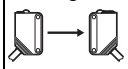
Photoelectric sensor with anti-tampering in compact plastic housing

E3Z-H

- Compact housing size and high power LED for excellent performance-size ratio
- IP67 and IP69K for highest water resistance
- Intensive shielding for highest noise immunity (EMC)
- No adjusters to protect against manipulation
- Rugged PBT housing for high mechanical resistance

Ordering Information

Sensor type	Sensing distance	Output configuration	Connection method				Model
							
Through-beam 	15 m	NPN	–	–	■	For ordering pigtail versions replace '2M' of cable types with: - M1J: M12 with 30 cm cable - M3J: M8 4-pin with 30 cm cable - M5J: M8 3-pin with 30 cm cable	E3Z-T61H 2M
			■	–	–		E3Z-T66H
		PNP	–	–	■		E3Z-T81H 2M
			■	–	–		E3Z-T86H
Retro-reflective with M.S.R. 	0.1 to 4 m[*1]	NPN	–	–	■		E3Z-R61H 2M
			■	–	–		E3Z-R66H
		PNP	–	–	■		E3Z-R81H 2M
			■	–	–		E3Z-R86H
Diffuse-reflective wide-beam 	0.1 m (adjustable)	NPN	–	–	■		E3Z-D61H 2M
			■	–	–		E3Z-D66H
		PNP	–	–	■		E3Z-D81H 2M
			■	–	–		E3Z-D86H
Diffuse-reflective 	1 m (adjustable)	NPN	–	–	■		E3Z-D62H 2M
			■	–	–		E3Z-D67H
		PNP	–	–	■		E3Z-D82H 2M
			■	–	–		E3Z-D87H

[*1] Measured with E39-R1S. The reflector is sold separately.

Reflectors (Order seperately)

Name	Sensing distance (typical)[*1]	Size in mm	Model
Reflectors	3 m [100 mm]	60x40	E39-R1
	4 m [100 mm]	60x40	E39-R1S
	5 m [100 mm]	Ø84	E39-R7
	6 m [100 mm]	100x100	E39-R8
	4 m [100 mm]	50x50	E39-R42
	1.5 m [50 mm]	35x20	E39-R3
Tape Reflector	700 mm [150 mm]	35x10	E39-RS1
	1.1 m [150 mm]	35x40	E39-RS2
	1.4 m [150 mm]	80x70	E39-RS3

[*1] Values in parentheses indicate the minimum required distance between the sensor and reflector.

Mounting Brackets

Shape	Model	Quantity	Remarks
	E39-L153	1	Mounting Brackets
	E39-L104	1	
	E39-L43	1	Horizontal type mounting bracket
	E39-L142	1	Horizontal type protective cover bracket
	E39-L44	1	Rear mounting bracket
	E39-L98	1	Protective cover bracket

Shape	Model	Quantity	Remarks
	E39-L150	One set	Sensor adjuster Easy mounting to aluminum frame/rail of conveyor or like, easy adjustment. For left-to-right adjustment
	E39-L151	One set	
	E39-L93□	One set	Sensor adjuster Easy mounting to aluminum frame/rail of conveyor or like, easy adjustment. For vertical angle adjustment
	E39-L144	1	Vertical protective cover bracket

Note: 1 . If a through-beam model is used, order two Mounting Brackets for the emitter and receiver respectively.
2 . For details, refer to the "Mounting bracket list".

