

# Solid State Relays for Industrial I/O

# G3TC

## Reliable SSRs for I/O Module Mounting Boards

- Use I/O SSRs as an interface between logic circuitry and the load.
- Variety of AC/DC input and output modules with industry-standard footprint and color coding.
- Built-in hold down screw fastens relay to board to eliminate loosening by vibration.
- Optical Isolation - Dielectric strength of 4 kV between input and output terminals.
- Zero cross function on AC output models.
- AC and DC input versions incorporate a rectifier to accept both AC or DC inputs.
- UL, CSA and TUV approved; marked with CE.



## Ordering Information

### Input Module

Function	Color	Isolation	Input operating voltage range	Logic level output supply voltage	Model
AC input	Yellow	Photo-coupler	90-140 VDC/AC	5 VDC	G3TC-IAC5 AC/DC120
				15 VDC	G3TC-IAC15 AC/DC120
				24 VDC	G3TC-IAC24 AC/DC120
			180-280 VDC/AC	5 VDC	G3TC-IAC5A AC/DC240
				15 VDC	G3TC-IAC15A AC/DC240
				24 VDC	G3TC-IAC24A AC/DC240
DC input	White		10-32 VDC/AC	5 VDC	G3TC-IDC5 DC/AC24
				15 VDC	G3TC-IDC15 DC/AC24
				24 VDC	G3TC-IDC24 DC/AC24

