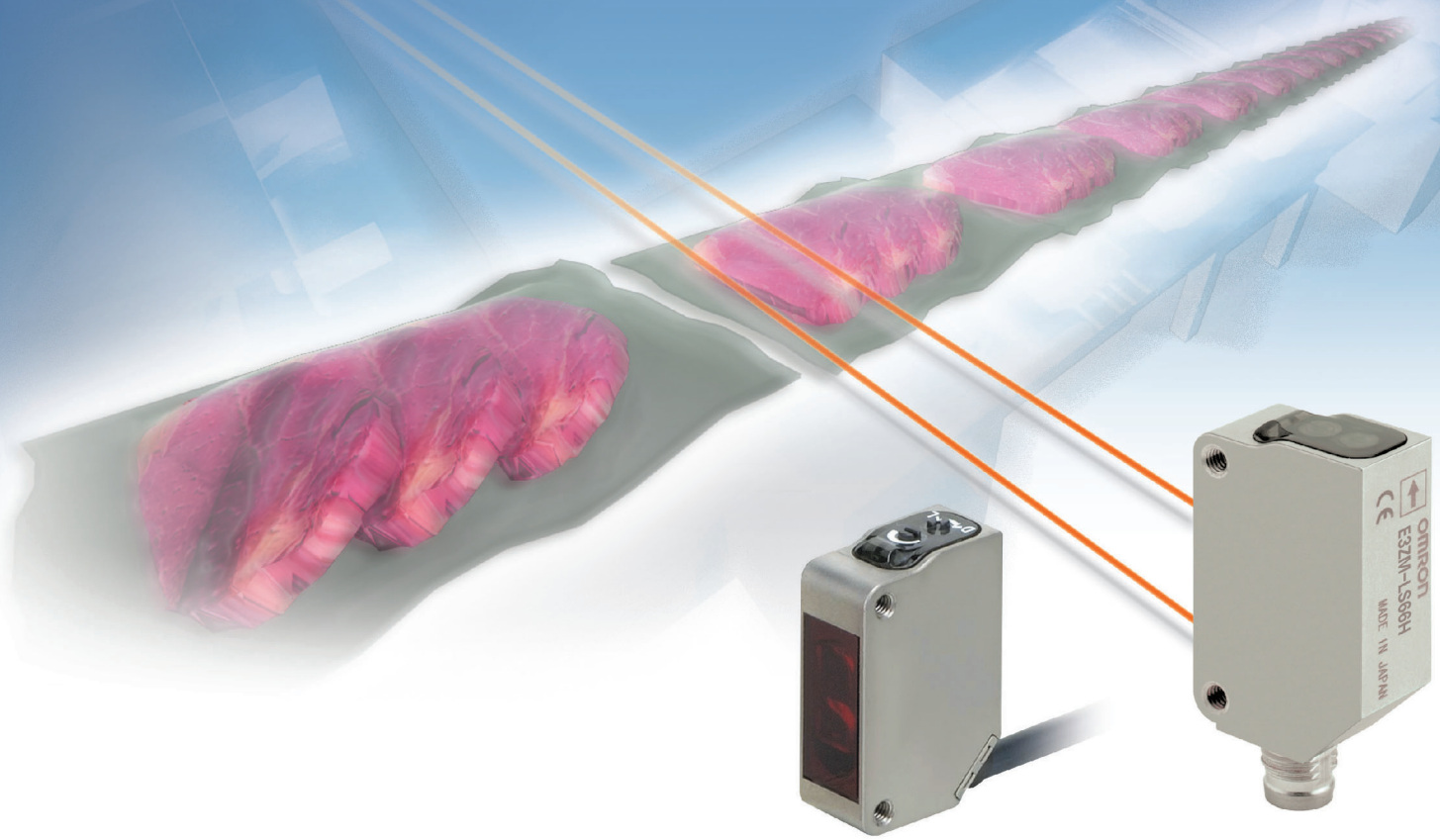
OMRON

Stainless Steel Housing

Compact Photoelectric Sensor with Built-in Amplifier

E3ZM

Designed for the Food Industry.
Hygienic, Durable, and Detergent Resistant.
316L Stainless Steel Housing.
IP69K



realizing

Patent pending

Stainless Steel Housing - Ideal for the Food Industry!

World's Strongest

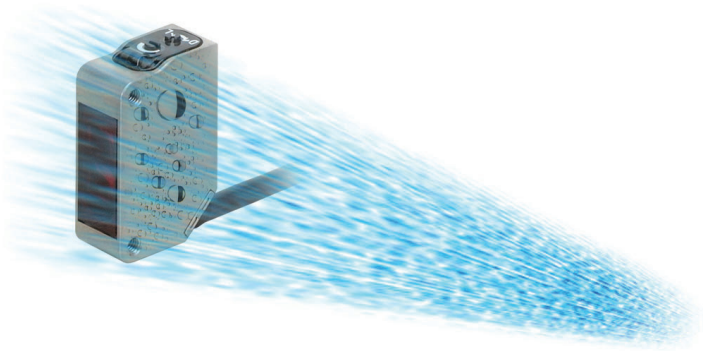
Withstands Detergent and Disinfectant Spray

We used SUS316L for the case and the best material for all parts to achieve 200 times the durability of the E3Z (in 1.5% solution of sodium hydroxide at 70°C) to make the E3ZM suitable for the cleaning conditions of food-processing machinery.

Note: Refer to page 16 for details on chemicals, detergents, and disinfectants.

World's First

Superior Protective Structure

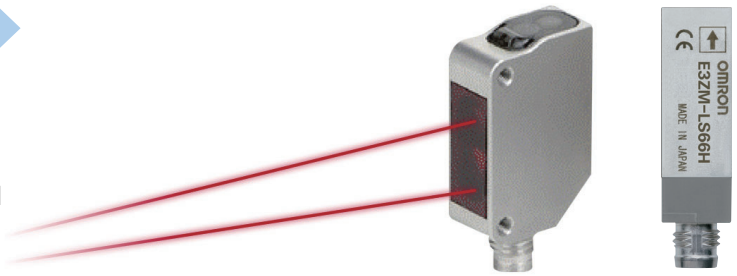


The first IP69K* (DIN 40050-9) protective structure in the world for a square metal photoelectric sensor. Suitable for high-temperature, high-pressure jet water spray cleaning applications.

*Refer to the footnote on page 8.

Industry's Best

Shape and Markings Designed for Greater Hygiene



Few indentations in the shape means less dust and water can collect, making the E3ZM more hygienic. No labels have been used in order to prevent foreign matter contaminating food products. The E3ZM model and lot numbers are imprinted using a laser marker.

Advanced
Industrial
Automation

Structural Design That Provides Excellent Environment-resistance

Indicator cover: Polyethersulfone (PES)

Excellent resistance to detergents and disinfectants.

Waterproofing ring: Fluorine rubber

Excellent resistance to detergents and disinfectants.

Sensitivity adjustment and mode selector switch: Polyetheretherketone (PEEK)

Excellent resistance to detergents and disinfectants. Also has excellent abrasion resistance.

Optical plate: Polymethylmethacrylate (PMMA)

Excellent resistance to detergents and disinfectants. High transparency and other qualities give PMMA excellent optical characteristics.

