OMRON

Inductive Proximity Sensor | E2FQ

Sensor Insusceptible to Spatter During Welding

- Housing and mounting nuts are made of fluororesin resistant to welding spatter and chemicals.
- Watertight housing conforms to IEC IP67.
- Oil-tight cord applied.
- Both two-and three-wire types available for DC switching models.

<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.

Ordering Information

■ Fluororesin Case Models

Size	Shield	Sensing distance	DC 3-wire models			DC 2-wire models		AC 2-wire models	
			PNP (NO)	NPN (NO)	Response frequency	NO	Response frequency	NO	Response frequency
M12	Shielded	2 mm	E2FQ-X2F1	E2FQ-X2E1	1.5 kHz	E2FQ-X2D1	800 Hz	---	---
M18		5 mm	E2FQ-X5F1	E2FQ-X5E1	600 Hz	E2FQ-X5D1	500 Hz	E2FQ-X5Y1	25 Hz
M30		10 mm	E2FQ-X10F1	E2FQ-X10E1	400 Hz	E2FQ-X10D1	300 Hz	E2FQ-X10Y1	

Specifications

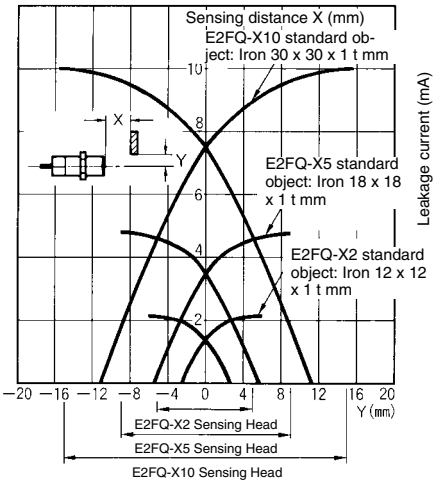
■ Ratings/Characteristics

Item		E2FQ-X2E1, E2FQ-X2D1, E2FQ-X2F1	E2FQ-X5E1, E2FQ-X5D1, E2FQ-X5F1, E2FQ-X5Y1	E2FQ-X10E1, E2FQ-X10D1, E2FQ-X10F1, E2FQ-X10Y1
Supply voltage (operating voltage range)		E1 and F1 models: 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. D1 models 12 to 24 VDC (10 to 36 VDC), ripple (p-p): 20% max. Y1 models 24 to 240 VAC (20 to 264 VAC), 50/60 Hz		
Current consumption		E1 and F1 models: 17 mA max.		
Leakage current		D1 models: 0.8 mA max. Y1 models: 1.7 mA max. at 200 VAC		
Sensing object		Ferrous metal (refer to *Engineering Data* for non-ferrous metal)		
Sensing distance		2 mm ±10%	5 mm ±10%	10 mm ±10%
Sensing distance (standard object)		0 to 1.6 mm (iron, 12 x 12 x 1 t)	0 to 4 mm (iron, 18 x 18 x 1 t)	0 to 8 mm (iron, 30 x 30 x 1 t)
Differential travel		E1, F1 and Y1 models: 10% max. of sensing distance D1 models: 20% max. of sensing distance		
Response frequency (see note)		E1 and F1 models: 1.5 kHz, D1 models: 800 Hz	E1 and F1 models: 600 Hz, D1 models: 500 Hz	E1 and F1 models: 400 Hz, D1 models: 300 Hz
		---	Y1 models: 25 Hz	
Operating status (with sensing object approaching)		E1 and F1 models: L output signal with load ON D1 models: Load ON Y1 models: Load ON		
Control output (switching capacity)		E1 and F1 models: 200 mA max. D1 models: 5 to 100 mA DC Y1 models: 5 to 300 mA		
Circuit protection		E1 and F1 models: Reverse connection protection, load short-circuiting protection, and surge absorber D1 and Y1 models: Surge absorber		
Ambient temperature		Operating: –25°C to 70°C (with no icing)		
Ambient humidity		Operating: 35% to 95%		
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25°C to 70°C		
Voltage influence		E1 and F1 models: ±2.5% max. of sensing distance within a range of ±15% of the rated power supply voltage D1 models: ±2.5% max. of sensing distance within a range of ±20% of the rated power supply voltage Y1 models: ±1% max. of sensing distance within a range of ±10% of the rated power supply voltage		
Residual voltage		E1 and F1 models: 2.0 V max. under a load current of 200 mA and a cord length of 2 m D1 models: 4.0 V max. under a load current of 100 mA and a cord length of 2 m Y1 models: Refer to *Residual Load Voltage (Typical)* on page 3.		
Insulation resistance		50 MΩ min. (at 500 VDC) between current carry parts and case		
Dielectric strength		E1, F1 and D1 models: 1,000 VAC, 50/60 Hz for 1 min between current carry parts and case Y1 models: 4,000 VAC, 50/60 Hz for 1 min between current carry 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: 500 m/s^2 (approx. 50G) 10 times each in X, Y, and Z directions	Destruction: 1,000 m/s^2 (approx. 100G) 10 times each in X, Y, and Z directions	
Degree of protection		IEC60529 IP67		
Weight		Approx. 70 g	Approx. 130 g	Approx. 170 g
Material	**Case**	Fluororesin		
	Sensing surface	Fluororesin		

