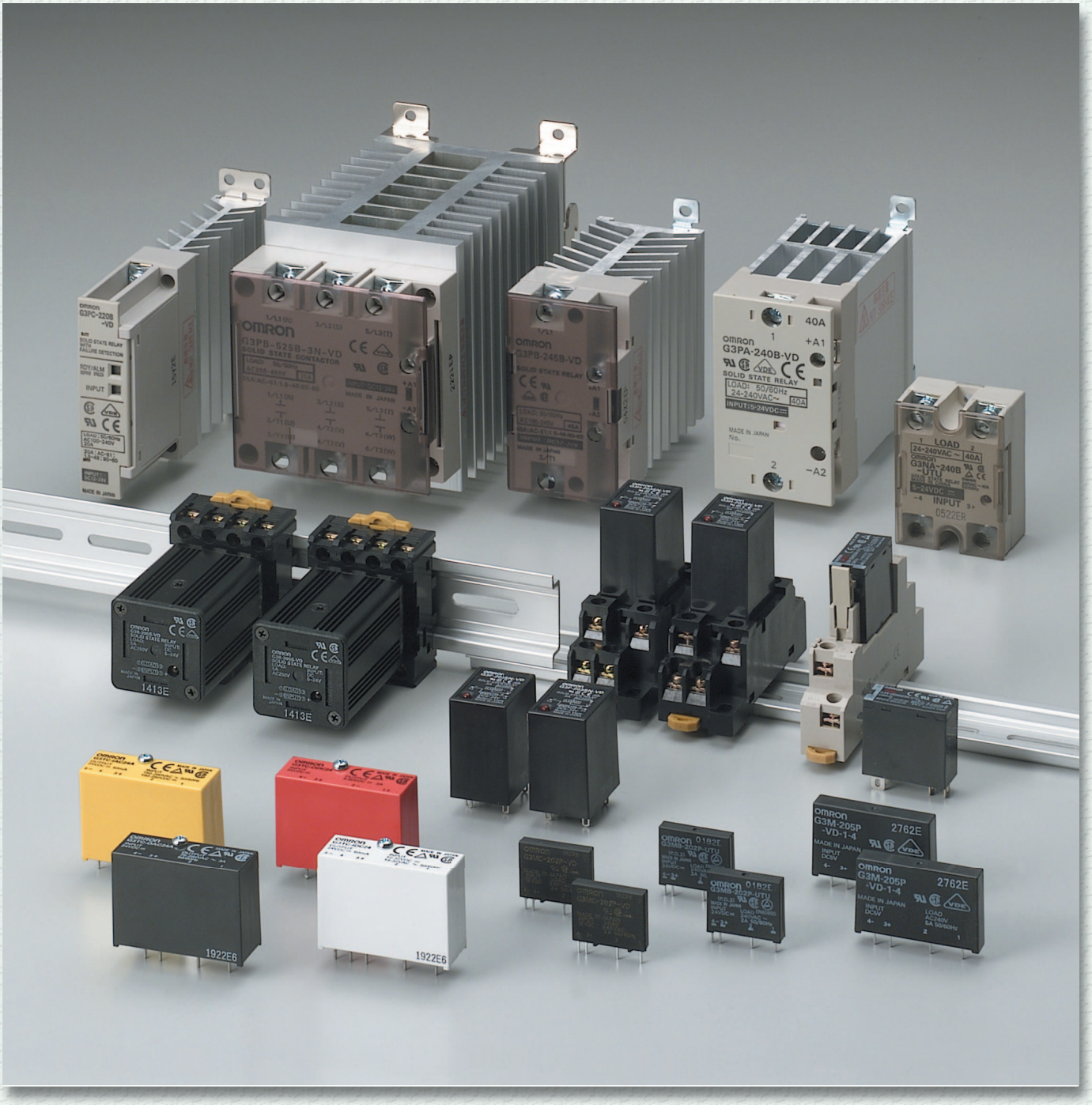
OMRON

Cat. No. X030-E1-09

Solid State Relays



Product Information

G3PC

Defects failures in SSRs used for heater temperature control and simultaneously outputs alarm signals.

1 You want to include safety circuits to protect the system from unlikely failures.

2 You want to install a Fault Detection Unit, but there isn't enough space in the control panel.

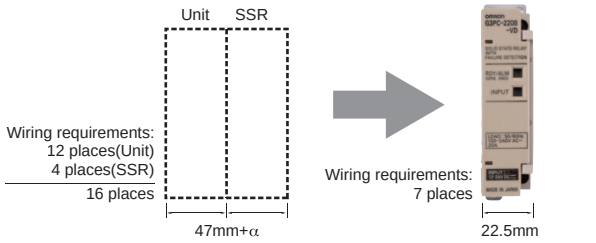
3 You want to improve maintenance by locating faults more quickly.

Solution

The G3PC detects faults automatically and outputs alarm signals. It provides the answer to all of these problems.

Enables downsizing of equipment (control panel, etc.) and wiring reductions

With a thickness of only 22.5 mm, the G3PC contributes to equipment downsizing and promotes more efficient use of space by allowing wiring reductions.



Compatible with a wide range of peripheral devices

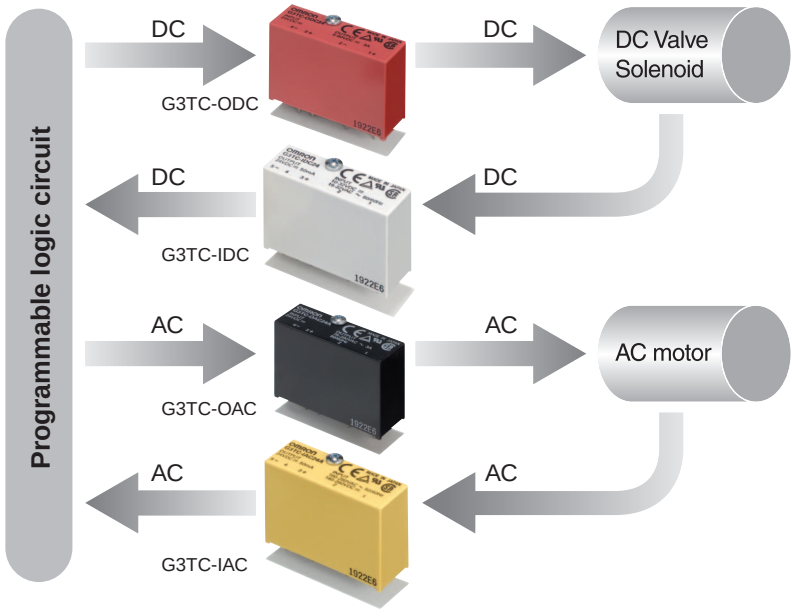
The G3PC's alarm output is compatible with either NPN or PNP input circuit configurations of external peripheral devices.

(The alarm output circuit has an independent NPN open collector configuration.)

G3TC

OMRON produces I/O Modules for pin array socket type with SSR.
I/O Modules provide four functions: AC outputs, AC inputs, DC outputs, and DC inputs. All Modules are isolated at 4,000 VAC internally for reliability and have the CE mark.

Arrangement for I/O Connections



Warranty and Application Considerations

Read and Understand this Catalog
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

■ Warranty and Limitations of Liability

Warranty and Limitations of Liability
WARRANTY OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.
LIMITATIONS OF LIABILITY OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted. IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

■ Application Considerations

Application Considerations

BASIC CONSIDERATIONS

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 values. Use the SSRs only in systems that are designed with redundancies, flame protection, countermeasures to prevent operation errors, and other countermeasures to prevent accidents involving human life or fires.

SELECTION OF PRODUCTS

The applications, illustrations, and charts shown in this catalog are intended solely for purposes of example. Because there are many variables and requirements associated with any particular application, the final design can only be made in view of the specific parameters of each application. OMRON does not assume responsibility or liability for actual use based upon the examples shown in this catalog. Please consult one of our sales offices if you have any doubts or questions concerning your application.

In particular, the following criteria must always be considered in the selection, application, and installation of control equipment.

- Type of power supply
- Voltage rating (max. and min.)
- Current rating (max. and min.)
- Power rating (max. and min.)
- Suitability of frequency of operating controls
- Effects of component failure (mechanical and/or electrical)
- Ambient temperature of SSR (Be aware that SSRs generate heat.)
- Mounted state
- Inrush current (The inrush current varies with the type of load. For example, resistive loads have no inrush current, motor loads have an inrush current of 6 times the steady-state current, and lamp loads have an inrush current of 10 times the steady-state current.) Read the *List of Recommended Loads* (page 19) in this catalog.
- Safety standards

Please read the *Technical and Safety Information* section (page 6) of this catalog.

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products.

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear 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.

Please know and observe all prohibitions of use applicable to the products.

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

■ Disclaimers

Disclaimers
PERFORMANCE DATA Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*
CHANGE IN SPECIFICATIONS Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.
DIMENSIONS AND WEIGHTS Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.
ERRORS AND OMISSIONS The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

■ Copyright and Copy Permission

Copyright and Copy Permission
COPYRIGHT AND COPY PERMISSION This catalog shall not be copied for sales or promotions without permission. This catalog is protected by copyright and is intended solely for use in conjunction with the products. Please notify us before copying or reproducing this catalog in any manner, for any other purpose. If copying or transmitting this catalog to another, please copy or transmit it in its entirety.

Safety Precautions

■ Meaning of Signal Words

The following signal words are used in this catalog.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

■ Meaning of Alert Symbols

The following alert symbols are used in this catalog.

	Indicates the possibility of electric shock under specific conditions.
	Indicates the possibility of injury by high temperature under specific conditions.
	Indicates the possibility of fire under specific conditions.
	Indicates the possibility of explosion under specific conditions.

■ Alert Statements in this Catalog

The following alert statements apply to the products in this catalog. Each alert statement also appears at the locations needed in this catalog to attract your attention.

Please read the *Technical and Safety Information* section (page 6) of this catalog for other operation precautions.

⚠ WARNING	
SSR malfunction or fire damage may occasionally occur. Do not apply excessive voltage or current to the SSR input or output circuits.	
Heat generated by a terminal error may occasionally result in fire damage. Do not operate if the screws on the output terminal are loose.	
Heat generated from an SSR error may occasionally cause the output element to short, or cause fire damage. Do not obstruct the airflow to the SSR or heat sink.	
If a material with high thermal resistance, such as wood, is used, heat generated by the SSR may occasionally cause fire or burning. 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.	
SSRs may occasionally explode. Do not apply a short-circuit current to the load side of an SSR.	

⚠ CAUTION	
Touching the charged section is likely to cause electric shock. Do not touch the SSR terminal section (the charged section) when the power supply is ON. For SSRs with terminal covers, be sure to attach the cover before use.	
The SSR and heat sink will be hot and are likely to cause burns. 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 internal snubber circuit is charged and will cause electric shock. Do not touch the SSR load terminal immediately after the power is turned OFF.	
Electric shock is likely to result. Be sure to conduct wiring with the power supply turned OFF.	

Technical and Safety Information

Note: Refer to *Solid-state Relays USER'S GUIDE* (Catalog No. Y108-E1-1) in order to select the best SSRs according to the purposes and applications.

■ Operating and Storage Environments

1. Operating Ambient 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).

2. Operating 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.

- 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.

3. 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.

4. Transportation

When transporting the SSR, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

- Do not drop the SSR or subject it to severe vibration or shock.
- Do not transport the product if it is wet.

5. Vibration and Shock

Do not subject the SSR to excessive vibration or shock. Otherwise the SSR may malfunction and internal components may be damaged.

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.

6. 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.

7. 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.

■ Precautions for Correct Use

Note: Observe the following precautions to prevent failure to operate, malfunction, or undesirable effects on product performance. For precautionary information on individual products, refer to *Precautions for Correct Use* in the relevant section.

Before Actual Operation

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 88 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.

Operating Conditions

Do not apply currents exceeding the rated current otherwise, the temperature of the SSR may rise excessively.

Be sure to prevent the ambient temperature from rising due to the heat radiation of the SSR. If the SSR is mounted inside a panel, install a fan so that the interior of the panel is fully ventilated.

Do not use the SSR if heat dissipation fins have been bent as a result of, for example, dropping the SSR. If used in this state, the SSR may be damaged due to the decreased heat dissipation capacity.

Only use the SSR with loads that are within the rated values. Using the SSR 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.

Keep wiring separate from high-voltage power lines and use wires of an appropriate length, otherwise malfunction and damage may result due to induction.

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.

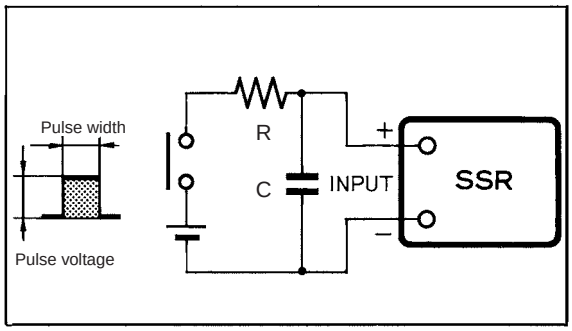
Input Circuit

Input Noise

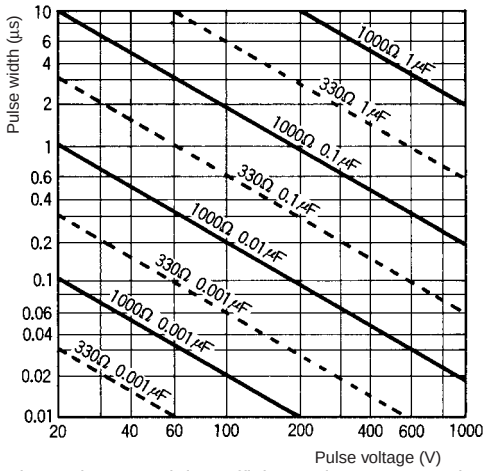
SSRs need only a small amount of power to operate. This is why the input terminals must shut out electrical noise as much as possible. Noise applied to the input terminals may result in malfunction. The following describes measures to be taken against pulse noise and inductive noise.

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.



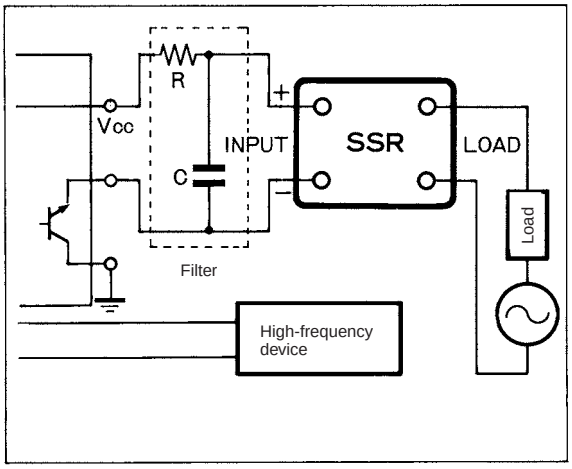
Note: For low-voltage models, sufficient voltage may not be applied to the SSR because of the relationship between C, R, and the internal impedance. When deciding on a value for R, check the input impedance for the SSR.

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.

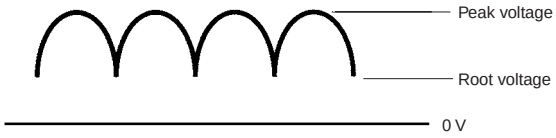


Note: R: 20 to 100 Ω
C: 0.01 to 1 µF

Input Conditions

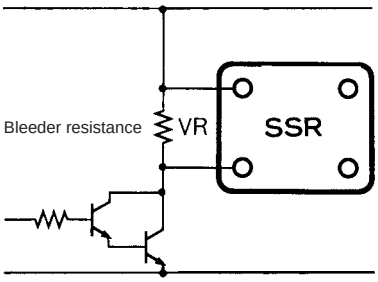
Input Voltage Ripples

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 must release voltage may be insufficient due to leakage current while power is OFF. To counteract this, connect bleeder resistance as shown in the diagram below and set the bleeder resistance so that VR is 0.5 V or less.



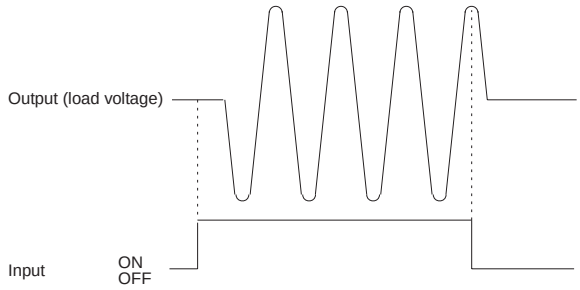
ON/OFF Frequency

The ON/OFF frequency should be set to 10 Hz maximum for AC load switching and 100 Hz maximum for DC load switching. If switching occurs at frequencies exceeding these values, the SSR output will not be able to follow-up.

Output Circuit

Zero Cross Function

An SSR with a zero cross function operates when the AC load voltage approaches the zero point or its vicinity, and releases when the current reaches the zero point. An SSR with a zero cross function reduces clicking noises that may be generated when the load is turned ON.

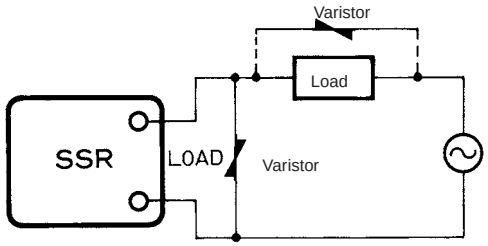


AC Switching SSR Output Noise Surges

If there is a large voltage surge in the AC current 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 overvoltage damage to the SSR.

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.

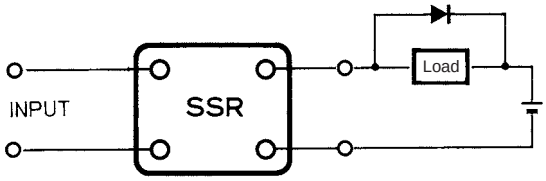


Select an element which meets the conditions in the following table as the surge absorbing element.

Voltage	Varistor voltage	Surge resistance
100 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 Switching SSR Output Noise Surges

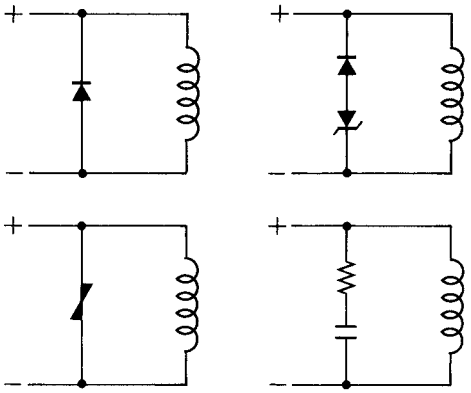
When an L load, such as a solenoid or electromagnetic valve, is connected, connect a diode that prevents counter-electromotive force. If the counter-electromotive force exceeds the withstand voltage of the SSR output element, it could result in damage to the SSR output element. To prevent this, insert 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.

Absorption Element Example

Absorption element				
	Diode	Diode + Zener diode	Varistor	CR
Effective-ness	Most effective	Most effective	Somewhat effective	Ineffective



(Reference)

1. Selecting a Diode
Withstand voltage = $V_{RM} \geq$ Power supply voltage $\times$ 2
Forward current = $I_F \geq$ load current

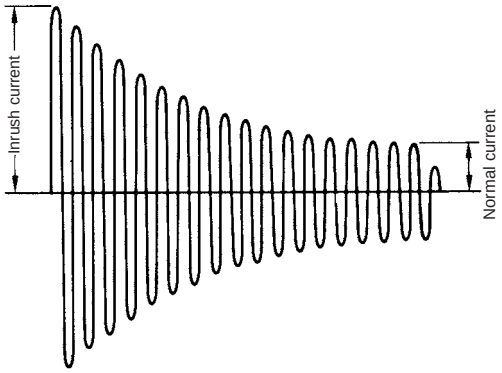
2. Selecting a Zener Diode
Zener voltage =
Vz < SSR withstand voltage – (Power supply voltage + 2 V)
Zener surge power =
P_{rsm} > Vz $\times$ Load current $\times$ Safety factor (2 to 3)

Note: When the Zener voltage is increased (Vz), the Zener diode capacity (P_{RSM}) is also increased.

Selecting an SSR for Different Loads

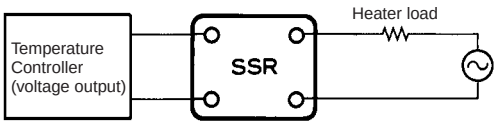
The following provides examples of the inrush currents for different loads.

AC Load and Inrush Current

Load	Solenoid	Incan-descent lamp	Motor	Relay	Capacitor	Resis-tive 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
Wave-form						

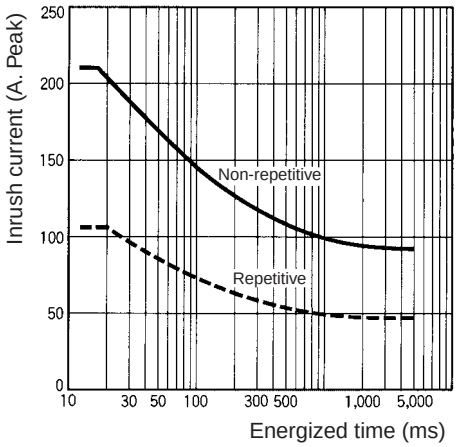
Heater Load (Resistive Load)

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.



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 inrush current resistance 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 inrush current resistance is applied, the output element of the SSR may be damaged.



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 inrush current resistance 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.

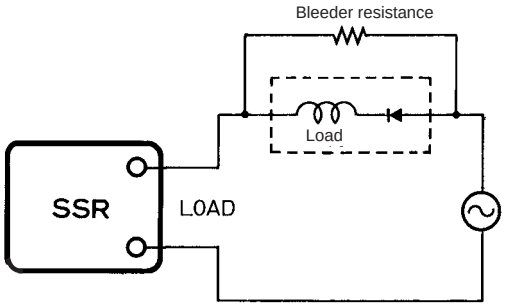
Transformer Load

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 inrush current resistance of the SSR.

Half-wave Rectifying 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.

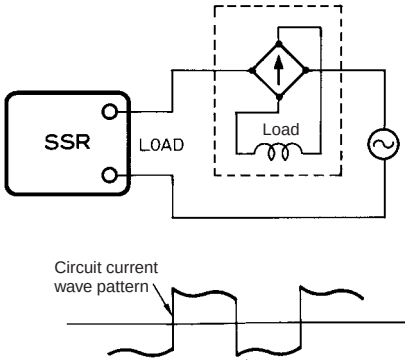
(a) Connect a bleeder resistance with approximately 20% of the SSR load current.



(b) Use SSRs without the zero cross function.

Full-wave Rectified Loads (Consult your OMRON representative for model numbers.)

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

Small-capacity Loads

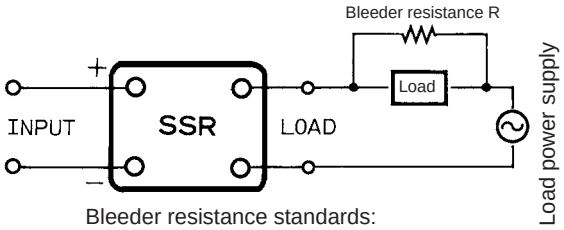
Even when there is no input signal to the SSR, there is a small leakage current (I_L) from the SSR output (LOAD). If this leakage current is larger than the load release current, the SSR may fail to reset.

Connect a bleeder resistance R in parallel to increase the SSR switching current.

Load (e.g., relays) release voltage
Load (e.g., relays) release current

$$R < \frac{E}{I_L - I}$$

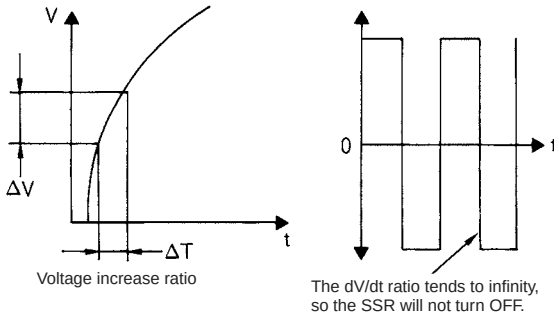
E: Load (e.g., relays) reset voltage
I: Load (e.g., relays) reset current



Bleeder resistance standards:
100-VAC power supply, 5 to 10 kW, 3 W
200-VAC power supply, 5 to 10 kW, 15 W

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

Capacitive Load

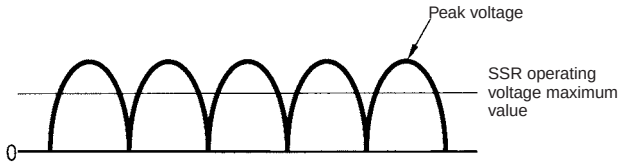
The supply voltage plus the charge voltage of the capacitor is applied to both ends of the SSR when it is OFF. Therefore, use an SSR model with an input voltage rating twice the size of the supply voltage.

Limit the charge current of the capacitor to less than half the peak inrush current value allowed for 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

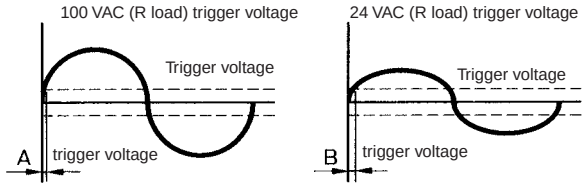
The operating frequency range for an AC load power supply is 47 to 63 Hz.

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.

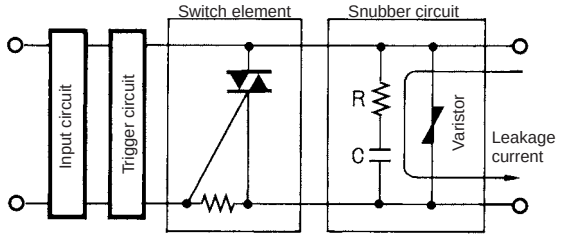
If the load voltage falls below the trigger voltage, the SSR will not turn ON, so be sure to set the load voltage to 24 VAC minimum. (Except for the G3PA-VD and G3NA-2□□B.)



Operation

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

Screw size	Recommended tightening torque
M3.5	0.78 to 1.18 N·m
M4	0.98 to 1.37 N·m
M5	1.57 to 2.35 N·m
M6	3.92 to 4.9 N·m
M8	8.82 to 9.8 N·m

SSR Mounting Panel Quality

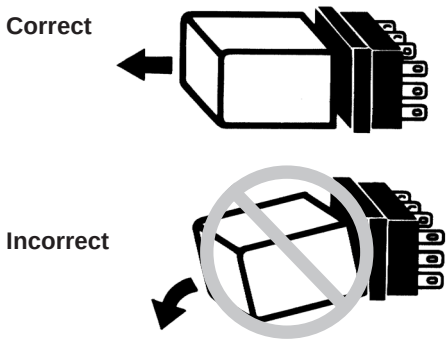
If G3NA or G3NE SSRs are to be mounted directly onto the control panel, without the use of a heat sink, be sure to use a panel material with low thermal resistance, such as aluminum or steel. Do not mount the SSR on a panel with high thermal resistance, such as a panel coated with paint. Doing so will 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 a 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 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 at an angle from the diagonal line, terminals of the SSR may bend and the SSR may not be properly inserted in the Socket.



Tab Terminal Soldering Precautions

Do not solder the lead wires to the tab terminals. Otherwise the SSR components will be damaged.

Cutting Terminals

Do not cut the terminals using an auto-cutter. Cutting the terminals 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

1. SSRs must be soldered at 260°C within five seconds. For models, however, that conform to separate conditions, perform soldering according to the specified requirements.
2. Use a rosin-based non-corrosive flux that is compatible with the material of the SSR.

Ultrasonic Cleaning

Do not perform ultrasonic cleaning. Performing ultrasonic cleaning after the SSR base has been installed will cause ultrasonic waves to resonate throughout the SSR internal structure, thereby damaging the internal components.

Safety Concept

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.

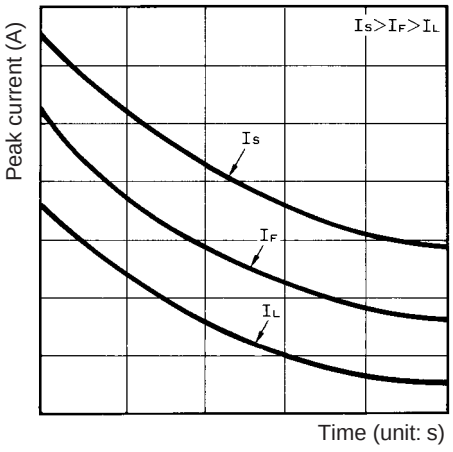
Therefore, to provide a safety feature for a control circuit using an SSR, design a circuit in which a contactor or circuit breaker on the load power supply side will turn OFF the load when the SSR causes an error. Do not design a circuit that turns OFF the load power supply only with the SSR. For example, 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	

Short-circuit 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.

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.



Quick-break Fuse Selection

The basic purpose of quick-break fuses is to provide short-circuit protection for loads with an I^2t value (time integral of the current squared) less than the I^2t value for the SSR.

1. Rated voltage: The fuse's rated voltage must be higher than the circuit's peak voltage.
2. Rated current: Allow leeway in the fuse's rated current so that the fuse does not operate for inrush current in the load. It is recommended that the rated current should satisfy the following:

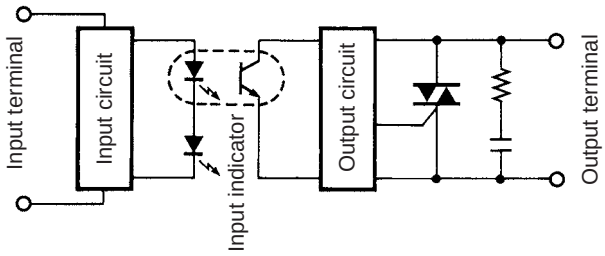
   Load's continuous carry current < 80% of the fuse's rated current
3. Total breaking I^2t value: Select a fuse with a total breaking I^2t value less than that of the SSR.
4. Melting characteristic curve: The fuse's melting characteristic curve must be below the SSR's surge withstand curve.

Overcurrent Protection

Provide an appropriate non-fuse breaker to each machine for the overcurrent protection of the machine.

Operation Indicator

The operation indicator turns ON when current flows through the input circuit. It does not indicate that the output element is ON.



Heat Sink Conditions

Heat Sink Selection

SSR models with no heat sinks incorporated (e.g., 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. For example, the following combinations are ideal.

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 (e.g., 1.5°c/W), 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.

Heat Sink Mounting

Heat is mainly dissipated from heat sinks by convection. If air cannot flow freely around the heat sink, heat will not be dissipated properly and the SSR may malfunction. It is recommended that the heat sink is mounted with the fins vertical to allow air to flow freely across the surface of the heat sink. If there is a duct above or below the SSR, ensure that it does not cover the SSR's heat sink. Horizontal mounting and inverted mounting are not recommended. The airflow is not as good and SSR derating is necessary.

SSR Mounting

The SSR must be mounted on the surface of a heat sink with no oxidation or dirt. Before mounting, ensure that air does not flow between the SSR's mounting surface and the heat sink by applying heat-conductive silicone grease to the SSR's mounting surface (whole surface). The thickness of the silicone grease, how uniformly it is applied, and how securely the SSR is mounted to the heat sink are all factors that influence the heat conductivity.

It is recommended that a thin (approx. 0.5-mm) layer of Toshiba Silicone's YG6111 or YG6240, Sinetsu Silicone's G746, or a similar product is applied before mounting. Mount the SSR by tightening the mounting screws on both sides to the applicable torque (0.78 N·m for M3 screws and 0.98 N·m for M4 screws). If the layer of silicone grease is too thick, the heat conductivity will be reduced.

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.

Panel-mounting SSRs

If SSRs are mounted inside an enclosed panel, the radiated heat of the SSR will build up inside, thus not only reducing the carry-current capacity of the SSRs, but also adversely affecting other electronic devices mounted inside. Open some ventilation holes on the upper and lower sides of the control panel before use. Refer to the relevant datasheet for details.

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

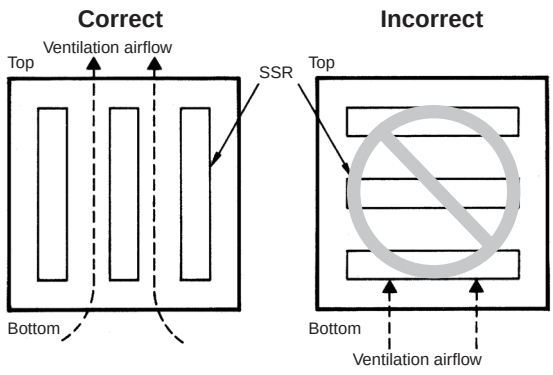
Refer to the following table to select the terminal hole and land diameters based on the SSR mounting dimensions. The land diameter may be smaller if the land is processed with through-hole plating.

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.

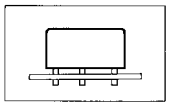
Provide adequate ventilation to the SSRs as shown in the following diagram.



Mounting SSR to PCB

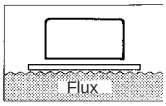
Read the precautions for each model and fully familiarize yourself with the following information when mounting the SSR to the PCB.

Step 1
SSR mounting



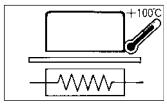
1. Do not bend the terminals to make the SSR self-standing, otherwise the full performance of the SSR may not be possible.
2. Process the PCB properly according to the mounting dimensions.

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

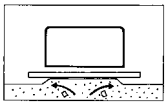


1. Be sure to preheat the SSR to allow better soldering.
2. Preheat the SSR under the following conditions.

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

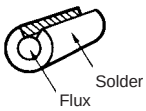


Automatic Soldering

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.

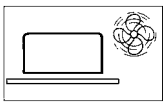
Manual Soldering

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



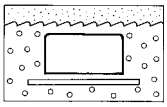
2. As shown in the above illustration, solder with a groove for preventing flux dispersion.

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

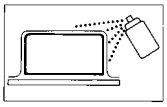
Detergent		Applicability
Chlorine detergent	Perochine Chlorosolder Trichloroethylene	OK
Aqueous detergent	Indusco Holys Pure water (pure hot water)	OK
Alcohol	IPA Ethanol	OK
Others	Paint thinner Gasoline	NG

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

Reliability

SSR Endurance

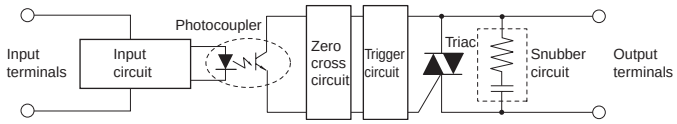
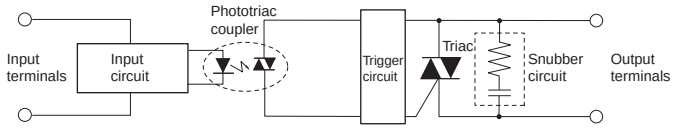
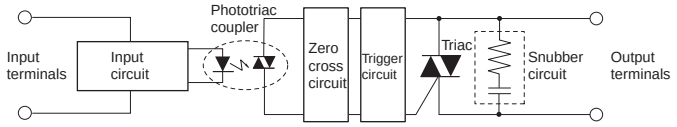
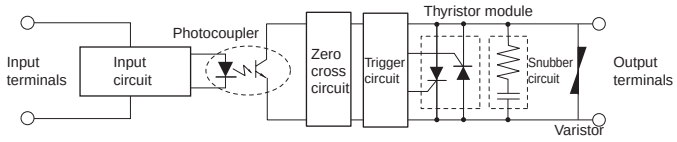
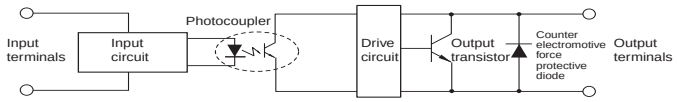
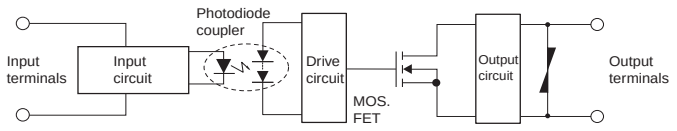
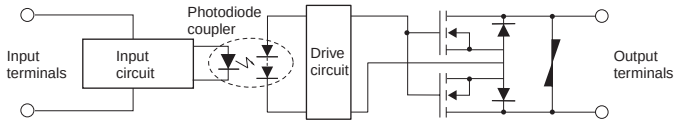
The SSR is not subject to mechanical wear. Therefore, the endurance of the SSR depends on the rate of internal component malfunction. For example, the rate for the G3M-202P is 321 Fit (1 Fit = 10^{-9} = λ (malfunctions/operation)). The MTTF calculated from this value is as follows:

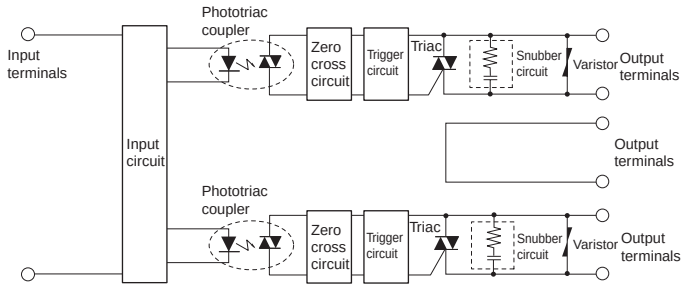
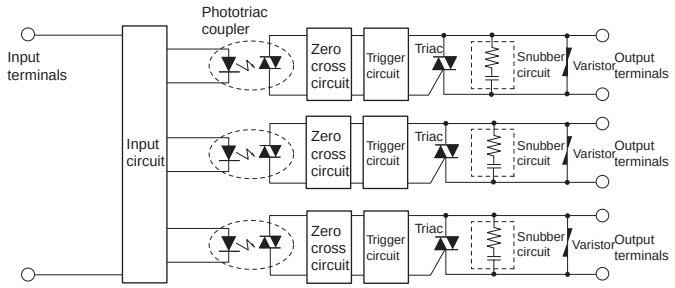
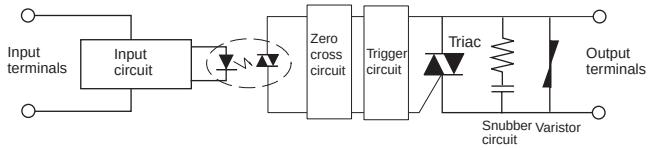
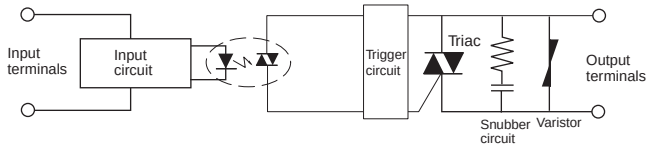
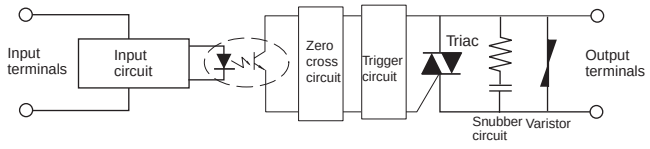
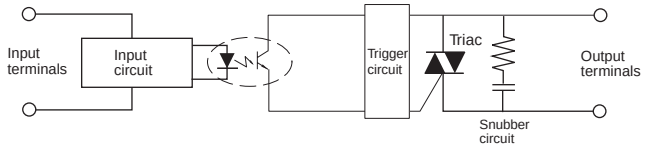
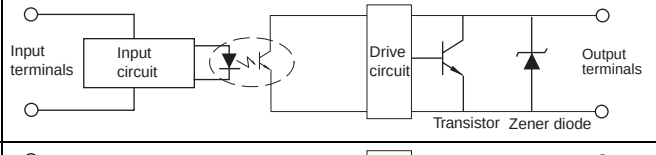
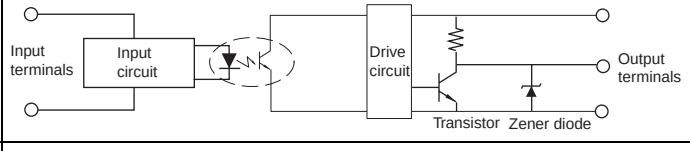
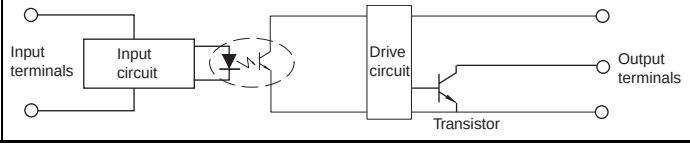
MTTF = $321/\lambda_{60} = 3.12 \times 10^6$ (operations)

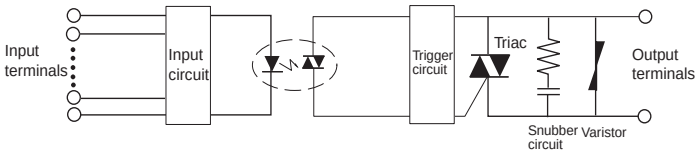
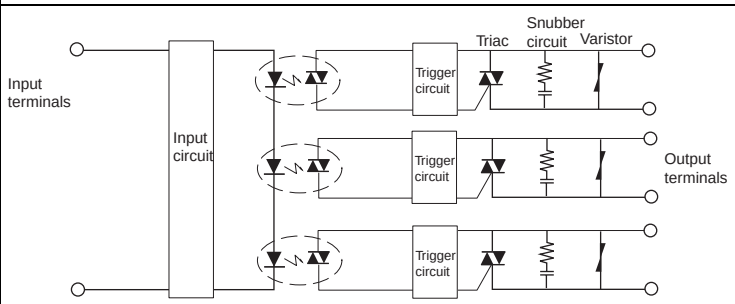
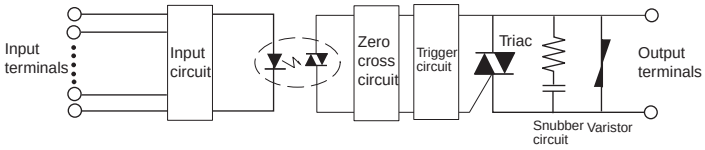
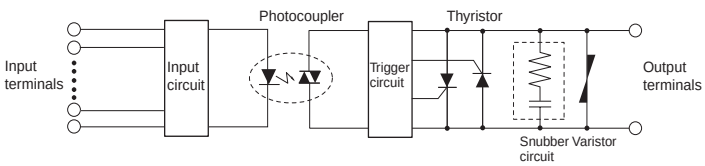
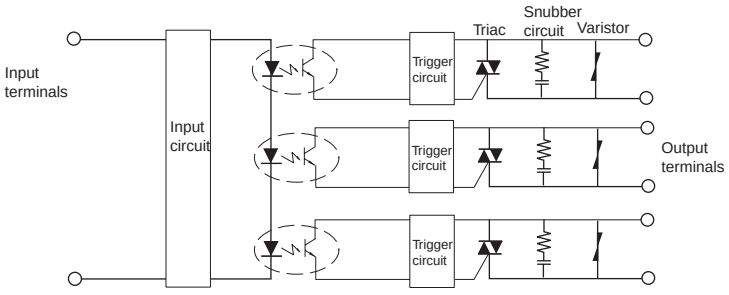
The effects of heat on the solder also need to be considered in estimating the total endurance of the SSR. The solder deteriorates due to heat-stress from a number of causes. OMRON estimates that the SSR begins to malfunction due to solder deterioration approximately 10 years after it is first installed. The actual life will depend on the temperature and other operating conditions.

■ Additional Information

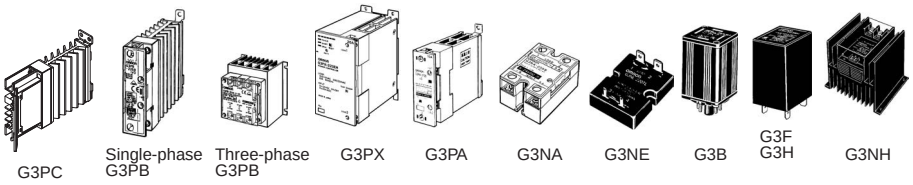
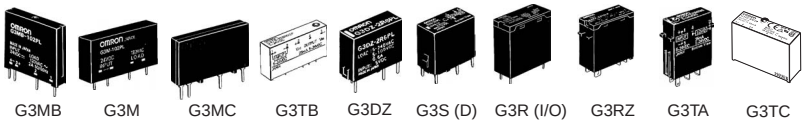
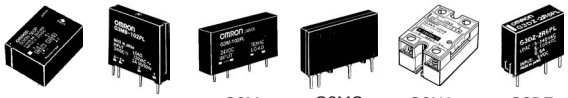
Circuit Configuration

Load specifications	Zero cross function	Isolation	Circuit configuration	Model	No
AC load	Yes	Photo-coupler		G3CN, G3F, G3B, G3H, G3TB-OA□PZ	(1)
	No	Phototriac		G3TA-OA□L, G3F-□SL, G3H-□SL, G3R-□PL, G3R-OA□SL, G3M-□PL, G3MB-□PL, G3MC-□PL, G3CN-□PL	(2)
	Yes	Phototriac		G3TA-OA□Z, G3R, G3M, G3MB, G3MC, G3TC-OA	(3)
AC load	Yes	Photo-coupler		G3NA-4, G3NH	(4)
DC load	---	Photo-coupler		G3NA-D, G3CN-D, G3TA-OD, G3FD, G3HD, G3BD, G3RD, G3R-I, G3R-OD, G3TB-OD, G3TC-OD	(5)
AC/DC load	No	Photo-diode coupler		G3FM	(6)
		Photo-diode coupler		G3DZ, G3RZ	(7)

Load specifications	Zero cross function	Isolation	Circuit configuration	Model	No
AC load	Yes	Phototriac		G3PB-□-2	(8)
AC load	Yes	Phototriac		G3PB-□-3	(9)
AC load	Yes	Phototriac		G3PB, G3PA-VD, G3NA, G3NE	(10)
	No	Phototriac		G3PA-□BL-VD, G3NE-□TL, G3S	(11)
	Yes	Photo-coupler		G3NA (AC input)	(12)
	No	Photo-coupler		G3TB-OA□PL	(13)
DC load	---	Photo-coupler		G3TA-I, G3SD	(14)
	---	Photo-coupler		G3TB-I	(15)
	---	Photo-coupler		G3TC-I	(16)

Load specifications	Zero cross function	Isolation	Circuit configuration	Model	No
AC load	No	Phototriac		G3PX	(17)
	No	Phototriac		G3J	(18)
	Yes	Phototriac		G3PC	(19)
AC load	No	Phototriac		G3PX-260	(20)
	No	Photo-coupler		G3J (AC input)	(21)

Classification by Application

Application	Recommended SSR
Heater control These SSRs are applicable to machines that require highly sensitive temperature control for turning heaters ON and OFF, such as molding equipment, packaging machines, and solderers. These SSRs feature plug-in models, replaceable power element cartridge models, and built-in heat sink model. They meet the high-capacity, high switching frequency requirements of heater control.	 G3PC · Single-phase G3PB · Three-phase G3PB · G3PX · G3PA · G3NA · G3NE · G3B · G3F G3H · G3NH
Motor control These SSRs are applicable to machines that require motor inching operation and reversible operation, such as machine tools, conveyors, and packaging equipment. They have high-speed response time and high switching frequency, required for inching and reversible operation.	 G3J · G3NA · G3NE · G3H (D) · G3F (D)
Interface These SSRs meet the requirements for isolated transmission of control outputs from PLCs and Position Controllers to an actuator. In particular, the G3DZ and G3RZ Relays use MOS FET in the output element to allow shared use of the Relays in both low-leakage-current AC and DC circuits.	 G3MB · G3M · G3MC · G3TB · G3DZ · G3S (D) · G3R (I/O) · G3RZ · G3TA · G3TC
OA, HA, amusement machines These Relays have high switching frequency, noiseless operation, and when compared to mechanical relays, have greater resistance to vibration, shock, dust and dirt, and gas, making them ideal for situations where these factors are important.	 G3CN · G3MB · G3M · G3MC · G3NA · G3DZ

List of Recommended Loads

Use the following table for reference when selecting the load of your SSR. The values in this table are all measured at an ambient temperature of 25°C or 40°C. Load current applied to SSR should be considered in relation to ambient temperature. Engineering data of *Load Current vs. Ambient Temperature* by each model shows the curve in order to derate the carry current. The peak value in the list applies when the SSR inrush current is within the permissible range.

Load voltage	Model	Max. load current	Type						Remarks
			Heater	Single-phase motor	Three-phase motor	Lamp load	Valve	Trans-former	
110 VAC	G3S-201□, G3MC-101□	1 A	0.8 A	---	---	0.5 A	0.5 A	50 W	---
	G3R-102□, G3CN-202□, G3M-102□, G3MB-102PL	2 A	1.6 A	---	---	1 A	1 A	100 W	---
	G3F-203□, G3H-203□, G3CN-203□	3 A	2.4 A	35 W	---	1.5 A	1.5 A	150 W	---
	G3NE-205□, G3B-205S, G3NA-205B	5 A	4 A	65 W	---	2.5 A	2.5 A	250 W	---
110 VAC	G3NE-210□, G3PA-210B-VD	10 A	8 A	100 W	---	5 A	5 A	500 W	---
	G3PB-215B-VD	15 A	12 A	---	---	7.5 A	7.5 A	750 W	---
	G3NE-220□, G3PA-220B-VD	20 A	16 A	300 W	---	10 A	10 A	1 kW	---
	G3PX-220□	20 A	16 A	---	---	10 A	---	---	---
	G3PC-220BVD	20 A	16 A	---	---	10 A	---	---	---
	G3PB-225B-VD	25 A	20 A	---	---	12.5 A	12.5 A	---	---
	G3PB-235B-VD	35 A	28 A	---	---	17.5 A	17.5 A	---	---
	G3PA-240B-VD	40 A	32 A	750 W	---	20 A	20 A	2 kW	---
	G3PX-240□	40 A	32 A	---	---	20 A	---	---	---
	G3PB-245B-VD	45 A	36 A	---	---	22.5 A	22.5 A	---	---
	G3PA-260B-VD	60 A	48 A	---	---	30 A	30 A	---	---
	G3PX-260□	60 A	48 A	---	---	30 A	---	---	---
	G3NH-2075B	75 A	60 A	---	---	37 A	---	---	---
	G3NH-2150B	150 A	120 A	---	---	75 A	---	---	---
220 VAC	G3S-201□, G3MC-201□, G3RZ-201SLN	1 A	0.8 A	15 W	50 W	0.5 A	0.5 A	100 W	---
	G3R-202□, G3CN-202□, G3M-202□, G3MB-202□	2 A	1.6 A	35 W	100 W	1 A	1 A	200 W	---
	G3F-203□, G3H-203□, G3CN-203□, G3M-203□	3 A	2.4 A	65 W	200 W	1.5 A	1.5 A	300 W	---
	G3NE-205□, G3B-205S□, G3NA-205B	5 A	4 A	100 W	400 W	2.5 A	2.5 A	500 W	---
	G3J-S205BL, G3J-T205BL	4.8 A	---	---	0.75 kW	---	---	---	---
	G3J-S211BL, G3J-T211BL	11.1 A	---	---	2.2 kW	---	---	---	---
	G3J-T217BL	17.4 A	---	---	3.7 kW	---	---	---	---
	G3NE-210□, G3NA-210B, G3PA-210B-VD	10 A	8 A	250 W	750 W	5 A	5 A	1 kW	---
	G3PB-215B-VD	15 A	12 A	---	---	7.5 A	7.5 A	---	---
	G3PB-215B-□-VD	15 A	12 A	---	---	---	---	---	---
220 VAC	G3NE-220□, G3NA-220B, G3PA-220B-VD	20 A	16 A	750 W	1.5 kW	10 A	10 A	2 kW	---
	G3PX-220□	20 A	16 A	---	---	10 A	---	---	---
	G3PC-220B-VD	20 A	16 A	---	---	10 A	---	---	---
	G3NA-225B	25 A	20 A	---	---	12.5 A	12.5 A	---	---
	G3PB-225B-VD	25 A	20 A	---	---	12.5 A	12.5 A	---	---
	G3PB-225B-□-VD	25 A	20 A	---	---	---	---	---	Three-phase
	G3PB-235B-VD	35 A	28 A	---	---	17.5 A	17.5 A	---	---
	G3PB-235B-□-VD	35 A	28 A	---	---	---	---	---	Three-phase

Load voltage	Model	Max. load current	Type						Remarks
			Heater	Single-phase motor	Three-phase motor	Lamp load	Valve	Transformer	
220 VAC	G3PA-240B-VD, G3NA-240B	40 A	32 A	1.5 kW	2.2 kW	20 A	20 A	4 kW	---
	G3PX-240□	40 A	32 A	---	---	20 A	---	---	---
	G3PB-245B-VD	45 A	36 A	---	---	22.5 A	22.5 A	---	---
	G3PB-245B-□-VD	45 A	36 A	---	---	---	---	---	Three-phase
	G3PA-260B-VD	60 A	48 A	---	2.7 kW	30 A	30 A	---	---
	G3PX-260□	60 A	48 A	---	---	30 A	---	---	---
	G3NH-2075B	75 A	60 A	---	3.7 kW	37 A	---	---	---
	G3NH-2150B	150 A	120 A	---	7.5 kW	75 A	---	---	---
400 VAC	G3J-S403BL, G3J-T403BL	2.4 A	---	---	0.75 kW	---	---	---	Three-phase
	G3J-S405BL, G3J-T405BL	5.5 A	---	---	2.2 kW	---	---	---	Three-phase
440 VAC	G3NA-410B	10 A	8 A	---	2.2 kW	5 A	---	---	---
	G3PB-415B-□-VD	15 A	12 A	---	---	7.5 A	---	---	Three-phase
	G3NA-420B, G3PA-420B-VD	20 A	16 A	---	3.7 kW	10 A	---	---	---
	G3NA-425B	25 A	20 A	---	---	12.5 A	---	---	---
	G3PB-425B-□-VD	25 A	20 A	---	---	12.5 A	---	---	Three-phase
	G3PA-430B-VD	30 A	24 A	---	5.5 kW	15 A	---	---	---
	G3PB-435B-□-VD	35 A	28 A	---	---	17.5 A	---	---	Three-phase
	G3NA-440B	40 A	32 A	---	---	20 A	---	---	---
	G3PB-445B-□-VD	45 A	36 A	---	---	22.5 A	---	---	Three-phase
	G3NA-450B	50 A	40 A	---	---	25 A	---	---	---
	G3NH-4075B	75 A	60 A	---	7.5 kW	37 A	---	---	---
	G3NH-4150B	150 A	120 A	---	15 kW	75 A	---	---	---
480 VAC	G3PA-420B-VD-2	20 A	16 A	---	---	10 A	---	---	---
	G3PA-430B-VD-2	30 A	24 A	---	---	15 A	---	---	---
	G3PA-450B-VD-2	50 A	40 A	---	---	25 A	---	---	---
24 VDC	G3SD-Z01□	1 A	0.8 A	---	---	0.5 A	0.5 A	---	---
48 VDC	G3CN-DX02□, G3RD-X02□	2 A	1.6 A	---	---	1 A	1 A	---	---
	G3CN-DX03□, G3FD-X03S, G3HD-X03S	3 A	2.4 A	---	---	1.5 A	1.5 A	---	---
100 VDC	G3RZ-201SLN	1 A	0.8 A	---	---	0.5 A	0.5 A	---	---
	G3RD-101□	1.5 A	1.2 A	---	---	0.75 A	0.75 A	---	---
	G3FD-102□	2 A	1.6 A	---	---	1 A	1 A	---	---
	G3BD-103S	3 A	2.4 A	---	---	1.5 A	1.5 A	---	---
200 VDC	G3NA-D210B	10 A	8 A	---	---	3 A	5 A	---	---
24 to 220 VAC, 5 to 110 VDC	G3FM-2R5SLN	0.5 A	---	---	---	0.4 A	0.4 A	50 W	---
5 to 240 VAC, 5 to 100 VDC	G3DZ-2R6PL	0.6 A	---	---	---	0.5 A	0.5 A	60 W	---
5 to 240 VAC, 5 to 100 VDC	G3RZ-201SLN	1 A	---	---	---	0.5 A	0.5 A	50 W	---

Note: 1. The data given in this table is provided as a guide for the user in determining suitability and does not constitute a warranty.

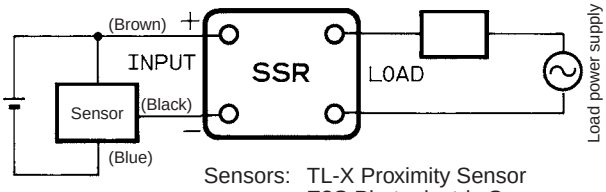
2. If a transformer load is connected to an SSR, limit the inrush current to 1/2 of the maximum rated value to be applied to the SSR.

3. The maximum SSR load current was determined assuming that a single resistive load is installed. It is expected, however, that the SSR will be exposed to harsher conditions in actual operation than in the trial testing because of power voltage fluctuations and control panel space limitations. To allow for a sufficient safety margin, the recommended values are 20% to 30% lower than the rated values. The safety margins for inductive loads, such as transformers and motors, should be higher because these loads generate inrush current.

Application Circuit Examples

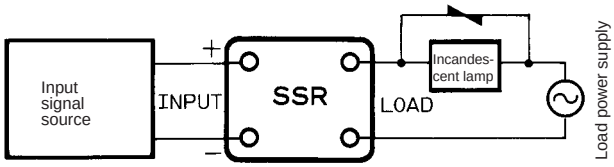
Connection to Sensors

The SSR connects directly to a Proximity Sensor or Photoelectric Sensor.

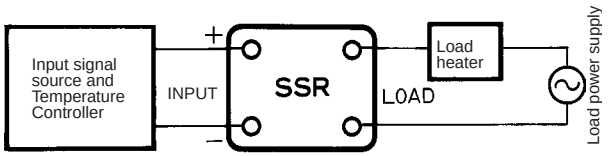


Sensors: TL-X Proximity Sensor
E3S Photoelectric Sensor

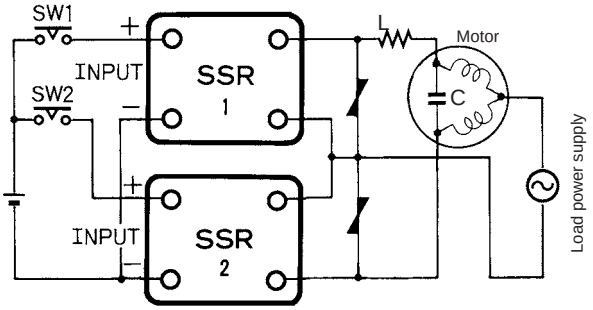
Switching Control of Incandescent Lamps



Temperature Control of Electric Furnaces



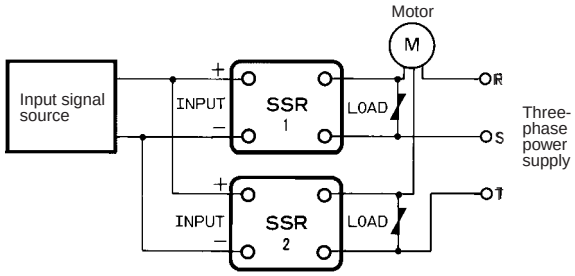
Forward and Reverse Operation of Single-phase Inductive Motors



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 the motor operates at 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.

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.

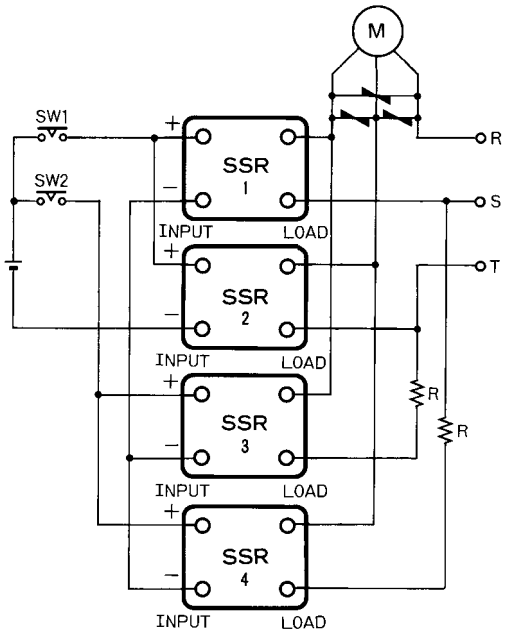
The value of the protective resistance R must be determined according to the withstanding inrush current of the SSR. For example, the G3NA-220B withstands an inrush current of 220 A. The value of the protective resistance R is obtained from the following.

$R > 220\ V \times \sqrt{2}/200A = 1.4\ \Omega$

Considering the circuit current and weld time, insert the protective resistance into the side that reduces the current consumption.

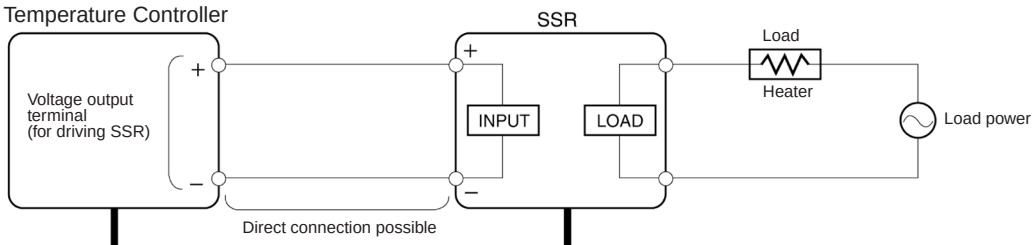
Obtain the consumption power of the resistance from the following.

$P = I^2R \times$ Safety factor
(I = Load current, R = Protective resistance, Safety factor = 3 to 5)

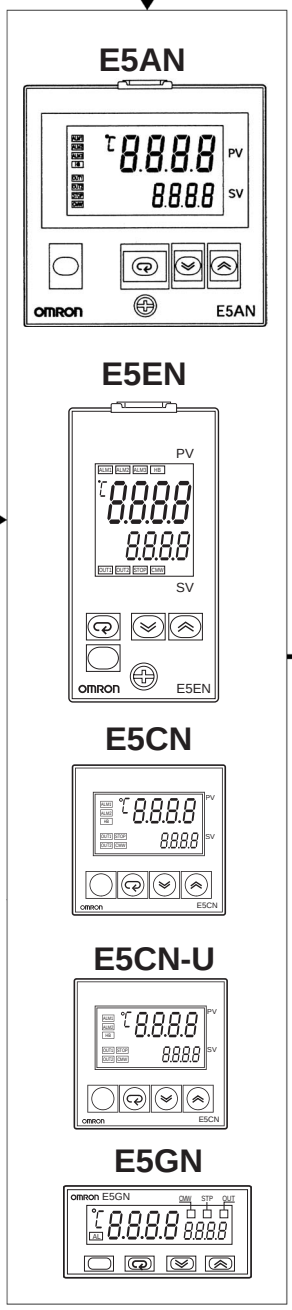


Temperature Sensor and SSR

Connection Example with SSR

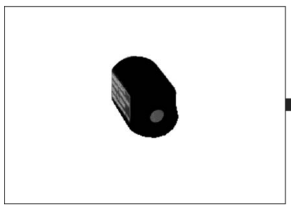


Max. No. of SSRs connectable in parallel



E52

ES1A



Calculating the Maximum Number of SSRs Connectable in Parallel

A: Max. load current of Temperature Controller's voltage output (driving SSRs) = 21 mA for the E5CN

B: SSR's input impedance = 7 mA for G3NA

In this case, the maximum number of SSRs connectable in parallel would be as follows:

A/B = 3

3 units (E5CN/E5GN)
5 units (E5AN/ E5EN)

G3PC (SSR with failure detection) 240 VAC (20 A)

Rated input voltage: 12 to 24 VDC

Compact and slim models with a built-in heat sink

3 units (E5CN/E5GN)
5 units (E5AN/ E5EN)

G3PB (Single-phase) 240 VAC (15 A, 25 A, 35 A, 45 A)

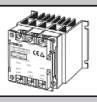
Rated input voltage: 12 to 24 VDC

Compact and slim models with a built-in heat sink

2 units (E5CN/E5GN)
4 units (E5AN/ E5EN)

G3PB (Three-phase) 240 VAC/400 VAC (15 A, 25 A, 35 A, 45 A)

Rated input voltage: 12 to 24 VDC



Simultaneous three-phase control with a built-in heat sink

3 units (E5CN/E5GN)
5 units (E5AN/ E5EN)

G3PA 240 VAC (10 A, 20 A, 40 A, 60 A) 400 VAC (20 A, 30 A, 50 A)

Rated input voltage: 5 to 24 VDC

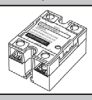
Compact and slim models with a built-in heat sink

3 units (see note) (E5CN/E5GN)
5 units (E5AN/ E5EN)

Note: 4 units for 480-VAC models

G3NA 240 VAC (5 A, 10 A, 20 A, 40 A) 480 VAC (10 A, 20 A, 40 A)

Rated input voltage: 5 to 24 VDC



Standard models with screw terminals

1 unit (E5CN/E5GN)
2 units (E5AN/ E5EN)

G3NE 240 VAC (5 A, 10 A, 20 A)

Rated input voltage: 12 VDC

Compact and low-cost models with tab terminals

4 units (E5CN/E5GN)
8 units (E5AN/ E5EN)

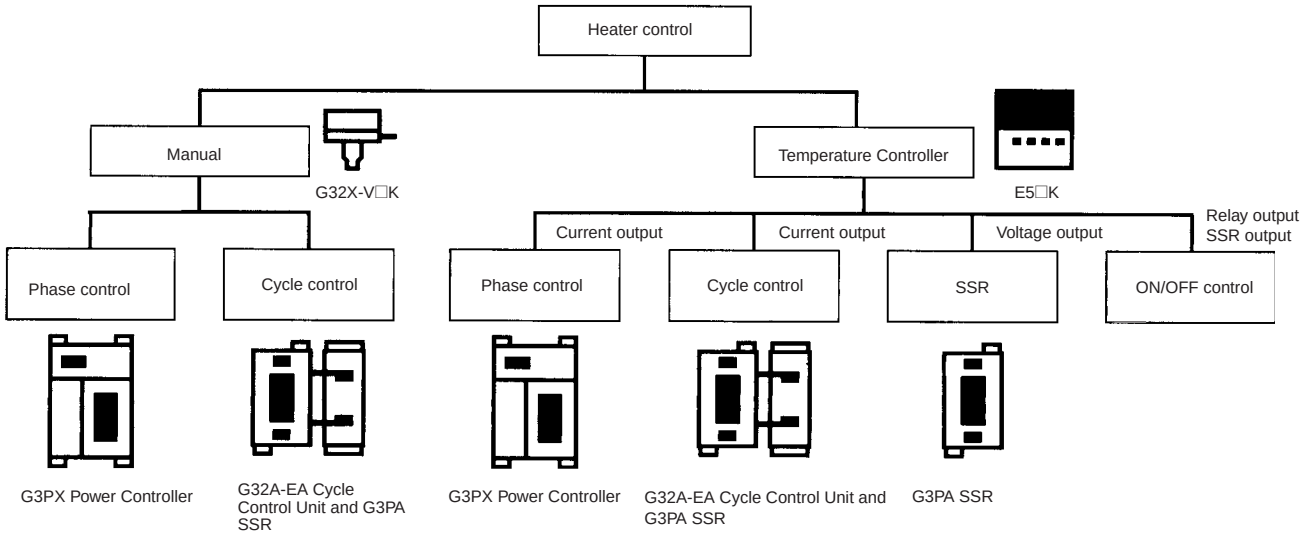
G3NH 440 VAC (75 A, 150 A)

Rated input voltage: 5 to 24 VDC

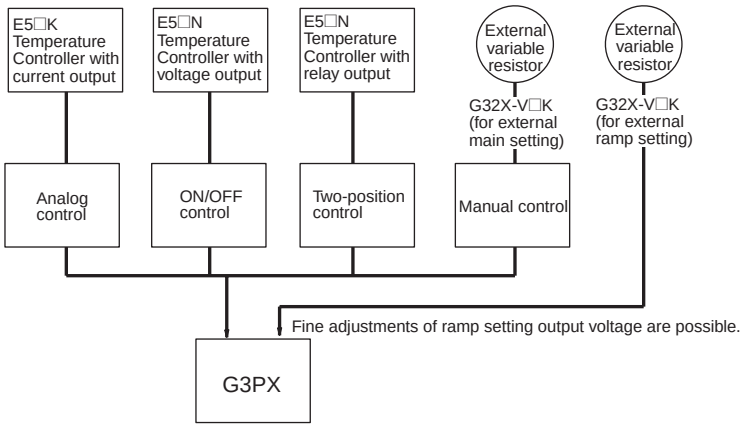
For controlling high-power heaters

Heater Control Types and G3PX Control Methods

Heater Control Types

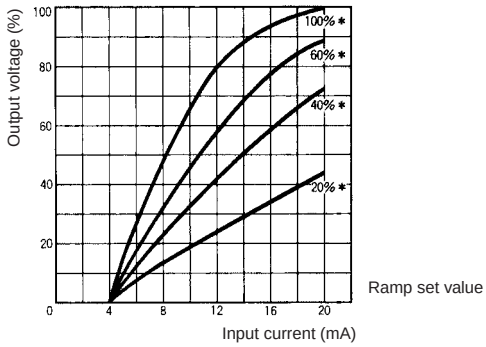


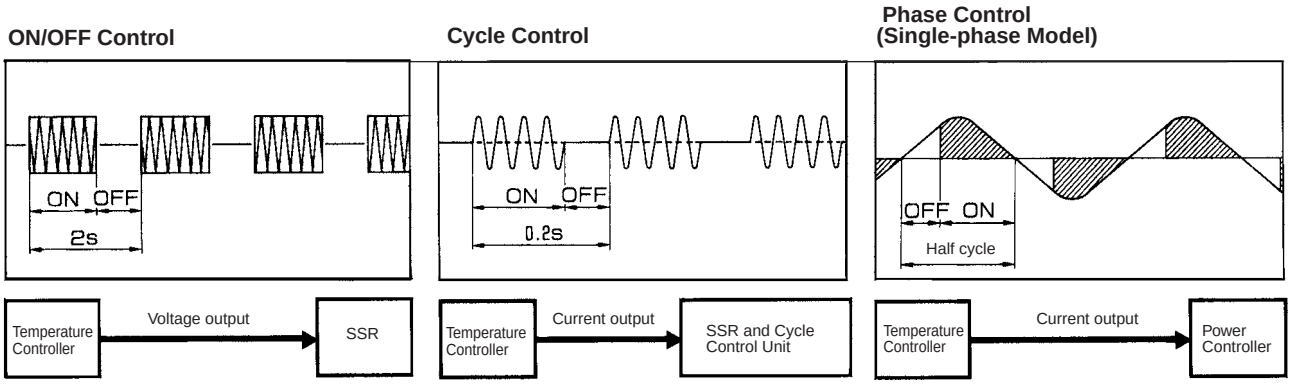
G3PX Control Methods



- **Analog Control**
  The change in current output of the Temperature Controller between 4 and 20 mA is used for precise heater control by the G3PX, which outputs smoothly adjusted power. Fine adjustments of the heater temperature are possible with external or internal ramp setting.
- **ON/OFF Control**
  The voltage output of the Temperature Controller is used for ON/OFF heater control. Fine adjustments of the heater temperature are possible with external or internal ramp setting.
- **Two-position Control**
  The high level and low level of the output are freely set with an external variable resistor, either of which is selectable with the relay output of the Temperature Controller.
- **Manual Control**
  Output adjustments are possible with an external variable resistor.

Ramp Setting (in all G3PX Single-phase Models)





Enables noiseless temperature control at low cost with no complicated maintenance work required.

Noiseless, high-speed response

Highly accurate temperature control enables each heater to withstand long use.

List of Functions

Select most suitable model depending on the application and purpose.

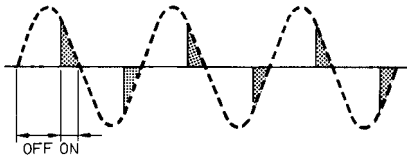
Item	Use	Single phase			
		Single-function	Advanced-function		
		Basic models	Single-heater open circuit detection models	Multiple-heater open circuit detection models	Constant-current models
		G3PX -2□□EUN	G3PX -2□□EH	G3PX -2□□EHN	G3PX -2□□EC
Level indicator	Output LED indicator	Yes	Yes	Yes	Yes
Soft-start	Soft up and down time between approximately 0.1 s and 1 s		Yes		
Extended soft start	Soft up and down time between approximately 0.5 to 10 s	Yes		Yes	Yes
Base-up	Continuous output is possible after input is turned OFF. The base-up variable resistor is adjustable between 0% and 100%	Yes			
Element-ON failure detection	Detects failures in power elements caused by short-circuiting		Yes	Yes	Yes
Single-heater open circuit detection	Enables heater open circuit detection in phase control of a single heater		Yes	Yes	Yes
Multiple-heater open circuit detection	Enables single-heater open circuit detection in phase control of a maximum of five heaters connected in parallel			Yes	
Constant current control	Possible to control heaters that change their resistance values greatly due to temperature changes				Yes
Current limit control	Enables current control below rated current				Yes
Overcurrent detection	Protecting the elements from overcurrent that cannot be suppressed in constant current control				Yes
Controlled object		Alloyed heater (Nichrome)			Pure metal heater (Kanthal super)

Description of Functions

Phase Control

Output is varied at half-phase intervals. Therefore, highly accurate temperature control is possible.

The following is an example of a waveform in single-phase control.



The change in current output of the Temperature Controller between 4 and 20 mA is used for analog control of the output power of the G3PX.

This function suppresses heat shock and ensures fine control without being influenced by external disturbance. As a result, each heater can withstand long use.

Ramp Setting

As shown in the following graphs, the change of output can be adjusted with an internal or external variable resistor.

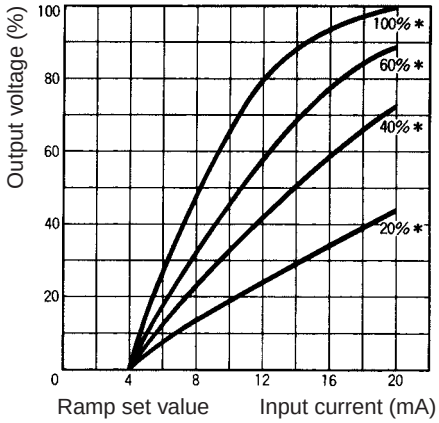
In the case of an electric oven, overshooting may result by using a heater with a capacity that is excessively high for the size of the oven.

By adjusting the ramp-setting variable resistor, the overshooting can be suppressed.

For example, if a ramp of 60% is set for a 5-kW heater, a maximum of 3 kW will be input into the heater. Thus, it operates as a 3-kW heater.

Ramp Setting

All G3PX Single-phase Models

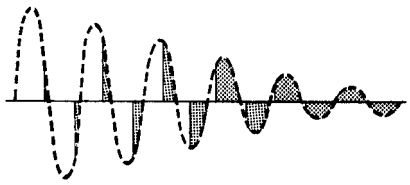


Soft-start

This function suppresses the inrush current that is caused when the load is turned ON, thus ensuring smooth starting of the load.

This function is especially effective for loads that involve high inrush current, such as halogen lamps.

The following is an example of a waveform in single-phase control.



Base-up

This function briefly keeps the output of the G3PX turned ON after heating when the input signal is OFF.

This is effective for a smooth start of equipment that is slow in initial heating operation.

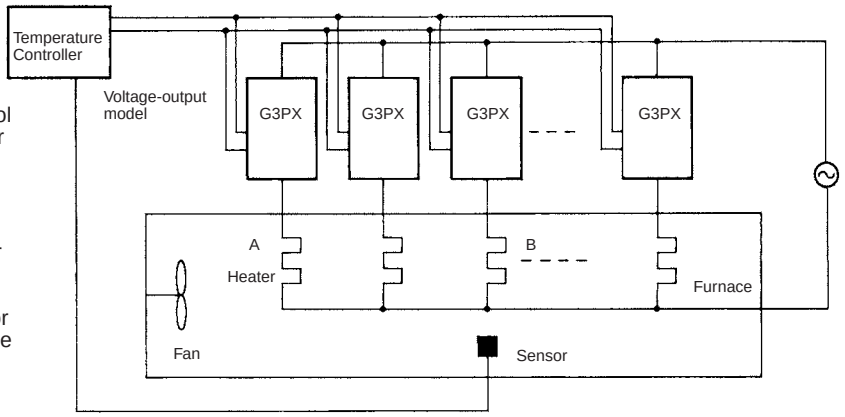
Constant Current

If the load has an extremely high inrush current, the extended soft-start function cannot suppress the inrush current. The constant-current function suppresses the inrush current automatically, thus protecting the heater and system from damage.

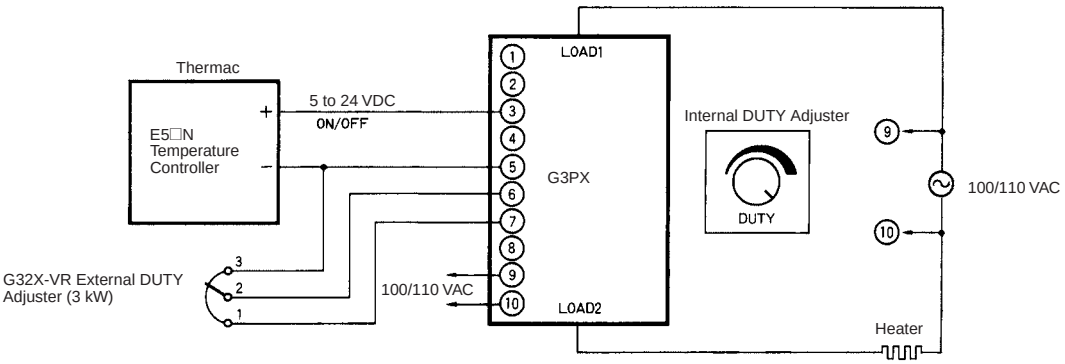
Connection Examples of Single-phase G3PX and Temperature Controller

- The soft-start time is adjusted between 0.5 and 10 s, thus enabling the heaters to withstand long use.
- If a single Temperature Controller is in control of more than one heater, by making a proper ramp setting, the difference in temperature between the heaters can be improved. (Connection Example 2)

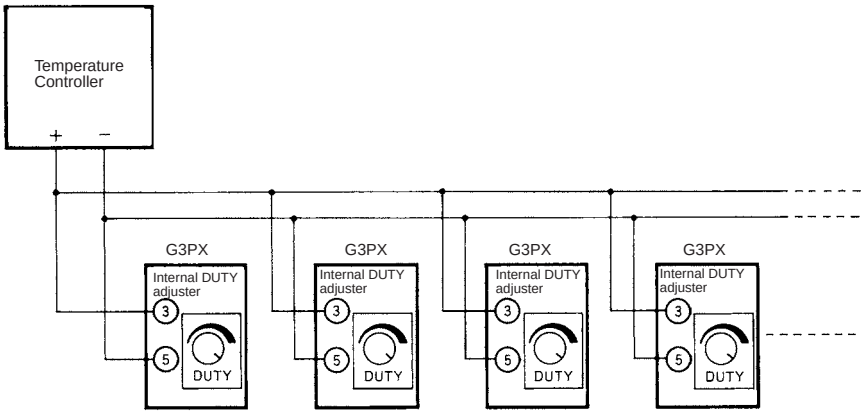
Note: The temperature at point B can be higher than that at point A due to thermal interference. In that case, make the ramp set value for heater B smaller than that for heater A so that there will be no difference in temperature between points A and B.



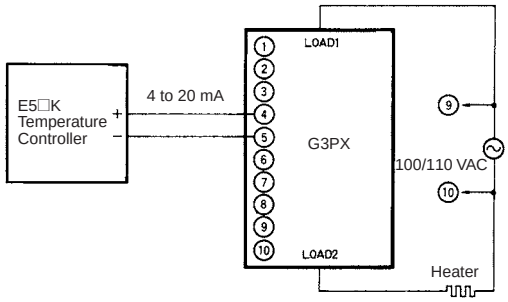
Connection Example 1. Ramp Change Using Voltage-output Temperature Controller and One G3PX



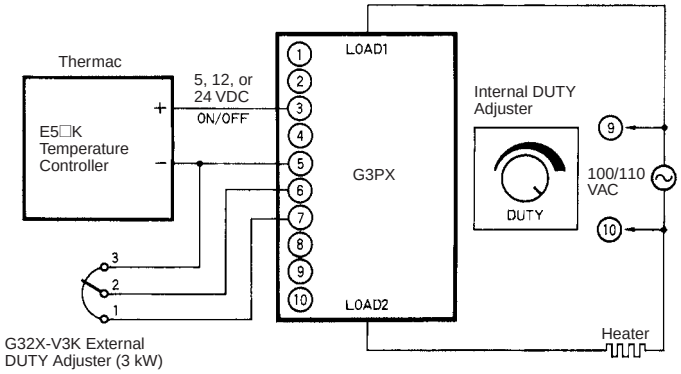
Connection Example 2. Ramp Change Using Voltage-output Temperature Controller and Multiple G3PXs



Connection Example 3. Temperature Control Using Temperature Controller with Current Output of 4 to 20 mA and G3PX



Connection Example 4. Ramp Change Using Temperature Controller with Current Output of 4 to 20 mA and G3PX



Glossary

Terms		Meaning
Circuit functions	Photocoupler Phototriac coupler	Transfers the input signal while insulating inputs and outputs.
	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 that 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 for the constant current input method.
	Must operate voltage	Minimum input voltage when the output status changes from OFF to ON.
	Must release 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 (such as the size, materials, thickness of the heat sink, and ambient temperature radiating conditions).
	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, materials, thickness of heat sink, and ambient temperature radiation conditions).
Characteristics	Dielectric strength	The effective AC voltage that the SSR can withstand when it is applied between the input terminals and output terminals or I/O terminals and metal housing (heat sink) for more than 1 minute.
	Insulation resistance	The resistance between the input and output terminals or I/O terminals and metal housing (heat sink) when DC voltage is imposed.
	Operate 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	Inrush current resistance	A current which can be applied for short periods of time to the electrical element.
	Counter-electromotive force	Extremely steep voltage rise which occurs when the load is turned ON or OFF.
	Recommended applicable load	The recommended load capacity that takes into account the safety factors of ambient temperature 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.

Standards

■ SSR Models Certified by International Standards

Model	Certified by UL (Report No. E64562)	Certified by CSA (Report No. LR35535)	Certified by VDE, TÜV, KEMA	CE marking
G3PX	G3PX-220EUN G3PX-240EUN G3PX-260EUN G3PX-220EH G3PX-240EH G3PX-260EH G3PX-220EHN G3PX-240EHN G3PX-260EHN G3PX-220EC G3PX-240EC G3PX-260EC	G3PX-220EUN G3PX-240EUN G3PX-260EUN G3PX-220EH G3PX-240EH G3PX-260EH G3PX-220EHN G3PX-240EHN G3PX-260EHN G3PX-220EC G3PX-240EC G3PX-260EC		
G3J	G3J-205BL (-2) G3J-211BL (-2) G3J-S205BL G3J-S211BL G3J-S403BL G3J-S405BL G3J-T205BL G3J-T211BL G3J-T217BL G3J-T403BL G3J-T405BL	G3J-205BL (-2) G3J-211BL (-2) G3J-S205BL G3J-S211BL G3J-S403BL G3J-S405BL G3J-T205BL G3J-T211BL G3J-T217BL G3J-T403BL G3J-T405BL	G3J-S205BL G3J-S211BL G3J-S403BL G3J-S405BL Certified by KEMA	G3J-S205BL G3J-S211BL G3J-S403BL G3J-S405BL
G3PC	G3PC-220B-VD	G3PC-220B-VD	G3PC-220B-VD Certified by VDE	G3PC-220B-VD
G3PB	G3PB-215B-VD G3PB-225B-VD G3PB-235B-VD G3PB-245B-VD G3PB-215B-3 (2) (H)-VD G3PB-225B-3 (2) (H)-VD G3PB-235B-3 (2) (H)-VD G3PB-245B-3 (2) (H)-VD G3PB-415B-3 (2) (H)-VD G3PB-425B-3 (2) (H)-VD G3PB-435B-3 (2) (H)-VD G3PB-445B-3 (2) (H)-VD G3PB-215B-3(2)N-VD G3PB-225B-3(2)N-VD G3PB-235B-3(2)N-VD G3PB-245B-3(2)N-VD G3PB-515B-3(2)N-VD G3PB-525B-3(2)N-VD G3PB-535B-3(2)N-VD G3PB-545B-3(2)N-VD	G3PB-215B-VD G3PB-225B-VD G3PB-235B-VD G3PB-245B-VD G3PB-215B-3 (2) (H)-VD G3PB-225B-3 (2) (H)-VD G3PB-235B-3 (2) (H)-VD G3PB-245B-3 (2) (H)-VD G3PB-415B-3 (2) (H)-VD G3PB-425B-3 (2) (H)-VD G3PB-435B-3 (2) (H)-VD G3PB-445B-3 (2) (H)-VD G3PB-215B-3(2)N-VD G3PB-225B-3(2)N-VD G3PB-235B-3(2)N-VD G3PB-245B-3(2)N-VD G3PB-515B-3(2)N-VD G3PB-525B-3(2)N-VD G3PB-535B-3(2)N-VD G3PB-545B-3(2)N-VD	G3PB-215B-VD G3PB-225B-VD G3PB-235B-VD G3PB-245B-VD G3PB-215B-3 (2) (H)-VD G3PB-225B-3 (2) (H)-VD G3PB-235B-3 (2) (H)-VD G3PB-245B-3 (2) (H)-VD G3PB-415B-3 (2) (H)-VD G3PB-425B-3 (2) (H)-VD G3PB-435B-3 (2) (H)-VD G3PB-445B-3 (2) (H)-VD G3PB-215B-3(2)N-VD G3PB-225B-3(2)N-VD G3PB-235B-3(2)N-VD G3PB-245B-3(2)N-VD G3PB-515B-3(2)N-VD G3PB-525B-3(2)N-VD G3PB-535B-3(2)N-VD G3PB-545B-3(2)N-VD Certified by VDE	G3PB-215B-VD G3PB-225B-VD G3PB-235B-VD G3PB-245B-VD G3PB-215B-3 (2) (H)-VD G3PB-225B-3 (2) (H)-VD G3PB-235B-3 (2) (H)-VD G3PB-245B-3 (2) (H)-VD G3PB-415B-3 (2) (H)-VD G3PB-425B-3 (2) (H)-VD G3PB-435B-3 (2) (H)-VD G3PB-445B-3 (2) (H)-VD G3PB-215B-3(2)N-VD G3PB-225B-3(2)N-VD G3PB-235B-3(2)N-VD G3PB-245B-3(2)N-VD G3PB-515B-3(2)N-VD G3PB-525B-3(2)N-VD G3PB-535B-3(2)N-VD G3PB-545B-3(2)N-VD
G3PA	G3PA-420B(-VD)(-2) G3PA-430B(-VD)(-2) G3PA-450B-VD-2 G3PA-210B-VD G3PA-220B-VD G3PA-240B-VD G3PA-260B-VD	G3PA-420B(-VD)(-2) G3PA-430B(-VD)(-2) G3PA-450B-VD-2 G3PA-210B-VD G3PA-220B-VD G3PA-240B-VD G3PA-260B-VD	G3PA-420B(-VD)(-2) G3PA-430B(-VD)(-2) G3PA-450B-VD-2 G3PA-210B-VD G3PA-220B-VD G3PA-240B-VD G3PA-260B-VD Certified by VDE	G3PA-420B(-VD)(-2) G3PA-430B(-VD)(-2) G3PA-450B-VD-2 G3PA-210B-VD G3PA-220B-VD G3PA-240B-VD G3PA-260B-VD
G32A	G32A-B-US G32A-C-US G32A-A10-US G32A-A20-US G32A-A40-US G32A-A60-VD G32A-D20-US G32A-D40-US G32A-A420(-VD)(-2) G32A-A430(-VD)(-2) G32A-A450-VD-2 G32A-EA-US	G32A-B-US G32A-C-US G32A-A10-US G32A-A20-US G32A-A40-US G32A-A60-VD G32A-D20-US G32A-D40-US G32A-A420(-VD)(-2) G32A-A430(-VD)(-2) G32A-A450-VD-2 G32A-EA-US	G32A-A10-VD G32A-A20-VD G32A-A40-VD G32A-A60-VD G32A-A420-VD(-2) G32A-A430-VD(-2) G32A-A450-VD-2 Certified by VDE	G32A-A10-VD G32A-A20-VD G32A-A40-VD G32A-A60-VD G32A-A420-VD(-2) G32A-A430-VD(-2) G32A-A450-VD-2
G3NA	G3NA-205B(-UTU) G3NA-210B(-UTU) G3NA-220B(-UTU) G3NA-240B(-UTU) G3NA-D210B(-UTU) G3NA-410B G3NA-420B G3NA-440B	G3NA-205B(-UTU) G3NA-210B(-UTU) G3NA-220B(-UTU) G3NA-240B(-UTU) G3NA-D210B(-UTU) G3NA-410B G3NA-420B G3NA-440B	G3NA-205B-UTU G3NA-210B-UTU G3NA-220B-UTU G3NA-240B-UTU G3NA-D210B-UTU Certified by TÜV	G3NA-205B-UTU G3NA-210B-UTU G3NA-220B-UTU G3NA-240B-UTU G3NA-D210B-UTU

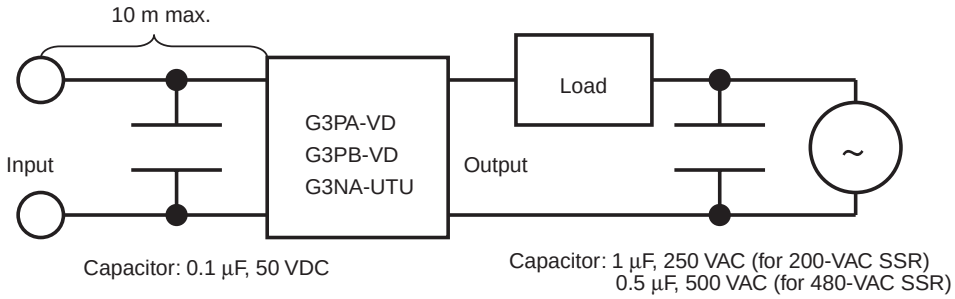
Model	Certified by UL (Report No. E64562)	Certified by CSA (Report No. LR35535)	Certified by VDE, TÜV, KEMA	CE marking
G3NE	G3NE-205T (L)-US G3NE-210T (L)-US G3NE-220T (L)-US	G3NE-205T (L)-US G3NE-210T (L)-US G3NE-220T (L)-US	G3NE-205T (L)-US G3NE-210T (L)-US G3NE-220T (L)-US Certified by TÜV	G3NE-205T (L)-US G3NE-210T (L)-US G3NE-220T (L)-US
G3TA	G3TA-IAZR02S-US G3TA-IDZR02S (M)-US G3TA-OA202S (Z) (L)-US G3TA-ODX02S-US G3TA-OD201S-US	G3TA-IAZR02S-US G3TA-IDZR02S (M)-US G3TA-OA202S (Z) (L)-US G3TA-ODX02S-US G3TA-OD201S-US		
G3F/G3FD	G3F-202SN-VD G3F-203S(L)(N)-VD G3FD-X03S(N)-VD G3FD-102S(N)-VD	G3F-202SN-VD G3F-203S(L)(N)-VD G3FD-X03S(N)-VD G3FD-102S(N)-VD	G3F-202SN-VD G3F-203S(L)(N)-VD G3FD-X03S(N)-VD G3FD-102S(N)-VD Certified by VDE	G3F-202SN-VD G3F-203S(L)(N)-VD G3FD-X03S(N)-VD G3FD-102S(N)-VD
G3B/G3BD	G3B-205S-VD G3BD-103S-VD	G3B-205S-VD G3BD-103S-VD	G3B-205S-VD G3BD-103S-VD Certified by VDE	G3B-205S-VD G3BD-103S-VD
G3H/G3HD	G3H-203S(L)(N)-VD G3HD-X03S(N)-VD	G3H-203S(L)(N)-VD G3HD-X03S(N)-VD	G3H-203S(L)(N)-VD G3HD-X03S(N)-VD Certified by VDE	G3H-203S(L)(N)-VD G3HD-X03S(N)-VD
G3R-I/O	G3R-IAZR1SN-UTU G3R-IDZR1SN-UTU G3R-IDZR1SN-1-UTU G3R-OA202SZN-UTU G3R-OA202SLN-UTU G3R-ODX02SN-UTU G3R-OD201SN-UTU	G3R-IAZR1SN-UTU G3R-IDZR1SN-UTU G3R-IDZR1SN-1-UTU G3R-OA202SZN-UTU G3R-OA202SLN-UTU G3R-ODX02SN-UTU G3R-OD201SN-UTU	G3R-IAZR1SN-UTU G3R-IDZR1SN-UTU G3R-IDZR1SN-1-UTU G3R-OA202SZN-UTU G3R-OA202SLN-UTU G3R-ODX02SN-UTU G3R-OD201SN-UTU Certified by TÜV	G3R-IAZR1SN-UTU G3R-IDZR1SN-UTU G3R-IDZR1SN-1-UTU G3R-OA202SZN-UTU G3R-OA202SLN-UTU G3R-ODX02SN-UTU G3R-OD201SN-UTU
G3R	G3R-101P (L) (N)-US G3R-102P (L) (N)-US G3R-201P (L) (N)-US G3R-202P (L) (N)-US	G3R-101P (L) (N)-US G3R-102P (L) (N)-US G3R-201P (L) (N)-US G3R-202P (L) (N)-US		
G3RD	G3RD-X02P (N)-US	G3RD-X02P (N)-US		
G3CN	G3CN-202P (L) (1)-US G3CN-203P (L) (1)-US G3CN-DX02P (L) (1)-US G3CN-DX03P (L) (1)-US	G3CN-202P (L) (1)-US G3CN-203P (L) (1)-US G3CN-DX02P (L) (1)-US G3CN-DX03P (L) (1)-US		
G3M	G3M-102P(L)-US(-4) G3M-202P(L)-US(-4) G3M-202P(L)-UTU(-1)(-4) G3M-203P(L)(-4) G3M-203P(L)-UTU-1(-4) G3M-205P(L)-VD-1(-4)	G3M-102P(L)-US(-4) G3M-202P(L)-US(-4) G3M-202P(L)-UTU(-1)(-4) G3M-203P(L)(-4) G3M-203P(L)-UTU-1(-4) G3M-205P(L)-VD-1(-4)	G3M-202P(L)-UTU-1(-1)(-4) G3M-203P(L)-UTU-1(-4) Certified by TÜV G3M-205P(L)-VD-1(-4) Certified by VDE	
G3MB	G3MB-102P(L)(-UTU) G3MB-202P(L)(-UTU)	G3MB-102P(L)(-UTU) G3MB-202P(L)(-UTU)	G3MB-102P(L)-UTU G3MB-202P(L)-UTU Certified by TÜV	
G3MC	G3MC-101P (L)(-VD) G3MC-201P (L)(-VD) G3MC-102P (L)(-VD) G3MC-202P (L)(-VD)	G3MC-101P (L)(-VD) G3MC-201P (L)(-VD) G3MC-102P (L)(-VD) G3MC-202P (L)(-VD)	G3MC-101P (L)-VD G3MC-201P (L)-VD G3MC-102P (L)-VD G3MC-202P (L)-VD Certified by VDE	
G3TB	G3TB-IAZR02P-US G3TB-IDZR02P-US G3TB-OA203PZ (M)-US G3TB-OA203PL (M)-US G3TB-ODX03P (M)-US G3TB-OD201P (M)-US (Report No. E41515)	G3TB-IAZR02P-US G3TB-IDZR02P-US G3TB-OA203PZ (M)-US G3TB-OA203PL (M)-US G3TB-ODX03P (M)-US G3TB-OD201P (M)-US		
G3TC	G3TC-IDC5 G3TC-IDC15 G3TC-IDC24 G3TC-IAC5(A) G3TC-IAC15(A) G3TC-IAC24(A) G3TC-ODC5(A) G3TC-ODC15(A) G3TC-ODC24(A) G3TC-OAC5(A) G3TC-OAC15(A) G3TC-OAC24(A)	G3TC-IDC5 G3TC-IDC15 G3TC-IDC24 G3TC-IAC5(A) G3TC-IAC15(A) G3TC-IAC24(A) G3TC-ODC5(A) G3TC-ODC15(A) G3TC-ODC24(A) G3TC-OAC5(A) G3TC-OAC15(A) G3TC-OAC24(A)	G3TC-IDC5 G3TC-IDC15 G3TC-IDC24 G3TC-IAC5(A) G3TC-IAC15(A) G3TC-IAC24(A) G3TC-ODC5(A) G3TC-ODC15(A) G3TC-ODC24(A) G3TC-OAC5(A) G3TC-OAC15(A) G3TC-OAC24(A) Certified by TÜV	G3TC-IDC5 G3TC-IDC15 G3TC-IDC24 G3TC-IAC5(A) G3TC-IAC15(A) G3TC-IAC24(A) G3TC-ODC5(A) G3TC-ODC15(A) G3TC-ODC24(A) G3TC-OAC5(A) G3TC-OAC15(A) G3TC-OAC24(A)
G3S	G3S-201P (L)(-PD)-US G3SD-Z01P(-PD)-US	G3S-201P (L)(-PD)-US G3SD-Z01P(-PD)-US		
G3DZ	G3DZ-2R6PL	G3DZ-2R6PL		

■ EMC Directive Compliance

G3PA-VD, G3PB-VD, and G3NA-UTU

EMC directives can be complied with under the following conditions.

