Multiple Limit Switch
VB

A New Monoblock Multiple Limit Switch Incorporating a Head Box with a Tough Head and Ensuring High Sealing Performance and a Mechanical Durability of 5,000,000 Operations

- Used for the sequential control of a variety of engineering machines and belt conveyor lines.
- Built-in oil filter shuts out oil and water.
- Approved by EN, IEC, and CCC (Chinese standard). (Ground terminal models only.)
- Ground terminal models bear the CE mark.



Model Number Structure

■ Model Number Legend

VB-□□□□□□
1 2 3 4 5 6

1. Number of Plungers
- 2: 2 plungers
- 3: 3 plungers
- 4: 4 plungers
- 5: 5 plungers
- 6: 6 plungers

2. Actuator
- 1: Bevel plunger
- 2: Roller plunger

3. Switch Box
- 1: Flange switch box with two conduit holes on the side
- 2: Flange switch box with four conduit holes
- 4: Non-flange switch box with two conduit holes on the side
- 5: Non-flange switch box with four conduit holes

4. Scraper
- 1: NBR scraper
- 2: FPM scraper

5. Contact
- None: 10 A (standard)
- A: 0.1 A (micro load)

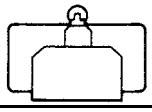
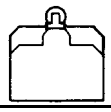
6. Ground Terminal
- None: Without ground terminal
- E: With ground terminal

Replaceable Switch Unit

Rating	Model
Standard load model	VB-S101N

Ordering Information

■ List of Models

Actuator	Conduit	Model	
		With flange 	Without flange 
Roller plunger (with a 6.8-dia. roller) 	Two on the side	VB-2211	VB-2241
		VB-3211	VB-3241
		VB-4211	VB-4241
		VB-5211	VB-5241
		VB-6211	VB-6241
	Four	VB-2221	VB-2251
		VB-3221	VB-3251
		VB-4221	VB-4251
		VB-5221	VB-5251
		VB-6221	VB-6251
Bevel plunger 	Two on the side	VB-2111	VB-2141
		VB-3111	VB-3141
		VB-4111	VB-4141
		VB-5111	VB-5141
		VB-6111	---
	Four	VB-2121	VB-2151
		VB-3121	VB-3151
		VB-4121	VB-4151
		VB-5121	---
		VB-6121	---

Note: 1. Other than the above models, minute load models switching 0.1 A are available. When ordering a minute load model, add the suffix A to the model number (i.e., VB-2211A for example).

2. SC connectors can be connected to VB models.

3. Models with ground terminals are also available. When ordering a ground terminal model, add the suffix E to the model number (i.e., VB-2211E for example).

4. Since the actuator is incorporated into the monoblock switch, the actuator cannot be replaced.

Specifications

■ Approved Standards

Agency	Standards	File No.	Approved models
TÜV Rheinland	EN60947-5-1 (IEC947-5-1)	R9551017	Only models with ground terminals
CCC (CQC)	GB14048.5	2003010305077628	Ask your OMRON representative for information on approved models.

Note: Ground terminal models only.

■ Approved Standard Ratings

TÜV (EN60947-5-1) (Only Ground Terminal Models are Approved)

Standard Load

Applicable category and ratings
AC-15 2 A/250 VAC
DC-12 2 A/48 VDC

Micro Load

Applicable category and ratings
AC-14 0.1 A/125 VAC
DC-12 0.1 A/30 VDC

CCC (GB14048.5)

Applicable category and ratings
AC-15 2 A/250 VAC

■ General Ratings

Standard Load

Rated voltage	Resistive load		Inrush current	Inrush current
	NC	NO	NC	NO
125 VAC	10 A		24 A max.	
250 VAC	10 A			
125 VDC	0.6 A			
250 VDC	0.3 A			

Note: The above currents are steady-state currents.

