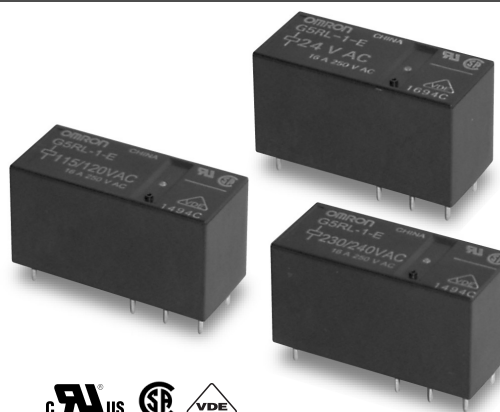


# PCB Relay G5RL

## Low-profile Relay with Various Models

- Low profile: 15.7 mm in height
- Creepage distance 8mm between coil and contacts
- 10 kV Impulse withstand voltage
- Models with AC coil available.
- High-Inrush model available  
(Inrush peak currents up to 100 A)
- Low Noise model available  
(Approx. 10 to 20 dB less sound pressure than standard G5RL-Series Relays)
- RoHS Compliant



## Ordering Information

Classification		Enclosure ratings	Contact form	
Contact ratings	Special function		SPST-NO	SPDT
16 A (high capacity)	AC coil	Flux protection	—	G5RL-1-E
	High inrush		G5RL-1A-E-HR	G5RL-1-E-HR
	Low noise		G5RL-1A-E-LN	
12 A			G5RL-1A-LN	

**Note:** When ordering, add the rated coil voltage to the model number. Example: G5RL-1A-LN DC12

## Model Number Legend:

G5RL-  $\frac{\square}{1}$   $\frac{\square}{2}$  -  $\frac{\square}{3}$   $\frac{\square}{4}$  DC (AC)  $\frac{\square}{5}$

### 1. Number of Poles

1: 1 pole

### 2. Contact Form/Contact Construction

None: SPDT

A: SPST-NO

### 3. Classification

None: 12 A

E: 16 A (high capacity)

### 4. Special Function

None: Standard

HR: High-inrush

LN: Low Noise

### 5. Rated Coil Voltage

Coil ratings are listed in each section (AC coil, High inrush, and Low noise).

# Models with AC Coil: G5RL-1-E

## ■ Specifications

### Coil Ratings

Rated voltage	24 VAC	100 VAC	115 VAC/120 VAC		200 VAC	230 VAC/240 VAC	
Rated current at 50 Hz	31.30 mA	7.50 mA	5.85 mA	6.25 mA	3.75 mA	3.00 mA	3.13 mA
Rated current at 60 Hz	28.30 mA	6.88 mA	5.35 mA	5.70 mA	3.45 mA	2.76 mA	2.88 mA
Coil resistance	443 Ω	8,220 Ω	11,600 Ω		33,000 Ω	47,600 Ω	
Must operate voltage	75% max. rated voltage						
Must release voltage	15% min. rated voltage						
Max. voltage	110% of rated voltage						
Power consumption	Approx. 0.75 VA						

**Note:** 1. The rated current tolerance is +15%/–20%. All above data is based on coil temperature of 23°C.  
 2. Coil resistances are provided as reference values.

### Contact Ratings

Contact form	SPDT
Contact material	Ag alloy (Cd free)
Rated load (resistive)	16 A at 250 VAC, 24 VDC (NO) when there is no load on (NC) 5 A at 250 VAC, 24 VDC (SPDT)
Rated carry current	16 A (NO), 5 A (NC)
Max. switching voltage	250 VAC, 24 VDC
Max. switching current	16 A (NO), 5 A (NC)
Max. switching capacity	4,000 VA, 384 W (NO) when there is no load on (NC) 1,250 VA, 120 W (SPDT)
Min. permissible load (reference value)	40 mA at 24 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations

