays is a mark indicating where the relay coil is located. Knowing the coil location aids in designing PCBs when spacing components. Also, pin orientation is easy to discern when automatic or hand-mounting relays.



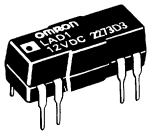
On dimensional drawings in all OMRON literature this mark is left-oriented. Mounting holes, terminal arrangements, and internal connections follow this alignment. The following two symbols are used to represent the orientation mark.

Drawing view	Bottom	Top
Detail	Mounting holes	Terminal arrangement/ internal connections
Symbol		
Example	 (Bottom view)	 (Bottom view)

■ Terminal Arrangement/Internal Connections

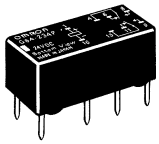
Top View

If the terminal arrangement of a relay can be seen from above the PCB, the top view of the relay is provided in the Dimensions section of the catalog or data sheet.



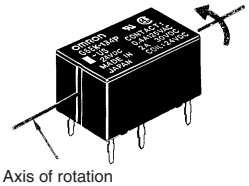
Bottom View

If the relay’s terminals cannot be seen from above the PC board, as in this example, a bottom view is shown.



Rotation Direction to Bottom View

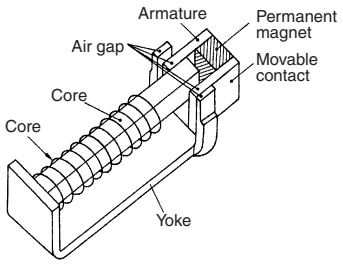
The bottom view shown in the catalog or data sheet is rotated in the direction indicated by the arrow, with the coil always on the left.



Moving Loop System

In the U.S.A., the National Association of Relay Manufactures (NARM) in April 1984, awarded OMRON for monumental advances in relay technology, as embodied in the Moving Loop System.

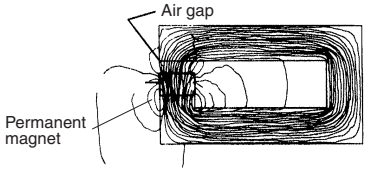
This unique relay construction maximizes electrical and permanent magnet energy. A high-efficiency magnet adds to the magnetic flux of the relay coil, which also allows for tighter packing of relay parts. Relays having such a coil are known as “polarized relays.” Details of construction are shown below.



The moving loop design has similarities with polarized relays; however, the following two features make for a large performance distinction.

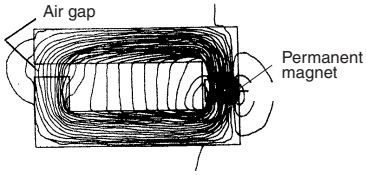
A permanent magnet is placed in the vicinity of the “working gaps.” The flux energy of this permanent magnet complements that of the electrical coil. This increased efficiency enables the mechanism holding the contacts closed to ultimately switch larger loads, and at the same time reduces the power consumed by the coil.

The following diagram shows concentric lines of magnetic flux when the permanent magnet is placed near the working gap.



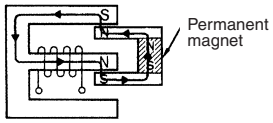
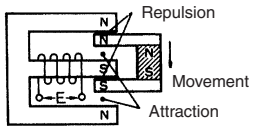
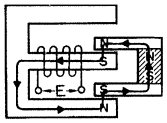
Conventional Relay Coil

The following diagram shows the lines of magnetic flux when the permanent magnet is placed away from the working gap. These lines of flux detract from the total strength of the coil.



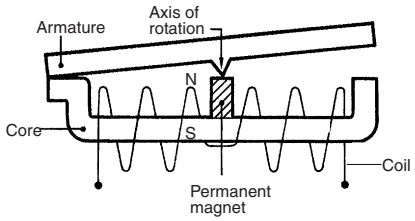
When the switching voltage is removed from the coil, the collapse of the magnetic flux created by the permanent magnet and the electrical coil provides the force to return the relay contacts to the reset position. Note the flux path and magnet polarity in the illustration overleaf.

Operating Principle, Moving Loop

Release	
Transition from release to operation (operating voltage supplied)	
Operation	

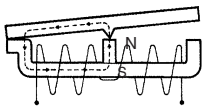
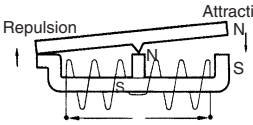
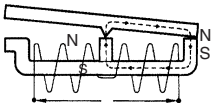
Super Moving Loop System

A very small high-sensitivity magnetic circuit is incorporated to further minimize the conventional moving loop system.



This magnetic circuit has the following features:

- High-efficiency polarized magnetic circuit utilizes power of both attraction and repulsion.
- Balanced armature system improves resistance to both vibration and impacts.
- Ideal mechanism for a low-profile relay.

Release	 Released status is maintained by per manent magnet.
Transition from release to operation (operating voltage supplied)	 The armature see saws due to the at traction and repul sion torque exerted on the armature by the coil voltage and the permanent magnet.
Operation	 Energized status is maintained by the coil voltage and permanent magnet.

Note: The above applies to a latching relay.

Glossary

■ Terms Related to Contacts

Carry Current

The value of the current which can be continuously applied to the relay contacts without opening or closing them, and which allows the relay to stay within the permissible temperature rise.

Maximum Switching Current

A current which serves as a reference in determining the performance of the relay contacts. This value will never exceed the current flow. When using a relay, do not exceed this value.

Contact Form

OMRON uses the following relay terminology for the various polarity and switch configurations.

1 FORM A: SPST-NO

1 FORM B: SPST-NC

1 FORM C: SPDT

2 FORM C: DPDT

Contact symbols

NO	NC	DT
		
Double-break		NC
		
Make-before-break		Latching relays
		

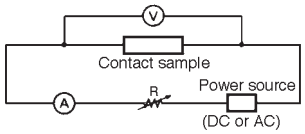
Make-before-break (MBB) Contact

A contact arrangement in which part of the switching section is shared between both an NO and NC contact. When the relay operates or releases, the contact that closes the circuit operates before the contact that opens the circuit releases. Thus both contacts are closed momentarily at the same time.

Contact Resistance

The total resistance of the conductor, as well as specific resistivities such as of the armature and terminal, and the resistance of the contacts. Contact resistance values given in this catalog are initial values. These values are not intended to indicate suitability or unsuitability in actual use. The contact resistance values given are measurement values for a stable contact circuit at a stable contact resistance. This value is determined by measuring the voltage drop across the contacts by applying test currents as shown in the table below.

Rated current (A)	Test current (mA)
Under 0.01	1
0.01 to 0.1	10
0.1 to 1	100
Over 1	1000



A: Ammeter V: Voltmeter R: Variable resistor

For most applications, use at least 1 A, 5 VDC for contact resistance measurements.

Maximum Switching Capacity

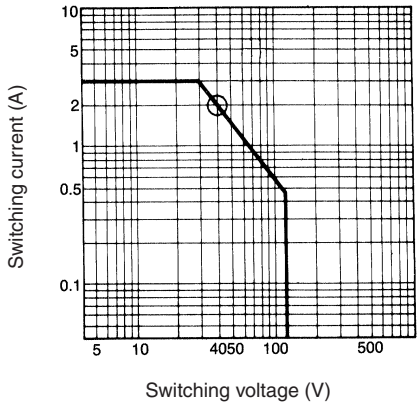
The maximum value of the load capacity which can be switched without problem. When using a relay, do not exceed this value.

For example, when maximum switching voltage V_1 is known, maximum switching current I_1 can be obtained at the point of intersection on the characteristic curve “Maximum Switching Capacity” shown below. Conversely, maximum switching voltage V_1 can be obtained if I_1 is known.

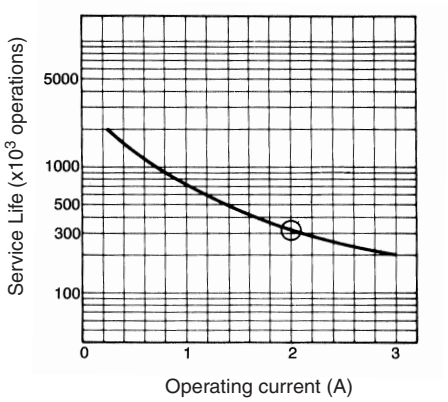
$$\text{Maximum switching current } (I_1) = \frac{\text{Max. switching power [W(VA)]}}{\text{Max. switching voltage (V1)}}$$

$$\text{Maximum switching voltage } (V_1) = \frac{\text{Max. switching power [W(VA)]}}{\text{Max. switching current (I1)}}$$

For instance, if the maximum switching voltage = 40 V
Maximum switching current = 2 A (see circled point on graph below.)

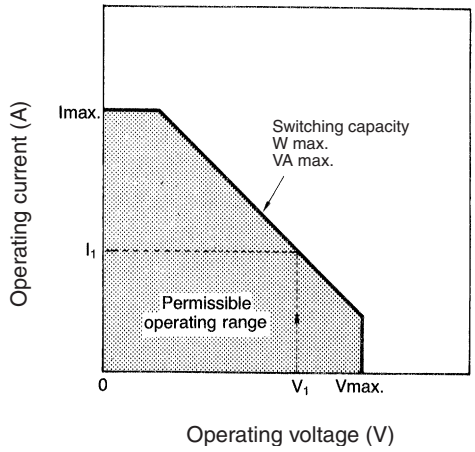


The life expectancy of the relay can be determined from the electrical service life curve shown below, based on the rated switching current (I_1) obtained above. For instance, the electrical service life at the obtained maximum switching current of 2 A is slightly over 300,000 operations (see circled point on graph below).



However, with a DC load, it may become difficult to break the circuit of 48 V or more due to arcing. Determine the suitability of the relay in actual usage testing.

The correlation between the contact ratings is shown in the following figure:



Minimum Permissible Load

The minimum permissible load indicates the lower limit of switching capability of a relay as the reference value. Such minute load levels are found in microelectronic circuits. This value may vary, depending on operating frequency, operating conditions, expected reliability level of the relay, etc. It is always recommended to double-check relay suitability under actual load conditions.

In Omron catalogs, the minimum permissible load of each relay is indicated as a reference value. It indicates failure level at a reliability level of 60% (λ_{60}). λ_{60}=0.1x 10^{-6}/operation means that one failure is presumed to occur per 10,000,000 (ten million) operations at a reliability level of 60%.

Number of Poles

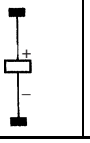
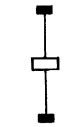
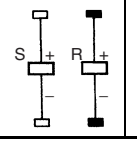
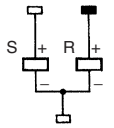
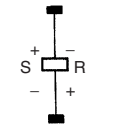
The number of contact circuits. See *Contact Form* for reference.

■ Terms Related to Coils

Rated Coil Voltage

A reference voltage applied to the coil when the relay is used under normal operating conditions.

Coil Symbols

Single-sided stable (Non-latching)		Dual Coil Latching		Single Coil Latching
Polarized	Non-polarized	w/4 terminals	w/3 terminals	
				

Coil Resistance (Applicable to DC-switching Relays only)

The resistance of the coil is measured at a temperature of 23°C with a tolerance of ±10% unless otherwise specified. (The coil resistance of an AC-switching type relay may be given for reference when the coil inductance is specified.)

Cold Start

The ratings set forth in the catalog or data sheet are measured at a coil temperature of 23°C unless otherwise specified.

Maximum Voltage

The maximum value of permissible over voltage or pulsating voltage fluctuations in the operating power supply to the relay coil.

Minimum Pulse Width

The minimum value of the pulse voltage required to set and reset a latching relay at a temperature of 23°C.

Must Operate (Must Set) Voltage

The threshold value of a voltage at which a relay operates when the input voltage applied to the relay coil in the reset state is increased gradually.

Must Release (Must Reset) Voltage

The threshold value of a voltage at which a relay releases when the rated input voltage applied to the relay coil in the operating state is decreased gradually.

Power Consumption

The power (= rated voltage x rated current) consumed by the coil when the rated voltage is applied to it. A frequency of 60 Hz is assumed if the relay is intended for AC operation. The current flows through the coil when the rated voltage is applied to the coil at a temperature of 23°C. The tolerance is +15%/-20% unless otherwise specified.

■ Terms Related to Electrical Characteristics

Dielectric Strength

The critical value which a dielectric can withstand without rupturing when a high-tension voltage is applied for 1 minute between the following points:

- Between coil and contact
- Between contacts of different poles
- Between contacts of same poles
- Between set coil and reset coil
- Between current-carrying metal parts and ground terminal

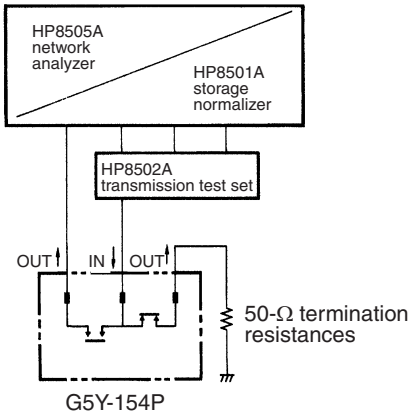
Note that normally a leakage current of 3 mA is detected; however, a leakage current of 1 mA to 10 mA may be detected on occasion.

Electrical Service Life

The life of a relay when it is switched at the rated operating frequency with the rated load applied to its contacts. Also known as Electrical Endurance.

High-frequency Isolation (Applicable to High-frequency Relay only)

The degree of isolation of a high-frequency signal, which is equivalent to the insulation resistance of ordinary relays.



The following characteristics are measured with contacts unrelated to the measurement terminated at 50Ω, when a signal is applied from input terminal 11 to output terminal 8 or from input terminal 11 to output terminal 14 of the sample.

- Isolation characteristics
- Insertion loss characteristics
- Return loss

The following conversion formula converts from return loss to VSWR.

$$VSWR = \frac{1 + 10^{-\frac{x}{20}}}{1 - 10^{-\frac{x}{20}}}$$

where,
x = return loss

High-frequency Switching Power (Applicable to High-frequency Relays Only)

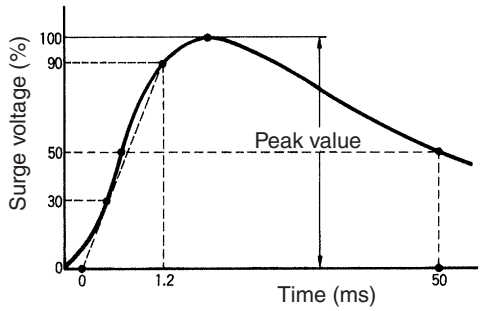
The power of a high-frequency signal that can be switched.

High-frequency Transmitted Power (Applicable to High-frequency Relays Only)

The transmission capacity of a high-frequency signal.

Impulse Withstand Voltage

The critical value which the relay can withstand when the voltage surges momentarily due to lightning, switching an inductive load, etc. The surge waveform which has a pulse width of ±1.2 x 50 μs is shown below:



Insertion Loss (Applicable to High-frequency Relays Only)

The attenuation of a high-frequency signal in a transmission line and is equivalent to the contact resistance of ordinary relays.

Insulation Resistance

The resistance between an electric circuit such as the contacts and coil, and grounded, non-conductive metal parts such as the core, or the resistance between the contacts. The measured values are as follows:

Rated insulation voltage	Measured value
60 V max.	250 V
61 V min.	500 V

Maximum Operating Frequency

The frequency or intervals at which the relay continuously operates and releases, satisfying the rated mechanical and electrical service life.

Mechanical Service Life

The life of a relay when it is switched at the rated operating frequency without the rated load. Also known as Mechanical Endurance.

Operate Bounce Time

The bounce time of the normally open (NO) contact of a relay when the rated coil voltage is applied to the relay coil at an ambient temperature of 23°C.

Operate Time

The time that elapses after power is applied to a relay coil until the NO contacts have closed, at an ambient temperature of 23°C. Bounce time is not included. For the relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Operate time	5 ms max. (mean value: approx. 2.3 ms)

Release Bounce Time

The bounce time of the normally closed (NC) contact of a relay when the coil is de-energized at an ambient temperature of 23°C.

Release Time

The time that elapses between the moment a relay coil is de-energized until the NC contacts have closed, at an ambient temperature of 23°C. (With a relay having SPST-NO or DPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For the relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Release time	5 ms max. (mean value: approx. 2.3 ms)

Reset Time (Applicable to Latching Relays Only)

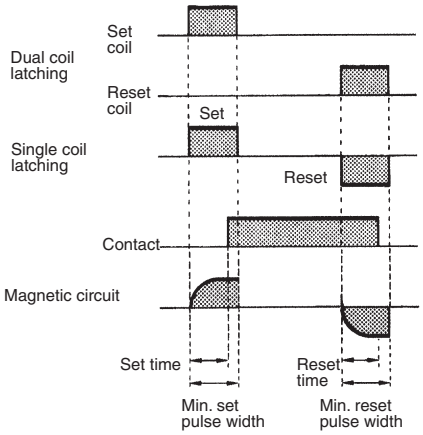
The time that elapses from the moment a relay coil is de-energized until the NC contacts have closed, at an ambient temperature of 23°C. (With a relay having SPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For the relays having a reset time of less than 10 ms, the mean (reference) value of its reset time is specified as follows:

Reset time	5 ms max. (mean value: approx. 2.3 ms)

Set Time

The time that elapses after power is applied to a relay coil until the NO contacts have closed, at an ambient temperature of 23°C. Bounce time is not included. For the relays having a set time of less than 10 ms, the mean (reference) value of its set time is specified as follows:

Reset time	5 ms max. (mean value: approx. 2.3 ms)



Shock Resistance

The shock resistance of a relay is divided into two categories: “Mechanical Durability” (“Destruction”) which quantifies the characteristic change of, or damage to, the relay due to considerably large shocks which may develop during the transportation or mounting of the relay, and “Malfunction Durability” which quantifies the malfunction of the relay while it is in operation.

Stray Capacitance

The capacitance measured between terminals at an ambient temperature of 23°C and a frequency of 1 kHz.

VSWR (Applicable to High-frequency Relays Only)

Stands for voltage standing-wave ratio. The degree of reflected wave that is generated in the transmission line.

Vibration Resistance

The vibration resistance of a relay is divided into two categories: “Mechanical Durability” (“Destruction”) which quantifies the characteristic changes of, or damage to, the relay due to considerably large vibrations which may develop during the transportation or mounting of the relay, and “Malfunction Durability” which quantifies the malfunction of the relay due to vibrations while it is in operation.

$a = 0.002f^2A$

where,

a: Acceleration of vibration (G-force equivalence)

f: Frequency (Hz)

A: Double amplitude

Precautions

■ Basic Information

Before actually committing any component to a mass-production situation, OMRON strongly recommends situational testing, in as close to actual production situations as possible. One reason is to confirm that the product will still perform as expected after surviving the many handling and mounting processes that are involved in mass production. Also, even though OMRON relays are individually tested a number of times, and each meets strict requirements, a certain testing tolerance is permissible. When a high-precision product uses many components, each depends upon the rated performance thresholds of the other components. Thus, the overall performance tolerance may accumulate into undesirable levels. To avoid problems, always conduct tests under the actual application conditions.

General

To maintain the initial characteristics of a relay, exercise care that it is not dropped or mishandled. For the same reason, do not remove the case of the relay; otherwise, the characteristics may degrade. Avoid using the relay in an atmosphere containing chemicals such as sulfuric acid (SO_2), hydrogen sulfide (H_2S), or other corrosive gases. Do not continuously apply a voltage higher than the rated maximum voltage to the relay. Never try to operate the relay at a voltage and a current other than those rated.

If the relay is intended for DC operation, the coil may have a polarity. Pay particular attention to this polarity. Connect the power source to the coil in the correct direction. Do not use the relay at temperatures higher than that specified in the catalog or data sheet.

The storage for the relay should be in room temperature and humidity.

Coil

AC-switching Relays

Generally, the coil temperature of the AC-switching relay rises higher than that of the DC-switching relay. This is because of resistance losses in the shading coil, eddy current losses in the magnetic circuit, and hysteresis losses. Moreover, a phenomenon known as “chatter” may take place when the AC-switching relay operates on a voltage lower than that rated. For example, chatter may occur if the relay’s supply voltage drops. This often happens when a motor (which is to be controlled by the relay) is activated. This results in damage to the relay contacts by burning, contact weld, or disconnection of the self-holding circuit. Therefore, countermeasures must be taken to prevent fluctuation in the supply voltage.

One other point that requires attention is the “inrush current.” When the relay operates, and the armature of the relay is released from the magnet, the impedance drops. As a result, a current much higher than that rated flows through the coil. This current is known as the inrush current. (When the armature is attracted to the magnet, however, the impedance rises, decreasing the inrush current to the rated level.) Adequate consideration must be given to the inrush current, along with the power consumption, especially when connecting several relays in parallel.

DC-switching Relays

This type of relay is often used as a so-called “marginal” relay that turns ON or OFF when the voltage or current reaches a critical value, as a substitute for a meter. However, if the relay is used in this way, its control output may fail to satisfy the ratings because the current applied to the coil gradually increases or decreases, slowing down the speed at which the contacts move. The coil resistance of the DC-switching relay changes by about 0.4% per degree C change in the ambient temperature. It also changes when the relay generates heat. This means that the pickup and dropout voltages may increase as the temperature rises.

Coil Operating Voltage Source

If the supply voltage fluctuates, the relay will malfunction regardless of whether the fluctuation lasts for a long time or only for a moment.

For example, assume that a large-capacity solenoid, relay, motor, or heater is connected to the same power source as the relay, or that many relays are used at the same time. If the capacity of the power source is insufficient to operate these devices at the same time, the relay may not operate, because the supply voltage has dropped. Conversely, if a high voltage is applied to the relay (even after taking voltage drop into account), chances are that the full voltage will be applied to the relay. As a consequence, the relay’s coil will generate heat. Therefore, be sure 1) to use a power source with sufficient capacity and 2) that the supply voltage to the relay is within the rated must operate voltage range of the relay.

Lower Limit Pickup Voltage

When a relay is used at high temperatures, or when the relay coil is continuously energized, the coil temperature rises and coil resistance increases. Consequently, the pickup voltage increases. This increase in the pickup voltage requires attention when determining the lower-limit pickup value of the pickup voltage. An example and outline for determining this lower-limit pickup voltage is given below for reference when designing a power source appropriate for the relay.

Assuming a coil temperature rise of 10°C, the coil resistance will increase about 4%. The pickup voltage increases as follows:

Rated values of Model G5LE are taken from catalog or data sheet.

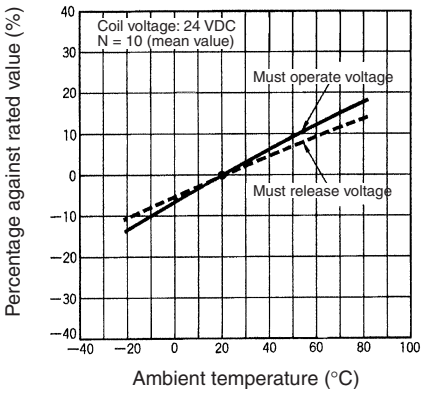
Rated voltage: 12 VDC
Coil resistance: 360Ω
Pickup voltage: 75% max. of rated voltage at 23°C coil temperature

The rated current that flows through this relay can be obtained by dividing the rated voltage by the coil resistance. Hence,

12 VDC ÷ 360Ω = 33.3 mA

However, the relay operates at 75% maximum of this rated current, i.e., 25mA (= 33 mA x 0.75). Assuming that the coil temperature rises by 10°C, the coil resistance increases 4% to 374Ω (= 360Ω x 1.04). The voltage that must be applied to the relay to flow an operating current of 25 mA through the relay under this condition is 25 mA x 374Ω = 9.35 V.

Coil Temperature vs.
Must Operate/release Voltage



The minimum must operate voltage can be determined by this expression.

$$E_T > E \times \frac{Epv + 5}{100} \times \left(\frac{T - Ta}{234.5 + Ta} + 1 \right) [V]$$

where,

E (V): Rated coil voltage
Epv (%): Must operate voltage
Ta: Coil temperature for determining Epv (20°C, unless otherwise specified)
T (°C): Ambient operating temperature
ET (V): Minimum must operate voltage

Note: In the above expression, T is taken to be the result of energization of the coil, when the coil temperature is the same as the ambient temperature.

■ Coil Input

To guarantee accurate and stable relay operation, the first and foremost condition to be satisfied is the application of the rated voltage to the relay. Additionally, details concerning the type of the power source, voltage fluctuation, changes in coil resistance due to temperature rise and the rated voltage must also be considered. If a voltage higher than the rated maximum voltage is applied to the coil for a long time, layer short-circuiting and damage to the coil by burning may take place.

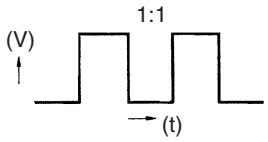
Coil Temperature Rise

When a current flows through the coil, the coil's temperature rises to a measurable level, because of copper loss. If an alternating current flows, the temperature rises even more, due not only to the copper loss, but additionally to the iron loss of the magnetic materials, such as the core. Moreover, when a current is applied to the contact, heat is generated on the contacts, raising the coil temperature even higher (however, with relays whose switching current is rated at 2 A or lower, this rise is insignificant).

Temperature Rise by Pulsating Voltage

When a pulsating voltage having an ON time of less than 2 minutes is applied to the relay, the coil temperature rise varies, and is independent of the duration of the ON time, depending only on the ratio of the ON time to the OFF time. The coil temperature in this case does not rise as high as when a voltage is continuously applied to the relay.

Energization time	Release temperature rise
Continuous energization	100%
ON:OFF = 3:1 approx.	80%
ON:OFF = 1:1 approx.	50%
ON:OFF = 1:3 approx.	35%



Changes in Must Operate Voltage by Coil Temperature Rise (Hot Start)

The coil resistance of a DC-switching relay increases (as the coil temperature rises) when the coil has been continuously energized, de-energized once, and then immediately energized again. This increase in the coil resistance raises the voltage value at which the relay operates. Additionally, the coil resistance rises when the relay is used at a high ambient temperature.

Maximum Must Operate Voltage

The maximum voltage applicable to a relay is determined in accordance with the coil temperature rise and the coil insulation materials' heat resistivity, electrical as well as mechanical life, general characteristics, and other factors.

If a voltage exceeding the maximum voltage is applied to the relay, it may cause the insulation materials to degrade, the coil to be burnt, and the relay to malfunction at normal levels.

The coil temperature must not exceed the temperature that the coil can withstand.

How to Calculate Coil Temperature

$$t = \frac{R2 - R1}{R1}(234.5+T1) + T1\ [°C]$$

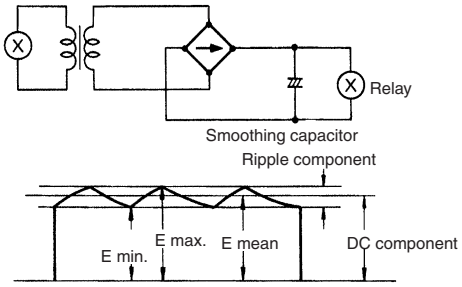
where,

R1 Ω:	coil resistance before energization
R2 Ω:	coil resistance after energization
T1 (°C):	coil temperature (ambient) before energization
t (°C):	coil temperature after energization

Before using the relay confirm no problems occur.

DC Input Power Source

Pay attention to the coil polarity of the DC-switching relay. Power sources for DC-operated relays are usually a battery or a DC power supply, **either with a maximum ripple of 5%**. If power is supplied to the relay via a rectifier, the pickup and dropout voltages vary with the ripple percentage. Therefore, check the voltages before actually using the relay. If the ripple component is extremely large, chatter may occur. If this happens, it is recommended that a smoothing capacitor be inserted as shown in the following diagram.



$$Ripple\ percentage = \frac{Emax. - Emin.}{Emean} \times 100$$

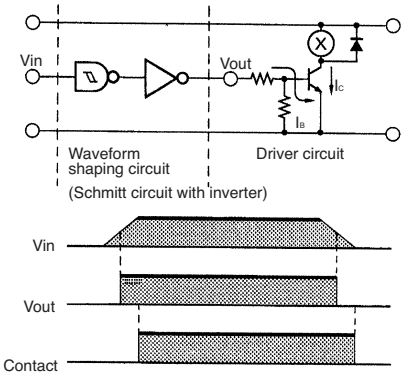
where,
E max.: maximum value of ripple component
E min.: minimum value of ripple component
E mean: mean value of DC component

The use of a regulated, filtered power supply is preferred for DC coils.

If the voltage applied to the DC-operated coil increases or decreases slowly, each contact of a multi-pole contact relay may not operate at the same time. It is also possible for this situation to result in the must operate voltage varying each time the relay operates. Either way, circuit sequencing will not be correct. In critical applications, the use of a Schmitt circuit is recommended to reshape the DC waveform to trigger all contacts of the relay at the same time.

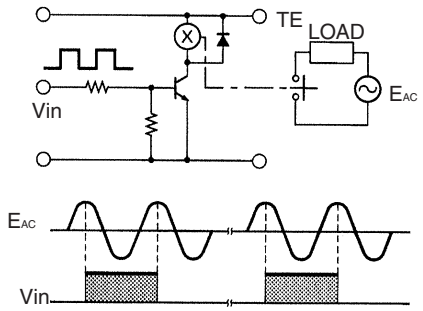
Relay Driving Signal Waveform

A long rise time and/or fall time of the signal driving the relay may prolong the operate time and/or release time of the relay. This situation may shorten the life expectancy of the contacts. If this situation cannot be avoided, providing a Schmitt trigger circuit at the circuit stage preceding the relay circuit will shape a waveform with sharp transitions, as shown in the following diagram:



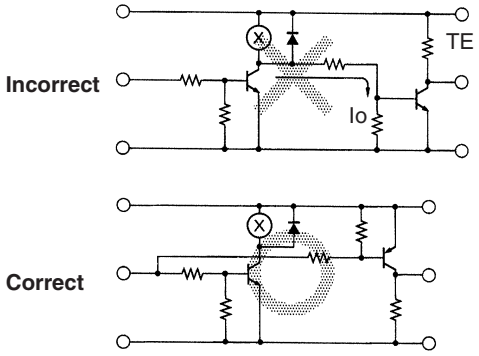
If the Schmitt trigger circuit is configured of transistors, a residual voltage may exist in the output of the circuit. Therefore, confirm that the rated voltage is present across the relay coil, or that the residual voltage drops to zero when the relay releases.

Cyclic Switching of AC Load



If the relay operates in synchronization with the supply voltage, the life of the relay may be shortened. When designing the control system in which the relay is used, estimate the life of the relay and thus the reliability of the overall system under actual operating conditions. Moreover, construct the circuit so that the relay operates in a random phase or in the vicinity of the zero point.

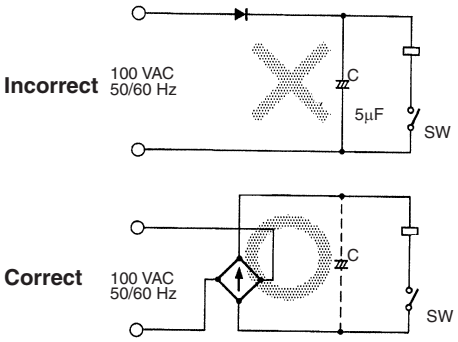
Dark Current in OFF Time



A circuit that produces a control output as soon as the relay operates must be carefully designed. In the first example, electrode dark current flows as shown when the relay operates. When dark current flows into the relay coil, the relay's resistivity to shock and vibration may degrade.

Overcoming Chatter in DC Relays

Use a full wave rectified signal that is filtered and regulated to control the coil of a DC relay. Ensure that the maximum ripple is 5%.

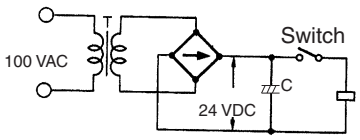


Voltage Considerations for AC Relays

The voltage applied to the relay must be a sine wave. When a commercial power source is used, there should be no problem. However, if an AC stabilized power source is used, either chatter or abnormal heating may occur, depending on the wave distortion of the power source. A shading coil is used to suppress beat (chatter) in an AC current coil, but wave distortion defeats this function.

When a motor, solenoid, transformer, or other device is connected to the same power line source as the relay controller, and any of these devices causes a drop in the line voltage, the relay may chatter, damaging the contact. This commonly occurs when a small transformer is added to the line, when the transformer is too small, when long wiring is used, or when thin wiring is used in the customer's premises. Be aware of this phenomenon, as well as normal voltage fluctuations. Should this problem occur, check the change in voltage with a synchroscope or the like, and take appropriate countermeasures. Effective countermeasures include replacing the relay with a special relay suited to the circumstances, or use of a DC circuit and inclusion of a capacitor to compensate for the voltage change, as shown in the following circuit diagram.

Voltage change compensation circuit incorporating a capacitor



■ Contacts

The contacts are the most important constituent of a relay. Their characteristics are significantly affected by factors such as the material of the contacts, voltage and current values applied to them (especially, the voltage and current waveforms when energizing and de-energizing the contacts), the type of load, operating frequency, atmosphere, contact arrangement, and bounce. If any of these factors fail to satisfy predetermined values, problems such as metal deposition between contacts, contact welding, wear, or rapid increase in the contact resistance may occur.

Switching voltage (AC, DC)

When a relay breaks an inductive load, a fairly high counterelectromotive force (counter emf) is generated in the relay's contact circuit. The higher the counter emf, the greater the damage to the contacts. This may result in a significant decrease in the switching capacity of DC-switching relays. This is because, unlike the AC-switching relay, the DC-switching relay does not have a zero-cross point. Once arc has been generated, it does not easily diminish, prolonging the arc time. Moreover, the unidirectional flow of the current in a DC circuit may cause metal degradation to occur between contacts and the contacts to wear rapidly (this is discussed later).

Despite the information a catalog or data sheet sets forth as the approximate switching power of the relay, always confirm the actual switching power by performing a test with the actual load.

Switching Current

The quantity of electrical current which flows through the contact directly influences the contact' characteristics. For example, when the relay is used to control an inductive load such as a motor or a lamp, the contacts will wear faster, and metal decomposition between the mating contacts will occur more often as the inrush current to the contacts increases. Consequently, at some point the contacts may weld.

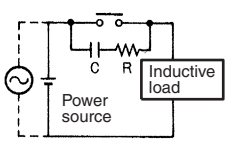
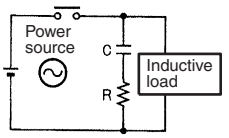
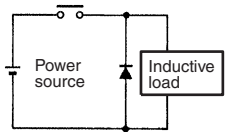
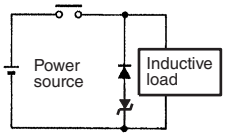
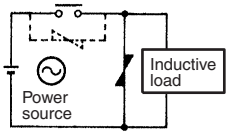
Contact Materials

Selection of an appropriate contact material according to the load to be opened or closed is important. Several contact materials and their properties are listed below.

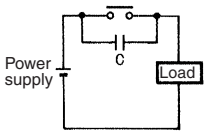
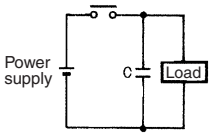
Examples of Contact Materials	
P. G. S. Alloy	This material has excellent corrosion resistance and is suitable for very small current circuits. (Au : Ag : Pt = 69 : 25 : 6)
AgPd	This material exhibits good corrosion and sulphur resistance. In a dry circuit, it attracts organic gas to generate a polymer, therefore it is usually plated with gold or other material.
Ag	This material has the highest electric and heat conductivities among all metals. It exhibits low contact resistance, but easily forms sulfide film in a sulfide gas environment. This may result in defective contact performance at a low-voltage small-current operation.
AgNi	This material exhibits the same high electric conductivity as silver and excellent arc resistance.
AgSnIn	This material exhibits excellent deposition resistance and exhaustion resistance.
$AgSnO_2$	This material exhibits excellent deposition resistance. It easily forms sulfide film in a sulfide gas environment, same as Ag contact material
AgW	This material exhibits a high hardness and melting point. It also exhibits excellent arc resistance and superior resistance to deposition and transfer. However, it shows high contact resistance and inferior environmental resistance.

Contact Protection Circuit

A contact protection circuit, designed to prolong the life of the relay, is recommended. This protection will have the additional advantages of suppressing noise, as well as preventing the generation of carbide and nitric acid, which otherwise would be generated at the contact surface when the relay contact is opened. However, unless designed correctly, the protection circuit may produce adverse effects, such as prolonging the release time of the relay. The following table lists examples of contact protection circuits.

Circuit example		Applicability		Features and remarks	Element selection
		AC	DC		
CR		Fair	Good	Load impedance must be much smaller than the RC circuit when the relay operates on an AC voltage.	Optimum C and R values are: C: 1 to 0.5 μF for 1–A switching current R: 0.5 to 1Ω for 1–V switching voltage These values do not always agree with the optimum values due to the nature of the load and the dispersion in the relay characteristics. Confirm optimum values experimentally. Capacitor C suppresses discharge when the contacts are opened, while resistor R limits the current applied when the contacts are closed the next time. Generally, employ a capacitor C whose dielectric strength is 200 to 300 V, or more than double the switching voltage. If the circuit is powered by an AC power source, employ an AC capacitor (non-polarized).
		Good	Good	This circuit is effective if connected across the load when the supply voltage is 24 to 48 V. When the supply voltage is 100 to 240 V, connect the circuit across the contacts.	
Diode		N/A	Good	The diode protects the coil and driver circuit from inductive kickback. Relays with a diode connected in parallel with the relay coil tend to experience increased release times.	Employ a diode having a reverse breakdown voltage of more than 10 times the circuit voltage and a forward current rating greater than the load current. A diode having a reverse breakdown voltage two to three times that of the supply voltage can be used in an electronic circuit where the circuit voltage is not particularly high.
Diode + Zener Diode		N/A	Good	This circuit effectively shortens release time in applications where the release time of a diode protection circuit proves to be too slow.	The zener diode breakdown voltage should be about the same as the supply voltage.
Varistor		Good	Good	By utilizing the constant-voltage characteristic of a varistor, this circuit prevents high voltages from being applied across the contacts. This circuit also somewhat delays the release time. This circuit, if connected across the load, is effective when the supply voltage is 24 to 48 V. If the supply voltage is 100 to 240 V, connect the circuit across the contacts.	—

Avoid use of a surge suppressor in the manner shown below.

	
This circuit arrangement is very effective for diminishing sparking (arcing) at the contacts, when breaking the circuit. However, since electrical energy is stored in C (capacitor) when the contacts are open, the current from C flows into the contacts when they close. Therefore, metal degradation is likely to occur between mating contacts due to capacitive current inrush.	This circuit arrangement is very useful for diminishing sparking (arcing) at the contacts when breaking the circuit. However, since the charging current to C flows into the contacts when they are closed, metal degradation is likely to occur between the mating contacts due to capacitive current inrush.

Although it is considered that switching a DC inductive load is more difficult than a resistive load, an appropriate contact protection circuit can achieve almost the same characteristics.

■ Latching Relays

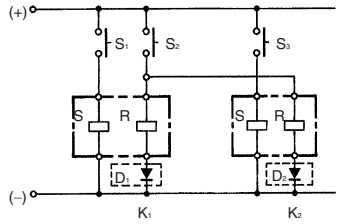
- Avoid use in locations subject to excessive magnetic particles or dust.
- Avoid use in magnetic fields (over 8,000 A•m).
- Take measures to preventing problems caused by vibration or shock. Problems may originate from other relay(s) operating or releasing on the same panel.
- Avoid simultaneous energization of the set and reset coils, even though both coils can be continuously energized.
- Avoid use under conditions where excessive surge-generating sources exist in the coil power source.
- When planning to mount multiple relays side-by-side, observe the minimum mounting interval of each type of relay.

Drive Circuit (Dual Coil Latching Relays G5AK, G6AK, G6BK, etc.)

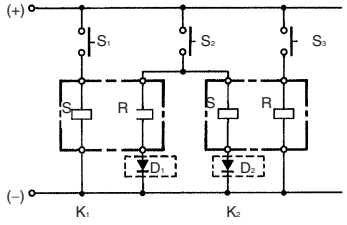
When a DC-switching latching relay is used in one of the circuits shown in the following diagram, the relay contacts may be released from the locked state unless a diode (enclosed in the dotted box in the circuit diagram) is connected to the circuit.

Circuits

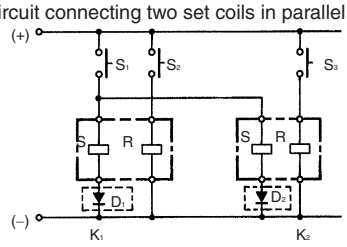
Circuit connecting two reset coils in parallel.



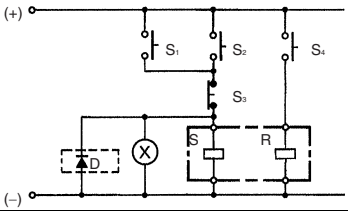
Circuit connecting set coil to reset coil.



Circuit connecting two set coils in parallel



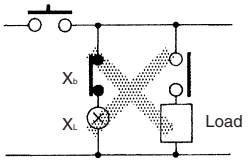
Circuit connecting set coil of latching relay in parallel with another relay coil.



When connecting a diode to the relay circuit, be sure to use a diode with a repetitive peak-inverse voltage, and a DC reverse voltage sufficient to withstand external noise or surge. Also be sure that the diode has an average rectified current greater than the coil current.

If the contact of the relay is used to de-energize the relay, the relay may not operate normally. Avoid using the relay in a circuit like the one shown below:

Incorrect Use:



X_L: Latching relay
X_b: NC contact of relay

PCB Design

■ Soldering

As demands for more compact electronic devices have grown, so have demands declined for the plug-in relays that requires a bulky socket for connection. This trend has lead to the development of relays that can be soldered directly onto the PCB. Smaller relays have made possible great density increases on the PCB, which in turn reduces the size of the product or device. However, unless the relay is fully sealed, when soldered onto a PCB, flux may penetrate into the housing, adversely affecting the internal circuitry.

The following points will help when designing a product which uses relays. This section points out details to be noted when soldering a relay to a PCB.

■ PCB Selection

In general, relays are directly mounted and soldered onto a PCB. Although seemingly an uninvolved process, soldering and its related processes of flux application, relay mounting, heat application, and washing can be detrimental to a relay's performance. For example, if the PCB were to warp, the internal mechanism of the relay could become distorted, degrading the performance characteristics. Thus it could be said that the relay's characteristics are also affected by the size, thickness, and material of the PCB. Therefore, carefully select a PCB that will not jeopardize the performance of the relay.

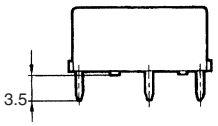
■ PCB Materials

Generally, the substrate of a PCB is made of glass epoxy (GE), paper epoxy (PE), or paper phenol (PP). Of these, the glass-epoxy or paper-epoxy PCB is recommended for mounting relays. See the following table

Item	Epoxy Based		Phenol-based
	Glass Epoxy (GE)	Paper Epoxy (PE)	Paper Phenol (PP)
Electrical characteristics	High insulation resistance. Insulation resistance hardly affected by humidity.	Fair	Insulation resistance degraded by humidity.
Mechanical characteristics	Little expansions/shrinkage caused by change in temperature or humidity. Suitable for through-hole PCBs and multi-layered PCBs.	Fair	Much expansion/shrinkage caused by changes in temperature or humidity. Not suitable for through-hole PCB.
Cost Effectiveness	Expensive	Fair	Fair

■ PCB Thickness

PCBs having a thickness of 0.8, 1.2, 1.6, or 2.0 mm are generally used. A PCB that is 1.6 mm thick is best for mounting a PCB relay, considering the weight of the relay and the length of the terminals. (The terminal length of OMRON relays is 3, 3.5, or 4.0 to 5.0 mm.)



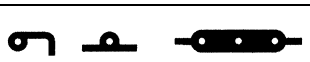
■ Terminal Hole Diameter and Land Diameter

Select the appropriate terminal hole and land diameters from the following table, based on the PCB mounting hole drawing. Land diameters may be reduced to less than those listed below if the through-hole connection process is to be employed.

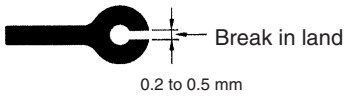
Terminal Hole and Land Diameters		
Terminal Hole Diameter		Minimum Land Diameter
Normal	Tolerance	
0.6 mm	±0.1 mm	1.5 mm
0.8 mm		1.8mm
1.0 mm		2.0mm
1.2 mm		2.5mm
1.3 mm		2.5mm
1.5 mm		3.0mm
1.6 mm		3.0mm
2.0 mm		3.0mm

■ Shape of Lands

The land section should be on the center line of the copper-foil pattern, so that the soldered fillets become uniform.

Correct	
Incorrect	

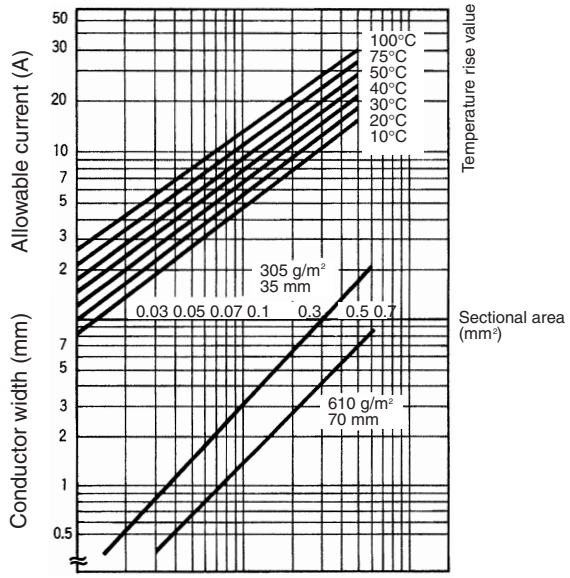
A break in the circular land area will prevent molten solder from filling holes reserved for components which must be soldered manually after the automatic soldering of the PCB is complete.



■ Conductor Width and Thickness

The following thickness of copper foil are standard: 35 μm and 70 μm. The conductor width is determined by the current flow and allowable temperature rise. Refer to the chart below.

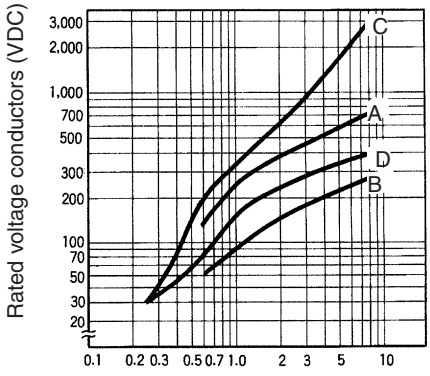
Conductor Width and Carry Current
(according to IEC Pub326-3)



■ Conductor Pitch

The conductor pitch on a PCB is determined according to the insulation resistance between conductors and the environmental conditions under which the PCB is to be placed. The following graph shows the general relationship between the voltage between conductors and the conductor pitch on a PCB. However, if the PCB must conform to safety organization standards (such as UL, CSA, VDE, etc.), priority must be given to fulfilling their requirements.

Voltage between Conductors vs. Conductor Pitch



A = w/o coating at altitude of 3,000 m max.
B = w/o coating at altitude of 3,000 m or higher but lower than 15,000 m
C = w/coating at altitude of 3,000 m max.
D = w/coating at altitude of 3,000 m or higher

■ Temperature and Humidity

PCBs expand or contract with changes in temperature. Should expansion occur with a relay mounted on the PCB, the internal components of the relay may be shifted out of operational tolerance. As a result, the relay may not be able to operate with its normal characteristics.

PCB materials have "directionality," which means that a PCB generally has expansion and contraction coefficients 1/10 to 1/2 higher in the vertical direction than in the horizontal direction. Conversely, its warp in the vertical direction is 1/10 to 1/2 less than in the horizontal direction. Therefore, take adequate counter-measures against humidity by coating the PCB. Should heat or humidity be entirely too high, the relay's physical characteristics will likewise be affected. For example, as the heat rises the PCB's insulation resistance degrades. Mechanically, PCB parts will continue to expand as heat is applied, eventually passing the elastic limit, which will permanently warp components.

Moreover, if the relay is used in an extremely humid environment, silver migration may take place.

■ Gas

Exposure to gases containing substances such as sulfuric acid, nitric acid, or ammonia can cause malfunctions such as faulty contacting in relays. They can also cause the copper film of a PCB to corrode, or prevent positive contacts between the PCB's connectors. Of the gases mentioned, nitric acid is particularly damaging as it tends to accelerate the silver migration. As a counter-measure against gas exposure damage, the following processes on the relay and PCB have proved useful.

Item	Process
Outer Casing, housing	Sealed construction by using packing, etc.
Relay	Use of simplified hermetically sealed type relay, DIP relay
PCB, Copper Film	Coating
Connector	Gold-plating, rhodium-plating process

■ Vibration and Shock

Although the PCB itself is not usually a source of vibration or shock, it may simplify or prolong the vibration by sympathetically vibrating with external vibrations or shocks. Securely fix the PCB, paying attention to the following points.

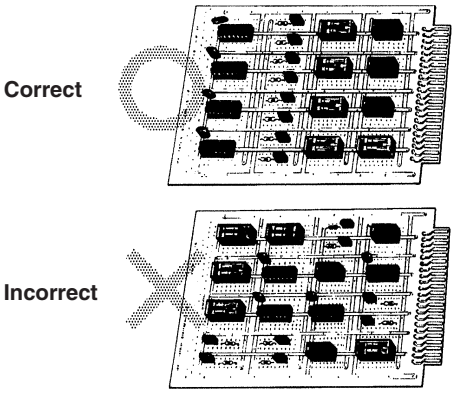
Mounting Method	Remarks
Rack Mounting	No gap between rack's guide & PCB
Screw Mounting	Securely tighten screw. Place heavy components such as relays on part of PCB near screws. Attach rubber washers to screws when mounting components that are affected by shock (such as audio devices.)

■ Mounting Position

Depending on where the relay is mounted, the function of the relay (and the performance of the circuit which includes the relay) may be adversely affected.

The relay may malfunction if it is mounted near a transformer or other device that generates a large magnetic field, or much heat. Provide an adequate distance between the relay and such devices.

Also, keep the relay away from semiconductor devices, if they are to be mounted on the same PCB.



■ Mounting Direction

To allow a relay to operate to its full capability, adequate consideration must be given to the mounting direction of the relay. Relay characteristics that are considerably influenced by mounting direction are shock resistance, life expectancy, and contact reliability.

■ Shock Resistance

Ideally, the relay must be mounted so that any shock or vibration is applied to the relay at right angles to the operating direction of the armature of the relay. Especially when a relay's coil is not energized, the shock resistance and noise immunity are significantly affected by the mounting direction of the relay.

■ Life Expectancy

When switching a heavy load that generates arc (generally, a load having a greater impedance than that of the relay coil), substances spattered from the contact may accumulate in the vicinity, resulting in degradation of the insulation resistance of the circuit. Mounting the relay in the correct direction is also important in preventing this kind of degradation of the insulation resistance.

■ Contact Reliability

Switching both a heavy and a minute load with a single relay contact is not recommended. The reason for this is that the substances scattered from the contact when the heavy load is switched degrade the contact when switching the minute load. For example, when using a multi-pole contact relay, avoid the mounting direction or terminal connections in which the minute load switching contact is located below the heavy load switching contact.

■ Mounting Interval

When mounting multiple relays side by side on a PCB, pay attention to the following points:

When many relays are mounted side by side, they may generate an abnormally high heat due to the thermal interference between the relays. Therefore, provide an adequate distance between the relays to dissipate the heat. When using a relay, be sure to check the minimum mounting interval.

Also, if multiple PCBs with relays are mounted to a rack, the temperature may rise. In this case, preventive measures must be taken so that the ambient temperature falls within the rated value.

Pattern Layout

Countermeasures Against Noise

The relay can be a noise source when viewed from a semiconductor circuit. This must be taken into consideration when designing the layout positioning of the relay and other semiconductor components on the PCB.

- Keep the relay away from semiconductor components as far away as possible.
- Locate the surge suppressor for the relay coil as close to the relay as possible.
- Do not route wiring for signals such as audio signals that are likely to be affected by noise below the relay.
- Design the shortest possible pattern.
- One method for separating the power source and relay from other electronic components is to use shielded patterns.

■ Conformal Coating

Coating the PCB is recommended to prevent the circuitry from being degraded by harmful gases. When coating the PCB, care should be taken to avoid relay contamination. Otherwise, faulty contact of the relay may occur due to sticking or coating. Some coating agents may degrade or adversely affect the relay. Select the coating agent carefully.

Type of Coating		
Item	**Applicability to PCB with relays mounted**	**Feature**
Epoxy	Good	Good insulation. Applying this coating is a little difficult, but has no effect on relay contact.
Urethane	Good	Good insulation and easy to coat. Be careful not to allow the coating on the relay itself, as thinner-based solvents are often used with this coating.
Silicon	Poor *	Good insulation and easy to coat. However, silicon gas may cause contact contamination and misoperation.

* Satisfactory for sealed, but totally unsatisfactory for unsealed relays.

Automatic Mounting of Relay on PCB

■ Through-hole Mounting

The following tables list the processes required for mounting a relay onto a PCB and the points to be noted in each process.

Process 1: Placement

Do not bend any terminal of the relay to use it as a self-clinching relay or the relay may malfunction.

It is recommended to use magazine-packaged self-clinching relays for placement onto the PCB.

Possibility of Automatic Placement			
Construction	**Unsealed**	**Flux protection**	**Fully sealed**
Magazine-packaged relay	NO	YES	YES
Self-clinching relays			

Process 2: Flux Application

To apply flux to a flux protection or fully sealed relay, a sponge soaked with flux can be used. Place the relay in the holes drilled in the PCB and press the PCB (with the relay still mounted) firmly against the sponge. The flux will be pushed up the relay's contact legs, and through the PCB holes. This method must never be applied with an unsealed relay because the flux will penetrate into the relay.

Use a non-corrosive rosin-type flux or water washable organic flux.

For the flux solvent, use an alcohol-based solvent, which tends to be less chemically reactive.

Apply the flux sparingly and evenly to prevent penetration into the relay. When dipping the relay terminals into liquid flux, be sure to adjust the flux level, so that the upper surface of the PCB is not flooded with flux.

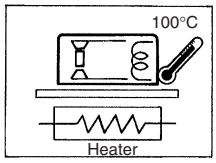
Possibility of Dipping Method		
Unsealed	**Flux protection**	**Fully sealed**
NO	YES	YES

Process 3: Transportation

When the PCB is transported, the relay mounted on the PCB may be lifted from the board surface due to vibration. This can be prevented if the relay mounted on the PCB has self-clinching terminals.

Process 4: Preheating

Preheat the PCB at a temperature of 110°C maximum within a period of approximately 40 seconds for smooth soldering. The characteristics of the relay may change if it is heated at a high temperature for a long time.



Possibility of Preheating		
Unsealed	**Flux protection**	**Fully sealed**
NO	YES	YES

Process 5: Soldering

Flow soldering is recommended to assure a uniform solder joint.

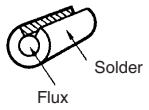
- Solder temperature and soldering time: 260°C, 5 s max.
- Adjust the level of the molten solder so that the PCB is not flooded with solder.

Possibility of Automatic Soldering		
Unsealed	**Flux protection**	**Fully sealed**
NO	YES	YES

Manual Soldering

Complete the soldering operation quickly. Use the correct wattage of soldering iron. Do not overheat while smoothing the applied solder with the tip of the iron.

- Soldering iron: rated at 30 to 60 W
- Tip temperature: 280°C to 300°C
- Soldering time: 3 s max.
- The following table contains recommended solders:



Type	Sparkle solder
Applicable solder diameter	**0.8 to 1.6 mm**
Spread rate	**90%**
Storage	**3 months max.**

The solder in the illustration shown above is provided with a cut section to prevent the flux from splattering.

Possibility of Manual Soldering

Unsealed	Flux protection	Fully sealed
YES	YES	YES

Process 6: Cooling

Upon completion of automatic soldering, use a fan or other device to forcibly cool the PCB. This helps prevent the relay and other components from deteriorating due to the inertial heat of soldering.

Fully sealed relays are washable. Do not, however, put fully sealed relays in a cold cleaning solvent immediately after soldering or the seals may be damaged.

Flux protection	Fully sealed
Necessary	Necessary

Process 7: Cleaning

Avoid cleaning the soldered terminals whenever possible. When a resin-type flux is used, no cleaning is necessary. If cleaning cannot be avoided, exercise care in selecting an appropriate cleaning solvent.

Cleansing Method		
Unsealed	**Flux protection**	**Fully sealed**
Boiling cleaning and immersion cleaning are not possible. Clean only the back of the PCB with a brush.		Boiling cleaning and immersion cleaning are possible. Ultrasonic cleaning will have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. The washing temperature is 40°C max.

List of Cleaning Solvents		
Solvent		**Fully Seated**
Chlorine-based	Perochlene Chlorosolder Trichloroethylene	Yes
Water-based	Indusco Holys	Yes
Alcohol-based	IPA Ethanol	Yes
Others	Thinner Gasoline	No
Cleaning method		Automatic cleaning Ultrasonic cleaning (see note 4)

Note: 1. Consult your OMRON representative before using any other cleaning solvent. Do not use Freon-TMC-based, thinner-based, or gasoline-based cleaning solvents.

2. Worldwide efforts are being made at discontinuing the use of CFC-113-based (fluorochlorocarbon-based) and trichloroethylene-based cleaning solvents. The user is requested to refrain from using these cleaning solvents

3. It may be difficult to clean the space between the relay and PCB using hydrogen-based or alcohol-based cleaning solvent. It is recommended the stand-off-type be used, such as G6A-□-*ST*, when using hydrogen-based or alcohol-based cleaning solvents.

4. Ultrasonic cleaning may have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. Please refer to the model number to determine if your relay is intended to be cleaned ultrasonically.

5. Contact Omron representative for recommended cleaning procedures of specific relays.

Process 8: Coating

Do not apply a coating agent to any flux-resistant relay or relay with a case because the coating agent will penetrate into the relay and the contacts may be damaged.

Some coating agents may damage the case of the relay. Be sure to use a proper coating agent.

Do not fix the position of relay with resin or the characteristics of the relay will change.

Resin	Fully Sealed
Epoxy	YES
Urethane	YES
Silicone	NO
Fluorine	YES

■ Surface Mounting

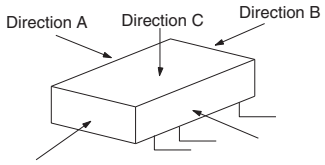
The following tables list the processes required for mounting a relay onto a PCB and the points to be noted in each process.

Process 1: Cream Solder Printing

Do not use a cream solder that contains a flux with a large amount of chlorine or the terminals of the relay may be corroded.

Process 2: Relay Mounting

The holding force of the relay holder must be the same as or more than the minimum holding force value required by the relay.



Direction	G6H	G6S
A	200 g max.	200 g max.
B	500 g max.	500 g max.
C	200 g max.	200 g max.

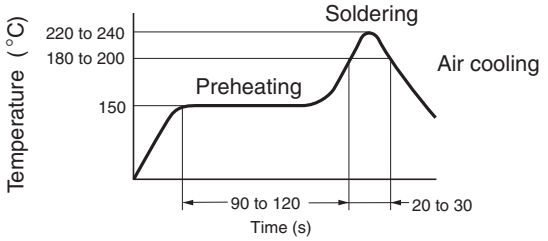
Process 3: Transportation

The relay may be dismounted by vibration during transportation. To prevent this, it is recommended an adhesive agent be applied to the relay's gluing part (protruding part) to tack the relay.

Adhesive Agent Application Methods	
Dispenser Method	**Screen-printing Method**
NO	YES

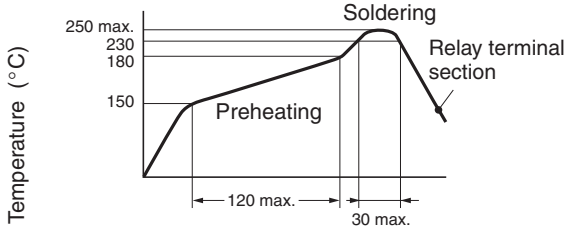
Process 4: Soldering Reflow

Mounting with lead solder	Mounting with lead-free solder
The recommended soldering conditions show the temperature changes of the PCB surface. The conditions, however, vary with the relay model. Check the relay specifications before soldering. (For details refer to the precautions for each model.) Do not put the relay in a cleaning solvent or other cold liquid immediately after soldering or the seal of the relay may be damaged.	The recommended soldering conditions show the temperature changes of the relay terminal section. The conditions, however, vary with the relay model. Check the relay specifications before soldering. (For details refer to the precautions for each model.) Do not put the relay in a cleaning solvent or other cold liquid immediately after soldering or the seal of the relay may be damaged.



Recommended IRS Conditions (G6H-2F)

Top surface of case (peak): 255˚C max.



Recommended IRS Conditions (G6H-2F)

Note: Do not submerse the relay in a solder bath. Doing so will deform the resin, causing faulty operation.

Process 5: Cleaning

Boiling cleaning and immersion cleaning are recommended. When washing the product after soldering the relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C

Ultrasonic cleaning will have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning.

List of Cleaning Solvents		
Solvent		**Fully Sealed**
Chlorine-based	Perochlene Chlorosolder Trichloroethylene	Yes
Water-based	Indusco Holys	Yes
Alcohol-based	IPA Ethanol	Yes
Others	Thinner Gasoline	No
Cleaning method		Automatic cleaning Ultrasonic cleaning (see note 4)

Note: 1. Consult your OMRON representative before using any other cleaning solvent. Do not use Freon-TMC-based, thinner-based, or gasoline-based cleaning solvents.

2. Worldwide efforts are being made at discontinuing the use of CFC-113-based (fluorochlorocarbon-based) and trichloroethylene-based cleaning solvents. The user is requested to refrain from using these cleaning solvents

3. It may be difficult to clean the space between the relay and PCB using hydrogen-based or alcohol–based cleaning solvent. It is recommended the stand-off-type be used, such as G6A-□-*ST*, when using hydrogen-based or alcohol-based cleaning solvents.

4. Ultrasonic cleaning may have an adverse effect on the performance of relays not specifically manufactured for ultrasonic cleaning. Please refer to the model number to determine if your relay is intended to be cleaned ultrasonically.

5. Contact Omron representative for recommended cleaning procedures of specific relays.

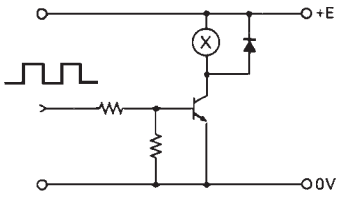
Notes on Correct Use

■ Driving by Transistor

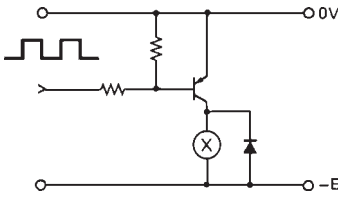
When a transistor is used to drive the relay, be sure to ground the emitter of the transistor.

When the transistor is used in emitter-follower configuration (i.e., the collector is grounded), give adequate consideration to the voltage across the collector and emitter. The required voltage must be applied to the relay.

NPN transistor



PNP transistor



Advice on selecting a transistor for driving the relay

1. From the relay catalog or data sheet, ascertain the following coil characteristics:

Rated voltage _____ VDC

Rated current _____ mA

Coil resistance _____ Ω

2. Determine the lower- and upper-limit values of the pickup voltage from the rated voltage.

Lower-limit pickup voltage _____V

Upper-limit pickup voltage _____V

(If surge is contained in the rated voltage, obtain the maximum value including the surge.)

3. By determining the component for suppressing surge, obtain the dielectric strength of the transistor for driving the relay.

In the case of diode

(Upper-limit of pickup voltage + 0.6) x 2* ≅ V_{CEO} ≅ V_{CBO} = ___V

In the case of diode and zener diode

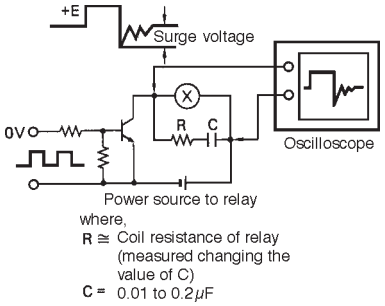
(Upper-limit of pickup voltage + 0.6 + breakdown voltage**) x 2* ≅ V_{CEO} ≅ V_{CBO} = ___V

In the case of varistor

(Upper-limit pickup voltage + varistor voltage***) x 2* ≅ V_{CEO} ≅ V_{CBO} = ___V

In the case of RC

(Upper-limit pickup voltage + surge voltage****) x 2* ≅ V_{CEO} ≅ V_{CBO} = ___V



4. Determine collector current I_C.

I_C = Upper-limit pickup voltage/Coil resistance x 2*

5. Select the transistor that satisfies the conditions determined in steps 3 and 4.

6. After selecting the transistor, observe the I_C vs. V_{CE} characteristics of the transistor indicated in its ratings.

The characteristic curve illustrates the relation between collector current I_C and collector-emitter voltage V_{CE} at base current I_B. From this graph, obtain collector-emitter voltage V_{CE} where,

I_C = Maximum value of must operate voltage/Coil resistance

I_B = Base current of the switching transistor which is determined by the driver stage.

Thus, Collector-emitter voltage V_{CE} = V

Use the transistor in its switching (saturation) area. An adequate base current is required.

Note:

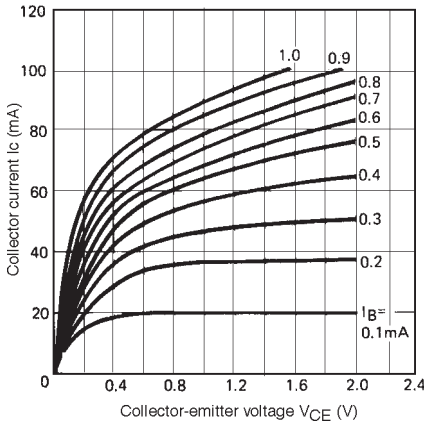
* This safety factor must be determined by the user.

** The breakdown voltage differs depending on the component. If multiple zener diodes are to be used, use their maximum breakdown voltage.

*** The varistor voltage differs depending on the component. In addition, the varistor voltage of a single varistor may vary depending on the current. Consult the manufacturer of the varistor to be used to determine the varistor voltage.

****The surge voltage differs depending on the type and rating of the relay, and the constants of C and R of the circuit in which the relay is used. Positively determine the surge voltage by experiment.

I_C vs. V_{CE} characteristics (Example)



7. Using the following formula, calculate the power dissipated by the transistor to confirm that it is within the range of permissible power dissipation of the transistor.

Total power dissipation P_T = Collector dissipation P_C + Base dissipation P_B where,

P_C= Maximum value of pickup voltage/ Coil resistance x V_{CE}

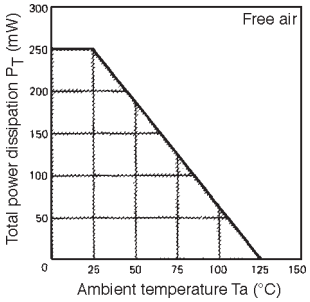
(V_{CE} is determined in step 6.)

$P_B = I_B$ x 0.6 to 1

(For details on I_B, refer to step 6.)

Confirm that P_T obtained by the above formula is within the curve representing the total power dissipation vs. ambient temperature characteristics.

Total power dissipation vs. ambient temperature



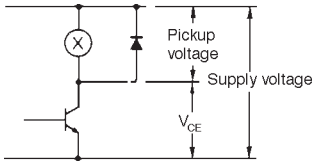
In case the total dissipation exceeds the permissible power dissipation, either attach a radiator plate to the transistor, or replace the transistor.

8. Determine the supply voltage to the relay.

The maximum and minimum values of the supply voltage to the relay are determined by the following expressions using the upper- and lower-limit values of the pickup voltage V_{CE} obtained in step 6.

Maximum supply voltage ≤ Upperlimit pickup voltage + V_{CE}

Minimum supply voltage ≥ Lowerlimit pickup voltage + V_{CE}



9. Verify that the following conditions are satisfied.

V_{CEO} > (Maximum supply voltage + surge voltage) x safety factor*

V_{CBO} > (Maximum supply voltage + surge voltage) x safety factor*

* Determine the safety factor giving consideration to external surge (such as lightning and surge from other devices).

10. Check the following items during actual use of the relay.

- Is the upper-limit value of the pickup voltage equal to or less than the rated value when the maximum supply voltage is applied?
- Is the lower-limit value of the pickup voltage equal to or more than the rated value when the minimum supply voltage is applied?
- Are the above conditions satisfied within the operating temperature range?
- Is there any abnormality found in a test run?

In addition to checking the above items, take into consideration the items listed in this table.

Rated voltage of relay	Low	High
Coil current*	High	Low
I_C of switching transistor	High	Low
V_{ECO}, V_{CEO} of switching transistor**	Low	High
Driving current of transistor	High	Low
Voltage drop V_{CE} in transistor	High	Low
Voltage dropV_{BE} in transistor	High	Low
Total power dissipation P_T of transistor	High	Low

* Inversely proportional to voltage

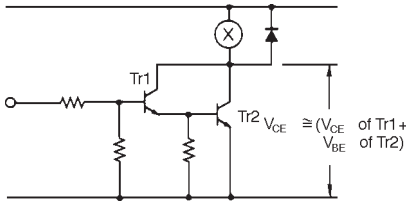
** Often used V_{CEO}: 35 to 60 V

From the above discussion, the best relay coil should be rated at 12 VDC or 24 VDC when the relay is driven by a transistor.

■ Driving by Darlington-Connected Transistors

To reduce the current of the transistor to drive the relay (i.e., base current of the transistor), two transistors may be used, via Darlington connection. Darlington connected transistors are available enclosed in a single package.

NPN-NPN Darlington Connection

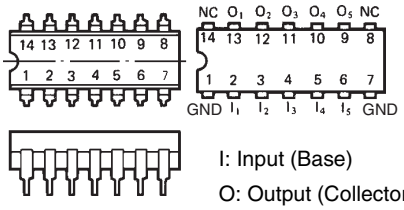


When the Darlington-connected transistors are used, the required value of V_{CE} is higher than when using a single transistor. For this reason, consideration must be given to designing the total power dissipation and supply voltage for the second transistor, Tr2.

■ Driving by IC

An IC on which multiple driving transistors are integrated is available. The designing of the circuit or PCB to drive multiple relays, a small-size solenoid, or a small-size lamp can be simplified by using this IC. Consult the manufacturer of the IC for details. For V_{CE}, refer to the description of the related voltage and surge suppressor.

Dimensions Connection (Top view)

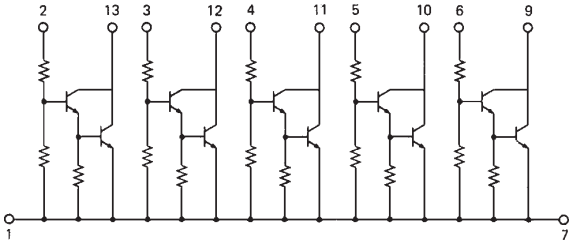


I: Input (Base)

O: Output (Collector)

GND: (Common Emitter)

Equivalent circuit



■ Driving by TTL

TTLs can be divided into two types by classification of the output: totem-pole and open-collector outputs. Connection of each type of TTL is described below.

Use a diode as surge suppressor.

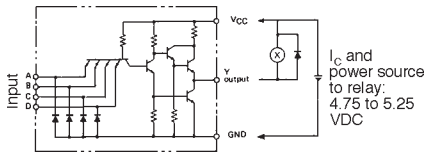
In the specifications of some ICs, such a phrase as “fan-out 10” may be used in place of the legend I_{OL}. This denotes that 10 standard TTLs can be connected in parallel. In terms of current, fan-out 1 equals 1.6 mA. Hence,

Fan-out n = 1.6 x n (mA)

1. To drive a relay by the totem-pole output of a TTL, these conditions must be satisfied:

- I_{OL} (low-level output current) > Maximum supply voltage/Coil resistance.
- I_{OH} (high-level output current) < Rated current x pickup voltage (%)/Coil resistance
- Minimum supply voltage (4.75 V) – Maximum V_{OL} (low-level output voltage) > Lower-limit value of pickup voltage (Refer to *Driving by Transistor*)

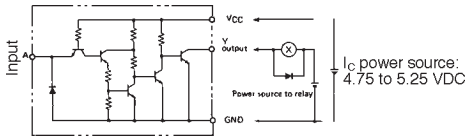
Totem-pole output



2. To drive a relay with open-collector output type TTL, a degree of freedom is allowed in the ratings of the relay coil. However, these, conditions must be satisfied:

- I_{OL} > Maximum supply voltage to the relay coil/Coil resistance
- I_{OH} < Rated current x pickup voltage (%)/200
- V_O = Dielectric strength of the output transistor (Refer to *Driving by Transistor*.)
- V_{OL} = Collector emitter voltage V_{CE} of the output transistor (Refer to *Driving by Transistor*.)

Open-collector output

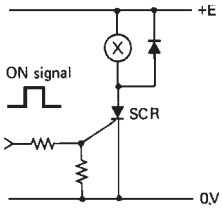


The above description of the standard TTL is applicable when using S, H, and LS type TTLs.

■ Driving by Other Switching Devices

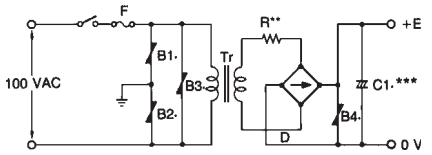
Consult the manufacturer of the switching device. The upper- and lower-limit values of the pickup voltage can be determined in the same manner as described in Upper-limit Pickup Voltage and Lower-limit Pickup Voltage.

Example of Driving by SCR



■ Designing Power Circuit

Since many documents and reference books on the power circuit are available, a detailed description is omitted here.

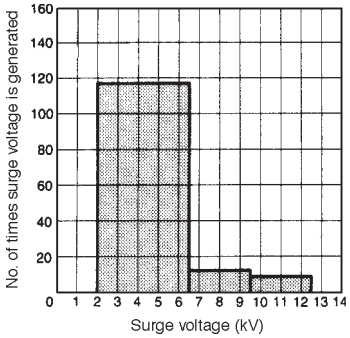


* In the circuit above, varistors B_1 to B_4 are used to protect the power circuit elements, as well as elements related to the power circuit, in case the voltage on the power line experiences surges (due to lightning or the surge voltage generated in other devices connected to the power circuit). Connect an appropriate surge suppressor across the output terminals of the power circuit to prevent a surge voltage from being generated. The surge suppressor must keep the surge voltage, if generated, from exceeding the breakdown voltage of each element in the power circuit.

** Resistor R protects diode bridge D from the inrush current that flows through the power circuit upon power application. Although the resistance of R is determined according to the resistance of the load coil and the ratings of the diodes, the use of a resistor having a resistance of 0.1 to 100Ω is recommended.

*** C_1 is a smoothing capacitor. Its capacitance must be as large as possible to reduce the ripple percentage.

■ Connection of Surge Suppressor



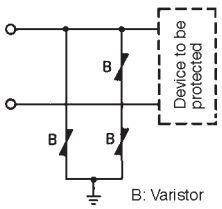
Note: This graph is plotted by measuring the surge voltage in the line of low-tension overhead wiring (cable length: 200 to 500 m).

When connecting a surge suppressor, pay attention to the following points:

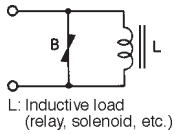
1. Place the surge suppressor near the device to be protected. For example, to protect a device from external surge, set the surge suppressor at the inlet of the device's power cable.

   To suppress an internal surge, the suppressor must be placed near the surge generating source.

External surge



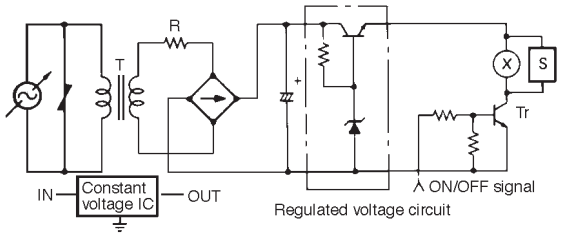
Internal surge



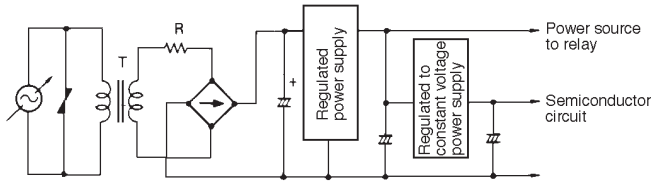
2. The cable for connecting the surge suppressor must be as short as possible in length, and thick enough in diameter so that it can sufficiently withstand the surge current. The short length and thick diameter are important to reduce the inductance and generated voltage, and to protect the device from heat damage.
3. When using a surge suppressor between cable and ground, the lower the ground resistance of the surge suppressor, the better the protective effect of the surge suppressor. Perform grounding at a ground resistance of 10Ω or less.

■ Countermeasures Against Supply Voltage Fluctuation

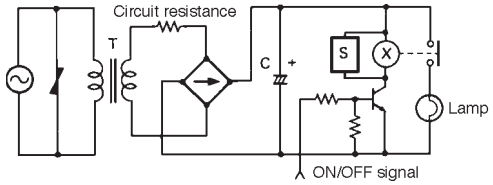
In case the supply voltage fluctuates heavily, insert a regulated voltage circuit or constant-voltage circuit in the application circuit as shown below.



Relays consume more power than semiconductor elements. The following circuit configuration is recommended to improve the characteristics.

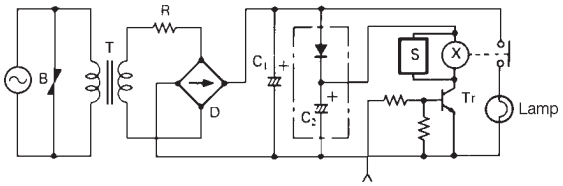


■ Countermeasures Against Inrush Current

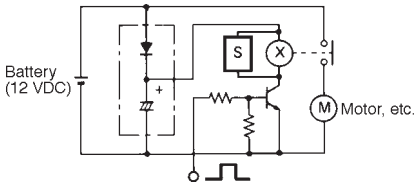


If a load such as a capacitor or lamp through which an inrush current flows is connected to the power source and contact of the relay, the supply voltage may drop when the contact is closed, causing the relay to abnormally release.

Increasing the capacity of the transformer or providing an additional control circuit can be used to prevent this drop in the supply voltage. On some occasions, use of the following circuit may prevent voltage drop.



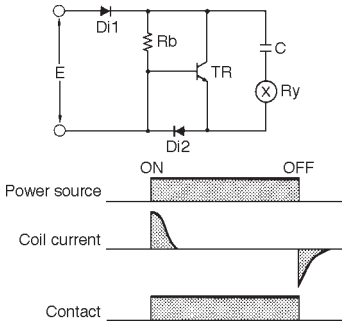
The same circuit also applies when the relay is driven by a battery.



■ Designing Power-Conserving Driver Circuit with Single-Winding Latching Relay (Pat. 1239293)

This section introduces a patented drive circuit for the single-winding latching relay that can be driven on several milliwatts. This drive circuit not only allows the relay to be used in the same manner as semiconductor devices but also offers a wide range of applications.

Operating principle



Set

When a specified voltage is applied across E, the current flows through the circuit in the sequence of diode Di1, capacitor C, relay Ry, and diode Di2. C is then charged, setting the relay.

Energization

When C has been fully charged, the relay is biased by the current flowing from Di1 to Rb. C does not discharge. The power consumption at this time is very small, several milliwatts at best, and its value can be calculated as follows:

$$P = \frac{(E - V_F)^2}{Rb}$$

where,

P: power consumption

V_F: voltage drop across diode Di1

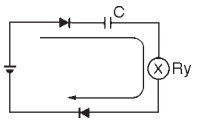
The current that is to flow through Rb at this time is dependent on the transfer ratio h_{fe} of transistor TR which is required for TR to turn ON.

Reset

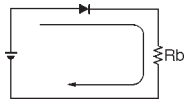
When the voltage placed across E is removed, the electricity charged in C is discharged, causing the current to flow through the circuit in the sequence of Rb, the base, and the emitter of TR. In this way, the relay is reset by the current flowing in the direction opposite to when the relay is set.

The following equivalent circuits respectively illustrate the current flows when the relay is set, energized, and reset.

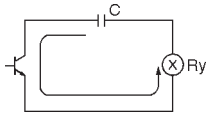
Set



Energization



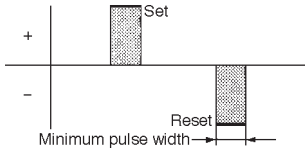
Reset



Circuit design

Fundamental

Generally, the latching relay is set and reset when a pulse having a square waveform is applied to it for a short time. The minimum pulse width required to set and reset the relay is predetermined.

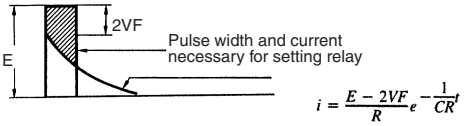


The charging current shown in the above equivalent circuit diagrams, has a sawtooth waveform that can be expressed by the following formula, because it is the primary circuit of C and R.

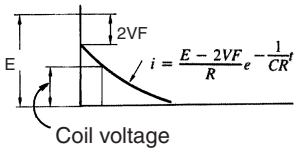
$$i = \frac{E - 2VF}{R} e^{-\frac{1}{CR}t}$$

(2 Forward voltage diode drops)

If applied voltage E and the rated coil voltage of the relay are the same, the current to the relay falls short by the quantity indicated by the shaded portion in the following figure.

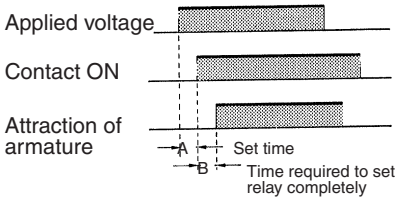


Therefore, the current must be applied to the relay as follows when designing this driver circuit.



Time constant

When the rated voltage is applied to the relay, time A in the timing chart below is required to turn ON the contacts. After this time has elapsed, time B is required until the armature attraction to the magnet is complete.

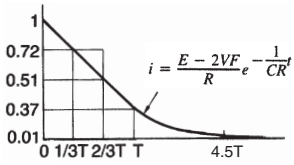


Therefore, it is apparent that time constant T obtained as the product of C and R must be equal to or longer than the sum of A and B. Actually, however, T should not be equal to the sum of A and B but must be longer than that to ensure the stable operation of the circuit. Thus,

T = A + B + X

where X is the time margin.

The set time A of OMRON's moving-loop relays (with a pickup power of 200 mW) is rated at about 3 milliseconds. Time constant T for them should be about three times that of A. The following graph illustrates this. This graph indicates that, if C is completely charged (I_{PEAK}), it takes 4.6T to discharge I to 1%. Note that time constant T is broken down into three segments. The first 1/3T equals A, the second 1/3T, B. The remaining 1/3T is the time margin expressed as X in the above equation. T is three times A.



Voltage drop E1 across the total resistance of the capacitance C's resistance and relay coil's internal resistance is the difference between the supply voltage E and voltage drops across two diodes: Di1 and Di2. Hence,

E1 = E – 2VF

Assuming the supply voltage to be 5 V and VF to be 0.6 V,

E1 = 5 – 2 x 0.6 = 3.8 V

From E1 and the above graph, the required coil voltage of a relay can be obtained. Again assuming the E, i.e., the supply voltage of a single-winding latching relay is 5 V, the coil voltage is:

3.8 x 0.72 = 2.7 V

At this time, the capacitance of C is 246.9 μF, according to the equation shown in the above graph.

Coil ratings and capacitance of C

In the example, the coil voltage obtained by calculation is 2.7 V, which is 0.3 V less than the value at which the coil voltage of commercially available standard latching relay is rated. The standard coil voltages of relays at a supply voltage of 6, 9, 12, and 24 V can be respectively calculated in the same way. Table 1 compares the results of the calculation and the coil voltages of standard relays.

Table 1

Supply voltage	Coil voltage (calculated)	Standard voltage	Coil resistance
5 V	2.7 V	3 V	45Ω
6 V	3.5 V	3 V	45Ω
9 V	5.6 V	5 V	125Ω
12 V	7.8 V	6 V	405Ω
24 V	16.4 V	12 V	720Ω

Table 2

Supply voltage	Coil voltage (calculated)	Coil resistance	Capacitance of C
5 V	2.7 V	45Ω	280 μF
6 V	3.5 V	45Ω	142 μF
9 V	5.6 V	125Ω	54 μF
12 V	7.8 V	405Ω	40 μF
24 V	16.4 V	720Ω	6.5 μF

The calculated coil voltages significantly deviates from the standard values. It is therefore necessary to determine the time constant of the relay by adjusting the capacitance of C when the relay coil is to operate on the standard voltage.

As an example, calculate the capacitance of C and time constant T of a relay with a rated supply voltage of 5 V. The coil voltage E_1 has been calculated above (3.8 V). To determine how much current I flows through the coil at 3.8 V, from Table 1, note that the coil resistance is 45Ω. So,

I = 3.8/45 = 84.4 mA

Therefore, the peak current of capacitor C to be used must be 84.4 mA.

Remember, that time A of an OMRON relay is 3 ms. Capacitance C must be a value that allows 66.6 mA to flow through 3 ms after 5 V is applied to the relay.

Thus,

$$66.6 = 84.4e^{-\frac{3\times10^{-3}}{c\times45}}$$

From this,

C = 280 μF

At this time, time constant T is:

280 x 10^{-6} x 45 = 12.6 ms

By calculating the C of each of the relays listed in Table 1, the values in Table 2 are obtained.

Again, these calculated capacitances deviate from the commercially available standard capacitors. There is no problem in using standard capacitors but, if the cost and circuit space permit, it is recommended to use two or more capacitors so that a capacitance as close to the calculated value as possible is obtained. At this time, pay attention to the following points:

- Confirm that the relay operates normally even when the supply voltage is brought to 80%-120% of the rated value.
- Even if a voltage of two or three times the rated voltage is applied to this driver circuit, the coil wire will not sever. That is why, for example, when the driver circuit is mounted in an automobile where a supply voltage of 12 VDC is available from the battery, it is recommended to use a relay whose coil voltage is rated at 6 VDC, taking a voltage fluctuation of 8 to 16 VDC into consideration.

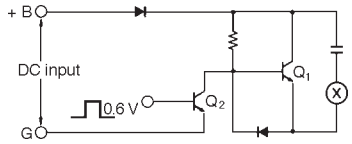
Determining Rb

The current flows into Rb should be enough to turn ON TR when the relay is reset. When determining value of Rb, the following points must be noted:

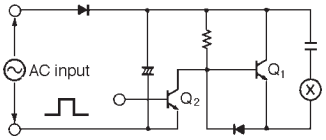
- TR must be sufficiently turned ON even when T equals the time constant.
- Give adequate consideration to changes in the due to changes in ambient temperature. Simple as it is, the driver circuit introduced here can efficiently control the relay, consuming a tiny amount of power.

An experiment reveals that the relay sufficiently operates with a capacitance of 100 μF + 47 μF where the relay is rated at a supply voltage of 5 VDC and a coil voltage of 3 VDC. It can therefore be said that the capacitance can be lower than the calculated value. This is because the time constant is determined with a relatively wide margin. So it is recommended to perform experiments to determine the time constant.

Application circuit example

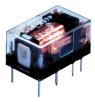


The TTL output of a solid-state switch can be used as Q_2.



Half-wave rectified AC power is applied to the circuit. Q_1 is the output of a TTL, and drives the relay.

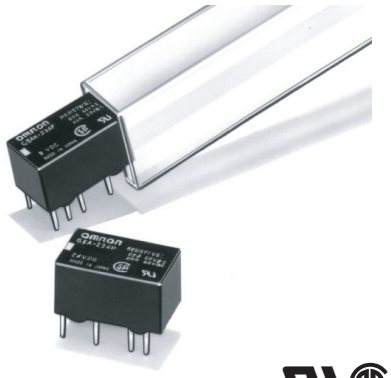
Low Signal Relay Selection Guide

	 Page 31	 Page 37	 Page 45	 Page 49	 Page 57
General Attributes	**G5A**	**G6L**	**G5V-1**	**G6H**	**G6J-Y**
Dimensions mm(in)	8.38 H x 16 L x 9.9 W (0.33 x 0.63 x 0.39)	4.5 H x 10.6 L x 7.0 W (0.18 x 0.42 x 0.28	10.0 H x 12.50 L x 7.50 W (0.39 x 0.49 x 0.30)	5.08 H x 13.97 L x 8.89 W (0.20 x 0.55 x 0.35)	10.0 H x 10.6 L x 5.7 W (0.39 x 0.42 x 0.22)
Switching	1A max.	1A max.	1A max.	1A max.	1A max.
Features	•General use, 2 Form C, 1 Amp relay •Semi-sealed or fully-sealed construction •Ideal for Telecom, Security, Computer Peripheral, Office Automation	• Very low profile, 1 Form A, 1 Amp relay • 1.5kV surge withstand • SMT & PCB versions • Ideal for Security & General Use	• General use, 1 Form C, 1 Amp relay • 150mW power consumption • 1.5kV surge withstand • Conforms to FCC Part 68 • Ideal for Telecom, Security, Computer Peripheral	• Low profile (5mm), 2 Form C, 1 Amp relay) • Available in SMT & PCB • 1.5kV surge withstand • 140mW power consumption • Ideal for Telecom, Test & Measurement, Medical, Security, Office Automation, Computer Peripheral	• Slimline, 2 Form C, 1 Amp relay • SMT & PCB versions • 2.5kV surge withstand • Available in SMT & PCB • Latching & non-latching versions • Ideal for Telecom, Test & Measurement, Medical, Security, Computer Peripheral, Office Automation
Contact Information					
Contact form	2 Form C	1 Form A	1 Form C	2 Form C	2 Form C
Contact type(s)	Bifurcated crossbar	Single crossbar	Single crossbar	Bifurcated crossbar	Bifurcated crossbar
Contact Material	Ag with Au clad	Ag with Au clad	Ag with Au clad	Ag with Au clad	Ag with Au alloy clad
Rated load (under resistive load)	0.5A @ 24VAC, 1A @ 24VDC	0.3A @ 125VAC, 1A @ 24VDC	0.5A @ 125VAC, 1A @ 24VDC	0.5A @ 125VAC, 1A @ 30VDC	0.3A @ 125VAC, 1A @ 30VDC
Max.operating voltage	125VAC, 125VDC	125VAC, 60VDC	125VAC, 60VDC	125VAC, 110VDC	125VAC, 110VDC
Max. switching capacity under resistive load	37.5VA, 33W	37.5VA, 24W	62.5VA, 30W	62.5VA, 33W	37.5VA, 30W (NO)
Min. electrical service life (operations at rated load	100,000	100,000	100,000	100,000	100,000
Min. permissible load (for reference only)	1mA @ 5VDC	1mA @ 5VDC	1mA @ 5VDC	10μA @ 10mVDC	10μA @ 10mVDC
Coil Information					
Coil voltage	5, 6, 9, 12, 24, 48VDC	3, 4.5, 5, 12, 24VDC	5, 6, 9, 12, 24VDC	3, 5, 6, 9, 12, 24, 48VDC	3, 4.5, 5, 12, 24VDC
Power consumption	200mW (standard & latching)	180mW (standard)	150mW	140mW (standard)	140mW (230mW for DC24)
Characteristics					
Dielectric strength between coil & contacts (50/60 Hz for 1 minute)	1,000VAC	1,000VAC	1,000VAC	1,000VAC	1,500VAC
Surge withstand	—	—	1.5kV (10 x 160μs)	1.5kV (10 x 160μs)	2.5kV (2 x 10μs)
Terminal choices	PCB	PCB, SMT Gullwing	PCB	PCB (G6H), SMT Gullwing (G6H-2F)	SMT Gullwing, PCB
Packaging	—	Tape & reel available	—	Tape & reel available	Tape & reel available
Approved standards	UL, CSA	UL, CSA (FCC Part 68)	UL, CSA	UL, CSA (FCC Part 68)	Bellcore 2.5kV / Telcordia GR-1089-CORE 2.5kV between coil and contacts

	 Page 67	 Page 77	 Page 81	 Page 89	 Page 95
General Attributes	**G6K**	**G5V-2**	**G6A**	**G6E**	**G6S**
Dimensions mm(in)	5.30 H x 10.20 L x 6.70 W (0.21 x 0.40 x 0.26)	11.43 H x 20.32 L x 9.91 W (0.45 x 0.80 x 0.39	8.40 H x 20.20 L x 10.10 W (0.33 x 0.80 x 0.40)	8.38 H x 16 L x 9.9 W (0.33 x 0.63 x 0.39)	9.40 H x 15 L x 7.50 W (0.37 x 0.59 x 0.30)
Switching	1A max.	2A max.	2A max.	3A max.	2A max.
Features	• Small real estate, 2 Form C, 1 Amp relay • 100mW power consumption • 2.5kV surge withstand • SMT & PCB versions • Latching & non-latching models • Ideal for Telecom, Test & Measurement, Medical, Security, Office Automation, Computer Peripheral • Conforms to FCC Part 68	• 2 Form C, 1-2 Amp relay • Ideal for general use • Industry standard footprint • 150mW, 360mW & 500mW coil power versions • 1.5 kV surge withstand • Conforms to FCC Part 68	• Industry standard, 2 Form C, 2 Amp relay • 200mW, 400mW versions • 2 Pole & 4 Pole models • Latching & non-latching versions • 1.5kV surge withstand • Ideal for Telecom, Test & Measurement, Security	• General use, 1 Form C, 3 Amp relay • 2.5 kV surge withstand • 200mW, 400mW models • Latching and non-latching versions	•Industry standard, 2 Form C, 2 Amp relay •2.5 kV surge withstand •SMT gullwing, SMT inside-L, PCB models •Latching & non-latching versions •European version available (supplementary insulation at 250V at pollution degree 2 per EN60950/EN41003) •Ideal for Telecom, Thermostats, Medical, Test & Measurement, Security
Contact Information					
Contact form	2 Form C	2 Form C	2 Form C, 4 Form C	1 Form C	2 Form C
Contact type(s)	Bifurcated crossbar	Bifurcated crossbar	Bifurcated crossbar	Bifurcated crossbar	Bifurcated crossbar
Contact Material	Ag with Au clad	Ag with Au clad	Ag with Au clad; AgPd with Au clad	Ag with Au clad	Ag with Au clad; AgPd with Au clad
Rated load (under resistive load)	0.3A @ 125VAC, 1A @ 30VDC	0.5A @ 125VAC, 2A @ 30VDC	0.3A to 0.5A @ 125VAC, 1A to 2A @ 30VDC	0.4A @ 125VAC, 2A @ 30VDC	0.5 @ 125VAC, 2A @ 30VDC
Max.operating voltage	125VAC, 60VDC	125VAC, 125VDC	250VAC, 220VDC	250VAC, 220VDC	250VAC, 220VDC
Max. switching capacity under resistive load	37.5VA, 30W	62.5VA, 60W	125VA, 60W	50VA, 60W	62.5VA, 60W
Min. electrical service life (operations at rated load	100,000	300,000	500,000	100,000	100,000
Min. permissible load (for reference only)	10μA @ 10mVDC	10μA @ 10mVDC	10μA @ 10mVDC	10μA @ 10mVDC	10μA @ 10mVDC
Coil Information					
Coil voltage	3, 4.5, 5, 6, 9, 12, 24VDC	3, 5, 6, 9, 12, 24, 48VDC	3, 5, 6, 9, 12, 24, 48VDC	3, 5, 6, 9, 12, 24, 48VDC	3, 4.5, 5, 6, 9, 12, 24VDC
Power consumption	100mW (standard and latching)	500mW (standard) 360mW (high-sensitivity) 150mW (ultra-sensitive)	200mW (DPDT standard) 180mW (DPDT latching) 360mW (4PDT standard)	200mW (standard) 400mW (standard)	140mW (standard) 140mW, 200mW (latching)
Characteristics					
Dielectric strength between coil & contacts (50/60 Hz for 1 minute)	1,500VAC	1,000VAC	1,000VAC	1,500VAC	2,000VAC
Surge withstand	2.5kV (2 x 10μs)	1.5kV (10 x 160μs)	1.5kV (10 x 160μs)	2.5kV (2 x 10μs)	2.5kV (2 x 10μs)
Terminal choices	SMT Gullwing, SMT Inside-L, PCB	PCB	PCB	PCB	SMT Gullwing, SMT Inside-L, PCB
Packaging	Tape & reel available	—	—	—	Tape & reel available
Approved standards	UL, CSA Bellcore 2.5kV / Telcordia GR-1089-CORE 2.5kV between coil and contacts	UL, CSA	UL, CSA (FCC Part 68)	UL/CSA (FCC Part 68) Bellcore 2.5kV / Telcordia GR-1089-CORE 2.5kV between coil and contacts	UL, CSA Bellcore 2.5 kV / Telcordia GR-1089-CORE 2.5 kV (between coil and contacts)

Low Signal Relay
G5A

- Subminiature 8.40 H x 9.90 W x 16 L mm
- Unique moving-loop armature reduces relay size, magnetic interference, and contact bounce time.
- Low nominal power consumption.
- Bifurcated crossbar contact assures reliable switching of loads as low as 10 mVDC, 0.1 mA (reference value).
- Available in standard and ultrasonic cleaning versions.
- Highly stable magnetic circuit for latching endurance and excellent resistance to vibration and shock.
- Single or double coil winding types available.
- RoHS Compliant.



FCC

Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G5AU-234P-*DC12*).

■ Non-Latching

Type	Contact form	Construction	Model
Standard	DPDT	Sealed	**G5A-234P**

■ Latching

Type	Contact form	Construction	Model	
			Single-winding latching	Double-winding latching
Standard	DPDT	Sealed	**G5AU-234P**	**G5AK-234P**

Model Number Legend

G5A □ - □ □ □ □ □ - □ **DC** □
1 2 3 4 5 6 7

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   2: DPDT
3. **Contact Type**
   3: Bifurcated crossbar Ag (Au-Alloy)
4. **Enclosure Ratings**
   4: Fully sealed
5. **Terminals**
   P: Straight PCB
   C: Self-clinching PCB
6. **Special Function**
   None: General-purpose
   FC: FCC part 68 compliance
   U: For ultrasonically cleanable
7. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.50 A at 30 VAC, 1 A at 30 VDC	0.10 A at 30 VAC, 0.20 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	1 A	
Max. operating voltage	125 VAC, 125 VDC	
Max. operating current	1 A (AC) 1 A (DC)	0.50 A (AC) 0.50 A (DC)
Max. switching capacity	37.50 VA, 33 W	12.50 VA 11 W
Min. permissible load (See note)	10 μA, 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 100 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Standard Non-latching (G5A-234P)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated value			
3	66.7	45	0.048	0.043	70% max	10% min.	200%	Approx. 200
5	40	125	0.13	0.12				
6	33.30	180	0.17	0.16				
9	22.20	405	0.43	0.40				
12	16.70	720	0.71	0.68				
24	8.30	2,880	2.76	2.70				
48	5.80	8,230	7.44	7.25			170%	Approx. 280

Latching (G5AU-234P, G5AK-234P)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated value			
3	66.70	45	0.02	0.02	80% max.	80% min.	200%	Approx. 200
5	40	125	0.06	0.05				
6	33.30	180	0.08	0.07				
9	22.20	405	0.17	0.14				
12	16.70	720	0.29	0.24				
24	8.30	2,880	1.10	0.85				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C (73°F).
3. The maximum voltage is the highest voltage that can be imposed on the relay coil

■ Characteristics

Type		Non-latching	Latching
Contact resistance (See note 2)		50 mΩ max.	
Operate (set) time		5 ms. max. (mean value approx 2.4 ms)	5 ms. max. (mean value approx. 2.0 ms)
Release (reset) time		5 ms. max. (mean value approx. 1.1 ms)	5 ms. max. (mean value approx. 1.8 ms)
Operating frequency (max.)	**Mechanical**	36,000 operations/hour	
	Electrical	18,000 operations/hour (under rated load)	
Insulation resistance (See note 3)		1,000 mΩ min. (at 250 VDC)	
Dielectric strength	**Standard**	1,000 VAC, 50/60 Hz for 1 minute between coil and contacts (See note 4)	
		1,000 VAC, 50/60 Hz for 1 minute between contacts of different poles (See note 4)	
		500 VAC, 50/60 Hz for 1 minute between contacts of same pole (See note 5)	
	Set and reset coils	--	100 VAC, 50/60 Hz for 1 minute
Impulse Withstand Voltage (See notes 4 & 5)		1,500 V (10 x 160 μs) between contacts of the same polarity (conforms to FCC Part 68)	
Vibration	**Mechanical durability**	10 to 55 Hz; 1.50 mm (0.06 in) double amplitude	
	Malfunction durability	10 to 55 Hz; 1.50 mm (0.06 in) double amplitude	
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100 G)	
	Malfunction durability	300 m/s^2 (approx. 30 G	
Ambient temperature		-40 to 70°C (-40 to 158°F) with no icing	
Humidity		5% to 85% RH	
Service life	**Mechanical**	50 million operations min. at 36,000 operations/hour	50 million operations min. at 36,000 operations/hour
	Electrical	100,000 operations min. (at 1,800 operations/hr) See “Characteristic Data”	
Weight		Approx. 3 g (0.11 oz)	

Note: 1. Data shown are of initial value.

2. The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method

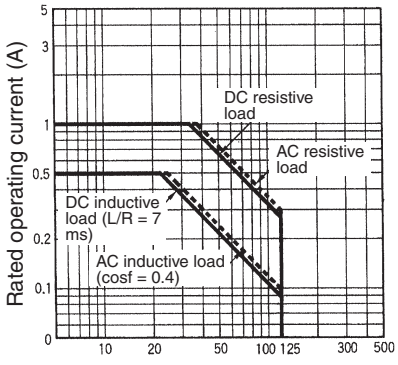
3. The insulation resistance was measured with a 250-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength (except between the set and reset coil).

4. Models with FC suffix: 1,200 VAC, 50/60 Hz for 1 min, impulse withstand voltage of 1,500 V (10 x 160 μs)

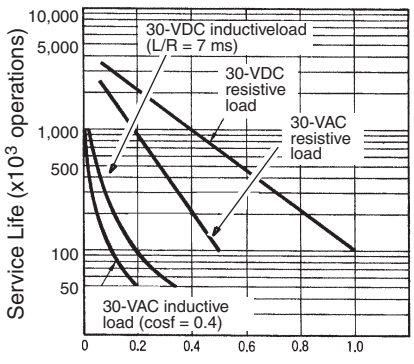
5. Models with FC suffix: 750 VAC, 50/60 Hz for 1 min, impulse withstand voltage of 1,500 V (10 x 160 μs)

■ Characteristic Data

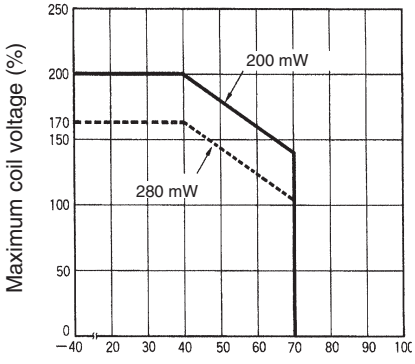
Maximum Switching Capacity



Electrical Service Life



Ambient Temperature vs. Maximum Coil Voltage



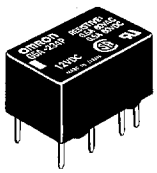
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

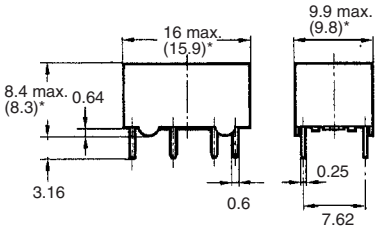
Dimensions

Note: 1. All units are in millimeters unless otherwise inciated. To convert millimeters into inches, multiply by 0.03937.

2. Orientation marks are indicated as follows:

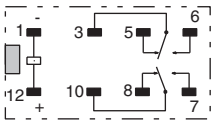
G5A-234P





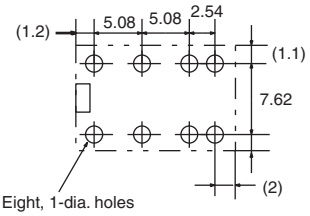
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)

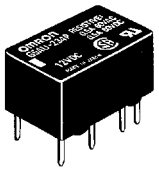


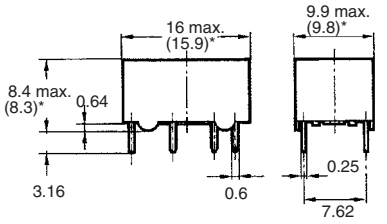
Mounting Holes (Bottom View)

Tolerance: ±0.1

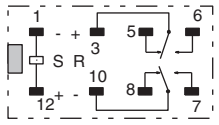


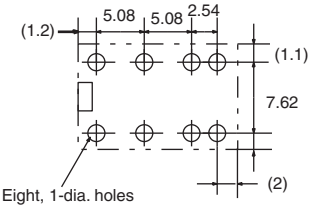
G5AU-234P



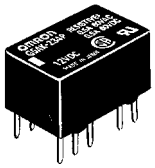


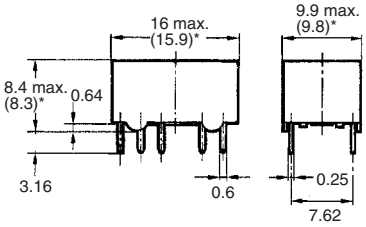
*Average value



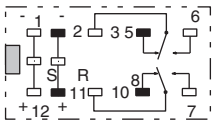


G5AK-234P

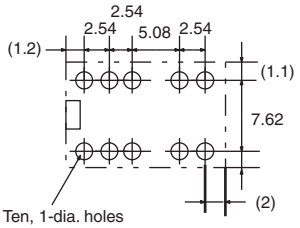




*Average value



S: Set coil
R: Reset coil



■ Approvals

UL Recognized (File No. E41515)/CSA Certified (File No. LR24825) - - Ambient Temp. = 40°C

Type	Contact form	Coil ratings	Contact ratings
G5A-234P	DPDT	3 to 48 VDC	0.5 A, 60 VAC
G5AU-234P		3 to 24 VDC	0.5 A, 60 VDC
G5AK-234P			1 A, 30 VDC

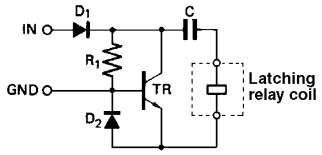
Note: 1. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

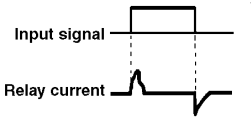
Hints on Correct Use

Single-winding type (G5AU)
Example of low-power drive circuit

1. The figure below shows a drive circuit (JAPAN PAT. NO. 1239293) in which the latching relay can function like a general-purpose relay from a normal input pulse for switching.
2. Use a charging current of capacitor C to operate the latching relay, which flows suddenly through diode D1, capacitor C, latching relay, and diode D2, and the relay contacts will be put in the locked state.



3. Use a discharging current of capacitor C to release the latching relay, which flows through transistor TR, capacitor C, and the latching relay.



Note: 1. When applying the relay for practical use, make sure of the set or reset state of the relay; then determine the circuit constraints.
2. Because OMRON possesses the patent of this drive circuit, contact OMRON when adopting it.

Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

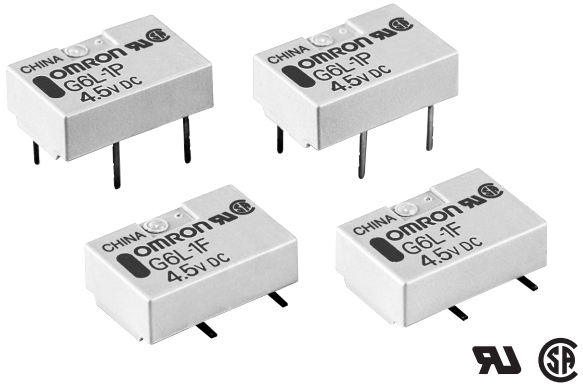
When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

MEMO

Low Signal Relay
G6L

Extremely Thin SPST-NO Flat Relay, One of the Thinnest Relays in the World

- Uses 20% less mounting area and 67% less volume in comparison with the G5V-1 relay.
- Measures just 7.0 (W) x 10.6 (L) x 4.5 (H) mm for surface-mount or 4.1 (H) for through-hole.
- High dielectric strength: 1,000 VAC between coil and contacts and 750 VAC between contacts of the same polarity.
- Conforms to FCC Part 68.
- UL recognized / CSA certified
- RoHS Compliant - Use of lead completely eliminated.



Ordering Information

Contact form	Construction	Mounting type	Model
SPST-NO	Fully sealed	Through-hole terminal	**G6L-1P**
		Surface-mount terminal	**G6L-1F**

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G6L-1P DC12
Rated coil voltage

2. When ordering tape packing (surface mount versions), add "-TR" to the model number.
Example: G6L-1F-TR DC12
Tape packing

Be sure since "-TR" is not part of the relay model number, it is not marked on the relay case.

Model Number Legend:

G6L □ - 1 □ - □ DC □
1 2 3 4 5

1. **Relay Function**
   None: Non-latching
2. **Contact Form**
   1: SPST-NO
3. **Terminal Shape**
   P: Through-hole
   F: Surface mount
4. **Packaging**
   None: Tube packaging
   TR: Tape and reel packaging
5. **Rated Coil Voltage**
   3, 4.5, 5, 12, 24

■ Application Examples

- Peripherals of MODEM/PC
- Telephones
- Office automation machines
- Audio-visual products
- Communications equipment
- Measurement devices
- Amusement equipment
- Security equipment

Specifications

■ Contact Ratings

Item	Resistive load
Contact mechanism	Single crossbar
Rated load	0.3 A at 125 VAC, 1 A at 24 VDC
Carry current	1 A
Max. operating voltage	125 VAC, 60 VDC
Max. operating current	1 A
Min. permissible load - P level (See note)	1 mA at 5 VDC

Note: This value was measured at a switching frequency of 120 operations/min. This value may vary, depending on switching frequency, operating conditions, expected reliability level of the relay, etc. It is always recommended to double-check relay suitability under actual load conditions.

■ Coil Ratings

Item	Voltage Rating				
Rated voltage	3 VDC	4.5 VDC	5 VDC	12 VDC	24 VDC
Rated current	60.0 mA	40.0 mA	36.0 mA	15.0 mA	9.6 mA
Coil resistance	50.0 Ω	112.5 Ω	139.0 Ω	800.0 Ω	2,504.0 Ω
Pick-up voltage	75% max. of rated voltage				
Dropout voltage	10% min. of rated voltage				
Maximum voltage	150% of rated voltage				130% of rated voltage
Power consumption	Approx. 180 mW				Approx. 230 mW

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

4. The voltage measurements for Pick-up/Dropout are the values obtained for instantaneous changes in the voltage (rectangular wave).

■ Characteristics

Item		G6L-1P, G6L-1F
Contact resistance (See Note 1)		100 mΩ max.
Operate time (See Note 2)		5 ms max. (approx. 1.1 ms)
Release time (See Note 2)		5 ms max. (approx. 0.4 ms)
Insulation resistance (See Note 3)		1,000 MΩ min. (at 500 VDC)
Dielectric strength	**Coil and contacts**	1,000 VAC, 50/60 Hz for 1 min
	Contacts of same poles	750 VAC, 50/60 Hz for 1 min
Surge withstand voltage	**Coil and contacts**	1,500 VAC, 10 × 160 μs
Vibration	**Mechanical durability**	10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
	Malfunction durability	10 to 55 Hz, 1.65-mm single amplitude (3.3-mm double amplitude)
Shock	**Mechanical durability**	1,000 m/s^2
	Malfunction durability	100 m/s^2
Service life	**Mechanical**	5,000,000 operations min. (at 36,000 operations/hour)
	Electrical	100,000 operations min. (with a rated load at 1,800 operations/hour)
Ambient temperature		Operating: -40°C to 70°C (with no icing or condensation)
Humidity		Operating: 5% to 85% RH
Weight		Approx. 0.6 g

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

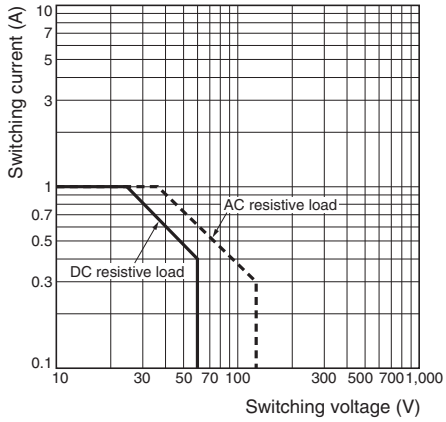
2. Values in parentheses are actual values.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength.

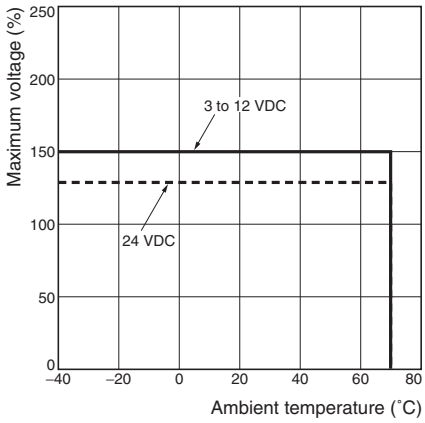
4. The above values are initial values.

Engineering Data

Maximum Switching Capacity

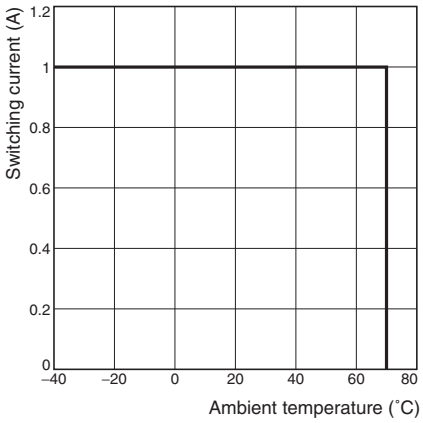


Ambient Temperature vs. Maximum Voltage

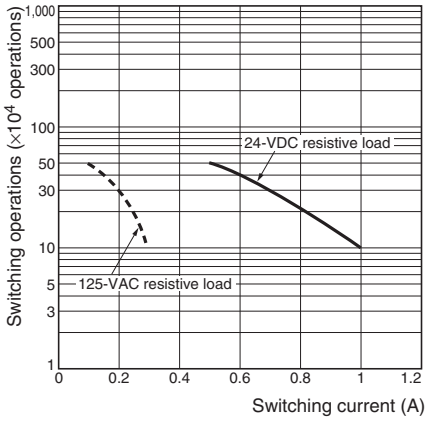


Note: "Maximum Voltage" is the maximum voltage that can be applied to the relay coil.

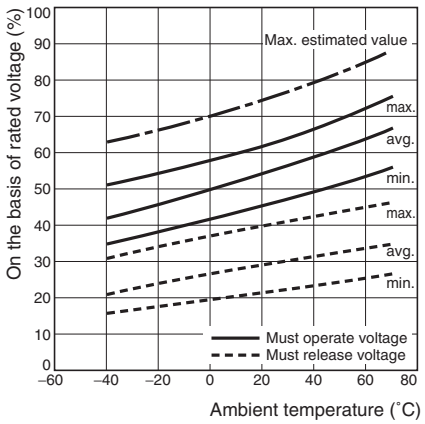
Ambient Temperature vs. Switching Current



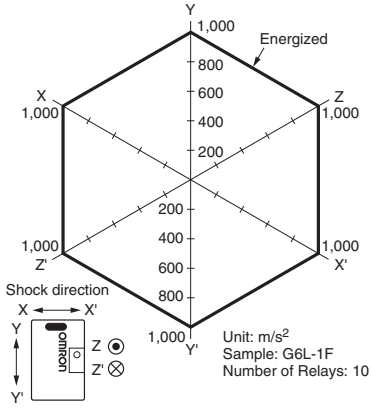
Electrical Service Life



Ambient Temperature vs. Must Operate or Must Release Voltage

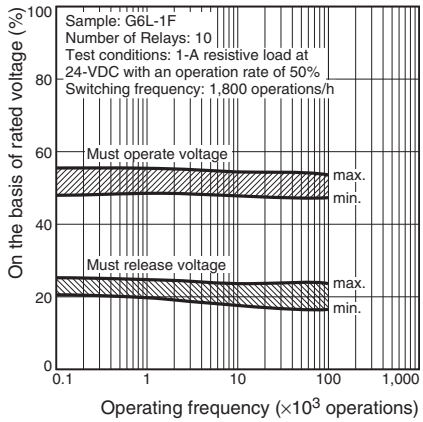


Shock Malfunction

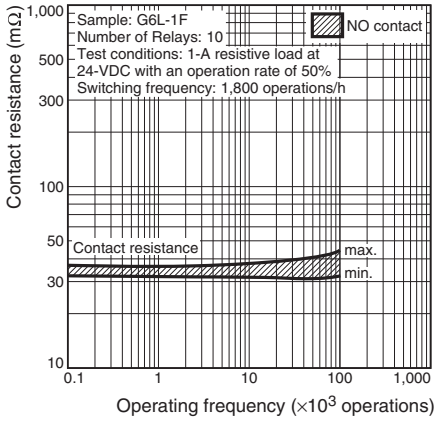


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

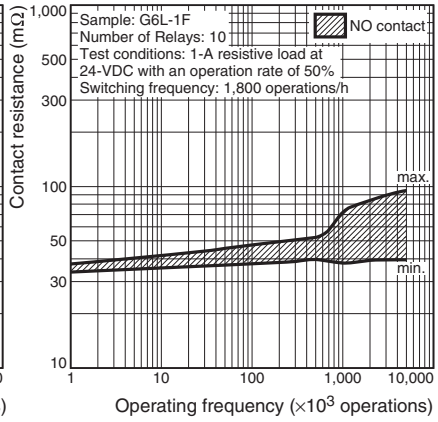
Electrical Service Life (with Must Operate and Must Release Voltage) (See note 1)



Electrical Service Life (Contact Resistance) (See note 1)

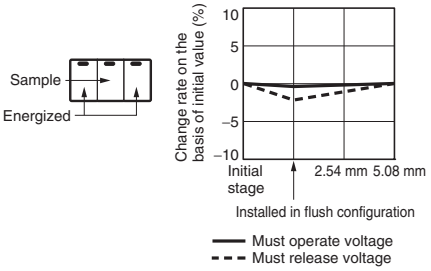


Contact Reliability Test (Contact Resistance) (See notes 1 and 2)

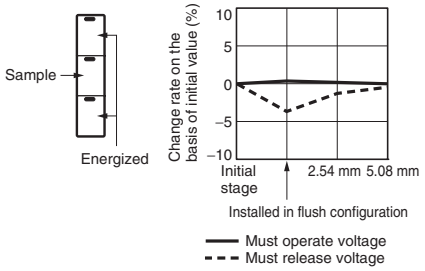


Note: 1. The tests were conducted at an ambient temperature of 23°C.
2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

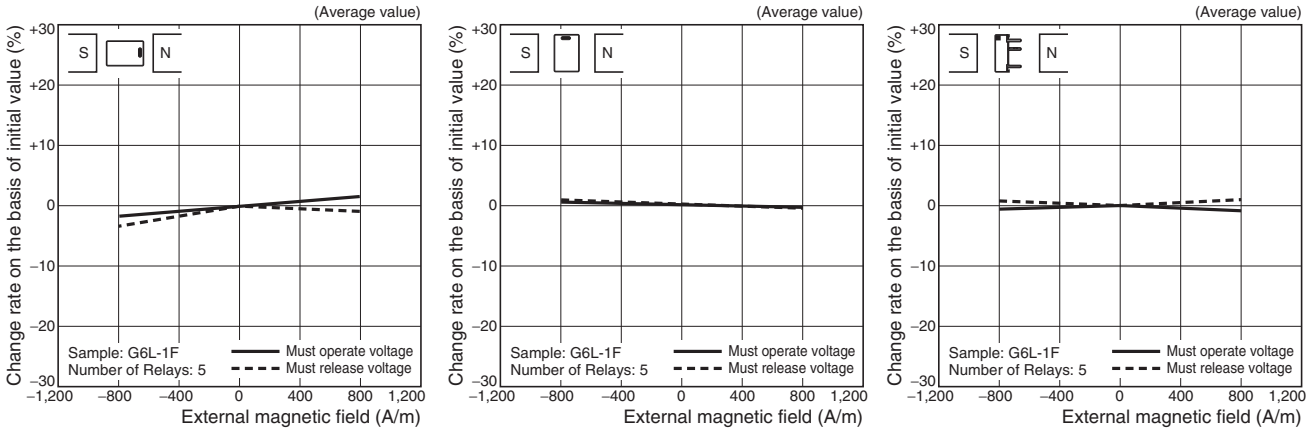
Mutual Magnetic Interference



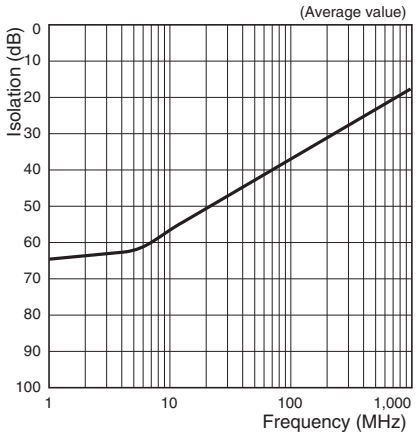
Mutual Magnetic Interference



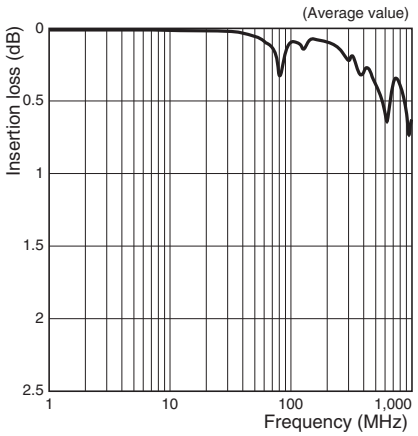
External Magnetic Interference



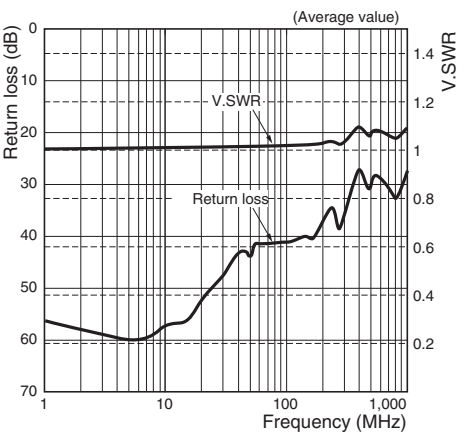
High-frequency Characteristics (Isolation) (See note)



High-frequency Characteristics (Insertion Loss) (See note)

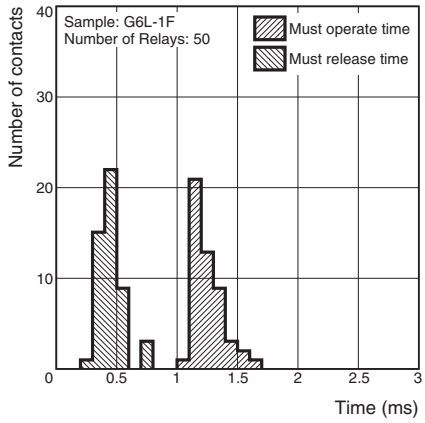


High-frequency Characteristics (Return Loss, V.SWR) (See note)

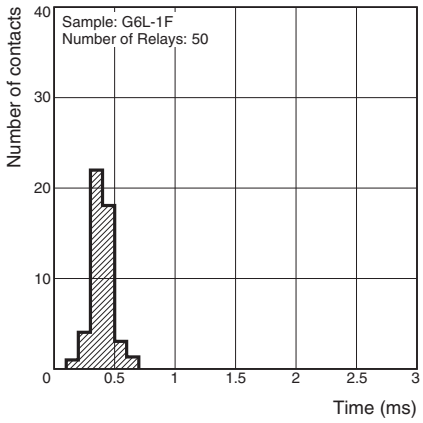


Note: High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

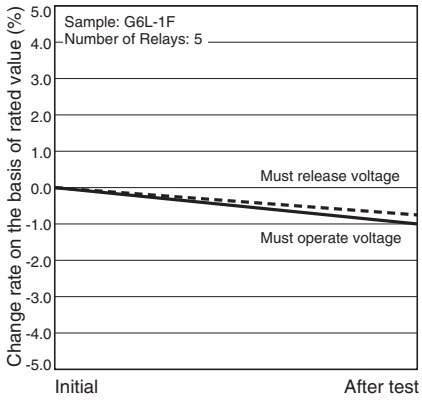
Must Operate and Must Release Time Distribution (See Note)



Distribution of Bounce Time (See Note)



Vibration Resistance

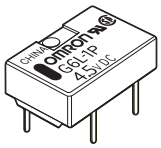


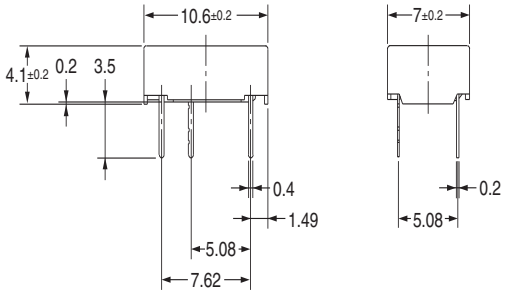
Note: The tests were conducted at an ambient temperature of 23°C.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G6L-1P

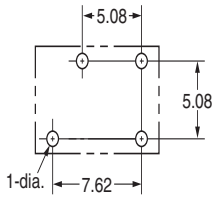




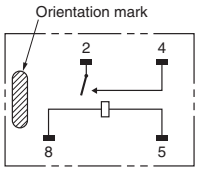
Note: Each value has a tolerance of ±0.3 mm.

PCB Mounting Holes (Bottom View)

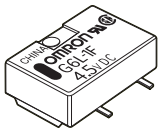
Tolerance: ±0.1 mm

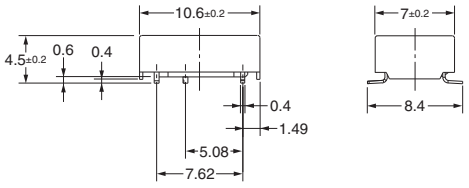


Terminal Arrangement/ Internal Connections (Bottom View)



G6L-1F

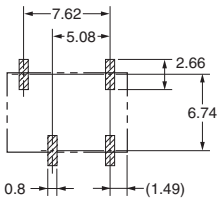




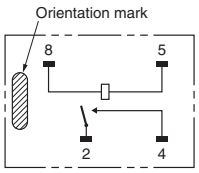
Note: Each value has a tolerance of ±0.3 mm.

PCB Mounting Holes (Top View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Top View)

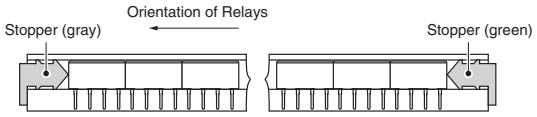


Packaging

■ Tube Packaging

Relays in tube packaging are arranged so that the orientation mark of each Relay is on the left side.

Always confirm that the Relays are in the correct orientation when mounting the Relays to the PCBs.



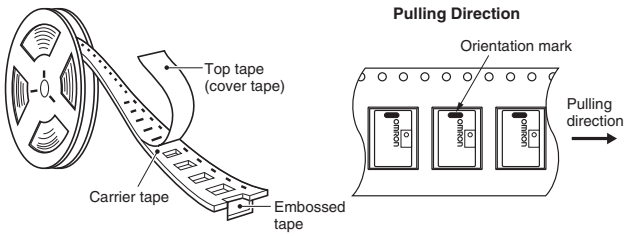
Tube length: 552 mm (stopper not included)
No. of Relays per tube: 50

■ Tape and Reel Packaging (Surface-mount models)

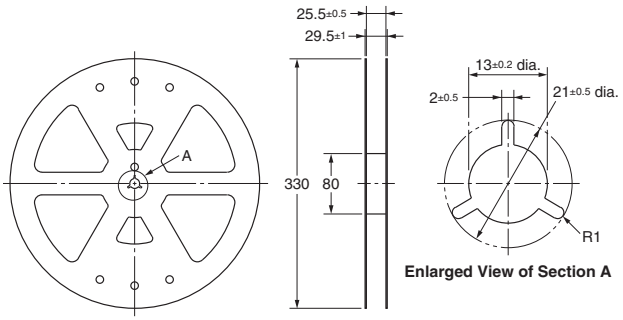
When ordering Relays in tape and reel packaging, add the suffix "-TR" to the model number, otherwise the Relays in tube packing will be provided.

- Tape type: TB2412R (Refer to EIAJ (Electronic Industries Association of Japan)
- Reel type: R24D (Refer to EIAJ (Electronic Industries Association of Japan)
- Relays per reel: 1,000

1. Direction of Relay Insertion

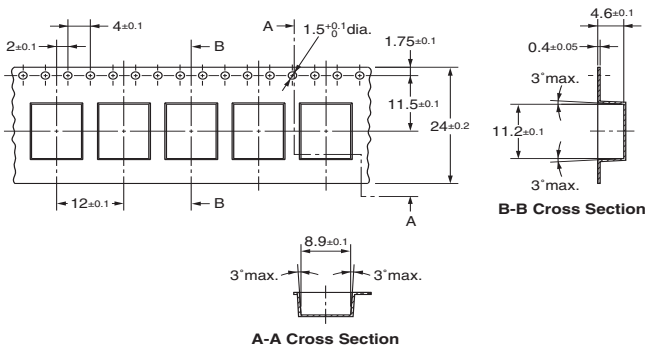


2. Reel Dimensions



3. Carrier Tape Dimensions

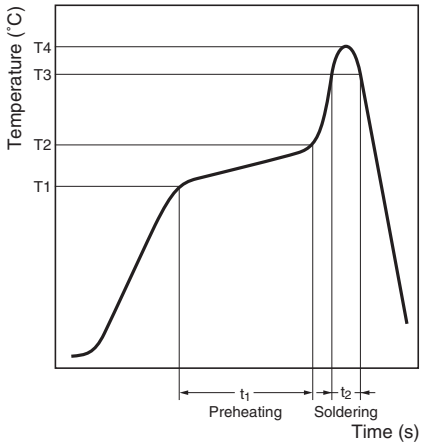
G6L-1F



Recommended Soldering Method

■ Temperature Profile According to IRS

When performing reflow-soldering, check the profile on an actual device after setting the temperature condition so that the temperatures at the relay terminals and the upper surface of the case do not exceed the limits specified in the following tables.

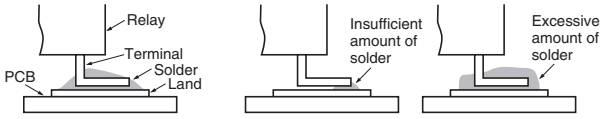


Item Measuring position	Preheating (T1 to T2, t_1)	Soldering (T3, t_2)	Peak value (T4)
Terminal	150°C to 180°C, 120 s max.	180°C to 200°C, 20 to 30 s	245°C max.
Upper surface of case	——	——	250°C max.

Item Measuring position	Preheating (T1 to T2, t_1)	Soldering (T3, t_2)	Peak value (T4)
Terminal	150°C to 180°C, 120 s max.	230°C, 30 s max.	250°C max.
Upper surface of case	——	——	255°C max.

The thickness of cream solder to be applied should be within a range between 150 and 200 μm on OMRON's recommended PCB pattern.

Correct Soldering **Incorrect Soldering**



Visually check that the Relay is properly soldered.

■ Approved Standards

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Contact form	Coil rating	Contact rating	Number of test operations
SPST-NO	G6L-1P and G6L-1F: 3 to 24 VDC	1A at 30 VDC (Resistive) 0.5A at 60 VDC (Resistive) 0.3A at 125 VAC (General Use)	6,000

Precautions

■ Correct Use

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Handling

Leave the Relays packed until just prior to mounting them.

Soldering

Solder: JIS Z3282, H63A

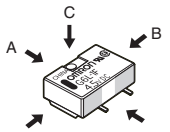
Soldering temperature: Approx. 250°C (At 260ºC if the DWS method is used.)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Insertion

During automatic insertion of Relays, make sure to set the securing force of the claws to the following values so that the Relay characteristics will be maintained.



Direction A: 5.0 N max.
Direction B: 5.0 N max.
Direction C: 5.0 N max.

Secure the claws to the area indicated by shading.
Do not attach them to the center area or to only part of the Relay.

Environmental Conditions During Operation, Storage, and Transportation

Protect the Relays from direct sunlight and keep the Relays under normal temperature, humidity, and pressure.

Maximum Voltage

The maximum voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting). The maximum voltage also involves important restrictions which include the following:

- Must not cause thermal changes in or deterioration of the insulating material.
- Must not cause damage to other control devices.
- Must not cause any harmful effect on people.
- Must not cause fire.

Therefore, be sure not to exceed the maximum voltage specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than the maximum voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase thus affecting characteristics such as electrical life and resulting in the deterioration of coil insulation.

Coating

Relays mounted on PCBs may be coated or washed. Do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relays.

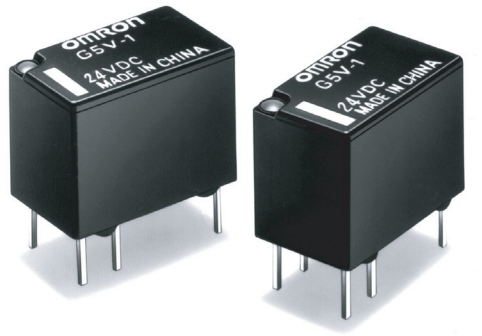
Coil Power Supply Waveform

If the voltage applied to the coil is increased or decreased gradually, operating characteristics may be unstable, contact endurance may decline, or the Relay may not function at its full performance level. Therefore, always use an instantaneous ON and instantaneous OFF when applying the voltage. Be sure that the rated voltage or zero voltage is reached within 1 ms.

Low Signal Relay
G5V-1

Ultra-miniature, Highly Sensitive SPDT Relay for Signal Circuits

- High sensitivity: 150 mW nominal power consumption.
- Small size at 10 H x 7.5 W x 12.5 L mm.
- Switches from 1 mA to 1 A.
- Conforms to FCC part 68 requirements for coil to contacts.
- Fully-sealed construction.
- Ideal for use in telecommunications, security, and computer/peripheral equipment.
- RoHS Compliant.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G5V-1-*DC12*).

Terminal	Type	Contact form	Contact type	Construction	Model
PCB through-hole	Standard	SPDT	Single crossbar	Fully sealed	**G5V-1**

Model Number Legend

G5V - □ - □ DC □
1 2 3

1. **Contact Form**
   1: SPDT
2. **Pickup Voltage %**
   Blank: Standard, 80% of nominal
3. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24 VDC

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)
Rated load	0.50 A at 125 VAC, 1A 24 VDC
Contact material	Ag + Au-Alloy
Carry current	2 A
Max. operating voltage	125 VAC, 60 VDC
Max. operating current	1 A
Max. switching capacity	62.50 VA, 30W
Min. permissible load (See note)	1 mA, 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 100 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (Ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	50	60	0.05	0.11	80%	10% min.	200% at 23°C	Approx. 150
5	30	167	0.15	0.29				
6	25	240	0.20	0.41				
9	16.70	540	0.45	0.93				
12	12.50	960	0.85	1.63				
24	6.25	3,840	3.48	6.61				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Characteristics

Contact resistance (See note 1)		100 mΩ max.
Operate time (See note 2)		5 ms max. (mean value: approx. 2.50 ms)
Release time (See note 2)		5 ms max. (mean value: approx. 0.90 ms)
Operating frequency (max.)	**Mechanical**	36,000 operations/hour
	Electrical	1,800 operations/hour
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC between coil and contacts, at 250 VDC between contacts of same polarity)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between coil and contacts 400 VAC, 50/60 Hz for 1 minute between contacts of same polarity
Impulse withstand voltage		1,500 V (10 X 160 μs) between coil and contacts (conforms to FCC Part 68)
Vibration	**Mechanical durability**	10 to 55 Hz, 3.30 mm double amplitude
	Malfunction durability	
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100G)
	Malfunction durability	100 m/s^2 (approx. 10 G)
Ambient temperature		-40°C to 70°C
Humidity		5% to 85% RH
Service life	**Mechanical**	5 million operations min. (at 18,000 operations/hour)
	Electrical	100,000 operations min. (under rated load,1,800 ops/hr) See “Characteristic Data”
Weight		Approx. 2 g

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

2. Values in parentheses are typical values unless otherwise stated.

3. The insulation resistance was measured with a 500-VDC Megohmmeter between coil and contacts and a 250 VDC megohmmeter between contacts with the same polarity applied to the same parts as those for checking the dielectric strength.

4. The above values are initial values.

■ Approvals

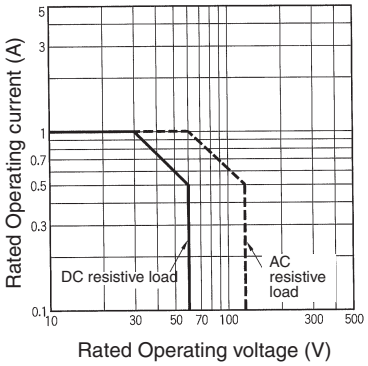
UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Type	Contact form	Coil rating	Contact ratings	Number of test operations
G5V-1	SPDT	3 to 24 VDC	0.5A at 125 VAC (General Use)	100,000
			0.3 A at 110 VDC (Resistive) 1A at 30 VDC (Resistive)	6,000

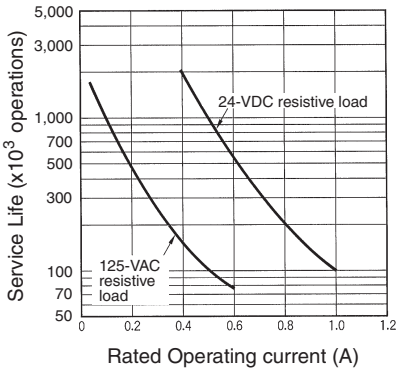
Note: In the interest of product improvement, specifications are subject to change.

■ Characteristic Data

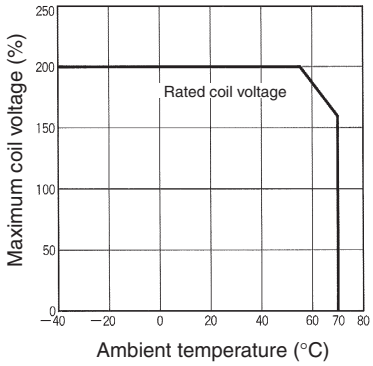
Maximum Switching Capacity



Electrical Service Life



Ambient Temperature vs. Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

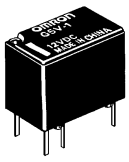
Note: 1. All units are in millimeters unless otherwise indicated. To convert millimeters into inches, multiply by 0.03937.

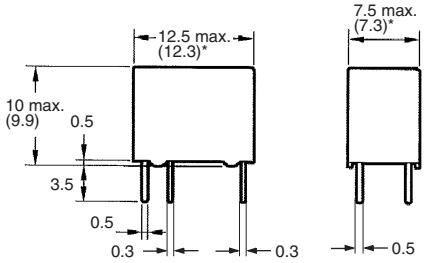
2. Numbers in parentheses are reference values.

3. Tolerance: ±0.1

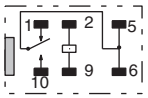
4. Orientation marks are indicated as follows:

G5V-1



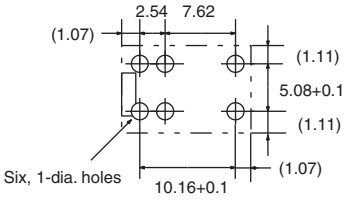


Terminal Arrangement/ Internal Connections (Bottom View)



* Average value

Mounting Holes (Bottom View)



Precautions

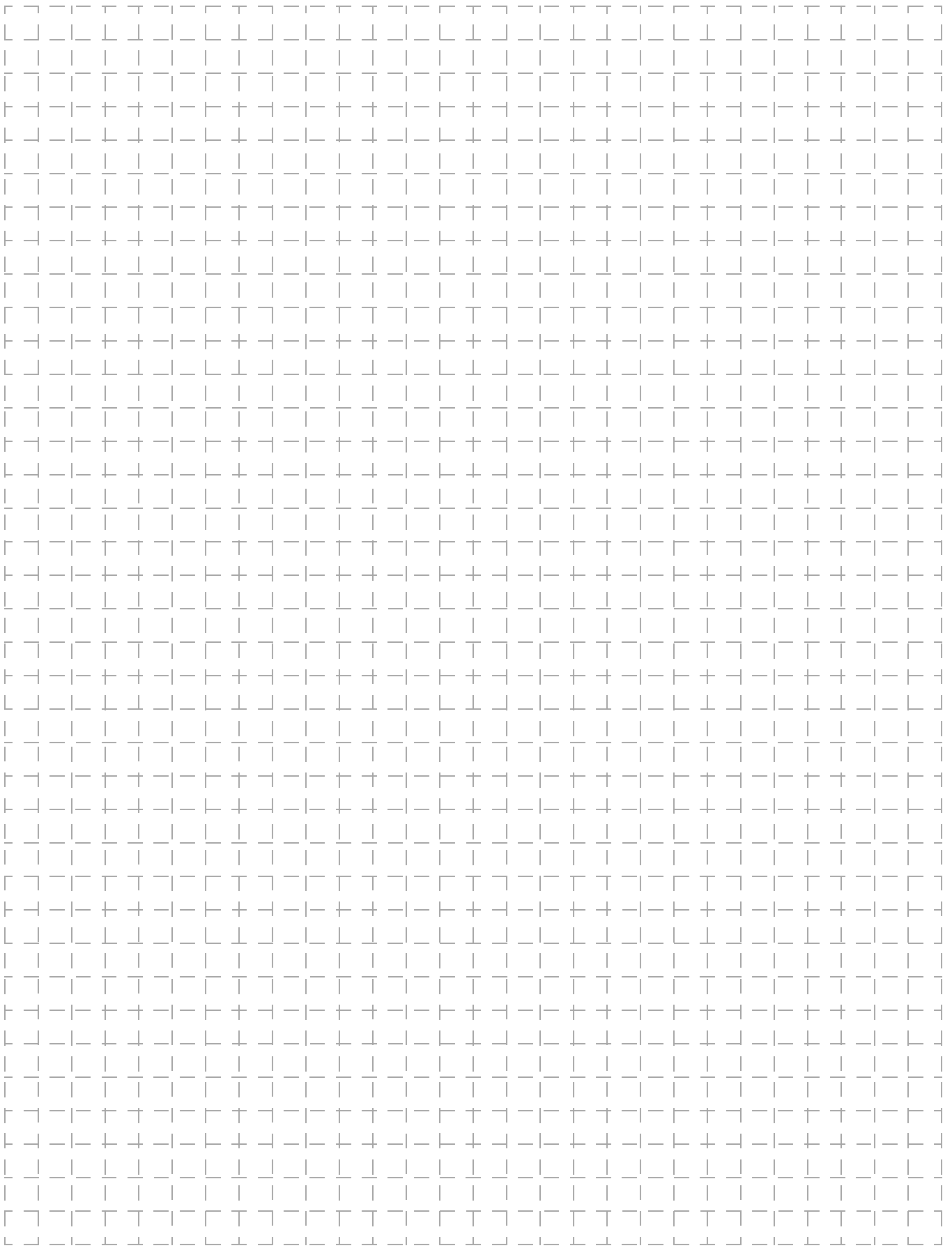
Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts, because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

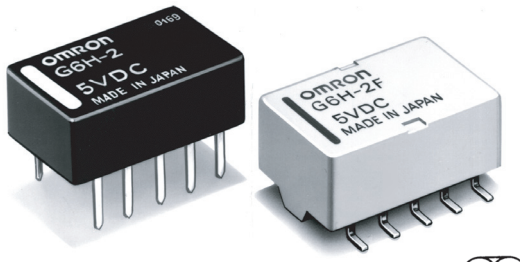
MEMO



Low Signal Relay
G6H

Ultra-compact, Ultra-sensitive DPDT Relay

- Compact size and low 5 mm profile.
- Low thermoelectromotive force.
- Low magnetic interference enables high-density mounting.
- Utilizes Omron's moving-loop design.
- Highly stable magnetic circuit for latching endurance and excellent resistance to vibration and shock.
- High sensitivity with low nominal power consumption.
- Single or dual coil latching types available.
- RoHS Compliant



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G6H-2-*DC6)*.

■ Non-latching

Terminal Type	Contact form	Model
Through-hole	DPDT	**G6H-2**
Surface mount		**G6H-2F**

■ Latching

Terminal Type	Contact form	Model	
		Single coil latching	Dual coil latching
Through-hole	DPDT	**G6HU-2**	**G6HK-2**

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)
Rated load	0.50 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)
Carry current	1 A
Max. operating voltage	125 VAC, 110 VDC
Max. operating current	1 A
Max. switching capacity	62.50 VA, 33 W
Min. permissible load (See note)	10 μA, 10 mVDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Non-latching Type (G6H-2, G6H-2F)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	46.70	64.30	0.025	0.022	75% max.	10% min.	200% max. at 23°C	Approx. 140
5	28.10	178	0.065	0.058				
6	23.30	257	0.11	0.09				
9	15.50	579	0.24	0.20				
12	11.70	1,028	0.43	0.37				
24	8.30	2,880	1.20	1.0			170% max. at 23°C	Approx. 200
48	5.8	8,228	—	—			140% max. at 23°C	Approx. 300

Single Coil Latching Type (G6HU-2)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	33.30	90	0.034	0.029	75% max.	75% max.	180% max. at 23°C	Approx. 100
5	20	250	0.11	0.09				
6	16.70	360	0.14	0.12				
9	11.10	810	0.33	0.28				
12	8.30	1,440	0.60	0.50				
24	6.25	3,840	1.6	1.3				Approx. 150

Dual Coil Latching Type (G6HK-2)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.014	0.0075	75% max.	75% max.	160% max. at 23°C	Approx. 200
5	40	125	0.042	0.023				
6	33.30	180	0.065	0.035				
9	22.20	405	0.16	0.086				
12	16.70	720	0.3	0.16				
24	12.50	1,920	0.63	0.33			130% max. at 23°C	Approx. 300

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C with a tolerance of ±10%.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

4. The maximum voltage that can be be applied when using the G6H-2F (at 85°C) is 115% (3 to 12 V) or 105% (24 V) of the rated voltage.

■ Characteristics

Contact resistance (See note 1)		50 mΩ max. (through-hole); 60 mΩ max. (surface mount)
Operate (set) time (See note 2)		Non-latching: 3 ms max. (approx. 2.0 ms) Latching: 3ms max. (approx. 1.5 ms)
Release (reset) time (See note 2)		Non-latching: 2 ms max. (approx. 1.0 ms) Latching: 3ms max. (approx. 1.5 ms)
Min. set/reset signal width		5ms min. (at 23°C)
Operating frequency (max.)	**Mechanical**	36,000 operations/hour
	Electrical	1,800 operations/hour (under rated load)
Insulation resistance (See note 3)		1,000 MΩ max. (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between coil and contacts 1,000 VAC, 50/60 Hz for 1 minute between contacts of different poles 750 VAC, 50/60 Hz for 1 minute between contacts of same pole 125 VAC, 50/60 Hz for 1 minute between set and reset coils (G6HK-2)
Surge withstand voltage		1,500 V (10 x 160 μs) between contacts of same polarity (conforms to FCC Part 68)
Vibration	**Mechanical durability**	10 to 55 Hz; 5 mm double amplitude
	Malfunction durability	10 to 55 Hz; 3 mm double amplitude
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100 G)
	Malfunction durability	500 m/s^2 (approx. 50 G)
Ambient temperature		-40° to 70°C with no icing
Humidity		5% to 85% RH
Service life	**Mechanical**	100 million operations min. (at 36,000 operations/hr)
	Electrical	200,000 operations min. (at 1,800 operations/hr) See “Characteristic Data”
Weight		Approx. 1.5 g

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

2. Values in parentheses are typical values unless otherwise stated.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those for checking the dielectric strength. (The insulation resistance between the set and reset coil (G6HK-2), however, is 100MΩ min. when measured with a 125-VDC megohmmeter).

4. The above values are initial values.

■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

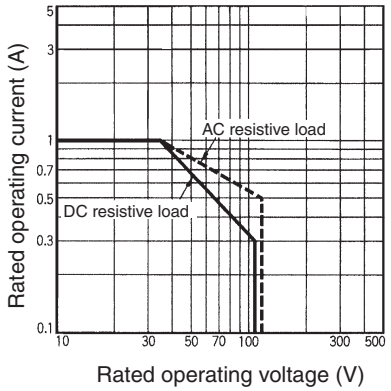
Type	Contact form	Coil rating	Contact ratings
G6H-2(F)	DPDT	1.50 to 48 VDC	2 A, 30 VDC
G6HU-2			0.30 A, 110 VDC
G6HK-2			0.50 A, 125 VAC

Note: 1. The rated values approved by each of the safety standards (e.g., UL, CSA, TUV) may be different from the performance characteristics individually defined in this catalog.

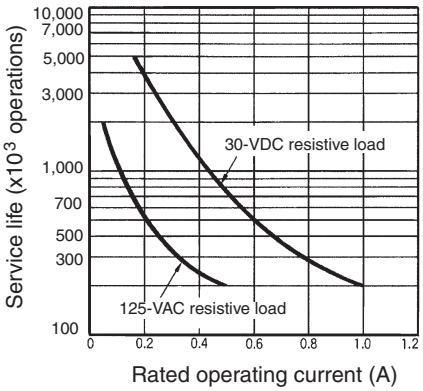
2. In the interest of product improvement, specifications are subject to change.

■ Characteristic Data

Maximum Switching Capacity

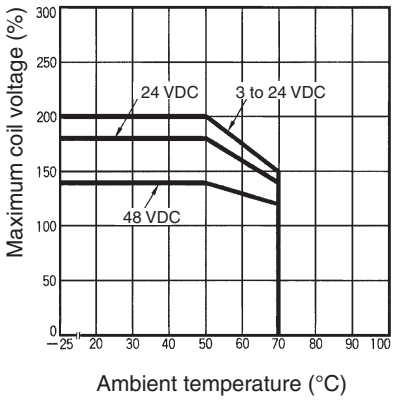


Electrical Service Life

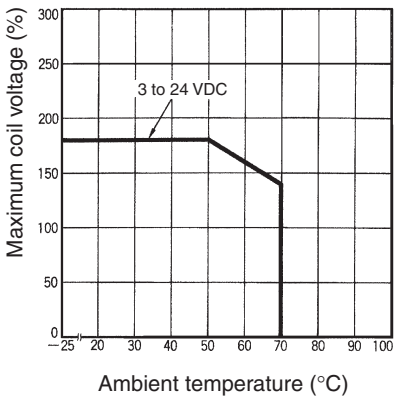


Ambient Temperature vs. Maximum Coil Voltage

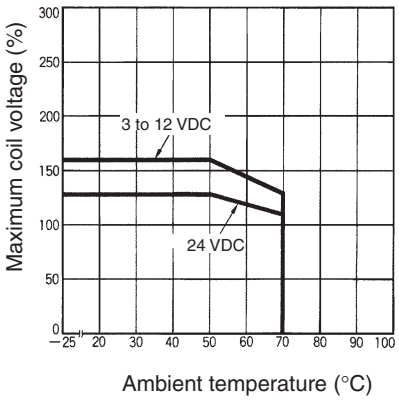
Non-latching (G6H-2)



Single Coil Latching (G6HU-2)



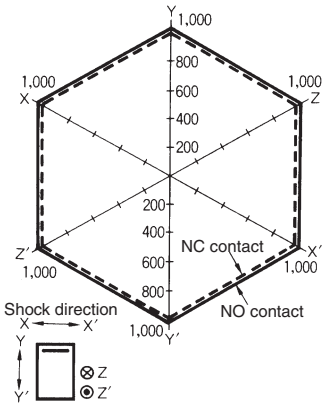
Dual Coil Latching (G6HK-2)



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Malfunctioning Shock Resistance (G6H-2)

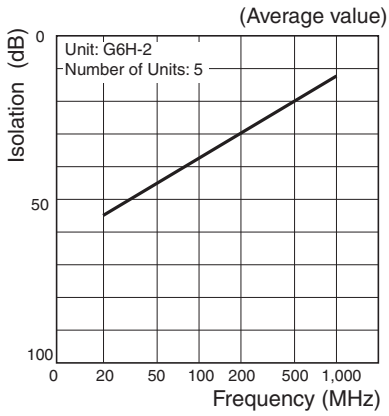
5 VDC
Number of Units: 10



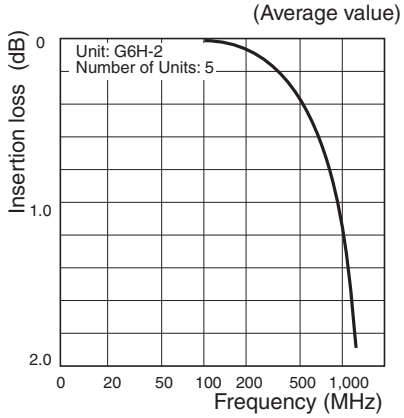
Condition: The Units were shocked at the rate of 500 m/s² three times each in the ±X, ±Y, and ±Z directions with and without voltage imposed on the Units until the Units malfunctioned.

High-frequency Characteristics (See notes 1 and 2.)

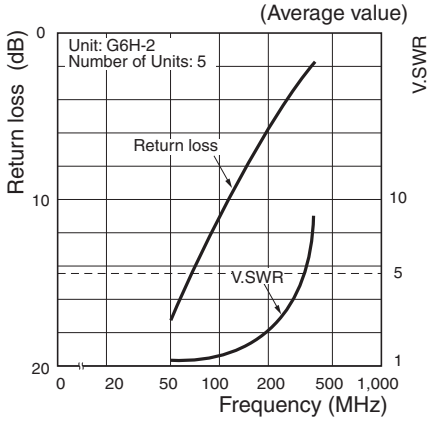
Frequency vs. Isolation



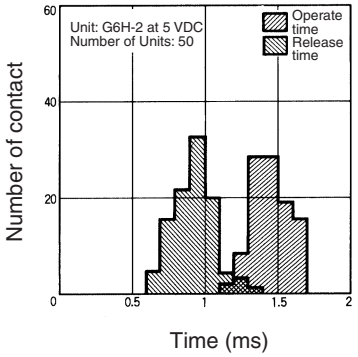
Frequency vs. Insertion Loss



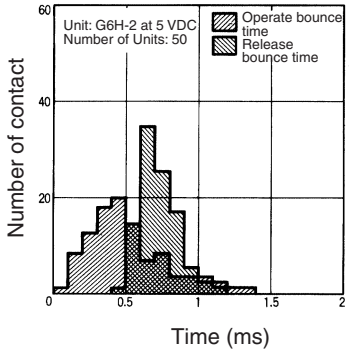
Frequency vs. Return Loss, V.SWR



Distribution of Operate and Release Time (See note 1.)



Distribution of Bounce Time (See note 1.)



Note: 1. The ambient temperature is 23°C.

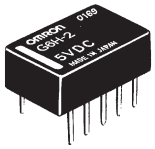
2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

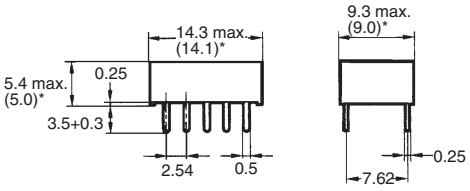
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

■ Non-latching

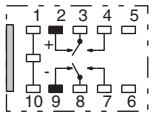
G6H-2





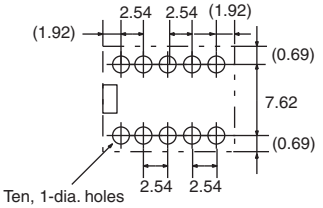
* Average value

Terminal Arrangement/ Internal Connections (Bottom View)

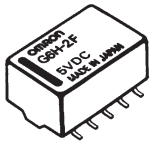


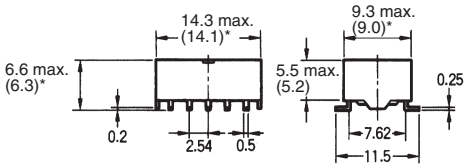
Mounting Holes (Bottom View)

Tolerance: ±0.1

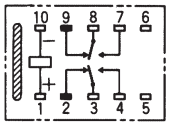


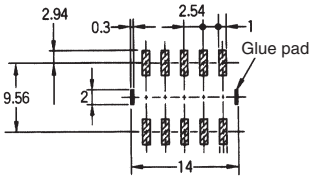
G6H-2F





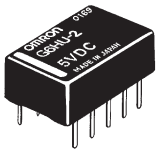
* Average value

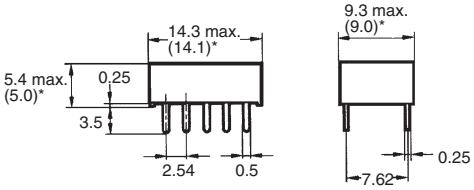




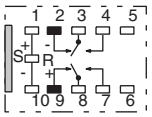
■ Latching

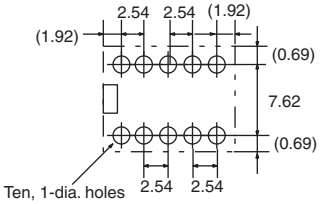
G6HU-2



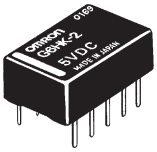


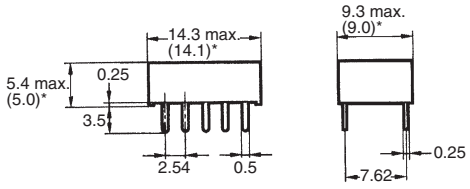
* Average value



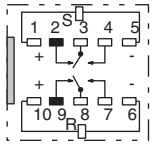


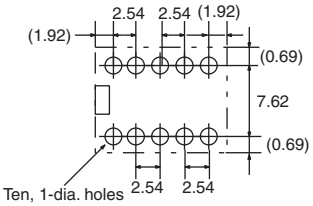
G6HK-2





* Average value

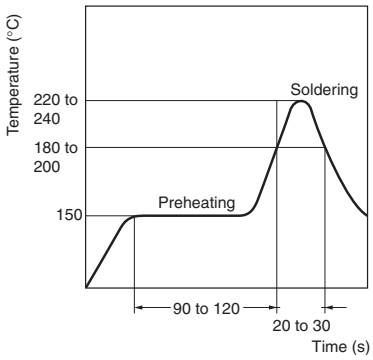




Hints on correct use

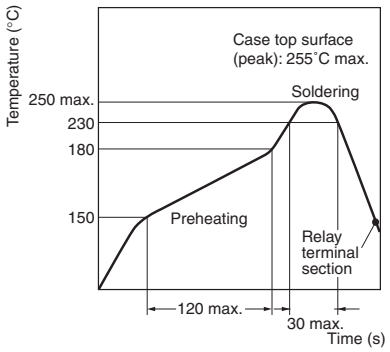
Example of Recommended Soldering Conditions for the G6H-2F (Surface Mount Relays)

(1) IRS Method (Mounting Solder: Lead)



Note: The temperature profile indicates the temperature on the PCB.

(2) IRS Method (Mounting Solder: Lead-free)



Note: The temperature profile indicates the temperature on the relay terminal.

Approved Standards

The approved rated values for international standards differ from the performance characteristics of the individual models.
Be sure to confirm that required standards are satisfied before actual use.

UL Recognized (File No. E41515) - -Ambient Temp. = 40°C

Model	No. of poles	Coil rating	Contact rating	No. of operations
G6H-2(F)	2	1.5 to 48 VDC	2 A, 30 VDC	6,000
			0.3 A, 110 VDC	
			0.5 A, 125 VAC	

CSA Certified (File NO. LR31928)

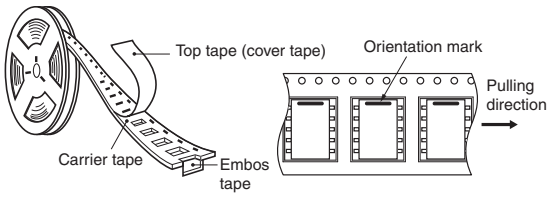
Model	No. of poles	Coil rating	Contact rating	No. of operations
G6H-2(F)	2	1.5 to 48 VDC	2 A, 30 VDC	6,000
			0.3 A, 110 VDC	
			0.5 A, 125 VAC	

Tape Packing (Surface Mounting Terminal Models)

When ordering Relays in tape packing, add the prefix “-TR” to the model number otherwise the Relays in stick packing will be provided.

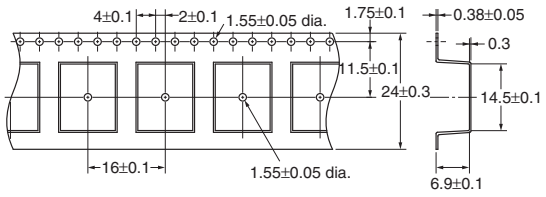
Relays per Reel: 500

Direction of Relay Insertion

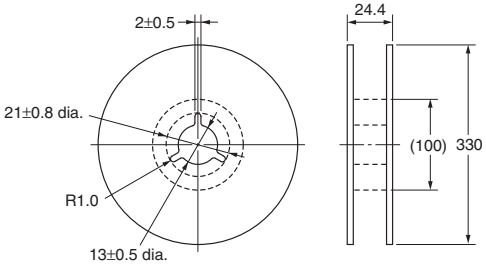


Carrier Tape Dimensions

G6H-2F



Reel Dimensions



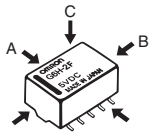
Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



Direction A: 1.96 N max.
Direction B: 4.90 N max.
Direction C: 1.96 N max.

Relay Handling

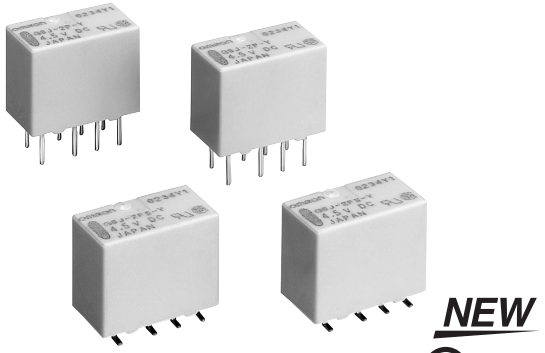
Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may deteriorate and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and seal the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Surface-mounting Relay
G6J-Y

Ultra-compact and Slim DPDT Relay

- Dimensions of 9H x 5.7W x 10.6L mm provide a mounting area reduction of approx. 56% when compared with the OMRON G6S.
- Dielectric strength of 1,500 VAC and an impulse withstand voltage of 2,500 V for 2 x 10 μs (conforms to Telcordia specifications (formerly Bellcore)).
- Conforms to FCC Part 68 requirments (1,500 V,10 x 160 μs).
- Single-winding latching models to save energy.
- UL recognized / CSA certified.
- RoHS Compliant.



Ordering Information

Item		Model	
Terminal	**Contact form**	**Non-latching**	**Single coil latching**
PCB through-hole	DPDT	**G6J-2P-Y**	**G6JU-2P-Y**
SMT Gull-wing		**G6J-2FL-Y**	**G6JU-2FL-Y**
SMT Shortened leads		**G6J-2FS-Y**	**G6JU-2FS-Y**

Note 1: When ordering, add the rated coil voltage to the model number.
Example: G6J-2P-Y DC12
Rated coil voltage

Note 2: When ordering tape packing, add "-TR" to the model number.
Example: G6J-2P-Y-TR DC12
Rated coil voltage

"-TR" is not part of the relay model number. Therefore it is not marked on the relay case.

Model Number Legend:

G6J □ - □ □ - Y - □ DC □
1 2 3 4 5

1. **Relay Function**
   None: Non-latching, standard
   U: Single-winding latching
2. **Contact Form**
   2: DPDT
3. **Terminal Shape**
   P: PCB through-hole terminals
   FL: SMT Gull-wing
   FS: SMT shortened leads
4. **Packaging**
   None: Tube packaging
   TR: Tape and reel packaging
9. **Rated Coil Voltage**
   3, 4.5, 5, 12, 24

Application Examples

Communications equipment, measurement devices, computer peripheral devices, office automation equipment, and audio-visual products.

Specifications

■ Contact Data

Rated load	0.3 A @ 125 VAC 1 A @ 30 VDC
Contact material	Ag (Au Clad)
Max. carry current	1 A
Max. operating voltage	125 VAC, 110 VDC
Max. operating current	1 A
Max. switching capacity	37.5 VA, 30 W
Min. permissible load (see note)	10m VDC, 10μA

Note: This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 5% of the load impedance. This value may vary depending on the operating frequency, operating conditions, expected reliability level of the relay, etc. Always double-check relay suitability under actual load conditions.

■ Coil Data

G6J-Y Standard, Non-latching (G6J-2P-Y, G6J-2FS-Y, G6J-2FL-Y)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Drop-out voltage	Max. voltage	Power consumption (mW)
			% of rated voltage			
3	48.0	62.5	75% max.	10% min.	150% max.	140
4.5	32.6	137.9				
5	28.9	173.1				
12	12.3	976.8				
24	9.2	2,600.5				230

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

G6JU-Y Single coil, Latching (G6JU-2P-Y, G6JU-2FL-Y, G6JU-2FS-Y)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Set voltage	Reset voltage	Max. voltage	Power consumption (mW)
			% of rated voltage			
3	33.7	89.0	75% max.	75% max.	150% max.	100
4.5	22.0	204.3				
5	20.4	245.5				
12	9.0	1,329.2				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the Relay coil instantaneously.

■ Characteristics

Item		Standard non-latching relays	Single coil latching relays
		G6J-2P-Y, G6J-2FS-Y, G6J-2FL-Y	G6JU-2P-Y, G6JU-2FS-Y, G6JU-2FL-Y
Contact resistance (See note 1)		100 mΩ max.	
Operating (set) time (See note 2)		3 ms max. (approx. 1.6 ms)	
Release (reset) time (See note 2)		3 ms max. (approx. 1.0 ms)	3 ms max. (approx. 0.9 ms)
Minimum set/reset pulse width		---	10 ms min. (at 100% rated coil voltage)
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC)	
Dielectric strength		1,500 VAC, 50/60 Hz for 1 min. between coil and contacts 1,000 VAC, 50/60 Hz for 1 min. between contacts of different polarity 750 VAC, 50/60 Hz for 1 min. between contacts of the same polarity	
Surge withstand voltage		2,500 VAC, (2 x 10 μs) between coil and contacts	
		1,500 VAC, (10 x 160 μs) between contacts of the same and different polarity	
Vibration	Mechanical durability	10 to 55 Hz, 5-mm double amplitude	
	Malfunction durability	10 to 55 Hz, 3.3-mm double amplitude	
Shock	Mechanical durability	1,000 m/s^2 (approx. 100G)	
	Malfunction durability	750 m/s^2 (approx. 75G)	
Service life	Mechanical	50,000,000 operations min. (at 36,000 operations/hour)	
	Electrical	100,000 operations min. (with a rated load at 1,800 operations/hour)	
Ambient temperature		−40 to 85°C with no icing or condensation	
Humidity		5% to 85% RH	
Weight		Approx. 1.0 g	

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

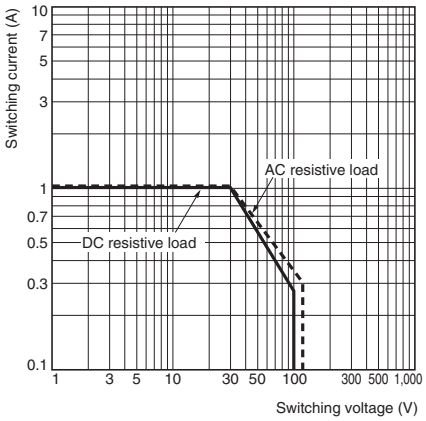
2. Values in parentheses are typical values unless otherwise stated.

3. The insulation resistance was measured with a 500-VDC Megger Tester applied to the same parts as those for checking the dielectric strength.

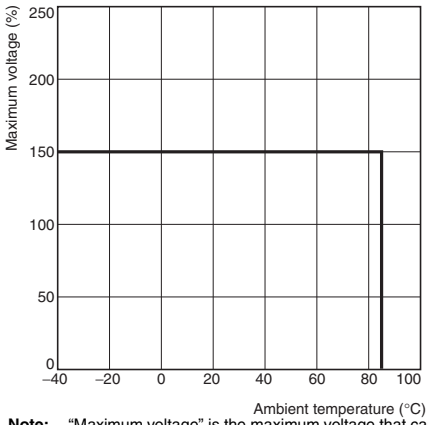
4. The above values are initial values.

Characteristic Data

Maximum Switching Capacity

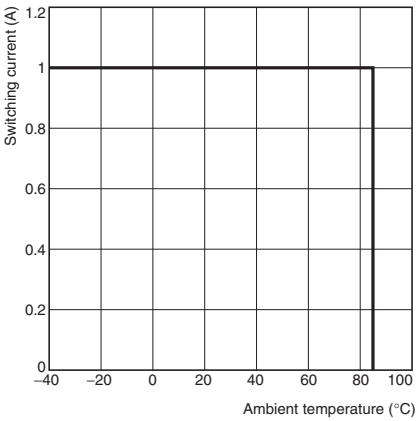


Ambient Temperature vs. Maximum Voltage

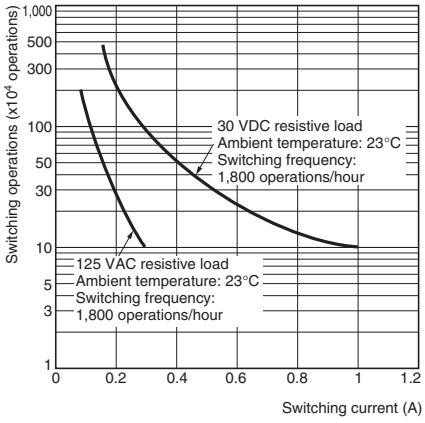


Note: "Maximum voltage" is the maximum voltage that can be applied to the Relay coil.

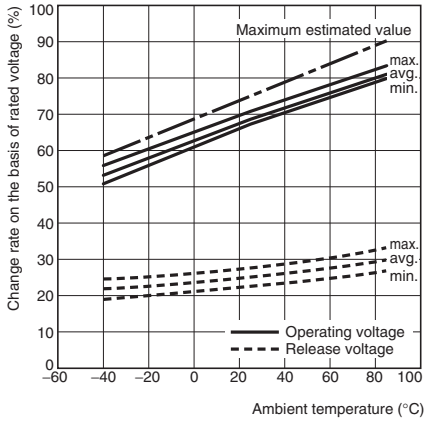
Ambient Temperature vs. Switching Current



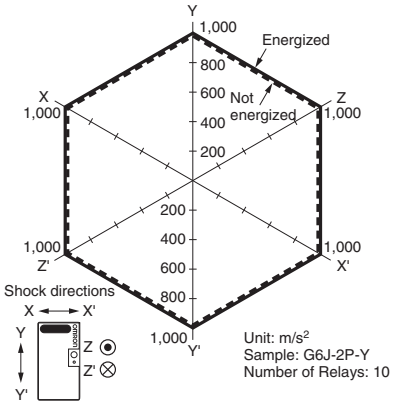
Electrical Life Expectancy



Ambient Temperature vs. Must Operate or Must Release Voltage

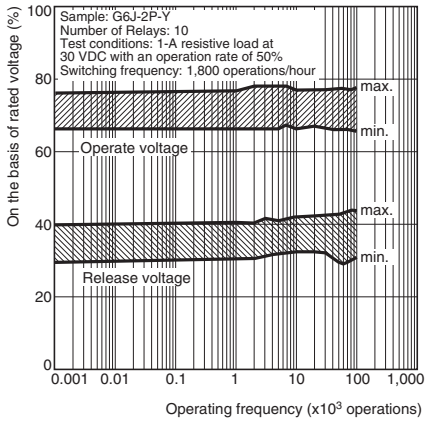


Shock Malfunction

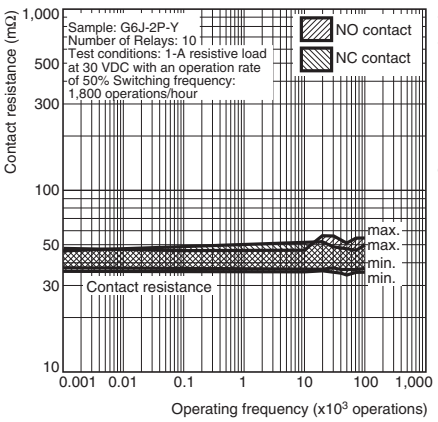


Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

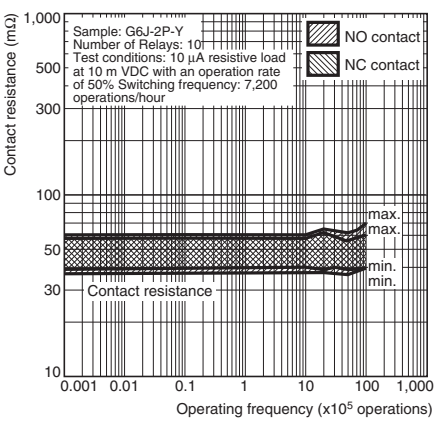
Electrical Life Expectancy (with Must Operate and Must Release Voltage) (See note.)