Case: SUS316L

Excellent corrosion resistance to many chemical reagents.

Seal

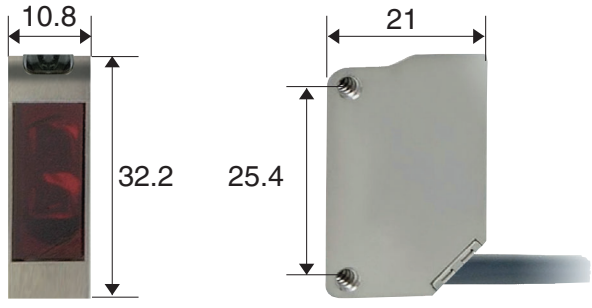
The seal provides the durability to high-temperature and high-pressure water that complies with IP69K.

Cable: Polyvinylchloride

Excellent resistance to detergents and disinfectants.

Smallest Square Metal Photoelectric Sensor in the World

The same compact shape and mounting method as the E3Z. The E3ZM is durable, comes in a world standard size, and no other square metal photoelectric sensor is as easy to use.



(Actual size)

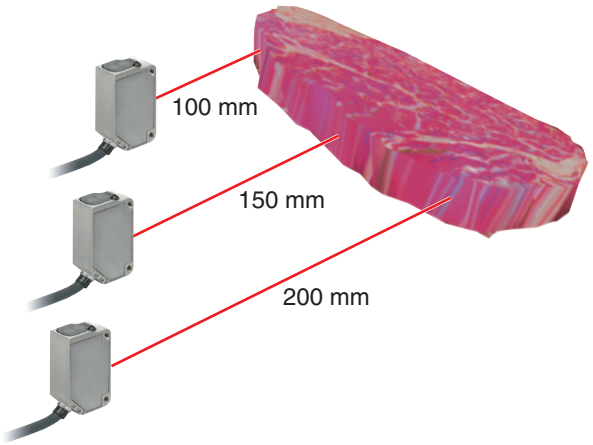
(Unit: mm)

Unique Members of the E3ZM Family

BGS Reflective Models

E3ZM-LS6□H/-LS8□H

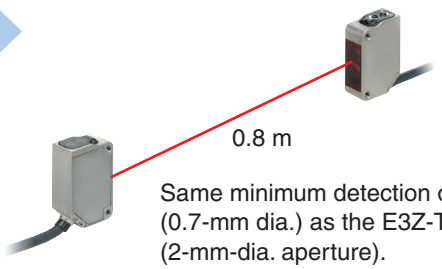
Three models with different fixed sensitivity (rated sensing distances) have been created. These models cover the sensing ranges of the E3Z-LS61.



Through-beam Inner Aperture Models

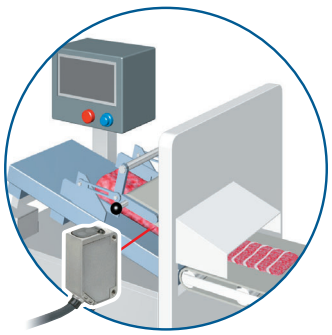
E3ZM-T63 (Typical model. Available soon.)

Fine beam without attaching an external aperture. This eliminates malfunctions from residual water drops, even immediately after washing.

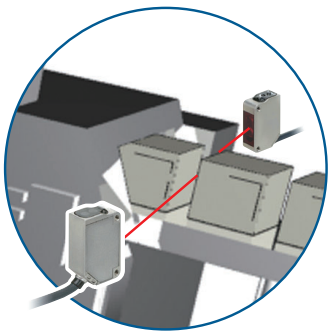


Same minimum detection object (0.7-mm dia.) as the E3Z-T61+E39-S65C (2-mm-dia. aperture).

A Better Fit for the Application!



Meat slicing and similar processing



Wrapping raw food products

ECOLAB

Ecolab GmbH & Co. OHG
P.O. Box 13 04 06
D-40551 Düsseldorf

certifies that for

OMRON

OMRON Manufacturing of Germany GmbH
Carl-Benz-Strasse 4
71154 Nufringen

material resistance tests

were performed with cleaning substances P3-topax 56, P3-topax 66, P3-topax 91, P3 Topactiv DES and demineralized water as a zero reference factor.

The material resistance of the tested series Photoelectric Sensor E3ZM

to the P3 products used in the test can be considered to be positive according to the cleaning procedure mentioned overleaf.

Düsseldorf, 14th February 2006

Ecolab GmbH & Co. OHG

i.V. Thomas Tyborski

i.V. Re Imund Laaff

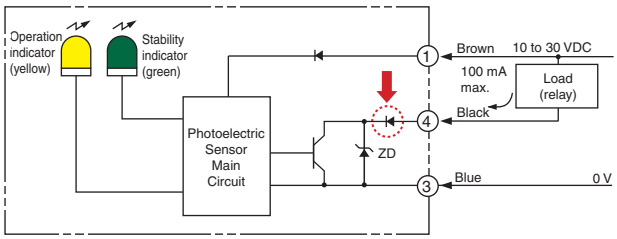
E3ZM passed the material resistance tests and is certified by Ecolab.

Advanced
Industrial
Automation

Reliability Inherited from the E3Z

Increased Voltage Range

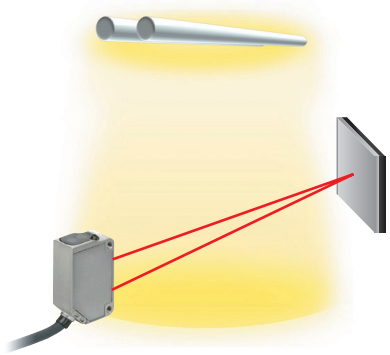
Reversed output polarity protection provided. The power supply voltage surpasses the standard E3Z at 10 to 30 V DC.



Wiring for NPN Output

Immunity to External Light and Noise

Uses recognized algorithm to prevent external light interference in the reflective sensor. This provides reliability when using the E3ZM near inverter fluorescent lights and similar applications. Excellent noise immunity has also been inherited from the E3Z.



And Of Course, Ecological

Total European RoHS Compliance (Available soon)

Lead, mercury, cadmium, chromium, polybromide biphenyl, and polybromide diphenyl ether have been completely eliminated.

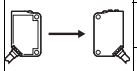
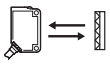
The environment-friendly features of the E3Z, such as energy-saving and resource-saving, are carried on to the E3ZM as well.