Sensor I/O Connectors

Size	Cable type	Shape	Cable length		Model
M8	Standard cable	Straight 	2 m	4-wire type	XS3F-M421-402-A
			5 m		XS3F-M421-405-A
		L-shaped 	2 m		XS3F-M422-402-A
			5 m		XS3F-M422-405-A
M12 (for -M1J)		Straight 	2 m	4-wire type	XS2F-D421-D80-A
			5 m		XS2F-D421-G80-A
		L-shaped 	2 m		XS2F-D422-D80-A
			5 m		XS2F-D422-G80-A

Rating/performance

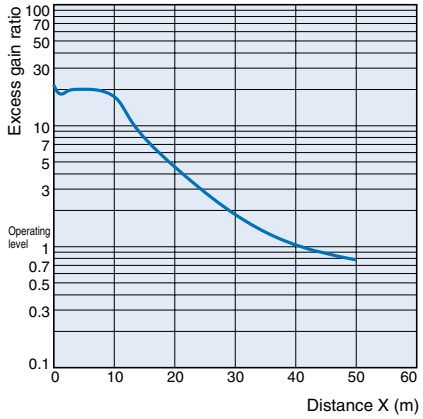
Item		Through-beam	Retro-reflective with M.S.R.	Diffuse-reflective	
				wide-beam	standard-beam
	NPN output	E3Z-T61H/T66H	E3Z-R61H/R66H	E3Z-D61H/D66H	E3Z-D62H/D67H
	PNP output	E3Z-T81H/T86H	E3Z-R81H/R86H	E3Z-D81H/D86H	E3Z-D82H/D87H
Sensing distance		15 m	4 m (100 mm)[*1] * (When using the E39-R1S)	100 mm (White paper 100 x 100 mm)	1 m (White paper 300 x 300 mm)
Standard sensing object		Opaque: 12-mm dia. min.	Opaque: 75-mm dia. min.	---	
Differential distance		---		20% max. of sensing distance	
Directional angle		Both emitter and receiver: 3° to 15°	2° to 10°	---	
Light source (wave length)		Infrared LED (860 nm)	Red LED (680 nm)	Infrared LED (860 nm)	
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p) : 10% max.			
Current consumption		emitter: 15 mA receiver: 20 mA	30 mA max.		
Control output		Load power supply voltage 26.4 VDC max., load current 100 mA max. (residual voltage 2 V max.) Open collector output type (depends on the NPN/PNP output format), Light-ON/Dark-ON selectable by wiring			
Protective circuits		Protection from load short-circuit and reversed power supply connection	Reverse polarity protection, output short-circuit protection, mutual interference prevention, output reverse protection		
Response time		Operation or reset: 1 ms max.			
Sensitivity adjustment		no adjustment		Single-turn adjustment	
Ambient illuminance		Incandescent lamp: 3,000 lux max. Sunlight 10,000 lux max.			
Ambient temperature		Operating: -25°C to 55°C, Storage: -40°C to 70°C (with no icing or condensation)			
Ambient humidity		Operating: 35% to 85% RH, Storage: 35% to 95% RH (with no icing or condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute			
Vibration resistance		10 to 55 Hz, 1.5-mm or 300m/s^2 double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP67, IP69k after DIN 40050 part 9			
Connection method		Pre-wired (standard length: 2 m/500 mm)/M8 connector			
Indicator lamp		Operation indicator (orange), stability indicator (green) [Note that the emitter has the power indicator (orange) only]			
Weight (Packed state)	Pre-wired models (with 2-m cable)	Approx. 120 g	65 g		
	Connector type	30 g	Approx. 20 g		
Material	Case	PBT (polybutylene terephthalate)			
	Lens	Methacylate resin			
Accessories		Instruction manual (The Reflector or Mounting Bracket is not provided with any of the above models.)			

[*1] Values in parentheses indicate the minimum required distance between the sensor and reflector.

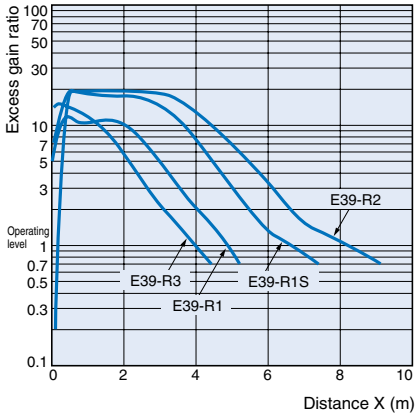
Caracteristic data (typical)

