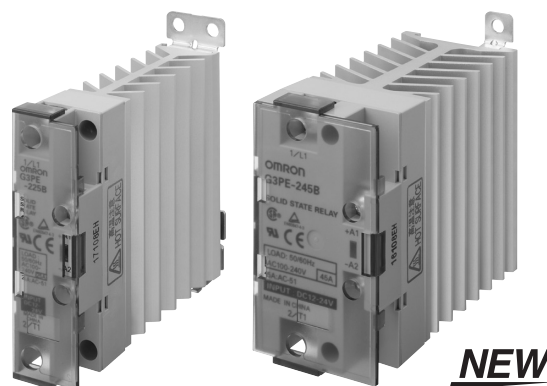


Single-phase Solid State Relays for Heaters G3PE

**Slim Profile Industrial SSR with Heatsink
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.
- 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)

Model	Item	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

Item	Model	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 ² t (reference value)		121A ² s	260A ² s	1,260A ² s	
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*

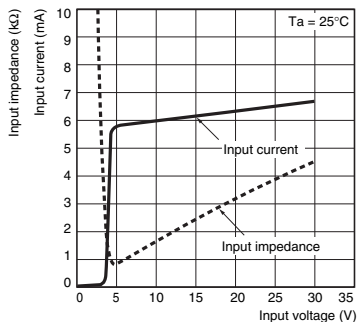
■ Characteristics

Item	Model	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 to 10 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	

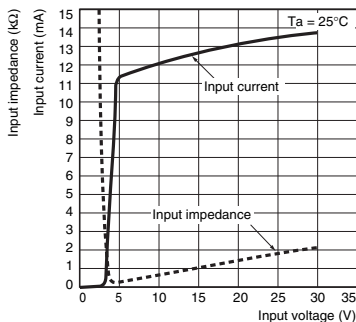
Engineering Data

Input Voltage vs. Input Impedance and Input Voltage vs. Input Current

G3PE-2□□B

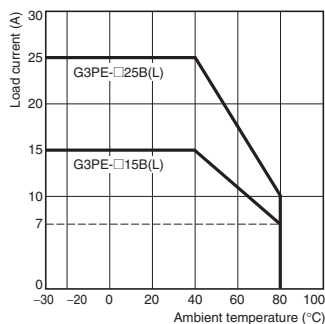


G3PE-2□□BL

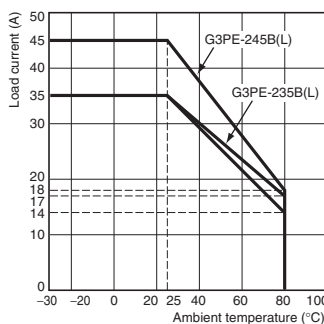


Load Current vs. Ambient Temperature

G3PE-215B(L), G3PE-225B(L)



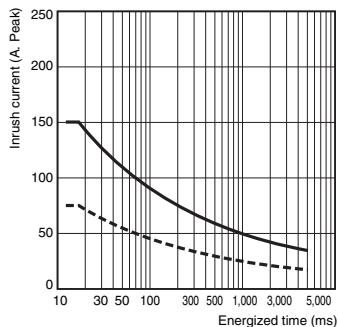
G3PE-235B(L), G3PE-245B(L)



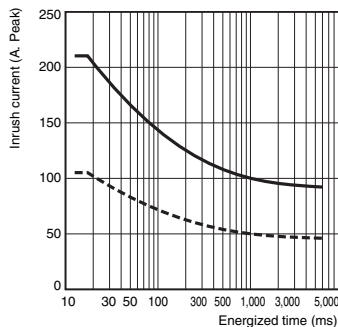
Inrush Current Resistivity: Non-repetitive

Make sure the inrush current stays below the dashed line curve if it occurs repetitively.