Micro Load Ratings

Rated voltage	Resistive load
125 VAC	0.1 A
8 VDC	0.1 A
30 VDC	0.1 A

■ Characteristics

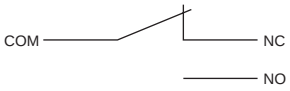
Degree of protection	IP67
Durability (See note 2.)	Mechanical: 5,000,000 operations min. Electrical: 300,000 operations min. (10 A at 250 VAC, resistive load)
Operating speed	0.1 mm to 0.5 m/s
Operating frequency	Mechanical: 120 operations min. Electrical: 30 operations min.
Rated frequency	50/60 Hz (AC)
Insulation resistance	100 MΩ min. (at 500 VDC)
Contact resistance	15 mΩ max. (initial value)
Dielectric strength	1,000 VAC/U_{imp} 4,000 VAC between terminals of same polarity 1,500 VAC/U_{imp} 4,000 VAC between current-carrying metal parts and ground 1,500 VAC/U_{imp} 4,000 VAC between each terminal and non-current-carrying metal part U_{imp} 4 kV (EN60947-5-1) between terminals of different polarity
Rated insulation voltage (U_i)	300 VAC (EN60947-5-1)
Switching overvoltage	1,000 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gG or gI (IEC269)
Conditional short-circuit current	100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	5 A, 0.5 A (EN60947-5-1)
Protection against electric shock	Insulation class I (Use the grounding terminal or ground on the machine side.)
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 200 m/s^2 min.
Ambient temperature	Operating: –10°C to 80°C (with no icing)
Ambient humidity	Operating: 35% to 95%
Weight	Approx. 580 g (in the case of VB-4211)

Note: 1. The above values are initial values.

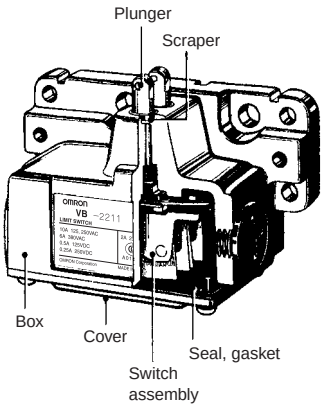
2. The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

Connections

■ Contact Form



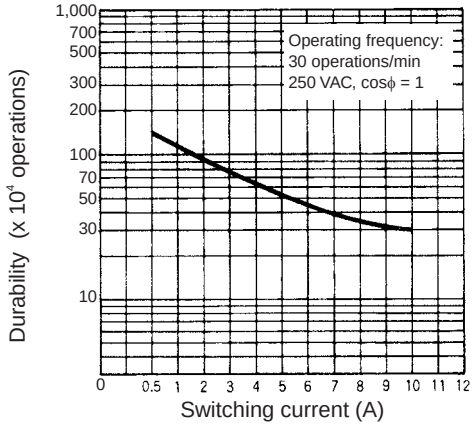
Nomenclature (for the VB-2211)



Engineering Data

■ Electrical Durability (with more than 300,000 Operations)

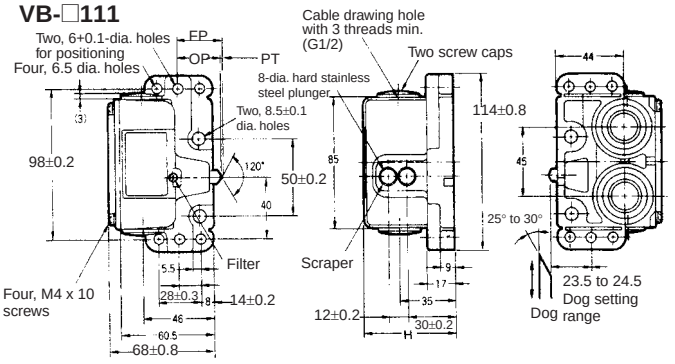
(Ambient temperature: 5°C to 35°C; Ambient humidity: 40% to 70%)



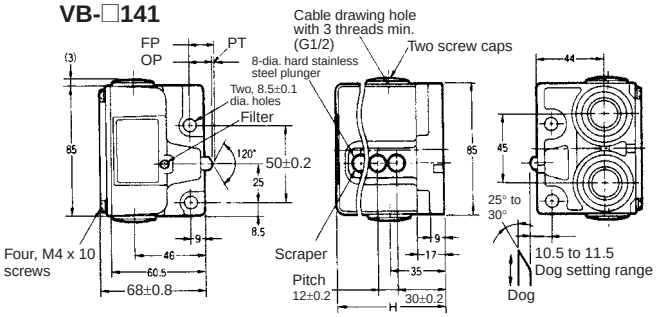
Dimensions

Note: All units are in millimeters unless otherwise indicated.