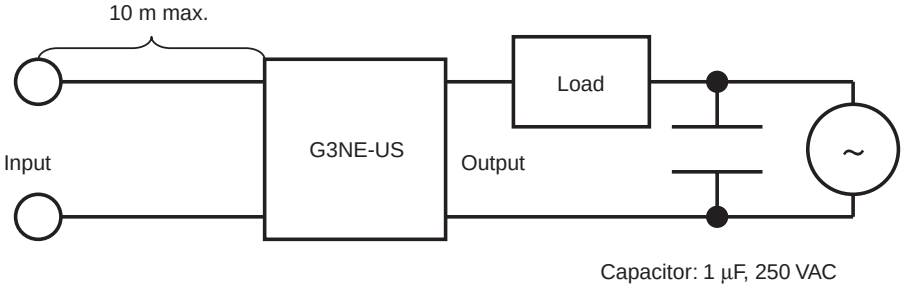
- A capacitor must be connected to the load power supply.
- A capacitor must be connected between the input terminals for SSRs with DC inputs.
- The input cable must be less than 10 m.



G3NE-US

EMC directives can be complied with under the following conditions.

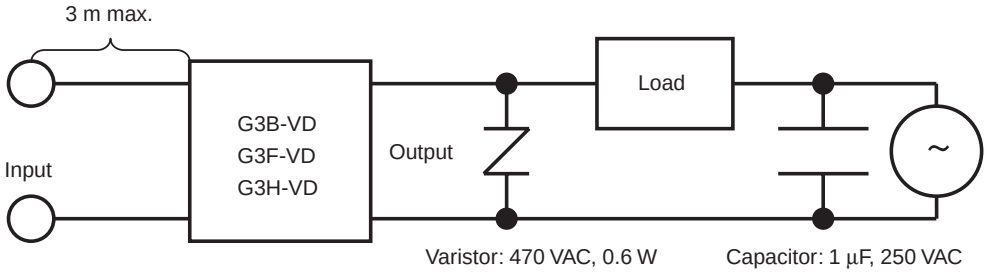
- A capacitor must be connected to the load power supply.
- The input cable must be less than 10 m.



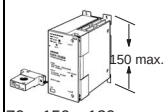
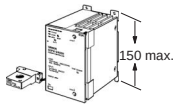
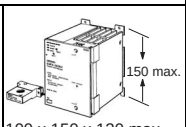
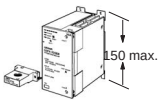
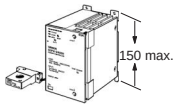
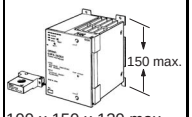
G3B-VD, G3F-VD, and G3H-VD

EMC directives can be complied with under the following conditions.

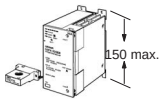
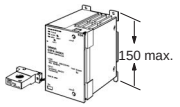
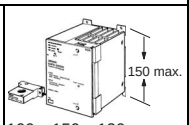
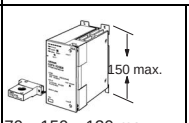
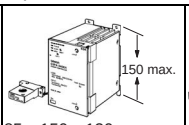
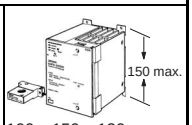
- A varistor must be connected between the output terminals.
- A capacitor must be connected to the load power supply.
- The input cable must be less than 3 m.



Solid State Relays
Selection Guide

Classification		Power controller					
Model		G3PX-220EUN	G3PX-240EUN	G3PX-260EUN	G3PX-220EH	G3PX-240EH	G3PX-260EH
Features		• Phase-control system • Base-up and Extended start-up Functions available			• Phase-control system • Possible to detect open circuit in heaters		
Appearance and dimensions (W x H x D) (mm)		 70 x 150 x 130 max.	 85 x 150 x 130 max.	 100 x 150 x 130 max.	 70 x 150 x 130 max.	 85 x 150 x 130 max.	 100 x 150 x 130 max.
Output	**Insulation**	Phototriac					
	Element	Triac	Triac	Thyristor	Triac	Triac	Thyristor
	Load voltage	100/110 VAC, 200/230 VAC					
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})					
	Maximum switching current	20 A	40 A	60 A	20 A	40 A	60 A
	Leakage current	10 mA max. at 100/110 VAC, 20 mA max. at 200/220 VAC					
	di/dt (A/μs)	50	50	100	50	50	100
	dv/dt (V/μs)	100	100	500	100	100	500
	I^2t (A^2s)	260	1,260	1,260	260	1,260	1,260
	Tj (°C) max.	125	125	125	125	125	125
Input signal for control	**External main setting**	2 kΩ (type B, 2 W min.)			3 kΩ (type B, 2 W min.)		
	Current input	4 to 20 mA (at 1 to 5 VDC) (input impedance: 250 Ω)					
	Voltage ON/OFF input	5 to 24 VDC (input impedance: approx. 20 kΩ)					
	External duty setting	3 kΩ (type B)					
Reverse polarity protection for input		No					
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min					
Ambient temperature		–20 to 55°C (with no icing or condensation)					
Function	**Zero cross**	No					
	Operation indicator	Yes (lever indicator)					
	Built-in varistor	Yes					
Terminal type	**Plug-in**	---					
	Screw	Yes					
	Tab	---					
	PCB	---					
	Mounting method	Panel mounting					
Certified standards		UL, CSA					
Socket		---					
Weight		Approx. 1.1 kg	Approx. 1.4 kg	Approx. 1.7 kg	Approx. 1.1 kg	Approx. 1.4 kg	Approx. 1.7 kg
Page No.		67			67		

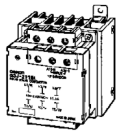
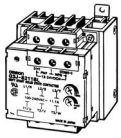
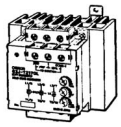
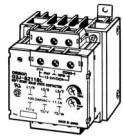
Note: **1.** V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage
2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Power controller					
Model		G3PX-220EHN	G3PX-240EHN	G3PX-260EHN	G3PX-220EC	G3PX-240EC	G3PX-260EC
Features		• Phase-control system • Possible to detect open circuit in heaters			• Overcurrent detecting functions • Possible to detect open circuit in heaters		
Appearance and dimensions (W x H x D) (mm)		 70 x 150 x 130 max.	 85 x 150 x 130 max.	 100 x 150 x 130 max.	 70 x 150 x 130 max.	 85 x 150 x 130 max.	 100 x 150 x 130 max.
Output	**Insulation**	Phototriac					
	Element	Triac	Triac	Thyristor	Triac	Triac	Thyristor
	Load voltage	100/110 VAC, 200/230 VAC					
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})					
	Maximum switching current	20 A	40 A	60 A	20 A	40 A	60 A
	Leakage current	10 mA max. at 100/110 VAC, 20 mA max. at 200/220 VAC					
	di/dt (A/μs)	50	50	100	50	50	100
	dv/dt (V/μs)	100	100	500	100	100	500
	I^2t (A^2s)	260	1,260	1,260	260	1,260	1,260
	Tj (°C) max.	125	125	125	125	125	125
Input signal for control	**External main setting**	2 kΩ (type B, 2 W min.)					
	Current input	4 to 20 mA (at 1 to 5 VDC) (input impedance: 250 Ω)					
	Voltage ON/OFF input	5 to 24 VDC (input impedance: approx. 20 kΩ)					
	External duty setting	3 kΩ (type B)					
Reverse polarity protection for input		No					
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min					
Ambient temperature		–20 to 55°C (with no icing or condensation)					
Function	**Zero cross**	No					
	Operation indicator	Yes (lever indicator)					
	Built-in varistor	Yes					
Terminal type	**Plug-in**	---					
	Screw	Yes					
	Tab	---					
	PCB	---					
	Mounting method	Panel mounting					
Certified standards		UL, CSA					
Socket		---					
Weight		Approx. 1.2 kg	Approx. 1.5 kg	Approx. 1.8 kg	Approx. 1.1 kg	Approx. 1.4 kg	Approx. 1.7 kg
Page No.		67			67		

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

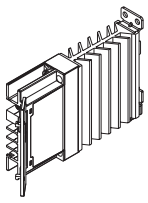
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type												
Model		G3J				G3J-T					G3J-S			
		G3J-205BL	G3J-211BL	G3J-205BL-2	G3J-211BL-2	G3J-T403BL	G3J-T405BL	G3J-T205BL	G3J-T211BL	G3J-T217BL	G3J-S403BL	G3J-S405BL	G3J-S205BL	G3J-S211BL
Appearance and dimensions (W x H x D) (mm)		 80 x 89 x 100				 80 x 89 x 100				 100 x 89 x 110	 80 x 89 x 100			
Features		• Solid state contactor for three-phase motors • Achieves harmonized protection with thermal overload relays. • Two-element models and three-element models are available.				• Soft start/stop is available. • SSR contactor for three-phase motors					• Soft start is available. • Possible to mount together with a thermal overload relay.			
Output	**Insulation**	Phototriac (DC input) Phototriac coupler (AC input)				Phototriac								
	Element	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC				180 to 440 VAC		180 to 264 VAC			180 to 440 VAC		180 to 264 VAC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})				1,000 (V_{DRM})		600 (V_{DRM})			1,000 (V_{DRM})		600 (V_{DRM})	
	Maximum switching current	4.8 A	11.1 A	4.8 A	11.1 A	2.4 A	5.5 A	4.8 A	11.1 A	17.4 A	2.4 A	5.5 A	4.8 A	11.1 A
	Leakage current	10 mA max. at 200 VAC (With the two-element models, the leakage current of the S phase increases by $\sqrt{3}$.)				10 mA max. at 400 VAC		10 mA max. at 200 VAC			10 mA max. at 400 VAC		10 mA max. at 200 VAC	
	di/dt (A/μs)	50	50	50	50	50		50	50	50	50		50	50
	dv/dt (V/μs)	100	100	100	100	500		100	100	100	500		100	100
	I^2t (A^2s)	121	1260	121	1260	260		121	1,260	2,660	260		121	1,260
	Tj (°C) max.	125	130	125	130	125		125	130	125	125		125	130
Rated supply voltage		12 to 24 VDC, 100 to 240 VAC				12 to 24 VDC								
Reverse polarity protection for input		DC input: Yes (–26.4 VDC max.) AC input: ---				Yes (–26.4 VDC max.)								
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min				2,500 VAC, 50/60 Hz for 1 min								
Ambient temperature (operating)		–20° to 60°C (with no icing or condensation)				–20° to 60°C (with no icing or condensation)								
Function	**Zero cross**	No				No								
	Operation indicator	Yes				Yes								
	Built-in varistor	Yes				Yes								
Terminal type	**Plug-in**	No				No								
	Screw	Yes				Yes								
	Tab	No				No								
	PCB	No				No								
	Mounting method	Panel mounting (DIN track mounting)				Panel mounting (DIN track mounting)								
Certified standards		UL, CSA				UL, CSA					UL, CSA, KEMA, CE			
Socket		---				---								
Weight		Approx. 700 g				Approx. 730 g				Approx. 800 g	Approx. 730 g			
Page No.		96				99					102			

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

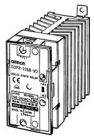
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type
Model		G3PC
		G3PC-220B-VD
Appearance and dimensions (W x H x D) (mm)		 22.5 x 80 x 130
Features		• Failure detection • Slim design
Output	**Insulation**	Phototriac
	Element	Triac
	Load voltage	75 to 264 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})
	Maximum switching current	20 A
	Leakage current	10 mA max. at 200 VAC
	di/dt (A/μs)	50
	dv/dt (V/μs)	100
	I^2t (A^2s)	260
	Tj (°C) max.	125
Rated input voltage		12 to 24 VDC
Reverse polarity protection for input		Yes (–30 VDC max.)
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min
Ambient temperature (operating)		–20° to 60°C (with no icing or condensation)
Function	**Zero cross**	Yes
	Operation indicator	Yes
	Built-in varistor	Yes
Terminal type	**Plug-in**	No
	Screw	Yes
	Tab	No
	PCB	No
	Mounting method	Panel mounting (DIN track mounting)
Certified standards		UL, CSA, VDE, CE
Socket		---
Weight		Approx. 300 g
Page No.		121

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

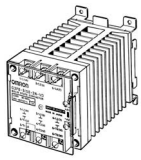
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type			
Model		G3PB			
		G3PB-215B-VD	G3PB-225B-VD	G3PB-235B-VD	G3PB-245B-VD
Appearance and dimensions (W x H x D) (mm)		 22.5 x 80 x 100		 44.5 x 80 x 100	
Features		•Monoblock construction incorporating a heat sink •Thin profile SSR			
Output	**Insulation**	Phototriac			
	Element	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC			
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})			
	Maximum switching current	15 A	25 A	35 A	45 A
	Leakage current	10 mA max. at 200 VAC			
	di/dt (A/μs)	50		50	
	dv/dt (V/μs)	100		100	
	I^2t (A^2s)	260		2,660	
	Tj (°C) max.	130		125	
Rated input voltage		12 to 24 VDC			
Reverse polarity protection for input		Yes (–30 VDC max.)			
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min			
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			
Function	**Zero cross**	Yes			
	Operation indicator	Yes			
	Built-in varistor	Yes			
Terminal type	**Plug-in**	No			
	Screw	Yes			
	Tab	No			
	PCB	No			
	Mounting method	Panel mounting (DIN track mounting)			
Certified standards		UL, CSA, VDE, CE			
Socket		---			
Weight		Approx. 240 g		Approx. 400 g	
Page No.		128			

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

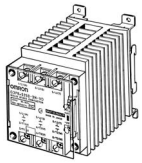
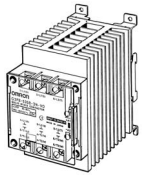
3. The selection guide tables provided only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type					
Model		G3PB					
		G3PB-215B-2N-VD	G3PB-515B-2N-VD	G3PB-225B-2N-VD	G3PB-525B-2N-VD	G3PB-215B-3N-VD	G3PB-515B-3N-VD
Appearance and dimensions (W x H x D) (mm)		 80 x 80.5 x 150.5					
Features		• Integrated 3-phase structure • 2-element type				• 3-element type	
Output	**Insulation**	Phototriac coupler					
	Element	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 528 VAC	75 to 264 VAC	180 to 528 VAC	75 to 264 VAC	180 to 528 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,200 (V_{DRM})	600 (V_{DRM})	1,200 (V_{DRM})	600 (V_{DRM})	1,200 (V_{DRM})
	Maximum switching current	15 A		25 A		15 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC
		With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.					
	di/dt (A/μs)	50	50	50	50	50	50
	dv/dt (V/μs)	100	500	100	500	100	500
	I^2t (A^2s)	260	260	2,660	1,040	260	260
	Tj (°C) max.	130	125	125	125	130	125
Rated input voltage		12 to 24 VDC					
Reverse polarity protection for input		Yes (–30 VDC max.)					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes					
	Operation indicator	Yes					
	Built-in varistor	Yes					
Terminal type	**Plug-in**	No					
	Screw	Yes					
	Tab	No					
	PCB	No					
	Mounting method	Panel mounting (DIN track mounting)					
Certified standards		UL, CSA, VDE, CE					
Socket		---					
Weight		Approx. 1.25 Kg					
Page No.		137					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

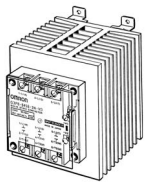
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type							
Model		G3PB							
		G3PB-235B-2N-VD	G3PB-535B-2N-VD	G3PB-225B-3N-VD	G3PB-525B-3N-VD	G3PB-245B-2N-VD	G3PB-545B-2N-VD	G3PB-235B-3N-VD	G3PB-535B-3N-VD
Appearance and dimensions (W x H x D) (mm)		 80 x 100 x 150.5				 80 x 120 x 150.5			
Features		• 2-element type		• 3-element type		• Integrated 3-phase structure • 2-element type		• 3-element type	
Output	**Insulation**	Phototriac coupler							
	Element	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 528 VAC	75 to 264 VAC	180 to 528 VAC	75 to 264 VAC	180 to 528 VAC	75 to 264 VAC	180 to 528 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,200 (V_{DRM})	600 (V_{DRM})	1,200 (V_{DRM})	600 (V_{DRM})	1,200 (V_{DRM})	600 (V_{DRM})	1,200 (V_{DRM})
	Maximum switching current	35 A		25 A		45 A		35 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC
		With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.				With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.			
	di/dt (A/μs)	50	50	50	50	50	50	50	50
	dv/dt (V/μs)	100	100	100	100	100	100	100	100
	I^2t (A^2s)	2,660	1,040	2,660	1,040	2,660	1,040	2,660	1,040
	Tj (°C) max.	125	125	125	125	125	125	125	125
Rated input voltage		12 to 24 VDC							
Reverse polarity protection for input		Yes (–30 VDC max.)							
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min							
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)							
Function	**Zero cross**	Yes							
	Operation indicator	Yes							
	Built-in varistor	Yes							
Terminal type	**Plug-in**	No							
	Screw	Yes							
	Tab	No							
	PCB	No							
	Mounting method	Panel mounting (DIN track mounting)							
Certified standards		UL, CSA, VDE, CE							
Socket		---							
Weight		Approx. 1.45 Kg				Approx. 1.65 Kg			
Page No.		137							

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

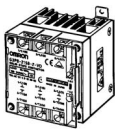
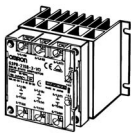
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type	
Model		G3PB	
		G3PB-245B-3N-VD	G3PB-545B-3N-VD
Appearance and dimensions (W x H x D) (mm)		 110 x 120 x 150.5	
Features		• Integrated 3-phase structure • 3-element type	
Output	**Insulation**	Phototriac coupler	
	Element	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 528 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,200 (V_{DRM})
	Maximum switching current	45 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC
	di/dt (A/μs)	50	50
	dv/dt (V/μs)	100	500
	I^2t (A^2s)	2,660	1,040
	Tj (°C) max.	125	125
Rated input voltage		12 to 24 VDC	
Reverse polarity protection for input		Yes (–30 VDC max.)	
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min	
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)	
Function	**Zero cross**	Yes	
	Operation indicator	Yes	
	Built-in varistor	Yes	
Terminal type	**Plug-in**	No	
	Screw	Yes	
	Tab	No	
	PCB	No	
	Mounting method	Panel mounting (DIN track mounting)	
Certified standards		UL, CSA, VDE, CE	
Socket		---	
Weight		Approx. 2.0 Kg	
Page No.		137	

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

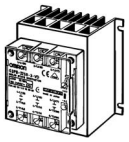
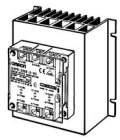
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type					
Model		G3PB					
		G3PB-215B-2-VD	G3PB-415B-2-VD	G3PB-225B-2-VD	G3PB-425B-2-VD	G3PB-215B-3-VD	G3PB-415B-3-VD
Appearance and dimensions (W x H x D) (mm)		 80 x 80.5 x 85.5		 110.5 x 80.5 x 100.5			
Features		• Integrated 3-phase structure • 2-element type				• 3-element type	
Output	**Insulation**	Phototriac coupler					
	Element	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 440 VAC	75 to 264 VAC	180 to 440 VAC	75 to 264 VAC	180 to 440 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,000 (V_{DRM})	600 (V_{DRM})	1,000 (V_{DRM})	600 (V_{DRM})	1,000 (V_{DRM})
	Maximum switching current	15 A		25 A		15 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC
		With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.					
	di/dt (A/μs)	50	50	50	50	50	50
	dv/dt (V/μs)	100	500	100	500	100	500
	I^2t (A^2s)	260	260	2,660	1,040	260	260
	Tj (°C) max.	130	125	125	125	130	125
Rated input voltage		12 to 24 VDC					
Reverse polarity protection for input		Yes (–30 VDC max.)					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes					
	Operation indicator	Yes					
	Built-in varistor	Yes					
Terminal type	**Plug-in**	No					
	Screw	Yes					
	Tab	No					
	PCB	No					
	Mounting method	Panel mounting (DIN track mounting)		Panel mounting			
Certified standards		UL, CSA, VDE, CE					
Socket		---					
Weight		Approx. 750 g		Approx. 750 g			
Page No.		149					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

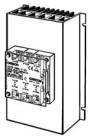
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type							
Model		G3PB							
		G3PB-235B-2-VD	G3PB-435B-2-VD	G3PB-225B-3-VD	G3PB-425B-3-VD	G3PB-245B-2-VD	G3PB-445B-2-VD	G3PB-235B-3-VD	G3PB-435B-3-VD
Appearance and dimensions (W x H x D) (mm)		 110.5 x 110.5 x 100.5				 130.5 x 130.5 x 100.5			
Features		• 2-element type		• 3-element type		• Integrated 3-phase structure • 2-element type		• 3-element type	
Output	**Insulation**	Phototriac coupler							
	Element	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 440 VAC	75 to 264 VAC	180 to 440 VAC	75 to 264 VAC	180 to 440 VAC	75 to 264 VAC	180 to 440 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,000 (V_{DRM})	600 (V_{DRM})	1,000 (V_{DRM})	600 (V_{DRM})	1,000 (V_{DRM})	600 (V_{DRM})	1,000 (V_{DRM})
	Maximum switching current	35 A		25 A		45 A		35 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC	10 mA max. at 200 VAC	20 mA max. at 400 VAC
		With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.				With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.			
	di/dt (A/μs)	50	50	50	50	50	50	50	50
	dv/dt (V/μs)	100	100	100	100	100	100	100	100
	I^2t (A^2s)	2,660	1,040	2,660	1,040	2,660	1,040	2,660	1,040
	Tj (°C) max.	125	125	125	125	125	125	125	125
Rated input voltage		12 to 24 VDC							
Reverse polarity protection for input		Yes (–30 VDC max.)							
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min							
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)							
Function	**Zero cross**	Yes							
	Operation indicator	Yes							
	Built-in varistor	Yes							
Terminal type	**Plug-in**	No							
	Screw	Yes							
	Tab	No							
	PCB	No							
	Mounting method	Panel mounting							
Certified standards		UL, CSA, VDE, CE							
Socket		---							
Weight		Approx. 900 g				Approx. 1,150 g			
Page No.		149							

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

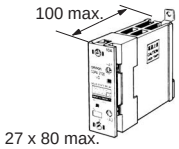
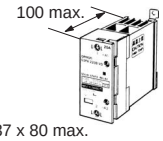
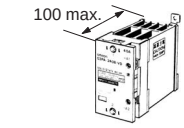
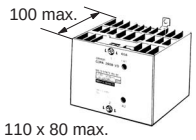
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type	
Model		G3PB	
		G3PB-245B-3-VD	G3PB-445B-3-VD
Appearance and dimensions (W x H x D) (mm)		 130.5 x 190.5 x 100.5	
Features		• Integrated 3-phase structure • 3-element type	
Output	**Insulation**	Phototriac coupler	
	Element	Triac	Triac
	Load voltage	75 to 264 VAC	180 to 440 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1,000 (V_{DRM})
	Maximum switching current	45 A	
	Leakage current	10 mA max. at 200 VAC	20 mA max. at 400 VAC
		With the 2-element type, the leakage current for the S-phase increases by a factor of approx. $\sqrt{3}$.	
	di/dt (A/μs)	50	50
	dv/dt (V/μs)	100	500
	I^2t (A^2s)	2,660	1,040
	Tj (°C) max.	125	125
Rated input voltage		12 to 24 VDC	
Reverse polarity protection for input		Yes (–30 VDC max.)	
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min	
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)	
Function	**Zero cross**	Yes	
	Operation indicator	Yes	
	Built-in varistor	Yes	
Terminal type	**Plug-in**	No	
	Screw	Yes	
	Tab	No	
	PCB	No	
	Mounting method	Panel mounting	
Certified standards		UL, CSA, VDE, CE	
Socket		---	
Weight		Approx. 1,500 g	
Page No.		149	

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

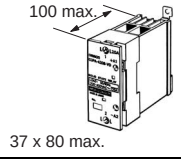
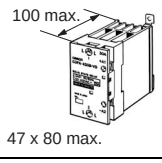
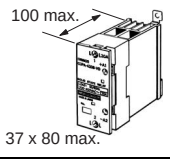
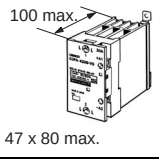
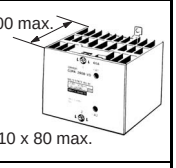
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type			
Model		G3PA			
		G3PA- 210B-VD	G3PA- 220B-VD	G3PA- 240B-VD	G3PA- 260B-VD
Appearance and dimensions (W x H x D) (mm)					
Features		• Monoblock construction incorporating a heat sink • Subminiature, thin profile SSR • Replaceable power cartridge			
Output	**Insulation**	Phototriac coupler			
	Element	Triac	Triac	Triac	Triac
	Load voltage	19 to 264 VAC			
	Maximum switching current	10 A	20 A	40 A	60 A
	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	
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})			
	di/dt (A/μs)	50			
	dv/dt (V/μs)	100			
	I^2t (A^2s)	260		1,260	
	Tj (°C) max.	125			
Rated input voltage		5 to 24 VDC			
Reverse polarity protection for input		Yes (–30 VDC max.)			
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min			
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			
Function	**Zero cross**	Yes			
	Operation indicator	Yes			
	Built-in varistor	Yes			
Terminal type	**Plug-in**	No			
	Screw	Yes			
	Tab	No			
	PCB	No			
	Mounting method	Panel mounting (DIN track mounting)			
Magnet relay with compatible terminals		---			
Certified standards		UL, CSA, VDE, CE			
Socket		---			
Weight		Approx. 260 g	Approx. 340 g	Approx. 460 g	Approx. 900 g
Page No.		166			

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

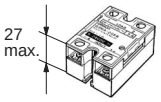
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type				
Model		G3PA				
		G3PA- 420B-VD	G3PA- 430B-VD	G3PA- 420B-VD-2	G3PA- 430B-VD-2	G3PA- 450B-VD-2
Appearance and dimensions (W x H x D) (mm)						
Features		• Monoblock construction incorporating a heat sink • Subminiature, thin profile SSR • Replaceable power cartridge				
Output	**Insulation**	Phototriac coupler				
	Element	Triac	Triac	Triac	Triac	Triac
	Load voltage	150 to 440 VAC		180 to 528 VAC		
	Maximum switching current	20 A	30 A	20 A	30 A	50 A
	Leakage current	20 mA max. at 400 VAC		20 mA max. at 480 VAC		
	V_{DRM}, V_{CEO}, V_{DS} (V)	1000 (V_{DRM})		1200 (V_{DRM})		
	di/dt (A/μs)	100		100		
	dv/dt (V/μs)	300		300		
	I^2t (A^2s)	260	1800	1800		
	Tj (°C) max.	125				
Rated input voltage		12 to 24 VDC				
Reverse polarity protection for input		Yes (–30 VDC max.)				
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min				
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				
Function	**Zero cross**	Yes				
	Operation indicator	Yes				
	Built-in varistor	Yes				
Terminal type	**Plug-in**	No				
	Screw	Yes				
	Tab	No				
	PCB	No				
	Mounting method	Panel mounting (DIN track mounting)				
Magnet relay with compatible terminals		---				
Certified standards		UL, CSA, VDE, CE				
Socket		---				
Weight		Approx. 290 g	Approx. 410 g	Approx. 290 g	Approx. 410 g	Approx. 900 g
Page No.		166				

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

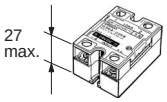
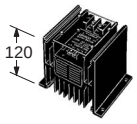
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type				
Model		G3NA				
		G3NA-205B	G3NA-210B	G3NA-220B	G3NA-240B	G3NA-410B
Appearance and dimensions (W x H x D) (mm)		 43 x 58 max.				
Features		• All models are of the same size. • Provided with terminal protection covers.				
Output	**Insulation**	Phototriac DC input or photocoupler AC input				Photocoupler
	Element	Triac	Triac	Triac	Triac	Thyristor
	Load voltage	19 to 264 VAC				180 to 528 VAC
	Maximum switching current	5 A	10 A	20 A	40 A	10 A
	Leakage current	5 mA max. at 100 VAC 10 mA max. at 200 VAC				10 mA max. at 200 VAC 20 mA max. at 400 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})				1,200 (V_{DRM})
	di/dt (A/μs)	100	50			100
	dv/dt (V/μs)	200	100			300
	I^2t (A^2s)	24.5	112.5	260	1260	260
	Tj (°C) max.	125				
Rated input voltage		5 to 24 VDC, 100 to 120 VAC, 200 to 240 VAC				5 to 24 VDC, 100 to 240 VAC
Reverse polarity protection for input		Yes (–30 VDC max.)				
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min				
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				
Function	**Zero cross**	Yes				
	Operation indicator	Yes				
	Built-in varistor	Yes				
Terminal type	**Plug-in**	No				
	Screw	Yes				
	Tab	No				
	PCB	No				
	Mounting method	Panel mounting				
Magnet relay with compatible terminals		---				
Certified standards		UL, CSA, TÜV (with -UTU version), CE				UL, CSA
Socket		---				
Weight		Approx. 60 g			Approx. 70 g	Approx. 80 g
Page No.		188				

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

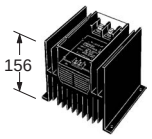
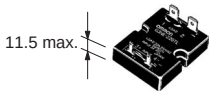
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type				
Model		G3NA			G3NH	
		G3NA-420B	G3NA-440B	G3NA-D210B	G3NH-2075B	G3NH-4075B
Appearance and dimensions (W x H x D) (mm)		 43 x 58 max.			 150 x 120	
Features		• All models are of the same size. • Provided with terminal protection covers.			• Controlling high-power loads • Heat sink incorporated • Replaceable power cartridge	
Output	**Insulation**	Photocoupler			Photocoupler	
	Element	Thyristor	Thyristor	Transistor	Thyristor	Thyristor
	Load voltage	180 to 528 VAC		4 to 220 VDC	75 to 264 VAC	150 to 484 VAC
	Maximum switching current	20 A	40 A	10 A	75 A	
	Leakage current	10 mA max. at 200 VAC 20 mA max. at 400 VAC		5 mA max. at 200 VDC	30 mA max. at 200 VAC 60 mA max. at 400 VAC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	1,200 (V_{DRM})		400 (V_{CEO})	600 (V_{DRM})	1,200 (V_{DRM})
	di/dt (A/μs)	100		---	150	
	dv/dt (V/μs)	300		---	500	
	I^2t (A^2s)	260	1,800	---	12,800	
	Tj (°C) max.	125		150	125	
Rated input voltage		5 to 24 VDC, 100 to 240 VAC			5 to 24 VDC, 100 to 240 VAC	
Reverse polarity protection for input		Yes (–32 VDC max.)			Yes (–30 VDC max.)	
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min			2,500 VAC, 50/60 Hz for 1 min	
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)	
Function	**Zero cross**	Yes		No	Yes	
	Operation indicator	Yes		Yes	Yes	
	Built-in varistor	Yes		No	Yes	
Terminal type	**Plug-in**	No			No	
	Screw	Yes			Yes	
	Tab	No			No	
	PCB	No			No	
	Mounting method	Panel mounting			Panel mounting	
Magnet relay with compatible terminals		---			---	
Certified standards		UL, CSA		UL, CSA, TÜV (with -UTU version), CE	---	
Socket		---			---	
Weight		Approx. 80 g		Approx. 70 g	Approx. 1.8 kg	
Page No.		188			198	

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

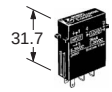
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Control panel mounting type							
Model		G3NH		G3NE					
		G3NH-2150B	G3NH-4150B	G3NE-205T-US	G3NE-205TL-US	G3NE-210T-US	G3NE-210TL-US	G3NE-220T-US	G3NE-220TL-US
Appearance and dimensions (W x H x D) (mm)		 186 x 156		 37.5 x 47 max.					
Features		• Controlling high-power loads • Heat sink incorporated • Replaceable power cartridge		• Miniature, low-cost SSR • Tab terminals					
Output	**Insulation**	Photocoupler		Phototriac					
	Element	Thyristor	Thyristor	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC	150 to 484 VAC	75 to 264 VAC					
	Maximum switching current	150 A		5 A		10 A		20 A	
	Leakage current	30 mA max. at 200 VAC 60 mA max. at 400 VAC		5 mA max. at 100 VAC 10 mA max. at 200 VAC					
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	1200 (V_{DRM})	600 (V_{DRM})					
	di/dt (A/μs)	200		100		50			
	dv/dt (V/μs)	500		200		500		100	
	I^2t (A^2s)	26,500		24.5		60		260	
	Tj (°C) max.	125		125					
Rated input voltage		5 to 24 VDC, 100 to 240 VAC		5, 12, 24 VDC					
Reverse polarity protection for input		Yes (–30 VDC max.)		Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min		2,000 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes		Yes	No	Yes	No	Yes	No
	Operation indicator	Yes		No					
	Built-in varistor	Yes		Yes					
Terminal type	**Plug-in**	No		No					
	Screw	Yes		No					
	Tab	No		Yes					
	PCB	No		No					
	Mounting method	Panel mounting		Panel mounting					
Magnet relay with compatible terminals		---		---					
Certified standards		---		UL, CSA, TÜV, CE					
Socket		---		---					
Weight		Approx. 3.0 kg		Approx. 37 g					
Page No.		198		203					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

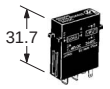
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type		
Model		G3TA		
		G3TA-IAZR02S-US	G3TA-IDZR02S-US	G3TA-IDZR02SM-US
Appearance and dimensions (W x H x D) (mm)		I/O SSR input module  33.5 x 10 max.		
Features		• Mounting to I/O relay terminals • Compatible with OMRON's G7T		
Output	**Insulation**	Photocoupler		
	Element	Transistor	Transistor	Transistor
	Load voltage	4 to 32 VDC		
	Maximum switching current	25 mA		
	Leakage current	5 μA max. at 32 VDC		0.1 mA max. at 32 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	80 (V_{CEO})		
	di/dt (A/μs)	---		
	dv/dt (V/μs)	---		
	I^2t (A^2s)	---		
	Tj (°C) max.	150		
Rated input voltage		100 to 240 VAC	5 to 24 VDC	4 to 24 VDC
Reverse polarity protection for input		---	Yes (–32 VDC max.)	
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min		
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)		
Function	**Zero cross**	No		
	Operation indicator	Yes		No
	Built-in varistor	No		
Terminal type	**Plug-in**	Yes		Yes
	Screw	No		
	Tab	No		
	PCB	No		
	Mounting method	Socket mounting		
Magnet relay with compatible terminals		G7T 		
Certified standards		UL, CSA		
Socket		P7TF-IS16, P7TF-OS16, P7TF-05		
Weight		Approx. 16 g		
Page No.		207		

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

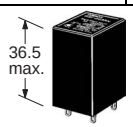
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type			
Model		G3TA			
		G3TA-OA202SZ-US	G3TA-OA202SL-US	G3TA-ODX02S-US	G3TA-OD201S-US
Appearance and dimensions (W x H x D) (mm)		I/O SSR output module  31.7 33.5 x 10 max.			
Features		• Mounting to I/O relay terminals • Compatible with OMRON's G7T			
Output	**Insulation**	Phototriac		Photocoupler	
	Element	Triac	Triac	Transistor	Transistor
	Load voltage	75 to 264 VAC		4 to 60 VDC	40 to 200 VDC
	Maximum switching current	2 A			1 A
	Leakage current	5 mA max. at 200 VAC		1 mA max. at 60 VDC	1 mA max. at 200 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})		80 (V_{CEO})	400 (V_{CEO})
	di/dt (A/μs)	50		---	---
	dv/dt (V/μs)	250		---	---
	I^2t (A^2s)	18		---	---
	Tj (°C) max.	125		150	150
Rated input voltage		12, 24 VDC			
Reverse polarity protection for input		Yes (12 VDC: –13.2 VDC max.; 24 VDC: –26.4 VDC max.)			
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min			
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			
Function	**Zero cross**	Yes	No		
	Operation indicator	Yes			
	Built-in varistor	No			
Terminal type	**Plug-in**	Yes			
	Screw	No			
	Tab	No			
	PCB	No			
	Mounting method	Socket mounting			
Magnet relay with compatible terminals		G7T 			
Certified standards		UL, CSA			
Socket		P7TF-IS16, P7TF-OS16, P7TF-OS08, P7TF-05			
Weight		Approx. 23 g			
Page No.		207			

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

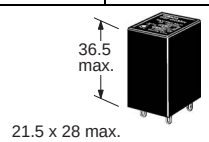
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type				
Model		G3F/G3FD				
		G3F-203SN-VD	G3F-203S-VD	G3F-203SLN-VD	G3F-203SL-VD	G3F-202SN-VD
Appearance and dimensions (W x H x D) (mm)						
Features		Compatible with OMRON's MY (general-purpose relay)				
Output	**Insulation**	Photocoupler		Phototriac		Photocoupler
	Element	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 264 VAC				
	Maximum switching current	3 A				2 A
	Leakage current	5 mA max. at 100 VAC 10 mA max. at 200 VAC		2.5 mA max. at 100 VAC 5 mA max. at 200 VAC		5 mA max. at 100 VAC 10 mA max. at 200 VAC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})				
	di/dt (A/μs)	50				
	dv/dt (V/μs)	250				
	I^2t (A^2s)	18				
	Tj (°C) max.	125				
Rated input voltage		5 to 24 VDC	4 to 24 VDC	5, 12, 24 VDC		100/110 VAC, 200/220 VAC
Reverse polarity protection for input		Yes (–28 VDC max.)		Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)		---
Dielectric strength (between input and output terminals)		1,500 VAC, 50/60 Hz for 1 min				
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				
Function	**Zero cross**	Yes		No		Yes
	Operation indicator	Yes	No	Yes	No	Yes
	Built-in varistor	No				
Terminal type	**Plug-in**	Yes				
	Screw	No				
	Tab	No				
	PCB	No				
	Mounting method	Socket mounting				
Magnet relay with compatible terminals		MY 				
Certified standards		UL, CSA, VDE, CE				
Socket		PYF08A, PY08, PY08-02, PY08QN(2), PYF08A-E				
Weight		Approx. 50 g				
Page No.		214				

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

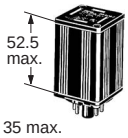
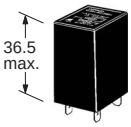
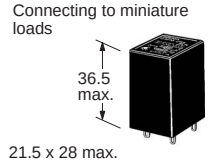
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type			
Model		G3F/G3FD			
		G3FD-X03SN-VD	G3FD-X03S-VD	G3FD-102SN-VD	G3FD-102S-VD
Appearance and dimensions (W x H x D) (mm)					
Features		Compatible with OMRON's MY (general-purpose relay)			
Output	**Insulation**	Photocoupler			
	Element	Transistor	Transistor	Transistor	Transistor
	Load voltage	3 to 52.8 VDC		3 to 125 VDC	
	Maximum switching current	3 A		2 A	
	Leakage current	5 mA max. at 50 VDC		0.1 mA max. at 100 VDC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	80 (V_{CEO})		200 (V_{DRM})	
	di/dt (A/μs)	---			
	dv/dt (V/μs)	---			
	I^2t (A^2s)	---			
	Tj (°C) max.	150			
Rated input voltage		5 to 24 VDC	4 to 24 VDC	5 to 24 VDC, 100/110 VAC, 200/220 VAC	4 to 24 VDC
Reverse polarity protection for input		Yes (–28 VDC max.)		Yes (5 to 24 VDC: –28 VDC max.; AC input: ---)	Yes (–28 VDC max.)
Dielectric strength (between input and output terminals)		1,500 VAC, 50/60 Hz for 1 min			
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			
Function	**Zero cross**	No			
	Operation indicator	Yes	No	Yes	No
	Built-in varistor	No			
Terminal type	**Plug-in**	Yes			
	Screw	No			
	Tab	No			
	PCB	No			
	Mounting method	Socket mounting			
Magnet relay with compatible terminals		MY 			
Certified standards		UL, CSA, VDE, CE			
Socket		PYF08A, PY08, PY08-02, PY08QN(2), PYF08A-E			
Weight		Approx. 50 g			
Page No.		214			

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

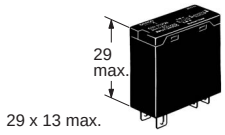
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type					
Model		G3B/G3BD		G3H/G3HD			G3FM
		G3B-205S-VD	G3BD-103S-VD	G3H-203SN-VD	G3H-203SLN-VD	G3HD-X03SN-VD	G3FM-2R5SLN
Appearance and dimensions (W x H x D) (mm)							
Features		Compatible with OMRON's MK		Compatible with OMRON's LY			• No bleeder resistor • AC/DC SSR
Output	**Insulation**	Phototriac	Photocoupler	Phototriac	Phototriac	Photocoupler	Photodiode array
	Element	Triac	Transistor	Triac	Triac	Transistor	MOSFET
	Load voltage	75 to 264 VAC	3 to 125 VDC	75 to 264 VAC		3 to 52.8 VDC	19.2 to 264 VAC, 19.2 to 125 VDC
	Maximum switching current	5 A	3 A	3 A			0.5 A
	Leakage current	5 mA max. at 100 VAC, 10 mA max. at 200 VAC	5 mA max. at 125 VAC	5 mA max. at 100 VAC 10 mA max. at 200 VAC	2.5 mA max. at 100 VAC 5 mA max. at 200 VAC	5 mA max. at 50 VDC	0.1 mA max. at 125 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	150 (V_{CEO})	600 (V_{DRM})		80 (V_{CEO})	500 (V_{DS})
	di/dt (A/μs)	50	---	50		---	---
	dv/dt (V/μs)	500	---	250		---	---
	I^2t (A^2s)	41.6	---	18		---	---
	Tj (°C) max.	125	150	125		150	150
Rated input voltage		5 to 24 VDC		5 to 24 VDC	5, 12, 24 VDC	5 to 24 VDC	5, 12, 24 VDC
Reverse polarity protection for input		Yes (–30 VDC max.)		Yes (–28 VDC max.)	Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)	Yes (–28 VDC max.)	Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)
Dielectric strength (between input and output terminals)		1,500 VAC, 50/60 Hz for 1 min		1,500 VAC, 50/60 Hz for 1 min			1,500 VAC, 50/60 Hz for 1 min
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)		–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)
Function	**Zero cross**	Yes	No	Yes	No		No
	Operation indicator	Yes		Yes (Models with no operation indicator are available.)			Yes
	Built-in varistor	No		No			No
Terminal type	**Plug-in**	Yes		Yes			Yes
	Screw	No		No			No
	Tab	No		No			No
	PCB	No		No			No
	Mounting method	Socket mounting		Socket mounting			Socket mounting
Magnet relay with compatible terminals		MK 		LY 			MY 
Certified standards		UL, CSA, VDE, CE		UL, CSA, VDE, CE			---
Socket		PF083A, PL08, PLE08-0, PL08-Q, PF083A-E		PTF08A, PT08, PT08-0, PT08QN, PTF08A-E			PYF08A, PY08, PY08-02, PY08QN(2), PYF08A-E
Weight		Approx. 70 g		Approx. 50 g			Approx. 50 g
Page No.		220		224			228

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

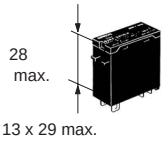
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type						
Model		G3R I/O						
		G3R-IAZR1SN-UTU	G3R-IDZR1SN-UTU	G3R-IDZR1SN-1-UTU	G3R-OA202SZN-UTU	G3R-OA202SLN-UTU	G3R-ODX02SN-UTU	G3R-OD201SN-UTU
Appearance and dimensions (W x H x D) (mm)		I/O SSR Input Module			I/O SSR Output Module			
								
Features		• Compatible with OMRON's G2R • For mounting G70A-ZOC16 Relay Terminal Socket • For mounting G730-R or G730-Z Remote I/O Terminal						
Output	**Insulation**	Photocoupler			Phototriac		Photocoupler	
	Element	Transistor	Transistor	Transistor	Triac	Triac	Transistor	Transistor
	Load voltage	4 to 32 VDC			75 to 264 VAC		4 to 60 VDC	40 to 200 VDC
	Maximum switching current	100 mA			2 A		2 A	1 A
	Leakage current	5 μA max. at 32 VDC			1.5 mA max. at 200 VAC		1 mA max. at 50 VDC	1 mA max. at 200 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	80 (V_{CEO})			600 (V_{DRM})		80 (V_{CEO})	400 (V_{CEO})
	di/dt (A/μs)	---			30		---	
	dv/dt (V/μs)	---			300		---	
	I^2t (A^2s)	---			10.4		---	
	Tj (°C) max.	150			125		150	
Rated input voltage		100 to 240 VAC	5, 12 to 24 VDC		5 to 24 VDC			
Reverse polarity protection for input		---	Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)		Yes (–32 VDC max.)			
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min						
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)						
Function	**Zero cross**	No			Yes	No		
	Operation indicator	Yes			Yes	Yes		
	Built-in varistor	No						
Terminal type	**Plug-in**	Yes			Yes	Yes		
	Screw	No						
	Tab	No						
	PCB	No						
	Mounting method	Socket mounting						
Magnet relay with compatible terminals		G2R-1-S 						
Certified standards		UL, CSA, TÜV (with -UTU version), CE						
Socket		P2RF-05, P2RF-05-E, P2R-05P, P2R-05A, P2R-057P			P2RF-05, P2R-05P, P2R-05A, P2R-057P, P2RF-05-E			
Weight		Approx. 18 g						
Page No.		231						

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

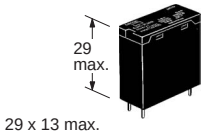
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		Socket mounting type
Model		G3RZ
		G3RZ-201SLN
Appearance and dimensions (W x H x D) (mm)		
Features		• Leakage current of 10 μA max. • Input resistor and varistor incorporated • Same shape as G2R • AC/DC SSR
Output	**Insulation**	Photodiode array
	Element	MOSFET
	Load voltage	3 to 264 VAC, 3 to 125 VDC
	Maximum switching current	1.0 A
	Leakage current	10 μA max. at 125 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	500 (V_{DS})
	di/dt (A/μs)	---
	dv/dt (V/μs)	---
	I^2t (A^2s)	---
	Tj (°C) max.	150
Rated input voltage		5, 12, 24 VDC
Reverse polarity protection for input		Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min
Ambient temperature (operating)		–30° to 85°C (with no icing or condensation)
Function	**Zero cross**	No
	Operation indicator	Yes
	Built-in varistor	Yes
Terminal type	**Plug-in**	Yes
	Screw	No
	Tab	No
	PCB	No
	Mounting method	Socket mounting
Magnet relay with compatible terminals		G2R 
Certified standards		---
Socket		P2RF-05 (E), P2R-05P, P2R-05A, P2R-057P
Weight		Approx. 20 g
Page No.		241

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

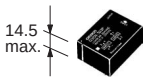
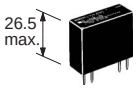
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type					
Model		G3R/G3RD					
		G3R-102PN-US	G3R-102PLN-US	G3R-202PN-US	G3R-202PLN-US	G3RD-101PN-US	G3RD-X02PN-US
Appearance and dimensions (W x H x D) (mm)							
Features		Compatible with OMRON's G2R					
Output	**Insulation**	Phototriac				Photocoupler	
	Element	Triac	Triac	Triac	Triac	Transistor	Transistor
	Load voltage	75 to 132 VAC		75 to 264 VAC		3 to 125 VDC	3 to 52.8 VDC
	Maximum switching current	2 A				1.5 A	2 A
	Leakage current	2 mA max. at 100 VAC		2 mA max. at 100 VAC 5 mA max. at 200 VAC		0.1 mA max. at 125 VDC	0.1 mA max. at 50 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	400 (V_{DRM})		600 (V_{DRM})		180 (V_{CEO})	80 (V_{CEO})
	di/dt (A/μs)	30				---	
	dv/dt (V/μs)	300				---	
	I^2t (A^2s)	10.4				---	
	Tj (°C) max.	125				150	
Rated input voltage		5, 12, 24 VDC					
Reverse polarity protection for input		Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.)					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes	No	Yes	No		
	Operation indicator	Yes					
	Built-in varistor	No					
Terminal type	**Plug-in**	No					
	Screw	No					
	Tab	No					
	PCB	Yes					
	Mounting method	PCB mounting					
Magnet relay with compatible terminals		G2R 					
Certified standards		UL, CSA					
Socket		---					
Weight		Approx. 18 g					
Page No.		245					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

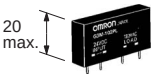
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type					
Model		G3CN					
		G3CN-202P(1)-US	G3CN-202PL(1)-US	G3CN-203P(1)-US	G3CN-203PL(1)-US	G3CN-DX02P(1)-US	G3CN-DX03P(1)-US
Appearance and dimensions (W x H x D) (mm)		 33 x 25 max.			Type (1)  33 x 14 max.		
Features		• Multiple input					
Output	**Insulation**	Photocoupler	Phototriac	Photocoupler	Phototriac	Photocoupler	
	Element	Triac	Triac	Triac	Triac	Transistor	Transistor
	Load voltage	75 to 264 VAC	75 to 264 VAC			3 to 52.8 VDC	
	Maximum switching current	2 A	2 A	3 A		2 A	3 A
	Leakage current	5 mA max. at 100 VAC 10 mA max. at 200 VAC	2.5 mA max. at 100 VAC 5 mA max. at 200 VAC	5 mA max. at 100 VAC, 10 mA max. at 200 VAC	2.5 mA max. at 100 VAC, 5 mA max. at 200 VAC	5 mA max. at 50 VDC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	600 (V_{DRM})			120 (V_{CEO})	80 (V_{CEO})
	di/dt (A/μs)	50	50			---	
	dv/dt (V/μs)	250	250			---	
	I^2t (A^2s)	18	18			---	
	Tj (°C) max.	125	125			150	
Rated input voltage		4 to 24 VDC	5, 12, 24 VDC	4 to 24 VDC	5, 12, 24 VDC	4 to 24 VDC	
Reverse polarity protection for input		Yes (5 VDC: –6 VDC max.; 12 VDC: –14.4 VDC max.; 24 VDC: –28.8 VDC max.; 4 to 24 VDC: –28 VDC max.)					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes	No	Yes	No		
	Operation indicator	No					
	Built-in varistor	No					
Terminal type	**Plug-in**	No					
	Screw	No					
	Tab	No					
	PCB	Yes					
	Mounting method	PCB mounting					
Magnet relay with compatible terminals		---					
Certified standards		UL, CSA					
Socket		---					
Weight		Approx. 25 g					
Page No.		249					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

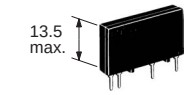
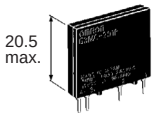
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type							PCB mounting type		
Model		G3M							G3MB		
		G3M-102PL	G3M-202PL	G3M-202P	G3M-203P	G3M-203PL	G3M-205P	G3M-205PL	G3MB-102PL	G3MB-202PL	G3MB-202P
Appearance and dimensions (W x H x D) (mm)		 20 max. 40 x 9 max.					 25 max. 40 x 7.6		 20.5 max. 24.5 x 5.5 max.		
Features		Miniature, low-cost SSR							Miniature, low-cost SSR		
Output	**Insulation**	Phototriac							Phototriac		
	Element	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 132 VAC	75 to 264 VAC						75 to 132 VAC	75 to 264 VAC	
	Maximum switching current	2 A			3 A		5 A		2 A		
	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				1 mA max. at 100 VAC	1.5 mA max. at 200 VAC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	400 (V_{DRM})	600 (V_{DRM})						400 (V_{DRM})	600 (V_{DRM})	
	di/dt (A/μs)	30					---		40		
	dv/dt (V/μs)	300					---		100		
	I^2t (A^2s)	10.4					---		4		
	Tj (°C) max.	125					---		125		
Rated input voltage		5, 12, 24 VDC							5, 12, 24 VDC		
Reverse polarity protection for input		No							No		
Dielectric strength (between input and output terminals)		2,000 VAC, 50/60 Hz for 1 min			2,500 VAC, 50/60 Hz for 1 min				2,500 VAC, 50/60 Hz for 1 min		
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)							–30° to 80°C (with no icing or condensation)		
Function	**Zero cross**	No		Yes		No	Yes	No	No		Yes
	Operation indicator	No					No		No		
	Built-in varistor	No					No		No		
Terminal type	**Plug-in**	No					No		No		
	Screw	No					No		No		
	Tab	No					No		No		
	PCB	Yes							Yes		
	Mounting method	PCB mounting							PCB mounting		
Magnet relay with compatible terminals		---							---		
Certified standards		UL, CSA, TÜV (with -UTU version)					UL, CSA VDE (with -VD version)		UL, CSA, TÜV (with -UTU version)		
Socket		---							---		
Weight		Approx. 15 g					Approx. 25 g		Approx. 5 g		
Page No.		255							260		

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

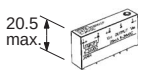
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type					
Model		G3MC					
		G3MC-101P	G3MC-101PL	G3MC-201P	G3MC-201PL	G3MC-202P	G3MC-202PL
Appearance and dimensions (W x H x D) (mm)							
Features		Miniature, low-cost SSR					
Output	**Insulation**	Phototriac					
	Element	Triac	Triac	Triac	Triac	Triac	Triac
	Load voltage	75 to 132 VAC		75 to 264 VAC		75 to 264 VAC	
	Maximum switching current	1 A				2 A	
	Leakage current	1 mA max. at 100 VAC		1.5 mA max. at 200 VAC		1.5 mA max. at 200 VAC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	400 (V_{DRM})		600 (V_{DRM})		600 (V_{DRM})	
	di/dt (A/μs)	50				40	
	dv/dt (V/μs)	300				100	
	I^2t (A^2s)	0.9				4	
	Tj (°C) max.	125					
Rated input voltage		5, 12, 24 VDC					
Reverse polarity protection for input		No					
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min					
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)					
Function	**Zero cross**	Yes	No	Yes	No	Yes	No
	Operation indicator	No					
	Built-in varistor	No					
Terminal type	**Plug-in**	No					
	Screw	No					
	Tab	No					
	PCB	Yes					
	Mounting method	PCB mounting					
Magnet relay with compatible terminals		---					
Certified standards		UL, CSA, VDE (with -VD version)					
Socket		---					
Weight		Approx. 2.5 g				Approx. 5 g	
Page No.		265					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type				
Model		G3TB				
		G3TB-IAZR02P-US	G3TB-IDZR02P-US	G3TB-OA203PZ-US	G3TB-OA203PZM-US	G3TB-OA203PL-US
Appearance and dimensions (W x H x D) (mm)		I/O SSR input module  43.5 x 10 max.		I/O SSR output module  43.5 x 10 max.		
Features		• Used for interfaces • Dielectric strength of 4,000 VAC between input and output terminals				
Output	**Insulation**	Photocoupler				
	Element	Transistor	Transistor	Triac	Triac	Triac
	Load voltage	4 to 32 VDC		75 to 264 VAC		
	Maximum switching current	25 mA		3 A		
	Leakage current	0.1 mA max. at 32 VDC		5 mA max. at 200 VAC		
	V_{DRM}, V_{CEO}, V_{DS} (V)	80 (V_{CEO})		600 (V_{DRM})		
	di/dt (A/μs)	---		50		
	dv/dt (V/μs)	---		250		
	I^2t (A^2s)	---		18		
	Tj (°C) max.	150		125		
Rated input voltage		100 to 240 VAC	4 to 24 VDC	5 to 24 VDC	4 to 24 VDC	5 to 24 VDC
Reverse polarity protection for input		---	Yes (–32 VDC max.)			
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min				
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				
Function	**Zero cross**	No		Yes		No
	Operation indicator	Yes			No	Yes
	Built-in varistor	No				
Terminal type	**Plug-in**	No				
	Screw	No				
	Tab	No				
	PCB	Yes				
	Mounting method	PCB mounting				
Magnet relay with compatible terminals		---				
Certified standards		UL, CSA				
Socket		---				
Weight		Approx. 22 g		Approx. 32 g		
Page No.		271				

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

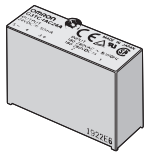
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type				
Model		G3TB				
		G3TB-OA203PLM-US	G3TB-ODX03P-US	G3TB-ODX03PM-US	G3TB-OD201P-US	G3TB-OD201PM-US
Appearance and dimensions (W x H x D) (mm)		I/O SSR output module  43.5 x 10 max.				
Features		• Used for interfaces • Dielectric strength of 4,000 VAC between input and output terminals				
Output	**Insulation**	Photocoupler				
	Element	Triac	Transistor	Transistor	Transistor	Transistor
	Load voltage	75 to 264 VAC	4 to 60 VDC		40 to 200 VDC	
	Maximum switching current	3 A			1.5 A	
	Leakage current	5 mA max. at 200 VAC	0.1 mA max. at 50 VDC		1 mA max. at 200 VDC	
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})	80 (V_{CEO})		400 (V_{CEO})	
	di/dt (A/μs)	50	---		---	
	dv/dt (V/μs)	250	---		---	
	I^2t (A^2s)	18	---		---	
	Tj (°C) max.	125	150		150	
Rated input voltage		4 to 24 VDC	5 to 24 VDC	4 to 24 VDC	5 to 24 VDC	4 to 24 VDC
Reverse polarity protection for input		Yes (–32 VDC max.)				
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min				
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				
Function	**Zero cross**	No				
	Operation indicator	No	Yes	No	Yes	No
	Built-in varistor	No				
Terminal type	**Plug-in**	No				
	Screw	No				
	Tab	No				
	PCB	Yes				
	Mounting method	PCB mounting				
Magnet relay with compatible terminals		---				
Certified standards		UL, CSA				
Socket		---				
Weight		Approx. 32 g				
Page No.		271				

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type								
Model		G3TC								
		G3TC-IDC5	G3TC-IDC15	G3TC-IDC24	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Appearance and dimensions (W x H x D) (mm)		 43.2 x 15.2 x 31.8			 43.2 x 15.2 x 31.8					
Features		• I/O modules with plug-in type of pin terminals • Dielectric strength of 4,000 VAC between input and output terminals								
Output	**Insulation**	Photocoupler			Photocoupler			Photocoupler		
	Element	Transistor			Transistor			Transistor		
	Load voltage	4.5 to 6 VDC	12 to 18 VDC	20 to 30 VDC	4.5 to 6 VDC	12 to 18 VDC	20 to 30 VDC	4.5 to 6 VDC	12 to 18 VDC	20 to 30 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	50 (V_{CEO})			50 (V_{CEO})			50 (V_{CEO})		
	Maximum switching current	50 mA max.			50 mA max.			50 mA max.		
	Leakage current	100 μA max.			100 μA max.			100 μA max.		
	di/dt (A/μs)	---			---			---		
	dv/dt (V/μs)	---			---			---		
	I^2t (A^2s)	---			---			---		
	Tj (°C) max.	150			150			150		
Rated input voltage		24 VDC/AC			120 VDC/AC			240 VDC/AC		
Reverse polarity protection for input		Yes (–32 VDC max.)			Yes (–140 VDC max.)			Yes (–280 VDC max.)		
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min			4,000 VAC, 50/60 Hz for 1 min			4,000 VAC, 50/60 Hz for 1 min		
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)		
Function	**Zero cross**	No			No			No		
	Operation indicator	No			No			No		
	Built-in varistor	No			No			No		
Terminal type	**Plug-in**	No			No			No		
	Screw	No			No			No		
	Tab	No			No			No		
	PCB	Yes			Yes			Yes		
	Mounting method	PCB mounting			PCB mounting			PCB mounting		
Certified standards		UL, CSA TÜV, CE			UL, CSA TÜV, CE			UL, CSA TÜV, CE		
Socket		---			---			---		
Weight		Approx. 40 g			Approx. 40 g			Approx. 40 g		
Page No.		278								

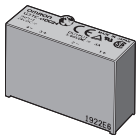
Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type					
Model		G3TC					
		G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Appearance and dimensions (W x H x D) (mm)		 43.2 x 15.2 x 31.8					
Features		• I/O modules with plug-in type of pin terminals • Dielectric strength of 4,000 VAC between input and output terminals					
Output	**Insulation**	Phototriac			Phototriac		
	Element	Triac			Triac		
	Load voltage	75 to 140 VAC			75 to 280 VAC		
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})			600 (V_{DRM})		
	Maximum switching current	3 A max.			3 A max.		
	Leakage current	2.5 mA max. at 120 VAC			5 mA max. at 240 VAC		
	di/dt (A/μs)	50			50		
	dv/dt (V/μs)	250			250		
	I^2t (A^2s)	18			18		
	Tj (°C) max.	125			125		
Rated input voltage		2.5 to 8 VDC	9 to 16 VDC	18 to 32 VDC	2.5 to 8 VDC	9 to 16 VDC	18 to 32 VDC
Reverse polarity protection for input		Yes (–8 VDC max.)	Yes (–16 VDC max.)	Yes (–32 VDC max.)	Yes (–8 VDC max.)	Yes (–16 VDC max.)	Yes (–32 VDC max.)
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min			4,000 VAC, 50/60 Hz for 1 min		
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)		
Function	**Zero cross**	Yes			Yes		
	Operation indicator	No			No		
	Built-in varistor	No			No		
Terminal type	**Plug-in**	No			No		
	Screw	No			No		
	Tab	No			No		
	PCB	Yes			Yes		
	Mounting method	PCB mounting			PCB mounting		
Certified standards		UL, CSA TÜV, CE			UL, CSA TÜV, CE		
Socket		---			---		
Weight		Approx. 45 g			Approx. 45 g		
Page No.		278					

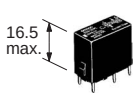
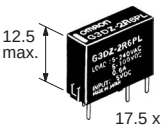
Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage
2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.
3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type					
Model		G3TC					
		G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Appearance and dimensions (W x H x D) (mm)		 43.2 x 15.2 x 31.8					
Features		• I/O modules with plug-in type of pin terminals • Dielectric strength of 4,000 VAC between input and output terminals					
Output	**Insulation**	Photocoupler			Photocoupler		
	Element	Transistor			Transistor		
	Load voltage	5 to 60 VDC			5 to 200 VDC		
	V_{DRM}, V_{CEO}, V_{DS} (V)	70 (V_{CEO})			300 (V_{CEO})		
	Maximum switching current	3 A max.			1 A max.		
	Leakage current	1 mA max. at 60 VDC			1 mA max. at 200 VDC		
	di/dt (A/μs)	---			---		
	dv/dt (V/μs)	---			---		
	I^2t (A^2s)	---			---		
	Tj (°C) max.	150			150		
Rated input voltage		2.5 to 8 VDC	9 to 16 VDC	18 to 32 VDC	2.5 to 8 VDC	9 to 16 VDC	18 to 32 VDC
Reverse polarity protection for input		Yes (–8 VDC max.)	Yes (–16 VDC max.)	Yes (–32 VDC max.)	Yes (–8 VDC max.)	Yes (–16 VDC max.)	Yes (–32 VDC max.)
Dielectric strength (between input and output terminals)		4,000 VAC, 50/60 Hz for 1 min			4,000 VAC, 50/60 Hz for 1 min		
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)			–30° to 80°C (with no icing or condensation)		
Function	**Zero cross**	No			No		
	Operation indicator	No			No		
	Built-in varistor	No			No		
Terminal type	**Plug-in**	No			No		
	Screw	No			No		
	Tab	No			No		
	PCB	Yes			Yes		
	Mounting method	PCB mounting			PCB mounting		
Certified standards		UL, CSA TÜV, CE			UL, CSA TÜV, CE		
Socket		---			---		
Weight		Approx. 45 g			Approx. 40 g		
Page No.		278					

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

Classification		PCB mounting type				
Model		G3S/G3SD				G3DZ
		G3S-201PL-US	G3S-201PL-PD-US	G3SD-Z01P-US	G3SD-Z01P-PD-US	G3DZ-2R6PL
Appearance and dimensions (W x D) (mm)		 16.5 max. 20 x 10 max. -PD types each separated by heat sink 				 12.5 max. 17.5 x 6.5 max.
Features		Compatible with OMRON's G6B				• AC/DC SSR • 10-μA leakage current max. • Same shape as G6D • Input resistor and varistor incorporated
Output	**Insulation**	Phototriac		Photocoupler		Photodiode array
	Element	Triac	Triac	Transistor	Transistor	MOSFET
	Load voltage	75 to 264 VAC		3 to 26 VDC		3 to 264 VAC, 3 to 125 VDC
	Maximum switching current	1 A	1.2 A	1 A	1.1 A	0.6 A
	Leakage current	2 mA max. at 200 VAC		0.1 mA max. at 26 VDC		10 μA max. at 125 VDC
	V_{DRM}, V_{CEO}, V_{DS} (V)	600 (V_{DRM})		32 (V_{CEO})		600 (V_{DS})
	di/dt (A/μs)	30		---		---
	dv/dt (V/μs)	300		---		---
	I^2t (A^2s)	10.4		---		---
	Tj (°C) max.	125		150		150
Rated input voltage		5, 12, 24 VDC				5, 12, 24 VDC
Reverse polarity protection for input		No				No
Dielectric strength (between input and output terminals)		2,500 VAC, 50/60 Hz for 1 min				2,500 VAC, 50/60 Hz for 1 min
Ambient temperature (operating)		–30° to 80°C (with no icing or condensation)				–30° to 85°C (with no icing or condensation)
Function	**Zero cross**	No				No
	Operation indicator	No				No
	Built-in varistor	Yes				Yes
Terminal type	**Plug-in**	No				No
	Screw	No				No
	Tab	No				No
	PCB	Yes				Yes
	Mounting method	Socket mounting				Socket mounting/ PCB mounting
Magnet relay with compatible terminals		G6B 				G6D 
Certified standards		UL, CSA				UL, CSA
Socket		P6BF-4BND (with operating indicator, with counter-electromotive voltage absorption diode), P6B-04P				P6D-04P
Weight		Approx. 13 g				Approx. 3.1 g
Page No.		287				293

Note: 1. V_{DRM}: Repetitive forward and reverse OFF-state voltage
V_{CEO}: Collector-emitter voltage
V_{DS}: Drain-source voltage

2. The above values are engineering data (reference values) for each output semiconductor incorporated by the respective SSRs.

3. The selection guide tables provide only specific specifications. Check the detailed specifications and read the precautions in the datasheets later in this catalog before attempting to use a product.

CONTENTS

Power Controllers
G3PX

- Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).
- Refer to *Heater Control Types and G3PX Control Methods* (page 23).

■ Single-phase Models

EUN Series

AC Power Controllers with Phase-control System Allow Precise Temperature Control Models with Base-up and Soft-start Functions

EH Series

Phase Control System Makes It Possible to Detect Single Heater Open Circuit (EH Series) and Multiple Heater Open Circuits (EHN Series)

EC Series

Optimum Devices for Controlling Input Power for Pure Metal Heater, and Incorporating Overcurrent Detecting and Single Heater Open Circuit Detecting Functions

- OMRON's unique design and carefully-selected materials made it possible to produce a compact and lightweight Power Controller.
- Replaceable, easy-to-install Power Device Cartridge assures ease of maintenance.
- Detecting component failures and operating errors.
- Certified by UL and CSA.

Model Number Structure

■ Model Number Legend

G3PX-□□□□-□
1 2 3 4 5 6

1. **Basic Model Name**
   G3PX: Power Controller
2. **Rated Load Power Supply Voltage**
   2: 100/110 VAC and 200/230 VAC
3. **Rated Load Current**
   20: 20 A
   40: 40 A
   60: 60 A
4. **Number of Phases**
   E: Single
5. **Functions**
   UN: Simple models
   H: Single heater open circuit detection function
   HN: Multiple heater open circuit detection function
   C: Constant-current function
6. **CT Unit Type**

Note: Refer to *CT Unit* on page 70.

G3PX Cartridge

G32X-□□
1 2 3

1. **Basic Model Type**
   G32X: Accessory for G3PX
2. **Basic Model Name**
   A: Power Device Cartridge
3. **Rated Load Current**
   20: 20 A
   40: 40 A
   60: 60 A

CT Unit

G32X-□□□
1 2 3 4

1. **Basic Model Type**
   G32X: Accessory for G3PX
2. **Basic Model Name**
   CT: CT Unit
3. **Length of Lead Wires**
   03: 30 cm
   10: 100 cm
4. **Series**
   Blank: Series for single heater open circuit detection
   HN: Series for multiple heater open circuit detection
   C: Series for constant current

Variable Resistor

G32X-□
1 2

1. **Basic Model Type**
   G32X: Accessory for G3PX
2. **Basic Model Name**
   V3K: 3-kΩ Variable Resistor
   V2K: 2-kΩ Variable Resistor

Ordering Information

■ List of Models

EUN Series

Phase	Applicable load	Level indicator	Base-up function (See note 1.)	Soft-start time	Carry current	Rated voltage	Model
Single	Resistive load Heater	Yes	Yes	Approx. 0.5 to 10 s	20 A	100/110 VAC 200/230 VAC (See note 2.)	G3PX-220EUN
					40 A		G3PX-240EUN
					60 A		G3PX-260EUN

Note: 1. The base-up output with a 0-mA temperature controller output (i.e. the temperature controller is OFF) differs from that with a 4-mA temperature controller output. Refer the *Characteristics data* on page 73.

2. When ordering, make sure that the rated voltage is 200/230 VAC. For a rated voltage of 200/220 VAC, the G3PX is available.

EH Series

Phase	Applicable load	Level indicator	Single heater open circuit detection	Multiple heater open circuit detection	Carry current	Rated voltage	Model (See note 1.)
Single	Resistive load Heater	Yes	Yes	No	20 A	100/110 VAC 200/230 VAC (See note 3.)	G3PX-220EH-CT03
							G3PX-220EH-CT10
					40 A		G3PX-240EH-CT03
							G3PX-240EH-CT10
					60 A		G3PX-260EH-CT03
							G3PX-260EH-CT10
			Yes (See note 2.)	Yes	20 A		G3PX-220EHN-CT03
							G3PX-220EHN-CT10
					40 A		G3PX-240EHN-CT03
							G3PX-240EHN-CT10
					60 A		G3PX-260EHN-CT03
							G3PX-260EHN-CT10

Note: 1. EH- and EHN-series models are provided with a CT incorporating 30- or 100-cm-long lead wires and Power Device Cartridge. When ordering, specify the length of the lead wires by adding a code to the model number as shown below.
G3PX-2□0EH-CT03: CT with 30-cm-long lead wires
G3PX-2□0EH-CT10: CT with 100-cm-long lead wires

2. Adjusts the multiple heater open circuit detection sensitivity of EHN-series models. Enables single heater open circuit detection in control of a maximum of five heaters.

3. When ordering, make sure that the rated voltage is 200/230 VAC. For a rated voltage of 200/220 VAC, the G3PX is available.

EC Series

Phase	Applicable load	Level indicator	Constant-current function	Single heater open circuit detection	Carry current	Rated voltage	Model (See note 1.)
Single	Resistive load Heater	Yes	Yes	Yes	20 A	100/110 VAC 200/230 VAC (See note 2.)	G3PX-220EC-CT03
							G3PX-220EC-CT10
					40 A		G3PX-240EC-CT03
							G3PX-240EC-CT10
					60 A		G3PX-260EC-CT03
							G3PX-260EC-CT10

Note: 1. EC-series models are provided with a CT Unit with lead wires (30- or 100- cm in length). When ordering, specify the length of the lead wires by adding a code to the model number as shown below.
G3PX-2□0EC-CT03: CT with 30-cm-long lead wires
G3PX-2□0EC-CT10: CT with 100-cm-long lead wires

2. When ordering, make sure that the rated voltage is 200/230 VAC. For a rated voltage of 200/220 VAC, the G3PX is available.

■ Accessories (Order Separately)

CT Unit

Name	Length of lead wires	Solderless terminals	Applicable models	Model
CT Unit	30 cm	Yes	G3PX-2□□EH	G32X-CT03
	100 cm			G32X-CT10
	30 cm		G3PX-2□□EHN	G32X-CT03HN
	100 cm			G32X-CT10HN
	30 cm		G3PX-2□□EC	G32X-CT03C
	100 cm			G32X-CT10C

Power Device Cartridge

Name	Carry current	Applicable models	Model
Power Device Cartridge	20 A	G3PX-220E□□	G32X-A20
	40 A	G3PX-240E□□	G32X-A40
	60 A	G3PX-260E□□	G32X-A60

Note: The G32X-A is a dedicated Power Device Cartridge for the G3PX.
Refer to *Replacement Parts* on page 81.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Control

Item		G3PX-220EUN/240EUN/260EUN	G3PX-220EH/240EH/260EH	G3PX-220EHN/240EHN/260EHN	G3PX-220EC/240EC/260EC
Rated voltage		100/110, 200/230 VAC			
Frequency		50/60 Hz (See note 1.)			
Input signal for control	**External main setting (See note 2.)**	2 kΩ (type B, 2 W min.)	3 kΩ (type B, 2 W min.)	2 kΩ (type B, 2 W min.)	
	Current input	4 to 20 mA (at 1 to 5 VDC) (Input impedance: 250Ω) (See note 3.)			
	Voltage ON/OFF input	5 to 24 VDC (Input impedance: approx. 20 kΩ)			
	External duty setting	3 kΩ (type B)			
Relay output for alarm		---	SPDT: 8 A at 250 VAC/30 VDC		

Note: 1. 50/60 Hz (no selector required) (EUN Series)
Terminals 18 and 19 of EHN/EC-series models must be open when the supply frequency is 50 Hz. These terminals must be short-circuited when the supply frequency is 60 Hz.

2. Use the G32X-V2K 2-kΩ Variable Resistor for external main setting on EUN, EC, and EHN (G32X-V3K 3-kΩ for EN-series models).

3. Input 4 to 20 mA or 1 to 5 VDC linear input to the 4 to 20 mA current input terminal.

Output

Model	Applicable load			
	Rated load voltage	**Load current**	**Inrush current**	**Number of phases**
G3PX-220E□ G3PX-220E□N	100/110, 200/230 VAC (50/60 Hz)	1 to 20 A (See note.)	220 A (60 Hz, 1 cycle)	Single
G3PX-240E□ G3PX-240E□N		1 to 40 A (See note.)	440 A (60 Hz, 1 cycle)	
G3PX-260E□ G3PX-260E□N		1 to 60 A (See note.)	440 A (60 Hz, 1 cycle)	

Note: The G3PX-2□□EHN (model with multiple heater open circuit detecting function) and G3PX-2□□EC (constant-current model) require 20% min. of the rated current to detect a short mode failure. EC-series models detect an open mode failure if the load current has dropped to 80% of the rated value. A short mode failure will be detected if the current has risen to 20% of the rated value.

■ Characteristics

EU/EH Series

Item	G3PX-220EUN/ 240EUN/260EUN	G3PX-220EH/240EH/260EH	G3PX-220EHN/ 240EHN/260EHN
Operating voltage range	±10%		
Operating frequency range	±1 Hz		
Output voltage adjustable range	0% to 95%		
Internal duty setting range	0% to 100%	10% to 100% (See note 1.)	0% to 100%
External duty setting range	0% to 100%	10% to 100% (See note 1.)	0% to 100%
Start-up time (See note 2.)	Approx. 0.5 to 10 s (See note 3.)	Approx. 0.1 to 1 s (See note 3.)	Approx. 0.5 to 10 s (See note 3.)
Base-up range	0% to 90%	---	
Multiple heater open circuit detection	---		20% max. (See note 4.)
Min. phase detection	---	Approx. 1/6 π	
Min. phase setting	---	---	Approx. 1/6 π
Min. load current for ON error detecting	---	1 A	30% max. of rated current (See note 5.)
Abnormality detection time	---	0.1 s max.	1 s max.
Voltage drop with output ON	1.6 V max. (RMS)		
Leakage current	10 mA max. at 100/110 VAC, 20 mA max. at 200/230 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 to 10 Hz, 100 m/s^2		
Shock resistance	Malfunction: 300 m/s^2		
Ambient temperature	Operating: –25°C to 65°C (with no icing or condensation) Storage: –10°C to 55°C (with no icing or condensation)		
Ambient humidity	Operating: 45% to 85%		
Weight	G3PX-220EUN: approx. 1.1 kg G3PX-240EUN: approx. 1.4 kg G3PX-260EUN: approx. 1.7 kg	G3PX-220EH: approx. 1.1 kg G3PX-240EH: approx. 1.4 kg G3PX-260EH: approx. 1.7 kg	G3PX-220EHN: approx. 1.2 kg G3PX-240EHN: approx. 1.5 kg G3PX-260EHN: approx. 1.8 kg

Note: 1. Duty setting does not complete to the OFF state (i.e. 10% remains).

2. The start-up time is factory-set to 1 s on the EH Series, approx. 0.5 s on the EHN and EC Series.

3. This is the initial start-up time with a 100% duty setting.

4. Detection is effective when the set current is reduced by 20% or more.

5. The minimum set value in the G3PX-220EHN is 6 A. If a lower value is required, increase the number of wiring turns around the CT.

EC Series

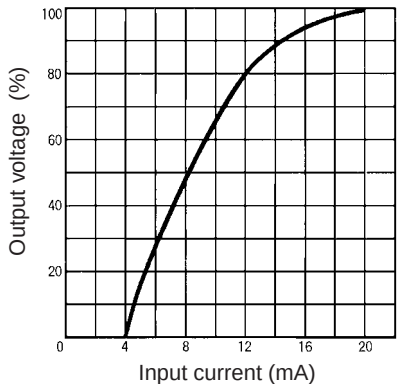
Item	G3PX-220EC	G3PX-240EC	G3PX-260EC
Operating voltage range	±10%		
Operating frequency range	±1 Hz		
Output voltage adjustable range	0% to 95%		
Internal duty setting range	0% to 100%		
External duty setting range	0% to 100%		
Start-up time	Approx. 0.5 to 10 s		
Min. load current for ON error detecting	20% max. of rated current		
Current limit range	0% to 100%		
Excess current detection	Peak current of 110 A within 1 cycle	Peak current of 220 A within 1 cycle	Peak current of 330 A within 1 cycle
Constant current	±3% max. with 10-time increment of load value ±3% max. with ±10% change of voltage		
Abnormality detection time	1 s max.		
Voltage drop with output ON	1.6 V max. (RMS)		
Leakage current	10 mA max. at 100/110 VAC, 20 mA max. at 200/230 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 to 10 Hz, 100 m/s^2		
Shock resistance	Malfunction: 300 m/s^2		
Ambient temperature	Operating: –25°C to 65°C (with no icing or condensation) Storage: –10°C to 55°C (with no icing or condensation)		
Ambient humidity	Operating: 45% to 85%		
Weight	G3PX-220EC: approx. 1.1 kg G3PX-240EC: approx. 1.4 kg G3PX-260EC: approx. 1.7 kg		

Engineering Data

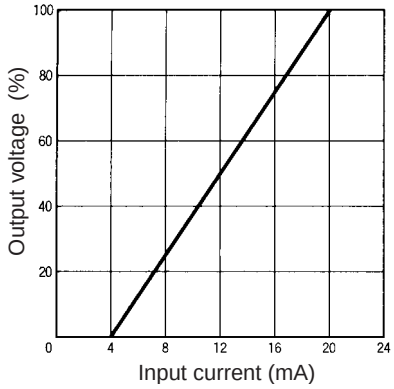
The following data is for an ambient temperature of 25°C.

Output Characteristics

G3PX-EUN/EH/EHN Models

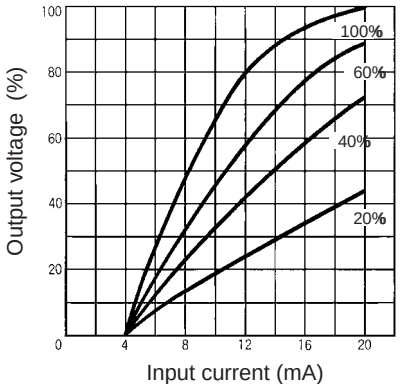


G3PX-EC Models



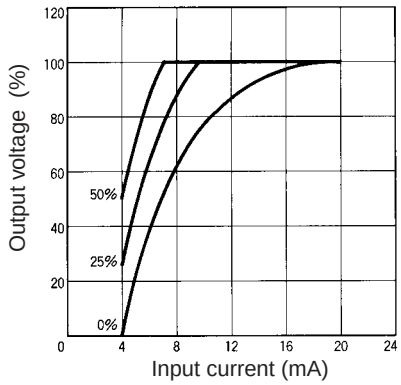
Duty Setting

G3PX-EUN/EH/EHN Models



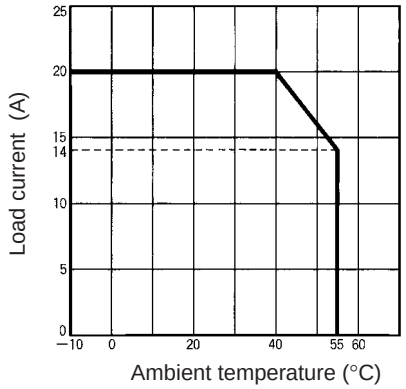
Base-up Characteristics

G3PX-2□0EUN Models

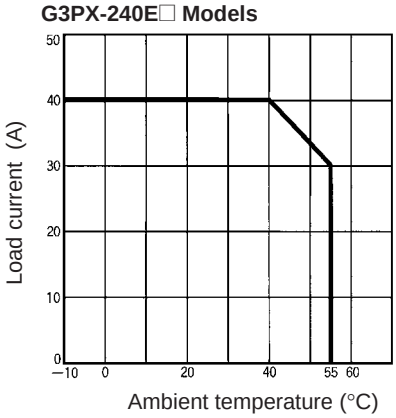


Load Current vs. Ambient Temperature

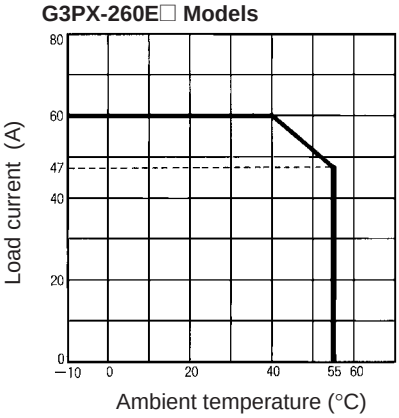
G3PX-220E□ Models



G3PX-240E□ Models

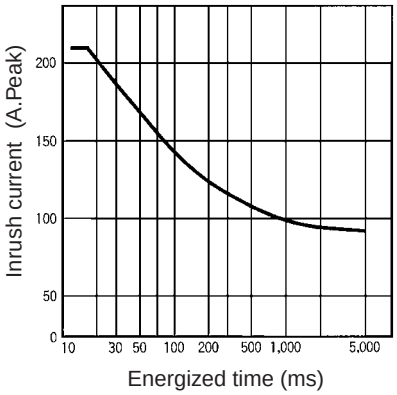


G3PX-260E□ Models

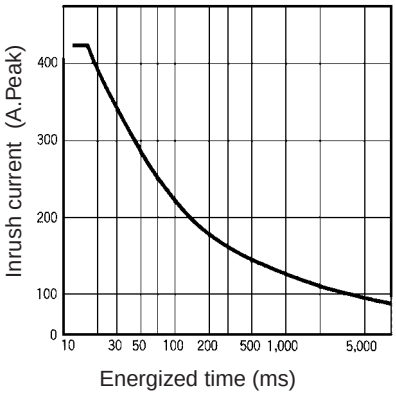


One Cycle Surge Current: Non-repetitive

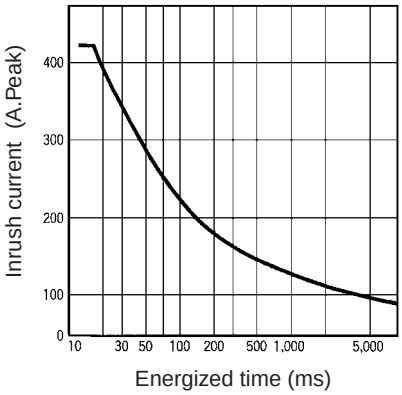
G3PX-220E□ Models



G3PX-240E□ Models



G3PX-260E□ Models

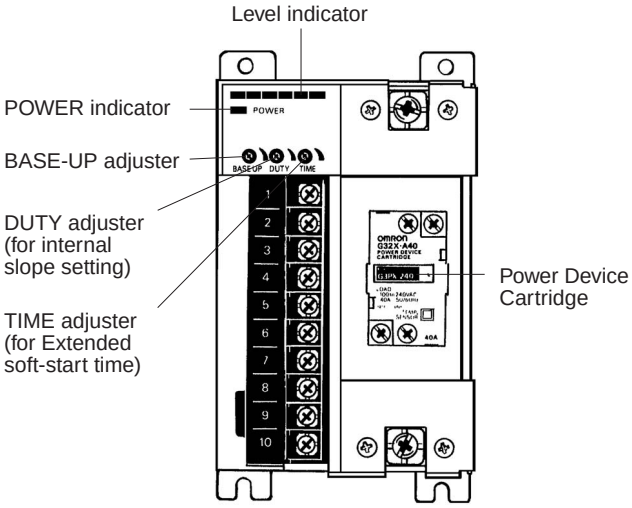


Note: The above are possible on condition that the G3PX is in non-repetitive operation. If the G3PX is in repetitive operation, reduce the applied current to half.

Nomenclature

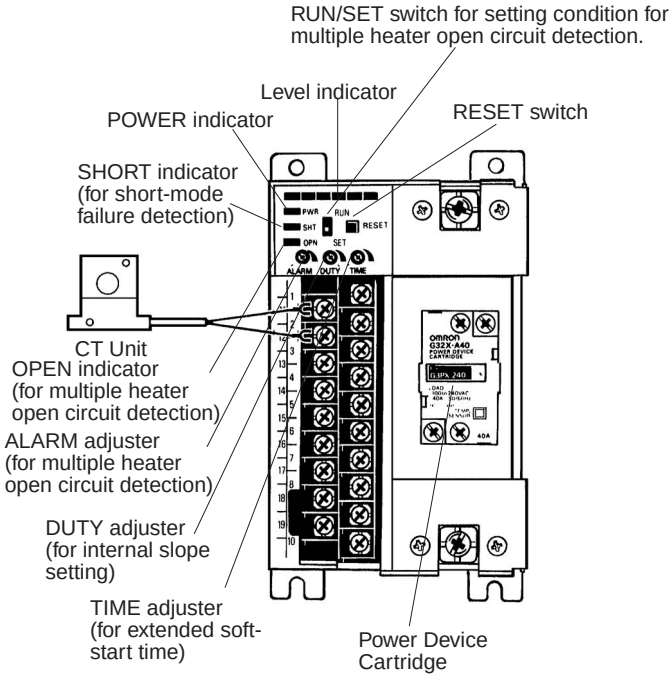
Single-function Model (EUN-series Model)

G3PX-2□0EUN



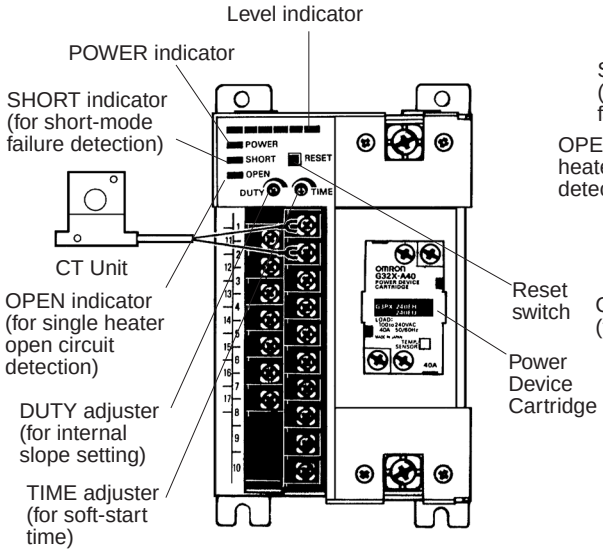
Multiple Heater Open Circuit Detection (EHN-series Model)

G3PX-2□0EHN-CT□□



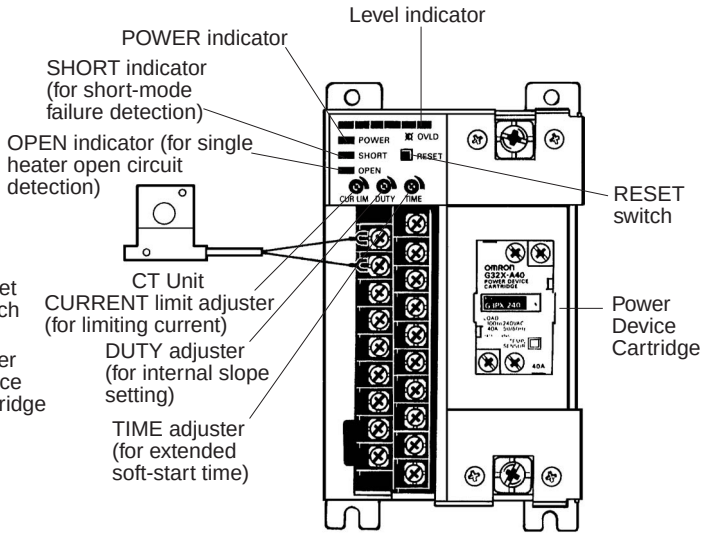
Single Heater Open Circuit Detection (EH-series Model)

G3PX-2□0EH-CT□□



Constant-current Model (EC-series Model)

G3PX-2□0EC-CT□□



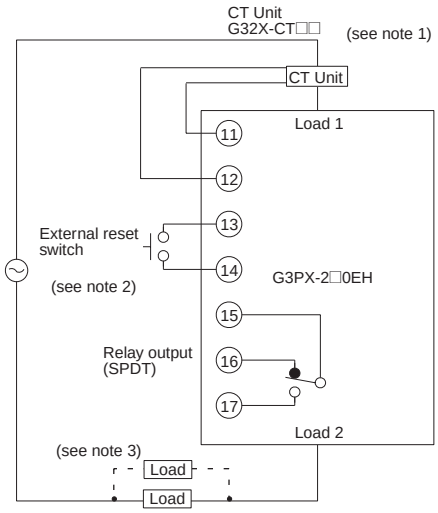
Operation

■ Error Detecting Function

Wiring

Single-phase Models

All G3PX-2□0EH/EHN/EC-series models incorporate terminals 11 and 12 for the CT Unit, 13 and 14 for the external reset switch, and 16 and 17 for relay output as well as power/input terminals 1 through 10.