- Low-power circuit design
- Polyethylene packaging that can be incinerated as general waste

Ordering Information

Sensors

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN output	PNP output
Through-beam *5		Pre-wired (2 m) *3	15 m	E3ZM-T61	E3ZM-T81
		Connector (M8, 4 pins) *4		E3ZM-T66	E3ZM-T86
		Pre-wired (2 m) *3 (released soon)	0.8 m (apertures built in)	E3ZM-T63	E3ZM-T83
		Connector (M8, 4 pins) *4 (released soon)		E3ZM-T68	E3ZM-T88
Retro-reflective with MSR function	 *1	Pre-wired (2 m) *3	*2 4 m (100 mm) (Using E39-R1S)	E3ZM-R61	E3ZM-R81
		Connector (M8, 4 pins) *4		E3ZM-R66	E3ZM-R86
Diffuse-reflective		Pre-wired (2 m) *3	1 m	E3ZM-D62	E3ZM-D82
		Connector (M8, 4 pins) *4		E3ZM-D67	E3ZM-D87
BGS reflective (fixed distance)		Pre-wired (2 m) *3	10 to 100 mm	E3ZM-LS61H	E3ZM-LS81H
		Connector (M8, 4 pins) *4		E3ZM-LS66H	E3ZM-LS86H
		Pre-wired (2 m) *3	10 to 150 mm	E3ZM-LS62H	E3ZM-LS82H
		Connector (M8, 4 pins) *4		E3ZM-LS67H	E3ZM-LS87H
		Pre-wired (2 m) *3	10 to 200 mm	E3ZM-LS64H	E3ZM-LS84H
		Connector (M8, 4 pins) *4		E3ZM-LS69H	E3ZM-LS89H

*1. The Reflector is sold separately. Select the Reflector model most suited to the application.
*2. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.
*3. Pre-wired Models with a 5-m cable are also available for these products. When ordering, specify the cable length by adding "5M" to the end of the model number (e.g., E3ZM-LT61 5M).
M12 Pre-wired Connector Models are also available. When ordering, add "-M1J" to the end of the model number (e.g., E3ZM-R61-M1J 0.3m).
*4. M8 Connector Models are also available with three-pin connectors. When ordering, add "-M5" to the end of the model number (e.g., E3ZM-T66-M5).
This does not apply to BGS Reflective Models, however, because they require 4 pins.
*5. 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-T61-G0).

Accessories

Reflectors

Name	E3ZM-R Sensing distance (typical) *	Model	Quantity	Remarks
Reflector	3 m (100 mm) (rated value)	**E39-R1**	1	• Reflectors are not provided with Retro-reflective 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	
Fog Preventive Coating	3 m (100 mm)	**E39-R1K**	1	
Small Reflector	1.5 m (50 mm)	**E39-R3**	1	
Tape Reflector	700 mm (150 mm)	**E39-RS1**	1	
	1.1 m (150 mm)	**E39-RS2**	1	
	1.4 m (150 mm)	**E39-RS3**	1	

Note: When using a Reflector without a rated value, use 0.7 times typical value as a guideline for the sensing distance.
* Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

Mounting Brackets

Appearance	Model (Material)	Quantity	Remarks	Appearance	Model (Material)	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)
	**E39-L43 (SUS304)**	1	Horizontal Mounting Bracket *		**E39-L151 (SUS304)**	1 set	Easily mounted to the aluminum frame rails of conveyors and easily adjusted. For left to right adjustment
	**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 Through-beam Models, order one bracket for the Receiver and one for the Emitter.
* Cannot be used for Standard Connector models.

Sensor I/O Connectors

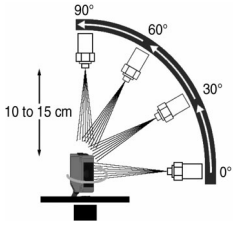
Size	Cable	Appearance		Cable type		Model
M8 (4 pins)	Standard	Straight		2 m	4-wire	**XS3F-M421-402-A**
				5 m		**XS3F-M421-405-A**
		L-shaped		2 m		**XS3F-M422-402-A**
				5 m		**XS3F-M422-405-A**
M12 (For -M1J models)		Straight		2 m	3-wire	**XS2F-D421-DC0-A**
				5 m		**XS2F-D421-GC0-A**
		L-shaped		2 m		**XS2F-D422-DC0-A**
				5 m		**XS2F-D422-GC0-A**
		Straight		2 m	4-wire	**XS2F-D421-D80-A**
				5 m		**XS2F-D421-G80-A**
		L-shaped		2 m		**XS2F-D422-D80-A**
				5 m		**XS2F-D422-G80-A**

Note: Depending on the connector specification, the IP67 performance applies. When using high-pressure washing, use connector compliant with IP69K.

Ratings and Specifications

Item	Sensing method	Through-beam		Retro-reflective with MSR function	Diffuse-reflective Models
Model	NPN output	E3ZM-T61 E3ZM-T66	E3ZM-T63 E3ZM-T68	E3ZM-R61 E3ZM-R66	E3ZM-D62 E3ZM-D67
	PNP output	E3ZM-T81 E3ZM-T86	E3ZM-T83 E3ZM-T88	E3ZM-R81 E3ZM-R86	E3ZM-D82 E3ZM-D87
Sensing distance		15 m	0.8 m	4 m [100 mm] (Using E39-R1S) 3 m [100 mm] (Using E39-R1)	1 m (White paper 300 × 300 mm)
Spot diameter (typical)		---			
Standard sensing object		Opaque: 12-mm dia. min.	Opaque: 2-mm dia. min.	Opaque: 75-mm dia. min.	---
Differential travel		---			20% of sensing distance max.
Black/white error		---			
Directional angle		Emitter, Receiver: 3° to 15°		Sensor: 3° to 10° Reflector: 30°	---
Light source (wavelength)		Infrared LED (870 nm)		Red LED (660 nm)	Infrared LED (860 nm)
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)			
Current consumption		Emitter, Receiver: 20 mA max. each		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, and Reversed output polarity protection		Reversed power supply polarity protection, Output short-circuit protection, Mutual interference prevention, and Reversed output polarity protection	
Response time		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 *1		IEC: IP67, DIN 40050-9: IP69K			
Connection method		Pre-wired cable (standard length: 2 m) M8 4-pin Connector			
Indicator		Operation indicator (yellow), Stability indicator (green) (Emitter has only power supply indicator (green).)			
Weight (packed state)	**Pre-wired models (with 2-m cable)**	Approx. 150 g		Approx. 90 g	
	Connector models	Approx. 60 g		Approx. 40 g	
Materials	**Case**	SUS316L			
	Lens	PMMA (polymethylmethacrylate)			
	Display	PES (polyethersulfone)			
	Sensitivity adjustment and mode selector switch	PEEK (polyetheretherketone)			
	Seals	Fluoro rubber			
Accessories		Instruction sheet (Note: Reflectors and Mounting Brackets are sold separately.)			

*1. 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.

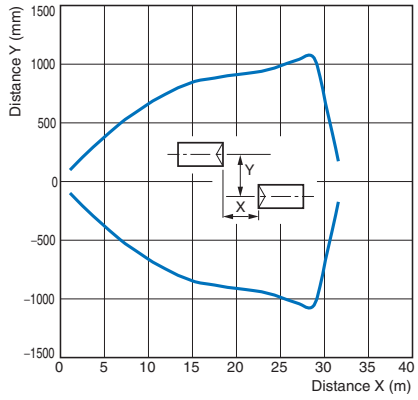


Item	Model	BGS Reflective Models		
Sensing method				
	NPN output	E3ZM-LS61H E3ZM-LS66H	E3ZM-LS62H E3ZM-LS67H	E3ZM-LS64H E3ZM-LS69H
	PNP output	E3ZM-LS81H E3ZM-LS86H	E3ZM-LS82H E3ZM-LS87H	E3ZM-LS84H E3ZM-LS89H
Sensing distance		10 to 100 mm (White paper 100 × 100 mm)	10 to 150 mm (White paper 100 × 100 mm)	10 to 200 mm (White paper 100 × 100 mm)
Spot diameter (typical)		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.
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 *1		IEC: IP67, DIN 40050-9: IP69K		
Connection method		Pre-wired cable (standard length: 2 m) M8 4-pin Connector		
Indicator		Operation indicator (yellow), Stability indicator (green)		
Weight (packed state)	Pre-wired models (with 2-m cable)	Approx. 90 g		
	Connector models	Approx. 40 g		
Materials	Case	SUS316L		
	Lens	PMMA (polymethylmethacrylate)		
	Display	PES (polyethersulfone)		
	Seals	Fluoro rubber		
Accessories		Instruction sheet (Note: Mounting Brackets are sold separately.)		

