# **EE-SX47/67**

# Global Standard Slot-type photomicrosensors with 50- to 100-mA direct switching capacity for built-in application.

- Series includes models that enable switching between dark-ON and light-ON operation.
- Response frequency as high as 1 kHz.
- Easy operation monitoring with bright light indicator.
- Wide operating voltage range: 5 to 24 VDC
- Models in which the light indicator turns ON for dark-ON operation are also available.
- A wide range of variations in eight different shapes.
- Flexible robot cable is provided as a standard feature. \*2



Be sure to read *Safety Precautions* on page 8.

\*1. Only the EE-SX67 Series has pre-wired models.



#### **Ordering Information**

#### Connector models Infrared light

A mmoowamas	Sensing	Connect-	Canaina diata:	Output	Indicator models	Model	
Appearance	method	ing method	Sensing distance	configuration	Indicator mode	NPN output	PNP output
Standard a				Dark-ON/Light-ON	Incident light	EE-SX670	EE-SX670P
1999				(selectable) *3	No incident light	EE-SX670A	EE-SX670R
9999				Light-ON	Incident light	EE-SX470	EE-SX470P
L-shaped				Dark-ON/Light-ON	Incident light	EE-SX671	EE-SX671P
				(selectable) *3	No incident light	EE-SX671A	EE-SX671R
1111				Light-ON	Incident light	EE-SX471	EE-SX471P
T-shaped				Dark-ON/Light-ON	Incident light	EE-SX672	EE-SX672P
1 P				(selectable) *3	No incident light	EE-SX672A	EE-SX672R
				Light-ON	Incident light	EE-SX472	EE-SX472P
Close-				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX673	EE-SX673P
mounting	<b>-</b>				No incident light	EE-SX673A	EE-SX673R
9999	Through- beam	Connector	5 mm	Light-ON	Incident light	EE-SX473	EE-SX473P
Close-	type (with slot)	(4 poles)	(slot width)	Dark-ON/Light-ON	Incident light	EE-SX674	EE-SX674P
mounting	(With Siot)			(selectable) *3	No incident light	EE-SX674A	EE-SX674R
1111				Light-ON	Incident light	EE-SX474	EE-SX474P
T-shaped, slot center: 10 mm				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX675	EE-SX675P
F-shaped				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX676	EE-SX676P
R-shaped				Dark-ON/Light-ON (selectable) *3	Incident light	EE-SX677	EE-SX677P

<sup>\*3.</sup> These models can be used as Light-ON when the L terminal and positive (+) terminal are connected to each other. To use them as Dark-ON, do not connect these terminals to each other. When used at light-ON, it is useful to select the connector EE-1001-1. The L terminal and positive (+) terminal of this connector are short-circuited in advance.

<sup>\*2.</sup> Only for Pre-wired Models.

#### **Pre-wired Models and Models**

Infrared light

_	Sensing		Output	Indicator	Connecting	N	lodel
Appearance	method	Sensing distance	configura- tion	mode	method	NPN output	PNP output
Standard						EE-SX670-WR	EE-SX670P-WR
L-shaped						EE-SX671-WR	EE-SX671P-WR
T-shaped, slot center: 7 mm						EE-SX672-WR	EE-SX672P-WR
Close- mounting	Through-	5 mm	Dark-ON/ Light-ON (selectable) *	Incident light	Pre-wired models (1 m)	EE-SX673-WR	EE-SX673P-WR
Close- mounting	type (with slot)	(slot width)				EE-SX674-WR	EE-SX674P-WR
T-shaped, slot center: 10 mm						EE-SX675-WR	EE-SX675P-WR
F-shaped						EE-SX676-WR	EE-SX676P-WR
R-shaped						EE-SX677-WR	EE-SX677P-WR

<sup>\*</sup> These models can be used as Light-ON when the L line and positive (+) line are connected to each other. To use them as Dark-ON, do not connect these lines to each other.

#### **Accessories for Models with Connectors (Order Separately)**

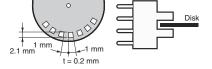
	Туре	Cable length	Model	Remarks
Connector			EE-1001	
			EE-1001-1	L terminal and positive (+) terminal are already short-circuited.
			EE-1009	
	Occurred weight Oakle	1 m	EE-1006	
		1 m	EE-1010	
	Connector with Cable		EE-1006	
		2 m	EE-1010	
	Connector with Robot	1 m	EE-1010-R	
Cable		2 m	EE-1010-R	
Connector	Hold-down Clip		EE-1006A	For EE-1006 only.

