CSM_E2F_DS_E_6_1

Proximity Sensor with Resin Case with Superb Water Resistance

- IP68 protection.
- Mutual interference prevention with models with different frequencies is also available.

⚠ Be sure to read *Safety Precautions* on page 5.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Ordering Information

Sensors [Refer to *Dimensions* on page 6.]

Model		Sensing distance	Output configuration	Model	
				Operation mode	
				NO	NC
Shielded	M8	1.5 mm	DC 3-wire, NPN	E2F-X1R5E1 2M	E2F-X1R5E2 2M
			AC 2-wire	E2F-X1R5Y1 2M	E2F-X1R5Y2 2M
	M12	2 mm	DC 3-wire, NPN	E2F-X2E1 2M *1	E2F-X2E2 2M *1
			AC 2-wire	E2F-X2Y1 2M *1	E2F-X2Y2 2M *1
	M18	5 mm	DC 3-wire, NPN	E2F-X5E1 2M *1	E2F-X5E2 2M *1
			AC 2-wire	E2F-X5Y1 2M *1 *2	E2F-X5Y2 2M *1 *2
	M30	10 mm	DC 3-wire, NPN	E2F-X10E1 2M *1	E2F-X10E2 2M *1
			AC 2-wire	E2F-X10Y1 2M *1 *2	E2F-X10Y2 2M *1 *2

*1. Models with different frequencies are also available. The model numbers are E2F-X□□□5 (e.g., E2F-X5E15).
*2. Models are also available with short-circuit protection. The model numbers are E2F-X□Y□-53 (e.g., E2F-X5Y1-53).
The power supply voltage, however, is 100 to 120 VAC.

Accessories (Order Separately)

Protective Covers

Refer to *Y92□* for details.

Ratings and Specifications

Item \ Model		E2F-X1R5E□ E2F-X1R5Y□	E2F-X2E□ E2F-X2Y□	E2F-X5E□ E2F-X5Y□	E2F-X10E□ E2F-X10Y□
Sensing distance		1.5 mm ±10%	2 mm ±10%	5 mm ±10%	10 mm ±10%
Set distance		0 to 1.2 mm	0 to 1.6 mm	0 to 4 mm	0 to 8 mm
Differential travel		10% max. of sensing distance			
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 3.)			
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *1		E Models: 2 kHz, Y Models: 25 Hz	E Models: 1.5 kHz, Y Models: 25 Hz	E Models: 600 Hz, Y Models: 25 Hz	E Models: 400 Hz, Y Models: 25 Hz
Power supply voltage (operating voltage range)		E Models: 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. Y Models: 24 to 240 VAC (20 to 264 VAC)			
Current consumption		E Models: 17 mA max.			
Leakage current		Y Models: 1.7 mA max. at 200 VAC (Refer to *Engineering Data* on page 3.)			
Control output	**Load current**	E Models: 200 mA max. Y Models: 5 to 100 mA		E Models: 200 mA max. Y Models: 5 to 300 mA	
	Residual voltage	E Models: 2 V max. (Load current: 200 mA, Cable length: 2 m) Y Models: Refer to *Engineering Data* on page 4.			
Indicators		E1 Models: Detection indicator (red), E2 Models: Operation indicator (red) Y Models: Operation indicator (red)			
Operation mode (with sensing object approaching)		E1/Y1 Models: NO E2/Y2 Models: NC Refer to the timing charts under *I/O Circuit Diagrams* on page 4 for details.			
Protection circuits		E Models: Reverse polarity protection, Load short-circuit protection, Surge suppressor; Y Models: None			
Ambient temperature range		Operating/Storage: –25 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating/Storage: 35% to 95%			
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C			
Voltage influence		E Models: ±2.5% max. of sensing distance at rated voltage in rated voltage ±15% range Y Models: ±1% max. of sensing distance at rated voltage in rated voltage ±10% range			
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case			
Dielectric strength		E Models: 1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case Y Models: (M8 Models): 2,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case (Other M8 Models): 4,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 1,000 m/s^2 10 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP68, in-house standards: oil-resistant *2			
Connection method		Pre-wired Models (Standard cable length: 2 m)			
Weight (packed state)		Approx. 40 g	Approx. 50 g	Approx. 130 g	Approx. 170 g
Materials	**Case**	Polyarylate resin			
	Sensing surface				
	Clamping nuts	Polyacetal			
Accessories		Instruction manual			

*1. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.
*2. When using the Sensor in environments subject to splashing cutting oil, deterioration may result due to the additives in the oil. The E2E is recommended in such environments.