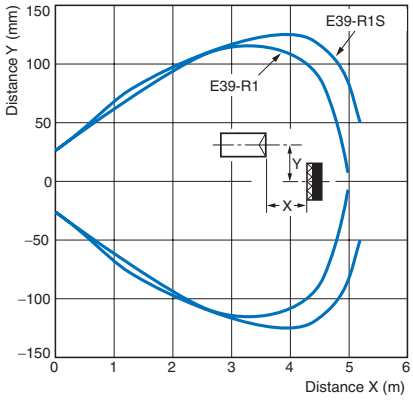
Engineering Data (Typical)

Parallel Operating Range

Through-beam Models
E3ZM-T□1(T□6)

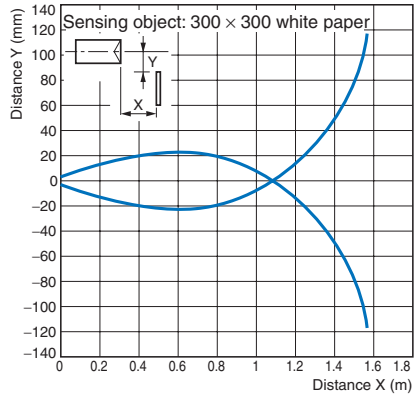


Retro-reflective Models
E3ZM-R□1(R□6)

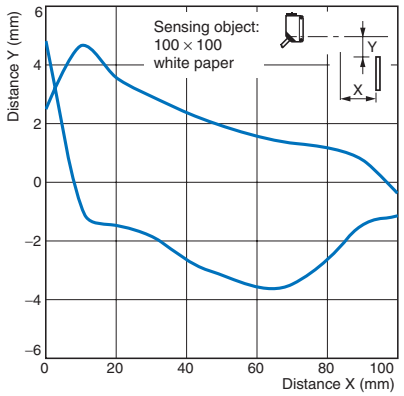


Operating Range

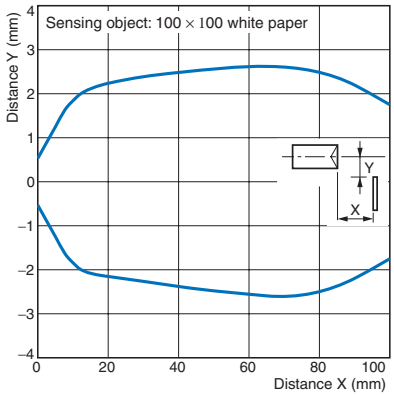
Diffuse-reflective Models
E3ZM-D□2(D□7)



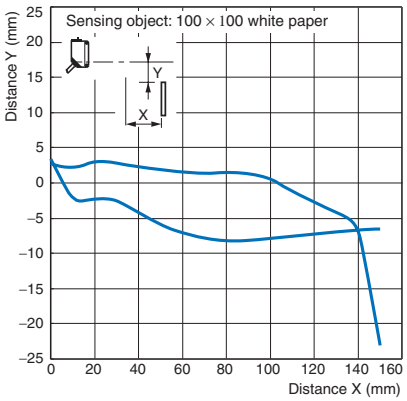
BGS Reflective Models
E3ZM-LS□1H(LS□6H), Top to Bottom



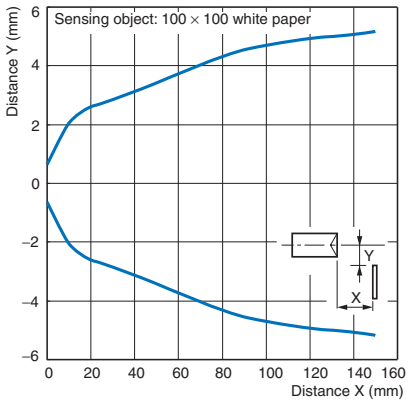
E3ZM-LS□1H(LS□6H), Left to Right



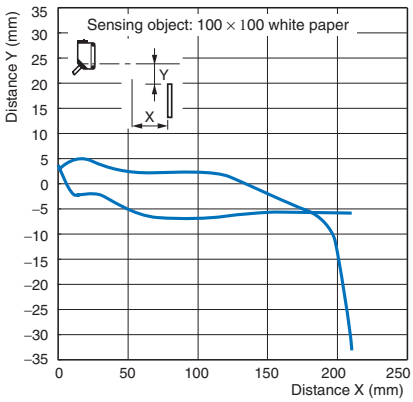
E3ZM-LS□2H(LS□7H), Top to Bottom



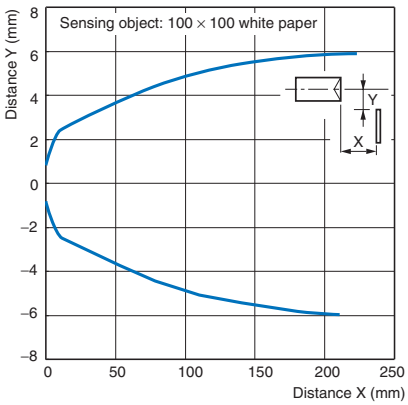
E3ZM-LS□2H(LS□7H), Left to Right



E3ZM-LS□4H(LS□9H), Top to Bottom

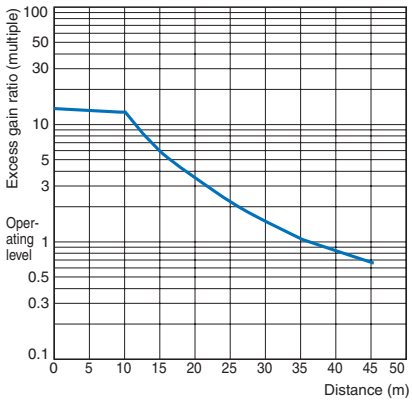


E3ZM-LS□4H(LS□9H), Left to Right

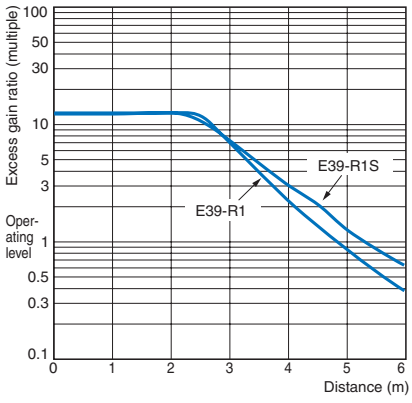


Excess Gain vs. Distance

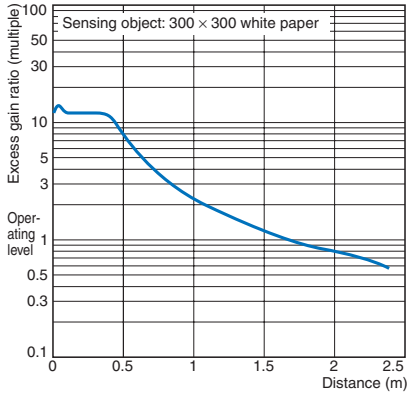
Through-beam Models
E3ZM-T□1(T□6)



