# **Enclosed Switch**

### **Economical, High Utility Enclosed Switch**

- High precision and long life (10,000,000 mechanical operations) through employment of the moving spring used in OMRON  ${\sf Z}$ Basic Switch.
- Sealed with gasket diaphragm to provide high sealing property without use of any adhesive or pin.
- Suitable for applications demanding higher mechanical strength, dustproof and drip-proof properties than those on ba-
- Panel mount versions have the same operating position as Z Basic Switch.
- Resin molded terminal versions are available.
- Approved by UL, CSA, and CCC (Chinese standard).





### **Model Number Structure**

### **■ Model Number Legend**



1. Actuator
5000: Panel mount plunger
5020: Panel mount roller plunger

5040: Panel mount crossroller plunger

1020: Short hinge lever 1000: Hinge lever

2000: Hinge roller lever Short hinge roller lever

3030: One-way action short hinge roller lever

### **Ordering Information**

### **■** List of Models

Actuator		Model
Panel mount plunger		D4MC-5000
Panel mount roller plunger	HO	D4MC-5020
Panel mount crossroller plunger		D4MC-5040
Short hinge lever		D4MC-1020
Hinge lever		D4MC-1000
Hinge roller lever		D4MC-2000
Short hinge roller lever		D4MC-2020
One-way action short hinge roller lever		D4MC-3030

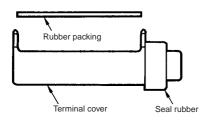
Note: Use molded terminal models (refer to page 158) when using the Switch under one of the following conditions:
a) dusty, b) high amount of dripping oil, or c) high humidity.

Models are available with the lead outlet in one of three locations: right-hand, left-hand, and underside.

woodes are available with the load outlet in one of three locations. Tight hand, lot hand, and underside.

### ■ Terminal Protective Cover, Seal Rubber, and Rubber Packing

(The Switch is equipped with these 3 items as a standard.)



- ZC Terminal Cover (Product code: ZC55-0002H)
- ZC Seal Rubber (Product code: SC-1404C)
- ZC Rubber Packing (Product code: ZC55-0003F)

### **Specifications**

## ■ Approved Standards (Except Molded Terminal Models)

Agency	Standard	File No.
UL	508	E76675
CSA	C22.2 No. 14	E45258
CCC (CQC)	GB14048.5	2003010303077627

Note: Ask your OMRON representative for information on approved models.

### **■** Approved Standard Ratings

### **UL/CSA**

#### A300

Rated voltage	Carry current	Current		Volt-amperes	
		Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		

### EN60947-1 and EN60947-5-1

250 V, 10 A (AC12) (Tested by ASTA)

### CCC (GB14048.5)

Applicable category and ratings
AC-12 10 A/250 VAC

### **■** General Ratings

Rated voltage		Non-inductive load				Inductive load			
	Resisti	Resistive load		Lamp load		Inductive load		Motor load	
İ	NC	NO	NC	NO	NC	NO	NC	NO	
125 VAC	10 A	•	3 A	1.5 A	10 A	•	5 A	2.5 A	
250 VAC	10 A		2.5 A	1.25 A	10 A		3 A	1.5 A	
480 VAC	3 A		1.5 A	0.75 A	2.5 A		1.5 A	0.75 A	
8 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A	
14 VDC	10 A		3 A	1.5 A	6 A		5 A	2.5 A	
30 VDC	6 A		3 A	1.5 A	5 A		5 A	2.5 A	
125 VDC	0.5 A		0.4 A	0.4 A	0.05 A		0.05 A	0.05 A	
250 VDC	0.25 A		0.2 A	0.2 A	0.03 A		0.03 A	0.03 A	

Inrush current	NC	30 A max.	
	NO	15 A max.	

Note: 1. The above figures are for steady-state currents.

- 2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
- 3. Lamp load has an inrush current of 10 times the steady-state current.
- 4. Motor load has an inrush current of 6 times the steady-state current.
- 5. The above ratings were tested under the following conditions.