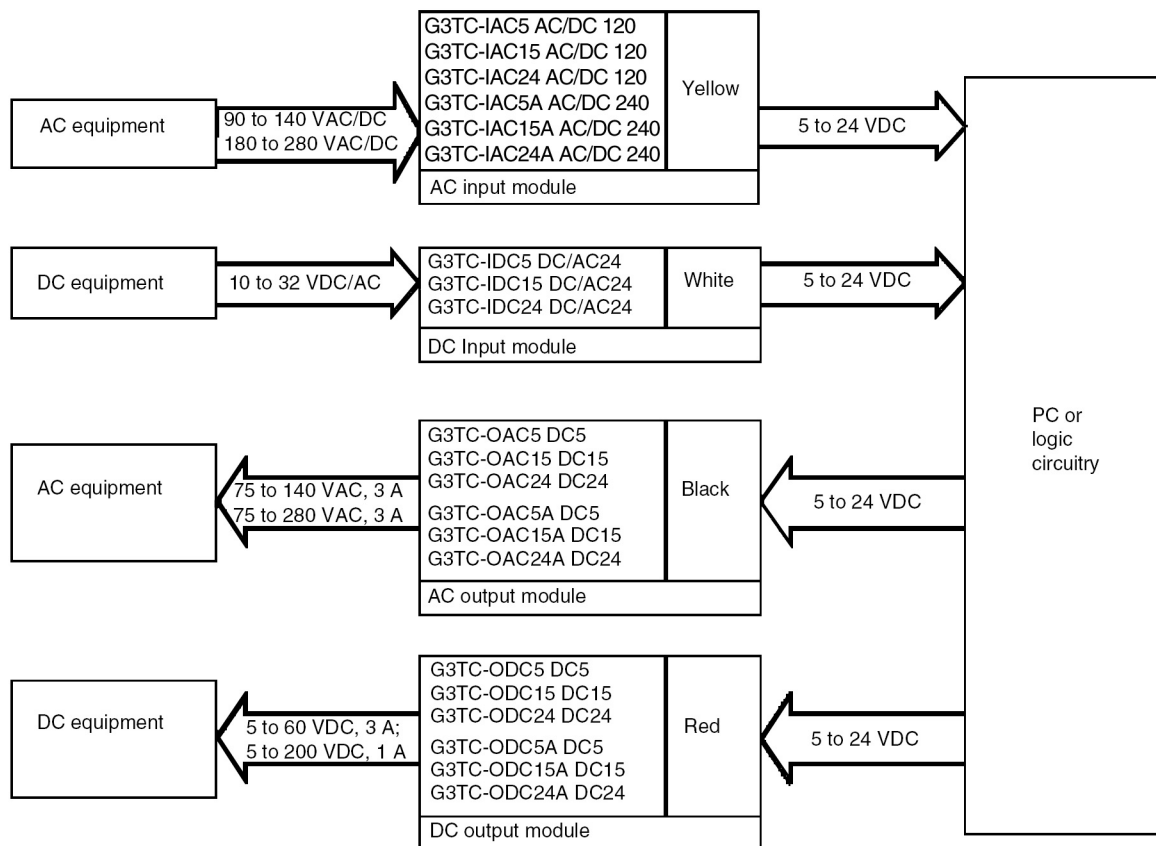
### Output Module

Function	Color	Isolation	Rated input voltage	Rated output voltage (Applicable output voltage)	Model
AC output	Black	Photo-triac	5 VDC	3 A at 120 VAC (3 A at 75-140 VAC)	G3TC-OAC5 DC5
			15 VDC		G3TC-OAC15 DC15
			24 VDC		G3TC-OAC24 DC24
			5 VDC	3 A at 240 VAC (3 A at 75-280 VAC)	G3TC-OAC5A DC5
			15 VDC		G3TC-OAC15A DC15
			24 VDC		G3TC-OAC24A DC24
DC output	Red	Photo-coupler	5 VDC	3 A at 60 VDC (3 A at 5-60 VDC)	G3TC-ODC5 DC5
			15 VDC		G3TC-ODC15 DC15
			24 VDC		G3TC-ODC24 DC24
			5 VDC	1 A at 200 VDC (1 A at 5-200 VDC)	G3TC-ODC5A DC5
			15 VDC		G3TC-ODC15A DC15
			24 VDC		G3TC-ODC24A DC24

## ■ Typical Applications

- HVAC, refrigeration equipment
- Automation controls
- Injection molding machines
- Packaging equipment

## ■ I/O Classification by Color



## Specifications

### ■ Common Characteristics

<b>Insulation resistance</b>	100 MΩ min at 500 VDC
<b>Dielectric strength</b>	4000 VAC, 50/60 Hz for 1 minute between input and output
<b>Vibration resistance</b>	Malfunction: 10 to 55 Hz, 1.5 mm double amplitude
<b>Shock resistance</b>	Malfunction: 1,000 m/s <sup>2</sup>
<b>Ambient temperature</b>	Operating: -30° C to 80° C with no icing or condensation Storage: -30° C to 100° C with no icing or condensation
<b>Ambient humidity</b>	Operating: 45% to 85%
<b>Approved standards</b>	UL508, UL60950, CSA22.2 No 14, No 950, EN60950

## ■ AC Input Module G3TC-IAC

### Ratings (Ambient Temperature 25° C)

#### Input

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Rated voltage	120 VAC/DC			240 VAC/DC		
Operating voltage	90-140 VAC/DC			180-280 VAC/DC		
Must operate voltage	90 VAC/DC max.			180 VAC/DC max.		
Must release voltage	25 VAC/DC min.			45 VAC/DC min.		
Input current at rated voltage	5 mA max.			5 mA max.		
Input resistance (see note 1)	30k $\Omega$			69k $\Omega$		

#### Output

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Output supply voltage-nominal	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Output supply voltage-range	4.5-6 VDC	12-18 VDC	20-30 VDC	4.5-6 VDC	12-18 VDC	20-30 VDC
Output supply current at rated input voltage (see note 2)	12 mA max.	15 mA max.	18 mA max.	12 mA max.	15 mA max.	18 mA max.
Control resistance (Rc in circuit configuration - see note 1)	240 $\Omega$	1k $\Omega$	2.2k $\Omega$	240 $\Omega$	1k $\Omega$	2.2k $\Omega$
Output current	50 mA max.					

### Characteristics

Item	G3TC-IAC5	G3TC-IAC15	G3TC-IAC24	G3TC-IAC5A	G3TC-IAC15A	G3TC-IAC24A
Operate time (see note 3)	20 ms max.					
Release time (see note 3)	20 ms max.					
Output ON voltage drop	0.4 V max.					
Leakage current	100 $\mu$ A max.					
Weight	Approx. 40g					

Note: 1. Resistance values are reference.