Retro-reflective Models
E3ZM-R□1(R□6)

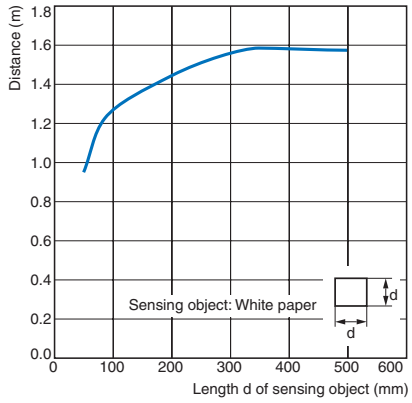


Diffuse-reflective Models
E3ZM-D□2(D□7)



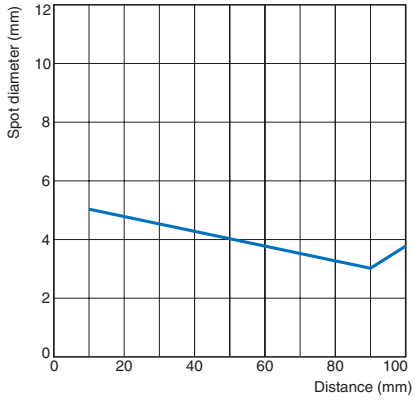
Sensing Object Size vs. Distance

Diffuse-reflective Models
E3ZM-D□2(D□7)

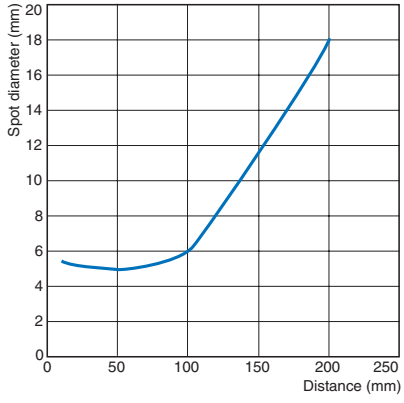


Spot Diameter vs. Distance

BGS Reflective Models
E3ZM-LS□1H(LS□6H)



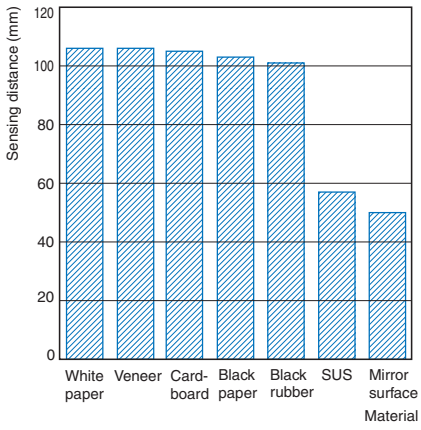
E3ZM-LS□2H/LS□4H(LS□7H/LS□9H)



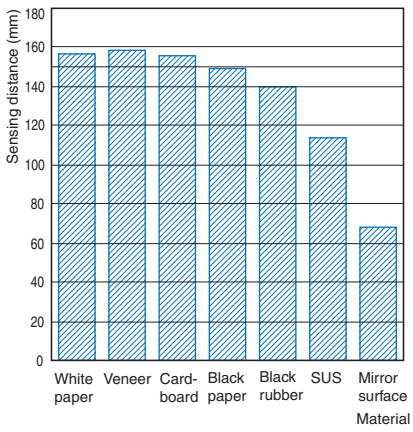
Sensing Distance vs. Sensing Object Material

BGS Reflective Models

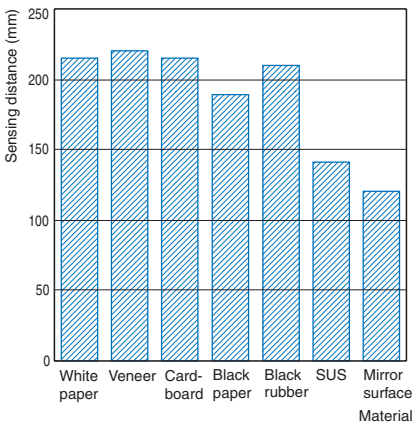
E3ZM-LS□1H(LS□6H)



E3ZM-LS□2H(LS□7H)



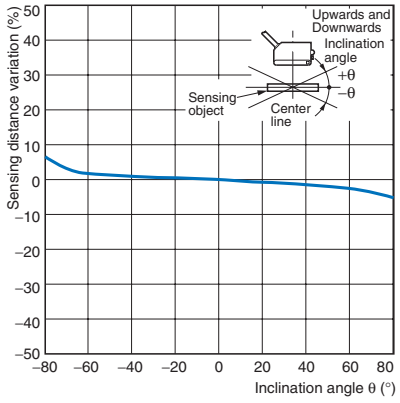
E3ZM-LS□4H(LS□9H)



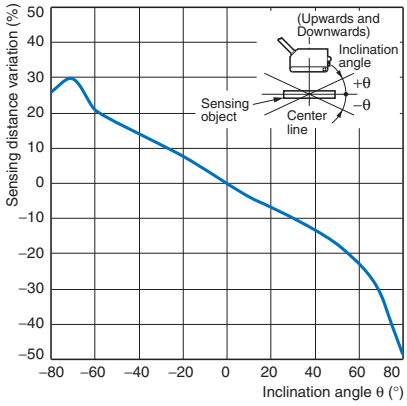
Inclination Characteristics (Vertical)

BGS Reflective Models

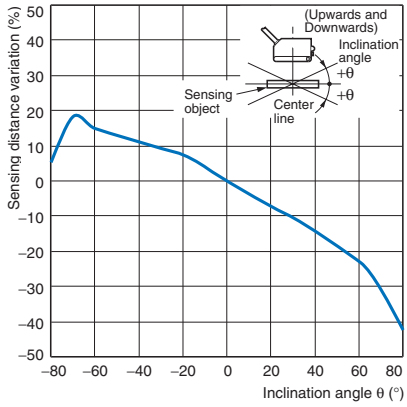
E3ZM-LS□1H(LS□6H)



E3ZM-LS□2H(LS□7H)



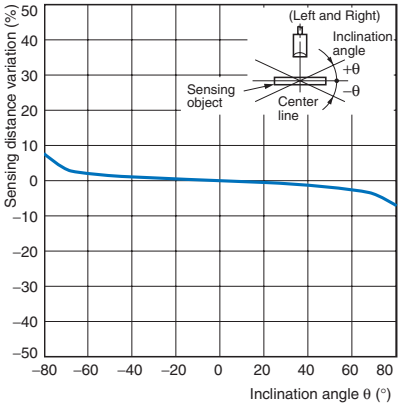
E3ZM-LS□4H(LS□9H)