Note: 1. Connect either the black or white lead wire of the CT Unit to terminal 11 and the other lead wire to terminal 12. The G3PX will malfunction if you do not connect the CT Unit to the G3PX.
2. The rated current and voltage of G3PX models when reset are as follows:
EH-series models: 12 mA at 12 VDC
EHN- and EC-series models: 1 mA at 12 VDC
3. For more than one heater.

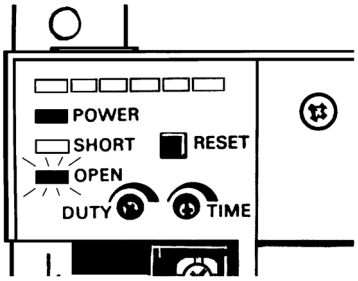
Output

Single-phase Models

The following illustrations show the condition of the G3PX LED indicators when the G3PX detects heater open circuit, a short-mode failure (ON failure of components), or overcurrent (EC-series constant-current models only). The indicator and relay output signals are reset with the internal or external reset switch provided that the error condition has been remedied.

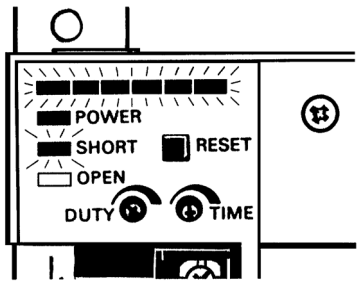
1. When EH/EHN/EC-series models detect single or multiple heater open circuit, the OPEN indicator is lit and the SPDT relay output is ON.

Note: When the G3PX detects heater open circuit, the Level indicator will be OFF regardless of the G3PX input condition. The red OPEN indicator will be lit. EHN-series models, however, will continue operating with level indication.

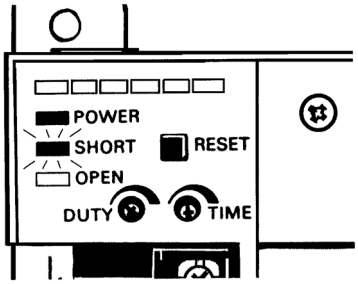


2. When EH/EHN/EC-series models detect a short-mode failure, the SHORT indicator is lit and the SPDT relay output is ON.

With continuous load current.

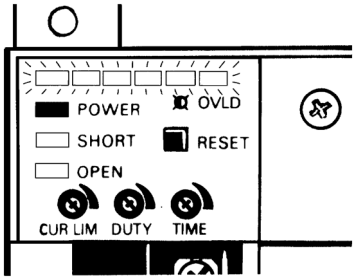


With load current shut off.



Note: When the G3PX detects a short-mode failure, all LEDs of the Level indicator and red SHORT indicator are lit. When you use a breaker to disconnect the load with the relay output, all LEDs of the Level indicator will be OFF regardless of the input to the G3PX.

3. When EC-series models detect an overcurrent, the Level indicator will flash and the SPDT relay output is ON. The input signal will be shut off.



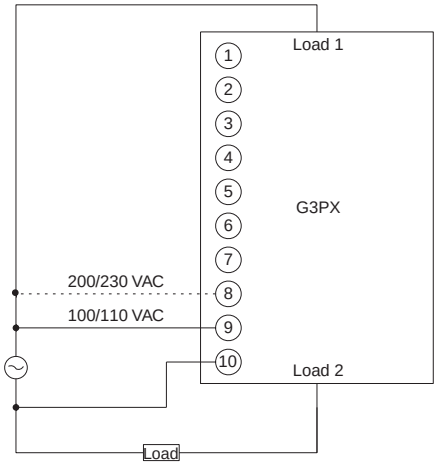
Note: When resetting, leave power supply terminals 10 to 9 or 8 ON.

■ Wiring

Main Circuit

Single-phase Models

The following illustrations show connection examples:



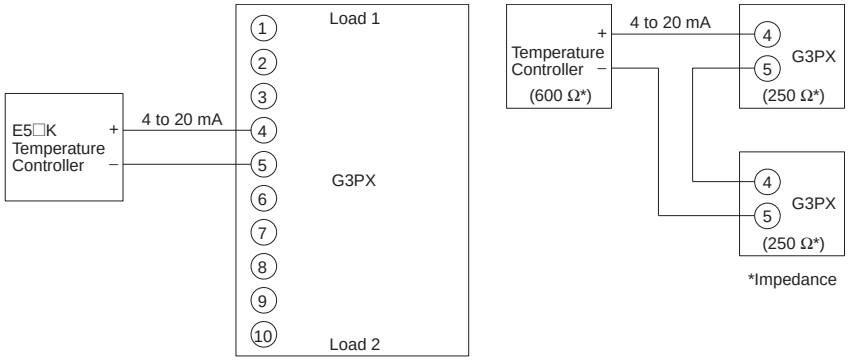
Note: Use a single power supply for the G3PX and the load.

Setting Circuit

Analog Control

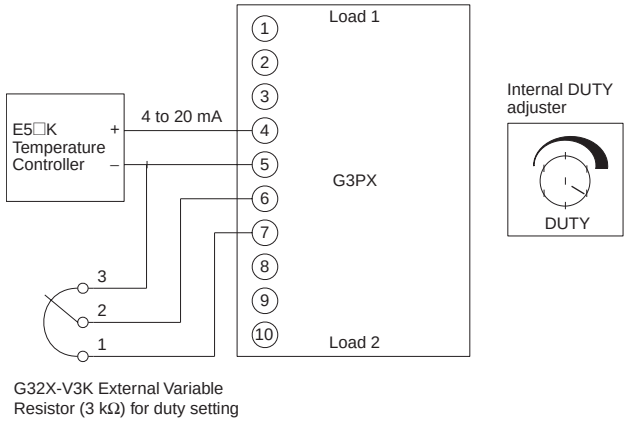
Single-phase Models

1. A Temperature Controller with an output of 4 to 20 mA is used to control the G3PX.



Note: Two G3PX models can be connected in series to OMRON's single Temperature Controller (with an internal impedance of 600 Ω) with a current output.

2. A Temperature Controller with an output of 4 to 20 mA is used with the G3PX to change the duty.

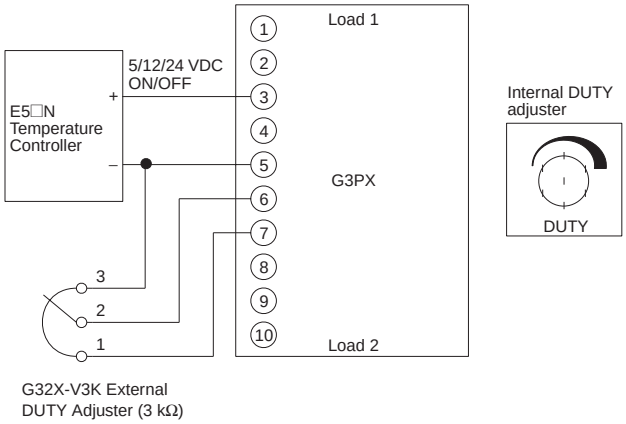


Note: You can change the duty with the external or internal ramp adjuster.

ON/OFF Control

Single-phase Models

1. A Temperature Controller is used to change the duty of G3PX.

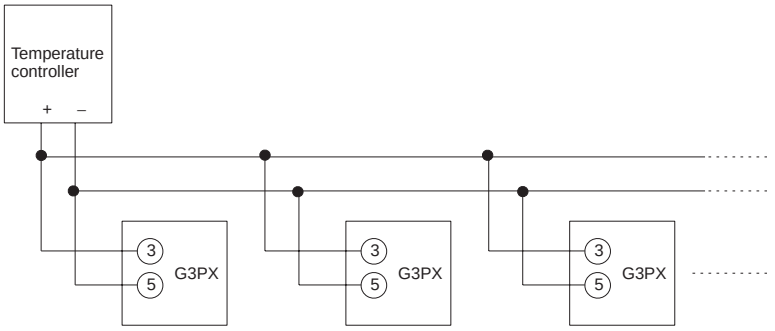


Note: You can change the duty with the external or internal variable resistor.

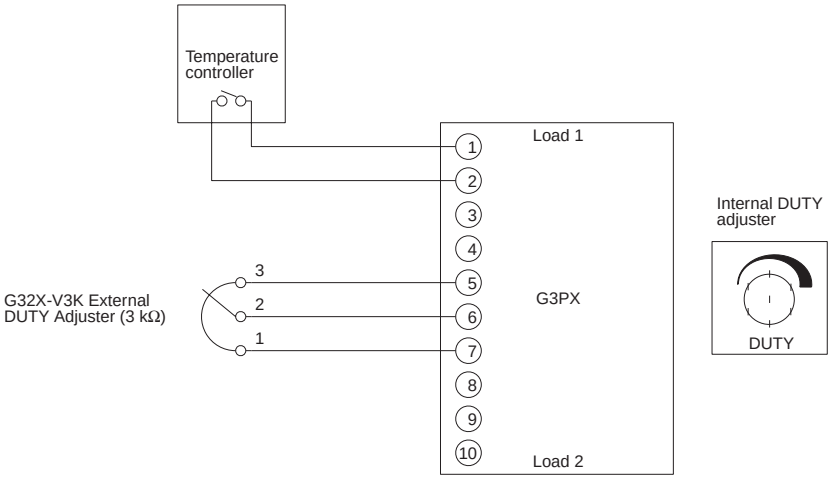
2. A Temperature Controller (with a voltage output) is used to control several G3PXs.

Temperature Controller specifications	No. of G3PX
E5□K: 40 mA at 12 V	20 sets
E5□N: 20 mA at 12 V	20 sets
20 mA at 5 V	20 sets
10 mA at 5 V	20 sets

Connection Example

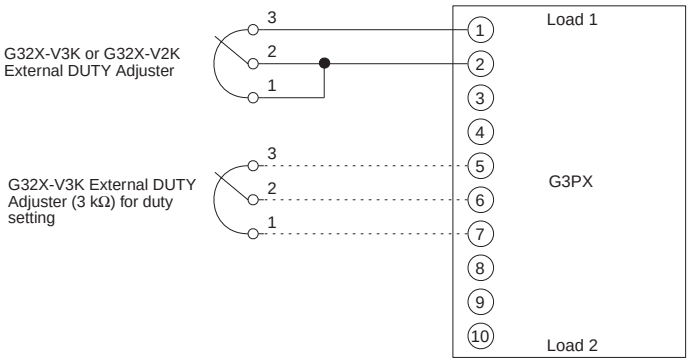


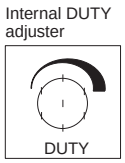
3. A Temperature Controller (with a relay output) is used to vary the duty of G3PX.



Manual Control

Single-phase Models

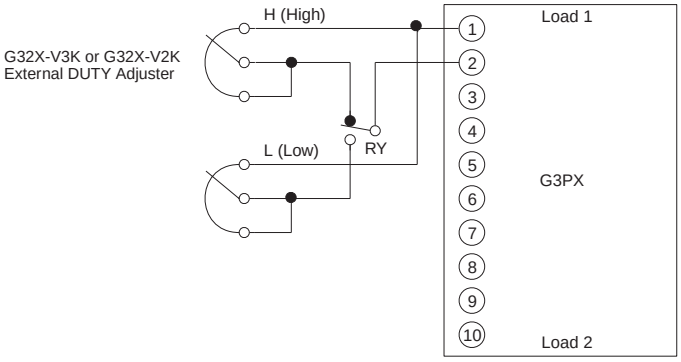




Note: Delicate duty adjustment is possible with the external or internal resistor. Use a right DUTY adjuster (2- or 3-kΩ type) according to the G3PX model as follows:
G32K-V3K (3 kΩ) for EH-series models
G32X-V2K (2 kΩ) for EUN-, EHN-, and EC-series models

Two-position Control

Single-phase Models



Note: 1. A temperature controller with relay output or a single relay can be used with the G3PX in two-position (high-and low-position) control, in which case the relay contact current is 30 mA at 12 VDC with the External DUTY Adjuster set to 0 Ω.

2. Use a right DUTY adjuster (2- or 3-kΩ type) according to the G3PX model as follows:
G32X-V3K (3 kW) for EH-series models
G32X-V21K (2 kW) for EUN-, EHN-, and EC-series models.

■ Setting of Base-up Output (G3PX-2□0EUN Series)

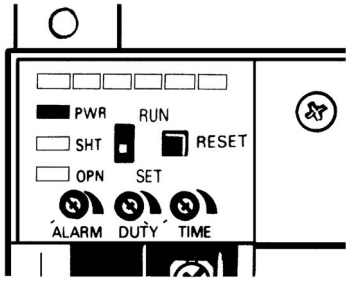
The base-up output can be adjusted with the base-up adjuster knob. It is also possible to control the base-up output for the full scale of 4 to 20-mA input current by adjusting the duty adjuster. Refer to *Engineering Data* on page 73 for the base-up characteristics.

■ G3PX-2□0EHN Series (Multiple Heater Open Circuit Detection Model)

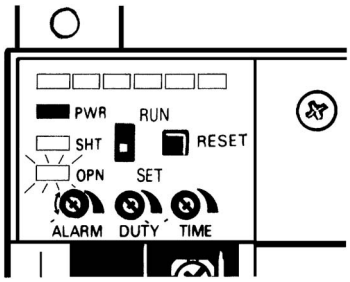
Setting

1. Use the G32X-CT□□HN CT Unit and make sure that the G3PX is wired correctly.

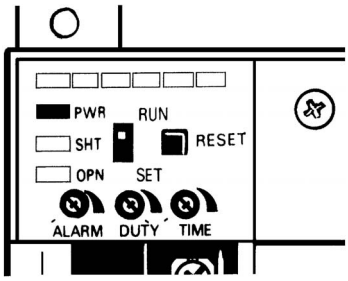
2. The G3PX initially set is shown in the following illustration.
Make sure that the RUN/SET switch has been set to SET.
Make sure that the DUTY adjuster has been turned clockwise to the maximum.



3. Adjust the sensitivity.
Turn the ALARM adjuster and set to the position where the OPEN indicator is lit. Stop turning the ALARM adjuster as soon as the indicator is lit to complete the setting.



4. Set the RUN/SET switch to RUN.
When all settings have been finished, the OPEN indicator is OFF.



Note: 1. The G3PX can control any part of the phase as long as the controlled phase is approximately 1/6π or more in width.

2. Be sure to prepare terminals 18 and 19 corresponding to the supply frequency of 50 Hz or 60 Hz. Otherwise, a setting error will result in a malfunction regardless of the RUN/SET switch setting.
When the error has occurred, turn the ALARM adjuster counterclockwise to the minimum setting, reset the G3PX, and readjust.

■ Replacement Parts

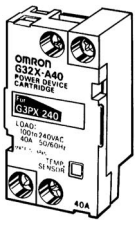
G32X-A Power Device Cartridge

The temperature indicator will be lit in red if the power element is damaged. If the power element is damaged due to overcurrent or other reasons, the power element and its peripheral parts can be replaced.
The power element and its peripheral parts can be replaced without disconnecting the wires of the G3PX.
Improve the heat radiation of the G3PX before replacing the Cartridge.
The temperature indicator will not be lit in red if the G3PX has overcurrent due to load short-circuiting or other reasons over a short time.

Appearance

G32X-A20

G32X-A40



G32X-A60

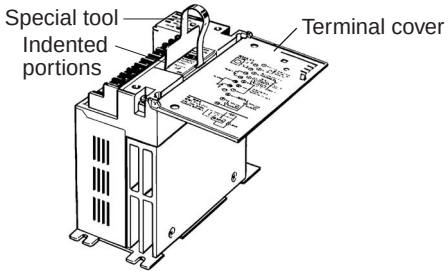
Replacement of G32X-A20 Power Device Cartridge

Use the special tool (provided) to extract the Cartridge for replacement with a new one.

Extraction

Follow the procedures below to dismount the Power Device Cartridge from the G3PX.

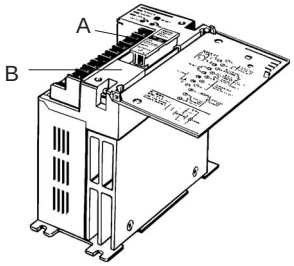
1. Switch off the power.
2. Remove the terminal cover.
3. Hook the tool on the indented portions of the Power Device Cartridge as shown in the illustration below and pull up the Power Device Cartridge vertically.



Mounting

The procedures for mounting the Power Device Cartridge are as follows:

1. Apply silicone grease (provided with the G32X-A) to the entire surface of the heat sink.
2. Make sure there is no dust or pieces of wire on the heat sinks of the G32X-A or the G3PX.
3. Insert the Cartridge into the opening of the G3PX so that the letters on the Cartridge and those on the G3PX are in the same direction and sides A and B are even.



4. Attach the terminal cover.
5. Switch on the power and check the G3PX to be sure it works properly.

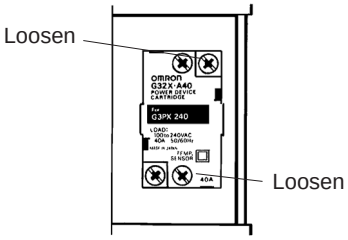
G32X-A40/60

The G32X-A40 and G32X-A60 are secured with screws.

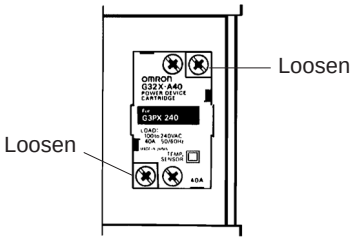
Extraction

The procedures for dismounting the Power Device Cartridge are as follows:

1. Switch off the G3PX.
2. Remove the terminal cover.
3. Be sure to turn off the G3PX and loosen the screws located in the upper center and lower center. These screws are connected to terminals 1 and 2.



4. Loosen the screws on both corners.



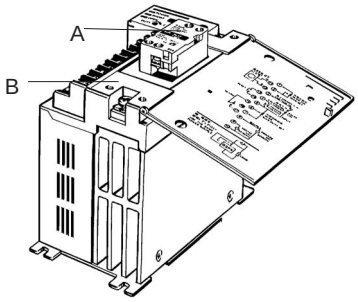
5. Hold the indented part of both corners to dismount the Cartridge.

Mounting

1. Apply silicone grease (provided with the G32X-A) to the entire surface of the heat sink.

2. Make sure there is no dust or pieces of wire on the heat sinks of the G32X-A or the G3PX.

3. Insert the Cartridge into the opening of the G3PX so that the letters on the Cartridge and those on the G3PX are in the same direction and sides A and B are even.



4. Tighten the screws on both corners with a tightening torque of 0.59 to 0.78 N·m.

5. Tighten the center screws of the G3PX 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 G3PX to be sure it works properly.

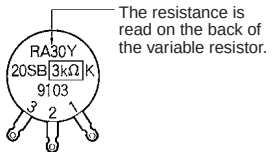
■ External Variable Resistor

The G32X-V3K and G32X-V2K are provided with a set consisting of adjuster, knob, and nameplate.

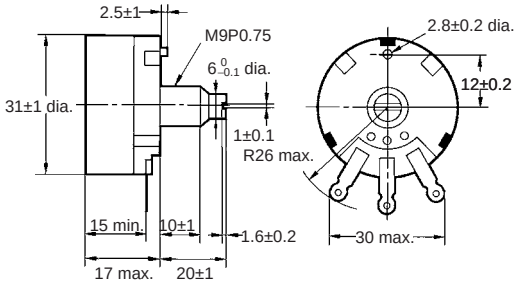
Resistive value (See note 1.)	Model
3 kΩ	G32X-V3K (See note 2.)
2 kΩ	G32X-V2K

Note: 1. The G32X-V3K is equivalent to the conventional G32X-VR.

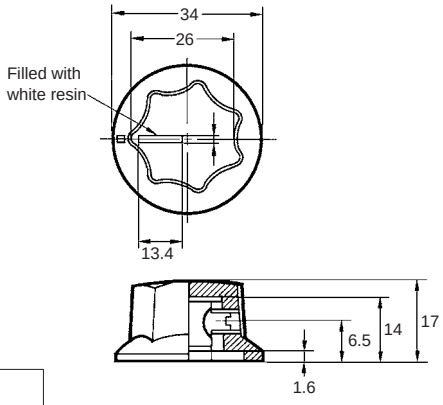
2. Resistive Value



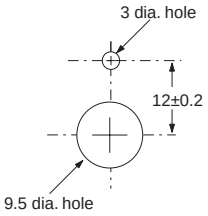
External DUTY Adjuster



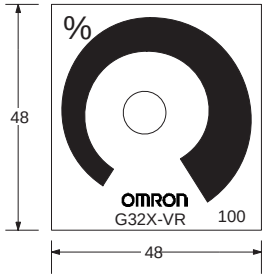
Knob



Mounting Holes



Nameplate

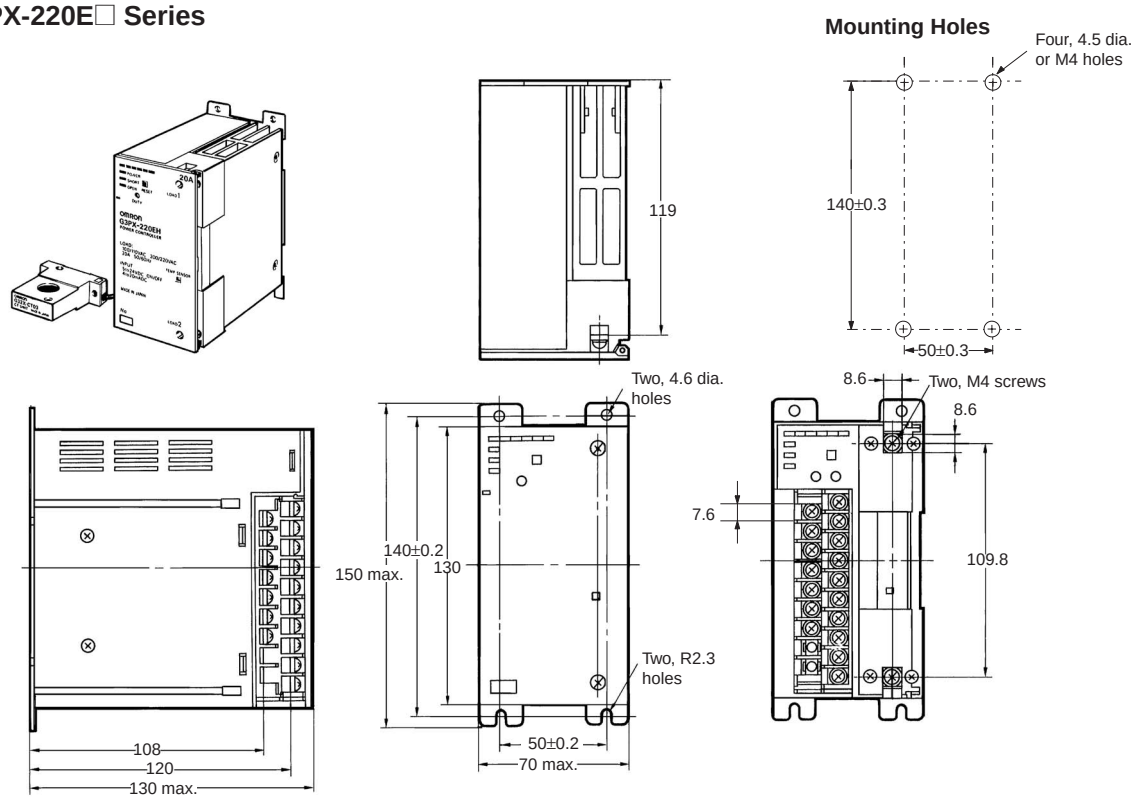


Dimensions

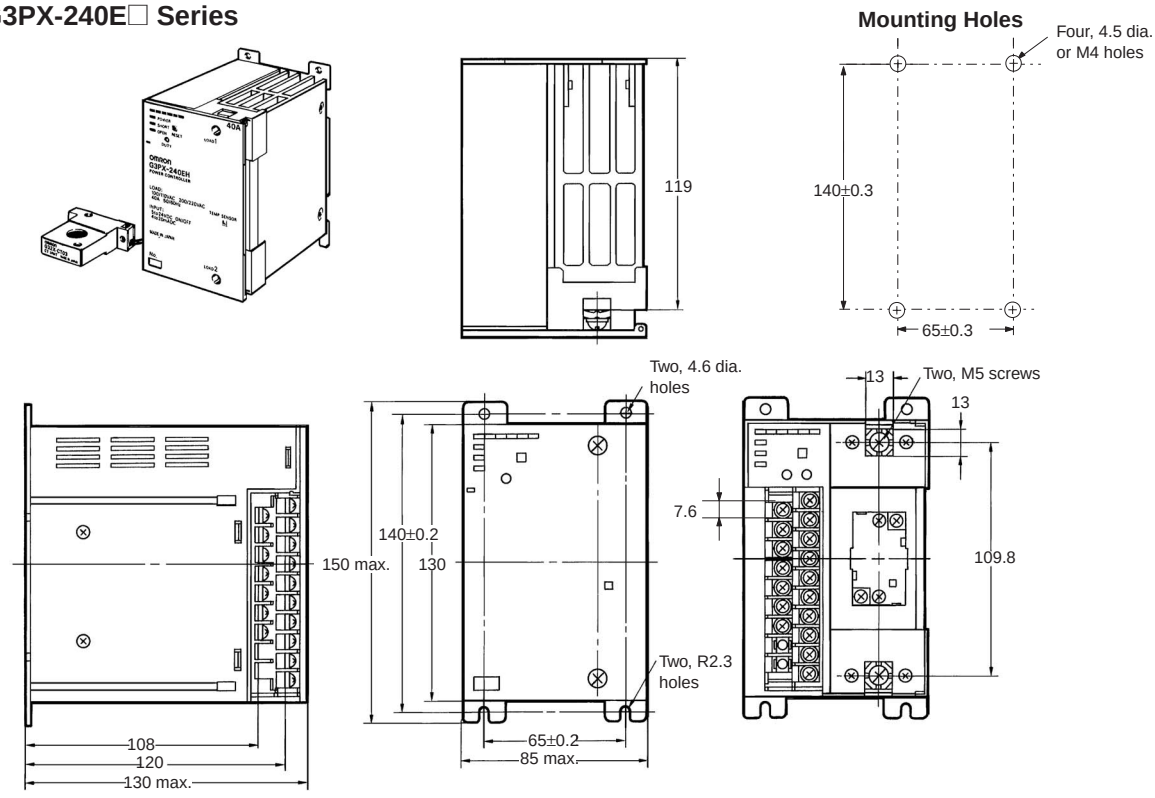
Note: All units are in millimeters unless otherwise indicated.

■ Single-phase Models

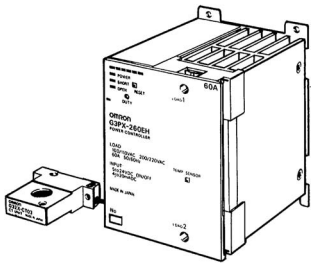
G3PX-220E□ Series

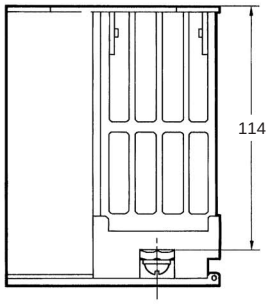


G3PX-240E□ Series

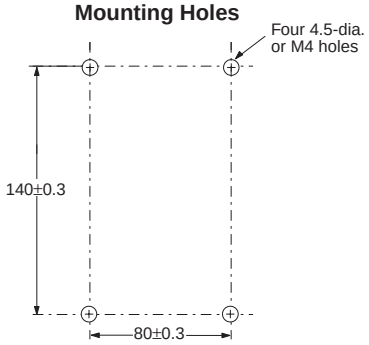


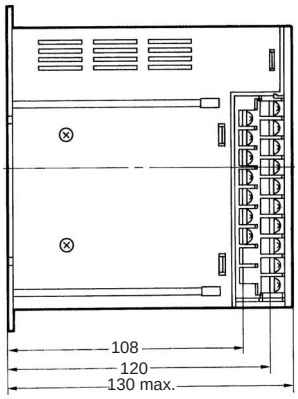
G3PX-260E□ Series

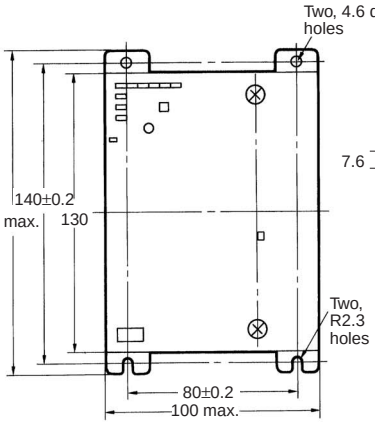


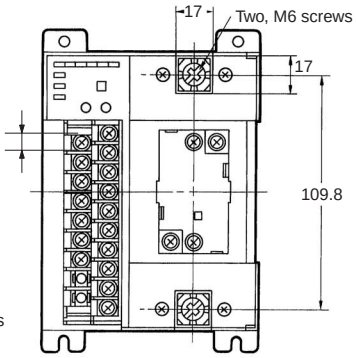


Mounting Holes

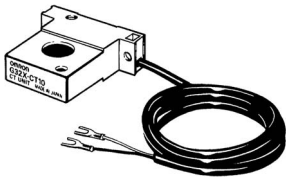


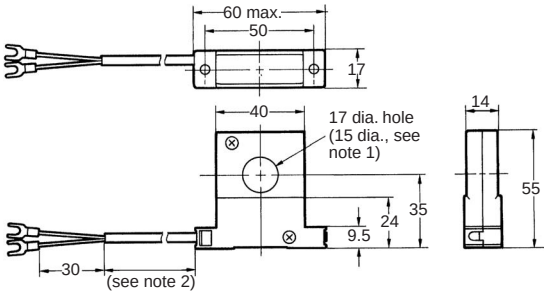




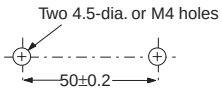


G32X-CT03□ Series
G32X-CT10□ Series





Mounting Holes



Note: 1. Color of the hole
EH Series: Black
EHN Series: White
EC Series: Light gray
The size of the hole of CT Units for EC- and EHN-series models is 15 dia.

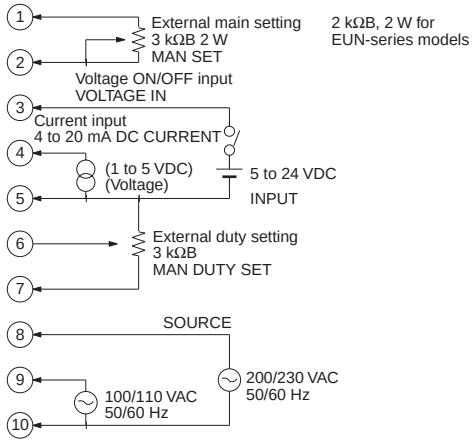
2. The G32X-CT03□ incorporates 30-cm solderless terminals and the G32X-CT10□ incorporates 100-cm solderless terminals.

Installation

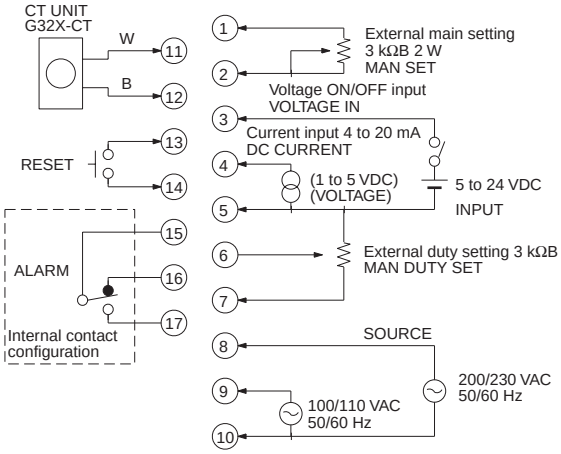
■ Terminal Arrangement

Single-phase Models

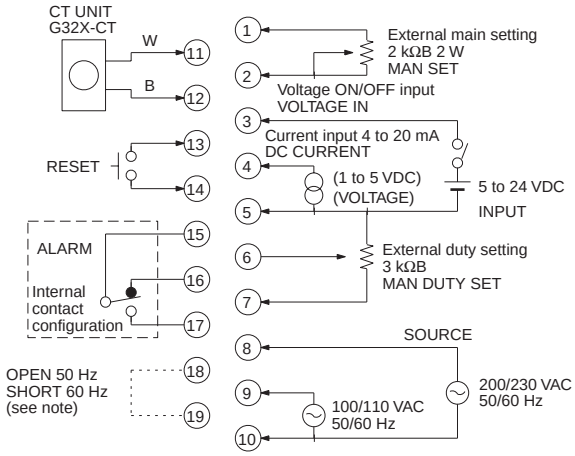
G3PX-220EUN
G3PX-240EUN
G3PX-260EUN



G3PX-220EH
G3PX-240EH
G3PX-260EH



G3PX-220EHN/220EC
G3PX-240EHN/240EC
G3PX-260EHN/260EC



Note: Open the terminals for 50 Hz or short-circuit the terminals for 60 Hz. When the product is shipped, the terminals are short-circuited using a short-circuiting bar to set to 60 Hz. When using at 50 Hz, remove the short-circuiting bar.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

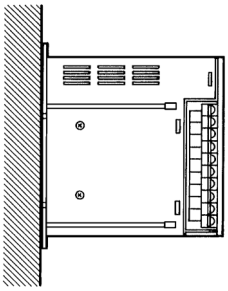
Load

Only resistive loads can be connected to the G3PX. Contact your OMRON representatives if it is necessary to connect inductive or transformer loads.

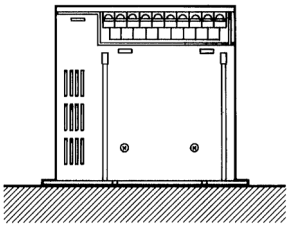
Mounting

Pay utmost attention when mounting the G3PX so that the G3PX will not fall thus resulting in injury.

Vertical Mounting

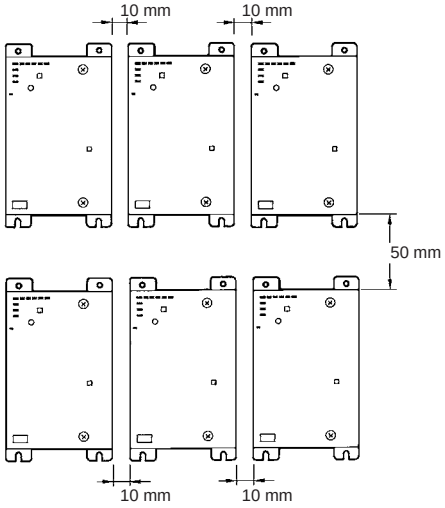


Horizontal Mounting



Note: In the case of flat mounting, the 30% derating of the load current is required.

Close Mounting Example (Single-phase Models)



Note: Make sure that there is a space of at least 50 mm vertically and at least 10 mm horizontally between adjacent single-phase models.

Wiring

Make sure that the lead wires are thick enough according to the current.

Be sure to turn off power to the G3PX when wiring. The G3PX has current leakage although the G3PX is turned off if the power supply is connected to the G3PX, which may give an electric shock.

Do not wire power lines or high-tension lines along with the lines of the G3PX in the same conduit, otherwise the G3PX may be damaged or malfunction due to induction. Be sure to wire the lines of the G3PX separated from power lines or high-tension lines or laid in an exclusive, shielded conduit.

Tightening Torque

Apply the following tightening torque.
Output terminal:
20-A model: 1.47 N·m
40-A model: 2.45 N·m
60-A model: 4.12 N·m
Terminal block:
Single-phase model: 0.98 N·m
Be sure to protect the terminals with the protective cover after wiring.

Wiring for Error Detection

If a contactor is employed and operated with the relay output signal of the G3PX for error detection, make sure that the G3PX is closer to the power supply than the contactor.

Instruments

Instrument	Remarks
Thermal type	Available
Digital type displaying root-mean-square values	
Moving-iron type	
Rectifier type	Not available (not precise enough)
Multimeter	
Digital multimeter	

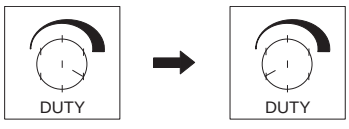
The instruments are used for displaying root-mean-square voltage and current values of the AC circuitry.

Operation Monitoring

The level indicator just indicates the phase of the load and it is not highly precise.

Ramp Setting

There is a decrease in ramp if the internal DUTY adjuster is turned counterclockwise.



100% 10%

If the External DUTY Adjuster is used, set the Internal DUTY Adjuster to 100%.

CT Unit

The CT Unit varies with the G3PX-series model. Use the following CT Units in combination with the G3PX models.

G3PX-2□0EH Series: G32X-CT□□
G3PX-2□0EHN Series: G32X-CT□□HN
G3PX-2□0EC Series: G32X-CT□□C

If any of the following models is used and the actual load current is 50% of the maximum rated load current or lower, increase the number of turns of the wire around the CT Unit.
G3PX-20EHN Series (multi-heater open circuit detective models)
G3PX-20EC Series (constant current)

For example, make two turns if the actual load current is 50% of the maximum rated load current and four turns if the actual load current is 25% of the maximum rated load current.

If the G3PX is a constant current model, do not increase the number of turns of the wire around the CT Unit excessively, otherwise the overcurrent detective function may operate by mistake.

External DUTY Adjuster

Use the External DUTY Adjuster with a resistance of 2 kΩ or that with a resistance of 3 kΩ according to the G3PX-series model in use. Refer to the following combinations.
G3PX-2□EH Series: G32X-V3K (3 kΩ)
G3PX-2□0EUN Series
G3PX-2□0EC Series

Base-up Function

If the model in use has the model number suffix “EUN,” the base-up function is available.

The base-up output of the G3PX with a temperature controller output of 0 mA (i.e., the temperature controller is turned off) and that of the G3PX with a temperature controller output of 4 mA are different from each other.

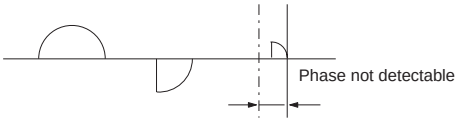
Power Device Cartridge

Do not apply power to the G3PX with the Power Device Cartridge dismounted.

Heater Open Circuit Detection

EH and EHN Models

The heater open circuit detective function is not available for detecting the phase less than the following.



G3PX-20EH Series: π/8 or less
G3PX-20EHN Series: Approx. π/6 or less

Power Supply

Single-phase Models Only

Do not apply 200 V to the 100-V terminals, otherwise the thermal fuse of the built-in transformer will be blown and the G3PX will not operate.

Others

It is not possible to use three single-phase models for three-phase load control.

If three-phase power supply is used for single-phase models operating in parallel, make sure that the two phases supplied to all the single-phase models are the same.

Troubleshooting

Check the following if the G3PX does not operate or has difficulty in temperature control.

- The load does not turn on with 100% input.
  Check the default internal ramp setting.

Make sure that the adjuster is set to the farthest clockwise position.

Also check the current limit adjuster if the G3PX is a constant DC model.

- The G3PX does not operate or is in abnormal operation.

  Make sure that all input terminals are connected properly with no mistakes in polarity.

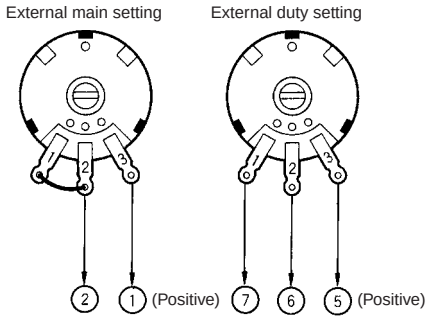
  Make sure that the internal DUTY adjuster is not set to the farthest clockwise position.

  Make sure that the frequency used by the G3PX (i.e., 50 or 60 Hz) is set properly. (This applies to the EC, and EHN models.)

- The G3PX malfunctions if the external adjusters are turned.

  Make sure that the numbers on the external adjusters coincide with the corresponding terminal numbers on the G3PX.

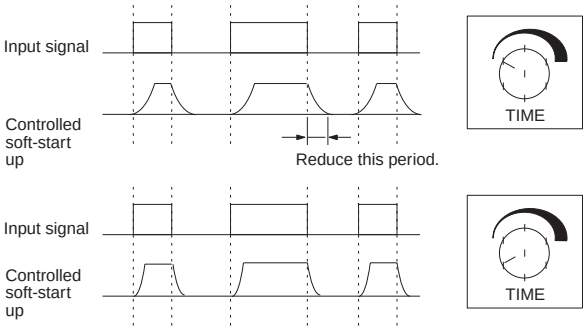
  Make sure that the 2-kΩ and 3-kΩ DUTY adjusters are connected correctly.



Note: 1, 2, 3, 5, 6, and 7 are terminal numbers of the G3PX.

- Temperature control with a Voltage-output Temperature Controller is not smooth.

  Make sure that the controlled soft-start up/down time has been adjusted properly. If not, turn the TIME adjuster counterclockwise to the minimum setting to reduce the controlled start-up/down time.



- The Level indicator is not OFF with a 0% input signal (G3PX-2□0EUN Series).

  Make sure that the BASE UP adjuster has been turned counterclockwise to the minimum setting.

Make sure that the adjuster is turned counterclockwise to the minimum setting.

- The OPEN indicator of a multiple heater open circuit detection model is lit at the initial stage (G3PX-2□0EHN Series).

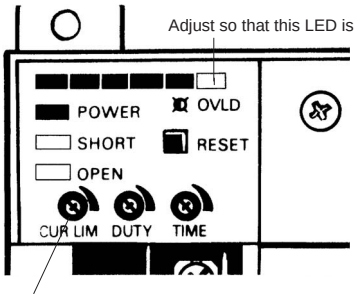
  Make sure that the initial settings are OK. If not, readjust the G3PX.
  Make sure that terminals 18 and 19 are open if the supply frequency is 50 Hz. These terminals must be short-circuited if the supply frequency is 60 Hz.

  Make sure that the load current is large enough.

- The Level indicator LEDs of a constant-current model are all lit and no power control operation is possible.

  Make sure that the load current is large enough.

  Countermeasure 1: Adjust the CUR LIM adjuster so that the LED on the farthest right of the Level indicator is OFF.



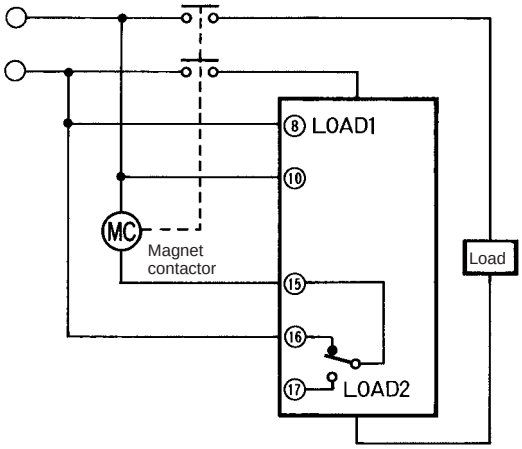
CUR LIM adjuster for limiting current

  Countermeasure 2: When the supply current is less than 50%, increase the number of turns. When the supply current is 50% of the rated current, the wires must be coiled twice on the CT Unit. When the supply current is 25% of the rated current, the wires must be coiled three to four times on the CT Unit.

- No reset will be performed even if the RESET button is pressed. Check whether the RESET button is pressed while there is nothing input into to power supply terminals 8 and 10 or 9 and 10 of the G3PX.

  Be sure to press the RESET button with power supplied to the G3PX.

The following wiring will be required if the breaker or contactor connected between the power supply and the G3PX is operated by the relay output of the G3PX.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K076-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Cycle Control Units
G32A-EA

Refer to Warranty and Application Considerations (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Used in Combination with the G3PA to Enable High-precision Temperature Control

- Use cycle control to achieve power control with little noise.
- Used in combination with the G3PA to connect to single- and three-phase loads.
- Three types of input method available: Internal adjuster, external adjuster, or DC signals from 4 to 20 mA.
- Streamline design. Both DIN track mounting and screw mounting possible.
- Use linking terminals for close mounting of the G3PA.
- Built-in isolation transformer.
- Power supply range: 100 to 240 V.

Model Number Structure

■ Model Number Legend

G32A-EA-US
1 2 3

1. **Basic Model Type**
   G32A: Accessory for G3PA
2. **Basic Model Name**
   EA: Cycle Control Unit
3. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

Name	Isolation transformer	Rated power supply voltage	Model
Cycle Control Unit	Yes	100 to 240 VAC	G32A-EA-US

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

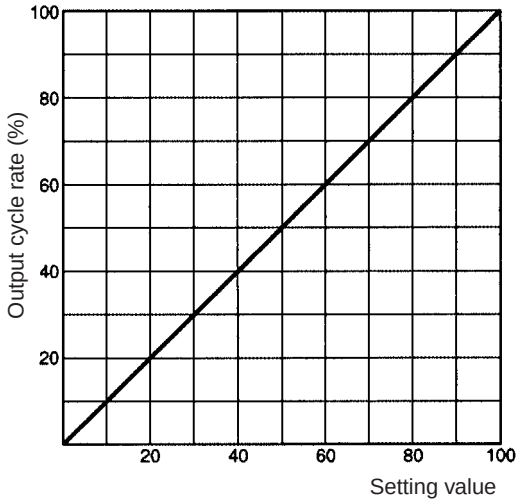
Rated power supply current	**50 Hz**	**100 (200) VAC**	40 mA max.
		120 (240) VAC	
	60 Hz	**100 (200) VAC**	
		120 (240) VAC	
Output signal			15 mA max. at 12 VDC ±15% (at 25°C)
Input signal			Current signal: 4 to 20 mA (input impedance: 352 Ω) Internal adjuster: 50 kΩ (1/4 W) External adjuster: 50 kΩ (1/4 W)
Output cycle rate			0 to 100%
Control cycle			0.2 s
Number of operable Units			2 G3PA Relays max.

■ Characteristics

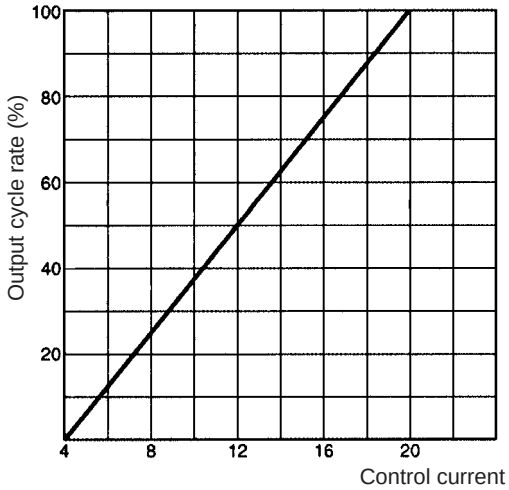
Power supply voltage range	75 to 264 VAC
Dielectric strength	1,500 VAC, 50/60 Hz for 1 minute (between AC power supply and input/output terminals)
Vibration resistance	10 to 55 to 10 Hz, 0.375-mm single amplitude (when mounted to DIN track)
Shock resistance	300 m/s^2 (approx. 30 G)
Storage temperature	–30 to 100°C (with no icing or condensation)
Ambient temperature	–30 to 80°C (with no icing or condensation)
Ambient humidity	45% to 85%
Weight	Approx. 100 g

Engineering Data

Output Cycle Rate vs. Setting Value

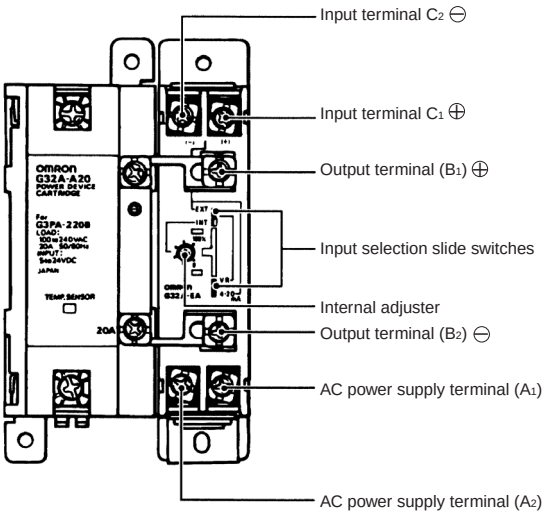


Output Cycle Rate vs. Control Current



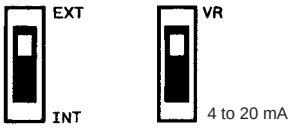
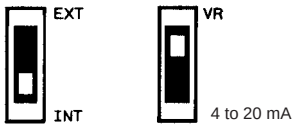
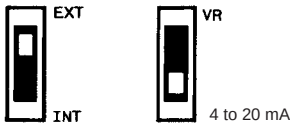
Nomenclature

The following diagram shows the terminals, adjusters, and switches on the G32A-EA.



Setting the Input Method

Select external adjuster, internal adjuster, or control current as the input method using the selection switches as shown in the following table.

Control method	Input selection slide switches
External adjuster	
Internal adjuster (See note 2.)	
Control current	

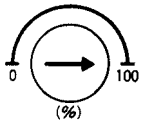
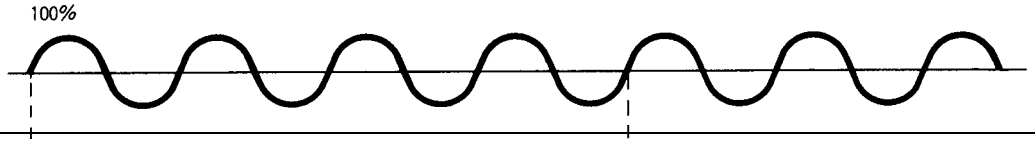
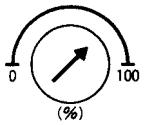
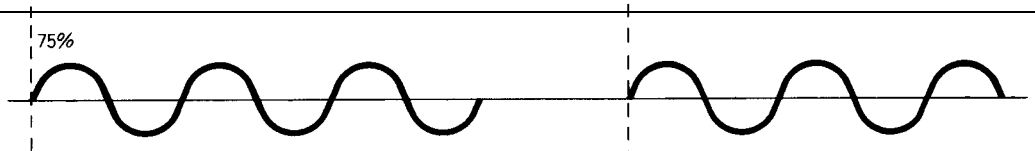
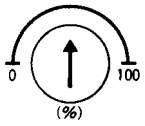
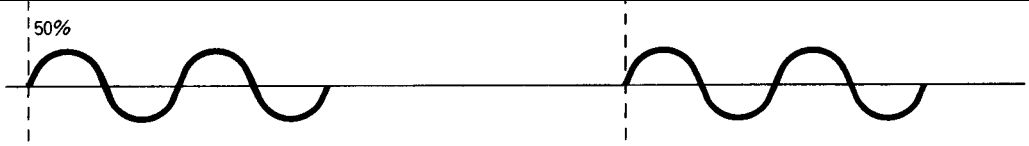
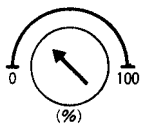
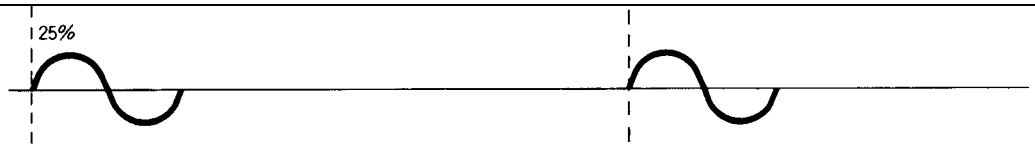
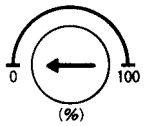
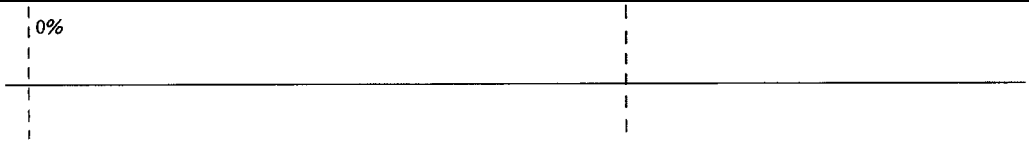
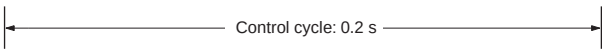
Note: 1. The input selection slide switches are factory-set to internal adjuster input. Change the setting of the switches for the input method required.

2. When using the internal adjuster, use with the input terminals (C_1, C_2) in the open state. Internal setting is not possible if there is a Temperature Controller or other device connected to C_1 or C_2.

■ Cycle Control Setting Method

The output cycle rate can be adjusted using the internal or external adjuster.
For current control, refer to the Output Cycle Rate vs. Control Current graph on page 90.

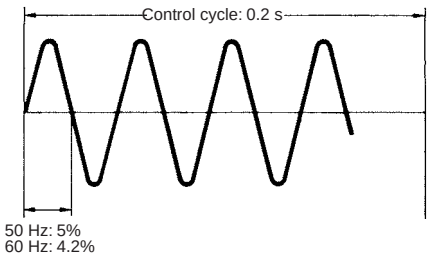
Note: When using the internal adjuster or external adjuster, it is necessary to set the input control method in the way described previously.

V_R setting	Output cycle rate (%)
	
	
	
	
	
	

■ Output Power Resolution

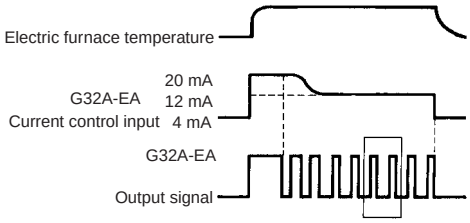
When power is controlled using the Cycle Control Unit, the output resolution (minimum variation value) changes depending on the power supply frequency. (SSR with zero cross function)

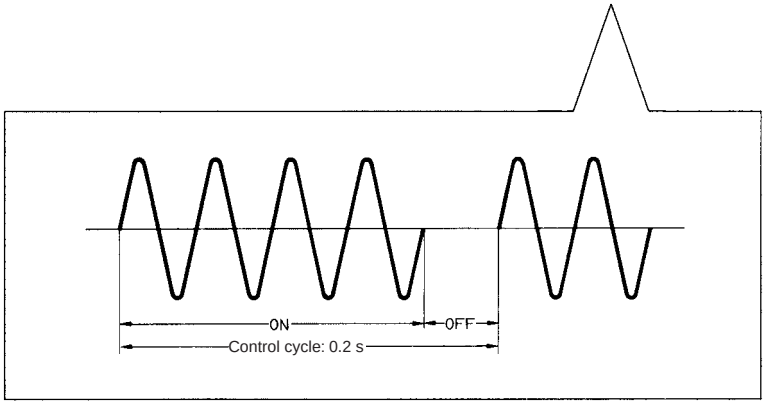
Control cycle	Output power resolution	
	50 Hz	60 Hz
0.2 s	5%	4.2%



■ Cycle Control Method

The power on the load side can be controlled by adjusting the number of cycles within the control cycle of 0.2 s and repeating this control cycle.

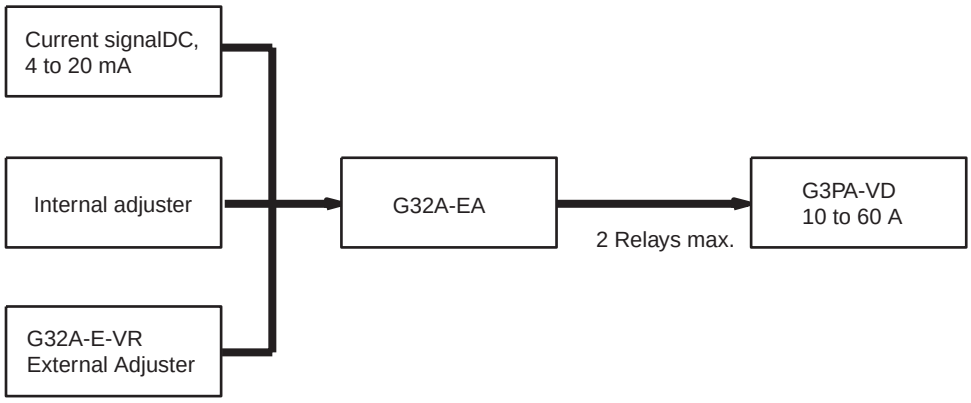




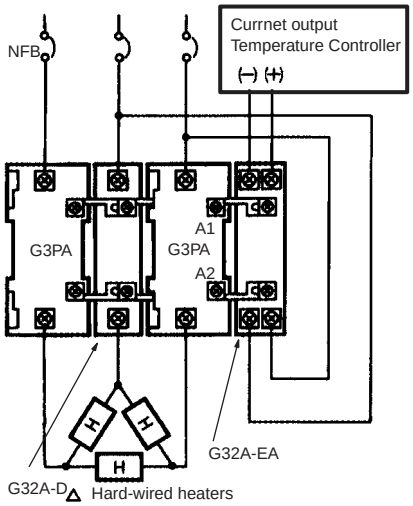
Operation

■ Application Examples

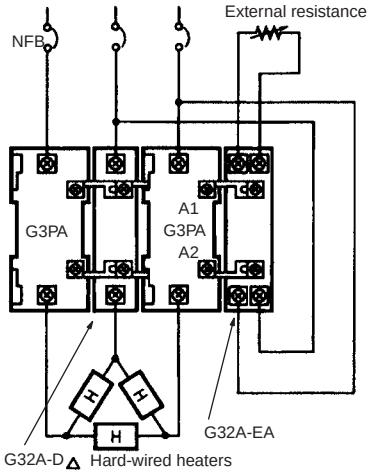
High-precision temperature control can be achieved in combination with the G3PA.



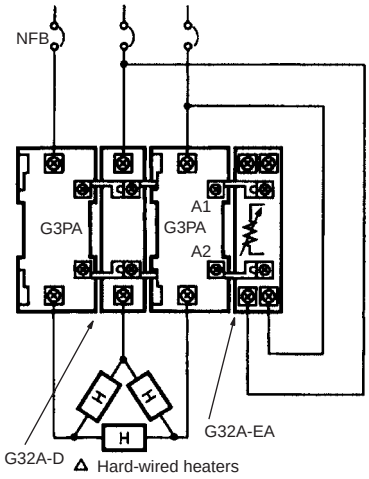
1. Control Using Current Input



2. Control Using External Adjuster



3. Control Using Internal Adjuster



Applications 1, 2, and 3 each use a different type of input method and so it is necessary to change the settings of the input selection slide switches. Be sure to change the slide switch settings in accordance with the input method on page 91.

Note: 1. For details of input selection slide switch settings, refer to *Setting the Input Method*.

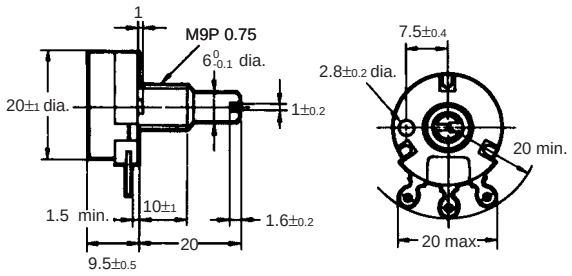
2. The above examples are for when a G3PA-VD (except 60-A models) is used at 200 VAC.

■ External Adjuster

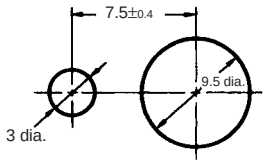
G32A-E-VR

The external adjuster, its adjuster knob, and its nameplate, all come in a set (G32A-E-VR).

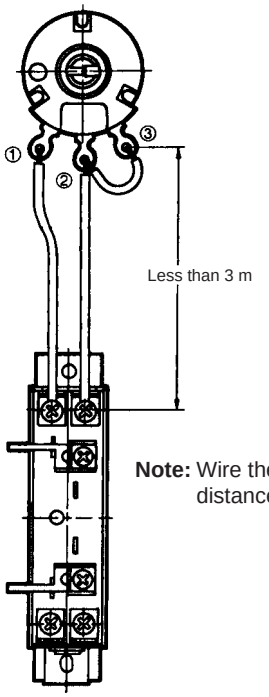
External Adjuster
(50 kΩ, B Characteristic)



Mounting Holes

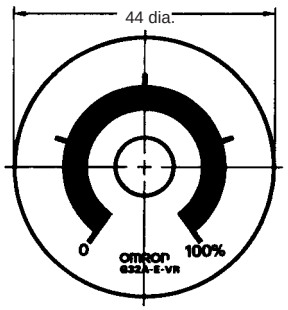


When wiring, connect in the way shown below.



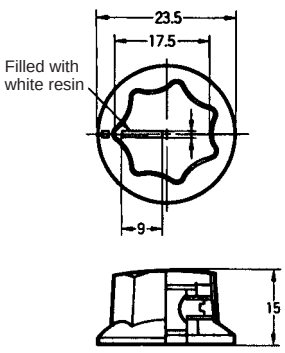
Note: Wire the external adjuster at a distance of less than 3 m.

Nameplate



Note: When using the external adjuster for input, be sure to set the input selection slide switches accordingly.

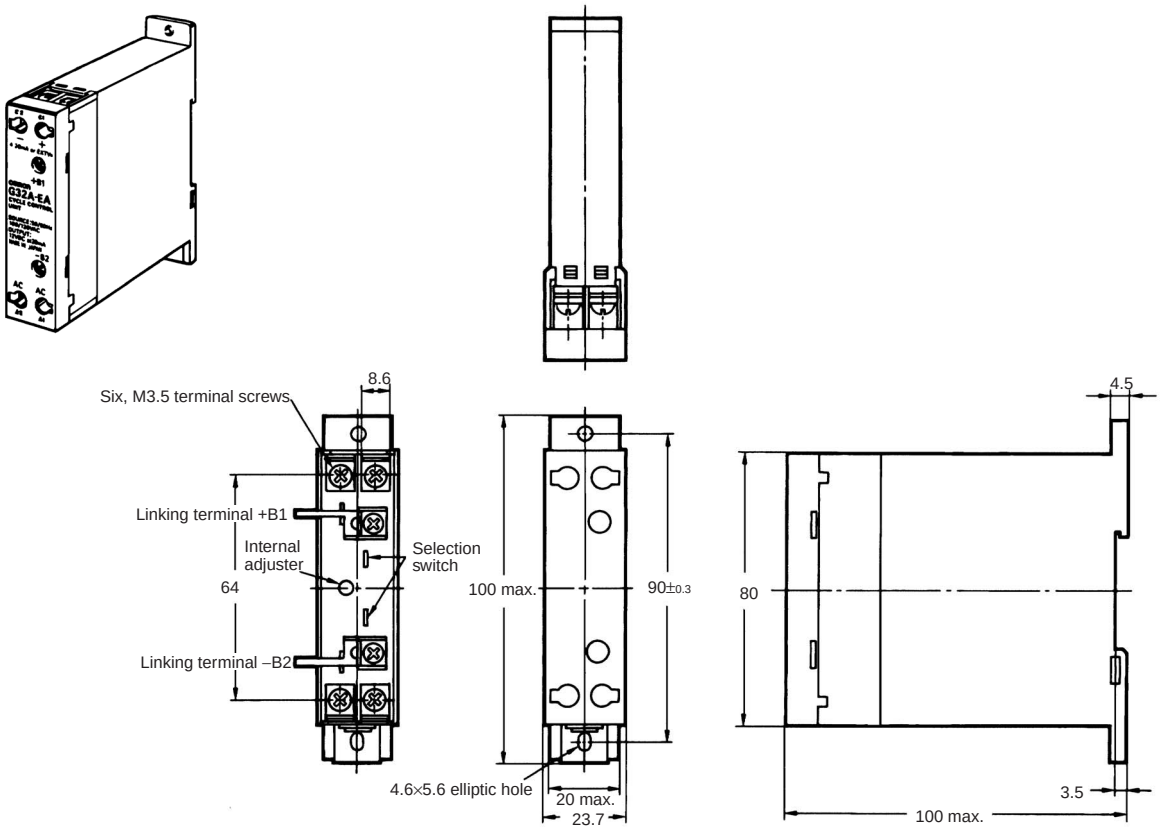
Knob



Dimensions

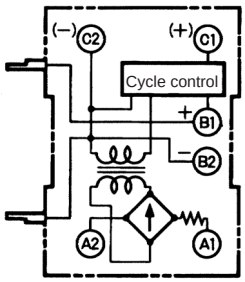
Note: All units are in millimeters unless otherwise indicated.

G32A-EA-US

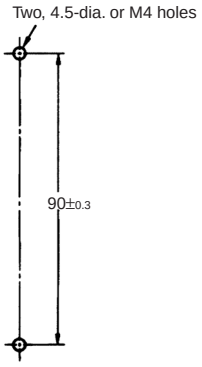


Without Terminal Cover **With Terminal Cover**

Terminal Arrangement/ Internal Connection



Mounting Holes

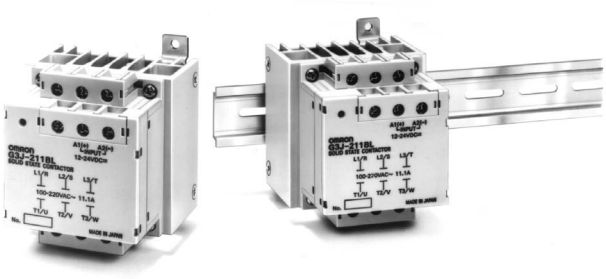


ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J125-E1-03 In the interest of product improvement, specifications are subject to change without notice.

Simple Solid State Contactors
G3J

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).



Solid State Contactors That Can Drive 3-phase Motors Frequently, and Achieve Harmonized Protection with Thermal Overload Relays

- Harmonized protection with thermal overload relays complying with IEC 947-4-1 (Class 10A/10); can be used like a standard contactor.
- Conform to AC Class 3 (IEC947).
- Comply with UL, CSA, IEC, and JEM requirements.
- Mount with screws or to DIN tracks.
- Compact monoblock construction (W: 80 × H: 100 × D: 100 mm) with a heat sink.
- Snubber circuit and varistor are built-in.
- Operation indicator.
- Two-element models added to series.

Model Number Structure

■ Model Number Legend

G3J-□□□□□□-□
1 2 3 4 5 6 7 8

1. **Basic Model Name**
   G3J: Solid State Contactor
2. **Load Power Supply**
   Blank: AC output
3. **Functions**
   Blank: Simple models
4. **Rated Load Power Supply Voltage**
   2: 200 VAC
5. **Rated Load Current**
   11: 11.1 A (200-V models)
   05: 4.8 A (200-V models)
6. **Terminal Type**
   B: Screw terminals
7. **Zero Cross Function**
   L: Not equipped with zero cross function
8. **Number of Elements**
   Blank: Standard models (3 elements)
   2: 2 elements

Ordering Information

■ List of Models

Number of elements	Insulation method	Rated supply voltage	Applicable motor		Model
3	Phototriac	12 to 24 VDC	2.2 kW (11.1 A)	200 to 220 VAC	G3J-211BL
			0.75 kW (4.8 A)		G3J-205BL
	Photocoupler	100 to 240 VAC	2.2 kW (11.1 A)		G3J-211BL
			0.75 kW (4.8 A)		G3J-205BL
2	Phototriac	12 to 24 VDC	2.2 kW (11.1 A)		G3J-211BL-2
			0.75 kW (4.8 A)		G3J-205BL-2
	Photocoupler	100 to 240 VAC	2.2 kW (11.1 A)		G3J-211BL-2
			0.75 kW (4.8 A)		G3J-205BL-2

Note: When ordering, specify the rated supply voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Operation Circuit

Item	DC-input models	AC-input models
Rated supply voltage	12 to 24 VDC	100 to 240 VAC (50/60 Hz)
Operating voltage range	9.6 to 26.4 VDC	75 to 264 VAC (50/60 Hz)
Rated input current (impedance)	15 mA max. (at 12 to 24 VDC)	36 kΩ ±20% (100 to 240 VAC)
Must operate voltage	9.6 VDC max.	75 VAC max.
Must release voltage	3.6 VDC min.	20 VAC min.

Main Circuit

Item		G3J-211BL, G3J-211BL-2	G3J-205BL, G3J-205BL-2
Rated load voltage		100 to 240 VAC (50/60 Hz)	
Load voltage range		75 to 264 VAC (50/60 Hz)	
Rated carry current (See note 3.)		11.1 A (Ta = 40°C)	4.8 A (Ta = 40°C)
Min. load current		0.5 A	
Peak-value current resistivity		350 A, 60 Hz, 1 cycle	150 A, 60 Hz, 1 cycle
Overload resistance		Refer to *Engineering Data* on page 105.	
Closed current (effective value)	**AC3**	111 A	48 A
	AC4	133.2 A	57.6 A
Breaking current (effective value)	**AC3**	88.8 A	38.4 A
	AC4	111 A	48 A
Applicable load	**3-phase inductive motor (AC3 AC4 AC53-a)**	200 to 220 VAC, 2.2 kW, (11.1 A)	200 to 220 VAC, 0.75 kW, (4.8 A)
		Motors passing the AC3-class, AC4-class, and AC53-a-class switching frequency test (Ta = 40°C) under conditions specified by OMRON. Refer to *Switching Frequency Test Conditions* on page 105.	
	Single-phase motor (AC3) (See note 1.)	100 VAC, 0.4 kW (11.1 A) 200 VAC, 0.75 kW (8.8 A)	100 VAC, 0.1 kW, (5.1 A) 200 VAC, 0.4 kW (5.5 A) (See note 2.)
	Resistive load (AC1)	100 to 240 VAC, 11.1 A	100 to 240 VAC, 4.8 A

Note: 1. With 2-element models, L2 and T2 are shorted internally.

2. When using 0.75-W models with 3 poles ON simultaneously, use either combination at 4.8 A max.

3. The rated carry current varies depending on the ambient temperature. Refer to L*oad Current vs. Ambient Temperature* under *Engineering Data* for details.

■ Characteristics

Item	DC-input models	AC-input models
Operate time	1 ms max.	50 ms max.
Release time	5/6 of the load power supply cycle time + 1 ms max.	3/2 of the load power supply cycle time + 1 ms max.
Output ON-voltage drop	1.6 V_{RMS} max.	
Leakage current (See note.)	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	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude	
Shock resistance	Destruction: 294 m/s^2	
Ambient temperature	Operating: –20°C to 60°C (with no icing or condensation) Storage: –30°C to 70°C (with no icing or condensation)	
Ambient humidity	Operating: 45% to 85%	
Weight	Approx. 700 g	
Standards	UL508, CSA22.2 No. 14, IEC947-4-2	

Note: With 2-element models, the S-phase leakage current will be larger by a factor of $\sqrt{3}$.

Soft-start/stop Solid State Contactors
G3J-T

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Soft-start/stop Function Starts and Stops Three-phase Motors Smoothly and Economically

- Function like an inverter by holding down the starting current.
- Harmonized protection with thermal overload relays complying with IEC 947-4-1 (Class 10A/10); can be used like a standard contactor.
- Conform to AC Class 3 (IEC947).
- Comply with UL, CSA, IEC (400-V models only), and JEM requirements.
- Mount with screws or to DIN tracks.
- Compact monoblock construction for the G3J-T217BL (W: 100 × H: 100 × D: 110 mm) with a heat sink.
- Snubber circuit and varistor are built-in.
- Operation indicator.

Model Number Structure

■ Model Number Legend

G3J-□□□□□□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3J: Solid State Contactor
2. **Load Power Supply**
   Blank: AC output
3. **Functions**
   T: Soft-start/stop function
4. **Rated Load Power Supply Voltage**
   2: 200 VAC
   4: 400 VAC
5. **Rated Load Current**
   17: 17.4 A (200-V models)
   11: 11.1 A (200-V models)
   05: 4.8 A (200-V models), 5.5 A (400-V models)
   03: 2.4 A (400-V) models
6. **Terminal Type**
   B: Screw terminals
7. **Zero Cross Function**
   L: Not equipped with zero cross function

Ordering Information

■ List of Models

Number of elements	Insulation method	Rated supply voltage	Input method	Applicable motor		Model
3	Phototriac	12 to 24 VDC	No-voltage input (open and short-circuit input)	2.2 kW (5.5 A)	380 to 400 VAC	G3J-T405BL
				0.75 kW (2.4 A)		G3J-T403BL
				3.7 kW (17.4 A)	200 to 220 VAC	G3J-T217BL
				2.2 kW (11.1 A)		G3J-T211BL
				0.75 kW (4.8 A)		G3J-T205BL

Note: When ordering, specify the rated supply voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Power Supply

Rated supply voltage	12 to 24 VDC
Operating voltage range	10.2 to 26.4 VDC
Current consumption	50 mA max. (at 12 to 24 VDC)

Operation Circuit

Input current	10 mA max. (at 12 to 24 VDC)
Input method **No-voltage input (short-circuiting and opening inputs) (See note.)**	Short-circuiting or opening terminals 1 and COM or 2 (+) and 1 SSR input turned ON:A maximum residual voltage of 2 V between short-circuited terminals SSR input turned OFF:A maximum leakage current of 0.15 mA Relay input: For minute signals

Note: Refer to page 115 for wiring examples.

Main Circuit

Item		G3J-T405BL	G3J-T403BL	G3J-T217BL	G3J-T211BL	G3J-T205BL
Rated load voltage		200 to 400 VAC (50/60 Hz)		200 to 240 VAC (50/60 Hz)		
Load voltage range		180 to 440 VAC (50/60 Hz)		180 to 264 VAC (50/60 Hz)		
Rated carry current		5.5 A (Ta = 40°C)	2.4 A (Ta = 40°C)	17.4 A (Ta = 40°C)	11.1 A (Ta = 40°C)	4.8 A (Ta = 40°C)
Min. load current		0.5 A				
Peak-value current resistivity		220 A, 60 Hz, 1 cycle	96 A, 60 Hz, 1 cycle	500 A, 60 Hz, 1 cycle	350 A, 60 Hz, 1 cycle	150 A, 60 Hz, 1 cycle
Overload resistance		Refer to *Engineering Data* on page 105.				
Closed current (effective value)	**AC3**	55 A	24 A	174 A	111 A	48 A
	AC4	66 A	28.8 A	208.8 A	133.2 A	57.6 A
Breaking current (effective value)	**AC3**	44 A	19.2 A	139.2 A	88.8 A	38.4 A
	AC4	55 A	24 A	174 A	111 A	48 A
Applicable load	**3-phase inductive motor (AC3 AC4 AC53-a)**	380 to 400 VAC, 2.2 kW, 5.5 A	380 to 400 VAC, 0.75 kW, 2.4 A	200 to 220 VAC, 3.7 kW, 17.4 A	200 to 220 VAC, 2.2 kW, 11.1 A	200 to 220 VAC, 0.75 kW, 4.8 A
		Motors passing the AC3-class, AC4-class, and AC53-a-class switching frequency test (Ta = 40°C) under conditions specified by OMRON. Refer to *Switching Frequency Test Conditions* on page 105.				
	Resistive load (AC1) (See note.)	200 to 400 VAC, 5.5 A	200 to 400 VAC, 2.4 A	200 to 240 VAC, 17.4 A	200 to 240 VAC, 11.1 A	200 to 240 VAC, 4.8 A

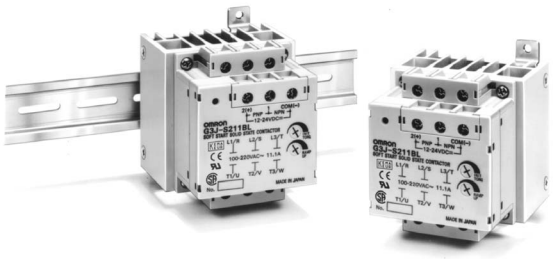
Note: No single-phase load can be connected.

■ Characteristics

Item	G3J-T405BL	G3J-T403BL	G3J-T217BL	G3J-T211BL	G3J-T205BL
Ramp-up time	Set within a range from 1 to 25 s.				
Ramp-down time	Set within a range from 1 to 25 s.				
Starting torque	Set within a range from 200% to 450% In.				
Output ON-voltage drop	1.8 V_{RMS} max.		1.6 V_{RMS} max.		
Leakage current	20 mA max. (at 400 VAC)		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	Destruction: 10 to 55 to 10 Hz, 0.75–mm single amplitude				
Shock resistance	Destruction: 294 m/s^2				
Ambient temperature	Operating: –20°C to 60°C (with no icing or condensation) Storage: –30°C to 70°C (with no icing or condensation)				
Ambient humidity	Operating: 45% to 85%				
Weight	730 g max.		800 g max.	730 g max.	
Standards	UL508 File No. E64562 CSA22.2 No. 14 File No. LR35535				

Soft-start Solid State Contactors
G3J-S

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).



Soft-start Function Starts Motors Smoothly and Economically

- The soft-start function allows a smooth startup of motors by holding down the starting current, and functions like an inverter.
- Harmonized protection with thermal overload relays complying with IEC 947-4-1 (Class 10A/10); can be used like a standard contactor.
- Conform to AC Class 3 (IEC947).
- Comply with UL, CSA, IEC, and JEM requirements.
- Mount with screws or to DIN tracks.
- Compact monoblock construction (W: 80 × H: 100 × D: 100 mm) with a heat sink.
- Snubber circuit and varistor are built-in.
- Operation indicator.

Model Number Structure

■ Model Number Legend

G3J-□□□□□□

1 2 3 4 5 6 7

1. Basic Model Name
G3J: Solid State Contactor

2. Load Power Supply
Blank: AC output

3. Functions
S: Soft-start function

4. Rated Load Power Supply Voltage
2: 200 VAC
4: 400 VAC

5. Rated Load Current
11: 11.1 A (200-V models)
05: 4.8 A (200-V models), 5.5 A (400-V models)
03: 2.4 A (400-V) models

6. Terminal Type
B: Screw terminals

7. Zero Cross Function
L: Not equipped with zero cross function

Ordering Information

■ List of Models

Number of elements	Insulation method	Rated supply voltage	Input method	Applicable motor		Model
3	Phototriac	12 to 24 VDC	No-voltage input (open and short-circuit input)	2.2 kW (5.5 A)	380 to 400 VAC	G3J-S405BL
				0.75 kW (2.4 A)		G3J-S403BL
				2.2 kW (11.1 A)	200 to 220 VAC	G3J-S211BL
				0.75 kW (4.8 A)		G3J-S205BL

Note: When ordering, specify the rated supply voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Power Supply

Rated supply voltage	12 to 24 VDC
Operating voltage range	10.2 to 26.4 VDC
Current consumption	100 mA max. (at 12 to 24 VDC)

Operation Circuit

Input current	10 mA max. (at 12 to 24 VDC)
Input method **No-voltage input (short-circuiting and opening inputs) (See note.)**	Short-circuiting or opening terminals 1 and COM or 2 (+) and 1 SSR input turned ON: A maximum residual voltage of 2 V between short-circuited terminals SSR input turned OFF: A maximum leakage current of 0.15 mA Relay input: For minute signals

Note: Refer to page 115 for wiring examples.

Main Circuit

Item		G3J-S405BL	G3J-S403BL	G3J-S211BL	G3J-S205BL
Rated load voltage		200 to 400 VAC (50/60 Hz)		200 to 240 VAC (50/60 Hz)	
Load voltage range		180 to 440 VAC (50/60 Hz)		180 to 264 VAC (50/60 Hz)	
Rated carry current		5.5 A (Ta = 40°C)	2.4 A (Ta = 40°C)	11.1 A (Ta = 40°C)	4.8 A (Ta = 40°C)
Min. load current		0.5 A			
Peak-value current resistivity		220 A, 60 Hz, 1 cycle	96 A, 60 Hz, 1 cycle	350 A, 60 Hz, 1 cycle	150 A, 60 Hz, 1 cycle
Overload resistance		Refer to *Engineering Data* on page 105.			
Closed current (effective value)	**AC3**	55 A	24 A	111 A	48 A
	AC4	66 A	28.8 A	133.2 A	57.6 A
Breaking current (effective value)	**AC3**	44 A	19.2 A	88.8 A	38.4 A
	AC4	55 A	24 A	111 A	48 A
Applicable load	**3-phase inductive motor (AC3 AC4 AC53-a)**	380 to 400 VAC, 2.2 kW, 5.5 A	380 to 400 VAC, 0.75 kW, 2.4 A	200 to 220 VAC, 2.2 kW, 11.1 A	200 to 220 VAC, 0.75 kW, 4.8 A
		Motors passing the AC3-class, AC4-class, and AC53-a-class switching frequency test (Ta = 40°C) under conditions specified by OMRON. Refer to *Switching Frequency Test Conditions* on page 105.			
	Resistive load (AC1) (See note.)	200 to 400 VAC, 5.5 A	200 to 400 VAC, 2.4 A	200 to 240 VAC, 11.1 A	200 to 240 VAC, 4.8 A

Note: No single-phase load can be connected.

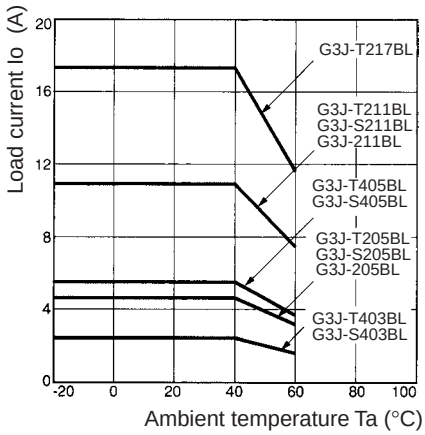
■ Characteristics

Item	G3J-S405BL	G3J-S403BL	G3J-S211BL	G3J-S205BL
Ramp-up time	Set within a range from 1 to 25 s.			
Reset time	5/6 cycles of load power supply + 1 ms max.			
Starting torque	Set within a range from 200% to 450% In.			
Output ON-voltage drop	1.8 V_{RMS} max.		1.6 V_{RMS} max.	
Leakage current	20 mA max. (at 400 VAC)		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	Destruction: 10 to 55 to 10 Hz, 0.75–mm single amplitude			
Shock resistance	Destruction: 294 m/s^2			
Ambient temperature	Operating: –20°C to 60°C (with no icing or condensation) Storage: –30°C to 70°C (with no icing or condensation)			
Ambient humidity	Operating: 45% to 85%			
Weight	730 g max.			
Certified standards	UL508 File No. E64562 CSA 22.2 No. 14 File No. LR35535 IEC947-4-2 File No. 96.2597.02			
EMC	Emission AC mains: IEC947-4-2, CISPR 11 Class A Emission Electromagnetic: IEC947-4-2, CISPR 11 Class A Immunity ESD: IEC947-4-2, IEC801-2: 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic: IEC947-4-2, IEC1000-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT: IEC947-4-2, IEC801-4: 2 kV AC power-signal line Immunity Surge transient: IEC947-4-2, IEC1000-4-5 1 kV differential mode 2 kV common mode Immunity RF disturbance: IEC947-4-2, IEC/DIS1000-4-6 10 V (0.15 to 80 MHz)			

Engineering Data

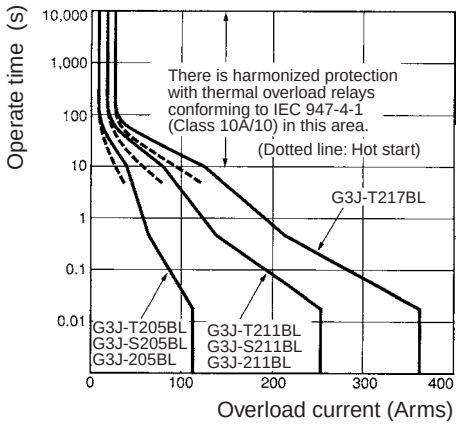
■ G3J, G3J-T, G3J-S

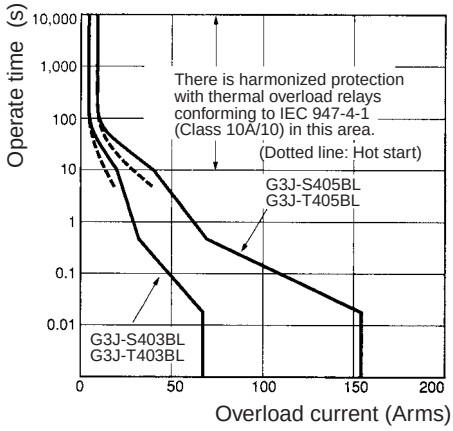
Load Current vs. Ambient Temperature



Overload Current Resistivity

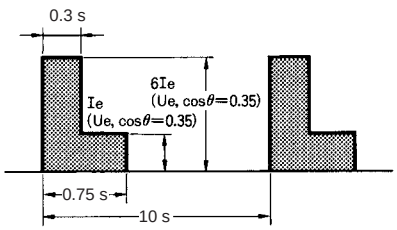
Conditions: 60 Hz, Ta of 25°C, non-repetitive (1/2 for repetitive)





■ Switching Frequency Test Conditions (AC3/AC4/AC53-a)

AC3 Class (Immediate Start)



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

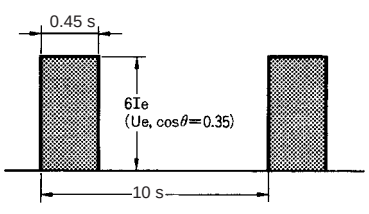
The following Soft-start conditions apply.

Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

AC4 Class (Inching)



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

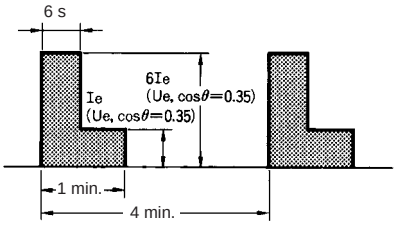
The following Soft-start conditions apply.

Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

AC53-a: 6-6: 25-15



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

The following Soft-start conditions apply.

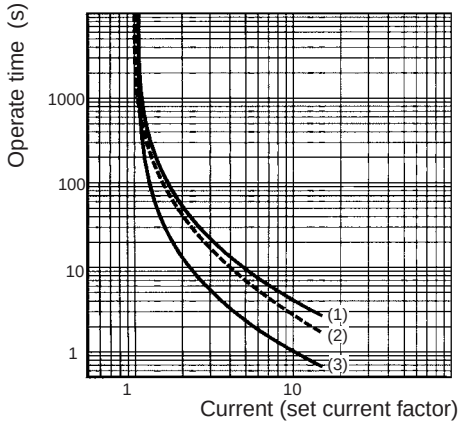
Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

■ Recommended Thermal Overload Performance

Overload Characteristics



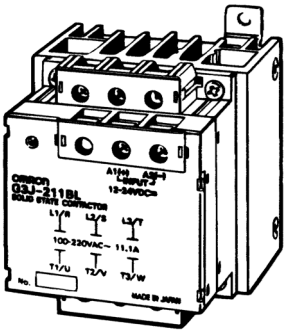
(1): Balanced operation, 3-phase, from cold state
(2): Balanced operation, 2-phase, from cold state
(3): Balanced operation, 3-phase, after a long period of set current flow (hot state).

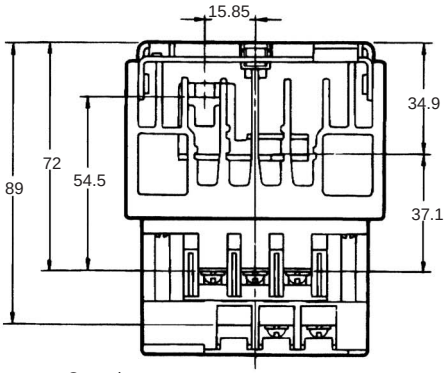
Dimensions

Note: All units are in millimeters unless otherwise indicated.