Excess Gain vs. Distance

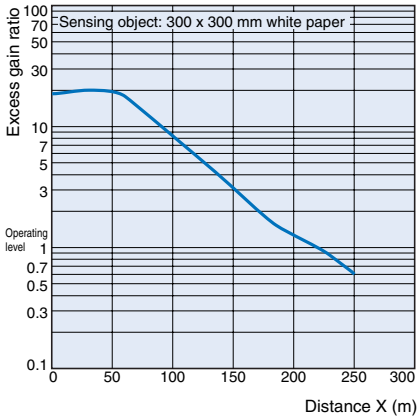
Through-beam
E3Z-T□1H(T□6H)



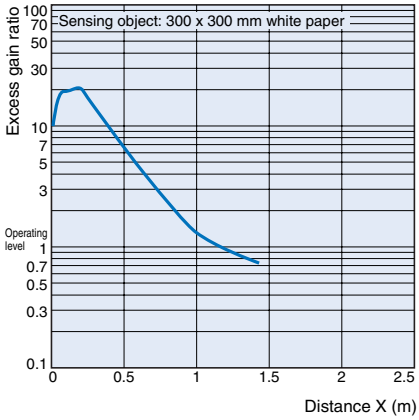
Retro-reflective with M.S.R.
E3Z-R□1H(R□6H) + Reflectors



Diffuse-reflective
E3Z-D□1H(D□6H)

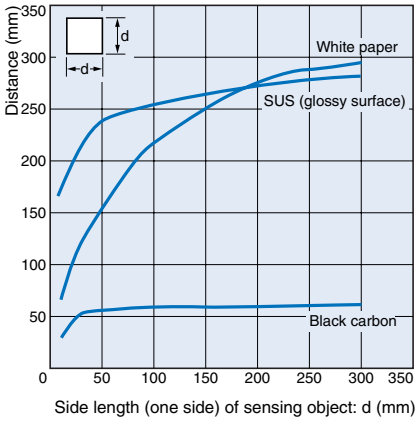


Diffuse-reflective
E3Z-D□2H(D□7H)

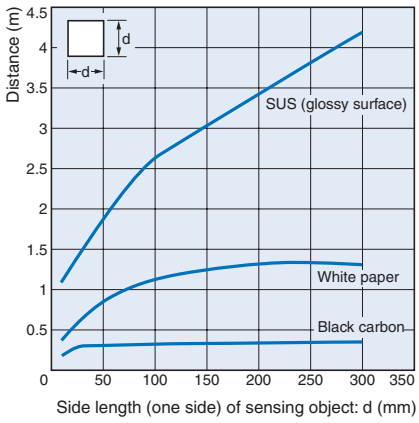


Distance vs. Size

Diffuse-reflective
E3Z-D□1H(D□6H)

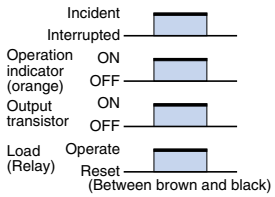
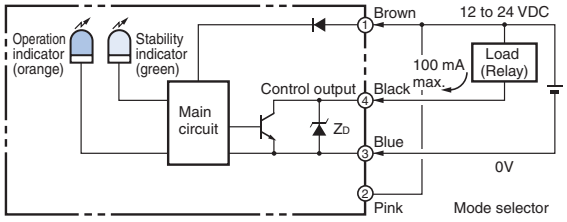
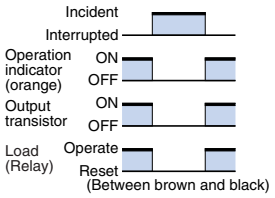
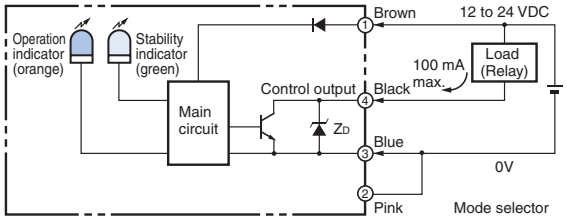
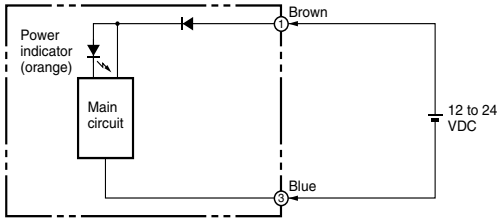


