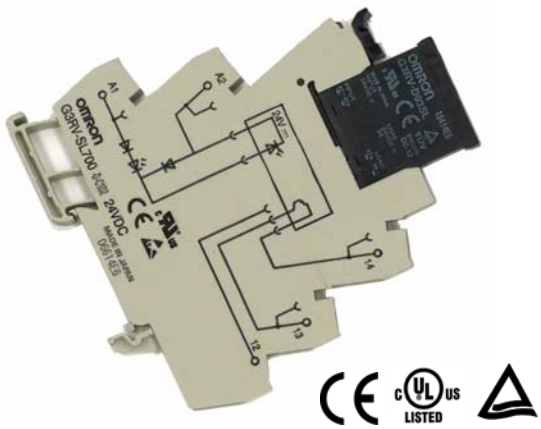
OMRON

Solid State Relays

G3RV-C1D2

Slimmest Industrial Plug-in SSR for Use in Class I Division 2 Hazardous Areas

- Rated UL Class I Div 2 for use in hazardous environments
- Save panel space: Measures just 6.2 mm wide, allows gang mounting of 8 relays for a compact output block
- Direct connection with PLC adapter and pre-terminated cables to Omron PLCs and slice I/O
- Long electrical life and high speed switching
- G3RV Socket - Robust plug-in terminals for reliable connection
- G3RV-D (DC load) models can manage resistive loads of 100 µA to 3.0 A
- Monitor operation status with built-in LED indicator



Model Number Structure

■ Model Number Legend

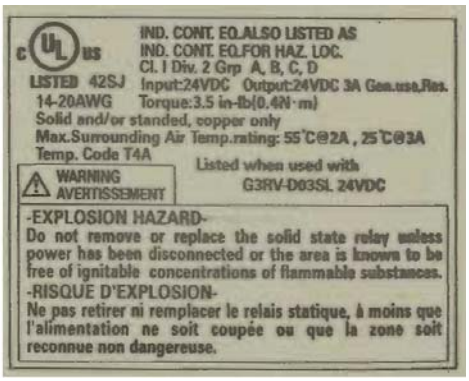
G3RV-SL □ □ □ - □ □
1 2 3 4 5

1. **Basic Model Name**
   G3RV: Solid State Relay
2. **Auxiliary Type Designation**
   SL: Slim Solid State Relay and socket combination
3. **Wire Connection**
   700: Screw Terminals
   500: Spring Terminals
4. **Output voltage specifications**
   A(L): AC Output…TRIAC
   ∗A: with Zero cross function AL: without Zero cross function
   D: DC Output…MOS FET
5. **Special UL Rating**
   C1CD2: Class 1 Div 2

Class I, Division 2 Rating

■ Use in Hazardous Environments

Products with this rating are not capable of causing an ignition within a specified flammable gasses or vapor-air mixture due to arcing.



One of the following three situations must exist in order for an area to be considered a Class I, Division 2 location.

- An area where flammable liquids and gases are handled, but not expected to be in explosive concentrations. However, the possibility for these concentrations to exist might occur if there was an accidental rupture or other unexpected incident.
- An area where ignitable gases or vapors are normally prevented from accumulating by positive mechanical ventilation, yet could exist in ignitable quantities if there was a failure in the ventilation systems.
- Areas adjacent to Class I, Division 1 locations where the atmosphere is expected to contain explosive mixtures of gases, vapors, or liquids during normal working operations. It is possible for ignitable concentrations of gas/vapors to come into the Class I, Division 2 area if there is not proper ventilation.

Ordering Information

■ List of Models

SSR and Socket Combinations

Input Voltage	Screw Termination Model Number	Spring Termination Model Number
12 VDC	G3RV-SL700-D-C1D2 DC12	G3RV-SL500-D-C1D2 DC12
	G3RV-SL700-A-C1D2 DC12	G3RV-SL500-A-C1D2 DC12
	G3RV-SL700-AL-C1D2 DC12	G3RV-SL500-AL-C1D2 DC12
24 VDC	G3RV-SL700-D-C1D2 DC24	G3RV-SL500-D-C1D2 DC24
	G3RV-SL700-A-C1D2 DC24	G3RV-SL500-A-C1D2 DC24
	G3RV-SL700-AL-C1D2 DC24	G3RV-SL500-AL-C1D2 DC24
24 VAC/DC	G3RV-SL700-D-C1D2 AC/DC24	G3RV-SL500-D-C1D2 AC/DC24
	G3RV-SL700-A-C1D2 AC/DC24	G3RV-SL500-A-C1D2 AC/DC24
	G3RV-SL700-AL-C1D2 AC/DC24	G3RV-SL500-AL-C1D2 AC/DC24
48 VAC/DC	G3RV-SL700-D-C1D2 AC/DC48	G3RV-SL500-D-C1D2 AC/DC48
	G3RV-SL700-A-C1D2 AC/DC48	G3RV-SL500-A-C1D2 AC/DC48
	G3RV-SL700-AL-C1D2 AC/DC48	G3RV-SL500-AL-C1D2 AC/DC48
110 VAC	G3RV-SL700-D-C1D2 AC110	G3RV-SL500-D-C1D2 AC110
	G3RV-SL700-A-C1D2 AC110	G3RV-SL500-A-C1D2 AC110
	G3RV-SL700-AL-C1D2 AC110	G3RV-SL500-AL-C1D2 AC110
230 VAC	G3RV-SL700-D-C1D2 AC230	G3RV-SL500-D-C1D2 AC230
	G3RV-SL700-A-C1D2 AC230	G3RV-SL500-A-C1D2 AC230
	G3RV-SL700-AL-C1D2 AC230	G3RV-SL500-AL-C1D2 AC230