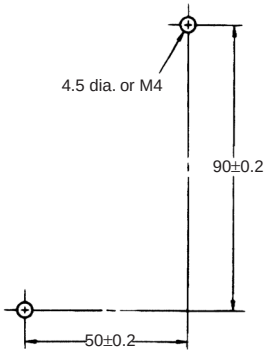
■ Solid State Contactors

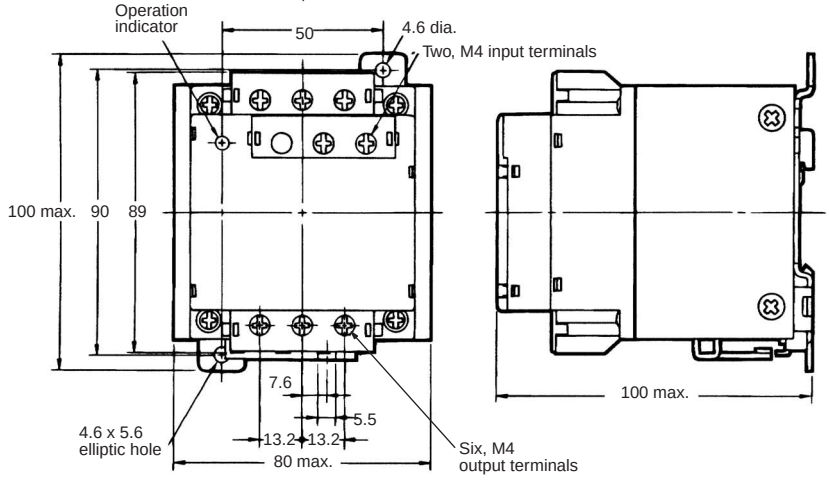
G3J-211BL
G3J-205BL
G3J-211BL-2
G3J-205BL-2



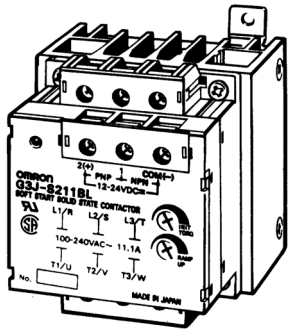


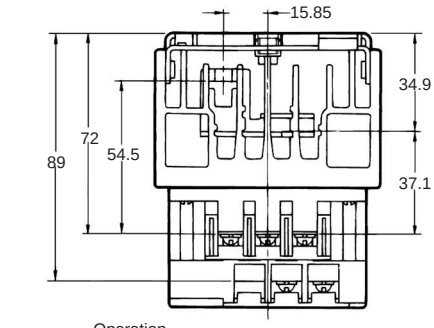
Mounting Holes

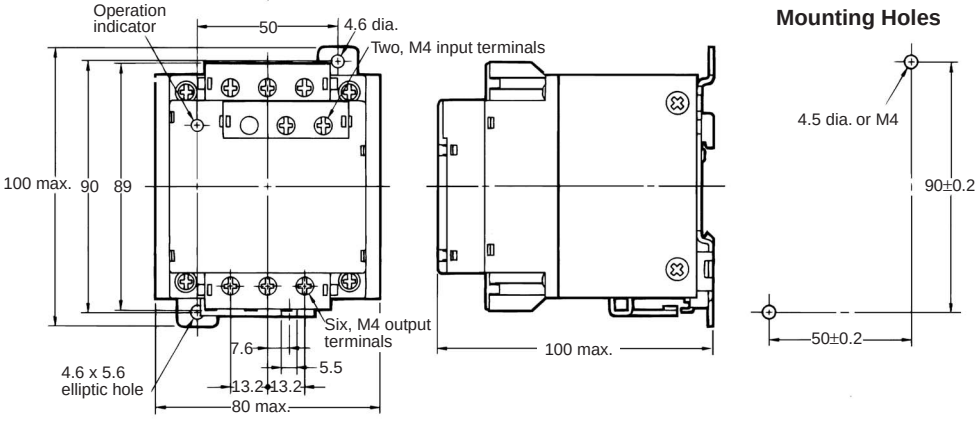




G3J-T211BL
G3J-T205BL
G3J-T405BL
G3J-T403BL

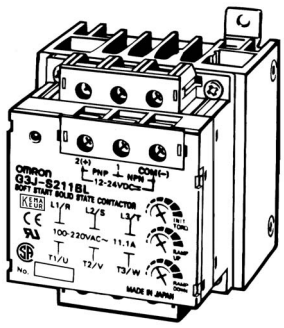


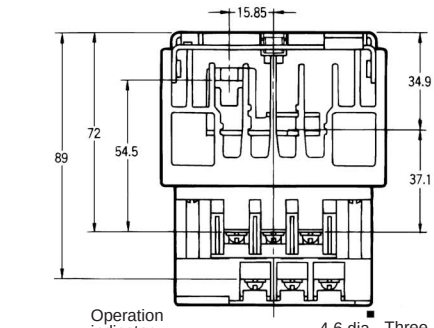


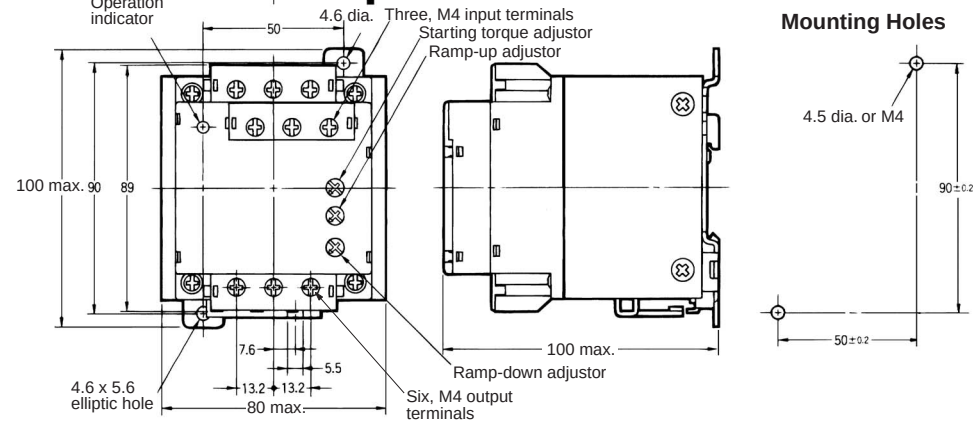


Mounting Holes

G3J-S211BL
G3J-S205BL
G3J-S405BL
G3J-S403BL

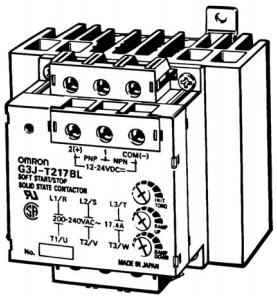


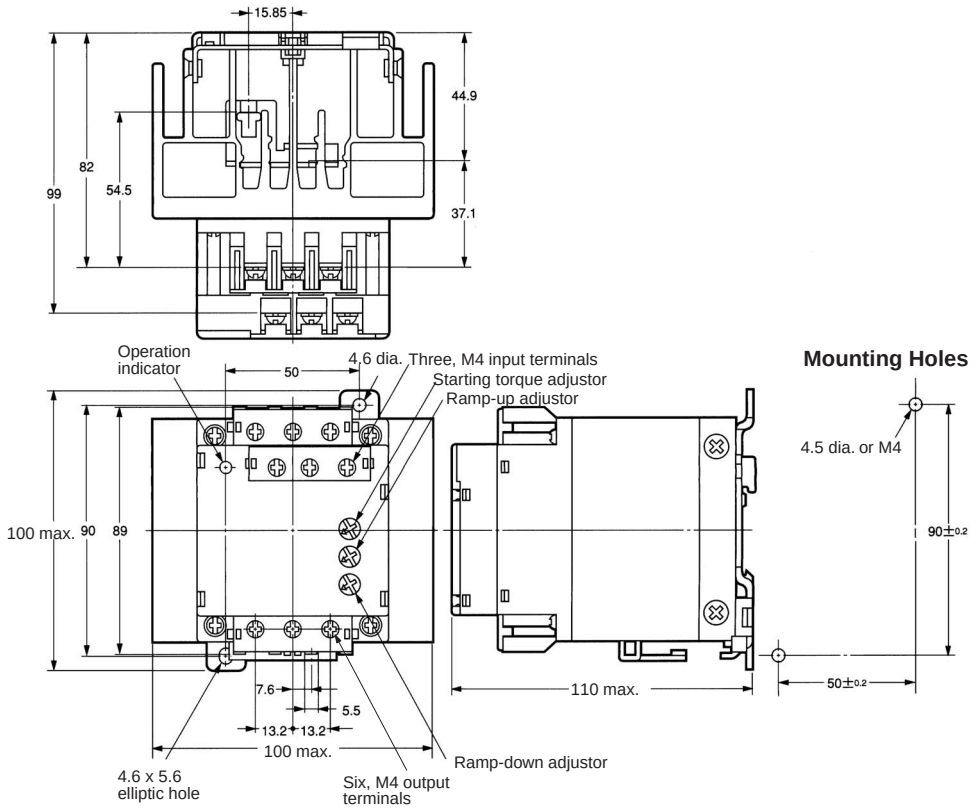




Mounting Holes

G3J-T217BL

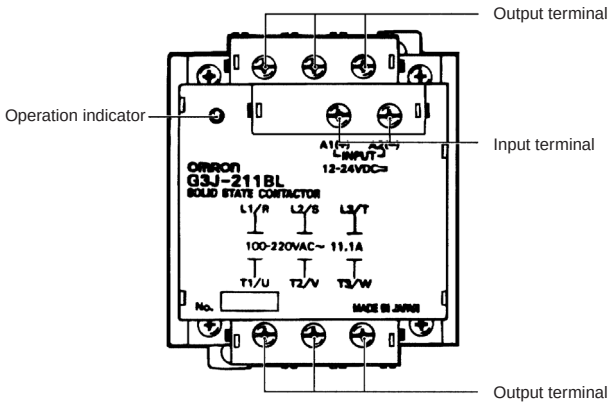



15.85
44.9
82
99
54.5
37.1
Operation indicator
50
4,6 dia.
Three, M4 input terminals
Starting torque adjustor
Ramp-up adjustor
100 max.
90
89
7.6
5.5
13.2
13.2
100 max.
110 max.
4.6 x 5.6 elliptic hole
Six, M4 output terminals
Ramp-down adjustor
Mounting Holes
4.5 dia. or M4
90±0.2
50±0.2

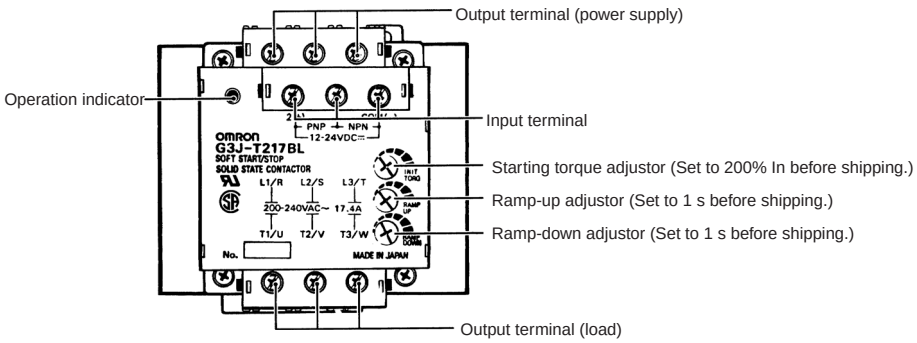
Installation

■ Nomenclature

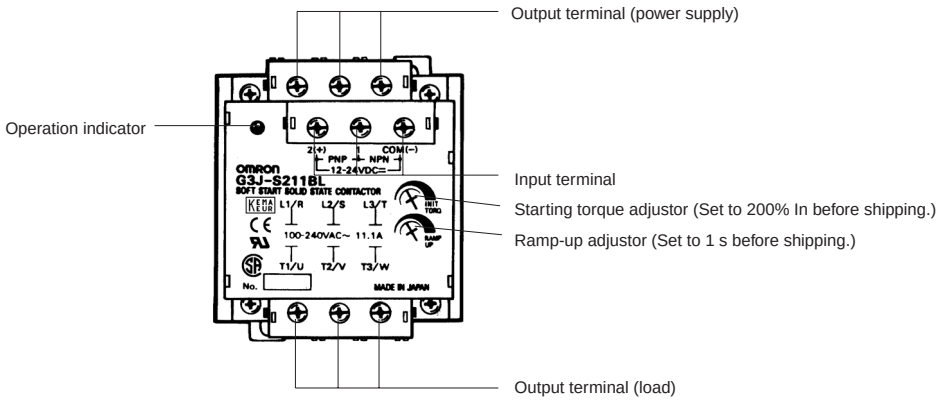
G3J



G3J-T



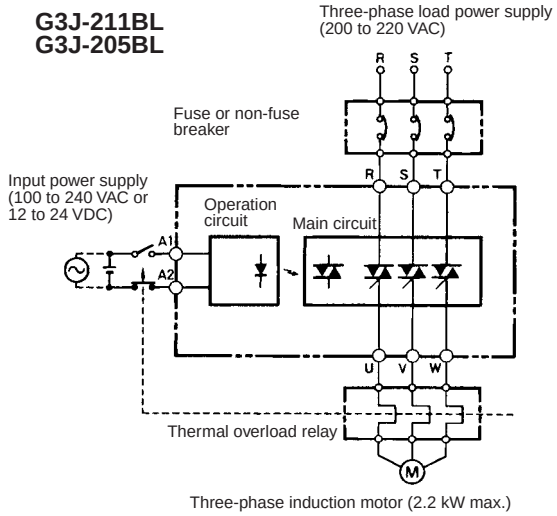
G3J-S



■ Internal Connections

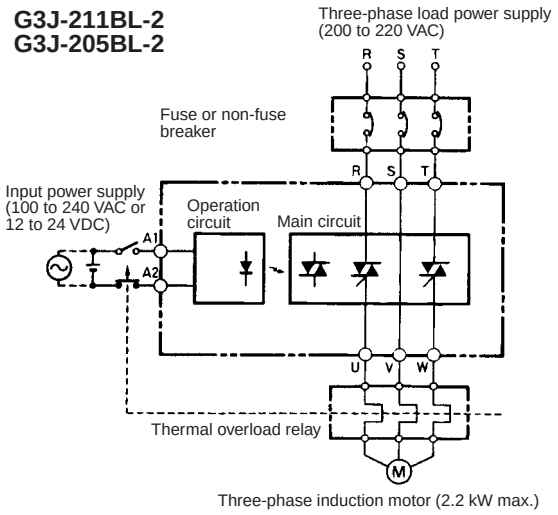
Simple 3-element Models

G3J-211BL
G3J-205BL



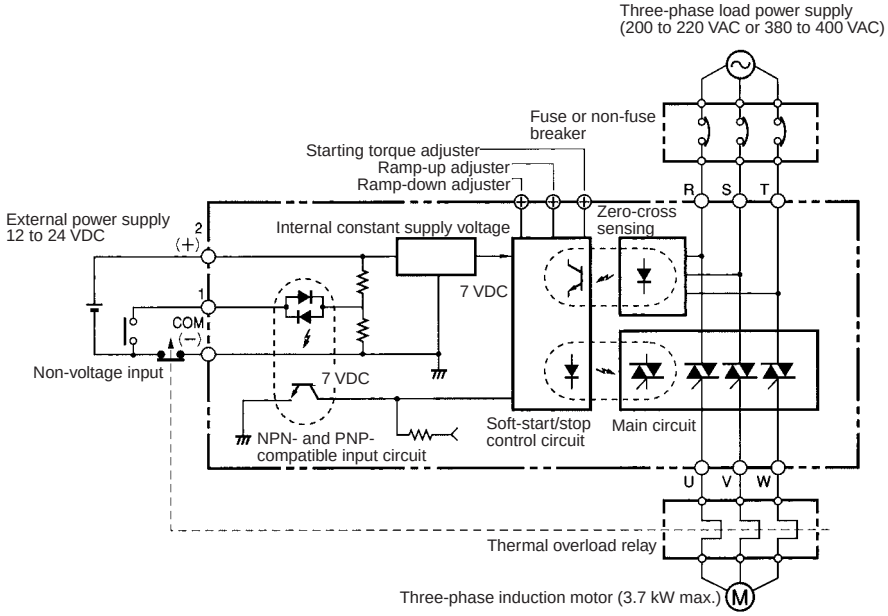
Simple 2-element Models

G3J-211BL-2
G3J-205BL-2



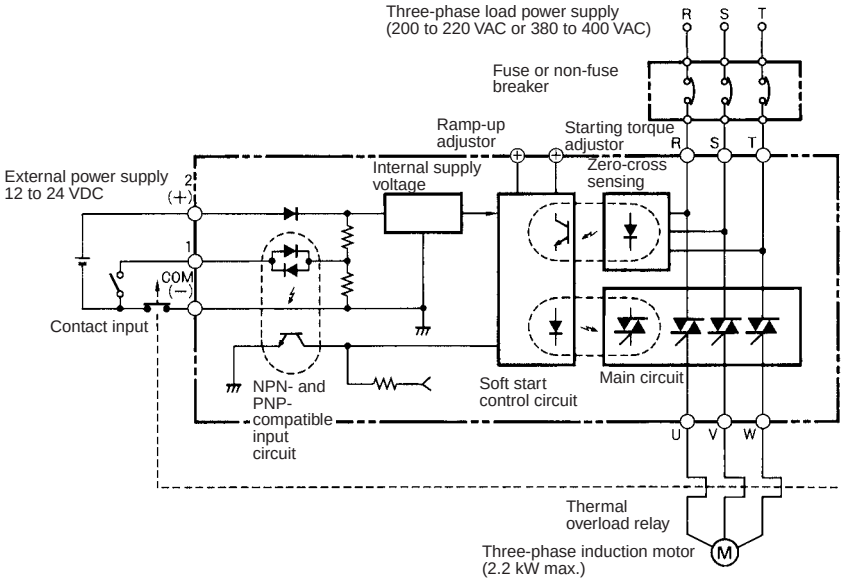
Soft-start/stop Models

G3J-T217BL
G3J-T211BL
G3J-T205BL
G3J-T405BL
G3J-T403BL



Soft-start Models

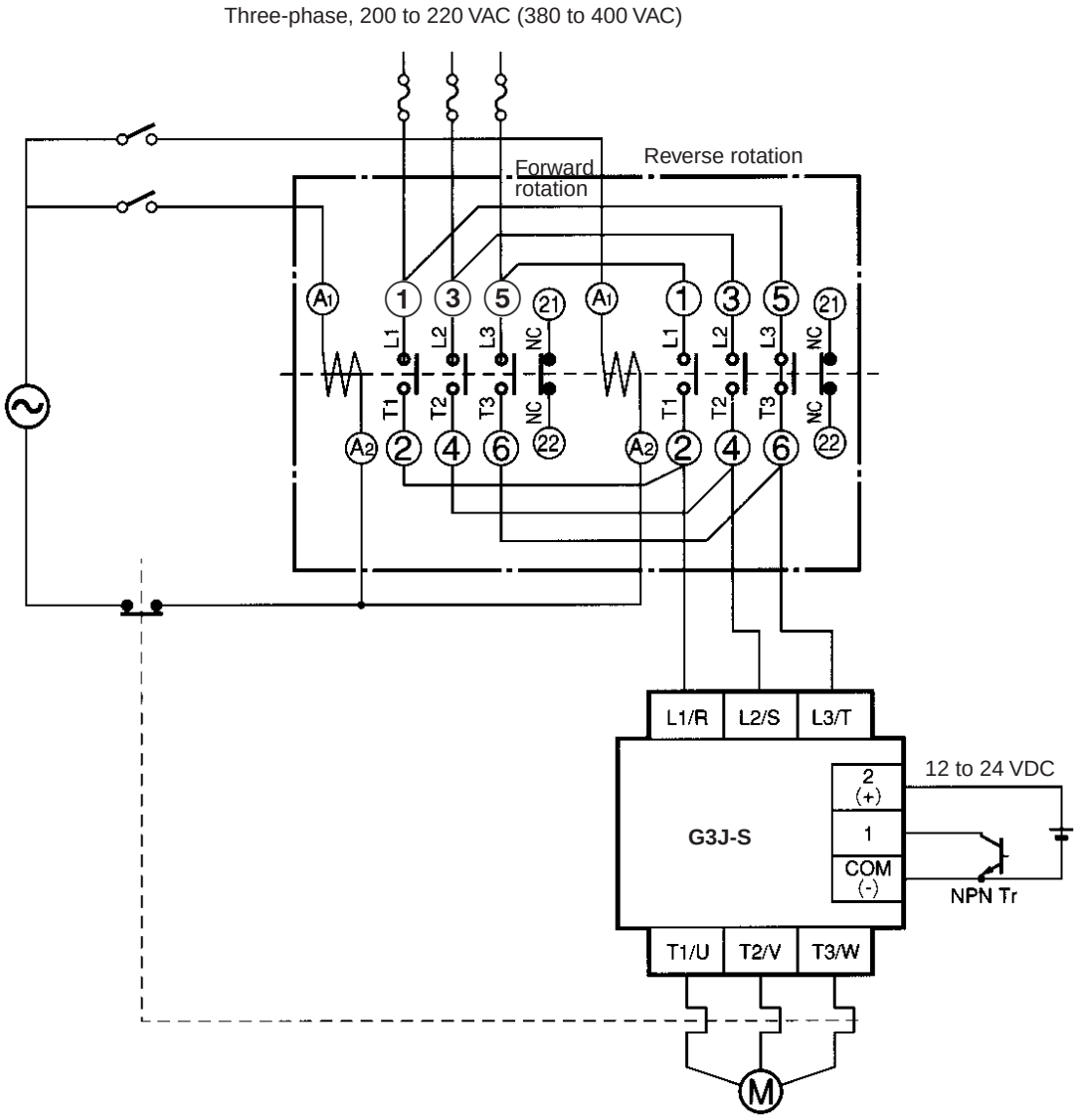
G3J-S211BL
G3J-S205BL
G3J-S405BL
G3J-S403BL



Forward/Reverse Rotation: Example 1

G3J-S or G3J-T with a Reversible Contactor with Built-in Mechanical Interlock Function

G3J-S□BL or G3J-T□BL

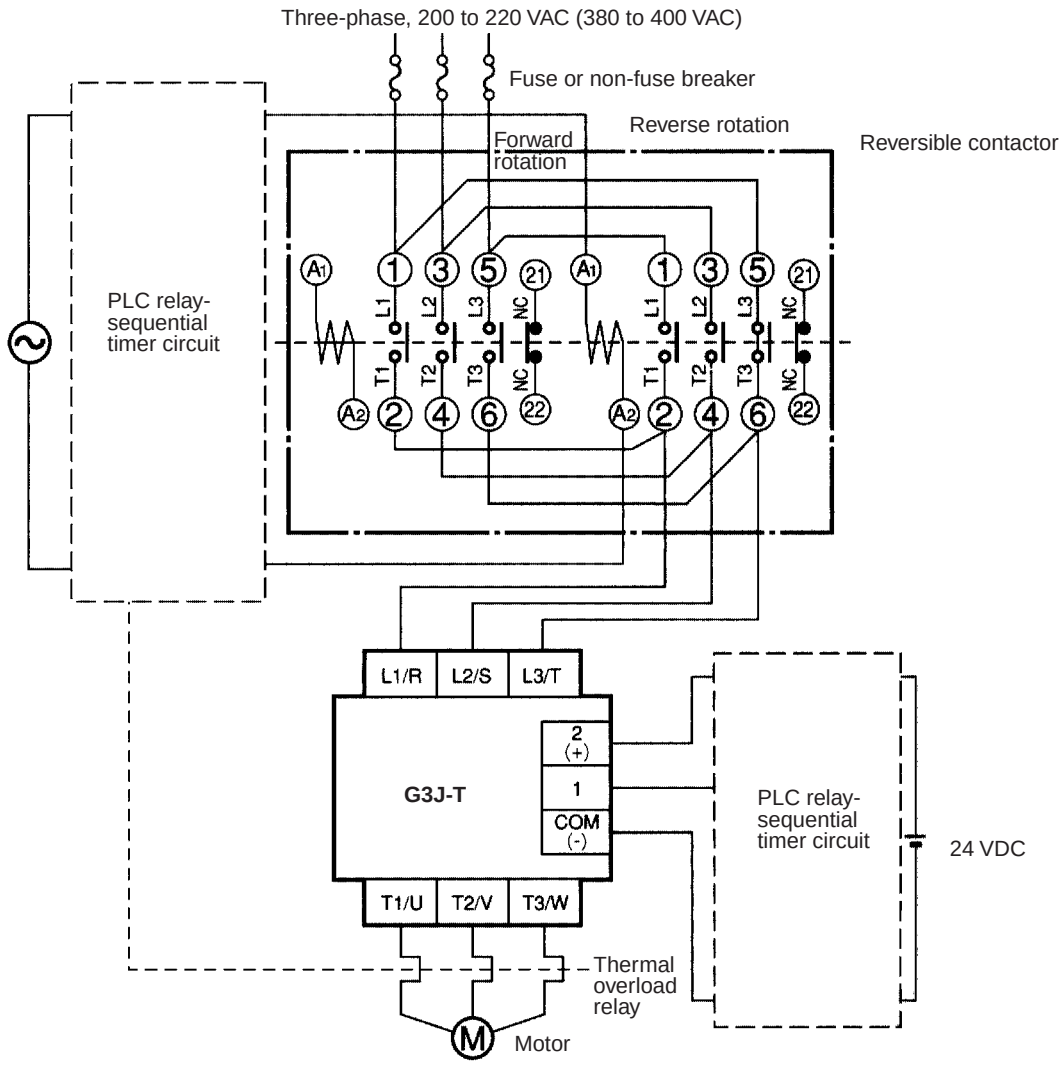


Note: 1. Be sure to use a fuse or non-fuse breaker to protect the G3J.

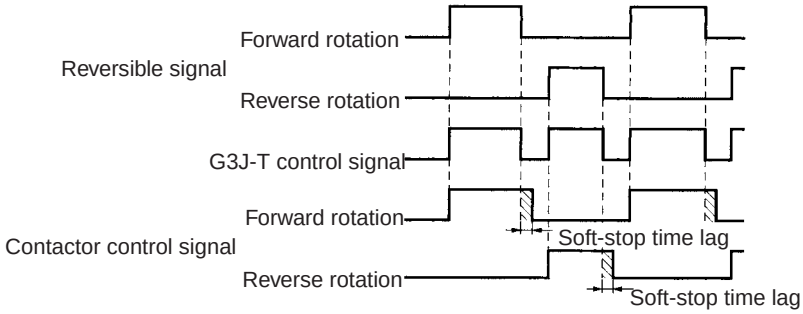
2. Make sure that the interval between forward and reverse operations is at least 100 ms.

3. Be sure to apply the input signal of the G3F-S after the reversible contactor starts operating. If the input signal is applied before the contactor starts operating, the soft-start function may not operate.

G3J-S or G3J-T



For soft-stop control, the G3J-T has enough load current to continue rotating the motor during ramp-down time setting even after the control signal of the G3J-T is tuned OFF. Therefore, a time lag is required between the time when the G3J-T stops operating up to the time when the reversible contactor is turned OFF. The ramp-down time of the G3J-T is adjustable up to approximately 25 s max. Therefore, set the time lag to 25 s in the initial sequence during the adjustment stage. Adjust the time lag of the sequential circuit according to the application.



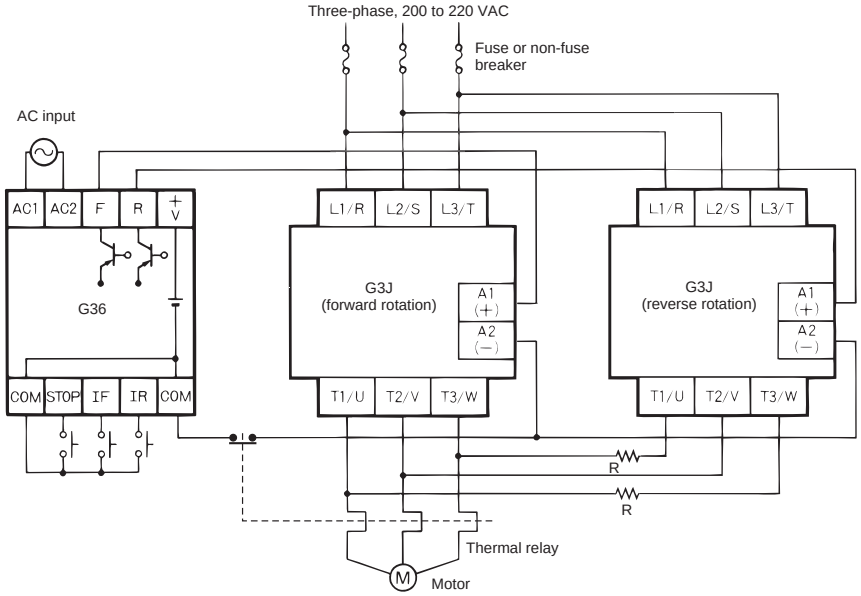
Note: Make sure that the interval between forward and reverse operations is at least 100 ms. If the G3J is turned ON by noise input, short-circuiting between phases will result. In order to prevent this, insert a protective resistor.

⚠ WARNING

Do not use two G3J-S or G3J-T Units together in reversible operation.

Forward/Reverse Rotation: Example 2

Simple G3J Model with G36 Reversible Unit



Note: 1. Be sure to use a fuse or non-fuse breaker to protect the G3J.

2. The G36 can only be used with simple DC-input G3J models at the rated operating voltage.

3. The G36 operates when the COM and IF (IR, STOP) terminals are connected.

4. Make sure that the interval between forward and reverse operations is at least 100 ms. If the G3J turns ON erroneously due to, for example, noise to inputs, an interphase short-circuit will occur. To prevent accidents due to short-circuits, install a protective resistance R.

To prevent accidents due to short-circuits, install a protective resistance R. Refer to the table below for the formula for calculating R.

Example: G3J-205BL

The peak-value current resistivity for the G3J-205BL is 150 A and so R must satisfy the following:

$R > 200\ V \times \sqrt{2} / 150\ A = 1.9\ \Omega$

Taking the circuit current and ON time into consideration, install R on the side with less power consumption.

The power consumption P of the resistance can be calculated using the following:

$P = I^2R \times$ safety coefficient

(I = load current; R = protective resistance; Safety coefficient = 4)

Approximate Values for R

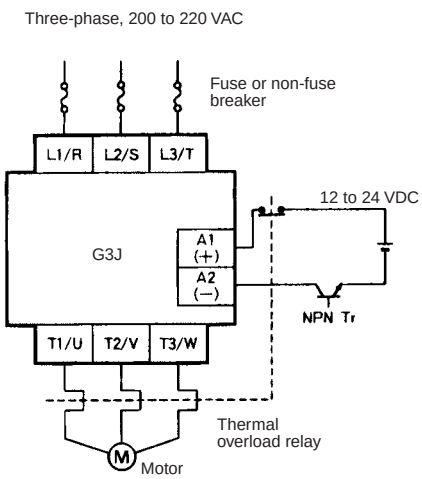
Model	Applicable motor	R
G3J-205BL(-2)	0.75 kW	2Ω, 100 W
G3J-211BL(-2)	1.5 kW	1Ω, 200 W
G3J-211BL(-2)	2.2 kW	1Ω, 400 W

■ Connections Example

Harmonized protection is ensured for motor overcurrents.
Be sure to supply power to the G3J through a fuse or non-fuse breaker to protect the G3J from damage due to short-circuiting.

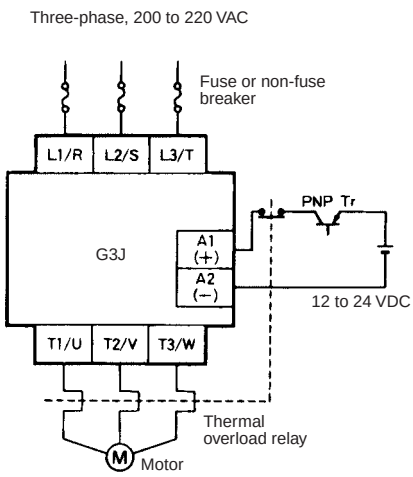
Simple DC-input Models

G3J-□BL, G3J-□BL-2



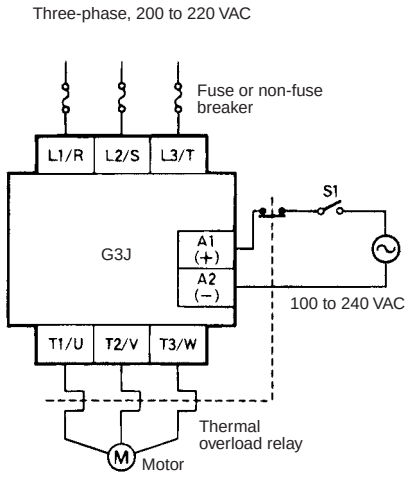
Simple DC-input Models

G3J-□BL, G3J□BL-2



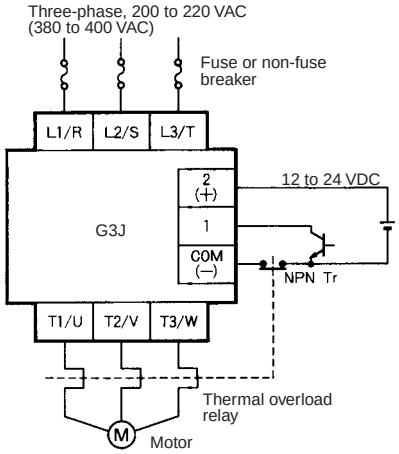
Simple AC-input Models

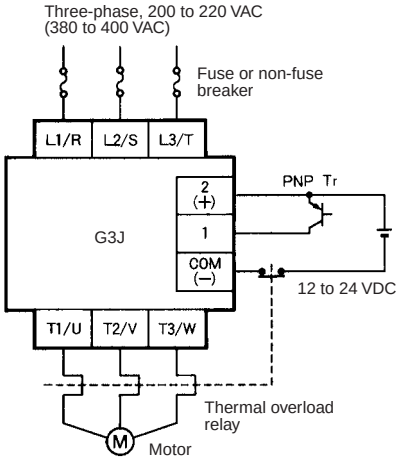
G3J-□BL, G3J-□BL-2



Soft-start/Soft-start/stop Models

G3J-S□BL, G3J-T□BL



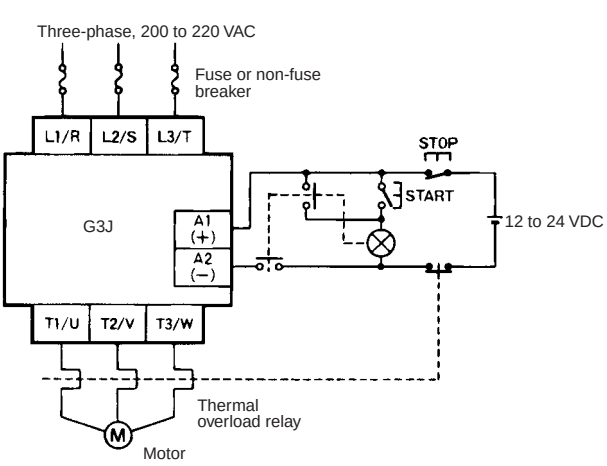


Note: 1. When the minimum applicable load of the thermal relay auxiliary contacts becomes smaller than the input current of the G3J, insert a bleeder resistance.

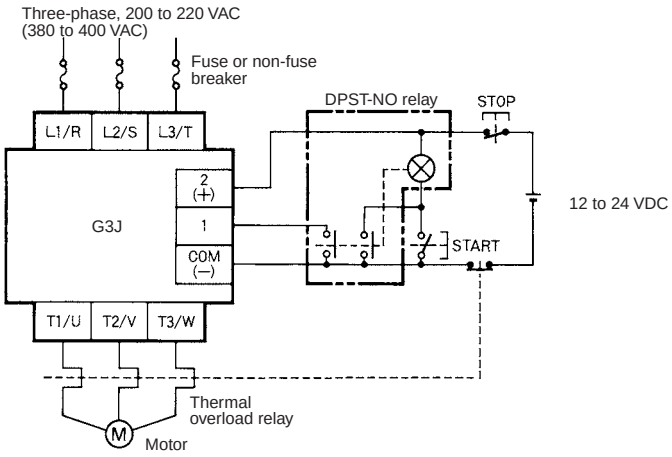
2. Connect the thermal relay NC contact to the 2 (+) or COM (–) line. Connecting the thermal relay NC contact to the 1 input will cause contact failure.

Self-hold Circuits

G3J-□BL, G3J-□BL-2



G3J-S□BL, G3J-T□BL



Note: Be sure to use a fuse or non-fuse breaker to protect the G3J.

■ Fuse Selection

The following table shows the I^2t (60 Hz half-wave 1 cyc) values for G3J models.

Model	I^2t
G3J-T217BL	2,660A^2s
G3J-S211BL **G3J-T211BL**	1,260A^2s
G3J-S205BL **G3J-T205BL**	121A^2s
G3J-S405BL **G3J-T405BL**	260A^2s
G3J-S403BL **G3J-T403BL**	260A^2s

When selecting a fuse to protect a G3J, use a quick-breaking fuse for semiconductor protection that satisfies the following condition: fuse's I^2t < G3J's I^2t.

Operation

■ Soft-Start/Stop (Function of G3J-T)

The G3J-T is a solid state contactor that smoothly starts and stops machines and equipment connected to power supplies without damaging the machines, equipment, or power supplies.

Soft-start Time

The voltage imposed on the motor increases while ignition α is gradually reduced, thus gradually increasing the rotation speed of the motor.

Ramp-up Time

Ramp-up time is a period required for ignition α to become zero degrees with a 100% voltage imposed on the motor.

Starting Torque

Starting torque is determined by the value of ignition α immediately after the input signal is turned ON.

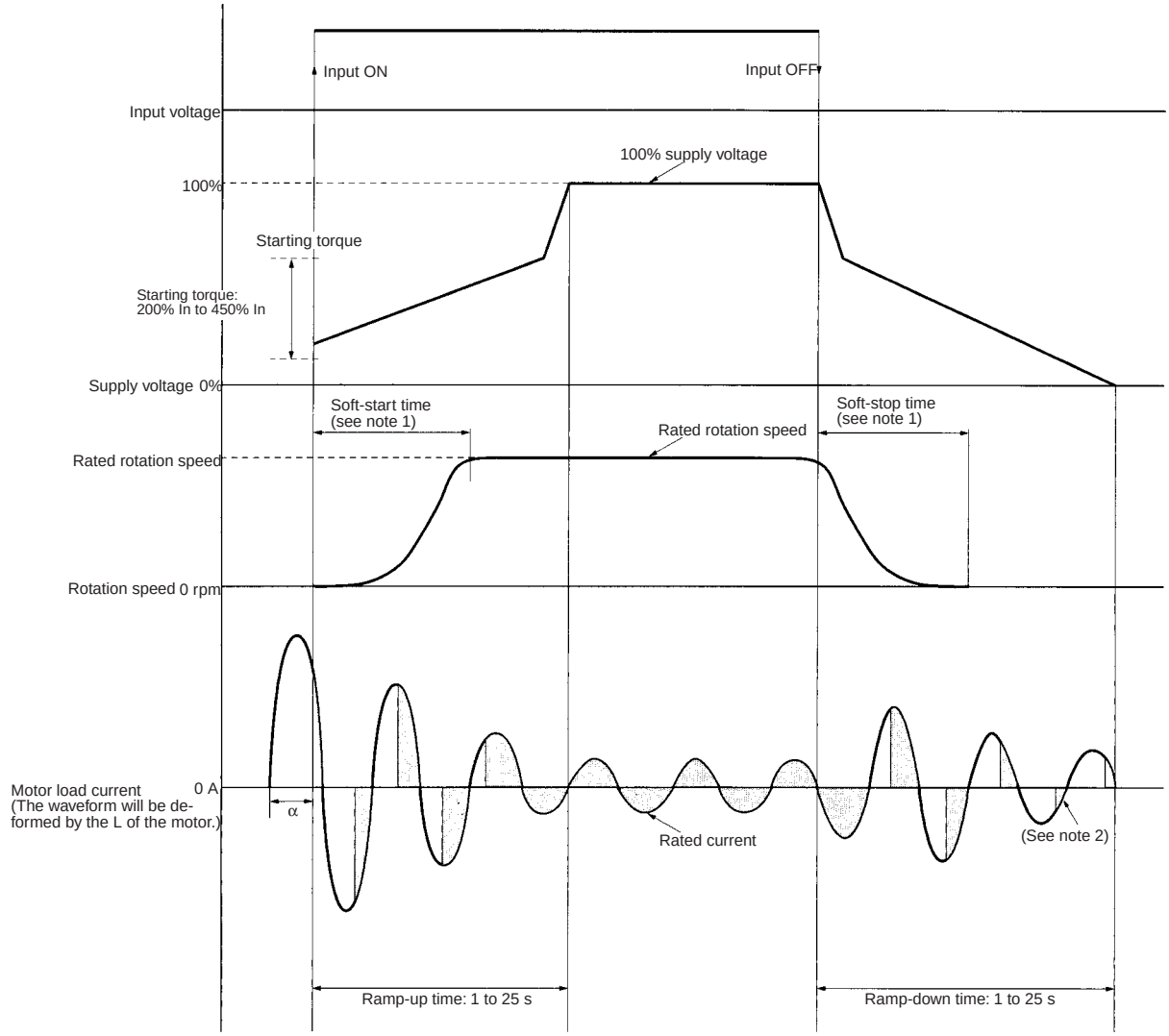
Soft-stop Time

The voltage imposed on the motor decreases while ignition α is gradually increased, thus gradually decreasing the rotation speed of the motor.

Ramp-down Time

Ramp-down time is a period required for ignition α to become 180 degrees with a 0% voltage imposed on the motor.

Soft-start/stop Characteristics



Note: 1. In addition to starting torque, ramp-up time, and ramp-down time, the soft-start time and soft-stop time vary with the load characteristics such as the inertia and friction factor of the load. Therefore, the soft-start time or soft-stop time will not increase beyond a certain point.

2. Due to the soft-stop control characteristics, the load current continues flowing even after the motor stops. Set to the optimum value according to the adjustment steps.

■ Soft-start/stop Setting Method

Adjuster

Starting Torque Setting with the Starting Torque Adjuster

The starting torque of a motor can be set within a range from 200% to 450% In provided that the starting torque is 600% In when the motor is started at full voltage, which allows optimum motor control without any time lag at the time the motor starts.

Set with a Phillips or flat-blade screwdriver.

Ramp-up Time Setting with the Ramp-up Adjuster

The ramp-up time of a motor can be set within a range from 1 to 25 s, with which the soft-start time of the motor is adjusted until the motor rotates at full speed.

Set with a Phillips or flat-blade screwdriver.

Ramp-down Time Setting with the Ramp-down Adjuster

The ramp-down time of a motor can be set within a range from 1 to 25 s, with which the soft-stop time of the motor is adjusted until the motor decelerates to a stop.

Set with a Phillips or flat-blade screwdriver.

Adjustment Steps

1. Start and stop the motor with the factory settings.
   Ramp-up adjuster: 1 s
   Starting torque adjuster: 200% In
   Ramp-down adjuster: 1 s
2. If the motor does not rotate smoothly, increase the starting torque.
3. Gradually increase the ramp-up time to adjust the start time.
4. Gradually increase the ramp-down time to adjust the stop time.
5. The soft-start time or soft-stop time will not increase beyond a certain point (depend on load). Do not set the ramp-up time or ramp-down time beyond this point.

Further Adjustment or Arrangement

1. Increase the starting torque if the motor does not start with a long soft-start time.
2. To start normally (i.e., not using soft-start) use a simple G3J model.

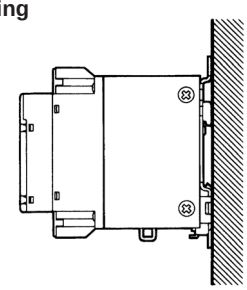
Safety Precautions

■ Precautions for Correct Use

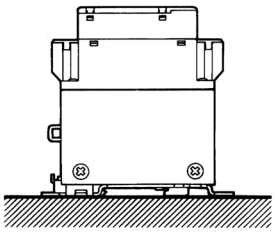
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Mounting

Vertical Mounting

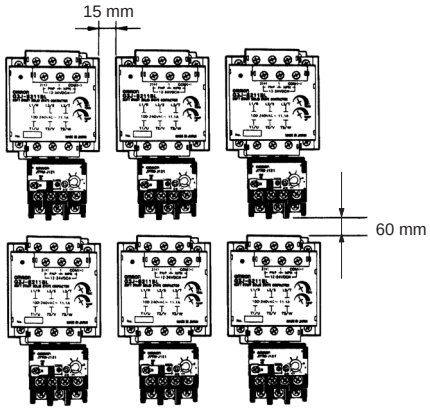


Horizontal Mounting



Note: When the G3J is mounted horizontally, the load current must be 50% of the rated load current if the G3J is used at a temperature exceeding 40°C.

Close Mounting



Note: Minimum distances of 15 mm horizontally and 60 mm vertically are required between adjacent G3Js with thermal overload relays.
Thermal overload relays can be directly attached or separated for use.

Harmonized Protection with Thermal Relay

The G3J enables harmonized protection with thermal overload relays complying with IEC947-4-1 (Class 10A/10).
When using the G3J with the thermal overload relay, set the steady current of the thermal overload relay to a value lower than the current value at 100% motor load (approx. 80% or less of the rated current of G3J).

Power Supply to Soft-start and Soft-start/stop Models

Perform operation input to the Soft-start type or Soft-start/stop type only after the power supply has sufficiently stabilized to achieve stable soft-start operation.

Wiring

Make sure that each wire connected to the G3J is thick enough for the current flow.

Output terminals T1, T2, and T3 may be charged even if power supply to the G3J is off. An electric shock may occur by touching the terminals.

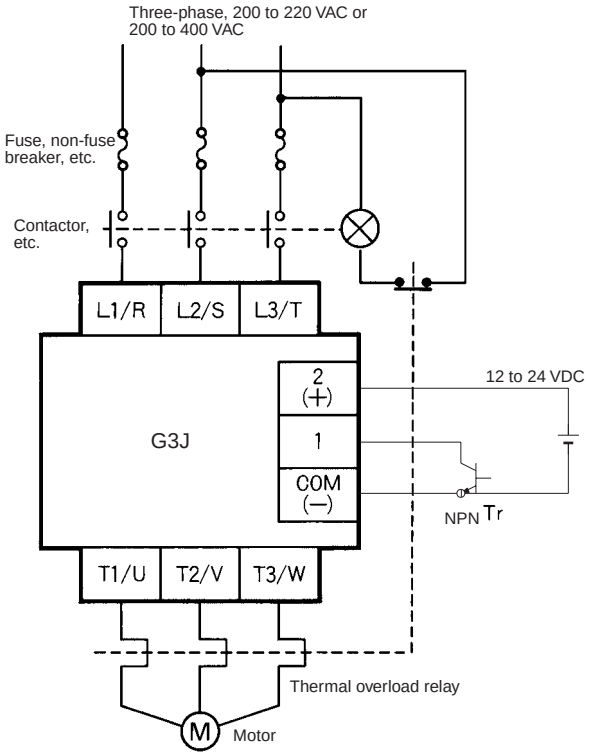
Supply power to the G3J through a breaker.

Be sure to shut off power supply to the G3J before wiring, otherwise an electric shock may occur.

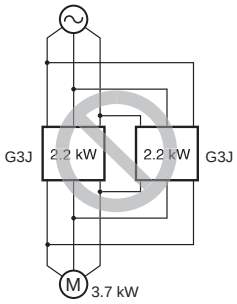
Do not wire any cable connected to the G3J alongside power or high-tension lines in the same conduit. Doing so may cause the G3J to malfunction or break down due to induction noise.

System Protection

The system will be safer by inserting a contactor into the power line of the G3J to shut off power supply to the G3J as shown in the following diagram.



- Do not operate motors that exceed the allowable capacity with contactors connected in parallel. Doing so may result in malfunction.



Tightening Screw

Tighten each screw of the G3J securely so that the G3J will not malfunction.

Appropriate tightening torque: 1.2 N·m

Operating Conditions

Make sure that no current exceeding the rated current will flow into the G3J, otherwise the G3J may generate excessive heat.

Make sure that there is no excess ambient temperature rise due to the heat generation of the G3J. If the G3J is mounted inside a panel, install a fan to ventilate the interior of the panel properly.

Power Supply to G3J with Soft-start or Soft-start/stop Function

Use the soft-start or soft-start/stop function of the G3J-S□/T□ after power supply to the G3J-S□/T□ is stabilized so that the G3J-S□ / T□ will be in stable soft-start or soft-start/stop operation.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J136-E1-03 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays with Failure Detection Function
G3PC

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Detects failures in SSR used for heater temperature control and simultaneously outputs alarm signal. This SSR supports the safe design of heater control systems, and contributes to maintenance improvements by the user.

- Main detection items:
  SSR short-circuits and SSR open-circuits
- Alarm output possible to NPN/PNP-input devices.
- The failure-detection function is built-in and power is supplied from the main circuit power supply making wiring simple.
- Slim design (width: 22.5 mm) incorporating a heat sink.
- In addition to screw mounting, DIN track mounting is also possible.
- Certified by EC, UL, and CSA.

Model Number Structure

■ Model Number Legend

G3PC-□□□-□
1 2 3 4 5

1. **Basic Model Name**
   G3PC: SSR with Failure Detection Function
2. **Rated Load Power Supply Voltage**
   2: 100 to 240 VAC
3. **Rated Load Current**
   20: 20 A (carry current)
4. **Terminal Type**
   B: Screw terminals
5. **Certification**
   VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models

Insulation method	Zero cross function	Indicators	Rated output load	Model number
Phototriac coupler	Yes	Yes (See page 126)	20 A, 100 to 240 VAC (resistive load: AC, Class1)	G3PC-220B-VD

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Name	Dimensions	Model number
Mounting Track	50 cm (ℓ) × 7.3 mm (t)	PFP-50N
	1 m (ℓ) × 7.3 mm (t)	PFP-100N
	1 m (ℓ) × 16 mm (t)	PFP-100N2

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Detection Power Supply

Rated power supply voltage	100 to 240 VAC (50/60 Hz)
Operating voltage range	75 to 264 VAC (50/60 Hz)
Current consumption	15 mA AC max. (at 200 VAC)

Operating Circuit

Input method	Voltage input
Rated input voltage	12 to 24 VDC
Operating input voltage range	9.6 to 30 VDC
Must operate voltage	9.6 VDC max.
Must release voltage	1 VDC min.
Input current	7 mA DC max. (at rated input voltage)

Main Circuit

Rated load voltage	100 to 240 VAC (50/60 Hz)
Operating voltage range	75 to 264 VDC (50/60 Hz)
Rated carry current	20 A (Ta = 40)
Minimum load current	0.1 A
Inrush current resistance (peak value)	220 A (60 Hz, 1 cycle)
Permissible (I^2t)	260 A^2s
Applicable load (with Class-1 AC resistive load)	4 kW (at 200 VAC)

Alarm Output

Output OFF collector voltage	30 VDC max.
Maximum carry current	0.1 A
Output form	Independent NPN open collector

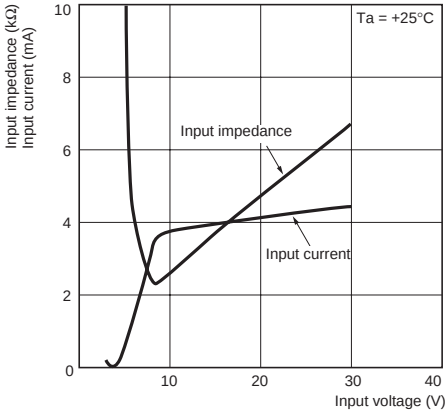
■ Characteristics

Operate time		1/2 of load power source cycle + 1 ms max.
Release time		1/2 of load power source cycle + 1 ms max.
Main circuit	**Output ON voltage drop**	1.6 V rms max.
	OFF leakage current	10 mA max. (at 200 VAC)
Alarm output	**Output ON voltage drop**	1.5 V max.
	OFF leakage current	0.1 mA max.
Insulation resistance		100 MΩ min. (at 500 VDC)
Dielectric strength		2,500 VAC, 50/60 Hz for 1 min
Vibration resistance		Destruction: 10 to 55 to10 Hz, 0.35-mm single amplitude
Shock resistance		Destruction: 294 m/s^2
Ambient temperature		Operating: -20 to 60°C (with no icing or condensation) Storage: -30 to 70°C (with no icing or condensation)
Ambient humidity		45% to 85%
Weight		Approx. 300 g
Certified standards		UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3); Certified by VDE

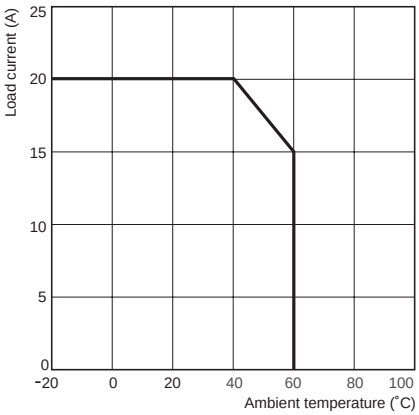
EMC	Emission		EN55011 Group 1 Class B
	Immunity	ESD	IEC947-4-3, EN61000-4-2 4 kV contact discharge 8 kV air discharge
	Immunity	Electromagnetic	IEC947-4-3, EN61000-4-3 10 V/m (80 MHz to 1 GHz)
	Immunity	EFT	IEC947-4-3, EN61000-4-4 2 kV AC power-signal line
	Immunity	Surge transient	IEC947-4-3, EN61000-4-5 2 kV
	Immunity	RF disturbance	IEC947-4-3, EN61000-4-6 10 V (0.15 to 80 MHz)
	Immunity	Dips	IEC947-4-3, EN61000-4-11

Engineering Data

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

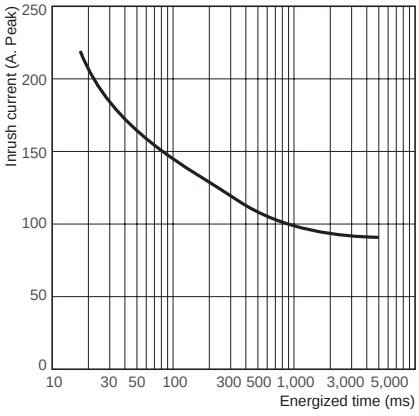


Load Current vs. Ambient Temperature



One Cycle Surge Current: Non-repetitive

The figure will be less than 1/2 the rated value for repetitive input.



Operation

■ Failure Detection Function

Conditions for SSR Failure Detection

Failure mode (See note 1.)	Operating input (between terminals A1 and A2)	Detection time	Alarm display (See note 3.)	Alarm display (between terminals X1 and X2) (See note 3.)
SSR short-circuit	OFF	0.5 s max. (See note 2.)	Red	Open collector transistor output
SSR half-wave short-circuit	OFF			
SSR open-circuit	ON			
SSR half-wave open-circuit	ON			

Note: 1. The contents of each of the above failure modes is as follows:
SSR short-circuit: SSR output circuit remains in the ON state.
SSR half-wave short-circuit: SSR output circuit remains in the ON state in one direction.
SSR open-circuit: SSR output circuit remains in the OFF state.
SSR half-wave open-circuit: SSR output circuit remains in the OFF state in one direction.
In addition to the failure modes listed above, detection of circuit disconnections for the load circuit is also possible. (As a rough guide, circuit disconnection will be detected if the load impedance is greater than or equal to 1 MΩ.)

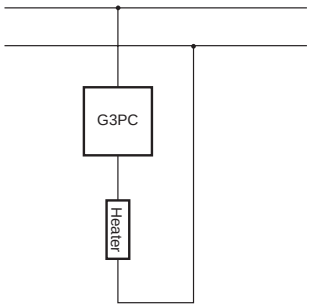
2. The same power supply is used for both the detection and for the output circuit and so detection is not performed during power interruptions.

3. If power supply (terminal 3) is in the open state, the SSR will still turn ON and OFF in the same way but the failure detection function and alarm display will not operate properly.

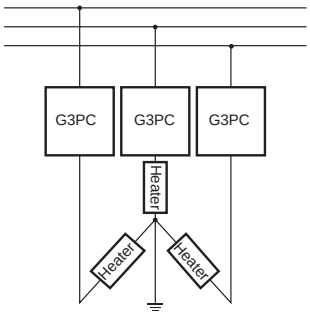
Connection Diagrams (Main Circuit)

The following diagrams show the applicable load connection configurations for SSR failure detection.

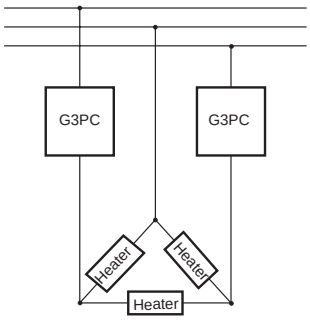
Single Phase



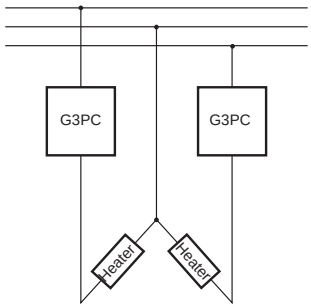
3-phase Star Connection



3-phase Delta Connection (3-phase, 2-wire Switching)

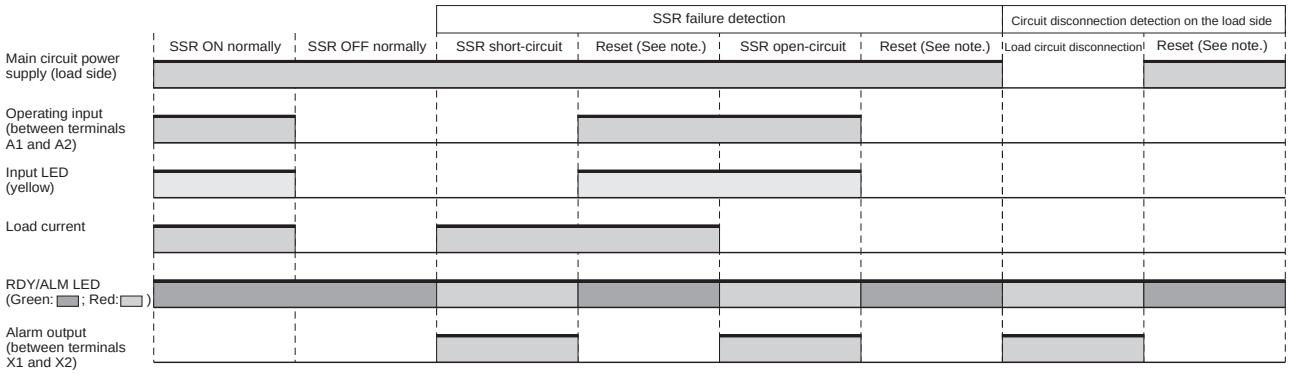


3-phase V Connection



Note: With 3-phase connection, so that the power supply voltage is applied between the G3PC's terminals 1/L1 and 3, connect the desired phase to terminal 3.

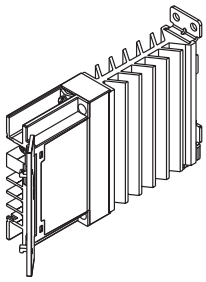
Timing Chart

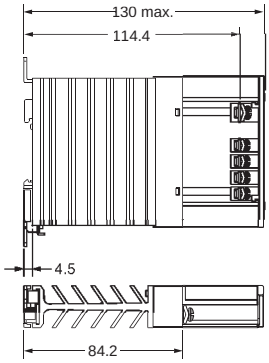


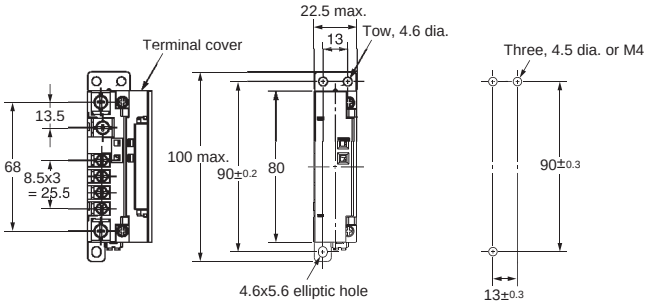
Note: After failure detection, if the detection conditions differ to the conditions given under *Conditions for SSR Failure Detection*, alarm output is reset.

Dimensions

G3PC-220B-VD







Mounting Holes

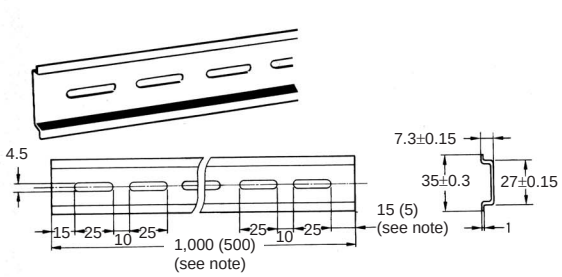
Note The above diagram is for when the terminal cover is open.

Note The above diagram is for when the terminal cover is closed.

Accessories (Order Separately)

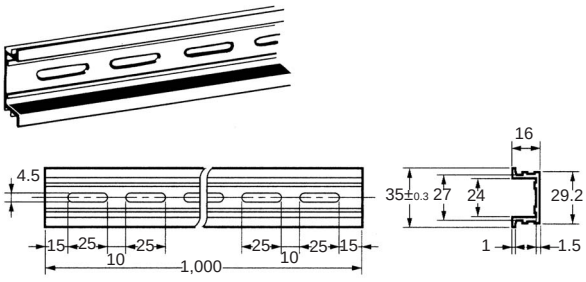
Mounting Tracks

PFP-100N, PFP-50N



Note Values in parentheses indicate dimensions for the PFP-50N.

PFP-100N2



Installation

■ External Specifications

Terminal Arrangement

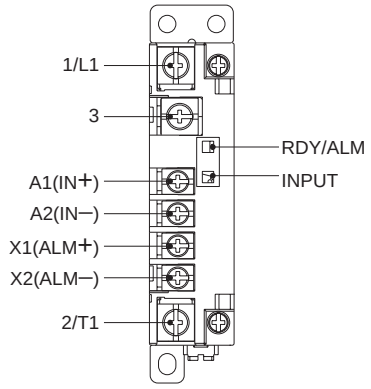
Terminal name	Terminal number	Screw size
Main circuit terminals (output)	1/L1, 2/T1	M4
Detection power supply terminal (input)	3	
Operating circuit terminals (input)	A1, A2	M3.5
Alarm output terminals (output)	X1, X2	

Indicators

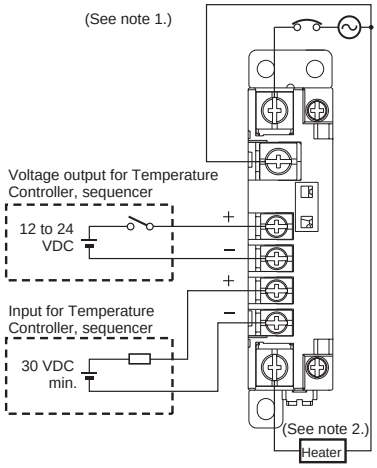
Name	Symbol	Color	Meaning
Status indicators	RDY	Green	SSR normal
	ALM	Red	SSR failure detection and circuit disconnection detection
Input indicator	INPUT	Yellow	Operating

Note: The same indicator is used as both the power supply indicator and the alarm indicator.

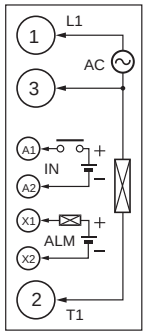
Appearance



■ Connection Example



Display Labels



Note: 1. If the detection power supply terminal (terminal 3) is not connected, failure detection is not performed and so be sure to connect this terminal.

2. If the load is connected to terminal 1/L1, failure detection may not operate correctly and so connect the load to terminal 2/T1.

3. With inductive loads (relay coil, etc.), connect back-current prevention diodes to both sides of the load.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Mounting Method

DIN Track Mounting

When mounting to a DIN track, mount the G3PC until it clicks into place, otherwise it become loose during use and fall. Fix both ends with end plates.

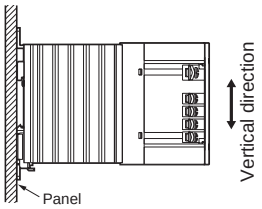
Panel Mounting

When mounting directly to a panel, observe the following conditions:

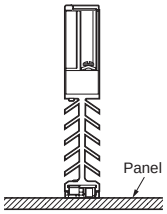
Screw diameter: M4

Tightening torque: 0.98 to 1.47 N·m

Vertical Mounting

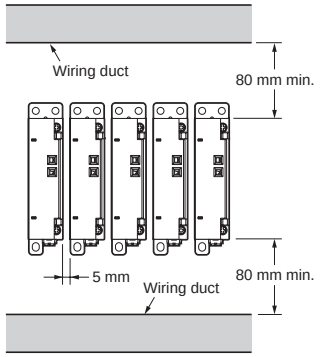


Horizontal Mounting



Note: Use the G3PC at a load current of 50% of the rated load current when it is mounted horizontally.

Close Mounting

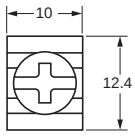


Note: Use the G3PC at a load current of 80% of the rated load current when it is mounted side by side.

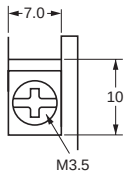
Wiring

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

Main Circuit Power Supply (Terminals 1 to 3)



Operating Input/Alarm Output (Terminals A1, A2, X1, and X2)



- Make sure that all lead wires are of a thickness appropriate for the current.
- The output terminals are charged, and touching them may result in electric shock, even when the G3PC is OFF. Separate the outputs from the power supply by installing a circuit-breaker at a higher level in the circuit.

Tightening Torque

Be sure to tighten the screws to the specified torques given below. Not doing so may result in malfunction.

Terminal number	Screw terminal diameter	Tightening torque
A1, A2, X1, X2	M3.5	0.59 to 1.18 N·m
1/L1, 2/T1, 3	M4	0.98 to 1.47 N·m

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J127-E1-03

In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays (Single-phase)
G3PB

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

New Single-phase Solid State Relays with Compact Size for Heater Control

- Slim models with a thickness of only 22.5 mm are also available.
- Compact design achieved by optimizing heat sink shape.
- DIN track mounting possible in addition to screw mounting.
- Comply with EN60947-4-3 (IEC947-4-3) UL508, and CSA22.2 No. 14, and bear CE marking.

Model Number Structure

■ Model Number Legend

G3PB-□□□-□□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3PB: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
3. **Rated Load Current**
   15: 15 A
   25: 25 A
   35: 35 A
   45: 45 A
4. **Terminal Type**
   B: Screw terminals
5. **Single-phase/3-phase and Number of Elements for 3-phase**
   Blank: Single-phase models
6. **Single-phase Type**
   Blank: DIN track mounting and built-in heat sink
7. **Certification**
   VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models

Isolation method	Zero cross function	Operation indicator	Rated input voltage	Rated output load	Model number
Phototriac coupler	Yes	Yes (yellow)	12 to 24 VDC	15 A, 100 to 240 VAC	G3PB-215B-VD 12 to 24 VDC
				25 A, 100 to 240 VAC	G3PB-225B-VD 12 to 24 VDC
				35 A, 100 to 240 VAC	G3PB-235B-VD 12 to 24 VDC
				45 A, 100 to 240 VAC	G3PB-245B-VD 12 to 24 VDC

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Mounting Track	50 cm (1) x 7.3 mm (t)	PFP-50N
	1 m (1) x 7.3 mm (t)	PFP-100N
	1 m (1) x 16 mm (t)	PFP-100N2

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Item	Common
Rated voltage	12 to 24 VDC
Operating voltage range	9.6 to 30 VDC
Rated input current	7 mA max.
Must operate voltage	9.6 VDC max.
Must release voltage	1 VDC min.
Insulation method	Phototriac
Operation indicator	Yellow LED

Output

Item	G3PB-215B-VD	G3PB-225B-VD	G3PB-235B-VD	G3PB-245B-VD
Rated load voltage	100 to 240 VAC			
Load voltage range	75 to 264 VAC			
Applicable load current (See note.)	0.1 to 15 A	0.1 to 25 A	0.5 to 35 A	0.5 to 45 A
Inrush current resistance (peak value)	150 A (60 Hz, 1 cycle)	220 A (60 Hz, 1 cycle)	440 A (60 Hz, 1 cycle)	
Permissible I^2t (half 60-Hz wave)	260 A^2s	260 A^2s	2,660 A^2s	
Applicable load (with Class-1 AC resistive load)	3 kW max. (at 200 VAC)	5 kW max. (at 200 VAC)	7 kW max. (at 200 VAC)	9 kW max. (at 200 VAC)

Note: The applicable load current varies depending on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in Engineering Data.

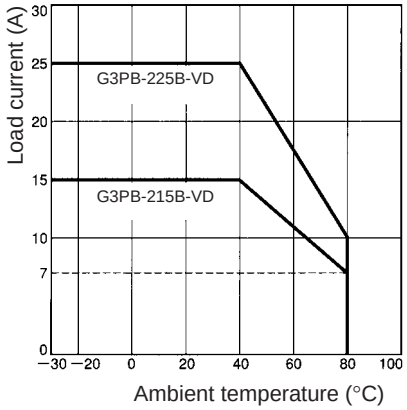
■ Characteristics

Item	G3PB-215B-VD	G3PB-225B-VD	G3PB-235B-VD	G3PB-245B-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)			
Release time	1/2 of load power source cycle + 1 ms max. (DC input)			
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	Destruction: 10 to 55 to 10 Hz, 0.375-mm single amplitude (Mounted to DIN track)			
Shock resistance	Destruction: 294 m/s^2 (DIN track mounting)			
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	UL508 File No. E64562 CSA22.2 No. 14 File No. LR35535 IEC947-4-3 File No. 6825 UG			
Weight	Approx. 240 g	Approx. 240 g	Approx. 400 g	Approx. 400 g

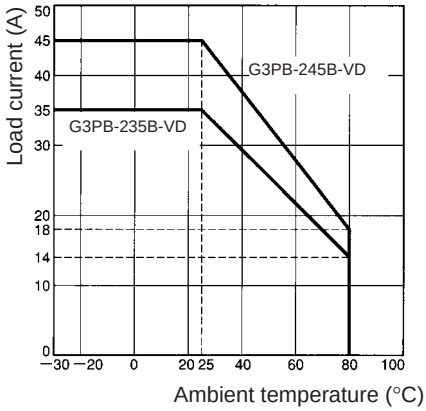
Engineering Data

Load Current vs. Ambient Temperature

G3PB-215B-VD
G3PB-225B-VD

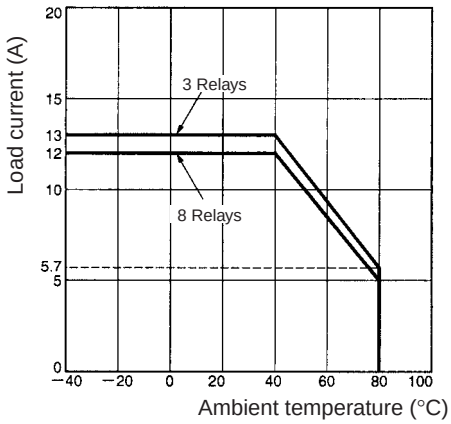


G3PB-235B-VD
G3PB-245B-VD

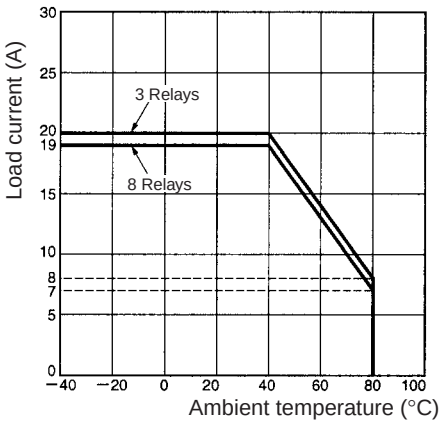


Close Mounting (3 Relays, 8 Relays)

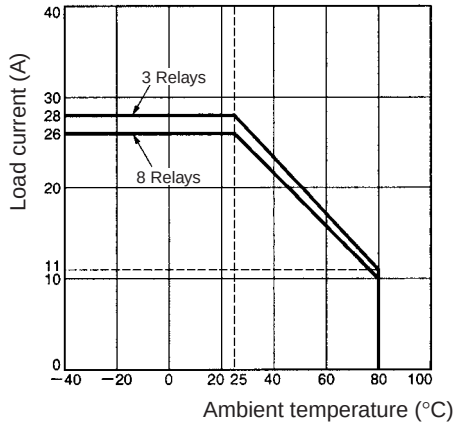
G3PB-215B-VD



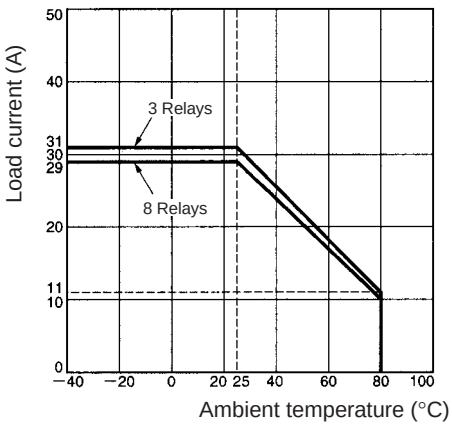
G3PB-225B-VD



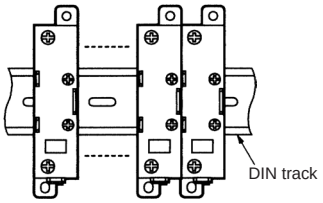
G3PB-235B-VD



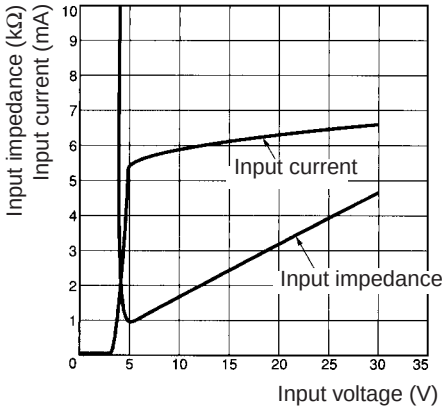
G3PB-245B-VD



Close Mounting Example



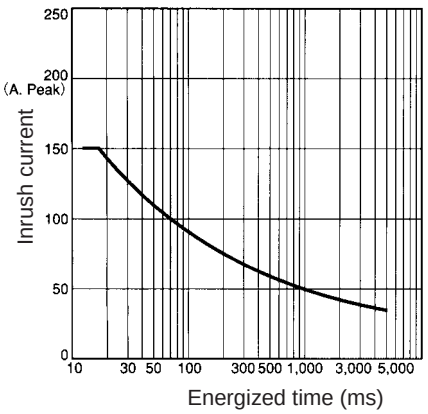
Input Voltage vs. Input Current and Input Voltage vs. Input Impedance



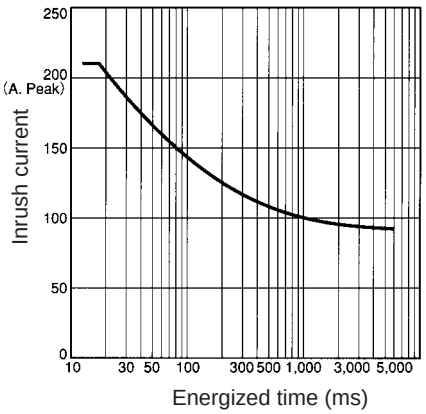
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

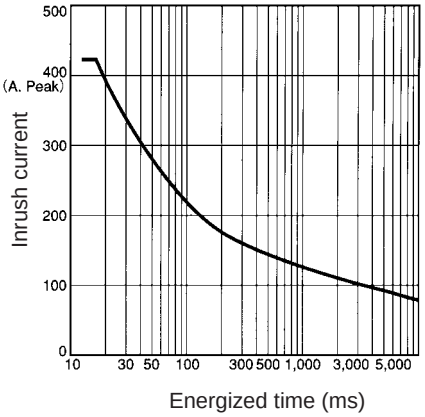
G3PB-215B-VD



G3PB-225B-VD



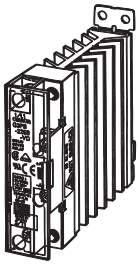
G3PB-235B-VD
G3PB-245B-VD

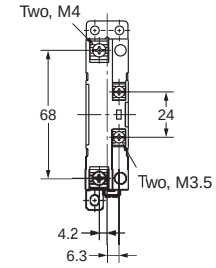


Dimensions

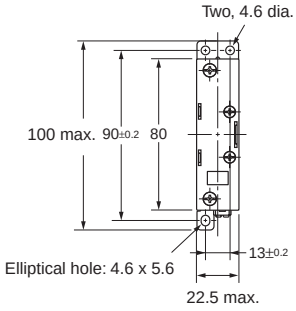
Note: All units are in millimeters unless otherwise indicated.

G3PB-215B-VD
G3PB-225B-VD

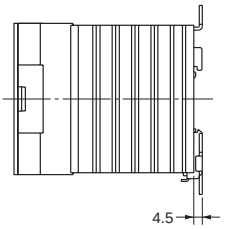




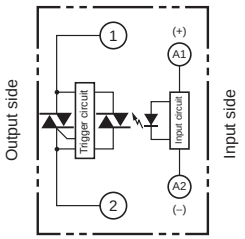
Note: Without terminal cover.



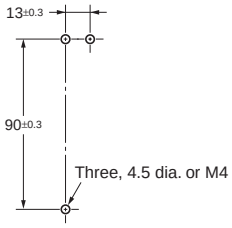
Note: With terminal cover.

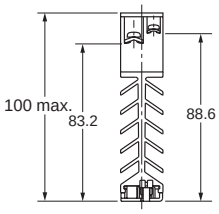


Terminal Arrangement/ Internal Circuit Diagram

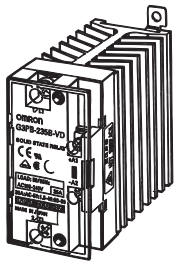


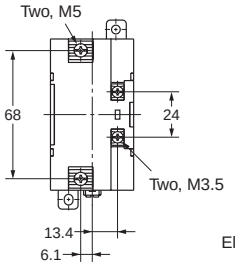
Mounting Holes



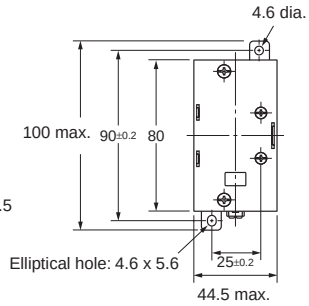


G3PB-235B-VD
G3PB-245B-VD

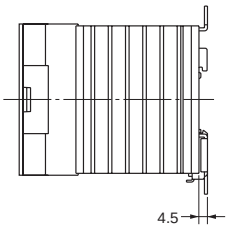




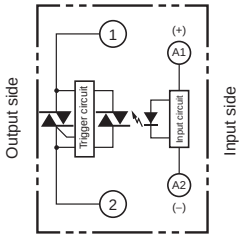
Note: Without terminal cover.



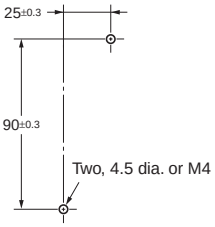
Note: With terminal cover.

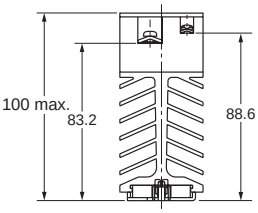


Terminal Arrangement/ Internal Circuit Diagram



Mounting Holes

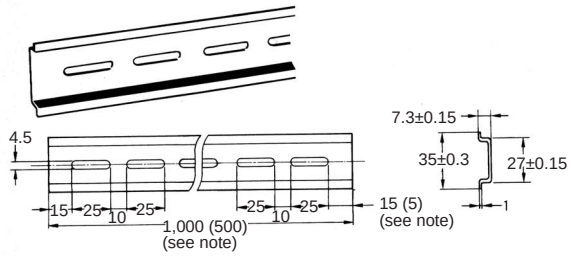




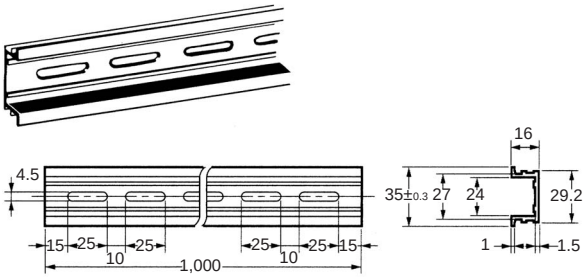
Accessories (Order Separately)

Mounting Tracks

PFP-100N, PFP-50N



PFP-100N2



Note: Values in parentheses indicate dimensions for the PFP-50N.

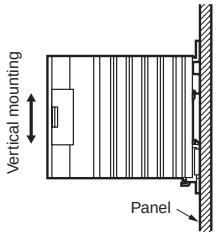
Safety Precautions

■ Precautions for Correct Use

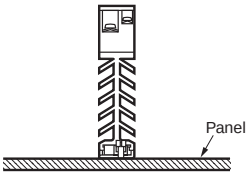
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Mounting Method

Vertical Mounting



Horizontal Mounting

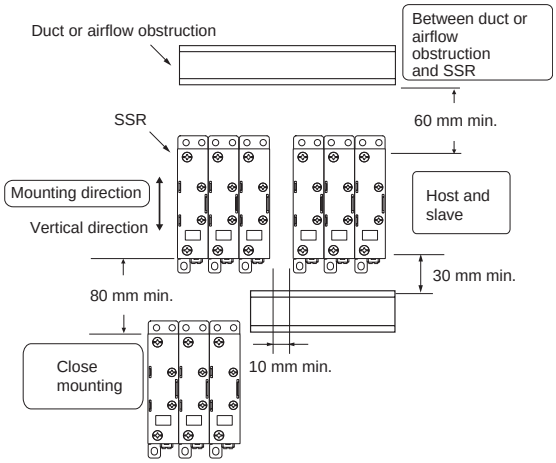


Note: Make sure that the load current is 50% of the rated load current when the G3PB is mounted horizontally.

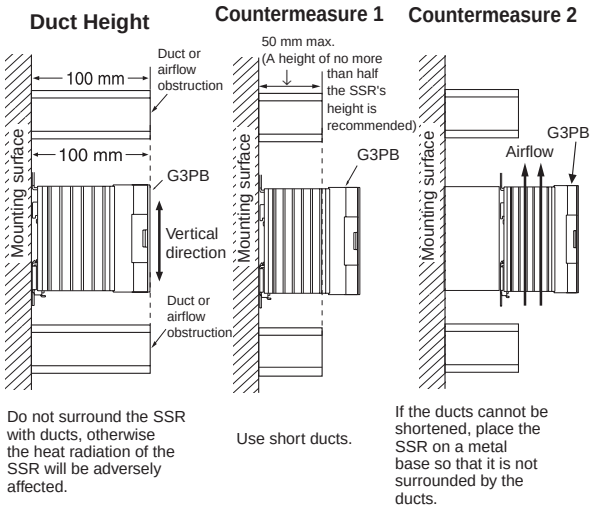
Close Mounting

SSR Mounting Pitch

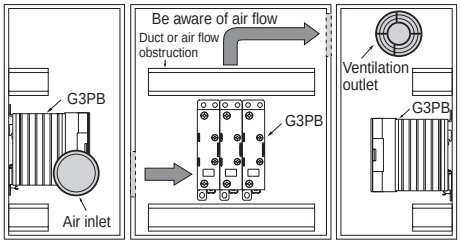
Panel Mounting



Relationship between SSRs and 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)	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 SSRs with load currents of 20 A,
0.23 x 10 = 2.3
Thus, 3 fans would be required.

Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30 °C

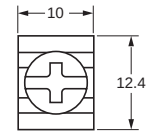
If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

Wiring

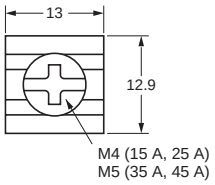
- When using crimp terminals, refer to the terminal clearances shown below.

Output Terminal Section (Single-phase Models)

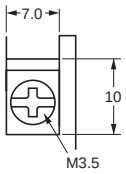
15-A and 25-A Models



35-A and 45-A Models



Input Terminal Section



- Make sure that all lead wires are appropriate for the current.
- Output terminals are charged even when the Relay is turned OFF. Touching the terminals 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.
  Be sure to turn OFF the power supply before wiring the Relay.

Tightening Torque

- Refer to the following and be sure to tighten each screw of the Relay to the specified torque in order to prevent the Relay from malfunctioning.

Item	Screw terminal diameter	Tightening torque
Input terminal	M3.5	0.8 N·m
Output terminal	M4	1.2 N·m
	M5	2.0 N·m

Solid State Contactors (New Heat Sink Construction)
G3PB

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Space and working time saved with new heat sink construction. Series now includes 480-VAC models to allow use in a greater range of applications.

- A comprehensive lineup that now includes 480-VAC models.
- Slim design with 3-phase output and built-in heat sinks.
- New heat sink construction with smaller mounting section.
- DIN track mounting supported as standard. (Screw mounting is also possible.)
- Certified by UL, CSA, and VDE.

Model Number Structure

■ Model Number Legend

G3PB-□□□-□□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3PB: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
   5: 480 VAC
3. **Rated Load Current**
   15: 15 A
   25: 25 A
   35: 35 A
   45: 45 A
4. **Terminal Type**
   B: Screw terminals
5. **Single-phase/3-phase and Number of Elements for 3-phase**
   2: 3-phase, 2-element models
   3: 3-phase, 3-element models
6. **3-phase Type**
   N: DIN track mounting and built-in heat sink
7. **Certification**
   VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models (Built-in Heat Sinks)

Applicable phase	Main circuit voltage	Zero cross function	Applicable heater capacity (with Class-1 AC resistive load)	Number of poles	Model
3	100 to 240 VAC	Yes	5.1 kW max. (15 A)	3	G3PB-215B-3N-VD
				2	G3PB-215B-2N-VD
			8.6 kW max. (25 A)	3	G3PB-225B-3N-VD
				2	G3PB-225B-2N-VD
			12.1 kW max. (35 A)	3	G3PB-235B-3N-VD
				2	G3PB-235B-2N-VD
			15.5 kW max. (45 A)	3	G3PB-245B-3N-VD
				2	G3PB-245B-2N-VD
	200 to 480 VAC		12.5 kW max. (15 A)	3	G3PB-515B-3N-VD
				2	G3PB-515B-2N-VD
			20.7 kW max. (25 A)	3	G3PB-525B-3N-VD
				2	G3PB-525B-2N-VD
			29.0 kW max. (35 A)	3	G3PB-535B-3N-VD
				2	G3PB-535B-2N-VD
			37.4 kW max. (45 A)	3	G3PB-545B-3N-VD
				2	G3PB-545B-2N-VD

Note: When ordering, specify the rated input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Operating Circuit (Common)

Item	Common
Rated voltage	12 to 24 VDC
Operating voltage range	9.6 to 30 VDC
Rated input current (Impedance)	10 mA max. (at 24 VDC)
Must operate voltage	9.6 VDC max.
Must release voltage	1 VDC min.
Insulation method	Phototriac coupler
Operation indicator	Yellow LED

Main Circuit of Models with Built-in Heat Sinks

Item	G3PB-215B-3N-VD	G3PB-215B-2N-VD	G3PB-225B-3N-VD	G3PB-225B-2N-VD	G3PB-235B-3N-VD	G3PB-235B-2N-VD	G3PB-245B-3N-VD	G3PB-245B-2N-VD
Rated load voltage	100 to 240 VAC							
Load voltage range	75 to 264 VAC							
Applicable load current (See note.)	0.2 to 15 A		0.2 to 25 A		0.5 to 35 A		0.5 to 45 A	
Inrush current resistance (peak value)	150 A (60 Hz, 1 cycle)		220 A (60 Hz, 1 cycle)		440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		2,660 A^2s		2,660 A^2s			

Item	G3PB-515B-3N-VD	G3PB-515B-2N-VD	G3PB-525B-3N-VD	G3PB-525B-2N-VD	G3PB-535B-3N-VD	G3PB-535B-2N-VD	G3PB-545B-3N-VD	G3PB-545B-2N-VD
Rated load voltage	200 to 480 VAC							
Load voltage range	180 to 528 VAC							
Applicable load current (See note.)	0.5 to 15 A		0.5 to 25 A		0.5 to 35 A		0.5 to 45 A	
Inrush current resistance (peak value)	220 A (60 Hz, 1 cycle)				440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		1,040 A^2s		1,040 A^2s			

Note: Applicable load current varies depending on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in *Engineering Data.*

■ Characteristics

Models with Built-in Heat Sinks

Item	G3PB-215B-3N-VD	G3PB-215B-2N-VD	G3PB-225B-3N-VD	G3PB-225B-2N-VD	G3PB-235B-3N-VD	G3PB-235B-2N-VD	G3PB-245B-3N-VD	G3PB-245B-2N-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.6 V (RMS) max.							
Leakage current (See note.)	10 mA (at 200 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.175-mm single amplitude (Mounted to DIN track)							
Shock resistance	Destruction: 294 m/s^2 (98 m/s^2 with reverse mounting)							
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. 1.25 kg		Approx. 1.45 kg		Approx. 1.65 kg		Approx. 2.0 kg	
Certified standards	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3); Certified by VDE (From April 2001)							
EMC	Emission		EN55011 Group 1 Class B					
	Immunity	ESD	IEC947-4-3, EN61000-4-2 4 kV contact discharge 8 kV air discharge					
	Immunity	Electromagnetic	IEC947-4-3, EN61000-4-3 10 V/m (80 MHz to 1 GHz)					
	Immunity	EFT	IEC947-4-3, EN61000-4-4 2 kV AC power-signal line					
	Immunity	Surge transient	IEC947-4-3, EN61000-4-5 Normal mode ±1 kV, Common mode ±2 kV					
	Immunity	RF disturbance	IEC947-4-3, EN61000-4-6 10 V (0.15 to 80 MHz)					
	Immunity	Dips	IEC947-4-3, EN61000-4-11					

Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

Item	G3PB-515B-3N-VD	G3PB-515B-2N-VD	G3PB-525B-3N-VD	G3PB-525B-2N-VD	G3PB-535B-3N-VD	G3PB-535B-2N-VD	G3PB-545B-3N-VD	G3PB-545B-2N-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.8 V (RMS) max.							
Leakage current (See note.)	20 mA (at 480 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.175-mm single amplitude (Mounted to DIN track)							
Shock resistance	Destruction: 294 m/s^2 (98 m/s^2 with reverse mounting)							
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. 1.25 kg		Approx. 1.45 kg		Approx. 1.65 kg		Approx. 2.0 kg	
Certified standards	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3); Certified by VDE (From April 2001)							
EMC	Emission		EN55011 Group 1 Class B					
	Immunity	ESD	IEC947-4-3, EN61000-4-2 4 kV contact discharge 8 kV air discharge					
	Immunity	Electromagnetic	IEC947-4-3, EN61000-4-3 10 V/m (80 MHz to 1 GHz)					
	Immunity	EFT	IEC947-4-3, EN61000-4-4 2 kV AC power-signal line					
	Immunity	Surge transient	IEC947-4-3, EN61000-4-5 Normal mode ±1 kV, Common mode ±2 kV					
	Immunity	RF disturbance	IEC947-4-3, EN61000-4-6 10 V (0.15 to 80 MHz)					
	Immunity	Dips	IEC947-4-3, EN61000-4-11					

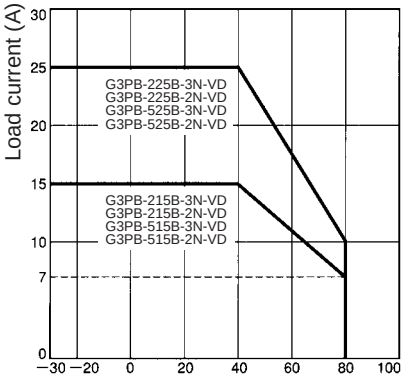
Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

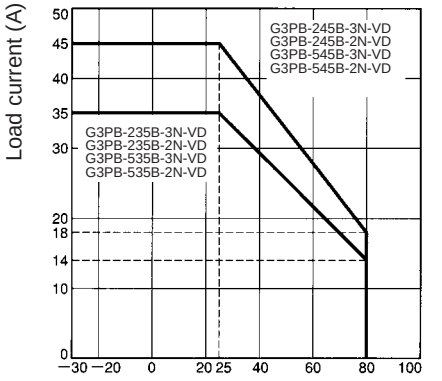
Engineering Data

Load Current vs. Ambient Temperature

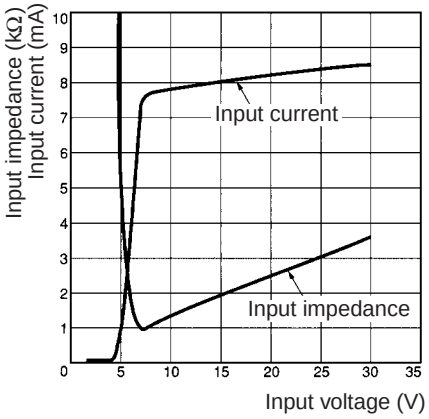
Models with Built-in Heat Sinks

G3PB-215B-3N-VD G3PB-225B-3N-VD G3PB-235B-3N-VD G3PB-245B-3N-VD
G3PB-215B-2N-VD G3PB-225B-2N-VD G3PB-235B-2N-VD G3PB-245B-2N-VD
G3PB-515B-3N-VD G3PB-525B-3N-VD G3PB-535B-3N-VD G3PB-545B-3N-VD
G3PB-515B-2N-VD G3PB-525B-2N-VD G3PB-535B-2N-VD G3PB-545B-2N-VD





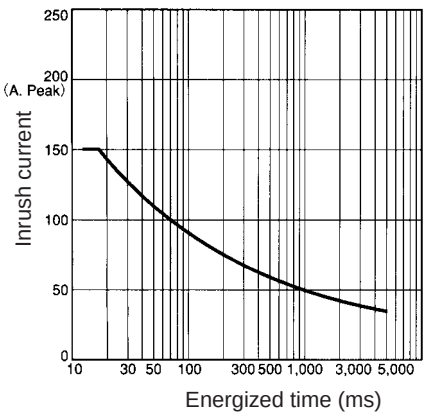
Input Voltage vs. Input Current and Input Voltage vs. Input Impedance



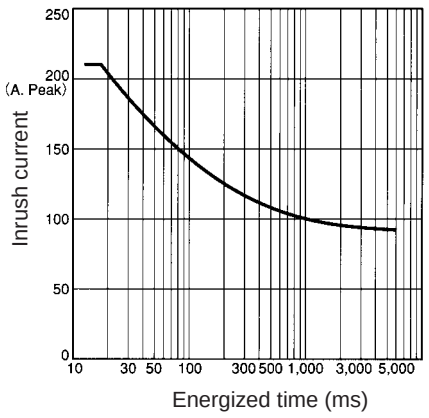
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

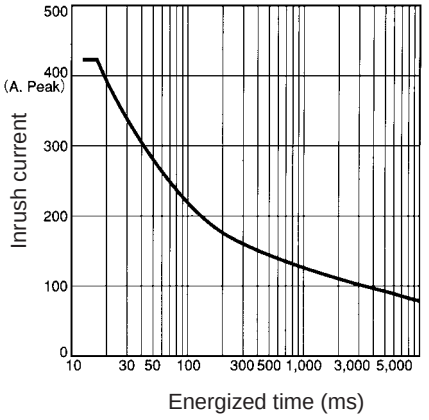
G3PB-215B-3N-VD
G3PB-215B-2N-VD



G3PB-225B-3N-VD G3PB-225B-2N-VD
G3PB-515B-3N-VD G3PB-515B-2N-VD
G3PB-525B-3N-VD G3PB-525B-2N-VD



G3PB-235B-3N-VD G3PB-245B-3N-VD
G3PB-235B-2N-VD G3PB-245B-2N-VD
G3PB-535B-3N-VD G3PB-545B-3N-VD
G3PB-535B-2N-VD G3PB-545B-2N-VD

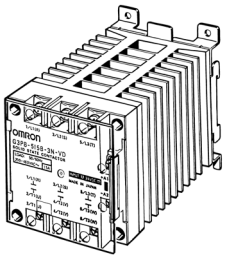


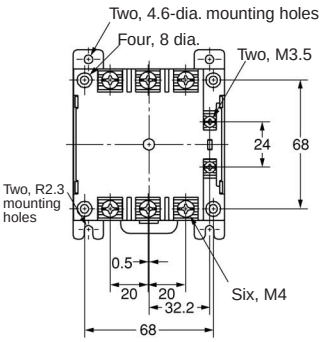
Dimensions

Note: All units are in millimeters unless otherwise indicated.

