Oil-resistant, Robust, Compact Photoelectric Sensor

E3ZM-C

CSM_E3ZM-C_DS_E_4_5

Photoelectric Sensor for the Automotive and Machine Tool Industries

- Oil-resistant, rugged body made of stainless steel.
- Spot visibility improved to as far as 1 m away.
  Product lineup includes Through-beam Models with Orange Spot.
- Product lineup includes M12 Smartclick pre-wired connector models.

Refer to *Safety Precautions* on page 11.



Features

Industry Top **A Sensor with Stainless Steel Housing That's Strong, Compact, and Easy to Use!**

Resists Oils and Coolants

The E3ZM-C features a simple shape and structure, and yet provides IP67 protection and oil resistance (oil resistant to OMRON in-house standard). This performance exceeds any previous models from OMRON.

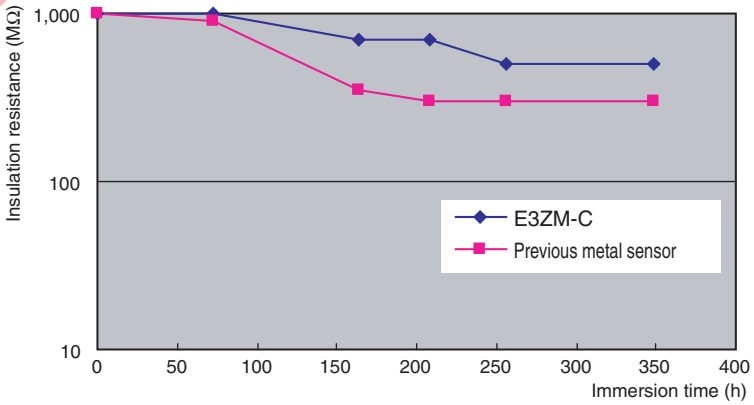
The protective structure eliminates the need for screws to hold a cover, so there are no worries about loose screws leading to liquid penetration.

And the model number is laser-marked on the housing so it's always readable when the time comes to order maintenance parts.

The compact, easy-to-use E3ZM-C with built-in amplifier is ideal for oily environments.



Comparison Example for Oil Resistance (Test Oil: Gryton 1700D)





E3ZM-C Laser Marking

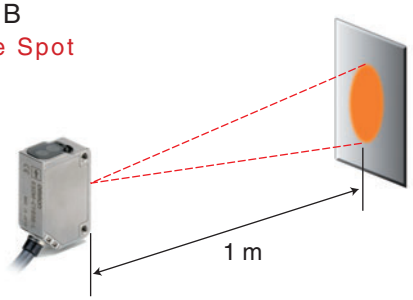
www.datasheet.live

Industry Top Perfectly Reliable Detection Performance and Connection Method

Visible Beam. Long-distance Operation Even in Dusty, Dirty Environments

The E3ZM-CT□2B uses a bright orange LED to generate a spot that's visible 1 m away. And the sensing distance of 20 m provides more leeway in detection (response time: 2 ms). It all adds up to a more visible, more dependable worksite.

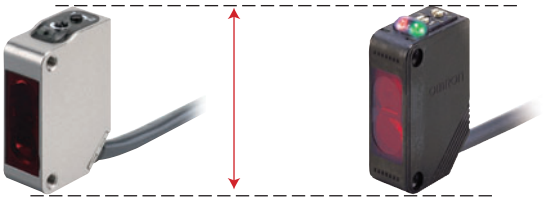
E3ZM-CT□2B
Bright Orange Spot



World's Smallest, and Yet Robust Patent Pending

The E3ZM-C is the same compact size as the E3Z, making it the smallest square metal photoelectric sensor in the world (according to OMRON investigation).

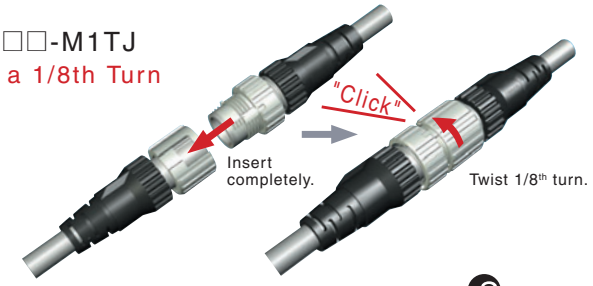
The SUS316L housing makes it robust, and removes all worries of the coating coming off.



Simple, Yet Dependable M12 Twist-and-Click Pre-wired Connectors

These Connectors match the XS5 Connectors released from August 2006, which reduce wiring work.
They eliminate the troublesome need to control torque when tightening connectors, and remove worries about screws loosening due to vibration.

E3ZM-C□□□-M1TJ
Locks with a 1/8th Turn

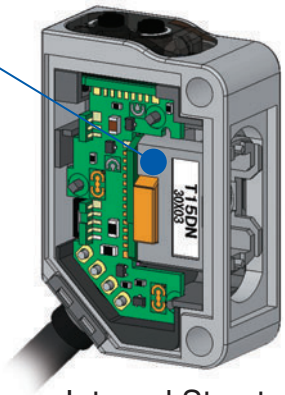


Smartclick

Unique Miniaturization and Modularization Technologies

Sensing Module

The optical system and signal processing are all contained in one module, providing all the main functions required of a Photoelectric Sensor.



Internal Structure

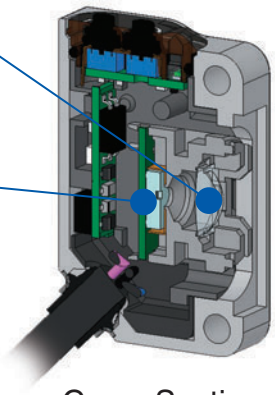
Optical System

Maximizes manufacturing technology, including sophisticated inline optical axis adjustment.