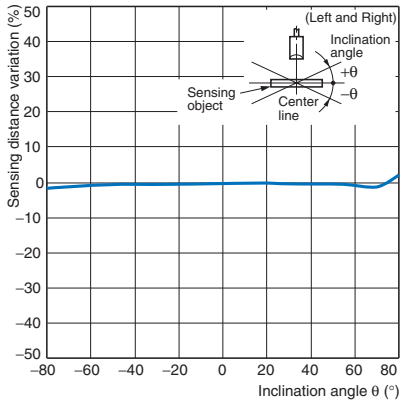
Inclination Characteristics (Horizontal)

BGS Reflective Models

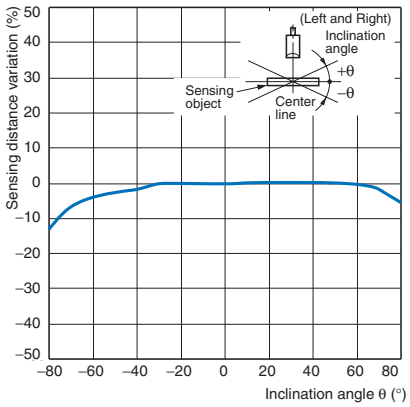
E3ZM-LS□1H(LS□6H)



E3ZM-LS□2H(LS□7H)

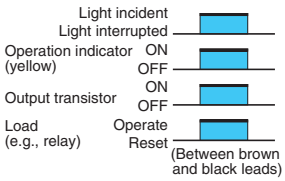
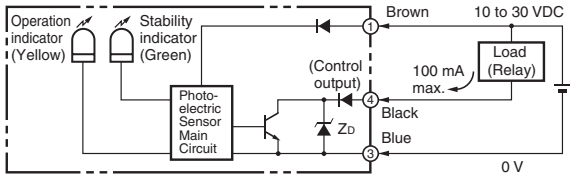


E3ZM-LS□4H(LS□9H)



I/O Circuit Diagrams

NPN Output

<table>
<tr><th>Model</th><th>Operation mode</th><th>Timing charts</th><th>Mode selector switch</th><th>Output circuit</th></tr>
<tr><td rowspan="3">E3ZM-T61
E3ZM-T63
E3ZM-T66
E3ZM-T68
E3ZM-R61
E3ZM-R66
E3ZM-D62
E3ZM-D67</td><td>Light-ON</td><td> 
</td><td>L side (LIGHT ON)</td><td rowspan="2">Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models
 
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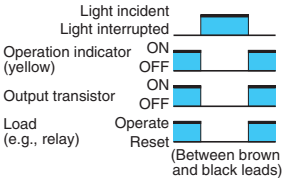
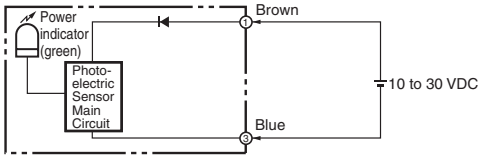
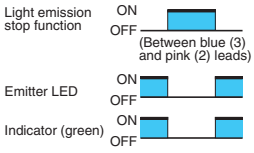
<tr><td>Dark-ON</td><td> 
</td><td>D side (DARK ON)</td></tr>
<tr><td colspan="3">Through-beam Emitter
 
</td></tr>
<tr><td>E3ZM-T61-G0
E3ZM-T63-G0
E3ZM-T66-G0
E3ZM-T68-G0</td><td>---</td><td> 
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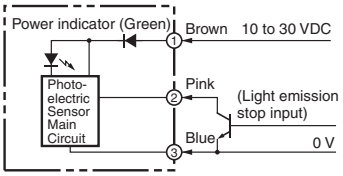
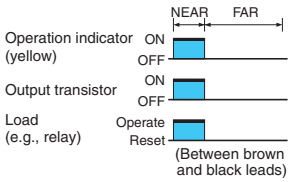
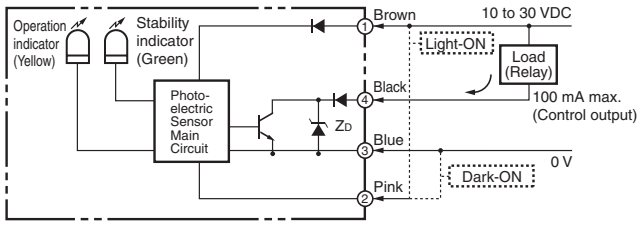
 
</td></tr>
<tr><td rowspan="2">E3ZM-LS61H
E3ZM-LS66H
E3ZM-LS62H
E3ZM-LS67H
E3ZM-LS64H
E3ZM-LS69H</td><td>Light-ON</td><td> 
</td><td>Connect pink lead (2) to brown lead (1).</td><td rowspan="2"> 
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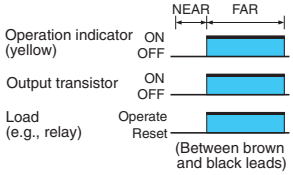
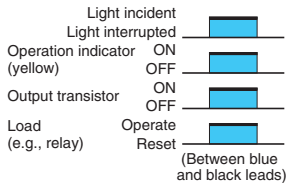
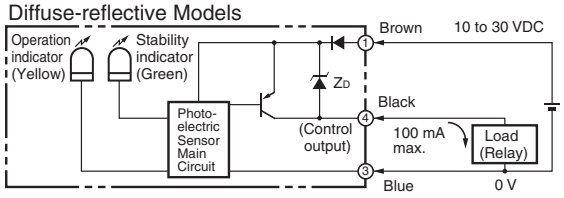
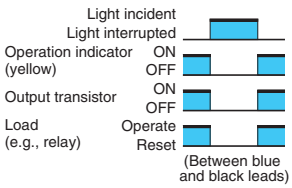
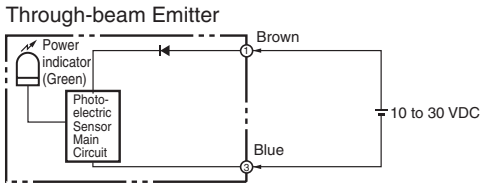
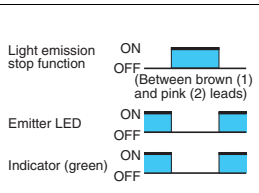
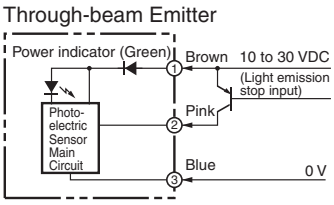
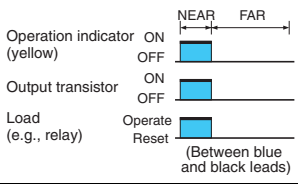
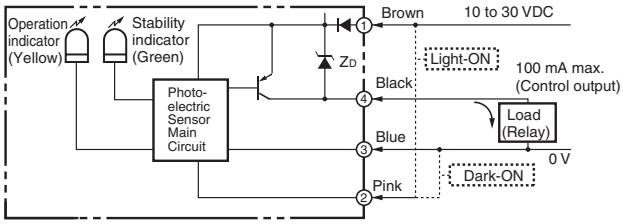
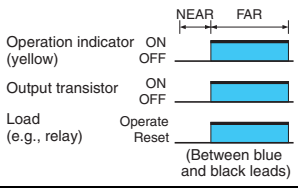
<tr><td>Dark-ON</td><td> 
</td><td>Connect pink lead (2) to blue lead (3) or leave open.</td></tr>
</table>

