

## VAF Meter EMS-18

### Features

- High brightness red LED display.
- Programmed values of parameters are protected against unintentional/unauthorised changes.
- Measurement of basic parameters. (Current (L-N), Voltage (L-N), (L-L), frequency(avg)).

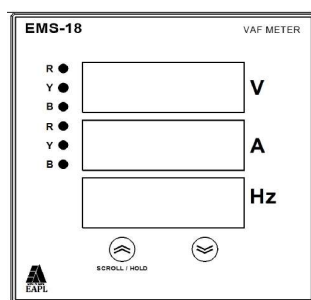


### Ordering Information

| Models | Function  | Source Voltage    | Display Parameters                        |
|--------|-----------|-------------------|---|
| EMS-18 | VAF meter | 85V to 270V AC/DC | V(R, Y, B), V(RY, YB, BR), A(R, Y, B), Hz |

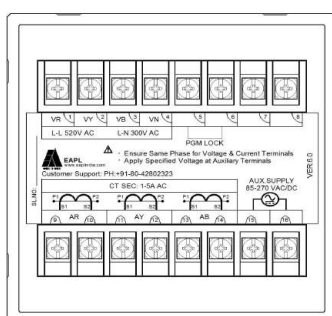
### Front View

#### EMS-18



### Rear View

#### EMS-18



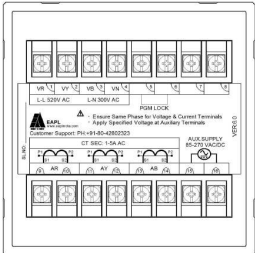
### Over-all Dimension

| Models | Dimension Details in mm |    |      | Cutout Dimension in mm |    |
|--------|-------------------------|----|------|------------------------|----|
|        | W                       | H  | D    | W                      | H  |
| EMS-18 | 96                      | 96 | 95.5 | 92                     | 92 |

## ■ Specifications

| Parameters                            | Models | EMS-18  |
|---------------------------------------|--------|---|
| Function                              |        | Voltage, current, frequency meter   |
| Rated supply Voltage                  |        | 85V to 270 V AC / DC  |
| Rated Frequency                       |        | 50 / 60Hz $\pm$ 5% for AC only  |
| Power consumption                     |        | AC Approx 5VA DC Approx 2W  |
| Burden                                |        | < 0.2 VA per Volts/Amps input   |
| Input Voltage                         |        | 3 Phase 4 wire (R,Y,B,N) Range - 415 VAC (-40% to +20%) 110 VAC (-40% to +20%)      |
| Input Current                         |        | Current inputs (AR,AY,AB)1A to 5A (to 200%)   |
| Accuracy(Voltage, Current ,Frequency) |        | $\pm$ 1% of FS $\pm$ 1 digit  |
| Sensing                               |        | True RMS  |
| Recovery Time                         |        | 2 sec minimum   |
| Humidity                              |        | Up to 95% RH @ 40°C   |
| Ambient Temperature                   |        | Operation: -10°C to +55°C(14°F to 131°F)<br>Storage: -25°C to +80°C(-13°F to 176°F) |
| Dielectric Strength                   |        | 2.5KV AC, 50Hz for 1minute (Between current carrying & non-current carrying parts)  |
| Insulation resistance                 |        | >100M ohms @500V DC   |
| Electrical connection                 |        | Screw type terminals with self lifting clamps.                                      |
| Dimension (W x H x D)                 |        | 96 X 96 X 95.5mm  |
| Cut-out Dimension(W x H)              |        | 92X 92 mm   |

## Connection and Terminal Details

|                    |  |  |
|--------------------|--|--|
| Connection Details | EMS-18   |  |
|                    |    |  |
| Terminal Details   | EMS-18   |  |
|                    | <b>For Three phase</b><br><b>1, 2, 3, 4 :</b> R, Y, B, N<br><b>5, 6 :</b> Program lock<br><b>9, 10 :</b> S1, S2 (R Phase)<br><b>11,12 :</b> S1, S2 (Y Phase)<br><b>13,14 :</b> S1, S2 (B Phase)<br><b>15,16 :</b> Auxiliary Supply(85-270 V AC/DC) | <b>For single phase</b><br><b>1, 4 :</b> R, N<br><b>5, 6 :</b> Program lock<br><b>9, 10 :</b> S1, S2<br><b>15,16 :</b> Auxiliary Supply (85-270 V AC/DC) |