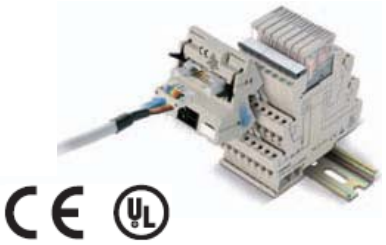
Replacement SSR

Classification		Enclosure rating	Input voltage	Contact form	Type of connection	Model number
Plug-in terminals	General-purpose	Unsealed	AC/DC	SPST	Screw terminals	G3RV-SL700
					Spring terminals	G3RV-SL500

■ Accessories

PLC Interface Unit







Description	Connection	Model number
PLC Output Interface for 8x G2RV-SL700 series relays; PNP type	Ribbon cable connector 10 pole, IEC603/1	P2RVC-8-O-F

Cables for PLC Interface

Compatible units	Connectors	Cable length	Model number
CJ1 output units-MIL connectors: CJ1W-OD232, CJ1W-OD262	MIL10–MIL40	1.0 m	**P2RV-4-100C**
		2.0 m	**P2RV-4-200C**
		3.0 m	**P2RV-4-300C**
		5.0 m	**P2RV-4-500C**
Universal output units	MIL10–Flying leads	1.0 m	**P2RV-4-A100C**
		2.0 m	**P2RV-4-A200C**
		3.0 m	**P2RV-4-A300C**
		5.0 m	**P2RV-4-A500C**
NX Slice I/O series output units: NX-OD2258, NX-OD3256, NX-OD3257, NX-OD4256, NX-OD5256	MIL10-XW7F 16-pole	0.5 m	**P2RV-A050C-OMR NX**
		1.0 m	**P2RV-A100C-OMR NX**
GRT1 Slice I/O series output units: GRT1-OD4-1, GRT1-OD4G-1, GRT1-OD4G-3, GRT1-OD8-1, GRT1-OD8G-1	MIL10-XW7F 12-pole	0.5 m	**P2RV-A050C-OMR GRT1**
		1.0 m	**P2RV-A100C-OMR GRT1**

Cross Bars

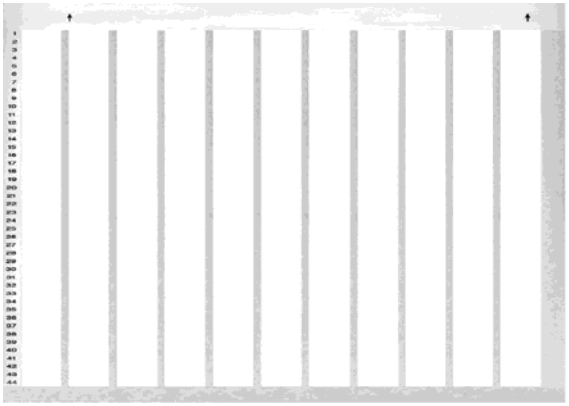
Specifications

Item	Remarks	Rating
Max. current	EN60947-7-1 section 8.3.3/1991	32 A
Max. voltage	--	400 VAC
	When cutting cross bar without using a separation plate or end bracket	250 VAC



Number of Poles	Model number		
	Red	Blue	Black
2	**P2RVM-020R**	**P2RVM-020S**	**P2RVM-020B**
3	**P2RVM-030R**	**P2RVM-030S**	**P2RVM-030B**
4	**P2RVM-040R**	**P2RVM-040S**	**P2RVM-040B**
10	**P2RVM-100R**	**P2RVM-100S**	**P2RVM-100B**
20	**P2RVM-200R**	**P2RVM-200S**	**P2RVM-200B**

Labels (Stickers) for G2RV/G3RV Sockets



Color	Box quantity	Model number
White	1 piece = 1 sheet = 484 labels (stickers)	**R99-16 for G2RV**

Plastic Labels for G2RV/G3RV Sockets

Color	Box quantity	Model number
White	5 sheets x 120 labels = 600 labels (minimum order)	**R99-15 for G2RV**



Separating Plate

Description	Model number
Plate provides isolation between adjacent relays to achieve 400 V isolation.	**P2RV-S**



Specifications

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

Input

G3RV-SL700/500-A Series

Rated voltage	Rated current			Must operate voltage	Must release voltage	Input voltage
	AC		DC			% of rated voltage
	50 Hz	60 Hz				
12 VDC	--	--	15 mA	10.8 V	1 V	±10%
24 VDC	--	--	12 mA	21.6 V		
24 VAC/DC	20 mA	21 mA	11 mA	21.6 V		
48 VAC/DC	10 mA	11 mA	6 mA	43.2 V		
110 VAC	7.5 mA	8.2 mA	--	99 V		
230 VAC	7.3 mA	8.6 mA	--	207 V		