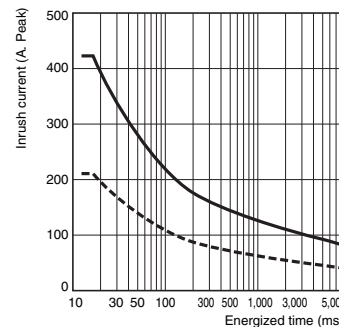
G3PE-215B(L)



G3PE-225B(L)

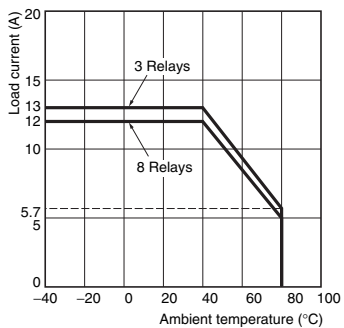


G3PE-235B(L), G3PE-245B(L)

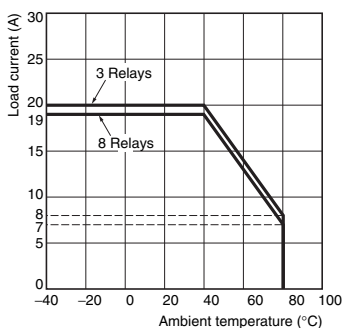


Close Mounting (3 or 8 SSRs)

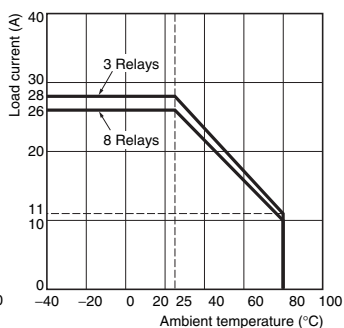
G3PE-215B(L)



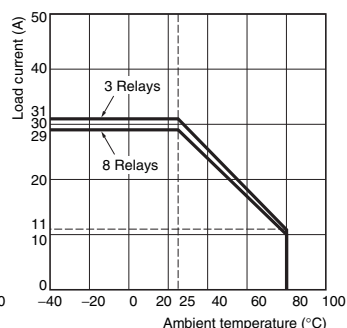
G3PE-225B(L)



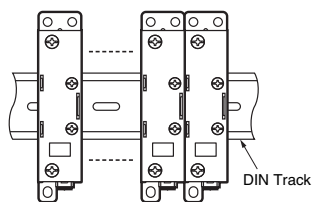
G3PE-235B(L)



G3PE-245B(L)



Close Mounting Example



■ Approvals

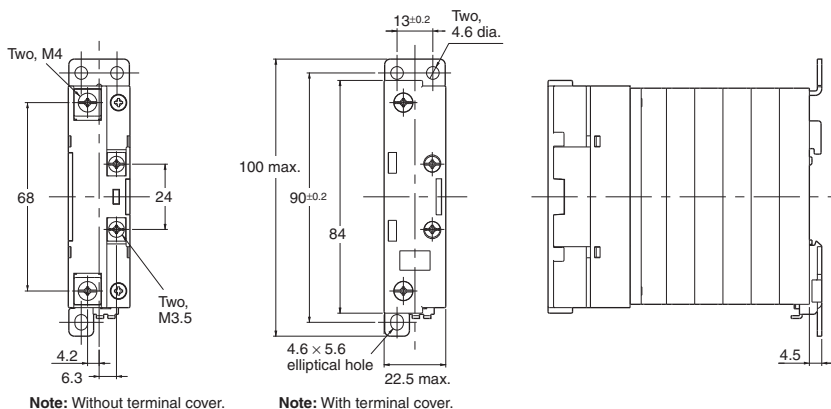
UL Recognized, CSA Certified and EN60947-4-3 (TÜV) approved

Dimensions

Note: All units are in millimeters unless otherwise indicated.

Solid State Relays

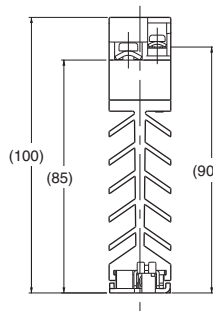
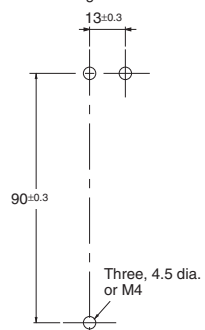
G3PE-215B(L)
G3PE-225B(L)



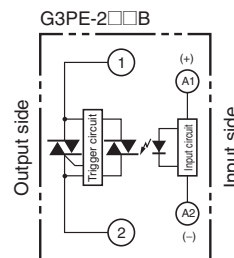
Note: Without terminal cover.

Note: With terminal cover.