## ■ Coils Ratings for High-sensitivity Models

|                      |                                 |        |          |
|----------------------|---------------------------------|--------|----------|
| Rated voltage        | 5VDC                            | 12VDC  | 24VDC    |
| Rated current        | 50.0mA                          | 20.8mA | 10.42 mA |
| Coil resistance      | 100Ω                            | 576Ω   | 2,304Ω   |
| Must operate voltage | 75% max. of the rated voltage   |        |          |
| Must release voltage | 10% min. of the rated voltage   |        |          |
| Max. voltage         | 180% of rated voltage (at 23°C) |        |          |
| Power consumption    | Approx. 250mW                   |        |          |

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

## ■ Contact Ratings

| Item                   | General-purpose Models                        |   | High-capacity Models                         | High-sensitivity Models                      |
|------------------------|---|---|--|--|
| Number of poles        | 1 pole  | 2 poles                                     | 1 pole                                       | 1 pole                                       |
| Contact material       | Ag Alloy (Cd free)                            |   |  |  |
| Load                   | Resistive load ( $\cos\phi=1$ )               |   |  |  |
| Rated load             | 12A at 250VAC<br>12A at 24 VDC<br>(See note.) | 8A at 250 VAC<br>8A at 30VDC<br>(See note.) | 16A at 250VAC<br>16A at 30VDC<br>(See note.) | 10A at 250VAC<br>10A at 24VDC<br>(See note.) |
| Rated carry current    | 12A (See note.)                               | 8A (70°C)/5A (85°C)<br>(See note.)          | 16A (See note.)                              | 10A (See note.)                              |
| Max. switching voltage | 440VAC, 300VDC                                |   |  |  |
| Max. switching current | 12A   | 8A  | 16A  | 10A  |
| Max. switching power   | 3,000VA (4,000VA)                             | 2,000VA                                     | 4,000 VA                                     | 2,500VA                                      |

**Note:** Contact your OMRON representative for the ratings on fully sealed models.

## ■ Characteristics

| Item                      | General-purpose<br>(High-capacity) Models  | General-purpose Models  | High-sensitivity Models  |
|---------------------------|--|---|--|
| Number of poles           | 1 pole   | 2 pole  | 1 pole   |
| Contact resistance        | 100mΩ max.   |   |  |
| Operate (set) time        | 15ms max.  |   |  |
| Release (reset) time      | 5ms max.   |   |  |
| Max. operating frequency  | Mechanical: 18,000 operation/hr<br>Electrical: 1,800 operation/hr at rated load  |   |  |
| Insulation resistance     | 1,000MΩ min. (at 500VDC)   |   |  |
| Dielectric strength       | 5,000VAC, 1min between coil and contacts<br>1,000VAC, 1min between contacts of same polarity   | 5,000VAC, 1min between coil and contacts<br>2,500VAC, 1min between contacts of different polarity<br>1,000VAC, 1min between contacts of same polarity | 5,000VAC, 1min between coil and contacts<br>1,000VAC, 1min between contacts of same polarity |
| Impulse withstand voltage | 10kV (1.2×50μs) between coil and contact   |   |  |
| Vibration resistance      | Destruction: 10 to 55 to 10Hz, 0.75mm single amplitude (1.5mm double amplitude)<br>Malfunction: 10 to 55 to 10Hz, 0.75mm single amplitude (1.5mm double amplitude) |   |  |
| Shock resistance          | Destruction: 1,000m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 100 m/s <sup>2</sup> (approx. 10 G)  |   |  |
| Endurance (Mechanical)    | 20,000,000 operations (at 18,000 operations/hr)  |   |  |
| Ambient temperature       | Operating: -40°C to 85°C (with no icing) Storage: -40°C to 85°C (with no icing)  |   |  |
| Ambient humidity          | 5% to 85%  |   |  |
| Weight                    | Approx. 12g  |   |  |

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

## ■ Approved Standards

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

| Model     | Contact form | Coil ratings | Contact ratings  | Number of test operations |
|-----------|--------------|--------------|--|---------------------------|
| G2RL-1A   | SPST-NO      | 3 to 48 VDC  | 12 A at 250 VAC (General use)                            | 100,000                   |
| G2RL-1    | SPDT         |              | 12 A at 24 VDC (Resistive)                               | 50,000                    |
| G2RL-1A-E | SPST-NO      | 3 to 48 VDC  | 16 A at 250 VAC (General use)                            | 100,000                   |
| G2RL-1-E  | SPDT         |              | 16 A at 24 VDC (Resistive)                               | 50,000                    |
| G2RL-1A-H | SPST-NO      | 5 to 24 VDC  | 10 A at 250 VAC (General use) 10 A at 24 VDC (Resistive) | 50,000                    |
| G2RL-1-H  | SPDT         |              |  |                           |
| G2RL-2A   | DPST-NO      | 3 to 48 VDC  | 8 A at 277 VAC (General use) 8 A at 30 VDC (Resistive)   | 100,000                   |
| G2RL-2    | DPDT         |              |  |                           |