G3RV-SL700/500-AL Series

Rated voltage	Rated current			Must operate voltage	Must release voltage	Input voltage
	AC		DC			% of rated voltage
	50 Hz	60 Hz				
12 VDC	--	--	15 mA	10.8 V	1 V	±10%
24 VDC	--	--	12 mA	21.6 V		
24 VAC/DC	20 mA	21 mA	11 mA	21.6 V		
48 VAC/DC	10 mA	11 mA	6 mA	43.2 V		
110 VAC	7.5 mA	8.2 mA	--	99 V		
230 VAC	7.3 mA	8.6 mA	--	207 V		

G3RV-SL700/500-D Series

Rated voltage	Rated current			Must operate voltage	Must release voltage	Input voltage
	AC		DC			% of rated voltage
	50 Hz	60 Hz				
12 VDC	--	--	8 mA	10.8 V	1 V	±10%
24 VDC	--	--	4.5 mA	21.6 V		
24 VAC/DC	10.7 mA	11.1 mA	4.3 mA	21.6 V		
48 VAC/DC	9.6 mA	10.2 mA	6 mA	43.2 V		
110 VAC	6.8 mA	7.5 mA	--	99 V		
230 VAC	6.8 mA	8.1 mA	--	207 V		

Output

Item	G3RV-SL700/500-A(L)	G3RV-SL700/500-D
Rated load voltage	100 to 240 VAC, 50/60 Hz	5 to 24 VDC
Load voltage range	75 to 264 VAC, 50/60 Hz	3 to 26.5 VDC
Load current	0.1 to 2 A (Ta=40°C)	100 µA to 3 A (Ta=40°C)
Inrush current	30 A (60 Hz/1 cycle)	30 A (60 Hz/1 cycle)
Permissible I^2t; Joule Integral (Reference value)	15 A^2s	9 A^2s
Application load capacity	400 W (Output voltage: 200 VAC)	72 W (Output voltage: 24 VDC)

■ Characteristics

Item	G3RV-SL700/500-A	G3RV-SL700/500-AL	G3RV-SL700/500-D
Operate time	½ of load power source cycle + 1 ms max.	1 ms max.	6 ms max.
Release time	40 ms max.	20 ms max.	60 ms max.
Output ON voltage drop	1.6 V rms max.		0.9 V max.
Leakage current	5 mA max. (at 200 VAC 50/60Hz)		10 µA max. (at 24 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)		
Dielectric strength	2500VAC, 50/60 Hz for 1 minute between input and output		
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.7-mm single amplitude		
Shock resistance	300 m/s^2		
Ambient temperature	Storage: -30~+100°C (with no icing or condensation) Operating: -30~+55°C (with no icing or condensation)		
Ambient humidity	45~85% RH		
Weight	Approx. 38 g		
Pollution degree	2		
Degree of protection according to IEC 60529	IP20		
Rated Impulse Withstand Voltage	4.0kV / III		
Load category	LC-A		DC-12
Overload Current Profile	1.5Ie 1.1Ue 5s ON, 10s OFF, 10 cycles		
Rated insulation Voltage	240		

■ Approved Standards

UL 508 (File No. E64562)

Model	Input ratings	Contact ratings
G3RV-SL700/500-D Series	12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	24 VDC 3 A (Resistive Load) at 25°C
G3RV-SL700/500-A(L) Series	12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	240 VAC 2 A (Resistive Load) at 25°C

IEC/TUV (EN 62314)

Input ratings	Contact ratings
12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	24 VDC 3 A (Resistive Load)
12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	240 VAC 2 A (Resistive Load)

Approved Standards for Class 1 Div 2

ANSI/ISA 12.12.01 (File No. E467446), CSA22.2 No.213 (File No. E467446)

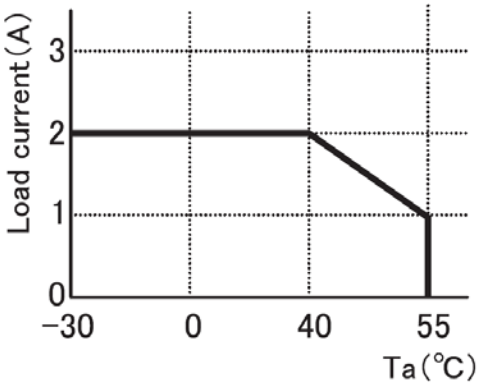
Model	Input Ratings	Contact Ratings
G3RV-SL700/500-D-CD12 Series	12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	5 to 24 VDC 3 A (General use, Resistive load) at 25°C 5 to 24 VDC 2 A (General use, Resistive load) at 55°C
G3RV-SL700/500-A(L)-CD12 Series	12, 24 VDC 24, 48 VAC/DC 110, 230 VAC	100 to 240 VAC 2 A (General use, Resistive load) at 25°C 100 to 240 VAC 1 A (General use, Resistive load) at 55°C