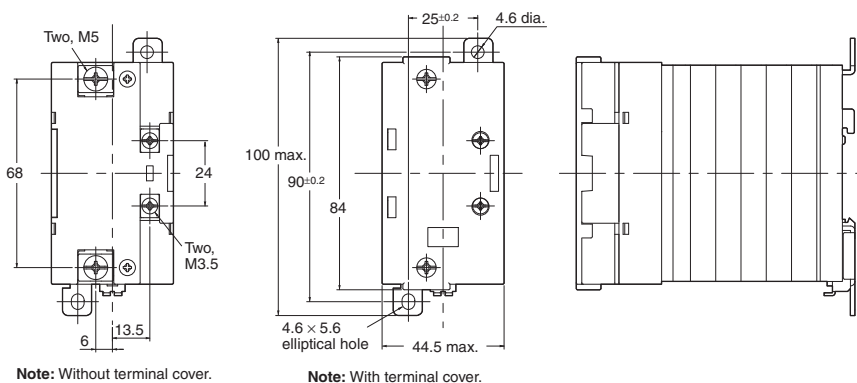
Mounting Holes



Terminal Arrangement/Internal Circuit Diagram



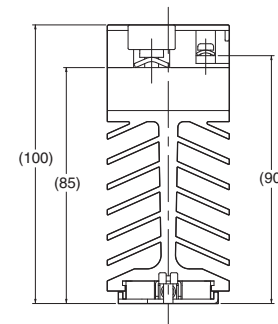
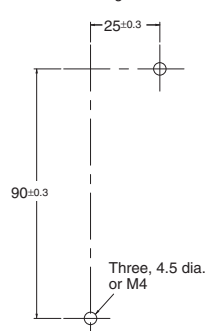
G3PE-235B(L)
G3PE-245B(L)



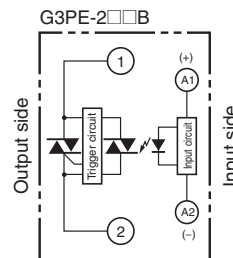
Note: Without terminal cover.

Note: With terminal cover.

Mounting Holes



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

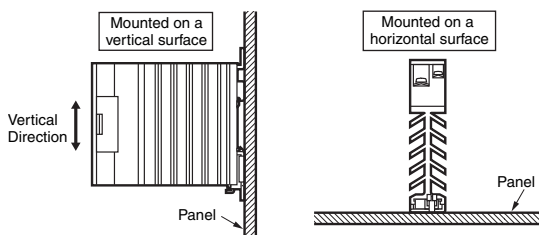
- Do not supply overvoltage to the input circuits or output circuits. Doing so may result in failure or burning.
- Do not use or store the G3PE in the following conditions. Doing so may result in deterioration of performance.
 - Locations subject to static electricity or noise
 - Locations subject to 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

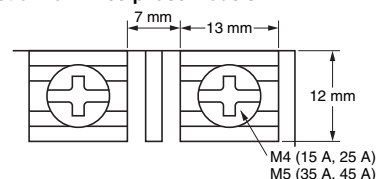


Note: Make sure that the load current is 50% of the rated load current when the G3PE is mounted horizontally. For details on close mounting, refer to the related information under performance characteristics. Mount the G3PE in a direction so that the markings read naturally.

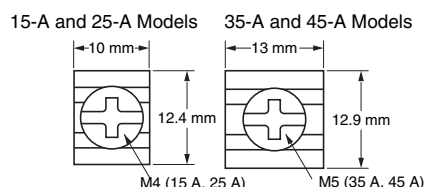
Wiring

- When using crimp terminals, refer to the terminal clearances shown below.

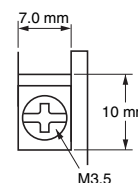
Output Terminal Section for Three-phase Models



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.

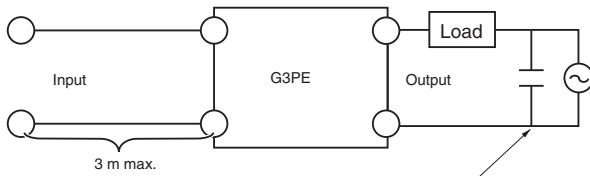
Recommended Fuse Capacity

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.



Recommended Capacitor (Film Capacitor)
 G3PE-2□□B Series: 1 μ F, 250 VAC
 G3PE-5□□B Series: 0.5 μ F, 500 VAC

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 μ s
 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

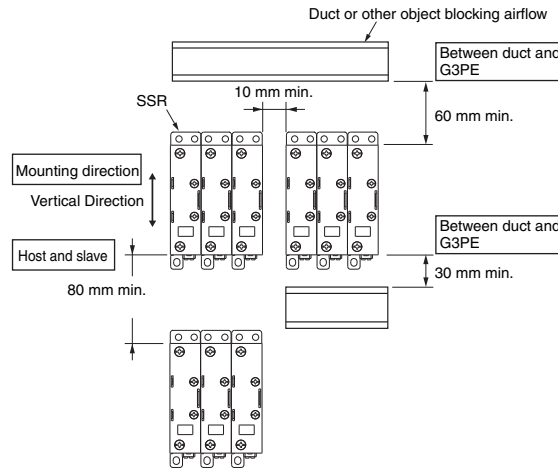
Mounting to Control Panel

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.