Diffuse-reflective
E3Z-D□2H(D□7H)

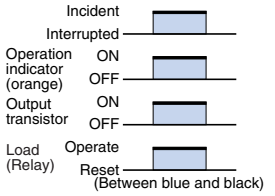
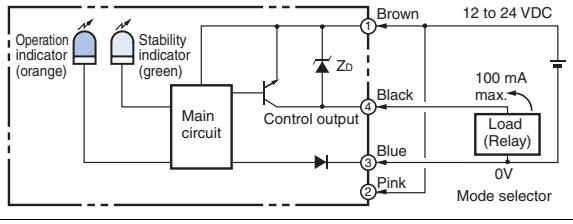
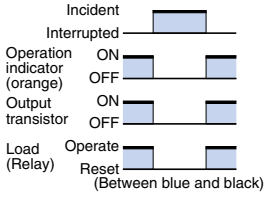
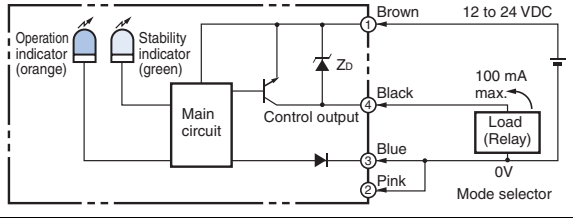
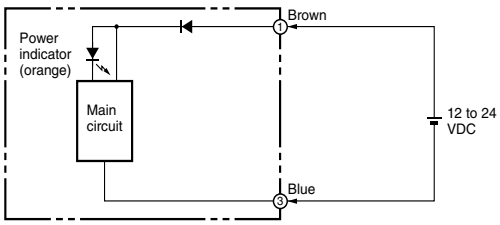


Output Circuit Diagram

NPN output

Model	Output transistor Status	Timing chart	Mode selection	Output circuit
E3Z-T61H E3Z-T66H E3Z-R61H E3Z-R66H E3Z-D61H E3Z-D66H E3Z-D62H E3Z-D67H	Light ON		Connect the pink (2) and the brown (1) cords.	
	Dark ON		Connect the pink (2) and the blue (3) cords, or open the pink (2) cord.	
		Through-beam emitter 		Connector Pin Arrangement  Note: Terminal 2 and 4 are not used.