Signal Processing

Leading-edge technology for stabilization and miniaturization is obvious in the photo IC, which includes an external light interference prevention algorithm, CSP* mounting, and other components.

*Chip Scale Package



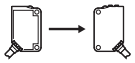
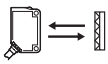
Cross Section

Application Precaution Use the E3ZM-T/-R/-D/-LS in food processing or beverage filling applications where cleaners or disinfectants are present.

Ordering Information

Sensors (Refer to *Dimensions* on page 13.)

Orange light Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN output	PNP output
Through-beam (Emitter + Receiver)*1		Pre-wired (2 m)	15 m	**E3ZM-CT61 2M** Emitter E3ZM-CT61-L 2M Receiver E3ZM-CT61-D 2M	**E3ZM-CT81 2M** Emitter E3ZM-CT81-L 2M Receiver E3ZM-CT81-D 2M
		Pre-wired (5 m)		**E3ZM-CT61 5M** Emitter E3ZM-CT61-L 5M Receiver E3ZM-CT61-D 5M	**E3ZM-CT81 5M** Emitter E3ZM-CT81-L 5M Receiver E3ZM-CT81-D 5M
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CT61-M1TJ 0.3M** Emitter E3ZM-CT61-L-M1TJ 0.3M Receiver E3ZM-CT61-D-M1TJ 0.3M	**E3ZM-CT81-M1TJ 0.3M** Emitter E3ZM-CT81-L-M1TJ 0.3M Receiver E3ZM-CT81-D-M1TJ 0.3M
		Pre-wired (2 m)	20 m	**E3ZM-CT62B 2M** Emitter E3ZM-CT62B-L 2M Receiver E3ZM-CT62B-D 2M	**E3ZM-CT82B 2M** Emitter E3ZM-CT82B-L 2M Receiver E3ZM-CT82B-D 2M
		Pre-wired (5 m)		**E3ZM-CT62B 5M** Emitter E3ZM-CT62B-L 5M Receiver E3ZM-CT62B-D 5M	**E3ZM-CT82B 5M** Emitter E3ZM-CT82B-L 5M Receiver E3ZM-CT82B-D 5M
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CT62B-M1TJ 0.3M** Emitter E3ZM-CT62B-L-M1TJ 0.3M Receiver E3ZM-CT62B-D-M1TJ 0.3M	**E3ZM-CT82B-M1TJ 0.3M** Emitter E3ZM-CT82B-L-M1TJ 0.3M Receiver E3ZM-CT82B-D-M1TJ 0.3M
Retro-reflective	 *2	Pre-wired (2 m)	4 m *2 (100 mm) (Using E39-R1S)	**E3ZM-CR61 2M**	**E3ZM-CR81 2M**
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CR61-M1TJ 0.3M**	**E3ZM-CR81-M1TJ 0.3M**
Diffuse-reflective		Pre-wired (2 m)	1 m	**E3ZM-CD62 2M**	**E3ZM-CD82 2M**
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CD62-M1TJ 0.3M**	**E3ZM-CD82-M1TJ 0.3M**
BGS reflective (fixed distance)		Pre-wired (2 m)	10 to 100 mm	**E3ZM-CL61H 2M**	**E3ZM-CL81H 2M**
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CL61H-M1TJ 0.3M**	**E3ZM-CL81H-M1TJ 0.3M**
		Pre-wired (2 m)	10 to 150 mm	**E3ZM-CL62H 2M**	**E3ZM-CL82H 2M**
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CL62H-M1TJ 0.3M**	**E3ZM-CL82H-M1TJ 0.3M**
		Pre-wired (2 m)	10 to 200 mm	**E3ZM-CL64H 2M**	**E3ZM-CL84H 2M**
		M12 twist-and-click pre-wired connector (0.3 m)		**E3ZM-CL64H-M1TJ 0.3M**	**E3ZM-CL84H-M1TJ 0.3M**

*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.
Orders for individual Emitters and Receivers are accepted. (Modifications are required for some models. Ask your OMRON representative for details.)
*2. Set the distance between the Sensor and the Reflector so that it is at least the value in parentheses.
*3. The Reflector is sold separately. Select the Reflector model most suited to the application.

We Can Manufacture Other Models to Meet Your Requirements

1. Retro-reflective, Diffuse-reflective, and BGS-reflective Models are also available with a 5-m pre-wired cable. When ordering, add the cable length to the end of the model number (e.g., E3ZM-CD62 5M).
2. Models with no moving parts (i.e., without a sensitivity adjustor or mode selection switch) are also available, as are models with built-in slits (through-beam, 0.8 m) (e.g., E3ZM-CT83H 2M for no sensitivity adjustment, wire-connection selection of operation mode, and built-in slit).
3. Through-beam Models are also available with a light emission stop function. When ordering, add "-G0" to the end of the model number (e.g., E3ZM-CT61-G0-2M).

Ask your OMRON representative for information on models, specifications, delivery, and whether there are any new modifications.

Accessories

Sensor I/O Connectors **(Models with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)**
(Refer to *Dimensions* on XS5.)

Size	Cable specifications	Appearance	Cable		Model
M12 (For -M1TJ models)	Standard	Straight 	2 m	4-wire	**XS5F-D421-D80-A**
			5 m		**XS5F-D421-G80-A**
	oil-resistant cable (polyurethane)		2 m		**XS5F-D421-D80-P**
			5 m		**XS5F-D421-G80-P**

Note 1. When using a Through-beam Sensor, order one Connector for the Receiver and one for the Emitter.
2. Ask your OMRON representative about connectors with other specifications.