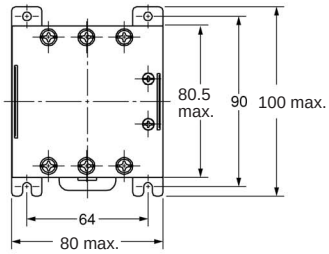
G3PB-215B-3N-VD G3PB-515B-3N-VD
G3PB-215B-2N-VD G3PB-515B-2N-VD
G3PB-225B-2N-VD G3PB-525B-2N-VD

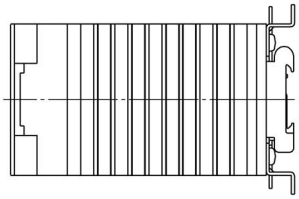
Without Terminal Cover





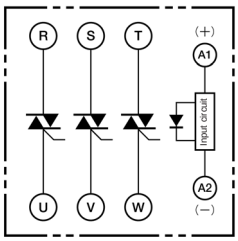
With Terminal Cover



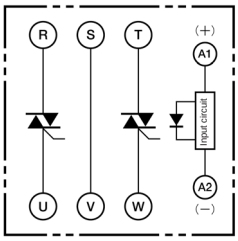


Terminal Arrangement/ Internal Connections

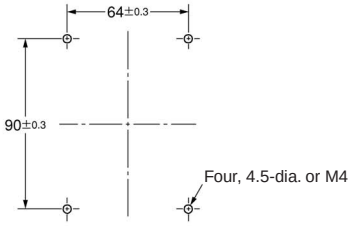
G3PB-□□□B-3N-VD

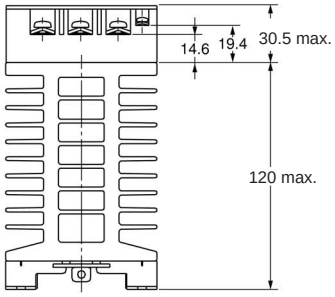


G3PB-□□□B-2N-VD

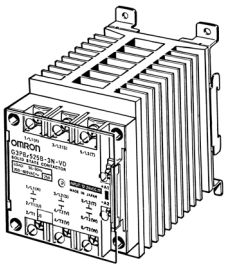


Mounting Hole Dimensions

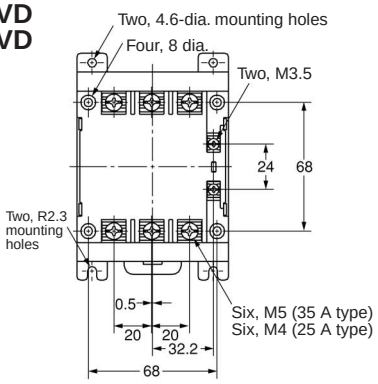




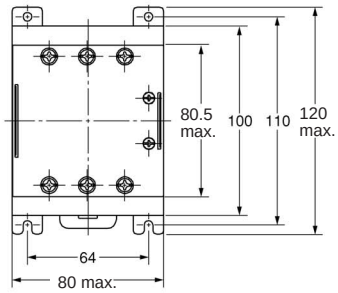
G3PB-225B-3N-VD
G3PB-235B-2N-VD
G3PB-525B-3N-VD
G3PB-535B-2N-VD

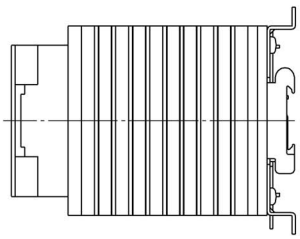


Without Terminal Cover

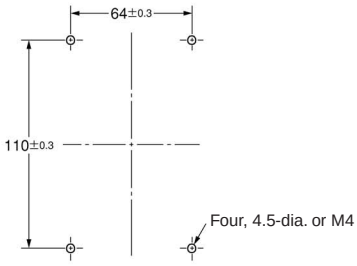


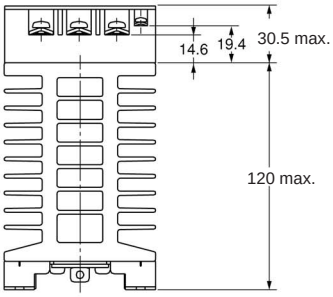
With Terminal Cover





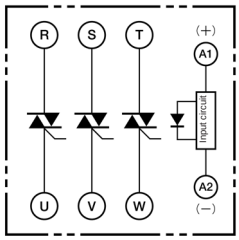
Mounting Hole Dimensions



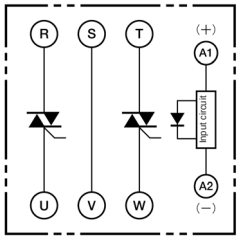


Terminal Arrangement/ Internal Connections

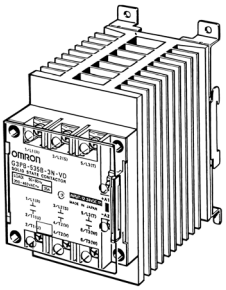
G3PB-□□□B-3N-VD



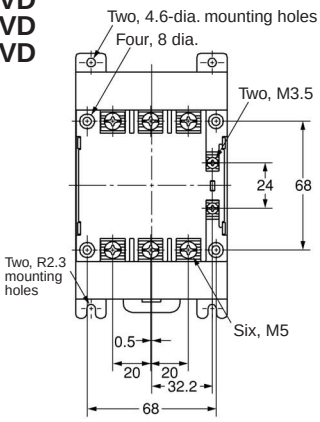
G3PB-□□□B-2N-VD



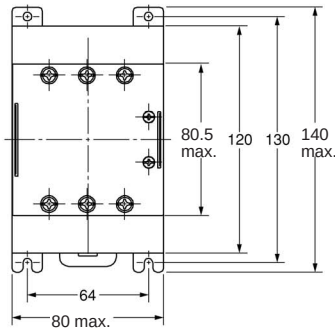
G3PB-235B-3N-VD
G3PB-245B-2N-VD
G3PB-535B-3N-VD
G3PB-545B-2N-VD

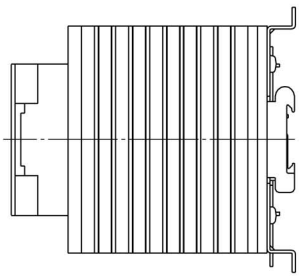


Without Terminal Cover



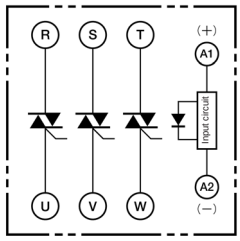
With Terminal Cover



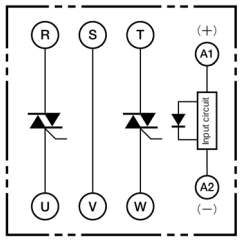


Terminal Arrangement/ Internal Connections

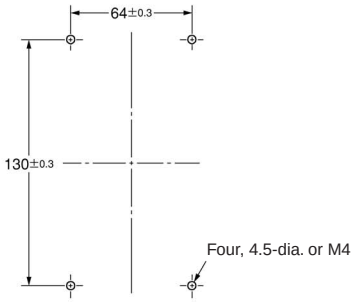
G3PB-□□□B-3N-VD

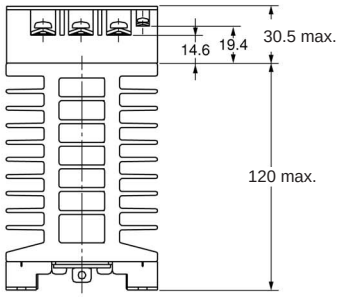


G3PB-□□□B-2N-VD

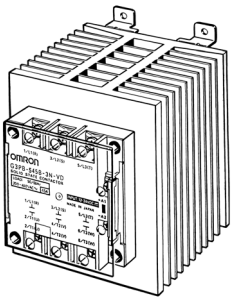


Mounting Hole Dimensions

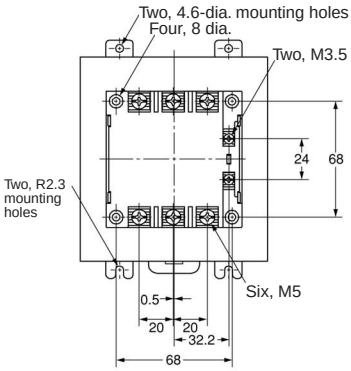




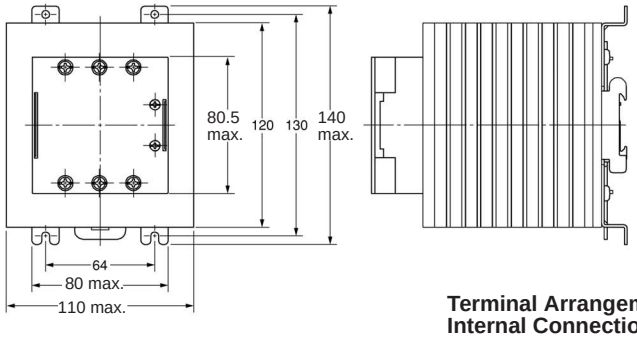
G3PB-245B-3N-VD
G3PB-545B-3N-VD



Without Terminal Cover

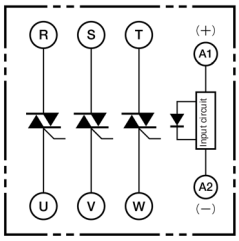


With Terminal Cover

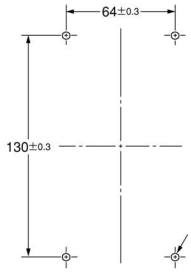


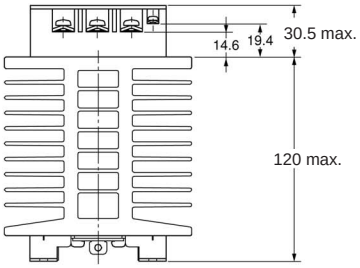
Terminal Arrangement/ Internal Connections

G3PB-□□□B-3N-VD



Mounting Hole Dimensions





Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Mounting Method

Since the Relay is heavy, firmly mount the DIN track and fix both ends with End Plates for DIN-track-mounting models.

Applicable DIN Tracks

The G3PB can be mounted to TH35-15Fe (IEC60715) DIN tracks. The manufacturers and models of DIN tracks to which mounting is possible are shown in the following table.

Manufacturer	Thickness	
	1.5 mm	2.3 mm
Schneider	AM1-DE200	---
WAGO	210-114, 210-197	210-118
PHOENIX	NS35/15	NS35/15-2.3

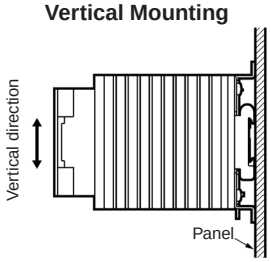
Direct Mounting

When mounting directly onto a panel, mount securely under the following conditions.

Screw diameter: M4
Tightening torque: 0.98 to 1.47 N·m

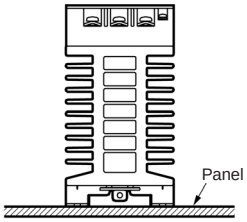
Mounted State

Vertical Mounting



Note: Mount the G3PB so that the markings can be read.

Horizontal Mounting

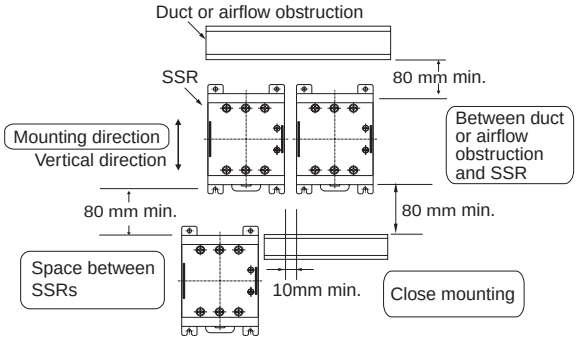


Note: When the G3PB is mounted horizontally, use at 50% of the rated load current.

Close Mounting

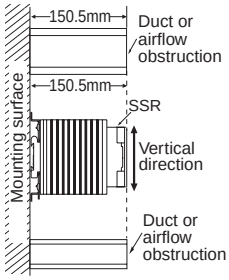
SSR Mounting Pitch

Panel Mounting



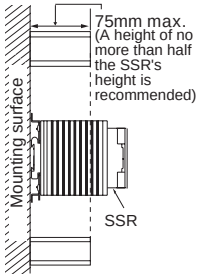
Relationship between SSRs and Ducts

Duct Height



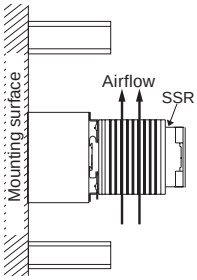
Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Countermeasure 1



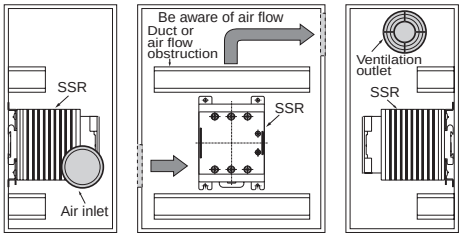
Use short ducts.

Countermeasure 2



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.)

Three-element Devices

Load current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.70	1.06	1.63	2.09

Two-element Devices

Load current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.47	0.78	1.09	1.40

Example: For 10 SSRs with load currents of 11 A (3-element devices,
1.63 x 10 = 16.3
Thus, 17 fans would be required.

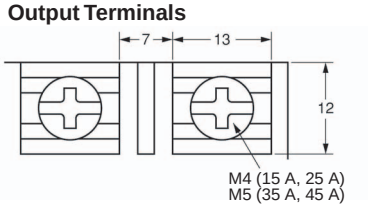
Size of fans: 92 mm^2, Air volume: 0.7 m^3/min,
Ambient temperature of control panel: 30 °C

If there are other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

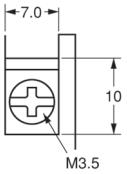
Wiring

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

Output Terminals



Input Terminals



- Make sure that all lead wires are thick enough for the current.
- Output terminals T1, T2, and T3 are charged regardless of whether the Unit is a 2- or 3-element model that is turned on or off. Do not touch these terminals, otherwise an electric shock may be received.

To isolate the Unit from the power supply, install an appropriate circuit breaker between the power supply and Unit.

Be sure to turn off the power supply before wiring the Unit.

- Terminal L2 and terminal T2 of the 2-element model are internally short-circuited to each other. Therefore, connect terminal L2 to the ground terminal side 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, for the prevention of electric shock accidents and ground faults.

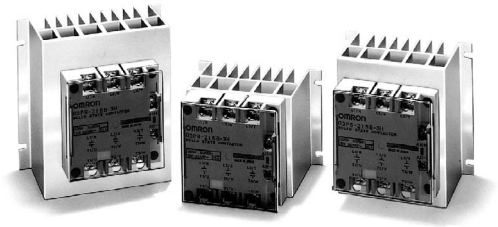
Tightening Torque

Refer to the following and be sure to tighten each screw of the Unit to the specified torque in order to prevent the Unit from malfunctioning.

Item	Screw terminal diameter	Tightening torque
Input terminal	M3.5	0.59 to 1.18 N·m
Output terminal	M4	0.98 to 1.47 N·m
	M5	1.47 to 2.45 N·m

Solid State Contactors (Three-phase)
G3PB

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).



Compact, Low-cost Solid State Contactors of an Innovative Construction Ideal for Three-phase Heaters

- Slim Units with three-phase output.
- Optimum heat sinks attach to models without built-in heat sinks.
- Compact design achieved by optimizing heat sink shape.
- DIN track mounting possible (when using the Y92B-P50 Heat Sink) in addition to screw mounting.
- Comply with EN60947-4-3 (IEC947-4-3) UL508, and CSA22.2 No. 14, and bear CE marking.

Model Number Structure

■ Model Number Legend

G3PB-□□□-□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3PB: Solid State Relay

2. Rated Load Power Supply Voltage
2: 200 VAC
4: 400 VAC

3. Rated Load Current
15: 15 A
25: 25 A
35: 35 A
45: 45 A

4. Terminal Type
B: Screw terminals

5. Single-phase/3-phase and Number of Elements for 3-phase
2: 3-phase, 2-element models
3: 3-phase, 3-element models

6. 3-phase Type
Blank: Built-in heat sink
H: No heat sink (“hockey puck” type)

7. Certification
VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models

Models with Built-in Heat Sinks

Number of phases	Main circuit voltage	Zero cross function	Applicable heater capacity (with Class-1 AC resistive load)	Number of elements	Model
3	100 to 240 VAC	Yes	5.1 kW max. (15 A)	3	G3PB-215B-3-VD
				2	G3PB-215B-2-VD
			8.6 kW max. (25 A)	3	G3PB-225B-3-VD
				2	G3PB-225B-2-VD
			12.1 kW max. (35 A)	3	G3PB-235B-3-VD
				2	G3PB-235B-2-VD
			15.5 kW max. (45 A)	3	G3PB-245B-3-VD
				2	G3PB-245B-2-VD
	200 to 400 VAC		10.3 kW max. (15 A)	3	G3PB-415B-3-VD
				2	G3PB-415B-2-VD
			17.3 kW max. (25 A)	3	G3PB-425B-3-VD
				2	G3PB-425B-2-VD
			24.2 kW max. (35 A)	3	G3PB-435B-3-VD
				2	G3PB-435B-2-VD
			31.1 kW max. (45 A)	3	G3PB-445B-3-VD
				2	G3PB-445B-2-VD

Note: 1. The load current vs. ambient temperature characteristics of the Unit vary with the heat radiation of the Unit. Refer to page 157, *Engineering Data* for details.]

2. When ordering, specify the rated input voltage.

Models without Built-in Heat Sinks

Number of phases	Main circuit voltage	Zero cross function	Rated carry current	Number of elements	Model
3	100 to 240 VAC	Yes	15 A max.	3	G3PB-215B-3H-VD
				2	G3PB-215B-2H-VD
			25 A max.	3	G3PB-225B-3H-VD
				2	G3PB-225B-2H-VD
			35 A max.	3	G3PB-235B-3H-VD
				2	G3PB-235B-2H-VD
			45 A max.	3	G3PB-245B-3H-VD
				2	G3PB-245B-2H-VD
	200 to 400 VAC		15 A max.	3	G3PB-415B-3H-VD
				2	G3PB-415B-2H-VD
			25 A max.	3	G3PB-425B-3H-VD
				2	G3PB-425B-2H-VD
			35 A max.	3	G3PB-435B-3H-VD
				2	G3PB-435B-2H-VD
			45 A max.	3	G3PB-445B-3H-VD
				2	G3PB-445B-2H-VD

Note: 1. The load current vs. ambient temperature characteristics of the Unit vary with the heat radiation of the Unit. Refer to page 157, *Engineering Data* for details.

2. When ordering, specify the rated input voltage.

Heat Sinks

Heat resistance (°C/W)	Model
1.67	Y92B-P50
1.01	Y92B-P100
0.63	Y92B-P150
0.43	Y92B-P200
0.36	Y92B-P250

■ Accessories (Order Separately)

Mounting Track	50 cm (1) x 7.3 mm (t)	PFP-50N
	1 m (1) x 7.3 mm (t)	PFP-100N
	1 m (1) x 16 mm (t)	PFP-100N2

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Operating Circuit (Common)

Item	Common
Rated voltage	12 to 24 VDC
Operating voltage range	9.6 to 30 VDC
Rated input current	10 mA max. (at 24 VDC)
Must operate voltage	9.6 VDC max.
Must release voltage	1 VDC min.
Insulation method	Phototriac
Operation indicator	Yellow LED

Main Circuit of Models with Built-in Heat Sinks

Item	G3PB-215B-3-VD	G3PB-215B-2-VD	G3PB-225B-3-VD	G3PB-225B-2-VD	G3PB-235B-3-VD	G3PB-235B-2-VD	G3PB-245B-3-VD	G3PB-245B-2-VD
Rated load voltage	100 to 240 VAC							
Load voltage range	75 to 264 VAC							
Applicable load current (See note.)	0.2 to 15 A		0.2 to 25 A		0.5 to 35 A		0.5 to 45 A	
Inrush current resistance (peak value)	150 A (60 Hz, 1 cycle)		220 A (60 Hz, 1 cycle)		440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		2,660 A^2s		2,660 A^2s			
Applicable load (with Class-1 AC resistive load)	5.1 kW max. (at 200 VAC)		8.6 kW (at 200 VAC)		12.1 kW max. (at 200 VAC)		15.5 kW max. (at 200 VAC)	

Item	G3PB-415B-3-VD	G3PB-415B-2-VD	G3PB-425B-3-VD	G3PB-425B-2-VD	G3PB-435B-3-VD	G3PB-435B-2-VD	G3PB-445B-3-VD	G3PB-445B-2-VD
Rated load voltage	200 to 400 VAC							
Load voltage range	180 to 440 VAC							
Applicable load current (See note.)	0.5 to 15 A		0.5 to 25 A		0.5 to 35 A		0.5 to 45 A	
Inrush current resistance (peak value)	220 A (60 Hz, 1 cycle)				440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		1,040 A^2s		2,660 A^2s			
Applicable load (with Class-1 AC resistive load)	10.3 kW max. (at 400 VAC)		17.3 kW max. (at 400 VAC)		24.2 kW max. (at 400 VAC)		31.1 kW max. (at 400 VAC)	

Note: Rated carry current varies depending on the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in *Engineering Data.*

Main Circuit of Models without Built-in Heat Sinks

Item	G3PB-215B-3H-VD	G3PB-215B-2H-VD	G3PB-225B-3H-VD	G3PB-225B-2H-VD	G3PB-235B-3H-VD	G3PB-235B-2H-VD	G3PB-245B-3H-VD	G3PB-245B-2H-VD
Rated load voltage	100 to 240 VAC							
Load voltage range	75 to 264 VAC							
Applicable load current (See note.)	0.2 to 15 A		0.2 to 25 A		0.2 to 35 A		0.2 to 45 A	
Inrush current resistance (peak value)	150 A (60 Hz, 1 cycle)		220 A (60 Hz, 1 cycle)		440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		2,260 A^2s		2,260 A^2s			
Applicable load (with Class-1 AC resistive load)	The applicable load varies with the heat radiation of the Unit. Refer to page 157, *Engineering Data* for details.							

Item	G3PB-415B-3H-VD	G3PB-415B-2H-VD	G3PB-425B-3H-VD	G3PB-425B-2H-VD	G3PB-435B-3H-VD	G3PB-435B-2H-VD	G3PB-445B-3H-VD	G3PB-445B-2H-VD
Rated load voltage	200 to 400 VAC							
Load voltage range	180 to 440 VAC							
Applicable load current (See note.)	0.5 to 15 A		0.5 to 25 A		0.5 to 35 A		0.5 to 45 A	
Inrush current resistance (peak value)	220 A (60 Hz, 1 cycle)				440 A (60 Hz, 1 cycle)			
Permissible I^2t (half 60-Hz wave)	260 A^2s		1,040 A^2s		2,660 A^2s			
Applicable load (with Class-1 AC resistive load)	Refer to page 157, *Engineering Data* for details.							

Note: The applicable load current varies depending on the radiation device or radiation plate to be connected and the ambient temperature. For details, refer to *Load Current vs. Ambient Temperature* in *Engineering Data.*

■ Characteristics

Models with Built-in Heat Sinks

Item	G3PB-215B-3-VD	G3PB-215B-2-VD	G3PB-225B-3-VD	G3PB-225B-2-VD	G3PB-235B-3-VD	G3PB-235B-2-VD	G3PB-245B-3-VD	G3PB-245B-2-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.6 V (RMS) max.							
Leakage current (See note.)	10 mA (at 200 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375–mm single amplitude (Mounted to DIN track)							
Shock resistance	Destruction: 294 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. 750 g	Approx. 750 g	Approx. 900 g	Approx. 750 g	Approx. 1,150 g	Approx. 900 g	Approx. 1,500 g	Approx. 1,150 g
Certified standards	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3) (From April 1999)							
EMC	Emission AC mains: EN55011 Group 1 Class B Emission Electromagnetic: EN55011 Group 1 Class B Immunity ESD: IEC947-4-3 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic: IEC947-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT: IEC947-4-3 2 kV AC power-signal line Immunity Surge transient: IEC947-4-3 2 kV Immunity RF disturbance: IEC947-4-3, EN50082-2 10 V (0.15 to 80 MHz)							

Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

Item	G3PB-415B-3-VD	G3PB-415B-2-VD	G3PB-425B-3-VD	G3PB-425B-2-VD	G3PB-435B-3-VD	G3PB-435B-2-VD	G3PB-445B-3-VD	G3PB-445B-2-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.8 V (RMS) max.							
Leakage current (See note.)	20 mA (at 400 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375–mm single amplitude (Mounted to DIN track)							
Shock resistance	Destruction: 294 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. 750 g	Approx. 750 g	Approx. 900 g	Approx. 750 g	Approx. 1,150 g	Approx. 900 g	Approx. 1,500 g	Approx. 1,150 g
Certified standards	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3)							
EMC	Emission AC mains: EN55011 Group 1 Class B Emission Electromagnetic: EN55011 Group 1 Class B Immunity ESD: IEC947-4-3 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic: IEC947-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT: IEC947-4-3 2 kV AC power-signal line Immunity Surge transient: IEC947-4-3 2 kV Immunity RF disturbance: IEC947-4-3, EN50082-2 10 V (0.15 to 80 MHz)							

Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

Models without Built-in Heat Sinks

Item	G3PB-215B-3H-VD	G3PB-215B-2H-VD	G3PB-225B-3H-VD	G3PB-225B-2H-VD	G3PB-235B-3H-VD	G3PB-235B-2H-VD	G3PB-245B-3H-VD	G3PB-245B-2H-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.6 V (RMS) max.							
Leakage current (See note.)	10 mA (at 200 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375–mm single amplitude							
Shock resistance	Destruction: 294 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	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3)							
Weight (Max.)	300 g max.							
EMC	Emission AC mains: EN55011 Group 1 Class B Emission Electromagnetic: EN55011 Group 1 Class B Immunity ESD: IEC947-4-3 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic: IEC947-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT: IEC947-4-3 2 kV AC power-signal line Immunity Surge transient: IEC947-4-3 2 kV Immunity RF disturbance: IEC947-4-3, EN50082-2 10 V (0.15 to 80 MHz)							

Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

Item	G3PB-415B-3H-VD	G3PB-415B-2H-VD	G3PB-425B-3H-VD	G3PB-425B-2H-VD	G3PB-435B-3H-VD	G3PB-435B-2H-VD	G3PB-445B-3H-VD	G3PB-445B-2H-VD
Operate time	1/2 of load power source cycle + 1 ms max. (DC input)							
Release time	1/2 of load power source cycle + 1 ms max. (DC input)							
Output ON voltage drop	1.8 V (RMS) max.							
Leakage current (See note.)	20 mA (at 400 VAC)							
Insulation resistance	100 MΩ min. (at 500 VDC)							
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min							
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375-mm single amplitude							
Shock resistance	Destruction: 294 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	UL508, CSA22.2 No. 14, EN60947-4-3 (IEC947-4-3)							
Weight	Approx. 300 g							
EMC	Emission AC mains: EN55011 Group 1 Class B Emission Electromagnetic: EN55011 Group 1 Class B Immunity ESD: IEC947-4-3 4 kV contact discharge 8 kV air discharge Immunity Electromagnetic: IEC947-4-3 10 V/m (80 MHz to 1 GHz) Immunity EFT: IEC947-4-3 2 kV AC power-signal line Immunity Surge transient: IEC947-4-3 2 kV Immunity RF disturbance: IEC947-4-3, EN50082-2 10 V (0.15 to 80 MHz)							

Note: The leakage current of phase S will be approximately $\sqrt{3}$ times larger if the 2-element model is applied.

Heat Sinks

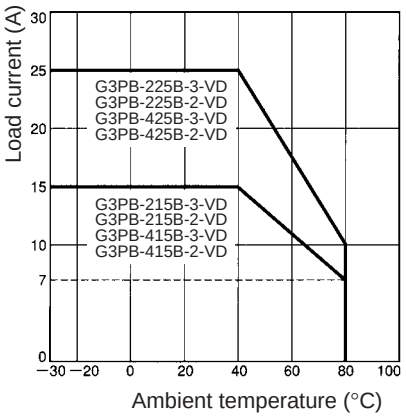
Model	Weight
Y92B-P50	Approx. 450 g
Y92B-P100	Approx. 450 g
Y92B-P150	Approx. 600 g
Y92B-P200	Approx. 850 g
Y92B-P250	Approx. 1,200 g

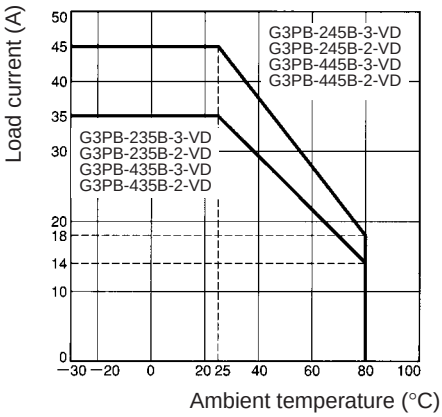
Engineering Data

Load Current vs. Ambient Temperature

Models with Built-in Heat Sinks

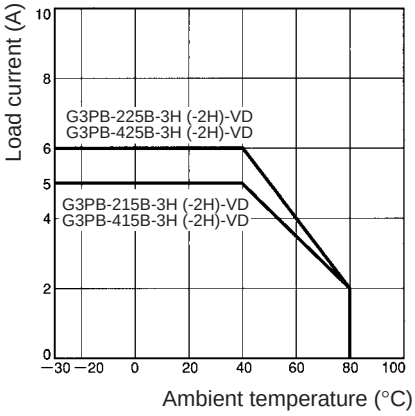
G3PB-215B-3-VD G3PB-225B-3-VD G3PB-235B-3-VD G3PB-245B-3-VD
G3PB-215B-2-VD G3PB-225B-2-VD G3PB-235B-2-VD G3PB-245B-2-VD
G3PB-415B-3-VD G3PB-425B-3-VD G3PB-435B-3-VD G3PB-445B-3-VD
G3PB-415B-2-VD G3PB-425B-2-VD G3PB-435B-2-VD G3PB-445B-2-VD



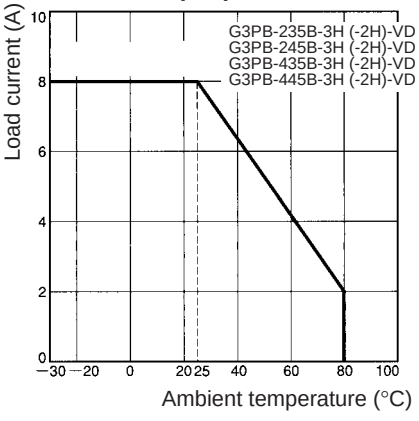


Models without Built-in Heat Sinks

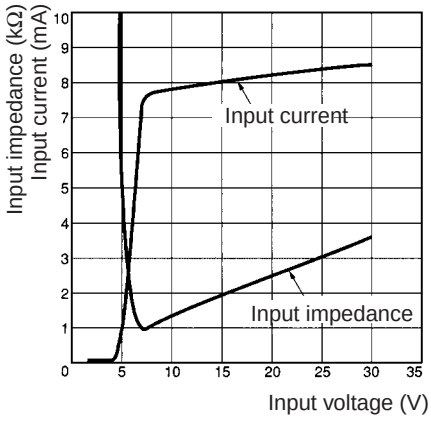
G3PB-215B-3H (-2H)-VD
G3PB-225B-3H (-2H)-VD
G3PB-415B-3H (-2H)-VD
G3PB-425B-3H (-2H)-VD



G3PB-235B-3H (-2H)-VD
G3PB-245B-3H (-2H)-VD
G3PB-435B-3H (-2H)-VD
G3PB-445B-3H (-2H)-VD



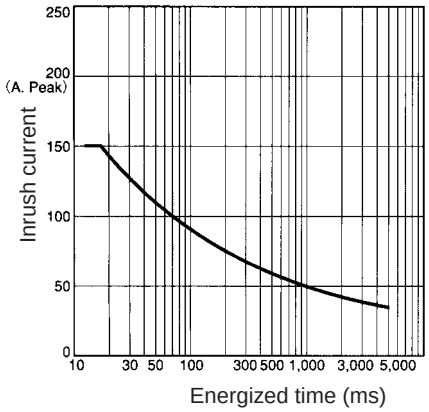
Input Voltage vs. Input Current and Input Voltage vs. Input Impedance



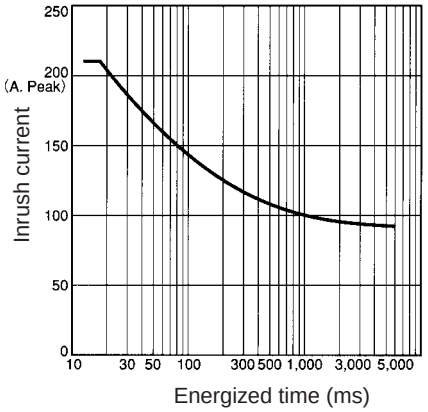
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

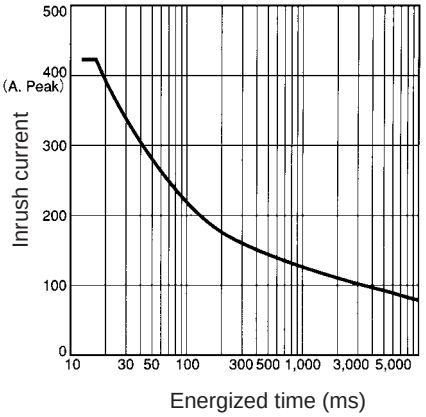
G3PB-215B-3 (H)-VD
G3PB-215B-2 (H)-VD



G3PB-225B-3 (H)-VD G3PB-425B-3 (H)-VD
G3PB-225B-2 (H)-VD
G3PB-415B-3 (H)-VD G3PB-425B-2 (H)-VD
G3PB-415B-2 (H)-VD

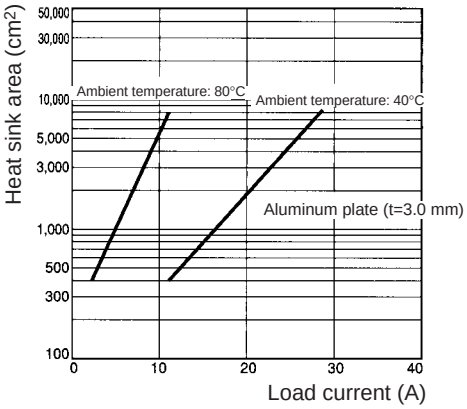


G3PB-235B-3 (H)-VD G3PB-435B-3 (H)-VD
G3PB-235B-2 (H)-VD G3PB-435B-2 (H)-VD
G3PB-245B-3 (H)-VD G3PB-445B-3 (H)-VD
G3PB-245B-2 (H)-VD G3PB-445B-2 (H)-VD

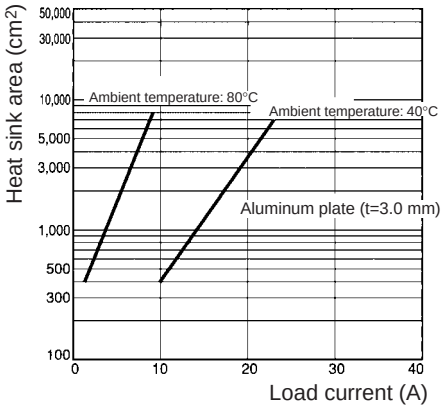


Heat Sink Area vs. Load Current

G3PB-225B-3H-VD



G3PB-425B-3H-VD



Note: The heat sink area refers to the combined area of the sides of the heat sink that radiate heat. In the case of G3PB-425B-3H-VD, 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 2,500 cm^2. Therefore, if the heat sink is square, one side of the heat sink must be 36 cm ($36^2 \times 2 = 2{,}592$) or longer.

Thermal Resistance Rth (Junction/SSR Back Surface)

Three-phase Models without Heat Sink

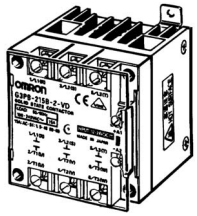
Model	Rth (°C/W)
G3PB-215B-3H-VD	1.05
G3PB-225B-3H-VD	0.57
G3PB-235B-3H-VD	0.57
G3PB-245B-3H-VD	0.57

Dimensions

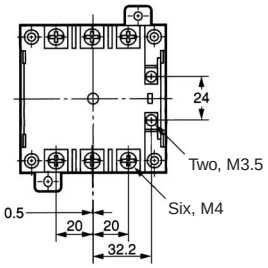
Note: All units are in millimeters unless otherwise indicated.

Models with Built-in Heat Sinks

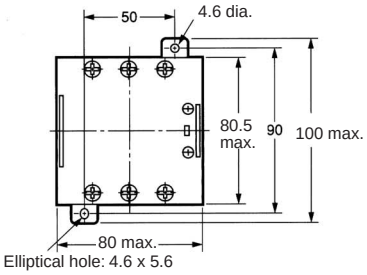
G3PB-215B-2-VD
G3PB-415B-2-VD

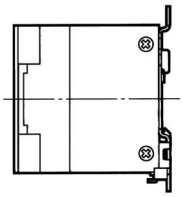


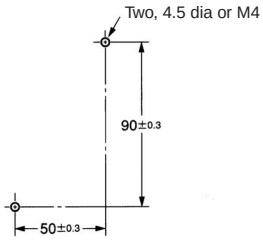
Without Terminal Cover

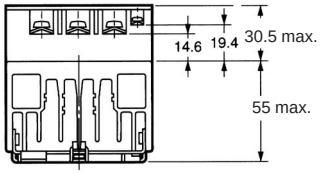


With Terminal Cover

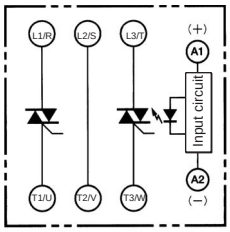




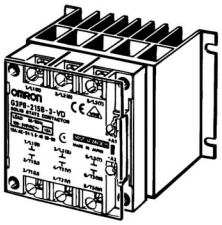




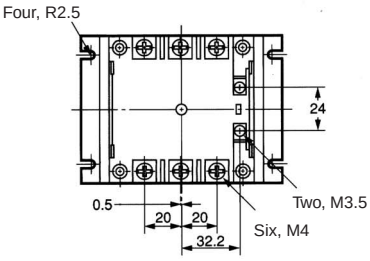
Terminal Arrangement/ Internal Circuit Diagram



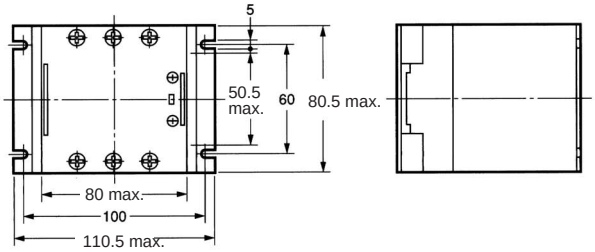
G3PB-215B-3-VD
G3PB-225B-2-VD
G3PB-415B-3-VD
G3PB-425B-2-VD



Without Terminal Cover

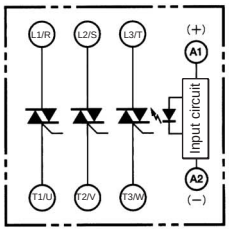


With Terminal Cover

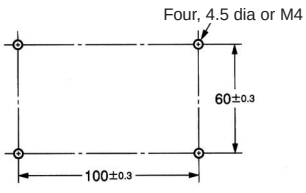


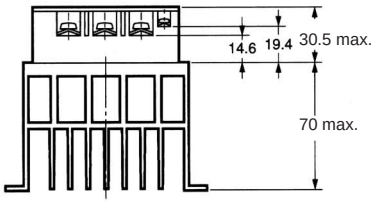
Terminal Arrangement/ Internal Circuit Diagram

G3PB-□□□B-3-VD

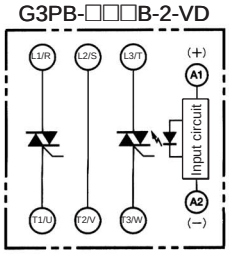


Mounting Holes

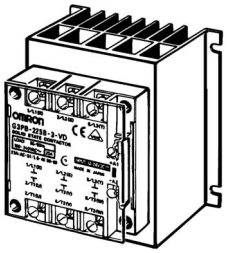




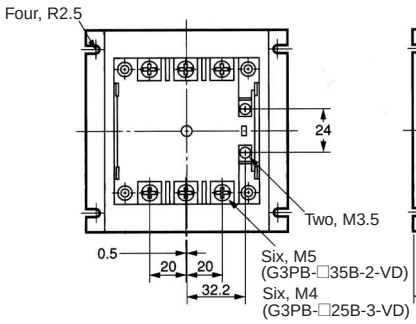
G3PB-□□□B-2-VD



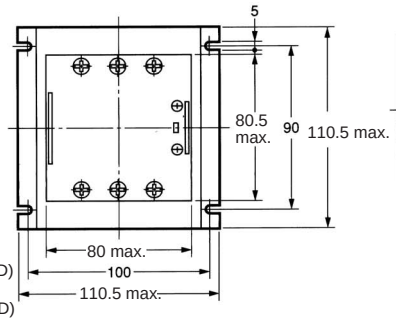
G3PB-225B-3-VD
G3PB-235B-2-VD
G3PB-425B-3-VD
G3PB-435B-2-VD

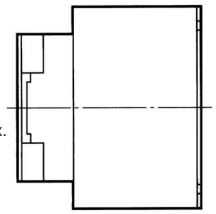


Without Terminal Cover



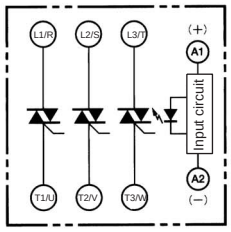
With Terminal Cover



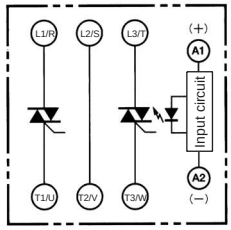


Terminal Arrangement/ Internal Circuit Diagram

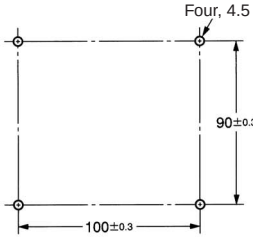
G3PB-□□□B-3-VD

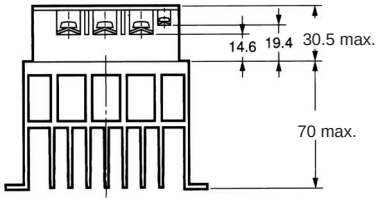


G3PB-□□□B-2-VD

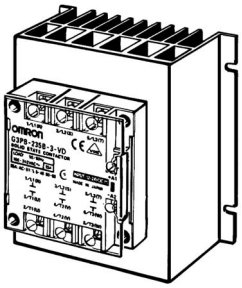


Mounting Holes

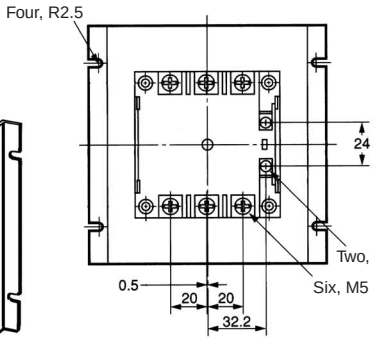




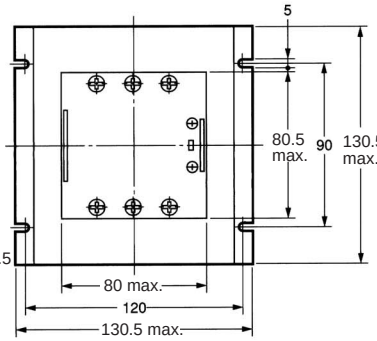
G3PB-235B-3-VD
G3PB-245B-2-VD
G3PB-435B-3-VD
G3PB-445B-2-VD

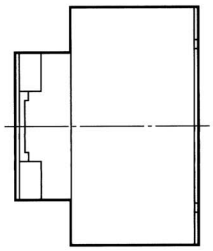


Without Terminal Cover



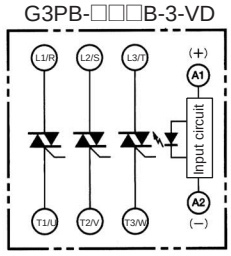
With Terminal Cover



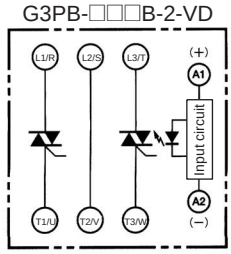


Terminal Arrangement/ Internal Circuit Diagram

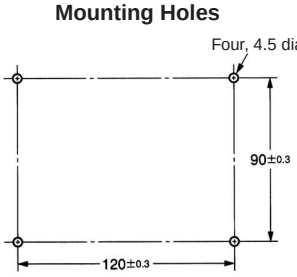
G3PB-□□□B-3-VD

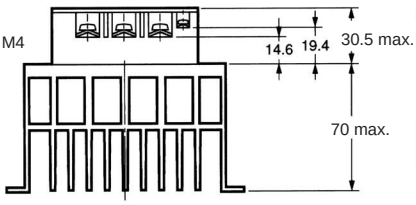


G3PB-□□□B-2-VD

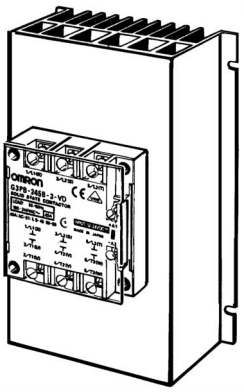


Mounting Holes

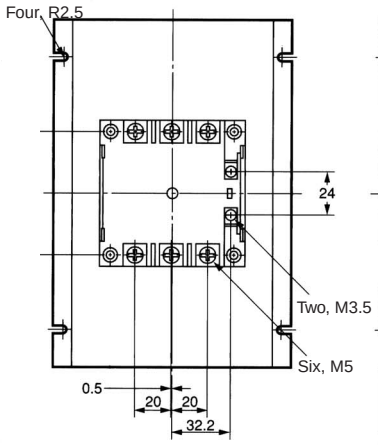




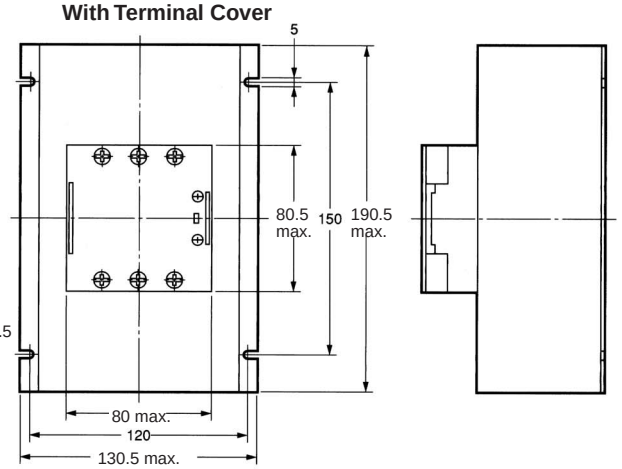
G3PB-245B-3-VD
G3PB-445B-3-VD



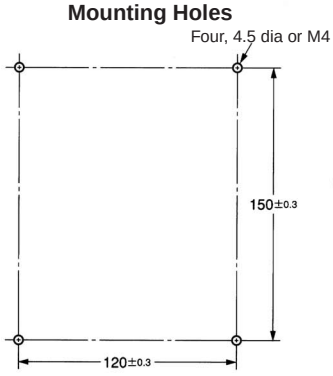
Without Terminal Cover

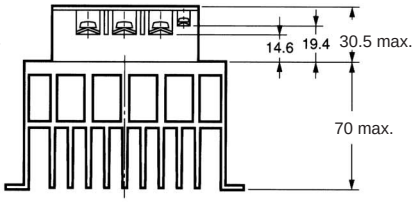


With Terminal Cover

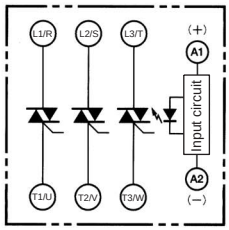


Mounting Holes



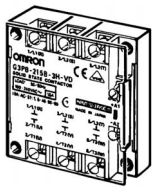


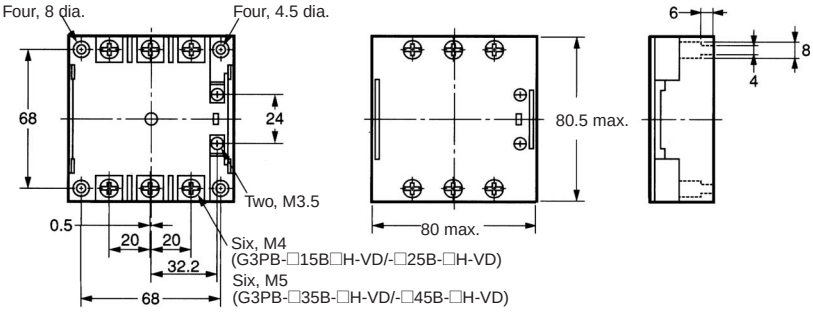
Terminal Arrangement/ Internal Circuit Diagram



Models without Built-in Heat Sinks

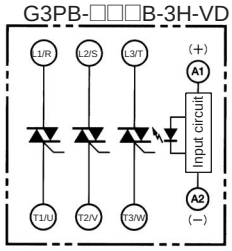
G3PB-215B-3H-VD G3PB-235B-3H-VD G3PB-415B-3H-VD G3PB-435B-3H-VD
G3PB-215B-2H-VD G3PB-235B-2H-VD G3PB-415B-2H-VD G3PB-435B-2H-VD
G3PB-225B-3H-VD G3PB-245B-3H-VD G3PB-425B-3H-VD G3PB-445B-3H-VD
G3PB-225B-2H-VD G3PB-245B-2H-VD G3PB-425B-2H-VD G3PB-445B-2H-VD



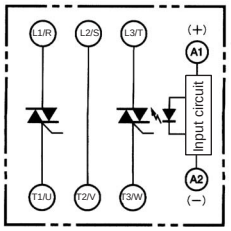


Terminal Arrangement/ Internal Circuit Diagram

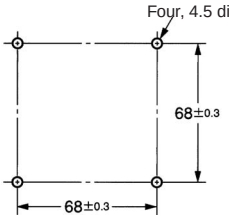
G3PB-□□□B-3H-VD

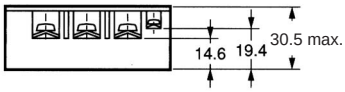


G3PB-□□□B-2H-VD



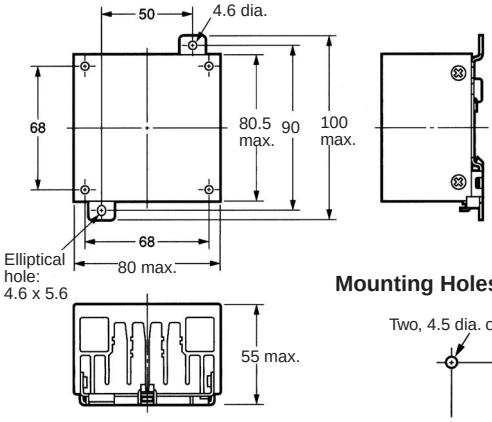
Mounting Holes



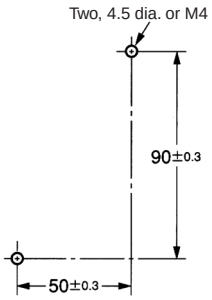


Heat Sinks

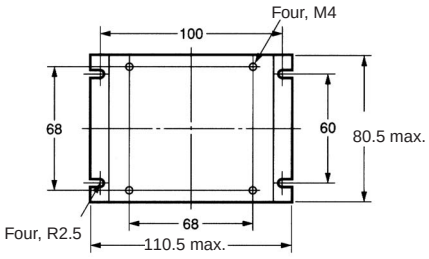
Y92B-P50
For model G3PB-215B-2H-VD
G3PB-415B-2H-VD



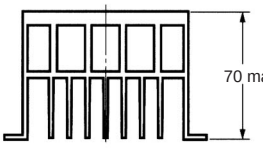
Mounting Holes

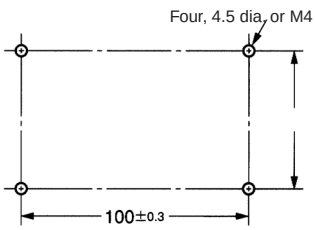


Y92B-P100
For G3PB-215B-3H-VD
G3PB-225B-2H-VD
G3PB-415B-3H-VD
G3PB-425B-2H-VD

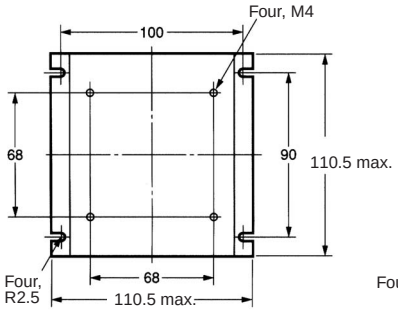


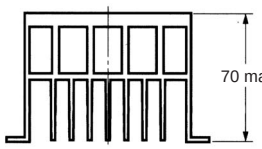
Mounting Holes



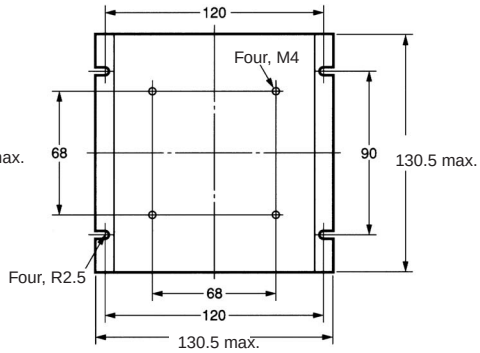


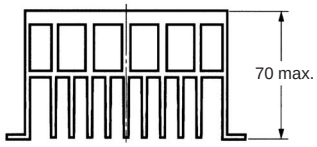
Y92B-P150
For model G3PB-225B-3H-VD
G3PB-235B-2H-VD
G3PB-425B-3H-VD
G3PB-435B-2H-VD



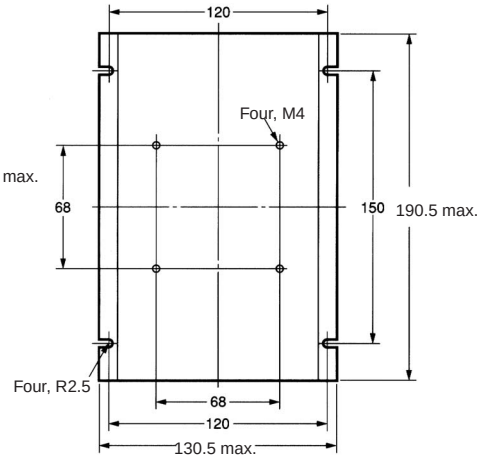


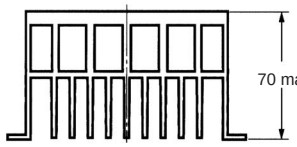
Y92B-P200
For model G3PB-235B-3H-VD
G3PB-245B-2H-VD
G3PB-435B-3H-VD
G3PB-445B-2H-VD



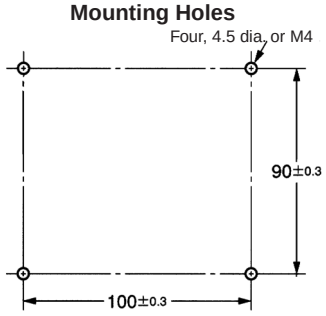


Y92B-P250
For model G3PB-245B-3-VD
G3PB-445B-3-VD

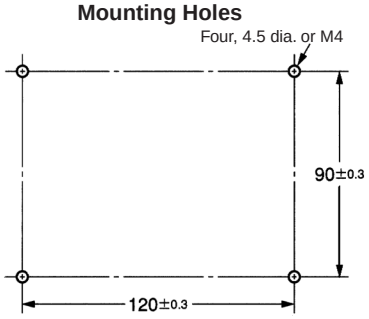




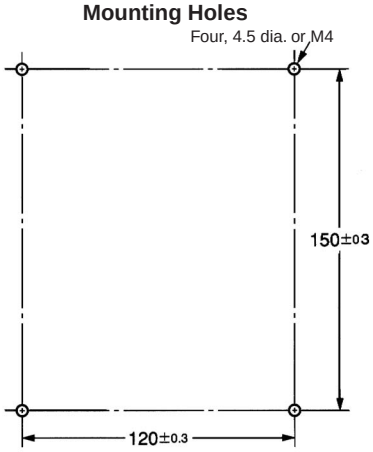
Mounting Holes



Mounting Holes



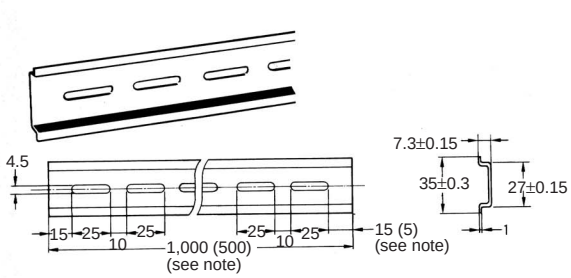
Mounting Holes



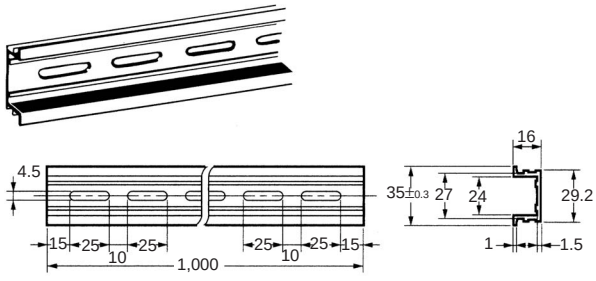
Accessories (Order Separately)

Mounting Tracks

PFP-100N, PFP-50N



PFP-100N2



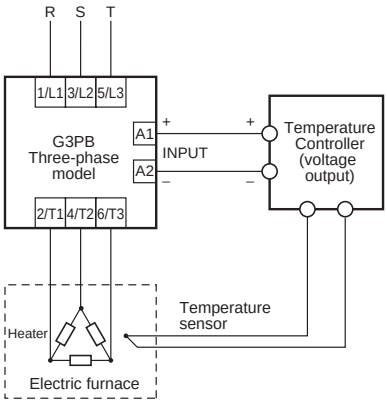
Note: Values in parentheses indicate dimensions for the PFP-50N.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

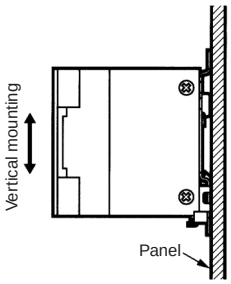
Connection Circuit Example



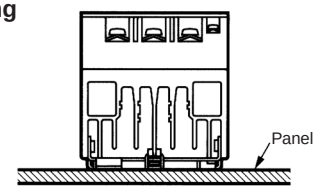
Mounting Method

Since the Relay is heavy, firmly mount the DIN track and fix both ends with End Plates for DIN-track-mounting models.
For direct mounting, firmly mount the Relay on the panel.

Vertical Mounting



Horizontal Mounting

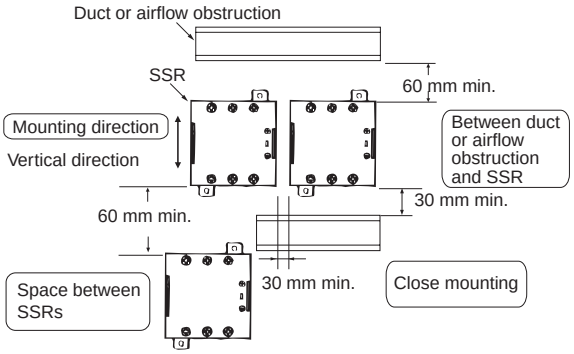


Note: Make sure that the load current is 50% of the rated load current when the G3PB is mounted horizontally.

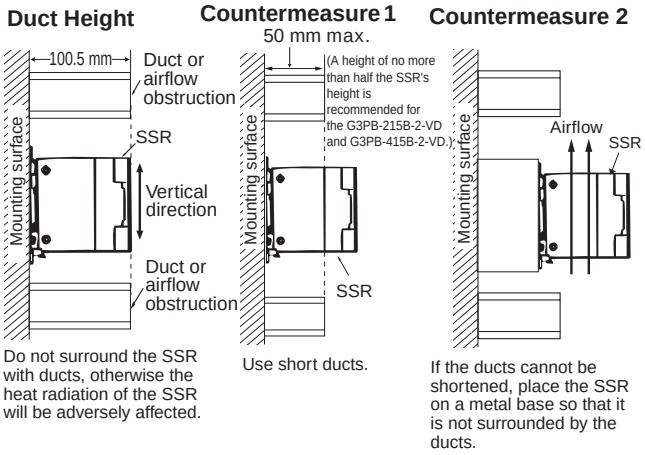
Close Mounting

SSR Mounting Pitch

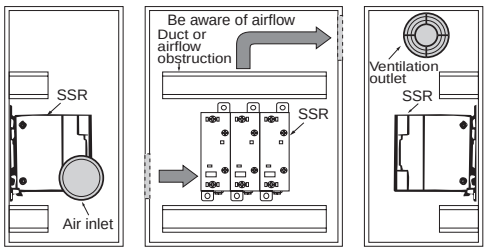
Panel Mounting



Relationship between SSRs and 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.)

Three-element Devices

Load current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.70	1.06	1.63	2.09

Two-element Devices

Load current (A)	15 A	25 A	35 A	45 A
Required number of fans per SSR	0.47	0.78	1.09	1.40

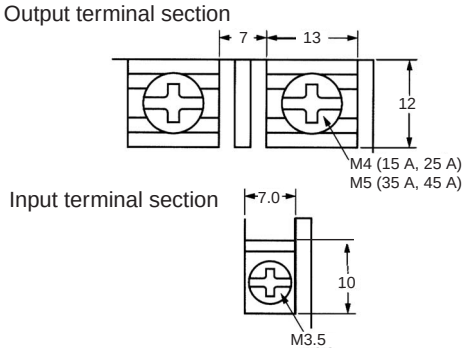
Example: For 10 SSRs with load currents of 11 A (3-element devices,
1.63 x 10 = 16.3
Thus, 17 fans would be required.

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.

Wiring

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



Make sure that all lead wires are thick enough according to the current.

Output terminals T1, T2, and T3 are charged regardless of whether the Unit is a 2- or 3-element model that is turned on or off. Do not touch these terminals, otherwise an electric shock may be received.

To isolate the Unit from the power supply, install an appropriate circuit breaker between the power supply and Unit.

Be sure to turn off the power supply before wiring the Unit.

Terminal L2 and terminal T2 of the 2-element model are internally short-circuited to each other. Therefore, 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, for the prevention of electric shock accidents and ground faults.

Tightening Torque

Refer to the following and be sure to tighten each screw of the Unit to the specified torque in order to prevent the Unit from malfunctioning.

Item	Screw terminal diameter	Tightening torque
Input terminal	M3.5	0.8 N·m
Output terminal	M4	1.2 N·m
	M5	2.0 N·m

Mounting Models without Built-in Heat Sink

Before attaching an external Heat Sink to the Unit, be sure to apply silicone grease for heat radiation, such as Toshiba Silicone's YG6260 or Sinetsu Silicone's G746, to the surface where the Heat Sink is attached.

Be sure to apply the following torque to secure the Unit and external Heat Sink for proper heat radiation.

Tightening torque: 2.0 N·m

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J135-E1-03

In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3PA

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

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.
- Comply with VDE 0160 (finger protection), with a dielectric strength of 4,000 V between input and load.
- Comply with VDE 0805, IEC 950.
- Certified by UL, CSA, and VDE (reinforced insulation).

Model Number Structure

■ Model Number Legend

G3PA-□□□□-□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3PA: Solid State Relay

2. Rated Load Power Supply Voltage
2: 200 VAC
4: 400 VAC

3. Rated Load Current
10: 10 A
20: 20 A
30: 30 A
40: 40 A
50: 50 A
60: 60 A

4. Terminal Type
B: Screw terminals

5. Zero Cross Function
Blank: Equipped with zero cross function
L: Not equipped with zero cross function

6. Certification
VD: Certified by UL, CSA, and VDE

7. Special Specifications
Blank: Standard models
2: 480-V models

Ordering Information

■ List of Models

Model	Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage
G3PA-210B-VD	Phototriac coupler	Yes	Yes	10 A at 24 to 240 VAC	5 to 24 VDC
G3PA-220B-VD				20 A at 24 to 240 VAC	
G3PA-240B-VD				40 A at 24 to 240 VAC	
G3PA-260B-VD				60 A at 24 to 240 VAC	
G3PA-210BL-VD		No		10 A at 24 to 240 VAC	
G3PA-220BL-VD				20 A at 24 to 240 VAC	
G3PA-240BL-VD				40 A at 24 to 240 VAC	
G3PA-260BL-VD				60 A at 24 to 240 VAC	
G3PA-210B-VD		Yes		10 A at 24 to 240 VAC	24 VAC
G3PA-220B-VD				20 A at 24 to 240 VAC	
G3PA-240B-VD				40 A at 24 to 240 VAC	
G3PA-260B-VD				60 A at 24 to 240 VAC	
G3PA-420B-VD				20 A at 180 to 400 VAC	12 to 24 VDC
G3PA-430B-VD				30 A at 180 to 400 VAC	
G3PA-420B-VD-2				20 A at 200 to 480 VAC	
G3PA-430B-VD-2				30 A at 200 to 480 VAC	
G3PA-450B-VD-2				50 A at 200 to 480 VAC	

Note: When ordering, specify the rated input voltage.

Replacement Parts

Name	Carry current	Load voltage range	Model	Applicable SSR	VDE certification
Power Device Cartridge	10 A	19 to 264 VAC	G32A-A10-VD DC5-24	G3PA-210B-VD DC5-24	Yes
			G32A-A10L-VD DC5-24	G3PA-210BL-VD DC5-24	
			G32A-A10-VD AC24	G3PA-210B-VD AC24	
	20 A		G32A-A20-VD DC5-24	G3PA-220B-VD DC5-24	
			G32A-A20L-VD DC5-24	G3PA-220BL-VD DC5-24	
			G32A-A20-VD AC24	G3PA-220B-VD AC24	
	40 A		G32A-A40-VD DC5-24	G3PA-240B-VD DC5-24	
			G32A-A40L-VD DC5-24	G3PA-240BL-VD DC5-24	
			G32A-A40-VD AC24	G3PA-240B-VD AC24	
	60 A		G32A-A60-VD DC5-24	G3PA-260B-VD DC5-24	
			G32A-A60L-VD DC5-24	G3PA-260BL-VD DC5-24	
			G32A-A60-VD AC24	G3PA-260B-VD AC24	
	20 A	150 to 440 VAC	G32A-A420-VD DC12-24	G3PA-420B-VD DC12-24	
	30 A		G32A-A430-VD DC12-24	G3PA-430B-VD DC12-24	
	20 A	180 to 528 VAC	G32A-A420-VD-2 DC12-24	G3PA-420B-VD-2 DC12-24	
	30 A		G32A-A430-VD-2 DC12-24	G3PA-430B-VD-2 DC12-24	
	50 A		G32A-A450-VD-2 DC12-24	G3PA-450B-VD-2 DC12-24	

■ Other Units (Order Separately)

Units that Enable 2-line Switching of 3-phase Power

Name	Current flow	Model	Applicable SSR
Short-circuit Unit	10 A	G32A-D20	G3PA-210B-VD, G3PA-210BL-VD
	20 A		G3PA-220B-VD, G3PA-220BL-VD G3PA-420B-VD, G3PA-420B-VD-2
	30 A	G32A-D40	G3PA-430B-VD, G3PA-430B-VD-2
	40 A		G3PA-240B-VD, G3PA-240BL-VD

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-210B-VD	5 to 24 VDC	4 to 30 VDC	7 mA max.	4 VDC max.	1 VDC min.
G3PA-220B-VD					
G3PA-240B-VD					
G3PA-260B-VD					
G3PA-210BL-VD	5 to 24 VDC	4 to 30 VDC	20 mA max.	4 VDC max.	1 VDC min.
G3PA-220BL-VD					
G3PA-240BL-VD					
G3PA-260BL-VD					
G3PA-210B-VD	24 VAC	19.2 to 26.4 VAC	1.4 kΩ±20%	19.2 VAC max.	4.8 VAC min.
G3PA-220B-VD					
G3PA-240B-VD					
G3PA-260B-VD					
G3PA-420B-VD	12 to 24 VDC	9.6 to 30 VDC	7 mA max.	9.2 VDC max.	1 VDC min.
G3PA-430B-VD					
G3PA-420B-VD-2					
G3PA-430B-VD-2					
G3PA-450B-VD-2					

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	Destruction: 10 to 55 to 10 Hz, 0.375–mm single amplitude (Mounted to DIN track)								
Shock resistance	Destruction: 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	UL508, CSA C22.2 (No.14, No.950), EN60950 File No. 5915ÜG				UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 6642ÜG	UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 133127ÜG	UL508, CSA C22.2 (No.14), EN60947-4-3 File No. 6642ÜG	UL508, CSA C22.2 (No.14), 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.

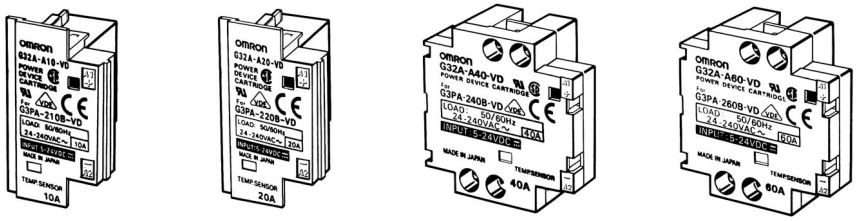
Improve the heat radiation efficiency of the G3PA before replacing the cartridge.

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.

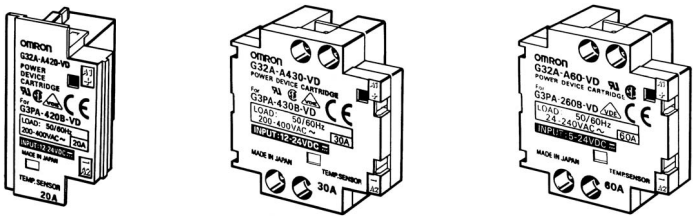
Be sure to turn OFF the power supply when replacing the Cartridge. Supplying power with the Cartridge removed may result in malfunction.

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

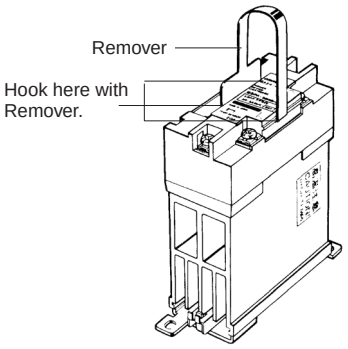
G32A-A10(L)-VD/G32A-A20(L)-VD/G32-A420-VD(-2)

Use the special tool (provided) to extract the cartridge for replacement with a new one.

Extraction

Follow the procedures below to dismount the Power Device Cartridge from the G3PA.

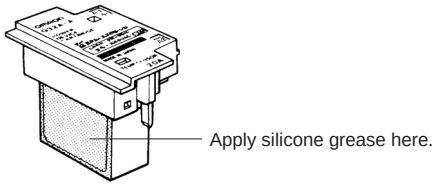
1. **Switch off the power.**
2. Remove the terminal cover.
3. Hook the indented part of the cartridge with the tool and pull up on the cartridge to remove it.



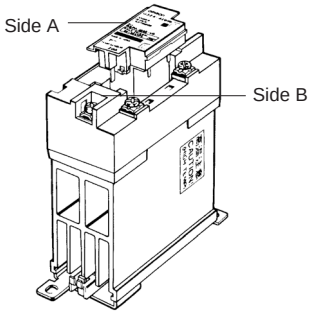
Mounting

Follow the procedures below to mount 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.

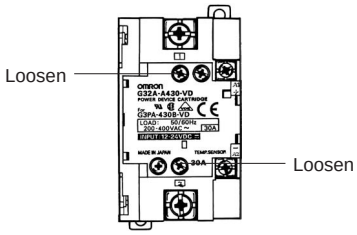
G32A-A40(L)-VD/G32A-A60(L)-VD/G32A-A430-VD(-2)/G32A-A450-VD-2

The G32A Power Device Cartridge is mounted and secured with screws to the G3PA Unit.

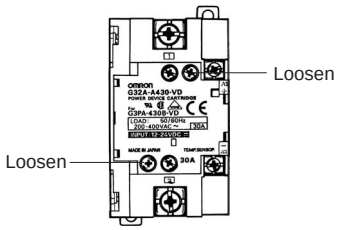
Extraction

Follow the procedures below to dismount 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.



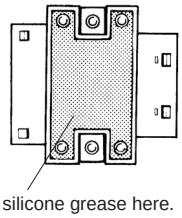
4. Loosen the screws on both the corners.



5. Hold the indented part of both the corners to dismount the cartridge.

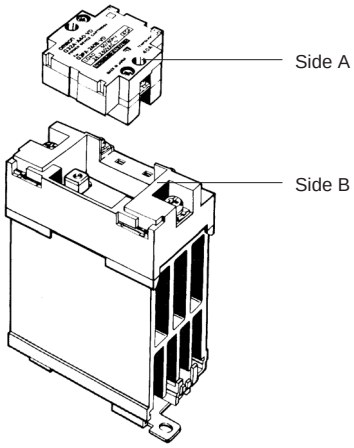
Mounting

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.

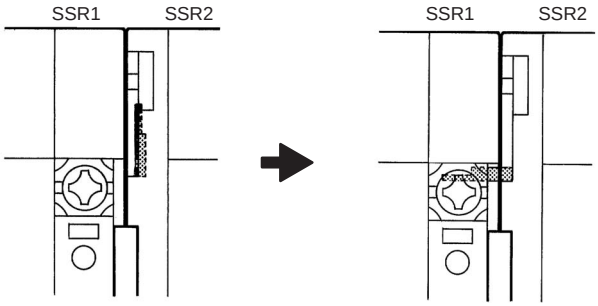
5. Tighten the screws on both the sides with a tightening torque of 0.59 to 0.78 N·m.

6. Attach the terminal cover.

7. Switch on the power and check the G3PA to be sure it works properly.

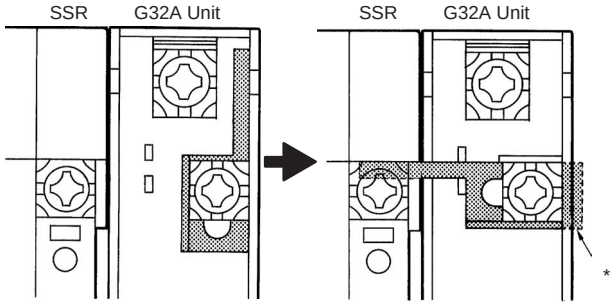
■ Linking Terminal Connection

• Connecting with linking terminal for G3PA-210B(L)-VD, -220B(L)-VD, -240B(L)-VD and G3PA-420B-VD(-2), G3PA-430B-VD(-2).



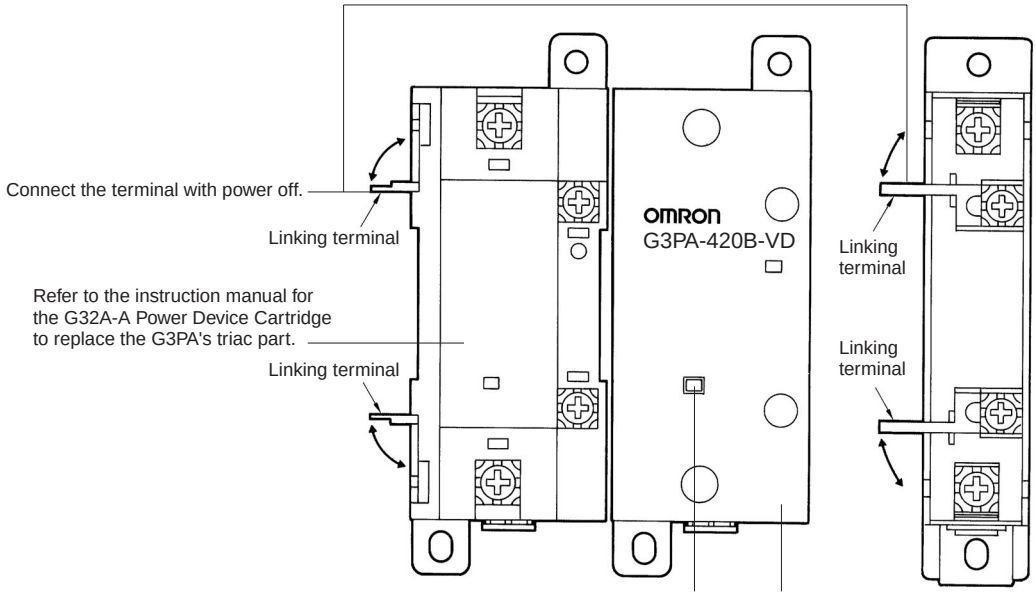
1. When SSRs are close mounted, loosen the M3.5 Sems screw and flip the linking terminal down.
2. Insert the linking terminal securely into the center of the screw and tighten the screw.

• Connecting with linking terminal for G32A.



* 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.



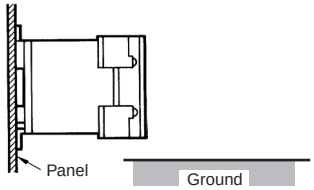
When the temperature indicator has turned from pink to red, the G32-A-A Power Device Cartridge may have malfunctioned, in which case the cartridge must be replaced with a new one.

Use the terminal cover to prevent accidents due to electric shock.

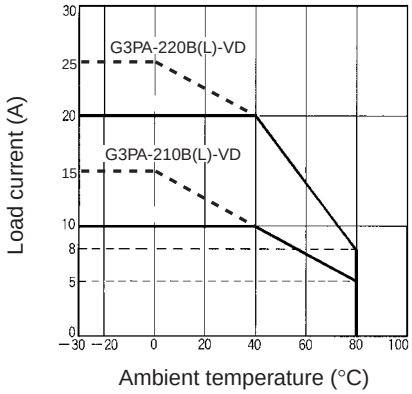
Engineering Data

Load Current vs. Ambient Temperature

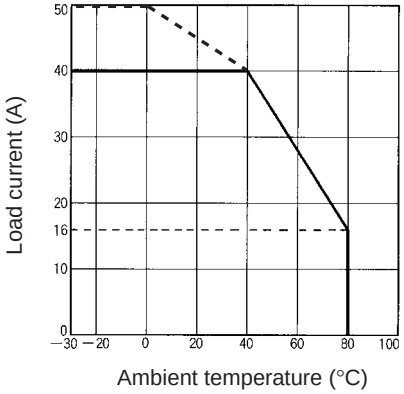
Vertical Mounting



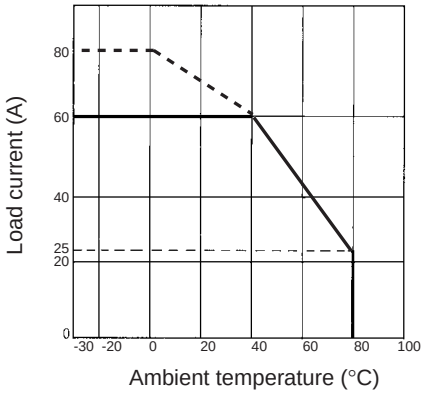
G3PA-210B(L)-VD, G3PA-220B(L)-VD



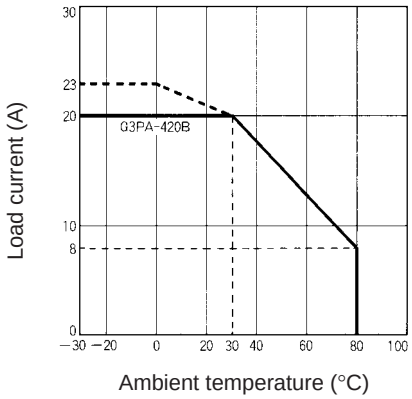
G3PA-240B(L)-VD



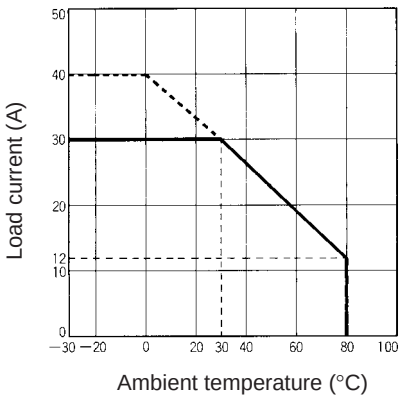
G3PA-260B(L)-VD



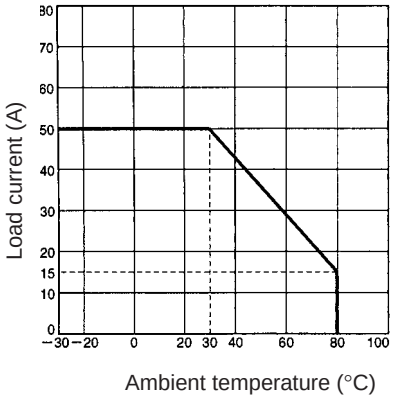
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



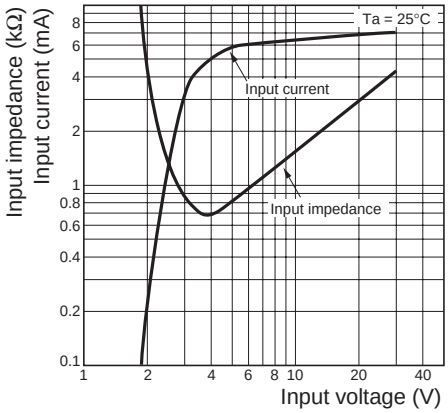
G3PA-450B-VD-2



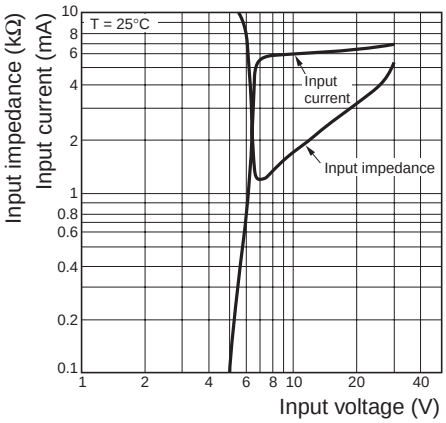
Note: Close mounting is possible for a maximum of three Units by reducing the load current by 20%. (A minimum clearance of 10 mm must be provided when mounting four or more Units.)

Input Voltage vs. Input Current

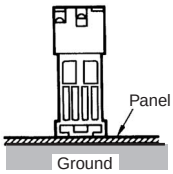
G3PA-2□0B-VD



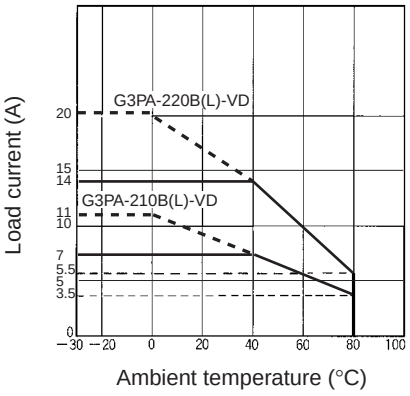
G3PA-4□0-VD, G3PA-4□-VD-2



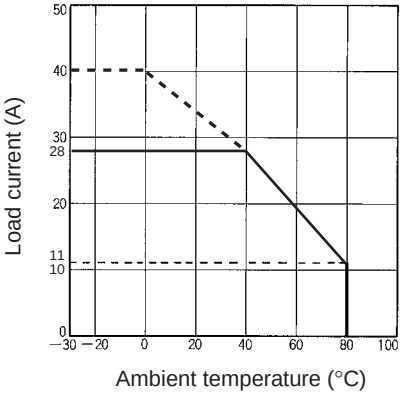
Horizontal Mounting



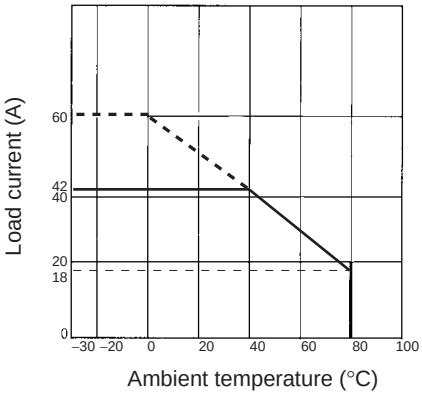
G3PA-210B(L)-VD, G3PA-220B(L)-VD



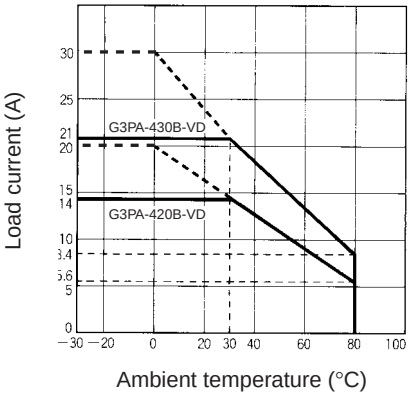
G3PA-240B(L)-VD



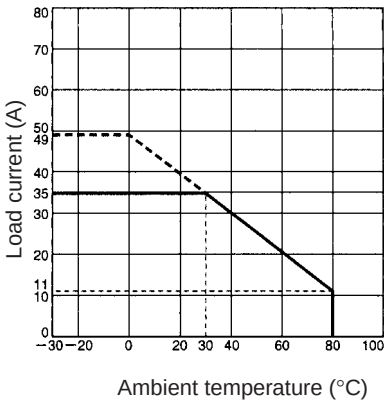
G3PA-260B(L)-VD



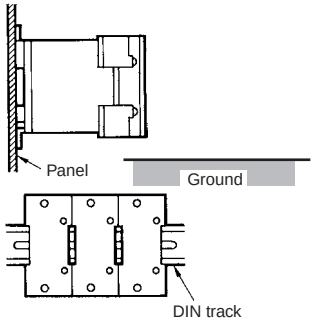
G3PA-420B-VD, G3PA-430B-VD
G3PA-420B -VD-2, G3PA-430B-VD-2



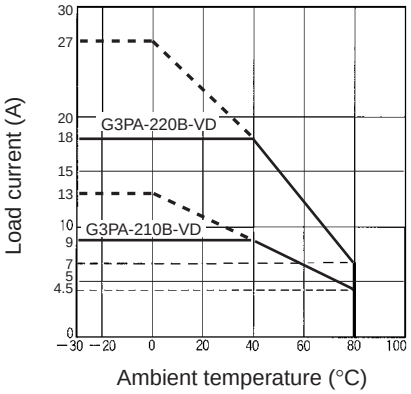
G3PA-450B-VD-2



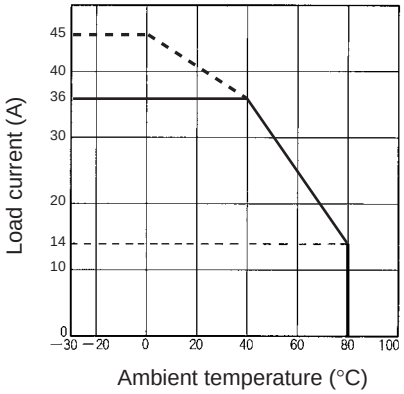
Close Mounting (Up to Three)



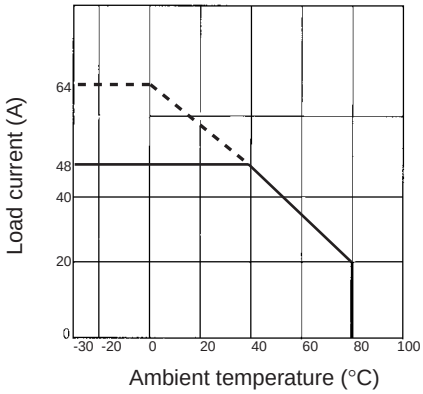
G3PA-210B(L)-VD, G3PA-220B(L)-VD



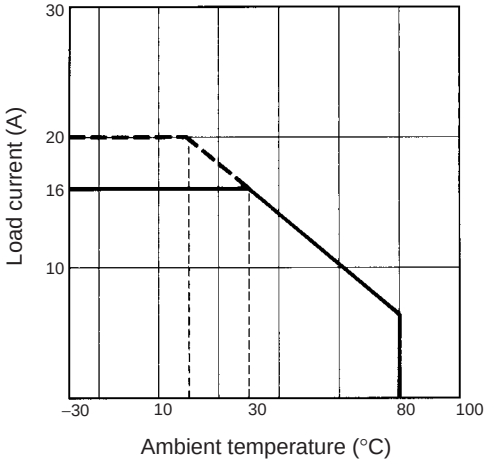
G3PA-240B(L)-VD



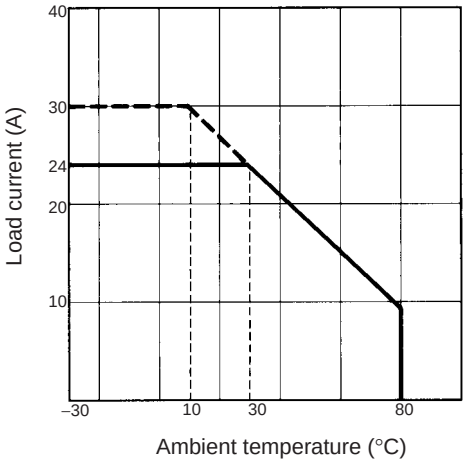
G3PA-260B(L)-VD



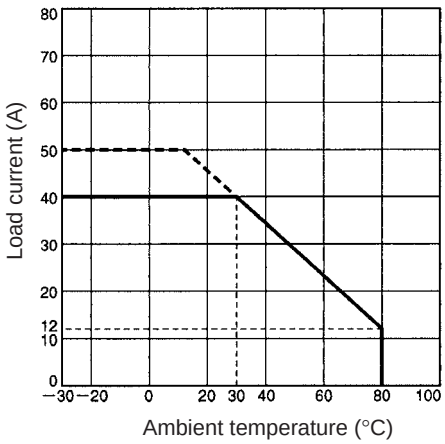
G3PA-420B-VD, G3PA-420B-VD-2



G3PA-430B-VD, G3PA-430B-VD-2



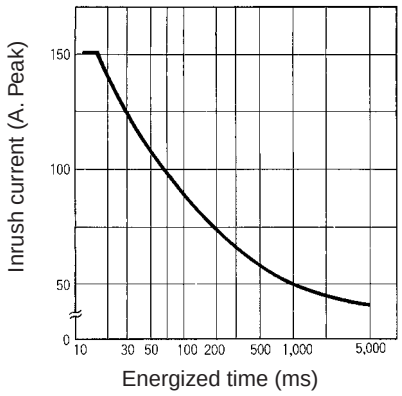
G3PA-450B-VD-2



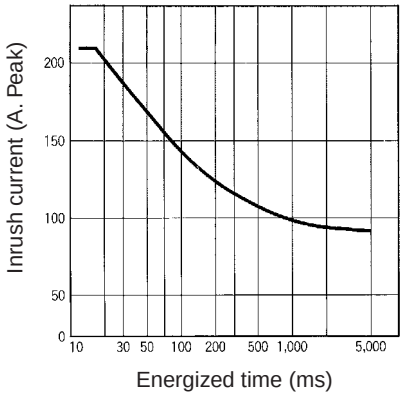
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

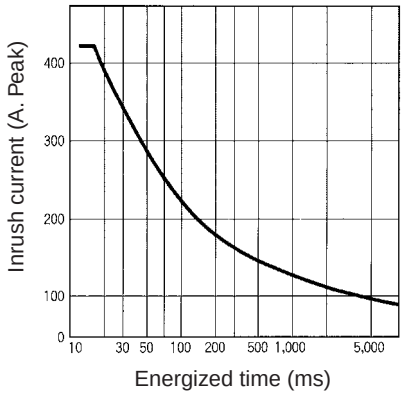
G3PA-210B(L)-VD



G3PA-220B(L)-VD, G3PA-420B-VD, G3PA-420B-VD-2



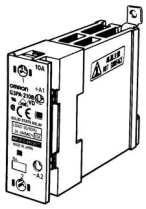
G3PA-240B(L)-VD/260B(L)-VD, G3PA-430B-VD, G3PA-430B-VD-2, G3PA-450B-VD-2



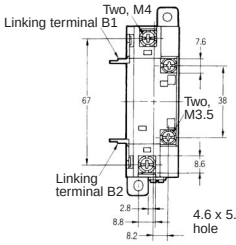
Dimensions

Note: All units are in millimeters unless otherwise indicated.

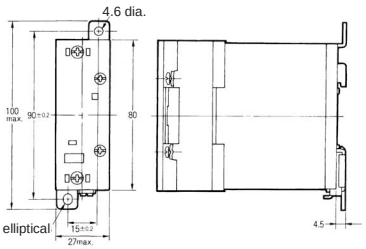
G3PA-210B(L)-VD

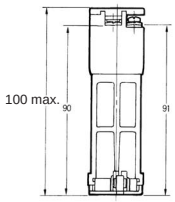


Without Terminal Cover

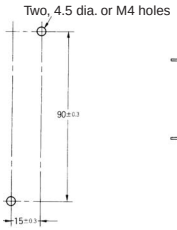


With Terminal Cover

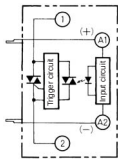




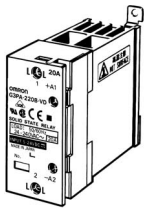
Mounting Holes



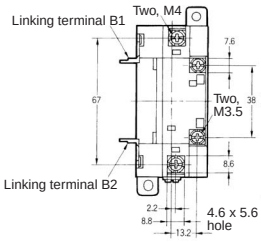
Terminal Arrangement/ Internal Connections



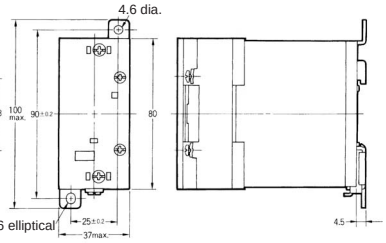
G3PA-220B(L)-VD

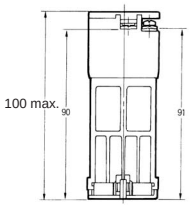


Without Terminal Cover

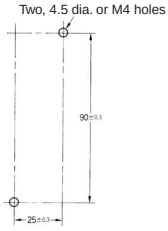


With Terminal Cover

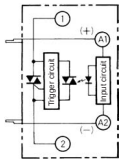




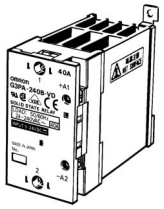
Mounting Holes



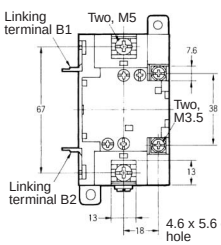
Terminal Arrangement/ Internal Connections



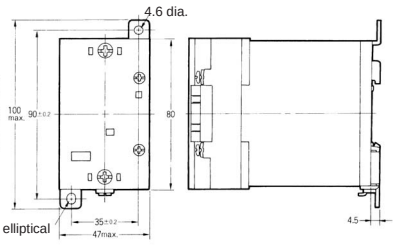
G3PA-240B(L)-VD

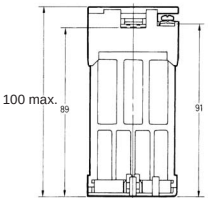


Without Terminal Cover



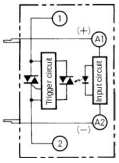
With Terminal Cover



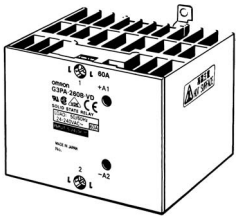


Mounting Holes

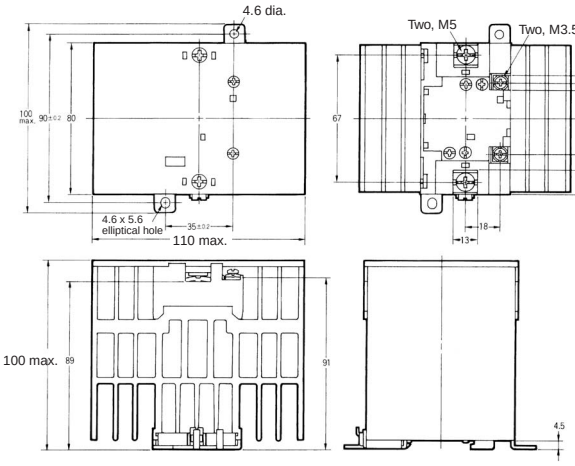
Terminal Arrangement/ Internal Connections



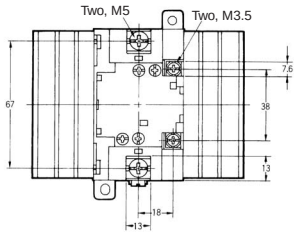
G3PA-260B(L)-VD
G3PA-450B-VD-2



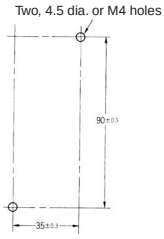
With Terminal Cover



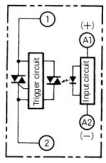
Without Terminal Cover



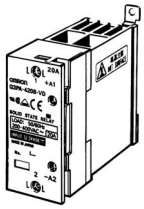
Mounting Holes



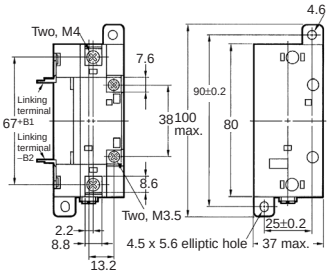
Terminal Arrangement/ Internal Connections



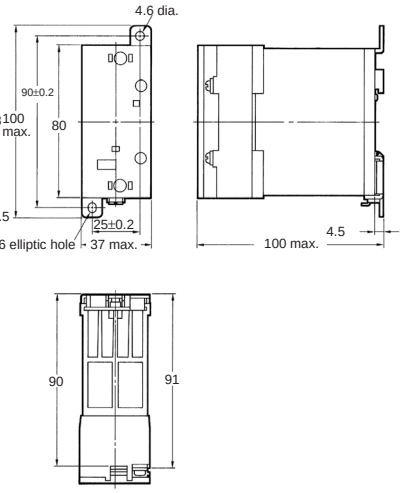
G3PA-420B-VD, G3PA-420B-VD-2



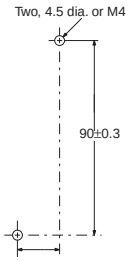
Without Terminal Cover



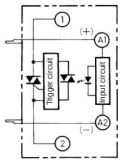
With Terminal Cover



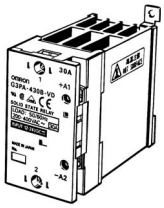
Mounting Holes



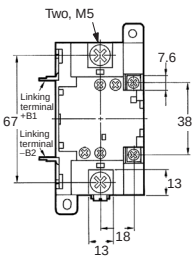
Terminal Arrangement/ Internal Connections



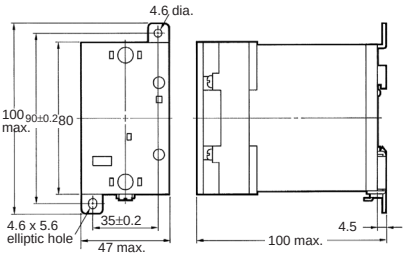
G3PA-430B-VD, G3PA-430B-VD-2

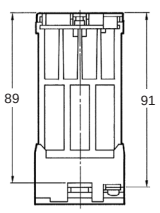


Without Terminal Cover

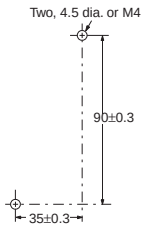


With Terminal Cover

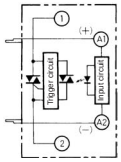




Mounting Holes



Terminal Arrangement/ Internal Connections



Safety Precautions

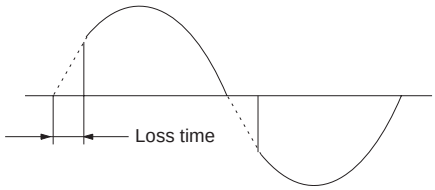
■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

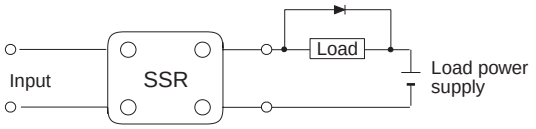
Load Connection

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.