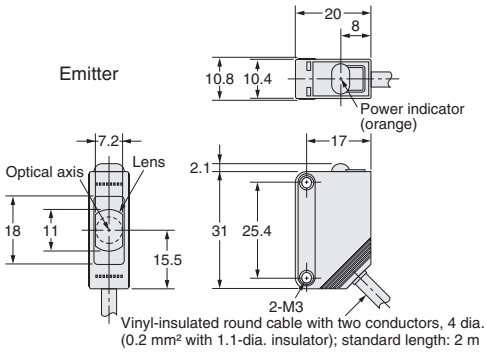
PNP output

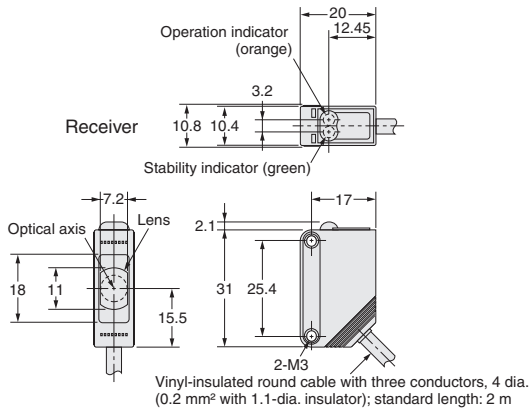
Model	Output transistor Status	Timing chart	Mode selection	Output circuit
E3Z-T81H E3Z-T86H E3Z-R81H E3Z-R86H E3Z-D81H E3Z-D86H E3Z-D82H E3Z-D87H	Light ON		Connect the pink (2) and the brown (1) cords.	
	Dark ON		Connect the pink (2) and the blue (3) cords, or open the pink (2) cord.	
		Through-beam emitter 		Connector Pin Arrangement  Note: Terminal 2 and 4 are not used.

Dimensions (Unit: mm)

Trough-beam
Pre-wired

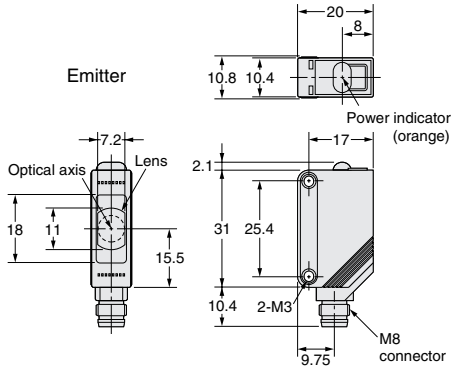
E3Z-T61H
E3Z-T81H

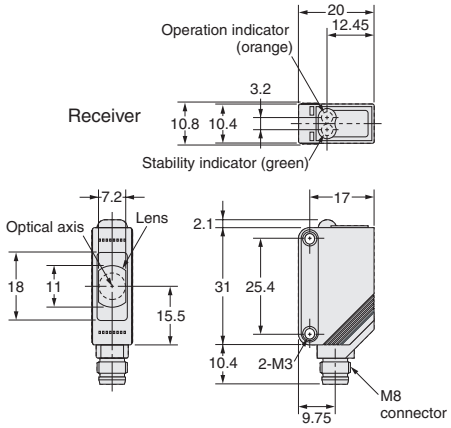




Trough-beam
Connector type

E3Z-T61H
E3Z-T81H



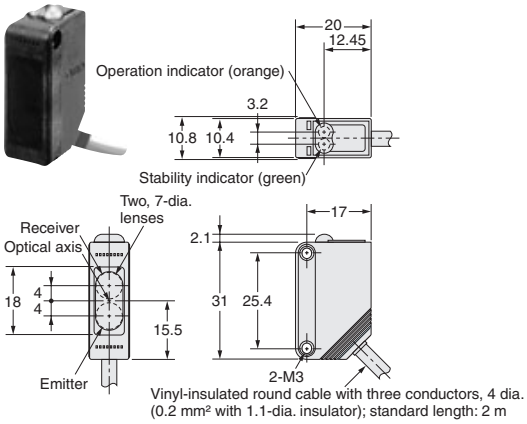


Retro-reflective
Pre-wired

E3Z-R61H
E3Z-R81H

Diffuse-reflective*
Pre-wired

E3Z-D61H
E3Z-D81H
E3Z-D62H
E3Z-D82H



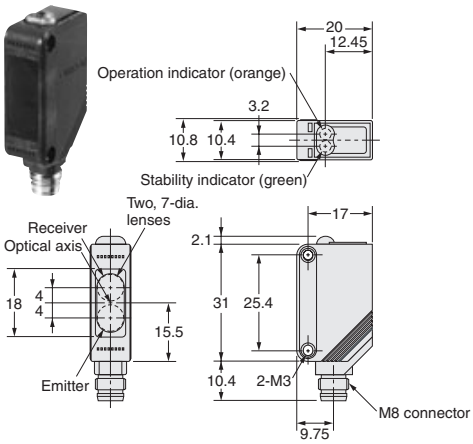
* Diffuse types have one screw-adjuster for sensitivity-adjustment on top of the sensor (not displayed in picture)

Retro-reflective
Connector type

E3Z-R66H
E3Z-R86H

Diffuse-reflective*
Connector type

E3Z-D66H
E3Z-D86H
E3Z-D67H
E3Z-D87H



* Diffuse types have one screw-adjuster for sensitivity-adjustment on top of the sensor (not displayed in picture)

Safety precautions

⚠ Warning

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

⚠ Caution

Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.