Mounting Brackets **A Mounting Bracket is not provided with the Sensor. Order a Mounting Bracket separately if required.**
(Refer to *Dimensions* on E39-L/F39-L/E39-S/E39-R.)

Appearance	Model	Quantity	Remarks	Appearance	Model	Quantity	Remarks
	**E39-L153 (SUS304)**	1	Mounting Brackets		**E39-L98 (SUS304)**	1	Metal Protective Cover Bracket *
	**E39-L104 (SUS304)**	1			**E39-L150 (SUS304)**	1 set	(Sensor adjuster) Easily mounted to the aluminum frame rails of conveyors and easily adjusted. For vertical angle adjustment
	**E39-L43 (SUS304)**	1	Horizontal Mounting Bracket *		**E39-L151 (SUS304)**	1 set	
	**E39-L142 (SUS304)**	1	Horizontal Protective Cover Bracket *				
	**E39-L44 (SUS304)**	1	Rear Mounting Bracket		**E39-L144 (SUS304)**	1	Compact Protective Cover Bracket *

Note: When using a Through-beam Sensor, order one Mounting Bracket for the Receiver and one for the Emitter.
*Cannot be used for Standard Connector models.

Reflector **(A Reflector is required for Retro-reflective Sensors: A Reflector is not provided with the Sensor. Be sure to order a Reflector.)**
(Refer to *Dimensions* on E39-L/F39-L/E39-S/E39-R.)

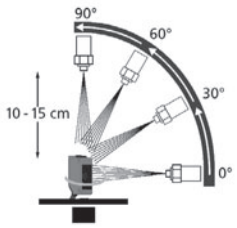
Name	E3ZM-CR sensing distance (typical) *	Model	Quantity	Remarks
Reflector	3 m (100 mm) (rated value)	**E39-R1**	1	· Reflectors are not provided with Retroreflective models. · The MSR function is enabled.
	4 m (100 mm) (rated value)	**E39-R1S**	1	
	5 m (100 mm)	**E39-R2**	1	
	2.5 m (100 mm)	**E39-R9**	1	
	3.5 m (100 mm)	**E39-R10**	1	
Small Reflector	1.5 m (50 mm)	**E39-R3**	1	

Note: When using a Reflector without a rated value, use 0.7 times typical value as a guideline for the sensing distance.
*Set the distance between the Sensor and the Reflector so that it is at least the value in parentheses.

Ratings and Specifications

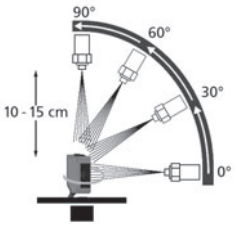
Item \ Model					
Sensing method		**Through-beam**		**Retro-reflective with MSR function**	**Diffuse-reflective**
Model	**NPN output**	**E3ZM-CT61 (-M1TJ)**	**E3ZM-CT62B (-M1TJ)**	**E3ZM-CR61 (-M1TJ)**	**E3ZM-CD62 (-M1TJ)**
Item	**PNP output**	**E3ZM-CT81 (-M1TJ)**	**E3ZM-CT82B (-M1TJ)**	**E3ZM-CR81 (-M1TJ)**	**E3ZM-CD82 (-M1TJ)**
Sensing distance		15 m	20 m	4 m [100 mm] *1 (Using E39-R1S) 3 m [100 mm] *1 (Using E39-R1)	1 m (White paper 300 × 300 mm)
Spot diameter		---			
Standard sensing object		Opaque: 12-mm dia. min.		Opaque: 75-mm dia. min.	---
Differential travel		---			20% of sensing distance max.
Reflectivity characteristic (black/white error)		---			
Directional angle		Emitter, Receiver: 3° to 15° (Distance between emitter and receiver. Rated sensing distance)		Sensor: 3° to 10° Reflector: 30° (Distance to Reflector. Rated sensing distance)	---
Light source (wavelength)		Infrared LED (870 nm)	Orange LED (615 nm)	Red LED (660 nm)	Infrared LED (860 nm)
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)			
Current consumption		40 mA (Emitter 20 mA max., Receiver 20 mA max.)		25 mA max.	
Control output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model) Light ON/Dark ON switch selectable			
Protection circuits		Reversed power supply polarity protection, Output short-circuit protection, Reversed output polarity protection		Reversed power supply polarity protection, Output short-circuit protection, Reversed output polarity protection, Mutual interference prevention	
Response time		Operate or reset: 1 ms max.	Operate or reset: 2 ms max.	Operate or reset: 1 ms max.	
Sensitivity adjustment		One-turn adjuster			
Ambient illumination (Receiver side)		Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.			
Ambient temperature range		Operating: −25 to 55°C, Storage: −40 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min			
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 3 times each in X, Y, and Z directions			
Degree of protection *2		IEC IP67 (oil resistance to OMRON in-house standard), DIN 40050-9: IP69K			
Connection method		Pre-wired (standard length: 2 m), -M1TJ: Pre-wired connector (standard length: 300 mm)			
Indicators		Operation indicator (yellow), Stability indicator (green) (Emitter has only power supply indicator (green).)			
Weight (packed state)	**Pre-wired models**	Approx. 150 g		Approx. 90 g	
Housing material		SUS316L			
Cable material		Oil-resistant vinyl chloride			
Lens material		PMMA (polymethylmethacrylate)			
Indicator material		PES (polyethersulfone)			
Sensitivity adjustment and mode selector switch		PEEK (polyetheretherketone)			
Seal material		Fluoro rubber			
Accessories		Instruction sheet (Note: Reflectors and Mounting Brackets are sold separately.)			