Electrical Life Expectancy (Contact resistance) (See note.)

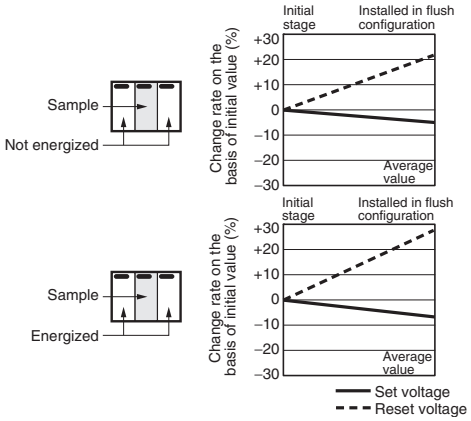


Contact Reliability Test (See note.)

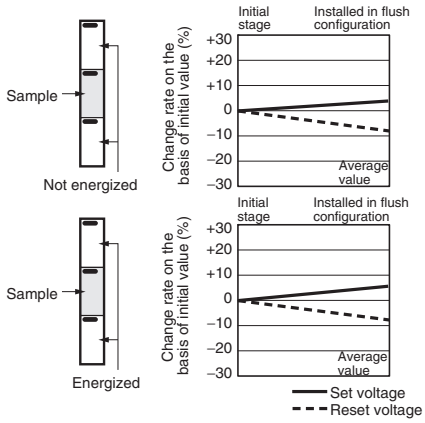


Note: **1.** The tests were conducted at an ambient temperature of 23°C.
2. The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use

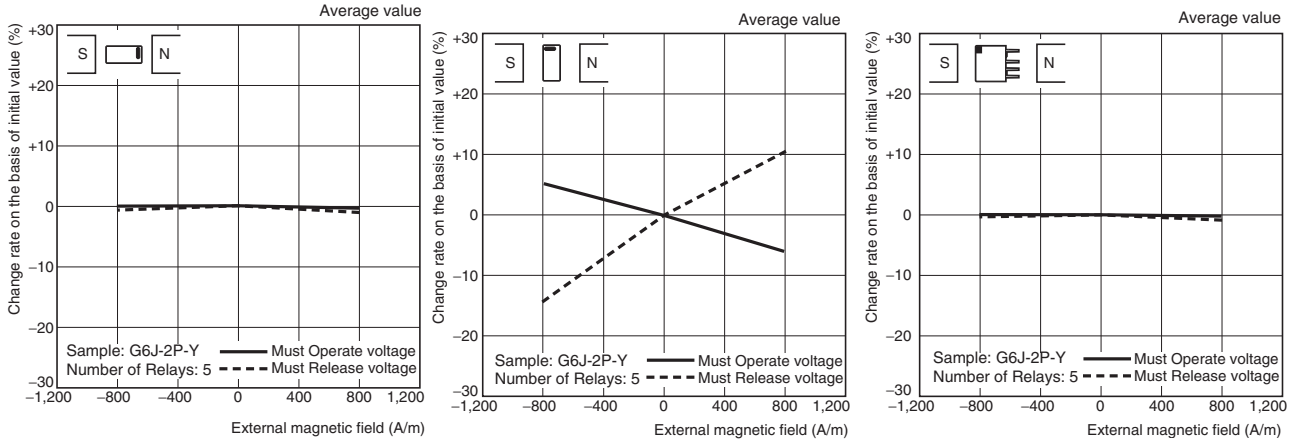
Mutual Magnetic Interference



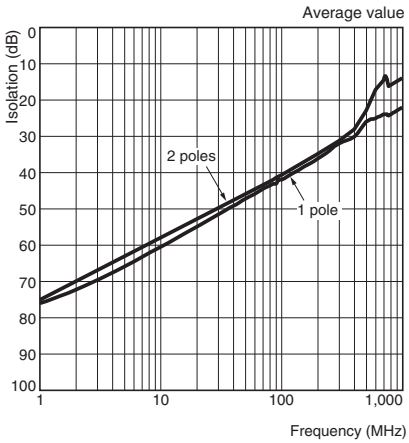
Mutual Magnetic Interference



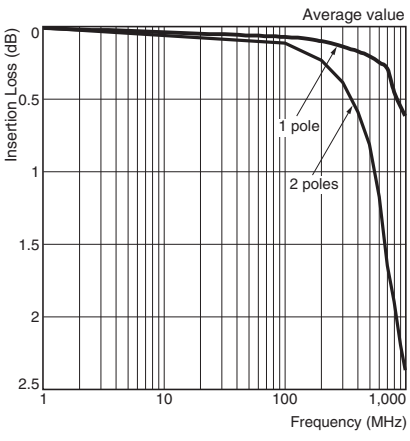
External Magnetic Interference



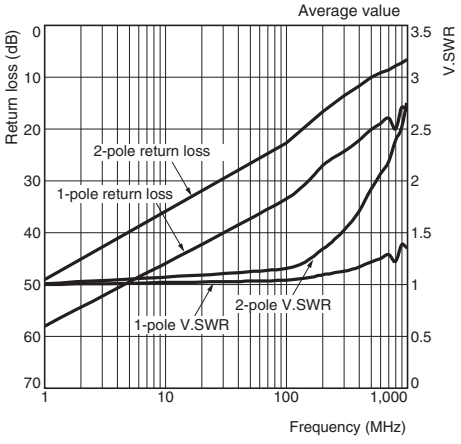
High-frequency Characteristics (Isolation)



High-frequency Characteristics (Insertion Loss)



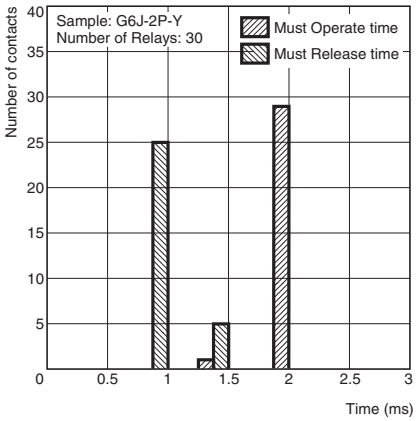
High-frequency Characteristics (Return Loss, V.SWR)



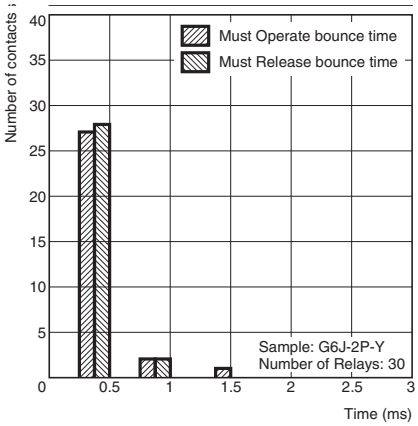
Note: 1. The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics, including endurance, in the actual machine before use.

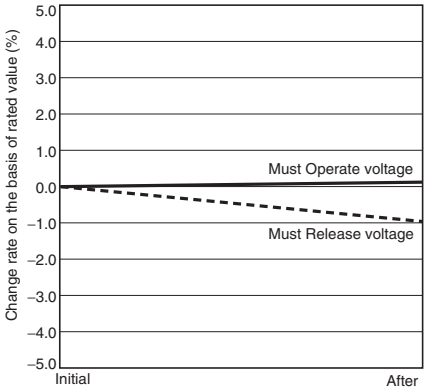
Must Operate and Must Release Time Distribution (See note.)



Must Operate and Must Release Bounce Time Distribution (See note.)



Vibration Resistance

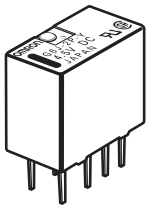


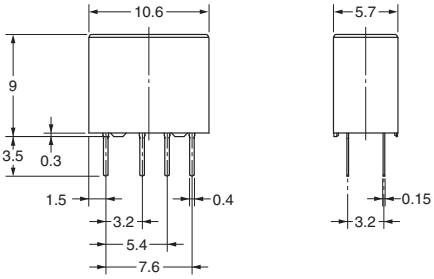
Note: The tests were conducted at an ambient temperature of 23°C.

Dimensions

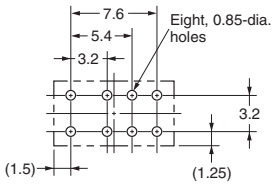
Note: All units are in millimeters unless otherwise stated.
A tolerance of ±0.3 (±0.01) applies to every dimension in the following drawings unless otherwise stated.

G6J-2P-Y
G6JU-2P-Y



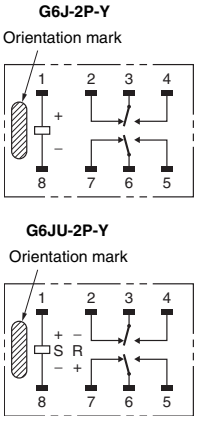


Mounting Dimensions (Bottom View)*

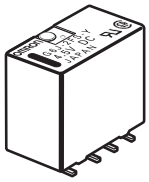


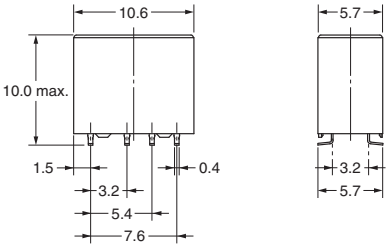
*Tolerance ±0.1 mm

Terminal Arrangement Internal Connections (Bottom View)

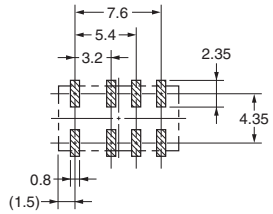


G6J-2FS-Y
G6JU-2FS-Y



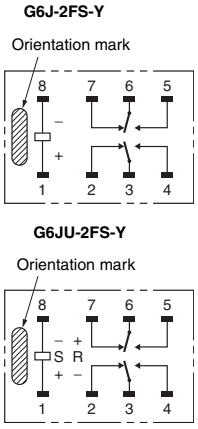


Mounting Dimensions (Top View)*

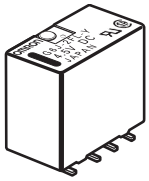


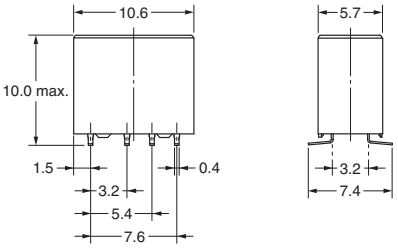
*Tolerance ±0.1 mm

Terminal Arrangement/ Internal Connections (Top View)

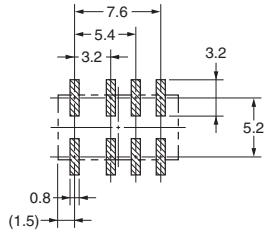


G6J-2FL-Y
G6JU-2FL-Y



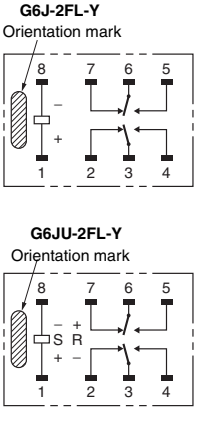


Mounting Dimensions (Top View)*



*Tolerance ±0.1 mm

Terminal Arrangement/ Internal Connections (Top View)

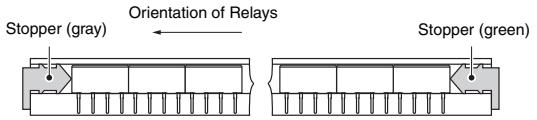


Stick Packing and Tape Packing

1. Stick Packing

Relays in stick packing are arranged so that the orientation mark of each Relay is on the left side.

Always confirm that the Relays are in the correct orientation when mounting the Relays to the PCBs.



Stick length: 555 mm (stopper not included)

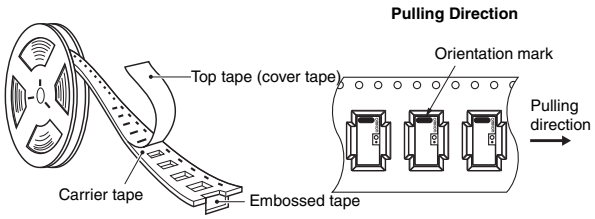
No. of Relays per stick: 50

2. Tape Packing (Surface-mounting Terminal Relays)

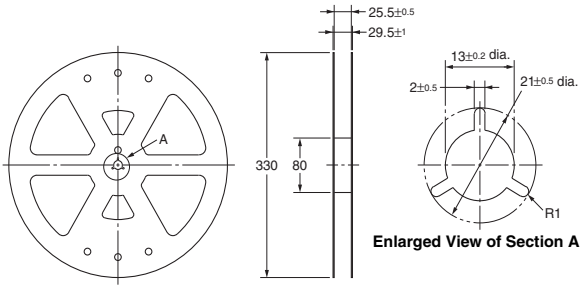
When ordering Relays in tape packing, add the prefix "-TR" to the model number, otherwise the Relays in stick packing will be provided.

Tape type:	TB2412R (EIAJ (Electronic Industrial Association of Japan))
Reel type:	R24D (EIAJ (Electronic Industrial Association of Japan))
Relays per reel:	400

Direction of Relay Insertion

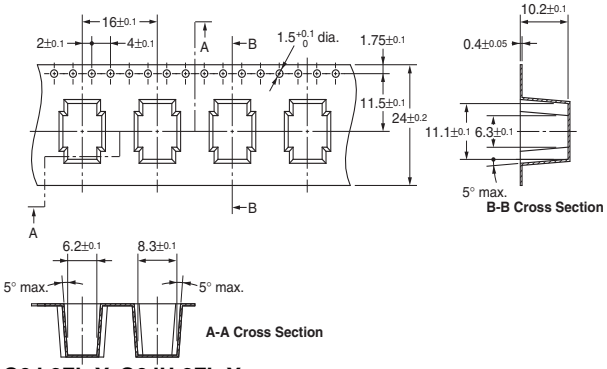


Reel Dimensions

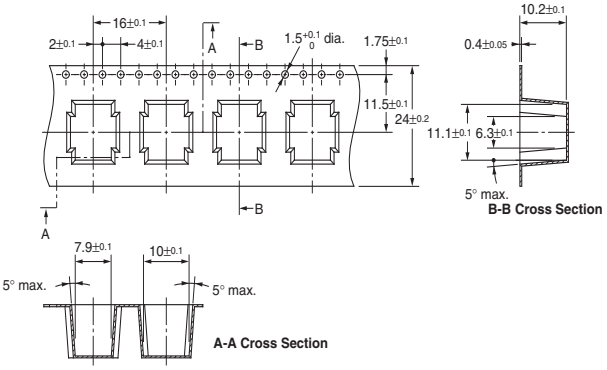


Carrier Tape Dimensions

G6J-2FS-Y, G6JU-2FS-Y

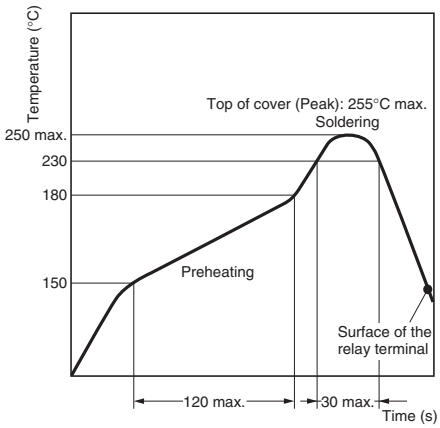


G6J-2FL-Y, G6JU-2FL-Y



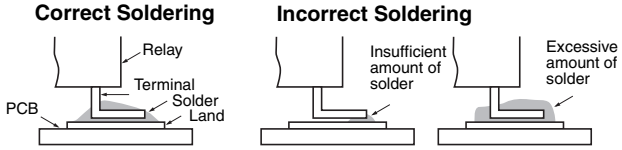
Recommended Soldering Method

IRS Method (for Surface-mounting Terminal Relays)



Note: Temperatures are given for the surface of the terminal.

- The thickness of cream solder to be applied should be between 150 and 200 μm on OMRON's recommended PCB pattern.
- In order to perform correct soldering, it is recommended that the correct soldering conditions be maintained as shown below on the left-hand side.



Visually check that the Relay is properly soldered.

■ Approved Standards

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Contact form	Coil rating	Contact rating	Number of test operations
DPDT	G6J-2P-Y, 2FS-Y, 2FL-Y: 3 to 24 VDC G6JU-2P-Y, 2FS-Y, 2FL-Y: 3 to 24 VDC	1 A at 30 VDC (Resistive) 0.5 A at 60 VDC (Resistive) 0.3 A at 125 VAC (General purpose)	6000

Precautions

Correct Use

Long Term Current Carrying

Under a long-term current carrying without switching, the insulation resistance of the coil goes down gradually due to the heat generated by the coil itself. Furthermore, the contact resistance of the Relay will gradually become unstable due to the generation of film on the contact surfaces. A Latching Relay can be used to prevent these problems. When using a non-latching relay, the design of the fail-safe circuit provides protection against contact failure and open coils.

Handling of Surface-mounting Relays

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and seal the package with adhesive tape.

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature at less than 40°C. Do not put the relay in a cold cleaning bath immediately after soldering.

Soldering

Solder: JIS Z3282, H63A

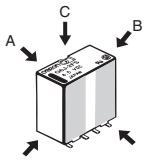
Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)

Soldering time: Approx. 5 s max. (Approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)

Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Insertion

During automatic insertion of Relays, make sure to set the securing force of the claws to the following values so that the Relay characteristics will be maintained.



Direction A: 4.90 N max.

Direction B: 9.80 N max.

Direction C: 9.80 N max.

Secure the claws to the area indicated by shading.
Do not attach them to the center area or to only part of the Relay.

Environmental Conditions During Operation, Storage, and Transportation

Protect the Relays from direct sunlight and keep the Relays under normal temperature, humidity, and pressure.

Mounting Latching Relays

The Latching Relays are reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relays may be set accidentally. Be sure to apply a reset signal before use. Make sure that the vibration or shock that is generated by other devices on the same panel does not exceed the rated value of the Latching Relays.

Maximum Voltage

The maximum voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting.) The maximum voltage also involves important restrictions. Maximum voltage:

- must not cause thermal changes or deterioration of the insulating material.
- must not cause damage to other control devices.
- must not cause any harmful effect on people.
- must not cause fire.

Therefore, be sure not to exceed the maximum voltage specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than the maximum voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase which could deteriorate the coil insulation, shorten the relay's electrical life, or affect various characteristics of the relay.

Coating

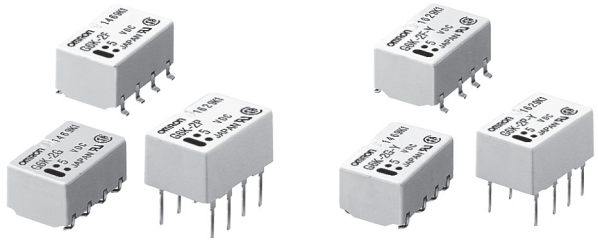
Relays mounted on PCBs may be coated or washed. Do not apply coatings or detergents containing silicone.

Other Handling

Dropping the relay may impose excess shock that exceeds the specifications. Do not use any relay that has been dropped.

Low Signal Relay
G6K

- Compact fourth generation design, offers excellent board space savings.
- Available in 2.54 and 3.2 mm coil-contact terminal spacing.
- "-Y" models meet 2.5 kV Bellcore surge requirements.
- Conforms to FCC Part 68.
- Terminal design based on Omron's successful G6S relay.
- Available in PCB through-hole, SMT gullwing and SMT "inside-L" terminals.
- UL recognized / CSA certified.
- Available in single coil latching.
- RoHS Compliant.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G6K-2F-*DC5*).

Terminal	Contact form	Model		
		Non-latching 2.54 mm spacing	Non-latching 3.2 mm coil-contact terminal spacing	Single coil latching 3.2 mm coil-contact terminal spacing
Gullwing	DPDT	**G6K-2F**	**G6K-2F-Y**	**G6KU-2F-Y**
Inside "L"		**G6K-2G**	**G6K-2G-Y**	**G6KU-2G-Y**
PCB through-hole		**G6K-2P**	**G6K-2P-Y**	**G6KU-2P-Y**

When ordering tape packing (surface mount versions), add "-TR" to the model number (e.g., G6K-2G-*TR*-DC5)

Specifications

■ Contact Data

Load	Resistive load (cosϕ=1)
Rated load	0.3 A at 125 VAC
	1 A at 30 VDC
Contact material	Ag (Au clad)
Max. carry current	1 A
Max. operating voltage	125 VAC, 60 VDC
Max. operating current	1 A
Max. switching capacity	37.5 VA, 30W
Min. permissible load (See note)	10 μA at 10 mVDC

Note: This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

G6K- 2.5 mm coil-contact terminal spacing, standard, non-latching (G6K-2F, G6K-2G, G6K-2P)
G6K- 3.2 mm coil-contact terminal spacing, non-latching (G6K-2F-Y, G6K-2G-Y, G6K-2P-Y)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			% of rated value			
3	33.0	91	80% max.	10% min.	150% max. @ 23°C to 70°C	Approx. 100
4.5	23.2	194				
5	21.1	237				
6	17.6	341				
9	11.3	795				
12	9.1	1,315				
24	4.6	5,220				

G6KU- 3.2 mm spacing, single coil latching (G6KU-2F-Y, G6KU-2G-Y, G6KU-2P-Y)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Set-up voltage	Reset voltage	Maximum voltage	Power consumption (mW)
			% of rated value			
3	33.0	91	75% max.	75% min.	150% max. @ 23°C to 70°C	Approx. 100
4.5	23.2	194				
5	21.1	237				
6	17.6	341				
9	11.3	795				
12	9.1	1,315				
24	4.6	5,220				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ± 10%.
2. The operating characteristics are measured at a coil temperature of 23°C unless otherwise specified.
3. Pick-up voltage will vary with temperature
4. The maximum voltage is the highest voltage that can be imposed on the relay coil instantaneously.

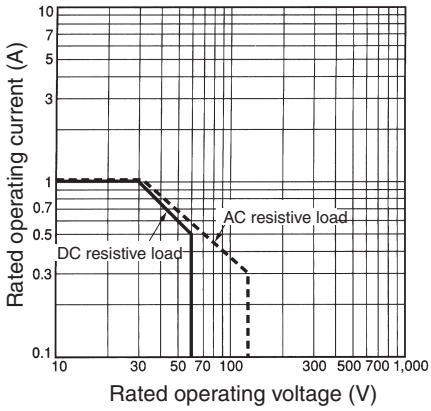
■ Characteristics

Contact resistance (See note 1)		100 mΩ max.
Operate (set) time (See note 2)		3 ms max. (Approx. 1.4 ms - standard. Approx. 1.2 ms - latching)
Release (set) time (See note 2)		3 ms max. (Approx. 1.3 ms - standard. Approx. 1.2 ms - latching)
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		1,500 VAC for 1 minute between coil contacts 1,000 VAC for 1 minute between contacts of different poles 750 VAC for 1 minute between contacts of the same pole
Surge withstand voltage	**"-Y' versions**	2,500 V, (2 x 10 μs) between coil and contacts. (Conforms to Bellcore specifications)
	Standard versions	1,500 V, (10 x 160 μs) between coil and contacts / contacts of different and same polarity. (Conforms to FCC Part 68)
Vibration	**Mechanical durability**	10 to 55 Hz; 5.0 mm double amplitude
	Malfunction durability	10 to 55 Hz; 3.3 mm double amplitude
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100G)
	Malfunction durability	750 m/s^2 (approx. 75G)
Ambient temperature		-40°C to 70°C with no icing or condensation
Humidity		5 to 85% RH
Service life	**Mechanical**	50,000,000 operations min. (at 36,000 operations per hour)
	Electrical	100,000 operations min. at rated load (at 1,800 operations per hour)
Weight		Approx. 0.7 g

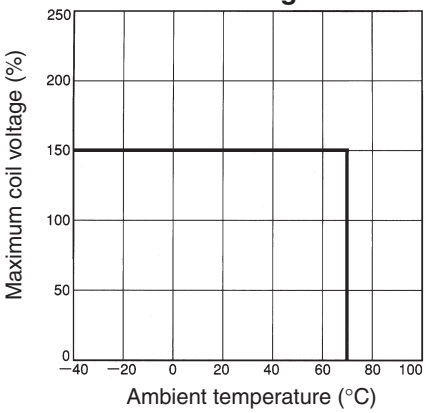
Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a voltage-drop method.
2. Values in parentheses are typical values unless otherwise stated.
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those for checking the dielectric strength.
4. Data shown are of initial value.

■ Characteristic data

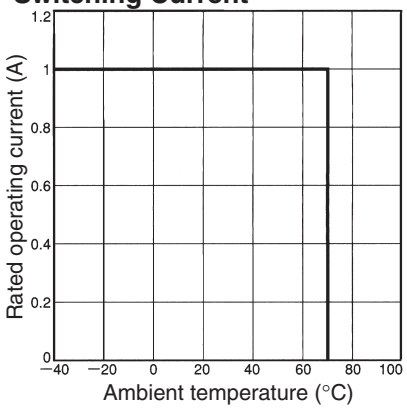
Maximum Switching Capacity



Ambient Temperature vs. Maximum Coil Voltage

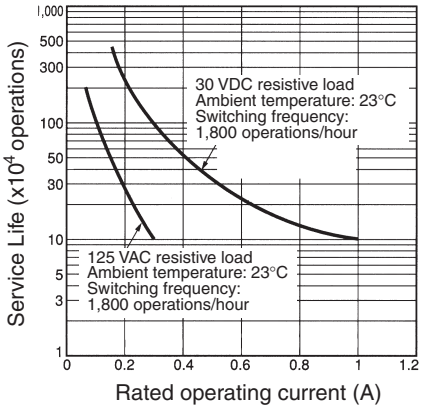


Ambient Temperature vs. Switching Current

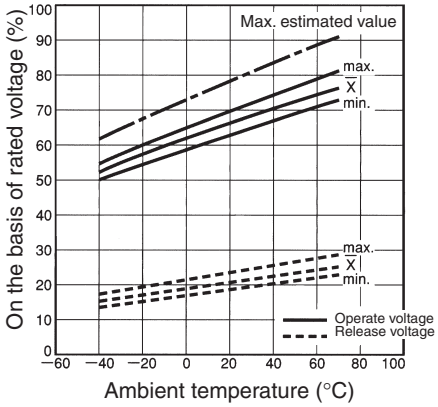


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

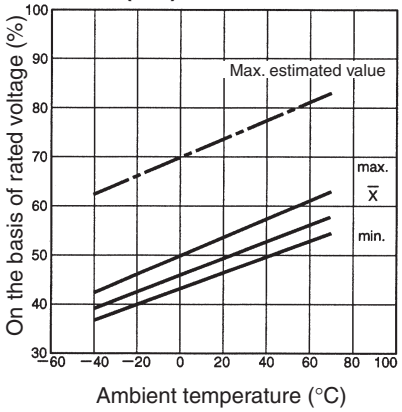
Electrical Service Life



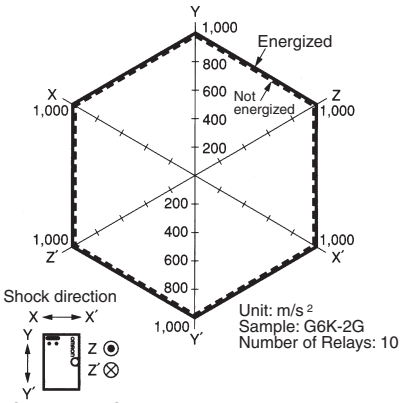
Ambient Temperature vs. Must Operate or Must Release Voltage
G6K-2G (F/P), G6K-2G (F/P)-Y



Ambient Temperature vs. Must Set or Must Reset Voltage
G6KU-2G (F/P)-Y

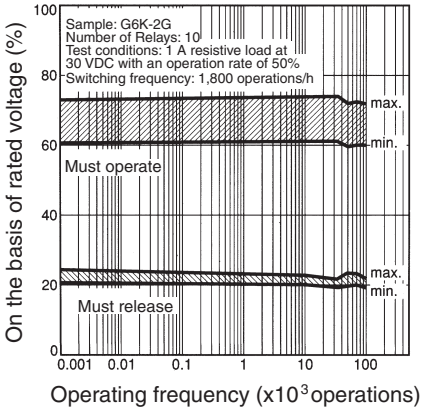


Shock Malfunction



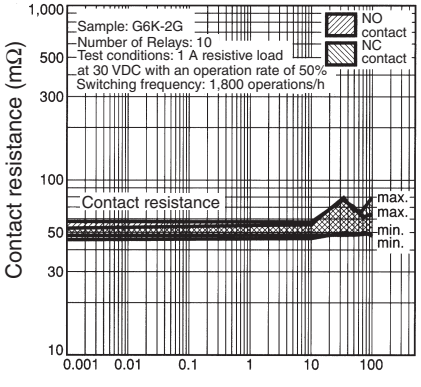
Conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of contact malfunctions.

Electrical Service Life (with Must Operate and Must Release Voltage) (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



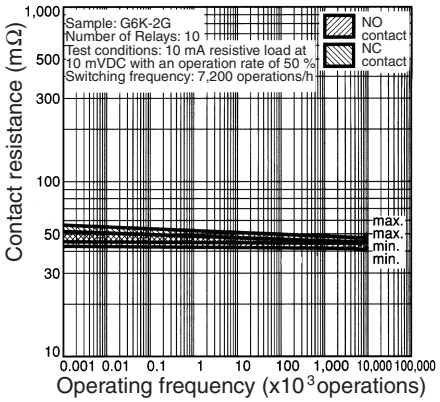
Note: The tests were conducted at an ambient temperature of 23°C.

Electrical Service Life (Contact Resistance) (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y

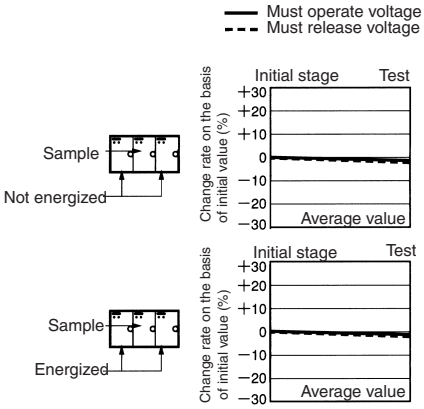


Note: The tests were conducted at an ambient temperature of 23°C.

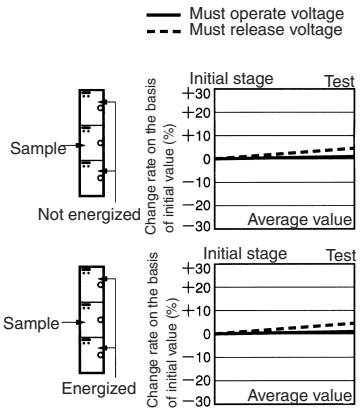
Contact Reliability Test (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



Mutual Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



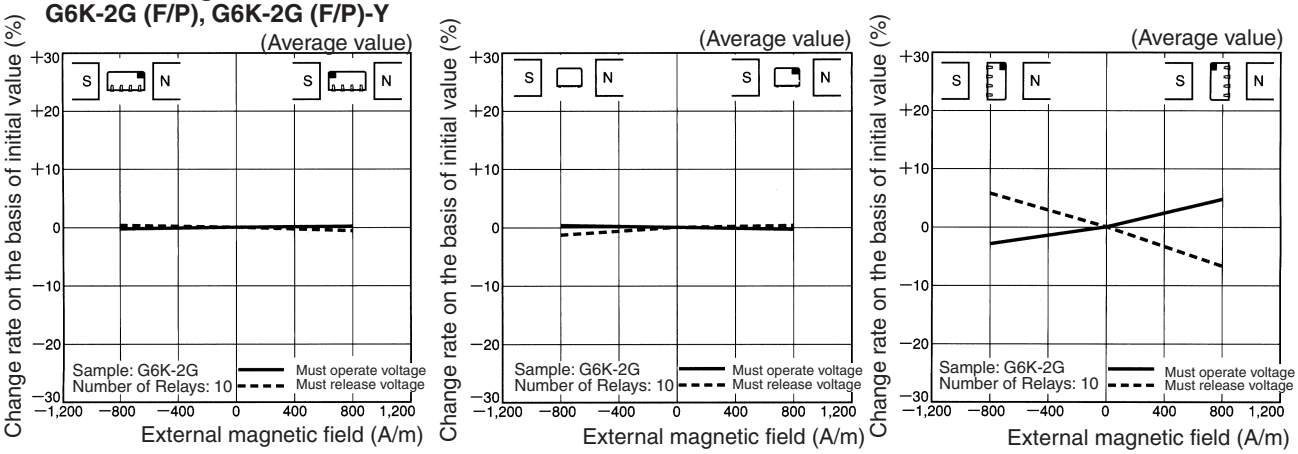
Mutual Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



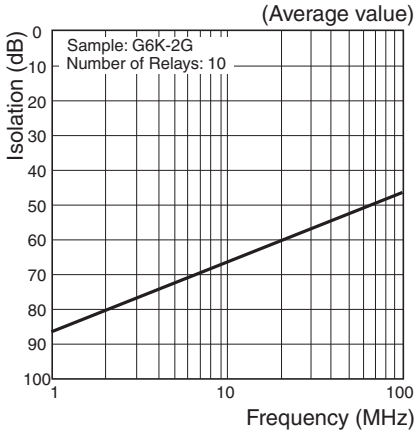
Note 1: The test was conducted at an ambient temperature of 23°C.

2: The contact resistance data are periodically measured reference values and are not values from each monitoring operation. Contact resistance values will vary according to the switching frequency and operating environment, so be sure to check operation under the actual operating conditions before use.

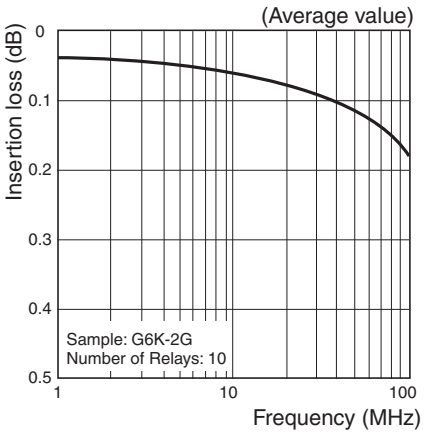
External Magnetic Interference
G6K-2G (F/P), G6K-2G (F/P)-Y



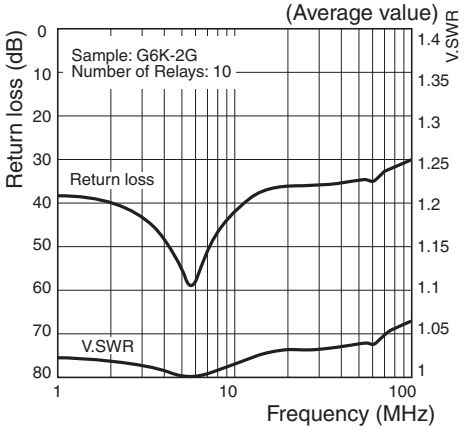
High-frequency Characteristics (Isolation)
G6K-2G (F/P), G6K-2G (F/P)-Y



High-frequency Characteristics (Insertion Loss)
G6K-2G (F/P), G6K-2G (F/P)-Y



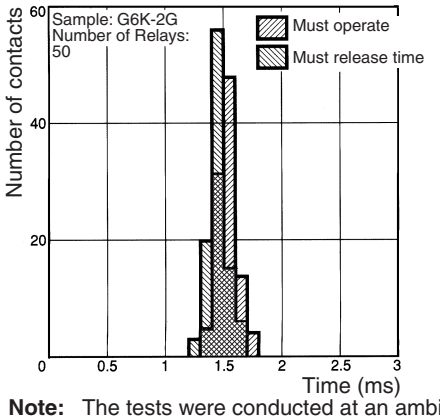
High-frequency Characteristics (Return Loss)
G6K-2G (F/P),G6K-2G (F/P)-Y



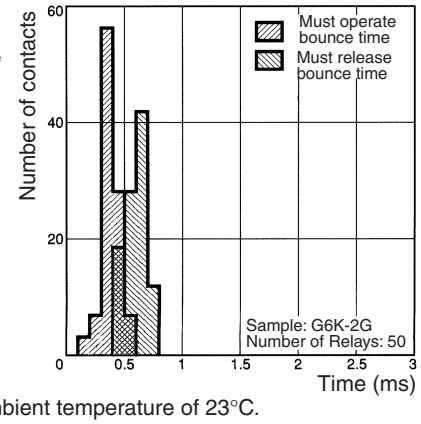
Note: 1. The tests were conducted at an ambient temperature of 23°C.

2. High-frequency characteristics depend on the PCB to which the Relay is mounted. Always check these characteristics including endurance in the actual machine before use.

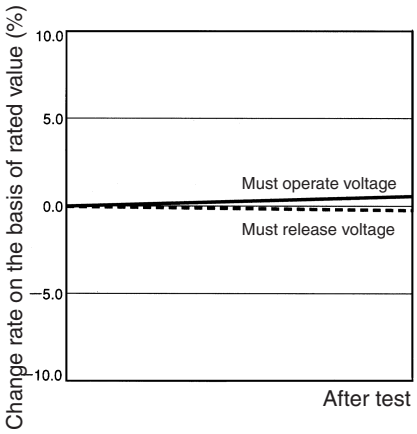
Must Operate and Must Release Time Distribution (See note.)
G6K-2G (F/P), G6K-2G (F/P)-Y



Must Operate and Must Release Bounce Time Distribution (See note.)
G6K-2G (F/P) , G6K-2G (F/P)-Y



Vibration Resistance
G6K-2G (F/P), G6K-2G (F/P)-Y



Note: The tests were conducted at an ambient temperature of 23°C.

■ Approvals

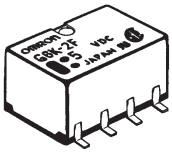
UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

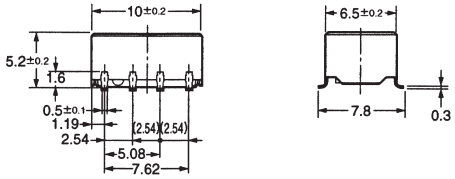
Contact form	Coil rating	Contact ratings	Number of test operations
DPDT	3 to 24 VDC	1 A at 30 VDC (Resistive) 0.5 A at 60 VDC (Resistive) 0.3 A at 125 VAC (General Use)	6,000

Dimensions

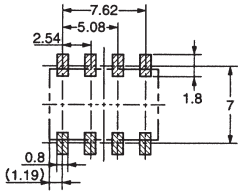
Note: All units are in millimeters unless otherwise indicated.

G6K-2F

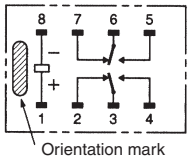




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

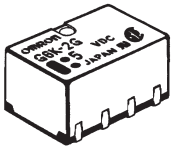


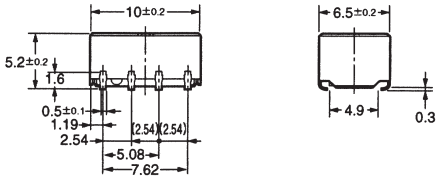
Terminal Arrangement/ Internal Connections (Top View)



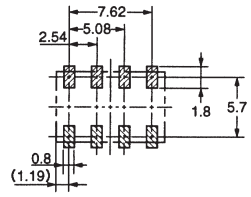
Note: Each value has a tolerance of ±0.3 mm.

G6K-2G

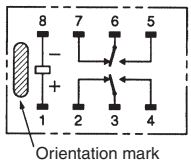




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

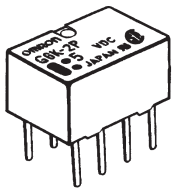


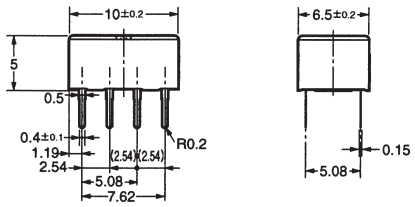
Terminal Arrangement/ Internal Connections (Top View)



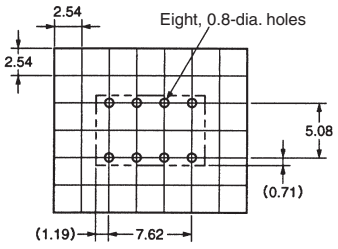
Note: Each value has a tolerance of ±0.3 mm.

G6K-2P

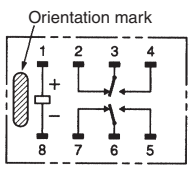




Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

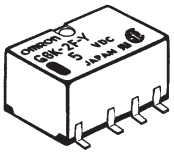


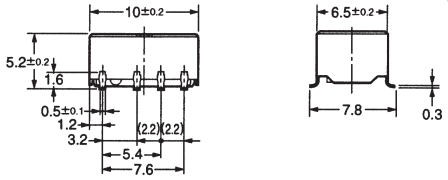
Terminal Arrangement/ Internal Connections (Bottom View)



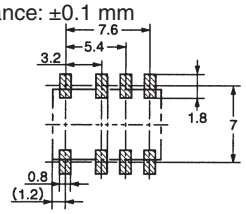
Note: Each value has a tolerance of ±0.3 mm.

G6K-2F-Y

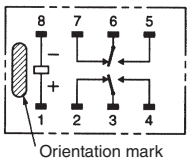




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

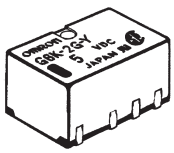


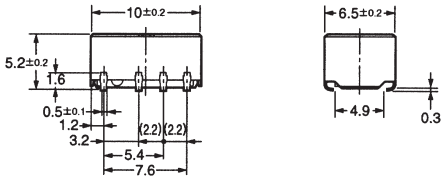
Terminal Arrangement/ Internal Connections (Top View)



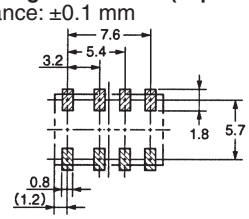
Note: Each value has a tolerance of ±0.3 mm.

G6K-2G-Y

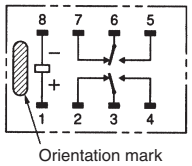




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

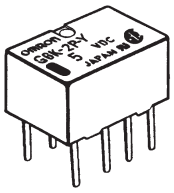


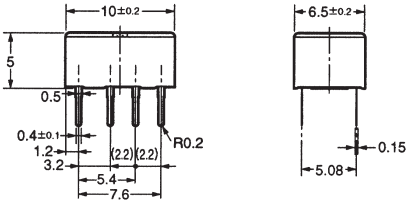
Terminal Arrangement/ Internal Connections (Top View)



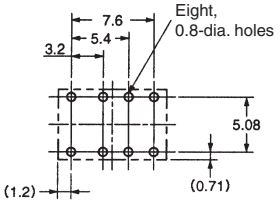
Note: Each value has a tolerance of ±0.3 mm.

G6K-2P-Y

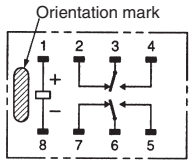




Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm

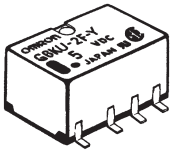


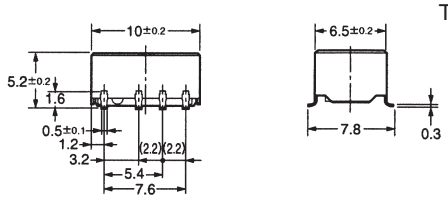
Terminal Arrangement/ Internal Connections (Bottom View)



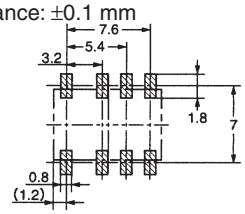
Note: Each value has a tolerance of ±0.3 mm.

G6KU-2F-Y

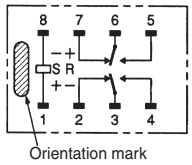




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

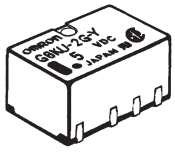


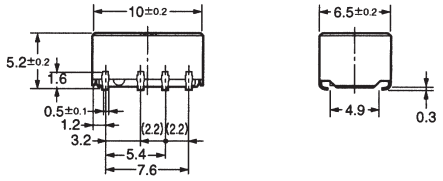
Terminal Arrangement/ Internal Connections (Top View)



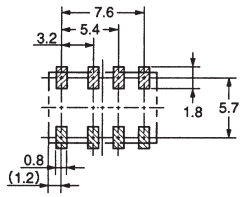
Note: Each value has a tolerance of ±0.3 mm.

G6KU-2G-Y

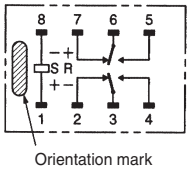




Mounting Dimensions (Top View)
Tolerance: ±0.1 mm

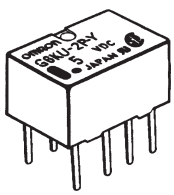


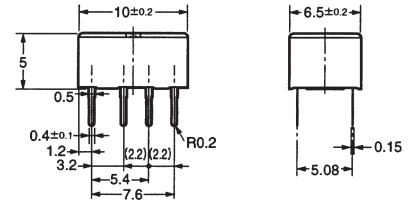
Terminal Arrangement/ Internal Connections (Top View)



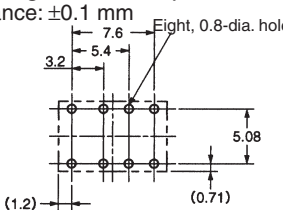
Note: Each value has a tolerance of ±0.3 mm.

G6KU-2P-Y

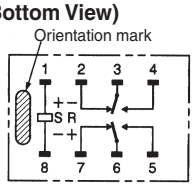




Mounting Dimensions (Bottom View)
Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)

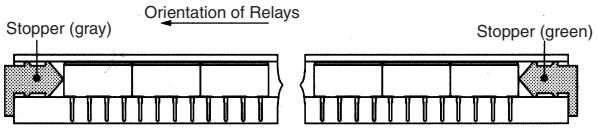


Note: Each value has a tolerance of ±0.3 mm.

■ Packaging Information

Tube packing	Standard nomenclature	50 pcs per anti-static tube
Tape packing (SMT versions, only)	When ordering, add "TR" before the rated coil voltage (e.g., G6K-2G-TR-DC5). Note: TR is not part of the relay model number and will not be marked on the relay.	900 pcs per reel 2 reels per box Order in box multiples (see details below)

Relays in tube packing are arranged so that the orientation mark of each Relay is on the left side.
Be sure to reference Relay orientation when mounting the Relay to the PCB.

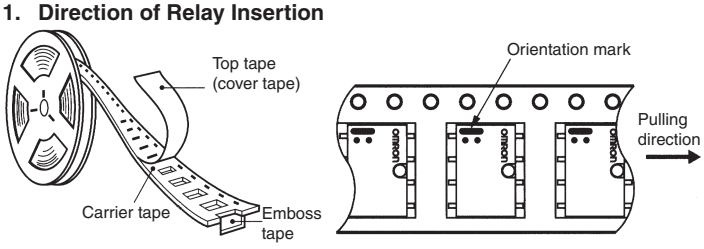


Tube length: 520 mm (stopper not included)
No. of Relays per Tube: 50

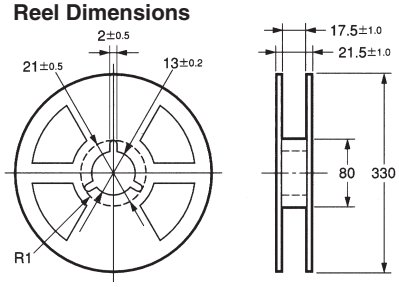
■ Tape and Reel Dimensions (Surface Mount Models)

- Tape type: ETX7200 (EIAJ - Electronic Industrial Association of Japan)
- Reel type: RPM-16D (EIAJ, 330 mm diameter)
- Relays per reel: 900

1. Direction of Relay Insertion

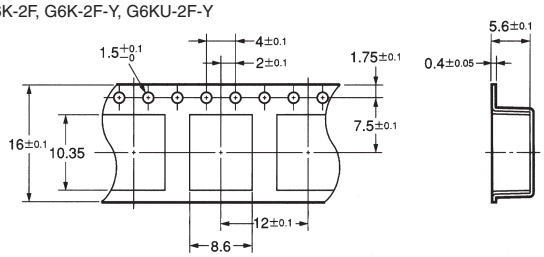


2. Reel Dimensions

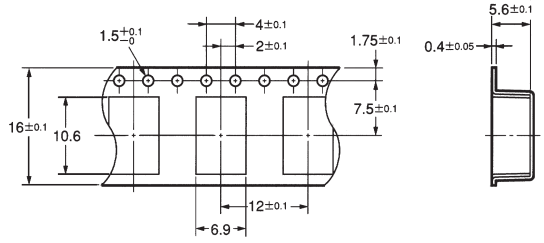


3. Carrier Tape Dimensions

G6K-2F, G6K-2F-Y, G6KU-2F-Y



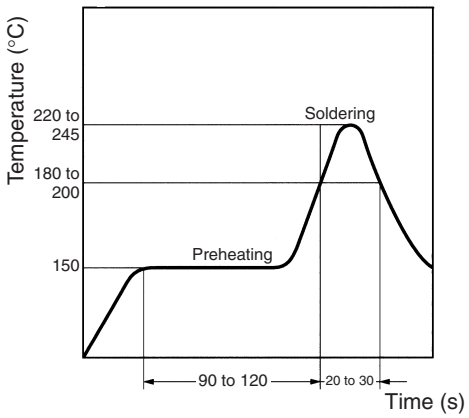
G6K-2G, G6K-2G-Y, G6KU-2G-Y



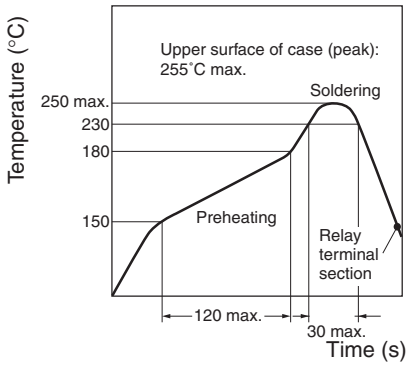
■ Recommended Soldering Method

Temperature indicates the surface temperature of the PCBs.
IRS Method (for surface mounting terminal models)

(1) IRS Method (Mounting Solder: Lead)



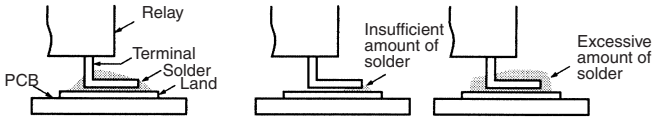
(2) IRS Method (Mounting Solder: Lead-free)



Note: The temperature profile indicates the temperature of the relay terminal section.

- The thickness of cream solder to be applied should be within a range between 150 and 200 μm on OMRON's recommended PCB pattern.
- In order to perform correct soldering, it is recommended that the correct soldering conditions be maintained as shown below on the left side.

Correct Soldering **Incorrect Soldering**



Visually check that the Relay is properly soldered.

Precautions

■ Correct Use

Handling

Do not unpack the relay until mounting it.

Soldering

Solder: JIS Z3282, H63A or equivalent

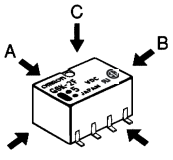
Soldering temperature: Approx. 250°C (260°C if the DWS method is used)

Soldering time: Approx. 5 s max. (approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used)

Be sure to make a molten solder level adjustment so that the solder will not overflow on the PCB.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, make sure to set the securing force of each claw to the following so that the Relays characteristics will be maintained.



Direction A: 1.96 N
Direction B: 4.90 N
Direction C: 1.96 N

Environmental Conditions During Operation, Storage, and Transportation

It is best to keep the relay in its packaging in a controlled environment until it is ready for mounting.

If the Relay is stored for a long time in an adverse environment with high temperature, high humidity, organic gases, or sulfide gases, sulfide or oxide films will form on the contact surfaces. These films may result in unstable contact, contact problems, or functional problems. Therefore, operate, store, or transport the product under specified environmental conditions.

Latching Relay Mounting

Make sure that the vibration or shock that is generated from other devices, such as relays in operation, on the same panel and imposed on the Latching Relay does not exceed the rated value, otherwise the Latching Relay that has been set may be reset or vice versa. The Latching Relay is reset before shipping. If excessive vibration or shock is imposed, however, the Latching Relay may be set accidentally. Be sure to apply a reset signal before use.

Maximum Allowable Voltage

The maximum allowable voltage of the coil can be obtained from the coil temperature increase and the heat-resisting temperature of coil insulating sheath material. (Exceeding the heat-resisting temperature may result in burning or short-circuiting.) The maximum allowable voltage also involves important restrictions which include the following:

- Must not cause thermal changes in or deterioration of the insulating material.
- Must not cause damage to other control devices.
- Must not cause any harmful effect on people.
- Must not cause fire.

Therefore, be sure to use the maximum allowable voltage as specified in the catalog.

As a rule, the rated voltage must be applied to the coil. A voltage exceeding the rated value, however, can be applied to the coil provided that the voltage is less than or equal to the maximum allowable voltage. It must be noted that continuous voltage application to the coil will cause a coil temperature increase which may affect characteristics such as electrical life and coil insulation.

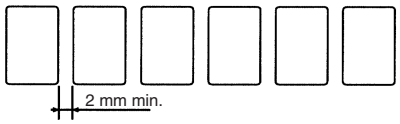
Coating

The Relay mounting on the PCB may be coated or washed but do not apply silicone coating or detergent containing silicone, otherwise the silicone coating or detergent may remain on the surface of the Relay.

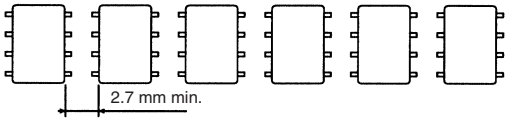
PCB Mounting

If two or more Relays are closely mounted with the long sides of the Relays facing each other and soldering is performed with infrared radiation, the solder may not be properly exposed to the infrared rays. Be sure to keep the proper distance between adjacent Relays as shown below to insure formation of good solder joints.

G6K-2G



G6K-2F



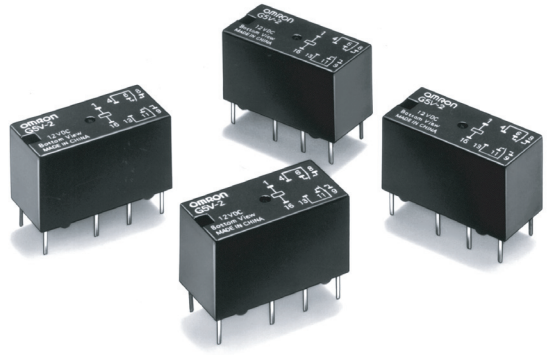
Two or more Relays may be mounted as closely as desired with the short sides of the Relays facing each other.

MEMO

Low Signal Relay
G5V-2

Miniature Relay for Signal Circuits

- Suitable for handling low signals in computer peripherals, telecommunications and security equipment.
- Capable of switching loads 10μA to 2 A.
- Conforms to FCC part 68 1,500 V surge withstand.
- Reliable Ag + Au-clad, bifurcated crossbar contacts.
- Fully-sealed construction.
- RoHS Compliant.



FCC

Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G5V-2-*DC12*).

Type	Contact form	Construction	Model
Standard	DPDT	Fully-sealed	**G5V-2**
High-sensitivity			**G5V-2-H1**

Model Number Legend

G5V - □ - □ DC □
1 2 3

1. **Contact Form**
   2: DPDT
2. **Coil type**
   Blank: Standard
   H1: High-sensitivity
3. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Contact Data

Item	Standard	High-sensitivity
Load	Resistive load (p.f. = 1)	
Rated load	0.50 A at 125 VAC 2 A at 30 VDC	0.5 A at 125 VAC 1 A at 24 VDC
Contact material	Ag (Au clad)	
Carry current	2 A	
Max. operating voltage	125 VAC 125 VDC	
Max. operating current	2 A	1 A
Max. switching capacity	62.5 VA 60W	62.5 VA 24W
Min. permissible load (See note)	10 μA, 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Standard Type

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (Ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	166.70	18	0.04	0.05	75% max.	5% min.	120% max. at 23°C	Approx. 500
5	100	50	0.09	0.11				
6	83.30	72	0.16	0.19				
9	55.60	162	0.31	0.49				
12	41.70	288	0.47	0.74				
24	20.80	1,152	1.98	2.63				
48	12	4,000	7.23	10.00				Approx. 580

High-sensitivity Type

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (Ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	50	60	0.18	0.57	75% max.	5% min.	180% max. at 23°C	Approx. 150
5	30	166.7	0.46	0.71				
6	25	240	0.70	0.97				
9	16.70	540	1.67	2.33				
12	12.50	960	2.90	3.99				
24	8.33	2,880	6.72	9.27				Approx. 200
48	6.25	7,680	20.10	26.70			150% max. at 23°C	Approx. 300

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Characteristics

Contact resistance (See note 1)		50 mΩ max. (G5V-2); 100 mΩ max. (G5V-2-H1)
Operate time (See note 2)		7 ms max. (mean value: approx. 3.5 ms)
Release time (See note 2)		3 ms max. (mean value: approx. 0.8 ms)
Operating frequency (max.)	**Mechanical**	36,000 operations/hour
	Electrical	1,800 operations/hour (under rated load)
Insulation resistance (See note 3)		1,000 MΩ min (at 500 VDC)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between coil and contacts 1,000 VAC, 50/60 Hz for 1 minute between contacts of different poles 750 VAC, 50/60 Hz for 1 minute between contacts of same poles (500 VAC, 50/60 Hz for 1 minute between contacts of same poles for high-sensitive type)
Surge withstand voltage		1,500 V (10 X 160 μs) between coil and contacts (conforms to part 68 of FCC rules)
Vibration	**Mechanical durability**	10 to 55 Hz, 1.50 mm double amplitude
	Malfunction durability	
Shock	**Mechanical durability**	1,000 m/s² (approx. 100 G)
	Malfunction durability	200 m/s² (approx. 20 G), 100 m/s² (approx. 10 G) for high-sensitive type
Ambient temperature	**Operating/storage**	-25° to 70°C (“-H1” versions) with no icing -25° to 65°C (standard versions) with no icing
Humidity		5% to 85% RH
Service life	**Mechanical**	15 million operations min. (at operating frequency of 36,000 operations/hour)
	Electrical	100,000 operations min. (at 1,800 operations/hr). See “Characteristic Data”
Weight		Approx. 5 g

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

2. Values in parentheses are typical values unless otherwise stated.

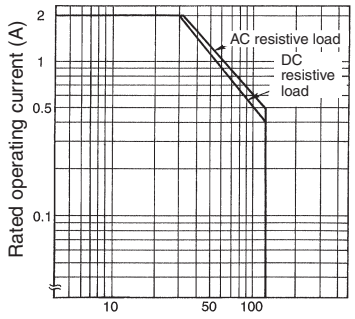
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those for checking the dielectric strength.

4. The above values are initial values.

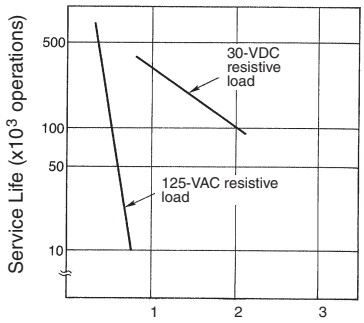
■ Characteristic Data

G5V-2

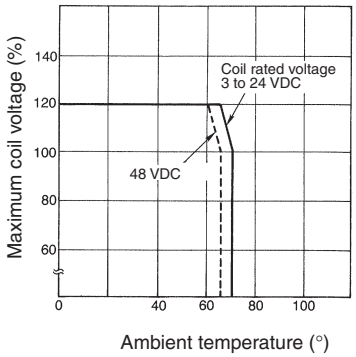
Maximum Switching Capacity



Electrical Service Life



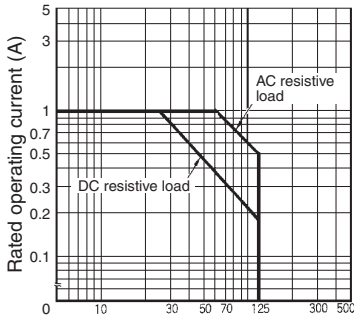
Ambient Temperature vs. Maximum Coil Voltage



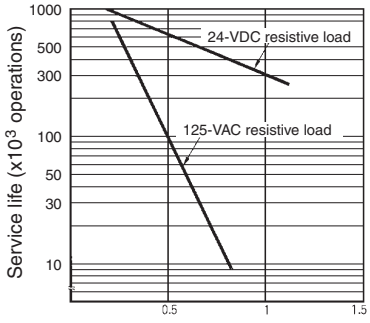
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

G5V-2-H1

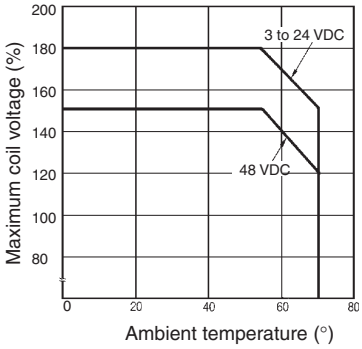
Maximum Switching Capacity



Electrical Service Life



Ambient Temperature vs. Maximum Coil Voltage

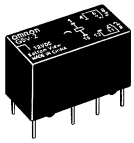


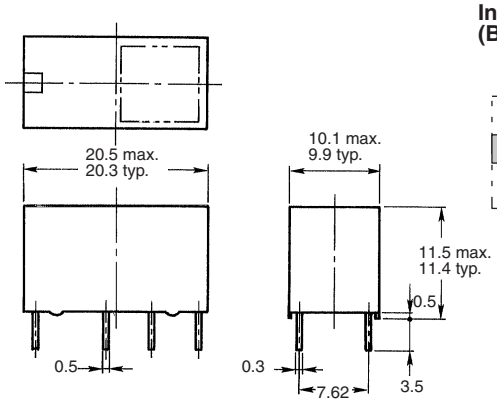
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

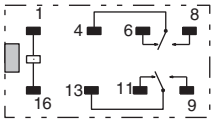
Note: 1. All units are in millimeters unless otherwise indicated.
2. Tolerance: ±0.1
3. Orientation marks are indicated as follows:

G5V-2, G5V-2-H1



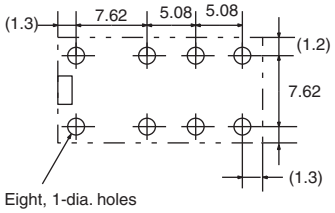


Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Type	Contact form	Coil rating	Contact ratings
G5V-2	DPDT	3 to 48 VDC	0.6 A at 125 VAC (General Use) 0.6 A at 110 VDC (Resistive) 2 A at 30 VDC (Resistive)
G5V-2-H1		3 to 48 VDC	0.5 A at 125 VAC (General Use) 0.2 A at 110 VDC (Resistive) 1 A at 24 VDC (Resistive)

Note: 1. The rated values approved by each of the safety standards may be different from the performance characteristics individually defined in this catalog.
2. In the interest of product improvement, specifications are subject to change.

Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout.

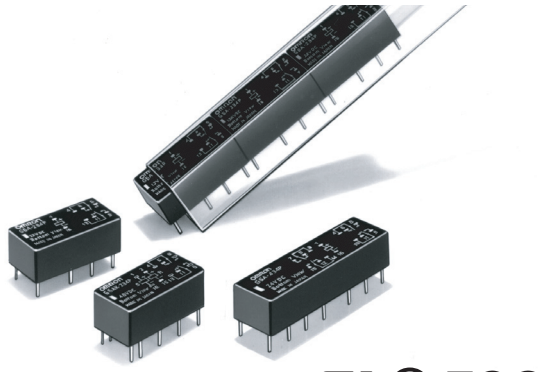
Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Low Signal Relay
G6A

Fullly Sealed Relay with High Impulse Withstand

- High sensitivity — can be driven by digital circuits.
- Low-profile design allows use in 12.70 mm PC board rack.
- Surge withstand voltage meets FCC Part 68 regulation.
- Units can be mounted side by side due to low magnetic leakage.
- Special models available for low thermoelectromotive force.
- Unique moving loop (permanent magnet) armature reduces relay size, magnetic interference, and contact bounce time.
- Single or dual coil winding types available.
- RoHS Compliant



FCC

Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G6A-274P-ST-US-*DC12*).

■ Non-latching

Type	Contact form	Model
		Ag (Au clad)
Standard	DPDT	**G6A-274P-ST-US**
	4PDT	**G6A-474P-ST-US**
Low-sensitivity	DPDT	**G6A-274P-ST40-US**
	4PDT	**G6A-474P-ST40-US**

■ Latching

Single Coil

Type	Contact form	Model
		Ag (Au clad)
Standard	DPDT	**G6AU-274P-ST-US**
	4PDT	**G6AU-474P-ST-US**

Dual Coil

Type	Contact form	Model
		Ag (Au clad)
Standard	DPDT	**G6AK-274P-ST-US**
	4PDT	**G6AK-474P-ST-US**
Low-sensitivity	DPDT	**G6AK-274P-ST40-US**
	4PDT	**G6AK-474P-ST40-US**

Specifications

■ Contact Data

Type	G6A-274P-ST(40)-US, G6A-474P-ST(40)-US G6AK-274P-ST(40)-US, G6AK-474P-ST(40)-US G6AU-274P-ST-US, G6AU-474P-ST-US	
Load	**Resistive load (p.f. = 1)**	**Inductive load (p.f. = 0.4) (L/R = 7 ms)**
Rated load	0.50 A at 125 VAC, 2 A at 30 VDC	0.3 A* at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	2 A	1 A
Max. switching capacity	125 VA, 60 W	62.50 VA, 30 W
Min. permissible load (See note)	10 μA, 10 mVDC	

* 0.25A at 125VAC for latching models

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 60 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Standard Non-latching DPDT (G6A-274P-ST-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.07	0.065	70% max.	10% min.	200% at 23°C	Approx. 200
4.5	44.6	101	0.16	0.14				
5	40	125	0.20	0.18				
6	33.30	180	0.29	0.26				
9	22.20	405	0.63	0.57				
12	16.70	720	1.10	1.06				
24	8.30	2,880	4.50	4.10				
48	4.90	9,750	13.70	12.50				Approx. 235

Low-sensitivity Non-latching DPDT (G6A-274P-ST40-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	133.30	22.50	0.03	0.02	70% max.	10% min.	150% at 23°C	Approx. 400
4.5	88.9	50.6	0.065	0.06				
5	80	62.50	0.08	0.07				
6	66.70	90	0.11	0.10				
9	44.30	203	0.27	0.23				
12	33.30	360	0.52	0.43				
24	16.70	1,440	2.10	1.80				
48	8.30	5,760	7.50	6.40				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Standard Non-latching 4PDT (G6A-474P-ST-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	120	25	0.05	0.045	70% max.	10% min.	150% at 23°C	Approx. 360
4.5	79.9	56.3	0.11	0.095				
5	72.50	69	0.14	0.12				
6	60	100	0.20	0.17				
9	40	225	0.45	0.38				
12	30	400	0.80	0.68				
24	15	1,600	3.20	2.70				
48	7.50	6,400	12.80	10.90				

Low-sensitivity Non-latching 4PDT (G6A-474P-ST40-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	133.30	22.50	0.035	0.02	70% max.	10% min.	150% at 23°C	Approx. 400
4.5	88.9	50.6	0.1	0.07				
5	80	62.50	0.12	0.09				
6	66.70	90	0.17	0.13				
9	44.30	203	0.42	0.30				
12	33.30	360	0.70	0.52				
24	16.70	1,440	2.80	2.20				
48	8.30	5,760	10.20	8.60				

Standard Single Coil Latching DPDT (G6AU-274P-ST-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	33.70	89	0.15	0.11	70% max.	70% min.	200% at 23°C	Approx. 100
4.5	22.2	202	0.34	0.25				
5	20	250	0.44	0.35				
6	16.70	360	0.64	0.48				
9	11.10	810	1.38	1.07				
12	8.30	1,440	2.50	2				
24	4.20	5,760	9.20	7.20				
48	2.50	19,000	28.50	22				Approx. 120

Standard Dual Coil Latching DPDT (G6AK-274P-ST-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set coil		Reset coil					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.037	0.027	0.027	0.037	70% max.	70% min.	200% at 23°C	Approx. 200
4.5	40.2	112	0.09	0.065	0.065	0.09				Approx. 180
5	36	139	0.11	0.08	0.08	0.11				
6	30	200	0.16	0.12	0.12	0.16				
9	20	450	0.38	0.28	0.28	0.38				
12	15	800	0.60	0.45	0.45	0.60				
24	7.50	3,200	2.10	1.50	1.50	2.10				
48	4.20	11,520	8.50	6.30	6.30	8.50				Approx. 200

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Low-sensitivity Dual Coil Latching DPDT (G6AK-274P-ST40-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set coil		Reset coil					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
3	120	25	0.015	0.01	0.01	0.015	70% max.	70% min.	150% at 23°C	Approx. 360
4.5	79.9	56.3	0.04	0.025	0.025	0.04				
5	72.50	69	0.05	0.035	0.035	0.05				
6	60	100	0.07	0.05	0.05	0.07				
9	40	225	0.16	0.12	0.12	0.16				
12	30	400	0.28	0.20	0.20	0.28				
24	15	1,600	1.10	0.75	0.75	1.10				
48	7.50	6,400	4	2.90	2.9	4				

Standard Single Coil Latching 4PDT (G6AU-474P-ST-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	106.80	28.10	0.03	0.02	70% max.	70% min.	150% at 23°C	Approx. 320
4.5	71.2	63.2	0.06	0.04				
5	64	78.10	0.08	0.06				
6	53.30	112.50	0.11	0.08				
9	35.60	253	0.25	0.18				
12	26.70	450	0.45	0.32				
24	13.30	1,800	1.80	1.30				
48	6.70	7,200	7.00	5.20				

Standard Dual Coil Latching 4PDT (G6AK-474P-ST-US

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set coil		Reset coil					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
3	106.80	28.10	0.03	0.02	0.02	0.03	70% max.	70% min.	150% at 23°C	Approx. 320
4.5	71.2	63.2	0.06	0.04	0.04	0.06				
5	64	78.10	0.08	0.06	0.06	0.08				
6	53.30	112.50	0.11	0.08	0.08	0.11				
9	35.60	253	0.25	0.18	0.18	0.25				
12	26.70	450	0.45	0.32	0.32	0.45				
24	13.30	1,800	1.80	1.30	1.30	1.80				
48	6.70	7,200	7.00	5.20	5.20	7.00				

Dual Coil Latching Low-sensitivity 4PDT (G6AK-474P-ST40-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set coil		Reset coil					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
3	120	25	0.02	0.02	0.02	0.02	70% max.	70% min.	150% at 23°C	Approx. 360
4.5	79.9	56.3	0.045	0.035	0.035	0.045				
5	72.50	69	0.065	0.05	0.05	0.065				
6	60	100	0.09	0.075	0.075	0.09				
9	40	225	0.18	0.14	0.14	0.18				
12	30	400	0.30	0.23	0.23	0.30				
24	15	1,600	1.20	0.82	0.82	1.20				
48	7.50	6,400	4.40	3.20	3.20	4.40				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Characteristics

Type		Non-latching	Latching
Contact resistance (See note 1)		50 mΩ max.	
Operate (set) time (See note 2)	**DPDT**	5 ms max. (mean value approx. 3 ms)	5 ms max. (mean value approx. 2.50 ms)
	4PDT	7 ms max. (mean value approx 3.80 ms)	7 ms max. (mean value approx. 3.30 ms)
Release (reset) time (See note 2)	**DPDT**	3 ms max. (mean value approx. 1.20 ms)	5 ms max. (mean value approx. 2.50 ms)
	4PDT	5 ms max. (mean value approx. 1.30 ms)	7 ms max. (mean value approx. 2.70 ms)
Min. set/reset signal width	**DPDT**	7 ms min.	
	4PDT	15 ms min.	
Operating frequency	**Mechanical**	36,000 operations/hour	
	Electrical	1,800 operations/hour (under rated load)	
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC); except for set-reset	
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between coil and contacts 1,000 VAC, 50/60 Hz for 1 minute between contacts of different poles 1,000 VAC, 50/60 Hz for 1 minute between contacts of same pole 250 VAC, 50/60 Hz for 1 minute between set and reset coils	
Surge withstand voltage		1,500 V (10 x 160 μs) (conforms to FCC Part 68)	
Vibration	**Mechanical durability**	10 to 55 Hz; 5 mm double amplitude	
	Malfunction durability	10 to 55 Hz; 3.3 mm double amplitude	
Shock	**Mechanical durability**	1,000 m/s^2 (Approx. 100G	
	Malfunction durability	DPDT: 500 m/s^2 (Approx. 50 G); 4PDT: 300 m/s^2 (Approx. 30 G)	
Ambient temperature		-40° to 70°C with no icing	
Humidity		5% to 85% RH	
Service life	**Mechanical**	100 million operations min. (at 36,000 operations/hour)	
	Electrical	500,000 operations min. (at 1,800 operations/hr) See “Characteristic Data”	
Weight	**DPDT**	Approx. 3.5 g	
	4PDT	Approx. 6.0 g	

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a fall-of-potential method.

2. Values in parentheses are typical values unless otherwise stated.

3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those for checking the dielectric strength (except between the set and reset coil).

4. The above values are initial values.

■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

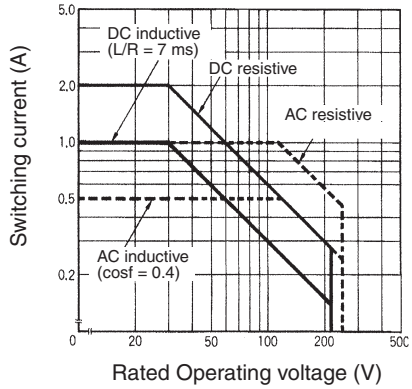
Type	Contact form	Coil rating	Contact ratings	Number of test operations
G6A( )-274P-ST( )-US	DPDT	1.5 to 48 VDC	1 A at 125 VAC (General Purpose) 2 A at 30 VDC (General Purpose) 0.6 A at 110 VDC (General Purpose)	6,000

Note: 1. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

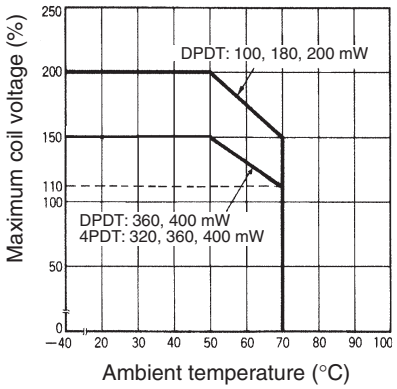
2. In the general interest of product improvement, specifications are subject to change.

■ Characteristic Data

Maximum Switching Capacity
DPDT, 4PDT

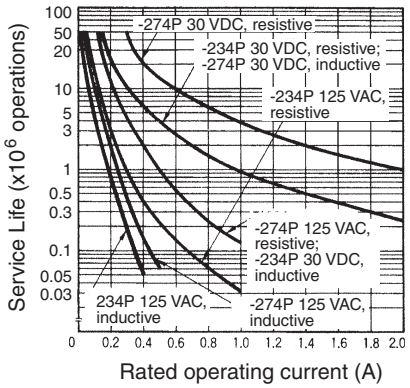


Ambient Temperature vs.
Maximum Coil Voltage

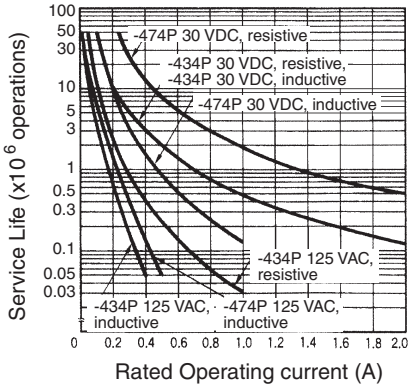


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Electrical Service Life
DPDT



4PDT

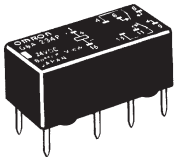


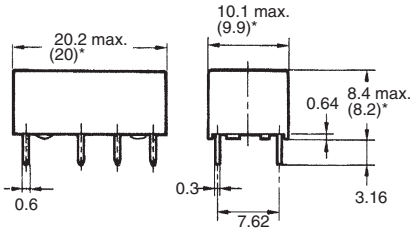
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

■ Non-latching

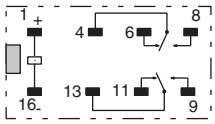
G6A-274P-ST(40)-US





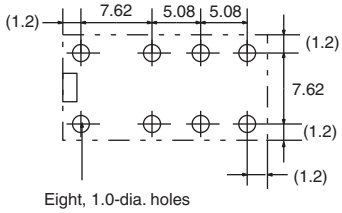
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



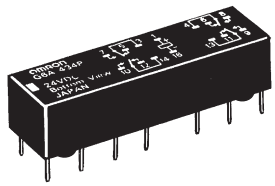
Mounting Holes (Bottom View)

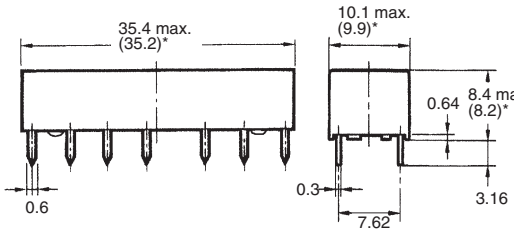
Tolerance: ±0.1



Eight, 1.0-dia. holes

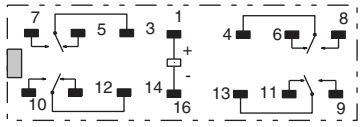
G6A-474P-ST-US





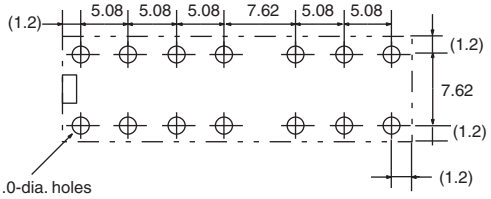
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Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

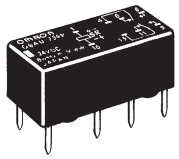
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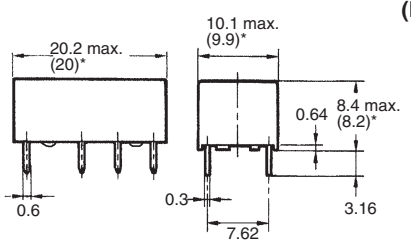


Fourteen, 1.0-dia. holes

■ Latching

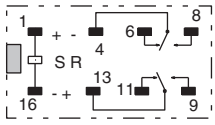
G6AU-274P-ST-US





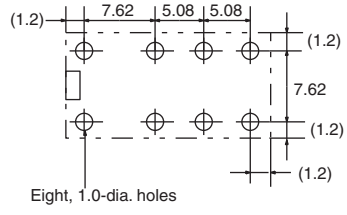
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



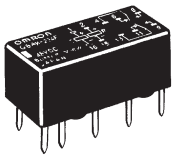
Mounting Holes (Bottom View)

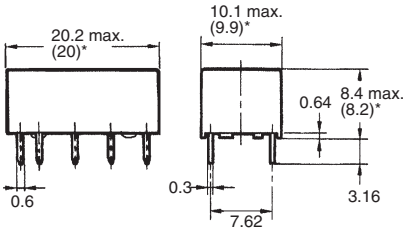
Tolerance: ±0.1



Eight, 1.0-dia. holes

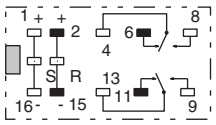
G6AK-274P-ST(40)-US





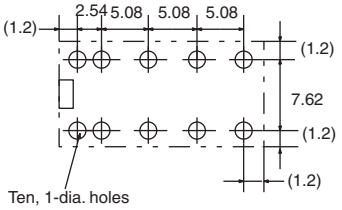
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Terminal Arrangement/ Internal Connections (Bottom View)

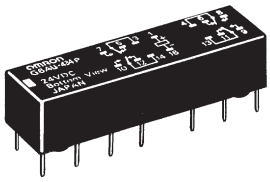


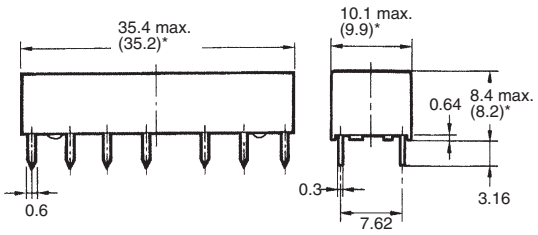
Mounting Holes (Bottom View)

Tolerance: ±0.1



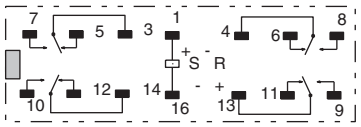
G6AU-474P-ST-US





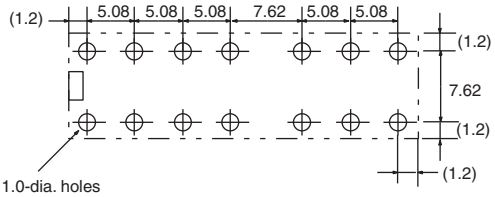
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Terminal Arrangement/ Internal Connections (Bottom View)

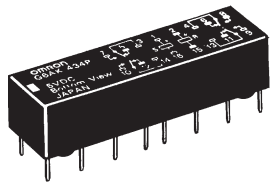


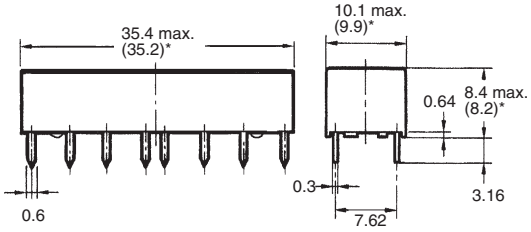
Mounting Holes (Bottom View)

Tolerance: ±0.1



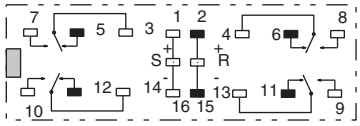
G6AK-474P-ST(40)-US





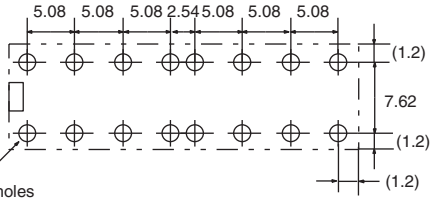
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



Precautions

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. Be sure to use a fail-safe circuit design that provides protection against contact failure or coil burnout. Otherwise, use a latching relay.

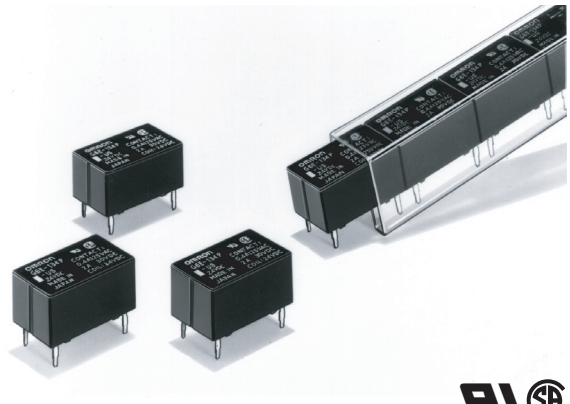
Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

Low Signal Relay
G6E

Subminiature, Sensitive Signal Relay

- Subminiature 7.87 H x 9.91 W x 16 L mm.
- High sensitivity with pick-up coil power of 98 mW.
- Surge withstand voltage meets FCC Part 68 requirements.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce time.
- Bifurcated crossbar contact assures high reliability.
- Single and Dual coil latching versions available.
- Fully sealed construction.
- RoHS Compliant.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G6E-134P-ST-US-*DC6*).

Contact form		Model			
		Terminal style	Standard	Single coil latching	Dual coil latching
SPDT	Bifurcated crossbar	Straight	**G6E-134P-US**	**G6EU-134P-US**	**G6EK-134P-US**
		Self-clinching	**G6E-134C-US**	**G6EU-134C-US**	**G6EK-134C-US**

Model Number Legend

G6E □ - □ □ □ □ □ - □ - □ **DC** □

1 2 3 4 5 6 7 8 9

1. **Relay Function**
   None: Single-side stable
   U: Single-winding latching
   K: Double-winding latching
2. **Contact Form**
   1: SPDT
3. **Contact Type**
   3: Bifurcated crossbar Ag (Au-Alloy) contact
4. **Enclosure Ratings**
   4: Fully sealed
5. **Terminals**
   P: Straight PCB
   C: Curved tail
6. **Special Function**
   L: Low sensitivity coil (400 mW)
7. **Standoff dimension**
   Blank: 0.3 mm
   ST: 0.64 mm
8. **Approved Standards**
   US: UL, CSA certified
9. **Rated Coil Voltage**
   3, 5, 6, 9, 12, 24, 48 VDC

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	0.40 A at 125 VAC, 2 A at 30 VDC	0.20 A at 125 VAC, 1 A at 30 VDC
Contact material	Ag (Au clad)	
Carry current	3 A	
Max. operating voltage	250 VAC, 220 VDC	
Max. operating current	3 A	
Max. switching capacity	50 VA, 60 W	25 VA, 30 W
Min. permissible load (See note)	10 μA, 10 mVDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the switching frequency and operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

Standard Non-latching Type (G6E-134P(-ST)-US, G6E-134C(-ST)-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.08	0.06	70% max.	10% min.	190% at 23°C	Approx. 200
5	40	125	0.18	0.17				
6	33.30	180	0.31	0.24				
9	22.20	405	0.62	0.50				
12	16.70	720	1.20	0.99				
24	8.30	2,880	4.70	3.90				
48	8.30	5,760	5.35	5.12			170% at 23°C	Approx. 400

Low-sensitivity Non-latching Type (G6E-134PL(-ST)-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	133	22.50	0.03	0.03	70% max.	10% min.	190% at 23°C	Approx. 400
5	79.40	63	0.08	0.07				
6	66.60	90	0.12	0.10				
9	44.30	203	0.21	0.19				
12	33.30	360	0.45	0.42				
24	16.70	1,440	1.77	1.65				

Standard Single Coil Latching Type (G6EU-134P(-ST)-US, G6EU-134C(-ST)-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.05	0.04	70% max.	70% min.	190% max. at 23°C	Approx. 200
5	40	125	0.13	0.12				
6	33.30	180	0.19	0.17				
9	22.20	405	0.45	0.40				
12	16.70	720	0.84	0.79				
24	8.30	2,880	3.56	3.10				

Standard Dual Coil Latching Type (G6EK-134P(-ST)-US, G6EK-134C(-ST)-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	66.70	45	0.05	0.04	70% max.	70% min.	190% max. at 23°C	Approx. 200
5	40	125	0.09	0.08				
6	33.30	180	0.12	0.11				
7	22.20	405	0.25	0.22				
12	16.70	720	0.44	0.41				
24	8.30	2,880	1.66	1.62				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

Low-sensitivity Dual Coil Latching Type (G6EK-134PL(-ST)-US)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	133	22.50	0.02	0.01	70% max.	70% min.	170% max. at 23°C	Approx. 400
5	79.40	63	0.04	0.03				
6	66.60	90	0.06	0.04				
9	44.30	203	0.12	0.09				
12	33.30	360	0.21	0.15				
24	16.70	1,440	0.80	0.58				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum voltage is the highest voltage that can be imposed on the relay coil.

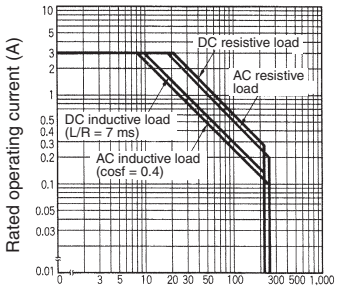
■ Characteristics

Contact resistance (See note 1)		50 mΩ max.
Operate time (set) time (See note 2)		5 ms max. (mean value approx. 2.90 ms, 48 VDC type, approx. 2.40 ms)
Release time (reset) time (See note 2)		5 ms max. (mean value approx. 1.30 ms)
Min. set/reset signal width		Latching type: 15 ms min. (at 23°C)
Operating frequency (max.)	**Mechanical**	36,000 operations/hour
	Electrical	1,800 operations/hour (under rated load)
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		1,500 VAC, 50/60 Hz for 1 minute between coil contacts 1,000 VAC, 50/60 Hz for 1 minute between contacts of same pole
Surge withstand voltage		1,500 V (10 x160 μs) (conforms to FCC Part 68) 2,500 V (2 x 10 μs) (Telcordia Requirement)
Vibration	**Mechanical durability**	10 to 55 Hz; 5 mm double amplitude
	Malfunction durability	10 to 55 Hz; 3.3 mm double amplitude
Shock	**Mechanical durability**	1,000 m/s^2, approx. 100G
	Malfunction durability	300 m/s^2, approx. 30G
Ambient temperature		-40°C to 70°C with no icing
Humidity		5% to 85% RH
Service life	**Mechanical**	100 million operations min. (at 36,000 operations/hour)
	Electrical	100,000 operations min (0.4A at 125 VAC resistive; 0.2A at 125VAC inductive) 500,000 operations min. (2A at 30 VDC resistive; 1A at 30VDC inductive) 200,000 operations min. (3A at 30 VDC resistive) See “Characteristic Data”
Weight		Approx. 2.7 g

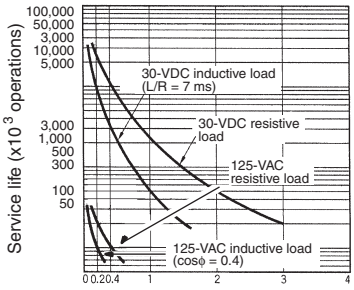
Note: 1. The contact resistance was measured with 1A at 5VDC with a fall-of-potential method.
2. Values in parentheses are typical values unless otherwise stated.
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those for checking the dielectric strength
4. The above values are initial values.

■ Characteristic Data

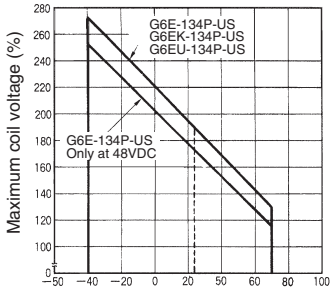
Maximum Switching Capacity



Electrical Service Life



Ambient Temperature vs. Maximum Coil Voltage



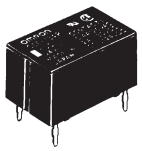
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

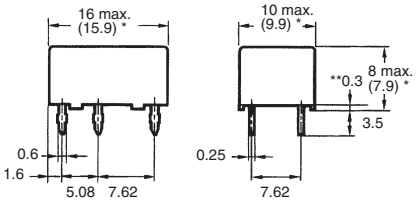
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

Standard coil

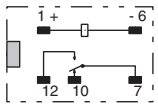
G6E-134P(L)(-ST)-US



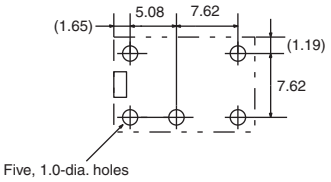


*Average value
** 0.64mm for "-ST" models

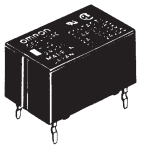
Terminal Arrangement/ Internal Connections (Bottom View)

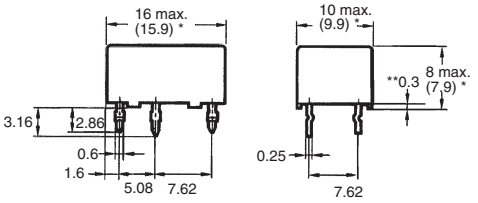


Mounting Holes (Bottom View)
Tolerance: ±0.1



G6E-134C(-ST)-US

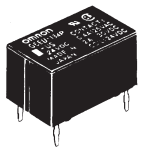


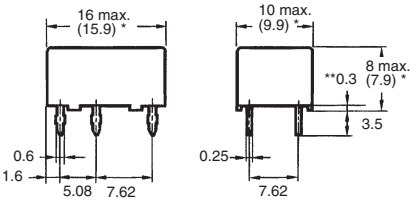


*Average value
** 0.64mm for "-ST" models

Single coil latching

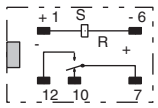
G6EU-134P(L)(-ST)-US



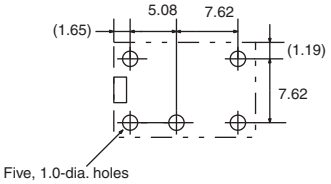


*Average value
** 0.64mm for "-ST" models

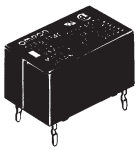
Terminal Arrangement/ Internal Connections (Bottom View)

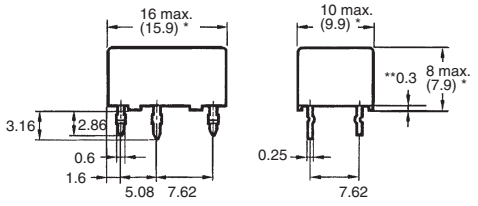


Mounting Holes (Bottom View)
Tolerance: ±0.1



G6EU-134C(-ST)-US

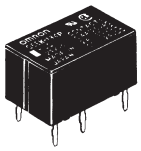


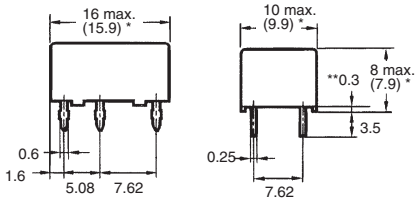


*Average value
** 0.64mm for "-ST" models

Dual coil latching

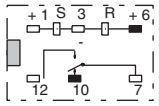
G6EK-134P(L)(-ST)-US





*Average value
** 0.64mm for "-ST" models

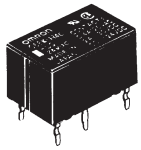
Terminal Arrangement/ Internal Connections (Bottom View)

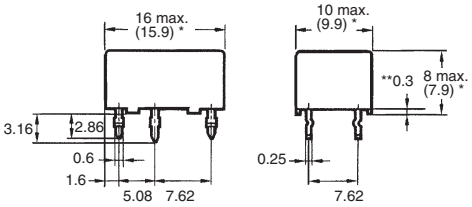


Mounting Holes (Bottom View)

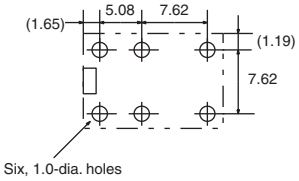
Tolerance: ±0.1

G6EK-134C(-ST)-US





*Average value
** 0.64mm for "-ST" models



■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Contact form	Coil ratings	Contact ratings	Number of test operations
SPDT	3 to 48 VDC	0.2 A at 250 VAC (General Use) 0.6 A at 125 VAC (General Use) 2 A at 30 VDC (Resistive) 0.6 A at 125 VDC (Resistive, Ag contact only)	6,000

Note: 1. The rated values approved by each of the safety standards (e.g., UL, CSA, TUV) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

Precautions

■ Precautions for Correct Use

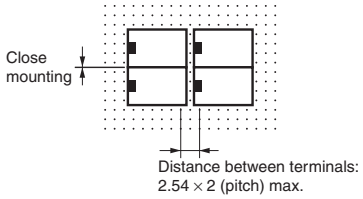
Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Installation

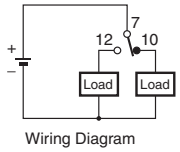
Do not reverse the polarity of the coil (+, -).

Provide sufficient space between Relays when mounting two or more on the same PCB, as shown in the following diagram.



Wiring

Refer to the following diagram when wiring to switch a DC load. The difference in polarity applied to the contacts will affect the endurance of the Relay due to the amount of contact movement. To extend the endurance characteristics beyond the performance ratings, wire the common (pin 7) terminal to the positive (+) side.



Wiring Diagram

Ultrasonic Cleaning

Do not use ultrasonic cleaning on standard relay models. Doing so may result in resonance, coil burnout, and contact adhesion within the Relay.

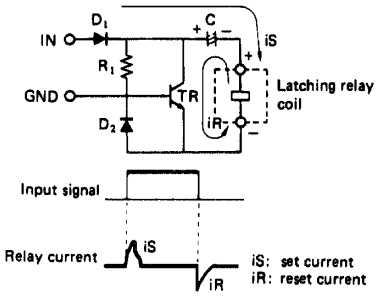
Relay Handling

When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

■ Hints on Correct Use

Single-winding type (G6EU)
Example of low-power consumption driver circuit

1. This is an example of a driver circuit that allows Model G6E to function as a normal relay with a normal switching pulse input.
2. The relay is set by an abrupt current charged to capacity C. This current flows in the relay via diode D_1 and C and out via diode D_2.
3. The relay is reset by the discharge current of C flowing in the relay via transistor TR and C.



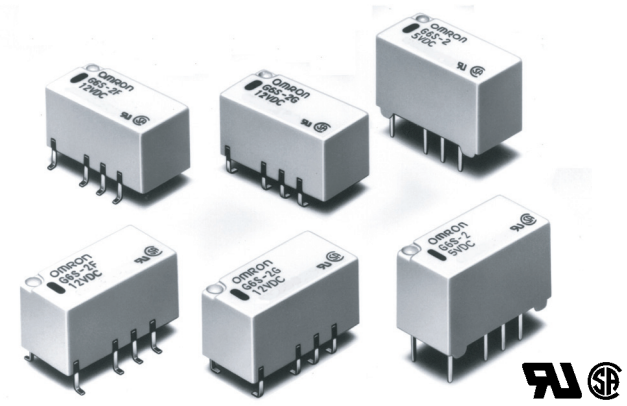
Note: 1. Give adequate consideration to the circuit constant when actually using this circuit, confirming the set and reset status of the relay.

2. OMRON owns the patent on this circuit. Consult OMRON when using this circuit.

Low Signal Relay
G6S

Suface Mount DPDT Relay

- High dielectric withstand voltage of 2,000 VAC between coil and contacts (standard type); 1,500 VAC between contacts of different polarity.
- Meets FCC Part 68 and Telcordia 2.5 kV surge withstand.
- European version certified for EN60950/EN41003 Supplementary Insulation at 250 V at Pollution Degree 2.
- Low power consumption of 140 mW (Non-latching)
- Available in through-hole and SMT terminals.
- Tape and reel or tube packaging.
- RoHS Compliant.



Ordering Information

■ Standard Version

.

Terminal	Model / Contact form	Non-latching		Single coil latching	Dual coil latching
		Standard	European Version*		
Gull-wing	DPDT	**G6S-2F**	**G6S-2F-Y**	**G6SU-2F**	**G6SK-2F**
Inside "L"		**G6S-2G**	**G6S-2G-Y**	**G6SU-2G**	**G6SK-2G**
PCB through-hole		**G6S-2**	**G6S-2-Y**	**G6SU-2**	**G6SK-2**

* Certified for EN60950/EN41003 Supplementary Insulation at 250 V (pollution degree 2)

Notes: 1. When ordering, add the rated coil voltage to the model number.
Example: G6S-2F DC12
└── Rated coil voltage

2. When ordering tape packing (surface mount models), add "-TR" to the model number.
Example: G6S-2F-TR DC12
└── Tape packing
"-TR" is not part of the relay model number. Therefore, it is not marked on the relay case.

3. Dual coil latching models are available with a High-sensitivity coil. (140 mW; 200 mW for DC24)
When ordering High-sensitivity dual coil latching models, add "-H" to the model number.
Example: G6SK-2G-H-TR DC5
└── High-sensitivity coil

Model Number Legend

G6S□ - □□ - □ - □ DC□
1 2 3 4 5 6

1. Relay Function
None: Non-latching
U: Single coil latching
K: Dual coil latching

2. Contact Form
2: DPDT

3. Terminal Shape
None: Through-hole
F: Gull-wing surface mount
G: Inside "L" surface mount

4. Approved Standards
None: UL/CSA
Y: EN60950/EN41003
(Standard coil models)

5. Packaging
None: Tube packaging
TR: Tape and reel packaging
(Surface mount models)

6. Rated Coil Voltage
4.5, 5, 12, 24

Specification

■ Contact Data

Load	Resistive load (cos ϕ = 1)
Rated load	0.5 A at 125 VAC 2 A at 30 VDC
Contact material	Ag (Au clad)
Max. carry current	2 A
Max. operating voltage	250 VAC, 220 VDC
Max. operating current	2 A
Max. switching capacity	62.5 VA, 60 W
Min. permissible load	10 μA, 10 mVDC

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation
This value was measured at a switching frequency of 120 operations/min and the criterion of contact resistance is 50 Ω. This value may vary depending on the operating environment. Always double-check relay suitability under actual operating conditions.

■ Coil Data

G6S - Standard Non-latching (G6S-2F, G6S-2G, G6S-2)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			% of rated voltage			
4.5	31.0	145	75% max.	10% max.	200% max. @ 23°C	Approx. 140
5	28.1	178				
12	11.7	1,028				
24	8.3	2,880			170% max. @ 23°C	Approx. 200

G6SU - Standard Single Coil Latching (G6SU-2F, G6SU-2G, G6SU-2)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil Inductance (H) (ref. value)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
4.5	22.2	203	0.27	0.14	75% max.	75% max.	180% max. @ 23°C	Approx. 100
5	20.0	250	0.36	0.18				
12	8.3	1,440	2.12	1.14				
24	6.3	3,840	5.80	3.79				Approx. 150

G6SK - Standard Dual Coil Latching (G6SK-2F, G6SK-2G, G6SK-2)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil Inductance (H) (ref. value)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set		Reset					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
4.5	44.4	101	0.12	0.074	0.082	0.14	75% max.	75% max.	170% max. @ 23°C	Approx. 200
5	40	125	0.14	0.088	0.098	0.16				
12	16.7	720	0.60	0.41	0.46	0.54				
24	12.5	1,920	1.98	1.23	1.34	2.23			140% max. @ 23°C	Approx. 300

G6S - European Version, Non-latching (G6S-2F-Y, G6S-2G-Y, G6S-2-Y)

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			% of rated voltage			
5	40.0	125	75% max.	10% max.	170% max. @ 23°C	Approx. 200
12	16.7	720				
24	9.6	2,504				Approx. 230

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C.
3. Pick-up voltage will vary with temperature.
4. The maximum voltage is the highest voltage that can be imposed on the relay coil.

■ Characteristics

Contact resistance (See note 1)		75 mΩ max.
Operate (set) time (See note 2)		4 ms max. (mean value approx. 2.5 ms G6S; 2.0 ms G6SU, G6SK)
Release (reset) time (See note 2)		4 ms max. (mean value approx. 1.5 ms G6S; 2.0 ms G6SU, G6SK)
Bounce time		Approx. 0.5 ms
Max. operating frequency		Mechanical: 36,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (See note 3)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 minute (G6S, G6SU) between coil and contacts 1,000 VAC, 50/60 Hz for 1 minute (G6SK) between coil and contacts 1,500 VAC, 50/60 Hz for 1 minute between contacts of different poles 1,000 VAC, 50/60 Hz for 1 minute between contacts of same pole 500 VAC, 50/60 Hz for 1 minute between set and reset coils (G6SK)
Surge withstand voltage	**Conforming to Telcordia specs.**	2,500 V (2 x 10 μS) between coil and contacts for G6S and G6SU 2,500 V (2 x 10 μS) between contacts of different poles
	Conforming to FCC Part 68	1,500 V (10 x 160 μS) between coil and contacts for G6SK 1,500 V (10 x 160 μS) between contacts of same pole
Vibration	**Mechanical durability**	10 to 55 Hz; 5 mm double amplitude
	Malfunction durability	10 to 55 Hz; 3.3 mm double amplitude
Shock	**Mechanical durability**	1,000 m/s^2; approx. 100 G
	Malfunction durability	750 m/s^2; approx. 75 G
Ambient temperature		-40 to +85°C with no icing; -40 to +70°C with no icing (G6SK, DC24 coil)
Ambient Humidity		5% to 85% RH
Service life	**Mechanical**	100,000,000 operations min. (at 36,000 operations/hour)
	Electrical	100,000 operations min. (2A@30VDC, resistive; 1,200 ops/hr.) 100,000 operations min. (0.5A@125VAC, resistive) See “Characteristic Data”
Weight		Approx. 2g

Note: 1. The contact resistance was measured with 10 mA at 1 VDC with a voltage drop method.

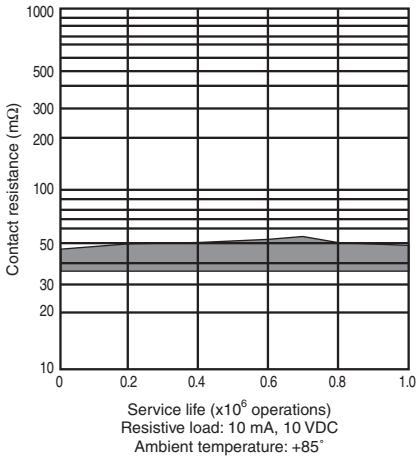
2. Values in parentheses are typical values unless otherwise stated.

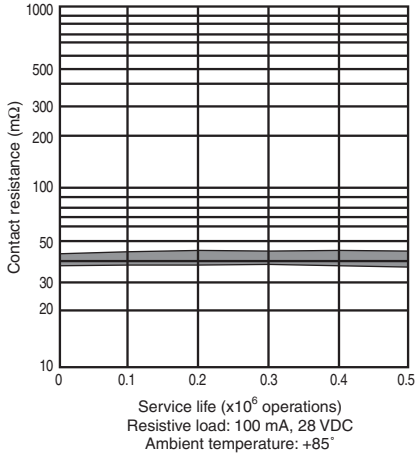
3. The insulation resistance was measured with a 500-VDC megohmmeter applied to the same parts as those used for checking the dielectric strength (except between the set and reset coil).

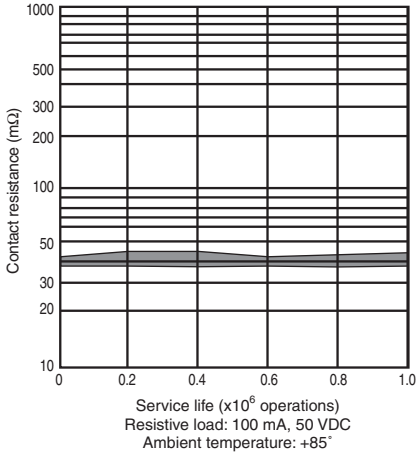
4. Data shown are of initial value.

■ Characteristic Data

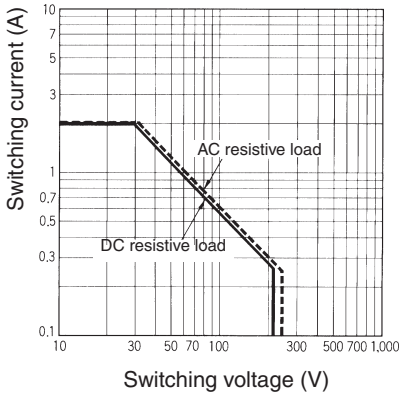
Service Life





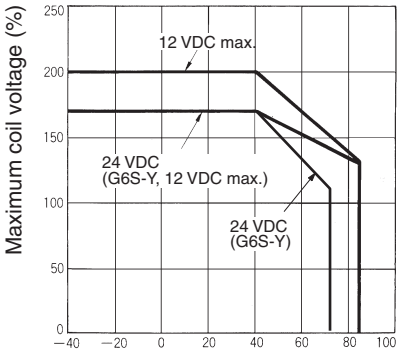


Maximum Switching Capacity

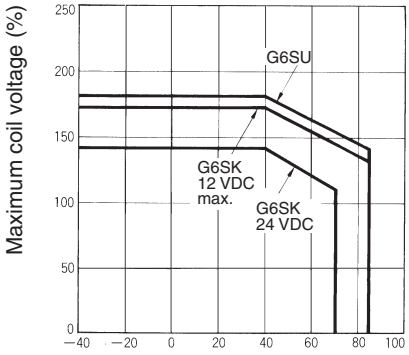


Ambient Temperature vs. Maximum Coil Voltage

Non-latching



Single Coil Latching
Dual Coil Latching

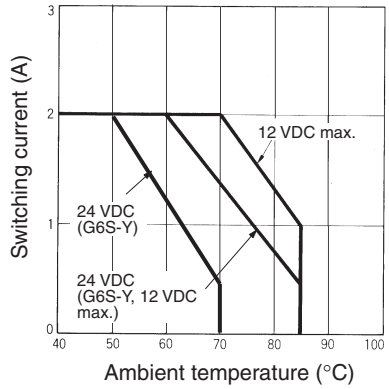


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

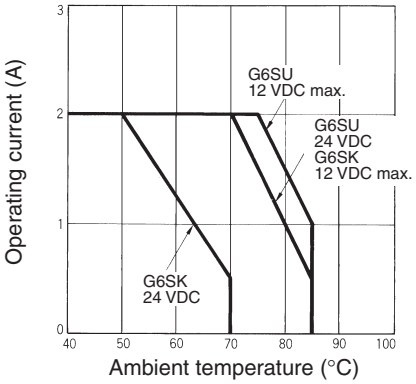
Reference Data

Ambient Temperature vs. Switching Current

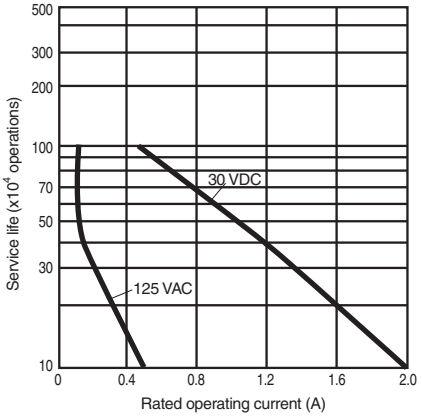
Non-latching



Single Coil Latching
Dual Coil Latching

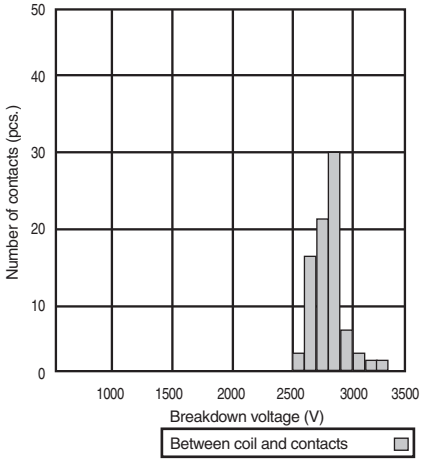


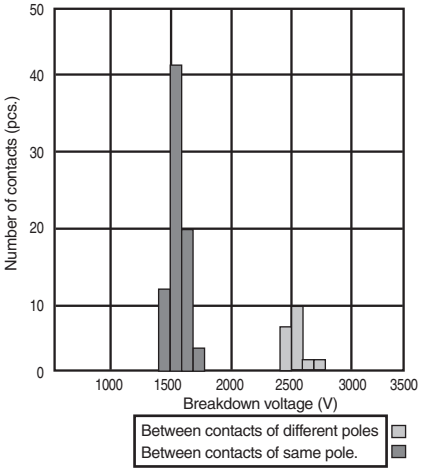
Electrical Service Life



Dielectric Strength (Standard Version, Non-latching)

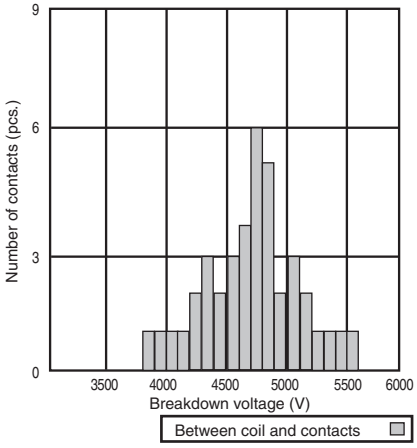
Detecting current: 1mA



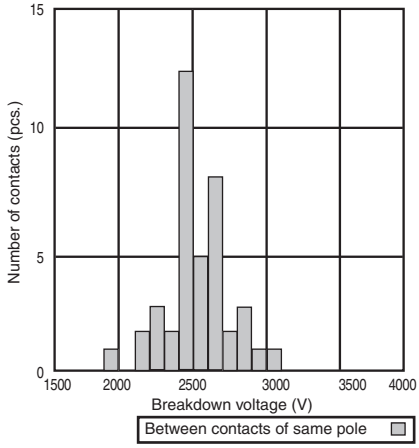


Impulse Withstand Voltage (Standard Version, Non-latching)

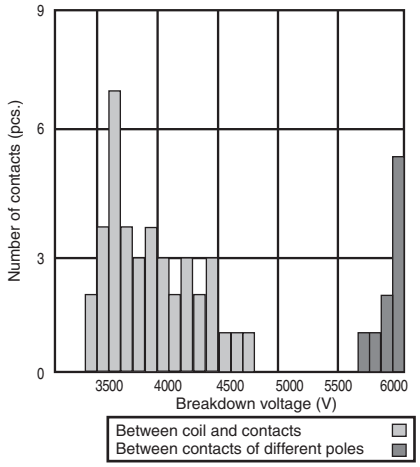
(2 x 10 ms)



(10 x 160 ms)

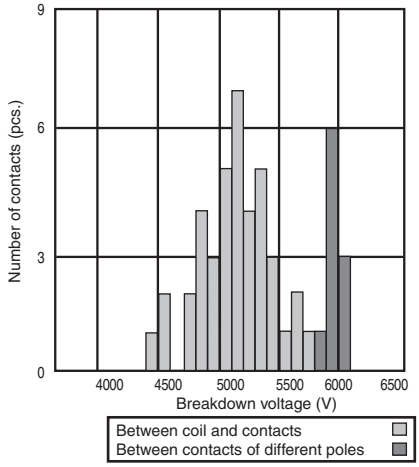


(10 x 160 ms)

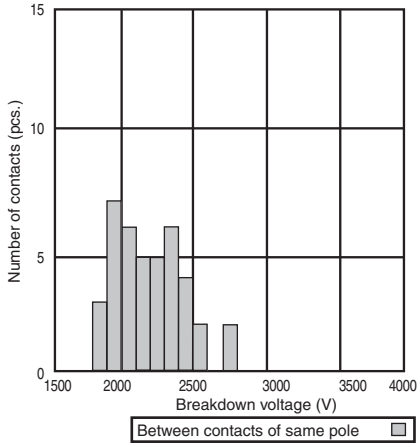


Impulse Withstand Voltage (European version)

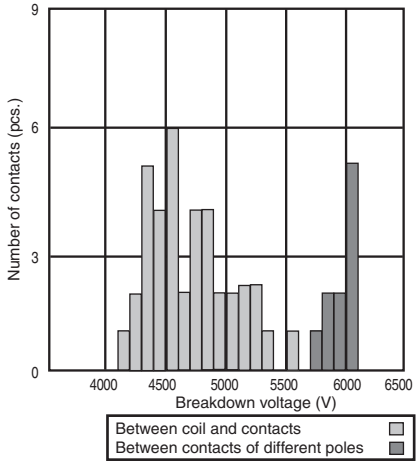
(2 x 10 ms)



(10 x 160 ms)

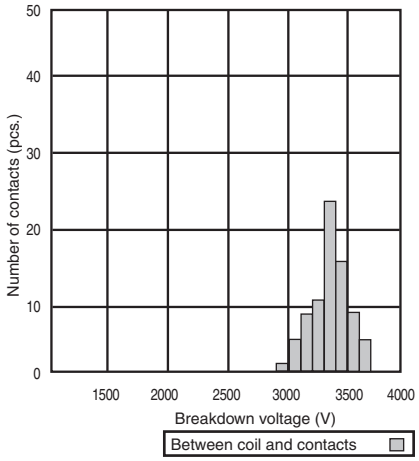


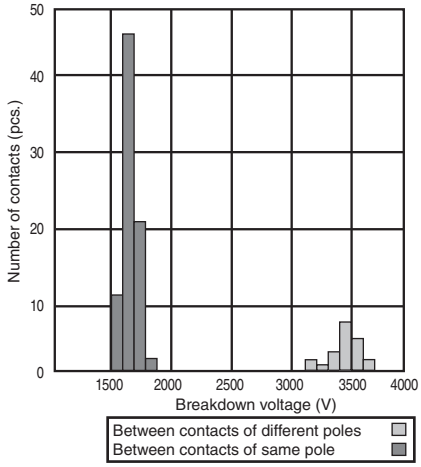
(10 x 160 ms)



Dielectric Strength (European Version, Non-latching)

Detecting current: 1mA



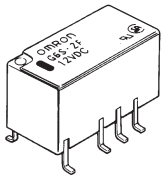


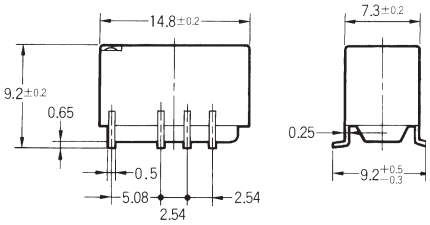
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Coplanarity is 0.1 mm max.

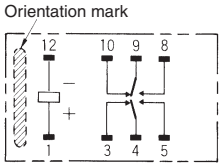
■ Standard

G6S-2F, G6S-2F-Y
Tolerance: ±0.3

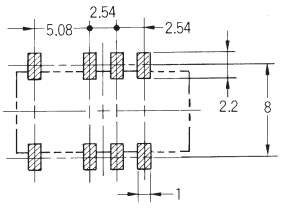




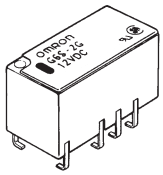
Terminal Arrangement/ Internal Connections (Top View)

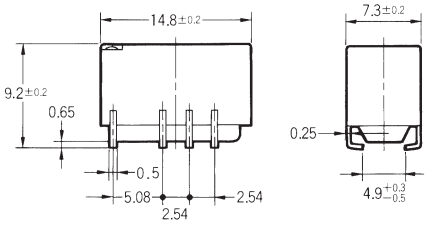


Footprint (Top View)
Tolerance: ±0.1

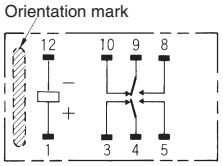


G6S-2G, G6S-2G-Y
Tolerance: ±0.3

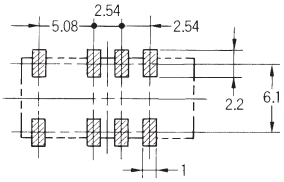




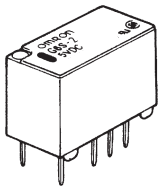
Terminal Arrangement/ Internal Connections (Top View)

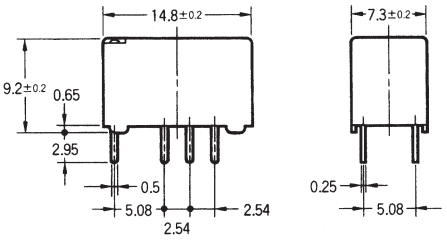


Footprint (Top View)
Tolerance: ±0.1

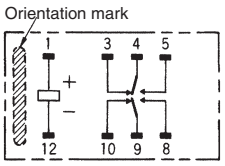


G6S-2, G6S-2-Y
Tolerance: ±0.3

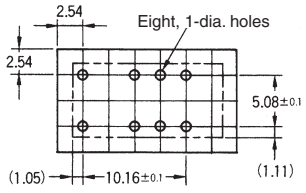




Terminal Arrangement/ Internal Connections (Bottom View)



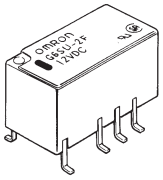
Footprint (Bottom View)
Tolerance: ±0.1

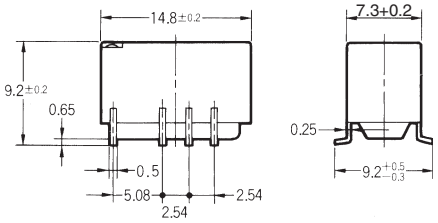


■ Single Coil Latching

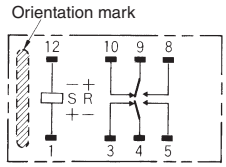
G6SU-2F

Tolerance: ±0.3



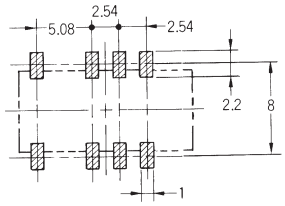


Terminal Arrangement/ Internal Connections (Top View)



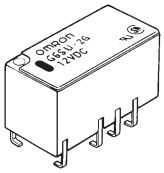
Footprint (Top View)

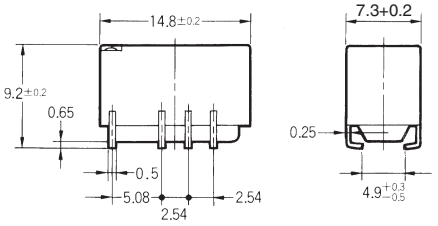
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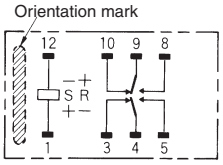
G6SU-2G

Tolerance: ±0.3



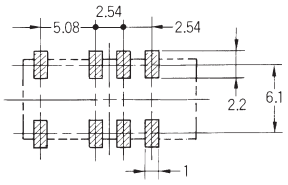


Terminal Arrangement/ Internal Connections (Top View)



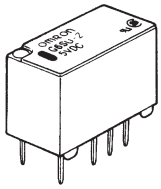
Footprint (Top View)

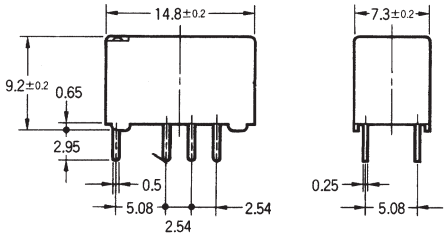
Tolerance: ±0.1



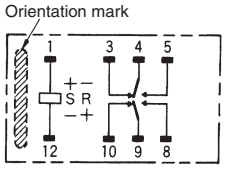
G6SU-2

Tolerance: ±0.3



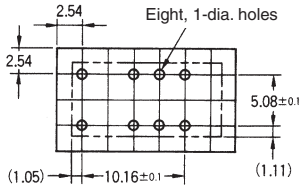


Terminal Arrangement/ Internal Connections (Bottom View)



Footprint (Bottom View)

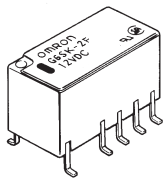
Tolerance: ±0.1

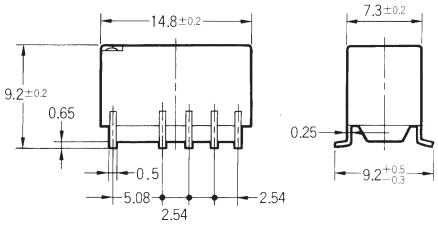


■ Dual Coil Latching

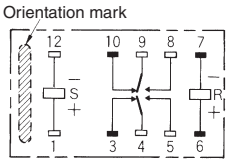
G6SK-2F

Tolerance: ±0.3



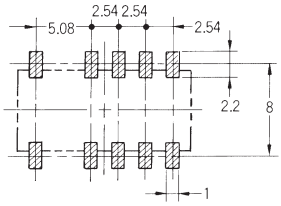


Terminal Arrangement/ Internal Connections (Top View)



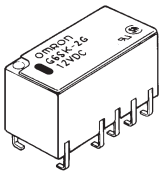
Footprint (Top View)

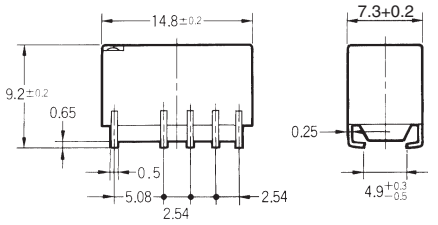
Tolerance: ±0.1



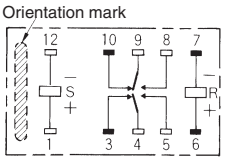
G6SK-2G

Tolerance: ±0.3



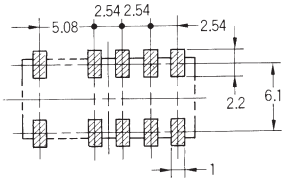


Terminal Arrangement/ Internal Connections (Top View)



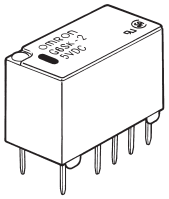
Footprint (Top View)

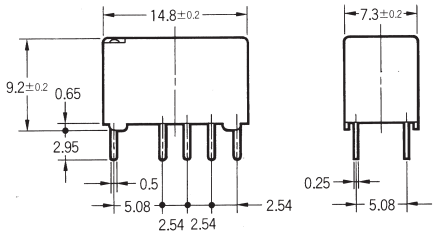
Tolerance: ±0.1



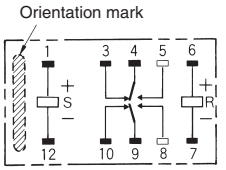
G6SK-2

Tolerance: ±0.3



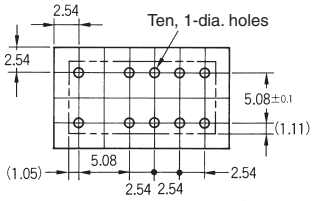


Terminal Arrangement/ Internal Connections (Bottom View)



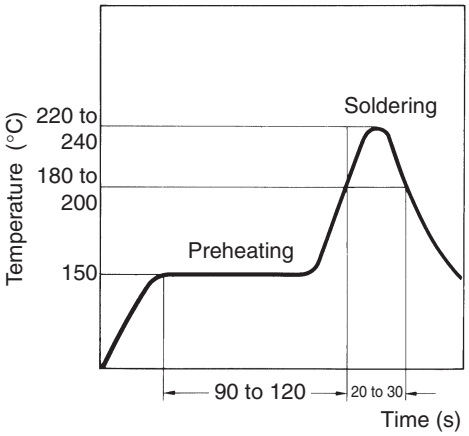
Footprint (Bottom View)

Tolerance: ±0.1

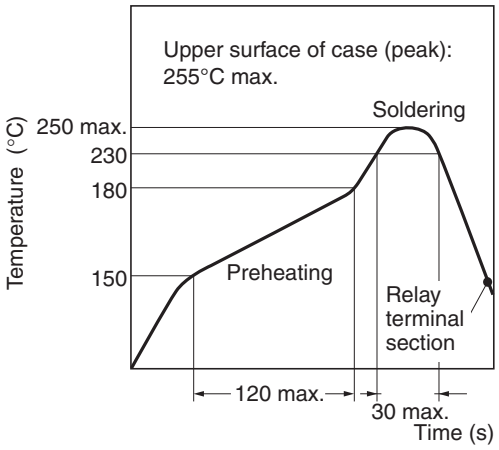


Recommended Soldering Method

(1) IRS Method (Mounting Solder: Lead)



(2) IRS Method (Mounting Solder: Lead-free)



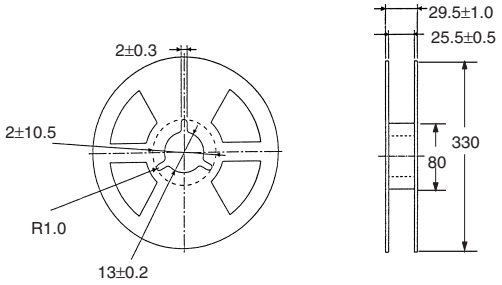
Note: The temperature profile indicates the temperature of the relay terminal section.

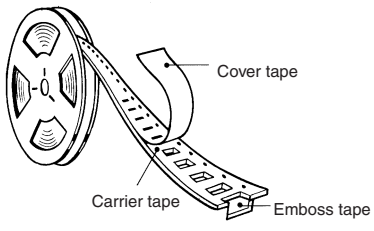
Packaging

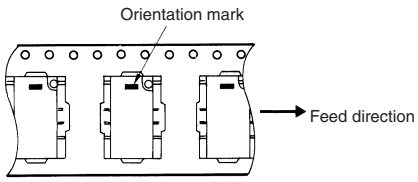
Tube packing	Standard nomenclature	50 pcs per anti-static tube
Tape packing (Surface mount versions)	When ordering, add "TR" before the rated coil voltage (e.g., G6S-2F-*TR*-DC12) Note: TR is not part of the relay model number and will not be marked on the relay.	

■ Tape and Reel Dimensions (Surface Mount Models)

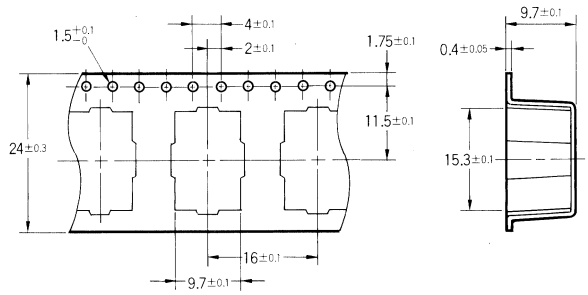
- Tape type: TE2416R (Refer to EIAJ - Electronic Industrial Association of Japan)
- Reel type: R24E (Refer to EIAJ - Electronic Industrial Association of Japan)
- Relays per reel: 400
- Reels per packing carton: 2 (800 relays)



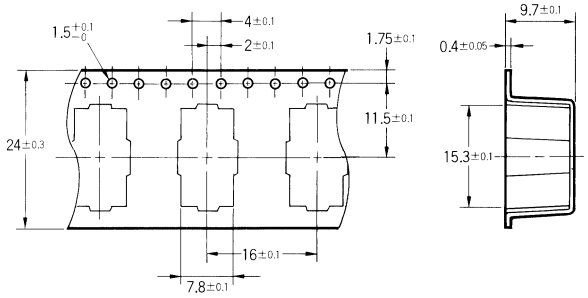




G6S-2F, G6SU-2F, G6SK-2F, G6S-2F-Y



G6S-2G, G6SU-2G, G6SK-2G, G6S-2G-Y



■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Type	Contact form	Coil rating	Contact ratings	Number of test operations
G6S-2, G6S-2F, G6S-2G	DPDT	2 to 48 VDC	3 A at 30 VDC (Resistive)	6,000
G6SU-2, G6SU-2F, G6SU-2G G6SK-2, G6SK-2F, G6SK-2G G6SK-2-Y, G6SK-2F-Y, G6SK-2G-Y		2 to 24 VDC	0.3 A at 110 VDC (Resistive) 0.5 A at 125 VAC (General Use)	

EN60950 / EN41003

Type	Contact form	Isolation Category	Voltage
G6S-2-Y, G6S-2F-Y, G6S-2G-Y	DPDT	Supplementary Isolation	250 VAC

Note: 1. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

Precautions

- Use a DC power supply with 5% or less ripple factor to operate the coil.
- Do not use the G6S where subject to strong external magnetic fields.
- Do not use the G6S where subject to magnetic particles or excessive amounts of dust.
- Do not reverse the polarity of the coil (+, –).
- Latching types are delivered in the reset position. We recommend that a reset voltage be applied in advance to start operation.
- Do not drop the G6S or otherwise subject it to excessive shock.
- Remove the relay from the packing immediately prior to usage.

■ Correct use

Long-term Continuously ON Contacts

Using the Relay in a circuit where the Relay will be ON continuously for long periods (without switching) can lead to unstable contacts because the heat generated by the coil itself will affect the insulation, causing a film to develop on the contact surfaces. We recommend using a latching relay (magnetic-holding relay) in this kind of circuit. If a single-side stable model must be used in this kind of circuit, we recommend using a fail-safe circuit design that provides protection against contact failure or coil burnout.

Relay Handling

Use the Relay as soon as possible after opening the moisture-proof package. If the Relay is left for a long time after opening the moisture-proof package, the appearance may suffer and seal failure may occur after the solder mounting process. To store the Relay after opening the moisture-proof package, place it into the original package and sealed the package with adhesive tape.

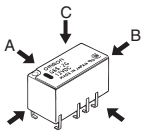
When washing the product after soldering the Relay to a PCB, use a water-based solvent or alcohol-based solvent, and keep the solvent temperature to less than 40°C. Do not put the Relay in a cold cleaning bath immediately after soldering.

G6S (K) (-U) -2 Soldering

- Soldering temperature: Approx. 250°C (At 260°C if the DWS method is used.)
- Soldering time: Approx. 5 s max. (Approx. 2 s for the first time and approx. 3 s for the second time if the DWS method is used.)
- Be sure to adjust the level of the molten solder so that the solder will not overflow onto the PCB.

Claw Securing Force During Automatic Mounting

During automatic insertion of Relays, be sure to set the securing force of each claw to the following so that the Relay's characteristics will be maintained.



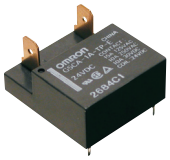
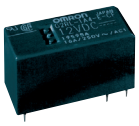
Dimension A: 1.96 N max.
Dimension B: 4.90 N max.
Dimension C: 1.96 N max.

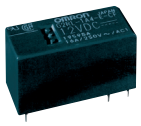
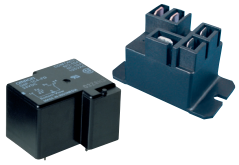
Power PCB Relay Selection Guide

	 Page 111	 Page 115	 Page 119	 Page 123
General Attributes	**G6M**	**G5NB (-E)**	**G5T**	**G5SB**
Dimensions mm(in)	17.7 H x 20.3 L x 5.08 W (0.70 x 0.80 x 0.20) max.	15.3 H x 20.5 L x 7.2 W (0.60 x 0.81 x 0.28) max.	15.3 H x 20.5 L x 7.2 W (0.60 x 0.81 x 0.28) max.	15.8 H x 20.3 L x 10.3 W (0.62 x 0.80 x 0.41) max.
Switching	5A	3A : G5NB 5A (AC Loads)/3A (DC Loads) : G5NB-E	5A	5A(NO)/3A(NC)
Features	• Very small PCB area of 104mm^2 ideal for high-density mounting • Very low 120mW nominal power • Satisfies IEC 61131-2 and 61010	• Compact 3A relay with PCB area of 148mm^2 • 5A switching capability AC loads, G5NB-E) • Meets EN tracking resistance CTI>250 • Sealed models available	• Compact 5A relay with PCB area of 148mm^2 • Meets EN tracking resistance CTI>250 • Semi-sealed construction	• High insulation between coil & contact • Impulse withstand of 8kV • Fully Sealed • Incorporates 5A NO contact
Contact Information				
Contact form	1 Form A	1 Form A	1 Form A	1 Form C
Contact type(s)	Single button	Single button	Single button	Single button
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	100,000 minimum: 3 A at 250 VAC/ 30 VDC	G5NB: 200,000: 3A @ 125VAC/30VDC G5NB-E: 200,000: 3A @ 30VDC 100,000: 5A @ 250VAC	30,000 minimum: 5 A at 250 VAC/ 30 VDC 100,000 minimum: 3 A at 250 VAC/ 30 VDC	200,000 3A (NO)/3A (NC) at 125VAC 50,000 5A (NO) at 250VAC 10,000 5A (NO)/3A (NC) at 30VDC
Max. switching capacity under resistive load	750VA, 90W	1,250VA, 90W	1,250VA, 150W	1,250VA, 150W(NO) 750 VA, 90 W (NC)
Min. permissible load (for reference only)	10mA @ 5VDC	10mA @ 5VDC	10mA @ 5VDC	10mA @ 5VDC
Coil Information				
Coil voltage	5, 12, 24VDC	5, 12, 18, 24VDC	5, 12, 24VDC	5, 9, 12, 24VDC
Power consumption	120mW	200mW	200mW	400mW
Insulation class	—	—	—	—
Characteristics				
Operating Temperature	-40 to +85°C	-40 to +70°C	-40 to +70°C	-40 to +70°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	5.08kV	10kV	—	8kV
Dielectric strength (50/60 Hz for 1 minute)	3,000VAC, (coil-contact) 750VAC, (open contacts)	4,000VAC (coil-contact) 750VAC (open contacts)	4,000VAC (coil-contact) 750VAC (open contacts)	4,000VAC (coil-contact) 1,000VAC (open contacts)
Terminal choices	PCB	PCB	PCB	PCB
Protection level	Fully Sealed	Sealed, semi-sealed	Semi-sealed	Sealed
Accessories	N/A	N/A	N/A	Back connecting socket
Approved standards	UL, CSA, VDE	UL, CSA, VDE	UL, CSA, VDE, CQC	UL, CSA, TUV

	 Page 127	 Page 131	 Page 137	 Page 141
General Attributes	**G6D-ASI**	**G6DS**	**G2RG**	**G6RN**
Dimensions mm(in)	12.5 H x 17.5 L x 6.5 W (0.49 x 0.69 x 0.26)	12.4 H x 20 L x 5.0 W (0.60 x 0.81 x 0.28)	25.5 H x 29 L x 13 W (1.00 x 1.14 x 0.51)	15 H x 28.5 L x 10 W (0.59 x 1.12 x 0.39)
Switching	5A	5A	8A	8A AC loads 5A DC loads
Features	• Subminiature, slim lightweight design • Low power consumption • Fully Sealed	• Slim 5mm for max. density mounting • High sensitive coil option reduces power consumption • Operating temperature -40C to + 85C • Fully sealed • Low profile of 12.5mm max	• 1.5mm contact gap between terminals of same polarity • Dimensions & mounting holes are same as G2R relay series • Sealed construction, standard • Meets EN tracking resistance CTI > 250	• 8 mm coil/contact creepage • Low profile • Sealed construction standard • Ideal for switching contactors, solenoids & motors
Contact Information				
Contact form	1 Form A	1 Form A	2 Form A	1 Form A, 1 Form C
Contact type(s)	Single button	Single button	Single button	Single button
Contact Material	Ag-Alloy	AgNi	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	300,000: 2A @ 30VDC/250VAC 70,000: 5A @ 30VDC/250VAC	100,000: 5A @ 30VDC/250VAC 80,000 (high sensitivity): 5A @ 30VDC/250VAC	10,000: 8A @ 250VAC	100,000: 8A @ 250VAC 5A @ 30VDC
Max. switching capacity under resistive load	1,250VA, 150W	1,250VA, 150W	2,000 VA	2,000VA,150W
Min. permissible load (for reference only)	10mA @ 5VDC	5mA @ 24VDC	10mA @ 5VDC	10mA @ 5 VDC
Coil Information				
Coil voltage	5, 12, 24, 48VDC	5, 12, 24VDC	12, 24VDC	5, 6, 12, 24, 48VDC
Power consumption	200mW	180mW 120mW (high-sensitivity)	800mW	220 mW, 250 mW (48 VDC)
Insulation class	—	—	—	—
Characteristics				
Operating Temperature	-25 to +70°C	-40 to +85°C	-40 to +70°C	-40 to +85°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	6kV	6kV	10kV	4.5kV
Dielectric strength (50/60 Hz for 1 minute)	3,000VAC (coil-contact) 750VAC (open contacts)	3,000VAC (coil-contact) 750VAC (open contacts)	5,000VAC, (coil-contact) 3,000VAC, (contacts pole-pole) 1,000VAC (open contacts)	4,000VAC (coil-contact) 1,000VAC (open contacts)
Terminal choices	PCB	PCB	PCB	PCB
Protection level	Sealed	Fully Sealed	Fully Sealed	Sealed
Accessories	Back connecting socket	Socket for back connecting, sockets with PCB terminals	N/A	N/A
Approved standards	UL, CSA, TUV	UL, CSA, VDE	UL, CSA, VDE (O700/0110)	UL, CSA, VDE

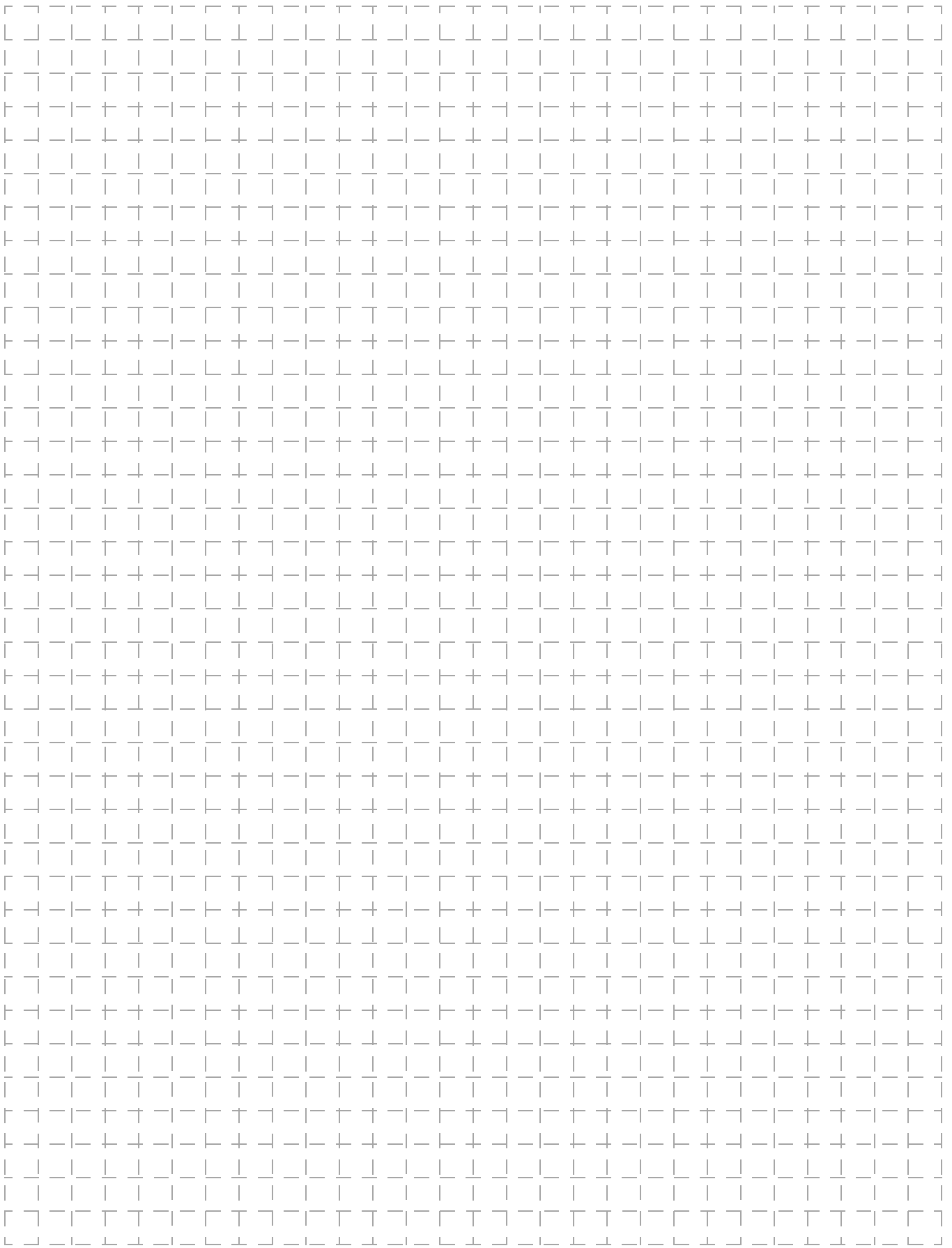
	 Page 145	 Page 149	 Page 157	 Page 167	 Page 173
General Attributes	**G5Q**	**G6B**	**G6C**	**G5LA**	**G5LE (-E)**
Dimensions mm(in)	15.8 H x 20.3 L x 10.3 W (0.62 x 0.80 x 0.41) max.	9.91 H x 20.07 L x 9.91 W (0.39 x 0.79 x 0.39)	9.91 H x 20.07 L x 14.99 W (0.39 x 0.79 x 0.59)	15.6 H x 19.6 L x 15.6 W (0.61 x 0.77 x 0.61)	19 H x 22.5 L x 16.5 W (0.75 x 0.89 x 0.65)
Switching	10 A (SPST-NO)	8A/5A	1 Form A: 10A 1 Form A + 1 Form B: 8A	10 A (SPST-NO)	10A (16A for Semi-sealed "E" type)
Features	• Compact relay with Class F coil insulation • 8kV Surge Withstand Voltage • UL 1/4HP Rating @ 250VAC (NO), 30,000 cycles • Low nominal power • CTI > 250 models available	• Low profile 12.5mm or less • Small PCB area of 200mm^2 • LED + Diode suppression models available • Single and dual coil latching types available	• Low power consumption for high power switching • Low profile 10A power relay • Single & dual coil latching types available • Sealed construction available • Back connecting sockets available	• Economical Sugar Cube Relay • Ideal applications: Appliance, HVAC • UL Rating 15A @ 125VAC, general use, 50,000 cycles • UL Rating of 10 A @ 277 VAC, general use, 100,000 cycles (NC) high capacity "E" type. • Class F models available	• Sugar Cube Relay • High capacity "-E" handles resistive loads up to 16A (NO) and 12A (NC) • Large contact gap "-G" available • Standard models: Class B coil insulation. Class F models available
Contact Information **Contact form**	1 Form A, 1 Form C	1 Form A, 2 Form A, 2 Form B 1 Form A + 1 Form B	1 Form A + 1 Form B, 1 Form A	1 Form A, 1 Form C	1 Form A, 1 Form C
Contact type(s)	Single Button	Single button	Single button	Single Button	Single button
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	200,000: 3A (NO)/3 A (NC) @ 125VAC 100,000: 3A (NO)/3 A (NC) @ 250VAC 5A (NO)/3 A (NC) @ 30VDC 50,000: 10A (NO) @125VAC (900 ops. per hour)	100,000: 5A @ 30 VDC/250VAC 8A @ 30 VDC/250VAC (high-capacity)	100,000: 10A @ 30VDC/250VAC (1 Form A models) For 1 Form A + 1 Form B models, see datasheet	100,000: 10A @ 250VAC/24VDC (NO) 5A @ 125VAC/24VDC (NC) 5A @ 250VAC/24VDC "E" (NC)	G5LE: 100,000 at rated load UL Rating 13A, 120VAC, resistive, 100,000 cycles, @ 85C G5LE-E: 50,000 (NO) at rated load 30,000 (NC) at rated load (600 operations/hour) UL Rating 12A @ 250VAC (NO), general use, 100,000 cycles, @105C
Max. switching capacity under resistive load	1,250VA,150W (NO) 375 VA, 90W (NC)	1,250VA, 150W 2,000VA, 240W (high-capacity type)	2,500VA, 300W 2,000VA, 240W(latching)	2,500 VA, 240 W (NO) 625 VA, 120 W (NC) standard 1,250 VA, 120 W (NC) high capacity	G5LE: 1200VA, 240W G5LE-E: 4000VA (NO) G5LE-G: 350W
Min. permissible load (for reference only)	10mA @ 5VDC	10mA @ 5VDC	10mA @ 5VDC	100 mA, 5 VDC	100 mA, 5 VDC
Coil Information **Coil voltage**	5, 12, 24VDC	5, 6, 12, 24VDC	3, 5, 6, 12, 24VDC	5, 9, 12, 24, 48 VDC	5, 6, 9, 12, 24, 48VDC
Power consumption	400mW Form C 200mW Form A	Standard non latching types 200mW (1 pole) 300mW (2 pole)	200mW (monostable & single coil latching) 280mW (dual coil latching)	Approx. 360 mW (480 mW 48 VDC)	G5LE/G5LE-E: 400mW (360mW models available) G5LE-G: 700mW
Insulation class	Class F	—	—	Class F models available	G5LE: Class B, G5LE-E/G: Class F
Characteristics **Operating Temperature**	-40 to +105°C	-25 to +70°C	-25°C to +70°C	-40 to +85°C	-40 to +85°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	8kV	—	4.5kV	4.5kV	4.5kV
Dielectric strength (50/60 Hz for 1 minute)	4,000VAC (coil-contact) 1,000VAC (open contacts)	see data sheet for full details	Non latching types: 2,000VAC (coil-contact) 1,000VAC (contacts same polarity)	2,000 VAC (coil and contacts) 750 VAC (contacts of same polarity)	2,000VAC (coil-contact) 750VAC (open contacts)
Terminal choices	PCB	PCB	PCB, self clinching	PCB	PCB
Protection level	Standard: Semi-sealed/vented Option: sealed	Sealed	Semi-sealed Fully sealed option	Sealed, semi-sealed	G5LE: sealed, flux tight G5LE-E/G: flux tight
Accessories	N/A	Back connecting PCB Sockets	Back connecting PCB sockets, socket clips	—	N/A
Approved standards	UL, CSA, VDE	UL, CSA	UL, CSA, VDE	UL, CSA, VDE, CQC	UL, CSA, VDE

	 Page 179	 Page 185	 Page 191	 Page 203
General Attributes	**G6RL**	**G5CA**	**G2R**	**G2RL**
Dimensions mm(in)	12.3 (H) x 28.5 (L) x 10.0 (W) (0.48 x 1.12 x 0.39) max.	11 H x 16 L x 22 W (10A) (0.43 x 0.63 x 0.87) 11 H x 22 L x 25 W (15A)	25.5 H x 29 L x 13 W (1 x 1.14 x 0.51) max.	15.5 H x 28.8 L x 12.5 W (0.61 x 1.13 x 0.49)
Switching	10 A (NO)/ 8 A (NC) AC loads 5 A DC loads	10A (15A high capacity)	3A/5A/10A/16A options	8A/10A/12A/16A options
Features	• 10mm creepage/clearance distance • Low profile: 12.3mm in height • 5 kV Dielectric Strength • Sealed and flux tight models • Maximum voltage of 400VAC or 300VDC	• Low profile of 11mm • High capacity "-E" models have 15A resistive load rating • High sensitivity "-H" models have 150mW Nominal Power • PCB or PCB + Q.C. terminal options • Sealed models available for PCB only (excluding high capacity)	• 8mm creepage/clearance • Latching models available • 10kV Surge Withstand • "H" 360mW models 1 or 2 pole plus flux tight or sealed • "T" quick connect models ideal for thin space panel mounting • Class B models available	• Low profile 15.7mm • Class F coil insulation • 10kV Surge Withstand • SPDT "H" 250mW models available • CTI > 250
Contact Information **Contact form**	1 Form A, 1 Form C	1 Form A	1 Form A, 1 Form C, 2 Form A, 2 Form C	1 Form A, 1 Form C, 2 Form A, 2 Form C
Contact type(s)	Single Button	Single button	Single button Bifurcated button	Single button
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	See datasheet for details	100,000 (1,200 ops/hour): 10A @ 30VDC 15A @ 110VAC (high capacity) 10A @ 250VAC (fully sealed, std) 300,000: 10A @ 250VAC (semi-sealed)	100,000: (high-capacity type) 16A @ 30VDC/250VAC Consult catalog for other ratings	100,000 (360 ops/hour): High capacity 16A 250VAC 1 Pole: 12A 250VAC 2 Pole: 8A 250VAC
Max. switching capacity under resistive load	2,500VA (NO) / 2,000VA (NC) 150 W	2,500VA, 300W	4,000VA, 480W(high-capacity 1 pole) Consult catalog for other ratings	4,000VA, 384W(high-capacity 1 pole) Consult catalog for other ratings
Min. permissible load (for reference only)	10 mA @ 5 VDC	100mA @ 5VDC	1 pole: 100mA @ 5VDC; 2 pole: 10mA @ 5VDC	40mA @ 24VDC
Coil Information **Coil voltage**	3, 5, 6, 12, 24, 48 VDC	5, 12, 24VDC	AC coil: 6, 12, 24, 120, 240 VAC DC coil: 3, 5, 6, 12, 24, 48 VDC See datasheet for more details	5, 12, 24, 48VDC "H" Type: 5, 9, 12, 24 VDC
Power consumption	Standard, ASI, PL Models: Approx. 220 mW Shock Resistant Models "SR": Approx. 300mW	200mW (standard & high capacity) 150mW (high sensitivity)	0.9VA, 530mW (standard) 360mW (high sensitivity) 850mW (latching set), 600mW (latching reset)	400mW (430mW for 48VDC) "H" Type: 250mW
Insulation class	Class B	—	Class B available	Class F
Characteristics **Operating Temperature**	-40 to +85°C	-25 to +70°C	-40 to +70°C (+85°C option)	-40 to +85°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	10kV	4.5kV	10kV	10kV
Dielectric strength (50/60 Hz for 1 minute)	5,000 VAC (coil and contacts) 1,000 VAC (contacts of same polarity)	2,500VAC (coil-contact) 1,000VAC (open contacts)	5,000VAC (coil-contact) 1,000 VAC (open contacts)	5,000VAC (coil-contact) 1,000 VAC (open contacts)
Terminal choices	PCB	PCB, Optional: PCB+quick-connect contact terminals	PCB, Quick connect (flange mount)	PCB
Protection level	Sealed, semi-sealed	Semi-sealed Sealed option	Sealed, semi-sealed	Sealed Semi-sealed (-H versions)
Accessories	N/A	N/A	N/A	N/A
Approved standards	UL, CSA, VDE	UL, CSA, TUV	UL, CSA, SEV SEMKO, VDE, TUV	UL, CSA, VDE

	 Page 209	 Page 213	 Page 221	 Page 225
General Attributes	**G2RL-TP**	**G5RL**	**G4A**	**G8PT**
Dimensions mm(in)	15.9 H x 40.4 L x 12.6 W (0.63 x 1.59 x 0.50)	15.5 H x 28.8 L x 12.5 W (0.61 x 1.13 x 0.49)	26.8 H* x 30.5 L x 16 W (1.05 x 1.20 x 0.63)	Multiple, refer to catalog. Basic: 20.1(H)x 32.1(L) x 27.7(W)
Switching	16A max.	see datasheet	20A max.	1 Form A: 30A 1 Form C: 20A (NO)/10A (NC)
Features	• Electrical life of 50,000 operations at 16A 250VAC @ 105°C • Simplifies PCB design by allowing removal of high power PCB tracings. • Maximum load voltage 440VAC • Operating Temperature -40°C to 105°C	• Low profile of 15.7mm • AC coil models "-E" • High inrush models "-HR" handling up to 100A peak inrush current • Low noise models "-LN" for sound sensitive environments	• Ideal for motor switching • Miniature relay with high switching power • Long endurance (-E) version available • PCB or PCB+Q.C. terminals	• 30A switching capacity for 1 Form A models (AC loads) • Class F coil insulation • Operating temperature:-55C to 105C • UL Rating 1 Form A models 15FLA/75LRA, 120VAC, 85C, 130,000 cycles • PCB, PCB + Q.C., and Q.C. terminal options
Contact Information				
Contact form	1 Form A	1 Form C ("HR" and AC coil type) 1 Form A ("HR" and "LN" type)	1 Form A	1 Form A, 1 Form C
Contact type(s)	Single button	Single button	Single button	Single button
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	50,000 16A @ 250VAC (900 ops/hour)	AC coil and "HR" models: 50,000 - 16A 250VAC/24VDC (NO) 50,000 - 5A 250VAC/24VDC (NC) "LN" models: standard/high capacity: 100,000 - 12A 250VAC (standard) 50,000 - 16A 250VAC (high capacity)	100,000: 20A @ 250VAC Consult datasheet for additional ratings.	100,000 (1 Form A): 30A @ 250VAC, 20A @ 28VDC 100,000 (1 Form C): 20A @ 250VAC, 20A @ 28VDC NO) 10A @ 250VAC, 10A @ 28VDC (NC) (360 ops/hour apply to all ratings)
Max. switching capacity under resistive load	4,000VA	4,000VA, 384W (NO) 1,250VA, 120W (NC)	5,000VA	1 Form A: 7,500VA, 560W 1 Form C: 5000/2500VA, 560W/280W*
Min. permissible load (for reference only)	—	AC coil: 40mA @ 24VDC "HR" and "LN": 100mA @ 5VDC	100mA @ 5VDC	500mA @ 5VDC
Coil Information				
Coil voltage	12, 24VDC Consult Omron for additional coil voltages	AC coil: 24, 115/120, 230/240 VAC "HR" type: 5, 12, 24, 48 VDC "LN" type: 5, 12, 24 VDC	5, 12, 24VDC	5, 9, 12, 24, 48, 110VDC Other coil voltages available
Power consumption	400mW	AC coil: 0.75VA "HR" type: 400mW "LN" type: 530mW	Approx. 900mW	900mW
Insulation class	Class F	—	—	Class F
Characteristics				
Operating Temperature	-40 to +105°C	-40 to +70°C (AC coil) -40 to +85°C (DC coil)	-20 to +60°C	-55 to +105°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	10kV	10kV	—	6kV
Dielectric strength (50/60 Hz for 1 minute)	5,000 VAC, (coil-contact) 1,000 VAC, (open contacts)	6,000 VAC (coil-contact) 1,000 VAC (open contacts)	4,500 VAC, (coil-contact) 1,000 VAC, (open contacts)	2,500 VAC, (coil-contact) 1,500 VAC, (open contacts)
Terminal choices	PCB (coil terminals) Quick-connect (contact terminals)	PCB	PCB, PCB+quick-connect contact terminals	PCB, PCB+quick-connect contact terminals Flange mount all quick connect
Protection level	Semi-sealed	Semi-sealed	Semi-sealed	Open frame, Vented/semi-sealed, Fully sealed
Accessories	N/A	N/A	N/A	N/A
Approved standards	UL, CSA, VDE	UL, CSA, VDE	UL, CSA, VDE	UL, CSA

*Q.C. version = 33.5 H (1.32) *N.O. Contact / N.C. Contact

MEMO



PCB Power Relay
G6M

Slim, Miniature Relay, Capable of Relaying Programmable Controller and Temperature Controller Outputs

- Slim 5-mm width, and miniature size.
- Reduced mounting area ideal for high-density mounting.
- Highly efficient magnetic circuit for high sensitivity (40% higher than the G6D, with power consumption of 120 mW).
- Satisfies EN61131-2 and EN61010 requirements.
- SIL (single-in-line) terminal pitch.
- UL recognized / CSA certified. VDE approval pending.
- RoHS Compliant.





Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Fully sealed	**G6M-1A**

Note: When ordering, add the rated coil voltage to the model number.

Example: G6M-1A DC12
Rated coil voltage

Model Number Legend

G6M -□ □- DC □
1 2 3

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	24 mA	10 mA	5 mA
Coil resistance	208 Ω	1,200 Ω	4,800 Ω
Must operate voltage	75% max. of rated voltage		
Must release voltage	5% min. of rated voltage		
Max. voltage	160% of rated voltage (at 23°C)		
Power consumption	Approx. 120 mW		

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.
3. The maximum allowable voltage is the maximum possible value of the voltage that can be applied to the relay coil. It is not the maximum voltage that can be applied continuously.
4. The must operate voltage is 72% or less of the rated voltage if the relay is mounted vertically and the terminals are pointed downwards.

■ Contact Ratings

Rated load	3 A at 250 VAC, 3 A at 30 VDC
Rated carry current	5 A
Max. switching voltage	270 VAC, 125 VDC
Max. switching current	5 A
Max. switching power	750 VAC, 90 W
Min. permissible load	10 mA at 5 VDC (at 120 operations/min)

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	3,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	5,080 V (1.2 x 50 μs) between coil and contacts
Vibration resistance	Destruction: 10 to 55 Hz, 2.5-mm single amplitude (5.0-mm double amplitude) Malfunction: 10 to 55 hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (3A at 250 VAC/30 VDC, resistive load at 1,800 operations/hr.)
Ambient temperature	Operating: -40°C to 85°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight approx.	4 g

■ Approved Standards

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

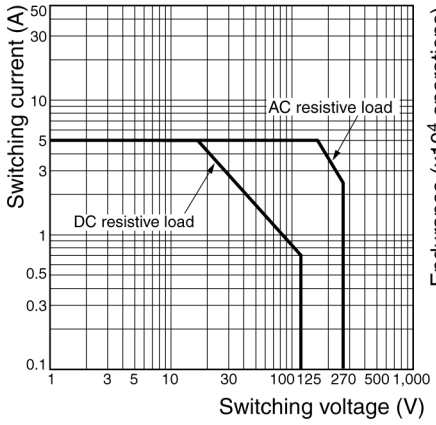
Model	Coil ratings	Contact ratings
G6M-1A	4.5 to 24 VDC	5A, 250 VAC (resistive load, 6,000 operations) 5 A, 24 VDC (resistive load, 6,000 operations) 3 A, 250 VAC (general use, 10,000 operations) 3 A, 24 VDC (general use, 10,000 operations)

VDE (Reg. No. 40003427) EN61810-1

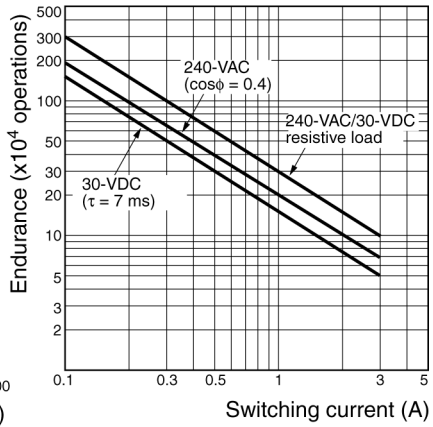
Model	Coil ratings	Contact ratings
G6M-1A	4.5, 5, 12, 24 VDC	3 A, 250 VAC (cosϕ=1, 50,000) 3 A, 30 VDC (0 ms, 50,000)

Engineering Data

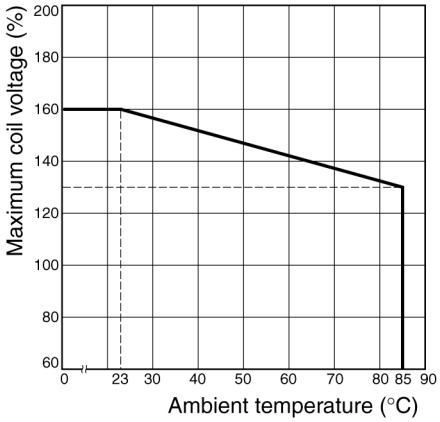
Maximum Switching Power



Endurance



Ambient Temperature vs. Maximum Coil Voltage

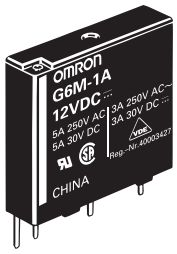


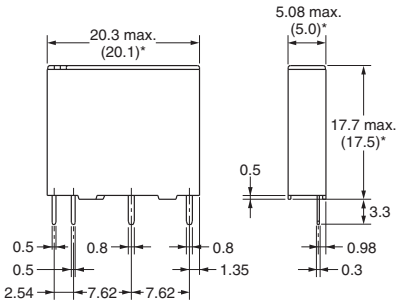
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Units: mm.

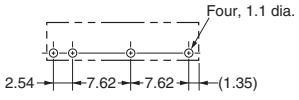
G6M-1A





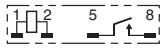
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

Tolerance: ±0.1



Precautions

■ Basic Information

Before actually committing any component to a mass-production situation, OMRON strongly recommends situational testing, in as close-to-actual-production situations as possible. One reason is to confirm that the product will still perform as expected after surviving the many handling and mounting processes involved in mass production. Also, even though OMRON relays are individually tested a number of times, and each meets strict requirements, a certain testing tolerance is permissible. When a high-precision product uses many components, each depends upon the rated performance thresholds of the other components. Thus, the overall performance tolerance may accumulate into undesirable levels.

To avoid problems, always conduct tests under the actual application conditions.

General

To maintain the initial characteristics of a relay, exercise care that it is not dropped or mishandled. For the same reason, do not remove the case of the relay; otherwise, the characteristics may degrade. Avoid using the relay in an atmosphere containing sulfuric acid (SO_2), hydrogen sulfide (H_2S), or other corrosive gases.

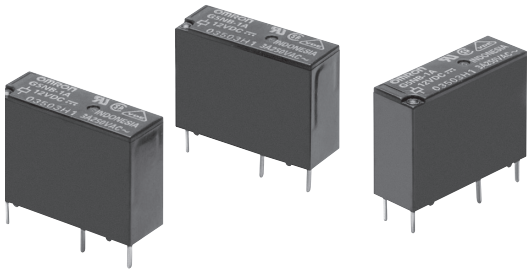
Do not continuously apply a voltage higher than the rated maximum voltage to the relay. Never try to operate the relay at a voltage and a current other than those rated.

Do not use the relay at temperatures higher than that specified in the catalog or data sheet

.

PCB Relay
G5NB

A Slim Compact Relay with 3 A Switching Capability and 10-kV Impulse Withstand Voltage



- Max size 20.5L x 7.2 W x 15.3 W mm.
- Standard models switch up to 3 A
  High-capacity models switch up to 5 A (AC loads only).
- Low power consumption (200 mW).
- Semi-sealed and sealed types available.
- UL recognized / CSA certified. VDE Approved.
- RoHS Compliant.

Ordering Information

Contact Form SPST-NO		
Classification	Enclosure ratings	
	Flux-tight model	Sealed model
Standard	**G5NB-1A**	**G5NB-1A4**
High Capacity	**G5NB-1A-E**	**G5NB-1A4-E**

Note: When ordering, add the rated coil voltage to the model number.
Example: G5NB-1A DC12
Rated coil voltage

Example2: G5NB-1A4-E DC5
Rated coil voltage

■ Model Number Legend

G5NB- □ □ □ **-** □ **DC** □
1 2 3 4 5

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Enclosure Ratings**
   None: Flux protection
   4: Sealed
4. **Type**
   None: Standard
   E: High Capacity
5. **Rated Coil Voltage**
   5, 12, 18, 24 VDC

Application Examples

Water heaters, refrigerators, air conditioners, and small electric appliances

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	18 VDC	24 VDC
Rated current	40.0 mA	16.7 mA	11.1 mA	8.3 mA
Coil resistance	125 Ω	720 Ω	1,620 Ω	2,880 Ω
Must operate voltage	75% of rated voltage (max.)			
Must release voltage	10% of rated voltage (min.)			
Max. voltage	Standard: 180% of rated voltage (at 23°C) High-capacity: 170% of rated voltage (at 23°C)			
Power consumption	Approx. 200 mW			

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The "Max. voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Load	Standard	High-capacity
Rated load (resistive, p.f.= 1)	3 A at 125 VAC 3 A at 30 VDC	5 A at 250 VAC 3 A at 30 VDC
Max. switching voltage	250 VAC, 30 VDC	250 VAC, 30 VDC
Rated carry current **Max. switching current**	3 A 3 A	5A 5A (AC load,) 3A (DC load)
Max. switching power	375 VA, 90 W	1,250 VA, 90 W

■ Characteristics

Contact resistance (see note 2)	100 mΩ max.	
Operate time	10 ms max.	
Release time	10 ms max.	
Insulation resistance (see note 3)	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min. between coil and contacts 750 VAC, 50/60 Hz for 1 min. between contacts of same polarity	
Impulse withstand voltage	10,000 V (1.2 x 50 μs) between coil and contacts	
Vibration resistance	Destruction: Malfunction:	10 to 55 Hz, 1.5-mm double amplitude 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: Malfunction:	1,000 m/s^2 (approx. 100 G) 100 m/s^2 (approx. 10 G)
Life expectancy	Mechanical:	5,000,000 operations min. (18,000 operations/hour)
	Electrical:	200,000 operations minimum: High-capacity: 5 A at 125 VAC, 3 A at 30 VDC Standard: 3 A at 125 VAC, 3 A at 30 VDC 100,000 operations minimum: High-capacity: 5 A at 250 VAC All electrical load ratings are resistive, with operation frequency = 1,800 operations/hour.
Minimum permissible load (reference value) (see note 4)	5 VDC, 10 mA	
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 4 g	

Note: 1. The data shown above are initial value.

2. Measurement conditions: 5 VDC, 1 A, voltage drop method

3. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

4. This value is for a switching frequency of 120 operations/minute. (P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations)

■ Approved Standards

UL Recognized (File No. E41515)

Coil ratings	Contact ratings
5 to 24 VDC	3 A at 30 VDC (Resistive), 70°C 3 A at 125 VAC (Resistive), 70°C

CSA Certified (File No. LR31928)

Coil ratings	Contact ratings
5 to 24 VDC	3 A at 30 VDC (Resistive) 3 A at 125 VAC (Resistive)

■ Actual Load Life (Reference Values)

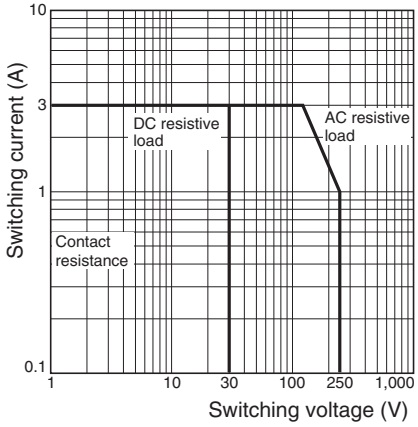
1. 120-VAC motor and lamp load (2.5-A surge and 0.5-A normal): 250,000 operations min. (at 23°C)

2. 160-VDC valve load (with varistor) (0.24-A): 250,000 operations min. (at 23°C)

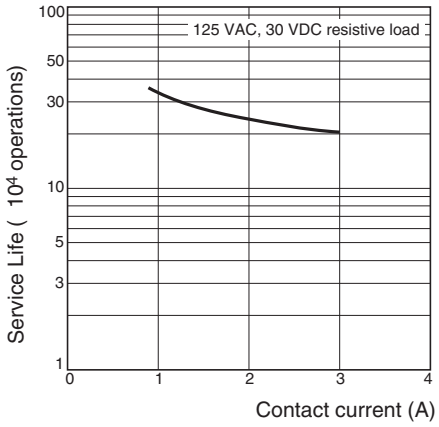
Engineering Data

Standard models

Maximum Switching Capacity

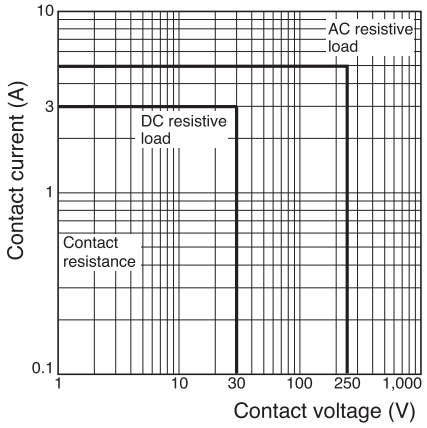


Electrical Service Life

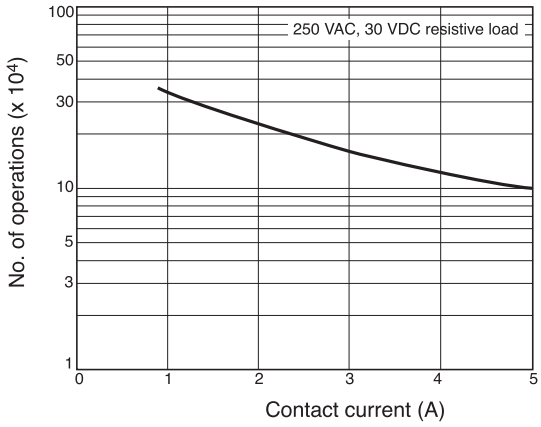


High-capacity models

Maximum Switching Capacity

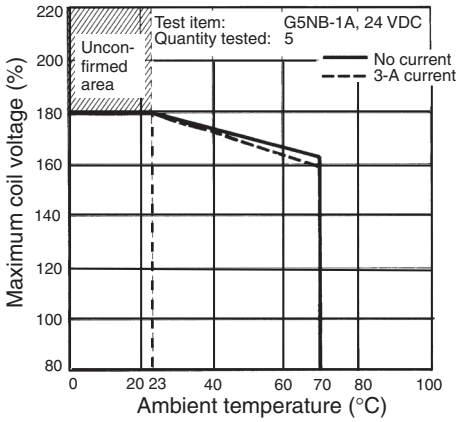


Electrical Service Life



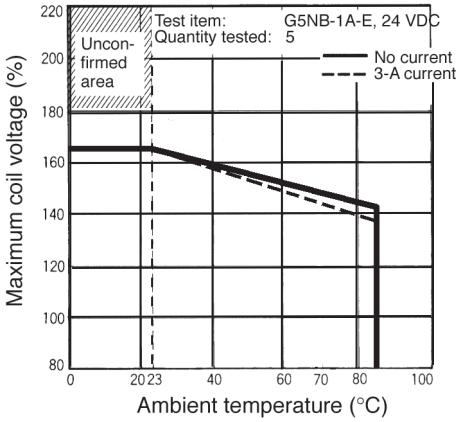
Standard models

Ambient Temperature vs. Maximum Coil Voltage



High-capacity models

Ambient Temperature vs. Maximum Coil Voltage

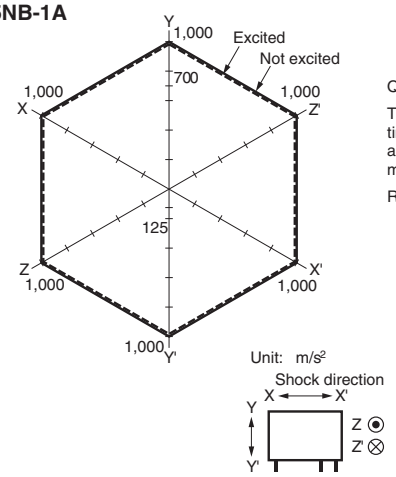


Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

All models

Malfunctioning Shock

G5NB-1A



Quantity Tested: 5 units

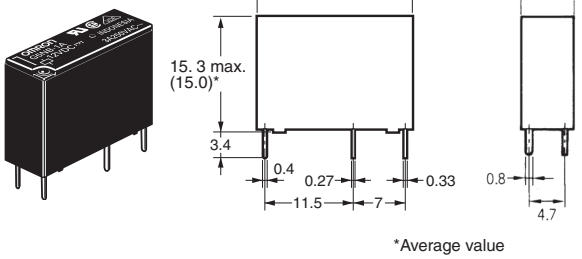
Test Method: Shock was applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction was measured.