Never use the product with an AC power supply. Otherwise, explostion may result.

When cleaning the product, do not apply a high-pressure spray of water to one part of the product. Otherwise, parts may become damaged and the degree of protection may be degraded.

High-temperature environments may result in burn injury.

Precautions for Safe Use

The following precautions must be observed to ensure safe operation of the Sensor.

Operating Environment

Do not use the Sensor in an environment where explosive or flammable gas is present.

Connecting Connectors

Be sure to hold the connector cover when inserting or removing the connector. Be sure to tighten the connector lock by hand; do not use pliers or other tools. If the tightening is insufficient, the degree of protection will not be maintained and the Sensor may become loose due to vibration. The appropriate tightening torque is 0.50 N·m for M8 connectors.

Load

Do not use a load that exceeds the rated load.

Environements with Cleaners and Disinfectants (e.g., Food Processing Lines)

Do not use the Sensor in environments subject to cleaners and disifectants. They may reduce the degree of protection.

Modifications

Do not attempt to disassemble, repair, or modify the Sensor.

Outdoor Use

Do not use the Sensor in locations subject to direct sunlight.

Cleaning

Do not use thinner, alcohol, or other organic solvents. Otherwise, the optical properties and degree of protection may be degraded.

Surface Temperature

Burn injury may occur. The Sensor surface temperature rises depending on application conditions, such as the surrounding temperature and the power supply voltage. Use caution when operating or washing the Sensor.

Precautions for Correct Use

Do not use the Sensor in any atmosphere or environment that exceeds the ratings.

Do not install the Sensor in the following locations.

(1) Locations subject to direct sunlight
(2) Locations subject to condensation due to high humidity
(3) Locations subject to corrosive gas
(4) Locations where the Sensor may receive direct vibration or shock

Connecting and Mounting

(1) The maximum power supply voltage is 24 VDC. Before turning the power ON, make sure that the power supply voltage does not exceed the maximum voltage.
(2) Laying Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in malfunction or damage due to induction. As a general rule, wire the Sensor in a separate conduit or use shielded cable.
(3) Use an extension cable with a minimum thickness of 0.3 mm^2 and less than 100 m long.
(4) Do not pull on the cable with excessive force.
(5) Pounding the Photoelectric Sensor with a hammer or other tool during mounting will impair water resistance.
(6) Mount the Sensor either using the bracket (sold separately) or on a flat surface.
(7) Be sure to turn OFF the power supply before inserting or removing the connector.

Cleaning

Never use thinner or other solvents. Otherwise, the Sensor surface may be dissolved.

Power Supply

If a commercial switching regulator is used, ground the FG (frame ground) terminal.

Power Supply Reset Time

The Sensor will be able to detect objects 100 ms after the power supply is tuned ON. Start using the Sensor 100 ms or more after turning ON the power supply. If the load and the Sensor are connected to separate power supplies, be sure to turn ON the Sensor first.

Turning OFF the Power Supply

Output pulses may be generated even when the power supply is OFF. Therefore, it is recommended to first turn OFF the power supply for the load or the load line.

Load Short-circuit Protection

This Sensor is equipped with load short-circuit protection, but be sure to not short circuit the load. Be sure to not use an output current flow that exceeds the rated current. If a load short circuit occurs, the output will turn OFF, so check the wiring before turning ON the power supply again. The short-circuit protection circuit will be reset.

Water Resistance

Do not use the Sensor in water, rainfall, or outdoors.

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.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

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.

SUITABILITY FOR USE

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.

Cat. No. E60E-EN-01 **In the interest of product improvement, specifications are subject to change without notice.**

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