PNP Output

Model	Operation mode	Timing charts	Mode selector switch	Output circuit
E3ZM-T81 E3ZM-T83 E3ZM-T86 E3ZM-T88 E3ZM-R81 E3ZM-R86 E3ZM-D81 E3ZM-D86 E3ZM-D82 E3ZM-D87	Light-ON		L side (LIGHT ON)	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models 
	Dark-ON		D side (DARK ON)	
		Through-beam Emitter 		
E3ZM-T81-G0 E3ZM-T83-G0 E3ZM-T86-G0 E3ZM-T88-G0	---		---	Through-beam Emitter 
E3ZM-LS81H E3ZM-LS86H E3ZM-LS82H E3ZM-LS87H E3ZM-LS84H E3ZM-LS89H	Light-ON		Connect pink lead (2) to brown lead (1).	
	Dark-ON		Connect pink lead (2) to blue lead (3) or leave open.	

Connector Pin Arrangement

M12 Pre-wired Connector

M12 Connector Pin Arrangement

M8 Connector (-CN)/M8 Pre-wired Connector

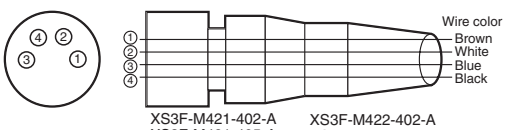
M8 4-pin Connector Pin Arrangement

M8 Pre-wired 3-pin Connector

M8 3-pin Connector Pin Arrangement

Plugs (Sensor I/O Connectors)

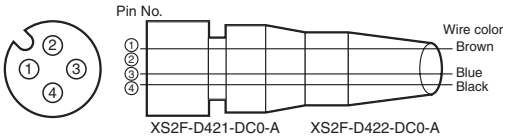
M8 4-pin Connectors



XS3F-M421-402-A
XS3F-M421-405-A

XS3F-M422-402-A
XS3F-M422-405-A

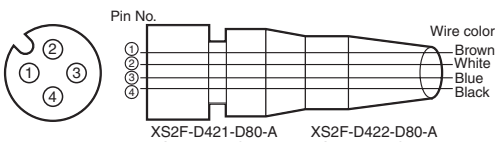
M12 3-wire Connectors



XS2F-D421-DC0-A
XS2F-D421-GC0-A

XS2F-D422-DC0-A
XS2F-D422-GC0-A

M12 4-wire Connectors



XS2F-D421-D80-A
XS2F-D421-G80-A

XS2F-D422-D80-A
XS2F-D422-G80-A

Classification	Wire color	Connector pin No.	Application
DC	Brown	1	Power supply (+V)
	White	2	Light emission stop input/ operation selection
	Blue	3	Power supply (0 V)
	Black	4	Output

Note: The above M8 and M12 Connectors made by OMRON are IP67. Do not use them in an environment where IP69K is required.

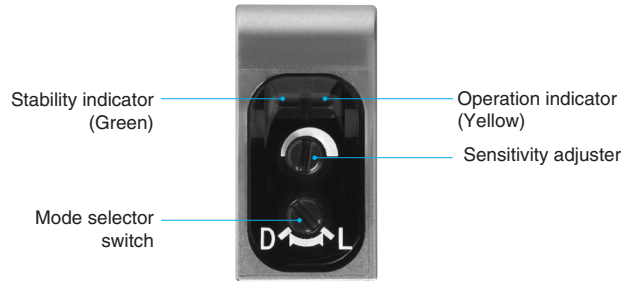
Nomenclature

Sensors with Sensitivity Adjustment and Mode Selector Switch

Through-beam Models
E3ZM-T□□ (Receiver)

Retro-reflective Models
E3ZM-R□□

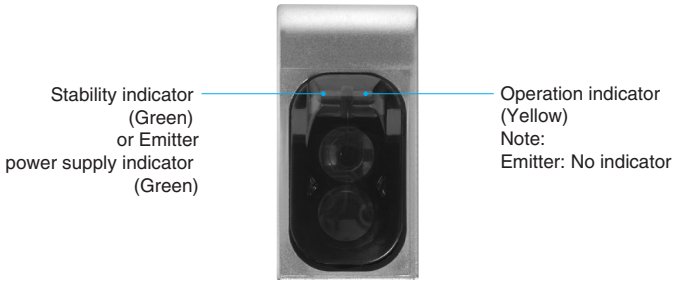
Diffuse-reflective Models
E3ZM-D□□



Infinite Adjustment Emitter

BGS Reflective Models
E3ZM-LS□□H

Through-beam Models
E3ZM-T□□ (Emitter)



Safety Precautions

Refer to *Warranty and Limitations of Liability* on page 20.

⚠ WARNING

This product is not designed or rated for 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 concentrated 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 0.3 to 0.4 N·m.

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.

Oily Environments
Do not use the Sensor in oily environments.

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.

Washing
Do not use highly concentrated detergents. They may cause malfunction. Do not use high-pressure water spray in excess of the specifications.

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 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

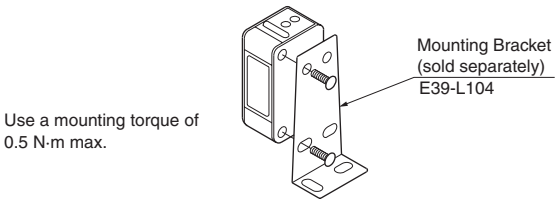
This Sensor is equipped with load short-circuit protection, but be sure to not short circuit the load. Be sure to not use an output current flow that exceeds the rated current. If a load short circuit occurs, the output will turn OFF, so check the wiring before turning ON the power supply again. The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

Water Resistance

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

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

Mounting Diagram



Resistance to Detergents, Disinfectants, and Chemicals

- Performance is assured for typical detergents and disinfectants, but performance may not be maintained for some detergents and disinfectants. Refer to the following table when using these agents.
- The E3ZM passed testing for resistance to detergents and disinfectants performed using the items in the following table. Refer to this table when considering use of detergents and disinfectants.

Category	Product name	Concentration	Temperature	Time
Chemical	Sodium hydroxide (NaOH)	1.5%	70°C	240h
	Potassium hydroxide (KOH)	1.5%	70°C	240h
	Phosphoric acid (H_3PO_4)	2.5%	70°C	240h
	Sodium hypochlorite (NaClO)	0.3%	25°C	240h
	Hydrogen peroxide (H_2O_2)	6.5%	25°C	240h
Alkaline foam detergent	P3-topax-66s (Manufactured by Ecolab)	3.0%	70°C	240h
Acidic foam detergent	P3-topax-56 (Manufactured by Ecolab)	5.0%	70°C	240h
Disinfectant	P3-oxonia active 90 (Manufactured by Ecolab)	1.0%	25°C	240h
	TEK121 (Manufactured by ABC Compounding)	1.1%	25°C	240h

Note: The Sensor was immersed in the chemicals, detergents, and disinfectants listed above at the temperatures in the table for 240 hours and then passed an insulation resistance of 100 MΩ min.