# **EE-SX47/67**

# **Ratings and Specifications**

		Туре	Standard	L-shaped	T-shaped, slot center: 7 mm	Close-m	ounting	T-shaped, slot center: 10 mm	F-shaped	R-shaped
	NPN mod-	Connector	EE-SX670 EE-SX670A EE-SX470	EE-SX671 EE-SX671A EE-SX471	EE-SX672 EE-SX672A EE-SX472	EE-SX673 EE-SX673A EE-SX473	EE-SX674 EE-SX674A EE-SX474	EE-SX675	EE-SX676	EE-SX677
	els	Pre-wired models	EE-SX670- WR	EE-SX671- WR	EE-SX672- WR	EE-SX673- WR	EE-SX674- WR	EE-SX675- WR	EE-SX676- WR	EE-SX677- WR
	PNP mod-	Connector	EE-SX670P EE-SX670R EE-SX470P	EE-SX671P EE-SX671R EE-SX471P	EE-SX672P EE-SX672R EE-SX472P	EE-SX673P EE-SX673R EE-SX473P	EE-SX674P EE-SX674R EE-SX474P	EE-SX675P	EE-SX676P	EE-SX677P
Item	els	Pre-wired models	EE-SX670P- WR	EE-SX671P- WR	EE-SX672P- WR	EE-SX673P- WR	EE-SX674P- WR	EE-SX675P- WR	EE-SX676P- WR	EE-SX677P- WR
Sensi	ing dis	tance	5 mm (slot wi	dth)						
Sensi	ing obj	ect	Opaque: 2 × 0	0.8 mm min.						
Differ	ential	distance	0.025 mm							
Light source			GaAs infrared LED with a peak wavelength of 940 nm							
Indica	ndicator *1 Light indicator (red) (turns ON when light is interrupted for models with A or R suffix)									
Supp	ly volta									
Curre	nt con	sumption	35 mA max. (NPN models), 30 mA max. (PNP models)							
Contr	ol out	out	·	40 mA llector: 5 to 24	load current voload current windows VDC, 50 mA r	vith a residual that residual v	oltage of 0.4 V	max.		
Respo	onse fr	equency *2	1 kHz min. (3 kHz average)							
Ambi	ent illu	mination	1,000 lx max. with fluorescent light on the surface of the receiver.							
Ambie	ent tem	perature range	Operating: -25 to +55°C, Storage: -30 to +80°C							
Ambi	ent hu	midity range	Operating: 5%	6 to 85%, Store	age: 5% to 95%	%				
Vibra	Destruction: 20 to 2,000 Hz (peak acceleration: 100 m/s²) 1.5-mm double amplitude for 2 h (4-min periods) each in X, Y, and Z directions									
	hock resistance Destruction: 500 m/s² for 3 times each in X, Y, and Z directions									
	nclosure rating IEC60529 IP50									
					• •	ole), Pre-wired				
Weigl		Connector	Approx. 3.1 g	Approx. 3 g	Approx. 2.4 g	Approx. 2.3 g	Approx. 3 g	Approx. 2.7 g	Approx. 2.2 g	Approx. 2.2 g
(pack aged)		Pre-wired models				Approx. 16.8 g	Approx. 17.1 g	Approx. 18.3 g	Approx. 16.9 g	Approx. 16.9 g
Ма-	Case			phthalate (PB	Γ)					
terial	Cover	emitter/receiver	Polycarbonate	e						

<sup>\*1.</sup> The indicator is a GaP red LED (peak wavelength: 690 nm).
\*2. The response frequency was measured by detecting the rotating disk shown at the right.



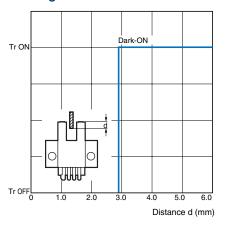
OMRON

#### **Engineering Data (Typical)**

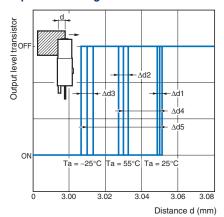
#### **Sensing Position Characteristics**

# Tr OFF 1.0 2.0 3.0 4.0 5.0 6.0 Distance d (mm)

#### **Sensing Position Characteristics**



#### **Repeated Sensing Position Characteristics**



Vcc =12 V, No. of repetitions: 20,  $\Delta$ d1 = 0.002 mm,  $\Delta$ d2 = 0.004 mm,  $\Delta$ d3 = 0.005 mm,  $\Delta$ d4 = 0.02 mm,  $\Delta$ d5 = 0.04 mm