Note: The response frequencies of the DC switching components are average values obtained by measuring in sequence a line-up standard sensing objects. The space between any adjacent sensing objects was twice the width of a single sensing object and the setting distance was half the maximum sensing distance.

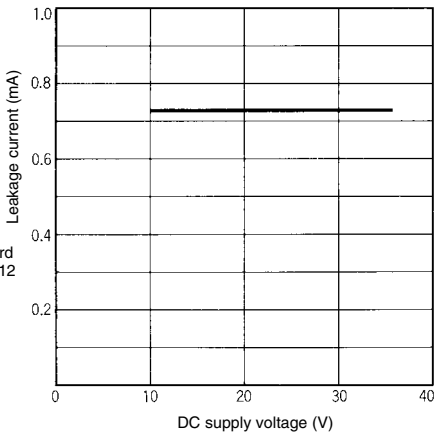
Engineering Data

Operating Range (Typical)

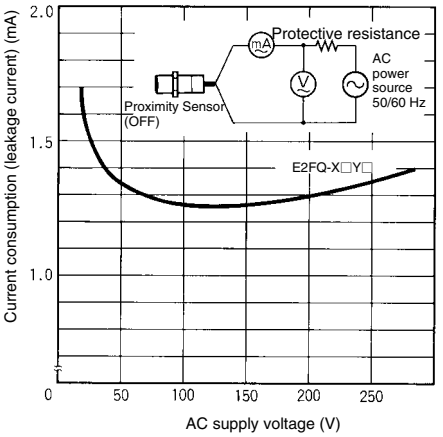


Leakage Current (Typical)

E2FQ-X2D1, E2FQ-X5D1, E2FQ-X10D1

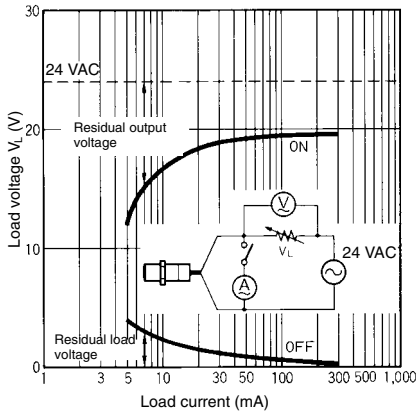


E2FQ-X5Y1, E2FQ-X10Y1

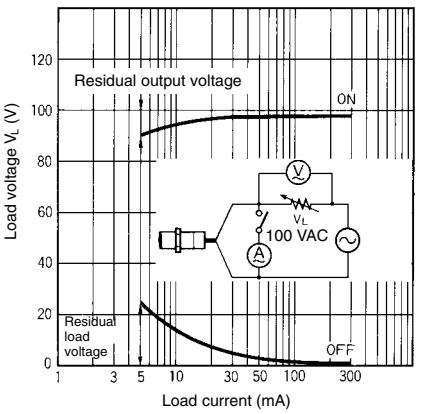


Residual Load Voltage (Typical)