### Characteristics


Contact resistance	100 m $\Omega$ max.
Operate time	20 ms max.
Release time	20 ms max.
Insulation resistance	1,000 M $\Omega$ min. (at 500 VDC)
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV between coil and contacts (1.2 $\times$ 50 $\mu$ s)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) Malfunction: 100 m/s <sup>2</sup> (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (Resistive load, 12A, 250 VAC/24 VDC, NO contact) 50,000 operations min. (at 1,800 operations/hr) (Resistive load, 16 A, 250 VAC/24 VDC, NO contact) (Resistive load, 5 A, 250 VAC/24 VDC, NC contact)
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 10 g

**Note:** 1. Values in the above table are initial values.  
 2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.  
 3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.  
 4. The resistive load ratings for NO contact apply when there is no load on NC contact.

## Approved Standards

 UL Recognized (File No. E41643) and  CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5RL-1-E	24 to 240 VAC	16 A, 277 VAC General, 50,000 operations - NO 16 A, 250 VAC General, 50,000 operations - NO TV-5, 25,000 operations - NO A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO 1/2 Hp, 120 VAC, 6,000 operations - NO 60 LRA/10 FLA, 250 VAC, 6,000 operations - NO 5 A, 250 VAC General, 50,000 operations - NC 5 A, 24 VDC Resistive, 50,000 operations - NC

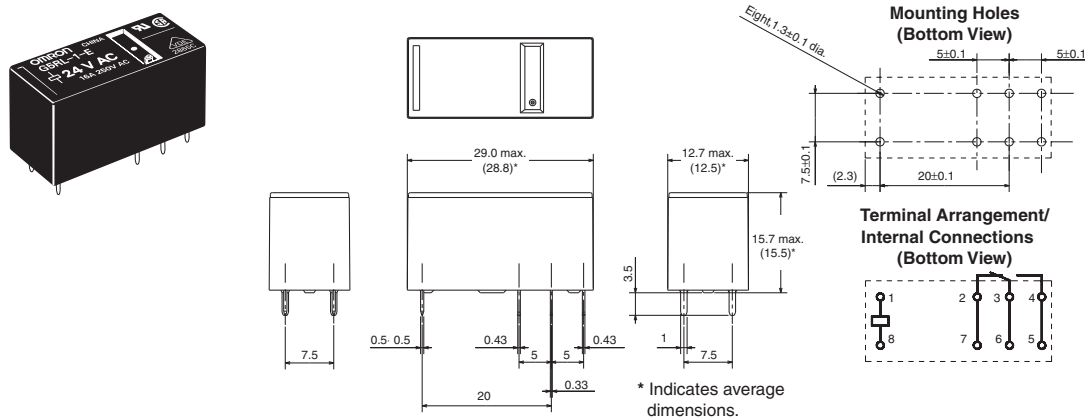
 VDE (EN61810-1) (License No. A282)

Model	Coil Rating	Contact rating
G5RL-1-E	24, 100, 115/120, 200, 230/240 VAC (50 Hz)	16 A, 250 VAC 15,000 operations - NO

## Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

### G5RL-1-E



## Precautions

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

# High-Inrush Models: G5RL-1(A)-E-HR

## ■ Specifications

### Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC	48 VDC
Rated current	80.0 mA	33.3 mA	16.7 mA	8.96 mA
Coil resistance	62.5 $\Omega$	360 $\Omega$	1,440 $\Omega$	5,358 $\Omega$
Must operate voltage	70% max. rated voltage			
Must release voltage	10% min. rated voltage			
Max. voltage	130% of rated voltage			
Power consumption	Approx. 400 mW			Approx. 430 mW

**Note:** The rated current and resistance are measured at a coil temperature of 23°C with a tolerance of  $\pm 10\%$ .

### Contact Ratings

Contact form	SPST-NO	SPDT
Contact material	Ag alloy (Cd free)	
Rated load (resistive)	16 A at 250 VAC 16 A at 24 VDC	16 A at 250 VAC, 24 VDC (NO) when there is no load on (NC) 5 A at 250 VAC, 24 VDC (SPDT)
Rated carry current	16 A	16 A (NO), 5 A (NC)
Max. switching voltage	250 VAC, 24 VDC	
Max. switching current	16 A	16 A (NO), 5 A (NC)
Max. switching capacity	4,000 VA, 384 W	4,000 VA, 384 W (NO) when there is no load on (NC) 1,250 VA, 120 W (SPDT)
Min. permissible load (reference value)	100 mA at 5 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations	