Engineering Data

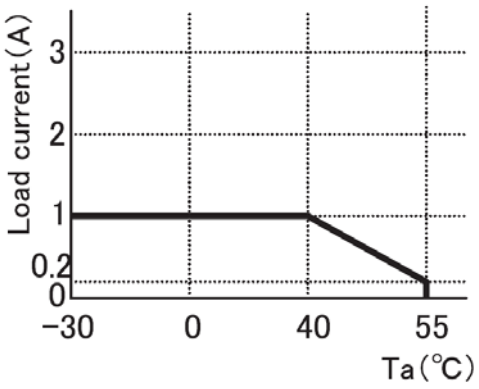
■ Load current derating curves

G3RV-SL700/500-A(L) Series

Mounting Distance 10mm

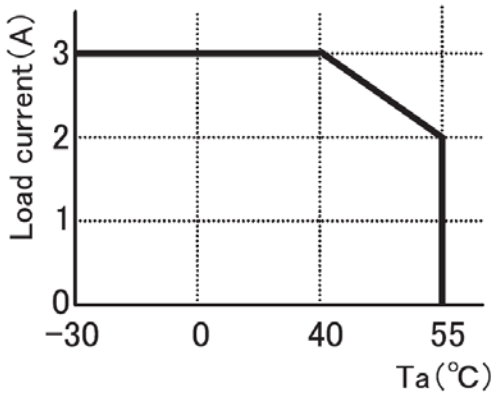


Mounting Distance 0mm

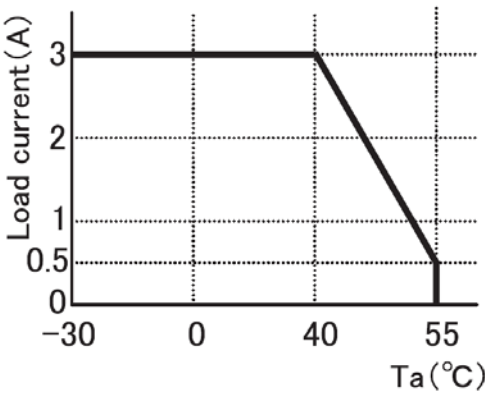


G3RV-SL700/500-D Series

Mounting Distance 10mm



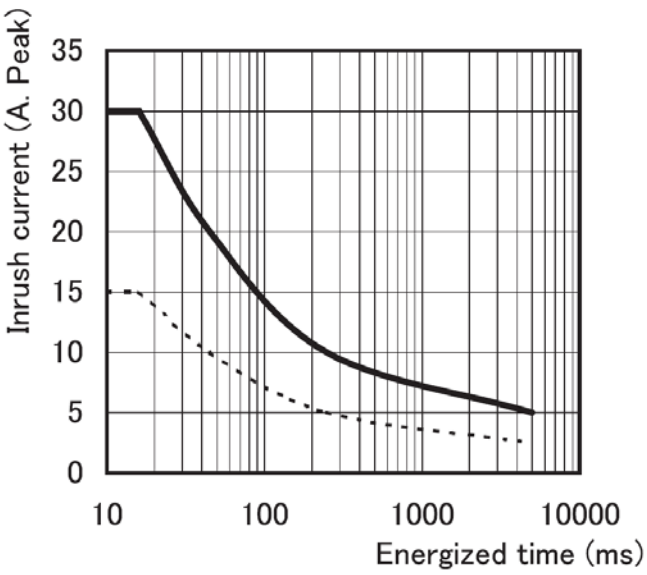
Mounting Distance 0mm



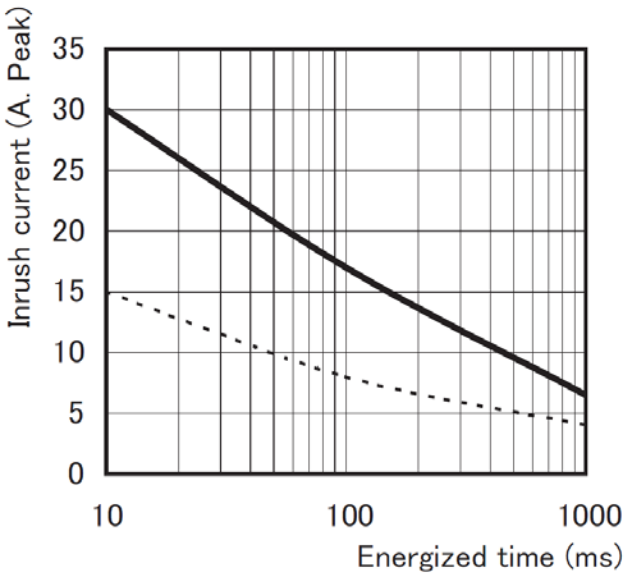
■ One Cycle Surge Current: Non-repetitive

The values shown by the solid line are for non-repetitive inrush currents. Values shown by the broken line are for repetitive inrush currents. Keep the inrush current to half the rated value if it occurs repetitively.