2. The input module supplies the current on I/O circuit board at nominal output voltage.

3. At nominal output supply voltage, rated input voltage and 25° C.

## ■ DC Input Module G3TC-IDC

### Ratings (Ambient Temperature 25° C)

#### Input

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Rated voltage	24 VDC/AC		
Operating voltage	10-32 VDC/ 15-32 VAC		
Must operate voltage	10 VDC/15 VAC max.		
Must release voltage	3 VDC/ 3 VAC min.		
Input current rated voltage	25 mA max.		
Input resistance	1.5k $\Omega$		

#### Output

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Output supply voltage-nominal	5 VDC	15 VDC	24 VDC
Output supply voltage-range	4.5-6 VDC	12-18 VDC	20-30 VDC
Output supply current at rated input voltage (see note 2)	12 mA max.	15 mA max.	18 mA max.
Control resistance (Rc in circuit configuration - see note 1)	240 $\Omega$	1k $\Omega$	2.2k $\Omega$
Output current	50 mA max.		

## Characteristics

Item	G3TC-IDC5	G3TC-IDC15	G3TC-IDC24
Operate time (see note 3)	5 ms max.		
Release time (see note 3)	5 ms max.		
Output ON voltage drop	0.4 V max.		
Leakage current	100 $\mu$ A max.		
Weight	Approx. 40g		

- Note:** 1. Resistance values are reference.  
 2. The input module supplies the current on I/O circuit board at nominal output voltage.  
 3. At nominal output supply voltage, rated input voltage and 25°C.

## ■ AC Output Module G3TC-OAC

### Ratings (Ambient Temperature 25°C)

#### Input

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Rated voltage	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Operating voltage	2.5-8 VDC	9-16 VDC	18-32 VDC	2.5-8 VDC	9-16 VDC	18-32 VDC
Must operate voltage	2.5 VDC max.	9 VDC max.	18 VDC max.	2.5 VDC max.	9 VDC max.	18 VDC max.
Must release voltage	1 VDC min.					
Input current at rated voltage (see note 1)	18 mA max.					
Control resistance (Rc in circuit configuration - see note 2)	240 $\Omega$	1k $\Omega$	2.2k $\Omega$	240 $\Omega$	1k $\Omega$	2.2k $\Omega$

#### Output

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Rated load voltage	120 VAC			240 VAC		
Load voltage range	75-140 VAC			75-280 VAC		
Load current	0.05 to 3 A					
Inrush current	45 A (60 Hz, 1 cycle)					

## Characteristics

Item	G3TC-OAC5	G3TC-OAC15	G3TC-OAC24	G3TC-OAC5A	G3TC-OAC15A	G3TC-OAC24A
Operate time (see note 3)	1/2 of load power source cycle + 1 ms max.					
Release time (see note 3)	1/2 of load power source cycle + 1 ms max.					
Output ON voltage drop	1.6 V (RMS) max.					
Leakage current	2.5 mA max. (at 120 VAC)			5 mA max. (at 240 VAC)		
Weight	Approx. 45g					

- Note:** 1. Resistance values are reference.  
 2. The input module supplies the current on I/O circuit board at nominal output voltage.  
 3. At nominal output supply voltage, rated input voltage and 25°C.

## ■ DC Output Module G3TC-ODC

### Ratings (Ambient Temperature 25° C)

#### Input

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Rated voltage	5 VDC	15 VDC	24 VDC	5 VDC	15 VDC	24 VDC
Operating voltage	2.5-8 VDC	9-16 VDC	18-32 VDC	2.5-8 VDC	9-16 VDC	18-32 VDC
Must operate voltage	2.5 VDC max.	9 VDC max.	18 VDC max.	2.5 VDC max.	9 VDC max.	18 VDC max.
Must release voltage	1 VDC min.					
Input current at rated voltage (see note 1)	18 mA max.					
Control resistance (Rc in circuit configuration - see note 2)	240 Ω	1k Ω	2.2k Ω	240 Ω	1k Ω	2.2k Ω