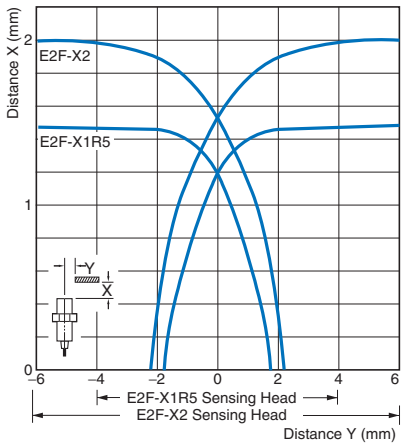
OMRON Test Method

Usage conditions: 10 m or less under water in natural conditions
1. No water ingress after 1 hour under water at 2 atmospheres of pressure.
2. Sensing distance and insulation resistance specifications must be met after 20 repetitions of 1 hour in 0°C water and 1 hour in 70°C water.

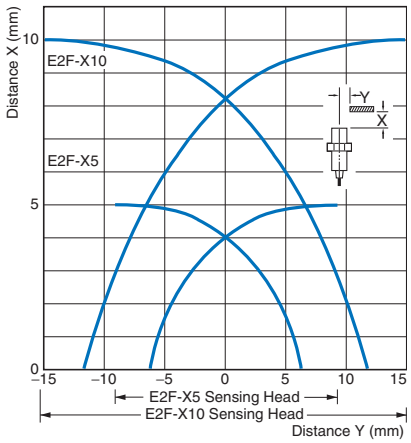
Engineering Data (Reference Value)