G3RV-SL700/500-A(L) Series



G3RV-SL700/500-D Series

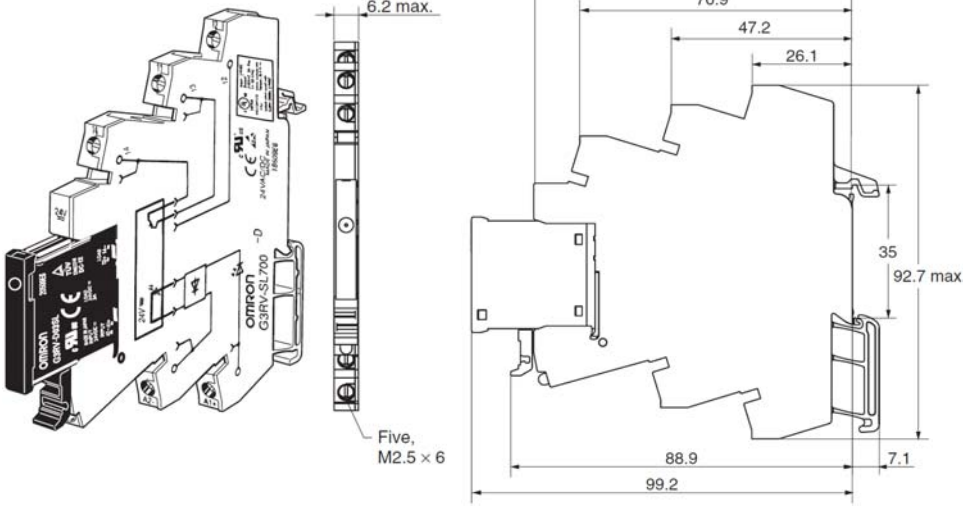


Dimensions

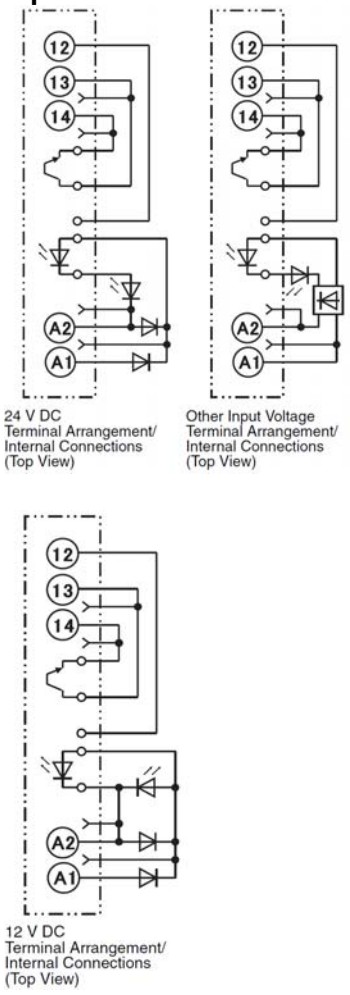
Note: All units are in millimeters unless otherwise indicated.

■ Complete Unit

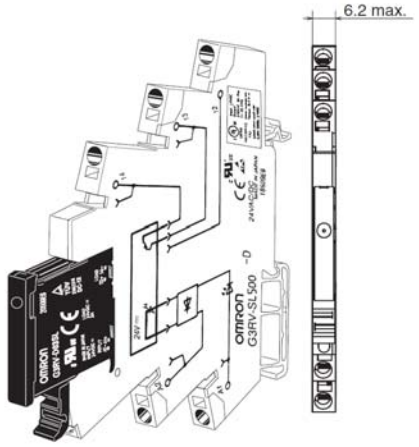
G3RV-SL700

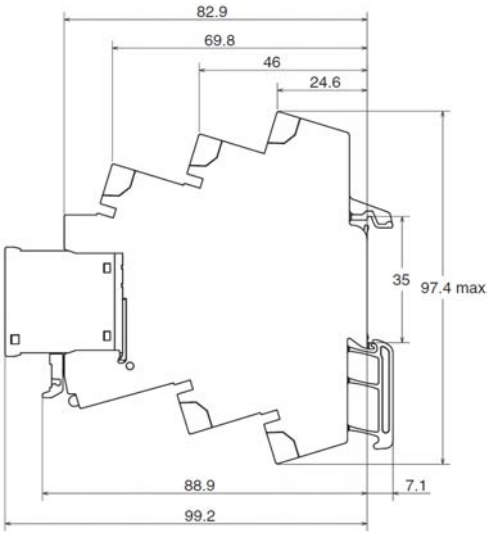


Input circuit

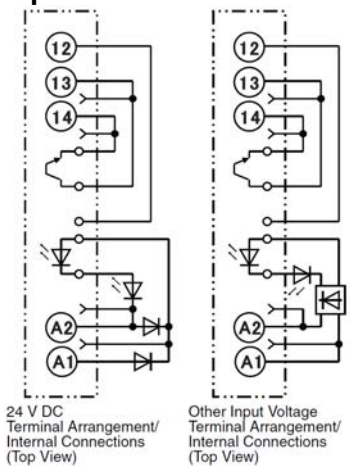


G3RV-SL500



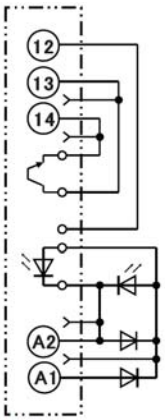


Input circuit



24 V DC
Terminal Arrangement/
Internal Connections
(Top View)

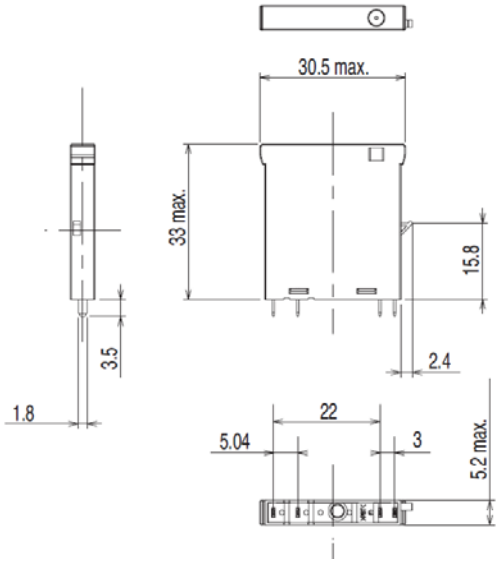
Other Input Voltage
Terminal Arrangement/
Internal Connections
(Top View)