### Characteristics

Contact resistance	100 m $\Omega$ max.
Operate time	15 ms max.
Release time	5 ms max.
Insulation resistance	1,000 M $\Omega$ min. (at 500 VDC)
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10 kV between coil and contacts (1.2 $\times$ 50 $\mu$ s)
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) Malfunction: 100 m/s <sup>2</sup> (approx. 10G)
Life expectancy	Mechanical: 10,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (Resistive load, 12A, 250 VAC/24 VDC, NO contact) 50,000 operations min. (at 1,800 operations/hr) (Resistive load, 16 A, 250 VAC/24 VDC, NO contact) (Resistive load, 5 A, 250 VAC/24 VDC, NC contact)
Ambient temperature	Operating: -40°C to 85°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 10 g


**Note:** 1. Values in the above table are initial values.

- The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.
- The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.
- The resistive load ratings for NO contact apply when there is no load on NC contact.

## Approved Standards

 UL Recognized (File No. E41643) and  CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

Model	Coil rating	Contact rating
G5RL-1(A)-E-HR	5 to 48 VAC	16 A, 277 VAC General, 50,000 operations - NO 16 A, 250 VAC General, 50,000 operations - NO TV-5, 25,000 operations - NO A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO 1/2 Hp, 120 VAC, 6,000 operations - NO 60 LRA/10 FLA, 250 VAC, 6,000 operations - NO 5 A, 250 VAC General, 50,000 operations - NC 5 A, 24 VDC Resistive, 50,000 operations - NC )

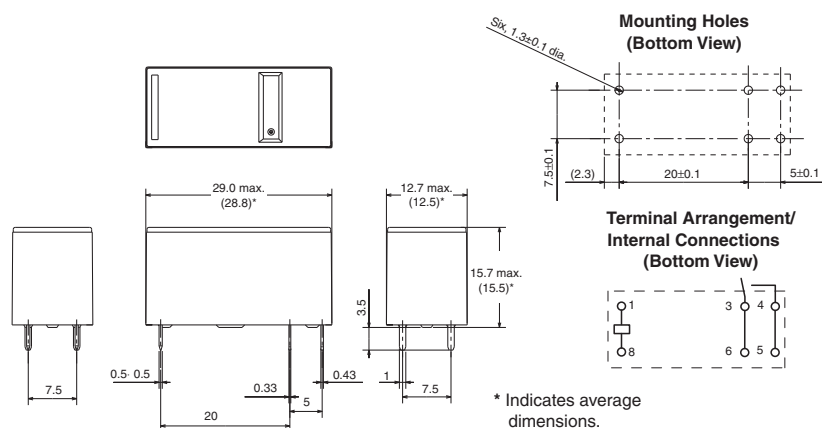
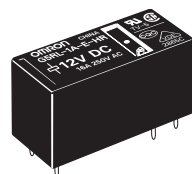
 VDE (EN61810-1) (License No. A282)

Model	Coil Rating	Contact rating
G5RL-1(A)-E-HR	5, 12, 24, 48 VDC	16 A, 250 VAC $\cos \phi = 1$ 15,000 operations - NO 240 VAC 100 A (0-P) Steady 10 A (rms) 50,000 operations - NO 240 VAC 50 A (0-P) Steady 5 A (rms) 100,000 operations - NO