**Note:** Consult Omron for additional UL/CSA ratings

VDE (EN 61810-1) (License No. 119650)

| Model       | Contact form | Coil ratings              | Contact ratings  |
|-------------|--------------|---------------------------|--|
| G2RL-1(A)   | 1 pole       | 5, 12, 18, 22, 24, 48 VDC | 12 A at 250 VAC ( $\cos\phi=1$ )<br>12 A at 24 VDC (L/R=0 ms) AC15: 3 A at 240 VAC<br>DC13: 2.5 A at 24 VDC, 50 ms                                       |
| G2RL-1(A)-E | 1 pole       | 5, 12, 18, 22, 24, 48 VDC | 16 A at 250 VAC ( $\cos\phi=1$ )<br>16 A at 24 VDC (L/R=0 ms)<br>AC15: 3 A at 240 VAC (NO)<br>1.5 A at 240 VAC (NC)<br>DC13: 2.5 A at 24 VDC (NO), 50 ms |
| G2RL-1(A)-H | 1 pole       | 5, 9, 12, 24 VDC          | 10 A at 250 VAC ( $\cos\phi=1$ )<br>10 A at 24 VDC (L/R=0 ms)  |
| G2RL-2(A)   | 2 poles      | 5, 12, 18, 22, 24, 48 VDC | 8 A at 250 VAC ( $\cos\phi=1$ )<br>8 A at 24 VDC (L/R=0 ms)<br>AC15: 1.5 A at 240 VAC<br>DC13: 2 A at 30 VDC, 50 ms                                      |

**Note:** To achieve approved life cycles on sealed models, the relay should be vented by removing the “knock off vent nib” on top of relay case after the soldering/washing process.

## Electrical Life Data

|                 |   |   |
|-----------------|---|---|
| <b>G2RL-1-E</b> | 16 A at 250 VAC ( $\cos\phi=1$ )<br>16 A at 24 VDC<br>8 A at 250 VAC ( $\cos\phi=0.4$ )<br>8 A at 30 VDC (L/R=7 ms) | 30,000 operations min.<br>30,000 operations min.<br>200,000 operation min. (normally open side operation)<br>10,000 operation min. (normally open side operation) |
| <b>G2RL-1</b>   | 12 A at 250 VAC ( $\cos\phi=1$ )<br>12 A at 24 VDC<br>5 A at 250 VAC ( $\cos\phi=0.4$ )<br>5 A at 30 VDC (L/R=7 ms) | 50,000 operations min.<br>30,000 operations min.<br>150,000 operation min. (normally open side operation)<br>20,000 operation min. (normally open side operation) |
| <b>G2RL-1-H</b> | 10 A at 250 VAC ( $\cos\phi=1$ )<br>10 A at 24 VDC  | 100,000 operations min.<br>50,000 operations min.   |
| <b>G2RL-2</b>   | 8 A at 250 VAC ( $\cos\phi=1$ )<br>8 A at 30 VDC  | 30,000 operations min.<br>30,000 operations min.  |

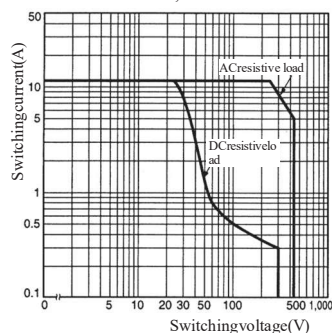
**Note:** 1. The results shown reflect values measured using very severe test conditions i.e., Duty: 1s ON/1s OFF.

- In order to obtain the full rated life cycles on the fully sealed models, the relay should be properly vented by removing the “knock off vent nib” on top of the relay case after the soldering/washing process.
- Electrical endurance will vary depending on the test conditions. Contact your OMRON representative if you require more detailed information for the electrical endurance under your test conditions.