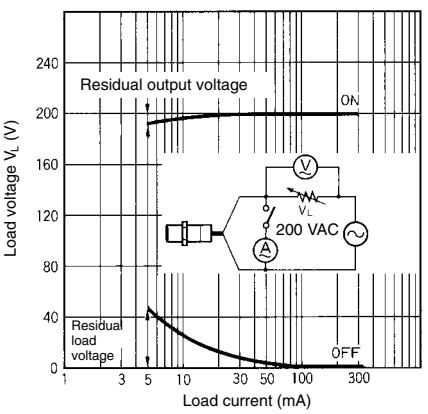
E2EQ-X5Y1, E2FQ-X10Y1 (at constant 24 VAC)



(at constant 100 VAC)

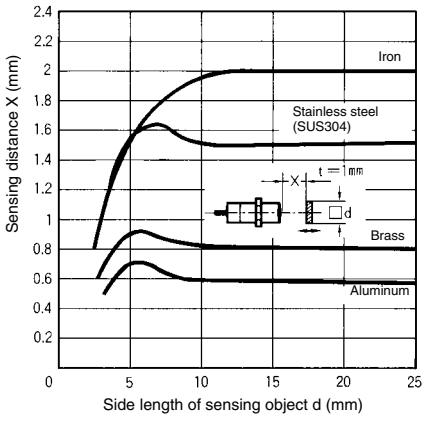


(at constant 200 VAC)

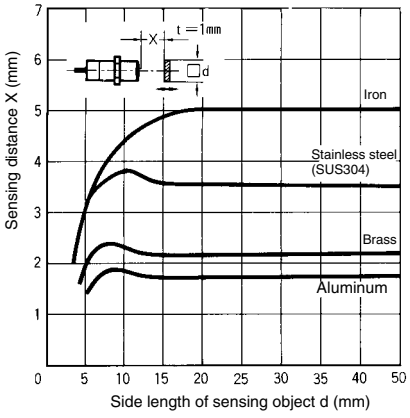


Sensing Object Size and Material vs. Sensing Distance (Typical)

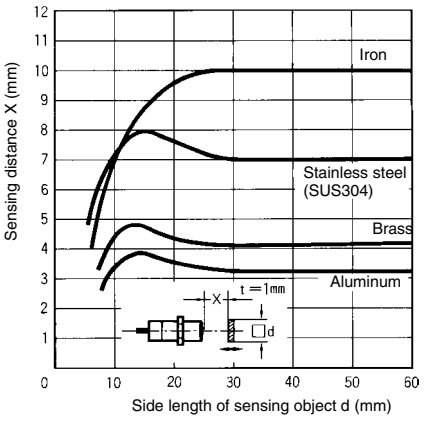
E2FQ-X2



E2FQ-X5



E2FQ-X10

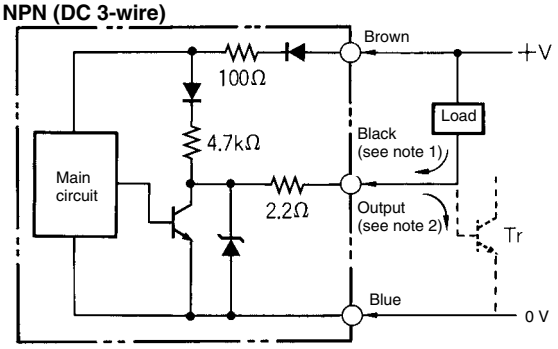


Operation

■ Output Circuits

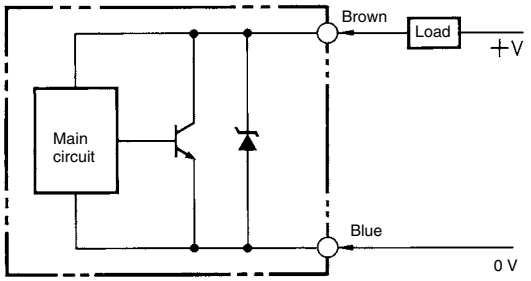
E1 Models

NPN (DC 3-wire)