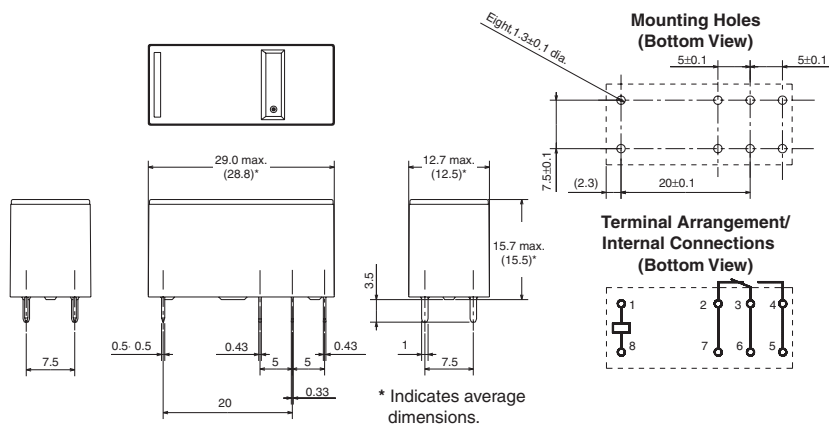
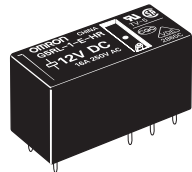
## ■ Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

### G5RL-1(A)-E-HR



### G5RL-1-E-HR



## ■ Precautions

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

# Low Noise Models: G5RL-1A(-E)-LN

## ■ Specifications

### Coil Ratings

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	106.0 mA	44.2 mA	22.1 mA
Coil resistance	47.2 $\Omega$	272 $\Omega$	1,086 $\Omega$
Must operate voltage	70% max. rated voltage		
Must release voltage	10% min. rated voltage		
Max. voltage	110% of rated voltage		
Power consumption	Approx. 530 mW		

**Note:** The rated current and resistance are measured at a coil temperature of 23°C with a tolerance of  $\pm 10\%$ .

### Contact Ratings

Item	Standard	High capacity
Contact form	SPST-NO	
Contact material	Ag alloy (Cd free)	
Rated load (resistive)	12 A at 250 VAC 12 A at 24 VDC	16 A at 250 VAC 16 A at 24 VDC
Rated carry current	12 A	16 A
Max. switching voltage	250 VAC, 24 VDC	
Max. switching current	12 A	16 A
Max. switching capacity	3,000 VA, 288 W	4,000 VA, 384 W
Min. permissible load (reference value)	100 mA at 5 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations	

### Characteristics

Item	Standard	High capacity
Contact resistance	100 m $\Omega$ max.	
Operate time	15 ms max.	
Release time	15 ms max.	
Insulation resistance	1,000 M $\Omega$ min. (at 500 VDC)	
Dielectric strength	6,000 VAC, 50/60 Hz for 1 min between coil and contacts 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	
Impulse withstand voltage	10 kV between coil and contacts (1.2 $\times$ 50 $\mu$ s)	
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) Malfunction: 100 m/s <sup>2</sup> (approx. 10G)	
Life expectancy	Mechanical: 1,000,000 operations min. (at 18,000 operations/hr)  Electrical: 100,000 operations min. Resistive load, 12 A, 250 VAC / 24 VDC (at 1,800 operations/hr)	Mechanical: 1,000,000 operations min. (at 18,000 operations/hr)  Electrical: 50,000 operations min. Resistive load, 16 A, 250 VAC / 24 VDC (at 1,800 operations/hr)
Ambient temperature	Operating: -40°C to 85°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 10 g	

**Note:** 1. Values in the above table are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.

3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.