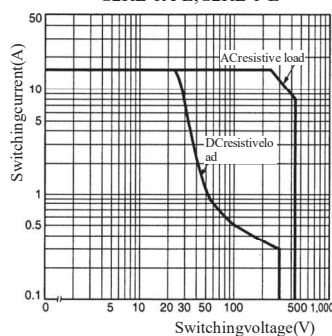
# EngineeringData

## ■ MaximumSwitchingCapacity

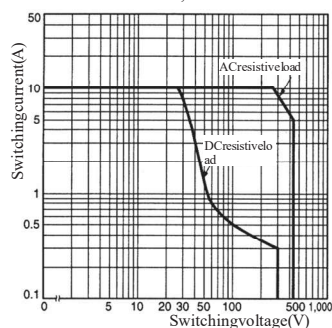
G2RL-1A,G2RL-1



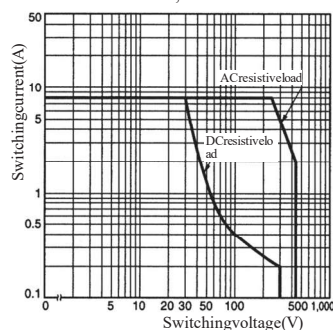
G2RL-1A-E,G2RL-1-E



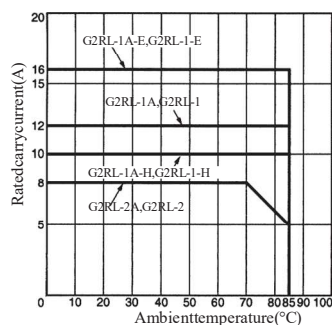
G2RL-1A-H,G2RL-1-H



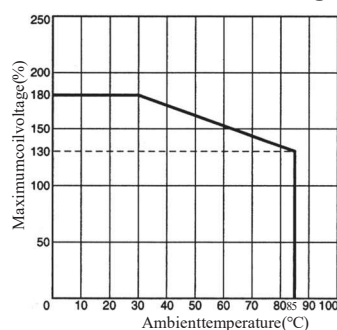
G2RL-2A,G2RL-2



## ■ AmbientTemperature vs Rated Carry Current



## ■ AmbientTemperature vs Maximum Coil Voltage



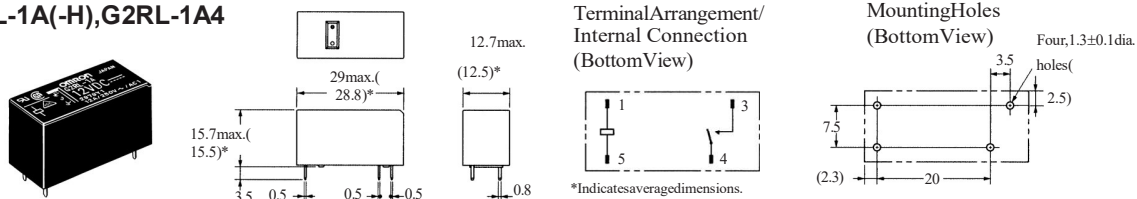
**Note:** The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