### I/O Circuit Diagrams

#### **NPN Output**

Model	Output configuration	Timing chart	Terminal connection	Output circuit
EE-SX67□ EE-SX67□-WR	Light-ON	Incident Interrupted Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases	Short-circuited between  terminal and positive terminal	
	Dark-ON	Light indicator ON (red) OFF Output transistor OFF Load Operates (e.g., relay) Releases	Open between  terminal and positive  terminal	Light indicator  (red)  Load  OUT
EE-SX670A EE-SX671A EE-SX672A EE-SX673A EE-SX674A	Light-ON	Light indicator ON (red) OFF  Output transistor OFF  Load Operates (e.g., relay) Releases	Short-circuited between  terminal and positive + terminal	Main circuit 100 mA max.
	Dark-ON	Light indicator ON (red) OFF  Output transistor OFF  Load Operates (e.g., relay) Releases	Open between  ① terminal and positive ⊕ terminal	
EE-SX470 EE-SX471 EE-SX472 EE-SX473 EE-SX474	Light-ON	Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases		Light indicator (red)  Main circuit  GUT  To to 24 VDC

#### **PNP Output**

Model	Output configuration	Timing chart	Terminal connection	Output circuit
EE-SX67□P EE-SX67□P-WR	Light-ON	Incident Interrupted Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases	Short-circuited between ( terminal and positive ( terminal	
	Dark-ON	Light indicator ON (red) OFF Output transistor OFF Load Operates (e.g., relay) Releases	Open between  terminal and positive  terminal	Light indicator (red)
EE-SX670R EE-SX671R EE-SX672R EE-SX673R EE-SX674R	Light-ON	Incident Interrupted Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases	Short-circuited between  terminal and positive  terminal	Main circuit OUT 5 to 24 VDC
	Dark-ON	Incident Interrupted Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases	Open between ① terminal and positive ⊕ terminal	
EE-SX470P EE-SX471P EE-SX472P EE-SX473P EE-SX474P	Light-ON	Incident Interrupted Light indicator ON (red) OFF Output ON transistor OFF Load Operates (e.g., relay) Releases		Light indicator (red)  Main Circuit  To be a control of the contro

#### **Safety Precautions**

#### Refer to Warranty and Limitations of Liability.



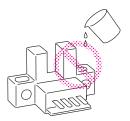
This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



#### **Precautions for Safe Use**

#### Operating Environment

These Photomicrosensors have an IP50 (conforms to IEC60529) enclosure and do not have a water-proof or dust-proof structure. Therefore, do not use them in applications in which the sensor will be subjected to splashes from water, oil, or any other liquid. Liquid entering the Sensor may result in malfunction.



#### **Precautions for Correct Use**

Make sure that this product is used within the rated ambient environment conditions.

#### Installation

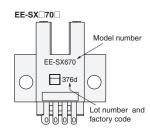
When direct soldering to the terminals, use the following guidelines.
 Soldering Conditions

Item	Temper- ature	Permissible time	Remarks
Soldering iron	350°C max.	3 s max.	The portion between the base of the terminals and the position 1.5 mm from the terminal base must not be soldered.

 The terminal base uses a polycarbonate resin, which could be deformed by excessive soldering heat, resulting in damage to the product's functionality.

#### Lot Numbers and Models

In the right illustration, 376d indicates the lot number and factory where the product was manufactured. Do not include this code with the model number when ordering.



**Dimensions** (Unit: mm)

#### **Sensors**

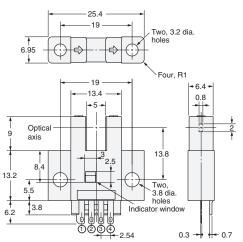
EE-SX670/670P EE-SX670A/670R EE-SX470/470P



#### **Terminal Arrangement**

(1)	$\oplus$	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	0	GND (0 V)

\* L Terminal needs no connection for all EE-SX47□ series sensors.



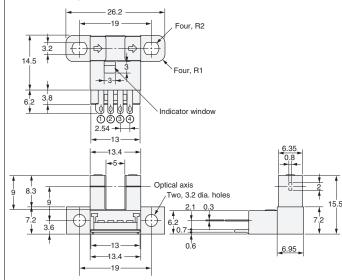
#### EE-SX671/671P EE-SX671A/671R EE-SX471/471P



#### **Terminal Arrangement**

(1)	$\oplus$	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	$\oplus$	GND (0 V)

\* L Terminal needs no connection for all EE-SX47□ series sensors.