12 V DC
Terminal Arrangement/
Internal Connections
(Top View)

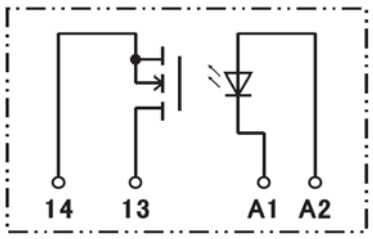
■ Solid State Relay

G3RV-D03SL
G3RV-202S(L)

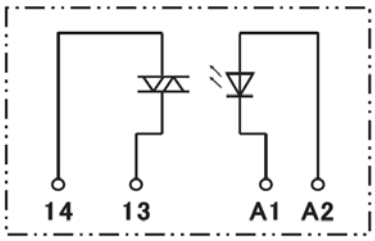


Input Circuit

G3RV-D03SL



G3RV-202S(L)



Terminal Arrangement/
Internal Connections
(Bottom View)

Installation

■ Tools

G3RV-SL700 series: Flat-Blade screwdriver should be used for mounting and / or releasing cables.

G3RV-SL500 series: Flat-Blade screwdriver should be used for mounting stranded wires without ferrules and / or releasing cables.

Applicable Screwdriver

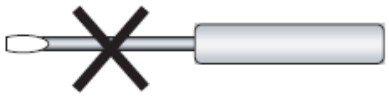
- Flat-blade, Parallel-tip, 2.5 mm diameter (3.0 mm max.)

- Flat-blade, Parallel-tip



2.5 dia. (3.0 mm max.)

- Flat-blade, Flared-tip



Cannot be used.

Examples: FACOM AEF.2.5 × 75E (AEF. 3 × 75E)
VESSEL No. 9900-(-)2.5 × 75 (No. 9900-(-)3 × 100)
WAGO 210-119
WIHA 260/2.5 × 40 (260/3 × 50)

*Chamfering the tip of the driver improves insertion when used as an exclusive tool.

■ Applicable Wires

Applicable Wire Sizes

G3RV-SL700 Series

Box clamp technology

Wire type	Applicable wire size	Stripping length
Stranded without ferrules	0.5 - 1.5 mm²	7 mm
Stranded with ferrules and plastic collar	0.5 - 1.5 mm²	7 mm
Stranded with ferrules without plastic collar	0.5 - 1.5 mm²	7 mm
Solid	0.5 - 1.5 mm²	7 mm

G3RV-SL500 Series

Push-in technology

Wire type	Applicable wire size	Stripping length
Stranded without ferrules	0.5 - 1.5 mm²	12 mm
Stranded with ferrules and plastic collar	0.5 - 1.5 mm²	12 mm
Stranded with ferrules without plastic collar	0.5 - 1.5 mm²	12 mm
Solid	0.5 - 1.5 mm²	12 mm

Tightening torque

G3RV-SL700 Series: 0.4Nm

■ Wiring

Use wires of the applicable sizes specified above. The length of the exposed conductor should be 7 mm for a G3RV-SL700 series, 12 mm for a G3RV-SL500 series.

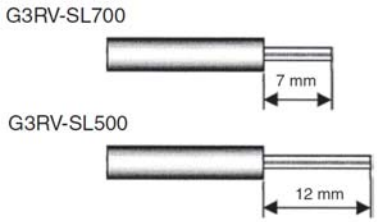
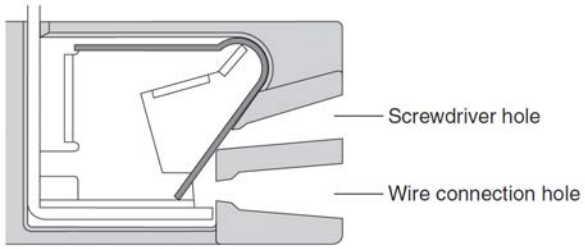
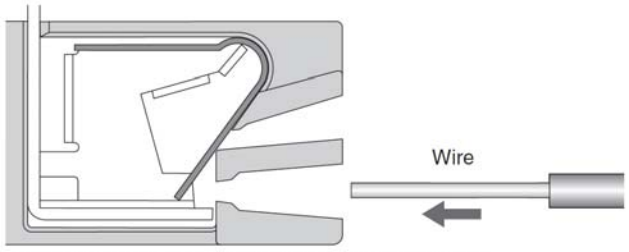


Fig. 1 Exposed Conductor Length

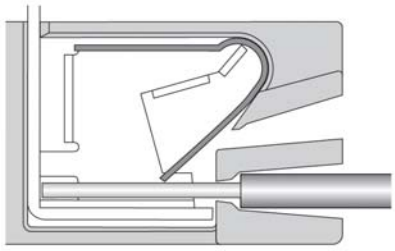
Wiring Procedure for G3RV-SL500 series



● Wiring



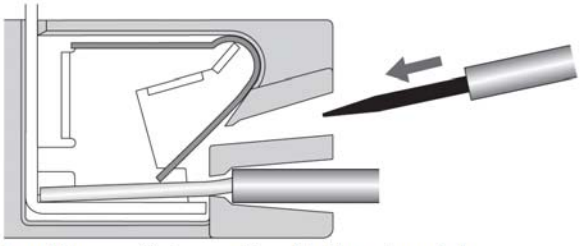
Insert the exposed conductor into the connection hole.