#### Output

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Rated load voltage	60 VDC			200 VDC		
Load voltage range	5-60 VDC			5-200 VDC		
Load current	0.01 to 3 A			0.01 to 1.0 A		
Inrush current	18 A (10 ms)			9 A (10 ms)		

### Characteristics

Item	G3TC-ODC5	G3TC-ODC15	G3TC-ODC24	G3TC-ODC5A	G3TC-ODC15A	G3TC-ODC24A
Operate time (see note 3)	50 μs max.			100 μs max.		
Release time (see note 3)	50 μs max. (see note 4)			750 μs max.		
Output ON voltage drop	1.6 V (RMS)max.					
Leakage current	1 mA max. (at 60 VAC)			1 mA max. (at 200 VAC)		
Weight	Approx. 45g			Approx. 40g		

**Note:** 1. The output module supplies the current on I/O circuit board at nominal input voltage.

2. Resistance values are reference.

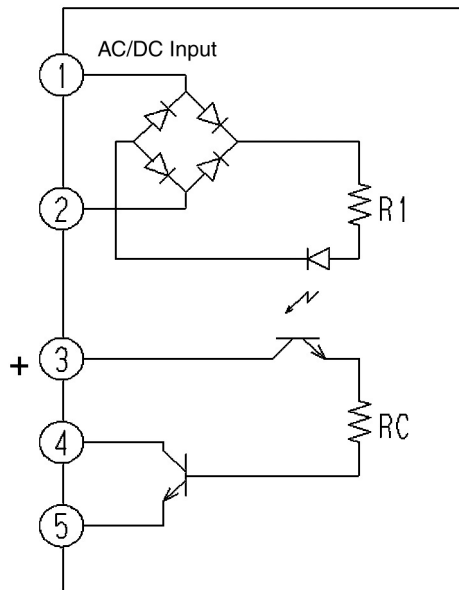
3. At rated load voltage, maximum rated load current, rated input voltage and 25° C.