Rating: 100 m/s²

Dimensions

Note: All units are in millimeters unless otherwise indicated.

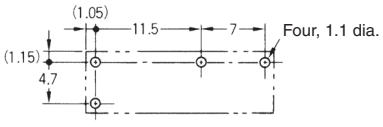
G5NB-1A(4)(-E)



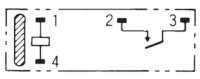
*Average value

PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)



(No coil polarity)

Precautions

■ Correct Use

Handling

Note: 1. The enclosure rating for G5NB-1A and G5NB-1A-E is suitable for flux protection. Do not use immersion-cleaning for these model

2. Do not ultrasonic clean any G5NB relay.

PCB Relay
G5T

Slim Relay capable of switching up to 5 A, Ideal for use In Air Conditioners, Water Heaters, and Small Electrical Appliances

- Economical slim relay ideal for high density mounting
- Low power consumption (200mW)
- 10-kV impulse withstand voltage (between coil and contacts)
- UL recognized / CSA certified. VDE Approved.
- Tracking Resistance: CTI ≥ 250 V
- RoHS compliant



Ordering Information

■ List of Models

Models	Enclosure rating	Contact form
G5T-1A	Flux protection	SPST-NO

Note: When ordering, add the rated coil voltage to the model number.

Example: G5T-1A DC 24
Rated coil voltage

Model Number Legend

G5T-□□DC□
1 2 3

1. **Number of Poles**
   1: 1pole
2. **2. Contact Form**
   A: SPST-NO
3. **3. Rated Coil Voltage**
   5, 12, 24

Specifications @ 23°C (coil resistance ± 10%)

■ Coil Ratings

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
5	40	125	75% max.	5% min.	110%	Approx. 200
12	16.7	720				
24	8.3	2880				

■ Contact Ratings

Rated load (resistive)	5 A at 250 VAC 5 A at 30 VDC
Rated carry current	5 A
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. switching capacity	1250 VA, 150 W
Minimum Permissible Load*	10 mA at 5 VDC

*P level: λ_{60} = 0.1 X 10^{-6}/operation

■ Characteristics

Contact resistance		100 mΩ max. (measured by voltage drop method using 1 A @ 5 VDC)
Operate time		10 ms max.
Release time		10 ms max.
Insulation resistance		1,000 MΩ min. (at 500 VDC)
Dielectric strength		4,000 VAC, 50/60 Hz for 1 min. between coil and contacts 750 VAC, 50/60 Hz for 1 min. between contacts of same polarity
Vibration resistance	**Destruction**	10 to 55 Hz, 1.5 mm double amplitude
	Malfunction	10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	**Destruction**	1,000 m/s^2 (approx.100 G)
	Malfunction	100 m/s^2 (approx. 10 G)
Service Life	**Mechanical**	2,000,000 operations min. (at 18,000 operations/hr)
	Electrical (resistive load)	100,000 operations min. (3 A at 250 VAC, 30 VDC) 30,000 operations min. (5 A at 250 VAC, 30 VDC) (at 1,800 operations/hr)
Ambient operating temperature		-40°C to 70°C (with no icing or condensation)
Ambient operating humidity		5% to 85%
Weight		Approx. 3 g

Note: 1. Data shown above are of initial value.

2. Please avoid ultrasonic cleaning this relay.

■ Approvals

UL Recognized (File No. E41515) / CSA Certified (File No. 1527954) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5T-1A	5, 12, 24 VDC	5 A, 250 VAC (resistive), 6,000 cycles 5 A, 30 VDC (resistive), 6,000 cycles

VDE0435 (EN61810-1)

Model	Coil rating	Contact rating
G5T-1A	5,12, 24 VDC	5 A, 250 VAC (cosϕ = 1) 10,000 cycles 5 A, 30 VDC (L/R = 0 ms) 10,000 cycles 3 A, 250 VAC (cosϕ = 1) 100,000 cycles

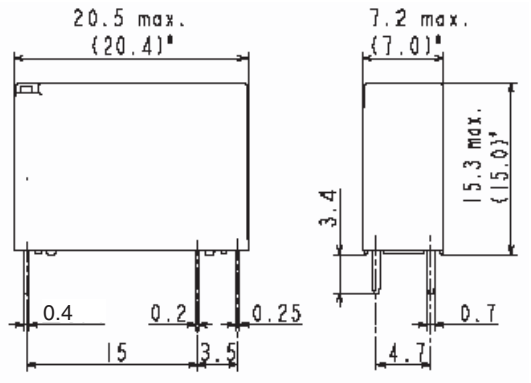
CQC (license No. 04001010419)

Model	Coil rating	Contact rating
G5T-1A	5,12, 24 VDC	5 A, 250 VAC resistive,10,000 cycles 5 A, 30 VAC resistive,10,000 cycles

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G5T-1A

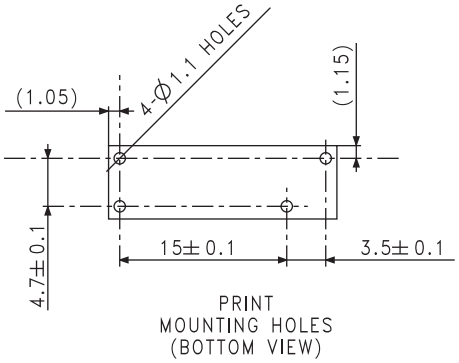


*Typical value

Terminal Arrangement/Internal Connections (Bottom View)



Mounting Holes (Bottom View)
Tolerance: ±0.1mm
Unless specified

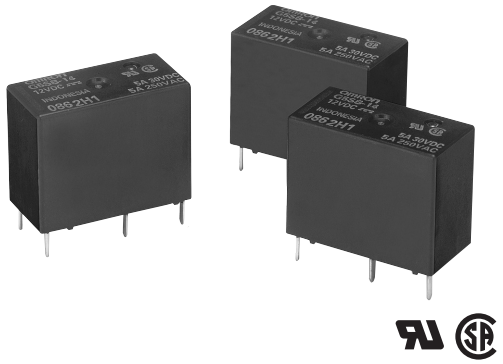


MEMO

PCB Relay
G5SB

Compact Single-pole Relay for Switching Up to 5 A (Normally Open Contact), Ideal for Fan Control of Air Conditioners, and Heating Control of Small Appliances.

- Environment-friendly, Pb-free/Cd-free.
- Compact SPDT Relay with high insulation between coil and contacts.
- Ensures an impulse withstand voltage of 8,000 V between the coil and contacts.
- UL recognized / CSA certified. (VDE approval pending).
- RoHS Compliant.



Ordering Information

Classification	Contact form	Protective structure	Model
Standard	SPDT	Fully sealed	**G5SB-14**

Note: When ordering, add the rated coil voltage to the model number.

Example: G5SB-14 DC12
Rated coil voltage

■ Model Number Legend

G5SB-□□-DC□
1 2 3

1. **Number of Poles**
   1: SPDT
2. **Protective Structure**
   4: Fully sealed
3. **Rated Coil Voltage**
   5, 9, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC
Rated current	80 mA	44.4 mA	33.3 mA	16.7 mA
Coil resistance	63 Ω	202 Ω	360 Ω	1,440 Ω
Must operate voltage	75% max. of rated voltage			
Must release voltage	5% min. of rated voltage			
Maximum voltage	110% of rated voltage			
Power consumption	Approx. 400 mW			

■ Contact Ratings

Load	Resistive load
Rated load	3 A (NO)/3 A (NC) at 125 VAC 5 A (NO)/3 A (NC) at 125 VAC 5 A (NO) at 250 VAC 3 A (NC) at 250 VAC 5 A (NO)/3 A (NC) at 30 VDC
Contact material	Ag alloy
Rated carry current	5 A (NO)/3 A (NC)
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A (NO)/3 A (NC)
Max. switching capacity	1,250 VA, 150 W (NO) 750 VA, 30 W (NC)
Min. permissible load	10 mA at 5 VDC

Note: P level: λ_{60}=0.1 x 10^{-6} operation (with an operating frequency of 120 operations/min.)

■ Characteristics

Contact resistance (See note 2.)	100 mΩ max. initial
Operate time (See note 3.)	10 ms max.
Release time (See note 3.)	5 ms max.
Insulation resistance (See note 4.)	1,000 MΩ min.
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	8 kV (1.2 x 50 μs)
Vibration resistance	Destruction:10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction:10 to 55 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction:1,000 m/s^2 (approx. 100G) Malfunction:Energized: 100 m/s^2 (approximately 10G) Non-energized: 100 m/s^2 (approximately 10G)
Life expectancy (See note 5.)	Mechanical: 5,000,000 operations (18,000 operations per hour) Electrical: 200,000 operations: 3 A (NO)/3 A (NC) at 125 VAC resistive load 50,000 operations: 5 A (NO)/3 A (NC) at 125 VAC resistive load 50,000 operations: 5 A (NO) at 250 VAC resistive load 10,000 operations: 3 A (NC) at 250 VAC resistive load 10,000 operations: 5 A (NO)/3 A (NC) at 30 VDC resistive load Switching frequency: 1,800 operations per hour
Ambient temperature	Operating: –40°C to 70°C with no icing or condensation
Ambient humidity	Operating: 5% to 95%
Weight	Approx. 6.5 g

Note: 1. The data shown above are initial values.

2. The contact resistance is possible with 1 A applied at 5 VDC using a fall-of-potential method.

3. The operating time is possible with the operating voltage imposed with no contact bounce at an ambient temperature of 23°C.

4. The insulation resistance is possible between coil and contacts and between contacts of the same polarity at 500 VDC.

5. The electrical life data items shown are possible at 23°C.

■ Approved Standards

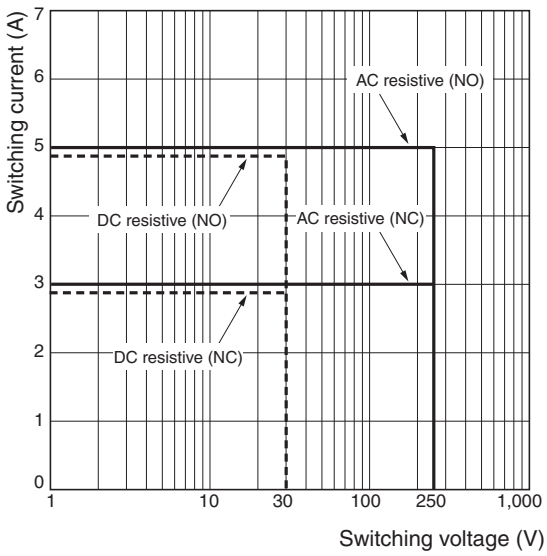
UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp = 40°C

Model	Coil ratings	Contact ratings	Number of test operations
G5SB	5 to 24 VDC	3 A, 125 VAC (resistive) NC only 2 A, 125 VAC (resistive) NC only 5 A, 250 VAC (resistive) NO only 3 A, 250 VAC (resistive) NO only 5 A, 30 VDC (resistive) NO only	6,000

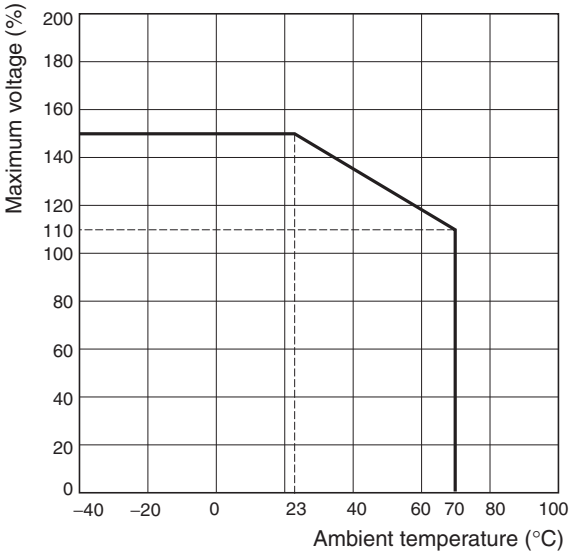
Note: Electrical durability tests are performed at 70°C.

Engineering Data

Max. Switching Capacity

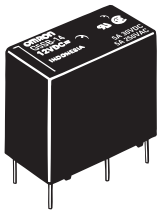


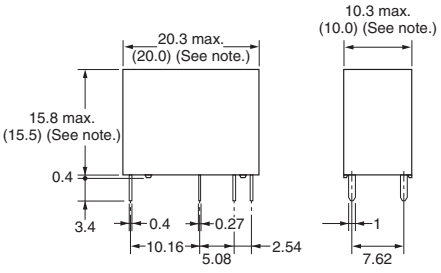
Ambient Temperature vs. Maximum Voltage



Dimensions

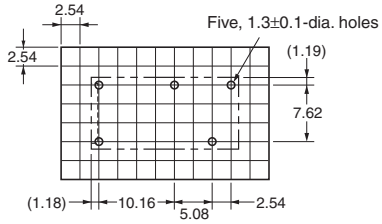
Unit: mm



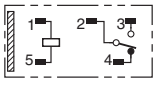


PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)



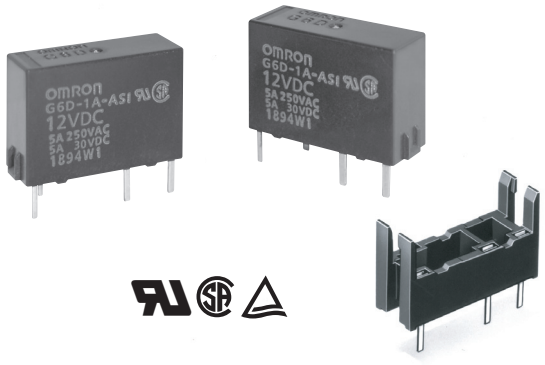
(No coil polarity)

Note: Values in parentheses are average values.

MEMO

Power PCB Relay
G6D-ASI

- Reduced board space ideal for high-density mounting (45% smaller than the surface area of G6B).
- Slim package: measures 6.5 W x 17.5 L x 12.5 H mm
- Switches loads up to 5 A, 250 VAC/30 VDC.
- Sealed construction allows automatic soldering and cleaning.
- Long service life: up to 300,000 operations with a 2 A, 250 VAC/30 VDC load.
- Rated for D150 pilot duty by UL, CSA.
- Optional mounting socket simplifies relay installation and servicing of finished equipment.
- RoHS Compliant.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G6D-1A-ASI-*DC12*).

Type	Contact form	Terminal	Construction	Model
Standard	SPST-NO	PCB	Fully sealed	**G6D-1A-ASI**

■ Accessories

Connecting Socket

Description	Model
PCB mount socket for G6D relay	**P6D-04P**

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.40, L/R = 7 ms)
Rated load	5 A at 250 VAC, 30 VDC	2 A at 250 VAC, 30 VDC
Contact material	Ag alloy	
Carry current	5 A	
Max. operating voltage	250 VAC, 30 VDC	
Max. operating current	5 A	
Max. switching capacity	1,250 VA, 150 W	500 VA, 60 W
Min. permissible load	10 mA at 5 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Coil Data

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			% of rated voltage			
5	40	125	70% max.	10% min.	160% at 23°C	Approx. 200
12	16.7	720				
24	8.3	2,880				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C (73°F).

3. The pick-up voltage is 75% or less of rated voltage if the relay is mounted upside down.

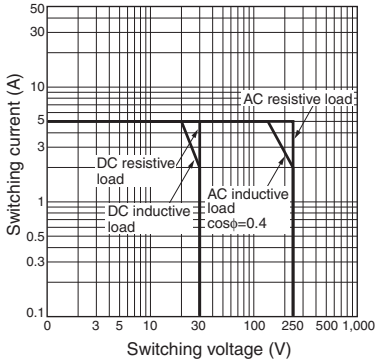
■ Characteristics

Contact resistance		100 mΩ max.
Operate time		10 ms max.
Release time		5 ms max.
Operating frequency	**Mechanical**	18,000 operations/hour
	Electrical	1,800 operations/hour (under rated load)
Insulation resistance		1,000 MΩ min. (at 500 VDC)
Dielectric strength		3,000 VAC, 50/60 Hz for 1 minute between coil and contacts
		750 VAC, 50/60 Hz for 1 minute between contacts of the same polarity
Surge withstand voltage		6,000 V, 1.20 x 50 μs between coil and contacts
Vibration	**Mechanical durability**	10 to 55 Hz, 1.50 mm (0.06 in) double amplitude
	Malfunction durability	10 to 55 Hz, 1.50 mm (0.06 in) double amplitude
Shock	**Mechanical durability**	1,000 m/s² (approx. 100 G)
	Malfunction durability	100 m/s² (approx. 10 G)
Ambient temperature	**Operating**	-25° to 70°C (-13° to 158°F)
Humidity		5% to 85% RH
Life expectancy	**Mechanical**	20 million operations min. (at operating frequency of 18,000 operations/hour)
	Electrical	70,000 operations min. at rated loads (300,000 operations min for 2A at 250 VAC, 30 VDC, resistive load)
Weight		Approx. 3 g (0.10 oz)

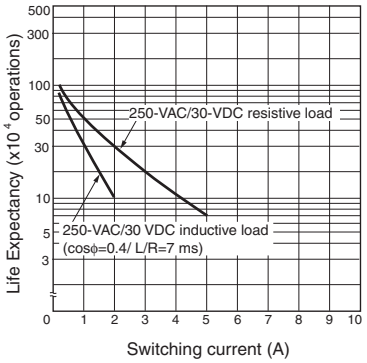
Note: Data shown are of initial value.

■ Characteristic Data

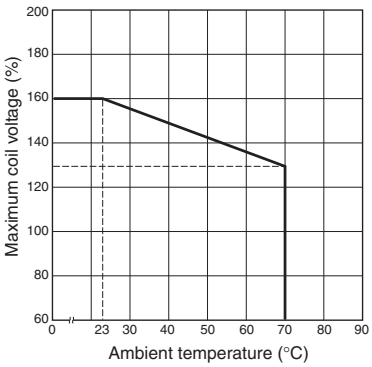
Maximum Switching Capacity



Life Expectancy

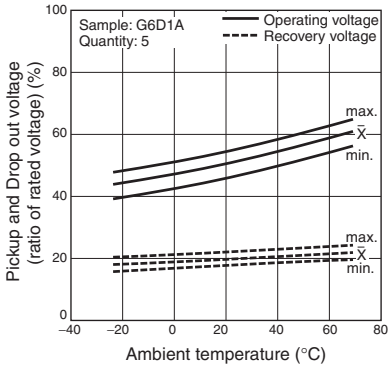


Ambient Temperature vs. Maximum Coil Voltage

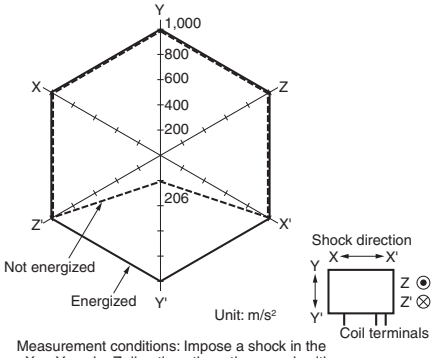


Note: The maximum coil voltage is the maximum voltage that can be applied to the relay coil.

Ambient Temperature vs. Pickup and Drop out Voltage G6D-1A-ASI



Malfunctioning Shock G6D-1A-ASI



Measurement conditions: Impose a shock in the ±X, ±Y, and ±Z directions three times each with the Relay energized to check the shock values that cause the Relay to malfunction.

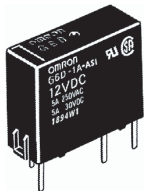
Dimensions

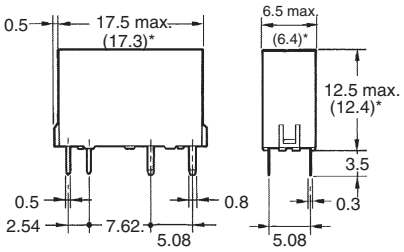
Unit: mm (inch)

Note: Orientation marks are indicated as follows:

■ Relays

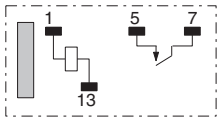
G6D-1A-ASI





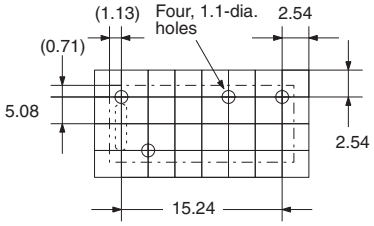
*Average value

Terminal Arrangement/ Internal Connections (Bottom View)



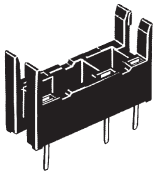
Mounting Holes (Bottom View)

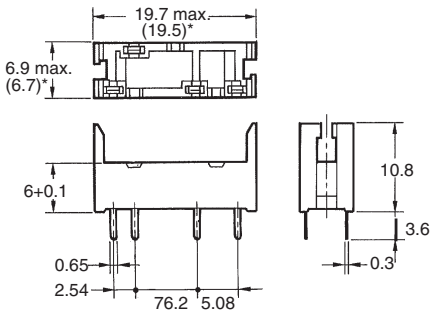
Tolerance: ±0.1



■ Socket

P6D-04P

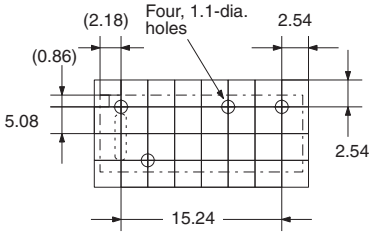




*Average value

Mounting Holes (Bottom View)

Tolerance: ±0.1



■ Approvals

• The rated values approved by each of the safety standards may be different from the performance characteristics individually defined in this catalog.

UL Recognized (File No. E41515) - - Ambient Temp. = 40°C

Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5 to 24 VDC	5 A, 250 VAC	6,000
			5 A, 30 VDC	

CSA Certified (File No. LR31928)

Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5 to 24 VDC	5 A, 250 VAC (General Use)	6,000
			5 A, 30 VDC (Resistive)	

EN/TÜV Approval (Registration No. R50029064/EN61810-1)

Model	Number of poles	Coil ratings	Contact ratings	Number of test operations
G6D-1A-ASI	1	5, 12, 24 VDC	5 A, 250 VAC (cosϕ=1.0)	70,000
			5 A, 30 VDC (0 ms)	

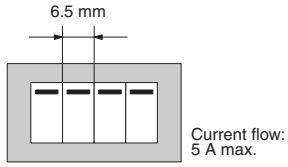
Note: 1. The rated values approved by each of the safety standards (e.g., UL, CSA, TUV) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

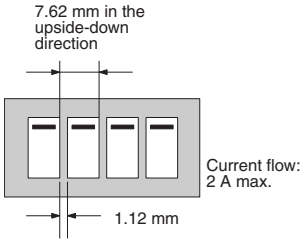
Precautions

■ Spacing Between Relays

More than two relays can be closely mounted right side up as shown in the illustration below.



More than two relays can be closely mounted upside down as shown in the illustration below.



Note: The space between each relay required for heat radiation may vary with operating conditions.

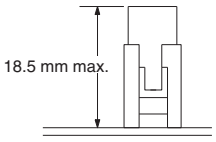
■ Socket Mounting

When mounting the relay, insert it into the socket as vertically as possible so that the relay terminals contact securely with the contact pins on the socket.

The P6D-04P socket is flux-resistant. Do not wash the socket with water.

Remove the relay from the socket before soldering the socket to a PC board.

Mounting height



PCB Relay
G6DS

Slim, Miniature Relay with 1-pole 5-A Switching Capability

- Slim 5-mm width and miniature size.(20.3 x 5.08 x 12.5 mm max.)
- Ideal for high-density mounting.
- Delivers high switching performance (5 A at 250 VAC/30 VDC) and enables various loads all in a slim, miniature size.
- Highly sensitive coil type (120 mW) also available.
- Satisfies EN 61131-2 (PLC) and EN 61010 (measuring instrument/ control equipment) reinforced insulation requirement.
- P6DS-04P Socket allows for easy installation and removal of Relays.
- RoHS compliant.



Model Number Structure

■ Model Number Legend

G6DS - □ □ - □ DC □
1 2 3 4

1. Number of Poles
1: 1 pole

2. Contact Form
A: SPST-NO

3. Classification
None: Standard
H: High-sensitivity

4. Rated Coil Voltage
5, 12, 24

Applications

Applications include: PLCs, I/O modules, I/O ports, Timers, Temperature Controllers, and Control Boards.

Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Fully sealed	**G6DS-1A**
High-sensitivity			**G6DS-1A-H**

Note: When ordering, add the rated coil voltage to the model number.
Example: G6DS-1A DC12
Rated coil voltage

■ Accessories (Order Separately)

Connecting Socket	**P6DS-04P**
Relay Pullout Tool	**R99-01 for G6DS**

■ Coil Ratings

Item	Standard			High-sensitivity		
Rated voltage	5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current	36 mA	15 mA	7.5 mA	24 mA	10 mA	5 mA
Coil resistance	139 Ω	800 Ω	3,200 Ω	208 Ω	1,200 Ω	4,800 Ω
Must operate voltage	70% max. of rated voltage					
Must release voltage	5% min. of rated voltage					
Max. voltage	160% of rated voltage (at 23°C)					
Power consumption	Approx. 180 mW			Approx. 120 mW		

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. “Max. voltage” refers to voltage that can be applied to the relay coil momentarily. Do not apply "Max. voltage" continuously.

■ Contact Ratings

Item	Resistive load (cos ϕ=1)	Inductive load (cos ϕ=0.4, L/R=7 ms)
Rated load	5 A at 250 VAC, 5 A at 30 VDC	2 A at 250 VAC, 2 A at 30 VDC
Rated carry current	5 A	
Max. switching voltage	250 VAC, 30 VDC	
Max. switching current	5 A	
Max. switching power	1,250 VA, 150 W	
Failure rate (reference value) (See note.)	5 mA at 24 VDC	

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operation

■ Characteristics

Contact resistance (See note 1.)		100 mΩ max.
Operate time		10 ms max.
Release time		5 ms max.
Insulation resistance (See note 2.)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		3,000 VAC, 50/60 Hz for 1 min. between coil and contacts 750 VAC, 50/60 Hz for 1 min. between contacts of same polarity
Impulse withstand voltage		6,000 V (1.2 × 50 μs) between coil and contacts
Vibration resistance	**Destruction**	10 to 55 to 10 Hz, 1.5-mm double amplitude
	Malfunction	10 to 55 to 10 Hz, 1.5-mm double amplitude
Shock resistance	**Destruction**	1,000 m/s^2
	Malfunction	150 m/s^2 (standard type); 130 m/s^2 (high-sensitivity type)
Endurance	**Mechanical**	20,000,000 operations min. (at 18,000 operations/hr)
	Electrical	100,000 operations min. for standard type; 80,000 operations min. for high sensitivity type (1,800 operations/hr @ 23°C)
Ambient temperature		Operating: −40°C to 85°C (with no icing or condensation)
Ambient humidity		Operating: 5% to 85%
Weight		Approx. 2.3 g

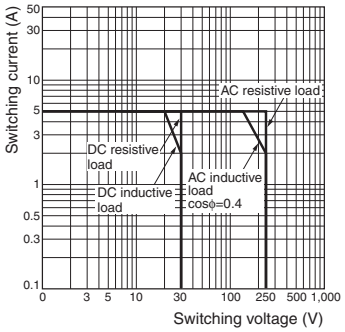
Note: 1. The data shown above are initial values.

2. The contact resistance is derived using voltage drop method with 1 A applied at 5 VDC.

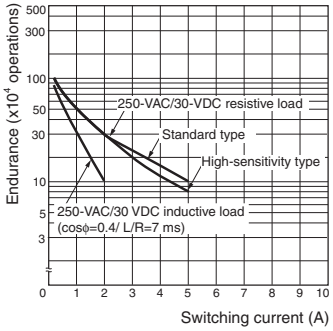
3. The insulation resistance is possible between coil and contacts and between contacts of the same polarity at 500 VDC.

Engineering Data

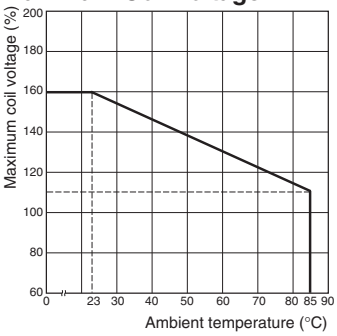
Maximum Switching Power



Endurance

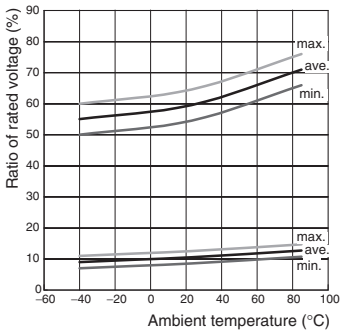


Ambient Temperature vs. Maximum Coil Voltage

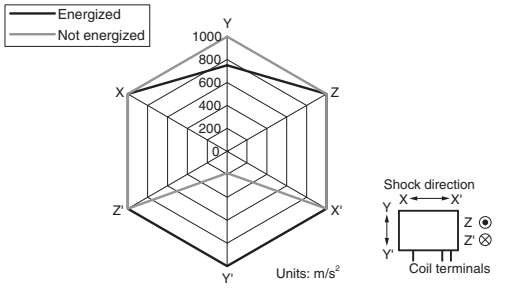


Note: The maximum coil voltage is the maximum voltage that can be applied to the relay coil.

Ambient Temperature vs. Operating/Recovery Voltage G6DS-1A



Malfunctioning Shock G6DS-1A



Measurement conditions: Impose a shock in the ±X, ±Y, and ±Z directions three times each with the Relay energized to check the shock values that cause the Relay to malfunction.

■ Approved Standards

• The rated values approved by each of the safety standards may be different from the performance characteristics individually defined in this catalog.

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp. = 95°C

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G6DS-1A	SPST-NO	5 to 24 VDC	5 A at 250 VAC (Resistive)	100,000
			5 A at 30 VDC (Resistive)	
G6DS-1A-H			5 A at 250 VAC (Resistive)	80,000
			5 A at 30 VDC (Resistive)	

VDE (EN61810-1) (License No. B161)

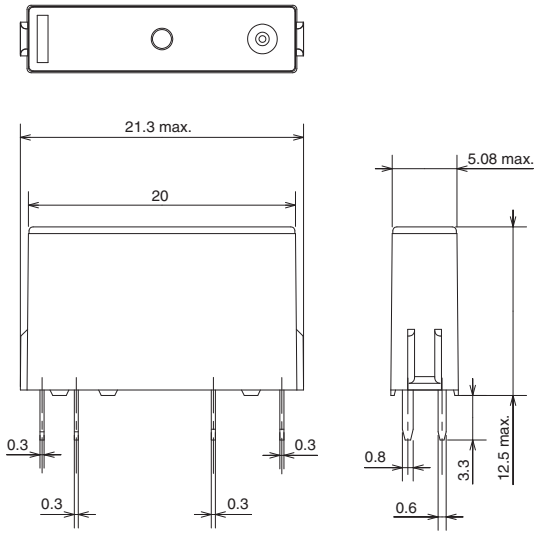
Model	Contact form	Coil ratings	Contact ratings
G6DS-1A	SPST-NO	5, 12, 24 VDC	5 A, 250 VAC (cosϕ=1.0) 5 A, 30 VDC (0 ms)
G6DS-1A-H			5 A, 250 VAC (cosϕ=1.0) 5 A, 30 VDC (0 ms)

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G6DS-1A/1A-H

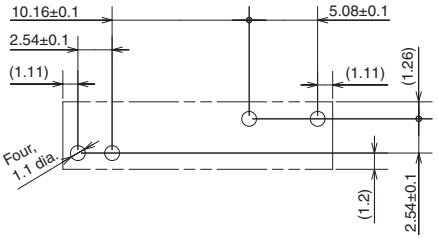




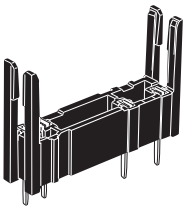
Terminal Arrangement/ Internal Connections (Bottom View)

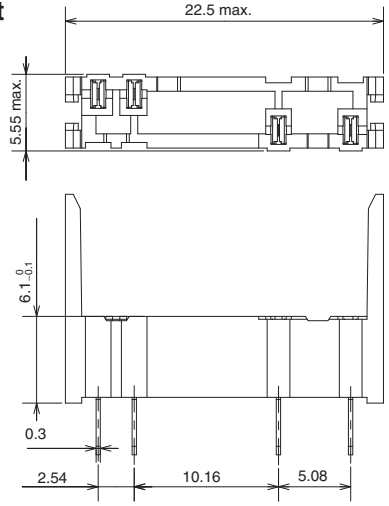


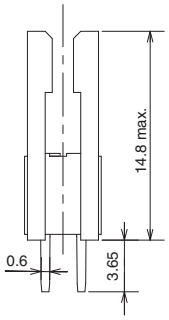
Mounting Holes (Bottom View)



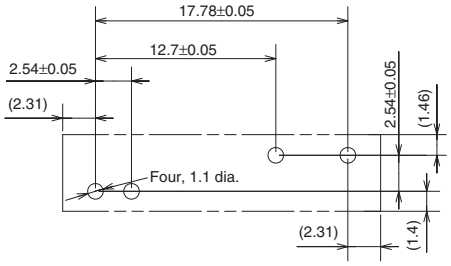
Connecting Socket
P6DS-04P







Mounting Holes (Bottom View)



Relay Pullout Tool

R99-01 for G6DS

The R99-01 for G6DS is a convenient tool to remove a G6DS Relay from a P6DS-04 Socket when sockets are mounted very closely together.

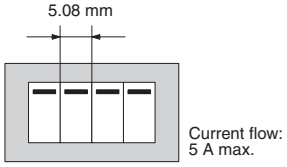
Packing

■ Stick packing

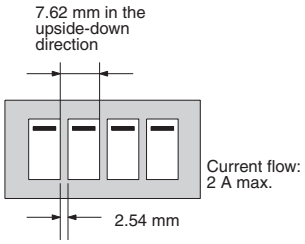
1 stick = 25 Relays
1 packing case = 20 sticks (500 Relays)
1 carton box = 6 packing cases (3,000 Relays)

Precautions

More than two relays can be closely mounted right side up as shown in the following illustration. (This applies to the P6DS as well.)

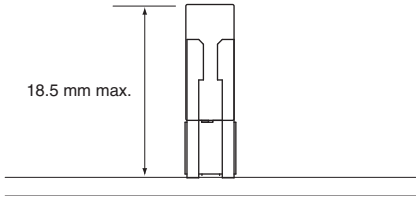


More than two relays can be closely mounted upside down as shown in the following illustration.



Note: The space between relays required for heat radiation may vary with operating conditions. Contact your OMRON representative for details.

Socket Mounting Height



When mounting the relay, insert it into the socket as vertically as possible so that the relay terminals contact securely with the contact pins on the socket.

The P6DS is flux-resistive. Do not wash the P6DS with water. Remove the relay from the socket before soldering the socket to a PCB.

Disclaimer:

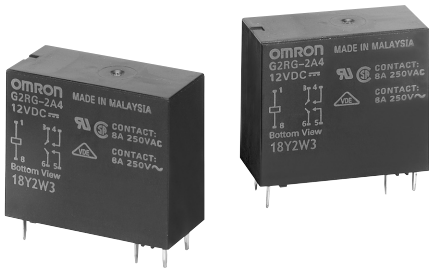
All technical performance data applies to the product as such; specific conditions of individual applications are not considered. Always check the suitability of the product for your intended purpose. OMRON does not assume any responsibility or liability for noncompliance herein, and we recommend prior technical clarification for applications where requirements, loading, or ambient conditions differ from those applying to general electric applications. Any responsibility for the application of the product remains with the customer alone. THIS COMPONENT CAN NOT BE USED FOR AUTOMOTIVE APPLICATIONS.

MEMO

PCB Relay
G2RG

Power Relay with 1.5mm Contact Gap

- Clearance between contact terminals of the same polarity: 1.5 mm min.
- Conforms to VDE0435 (VDE approval: C250 insulation grade). UL recognized / CSA certified.
- Meets VDE0700 requirements for household products according to VDE0110.
- Cadmium-free contacts ensuring environment-friendly use.
- Tracking resistance: CTI > 250 V.
- 10 kV impulse withstand voltage between coil and contacts.
- RoHS Compliant.



NEW

Ordering Information

To order: Select the part number and add the rated coil voltage to the part number. Example: G2RG-2A4 *DC12*.

Type	Contact material	Contact form	Construction	Model
Special contact gap	AgSnO	DPST-NO	Fully sealed	**G2RG-2A4**

Specifications

■ Coil Data

Item	Description	
Rated voltage	12 VDC	24 VDC
Rated current	66.6 mA	33.3 mA
Coil resistance	180 Ω	720 Ω
Must operate voltage	80% max. of rated voltage (DPST-NO)	
Must release voltage	10% min. of rated voltage	
Max. voltage	140% of rated voltage (at 23°C)	
Power consumption	Approx. 800 mW	

Note: 1. The rated current and coil resistance are for a coil temperature of 23°C and a tolerance of ±10%

■ Contact Data

Item	DPST-NO
Load	Resistive load ($\cos\phi = 1$)
Rated load	8 A at 250 VAC
Contact material	Silver alloy
Rated carry current	8 A
Max. switching voltage	380 VAC, 125 VDC
Max. switching current	8 A
Max. switching capacity	2,000 VA
Min. permissible load (See note)	10 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ ops at a switching frequency of 120 operations/min.

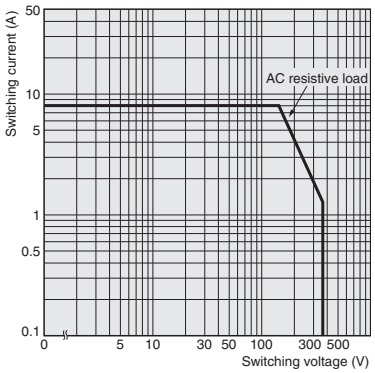
■ Characteristics

Contact resistance	100 mΩ max.
Operation time	15 ms max.
Release time	5 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr. Electrical: 1,800 operations/hr. (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min. between coil and contacts 3,000 VAC, 50/60 Hz for 1 min. between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min. between contacts of same polarity
Impulse withstand voltage	10,000 V (1.2 x 50 μS) between coil and contacts.
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100 G) Malfunction: 200 m/s^2 when energized (approx. 20 G); 100 m/s^2 when no energized (approx. 10 G)
Life expectancy	Mechanical: 1,000,000 operations min. (at 18,000 operations/hr.) Electrical: 10,000 operations min. (at 1,800 operations/hr. under rated load)
Ambient temperature	Operating: -40°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 17.2 g

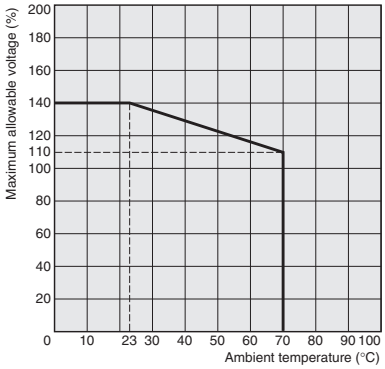
Note: Values in the above table are the initial values, measured at an ambient temperature of 23°C

Engineering Data

Maximum Switching Capacity



Ambient Temperature vs Maximum Allowable Voltage

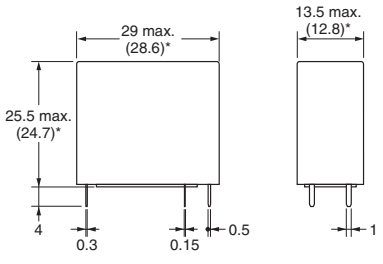


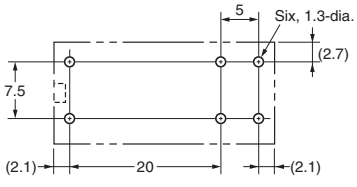
Dimensions

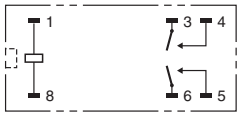
Unit: mm (inch)

DPST-NO Relays









(The coil has no polarity)

*Figures in parentheses indicate average values.

Note: The G2RG-2A4 has the same terminal arrangement as the G2R-2A4, but the switch capacity and electrical endurance are different. Confirm that correct operation is possible in the actual operating conditions before use.

■ Approvals

UL Recognized (File No. E441643)
CSA Certified (File No. LR31928)

Model	Contact Form	Coil Rating	Rating	Number of test operations
G2RG-2A4	DPST-NO	12 to 24 VDC	8A at 250 VAC (Resistive), 70°C	10 x10^3

VDE0435 (Approval No. 6166)

Model	Contact Form	Coil Rating	Rating
G2RG-2A4	DPST-NO	12, 24 VDC	250 VAC, 8 A, (resistive)

Note: The approved rated values for international standards are different from the individually specified characteristic values. Be sure to confirm that the required standards are satisfied before actual use.

MEMO

Power Relay
G6RN

Heavy-duty Miniature Relay

- Incorporates environmentally-friendly, cadmium-free contacts.
- Variety of contact forms: SPDT or SPST-NO (continuous current rating: 8 A).
- Low profile (0.39 W x 1.12 L x 0.59 H inches)
- High dielectric strength of 4 kV with 8 mm creepage/ clearance.
- Sealed plastic construction.
- Ideal for switching contactors, solenoids and motors.
- RoHS Compliant.



Ordering Information

Classification	Structure	Contact material	Contact form	
			SPST-NO	SPDT
Standard	Plastic-sealed	Ag-Alloy + gold plating	**G6RN-1A**	**G6RN-1**

Note: When ordering, add the rated coil voltage to the model number.
Example: G6RN-1A DC24
Rated coil voltage

■ Model Number Legend

G6RN-□□- DC□
1 2 3

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   A: SPST-NO
3. **Rated Coil Voltage**
   5, 12, 24, 48

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	43.9 mA	18.3 mA	9.2 mA	5.2 mA
Coil resistance	114 Ω	655 Ω	2,620 Ω	9,210 Ω
Must operate voltage	70% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	110% of rated voltage			
Power consumption	Approx. 220 mW			Approx. 250 mW

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Contact Ratings

Contact material	Ag-Alloy + gold plating (standard)
Rated switching current (resistive)	8 A at 250 VAC 5 A at 30 VDC
Rated carry current	8A
Max. switching voltage	250 VAC, 30 VDC
Max. switching capacity	2,000 VA, 150 W
Min. permissible load	10 mA, 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operation

■ Characteristics

Contact resistance		100 mΩ max.
Operate time		Approx. 6 ms
Release time		Approx. 3 ms
Max. operating frequency	**Mechanical**	36,000 operations/hr
	Electrical	360 operations/hr (under rated load)
Insulation resistance		1,000 MΩ min.
Dielectric strength		4,000 VAC: between coil and contacts 1,000 VAC: between contacts
Creepage/clearance		8 mm min. between coil and contacts
Vibration resistance	**Malfunction**	NO: 10 to 55 Hz, 1.5 mm double amplitude
		NC: 10 to 55 Hz, 0.8 mm double amplitude
Shock resistance	**Destruction**	1,000 m/s^2 (approx. 100 G)
	Malfunction	NO: 100 m/s^2 (approx. 10 G) NC: 50 m/s^2 (approx. 5 G)
Life expectancy	**Mechanical**	10,000,000 operations min.
	Electrical	50,000 operations (Typ. 100,000 operations - see note)
Ambient temperature	**Operating**	-40°C to 85°C
	Storage	-40°C to 85°C
Ambient humidity	**Operating**	5% to 85%
Weight		Approx. 9 g
Protection class		II according to VDE0106 Part 1
Insulation class		C/250, B/380 according to VDE0110

Note: Resistive load test at 250 VAC, 8 A, room temperature with diode.
Continuous monitoring must be performed to detect contact sticking and short circuit.
Dielectric strength measured at 500 V for 1 minute with the same polarity.

■ Approved Standards

VDE (EN61810-1)

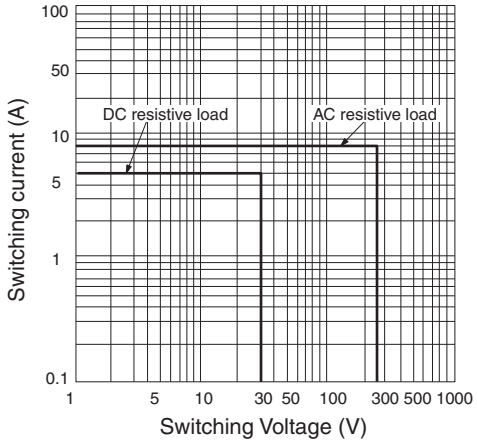
Contact form	Coil ratings	Contact ratings
SPDT SPST-NO	5, 12, 24, 48 VDC	8 A at 250 VAC (cosϕ =1)

UL Recognized (File No. E41515) /CSA Certified (File No. LR31928-543) - - Ambient Temp. = 40°C

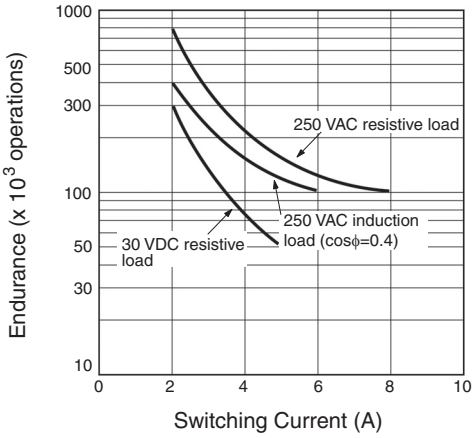
Coil ratings	Contact ratings
5, 12, 24, 48 VDC	250 VAC, 10 A resistive 250 VAC, 8 A resistive, 85°C 30 VDC, 5 A resistive

Engineering Data

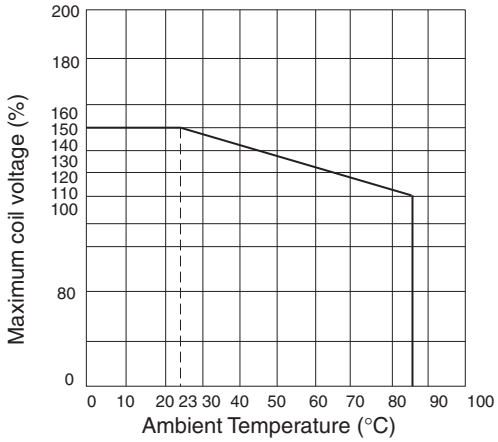
Maximum Switching Power



Endurance



Ambient Temperature vs Maximum Coil Voltage

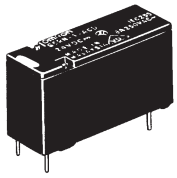


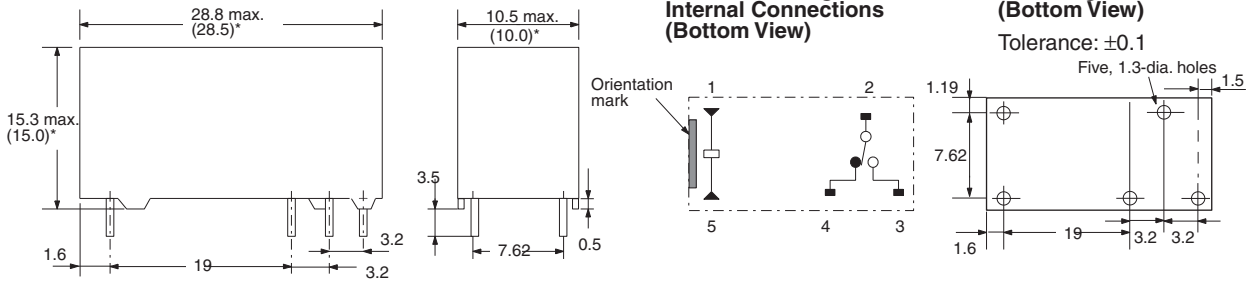
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Unit: mm

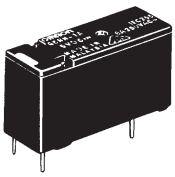
■ SPDT Type

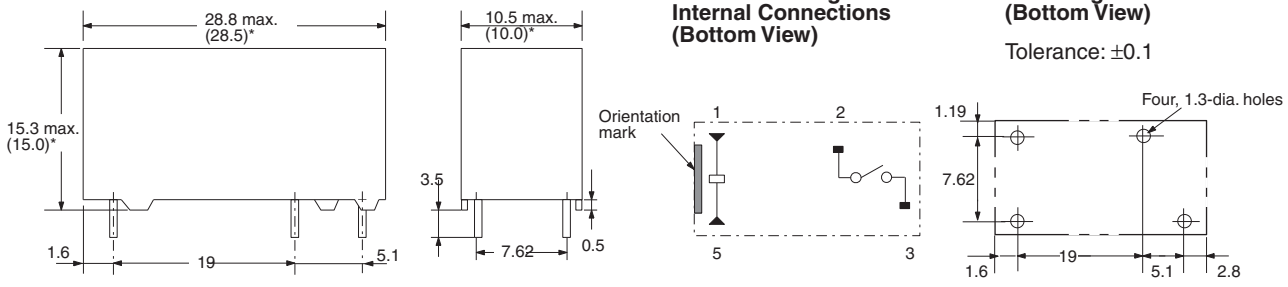




*Average value.

■ SPST-NO Type





*Average value.

PCB Relay
G5Q

Compact, High Isolation Relay

- Compact single pole relay with high isolation between coil and contacts.
- Ensures a withstand impulse voltage of 8,000V between the coil and contacts.
- Low coil power consumption.
- UL class F coil insulation.
- UL recognized / CSA certified. EN approved.
- Ideal for appliance and HVAC controls
- RoHS Compliant



Ordering Information

To Order: Select the part number and add the desired coil voltage and rating. (e.g., G5Q-14 *DC12*)

Classification		Enclosure rating	Model
Single contact, class F coil insulation	SPST-NO	Vented	**G5Q-1A**
		Sealed	**G5Q-1A4**
	SPDT	Vented	**G5Q-1**
		Sealed	**G5Q-14**

Note: Add "-EU" before the coil voltage to obtain versions with CTI > 250. (e.g., G5Q-1A4-EU DC12)
Specifications for "EU" type differ from standard models. Contact Omron for more details

Specifications

■ Coil Ratings

Rated voltage (V)		Rated coil current (mA)	Coil resistance (Ω)	Pick-up voltage	Drop-out voltage	Maximum voltage	Power consumption (mW)
				Percent of rated voltage			
SPDT	DC 5	80	63	75% max	5% min	190% @ 23°C	400
	DC 9	44.4	202				
	DC 12	33.3	360				
	DC 24	16.7	1440				
SPST-NO	DC 5	40	125				200
	DC 9	22.2	405				
	DC 12	16.7	720				
	DC 24	8.3	2880				

Note: Rated current and coil resistance are measured at 23°C with a tolerance of ±10%.

■ Contact Ratings

Item	SPDT	SPST-NO
Rated load (resistive)	10 A at 125 VAC (NO) 3 A at 250 VAC (NO) 5 A at 30 VDC (NO) 3 A at 125 VAC (NC) 3 A at 30 VDC (NC)	10 A at 125 VAC 3 A at 250 VAC 5 A at 30 VDC
Contact material	Ag alloy	
Rated carry current	10 A (NO)/3 A (NC)	
Max. switching voltage	277 VAC, 30 VDC	
Max. switching current	AC: 10 A (NO)/3 A (NC) DC: 5 A (NO)/3 A (NC)	
Max. switching capacity	1250 VA, 150 W (NO) 375 VA, 90 W (NC)	
Min. permissible load	10 mA at 5 VDC (P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation)	

■ Characteristics

Contact resistance (See note 2.)		100 mΩ max.
Operate time		10 ms max.
Release time		5 ms max.
Insulation resistance (See note 3.)		1,000 mΩ min.
Dielectric strength		4,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage		8 kV (1.2 × 50 μs) between coil an contacts
Vibration resistance		Destruction: 10 to 55 to 10 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 to 10 Hz, 1.5-mm double amplitude
Shock resistance		Destruction: 1000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy (See Note 4)	**Mechanical**	10,000,000 operations (18,000 operations per hour)
	Electrical	200,000 operations: 3 A (NO)/3 A (NC) at 125 VAC, resistive load 100,000 operations: 3 A (NO)/3 A (NC) at 250 VAC, 5 A (NO)/3 A (NC) at 30 VDC, resistive load 50,000 operations: 10 A at 125 VAC (900 operations per hour)
Ambient temperature	**Operating & storage**	−40°C to 105°C (-40°F to 221°F) with no icing or condensation
Ambient humidity	**Operating & storage**	5% to 85%

Note: 1. The data shown above are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using a fall-of-potential method.

3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.

4. The electrical life data items shown are possible at 23°C

■ Approved Standard

UL Recognized (File No. E41515) / CSA Certified (File No. LR31928) - - Ambient Temp = 40°C

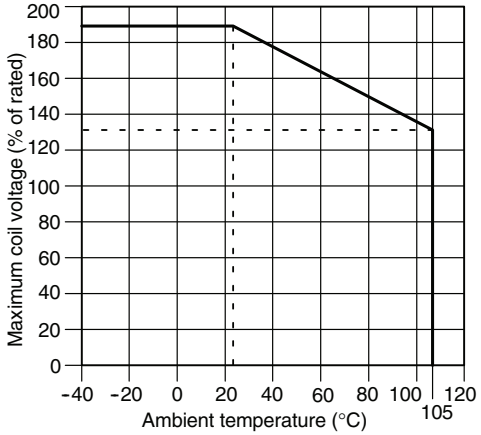
Model	Coil ratings	Contact ratings	
		NO contacts	NC contacts
G5Q	5 to 24 VDC	10 A at 250 VAC (Resistive), 6,000 ops 10 A at 30 VDC (Resistive), 6,000 ops 4 A at 120VAC (Resistive), 10,000 ops.	3 A at 250 VAC (Resistive), 6,000 ops. 3 A at 30 VDC (Resistive), 6,000 ops.

EN 61810-1 (VDE Reg. No. 125314)

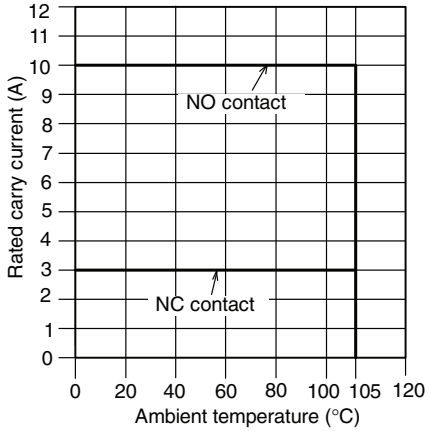
Model	Coil ratings	Contact ratings
G5Q	5, 9, 12, 24 VDC	10 A, 250 VAC cosϕ=1 (NO) 5 A, 30 VDC L/R=0 ms (NO) 3 A, 30 VDC L/R=0 ms (NC)

Engineering Data

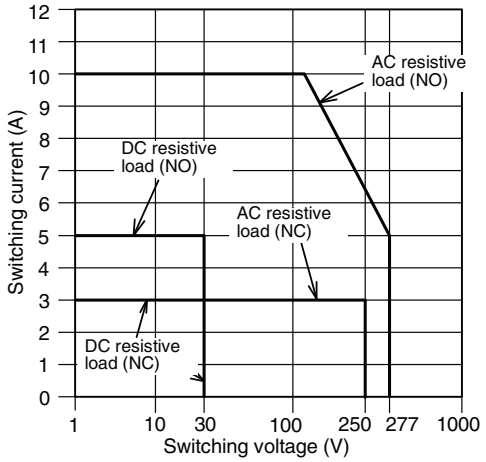
■ AMBIENT TEMPERATURE VS. MAXIMUM VOLTAGE



■ AMBIENT TEMPERATURE VS. RATED CARRY CURRENT



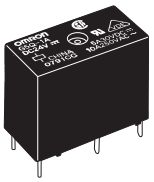
■ MAX. SWITCHING CAPACITY

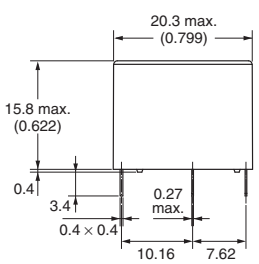


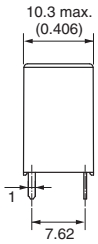
Dimensions

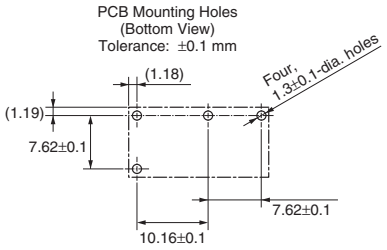
Note: All units are in millimeters unless otherwise indicated.

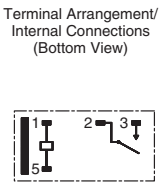
G5Q-1A
G5Q-1A4



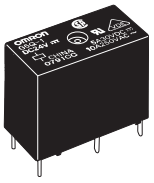


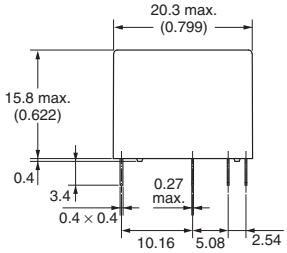


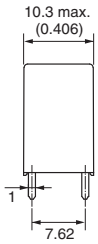


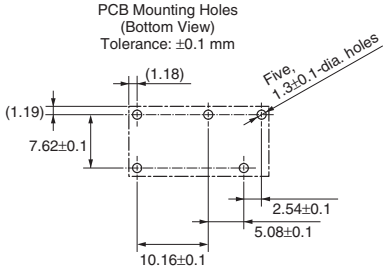


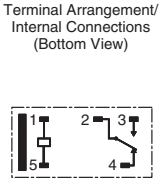
G5Q-1
G5Q-14







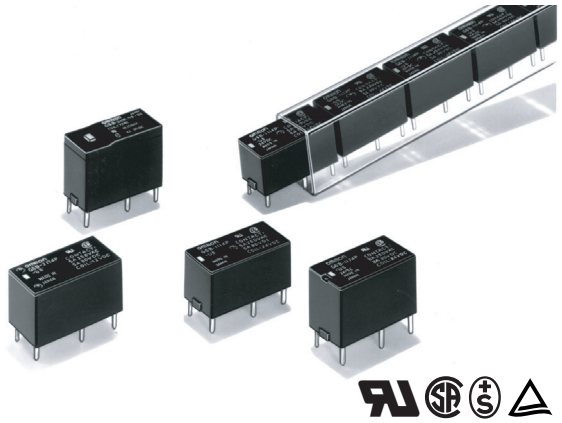




Power PCB Relay
G6B

Subminiature Relay that Switches up to 5 A

- Subminiature: 20 x 10 x 10 mm (L x W x H).
- Low power consumption: 200 mW.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce time.
- Fully sealed construction
- Single and Dual coil latching types also available.
- High Capacity versions available
- RoHS Compliant



Ordering Information

Classification	Contact form	Straight Through-hole PCB	Self-clinching Through-hole PCB
Non-latching	SPST-NO	**G6B-1114P-US**	**G6B-1114C-US**
	SPST-NO+SPST-NC	**G6B-2114P-US**	**G6B-2114C-US**
	DPST-NO	**G6B-2214P-US**	**G6B-2214C-US**
	DPST-NC	**G6B-2014P-US**	**G6B-2014C-US**
Single coil latching	SPST-NO	**G6BU-1114P-US**	**G6BU-1114C-US**
Dual coil latching	SPST-NO	**G6BK-1114P-US**	**G6BK-1114C-US**
High-capacity, Non-latching	SPST-NO	**G6B-1174P-US**	**G6B-1174C-US**

Note: When ordering, add the rated coil voltage to the model number.
Example: G6B-1114P-US DC12
Rated coil voltage

Model Number Legend

G6B □-□ □ □ □-□-□ DC□
1 2 3 4 5 6 7 8

1. Relay Function
None: Non-latching
U: Single coil latching
K: Dual coil latching

2. Contact Form
21: SPST-NO + SPST-NC
22: DPST-NO
20: DPST-NC
11: SPST-NO

3. Contact Type
1: Standard
7: High-capacity

4. Enclosure Ratings
4: Fully sealed

5. Terminals
P: Straight Through-hole PCB
C: Self-clinching Through-hole PCB

6. Approved Standards
US: UL/CSA certified

7. Mounting Method
None: Mount directly to PCB
P6B: Mount to Socket

8. Rated Coil Voltage
5, 6, 12, or 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable Relay	Back Connecting Socket (See note 1.)
G6B(U)-1114P-US-P6B	**P6B-04P**
G6BK-1114P-US-P6B	**P6B-06P**
G6B-2□□4P-US-P6B	**P6B-26P**
G6B-1174P-US-P6B	**P6B-04P**

Note: 1. Not applicable to the self-clinching type.

2. Use the G6B-□□□□P-US-***P6B*** if mounting relays in a P6B Socket.

Removal Tool	**P6B-Y1**
Hold-down Clips	**P6B-C2**

Specifications

■ Contact Ratings

Item	SPST-NO		SPST-NO + SPST-NC, DPST-NO, DPST-NC	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)
Rated load	5 A at 250 VAC; 5A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC	5 A at 250 VAC; 5A at 30 VDC	1.5 A at 250 VAC; 1.5 A at 30 VDC
Contact material	Ag Alloy (Cd free)			
Rated carry current	5 A			
Max. switching voltage	380 VAC, 125 VDC			
Max. switching current	5 A			
Max. switching capacity	1,250 VA, 150 W	500 VA, 60 W	1,250 VA, 150 W	375 VA, 80 W
Min. permissible load (reference value - see note)	10 mA at 5 VDC			

Item	SPST-NO (High-capacity)	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)
Rated load	8 A at 250 VAC; 8 A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC
Contact material	Ag Alloy (Cd free)	
Rated carry current	8 A	
Max. switching voltage	380 VAC, 125 VDC	
Max. switching current	8 A	
Max. switching capacity	2,000 VA, 150 W	
Min. permissible load (reference value - see note)	10 mA at 5 VDC	

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation

■ Coil Ratings

Non-latching, Single Pole

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value)(H)		Pick-up voltage	Dropout voltage	Max. voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
5	40	125	0.28	0.26	70% max.	10% min.	160% max. @ 23°C	Approx. 200
6	33.30	180	0.31	0.28				
12	16.70	720	1.2	1.1				
24	8.30	2,880	4.9	4.1				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

Non-latching, Double Pole

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Max. voltage	Power consumption (mW)
			% of rated voltage			
5	60	83.30	80% max.	10% min.	140% max. @ 23°C	Approx. 300
6	50	120				
12	25	480				
24	12.50	1,920				

Single Coil Latching

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
5	40	125	0.28	0.26	70% max.	70% max.	160% max. at 23°C	Approx. 200
6	33.30	180	0.31	0.28				
12	16.70	720	1.2	1.10				
24	8.30	2,880	4.9	4.10				

Dual Coil Latching

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
5	56	89.20	0.15	0.15	70% max.	70% max.	130% max. at 23°C	Approx. 280
6	46.80	128.50	0.18	0.18				
12	23.30	515	0.52	0.52				
24	11.70	2,060	1.20	1.20				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
2. Operating characteristics are measured at a coil temperature of 23°C.

■ Characteristics

Contact resistance		30 mΩ max.
Operate (set) time		10 ms max. (mean value: 1-pole approx. 3 ms, 2-pole approx. 4 ms)
Release (reset) time	**Non-latching**	10 ms max. (mean value: 1-pole approx. 1 ms, 2-pole approx. 2 ms)
	Latching	10 ms max. (mean value: approx. 3 ms)
Min. set/reset signal width		Latching type: 15 ms min. (at 23°C)
Max. operating frequency	**Mechanical**	18,000 operations/hr
	Electrical	1,800 operations/hr (under rated load)
Insulation resistance		1,000 MΩ min. (at 500 VDC, at 250 VDC between set coil and reset coil)
Dielectric strength		3,000 VAC (Latching types: 2,000 VAC), 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between set and reset coils 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity
Vibration resistance	**Mechanical durability**	10 to 55 Hz, 1.5-mm double amplitude
	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	**Mechanical durability**	1,000 m/s^2 (Approx 100G)
	Malfunction durability	Single-side stable: 100 m/s^2 (Approx 10G); Latching: 300 m/s^2 (Approx 30G)
Service Life	**Mechanical**	50,000,000 operations min. (at 18,000 operations/hr)
	Electrical	100,000 operation min. (at 1,800 operations/hr)
Ambient temperature		Operating: –25°C to 70°C (with no icing)
Ambient humidity		Operating: 5% to 85%
Weight		Double-winding latching: Approx. 3.7 g High-capacity: Approx. 4.6 g Double pole: Approx. 4.5 g Other: Approx. 3.5 g

Note: The data shown above are initial values.

■ Approved Standards

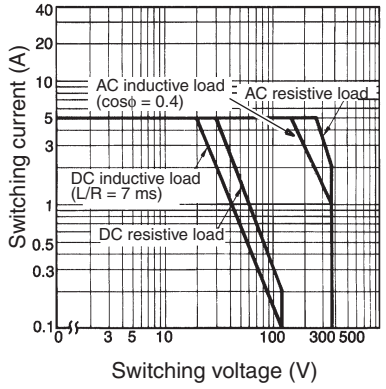
UL Recognized (File No. E41643) / CSA Certified (File No. LR31928)

Model	Contact form	Coil rating	Contact rating
G6B-1114P-US G6B-1114C-US G6BU-1114P-US G6BU-1114C-US G6BK-1114C-US G6BK-1114C-US	SPST-NO	3 to 24 VDC	5 A at 250 VAC (General Use) 80°C 5 A at 30 VDC (Resistive) 80°C
G6B-1174P-US G6B-1174C-US			8 A at 250 VAC (General Use) 80°C 8 A at 30 VDC (Resistive) 80°C
G6B-2114P-US G6B-2114C-US G6B-2214P-US G6B-2214C-US G6B-2014P-US G6B-2014C-US	SPST-NO + SPST-NC DPST-NO DPST-NC		5 A at 250 VAC (general use) 40°C 5 A at 30 VDC (resistive load) 40°C

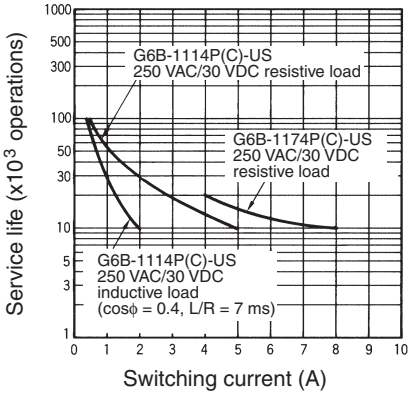
Engineering Data

G6B-1114P-US

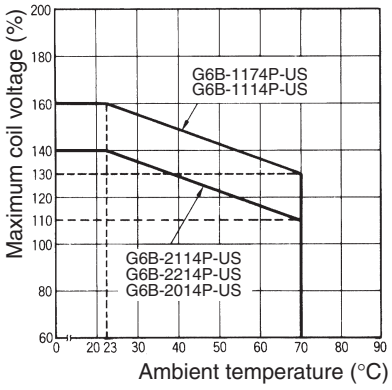
Maximum Switching Capacity



Electrical Service Life



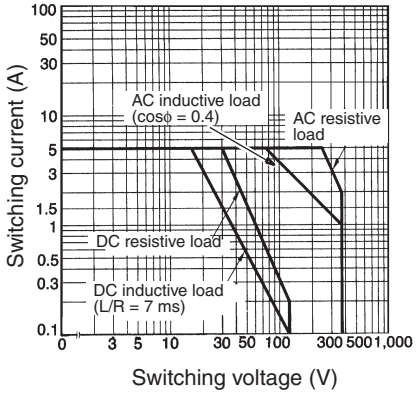
Ambient Temperature vs. Maximum Coil Voltage



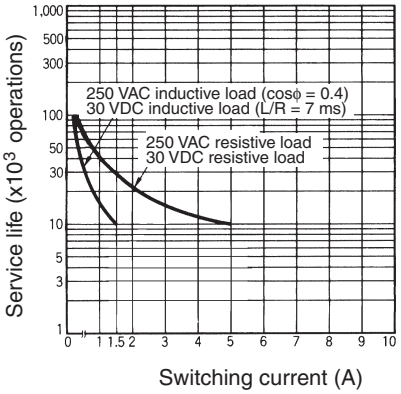
Note: The maximum coil voltage refers to the maxi-mum value in a varying range of operating power voltage, not a continuous voltage.

G6B-2114P-US, G6B-2214P-US, G6B-2014P-US

Maximum Switching Capacity



Electrical Service Life

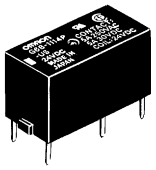


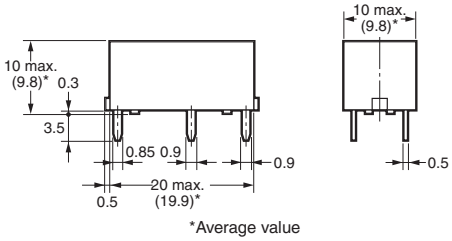
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

■ Single Pole

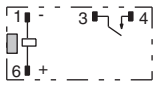
G6B-1114P-US
G6BU-1114P-US



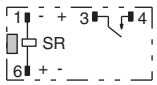


*Average value

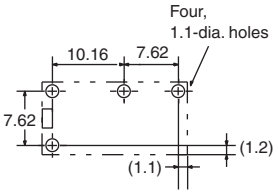
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1114P, -1114C



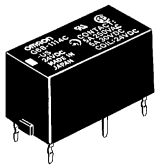
G6BU-1114P, -1114C

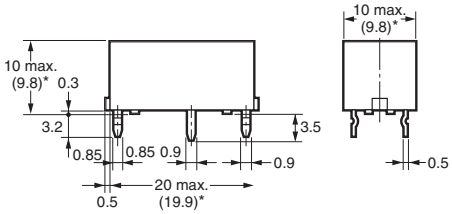


Mounting Holes (Bottom View)
G6B-1114P, -1114C
G6BU-1114P, -1114C



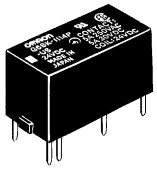
G6B-1114C-US
G6BU-1114C-US

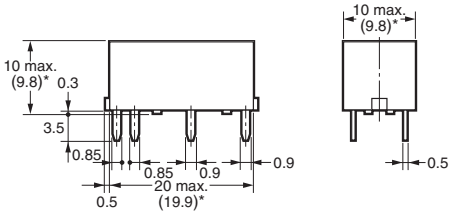




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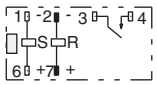
G6BK-1114P-US



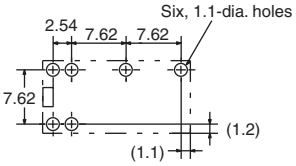


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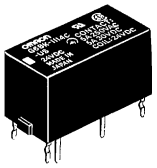
Terminal Arrangement/Internal Connections (Bottom View)
G6BK-1114P, -1114C

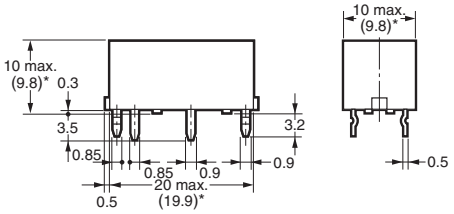


Mounting Holes (Bottom View)
G6BK-1114P, -1114C



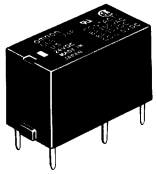
G6BK-1114C-US

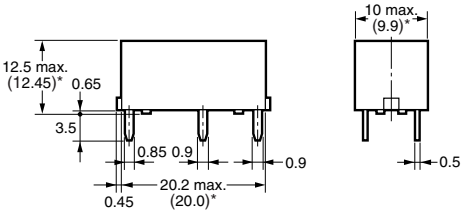




*Average value

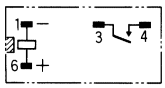
G6B-1174P-US



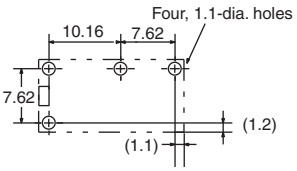


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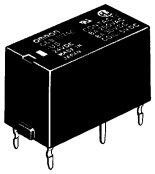
Terminal Arrangement/Internal Connections (Bottom View)
G6B-1174P, -1174C

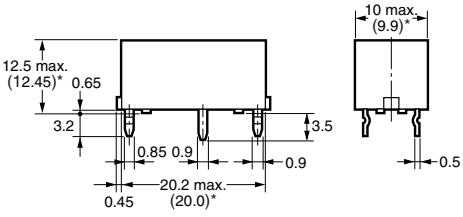


Mounting Holes (Bottom View)



G6B-1174C-US

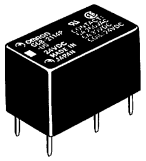


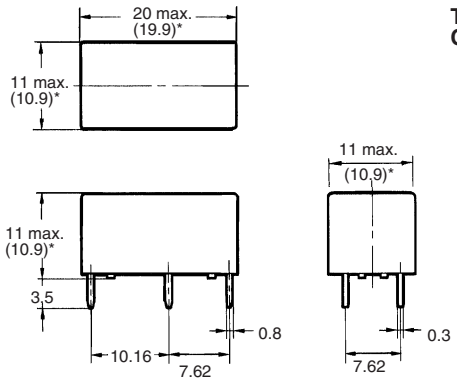


*Average value

■ Double Pole

G6B-2114P-US
G6B-2214P-US
G6B-2014P-US

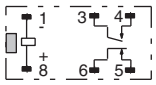




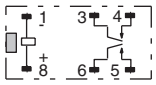
*Average value

Terminal Arrangement/Internal Connections (Bottom View)

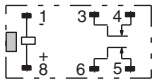
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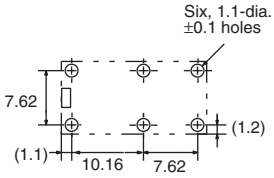
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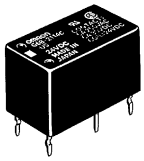
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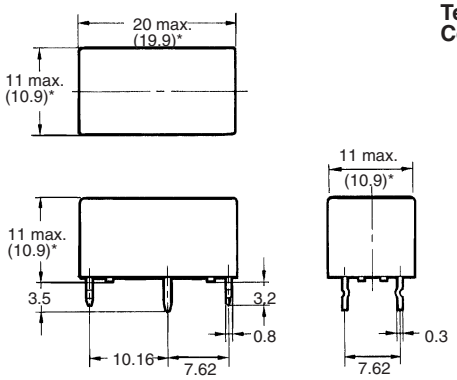


Mounting Holes (Bottom View)
Tolerance: ±0.1



G6B-2114C-US
G6B-2214C-US
G6B-2014C-US

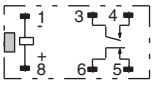




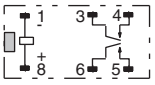
*Average value

Terminal Arrangement/Internal Connections (Bottom View)

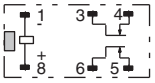
G6B-2114C-US



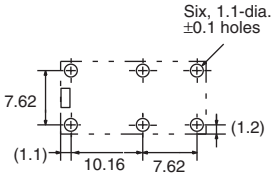
G6B-2214C-US



G6B-2014C-US

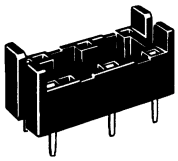


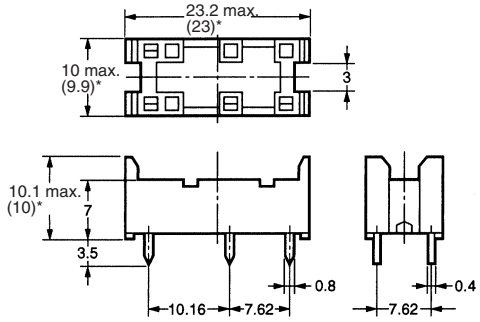
Mounting Holes (Bottom View)
Tolerance: ±0.1



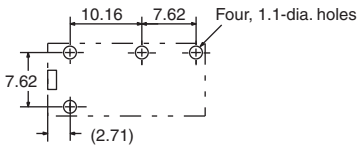
■ Accessories

Back Connecting Socket
P6B-04P



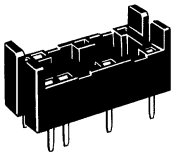


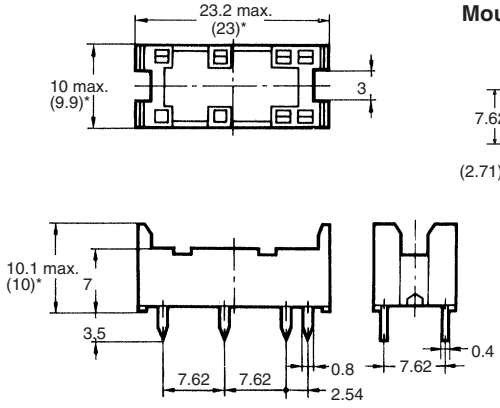
Mounting Holes (Bottom View)



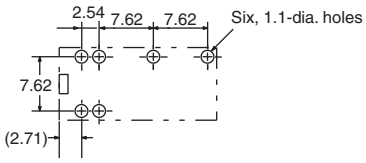
*Average value

P6B-06P



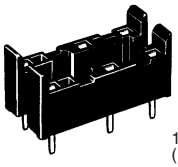


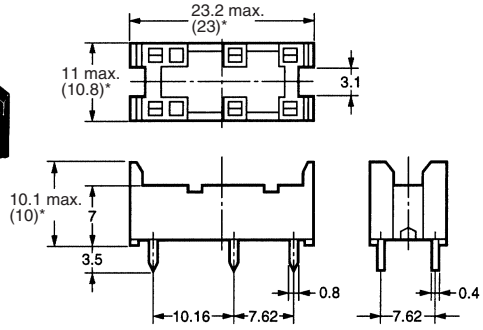
Mounting Holes (Bottom View)



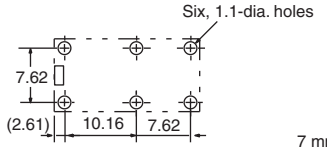
*Average value

P6B-26P



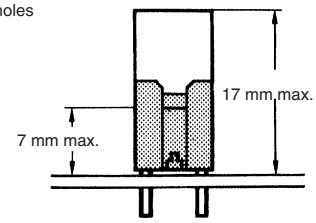


Mounting Holes (Bottom View)



Note: Rated current of socket is 5 A max.

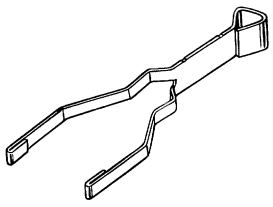
Mounting Height of Relay with Connecting Socket



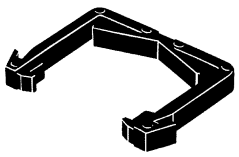
Note: Height of G6B-1174P-US is 19.5 mm max.

*Average value

Removal Tool
P6B-Y1



Hold-down Clips
P6B-C2



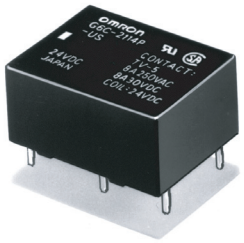
Note: P6B-C2 Hold-down Clips cannot be used for G6B-1174P-US.

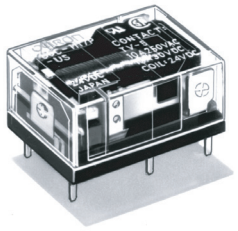
MEMO

Power PCB Relay
G6C

SPST-NO Type Breaks 10-A Loads; SPST-NO + SPST-NC Breaks 8-A Load

- Compact: 20 x 15 x 10 mm (L x W x H).
- Low power consumption: 200 mW.
- Semi-sealed or fully sealed construction available.
- Unique moving loop armature reduces relay size, magnetic interference, and contact bounce.
- Single and Dual coil latching types also available
- RoHS Compliant





Ordering Information

Classification	Contact form	Straight Through-hole PCB		Self-clinching Through-hole PCB	
		Semi-sealed	Fully sealed	Semi-sealed	Fully sealed
Non-latching	SPST-NO	**G6C-1117P-US**	**G6C-1114P-US**	**G6C-1117C-US**	**G6C-1114C-US**
	SPST-NO + SPST-NC	**G6C-2117P-US**	**G6C-2114P-US**	**G6C-2117C-US**	**G6C-2114C-US**
Single coil latching	SPST-NO	**G6CU-1117P-US**	**G6CU-1114P-US**	**G6CU-1117C-US**	**G6CU-1114C-US**
	SPST-NO + SPST-NC	**G6CU-2117P-US**	**G6CU-2114P-US**	**G6CU-2117C-US**	**G6CU-2114C-US**
Dual coil latching	SPST-NO	**G6CK-1117P-US**	**G6CK-1114P-US**	**G6CK-1117C-US**	**G6CK-1114C-US**
	SPST-NO + SPST-NC	**G6CK-2117P-US**	**G6CK-2114P-US**	**G6CK-2117C-US**	**G6CK-2114C-US**

Note: When ordering, add the rated coil voltage to the model number.
Example: G6C-1117P-US DC12
Rated coil voltage

Model Number Legend

G6C □ - □ □ □ □ - □ - □ DC □
1 2 3 4 5 6 7 8

1. **Relay Function**
   None: Non-latching
   U: Single coil latching
   K: Dual coil latching
2. **Contact Form**
   11: SPST-NO
   21: SPST-NO + SPST-NC
3. **Contact Type**
   1: Standard
4. **Enclosure Ratings**
   4: Fully sealed
   7: Semi-sealed
5. **Terminals**
   P: Straight Through-hole PCB
   C: Self-clinching Through-hole PCB
6. **Approved Standards**
   US: UL/CSA certified
7. **Mounting Method**
   None: Mount directly to PCB
   P6C: Mount to Socket
8. **Rated Coil Voltage**
   3, 5, 6, 12, or 24 VDC

■ Accessories (Order Separately)

Back Connecting Sockets

Applicable Relay	Back Connecting Socket (See note 1.)
G6C(U)-1114P-US-P6C G6C(U)-1117P-US-P6C G6C(U)-2114P-US-P6C G6C(U)-2117P-US-P6C	**P6C-06P**
G6CK-1114P-US-P6C G6CK-1117P-US-P6C G6CK-2114P-US-P6C G6CK-2117P-US-P6C	**P6C-08P**

Note: 1. Not applicable to the self-clinching versions.
The operating current for the socket is 5 A max.

2. Use the G6C(U)-□□□□P-US-***P6C*** if mounting relays in a P6C Socket.

Removal Tool	**P6B-Y1**
Hold-down Clips	**P6B-C2**

Specifications

■ Contact Ratings

Item	SPST-NO		SPST-NO+SPST-NC	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	8 A at 250 VAC; 8A at 30 VDC	3.5 A at 250 VAC; 3.5 A at 30 VDC
Contact material	Ag Alloy (Cd free)			
Rated carry current	10 A		8 A	
Max. switching voltage	380 VAC, 125 VDC (the case of latching 250 VAC, 125 VDC)			
Max. switching current	10 A		8 A	
Max. switching capacity	2,500 VA, 300 W	1,250 VA, 220 W	2,000 VA, 240 W	875 VA, 170 W
Min. permissible load (reference value - see note)	10 mA at 5 VDC			

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

■ Coil Data

Non-latching

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	67	45	0.078	0.067	70% max.	10% min.	160% max. at 23°C	Approx. 200
5	40	125	0.22	0.18				
6	33.30	180	0.36	0.29				
12	16.70	720	1.32	1.13				
24	8.30	2,880	4.96	4.19				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

Single Coil Latching Type

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	67	45	0.09	0.06	70% max.	70% min.	160% max. at 23°C	Approx. 200
5	40	125	0.25	0.20				
6	33.30	180	0.36	0.24				
12	16.70	720	1.75	1.17				
24	8.30	2,880	5.83	3.84				

Dual Coil Latching Type

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)				Set pick-up voltage	Reset pick-up voltage	Maximum voltage	Power consumption (mW)
			Set Coil		Reset Coil					
			Armature OFF	Armature ON	Armature OFF	Armature ON	% of rated voltage			
3	93.50	32.10	0.03	0.02	0.03	0.02	70% max.	70% max.	130% max. at 23°C)	Approx. 280
5	56	89.30	0.07	0.06	0.08	0.07				
6	46.70	129	0.10	0.08	0.12	0.10				
12	23.30	514	0.37	0.32	0.47	0.38				
24	11.70	2,056	1.56	1.18	1.46	1.13				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. The minimum pulse width of the set and reset voltage is 20 ms.

■ Characteristics

Contact resistance		30 mΩ max.
Operate (set) time		10 ms max. (mean value: approx. 5 ms)
Release (reset) time		10 ms max. (mean value: approx. 2 ms; latching types: mean value: approx. 5 ms)
Bounce time		5 ms max. (Approx. 3 ms typical)
Min. set/reset signal width		Latching type: 20 ms (at 23°C)
Max. switching frequency	**Mechanical**	18,000 operations/hr
	Electrical	1,800 operations/hr (under rated load)
Insulation resistance		1,000 MΩ min. (at 500 VDC, at 250 VDC between set coil and reset coil)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min between coil and contacts 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between set and reset coils (double winding latching type)
Surge withstand voltage		6.000 V (1.2 x 50 μs) between coil and contacts (latching types: 4,500 V, 1.2 x 50 μs)
Vibration resistance	**Mechanical durability**	10 to 55 Hz, 1.5-mm double amplitude
	Malfunction durability	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	**Mechanical durability**	1,000 m/s^2 (Appox. 100G)
	Malfunction durability	100 m/s^2 (Approx. 10G)
Ambient temperature		Operating: –25°C to 70°C (with no icing)
Ambient humidity		Operating: 5% to 85%
Service Life	**Mechanical:**	50,000,000 operations min. (at 18,000 operations/hr)
	Electrical:	100,000 operations min. (at 1,800 operations/hr) See “Characteristic Data”
Weight		Approx. 5.6 g

■ Approved Standards

UL Recognized (File No. E41643) - - See note

Model	Contact form	Coil rating	Contact rating
G6C-1114P-US G6C-1114C-US G6C-1117P-US G6C-1117C-US	SPST-NO	3 to 60 VDC	10 A, 250 VAC (general use) 10 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC 1/3 hp, 250 VAC TV-5 (40°C, 25,000 operations) 600 W, 120 VAC (tungsten) 530 VA, 20 to 265 VAC, 2 A max. (pilot duty) 43.2 VA, 30 VDC (pilot duty) 12LRA, 2.2FLA, 30 VDC (30,000 operations)
G6C-2114P-US G6C-2114C–US G6C-2117P-US G6C-2117C-US	SPST-NO + SPST-NC		8 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC 1/3 hp, 250 VAC TV-5 (40°C, 25,000 operations) 600 W, 120 VAC (tungsten) 530 VA, 20 to 265 VAC, 2 A max. (pilot duty) 43.2 VA, 30 VDC (pilot duty) 12LRA, 2.2FLA, 30 VDC (30,000 operations)

Note: UL Recognition tests performed at 80°C for 6,000 operations unless otherwise specified.

CSA Certified (File No. LR31928)

Model	Contact form	Coil rating	Contact rating
G6C-1114P-US G6C-1114C-US G6C-1117P-US G6C-1117C-US	SPST-NO	3 to 60 VDC	10 A, 250 VAC (general use) 10 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC 1/3 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten)
G6C-2114P-US G6C-2114C-US G6C-2117P-US G6C-2117C-US	SPST-NO + SPST-NC	3 to 60 VDC	8 A, 250 VAC (general use) 8 A, 30 VDC (resistive load) 1/6 hp, 125 VAC 1/4 hp, 125 VAC 1/4 hp, 250 VAC TV-5 600 W, 120 VAC (tungsten)

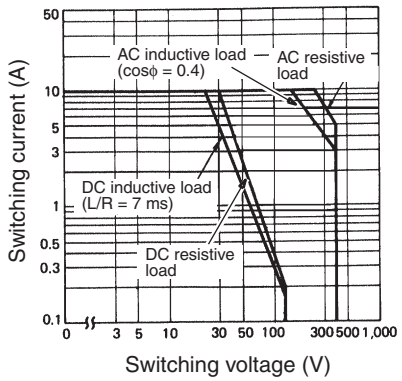
VDE (Approval No. 2413) EN61810-1

Model	Contact form	Coil rating	Contact rating	Number of test operations
G6C-1114P-US G6C-1114C-US G6C-1117P-US G6C-1117C-US	SPST-NO	3, 12, 24 VDC	10 A, 250 VAC ($\cos\phi$ = 1) 5 A, 250 VAC ($\cos\phi$ = 0.4)	100,000 operations
G6C-2114P-US G6C-2114C-US G6C-2117P-US G6C-2117C-US	SPST-NO + SPST-NC	Single-stable: 3, 5, 12, 24 VDC Latching: 5 VDC G6CU-2117P-VD: 3 VDC	7 A, 250 VAC ($\cos\phi$ = 1) 3.5 A, 250 VAC ($\cos\phi$ = 0.4)	100,000 operations

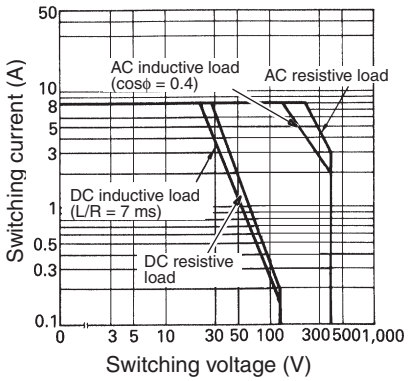
Engineering Data

Maximum Switching Capacity

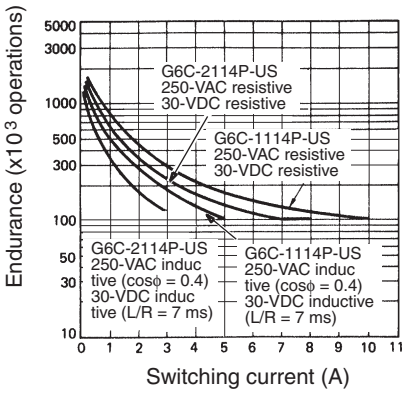
SPST-NO



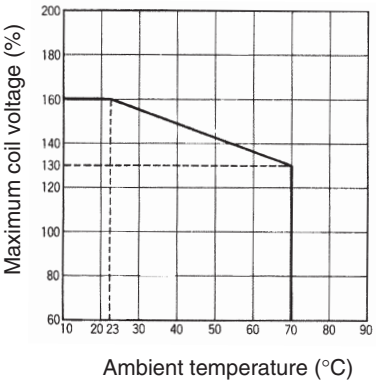
SPST-NO + SPST-NC



Service Life



Ambient Temperature vs. Maximum Coil Voltage



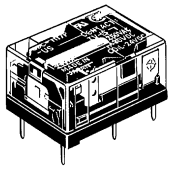
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

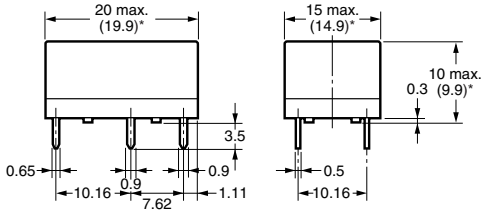
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation mark is indicated as follows: □

■ Non-latching

G6C-□117P-US

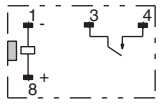




*Average value

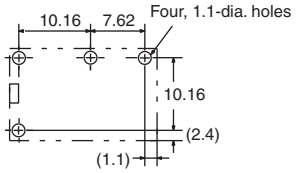
G6C-1117P-US, G6C-1117C-US
G6C-1114P-US, G6C-1114C-US

Terminal Arrangement/Internal Connections (Bottom View)

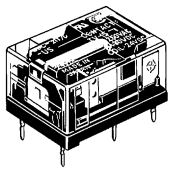


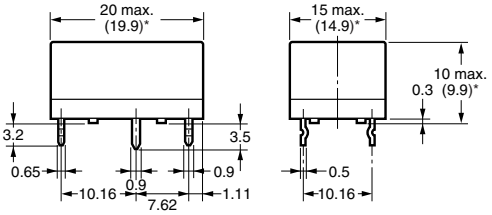
Mounting Holes (Bottom View)

Tolerance: ±0.1



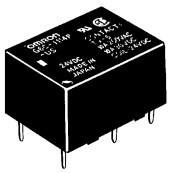
G6C-□117C-US

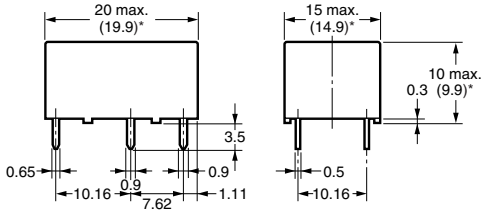




*Average value

G6C-□114P-US

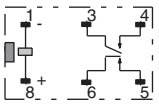




*Average value

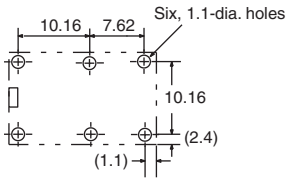
G6C-2117P-US, G6C-2117C-US
G6C-2114P-US, G6C-2114C-US

Terminal Arrangement/Internal Connections (Bottom View)

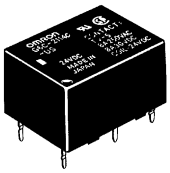


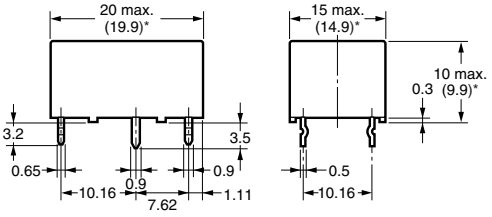
Mounting Holes (Bottom View)

Tolerance: ±0.1



G6C-□114C-US

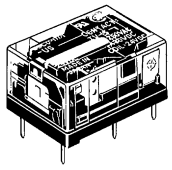


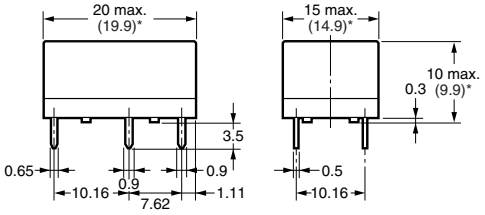


*Average value

■ Single Coil Latching

G6CU-□117P-US

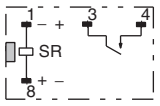




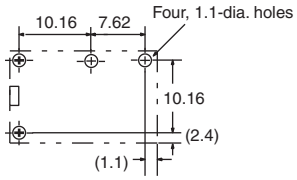
*Average value

G6CU-1117P-US, G6CU-1117C-US
G6CU-1114P-US, G6CU-1114C-US

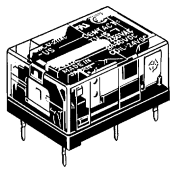
Terminal Arrangement/Internal Connections (Bottom View)

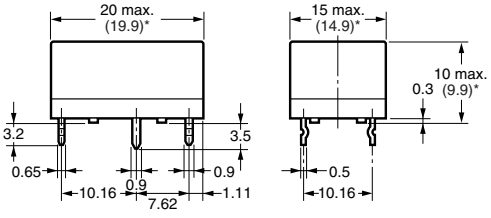


Mounting Holes (Bottom View)



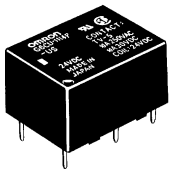
G6CU-□117C-US

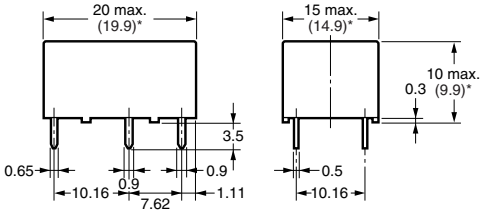




*Average value

G6CU-□114P-US

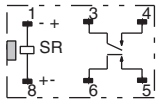




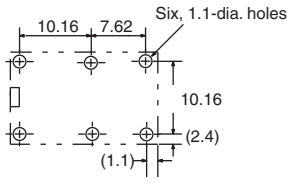
*Average value

G6CU-2117P-US, G6CU-2117C-US
G6CU-2114P-US, G6CU-2114C-US

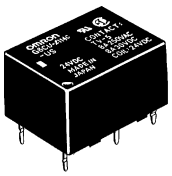
Terminal Arrangement/Internal Connections (Bottom View)

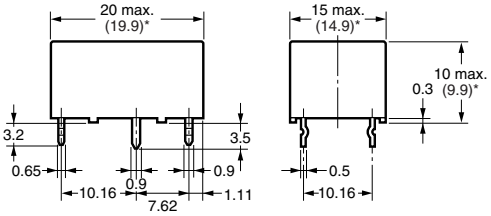


Mounting Holes (Bottom View)



G6CU-□114C-US

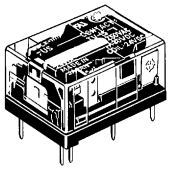


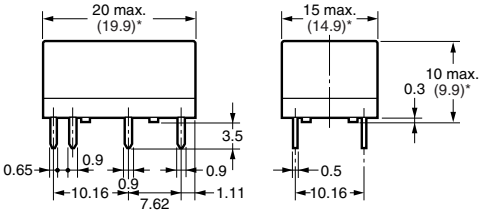


*Average value

■ Dual Coil Latching

G6CK-□117P-US

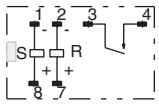




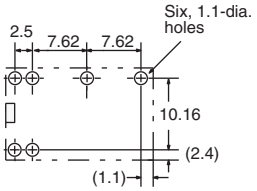
*Average value

G6CK-1117P-US, G6CK-1117C-US
G6CK-1114P-US, G6CK-1114C-US

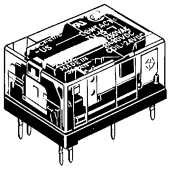
Terminal Arrangement/Internal Connections (Bottom View)

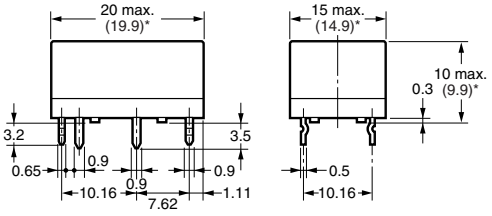


Mounting Holes (Bottom View)



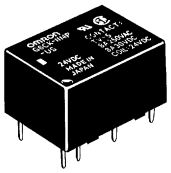
G6CK-□117C-US

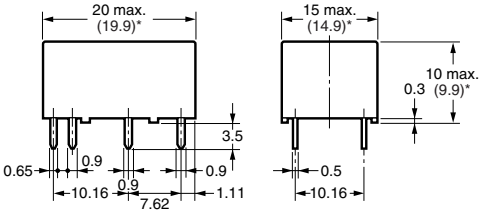




*Average value

G6CK-□114P-US

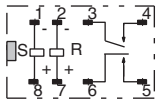




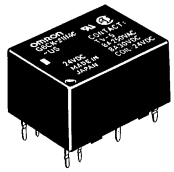
*Average value

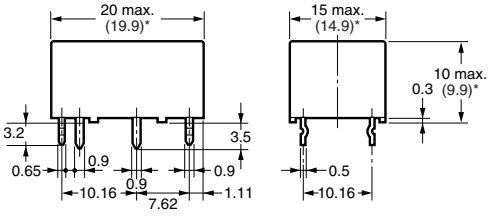
G6CK-2117P-US, G6CK-2117C-US
G6CK-2114P-US, G6CK-2114C-US

Terminal Arrangement/Internal Connections (Bottom View)



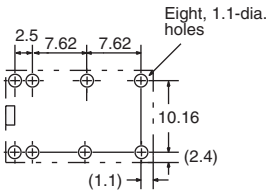
G6CK-□114C-US





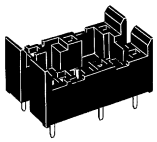
*Average value

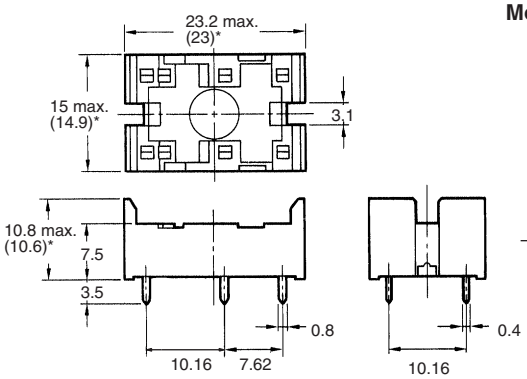
Mounting Holes (Bottom View)



■ Accessories

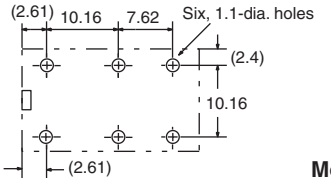
Back Connecting Sockets
P6C-06P



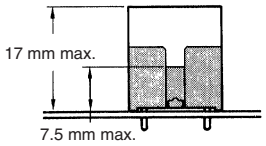


*Average value

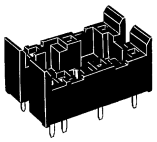
Mounting Holes (Bottom View)

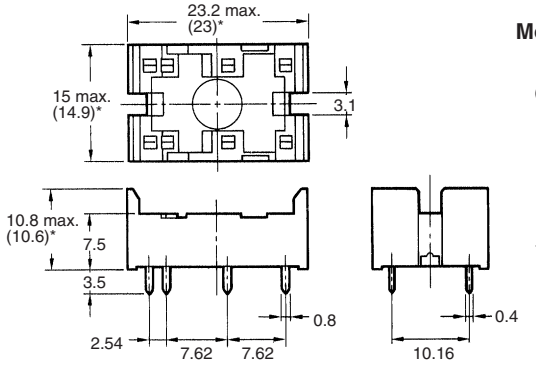


Mounting Height of Relay with Connecting Socket



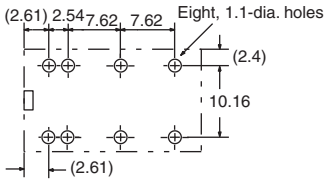
P6C-08P





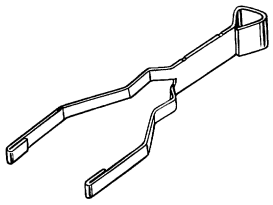
*Average value

Mounting Holes (Bottom View)

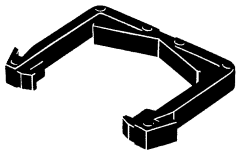


Note: Rated current of socket max. 5 A

Removal Tool
P6B-Y1



Hold-down Clips
P6B-C2

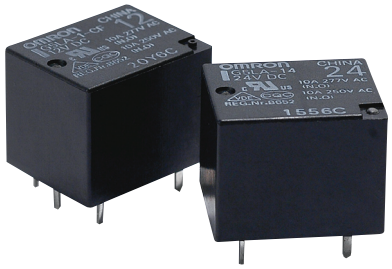


MEMO

PCB Relay
G5LA

A Cubic, Single-pole 10A Power Relay

- Economical cube relay with universal terminal footprint
- Conforms to VDE0435, CQC
- UL recognized/ CSA certified.
- High switching power: 10A @ 250VAC
- Withstands impulse of up to 4,500V
- Coil power consumption: 360mW
- UL Class F coil insulation type also available
- Tracking resistance: CTI>250
- RoHS Compliant



Ordering Information

Type	Contact form	Enclosure ratings	Model
Standard	SPST-NO (Class A)	Flux protection	**G5LA-1A**
		Sealed	**G5LA-1A4**
	SPST-NO (Class F)	Flux protection	**G5LA-1A-CF**
		Sealed	**G5LA-1A4-CF**
	SPDT (Class A)	Flux protection	**G5LA-1**
		Sealed	**G5LA-14**
	SPDT (Class F)	Flux protection	**G5LA-1-CF**
		Sealed	**G5LA-14-CF**
High-capacity	SPDT (Class A)	Flux protection	**G5LA-1-E**
		Sealed	**G5LA-14-E**
	SPDT (Class F)	Flux protection	**G5LA-1-E-CF**
		Sealed	**G5LA-14-E-CF**

Note: When ordering, add the rated coil voltage to the model number.
Example: G5LA-1 DC12
Rated coil voltage

■ Model Number Legend

G5LA- □ □ □ - □ - □ **DC** □
1 2 3 4 5 6

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   A: SPST-NO
3. **Enclosure Ratings**
   None: flux protection
   4: fully sealed
4. **Type**
   None: Standard
   E: High Capacity (SPDT only)
5. **Insulation Class**
   None: Class A
   CF: Class F
6. **Rated Coil Voltage**
   5, 9, 12, 24, or 48

Specifications

■ Coil Ratings

Rated Voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Must operate voltage	Must release voltage	Rated power consumption (W)	Max voltage
5	72	69.4	75% max.	10% min.	Approx. 0.36	130% of rated voltage at 85°C 170% of rated voltage at 23°C
9	40	225				
12	30	400				
24	15	1600				
48	10	4800			Approx. 0.48	

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±10%.

2. Please avoid ultrasonic cleaning this relay.

■ Contact Ratings

Rated load (resistive)	**SPST-NO**	10 A @ 250 VAC (NO)	10 A @ 24 VDC (NO)
	SPDT	5 A @ 125 VAC (NO/NC)	5 A @ 24 VDC (NO/NC)
	High-capacity	5 A @ 250 VAC (NO/NC)	5 A @ 24 VDC (NO/NC)
Rated carry current		10 A (SPST-NO) 10 A (High-capacity) 5 A (SPDT)	
Max. switching voltage		250 VAC	24 VDC
Max. switching current		10 A	SPST-NO
		5 A	SPDT, High-capacity
Max. switching capacity		2500 VA, 240 W (NO) 625 VA, 120 W (NC)	1250 VA, 120 W (NO/NC High-capacity)
Min. permissible load		100 mA at DC5V (P level: $\lambda_{60} = 0.1 \times 10^{-6}$ / ops)	
Contact Material		$AgSnO_2$	

Note: SPDT type can switch up to 10 A @ 250 VAC/24 VDC Resistive Load on NO contact if there is no load on the NC contact.

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max.
Release time	5 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 minute between coil and contacts 750 VAC, 50/60 Hz for 1 minute between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr under no load) Electrical: 100,000 operations average. (at 1,800 operations/hr under rated load)
Ambient temperature	Operating:- 40°C to 85°C (with no icing or condensation) Storage: -40°C to 85°C (with no icing or condensation)
Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%
Weight	Approx. 7.5g

Note: 1. Data shown are of initial value.

2. All G5LA Class A rated relays are factory guaranteed to maximum Operating Temperature of 85°C.
UL rated maximum temperature is pending approval for Class B rating.

■ Approved Standards

UL Recognized (File No. E41643) & CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5LA	5 to 48 VDC	NO: 10 A, 277 VAC, general use,100,000 cycles 10 A, 30 VDC, resistive, 50,000 cycles 1/2 HP, 125-250VAC, 1,000 cycles 10 A, 277 VAC, general use, 85°C 50,000 cycles (-CF type only) 200 W Tungsten, 125 VAC, 100,000 cycles NC: 10 A, 125 VAC, resistive 10 A, 277 VAC, general use, 100,000 cycles (-E type only) 10A, 24 VDC, resistive, 100,000 cycles (-E type only)

VDE0435 (EN61810-1)

Model	Coil rating	Contact rating
G5LA	5,9,12,24,48 VDC	NO: 10 A, 250 VAC, resistive, 85°C - flux protection: 50,000 cycles - fully sealed: 10,000 cycles 12 A, 125 VAC, resistive, 85°C, 10,000 cycles CO: 5 A, 250 VAC, resistive, 85°C - flux protection: 50,000 cycles - fully sealed: 10,000 cycles

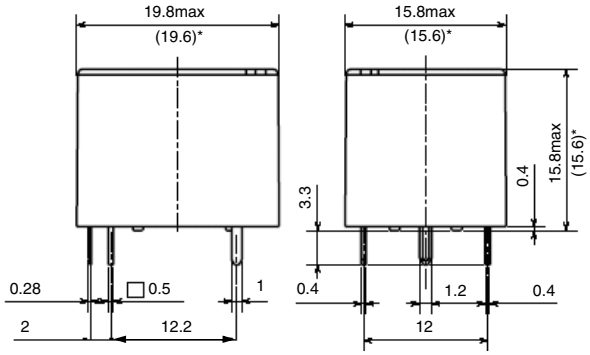
CQC

Model	Coil rating	Contact rating
G5LA	5,9,12,24,48 VDC	NO: 10 A, 250 VAC, resistive, 10,000 cycles 12 A, 120 VAC, resistive, 10,000 cycles

Dimensions

Note: All units are in millimeters unless otherwise indicated.

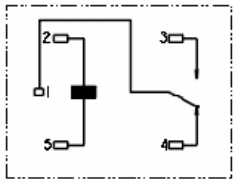
■ SPDT Models



*Average value

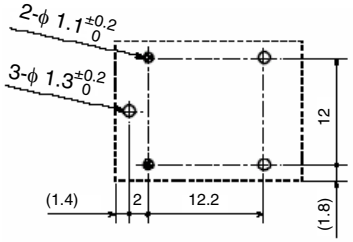
Terminal Arrangement/Internal Connections (Bottom View)

SPDT

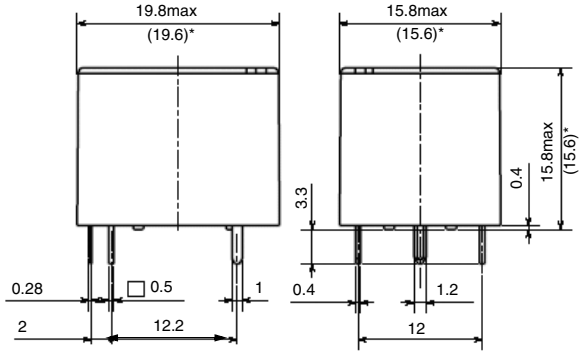


Mounting Holes (Bottom View)
Tolerance: ±0.1 mm
Unless specified

SPDT



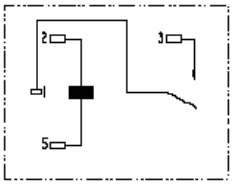
■ SPST-NO Models



*Average value

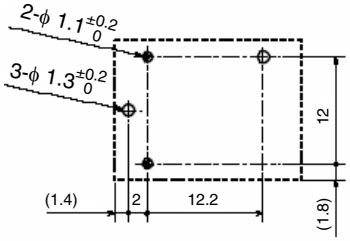
Terminal Arrangement/Internal Connections (Bottom View)

SPST-NO



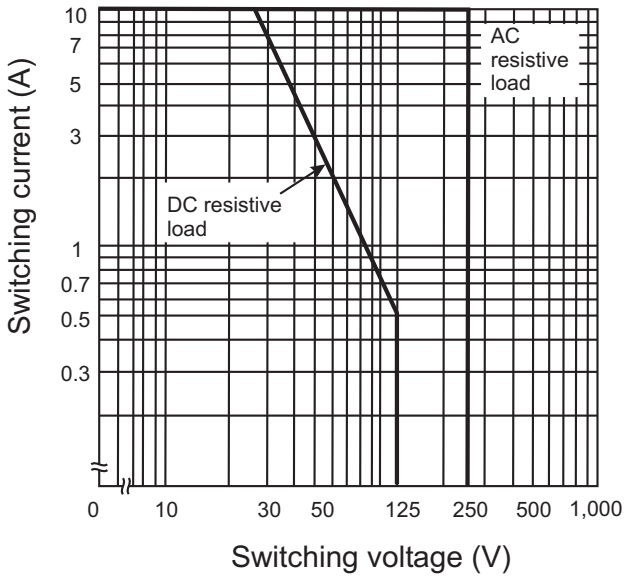
Mounting Holes (Bottom View)
Tolerance: ±0.1 mm
Unless specified

SPST-NO

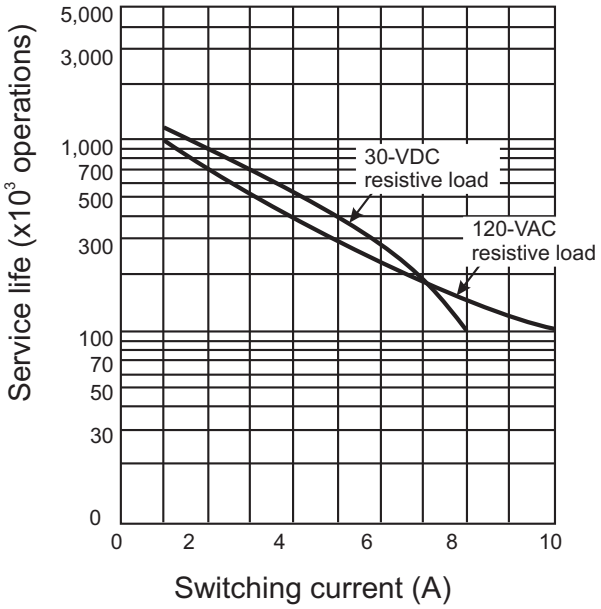


Engineering Data

Maximum switching capacity (NO)

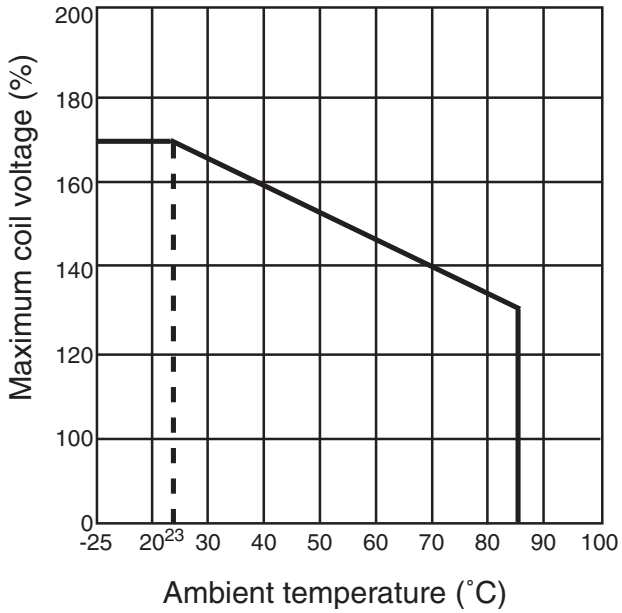


Electrical service life NO (Average value)



Note: The 120 VAC resistive load service life curve also applies for 250 VAC resistive load.

Ambient Temperature vs. Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage not a continuous voltage.

MEMO

PCB Relay
G5LE

A Cubic, Single-pole 10-A Power Relay

- High Capacity (-E) and 0.8mm Contact Gap (-G) versions
- Subminiature “sugar cube” relay with universal footprint.
- Conforms to EN 61810-1. UL recognized/ CSA certified.
- UL class-F coil insulation model available (UL class-B coil insulation for standard model).
- Withstands impulse of up to 4,500 V.
- 400-mW and 360-mW coil power types available.
- RoHS Compliant



Ordering Information

Enclosure ratings	Contact form/Style	Contact material			
		$AgSnO_2$	AgSnIn		
		Standard	Standard	High Capacity	0.8mm Contact Gap
Flux protection	SPDT	**G5LE-1** **G5LE-1-CF**	**G5LE-1-ASI** **G5LE-1-ASI-CF**	**G5LE-1-E**	**G5LE-1-G**
	SPST-NO	**G5LE-1A** **G5LE-1A-CF**	**G5LE-1A-ASI** **G5LE-1A-ASI-CF**	**G5LE-1A-E**	**G5LE-1A-G**
Fully sealed	SPDT	**G5LE-14** **G5LE-14-CF**	**G5LE-14-ASI** **G5LE-14-ASI-CF**	- - -	- - -
	SPST-NO	**G5LE-1A4** **G5LE-1A4-CF**	**G5LE-1A4-ASI** **G5LE-1A4-ASI-CF**	- - -	- - -

Note: When ordering, add the rated coil voltage to the model number.
Example: G5LE-1 DC12
Rated coil voltage

Model Number Legend

G5LE - □ □ □ - □ - □ - □ - □ - □ - □ - DC□
1 2 3 4 5 6 7 8 9 10

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   None: SPDT
   A: SPST-NO
3. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
   (Not applicable with -E and -G versions)
4. **Contact Material**
   None: $AgSnO_2$ (AgSnIn for -E and -G versions)
   ASI: AgSnIn
5. **Insulation System**
   None: Class B (Class F for -E and -G versions)
   CF: Class F (UL and CSA only)
6. **Coil Power Consumption/Coil Characteristic**
   None: Approx. 400 mW (Approx. 700mW for -G versions)
   36: Approx. 360 mW (Not applicable for -G versions)
7. **Approved Standards**
   G: 0.8mm contact gap type
   E: High capacity type
8. **Approved Standards**
   None: UL, CSA, and VDE
9. **Packaging**
   None: Standard polystyrene tray
   SP: Anti-static tube packaging
10. **Rated Coil Voltage**
    5, 9, 12, 24, 48 VDC

Specifications

■ Coil Ratings

700-mW Type (G5LE-G)

Rated voltage	9 VDC	12 VDC	20 VDC	48 VDC
Rated current	77.8mA	58.3mA	35.0mA	29.2mA
Coil resistance	115.7 Ω	205.7 Ω	571.4 Ω	822.9 Ω
Must operate voltage	75% max. of rated voltage (max.)			
Must release voltage	10% min. of rated voltage (min.)			
Max. voltage	120% of rated voltage at 85°C, 150% of rated voltage at 23°C			
Power consumption	Approx. 700 mW			

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

400-mW Type

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	79.4 mA	45 mA	33.3 mA	16.7 mA	8.33 mA
Coil resistance	63 Ω	200 Ω	360 Ω	1,440 Ω	5,760 Ω
Must operate voltage	75% max. of rated voltage (max.)				
Must release voltage	10% min. of rated voltage (min.)				
Max. voltage	130% of rated voltage at 85°C, 170% of rated voltage at 23°C				
Power consumption	Approx. 400 mW				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

360-mW Type

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	72 mA	40 mA	30 mA	15 mA	7.5 mA
Coil resistance	70 Ω	225 Ω	400 Ω	1,600 Ω	6,400 Ω
Must operate voltage	75% max. of rated voltage (max.)				
Must release voltage	10% min. of rated voltage (min.)				
Max. voltage	130% of rated voltage at 85°C, 170% of rated voltage at 23°C				
Power consumption	Approx. 360 mW				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Contact Ratings

	Standard	G5LE-G	G5LE-E
Load	Resistive load ($\cos\phi = 1$)		
Rated load	10 A at 120 VAC; 8 A at 30 VDC 10A at 240VAC (12 and 24 VDC coil)	10A at 35VDC	16A at 250VAC
Contact Material	$AgSnO_2$ (AgSnIn optional)	AgSnIn	AgSnIn
Rated carry current	10 A	10A	16A
Max. switching voltage	250 VAC, 125 VDC (30 VDC when UL/CSA standard is applied)	35VDC	250VAC
Max. switching current	AC: 10 A; DC: 8 A	DC: 10A	AC: 16A
Max. switching power	1,200 VA, 240 W	350W	4,000VA
Minimum Permissible Load (See note)	100 mA at 5 VDC		

Note: Reference value - P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

■ Characteristics

Contact resistance		100 mΩ max.
Operate time		10 ms max.
Release time		5 ms max.
Bounce Time		Operate: Approx. 0.6ms Release: Approx. 7.2ms
Max. switching frequency		Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr at rated load
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity 1,500 VAC (for suffix -G) 50/60Hz for 1 min between contacts of same polarity
Impulse withstand voltage		4,500 V (1.2 x 50 μs) between coil and contacts
Insulation Distance	**Creepage (Typ)**	3.3 mm
	Clearance (Typ)	2.7 mm
Tracking Resistance (CTI)		250 V
Vibration resistance		Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance		Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Endurance		Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) for standard type 36,000 operations min. (10A at 250VAC) 100,000 operations min. (at 1,800 operations/hr), 12A 250 VAC) - applicable for G5LE-1-E,NO contact only
Ambient temperature		Operating: −25°C to 85°C (with no icing)
Ambient humidity		Operating: 5% to 85%
Weight		Approx. 12 g

■ Approved Standards

UL Recognized (File No. E41643)
CSA Certified (File No. LR34815)

Model	Coil rating	Contact rating
G5LE	3 to 48 VDC (Standard) 5 to 24 VDC (-E versions) 9 to 24 VDC (-G versions)	10 A, 250 VAC (general use), 6,000 cycles, 40°C (excluding -G type) 10 A, 125 VAC (general use), 100,000 cycles, 40°C (excluding -E, -G types) 8 A, 30 VDC (resistive load), 6,000 cycles, 40°C (excluding -E, -G types) 125 VA, 125 VAC, pilot duty, 100,000 cycles, 105°C (excluding -G type) NO: 13 A, 120 VAC, resistive, 100,000 cycles, 85°C ($AgSnO_2$ & -E types, only) 1/2 hp, 125 VAC, 100,000 cycles, 40°C (excluding -G type) 1/3 hp, 125 VAC, 30,000 cycles, 70°C ($AgSnO_2$ type only, excluding -E, -G types) 400W-T (3.3A), 120 VAC, tungsten, 100,000 cycles ($AgSnO_2$ type only, excluding -E, -G types) TV-5, 120 VAC, 40°C (-ASI type only, excluding -E, -G types) 12 A, 250 VAC, general use, 100,000 cycles, 1s=on, 1s=off, 105°C (-E type only) TV-8,120 VAC, 25,000 cycles, 40°C (-E type only) 10 A, 35 VDC, resistive, 100,000 cycles, 1s=on, 1s=off, 40°C (-G type only) NC: 12 A, 250 VAC, general use, 30,000 cycles, 1s=on, 9s=off, 40°C (-E type only) 10 A, 35 VDC, resistive, 50,000 cycles, 5s=on, 5s=off, 40°C (-G type only) 1/8 hp, 120 VAC, 50,00 cycles, 40°C ($AgSnO_2$ type only, excluding -E, -G types)

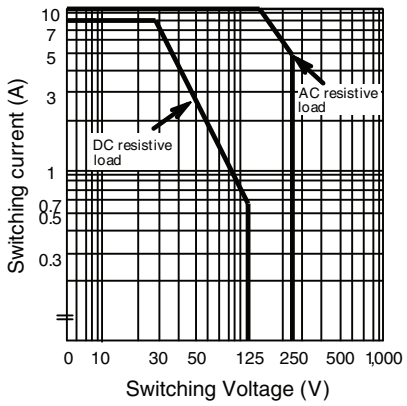
EN 61810-1, EN 60255, IEC (VDE TUV Reg No. R9151267, VDE Reg No. 6850UG)

Model	Coil rating	Contact rating
G5LE	Approx. 400 mW 3, 5, 6, 9, 12, 24, 48 VDC Approx. 360 mW 5, 6, 12, 24, 48 VDC	10A, 250VAC (resistive load, 50,000 cycles at 85°C) 5A, 30VDC 2.5 A, 250 VAC ($\cos\phi = 0.4$)

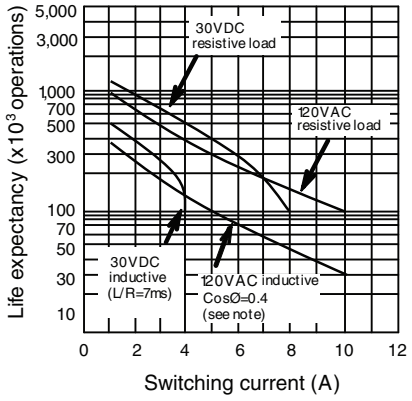
Engineering Data

For standard type

Max. Switching Capacity

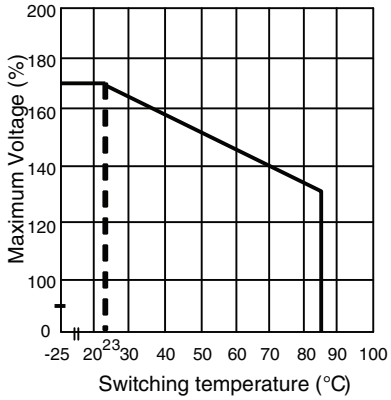


Life Expectancy



Note: Same curve as for 250-VAC resistive load

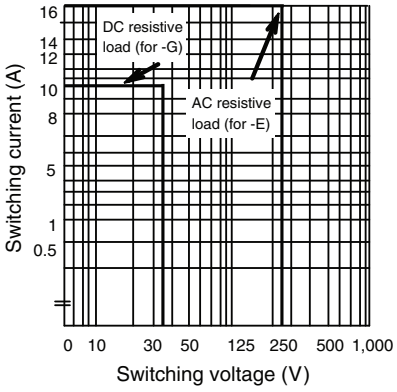
Ambient Temp. Vs. Max. Voltage



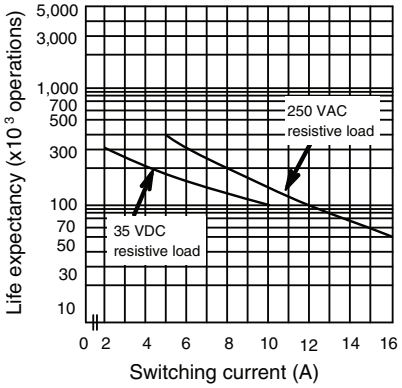
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

For suffix -E and -G

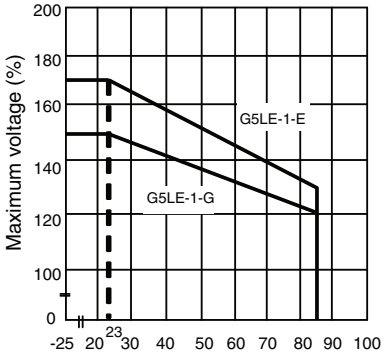
Max. Switching Capacity



Life Expectancy



Ambient Temp. Vs. Max. Voltage

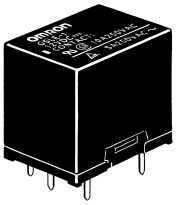


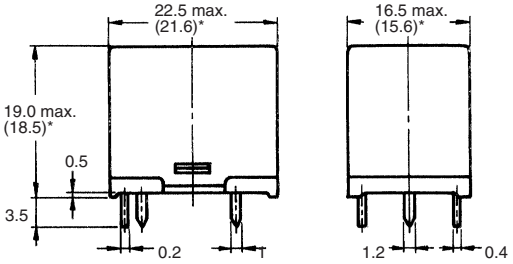
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows: ▭ □

G5LE-1
G5LE-1A

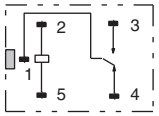




*Average value

Terminal Arrangement/Internal Connections (Bottom View)

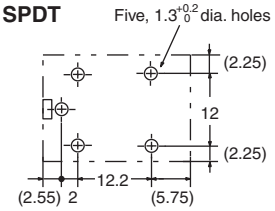
SPDT



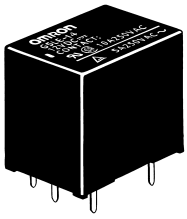
Mounting Holes (Bottom View)

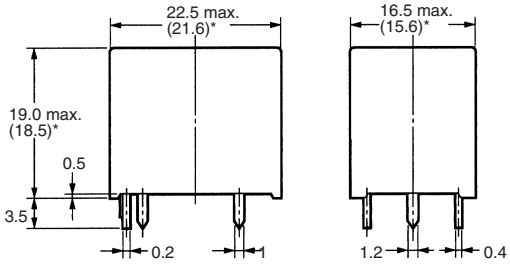
Tolerance: ±0.1 mm unless specified

SPDT



G5LE-14
G5LE-1A4

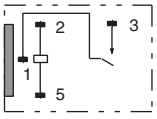




*Average value

Terminal Arrangement/Internal Connections (Bottom View)

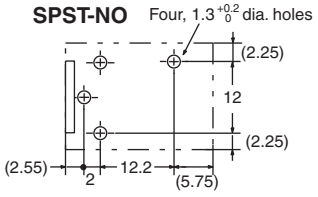
SPST-NO



Mounting Holes (Bottom View)

Tolerance: ±0.1 mm unless specified

SPST-NO

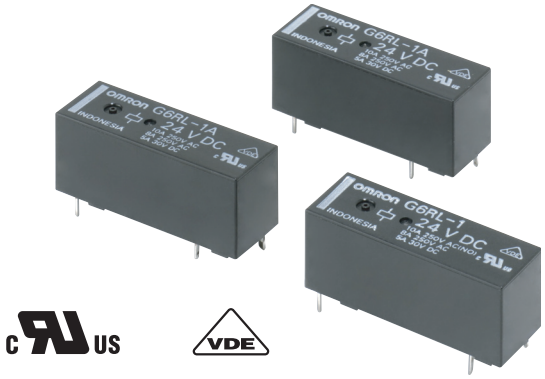


MEMO

PCB Relay
G6RL

Low-profile power relay with maximum switching of 10 A

- Low profile: 12.3 mm in height
- Max. switching capacity: 2,500 VA (NO)
- IEC 60947-5-1, AC-15, DC13
- Clearance and creepage distance: 10 mm.
- Models with high shock resistance (250 m/s^2) are available.
- Models for P1 load (2 × 200 W lamps parallel to ignition transformer) are available.
- RoHS Compliant



Applications:

Boilers, PLCs, I/O ports, timers, and temperature controllers

Ordering Information

Classification	Enclosure rating	Contact form	Contact material	
			AgSnIn	AgNi
Standard	Flux protection	SPST-NO	**G6RL-1A-ASI**	**G6RL-1A**
		SPDT	**G6RL-1-ASI**	**G6RL-1**
	Fully sealed	SPST-NO	**G6RL-1A4-ASI**	---
		SPDT	**G6RL-14-ASI**	---
P1 Load	Flux protection	SPST-NO	**G6RL-1A-ASI-PL**	---
		SPDT	**G6RL-1-ASI-PL**	---
Shock resistance	Flux protection	SPST-NO	---	---
		SPDT	**G6RL-1-SR-ASI**	---
	Fully sealed	SPST-NO	---	---
		SPDT	**G6RL-14-SR-ASI**	---

Note: When ordering, add the rated coil voltage to the model number.

Examples: G6RL-1A DC12
Rated coil voltage

■ Model Number Legend:

G6RL-□□□-□-□-□-□ DC□
1 2 3 4 5 6 7

1. **Number of Poles**
   1: 1 pole
2. **Contact Form/Contact Construction**
   None: SPDT
   A: SPST-NO
3. **Enclosure Rating**
   None: Flux protection
   4: Fully sealed
4. **Special Function 1**
   SR: Shock resistance of 25G
5. **Contact material**
   None: AgNi
   ASI: AgSnIn
6. **Special Function 2**
   PL: P1 load (See note.)
7. **Rated Coil Voltage**
   3, 5, 6, 12, 24, or 48

Note: Please refer to *Endurance Under Real Load* table in this datasheet.

Specifications

■ Coil Ratings

Classification	Standard, P1 load						Shock resistance				
Rated voltage	3 VDC	5 VDC	6 VDC	12 VDC	24 VDC	48 VDC	3 VDC	5 VDC	6 VDC	12 VDC	24 VDC
Rated current	73.3 mA	44 mA	36.7 mA	18.3 mA	9.2 mA	5 mA	101 mA	60.2 mA	50.1 mA	25.2 mA	12.6 mA
Coil resistance	40 Ω	113 Ω	163 Ω	654 Ω	2,618 Ω	9,600 Ω	30 Ω	83 Ω	120 Ω	476 Ω	1,912 Ω
Must operate voltage	70% max. of rated voltage						80% max. of rated voltage				
Must release voltage	10% min. of rated voltage						10% min. of rated voltage				
Max. voltage	150% of rated voltage						150% of rated voltage (23°C)				
Power consumption	Approx. 220 mW					Approx. 240 mW	Approx. 300 mW				

Note: 1. The above items are measured at a coil temperature of 23°C.

2. The tolerance of the rated current is ±10%.

■ Contact Ratings

Load	Resistive load (cos ϕ = 1)
Rated load (See note 1.)	10 A at 250 VAC, NO resistive load 8 A at 250 VAC, resistive load 5 A at 30 VDC, resistive load
Rated carry current	10 A at 250 VAC 5 A at 30 VDC
Max. switching voltage	400 VAC, 300 VDC
Max. switching current	NO: 10 A, NC: 8 A
Max. switching power	NO: 2,500 VA, NC: 2,000 VA 150 W
Failure rate (reference value)	10 mA at 5 VDC (P level) (See note 2.)

Note: 1. G6RL-1(A), G6RL-1(A)4-ASI: 8 A 250 VAC, resistive load; 5 A 24 VDC resistive load.

2. P level: $\lambda\ 60 = 0.1 \times 10^{-6}$ / operations

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	10 ms max. (SR Models: 15 ms max.)
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV between coil and contacts (1.2 × 50 μs)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 to 10 Hz, 0.825-mm single amplitude (1.65-mm double amplitude) when energized. 10 to 55 to 10 Hz, 0.4-mm single amplitude (0.8-mm double amplitude) when not energized.
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: NO: 200 m/s^2, NC: 50 m/s^2 when not energized SR Models: 250 m/s^2 (NO and NC) when not energized
Endurance	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr)
Ambient temperature	Operating: −40°C to 85°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 7.8 g

■ Other Data

Construction of protection	Flux protection	Fully sealed
Insulation material group	IIIa	
Rated insulation voltage	250 V	
Pollution degree	3	2
Rated voltage system	250 V	400 V
Overvoltage category	III	
Creepage distance	10 mm	
Clearance distance	10 mm	
RoHS	Compliant	
Tracking index of relay base	PTI 250	
Flammability class according to UL94	V-0	
Flammability-flame **GWFI (IEC 60695-2-12)** **GWIT (IEC 60695-2-13)**	 850°C 750°C	
Ball pressure test (IEC 60695-10-2)	170°C	

■ Approved Standards

UL Recognized (File No. E41643) - - Ambient Temp. = 85°C

Models	Contact form	Coil rating	Contact rating	
G6RL-1A	SPST-NO	3 to 48 VDC	10 A at 250 VAC (NO) (Resistive) 8 A at 250 VAC (Resistive) 5 A at 30 VDC (Resistive)	6,000 operations
G6RL-1	SPDT			
G6RL-1A(4)-ASI	SPST-NO			
G6RL-1(4)-ASI	SPDT			
G6RL-1(4)-SR-ASI	SPDT	3 to 24 VDC		

VDE (EN61810-1) (Certificate No.C266)

Models	Contact form	Coil rating	Contact rating	Model
G6RL-1A-(ASI)	SPST-NO	3, 5, 6, 12, 24, or 48 VDC	10 A at 250 VAC (NO)	10,000 operations at 85°C
G6RL-1-(ASI)	SPDT		8 A at 250 VAC	30,000 operations at 85°C
			5 A at 30 VDC	50,000 operations at 85°C
G6RL-1A4-ASI (See note.)	SPST-NO	3, 5, 6, 12, 24, or 48 VDC	10 A at 250 VAC (NO)	10,000 operations at 85°C
G6RL-14-ASI (See note.)	SPDT		8 A at 250 VAC	10,000 operations at 85°C
			5 A at 30 VDC	10,000 operations at 85°C
G6RL-1(4)-SR-ASI	SPDT	3, 5, 6, 12 or 24 VDC	10 A at 250 VAC (NO)	10,000 operations at 85°C
			8 A at 250 VAC	10,000 operations at 85°C
			5 A at 30 VDC	10,000 operations at 85°C

Note: In progress

VDE (60947-5-1) (Certificate No. C266)

Models	Contact rating			
	Utilization category		Rated voltage (V)	Operations
G6RL-1(A)	AC15 (NO)	Ie: 3 A, Ithe: 10 A (A300)	AC240	6,000
	AC15 (NO)	Ie: 3 A, Ithe: 5 A (B300)	AC120	6,000
	AC15 (NO)	Ie: 1.5 A, Ithe: 5 A (B300)	AC240	6,000
	DC13	Ie: 0.22A, Ithe: 1A (R150)	DC125	6,000
	DC13 (See note.)	Ie: 0.1 A, Ithe: 1 A (R300)	DC250	6,000
G6RL-1(A)-ASI G6RL-1(A)4-ASI (See note.) G6RL-1(4)-SR-ASI	AC15	Ie: 3 A, Ithe: 10 A (A300)	AC240	6,000
	AC15	Ie: 3 A, Ithe: 5 A (B300)	AC120	6,000
	AC15	Ie: 1.5 A, Ithe: 5 A (B300)	AC240	6,000
	DC13	Ie: 0.22 A, Ithe: 1 A (R150)	DC125	6,000
	DC13 (See note.)	Ie: 0.1 A, Ithe: 1 A (R300)	DC250	6,000

Note: 1. In progress
2. All ratings are valid at Room Temperature

VDE (60947-4-1) (Certificate No. C266)

Models	Contact rating			
	Utilization category		Rated voltage (V)	Operations
G6RL-1(A) G6RL-1(A)-ASI (See note.)	AC1	8 A	AC250	6,000
	AC3	2 A	AC250	6,000
	DC1	5 A	DC24	6,000
	DC3	2 A	DC24	6,000

Note: 1. In progress
2. All ratings are valid at Room Temperature

VDE (EN60730-1) (Certificate No. C266)

Models	Contact rating			
	Utilization category		Rated voltage (V)	Operations
G6RL-1(A)	2 (2) A	65°C	AC250	100,000
	8 (4) A (NO)	85°C	AC250	100,000
	6 (4) A (NO)	85°C (See note.)	AC250	100,000
	6 (4)A (NO)	65°C	AC250	100,000
	6 (4) A (NC)	65°C	AC250	100,000
G6RL-1(A)-ASI (See note.)	2 (2) A	65°C	AC250	100,000
	8 (4) A (NO)	85°C	AC250	100,000
	6 (4) A (NO)	85°C	AC250	100,000
	6 (4) A (NC)	65°C	AC250	100,000

Note: In progress

Electrical Endurance Data

G6RL-1(A)	8 A at 250 VAC (cosϕ = 1) NO	50,000 operations min.
	8 A at 250 VAC (cosϕ = 1) NC	50,000 operations min.
	5 A at 24 VDC	50,000 operations min.
G6RL-1(A)-(SR)-ASI-(PL)	10 A at 250 VAC (cosϕ = 1) NO	100,000 operations min.
	8 A at 250 VAC (cosϕ = 1)	100,000 operations min.
	5 A at 30 VDC	50,000 operations min.
G6RL-1(A)4-ASI	8 A at 250 VAC (cosϕ = 1) NO	50,000 operations min.
	8 A at 250 VAC (cosϕ = 1) NC	50,000 operations min.
	5 A at 24 VDC	50,000 operations min.
G6RL-14-SR-ASI	8 A at 250 VAC (cosϕ = 1) NO	50,000 operations min.
	3 A at 250 VAC (cosϕ = 1) NC	100,000 operations min.
	5 A at 24 VDC NO	50,000 operations min.
	5 A at 24 VDC NC	30,000 operations min.

Endurance Under Real Load (Reference Only)

G6RL-1(A)-ASI-PL

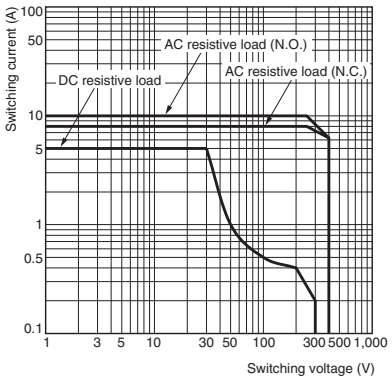
Rated voltage	Condition	Frequency	Electrical life
230 VAC	P1 load (2 × 200 W lamps parallel to ignition transformer)	1.5 s ON/4.5 s OFF	250,000 operations

Note: The results shown reflect values measured using very severe test conditions, i.e., Duty: 1 s ON/OFF.
Electrical endurance will vary depending on the test conditions. Contact your OMRON representative if you require more detailed information for the electrical endurance under your test conditions.

Engineering Data

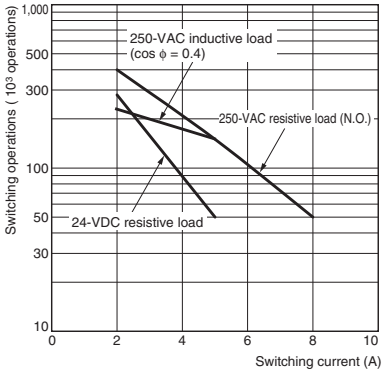
G6RL-1(A)(4)-(SR)-(ASI)-(PL)

Maximum Switching Capacity



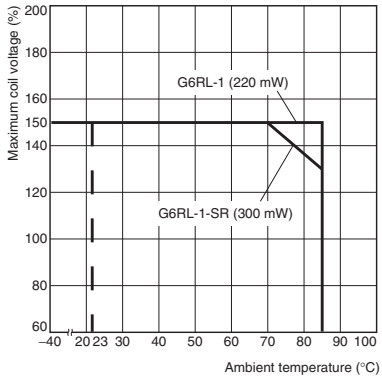
G6RL-1(A)

Endurance



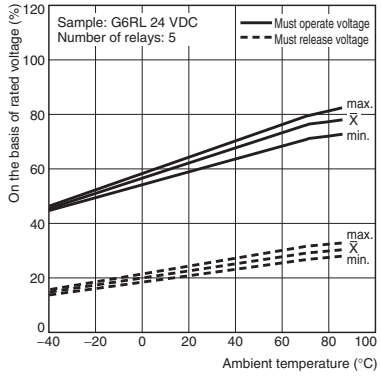
G6RL-1(A)(4)-(SR)-(ASI)-(PL)

Ambient Temperature vs. Maximum Coil Voltage



G6RL-1(A)(4)-(ASI)-(PL)

Ambient Temperature vs. Must Operate or Must Release Voltage

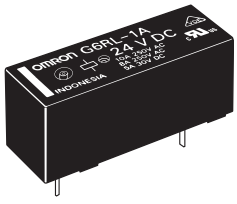


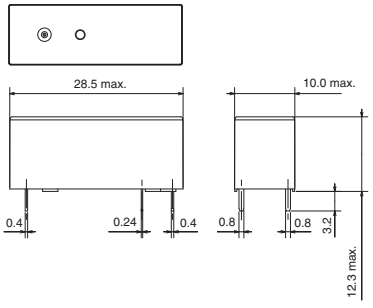
Note: The “maximum coil voltage” refers to the maximum value in a varying range of operating voltage, not a continuous voltage.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G6RL-1A(-ASI)
G6RL-1A4(-ASI)

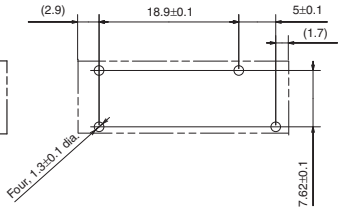




Terminal Arrangement/ Internal Connections (Bottom View)

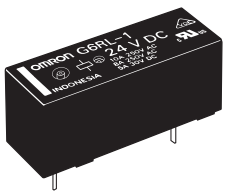


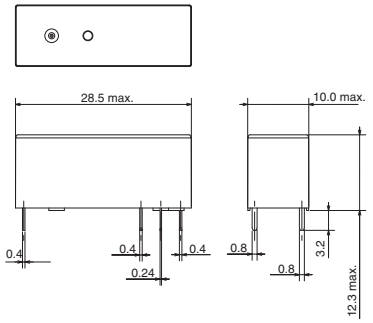
Mounting Holes (Bottom View)



Note: Indicates average dimensions.

G6RL-1(-ASI)
G6RL-14(-ASI)

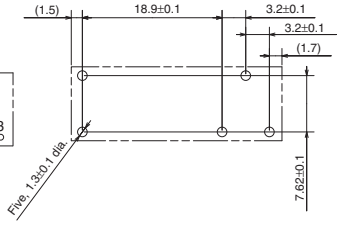




Terminal Arrangement/ Internal Connections (Bottom View)



Mounting Holes (Bottom View)

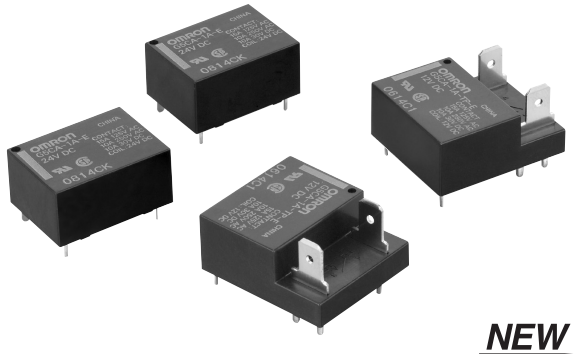


Note: Indicates average dimensions.

PCB Relay
G5CA

Flat Relays that Switch 10-A/15-A Loads with New Quick-connect Terminals

- Ideal for switching power in household appliances or for outputs from industrial devices.
- Subminiature dimensions: 16 x 22 x 11 mm (L x W x H).
- High-sensitivity models available with low power consumption (150 mW).
- UL recognized / CSA certified.
- Fully sealed models and quick-connect terminal models available (#187 load contact terminals).
- RoHS Compliant.



NEW

Ordering Information

To order: Select the part number and add the rated coil voltage to the part number. Example: G5CA-1A4-H *DC12*.

Item		Model			
Enclosure Ratings	**Contact configuration**	**Standard**	**High-sensitivity**	**High-capacity**	**Quick-connect terminals (#187)**
Flux protection	SPST-NO	**G5CA-1A**	**G5CA-1A-H**	**G5CA-1A-E**	**G5CA-1A-TP-E**
Fully sealed		**G5CA-1A4**	**G5CA-1A4-H**	---	---

Note: 1. Contact your OMRON representative for details on other coil voltage specifications.
2. High-capacity models with a fully sealed structure are not available.
3. Standard or high-sensitivity models with quick-connect terminals are not available.

■ Model Number Legend

G5CA-1A□-□-□-□-□
1 2 3 4 5

1. **Number of Poles**
   1A: 1 pole (SPST-NO)
2. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
3. **Terminal form**
   None: PCB terminal
   TP: Quick-connect terminal (#187)
4. **Special functions**
   None: Standard
   E: High-capacity
5. **Coil consumption**
   None: Standard
   H: High-sensitivity

Standard Specifications

Contact Configuration: SPST-NO
Enclosure Ratings: Flux protection
Terminal form: PCB terminal

Specifications

■ Coil Ratings

Item	Standard, high-capacity, or quick-connect terminals			High-sensitivity		
	5 VDC	12 VDC	24 VDC	5 VDC	12 VDC	24 VDC
Rated current	40 mA	16.7 mA	8.3 mA	30 mA	12.5 mA	6.25 mA
Coil resistance	125 Ω	720 Ω	2,880 Ω	167 Ω	960 Ω	3,840 Ω
Must-operate voltage	75% of rated voltage (max.)			80% of rated voltage (max.)		
Must-release voltage	10% of rated voltage (min.)					
Max. voltage	150% (standard)/130% (high-capacity, quick-connect terminals) of rated voltage (at 23°C)			150% of rated voltage at 23°C		
Power consumption	Approx. 200 mW			Approx. 150 mW		

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with a tolerance of ±10%.

2. The operating characteristics are measured at a coil temperature of 23°C.

3. The "maximum voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Item	Standard		High-sensitivity		High-capacity, or quick-connect terminals	
	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Contact form	Single					
Contact material	Silver alloy					
Rated load	10 A at 250 VAC; 10 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	10 A at 250 VAC; 10 A at 30 VDC	3 A at 250 VAC; 3 A at 30 VDC	15 A at 110 VAC; 10 A at 30 VDC	5 A at 110 VAC; 3 A at 30 VDC
Rated carry current	10 A		10 A		15 A	
Max. switching voltage	250 VAC, 125 VDC					
Max. switching current	10 A		10 A		15 A	
Max. switching power (reference value)	2,500 VA, 300 W	750 VA, 90 W	2,500 VA, 300 W	750 VA, 90 W	2,500 VA, 300 W	750 VA, 90 W

■ Characteristics

Contact resistance (see note 2)	30 mΩ max. (quick-connect terminals type: 100 mΩ max.)
Operate time (see note 3)	10 ms max. (15 ms max.)
Release time	10 ms max.
Insulation resistance (see note 4)	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min. between coil and contacts 1,000 VAC, 50/60 Hz for 1 min. between contacts of same polarity
Impulse withstand voltage	4,500 V (1.2 x 50 μs)
Vibration resistance	Destruction: 10 to 55Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (Approx. 100 G) Malfunction: 200 m/s^2 (Approx. 20 G)
Life expectancy	Mechanical: 20,000,000 operations min. at 18,000 operations/hr Electrical: • 300,000 operations min. (100,000 operations min. for Fully sealed Type) at 1,200 operations/hr under resistive load of 10 A at 250 VAC; • 100,000 operations min. under resistive load of 15 A at 110 VAC for high-capacity models • 100,000 operations min. at 1,200 operations/hr under resistive load of 10 A at 30 VDC
Minimum permissible load (reference value: see note 5)	5 VDC, 100 mA
Ambient temperature	Operating: -25°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 8 g (for TP model: Approx. 9.6 g)

Note: 1. The data shown above are initial values.

2. Measurement conditions: 5 VDC, 1 A, voltage drop method.

3. Measurement conditions: The value in parentheses indicates the operate time for high-sensitivity types.

4. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

5. This value is for a switching frequency of 120 operations/minute. (P level: $\lambda_{60} = 0.1 \times 10^{-5}$ operations)

■ Approved Standards

• The following UL-, CSA-, and EN/TÜV-certifying ratings differ from the performance characteristics of the individual models.

UL Recognized (File No. E41515) - - Ambient Temp. = 40°C

Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	5 to 100 VDC	15 A, 125 VAC (General purpose) 10 A, 250 VAC (General purpose) 10 A, 30 VDC (Resistive)	100,000

CSA Certified (File No. LR31928)

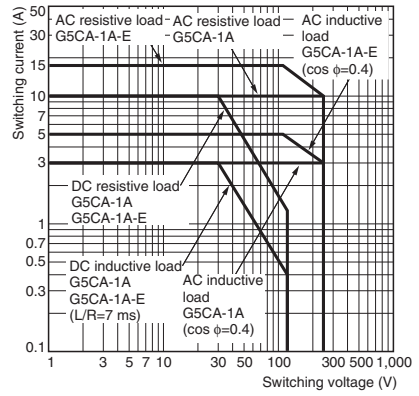
Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	5 to 100 VDC	15 A, 125 VAC (General purpose) 10 A, 250 VAC (General purpose) 10 A, 30 VDC (Resistive)	100,000

EN Standard/TÜV Certificated: EN61810-1 (Certification No. R50030053)

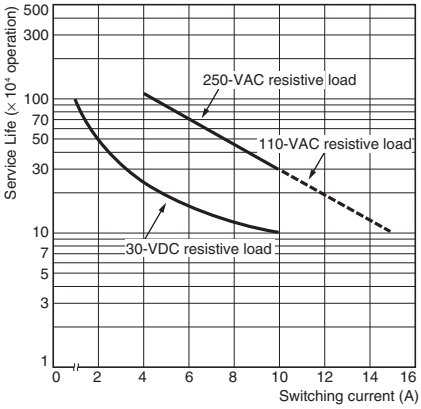
Model	No. of poles	Coil rating	Contact rating	No. of operations
G5CA	1	3, 5, 6, 12, 24, 48 VDC	15 A, 125 VAC ($\cos\phi$ = 1.0)	100,000
			15 A, 250 VAC ($\cos\phi$ = 1.0)	
			10 A, 30 VDC ($\frac{L}{R}$ = 0 ms)	

Engineering Data

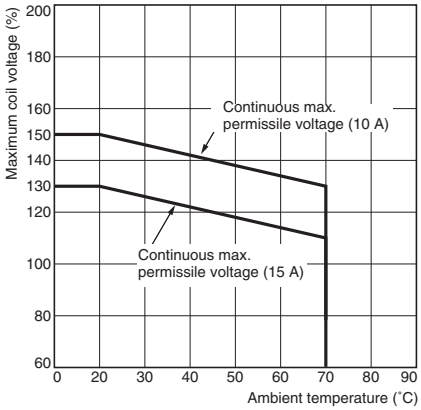
Maximum Switching Capacity



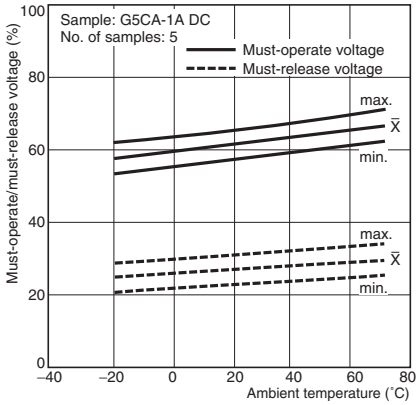
Electrical Service Life



Ambient Temperature vs. Maximum Coil Voltage

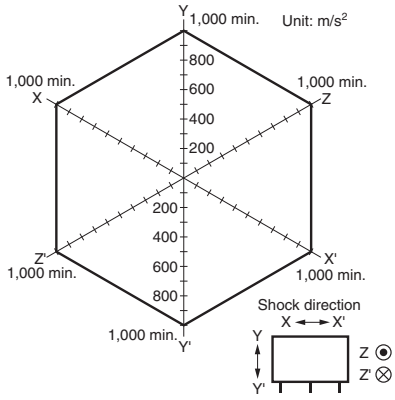


Operating Temperature vs. Must-operate/Must-release Voltage



Note: The "maximum voltage" is the maximum voltage that can be applied to the relay coil, but, not continously.

Malfunction Shock

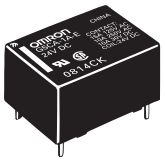


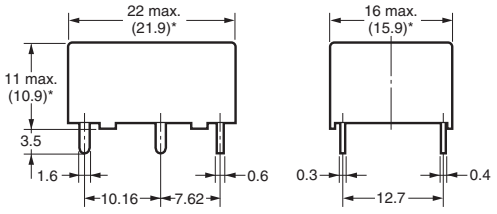
No. of samples: 10
Measured value: The value at which malfunction occurs in the contact when the contact is subjected to shock three times each in six directions for three axes.
Standard: 200 m/s²

Dimensions

Note: All units are in millimeters unless otherwise indicated.

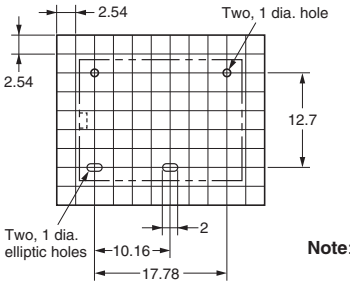
G5CA-1A(-E)
G5CA-1A4(-H)



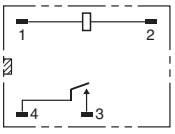


* Average value

Mounting Holes (PCB)
(BOTTOM VIEW)
Tolerance: ±0.1 mm



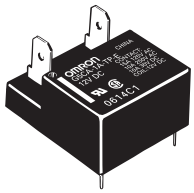
Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)

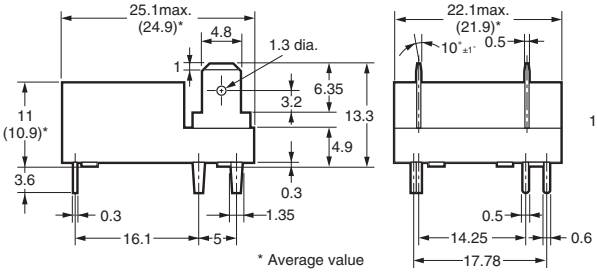


(No coil polarity)

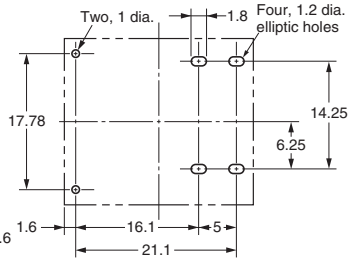
Note: Orientation marks are indicated as follows: ▨

G5CA-1A-TP-E

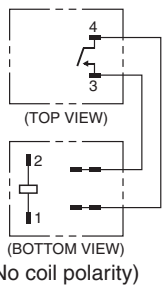




Mounting Holes
(BOTTOM VIEW)
Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)



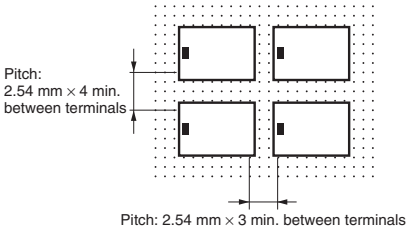
(No coil polarity)

Precautions

■ Precautions for Correct Use

Installation

Make sure that sufficient space is provided between relays when installing two or more relays side by side to facilitate heat dissipation. Insufficient heat dissipation may result in the relay malfunctioning.



Quick-connect Terminal Connections

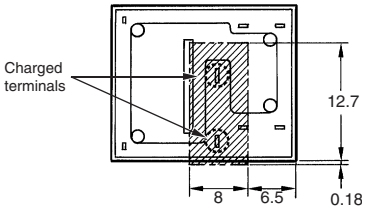
- Do not pass current through the PCB of the load contact terminals (quick-connect terminals).
- The terminals are compatible with Faston receptacle #187 and are suitable for positive-lock mounting.
  Use only Faston terminals with the specified numbers. Select leads for connecting Faston receptacles with wire diameters that are within the allowable range for the load current. Do not apply excessive force to the terminals when mounting or dismounting the Faston receptacle.
  Insert and remove terminals carefully one at a time. Do not insert terminals on an angle, or insert/remove multiple terminals at the same time.
  The following positive-lock connectors made by AMP are recommended. Contact the manufacturer directly for details on connectors including availability.

Type	Receptacle terminals (see note)	Positive housing
#187 terminals (width: 4.75 mm)	AMP 170330-1 (170324-1) AMP 170331-1 (170325-1) AMP 170332-1 (170326-1)	AMP 172074-1 (natural color) AMP 172074-4 (yellow) AMP 172074-5 (green) AMP 172074-6 (blue)

Note: The numbers shown in parentheses are for air-feeding.

Charged Terminals

The section marked with dotted circles (indicated by arrows) in the following diagram includes the charged terminals of the relay. When the relay is mounted on a PCB, make sure that there are no metal patterns on the section of the PCB facing the portion of the relay shaded in the following diagram.



Other Precautions

- The G5CA is a power relay designed for applications switching power loads such as heaters in electric household appliances. Do not use the G5CA to switch micro loads less than 100 mA, such as in signal applications.
- Use fully sealed models if the relays will require washing. Flux-protection models may malfunction or the relay's performance may be otherwise adversely affected if cleaning fluid enters the relay.

MEMO

Power PCB Relay
G2R

- Creepage distance of 8.0 mm min. between coil and contact.
- Dual-winding latching type available.
- Plug-in and quick-connect terminals available (see G2R-S(S) data sheet).
- High sensitivity (360 mW) and high capacity (16 A) types available.
- Highly stable magnetic circuit for latching endurance and excellent resistance to vibration and shock.
- Safety-oriented design assuring high surge resistance: 10,000 V min. between coil and contacts.
- UL recognized / CSA certified. RoHS Complaint





Ordering Information

To order: Select the part number and add the desired coil voltage rating (e.g., G2R-14-*DC12*).

■ Non-Latching

1-Pole - PCB Types

Type	Contact material	Contact form	Construction	Model
General purpose	Ag alloy	SPDT	Semi-sealed	**G2R-1**
			Sealed	**G2R-14**
		SPST-NO	Semi-sealed	**G2R-1A**
			Sealed	**G2R-1A4**
High-capacity		SPDT	Semi-sealed	**G2R-1-E**
		SPST-NO		**G2R-1A-E**
High-sensitivity		SPDT		**G2R-1-H**
			Sealed	**G2R-14-H**
		SPST-NO	Semi-sealed	**G2R-1A-H**
			Sealed	**G2R-1A4-H**

1-Pole - Quick-connect Types

Type	Contact material	Contact form	Terminal	Model
Upper-mount bracket	Ag alloy	SPDT	Quick connect	**G2R-1-T**
		SPST-NO		**G2R-1A-T**

2-Pole - PCB Types

Type	Contact material	Contact form	Construction	Model
General purpose	Ag alloy	DPDT	Semi-sealed	**G2R-2**
			Sealed	**G2R-24**
		DPST-NO	Semi-sealed	**G2R-2A**
			Sealed	**G2R-2A4**
High sensitivity		DPDT	Semi-sealed	**G2R-2-H**
			Sealed	**G2R-24-H**
		DPST-NO	Semi-sealed	**G2R-2A-H**
			Sealed	**G2R-2A4-H**

Note: 1. Bifurcated button available.
2. For individual product agency approvals consult factory.
3. Class B coil insulation available.

■ Latching

Type	Contact form	Construction	Model
Dual coil latching	SPDT	Semi-sealed	**G2RK-1**
	SPST-NO		**G2RK-1A**
	DPDT		**G2RK-2**
	DPST-NO		**G2RK-2A**

Specifications

■ Contact Data

Non-latching general purpose (semi-sealed) and upper-mount bracket.

Load	1-pole type		2-pole type	
	Resistive load (p.f. = 1)	**Inductive load (p.f. = 0.4) (L/R = 7 ms)**	**Resistive load (p.f. = 1)**	**Inductive load (p.f. = 0.4) (L/R = 7 ms)**
Rated load	10 A at 250 VAC 10 A at 30 VDC (8A at 250VAC/30VDC)	7.5 A at 250 VAC 5 A at 30 VDC (6A at 250VAC, 4A at 30VDC)	5 A at 250 VAC 5 A at 30 VDC (4A at 250VAC/30VDC)	2 A at 250 VAC 3 A at 30 VDC (1.5A at 250VAC, 2.5A at 30VDC)
Contact material	Ag-Alloy			
Carry current	10 A (8A)		5 A (4A)	
Max. operating voltage	380 VAC, 125 VDC			
Max. operating current	10 A (8A)		5 A (4A)	
Max. switching capacity	2,500 VA, 300 W (2,000 VA, 240W)	1,875 VA, 150 W (1,500 VA, 120W)	1,250 VA, 150 W (1,000 VA, 120 W)	500 VA, 90 W (375 VA, 75 W)
Min permissible load	100 mA, 5 VDC		10 mA, 5 VDC	

Note: Values in parenthesis are for sealed models.

Non-latching high capacity 1-pole type

Load	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	16 A at 250 VAC 16 A at 30 VDC	8 A at 250 VAC 8 A at 30 VDC
Contact material	Ag-Alloy	
Carry current	16 A	
Max. operating voltage	380 VAC, 125 VDC	
Max. operating current	16 A	
Max. switching capacity	4,000 VA, 480 W	2,000 VA, 240 W
Min. permissible load	100 mA, 5 VDC	

Non-latching high-sensitivity

Load	1-pole type		2-pole type	
	Resistive load (p.f. = 1)	**Inductive load (p.f. = 0.4) (L/R = 7 ms)**	**Resistive load (p.f. = 1)**	**Inductive load (p.f. = 0.4) (L/R = 7 ms)**
Rated load	5 A at 250 VAC 5 A at 30 VDC	2 A at 250 VAC 3 A at 30 VDC	3 A at 250 VAC 3 A at 30 VDC	1 A at 250 VAC 1.50 A at 30 VDC
Contact material	Ag-Alloy			
Carry current	5 A		3 A	
Max. operating voltage	380 VAC, 125 VDC			
Max. operating current	5 A		3 A	
Max. switching capacity	1,250 VA, 150 W	500 VA, 90 W	750 VA, 90 W	250 VA, 45 W
Min permissible load	100 mA, 5 VDC		10 mA, 5 VDC	

Note: 1. P standard: $\lambda_{50} = 0.10 \times 10^{-6}$ operation, for all models

2. For individual product agency approvals consult factory.

Latching

Load	1-pole type		2-pole type	
	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	5 A at 250 VAC 5 A at 30 VDC	3.50 A at 250 VAC 2.50 A at 30 VDC	3 A at 250 VAC 3 A at 30 VDC	1.50 A at 250 VAC 2 A at 30 VDC
Contact material	Ag-Alloy			
Carry current	5 A		3 A	
Max. operating voltage	380 VAC, 125 VDC			
Max. operating current	5 A		3 A	
Max. switching capacity	1,250 VA, 150 W	875 VA, 75 W	750 VA, 90 W	375 VA, 60 W
Min permissible load	100 mA, 5 VDC		10 mA, 5 VDC	

Note: 1. P standard: $\lambda_{50} = 0.10 \times 10^{-6}$ operation for all models

2. For individual product agency approvals consult factory.

■ Coil Data

Non-latching DC coil

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	176	17	0.07	0.14	70% max.	15% min.	110% max. at 70°C (158°F)	Approx. 530
5	106	47	0.20	0.39				
6	88.20	68	0.28	0.55				
12	43.60	275	1.15	2.29				
24	21.80	1,100	4.27	8.55				
48	11.50	4,170	13.86	22.71				
100	5.30	18,860	67.20	93.20				
110	4.80	22,900	81.50	110.60				

Non-latching AC coil

Rated voltage (VAC)	Rated current (mA)(at 60Hz)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA)
			Armature OFF	Armature ON	% of rated voltage			
6	150	16	0.05	0.10	80% max.	30% min.	110% max. at 70°C (158°F)	Approx. 0.9
12	75	65	0.19	0.39				
24	37.50	260	0.81	1.55				
50	18	1,130	3.25	6.73				
100/(110)	9/(10.60)	4,600	13.34	26.84				
120	7.50	6,500	21	42				
200/(220)	4.5/(5.3)	20,200	51.3	102				
220	4.1	25,000	57.5	117				
240	3.80	30,000	65.50	131				

Non-latching high-sensitivity DC coil

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	120	25	0.13	0.26	70% max.	15% min.	110% max. at 70°C (158°F)	Approx. 360
5	71.40	70	0.37	0.75				
6	60	100	0.53	1.07				
12	30	400	2.14	4.27				
24	15	1,600	7.80	15.60				
48	7.50	6,400	31.20	62.40				

Latching dual coil type - Set coil

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	227	10.80	0.026	0.052	70% max.	70% max.	110% max. at 70°C (158°F)	Approx. 850
5	167	30	0.073	0.146				
6	138	43.50	0.104	0.208				
12	70.60	170	0.42	0.83				
24	34.60	694	1.74	3.43				

Latching dual coil type - Reset coil

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			Armature OFF	Armature ON	% of rated voltage			
3	200	15	0.001	0.002	70% max.	70% max.	110% max. at 70°C (158°F)	Approx. 600
5	119	42	0.003	0.006				
6	100	60	0.005	0.009				
12	50	240	0.018	0.036				
24	25	960	0.079	0.148				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with a tolerance of ±10%.
2. The operating characteristics are measured at a coil temperature of 23°C (73°F).

■ Characteristics

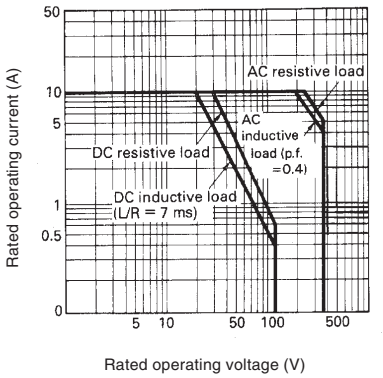
Item		Non-latching	Latching
Contact resistance		100 mΩ	
Operate (set) time		15 ms. max.	20 ms max.
Release (reset) time		AC: 10 ms max.; DC: 5 ms max.	20 ms max.
Bounce time	Operate	---	Mean value approx. 3 ms
	Release	---	Mean value approx. 8 ms
Operating frequency	Mechanical	18,000 operations/hour	
	Electrical	1,800 operations/hour (under rated load)	
Insulation resistance		1,000 MΩ min. (at 500 VDC)	
Dielectric strength		5,000 VAC, 50/60 Hz for 1 minute between coil and contacts	
		1,000 VAC, 50/60 Hz for 1 minute across contacts of same pole	
		3,000 VAC, 50/60 Hz for 1 minute between contact sets, 2-pole non-latching	
		1,000 VAC, 50/60 Hz for 1 minute between set and reset coils of dual coil latching	
Vibration	Mechanical durability	10 to 55 Hz; 1.50 mm (0.06) double amplitude	
	Malfunction durability	10 to 55 Hz; 1.50 mm (0.06) double amplitude	
Shock	Mechanical durability	1,000 m/s² (approx. 100G)	
	Malfunction durability	200 m/s² (approx. 20 G) when energized 100 m/s² (approx. 10 G) when de-energized	500 m/s² (approx. 50 G) at set (1-pole) 200 m/s² (approx 20G) at set (2-pole) 100 m/s² (approx. 10 G) at reset
Ambient temperature		-40 to 70°C (-40 to 158°F)	
Humidity		5% to 85% RH	
Service life	Mechanical	10,000,000 operations min. DC: 20,000,000 operations min. (at 18,000 operations/hour)	10,000,000 operations min. (at 18,000 operations/hour)
	Electrical	100,000 operations min. (at 1,800 operations /hr) at rated load. See “Characteristics Data”	
Weight		Approx. 17 g (0.60 oz.)	Approx. 17 g. (Approx 20g for quick-connect type)

Note: Data shown are of initial value.