Ambient temperature: 20±2°C Ambient humidity: 65±5%

Operating frequency: 20 operations/min

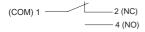
### **■** Characteristics

Degree of protection	IP67	
Durability	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.	
Operating speed	0.05 mm/s to 0.5 m/s (for plunger models)	
Operating frequency	Mechanical: 120 operations/min Electrical: 20 operations/min	
Rated frequency	50/60 Hz	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Contact resistance	15 mΩ max. (initial value)	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity 2,000 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying part	
Rated insulation voltage (U <sub>i</sub> )	1,000 VAC	
Pollution degree (operating environment)	3 (IEC947-5-1)	
Protection against electric shock	Class II	
PTI (tracking characteristics)	175	
Switch category	D (IEC335)	
Rated operating current (I <sub>e</sub> )	10 A	
Rated operating voltage (U <sub>e</sub> )	250 VAC	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note)	
Shock resistance	Destruction: 1,000 m/s² min.  Malfunction: 100 m/s² min. (for plunger models) (see note)	
Ambient temperature	Operating: -10°C to 80°C (with no icing)	
Ambient humidity	Operating: 35% to 95%	
Weight	Approx. 71 g (at panel mount plunger)	

Note: Less than 1 ms under a free state at the operating limits.

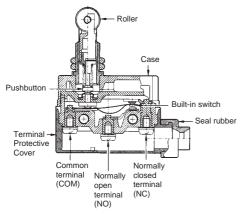
### **Connections**

### **■** Contact Form



### **Nomenclature**

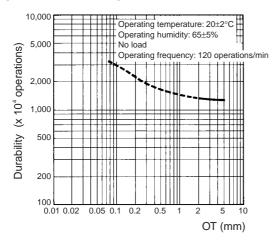
Changing the Terminal Protective Cover around allows the cable to be pulled out from either the right or the left.



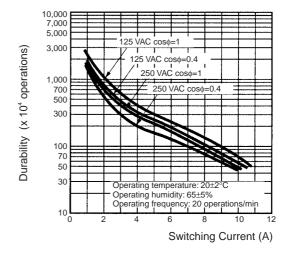
Note: M4 binding head screws (with toothed washers) are used as the terminal screws.

### **Engineering Data**

## ■ Mechanical Durability (D4MC-5000)



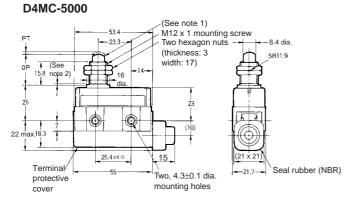
### **■** Electrical Durability



### **Dimensions**

- Note: 1. All units are in millimeters unless otherwise indicated.
  - 2. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

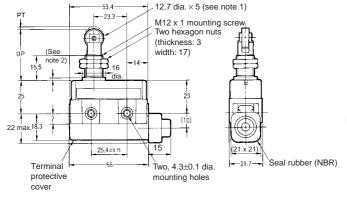
### Panel Mount Plunger



Model	D4MC-5000
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	21.8± 1.2 mm
FP max.	

- Note: 1. Stainless steel plunger
  - 2. The length of the imperfect threads is 1.5 mm maximum.
  - 3. Do not use the M12 mounting screw and the case mounting hole at the same time.

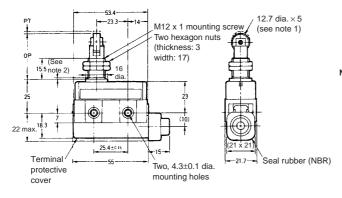
### Panel Mount Roller Plunger D4MC-5020



Model	D4MC-5020
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	33.4±1.2 mm
FP max.	

- Note: 1. Stainless steel roller
  - 2. The length of the imperfect threads is 1.5 mm maximum.
  - Do not use the M12 mounting screw and the case mounting hole at the same time.

### Panel Mount Crossroller Plunger D4MC-5040

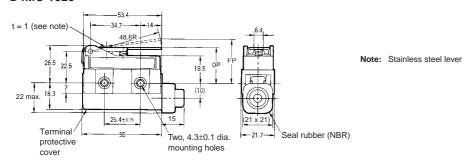


- Note: 1. Stainless steel roller
  - 2. The length of the imperfect threads is 1.5 mm maximum.
  - 3. Do not use the M12 mounting screw and the case mounting hole at the same time.

Model	D4MC-5040
OF max.	5.88 N
RF min.	0.98 N
PT max.	1.6 mm
OT min.	5 mm
MD max.	0.2 mm
OP	33.4±1.2 mm
FP max.	