*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.
*2. IP69K Degree of Protection Specification
IP69K is a protection standard against high temperature and high-pressure water defined in the German standard DIN 40050, Part 9. The test piece is sprayed with water at 80°C at a water pressure of 80 to 100 BAR using a specified nozzle shape at a rate of 14 to 16 liters/min. The distance between the test piece and nozzle is 10 to 15 cm, and water is sprayed horizontally for 30 seconds each at 0°, 30°, 60° and 90°while rotating the test piece on a horizontal plane.



Item	Model	Sensing method	BGS Reflective		
		NPN output	E3ZM-CL61H (-M1TJ)	E3ZM-CL62H (-M1TJ)	E3ZM-CL64H (-M1TJ)
		PNP output	E3ZM-CL81H (-M1TJ)	E3ZM-CL82H (-M1TJ)	E3ZM-CL84H (-M1TJ)
Sensing distance			10 to 100 mm (White paper 100 × 100 mm)	10 to 150 mm (White paper 100 × 100 mm)	10 to 200 mm (White paper 100 × 100 mm)
Spot diameter			4-mm dia. at sensing distance of 100 mm	12-mm dia. at sensing distance of 150 mm	18-mm dia. at sensing distance of 200 mm
Standard sensing object			---		
Differential travel			3% of sensing distance max.	15% of sensing distance max.	20% of sensing distance max.
Reflectivity characteristics (black/white error)			5% of sensing distance max.	10% of sensing distance max.	20% of sensing distance max.
Directional angle			---		
Light source (wavelength)			Red LED (650 nm)	Red LED (660 nm)	
Power supply voltage			10 to 30 VDC, including 10% ripple (p-p)		
Current consumption			25 mA max.		
Control output			Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.) Open-collector output (NPN/PNP output depending on model) Light ON/Dark ON cable connection selectable		
Protection circuits			Reversed power supply polarity protection, Output short-circuit protection, Reversed output polarity protection, Mutual interference protection		
Response time			Operate or reset: 1 ms max.		
Sensitivity adjustment			---		
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max.		
Ambient temperature range			Operating: −25 to 55°C, Storage: −40 to 70°C (with no icing or condensation)		
Ambient humidity range			Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)		
Insulation resistance			20 MΩ min. at 500 VDC		
Dielectric strength			1,000 VAC, 50/60 Hz for 1 min		
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 3 times each in X, Y, and Z directions		
Degree of protection *			IEC IP67 (oil resistance to OMRON standards), DIN 40050-9: IP69K		
Connection method			Pre-wired (standard length: 2 m), -M1TJ: Pre-wired connector (standard length: 300-mm)		
Indicators			Operation indicator (yellow), Stability indicator (green)		
Weight (packed state)	**Pre-wired models**		Approx. 90 g		
Housing material			SUS316L		
Cable material			Oil-resistant vinyl cable		
Lens material			PMMA (polymethylmethacrylate)		
Indicator material			PES (polyethersulfone)		
Seal material			Fluoro rubber		
Accessories			Instruction sheet (Note: Mounting Brackets are sold separately.)		

*IP69K Degree of Protection Specification
IP69K is a protection standard against high temperature and high-pressure water defined in the German standard DIN 40050, Part 9. The test piece is sprayed with water at 80°C at a water pressure of 80 to 100 BAR using a specified nozzle shape at a rate of 14 to 16 liters/min. The distance between the test piece and nozzle is 10 to 15 cm, and water is sprayed horizontally for 30 seconds each at 0°, 30°, 60°, and 90° while rotating the test piece on a horizontal plane.

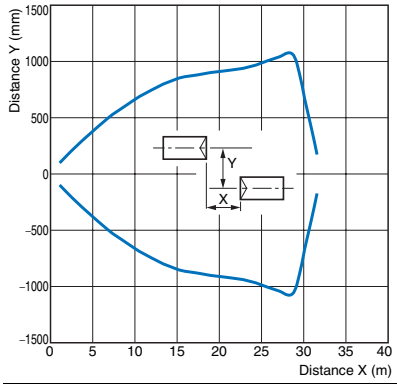


Engineering Data (Typical)