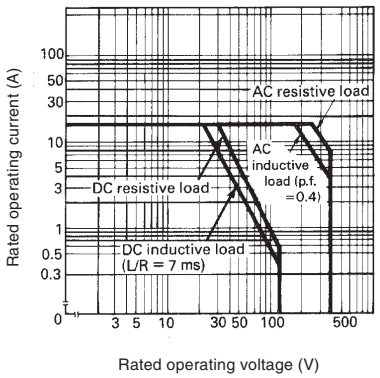
■ Characteristic Data

Maximum Switching Capacity - Non-latching Types

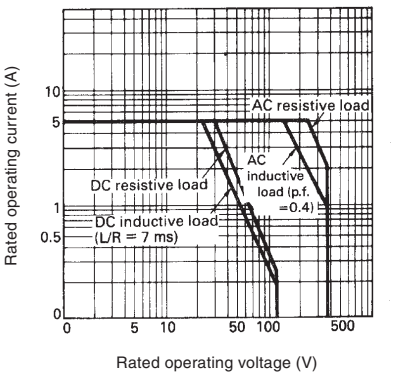
PCB: Single-pole general purpose Semi-sealed
Quick-connect: Single-pole single button



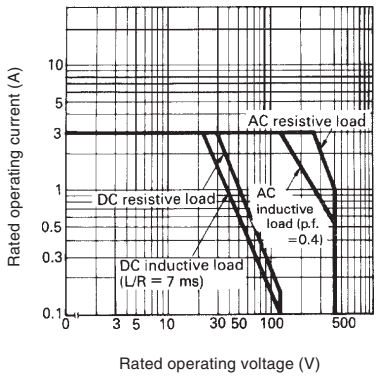
High capacity



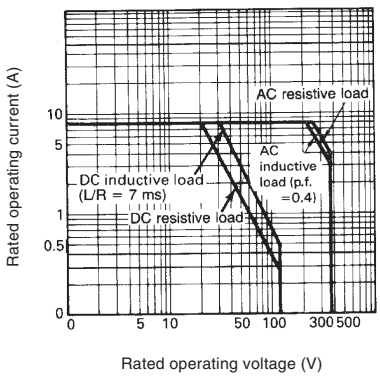
PCB: Single-pole high sensitivity Two-pole general purpose



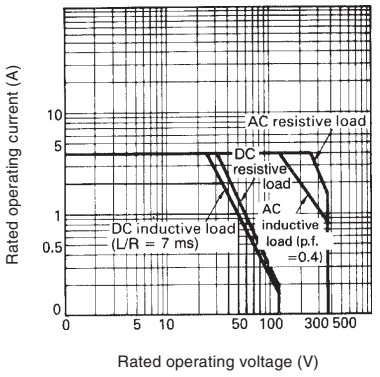
PCB: Two-pole high sensitivity



PCB: Single-pole general purpose Sealed

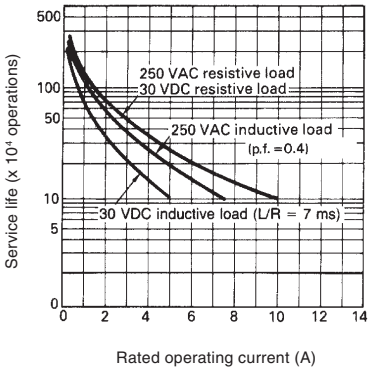


PCB: Two-pole general purpose Sealed

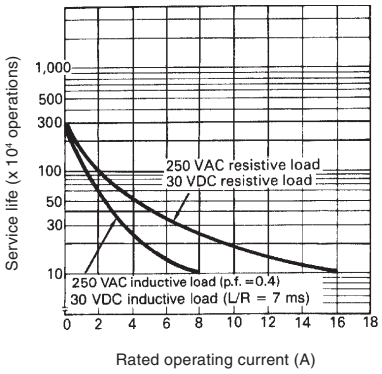


Electrical Service Life - Non-latching Types

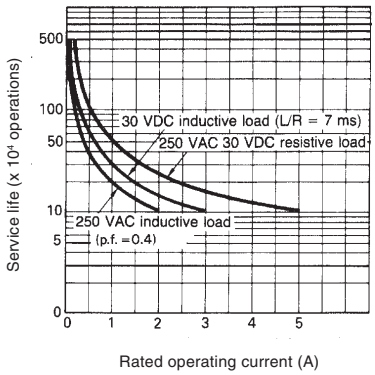
PCB: Single-pole general purpose
Semi-sealed
Quick-connect: Single-pole single button



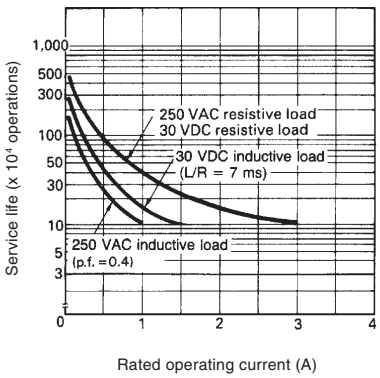
High capacity



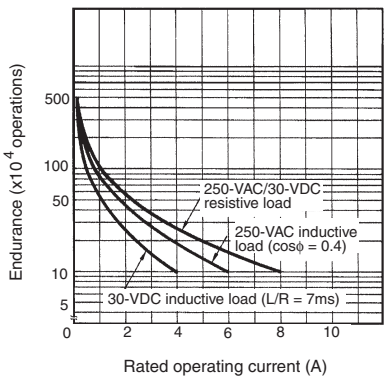
PCB: Single-pole high sensitivity
Two-pole general purpose



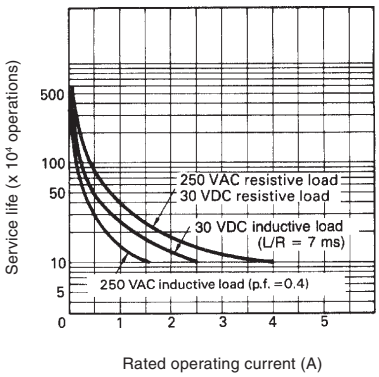
PCB: Two-pole high sensitivity



PCB: Single-pole general purpose
Sealed

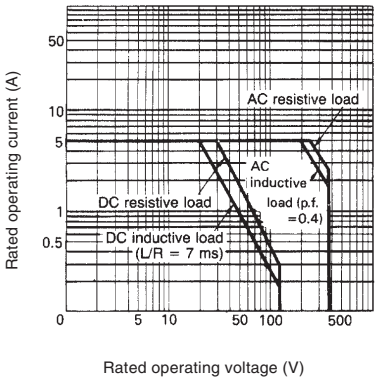


PCB: Two-pole general purpose
Sealed

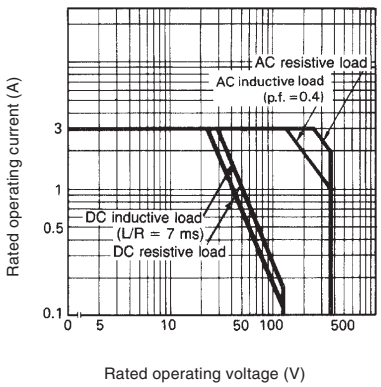


Maximum Switching Capacity - Latching Types

One pole

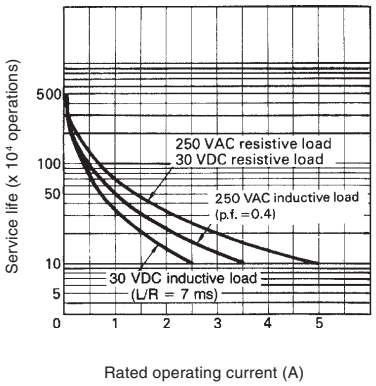


Two-pole

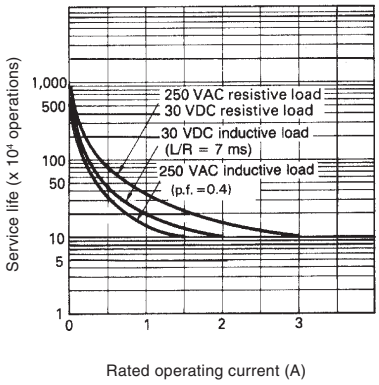


Electrical Service Life - Latching Types

One pole



Two-pole

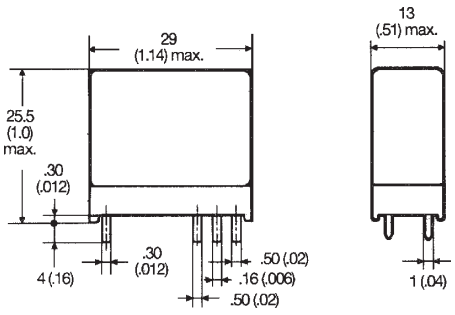


Dimensions

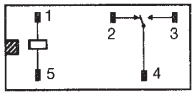
Unit: mm (inch)

■ Non-latching

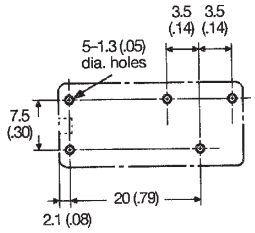
PCB Terminal: SPDT, general purpose & high sensitivity



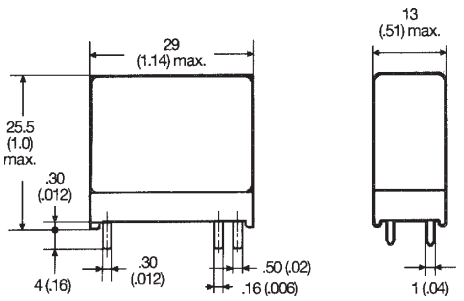
Terminal arrangement/ Internal connections
(Bottom view)



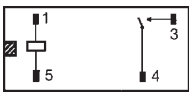
Mounting holes
(Bottom view)



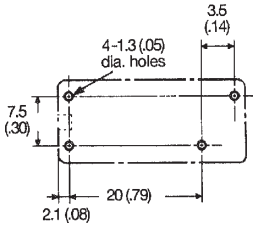
PCB Terminal: SPST-NO, general purpose & high sensitivity



Terminal arrangement/ Internal connections
(Bottom view)

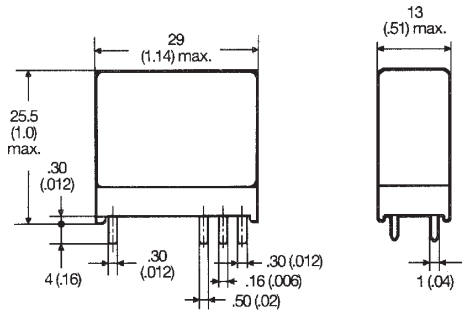


Mounting holes
(Bottom view)

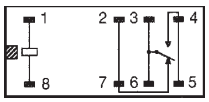


Note: 1. ▨ and [ ] indicate mounting orientation marks.
2. A tolerance of ±0.10 (0.004) applies to the above dimensions.

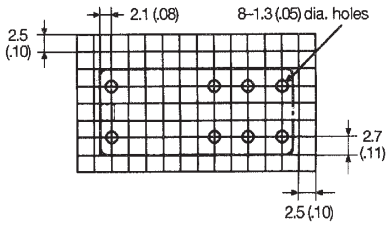
PCB Terminal: SPDT, high capacity



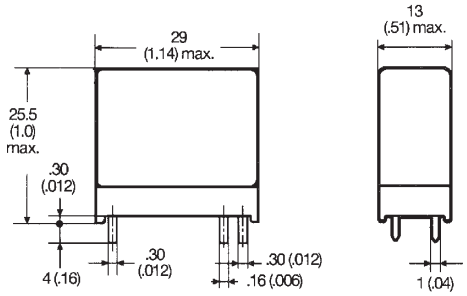
Terminal arrangement/ Internal connections
(Bottom view)



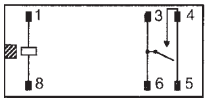
Mounting holes
(Bottom view)



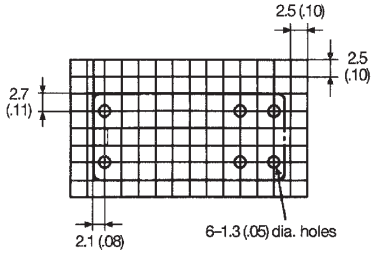
PCB Terminal: SPST-NO, high capacity



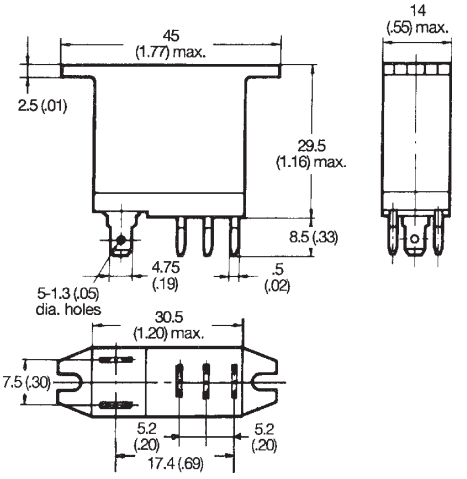
Terminal arrangement/ Internal connections
(Bottom view)



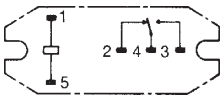
Mounting holes
(Bottom view)



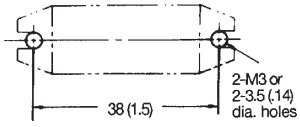
Quick-connect: SPDT



Terminal arrangement/ Internal connections
(Bottom view)

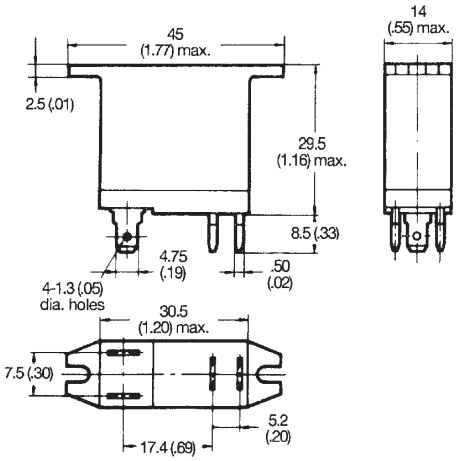


Mounting holes
(Bottom view)

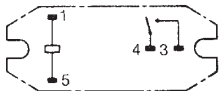


Note: 1. ▨ and [ ] indicate mounting orientation marks.
2. A tolerance of ±0.10 (0.004) applies to the above dimensions.

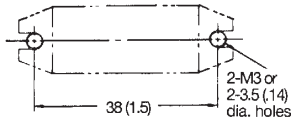
Quick-connect: SPST-NO



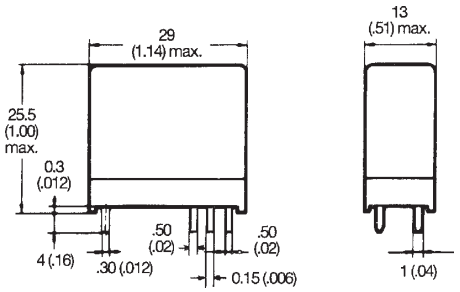
Terminal arrangement/ Internal connections
(Bottom view)



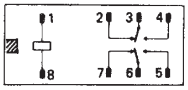
Mounting holes
(Bottom view)



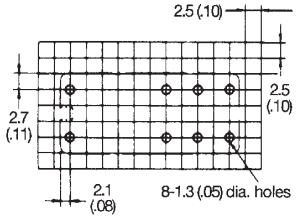
PCB Terminal: DPDT, general purpose & high sensitivity



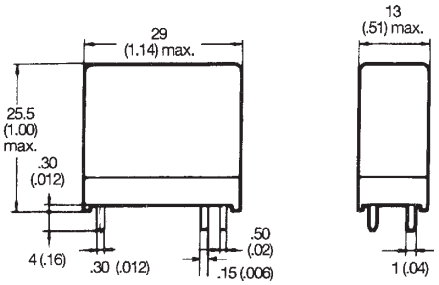
Terminal arrangement/ Internal connections
(Bottom view)



Mounting holes
(Bottom view)



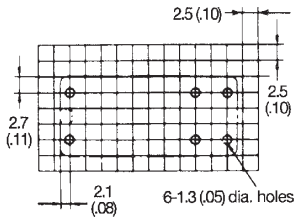
PCB Terminal: DPST-NO, general purpose & high sensitivity



Terminal arrangement/ Internal connections
(Bottom view)



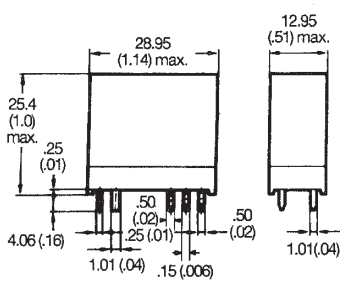
Mounting holes
(Bottom view)



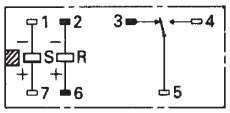
Note: 1. ▨ and [ ] indicate mounting orientation marks.
2. A tolerance of ±0.10 (0.004) applies to the above dimensions.

■ Latching

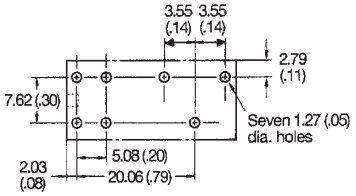
SPDT, Dual coil latching
G2RK-1



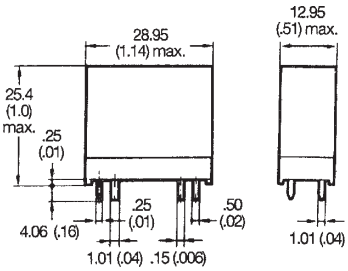
Dual coil



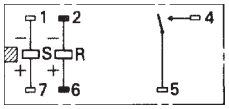
Dual coil



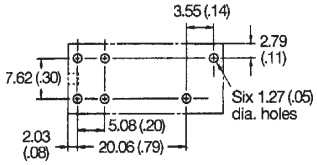
SPST-NO, Dual coil latching
G2RK-1A



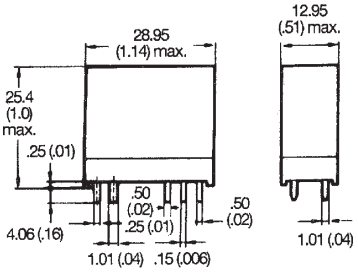
Dual coil



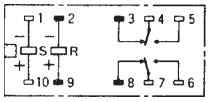
Dual coil



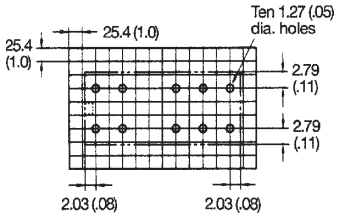
DPDT, Dual coil latching
G2RK-2



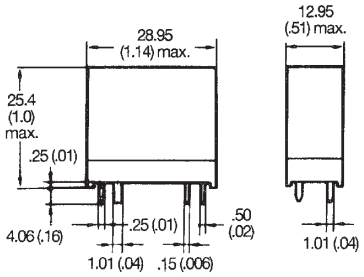
Dual coil



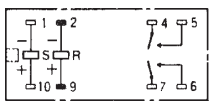
Dual coil



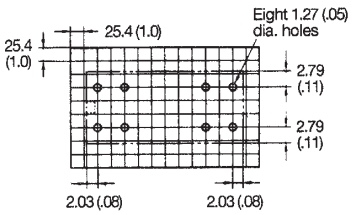
DPST-NO, Dual coil latching
G2RK-2A



Dual coil



Dual coil



Note: 1. ▨ and [ ] indicate mounting orientation marks.
2. A tolerance of ±0.10 (0.004) applies to the above dimensions.

■ Approvals

UL Recognized (File No. E41643) / CSA Certified (File No. 31928)

Type	Coil rating	Contact ratings	Number of test operations
G2R-1(A) **G2R-1(A)4** **G2R-1(A)-H**	3 to 110 VDC 3 to 240VAC	10A , 30 VDC (Resistive), 40°C	100 x 10^3
		10A , 250 VAC (General purpose), 40°C	
		10A , 277 VAC (General purpose), 40°C	6 x 10^3
		TV-3 , 120 VAC (N.O. contact) , 40°C	
		600WT, 120VAC (Tungsten), 40°C	25 x 10^3
		1/3 HP , 125 VAC (N.O. contact), 70°C	30 x 10^3
		1/2 HP , 277 VAC , 40°C	6 x 10^3
		TV-8 , 120 VAC (N.O. contact , ASI contacts), 40°C	25 x 10^3
		B300 (Poilot duty), 60°C	30 x 10^3
G2R-1(A)-E	3 to 110 VDC 3 to 240VAC	16A , 30 VDC (Resistive), 40°C	6 x 10^3
		16A , 250 VAC (General purpose), 40°C	30 x 10^3
		360 WT , 120 VAC (Tungsten), 40°C	25 x 10^3
		TV-3 , 120 VAC , 40°C	
		1HP , 240 VAC, 40°C	6 x 10^3
		TV-8 , 120 VAC (N.O. contact), 40°C	25 x 10^3
G2R-2(A) **G2R-2(A)4** **G2R-2(A)-H**	3 to 110 VDC 3 to 240VAC	10A , 30 VDC (Resistive), 40°C	50 x 10^3
		10A , 277 VAC (General purpose), 40°C	20 x 10^3
		5A , 250 VAC (General purpose), 70°C	100 x 10^3
		TV-3 , 120 VAC (N.O. contact), 40°C	25 x 10^3
		1/6 HP , 120 VAC, 40°C	6 x 10^3
		1/3 HP , 265 VAC, 40°C	30 x 10^3
		250 VA , 120 VAC (Pilot duty), 70°C	
		B300 (Poilot duty), 40°C	6 x 10^3
G2RK-1(A)	3 to 24 VDC	10A , 30 VDC (Resistive), 40°C	6 x 10^3
		10A , 250 VAC (General use), 40°C	
		TV-3 (N.O. contact), 40°C	25 x 10^3
		1/2 HP , 250 VAC, 40°C	6 x 10^3
		A300 (Pilot duty), 40°C	
G2RK-2(A)	3 to 24 VDC	5A , 30 VDC (Resistive), 40°C	6 x 10^3
		5A , 250 VAC (General use), 40°C	
		TV-3 (N.O. contact), 40°C	25 x 10^3
		1/6 HP , 120 VAC, 40°C	6 x 10^3
		1/3 HP , 240 VAC, 40°C	
		B300 (Pilot duty), 40°C	

Note: 1. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

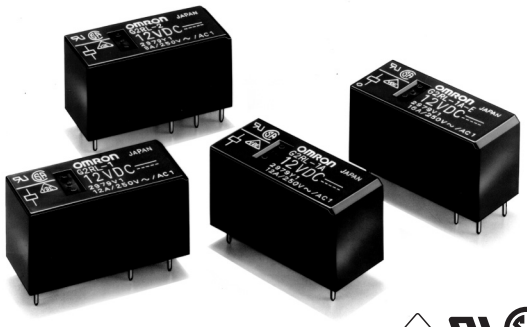
2. In the interest of product improvement, specifications are subject to change.

MEMO

PCB Relay
G2RL

A Power Relay with Various Models

- High-sensitivity (250 mW) and High-capacity (16 A) versions.
- Designed for cooking and HVAC controls: blower motor, damper, active air purification, duct flow boost fans, etc.
- Conforms to VDE (EN61810-1). UL recognized/ CSA certiified
- Meets EN60335-1 requirements for household products.
- Clearance and creepage distance: 10 mm/10 mm.
- Tracking resistance: CTI>250
- Coil Insulation system: Class F.
- RoHS Compliant



Ordering Information

Classification	Enclosure ratings	Contact form			
		SPST-NO	SPDT	DPST-NO	DPDT
General-purpose	Flux protection	**G2RL-1A**	**G2RL-1**	**G2RL-2A**	**G2RL-2**
	Fully sealed	**G2RL-1A4**	**G2RL-14**	**G2RL-2A4**	**G2RL-24**
High-capacity	Flux protection	**G2RL-1A-E**	**G2RL-1-E**	---	---
	Fully sealed	**G2RL-1A4-E**	**G2RL-14-E**	---	---
High-sensitivity	Flux protection	**G2RL-1A-H**	**G2RL-1-H**	---	---

Note: When ordering, add the rated coil voltage to the model number.
Example: G2RL-1A DC12
Rated coil voltage

Model Number Legend

G2RL-□□□-□
1 2 3 4

1. **Number of Poles**
   1: 1 pole
   2: 2 poles
2. **Contact Form**
   None: □PDT
   A: □PST-NO
3. **Enclosure Ratings**
   None: Flux protection
   4: Fully sealed
4. **Classification**
   None: General purpose
   E: High capacity (1 pole)
   H: High sensitivity (1 pole)

Specifications

■ Coils Ratings for General-purpose and High-capacity Models

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	80.0 mA	33.3 mA	16.7 mA	8.96 mA
Coil resistance	62.5 Ω	360 Ω	1,440 Ω	5,358 Ω
Must operate voltage	70% max. of the rated voltage			
Must release voltage	10% min. of the rated voltage			
Max. voltage	180% of rated voltage (at 23°C)			
Power consumption	Approx. 400 mW			Approx. 430 mW

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Coils Ratings for High-sensitivity Models

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	50.0 mA	20.8 mA	10.42 mA
Coil resistance	100 Ω	576 Ω	2,304 Ω
Must operate voltage	75% max. of the rated voltage		
Must release voltage	10% min. of the rated voltage		
Max. voltage	180% of rated voltage (at 23°C)		
Power consumption	Approx. 250 mW		

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

■ Contact Ratings

Item	General-purpose Models		High-capacity Models	High-sensitivity Models
Number of poles	1 pole	2 poles	1 pole	1 pole
Contact material	Ag Alloy (Cd free)			
Load	Resistive load (cosϕ=1)			
Rated load	12 A at 250 VAC 12 A at 24 VDC (See note.)	8 A at 250 VAC 8 A at 30 VDC (See note.)	16 A at 250 VAC 16 A at 30 VDC (See note.)	10 A at 250 VAC 10 A at 24 VDC (See note.)
Rated carry current	12 A (See note.)	8 A (70°C)/5 A (85°C) (See note.)	16 A (See note.)	10 A (See note.)
Max. switching voltage	440 VAC, 300 VDC			
Max. switching current	12 A	8 A	16 A	10 A
Max. switching power	3,000 VA (4,000 VA)	2,000 VA	4,000 VA	2,500 VA

Note: Contact your OMRON representative for the ratings on fully sealed models.

■ Characteristics

Item	General-purpose (High-capacity) Models	General-purpose Models	High-sensitivity Models
Number of poles	1 pole	2 pole	1 pole
Contact resistance	100 mΩ max.		
Operate (set) time	15 ms max.		
Release (reset) time	5 ms max.		
Max. operating frequency	Mechanical:18,000 operation/hr Electrical:1,800 operation/hr at rated load		
Insulation resistance	1,000 MΩ min. (at 500 VDC)		
Dielectric strength	5,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of same polarity	5,000 VAC, 1 min between coil and contacts 2,500 VAC, 1 min between contacts of different polarity 1,000 VAC, 1 min between contacts of same polarity	5,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of same polarity
Impulse withstand voltage	10 kV (1.2×50 μs) between coil and contact		
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)		
Shock resistance	Destruction:1,000 m/s^2 (approx. 100 G) Malfunction:100 m/s^2 (approx. 10 G)		
Endurance (Mechanical)	20,000,000 operations (at 18,000 operations/hr)		
Ambient temperature	Operating:–40°C to 85°C (with no icing) Storage:–40°C to 85°C (with no icing)		
Ambient humidity	5% to 85%		
Weight	Approx. 12 g		

Note: Values in the above table are the initial values.

■ Approved Standards

UL Recognized (File No. E41643) / CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G2RL-1A	SPST-NO	3 to 48 VDC	12 A at 250 VAC (General use)	100,000
G2RL-1	SPDT		12 A at 24 VDC (Resistive)	50,000
G2RL-1A-E	SPST-NO	3 to 48 VDC	16 A at 250 VAC (General use)	100,000
G2RL-1-E	SPDT		16 A at 24 VDC (Resistive)	50,000
G2RL-1A-H	SPST-NO	5 to 24 VDC	10 A at 250 VAC (General use) 10 A at 24 VDC (Resistive)	50,000
G2RL-1-H	SPDT			
G2RL-2A	DPST-NO	3 to 48 VDC	8 A at 277 VAC (General use) 8 A at 30 VDC (Resistive)	100,000
G2RL-2	DPDT			

Note: Consult Omron for additional UL / CSA ratings

VDE (EN61810-1) (License No. 119650)

Model	Contact form	Coil ratings	Contact ratings
G2RL-1(A)	1 pole	5, 12, 18, 22, 24, 48 VDC	12 A at 250 VAC (cosϕ=1) 12 A at 24 VDC (L/R=0 ms) AC15: 3 A at 240 VAC DC13: 2.5 A at 24 VDC, 50 ms
G2RL-1(A)-E	1 pole	5, 12, 18, 22, 24, 48 VDC	16 A at 250 VAC (cosϕ=1) 16 A at 24 VDC (L/R=0 ms) AC15: 3 A at 240 VAC (NO) 1.5 A at 240 VAC (NC) DC13: 2.5 A at 24 VDC (NO), 50 ms
G2RL-1(A)-H	1 pole	5, 9, 12, 24 VDC	10 A at 250 VAC (cosϕ=1) 10 A at 24 VDC (L/R=0 ms)
G2RL-2(A)	2 poles	5, 12, 18, 22, 24, 48 VDC	8 A at 250 VAC (cosϕ=1) 8 A at 24 VDC (L/R=0 ms) AC15: 1.5 A at 240 VAC DC13: 2 A at 30 VDC, 50 ms

Note: To achieve approved life cycles on sealed models, the relay should be vented by removing the “knock off vent nib” on top of relay case after the soldering/washing process.

Electrical Life Data

G2RL-1-E	16 A at 250 VAC (cosϕ=1)	30,000 operations min.
	16 A at 24 VDC	30,000 operations min.
	8 A at 250 VAC (cosϕ=0.4)	200,000 operation min. (normally open side operation)
	8 A at 30 VDC (L/R=7 ms)	10,000 operation min. (normally open side operation)
G2RL-1	12 A at 250 VAC (cosϕ=1)	50,000 operations min.
	12 A at 24 VDC	30,000 operations min.
	5 A at 250 VAC (cosϕ=0.4)	150,000 operation min. (normally open side operation)
	5 A at 30 VDC (L/R=7 ms)	20,000 operation min. (normally open side operation)
G2RL-1-H	10 A at 250 VAC (cosϕ=1)	100,000 operations min.
	10 A at 24 VDC	50,000 operations min.
G2RL-2	8 A at 250 VAC (cosϕ=1)	30,000 operations min.
	8 A at 30 VDC	30,000 operations min.

Note: 1. The results shown reflect values measured using very severe test conditions i.e., Duty: 1 s ON/1 s OFF.

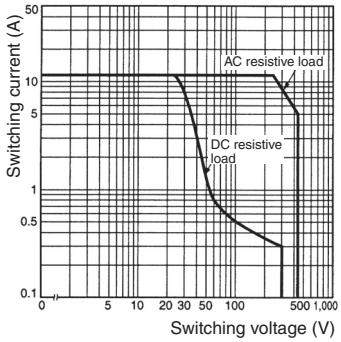
2. In order to obtain the full rated life cycles on the fully sealed models, the relay should be properly vented by removing the “knock off vent nib” on top of the relay case after the soldering/washing process.

3. Electrical endurance will vary depending on the test conditions. Contact your OMRON representative if you require more detailed information for the electrical endurance under your test conditions.

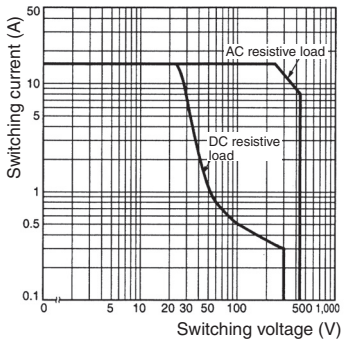
Engineering Data

■ Maximum Switching Capacity

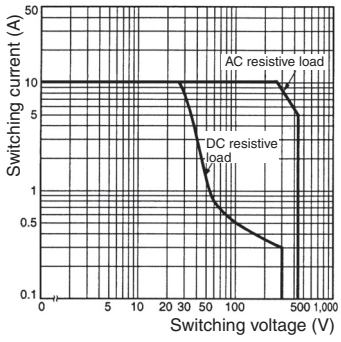
G2RL-1A, G2RL-1



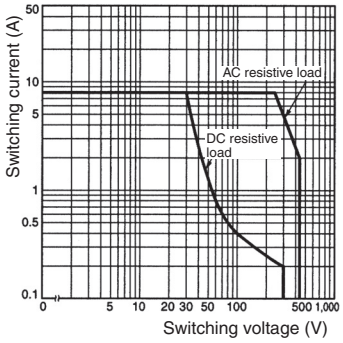
G2RL-1A-E, G2RL-1-E



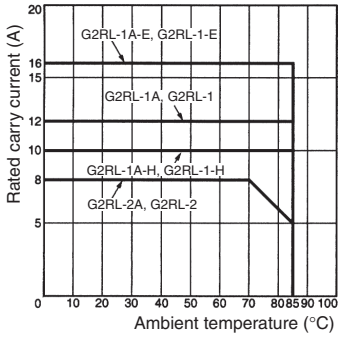
G2RL-1A-H, G2RL-1-H



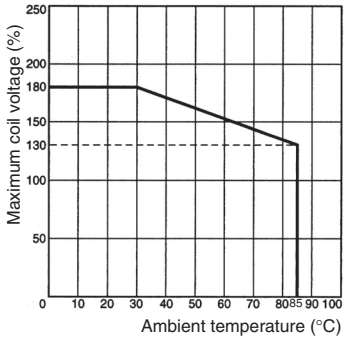
G2RL-2A, G2RL-2



■ Ambient Temperature vs Rated Carry Current



■ Ambient Temperature vs Maximum Coil Voltage



Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

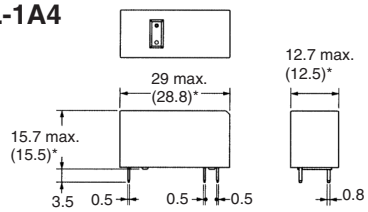
Note: Contact your OMRON representative for the data on fully sealed models.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G2RL-1A(-H), G2RL-1A4



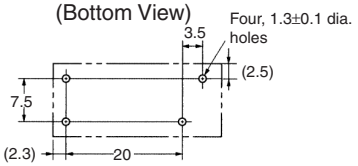


Terminal Arrangement/
Internal Connection
(Bottom View)



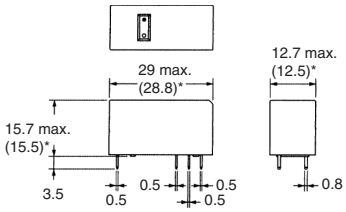
* Indicates average dimensions.

Mounting Holes
(Bottom View)

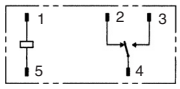


G2RL-1(-H), G2RL-14



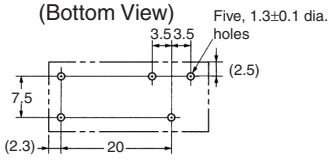


Terminal Arrangement/
Internal Connection
(Bottom View)



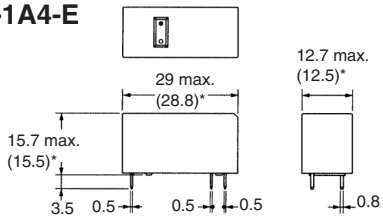
* Indicates average dimensions.

Mounting Holes
(Bottom View)

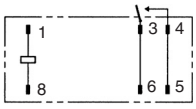


G2RL-1A-E, G2RL-1A4-E



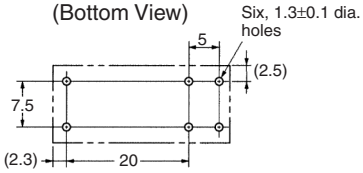


Terminal Arrangement/
Internal Connection
(Bottom View)

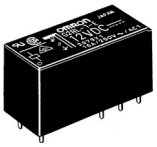


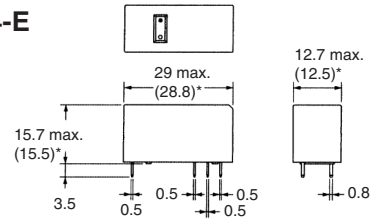
* Indicates average dimensions.

Mounting Holes
(Bottom View)

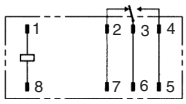


G2RL-1-E, G2RL-14-E



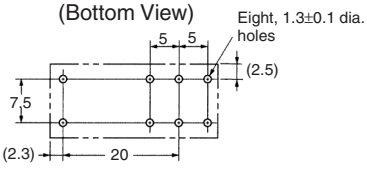


Terminal Arrangement/
Internal Connection
(Bottom View)



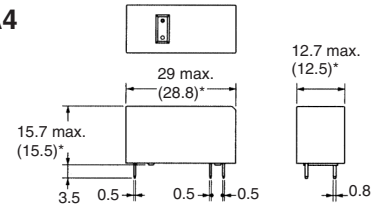
* Indicates average dimensions.

Mounting Holes
(Bottom View)



G2RL-2A, G2RL-2A4



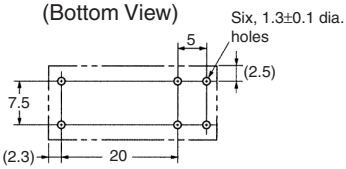


Terminal Arrangement/
Internal Connection
(Bottom View)



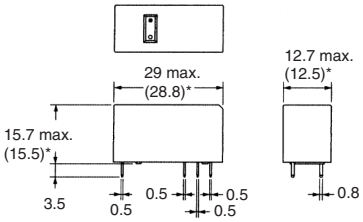
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Mounting Holes
(Bottom View)

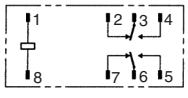


G2RL-2, G2RL-24



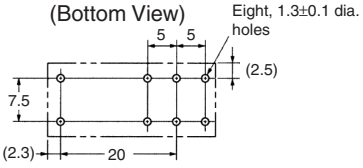


Terminal Arrangement/
Internal Connection
(Bottom View)



* Indicates average dimensions.

Mounting Holes
(Bottom View)



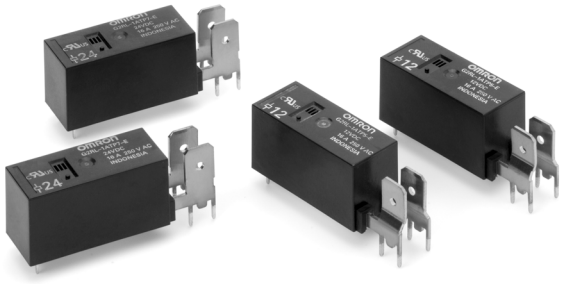
MEMO

PCB Relay
G2RL-TP

PCB Power Relay with Quick-connect Terminals

- High switching capacity: 250 VAC, 16 A at 105°C.
- Ideal for high temperature applications.
- Coil insulation: Class F.
- Low profile for total size reduction.
- Easy wiring with quick-connect terminals.
- Model with 5-mm pitch (RAST5) is also available.

Application: Cooking ovens, electric heating, power supplies.



(VDE Approval pending)

Ordering Information

Classification	Contact form	Enclosure ratings	Model
5-mm pitch	SPST-NO	Flux protection	**G2RL-1ATP5-E**
7.5-mm pitch			**G2RL-1ATP7-E**

Note: When ordering, add the rated coil voltage to the model number.
Example: G2RL-1ATP7-E DC12
Rated coil voltage

Model Number Legend

G2RL-□ □ □-□ DC□
1 2 3 4 5

1. **Number of Poles**
   1: 1 pole
2. **Contact Form**
   A: SPST-NO
3. **Quick-connect Terminal Pitch**
   TP5: 5-mm pitch
   TP7: 7.5-mm pitch
4. **Classification**
   E: High capacity
5. **Rated Coil Voltage**
   12, 24 VDC

Specifications

■ Coils Ratings

Rated voltage	12 VDC	24 VDC
Rated current	33.3 mA	16.7 mA
Coil resistance	360 Ω	1,440 Ω
Must operate voltage	70% max. of the rated voltage	
Must release voltage	10% min. of the rated voltage	
Max. voltage	130% at 105°C of the rated voltage	
Power consumption	Approx. 400 mW	

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of 10%.

■ Contact Ratings

Contact material	Ag alloy (Cd free)
Load	Resistive load (cosϕ=1)
Rated load	16 A at 250 VAC
Rated carry current	16 A
Max. switching voltage	440 VAC
Max. switching current	16 A
Max. switching power	4,000 VA

Note: P level: λ_{60}=0.1 x 10^{-6} operations

■ Characteristics

Contact resistance	100 mΩ max.	
Operate time	15 ms max.	
Release time	5 ms max.	
Max. operating frequency	Mechanical:	18,000 operations/hr
	Electrical:	900 operations/hr at rated load
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of same polarity	
Impulse withstand voltage	10 kV (1.2 × 50 μs) between coil and contact	
Vibration resistance	Destruction:	10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
	Malfunction:	10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction:	1,000 m/s^2
	Malfunction:	Energized:100 m/s^2
		Not energized:100 m/s^2
Endurance	Mechanical:	20,000,000 operations min. (at 18,000 operations/hr)
	Electrical:	50,000 operations min. (at 900 operations/hr)
Ambient temperature	–40 to 105°C (with no icing)	
Ambient humidity	5% to 85%	
Weight	Approx. 12 g	

Note: Values in the above table are the initial values.

■ Approved Standards

UL Recognized (File No. E41643) / CSA Certified (File No. LR31928)

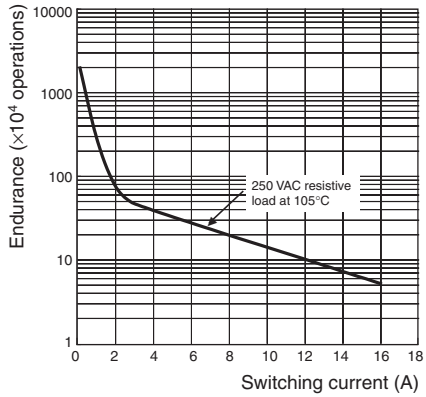
Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G2RL-1ATP7-E	SPST-NO (High capacity)	12 to 24 VDC	16 A at 250 VAC (General use), 40°C	100,000
G2RL-1ATP5-E			16 A at 24 VDC (Resistive), 40°C	50,000
			16 A at 250 VAC (Resistive), 105°C	100,000

VDE (EN61810-1): Pending

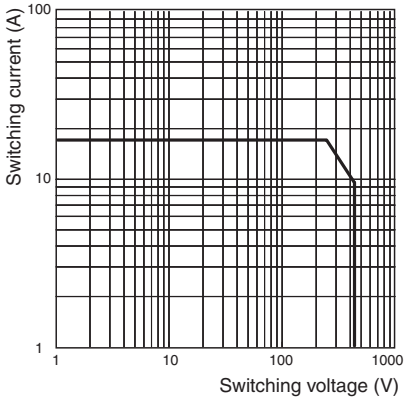
Engineering Data

G2RL-1ATP5-E/G2RL-1ATP7-E

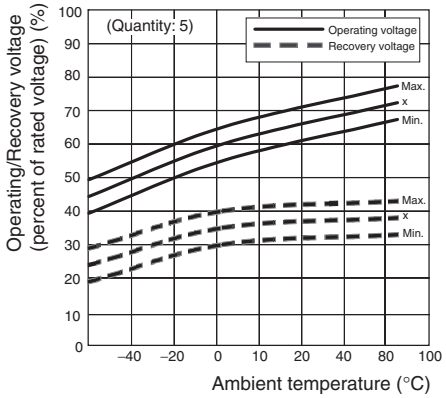
■ Endurance at 105°C



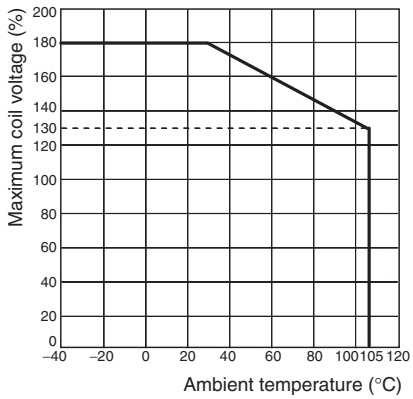
■ Maximum Switching Power



■ Ambient temperature vs. Operating/Recovery Voltage



■ Ambient Temperature vs. Maximum Coil Voltage

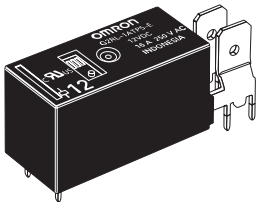


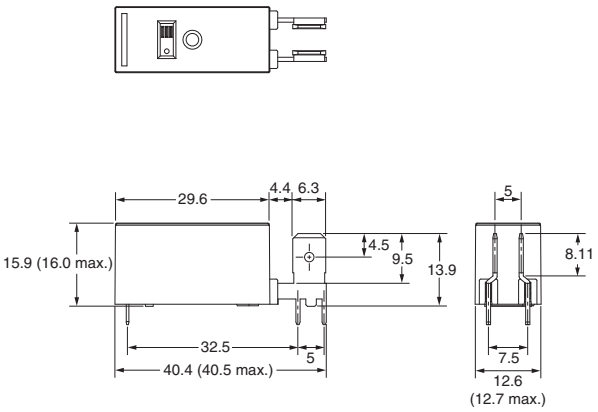
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

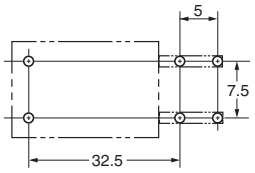
Note: All units are in millimeters unless otherwise indicated.

G2RL-1ATP5-E

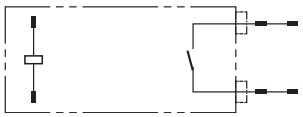




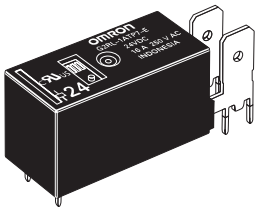
PCB Mounting Holes (Bottom View)

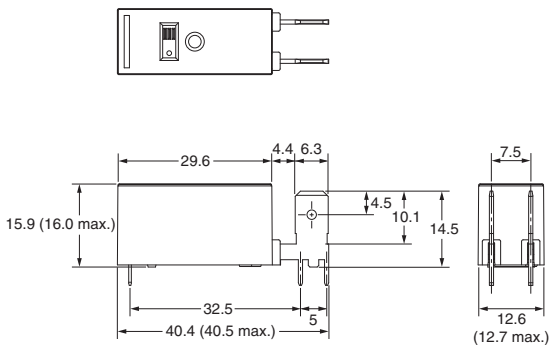


Terminal Arrangement/ Internal Connection (Bottom View)



G2RL-1ATP7-E

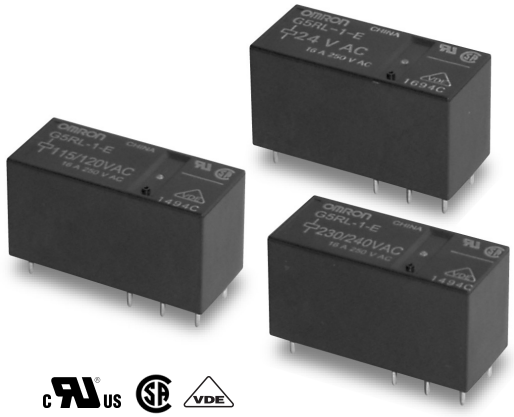




PCB Relay
G5RL

Low-profile Relay with Various Models

- Low profile: 15.7 mm in height
- Creepage distance 8mm between coil and contacts
- 10 kV Impulse withstand voltage
- Models with AC coil available.
- High-Inrush model available
  (Inrush peak currents up to 100 A)
- Low Noise model available
  (Approx. 10 to 20 dB less sound pressure than standard G5RL-Series Relays)
- RoHS Compliant



Ordering Information

Classification		Enclosure ratings	Contact form	
Contact ratings	Special function		SPST-NO	SPDT
16 A (high capacity)	AC coil	Flux protection	—	**G5RL-1-E**
	High inrush		**G5RL-1A-E-HR**	**G5RL-1-E-HR**
	Low noise		**G5RL-1A-E-LN**	
12 A			**G5RL-1A-LN**	

Note: When ordering, add the rated coil voltage to the model number. Example: G5RL-1A-LN *DC12*

■ Model Number Legend:

G5RL- □ □ **-** □ □ **DC (AC)** □
1 2 3 4 5

1. Number of Poles
1: 1 pole

2. Contact Form/Contact Construction
None: SPDT
A: SPST-NO

3. Classification
None: 12 A
E: 16 A (high capacity)

4. Special Function
None: Standard
HR: High-inrush
LN: Low Noise

5. Rated Coil Voltage
Coil ratings are listed in each section (AC coil, High inrush, and Low noise).

Models with AC Coil: G5RL-1-E

■ Specifications

Coil Ratings

Rated voltage	24 VAC	100 VAC	115 VAC/120 VAC		200 VAC	230 VAC/240 VAC	
Rated current at 50 Hz	31.30 mA	7.50 mA	5.85 mA	6.25 mA	3.75 mA	3.00 mA	3.13 mA
Rated current at 60 Hz	28.30 mA	6.88 mA	5.35 mA	5.70 mA	3.45 mA	2.76 mA	2.88 mA
Coil resistance	443 Ω	8,220 Ω	11,600 Ω		33,000 Ω	47,600 Ω	
Must operate voltage	75% max. rated voltage						
Must release voltage	15% min. rated voltage						
Max. voltage	110% of rated voltage						
Power consumption	Approx. 0.75 VA						

Note: 1. The rated current tolerance is +15%/–20%. All above data is based on coil temperature of 23°C.

2. Coil resistances are provided as reference values.

Contact Ratings

Contact form	SPDT
Contact material	Ag alloy (Cd free)
Rated load (resistive)	16 A at 250 VAC, 24 VDC (NO) when there is no load on (NC) 5 A at 250 VAC, 24 VDC (SPDT)
Rated carry current	16 A (NO), 5 A (NC)
Max. switching voltage	250 VAC, 24 VDC
Max. switching current	16 A (NO), 5 A (NC)
Max. switching capacity	4,000 VA, 384 W (NO) when there is no load on (NC) 1,250 VA, 120 W (SPDT)
Min. permissible load (reference value)	40 mA at 24 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

Characteristics

Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV between coil and contacts (1.2 × 50 μs)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (Resistive load, 12A, 250 VAC/24 VDC, NO contact) 50,000 operations min. (at 1,800 operations/hr) (Resistive load, 16 A, 250 VAC/24 VDC, NO contact) (Resistive load, 5 A, 250 VAC/24 VDC, NC contact)
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 10 g

Note: 1. Values in the above table are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.

3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.

4. The resistive load ratings for NO contact apply when there is no load on NC contact.

Approved Standards

UL Recognized (File No. E41643) and CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5RL-1-E	24 to 240 VAC	16 A, 277 VAC General, 50,000 operations - NO 16 A, 250 VAC General, 50,000 operations - NO TV-5, 25,000 operations - NO A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO 1/2 Hp, 120 VAC, 6,000 operations - NO 60 LRA/10 FLA, 250 VAC, 6,000 operations - NO 5 A, 250 VAC General, 50,000 operations - NC 5 A, 24 VDC Resistive, 50,000 operations - NC

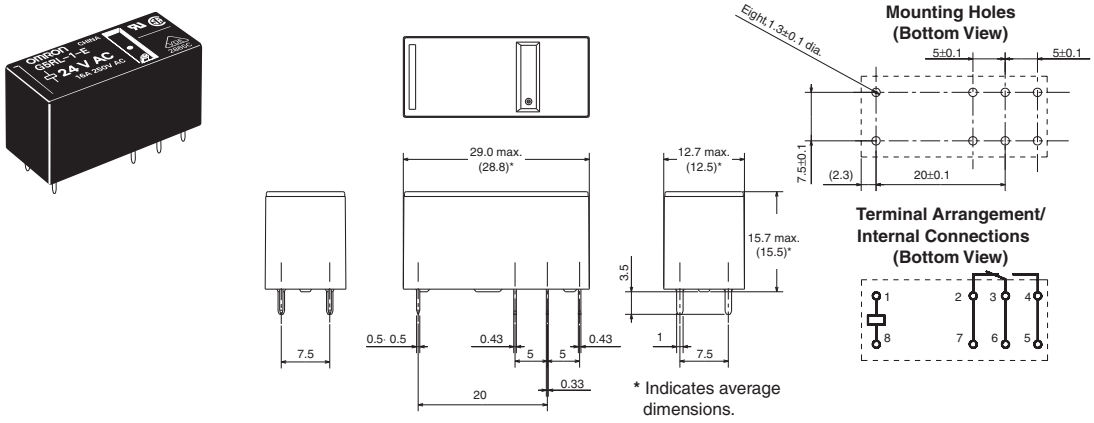
VDE (EN61810-1) (License No. A282)

Model	Coil Rating	Contact rating
G5RL-1-E	24, 100, 115/120, 200, 230/240 VAC (50 Hz)	16 A, 250 VAC 15,000 operations - NO

■ Dimensions

Note: All units are in millimeters unless otherwise indicated.

G5RL-1-E



■ Precautions

Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

High-Inrush Models: G5RL-1(A)-E-HR

■ Specifications

Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	80.0 mA	33.3 mA	16.7 mA	8.96 mA
Coil resistance	62.5 Ω	360 Ω	1,440 Ω	5,358 Ω
Must operate voltage	70% max. rated voltage			
Must release voltage	10% min. rated voltage			
Max. voltage	130% of rated voltage			
Power consumption	Approx. 400 mW			Approx. 430 mW

Note: The rated current and resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

Contact Ratings

Contact form	SPST-NO	SPDT
Contact material	Ag alloy (Cd free)	
Rated load (resistive)	16 A at 250 VAC 16 A at 24 VDC	16 A at 250 VAC, 24 VDC (NO) when there is no load on (NC) 5 A at 250 VAC, 24 VDC (SPDT)
Rated carry current	16 A	16 A (NO), 5 A (NC)
Max. switching voltage	250 VAC, 24 VDC	
Max. switching current	16 A	16 A (NO), 5 A (NC)
Max. switching capacity	4,000 VA, 384 W	4,000 VA, 384 W (NO) when there is no load on (NC) 1,250 VA, 120 W (SPDT)
Min. permissible load (reference value)	100 mA at 5 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations	

Characteristics

Contact resistance	100 mΩ max.
Operate time	15 ms max.
Release time	5 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV between coil and contacts (1.2 × 50 μs)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (Resistive load, 12A, 250 VAC/24 VDC, NO contact) 50,000 operations min. (at 1,800 operations/hr) (Resistive load, 16 A, 250 VAC/24 VDC, NO contact) (Resistive load, 5 A, 250 VAC/24 VDC, NC contact)
Ambient temperature	Operating: –40°C to 85°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 10 g

Note: 1. Values in the above table are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.

3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.

4. The resistive load ratings for NO contact apply when there is no load on NC contact.

Approved Standards

UL Recognized (File No. E41643) and CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5RL-1(A)-E-HR	5 to 48 VAC	16 A, 277 VAC General, 50,000 operations - NO 16 A, 250 VAC General, 50,000 operations - NO TV-5, 25,000 operations - NO A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO 1/2 Hp, 120 VAC, 6,000 operations - NO 60 LRA/10 FLA, 250 VAC, 6,000 operations - NO 5 A, 250 VAC General, 50,000 operations - NC 5 A, 24 VDC Resistive, 50,000 operations - NC)

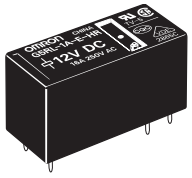
VDE (EN61810-1) (License No. A282)

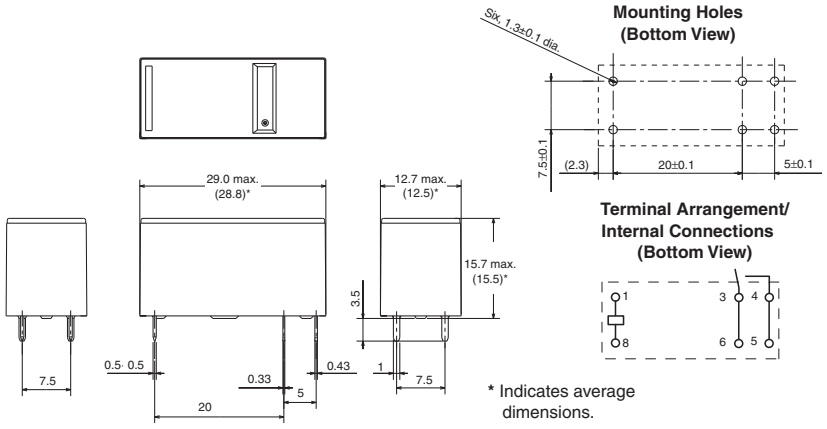
Model	Coil Rating	Contact rating
G5RL-1(A)-E-HR	5, 12, 24, 48 VDC	16 A, 250 VAC cos ϕ =1 15,000 operations - NO 240 VAC 100 A (0-P) Steady 10 A (rms) 50,000 operations - NO 240 VAC 50 A (0-P) Steady 5 A (rms) 100,000 operations - NO

■ Dimensions

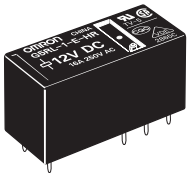
Note: All units are in millimeters unless otherwise indicated.

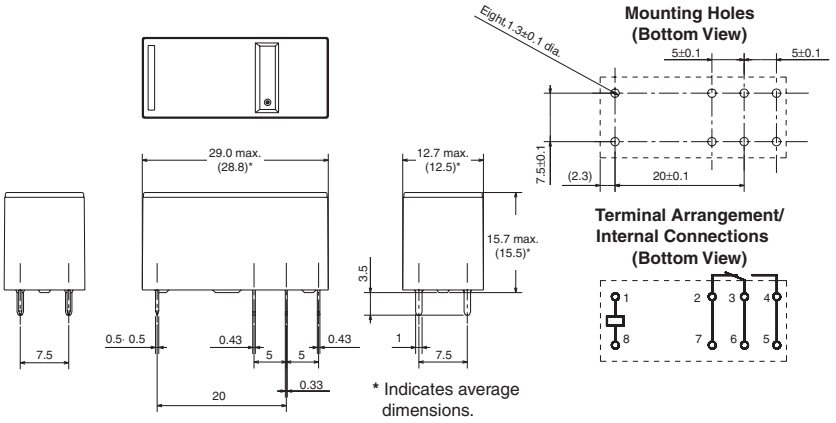
G5RL-1(A)-E-HR





G5RL-1-E-HR





■ Precautions

Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

Low Noise Models: G5RL-1A(-E)-LN

■ Specifications

Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	106.0 mA	44.2 mA	22.1 mA
Coil resistance	47.2 Ω	272 Ω	1,086 Ω
Must operate voltage	70% max. rated voltage		
Must release voltage	10% min. rated voltage		
Max. voltage	110% of rated voltage		
Power consumption	Approx. 530 mW		

Note: The rated current and resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

Contact Ratings

Item	Standard	High capacity
Contact form	SPST-NO	
Contact material	Ag alloy (Cd free)	
Rated load (resistive)	12 A at 250 VAC 12 A at 24 VDC	16 A at 250 VAC 16 A at 24 VDC
Rated carry current	12 A	16 A
Max. switching voltage	250 VAC, 24 VDC	
Max. switching current	12 A	16 A
Max. switching capacity	3,000 VA, 288 W	4,000 VA, 384 W
Min. permissible load (reference value)	100 mA at 5 VDC: P level: λ_{60} = 0.1 x 10^{-6} operations	

Characteristics

Item	Standard	High capacity
Contact resistance	100 mΩ max.	
Operate time	15 ms max.	
Release time	15 ms max.	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	
Impulse withstand voltage	10 kV between coil and contacts (1.2 × 50 μs)	
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Destruction: 1,000 m/s² (approx. 100G) Malfunction: 100 m/s² (approx. 10G)	
Life expectancy	Mechanical: 1,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. Resistive load, 12 A, 250 VAC / 24 VDC (at 1,800 operations/hr)	Mechanical: 1,000,000 operations min. (at 18,000 operations/hr) Electrical: 50,000 operations min. Resistive load, 16 A, 250 VAC / 24 VDC (at 1,800 operations/hr)
Ambient temperature	Operating: –40°C to 85°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 10 g	

Note: 1. Values in the above table are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.

3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.

4. The release time of 15ms max. is based on adding a diode to coil circuit.

Approved Standards

UL / cUL Recognized (File No. E41643) - - Ambient Temp. = 40°C

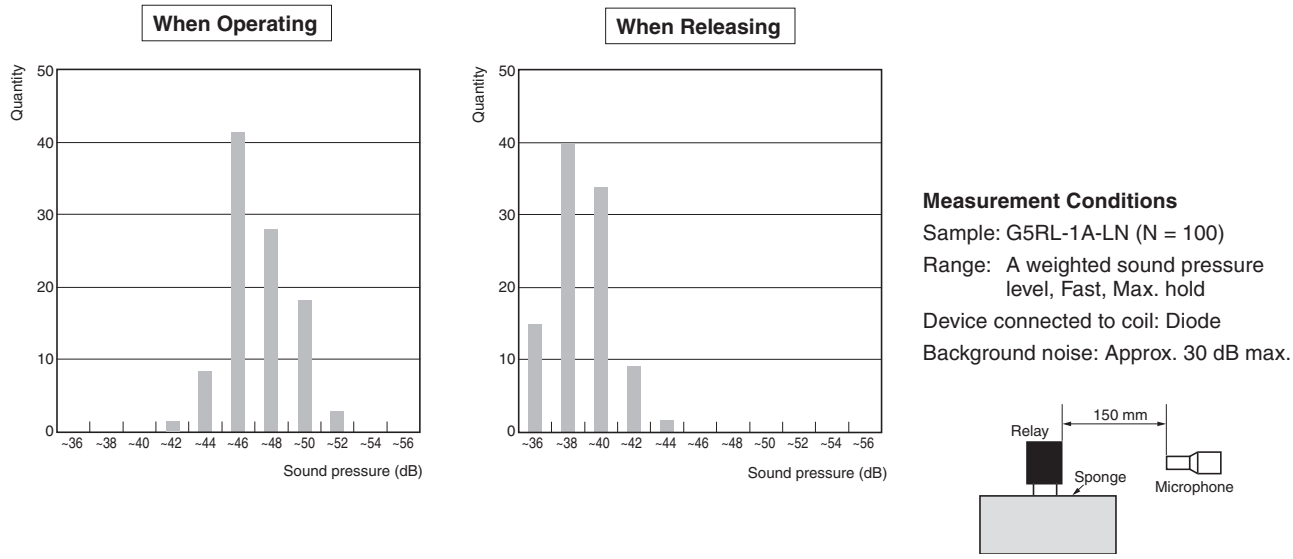
Model	Coil rating	Contact rating
G5RL-1A-LN	5 to 24 VAC	12 A, 250 VAC Resistive, 100,000 operations 12 A, 24 VDC Resistive, 100,000 operations TV-8, 25,000 operations
G5RL-1A-E-LN		16 A, 250 VAC Resistive, 50,000 operations 16 A, 24 VDC Resistive, 50,000 operations TV-8, 25,000 operations

VDE (EN61810-1, EN60065) (License No. A282)

Model	Coil Rating	Contact rating
G5RL-1A-LN	5, 12, 24 VDC	12 A, 250 VAC cos ϕ =1 60,000 operations 12 A, 24 VDC (0 ms) 100,000 operations 230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations 250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations 250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations
G5RL-1A-E-LN		16 A, 250 VAC cos ϕ =1 30,000 operations 16 A, 24 VDC (0 ms) 40,000 operations 230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations 250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations 250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations

■ Engineering Data

Distribution of Sound Pressure



Measurement Conditions

Sample: G5RL-1A-LN (N = 100)

Range: A weighted sound pressure level, Fast, Max. hold

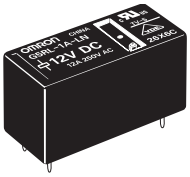
Device connected to coil: Diode

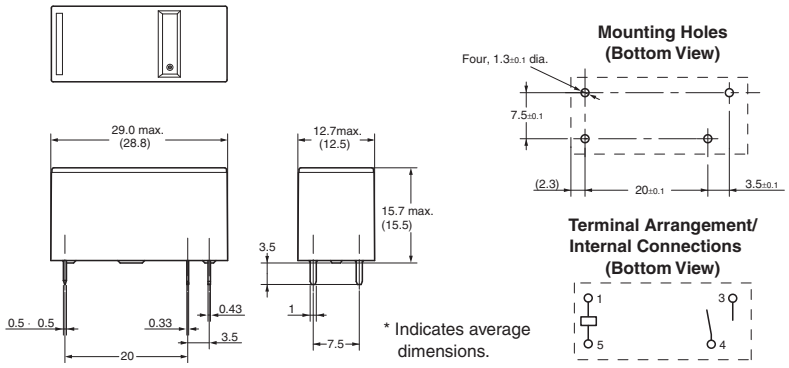
Background noise: Approx. 30 dB max.

■ Dimensions

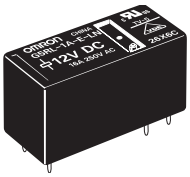
Note: All units are in millimeters unless otherwise indicated.

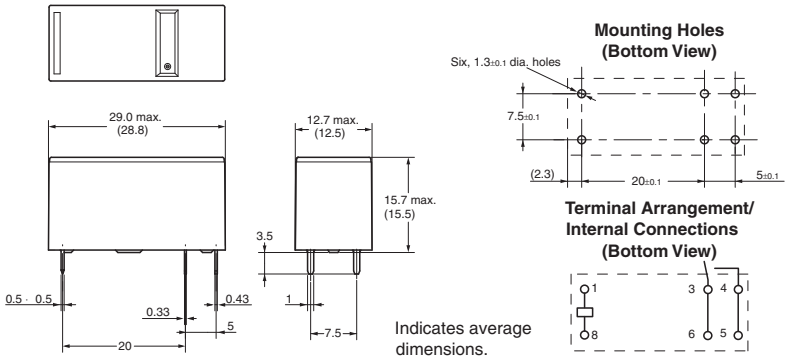
G5RL-1A-LN





G5RL-1A-E-LN





■ Precautions

Mounting

When mounting a G5RL-LN Relay (Low Noise Relay) on a PCB, use a diode for surge absorption for the coil.

Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

Others

Do not decrease coil voltage after operation and do not use a pulse wave drive.

Disclaimer:

All technical performance data applies to the product as such; specific conditions of individual applications are not considered. Always check the suitability of the product for your intended purpose. OMRON does not assume any responsibility or liability for noncompliance herein, and we recommend prior technical clarification for applications where requirements, loading, or ambient conditions differ from those applying to general electric applications. Any responsibility for the application of the product remains with the customer alone. THIS COMPONENT CAN NOT BE USED FOR AUTOMOTIVE APPLICATIONS.

Power PCB Relay
G4A

Miniature Single-pole Relay with 80-A Surge Current and 20-A Switching Current

- Ideal for motor switching.
- Miniature, relay with high switching power and long endurance.
- Creepage distance conforms to UL and CSA standards.
- Highly noise-resistive insulation materials employed.
- Standard model available with flux protection construction.
- RoHS Compliant



Ordering Information

Classification	Contact form	Model
#250 tab terminals/PCB coil terminals	SPST-NO	**G4A-1A-E**
PCB terminals/PCB coil terminals		**G4A-1A-PE**

Note: When ordering, add the rated coil voltage to the model number.
Example: G4A-1A-E DC12
Rated coil voltage

Model Number Legend

G4A□□ - □□ **DC**□
1 2 3 4 5

1. **Number of Poles**
   1: 1 Pole
2. **Contact Form**
   A: SPST-NO
3. **Terminals**
   None: #250 tab/PCB coil terminals
   P: Straight PCB/PCB coil terminals
4. **Special Function**
   E: For long endurance
5. **Rated Coil Voltage**
   5, 12, 24 VDC

Specifications

■ Contact Ratings

Rated load	20 A at 250 VAC
Rated carry current	20 A
Max. switching voltage	250 VAC
Max. switching current	20 A
Max. switching capacity	5,000 VA
Min. Permissible Load (reference value - see note)	100 mA at 5 VDC

Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$/operation

■ Coil Ratings

Rated voltage		5 VDC	12 VDC	24 VDC
Rated current		180 mA	75 mA	37.5 mA
Coil resistance		27.8 Ω	160 Ω	640 Ω
Coil inductance (ref. value)	**Armature OFF**	---	0.8 H	3.5 H
	Armature ON	---	1.1 H	4.8 H
Pick-up voltage (max.)		70% of rated voltage max.		
Dropout voltage (min.)		10% of rated voltage min.		
Maximum coil voltage		160% of rated voltage at (23°C)		
Power consumption		Approx. 0.9 W		

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

2. Operating characteristics are measured at a coil temperature of 23°C.

3. Max. permissible voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

■ Endurance

With Motor Load

Load conditions	Switching frequency	Electrical endurance
250 VAC: Inrush current: 80 A, 0.3 s (cosϕ= 0.7) Break current: 20 A (cosϕ = 0.9)	ON:1.5 s OFF:1.5 s	200,000 operations

With Overload

Load conditions	Switching frequency	Electrical endurance
250 VAC: Inrush current: 80 A (cosϕ= 0.7) Break current: 80 A (cosϕ = 0.7)	ON:1.5 s OFF:99 s	1,500 operations

With Inverter Load

Load conditions	Switching frequency	Electrical endurance
100 VAC; Inrush current: 200 A (0–P) Break current: 20 A	ON:3 s OFF:5 s	30,000 operations

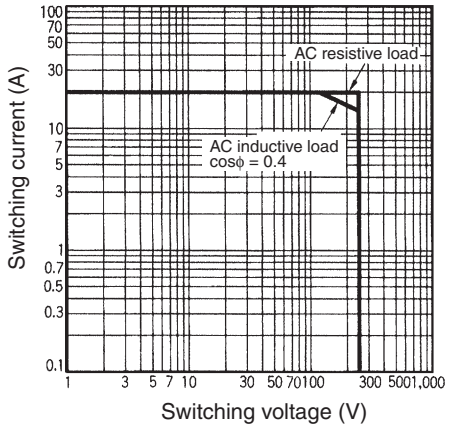
■ Characteristics

Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	10 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,500 VAC 50/60 Hz for 1 min between coil and contacts 1,000 VAC 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55, 1.5-mm double amplitude Malfunction: 10 to 55, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Service Life	Mechanical: 2,000,000 operations min. (at 18,000 operations/hr) Motor load: 100,000 operations min. (ON/OFF: 1.5 s) Inverter load: 30,000 operations min. (ON: 3 s, OFF: 5 s
Ambient temperature	Operating: –20°C to 60°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 23 g

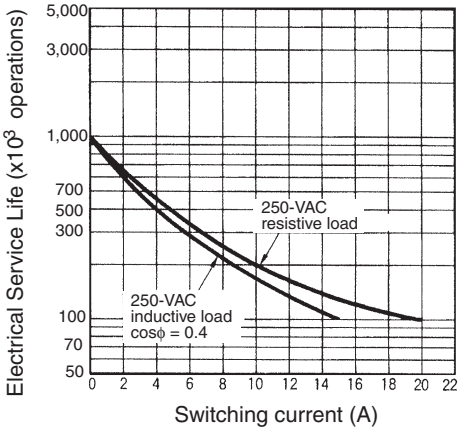
Note: The data shown above are initial values.

Engineering Data

Maximum Switching Capacity



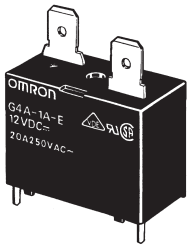
Electrical Service Life

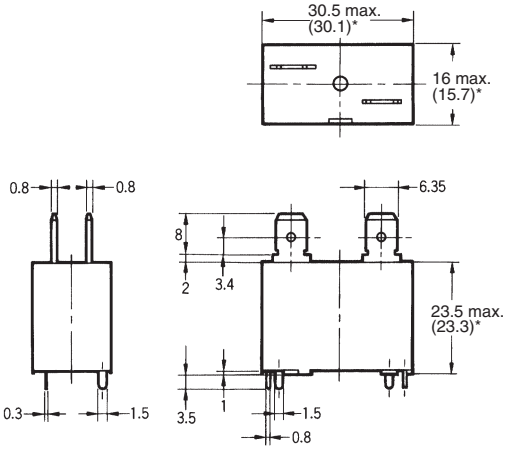


Dimensions

Note: All units are in millimeters unless otherwise indicated; dimensions shown in parentheses are in inches.

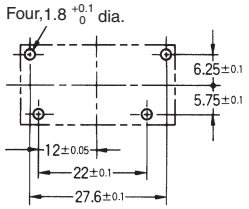
G4A-1A-E



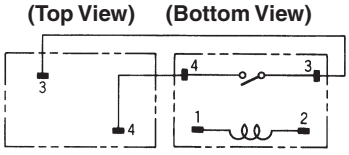


*Average value

Mounting Holes (Bottom View)

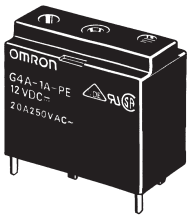


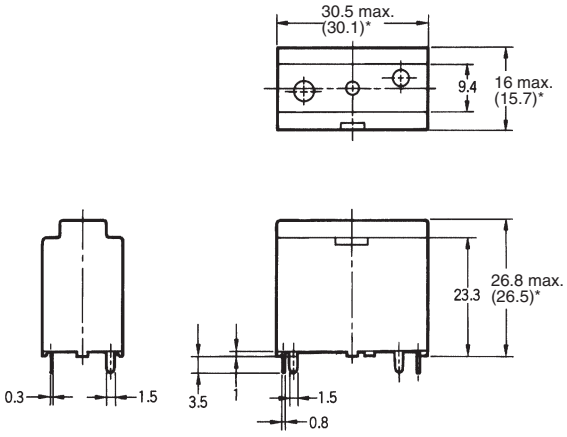
Terminal Arrangement /Internal Connections



Tab Terminal **PCB Terminal**

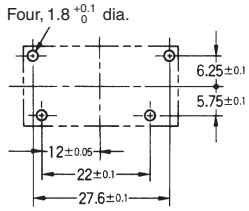
G4A-1A-PE



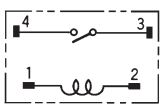


*Average value

Mounting Holes (Bottom View)



Terminal Arrangement /Internal Connections (Bottom View)



Precautions

Mounting

When mounting two or more relays side by side, provide a minimum space of 3 mm between relays.

Terminal Connection

The terminals fit FASTON receptacle 250 and are suitable for positive-lock mounting.

Do not apply excessive force on the terminals when mounting or dismounting the relay.

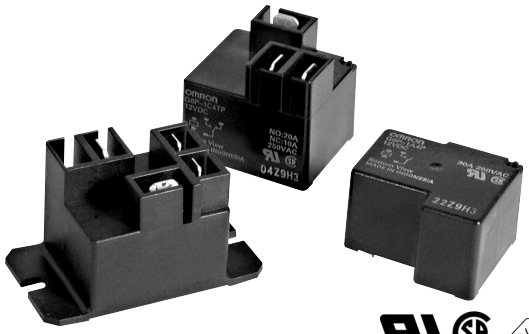
The following positive-lock connectors made by AMP are recommended.

Type	Receptacle terminals	Positive housing
#250 terminals (width: 6.35 mm)	AMP 170333-1 (170327-1) AMP 170334-1 (170328-1) AMP 170335-1 (170329-1)	AMP 172076-1 natural color AMP 172076-4 yellow AMP 172076-5 green AMP 172076-6 blue

Note: The numbers shown in parentheses are for air-feeding.

Power PCB Relay
G8PT

- Up to 30 A switching capacity in compact package.
- Available with quick-connect contact terminals for easy load connecting with either QC or PCB coil terminals.
- UL Class F coil insulation standard
- Minimum 6 kV Impulse Surge Withstand.
- Ideal for home and industrial appliances, HVAC and many other applications.
- UL recognized / CSA certified.
- VDE approved.
- RoHS Compliant



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G8P-1A4P-*DC12*).

Mounting type	Contact form	Construction	Model
PCB	SPST-NO	Open frame	**G8P-1AP**
		Sealed with ventable nib*	**G8P-1A4P**
	SPDT	Open frame	**G8P-1CP**
		Sealed with ventable nib*	**G8P-1C4P**
PCB & Quick Connect load terminals	SPST-NO	Open frame	**G8P-1ATP**
		Sealed with ventable nib*	**G8P-1A4TP**
	SPDT	Open frame	**G8P-1CTP**
		Sealed with ventable nib*	**G8P-1C4TP**
Flange mount Quick Connect terminals	SPST-NO	Vented	**G8P-1A2T-F**
	SPDT	Vented	**G8P-1C2T-F**

Note: Load terminals are .250" Quick Connect. Coil terminals on Flange Mount versions are .187" Quick Connect.

* Sealed and vented optional.

Specifications

■ Contact Data

Type	SPST-NO	SPDT
Rated load	30 A 250 VAC, 20 A 28 VDC	20/10 A* at 250 VAC, 20/10 A at 28 VDC
Contact material	Ag-Alloy	
Carry current	30 A max.	20/10 A*
Max. operating voltage	250 VAC, 28 VDC	
Max. operating current	AC 30 A, DC 20 A	AC 20/10 A, DC 20/10 A*
Max. switching capacity	7,500 VA, 560 W	5,000/2,500 VA, 560/280 W*
Min. permissible load	500 mA@ 5 VDC (AgSnIn), 100 mA @ 5 VDC (optional alloy)	

* NO contact/NC contact

■ Coil Data

Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (mW)
			% of rated voltage			
5	185	27	75% max.	10% min.	120% max.	Approx. 900
9	93	97				
12	77	155				
24	36	660				
48	19	2,480				
110	9	12,400				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with tolerances of ±10%.

■ Characteristics

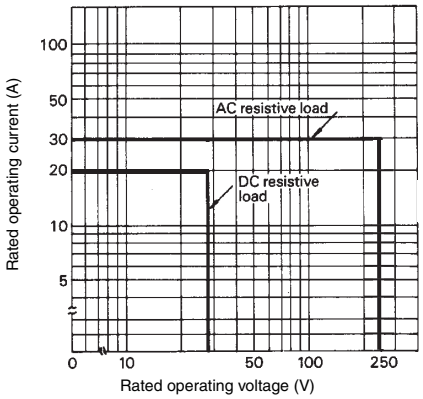
Contact resistance		100 mΩ max. (measured with 5 VDC, 1 A)
Operate time		15 ms. max.
Release time		10 ms. max.
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,500 VAC, 50/60 Hz for 1 minute (coil to contacts), 1,500 VAC, 50/60 Hz for 1 minute (between contacts)
Impulse surge withstand		6,000 V between coil to contacts (1.2 μs/50 μs & 100 kHz ring wave per IEC 1000-4-12)
Vibration	**Mechanical durability**	10 to 55 Hz, 1.65 mm (0.06 in) double amplitude for 2 hours
	Malfunction durability	10 to 55 Hz, 1.65 mm (0.06 in) double amplitude for 5 minutes
Shock	**Mechanical durability**	1,000 m/s² (approx. 100 G)
	Malfunction durability	100 m/s² (approx. 10 G)
Ambient temperature		-55° to 105°C, cold coil condition (with no icing) -55° to 85°C, hot coil condition (hot start) (with no icing)
Humidity		5% to 85% RH
Service life	**Mechanical**	10 million operations minimum
	Electrical	100,000 operations, 360 ops/hr, at rated load (minimum)

Note: 1. Data shown are of initial value. Operate and release times excluding bounce.

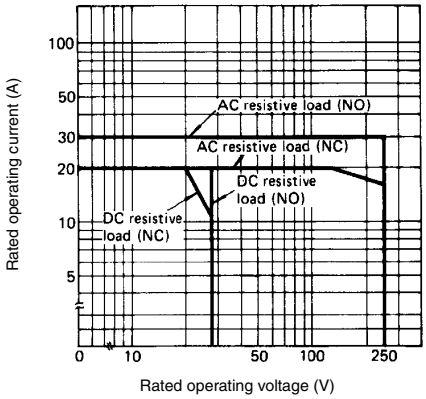
2. Please vent sealed relays after processing in order to achieve rated electrical service life, by removing the vent nib.

■ Characteristic Data

Maximum switching capacity
SPST-NO

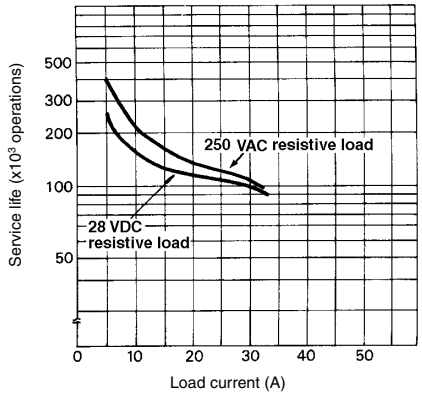


SPDT

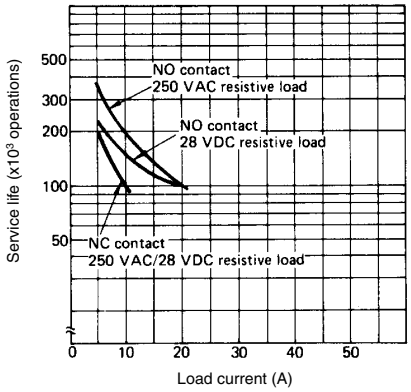


■ Characteristic Data

Electrical service life
SPST-NO



SPDT

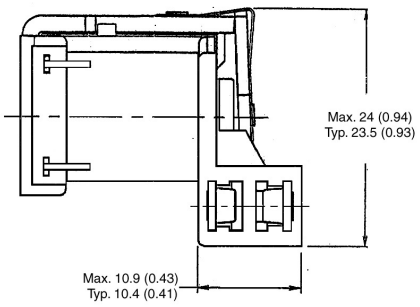


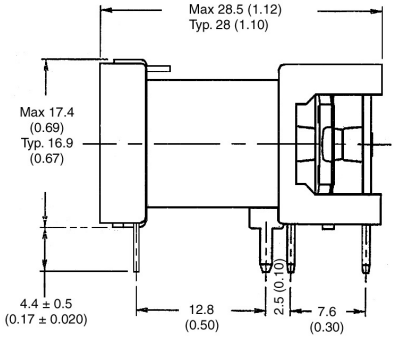
Dimensions

Unit: mm (inch)

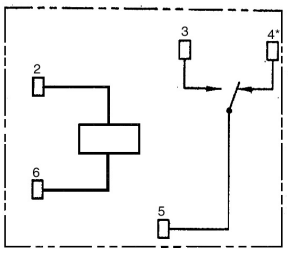
■ Relays

Open frame, PCB terminals

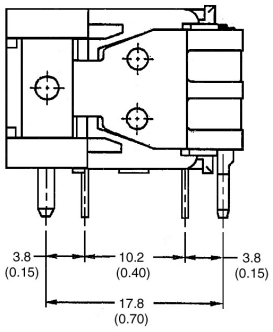




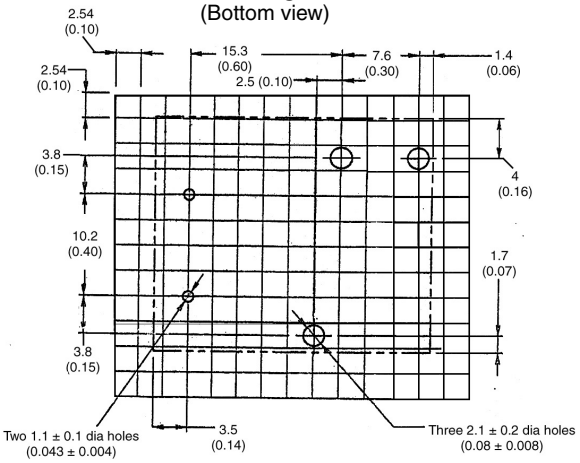
Terminal arrangement/ Internal connections
(Bottom view)



Note: Terminal #4 is omitted on SPST-NO version.

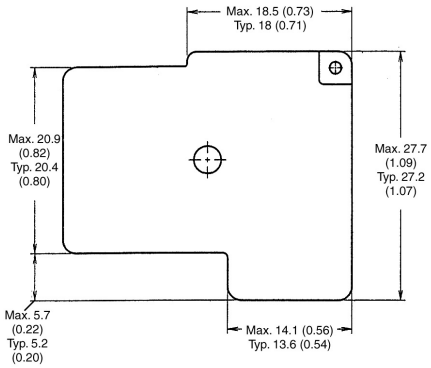


Mounting holes
(Bottom view)

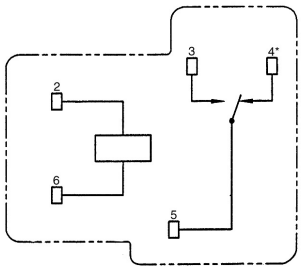


Unit: mm (inch)

Sealed/Ventable, PCB terminals

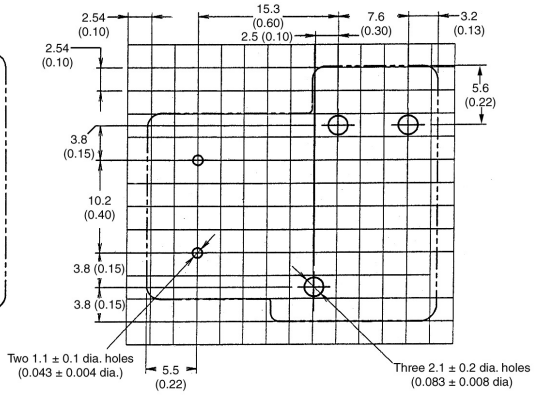


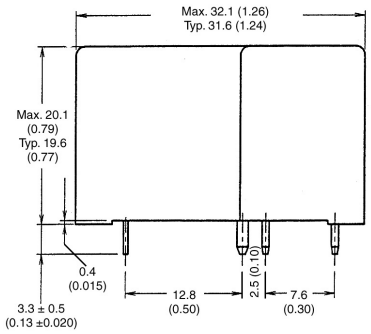
Terminal arrangement/ Internal connections
(Bottom view)

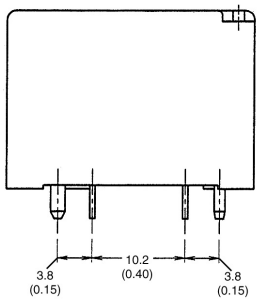


Note: Terminal #4 is omitted on SPST-NO version.

Mounting holes
(Bottom view)



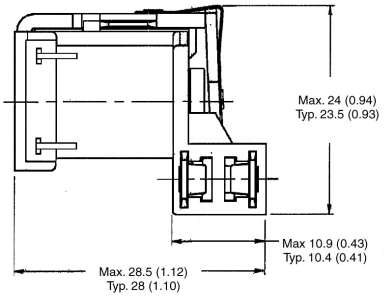




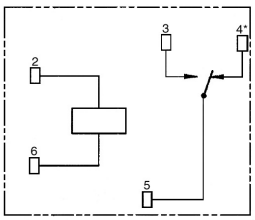
Pin Dimensions

large = 1.6 x 1.2; 1.2 x 0.8 x 3.3L
small = 0.6 x 0.5 x 3.3L

Open frame, PCB with Quick Connect terminals

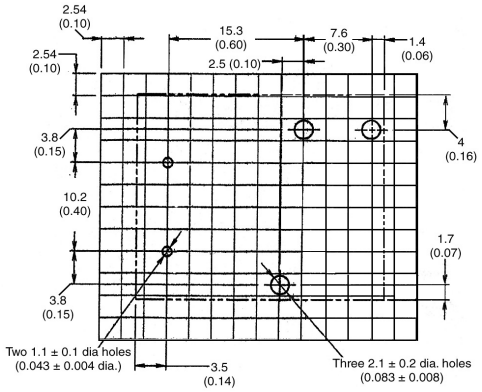


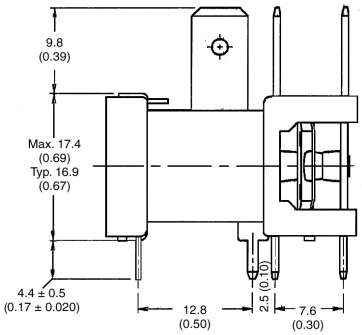
Terminal arrangement/ Internal connections
(Bottom view)

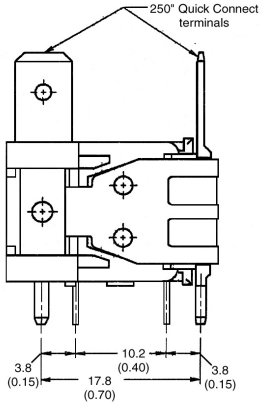


Note: Terminal #4 is omitted on SPST-NO version.

Mounting holes
(Bottom view)





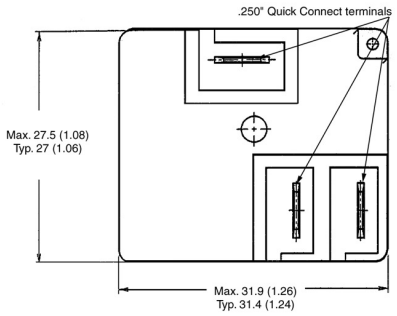


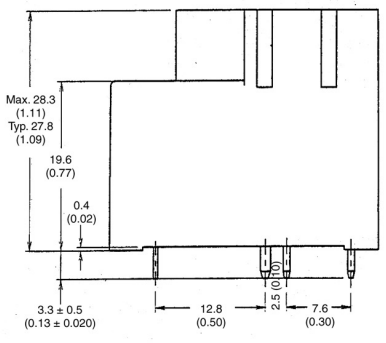
Pin Dimensions

large = 1.6 x 1.2; 1.2 x 0.8 x 3.3L
small = 0.6 x 0.5 x 3.3L

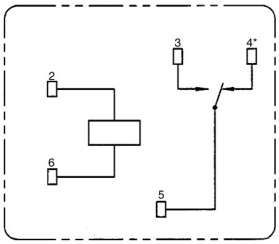
Unit: mm (inch)

Sealed/Ventable, PCB with Quick Connect terminals

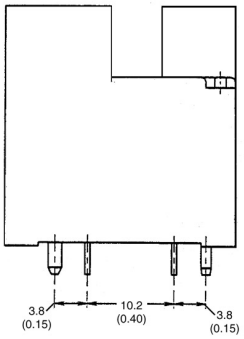




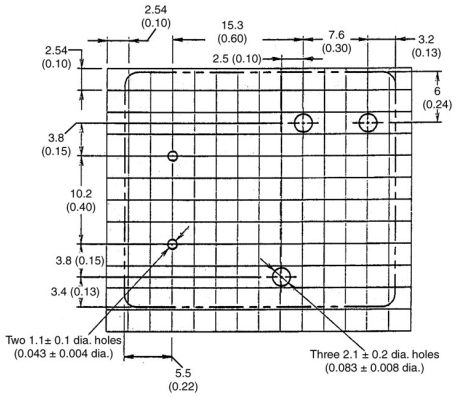
Terminal arrangement/ Internal connections
(Bottom view)



Note: Terminal #4 is omitted on SPST-NO version.



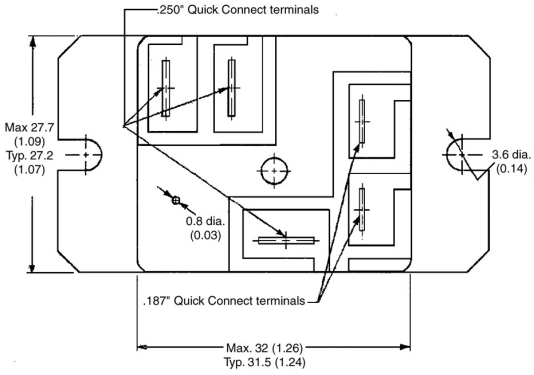
Mounting holes
(Bottom view)

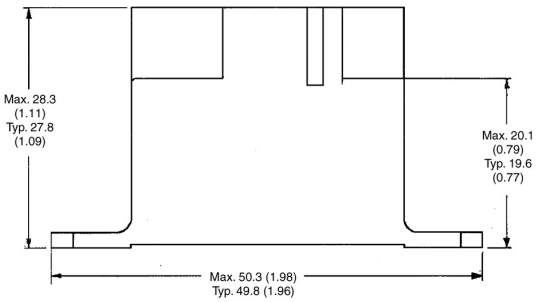


Pin Dimensions

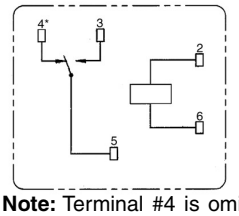
large = 1.6 x 1.2; 1.2 x 0.8 x 3.3L
small = 0.6 x 0.5 x 3.3L

Flange mount

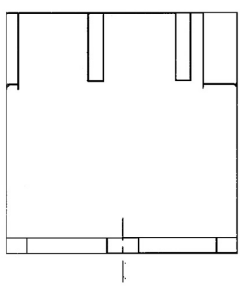




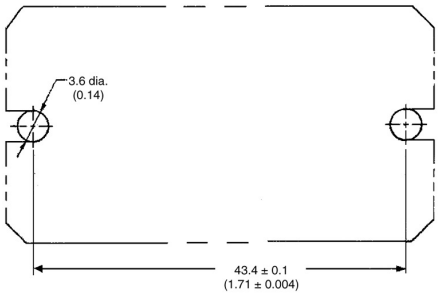
Terminal arrangement/ Internal connections
(Bottom view)



Note: Terminal #4 is omitted on SPST-NO version.



Mounting holes
(Bottom view)



Note: Allow air circulation within the sealed type G8PT by removing the ventilation nib from the cover after soldering and cleaning is complete.

■ Approvals

UL Recognized (File No. E42643), CSA Certified (File No. LR34815)

Contact form	Coil ratings	Contact ratings
SPST-NO	5 to 110 VDC	30 A, 240 VAC (G.P./Res.), 40°C, 50,000 cycles 20 A, 28 VDC (Res.), 40°C, 6,000 cycles 20 A, 240 VAC (Res.), 70°C, 100,000 cycles 23 A, 240 VAC (Res.), 85°C, 100,000 cycles 1 HP, 125-250 VAC, 40°C, 1,000 cycles 2 HP, 250 VAC, 40°C, 1,000 cycles A300 Pilot Duty, 40°C, 600 cycles 20 FLA, 96 LRA, 125 VAC, 40°C, 100,000 cycles 5 A, 250 VAC (Tungsten), 40°C, 6,000 cycles 20 A, 120-277 VAC (Ballast), 40°C, 6,000 cycles TV-5, 40°C, 25,000 cycles
SPDT	5 to 110 VDC	NO/NC
		30 A/20 A, 277 VAC (Res.), 40°C, 100,000 cycles (N.O.) and 30,000 cycles (N.C.) 20 A/15 A, 250 VAC (Res.), 105°C, 100,000 cycles (N.O.) and 30,000 cycles (N.C.) 20 A/10 A, 28 VDC (Res.), 40°C, 6,000 cycles 30 A/30 A, 277 VAC(Res.), 40°C, 100,000 cycles 1/2 HP/1/2 HP, 125 VAC, 40°C, 100,000 cycles 2 HP/ 1/2 HP, 250 VAC, 40°C, 1,000 cycles 1 HP/ 1/4 HP, 125 VAC, 40°C, 1,000 cycles B150 Pilot Duty, 40°C, 100,000 cycles 5 A/ 3 A, 250 VAC (Tungsten), 40°C, 6,000 cycles 6 A/ 3 A, 277 VAC (Ballast), 40°C, 6,000 cycles TV-5 (N.O.), 40°C, 25,000 cycles

VDE recognized type (Licence No. 40004714)

Note: 1. The rated values approved by each of the safety standards (e.g., UL, CSA) may be different from the performance characteristics individually defined in this catalog.

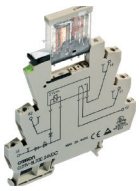
2. For information on additional ratings not included in this catalog, contact your local Omron Representative.

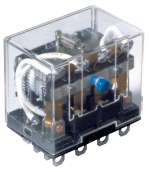
3. In the interest of product improvement, specifications are subject to change.

4. Please contact Omron for details regarding VDE approvals.

5. Meets requirements of polluiton degree 2 with Material II & III.

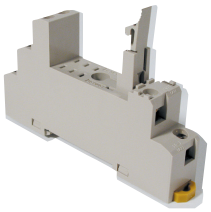
General Purpose Relay Selection Guide

	 Page 235	 Page 245	 Page 255	 Page 259
General Attributes	**G2RV**	**G2RS-(S)**	**MY4H**	**MY**
Dimensions mm(in)	99.2 H x 97.4 L x 6.2 W (3.91 x 3.83 x 0.24) max.	35.5 H x 29 L x 13 W (1.40 x 1.14 x 0.51)	35 H x 28.5 L x 122 W (1.38 x 1.12 x 0.87)	36 H x 28 L x 21.5 W (1.42 x 1.10 x 0.85)
Switching	6A max.	1 pole: 10A max.; 2 pole: 5A max.	3A max.	10A (2 pole); 5 A (4 pole)
Features	• Mechanical flag, clear case, and LED on socket provide quick easy proof of relay operation • Large quick connect terminals allow for reliable connection between relay and socket • Ideal for automation applications	• Nameplate and mechanical flag indicator standard • LED, diode, and lockable test button option available • Wide variety of sockets including screwless clamp type	• Fully hermetically sealed for hazardous locations • Class I, Division II approved (MY4ZH) • Cadmium-free contacts • Models with bifurcated contacts also available	• Exceptional reliability • Push-to-test button available • Arc barrier built into 4 pole • Options include LED Indicator, Diode, and test button • Name plate and mechanical indicator, standard
Contact Information				
Contact form	1 Form C	1 Form C, 2 Form C	4 Form C	2 Form C, 4 Form C
Contact type(s)	Single button	Single button	Single button, bifurcated	Single button, bifurcated
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	6A @ 250 VAC / 30 VDC: 70,000 minimum (NO) 50,000 minimum (NC)	100,000 min. (at rated loads) (see data sheet for more information)	3A @ 110 VAC / 24VDC 100,000 min.	2P 500,000: 5A @ 30VDC/250VAC 4P 200,000: 3A @ 30VDC/250VAC 100,000: 3A@30VDC/250VAC (bifurcated)
Max. switching capacity under resistive load	1,500VA, 180W (resistive load)	2,500VA, 300W (1-pole)	330VA, 72W	2,500VA, 300W (NO)
Min. permissible load (for reference only)	10mA @ 5VDC	100mA @ 5VDC 10mA @ 5VDC (2 pole)	100 μA @1VDC for MY4H 100 μA @ 100mVDC for MY4ZH (bifurcated)	2 pole: 1mA @ 5VDC 4 pole: 1mA @ 1VDC 10μA @ 1 VDC (bifurcated contacts)
Coil Information				
Coil voltage	12, 24, 48VDC 24, 48, 110, 230VAC	6, 12, 24, 48VDC; 24, 110 120, 230, 240VAC	12, 24VDC 24, 110/120VAC	AC coils: 6, 12, 24, 120, 240 VAC DC coils: 6, 12, 24, 48, 110 VDC
Power consumption	see datasheet for details	0.9VA, 0.53W	0.9 - 1.1VA, 0.9W	AC Coil: 0.9 to 1.2VA DC Coil: 0.9W
Insulation class	—	—	—	—
Characteristics				
Operating Temperature	-40 to +55°C	-40 to +70°C	-25 to +60°C	-55 to 70°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	—	—	—	—
Dielectric strength (50/60 Hz for 1 minute)	4,000VAC (coil-contacts) 1,000VAC (open contacts)	1 pole: 5,000VAC (coil-contacts) 1,000VAC (open contacts) 2 pole: 5,000VAC (coil-contacts) 3,000VAC (different polarity) 1,000VAC (open contacts)	1,000VAC (coil-contacts) 1,000VAC (open contacts) 750VAC (between poles)	2,000VAC (coil-contact) 1,000VAC (open contacts)
Terminal choices	Relay: Quick connect Socket: Push-in wire or screw terminals.	Plug-in		PCB, plug-in
Protection level	Unsealed	Unsealed		Unsealed
Accessories	Replacement relays, cross bars, separator plates, labels, PLC interface, and interface cables	Sockets for track mount, sockets with screw terminals, & back connecting sockets with solder & PCB terminals. Note: P2RF-S series screwless clamp terminal socket available. SSR option: G3R.	Track mount sockets, clips, and DIN Rails	Track mount sockets, clips, and DIN Rails
Approved standards	UL, CSA, VDE	UL, CSA, VDE	UL, CSA	UL, CSA, VDE

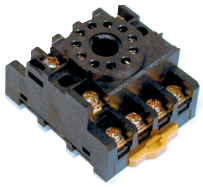
	 Page 277	 Page 285	 Page 299	 Page 305
General Attributes	**MKS**	**LY**	**G7J**	**G7L**
Dimensions mm(in)	52.58 H x 34.54 L x 34.54 W (2.07 x 1.36 x 1.36)	35.56 H x 27.94 L x 21.59 W (1.40 x 1.10 x 0.85)	64 H x 53.5 L x 34.5 W (2.52 x 2.11 x 1.36)	49.02 H x 68.58 L x 34.54 W (1.93 x 2.70 x 1.36)
Switching	10 A max.	1 pole: 15A 2-4 pole: 10A	25A max.	30A max.
Features	• Octal base plug-in • IEC Rating 7A 250VAC, general use, 100,000 cycles • New two way lockable test button models available • Options include test button, LED Indicator, Diode, Varistor, and wiring styles • Wider operating temperature versus previous MK Relays.	• Compact power relay • LED, Push-to-test button, bifurcated contacts and other features available • Space efficient power switching • Long life, 2 pole 500,000 ops, 1,3, and 4 pole 200,000 ops.	• Variety of contact forms • Ideal for 3 phase motor control • UL 3 phase rating (NO) 5HP, 277VAC 30,000 cycles • Minimal chattering • UL94V-0	• Reliable high power relay • 3 mm contact gap • Conforms to IEC 950 • Class B insulation standard • Most cost effective solution in its class. • Ideal for pump, motor loads
Contact Information				
Contact form	2 Form C, 3 Form C	1 Form C, 2 Form C, 3 Form C, 4 Form C	4 Form A, 3 Form A/1 Form B, 2 Form A/2 Form B	1 Form A-(Double Make) 2 Form A-(Double Make)
Contact type(s)	Single button	Single button, bifurcated	Single button	Single button
Contact Material	Ag-Alloy	Ag-Alloy	Ag-Alloy	Ag-Alloy
Electrical Service Life (@ 1800 ops./hr) (resistive load)	100,000 min. 10A @ 250VAC/30VDC (NO)	200,000 min: 15A @ 24VDC/110VAC (1 pole) 10A @ 24VDC/110VAC 500,000 min: 10A @ 110VAC (2 pole)	100,000 min. (at rated loads) (see data sheet for more information)	100,000 min. (at rated loads) (see data sheet for more information)
Max. switching capacity under resistive load	2,500VA, 300W (NO)	1,650VA, 360W (1 pole)	5,500VA, 750W (NO contacts) 1,760VA, 240W (NC contacts)	Screw/Q.C. 6,600VA (1 pole) 5,500VA (2 pole)
Min. permissible load (for reference only)	100mA @ 1VDC	100mA @ 5VDC 10mA @ 5VDC (bifurcated contacts)	100mA @ 24VDC	100mA @ 5VDC
Coil Information				
Coil voltage	AC coils: 6, 12, 24, 120, 240 VAC DC coils: 6, 12, 24, 48, 110 VDC	6, 12, 24, 110/120, 220/240 VAC 6, 12, 24, 48, 100/110 VDC	6, 12, 24, 48, 100/110VDC; 24, 50, 100/120, 200/240VAC	12, 24, 48, 100VDC; 12, 24, 100/120, 200/240VAC
Power consumption	Approx. 2.3VA 60Hz, 1.4W	1.1VA, 0.9W (1 pole); 1.1VA, 0.9W (DPDT); 1.6VA, 1.4W (3PDT); 1.95VA, 1.5W (4PDT)	1.8 to 2.6VA, 2.0W	1.7 to 2.5VA, 1.9W
Insulation class	—	—	Class B available	Class B
Characteristics				
Operating Temperature	LED Type: -25 to 60°C non-LED: -40 to 60°C	Carry current 4A or less: 1-3 pole: -25 to 70°C 4 pole: -25 to 55°C	-25 to +60°C	-25 to +60°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	—	—	10kV (coil-contacts)	10kV (coil-contacts)
Dielectric strength (50/60 Hz for 1 minute)	2,500VAC (coil-contact) 1,000VAC (open contacts)	2,000VAC (coil-contact) 1,000VAC (open contacts)	4,000VAC (coil-contacts) 4,000VAC (different polarity) 2,000VAC (open contacts)	4,000VAC (coil-contacts) 2,000VAC (different polarity) 2,000VAC (open contacts)
Terminal choices	Plug-in	PCB, quick connect, plug-in	Quick-connect, screw, PCB	Quick-connect, screw, PCB
Protection level	Unsealed	Unsealed (other options possible)	Unsealed Semi-sealed (PCB type only)	Unsealed Semi-sealed (PCB type only)
Accessories	Track mount sockets, clips, and DIN Rails	Sockets & clips for track mount sockets with screw terminals, & back connecting sockets with solder & PCB terminals	R99-04-FOR-G5F bracket	R99-07G5D E bracket; P7LF-D adapter; P7LF-06 front connecting socket
Approved standards	UL, CSA, TUV	UL, CSA	UL, CSA, TUV, CE, IEC	UL, CSA, TUV

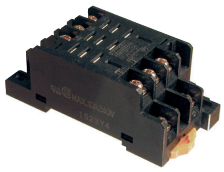
	 Page 317	 Page 325	 Page 329
General Attributes	**MJN**	**MGN**	**G7Z**
Dimensions mm(in)	48.38 H x 35.56 L x 38.73 W (1.91 x 1.40 x 1.53)	Short Base: 55.88 H x 63.50 L x 63.50 W (2.20 x 2.50 x 2.50) Long Base: 60.45 H x 84.33 L x 63.50 W (2.38 x 3.32 x 2.50)	84 H x 62 L x 45 W (3.31 x 2.44 x 1.77)
Switching	10A, 20A, 30A (UL ratings) (see: Electrical service life)	30A max.	40A max.
Features	• Rugged power driver offers superior 3/16" through-air & 3/8" over-surface spacing • Interlocked frame & contact block prevent contact misalignment during plug-in • Indicator lamp, push-to-operate options • 10A-30A in same package • Continous duty at 125% coil voltage	• 30 Amp heavy duty power relay • Class F coil insulation system for 155°C (total temperature) • Coil molded in DuPont Rynite® for environmental protection • Rugged construction rivets terminals to base • Magnetic blow-out option	• Carry up to 160A for 4 pole NO all terminals tied in parallel • Nominal power 3.7W • Reduced size versus typical IEC-AC1 50A contactor • NC auxiliary contact can be used to monitor contact weld on Main NO Contacts.
Contact Information **Contact form**	1 Form C, 2 Form C, 3 Form C (monostable); 2 Form C (latching)	1 Form A, 1 Form B, 1 Form C, 2 Form A, 2 Form C (long base)	4A, 3A/1B, 2A/2B
Contact type(s)	Single button	Single button	Single button (Load) /Bifurcated Crossbar (Aux.)
Contact Material	3/16" diameter $AgCdO_2$	5/16" diameter $AgCdO_2$	AgSnIn
Electrical Service Life (@ 1800 ops./hr) (resistive load)	100,000 min. 10A @ 28VDC/240VAC 20A @ 28VDC/277VAC 30A @ 28VDC	100,000 min. 30A @ 28VDC/240VAC	100,000: 5A @ 110VDC (at 1,2000 ops/hr) 80,000: 40A @ 440VAC
Max. switching capacity under resistive load	N/A	N/A	17,600VA, 550W 440VA, 110W (aux. contact block)
Min. permissible load (for reference only)	N/A	N/A	2A @ 24VDC 1mA @ 5VDC (auxiliary contact block)
Coil Information **Coil voltage**	6, 12, 24, 120VAC 5, 6, 12, 24, 48, 110VDC	6, 12, 24, 120, 240, 480VAC; 6, 12, 24, 48, 110VDC	12, 24VDC
Power consumption	AC1.7VA (1, 2PDT) 2.0VA(3PDT DC 1.2W	9.5VA nominal; 2W nominal	3.7W
Insulation class	—	Class F	—
Characteristics **Operating Temperature**	-45 to +60°C (1 & 2 pole AC coil), + 70°C (DC coil) -45 to +45°C (3 pole AC coil) -45 to +70°C (3 pole DC coil)	At 30Amps: -45 to +80°C (AC coil) -45 to +115°C (DC coil)	-25 to +60°C
Impulse withstand voltage (1.2 x 50 μ sec. unless noted)	N/A	N/A	10kV (coil to contacts or different polarity) 4.5kV (open contacts)
Dielectric strength (50/60 Hz for 1 minute)	750VAC, rms 60Hz across open contacts; 2,500VAC, rms 60Hz all other mutually insulated elements	2,200Vrms, 60Hz between contacts; 2,200Vrms, 60Hz between other elements	4,000VAC (coil-contacts) 4,000VAC (different polarity) 2,000VAC (open contacts)
Terminal choices	Quick-connect plug-in	Screw	Screw
Protection level	Unsealed	Unsealed	Unsealed
Accessories	PTF11PC Socket; PTF11QDC Socket; PTF21PC Socket; PTFPCB Socket; PYMJN-PCB Retaining Clips; PYMJN-S Retaining Clips	Aluminum dust cover - sealed knock-out holes for standard conduit fittings. Relay mounts on pre-drilled base. Snap action cover release 127 W x 76.20 H x 101.60 D (5 x 3 x 4)	Auxiliary contact blocks
Approved standards	UL, CSA	UL, CSA	UL, CSA, TUV

Socket Selection Guide











Relay Type	Track Mount Socket	Back Connecting Sockets	
		Solder Terminals	PCB Terminals
G2R-1-S	P2RF-05 P2RF-05-E P2RF-05-S	P2R-05A	P2R-05P
G2R-2-S	P2RF-08 P2RF-08-E P2RF-08-S	P2R-08A	P2R-08P
G2RV	G2RV-SL500, -SL700	–	–
G6B	–	–	P6B-04P (1-pole), P6B-26P (2-pole)
G6D	–	–	P6D-04P
G6BK	–	–	P6B-06P
G6BU	–	–	P6B-04P
G6C-1, G6C-2	–	–	P6C-06P
G6CK	–	–	P6C-08P
G6CU	–	–	P6C-06P
LY1, LY2	PTF08A-E	PT08	PT08-0
LY3	PTF11A	PT11	PT11-0
LY4	PTF14A-E	PT14	PT14-0
MK2	PF083A-E	PL08	PLE08-0
MK3	PF113A-E	PL11	PLE11-0
MY2	PYF08A-E PYF08A-N PYF08S	PY08	PY08-02
MY3	PYF11A	PY11	PY11-02
MY4	PYF14A-E PYF14A-N PYF14S	PY14	PY14-02
MY2K	PYF14A-E	PY14	PY14-02
MY4(Z)H	PYF14A-E-US	–	–

Note: **1.** -E and -N models are finger-protect construction. Round terminals cannot be used. Use Y-shaped terminals.
2. -S types are screwless terminal styles.

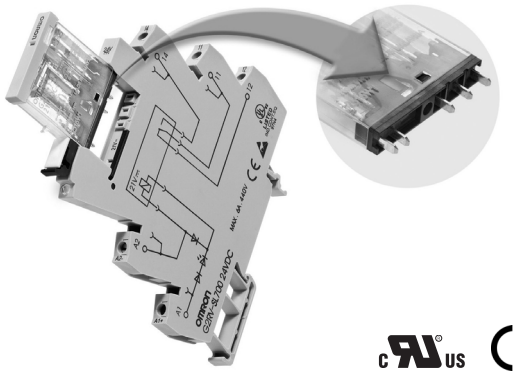
Relay Type	Mounting	Adaptor	Front Connecting Socket
	Bracket	Track Mount/Panel Mount	Track Mount/Panel Mount
G7J-(ALL)	R99-04-FOR-G5F W bracket	–	–
G7L-1A-T	R99-07G5D E bracket	P7LF-D	P7LF-06
G7L-1A-TJ			P7LF-06
G7L-1A-B			–
G7L-1A-BJ			–
G7L-2A-T			P7LF-06
G7L-2A-TJ			P7LF-06
G7L-2A-B			–
G7L-2A-BJ			–

Terminal Cover	Socket Bridge
P7LF-C	PYD

Slim Relay
G2RV

Industrial Slim Relay Rated at 6 Amps

- Large plug-in terminals for reliable connection.
- LED indicator, clear case, and mechanical flag allows easy and immediate visual operation verification.
- Has a maximum switching voltage of 440 VAC.
- Slim outline to save space in high volume rack and PLC applications.
- Low power consumption for system energy savings.



Model Number Structure

■ Model Number Legend

G2RV-SL □ □ □ - □
1 2 3 4 5

1. Auxiliary Type Designation
SL: Slim relay and socket combination

2. Wire Connection
7: Screw terminals
5: Push-in terminals

3. Relay LED
0: Without LED

4. Relay Pushbutton
0: Without pushbutton

5. Input Voltage
(Complete part numbers listed in the Relay and Socket Combinations Chart below)

Note: LED indicator standard feature on Socket.

Ordering Information

■ List of Models

Classification		Enclosure rating	Input voltage	Type of connection	Contact form
					SPDT
Plug-in terminals	General-purpose	Unsealed	AC/DC	Screw terminals	**G2RV-SL700**
				Push-in terminals	**G2RV-SL500**

■ Relay and Socket Combinations

Input voltage	Screw terminals	Push-in terminals
12 VDC	**G2RV-SL700-DC12(DC11)**	**G2RV-SL500-DC12(DC11)**
24 VDC	**G2RV-SL700-DC24(DC21)**	**G2RV-SL500-DC24(DC21)**
24 VAC/DC	**G2RV-SL700-AC/DC24**	**G2RV-SL500-AC/DC24**
48 VAC/DC	**G2RV-SL700-AC/DC48**	**G2RV-SL500-AC/DC48**
110 VAC	**G2RV-SL700-AC110**	**G2RV-SL500-AC110**
230 VAC	**G2RV-SL700-AC230**	**G2RV-SL500-AC230**

c UL us LISTED

Note: Relay and Socket Combinations are $_{c}UL_{us}$ listed.

Specifications

■ Coil Ratings @ 23°C

Rated voltage	Rated current			Operate voltage	Release voltage	Power consumption		Input voltage
	AC		DC	% of rated voltage		AC (VA) Approx.	DC (mW) Approx.	% of rated voltage
	50 Hz	60 Hz						
12 VDC	---	---	27.2	80% max.	10% min.	---	300 mW	±10%
24 VDC	---	---	13.3			---	300 mW	
24 VAC/DC	21.1	22.5	13.0			0.5 VA	300 mW	
48 VAC/DC	8.5	9.0	5.2			0.4 VA	250 mW	
110 VAC	7.1	7.5	---			0.8 VA	---	
230 VAC	7.3	7.9	---			1.7 VA	---	

■ Contact Ratings

Number of poles	1 pole	
Load	Resistive load (cos ϕ = 1)	Inductive load (cos ϕ = 0.4, L/R = 7 ms)
Rated load	2A at 400 VAC; 6 A at 250 VAC; 6 A at 30 VDC	2 A at 250 VAC; 2 A at 30 VDC
Rated carry current	6 A	
Max. switching voltage	440 VAC, 125 VDC	
Max. switching current	6 A	
Max. switching power	1,500 VA 180 W	500 VA 60 W
Minimum permissible load	10 mA at 5 VDC : P level: λ_{60} = 0.1 x 10^{-6}/operation	

■ Characteristics

Item	1 pole
Contact resistance	100 mΩ max.
Operate (set) time	20 ms max.
Release time	40 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr
	Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts
	1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 Hz, 1.0 mm double amplitude
	Malfunction: 10 to 55 Hz, 1.0 mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G)
	Malfunction: 100 m/s^2 (approx. 10G)
Life expectancy	Mechanical: 5,000,000 operations min.
	Electrical: 100,000 typical; NO 70,000 operations min.; NC 50,000 operations min.
Ambient temperature	Operating: –40°C to 55°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 35 g
Overvoltage category	III
Pollution degree	2

Note: Data shown are of initial values.

Switching Timing

Model number	Operating time (typical)	Release time (typical
G2RV-SL7❑❑/5❑❑ DC12	5 ~ 7 ms	5 ~ 8 ms
G2RV-SL7❑❑/5❑❑ DC24	5 ~ 7 ms	5 ~ 8 ms
G2RV-SL7❑❑/5❑❑ AC/DC24	5 ~ 7 ms	17 ~ 22ms
G2RV-SL7❑❑/5❑❑ AC/DC48	5 ~ 7 ms	22 ~ 30 ms
G2RV-SL7❑❑/5❑❑ AC110	12 ~ 15 ms	22 ~ 30 ms
G2RV-SL7❑❑/5❑❑ AC230	12 ~ 15 ms	22 ~ 30 ms

■ Approved Standards

UL Recognized (File No. E41643) - - Ambient Temp. = 40°C

Model	Contact form	Coil ratings	Contact ratings	Operations
G2RV-SL Series	SPDT	12 to 48 VDC 24 to 230 VAC	250 VAC 6 A (Resistive Load) 30 VDC 6 A (Resistive Load) 400 VAC 2 A (Resistive Load)	6,000

IEC/VDE (EN 61810)

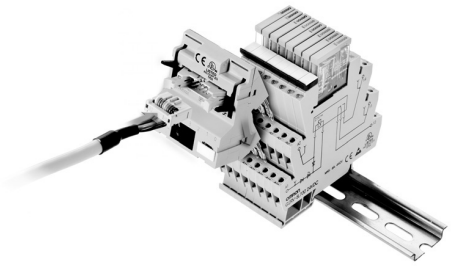
Contact form	Coil ratings	Contact ratings	Operations
1 pole	12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	250 VAC 6 A (Res.) 30 VDC 6 A (Res.) 400 VAC 2 A (Res.)	50,000 50,000 6,000

Accessories

■ PLC Interface (for G2RV-SL700 series only)

List of Models

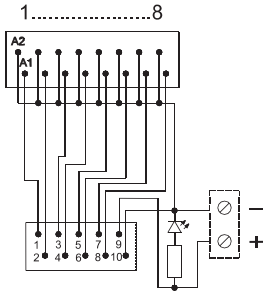
Model number	Description	Connection
P2RVC-8-O-F	For output use	Flat cable



Specifications

Input	**Rated voltage**	30 VAC/VDC max.
	Current capacity	0.5 A per channel
		2.0 A total current, power supply terminal
Characteristics	**Ambient temperature**	Operating: 0 to 55°C Storage: –20 to 85°C
	Overvoltage category	III
	Pollution degree	2

Electrical schematic P2RVC-8-O-F

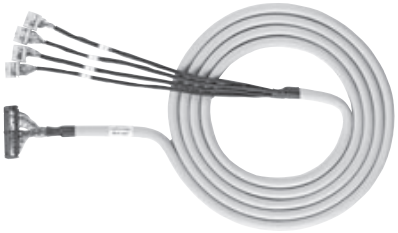


■ Cables for PLC Interface P2RV-4-□□□C

P2RV-4-□□□C

Cable to connect CJ1 to 4 x P2RVC-8-O-F

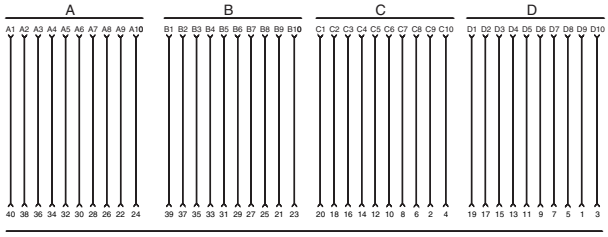
40 pole IDC mounting to Omron PLC CJ1-OD232

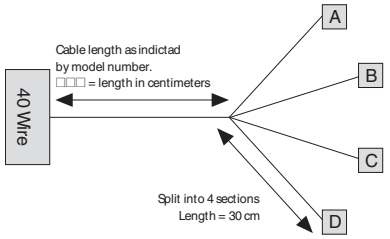


List of Models

Model number	Cable length
P2RV-4-100C	1.0 m
P2RV-4-200C	2.0 m
P2RV-4-300C	3.0 m
P2RV-4-500C	5.0 m

4x10 pole IDC mounting to 4 x P2RVC-8-O-F





Technical data

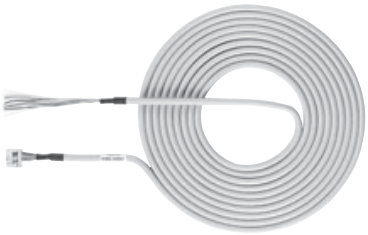
Control line	AWG26/0.14 mm^2, tin-plated copper
Diameter cable	10.6 mm (one end splits into 4 sections: A, B, C, D
Operating voltage	60 VDC
Continuous current per signal wire	0.5 A
Max. total current, 4 bytes, each	1.0 A
Test voltage	0.5 KV, 50 Hz, 1 min
Operating temperature range	–20°C to +50°C

P2RV-A□□□C

Cable, single sided 10 pole IDC connector, to connect to P2RVC-8-O-F

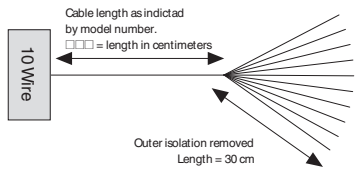
List of Models

Model number	Cable length
P2RV-A100C	1.0 m
P2RV-A200C	2.0 m
P2RV-A300C	3.0 m
P2RV-A500C	5.0 m



10 pole IDC mounting to P2RVC-8-O-F





Technical data

Control line	AWG26/0.14 mm^2, tin-plated copper
Diameter cable	6.8 mm
Operating voltage	60 VDC
Continuous current per signal wire	0.5 A
Max. total current	1.0 A
Test voltage	0.5 KV, 50 Hz, 1 min
Operating temperature range	–20°C to +50°C

■ Stand-Alone Relays for MRO and Reference

Model Number Legend

G2RV-□ - □ □ □ DC□
1 2 3 4 5

1. Number of Poles
1: 1 pole

2. Terminals
S: Plug-In

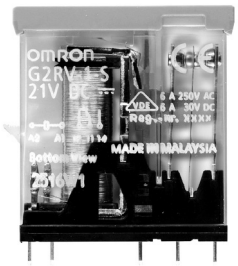
3. Relay LED
Blank: Without LED

4. Contact Material
Blank: AgSnIn

5. Rated Coil Voltage
11, 21, 48

List of Models

Model number	Replacement for
G2RV-1-S DC11	G2RV-SL7□□/5□□ DC12(DC11)
G2RV-1-S DC21	G2RV-SL7□□/5□□ DC24(DC21)
	G2RV-SL7□□/5□□ AC/DC24
G2RV-1-S DC48	G2RV-SL7□□/5□□ AC/DC48
	G2RV-SL7□□/5□□ AC110
	G2RV-SL7□□/5□□ AC230



Accessories (Order Separately)

■ Cross Bars

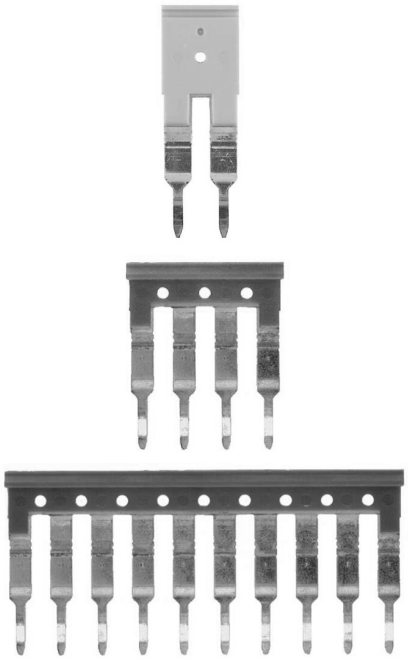
Model Number Legend

P2RVM- □ □
1 2

1. Number of Poles
020: 2 poles
030: 3 poles
040: 4 poles
100: 10 poles
200: 20 poles

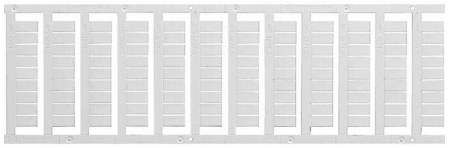
2. Color
R:Red
S:Blue
B:Black

Model number	Poles	Color
P2RVM-020□	2	Red (R) Blue (S) Black (B)
P2RVM-030□	3	
P2RVM-040□	4	
P2RVM-100□	10	
P2RVM-200□	20	



■ Plastic Labels for G2RV Sockets

Model number	Quantity	Color
R99-15 for G2RV	5 sheets x 120 labels = 600 labels (minimum order)	White

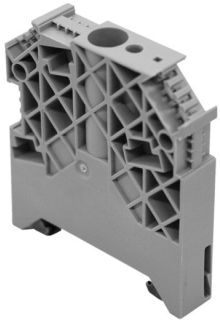


■ Labels (Stickers) for G2RV Sockets

Model number	Quantity	Color
R99-16 for G2RV	10 sheets x 484 labels = 4,840 labels (minimum order)	White

■ Separating Plates

Model number	Quantity	Description
P2RV-S	50 plates (minimum order)	Provides isolation between adjacent relays to achieve 400 V isolation.

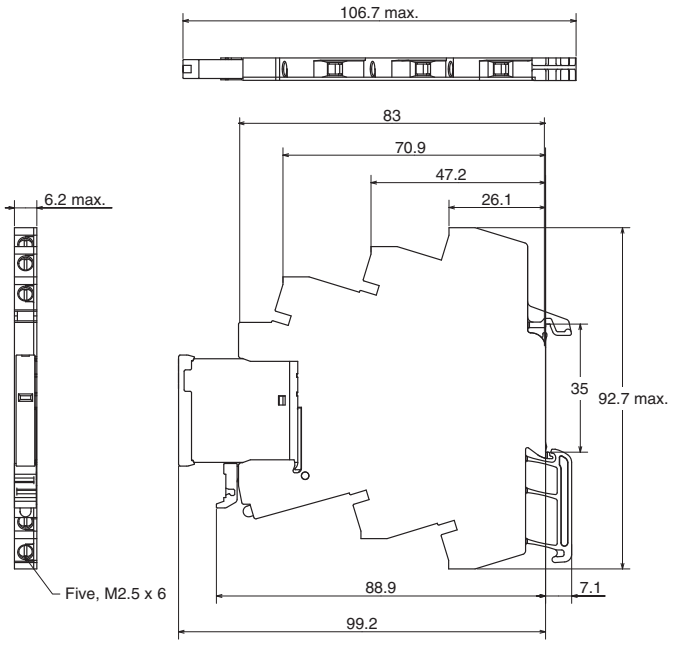


Dimensions

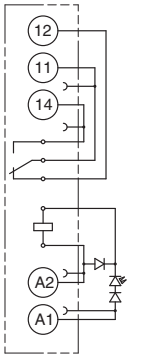
Note: All units are in millimeters unless otherwise indicated.

■ Complete Unit

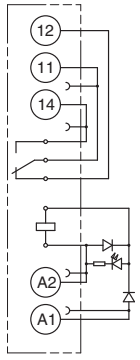
G2RV-SL700



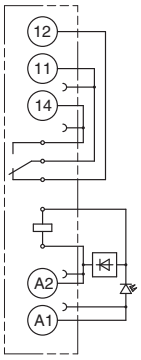
Input circuit



24 V DC
Terminal Arrangement/
Internal Connections
(Top View)

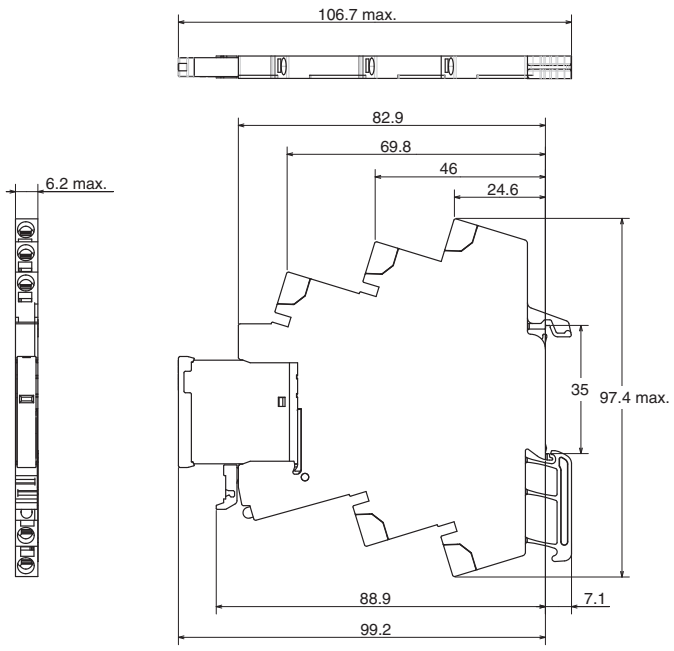


12 V DC
Terminal Arrangement/
Internal Connections
(Top View)

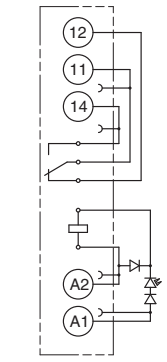


Other Coil Voltage
Terminal Arrangement/
Internal Connections
(Top View)

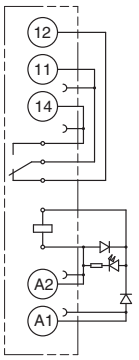
G2RV-SL500



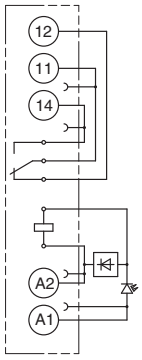
Input circuit



24 V DC
Terminal Arrangement/
Internal Connections
(Top View)



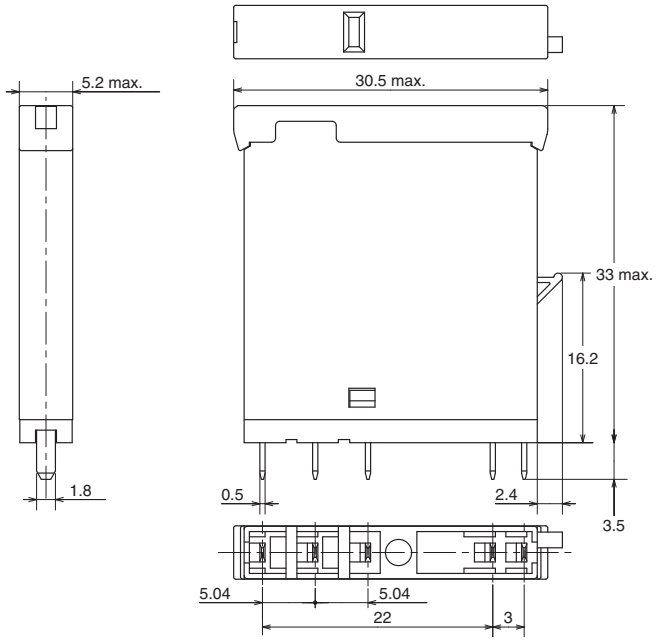
12 V DC
Terminal Arrangement/
Internal Connections



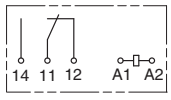
Other Coil Voltage
Terminal Arrangement/
Internal Connections
(Top View)

■ Single Relay

G2RV-1-S



Input circuit



Terminal Arrangement/
Internal Connections
(Bottom View)

Installation

■ Tools

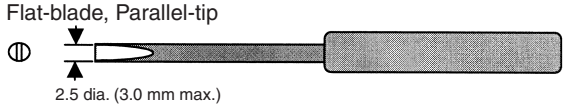
G2RV-SL700 series: Flat-blade screwdriver should be used for mounting and / or releasing cables.

G2RV-SL500 series: Flat-bade screwdriver should be used for mounting stranded wires without ferrules and / or releasing cables.

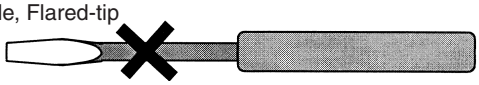
Applicable Screwdriver

• Flat-blade, Parallel-tip, 2.5 mm diameter (3.0 mm max.)

– Flat-blade, Parallel-tip



– Flat-blade, Flared-tip



Cannot be used.

Examples: FACOM AEF.2.5x75E (AEF. 3x75E)
VESSEL No. 9900-(-)2.5x75 (No. 9900-(-)3x100)
WAGO 210-119
WIHA 260/2.5x40 (260/3x50)

*Chamfering the tip of the driver improves insertion when used as an exclusive tool.

■ Applicable Wires

Applicable Wire Sizes

G2RV-SL700 Series

Box Clamp Technology

Wire type	Applicable Wire Size	Stripping Length
Stranded without ferrules	0.5 - 2.5 mm^2	7 mm
Stranded with ferrules and plastic collar	0.5 - 2.5 mm^2	7 mm
Stranded with ferrules without plastic collar	0.5 - 2.5 mm^2	7 mm
Solid	0.5 - 4.0 mm^2	7 mm

G2RV-SL500 Series

Push-in Technology

Wire type	Applicable Wire Size	Stripping Length
Stranded without ferrules	0.5 - 2.5 mm^2	12 mm
Stranded with ferrules and plastic collar	0.5 - 2.5 mm^2	12 mm
Stranded with ferrules without plastic collar	0.5 - 2.5 mm^2	12 mm
Solid	0.5 - 4.0 mm^2	12 mm

■ Wiring

Use wires of the applicable sizes specified above. The length of the exposed conductor should be 7 mm for a G2RV-SL700 series, 12 mm for a G2RV-SL500 series.

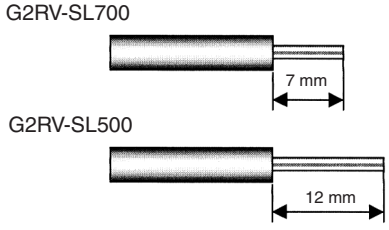


Fig. 1 Exposed Conductor Length

Precautions

■ Precautions for Connection

- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the clamp spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of socket and result in a short-circuit.
- Do not insert two or more wires in the hole. Wires may come in contact with the spring causing a temperature rise or be subject to sparks. (There are two wiring holes for each terminal.)
- Insert the screwdriver along the hole wall as shown below.
- If lubricating liquid, such as oil, is present on the tip of screwdriver, the screwdriver may fall out resulting in injury to the operator.
- Insert the screwdriver into the bottom of the hole. It may not be possible to connect cables properly if the screwdriver is inserted incorrectly.

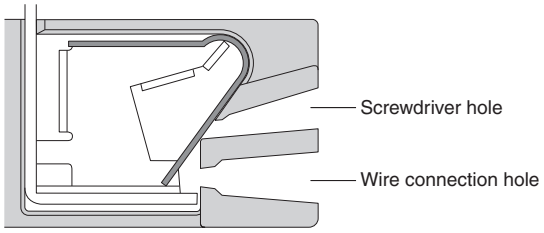
■ General Precautions

- Do not use the product if it has been dropped on the ground. Dropping the product may adversely affect performance.
- Confirm that the socket is securely attached to the mounting track before wiring. If the socket is mounted insecurely it may fall and injure the operator.
- Insure that the socket is not charged during wiring and maintenance. Not doing so may result in electric shock.
- Do not pour water or cleansing agents on the product. Doing so may result in electric shock.
- Do not use the socket in locations subject to solvents or alkaline chemicals.
- Do not use the socket in locations subject to ultraviolet light (e.g., direct sunlight). Doing so may result in markings fading, rust, corrosion, or resin deterioration.
- Do not dispose of the product in fire.

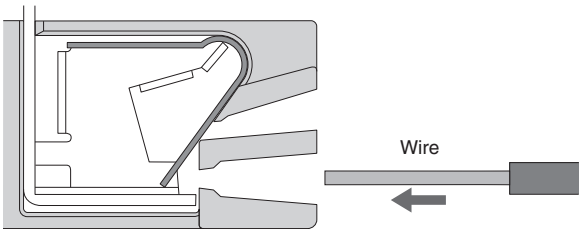
■ Removing from Mounting Rail

To remove the socket from the mounting rail, insert the tip of screwdriver in the fixture rail, and move it in the direction shown below.

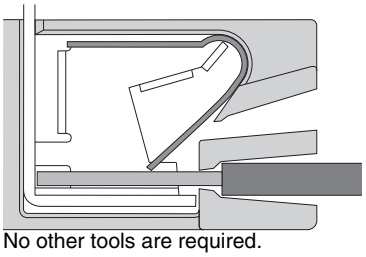
■ Wiring Procedure for G2RV-SL500 series



Wire insertion



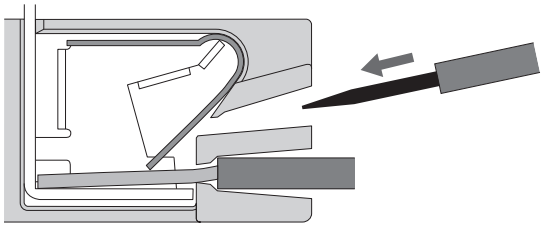
Insert the exposed conductor into the connection hole.



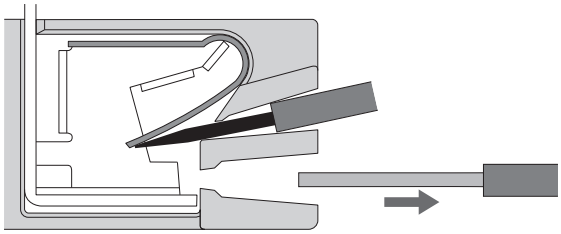
No other tools are required.

Note: In case of wiring stranded wires without ferrules screwdriver should be inserted before inserting the wire. Screwdriver should be removed after fully insertion of the wire.

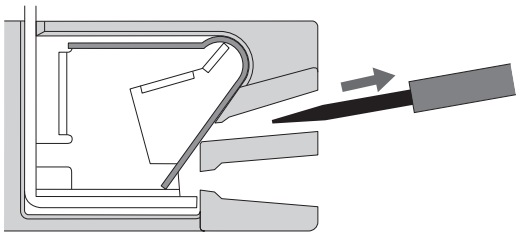
Wire removal



Insert the specified screwdriver into the release hole.



Removing wire.

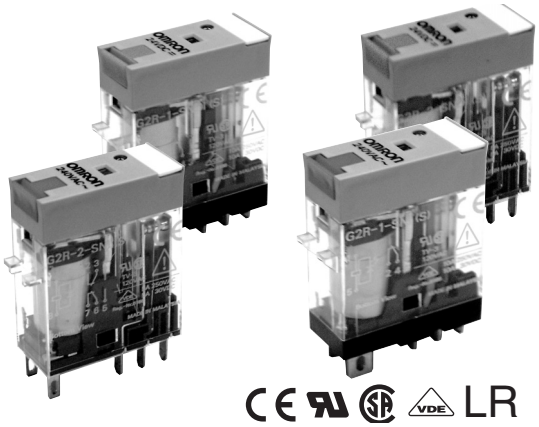


Removing screwdriver.

General-purpose Relay
G2RS-(S)

Slim and Space-saving Power Plug-in Relay

- Lockable test button models now available.
- Built-in mechanical operation indicator.
- Provided with nameplate.
- AC type is equipped with a coil-disconnection self-diagnostic function (LED type).
- High switching power (1-pole: 10 A).
- Environment-friendly (Cd, Pb free).
- Wide range of Sockets also available.
- RoHS Compliant.



Model Number Structure

■ Model Number Legend

G2R□-□ □ □-□ □-□(S)
1 2 3 4 5 6 7

1. **Relay Function**
   Blank: General-purpose
2. **Number of Poles**
   1: 1 pole
   2: 2 poles
3. **Contact Form**
   Blank: SPDT
4. **Contact Type**
   Blank: Single
5. **Terminals**
   S: Plug-in
6. **Classification**
   Blank: General-purpose
   N: LED indicator
   D: Diode
   ND: LED indicator and diode
   NI: LED indicator with test button
   NDI: LED indicator and diode with test button
7. **Rated Coil Voltage**

Ordering Information

■ List of Models

Classification		Enclosure rating	Coil ratings	Contact form/Model	
				SPDT	DPDT
Plug-in terminal	General-purpose	Unsealed	AC/DC	**G2R-1-S**	**G2R-2-S**
	LED indicator			**G2R-1-SN**	**G2R-2-SN**
	LED indicator with test button			**G2R-1-SNI**	**G2R-2-SNI**
	Diode		DC	**G2R-1-SD**	**G2R-2-SD**
	LED indicator and diode			**G2R-1-SND**	**G2R-2-SND**
	LED indicator and diode with test button			**G2R-1-SNDI**	**G2R-2-SNDI**

Note: When ordering, add the rated coil voltage and "(S)" to the model number. Rated coil voltages are given in the coil ratings table.
Example: G2R-1-S DC12 (S) ——— New model
└——— Rated coil voltage

■ Accessories (Order Separately)

Connecting Sockets

Applicable Relay model	Track/surface-mounting Socket		Back-mounting Socket	
	Screwless clamp terminal (See note.)	Screw terminal	Terminals	Model
1 pole G2R-1-S(N)(D)(ND)(NI)(NDI)	**P2RF-05-S + P2CM-S**	**P2RF-05-E** / **P2RF-05**	PCB terminals	**P2R-05P, P2R-057P**
			Solder terminals	**P2R-05A**
2 poles G2R-2-S(N)(D)(ND)(NI)(NDI)	**P2RF-08-S + P2CM-S**	**P2RF-08-E** / **P2RF-08**	PCB terminals	**P2R-08P, P2R-087P**
			Solder terminals	**P2R-08A**

Note: Use of P2CM Clips are optional. However, use of the P2CM Clip & Release Lever is recommended to ensure stable mounting.

Accessories for Screwless Clamp Terminal Socket (Option)

Name	Model	
Clip & Release Lever	**P2CM-S**	
Nameplate	**R99-11 Nameplate for MY**	
Socket Bridge	**P2RM-SR (for AC),**	**P2RM-SB (for DC)**

Mounting Tracks

Applicable Socket	Description		Model
Mounting track and accessories	Mounting track	50 cm (ℓ) x 7.3 mm (t) 1 m (ℓ) x 7.3 mm (t) 1 m (ℓ) x 16 mm (t)	**PFP-50N** **PFP-100N** **PFP-100N2**
	End plate		**PFP-M**
	Spacer		**PFP-S**
Mounting plate*	Back-connecting Sockets		**P2R-P**

*Used to mount several P2R-05A and P2R-08A Connecting Sockets side by side.

Specifications

■ Coil Ratings

Rated voltage		Rated current*		Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
AC	24 V	43.5 mA	37.4 mA	253 Ω	0.81	1.55	80% max.	30% min.	110%	0.9 VA at 60 Hz
	110 V	9.5 mA	8.2 mA	5,566 Ω	13.33	26.83				
	120 V	8.6 mA	7.5 mA	7,286 Ω	16.13	32.46				
	230 V	4.4 mA	3.8 mA	27,172 Ω	72.68	143.90				
	240 V	3.7 mA	3.2 mA	30,360 Ω	90.58	182.34				

Rated voltage		Rated current*	Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
				Armature OFF	Armature ON	% of rated voltage			
DC	6 V	87.0 mA	69 Ω	0.25	0.48	70% max.	15% min.	110%	0.53 W
	12 V	43.2 mA	278 Ω	0.98	2.35				
	24 V	21.6 mA	1,113 Ω	3.60	8.25				
	48 V	11.4 mA	4,220 Ω	15.2	29.82				

* The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±10%.

■ Contact Ratings

Number of poles	1 pole		2 poles	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10 A at 30 VDC	7.5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC
Rated carry current	10 A		5 A	
Max. switching voltage	440 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	10 A		5 A	
Max. switching capacity	2,500 VA, 300 W	1,875 VA, 150 W	1,250 VA, 150 W	500 VA, 90 W
Minimum permissible load	100 mA at 5 VDC		10 mA at 5 VDC	

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation

■ Characteristics

Item	1 pole	2 poles
Contact resistance	100 mΩ max.	
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max. (w/built-in diode: 20 ms max.)	AC: 15 ms max.; DC: 10 ms max. (w/built-in diode: 20 ms max.)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2 when energized; 100 m/s^2 when not energized	
Service life	Mechanical: AC coil: 10,000,000 operations min.; DC coil: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load) (DC coil type)	
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 21 g	

Note: Values in the above table are the initial values.
*4,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A Socket is used.

■ Approved Standards

UL Recognized (File No. E41643) - - Ambient Temp. = 40°C

Model	Contact form	Coil ratings	Contact ratings	Cycles
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

IEC/VDE (EN61810)

Contact form	Coil ratings	Contact ratings	Cycles
1 pole	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 440 VAC (cosϕ = 1.0) 10 A, 250 VAC (cosϕ = 1.0) 10 A, 30 VDC (0 ms)	100 x 10^3
2 poles	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 250 VAC (cosϕ =1.0) 5 A, 30 VDC (0 ms)	100 x 10^3

CSA Certified (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Cycles
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

LR

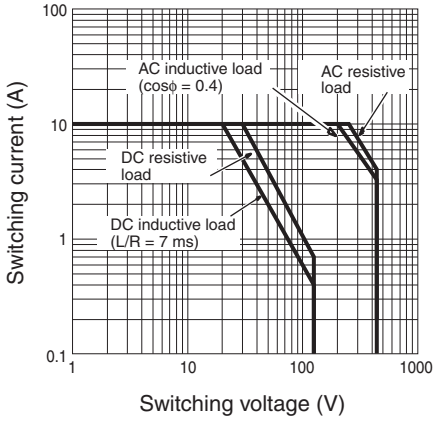
Number of poles	Coil ratings	Contact ratings	Cycles
1 pole	5 to 110 VDC 5 to 240 VDC	10 A, 250 VAC (general use) 7.5 A, 250 VAC (PF0.4) 10 A, 30 VDC (resistive) 5A, 30VDC (L/R=7ms)	100 x 10^3
2 poles	5 to 110 VDC 5 to 240 VDC	5 A, 250 VAC (general use) 2 A, 250 VAC (PF0.4) 5 A, 30 VDC (resistive) 3A, 30VDC (L/R=7ms)	100 x 10^3

Engineering Data

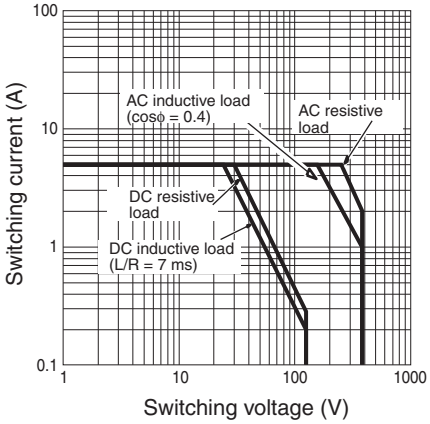
■ Maximum Switching Capacity

Plug-in Relays

G2R-1-S



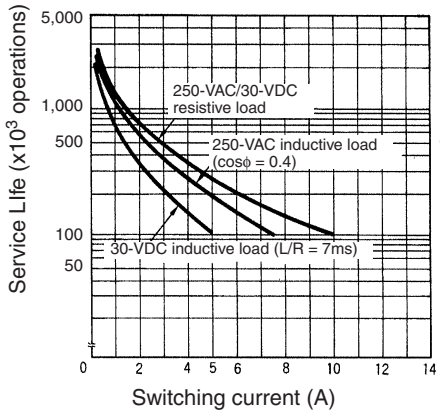
G2R-2-S



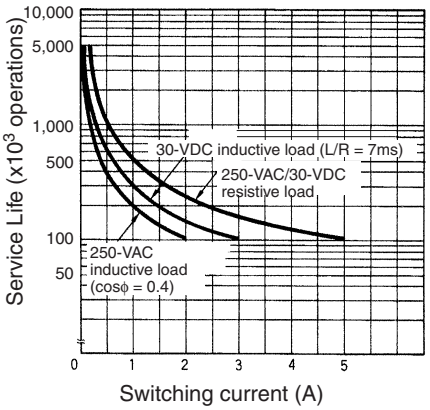
■ Electrical Service Life

Plug-in Relays

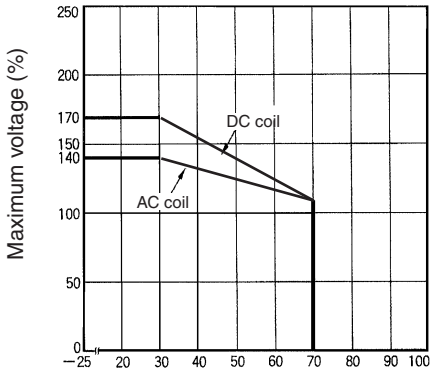
G2R-1-S



G2R-2-S



Ambient Temperature vs. Maximum Coil Voltage



Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

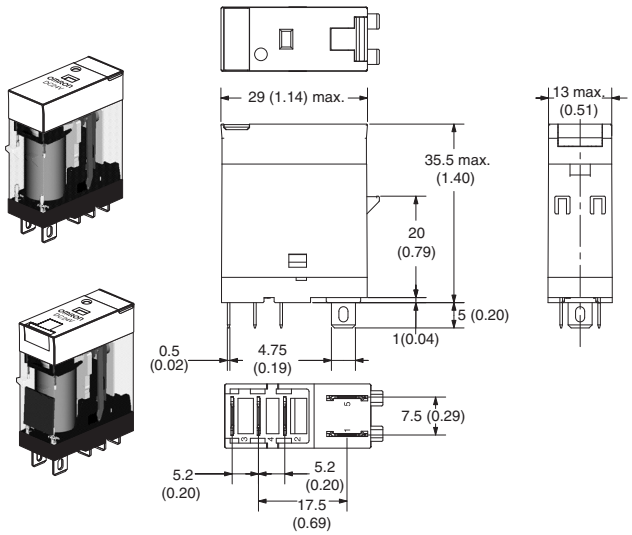
Dimensions

Unit: mm (inch)

■ Relays with Plug-in Terminals

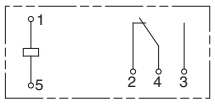
SPDT Relays

G2R-1-S, G2R-1-SN, G2R-1-SNI
G2R-1-SD, G2R-1-SND, G2R-1-SNDI

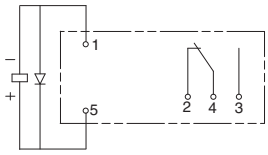


Terminal Arrangement/Internal Connections (Bottom View)

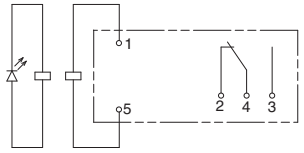
G2R-1-S



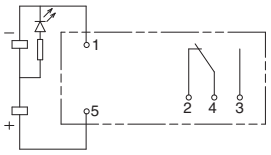
G2R-1-SD (DC)



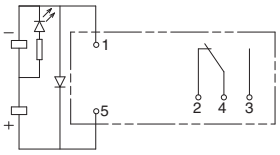
G2R-1-SN, G2R-1-SNI (AC)



G2R-1-SN, G2R-1-SNI (DC)

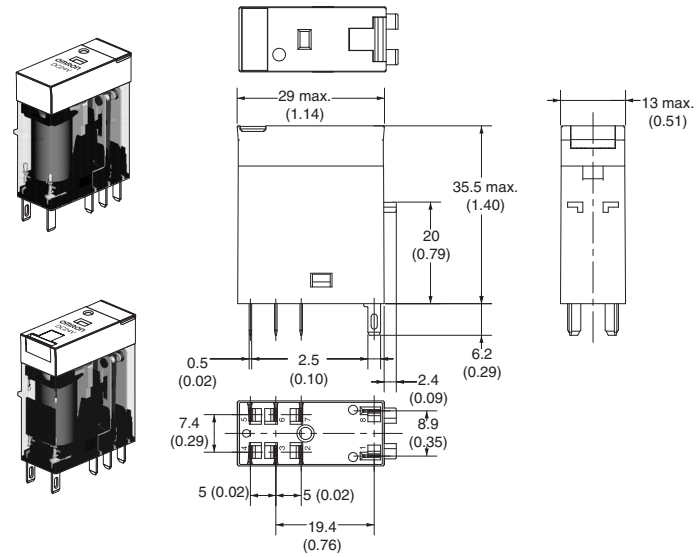


G2R-1-SND, G2R-1-SNDI (DC)



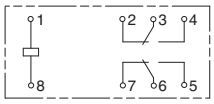
DPDT Relays

G2R-2-S, G2R-2-SN, G2R-2-SNI
G2R-2-SD, G2R-2-SND, G2R-2-SNDI

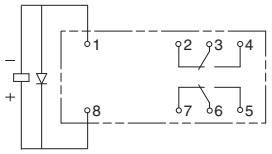


Terminal Arrangement/Internal Connections (Bottom View)

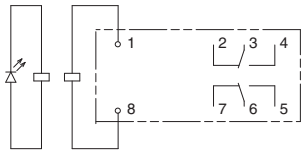
G2R-2-S



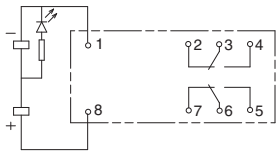
G2R-2-SD (DC)



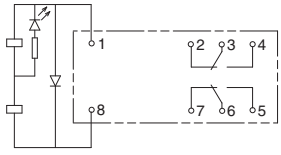
G2R-2-SN, G2R-2-SNI (AC)



G2R-2-SN, G2R-2-SNI (DC)

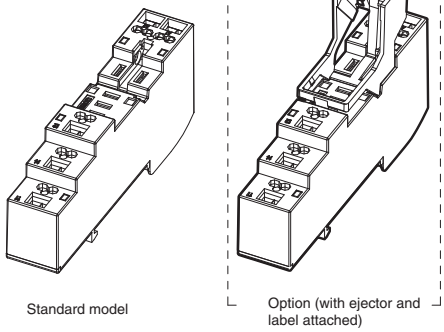


G2R-2-SND, G2R-2-SNDI (DC)



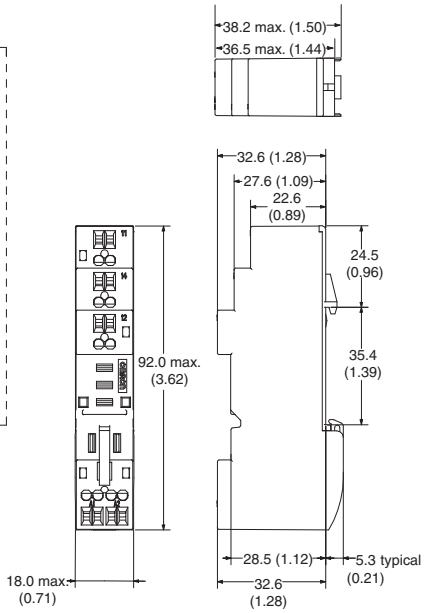
Track/Surface Mounting Sockets

P2RF-05-S

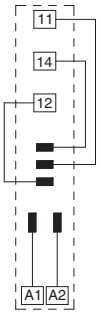


Standard model

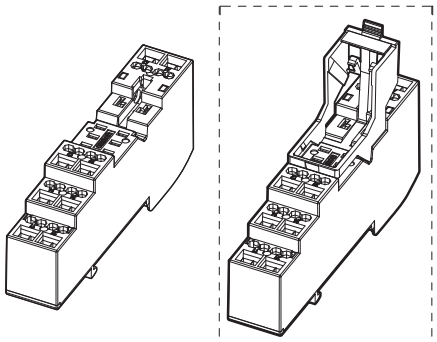
Option (with ejector and label attached)



Terminal Arrangement (Top View)

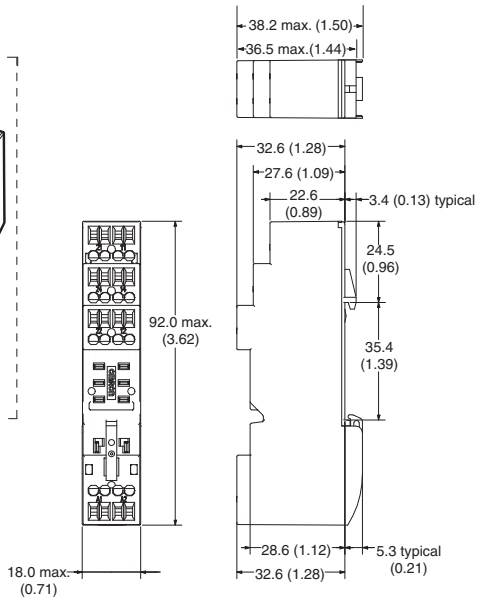


P2RF-08-S

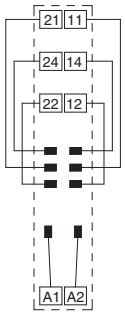


Standard model

Option (with ejector and label attached)

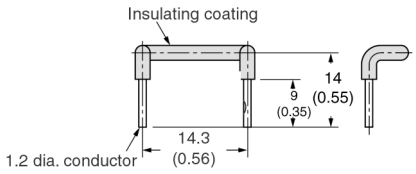


Terminal Arrangement (Top View)



Accessories for P2RF-□-S

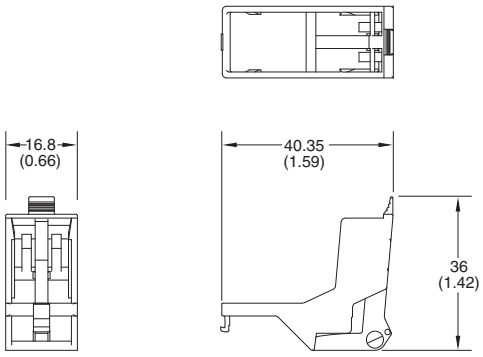
Socket Bridge



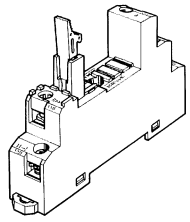
Note: The color of insulating coating indicates power type.

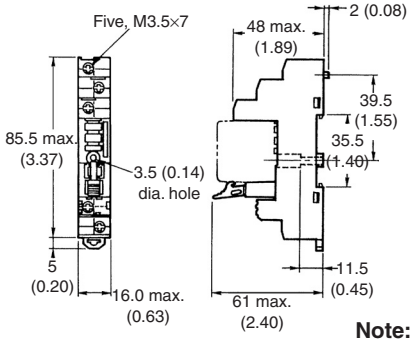
Model	Power	Color
P2RM-SR	AC	Red
P2RM-SB	DC	Blue

Clip and Release Lever

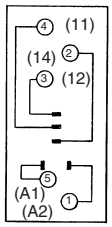


P2RF-05-E

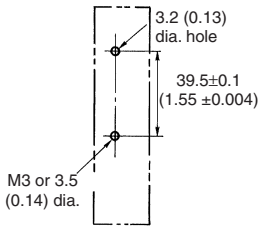




Terminal Arrangement (Top View)

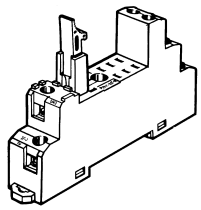


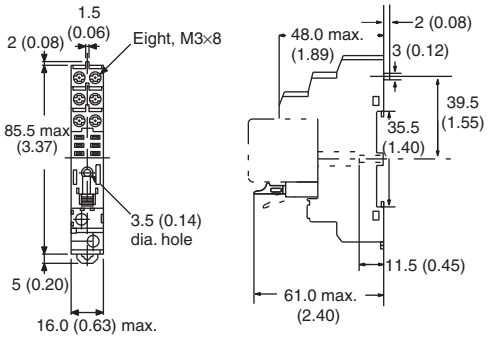
Mounting Holes (for Surface Mounting)



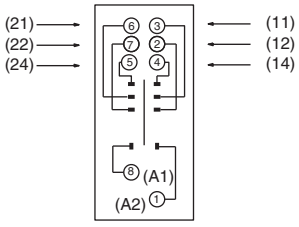
Note: Pin numbers in parentheses apply to DIN standard.

P2RF-08-E

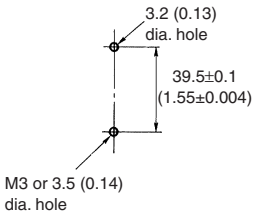




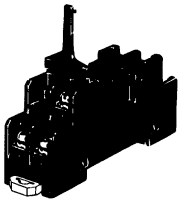
Terminal Arrangement (Top View)

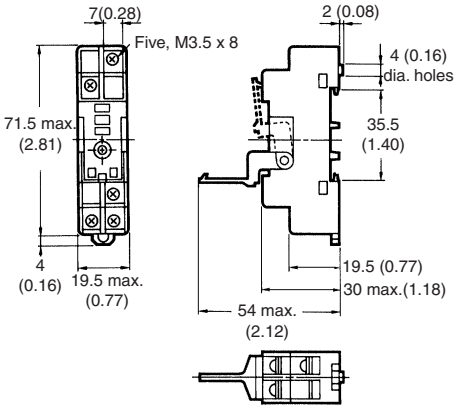


Mounting Holes (for Surface Mounting)

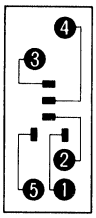


P2RF-05

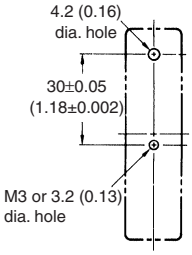




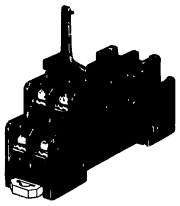
Terminal Arrangement (Top View)

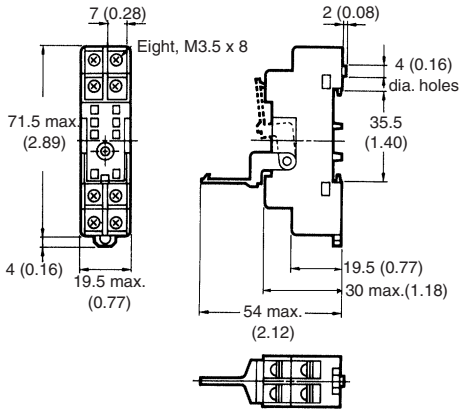


Mounting Holes (for Surface Mounting)

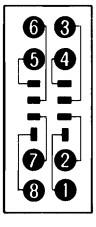


P2RF-08

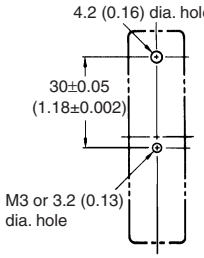




Terminal Arrangement (Top View)

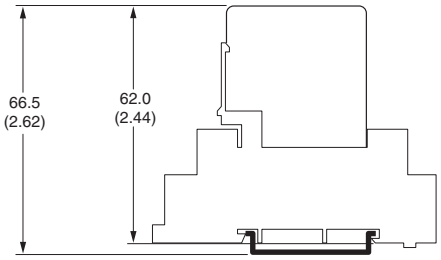


Mounting Holes (for Surface Mounting)

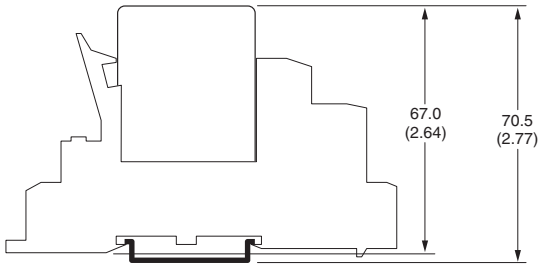


Mounting Height of Relay with Track/Surface Mounting Sockets

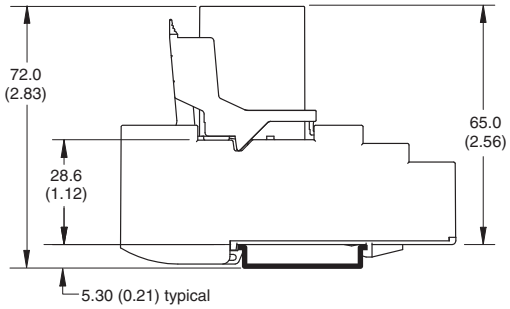
P2RF-□



P2RF-□-E

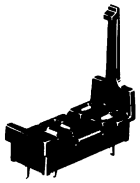


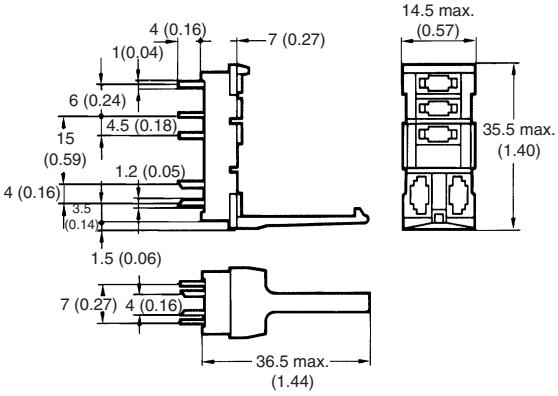
P2RF-□-S



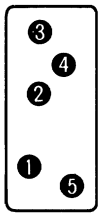
Back-connecting Sockets

P2R-05P (1-pole)



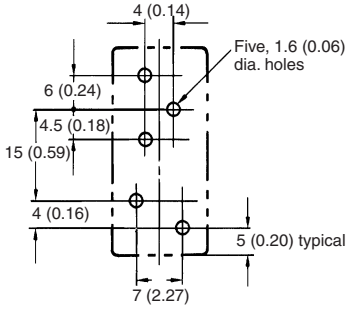


Terminal Arrangement (Bottom View)

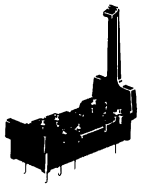


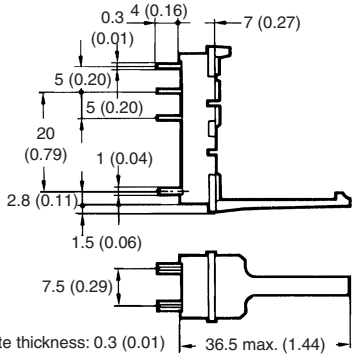
Mounting Holes

Tolerance: ±0.1

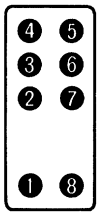


P2R-08P (2-pole)

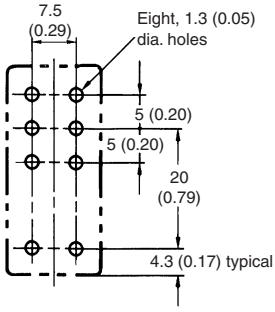




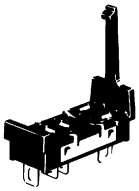
Terminal Arrangement (Bottom View)

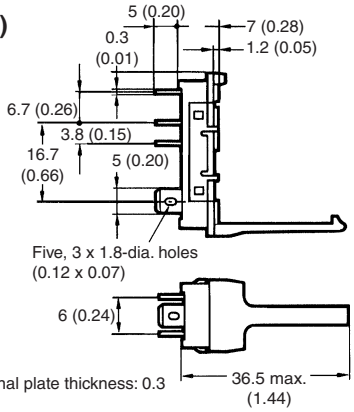


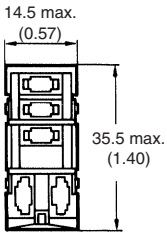
Mounting Holes



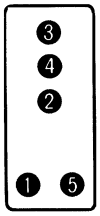
P2R-05A (1-pole)



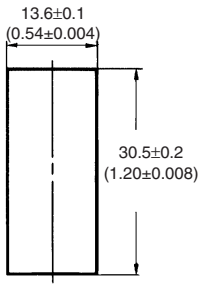




Terminal Arrangement (Bottom View)

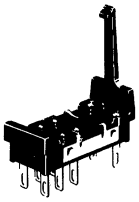


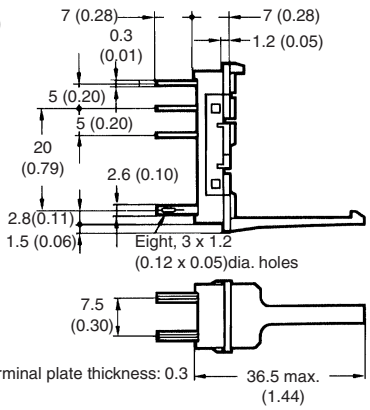
Panel Cutout

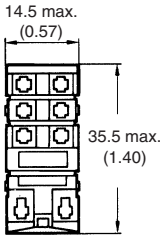


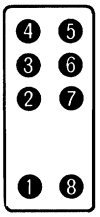
Recommended thickness of the panel is 1.6 to 2.0 mm

P2R-08A (2-pole)

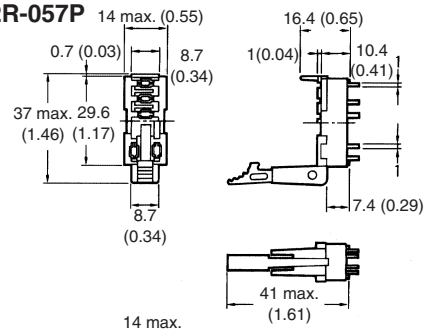




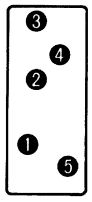




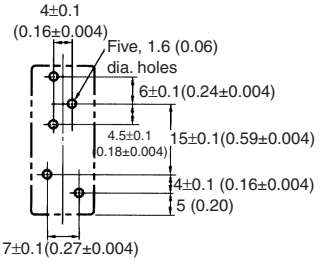
P2R-057P



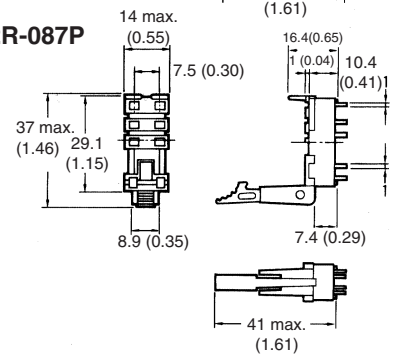
Terminal Arrangement (Bottom View)



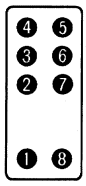
Mounting Holes



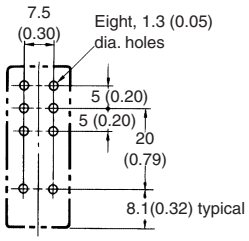
P2R-087P



Terminal Arrangement (Bottom View)

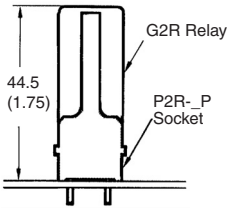


Mounting Holes

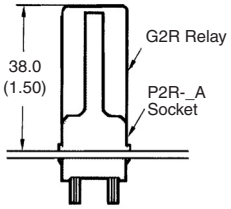


Mounting Height of Relay with Back-connecting Sockets

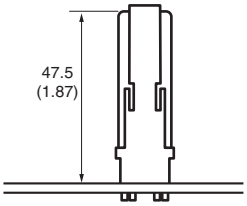
G2R-□P



G2R-□A

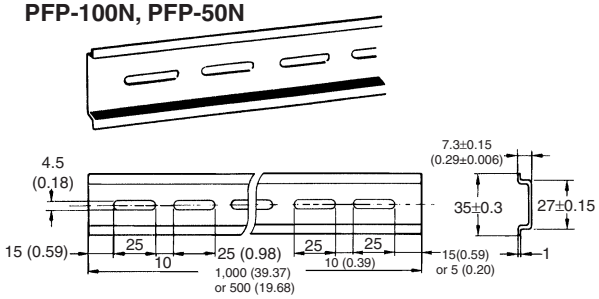


G2R-□7P

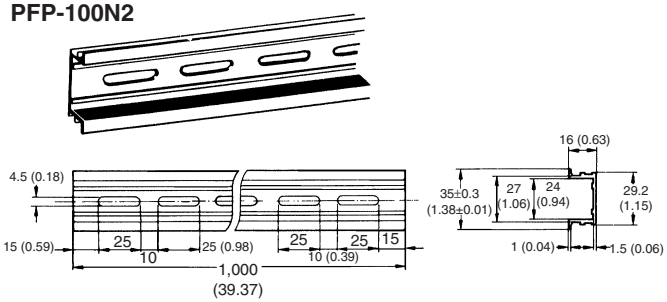


Mounting Tracks

PFP-100N, PFP-50N



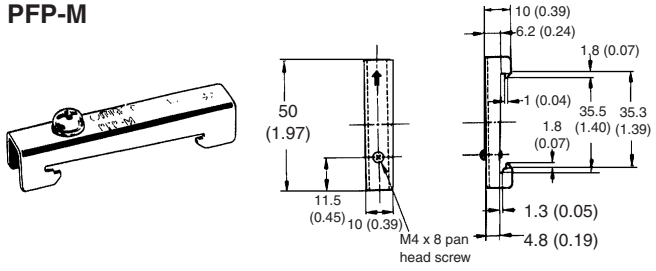
PFP-100N2



It is recommended to use a panel 1.6 to 2.0 mm thick.

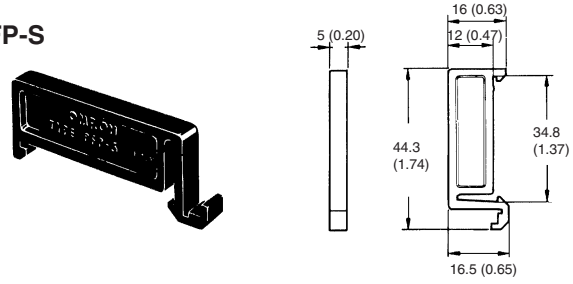
End Plate

PFP-M



Spacer

PFP-S



Precautions

⚠ CAUTION

Do not use the test button for any purpose other than testing. Be sure not to touch the test button accidentally as this will turn the contacts ON. Before using the test button, confirm that circuits, the load, and any other connected item will operate safely.

⚠ CAUTION

Check that the test button is released before turning ON relay circuits.

⚠ CAUTION

If the test button is pulled out too forcefully, it may bypass the momentary testing position and go straight into the locked position.

⚠ CAUTION

Use an insulated tool when you operate the test button.