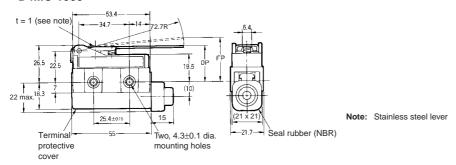
### OMRON

### Short Hinge Lever D4MC-1020



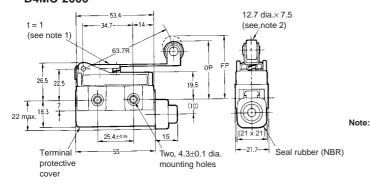
Model	D4MC-1020
OF max.	2.55 N
RF min.	0.34 N
PT max.	
OT min.	2.5 mm
MD max.	1.7 mm
OP	25±1 mm
FP max.	33 mm

### Hinge Lever D4MC-1000



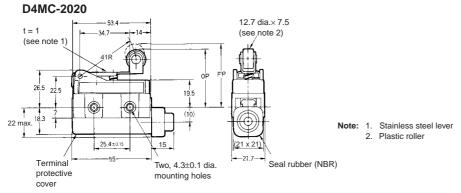
Model	D4MC-1000
OF max.	1.67 N
RF min.	0.25 N
PT max.	
OT min.	4 mm
MD max.	3 mm
OP	25±1 mm
FP max.	36 mm

### Hinge Roller Lever D4MC-2000



Model	D4MC-2000
OF max.	1.96 N
RF min.	0.39 N
PT max.	
OT min.	5 mm
MD max.	3 mm
OP	40±1 mm
FP max.	51 mm

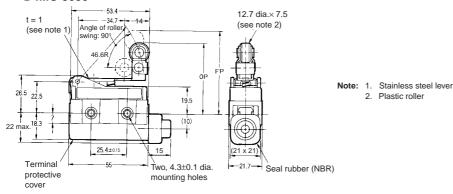
### Short Hinge Roller Lever



Model	D4MC-2020
OF max.	2.94 N
RF min.	0.39 N
PT max.	
OT min.	2 mm
MD max.	1.5 mm
OP	40±1 mm
FP max.	47 mm

Stainless steel lever
 Plastic roller

### One-way Action Short Hinge Roller Lever D4MC-3030

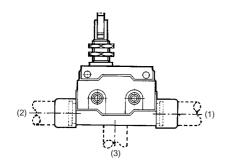


Model	D4MC-3030
OF max.	2.94 N
RF min.	0.39 N
PT max.	
OT min.	2 mm
MD max.	1.5 mm
OP	50±1 mm
FP max.	57.2 mm

### **Molded Terminal Models**

### ■ Molded Terminal Models (Not Approved by UL, CSA, or EN)

The molded terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil, or moisture.



When placing your order for the Switch specify the required length of V.C.T. cable in addition to the model number of the Switch

#### Example:

Standard type: D4MC-5020 Location of lead outlet: Underside Length of lead: 1 m (V.C.T. lead)

When placing your order for the above Switch specify the model

number as D4MC-5023 VCT 1M

### Suffix by Location of Lead Outlet

Location of lead outlet	Model
	COM, NC, and NO
Right-hand	D4MC-□□□1
Left-hand	D4MC-□□□2
Underside	D4MC-□□3

### **Leads Supplied**

Leads	Nominal cross-sectional area	Finished outside diameter	Terminal connections	Standard length
V.C.T. (Vinyl cabtire cable)	1.25 mm <sup>2</sup>		Black: COM White: NO Red: NC	1, 3 m

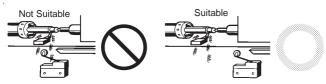
### **Precautions**

Refer to the "Precautions for General-purpose Limit Switches (Including Multiple Limit Switches, Mechanical Touch Switches, High-precision Switches, Touch Switches, On-site Flexible Switches; Not Including Safety Switches)" on page 17.

#### **■** Correct Use

#### **Operating Environment**

- Seal material may deteriorate if a Switch is used outdoor or where subject to special cutting oils, solvents, or chemicals. Always appraise performance under actual application conditions and set suitable maintenance and replacement periods.
- Install Switches where they will not be directly subject to cutting chips, dust, or dirt. The Actuator and Switch must also be protected from the accumulation of cutting chips or sludge.