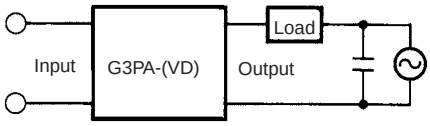


When attaching a heat sink to the G3PA-(VD), in order to facilitate heat dissipation, apply silicone grease or equivalent heat-conductive grease on the heat sink. (Toshiba Silicone, Shinetsu Silicone, etc.)

Tighten the mounting screws of the heat sink with a torque of 0.78 to 0.98 N·m.

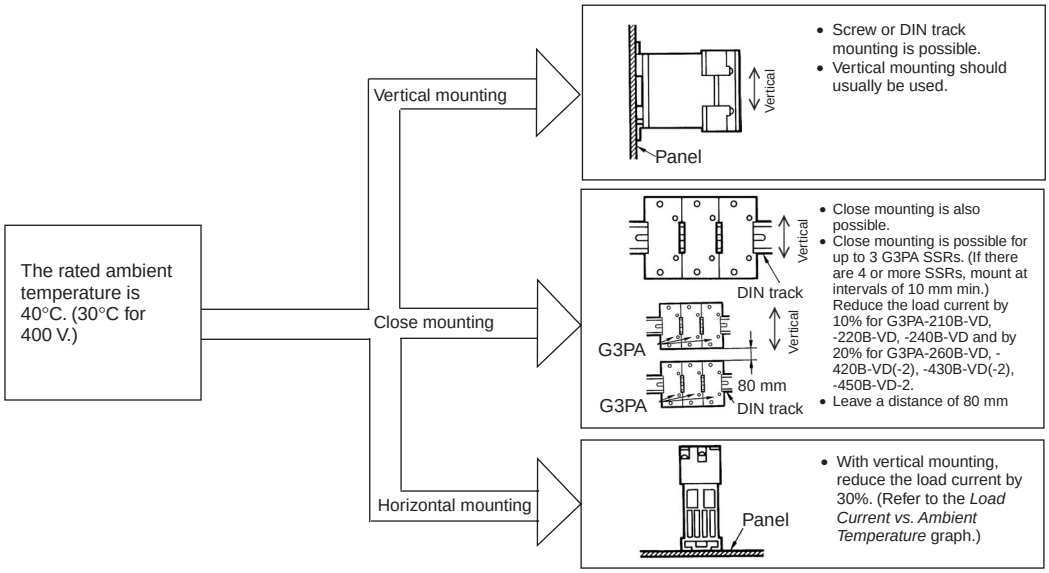
Noise Terminal Voltage according to EN55011

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

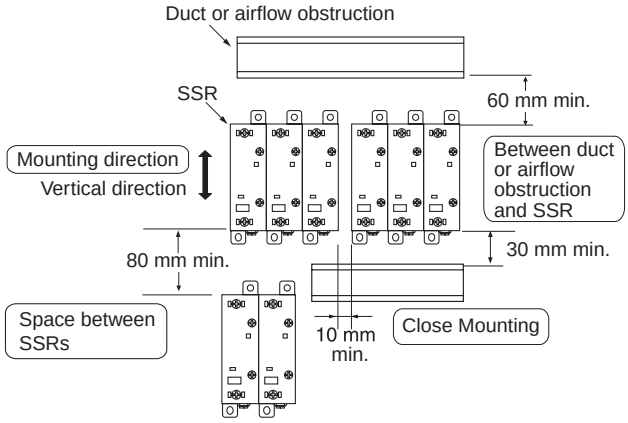


Note: Leave a distance of 60 mm min. between SSRs and ducts (especially above the SSR).

Close Mounting

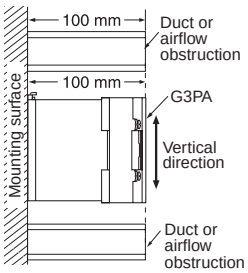
SSR Mounting Pitch

Panel Mounting (At a rated ambient temperature of 40°C).



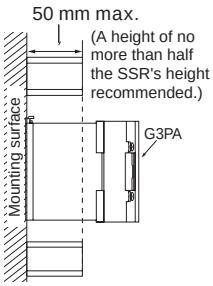
Relationship between SSRs and Ducts

Duct Height



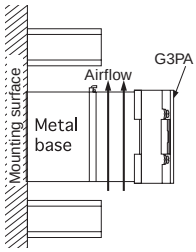
Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Countermeasure (1)



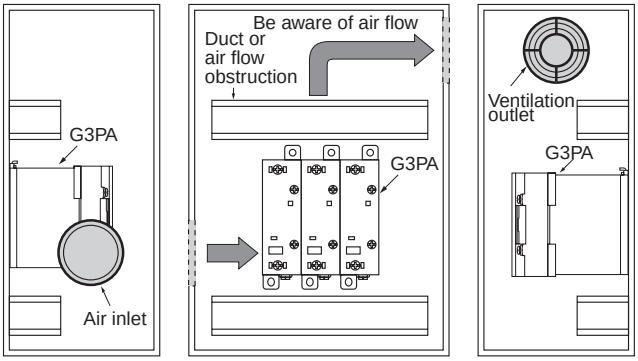
Use short ducts.

Countermeasure (2)



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 other instruments that generate heat in the control panel other than SSRs, additional ventilation will be required.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

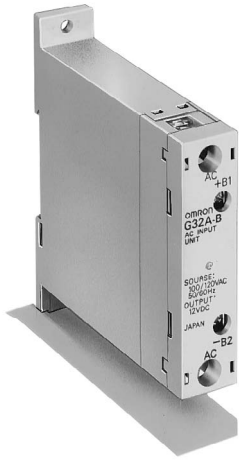
Cat. No. K094-E1-06 In the interest of product improvement, specifications are subject to change without notice.

AC Input Unit
G32A-B

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

AC Input Unit Enabling AC Operation

• Connects to a maximum of two G3PA-VD Relays.



Model Number Structure

■ Model Number Legend

G32A-B-US
1 2 3

1. **Basic Model Type**
   G32A: Accessory for G3PA
2. **Basic Model Name**
   B: AC Input Unit
3. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

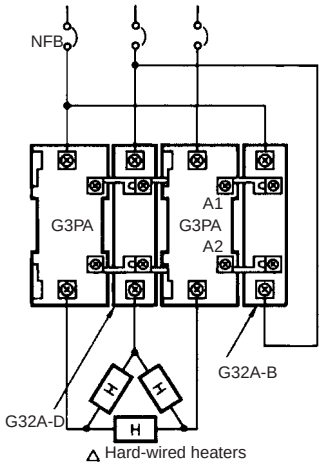
Name	Rated input voltage	Model
AC Input Unit	100/120 VAC	G32A-B-US
	200/240 VAC	

Note: When ordering, specify the rated input voltage.

Application Examples

AC Operation

Two G3PA-VD Relays and One G32A-B AC Input Unit



Note: 1. Two voltage specifications are available for the G32A-B, 100/120 VAC and 200/240 VAC.

2. The G32A-B can only be used with the G3PA-VD.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Item			Rated input voltage	
			100/120 VAC	200/240 VAC
Rated input current	50 Hz	100 (200) VAC	21.4 mA TYP	20.9 mA TYP
		120 (240) VAC	26.5 mA TYP	25.4 mA TYP
	60 Hz	100 (200) VAC	25.4 mA TYP	24.9 mA TYP
		120 (240) VAC	31.6 mA TYP	30.3 mA TYP
Must operate voltage			75% max. of the rated voltage	75% max. of the rated voltage
Must release voltage			10% min. of the rated voltage	10% min. of the rated voltage
Output voltage/current			12 VDC ±15%/15 mA max.	12 VDC ±15%/15 mA max.

■ Characteristics

Item	Rated input voltage	
	100/120 VAC	200/240 VAC
Input voltage range	75 to 132 VAC	150 to 264 VAC
Operate time	1.5 cycles max. of load power supply	
Release time	1.5 cycles max. of load power supply	
Vibration resistance	10 to 55 to 10 Hz, 0.375-mm single amplitude (when mounted to DIN track)	
Shock resistance	300 m/s^2 (Approx. 30 G)	
Ambient temperature	Storage: –30 to 100°C (with no icing or condensation) Operating: –30 to 80°C (with no icing or condensation)	
Ambient humidity	Operating: 45% to 85%	
Weight	Approx. 80 g	

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

For details on connecting linking terminals, refer to page 172.

Input

The capacitor drop method is used in the internal circuit of the G32A-B. As a result, if the input of the G32A-B is switched using relay contacts, when power is OFF, the capacitor will cause a voltage approximately twice the power supply voltage to be applied to the relay contacts.

Voltage Detection Unit
G32A-C

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Prevents G3PA Malfunction

- Connects to a maximum of two G3PA-VD Relays.
- Prevents malfunction of the G3PA-VD due to residual voltage, leakage current, or input noise.

Model Number Structure

■ Model Number Legend

G32A-C-US
1 2 3

1. **Basic Model Type**
   G32A: Accessory for G3PA
2. **Basic Model Name**
   C: Voltage Detection Unit
3. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

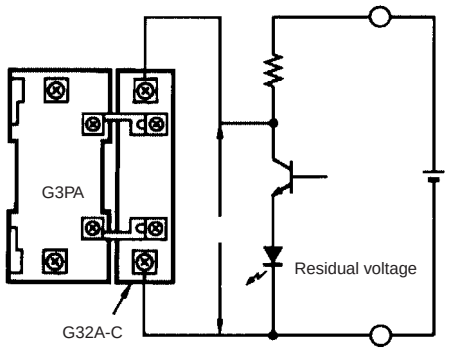
Name	Rated input voltage	Model
Voltage Detection Unit	12/24 VDC	G32A-C-US

Note: When ordering, specify the rated input voltage.

Application Examples

- The G32A-C can be used to prevent malfunction due to residual voltage, leakage current, and input noise.

Residual Voltage



In rated operation, the G3PA turns ON at 4 V max. Ordinarily, the G3PA might turn ON if the residual voltage in transistor circuits exceeds 3 V. (The G32A-C makes voltage output at voltages exceeding 9.6 V.)

- The G32A-C can be used to improve the synchronization of input signals during 3-phase load switching.
- The G32A-C can be used to fix the trigger voltage when using a timing circuit.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Item		Specifications
Rated input voltage		12/24 VDC
Rated input current	**One G3PA**	8 mA max. (when 24 VDC applied)
	Two G3PAs	14 mA max. (when 24 VDC applied)
Must operate voltage		9.6 V ±10%
Must release voltage		5 V min.
Output voltage		12 VDC ±15%

■ Characteristics

Item	Specifications
Input voltage range	10.2 to 30 VDC
Operate time	1 ms max.
Release time	1 ms max.
Vibration resistance	10 to 55 to 10 Hz, 0.375-mm single amplitude (when mounted using screws)
Shock resistance	300 m/s^2 (approx. 30 G)
Ambient temperature	Storage: –30 to 100°C (with no icing or condensation) Operating: –30 to 80°C (with no icing or condensation)
Ambient operating humidity	45% to 85%
Weight	Approx. 65 g

Short-circuit Units
G32A-D

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Allows 2-wire Switching of 3-phase Power

- Ideal for 2-wire switching of 3-phase heaters.
- Improve ease of operation.

Model Number Structure

■ Model Number Legend

G32A-D□-US
1 2 3 4

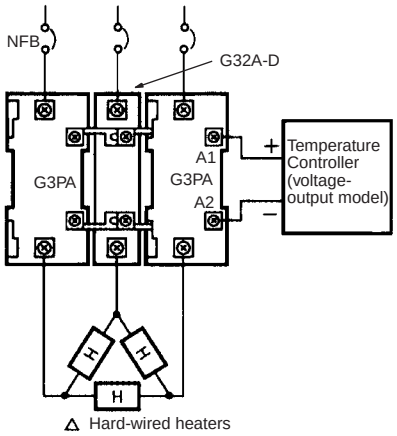
1. **Basic Model Type**
   G32A: Accessory for G3PA
2. **Basic Model Name**
   D: Short-circuit Unit
3. **Rated Carry Current**
   20: 20 A
   40: 40 A
4. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

Name	Current flow	Applicable SSR	Model
Short-circuit Unit	10 A	G3PA-210B-VD	G32A-D20-US
	20 A	G3PA-220B-VD G3PA-420B-VD	
	30 A	G3PA-430B-VD	G32A-D40-US
	40 A	G3PA-240B-VD	

Application Example



Note: When performing 2-wire switching of 3-phase power, the leakage current that is generated when the SSR with the shorted phase is turned OFF will increase by a factor of 1.7.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

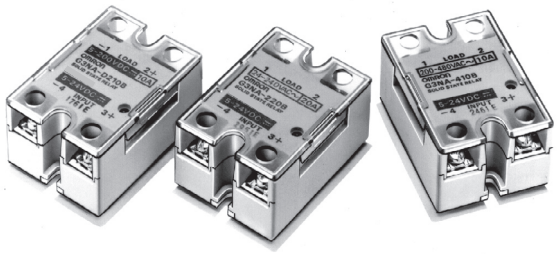
Cat. No. J124-E1-03

Solid State Relays
G3NA

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

A Wide Range of Models with 5- to 50-A Output Currents and Up to 480-VAC/200-VDC Output Voltages

- All models feature the same compact dimensions to provide a uniform mounting pitch.
- Built-in varistor effectively absorbs external surges.
- Operation indicator (red LED) enables monitoring operation.
- Protective cover for greater safety.
- Standard models certified by UL and CSA and -UTU models by VDE (TÜV) (TÜV-version not available for G3NA-410B, G3NA-420B, and G3NA-440B).



Model Number Structure

■ Model Number Legend

G3NA-□□□□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3NA: Solid State Relay

2. Load Power Supply
Blank: AC output
D: DC output

3. Rated Load Power Supply Voltage
2: 200 VAC or 200 VDC
4: 400 VAC

4. Rated Load Current
05: 5 A
10: 10 A
20: 20 A
40: 40 A
50: 50 A

5. Terminal Type
B: Screw terminals

6. Zero Cross Function
Blank: Equipped with zero cross function (AC-output models only)

7. Certification
Blank: Standard models (certified by UL and CSA)
UTU: Certified by UL, CSA, and TÜV

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac	Yes	Yes	5 A at 24 to 240 VAC*	5 to 24 VDC	G3NA-205B
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
Phototriac			10 A at 24 to 240 VAC*	5 to 24 VDC	G3NA-210B
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
			10 A at 200 to 480 VAC*	5 to 24 VDC	G3NA-410B
				100 to 240 VAC	
	---		10 A at 5 to 200 VDC	5 to 24 VDC	G3NA-D210B
				100 to 240 VAC	
Phototriac	Yes		20 A at 24 to 240 VAC*	5 to 24 VDC	G3NA-220B
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
			20 A at 200 to 480 VAC*	5 to 24 VDC	G3NA-420B
				100 to 240 VAC	
Phototriac			40 A at 24 to 240 VAC*	5 to 24 VDC	G3NA-240B
Photocoupler				100 to 120 VAC	
				200 to 240 VAC	
			40 A at 200 to 480 VAC*	5 to 24 VDC	G3NA-440B
				100 to 240 VAC	
			50 A at 200 to 480 VAC*	5 to 24 VDC	G3NA-450B

*Loss time increases under 75 VAC. (Refer to page 196.) Confirm operation with the actual load.

Note: 1. When ordering a TÜV-certified model, add "-UTU" to the model number as shown below. (There are no TÜV-certified versions of 400-V models.)
Example: G3NA-210B-UTU

2. When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Heat Sinks

The following heat sinks are thin and can be DIN-track mounted (except Y92B-P250).
See *Dimensions* for details.

Model	Applicable SSR
Y92B-N50	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-410B
Y92B-N100	G3NA-220B, G3NA-420B
Y92B-N150	G3NA-240B, G3NA-440B
Y92B-P250	G3NA-450B

Low-cost Models

Model	Applicable SSR
Y92B-A100	G3NA-205B, G3NA-210B, G3NA-D210B, G3NA-220B, G3NA-410B, G3NA-420B
Y92B-A150N	G3NA-240B, G3NA-440B
Y92B-A250	G3NA-440B

Mounting Bracket

Used to mount the G3NA with a mounting dimension of 56 mm.

Model	Applicable SSR
R99-11	G3NA-240B, G3NA-440B

See *Dimensions* for details. (Refer to page 194.)

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3NA-2□□B	5 to 24 VDC	4 to 32 VDC	7 mA max.*	4 VDC max.	1 VDC min.
	100 to 120 VAC	75 to 132 VAC	36 kΩ±20%	75 VAC max.**	20 VAC min.**
	200 to 240 VAC	150 to 264 VAC	72 kΩ±20%	150 VAC max.**	40 VAC min.**
G3NA-4□□B	5 to 24 VDC	4 to 32 VDC	5 mA max.*	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.

Note: 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).
*With constant current input circuit system. The impedance for the G3NA-□□□B-UTU is 15 mA max.
**Refer to the *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-205B	24 to 240 VAC	19 to 264 VAC	0.1 to 5 A	0.1 to 3 A	60 A (60 Hz, 1 cycle)
G3NA-210B			0.1 to 10 A	0.1 to 4 A	150 A (60 Hz, 1 cycle)
G3NA-410B	200 to 480 VAC	180 to 528 VAC	0.2 to 10 A	0.2 to 4 A	
G3NA-220B	24 to 240 VAC	19 to 264 VAC	0.1 to 20 A	0.1 to 4 A	220 A (60 Hz, 1 cycle)
G3NA-420B	200 to 480 VAC	180 to 528 VAC	0.2 to 20 A	0.2 to 4 A	
G3NA-240B	24 to 240 VAC	19 to 264 VAC	0.1 to 40 A	0.1 to 6 A	440 A (60 Hz, 1 cycle)
G3NA-440B	200 to 480 VAC	180 to 528 VAC	0.2 to 40 A	0.2 to 6 A	
G3NA-450B	200 to 480 VAC	180 to 528 VAC	0.2 to 50 A	0.2 to 6 A	
G3NA-D210B	5 to 200 VDC	4 to 220 VDC	0.1 to 10 A	0.1 to 4 A	20 A (10 ms)

Note: 1. The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data*.
2. When OMRON's heat sink (refer to the accessories) or a heat sink of specified size is used.

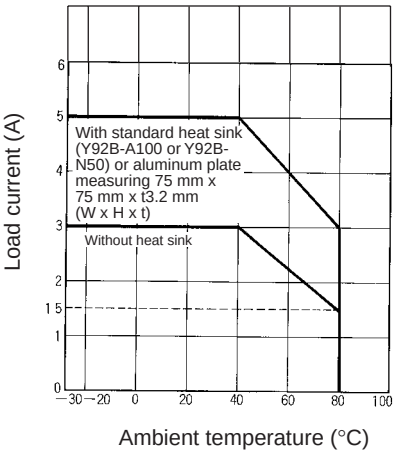
■ Characteristics

Item	G3NA-205B, -210B, -220B	G3NA-240B	G3NA-410B, -420B, -440B, -450B	G3NA-D210B
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)			1 ms max. (DC input) 30 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)			5 ms max. (DC input) 30 ms max. (AC input)
Output ON voltage drop	1.6 V (RMS) max.		1.8 V (RMS) max.	1.5 V max.
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)		10 mA max. (at 200 VAC) 20 mA max. (at 400 VAC)	5 mA max. (at 200 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)			
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min			
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single 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)			
Certified standards	UL508 File No. E64562/CSA C22.2 (No.0, No.14) File No. LR35535 (except for G3NA-450B) TÜV R9151660 (EN60950) (except for G3NA-4□0B)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 60 g	Approx. 70 g	Approx. 80 g	Approx. 70 g

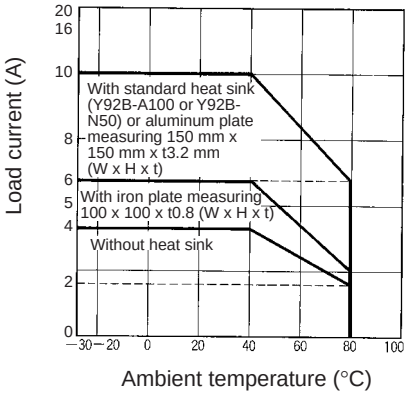
Engineering Data

Load Current vs. Ambient Temperature

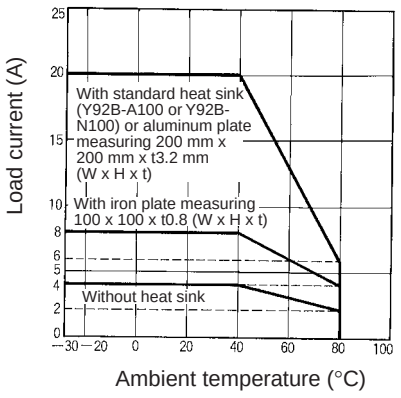
G3NA-205B



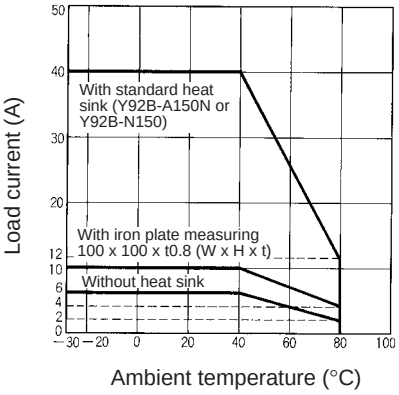
G3NA-210B/410B



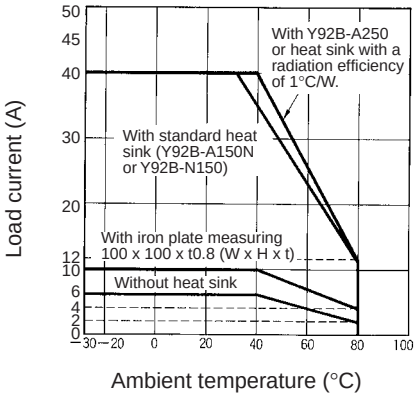
G3NA-220B/420B



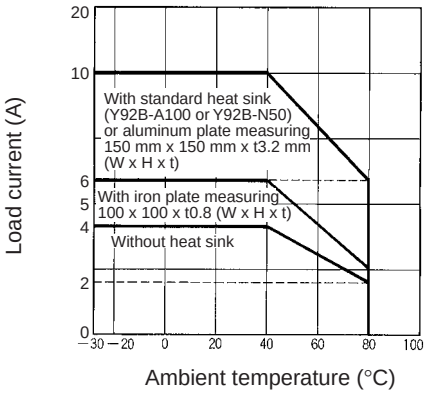
G3NA-240B



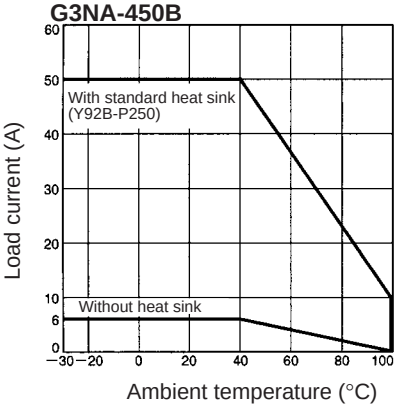
G3NA-440B



G3NA-D210B



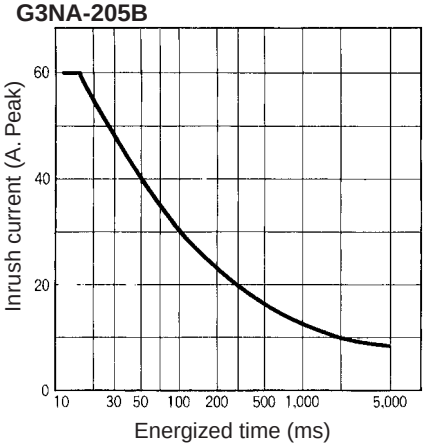
G3NA-450B



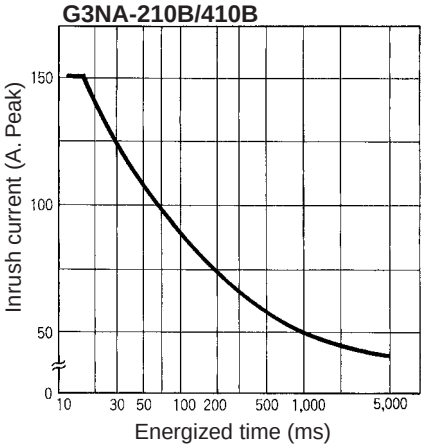
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

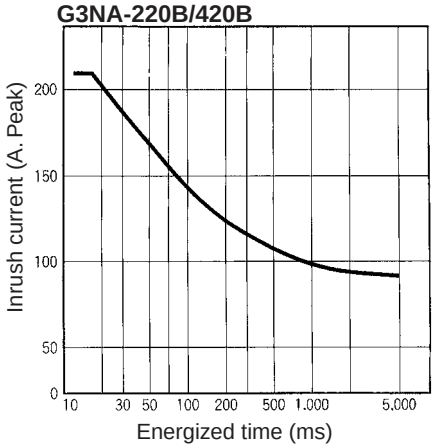
G3NA-205B



G3NA-210B/410B

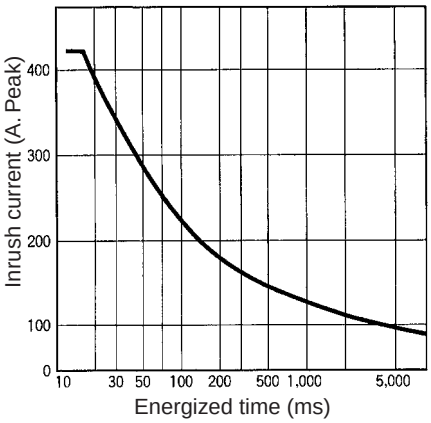


G3NA-220B/420B

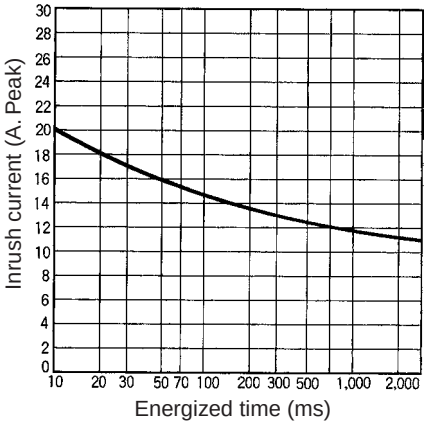


Temperature Characteristics (with Must Operate Voltage and Must Release Voltage)

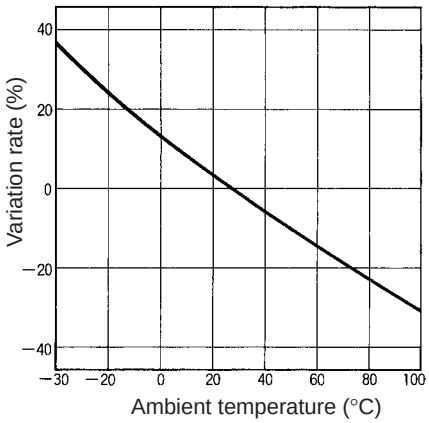
G3NA-240B/440B/450B



G3NA-D210B

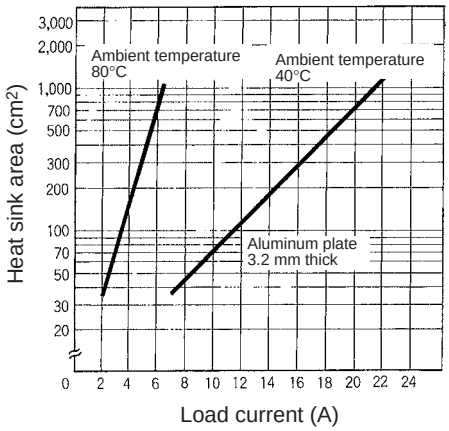


G3NA-2□□B AC Input



Heat Sink Area vs. Load Current

G3NA-220B

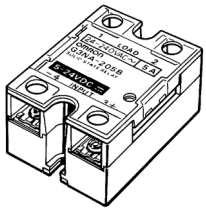


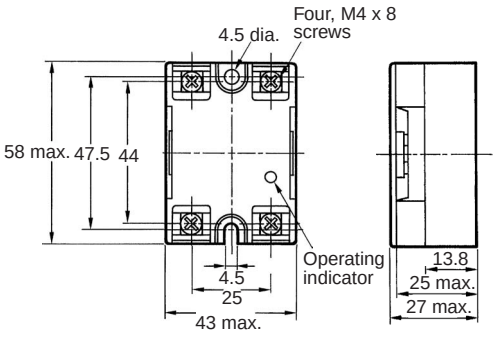
Note: The heat sink area refers to the combined area of the sides of the heat sink that radiate heat. For example, when a current of 18 A is allowed to flow through the SSR at 40°C, the graph shows that the heat sink area is about 450 cm^2. Therefore, if the heat sink is square, one side of the heat sink must be 15 cm ($\sqrt{450\ (cm^2)/2}$) or longer.

Dimensions

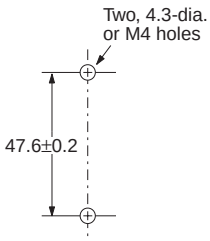
Note: All units are in millimeters unless otherwise indicated.

G3NA-205B, G3NA-210B, G3NA-220B, G3NA-410B, G3NA-420B

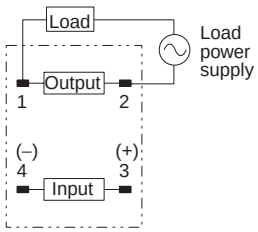




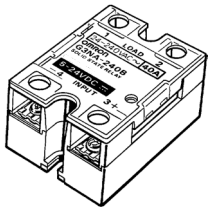
Mounting Holes

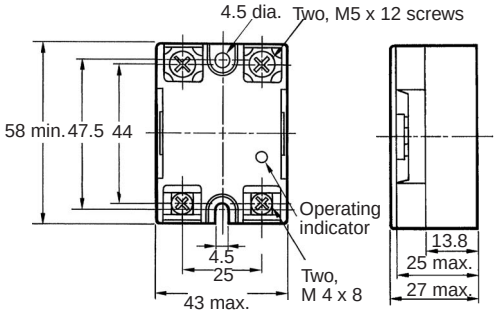


Terminal Arrangement/ Internal Connections (Top View)

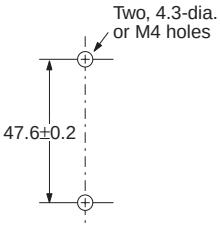


G3NA-240B, G3NA-440B, G3NA-450B

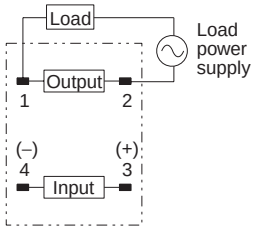




Mounting Holes

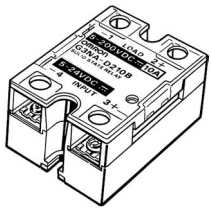


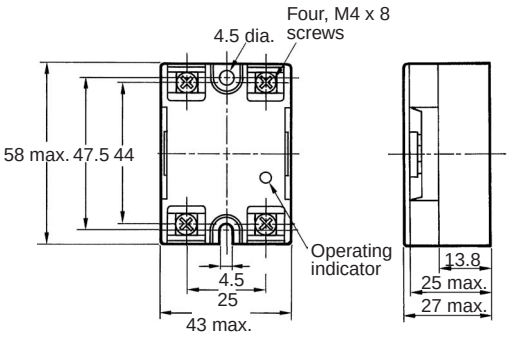
Terminal Arrangement/ Internal Connections (Top View)



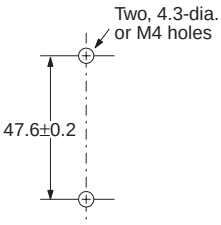
G3NA-D210B

Note: The load can be connected to either the positive or negative side.

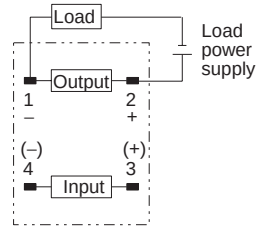




Mounting Holes



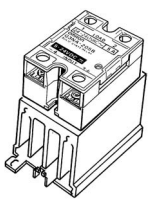
Terminal Arrangement/ Internal Connections (Top View)

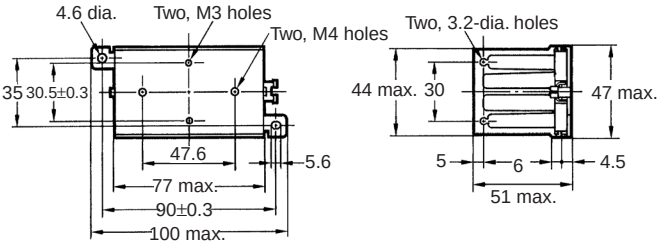


Heat Sink Y92B-N50

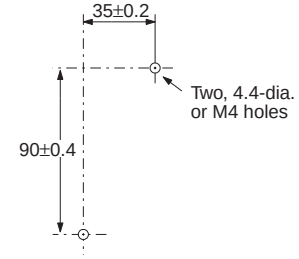
In the case of surface mounting, a 30% derating of the load current is required.

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.



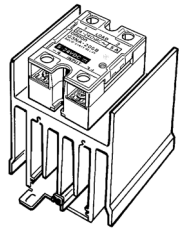


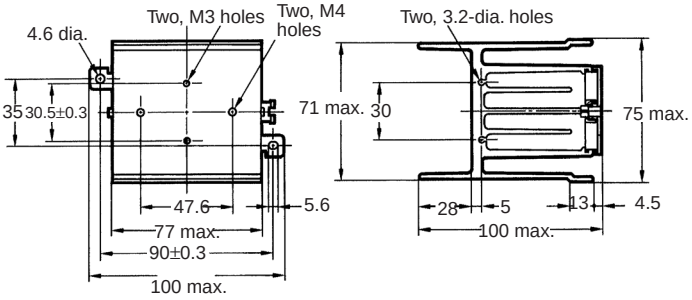
Mounting Holes



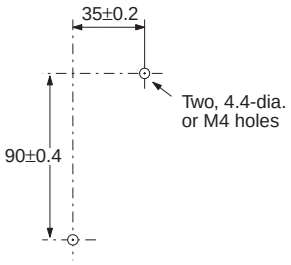
Weight: approx. 200 g

Y92B-N100



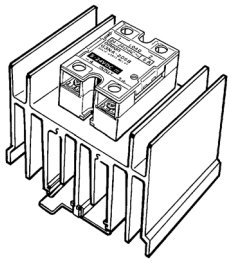


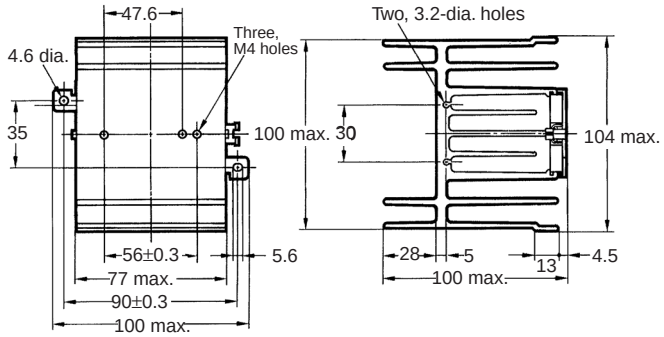
Mounting Holes



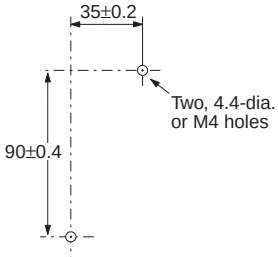
Weight: approx. 400 g

Y92B-N150



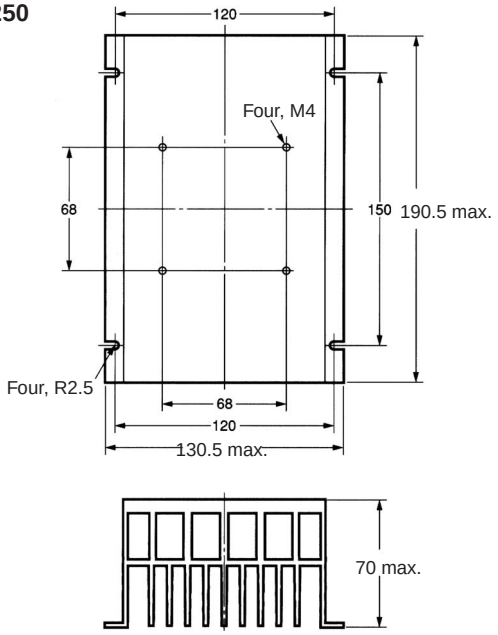


Mounting Holes

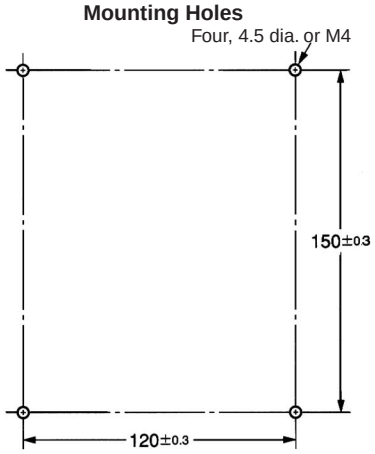


Weight: approx. 560 g

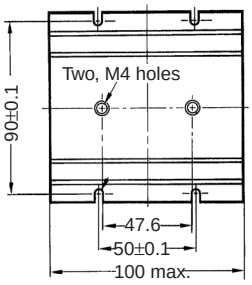
Y92B-P250



Mounting Holes

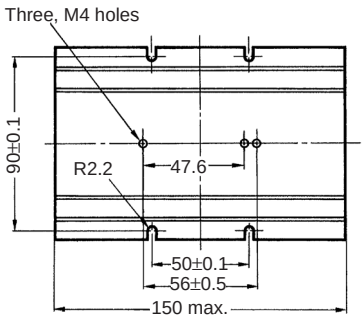


Y92B-A100



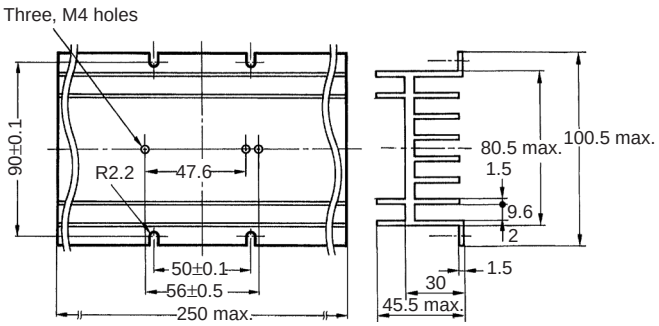
Weight: approx. 210 g

Y92B-A150N



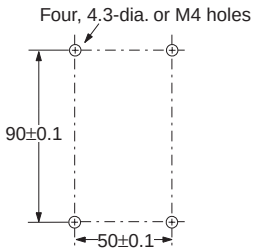
Weight: approx. 310 g

Y92B-A250



Weight: approx. 510 g

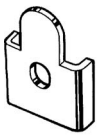
Mounting Holes
Y92B-A100
Y92B-A150N
Y92B-A250

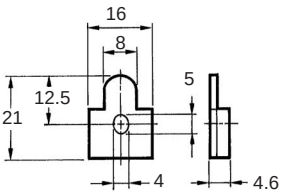


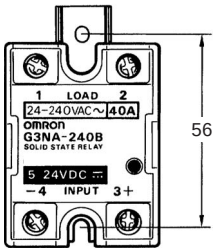
R99-11

Use Mounting Bracket R99-11 so that the G3NA-240B can be mounted with the same pitch as that of the G3N-240B.

Model	Applicable SSR
R99-11	G3NA-240B G3NA-440B







Safety Precautions

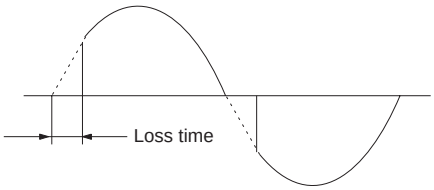
■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

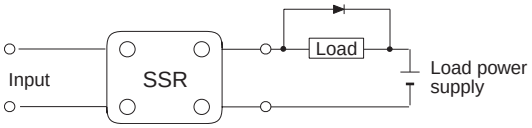
Load Connection

For an AC load, use a power supply rated at 50 or 60 Hz.
The maximum operating frequency is 10 Hz.
The G3NA 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.

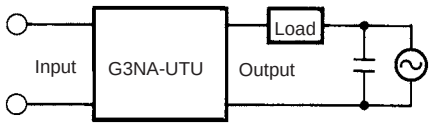


When attaching a heat sink to the G3NA, in order to facilitate heat dissipation, apply silicone grease or equivalent heat-conductive grease on the heat sink. (Toshiba Silicone, Shinetsu Silicone, etc.)

Tighten the mounting screws of the heat sink with a torque of 0.78 to 0.98 N·m.

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.



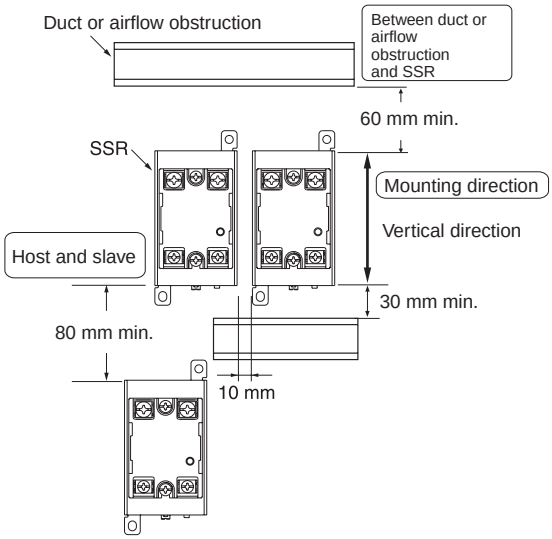
Recommended Capacitor: 1 μF, 250 VAC

The output terminal side of the G3NA-D210B is connected to a built-in diode for protecting 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.

Close Mounting

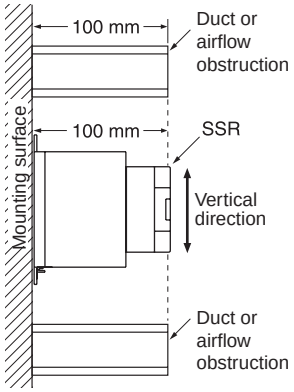
SSR Mounting Pitch

Panel Mounting



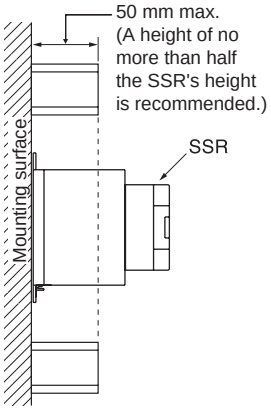
Relationship between SSRs and Ducts

Duct Height



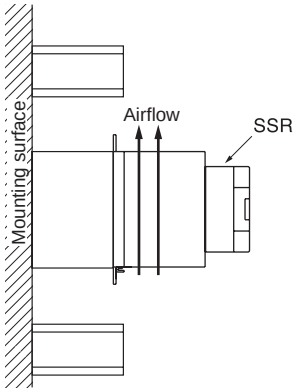
Do not surround the SSR with ducts, otherwise the heat radiation of the SSR will be adversely affected.

Countermeasure 1



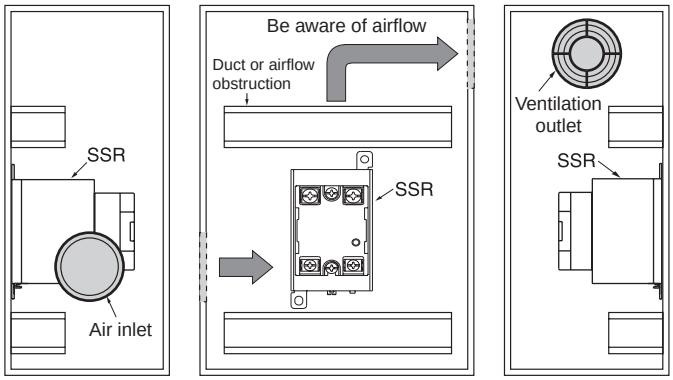
Use short ducts.

Countermeasure 2



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 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.

When attaching a heat sink to the SSR, apply silicone grease or an equivalent heat-conductive grease on the heat sink. (Toshiba Silicone: YG6260, Shinetsu Silicone: G746, etc.)

Tighten the mounting screws of the heat sink with a torque of 0.78 to 0.98 N·m.

When using the following models, connect the heat sink (steel plate on the bottom) to the ground: G3NA-D210B, G3NA-410B, G3NA-420B, and G3NA-440B.

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)	5 A	10 A	20 A	40 A
Required number of fans per SSR	0.08	0.16	0.31	0.62

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K067-E1-05

Solid State Relays
G3NH

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Switching 75 to 150 A at 240 to 440 VAC

- Easy-to-mount monoblock construction incorporating heat sink.
- Replaceable power cartridge.
- Built-in operation indicator and varistor.
- A series of high-voltage (440 V) models available.

Model Number Structure

■ Model Number Legend

G3NH-□□□□
1 2 3 4 5

1. **Basic Model Name**
   G3NH: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
   4: 400 VAC
3. **Rated Load Current**
   075: 75 A
   150: 150 A
4. **Terminal Type**
   B: Screw terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photocoupler	Yes	Yes	75 A at 100 to 240 VAC	5 to 24 VDC 100 to 240 VAC	G3NH-2075B
			75 A at 180 to 440 VAC		G3NH-4075B
			150 A at 100 to 240 VAC		G3NH-2150B
			150 A at 180 to 440 VAC		G3NH-4150B

The built-in Thyristor Modules can be replaced. Refer to the table on page 200 for the model number.

Note: When ordering, specify the rated input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Impedance (Input current)	Voltage level	
			Must operate voltage	Must release voltage
5 to 24 VDC	4 to 30 VDC	5 mA max.*	4 VDC max.	1 VDC min.
100 to 240 VAC	75 to 264 VAC	41 kΩ±20%	75 VAC max.	20 VAC min.

*G3NH converts the input current into a constant current.

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3NH-2075B	100 to 240 VAC	75 to 264 VAC	1 to 75 A	800 A (60 Hz, 1 cycle)
G3NH-4075B	180 to 440 VAC	150 to 484 VAC		
G3NH-2150B	100 to 240 VAC	75 to 264 VAC	1 to 150 A	1,800 A (60 Hz, 1 cycle)
G3NH-4150B	180 to 440 VAC	150 to 484 VAC		

Note: The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data* for details.

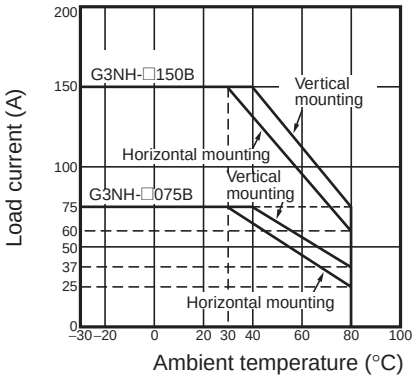
■ Characteristics

Item	G3NH-2075B	G3NH-4075B	G3NH-2150B	G3NH-4150B
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	1.6 V (RMS) max.			
Leakage current	30 mA max. (at 200 VAC)	60 mA max. (at 400 VAC)	30 mA max. (at 200 VAC)	60 mA max. (at 400 VAC)
Insulation resistance	100 MΩ min. (at 500 VDC)			
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min			
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375-mm single amplitude			
Shock resistance	Destruction: 500 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. 1.8 kg		Approx. 3.0 kg	

Engineering Data

Load Current vs. Ambient Temperature

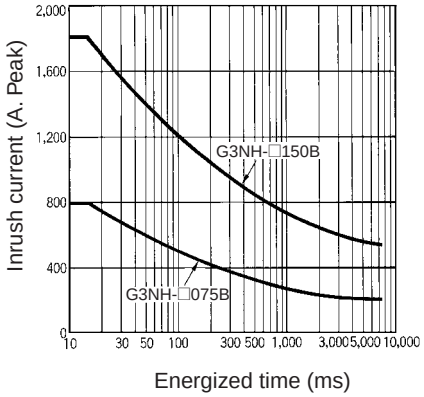
G3NH-□075B, G3NH-□150B



One Cycle Surge Current: Non-repetitive

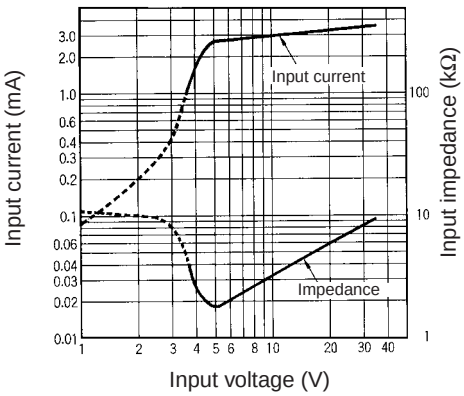
Note: Keep the inrush current to half the rated value if it occurs repeatedly.

G3NH-□075B, G3NH-□150B

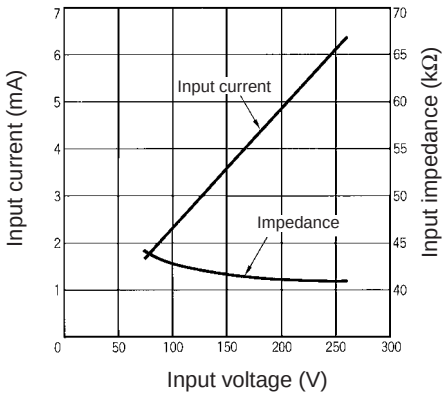


Input Current vs. Input Impedance

G3NH (4 to 30 VDC)



G3NH (75 to 264 VAC)

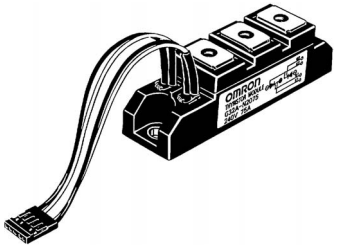


Operation

■ Replacement Parts

G32A-N Thyristor Module

If the thyristor module is damaged, replace it with a new one.

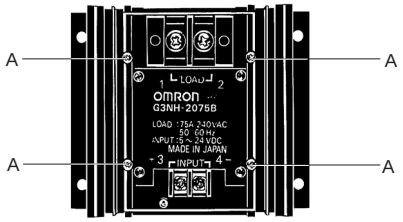


Name	Applicable load	Applicable Relay	Model
Thyristor module	75 A at 75 to 264 VAC	G3NH-2075B	G32A-N2075
	75 A at 150 to 484 VAC	G3NH-4075B	G32A-N4075
	150 A at 75 to 264 VAC	G3NH-2150B	G32A-N2150
	150 A at 150 to 484 VAC	G3NH-4150B	G32A-N4150

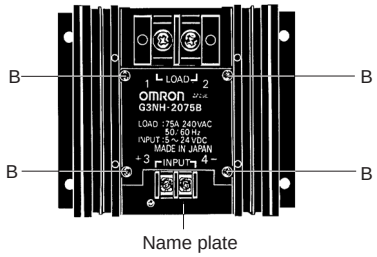
Replacement

Be sure to turn off the power before replacement.

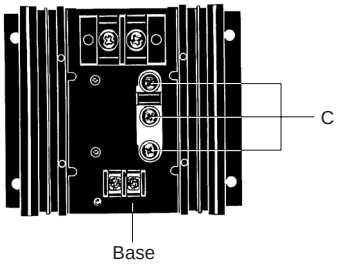
1. First, remove the four screws (shown below as “A”) and the transparent protective cover from the relay housing and then disconnect the wiring.



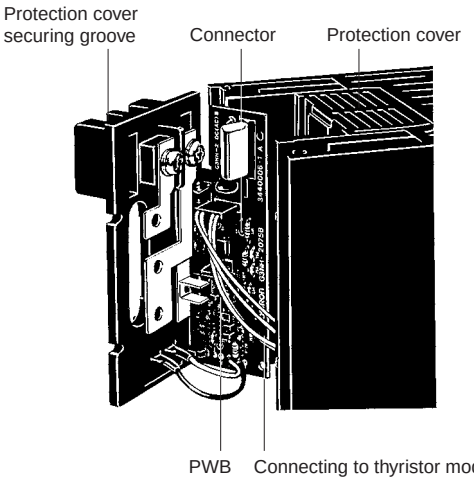
2. Remove the four screws (shown in the following as “B”) and the nameplate from the relay housing.



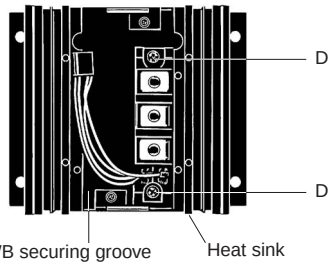
3. Remove the three screws (shown in the following as “C”) from inside the housing and pull the Base Assembly up to detach. (The Base Assembly cannot be removed thoroughly because of the leads connected to the base.)



4. When the Base Assembly is detached, you will see the leads connected to the built-in thyristor module. Pull the connector to disconnect the leads. At this point, if any defect exists in any of the electronic components on the PWB, the SSR may fail again even after the replacement of the built-in thyristor module. In such a case, consult OMRON about appropriate remedial action.



5. Remove the two screws (shown in the following as “D”) and take out the built-in thyristor module.



Assembly of the thyristor module must be performed in the exact reverse order of the previous disassembly steps 1 to 5.

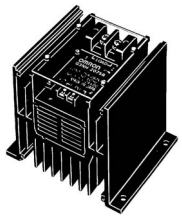
6. Before mounting the new thyristor module for replacement, wipe off the silicone grease adhering to the heat sink, keep clean the jointing surfaces of the heat sink and thyristor module, and apply the new grease (supplied as an accessory) to the jointing surfaces. Secure the thyristor module to the heat sink with the two screws “D” and tighten each screw to a torque of 2.45 to 2.94 N·m.
7. Connect the thyristor module to the PWB with the socket. (The socket may be inserted in either direction.) Assemble the Base Assembly with the heat sink by aligning the PWB with the PWB securing groove and the protective cover with the protective cover securing groove, respectively, while exercising caution not to get any of the leads caught between the Base Assembly and the heat sink.
8. Secure the Base Assembly with the three screws “C”. Because a large current flows into these screw parts, make sure that any of the screws is not clogged with foreign matter and tighten each screw to a torque of 4.41 to 4.90 N·m.
9. Check the assembled parts again for any lead caught between the Base Assembly and heat sink and for proper fitting of the PWB and protective cover into their respective securing grooves. Then, replace the nameplate and secure it with the four screws “B”.
10. Complete the wiring and secure the protective cover with the four screws “A”.
11. Apply power to the relay and check the relay for proper operation.

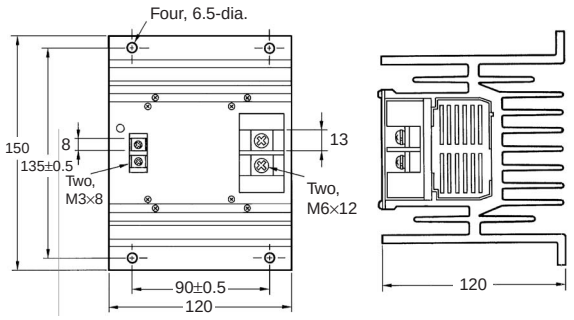
Dimensions

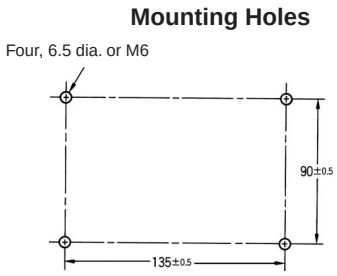
Note: All units are in millimeters unless otherwise indicated.

The orientation indicated by the external dimensions is not the correct mounting orientation. When opening mounting holes, refer to the mounting hole dimensions.

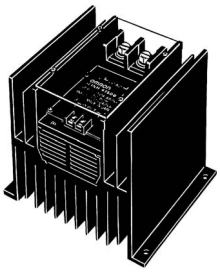
G3NH-2075B/4075B

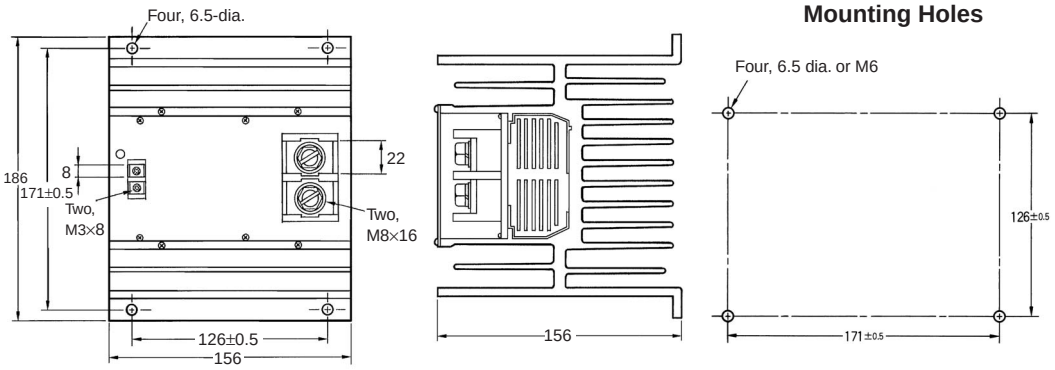






G3NH-2150B/4150B





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

Securely tighten the LOAD terminal screws with the torque specified in the following list after you connect the load to the LOAD terminals. If the tightening torque is not enough, the terminals will generate heat.

Model	Tightening torque
G3NH-□075B	4.41 to 4.90 N·m
G3NH-□150B	8.82 to 9.80 N·m

Mounting

When you locate the G3NH near other equipment, take the heat resistivity of the equipment into consideration. The temperature of the G3NH's heat sink will rise by approximately 50°C with a rated current flow through the G3NH.

The G3NH will rise the ambient temperature. When mounting the G3NH inside a panel, install a fan for proper ventilation.

When closely mounting the G3NH Solid State Relays side by side, reduce the load current 30% lower than the specified value shown in the load current vs. ambient temperature graph.

Take proper measures so that the heat sink will be protected from dust.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

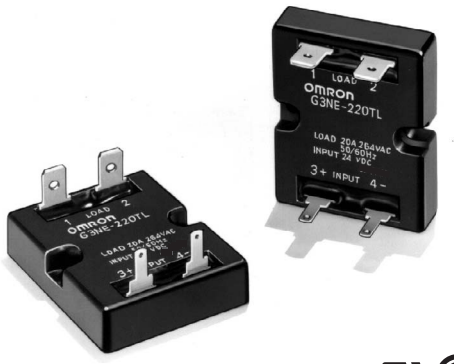
Cat. No. K070-E1-05 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3NE

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Compact, Low-cost, SSR Switching 5 to 20 A

- Wide load voltage range: 75 to 264 VAC. Both 100-V and 200-V loads can be handled with the same model.
- 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).



Model Number Structure

■ Model Number Legend

G3NE-□□□□-□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3NE: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
3. **Rated Load Current**
   05: 5 A
   10: 10 A
   20: 20 A
4. **Terminal Type**
   T: Quick-connect terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
6. **Special Specifications**
   Blank: Standard models
   2: #187 input terminals
7. **Certification**
   US: Certified by UL, CSA, and TÜV

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac	Yes	No	5 A at 100 to 240 VAC	5, 12, 24 VDC	G3NE-205T-US G3NE-205T-2-US
			10 A at 100 to 240 VAC		G3NE-210T-US G3NE-210T-2-US
			20 A at 100 to 240 VAC		G3NE-220T-US G3NE-220T-2-US
	No		5 A at 100 to 240 VAC		G3NE-205TL-US G3NE-205TL-2-US
			10 A at 100 to 240 VAC		G3NE-210TL-US G3NE-210TL-2-US
			20 A at 100 to 240 VAC		G3NE-220TL-US G3NE-220TL-2-US

Note: When ordering, specify the input voltage.

■ 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 L*oad 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.

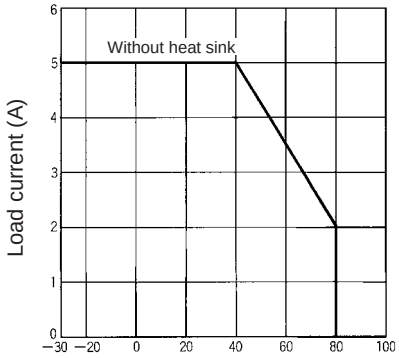
■ Characteristics

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	Destruction: 10 to 55 to 10 Hz, 0.75-mm single 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%	
Certified standards	UL508 File No.E64562/CSA C22.2 (No.0, No.14) File No. LR35535 TÜV R9051064 (VDE0435) (EN60950)	
Weight	Approx. 37 g	

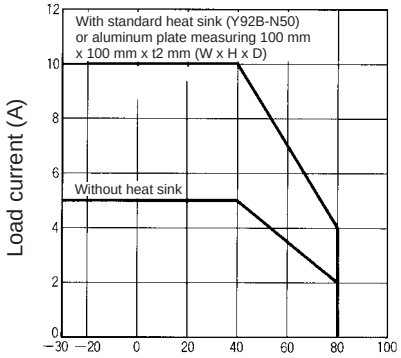
Engineering Data

Load Current vs. Ambient Temperature

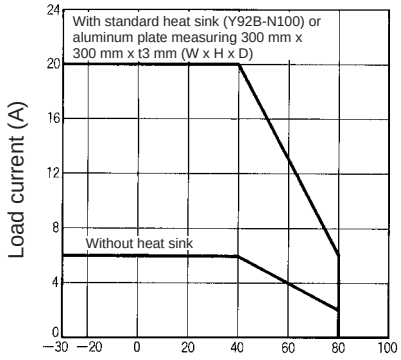
G3NE-205T(L)(-2)-US



G3NE-210T(L)(-2)-US



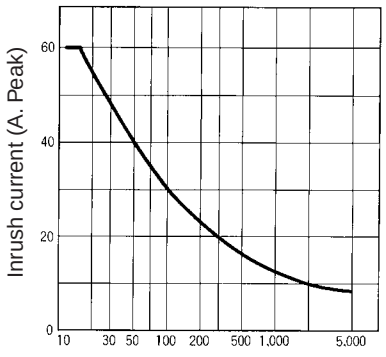
G3NE-220T(L)(-2)-US



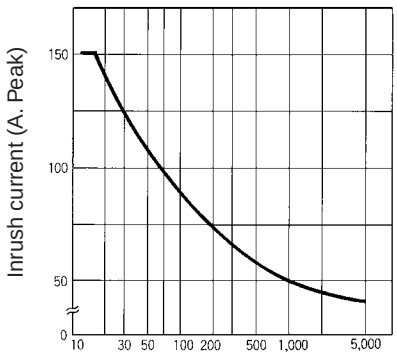
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

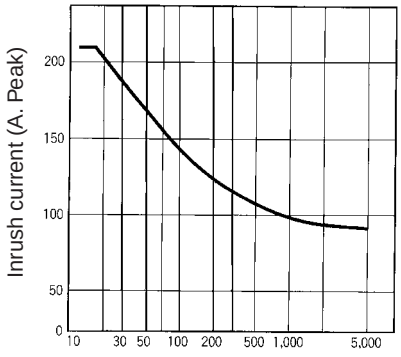
G3NE-205T(L)(-2)-US



G3NE-210T(L)(-2)-US



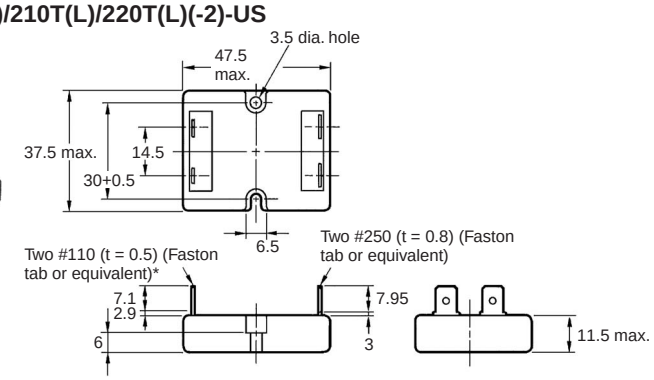
G3NE-220T(L)(-2)-US



Dimensions

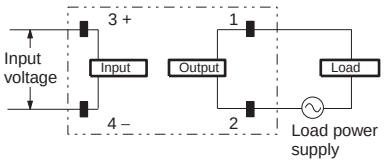
Note: All units are in millimeters unless otherwise indicated.

G3NE-205T(L)/210T(L)/220T(L)(-2)-US

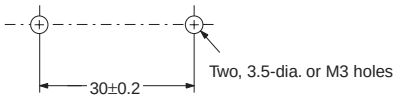


* G3NE-2□□T(L)-2-US: Two, #187 (t=0.5) (Faston tab or equivalent)

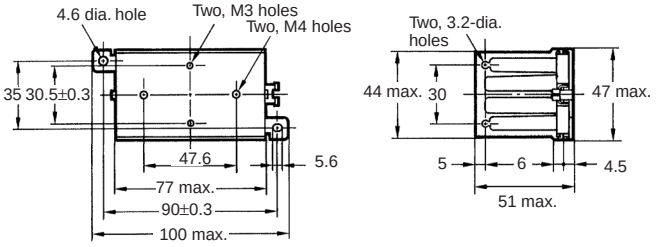
Terminal Arrangement/ Internal Connections (Top View)



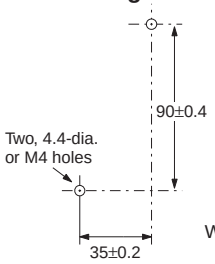
Mounting Holes



Heat Sink Y92B-N50

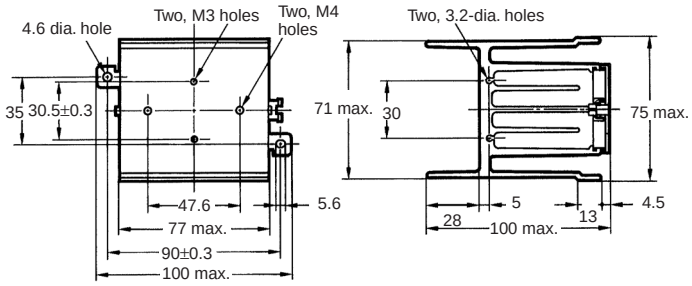


Mounting Holes

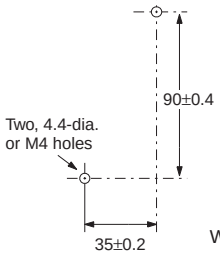


Weight: approx. 200 g

Y92B-N100



Mounting Holes



Weight: approx. 400 g

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Do not apply excessive force to the terminals. Be careful when pulling or inserting the terminal clips for the Quick Connector (QC).

When attaching a heat sink to the G3NE, in order to facilitate heat dissipation, 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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K062-E1-05

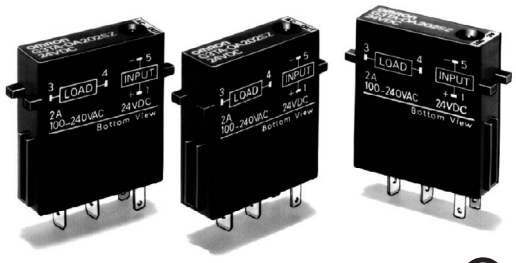
In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3TA

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

I/O SSRs That Mount to OMRON's G7TC I/O Block

- Input and output modules are available in wide variety.
- Snaps easily into P7TF I/O Terminals and can be used together with G7T I/O relays.
- Operation of each SSR can be monitored easily through an LED indicator.
- Certified by UL and CSA.



Model Number Structure

■ Model Number Legend

G3TA□□□□□□□-□
1 2 3 4 5 6 7 8 9 10

1. Basic Model Name
G3T: I/O Solid State Relay

2. Structure
A: Socket type for PCB

3. I/O
I: Input models
O: Output models

4. Type
A: Input models: AC input
Output models: AC output
D: Input models: DC input
Output models: DC output

5. Rated Load Power Supply Voltage
2: 200 VAC/200 VDC
X: 50 to 100 V
Z: 26 V max.

6. Rated Load Current
01: 1 A
02: 2 A
R02: 25 mA

7. Terminal Type
S: Plug-in terminals

8. Zero Cross Function
Blank: DC output models
Z: Equipped with zero cross function
L: Not equipped with zero cross function

9. Operation Indicator
Blank: Equipped with operation indicator
M: Not equipped with operation indicator

10. Certification
US: Certified by UL and CSA

Ordering Information

■ List of Models

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	G3TA-IAZR02S-US
				5 to 24 VDC	G3TA-IDZR02S-US
	No			4 to 24 VDC	G3TA-IDZR02SM-US

Note: When ordering, specify the rated input voltage.

Output Modules

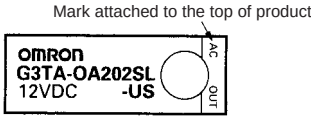
Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac	Yes	Yes	2 A at 100 to 240 VAC	12 VDC	G3TA-OA202SZ-US
				24 VDC	
	No			12 VDC	G3TA-OA202SL-US
				24 VDC	
Photocoupler	---		2 A at 5 to 48 VDC	12 VDC	G3TA-ODX02S-US
				24 VDC	
			1 A at 48 to 200 VDC	12 VDC	G3TA-OD201S-US
				24 VDC	

Note: When ordering, specify the rated input voltage.

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



■ Accessories (Order Separately)

Connecting Socket

I/O classification	Rated voltage	Model
Input (NPN, – common)	12 VDC	P7TF-IS16
	24 VDC	
	100/110 VDC	
	100/110 VAC	
	200/220 VAC	
Output (NPN, + common)	12 VDC	P7TF-OS16
	24 VDC	
Output (PNP, – common)	12 VDC	P7TF-OS16-1
	24 VDC	
Output (NPN, + common)	12 VDC	P7TF-OS08
	24 VDC	
---	---	P7TF-05

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
G3TA-IAZR02S-US	100 to 240 VAC	80 to 264 VAC	5 mA max.	80 VAC max.	10 VAC min.
G3TA-IDZR02S-US	5 to 24 VDC	4 to 32 VDC		4 VDC max.	1 VDC min.
G3TA-IDZR02SM-US	4 to 24 VDC	3 to 32 VDC		3 VDC max.	

Output

Model	Logic level supply voltage	Output breakdown voltage	Output current	Output current (load current)
G3TA-IAZR02S-US	4 to 32 VDC	32 VDC max.	25 mA max.	0.1 to 25 mA
G3TA-IDZR02S-US				
G3TA-IDZR02SM-US				

Output Module

Input

Model	Rated voltage	Operating voltage	Input impedance	Voltage level	
				Must operate voltage	Must release voltage
G3TA-OA202SZ-US	12 VDC	9.6 to 13.2 VDC	0.9 kΩ±20%	9.6 VDC max.	2 VDC min.
	24 VDC	19.2 to 26.4 VDC	1.7 kΩ±20%	19.2 VDC max.	
G3TA-OA202SL-US	12 VDC	9.6 to 13.2 VDC	0.9 kΩ±20%	9.6 VDC max.	
	24 VDC	19.2 to 26.4 VDC	1.7 kΩ±20%	19.2 VDC max.	
G3TA-ODX02S-US	12 VDC	9.6 to 13.2 VDC	3.5 kΩ±20%	9.6 VDC max.	
	24 VDC	19.2 to 26.4 VDC	6.5 kΩ±20%	19.2 VDC max.	
G3TA-OD201S-US	12 VDC	9.6 to 13.2 VDC	3.6 kΩ±20%	9.6 VDC max.	
	24 VDC	19.2 to 26.4 VDC	6.4 kΩ±20%	19.2 VDC max.	

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3TA-OA202SZ-US	100 to 240 VAC	75 to 264 VAC	0.05 to 2 A	30 A (60 Hz, 1 cycle)
G3TA-OA202SL-US	100 to 240 VAC	75 to 264 VAC		
G3TA-ODX02S-US	5 to 48 VDC	4 to 60 VDC	0.01 to 2 A	12 A (10 ms)
G3TA-OD201S-US	48 to 200 VDC	40 to 200 VDC	0.01 to 1 A	6 A (10 ms)

Note: The minimum current value is measured at 10°C min.

■ Characteristics

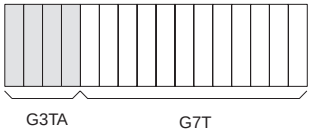
Input Module

Item	G3TA-IAZR02S-US	G3TA-IDZR02S-US	G3TA-IDZR02SM-US
Operate time	20 ms max.	0.5 ms max.	
Release time	20 ms max.	0.5 ms max.	
Output ON voltage drop	1.6 V max.		
Leakage current	5 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 to 10 Hz, 0.75-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	UL508 file No. E64562/CSA C22.2 (No. 0, No. 14) file No. LR35535		
Weight	Approx. 16 g		

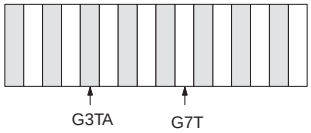
Output Module

Item	G3TA-OA202SZ-US	G3TA-OA202SL-US	G3TA-ODX02S-US	G3TA-OD201S-US
Operate time	1/2 of load power source cycle + 1 ms max.	1 ms max.	0.5 ms max.	2 ms max.
Release time	1/2 of load power source cycle + 1 ms max.		2 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 to 10 Hz, 0.75-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	UL508 file No. E64562, CSA C22.2 (No. 14) file No. LR3553			
Weight	Approx. 23 g			

With up to four G3TA SSRs mounted before G7T Relays, switching is possible at the rated load current for each Relay.



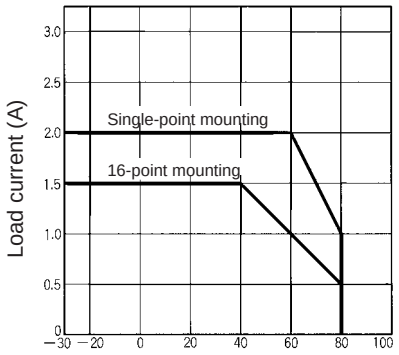
With G3TA SSRs mounted before every other G7T Relays, switching is possible at the rated load current for each Relay.



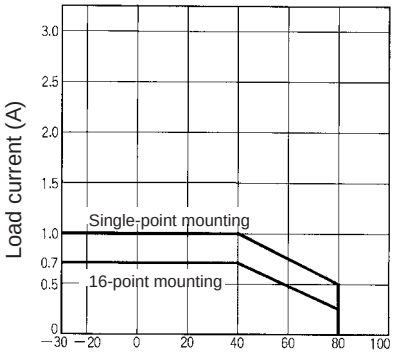
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3TA-OA202SZ/OA202SL/ODX02S-US



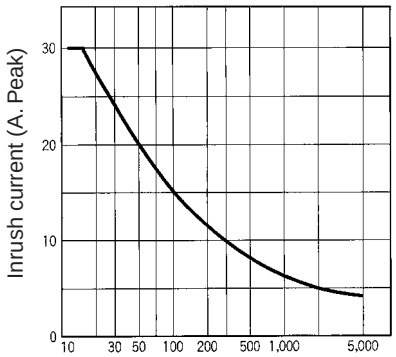
G3TA-OD201S-US



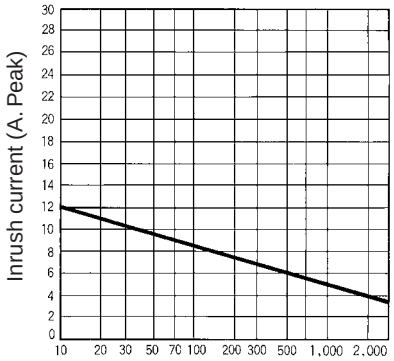
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

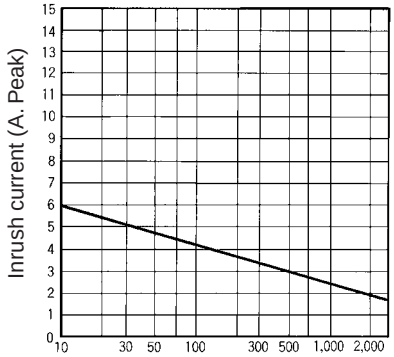
G3TA-OA202SZ/OA202SL-US



G3TA-ODX02S-US



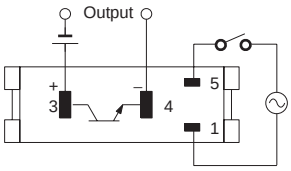
G3TA-OD201S-US



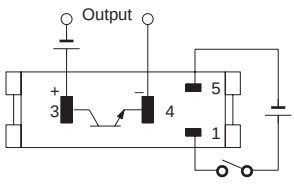
Connections

■ External Connections (Bottom View)

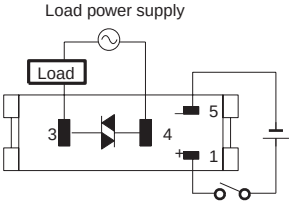
G3TA-IAZR02S



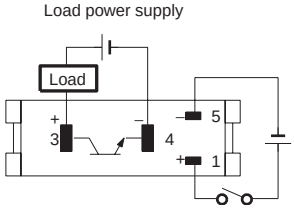
G3TA-IDZR02S/IDZR02SM



G3TA-OA

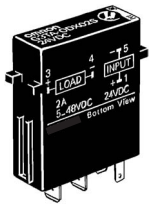


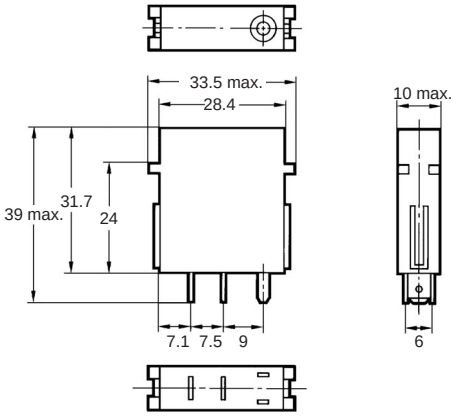
G3TA-OD



Dimensions

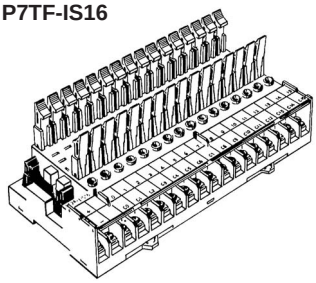
Note: All units are in millimeters unless otherwise indicated.

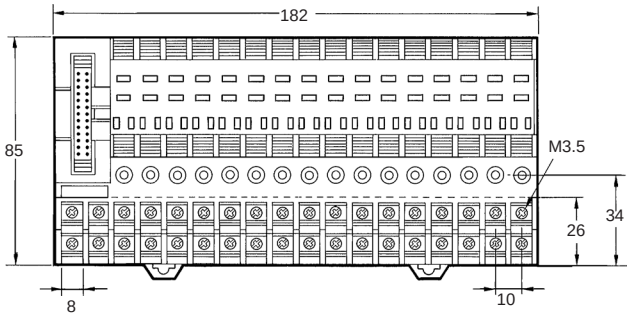


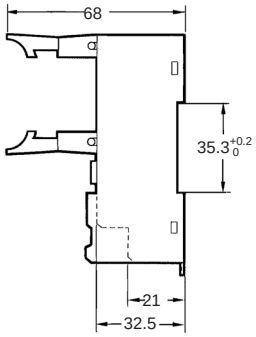


Connecting Sockets

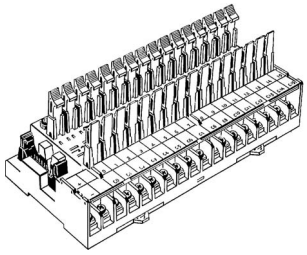
For Input (NPN, - Common)
P7TF-IS16

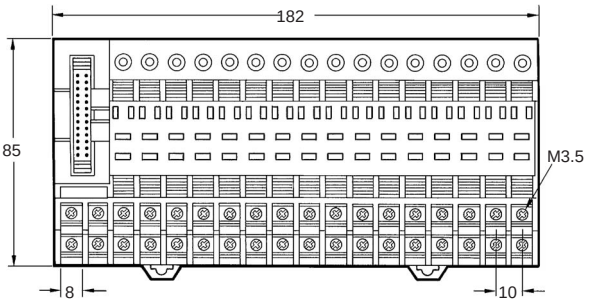


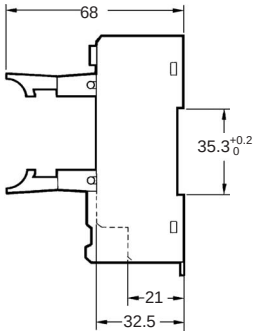




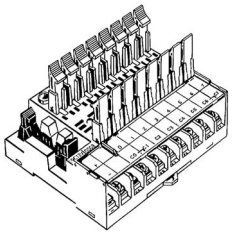
For Output (NPN, + Common)
P7TF-OS16

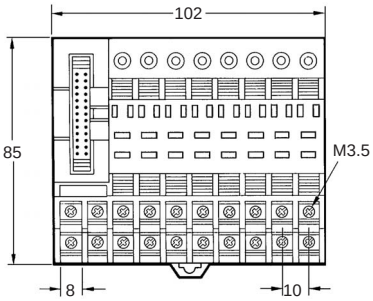


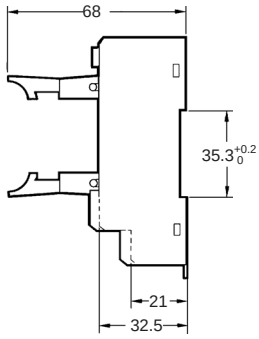




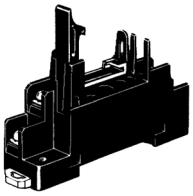
For Output (PNP, + Common)
P7TF-OS08

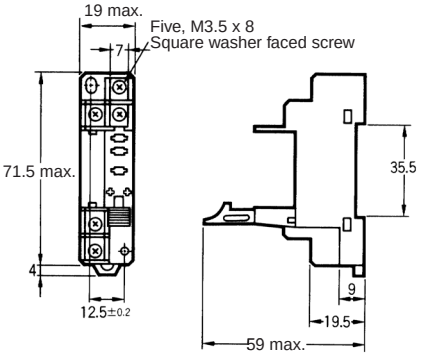






P7TF-O5





Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J049-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays G3□-VD
G3F/G3FD

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

International Standards for G3F Series, Same Profile as MY Power Relays

- Shape-compatible with mechanical relays.
- Certified by UL, CSA, and VDE (model numbers with a suffix of "-VD").
- Socket type, same size as MY Power Relays.
- Operation indicator provided to confirm input (model numbers with "N" before the suffix).

Model Number Structure

■ Model Number Legend

G3F-□□□□□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3F: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
3. **Rated Load Current**
   02: 2 A
   03: 3 A
4. **Terminal Type**
   S: Plug-in terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross functions
   L: Not equipped with zero cross function
6. **Operation Indicator**
   Blank: Not equipped with operation indicator
   N: Equipped with operation indicator
7. **Certification**
   VD: Certified by UL, CSA, and VDE

G3FD-□□□□-□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3F: Solid State Relay
2. **Load Power Supply Type**
   D: DC
3. **Rated Load Power Supply Voltage**
   X: 50 VDC
   1: 100 VDC
4. **Rated Load Current**
   02: 2 A
   03: 3 A
5. **Terminal Type**
   S: Plug-in terminals
6. **Operation Indicator**
   Blank: Not equipped with operation indicator
   N: Equipped with operation indicator
7. **Certification**
   VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photocoupler	Yes	Yes	3 A at 100 to 240 VAC (See note 1.)	5 to 24 VDC	G3F-203SN-VD
			2 A at 100 to 240 VAC (See note 1.)	100/110 VAC	G3F-202SN-VD
				200/220 VAC	
Phototriac coupler	No		3 A at 100 to 240 VAC (See note 1.)	5 VDC	G3F-203SLN-VD
				12 VDC	
				24 VDC	
Photocoupler			3 A at 4 to 48 VDC (See note 2.)	5 to 24 VDC	G3FD-X03SN-VD
			2 A at 5 to 110 VDC	100/110 VAC	G3FD-102SN-VD
				200/220 VAC	
				5 to 24 VDC	
Photocoupler	Yes	No	3 A at 100 to 240 VAC (See note 1.)	4 to 24 VDC	G3F-203S-VD
Phototriac coupler	No			5 VDC	G3F-203SL-VD
				12 VDC	
				24 VDC	
Photocoupler			3 A at 4 to 48 VDC (See note 2.)	4 to 24 VDC	G3FD-X03S-VD
			2 A at 5 to 110 VDC		G3FD-102S-VD

Note: 1. Product is labelled “250 VAC”.
2. Product is labelled “50 VDC”.
3. When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Connecting Sockets

Refer to page 297 for details.

Item	PYF08A-E	PY08	PY08-02	PY08QN(2)
Connecting	Front connecting	Back connecting		
Mounting method/ Terminal type	Track mounted/ screw terminals	Solder terminals	PCB terminals	Wrapping terminals
Hold-down clip	PYC-A1	PYC-P		

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3F-203SN-VD	5 to 24 VDC	4 to 28 VDC	15 mA max. (See note.)	4 VDC max.	1 VDC min.
G3F-202SN-VD	100/110 VAC	75 to 125 VAC	41 kΩ±20%	75 VAC max.	20 VAC min.
	200/220 VAC	150 to 250 VAC	72 kΩ±20%	150 VAC max.	40 VAC min.

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3F-203SLN-VD	5 VDC	4 to 6 VDC	390 Ω±20%	4 VDC max.	1 VDC min.
	12 VDC	9.6 to 14.4 VDC	900 Ω±20%	9.6 VDC max.	
	24 VDC	19.2 to 28.8 VDC	2 kΩ±20%	19.2 VDC max.	
G3FD-X03SN-VD	5 to 24 VDC	4 to 28 VDC	1.5 $k\Omega^{+20\%}/_{-10\%}$	4 VDC max.	
G3FD-102SN-VD	5 to 24 VDC	4 to 28 VDC	1.5 $k\Omega^{+20\%}/_{-10\%}$	4 VDC max.	
	100/110 VAC	75 to 125 VAC	41 kΩ±20%	75 VAC max.	20 VAC min.
	200/220 VAC	150 to 250 VAC	72 kΩ±20%	150 VAC max.	40 VAC min.
G3F-203S-VD	4 to 24 VDC	3 to 28 VDC	15 mA max. (See note.)	3 VDC max.	1 VDC min.
G3F-203SL-VD	5 VDC	4 to 6 VDC	390 Ω±20%	4 VDC max.	
	12 VDC	9.6 to 14.4 VDC	900 Ω±20%	9.6 VDC max.	
	24 VDC	19.2 to 28.8 VDC	2 kΩ±20%	19.2 VDC max.	
G3FD-X03S-VD	4 to 24 VDC	3 to 28 VDC	1.5 $k\Omega^{+20\%}/_{-10\%}$	3 VDC max.	
G3FD-102S-VD					

Note: Constant-current input circuit.

Output

Model	Rated load voltage	Applicable load		
		Load voltage range	Load current	Inrush current
G3F-203SN-VD **G3F-203SLN-VD** **G3F-203S-VD** **G3F-203SL-VD**	100 to 240 VAC	75 to 264 VAC	0.1 to 3 A	45 A (60 Hz, 1 cycle)
G3F-203SN-VD	100 to 240 VAC	75 to 264 VAC	0.1 to 2 A	45 A (60 Hz, 1 cycle)
G3FD-X03SN-VD **G3FD-X03S-VD**	4 to 48 VDC	3 to 52.8 VDC	0.1 to 3 A	18 A (10 ms)
G3FD-102SN-VD **G3FD-102S-VD**	5 to 110 VDC	3 to 125 VDC	0.1 to 2 A	10 A (10 ms)

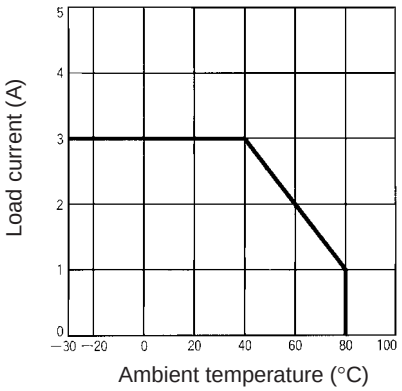
■ Characteristics

Item	G3F-203SN-VD G3F-202SN-VD G3F-203S-VD	G3F-203SLN-VD G3F-203SL-VD	G3FD-X03SN-VD G3FD-X03S-VD	G3FD-102SN-VD	G3FD-102S-VD
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)	1 ms max.	0.5 ms max.	0.5 ms max. (DC input) 20 ms max. (AC input)	0.5 ms max.
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)	1/2 of load power source cycle + 1 ms max.	2 ms max.	2.5 ms max. (DC input) 20 ms max. (AC input)	2.5 ms max.
Output ON voltage drop	1.6 V (RMS) max.		1.5 V max.		
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)	2.5 mA max. (at 100 VAC) 5 mA max. (at 200 VAC)	5 mA max. (at 50 VDC)	0.1 mA max. (at 100 VDC)	0.1 mA max. (at 100 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)				
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min		1,500 VAC, 50/60 Hz for 1 min		
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single 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%				
Certified standards	G3F: UL508, CSA C22.2 No. 14, EN60947-4-3 G3FD: UL508, CSA C22.2 No. 14, EN60950				
Weight	Approx. 50 g				

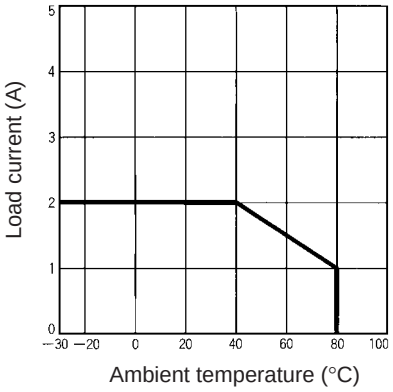
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3F-203SN-VD/203S-VD/203SLN-VD/ 203SL-VD
G3FD-X03SN-VD/X03S-VD



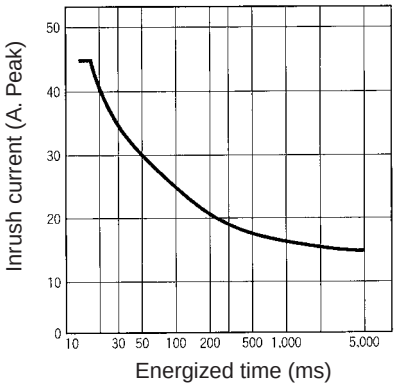
G3F-202SN-VD
G3FD-102SN-VD/102S-VD



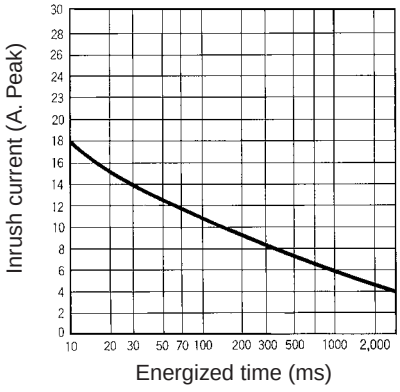
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

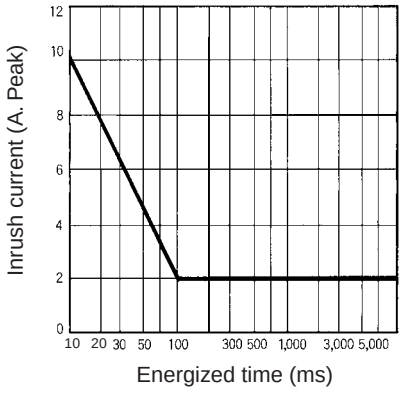
G3F-203SN-VD/203S-VD/202SN-VD/ 203SLN-VD/203SL-VD



G3FD-X03SN-VD/X03S-VD

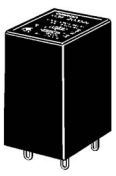


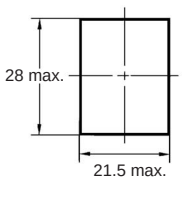
G3FD-102SN-VD/102S-VD

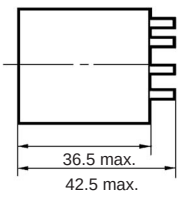


Dimensions

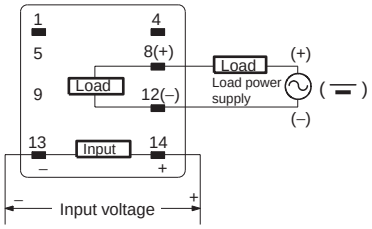
Note: All units are in millimeters unless otherwise indicated.