#### EE-SX672/672P EE-SX672A/672R EE-SX472/472P

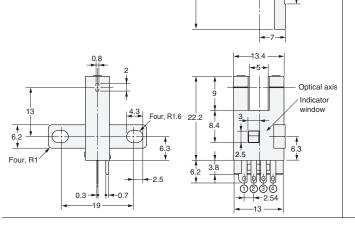


#### Terminal Arrangement

⇔

(1)	$\oplus$	Vcc
(2)	г	L*
(3)	TUO	OUTPUT
(4)	$\Theta$	GND (0 V)

\* L Terminal needs no connection for all EE-SX47□ series sensors.



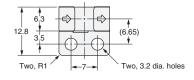
EE-SX673/673P EE-SX673A/673R EE-SX473/473P

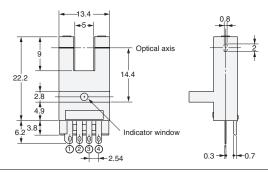


#### **Terminal Arrangement**

(1)	$\oplus$	Vcc
(2)	٦	L*
(3)	OUT	OUTPUT
(4)	0	GND (0 V)

\* L Terminal needs no connection for all EE-SX47 series sensors.





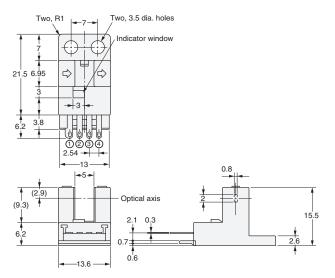
#### EE-SX674/674P EE-SX674A/674R EE-SX474/474P



#### **Terminal Arrangement**

(1)	$\oplus$	Vcc
(2)	L	L*
(3)	OUT	OUTPUT
(4)	$\Theta$	GND (0 V)

\* L Terminal needs no connection for all EE-SX47□ series sensors.

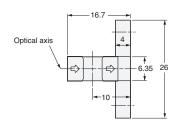


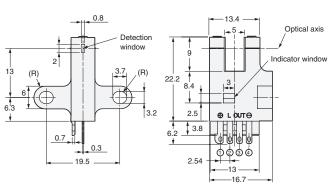
#### EE-SX675/675P



#### **Terminal Arrangement**

(1)	$\oplus$	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	$\Theta$	GND (0 V)



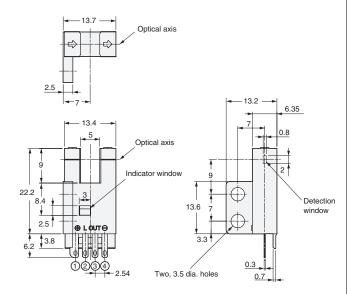


EE-SX676/676P



**Terminal Arrangement** 

(1)	$\oplus$	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	$\ominus$	GND (0 V)

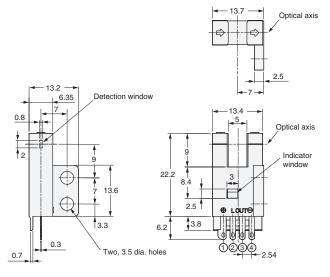


EE-SX677/677P



**Terminal Arrangement** 

(1)	$\oplus$	Vcc
(2)	L	L
(3)	OUT	OUTPUT
(4)	$\Theta$	GND (0 V)



#### **EE-SX670-WR/670P-WR**

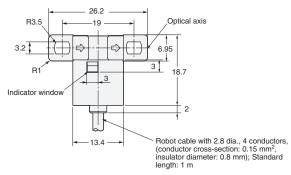
#### **Terminal Arrangement** Brown Vcc Pink GND (0 V) Blue OUTPUT Black Optical axis 3.2 dia. holes 25.4 -13.46.35 Optical axis **-**-5-8.0 Detection window 3 26.2 4.6 dia. holes 3.8 dia, holes Indicator window Robot cable with 2.8 dia., 4 conductors (conductor cross-section: 0.15 mm², insulator diameter: 0.8 mm); Standard length: 1 m

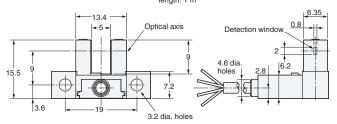
#### EE-SX671-WR/671P-WR



#### **Terminal Arrangement**

Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT



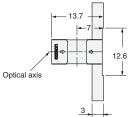


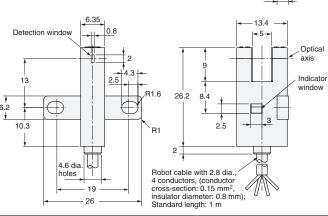
#### **EE-SX672-WR/672P-WR**



#### **Terminal Arrangement**

Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT



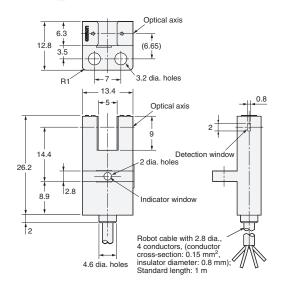


#### EE-SX673-WR/673P-WR



#### **Terminal Arrangement**

Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT



#### **EE-SX674-WR/674P-WR**



3.5 dia. holes

Optical 3 axis

Indicator window

#### **Terminal Arrangement**

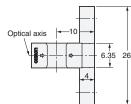
Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT

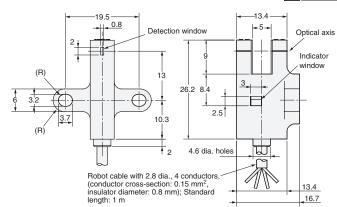
#### **EE-SX675-WR/675P-WR**



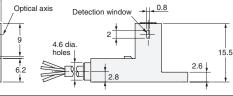
#### **Terminal Arrangement**

Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT





# Robot cable with 2.8 dia., 4 conductors, (conductor cross-section: 0.15 mm², insulator diameter: 0.8 mm); Standard length: 1 m (2.9)



#### **EE-SX676-WR/676P-WR**

Optical axis



Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT
_	

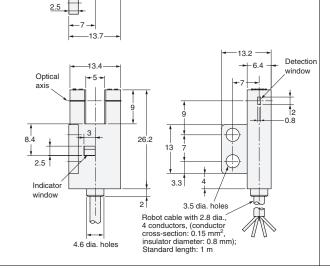
**Terminal Arrangement** 

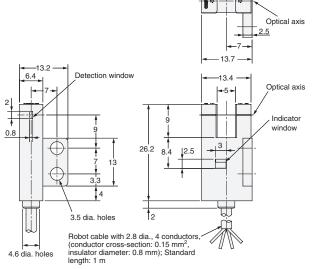
#### EE-SX677-WR/677P-WR

#### **Terminal Arrangement**

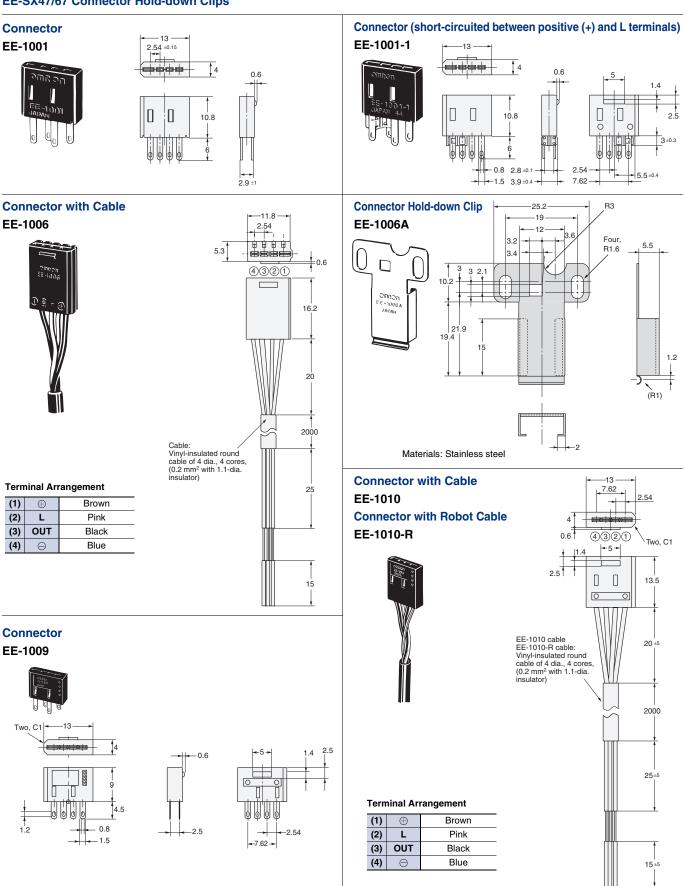


Brown	Vcc
Pink	L
Blue	GND (0 V)
Black	OUTPUT





#### **EE-SX47/67 Connector Hold-down Clips**



In the interest of product improvement, specifications are subject to change without notice.

This document provides information mainly for selecting suitable models. Please read the Instruction sheet carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

# **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 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. 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.

  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.

- 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
- 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.

  <u>Taxes</u>. 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.
- and remitted by Buyer to Omron. <u>Financial.</u> 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. unpaid accounts.
- 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:
- constitute delivery to Buyer; c. All sales and shipments of Products shall be FOB shipping point (unless oth 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.

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