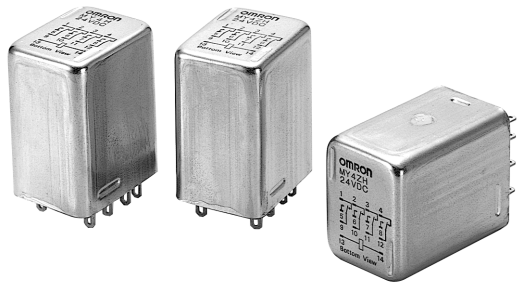
Precautions for P2RF-□-S Connection

- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the clamp spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of the socket and result in a short-circuit.

Hermetically Sealed Relay
MY4H

Hermetically Sealed Relay Ideal for Hazardous Locations

- Class 1 Division 2 approved.
- Fully hermetically sealed for hazardous locations.
- Cadmium-free contacts for environment-friendly use.
- Models with bifurcated contact also available.
- UL recognized / CSA certified.



Ordering Information

Type	Contact form	Model
		Plug-in socket/solder terminals
Hermetically sealed	4PDT (bifurcated)	**MY4ZH-US**

■ Model Number Legend:

MY-❑❑❑ - ❑ - ❑
1 2 3 4 5

1. **Number of Poles**
   4: 4 poles
2. **Contact**
   Z: Bifurcated
3. **Enclosure ratings**
   H: Hermetically sealed
4. **Approval**
   US: Class 1 Division 2 approval
5. **Rated voltage**
   12 VDC, 24 VDC, 24 VAC, 110/120 VAC

Specifications

■ Ratings

Coil

Rated voltage (V)		Rated current (mA)		Coil resistance (Ω)	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
DC	12	75		160	80% max.	10% min.	110%	900 mW
	24	36.9		650				
AC	110/120	9.9/10.8	8.4/9.2	4,430		30% min.		0.9-1.1 VA (60 Hz)
	24	53.8	46	180				

Contact Ratings

Contact material		Ag alloy
Rated load	**Resistive p.f.=1**	110 VAC, 3 A 24 VDC, 3A
	Inductive p.f.=0.4 L/R-7 ms	110 VAC, 0.8 A 24 VDC, 1.5 A
Rated carry current		3 A
Max. switching voltage		125 VAC, 125 VDC
Max. switching current		3 A
Max. switching power		330 VA 72 W

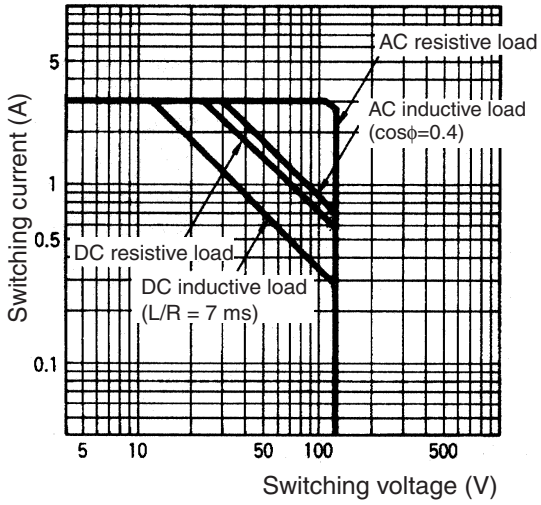
■ Characteristics

Contact resistance		50 mΩ max.
Operate time		20 ms max.
Release time		20 ms max.
Max. operating frequency	**Mechanical**	18,000 operations/hr
	Electrical	1,800 operations/hr (under rated load)
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of different polarity 700 VAC, 1 min between contacts of same polarity
Vibration resistance	**Destruction**	10 to 55 Hz, 0.5 mm single amplitude
	Malfunction	10 to 55 Hz, 0.5 mm single amplitude
Shock resistance	**Destruction**	1,000 m/s^2
	Malfunction	When energized: 200 m/s^2 When not energized: 200 m/s^2
Endurance		Mechanical: 5,000,000 operations Electrical: 50,000 operations
Ambient temperature	**Operating**	-25 to 60°C
	Storage	-25 to 60°C
Ambient humidity		5% to 85%
Weight		Approx. 50 g

■ Characteristic Data

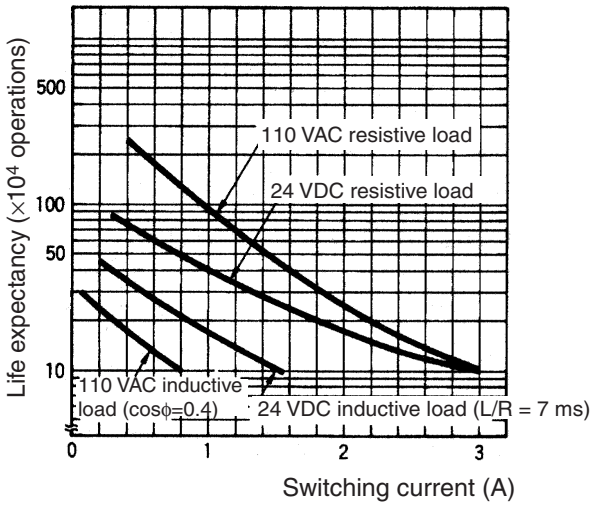
Maximum Switching Power

MY4ZH



Endurance

MY4ZH



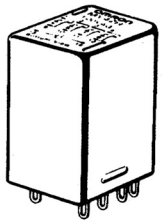
Note: The endurance is for bifurcated contact models.

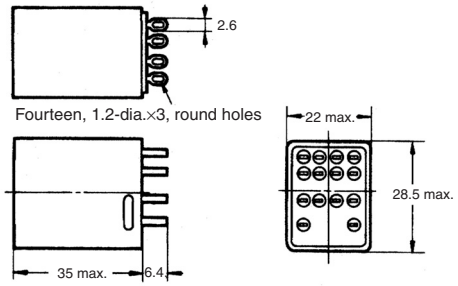
Dimensions

Unit: mm

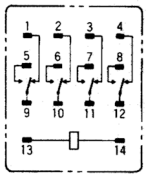
■ Solder Terminal Models

MY4ZH





Terminal Arrangement/ Internal Connections
(BOTTOM VIEW)

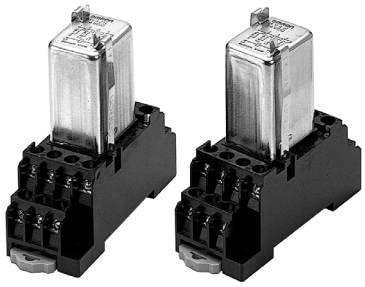


(There is no coil polarity.)

■ Socket

Track-mounted Socket Conforming to Class 1 Division 2

- Special Socket with Class 1 Division 2 approval.
- Holding clips contribute to safety by preventing the Relay falling out of the Socket due to vibration.



Ordering Information

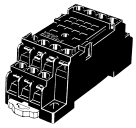
Item	Pole	Model
Track-mounted socket	4	**PYF14A-E**

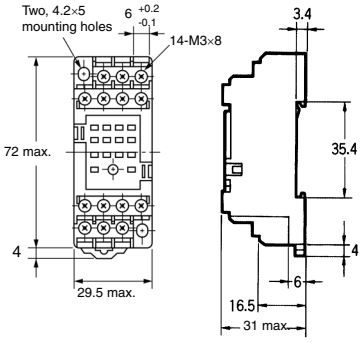
Note: 1. Class 1 Division 2 approval is obtained for use with the MY4ZH Relay.
2. Clips are not included.

Dimensions

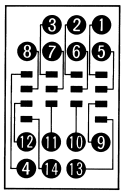
Unit: mm

PYF14A-E

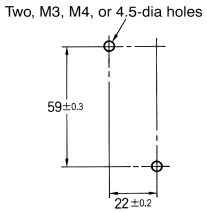




Terminal Arrangement/ Internal Connections (Top View)



Mounting Holes



(TOP VIEW)

Note: Track mounting is also possible.

Approval Tables

UL recognized type (File no. E216067) - - Ambient Temp = 40°C

Type	Contact form	Coil ratings	Contact ratings
MY4ZH	4PDT	6 - 24 VAC 6 - 125 VDC	0.8 A - 120 VAC general purpose 1.5 A - 24 VDC general purpose 3.0 A - 120 VAC resistive 3.0 A - 24 VDC resistive

CSA certified type (File no. LR 31928)

Type	Contact form	Coil ratings	Contact ratings
MY4ZH	4PDT	6 - 24 VAC 6 - 125 VDC	0.8 A - 120 VAC general purpose 1.5 A - 24 VDC general purpose 3.0 A - 120 VAC resistive 3.0 A - 24 VDC resistive

General-purpose Relay
MY

Versatile, Multi-featured, Miniature Power Relay for Sequence Control and Power Switching Applications

- Models with lockable test buttons now available.
- Multiple features available, including operation indicators (mechanical and LED indicators), lockable test button, built-in diode and CR (surge suppression), bifurcated contacts, etc.
- Environment-friendly cadmium-free contacts.
- Wide range of Sockets (PY, PYF Series) and optional parts.
- Max. Switching Current: 2-pole: 10 A, 4-pole: 5 A
- Provided with nameplate.
- RoHS Complaint.



Ordering Information

■ Relays

Standard Coil Polarity

Type	Contact form	Model		
		Plug-in socket/solder terminals		
		Standard with LED indicator	With LED indicator and lockable test button	Without LED indicator
Standard	DPDT	**MY2N**	**MY2IN**	**MY2**
	4PDT	**MY4N**	**MY4IN**	**MY4**
	4PDT (bifurcated)	**MY4ZN**	**MY4ZIN**	**MY4Z**
With built-in diode (DC only)	DPDT	**MY2N-D2**	**MY2IN-D2**	**---**
	4PDT	**MY4N-D2**	**MY4IN-D2**	**---**
	4PDT (bifurcated)	**MY4ZN-D2**	**MY4ZIN-D2**	**---**
With built-in CR (220/240 VAC, 110/120 VAC only)	DPDT	**MY2N-CR**	**MY2IN-CR**	**---**
	4PDT	**MY4N-CR**	**MY4IN-CR**	**---**
	4PDT (bifurcated)	**MY4ZN-CR**	**MY4ZIN-CR**	**---**

Reverse Coil Polarity

Type	Contact form	Model	
		Plug-in socket/solder terminals	
		With LED indicator	With LED indicator and lockable test button
Standard (DC only)	DPDT	**MY2N1**	**MY2IN1**
	4PDT	**MY4N1**	**MY4IN1**
	4PDT (bifurcated)	**MY4ZN1**	**MY4ZIN1**
With built-in diode (DC only)	DPDT	**MY2N1-D2**	**MY2IN1-D2**
	4PDT	**MY4N1-D2**	**MY4IN1-D2**
	4PDT (bifurcated)	**MY4ZN1-D2**	**MY4ZIN1-D2**

Note: 1. When ordering, add the rated coil voltage to the model number(s), followed by "(S)". Rated coil voltages are given in the coil ratings table.
Example: MY2 AC12(S)
↑
Rated coil voltage

2. Arc barrier standard on all four-pole relays.

3. Other models also available, such as, three-pole versions, flangemount, PCB, etc. Contact your Omron Representative for details.

Specifications

■ Coil Ratings

Rated voltage		Rated current		Coil resistance	Inductance (reference value)		Must operate	Must release	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V*	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	48/50 V*	24.7/ 25.7 mA	21.1/ 22.0 mA	788 Ω	3.22 H	5.66 H				
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				0.9 to 1.1 VA (60 Hz)
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.4 H				
DC	6 V*	151 mA		39.8 Ω	0.17 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	37.7 mA		636 Ω	3.20 H	5.72 H				
	48 V*	18.8 mA		2,560 Ω	10.60 H	21.0 H				
	100/110 V	9.0/9.9 mA		11,100 Ω	45.60 H	86.2 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. AC coil resistance and impedance are provided as reference values (at 60 Hz).

4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

5. Rated voltage denoted by "*" will be manufactured upon request. Ask your OMRON representative.

■ Contact Ratings

Item	2-pole		4-pole		4-pole (bifurcated)	
	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4, L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4, L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4, L/R = 7 ms)
Rated load	5 A, 250 VAC 5 A, 30 VDC	2 A, 250 VAC 2 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC
Carry current	10 A (see note)		5 A (see note)			
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC			
Max. switching current	10 A		5 A			
Max. switching capacity	2,500 VA 300 W	1,250 VA 300 W	1,250 VA 150 W	500 VA 150 W	1,250 VA 150 W	500 VA 150 W
Min. permissible load*	5 VDC, 1 mA		1 VDC, 1 mA		1 VDC, 100 μA	

* Reference value.

Note: Do not exceed the carry current of a Socket in use.

■ Characteristics

Contact resistance		100 mΩ max.
Operate time		20 ms max.
Release time		20 ms max.
Max. operating frequency	**Mechanical**	18,000 operations/hr
	Electrical	1,800 operations/hr (under rated load)
Insulation resistance		1,000 MΩ min. (at 500 VDC)
Dielectric withstand voltage		2,000 VAC, 50/60 Hz for 1.0 min (1,000 VAC between contacts of same polarity)
Vibration resistance		Destruction:10 to 55 Hz, 1.0 mm double amplitude Malfunction:10 to 55 Hz, 1.0 mm double amplitude
Shock resistance		Destruction:1,000 m/s^2 (approx. 100G) Malfunction:200 m/s^2 (approx. 20G)
Life expectancy		See the following table.
Ambient temperature	**Operating**	-55°C to 70°C (-67°F to 158°F) with no icing (see note)
Ambient humidity	**Operating**	5% to 85% RH
Weight		Approx. 35 g

Note: The values given above are initial values.

■ Life Expectancy Characteristics

Pole	**Mechanical life (at 18,000 operations/hr)**	**Electrical life (at 1,800 operations/hr under rated load)**
2-pole	AC:50,000,000 operations min. DC:100,000,000 operations min.	500,000 operations min.
4-pole		200,000 operations min.
4-pole (bifurcated)	20,000,000 operations min.	100,000 operations min.

■ Approved Standards

VDE, UL, CSA, IMQ, CE

■ Precautions

Connections

Do not reverse polarity when connecting DC-operated Relays with built-in diodes or indicators or high-sensitivity DC-operated Relays.

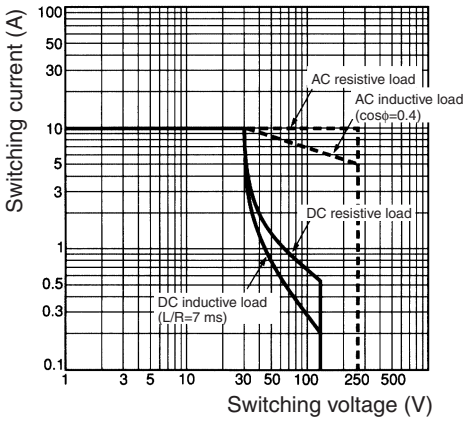
Mounting

Whenever possible, mount Relays so that it is not subject to vibration or shock in the same direction as that of contact movement.

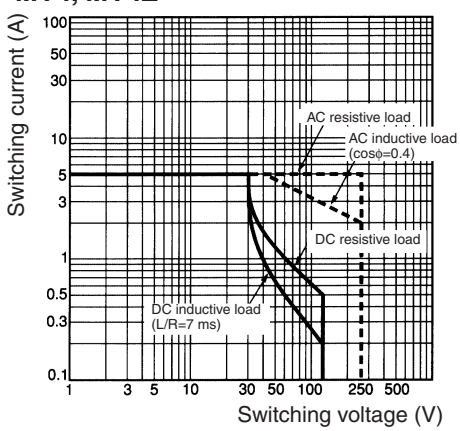
Engineering Data

■ Maximum Switching Power

MY2

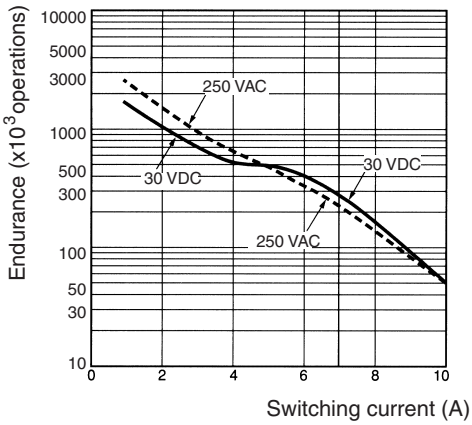


MY4, MY4Z

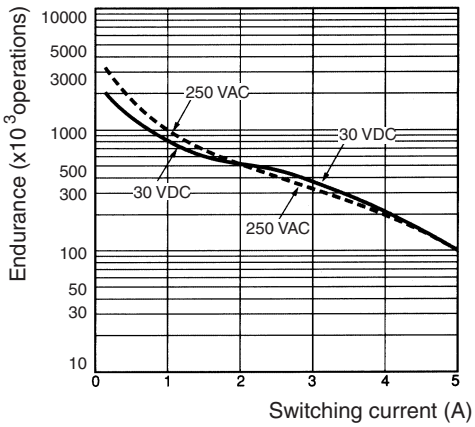


■ Endurance

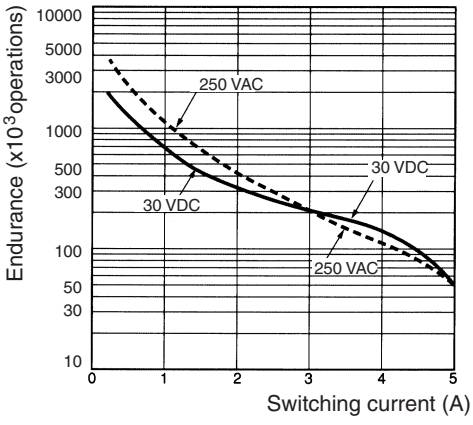
MY2 (Resistive Loads)



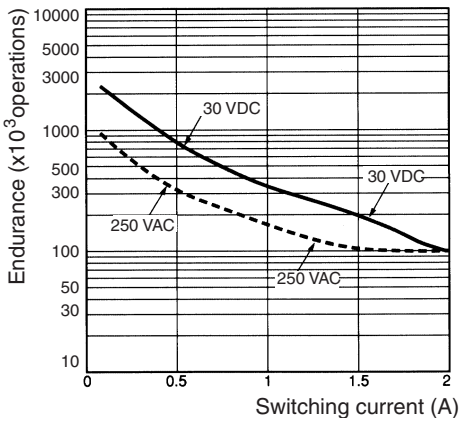
MY2 (Inductive Loads)



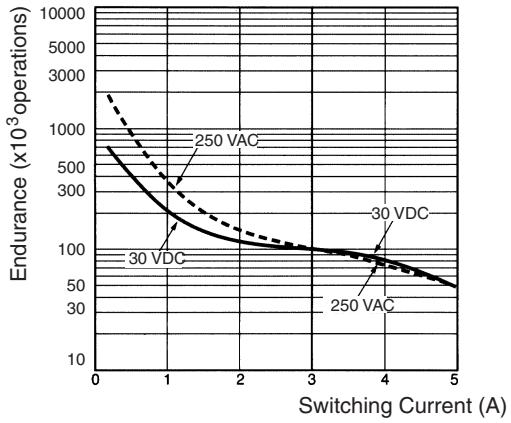
MY4 (Resistive Loads)



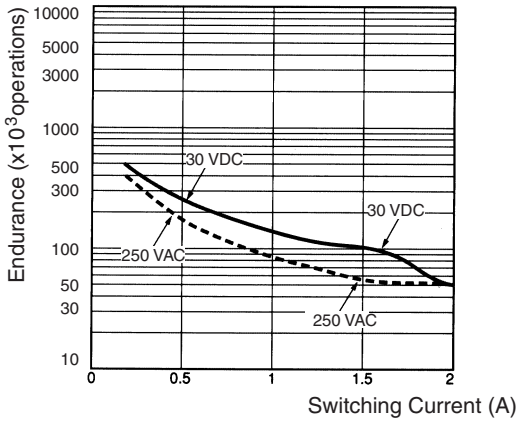
MY4 (Inductive Loads)



MY4Z (Resistive Loads)



MY4Z (Inductive Loads)

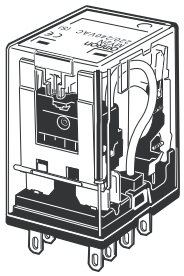


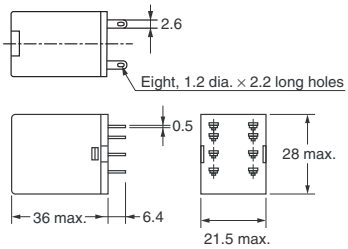
Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ 2-Pole Models

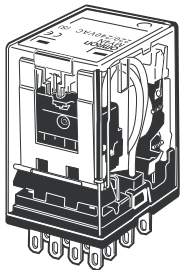
MY2N

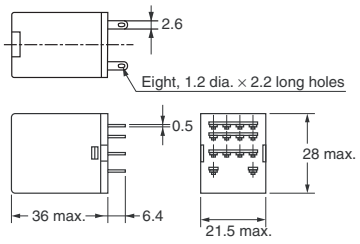




■ 4-Pole Models

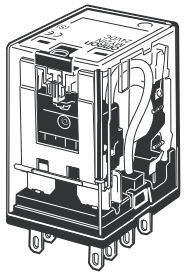
MY4N

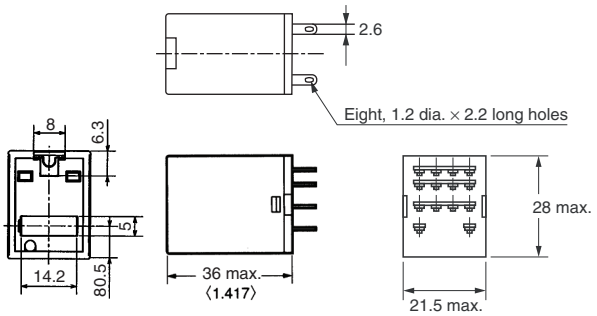




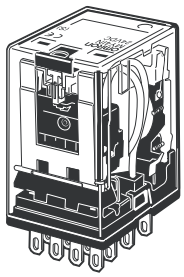
■ Models with Test Button

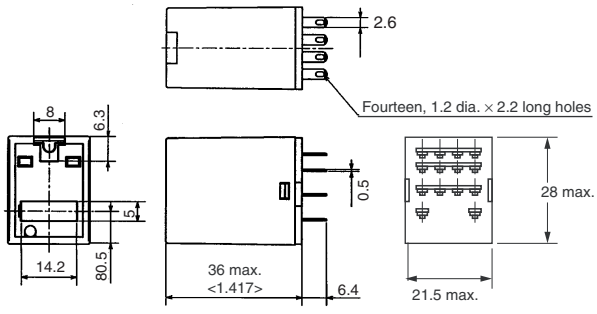
MY2IN





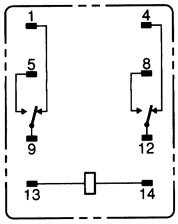
MY4IN



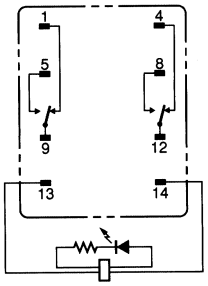


■ Terminal Arrangement/Internal Connections (Bottom View)

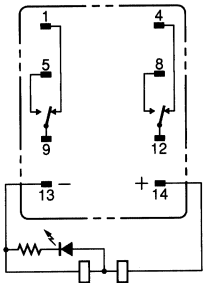
MY2



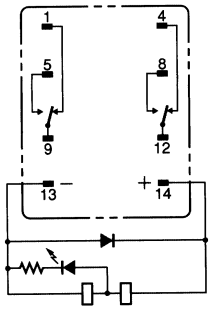
MY2N/MY2IN (AC Models)



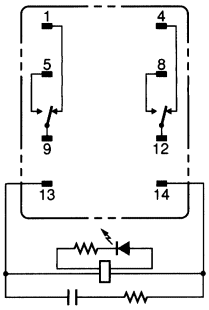
MY2N/MY2IN (DC Models)



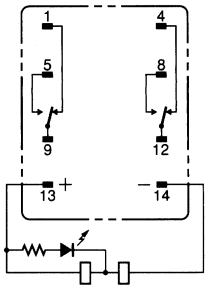
MY2N-D2/MY2IN-D2 (DC Models Only)



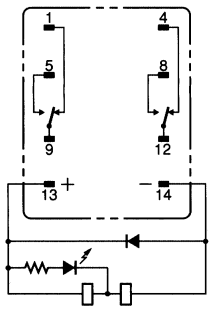
MY2N-CR/MY2IN-CR (AC Models Only)



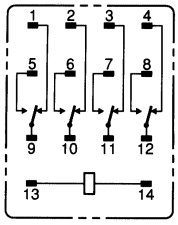
MY2N1/MY2IN1 (DC Models Only)



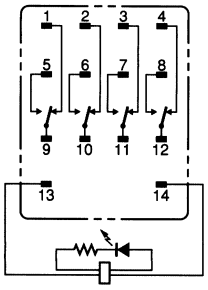
MY2N1-D2/MY2IN1-D2 (DC Models Only)



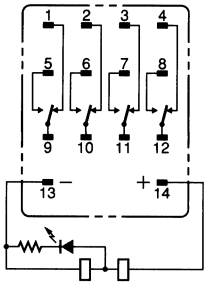
MY4(Z)



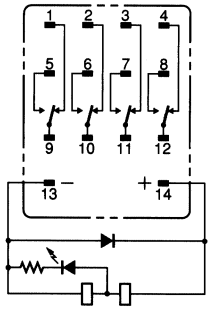
MY4(Z)N/MY4(Z)IN (AC Models)



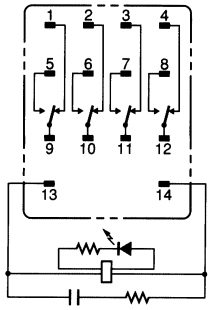
MY4(Z)N/MY4(Z)IN (DC Models)



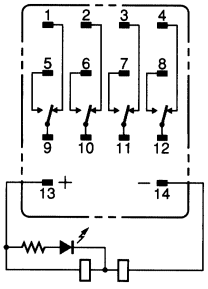
MY4(Z)N-D/MY4(Z)IN-D2 (DC Models Only)



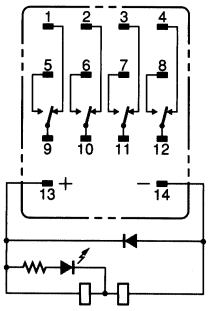
MY4(Z)N-CR/MY4(Z)IN-CR (AC Models Only)



MY4(Z)N1/MY4(Z)IN1 (DC Models Only)



MY4(Z)N1-D2/MY4(Z)N1-D2 (DC Models Only)



Accessories (order separately)

■ Track-mounted Screwless Clamp Terminal Sockets

Item	Model			
	4-pole		2-pole	
Socket	PYF14S		PYF08S	
Clip & release lever	PYCM-14S		PYCM-08S	
Nameplate	R99-11 Nameplate for MY			
Socket bridge	PYDM-14SR	PYDM-14SB	PYDM-08SR	PYDM-08SB

Note: For complete specifications, see the datasheet at Omron's Knowledge Center on our website: www.knowledge.omron.com.

■ Sockets

Poles	Front-connecting socket (DIN-track/screw mounting)	Back-connecting socket		
		Solder terminals		PCB terminals
		Without clip	With clip	
2	PYF08A-E	PY08	PY08-Y1	PY08-02
	PYF08A-N			
4	PYF14A-E	PY14	PY14-Y1	PY14-02
	PYF14A-N			

■ Socket Specifications

Item	Pole	Model	Carry current	Dielectric withstand voltage	Insulation resistance (see note 2)
Screwless clamp terminal socket	2	PYF08S	10 A	2,000 VAC, 1 min	Less than 1,000 MΩ
	4	PYF14S	5 A		
Track-mounted socket	2	PYF08A-E	7 A	2,000 VAC, 1 min	1,000 MΩ min.
		PYF08A-N (see note 3)	7 A (see note 4)		
	4	PYF14A-E	5 A		
		PYF14A-N (see note 3)	5 A (see note 4)		
Back-connecting socket	2	PY08(-Y1)	7 A	1,500 VAC, 1 min	100 MΩ min.
		PY08-02			
	4	PY14(-Y1)	3 A		
		PY14-02			

Note: 1. The values given above are initial values.

2. The values for insulation resistance were measured at 500 V at the same place as the dielectric strength.

3. The maximum operating ambient temperature for the PYF08A-N and PYF14A-N is 55°C.

4. When using the PYF08A-N or PYF14A-N at an operating ambient temperature exceeding 40°C, reduce the current to 60%.

5. The MY2(S) can be used at 70°C with a carry current of 7 A.

■ Socket Hold-down Clip Pairing

Relay type	Poles	Front-connecting socket (DIN-track/screw mounting)		Back-connecting socket			
				Solder terminals		PCB terminals	
		Socket	Clip	Socket	Clip	Socket	Clip
Without 2-pole test button	2	PYF08A-E	PYC-A1	PY08	PYC-P PYC-P2	PY08-02	PYC-P PYC-P2
		PYF08A-N					
Without 2-pole test button	4	PYF14A-E	PYC-A1	PY14	PYC-P PYC-P2	PY14-02	PYC-P PYC-P2
		PYF14A-N					
2-pole test button	2	PYF08A-E	PYC-E1	PY08	PYC-P2	PY08-02	PYC-P2
		PYF08A-N					

■ Mounting Plates for Sockets

Socket model	For 1 socket	For 18 sockets	For 36 sockets
PY08, PY14	**PYP-1**	**PYP-18**	**PYP-36**

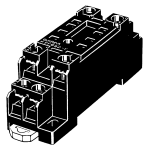
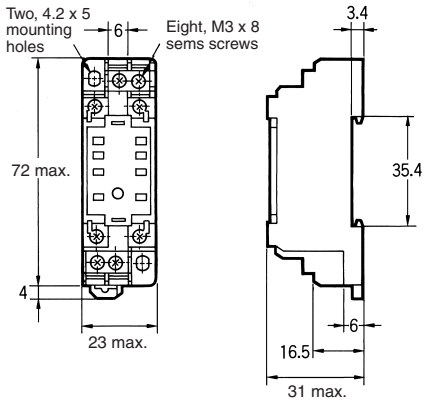
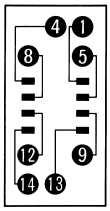
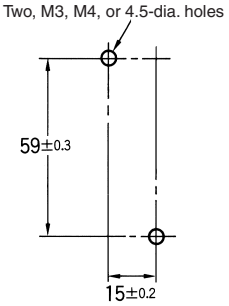
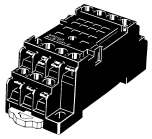
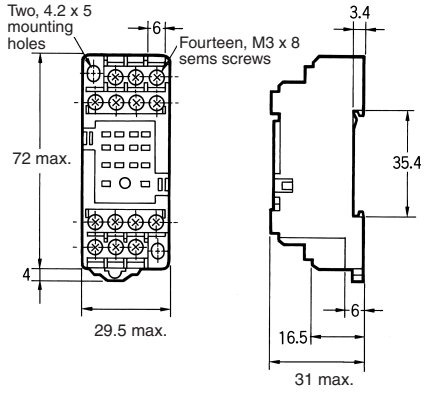
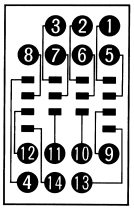
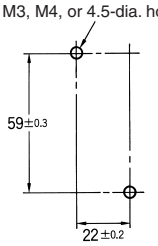
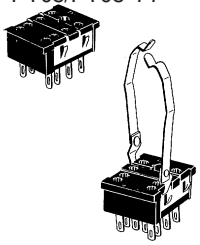
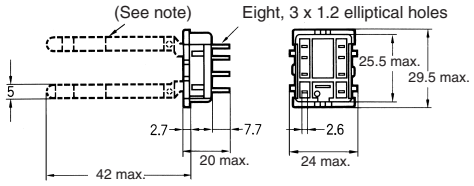
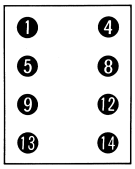
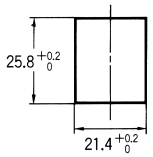
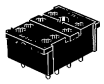
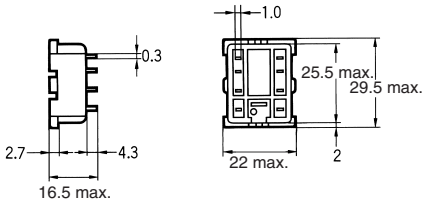
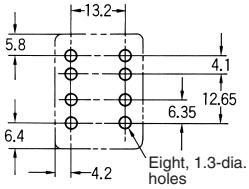
Note: PYP-18 and PYP-36 can be cut into any desired length in accordance with the number of Sockets.

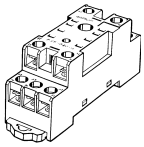
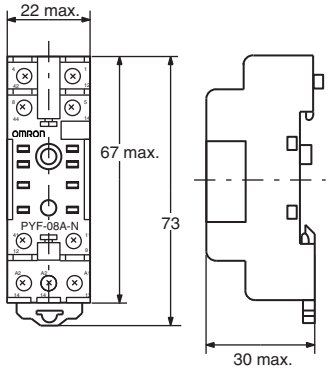
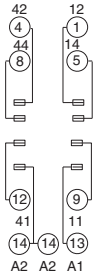
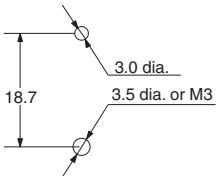
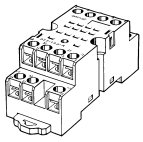
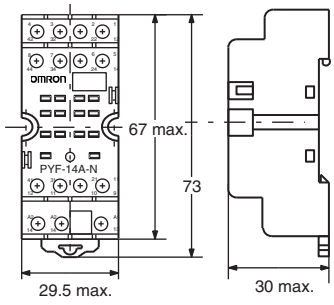
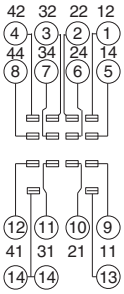
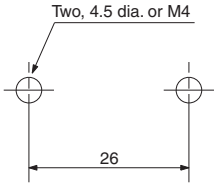
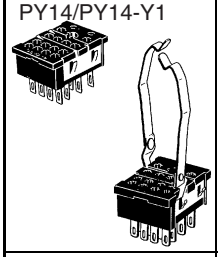
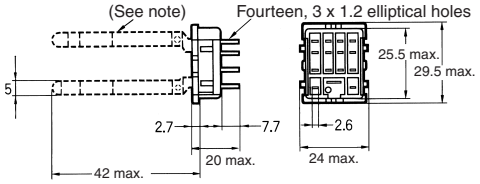
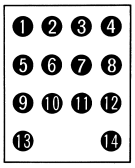
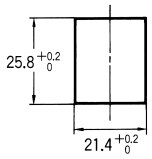
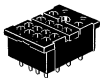
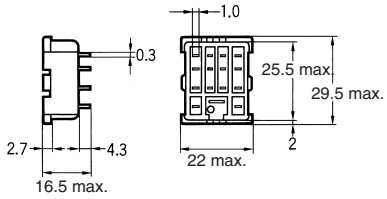
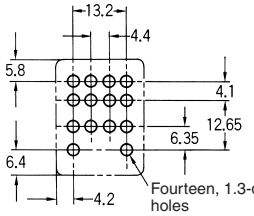
■ DIN Rail Track and Accessories

Description	Model
Mounting rail (length = 500 mm)	**PFP-50N**
Mounting rail (length = 1,000 mm)	**PFP-100N, PFP-100N2**
End Plate	**PFP-M**
Spacer	**PFP-S**

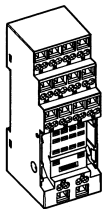
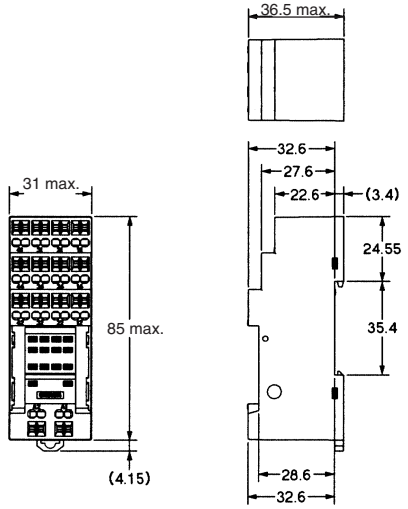
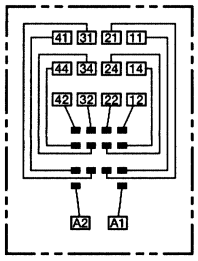
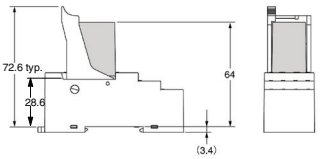
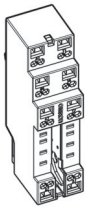
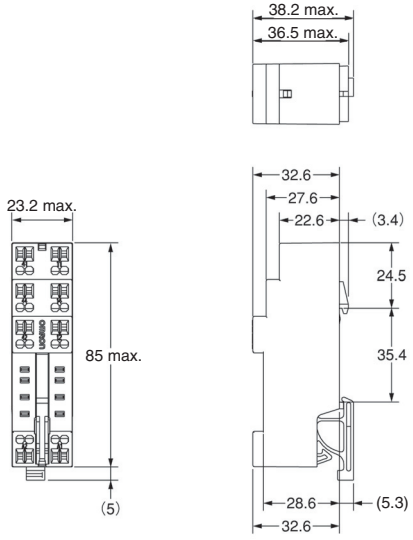
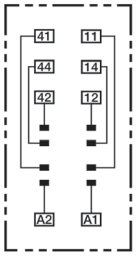
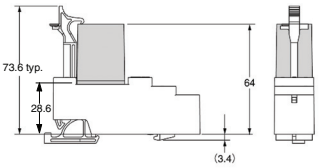
■ Dimensions

Unit: mm (inch)

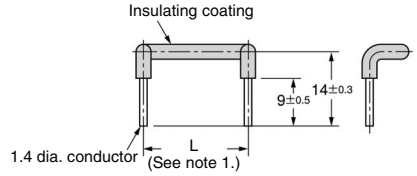
Socket	Dimensions	Terminal arrangement/ internal connections (top view)	Mounting holes
PYF08A-E 			 (TOP VIEW) **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PYF14A-E 			 (TOP VIEW) **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PY08/PY08-Y1 	 **Note:** The PY08-Y1 includes sections indicated by dotted lines.		
PY08-02 			

Socket	Dimensions	Terminal arrangement/ internal connections (top view)	Mounting holes
PYF08A-N 			 **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PYF14A-N 			 **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PY14/PY14-Y1 	 **Note:** The PY14-Y1 includes sections indicated by dotted lines.		
PY14-02 			

Note: Use a panel with plate thickness of 1 to 2 mm for mounting the Sockets.

Socket	Dimensions	Terminal arrangement/ internal connections (top view)	Mounting height (with lever)
PYF14S 		 **Note:** Pole-2 and pole-3 cannot be used with the MY2 type. Use pole-1 (terminal numbers 11, 14, 12) and pole-4 (terminal numbers 41, 44, 42).	 **Note:** Track mounting only.
PYF08S 			 **Note:** Track mounting only.

Socket Bridge



Model number	Length L (mm)	Color of insulating coating
PYDM-14SR	27.5±0.3	Red
PYDM-14SB		Blue
PYDM-08SR	19.7±0.3	Red
PYDM-08SB		Blue

Note: 1. The relationship between the model number, the length L, and the color of the insulating coating is shown above.

2. The insulating coating must be able to withstand a voltage of 1,500 V for 1 minute. Use either PE or PA as the material of the insulating coating.

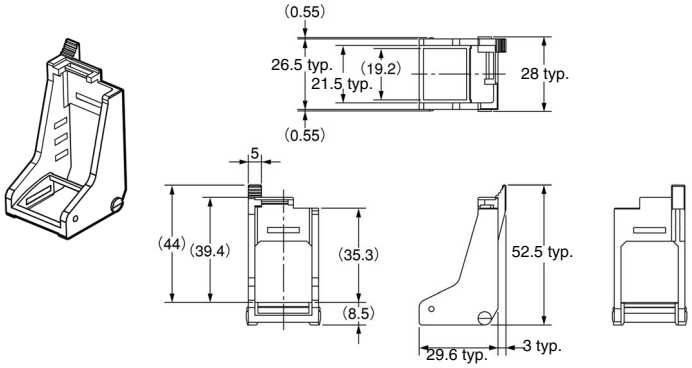
Item	Characteristic
Rated ON current	10 A
Rated insulation voltage	250 VAC
Temperature rise	35°C max.
Dielectric strength	1,500 VAC for 1 minute
Ambient operating temperature	-55 to 70°C

3. The positions of the ends of the insulating coating must not vary more than 0.5 mm.

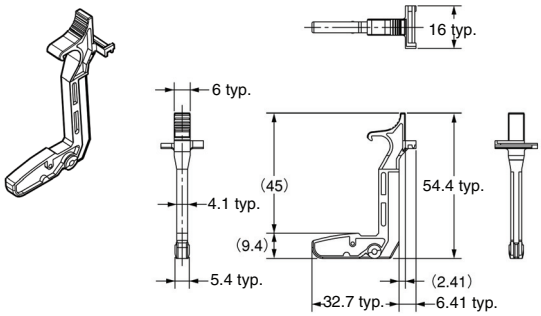
4. The characteristics of the socket bridge are shown above.

■ Clip and Release Levers

PYCM-14S

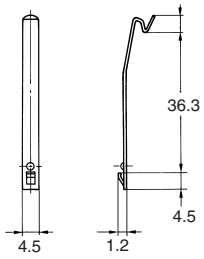


PYCM-08S

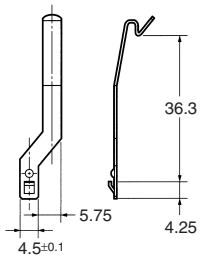


■ Hold-down Clips

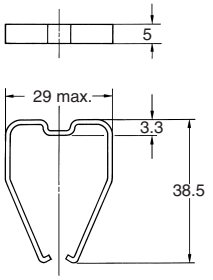
PYC-A1
(2 pcs per set)



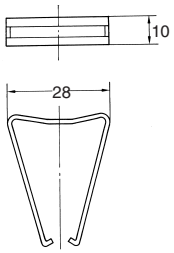
PYC-E1
(2 pcs per set)



PYC-P

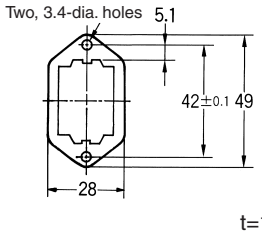


PYC-P2

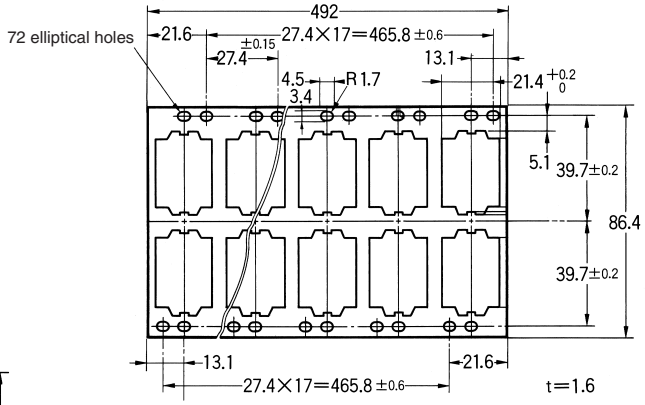


■ Mounting Plates for Back-connecting Sockets

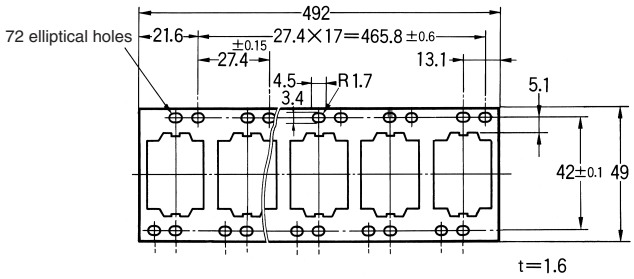
PYP-1



PYP-36



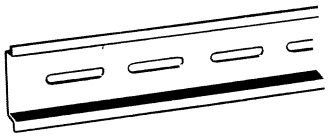
PYP-18

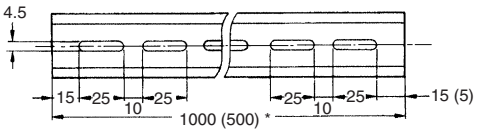


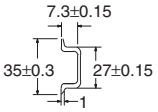
■ Mounting Track and Accessories

DIN Rail Track

PFP-50N/PFP-100N

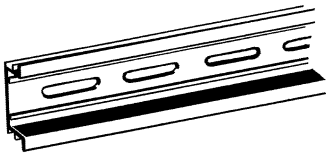


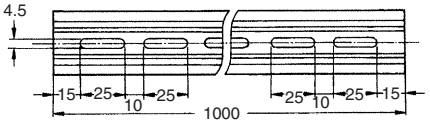


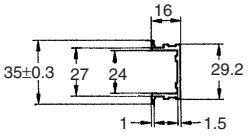


Note: The figure in the parentheses is for PFP-50N.

PFP-100N2

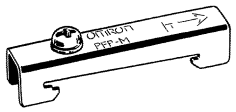


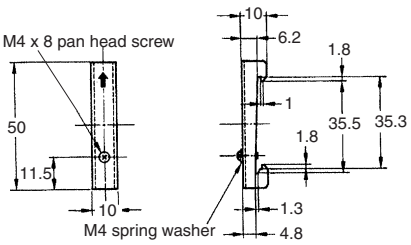




End Plate

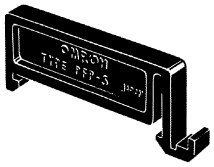
PFP-M

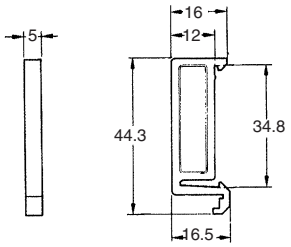




Spacer

PFP-S





■ Approved Standards

VDE Recognitions (File No. 112467UG, IEC 255, VDE 0435)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 250 VAC (cosϕ=1) 10 A, 30 VDC (L/R=0 ms)	10×10^3
4		5 A, 250 VAC (cosϕ=1) 5 A, 30 VDC (L/R=0 ms)	100×10^3 MY4Z AC; 50×10^3

UL Recognized (File No. 41515)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC (general purpose), 40°C 10 A, 250 VAC (general purpose), 40°C	6×10^3
4		5 A, 30 VDC (general purpose), 40°C (Same polarity) 5 A, 250 VAC (general purpose), 40°C (Same polarity)	

CSA Certified (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC 10 A, 250 VAC	6×10^3
4		5 A, 250 VAC (same polarity) 5 A, 30 VDC (same polarity)	

IMQ (File No. EN013 to 016)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 30 VDC 10 A, 250 VAC	10×10^3
4		5 A, 250 VAC 5 A, 30 VDC	100×10^3 MY4Z AC; 50×10^3

LR Recognitions (File No. 98/10014)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC (resistive) 2 A, 250 VAC (PF0.4) 10 A, 30 VDC (resistive) 2 A, 30 VDC (L/R=7 ms)	50×10^3
4		5 A, 250 VAC (resistive) 0.8 A, 250 VAC (PF0.4) 5 A, 30 VDC (resistive) 1.5 A, 30 VDC (L/R=7 ms)	50×10^3

SEV Listings (File No. 99.5 50902.01)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC 10 A, 30 VDC	10 x 10^3
4		5 A, 250 VAC 5 A, 30 VDC	100 x 10^3 MY4Z AC; 50 x 10^3

Note: 1. The rated values approved by each of the safety standards (eg., UL, CSA, VDE, and SEV) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

PYF-S Installation Notes

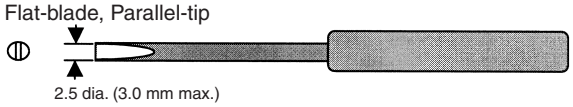
■ Tools

A flat-blade screwdriver should be used to mount the cables.

Applicable Screwdriver

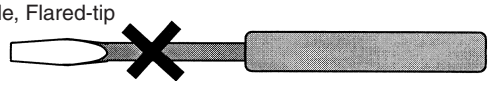
● Flat-blade, Parallel-tip, 2.5 mm diameter (3.0 mm max.)

● Flat-blade, Parallel-tip



2.5 dia. (3.0 mm max.)

● Flat-blade, Flared-tip



Cannot be used.

Examples: FACOM AEF.2.5 × 75E (AEF. 3 × 75E)
VESSEL No. 9900-(-)2.5 × 75 (No. 9900-(-)3 × 100)
WAGO 210-119
WIHA 260/2.5 × 40 (260/3 × 50)

*Chamfering the tip of the driver improves insertion when used as an exclusive tool.

■ Applicable Wires

Applicable Wire Sizes

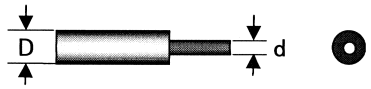
0.2 to 1.5 mm^2, AWG24 to AWG16

Applicable Wire Type

Solid wires, stranded wires, flexible wires, or wires with ferules can be used.

(See note 1.) < 2.2 ≤ Diameter D (mm) ≤ 3.2 (3.5: see note 2.)

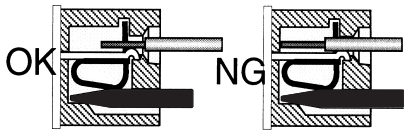
Conductor diameter d (mm) or length of sides a and b (mm) ≤ 1.9



Wires with Ferules



Note: 1. If the overall diameter of the wire is less than 2.2 mm, do not insert the wire past the conductor. Refer to the following diagrams.



2. If the overall diameter of the wire is over 3.2 mm, it will be difficult to use double wiring.

Examples of Applicable Wires (Confirmed Using Catalog Information)

Type of wire	Conductor type	See note 1, above.	Recommended wire sizes	See note 2, above.
Equipment wire 2491X	Flexible		0.5, 0.75, 1.0 mm^2	1.5 mm^2
BS6004	Solid	0.5 mm^2		
Switchgear BS6231	Solid		1.0 mm^2	1.5 mm^2
Switchgear BS6231	Flexible		0.5, 0.75 mm^2	1.0 mm^2
Tri-rated control and switchgear	Flexible		0.5, 0.75, 1.0, 1.5 mm^2	
Conduit	Stranded		1.5 mm^2	
UL1007	Flexible	18AWG	16AWG	
UL1015	Flexible		18AWG, 16AWG	
UL1061	Flexible	18AWG		
UL1430	Flexible	18AWG	16AWG	

■ Wiring

Use wires of the applicable sizes specified above. The length of the exposed conductor should be 8 to 9 mm.

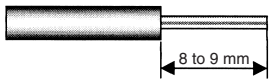


Fig. 1 Exposed Conductor Length

Use the following wiring procedure.

1. Insert the specified screwdriver into the release hole located beside the wire connection hole where the wire is to be inserted.

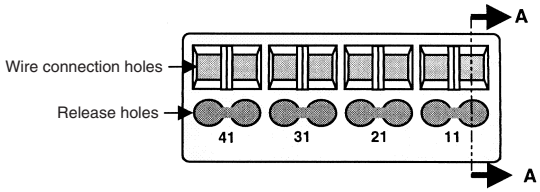


Fig. 2 Wire Connection Holes and Release Holes

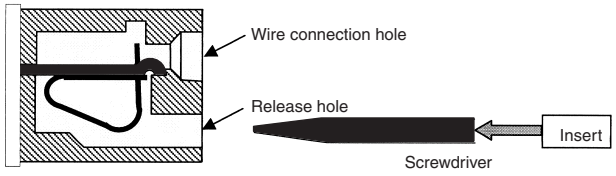
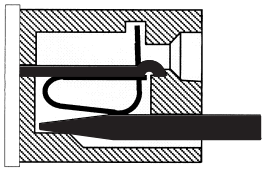
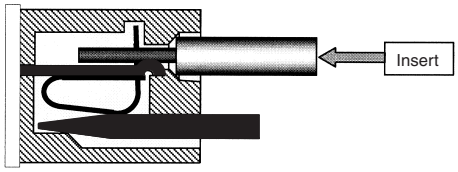


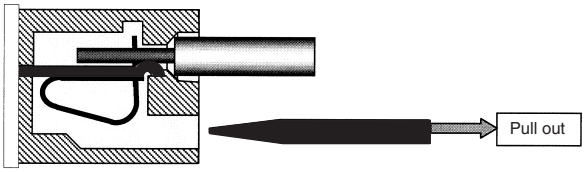
Fig. 3 Section A-A of Fig. 2



2. Insert the exposed conductor into the wire connection hole.



3. Pull out the screwdriver.

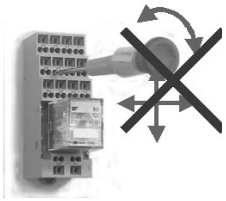


Note: Use no more than 2 wires per terminal, 1 wire per hole.

■ Precautions

Precautions for Connection

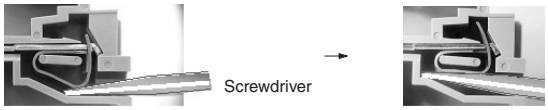
- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the coil spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of socket and result in a short-circuit.



- Do not insert two or more wires in the hole. Wires may come in contact with the spring causing a temperature rise or be subject to sparks. (There are two wiring holes for each terminal.)



- Insert the screwdriver along the hole wall as shown below.



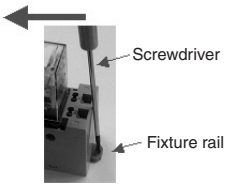
- If lubricating liquid, such as oil, is present on the tip of screwdriver, the screwdriver may fall out resulting in injury to the operator.
- Insert the screwdriver into the bottom of the hole. It may not be possible to connect cables properly if the screwdriver is inserted incorrectly.

General Precautions

- Use the clip to prevent relays floating or falling out of the socket.
- Do not use the product if it has been dropped on the ground. Dropping the product may adversely affect performance.
- Confirm that the socket is securely attached to the mounting track before wiring. If the socket is mounted insecurely it may fall and injure the operator.
- Ensure that the socket is not charged during wiring and maintenance. Not doing so may result in electric shock.
- Do not pour water or cleansing agents on the product. Doing so may result in electric shock.
- Do not use the socket in locations subject to solvents or alkaline chemicals.
- Do not use the socket in locations subject to ultraviolet light (e.g., direct sunlight). Doing so may result in markings fading, rust, corrosion, or resin deterioration.
- Do not dispose of the product in fire.

Removing from Mounting Rail

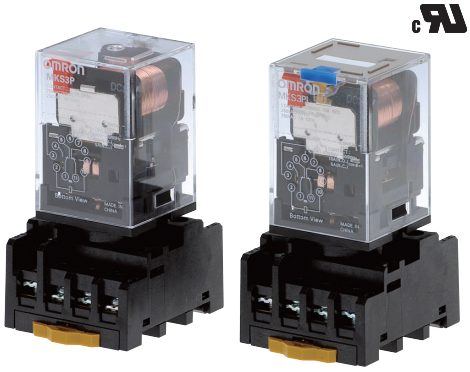
To remove the socket from the mounting rail, insert the tip of screwdriver in the fixture rail, and move it in the direction shown below.



General Purpose Relays
MKS

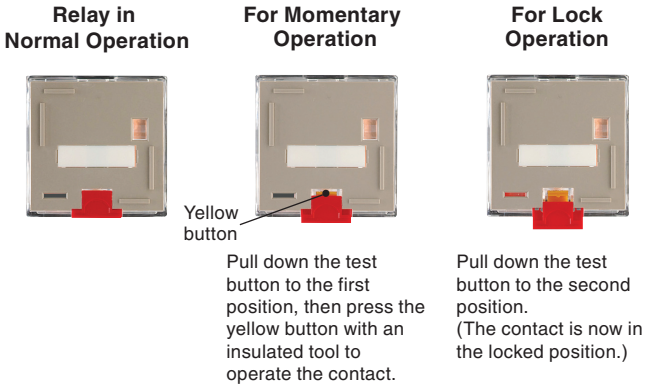
Exceptionally Reliable General Purpose Relay now available with Lockable Test Button

- IEC Rating of 7A 250 V AC 50/60 Hz, General use 100,000 cycles.
- Mechanical indicator standard for all models.
- Optional features include lockable test button, LED indicator, diode surge suppression, varistor, reverse polarity, and alternate wiring styles.
- UL (RU/$_C$RU), CE and TUV approved.
- RoHS Compliant.



Features

Two-way Action Test Button



Model Number Structure

■ Model Number Legend

MKS□□□□□-□-□
1 2 3 4 5 6 7

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Terminals**
   P: Plug-in
3. **Mechanical Indicator/Test Button**
   Blank: Mechanical indicator
   I: Mechanical indicator and lockable test button
4. **LED Indicator**
   Blank: Standard
   N: LED indicator
5. **Coil Polarity**
   Blank: Standard
   1: Reverse polarity (DC coil only)
6. **Surge Absorption**
   Blank: Standard
   D: Surge absorber diode (DC coil only)
   V: Surge absorber varistor (AC coil only)
7. **Internal Connections DPDT**
   Blank: Standard
   2 : Non Standard
   Internal Connections 3PDT
   5 : Standard
   Blank: Non Standard
   2 : Non Standard
8. **Rated Voltage**
   (Refer to *"Coil Ratings"*.)

Ordering Information

■ List of Models

Type	Terminals	Contact form	Internal connections (See note 3.)	With mechanical indicator	With mechanical indicator and lockable test button	Coil ratings
Basic Models	Plug-in	DPDT	Standard	**MKS2P**	**MKS2PI**	AC/DC
			Non Standard	**MKS2P-2**	**MKS2PI-2**	
		3PDT	Standard	**MKS3P-5**	**MKS3PI-5**	
			Non Standard	**MKS3P-2**	**MKS3PI-2**	
				MKS3P	**MKS3PI**	
Models with LED Indicator (See note 2.)		DPDT	Standard	**MKS2PN(1)**	**MKS2PIN(1)**	AC/DC
			Non Standard	**MKS2PN(1)-2**	**MKS2PIN(1)-2**	
		3PDT	Standard	**MKS3PN(1)-5**	**MKS3PIN(1)-5**	
			Non Standard	**MKS3PN(1)-2**	**MKS3PIN(1)-2**	
				MKS3PN(1)	**MKS3PIN(1)**	
Models with Diode (See note 2.)		DPDT	Standard	**MKS2P(1)-D**	**MKS2PI(1)-D**	DC
			Non Standard	**MKS2P(1)-D-2**	**MKS2PI(1)-D-2**	
		3PDT	Standard	**MKS3P(1)-D-5**	**MKS3PI(1)-D-5**	
			Non Standard	**MKS3P(1)-D-2**	**MKS3PI(1)-D-2**	
				MKS3P(1)-D	**MKS3PI(1)-D**	
Models with LED Indicator and Diode		DPDT	Standard	**MKS2PN-D**	**MKS2PIN-D**	DC
			Non Standard	**MKS2PN-D-2**	**MKS2PIN-D-2**	
		3PDT	Standard	**MKS3PN-D-5**	**MKS3PIN-D-5**	
			Non Standard	**MKS3PN-D-2**	**MKS3PIN-D-2**	
				MKS3PN-D	**MKS3PIN-D**	
Models with Varistor		DPDT	Standard	**MKS2P-V**	**MKS2PI-V**	AC
			Non Standard	**MKS2P-V-2**	**MKS2PI-V-2**	
		3PDT	Standard	**MKS3P-V-5**	**MKS3PI-V-5**	
			Non Standard	**MKS3P-V-2**	**MKS3PI-V-2**	
				MKS3P-V	**MKS3PI-V**	
Models with LED Indicator and Varistor		DPDT	Standard	**MKS2PN-V**	**MKS2PIN-V**	AC
			Non Standard	**MKS2PN-V-2**	**MKS2PIN-V-2**	
		3PDT	Standard	**MKS3PN-V-5**	**MKS3PIN-V-5**	
			Non Standard	**MKS3PN-V-2**	**MKS3PIN-V-2**	
				MKS3PN-V	**MKS3PIN-V**	

Note: **1.** When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in the specifications.

Example: MKS2P DC48
Rated voltage

2. The DC coil comes in two types: standard coil polarity and reverse coil polarity.
Refer to *Terminal Arrangement and Internal Connections*.

Example: MKS3PN1-5 DC24
Reverse coil polarity

3. Refer to *Terminal Arrangement and Internal Connections* for all wiring diagrams.

■ 10A Sockets (Order Separately)

Item	Type	Model
Track-mounted Socket	8-pin	**PF083A-E**
	11-pin	**PF113A-E**
	8-pin	**PF083A-D**
	11-pin	**PF113A-D**
Hold-down Clip (For PF083A-E and PF113A-E)		**PFC-A1**

Specifications

■ Ratings

Coil Ratings

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC	6 V	443 mA	385 mA	3.1 Ω	80% max. of rated voltage	30% min. of rated voltage at 60 Hz 25% min. of rated voltage at 50 Hz	110% of rated voltage	Approx. 2.3 VA at 60 Hz Approx. 2.7 VA at 50 Hz
	12 V	221 mA	193 mA	13.7 Ω				
	24 V	110 mA	96.3 mA	48.4 Ω				
	110 V	24.2 mA	21.0 mA	932 Ω				
	120 V	22.2 mA	19.3 mA	1,130 Ω				
	220 V	12.1 mA	10.5 mA	3,550 Ω				
	230 V	11.5 mA	10.0 mA	4,250 Ω				
	240 V	11.0 mA	9.6 mA	4,480 Ω				
DC	6 V	224 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.4 W
	12 V	112 mA		107 Ω				
	24 V	55.8 mA		430 Ω				
	48 V	28.1 mA		1,710 Ω				
	100 V	13.5 mA		7,390 Ω				
	110 V	12.3 mA		8,960 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. The maximum voltage is one that is applicable instantaneously to the Relay coil at 23°C and not continuously.

4. For DC-operated Relays with the LED indicator built-in, add an LED current of approx. 5 mA to the rated current.

Contact Ratings

Load		Resistive load (cosϕ = 1)	Inductive load (p.f. = 0.4)
Contact mechanism		Single	
Contact material		AgSnIn	
Rated load	**NO**	10 A, 250 VAC 10A, 30 VDC	7 A, 250 VAC
	NC	5 A, 250 VAC 5 A, 30 VDC	
Rated carry current		10 A	
Max. switching voltage		250 VAC, 250 VDC	
Max. switching current		10 A	
Max. switching capacity	**NO**	2,500 VA/300 W	
	NC	1,250 VA/150 W	

■ Characteristics

Contact resistance	100 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.(40 ms max. for built-in diode models)
Max. operating frequency	Mechanical: 18,000 operations/hr (no load) Electrical:1,800 operations/hr (at rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC 50/60 Hz for 1 min. between coil and contacts 1,000 VAC 50/60 Hz for 1 min. between contacts of same polarity and terminals of the same polarity 2,500 VAC 50/60 Hz for 1 min. between current-carrying parts, non-current-carrying parts, and opposite polarity
Insulation method	Basic insulation
Impulse withstand voltage	4.5 kV between coil and contacts (with 1.2 × 50 μs impulse wave) 3.0 kV between contacts of different polarity (with 1.2 × 50 μs impulse wave)
Pollution degree	3
Rated insulation voltage	250 V
Vibration resistance	Destruction:10 to 55 Hz, 1.5 mm double amplitude Malfunction:10 to 55 Hz, 1.0 mm double amplitude
Shock resistance	Destruction:1,000 m/s^2 (approx. 100 G) Malfunction:100 m/s^2 (approx. 10 G)
Life expectancy	Mechanical: 5,000,000 operations min. Electrical:100,000 operations min.
Min. permissible load	10 mA at 1 VDC P level: λ_{60}=0.1 x 10^{-6} / ops
Ambient temperature	Operating: –40 to 60°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 90 g

Note: 1. The values given above are initial values.
2. Ambient temperature of models with LED indicator is –25 to 60°C.

■ Approved Standards

UL Recognized (File No. E41515) - - Ambient Temp. = 40°C

Coil ratings	Contact ratings		Operations
6 to 110 VDC 6 to 240 VAC	N.O. contact	10 A, 250 V AC 50/60 Hz (Resistive) 10 A, 30 V DC (Resistive) 7 A, 250 V AC 50/60 Hz (General Use)	100,000
	N.C. contact	10 A, 250 V AC 50/60 Hz (Resistive) 10 A, 30 V DC (Resistive) 7 A, 250 V AC 50/60 Hz (General Use)	100,000

Note: 10A UL ratings are with no load on the other contact set.

CSA Certified by c UL us

IEC Standard/TUV Certification: IEC61810-1 (Certification No. R50104853)

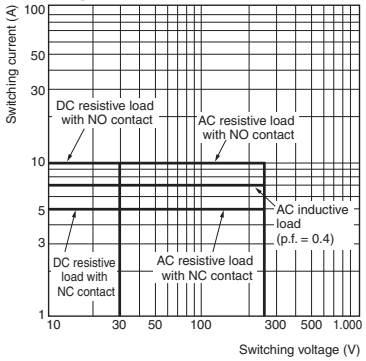
Coil ratings	Contact ratings		Operations
6, 12, 24, 48, 100, 110 VDC 6, 12, 24, 100, 110, 200, 220, 240 VAC	N.O. contact	10 A, 250 V AC 50/60 Hz (Resistive) 10 A, 30 V DC (Resistive) 7 A, 250 V AC 50/60 Hz (General Use)	100,000
	N.C. contact	5 A, 250 V AC 50/60 Hz (Resistive) 5 A, 30 V DC (Resistive) 7 A, 250 V AC 50/60 Hz (General Use)	100,000

Note: Maximum carrying current per TUV Certification is 9 A when new MK-S relays are mounted in PF083A-E or PF113A-E Sockets.

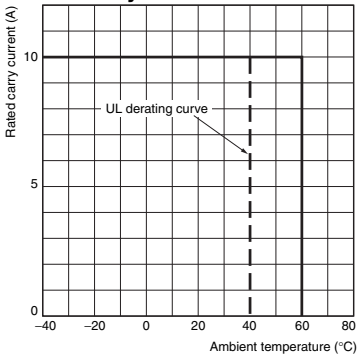
Engineering Data

■ Reference Data

Maximum Switching Power



Rated Carry Current vs. Ambient Rated Temperature

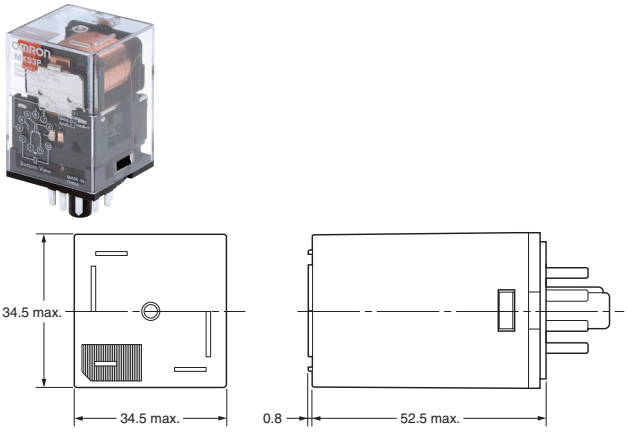


Note: The lower limit of the ambient operating temperature for models with built-in operation indicators is –25°C.

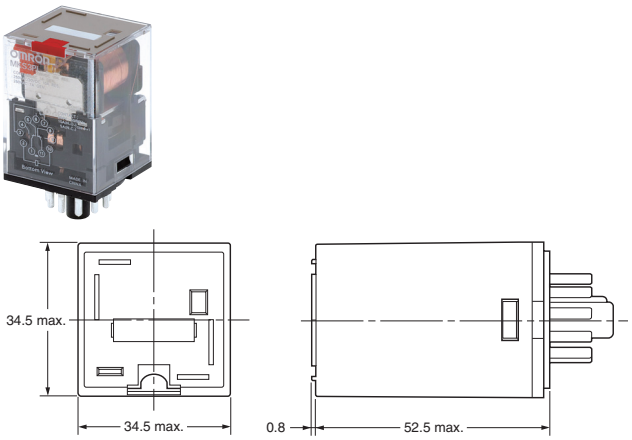
Dimensions

Note: All units are in millimeters unless otherwise indicated.

Models without Test Button

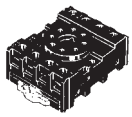
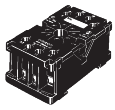
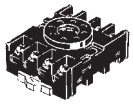


Models with Lockable Test Button



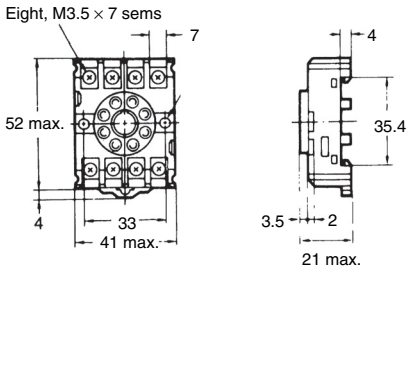
Track Mounted Sockets

See below for Socket dimensions.

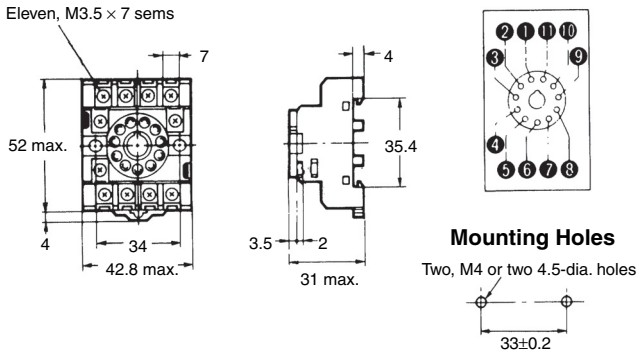
Poles	Finger-protection models		—
Maximum carry current	10 A		5 A
2 poles	PF083A-E 	PF083A-D 	PF083A 
3 poles	PF113A-E 	PF113A-D 	PF113A 

Note: If using the PF083A or PF113A Sockets, be sure the maximum carrying current is 5 A or less. When using finger-protection sockets, make sure the connecting wire terminals are Y-shaped.

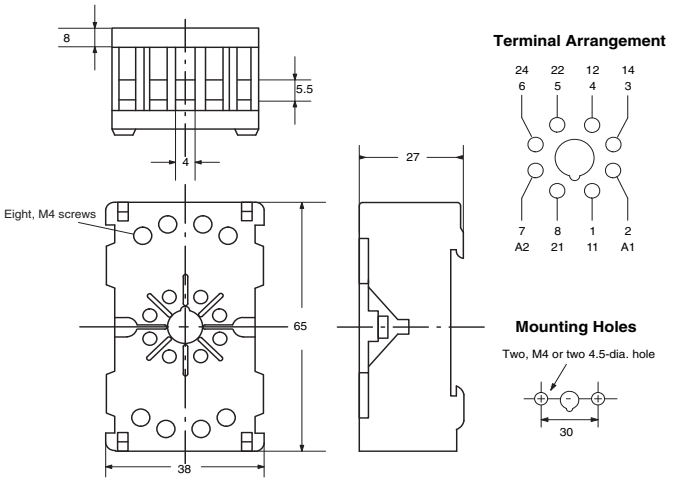
PF083A-E (Conforming to EN 50022)



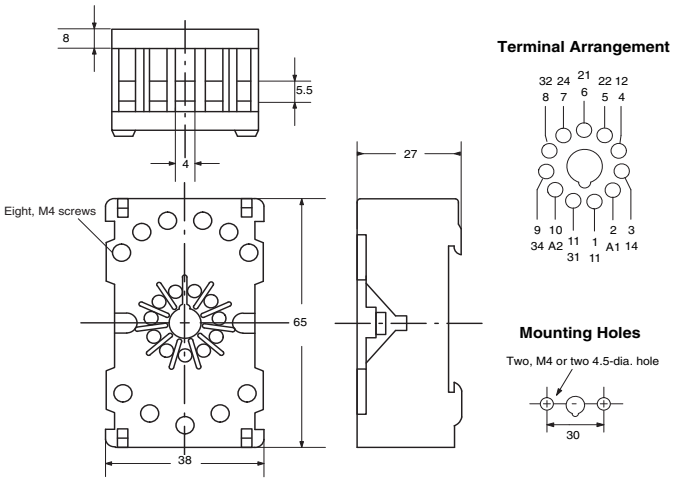
PF113A-E (Conforming to EN 50022)



PF083A-D

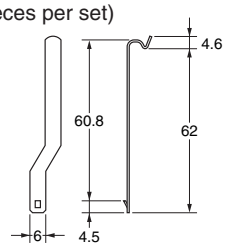


PF113A-D



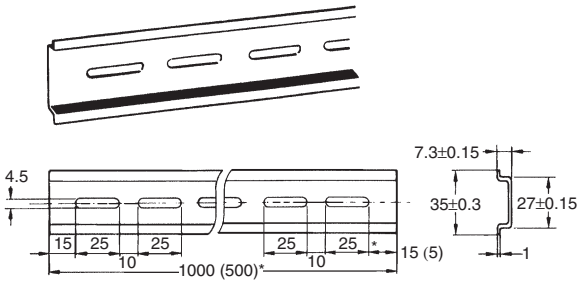
Hold-down Clips

PFC-A1
(2 pieces per set)

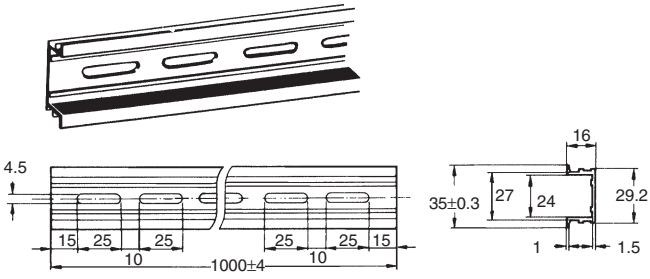


Mounting Tracks

PFP-100N, PFP-50N
(Conforming to EN 50022)

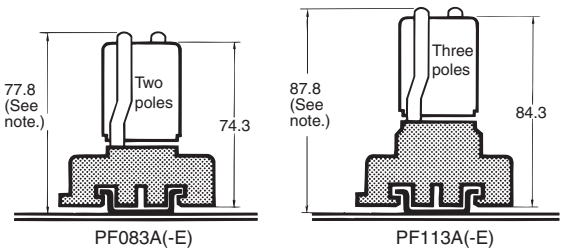


PFP-100N2
(Conforming to EN 50022)



* The figure in parenthesis is for PFP-50N.

Mounting Height with Sockets

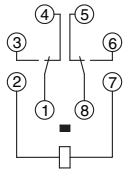
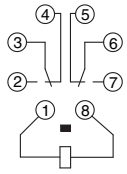
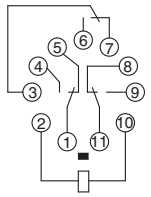
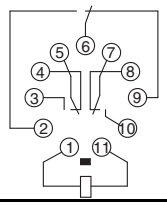
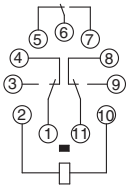


PF083A(-E) PF113A(-E)

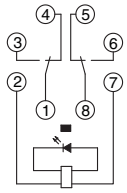
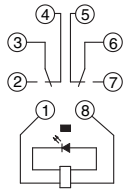
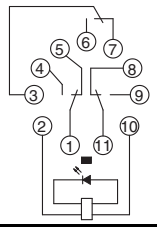
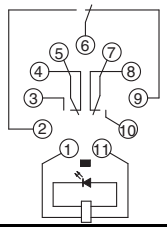
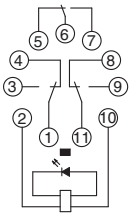
Note: PF083A(-E) and PF113A(-E) allow either track or screw mounting.

Terminal Arrangement/Internal Connection (Bottom View)

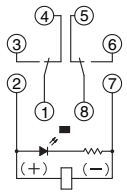
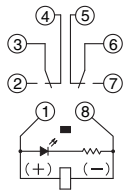
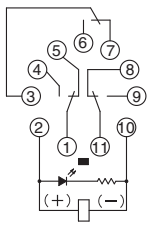
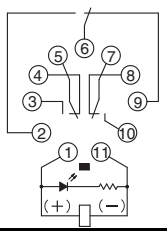
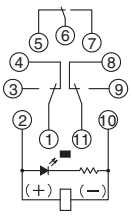
Basic Models (AC/DC Coil)

MKS2P(I)	MKS2P(I)-2	MKS3P(I)	MKS3P(I)-2	MKS3P(I)-5
				

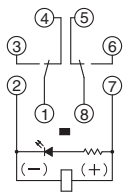
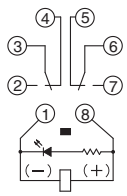
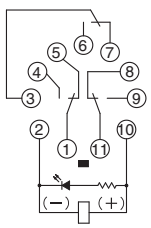
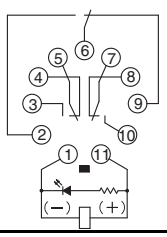
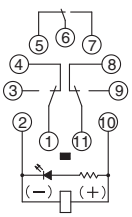
LED Indicator Type (AC Coil)

MKS2P(I)N	MKS2P(I)N-2	MKS3P(I)N	MKS3P(I)N-2	MKS3P(I)N-5
				

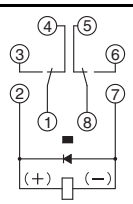
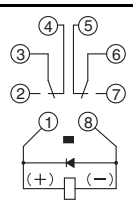
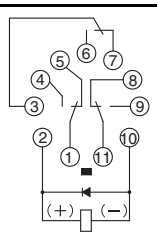
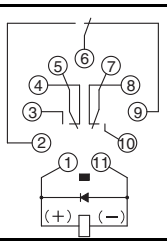
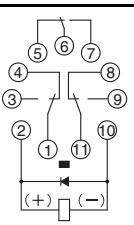
LED Indicator Type (DC Coil: Standard Polarity)

MKS2P(I)N	MKS2P(I)N-2	MKS3P(I)N	MKS3P(I)N-2	MKS3P(I)N-5
				

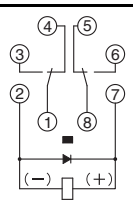
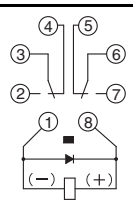
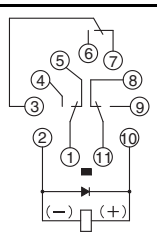
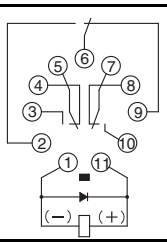
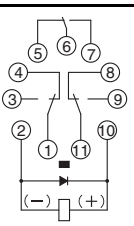
LED Indicator Type (DC Coil: Reverse Polarity)

MKS2P(I)N1	MKS2P(I)N1-2	MKS3P(I)N1	MKS3P(I)N1-2	MKS3P(I)N1-5
				

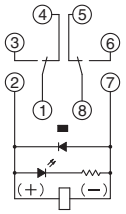
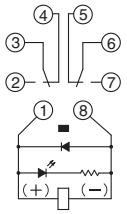
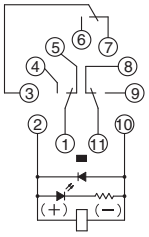
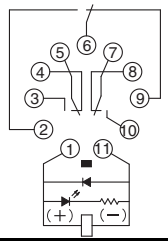
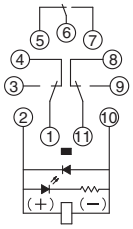
Diode Type (DC Coil: Standard Polarity)

MKS2P(I)-D	MKS2P(I)-D-2	MKS3P(I)-D	MKS3P(I)-D-2	MKS3P(I)-D-5
				

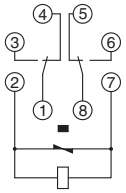
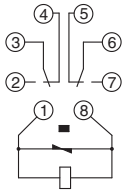
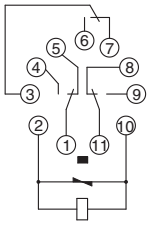
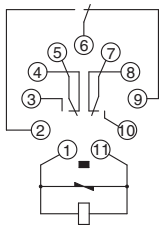
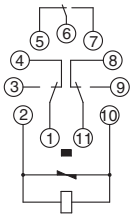
Diode Type (DC Coil: Reverse Polarity)

MKS2P(I)1-D	MKS2P(I)1-D-2	MKS3P(I)1-D	MKS3P(I)1-D-2	MKS3P(I)1-D-5
				

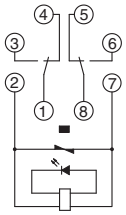
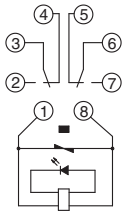
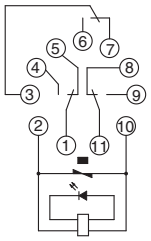
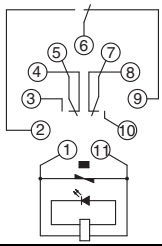
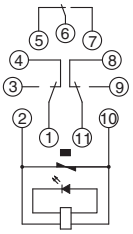
LED Indicator and Diode Type (DC Coil)

MKS2P(I)N-D	MKS2P(I)N-D-2	MKS3P(I)N-D	MKS3P(I)N-D-2	MKS3P(I)N-D-5
				

Varistor Type (AC Coil)

MKS2P(I)-V	MKS2P(I)-V-2	MKS3P(I)-V	MKS3P(I)-V-2	MKS3P(I)-V-5
				

LED Indicator and Varistor Type (AC Coil)

MKS2P(I)N-V	MKS2P(I)N-V-2	MKS3P(I)N-V	MKS3P(I)N-V-2	MKS3P(I)N-V-5
				

Safety Precautions

■ Safety Precautions for Correct Use

Installation

Recommend mounting MK-S Relay so that side with wiring diagram is facing down.

Handling

Check coil polarity when wiring LED Indicator and Diode Models.

Test Button

Do not use the test button for any purpose other than testing. Be sure not to touch the test button accidentally as this will turn the contacts ON. Before using the test button, confirm that circuits, the load, and any other connected item will operate safely.

Check that the test button is released before turning ON relay circuits.

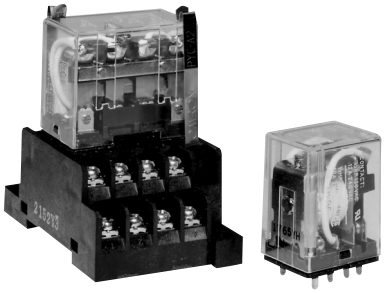
If the test button is pulled out too forcefully, it may bypass the momentary testing position and go straight into the locked position.

Use an insulated tool when you operate the test button.

Models with test buttons or LED indicators fulfill the requirements for reinforced insulation between live parts and the front of cover only when the Relay is in a complete condition, i.e. with the nameplate, nameplate frame, test button, and slider in place. If any of these parts are removed, only the requirements for basic insulation are fulfilled.

General Purpose Relay
LY

- Arc barrier equipped.
- High dielectric strength (2,000 VAC).
- Long dependable service life assured by Ag-Alloy contacts.
- Choose models with single or bifurcated contacts, LED indicator, diode surge suppression, push-to-test button, or RC circuit.
- UL, CSA, TUV, and CE approvals on all standard LY Relay Part Numbers.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., LY1-*DC6*).

Type	Terminal	Contact form	Model			
			Single contact		Bifurcated contact	
			Standard bracket mounting	Upper mounting bracket	Standard bracket mounting	Upper mounting bracket
Standard	Plug-in/solder	SPDT	**LY1**	**LY1F**	—	—
		DPDT	**LY2**	**LY2F**	**LY2Z**	**LY2ZF**
		3PDT	**LY3**	**LY3F**	—	—
		4PDT	**LY4**	**LY4F**	—	—
	PCB	SPDT	**LY1-0**	—	—	—
		DPDT	**LY2-0**	—	**LY2Z-0**	—
		3PDT	**LY3-0**	—	—	—
		4PDT	**LY4-0**	—	—	—
LED indicator	Plug-in/solder	SPDT	**LY1N**	—	—	—
		DPDT	**LY2N**	—	**LY2ZN**	—
		3PDT	**LY3N**	—	—	—
		4PDT	**LY4N**	—	—	—
Diode surge suppression		SPDT	**LY1-D**	—	—	—
		DPDT	**LY2-D**	—	**LY2Z-D**	—
		3PDT	**LY3-D**	—	—	—
		4PDT	**LY4-D**	—	—	—
LED indicator and diode surge suppression		SPDT	**LY1N-D2**	—	—	—
		DPDT	**LY2N-D2**	—	**LY2ZN-D2**	—
		4PDT	**LY4N-D2**	—	—	—
RC circuit		SPDT	**LY1-CR**	—	—	—
		DPDT	**LY2-CR**	—	**LY2Z-CR**	—
LED indicator and RC circuit		SPDT	**LY1N-CR**	—	—	—
		DPDT	**LY2N-CR**	—	**LY2ZN-CR**	—

Note: 1. Types with specifications other than those listed are available. Contact your Omron Sales representative.

2. To order connecting sockets and mounting tracks, see “Accessories” section.

3. Relays with RC circuit are only available in AC coil voltages of 100 VAC or greater.

Type	Terminal	Contact form	Model			
			Single contact		Bifurcated contact	
			Standard bracket mounting	Upper mounting bracket	Standard bracket mounting	Upper mounting bracket
Push-to-test button	Plug-in/solder	SPDT	**LY1I4**	—	—	—
		DPDT	**LY2I4**	—	**LY2ZI2**	—
		3PDT	**LY3I4**	—	—	—
		4PDT	**LY4I4**	—	—	—
LED indicator and push-to-test button	Plug-in/solder	DPDT	**LY2I4N**	—	**LY2ZI2N**	—
		4PDT	**LY4I4N**	—	—	—

Note: 1. Types with specifications other than those listed are available. Contact your Omron Sales representative.
2. To order connecting sockets and mounting tracks, see "Accessories" section.

■ Accessories

Connecting Sockets

To Order: Select the appropriate part numbers for sockets, clips, and mounting tracks (if required) from the following charts.

Track Mounted Sockets

Relay	Socket*	Relay hold-down clip		Mounting track
		Standard	RC circuit	
SPDT DPDT	**PTF08A-E**	**PYC-A1**	**Y92H-3**	**PFP-100N/PFP-50N** & **PFP-M** or **PFP-100N2** **PFP-S** (Option spacer)
3PDT	**PTF11A**			
4PDT	**PTF14A-E**			

* Track mounted socket can be used as a front connecting socket.

Back Connecting Sockets

Relay	Solder terminal socket	Wire wrap terminal socket	Relay hold-down clip				Socket Mounting Plate			
			Standard	Push-to-test	RC circuit	Mtg. plate	1	10	12	18
SPDT DPDT	**PT08**	**PT08QN**	**PYC-P**	**PYC-P2**	**PYC-1**	**PYC-S**	**PYP-1**	–	–	**PYP-18**
3PDT	**PT11**	**PT11QN**					**PTP-1-3**	–	**PTP-12**	–
4PDT	**PT14**	**PT14QN**					**PTP-1**	**PTP-10**	–	–

Note: Types PYP-18, PTP-12 and PTP-10 may be cut to any desired length.

Relay	PC terminal socket	Relay hold-down clip		
		Standard	Push-to-test	RC circuit
SPDT DPDT	**PT08-0**	**PYC-P**	**PYC-P2**	**PYC-1**
3PDT	**PT11-0**			
4PDT	**PT14-0**			

Specifications

■ Contact Data

Load	Single contact				Bifurcated contact	
	SPDT		DPDT, 3PDT, 4PDT		DPDT	
	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)	Resistive load (p.f. = 1)	Inductive load (p.f. = 0.4) (L/R = 7 ms)
Rated load	15 A at 110 VAC 15 A at 24 VDC	10 A at 110 VAC 7 A at 24 VDC	10 A at 110 VAC 10 A at 24 VDC	7.5 A at 110 VAC 5 A at 24 VDC	5 A at 110 VAC 5 A at 24 VDC	4 A at 110 VAC 4 A at 24 VDC
Contact material	Ag-Alloy					
Carry current	15 A		10 A		7 A	
Max. operating voltage	250 VAC 125 VDC					
Max. operating current	15 A		10 A		7 A	
Max. switching capacity	1,700 VA 360 W	1,100 VA 170 W	1,100 VA 240 W	825 VA 120 W	550 VA 120 W	440 VA 100 W
Min. permissible load	100 mA, 5 VDC				10 mA, 5 VDC	

■ Coil Data

1- and 2-pole Types – AC

Rated voltage (V)	Rated current (mA)		Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
	50 Hz	60 Hz		Armature OFF	Armature ON	(% of rated voltage)			
6	214.10	183	12.20	0.04	0.08	80% max.	30% min.	110%	Approx. 1.00 to 1.20 (60 Hz)
12	106.50	91	46	0.17	0.33				
24	53.80	46	180	0.69	1.30				
50	25.70	22	788	3.22	5.66				
100/110	11.70/12.90	10/11	3,750	14.54	24.60				Approx. 0.90 to 1.10 (60 Hz)
110/120	9.90/10.80	8.40/9.20	4,430	19.20	32.10				
200/220	6.20/6.80	5.30/5.80	12,950	54.75	94.07				
220/240	4.80/5.30	4.20/4.60	18,790	83.50	136.40				

1- and 2-pole Types – DC

Rated voltage (V)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
			Armature OFF	Armature ON	(% of rated voltage)			
6	150	40	0.16	0.33	80% max.	10% min.	110%	Approx. 0.90
12	75	160	0.73	1.37				
24	36.90	650	3.20	5.72				
48	18.50	2,600	10.60	21				
100/110	9.10/10	11,000	45.60	86.20				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with tolerances of +15%, -20% for AC rated current, and ±15% for DC rated coil resistance.

2. The AC coil resistance and inductance are reference values at 60 Hz.

3. The performance characteristics are measured at a coil temperature of 23°C (73°F).

4. Class B coil insulation is available.

3-pole Type – AC

Rated voltage (V)	Rated current (mA)		Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
	50 Hz	60 Hz		Armature OFF	Armature ON	(% of rated voltage)			
6	310	270	6.70	0.03	0.05	80% max.	30% min.	110%	Approx. 1.60 to 2.00 (60 Hz)
12	159	134	24	0.12	0.21				
24	80	67	100	0.44	0.79				
50	38	33	410	2.24	3.87				
100/110	15.90/18.30	13.60/15.60	2,300	10.50	18.50				
120	17.30	14.8	2,450	11.50	20.60				
200/220	10.50/11.60	9.00/9.90	8,650	34.80	59.50				
240	9.40	8	10,400	38.60	74.60				

3-pole Type – DC

Rated voltage (V)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
			Armature OFF	Armature ON	(% of rated voltage)			
6	234	25.70	0.11	0.21	80% max.	10% min.	110%	Approx. 1.40
12	112	107	0.45	0.98				
24	58.60	410	1.89	3.87				
48	28.20	1,700	8.53	13.90				
100/110	12.70/13	8,500	29.60	54.30				

4-pole Type – AC

Rated voltage (V)	Rated current (mA)		Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
	50 Hz	60 Hz		Armature OFF	Armature ON	(% of rated voltage)			
6	386	330	5	0.02	0.04	80% max.	30% min.	110%	Approx. 1.95 to 2.50 (60 Hz)
12	199	170	20	0.10	0.17				
24	93.60	80	78	0.38	0.67				
50	46.80	40	350	1.74	2.88				
100/110	22.50/25.50	19/21.80	1,800	10.50	17.30				
120	19.00	16.40	2,200	9.30	19				
200/220	11.50/13.10	9.80/11.20	6,700	33.10	57.90				
240	11.00	9.50	9,000	33.20	63.40				

4-pole Type – DC

Rated voltage (V)	Rated current (mA)	Coil resistance (Ω)	Coil inductance (ref. value) (H)		Pick-up voltage	Dropout voltage	Maximum voltage	Power consumption (VA, W)
			Armature OFF	Armature ON	(% of rated voltage)			
6	240	25	0.09	0.21	80% max.	10% min.	110%	Approx. 1.50
12	120	100	0.39	0.84				
24	69	350	1.41	2.91				
48	30	1,600	6.39	13.60				
100/110	15/15.90	6,900	32	63.70				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with tolerances of +15%, -20% for AC rated current, and ±15% for DC rated coil resistance.

2. The AC coil resistance and inductance are reference values at 60 Hz.

3. The performance characteristics are measured at a coil temperature of 23°C (73°F).

4. Class B coil insulation is available.

■ Characteristics

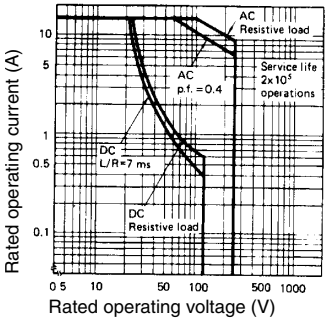
Contact resistance		50 mΩ max.
Operate time		25 ms max.
Release time		25 ms max.
Operating frequency	**Mechanically**	18,000 operations/hour
	Under rated load	1,800 operations/hour
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 minute 1,000 VAC, 50/60 Hz for 1 minute between contacts of same polarity
Vibration	**Mechanical durability**	10 to 55 Hz, 1.00 mm (0.04 in) double amplitude
	Malfunction durability	10 to 55 Hz, 1.00 mm (0.04 in) double amplitude
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100 G)
	Malfunction durability	200 m/s^2 (approx. 20 G)
Ambient temperature	**Operating**	LY1, LY2, LY3: -25° to 55°C; LY4 =-25° to 40°C
Humidity		35 to 85% RH
Service Life	**Mechanically**	AC: 50 million operations min. (at operating frequency of 18,000 operations/hour) DC: 100 million operations min. (at operating frequency of 18,000 operations/hour)
	Electrically	See “Characteristic Data”
Weight		SPDT, DPDT: Approx. 40 g (1.41 oz), 3PDT: Approx. 50 g (1.76 oz) 4PDT: Approx. 70 g (2.47 oz)

Note: Data shown are of initial value.

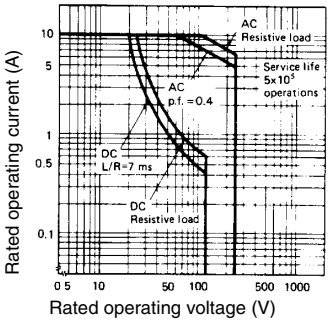
■ Characteristic Data

Maximum switching capacity

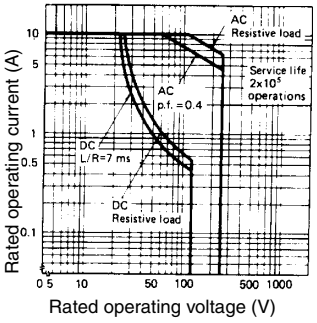
LY1



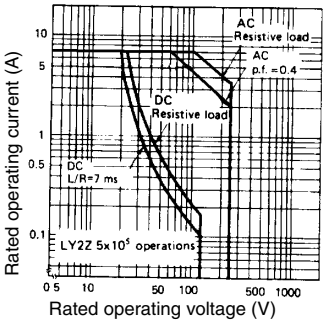
LY2



LY3, LY4

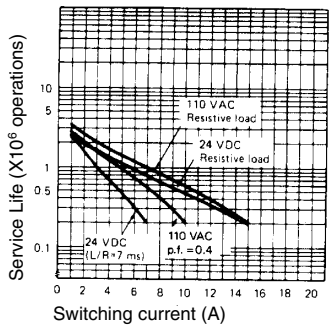


LY2Z

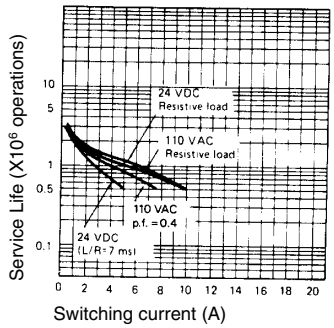


Electrical service life

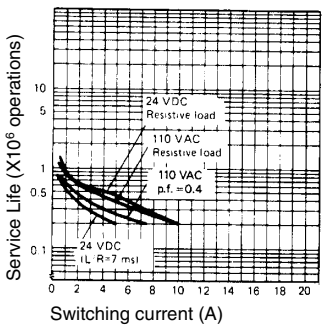
LY1



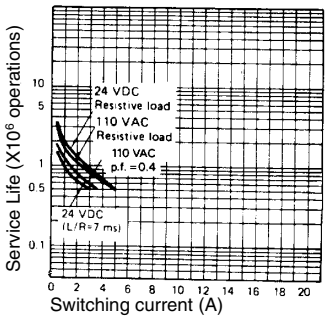
LY2



LY3, LY4



LY2Z

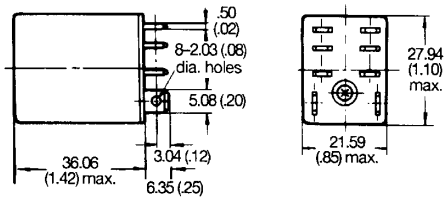


Dimensions

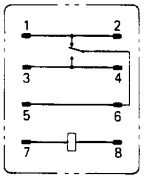
Unit: mm (inch)

■ Relays

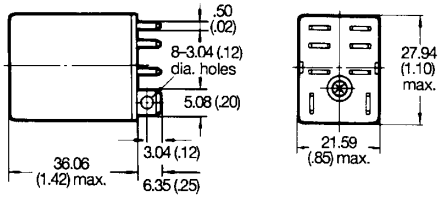
LY1



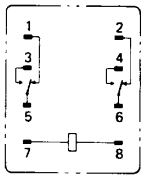
Terminal arrangement
(Bottom view)



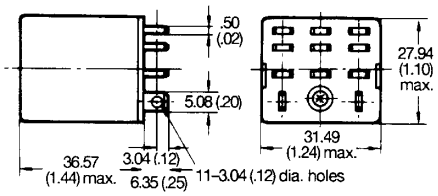
LY2



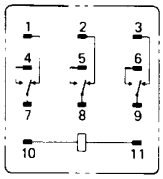
Terminal arrangement
(Bottom view)



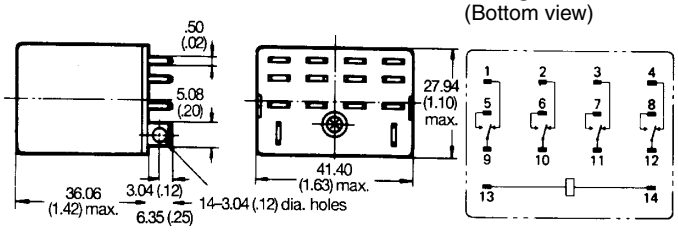
LY3



Terminal arrangement
(Bottom view)

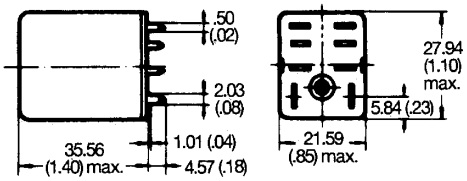


LY4



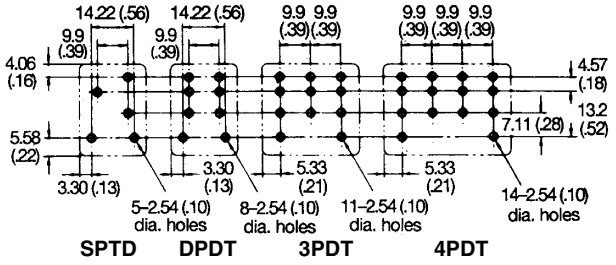
Terminal arrangement
(Bottom view)

LY1-0, LY2-0, LY3-0, LY4-0

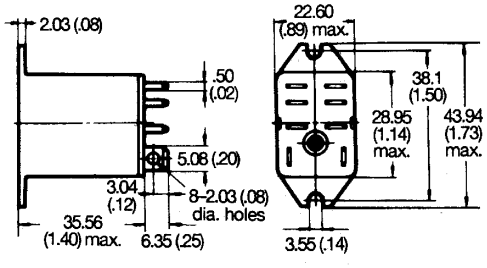


Note: The above drawing shows LY2-0. With LY1-0, dimension "*" should read as eight 6.35 (.25).

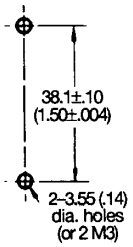
Mounting holes for LY1-0, LY2-0, LY3-0, LY4-0
(Bottom view)



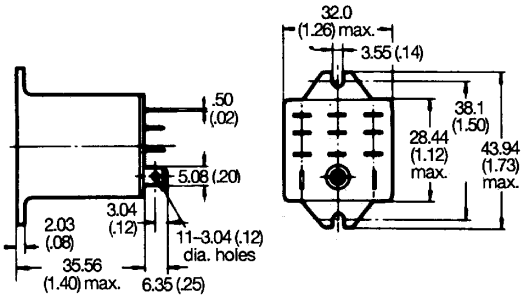
LY1F, LY2F



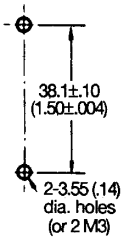
Mounting holes



LY3F

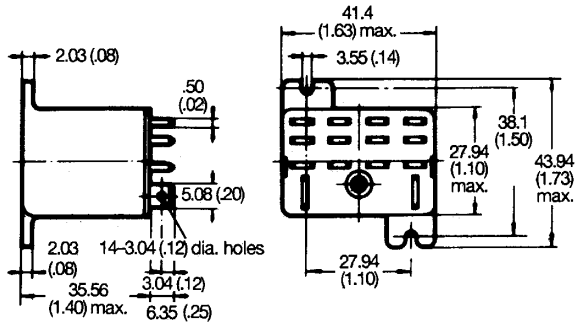


Mounting holes

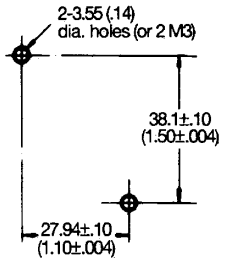


Note: The above drawing shows LY1F. With LY2F, dimension "*" should read as eight 3.05 mm (0.12 in) dia. holes.

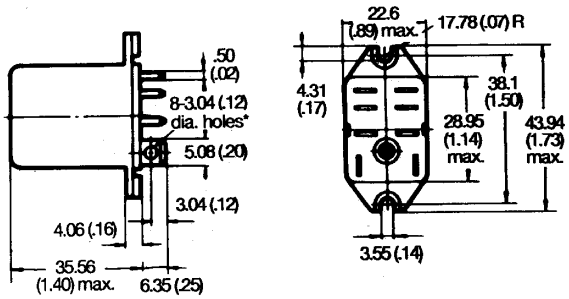
LY4F



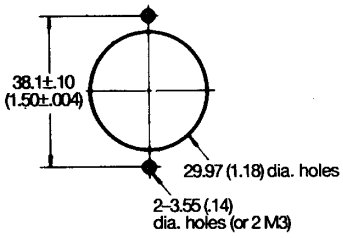
Mounting holes



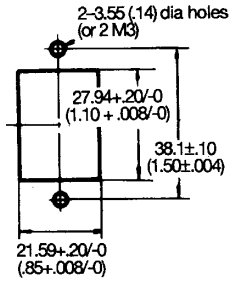
LY1S, LY2S



Round hole

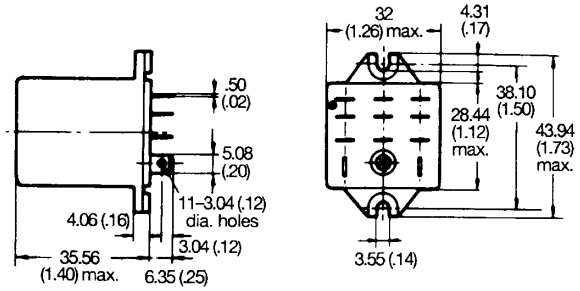


Rectangular hole

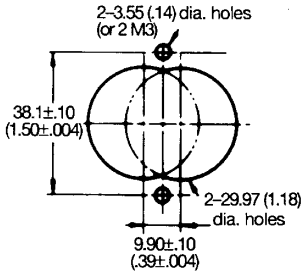


Note: The above drawing shows LY2S-US. With LY1S-US, dimension "*" should read as eight 2.03 mm (0.08 in) dia. holes.

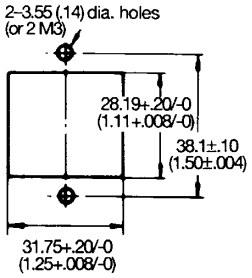
LY3S



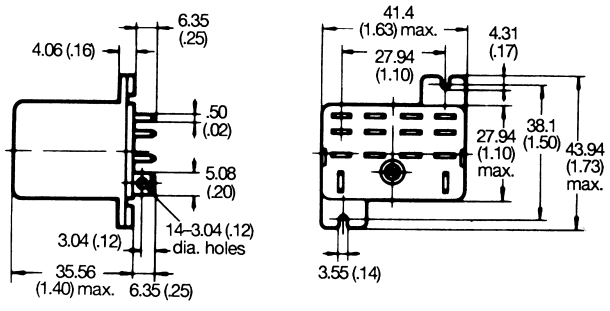
Round hole



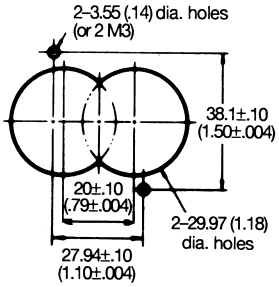
Rectangular hole



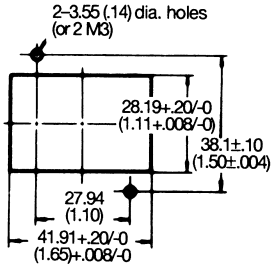
LY4S



Round hole



Rectangular hole



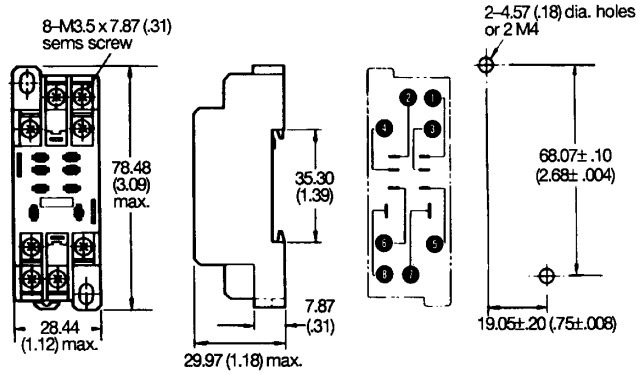
■ Accessories

Unit: mm (inch)

Track mounted sockets (UL File No. E87929) (CSA Report No. LR31928)

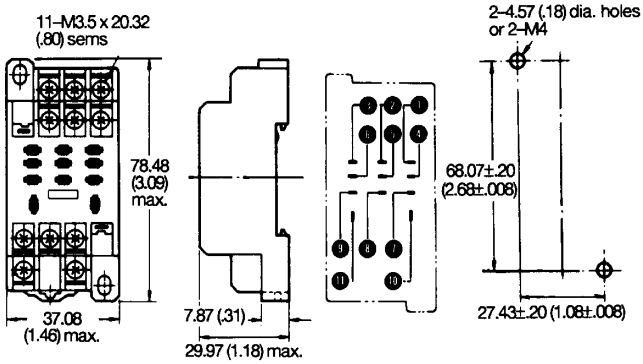
PTF08A
(see note 3)

Terminal arrangement/ mounting holes
(Top view)



PTF11A

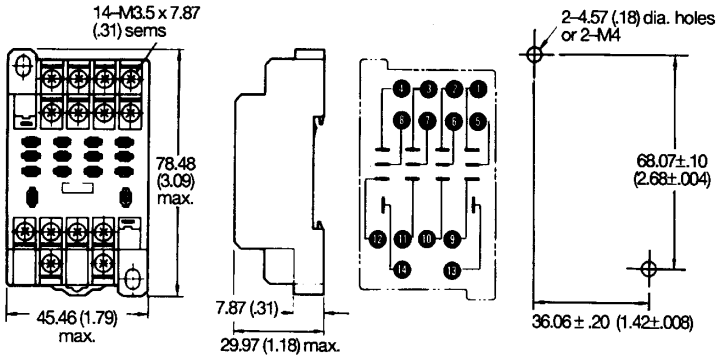
Terminal arrangement/ mounting holes
(Top view)



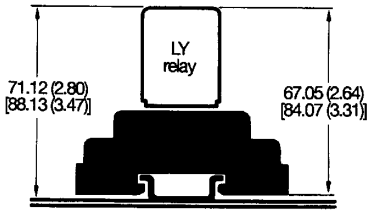
Track mounting sockets (UL File No. E87929) (CSA Report No. LR31928)

PTF14A
(see note 3)

Terminal arrangement/ mounting holes
(Top view)



Mounting height of relay with socket
(Applies to all PTF❑A sockets)

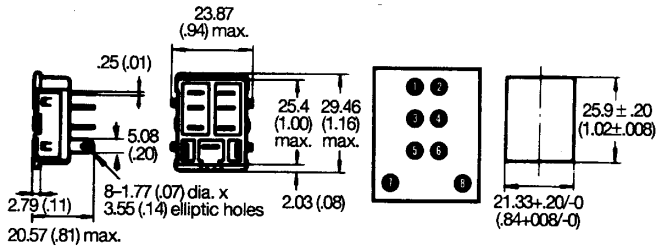


Note: 1. UL/CSA does not apply to wire wrap (Q) type sockets.
2. Values in brackets for LY❑CR.
3. PTF08A-E and PTF14A-E = touch safe screws. Height = 33 mm max.

Back connecting socket (UL File No. E87929) (CSA Report No. LR31928)

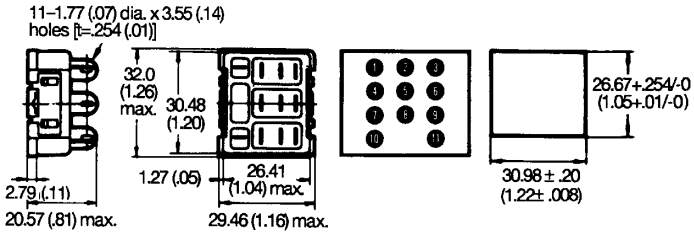
PT08

Terminal arrangement/
(Bottom view)



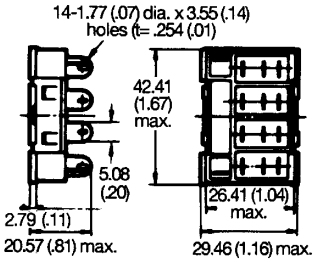
PT11

Terminal arrangement/
(Bottom view)

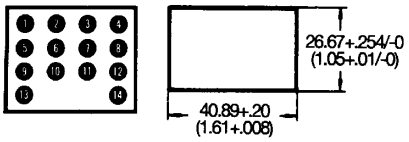


Back connecting socket (UL File No. E87929) (CSA Report No. LR31928)

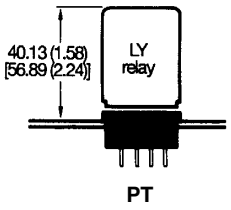
PT14



Terminal arrangement
(Bottom view)



Mounting height of relay with socket
(Applies to all PT sockets)



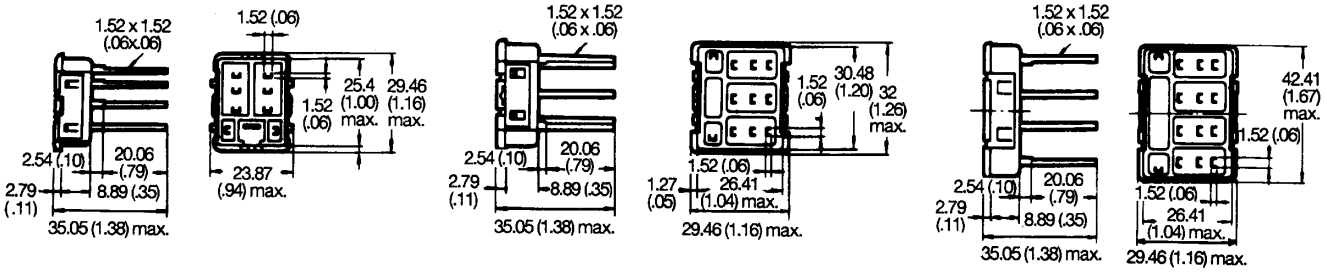
Note: Values in brackets for LY❑CR.

Back connecting socket (UL File No. E87929) (CSA Report No. LR31928)

PT08QN
Panel cut-out and terminal arrangement are the same as Type PT08.

PT11QN
Panel cut-out and terminal arrangement are the same as Type PT11.

PT14QN
Panel cut-out and terminal arrangement are the same as Type PT14.



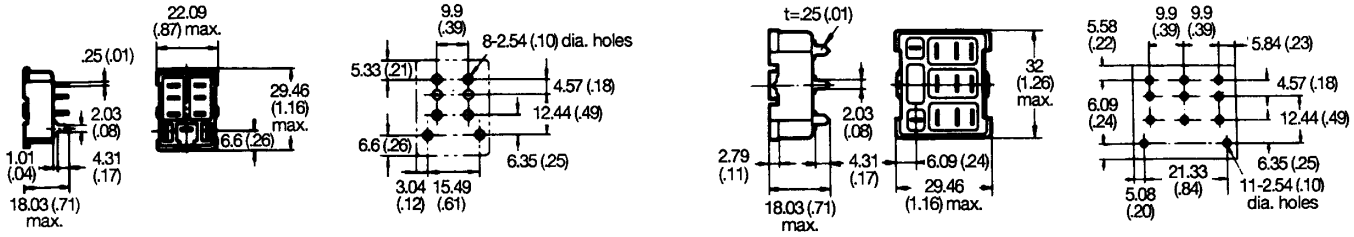
Back connecting socket (UL File No. E87929) (CSA Report No. LR31928)

PT08-0
Terminal arrangement is the same as Type PT08.

Mounting holes
(Bottom view)

PT11-0
Terminal arrangement is the same as Type PT11.

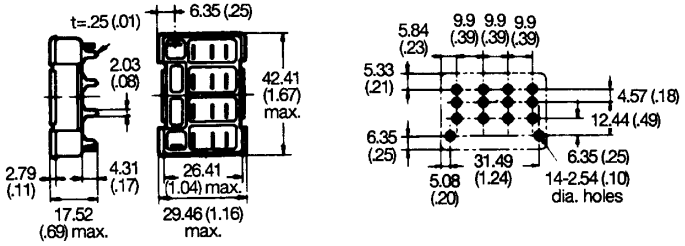
Mounting holes
(Bottom view)



Back connecting socket (UL File No. E87929) (CSA Report No. LR31928)

PT14-0
Terminal arrangement is the same as Type PT14.

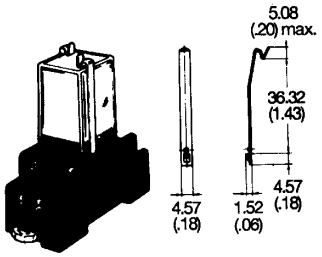
Mounting holes
(Bottom view)



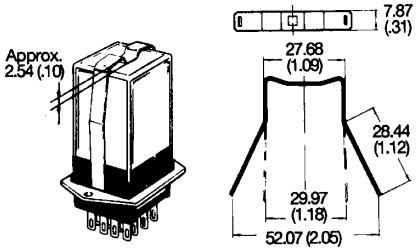
Unit: mm (inch)

Relay hold-down clips

PYC-A1
For PTF❑A socket

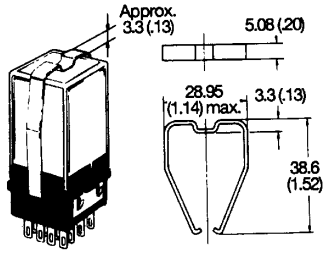


PYC-S
For relay mounting plates
(Applicable to Type PYP-1 and PYP-18 socket mounting plates only.)



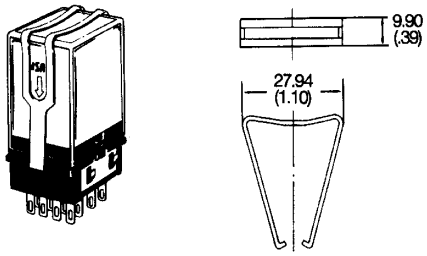
(Applicable to Type PYP-1 and PYP-18 socket mounting plates only.)

PYC-P
For PT❑ socket

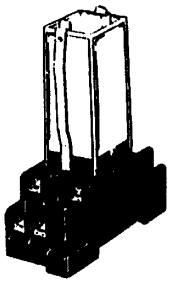


Relay hold-down clips

PYC-P2
For push-to-test button type with PT❑ socket



Y92H-3
For RC circuit type

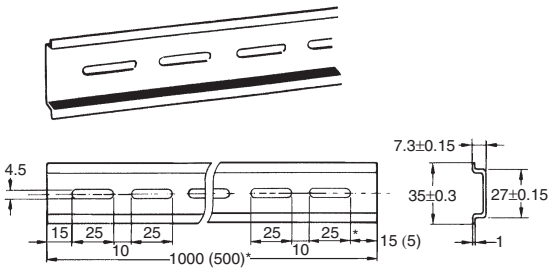


PYC-1
For RC circuit type

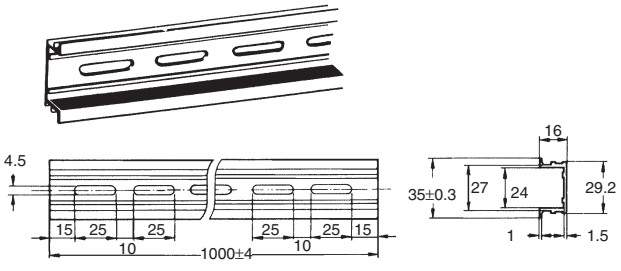


Mounting track/end plate/spacer

PFP-100N, PFP-50N
(Conforming to EN 50022)



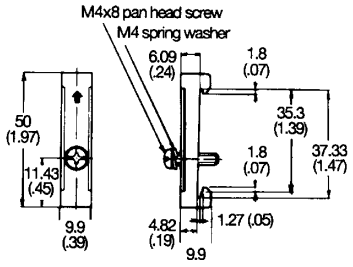
PFP-100N2
(Conforming to EN 50022)



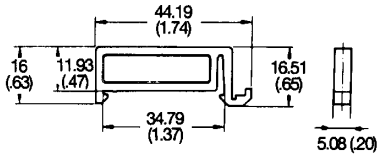
* The figure in parenthesis is for PFP-50N.

*This dimension is 14.99 mm (0.59 in) on both ends in the case of PFP-100N, but on one end in the case of PFP-50N.
** L = Length
PFP-50N L = 497.84 mm (19.60 in)
PFP-100N L = 990.60 mm (39.00 in)
PFP-100N2 L = 990.60 mm (39.00 in)
***A total of twelve 24.89 x 4.57 mm (0.98 x 0.18 in) elliptic holes are provided, with six holes cut from each end of the track at a pitch of 9.91 (0.39) between holes.

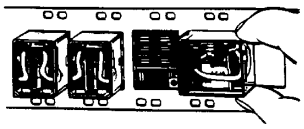
PFP-M end plate



PFP-S spacer

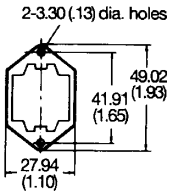


Socket mounting plates [t=1.52 (.06)]

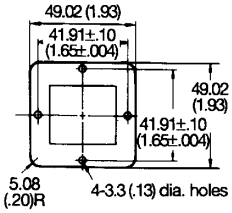


	Number of socket specs.			
Socket needed	1	10	12	18
PT08, PT08QN	PYP-1	–	–	PYP-18
PT11, PT11QN	PTP-1-3	–	PTP-1-2	–
PT14, PT14QN	PTP-1	PTP-10	–	–
PTP-10	PTP-12			

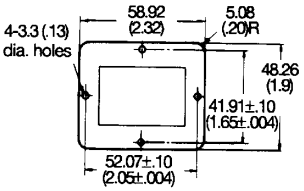
PYP-1



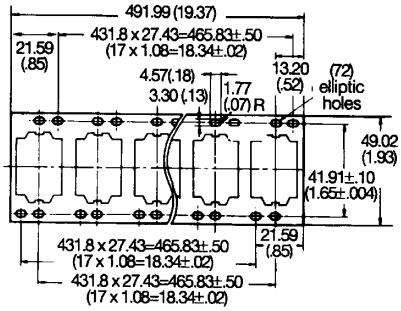
PTP-1-3



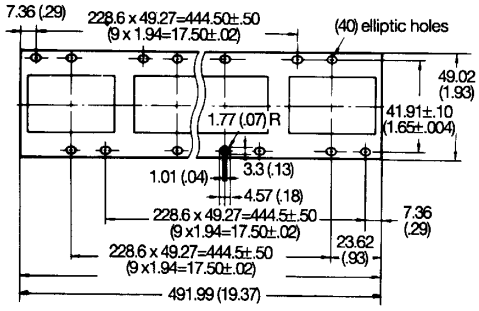
PTP-1



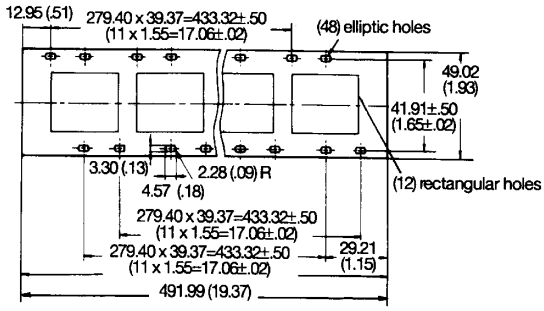
PYP-18



PTP-10



PTP-12



■ Relay Options

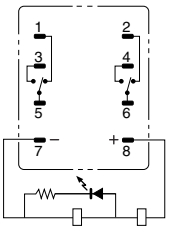
LED Indicator

Specifications and dimensions same as the Standard Type with the following exception. With the LED indicator type, the rated current is approximately 0 to 5.0 mA higher than the Standard Type.

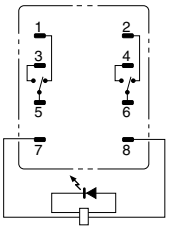
Terminal arrangement/Internal connections (Bottom view)

LY2N

DC coil rating type



AC coil rating type

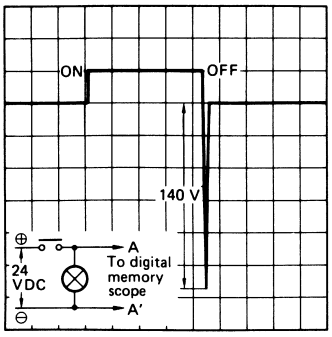


Note: 1. The coil terminals 10 and 11 of Type LY3N become (-) and (+) and terminals 13 and 14 of Type LY4N become (-) and (+), respectively.
2. Pay special attention to the polarities when using the DC type.

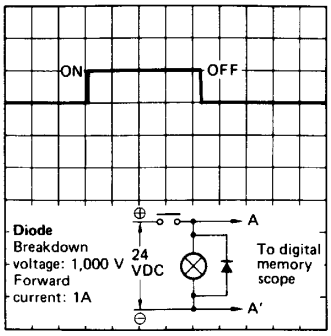
Diode Surge Suppression

Specifications and dimensions same as the Standard Type with the following exception. Ambient operating temperature: -25° to 40°C (-13° to 104°F)

Without Diode



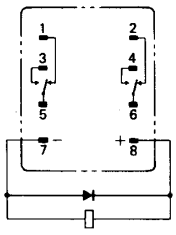
With Diode



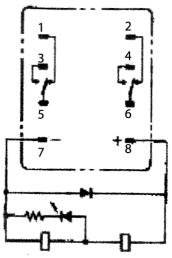
Terminal arrangement/Internal connections (Bottom view)

LY2(N)-D(2)

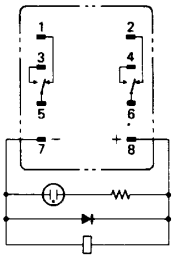
LY2-D
6, 12, 24, 48
100/110 VDC



LY2N-D2
6, 12, 24, 48 VDC



LY2N-D2
100/110 VDC



Note: 1. Pay special attention to the polarities when using the DC type.
2. The release time is somewhat longer, but satisfies the standard specifications of 25 ms.
3. The reverse-breakdown voltage of the diode is 1,000 VDC.
4. Available on DC versions only.

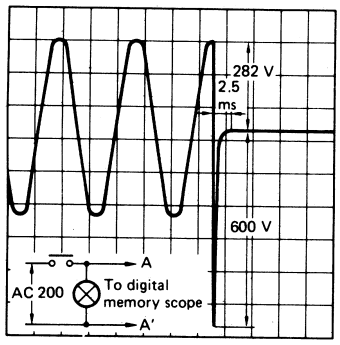
■ Relay Options

RC Circuit

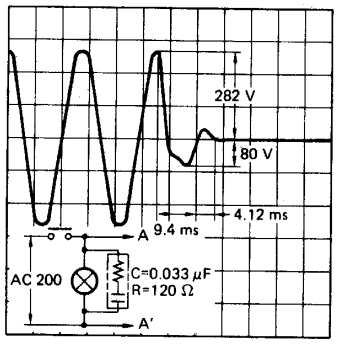
Specifications and dimensions same as the Standard Type with the following exceptions.

Characteristic Data

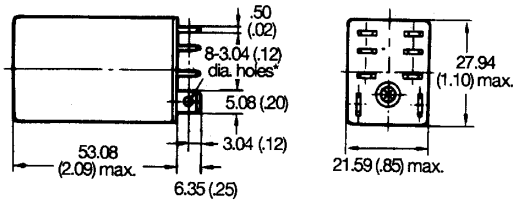
Without RC circuit



With RC circuit

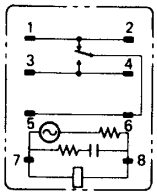


LY1-CR, LY2(Z)-CR

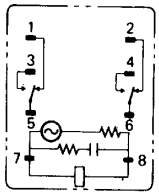


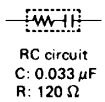
Terminal arrangement/Internal connections (Bottom view)

LY1-CR



LY2(Z)-CR



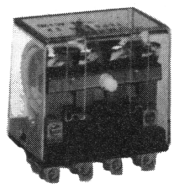


Note: 1. The above drawing shows LY2(Z)-CR. With LY1-CR, "*" should read eight 2.03 mm (0.08 in) dia. holes.
2. Available on AC versions only.

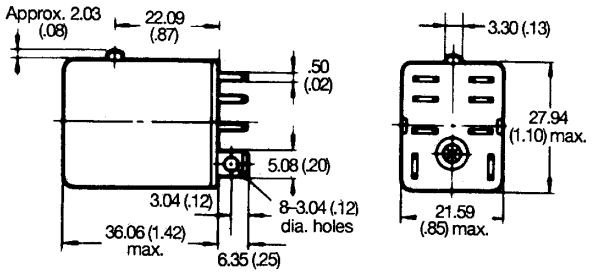
Push-to-test Button

Specifications and dimensions same as the Standard Type with the following exceptions.

LY❑I2

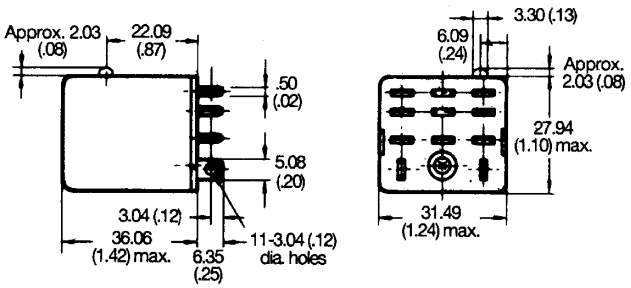


LY1I2, LY2I2

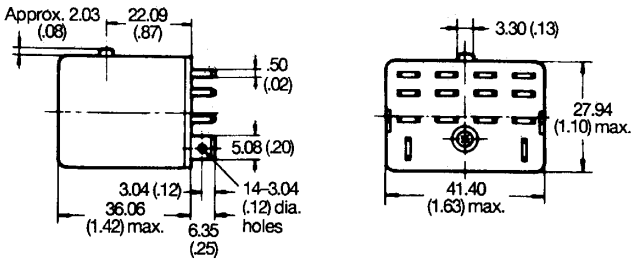


Note: Type LY1I2 has the same dimensions and appearances as Type LY2I2 shown except that dimensions "*" is 2.03 mm (0.08 in) dia. holes.

LY3I2



LY4I2



■ Approvals

UL Recognized Type (File No. E41643)

Type	Contact form	Coil ratings	Contact ratings	Number of test operations
LY1❑	SPDT	6 to 240 VAC 6 to 120 VDC	15A, 30VDC (Resistive), 40°C	6 x 10^3
			15A, 240VAC (General use), 40°C	
			TV-5, 120VAC, 40°C	25 x 10^3
			1/2HP, 120VAC, 50°C	
LY2❑	DPDT		15A, 28VDC (Resistive), 40°C	6 x 10^3
			15A, 120VAC (Resistive), 40°C	
			12A, 240VAC (General use), 40°C	
			1/2HP, 120VAC, 50°C	25 x 10^3
			TV-3, 120VAC, 40°C	
LY3❑ LY4❑	3PDT 4PDT		10A, 30VDC (Resistive), 40°C (Same polarity)	6 x 10^3
			10A, 240VAC (General use), 40°C (Same polarity)	
			1/2HP, 240VAC, 40°C	
LY2Z❑ (Bifurcated)	DPDT		7A, 240VAC (General use), 40°C	6 x 10^3
			7A, 28VDC (Resistive), 40°C	

CSA Certified Type (File No. LR31928)

Type	Contact form	Coil ratings	Contact ratings
LY1❑	SPDT	6 to 240 VAC 6 to 120 VDC	15 A, 120 VAC (Inductive)
			10 A, 240 VAC (Inductive)
			15 A, 28 VDC (Resistive)
			TV-5 (ACTV)
LY2❑	DPDT		13 A, 28 VDC (Resistive)
			12 A, 120 VAC (Inductive)
			10 A, 240 VAC (Inductive)
			1/3 HP, 120 VAC (Motor)
			TV-3 (ACTV)
LY3❑	3PDT		10 A, 240 VAC (Inductive)
LY3❑	4PDT		10 A, 28 VDC (Resistive)

VDE Approved Type (File No. 9903 [SPDT, DPDT & 3PDT], File No. 9947 [4PDT])

Type	Contact form	Coil ratings	Contact ratings
LY❑-VD	SPDT	6, 12, 24, 50, 110, 220 VAC and 6, 12, 24, 48, 110 VDC	10 A, 220 VAC (Resistive)
			10 A, 28 VDC (Resistive)
			7 A, 220 VAC (Inductive)
			7 A, 28 VDC (Inductive)
LY❑-VD	DPDT		7 A, 220 VAC (Resistive)
	3PDT		7 A, 28 VDC (Resistive)
	4PDT		4 A, 28 VDC and 4A, 220 VAC (Inductive)

LR (Lloyd's Register) Approved Type (File No. 562KOB-204523)

Type	Contact form	Coil ratings	Contact ratings
LY❑	DPDT	6 to 240 VAC	7.5 A, 230 VAC (Inductive)
	4PDT	6 to 110 VDC	5 A, 24 VDC (Inductive)

SEV Listed Type (File No. D7 91/82 [2- & 4-pole], D 91/204a [1- & 3-pole])

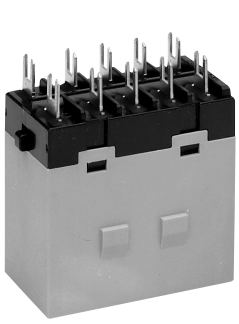
Type	Contact form	Coil ratings	Contact ratings
LY❑-SV	SPDT	6 to 240 VAC 6 to 110 VDC	15 A, 220 VAC (Resistive)
			15 A, 24 VDC (Resistive)
LY❑-SV	DPDT		10 A, 220 VAC (Resistive)
	3PDT		10 A, 24 VDC (Resistive)
	4PDT		

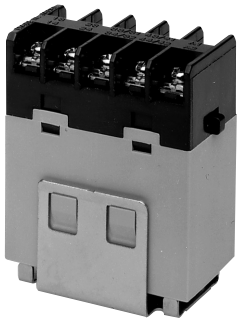
Note: 1. The rated values approved by each of the safety standards (e.g., UL, CSA, VDE, and SEV) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

General Purpose Relay
G7J

- Ideal for 3-phase motor control applications and resistive and inductive loads.
- No contact chattering for momentary voltage drops up to 50% of rated voltage.
- Withstands more than 4 kV between contacts that are of different polarity and between the coil and contacts.
- Flame-resistant materials (UL94V-0) used for all insulation.
- Push-to-test button on all models lets user check contact operation.
- Class B coil insulation available.





Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G7J-3A1B-B-*AC100/120)*.

Type	Contact form	Model		
		Quick-connect terminal	Screw terminal	PCB terminal
PCB mounting	4PST-NO	—	—	**G7J-4A-P**
	3PST-NO/SPST-NC	—	—	**G7J-3A1B-P**
	DPST-NO/DPST-NC	—	—	**G7J-2A2B-P**
W-bracket (see note)	4PST-NO	**G7J-4A-T**	**G7J-4A-B**	
	3PST-NO/SPST-NC	**G7J-3A1B-T**	**G7J-3A1B-B**	
	DPST-NO/DPST-NC	**G7J-2A2B-T**	**G7J-2A2B-B**	

Note: The G7J-B relays require a W-bracket for mounting. Order the bracket separately below. To order a relay and bracket packed together, add "-W1" to the part number before the coil voltage suffix. For example, G7J-2A2B-B-W1-AC100/120.

■ Accessories

Types	Applicable relays	Model
W-brackets	G7J-4A-B, G7J-3A1B-B, G7J-2A2B-B	**R99-04-FOR-G5F**

■ Typical Applications

Compressors for air conditioners and heater switching controllers.

Switching controllers for power tools or motors.

Lamp controls, motor drivers, and power supply switching controllers in copy machines, facsimile machines, and other office equipment.

Power controllers for packers or food processing equipment.

Power controllers for inverters.

Specifications

■ Contact Data

Load	Resistive load (p.f. = 1)	
	NO	NC
Rated load	25 A, 220 VAC (24 A, 230 VAC), 25 A, 30 VDC	8 A, 220 VAC (7.5 A, 230 VAC), 8 A, 30 VDC
Rated carry current	25 A	8 A
Max. switching voltage	250 VAC,125 VDC	
Max. switching current	25 A	8 A
Max. switching capacity	5,500 VA, 750 W DC	1,760 VA, 240 W DC
Min. permissible load	100 mA, 24 VDC at 120 operations/minute, 23°C (73°F) ambient temperature)	

■ Coil Data

AC

Coil voltage	Rated voltage (VAC)	Rated current (mA)	Coil resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption
				% of rated voltage			
24	24	75	—	75% max.	15% min.	110%	Approx.1.8 to 2.6 VA
50	50	36	—				
100/120	100 to 120	18 to 21.60	—	75 volts	18 volts	132 volts	
200/240	200 to 240	9 to 10.80	—	150 volts	36 volts	264 volts	

DC

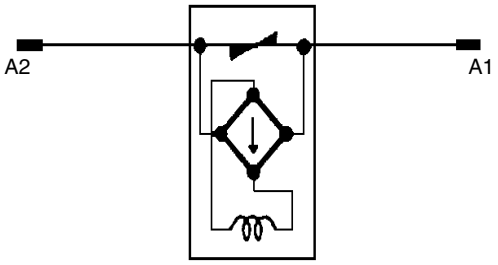
Coil voltage	Rated voltage (VDC)	Rated current (mA)	Coil resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption
				% of rated voltage			
12	12	167	72	75% max.	10% min.	110%	Approx. 2.0 W
24	24	83	288				
48	48	42	1150				
100	100	20	5000				
110	110	18	6050				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with tolerances of +15%/-20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C (73°F).

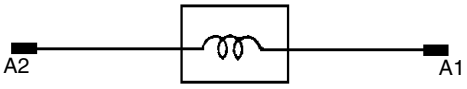
■ Coil Internal Circuit

AC operating coil

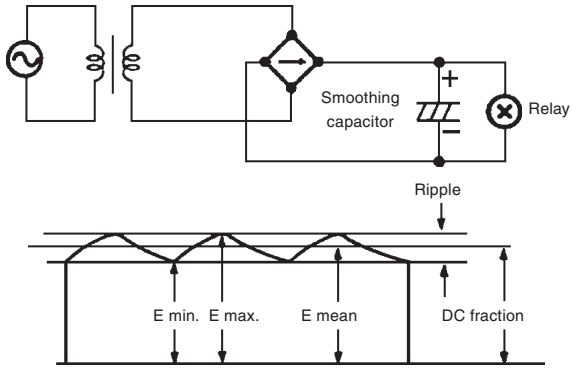


The G7J incorporates a bridge rectifier circuit in the AC coil versions that prevents contact chatter or dropout during a voltage drop. This circuit allows the relays to withstand, with no vibration or shock, voltage drops to the coil of up to 50% of the rated coil voltage for one second maximum.

DC operating coil



As a rule, either a DC battery or a DC power supply with a maximum of 5% ripple must be used for the operating voltage for DC relays. Before using a rectified AC supply, confirm that the ripple is not greater than 5%. Ripple greater than this can lead to variations in the operating and reset voltages. As excessive ripple can generate pulses, the insertion of a smoothing capacitor is recommended as shown below.



$$\% \text{ of ripple} = \frac{E_{max.} - E_{min.}}{E_{mean}} \times 100$$

E max.:Maximum ripple
E min.:Minimum ripple
E mean:Mean DC voltage value

When driving the coil with a transistor, check the leakage current and connect a bleeder resistor if necessary.

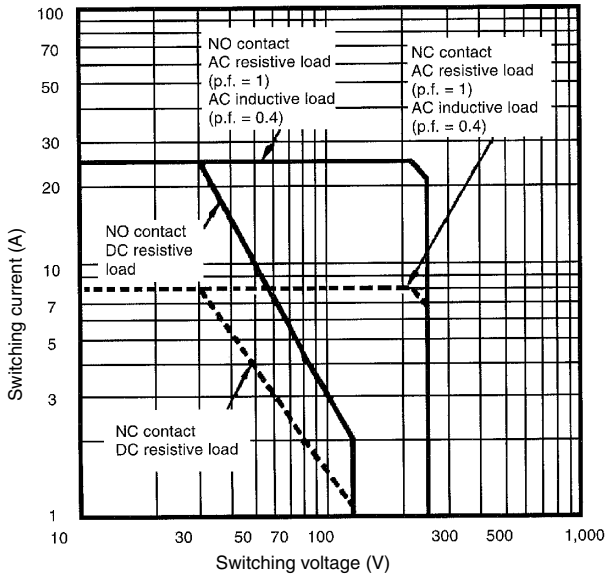
■ Characteristics

Contact resistance		50 mΩ max.
Operating time		50 ms max.
Release time		50 ms max.
Operating frequency	**Mechanical**	1,800 operations/hour max.
	Electrical	1,800 operations/hour max.
Insulation resistance		1,000 MΩ minimum at 500 VDC
Dielectric strength		4,000 VAC, 50/60 Hz for 1 minute between coil and contacts
		4,000 VAC, 50/60 Hz for 1 minute between contacts of different polarity
		2,000 VAC, 50/60 Hz for 1 minute between contacts of the same polarity
Impulse withstand voltage		10,000 V between coil and contact with 1.2 x 50 μs impulse wave
Vibration	**Mechanical durability**	10 to 55 Hz, 1.50 mm (0.06 in) double amplitude
	Malfunction durability	NO: 10 to 55 Hz, 1.50 mm (0.06 in) double amplitude
		NC: 10 to 26 Hz, 1.50 mm (0.06 in) double amplitude
Shock	**Mechanical durability**	1000 m/s^2 (Approx. 100 G)
	Malfunction durability	NO: 100 m/s^2 (Approx. 10 G)
		NC: 20 m/s^2 (Approx. 2 G)
Service life	**Mechanical**	1 million operations minimum at 1,800 operations/hour
	Electrical	100,000 operations minimum at 1,800 operations/hour at rated load
Ambient temperature	**Operating**	-25° to 60°C (-13° to 140°F) with no icing
Humidity	**Operating**	35% to 85% RH
Weight	**PCB terminal**	Approx. 140 g (4.90 oz.)
	Screw terminal	Approx. 165 g (5.80 oz.)

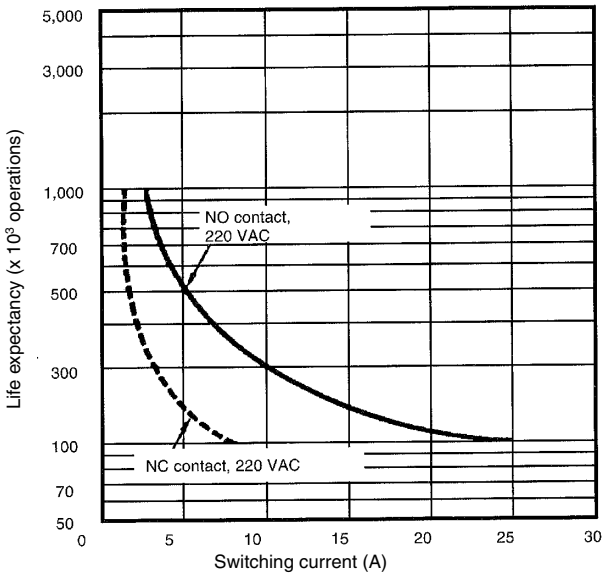
Note: Data shown are of initial value.

■ Characteristic Data

Maximum switching capacity



Electrical service life

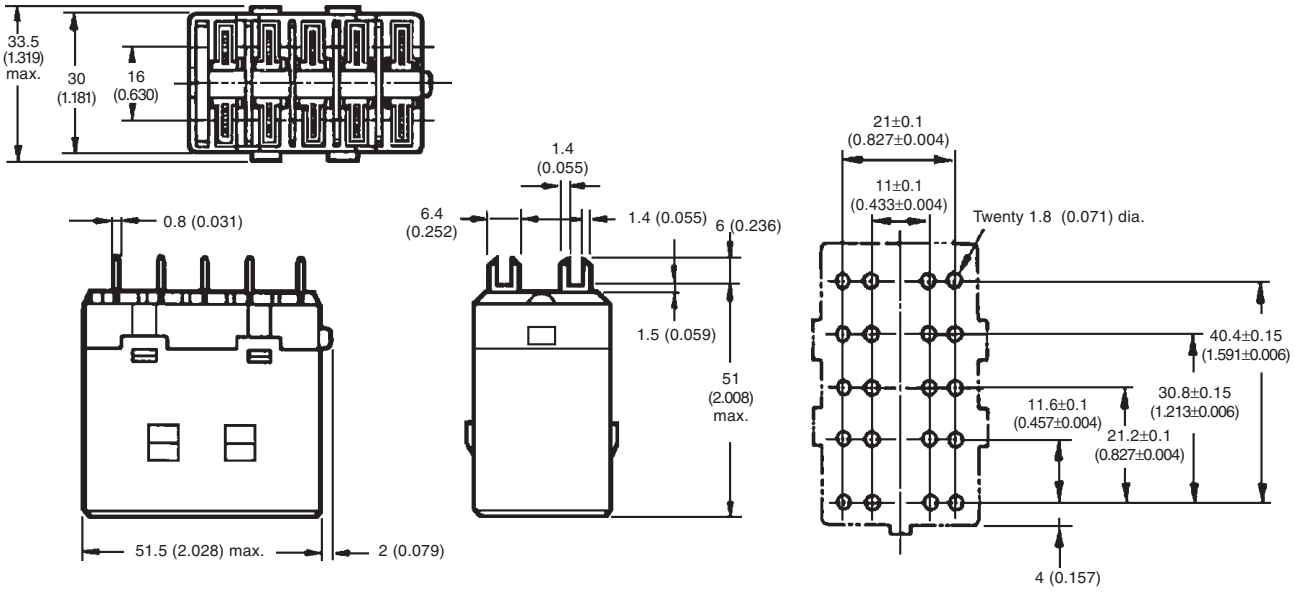


Dimensions

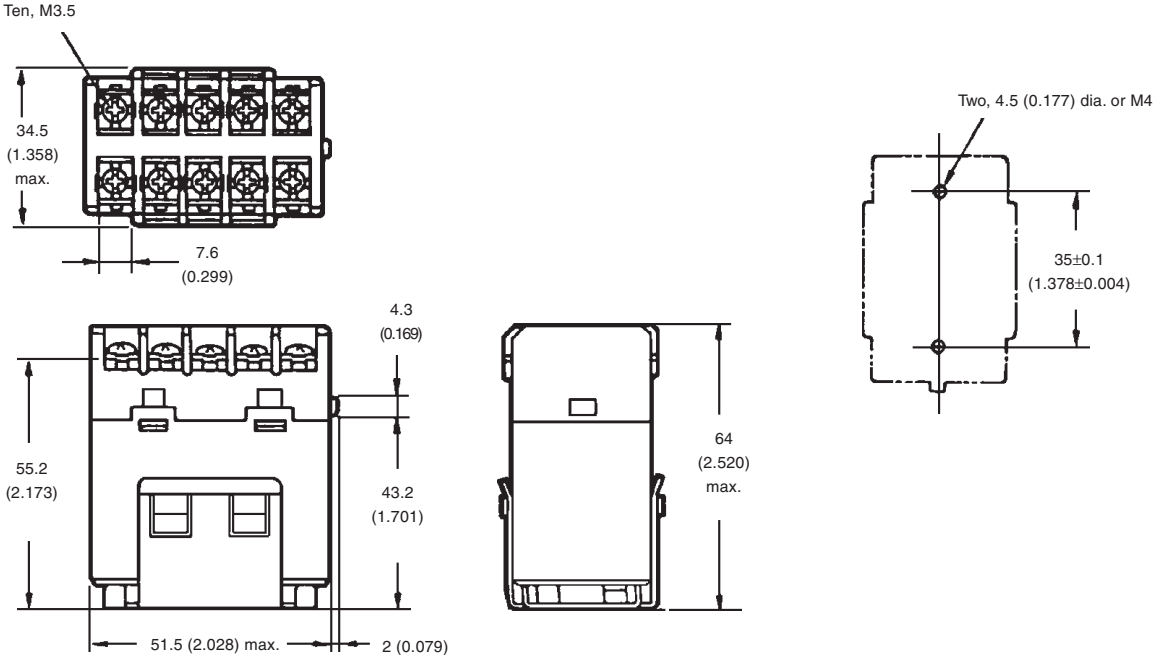
Unit: mm (inch)

■ Relays

PCB Terminals with PCB Mounting
G7J-4A-P, G7J-3A1B-P, G7J-2A2B-P

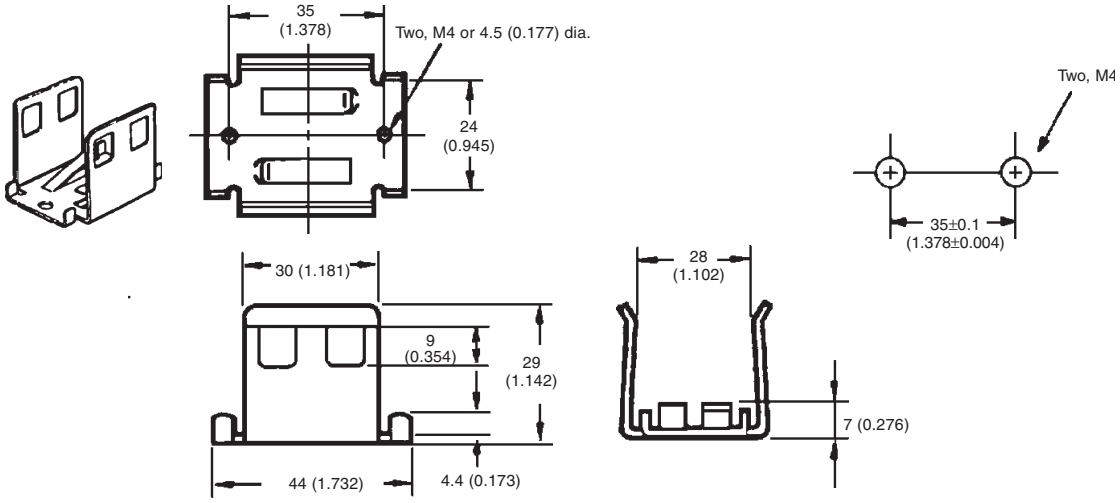


Screw Terminals (requires W-bracket for mounting)
G7J-4A-B, G7J-3A1B-B, G7J-2A2B-B



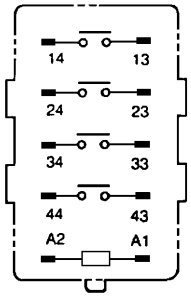
■ Accessories

W-Bracket for G7J-B Relays with Screw Terminals
R99-04-FOR-G5F

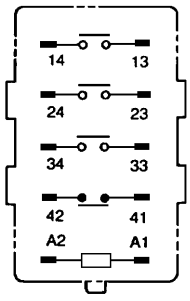


■ Terminal Arrangement – Internal Connections

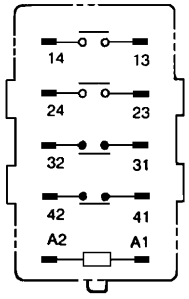
G7J-4A-P(B)



G7J-3A1B-P(B)



G7J-2A2B-P(B)



■ Approvals

UL Recognized (File No. E41643) / CSA Certified (File No. LR 35535) - - Ambient Temp = 40°C

Contact arrangement	Load type	Contact ratings
Normally Open	Resistive	25 A, 277 VAC, 30,000 cycles
		25 A, 30 VDC, 30,000
	General use	25 A, 120 VAC, 30,000 cycles
		25 A, 277 VAC, 30,000 cycles
		25 A, 240 VAC, 100,000 cycles
	Tungsten	1.5 kW, 120 VAC
	Motor load	1.5 HP, 120 VAC
		3 HP, 240/265/277 VAC
		3-phase, 3 hp, 240/265/277 VAC, 30,000 cycles
		3-phase, 5 hp, 240/ 265/277 VAC, 30,000 cycles
		20 FLA/120 LRA, 120 VAC, 30,000 cycles
		17 FLA/102 LRA, 277 VAC, 30,000 cycles
	TV	TV-10, 120 VAC
Normally Closed	Resistive	8 A, 277 VAC, 30,000 cycles
		8 A, 30 VDC, 30,000 cycles
	General use	8 A, 120 VAC, 30,000 cycles
		8 A, 277 VAC, 30,000 cycles

Note: 1. The rated values approved by each of the safety standards may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change without notice.

Precautions

■ Handling

- To preserve performance, do not drop or otherwise subject the G7J relay to shock.
- The case is not designated to be removed during normal handling and operation. Doing so may affect performance.
- Use the power relay in a dry environment free from excessive dust, SO_2, H_2S, or organic gas.
- Do not allow a voltage greater than the maximum allowable coil voltage to be applied continuously.
- Do not use the relay outside of specified voltages and currents.
- Do not allow the ambient operation temperature to exceed the specified limit.

■ Installation

Although there are not specific limits on the installation site, it should be as dry and dust-free as possible.

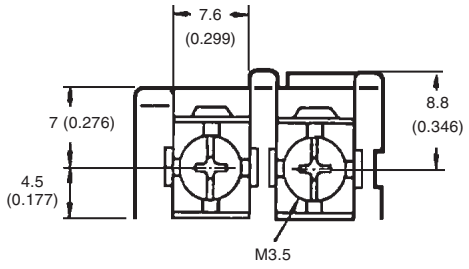
PCB terminal-equipped relays weigh approximately 140 g. Be sure that the PCB is strong enough to support them. OMRON recommends dual-side through-hole PCBs to reduce solder cracking from heat stress.

■ Cleaning PCB Terminals

PCB terminals have semi-sealed construction which prevents flux from penetrating into the relay base housing due to capillary action. This type of relay cannot be immersed for cleaning.

■ Connection

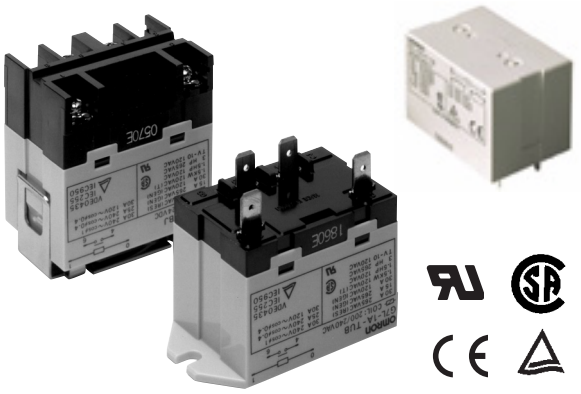
Refer to the diagram below when connecting a wire to the screw terminals on G7J.



Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force. Maximum tightening torque is 10 kgf-cm (0.72 ft-lbs).

General Purpose Relay
G7L

- Ideally suited for high-inrush fluid pump controls: pool/spa, water processing, emergency, chemical industry, etc.
- High-capacity, high-withstand voltage relay with no contact chattering for momentary voltage drops up to 50% of rated voltage.
- UL Class B construction standard.
- Wide-range AC-activated coil that handles 100 to 120 VAC at either 50 or 60 Hz.
- Miniature hinge for maximum switching capacity, particularly for inductive loads.
- Flame resistant materials (UL94V-0-qualifying) used for all insulation material.
- Quick-connect, screw, and PCB terminals available.
- Standard models are UL, CSA, and TUV approved; VDE/IEC 950 versions are now available. Meet pollution degree 3, Material Group II & III.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating (e.g., G7L-1A-T-CB-*AC100/120*).

Type	Contact form	Model		
		Quick-connect terminal	Screw terminal	PCB terminal
E bracket (see note 1)	SPST-NO	**G7L-1A-T-CB**	**G7L-1A-B-CB**	**—**
	DPST-NO	**G7L-2A-T-CB**	**G7L-2A-B-CB**	**—**
E bracket (see note 1) (with test button)	SPST-NO	**G7L-1A-TJ-CB**	**G7L-1A-BJ-CB**	**—**
	DPST-NO	**G7L-2A-TJ-CB**	**G7L-2A-BJ-CB**	**—**
Upper bracket	SPST-NO	**G7L-1A-TUB-CB**	**G7L-1A-BUB-CB**	**—**
	DPST-NO	**G7L-2A-TUB-CB**	**G7L-2A-BUB-CB**	**—**
Upper bracket (with test button)	SPST-NO	**G7L-1A-TUBJ-CB**	**G7L-1A-BUBJ-CB**	**—**
	DPST-NO	**G7L-2A-TUBJ-CB**	**G7L-2A-BUBJ-CB**	**—**
PCB mounting	SPST-NO	**—**	**—**	**G7L-1A-P-CB**
	DPST-NO	**—**	**—**	**G7L-2A-P-CB**

Note: 1. E bracket or socket must be used for mounting (part number R99-07G5D). Refer to “Accessories” section for options and part numbers.
2. For VDE approved versions, please consult OMRON.

■ Model Number Legend

G7L-❑ ❑ - ❑ ❑ ❑ ❑
1 2 3 4 5 6

1. Contact form
1A:SPST-NO
2A:DPST-NO

2. Terminal shape
T:Quick-connect terminals
P:PCB terminals
B:Screw terminals

3. Mounting construction
No symbol:E bracket type
UB:Upper bracket type

4. Special functions
No symbol:Without test button
J:With test button

5. 80: VDE approved version
(includes UL, CSA and TÜV)

6. CB: Class B insulation

7. Rated coil voltage

■ Accessories

Quick-connect Terminals

Description	Model				Model
	Contact form				
	SPST-NO		DPST-NO		
E-brackets	G7L-1A-T	G7L-1A-TJ	G7L-2A-T	G7L-2A-TJ	**R99-07G5D**
Track mounting adaptor					**P7LF-D**
Front connecting socket					**P7LF-06**
Cover					**P7LF-C**

Note: P7LF-C cover is supplied with the P7LF-06 socket.

Screw Terminals

Description	Model				Model
	Contact form				
	SPST-NO		DPST-NO		
E-brackets	G7L-1A-B	G7L-1A-BJ	G7L-2A-B	G7L-2A-BJ	**R99-07G5D**
Track mounting adaptor					**P7LF-D**

Specifications

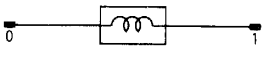
■ Contact Data

Load	G7L-1A-T, G7L-1A-B		G7L-2A-T, G7L-2A-B		G7L-1A-P, G7L-2A-P	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Rated load	30 A, 220 VAC	25 A, 220 VAC			20 A, 220 VAC	
Contact material	AgSnIn					
Carry current	30 A		25 A		20 A	
Max. operating voltage	250 VAC					
Max. operating current	30 A		25 A		20 A	
Max. switching capacity	6,600 VA	5,500 VA			4,400 VA	
Min. permissible load	100 mA, 5 VDC (please inquire for lower minimum rating)					

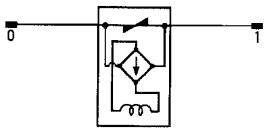
Note: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operation.

■ Coil Internal Circuit

DC operating coil



AC operating coil



■ Coil Data

AC

Rated voltage (V)	Rated current (mA)	Resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption
			% of rated voltage			
6	283	18.90	75% max.	15% min.	110% max.	Approx.1.70 to 2.50 VA
12	142	75				
24	71	303				
50	34	1,310				
100/120	17.00/20.40	5,260	75 volts	18 volts	132 volts	
200/240	8.50/10.20	21,000	150 volts	36 volts	264 volts	

DC

Rated voltage (V)	Rated current (mA)	Resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption
			% of rated voltage			
6	317	18.90	75% max.	15% min.	110% max.	Approx.1.90 W
12	158	75				
24	79	303				
48	40	1,220				
100	19	5,260				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C (73°F) with tolerances of +15%/-20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C (73°F).

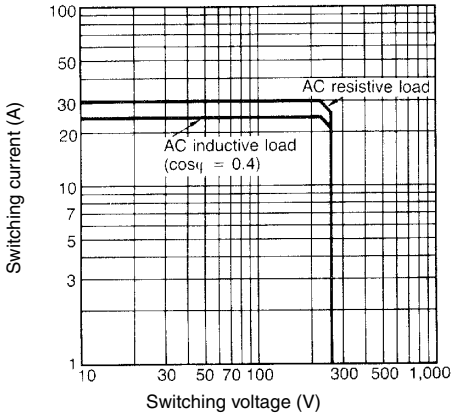
■ Characteristics

Contact resistance		50 mΩ max.
Operate time		30 ms max.
Release time		30 ms max.
Max. operating frequency	**Mechanical**	1,800 operations/hour
	Electrical	1,800 operations/hour (under rated load)
Insulation resistance		1,000 MΩ min. (at 500 VDC)
Dielectric strength		4,000 VAC, min./5,000 VAC typical, 50/60 Hz for 1 minute between coil and contacts
		2,000 VAC, 50/60 Hz for 1 minute between contacts of same pole
		2,000 VAC, 50/60 Hz for 1 minute between contacts of different poles (DPST-NO type)
Impulse withstand voltage		Between coil and contact: 10,000 V min./12,000 V typ. (impulse wave used: 1.20 x 50 μs)
Vibration	**Mechanical durability**	10 to 55 Hz; 1.50 mm (0.06 in) double amplitude
	Malfunction durability	10 to 55 Hz; 1.50 mm (0.06 in) double amplitude
Shock	**Mechanical durability**	1,000 m/s^2 (approx. 100 G)
	Malfunction durability	1,000 m/s^2 (approx.10 G)
Life expectancy	**Mechanical**	1,000,000 operations min. (at 1,800 operations/hour)
	Electrical	100,000 operations min. (at 1,800 operations/hour under rated load 250,000 ops typical)
Ambient temperature		-25° to 60°C (-13° to 140°F)
Humidity		35% to 85% RH
Weight		Quick-connect terminal type: approx. 90 g (3.17 oz)
		PCB terminal type: approx. 100 g (3.52 oz)
		Screw terminal type: approx. 120 g (4.23 oz)

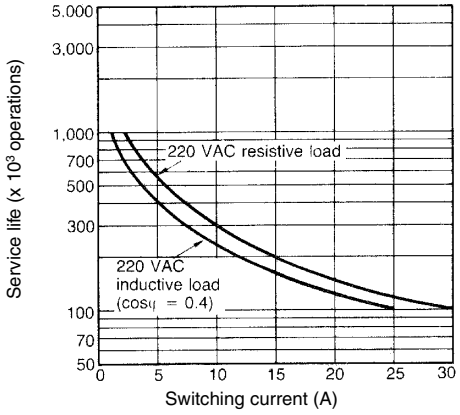
Note: Data shown are of initial value.

■ Characteristic Data

Maximum switching capacity



Electrical service life

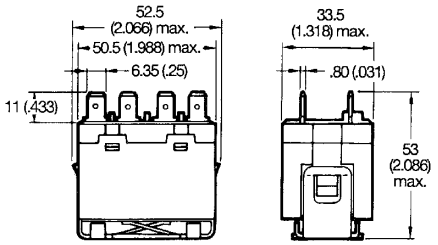


Dimensions

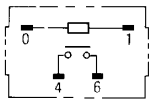
Unit: mm (inch)

■ Relays

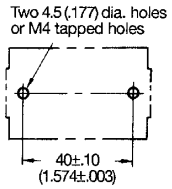
G7L-1A-T
(E Bracket Attached)*



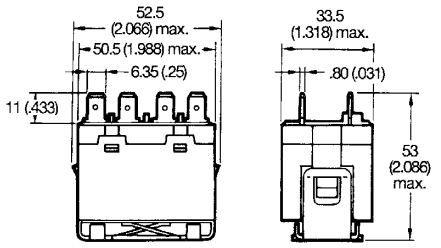
Terminal arrangement/
Internal connections
(Top view)



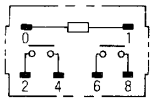
Mounting holes
(Bottom view)



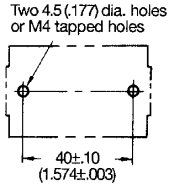
G7L-2A-T
(E Bracket Attached)*



Terminal arrangement/
Internal connections
(Top view)

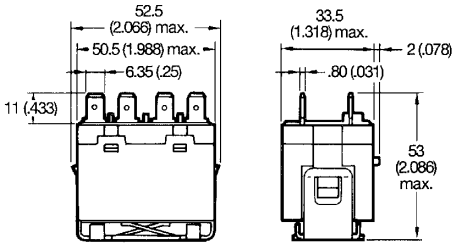


Mounting holes
(Bottom view)

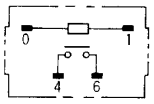


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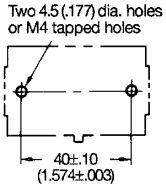
G7L-1A-TJ
(E Bracket Attached)*



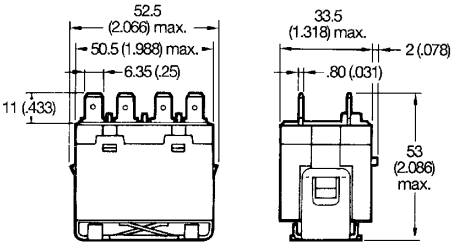
Terminal arrangement/
Internal connections
(Top view)



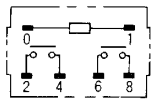
Mounting holes
(Bottom view)



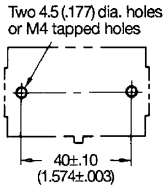
G7L-2A-TJ
(E Bracket Attached)*



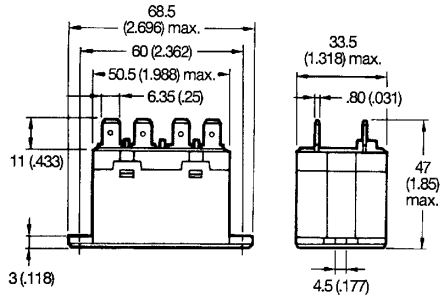
Terminal arrangement/
Internal connections
(Top view)



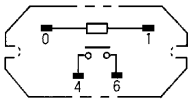
Mounting holes
(Bottom view)



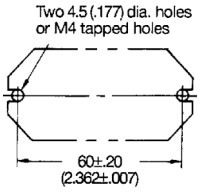
G7L-1A-TUB



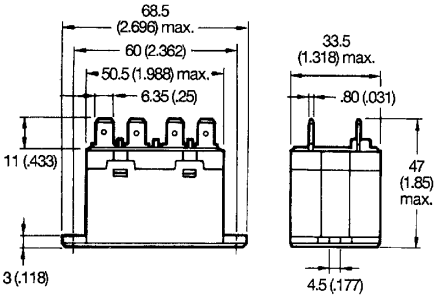
Terminal arrangement/
Internal connections
(Top view)



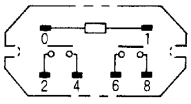
Mounting holes
(Bottom view)



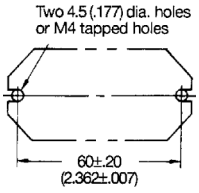
G7L-2A-TUB



Terminal arrangement/
Internal connections
(Top view)



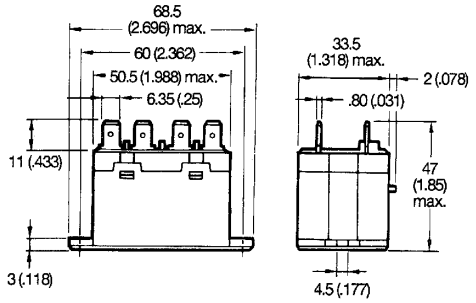
Mounting holes
(Bottom view)



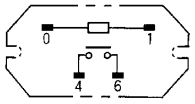
*E bracket must be ordered separately.

Unit: mm (inch)

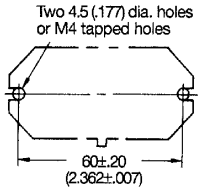
G7L-1A-TUBJ



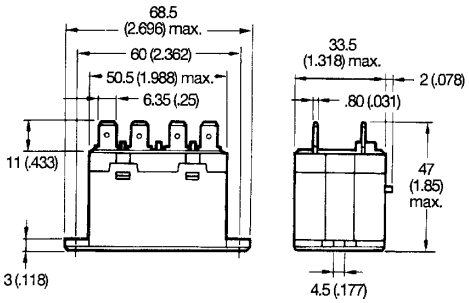
Terminal arrangement/ Internal connections (Top view)



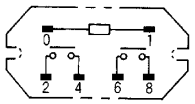
Mounting holes (Bottom view)



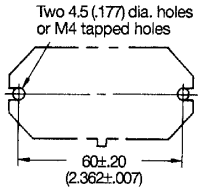
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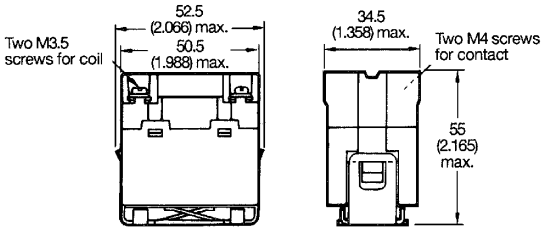
Terminal arrangement/ Internal connections (Top view)



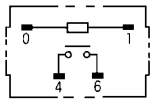
Mounting holes (Bottom view)



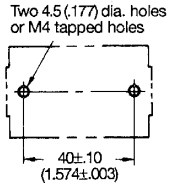
G7L-1A-B
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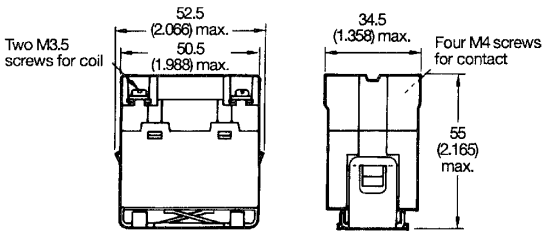
Terminal arrangement/ Internal connections (Top view)



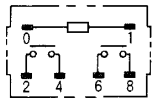
Mounting holes (Bottom view)



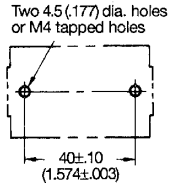
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Terminal arrangement/ Internal connections (Top view)

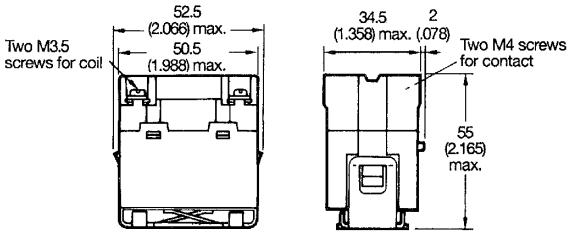


Mounting holes (Bottom view)

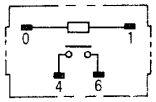


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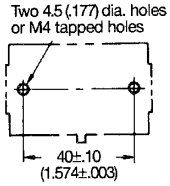
G7L-1A-BJ
(E bracket Attached)*



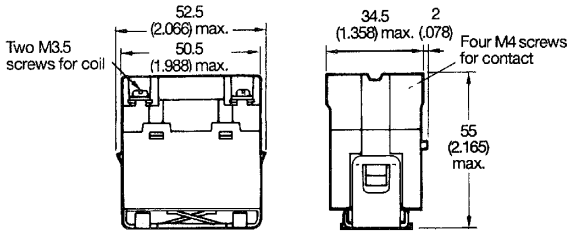
Terminal arrangement/
Internal connections
(Top view)



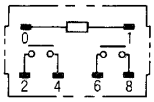
Mounting holes
(Bottom view)



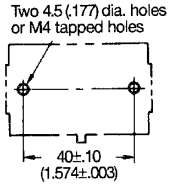
G7L-2A-BJ
(E bracket Attached)*



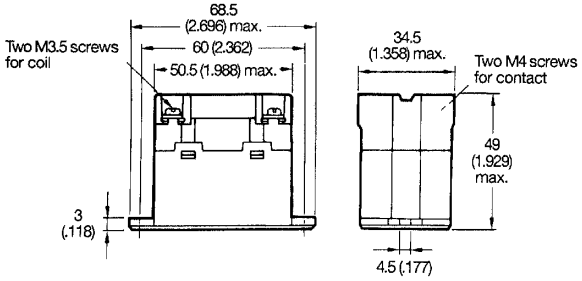
Terminal arrangement/
Internal connections
(Top view)



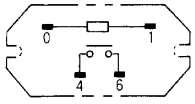
Mounting holes
(Bottom view)



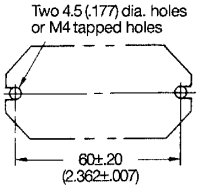
G7L-1A-BUB



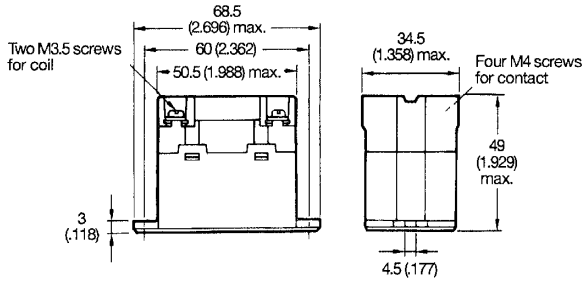
Terminal arrangement/
Internal connections
(Top view)



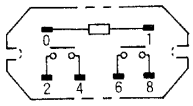
Mounting holes
(Bottom view)



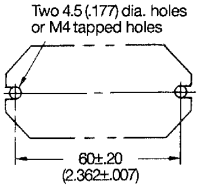
G7L-2A-BUB



Terminal arrangement/
Internal connections
(Top view)



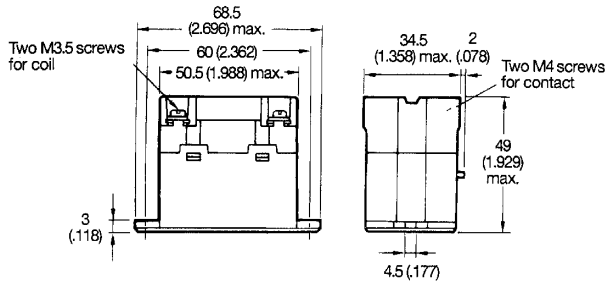
Mounting holes
(Bottom view)



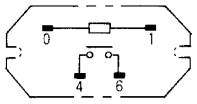
* E bracket must be ordered separately.