D1 Models

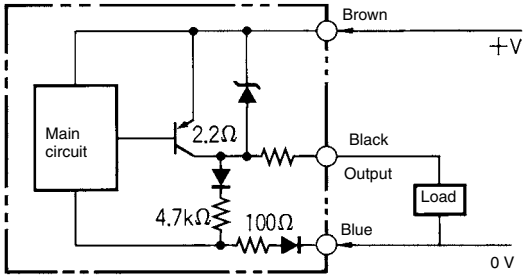
(DC 2-wire)



Note: 1. 200 mA max. (load current)
2. When a transistor is connected

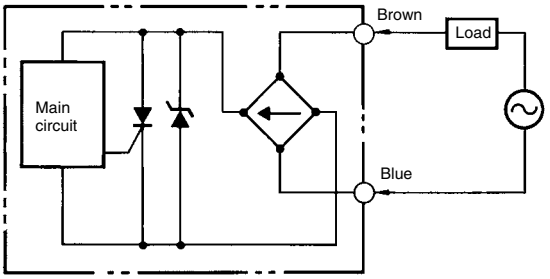
F1 Models

PNP (DC 3-wire)



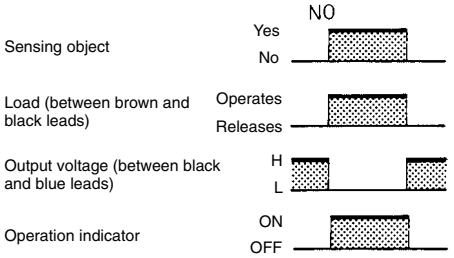
Y1 Models

(AC 2-wire)

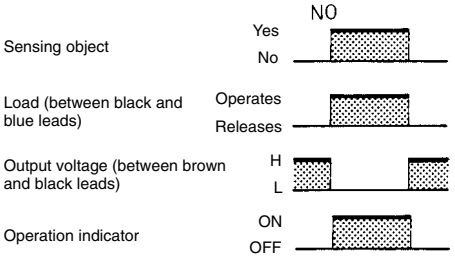


■ Timing Charts

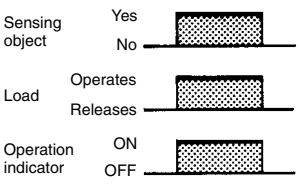
E1 Models



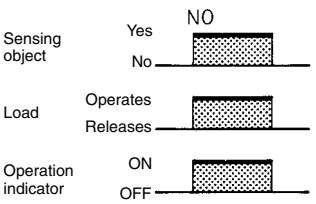
F1 Models



D1 Models



Y1 Models

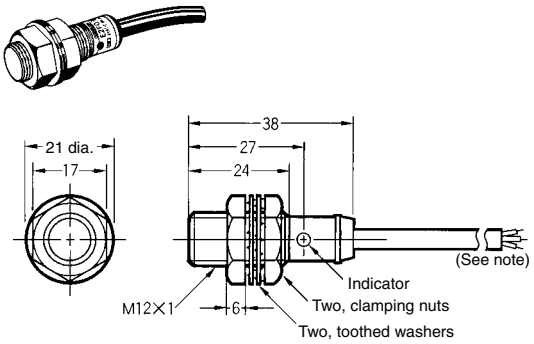


Note: Like the E2EQ, the load can be connected in two ways.

Dimensions

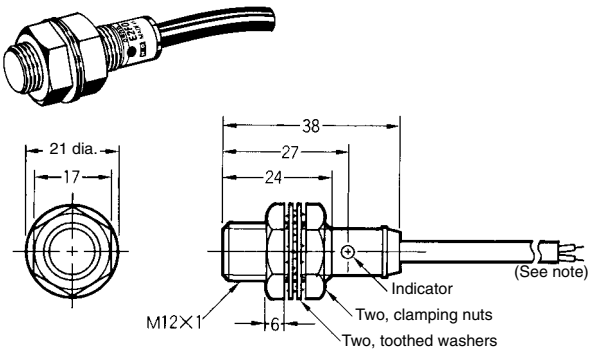
Note: All units are in millimeters unless otherwise indicated.