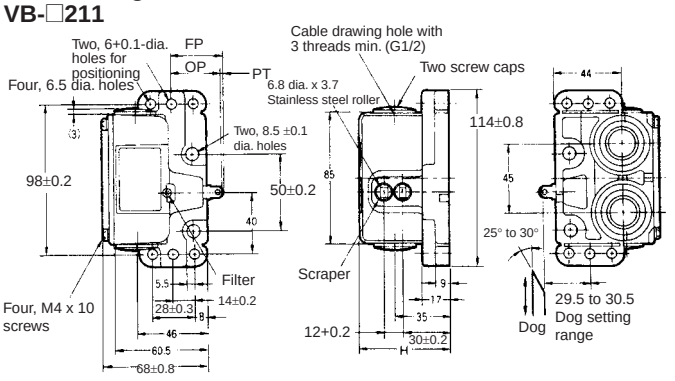
Bevel Plunger
VB-□111



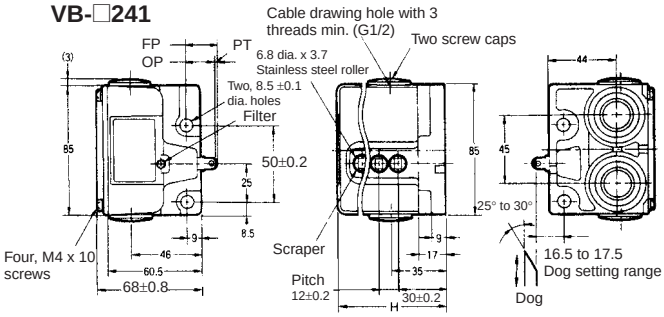
Bevel Plunger
VB-□141



Roller Plunger
VB-□211



Roller Plunger
VB-□241



Model	VB-□211	VB-□241	VB-□111	VB-□141
OF max.	14.71 N	14.71 N	14.71 N	14.71 N
RF min.	4.90 N	4.90 N	4.90 N	4.90 N
PT max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm
OT (see note 2)	(3.5 mm)	(3.5 mm)	(3.5 mm)	(3.5 mm)
MD max.	0.5 mm	0.5 mm	0.5 mm	0.5 mm
OP	32±0.4 mm	19±0.4 mm	26±0.4 mm	13±0.4 mm
FP (see note 2)	(33 mm)	(20 mm)	(27 mm)	(14 mm)

Note: 1. The above operating characteristic values apply to a single switch.
2. The OT and FP values are reference values.
3. The actual model numbers of each of the above VB models have a figure 2 to 6, which indicate the number of plungers.

Number of plungers	H
2	58 mm
3	70 mm
4	82 mm
5, 6 (see note)	106 mm

Note: When five plungers are mounted in series, no outer actuator will be provided.

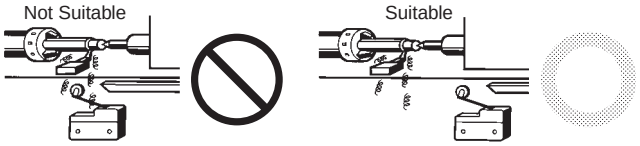
Precautions

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_2) 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.

Be sure to connect a fuse with a breaking current 1.5 to 2 times larger than the rated current to the Switch in series in order to protect the Switch from damage due to short-circuiting.

If the VB is used for EN ratings, use a gI or gG 10-A fuse approved by IEC269.

Operation

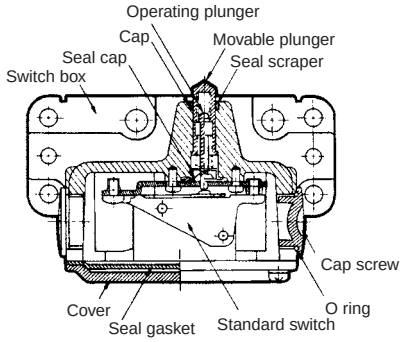
Make sure the notch of the plunger is not pressed into the scraper when operating the VB Multiple Limit Switch, otherwise chips or dust may penetrate into the VB Multiple Limit Switch.

Sealing

The switch box and cover are made of die-cast aluminum and the mounting part of the Switch is covered with a seal cap, and ensure a sealing performance of more than 98×10^3 Pa for the VB Multiple Limit Switch.

The filter on the side of the head prevents oil and water from penetrating into the interior of the VB Multiple Limit Switch while preventing the internal pressure of the VB Multiple Limit Switch from rising when the plunger is pressed.

The seal scraper on the tip of the actuator prevents chips and dust from penetrating into the moving parts of the VB Multiple Limit Switch.

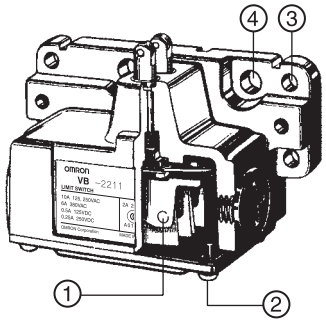


Apply extra tightening to the cap screw on the conduit.

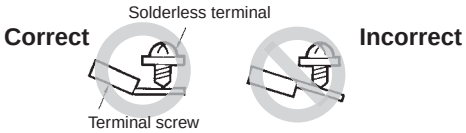
In order to protect the plunger from abrasion and prolong its service life, apply a small amount of grease to the plunger and dog or cam that come into contact with the plunger. (Molybdenum disulfide grease is recommended.)