Unit: mm (inch)

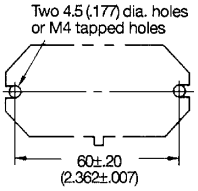
G7L-1A-BUBJ



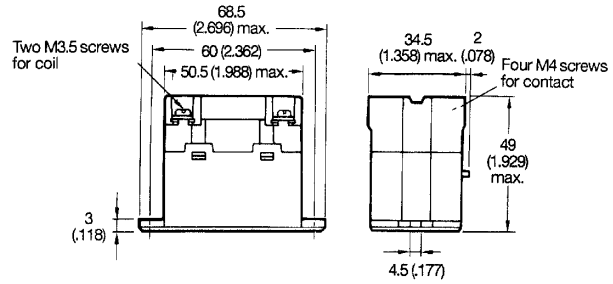
Terminal arrangement/ Internal connections
(Top view)



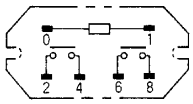
Mounting holes
(Bottom view)



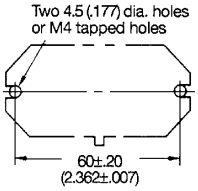
G7L-2A-BUBJ



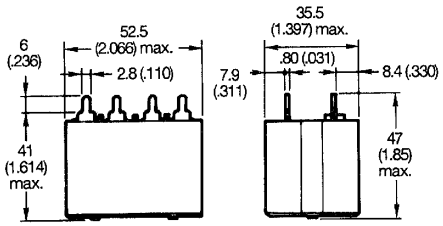
Terminal arrangement/ Internal connections
(Top view)



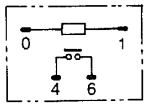
Mounting holes
(Bottom view)



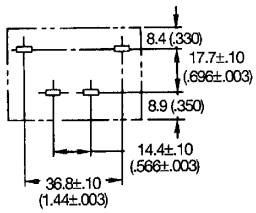
G7L-1A-P



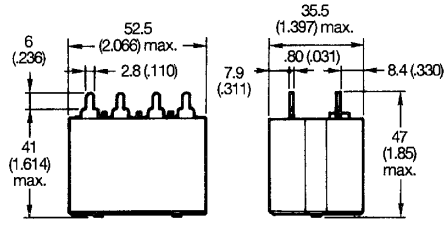
Terminal arrangement/ Internal connections
(Top view)



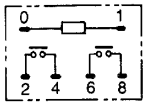
Mounting holes
(Bottom view)



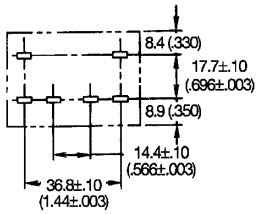
G7L-2A-P



Terminal arrangement/ Internal connections
(Top view)

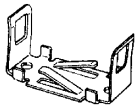


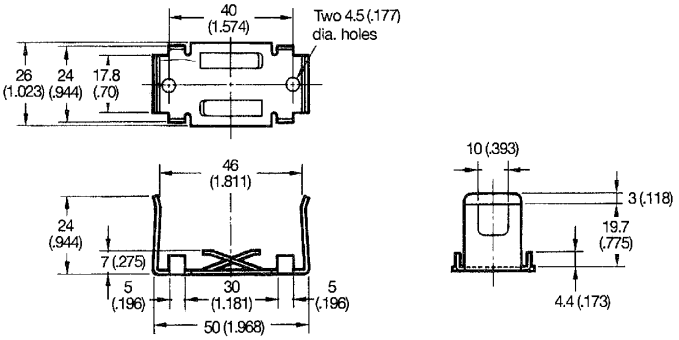
Mounting holes
(Bottom view)



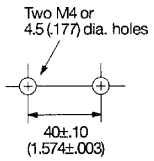
■ Accessories

E bracket
R99-07G5D

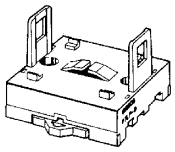


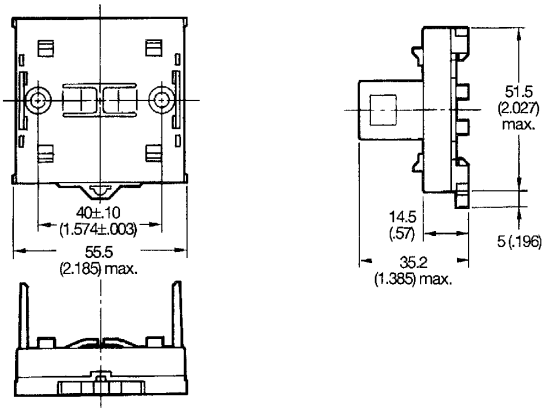


Mounting holes
(Bottom view)

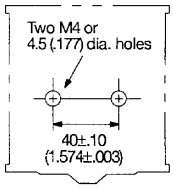


Adaptor
P7LF-D

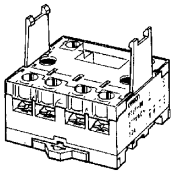


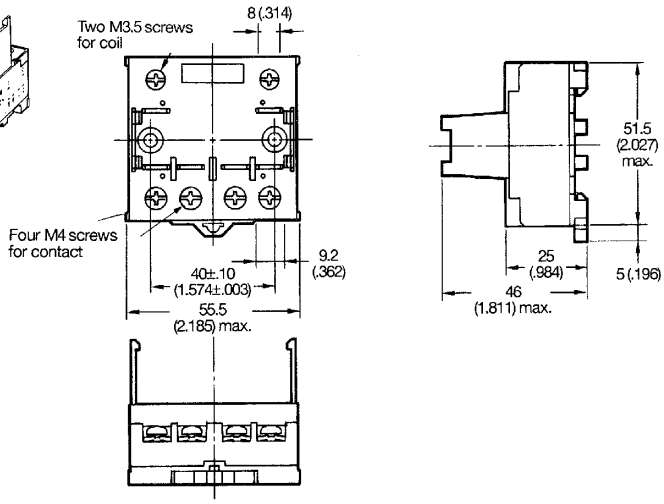


Mounting holes
(Bottom view)

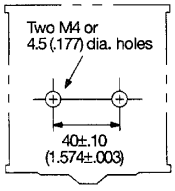


Front connecting socket
P7LF-06





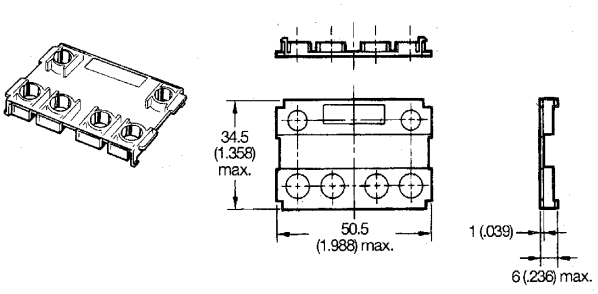
Mounting holes
(Bottom view)



Note: 1. To protect against electric shock, use the P7LF-C cover on terminals.
2. P7LF-C cover is supplied with P7LF-06 socket.

Unit: mm (inch)

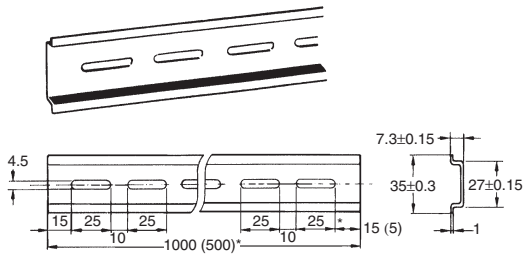
Cover
P7LF-C



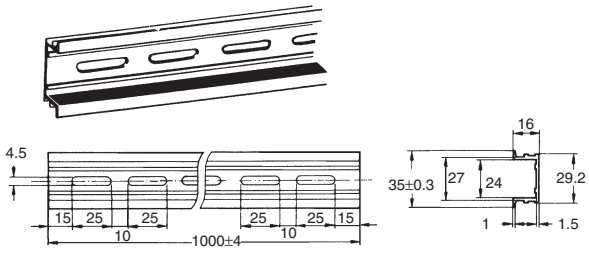
Note: P7LF-C cover is supplied with P7LF-06 socket.

Mounting track

PFP-100N, PFP-50N
(Conforming to EN 50022)



PFP-100N2
(Conforming to EN 50022)

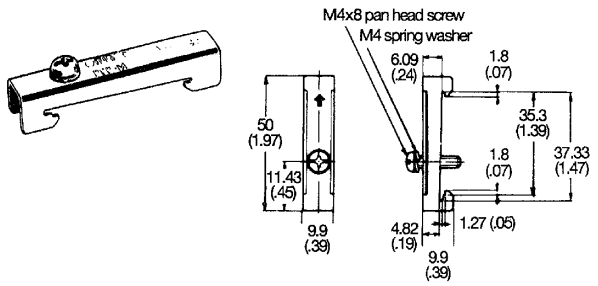


* The figure in parenthesis is for PFP-50N.

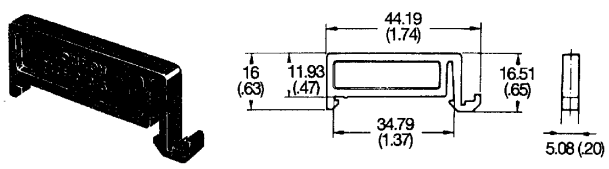
Note: 1. It is recommended that a panel thickness of 1.60 to 2.00 mm (0.06 to 0.08 in) be used.

2. L = Length
PFP-100N L = 1 m (39.00 in)
PFP-50N L = 50 cm (19.60 in)
PFP-100N2 L = 1 m (39.00 in)

End plate
PFP-M



Spacer
PFP-S



■ Approvals

UL Recognized (File No. E41643) / CSA Certified (File No. LR35535) - - Ambient Temp. = 40°C

Type	Contact form	Terminal type	Contact ratings
G7L-1A-T-CB G7L-1A-TJ-CB G7L-1A-TUB-CB G7L-1A-TUBJ-CB	SPST-NO	Quick-connect	30 A, 277 VAC, General Use, 100,000 ops 1.5 kW, 120 VAC, Tungsten, 6,000 ops 1.5 HP, 120 VAC, 6,000 ops 3 HP, 277 VAC, 6,000 ops
G7L-1A-B-CB G7L-1A-BJ-CB G7L-1A-BUB-CB G7L-1A-BUBJ-CB		Screw	20 FLA/120 LRA, 120 VAC, 30,000 ops 17 FLA/102 LRA, 265 VAC, 30,000 ops TV-10, 120 VAC, 25,000 ops
G7L-1A-P-CB		PCB	
G7L-2A-T-CB G7L-2A-TJ-CB G7L-2A-TUB-CB G7L-2A-TUBJ-CB	DPST-NO	Quick-connect	
G7L-2A-B-CB G7L-2A-BJ-CB G7L-2A-BUB-CB G7L-2A-BUBJ-CB		Screw	
G7L-2A-P-CB		PCB	

Note: Contact Omron for actual ratings marked on G7L relays

TÜV (File No. R9251551)

Type	Contact form	Coil ratings	Terminal type	Contact ratings
G7L-1A-T-CB G7L-1A-TJ-CB G7L-1A-TUB-CB G7L-1A-TUBJ-CB	SPST-NO	6, 12, 24, 48, 100, 110, 200, 220 VDC	Quick-connect	25 A, 240 VAC, ($\cos\phi$ = 1) 25 A, 240 VAC, ($\cos\phi$ = 0.4)
G7L-1A-B-CB G7L-1A-BJ-CB G7L-1A-BUB-CB G7L-1A-BUBJ-CB		12, 24, 50, 100/120, 200/240 VAC	Screw	30 A, 240 VAC, ($\cos\phi$ = 1) 25 A, 240 VAC, ($\cos\phi$ = 0.4) 30 A, 240 VAC, ($\cos\phi$ = 0.4)
G7L-1A-P-CB			PCB	20 A, 240 VAC, ($\cos\phi$ = 1) 20 A, 240 VAC, ($\cos\phi$ = 0.4)
G7L-2A-T-CB G7L-2A-TJ-CB G7L-2A-TUB-CB G7L-2A-TUBJ-CB	DPST-NO		Quick-connect	25 A, 240 VAC, ($\cos\phi$ = 1) 25 A, 240 VAC, ($\cos\phi$ = 0.4)
G7L-2A-B-CB G7L-2A-BJ-CB G7L-2A-BUB-CB G7L-2A-BUBJ-CB			Screw	25 A, 240 VAC, ($\cos\phi$ = 1) 25 A, 240 VAC, ($\cos\phi$ = 0.4)
G7L-2A-P-CB			PCB	20 A, 240 VAC, ($\cos\phi$ = 1) 20 A, 240 VAC, ($\cos\phi$ = 0.4)

VDE recognized type (Licence no. 1530 UG)

Note: 1. Please consult OMRON for details of VDE approvals.

2. The G7L relay conforms to the following standards:

Electrical safety: DIN IEC 255 Teil 1-00/DIN VDE 0435 Teil 201/05. 83
DIN VDE 0435 Teil 201 A1/05. 90
DIN IEC 255 Teil 0-20/DIN VDE 0435 Teil 120/10. 81
DIN EN 60 950/VDE 0805/11. 93

EMC: prEN 50082-2, EN 55022

3. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

4. In the interest of product improvement, specifications are subject to change.

5. Suffix T130 rated at 130°C

6. Pollution degree 3, Material Group II & III.

Precautions

■ Handling

- To preserve initial performance, do not drop or otherwise subject the power relay to shock.
- The case is not designed to be removed during normal handling and operation. Doing so may affect performance.
- Use the power relay in a dry environment free from excessive dust, SO_2, H_2S, or organic gas.
- Do not allow a voltage greater than the maximum allowable coil voltage to be applied continuously.
- Do not use the power relay outside of specified voltages and currents.
- Do not allow the ambient operating temperature to exceed the specified limit.

■ Installation

- Although there are not specific limits on the installation site, it should be as dry and dust-free as possible.
- PCB terminal-equipped relays weigh approximately 100 g. Be sure that the PCB is strong enough to support them. We recommend dual-side through-hole PCBs to reduce solder cracking from heat stress.
- Quick-connect terminals can be connected to fast on receptacle #250 and positive-lock connectors.
- Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force.

■ Cleaning PCB Terminals

- PCB terminals have semi-sealed construction which prevents flux from entering the relay base. It is recommended that the user should apply a tape seal over the vent hole prior to wave soldering or cleaning. The tape should then be removed after processing.

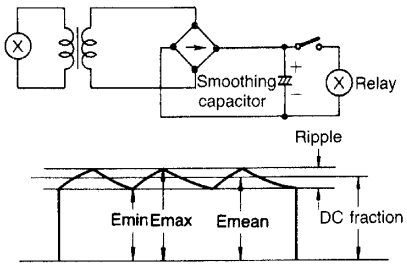
■ Applications

- Compressors for package air conditioners and heater switching controllers
- Switching controllers for power tools or motors
- Power controllers for water heaters
- Power controllers for dryers
- Lamp control, motor drivers, and power supply switching in copy machines, facsimiles, and other OA equipment
- Lighting controllers
- Power controllers for packers or food processing equipment
- Magnetron control in microwaves

■ Operating Coil

- As a rule, either a battery or a DC power supply with a maximum 5% ripple is used for the operating voltage for DC relays. Before using a rectified AC supply, confirm that the ripple is not greater than 5%. Ripple greater than this can lead to variations in the operating and reset voltages.

  As excessive ripple can generate beats, the insertion of a smoothing capacitor is recommended as shown below.



$$\% \text{ of ripple} = \frac{E_{max} - E_{min}}{E_{mean}} \times 100$$

E max: Max. ripple
E min: Min. ripple
E mean: Mean DC value

- When driving a transistor, check the leakage current and connect a bleeder resistor if necessary.
- Momentary voltage drops on coil input voltage should not exceed one second duration after contact mating with no shock or vibration.

General Purpose Relay
MJN

Relay with Plug-in Termination, available in SPDT, DPDT or 3PDT models

- Rugged power driver offers superior 3/16” through-air and 3/8 over-surface spacing
- Interlocked frame and contact block prevent contact misalignment during plug-in
- Available with dust covers, indicator lamps and push-to-operate buttons
- UL and CSA recognition as motor controllers up to 600 VAC
- Recognized for 1/2 hp motor control applications at 240/480/600 VAC (1/3 hp at 120 VAC)



Ordering Information

To Order: Select part number and add the desired coil voltage rating (e.g. MJN1C-AC24).

Item			**Model**			
Type	**Terminal**	**Contact form**	**10A Version, flange mounting**	**20 A Version, flange mounting**	**30A Version, flange mounting**	**10 A Relay only**
Standard	Plug-in	SPDT	**MJN1CF**	---	**MJN1Z-E-RP**	**MJN1C**
		DPDT	**MJN2CF**	**MJN2CE**	---	**MJN2C**
		3PDT	**MJN3CF**	---	---	**MJN3C**
LED indicator	Plug-in	SPDT	**MJN1CF-N***	---	---	**MJN1C-N**
		DPDT	**MJN2CF-N***	---	---	**MJN2C-N**
		3PDT	**MJN3CF-N***	---	---	**MJN3C-N**
Push-to-operate button	Plug-in	SPDT	**MJN1CF-I***	---	---	**MJN1C-I**
		DPDT	**MJN2CF-I***	---	---	**MJN2C-I**
		3PDT	**MJN3CF-I***	---	---	**MJN3C-I**
Push-to-operate button & LED indicator	Plug-in	SPDT	**MJN1CF-IN***	---	---	**MJN1C-IN**
		DPDT	**MJN2CF-IN***	---	---	**MJN2C-IN**
		3PDT	**MJN3CF-IN***	---	---	**MJN3C-IN**
Latching	Plug-in	DPDT	---	---	---	**MJN2CK**

Note: All part numbers marked with an “*” are non-standard parts. Contact an Omron representative for additional information.

Specifications

■ Contact Data

Configuration		SPDT, DPDT, 3PDT
Initial contact resistance		50 mΩ max.
Materials		3/16" diameter Ag-Alloy
Contact UL ratings	**10 A**	10 amp @ 28 VDC and 120/240 VAC at 80% pf, 1/3 hp @ 120 VAC, 1/2 hp @ 277/240/480/600 VAC 8.5 FLA - 36 LRA at 18 VDC, 3 amp @ 480/600 VAC at 80% pf, 10 amp @ 277 VAC resistive
	20 A	20 amp @28 VDC and 120/240/277 VAC, 10 amp @ 480/600 VAC, 3.4 hp @ 120 VAC, 1-1/2 hp @ 240 VAC, 17 FLA - 65 LRA at 300VAC
	30 A	30 amp @ 28 VDC, 15 amp @ 480 / 600 VAC, 1hp @ 120 VAC, 1-1/2 hp @ 240 VAC
UL recognized file number		E41643

■ Coil Data

Non-latching - AC

Nominal voltage	**Resistance in Ohms ± 10%**		**Nominal coil power**		**Coil voltages**	**Insulation resistance**	**Pick up voltage at 25°C (77°F)**
	1 & 2 PDT	**3PDT**	**1 & 2 PDT**	**3PDT**			
6 VAC	6.0	4.2	1.7 VA	2.0 VA	6 to 240 VAC 50/60 Hz	1,000 MΩ min. @ 500 VDC	85% of nominal
12 VAC	21	18					
24 VAC	75	72					
120 VAC	2,250	1,700					
240 VAC	9,100	7,200					

Non-latching - DC

Nominal voltage	**Resistance in Ohms ± 10%**	**Nominal coil power**	**Coil voltages**	**Insulation resistance**	**Pick up voltage at 25°C (77°F)**
5 VDC	20	1.2 W	5 to 110 VDC	1,000 MΩ min. @ 500 VDC	75% of nominal
6 VDC	32				
12 VDC	120				
24 VDC	470				
48 VDC	1,800				
110 VDC	10,000				

Latching - AC

Nominal voltage	**Latch coil resistance in Ohms ± 10%**	**Unlatch coil resistance in Ohms ± 10%**	**Nominal coil power**		**Coil voltages**	**Insulation resistance**	**Operate voltage (latch/unlatch) at 25°C (77°F) (see note)**
6 VAC	5.5	105	1.7 VA	2.0 VA	6 to 240 VAC 50/60 Hz	1,000 MΩ min. @ 500 VDC	85% of nominal
12 VAC	22	445					
24 VAC	88	1,740					
120 VAC	2,090	17,430					

Note: 120% of nominal or greater (one second duration single pulse) unlatch voltage - - above this the relay latches again.
Maximum continuous voltage: 120% of nominal (one coil only).

Latching - DC

Nominal voltage	Latch coil resistance in Ohms ± 10%	Unlatch coil resistance in Ohms ± 10%	Nominal coil power	Coil voltages	Insulation resistance	Operate voltage (latch/unlatch) at 25°C (77°F) (see note)
5 VDC	14	45	1.2 W	5 to 110 VDC	1,000 MΩ min. @ 500 VDC	75% of nominal
6 VDC	20	64				
12 VDC	80	275				
24 VDC	330	1,070				
48 VDC	1,290	2,850				
110 VDC	5,125	10,750				

Note: 120% of nominal or greater (one second duration single pulse) unlatch voltage - - above this the relay latches again.
Maximum continuous voltage: 120% of nominal (one coil only).

■ Characteristics

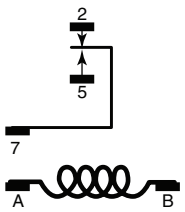
Operate time			15 ms nominal; 20 ms maximum
Release time			6 ms nominal; 10 ms maximum
Latch time			13 ms nominal with a one second pulse of nominal voltage (See note)
Unlatch time			13 ms nominal with a one second pulse of nominal unlatch voltage after latching with a one second pulse of nominal latching voltage (See note)
Operating ambient temperature	**AC: 1 & 2 pole**	**Operating**	-45° to 60°C (-49° to 140°F)
		Storage	-65° to 100°C (-85° to 212°F)
	AC: 3 pole	**Operating**	-45° to 45°C (-49° to 113°F)
		Storage	-65° to 100°C (-85° to 212°F)
	DC: 1, 2 & 3 pole	**Operating**	-45° to 70°C (-49° to 158°F)
		Storage	-65° to 100°C (-85° to 212°F)
Insulation material			High quality phenolic
Duty cycle			Rated for continuous duty operation at 25% overvoltage
Shock			15 g's 11±1 ms (non-operating test, no mechanical damage)
Vibration			0.1" DA or 10 g's, 10 to 55 Hz (operating test, no contact chatter)
Life expectancy		**Electrical at rated load**	100,000 operations
		Mechanical	10,000,000 operations
Dielectric strength			Greater than 750 VAC, RMS 60 Hz across open contacts Greater than 2,500 VAC, RMS 60 Hz all other mutually insulated elements
Terminals			Quick Connect
Weight			64 g (2.3 oz) open relay 54 g (3.0 oz) enclosed relay

Note: A latch pulse of 50 ms minimum at nominal voltage is recommended to insure positive latching.

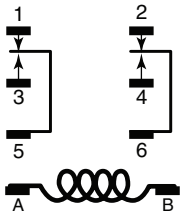
Terminal Arrangement

■ Non-Latching

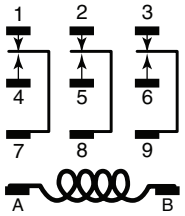
Reference only



1 Form C (SPDT)

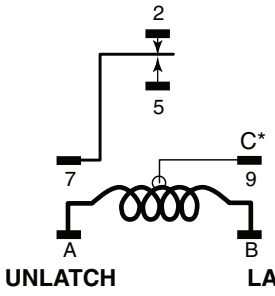


2 Form C (DPDT)

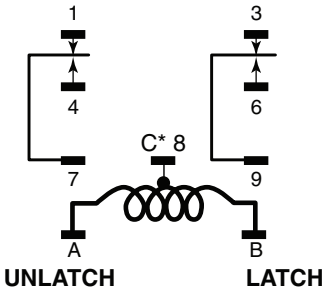


3 Form C (3PDT)

■ Latching / Unlatching



1 Form C (SPDT)



2 Form C (DPDT)

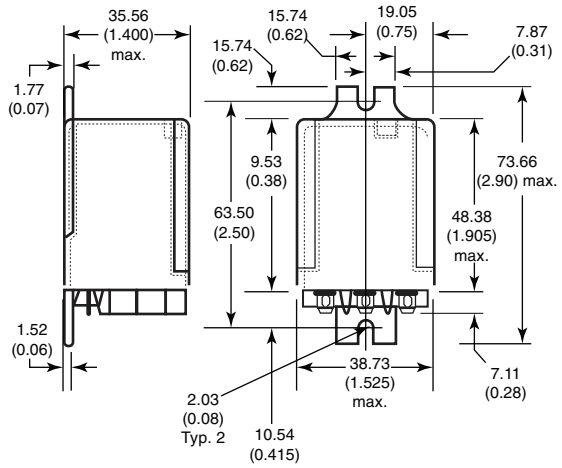
* C denoted common connection. On 3-pole relays the common connection is a wire lead coming off of the coil. It is not terminated to the relay header. Consult your Omron representative for single coil or isolated double coil models.

Dimensions

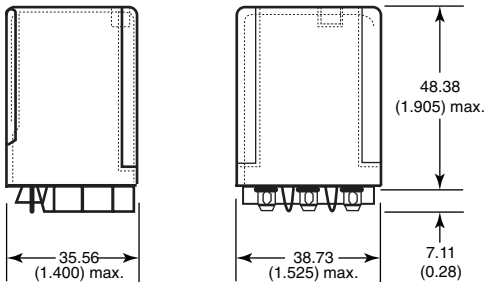
Unit: mm (inch)

■ Relays

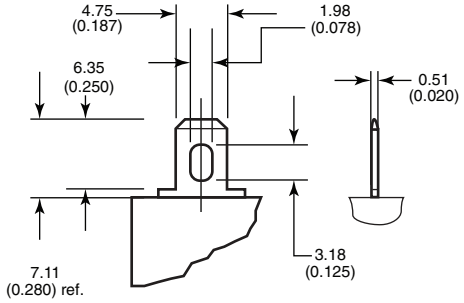
MJN□CF/MJN2CE
Dust cover with mounting flanges



Dust cover MJN

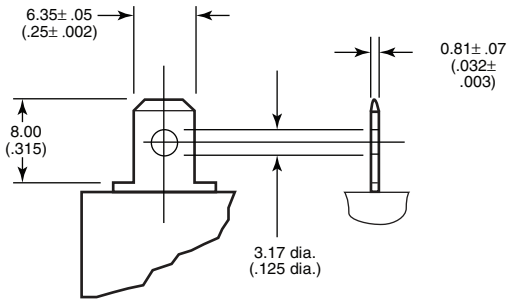


■ Terminal-10 Amp Version

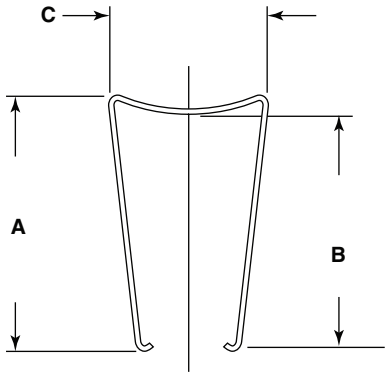


Note: Mates with .187" UL standard quick-connect terminals; also suitable for solder connection.

■ Terminal-20 and 30 Amp Versions



■ Hold Down Springs

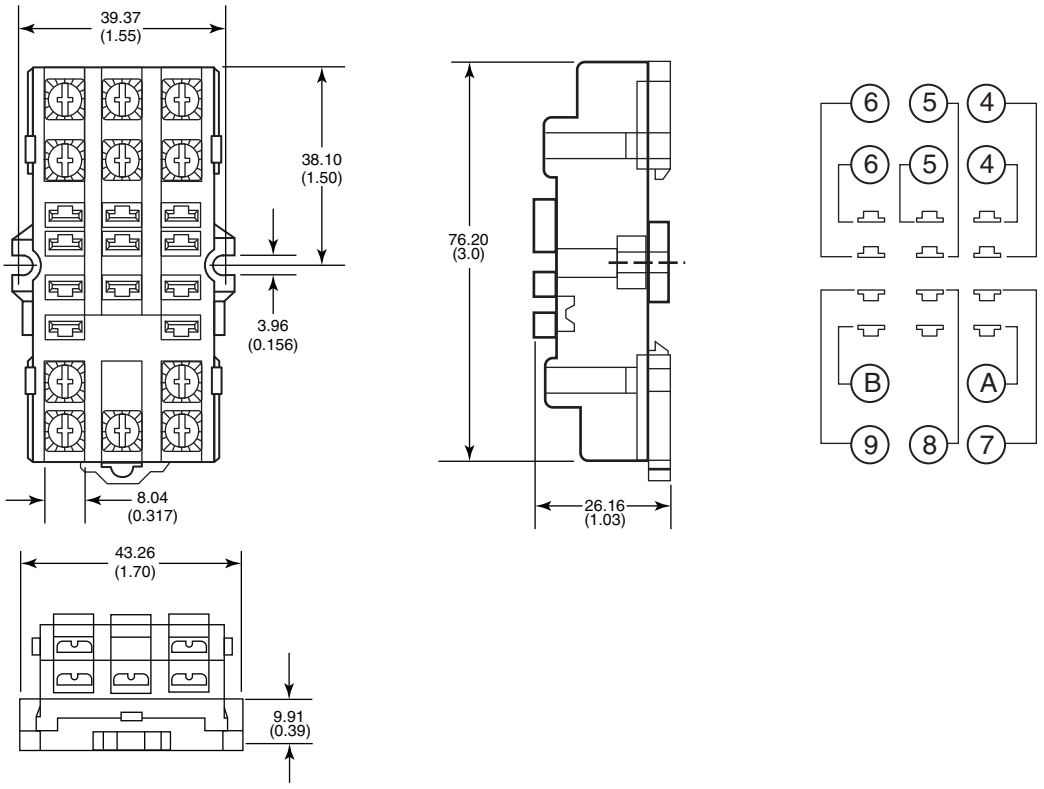


Hold Down Springs Dimensional Reference chart

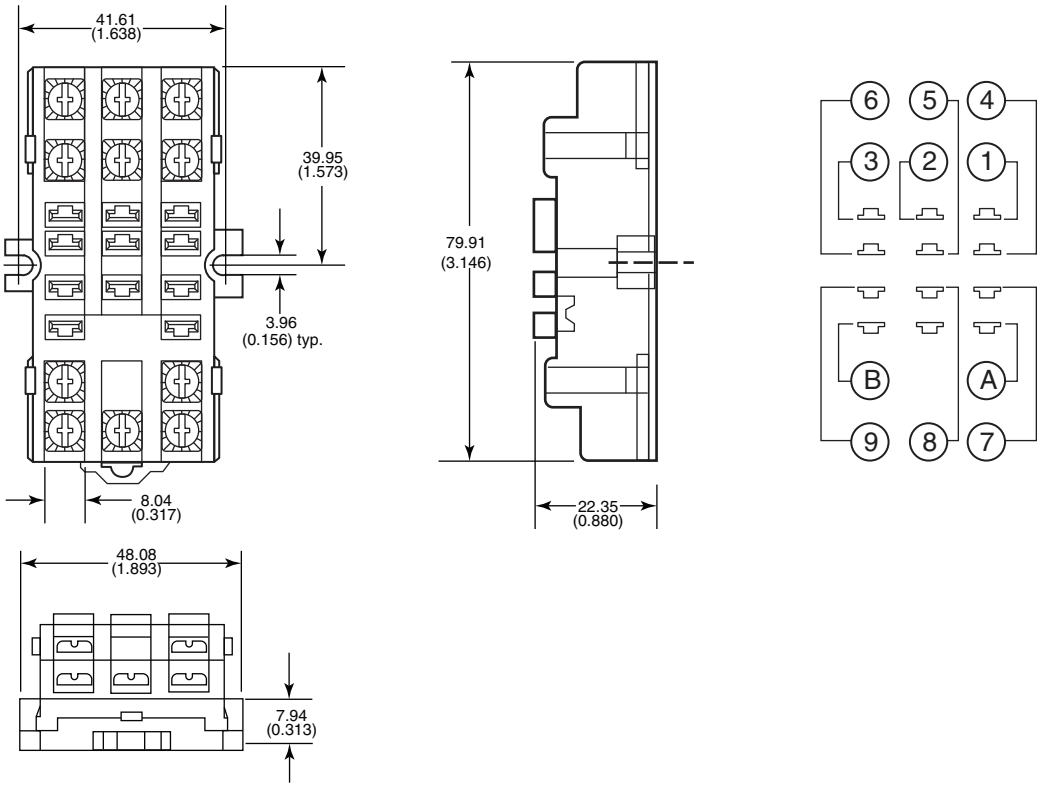
Part number	Reference dimension	Actual dimension
PYMJN-PCB	A	58.67 (2.31)
	B	53.82 (2.12)
	C	37.08 (1.46)
PYMJN-S	A	58.67 (2.31)
	B	53.59 (2.11)
	C	40.26 (1.59)

■ Sockets (for use with 10 Amp, non-flange mount versions)

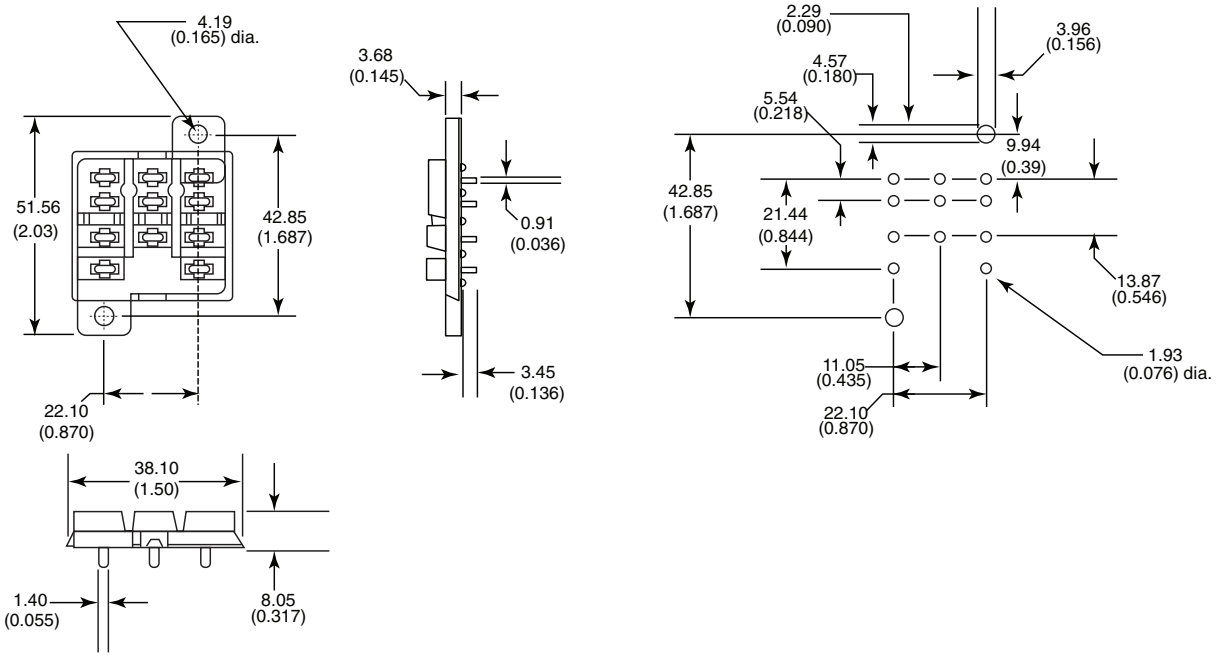
PTF11PC



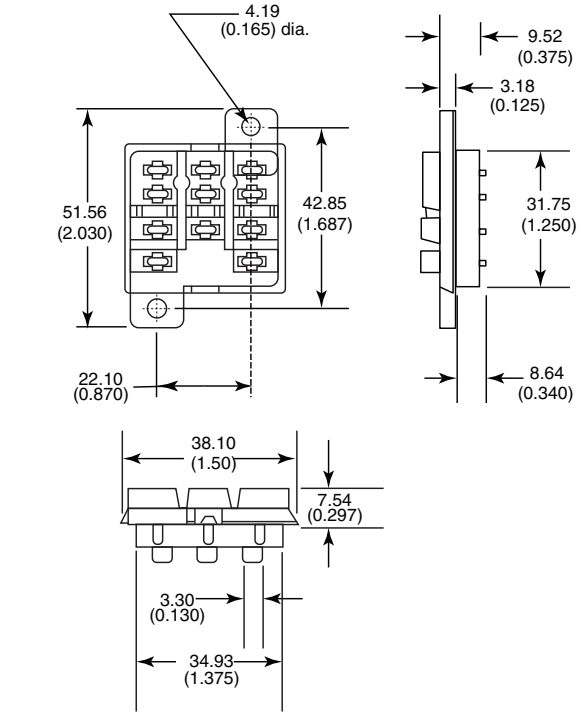
PTF21PC



PTFPCB



PTF11QDC



MEMO

Heavy Duty Power Relay
MGN

30 Amp Heavy Duty Relay

- Class F coil insulation system for 155°C (311°F)
- Coil molded in DuPont Rynite® for environmental protection
- Rugged construction rivets terminals to base
- $_{C}UL_{US}$ Listed
- Short Circuit Current Rating (SCCR) of 5kA, 600VAC



Ordering Information

To Order: Select part number and add the desired coil voltage rating (e.g. MGN1C-AC24)

Base size	Contact Form	Model
Short	SPDT	**MGN1C**
	SPST-NO	**MGN1A**
	SPST-NO-DM	**MGN1X**
	SPST-NO	**MGN1AM** (see note)
	SPST-NC	**MGN1B**
	DPST-NO	**MGN2A**
Long	DPDT	**MGN2C**
	DPDT	**MGN2CM** (see note)
MG series dust cover		**MGCOV**

Note: Magnetic blow-out version

Specifications

■ Contact Data

Materials	All versions 5/16" diameter Ag-Alloy
Contact UL ratings	30 amp or 1-1/2 hp @ 120 or 240 VAC, 2 hp @ 240 VAC, 3,600w @ 120 or 240 VAC (ballast), 30 amp @ 240 VAC, 100,000 cycle (resistive), 20 amp @ 600 VAC, 30 amp @ 28 VDC
UL file number	E41643

Note: Magnetic Blow-out versions also have a 20 amp @ 125 VDC (resistive) load rating.

■ Coil Data

AC

Nominal voltage	Resistance in Ohms ± 10%	Nominal coil power	Coil voltages	Coil treatment	Insulation resistance	Pick up voltage at 25°C (77°F)
6 VAC	0.85	9.5 VA	Up to 600 volts/60 Hz	Molded Rynite® Std. Class F	100 megohms min.	85% or less of nominal
12 VAC	2.85					
24 VAC	11.5					
120 VAC	295					
240 VAC	1,170					
480 VAC	4,860					

DC

Nominal voltage	Resistance in Ohms ± 10%	Nominal coil power	Coil voltages	Coil treatment	Insulation resistance	Pick up voltage at 25°C (77°F)
6 VDC	18	2W	Up to 125 volts	Molded Rynite® Std. Class F	100 megohms min.	75% or less of nominal
12 VDC	72					
24 VDC	290					
48 VDC	1,150					
110 VDC	6,050					

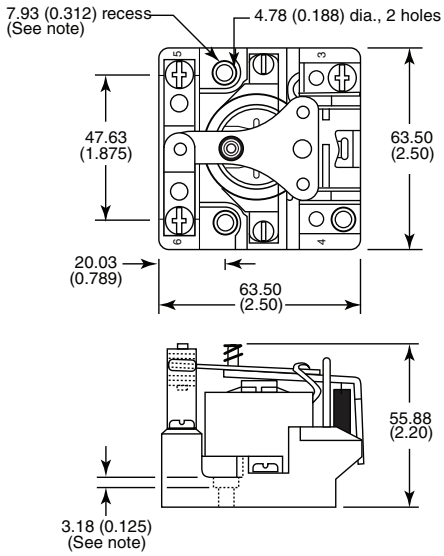
■ Characteristics

Operate time		Approximately 30 ms
Release time		Approximately 30 ms
Operating ambient temperature		AC: -45° to 80°C (-49° to 176°F) @ 30 amps
		DC: -45° to 115°C (-49° to 239°F) @ 30 amps
Coil temperature rise		25°C ambient-continuous duty AC: 70°C (158°F) approx. @ 60 Hz (use at 50 Hz will cause slight increase in coil rise) DC: 35°C (95°F) approx.
Life expectancy	Electrical at rated load	100,000 operations (minimum)
	Mechanical	1,000,000 operations
Dielectric strength		2,200 VRMS, 60 Hz between contacts 2,200 VRMS, 60 Hz between other elements
Terminals		Screw type
Weight		Short base version: approx 227 g (8 oz) Long base version: approx 283 g (10 oz)

Dimensions

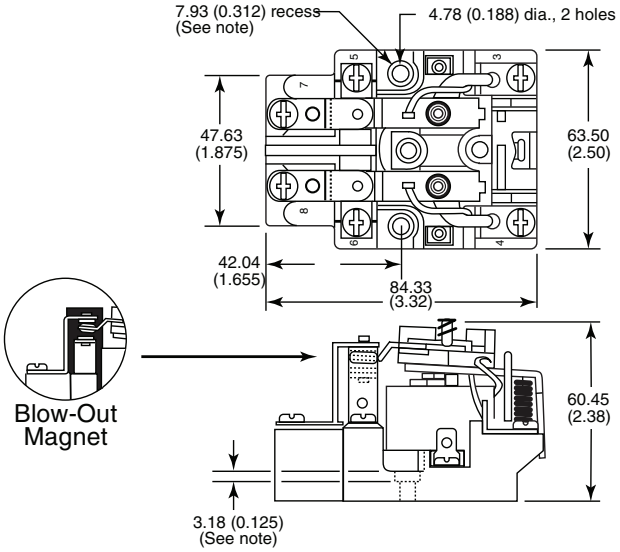
Unit: mm (inch)

■ MGN (Short Base)



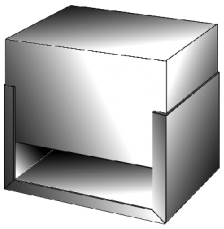
Note: Recess for screw mounting on units with 300-600 VAC coils

■ MGN (Long Base)



Note: Recess for screw mounting on units with 300-600 VAC coils

■ MG Series Dust Cover (Optional)



Sealed knock-out holes for standard conduit fittings. Relay mounts on pre-drilled base. Constructed of Aluminum. Snap-action cover release.

127W x 76.2H x 101.6D mm (5W x 3H x 4D in)

MEMO

Power Relays
G7Z

Multi-pole Power Relay for Carrying and Switching Contactor Current Range of 40 A at 440 VAC

- 40 A can be carried and switched on each of 4 poles.
- Possible to reach a maximum load capacity of 160 A when using 4-pole parallel connections.
- EN 60947-4-1 certification for mirror contact mechanisms has been obtained by using a combination of the relay and auxiliary contact blocks.
- Typical applications: high current or high inrush power supplies, commercial and industrial.
- RoHS compliant.

NEW



Model Number Structure

■ Model Number Legend

Relay with Auxiliary Contact Block

G7Z-□ - □□
1 2 3

1. **Relay Contact Configuration**
   4A: 4PST-NO
   3A1B: 3PST-NO/SPST-NC
   2A2B: DPST-NO/DPST-NC
2. **Contact Configuration of Auxiliary Contacts**
   20: DPST-NO
   11: SPST-NO/SPST-NC
   02: DPST-NC
3. **Contact Mechanism of Auxiliary Contacts**
   Z: Bifurcated crossbar contact

Auxiliary Contact Block

G73Z-□□
1 2

1. **Contact Configuration of Auxiliary Contacts**
   20: DPST-NO
   11: SPST-NO/SPST-NC
   02: DPST-NC
2. **Contact Mechanism of Auxiliary Contacts**
   Z: Bifurcated crossbar contact

■ Configuration

Classification	Structure	Contact configuration: Relay	Contact configuration: Auxiliary Contact Block	Screw terminals (See notes 1 and 2)
Relay with Auxiliary Contact Block	4 poles + 2 poles	4PST-NO	DPST-NO	**G7Z-4A-20Z**
			SPST-NO/SPST-NC	**G7Z-4A-11Z**
			DPST-NC	**G7Z-4A-02Z**
		3PST-NO/SPST-NC	DPST-NO	**G7Z-3A1B-20Z**
			SPST-NO/SPST-NC	**G7Z-3A1B-11Z**
			DPST-NC	**G7Z-3A1B-02Z**
		DPST-NO/DPST-NC	DPST-NO	**G7Z-2A2B-20Z**
			SPST-NO/SPST-NC	**G7Z-2A2B-11Z**
			DPST-NC	**G7Z-2A2B-02Z**
Auxiliary Contact Block	2 poles	—	DPST-NO	**G73Z-20Z**
			SPST-NO/SPST-NC	**G73Z-11Z**
			DPST-NC	**G73Z-02Z**

Note: 1. Relay contact terminals are M5, and the coil terminals are M3.5.
2. Auxiliary contact block terminals are M3.5.

Ordering Information

■ Relay with Auxiliary Contact Block

Relay with Auxiliary Contact Block (for Screw Terminals)

Contact configuration		Rated voltage	Model
Relay	Auxiliary contact block		
4PST-NO	DPST-NO	12, 24 VDC	**G7Z-4A-20Z**
	SPST-NO/SPST-NC	12, 24 VDC	**G7Z-4A-11Z**
	DPST-NC	12, 24 VDC	**G7Z-4A-02Z**
3PST-NO/ SPST-NC	DPST-NO	12, 24 VDC	**G7Z-3A1B-20Z**
	SPST-NO/SPST-NC	12, 24 VDC	**G7Z-3A1B-11Z**
	DPST-NC	12, 24 VDC	**G7Z-3A1B-02Z**
DPST-NO/ DPST-NC	DPST-NO	12, 24 VDC	**G7Z-2A2B-20Z**
	SPST-NO/SPST-NC	12, 24 VDC	**G7Z-2A2B-11Z**
	DPST-NC	12, 24 VDC	**G7Z-2A2B-02Z**

■ Accessories (Order Separately)

Auxiliary Contact Block

Contact configuration	Model
DPST-NO	**G73Z-20Z**
SPST-NO/SPST-NC	**G73Z-11Z**
DPST-NC	**G73Z-02Z**

Specifications

■ Ratings

Coil Ratings

Item / Rated voltage	Rated current	Coil resistance	Must operate voltage	Must release voltage	Maximum voltage	Power consumption
			Percentage of rated voltage			
12 VDC	333 mA	39 Ω	75% max.	10% min.	110%	Approx. 3.7 W
24 VDC	154 mA	156 Ω				

Note: 1. Rated current and coil resistance were measured at a coil temperature of 23°C with coil resistance of ±15%.

2. Operating characteristics were measured at a coil temperature of 23°C.

3. The maximum allowable voltage is the maximum value of the fluctuation range for the Relay coil operating power supply and was measured at an ambient temperature of 23°C.
There is, however, no continuous allowance.

Contact Ratings

Relay

Item / Model / Load		G7Z-4A-□Z, G7Z-3A1B-□Z, G7Z-2A2B-□Z		
		Resistive load	Inductive load cosϕ = 0.3	Resistive load L/R = 1 ms
Contact structure		Double break		
Contact material		AgSnIn		
Rated load	NO	40 A at 440 VAC	22 A at 440 VAC	5 A at 110 VDC
	NC	25 A at 440 VAC	10 A at 440 VAC	5 A at 110 VDC
Rated carry current	NO	40 A	22 A	5 A
	NC	25 A	10 A	5 A
Maximum contact voltage		480 VAC		125 VDC
Maximum contact current	NO	40 A		
	NC	25 A		
Maximum switching capacity	NO	17,600 VA	9,680 VA	550 W
	NC	11,000 VA	4,400 VA	550 W
Minimum load		2 A at 24 VDC		

Note: The ratings for the auxiliary contact block mounted on the G7Z are the same as those for the G73Z auxiliary contact block.

Auxiliary Contact Block

Item / Model / Load	G73Z-20Z, G73Z-11Z, G73Z-02Z		
	Resistive load	Inductive load cosϕ = 0.3	Resistive load L/R = 1 ms
Contact structure	Double break		
Contact material	AgSnIn + Ag Rotary		
Rated load	1 A at 440 VAC	0.5 A at 440 VAC	5 A at 110 VDC
Rated carry current	1 A		
Maximum contact voltage	480 VAC		125 VDC
Maximum contact current	1 A		
Maximum switching capacity	440 VA	220 VA	110 W
Minimum load	1 mA at 5 VDC		

■ Characteristics

Item / Classification		Relay (See note 6.)	Auxiliary contact block
Model		**G7Z-4A-□Z, G7Z-3A1B-□Z, G7Z-2A2B-□Z**	**G73Z-20Z, G73Z-11Z, G73Z-02Z**
Contact resistance (See note 2.)		100 mΩ max.	
Operating time (See note 3.)		50 ms max.	
Release time (See note 3.)		50 ms max.	
Maximum operating frequency	**Mechanical**	1,800 operations/h	
	Rated load	1,200 operations/h	
Insulation resistance (See note 4.)		1,000 MΩ min.	
Dielectric strength	**Between coil and contacts**	4,000 VAC, 50/60 Hz for 1 min	—
	Between contacts of different polarity	4,000 VAC, 50/60 Hz for 1 min	
	Between contacts of the same polarity	2,000 VAC, 50/60 Hz for 1 min	
Impulse withstand voltage	**Between coil and contacts**	10 kV, 1.2 x 50 μs	—
	Between contacts of different polarity	10 kV, 1.2 x 50 μs	
	Between contacts of the same polarity	4.5 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	NO: 10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude) NC: 10 to 32 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)	
Shock resistance	**Destruction**	Screw mounting: 800 m/s^2, DIN Track mounting: 500 m/s^2	
	Malfunction	NO: 100 m/s^2 NO: 25 m/s^2	
Endurance	**Mechanical**	1,000,000 operations min. (at 1,800 operations/h, contact no load)	
	Electrical (See note 5.)	AC resistive load: 80,000 operations AC inductive load: 80,000 operations DC resistive load: 100,000 operations (at 1,200 operations/h, rated load)	
Minimum load		2 A at 24 VDC	1 mA at 5 VDC
Ambient operating temperature		-25 to 60°C (with no icing or condensation)	
Ambient operating humidity		5% to 85%	
Weight		Approx. 330 g	

Note: 1. The above values are initial values.

2. The contact resistance for the Relay (G7Z) was measured with 1 A at 5 VDC using the voltage drop method.
The contact resistance for the auxiliary contact block (G73Z) was measured with 0.1 A at 5 VDC using the voltage drop method.

3. The operate time was measured with the rated voltage imposed with any contact bounce ignored at the ambient temperature of 23°C.

4. The insulation resistance was measured with a 1,000-VDC megohmmeter applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. The specifications for the auxiliary contact block mounted on the G7Z are the same as those for the G73Z auxiliary contact block.

■ Approved Standards

UL Recognized (File No. E41643) - - Ambient Temp = 40°C

Model	Coil ratings	Contact ratings		Number of test operations
G7Z	12, 24 VDC	NO contact	40 A, 480 VAC, 60 Hz (Resistive)	80,000
			5 A, 120 VDC (Resistive)	100,000
			22 A, 480 VAC, 60 Hz (General Use)	100,000
			D300* (1-A current applied)	—
		NC contact	25 A, 480 VAC, 60 Hz (Resistive) 5 A, 120 VDC (Resistive) 10 A, 480 VAC, 60 Hz (General Use)	100,000
			D300* (1-A current applied)	—

Note: Auxiliary contact ratings

Model	Contact ratings	
G73Z	NO contact	D300 (1-A current applied)
	NC contact	

CSA Certification by c UL us

EN Standard/TÜV Certification: EN 60947-4-1 (Certification No. R50079155)

Model	Coil ratings	Contact ratings	
G7Z	12, 24 VDC	NO contact	AC-1: 40 A, 440 V, 50/60 Hz
			AC-3: 16 A, 440 V, 50/60 Hz
			DC-1: 5 A, 110 V
			*AC15: 0.5 A, 440 V, 50/60 Hz
			*DC13: 0.5 A, 110 V
		NC contact	AC-1: 25 A, 440 V, 50/60 Hz
			DC-1: 5 A, 110 V
			*AC15: 0.5 A, 440 V, 50/60 Hz
			*DC13: 0.5 A, 110 V
G73Z	—	NO contact	AC15: 0.5 A, 440 V, 50/60 Hz
		NC contact	DC13: 0.5 A, 110 V

Note: Auxiliary contact ratings

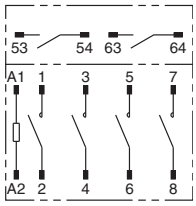
Connections

■ Terminal Arrangement/Internal Connections

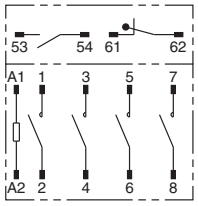
Relay with Auxiliary Contact Block

Note: non-polarized coil.

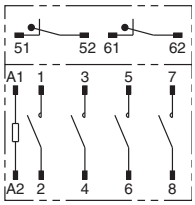
G7Z-4A-20Z



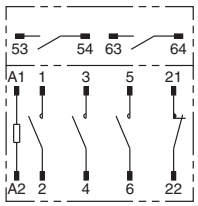
G7Z-4A-11Z



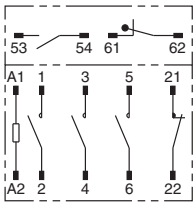
G7Z-4A-02Z



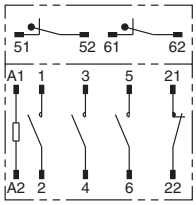
G7Z-3A1B-20Z



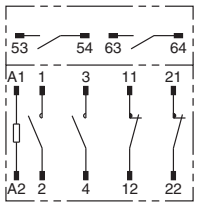
G7Z-3A1B-11Z



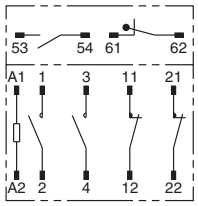
G7Z-3A1B-02Z



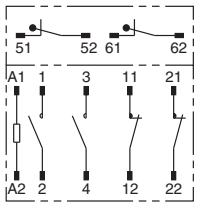
G7Z-2A2B-20Z



G7Z-2A2B-11Z

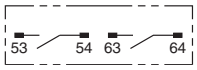


G7Z-2A2B-02Z



Auxiliary Contact Block

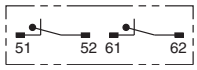
G73Z-20Z



G73Z-11Z



G73Z-02Z



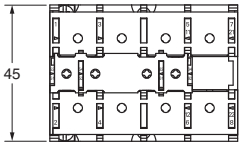
Dimensions

Note: All units are in millimeters unless otherwise indicated.

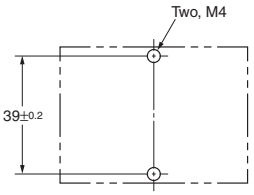
Relay (12 VDC, 24 VDC) with Auxiliary Contact Block

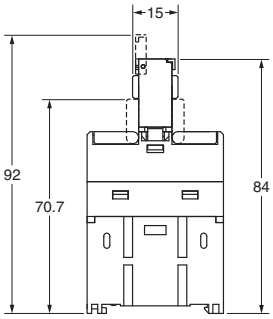
4 Poles

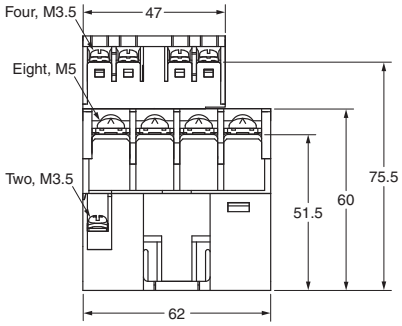




Mounting Hole Dimensions



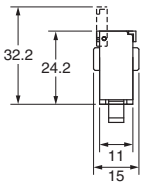


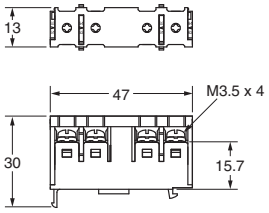


Note: The dimensions are typical values.

Auxiliary Contact Block



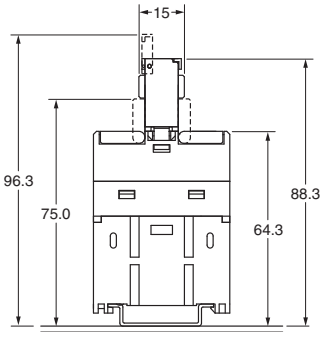




Note: The dimensions are typical values.

DIN Track Mounting Height

(when using the PFP-100N or PFP-50N mounting rail)



Note: The dimensions are typical values.

Precautions

Be sure to read the common precautions provided in *Best Control Devices Catalog Version 17* before using the Relay.

⚠ WARNING

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



⚠ CAUTION

Do not touch the terminal section (charged parts) when power is being supplied.
Always use the Relay with terminal covers mounted. Contact with charged parts may result in electric shock.



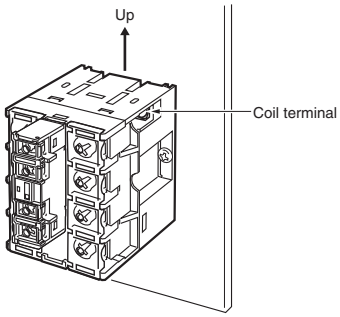
Do not touch the Relay when power is being supplied or right after the power has been turned OFF. The hot surface may cause burn injury.



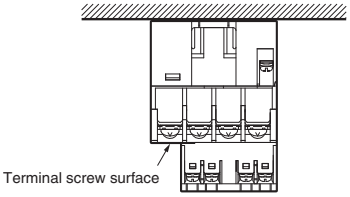
■ Precautions for Correct Use

Installation

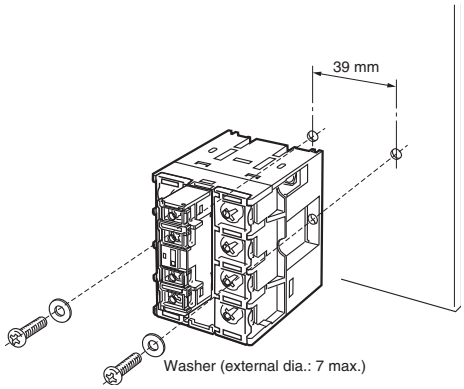
- Mount the G7Z with the coil terminal at the top.



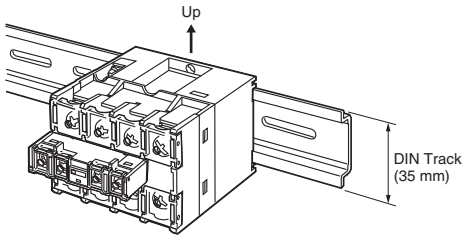
- Do not use the Relay with the terminal screw surfaces facing down.



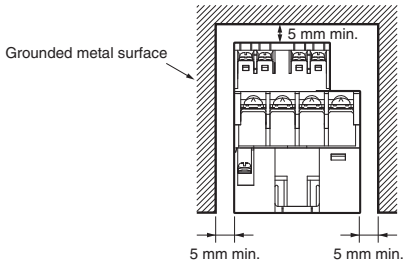
- To mount the Relay, secure M4 screws in two locations. Use a screw-tightening torque of 1.2 to 1.3 N•m.



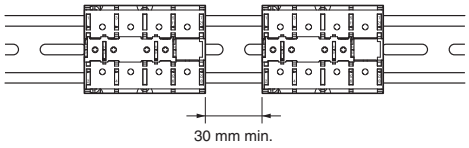
- The Relay can be mounted directly on a mounting rail (PTP) or a DIN Track (EN 50022-35 x 7.5, 15). The Relay cannot be mounted, however, to some reinforced rails (e.g., those produced by Kameda Denki or Toyogiken).
- Mount the Relay sideways when it is mounted on a rail.
- Use End Plates (PFP-M) on both sides of the Relay to make sure that it is properly secured.



- Provide at least 5 mm of space between the sides and top of the Relay and nearby grounded metal surfaces.



- Provide at least 30 mm of space between Relays when two or more Relays are mounted in a row.

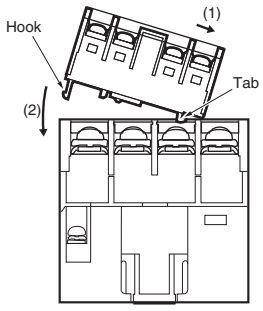


- The auxiliary contact block (G73Z) can be mounted on the Relay.

Mounting and Removal

Mounting

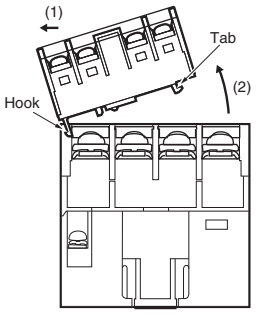
Insert the tab on the auxiliary contact block into the groove on the Relay and press down until the hook on the auxiliary contact block catches in the mounting hole on the Relay.



Removing

Slide the auxiliary contact block, remove the auxiliary contact block tab from the groove on the Relay, and remove the auxiliary contact block hook from the Relay.

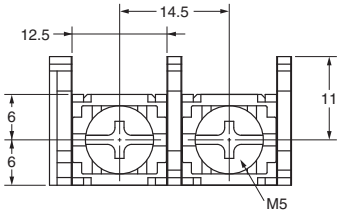
Be careful not to apply excessive force on the hook.



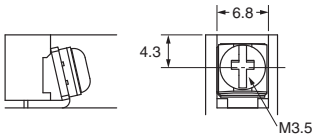
Connecting

- Use round or open-end (Y-type) crimp terminals and connect the terminals with the appropriate tightening torque. Refer to the terminal section space in the following figure for the crimp terminal dimensions.

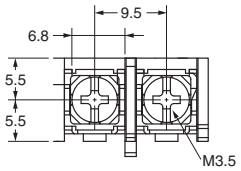
Relay Contacts (Unit: mm)



Relay Coil



Auxiliary Contact Block



- One crimp terminal can be used for the Relay contact section (M5 screw). Two crimp terminals can be connected for the coil terminal and auxiliary contact block.

Recommended Crimp Terminals and Wire

Location	Crimp terminals	Appropriate wire size
Contact section	5.5-5	2.63 to 6.64 mm^2 (AWG12, 10)
	8-5	6.64 to 10.52 mm^2 (AWG8)
Coil section	1.25-3.5	0.5 to 1.65 mm^2 (AWG20 to 16)

- Use the following tightening torque when tightening screws. Loose screws may result in fire caused by abnormal heat generated when the power is being supplied.
  M5 screws: 2.0 to 2.2 N•m
  M3.5 screws: 0.8 to 0.9 N•m
- Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force.

Microloads

The G7Z is used for switching power loads, such as current carry for device power supplies and heater loads. Use an auxiliary contact block (G73Z) if microloads are required for signal applications and operation status feedback.

Operating Coil

(Internal Connections of Coils)

DC Coil

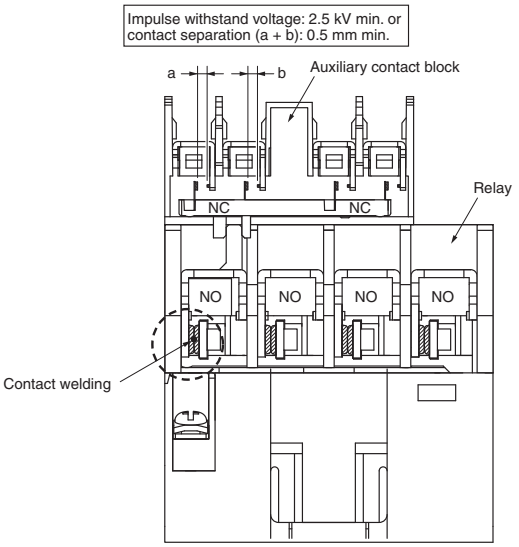


- If a transistor drives the G7Z, check the leakage current and connect a bleeder resistor if necessary.
- The must operate voltage is the minimum value for the Relay armature to operate and the contacts to turn ON. Therefore, fundamentally apply the rated voltage to the coils, taking into consideration the increases in coil resistance caused by voltage fluctuation and coil temperature rise.

Mirror Contact Mechanism

By combining a Relay with an auxiliary contact block, all NC contacts of the auxiliary contact block will satisfy an impulse withstand voltage of more than 2.5 kV or maintain a gap of more than 0.5 mm when the coil is de-energized even if at least one NO contact (main contact) of the Relay is welded (according to EN 60947-4-1).

Description of Mirror Contact Mechanism



Solid State Relays
Technical Information

Glossary

Terms		Meaning
Circuit functions	Photocoupler Phototriac coupler	Transfers the input signal and insulates inputs and outputs as well.
	Zero cross circuit	A circuit which starts operation with the AC load voltage at close to zero-phase.
	Trigger circuit	A circuit for controlling the triac trigger signal, which turns the load current ON and OFF.
	Snubber circuit	A circuit consisting of a resistor R and capacitor C, which prevents faulty ignition from occurring in the SSR triac by suppressing a sudden rise in the voltage applied to the triac.
Input	Input impedance	The impedance of the input circuit and the resistance of current-limiting resistors used. Impedance varies with the input signal voltage in case of the constant current input method.
	Operating voltage	Minimum input voltage when the output status changes from OFF to ON.
	Reset voltage	Maximum input voltage when the output status changes from ON to OFF.
	Operating voltage	The permissible voltage range within which the voltage of an input signal voltage may fluctuate.
	Rated voltage	The voltage that serves as the standard value of an input signal voltage.
	Input current	The current value when the rated voltage is applied.
Output	Leakage current	The effective value of the current that can flow into the output terminals when a specified load voltage is applied to the SSR with the output turned OFF.
	Load voltage	The effective supply voltage at which the SSR can be continuously energized with the output terminals connected to a load and power supply in series.
	Maximum load current	The effective value of the maximum current that can continuously flow into the output terminals under specified cooling conditions (i.e., the size, materials, thickness of the heat sink, and an ambient temperature radiating condition).
	Minimum load current	The minimum load current at which the SSR can operate normally.
	Output ON voltage drop	The effective value of the AC voltage that appears across the output terminals when the maximum load current flows through the SSR under specified cooling conditions (such as the size, material, and thickness of heat sink, ambient temperature radiation conditions, etc.)
Characteristics	Dielectric strength	The effective AC voltage that the SSR can withstand when it is applied between the input terminals and output terminals of I/O terminals and metal housing (heat sink) for more than 1 minute.
	Insulation resistance	The resistance between the input and output terminals of I/O terminals and metal housing (heat sink) when DC voltage is imposed.
	Operating time	A time lag between the moment a specified signal voltage is imposed to the input terminals and the output is turned ON.
	Release time	A time lag between the moment the imposed signal input is turned OFF and the output is turned OFF.
	Ambient temperature and humidity (operating)	The ranges of temperature and humidity in which the SSR can operate normally under specified cooling, input/output voltage, and current conditions.
	Storage temperature	The temperature range in which the SSR can be stored without voltage imposition.
Others	Withstand surge current (See note.)	The maximum non-repeat current that can flow to the SSR. Expressed using the peak value at the commercial frequency in one cycle.
	Counter-electromotive force	Extremely steep voltage rise which occurs when the load is turned ON or OFF.
	Recommended applicable load	The recommended load capacity which takes into account the safety factors of ambient temperate and inrush current.
	Bleeder resistance	The resistance connected in parallel to the load in order to increase apparently small load currents, so that the ON/OFF of minute currents functions normally.

Note: This value was conventionally expressed as the “withstand inrush current”, but has been changed to “withstand surge current” because the former term was easily mistaken for inrush current of loads.

Overview of SSRs

■ What Are SSRs?

Difference between SSRs and Mechanical Relays

SSRs (Solid State Relays) have no movable contacts. SSRs are not very different in operation from mechanical relays that have movable contacts. SSRs, however, employ semiconductor switching elements, such as thyristors, triacs, diodes, and transistors.

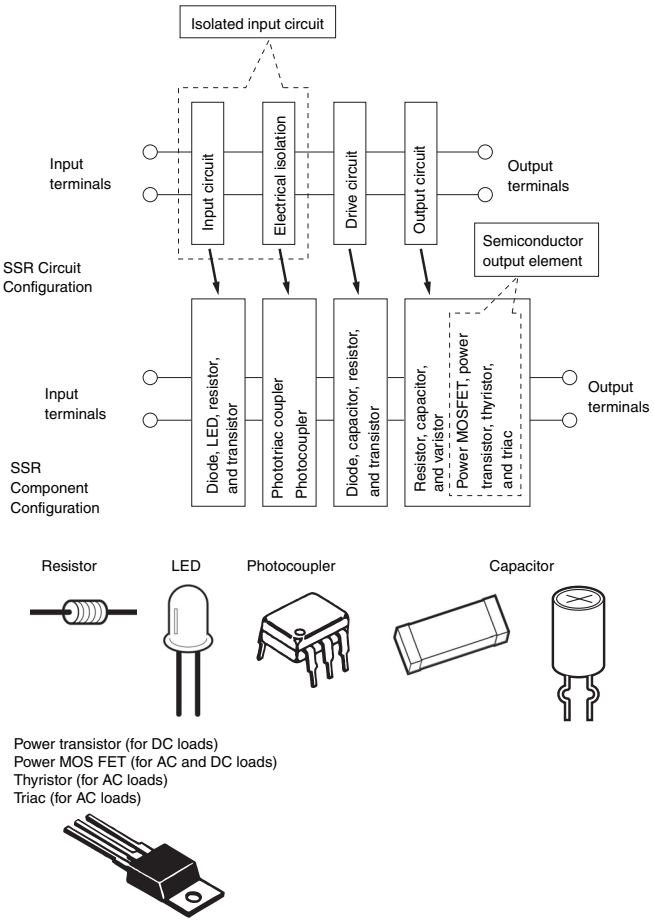
Furthermore, SSRs employ optical semiconductors called photocouplers to isolate input and output signals. Photocouplers change electric signals into optical signals and relay the signals through space, thus fully isolating the input and output sections while relaying the signals at high speed.

SSRs consist of electronic parts with no mechanical contacts. Therefore, SSRs have a variety of features that mechanical relays do not incorporate. The greatest feature of SSRs is that SSRs do not use switching contacts that will physically wear out.

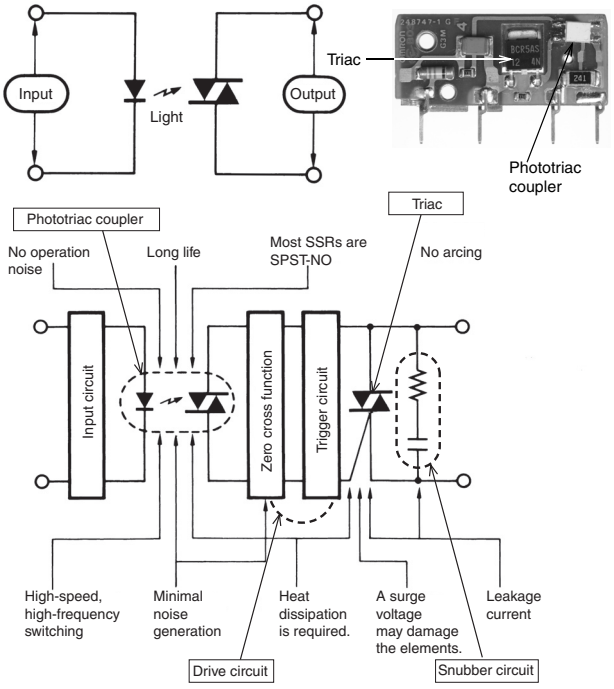
SSRs are ideal for a wide range of applications due to the following performance characteristics.

- They provide high-speed, high-frequency switching operations.
- They have no contact failures.
- They generate little noise.
- They have no operation noise.

Configuration of SSRs

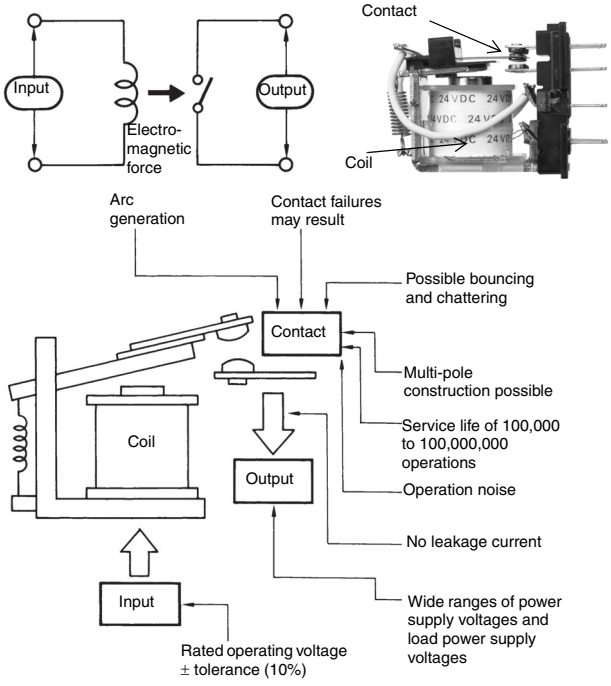


SSRs (Representative Example of Switching for AC Loads)



Electromagnetic Relay (EMR)

An EMR generates electromagnetic force when input voltage is applied to the coil. The electromagnetic force moves the armature that switches the contacts in synchronization. EMRs are not only mounted to control panels, but also used for a wide range of applications. The principle of the operation of EMRs is simple and it is possible to manufacture EMRs at low costs.



Control of SSRs

ON/OFF control is a form of control where a heater is turned ON or OFF by turning an SSR ON or OFF in response to voltage output signals from a Temperature Controller. The same kind of control is also possible with an electromagnetic relay but if control where the heater is turned ON and OFF at intervals of a few seconds over a period of several years, then an SSR must be used.

With cycle control (G32A-EA), output voltage is turned ON/OFF at a fixed interval of 0.2 s. Control is performed in response to current output from a Temperature Controller in the range 4 to 20 mA.

The basic principle used for optimum cycle control is zero cross control, which determines the ON/OFF status each half cycle. A waveform that accurately matches the average output time is output. The accuracy of the zero cross function is the same as for conventionally zero cross control.

With conventional zero cross control, however, the output remains ON continuously for a specific period of time, whereas with optimum cycle control, the ON/OFF status is determined each cycle to improve output accuracy.

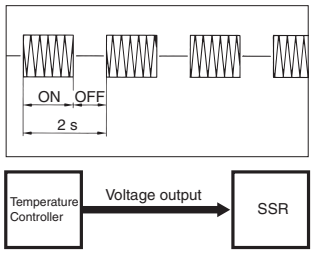
Precaution for Cycle Control and Optimum Cycle Control

With cycle control, inrush current flows five times every second (because the control cycle is 0.2 s). With a transformer load, the following problems may occur due to the large inrush current (approximately 10 times the rated current), and controlling the power at the transformer primary side may not be possible.

1. The SSR may be destroyed if there is not sufficient leeway in the SSR rating.
2. The breaker on the load circuit may be tripped.

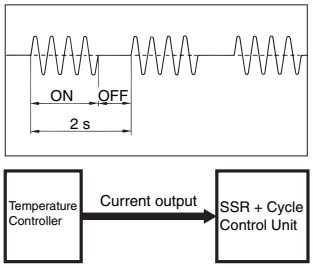
With phase control, output is changed every half-cycle in response to current output signals in the range 4 to 20 mA from a Temperature Controller. Using this form of control, high-precision temperature control is possible, and is used widely with semiconductor equipment.

ON/OFF Control



Enables low-cost, noiseless operation without maintenance requirements.

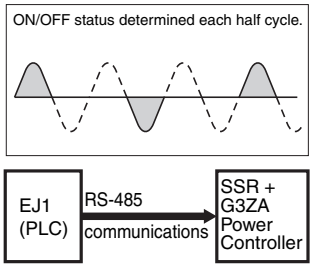
Cycle Control



Enables noiseless operation with high-speed response.

Optimum Cycle Control

(High-accuracy Zero Cross Control)

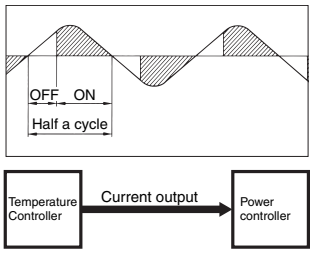


Many heaters can be control using communications.

Enables noiseless operation with high-speed response.

Phase Control

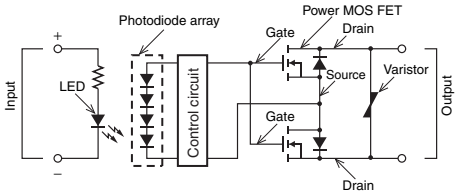
(Single Phase)



Enables precise temperature control and increases the heater's service life.

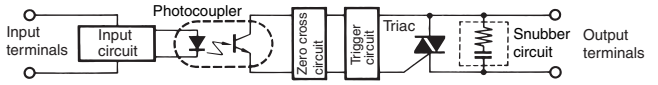
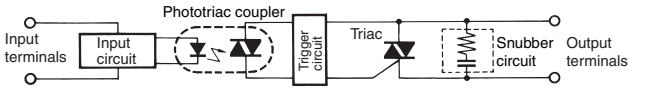
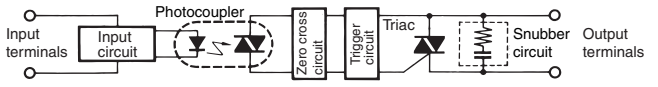
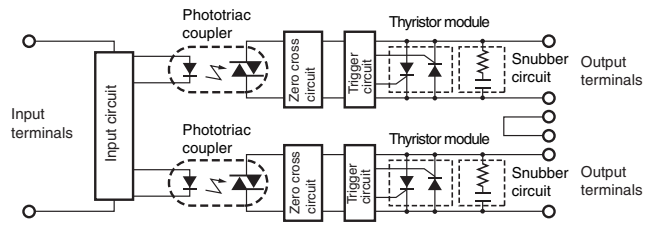
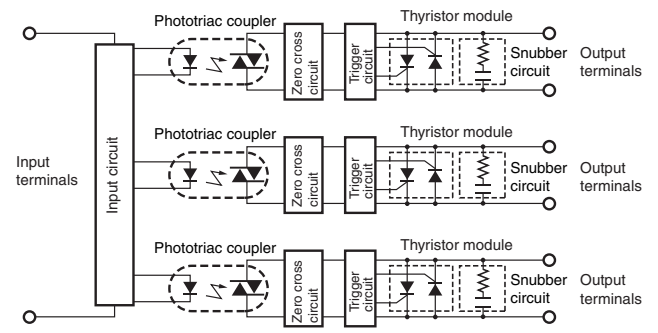
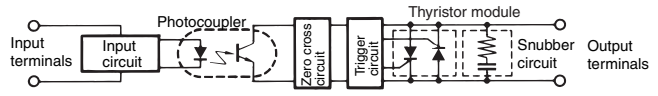
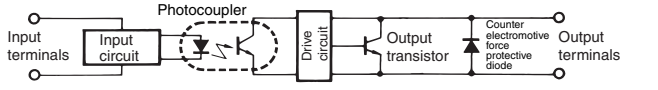
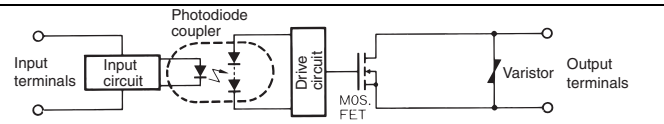
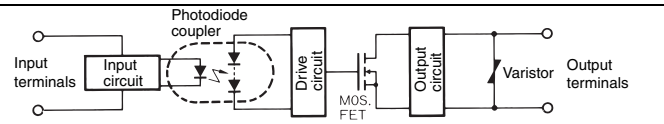
Configuration and Operating Principle of MOS FET Relays

MOS FET relays are SSRs that use power MOS FETs in output elements. In order to operate the power MOS FETs, photodiode arrays are used as light-receiving elements. When current flows into the input terminal, the LED lights. This light generates a photoelectromotive force in the photodiode array, and this acts as a gate voltage that turns ON the power MOS FET. By connecting 2 power MOS FETs using a source common, control of AC loads is possible. There are models for control of DC loads, which have just one power MOS FET.



Note: There is no varistor in the G3VM style MOS FET relay that is designed to switch low signal loads.

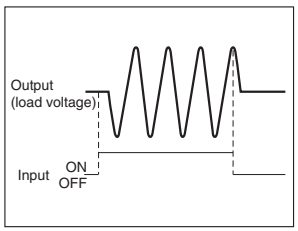
■ SSR Internal Circuit Configuration Examples

Load specifications	Zero cross function	Isolation	Circuit configuration	Model
AC load	Yes (See note 1.)	Photo-coupler		G3H G3B G3F G3NA (AC input)
	No	Phototriac		G3NE G3J G3F G3H G3TA-OA
	Yes (See note 1.)	Phototriac		G3PA-VD G3PB (single phase) G3NA (DC input) G3NE
	Yes (See note 1.)	Phototriac		G3PB-2(N) (three phases) (See note 2.)
	Yes (See note 1.)	Phototriac		G3PB-3(N) (three phases) (See note 2.)
	Yes (See note 1.)	Photo-coupler		G3NA-4□□B G3NH G3PA-4□□B G3PB-5□□B
DC load	---	Photo-coupler		G3FD, G3HD-X03 G3BD G3TA-OD G3NA-D
		Photo-diode coupler		G3HD-202SN
AC/DC load	No	Photo-diode coupler		G3FM

Note: 1. The zero cross function turns ON the SSR when the AC load voltage is 0 V or close to 0 V. SSRs with the zero cross function are effective in the following ways.

- Clicking noise when a load is turned ON is reduced.
- Effects on the power supply are reduced by suppressing inrush current with loads, such as lamps, heaters, and motors, thereby reducing inrush current protection circuits.

2. For 200-V models, use a triac on the output switching elements.



Precautions and Notes on Correct Use

⚠ WARNING

Do not touch the SSR terminal section (charged section) when the power supply is ON. For SSRs with terminal covers, be sure to attach the cover before use. Touching the charged section may cause electric shock.
Do not touch the SSR or the heat sink either while the power supply is ON, or immediately after the power is turned OFF. The SSR/heat sink will be hot and will cause burns.
Do not touch the SSR LOAD terminal immediately after the power is turned OFF. The internal snubber circuit is charged and may cause electric shock.

- Do not apply excessive voltage or current to the SSR input or output circuits, or SSR malfunction or fire damage may result.
- Do not operate if the screws on the output terminal are loose, or heat generated by a terminal error may result in fire damage.
- Do not obstruct the air flow to the SSR or heat sink, or heat generated from an SSR error may cause the output element to short, or cause fire damage.
- Be sure to conduct wiring with the power supply turned OFF, or electric shock may result.
- Follow the *Correct Use* section when conducting wiring and soldering. If the product is used before wiring or soldering are complete, heat generated from a power supply error may cause fire damage.
- When installing the SSR directly into a control panel so that the panel can be used as a heat sink, use a panel material with low thermal resistance such as aluminum or steel. If a material with high thermal resistance such as wood is used, heat generated by the SSR may cause fire or burning.

■ Before Using the SSR

Unexpected events may occur before the SSR is used. For this reason it is important to test the SSR in all possible environments. For example, the features of the SSR will vary according to the product being used.

All rated performance values listed in this catalog, unless otherwise stated, are all under the JIS C5442 standard test environment (15° to 30°C, 25% to 85% relative humidity, and 88 to 106 kPa atmosphere). When checking these values on the actual devices, it is important to ensure that not only the load conditions, but also the operating environmental conditions are adhered to.

■ Input Circuit

Input-side Connection

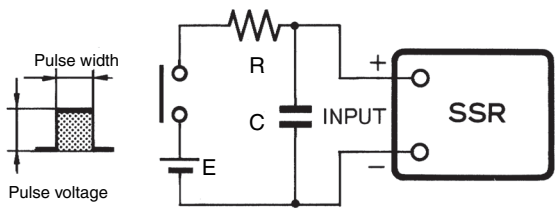
There is variation in the input impedance of SSR's. Therefore, do not connect multiple inputs in series. Otherwise, malfunction may occur.

Input Noise

SSRs need only a small amount of power to operate. This is why the input terminals must shut out electrical noise as much as possible. Noise applied to the input terminals may result in malfunction. The following describes measures to be taken against pulse noise and inductive noise.

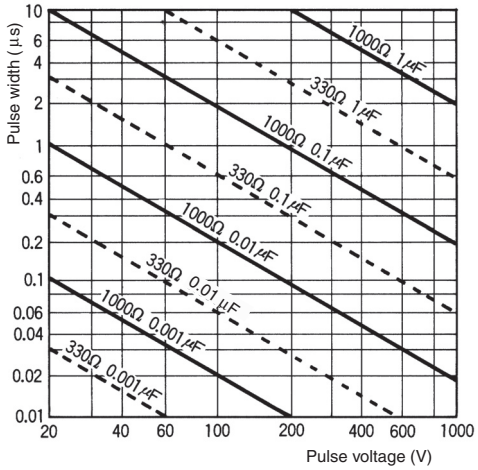
Pulse Noise

A combination of capacitor and resistor can absorb pulse noise effectively. The following is an example of a noise absorption circuit with capacitor C and resistor R connected to an SSR incorporating a photocoupler.



The value of R and C must be decided carefully. The value of R must not be too large or the supply voltage (E) will not be able to satisfy the required input voltage value.

The larger the value of C is, the longer the release time will be, due to the time required for C to discharge electricity.



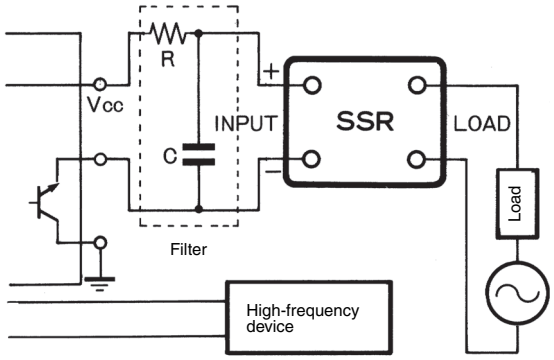
Note: For low-voltage models, sufficient voltage may not be applied to the SSR because of the relationship between C, R, and the internal impedance. When deciding on a value for R, check the input impedance for the SSR.

Inductive Noise

Do not wire power lines alongside the input lines. Inductive noise may cause the SSR to malfunction. If inductive noise is imposed on the input terminals of the SSR, use the following cables according to the type of inductive noise, and reduce the noise level to less than the must release voltage of the SSR.

Twisted-pair wire: For electromagnetic noise
Shielded cable: For static noise

A filter consisting of a combination of capacitor and resistor will effectively reduce noise generated from high-frequency equipment.

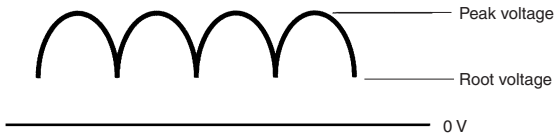


Note: R: 20 to 100 Ω
C: 0.01 to 1 µF

Input Conditions

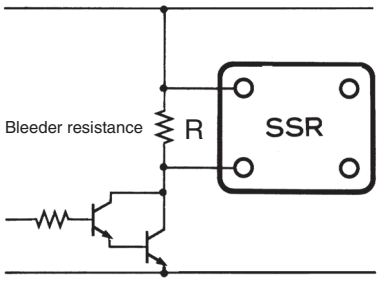
Input Voltage Ripples

When there is a ripple in the input voltage, set the input voltage so that the peak voltage is lower than the maximum operating voltage and the root voltage is above the minimum operating voltage.



Countermeasures for Leakage Current

When the SSR is powered by transistor output, the reset voltage may be insufficient due to leakage current of the transistor while power is OFF. To counteract this, connect bleeder resistance R as shown in the diagram below and set the bleeder resistance so that the voltage applied to both ends of the resistance is less than half of the reset voltage of the SSR.



The bleeder resistance R can be obtained in the way shown below.

$$R \leq \frac{E}{I_L - I}$$

E: Voltage applied at both ends of the bleeder resistance = half of the reset voltage of the SSR

I_L: Leakage current of the transistor

I: Reset current of the SSR

The actual value of the reset current is not given in the datasheet and so when calculating the value of the bleeder resistance, use the following formula.

$$\text{Reset current for SSR} = \frac{\text{Minimum value of reset voltage}}{\text{Input impedance}}$$

For SSRs with constant-current input circuits (e.g., G3NA, G3PA, G3PB), calculation is performed at 0.1 mA.

The calculation for the G3M-202P DC24 is shown below as an example.

$$\text{Reset current I} = \frac{1\ \text{V}}{1.6\ \text{k}\Omega} = 0.625\ \text{mA}$$

$$\text{Bleeder resistance R} = \frac{1\ \text{V} \times 1/2}{I_L - 0.625\ \text{mA}}$$

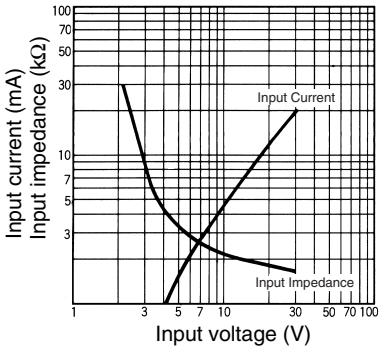
ON/OFF Frequency

An SSR has delay times called the operating time and reset time. Loads, such as inductive loads, also have delay times called the operating time and reset time. These delays must all be considered when determining the switching frequency.

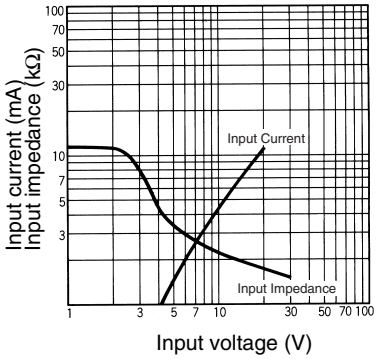
Input Impedance

In SSRs which have wide input voltages (such as G3F and G3H), the input impedance varies according to the input voltage and changes in the input current. For semiconductor-driven SSRs, changes in voltage can cause malfunction of the semiconductor, so be sure to check the actual device before usage. See the following examples.

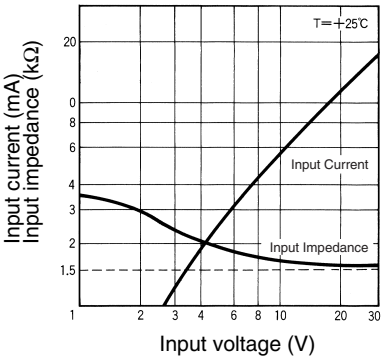
Applicable Input Impedance for a Photocoupler- type SSR without Indicators (Example) G3F, G3H (Without Indicators)



Applicable Input Impedance for a Photocoupler- type SSR with Indicators (Example) G3B, G3F, G3H (With Indicators)



Applicable Input Impedance (Example) G3CN



■ Output Circuit

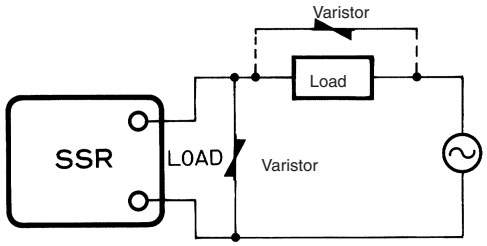
AC ON/OFF SSR Output Noise Surges

If there is a large voltage surge in the AC pwer supply being used by the SSR, the C/R snubber circuit built into the SSR between the SSR load terminals will not be sufficient to suppress the surge, and the SSR transient peak element voltage will be exceeded, causing over-voltage damage to the SSR.

Varistors should generally be added because measuring surges is often difficult (except when it has been confirmed that there is no surge immediately before use).

Only the following models have a built-in surge absorbing varistor: G3NA, G3S, G3PA, G3NE, G3NH, G3DZ (some models), G3RZ, and G3FM. When switching an inductive load with any other models, be sure to take countermeasures against surge, such as adding a surge absorbing element.

In the following example, a surge voltage absorbing element has been added.

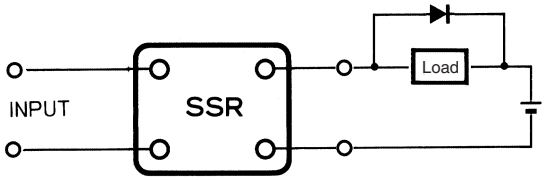


Select an element which meets the conditions in the following table as the surge absorbing element.

Voltage	Varistor voltage	Surge resistance
10 to 120 VAC	240 to 270 V	1,000 A min.
200 to 240 VAC	440 to 470 V	
380 to 480 VAC	820 to 1,000 V	

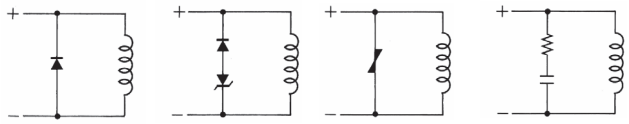
DC ON/OFF SSR Output Noise Surges

When an inductive load (L), such as a solenoid or electromagnetic valve, is connected, connect a diode that prevents counter-electromotive force. If the counter-electromotive force exceeds the withstand voltage of the SSR output element, it could result in damage to the SSR output element. To prevent this, insert the element parallel to the load, as shown in the following diagram and table.



As an absorption element, the diode is the most effective at suppressing the counter-electromotive force. The release time for the solenoid or electromagnetic valve will, however, increase. Be sure to check the circuit before use. To shorten the time, connect a Zener diode and a regular diode in series. The release time will be shortened at the same rate that the Zener voltage (Vz) of the Zener diode is increased.

Absorption Element Example				
Absorption element	Diode	Diode + Zener diode	Varistor	CR
Effectiveness	❍	❍	Δ	×



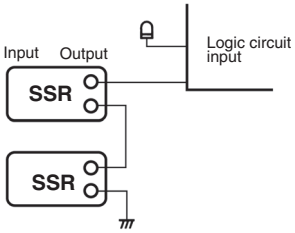
(Reference)

1. Selecting a Diode
   Withstand voltage = $V_{RM} \geq$ Power supply voltage × 2
   Forward current = $I_F \geq$ load current
2. Selecting a Zener Diode
   Zener voltage =
   Vz < SSR withstand voltage – (Power supply voltage + 2 V)
   Zener surge power =
   P_{RSM} > Vz × Load current × Safety factor (2 to 3)

Note: When the Zener voltage is increased (Vz), the Zener diode capacity (P_{RSM}) is also increased.

AND Circuits with DC Output SSRs

Use the G3DZ or G3RZ for the following type of circuit. Do not use standard SSRs, otherwise the circuit may not be reset



Self-holding Circuits

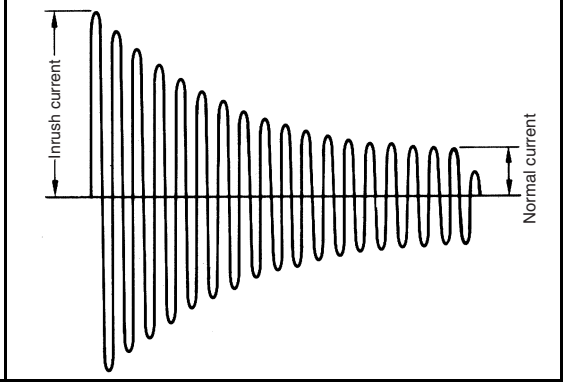
Self-holding circuits must use mechanical relays. SSRs cannot be used to design self-holding circuits.

Output Connections

Do not connect SSR outputs in parallel. With SSRs, both sides of the output will not turn ON at the same time, so the load current cannot be increased by using parallel connections.

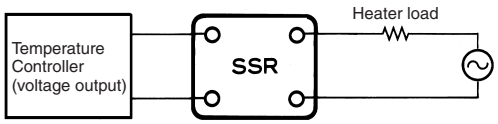
Selecting an SSR for Different Loads

The following shows examples of the inrush currents for different loads.

AC Load	Solenoid 	Incandescent lamp 	Motor 	Relay 	Capacitor 	Resistive load
Inrush current/ Normal current	Approx. 10 times	Approx. 10 to 15 times	Approx. 5 to 10 times	Approx. 2 to 3 times	Approx. 20 to 50 times	1
Waveform						

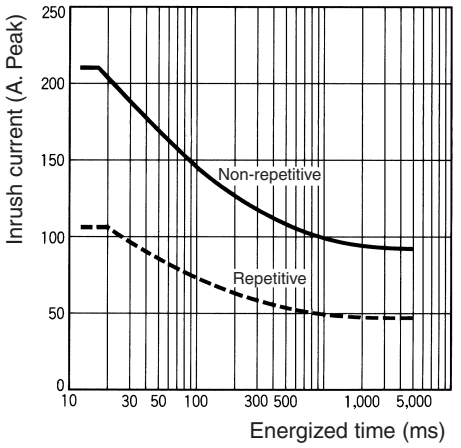
1. Heater Load (Resistive Load)

A resistive load has no inrush current. The SSR is generally used together with a voltage-output temperature controller for heater ON/OFF switching. When using an SSR with the zero cross function, most generated noise is suppressed. This type of load does not, however, include all-metal and ceramic heaters. Since the resistance values at normal temperatures of all-metal and ceramic heaters are low, an overcurrent will occur in the SSR, causing damage. For switching of all-metal and ceramic heaters, select a Power Controller (G3PX, consult your OMRON representative) with a long soft-start time, or a constant-current switch.



2. Lamp Load

A large inrush current flows through incandescent lamps, halogen lamps, and similar devices (approx. 10 to 15 times higher than the rated current). Select an SSR so that the peak value of inrush current does not exceed half the withstand surge current of the SSR. Refer to "Repetitive" (indicated by the dashed line) shown in the following figure. When a repetitive inrush current of greater than half the withstand surge current is applied, the output element of the SSR may be damaged.



3. Motor Load

When a motor is started, an inrush current of 5 to 10 times the rated current flows and the inrush current flows for a longer time than for a lamp or transformer. In addition to measuring the startup time of the motor or the inrush current during use, ensure that the peak value of the inrush current is less than half the withstand surge current when selecting an SSR. The SSR may be damaged by counter-electromotive force from the motor. Be sure to install overcurrent protection for when the SSR is turned OFF.

4. Transformer Load

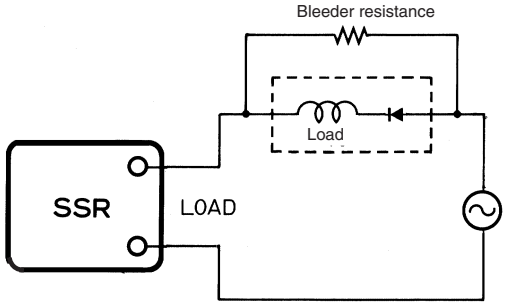
When the SSR is switched ON, an energizing current of 10 to 20 times the rated current flows through the SSR for 10 to 500 ms. If there is no load in the secondary circuit, the energizing current will reach the maximum value. Select an SSR so that the energizing current does not exceed half the withstand surge current of the SSR.

5. Half-wave Rectified Circuit

AC electromagnetic counters and solenoids have built-in diodes, which act as half-wave rectifiers. For these types of loads, a half-wave AC voltage does not reach the SSR output. For SSRs with the zero cross function, this can cause them not to turn ON. Two methods for counteracting this problem are described below.

These two methods, however, cannot be used to switch a half-wave rectified break coil. We recommend using an SSR that is designed to switch DC loads.
Refer to *DC ON/OFF SSR Output Noise Surges* and implement countermeasures for counter-electromotive force. Application is not possible for 200-VAC half-wave rectified circuits (peak voltage of 283 V)

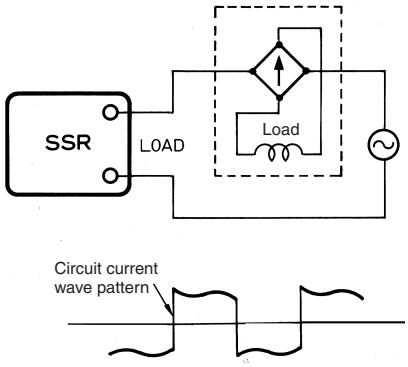
- Connect a bleeder resistance with approximately 20% of the SSR load current.



- Use SSRs without the zero cross function.

6. Full-wave Rectified Loads

AC electromagnetic counters and solenoids have built-in diodes, which act as full-wave rectifiers. The load current for these types of loads has a rectangular wave pattern, as shown in the following diagram.



Accordingly, AC SSRs use a triac (which turns OFF the element only when the circuit current is 0 A) in the output element. If the load current waveform is rectangular, it will result in an SSR reset error. When switching ON and OFF a load whose waves are all rectified, use a -V model or Power MOS FET Relay.

-V-model SSRs:	G3F-203SL-V, G3H-203SL-V
Power MOS FET Relay:	G3DZ, G3RZ, G3FM

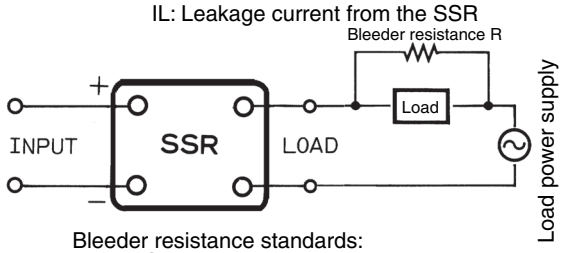
7. Small-capacity Loads

Even when there is no input signal to the SSR, there is a small leakage current (I_L) from the SSR output (LOAD). If this leakage current is larger than the load release current, the SSR may fail to reset.

Connect a bleeder resistance R in parallel to increase the SSR switching current.

$$R < \frac{E}{I_L - I}$$

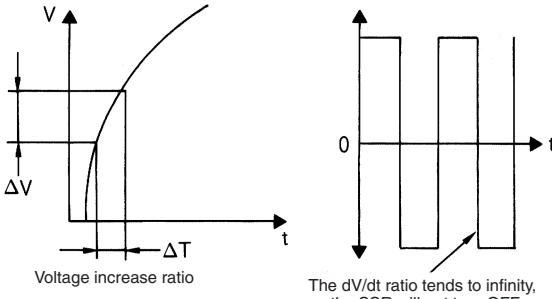
E: Load (relays etc.) reset voltage
I: Load (relays etc.) reset current
IL: Leakage current from the SSR



Bleeder resistance standards:
100-VAC power supply, 5 to 10 kΩ, 3 W
200-VAC power supply, 5 to 10 kΩ, 15 W

8. Inverter Load

Do not use an inverter-controlled power supply as the load power supply for the SSR. Inverter-controlled waveforms become rectangular, so the dV/dt ratio is extremely large and the SSR may fail to reset. An inverter-controlled power supply may be used on the input side provided the effective voltage is within the normal operating voltage range of the SSR.



ΔV/ΔT = dV/dt: voltage increase ratio

9. Capacitive Load

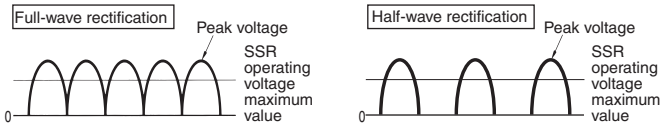
The supply voltage plus the charge voltage of the capacitor is applied to both ends of the SSR when it is OFF. Therefore, use an SSR model with an input voltage rating twice the size of the supply voltage.

Limit the charge current of the capacitor to less than half the withstand surge current of the SSR.

■ Load Power Supply

Rectified Currents

If a DC load power supply is used for full-wave or half-wave rectified AC currents, make sure that the peak load current does not exceed the maximum usage load power supply of the SSR. Otherwise, overvoltage will cause damage to the output element of the SSR.



Operating Frequency for AC Load Power Supply

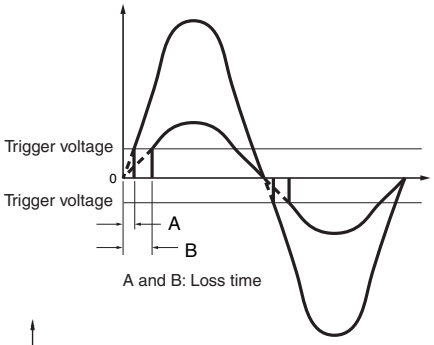
The operating frequency range for an AC load power supply is 47 to 63 Hz.

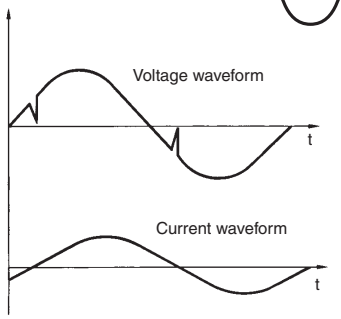
Low AC Voltage Loads

If the load power supply is used under a voltage below the minimum operating load voltage of the SSR, the loss time of the voltage applied to the load will become longer than that of the SSR operating voltage range. See the following load example. (The loss time is A < B.)

Before operating the SSR, make sure that this loss time will not cause problems.

If the load voltage falls below the trigger voltage, the SSR will not turn ON, so be sure to set the load voltage to 75 VAC minimum. (24 VAC for the G3PA-VD and G3NA-2□□B.)





An inductance (L) load causes a current phase delay as shown above. Therefore, the loss is not as great as that caused by a resistive (R) load. This is because a high voltage is already imposed on the SSR when the input current to the SSR drops to zero and the SSR is turned OFF.

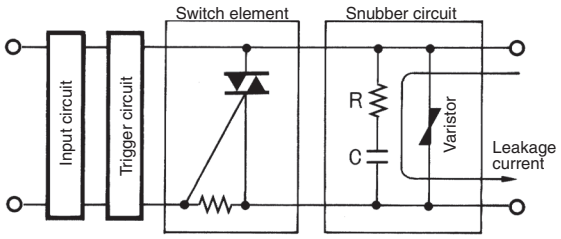
Phase-controlled AC Power Supplies

Phase-controlled power supply cannot be used.

■ Working with SSRs

Leakage Current

A leakage current flows through a snubber circuit in the SSR even when there is no power input. Therefore, always turn OFF the power to the input or load and check that it is safe before replacing or wiring the SSR.



Screw Tightening Torque

Tighten the SSR terminal screws properly. If the screws are not tight, the SSR will be damaged by heat generated when the power is ON. Perform wiring using the tightening torque shown in the following table.

SSR Terminal Screw Tightening Torque

SSR model	Screw size	Recommended tightening torque
Sockets, etc.	M3.5	0.78 to 1.18 N·m
G3NA, G3PA-10/20A	M4	0.98 to 1.37 N·m
G3NA, G3PA-40A	M5	1.57 to 2.35 N·m
G3HN-□□75	M6	3.92 to 4.9 N·m
G3HN-□□150	M8	8.82 to 9.8 N·m

Note: Excessive tightening may damage the screws. Tighten screws to within the above ranges.

SSR Mounting Panel Quality

If the G3NA, G3NE, or G3PB models with separate heat sinks are to be mounted directly onto the control panel, without the use of a heat sink, be sure to use a panel material with low thermal resistance, such as aluminum. Be sure to apply silicon grease for heat dissipation (e.g., the YG6260 from Toshiba or the G746 from Shin-Etsu) to the mounting surface.
Do not mount the SSR on a panel with high thermal resistance such as a panel coated with paint. Doing so will decrease the radiation efficiency of the SSR, causing heat damage to the SSR output element.
Do not mount the SSR on a panel made of wood or any other flammable material. Otherwise the heat generated by the SSR will cause the wood to carbonize, and may cause a fire.

Surface-mounting Socket

1. Make sure that the surface-mounting socket screws are tightened securely when mounted. If the Unit is subjected to shock or vibration and the socket mounting screws are loose, the Socket and the SSR, or the lead wires may detach. The surface-mounting Sockets can be snapped on to the 35-mm DIN Track.
2. Use a holding bracket to ensure proper connection between the SSR and Socket. Otherwise the SSR may detach from the socket if an excessive vibration or shock is applied.

SSR Mounting and Dismounting Direction

Mount or dismount the SSR from the Socket perpendicular to the Socket surface. If it is mounted or dismounted with an inclination from the diagonal line, terminals of the SSR may bend and the SSR may not be properly inserted in the Socket.



Wiring for Wrapping Terminal Socket

Refer to the following table and conduct wiring properly. Improper wiring may cause the lead wires to detach.

Model	Wrapping type	Model (bit)	Applicable wires		Sheath length to be removed (mm)	Number of effective turns	Standard terminal (mm)	Draw-out force (kg)	Applic-able sleeve
			AWG	Dia.					
PY□QN	Single-turn wrapping of sheathed line	21-A	26	0.4	43 to 44	Approx. 6	1 × 1	3 to 8	1-B
		22-A	24	0.5	36 to 37	Approx. 6		4 to 13	2-B
		23-A	22	0.65	41 to 42			4 to 15	20-B
PT□QN	Normal wrapping	20-A	20	0.8	37 to 38	Approx. 4	1.0 × 1.5	5 to 15	

Note: The PY□QN uses a 0.65-mm-dia. wire that can be turned six times.
The PT□QN uses a 0.8-mm-dia. wire that can be turned four times.

Tab Terminal Soldering Precautions

Do not solder the lead wires to the tab terminal. Otherwise the SSR (e.g., G3NE) components will be damaged.

Cutting Terminals

Do not cut the terminal using an auto-cutter. Cutting the terminal with devices such as an auto-cutter may damage the internal components.

Deformed Terminals

Do not attempt to repair or use a terminal that has been deformed. Otherwise excessive force will be applied to the SSR, and it will lose its original performance capabilities.

Hold-down Clips

Exercise care when pulling or inserting the hold-down clips so that their form is not distorted. Do not use a clip that has already been deformed. Otherwise excessive force will be applied to the SSR, causing it not to perform to its full capacity, and also it will not have enough holding power, causing the SSR to be loose, and resulting in damage to the contacts.

PCB SSR Soldering

- SSRs must be wave soldered at 260°C within five seconds. For models, however, that conform to separate conditions, perform soldering according to the specified requirements.
- Use a rosin-based non-corrosive flux that is compatible with the material of the SSR.

Ultrasonic Cleaning

Do not use ultrasonic cleaning. If the SSR is cleaned using ultrasonic cleaning after it has been mounted to the PCB, resonance due to ultrasonic waves may result in damage to the SSR's internal components.

■ Operation and Storage Environment Precautions

Ambient Operating Temperature

The rated value for the ambient operating temperature of the SSR is for when there is no heat build-up. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the SSR may exceed the rated value resulting in malfunction or burning.

When using the SSR, design the system to allow heat dissipation sufficient to stay below the Load Current vs. Ambient Temperature characteristic curve. Note also that the ambient temperature of the SSR may increase as a result of environmental conditions (e.g., climate or air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

Operation and Storage Locations

Do not use or store the SSR in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Locations subject to direct sunlight
- Usage in locations subject to ambient temperatures outside the range specified for individual products
- Usage in locations subject to relative humidity outside the range specified for individual products or locations subject to condensation as the result of severe changes in temperature
- Storage in locations subject to ambient temperatures outside the range specified for individual products
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to shock or vibration

Locations subject to exposure to water, oil, or chemicals

Extended Storage of SSR

If the SSR is stored for an extended period of time, the terminals will be exposed to the air, reducing its solderability due to such effects as oxidation. Therefore, when installing a Relay onto a board after a long time in storage, check the state of the solder before use. Also, take preventive measures so that the terminals will not be exposed to water, oil, or solvents while they are stored.

Vibration and Shock

Do not subject the SSR to excessive vibration or shock. Otherwise the SSR will malfunction and may cause damage to the internal components.

To prevent the SSR from abnormal vibration, do not install the SSR in locations or by means that will subject it to vibration from other devices, such as motors.

Solvents

Do not allow the SSR to come in contact with solvents such as thinners or gasoline. Doing so will dissolve the markings on the SSR.

Oil

Do not allow the SSR terminal cover to come in contact with oil. Doing so will cause the cover to crack and become cloudy.

■ Safety Considerations

Error Mode

The SSR is an optimum relay for high-frequency switching and high-speed switching, but misuse or mishandling of the SSR may damage the elements and cause other problems. The SSR consists of semiconductor elements, and will break down if these elements are damaged by surge voltage or overcurrent. Most faults associated with the elements are short-circuit malfunctions, whereby the load cannot be turned OFF.

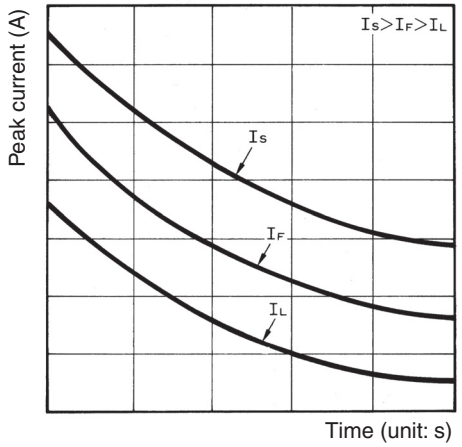
Therefore, to provide a safety feature for a control circuit using an SSR, design a circuit in which a contactor or circuit breaker on the load power supply side will turn OFF the load when the SSR causes an error. Do not design a circuit that turns OFF the load power supply only with the SSR. For example, if the SSR causes a half-wave error in a circuit in which an AC motor is connected as a load, DC energizing may cause overcurrent to flow through the motor, thus burning the motor. To prevent this from occurring, design a circuit in which a circuit breaker stops overcurrent to the motor.

Location	Cause	Result
Input area	Overvoltage	Input element damage
Output area	Overvoltage	Output element damage
	Overcurrent	
Whole Unit	Ambient temperature exceeding maximum	Output element damage
	Poor heat radiation	

Overcurrent Protection

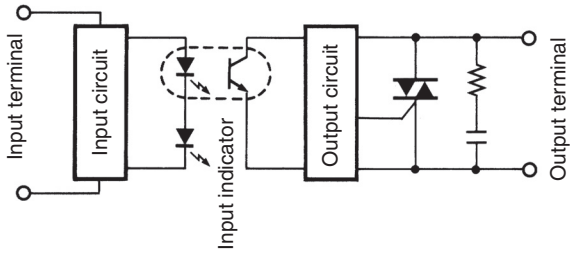
A short-circuit current or an overcurrent flowing through the load of the SSR will damage the output element of the SSR. Connect a quick-break fuse in series with the load as a short-circuit protection measure. (Provide an appropriate non-fuse breaker to each machine.)

Design a circuit so that the protection coordination conditions for the quick-break fuse satisfy the relationship between the SSR surge resistance (I_S), quick-break fuse current-limiting feature (I_F), and the load inrush current (I_L), shown in the following chart.



Operation Indicator

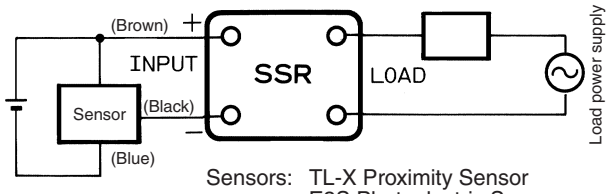
The operation indicator turns ON when current flows through the input circuit. It does not indicate that the output element is ON.



■ Application Circuit Examples

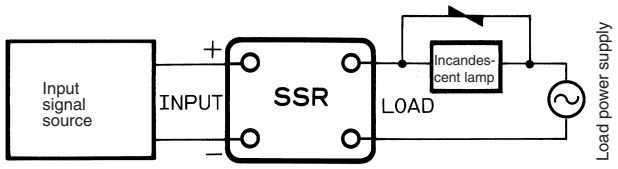
Connection to Sensors

The SSR connects directly to a Proximity Sensor or Photoelectric Sensor.

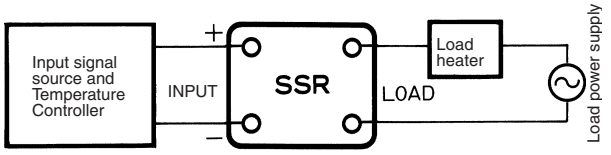


Sensors: TL-X Proximity Sensor
E3S Photoelectric Sensor

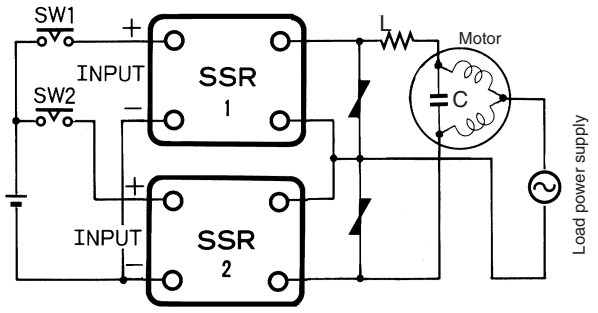
Switching Control of Incandescent Lamps



Temperature Control of Electric Furnaces



Forward and Reverse Operation of Single-phase Inductive Motors

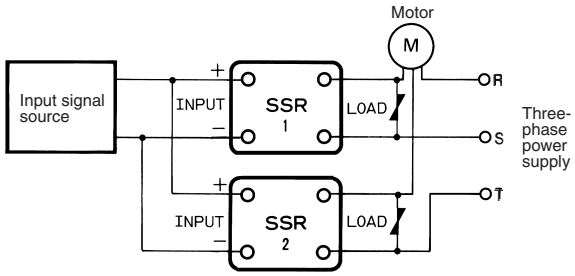


Note: 1. The voltage between the load terminals of either SSR 1 or SSR 2 when turned OFF is approximately twice as high as the supply voltage due to LC coupling. Be sure to use an SSR model with a rated output voltage of at least twice the supply voltage.
For example, if forward/reverse operation is to be performed on a single-phase inductive motor with a supply voltage of 100 VAC, the SSR must have an output voltage of 200 VAC or higher.

2. Make sure that there is a time lag of 30 ms or more to switch over SW1 and SW2.

3. Resistor to limit advanced phase capacitor discharge current. To select a suitable resistor, consult with the manufacturer of the motor.

ON/OFF Control of Three-phase Inductive Motors



Forward and Reverse Operation of Three-phase Inductive Motors

Make sure that signals input into the individual SSRs are proper if the SSRs are applied to the forward and reverse operation of a three-phase motor. If SW1 and SW2 as shown in the following circuit diagram are switched over simultaneously, a phase short-circuit will result on the load side, which may damage the output elements of the SSRs. This is because the SSR has a triac as an output element that is turned ON until the load current becomes zero regardless of the absence of input signals into the SSR. Therefore, make sure that there is a time lag of 30 ms or more to switch over SW1 and SW2.

The SSR may be damaged due to phase short-circuiting if the SSR malfunctions with noise in the input circuit of a SSR. To protect the SSR from phase short-circuiting damage, a protective resistance R may be inserted into the circuit.

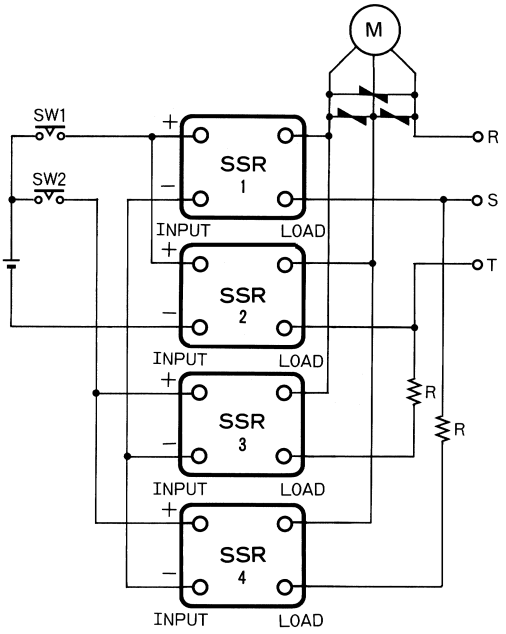
The value of the protective resistance R must be determined according to the withstanding inrush current of the SSR. For example, the G3NA-220B withstands an inrush current of 220 A. The value of the protective resistance R is obtained from the following.

$R > 220\ V \times \sqrt{2}\ /200A = 1.4\ \Omega$

Considering the circuit current and ON time, insert the protective resistance into the side that reduces the current consumption.

Obtain the consumption power of the resistance from the following.

$P = I^2R \times$ Safety factor
(I = Load current, R = Protective resistance, Safety factor = 3 to 5)



Inrush Currents to Transformer Loads

The inrush current from a transformer load will reach its peak when the secondary side of the transformer is open, when no mutual reactance will work. It will take half a cycle of the power supply frequency for the inrush current to reach its peak, the measurement of which without an oscilloscope will be difficult.

The inrush current can be, however, estimated by measuring the DC resistance of primary side of the transformer.

Due to the self-reactance of the transformer in actual operation, the actual inrush current will be less than the calculated value.

$$I\ peak = V\ peak/R = (\sqrt{2} \times V)/R$$

If the transformer has a DC resistance of 3Ω and the load power supply voltage is 220 V, the following inrush current will flow.

$$I\ peak = (1.414 \times 220)/3 = 103.7\ A$$

The withstand surge current of OMRON's SSRs is specified on condition that the SSRs are in non-repetitive operation (one or two operations). If your application requires repetitive SSR switching, use an SSR with an inrush current resistance twice as high as the rated value (I peak).

In the case above, use the G3□□-220□ with an withstand surge current of 207.4 A or more.

The DC resistance of primary side of the transformer can be calculated back from the withstand surge current by using the following formula.

$$R = V\ peak/I\ peak = (\sqrt{2} \times V)/I\ peak$$

For applicable SSRs based on the DC resistance of the primary side of the transformer, refer to the tables below.

These tables list SSRs with corresponding inrush current conditions. When using SSRs to actual applications, however, check that the steady-state currents of the transformers satisfy the rated current requirement of each SSR.

SSR Rated Current

G3□□-2<u>40</u>□

The underlined two digits refer to the rated current (i.e., 40 A in the case of the above model).

Three digits may be used for the G3NH only.

G3NH: G3NH-□075B = 75 A
G3NH-□150B = 150 A

Condition 1: The ambient temperature of the SSR (the temperature inside the panel) is within the rated value specified.

Condition 2: The right heat sink is provided to the SSR.

Load Power Supply Voltage: 100 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
4.8 min.	30	60	---	-205□	-205□	---
1.9 to 4.7	75	150	-210□ -215□	-210□	-210□	---
1.3 to 1.8	110	220	-220□ -225□	-220□	-220□	---
0.65 to 1.2	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.36 to 0.64	400	800	---	---	---	-2075□
0.16 to 0.35	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 110 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
5.2 min.	30	60	---	-205□	-205□	---
2.1 to 5.1	75	150	-210□ -215□	-210□	-210□	---
1.5 to 2.0	110	220	-220□ -225□	-220□	-220□	---
0.71 to 1.4	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.39 to 0.70	400	800	---	---	---	-2075□
0.18 to 0.38	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 120 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
5.7 min.	30	60	---	-205□	-205□	---
2.3 to 5.6	75	150	-210□ -215□	-210□	-210□	---
1.6 to 2.2	110	220	-220□ -225□	-220□	-220□	---
0.78 to 1.5	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.43 to 0.77	400	800	---	---	---	-2075□
0.19 to 0.42	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 200 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
9.5 min.	30	60	---	-205□	-205□	---
3.8 to 9.4	75	150	-210□ -215□	-210□	-210□	---
2.6 to 3.7	110	220	-220□ -225□	-220□	-220□	---
1.3 to 2.5	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.71 to 1.2	400	800	---	---	---	-2075□
0.32 to 0.70	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 220 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
10.4 min.	30	60	---	-205□	-205□	---
4.2 to 10.3	75	150	-210□ -215□	-210□	-210□	---
2.9 to 4.1	110	220	-220□ -225□	-220□	-220□	---
1.5 to 2.8	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.78 to 1.4	400	800	---	---	---	-2075□
0.35 to 0.77	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 240 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
11.4 min.	30	60	---	-205□	-205□	---
4.6 to 11.3	75	150	-210□ -215□	-210□	-210□	---
3.1 to 4.5	110	220	-220□ -225□	-220□	-220□	---
1.6 to 3.0	220	440	-235□ -240□ -245□ -260□	-240□	---	---
0.85 to 1.5	400	800	---	---	---	-2075□
0.38 to 0.84	900	1,800	---	---	---	-2150□

Load Power Supply Voltage: 400 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
7.6 min.	75	150	---	-410□	---	---
5.2 to 7.5	110	220	-420□ -430□	-420□	---	---
2.6 to 5.1	220	440	-435□ -445□	---	---	---
1.5 to 2.5	400	800	---	---	---	-4075□
0.63 to 1.4	900	1,800	---	---	---	-4150□

Load Power Supply Voltage: 440 V

Trans-former DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P≅	G3NA	G3NE	G3NH
8.3 min.	75	150	---	-410□	---	---
5.7 to 8.2	110	220	-420□ -430□	-420□	---	---
2.9 to 5.6	220	440	-435□ -450□	---	---	---
1.6 to 2.8	400	800	---	---	---	-4075□
0.70 to 1.5	900	1,800	---	---	---	-4150□

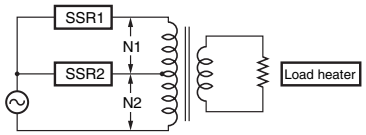
Load Power Supply Voltage: 480 V

Transformer DC resistance (Ω)	Inrush current (A)	SSR inrush current resistance (A)	Applicable SSR			
			G3P□	G3NA	G3NE	G3NH
9.1 min.	75	150	---	-410□	---	---
6.2 to 9.0	110	220	-420□ -430□	-420□	---	---
3.1 to 6.1	220	440	-450□	---	---	---

Transformer Tap Selection

SSRs can be used to switch between transformer taps. In this case, however, be aware of voltage induced on the OFF-side SSR. The induced voltage increases in proportion to the number of turns of the winding that is almost equivalent to the tap voltage.

See the following example. The power supply voltage is at 200 V, N1 is 100, N2 is 100, and SSR2 is ON. Then the difference in voltage between output terminals of SSR1 is at 400 V (i.e., twice as high as the power supply voltage).



■ Designing SSR Circuits

Heat Radiation Designing

1. SSR Heat Radiation

Triacs, thyristors, and power transistors are semiconductors that can be used for an SSR output circuit. These semiconductors have a residual voltage internally when the SSR is turned ON. This is called output-ON voltage drop. If the SSR has a load current, the Joule heating of the SSR will result consequently. The heating value P (W) is obtained from the following formula.

Heating value P (W) = Output-ON voltage drop (V) × Carry current (A)

For example, if a load current of 8 A flows from the G3NA-210B, the following heating value will be obtained.

$P = 1.6\ V \times 8\ A = 12.8\ W$

If the SSR employs power MOS FET for SSR output, the heating value is calculated from the ON-state resistance of the power MOS FET instead.

In that case, the heating value P (W) will be obtained from the following formula.

$P\ (W) = \text{Load current}^2\ (A) \times \text{ON-state resistance}\ (\Omega)$

If the G3RZ with a load current of 0.5 A is used, the following heating value will be obtained.

$P\ (W) = 0.5^2\ A \times 2.4\ \Omega = 0.6\ W$

The ON-state resistance of a power MOS FET rises with an increase in the junction temperature of a power MOS FET. Therefore, the ON-state resistance varies while the SSR is in operation. If the load current is 80% of the load current or higher, as a simple method, the ON-state resistance will be multiplied by 1.5.

$P\ (W) = 1^2\ A \times 2.4\ \Omega \times 1.5 = 3.6\ W$

The SSR in usual operation switches a current of approximately 5 A with no heat sink used. If the SSR must switch a higher current, a heat sink will be required. The higher the load current is, the larger the heat sink size will be. If the switching current is 10 A or more, the size of the SSR with a heat sink will exceed a single mechanical relay. This is a disadvantage of SSRs for circuit downsizing purposes.

2. Heat Sink Selection

SSR models with no heat sinks incorporated (i.e., the G3NA, G3NE, and three-phase G3PB) need external heat sinks. When using any of these SSRs, select an ideal combination of the SSR and heat sink according to the load current.

The following combinations are ideal, for example.

G3NA-220B: Y92B-N100
G3NE-210T(L): Y92B-N50
G3PB-235B-3H-VD: Y92B-P200

A standard heat sink equivalent to an OMRON-made one can be used, on condition that the thermal resistance of the heat sink is lower than that of the OMRON-made one.

For example, the Y92B-N100 has a thermal resistance of 1.63°C/W.

If the thermal resistance of the standard heat sink is lower than this value (i.e., 1.5°C/W, for example), the standard heat sink can be used for the G3NA-220B.

Thermal resistance indicates a temperature rise per unit (W). The smaller the value is, the higher the efficiency of heat radiation will be.

3. Calculating Heat Sink Area

An SSR with an external heat sink can be directly mounted to control panels under the following conditions.

- If the heat sink is made of steel used for standard panels, do not apply a current as high as or higher than 10 A, because the heat conductivity of steel is less than that of aluminum. Heat conductivity (in units of W·m·°C) varies with the material as described below.

Steel: 20 to 50
Aluminum: 150 to 220

The use of an aluminum-made heat sink is recommended if the SSR is directly mounted to control panels. Refer to the data sheet of the SSR for the required heat sink area.

- Apply heat-radiation silicon grease (e.g., the YG6260 from Toshiba or the G746 from Shin-Etsu) or a heat conductive sheet between the SSR and heat sink. There will be a space between the SSR and heat sink attached to the SSR. Therefore, the generated heat of the SSR cannot be radiated properly without the grease. As a result, the SSR may be overheated and damaged or deteriorated.
  The heat dissipation capacity of a heat conduction sheet is generally inferior to that of silicon grease. If a heat conduction sheet is used, reduce the load current by approximately 10% from the *Load Current vs. Ambient Temperature Characteristics* graph.

4. Control Panel Heat Radiation Designing

Control equipment using semiconductors will generate heat, regardless of whether SSRs are used or not. The failure rate of semiconductors greatly increases when the ambient temperature rises. It is said that the failure rate of semiconductors will be doubled when the temperature rises 10°C (Arrhenius model).

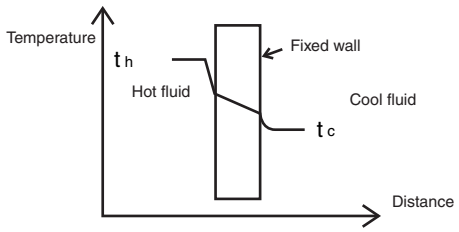
Therefore, it is absolutely necessary to suppress the interior temperature rise of the control panel in order to ensure the long, reliable operation of the control equipment.

Heat-radiating devices in a wide variety exists in the control panel. As a matter of course, it is necessary to consider the total temperature rise as well as local temperature rise of the control panel. The following description provides information on the total heat radiation designing of the control panel.

As shown below, the heat conductivity Q will be obtained from the following formula, provided that t_h and t_c are the temperature of the hot fluid and that of the cool fluid separated by the fixed wall.

$Q = k (t_h - t_c) A$

Where, k is an overall heat transfer coefficient (W/m²°C). This formula is called a formula of overall heat transfer.



When this formula is applicable to the heat conductivity of the control panel under the following conditions, the heat conductivity Q will be obtained as shown below.

Average rate of overall heat transfer of control panel: k (W/m²°C)
Internal temperature of control panel: T_h (°C)
Ambient temperature: T_c (°C)
Surface area of control panel: S (m²)
$Q = k \times (T_h - T_c) \times S$

The required cooling capacity is obtained from the following formula under the following conditions.

Desired internal temperature of control panel: T_h (°C)
Total internal heat radiation of control panel: P_1 (W)
Required cooling capacity: P_2 (W)
$P_2 = P_1 - k \times (T_h - T_c) \times S$

The overall heat transfer coefficient k of a standard fixed wall in a place with natural air ventilation will be 4 to 12 (W/m²°C). In the case of a standard control panel with no cooling fan, it is an empirically known fact that a coefficient of 4 to 6 (W/m²°C) is practically applicable. Based on this, the required cooling capacity of the control panel is obtained as shown below.

Example

- Desired internal temperature of control panel: 40°C
- Ambient temperature: 30°C
- Control panel size 2.5 × 2 × 0.5 m (W × H × D)
  Self-sustained control panel (with the bottom area excluded from the calculation of the surface area)
- SSR: 20 G3PA-240B Units in continuous operation at 30 A.
- Total heat radiation of all control devices except SSRs: 500 W

Total heat radiation of control panel: P1

P1 = Output-ON voltage drop 1.6 V × Load current 30 A × 20 SSRs + Total heat radiation of all control devices except SSRs = 960 W + 500 W = 1460 W

Heat radiation from control panel: Q2

Q2 = Rate of overall heat transfer 5 × (40°C − 30°C) × (2.5 m × 2 m × 2 + 0.5m × 2 m × 2 + 2.5 m × 0.5 m) = 662.5 W

Therefore, the required cooling capacity P2 will be obtained from the following formula.

P2 = 1,460 − 663 = 797 W

Therefore, heat radiation from the surface of the control panel is insufficient. More than a heat quantity of 797 W needs to be radiated outside the control panel.

Usually, a ventilation fan with a required capacity will be installed. If the fan is not sufficient, an air conditioner for the control panel will be installed. The air conditioner is ideal for the long-time operation of the control panel because it will effectively dehumidify the interior of the control panel and eliminate dust gathering in the control panel.

Axial-flow fan: OMRON's R87B, R87F, and R87T Series
Air conditioner for control panel: Apiste's ENC Series

5. Types of Cooling Device

Axial-flow Fans (for Ventilation)

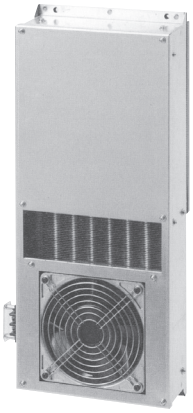
These products are used for normal types of cooling and ventilation. OMRON's Axial-flow Fan lineup includes the R87F and R87T Series.



Heat Exchangers

Heat exchangers dissipate the heat inside control panels along heat pipes. Using a heat exchanger enables the inside and outside of the control panel to be mutually isolated, allowing use in locations subject to dust or oil mist.

Note: OMRON does not produce heat exchangers.



Air Conditioners for Control Panels

Not only do these products offer the highest cooling capacity, they also offer resistance to dust and humidity by mutually isolating the inside and outside of the control panel.

Note: OMRON does not produce air conditioners for control panels.



Handling the SSRs

Do Not Drop

The SSR is a high-precision component. Do not drop the SSR or subject it to excessive vibration or shock regardless of whether the SSR is mounted or not.

The maximum vibration and shock that an SSR can withstand varies with the model. Refer to the relevant datasheet.

The SSR cannot maintain its full performance capability if the SSR is dropped or subjected to excessive vibration or shock resulting in possible damage to its internal components.

The impact of shock applied to the SSR that is dropped varies, and depends on the floor material, the angle of collision with the floor, and the dropping height. For example, if a single SSR is dropped on a plastic tile from a height of 10 cm, the SSR may receive a shock of 1,000 m/s^2 or more.

Handle SSRs in in-line packages with the same care and keep them free from excessive vibration or shock.

SSR Life Expectancy

The SSR is not subject to mechanical wear. Therefore, the endurance of the SSR depends on the rate of internal component malfunction. For example, the rate for the G3M-202P is 321 Fit (1 Fit = 10^{-9} = λ (malfunctions/operation)). The MTTF calculated from this value is as follows:

$MTTF = 321/\lambda_{60} = 3.12 \times 10^6$ (operations)

The effects of heat on the solder also need to be considered in estimating the total life expectancy of the SSR. The solder deteriorates due to heat-stress from a number of causes. OMRON estimates that the SSR begins to malfunction due to solder deterioration approximately 10 years after it is first installed.

■ Mounting and Installation

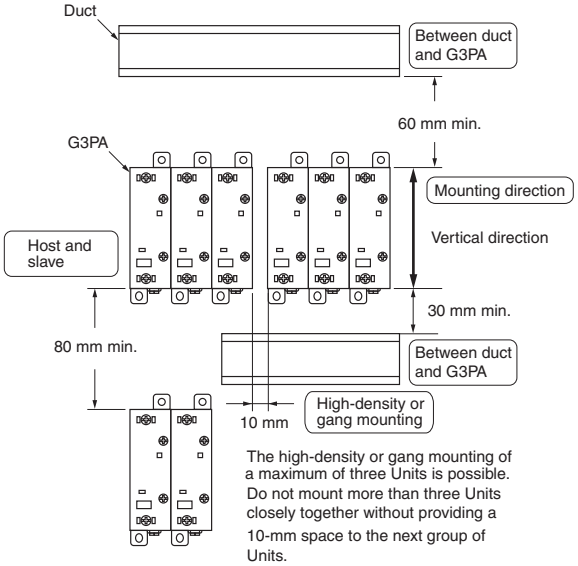
Panel Mounting

If SSRs are mounted inside an enclosed panel, the radiated heat of the SSR will stay inside, thus not only dropping the carry-current capacity of the SSRs but also adversely affecting other electronic device mounted inside. Open some ventilation holes on the upper and lower sides of the control panel before use.I

The following illustrations provide a recommended mounting example of G3PA Units. They provide only a rough guide and so be sure to confirm operating conditions using the procedure detailed in *(4) Confirmation after Installation*

1. SSR Mounting Pitch

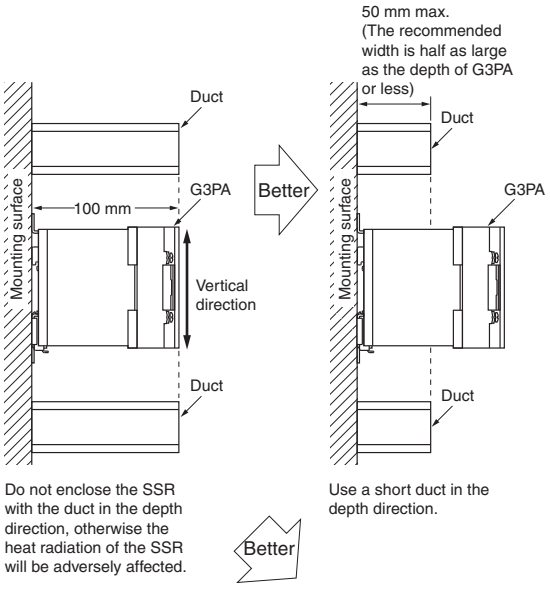
Panel Mounting



The high-density or gang mounting of a maximum of three Units is possible. Do not mount more than three Units closely together without providing a 10-mm space to the next group of Units.

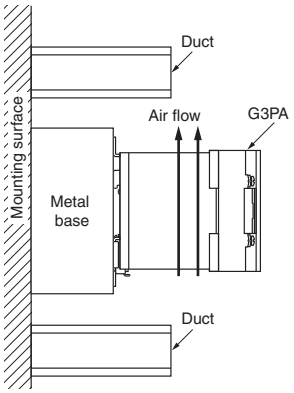
2. Relationship between SSRs and Ducts

Duct Depth



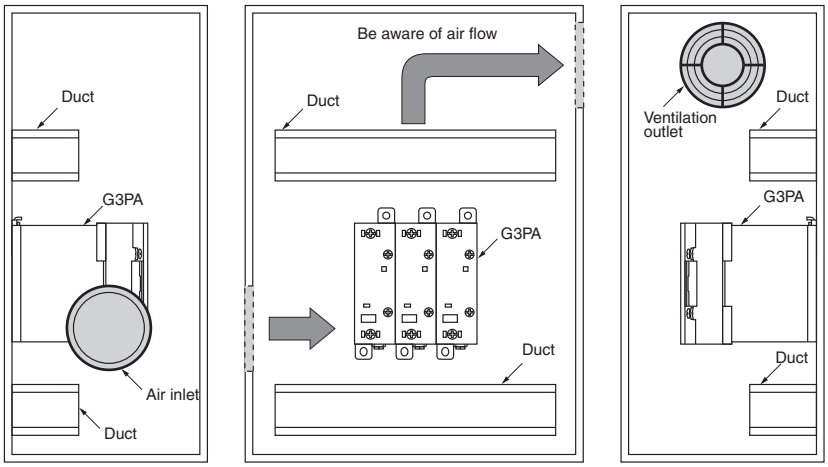
Do not enclose the SSR with the duct in the depth direction, otherwise the heat radiation of the SSR will be adversely affected.

Use a short duct in the depth direction.



If the height of the ducts cannot be lowered, place the SSRs on a metal base so that they are not surrounded by the ducts.

3.Ventilation



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging and ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, or otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the G3PA Units to ensure the efficiency of the heat exchanger.

4. Confirmation after Installation

The above conditions are typical examples confirmed by OMRON. The application environment may affect conditions and ultimately the ambient temperature must be measured under power application to confirm that the load current-ambient temperature ratings are satisfied for each model.

Ambient Temperature Measurement Conditions

1. Measure the ambient temperature under the power application conditions that will produce the highest temperature in the control panel and after the ambient temperature has become saturated.
2. Refer to *Figure 1* for the measurement position. If there is a duct or other equipment within the measurement distance of 100 mm, refer to *Figure 2*. If the side temperature cannot be measured, refer to *Figure 3*.

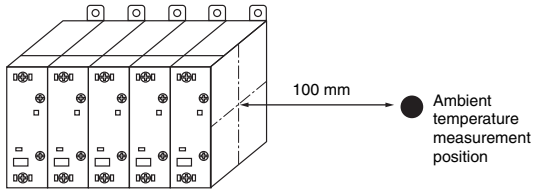


Figure 1: Basic Measurement Position for Ambient Temperature

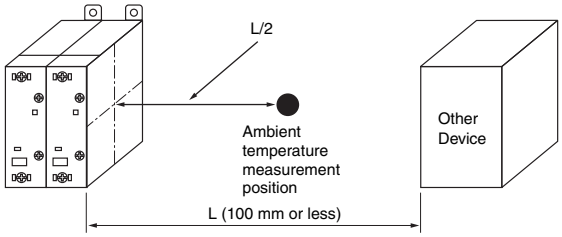


Figure 2: Measurement Position when a Duct or Other Device is Present

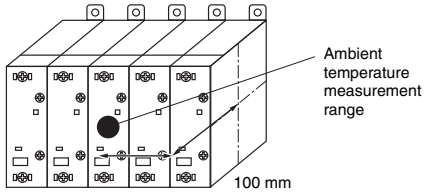


Figure 3: Measurement Position when Side Temperature Cannot be Measured

3. If more than one row of SSRs are mounted in the control panel, measure the ambient temperature of each row, and use the position with the highest temperature.
   Consult your OMRON dealer, however, if the measurement conditions are different from those given above.

Definition of Ambient Temperature

SSRs basically dissipate heat by natural convection. Therefore, the ambient temperature is the temperature of the air that dissipates the heat of the SSR.

PCB-mounting SSRs

Suitable PCBs

PCB Material

PCBs are classified into epoxy PCBs and phenol PCBs. The following table lists the characteristics of these PCBs. Select one, taking into account the application and cost. Epoxy PCBs are recommended for SSR mounting in order to prevent the solder from cracking.

Item	Epoxy		Phenol
	Glass epoxy	Paper epoxy	Paper phenol
Electrical characteristics	High insulation resistance. Highly resistive to moisture absorption.	Inferior to glass epoxy but superior to paper phenol PCBs.	New PCBs are highly insulation-resistive but easily affected by moisture absorption and cannot maintain good insulation performance over a long time.
Mechanical characteristics	The dimensions are not easily affected by temperature or humidity. Ideal for through-hole or multi-layer PCBs.	Inferior to glass epoxy but superior to paper phenol PCBs.	The dimensions are easily affected by temperature or humidity. Not suitable for through-hole PCBs.
Economical efficiency	Expensive	Rather expensive	Inexpensive
Application	Applications that require high reliability.	Applications that may require less reliability than those for glass epoxy PCBs but require more reliability than those of paper phenol PCBs.	Applications in comparatively good environments with low-density wiring.

PCB Thickness

The PCB may warp due to the size, mounting method, or ambient operating temperature of the PCB or the weight of components mounted to the PCB. Should warping occur, the internal mechanism of the SSR on the PCB will be deformed and the SSR may not provide its full capability. Determine the thickness of the PCB by taking the material of the PCB into consideration.

Terminal Hole and Land Diameters

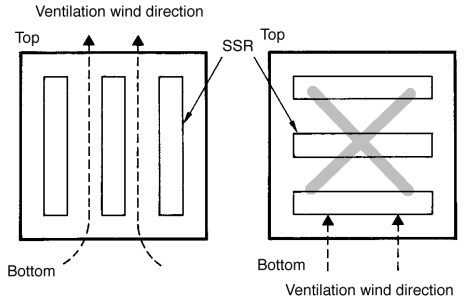
Refer to the following table to select the terminal hole and land diameters based on the SSR mounting dimensions. The land diameter may be smaller if the land is processed with through-hole plating.

Hole dia. (mm)		Minimum land dia. (mm)
Nominal value	Tolerance	
0.6	±0.1	1.5
0.8		1.8
1.0		2.0
1.2		2.5
1.3		2.5
1.5		3.0
1.6		3.0
2.0		3.0

Mounting Space

The ambient temperature around the sections where the SSR is mounted must be within the permissible ambient operating temperature. If two or more SSRs are mounted closely together, the SSRs may radiate excessive heat. Therefore, make sure that the SSRs are separated from one another at the specified distance provided in the datasheet. If there is no such specification, maintain a space that is as wide as a single SSR.

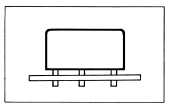
Provide adequate ventilation to the SSRs as shown in the following diagram.



Mounting SSR to PCB

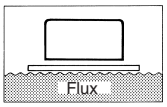
Read the precautions for each model and fully familiarize yourself with the following information when mounting the SSR to the PCB.

Step 1
SSR mounting



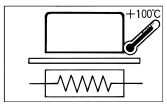
1. Do not bend the terminals to make the SSR self-standing, otherwise the full performance of the SSR may not be possible.
2. Process the PCB properly according to the mounting dimensions.

Step 2
Flux coating



1. The flux must be a non-corrosive rosin flux, which is suitable to the material of the SSR.
   Apply alcohol solvent to dissolve the flux.
2. Make sure that all parts of the SSR other than the terminals are free of the flux. The insulation resistance of the SSR may be degraded if there is flux on the bottom of the SSR.

Step 3
Preheating

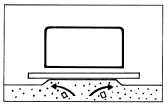


1. Be sure to preheat the SSR to allow better soldering.
2. Preheat the SSR under the following conditions.

Temperature	100°C max.
Time	1 min max.

3. Do not use the SSR if it is left at high temperature over a long time. This may change the characteristics of the SSR.

Step 4
Soldering

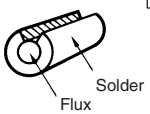


Automatic Soldering

1. Flow soldering is recommended for maintaining a uniform soldering quality.
   - Solder: JIS Z3282 or H63A
   - Soldering temperature: Approx. 260°C
   - Soldering time: Approx. 5 s (Approx. 2 s for first time and approx. 3 s for second time for DWS)
   - Perform solder level adjustments so that the solder will not overflow on the PCB.

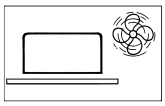
Manual Soldering

1. After smoothing the tip of the soldering iron, solder the SSR under the following conditions.
   - Solder: JIS Z3282, 1160A, or H63A with rosin-flux-cored solder
   - Soldering iron: 30 to 60 W
   - Soldering temperature: 280°C to 300°C
   - Soldering time: Approx. 3 s



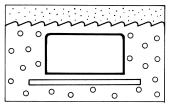
2. As shown in the above illustration, solder with a groove for preventing flux dispersion.

Step 5
Cooling



1. After soldering the SSR, be sure to cool down the SSR so that the soldering heat will not deteriorate the SSR or any other components.
2. Do not dip the SSR into cold liquid, such as a detergent, immediately after soldering the SSR.

Step 6
Cleaning



1. Refer to the following table for the selection of the cleaning method and detergent.

Detergent

Boiling or dip cleaning is possible for the SSR. Do not perform ultrasonic cleaning or cut the terminals, otherwise the internal parts of the SSR may be damaged. Make sure that the temperature of the detergent is within the permissible ambient operating temperature of the SSR.

2. Applicability of Detergents

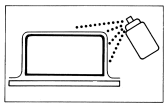
Detergent		Applicability
Chlorine detergent	Perochine Chlorosolder Trichloroethylene	OK
Aqueous detergent	Indusco Holys Pure water (pure hot water)	OK
Alcohol	IPA Ethanol	OK
Others	Paint thinner Gasoline	NG

Note: 1. Contact your OMRON representatives before using any other detergent. Do not apply Freon TMC, paint thinner, or gasoline to any SSR.

2. The space between the SSR and PCB may be not be adequately cleaned with a hydrocarbon or alcohol detergent.

Actions are being taken worldwide to stop the use of CFC-113 (chlorofluorocarbon) and 1.1.1 trichloroethane. Your understanding and cooperation are highly appreciated.

Step 7
Coating



1. Do not fix the whole SSR with resin, otherwise the characteristics of the SSR may change.
2. The temperature of the coating material must be within the permissible ambient operating temperature range.

Coating

Type	Applicability
Epoxy	OK
Urethane	OK
Silicone	OK

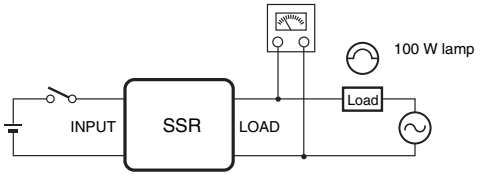
Q&A for SSRs

Q1 We think an SSR is faulty. Can a voltage tester be used to check an SSR to see if current is flowing?

A1 No, that is not possible.
The voltage and current in the tester's internal circuits are too low to check the operation of the semiconductor element in the SSR (a triac or thyristor). The SSR can be tested as described below if a load is connected.

● **Testing Method**

Connect a load and power supply, and check the voltage of the load terminals with the input ON and OFF. The output voltage will be close to the load power supply voltage with the SSR turned OFF. The voltage will drop to approximately 1 V with the SSR turned ON. This is more clearly checked if the dummy load is a lamp with an output of about 100 W.



Q2 What kind of applications can power MOS FET relays be used for?

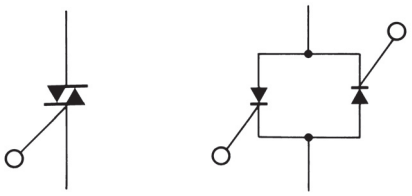
A2

1. Applications where it is not known whether the load connected to the relay is AC or DC.
   Example: Alarm output of robot controller.
2. Applications with high-frequency switching of loads, such as for solenoid valves with internally, fully rectified waves, where the relay (e.g., G2R) has to be replaced frequently.
   Power MOS FET relays have a longer lifetime than other relays and so the replacement frequency is less.
   The terminals of the G3RZ are compatible with those of the G2R-1A-S and so these models can be exchanged.

   Note: Confirm the input voltage, polarity, and output capacity before application.
3. Applications with high-voltage DC loads.
   In order to switch a 100-VDC, 1-A load with a relay, an MM2XP or equivalent is required. With the G3RZ power MOS FET relay, however, switching at this size is possible.
4. Applications where SSRs are used with a bleeder resistance.
   The leakage current for power MOS FET relays is very small (10 μA max.) and so a bleeder resistance is not required.

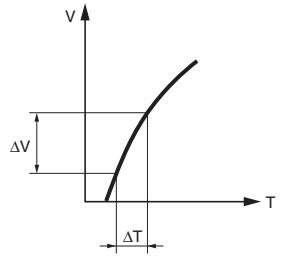
Q3 What is the difference in switching with a thyristor and a triac?

A3 There is no difference between them as long as resistive loads are switched. For inductive loads, however, thyristors are superior to triacs due to the inverse parallel connection of the thyristors. For the switching element, an SSR uses either a triac or a pair of thyristors connected in an inverse parallel connection.



There is a difference between thyristors and triacs in response time to rapid voltage rises or drops. This difference is expressed by dv/dt (V/μs). This value of thyristors is larger than that of triacs. Triacs can switch inductive motor loads that are as high as 3.7 kW. Furthermore, a single triac can be the functional equivalent of a pair of thyristors connected in an inverse parallel connection and can thus be used to contribute to downsizing SSRs.

Note: dv/dt = Voltage rise rate.

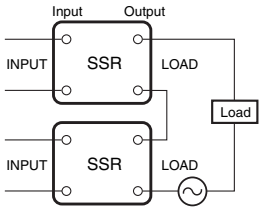


ΔV/ΔT = dv/dt: Voltage rise rate

	Resistive load		Inductive load	
	40 A max.	Over 40 A	3.7 kW max.	Over 3.7 kW
Triac	OK	OK	OK	Not as good
Two thyristors	OK	OK	OK	OK

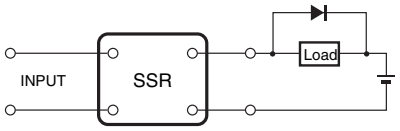
Q4 Is it possible to connect SSRs in series?

A4 Yes, it is. SSRs are connected in series mainly to prevent short circuit failures. Each SSR connected in series shares the burden of the surge voltage. The overvoltage is divided among the SSRs, reducing the load on each.
A high operating voltage, however, cannot be applied to the SSRs connected in series. The reason is that the SSRs cannot share the burden of the load voltage due to the difference between the SSRs in operating time and reset time when the load is switched.



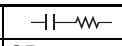
Q5 What needs to be done for surge absorption elements for SSRs for DC loads?

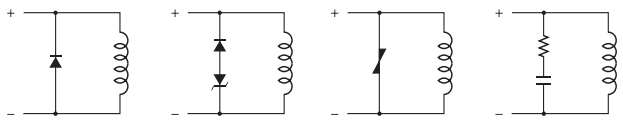
A5 Output Noise Surge Countermeasures for SSRs for DC Load Switching
When an L load, such as a solenoid or electromagnetic valve, is connected, connect a diode that prevents counter-electromotive force. If the counter-electromotive force exceeds the withstand voltage of the SSR output element, it could result in damage to the SSR output element. To prevent this, insert the element parallel to the load, as shown in the following diagram and table.



As an absorption element, the diode is the most effective at suppressing the counter-electromotive force. The release time for the solenoid or electromagnetic valve will, however, increase. Be sure to check the circuit before use. To shorten the time, connect a Zener diode and a regular diode in series. The release time will be shortened at the same rate that the Zener voltage (Vz) of the Zener diode is increased.

Table 1. Absorption Element Example

Absorption element				
	Diode	Diode + Zener diode	Varistor	CR
Effectiveness	Most effective	Most effective	Somewhat effective	Ineffective



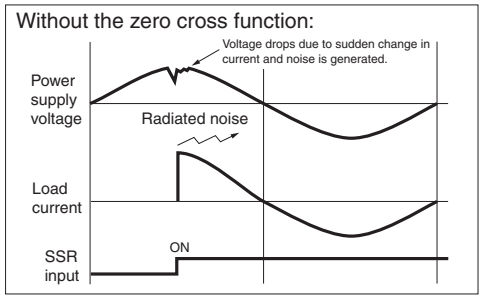
Reference

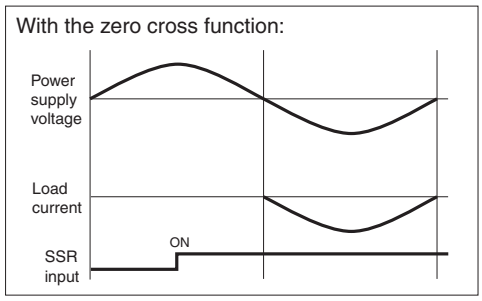
1. Selecting a Diode
   Withstand voltage = $V_{RM} \geq$ Power supply voltage × 2
   Forward current = IF ≥ load current
2. Selecting a Zener Diode
   Zener voltage =
   Vz < (Voltage between SSR's collector and emitter)* − (Power supply voltage + 2 V)
   Zener surge power =
   $P_{RSM} > V_Z \times$ Load current × Safety factor (2 to 3)

Note: When the Zener voltage is increased (V_Z), the Zener diode capacity (P_{RSM}) is also increased.

Q6 What is the zero cross function?

A6 The zero cross function turns ON the SSR when the AC load voltage is close to 0 V, thus suppressing the noise generation of the load current when the load current rises quickly.
The generated noise will be partly imposed on the power line and the rest will be released in the air. The zero cross function effectively suppresses both noise paths.
A high inrush current will flow when the lamp is turned ON, for example. When the zero cross function is used, the load current always starts from a point close to 0 V. This will suppress the inrush current more than SSRs without the zero cross function.



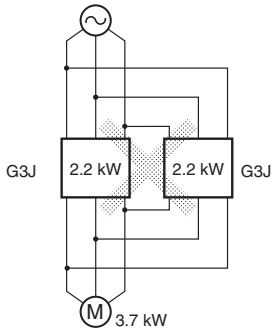


Q7 Is it possible to connect two 200-VAC SSRs in series to a 400-VAC load?

A7 No, it is not. The two SSRs are slightly different to each other in operating time. Therefore, 400 VAC will be imposed on the SSR with a longer operating time.

Q8 Is it possible to connect SSRs in parallel?

A8 Yes, it is. SSRs are connected in parallel mainly to prevent open circuit failures. Usually, only one of the SSR is turned ON due to the difference in output ON voltage drop between the SSRs.
Therefore, it is not possible to increase the load current by connecting the SSRs in parallel.
If an ON-state SSR in operation is open, the other SSR will turn ON when the voltage is applied, thus maintaining the switching operation of the load.
Do not connect two or more SSRs in parallel to drive a load exceeding the capacity each SSRs; the SSRs may fail to operate.



Example:
It is not possible to countrol a 3.7-kW heater with two SSRs for 2.2kW connected in parallel.

Q9 What is silicon grease?

A9 Special silicon grease is used to aid heat dissipation. The heat conduction of this special compound is five to ten times higher than standard silicon grease.
This special silicon grease is used to fill the space between a heat-radiating part, such as an SSR, and the heat sink to improve the heat conduction of the SSR.
Unless special silicon grease is applied, the generated heat of the SSR will not be radiated properly. As a result, the SSR may break or deteriorate due to overheating.

Available Silicon Grease Products for Heat Dissipation

Toshiba Silicone: YG6260
Shin-Etsu Silicones: G746

Q10 What precautions are necessary for forward/reverse operation of the singlephase motor?

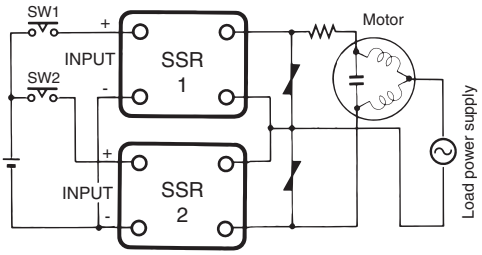
A10 Refer the following table for the protection of capacitor motors driven by SSRs.

Single-phase 100 V	Load current of recommended SSR	Protection of motor in forward/reverse operation
		R
25 W	AC 2 to 3 A	R = 6 Ω, 10 W
40 W		
60 W	AC 5 A	R = 4 Ω, 20 W
90 W		R = 3 Ω, 40 to 50 W

Single-phase 200 V	Load current of recommended SSR	Protection of motor in forward/reverse operation
		R
25 W	AC 2 to 3 A	R = 12 Ω, 10 W
40 W		
60 W	AC 5 A	R = 12 Ω, 20 W
90 W		R = 8 Ω, 40 W

Precautions for Forward/Reverse Operation

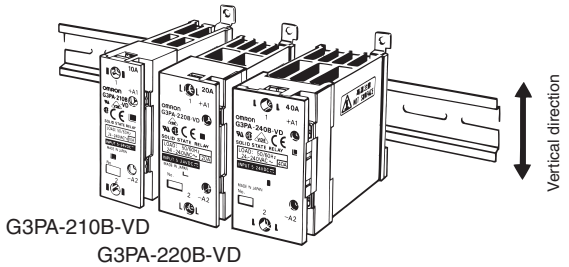
1. In the following circuit, if SSR1 and SSR2 are turned ON simultaneously, the discharge current, i, of the capacitor may damage the SSRs. Therefore, a minimum 30-ms time lag is required to switch between SSR1 and SSR2. If the malfunction of the SSRs is possible due to external noise or the counter-electromotive force of the motor, connect L or r in series with either SSR1 or SSR2 whichever is less frequently use. A CR absorber (consisting of 0.1-μF capacitor withstanding 630 V and 22-Ω resistor withstanding 2 W) can be connected in parallel to each SSR so that the malfunctioning of the SSRs will be suppressed.



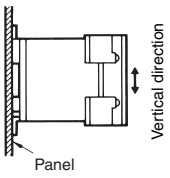
2. When the motor is in forward/reverse operation, a voltage that is twice as high as the power supply voltage may be imposed on an SSR that is OFF due to the LC resonance of the motor.
When selecting an SSR, be careful that this voltage does not exceed the rated load voltage of the SSR. (It is necessary to determine whether use is possible by measuring the actual voltage applied to the SSR on the OFF side.)

Q11 Does an SSR have a mounting direction?

A11 An SSR consists of semiconductor elements. Therefore, unlike mechanical relays that incorporate movable parts, gravity changes have no influence on the characteristics of the SSR.
Changes in the heat radiation of an SSR may, however, limit the carry current of the SSR.
An SSR should be mounted vertically. If the SSR has to be mounted horizontally, check with the SSR's datasheet. If there is no data available for the SSR, use with a load current at least 30% lower than the rated load current.

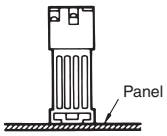


G3PA-210B-VD
G3PA-220B-VD
G3PA-240B-VD



Vertical mounting

Mount the SSR vertically.



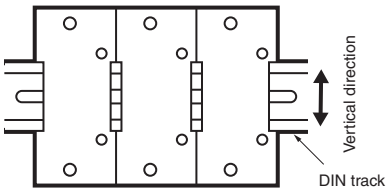
Flat Mounting

The SSR may be mounted on a flat surface, provided that the load current applied is 30% lower than the rated load current.

Q12 What precautions are required for high-density mounting or gang mounting?

A12 In the case of high-density or gang mounting of SSRs, check the relevant data in the SSR datasheet. If there is no data, check that the load current applied is 70% of the rated load current. A 100% load current can be applied if groups of three SSRs are mounted in a single row with a space as wide as a single SSR between adjacent groups.
If the SSRs are mounted in two or more rows, it is necessary to confirm the temperature rise of the SSR separately.
With side-by-side high-density or gang mounting of SSRs with heat sinks, reduce the load current to 80% of the rated load current.
Refer to the SSR's datasheet for details.

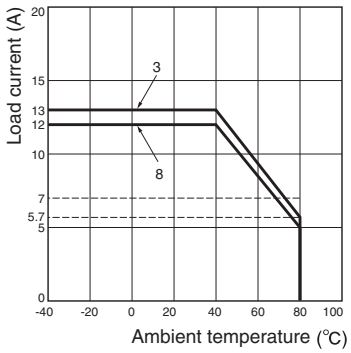
G3PA



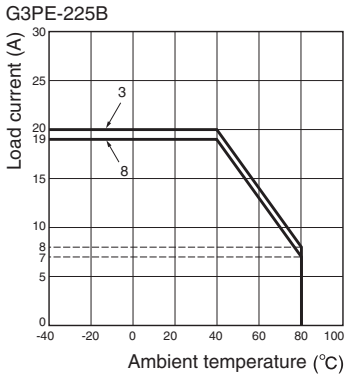
Do not mount more than a group of three Units closely together without providing a 10-mm space to the next group.

G3PE
Characteristic Data
High-density or Gang Mounting (3 or 8 Units)

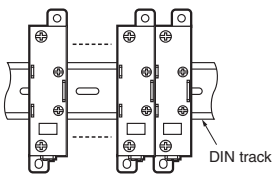
G3PE-215B



G3PE-225B



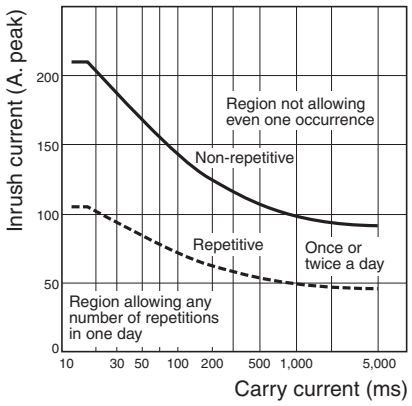
Example of high-density or gang mounting



Q13 What is the non-repetitive inrush current?

A13 The datasheet of an SSR gives the non-repetitive inrush current of the SSR. The concept of the non-repetitive inrush current of an SSR is the same as an absolute maximum rating of an element. Once the inrush current exceeds the level of the non-repetitive inrush current, the SSR will be destroyed. Therefore, check that the maximum inrush current of the SSR in usual ON/OFF operation is 1/2 of the non-repetitive inrush current. Unlike mechanical relays that may result in contact abrasion, the SSR will provide good performance as long as the actual inrush current is a maximum of 1/2 of the non-repetitive inrush current. If the SSR is in continuous ON/OFF operation and a current exceeding the rated value flows frequently, however, the SSR may overheat and a malfunction may result. Check that the SSR is operated with no overheating. Roughly speaking, inrush currents that are less than the non-repetitive inrush current and greater than the repetitive inrush current can be withstood once or twice a day (e.g., this level of inrush current can be withstood in cases where power is supplied to devices once a day).

G3NE-220T



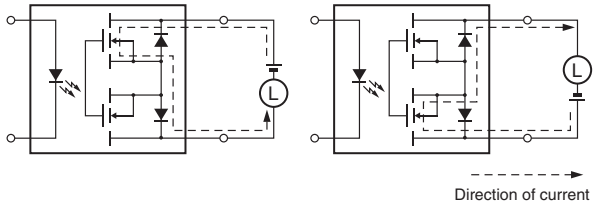
Q14 What kind of failure do SSRs have most frequently?

A14 OMRON's data indicates that most failures are caused by overvoltage or overcurrent as a result of the short-circuiting of SSRs. This data is based on SSR output conditions, which include those resulting from the open or short circuit failures on the input side.

	Failure	Load condition
Input	Short	Does not turn ON.
	Open	Does not turn ON.
Output	Output triac short circuit (80% of failures)	Does not turn OFF.
	Output triac open circuit (20% of failures)	Does not turn ON.

Q15 Why can MOS FET relays be used for both AC and DC loads?

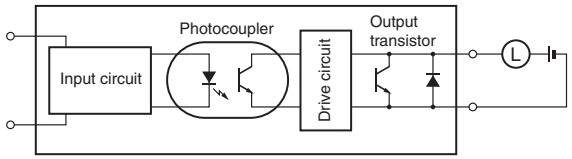
A15 With power MOS FET relays, because 2 MOS FET relays are connected in series in the way shown on the right, the load power supply can be connected in either direction. Also, because power MOS FET elements have a high dielectric strength, they can be used for AC loads, where the polarity changes every cycle.



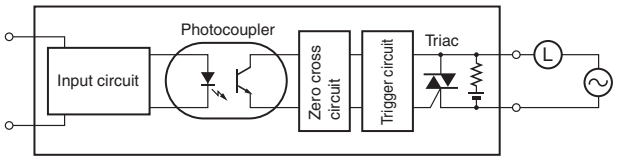
Q16 What are the differences between SSRs and power MOS FET relays?

A16 **Number 1: There are SSRs for DC loads and SSRs for AC loads.**

SSR for DC Loads (e.g., G3HD)



SSR for AC Loads (e.g., G3H)

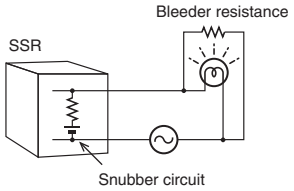


Power MOS FET relays can be used for both DC loads and AC loads.

Number 2: The leakage current for power MOS FET relays is small compared to that for SSRs.

SSRs

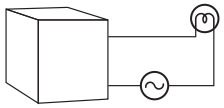
The lamp (see below) is faintly light by the leakage current. A bleeder resistance is added to prevent this. With SSRs, a snubber circuit is required to protect the output element.



Power MOS FET Relays

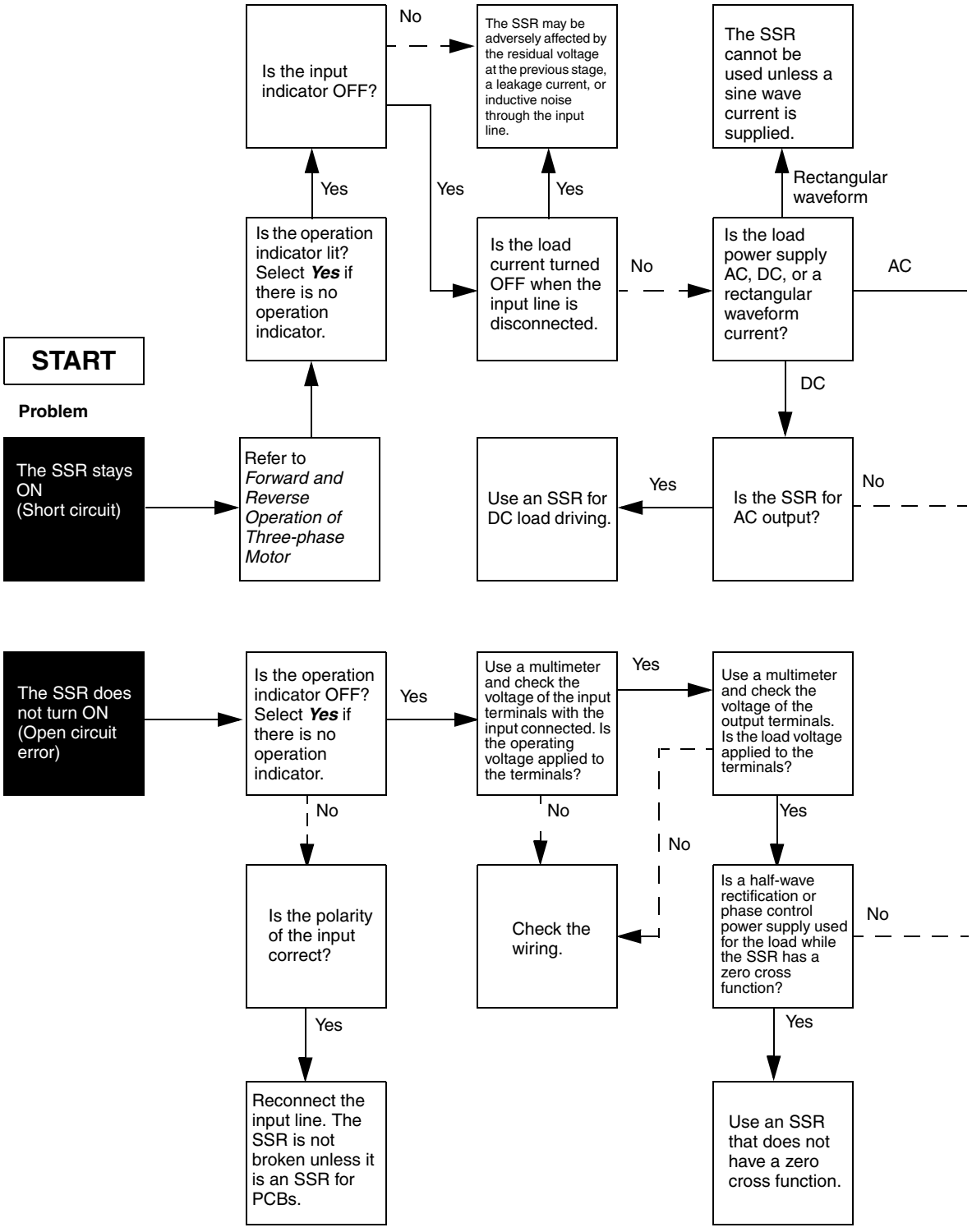
The leakage current is very small (10 μA max.) and so the lamp does not light. This is because a snubber circuit is not required to protect the MOS FET output element. A varistor is used to protect the MOS FET.