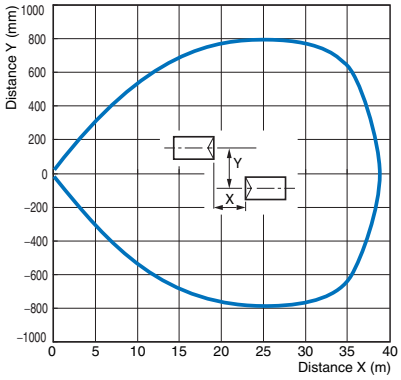
Parallel Operating Range

Through-beam Models

E3ZM-CT□1

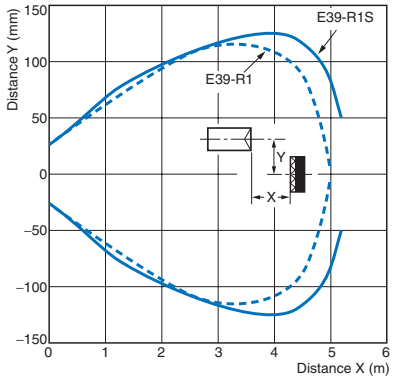


E3ZM-CT□2B



Retro-reflective Models

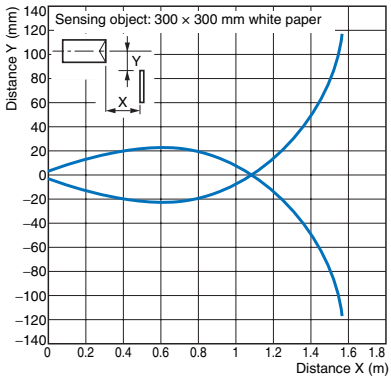
E3ZM-CR□1



Operating Range

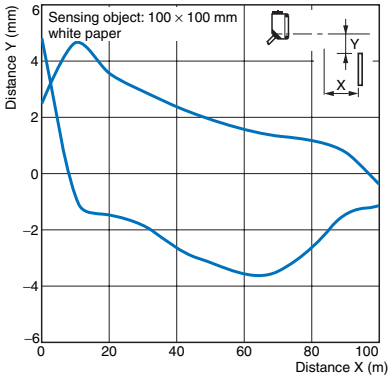
Diffuse-reflective Models

E3ZM-CD□2

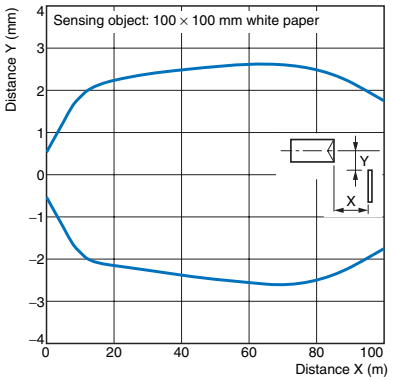


BGS Reflective Models

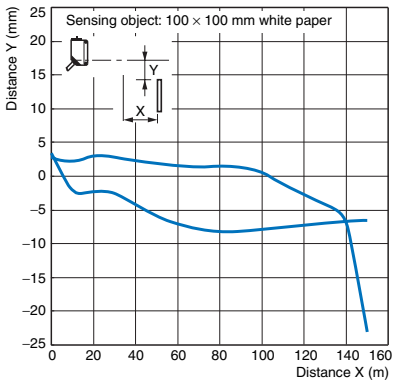
E3ZM-CL□1H (Vertical)



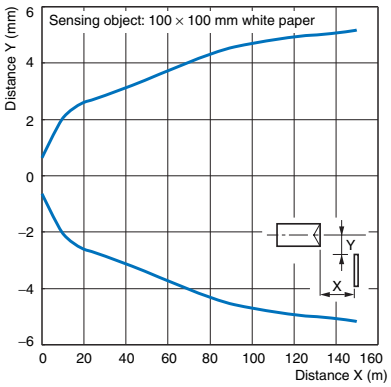
E3ZM-CL□1H (Horizontal)



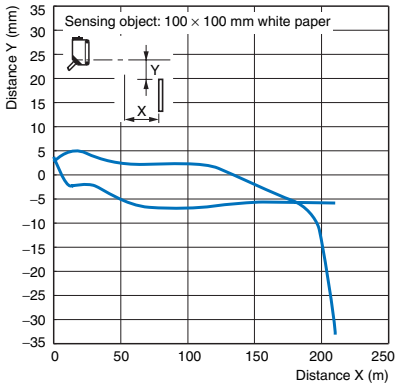
E3ZM-CL□2H (Vertical)



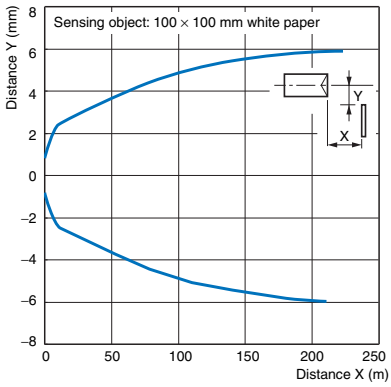
E3ZM-CL□2H (Horizontal)



E3ZM-CL□4H (Vertical)



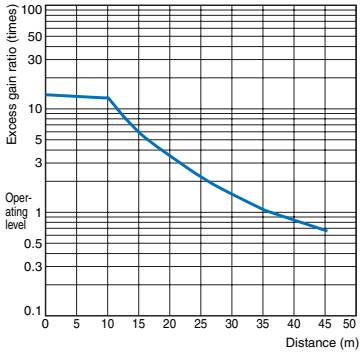
E3ZM-CL□4H (Horizontal)