Tightening Torque

1. Tighten each cover mounting screw to a torque of 1.18 to 1.37 N·m.
2. Tighten each switch terminal screw to a torque of 0.20 to 0.49 N·m if the mounting screw is M3 in size.



Be sure to wire each solderless terminal correctly with a screw as shown below.

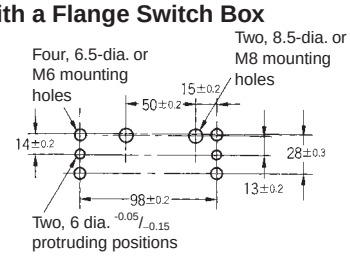


3. Apply a torque of 5.88 to 6.86 N·m to tighten each mounting bolt of the casing if the mounting bolt is an Allen-head bolt that is M6 in size. Apply a torque of 8.04 to 9.22 N·m instead if the mounting bolt is an Allen-head bolt that is M8 in size.

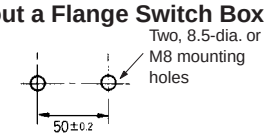
■ Mounting

Mounting Holes

With a Flange Switch Box



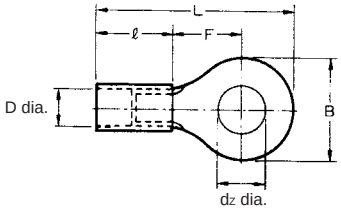
Without a Flange Switch Box



Wiring

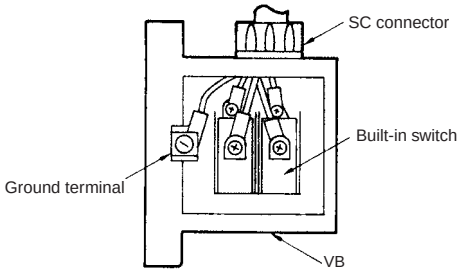
Connect a cable with a thickness of 0.75 mm^2 to the VB Multiple Limit Switch through the M3 round solderless terminals with insulation covers.

Dimensions of Round Solderless Terminal



dz dia.: 3.2
D dia.: 1.9
B: 5.2
L: 16.4
F: 5.8
ℓ: 8.0 (mm)

Wiring (Ground Terminal Models)



Note: Consult your OMRON representative for details on models with 3 to 6 plungers.

Others

Carefully connect a conduit to each conduit hole and apply a seal or tape to seal the conduit hole so that cuttings or other materials will not penetrate through the conduit hole.

Use the SC Connector. Consult your OMRON representative for details on SC Connectors.

Make sure that the position of the actuator that is traveling does not exceed the overtravel (OT) position.

Make sure that the operating stroke is 70% to 100% of the specified OT distance.

Terms and Conditions of Sale

1. 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 "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). 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.
2. Prices; Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. 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.
4. 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.
5. Orders. Omron will accept no order less than $200 net billing.
6. 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.
7. 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.
8. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron 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, Omron 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.
9. 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.
11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. 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 otherwise 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 normal 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 from Omron in the condition claimed.
13. 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) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly 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 Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See http://oeweb.omron.com or contact your Omron representative for published information.
14. 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.
15. Indemnities. Buyer shall indemnify and hold harmless Omron Companies and their 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 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 rights of another party.
16. 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.
17. Export Controls. 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.
18. 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. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. Suitability of Use. 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:
   (i) 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 Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. Programmable Products. Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. 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.
4. 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.
5. Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

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.

OMRON®

OMRON ELECTRONICS LLC
1 Commerce Drive
Schaumburg, IL 60173
Tel: 847.843.7900
For U.S. technical support or other inquiries: 800.556.6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
Tel: 416.286.6465

MEXICO SALES OFFICES
Mexico, D.F. 555.660.3144
Ciudad Juárez 656.623.7083
Monterrey, N.L. 818.377.4281
Querétaro 442.135.4510

BRAZIL SALES OFFICE
Sao Paulo 55.11.2101.6310

ARGENTINA SALES OFFICE
Cono Sur 54.114.787.1129

CHILE SALES OFFICE
Santiago 562.206.4592

OTHER LATIN AMERICAN SALES
mela@omron.com

OMRON ON-LINE
Global -
www.omron.com
USA -
www.omron247.com
Canada -
www.omron.ca
Brazil -
www.omron.com.br
Latin America -
www.espanol.omron.com

Cat. No. X019-E1-07 4/07 Specifications subject to change without notice Printed in USA