**Note:** Contact your OMRON representative for the data on fully sealed models.

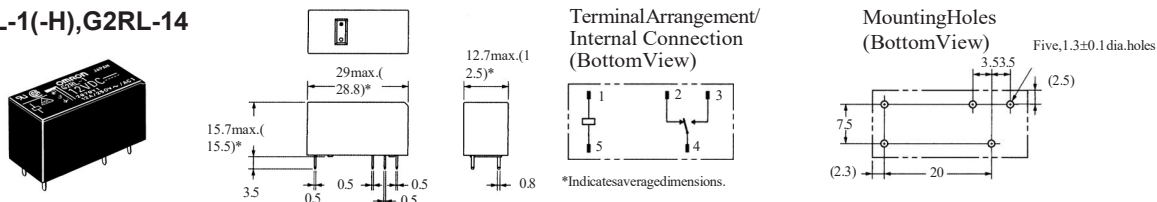
# Dimensions

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

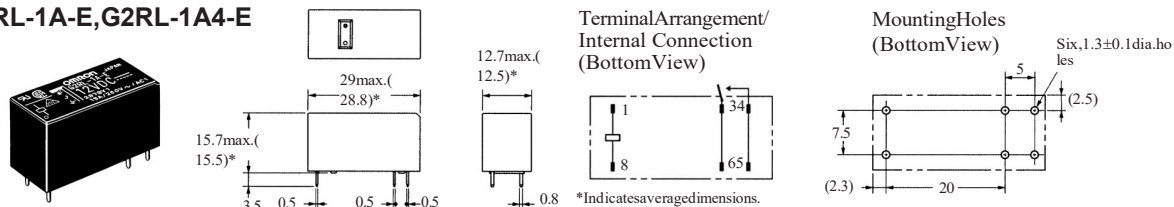
## G2RL-1A(-H), G2RL-1A4



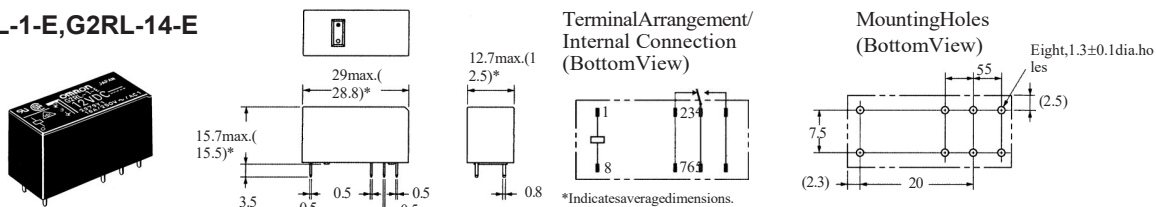
## G2RL-1(-H), G2RL-14



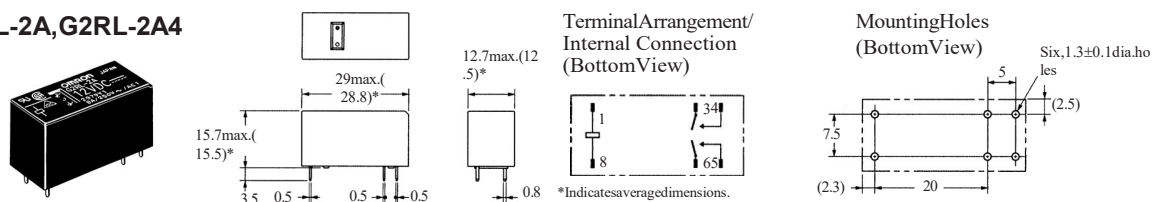
## G2RL-1A-E, G2RL-1A4-E



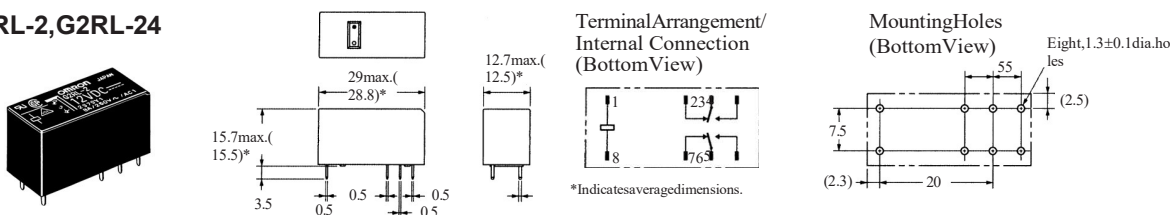
## G2RL-1-E, G2RL-14-E



## G2RL-2A, G2RL-2A4



## G2RL-2, G2RL-24





# MEMO



# 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 II 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 governmental 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 other requirements of any governmental 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 the 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 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 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 installation on 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 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 THE 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's specifications infringes 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 guidance 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.
- Errors And Omissions:** The information on Seller's website or in other documentation has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.
- Export Controls:** Buyer shall comply with all applicable laws, regulations and licenses regarding (a) export of the Products or information provided by Seller; (b) sale of Products to forbidden or other proscribed persons or organizations; (c) disclosure to non-citizens of regulated technology or information.

### VI. MISCELLANEOUS

- Waiver:** No failure or delay by Seller in exercising any right and no course of dealing between Buyer and Seller shall operate as a waiver of rights by Seller.
- Assignment:** Buyer may not assign its rights hereunder without Seller's written consent.
- Law:** These Terms are governed by Illinois law (without regard to conflict of laws). Federal and state courts in Cook County, Illinois have exclusive jurisdiction for any dispute hereunder.
- Amendment:** These Terms constitute the entire agreement between Buyer and Seller relating to the Products, and no provision may be changed or waived unless in writing signed by the parties.
- Severability:** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision.

## Certain Precautions on Specifications and Use

- Suitability for Use.** Seller shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in Buyer's application or use of the Product. At Buyer's request, Seller will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a completed determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
  - Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
  - 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.
  - Use in consumer products or any use in significant quantities.
  - Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this product.

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