4. The release time of 15ms max. is based on adding a diode to coil circuit.

## Approved Standards

**UL / cUL Recognized (File No. E41643) - - Ambient Temp. = 40°C**

Model	Coil rating	Contact rating
G5RL-1A-LN	5 to 24 VAC	12 A, 250 VAC Resistive, 100,000 operations 12 A, 24 VDC Resistive, 100,000 operations TV-8, 25,000 operations
G5RL-1A-E-LN		16 A, 250 VAC Resistive, 50,000 operations 16 A, 24 VDC Resistive, 50,000 operations TV-8, 25,000 operations

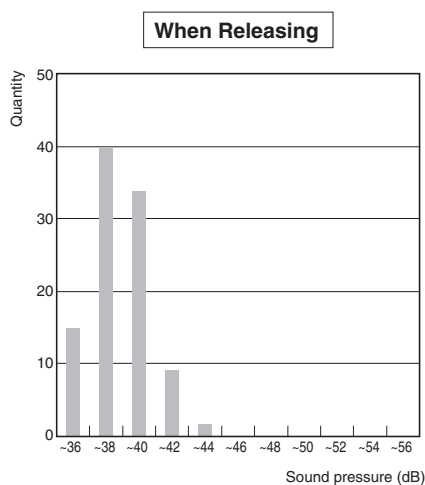
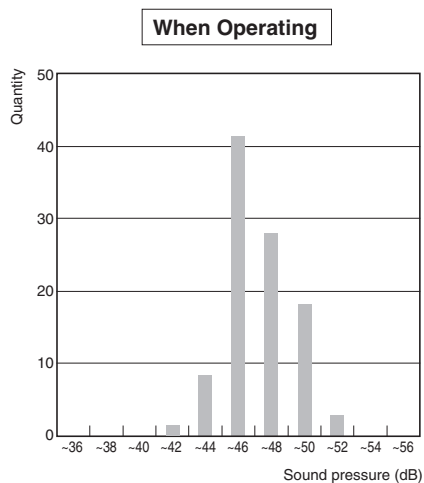


**VDE (EN61810-1, EN60065) (License No. A282)**

Model	Coil Rating	Contact rating
G5RL-1A-LN	5, 12, 24 VDC	12 A, 250 VAC $\cos \phi = 1$ 60,000 operations 12 A, 24 VDC (0 ms) 100,000 operations 230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations 250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations 250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations
G5RL-1A-E-LN		16 A, 250 VAC $\cos \phi = 1$ 30,000 operations 16 A, 24 VDC (0 ms) 40,000 operations 230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations 250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations 250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations

## Engineering Data

### Distribution of Sound Pressure



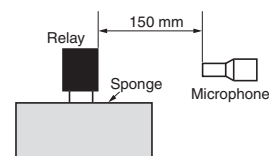
#### Measurement Conditions

Sample: G5RL-1A-LN (N = 100)

Range: A weighted sound pressure level, Fast, Max. hold

Device connected to coil: Diode

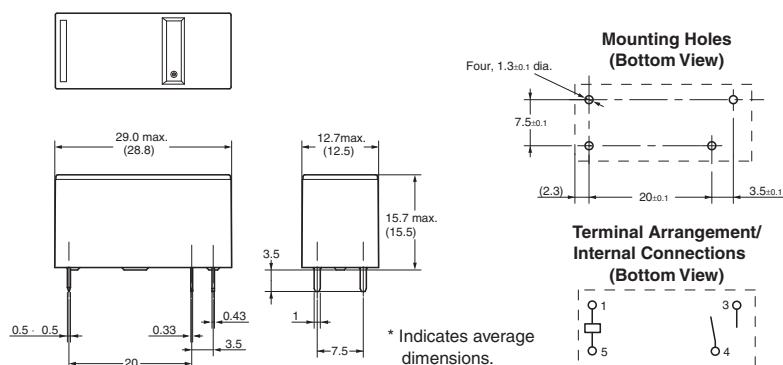
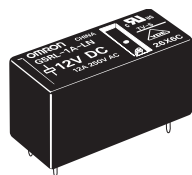
Background noise: Approx. 30 dB max.