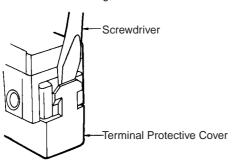
- Constantly subjecting a Switch to vibration or shock can result in wear, which can lead to contact interference with contacts, operation failure, reduced durability, and other problems. Excessive vibration or shock can lead to false contact operation or damage. Install Switches in locations not subject to shock and vibration and in orientations that will not produce resonance.
- The Switches have physical contacts. Using them in environments containing silicon gas will result in the formation of silicon oxide (SiO<sub>2</sub>) due to arc energy. If silicon oxide accumulates on the contacts, contact interference can occur. If silicon oil, silicon filling agents, silicon cables, or other silicon products are present near the Switch, suppress arcing with contact protective circuits (surge killers) or remove the source of silicon gas.

### **Operating**

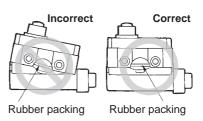
Excessive dog angle, operating speed, or overtravel (OT) may damage the actuator. Check that OT has a sufficient margin. The actual OT should be rated OT  $\times$  0.7 to 1.

### <u>Handling</u>

- Do not expose the Switch to water exceeding 60°C or use it in steam
- Do not use the Switch in oil or water.
- An 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm².)
- When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



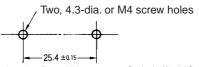
When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.



### Mounting

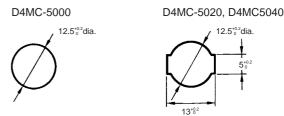
When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

#### **Mounting Holes**



- When mounting the Panel Mount-type Switch (D4MC-5000, D4MC-5020, or D4MC-5040) with screws on a side surface, remove the hexagonal nuts from the actuator.
- When mounting the panel mount type on a panel, be careful not to tighten to an excessive torque. Tightening the screws to a torque exceeding 4.91 N·m will cause the plunger to fail.

### **Mounting Hole Dimensions**



### **Correct Tightening Torque**

A loose screw may cause malfunctions. Be sure to tighten each screw to the proper tightening torque as shown in the table.

No.	Туре	Torque
1	Terminal screw	0.78 to 1.18 N·m
2	Panel mounting screw	2.94 to 4.92 N·m
3	Side mounting screw	1.18 to 1.47 N·m

### Terms and Conditions of Sale

- Offer: Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "<u>Products</u>") by Omron Electronics LLC and its subsidiary companies ("<u>Omron</u>"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms
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- 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 (i) the invoice is paid according to Omron's payment terms
- and (ii) Buyer has no past due amounts.

  Interest. Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms
- Orders. Omron will accept no order less than \$200 net billing.
- Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for 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 Omron or required to be collected directly or indirectly by Omron 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 Omron.
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- Cancellation: Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
- 10. Force Majeure. Omron 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 Omron:
   Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
  - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer; c. All sales and shipments of Products shall be FOB shipping point (unless oth-
  - erwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid; d. Delivery and shipping dates are estimates only; and e. Omron will package Products as it deems proper for protection against nor-
- mal handling and extra charges apply to special conditions.

  12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products term Omron in the condition claims. from Omron in the condition claimed.
- Warranties. (a) Exclusive Warranty. Omron'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 Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

  (b) <u>Limitations</u>. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABIL-

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- lished information.

  Limitation on Liability: Etc. OMRON COMPANIES 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 Omron Companies exceed the individual price of the Product on which liability is asserted.

  Indemnities. Buyer shall indemnify and hold harmless Omron Companies and their employees from and against all liabilities, losses, claims, costs and expenses (including attorneys fees and expenses) related to any claim inves-
- expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Omron 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. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property
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  Property: Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron 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.

  <u>Export Controls.</u> Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.

  Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right
  - Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (a) Definitions. As used against the amount owing in respect of this invoice. (g) <u>Definitions</u>. As used herein, "including" means "including without limitation"; and "<u>Omron Companies</u>" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

### Certain Precautions on Specifications and Use

- <u>Suitability of Use.</u> Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron 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 complete 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.

  - (ii) Use in consumer products or any use in significant quantities.
    (iii) 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. (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 Prod-
  - 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.
- OVERALL EQUIPMENT OR SYSTEM.

  Programmable Products. Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

  Performance Data. Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
- Change in Specifications. Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time
- to confirm actual specifications of purchased Product.

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Complete "Terms and Conditions of Sale" for product purchase and use are on Omron's website at www.omron247.com - under the "About Us" tab, in the Legal Matters section.

#### 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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