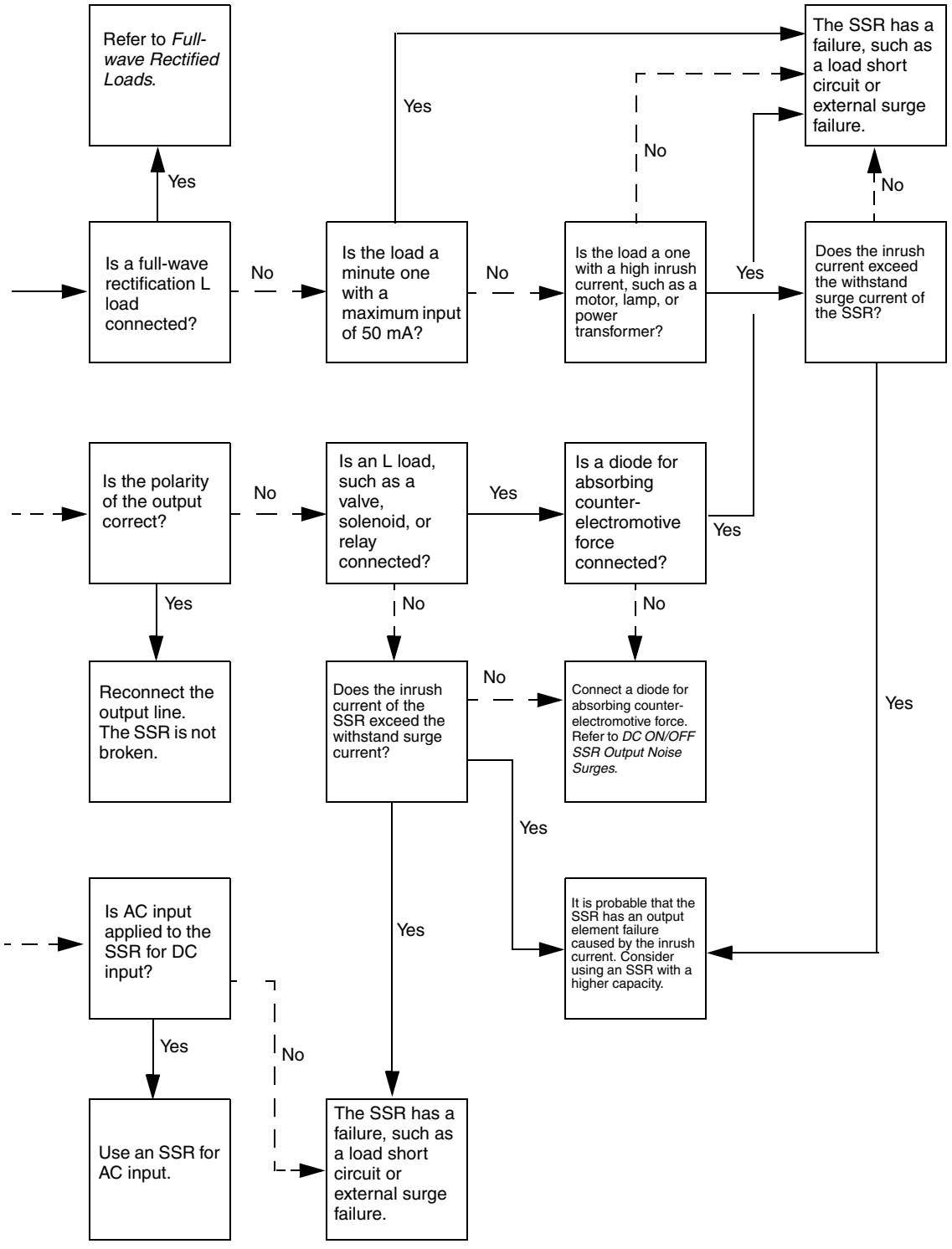
Power MOS FET relay



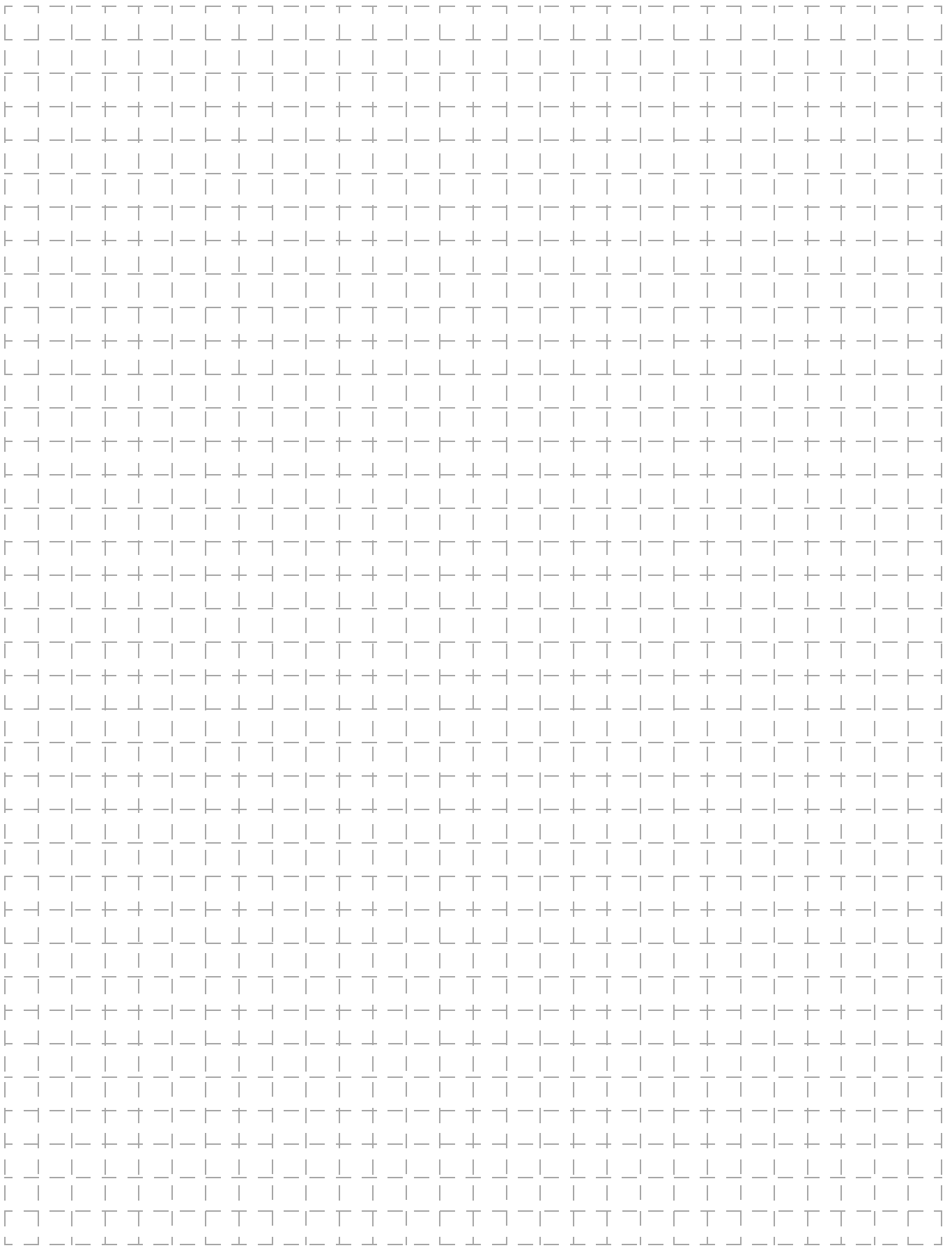
A bleeder resistance is not required and so circuits can be simplified and production costs reduced.

SSR Troubleshooting




Refer to *Full-wave Rectified Loads*.
Yes
Is a full-wave rectification L load connected?
No
Is the load a minute one with a maximum input of 50 mA?
Yes
No
Is the load a one with a high inrush current, such as a motor, lamp, or power transformer?
Yes
No
The SSR has a failure, such as a load short circuit or external surge failure.
No
Does the inrush current exceed the withstand surge current of the SSR?
Yes
Is the polarity of the output correct?
No
Is an L load, such as a valve, solenoid, or relay connected?
Yes
Is a diode for absorbing counter-electromotive force connected?
Yes
No
No
Yes
Reconnect the output line. The SSR is not broken.
Does the inrush current of the SSR exceed the withstand surge current?
No
Connect a diode for absorbing counter-electromotive force. Refer to *DC ON/OFF SSR Output Noise Surges*.
Yes
Yes
Is AC input applied to the SSR for DC input?
Yes
No
It is probable that the SSR has an output element failure caused by the inrush current. Consider using an SSR with a higher capacity.
Use an SSR for AC input.
The SSR has a failure, such as a load short circuit or external surge failure.

MEMO



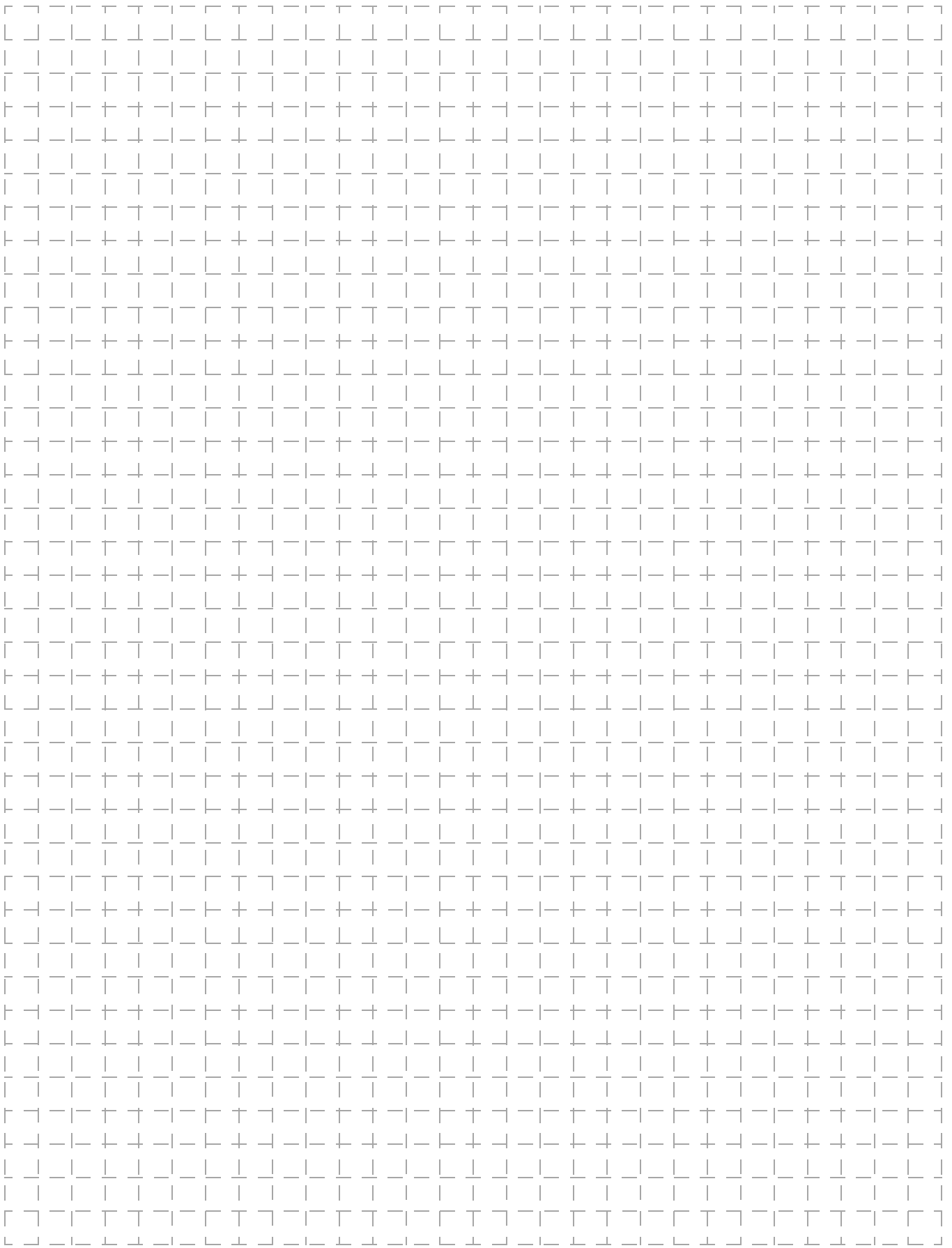
SSR Selection Guide

	 Page 369	 Page 373	 Page 377	 Page 383
General Attributes	**G3DZ**	**G3S/G3SD**	**G3MC**	**G3MB**
Dimensions	12.5 max. H x 18.5 L x 6.5 W (0.49 x 0.73 x 0.26) max.	16.5 H x 20 L x 10 W (0.65 x 0.79 x 0.39)	13.5 H* x 24.5 L x 4.5 W (0.53 x 0.96 x 0.18) *2A models : 20.5mm H	20.5 H x 24.5 L x 5.5 W (0.81 x 0.96 x 0.22)
Switching current (resistive)	0.6A @ 240VAC 0.6A @ 100VDC	1A @ 240VAC (1.2A, G3S-PD & heatsink) (1.1A, G3SD-PD & heatsink)	1A @ 120VAC 2A @ 240VAC	2A @ 240VAC
Features	• AC/DC & AC half-wave switching with one model • 10μA max. leakage current • Matches G6D form factor	• AC and DC models available • Socketable • Heatsink, available • Same footprint as G6B (1 Form A standard type)	• Reduced height thin profile SIP • Ideal for close PCB mounting • Monoblock construction results in ultimate reliability • Industry standard footprint	• Bottom surface area is less than 1/2 of G3M • Special 7-20mA input models available • Two footprints for design flexibility
Operating Temperature	-30 to +85°C	-30 to +80°C	-30 to +80°C	-30 to +80°C
Operating input	5, 12, 24VDC	5, 12, 24VDC	5, 12, 24VDC	5, 12, 24VDC (Current controlled versions are available.)
Output voltage	5-240VAC 5-100VDC	"201" models 100-240VAC "Z01" models 4-24VDC	75-264VAC	75-264VAC
Leakage Current (max.)	10μA (at 125VDC)	2mA (G3S) 0.1mA @ 26VDC (G3SD)	1.5mA (at 200VAC)	1.5mA (at 200VAC)
Isolation	Photodiode array	Phototriac (G3S) Photocoupler (G3SD)	Phototriac	Phototriac
Dielectric strength (50/60Hz for 1 min.)	2,500VAC	2,500VAC	2,500VAC	2,500VAC
Zero crossing	No	Optional	Yes	Optional
Snubber circuit	No	Yes (AC load models only)	Yes	Optional
Life (MTTF)	100,000 hours	100,000 hours	100,000 hours	100,000 hours
Mounting	PCB or PCB socket	PCB or Socket	PCB	PCB
Terminal	PCB	PCB	PCB	PCB
Approvals	UL, CSA	"US" models: UL, CSA	"VD" models: UL, CSA, VDE	"UTU" models: UL, CSA, TUV
Equivalent Omron EMR footprint	G6D	G6B	N/A	N/A
Optional heat sink	N/A	Y92B-S08N	N/A	N/A
Socket	P6D-04P	P6B-04P	N/A	N/A

	 Page 387	 Page 395	 Page 407	 Page 415
General Attributes	**G3TB**	**G3TC**	**G2R-I/O**	**G3M**
Dimensions	Input module: 20.5 H x 43.5 L x 10 W (0.81 x 1.70 x 0.39) Output module: 30.5 H x 43.5 L x 10 W (1.20 x 1.70 x 0.39)	31.8 H x 43.2 L x 15.2 W (1.25 x 1.7 x 0.6)	Input & Output modules: 28 H x 29 L x 13 W (1.10 x 1.14 x 0.51)	20 H x 40 L x 9 W* (0.79 x 1.58 x 0.35) *5A model: 25 H x 40 L x 7.6 W
Switching current (resistive)	Input module: 25mA @ 4 to 32VDC Output module: 3A max. @ 5 to 48VDC 3A max. @ 100 to 240 VAC 1.5Amax. @ 48 to 200 VDC	Input module: 12mA, 15mA, or 18mA (depending on model) Output module: 3A (1A on DC output models rated< 200VDC)	Input module: 100mA; Output module: 2A	2A, 3A, 5A @ 240VAC
Features	• Color-coded input & output modules • Industry standard footprint • 4kV dielectric strength • LED indicator (option)	• Color-coded modules • Industry standard footprint • Built-in anchor screw • Optical isolation – Dielectric 4kV • Zero cross on AC output modules	• 4 kV insulation • Operation indicator standard • Footprint is similar to G2R-S(S) • Ideal for DIN rail mount I/O	• Zero cross models • Space-saving SIP design • Ideal for high density Power PCB applications • High current switching capability
Operating Temperature	-30 to +80°C	-30 to +80°C	-30 to +80°C	-30 to +80°C
Operating input	Input module: 80-264VAC, 3-32VDC; Output module: 3-32VDC 4-32VDC (LED)	Input module: 90-140VDC/AC, 180-280 VDC/AC, 10-32VDC/AC Output module: 5, 15, 24VDC	Input module: 5VDC, 6.6-32VDC, 60-264VAC Output module: 4-32VDC	5, 12, 24VDC
Output voltage	Input module: 4-32VDC; Output module: 75-264VAC, 4-200VDC	Input module: 4.5-6VDC, 12-18VDC, 20-30VDC Output module: 75-140 VAC, 75-280VAC, 5-60 VDC, 5-200VDC	Input module: 4-32VDC Output module: 75-264VAC, 4-200VDC	75-264VAC
Leakage Current (max.)	Input module: 100μA max. Output module: 5mA @ 200VAC (AC) 1mA max. (DC)	Input module: 100μA AC Output modules: 5mA @ 240VAC 2.5mA @ 120VAC DC Output modules: 1mA	Input Module: 5μA Output Module: 1.5mA (AC) 1mA (DC)	2mA @ 100VAC/5mA @ 200VAC (2Amp versions) 1.5mA @ 200VAC (3 & 5 Amp versions)
Isolation	Photocoupler	AC Input, DC Input, DC Output: Photocoupler AC Output: Phototriac	Photocoupler, Phototriac	Phototriac
Dielectric strength (50/60Hz for 1 min.)	4,000VAC	4,000VAC	4,000VAC	2,000VAC (2A versions) 2,500VAC (3A and 5A versions)
Zero crossing	Input module: No; Output module: Yes (AC)	Yes (AC output modules only)	Input module: No; Output module: Yes	Optional
Snubber circuit	Input module: No; Output module: Yes	Yes (AC output modules only)	No	No
Life (MTTF)	100,000 hours	100,000 hours	100,000 hours	100,000 hours
Mounting	PCB	PCB with anchor screw	Socket	PCB
Terminal	PCB	PCB	Plug-in	PCB
Approvals	"US" models: UL, CSA	UL, CSA, TUV, CE	UL, CSA, TUV	"UTU" models: UL, CSA, TUV
Equivalent Omron EMR footprint	N/A	N/A	G2RS	N/A
Optional heat sink	N/A	N/A	N/A	N/A
Socket	N/A	N/A	P2RF-05E	N/A

General Attributes	 *Page 421* **G3NE**	 *Page 427* **G3PE**	 *Page 437* **G3PA**	 *Page 451* **G3NA**	 *Page 467* **G3NA-6**
Dimensions	11.5 H x 47.5 L x 37.5 W (0.45 x 1.90 x 1.50)	100 H x 84 L x 22.5 W 15A, 25A Models 100 H x 84 L x 44.5 W 35A, 45A Models (dimensions apply to single phase models only)	100 H x 90 L x 27 W 10A Models 100 H x 90 L x 37 W 20A Models 100 H x 90 L x 47W 30A, 40A Models 100 H x 90 L x 110W 50A, 60A Models	27 H x 58 L x 43 W (1.06 x 2.28 x 1.69)	28 H x 58 L x 43 W (1.06 x 2.28 x 1.69)
Switching current (resistive)	20A max.@ 240VAC (264VAC max.)	Models range from 15A to 45A	Models range from 10A to 60A	Versions range from 10A to 90A max. (when using heat sink)	Versions available in 10A, 25A and 50A max. (when using heat sink)
Features	• High capacity • Panel Mount • Quick-connect terminals • Low profile of 11.5mm height	• Industrial SSR with attached heatsink • Zero cross or Fast turn on models • Panel or track mounting	• Industrial SSR with attached heatsink • Close mounting possible for linking terminals. (Except for G3PA-260B-VD and G3PA-450B-VD-2) • Panel or track mounting • Replacable power element cartridges.	• Ideal for industrial controls & commercial cooking • "Hockey Puck" standard • Operation indicator standard	• 600 VAC load capability in standard "Hockey Puck" package. • Lower input current: 7mA max @ 24VDC • Operation indicator standard • Panel or track mounting
Operating Temperature	-30 to +80°C	-30 to +80°C	-30 to +80°C	-30 to +80°C	-30 to +80°C
Operating input	5, 12, 24VDC	12-24VDC	5-24VDC; 24VAC	4-32VDC; 75-264VAC	5-24VDC: 100-240 VAC
Output voltage	75-264VAC	100-240VAC	24 - 240VAC 180 to 400VAC 200 to 480VAC	19 - 264VAC 180 - 528VAC 4 - 220VDC (10A model)	400 - 600 VAC (360 - 660VAC max. range)
Leakage Current (max.)	2mA (at 100VAC) 5mA (at 200VAC)	10mA (200VAC)	"210B" and "220B" models: 5mA @ 100 VAC 10mA @ 200VAC "240B" and "260B" models 10mA @ 100VAC 20mA @ 200VAC All other models: 20mA @ 400VAC, 480VAC	5mA @ 100VAC 10mA @ 200VAC 20mA @ 400VAC	10mA @ 400VAC 20mA @ 600 VAC
Isolation	Phototriac	Phototriac	Phototriac	Phototriac, Photocoupler	Photocoupler
Dielectric strength (50/60Hz for 1 min.)	2,000VAC	2,500VAC	4,000 VAC	2,500VAC 4000VAC: (75 and 90A models)	4,000 VAC
Zero crossing	Optional	Yes	Optional	Yes	Yes
Snubber circuit	Yes (built in varistor)	Yes	Yes	Yes	No
Life (MTTF)	100,000 hours	100,000 hours	100,000 hours	100,000 hours	100,000 hours
Mounting	Panel	Panel, DIN	Panel, DIN	Panel	Panel
Terminal	Quick connect	Screw	Screw	Screw	Screw
Approvals	"US": UL, CSA, TUV	UL, CSA, TUV	UL, CSA, VDE	"UTU": UL, CSA, TUV	UL, CSA
Equivalent Omron EMR footprint	N/A	N/A	N/A	N/A	N/A
Optional heat sink	Y92B-N50, -N100	N/A	N/A	Y92B-A □, -B □, -P □	Y92B-A □, -B □, -P □
Socket	DIN Adapter available	N/A	N/A	DIN Adapter available	DIN Adapter available

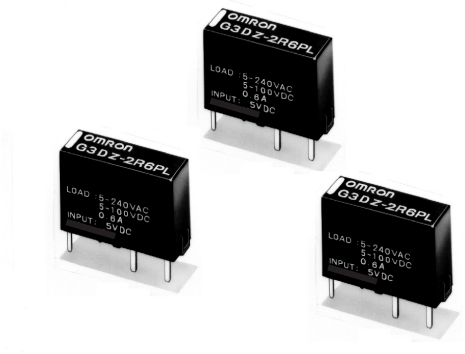
MEMO



Solid State Relay
G3DZ

SSR Identical to the G6D in Size with a Maximum AC/DC Switching Current of 0.6 A

- Switching 0.6 A at 240 VAC or 100 VDC.
- 10-μA current leakage max. between open output terminals.
- 2,500-VAC dielectric strength ensured between input and output terminals.
- Switching full- and half-wave rectified alternating currents.
- Approved by UL and CSA.



Ordering Information

To order: Select the part number and add the desired input voltage rating. (e.g., G3DZ-2R6PL DC5)

Contact form	Insulation	Zero cross function	Indicator	Applicable output load	Rated input voltage	Model
SPST-NO	Photo-voltage coupler	No	No	0.6 A at 5 to 240 VAC 5 to 100 VDC	5 VDC	**G3DZ-2R6PL**
					12 VDC	
					24 VDC	

■ Accessories (Order Separately)

See Dimensions for details.

Connecting socket	**P6D-04P**

Specifications

■ Ratings

Input

Rated voltage	Operating voltage	Input impedance	Voltage level	
			Must operate	Must release
5 VDC	4 to 6 VDC	830 Ω±20%	4 VDC max.	1 VDC min.
12 VDC	9.6 to 14.4 VDC	2 kΩ±20%	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	4 kΩ±20%	19.2 VDC max.	

Output

Rated voltage	Load voltage	Load current	Inrush current
5 to 240 VAC, 5 to 100 VDC	3 to 264 VAC, 3 to 125 VDC	100 μA to 0.6 A	6 A (ms)

■ Characteristics

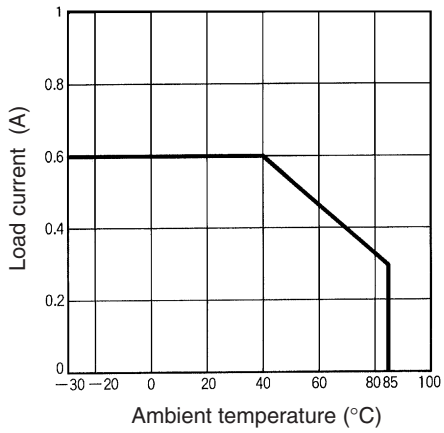
Operate time (see note)	6 ms max.
Release time (see note)	10 ms max.
Output ON-resistance (see note)	2.4 Ω max.
Leakage current	10 μA max. (at 125 VDC)
Insulation resistance	100 MΩ min. (500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between input and output
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction: 1,000 m/s^2
Ambient temperature	Operating: -30°C to 85°C (with no icing or condensation) Storage: -30°C to 100°C (with no icing or condensation)
Approved standards	UL File No. E64562 CSA File No. LR35535
Ambient humidity	Operating 45% to 85%
Weight	Approx. 3.1 g

Note: These values are under the measurement conditions whereby rated voltages are applied to the input.

Engineering Data

Load Current vs. Ambient Temperature Characteristics

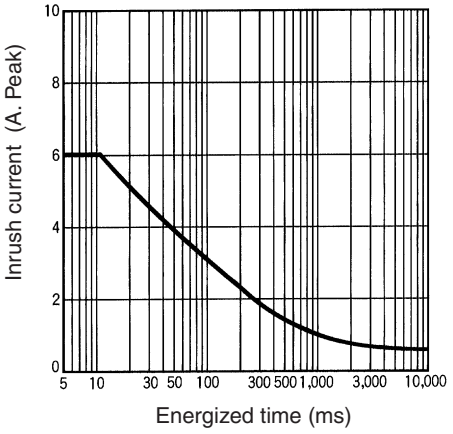
G3DZ-2R6PL



Inrush Current Resistivity

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

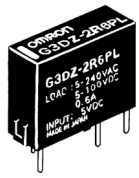
G3DZ-2R6PL

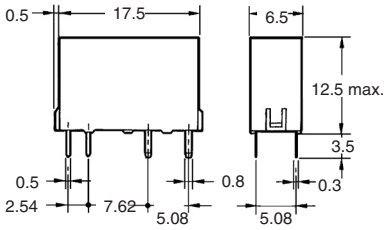


Dimensions

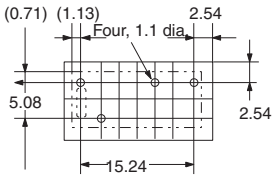
Note: 1. All units are in millimeters unless otherwise indicated.
2. Orientation marks are indicated as follows:

G3DZ-2R6PL

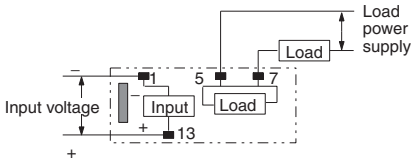




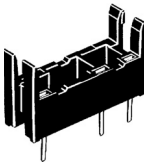
Mounting Holes (Bottom View)

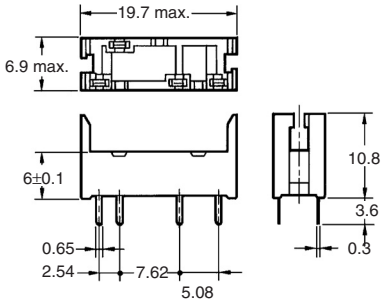


Terminal Arrangement/ Internal Connections (Bottom View)

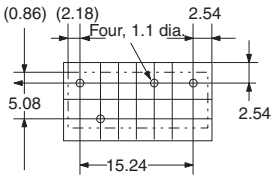


P6D-04P Connecting Socket

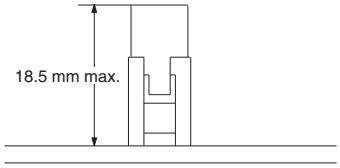




Mounting Holes (Bottom View)

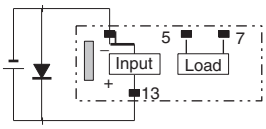


Socket Mounting Height



Precautions

If any reversed surge voltage is imposed on the input terminals, insert a diode in parallel to the input terminals as shown in the following circuit diagram and do not impose a reversed voltage value of 3 V or more.



Terminals

Since terminals are made of materials with high heat conduction, complete soldering (automatic or manual) within 10 seconds at a temperature of 260°C.

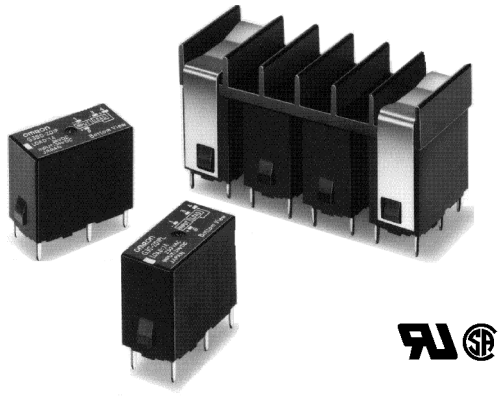
When fitting with a Socket, match properly and push straight down vertically.

MEMO

Solid State Relay
G3S/G3SD

Ultra-small Relay Breaks up to 1 A

- Ultra-small, dual in-line package (DIP) SSR.
- Terminals compatible with G6B Electromagnetic Relay's. Mix with G6Bs as the application requires.
- Close side-by-side mounting possible. In addition, heat sink dedicated to this mounting style also available.
- Both AC- and DC-load versions available.
- High isolation of 2,500 VAC between input and output freeing inputs from noise surge generated in the load.
- Approved by UL and CSA.



Ordering Information

To order: Select the part number and add the desired input voltage (Ex: G3SD-Z01P-PD-US *DC12*)

Isolation	Zero cross function	Indicator	Rated output load (applicable output load)	Rated input voltage	Model
Phototriac	No	No	1 A at 100 to 240 VAC (1 A at 75 to 264 VAC) (see note 1)	5 VDC	**G3S-201PL-US**
				12 VDC	
				24 VDC	
			1.2 A at 100 to 240 VAC (1.2 A at 75 to 264 VAC) (see note 1)	5 VDC	**G3S-201PL-PD-US**
				12 VDC	
				24 VDC	
Photocoupler			1 A at 4 to 24 VDC (1 A at 3 to 26 VDC) (see note 2)	5 VDC	**G3SD-Z01P-US**
				12 VDC	
				24 VDC	
			1.1 A at 4 to 24 VDC (1.1 A at 3 to 26 VDC) (see note 2)	5 VDC	**G3SD-Z01P-PD-US**
				12 VDC	
				24 VDC	

Note: 1. Product is labelled "250 VAC"
2. Product is labelled "24 VDC"

■ Accessories (Order Separately)

Heat Sink

Heat Sink	**Y92B-S08N**

See *Dimension* for details.

Connecting Socket

Connecting socket	**P6D-04P**

See *Dimensions* for details.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Impedance		Voltage level	
		G3S-201PL/201PL-PD	G3S-Z01PL/Z01P-PD	Must operate	Must release
5VDC	4 to 6 VDC	450 Ω±20%	630 Ω±20%	4 VDC max,	1 VDC min.
12 VDC	9.6 to 14.4 VDC	1.1 kΩ±20%	1.5 kΩ±20%	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	2.2 kΩ±20%	2.8 kΩ±20%	19.2 VDC max.	

Output

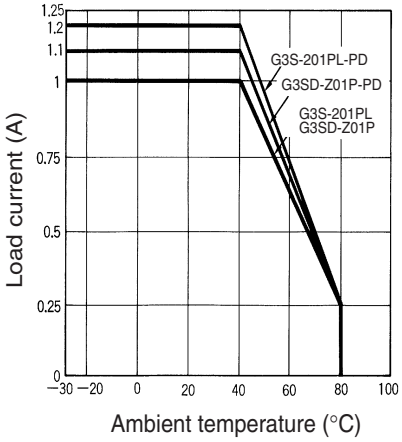
Model	Applicable load			
	Rated load voltage	Rated load voltage range	Load current	Inrush current
G3S-201PL	100 to 240 VAC	75 to 264 VAC	0.1 to 1A	15 A (60 Hz, 1 cycle)
G3S-201PL-PD			0.1 to 1.2 A	
G3SD-Z01PL	4 to 24 VDC	3 to 26 VDC	0.01 to 1A	3 A (10 ms)
G3SD-Z01PL-PD			0.01 to 1.1 A	

■ Characteristics

Item	G3S-201PL/201PL-PD	G3SD-Z01PL/Z01P-PD
Operate time	1 ms max.	
Release time	1/2 of load power source cycle + 1 ms. max.	1 ms. max.
Output ON voltage drop	1.6 V (RMS) max.	1.5 V max.
Leakage current	2 mA max.	0.1 mA max. (at 26 VDC)
Insulation resistance	100 MΩ min. (500 VDC)	
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Malfunction: 1,000 m/s^2	
Ambient temperature	Operating: -30°C to 80°C (with no icing or condensation) Storage: -30°C to 100°C (with no icing or condensation)	
Ambient humidity	Operating: 45% to 85%	
Approved standards	UL File No. E64562/CSA File No. LR35535	
Weight	Approx. 13 g	

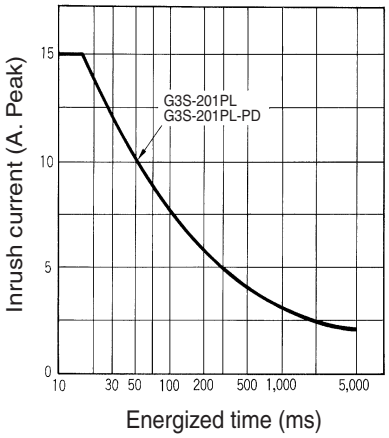
Engineering Data

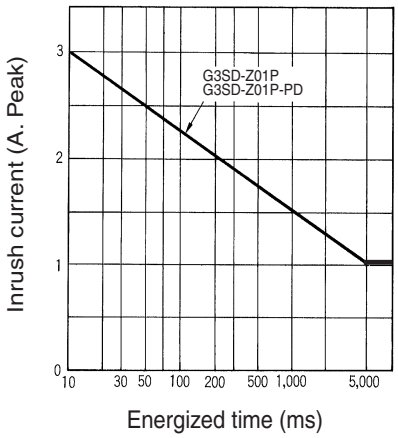
Load Current vs. Ambient Temperature Characteristics



Inrush Current Resistivity

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

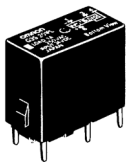


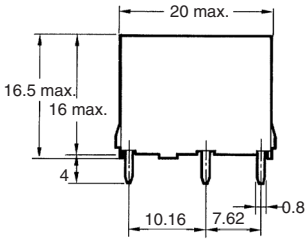


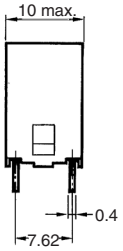
Dimensions

Note: All units are in millimeters unless otherwise indicated.

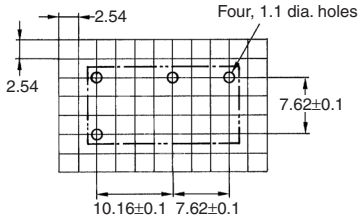
G3S/G3SD



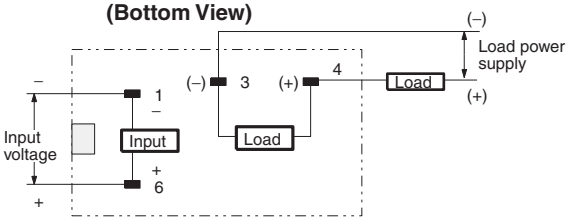




PCB Dimensions (Bottom View)

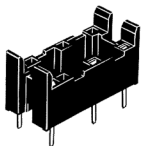


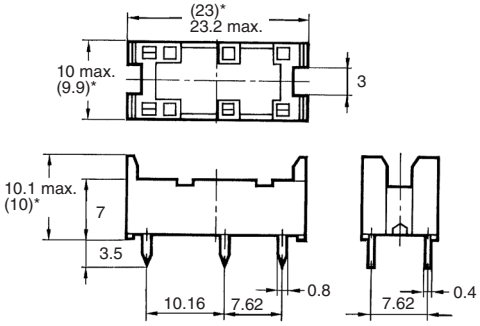
Terminal Arrangement/ Internal Connections (Bottom View)



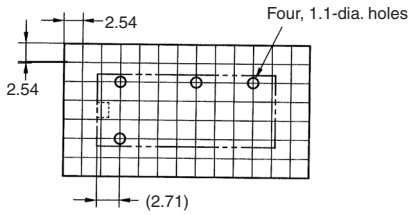
Note: Values in parentheses apply to the DC-load versions.

Connecting Socket
P6B-04P



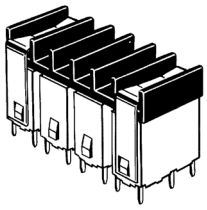


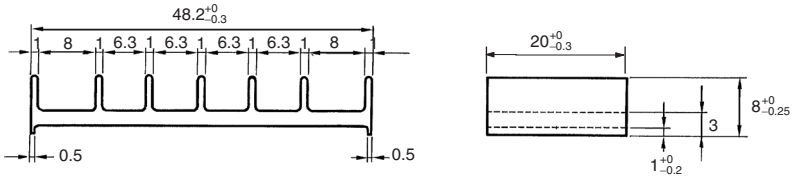
PCB Dimensions
(Bottom View)



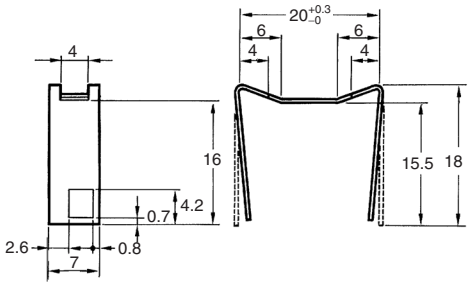
*Average value

Heat Sink
Y92B-S08N

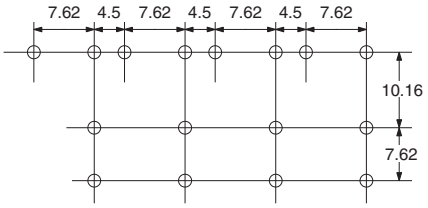




Mounting Bracket



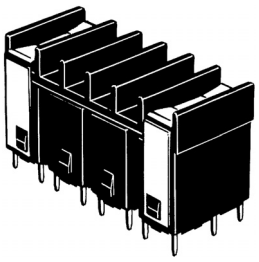
PCB Dimensions
(Bottom View)



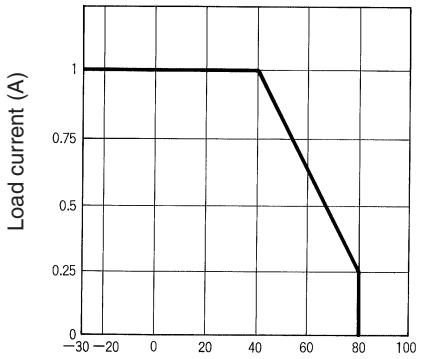
Precautions

Close Mounting

G3S-201PL-PD and G3SD-Z01-PD SSRs can be closely mounted side by side. Attach the Y92B-S08N Heat Sink to the SSRs mounted closely side by side. When these SSRs are mounted side by side, the load current vs. ambient temperature characteristic declines as shown on the right.



Load Current vs. Ambient Temperature Characteristics
(When four SSRs are mounted side by side and each of them is switched to the same load current.)



Connection

With the SSR for DC switching, the load can be connected to either positive or negative output terminal of the SSR

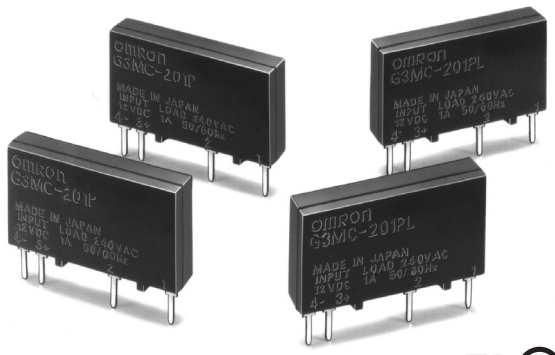
Protective Component

Since the SSR does not incorporate an overvoltage absorption component, be sure to connect an overvoltage absorption component when using the SSR under an inductive load.

Solid State Relay
G3MC

Compact, Thin-profile, Low-cost SSR with Reinforced Insulation

- Small bottom surface area (approx. 80% of the conventional G3MB's), ideal for close PCB mounting.
- DC input and AC output for an applicable load of 1A at 40°C.
- Compact, thin-profile SSR of monoblock construction with an all-in-one frame incorporates a PCB, terminals, and a heatsink.
- Approved by UL and CSA. VDE certified models available.
- Models with reinforced insulation are available.



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G3MC-101P-*DC12*).

Isolation	Zero-cross function	Built-in snubber circuit	Rated output load	Rated input voltage	Part number
Phototriac	Yes	Yes	1 A at 100 to 120 VAC (75 to 132 VAC)	5 VDC	**G3MC-101P**
				12 VDC	
				24 VDC	
	No			5 VDC	**G3MC-101PL**
				12 VDC	
				24 VDC	
	Yes		2 A at 100 to 240 VAC (75 to 264 VAC)	5 VDC	**G3MC-202P**
				12 VDC	
				24 VDC	
	No			5 VDC	**G3MC-202PL**
				12 VDC	
				24 VDC	

Note: 1. All models meet UL and CSA standards. In order to obtain VDE approved versions with UL, CSA and VDE Logos, add "-VD" to the part number. Example: G3MC-101P-*VD*-DC12

2. 2A models are available with reinforced insulation. Add "-1" to the part number to obain 2A models with reinfored insulation.
Examples: G3MC-202PL-*1*-DC5 G3MC-202P-VD-*1*-DC24

Specifications

■ Ratings (Ambient temperature 25°C)

Input

Rated voltage	Operating voltage	Impedance	Voltage levels	
			Must operate voltage	Must dropout voltage
5 VDC	4 to 6 VDC	300Ω ±20%	4 VDC max.	1 VDC min.
12 VDC	9.6 to 14.4 VDC	800Ω ±20%	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	1.6kΩ ±20%	19.2 VDC max.	

Note: Each model has 5-VDC, 12-VDC, and 24-VDC input versions.

Output

Part number	Applicable load			
	Rated load voltage	Load voltage range	Load current	Surge current
G3MC-101P(L)(-VD)	100 to 120 VAC, 50/60 Hz	75 to 132 VAC, 50/60 Hz	0.1 to 1 A	8 A (60 Hz, 1 cycle)
G3MC-202P(L)(-VD)(-1)	100 to 240 VAC, 50/60 Hz	75 to 264 VAC, 50/60 Hz	0.1 to 2 A	30 A (60 Hz, 1 cycle)

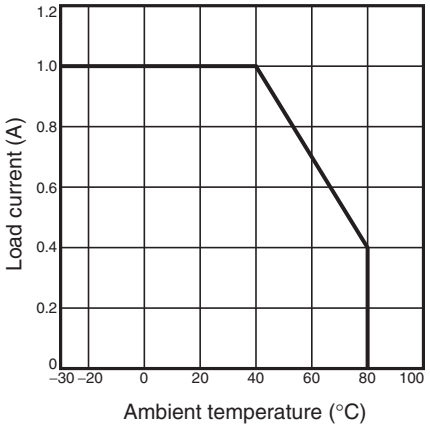
■ Characteristics

Item	G3MC-101P(-VD)	G3MC-101PL(-VD)	G3MC-202P(-VD)(-1)	G3MC-202PL(-VD)(-1)
Operate time	1/2 of load power source cycle + 1 ms	1 ms max.	1/2 of load power source cycle + 1 ms	1 ms max.
Release time	1/2 of load power source cycle + 1 ms)			
Output ON voltage drop	1.6 V (RMS) max.			
Leakage current	1 mA max. (at 100 VAC)		1.5 mA max. (at 200 VAC)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)			
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min (3,000 VAC, 50/60 Hz for 1 min. for G3MC-□□□-VD-1)			
Vibration resistance	Malfunction: 10 to 55 Hz, 0.75-mm double amplitude			
Shock resistance	Malfunction: 1,000 m/s^2 (approx. 100G)			
Ambient temperature	Operating:–30°C to 80°C (with no icing or condensation) Storage:–30°C to 100°C (with no icing or condensation)			
Approved standards	UL File No. E64562, CSA File No. LR35535 EN60950 File No. 5925UG (“-VD(-1)” type)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 2.5g (Approx. 5g for G3MC-202P(L)-VD-1)			

Engineering Data

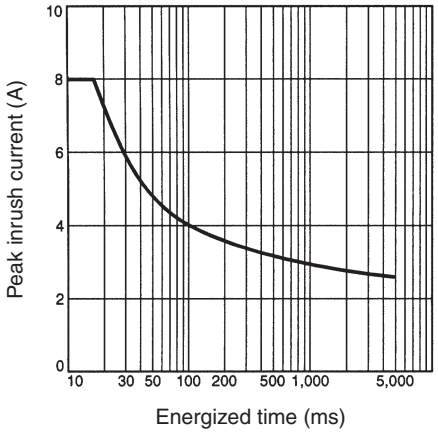
■ G3MC-101P(L)(-VD)

Load Current vs. Ambient Temperature Characteristics



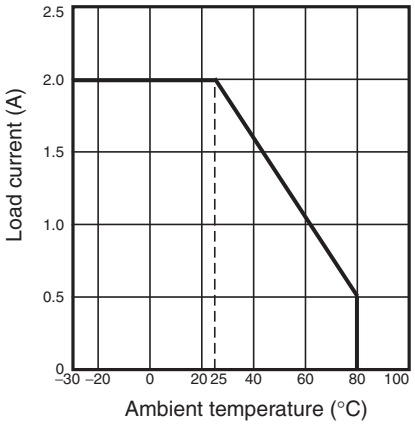
Inrush Current Resistivity

One cycle, non-repetitive (Keep the inrush current to half the rated value if it occurs repeatedly.)



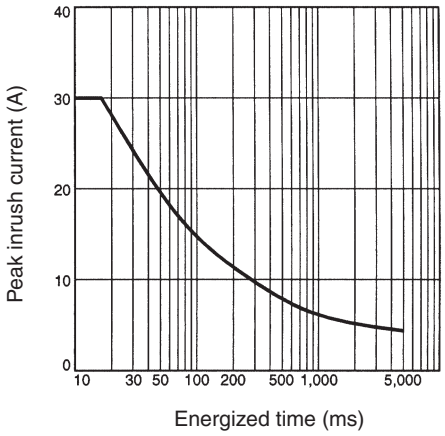
■ G3MC-202P(L)(-VD)(-1)

Load Current vs. Ambient Temperature Characteristics



Inrush Current Resistivity

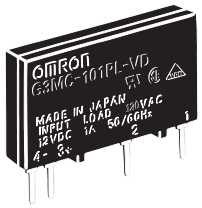
One cycle, non-repetitive (Keep the inrush current to half the rated value if it occurs repeatedly.)

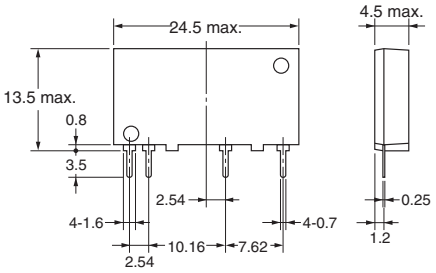


Dimensions

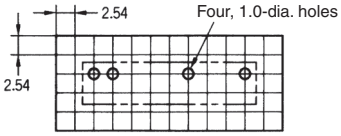
Units: mm (inch)

G3MC-101P(L)(-VD)

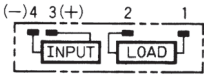




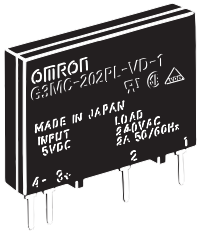
PCB Dimensions (Bottom View)

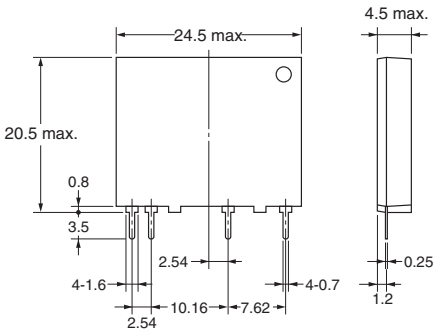


Terminal Arrangement (Bottom View)

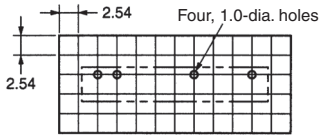


G3MC-202P(L)(-VD)(-1)

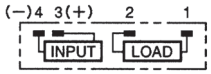




PCB Dimensions (Bottom View)



Terminal Arrangement (Bottom View)



Precautions

■ General Precautions

Do not touch the terminals of the SSR while power is being supplied to the SSR. The terminals are charged with the power, and an electric shock may be received by touching the terminals.

The built-in capacitor may have a residual voltage after the SSR is turned off. Be sure to discharge the residual voltage before touching the terminals of the SSR, otherwise an electric shock may be received.

■ Mounting

1. Make sure that no excessive voltage or current is imposed on or flows to the input or output circuit of the SSR, otherwise the SSR may malfunction or burn.
2. Solder the terminals of the SSR properly under the required soldering conditions. The SSR may be abnormally heated and burn if power is supplied to the terminals soldered incorrectly.
3. Do not short-circuit the load of the SSR while power is supplied to the SSR. Do not short-circuit the power supply through the SSR. The SSR may be damaged, malfunction, or burn if the load or power supply is short-circuited.

■ Correct use

The terminals of the SSR are highly heat-conductive. Each terminal must be soldered within 10 s at 260°C or within 5 s at 350°C.

The SSR is of a thin-profile construction. To maintain the vibration resistance of the SSR, make sure that the space between the SSR and PCB is 0.1 mm maximum. Lifting of the PCB can be prevented by setting the hole diameter of the PCBs on both sides slightly smaller than the actual terminal dimension.

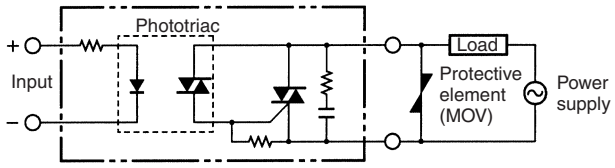
Select the model without the zero-cross function when using the Unit for phase control output.

The casing works as a heat sink. When mounting two or more Units closely, make sure that the Units are properly ventilated by taking ambient temperature rises into consideration. If Units are closely mounted and used in places with no ventilation, the load current of each Unit must be 1/2 of the rated load current.

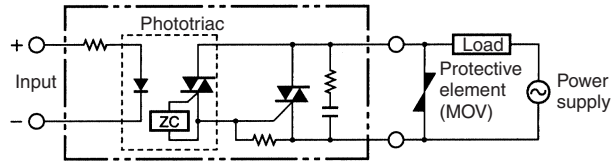
■ Protective element

No overvoltage absorption element is built in. Therefore, if the G3MC is connected to an inductive load, be sure to connect the overvoltage absorption element.

G3MC-□□□PL (without Zero cross function)



G3MC-□□□P (with Zero cross function)



MEMO

Solid State Relay
G3MB

Low cost Subminiature PCB mounting 2 amp Single in-line package (SIP) SSR

- Bottom is approximately 3 times smaller than G3M.
- Low cost “SIP” package switches up to 2A loads.
- Built in Snubber circuit and input resistor as option.
- Two footprints available for design flexibility.
- The G3MB-202PEG-4-DC20MA crosses directly to the Motorola M0C2A-60 series power triac.



Ordering Information

NOT FOR NEW DESIGN. Discontinuation planned for April, 2010.

To Order: Specify input voltage at end of part number. Example: G3MB-202P-*DC24*

Isolation	Output terminal pitch	Zero cross	Input resistor	Built-in snubber circuit	Rated output load	Rated input voltage	Model
Phototriac	7.62 mm	Yes	Yes	Yes	2 A at 100 to 240 VAC	5 VDC	**G3MB-202P**
						12 VDC	
						24 VDC	
		No			2 A at 100 to 240 VAC	5 VDC	**G3MB-202PL**
						12 VDC	
						24 VDC	
	5.08 mm	Yes			2 A at 100 to 240 VAC	5 VDC	**G3MB-202P-4**
						12 VDC	
						24 VDC	
		No			2 A at 100 to 240 VAC	5 VDC	**G3MB-202PL-4**
						12 VDC	
						24 VDC	
		Yes	No	No	2 A at 100 to 240 VAC	N/A *(See Note)	**G3MB-202PEG-4-DC20MA**
		No			2 A at 100 to 240 VAC	N/A *(See Note)	**G3MB-202PLEG-4-DC20MA**

Note: 1. For versions without input voltage specified, a current limiting resistor must be placed in series with the input. See LED drive specifications and recommendations.

2. TUV versions available. When ordering models certified by VDE (TUV), add “-UTU” to the model number given in the above table.

Specifications

■ Input Rating

Models with Input Resistor

Rated voltage	Operating range	Input impedance (-UTU Models)	Voltage Levels	
			Must operate voltage	Must release voltage
5 VDC	4 to 6 VDC	440 Ω ±20% (300 Ω ±20%)	4 VDC max.	1 VDC min.
12 VDC	9.60 to 14.40 VDC	1k Ω ±20% (750 Ω ±20%)	9.6 VDC max.	
24 VDC	19.20 to 28.80 VDC	2.20k Ω ±20% (1.6 kΩ ±20%)	19.2 VDC max.	

Models without Input Resistor

Input specifications	Operating characteristics			
Rated current	Continuous current	Must operate current	Must release current	Operating current
20 mA DC	20 mA DC	7 mA DC max.	1 mA DC min.	7 to 20 mA

LED forward current	50 mA max.
Repetitive peak LED forward current	1 A max.
LED reverse voltage	5 V max.

■ Recommended LED Operating Conditions

Models without Input Resistor

	Min.	Standard	Max.
LED forward current	5 mA	10 mA	20 mA
Must drop voltage	0	—	1 V

■ Output Rating

Model	Rated load voltage	Load voltage range	Load current	Surge current
G3MB-202	100 to 240 VAC, 50/60 Hz	75 to 264 VAC	0.10 to 2 A	30 A (60 Hz, 1 cycle)

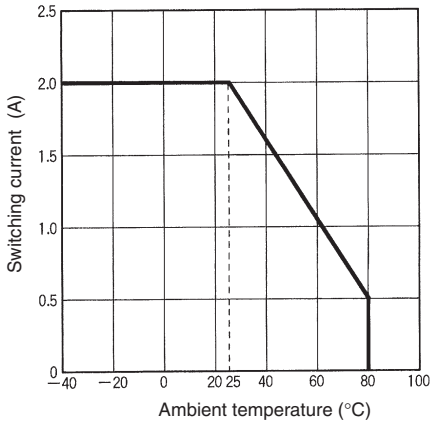
■ Characteristics

Type		G3MB-202P G3MB-202PEG	G3MB-202PL G3MB-202PLEG
Operate time		1/2 of load power source cycle + 1 ms max.	1 ms max.
Release time		1/2 of load power source cycle + 1 ms max.	
Output ON voltage drop		1.60 V (RMS) max.	
Leakage current		1.50 mA at 200 VAC	
Non-repetitive peak surge		30 A	
Output	**PIV (V_{DRM})**	600 V	
	di/dt	40 A/μs	
	dv/dt	100 V/μs	
	I^2t	4 A^2s	
Junction temperature (Tj)		125°C (257°F) max.	
Insulation resistance		1,000 MΩ min. at 500 VDC	
Dielectric strength		2500 VAC, 50/60 Hz for 1 minute	
Vibration	**Malfunction**	10 to 55 Hz, 0.75 mm (0.03 in) double amplitude	
Shock	**Malfunction**	Approx. 1,000 m/s^2 (approx. 100 G)	
Ambient temperature	**Operating**	-30° to 80°C (-22° to 176°F) with no icing or condensation	
	Storage	-30° to 100°C (-22° to 212°F) with no icing or condensation	
Humidity	**Operating**	45% to 85% RH	
Weight		Approx. 5 g (0.18 oz)	

Note: Data shown are of initial value.

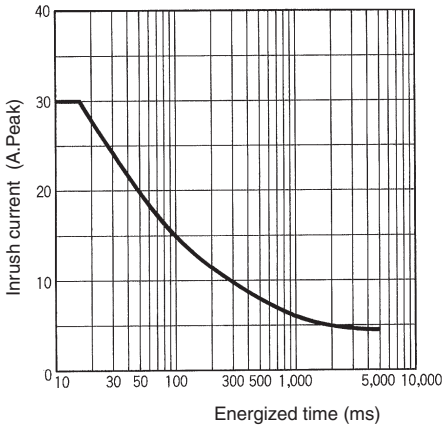
■ Characteristic Data

Load current vs. ambient temperature characteristics



Inrush current resistivity

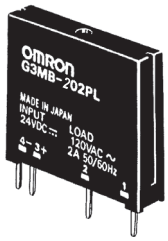
One cycle, non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)



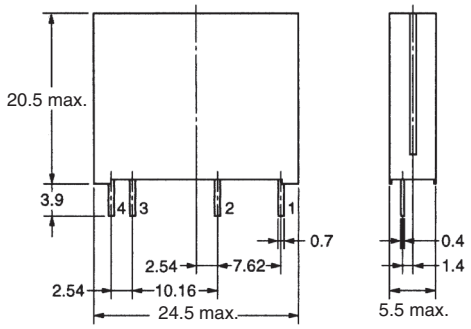
Dimensions

Unit: mm (inch)

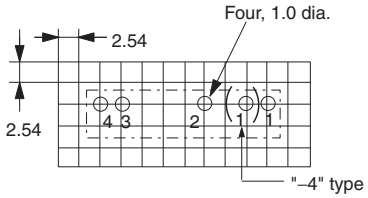
■ Relays



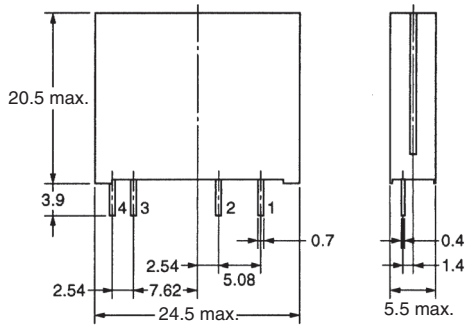
Models without "-4"



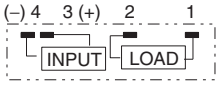
PCB Dimensions (Bottom View)



Models with "-4"



Terminal Arrangement/ Internal Connections (Bottom View)



■ Approvals

UL Recognized (File No. E64562) - - Ambient Temp. = 40°C

SSR Type	Input voltage	Load type	Load ratings
G3MB-102P	5 to 24 VDC	General purpose	2 A, 120 VAC
		Tungsten	1 A, 120 VAC
		Motor	1.60 FLA/9.60 LRA, 120 VAC
G3MB-202P		General purpose	2 A, 240 VAC
G3MB-202PL		Tungsten	1 A, 240 VAC
G3MB-202PEG		Motor	1.60 FLA/9.60 LRA, 240 VAC
G3MB-202PLEG			

CSA Certified (File No. LR35535)

SSR Type	Input voltage	Load type	Load ratings
G3MB-102P	5 to 24 VDC	General purpose	2 A, 120 VAC
		Tungsten	1 A, 120 VAC
		Motor	1.60 FLA/8.60 LRA, 120 VAC
G3MB-202P		General purpose	2 A, 240 VAC
G3MB-202PL		Tungsten	1 A, 240 VAC
		Motor	1.60 FLA/8.60 LRA, 240 VAC

Note: 1. The rated values approved by each of the safety standards (e.g., UL and CSA) may be different from the performance characteristics individually defined in this catalog.

2. In the interest of product improvement, specifications are subject to change.

Precautions

See General Information Section near the back of this catalog for Solid State Precautions.

Make sure that the space between the bottom of the relay and the PCB is 0.1 mm or less. When making holes on the PCB for the relay's edge terminals, the hole diameters should be slightly smaller than the actual diameters of the edge terminals. This will reduce unnecessary space between the bottom of the relay and the PCB.

To use the SSR output for phase control, select a model that does not incorporate a zero-cross function.

The SSR case serves to dissipate heat. When mounting more than three SSRs as a group, pay attention to the ambient temperature rise and install the Relays so that they are adequately ventilated. If poor ventilation is unavoidable, reduce the load current by half.

Protective Component

The input circuitry does not incorporate a circuit protecting the SSR from being damaged due to a reversed connection. Make sure that the polarity is correct when connecting the input lines.

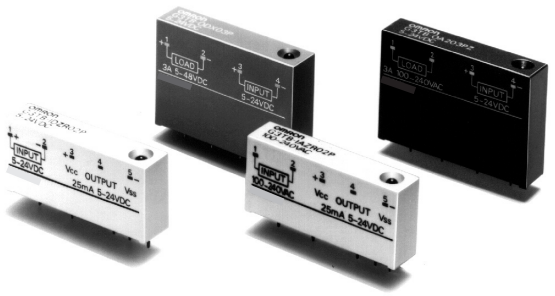
Protective Element

No overvoltage absorption element is built in. Therefore, if the G3MB is connected to an inductive load, be sure to connect the overvoltage absorption element.

Solid State Relay
G3TB

I/O SSR Used as Interface between Logic Circuitry and Load

- A variety of AC/DC input and output modules classified by color.
- Operation can be monitored easily through an LED indicator.
- Dielectric strength of 4,000 V between input and output terminals.
- Certified by UL and CSA.



Ordering Information

Input Modules

Isolation	Indicator	Logic level		Rated input voltage	Model
		Supply voltage	Supply current		
Photocoupler	Yes	4 to 32 VDC	25 mA	100 to 240 VAC	**G3TB-IAZR02P-US**
				4 to 24 VDC	**G3TB-IDZR02P-US**

Output Modules

Isolation	Zero cross function	Indicator	Rated output voltage (Applicable output load)	Rated input voltage	Model
Photocoupler	Yes	Yes	3 A at 100 to 240 VAC (3 A at 75 to 264 VAC)	5 to 24 VDC	**G3TB-OA203PZ-US**
		No		4 to 24 VDC	**G3TB-OA203PZM-US**
	No	Yes		5 to 24 VDC	**G3TB-OA203PL-US**
		No		4 to 24 VDC	**G3TB-OA203PLM-US**
	---	Yes	3 A at 5 to 48 VDC (3 A at 4 to 60 VAC)	5 to 24 VDC	**G3TB-ODX03P-US**
		No		4 to 24 VDC	**G3TB-ODX03PM-US**
		Yes	1.5 A at 48 to 200 VDC (1.5 A at 40 to 200 VDC)	5 to 24 VDC	**G3TB-OD201P-US**
		No		4 to 24 VDC	**G3TB-OD201PM-US**

Note: When ordering, specify the rated input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input Module

Input

Model	Rated voltage	Operating voltage	Input current	Voltage level	
				Must operate voltage	Must release voltage
G3TB-IAZR02P-US	100 to 240 VAC	80 to 264 VDC	5 mA max.	80 VAC max.	10 VAC min.
G3TB-IDZR02P-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	1 VDC min.

Output

Model	Logic level supply voltage	Output breakdown voltage	Output current
G3TB-IAZR02P-US	4 to 32 VDC	32 VDC max.	25 mA max.
G3TB-IDZR02P-US			

Output Module

Input

Model	Rated voltage	Operating voltage	Input current	Voltage level	
				Must operate voltage	Must release voltage
G3TB-OA203PZ-US	5 to 24 VDC	4 to 32 VDC	5 mA max.	4 VDC max.	1 VDC min.
G3TB-OA203PZM-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	
G3TB-OA203PL-US	5 to 24 VDC	4 to 32 VDC		4 VDC max.	
G3TB-OA203PLM-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	
G3TB-ODX03P-US	5 to 24 VDC	4 to 32 VDC		4 VDC max.	
G3TB-ODX03PM-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	
G3TB-OD201P-US	5 to 24 VDC	4 to 32 VDC		4 VDC max.	
G3TB-OD201PM-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3TB-OA203PZ-US	100 to 240 VAC	75 to 264 VAC	0.05 to 3 A	45 A (60 Hz, 1 cycle)
G3TB-OA203PZM-US				
G3TB-OA203PL-US				
G3TB-OA203PLM-US				
G3TB-ODX03P-US	5 to 48 VDC	4 to 60 VDC	0.01 to 3 A	18 A (10 ms)
G3TB-ODX03PM-US				
G3TB-OD201P-US	48 to 200 VDC	40 to 200 VDC	0.01 to 1.5 A	12 A (10 ms)
G3TB-OD201PM-US				

Note: The minimum current value is measured at 10°C min.

■ Characteristics

Input Module

Item	G3TB-IAZR02P-US	G3TB-IDZR02P-US
Operate time	20 ms max.	1 ms max.
Release time	20 ms max.	1 ms max.
Output ON voltage drop	0.4 V max.	
Leakage current	100 μA max.	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between input and output	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm single amplitude	
Shock resistance	Malfunction: 1,000 m/s^2	
Ambient temperature	Operating: –30°C to 80°C (with no icing or condensation) Storage: –30°C to 100°C (with no icing or condensation)	
Ambient humidity	Operating: 45% to 85%	
Certified standards	UL File No. E41515/CSA File No. LR35535/TÜV R90381 (VDE0806)	
Weight	Approx. 22 g	

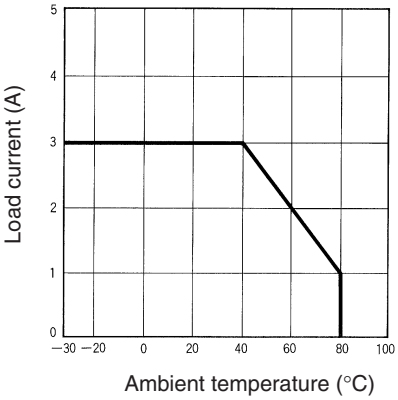
Output Module

Item	G3TB-OA203PZ-US	G3TB-OA203PZM-US	G3TB-OA 203PL-US	G3TB-OA 203PLM-US	G3TB-ODX03P-US	G3TB-ODX03PM-US	G3TB-OD 201P-US	G3TB-OD 201PM-US
Operate time	1/2 of load power source cycle + 1 ms max.		1 ms max.		0.5 ms max.			
Release time	1/2 of load power source cycle + 1 ms max.				2 ms max.			
Output ON voltage drop	1.6 V max.						2.5 V max.	
Leakage current	5 mA max. (at 200 VAC)				1 mA max.			
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between input and output							
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm single amplitude							
Shock resistance	Malfunction: 1,000 m/s^2							
Ambient temperature	Operating: –30°C to 80°C (with no icing or condensation) Storage: –30°C to 100°C (with no icing or condensation)							
Ambient humidity	Operating: 45% to 85%							
Certified standards	UL File No. E64562/CSA File No. LR35535/TÜV R90381 (VDE0806)							
Weight	Approx. 32 g							

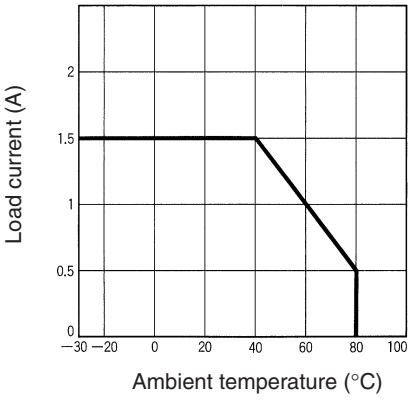
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3TB-OA203PZ-US/-OA203PZM-US /-OA203PL-US/-OA203PLM-US/ G3TB-ODX03P-US/-ODX03PM-US



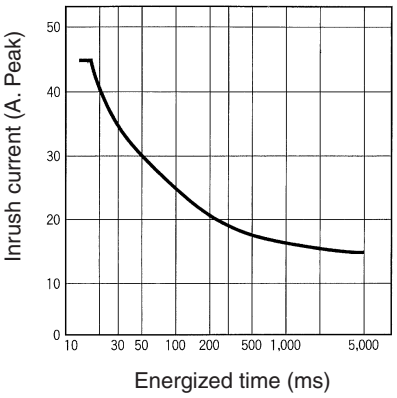
G3TB-OD201P-US/-OD201PM-US



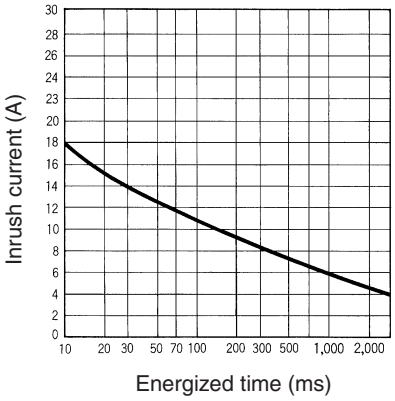
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

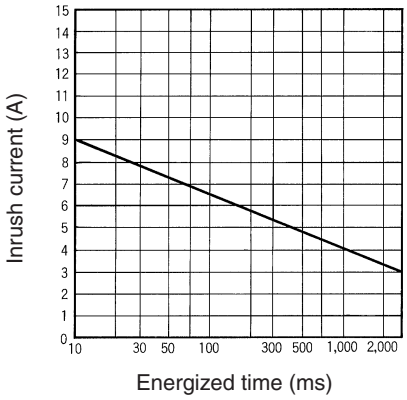
G3TB-OA203PZ-US/-OA203PZM-US/ -OA203PL-US/-OA203PLM-US



G3TB-ODX03P-US/-ODX03PM-US

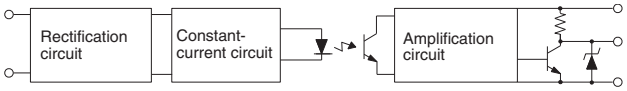
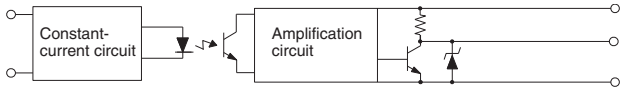
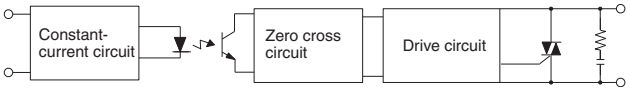
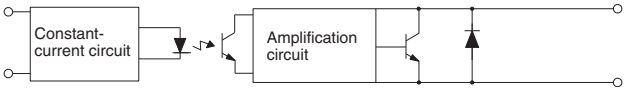


G3TB-OD201P-US/-OD201PM-US



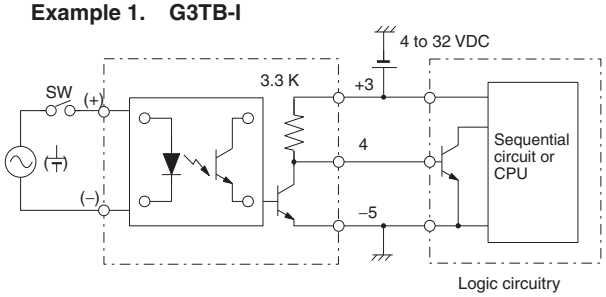
Operation

■ Circuit Configuration

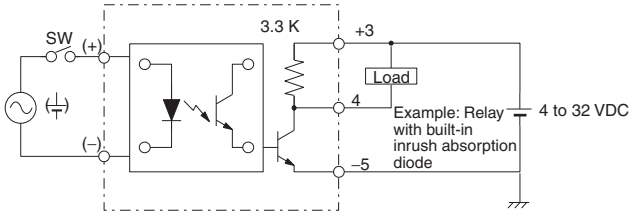
Type	Model	Case color	Indicator	Circuit
AC input	G3TB-IAZR02P-US	Yellow	Yes	
DC input	G3TB-IDZR02P-US	White	Yes	
AC output	G3TB-OA203PZ-US G3TB-OA203PL-US	Black	Yes	
	G3TB-OA203PZM-US G3TB-OA203PLM-US		No	
DC output	G3TB-ODX03P-US G3TB-OD201P-US	Red	Yes	
	G3TB-ODX03PM-US G3TB-OD201PM-US		No	

Example of Logic Output Circuit

Example 1. G3TB-I



Example 2. G3TB-I

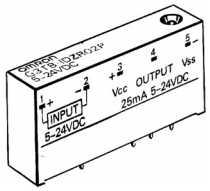


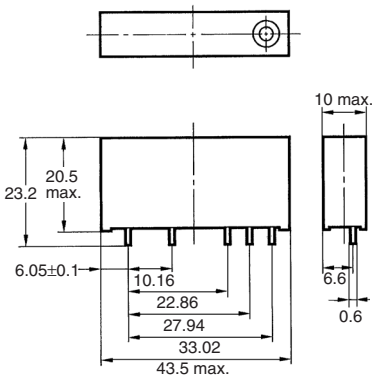
Note: AC- and DC-input versions are available.

Dimensions

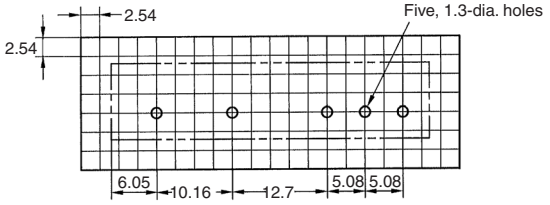
Note: All units are in millimeters unless otherwise indicated.

Input SSR
G3TB-I

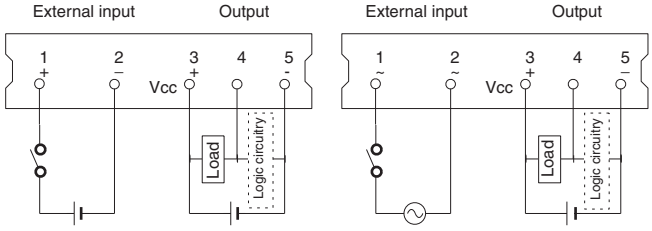




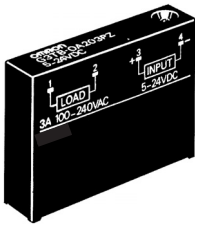
PCB Dimensions (Bottom View)

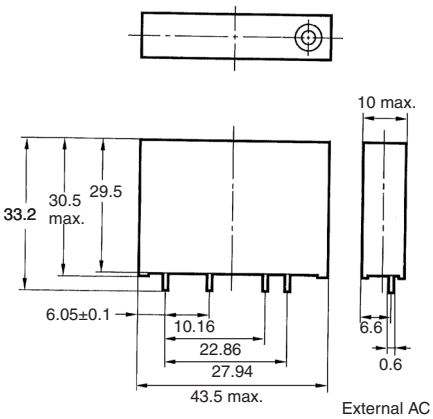


Terminal Arrangement (Bottom View)

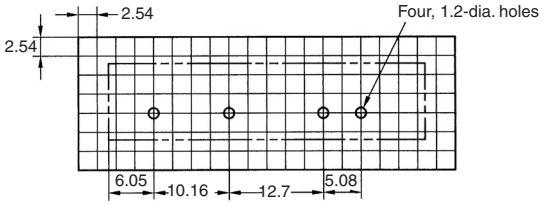


Output SSR
G3TB-O

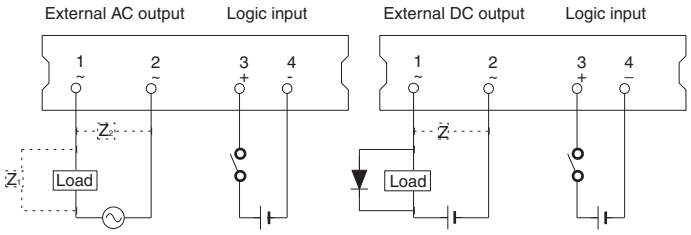




PCB Dimensions (Bottom View)



Terminal Arrangement (Bottom View)



Note: Z_1, Z_2, and Z refer to overvoltage absorption elements that you should connect.

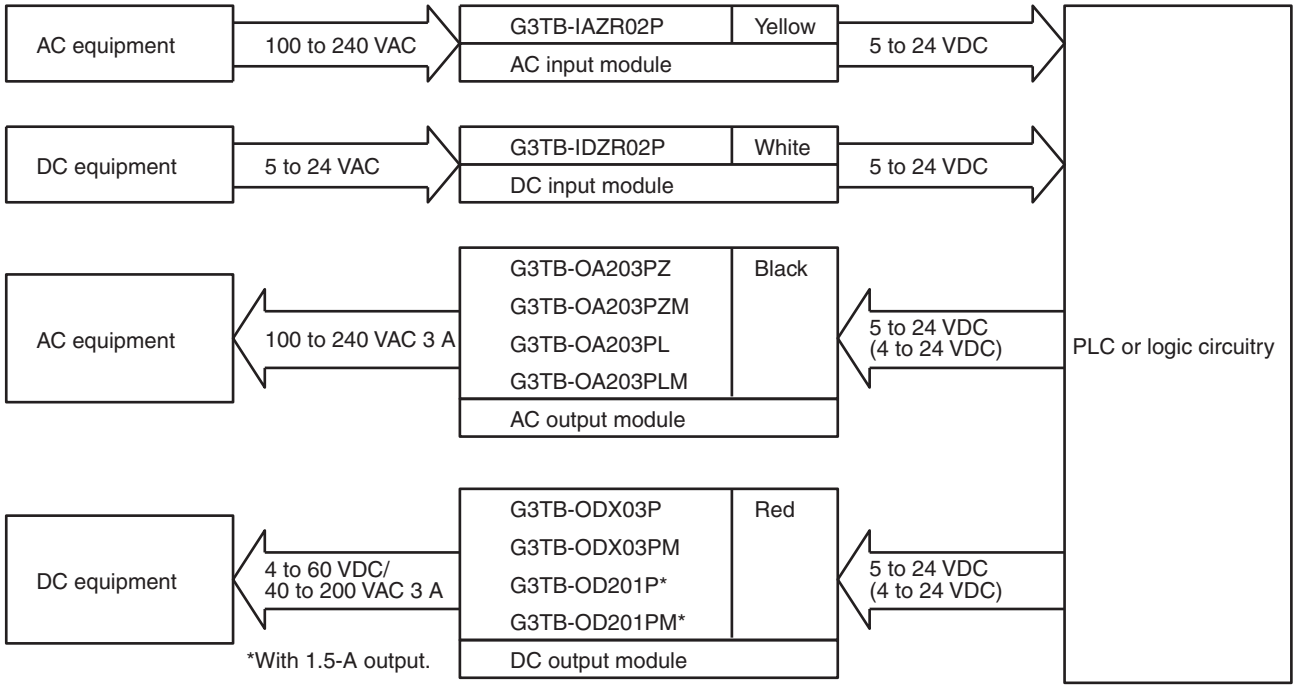
Safety Precautions

■ Precautions for Correct Use

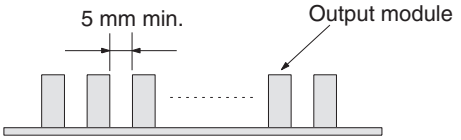
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

G3TB

I/O classification by the color is as follows:



When mounting more than one output module, make a distance of 5 mm minimum between adjacent SSRs. Up to 16-point, 3-A load switching is possible



Connection

With the SSR for DC switching, the load can be connected to either positive or negative output terminal of the SSR.

Protective Component

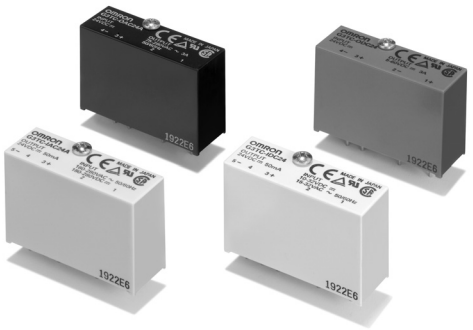
Since the SSR does not incorporate an overvoltage absorption component, be sure to connect an overvoltage absorption component when using the SSR under an inductive load.

MEMO

Solid State Relays for Industrial I/O
G3TC

Reliable SSRs for I/O Module Mounting Boards

- Use I/O SSRs as an interface between logic circuitry and the load.
- Variety of AC/DC input and output modules with industry-standard footprint and color coding.
- Built-in hold down screw fastens relay to board to eliminate loosening by vabration.
- Optical Isolation - Dielectric strength of 4 kV between input and output terminals.
- Zero cross function on AC output models.
- AC and DC input versions incorporate a rectifier to accept both AC or DC inputs.
- UL, CSA and TUV approved; marked with CE.



Ordering Information

■ Input Module

Function	Color	Isolation	Input operating voltage range	Logic level output supply voltage	Model
AC input	Yellow	Photo-coupler	90-140 VDC/AC	5 VDC	**G3TC-IAC5 AC/DC120**
				15 VDC	**G3TC-IAC15 AC/DC120**
				24 VDC	**G3TC-IAC24 AC/DC120**
			180-280 VDC/AC	5 VDC	**G3TC-IAC5A AC/DC240**
				15 VDC	**G3TC-IAC15A AC/DC240**
				24 VDC	**G3TC-IAC24A AC/DC240**
DC input	White		10-32 VDC/AC	5 VDC	**G3TC-IDC5 DC/AC24**
				15 VDC	**G3TC-IDC15 DC/AC24**
				24 VDC	**G3TC-IDC24 DC/AC24**

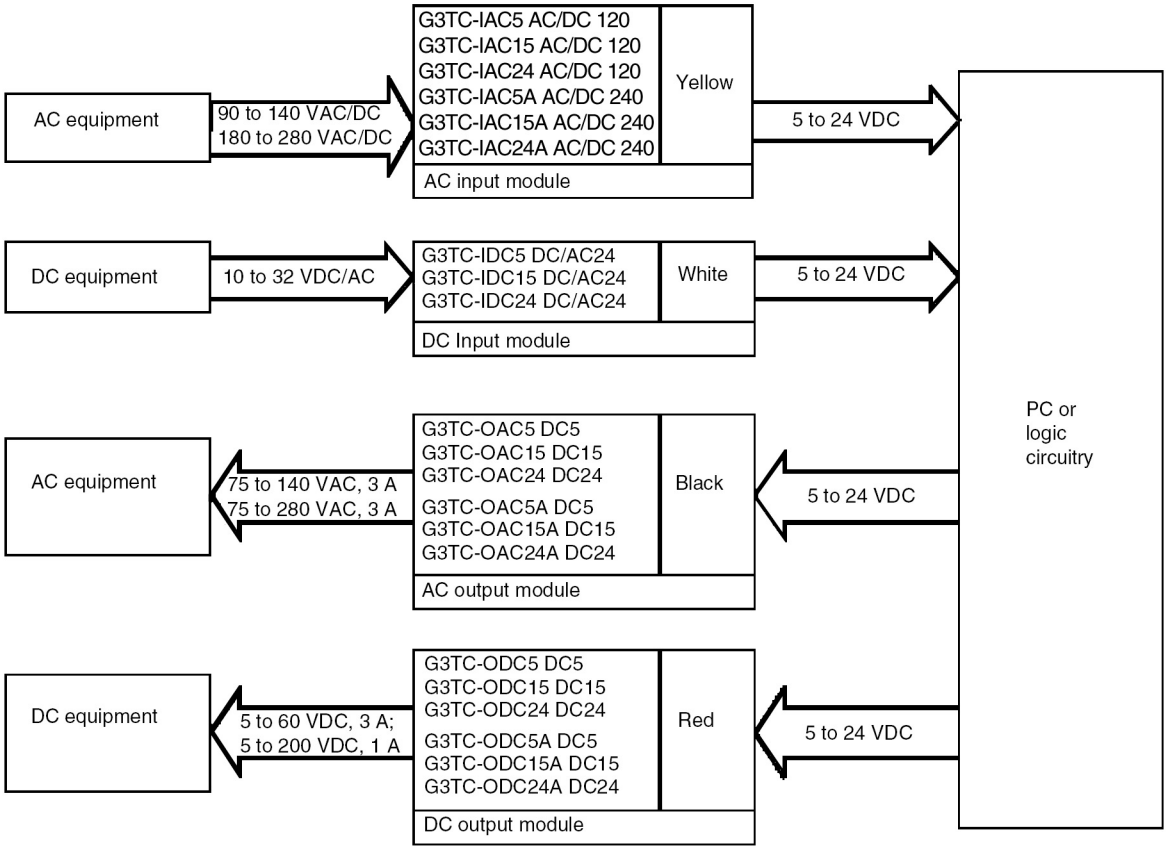
■ Output Module

Function	Color	Isolation	Rated input voltage	Rated output voltage (Applicable output voltage)	Model
AC output	Black	Photo-triac	5 VDC	3 A at 120 VAC (3 A at 75-140 VAC)	**G3TC-OAC5 DC5**
			15 VDC		**G3TC-OAC15 DC15**
			24 VDC		**G3TC-OAC24 DC24**
			5 VDC	3 A at 240 VAC (3 A at 75-280 VAC)	**G3TC-OAC5A DC5**
			15 VDC		**G3TC-OAC15A DC15**
			24 VDC		**G3TC-OAC24A DC24**
DC output	Red	Photo-coupler	5 VDC	3 A at 60 VDC (3 A at 5-60 VDC)	**G3TC-ODC5 DC5**
			15 VDC		**G3TC-ODC15 DC15**
			24 VDC		**G3TC-ODC24 DC24**
			5 VDC	1 A at 200 VDC (1 A at 5-200 VDC)	**G3TC-ODC5A DC5**
			15 VDC		**G3TC-ODC15A DC15**
			24 VDC		**G3TC-ODC24A DC24**

■ Typical Applications

- HVAC, refrigeration equipment
- Automation controls
- Injection molding machines
- Packaging equipment

■ I/O Classification by Color



Specifications

■ Common Characteristics

Insulation resistance	100 MΩ min at 500 VDC
Dielectric strength	4000 VAC, 50/60 Hz for 1 minute between input and output
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
Shock resistance	Malfunction: 1,000 m/s^2
Ambient temperature	Operating: -30°C to 80°C with no icing or condensation Storage: -30°C to 100°C with no icing or condensation
Ambient humidity	Operating: 45% to 85%
Approved standards	UL Recognized, CSA Certified, EN60950

■ AC Input Module G3TC-IAC

Ratings (Ambient Temperature 25°C)

Input

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Rated voltage	120 VAC/DC			240 VAC/DC		
Operating voltage	90-140 VAC/DC			180-280 VAC/DC		
Must operate voltage	90 VAC/DC max.			180 VAC/DC max.		
Must release voltage	25 VAC/DC min.			45 VAC/DC min.		
Input current at rated voltage	5 mA max.			5 mA max.		
Input resistance (see note 1)	30 kΩ			69 kΩ		

Output

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Output supply voltage-nominal	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Output supply voltage-range	4.5-6 VDC	12-18 VDC	20-30 VDC	4.5-6 VDC	12-18 VDC	20-30 VDC
Output supply current at rated input voltage (see note 2)	18 mA max.	15 mA max.	12 mA max.	18 mA max.	15 mA max.	12 mA max.
Control resistance (Rc in circuit configuration - see note 1)	240 Ω	1 kΩ	2.2 kΩ	240 Ω	1k Ω	2.2k Ω
Output current	50 mA max.					

Characteristics

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Operate time (see note 3)	20 ms max.					
Release time (see note 3)	20 ms max.					
Output ON voltage drop	0.4 V max.					
Leakage current	100 μA max.					
Weight	Approx. 40g					

Note: 1. Resistance values are reference.

2. The input module supplies the current on I/O circuit board at nominal ouput voltage.

3. At nominal output supply voltage, rated input voltage and 25°C.

■ DC Input Module G3TC-IDC

Ratings (Ambient Temperature 25°C)

Input

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Rated voltage	24 VDC/AC		
Operating voltage	10-32 VDC/ 15-32 VAC		
Must operate voltage	10 VDC/15 VAC max.		
Must release voltage	3 VDC/ 3 VAC min.		
Input current rated voltage	25 mA max.		
Input resistance (see note 1)	1.5 kΩ		

Output

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Output supply voltage-nominal	5 VDC	15 VDC	24 VDC
Output supply voltage-range	4.5-6 VDC	12-18 VDC	20-30 VDC
Output supply current at rated input voltage (see note 2)	18 mA max.	15 mA max.	12 mA max.
Control resistance (Rc in circuit configuration - see note 1)	240 Ω	1 kΩ	2.2 kΩ
Output current	50 mA max.		

Characteristics

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Operate time (see note 3)	5 ms max.		
Release time (see note 3)	5 ms max.		
Output ON voltage drop	0.4 V max.		
Leakage current	100 μA max.		
Weight	Approx. 40g		

Note: 1. Resistance values are reference.
2. The input module supplies the current on I/O circuit board at nominal ouput voltage.
3. At nominal output supply voltage, rated input voltage and 25°C.

■ AC Output Module G3TC-OAC

Ratings (Ambient Temperature 25°C)

Input

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Rated voltage	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Operating voltage	2.5-8 VDC	9-16 VDC	18-32 VDC	2.5-8 VDC	9-16 VDC	18-32 VDC
Must operate voltage	2.5 VDC max.	9 VDC max.	18 VDC max.	2.5 VDC max.	9 VDC max.	18 VDC max.
Must release voltage	1 VDC min.					
Input current at rated voltage (see note 2)	18 mA max.					
Control resistance (Rc in circuit configuration - see note 1)	240 Ω	1 kΩ	2.2 kΩ	240 Ω	1 kΩ	2.2 kΩ

Output

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Rated load voltage	120 VAC			240 VAC		
Load voltage range	75-140 VAC			75-280 VAC		
Load current	0.05 to 3 A					
Inrush current	45 A (60 Hz, 1 cycle)					

Characteristics

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Operate time (see note 3)	1/2 of load power source cycle + 1 ms max.					
Release time (see note 3)	1/2 of load power source cycle + 1 ms max.					
Output ON voltage drop	1.6 V (RMS) max.					
Leakage current	2.5 mA max. (at 120 VAC)			5 mA max. (at 240 VAC)		
Weight	Approx. 45g					

Note: 1. Resistance values are reference.
2. The output module supplies the current on I/O circuit board at nominal input voltage.
3. At nominal output supply voltage, rated input voltage and 25°C.

■ DC Output Module G3TC-ODC

Ratings (Ambient Temperature 25°C)

Input

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Rated voltage	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Operating voltage	2.5-8 VDC	9-16 VDC	18-32 VDC	2.5-8 VDC	9-16 VDC	18-32 VDC
Must operate voltage	2.5 VDC max.	9 VDC max.	18 VDC max.	2.5 VDC max.	9 VDC max.	18 VDC max.
Must release voltage	1 VDC min.					
Input current at rated voltage (see note 2)	18 mA max.					
Control resistance (Rc in circuit configuration - see note 1)	240 Ω	1 kΩ	2.2 kΩ	240 Ω	1 kΩ	2.2 kΩ

Output

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Rated load voltage	60 VDC			200 VDC		
Load voltage range	5-60 VDC			5-200 VDC		
Load current	0.01 to 3 A			0.01 to 1.0 A		
Inrush current	18 A (10 ms)			9 A (10 ms)		

Characteristics

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Operate time (see note 3)	50 μs max.			100 μs max.		
Release time (see note 3)	50 μs max. (see note 4)			750 μs max.		
Output ON voltage drop	1.6 V max.					
Leakage current	1 mA max. (at 60 VDC)			1 mA max. (at 200 VDC)		
Weight	Approx. 45g			Approx. 40g		

Note: 1. Resistance values are reference.

2. The output module supplies the current on I/O circuit board at nominal input voltage.

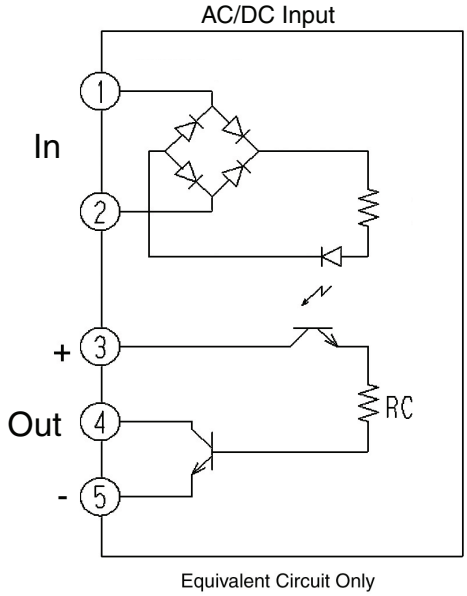
3. At rated load voltage, maximum rated load current, rated input voltage and 25°C.

4. At 24 VDC load voltage, 3 A load current and 25°C.

Engineering Data

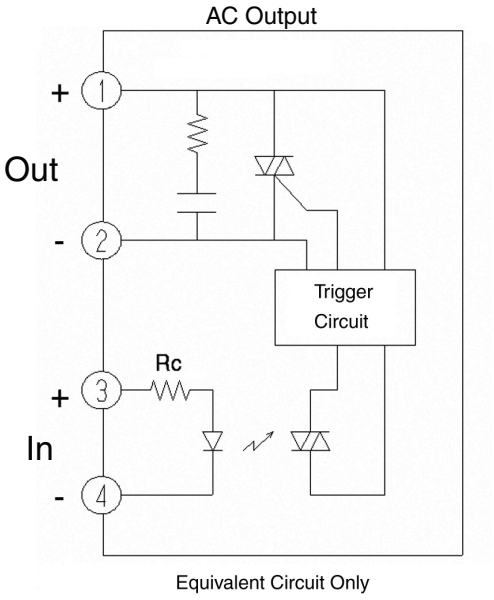
■ Internal Circuit

G3TC-IAC/IDC



Equivalent Circuit Only

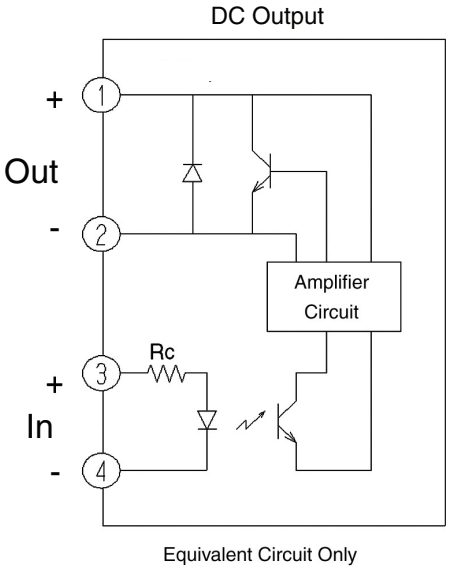
G3TC-OAC



Equivalent Circuit Only

Note: Internal biasing circuitry is different between AC input and DC input modules

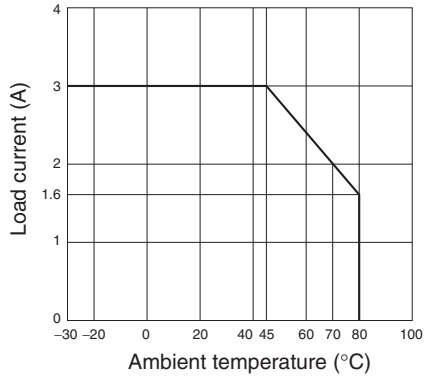
G3TC-ODC



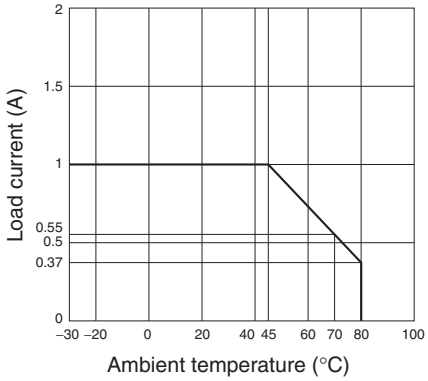
Equivalent Circuit Only

■ Load Current vs. Ambient Temperature Characteristics

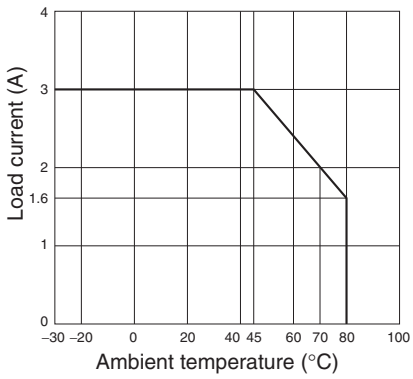
G3TC-ODC5
G3TC-ODC15
G3TC-ODC24



G3TC-ODC5A
G3TC-ODC15A
G3TC-ODC24A



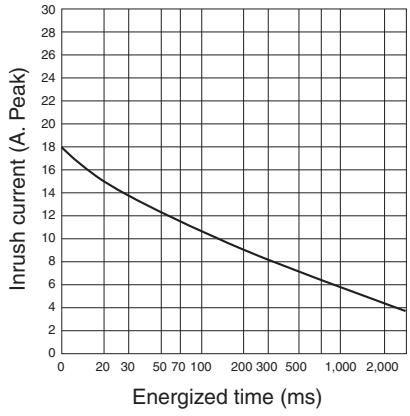
G3TC-OAC5 **G3TC-OAC5A**
G3TC-OAC15 **G3TC-OAC15A**
G3TC-OAC24 **G3TC-OAC24A**



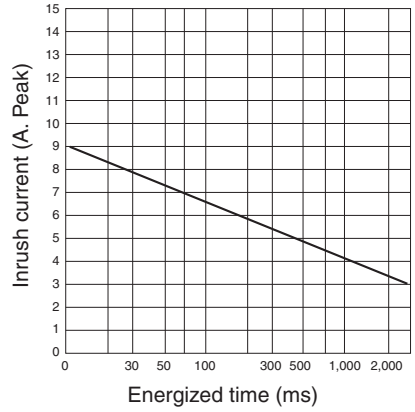
■ Inrush Current Resitivity

Non-repetitive (Keep inrush current to half the rated value if it occurs.)

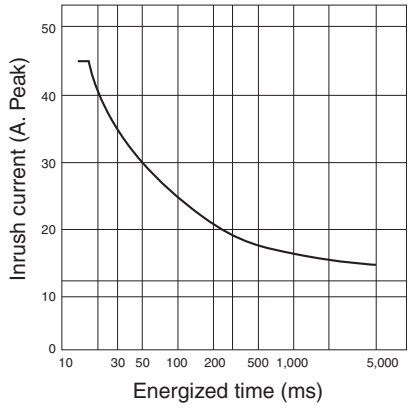
G3TC-ODC5
G3TC-ODC15
G3TC-ODC24



G3TC-ODC5A
G3TC-ODC15A
G3TC-ODC24A



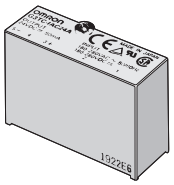
G3TC-OAC5 **G3TC-OAC5A**
G3TC-OAC15 **G3TC-OAC15A**
G3TC-OAC24 **G3TC-OAC24A**

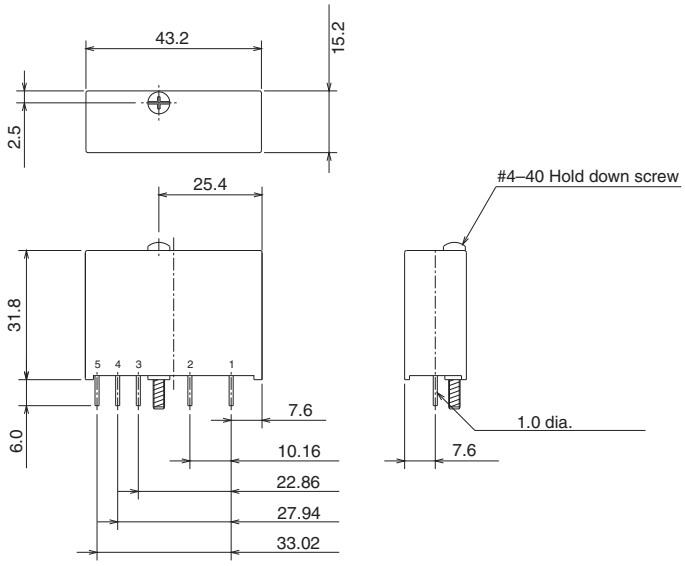


Dimensions

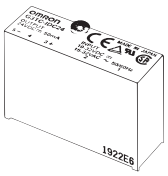
Note: All units are in millimeters unless otherwise indicated.

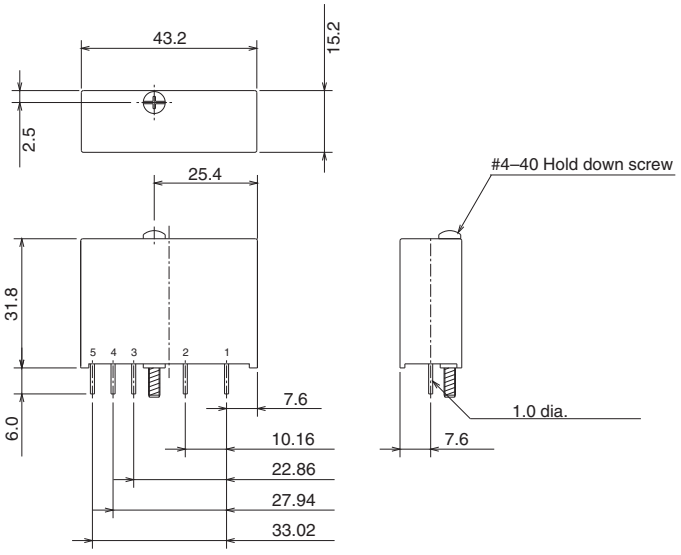
G3TC-IAC5 G3TC-IAC5A
G3TC-IAC15 G3TC-IAC15A
G3TC-IAC24 G3TC-IAC24A





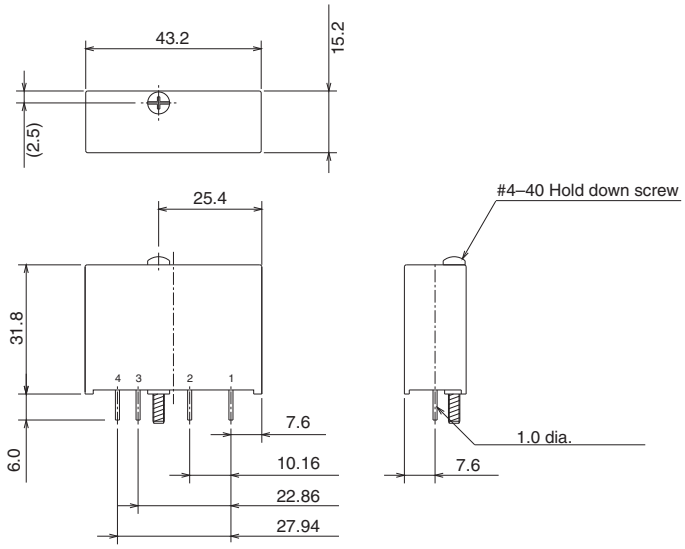
G3TC-IDC5
G3TC-IDC15
G3TC-IDC24



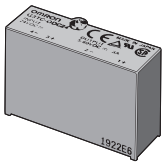


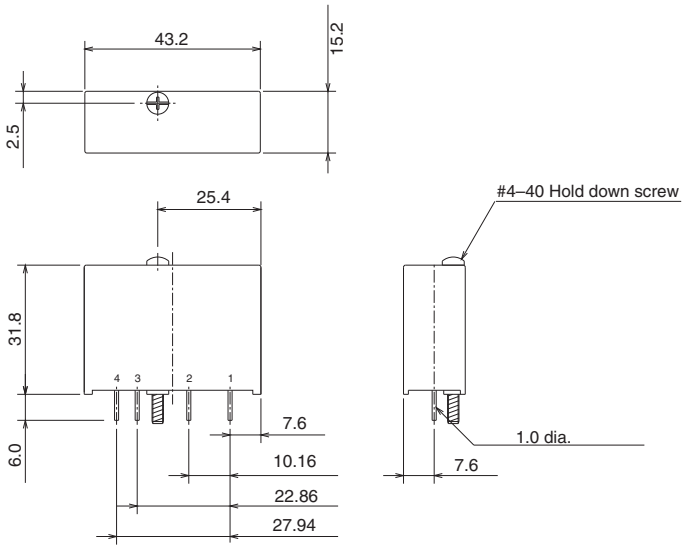
G3TC-OAC5 G3TC-OAC5A
G3TC-OAC15 G3TC-OAC15A
G3TC-OAC24 G3TC-OAC24A





G3TC-ODC5 G3TC-ODC5A
G3TC-ODC15 G3TC-ODC15A
G3TC-ODC24 G3TC-ODC24A





■ Approvals

UL Recognized (File No. E64562) / CSA Certified (File No. 35535) - - Ambient Temp. = 40°C

Input

Model	Input voltage
G3TC-IAC5, -IAC15, -IAC24	90-140 V AC/DC
G3TC-IAC5A, -IAC15A, -IAC24A	180-280 V AC/DC
G3TC-IDC5, -IDC15, -IDC24	10-32 VDC, 12-32 VAC
G3TC-ODC5, -ODC5A, -OAC5, -OAC5A	5 VDC
G3TC-ODC15, -ODC15A, -OAC15, -OAC15A	15 VDC
G3TC-ODC24, -ODC24A, -OAC24, -OAC24A	24 VDC

Output

Model	Load voltage	Load current
G3TC-IAC5, -IAC15, -IAC24	5/15/24 VDC	50 mA
G3TC-IAC5A, -IAC15A, -IAC24A	5/15/24 VDC	50 mA
G3TC-IDC5, -IDC15, -IDC24	5/15/24 VDC	50 mA
G3TC-ODC5, -ODC15, -ODC24	5-60 VDC	3 A
G3TC-ODC5A, -ODC15A, -ODC24A	5-200 VDC	1 A
G3TC-OAC5, -OAC15, -OAC24	75-140 VAC	3 A
G3TC-OAC5A, -OAC15A, -OAC24A	75-280 VAC	3 A

Note: The rated values approved by each of the safety standards (e.g., UL, CSA and TUV) may be different from the performance characteristics individually defined in this catalog.

Precautions

⚠ WARNING

Do not touch the relay while power is supplied or immediately after G3TC is turned OFF. Doing so may result in burns.

⚠ WARNING

Do not touch the load terminal of the G3TC immediately after the power is turned OFF, otherwise an electric shock may be received due to the residual charge of the built-in C/R circuit.

⚠ WARNING

Be sure to turn OFF the power supply to the G3TC before wiring, otherwise an electric shock may result.

⚠ WARNING

Ensure that a short-circuit current does not flow on the load side of the SSR, otherwise the G3TC may be damaged.

■ General Precautions

At OMRON, we are constantly working to improve the quality and reliability of our products. SSRs, however, use semiconductors, which are prone to malfunction. Be sure to use SSRs within their rated value. Use the SSR only in systems that are designed with redundancies, flame protection, counter measures to prevent operation errors, and other countermeasures to prevent accidents involving human life or fires.

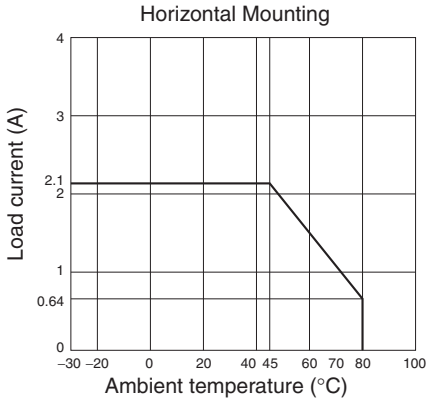
1. Do not apply excessive voltage or current to the input or output circuit of the G3TC. Doing so may result in malfunction or burning.
2. Do not connect the input and output circuits incorrectly. Doing so may result in malfunction or burning.
3. Do not obstruct the flow of air around the G3TC. Abnormal heating of the G3TC may result in short-circuiting of output elements and burning.

■ Correct Use

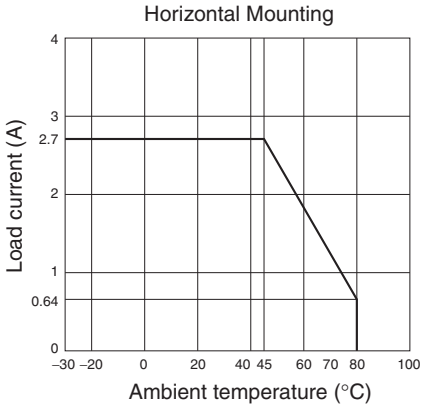
Before Actual Operation

1. In actual operation, the G3TC may cause accidents that were unforeseeable at the theoretical stage. Therefore, it is necessary to test the G3TC under a variety of conditions that are possible. As for the characteristics of the G3TC, it is necessary to consider the differences between G3TC models.
2. The ratings in this datasheet are for testing in a temperature range of 15 to 30°C, a relative humidity range of 25% to 85%, and an atmospheric pressure range of 88 to 106kPa. When testing operation, it is necessary to confirm correct operation not only with the actual load that will be used, but also at the same ambient conditions as for actual operation.
3. The input circuitry does not incorporate a circuit protecting the SSR from being damaged due to a reversed connection. Make sure that the polarity is correct when connecting the input lines.
4. Only use the G3TC with loads that are within the rated values. Using the G3TC with loads outside the rated values may result in malfunction, damage, or burning.
5. Use a power supply within the rated frequency range. Using a power supply outside the rated frequency range may result in malfunction, damage, or burning.
6. No over-voltage absorption element is built in. Therefore, if the G3TC is connected to an inductive load, be sure to connect an over-voltage absorption element.
7. As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses on the power supply side.
8. Keep wiring separate from high-voltage power lines and use wires of an appropriate length, otherwise malfunction and damage may result due to induction.
9. For a DC inductive load, a diode should be connected in parallel with the load to absorb the counter electromotive force of the load.
10. For an I/O mounting rack that is installed horizontally, use the G3TC with loads that are within the following conditions.

G3TC-OAC5, -OAC5A, -OAC15, -OAC15A, -OAC24, -OAC24A



G3TC-ODC5, -ODC15, -ODC24



■ Operating and Storage Environments

Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3TC is for when there is no built-up heat. For this, reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3TC may exceed the rated value resulting in malfunction or burning.

When using the G3TC, design the system to allow heat dissipation sufficient to stay below the Load Current vs. Ambient Temperature characteristic curve. Note also that the ambient temperature of the G3TC may increase as a result of environmental conditions (e.g., climate, air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

Operating and Storage Locations

Do not use or store the G3TC in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

1. Do not use or store in locations subject to direct sunlight.
2. Do not use in locations subject to ambient temperatures outside the range -30° to 80°C.
3. Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe change in temperature.
4. Do not store in locations subject to ambient temperatures outside the range -30° to 100°C.
5. Do not use or store in locations subject to corrosive or flammable gases.
6. Do not use or store in locations subject to dust (especially iron dust) or salts.
7. Do not use or store in locations subject to shock or vibration.
8. Do not use or store in locations subject to exposure to water, oil, or chemicals.

Transportation

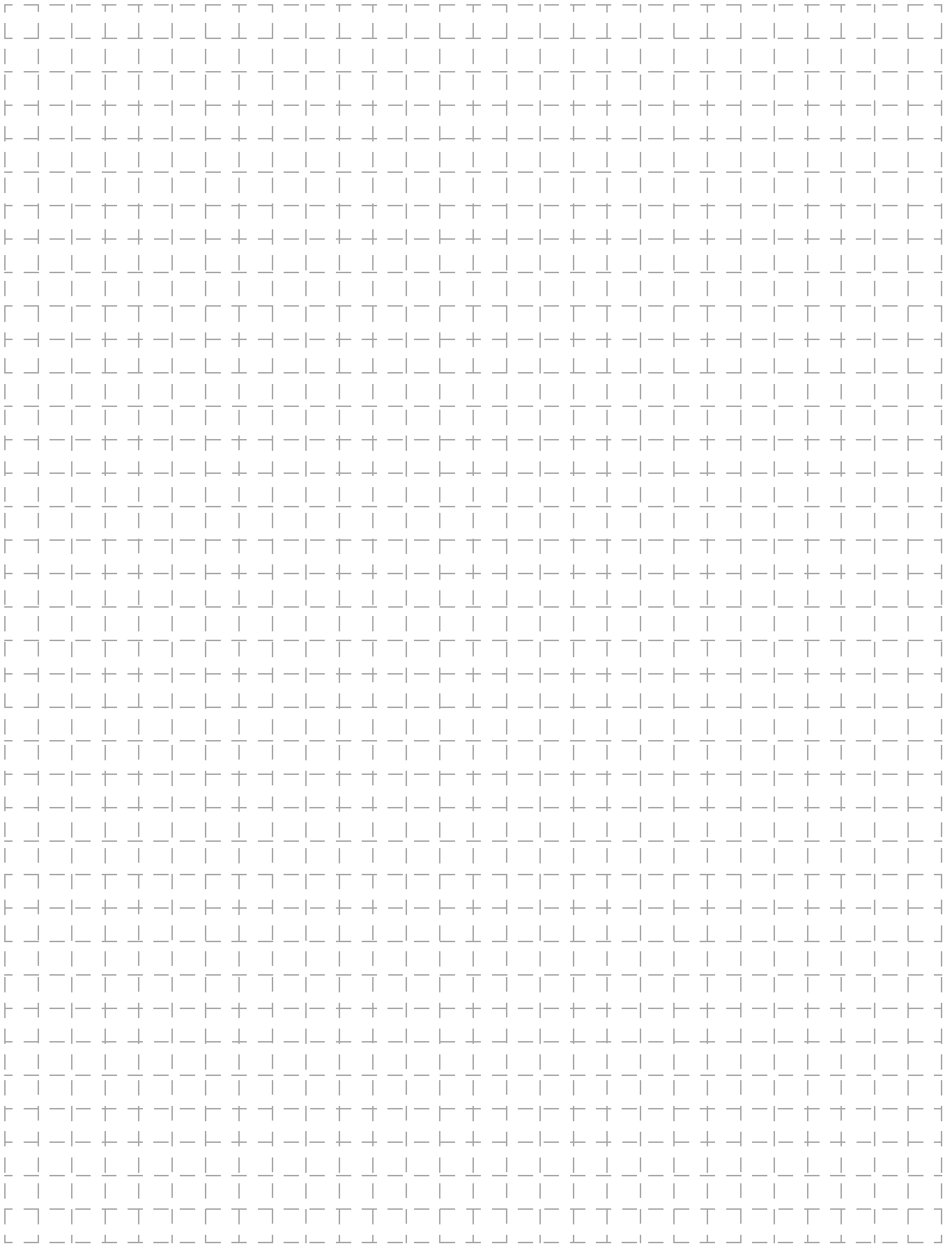
When transporting the G3TC, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

1. Do not drop the G3TC or subject it to severe vibrations or shock.
2. Do not transport the product if it is wet.

Vibration and Shock

Do not subject the SSR to excessive vibration or shock. Otherwise the SSR may malfunction and internal components may be damaged.

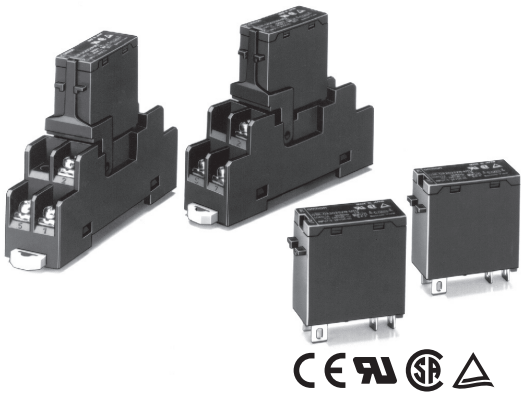
MEMO



Solid State Relay
G3R-I/O

Compact SSRs for I/O Interface with High Dielectric Strength Requirements

- High-speed models with optimum input ratings for a variety of sensors are available.
- Input Modules and Output Modules that have the same form-factor as the G2R.
- Using a coupler approved by VDE 0884 and assuring an I/O dielectric strength of 4 kV.
- Incorporating an easy-to-see monitoring indicator.
- Approved by UL, CSA, and TÜV. ("-UTU" models)



Ordering Information

To Order: Select the part number and add the desired coil voltage rating, (e.g., G3R-IAZR1SN-*DC5*)

■ Input Module

Isolation	Indicator	Response speed	Logic level		Rated input voltage	Model
			Supply voltage	Supply current		
Photocoupler	Yes	—	4 to 32 VDC	0.1 to 100 mA	100 to 240 VAC	**G3R-IAZR1SN**
		High-speed (1 kHz)			5 VDC	**G3R-IDZR1SN**
					12 to 24 VDC	
		Low-speed (10 Hz)			5 VDC	**G3R-IDZR1SN-1**
					12 to 24 VDC	

■ Output Module

Isolation	Indicator	Zero cross function	Rated output load	Rated input voltage	Model
Phototriac	Yes	Yes	2 A at 100 to 240 VAC	5 to 24 VDC	**G3R-OA202SZN**
		No			**G3R-OA202SLN**
Photocoupler		—	2 A at 5 to 48 VDC		**G3R-ODX02SN**
			1.5 A at 48 to 200 VDC		**G3R-OD201SN**

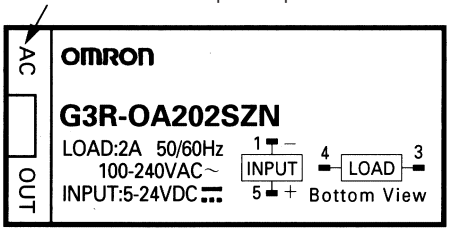
Note: When ordering a UL, CSA and EN (TÜV) approved model, add "-UTU" to the model number as shown below:
Example: G3R-OA202SZN-*UTU* DC5-24.

■ I/O Indication

I/O module classification and AC/DC use are indicated on the mark affixed to the top of the product.

Mark indication	Specification
AC IN	Input module, AC input
DC IN	Input module, DC input
AC OUT	Output module, AC output
DC OUT	Output module, DC output

Mark attached to the top of the product



Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input Module

Input

Model	Rated voltage	Operating voltage	Input current	Must operate voltage	Must release voltage
G3R-IAZR1SN	100 to 240 VAC	60 to 264 VAC	15 mA max.	60 VAC max.	20 VAC min.
G3R-IDZR1SN	5 VDC	4 to 6 VDC	8 mA max.	4 VDC max.	1 VDC min.
	12 to 24 VDC	6.6 to 32 VDC		6.6 VDC max.	3.6 VDC min.
G3R-IDZR1SN-1	5 VDC	4 to 6 VDC		4 VDC max.	1 VDC min.
	12 to 24 VDC	6.6 to 32 VDC		6.6 VDC max.	3.6 VDC min.

Output

Model	Logic level supply voltage	Logic level supply current
G3R-IAZR1SN	4 to 32 VDC	0.1 to 100 mA
G3R-IDZR1SN		
G3R-IDZR1SN-1		

Output Module

Input

Model	Rated voltage	Operating voltage	Input current	Must operate voltage	Must release voltage
G3R-OA202SZN	5 to 24 VDC	4 to 32 VDC	15 mA max. (at 25°C)	4 VDC max.	1 VDC min.
G3R-OA202SLN					
G3R-ODX02SN			8 mA max.		
G3R-OD201SN					

Output

Model	Rated load voltage	Load voltage range	Load current (see note)	Inrush current
G3R-OA202SZN	100 to 240 VAC	75 to 264 VAC	0.05 to 2 A	30 A (60 Hz, 1 cycle)
G3R-OA202SLN				
G3R-ODX02SN	5 to 48 VDC	4 to 60 VDC	0.01 to 2 A	8 A (10 ms)
G3R-OD201SN	48 to 200 VDC	40 to 200 VDC	0.01 to 1.5 A	8 A (10 ms)

Note: The minimum current value is measured at 10°C min.

Characteristics

■ Input Module

Item	G3R-IAZR1SN	G3R-IDZR1SN	G3R-IDZR1SN-1
Operate time	20 ms max.	0.1 ms max.	15 ms max.
Release time	20 ms max.	0.1 ms max.	15 ms max.
Response frequency	10 Hz	1 kHz	10 Hz
Output ON voltage drop	1.6 V max.		
Leakage current	5 μA max.		
Insulation resistance	100 MΩ min. between input and output		
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min. between input and output		
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude		
Shock resistance	1,000 m/s^2 {approx. 100G}		
Ambient temperature	Operating: -30°C to 80°C (with no icing) Storage: -30°C to 100°C (with no icing)		
Approved standards	UL File No. E64562 CSA File No. LR35535 TÜV File No. R9650094 (EN60950)		
Ambient humidity	Operating: 45% to 85%		
Weight	Approx. 18 g		

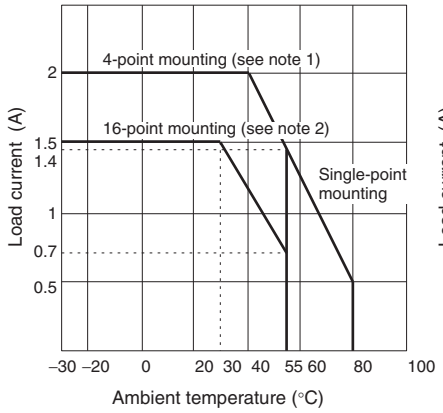
■ Output Module

Item	G3R-OA202SZN	G3R-OA202SLN	G3R-ODX025N	G3R-OA201SN
Operate time	1/2 of load power source cycle + 1 ms max.		1 ms max.	
Release time	1/2 of load power source cycle + 1 ms max.		2 ms max.	
Response frequency	20 Hz		100 Hz	
Output ON voltage drop	1.6 V max.			2.5 V max.
Leakage current	1.5 mA max.		1 mA max.	
Insulation resistance	100 MΩ min. between input and output			
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min. between input and output			
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude			
Shock resistance	1,000 m/s^2 {approx. 100G}			
Ambient temperature	Operating: -30°C to 80°C (with no icing) Storage: -30°C to 100°C (with no icing)			
Approved standards	UL File No. E64562 CSA File No. LR35535 TÜV File No. R9650094 (EN60950)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 18 g			

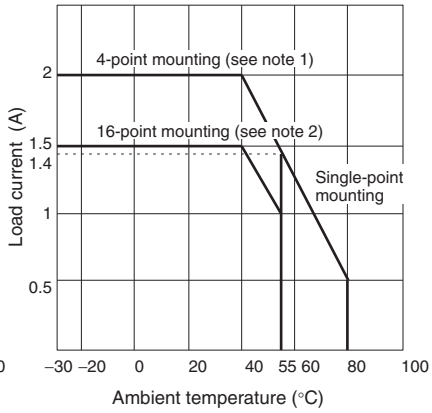
Engineering Data

Load Current vs. Ambient Temperature

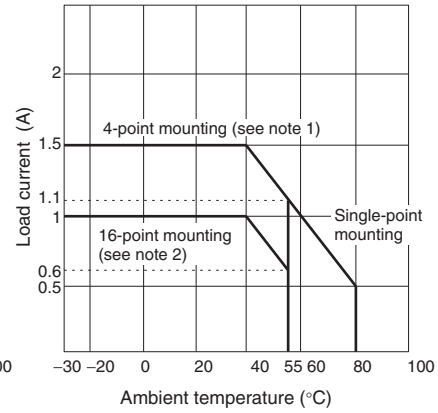
G3R-OA202SZN(-UTU)/OA202SLN(-UTU)



G3R-ODX02SN(-UTU) (4 to 60 VDC)



G3R-OD201SN(-UTU) (40 to 200 VAC)

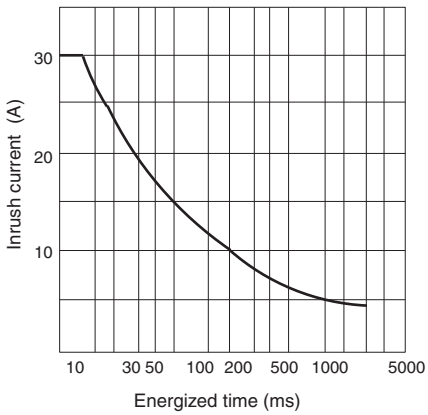


Note: 1. When G730-Z0M04-B is mounted.
2. When G70A-Z0C16 is mounted.

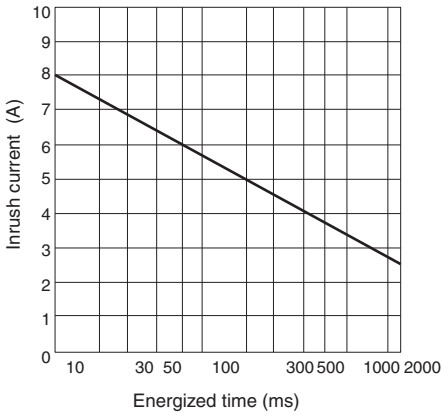
Inrush Current Resistivity

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

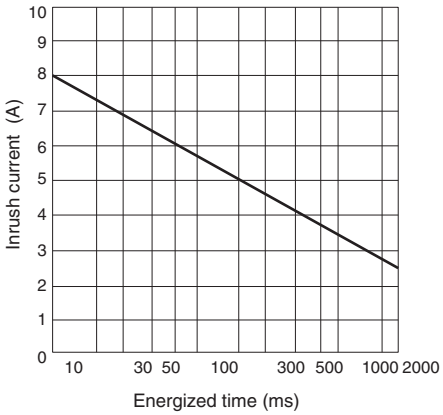
G3R-OA202SZN(-UTU)/OA202SLN(-UTU)



G3R-ODX02SN(-UTU)



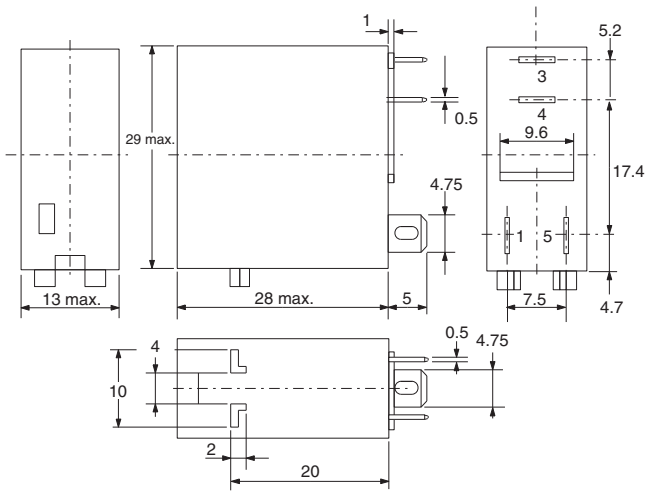
G3R-OD201SN(-UTU)



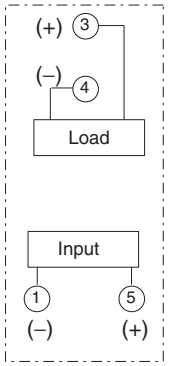
Dimensions

Unit: mm (inch)

■ G3R

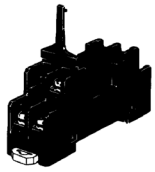


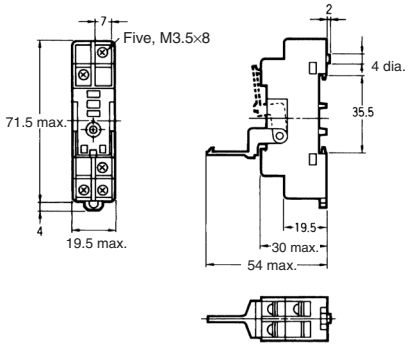
Terminal Arrangement/ Internal Connections (Bottom View)

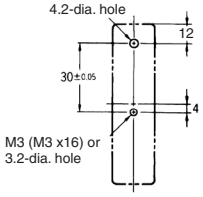


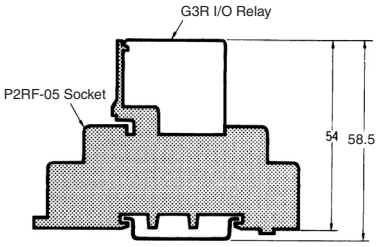
■ Connecting Sockets

P2RF-05



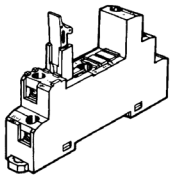


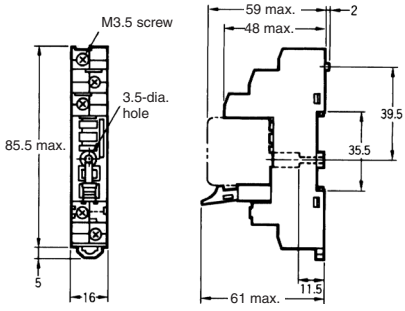


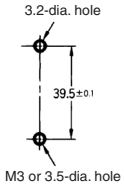


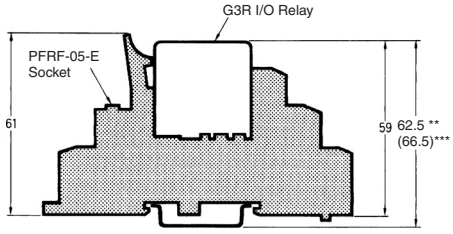
* Indicates a value when using the PFP-□N Supporting Rail.
The value is 67.5 when using the PFP-□N2.

P2RF-05-E





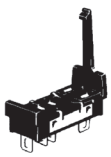


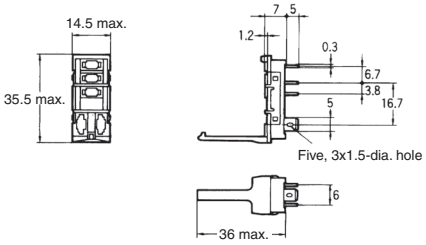


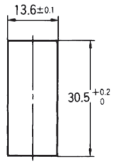
** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-05-E
The value is 71.5 when using the PFP-□N2.

*** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-08-E
The value is 75.5 when using the PFP-□N2.

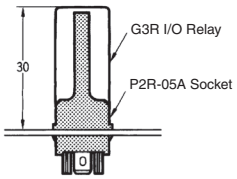
P2R-05A







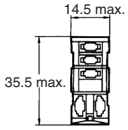
(Panel thickness must be 1.6 to 2.0 mm.)

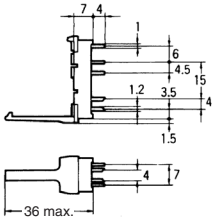


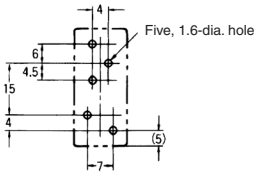
(For use when mounting in a panel or in the P2R-P mounting plate)

P2R-05P

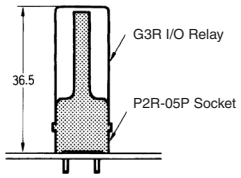




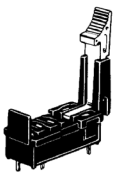


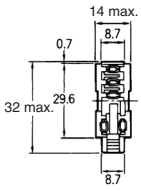


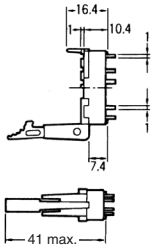
Dimensional tolerance is ±0.1.

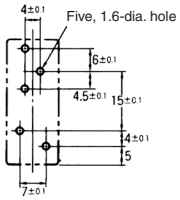


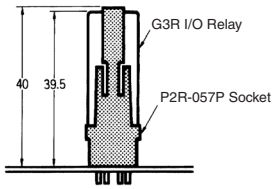
P2R-057P







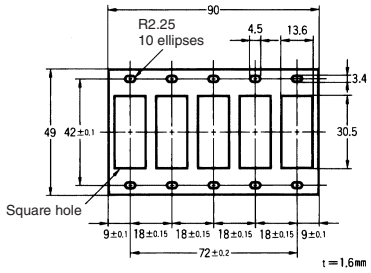




■ Socket Mounting Plate

Use the P2R-P Socket Mounting Plate when arranging several P2R-05A Sockets in a row.

P2R-P



■ Approvals

UL Recognized (File No. E64562) / CSA Certified (File No. LR35535)

Model G3R-	Module type	Rating
IAZR1SN	Input	100 to 240 VAC
IDZR1SN	Input	5 VDC, 12 to 24 VDC
IDZR1SN-1	Input	5 VDC, 12 to 24 VDC
OA202SZN	Output	5 to 24 VDC
OA202SLN	Output	5 to 24 VDC
ODX02SN	Output	5 to 24 VDC
OD201SN	Output	5 to 24 VDC

Model G3R-	Module type	Output rating
IAZR1SN	Input	32 VDC, 100 mA (General Purpose)
IDZR1SN	Input	32 VDC, 100 mA (General Purpose)
IDZR1SN-1	Input	32 VDC, 100 mA (General Purpose)
OA202SZN	Output	264 VAC, 2 A (General Purpose)
		264 VAC, 1 A (Tungsten)
		264 VAC, 1 A FLA, 6 A LRA
OA202SLN	Output	264 VAC, 2 A (General Purpose)
		264 VAC, 1 A (Tungsten)
		264 VAC, 1 A FLA, 6 A LRA
ODX02SN	Output	60 VDC, 2 A (General Purpose)
		60 VDC, 1 A (Tungsten)
OD201SN	Output	200 VDC, 1.5 A (General Purpose)
		200 VDC, 0.75 A (Tungsten)

Precautions

■ Connection

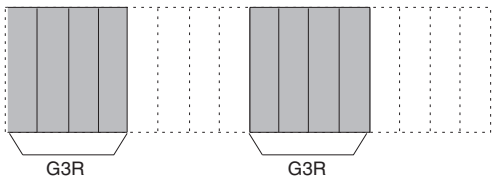
With the SSR for DC switching, the load can be connected to either positive or negative output terminal of the SSR.

■ Protective element

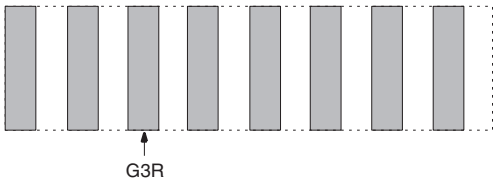
Since the SSR does not incorporate an overvoltage absorption component, be sure to connect an overvoltage absorption component when using the SSR under an inductive load.

■ Precaution of Mounting Output Modules

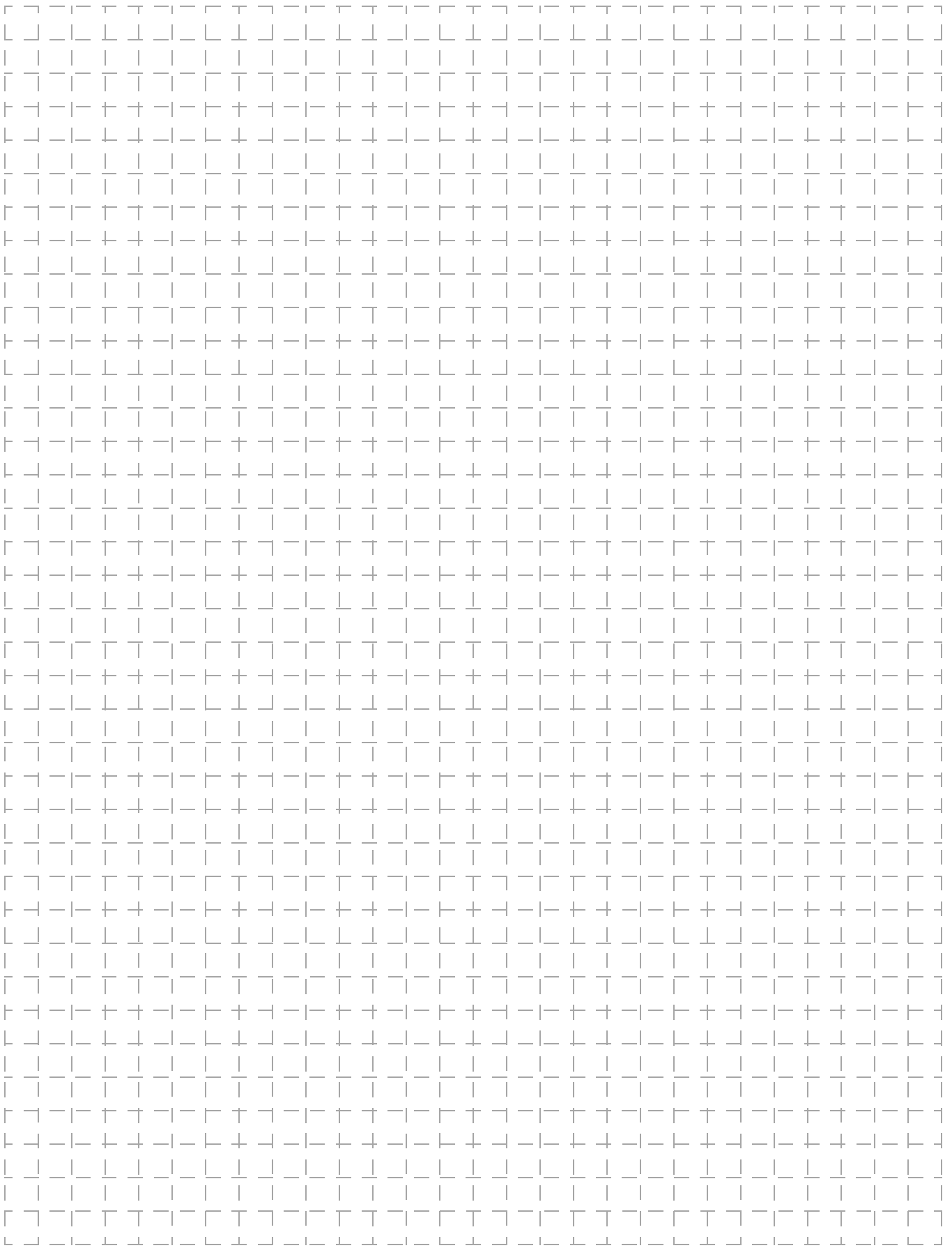
With up to four G3R SSRs mounted closely and side by side, 2-A loads can be switched.



With a G3R SSRs mounted every other slot, 2-A loads can be switched.



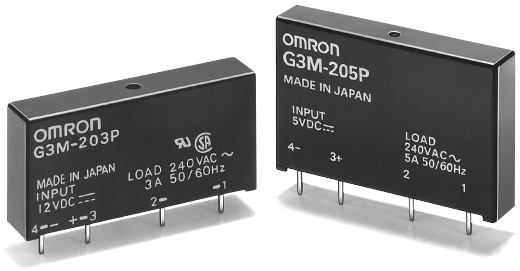
MEMO



Solid State Relays
G3M

Zero Cross Models Added to Compact, Low-cost G3M Series

- 2, 3 and 5A single in-line package SSR
- Thin design for high-density PCB applications.
- DC input-AC output for up to a 5-A load.
- Certified by UL, CSA, and VDE.



Ordering Information

To order: Select the part number and add the desired input voltage rating. (e.g., G3M-202P-US *DC5*)

Isolation	Input terminal pitch	Zero cross function	Indicator	Rated output load (Applicable output load)	Rated input voltage	Model
Phototriac	7.62 mm	Yes	No	2 A at 100 to 240 VAC (2 A at 75 to 264 VAC)	5 VDC	**G3M-202P-US**
					12 VDC	
					24 VDC	
				3 A at 100 to 240 VAC (3 A at 75 to 264 VAC)	5 VDC	**G3M-203P**
					12 VDC	
					24 VDC	
				5 A at 100 to 240 VAC (5 A at 75 to 264 VAC)	5 VDC	**G3M-205P**
					12 VDC	
					24 VDC	
		No		2 A at 100 to 120 VAC (2 A at 75 to 132 VAC)	5 VDC	**G3M-102PL-US**
					12 VDC	
					24 VDC	
				2 A at 100 to 240 VAC (2 A at 75 to 264 VAC)	5 VDC	**G3M-202PL-US**
					12 VDC	
					24 VDC	
				3 A at 100 to 240 VAC (3 A at 75 to 264 VAC)	5 VDC	**G3M-203PL**
					12 VDC	
					24 VDC	
				5 A at 100 to 240 VAC (5 A at 75 to 264 VAC)	5 VDC	**G3M-205PL**
					12 VDC	
					24 VDC	

(This table continues on the next page)

Note: 1. All models have UL and CSA approvals.

2. TÜV Marking is available with "-UTU" in place of "-US" on the part number

3. G3M-205P(L)-VD is approved by UL, CSA and VDE

Ordering information continued

Isolation	Input terminal pitch	Zero cross function	Indicator	Rated output load (Applicable output load)	Rated input voltage	Model
Phototriac	5.08 mm	Yes	No	2 A at 100 to 240 VAC (2 A at 75 to 264 VAC)	5 VDC	**G3M-202P-US-4**
					12 VDC	
					24 VDC	
				3 A at 100 to 240 VAC (3 A at 75 to 264 VAC)	5 VDC	**G3M-203P-4**
					12 VDC	
					24 VDC	
				5 A at 100 to 240 VAC (5 A at 75 to 264 VAC)	5 VDC	**G3M-205P-4**
					12 VDC	
					24 VDC	
		No		2 A at 100 to 120 VAC (2 A at 75 to 132 VAC)	5 VDC	**G3M-102PL-US-4**
					12 VDC	
					24 VDC	
				2 A at 100 to 240 VAC (2 A at 75 to 264 VAC)	5 VDC	**G3M-202PL-US-4**
					12 VDC	
					24 VDC	
				3 A at 100 to 240 VAC (3 A at 75 to 264 VAC)	5 VDC	**G3M-203PL-4**
					12 VDC	
					24 VDC	
				5 A at 100 to 240 VAC (5 A at 75 to 264 VAC)	5 VDC	**G3M-205PL-4**
					12 VDC	
					24 VDC	

Note: 1. All models have UL and CSA approvals.

2. TÜV Marking is available with "-UTU" in place of "-US" on the part number

3. G3M-205P(L)-VD is approved by UL, CSA and VDE

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Impedance	Voltage levels	
			Must operate voltage	Must release voltage
5 VDC	4 to 6 VDC	300 Ω ±20%	4 VDC max.	1 VDC min.
12 VDC	9.6 to 14.4 VDC	800 Ω ±20%	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	1.6 kΩ ±20%	19.2 VDC max.	

Note: Each model has 5-VDC, 12-VDC, and 24-VDC input versions.

Output

Model	Rated voltage	Applicable load		
		Load voltage range	Load current	Inrush current
G3M-102PL-US(-4)	100 to 120 VAC	75 to 132 VAC	0.1 to 2 A	30 A (60 Hz, 1 cycle)
G3M-202P(L)-US(-4)	100 to 240 VAC	75 to 264 VAC		
G3M-203P(L)(-4)			0.1 to 3 A	45 A (60 Hz, 1 cycle)
G3M-205P(L)(-4)			0.1 to 5 A	

■ Characteristics

Item	G3M-102PL-US(-4)	G3M-202P(L)-US(-4)	G3M-203P(L)(-4)	G3M-205P(L)(-4)
Operate time	1 ms max. (1/2 of load power source cycle + 1 ms max. for G3M-202P, G3M-203P, G3M-205P)			
Release time	1/2 of load power source cycle + 1 ms max.			
Output ON voltage drop	1.6 V (RMS) max.			
Leakage current	2 mA max. (at 100 VAC)	2 mA max. (at 100 VAC) 5 mA max. (at 200 VAC)	1.5 mA (at 200 VAC)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)			
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min		2,500 VAC, 50/60 Hz for 1 min	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude			
Shock resistance	Malfunction: 1,000 m/s^2 (approx. 100G)			
Ambient temperature	Operating: –30°C to 80°C (with no icing or condensation) Storage: –30°C to 100°C (with no icing or condensation)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 15 g			Approx. 25 g

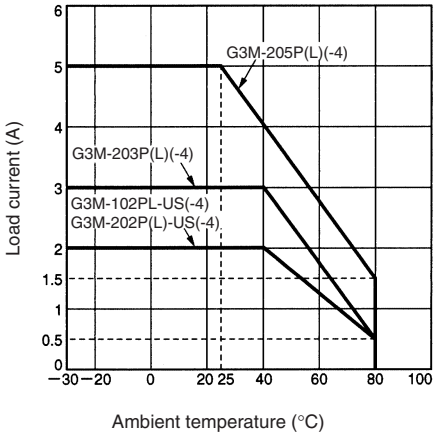
■ Approvals

UL Recognized (File No. E64562) / CSA Certified (File No. LR35535) - - Ambient Temp. = 40°C

Input Voltage	SSR Type	Load Rating
5, 12, 24 VDC	With Suffixes 102 and US or UTU	2 A, 125 VAC, Resistive 250 W, 125 VAC Tungsten 2 A FLA / 12 A LRA, 125 VAC
	With Suffixes 202 and US	2 A, 250 VAC, Resistive 500 W, 250 VAC Tungsten 2 A FLA / 12 A LRA, 250 VAC
	With Suffixes 202 and UTU	2 A, 250 VAC, Resistive 250 W, 250 VAC Tungsten 1 A FLA / 6 A LRA, 250 VAC
	With Suffixes 203 and US or UTU	3 A, 250 VAC, Resistive 750 W, 250 VAC Tungsten 1.5 A FLA / 9 A LRA, 250 VAC
	With Suffix 205	5 A, 250 VAC, Resistive 1,250 W, 250 VAC Tungsten 2.5 A FLA / 15 A LRA, 250 VAC

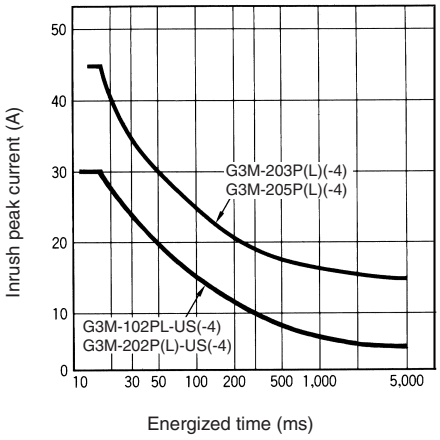
Engineering Data

Load Current vs. Ambient Temperature



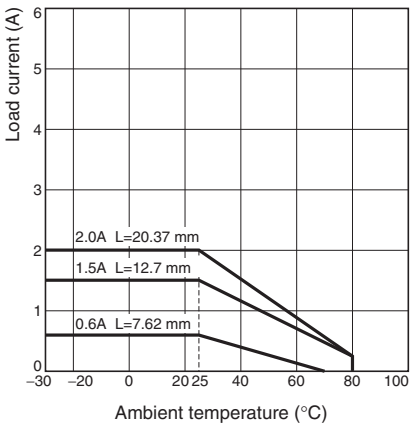
Inrush Current Immunity

Non-repetitive
Reduce the current to 1/2 or less if the G3M is in repetitive operation.

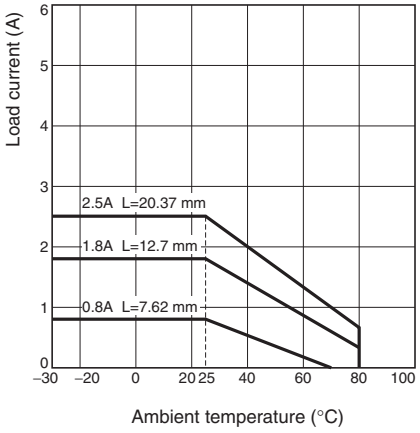


Load Current vs. Ambient Temperature (Close Mounting) G3M-205 Series (5-A Load)

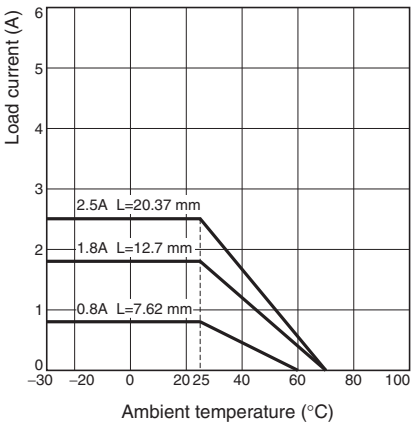
X direction

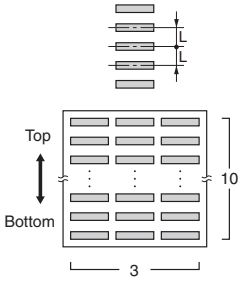


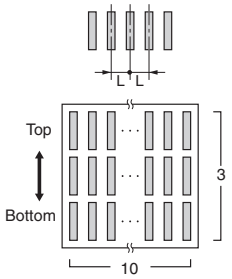
Y direction

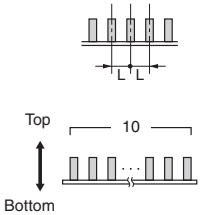


Z direction







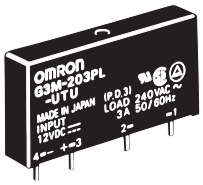


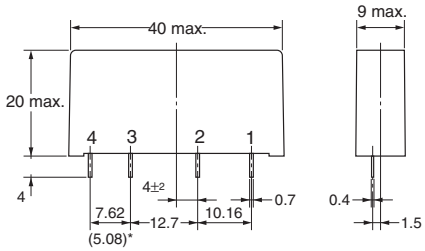
- Thirty Relays are soldered to the PCB at each given spacing.
- Continuous power.

Dimensions

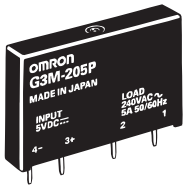
Note: All units are in millimeters unless otherwise indicated.

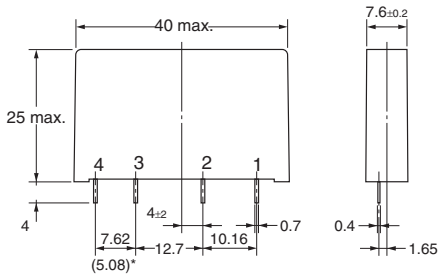
G3M-102PL-US(-4), G3M-202P(L)-4
G3M-203P(L)-4





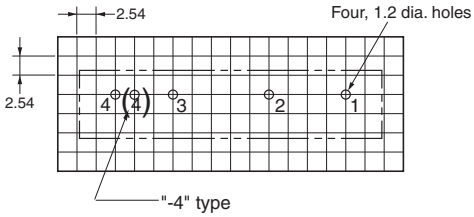
G3M-205P(L)-4



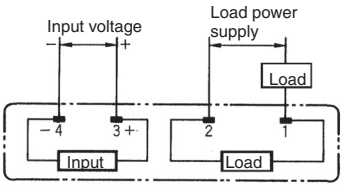


*Input terminal pitch for models ending in "-4" is 5.08 mm.

PCB Dimensions (Bottom View)



Terminal Arrangement (Bottom View)



Precautions

Protective Element

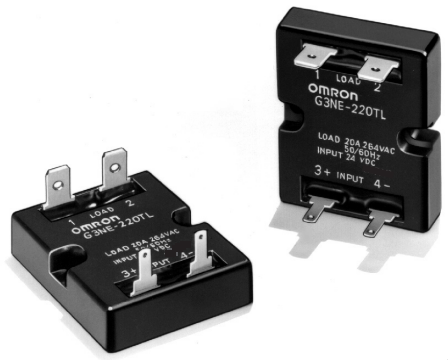
No overvoltage absorption element is built in. Therefore, if the G3M is connected to an inductive load, be sure to connect the overvoltage absorption element.

MEMO

Solid State Relays
G3NE

Compact, Low-cost, SSR Switching 5 to 20 A

- Wide load voltage range: 75 to 264 VAC.
- Dedicated, compact aluminum PCB and power elements used.
- Built-in varistor effectively absorbs external surges.
- Quick-connect #110 input terminals and #250 output connections. (#187 input terminals and #250 output connections are available.)
- "-US" models certified by UL, CSA, and IEC/EN (TÜV).



Ordering Information

To order: Select the part number and add the desired coil voltage rating. (e.g., G3NE-205T-US *DC24*)

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac	Yes	No	5 A at 100 to 240 VAC (5 A at 75 to 264 VAC)	5, 12, 24 VDC	**G3NE-205T-US**
			10 A at 100 to 240 VAC (10 A at 75 to 264 VAC)		**G3NE-210T-US**
			20 A at 100 to 240 VAC (20 A at 75 to 264 VAC)		**G3NE-220T-US**
	No		5 A at 100 to 240 VAC (5A at 75 to 264 VAC)		**G3NE-205TL-US**
			10 A at 100 to 240 VAC (10 A at 75 to 264 VAC)		**G3NE-210TL-US**
			20 A at 100 to 240 VAC (20 A at 75 to 264 VAC)		**G3NE-220TL-US**

Note: When ordering #187 input terminal versions, place "-2" before "-US in the part number. (e.g., G3NE-210TL-*2*-US DC12)

■ Accessories (Order Separately)

Heat Sinks

The following heat sinks are thin and can be DIN-track mounted.
See *Dimensions* for details.

Model	Applicable SSR
Y92B-N50	G3NE-205T(L)(-2)-US/-210T(L)(-2)-US
Y92B-N100	G3NE-220T(L)(-2)-US

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Voltage level		Input impedance	
		Must operate	Must release	With zero cross function	Without zero cross function
5 VDC	4 to 6 VDC	4 VDC max.	1 VDC min.	250 Ω±20%	300 Ω±20%
12 VDC	9.6 to 14.4 VDC	9.6 VDC max.		600 Ω±20%	800 Ω±20%
24 VDC	19.2 to 28.8 VDC	19.2 VDC max.		1.6 kΩ±20%	

Note: Each model has 5-VDC, 12-VDC, and 24-VDC input versions.

Output

Model	Applicable load				
	Rated load voltage	Load voltage range	Load current (See note 1)		Inrush current
			With heat sink	Without heat sink	
G3NE-205T(L)(-2)-US	100 to 240 VAC	75 to 264 VAC	0.1 to 5 A	0.1 to 5 A	60 A (60 Hz, 1 cycle)
G3NE-210T(L)(-2)-US			0.1 to 10 A (See note 2)	0.1 to 5 A	150 A (60 Hz, 1 cycle)
G3NE-220T(L)(-2)-US			0.1 to 20 A (See note 2)	0.1 to 5 A	220 A (60 Hz, 1 cycle)

Note: 1. The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data* for details.

2. These values apply when using a dedicated heat sink or a radiation plate of specified size.

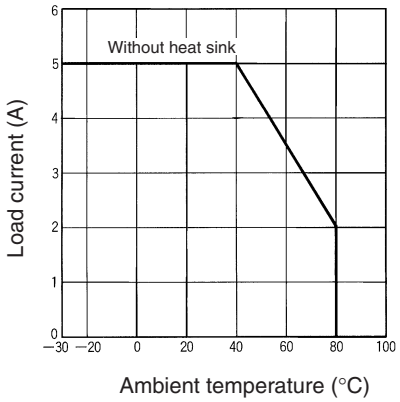
■ Characteristics

Item	G3NE-2□□T(-2)-US	G3NE-2□□TL(-2)-US
Operate time	1/2 of load power source cycle + 1 ms max.	1 ms max.
Release time	1/2 of load power source cycle + 1 ms max.	
Output ON voltage drop	1.6 V (RMS) max.	
Leakage current	2 mA max. (at 100 VAC) 5 mA max. (at 200 VAC)	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min	
Vibration resistance	Malfunction: 10 to 55, 1.5-mm double amplitude	
Shock resistance	Malfunction: 1,000 m/s^2 (approx. 100G)	
Ambient temperature	Operating:–30°C to 80°C (with no icing or condensation) Storage:–30°C to 100°C (with no icing or condensation)	
Ambient humidity	Operating:45% to 85%	
Certified standards	UL File No.E64562/CSA File No. LR35535 TÜV R9051064 (VDE0435) (EN60950)	
Weight	Approx. 37 g	

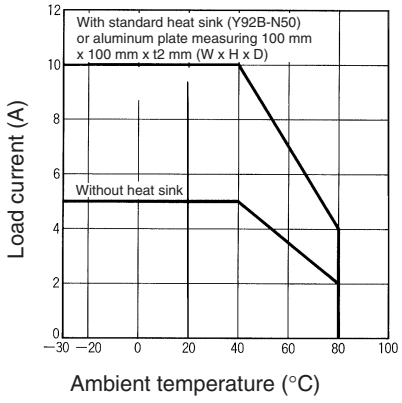
■ Engineering Data

Load Current vs. Ambient Temperature

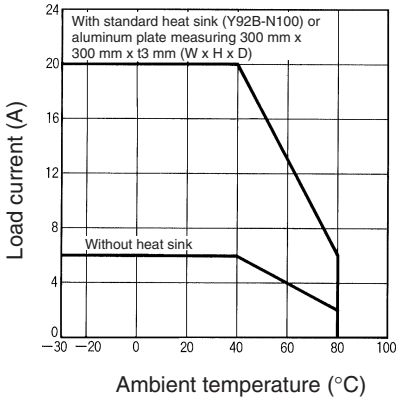
G3NE-205T(L)(-2)-US



G3NE-210T(L)(-2)-US



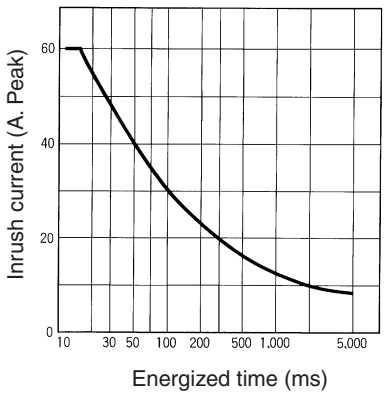
G3NE-220T(L)(-2)-US



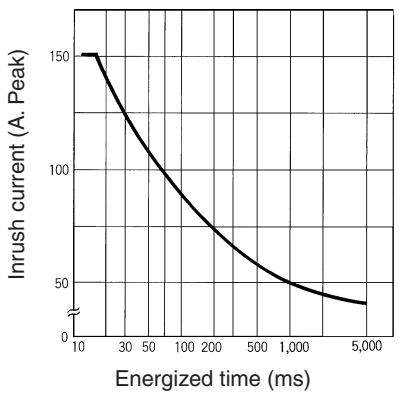
Inrush Current Resistivity

One cycle, non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

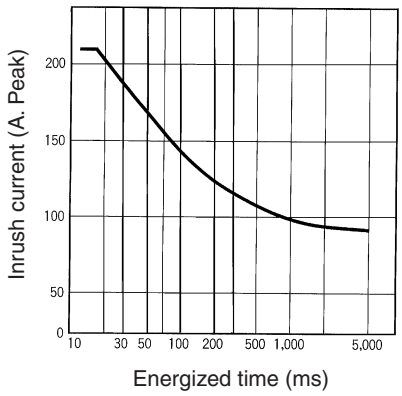
G3NE-205T(L)(-2)-US



G3NE-210T(L)(-2)-US



G3NE-220T(L)(-2)-US

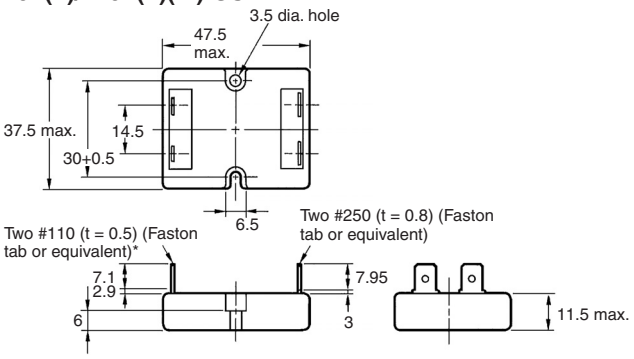


Dimensions

Note: All units are in millimeters unless otherwise indicated.

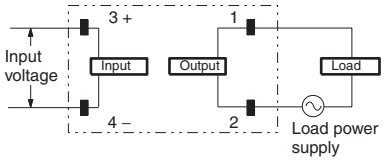
G3NE-205T(L)/210T(L)/220T(L)(-2)-US



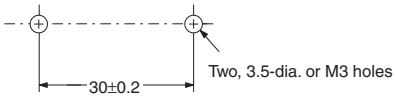


* G3NE-2□□T(L)-2-US: Two, #187 (t=0.5) (Faston tab or equivalent)

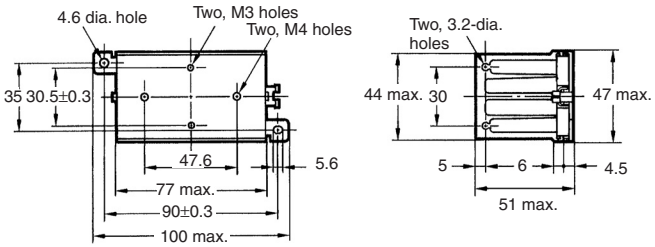
Terminal Arrangement/ Internal Connections (Top View)



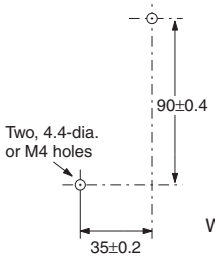
Mounting Holes



Heat Sink Y92B-N50

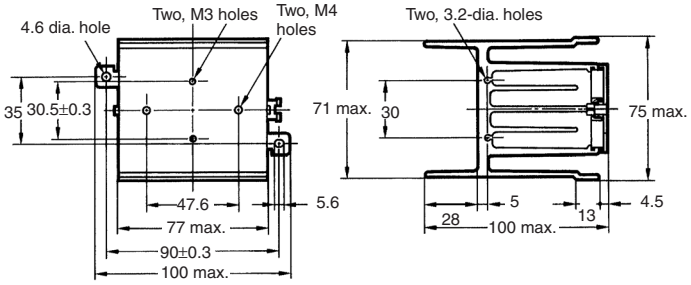


Mounting Holes

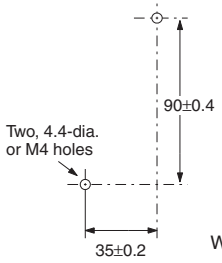


Weight: approx. 200 g

Y92B-N100



Mounting Holes



Weight: approx. 400 g

■ Approvals

UL Recognized (File No. E64562) / CSA Certified (File No. LR35535) - - Ambient Temp. = 40°C

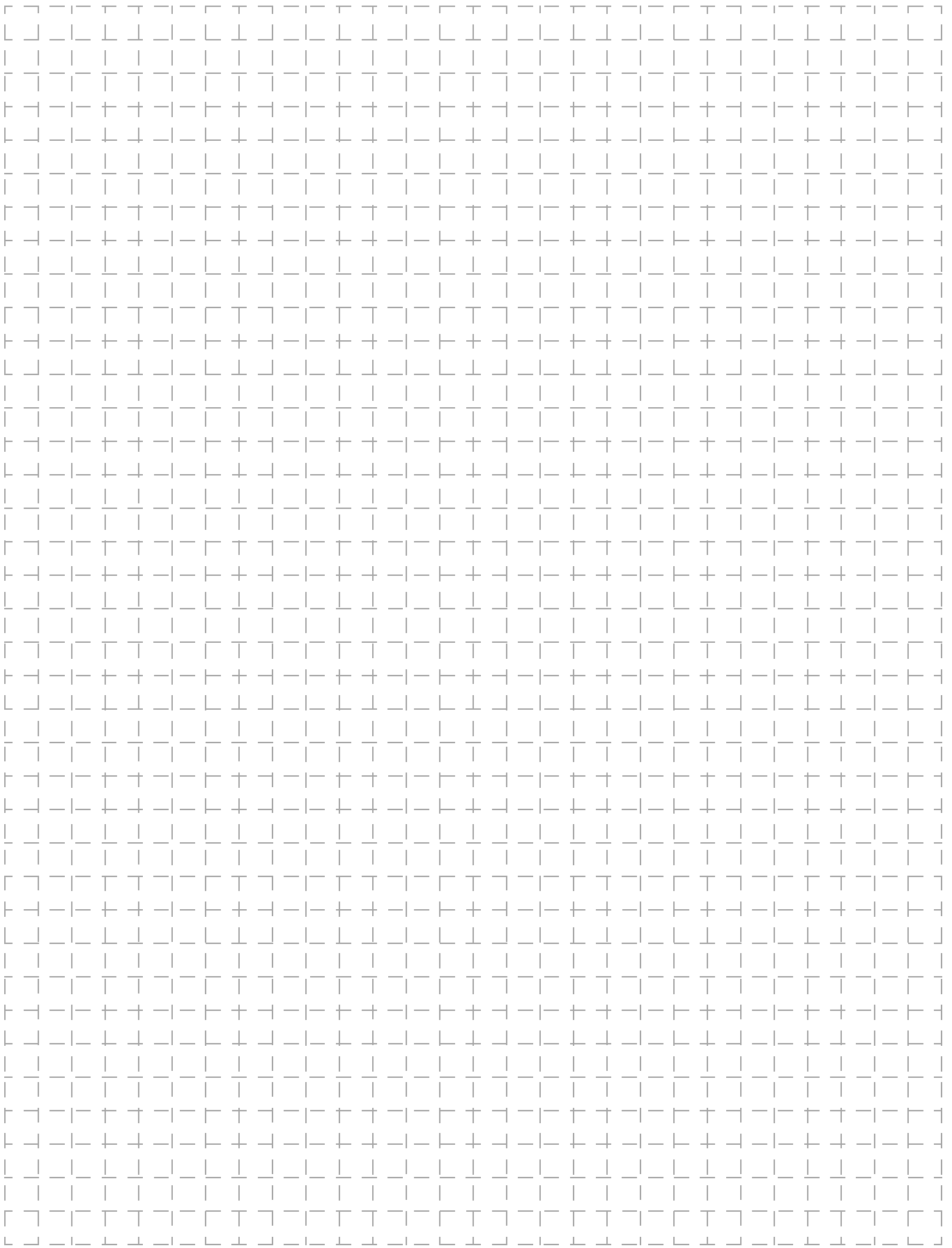
Input voltage	SSR type	Output ratings
5, 12, 24 VDC	G3NE-205	5A resistive, 240 VAC 3A Tungsten, 240 VAC 3.2A FLA/ 19.2A LRA, 240 VAC 50/60 Hz
	G3NE-210	10A resistive, 240 VAC 7.5A Tungsten, 240 VAC 4.8A FLA/ 28.8A LRA, 240 VAC 50/60 Hz
	G3NE-210	5A resistive, 240 VAC 5A Tungsten, 240 VAC 3A FLA/ 18A LRA, 240 VAC 50/60 Hz
	G3NE-220	20A resistive, 240 VAC 11A Tungsten, 240 VAC 11.1A FLA/ 66.6A LRA, 240 VAC 50/60 Hz
	G3NE-220	6A resistive, 240 VAC 6A Tungsten, 240 VAC 3.3A FLA/ 19.8A LRA, 240 VAC 50/60 Hz

Precautions

Do not apply excessive force to the terminals. Exercise care when pulling or inserting the terminal clips.

When attaching a heat sink to the G3NE, apply heat-conductive grease on the heat sink. Tighten the mounting screws of the heat sink with a torque of 0.59 to 0.98 N•m

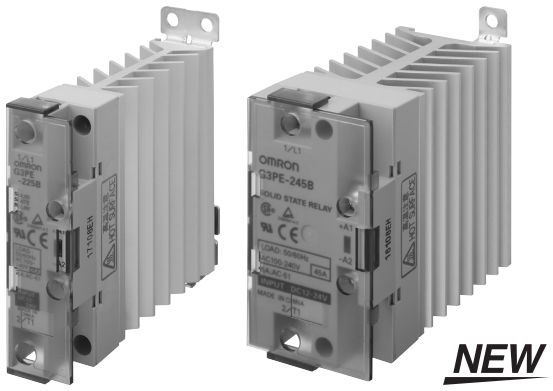
MEMO



Single-phase Solid State Relays for Heaters
G3PE

Slim Profile Industrial SSR with Heasink ideal for heater applications.

- Snubber circuit provides excellent short-term surge absorption.
- 15A and 25A models have slim 22.5mm width.
- Zero cross or “fast turn on” models.
- DIN track or panel mounting possible.
- LED indicator standard on all single phase models.
- UL, CSA and TÜV approved (240 VAC, single-phase models only).
- RoHS compliant.



⚠ **Refer to Safety Precautions**

Ordering Information

■ List of Models

Number of phases	Isolation method	Operation indicator	Rated input voltage	Zero cross function	Applicable load ✻	Model
Single-phase	Phototriac coupler	Yes (yellow)	12 to 24 VDC	Yes	15 A, 100 to 240 VAC	**G3PE-215B DC12-24**
					25 A, 100 to 240 VAC	**G3PE-225B DC12-24**
					35 A, 100 to 240 VAC	**G3PE-235B DC12-24**
					45 A, 100 to 240 VAC	**G3PE-245B DC12-24**
				No	15 A, 100 to 240 VAC	**G3PE-215BL DC12-24**
					25 A, 100 to 240 VAC	**G3PE-225BL DC12-24**
					35 A, 100 to 240 VAC	**G3PE-235BL DC12-24**
					45 A, 100 to 240 VAC	**G3PE-245BL DC12-24**

✻ The applicable load current depends on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in the *Engineering Data section.*

Specifications

■ Ratings

Input (at an Ambient Temperature of 25°C)

Item / Model	Rated voltage	Operating voltage range	Rated input current	Voltage level	
				Must operate voltage	Must release voltage
G3PE-□□□B	12 to 24 VDC	9.6 to 30 VDC	7 mA max.	9.6 VDC max.	1.0 VDC max.
G3PE-□□□BL			15 mA max.		

Output

Model / Item	G3PE-215B(L)	G3PE-225B(L)	G3PE-235B(L)	G3PE-245B(L)
Rated load voltage	100 to 240 VAC (50/60 Hz)			
Load voltage range	75 to 264 VAC (50/60 Hz)			
Applicable load current ✻	0.1 to 15 A (at 40°C)	0.1 to 25 A (at 40°C)	0.5 to 35 A (at 25°C)	0.5 to 45 A (at 25°C)
Inrush current	150 A (60 Hz, 1 cycle)	220 A (60 Hz, 1 cycle)	440 A (60 Hz, 1 cycle)	
Permissible I^2t (reference value)	121A^2s	260A^2s	1,260A^2s	
Applicable load (resistive load)	3 kW (at 200 VAC)	5 kW (at 200 VAC)	7 kW (at 200 VAC)	9 kW (at 200 VAC)

✻ The applicable load current depends on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature*

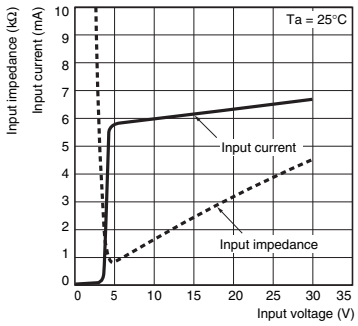
■ Characteristics

Model / Item	G3PE-215B	G3PE-225B	G3PE-235B	G3PE-245B	G3PE-215BL	G3PE-225BL	G3PE-235BL	G3PE-245BL
Operate time	1/2 of load power source cycle + 1 ms max.				1 ms max.			
Release time	1/2 of load power source cycle + 1 ms max.							
Output ON voltage drop	1.6 V (RMS) max.							
Leakage current	10 mA max. (at 200 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	10 to 55 to10 Hz, 0.375-mm single amplitude (0.75-mm double amplitude) (Mounted to DIN track)							
Shock resistance	Destruction: 294 m/s^2 (Mounted to DIN track)							
Ambient storage temperature	−30 to 100°C (with no icing or condensation)							
Ambient operating temperature	−30 to 80°C (with no icing or condensation)							
Ambient operating humidity	45% to 85%							
Weight	Approx. 240 g		Approx. 400 g		Approx. 240 g		Approx. 400 g	

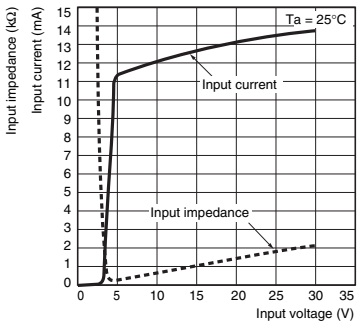
Engineering Data

Input Voltage vs. Input Impedance and Input Voltage vs. Input Current

G3PE-2□□B

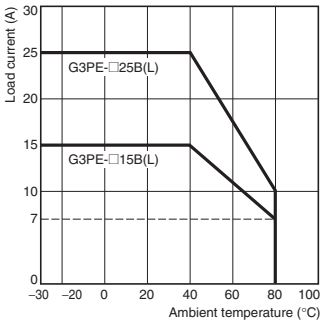


G3PE-2□□BL

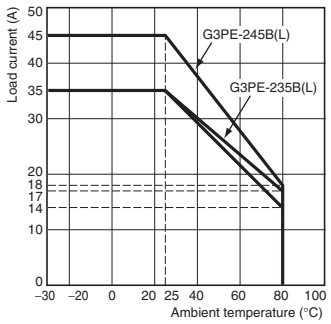


Load Current vs. Ambient Temperature

G3PE-215B(L), G3PE-225B(L)



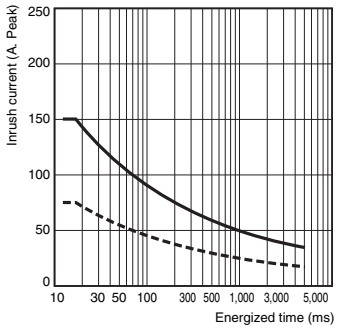
G3PE-235B(L), G3PE-245B(L)



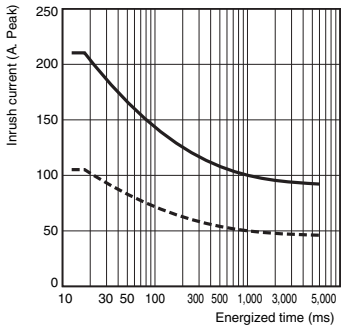
Inrush Current Resistivity: Non-repetitive

Make sure the inrush current stays below the dashed line curve if it occurs repetitively.