Terminal Arrangement/ Internal Connections



Note: The plus and minus symbols shown in parentheses are for DC loads.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Connection

The SSR for DC switching use can connect to a load regardless of the polarity of the positive and negative output terminals.

Close Mounting of Multiple Relays

If multiple Relays are mounted side by side, be aware that the outer wall of each SSR works as a heat sink.

The SSR casing serves to dissipate heat. Install the Relays so that they are adequately ventilated. If poor ventilation is unavoidable, reduce the load current by half.

Protective Terminal

When using for AC inductive loads, connect the load terminals of the SSR to an inrush absorber (varistor).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K055-E1-05

Solid State Relays G3□-VD
G3B/G3BD

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

International Standards for G3B Series, Same Profile as MK Power Relays

- Shape-compatible with mechanical relays.
- Certified by UL, CSA, and VDE (models numbers with a suffix of "-VD").
- Plug-in type, same size as MK Power Relays.
- Operation indicator provided to confirm input.
- DC Output model available with 3 to 125-VDC load voltage range for high-voltage applications.

Model Number Structure

■ Model Number Legend

G3B□-□□□-□
1 2 3 4 5 6

1. **Basic Model Name**
   G3B: Solid State Relay
2. **Load Power Supply Type**
   Blank: Switches AC loads
   D: Switches DC loads
3. **Rated Load Power Supply Voltage**
   2: 200 V
   1: 100 V
4. **Rated Load Current**
   03: 3 A
   05: 5 A
5. **Terminal Type**
   S: Plug-in terminals
6. **Certification**
   VD: Certified by UL, CSA, and VDE

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photocoupler	Yes	Yes	5 A at 100 to 240 VAC (See note.)	5 to 24 VDC	G3B-205S-VD
	No		3 A at 5 to 110 VDC		G3BD-103S-VD

Note: 1. Product is labelled "250 VAC".
2. When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Connecting Sockets/Hold-Down Clips

Refer to page 297 for details.

Item	PF083A-E	PL-08
Connecting	Front connecting	Back connecting
Mounting method/Terminal type	Track mounted/screw terminals	Solder terminals
Hold-down clip	PYC-A1 (when track mounted)	PLC

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating voltage	Input current	Voltage levels	
				Must operate voltage	Must release voltage
G3B-205S-VD	5 to 24 VDC	4 to 32 VDC	15 mA max. (See note.)	4 VDC max.	1 VDC min.
G3BD-103S-VD		4 to 30 VDC	15 kΩ+20%/–10%		

Note: Constant-current input circuit.

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current	Inrush current
G3B-205S-VD	100 to 240 VAC	75 to 264 VAC	0.1 to 5 A	80 A, 60 Hz for 1 cycle
G3BD-103S-VD	5 to 110 VDC	3 to 125 VDC	0.1 to 3 A	12 A (10 ms)

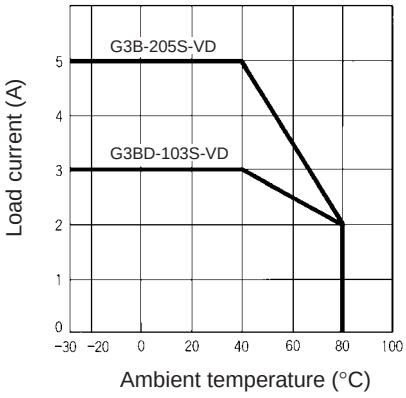
■ Characteristics

Model	G3B-205S-VD	G3BD-103S-VD
Operate time	1/2 cycle of load power source + 1 ms max.	0.5 ms max.
Release time	1/2 cycle of load power source + 1 ms max.	2.5 ms max.
Output ON voltage drop	1.6 V (RMS) max.	1.5 V max.
Leakage current	5 mA max. (at 100 VAC); 10 mA max. (at 200 VAC)	5 mA max. (at 125 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude	
Shock resistance	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	45% to 85%	
Certified standards	G3B: UL508, CSA C22.2 No. 14, EN60947-4-3 G3BD: UL508, CSA C22.2 No. 14, EN60950	
Weight	Approx. 70 g	

Engineering Data

Load Current vs. Ambient Temperature Characteristics

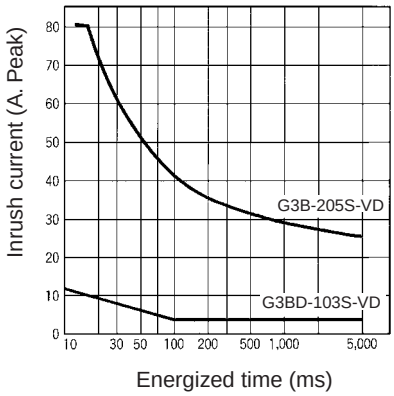
G3B-205S-VD, G3BD-103S-VD



One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

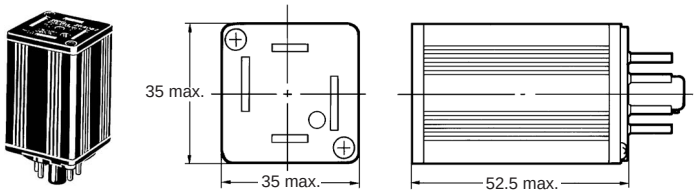
G3B-205S-VD, G3BD-103S-VD



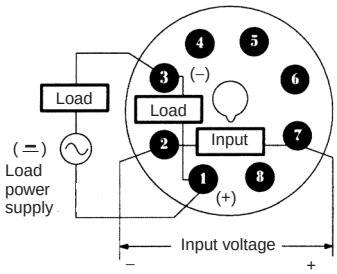
Dimensions

Note: All units are in millimeters unless otherwise indicated.

G3B-VD
G3BD-VD

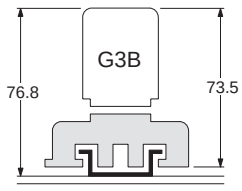


Terminal Arrangement (Bottom View)



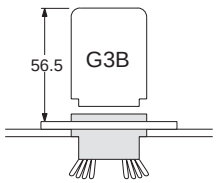
Note: The symbols shown in parentheses are for DC loads.

Mounting Height with socket
Front Connecting Socket



PF083A

Back Connecting Socket



PL08

Note: When mounting PF083A, mount the key track down.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

The SSR case serves to dissipate heat. Install the relays so that they are adequately ventilated. If poor ventilation is unavoidable, reduce the load current to half.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K051-E1-05

Solid State Relays G3□-VD
G3H/G3HD

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

International Standards for G3H Series, Same Profile as LY Power Relays

- Shape-compatible with mechanical relays.
- Certified by UL, CSA, and VDE (models numbers with a suffix of "-VD").
- Socket type, same size as LY Power Relays.
- Operation indicator provided to confirm input (models numbers with "N" before the suffix).

Model Number Structure

■ Model Number Legend

G3H-□□□□□□-□
1 2 3 4 5 6 7 8

1. Basic Model Name
G3H: Solid State Relay

2. Rated Load Power Supply Voltage
2: 200 VAC

3, 4. Rated Load Current
03: 3 A

5. Terminal Type
S: Plug-in terminals

6. Zero Cross Function
Blank: Equipped with zero cross function
L: Not equipped with zero cross function

7. Operation Indicator
Blank: Not equipped with operation indicator
N: Equipped with operation indicator

8. Certification
VD: Certified by UL, CSA, and VDE standards

G3HD-□□□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3H: Solid State Relay

2. Load Power Supply Type
D: DC

3. Rated Load Power Supply Voltage
X: 50 VDC

4. Rated Load Current
03: 3 A

5. Terminal Type
S: Plug-in terminals

6. Operation Indicator
Blank: Not equipped with operation indicator
N: Equipped with operation indicator

7. Certification
VD: Certified by UL, CSA, VDE

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photocoupler	Yes	Yes	3 A at 100 to 240 VAC (See note 1.)	5 to 24 VDC	G3H-203SN-VD
Phototriac coupler	No			5 VDC	G3H-203SLN-VD
				12 VDC	
				24 VDC	
Photocoupler	No		3 A at 4 to 48 VDC (See note 2.)	5 to 24 VDC	G3HD-X03SN-VD
Photocoupler	Yes	No	3 A at 100 to 240 VAC (See note 1.)	4 to 24 VDC	G3H-203S-VD
Phototriac coupler	No			5 VDC	G3H-203SL-VD
				12 VDC	
				24 VDC	
Photocoupler	No		3 A at 4 to 48 VDC (See note 2.)	4 to 24 VDC	G3HD-X03S-VD

Note: 1. Product is labelled “250 VAC”.
2. Product is labelled “50 VDC”.
3. When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Connecting Sockets

Refer to page 297 for details.

Item	PTF08A-E	PT08	PT08-0	PT08QN
Connecting	Front connecting	Back connecting		
Mounting method/ Terminal type	Track mounted screw terminals	Solder terminals	PCB terminals	Wire-wrapping terminals
Hold-down clip	PYC-A1	PYC-P		

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3H-203SN-VD	5 to 24 VDC	4 to 28 VDC	15 mA max. (See note.)	4 VDC max.	1 VDC min.
G3H-203SLN-VD	5 VDC	4 to 6 VDC	390 Ω±20%	4 VDC max.	1 VDC min.
	12 VDC	9.6 to 14.4 VDC	900 Ω±20%	9.6 VDC max.	
	24 VDC	19.2 to 28.8 VDC	2 kΩ±20%	19.2 VDC max.	
G3HD-X03SN-VD	5 to 24 VDC	4 to 28 VDC	1.5 kΩ $^{+20\%}/_{-10\%}$	4 VDC max.	1 VDC min.
G3H-203S-VD	4 to 24 VDC	3 to 28 VDC	15 mA max. (See note.)	3 VDC max.	1 VDC min.
G3H-203SL-VD	5 VDC	4 to 6 VDC	390 Ω±20%	4 VDC max.	1 VDC min.
	12 VDC	9.6 to 14.4 VDC	900 Ω±20%	9.6 VDC max.	
	24 VDC	19.2 to 28.8 VDC	2 kΩ±20%	19.2 VDC max.	
G3HD-X03S-VD	4 to 24 VDC	3 to 28 VDC	1.5 kΩ $^{+20\%}/_{-10\%}$	3 VDC max.	1 VDC min.

Note: Constant-current input circuit.

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current	Inrush current
G3H-203SN-VD G3H-203S-VD	100 to 240 VAC	75 to 264 VAC	0.1 to 3 A	45 A 60 Hz, 1 cycle
G3H-203SLN-VD G3H-203SL-VD				
G3HD-X03SN-VD G3HD-X03S-VD	4 to 48 VDC	3 to 52.8 VDC	0.1 to 3 A	18 A (10 ms)

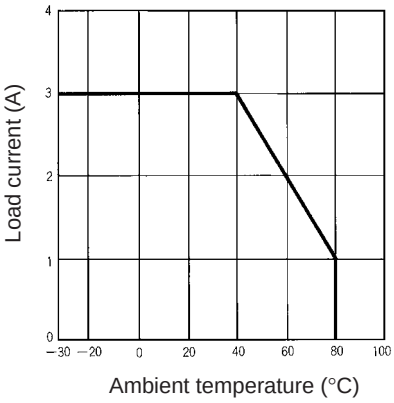
■ Characteristics

Model	G3H-203SN-VD/203S-VD	G3H-203SLN-VD/203SL-VD	G3HD-X03SN-VD/X03S-VD
Operate time	1/2 cycle of load power source + 1 ms max.	1 ms max.	0.5 ms max.
Release time	1/2 cycle of load power source + 1 ms max.		2 ms max.
Output ON voltage drop	1.6 V (RMS) max.		1.5 V max.
Leakage current	5 mA max. (at 100 VAC); 10 mA max. (at 200 VAC)	2.5 mA max. (at 100 VAC); 5 mA max. (at 200 VAC)	5 mA max. (at 50 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)		
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min		1,500 VAC, 50/60 Hz for 1 min
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude		
Shock resistance	Destruction: 1,000 m/s^2		
Ambient temperature	Operating: –30°C to 80°C (with no icing) Storage: –30°C to 100°C (with no icing)		
Ambient humidity	45% to 85%		
Certified standards	G3H: UL508, CSA C22.2 No. 14, EN60947-4-3 G3HD: UL508, CSA C22.2 No. 14, EN60950		
Weight	Approx. 50 g		

Engineering Data

Load Current vs. Ambient Temperature Characteristics

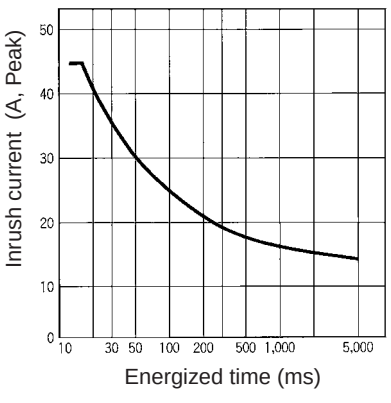
G3H-203SN-VD/203S-VD/203SLN-VD/203SL-VD
G3HD-X03SN-VD/X03S-VD



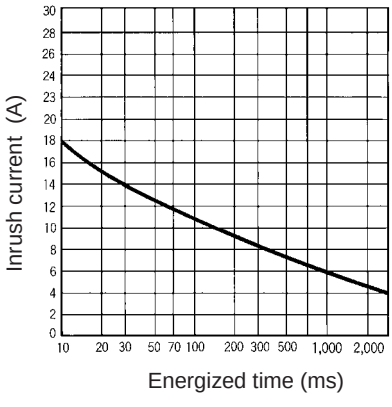
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

G3H-203SN-VD/203S-VD/203SLN-VD/G3H-203SL-VD

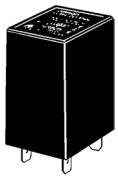


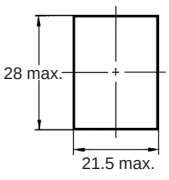
G3HD-X03SN-VD/X03S-VD

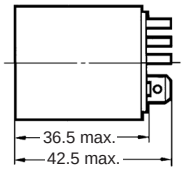


Dimensions

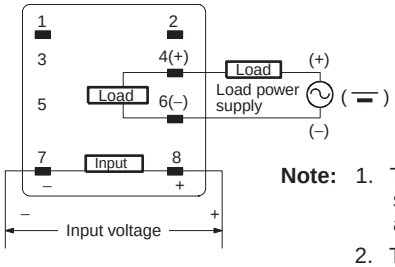
Note: All units are in millimeters unless otherwise indicated.







Terminal Arrangement/ Internal Connections (Bottom View)



Note: 1. The plus and minus symbols shown in the parentheses are for DC loads.

2. The coil has no polarity.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

The SSR case serves to dissipate heat. Install the relays so that they are adequately ventilated. If poor ventilation is unavoidable, reduce the load current by half.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K057-E1-05

Solid State Relays
G3FM

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

100-μA-max. Leakage Current, No Bleeder Resistor Required

- 1 mA to 500 mA micro-load switching.
- Switch to both AC and DC with no polarity.
- Switch for a wide range of voltages; 19.2 to 264 VAC, 19.2 to 125 VDC.
- Switch full- and half-wave rectifier AC loads.
- Same sizes and terminal arrangements as OMRON Power Relay MY Series.
- Operating indicator provided.
- Switch MY Series (without bleeder resistor).
- Superior surge absorption with a built-in varistor.
- Optimum SSR to control minute load, valves, and solenoids.

Model Number Structure

■ Model Number Legend

G3FM-□□□□□
1 2 3 4 5 6

1. **Basic Model Name**
   G3FM: Solid State Relay
2. **Rated Load Power Supply Voltage**
   2: 200 VAC
3. **Rated Load Current**
   R5: 0.5 A
4. **Terminal Type**
   S: Plug-in terminals
5. **Zero Cross Function**
   L: Not equipped with zero cross function
6. **Operation Indicator**
   N: Equipped with operation indicator

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photo-voltage coupler	No	Yes	0.5 A at 24 to 240 VAC 0.5 A at 24 to 110 VDC	5 VDC	G3FM-2R5SLN
				12 VDC	
				24 VDC	

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Connecting Sockets

Refer to page 297 for details.

Item	PYF08A-E	PY08	PY08-02	PY08QN(2)
Connecting	Front connecting	Back connecting		
Mounting method/ Terminal type	Track mounted/ screw terminals	Solder terminals	PCB terminals	Wrapping terminals
Hold-down clip	PYC-A1	PYC-P		

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Model	Input					Output			
	Rated voltage	Operating voltage	Impedance	Voltage levels		Applicable load			
				Must operate voltage	Must release voltage	Rated load voltage	Load voltage range	Load current	Inrush current
G3FM-2R5SLN	5 VDC	4 to 6 VDC	250 Ω±20%	4 VDC max.	1 VDC min.	24 to 240 VAC 24 to 110 VDC	19.2 to 264 VAC 19.2 to 125 VDC	1 to 500 mA	6 A (10 ms)
	12 VDC	9.6 to 14.4 VDC	600 Ω±20%	9.6 VDC max.					
	24 VDC	19.2 to 28.8 VDC	1.2 kΩ±20%	19.2 VDC					

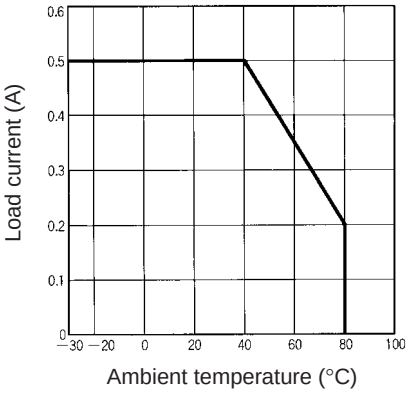
■ Characteristics

Operate time	5 ms max.
Release time	10 ms max.
Output ON voltage drop	3 V (RMS) max.
Leakage current	0.1 mA max.
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min
Vibration resistance	10 to 55 to 10 Hz, 0.75-mm single amplitude
Shock resistance	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. 50 g

Engineering Data

Load Current vs. Ambient Temperature Characteristics

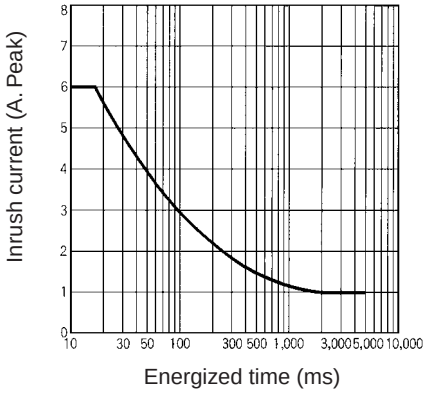
G3FM-2R5SLN



One Cycle Surge Current: Non-repetitive

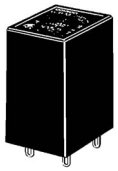
Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

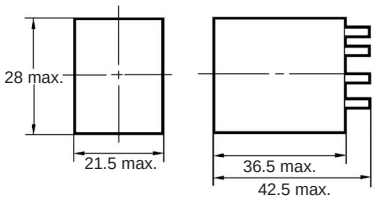
G3FM-2R5SLN



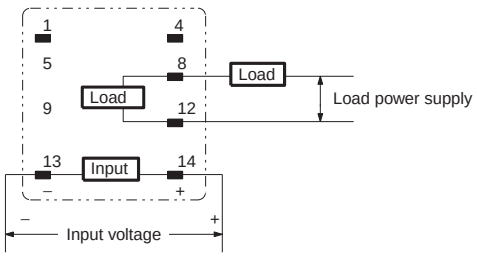
Dimensions

Note: All units are in millimeters unless otherwise indicated.





Terminal Arrangement/Internal Connections (Bottom View)



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

The SSR case serves to dissipate heat. Install the relays so that they are adequately ventilated. If poor ventilation is unavoidable, reduce the load current by half.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K072-E1-03 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3R-I/O

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

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 can be used for the G2R are available.
- Use a coupler conforming to VDE 0884 and assuring an I/O dielectric strength of 4,000 V.
- Incorporate an easy-to-see monitoring indicator.
- -UTU models certified by UL, CSA, and TÜV.

Model Number Structure

■ Model Number Legend

G3R-□□□□□□□□-□-□
1 2 3 4 5 6 7 8 9 10

1. **Basic Model Name**
   - G3R: Solid State Relay
2. **I/O Classification**
   - I: Input module
   - O: Output module
3. **Load Power Supply Type**
   - A: Switches AC loads
   - D: Switches DC loads
4. **Rated Load Power Supply Voltage**
   - Z: 24 VDC
   - X: 48 VDC
   - 2: 240 VAC
5. **Rated Load Current**
   - R1: 0.1 A
   - 01: 1 A
   - 02: 2 A
6. **Terminal Type**
   - S: Plug-in terminals
7. **Zero Cross Function**
   - Z: Equipped with zero cross function
   - L: Not equipped with zero cross function
   - Blank: DC-output model
8. **Operation Indicator**
   - N: Equipped with operation indicator
9. **Response Speed (only for DC Input Models)**
   - I: Low-speed (10 Hz)
   - Blank: High-speed (1 kHz)
10. **Certification**
    - UTU: Certified by UL, CSA, and TÜV

Ordering Information

■ List of Models

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-UTU
		High-speed (1 kHz)			5 VDC	G3R-IDZR1SN-UTU
					12 to 24 VDC	
		Low-speed (10 Hz)			5 VDC	G3R-IDZR1SN-1-UTU
					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-UTU
		No			G3R-OA202SLN-UTU
Photocoupler		---	2 A at 5 to 48 VDC		G3R-ODX02SN-UTU
			1.5 A at 48 to 200 VDC		G3R-OD201SN-UTU

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Track/Surface Mounting Socket (Recommended)

Model	Number of poles
P2RF-05-E	1 pole (G2R: 1 pole usage)

Note: Refer to page 236 for details on other Sockets.

Connecting Socket Attaching Plate

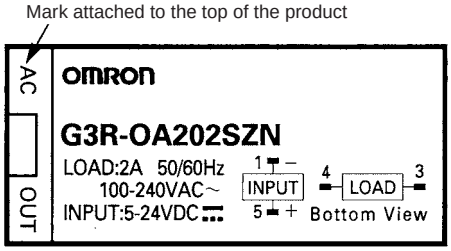
Model	Applicable Socket
P2R-P	P2R-05A

■ 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-UTU	100 to 240 VAC	60 to 264 VAC	15 mA max.	60 VAC max.	20 VAC min.
G3R-IDZR1SN-UTU	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-UTU	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-UTU	4 to 32 VDC	0.1 to 100 mA
G3R-IDZR1SN-UTU		
G3R-IDZR1SN-1-UTU		

Output Module

Input

Model	Rated voltage	Operating voltage	Input current	Must operate voltage	Must release voltage
G3R-OA202SZN-UTU	5 to 24 VDC	4 to 32 VDC	15 mA max. (at 25°C)	4 VDC max.	1 VDC min.
G3R-OA202SLN-UTU					
G3R-ODX02SN-UTU			8 mA max.		
G3R-OD201SN-UTU					

Output

Model	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3R-OA202SZN-UTU	100 to 240 VAC	75 to 264 VAC	0.05 to 2 A	30 A (60 Hz, 1 cycle)
G3R-OA202SLN-UTU				
G3R-ODX02SN-UTU	5 to 48 VDC	4 to 60 VDC	0.01 to 2 A	8 A (10 ms)
G3R-OD201SN-UTU	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-UTU	G3R-IDZR1SN-UTU	G3R-IDZR1SN-1-UTU
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 to 10 Hz, 0.75-mm single amplitude		
Shock resistance	1,000 m/s^2		
Ambient temperature	Operating: –30°C to 80°C (with no icing) Storage: –30°C to 100°C (with no icing)		
Certified standards	UL508 File No. E64562 CSA C22.2 (No. 14, No. 950) File No. LR35535 TÜV File No. R9650094 (EN60950)		
Ambient humidity	Operating: 45% to 85%		
Weight	Approx. 18 g		

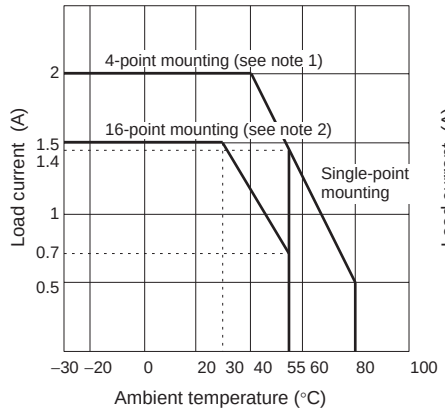
Output Module

Item	G3R-OA202SZN-UTU	G3R-OA202SLN-UTU	G3R-ODX02SN-UTU	G3R-OD201SN-UTU
Operate time	1/2 of load power source cycle + 1 ms max.	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	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude			
Shock resistance	Destruction: 1,000 m/s^2			
Ambient temperature	Operating: –30°C to 80°C (with no icing) Storage: –30°C to 100°C (with no icing)			
Certified standards	UL508 File No. E64562 CSA C22.2 (No. 14, No. 950) File No. LR35535 TÜV File No. R9650094 (EN60950)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 18 g			

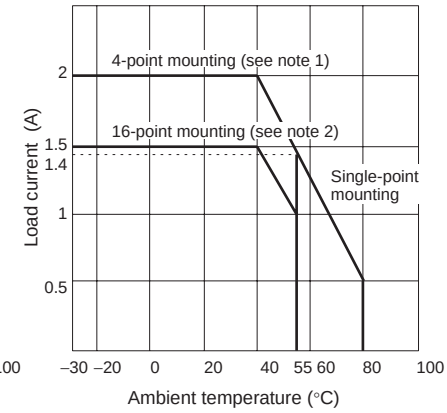
Engineering Data

Load Current vs. Ambient Temperature

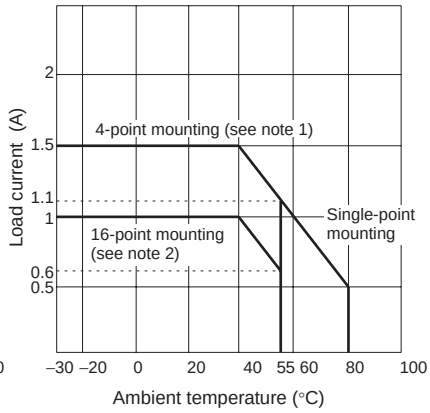
G3R-OA202SZN-UTU/OA202SLN-UTU



G3R-ODX02SN-UTU (4 to 60 VDC)



G3R-OD201SN-UTU (40 to 200 VAC)

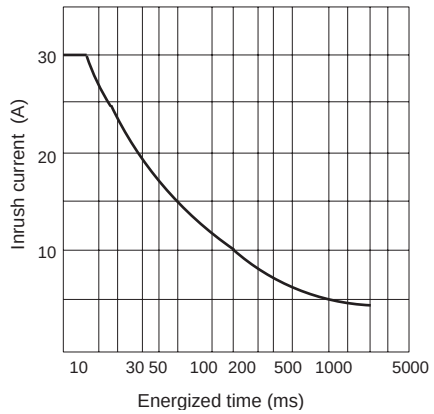


Note: 1. When G730-Z0M04-B is mounted.
2. When G70A-Z0C16 is mounted.

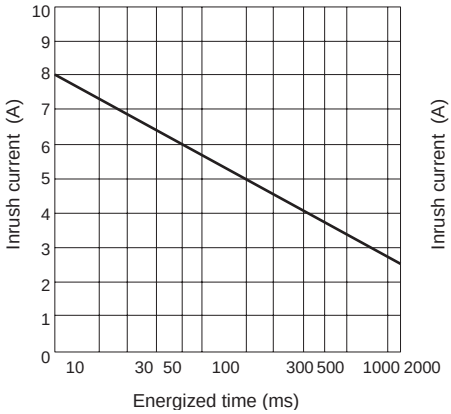
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

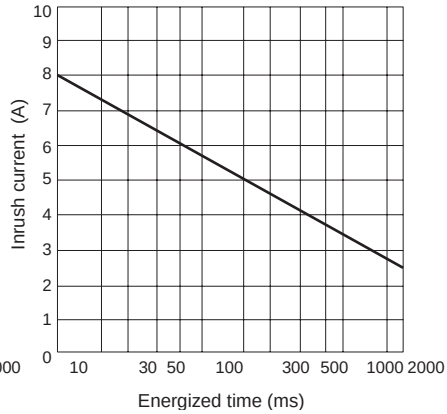
G3R-OA202SZN-UTU/OA202SLN-UTU



G3R-ODX02SN-UTU



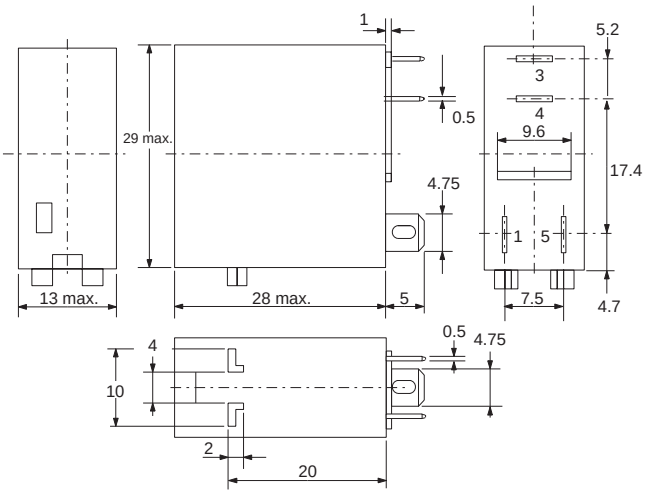
G3R-OD201SN-UTU



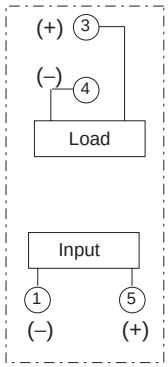
Dimensions

Note: All units are in millimeters unless otherwise indicated.

G3R



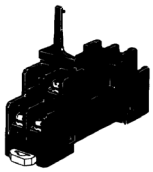
Terminal Arrangement/ Internal Connections (Bottom View)

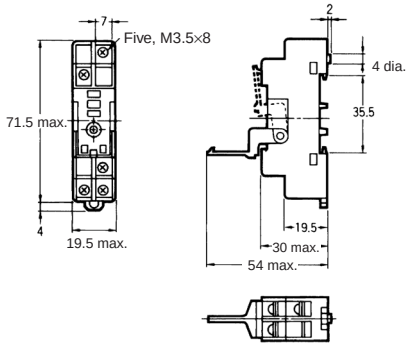


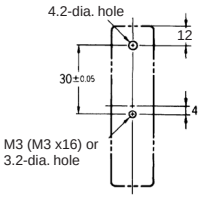
Connecting Sockets

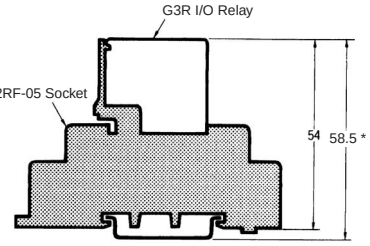
Connecting Socket Attaching Plates

P2RF-05



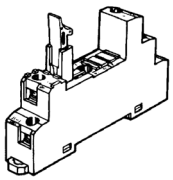


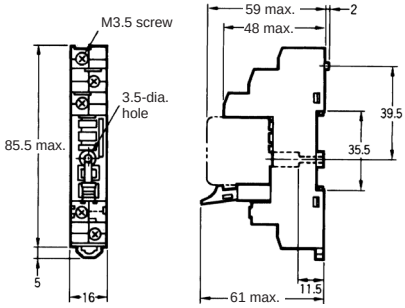


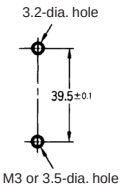


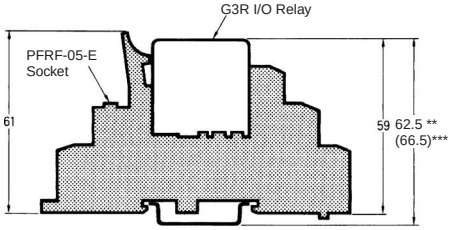
* Indicates a value when using the PFP-□N Supporting Rail.
The value is 67.5 when using the PFP-□N2.

P2RF-05-E





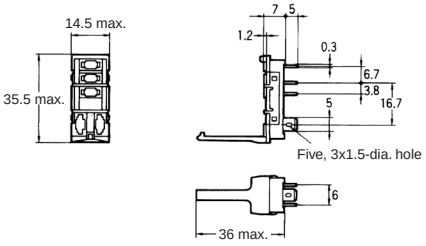


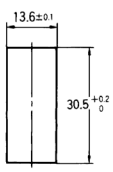


** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-05-E
The value is 71.5 when using the PFP-□N2.

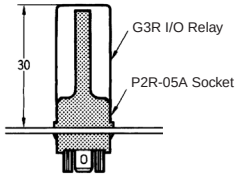
*** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-08-E
The value is 75.5 when using the PFP-□N2.

P2R-05A

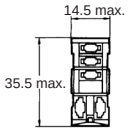


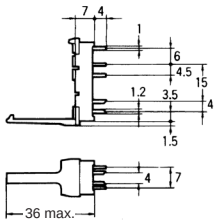


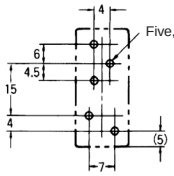
(Panel thickness must be 1.6 to 2.0 mm.)



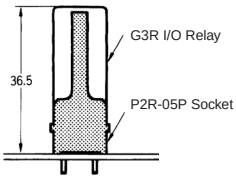
P2R-05P



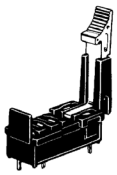


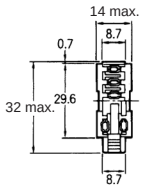


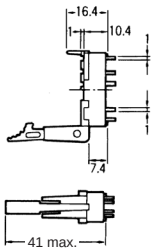
Dimensional tolerance is ±0.1.

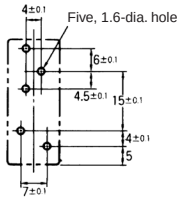


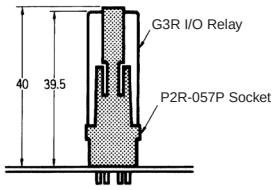
P2R-057P





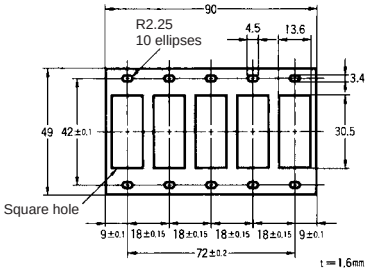






Socket Mounting Plate

Use the Socket Mounting Plate when arranging several Sockets in a row.



G70A I/O Block Base

■ Ordering Information

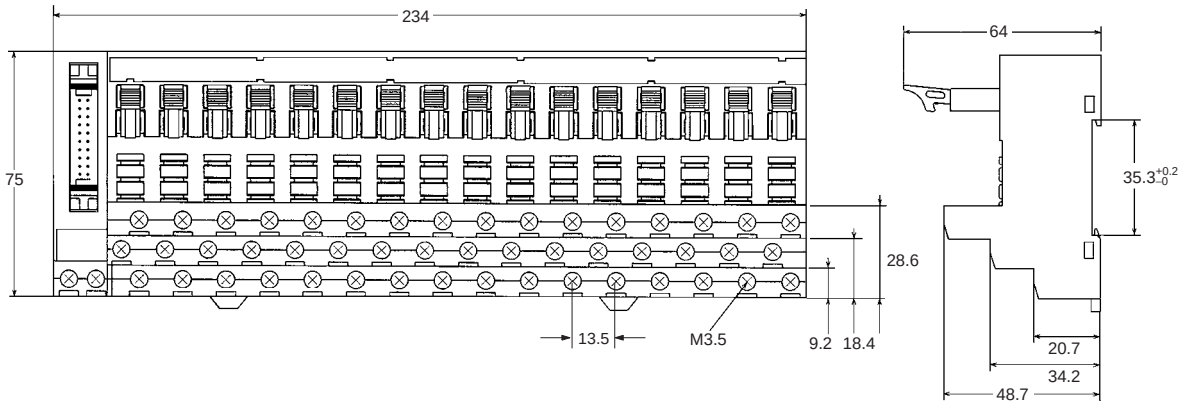
Classification	Internal I/O circuit common	Rated voltage	Model
Output	NPN (+ common)	24 VDC	G70A-ZOC16-3
	PNP (– common)	24 VDC	G70A-ZOC16-4
Input	NPN/PNP	110 VDC max., 240 VAC max. (See note.)	G70A-ZIM16-5

Note: Each relay to be mounted must incorporate a coil that has proper specifications within the maximum rated voltage range.

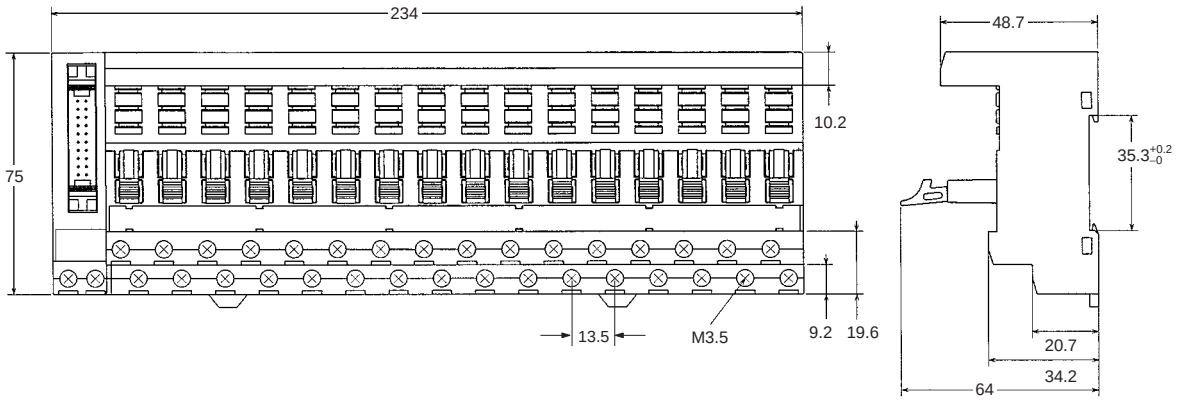
■ Dimensions

Note: All units are in millimeters unless otherwise indicated.

G70A-ZOC16 (Output)

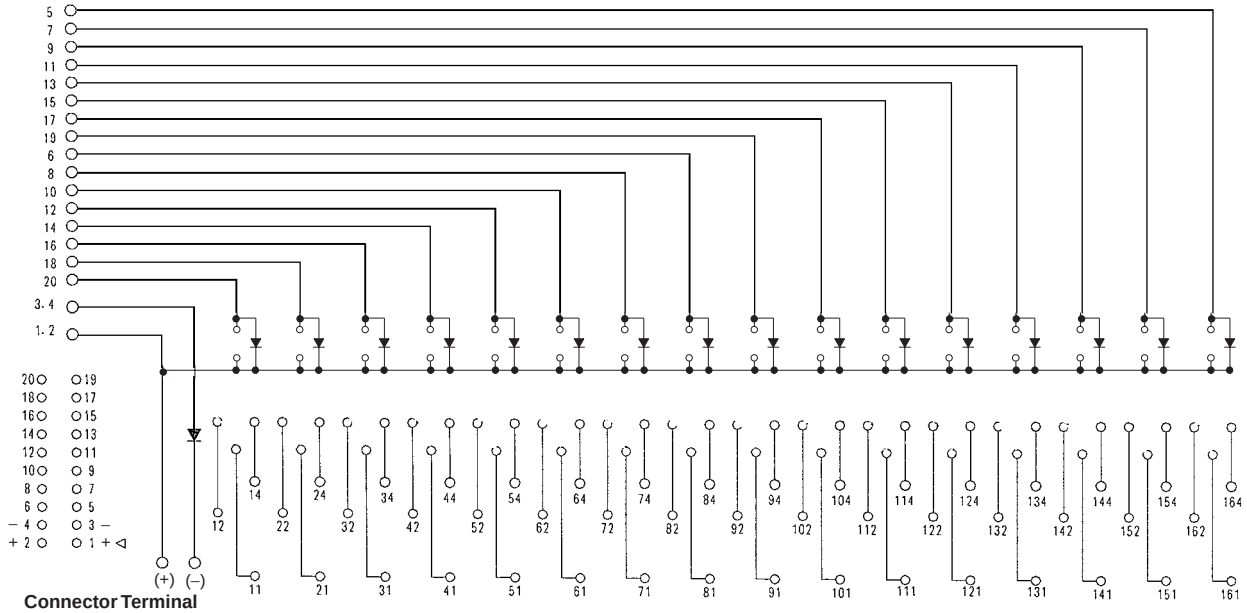


G70A-ZIM16 (Input)



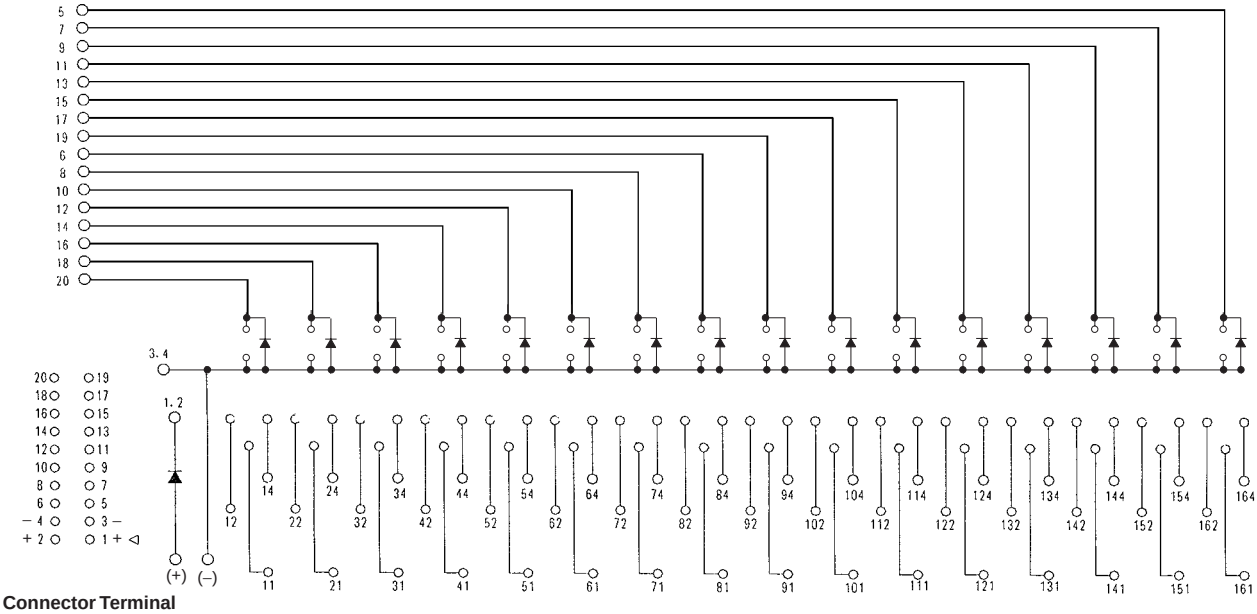
■ Terminal Arrangement/Internal Connection

G70A-ZOC16-3 (NPN)



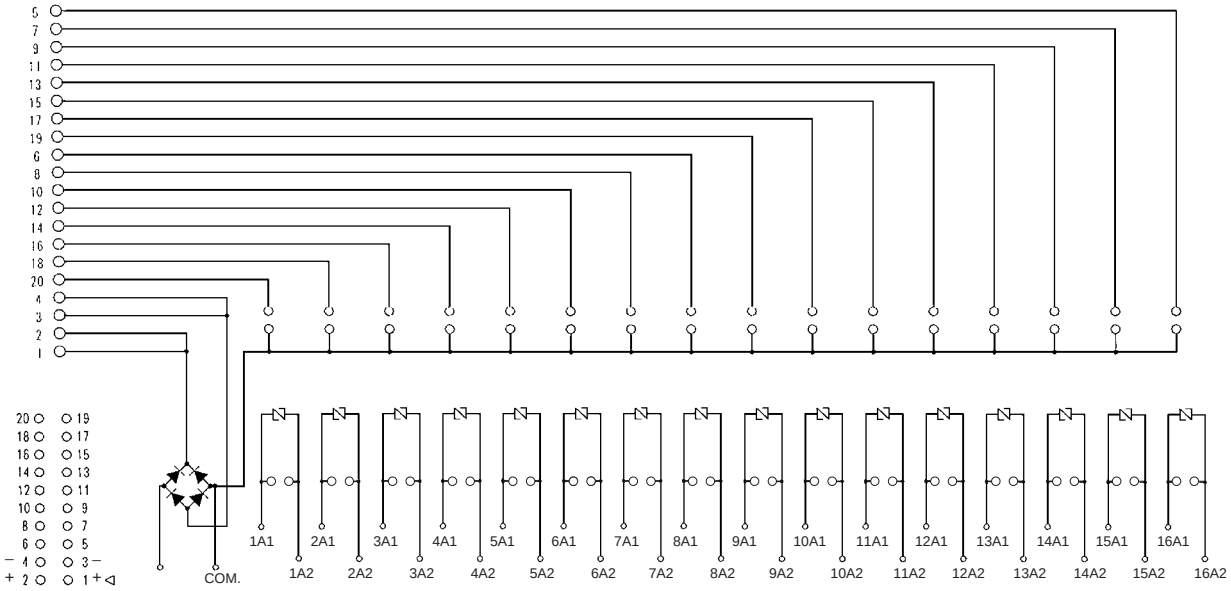
Connector Terminal Arrangement (Top View)

G70A-ZOC16-4 (PNP)



Connector Terminal Arrangement (Top View)

G70A-ZIM16-5 (NPN/PNP)



Connector Terminal Arrangement (Top View)

Safety Precautions

■ Precautions for Correct Use

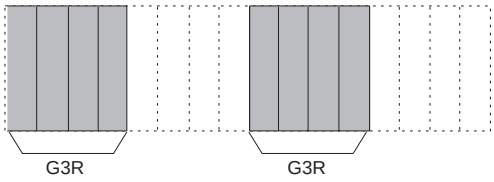
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Connection

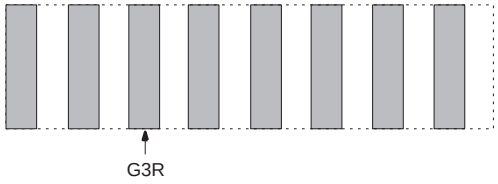
With the SSR for DC switching, the load can be connected to either positive or negative output terminal of the SSR.

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.



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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

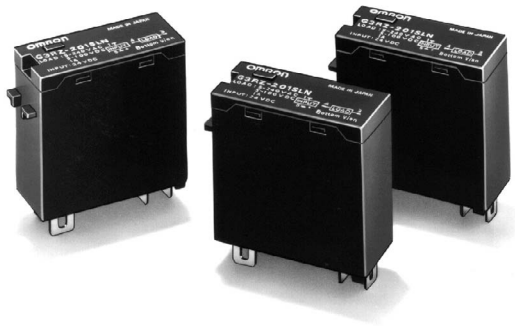
Cat. No. K091-E1-04 In the interest of product improvement, specifications are subject to change without notice.

MOS FET Relays
G3RZ

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

SSR Identical to the G2R in Size with a Maximum AC/DC Switching Current of 1 A

- Switch 1 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.
- Input resistor and varistor incorporated.
- Switch full- and half-wave rectified alternating currents.



Model Number Structure

■ Model Number Legend

G3RZ-□□□□□□
1 2 3 4 5 6 7

1. **Basic Model Name**
   G3RZ: MOS FET Relay
2. **Load Power Supply**
   Blank: AC/DC output
3. **Rated Load Power Supply Voltage**
   2: 200 VAC/125 VDC
4. **Rated Load Current**
   01: 1 A
5. **Terminal Type**
   S: Plug-in terminals
6. **Zero Cross Function**
   L: Not equipped with zero cross function
7. **Operation Indicator**
   N: Equipped with operation indicator

Ordering Information

■ List of Models

Insulation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photo-voltage coupler	No	Yes	1.0 A at 5 to 240 VAC 5 to 100 VDC	5 VDC	G3RZ-201SLN
				12 VDC	
				24 VDC	

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

The height of the G3RZ mounted to the P2RF-05 is 56 mm maximum.

Connecting Socket	P2RF-05, P2RF-05-E, P2R-05P, P2R-05A, P2R-057P

Connecting Socket Attaching Plate

Model	Applicable Socket
P2R-P	P2R-05A

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Input impedance	Must operate voltage	Must release voltage
5 VDC	4 to 6 VDC	400 Ω±20%	4 VDC max.	1 VDC min.
12 VDC	9.6 to 14.4 VDC	1.1 kΩ±20%	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	2.2 kΩ±20%	19.2 VDC max.	

Output

Load voltage range	Load current	Inrush current
3 to 264 VAC, 3 to 125 VDC	100 μA to 1.0 A	10 A (10 ms)

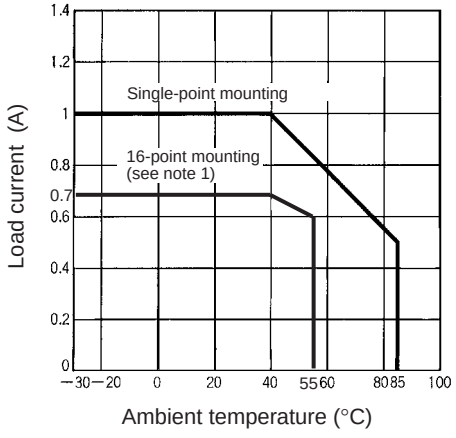
■ Characteristics

Operate time	6 ms max.
Release time	10 ms max.
Output ON-resistance	2.4 Ω max.
Leakage current	10 μA max. (at 125 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between input and output
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.75-mm single 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)
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 20 g

Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3RZ-201SLN

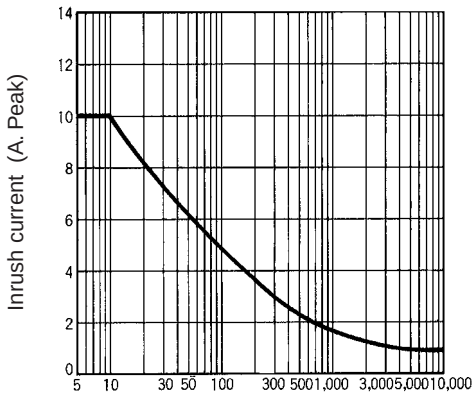


Note: 1. When G70A-ZOC16 is mounted.
The description of G70A I/O Block Base is on page 238 to 240.

One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

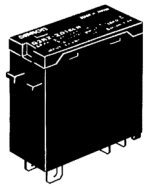
G3RZ-201SLN

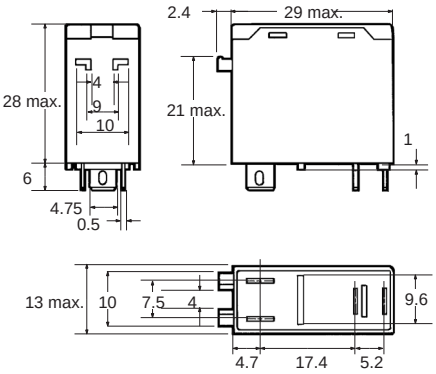


Dimensions

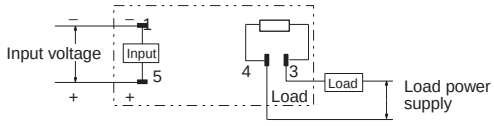
Note: All units are in millimeters unless otherwise indicated.

G3RZ-201SLN



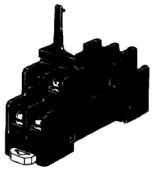


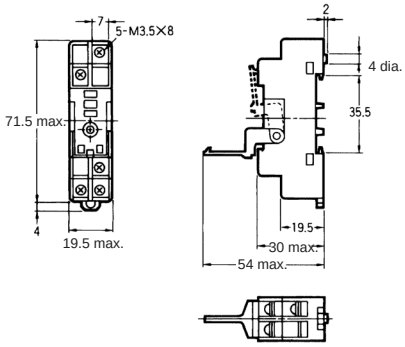
Terminal Arrangement/Internal Connections (Bottom View)

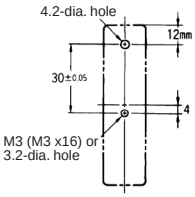


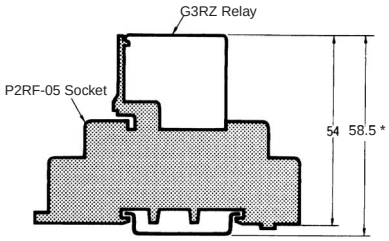
Connecting Sockets

P2RF-05



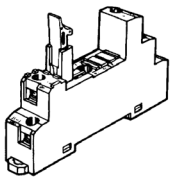


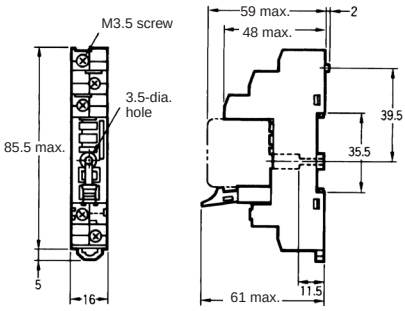


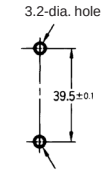


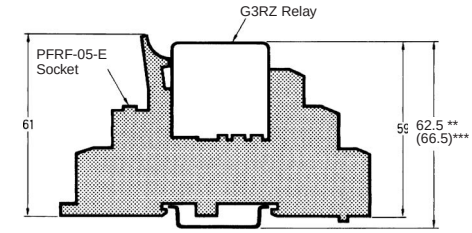
* Indicates a value when using the PFP-□N Supporting Rail.The value is 67.5 when using the PFP-□N2.

P2RF-05-E



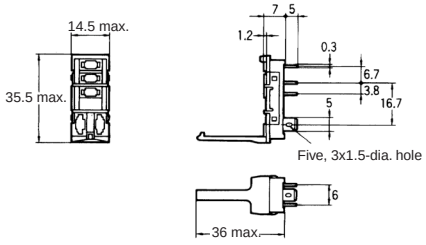


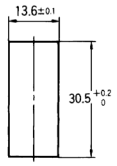




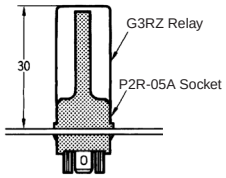
** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-05-E
The value is 71.5 when using the PFP-□N2.
*** Indicates a value when using the PFP-□N Supporting Rail with the P2RF-08-EThe value is 75.5 when using the PFP-□N2.

P2R-05A

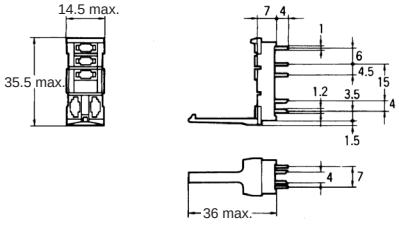


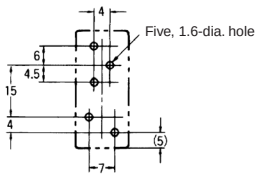


(Panel thickness must be 1.6 to 2.0 mm.)

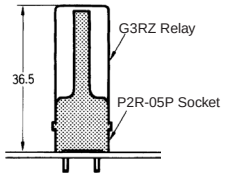


P2R-05P

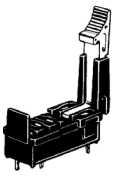


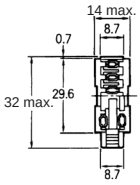


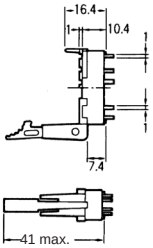
Dimensional tolerance is ±0.1.

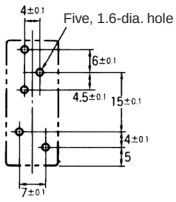


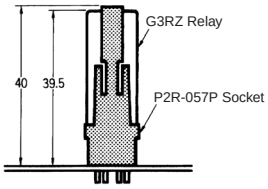
P2R-057P







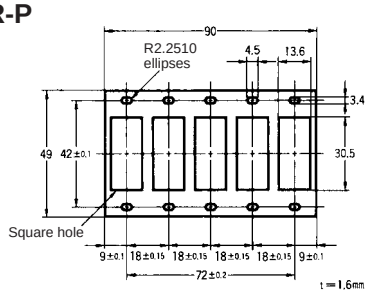




■ Connecting Socket Attaching Plate

Use the Socket Mounting Plate when arranging several Sockets in a row.

P2R-P



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Mounting

Socket Mounting

When mounting, take ventilation into consideration so that the heat of the MOS FET Relay is dissipated.
The temperature may rise. Securely insert the MOS FET Relay to the socket.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K090-E1-03 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3R/G3RD

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Compact SSRs Ideal for Built-in Applications

- Vertical, compact SSRs with an operation indicator offered in versatile variations.
- High dielectric strength of 2,500 VAC for 2-A models.
- High-voltage DC version also available.
- Certified by UL and CSA.

Model Number Structure

■ Model Number Legend

G3R-□□□□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3R: Solid State Relay

2. Rated Load Power Supply Voltage
1: 100 VAC
2: 200 VAC

3. Rated Load Current
02: 2 A

4. Terminal Type
P: PCB terminals

5. Isolation Method
Blank: Phototriac/photocoupler isolation with zero cross function
L: Phototriac/photocoupler isolation without zero cross function

6. Operation Indicator
N: Equipped with operation indicator

7. Certification
US: Certified by UL and CSA

G3RD-□□□□-□
1 2 3 4 5 6 7

1. Basic Model Name
G3R: Solid State Relay

2. Rated Output Load
D: Switches DC loads

3. Rated Load Power Supply Voltage
1: 100 VDC
X: 50 VDC

4. Rated Load Current
01: 1.5 A
02: 2 A

5. Terminal Type
P: PCB terminals

6. Operation Indicator
N: Equipped with operation indicator

7. Certification
US: Certified by UL and CSA

Ordering Information

■ List of Models

Terminals	Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
PCB	Phototriac	Yes	Yes	2 A at 100 to 120 VDC (See note 1.)	5, 12, 24 VDC	G3R-102PN-US
		No				G3R-102PLN-US
		Yes		2 A at 100 to 240 VAC (See note 2.)		G3R-202PN-US
		No				G3R-202PLN-US
	Photocoupler	---	Yes	1.5 A at 5 to 110 VDC		G3RD-101PN-US
				2 A at 4 to 48 VDC (See note 3.)		G3RD-X02PN-US

Note: 1. Product is labelled “125 VAC”.
2. Product is labelled “250 VAC”.
3. Product is labelled “50 VDC”.
4. When ordering, specify the rated input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input (AC Output With Zero Cross Function)

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3R-102PN-US **G3R-202PN-US**	5 VDC	4 to 6 VDC	250 Ω±20%	3.5 VDC max.	0.375 VDC min.
	12 VDC	9.6 to 14.4 VDC	600 Ω±20%	8.4 VDC max.	0.9 VDC min.
	24 VDC	19.2 to 28.8 VDC	1.5 kΩ±20%	16.8 VDC max.	1.8 VDC min.

Input (AC Output Without Zero Cross Function, DC Output)

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3R-102PLN-US	5 VDC	4 to 6 VDC	300 Ω±20%	3.5 VDC max.	0.375 VDC min.
G3R-202PLN-US	12 VDC	9.6 to 14.4 VDC	750 Ω±20%	8.4 VDC max.	0.9 VDC min.
G3RD-X02PN-US **G3RD-101PN-US**	24 VDC	19.2 to 28.8 VDC	1.5 kΩ±20%	16.8 VDC max.	1.8 VDC min.

Output

Model	Rated load voltage	Applicable load		
		Load voltage range	Load current	Inrush current
G3R-102PN-US **G3R-102PLN-US**	100 to 120 VAC	75 to 132 VAC	0.1 to 2 A	30 A (60 Hz, 1 cycle)
G3R-202PN-US **G3R-202PLN-US**	100 to 240 VAC	75 to 264 VAC	0.1 to 2 A	
G3RD-X02PN-US	4 to 48 VDC	3 to 52.8 VDC	0.01 to 2 A	8 A (10 ms)
G3RD-101PN-US	5 to 110 VDC	3 to 125 VDC	0.01 to 1.5 A	2.5 A (10 ms)

■ Characteristics

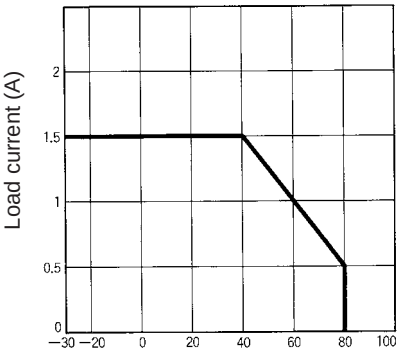
Item	G3R-102PLN-US	G3R-102PN-US	G3R-202PLN-US	G3R-202PN-US	G3RD-X02PN/-101PN-US
Operate time	1 ms max.	1/2 of load power source cycle + 1 ms max.	1 ms max.	1/2 of load power source cycle + 1 ms max.	1 ms max.
Release time	1/2 of load power source cycle + 1 ms max.				1 ms max.
Output ON voltage drop	1.6 V (RMS) max.				1.5 V max.
Leakage current	2 mA max. (at 100 VAC)		2 mA max. (at 100 VAC) 5 mA max. (at 200 VAC)		0.1 mA max. (at 50 VDC) 0.1 mA max. (at 125 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)				
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min				2,500 VAC, 50/60 Hz for 1 min
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.75-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)				
Certified standards	UL508 File No. E64562, CSA C22.2 (No. 14) File No. 35535				
Ambient humidity	Operating: 45% to 85%				
Weight	Approx. 18 g				

Engineering Data

Load Current vs. Ambient Temperature Characteristics

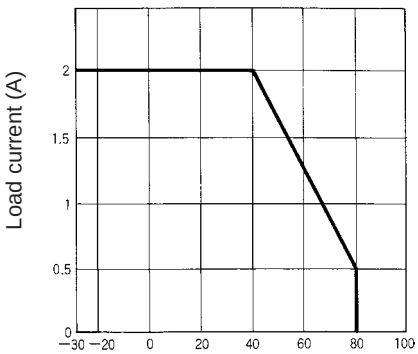
1-A Load Model

G3RD-101PN-US



2-A Load Model

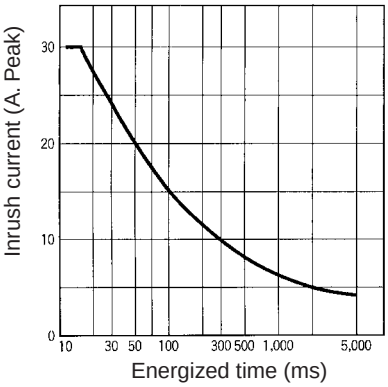
G3R-102□-US, G3R-X02□-US, G3R-202□-US



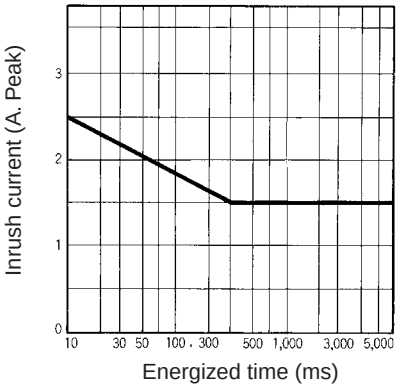
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

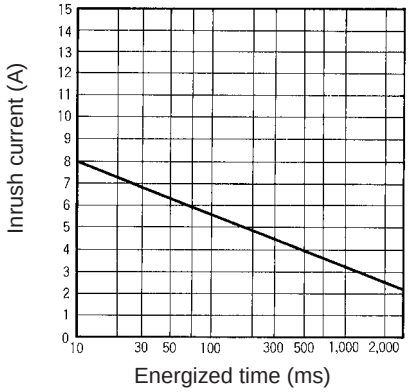
G3R-102□-US/-202□-US



G3RD-101PN-US



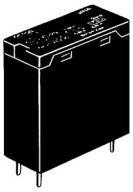
G3RD-X02□-US

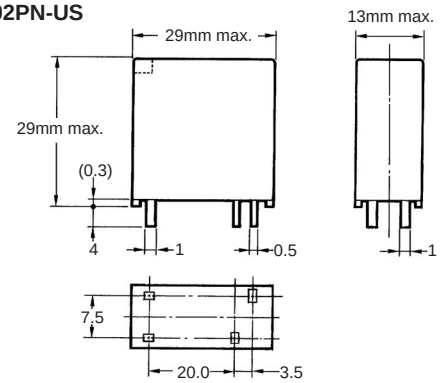


Dimensions

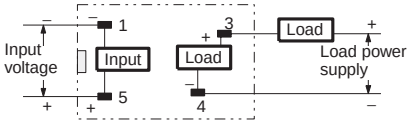
Note: All units are in millimeters unless otherwise indicated.

G3R-102P□-US/-202P□-US
G3RD-101PN-US/-X02PN-US



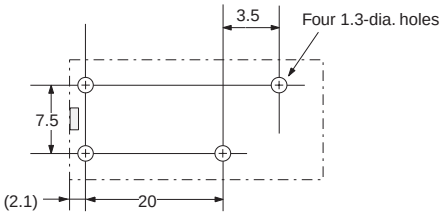


Terminal Arrangement/ Internal Connections (Bottom View)



Note: The plus and minus symbols shown in the parentheses are for DC loads.

Mounting Holes



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Connection

The SSR for DC switching a surge can connect to a load regardless of the polarity of the positive and negative output terminals.

Protective Terminal

For AC inductive loads, connect the load terminals of the SSR to a surge absorber (varistor).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

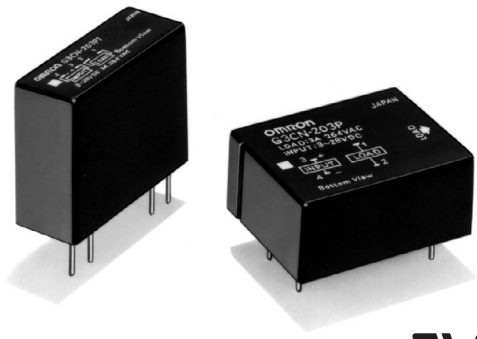
Cat. No. K059-E1-05 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3CN

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

PCB-mounting SSR for FA Equipment Requiring High Reliability

- Wide I/O voltage range: 3 to 28 VDC input and 75 to 264 VAC output or 3 to 28 VDC input and 3 to 52.8 VDC output.
- Two load currents available: 2 A and 3 A
- Flat and vertical models available for a variety of applications.
- Certified by UL and CSA.



Model Number Structure

■ Model Number Legend

G3CN-□□□□□□□
1 2 3 4 5 6 7 8

1. **Basic Model Name**
   G3CN: Solid State Relay
2. **Load Power Supply**
   D: DC output
   Blank: AC output
3. **Rated Load Power Supply Voltage**
   X: 50 VDC
   2: 200 VAC
4. **Rated Load Current**
   02: 2 A
   03: 3 A
5. **Terminal Type**
   P: PCB terminals
6. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
7. **Housing**
   Blank: Flat type
   1: Vertical type
8. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output voltage	Rated input voltage	Model
Photocoupler	Yes	No	2 A at 100 to 240 VAC	4 to 24 VDC	G3CN-202P-US
					G3CN-202P1-US (See note 1.)
			3 A at 100 to 240 VAC		G3CN-203P-US
					G3CN-203P1-US (See note 1.)
Phototriac	No		2 A at 100 to 240 VAC	5, 12, 24 VDC (See note 2.)	G3CN-202PL-US
					G3CN-202PL1-US (See note 1.)
			3 A at 100 to 240 VAC		G3CN-203PL-US
					G3CN-203PL1-US (See note 1.)
Photocoupler	---		2 A at 4 to 48 VDC	4 to 24 VDC	G3CN-DX02P-US
					G3CN-DX02P1-US (See note 1.)
			3 A at 4 to 48 VDC		G3CN-DX03P-US
					G3CN-DX03P1-US (See note 1.)

Note: 1. Vertical models.

2. When ordering, specify the input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Model	Rated voltage	Operating voltage	Impedance	Voltage level	
				Must operate voltage	Must release voltage
G3CN-202P(1)-US G3CN-203P(1)-US	4 to 24 VDC	3 to 28 VDC	1.5 kΩ $^{+20\%}/_{-10\%}$	3 VDC max.	1 VDC min.
G3CN-202PL(1)-US G3CN-203PL(1)-US	5 VDC	4 to 6 VDC	390 Ω±20%	4 VDC max.	
	12 VDC	9.6 to 14.4 VDC	900 Ω±20%	9.6 VDC max.	
	24 VDC	19.2 to 28.8 VDC	2 kΩ±20%	19.2 VDC max.	
G3CN-DX02P(1)-US G3CN-DX03P(1)-US	4 to 24 VDC	3 to 28 VDC	1.5 kΩ $^{+20\%}/_{-10\%}$	3 VDC max.	

Note: The input impedance is measured at the maximum value of the operating voltage. For example, with the model rated at 4 to 24 VDC, the input impedance is measured at 28 VDC.

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current	Inrush current
			Without heat sink	
G3CN-202P(1)-US G3CN-202PL(1)-US	100 to 240 VAC	75 to 264 VAC	0.1 to 2 A	30 A (60 Hz, 1 cycle)
G3CN-203P(1)-US G3CN-203PL(1)-US			0.1 to 3 A	45 A (60 Hz, 1 cycle)
G3CN-DX02P(1)-US	4 to 48 VDC	3 to 52.8 VDC	0.1 to 2 A	12 A (10 ms)
G3CN-DX03P(1)-US			0.1 to 3 A	18 A (10 ms)

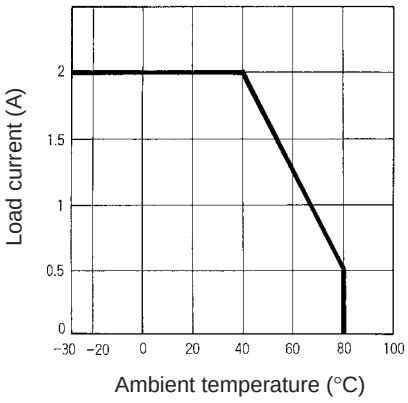
■ Characteristics

Item	G3CN-202P(1)-US/203P(1)-US	G3CN-202PL(1)-US/203PL(1)-US	G3CN-DX02P(1)-US/03P(1)-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.	1/2 of load power source cycle + 1 ms max.	2 ms max.
Output ON voltage drop	1.6 V (RMS) max.		1.5 V max.
Leakage current	5 mA max. (at 100 VAC) 10 mA max. (at 200 VAC)	2.5 mA max. (at 100 VAC) 5 mA max. (at 200 VAC)	5 mA max. (at 50 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)		
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min		
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude		
Shock resistance	Malfunction: 1,000 m/s^2		
Ambient temperature	Operating: –30°C to 80°C (with no icing nor condensation) Storage: –30°C to 100°C (with no icing nor condensation)		
Ambient humidity	Operating: 45% to 85%		
Certified standards	UL508, UL114 File No.E64562, CSA C22.2 (No.0, No.14) File No. LR35535		
Weight	Approx. 25 g		

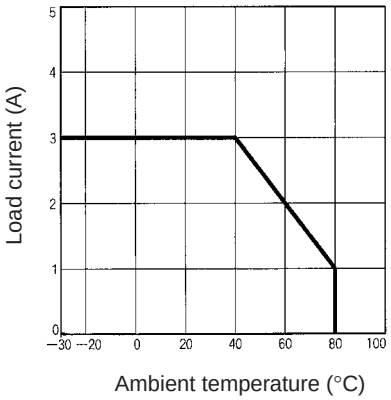
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3CN-202P(1)-US/-202PL(1)-US/-DX02P(1)-US



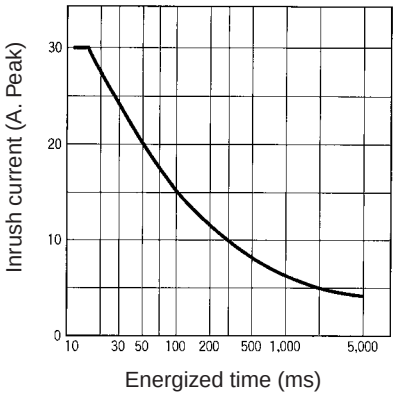
G3CN-203P(1)-US/-203PL(1)-US/-DX03P(1)-US



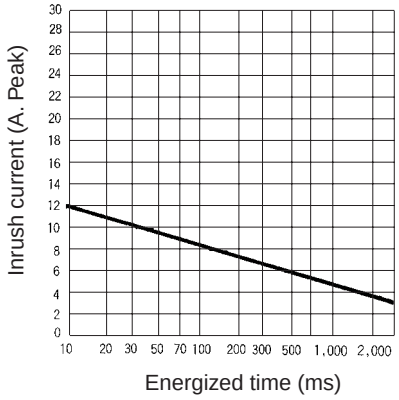
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

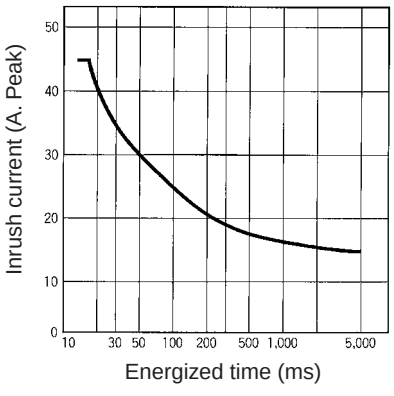
G3CN-202P(1)-US/-202PL(1)-US



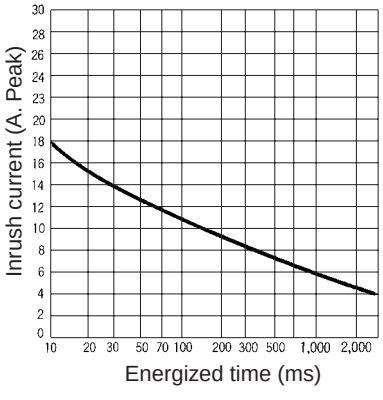
G3CN-DX02P(1)-US



G3CN-203P(1)-US/-203PL(1)-US



G3CN-DX03P(1)-US

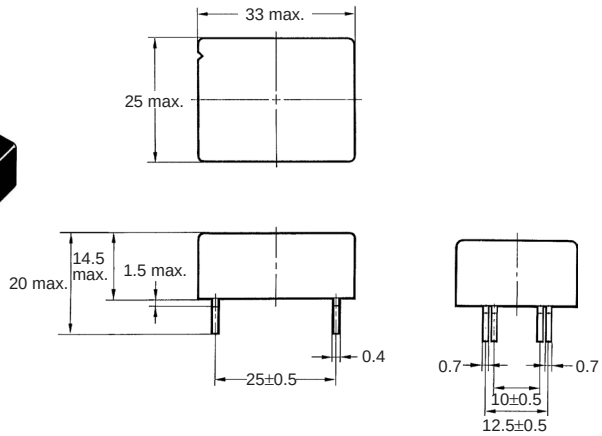


Dimensions

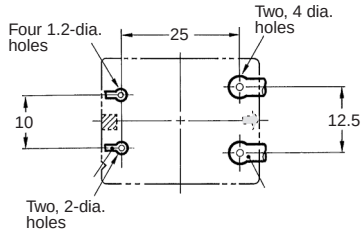
Note: All units are in millimeters unless otherwise indicated.

Flat Model

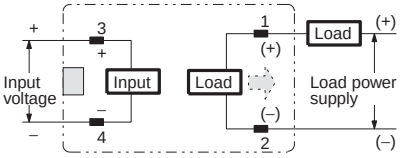
G3CN-20□P-US/-20□PL-US/-DX0□P-US



Terminal Arrangement/ Mounting Holes (Bottom View)



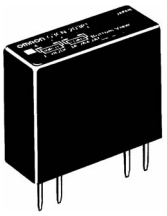
Terminal Arrangement/ Internal Connections (Bottom View)

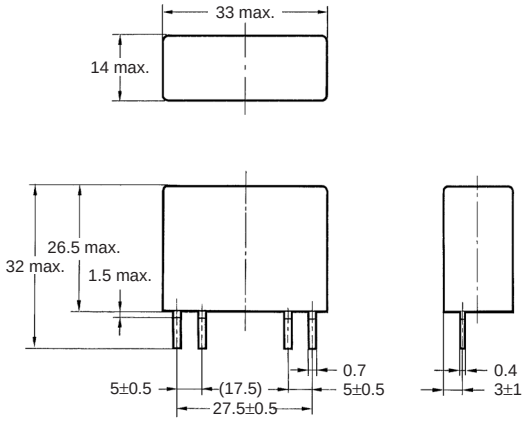


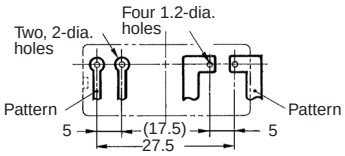
Note: Values in parentheses apply to the DC-load versions.

Vertical Model

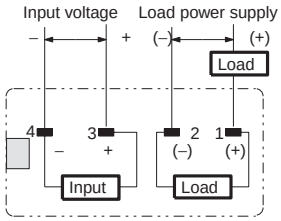
G3CN-20□P1-US/-20□PL1-US/-DX0□P1-US







Terminal Arrangement/ Internal Connections (Bottom View)



Note: Values in parentheses apply to the DC-load versions.

Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K063-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3M

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Zero Cross Models Added to Compact, Low-cost G3M Series

- Thin design for high-density PCB applications.
- DC input-AC output for up to a 5-A load.
- Certified by UL, CSA, and VDE.

Model Number Structure

■ Model Number Legend

G3M-□□□□-□-□-□
1 2 3 4 5 6 7 8

1. **Basic Model Name**
   G3M: Solid State Relay
2. **Rated Load Power Supply Voltage**
   1: 100 VAC
   2: 200 VAC
3. **Rated Load Current**
   02: 2 A
   03: 3 A
   05: 5 A
4. **Terminal Type**
   P: PCB terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
6. **Certification**
   Blank: Certified by UL and CSA for G3M-203 model
   UTU: Certified by UL, CSA, and TÜV
   US: Certified by UL and CSA
   VD: Certified by UL, CSA, and VDE
7. **Insulation Specifications**
   Blank: Standard models
   1: Reinforced isolation
   2: Reinforced isolation and no snubber circuit
8. **Terminal Pitch**
   Blank: Standard models
   4: Output terminal pitch of 5.08 mm

Ordering Information

■ List of Models

Isolation	Input terminal pitch	Zero cross function	Indicator	Rated output load	Rated input voltage	Model	
Phototriac	7.62 mm	Yes	No	2 A at 100 to 240 VAC	5 VDC	G3M-202P(-US)	5 VDC
					12 VDC	G3M-202P(-US)	12 VDC
					24 VDC	G3M-202P(-US)	24 VDC
				3 A at 100 to 240 VAC	5 VDC	G3M-203P	5 VDC
					12 VDC	G3M-203P	12 VDC
					24 VDC	G3M-203P	24 VDC
				5 A at 100 to 240 VAC	5 VDC	G3M-205P	5 VDC
					12 VDC	G3M-205P	12 VDC
					24 VDC	G3M-205P	24 VDC
		No		2 A at 100 to 120 VAC	5 VDC	G3M-102PL(-US)	5 VDC
					12 VDC	G3M-102PL(-US)	12 VDC
					24 VDC	G3M-102PL(-US)	24 VDC
				2 A at 100 to 240 VAC	5 VDC	G3M-202PL(-US)	5 VDC
					12 VDC	G3M-202PL(-US)	12 VDC
					24 VDC	G3M-202PL(-US)	24 VDC
				3 A at 100 to 240 VAC	5 VDC	G3M-203PL	5 VDC
					12 VDC	G3M-203PL	12 VDC
					24 VDC	G3M-203PL	24 VDC
				5 A at 100 to 240 VAC	5 VDC	G3M-205PL	5 VDC
					12 VDC	G3M-205PL	12 VDC
					24 VDC	G3M-205PL	24 VDC

Note: 1. The models given in the above table have UL and CSA certification. Consult your OMRON representative for details on models with TÜV or VDE certification.

2. When ordering, specify the rated input voltage.

Isolation	Input terminal pitch	Zero cross function	Indicator	Rated output load	Rated input voltage	Model	
Phototriac	5.08 mm	Yes	No	2 A at 100 to 240 VAC	5 VDC	G3M-202P(-US)-4	5 VDC
					12 VDC	G3M-202P(-US)-4	12 VDC
					24 VDC	G3M-202P(-US)-4	24 VDC
				3 A at 100 to 240 VAC	5 VDC	G3M-203P-4	5 VDC
					12 VDC	G3M-203P-4	12 VDC
					24 VDC	G3M-203P-4	24 VDC
				5 A at 100 to 240 VAC	5 VDC	G3M-205P-4	5 VDC
					12 VDC	G3M-205P-4	12 VDC
					24 VDC	G3M-205P-4	24 VDC
		No		2 A at 100 to 120 VAC	5 VDC	G3M-102PL(-US)-4	5 VDC
					12 VDC	G3M-102PL(-US)-4	12 VDC
					24 VDC	G3M-102PL(-US)-4	24 VDC
				2 A at 100 to 240 VAC	5 VDC	G3M-202PL(-US)-4	5 VDC
					12 VDC	G3M-202PL(-US)-4	12 VDC
					24 VDC	G3M-202PL(-US)-4	24 VDC
				3 A at 100 to 240 VAC	5 VDC	G3M-203PL-4	5 VDC
					12 VDC	G3M-203PL-4	12 VDC
					24 VDC	G3M-203PL-4	24 VDC
				5 A at 100 to 240 VAC	5 VDC	G3M-205PL-4	5 VDC
					12 VDC	G3M-205PL-4	12 VDC
					24 VDC	G3M-205PL-4	24 VDC

Note: 1. The models given in the above table have UL and CSA certification. Consult your OMRON representative for details on models with TÜV or VDE certification.

2. When ordering, specify the rated input voltage.

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

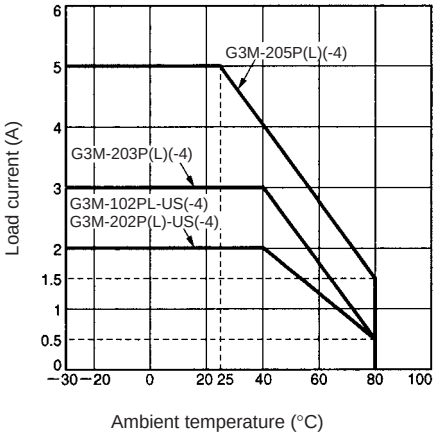
Model	Rated voltage	Applicable load		
		Load voltage range	Load current	Inrush current
G3M-102PL(-US)(-4)	100 to 120 VAC	75 to 132 VAC	0.1 to 2 A	30 A (60 Hz, 1 cycle)
G3M-202P(L)(-US)(-4)	100 to 240 VAC	75 to 264 VAC		
G3M-203P(L)(-4)			0.1 to 3 A	45 A (60 Hz, 1 cycle)
G3M-205P(L)(-4)			0.1 to 5 A	

■ 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	Destruction: 10 to 55 to 10 Hz, 0.75-mm single 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. 15 g			Approx. 25 g

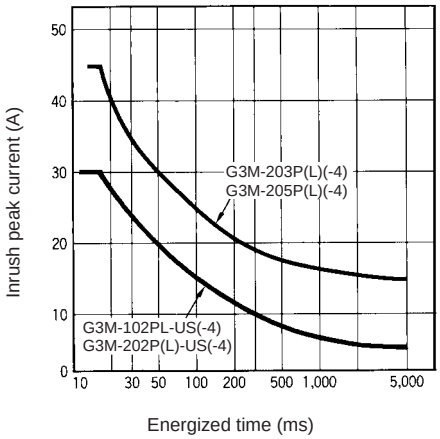
Engineering Data

Load Current vs. Ambient Temperature



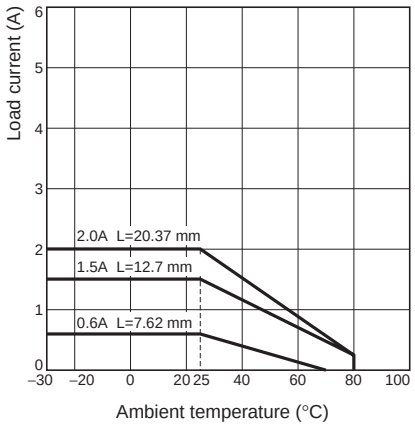
One Cycle Surge Current: Non-repetitive

Non-repetitive
Reduce the current to 1/2 or less if the G3M is in repetitive operation.

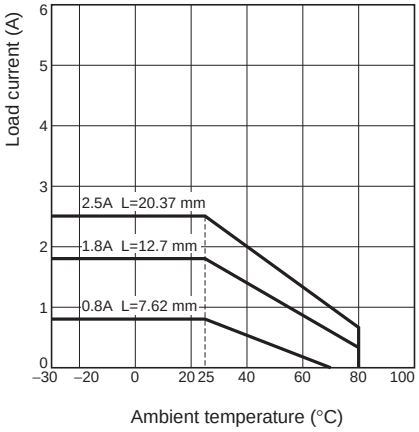


Load Current vs. Ambient Temperature (Close Mounting) G3M-205 Series (5-A Load)

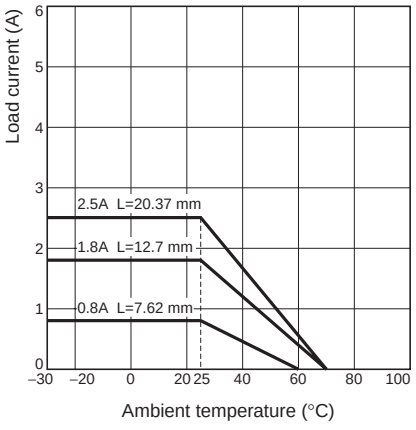
X direction

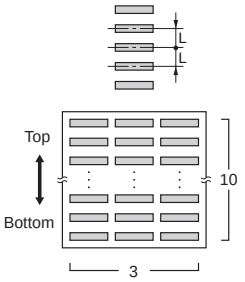


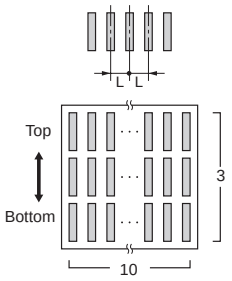
Y direction

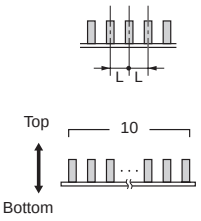


Z direction







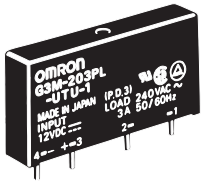


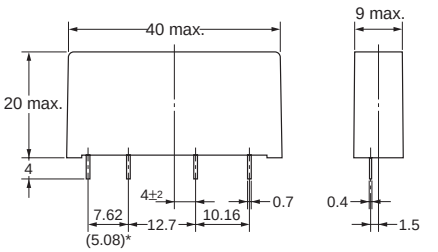
- Thirty Relays are soldered to the PCB at each given spacing.
- Continuous power.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

G3M-102PL
G3M-102PL-4
G3M-202P(L)
G3M-202P(L)-4
G3M-203P(L)
G3M-203P(L)-4

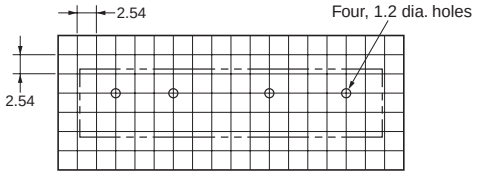




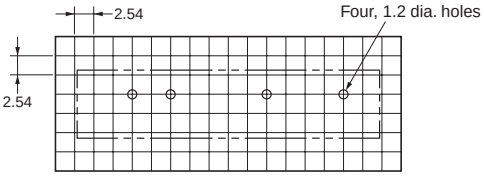
*Input terminal pitch for models ending in "-4" is 5.08 mm.

PCB Dimensions (Bottom View)

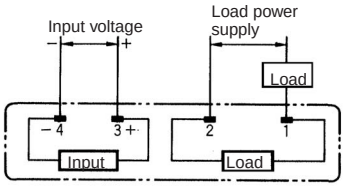
G3M-102PL, 202P(L), 203P(L)



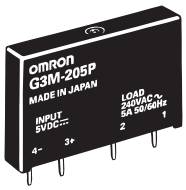
G3M-102PL-4, 202P(L)-4, 203P(L)-4

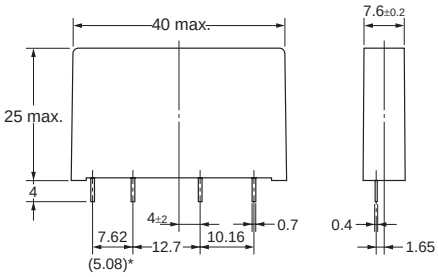


Terminal Arrangement (Bottom View)



G3M-205P(L)
G3M-205P(L)-4

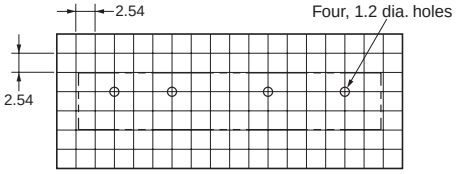




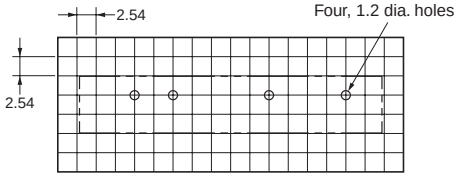
*Input terminal pitch for models ending in "-4" is 5.08 mm.

PCB Dimensions (Bottom View)

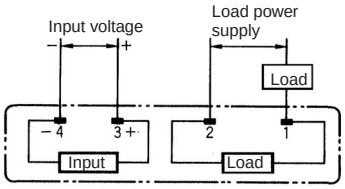
G3M-205P(L)



G3M-205P(L)-4



Terminal Arrangement (Bottom View)



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. K073-E1-04

Solid State Relays
G3MB

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Low-cost, Subminiature PCB-mounting SSR Switching 2 A

- Bottom surface area is approximately three times as small as that of the G3M and ideal for high-density PCB applications.
- DC input-AC output for 2-A load at 25°C.
- Mono-block lead frame incorporating terminals, heat sink, and a PCB directly mounted with bare chips made it possible to miniaturize the relay.
- Standard models certified by UL and CSA; -UTU models certified by VDE (TÜV).

Model Number Structure

■ Model Number Legend

G3MB-□□□□□-□-□
1 2 3 4 5 6 7 8

1. **Basic Model Name**
   G3MB: Solid State Relay
2. **Rated Load Power Supply Voltage**
   1: 100 VAC
   2: 200 VAC
3. **Rated Load Current**
   02: 2 A
4. **Terminal Type**
   P: PCB terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
6. **Special Specifications**
   Blank: Standard models
   EG: No snubber input resistance
7. **Terminal Pitch**
   4: Output terminal pitch of 5.08 mm
8. **Certification**
   Blank: Standard models (Certified by UL and CSA)
   UTU: Certified by UL, CSA, and TÜV

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Input resistor	Snubber circuit	Rated output load	Rated input voltage	Model
Phototriac	No	No	Yes	Yes	2 A at 100 to 120 VAC	5 VDC	G3MB-102PL (-UTU)
						12 VDC	
						24 VDC	
	Yes				2 A at 100 to 240 VAC	5 VDC	G3MB-202P (-UTU) G3MB-202P-4 (-UTU)
						12 VDC	
						24 VDC	
	No					5 VDC	G3MB-202PL (-UTU) G3MB-202PL-4 (-UTU)
						12 VDC	
						24 VDC	
	Yes		No	No		(See note 3.)	G3MB-202PEG-4 (-UTU)
	No						G3MB-202PLEG-4(-UTU)

Note: 1. When ordering models certified by VDE (TÜV), add “-UTU” to the model number given in the above table.