Sensing Area

E2F-X1R5□□/-X2□□

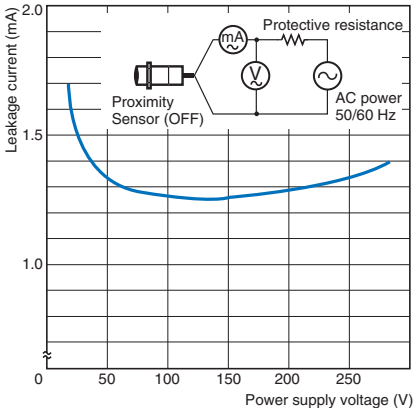


E2F-X5□□/-X10□□



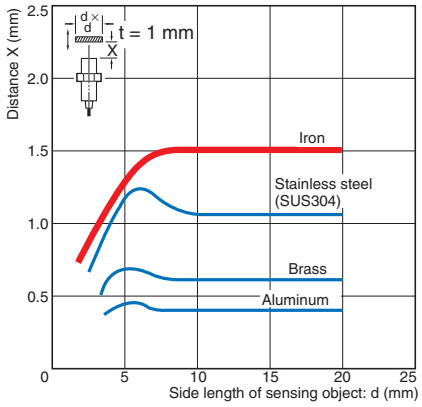
Leakage Current

E2F-X□Y□

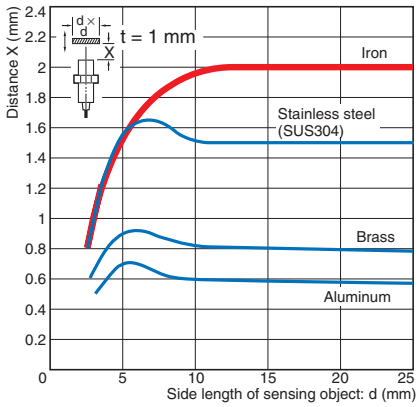


Influence of Sensing Object Size and Material

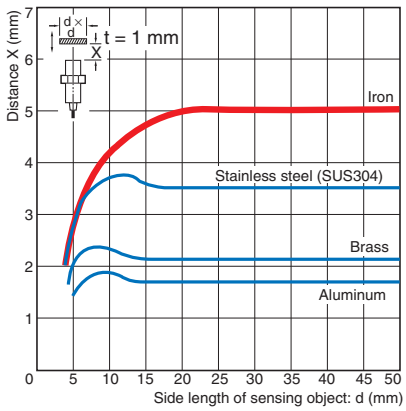
E2F-X1R5□□



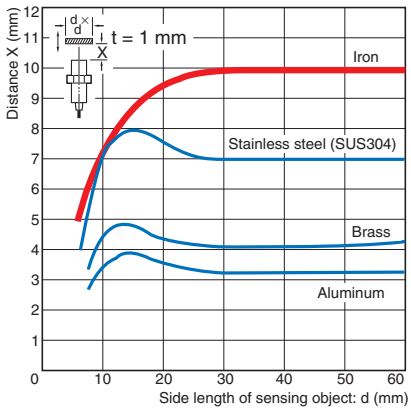
E2F-X2□□



E2F-X5□□

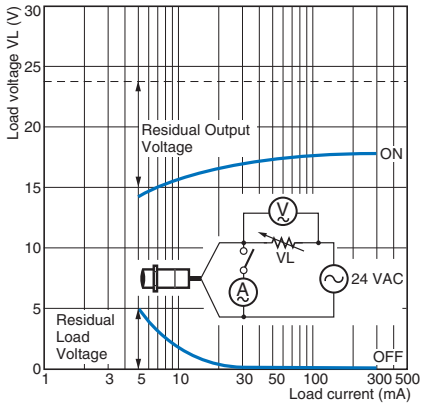


E2F-X10□□

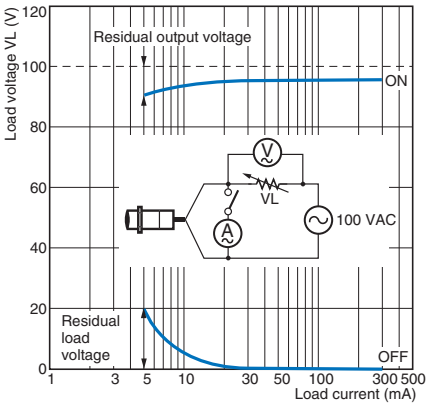


Residual Output Voltage

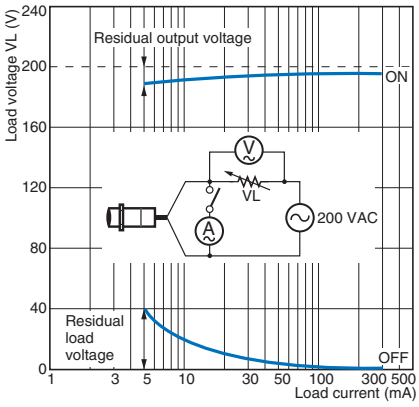
E2F-X□Y□ at 24 VAC



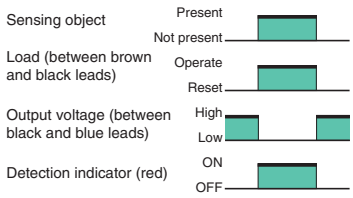
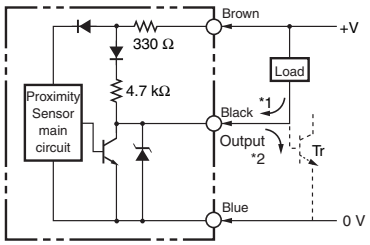
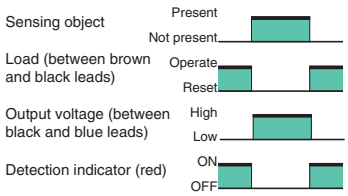
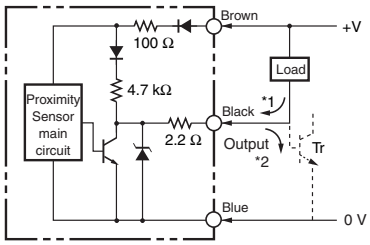
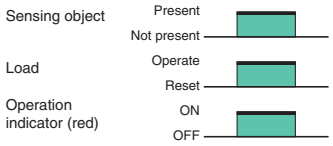
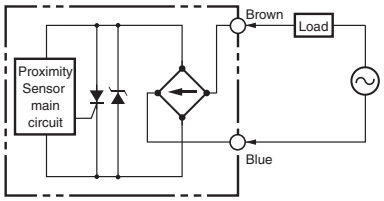
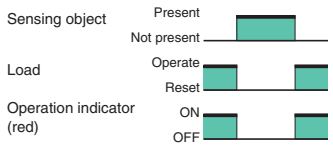
E2F-X□Y□ at 100 VAC