E2FQ-X2E1, E2FQ-X2F1



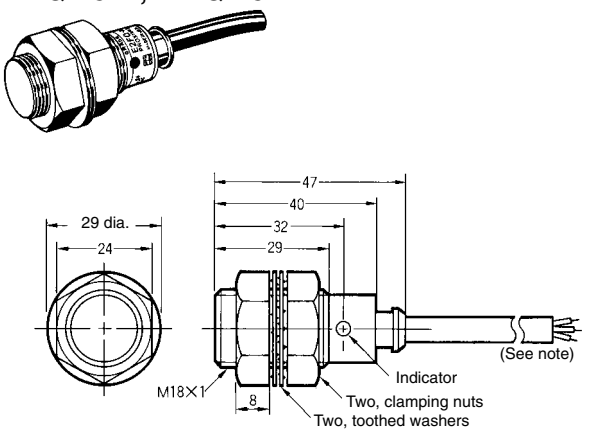
Note: Oil-resistant, vibration-resistant, and fire-retardant vinyl-insulated round cord, 6 dia., 0.5 dia. x 3 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

E2FQ-X2D1



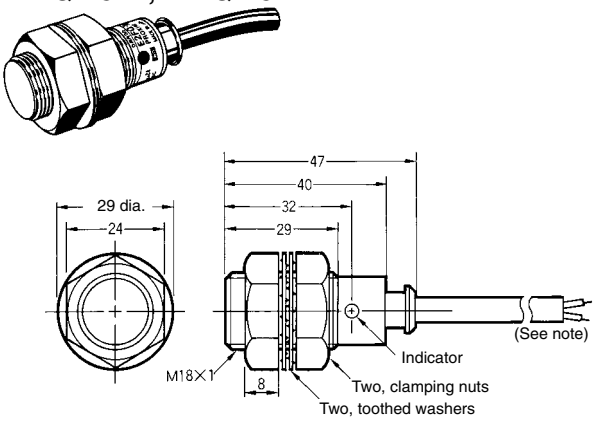
Note: Oil-resistant, vibration-resistant, and fire-retardant, vinyl-insulated round cord, 6 dia., 0.5 dia. x 2 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

E2FQ-X5E1, E2FQ-X5F1



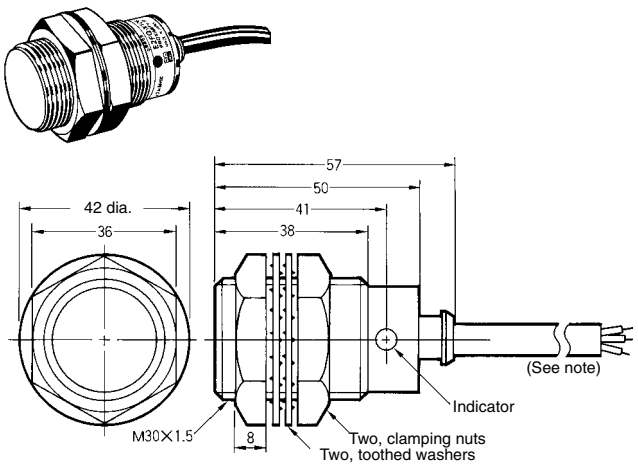
Note: Oil-resistant, vibration-resistant, and fire-retardant, vinyl-insulated round cord, 6 dia., 0.5 dia. x 3 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