2. When ordering, specify the rated input voltage.

3. Recommended Operating Conditions

Item	Min.	Standard	Max.
Forward current	5 mA	10 mA	20 mA
Must release voltage	0	---	1 V

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input (for -P(L) version)

Rated voltage	Operating voltage	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	9.6 to 14.4 VDC	1 kΩ ±20% (750 Ω ±20%)	9.6 VDC max.	
24 VDC	19.2 to 28.8 VDC	2.2 kΩ ±20% (1.6 kΩ ±20%)	19.2 VDC max.	

Note: Each model has 5-VDC, 12-VDC, and 24-VDC input versions.

No Input Resistor (for -P(L) EG version)

Item	Min.	Standard	Max.
Forward current	5 mA	10 mA	20 mA
Must release voltage	0	---	1 V

Input (for -P(L) EG version)

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

Output

Model	Applicable load			
	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3MB-102PL(-UTU)	100 to 120 VAC, 50/60 Hz	75 to 132 VAC, 50/60 Hz	0.1 to 2 A	30 A (60 Hz, 1 cycle)
G3MB-202P(-UTU) G3MB-202PL(-UTU)	100 to 240 VAC, 50/60 Hz	75 to 264 VAC, 50/60 Hz		
G3MB-202PEG-4(-UTU) G3MB-202PLEG-4(-UTU)				

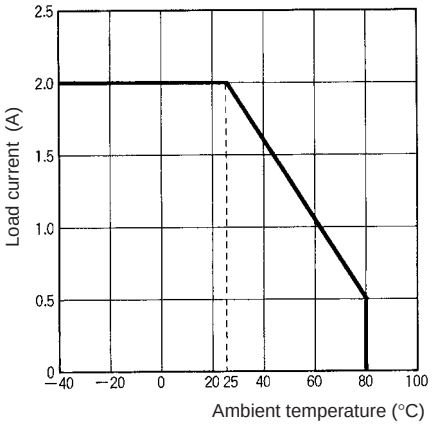
Note: The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data*.

■ Characteristics

Item	G3MB-102PL(-UTU)	G3MB-202P(-UTU), -202P-4(-UTU), -202PEG-4(-UTU)	G3MB-202PL(-UTU), -202PL-4(-UTU), -202PLEG-4(-UTU)
Operate time	1 ms max.	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	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		
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375-mm single 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%		
Certified standards	UL508 File No. E64562 CSA C22.2 (No.14) File No. LR35535 TÜV R9351062 (EN60950) (“-UTU” type)		
Weight	Approx. 5 g		

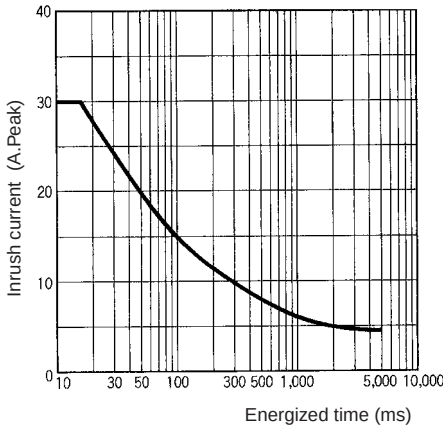
Engineering Data

Load Current vs. Ambient Temperature



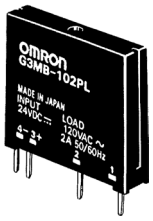
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

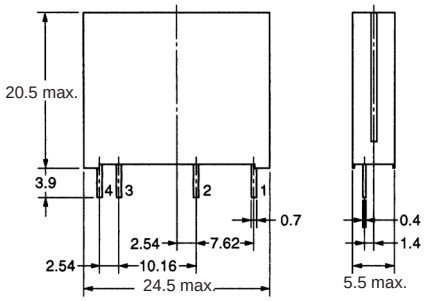


Dimensions

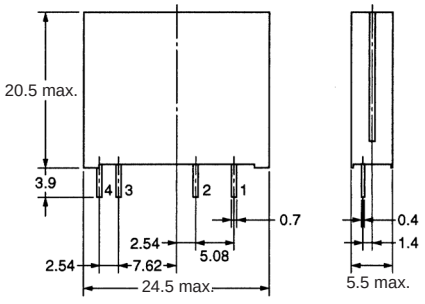
Note: All units are in millimeters unless otherwise indicated.



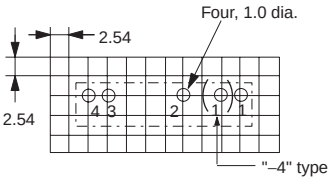
Models without "-4"



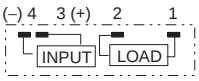
Models with "-4"



PCB Dimensions (Bottom View)



Terminal Arrangement/ Internal Connections (Bottom View)



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

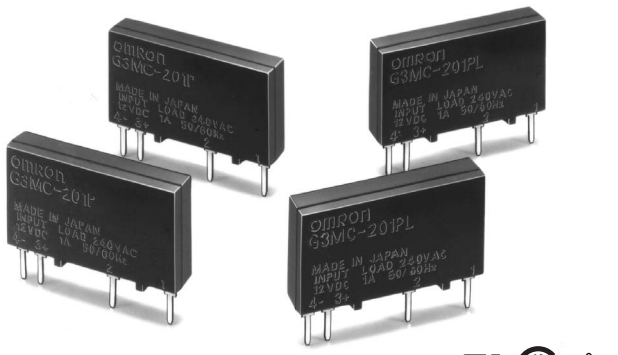
Cat. No. J091-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3MC

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

Reinforced Insulation Models Added to Compact, Thin-profile Series of SSRs for PCBs

- Small bottom surface area (approx. 80% of the conventional G3MB's) and ideal for close PCB mounting.
- DC input and AC output for an applicable load of 1 A at 40°C.
- Compact, thin-profile SSR of monoblock construction with an all-in-one frame incorporates a PCB, terminals, and heat sink.
- Standard models certified by UL and CSA.
- Models certified by VDE available.



Model Number Structure

■ Model Number Legend

G3MC-□□□□-□
1 2 3 4 5 6

1. **Basic Model Name**
   G3MC: Solid State Relay
2. **Rated Load Power Supply Voltage**
   1: 100 VAC
   2: 200 VAC
3. **Rated Load Current**
   01: 1 A
   02: 2 A
4. **Terminal Type**
   P: PCB terminals
5. **Zero Cross Function**
   Blank: Equipped with zero cross function
   L: Not equipped with zero cross function
6. **Certification**
   Blank: Standard models (certified by UL and CSA)
   VD: Certified by UL, CSA, VDE

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Snubber circuit	Rated output load	Rated input voltage	Model
Phototriac	Yes	No	Yes	1 A at 100 to 120 VAC	5 VDC	G3MC-101P(-VD)
					12 VDC	
					24 VDC	
	No				5 VDC	G3MC-101PL(-VD)
					12 VDC	
					24 VDC	
	Yes			1 A at 100 to 240 VAC	5 VDC	G3MC-201P(-VD)(-1)
					12 VDC	
					24 VDC	
	No				5 VDC	G3MC-201PL(-VD)(-1)
					12 VDC	
					24 VDC	
	Yes			2 A at 100 to 240 VAC	5 VDC	G3MC-202P(-VD)(-1)
					12 VDC	
					24 VDC	
	No				5 VDC	G3MC-202PL(-VD)(-1)
					12 VDC	
					24 VDC	

Note: 1. When ordering models certified by VDE (basic insulation), add "-VD" to the model number given in the above table. Reinforced insulation models are also available. When ordering reinforced insulation models, add "-1" to the model number given in the above table. For details, contact your OMRON representative.

2. When ordering, specify the rated input voltage.

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	Applicable load			
	Rated load voltage	Load voltage range	Load current (See note.)	Inrush current
G3MC-101P(-VD) G3MC-101PL(-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-201P(-VD)(-1) G3MC-201PL(-VD)(-1)	100 to 240 VAC 50/60 Hz	75 to 264 VAC 50/60 Hz		
G3MC-202P(-VD)(-1) G3MC-202PL(-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)

Note: The load current varies depending on the ambient temperature. Refer to *Load Current vs. Ambient Temperature* under *Engineering Data*.

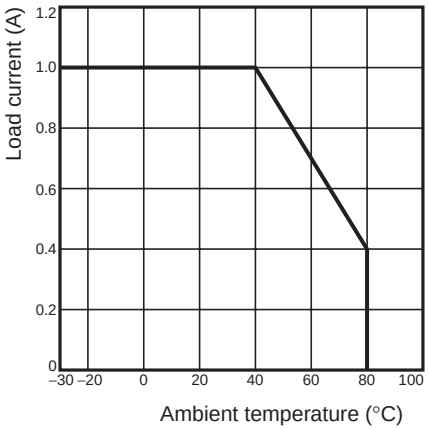
■ Characteristics

Item	G3MC-101P (-VD)	G3MC-101PL (-VD)	G3MC-201P(-VD)(-1) G3MC-202P(-VD)(-1)	G3MC-201PL(-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 to 10 Hz, 0.375-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)			
Certified standards	UL508 File No. E64562, CSA C22.2 (No. 14, No. 950) File No. LR35535, EN60950 File No. 5925UG (“-VD(-1)” type)			
Ambient humidity	Operating: 45% to 85%			
Weight	Approx. 2.5 g (Approx. 5 g for G3MC-202P(L)-VD-1)			

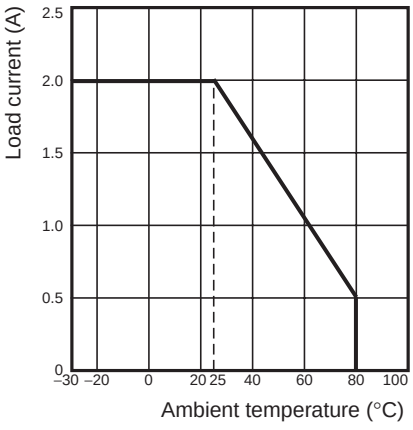
Engineering Data

Load Current vs. Ambient Temperature

G3MC-101P(-VD)
G3MC-101PL(-VD)
G3MC-201P(-VD)(-1)
G3MC-201PL(-VD)(-1)



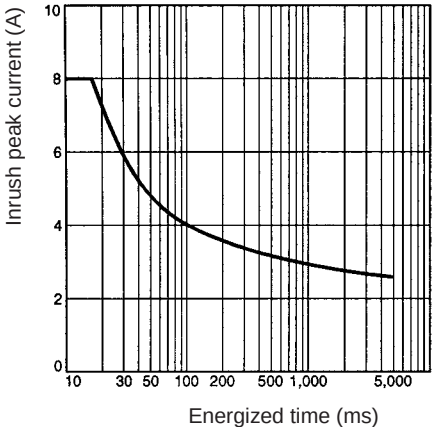
G3MC-202P(-VD)(-1)
G3MC-202PL(-VD)(-1)



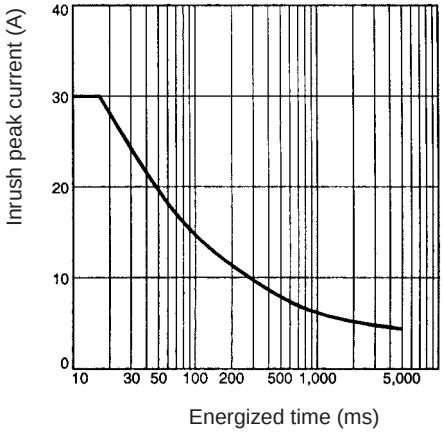
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the read value if it occurs repeatedly.

G3MC-101P(L)(-VD), G3MC-201P(L)(-VD)(-1)



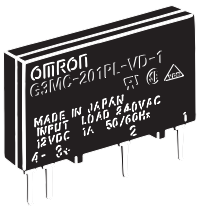
G3MC-202P(L)(-VD)(-1)

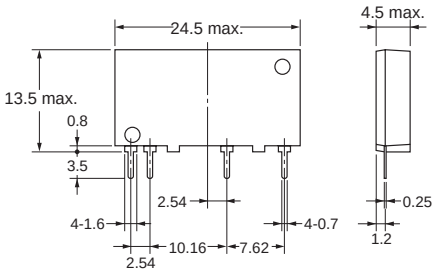


Dimensions

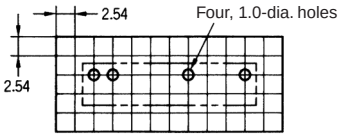
Note: All units are in millimeters unless otherwise indicated.

G3MC-101P(-VD)
G3MC-101PL(-VD)
G3MC-201P(-VD)(-1)
G3MC-201PL(-VD)(-1)

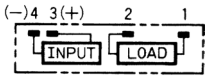




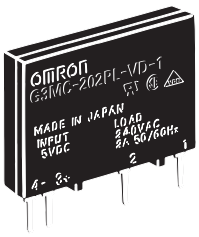
PCB Dimensions (Bottom View)

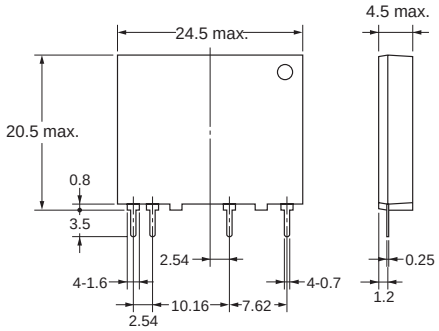


Terminal Arrangement (Bottom View)

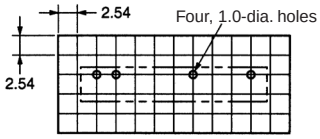


G3MC-202P(-VD)(-1)
G3MC-202PL(-VD)(-1)

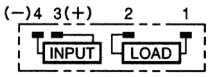




PCB Dimensions (Bottom View)



Terminal Arrangement (Bottom View)



Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

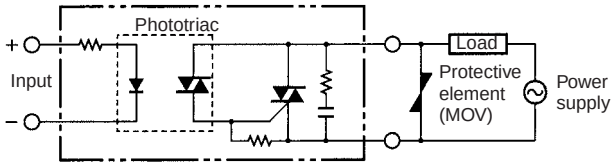
Mounting

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.

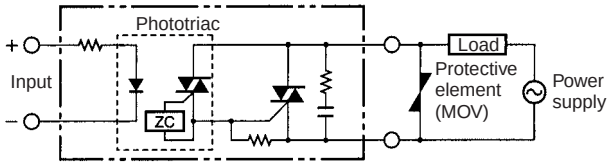
Protective Element

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)



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

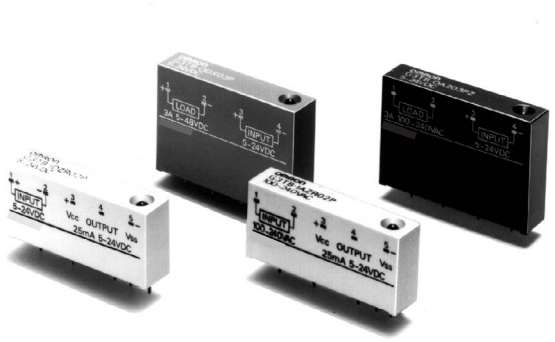
Cat. No. J108-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3TB

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

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.



Model Number Structure

■ Model Number Legend

G3TB□□□□□□□-□
1 2 3 4 5 6 7 8 9 10

1. **Basic Model Name**
   G3T: I/O Solid State Relay
2. **Structure**
   B: Pin type for PCB
3. **I/O**
   I: Input models
   O: Output models
4. **Type**
   A: Input models: AC input
   Output models: AC output
   D: Input models: AC input
   Output models: AC output
5. **Rated Load Power Supply Voltage**
   2: 200 VAC/200VDC
   X: 50 to 100 VDC
   Z: 26 VDC max.
6. **Rated Load Current**
   01: 1 A
   02: 2 A
   03: 3 A
   R02: 25 mA
7. **Terminal Type**
   P: PCB terminals
8. **Zero Cross Function**
   Blank: DC output models
   Z: Equipped with zero cross function
   L: Not equipped with zero cross function
9. **Operation Indicator**
   Blank: Equipped with operation indicator
   M: Not equipped with operation indicator
10. **Certification**
    US: Certified by UL and CSA

Ordering Information

■ List of Models

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	Rated input voltage	Model
Photocoupler	Yes	Yes	3 A at 100 to 240 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	5 to 24 VDC	G3TB-ODX03P-US
		No		4 to 24 VDC	G3TB-ODX03PM-US
		Yes	1.5 A at 48 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 to 10 Hz, 0.75-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	UL508 File No. E41515/CSA C22.2 (No.0, No.14) File No. LR35535/TÜV R90381 (VDE0806)	
Weight	Approx. 22 g	

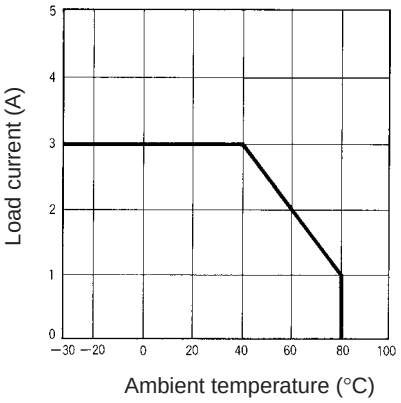
Output Module

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 to 10 Hz, 0.75-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	UL508 File No. E64562/CSA C22.2 (No.0, No.14) File No. LR35535/TÜV R90381 (VDE0806)							
Weight	Approx. 32 g							

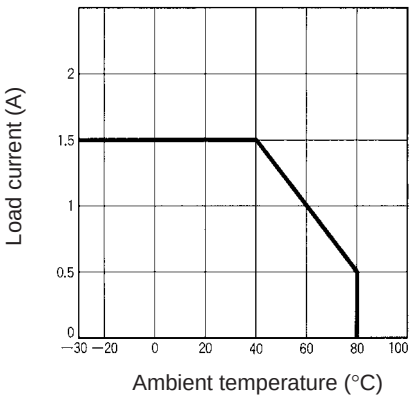
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3TB-OA203PZ-US/-OA203PZM-US /-OA203PL-US/-OA203PLM-US/ G3TB-ODX03P-US/-ODX03PM-US



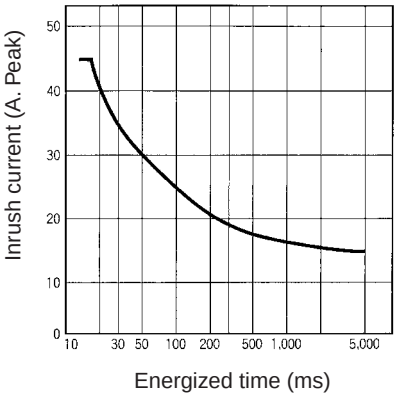
G3TB-OD201P-US/-OD201PM-US



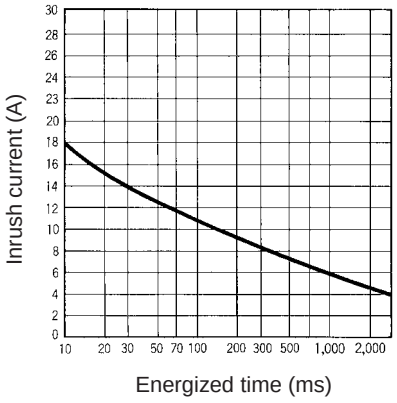
One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

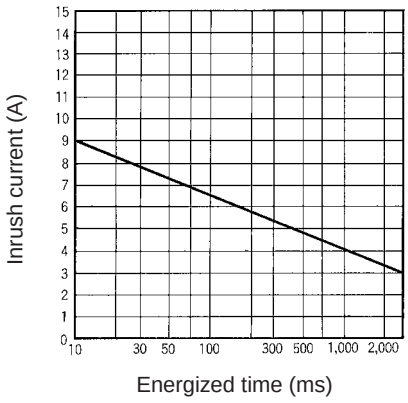
G3TB-OA203PZ-US/-OA203PZM-US/ -OA203PL-US/-OA203PLM-US



G3TB-ODX03P-US/-ODX03PM-US

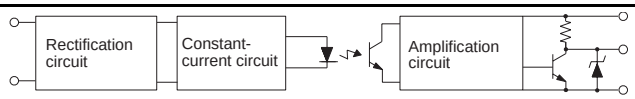
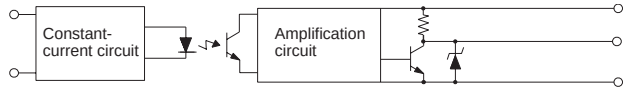
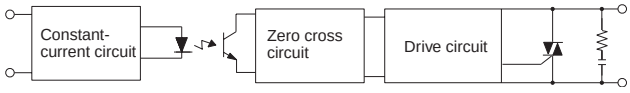
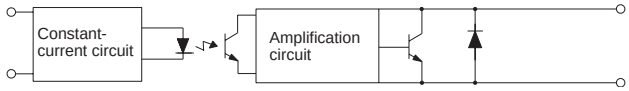


G3OD201P-US/-OD201PM-US



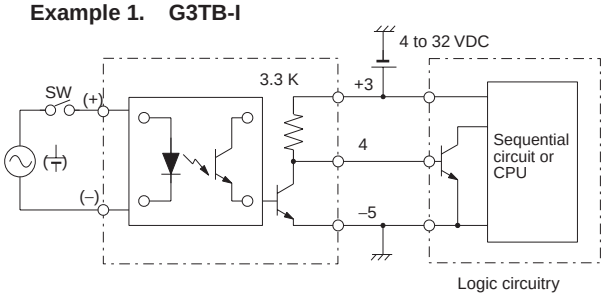
Operation

■ Circuit Configuration

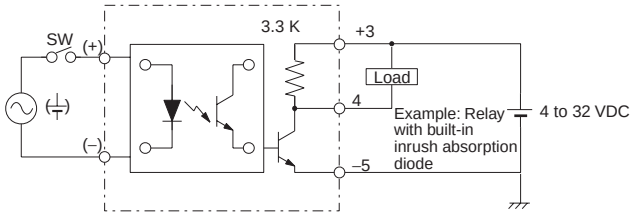
Type	Model	Case color	Indicator	Circuit
AC input	G3TB-IAZR02P-US	Yellow	Yes	
DC input	G3TB-IDZR02P-US	White	Yes	
AC output	G3TB-OA203PZ-US G3TB-OA203PL-US	Black	Yes	
	G3TB-OA203PZM-US G3TB-OA203PLM-US		No	
DC output	G3TB-ODX03P-US G3TB-OD201P-US	Red	Yes	
	G3TB-ODX03PM-US G3TB-OD201PM-US		No	

Example of Logic Output Circuit

Example 1. G3TB-I



Example 2. G3TB-I

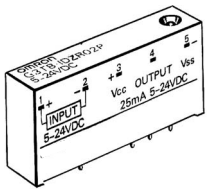


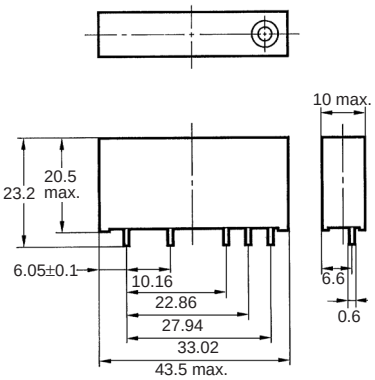
Note: AC- and DC-input versions are available.

Dimensions

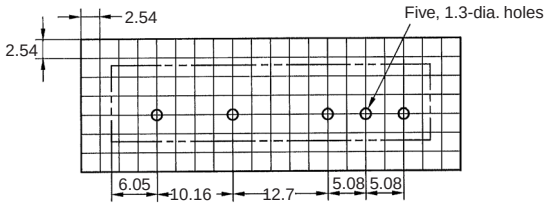
Note: All units are in millimeters unless otherwise indicated.

Input SSR
G3TB-I

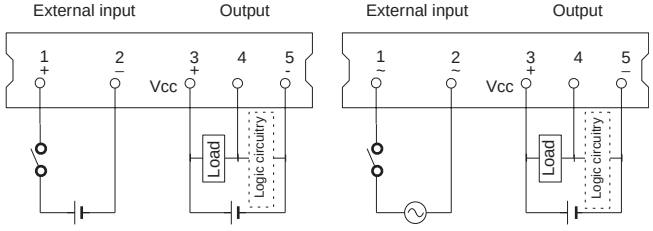




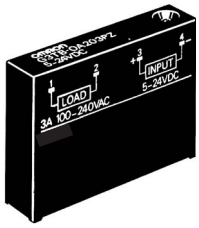
PCB Dimensions (Bottom View)

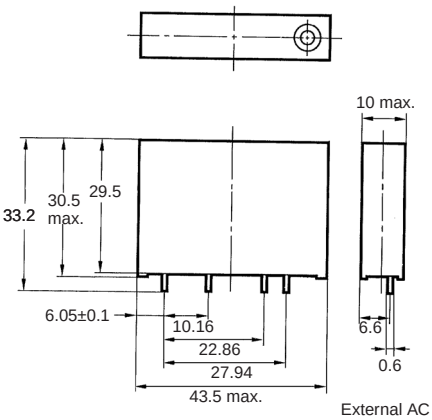


Terminal Arrangement (Bottom View)

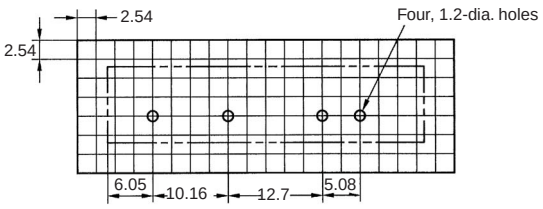


Output SSR
G3TB-O

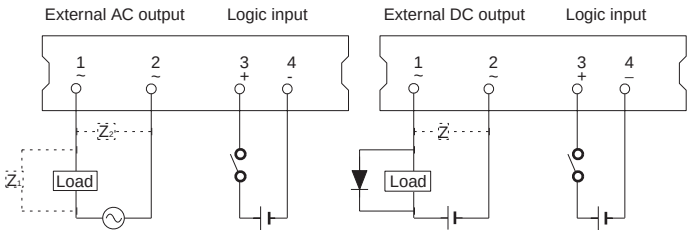




PCB Dimensions (Bottom View)



Terminal Arrangement (Bottom View)



Note: Z_1, Z_2, and Z refer to overvoltage absorption elements that you should connect.

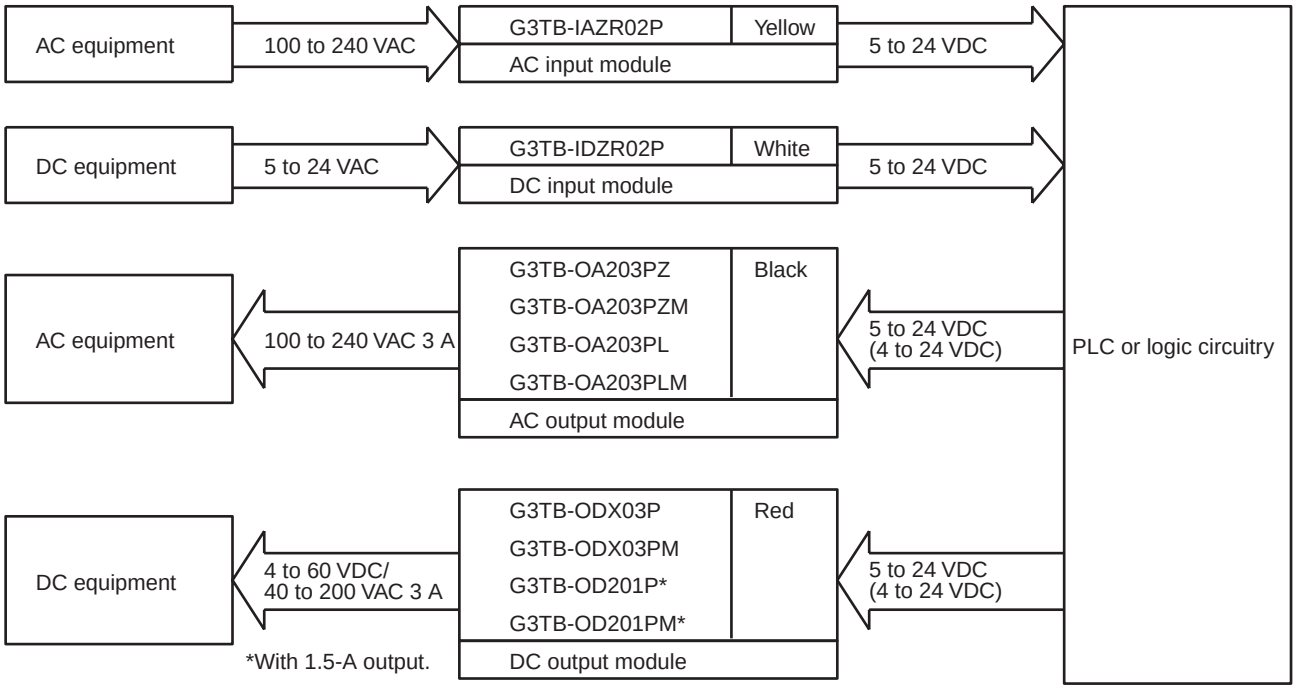
Safety Precautions

■ Precautions for Correct Use

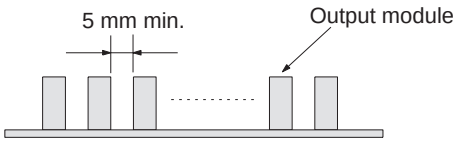
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

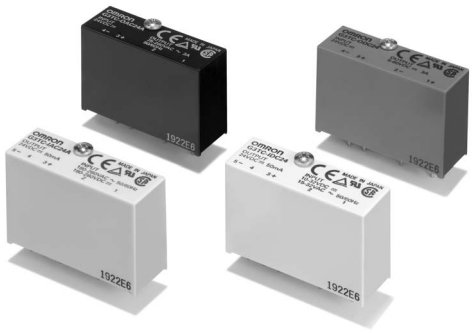
Cat. No. K077-E1-03

Solid State Relays
G3TC

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

I/O Modules with Plug-in Pin Terminals for Screw Fastening on I/O Board

- Plug-in pin terminals allow the modules to be replaced simply by loosening screws.
- Standardized structure enables I/O modules to be replaced with other models.
- A rich variety of I/O modules is available, with 9 types of input module and 12 types of output module.
- Coupler used to ensure dielectric strength of 4,000 VAC.
- Certified by UL, CSA, and TÜV.



Model Number Structure

■ Model Number Legend

G3TC-□□□□
1 2 3 4 5

1. Basic Model Name
- G3TC: I/O Solid State Relay

2. I/O
- O: Output
- I: Input

3. Type
- AC: Output models (OAC): DC input, AC output
  Input models (IAC): AC/DC input, DC output
- DC: Output models (ODC): DC input, DC output
  Input models (IDC): DC/AC input, DC output

4. Power Supply Voltage Specifications 1
- 5: Output models (O): Rated input voltage of 5 VDC
  Input models (I): Rated output voltage of 5 VDC
- 15: Output models (O): Rated input voltage of 15 VDC
  Input models (I): Rated output voltage of 15 VDC
- 24: Output models (O): Rated input voltage of 24 VDC
  Input models (I): Rated output voltage of 24 VDC

5. Power Supply Voltage Specifications 2
- Blank: OAC: Rated output voltage of 120 VAC
  ODC: Rated output voltage of 60 VDC
  IAC: Rated input voltage of 120 VAC/VDC
  IDC: Rated input voltage of 24 VDC/VAC
- A: OAC: Rated output voltage of 240 VAC
  ODC: Rated output voltage of 200 VDC
  IAC: Rated input voltage of 240 VAC/VDC

Ordering Information

■ List of Models

Input Modules

Function	Case color	Isolation	Logic level		Rated Input voltage	Model
			Supply voltage	Supply current		
DC input	White	Photocoupler	4.5 to 6 VDC	18 mA max.	24 VDC/VAC	G3TC-IDC5
			12 to 18 VDC	15 mA max.		G3TC-IDC15
			20 to 30 VDC	12 mA max.		G3TC-IDC24
AC input	Yellow		4.5 to 6 VDC	18 mA max.	120 VAC/VDC	G3TC-IAC5
			12 to 18 VDC	15 mA max.		G3TC-IAC15
			20 to 30 VDC	12 mA max.		G3TC-IAC24
			4.5 to 6 VDC	18 mA max.	240 VAC/VDC	G3TC-IAC5A
			12 to 18 VDC	15 mA max.		G3TC-IAC15A
			20 to 30 VDC	12 mA max.		G3TC-IAC24A

Output Modules

Function	Case color	Isolation	Applicable load		Rated Input voltage	Model
			Load voltage	Load current		
DC output	Red	Photocoupler	5 to 60 VDC	0.01 to 3 A	5 VDC	G3TC-ODC5
					15 VDC	G3TC-ODC15
					24 VDC	G3TC-ODC24
			5 to 200 VDC	0.01 to 1 A	5 VDC	G3TC-ODC5A
					15 VDC	G3TC-ODC15A
					24 VDC	G3TC-ODC24A
AC output	Black	Phototriac	75 to 140 VAC	0.05 to 3 A	5 VDC	G3TC-OAC5
					15 VDC	G3TC-OAC15
					24 VDC	G3TC-OAC24
			75 to 280 VAC	0.05 to 3 A	5 VDC	G3TC-OAC5A
					15 VDC	G3TC-OAC15A
					24 VDC	G3TC-OAC24A

Note: When ordering, specify the rated input voltage.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Item	Rated voltage	Operating voltage	Must operate voltage	Must release voltage	Input current at rated voltage	Input resistance (See note.)
G3TC-IDC5	24 VDC/VAC	10 to 32 VDC/15 to 32 VAC	10 VDC/15 VAC max.	3 VDC/3 VAC min.	25 mA max.	1.5 kΩ
G3TC-IDC15						
G3TC-IDC24						
G3TC-IAC5	120 VAC/VDC	90 to 140 VAC/ VDC	90 VAC/VDC max.	25 VAC/VDC min.	5 mA max.	30 kΩ
G3TC-IAC15						
G3TC-IAC24						
G3TC-IAC5A	240 VAC/VDC	180 to 280 VAC/ VDC	180 VAC/VDC max.	45 VAC/VDC min.	5 mA max.	69 kΩ
G3TC-IAC15A						
G3TC-IAC24A						

Item	Rated voltage	Operating voltage	Must operate voltage	Must release voltage	Input current at rated voltage (See note.)	Control resistance (RC in circuit configuration)
G3TC-ODC5	5 VDC	2.5 to 8 VDC	2.5 VDC max.	1 VDC min.	18 mA max.	240 Ω
G3TC-ODC15	15 VDC	9 to 16 VDC	9 VDC max.	1 VDC min.	18 mA max.	1 kΩ
GT3C-ODC24	24 VDC	18 to 32 VDC	18 VDC max.	1 VDC min.	18 mA max.	2.2 kΩ
G3TC-ODC5A	5 VDC	2.5 to 8 VDC	2.5 VDC max.	1 VDC min.	18 mA max.	240 Ω
G3TC-ODC15A	15 VDC	9 to 16 VDC	9 VDC max.	1 VDC min.	18 mA max.	1 kΩ
GT3C-ODC24A	24 VDC	18 to 32 VDC	18 VDC max.	1 VDC min.	18 mA max.	2.2 kΩ
G3TC-OAC5	5 VDC	2.5 to 8 VDC	2.5 VDC max.	1 VDC min.	18 mA max.	240 Ω
G3TC-OAC15	15 VDC	9 to 16 VDC	9 VDC max.	1 VDC min.	18 mA max.	1 kΩ
G3TC-OAC24	24 VDC	18 to 32 VDC	18 VDC max.	1 VDC min.	18 mA max.	2.2 kΩ
G3TC-OAC5A	5 VDC	2.5 to 8 VDC	2.5 VDC max.	1 VDC min.	18 mA max.	240 Ω
G3TC-OAC15A	15 VDC	9 to 16 VDC	9 VDC max.	1 VDC min.	18 mA max.	1 kΩ
G3TC-OAC24A	24 VDC	18 to 32 VDC	18 VDC max.	1 VDC min.	18 mA max.	2.2 kΩ

Note: The Output Module supplies the current on I/O circuit board at the nominal input voltage.

Output

Item	Output supply voltage-nominal	Output supply voltage-range	Output supply current at rated input voltage (See note.)	Control resistance (RC in circuit configuration)	Output current
G3TC-IDC5	5 VDC	4.5 to 6 VDC	18 mA max.	240 Ω	50 mA max.
G3TC-IDC15	15 VDC	12 to 18 VDC	15 mA max.	1 kΩ	
G3TC-IDC24	24 VDC	20 to 30 VDC	12 mA max.	2.2 kΩ	
G3TC-IAC5	5 VDC	4.5 to 6 VDC	18 mA max.	240 Ω	
G3TC-IAC15	15 VDC	12 to 18 VDC	15 mA max.	1 kΩ	
G3TC-IAC24	24 VDC	20 to 30 VDC	12 mA max.	2.2 kΩ	
G3TC-IAC5A	5 VDC	4.5 to 6 VDC	18 mA max.	240 Ω	
G3TC-IAC15A	15 VDC	12 to 18 VDC	15 mA max.	1 kΩ	
G3TC-IAC24A	24 VDC	20 to 30 VDC	12 mA max.	2.2 kΩ	

Note: The Input Module supplies the current on I/O circuit board at the nominal output voltage.

Item	Rated load voltage	Load voltage range	Load current	Inrush current
G3TC-ODC5	60 VDC	5 to 60 VDC	0.01 to 3 A	18 A (10 ms)
G3TC-ODC15				
G3TC-ODC24				
G3TC-ODC5A	200 VDC	5 to 200 VDC	0.01 to 1.0 A	9 A (10 ms)
G3TC-ODC15A				
G3TC-ODC24A				
G3TC-OAC5	120 VAC	75 to 140 VAC	0.05 to 3 A	45 A (60 Hz, 1 cycle)
G3TC-OAC15				
G3TC-OAC24				
G3TC-OAC5A	240 VAC	75 to 280 VAC		
G3TC-OAC15A				
G3TC-OAC24A				

■ Characteristics

Item	Operate time (See note 1.)	Release time (See note 1.)	Output ON voltage drop	Leakage current	Insulation resistance	Dielectric strength	Vibration resistance	Shock resistance	Ambient temperature	Ambient humidity	Certified standard	Weight
G3TC-IDC5	5 ms max.	5 ms max.	0.4 V max.	100 μA max.	100 MΩ min. (at 500 VDC)	4,000 VAC, 50/60 Hz for 1 min between input and output	Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude	Malfunction: 1,000 m/s²	Operating: −30 to 80°C (with no icing or condensation) Storage: −30 to 100°C (with no icing or condensation)	Operating: 45 to 85%	UL508, UL1950, CSA22.2 No. 14, No. 950, EN60950	Approx. 40 g
G3TC-IDC15												
G3TC-IDC24												
G3TC-IAC5	20 ms max.	20 ms max.	0.4 V max.	100 μA max.								Approx. 40 g
G3TC-IAC15												
G3TC-IAC24												
G3TC-IAC5A												
G3TC-IAC15A												
G3TC-IAC24A												
G3TC-ODC5	50 μs max.	50 μs max. (See note 2.)	1.6 V max.	1 mA max. (at 60 VDC)								Approx. 45 g
G3TC-ODC15												
G3TC-ODC24												
G3TC-ODC5A	100 μs max.	750 μs max.		1 mA max. (at 200 VDC)								Approx. 40 g
G3TC-ODC15A												
G3TC-ODC24A												
G3TC-OAC5	1/2 of load power source cycle + 1 ms max.	1/2 of load power source cycle + 1 ms max.	1.6 V (RMS) max.	2.5 mA max. (at 120 VAC)								Approx. 45 g
G3TC-OAC15												
G3TC-OAC24												
G3TC-OAC5A				5 mA max. (at 240 VAC)								
G3TC-OAC15A												
G3TC-OAC24A												

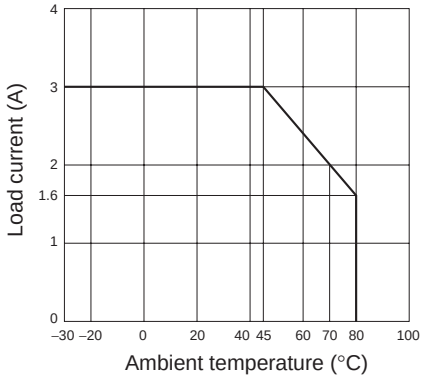
Note: 1. Tested at the nominal output supply voltage, the rated input voltage, and an ambient temperature of 25°C.

2. Tested at a 24-VDC load voltage, a 3-A load current, and an ambient temperature of 25°C.

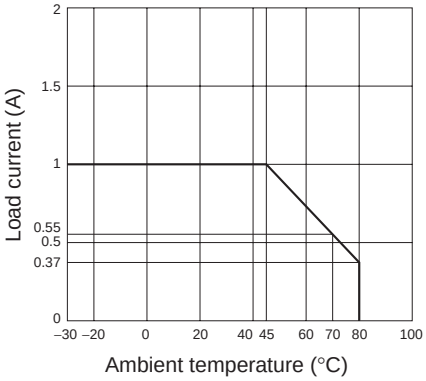
Engineering Data

Load Current vs. Ambient Temperature Characteristics

G3TC-ODC5
G3TC-ODC15
G3TC-ODC24

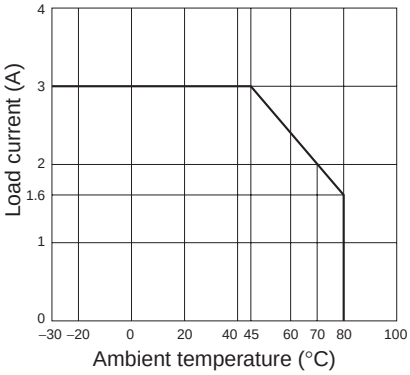


G3TC-ODC5A
G3TC-ODC15A
G3TC-ODC24A



G3TC-OAC5
G3TC-OAC15
G3TC-OAC24

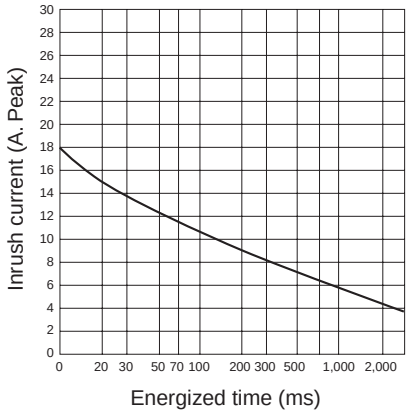
G3TC-OAC5A
G3TC-OAC15A
G3TC-OAC24A



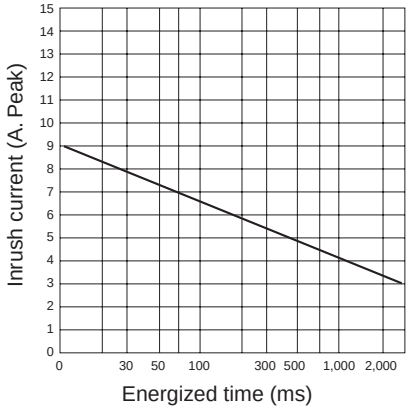
One Cycle Surge Current: Non-repetitive

Note: Keep the inrush current to half the rated value if it occurs repetitively.

G3TC-ODC5
G3TC-ODC15
G3TC-ODC24

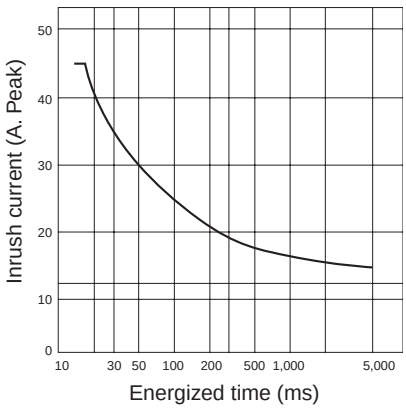


G3TC-ODC5A
G3TC-ODC15A
G3TC-ODC24A



G3TC-OAC5
G3TC-OAC15
G3TC-OAC24

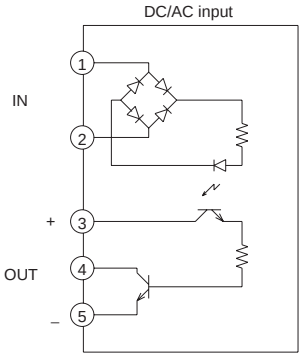
G3TC-OAC5A
G3TC-OAC15A
G3TC-OAC24A



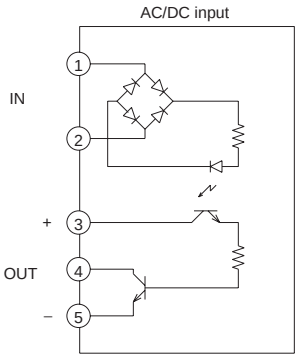
Operation

■ Circuit Configuration

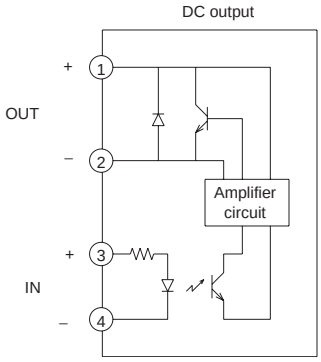
G3TC-IDC5
G3TC-IDC15
G3TC-IDC24



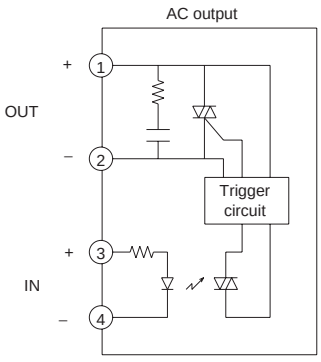
G3TC-IAC5 G3TC-IAC5A
G3TC-IAC15 G3TC-IAC15A
G3TC-IAC24 G3TC-IAC24A



G3TC-ODC5 G3TC-ODC5A
G3TC-ODC15 G3TC-ODC15A
G3TC-ODC24 G3TC-ODC24A



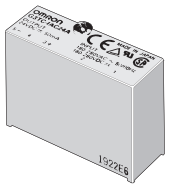
G3TC-OAC5 G3TC-OAC5A
G3TC-OAC15 G3TC-OAC15A
G3TC-OAC24 G3TC-OAC24A

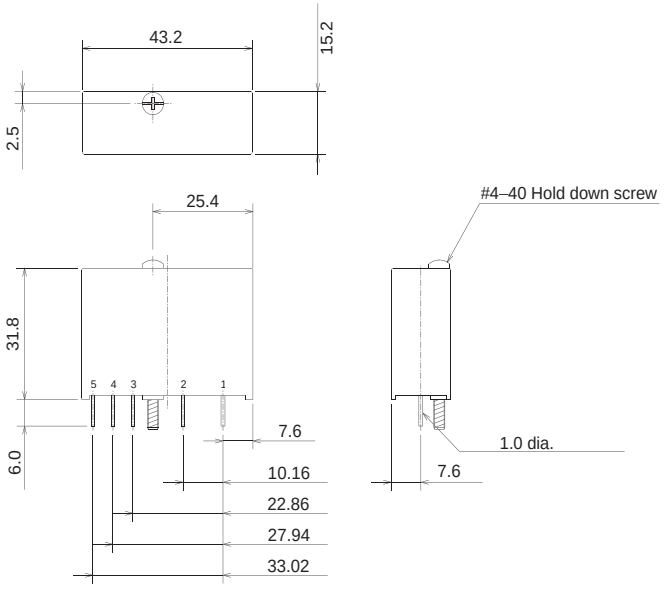


Dimensions

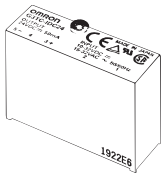
Note: All units are in millimeters unless otherwise indicated.

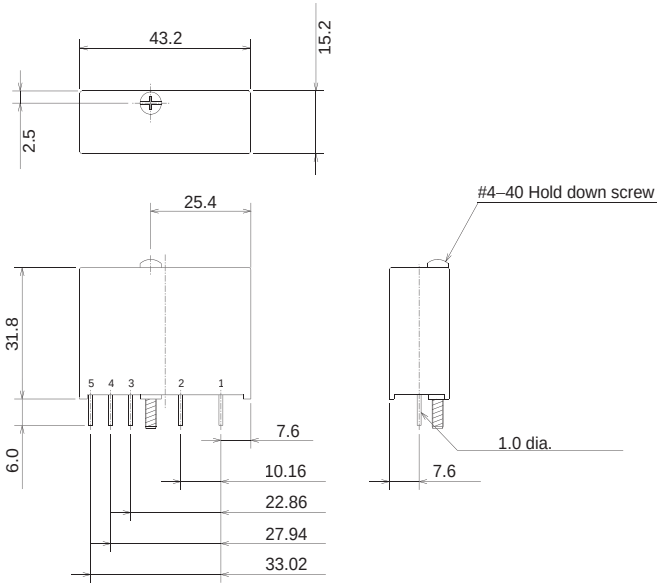
G3TC-IAC5 G3TC-IAC5A
G3TC-IAC15 G3TC-IAC15A
G3TC-IAC24 G3TC-IAC24A



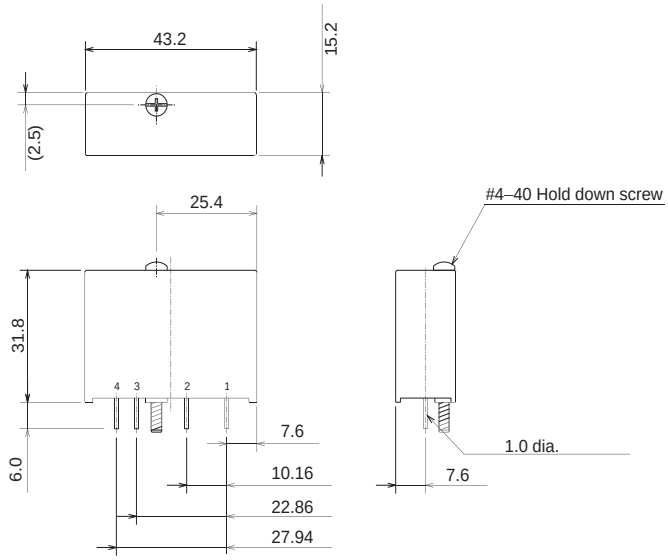


G3TC-IDC5
G3TC-IDC15
G3TC-IDC24

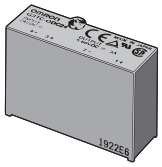


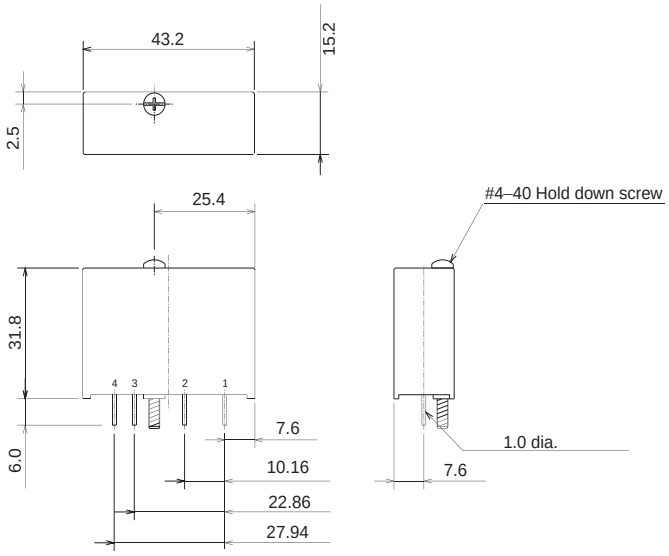


G3TC-OAC5 G3TC-OAC5A
G3TC-OAC15 G3TC-OAC15A
G3TC-OAC24 G3TC-OAC24A



G3TC-ODC5 G3TC-ODC5A
G3TC-ODC15 G3TC-ODC15A
G3TC-ODC24 G3TC-ODC24A





Safety Precautions

■ Precautions for Correct Use

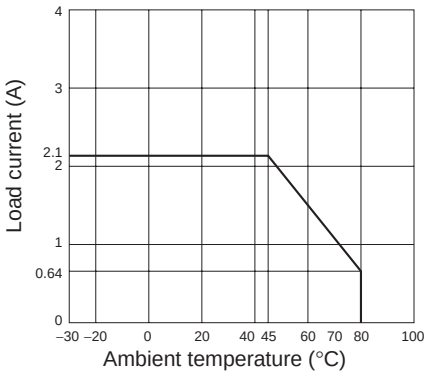
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

Before Actual Operation

1. 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 Units.
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 106 kPa. 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 damage 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 overvoltage absorption element is built in. Therefore, if the G3TC is connected to an inductive load, be sure to connect the overvoltage 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 the load to absorb the counter electromotive force of the load.
10. When mounting on the I/O mounting rack which is installed horizontally, use the G3TC with loads that are within the following conditions.

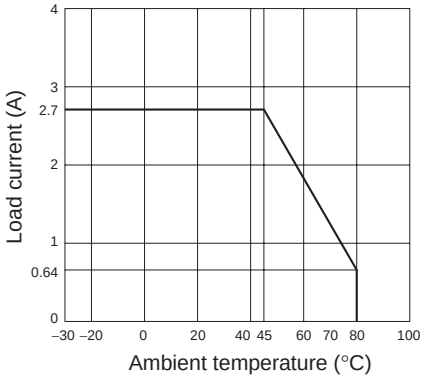
G3TC-OAC5, OAC15, OAC24
G3TC-OAC5A, OAC15A, OAC24A

Horizontal Mounting



G3TC-ODC5, ODC15, ODC24

Horizontal Mounting



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J141-E1-01 In the interest of product improvement, specifications are subject to change without notice.

Solid State Relays
G3S/G3SD

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

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 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.
- Built-in varistor effectively absorbs external surges. (In case of SSR for AC switching.)
- Certified by UL and CSA.

Model Number Structure

■ Model Number Legend

G3S□-□□□□-□-□
1 2 3 4 5 6 7 8

1. **Basic Model Name**
   G3S: Solid State Relay
2. **Rated Load Power Supply**
   Blank: AC output
   D: DC output
3. **Rated Load Power Supply Voltage**
   Z: 24 VDC
   2: 200 VAC
4. **Rated Load Current**
   01: 1 A
5. **Terminal Type**
   P: PCB terminals
6. **Zero Cross Function**
   Blank: DC-output model or equipped with zero cross function
   L: Not equipped with zero cross function
7. **Special Specifications**
   Blank: Standard models
   PD: High rated load current
8. **Certification**
   US: Certified by UL and CSA

Ordering Information

■ List of Models

Isolation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Phototriac	No	No	1 A at 100 to 240 VAC (See note 1.)	5 VDC	G3S-201PL-US
				12 VDC	
				24 VDC	
			1.2 A at 100 to 240 VAC (See note 1.)	5 VDC	G3S-201PL-PD-US
				12 VDC	
				24 VDC	
Photocoupler			1 A at 4 to 24 VDC (See note 2.)	5 VDC	G3SD-Z01P-US
				12 VDC	
				24 VDC	
			1.1 A at 4 to 24 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”.
3. When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

Heat Sink

Heat Sink	Y92B-S08N

See *Dimensions* for details.

Connecting Socket

Connecting Socket	P6B-04P

See *Dimensions* for details.

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

Input

Rated voltage	Operating voltage	Impedance		Voltage level	
		G3S-201PL-US /201PL-PD-US	G3S-Z01P-US /Z01P-PD-US	Must operate voltage	Must release voltage
5 VDC	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.	

Note: Each models has 5-VDC, 12-VDC, and 24-VDC input versions.

Output

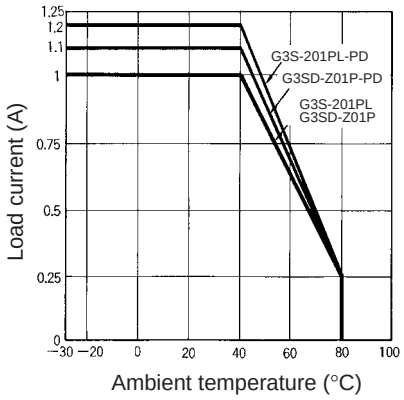
Model	Applicable load			
	Rated load voltage	Rated load voltage range	Load current	Inrush current
G3S-201PL-US	100 to 240 VAC	75 to 264 VAC	0.1 to 1 A	15 A (60 Hz, 1 cycle)
G3S-201PL-PD-US			0.1 to 1.2 A	
G3SD-Z01P-US	4 to 24 VDC	3 to 26 VDC	0.01 to 1 A	3 A (10 ms)
G3SD-Z01P-PD-US			0.01 to 1.1 A	

■ Characteristics

Item	G3S-201PL-US/201PL-PD-US	G3SD-Z01P-US/Z01P-PD-US
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. (at 500 VDC)	
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min	
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.75-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	UL508 File No. E64562/CSA C22.2 (No.0, No.14) File No. LR35535	
Weight	Approx. 13 g	

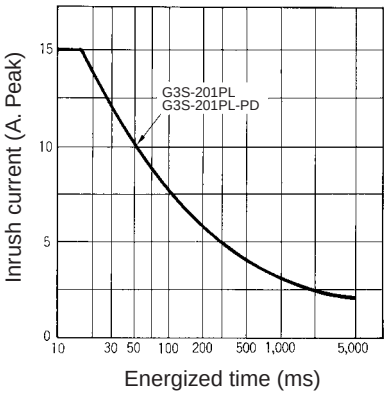
Engineering Data

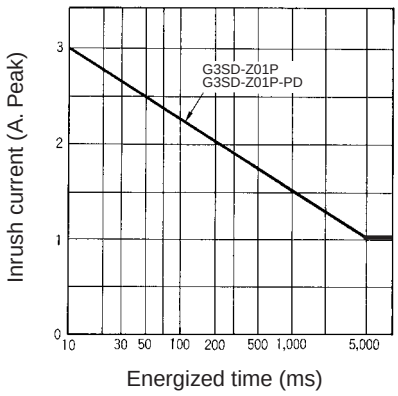
Load Current vs Ambient Temperature Characteristics



One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

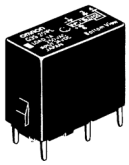


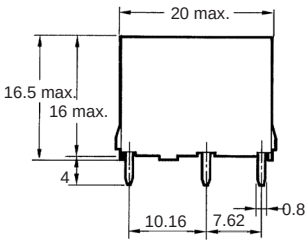


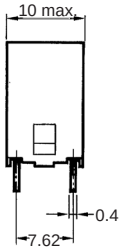
Dimensions

Note: All units are in millimeters unless otherwise indicated.

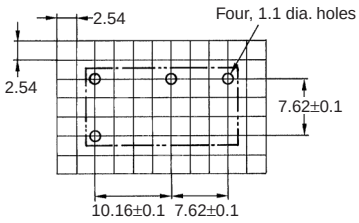
G3S/G3SD



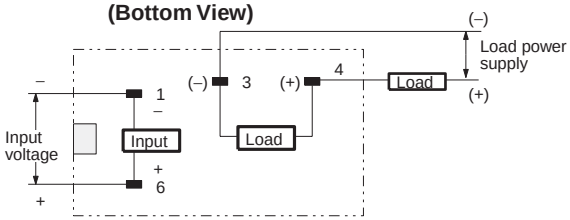




PCB Dimensions (Bottom View)

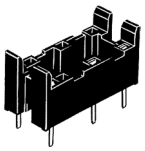


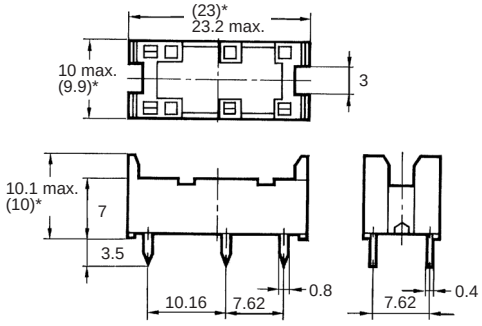
Terminal Arrangement/ Internal Connections (Bottom View)



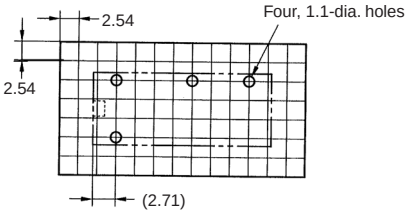
Note: Values in parentheses apply to the DC-load versions.

Connecting Socket
P6B-04P



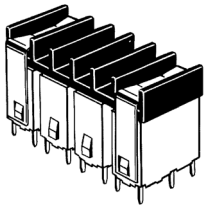


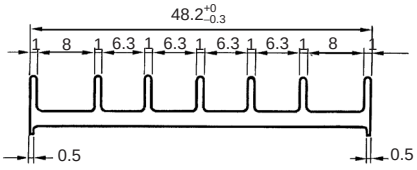
PCB Dimensions
(Bottom View)

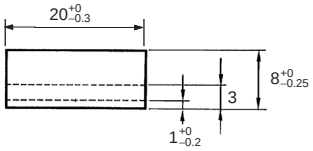


*Average value

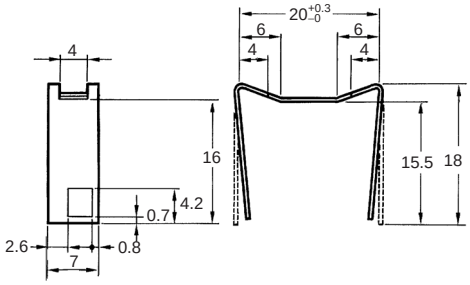
Heat Sink
Y92B-S08N



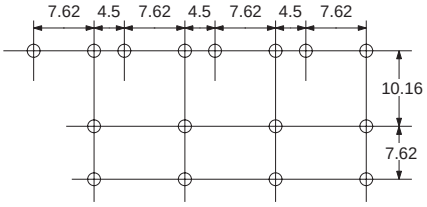




Mounting Bracket



PCB Dimensions
(Bottom View)



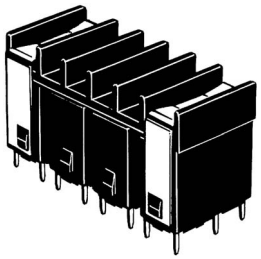
Safety Precautions

■ Precautions for Correct Use

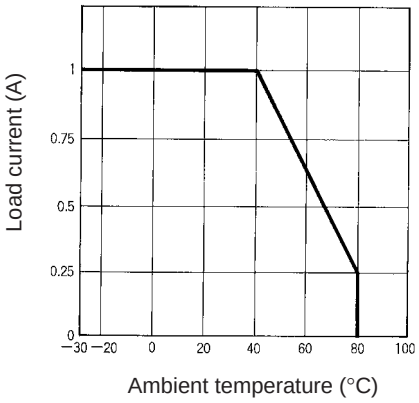
Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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 below.



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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

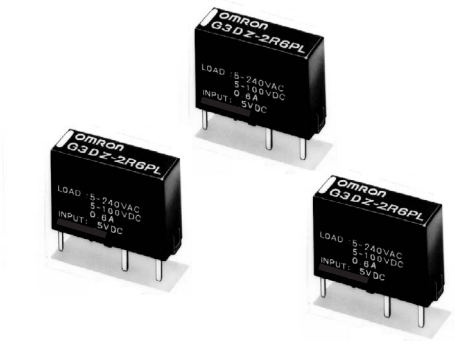
Cat. No. K060-E1-05

MOS FET Relays
G3DZ

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

SSR Identical to the G6D in Size with a Maximum AC/DC Switching Current of 0.6 A

- Switch 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.
- Input resistor and varistor incorporated models available.
- Switch full- and half-wave rectified alternating currents.
- Certified by UL and CSA.



Model Number Structure

■ Model Number Legend

G3DZ-□□□□□
1 2 3 4 5 6

1. **Basic Model Name**
   G3DZ: MOS FET Relay
2. **Rated Load Power Supply**
   Blank: AC/DC output
3. **Rated Load Power Supply Voltage**
   2: 200 VAC/125 VDC
4. **Rated Load Current**
   R6: 0.6 A
5. **Terminal Type**
   P: PCB terminals
6. **Zero Cross Function**
   L: Not equipped with zero cross function

Ordering Information

■ List of Models

Insulation	Zero cross function	Indicator	Rated output load	Rated input voltage	Model
Photo-voltage coupler	No	No	0.6 A at 5 to 240 VAC 5 to 100 VDC	5 VDC 12 VDC 24 VDC	G3DZ-2R6PL

Note: When ordering, specify the rated input voltage.

■ Accessories (Order Separately)

See *Dimensions* for details.

Connecting socket	P6D-04P

Specifications

■ Ratings (at an Ambient Temperature of 25°C)

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 range	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 (10 ms)

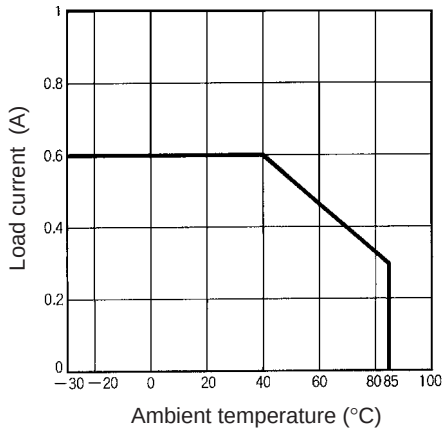
■ Characteristics

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. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between input and output
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.75-mm single 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)
Certified standards	UL508 File No. E64562 CSA C22.2 (No.14) File No. LR35535
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 3.1 g

Engineering Data

Load Current vs. Ambient Temperature Characteristics

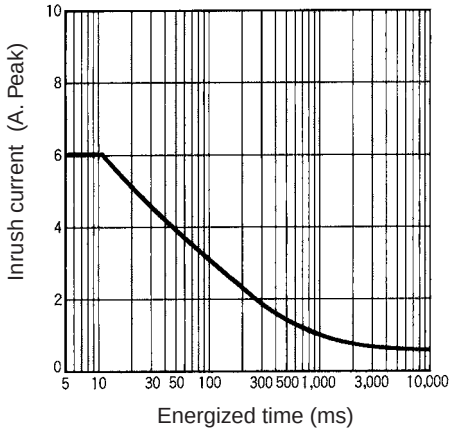
G3DZ-2R6PL



One Cycle Surge Current: Non-repetitive

Non-repetitive (Keep the inrush current to half the rated value if it occurs repetitively.)

G3DZ-2R6PL

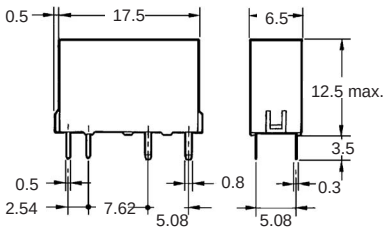


Dimensions

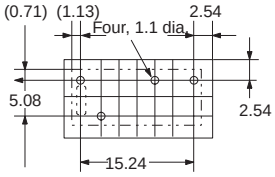
Note: 1. All units are in millimeters unless otherwise indicated.

2. Orientation marks are indicated as follows:

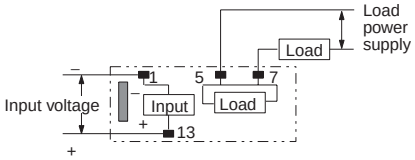
G3DZ-2R6PL



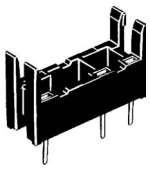
Mounting Holes (Bottom View)

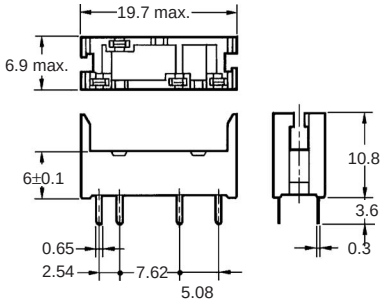


Terminal Arrangement/ Internal Connections (Bottom View)

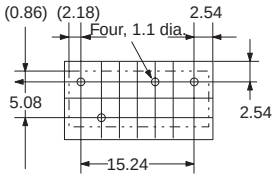


P6D-04P Connecting Socket

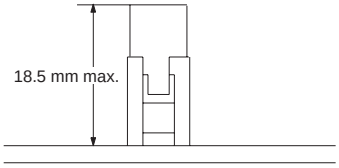




Mounting Holes (Bottom View)



Socket Mounting Height

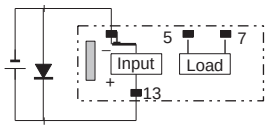


Safety Precautions

■ Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunction, or undesirable effect on product performance.

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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

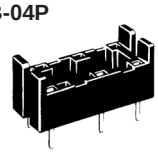
Cat. No. K089-E1-03 In the interest of product improvement, specifications are subject to change without notice.

Sockets

Refer to *Warranty and Application Considerations* (page 1), *Safety Precautions* (page 4), and *Technical and Safety Information* (page 6).

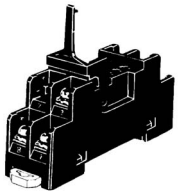
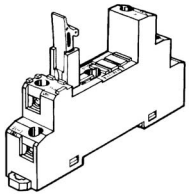
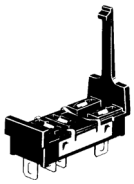
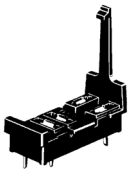
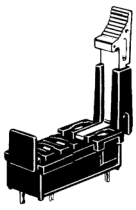
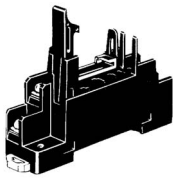
■ Sockets

PCB Relay Socket

Item	P6B *see page 300
4 pins	**P6B-04P** 

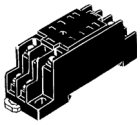
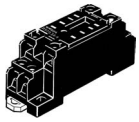
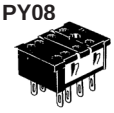
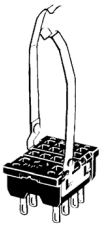
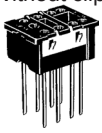
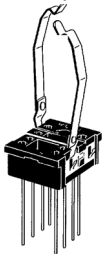
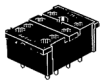
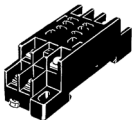
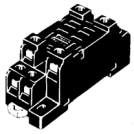
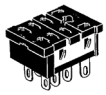
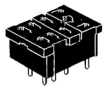
Note: The maximum carry current is 5 A.

Square Sockets

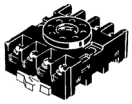
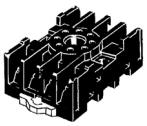
Item	P2RF *see page 301	P2R *see page 302		P7TF *see page 302
		Solder terminal	PCB terminal	
5 pins	**P2RF-05**  **P2RF-05-E** 	**P2R-05A** 	**P2R-05P**  **P2R-057P** 	**P7TF-05** 

Note: □-E Models are of finger-protect construction. Round terminals cannot be used. Use Y-shaped terminals.

Square Sockets

Item	PYF (track mounting) *see page 303	PY (back connecting) *see page 304			PTF (track mounting) *see page 305	PT (back connecting) *see page 305		
	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal
8 pins	**PYF08A**  **PYF08A-E**  **PYF08M** 	**PY08**  **PY08-Y1** 	**PYQ08QN** * Without clip  **PYO08ON2**  **PYQ08QN-Y1** **PYQ08QN2-Y1** * With clip 	**PY08-02** 	**PTF08A**  **PTF08A-E** 	**PT08** 	**PT08QN** 	**PT08-0** 

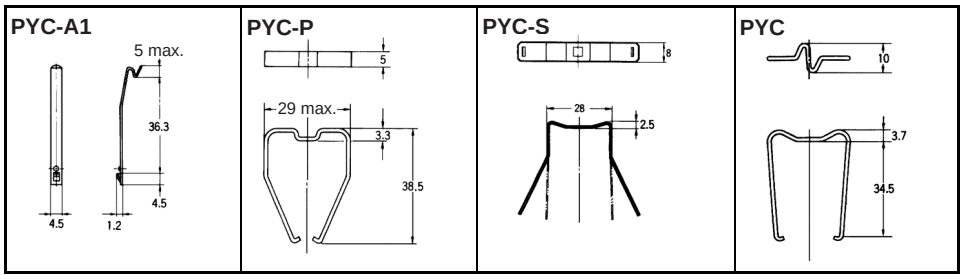
Round Sockets

Item	PF (surface mounting) *see page 306	PL (back connecting) *see page 307		
		Solder terminal	Wrapping terminal	PCB terminal
8 pins	**PF083A**  **PF083A-E**  **PF085A** 	**PL08** 	**PL08-Q** 	**PLE08-0** 

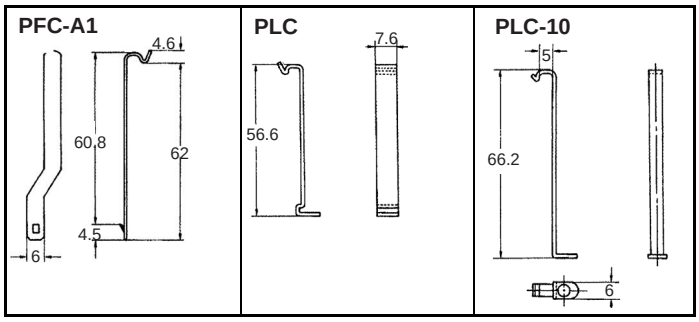
■ Hold-down Clips

Note: All units are in millimeters unless otherwise indicated.

For Square Sockets



For Round Sockets



■ Models Used with Sockets

Group	Model	Pin No.	Socket	
			Front connecting	Back connecting
G3S	G3S, G3SD	4	---	P6B
G3F	G3F, G3FD, G3FM	8	PYF	PY
G3H	---		PTF	PT
G3B	---		PF083A	PL
G3R	---	5	P2RF	P2R

■ Models Used with Hold-down Clips

Square Sockets

Item	PYF08A, PTF08A	PYF08M	PY08(QN), PT08(QN)	PY08-02, PT08-0
G3H series, G3F, G3FD, G3FM	PYC-A1	PYC PYC-P	PYC-P, PYC-S	PYC-P

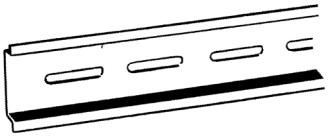
Round Sockets

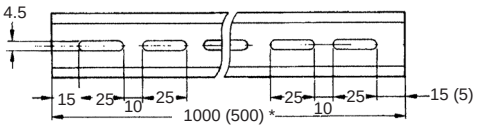
Item	PF083A, PF113A	PL08(-Q), PL11(-Q)	PLE08-0, PLE11-0
G3B	PFC-A1	PLC	PLC-10

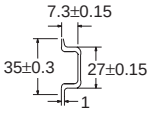
Note: A hold-down clip for PF085A is sold together with relays that can be used with PF085A.

■ Rails and Accessories

Supporting Rails
PFP-100N
PFP-50N

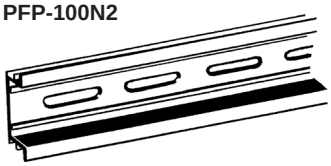


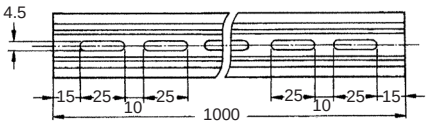


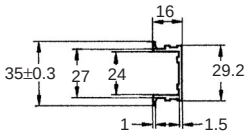


Note: The figure in the parentheses is for PFP-50N.

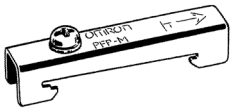
Supporting Rails
PFP-100N2

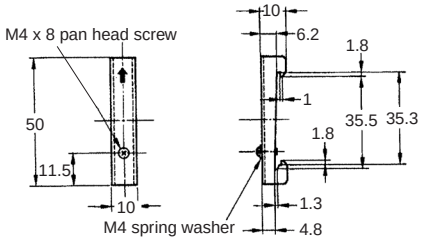




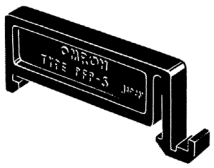


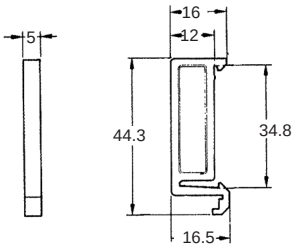
End Plate
PFP-M





PFP-S

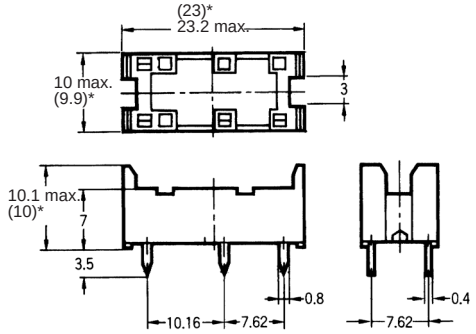
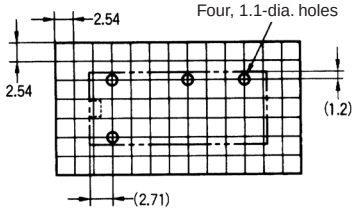




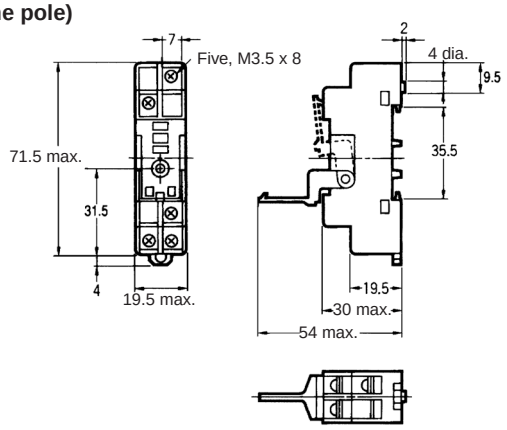
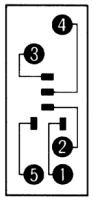
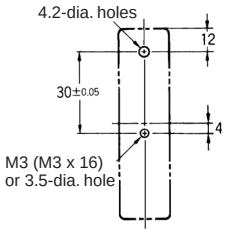
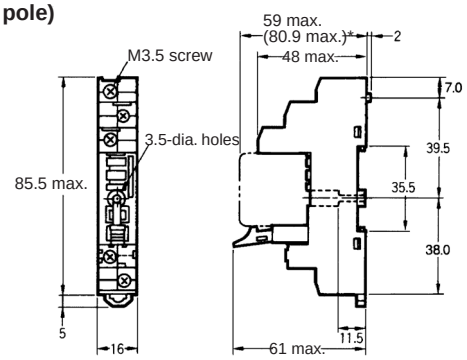
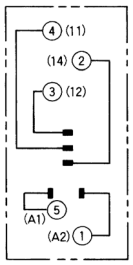
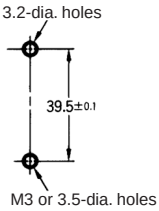
Dimensions

Note: All units are in millimeters unless otherwise indicated.

■ P6B

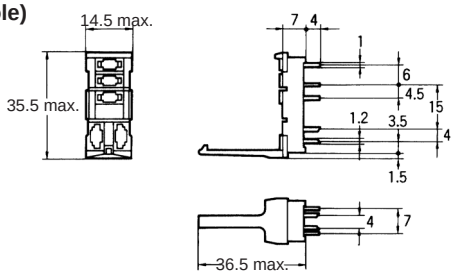
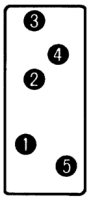
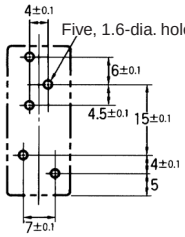
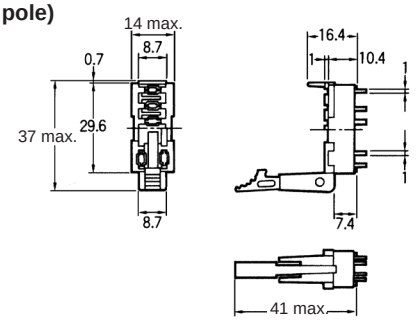
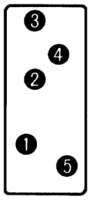
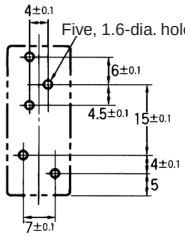
Dimensions	PCB dimensions
P6B-04P  * Average dimensions	

■ P2RF

Dimensions	Terminal arrangement/Internal connections (top view)	Mounting holes (top view)
P2RF-05 (One pole) 		 **Note:** Track mounting is also possible.
P2RF-05-E (One pole)  * When mounted on H3RN-1□.	 **Note:** Figures in parentheses are DIN standard numbers.	 **Note:** Track mounting is also possible.

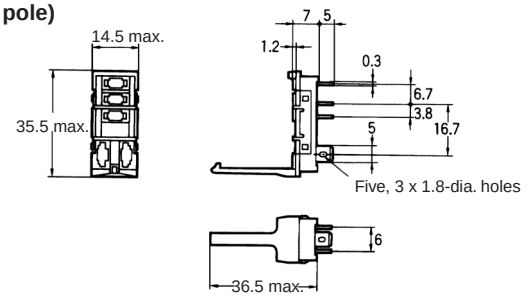
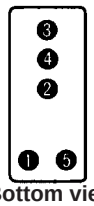
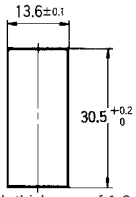
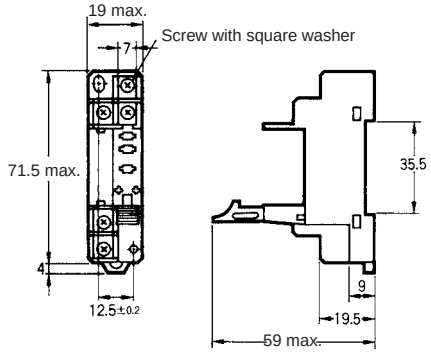
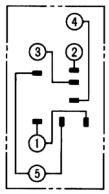
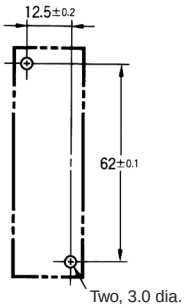
Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

■ P2R

Dimensions	Terminal arrangement/Internal connections (bottom view)	PCB dimensions (bottom view)
P2R-05P (One pole) 		
P2R-057P (One pole) 		

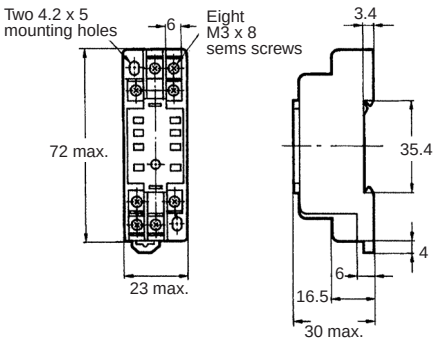
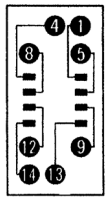
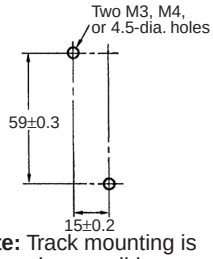
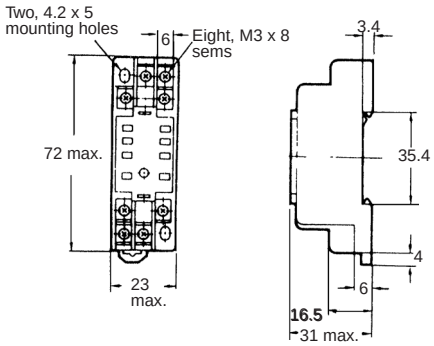
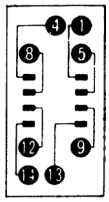
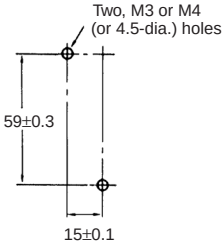
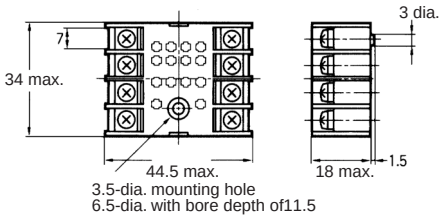
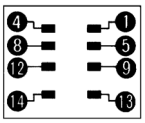
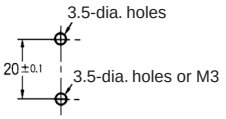
Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

■ P2R/P7TF

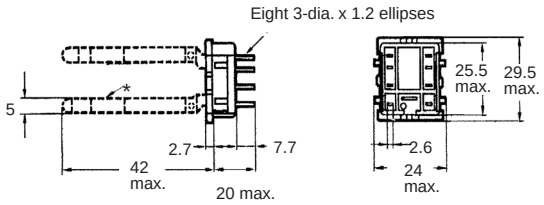
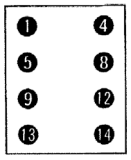
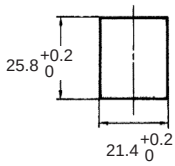
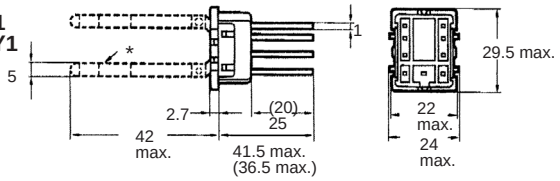
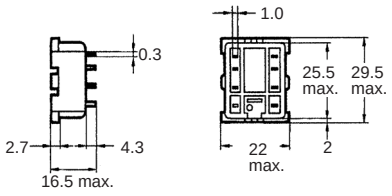
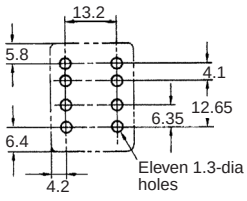
Dimensions	Terminal arrangement/ Internal connections	Mounting holes
P2R-05A (One pole) 	 **(Bottom view)**	 Use panel with thickness of 1.6 to 2.0 mm.
P7TF-05 	 **(Top view)**	 **(Top view)** **Note:** Track mounting is also possible.

Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

■ PYF Dimensions

Dimensions	Terminal arrangement/Internal connections (top view)	Mounting holes
PFY08A 		 **Note:** Track mounting is also possible.
PYF08A-E 		 **Note:** Track mounting is also possible.
PYF08M 		

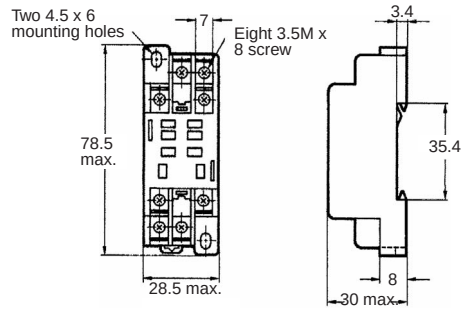
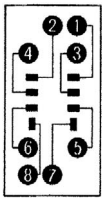
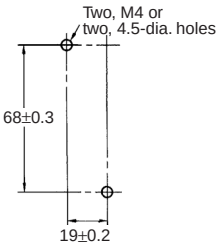
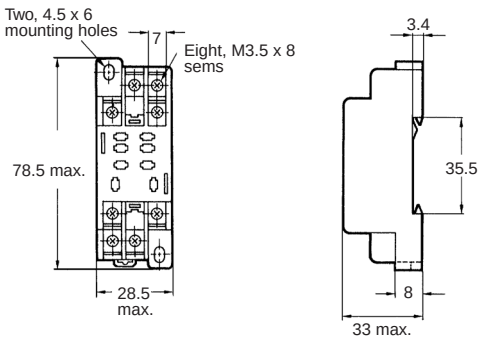
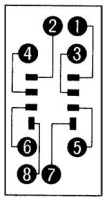
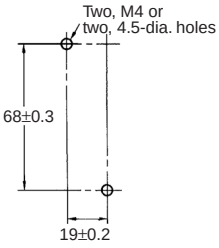
■ PY Dimensions

Dimensions	Terminal arrangement/Internal connections (bottom view)	Mounting holes
PY08 **PY08-Y1**  **Note:** PY08-Y1 includes the part outlined by the dashed lines above.		
PY08QN **PY08QN2** **PY08QN-Y1** **PY08QN2-Y1**  **Note:** 1. PY080N(2)-Y1 includes the part outlined by the dashed lines above. 2. The figures in the parentheses are for PY080N2.		
PY08-02 		

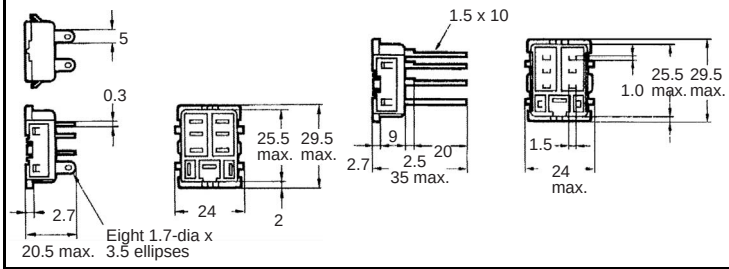
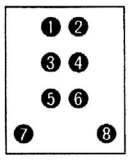
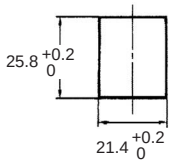
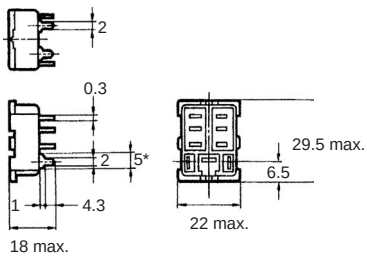
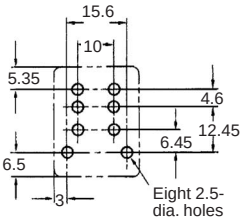
Note: 1. Use a panel with a thickness of 1 to 2 mm when mounting a socket on it.

2. The "*" marked length for PY□-Y2 is 49 max.

■ PTF Dimensions

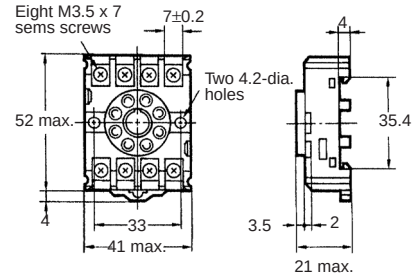
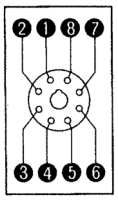
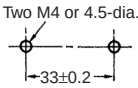
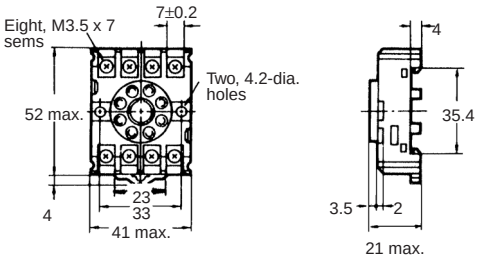
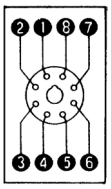
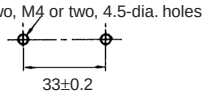
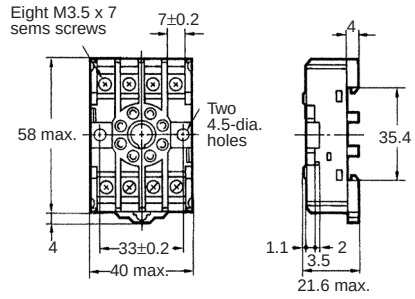
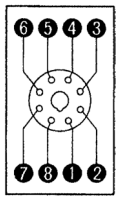
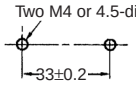
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PTF08A 		
PTF08A-E 		

■ PT Dimensions

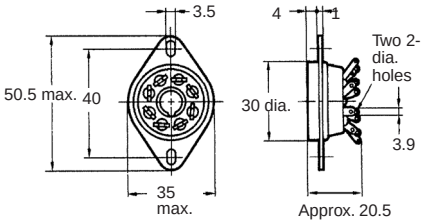
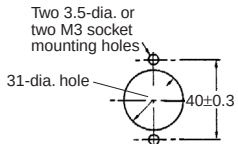
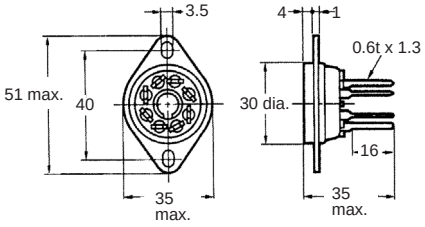
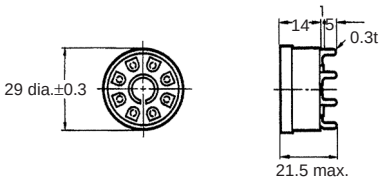
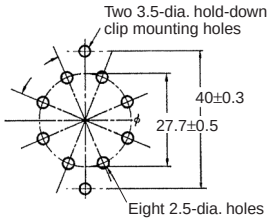
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PT08 **PT08QN** 		
PT08-0  * A proper distance between the socket and PC board patterns should be kept.		 The tolerance is ±0.1.

Note: Use a panel with a thickness of 1 to 2 mm when mounting a socket on it.

■ PF Dimensions

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PF083A 		 **Note:** Rail-mounting is available. See page 300.
PF083A-E 		
PF085A 		 **Note:** Rail-mounting is available. See page 300.

■ PL Dimensions

Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PL08 		
PL08-Q 		
PLE08-O 		

Note: When mounting, pay due attention to the direction of the key groove of applicable relays.