E2F-X□Y□ at 200 VAC



I/O Circuit Diagrams

Output configuration	Operation mode	Model	Timing chart	Output circuit
DC 3-wire	NO	E2F-X1R5E1 E2F-X2E1 E2F-X5E1 E2F-X10E1		E2F-X1R5□  *1. Load current: 200 mA max. *2. When a transistor is connected.
	NC	E2F-X1R5E2 E2F-X2E2 E2F-X5E2 E2F-X10E2		Except the E2F-X1R5□.  *1. Load current: 200 mA max. *2. When a transistor is connected.
AC 2-wire	NO	E2F-X1R5Y1 E2F-X2Y1 E2F-X5Y1 E2F-X10Y1		
	NC	E2F-X1R5Y2 E2F-X2Y2 E2F-X5Y2 E2F-X10Y2		

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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

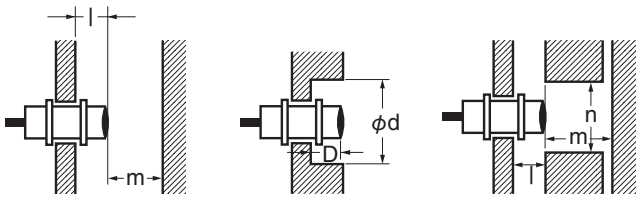
Precautions for Correct Use

Do not use this product under ambient conditions that exceed the ratings.

● Design

Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.

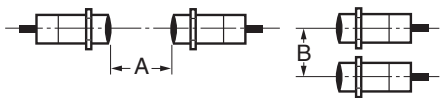


Influence of Surrounding Metal (Unit: mm)

Model / Item	l	d	D	m	n
E2F-X1R5□□	0	8	0	4.5	12
E2F-X2□□		12		8	18
E2F-X5□□		18		20	27
E2F-X10□□		30		40	45

Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



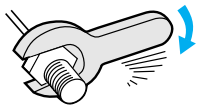
Mutual Interference (Unit: mm)

Model / Item	A	B
E2F-X1R5□□	20	15
E2F-X2□□	30 (20)	20 (12)
E2F-X5□□	50 (30)	35 (18)
E2F-X10□□	100 (50)	70 (35)

Note: Values in parentheses apply to Sensors operating at different frequencies. Models numbers for Sensors with different frequencies are E2F-X□□□5.

● Mounting

Do not tighten the nut with excessive force.



Model	Torque
E2F-X1R5□□	0.78 N·m
E2F-X2□□	
E2F-X5□□	2 N·m
E2F-X10□□	

● Maintenance and Inspection

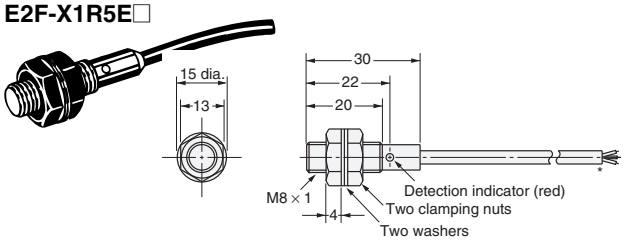
Do not use AC 2-Wire Models in water or in locations subject to water if the sensing surface or any other part of the Sensor is damaged, e.g., from contact with the sensing object. Electric shock may result.

Dimensions

(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

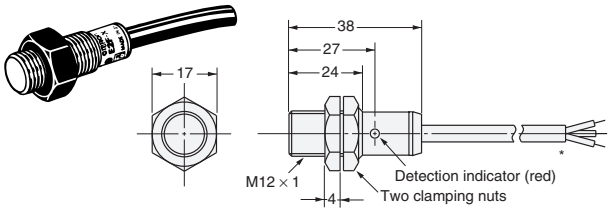
DC 3-Wire Models

E2F-X1R5E□



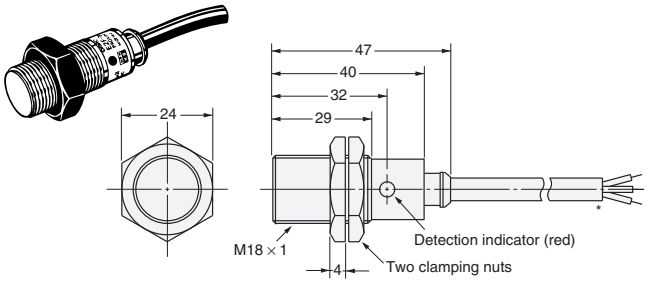
* 3.5-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 1 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X2E□