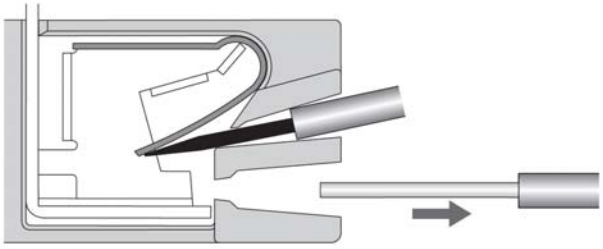
No other tools are required.

Note: In case of wiring stranded wires without ferrules screwdriver should be inserted before inserting the wire.
Screwdriver should be removed after fully inserting the wire.

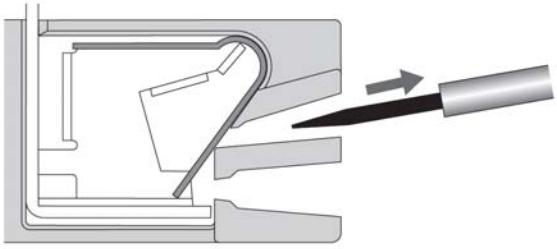
● Removing



Insert the specified screwdriver into the release hole.



Removing wire.

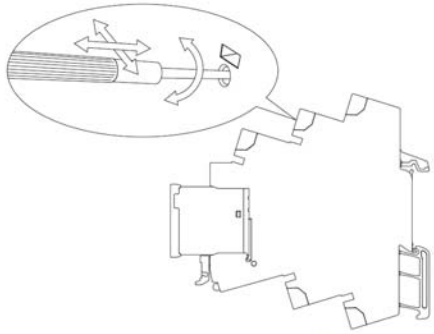


Removing screwdriver.

Precautions

Precautions for Connection

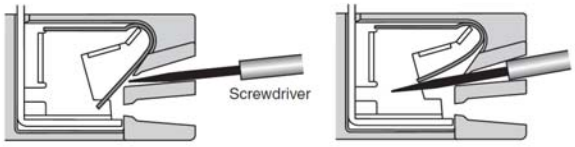
- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the clamp spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of socket and result in a short-circuit.



- Do not insert two or more wires in the hole. Wires may come in contact with the spring causing a temperature rise or be subject to sparks.



- Insert the screwdriver along the hole wall as shown below.



- If lubricating liquid, such as oil, is present on the tip of screwdriver, the screwdriver may fall out resulting in injury to the operator.
- Insert the screwdriver into the bottom of the hole. It may not be possible to connect cables properly if the screwdriver is inserted incorrectly.

General Precautions

- Do not use the product if it has been dropped on the ground. Dropping the product may adversely affect performance.
- Confirm that the socket is securely attached to the mounting track before wiring. If the socket is mounted insecurely it may fall and injure the operator.
- Ensure that the socket is not charged during wiring and maintenance. Not doing so may result in electric shock.
- Do not pour water or cleansing agents on the product. Doing so may result in electric shock.
- Do not use the socket in locations subject to solvents or alkaline chemicals.
- Do not use the socket in locations subject to ultraviolet light (e.g., direct sunlight). Doing so may result in markings fading, rust, corrosion, or resin deterioration.
- Do not dispose the product in fire.

Removing from Mounting Rail

To remove the socket from the mounting rail, insert the tip of screwdriver in the fixture rail, and move it in the direction shown below.



Definition of Precautionary Information

⚠ 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	A potentially hazardous situation by misuse, may result in property damage only accident.

⚠ CAUTION	
Minor hazard by electric shock may occasionally occur. Do not touch the G3RV's terminal (Charging part) while the power supply turned on.	
The G3RV may occasionally rupture in case of a short circuit. To protect against short-circuit accident, install a protective device, such as a quick-burning fuse or a circuit breaker or the like, on the power supply.	
Minor hazard by electric shock may occasionally occur. Do not touch the G3RV's main circuit terminals immediately after the power is turned OFF. The internal snubber circuit is charged. ✻ 202S,SL,G3RV-A(L) Type only	
Minor hazard by burns may occasionally occur. Do not touch the G3RV or the heat sink either while the power supply is ON, or immediately after the power is turned OFF. The G3RV and the heat sink will be hot.	

Precautions for Safe Use

- Shipping

  When shipping the G3RV, be sure to avoid the following:
  - Conditions where the G3RV is exposed to water.
  - High ambient temperatures and humidity.
  - Inadequate packaging

  Failure to avoid these conditions while shipping G3RV will lead to damage, malfunction, or deterioration.

- Operating and Storage Locations

  Do not use or store the G3RV in the locations listed below. Failure to do so may result in damage, malfunction, or deterioration of performance characteristics.
  - Locations subject to rain or water drops.
  - Locations subject to exposure to water, or oil, or chemicals.
  - Locations subject to high temperatures or high humidity.
  - Locations subject to ambient temperatures outside the range from -30 to +100 centigrade.
  - Locations subject to relative humidity outside the range 45% to 85%.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust (especially iron dust) or salts.
  - Locations subject to barrier.
  - Locations subject to static electricity or other forms of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations subject to possible exposure to radioactivity.

- Handling
  - Be sure to provide adequate air flow to G3RV. Failure to do so can cause the G3RV to overheat leading to short circuit and burning.
  - Do not install G3RV Relay with bent terminals into the socket. Doing so could lead to poor electrical connection and hazardous conditions.
  - Be sure to mount G3RV's with clean hands. Performing mounting with oil stained hands or coated with metal powder could result in hazardous outcomes.