4. At 24 VDC load voltage, 3 A load current and 25° C.

# Engineering Data

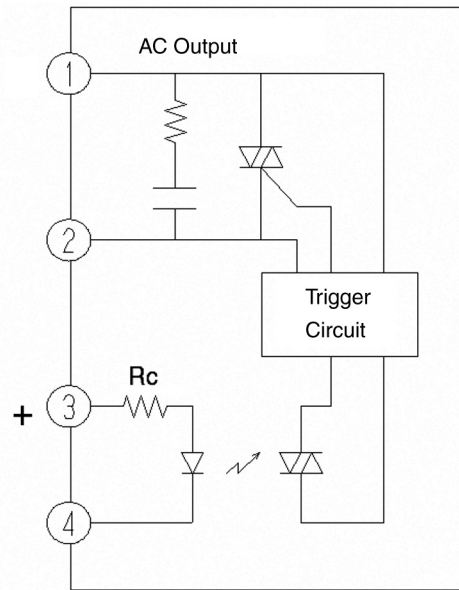
## Internal Circuit

### G3TC-IAC/IDC



Equivalent Circuit Only

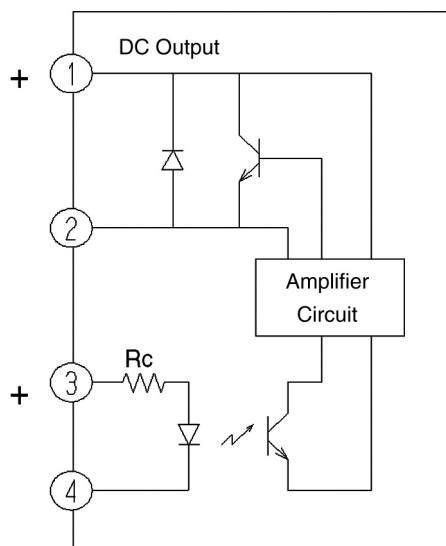
### G3TC-OAC



Equivalent Circuit Only

**Note:** Internal biasing circuitry is different between AC input and DC input modules

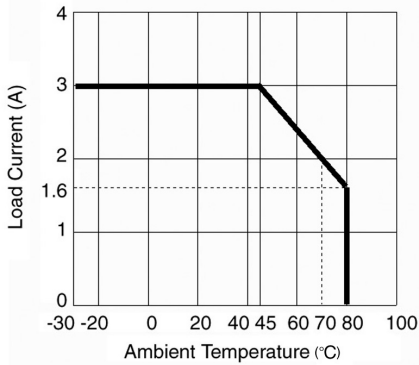
### G3TC-ODC



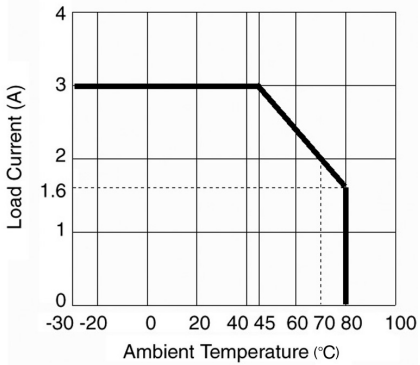
Equivalent Circuit Only

### ■ Load Current vs. Ambient Temperature Characteristics

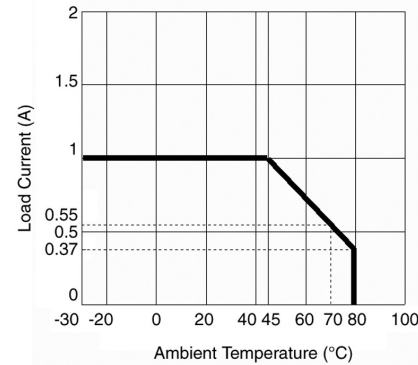
G3TC-OAC5, -OAC15, -OAC24, -OAC5A, -OAC15A, -OAC24A



G3TC-ODC5, -ODC15, -ODC24



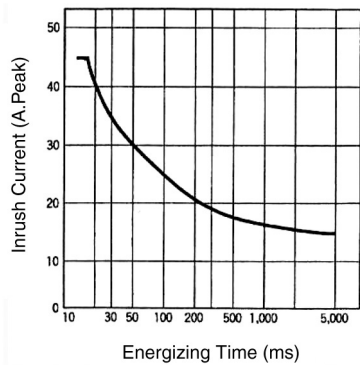
G3TC-ODC5A, -ODC15A, -ODC24A



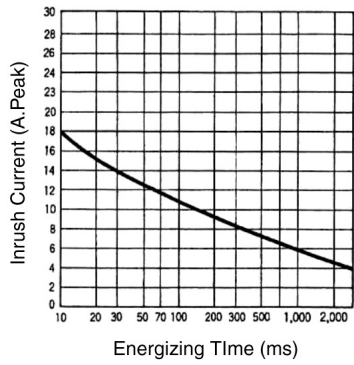
### ■ Inrush Current Resitivity

Non-repetitive (Keep inrush current to half the rated value if it occurs.)

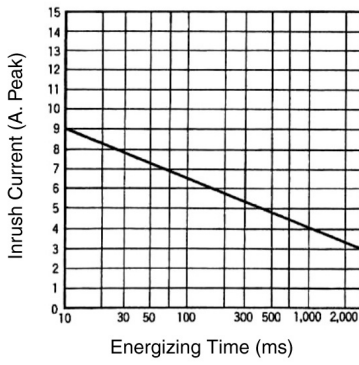
G3TC-OAC5, -OAC15, -OAC24, -OAC5A, -OAC15A, -OAC24A