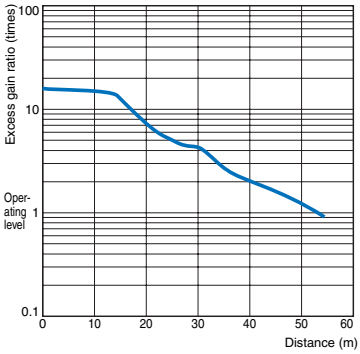
Excess Gain vs. Distance

Through-beam Models

E3ZM-CT□1

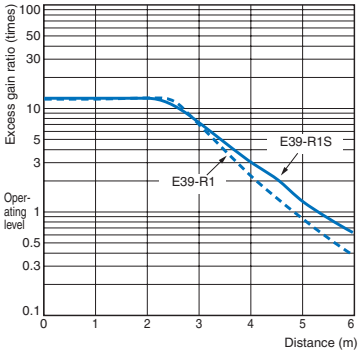


E3ZM-CT□2B



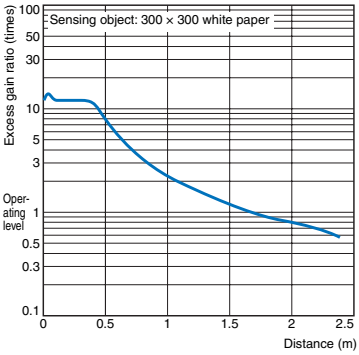
Retro-reflective Models

E3ZM-CR□1



Diffuse-reflective Models

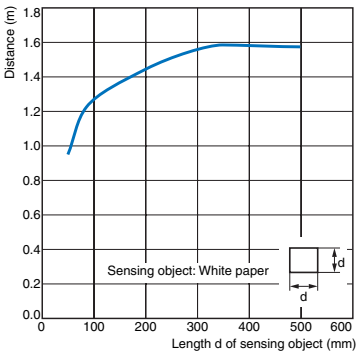
E3ZM-CD□2



Sensing Object Size vs. Distance

Diffuse-reflective Models

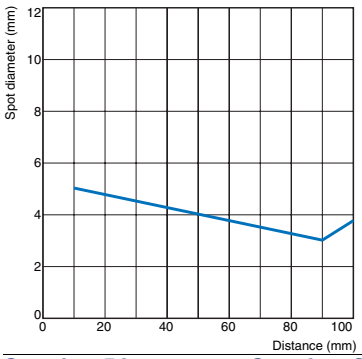
E3ZM-CD□2



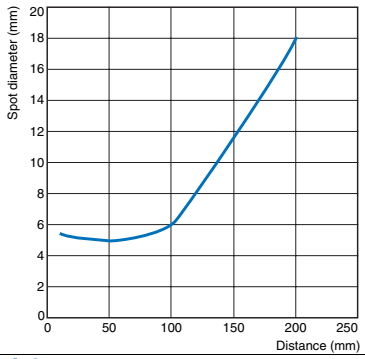
Spot Diameter vs. Distance

BGS Reflective Models

E3ZM-CL□1H



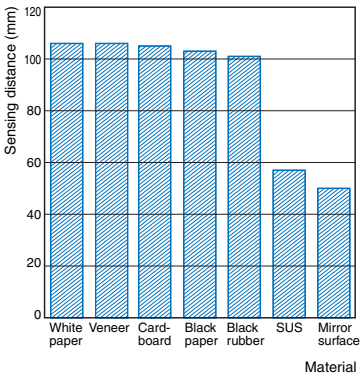
E3ZM-CL□2H/CL□4H



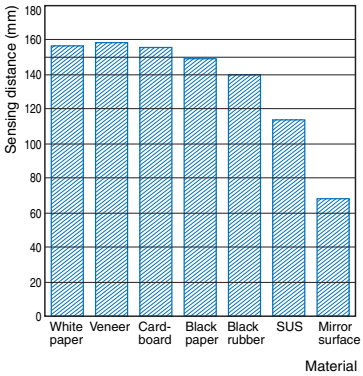
Sensing Distance vs. Sensing Object Material

BGS Reflective Models

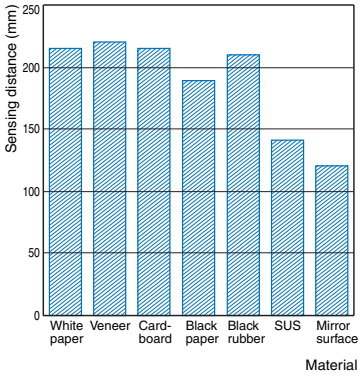
E3ZM-CL□1H



E3ZM-CL□2H

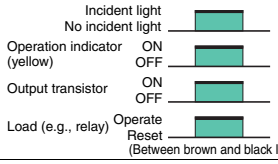
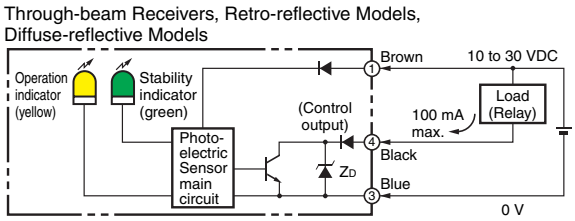
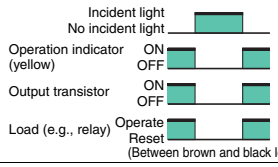
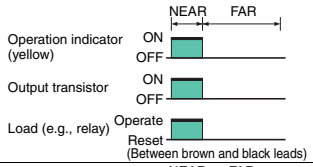
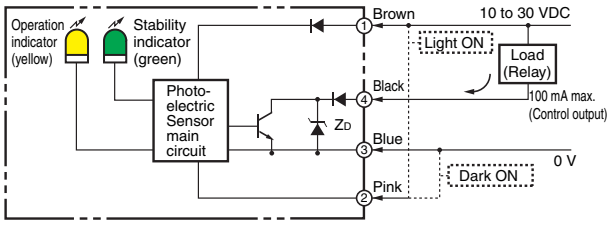
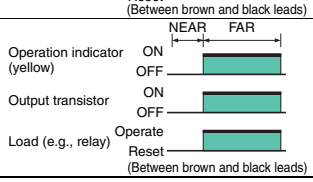


E3ZM-CL□4H

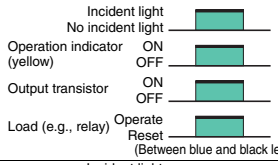
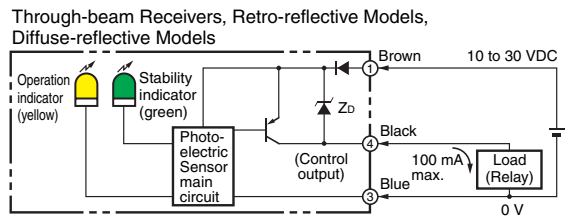
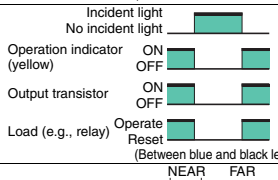
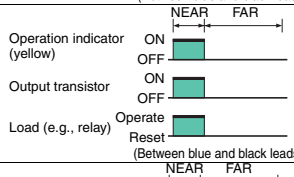
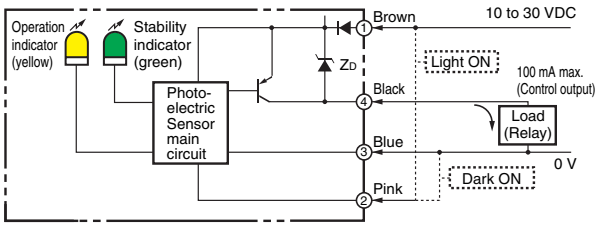
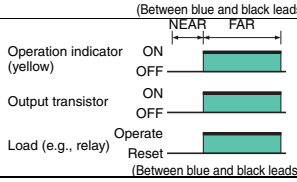