Dimensions

(Unit: mm)

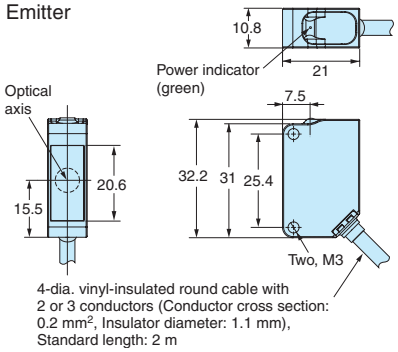
Sensors

Through-beam Models

Pre-wired Models

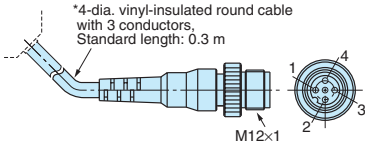
E3ZM-T61(-G0)
E3ZM-T81(-G0)
E3ZM-T63(-G0)
E3ZM-T83(-G0)

Emitter



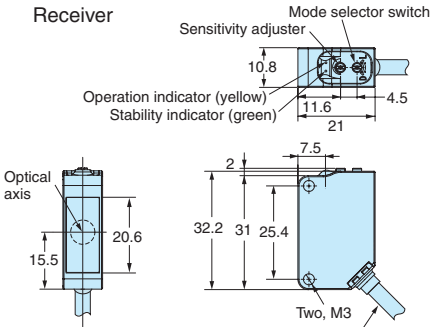
4-dia. vinyl-insulated round cable with 2 or 3 conductors (Conductor cross section: 0.2 mm^2, Insulator diameter: 1.1 mm), Standard length: 2 m

M12 Pre-wired Connector (E3ZM-□□□-M1J)



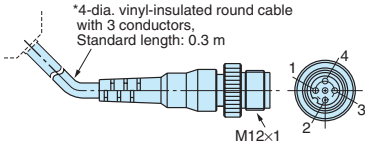
Terminal No.	Specifications
1	+V
2	Light emission stop input (-G0 only)
3	0 V
4	---

Receiver



4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm^2, Insulator diameter: 1.1 mm), Standard length: 2m

M12 Pre-wired Connector (E3ZM-□□□-M1J)



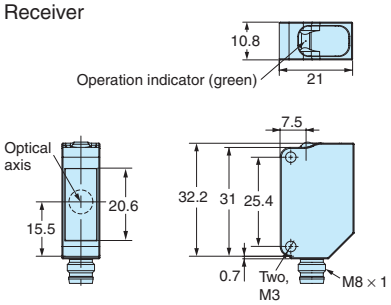
Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

Through-beam Models

Standard Connector

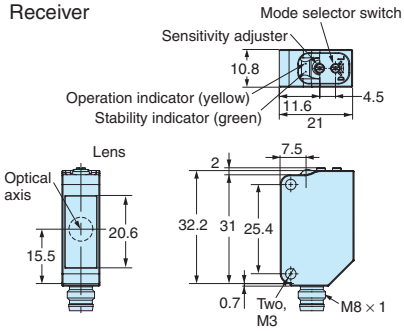
E3ZM-T66(-G0)
E3ZM-T86(-G0)
E3ZM-T68(-G0)
E3ZM-T88(-G0)

Receiver



Terminal No.	Specifications
1	+V
2	Light emission stop input (-G0 only)
3	0 V
4	---

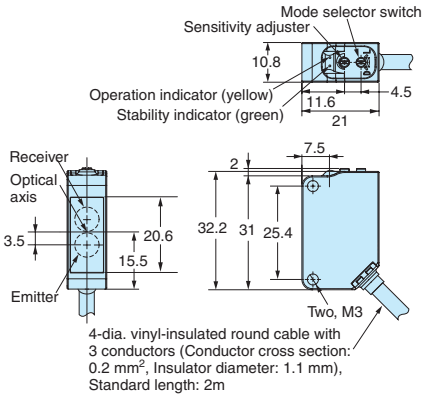
Receiver



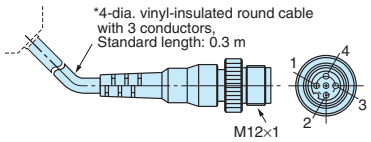
Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

Retro-reflective Models
Pre-wired Models
E3ZM-R61
E3ZM-R81

Diffuse-reflective Models
Standard Connector
E3ZM-D62
E3ZM-D82



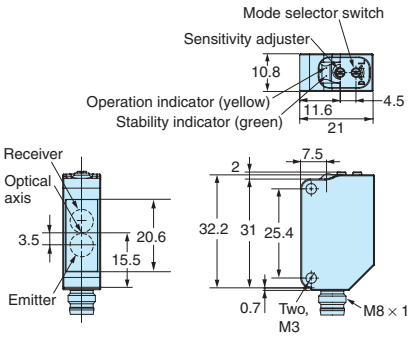
M12 Pre-wired Connector
(E3ZM-□□□-M1J)



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

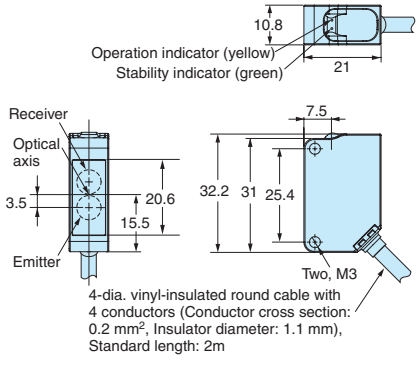
Retro-reflective Models
Standard Connector
E3ZM-R66
E3ZM-R86

Diffuse-reflective Models
Standard Connector
E3ZM-D67
E3ZM-D87

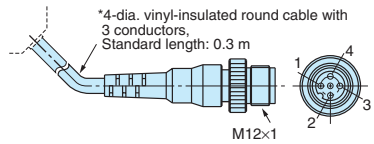


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

BGS Reflective Models
Pre-wired Models
E3ZM-LS61H
E3ZM-LS62H
E3ZM-LS64H
E3ZM-LS81H
E3ZM-LS82H
E3ZM-LS84H

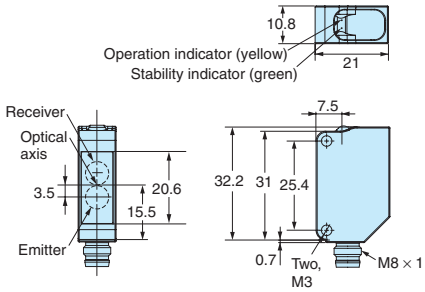


M12 Pre-wired Connector
(E3ZM-□□□-M1J)



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

BGS Reflective Models
Standard Connector
E3ZM-LS66H
E3ZM-LS67H
E3ZM-LS69H
E3ZM-LS86H
E3ZM-LS87H
E3ZM-LS89H



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

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