E2FQ-X5D1, E2FQ-X5Y1



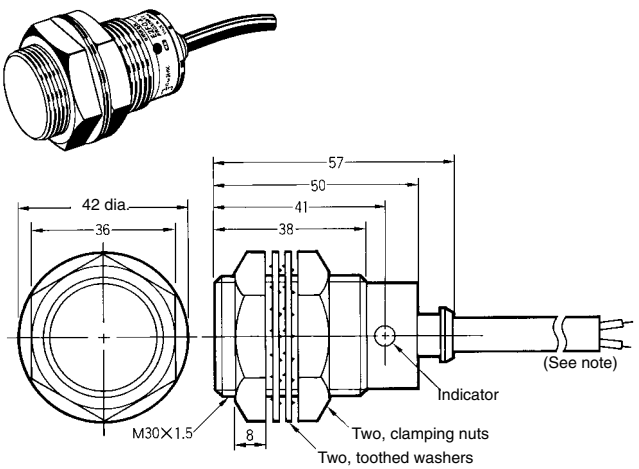
Note: Oil-resistant, vibration-resistant, and fire-retardant, vinyl-insulated round cord, 6 dia., 0.5 dia. x 2 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

E2FQ-X10E1, E2FQ-X10F1



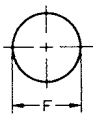
Note: Oil-resistant, vibration-resistant, and fire-retardant, vinyl-insulated round cord, 6 dia., 0.5 dia. x 3 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

E2FQ-X10D1, E2FQ-X10Y1



Note: Oil-resistant, vibration-resistant, and fire-retardant, vinyl-insulated round cord, 6 dia., 0.5 dia. x 2 cores, standard length: 2 m
The cord can be extended in an independent conduit for 200 m maximum.

Mounting Holes



Model	F (mm)
E2FQ-X2	$12.5^{+0.5}_{0}$ dia.
E2FQ-X5	$18.5^{+0.5}_{0}$ dia.
E2FQ-X10	$30.5^{+0.5}_{0}$ dia.

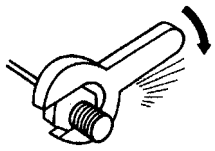
Precautions

⚠ WARNING

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

Mounting

Do not tighten the clamping nuts with excessive force.

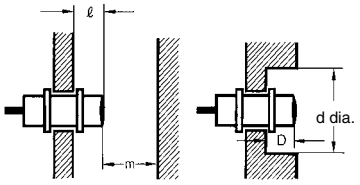


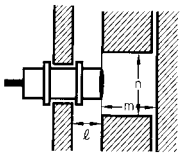
The tightening torques listed in the table below apply when the two toothed washers are used, and are also applicable to the AC switching model.

Model	Torque
E2FQ-X2	0.98 N • m (10 kgf • cm)
E2FQ-X5	2.0 N • m (20 kgf • cm)
E2FQ-X10	2.0 N • m (20 kgf • cm)

Effects of Surrounding Metals

When mounting a Proximity Sensor flush with a metallic panel, be sure to provide a minimum distance as shown for each model in the table below, to prevent the Sensor from being affected by metallic objects other than the sensing object.



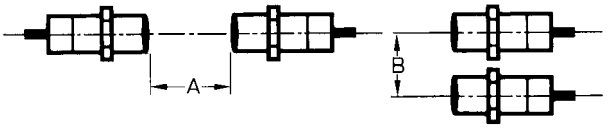


(Unit: mm)

Distance	Model		
	E2FQ-X2	E2FQ-X5	E2FQ-X10
ℓ	0	0	0
d	12	18	30
D	0	0	0
m	8	20	40
n	18	27	45

Mutual Interference

When two or more Proximity Sensors are installed face-to-face or side-by-side, provide a space between the two Sensors as shown in the table below.

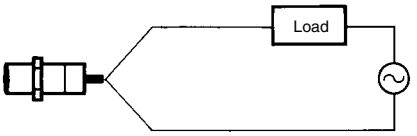


(Unit: mm)

Distance	Model		
	E2FQ-X2	E2FQ-X5	E2FQ-X10
A	30	50	100
B	20	35	70

Connection to Power Source for AC Type

Be sure to connect the Proximity Sensor to a power source through a load. Direct connection may damage the Sensor.



WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS 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 OR REPAIR.

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THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear 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.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PERFORMANCE DATA

Performance data given in this document 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 users must correlate it to actual application requirements. Actual performance is subject to the OMRON 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 model 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 model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. D029-E1-05 **In the interest of product improvement, specifications are subject to change without notice.**

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