I/O Circuit Diagrams

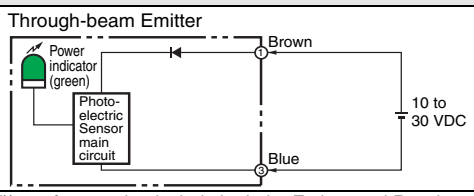
NPN Output

Model	Operation mode	Timing charts	Operation selector switch	Output circuit
E3ZM-CT61* E3ZM-CT62B* E3ZM-CR61 E3ZM-CD62	Light ON		L side (LIGHT ON)	
	Dark ON		D side (DARK ON)	
E3ZM-CL61H E3ZM-CL62H E3ZM-CL64H	Light ON		Connect pink lead (2) to brown lead (1).	
	Dark ON		Connect pink lead (2) to blue lead (3) or leave open.	

PNP Output

Model	Operation mode	Timing charts	Operation selector switch	Output circuit
E3ZM-CT81* E3ZM-CT82B* E3ZM-CR81 E3ZM-CD82	Light ON		L side (LIGHT ON)	
	Dark ON		D side (DARK ON)	
E3ZM-CL81H E3ZM-CL82H E3ZM-CL84H	Light ON		Connect pink lead (2) to brown lead (1).	
	Dark ON		Connect pink lead (2) to blue lead (3) or leave open.	

Emitter (Either NPN or PNP Output)

Model*	Circuit
E3ZM-CT61 E3ZM-CT62B E3ZM-CT81 E3ZM-CT82B	

*Models numbers for Through-beam Sensors (E3ZM-CT□□(-M1TJ)) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3ZM-CT61-L 2M), the model number of the Receiver, by adding "-D"(example: E3ZM-CT61-D 2M.) Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Connector Pin Arrangement

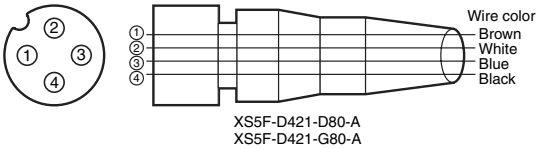
M12 Pre-wired Connector

M12 Connector Pin Arrangement



Plugs (Sensor I/O Connectors)

M12 Smartclick Connector



Nomenclature

Sensors with Sensitivity Adjuster and Operation Selector

Through-beam Models

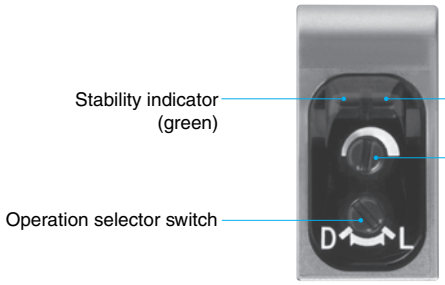
E3ZM-CT□□ (Receiver)

Retro-reflective Models

E3ZM-CR□□

Diffuse-reflective Models

E3ZM-CD□□



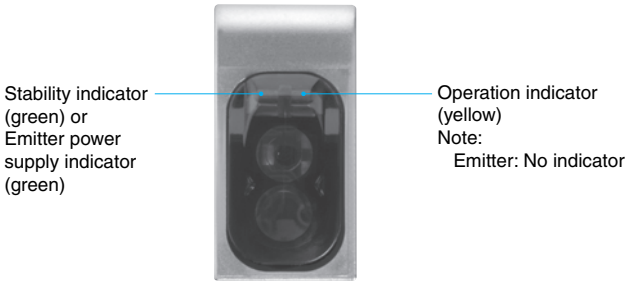
Non-adjustable Emitter

BGS Reflective Models

E3ZM-CL□□H

Through-beam Models

E3ZM-CT□□ (Emitter)



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ 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, explosion 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 0.39 to 0.49 N·m for M12 metal connectors and 0.3 to 0.4 N·m for M8 metal connectors.

Load

Do not use a load that exceeds the rated load.

Low-temperature Environments

Do not touch the metal surface with your bare hands when the temperature is low. Touching the surface may result in a cold burn.

Rotation Torque for Sensitivity Adjustment and Selector Switch

Adjust with a torque of 0.06 N·m or less.

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

Do not use the Sensor in environments subject to cleaners and disinfectants. 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 ambient temperature and the power supply voltage. Use caution when operating or performing maintenance on 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 30 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. Also, use M3 screws.
(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

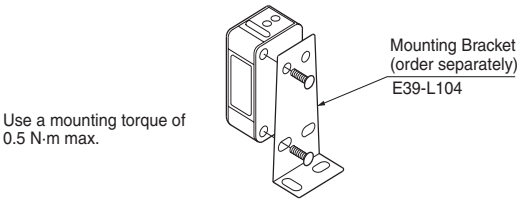
This Sensor is equipped with load short-circuit protection, but be sure to not short circuit the load. Be sure to not use an output current flow that exceeds the rated current. If a load short circuit occurs, the output will turn OFF, so check the wiring before turning ON the power supply again. The short-circuit protection circuit will be reset. The load short-circuit protection will operate when the current flow reaches 1.8 times the rated load current. When using a capacitive load, use an inrush current of 1.8 times the rated load current or lower.

Water Resistance

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

When disposing of the Sensor, treat it as industrial waste.

Mounting Diagram



Oil Resistance

The Sensor has passed oil resistance testing for the oils listed in the following table. Use this table as a guide when considering lubricants and cutting oils.