- Mounting
  - Be sure to mount the G3RV in the specified orientation. Mounting the G3RV in a different orientation could lead to abnormal heat generation causing output elements to short leading to burning.
  - G3RV's are SSR's and generate heat. Be sure to control ambient temperature in setting where G3RV is used. If mounted in an enclosed space, install a fan to insure G3RV is properly ventilated.
  - Be sure that the G3RV clicks into place when mounting it to DIN Track. The G3RV may fall if it is not mounted correctly.

- Wiring
  - Use a wire an adequate size for current to be applied. Abnormal heating of wire may cause burning.
  - Do not use any wires with damaged sheaths. These may cause electric shock.
  - Confirm that wiring to G3RV Socket is not used in pipe or duct for high voltage power supply. Using a wire in pipe or duct connected to high voltage power supply will generate induction causing malfunction or damage.
  - Be sure to conduct wiring with the power supply turned OFF. Touching the terminals when they are charged may occasionally result in minor electric shock.

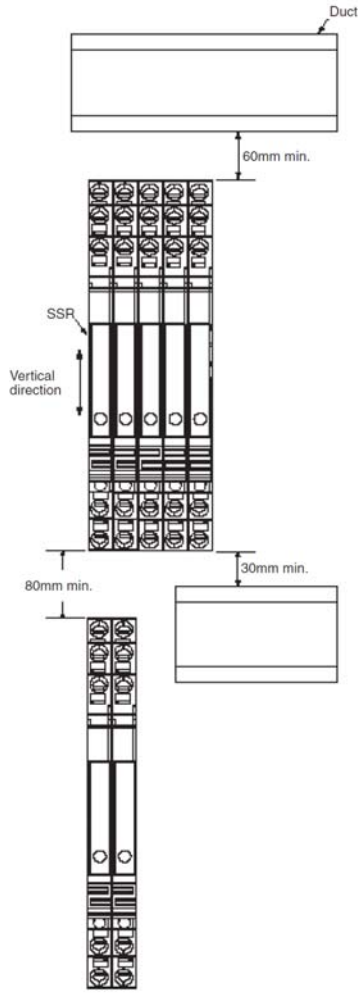
- Using
  - Select a load within the rated range. Inappropriate load may cause misoperation, trouble or burning.
  - Select the power supply within the rated frequency range. Inappropriate power frequency may cause misoperation, trouble or burning.

Precautions for Correct Use

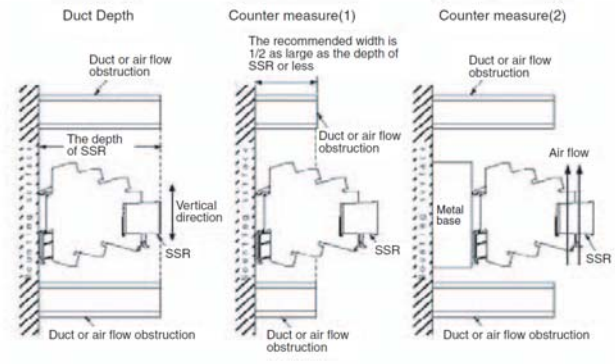
- G3RV uses electronics parts inside, so that any dropping, vibration, and physical shock beyond the standard level should be prevented. Failure to do so may result in damage, malfunction, or deterioration of performance characteristics.
- Be sure to use tightening torque of 0.4 N·m for screw terminal G3RV. Failure to do so could result in short circuit failure and burning.
- Be sure to use proper voltage/current to G3RV input and output terminals. Failure to do so could result in short circuit failure and burning.

● Mounting

<SSR Mounting Pitch (Panel Mounting)>



<Relations between SSR and duct (Depth of duct)>

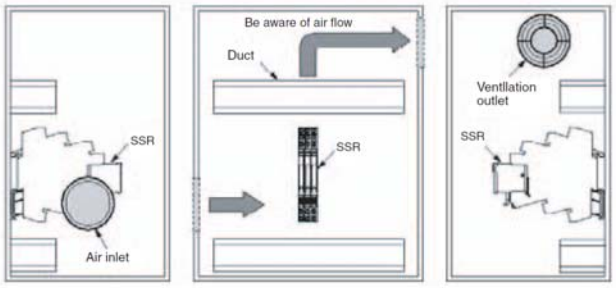


Do not surrounded the SSR with the duct in the depth direction, or otherwise the heat radiation of the S5R will be adversely affected.

Use a short duct in the depth direction.

If the height of the ducts can not be lowered, place the SSR or a metal base so that they are not surrounded by the ducts.

<Ventilation Outside the Control Panel>



- ✻ If the air inlet or outlet has a filter, clean the filter regularly to prevent it from clogging and ensuring efficient flow of air.
- ✻ Do no 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 G2RVs to ensure the efficiency of the heat exchanger.
- ✻ Please monitor the ambient temperature of the G3RV's. The rated load current is measured at 25°C ambient temperature.
- ✻ A G3RV uses 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 the 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 G3RVs and thus increase reliability.
  (Generally, each 10°C reduction in temperature will double the expected life.)

● EMI

- This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

Suitability for Use

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

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

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 PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also Product catalog for Warranty and Limitation of Liability.

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

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   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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