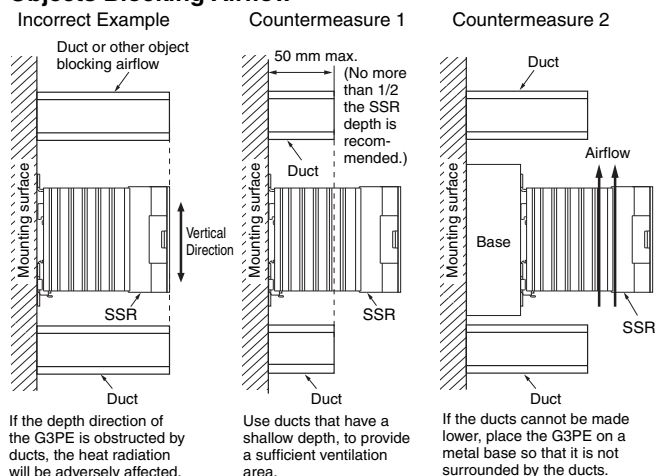
If the panel is airtight, heat from the SSR will build up inside, which may reduce the current carry ability of the SSR or adversely affect other electrical devices. Be sure to install ventilation holes on the top and bottom of the panel.

SSR Mounting Pitch (Panel Mounting)

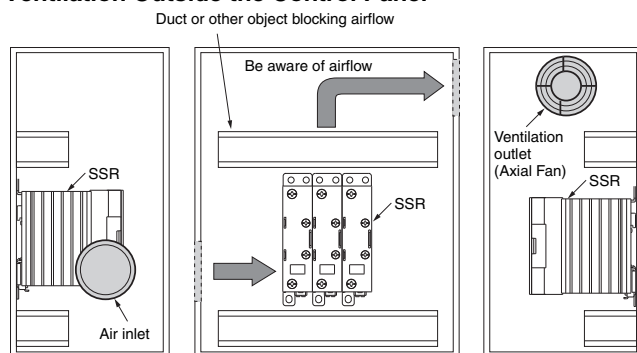
- Single-phase Model



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 m³/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

A large grid of dashed lines for taking notes, consisting of 20 columns and 30 rows of small squares.

Omron Electronic Components, LLC

Terms and Conditions of Sales

I. GENERAL

- Definitions:** The words used herein are defined as follows.
 - Terms:** These terms and conditions
 - Seller:** Omron Electronic Components LLC and its subsidiaries
 - Buyer:** The buyer of Products, including any end user in section III through VI
 - Products:** Products and/or services of Seller
 - Including:** Including without limitation
- 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.
- Distributor:** Any distributor shall inform its customer of the contents after and including section III of these Terms.

II. SALES

- 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.
- 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.
- 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.
- Orders:** Seller will accept no order less than 200 U.S. dollars net billing.
- 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.
- Governmental Approvals:** Buyer shall be responsible for all costs involved in obtaining any government approvals regarding the importation or sale of the Products.
- 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.
- 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.
- Cancellation; Etc:** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
- 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.
- Shipping; Delivery:** Unless otherwise expressly agreed in writing by Seller:
 - All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Products shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Products until the full purchase price is paid by Buyer;
 - Delivery and shipping dates are estimates only; and
 - Seller will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
- Claims:** Any claim by Buyer against Seller for shortage or damage to the Products occurring before delivery to the carrier or any claim related to pricing or other charges must be presented in detail in writing to Seller within 30 days of receipt of shipment.

III. PRECAUTIONS

- Suitability:** IT IS THE BUYER'S SOLE RESPONSIBILITY 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.
- 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:
 - Outdoor use, use involving potential chemical contamination or electrical interference.

- Use in consumer Products or any use in significant quantities.
 - Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - Systems, machines, and equipment that could present a risk to life or property.
- Prohibited Use:** NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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IV. WARRANTY AND LIMITATION

- 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.
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 - (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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