Test oil type	Product name	Kinetic viscosity at 40°C (mm^2/s)	pH (dilution rate)
Lubricants	Velocity Oil No. 3	2.02	---
Non-water-soluble cutting oils	Yushiron Oil No.2 AC	Less than 10	---
Water-soluble cutting oils	Yushiroken EC50T3	---	10.1 (×30)
	Yushiroken EC50T5		9.9 (×30)
	Yushiroken S46D		9.9 (×50)
	Yushiroken S50N		8.6 (×50)
	Yushiron Lubic HWC68		9.1 (×30)
	Yushiroken Synthetic #770TG		9.9 (×20)
	Emulcut FA-900ST		9.7 (×30)
	Multicool CSF-9000		9.7 (×20)
	Sugicut CS-68JS-1		9.6 (×20)
	Toyocool 3A-666		9.6 (×20)
	Gryton 1700		9.1 (×10)
	Gryton 1700D		9.3 (×3)

Note 1. The Sensor was immersed in the above oils for 240 h at 55°C and then passed an insulation resistance test at 100 MΩ.
2. Use the kinetic viscosities and pHs in the above table as a guide when using the Sensor in environments containing oils not listed in the table. Additives in the oil may also affect performance. Always test applicability in advance.

Dimensions

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

For models with M8 connectors, refer to the dimensions of models with the same sensing method in *Dimensions* in the *E3ZM Datasheet*. The dimensions of the E3ZM-C and E3ZM are the same.

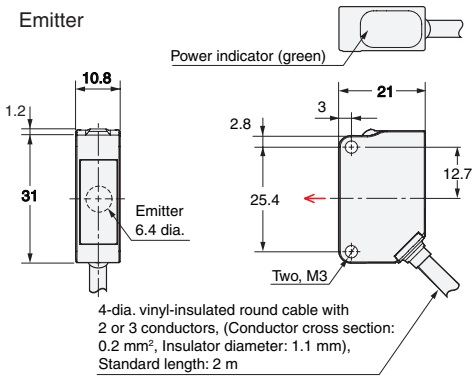
Sensors

Through-beam Models*

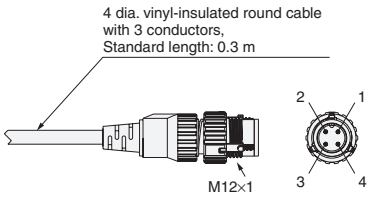
Pre-wired Models
E3ZM-CT61
E3ZM-CT81
E3ZM-CT62B
E3ZM-CT82B



Emitter

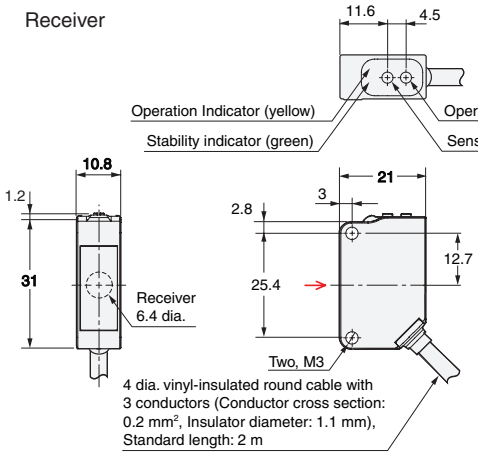


M12 Pre-wired Connector (E3ZM-□□□-M1TJ)

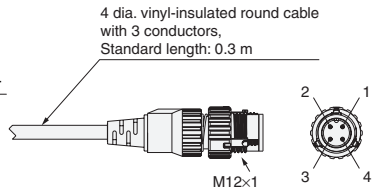


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	---

Receiver



M12 Pre-wired Connector (E3ZM-□□□-M1TJ)



Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

Retro-reflective Models

Pre-wired Models
E3ZM-CR61
E3ZM-CR81

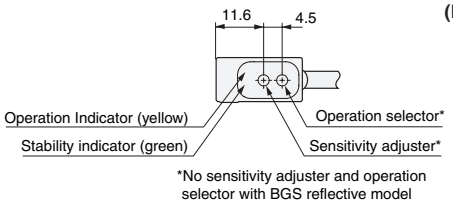
Diffuse-reflective Models

Pre-wired Models
E3ZM-CD62
E3ZM-CD82

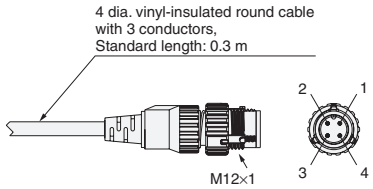
BGS Reflective Models

Pre-wired Models
E3ZM-CL61H
E3ZM-CL62H
E3ZM-CL64H
E3ZM-CL81H
E3ZM-CL82H
E3ZM-CL84H

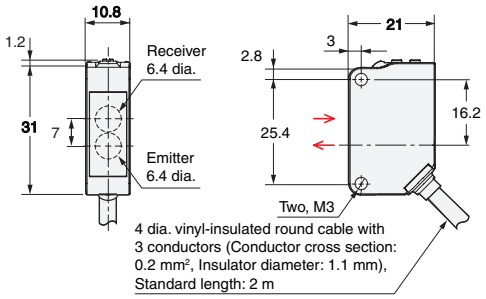




M12 Pre-wired Connector (E3ZM-□□□-M1TJ)



Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output



*Models numbers for Through-beam Sensors (E3ZM-CT□□(-M1TJ)) are for sets that include both the Emitter and Receiver.
The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3ZM-CT61-L 2M), the model number of the Receiver, by adding "-D"(example: E3ZM-CT61-D 2M.) Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

OMRON

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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://www.omron247.com or contact your Omron representative for published information.
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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.

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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.
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