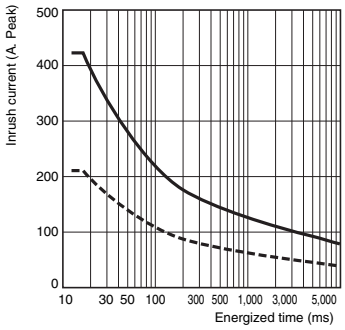
G3PE-215B(L)



G3PE-225B(L)

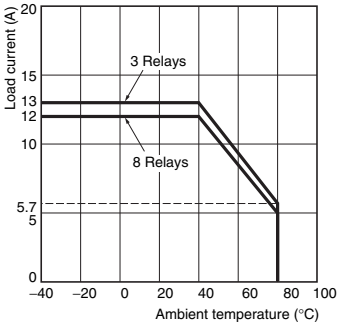


G3PE-235B(L), G3PE-245B(L)

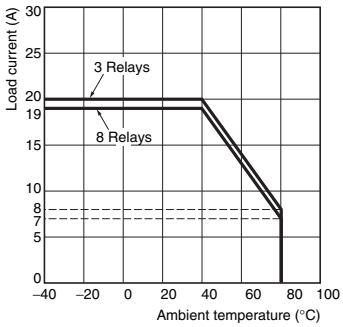


Close Mounting (3 or 8 SSRs)

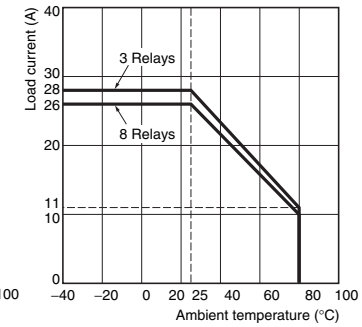
G3PE-215B(L)



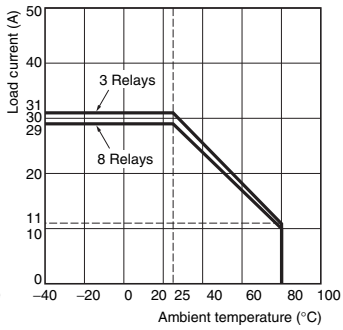
G3PE-225B(L)



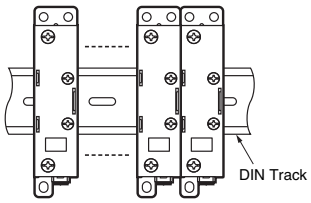
G3PE-235B(L)



G3PE-245B(L)



Close Mounting Example



■ Approvals

UL Recognized, CSA Certified and EN60947-4-3 (TÜV) approved

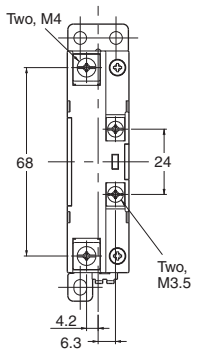
Dimensions

Note: All units are in millimeters unless otherwise indicated.

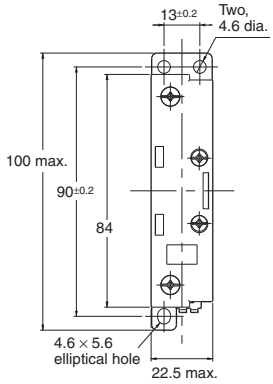
Solid State Relays

G3PE-215B(L)
G3PE-225B(L)

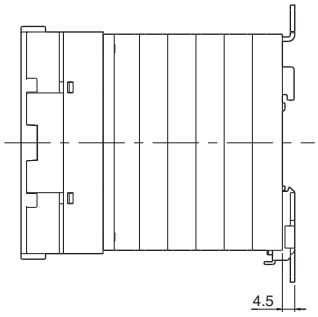


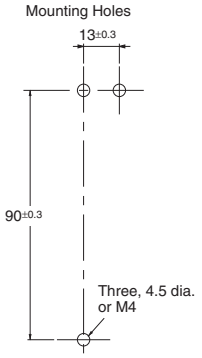


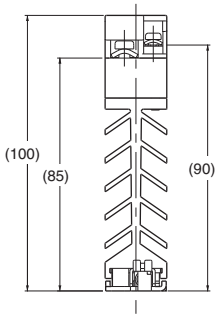
Note: Without terminal cover.



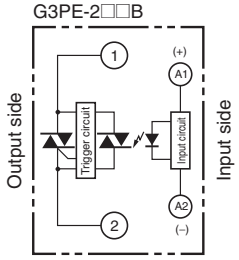
Note: With terminal cover.





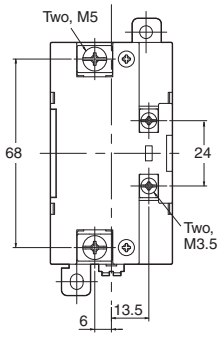


Terminal Arrangement/Internal Circuit Diagram

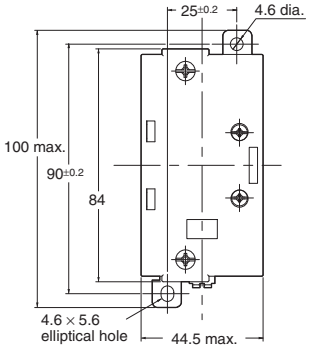


G3PE-235B(L)
G3PE-245B(L)

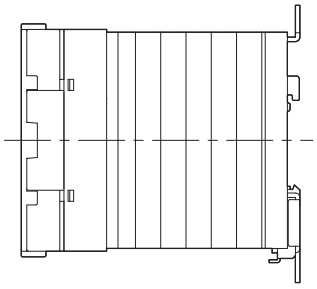


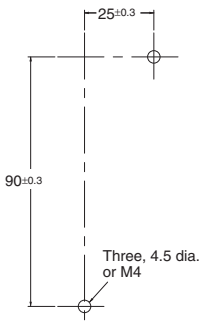


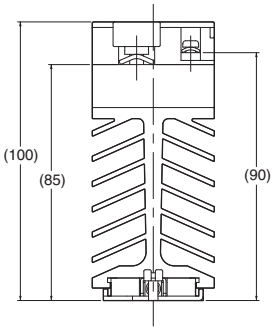
Note: Without terminal cover.



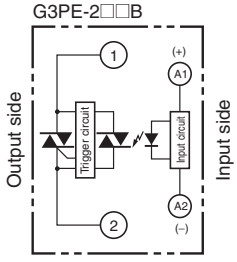
Note: With terminal cover.







Terminal Arrangement/Internal Circuit Diagram



Safety Precautions

Refer to Safety Precautions for All Solid State Relays.

⚠ CAUTION

Minor electrical shock may occasionally occur.
Do not touch the G3PE terminal section (i.e., current-carrying parts) while the power is being supplied. Also, always attach the cover terminal.



The G3PE may rupture if short-circuit current flows. As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses and no-fuse breakers, on the power supply side.



Minor electrical shock may occasionally occur.
Do not touch the main circuit terminals on the SSR immediately after the power supply has been turned OFF. Shock may result due to the electrical charge stored in the built-in snubber circuit.



Minor burns may occasionally occur.
Do not touch the SSR or the heatsink while the power is being supplied or immediately after the power supply has been turned OFF. The SSR and heatsink become extremely hot.



Precautions for Safe Use

OMRON constantly strives to improve quality and reliability. SSRs, however, use semiconductors, and semiconductors may commonly malfunction or fail. In particular, it may not be possible to ensure safety if the SSRs are used outside the rated ranges. Therefore, always use the SSRs within the ratings. When using an SSR, always design the system to ensure safety and prevent human accidents, fires, and social harm in the event of SSR failure. System design must include measures such as system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

Transport

Do not transport the G3PE under the following conditions. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Conditions in which the G3PE may be subject to water.
- Conditions in which the G3PE may be subject to high temperature or high humidity.
- Conditions in which the G3PE is not packaged.

Operating and Storage Environments

Do not use or store the G3PE in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Locations subject to rainwater or water splashes.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to high temperature or high humidity.
- Do not store in locations subject to ambient storage temperatures outside the range −30 to 100°C.
- Do not use in locations subject to relative humidity outside the range 45% to 85%.
- Locations subject to corrosive gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to direct sunlight.
- Locations subject to shock or vibration.

Installation and Handling

- Do not block the movement of the air surrounding the G3PE or heat sink. Abnormal heating of the G3PE may result in shorting failures of the output elements or burn damage.
- Do not use the G3PE if the heat radiation fins have been bent by being dropped. Doing so may result in malfunction due to a reduction in the heat radiation performance.
- Do not handle the G3PE with oily or dusty (especially iron dust) hands. Doing so may result in malfunction.
- Attach a heat sink or radiator when using an SSR. Not doing so may result in malfunction due to a reduction in the heat radiation performance.

Installation and Mounting

- Mount the G3PE in the specified direction. Otherwise excessive heat generated by the G3PE may cause short-circuit failures of the output elements or burn damage.
- Make sure that there is no excess ambient temperature rise due to the heat generation of the G3PE. If the G3PE is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.
- Make sure the DIN track is securely mounted. Otherwise, the G3PE may fall.
- When mounting the heat sink, do not allow any foreign matter between the heat sink and the mounting surface. Foreign matter may cause malfunction due to a reduction in the heat radiation performance.
- If the G3PE is mounted directly in a control panel, use aluminum, steel plating, or similar material with a low heat resistance as a substitute for a heat sink. Using the G3PE mounted in wood or other material with a high heat resistance may result in fire or burning due to heat generated by the G3PE.

Installation and Wiring

- Use wires that are suited to the load current. Otherwise, excessive heat generated by the wires may cause burning.
- Do not use wires with a damaged outer covering. Otherwise, it may result in electric shock or ground leakage.
- Do not wire any wiring in the same duct or conduit as power or high-tension lines. Otherwise, inductive noise may damage the G3PE or cause it to malfunction.
- When tightening terminal screws, prevent any non-conducting material from becoming caught between the screws and the tightening surface. Otherwise, excessive heat generated by the terminal may cause burning.
- Do not use the G3PE with loose terminal screws. Otherwise, excessive heat generated by the wire may cause burning.
- For the G3PE models with a carry current of 35 A or larger, use M5 crimp terminals that are an appropriate size for the diameter of the wire.
- Always turn OFF the power supply before performing wiring. Not doing so may cause electrical shock.

Installation and Usage

- Select a load within the rated values. Not doing so may result in malfunction, failure, or burning.
- Select a power supply within the rated frequencies. Not doing so may result in malfunction, failure, or burning.
- The G3PE provides a circuit to prevent photocoupler damage by forcibly arcing the output element for surge voltages applied to the load. The G3PE therefore cannot be used for motor loads. Doing so may result in load motor malfunction.

Precautions for Correct Use

The SSR in operation may cause an unexpected accident. Therefore it is necessary to test the SSR under the variety of conditions that are possible. As for the characteristics of the SSR, it is necessary to consider differences in characteristics between individual SSRs.
The ratings in this catalog are tested values in a temperature range between 15°C and 30°C, a relative humidity range between 25% and 85%, and an atmospheric pressure range between 86 and 106 kPa. It will be necessary to provide the above conditions as well as the load conditions if the user wants to confirm the ratings of specific SSRs.

Causes of Failure

- Do not drop the G3PE or subject it to abnormal vibration or shock during transportation or mounting. Doing so may result in deterioration of performance, malfunction, or failure.
- Tighten each terminal to the torque specified below. Improper tightening may result in abnormal heat generation at the terminal, which may cause burning.

Terminals	Screw terminal diameter	Tightening torque
Input terminals	M3.5	0.59 to 1.18 N·m
Output terminals	M4	0.98 to 1.47 N·m
	M5	1.57 to 2.45 N·m

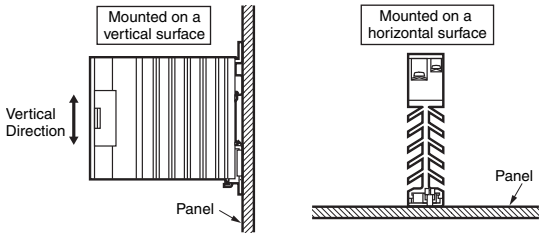
- Do not supply overvoltage to the input circuits or output circuits. Doing so may result in failure or burning.
- Do not use or store the G3PE in the following conditions. Doing so may result in deterioration of performance.
  - Locations subject to static electricity or noise
  - Locations subject to strong electric or magnetic fields
  - Locations subject to radioactivity

Mounting

- The G3PE is heavy. Firmly mount the DIN Track and secure both ends with End Plates for DIN Track mounting models. When mounting the G3PE directly to a panel, firmly secure it to the panel.

Screw diameter: M4

Tightening torque: 0.98 to 1.47 N·m

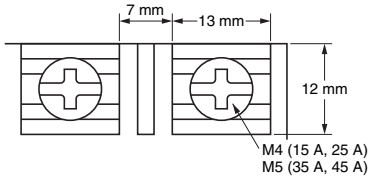


Note: Make sure that the load current is 50% of the rated load current when the G3PE is mounted horizontally.
For details on close mounting, refer to the related information under performance characteristics.
Mount the G3PE in a direction so that the markings read naturally.

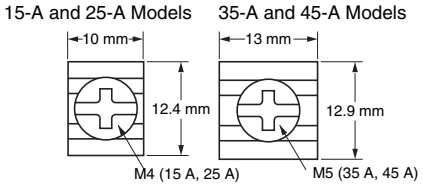
Wiring

- When using crimp terminals, refer to the terminal clearances shown below.

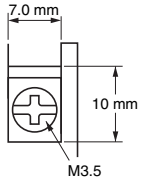
Output Terminal Section for Three-phase Models



Output Terminal Section for Single-phase Models



Input Terminal Section



- Make sure that all lead wires are thick enough for the current.
- For three-element and two-element models, the output terminal will be charged even when the Relay is OFF. Touching the terminal may result in electric shock. To isolate the Relay from the power supply, install an appropriate circuit breaker between the power supply and the Relay.
  Always turn OFF the power supply before wiring the Unit.
- Terminal L2 and terminal T2 of a 2-element model are internally connected to each other. Connect terminal L2 to the ground terminal of the power supply.
  If terminal L2 is connected to a terminal other than the ground terminal, cover all the charged terminals, such as heater terminals, to prevent electric shock and ground faults.

Fuses

- Use a quick-burning fuse on the output terminals to prevent accidents due to short-circuiting. Use a fuse with equal or greater performance than those given in the following table.

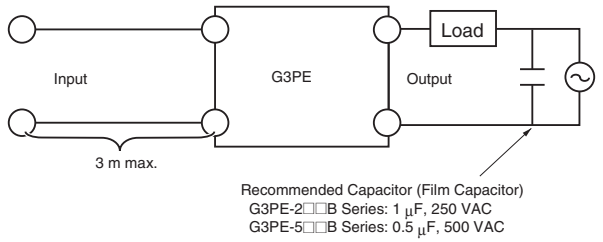
Recommended Fuse Capacity

Rated G3PE output current	Applicable SSR	Fuse (IEC 60269-4)
15 A	G3PE□15B Series	32 A
25 A	G3PE□25B Series	
35 A	G3PE□35B Series	63 A
45 A	G3PE□45B Series	

EMC Connection

Make EMC connections according to the following figure.

- Connect a capacitor to the load power supply.
- The input cable must be no longer than 3 m.



EMI

This is a Class A product (for industrial environments). In a domestic environment, the G3PE may cause radio interference, in which case the user may be required to take appropriate measures.

Noise and Surge Effects

If noise or an electrical surge occurs that exceeds the malfunction withstand limit for the G3PE output circuit, the output will turn ON for a maximum of one half cycle to absorb the noise or surge. Confirm that turning the output ON for a half cycle will not cause a problem for the device or system in which the G3PE is being used prior to actual use. The G3PE malfunction withstand limit is shown below.

- Malfunction withstand limit (reference value): 500 V

Note: This value was measured under the following conditions.
Noise duration: 100 ns and 1 μs
Repetition period: 100 Hz
Noise application time: 3 min

Mounting Models with Externally Attached Heat Sinks

- Before attaching an external Heat Sink or Radiator to the Unit, always apply silicone grease, such as Toshiba Silicone's YG6260 or Sinetsu Silicone's G746, to the mounting surface to enable proper heat radiation.
- Tighten the screws to the following torque to secure the Unit and external Heat Sink or Radiator to enable proper heat dissipation.
Tightening torque: 2.0 N·m

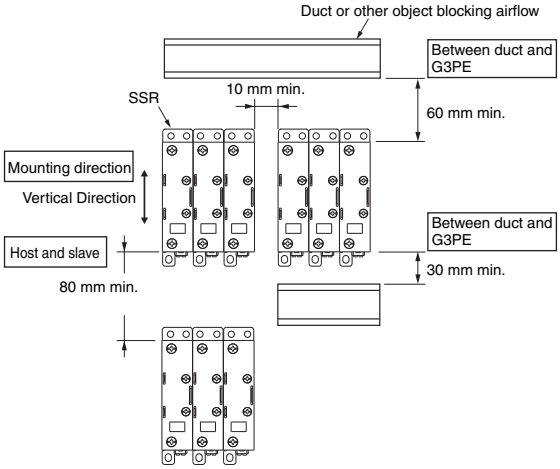
Mounting to Control Panel

The G3PE is heavy. Firmly mount the DIN track and secure both ends with End Plates for DIN-track-mounting models. When mounting the G3PE directly to a panel, firmly secure it to the panel.

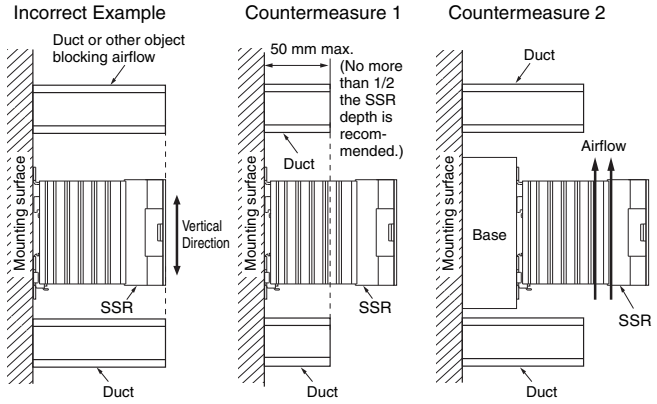
If the panel is airtight, heat from the SSR will build up inside, which may reduce the current carry ability of the SSR or adversely affect other electrical devices. Be sure to install ventilation holes on the top and bottom of the panel.

SSR Mounting Pitch (Panel Mounting)

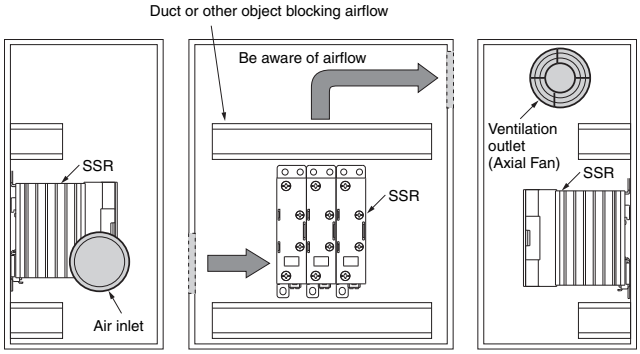
- Single-phase Model



Relationship between the G3PE and Ducts or Other Objects Blocking Airflow



Ventilation Outside the Control Panel



Note: 1. If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging to ensure an efficient flow of air.

2. Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

3. A heat exchanger, if used, should be located in front of the G3PE to ensure the efficiency of the heat exchanger.

G3PE Ambient Temperature

15A and 25A models have ambient temperature of 40°C, while 35A and 45A models have 25°C ambient Temperature. The G3PE uses a semiconductor to switch the load. This causes the temperature inside the control panel to increase due to heating resulting from the flow of electrical current through the load. The G3PE reliability can be increased by adding a ventilation fan to the control panel to dispel this heat, thus lowering the ambient temperature of the G3PE. (Arrhenius's law suggests that life expectancy is doubled by each 10°C reduction in ambient temperature.)

SSR rated current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.23	0.39	0.54	0.70

Example: For 10 G3PE SSRs with load currents of 15 A,

$0.23 \times 10 = 2.3$

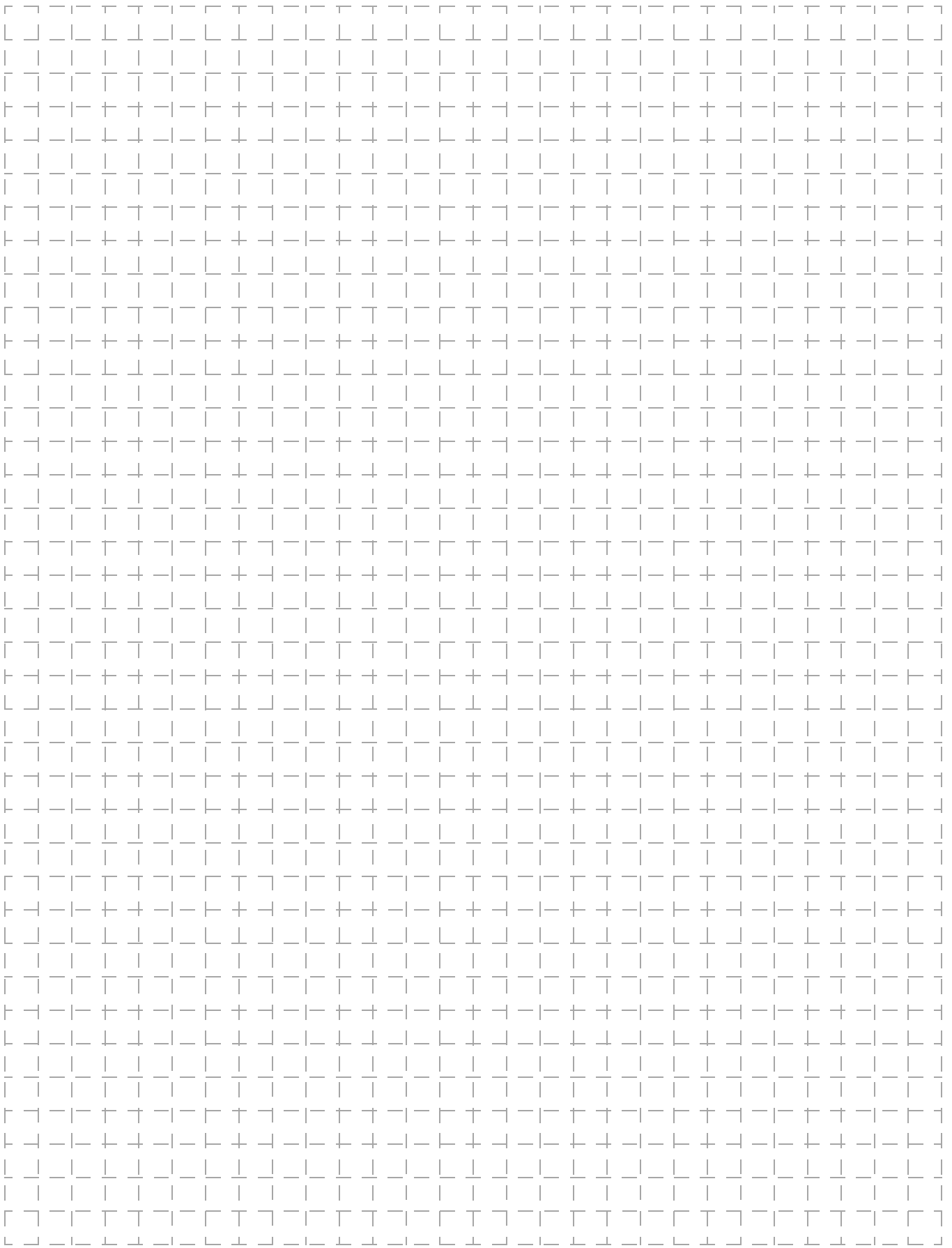
Thus, 3 fans would be required.

Note: 1. Size of fans: 92 mm × 92 mm, Air volume: 0.7 m^3/min, Ambient temperature of control panel: 30°C

2. If there are other instruments that generate heat in the control panel in addition to SSRs, more ventilation will be required.

3. Ambient temperature: The temperature that will allow the SSR to cool by convection or other means.

MEMO



Solid State Relays
G3PA

Extremely Thin Relays Integrated with Heat Sinks

- Downsizing achieved through optimum design of heat sink.
- Mounting possible via screws or via DIN track.
- Close mounting possible for linking terminals. (Except for G3PA-260B-VD and G3PA-450B-VD-2.)
- Applicable with 3-phase loads.
- Replaceable power element cartridges.
- Complies with VDE 0160 (finger protection), with a dielectric strength of 4,000 V between input and load.
- Complies with VDE 0805, IEC 950.
- Certified by UL, CSA, and VDE (reinforced insulation).



Ordering Information

List of Models

To Order: Select the part number and add the rated input voltage range. (e.g., G3PA-430B-VD-2 *DC12-24*)

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac coupler	Yes	Yes	10 A at 24 to 240 VAC	5 to 24 VDC	**G3PA-210B-VD**
			20 A at 24 to 240 VAC		**G3PA-220B-VD**
			40 A at 24 to 240 VAC		**G3PA-240B-VD**
			60 A at 24 to 240 VAC		**G3PA-260B-VD**
	No		10 A at 24 to 240 VAC		**G3PA-210BL-VD**
			20 A at 24 to 240 VAC		**G3PA-220BL-VD**
			40 A at 24 to 240 VAC		**G3PA-240BL-VD**
			60 A at 24 to 240 VAC		**G3PA-260BL-VD**
	Yes		10 A at 24 to 240 VAC	24 VAC	**G3PA-210B-VD**
			20 A at 24 to 240 VAC		**G3PA-220B-VD**
			40 A at 24 to 240 VAC		**G3PA-240B-VD**
			60 A at 24 to 240 VAC		**G3PA-260B-VD**
			20 A at 180 to 400 VAC	12 to 24 VDC	**G3PA-420B-VD**
			30 A at 180 to 400 VAC		**G3PA-430B-VD**
			20 A at 200 to 480 VAC		**G3PA-420B-VD-2**
			30 A at 200 to 480 VAC		**G3PA-430B-VD-2**
			50 A at 200 to 480 VAC		**G3PA-450B-VD-2**

Replacement Parts

Name	Carry current	Load voltage range	Applicable SSR	Model	VDE certification
Power Device Cartridge	10 A	19 to 264 VAC	G3PA-210B-VD DC5-24	**G32A-A10-VD DC5-24**	Yes
			G3PA-210BL-VD DC5-24	**G32A-A10L-VD DC5-24**	
			G3PA-210B-VD AC24	**G32A-A10-VD AC24**	
	20 A		G3PA-220B-VD DC5-24	**G32A-A20-VD DC5-24**	
			G3PA-220BL-VD DC5-24	**G32A-A20L-VD DC5-24**	
			G3PA-220B-VD AC24	**G32A-A20-VD AC24**	
	40 A		G3PA-240B-VD DC5-24	**G32A-A40-VD DC5-24**	
			G3PA-240BL-VD DC5-24	**G32A-A40L-VD DC5-24**	
			G3PA-240B-VD AC24	**G32A-A40-VD AC24**	
	60 A		G3PA-260B-VD DC5-24	**G32A-A60-VD DC5-24**	
			G3PA-260BL-VD DC5-24	**G32A-A60L-VD DC5-24**	
			G3PA-260B-VD AC24	**G32A-A60-VD AC24**	
	20 A	150 to 440 VAC	G3PA-420B-VD DC12-24	**G32A-A420-VD DC12-24**	
	30 A		G3PA-430B-VD DC12-24	**G32A-A430-VD DC12-24**	
	20 A	180 to 528 VAC	G3PA-420B-VD-2 DC12-24	**G32A-A420-VD-2 DC12-24**	
	30 A		G3PA-430B-VD-2 DC12-24	**G32A-A430-VD-2 DC12-24**	
	50 A		G3PA-450B-VD-2 DC12-24	**G32A-A450-VD-2 DC12-24**	

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating Voltage range	Input current impedance	Voltage level	
				Must operate voltage	Must release voltage
G3PA-2❑❑B-VD	5 to 24 VDC	4 to 30 VDC	7 mA max.	4 VDC max.	1 VDC min.
G3PA-2❑❑BL-VD			20 mA max.		
G3PA-2❑❑B-VD	24 VAC	19.2 to 26.4 VAC	1.4 kΩ±20%	19.2 VAC max.	4.8 VAC min.
G3PA-4❑❑B-VD(-2)	12 to 24 VDC	9.6 to 30 VDC	7 mA max.	9.2 VDC max.	1 VDC min.

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current	Inrush current
G3PA-210B(L)-VD	24 to 240 VAC (50/60 Hz)	19 to 264 VAC (50/60 Hz)	0.1 to 10 A	150 A (60 Hz, 1 cycle)
G3PA-220B(L)-VD			0.1 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-240B(L)-VD			0.5 to 40 A	440 A (60 Hz, 1 cycle)
G3PA-260B(L)-VD			0.5 to 60 A	440 A (60 Hz, 1 cycle)
G3PA-420B-VD	180 to 400 VAC (50/60 Hz)	150 to 440 VAC (50/60 Hz)	0.5 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-430B-VD			0.5 to 30 A	440 A (60 Hz, 1 cycle)
G3PA-420B-VD-2	200 to 480 VAC (50/60 Hz)	180 to 528 VAC (50/60 Hz)	0.5 to 20 A	220 A (60 Hz, 1 cycle)
G3PA-430B-VD-2			0.5 to 30 A	440 A (60 Hz, 1 cycle)
G3PA-450B-VD-2			0.5 to 50 A	440 A (60 Hz, 1 cycle)

Refer to *Engineering Data* for further details.

■ Characteristics

Item	G3PA-210B(L)-VD	G3PA-220B(L)-VD	G3PA-240B(L)-VD	G3PA-260B(L)-VD	G3PA-420B-VD	G3PA-420B-VD-2	G3PA-430B-VD	G3PA-430B-VD-2	G3PA-450B-VD-2
Operate time	1/2 of load power source cycle + 1 ms max. (DC Input, -B models) 1 1/2 of load power source cycle + 1 ms max. (AC Input) 1 ms max. (-BL models)								
Release time	1/2 of load power source cycle + 1 ms max. (DC Input) 1 1/2 of load power source cycle + 1 ms max. (AC Input)								
Output ON voltage drop	1.6 V (RMS) max.				1.8 V (RMS) max.				
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)		10 mA max. (at 100 VAC) 20 mA max. (at 200 VAC)		20 mA max. (at 400 VAC)	20 mA max. (at 480 VAC)	20 mA max. (at 400 VAC)	20 mA max. (at 480 VAC)	
I^2t	260 A^2s		1,260 A^2s		260 A^2s	1,800 A^2s	1,800 A^2s		1,800 A^2s
Insulation resistance	100 MΩ min. (at 500 VDC)								
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min								
Vibration resistance	Malfunction: 10 to 55, 0.75–mm double amplitude (Mounted to DIN track)								
Shock resistance	Malfunction: 300 m/s^2 (mounted to DIN track)								
Ambient temperature	Operating:–30°C to 80°C (with no icing or condensation) Storage:–30°C to 100°C (with no icing or condensation)								
Certified standards	UL, CSA, EN60950 File No. 5915ÜG				UL, CSA , EN60947-4-3 File No. 6642ÜG	UL, CSA, EN60947-4-3 File No. 133127ÜG	UL, CSA, EN60947-4-3 File No. 6642ÜG	UL, CSA, EN60947-4-3 File No. 133127ÜG	
Ambient humidity	Operating: 45% to 85%								
Weight	Approx. 260 g	Approx. 340 g	Approx. 460 g	Approx. 900 g	Approx. 290 g	Approx. 290 g	Approx. 410 g	Approx. 410 g	Approx. 900 g

Operation

■ Replacement Parts

G32A-A Power Device Cartridge

The G32A-A Power Device Cartridge (a Triac Unit) can be replaced with a new one. When the temperature indicator has changed from pink to red, the triac circuitry may have malfunctioned possibly by an excessive flow of current, in which case, dismount the damaged cartridge for replacement.

The damaged cartridge can be replaced with a new one without disconnecting the wires from the G3PA.

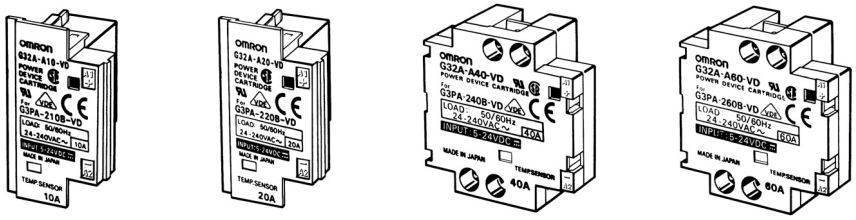
Improve the heat radiation efficiency of the G3PA before replacing the cartridge.

The G32A-A Power Device Cartridge can withstand an excessive current for a short period of time, such as may be caused accidentally by the short circuitry of the load, in which case the temperature indicator will not turn red.

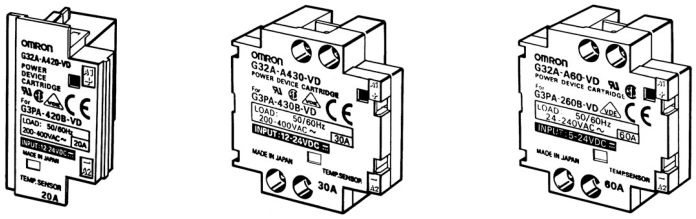
Be sure to turn OFF the power supply when replacing the Cartridge. Supplying power with the Cartridge removed may result in malfunction.

Appearance

G32A-A10(L)-VD **G32A-A20(L)-VD** **G32A-A40(L)-VD** **G32A-A60(L)-VD**



G32A-A420-VD(-2) **G32A-A430-VD(-2)** **G32A-A450-VD-2**



Replacing Power Device Cartridges

When replacing Power Device Cartridges, use the specified model. Using a Power Device Cartridge other than the specified one will result in faulty operation and destruction of the elements.

■ Replacement Procedure

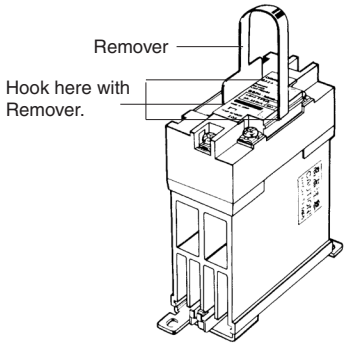
G32A-A10(L)-VD/G32A-A20(L)-VD/G32-A420-VD(-2)

Use the special tool (provided) to extract the cartridge for replacement with a new one.

Extraction

Follow the procedures below to remove the Power Device Cartridge from the G3PA.

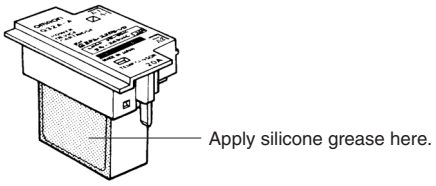
1. **Switch off the power.**
2. Remove the terminal cover.
3. Hook the indented part of the cartridge with the tool (supplied with a new cartridge) and pull up on the cartridge to remove it.



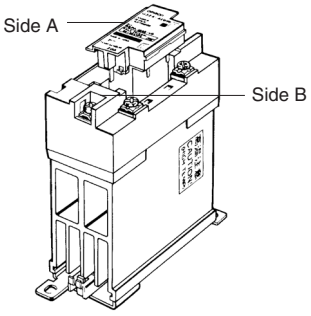
Installation

Follow the procedures below to Install the Power Device Cartridge on the G3PA.

1. Apply silicone grease (provided with the G32A-A) to the entire surface of the heat sink.



2. Make sure that there is no dust or pieces of wire on the heat sink of the G32A-A or the G3PA.
3. Insert the cartridge into the opening of the G3PA so that the letters on the cartridge and those on the G3PA are in the same direction and side A and side B are even.



4. Attach the terminal cover.
5. Switch on the power and check the G3PA to be sure it works properly.

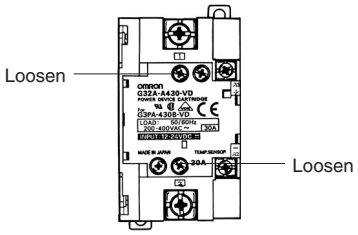
G32A-A40(L)-VD/G32A-A60(L)-VD/G32A-A430-VD(-2)/G32A-A450-VD-2

The G32A Power Device Cartridge is mounted and secured with screws to the G3PA Unit.

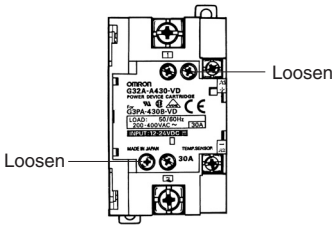
Extraction

Follow the procedures below to remove the G32A-A Power Device Cartridge from the G3PA.

1. **Switch off the power**.
2. Remove the terminal cover.
3. Loosen the two centered screws on the sides to dismount the cartridge. The screws are connected to terminals 1 and 2.



4. Loosen the screws on both the corners.

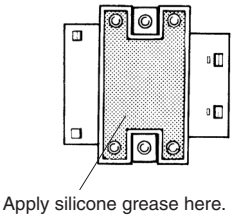


5. Hold the indented part of both the corners to remove the cartridge.

Installation

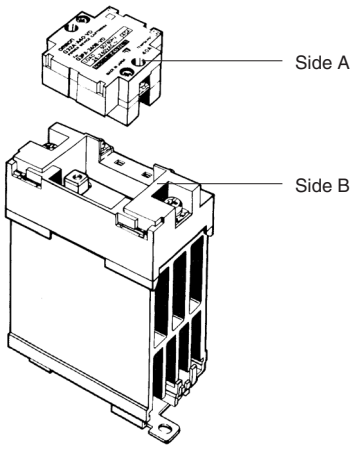
Follow the procedures below to Install the Power Device Cartridge on the G3PA.

1. Apply silicone grease to the entire surface of the heat sink.



2. Make sure that there is no dust or pieces of wire on the heat sink of the G32A-A or the G3PA.

3. Insert the cartridge into the opening of the G3PA so that side A and side B are even.



4. Tighten the screws on both the corners with a tightening torque of 0.59 to 0.78 N•m.

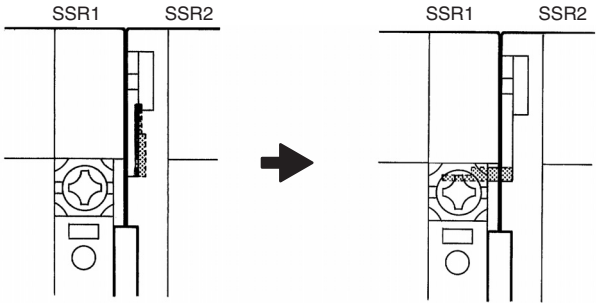
5. Tighten the screws on both the sides with a tightening torque of 0.59 to 0.78 N•m.

6. Attach the terminal cover.

7. Switch on the power and check the G3PA to be sure it works properly.

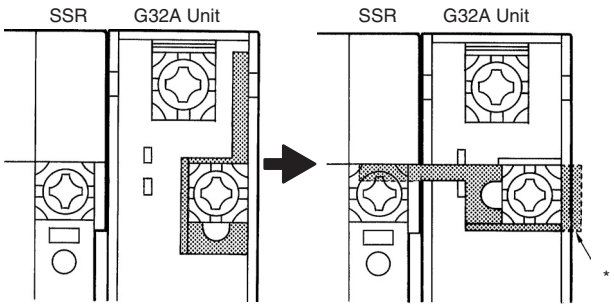
■ Linking Terminal Connection

• Connecting with linking terminal for G3PA-210B(L)-VD, -220B(L)-VD, -240B(L)-VD and G3PA-420B-VD(-2), G3PA-430B-VD(-2).



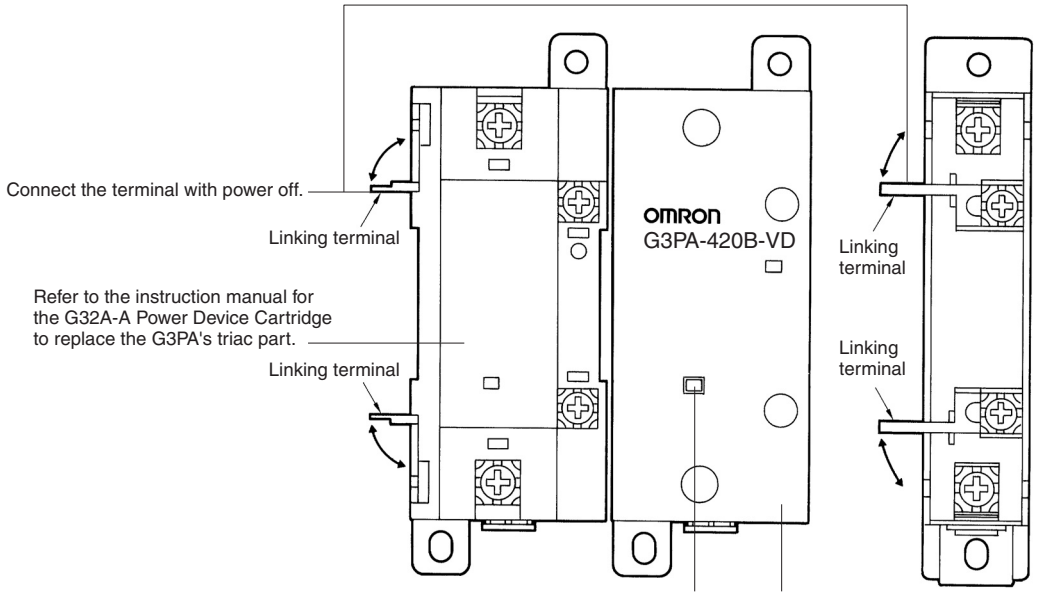
1. When SSRs are close mounted, loosen the M3.5 Sems screw and flip the linking terminal down.
2. Insert the linking terminal securely into the center of the screw and tighten the screw.

• Connecting with linking terminal to “G32A-D” series short circuit unit. (Order short circuit units seperately.)



* The cover will not fit if the terminal protrudes.

1. When SSR are close mounted, loosen the M3.5 Sems screw on the G32A and flip the linking terminal down.
2. Insert the linking terminal securely into the center of the screw and tighten the screw. Ensure that the linking terminal does not protrude.



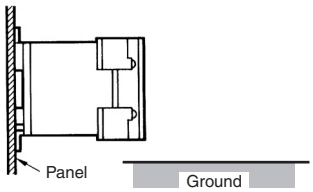
When the temperature indicator has turned from pink to red, the G32-A-A Power Device Cartridge may have malfunctioned, in which case the cartridge must be replaced with a new one.

Use the terminal cover to prevent accidents due to electric shock.

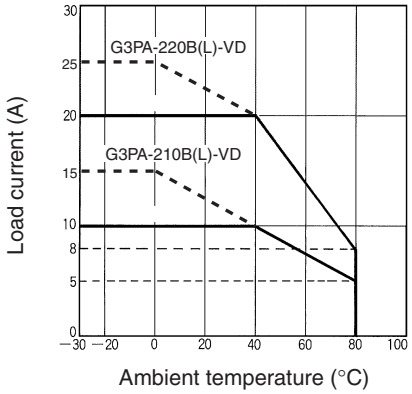
Engineering Data

Load Current vs. Ambient Temperature

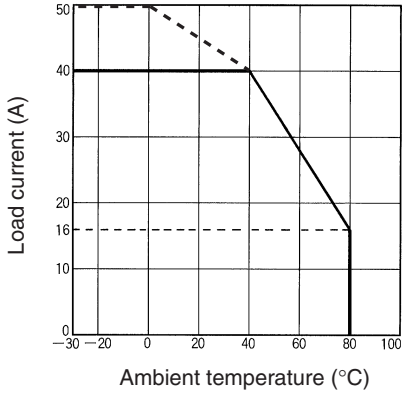
Vertical Mounting



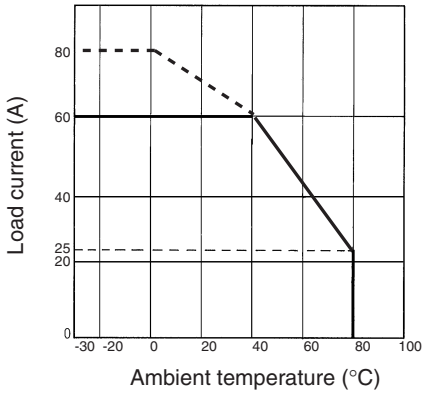
G3PA-210B(L)-VD, G3PA-220B(L)-VD



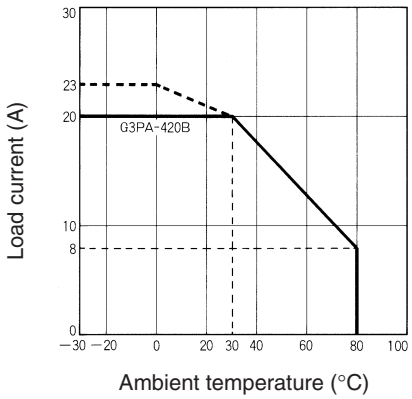
G3PA-240B(L)-VD



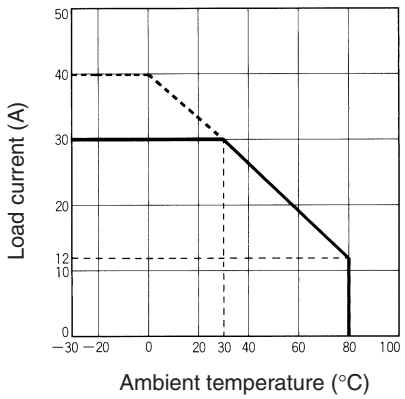
G3PA-260B(L)-VD



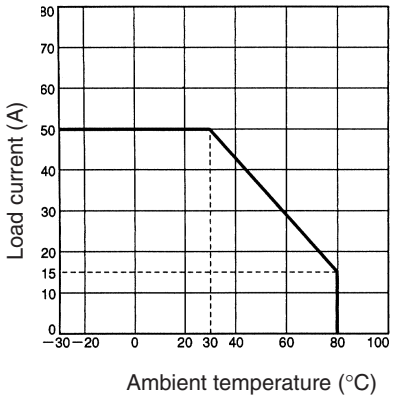
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



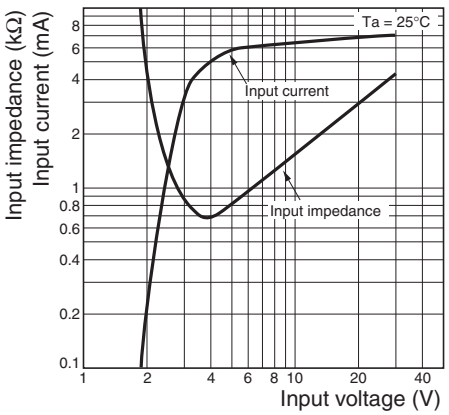
G3PA-450B-VD-2



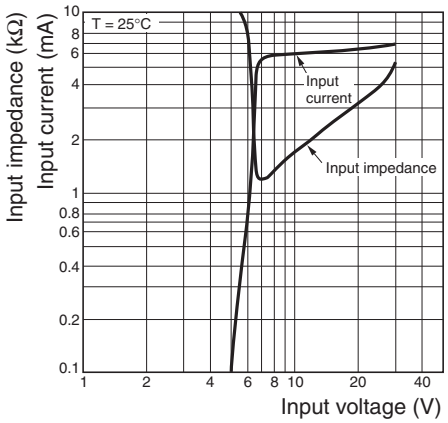
Note: Close mounting is possible for a maximum of three Units by reducing the load current by 20%. (A minimum clearance of 10 mm must be provided when mounting four or more Units.)

Input Voltage vs. Input Current

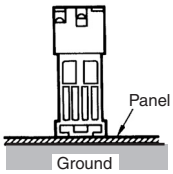
G3PA-2□0B-VD



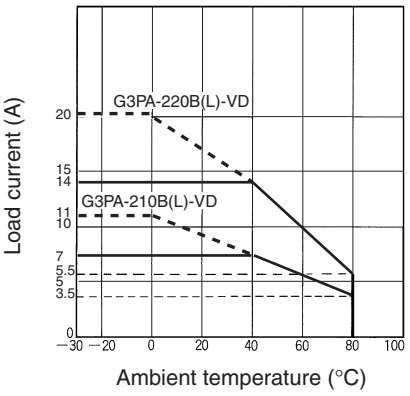
G3PA-4□0-VD, G3PA-4□-VD-2



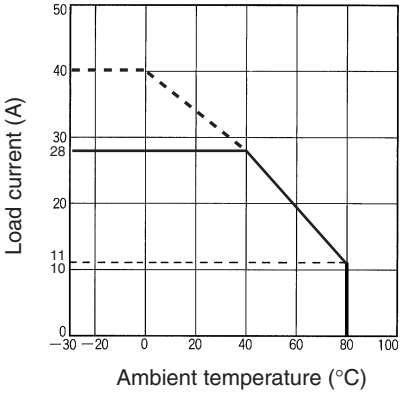
Horizontal Mounting



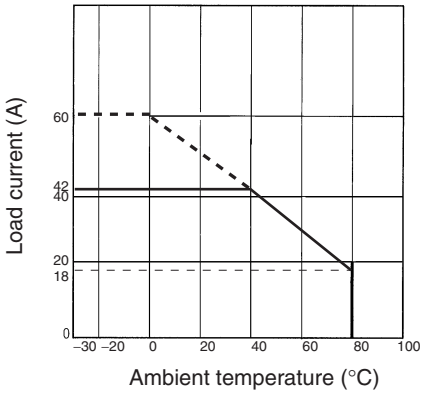
G3PA-210B(L)-VD, G3PA-220B(L)-VD



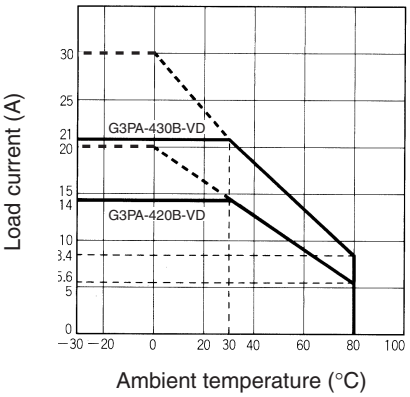
G3PA-240B(L)-VD



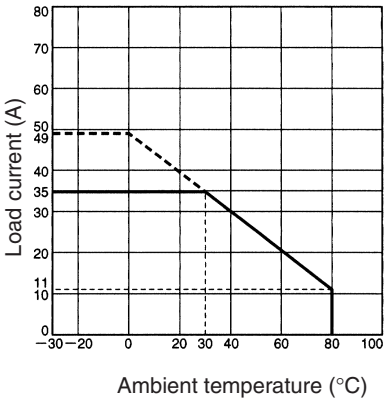
G3PA-260B(L)-VD



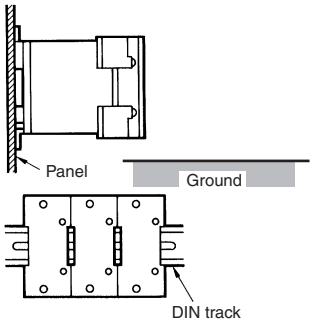
G3PA-420B-VD, G3PA-430B-VD
G3PA-420B -VD-2, G3PA-430B-VD-2



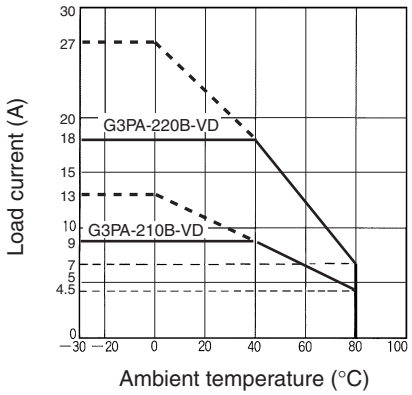
G3PA-450B-VD-2



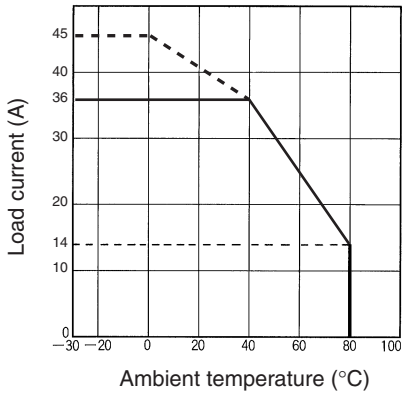
Close Mounting (Up to Three)



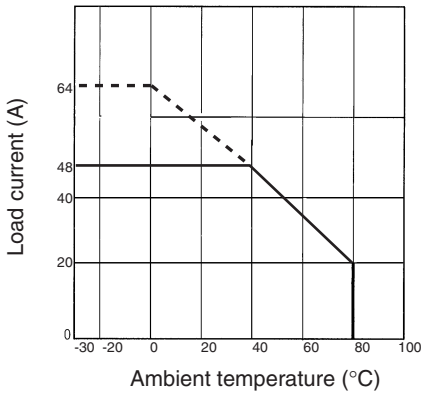
G3PA-210B(L)-VD, G3PA-220B(L)-VD



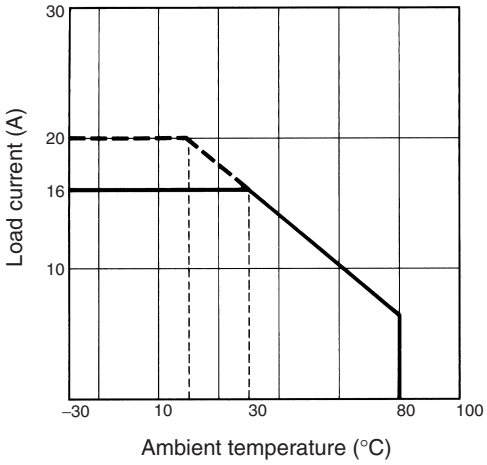
G3PA-240B(L)-VD



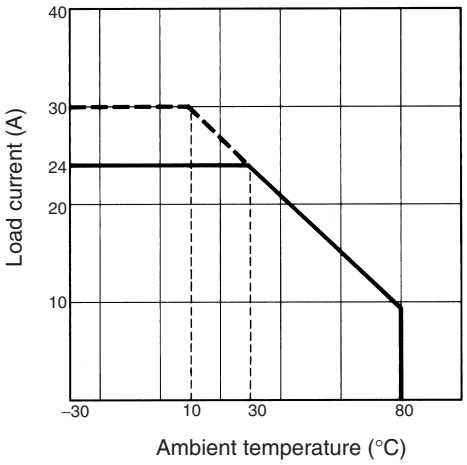
G3PA-260B(L)-VD



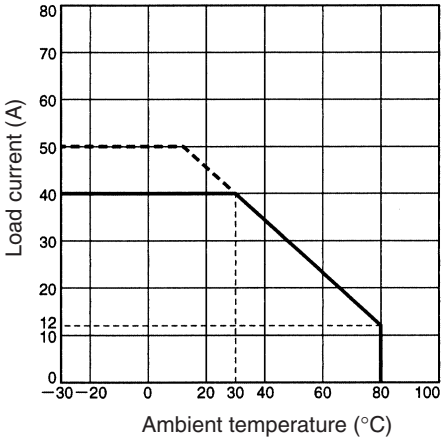
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



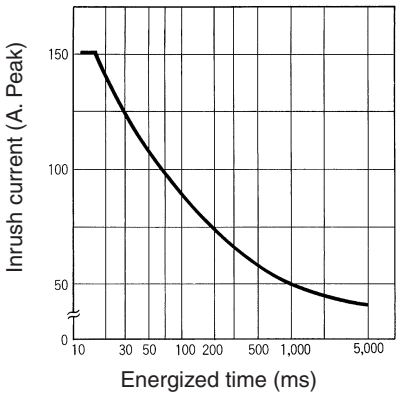
G3PA-450B-VD-2



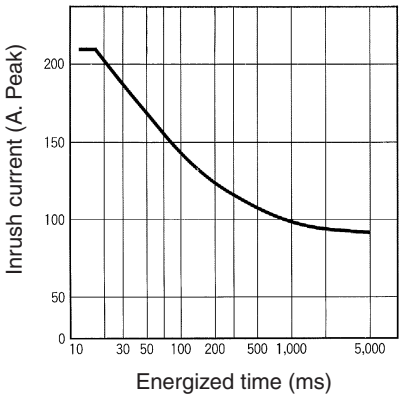
Inrush Current Resistivity

One cycle, non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

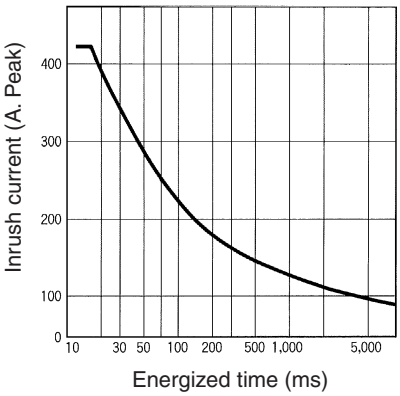
G3PA-210B(L)-VD



G3PA-220B(L)-VD, G3PA-420B-VD, G3PA-420B-VD-2



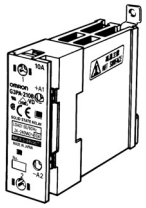
G3PA-240B(L)-VD/260B(L)-VD, G3PA-430B-VD, G3PA-430B-VD-2, G3PA-450B-VD-2



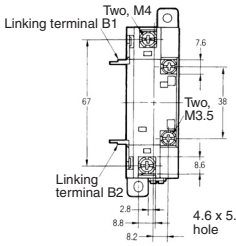
Dimensions

Note: All units are in millimeters unless otherwise indicated.

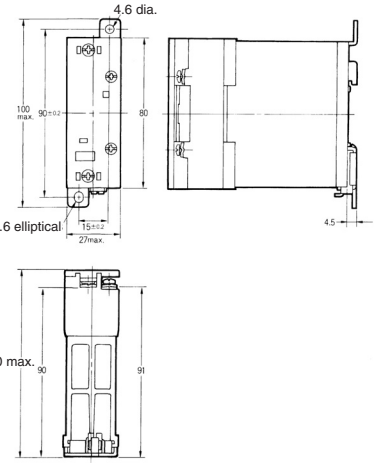
G3PA-210B(L)-VD



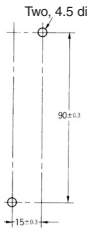
Without Terminal Cover



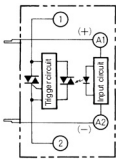
With Terminal Cover



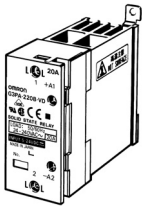
Mounting Holes



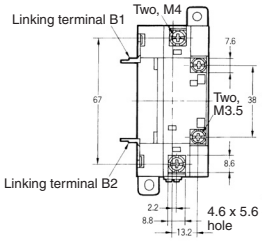
Terminal Arrangement/ Internal Connections



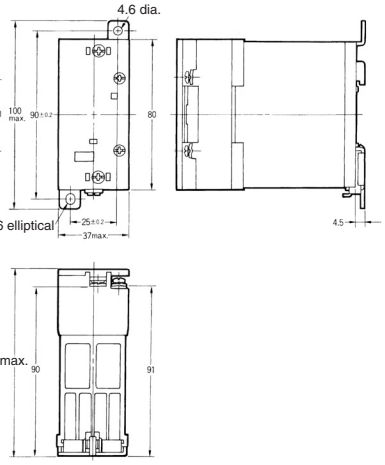
G3PA-220B(L)-VD



Without Terminal Cover



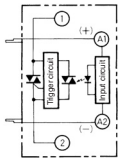
With Terminal Cover



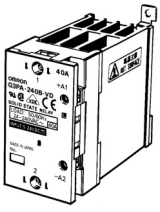
Mounting Holes



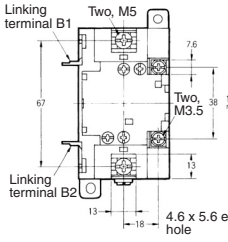
Terminal Arrangement/ Internal Connections



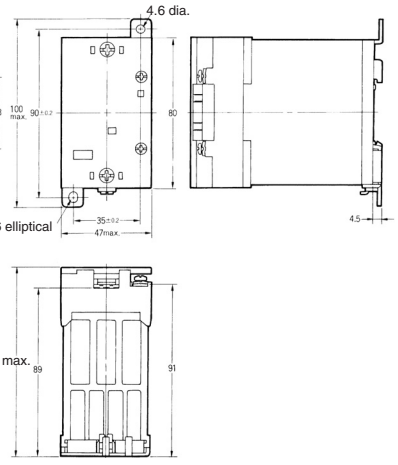
G3PA-240B(L)-VD



Without Terminal Cover



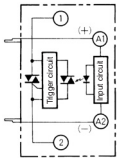
With Terminal Cover



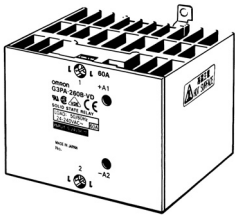
Mounting Holes



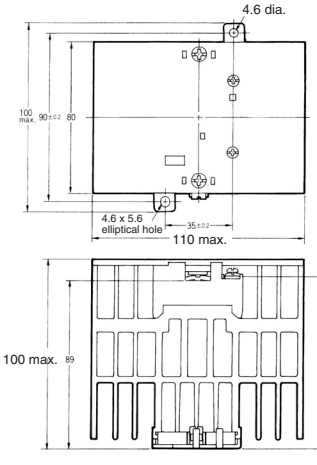
Terminal Arrangement/ Internal Connections



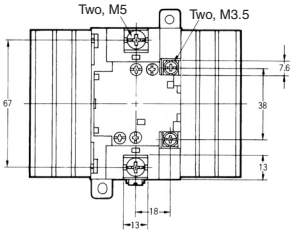
G3PA-260B(L)-VD
G3PA-450B-VD-2



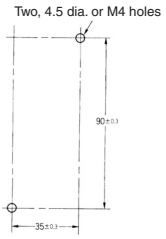
With Terminal Cover



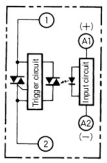
Without Terminal Cover



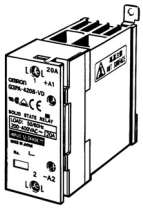
Mounting Holes



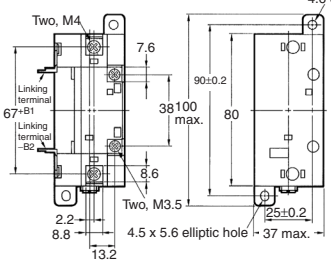
Terminal Arrangement/ Internal Connections



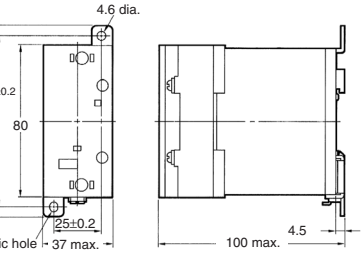
G3PA-420B-VD, G3PA-420B-VD-2

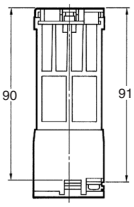


Without Terminal Cover

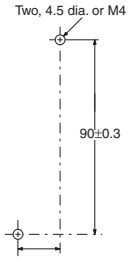


With Terminal Cover

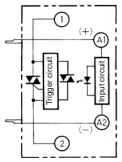




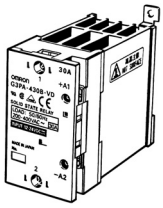
Mounting Holes



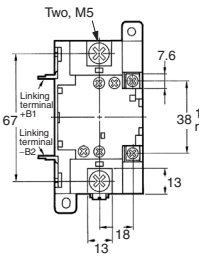
Terminal Arrangement/ Internal Connections



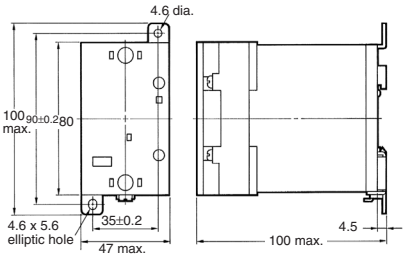
G3PA-430B-VD, G3PA-430B-VD-2

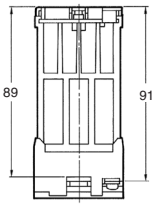


Without Terminal Cover

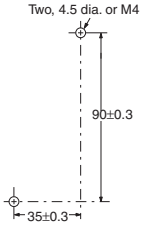


With Terminal Cover

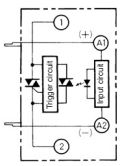




Mounting Holes



Terminal Arrangement/ Internal Connections



Safety Precautions

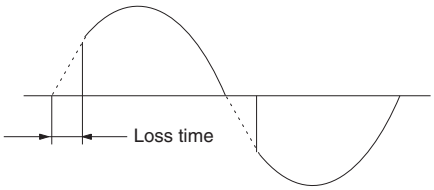
■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

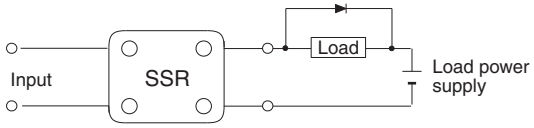
Load Connection

For an AC load, use a power supply rated at 50 or 60 Hz.
The maximum operating frequency is 10 Hz.
The G3PA-(VD) has a built-in varistor for overvoltage protection.

At a low applied voltage, such as 24 VAC, the load current is not fully supplied. When the Unit is switched ON, the voltage required to power the Unit deprives the output signal of the necessary voltage level and thus creates loss time. The lower the load voltage is, the greater the loss time is. This condition, however, will not create any serious problems.

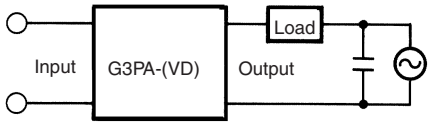


For a DC or L load, a diode should be connected in parallel the load to absorb the counter electromotive force of the load.



Noise Terminal Voltage according to EN55011

The G3PA-(VD) complies with EN55011 standards when a capacitor is connected to the load power supply as shown in the following circuit diagram.

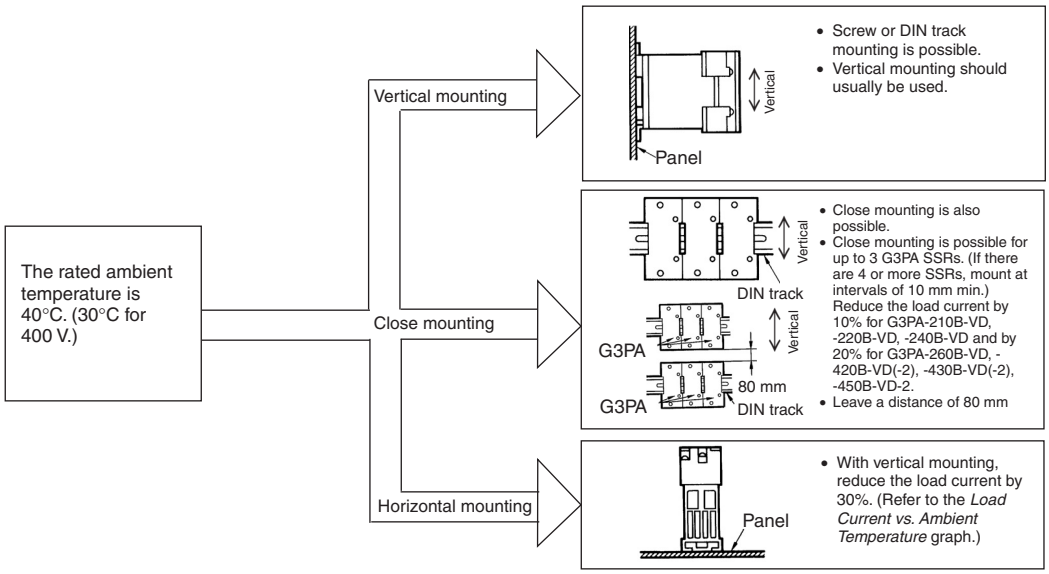


Recommended Capacitor: 1 μF, 250 VAC

Mounting

When attaching a heat sink to the G3PA-(VD), in order to facilitate heat dissipation, apply silicone grease or equivalent heat-conductive grease on the heat sink. (Toshiba Silicone, Shinetsu Silicone, etc.)

Tighten the mounting screws of the heat sink with a torque of 0.78 to 0.98 N•m.

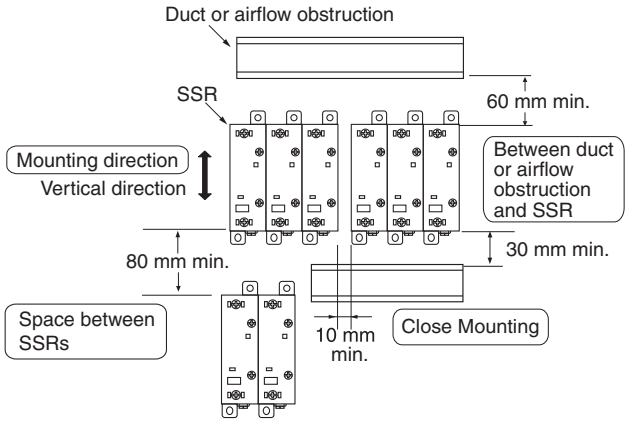


Note: Leave a distance of 60 mm min. between SSRs and ducts (especially above the SSR).

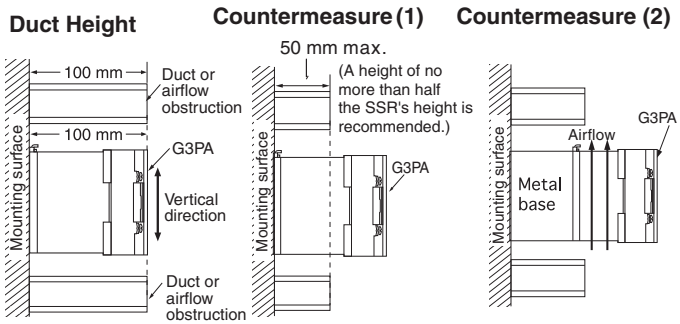
Close Mounting

SSR Mounting Pitch

Panel Mounting
(At a rated ambient temperature of 40°C).



Relationship between SSRs and Ducts

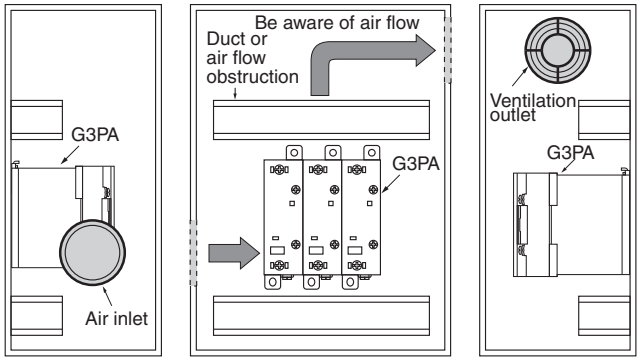


Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Use short ducts.

If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging and ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSR Units to ensure the efficiency of the heat exchanger.

Please reduce the ambient temperature of SSRs.

The rated load current of an SSR is measured at an ambient temperature of 25 or 40°C.

An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10°C reduction in temperature will double the expected life.)

Load current (A)	10 A	20 A	30 A	40 A	60 A
Required number of fans per SSR	0.16	0.31	0.47	0.62	0.93

Example: For 10 SSRs with load currents of 20 A,

0.31 x 10 = 3.1

Thus, 4 fans would be required.

Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,

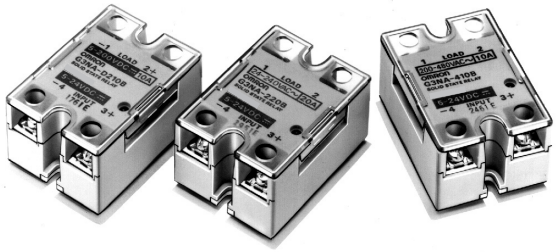
Ambient temperature of control panel: 30°C

If there are instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

Solid State Relay
G3NA

New Models with 75-A and 90-A Output Join the Previous Models with 5- to 50-A Output.

- AC Output Relays with 75-A and 90-A output added.
- All models feature a uniform mounting pitch.
- Built-in varistor effectively absorbs external surges.
- Operation indicator enables monitoring operation.
- Protective cover for greater safety.
- Standard models certified by UL and CSA and -UTU models by VDE (TÜV).



Ordering Information

To Order: Select the part number and add the desired rated input voltage, (e.g., G3NA-240B-*100 to 120 VAC*)

Isolation	Zero cross function	Indicator	Rated output load (applicable output load)	Rated input voltage	Model
Phototriac	Yes	Yes	5 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-205B**
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
Phototriac			10 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-210B**
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
Phototriac			20 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-220B**
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
			25 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-225B**
				100 to 120 VAC	
				200 to 240 VAC	
			25 A at 200 to 480 VAC* (180 to 528 VAC)	5 to 24 VDC	**G3NA-425B**
				100 to 240 VAC	

(Table continued on next page.)

Isolation	Zero cross function	Indicator	Rated output load (applicable output load)	Rated input voltage	Model
Phototriac	Yes	Yes	40 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-240B**
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
Phototriac			75 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-275B-UTU**
Photocoupler				100 to 240 VAC	
Phototriac			90 A at 24 to 240 VAC* (19 to 264 VAC)	5 to 24 VDC	**G3NA-290B-UTU**
Photocoupler				100 to 240 VAC	
	—		10 A at 5 to 200 VDC* (4 to 220 VDC)	5 to 24 VDC	**G3NA-D210B**
				100 to 240 VAC	
	Yes		10 A at 200 to 480 VAC* (180 to 528 VAC)	5 to 24 VDC	**G3NA-410B**
				100 to 240 VAC	
			20 A at 200 to 480 VAC* (180 to 528 VAC)	5 to 24 VDC	**G3NA-420B**
				100 to 240 VAC	
			40 A at 200 to 480 VAC* (180 to 528 VAC)	5 to 24 VDC	**G3NA-440B**
				100 to 240 VAC	
			50 A at 200 to 480 VAC (180 to 528 VAC)	5 to 24 VDC	**G3NA-450B**
			75 A at 200 to 480 VAC (180 to 528 VAC)	5 to 24 VDC	**G3NA-475B-UTU**
				100 to 240 VAC	
			90 A at 200 to 480 VAC (180 to 528 VAC)	5 to 24 VDC	**G3NA-490B-UTU**
				100 to 240 VAC	

*Loss time increases under 75 VAC.

Note: 1. When ordering a TÜV-approved model, add "-UTU" to the model number as shown below:
Example: G3NA-210B-*UTU.*

2. G3NA-4 are not CE marked.

3. G3NA-2 with "-UTU" are CE marked.

■ Accessories

Heat Sinks

Types	Applicable solid-state relays	Model
Standard mount	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-220B, G3NA-410B, G3NA-420B	**Y92B-A100**
	G3NA-225B, G3NA-240B, G3NA-425B, G3NA-440B	**Y92B-A150N**
	G3NA-440B	**Y92B-A250**
Track mount	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-410B	**Y92B-N50**
	G3NA-220B, G3NA-420B	**Y92B-N100**
	G3NA-225B, G3NA-240B, G3NA-425B, G3NA-440B	**Y92B-N150**
	G3NA-450B	**Y92B-P250**
	G3NA-275B-UTU, G3NA-290B-UTU, G3NA-475B-UTU, G3NA-490B-UTU	**Y92B-P250NF**

Mounting Track and Accessories

Description	Model
Mounting bracket for G3NA-240B. Changes pitch to 56 mm (2.21 in.) from 47.5 mm (1.73 in.), the same pitch as G3N-240B.	**R99-11**
DIN Rail Track, 50 cm (1.64 feet) length; use with Y92B-N❑❑❑ heat sinks	**PFP-50N**
DIN Rail Track, 1 m (3.28 feet) length; use with Y92B-N❑❑❑ heat sinks	**PFP-100N**
Spacer	**PFP-S**
End cap	**PFP-M**
One-touch mounting plate	**R99-12 FOR G3NA**

Specifications

■ Input Ratings

(Ambient temperature: 25°C [77°F])

Type	Rated voltage	Operating voltage range	Impedance (See note 1)	Voltage level	
				Must operate voltage	Must release voltage
G3NA-2❑❑B	5 to 24 VDC	4 to 32 VDC	7 mA max. (see note 2)	4 VDC max.	1 VDC min.
	100 to 120 VAC	75 to 132 VAC	36 kΩ ±20%	75 VAC max. (see note 3)	20 VAC min. (see note 3)
	200 to 240 VAC	150 to 264 VAC	72 kΩ ±20%	150 VAC max. (see note 3)	40 VAC min. (see note 3)
G3NA-4❑❑B	5 to 24 VDC	4 to 32 VDC	5 mA max. (see note 2)	4 VDC max.	1 VDC min.
G3NA-D210B	100 to 240 VAC	75 to 264 VAC	72 kΩ ±20%	75 VAC max.	20 VAC min.
G3NA-275B-UTU G3NA-290B-UTU	5 to 24 VDC	4 to 32 VDC	15 mA max. (see note 2)	4 VDC max.	1 VDC min.
G3NA-475B-UTU G3NA-490B-UTU	100 to 240 VAC	75 to 264 VAC	72 kΩ ±20%	75 VAC max.	20 VAC min.

Note: 1. The input impedance is measured at the maximum value of the rated supply voltage (for example, with the model rated at 100 to 120 VAC, the input impedance is measured at 120 VAC).

2. With constant current input circuit system, the impedance for the G3NA-2❑❑B-UTU is 15mA max.

3. Refer to the “Characteristic Data” for further details.

■ Output Ratings

Type	Applicable load				
	Rated load voltage	Load voltage range	Load current		Surge current
			With heat sink*	Without heat sink	
G3NA-205B	24 to 240 VAC	19 to 264 VAC	0.1 to 5 A (at 40°C)	0.1 to 3 A (at 40°C)	60 A (60 Hz, 1 cycle)
G3NA-210B	24 to 240 VAC	19 to 264 VAC	0.1 to 10 A (at 40°C)	0.1 to 4 A (at 40°C)	150 A (60 Hz, 1 cycle)
G3NA-410B	200 to 480 VAC	180 to 528 VAC	0.2 to 10 A (at 40°C)	0.2 to 4 A (at 40°C)	
G3NA-220B	24 to 240 VAC	19 to 264 VAC	0.1 to 20 A (at 40°C)	0.1 to 4 A (at 40°C)	220 A (60 Hz, 1 cycle)
G3NA-420B	200 to 480 VAC	180 to 528 VAC	0.2 to 20 A (at 40°C)	0.2 to 4 A (at 40°C)	
G3NA-240B	24 to 240 VAC	19 to 264 VAC	0.1 to 40 A (at 40°C)	0.1 to 6 A (at 40°C)	440 A (60 Hz, 1 cycle)
G3NA-440B	200 to 480 VAC	180 to 528 VAC	0.2 to 40 A (at 40°C)	0.2 to 6 A (at 40°C)	
G3NA-450B	200 to 480 VAC	180 to 528 VAC	0.2 to 50 A (at 40°C)	0.2 to 6 A (at 40°C)	
G3NA-D210B	5 to 200 VDC	4 to 220 VDC	0.1 to 10 A (at 40°C)	0.1 to 4 A (at 40°C)	20 A (10 ms)
G3NA-275B-UTU	24 to 240 VAC	19 to 264 VAC	1 to 75 A (at 40°C)	1 to 7 A (at 40°C)	800 A (60 Hz, 1 cycle)
G3NA-475B-UTU	200 to 480 VAC	180 to 528 VAC	1 to 75 A (at 40°C)	1 to 7 A (at 40°C)	800 A (60 Hz, 1 cycle)
G3NA-290B-UTU	24 to 240 VAC	19 to 264 VAC	1 to 90 A (at 40°C)	1 to 7 A (at 40°C)	1,000 A (60 Hz, 1 cycle)
G3NA-490B-UTU	200 to 480 VAC	180 to 528 VAC	1 to 90 A (at 40°C)	1 to 7 A (at 40°C)	1,000 A (60 Hz, 1 cycle)

*When the appropriate size OMRON heat sink is used.

■ Characteristics

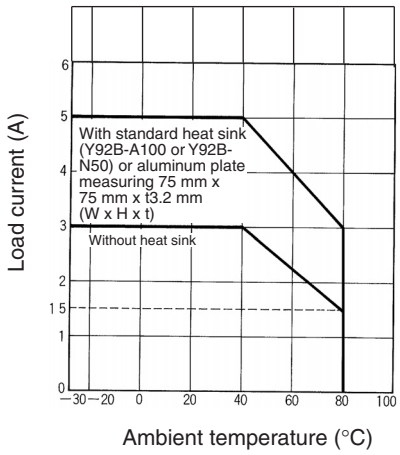
Type		G3NA-205B, -210B, -220B, -225B	G3NA-240B	G3NA-410B, -420B, -425B, -440B, -450B	G3NA-D210B	G3NA-275B-UTU	G3NA-290B-UTU	G3NA-475B-UTU	G3NA-490B-UTU
Operate time	DC input	1/2 of load power source cycle + 1 ms max.			1 ms max.	1/2 of load power source cycle + 1 ms max.			
	AC input	1 1/2 of load power source cycle + 1 ms max.			30 ms max.	3/2 of load power source cycle + 1 ms max.			
Release time	DC input	1/2 of load power source cycle + 1 ms max.			5 ms max.	1/2 of load power source cycle + 1 ms max.			
	AC input	1 1/2 of load power source cycle + 1 ms max.			30 ms max.	3/2 of load power source cycle + 1 ms max.			
Output ON voltage drop		1.6 V (RMS) max.	1.6 V (RMS) max.	1.8 V (RMS max.)	1.5 V max.	1.6 V (RMS) max.		1.8 V (RMS) max.	
Leakage current		5 mA max. at 100 VAC		10 mA max. at 200 VAC	5 mA max. at 200 VDC	5 mA max. at 100 VAC		10 mA max. at 200 VDC	
		10 mA max. at 200 VAC		20 mA max. at 400 VAC		10 mA max. at 200 VAC		20 mA max. at 400 VAC	
Insulation resistance		100 MΩ min at 500 VDC							
Dielectric strength		2,500 VAC, 50/60 Hz for 1 minute				4,000 VAC, 50/60 Hz for 1 min.			
Vibration	Malfunction	10 to 55 Hz, 1.5 mm double amplitude							
Shock	Malfunction	1,000 m/s^2 (approx. 100G)							
Ambient temperature	Operating	-30° to 80°C (-22° to 176°F) with no icing							
	Storage	-30° to 100°C (-22° to 212°F) with no icing							
Humidity		45% to 85% RH							
Weight		Approx. 60 g (2.1 oz.)	Approx. 70 g (2.5 oz.)	Approx. 80 g (2.8 oz.)	Approx. 70 g (2.5 oz.)	Approx. 120 g (4.2 oz.)			

Note: Data shown are of initial value.

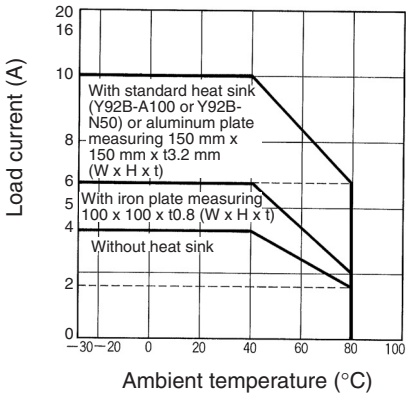
Engineering Data

Load Current vs. Ambient Temperature

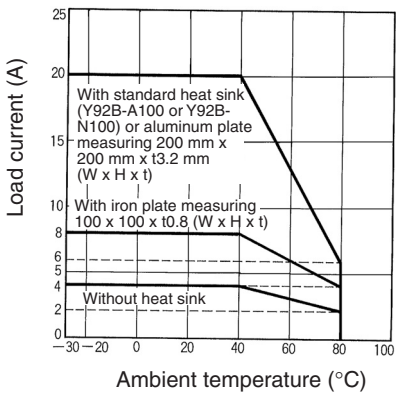
G3NA-205B



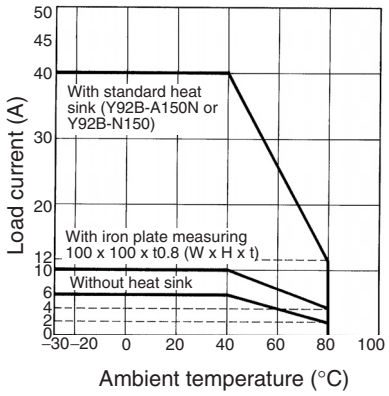
G3NA-210B/410B



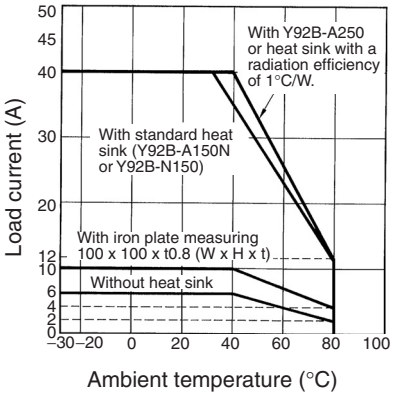
G3NA-220B/420B



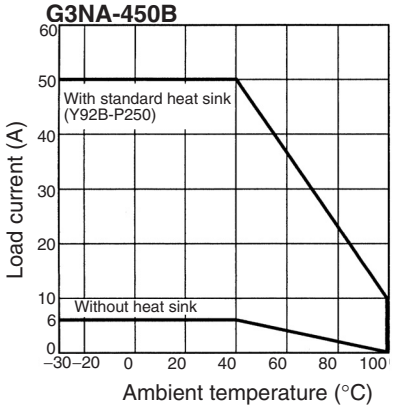
G3NA-240B



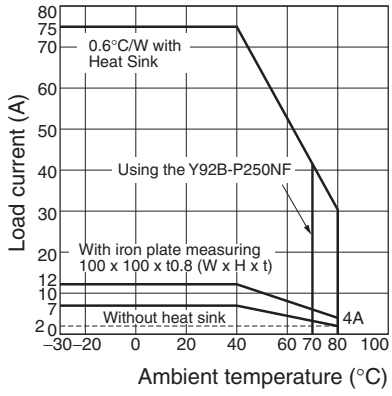
G3NA-440B



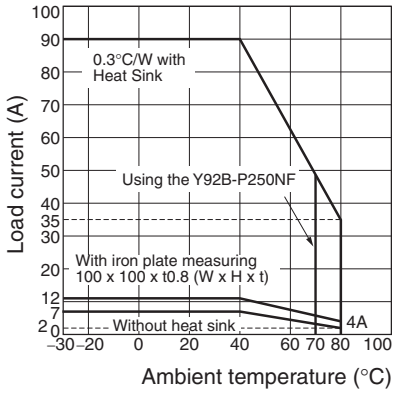
G3NA-450B



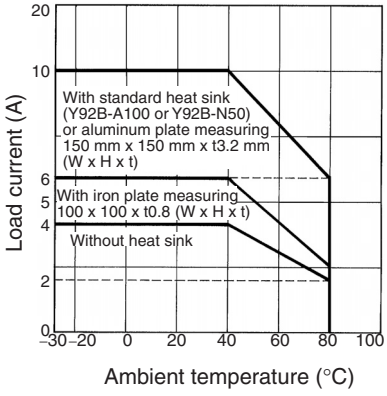
G3NA-275B-UTU
G3NA-475B-UTU



G3NA-290B-UTU
G3NA-490B-UTU



G3NA-D210B

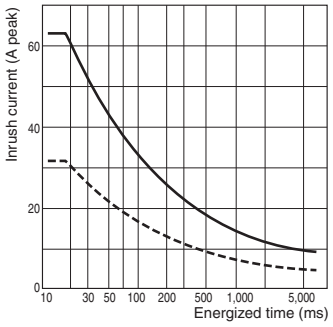


Note: The ambient operating temperature of the Y92B-P250NF is −30 to 70°C. Be sure the operating temperature is within this range.

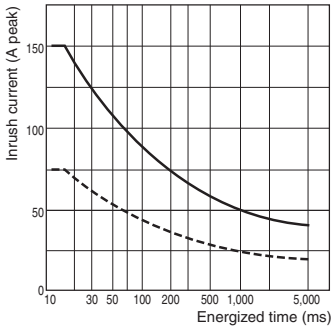
One Cycle Surge Current

The values shown by the solid line are for non-repetitive inrush currents.
Keep the inrush current below the values shown by the dotted line if it occurs repetitively.

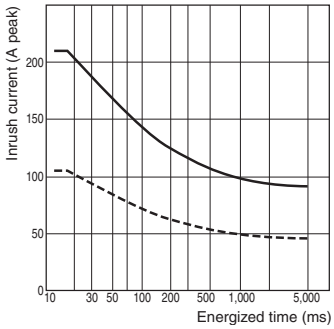
G3NA-205B



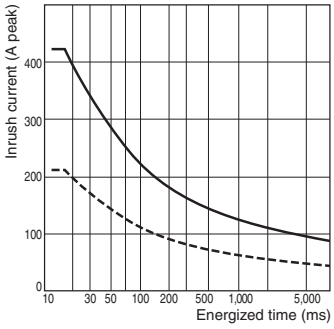
G3NA-210B
G3NA-410B



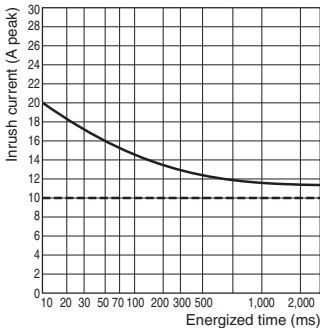
G3NA-220B
G3NA-420B



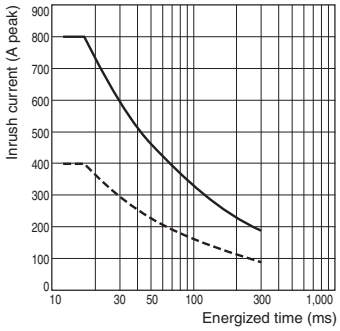
G3NA-240B
G3NA-440B/-450B



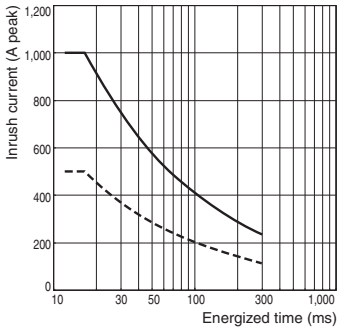
G3NA-D210B



G3NA-275B-UTU
G3NA-475B-UTU

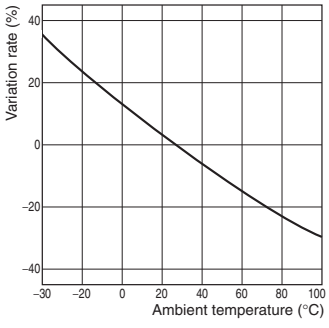


G3NA-290B-UTU
G3NA-490B-UTU



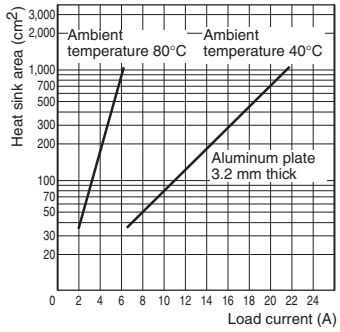
Temperature Characteristics (for Must Operate Voltage and Must Release Voltage)

G3NA-2❑❑B AC input



Heat Sink Area vs. Load Current

G3NA-220B



Note: The heat sink area refers to the combined area of the sides of the heat sink that radiate heat. For example, when a current of 18 A is allowed to flow through the SSR at 40°C, the graph shows that the heat sink area is about 450 cm^2. Therefore, if the heat sink is square, one side of the heat sink must be 15 cm ($\sqrt{450\ (cm^2)/2}$) or longer.

Thermal Resistance Rth (Back of Junction SSR) (Examples)

Model	Rth (°C/W)
G3NA-205B	3.22
G3NA-210B	2.62
G3NA-220B	1.99
G3NA-240B	0.45
G3NA-275B-UTU G3NA-475B-UTU G3NA-290B-UTU G3NA-490B-UTU	0.45
G3NA-D210B	2.62

Thermal Resistance Rth of Heat Sinks (Examples)

Model	Rth (°C/W)
Y92B-N50	2.8
Y92B-N100	1.63
Y92B-N150	1.38
Y92B-A100	1.63
Y92B-A150N	1.37
Y92B-A250	1.00
Y92B-P250NF	0.46

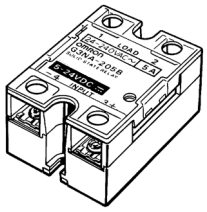
Note: When using a commercially available heat sink, use one with a thermal resistance equal to or less that the OMRON Heat Sink.

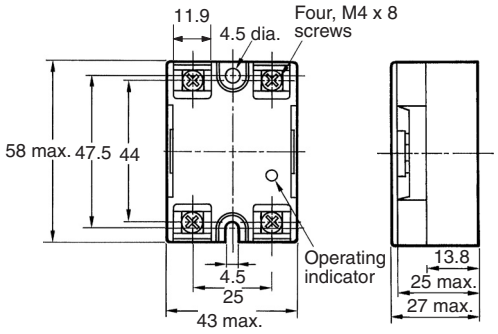
Dimensions

■ Relays

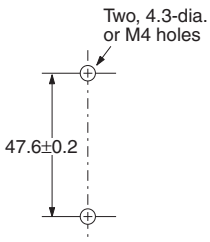
Note: All units are in millimeters unless otherwise indicated.

G3NA-205B, G3NA-210B, G3NA-220B, G3NA-410B, G3NA-420B

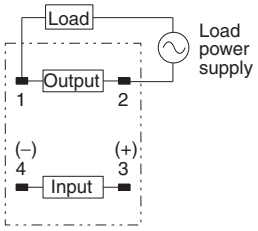




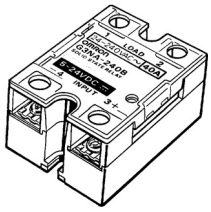
Mounting Holes

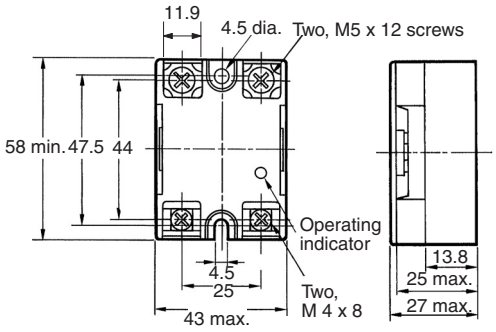


Terminal Arrangement/ Internal Connections (Top View)

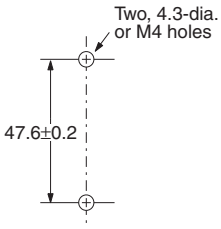


G3NA-240B, G3NA-440B

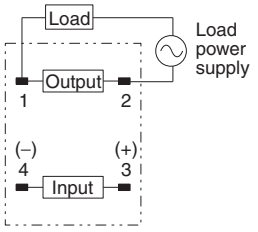




Mounting Holes

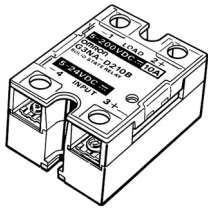


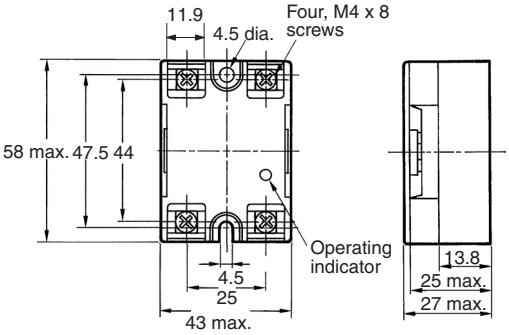
Terminal Arrangement/ Internal Connections (Top View)



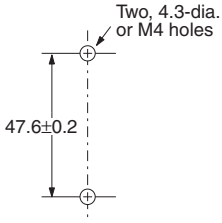
G3NA-D210B

Note: The load can be connected to either the positive or negative side.

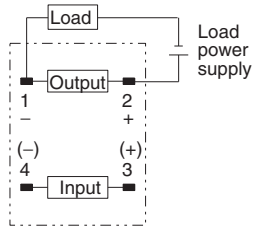




Mounting Holes

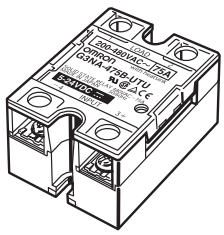


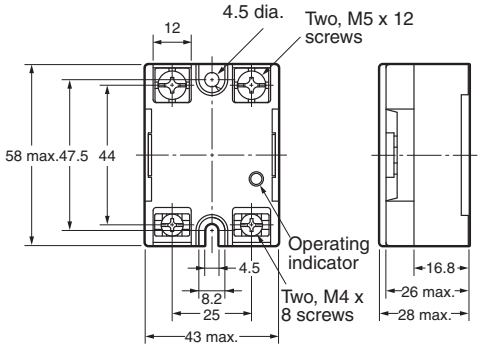
Terminal Arrangement/ Internal Connections (Top View)



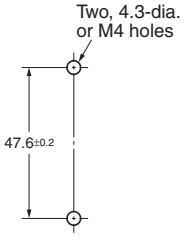
Note: When connecting the load, either the positive or negative side of the load terminals can be connected.

G3NA-275B-UTU, G3NA-475B-UTU, G3NA-290B-UTU, G3NA-490B-UTU

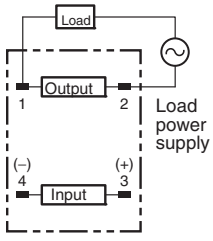




Mounting Holes



Terminal Arrangement/ Internal Connections (Top View)

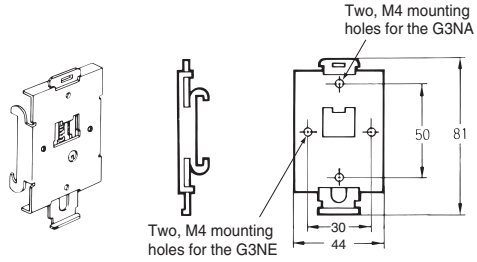


■ Options (Order Separately)

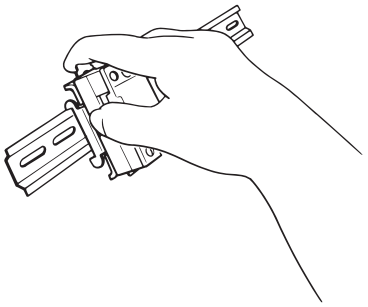
One-touch Mounting Plate

The One-touch Mounting Plate is used to mount the GN3A to a DIN Track.

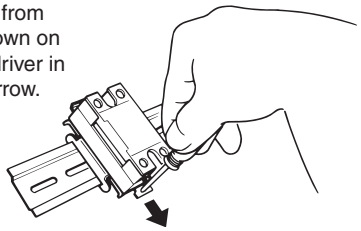
R99-12 FOR G3NA (for the G3NA and G3NE)



To mount the Relay to DIN Track, first mount it to the One-touch Mounting Plate and then attach it to the DIN Track as shown in the diagram.



To remove the Relay from the DIN Track, pull down on the tab with a screwdriver in the direction of the arrow.

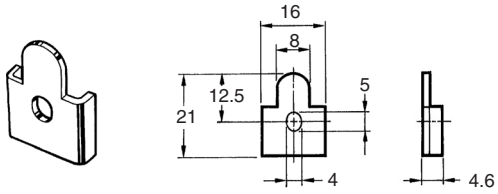


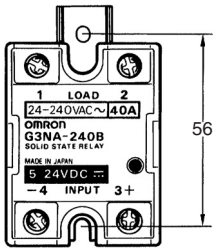
- When a Relay is mounted to DIN Track, use it within the rating for a Relay without a heat sink.
- Use the following DIN Tracks: PFP-100N or PFP-100N2.

Mounting Bracket

R99-11 (for the G3NA-240B, G3NA-440B)

Use Mounting Bracket R99-11 so that the G3NA-240B/-440B can be mounted with the same pitch as that of the G3N-240B.



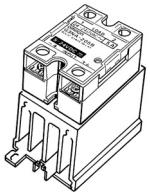


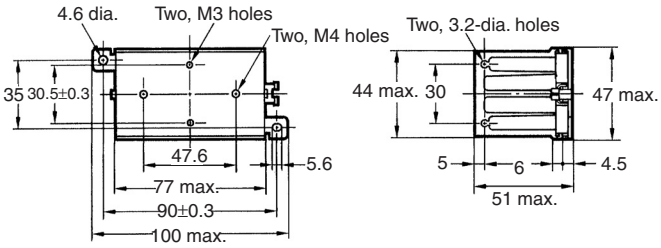
Heat Sinks

Y92B-N50 Heat Sink (for the G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-410B, G3NE-210T(L))

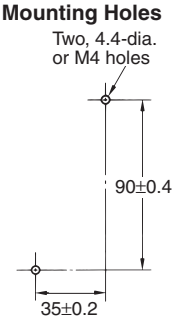
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes

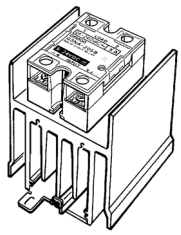


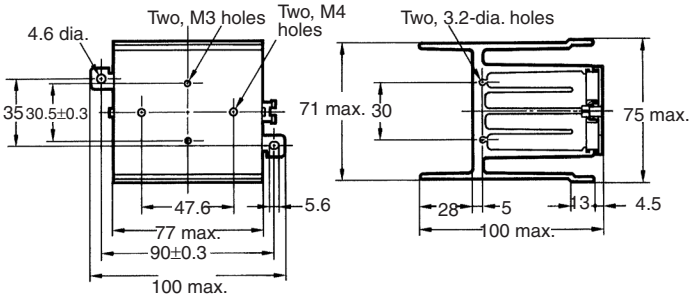
Weight: approx. 200 g

Y92B-N100 Heat Sink (for the G3NA-220B, G3NA-420B, G3NE-220T(L))

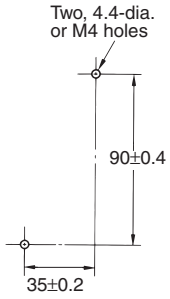
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes

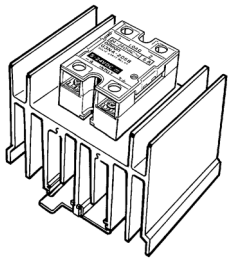


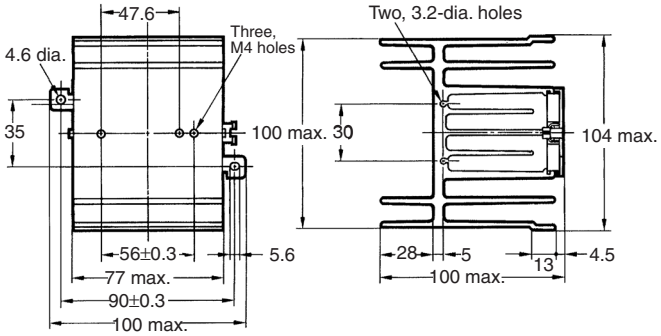
Weight: approx. 400 g

Y92B-N150 Heat Sink (for the G3NA-240B, G3NA-440B)

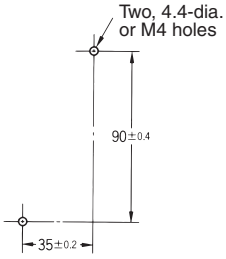
For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes

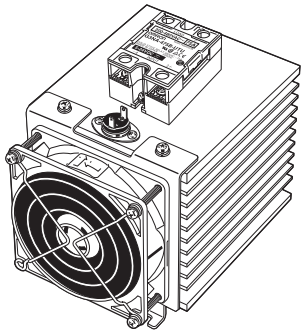


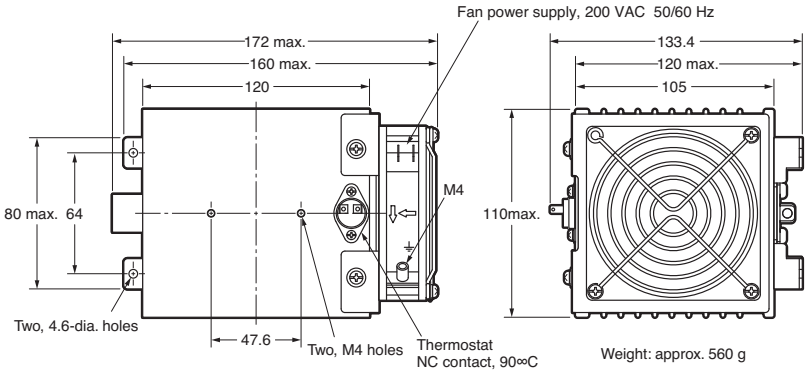
Weight: approx. 560 g

Y92B-P250NF Heat Sink (for the G3NA-275B-UTU, G3NA-475B-UTU, G3NA-290B-UTU, G3NA-490B-UTU)

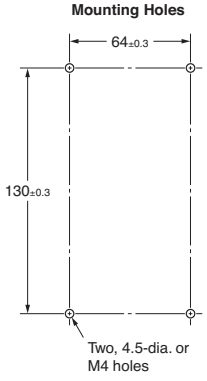
The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.

Observe the precautions given in Mounting Method under Precautions for Correct Use.

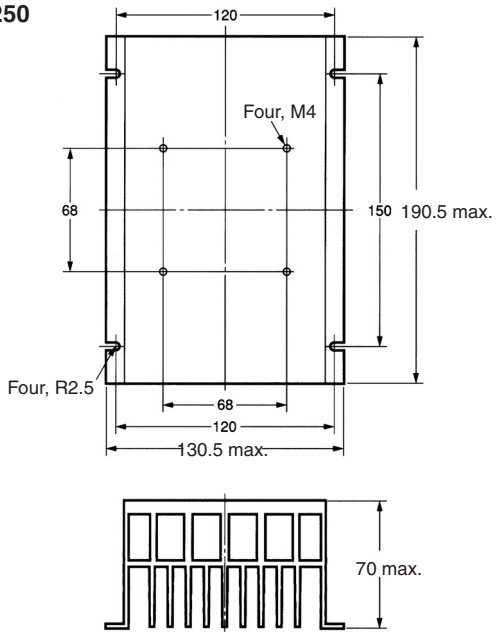




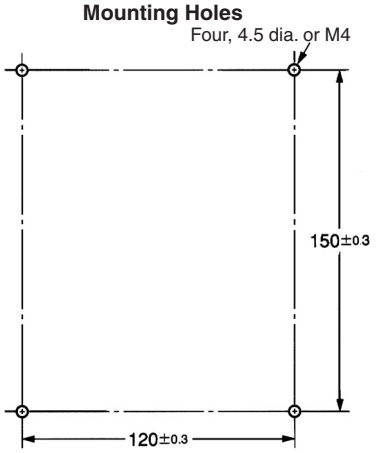
Mounting Holes



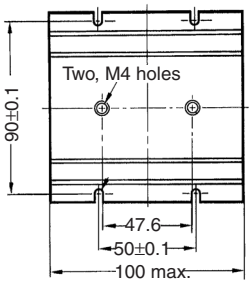
Y92B-P250



Mounting Holes

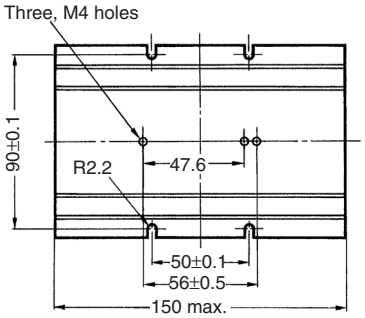


Y92B-A100 Heat Sink (for the G3NA-205B, G3NA-210B, G3NA-220B, G3NA-410B, G3NA-420B, G3NA-D210B)



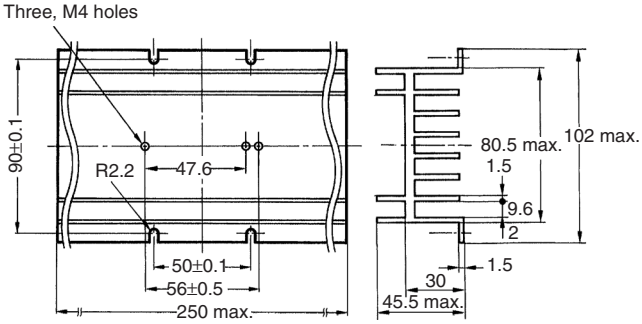
Weight: approx. 210 g

Y92B-A150N Heat Sink (for the G3NA-240B, G3NA-440B)



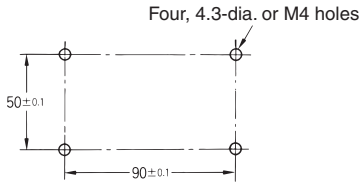
Weight: approx. 310 g

Y92B-A250 Heat Sink (for the G3NA-440B)



Weight: approx. 510 g

Mounting Holes
Y92B-A100
Y92B-A150
Y92B-A250



For surface mounting, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.

■ Approvals

UL Recognized (File No. E64562) / CSA Certified (File No. LR35535) - - Ambient Temp. = 40°C

SSR type	Input voltage	Load type	Contact ratings	
			Without heat sink	With heat sink (see note 1)
G3NA-205B	5 to 24 VDC 100 to 120 VAC 200 to 240 VAC	General use/Tungsten	3 A, 240 VAC	5 A, 240 VAC
		Motor	2.5 FLA, 15 LRA, 240 VAC	2.5 FLA, 15 LRA, 240 VAC
G3NA-210B		General use/Tungsten	4 A, 240 VAC	10 A, 240 VAC
		Motor	2.5 FLA, 15 LRA, 240 VAC	5 FLA, 30 LRA, 240 VAC
G3NA-220B		General use/Tungsten	4 A, 240 VAC	20 A, 240 VAC
		Motor	2.5 FLA, 15 LRA, 240 VAC	10 FLA, 60 LRA, 240 VAC
G3NA-225B		General use/Tungsten	4 A, 240 VAC	25 A, 240 VAC
		Motor	2.5 FLA, 15 LRA, 240 VAC	12 FLA, 72 LRA, 240 VAC
G3NA-240B		General use/Tungsten	6 A, 240 VAC	40 A, 240 VAC
		Motor	5 FLA, 30 LRA, 240 VAC	20 FLA, 120 LRA, 240 VAC
G3NA-410B	5 to 24 VDC 100 to 240 VAC	General use/Tungsten	4 A, 480 VAC	10 A, 480 VAC
		Motor	2.5 FLA, 15 LRA, 480 VAC	5 FLA, 30 LRA, 480 VAC
G3NA-420B		General use/Tungsten	4 A, 480 VAC	20 A, 480 VAC
		Motor	2.5 FLA, 15 LRA, 480 VAC	10 FLA, 60 LRA, 480 VAC
G3NA-425B		General use/Tungsten	4 A, 480 VAC	25 A, 480 VAC
		Motor	2.5 FLA, 15 LRA, 480 VAC	12 FLA, 72 LRA, 480 VAC
G3NA-440B		General use/Tungsten	6 A, 480 VAC	40 A, 480 VAC
		Motor	5 FLA, 30 LRA, 480 VAC	20 FLA, 120 LRA, 480 VAC
G3NA-450B		General use/Tungsten	6 A, 480 VAC	50 A, 480 VAC
		Motor	5 FLA, 30 LRA, 480 VAC	24 FLA, 144 LRA, 480 VAC
G3NA-D210B		General use	4 A, 200 VDC	10 A, 200 VDC

Note: 1. When used with the proper OMRON heat sink part number or an appropriately dimensioned equivalent.

2. The rated values approved by each of the safety standards (e.g., UL, CSA, and TÜV) may be different from the performance characteristics individually defined in this catalog.

3. In the interest of product improvement, specifications are subject to change.

Safety Precautions

⚠ Caution

Touching the charged section may occasionally cause minor electric shock. Do not touch the G3NA terminal section (the charged section) when the power supply is ON. Be sure to attach the cover before use.



⚠ Caution

The G3NA and heat sink will be hot and may occasionally cause minor burns. Do not touch the G3NA or the heat sink either while the power supply is ON, or immediately after the power is turned OFF.



⚠ Caution

The internal snubber circuit is charged and may occasionally cause minor electric shock. Do not touch the G3NA's main circuit terminals immediately after the power is turned OFF.



⚠ Caution

Be sure to conduct wiring with the power supply turned OFF, and always attach the terminal cover after completing wiring. Touching the terminals when they are charged may occasionally result in minor electric shock.



⚠ Caution

Do not apply a short-circuit to the load side of the G3NA. The G3NA may rupture. To protect against short-circuit accidents, install a protective device, such as a quick-burning fuse, on the power supply line.



■ Precautions for Safe Use

Although OMRON continuously strives to improve the quality and reliability of our relays, the G3NA contains semiconductors, which are generally prone to occasional malfunction and failure.

Maintaining safety is particularly difficult if a relay is used outside of its ratings. Always use the G3NA within the rated values. When using the G3NA, always design the system to ensure safety and prevent human accidents, fires, and social damage even in the event of G3NA failure, including system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

1. G3NA malfunction or fire damage may occasionally occur. Do not apply excessive voltage or current to the G3NA terminals.
2. Heat Dissipation
   - Do not obstruct the airflow to the G3NA or heat sink. Doing so may cause the output element to short, or cause fire damage.
   - Be sure to prevent the ambient temperature from rising due to the heat radiation of the G3NA. If the G3NA is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.
   - Mount the G3NA in the specified orientation. If the G3NA is mounted in any other orientation, abnormal heat generation may cause output elements to short or may cause burning.
   - Do not use the G3NA if the heat sink fins are bent, e.g., as the result of dropping the G3NA. Heat dissipation characteristics will be reduced, possibly causing G3NA failure.
   - Apply a thin layer of Toshiba Silicone's YG6260 or Sinetsu Silicone's G746, or a similar product to the heat sink before mounting.
   - If a material with high thermal resistance, such as wood, is used, heat generated by the G3NA may occasionally cause fire or burning. When installing the G3NA directly into a control panel so that the panel can be used as a heat sink, use a panel material with low thermal resistance, such as aluminum or steel.
   - Use the specified heat sink or one with equivalent or better characteristics.
3. Wire the G3NA and tighten screws correctly, observing the following precautions
   Heat generated by a terminal error may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.
   - Abnormal heat generated by wires may occasionally result in fire damage. Use wires suitable for the load current.
   - Abnormal heat generated by terminals may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.

Tightening Torque

Screw size	Tightening torque
M4	1.2 N•m
M5	2.0 N•m

   - Abnormal heat generated by terminals may occasionally result in fire damage. When tightening terminal screws, be sure that no non-conductive foreign matter is caught in screw.
   - For GN3A Relays of 40 A or higher, use crimp terminals of an appropriate size for the wire diameter for M5 terminals.
   - Do not use any wires with damaged sheaths. These may cause electric shock or leakage.
   - Do not place wiring in the same conduit or duct as high-voltage lines. Induction may cause malfunction or damage.
   - Use wires of an appropriate length, otherwise malfunction and damage may result due to induction.
   - Mount the DIN Track securely. Otherwise, the DIN Track may fall.
   - Be sure that the G3NA clicks into place when mounting it to DIN Track. The G3NA may fall if it is not mounted correctly.
   - Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.
   - Tighten the G3NA screws securely. Tightening torque: 0.78 to 0.98 N•m
   - Tighten the heat sink screws securely. Tightening torque: 0.98 to 1.47 N•m
4. Preventing Overheating
   When using the High-capacity Heat Sink (Y92B-P250NF), always use a thermostat or other method to protect from overheating in the event that the fan stops.
5. Do Not Touch Fan Blades
   When the fan is operating, do not touch the fan blades with any part of your body or allow foreign matter to come into contact with the blades. Always attach the enclosed finger guard when using the G3NA.
6. Operating Conditions
   - Only use the G3NA with loads that are within the rated values. Using the G3NA with loads outside the rated values may result in malfunction, damage, or burning.
   - Use a power supply within the rated frequency range. Using a power supply outside the rated frequency range may result in malfunction, damage, or burning.
7. Do not transport the G3NA under the following conditions. Failure or malfunction may occur.
   - Conditions under which the G3NA will be exposed to water
   - High temperatures or high humidity
   - Without proper packing

⚠ WARNING

Minor Humon hazard by electric shock may occasionally occur. Heatsink must be connected to ground in the end product.

Operating and Storage Locations

Do not use or store the G3NA in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not use or store in locations subject to direct sunlight.
- Do not use in locations subject to ambient temperatures outside the range –20 to 60°C.
- Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe changes in temperature.
- Do not store in locations subject to ambient temperatures outside the range –30 to 70°C.
- Do not use or store in locations subject to corrosive or flammable gases.
- Do not use or store in locations subject to dust (especially iron dust) or salts.
- Do not use or store in locations subject to shock or vibration.
- Do not use or store in locations subject to exposure to water, oil, or chemicals.
- Do not use or store in locations subject to high temperatures or high humidity.
- Do not use or store in locations subject to salt damage.
- Do not use or store in locations subject to rain or water drops.

■ Precautions for Correct Use

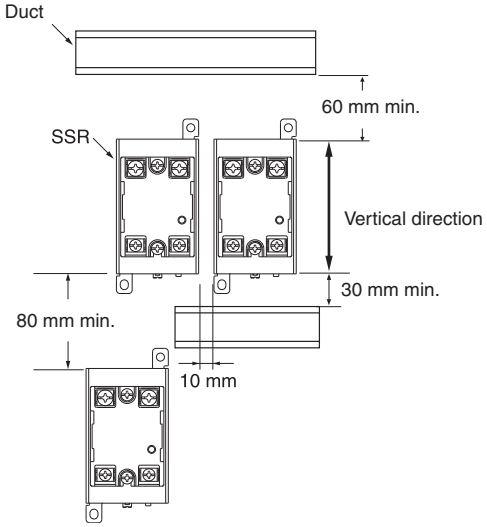
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Before Actual Operation

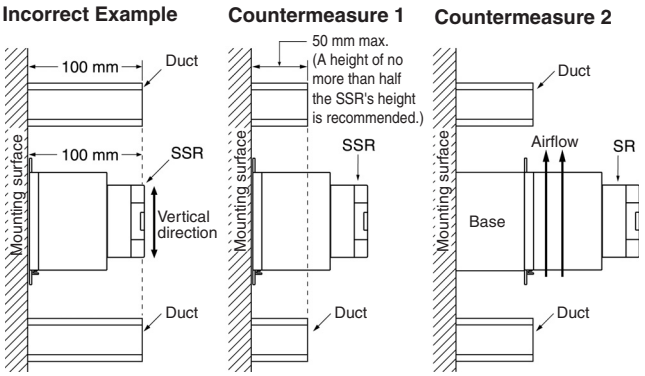
1. The G3NA in operation may cause an unexpected accident. Therefore it is necessary to test the G3NA under the variety of conditions that are possible. As for the characteristics of the G3NA, it is necessary to consider differences in characteristics between individual SSRs.
2. Unless otherwise specified, the ratings in this catalog are tested values in a temperature range between 15°C and 30°C, a relative humidity range between 25% and 85%, and an atmospheric pressure range between 88 and 106 kPa (standard test conditions according to JIS C5442). It will be necessary to provide the above conditions as well as the load conditions if the user wants to confirm the ratings of specific G3NAs.

Mounting Method

SSR Mounting Pitch (Panel Mounting)



Relationship between SSRs and Duct Height

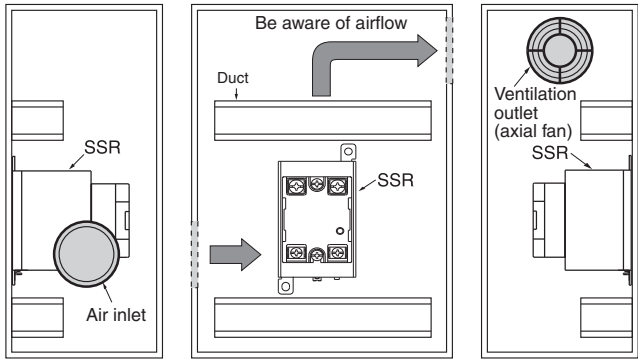


Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Use short ducts.

If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation Outside the Control Panel



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging to ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSRs to ensure the efficiency of the heat exchanger.

- Please reduce the ambient temperature of SSRs. The rated load current of an SSR is measured at an ambient temperature of 40°C.
- An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10 °C reduction in temperature will double the expected life.)

Load current (A)	5 A	10 A	20 A	40 A	75 A	90 A
Required number of fans per SSR	0.08	0.16	0.31	0.62	1.2	1.44

Example: For 10 SSRs with load currents of 10 A,

0.16 x 10 = 1.6

Thus, 2 fans would be required.

Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,

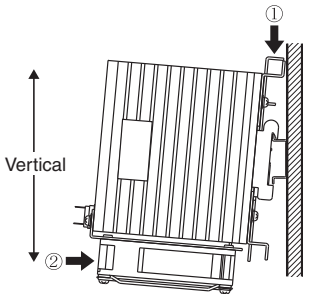
Ambient temperature of control panel: 30 °C

If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

High-capacity Heat Sink (Y92B-P250NF)

DIN-track Mounting

- Assembled DIN Tracks are heavy. Mount the DIN Tracks securely. Be sure that the Heat Sink is securely locked to the DIN Track.
- Attach End Plates (PFP-M, order separately) to both ends of the Units on the DIN Track to hold them in place.
- To mount a Heat Sink to a DIN Track, press down at the point indicated by arrow 1 in the diagram and then press in the Heat Sink at the point indicated by arrow 2.



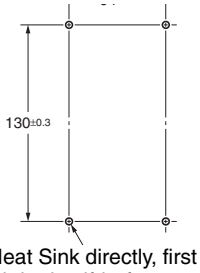
Applicable DIN Track

Mounting is possible on TE35-15Fe (IEC 60715) DIN tracks. DIN tracks from the following manufacturers can be used.

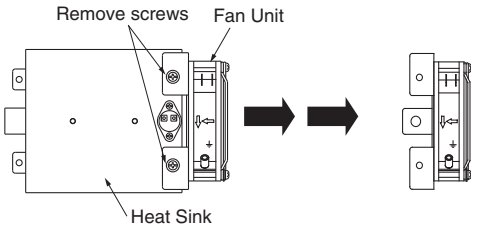
Manufacturer	Thickness: 1.5 mm	Thickness: 2.3 mm
Schneider	AM1-DE2000	---
WAGO	210-114 or 210-197	210-118
PHOENIX	N35/15	N35/15/15-2.3

Direct Mounting

- Prepare mounting holes as shown in the diagram. Tightening torque: 0.98 to 1.47 N•m



- When mounting a Heat Sink directly, first remove the Fan Unit, then mount the Heat Sink by itself before attaching the Fan Unit again. (Remove the two screws shown in the following diagram.)



- First, temporarily mount the Heat Sink with the bottom two screws and then attach the top two screws with the mounting bracket sandwiched between the Heat Sink and mounting surface. Finally, tighten all four screws.

Ratings and Characteristics of High-capacity Heat Sink (Y92B-P250NF)

Fan Ratings

Rated voltage	200 V
Operating voltage	85% to 110% of rated voltage
Frequency	50/60 Hz
Rated current (See note.)	0.085 A at 50 Hz 0.072 A at 60 Hz
Rated speed (See note.)	2,500 r/min at 50 Hz 2,850 r/min at 60 Hz

Note: Average values.

Thermostat Ratings

Operating temperature	Approx. 90°C
Contact ratings	3 A at 240 VAC, resistive load 3 A at 24 VDC, resistive load

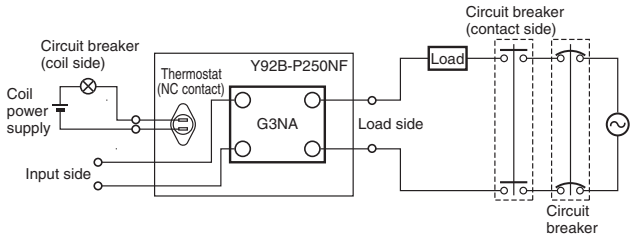
Fan/Thermostat Characteristics

Insulation class (Fan)	VDE:E (120°C) UL: A (105°C) CSA:B (130°C)
Protection class	1
Insulation resistance	100 MΩ min. (at 500 VDC) between power supply connections and non-charged metal part
Dielectric strength	Fan: 2,000 VAC for 1 min Thermostat: 1,500 VAC for 1 min Between power supply connections and non-charged metal part
Ambient operating temperature	−30 to 70°C (with no icing)
Storage temperature	−40 to 85°C (with no icing)
Ambient operating humidity	25% to 85%

- Use a commercial power supply (50/60 Hz) for the Fan.
- Be sure to turn OFF the power supply and wait for the blades to stop before inspecting the Fan.
- High-precision ball bearings are used in the fan and these may be damaged if the Fan is dropped or otherwise subjected to shock. The life and characteristics of the Fan will be reduced if the bearings are damaged. Do not subject the Fan to shock.
- The life of the Fan depends on the ambient temperature, As a guideline, the Fan life is 40,000 hours for continuous usage at 40°C.
- Be sure there are no objects near the air vents that would restrict air flow and no loose objects, such as electrical lines.
- The tightening torque of the mounting screw when replacing the Fan is 0.38 to 0.50 N•m.
- Terminals equivalent to Faston #110 are used for the Fan power supply terminals.
- Connect the ground screw hole on the fan to PE.

Preventing Overheating with a High-capacity Heat Sink (Y92B-P250NF)

- When the High-capacity Heat Sink is used, high-capacity switching at 75 A or 90 A requires forced cooling with a fan. Connect the Fan to a power supply according to its ratings specifications.
- If the Fan stops due to a power supply error, due to foreign matter in the power supply connection, or due to aging, the Heat Sink will heat to high temperatures, possibly resulting in failure of the SSR or adverse affects on other devices. Implement an overheating prevention measure, such as turning OFF the load current, if the Heat Sink overheats.
- A thermostat is provided to detect overheating. The thermostat uses a NC contact, i.e., the circuit will be opened for overheating. This thermostat can be used to stop the operation of the SSR. Implement an overheating prevention measure by using this signal to output an alarm or perform another response applicable to the system. Also, confirm that there is no problem with the overall system.
- Do not connect the thermostat directly to the load power supply. Connect it to a contactor or other shutoff device connected above the SSR.
- Terminals equivalent to Faston #187 are used for the thermostat terminals.
- Do not place heat-dissipating silicon grease on the thermostat.
- Do not solder the thermostat terminals.
- The following diagram shows a protective circuit example.



Ventilating a High-capacity Heat Sink (Y92B-P250NF)

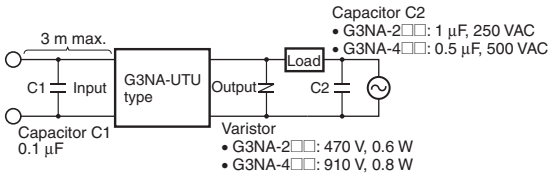
- Refer to *Ventilation Outside the Control Panel*.

Operating Conditions

- Do not apply currents exceeding the rated current otherwise, the temperature of the G3NA may rise excessively.
- As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses and no-fuse breakers, on the power supply side.
- Do not apply overvoltages to the input circuit or output circuit. Failure or burning may result.
- Do not drop the G3NA or otherwise subject it to abnormal shock. Malfunction or failure may result.
- Keep the cooling system running continuously during the ON/OFF operation of the SSR. This is to allow residual heat to dissipate while the SSR is OFF.

Noise Terminal Voltage According to EN55011

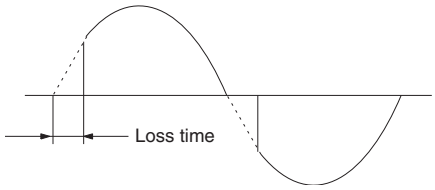
The G3NA-UTU complies with EN55011 standards when a capacitor is connected to the load power supply as shown in the following circuit diagram.



- Connect capacitor C1 to both sides of the input terminals for a G3NA with a DC input.
- Connect capacitor C2 to both sides of the load power supply output.
- Connect the varistor to both sides of the G3NA output terminals.
- Do not use an input line that is longer than 3 m.

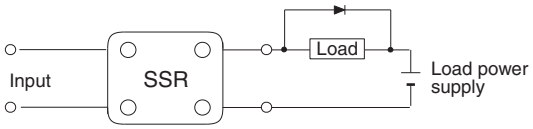
Loss Time

The loss time will increase when the G3NA is used at a low applied voltage or current. Be sure that this does not cause any problems.



Using DC Loads

For a DC or L load, a diode should be connected in parallel the load to absorb the counter electromotive force of the load.



Fuses

Connect a quick-break fuse in series with the load as a short-circuit protection measure. Use one of the fuses in the following table or one with equivalent or better characteristics.

Recommended Fuses

G3NA rated load current	Fuse model	Manufacturer	Applicable SSR
5 A	60LFF5	Kyosan Electric Manufacturing Company	G3NA-205B
8 A	60LFF8		G3NA-210B
10 A	60LFF10		
15 A	60LFF15		G3NA-220B
20 A	60LFF20 50SHA20		
25 A	60PFF25 50SHA25		G3NA-240B
30 A	60PFF30 50SHA30		
40 A	50SHA40		
45 A	50SHA45		
50 A	50SHA50		G3NA-275B-UTU
75 A	50SHA75		
80 A	50SHA80		G3NA-290B-UTU
100 A	50SHB100		

Reverse Connection

The output terminal side of the G3NA-D210B is connected to a built-in diode to protect the SSR from damage that may result from reverse connection. The SSR, however, cannot withstand one minute or more if the wires are connected in reverse. Therefore, pay the utmost attention not to make polarity mistakes on the load side.

■ Precautions on Operating and Storage Environments

1. Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3NA is for when there is no heat build-up. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3NA may exceed the rated value resulting in malfunction or burning.

When using the G3NA, design the system to allow heat dissipation sufficient to stay below the *Load Current vs. Ambient Temperature* characteristic curve. Note also that the ambient temperature of the G3NA may increase as a result of environmental conditions (e.g., climate or air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

2. Transportation

When transporting the G3NA, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not drop the G3NA or subject it to severe vibration or shock.
- Do not transport the G3NA if it is wet.
- Do not transport the G3NA under high temperatures or humidity.
- Do not transport the G3NA without packing it properly.

3. Vibration and Shock

Do not subject the G3NA to excessive vibration or shock. Otherwise the G3NA may malfunction and internal components may be deformed or damaged, resulting in failure of the G3NA to operate. To prevent the G3NA from abnormal vibration, do not install the G3NA in locations or by means that will subject it to vibration from other devices, such as motors.

4. Solvents

Do not allow the G3NA or the resin portion of the Fan's thermostat to come in contact with solvents, such as thinners or gasoline. Doing so will dissolve the markings on the G3NA.

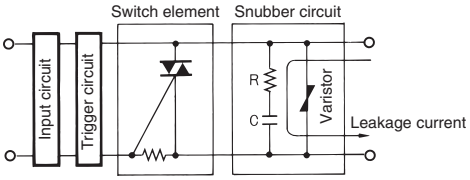
5. Oil

Do not allow the G3NA terminal cover to come in contact with oil. Doing so will cause the cover to crack and become cloudy.

■ Operation

1. Leakage Current

A leakage current flows through a snubber circuit in the G3NA even when there is no power input. Therefore, always turn OFF the power to the input or load and check that it is safe before replacing or wiring the G3NA.



2. Screw Tightening Torque

Tighten the G3NA terminal screws properly. If the screws are not tight, the G3NA will be damaged by heat generated when the power is ON. Perform wiring using the specified tightening torque.

3. Handling Relays

Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.

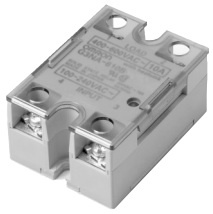
4. Do Not Drop

Be careful not to drop a Relay or Heat Sink onto any part of your body while working. Injury may result. This is particularly true for the High-capacity Heat Sink (Y92B-P250NF), which weighs 2.5 kg.

Solid State Relays (600 VAC Models)
G3NA-6

New Models Available at 600 VAC Load Voltage Line with 10 A, 25 A and 50 A Output Current

- Load voltage range: 180 to 660 VAC
- Lower input current: 7 mA max at 24 VDC
- All models are same dimensions as G3NA series.
- Built-in varistor effectively absorbs external surges.
- Operation indicator enables monitoring operation.
- Protective cover for greater safety.
- Certified by UL, CSA.





Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Applicable output load (See note 1.)	Rated input voltage	Model
Photocoupler	Yes	Yes	10 A at 400 to 600 VAC	5 to 24 VDC	**G3NA-610B DC5-24**
				100 to 240 VAC	**G3NA-610B AC100-240**
			25 A at 400 to 600 VAC	5 to 24 VDC	**G3NA-625B DC5-24**
				100 to 240 VAC	**G3NA-625B AC100-240**
			50 A at 400 to 600 VAC	5 to 24 VDC	**G3NA-650B DC5-24**
				100 to 240 VAC	**G3NA-650B AC100-240**

Note: 1. The applicable output load depends on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* in *Engineering Data.*

2. Loss time increases under 400 VAC. (Refer to *Precautions for Correct Use.*) Confirm operation with the actual load.

■ Accessories (Order Separately)

One-touch Mounting Plates

Model
R99-12 FOR G3NA

Heat Sinks

Slim Models Enabling DIN-track Mounting

Model	Applicable maximum load current
Y92B-N50	10 A
Y92B-N100	20 A
Y92B-N150	40 A
Y92B-P250N	50 A

Low-cost Models

Model	Applicable maximum load current
Y92B-A100	20 A
Y92B-A150N	40 A
Y92B-A250	40 A

Specifications

■ Ratings

Input (at an Ambient Temperature of 25°C)

Model	Rated voltage	Operating voltage	Impedance (See note 1.)	Voltage level	
				Must operate voltage	Must release voltage
G3NA-6□□B	5 to 24 VDC	4 to 32 VDC	7 mA max.	4 VDC max.	1 VDC min.
	100 to 240 VAC	75 to 264 VAC	72 kΩ±20%	75 VAC max.	20 VAC min.

Note: 1. The input impedance is measured at the maximum value of the rated supply voltage (for example, with the model rated at 100 to 240 VAC, the input impedance is measured at 240 VAC).

2. Refer to *Temperature Characteristics (for Must Operate Voltage and Must Release Voltage)* in *Engineering Data* for further details.

Output

Model	Applicable load				
	Rated load voltage	Load voltage range	Load current (See note 1.)		Inrush current
			With heat sink (See note 2.)	Without heat sink	
G3NA-610B	400 to 600 VAC	360 to 660 VAC	0.5 to 10 A (at 40°C)	0.5 to 4 A (at 40°C)	150 A (60 Hz, 1 cycle)
G3NA-625B			0.5 to 25 A (at 40°C)	0.5 to 4 A (at 40°C)	220 A (60 Hz, 1 cycle)
G3NA-650B			0.5 to 50 A (at 40°C)	0.5 to 6 A (at 40°C)	440 A (60 Hz, 1 cycle)

Note: 1. The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data*.

2. When an OMRON Heat Sink (refer to *Options*) or a heat sink of the specified size is used.

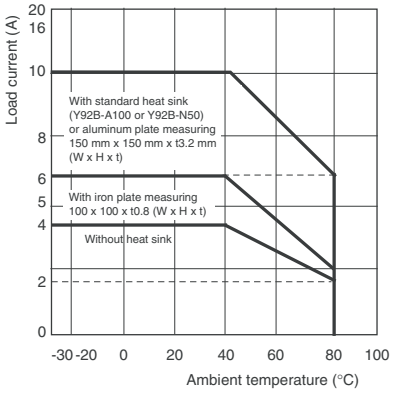
■ Characteristics

Item	G3NA-610B-UTU	G3NA-625B-UTU	G3NA-650B-UTU
Operate time	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)		
Release time	1/2 of load power source cycle + 1 ms max. (DC input) 3/2 of load power source cycle + 1 ms max. (AC input)		
Output ON voltage drop	1.8 V (RMS) max.		
Leakage current	10 mA max. (at 400 VAC) 20 mA max. (at 600 VAC)		
Insulation resistance	100 MΩ min. (at 500 VDC)		
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min		
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)		
Shock resistance	Destruction: 1,000 m/s^2		
Ambient temperature	Operating: −30°C to 80°C (with no icing or condensation) Storage: −30°C to 100°C (with no icing or condensation)		
Ambient humidity	Operating: 45% to 85%		
Weight	Approx. 120 g		

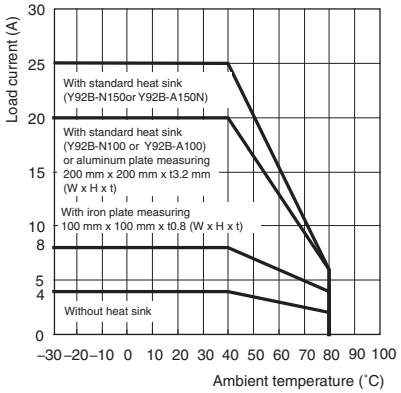
Engineering Data

Load Current vs. Ambient Temperature

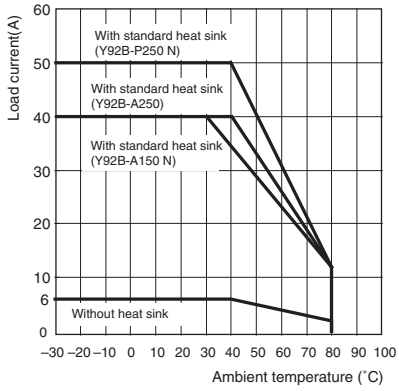
G3NA-610B



G3NA-625B



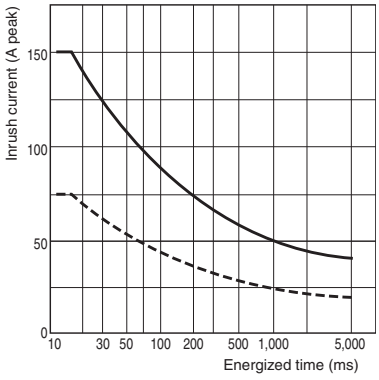
G3NA-650B



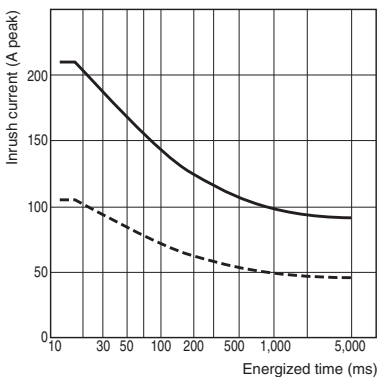
One Cycle Surge Current

The values shown by the solid line are for non-repetitive inrush currents.
Keep the inrush current below the values shown by the dotted line if it occurs repetitively.

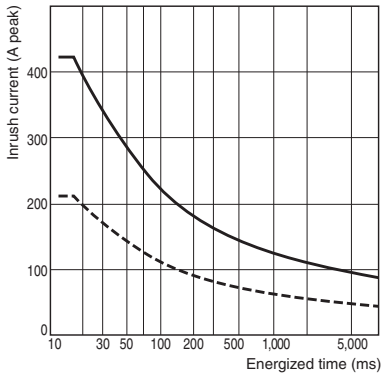
G3NA-610B



G3NA-625B



G3NA-650B



Thermal Resistance Rth (Back of Junction SSR) (Examples)

Model	Rth (°C/W)
G3NA-6□□B	0.37

Thermal Resistance Rth of Heat Sinks (Examples)

Model	Rth (°C/W)
Y92B-N50	2.8
Y92B-N100	1.63
Y92B-N150	1.38
Y92B-P250N	1.12
Y92B-A100	1.63
Y92B-A150N	1.37
Y92B-A250	1.25

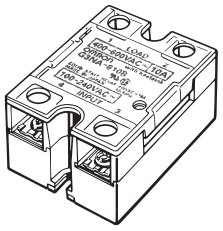
Note: When using a commercially available heat sink, use one with a thermal resistance equal to or less that the OMRON Heat Sink.

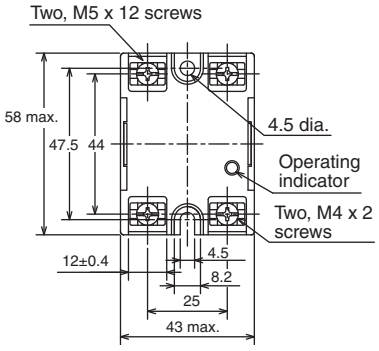
Dimensions

■ Relays

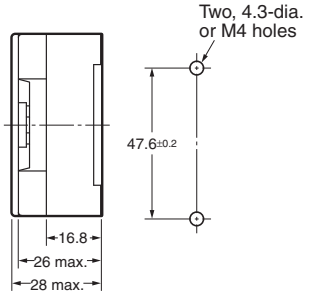
Note: All units are in millimeters unless otherwise indicated.

G3NA-610B, G3NA-625B

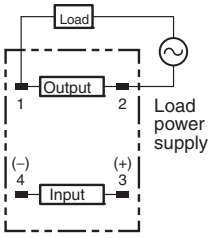




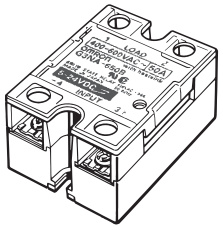
Mounting Holes

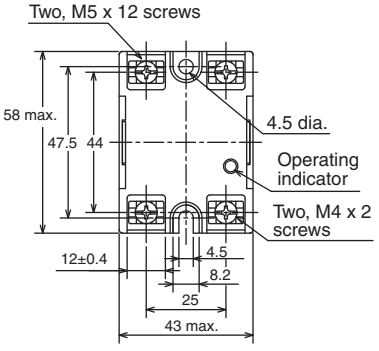


Terminal Arrangement/ Internal Connections (Top View)

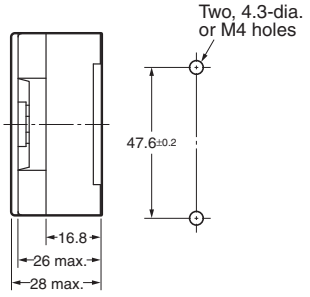


G3NA-650B

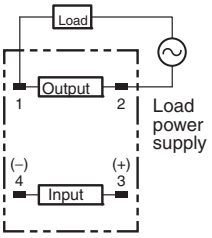




Mounting Holes



Terminal Arrangement/ Internal Connections (Top View)

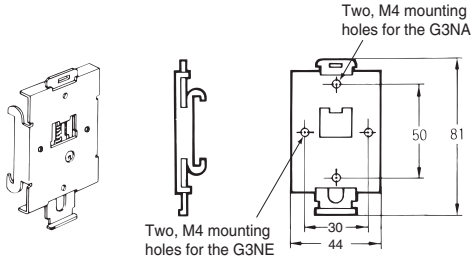


■ Optional Accessories (Order Separately)

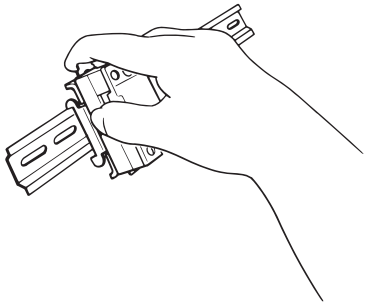
One-touch Mounting Plate

The One-touch Mounting Plate is used to mount the G3NA to a DIN Track.

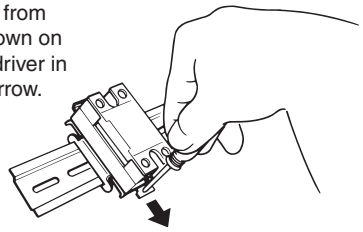
R99-12 FOR G3NA (for the G3NA and G3NE)



To mount the Relay to DIN Track, first mount it to the One-touch Mounting Plate and then attach it to the DIN Track as shown in the diagram.



To remove the Relay from the DIN Track, pull down on the tab with a screwdriver in the direction of the arrow.



- When a Relay is mounted to DIN Track, use it within the rating for a Relay without a heat sink.
- Use the following DIN Tracks: PFP-100N or PFP-100N2.

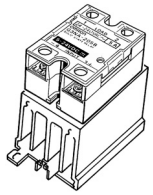
Heat Sinks

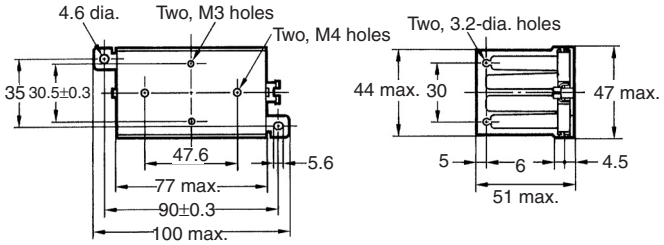
Y92B-N50 Heat Sink (for max. 10 A load current)

Type G3NA-610B is recommended for max. 10 A with this heat sink.

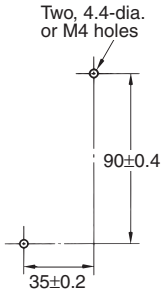
For upright standing to the ground, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes



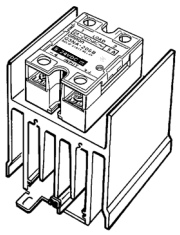
Weight: approx. 200 g

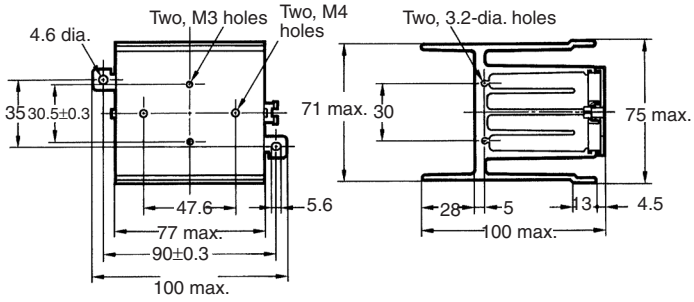
Y92B-N100 Heat Sink (for max. 20 A load current)

Type G3NA-625B is recommended for 20 A with this heat sink.

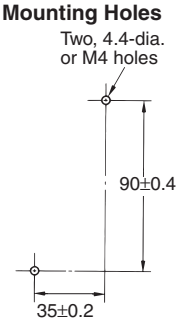
For upright standing to the ground, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes



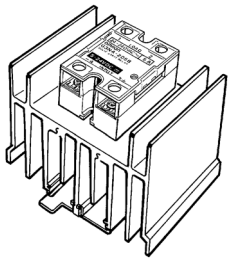
Weight: approx. 400 g

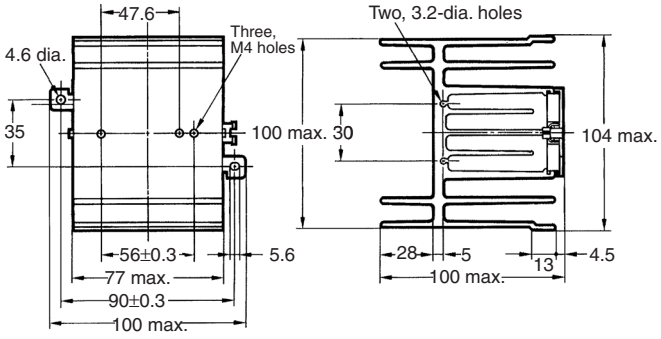
Y92B-N150 Heat Sink (for max. 40 A load current)

Type G3NA-625B is recommended for max. 25 A and G3NA-650B for max. 40 A with this heat sink.

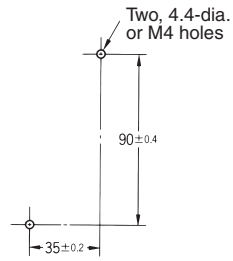
For upright standing to the ground, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.





Mounting Holes



Weight: approx. 560 g

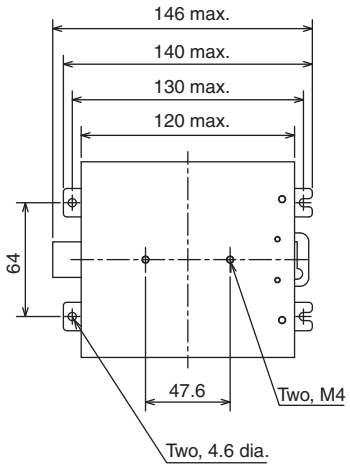
Y92B-P250N (for max. 50 A load current)

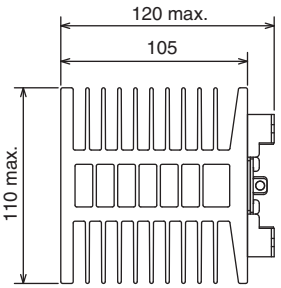
Type G3NA-650B is recommended for max. 50 A with this heat sink.

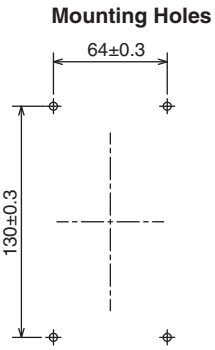
For upright standing to the ground, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.



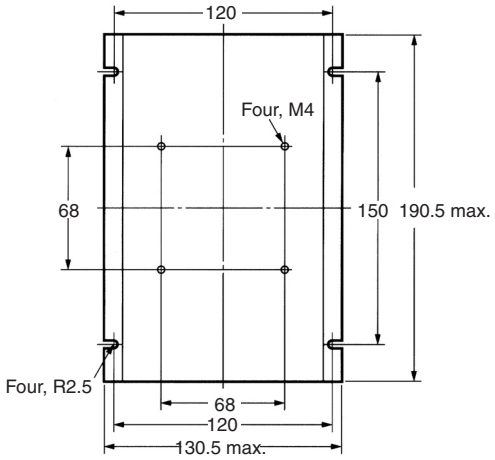


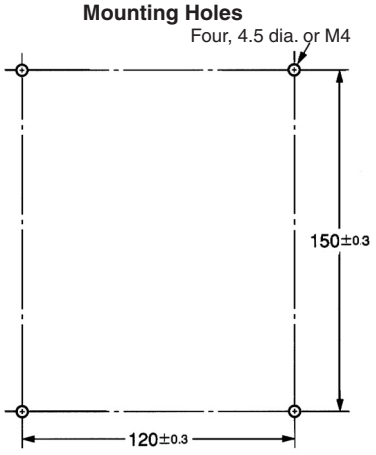




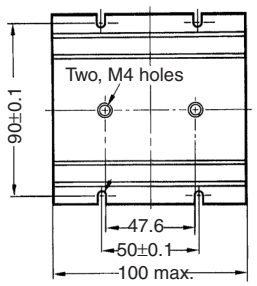
Other Heat Sinks

Y92B-P250 Heat Sink (for max. 50 A load current)



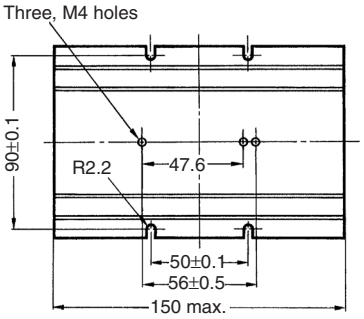


Y92B-A100 Heat Sink (for max. 20 A load current)



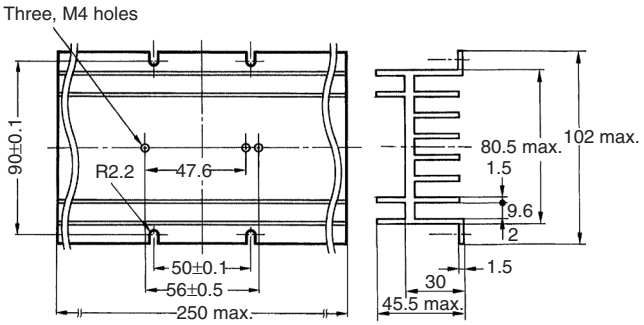
Weight: approx. 210 g

Y92B-A150N Heat Sink (for max. 40 A load current)



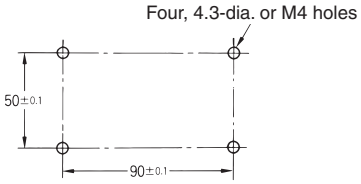
Weight: approx. 310 g

Y92B-A250 Heat Sink (for max. 40 A load current)



Weight: approx. 510 g

Mounting Holes
Y92B-A100
Y92B-A150N
Y92B-A250



For upright standing to the ground, a 30% derating of the load current is required (from the *Load Current vs. Ambient Temperature* graphs).
The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.

Safety Precautions

⚠ CAUTION

Touching the charged section may occasionally cause minor electric shock. Do not touch the G3NA terminal section (the charged section) when the power supply is ON. Be sure to attach the cover before use.



⚠ CAUTION

The G3NA and heat sink will be hot and may occasionally cause minor burns. Do not touch the G3NA or the heat sink either while the power supply is ON, or immediately after the power is turned OFF.



⚠ CAUTION

The internal snubber circuit is charged and may occasionally cause minor electric shock. Do not touch the G3NA's main circuit terminals immediately after the power is turned OFF.



⚠ CAUTION

Be sure to conduct wiring with the power supply turned OFF, and always attach the terminal cover after completing wiring. Touching the terminals when they are charged may occasionally result in minor electric shock.



⚠ CAUTION

Do not apply a short-circuit to the load side of the G3NA. The G3NA may rupture. To protect against short-circuit accidents, install a protective device, such as a quick-burning fuse, on the power supply line.



■ Precautions for Safe Use

Although OMRON continuously strives to improve the quality and reliability of our relays, the G3NA contains semiconductors, which are generally prone to occasional malfunction and failure.
Maintaining safety is particularly difficult if a relay is used outside of its ratings. Always use the G3NA within the rated values. When using the G3NA, always design the system to ensure safety and prevent human accidents, fires, and social damage even in the event of G3NA failure, including system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

1. G3NA malfunction or fire damage may occasionally occur. Do not apply excessive voltage or current to the G3NA terminals.

2. Heat Dissipation

- Do not obstruct the airflow to the G3NA or heat sink. Heat generated from an G3NA error may occasionally cause the output element to short, or cause fire damage.
- Be sure to prevent the ambient temperature from rising due to the heat radiation of the G3NA. If the G3NA is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.
- Mount the G3NA in the specified orientation. If the G3NA is mounted in any other orientation, abnormal heat generation may cause output elements to short or may cause burning.
- Do not use the G3NA if the heat sink fins are bent, e.g., as the result of dropping the G3NA. Heat dissipation characteristics will be reduced, possibly causing G3NA failure.
- Apply a thin layer of Toshiba Silicone's YG6260 or Sinetsu Silicone's G746, or a similar material to the heat sink before mounting
- If a material with high thermal resistance, such as wood, is used, heat generated by the G3NA may occasionally cause fire or burning. When installing the G3NA directly into a control panel so that the panel can be used as a heat sink, use a panel material with low thermal resistance, such as aluminum or steel.
- Use the specified heat sink or one with equivalent or better characteristics. Abnormal heat generation may cause output elements to short or may cause burning.

3. Wire the G3NA and tighten screws correctly, observing the following precautions
Heat generated by a terminal error may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.

- Abnormal heat generated by wires may occasionally result in fire damage. Use wires suitable for the load current.
- Abnormal heat generated by terminals may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.

Tightening Torque

Screw size	Tightening torque
M4	1.2 N·m
M5	2.0 N·m

- Abnormal heat generated by terminals may occasionally result in fire damage. When tightening terminal screws, be sure that no non-conductive material is caught in screw.
- For G3NA Relays of 50 A or higher, use crimp terminals of an appropriate size for the wire diameter for M5 terminals.
- Use wires that are suitable for the load current and voltage. Abnormal heat generated by the wires may result in fire damage or melting of the sheath, causing electric shock.
- Do not use any wires with damaged sheaths. These may cause electric shock or leakage.
- Do not place wiring in the same conduit or duct as high-voltage lines. Induction may cause malfunction or damage.
- Use wires of an appropriate length, otherwise malfunction and damage may result due to induction.
- Mount the DIN Track securely. Otherwise, the DIN Track may fall.
- Be sure that the G3NA clicks into place when mounting it to DIN Track. The G3NA may fall if it is not mounted correctly.
- Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.
- Tighten the G3NA screws securely.
Tightening torque: 0.78 to 0.98 N·m
- Abnormal heat generation may cause output elements to short or may cause burning.
- Tighten the heat sink screws securely.
Tightening torque: 0.98 to 1.47 N·m
- The G3NA may fall if it is not mounted correctly.

4. Operating Conditions

- Only use the G3NA with loads that are within the rated values. Using the G3NA with loads outside the rated values may result in malfunction, damage, or burning.
- Use a power supply within the rated frequency range. Using a power supply outside the rated frequency range may result in malfunction, damage, or burning.
- Never apply voltage or current to the I/O terminals that exceeds the rated range. Doing so may result in malfunction, damage, or burning.

5. Do not transport the G3NA under the following conditions. Failure or malfunction may occur.

- Conditions under which the G3NA will be exposed to water
- High temperatures or high humidity

Operating and Storage Locations

Do not use or store the G3NA in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not use or store in locations subject to direct sunlight.
- Do not use in locations subject to ambient temperatures outside the range −30 to 80°C.
- Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe changes in temperature.
- Do not store in locations subject to ambient temperatures outside the range −30 to 100°C.
- Do not use or store in locations subject to corrosive or flammable gases.
- Do not use or store in locations subject to dust (especially iron dust) or salts.
- Do not use or store in locations subject to shock or vibration.
- Do not use or store in locations subject to exposure to water, oil, or chemicals.
- Do not use or store in locations subject to high temperatures or high humidity.
- Do not use or store in locations subject to salt damage.
- Do not use or store in locations subject to rain or water drops.

■ Precautions for Correct Use

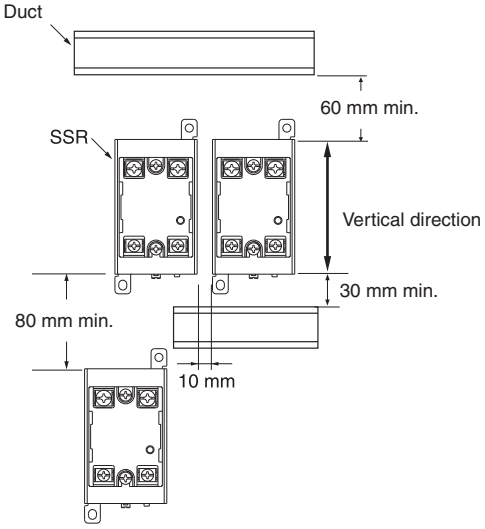
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Before Actual Operation

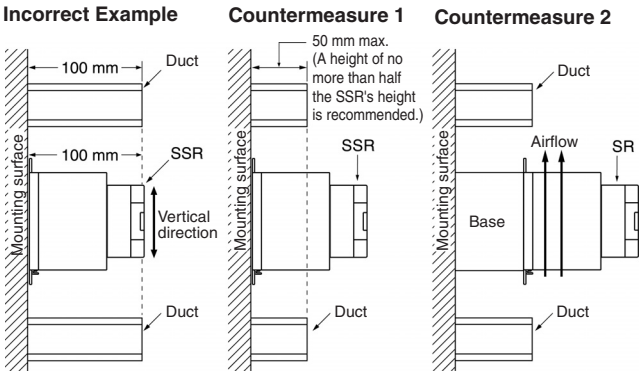
1. The G3NA in operation may cause an unexpected accident. Therefore it is necessary to test the G3NA under the variety of conditions that are possible. As for the characteristics of the G3NA, it is necessary to consider differences in characteristics between individual SSRs.
2. Unless otherwise specified, the ratings in this catalog are tested values in a temperature range between 15°C and 30°C, a relative humidity range between 25% and 85%, and an atmospheric pressure range between 88 and 106 kPa (standard test conditions according to JIS C5442). It will be necessary to provide the above conditions as well as the load conditions if the user wants to confirm the ratings of specific G3NAs.

Mounting Method

SSR Mounting Pitch (Panel Mounting)



Relationship between SSRs and Duct Height

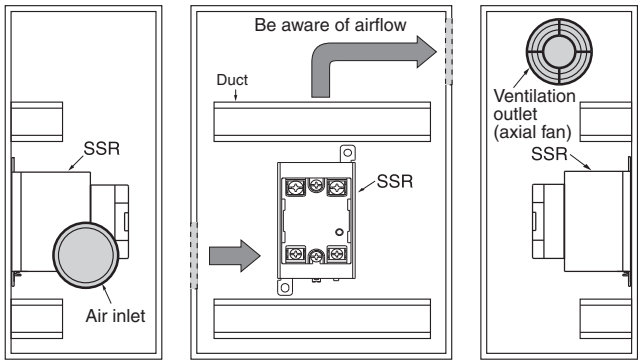


Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Use short ducts.

If the ducts cannot be shortened, place the SSR on a metal base so that it is not surrounded by the ducts.

Ventilation Outside the Control Panel



If the air inlet or air outlet has a filter, clean the filter regularly to prevent it from clogging to ensure an efficient flow of air.

Do not locate any objects around the air inlet or air outlet, otherwise the objects may obstruct the proper ventilation of the control panel.

A heat exchanger, if used, should be located in front of the SSRs to ensure the efficiency of the heat exchanger.

- Please reduce the ambient temperature of SSRs.
  The rated load cuρρεντ οφ αν ΣΣΡ ισ μεασυρεδ ατ αν αμβιεντ τεμπερατυρε οφ 40°C.
- An SSR uses a semiconductor in the output element. This causes the temperature inside the control panel to increase due to heating resulting from the passage of electrical current through the load. To restrict heating, attach a fan to the ventilation outlet or air inlet of the control panel to ventilate the panel. This will reduce the ambient temperature of the SSRs and thus increase reliability. (Generally, each 10°C reduction in temperature will double the expected life.)

(Reference)

Load current (A)	5 A	10 A	20 A	40 A	75 A	90 A
Required number of fans per SSR	0.08	0.16	0.31	0.62	1.2	1.44

Example: For 10 SSRs with load currents of 10 A,

0.16 x 10 = 1.6

Thus, 2 fans would be required.

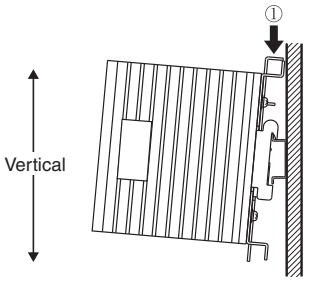
Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30°C

If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

High-capacity Heat Sink (Y92B-P250N)

DIN-track Mounting

- Assembled DIN Tracks are heavy. Mount the DIN Tracks securely. Be sure that the Heat Sink is securely locked to the DIN Track.
- Attach End Plates (PFP-M, order separately) to both ends of the Units on the DIN Track to hold them in place.
- To mount a Heat Sink to a DIN Track, press down at the point indicated by arrow 1 in the diagram and then press in the Heat Sink at the point indicated by arrow 2.



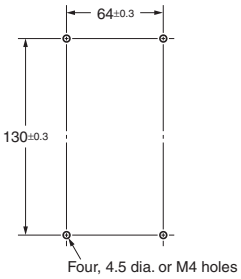
Applicable DIN Track

Mounting is possible on TE35-15Fe (IEC 60715) DIN tracks. DIN tracks from the following manufacturers can be used.

Manufacturer	Thickness: 1.5 mm	Thickness: 2.3 mm
Schneider	AM1-DE2000	---
WAGO	210-114 or 210-197	210-118
PHOENIX	N35/15	N35/15/15-2.3

Direct Mounting

- Prepare mounting holes as shown in the diagram. Tightening torque: 0.98 to 1.47 N·m

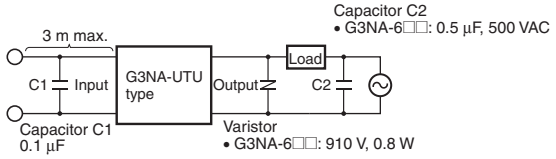


Operating Conditions

- Do not apply currents exceeding the rated current otherwise, the temperature of the G3NA may rise excessively.
- As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses and no-fuse breakers, on the power supply side.
- Do not apply overvoltages to the input circuit or output circuit. Failure or burning may result.
- Do not drop the G3NA or otherwise subject it to abnormal shock. Malfunction or failure may result.
- Keep the cooling system running continuously during the ON/OFF operation of the SSR. This is to allow residual heat to dissipate while the SSR is OFF.

Noise Terminal Voltage According to EN55011

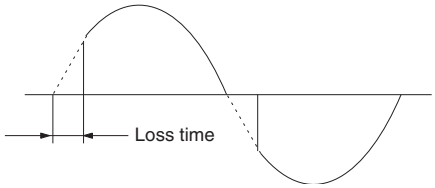
The G3NA-UTU complies with EN55011 standards when a capacitor is connected to the load power supply as shown in the following circuit diagram.



- Connect capacitor C1 to both sides of the input terminals for a G3NA with a DC input.
- Connect capacitor C2 to both sides of the load power supply output.
- Connect the varistor to both sides of the G3NA output terminals.
- Do not use an input line that is longer than 3 m.

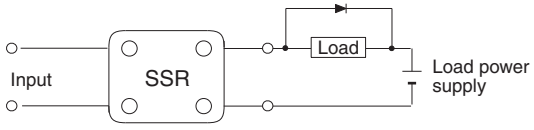
Loss Time

The loss time will increase when the G3NA is used at a low applied voltage or current. Be sure that this does not cause any problems.



Using DC Loads

For a DC or L load, a diode should be connected in parallel the load to absorb the counter electromotive force of the load.



■ Precautions on Operating and Storage Environments

1. Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3NA is for when there is no heat build-up. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3NA may exceed the rated value resulting in malfunction or burning.

When using the G3NA, design the system to allow heat dissipation sufficient to stay below the *Load Current vs. Ambient Temperature* characteristic curve. Note also that the ambient temperature of the G3NA may increase as a result of environmental conditions (e.g., climate or air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

2. Transportation

When transporting the G3NA, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not drop the G3NA or subject it to severe vibration or shock.
- Do not transport the G3NA if it is wet.
- Do not transport the G3NA under high temperatures or humidity.
- Do not transport the G3NA without packing it properly.

3. Vibration and Shock

Do not subject the G3NA to excessive vibration or shock. Otherwise the G3NA may malfunction and internal components may be deformed or damaged, resulting in failure of the G3NA to operate.

To prevent the G3NA from abnormal vibration, do not install the G3NA in locations or by means that will subject it to vibration from other devices, such as motors.

4. Solvents

Do not allow the G3NA or the resin portion of the Fan's thermostat to come in contact with solvents, such as thinners or gasoline. Doing so will dissolve the markings on the G3NA.

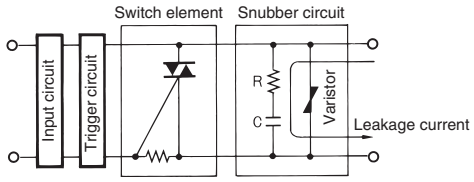
5. Oil

Do not allow the G3NA terminal cover to come in contact with oil. Doing so will cause the cover to crack and become cloudy.

■ Operation

1. Leakage Current

A leakage current flows through a snubber circuit in the G3NA even when there is no power input. Therefore, always turn OFF the power to the input or load and check that it is safe before replacing or wiring the G3NA.



2. Screw Tightening Torque

Tighten the G3NA terminal screws properly. If the screws are not tight, the G3NA will be damaged by heat generated when the power is ON. Perform wiring using the specified tightening torque.

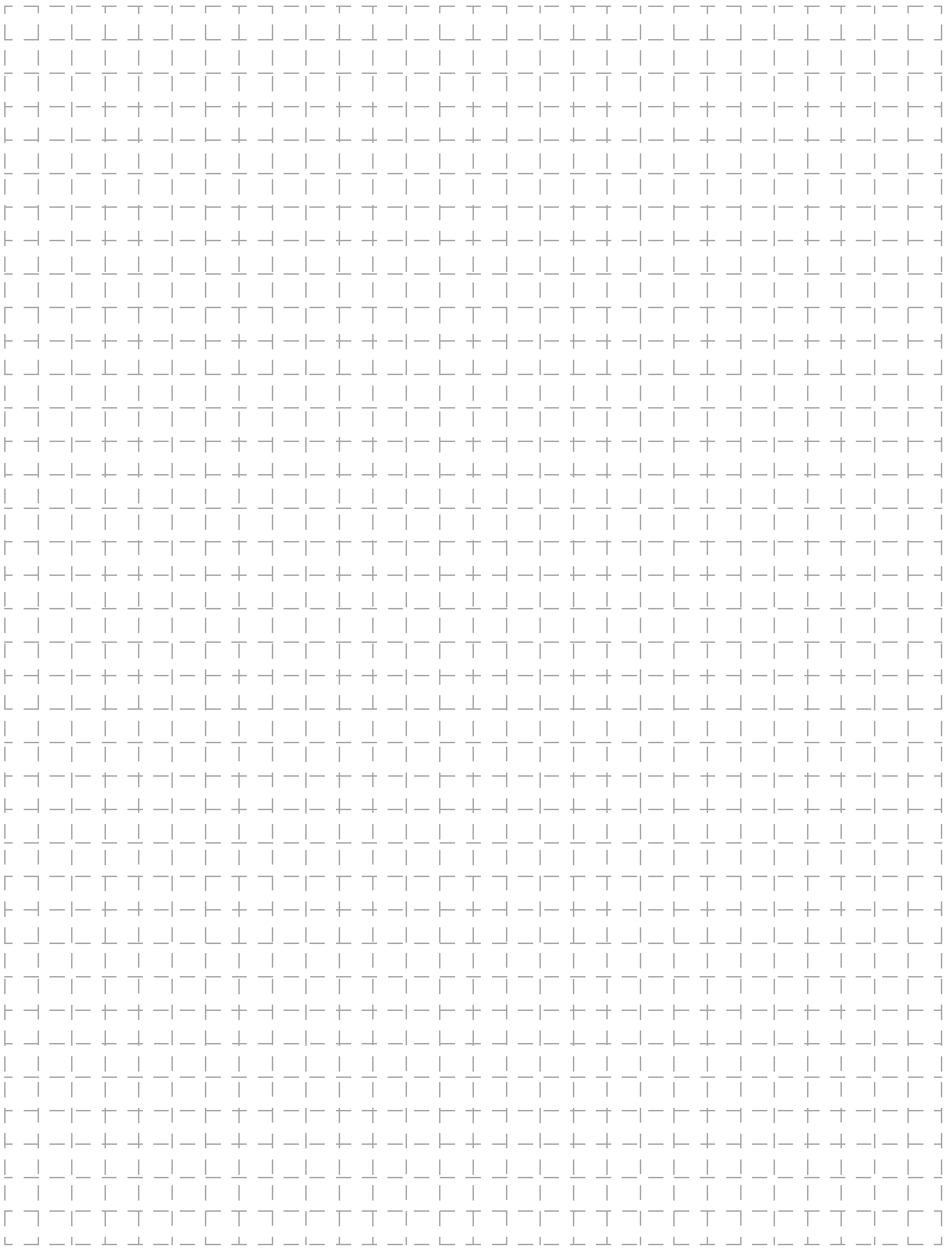
3. Handling Relays

Do not mount the G3NA when your hands are oily or dirty, e.g., with metal powder. These may cause G3NA failure.

4. Do Not Drop

Be careful not to drop a Relay or Heat Sink onto any part of your body while working. Injury may result. This is particularly true for the High-capacity Heat Sink (Y92B-P250N), which weighs 2.5 kg.

MEMO



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Environmental Responsibility

Omron's commitment is to offer products that are environmentally warranted (warranted to be free from any banned substances) to customers all over the world. In accordance with this policy, Omron has taken action to completely eliminate all hazardous substances from its control devices as well. To-date, all relays fully comply with the Restriction of Hazardous Substances (RoHS) Directive for their lead and cadmium free construction. Omron strives to be an industry forerunner in regulating the use of chemical substances and working toward the goal of eliminating all hazardous substances in Omron products.

Omron considers addressing environmental issues to be its corporate responsibility and is working to reduce its negative impact on the environment by establishing an environmental action plan that designates six areas of core activities and clarifies the targets of those activities.

- Eco-Management
- Eco-Products
- Eco-Factories/Laboratories/Offices
- Eco-Logistics
- Eco-Communication
- Eco-Mind

These constitute our efforts to become an environmentally advanced company that balances environmental preservation with economic development.



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