G3TC-ODC5, -ODC15, -ODC24

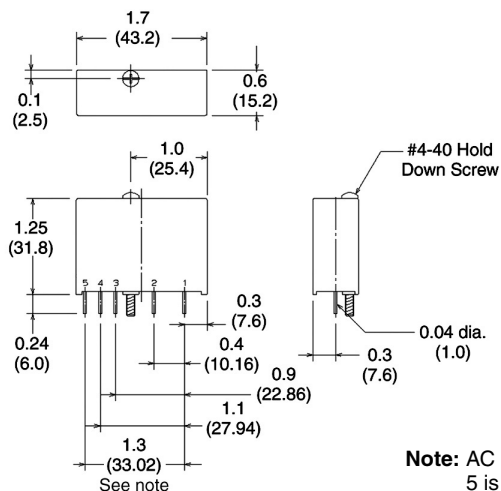


G3TC-ODC5A, -ODC15A, -ODC24A



# Dimensions

Unit: Inch (mm)



**Note:** AC and DC input versions only; pin 5 is not present on output modules.

## Approvals

**UL (File No. E64562)/CSA (File No. 35535)**

### Input

Model	Input voltage
G3TC-IAC5, -IAC15, -IAC24	90-140 V AC/DC
G3TC-IAC5A, -IAC15A, -IAC24A	180-280 V AC/DC
G3TC-IDC5, -IDC15, -IDC24	10-32 VDC, 12-32 VAC
G3TC-ODC5, -ODC5A, -OAC5, -OAC5A	5 VDC
G3TC-ODC15, -ODC15A, -OAC15, -OAC15A	15 VDC
G3TC-ODC24, -ODC24A, -OAC24, -OAC24A	24 VDC

### Output

Model	Load voltage	Load current
G3TC-IAC5, -IAC15, -IAC24	5/15/24 VDC	50 mA
G3TC-IAC5A, -IAC15A, -IAC24A	5/15/24 VDC	50 mA
G3TC-IDC5, -IDC15, -IDC24	5/15/24 VDC	50 mA
G3TC-ODC5, -ODC15, -ODC24	5-60 VDC	3 A
G3TC-ODC5A, -ODC15A, -ODC24A	5-200 VDC	1 A
G3TC-OAC5, -OAC15, -OAC24	75-140 VAC	3 A
G3TC-OAC5A, -OAC15A, -OAC24A	75-280 VAC	3 A

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



## Precautions

### ⚠ WARNING

Do not touch the relay while power is supplied or immediately after G3TC is turned OFF. Doing so may result in burns.

### ⚠ WARNING

Do not touch the load terminal of the G3TC immediately after the power is turned OFF, otherwise an electric shock may be received due to the residual charge of the built-in C/R circuit.

### ⚠ WARNING

Be sure to turn OFF the power supply to the G3TC before wiring, otherwise an electric shock may result.

### ⚠ WARNING

Ensure that a short-circuit current does not flow on the load side of the SSR, otherwise the G3TC may be damaged.

## General Precautions

At OMRON, we are constantly working to improve the quality and reliability of our products. SSRs, however, use semiconductors, which are prone to malfunction. Be sure to use SSRs within their rated value. Use the SSR only in systems that are designed with redundancies, flame protection, counter measures to prevent operation errors, and other countermeasures to prevent accidents involving human life or fires.

1. Do not apply excessive voltage or current to the input or output circuit of the G3TC. Doing so may result in malfunction or burning.
2. Do not connect the input and output circuits incorrectly. Doing so may result in malfunction or burning.
3. Do not obstruct the flow of air around the G3TC. Abnormal heating of the G3TC may result in short-circuiting of output elements and burning.