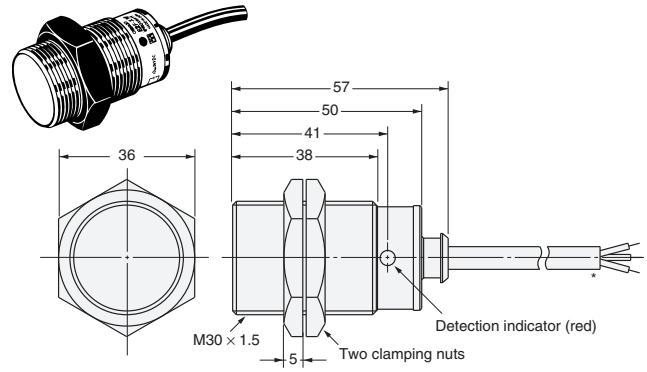
* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X5E□



* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

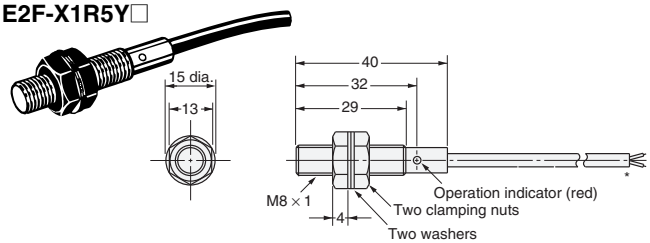
E2F-X10E□



* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

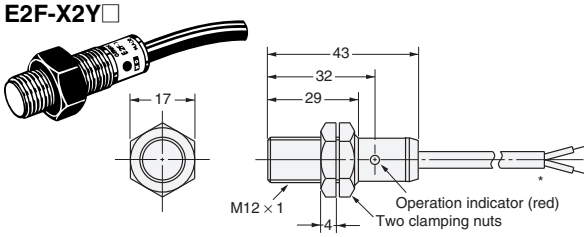
AC 2-Wire Models

E2F-X1R5Y□



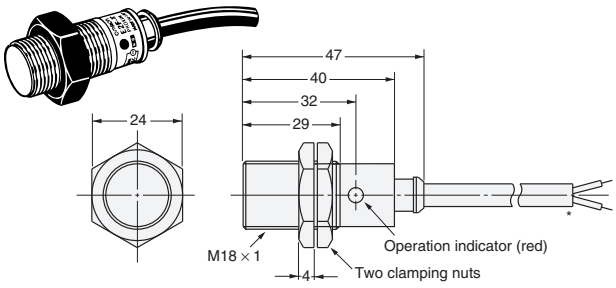
* 3.5-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 1 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X2Y□



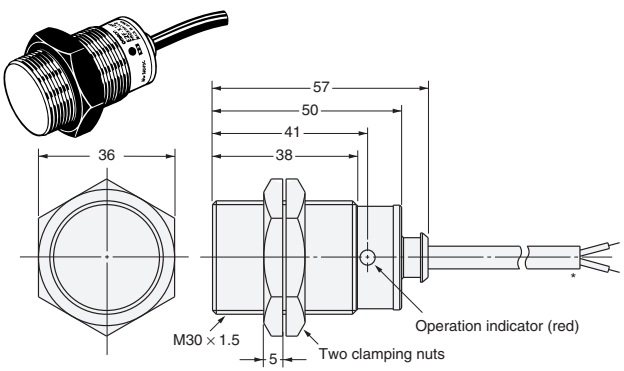
* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X5Y□



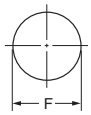
* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X10Y□



* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Mounting Hole Dimensions



Model	E2F-X1R5□□	E2F-X2□□	E2F-X5□□	E2F-X10□□
F (mm)	$8.5^{+0.5}_{0}$ dia.	$12.5^{+0.5}_{0}$ dia.	$18.5^{+0.5}_{0}$ dia.	$30.5^{+0.5}_{0}$ dia.

Terms and Conditions Agreement

Read and understand this catalog.
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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://www.omron.com/global/ or contact your Omron representative for published 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.

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.
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 PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE 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.

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.

2014.10

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

OMRON Corporation
Industrial Automation Company

http://www.ia.omron.com/