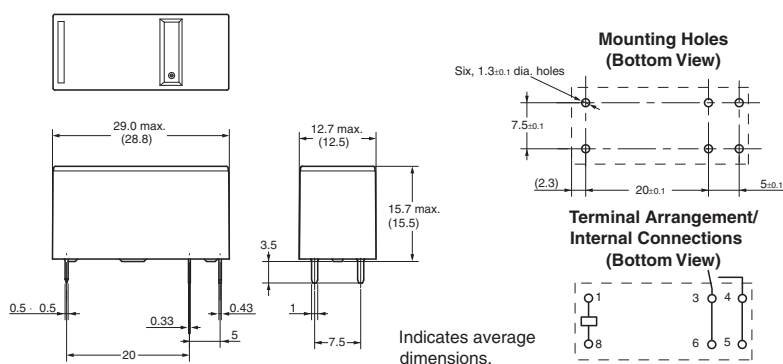
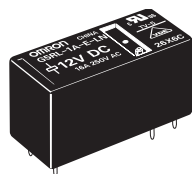
## ■ Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

### G5RL-1A-LN



### G5RL-1A-E-LN



## ■ Precautions

### Mounting

When mounting a G5RL-LN Relay (Low Noise Relay) on a PCB, use a diode for surge absorption for the coil.

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

### Others

Do not decrease coil voltage after operation and do not use a pulse wave drive.

#### Disclaimer:

All technical performance data applies to the product as such; specific conditions of individual applications are not considered. Always check the suitability of the product for your intended purpose. OMRON does not assume any responsibility or liability for noncompliance herein, and we recommend prior technical clarification for applications where requirements, loading, or ambient conditions differ from those applying to general electric applications. Any responsibility for the application of the product remains with the customer alone. THIS COMPONENT CAN NOT BE USED FOR AUTOMOTIVE APPLICATIONS.



# Omron Electronic Components, LLC

## Terms and Conditions of Sales

### I. GENERAL

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

### II. SALES

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

### III. PRECAUTIONS

- Suitability:** IT IS THE BUYER'S SOLE RESPONSIBILITY TO ENSURE THAT ANY OMRON PRODUCT IS FIT AND SUFFICIENT FOR USE IN A MOTORIZED VEHICLE APPLICATION. BUYER SHALL BE SOLELY RESPONSIBLE FOR DETERMINING APPROPRIATENESS OF THE PARTICULAR PRODUCT WITH RESPECT TO THE BUYER'S APPLICATION INCLUDING (A) ELECTRICAL OR ELECTRONIC COMPONENTS, (B) CIRCUITS, (C) SYSTEM ASSEMBLIES, (D) END PRODUCT, (E) SYSTEM, (F) MATERIALS OR SUBSTANCES OR (G) OPERATING ENVIRONMENT. Buyer acknowledges that it alone has determined that the Products will meet their requirements of the intended use in all cases. Buyer must know and observe all prohibitions of use applicable to the Product/s.
- Use with Attention:** The followings are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible use of any Product, nor to imply that any use listed may be suitable for any Product:
  - Outdoor use, use involving potential chemical contamination or electrical interference.

- Use in consumer Products or any use in significant quantities.
  - Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
  - Systems, machines, and equipment that could present a risk to life or property.
- Prohibited Use:** NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
  - Motorized Vehicle Application:** USE OF ANY PRODUCT/S FOR A MOTORIZED VEHICLE APPLICATION MUST BE EXPRESSLY STATED IN THE SPECIFICATION BY SELLER.
  - Programmable Products:** Seller shall not be responsible for the Buyer's programming of a programmable Product.

### IV. WARRANTY AND LIMITATION

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

### V. INFORMATION; ETC.

- Intellectual Property:** The intellectual property embodied in the Products is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Buyer (at its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
- Property; Confidentiality:** Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Seller. All information and materials supplied by Seller to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
- Performance Data:** Performance data is provided as a guide in determining suitability and does not constitute a warranty. It may represent the result of Seller's test conditions, and the users must correlate it to actual application requirements.
- Change In Specifications:** Product specifications and descriptions may be changed at any time based on improvements or other reasons. It is Seller's practice to change part numbers when published ratings or features are changed, or when significant engineering changes are made. However, some specifications of the Product may be changed without any notice.
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**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

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

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Cat. No. X301-E-1

06/09

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Printed in USA

PCB Relay **G5RL**