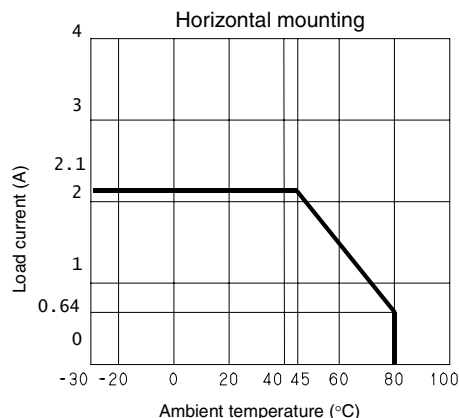
## Correct Use

### Before Actual Operation

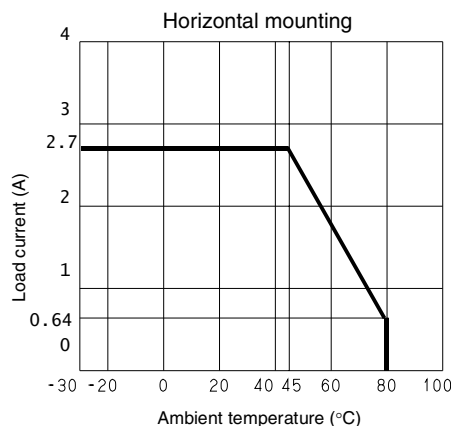
1. In actual operation, the G3TC may cause accidents that were unforeseeable at the theoretical stage. Therefore, it is necessary to test the G3TC under a variety of conditions that are possible. As for the characteristics of the G3TC, it is necessary to consider the differences between G3TC models.
2. The ratings in this datasheet are for testing in a temperature range of 15 to 30°C, a relative humidity range of 25% to 85%, and an atmospheric pressure range of 88 to 106kPa. When testing operation, it is necessary to confirm correct operation not only with the actual load that will be used, but also at the same ambient conditions as for actual operation.
3. The input circuitry does not incorporate a circuit protecting the SSR from being damaged due to a reversed connection. Make sure that the polarity is correct when connecting the input lines.
4. Only use the G3TC with loads that are within the rated values. Using the G3TC with loads outside the rated values may result in malfunction, damage, or burning.
5. Use a power supply within the rated frequency range. Using a power supply outside the rated frequency range may result in malfunction, damage, or burning.
6. No over-voltage absorption element is built in. Therefore, if the G3TC is connected to an inductive load, be sure to connect an over-voltage absorption element.
7. As protection against accidents due to short-circuiting, be sure to install protective devices, such as fuses on the power supply side.
8. Keep wiring separate from high-voltage power lines and use wires of an appropriate length, otherwise malfunction and damage may result due to induction.

9. For a DC inductive load, a diode should be connected in parallel with the load to absorb the counter electromotive force of the load.
10. For an I/O mounting rack that is installed horizontally, use the G3TC with loads that are within the following conditions.

#### G3TC-OAC5, -OAC5A, -OAC15, -OAC15A, -OAC24, -OAC24A



#### G3TC-ODC5, -ODC15, -ODC24



## ■ Operating and Storage Environments

### Operating Ambient Temperature

The rated value for the ambient operating temperature of the G3TC is for when there is no built-up heat. For this reason, under conditions where heat dissipation is not good due to poor ventilation, and where heat may build up easily, the actual temperature of the G3TC may exceed the rated value resulting in malfunction or burning.

When using the G3TC, design the system to allow heat dissipation sufficient to stay below the Load Current vs. Ambient Temperature characteristic curve. Note also that the ambient temperature of the G3TC may increase as a result of environmental conditions (e.g., climate, air-conditioning) and operating conditions (e.g., mounting in an airtight panel).

### Operating and Storage Locations

Do not use or store the G3TC in the following locations. Doing so may result in damage, malfunction, or deterioration of performance characteristics.

1. Do not use or store in locations subject to direct sunlight.
2. Do not use in locations subject to ambient temperatures outside the range -30° to 80°C.
3. Do not use in locations subject to relative humidity outside the range 45% to 85% or locations subject to condensation as the result of severe change in temperature.
4. Do not store in locations subject to ambient temperatures outside the range -30° to 100°C.
5. Do not use or store in locations subject to corrosive or flammable gases.
6. Do not use or store in locations subject to dust (especially iron dust) or salts.
7. Do not use or store in locations subject to shock or vibration.
8. Do not use or store in locations subject to exposure to water, oil, or chemicals.

### Transportation

When transporting the G3TC, observe the following points. Not doing so may result in damage, malfunction, or deterioration of performance characteristics.

1. Do not drop the G3TC or subject it to severe vibrations or shock.
2. Do not transport the product if it is wet.

### Vibration and Shock

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

# 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 time of shipment. 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 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.
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