Oil-resistant, Robust, Compact Photoelectric Sensor

E3ZM-C

CSM_E3ZM-C_DS_E_5_1

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.
- Antifouling coating prevents contamination on the sensing surface *1

*1. Only for E3ZM-CT series.

Refer to *Safety Precautions* on page 11.

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

Features

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

Resists Oils and Coolants

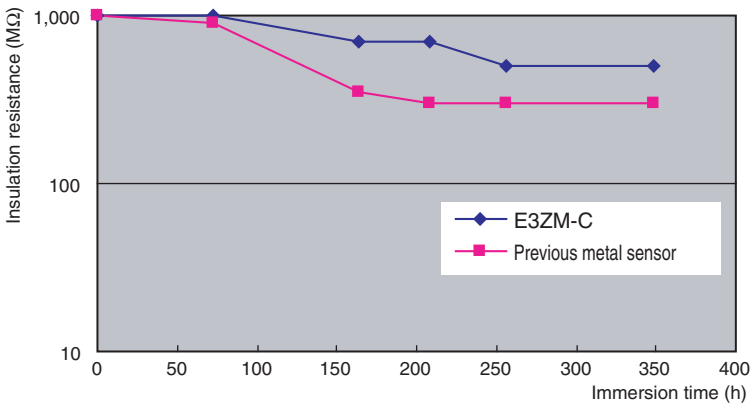
The E3ZM-C features a simple shape and structure, and yet provides IP67 protection and oil resistance (oil resistant to OMRON in-house standard). This performance exceeds any previous models from OMRON.

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)



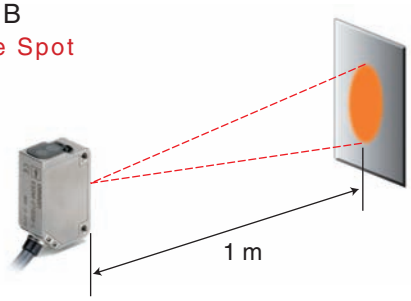
E3ZM-C Laser Marking

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.

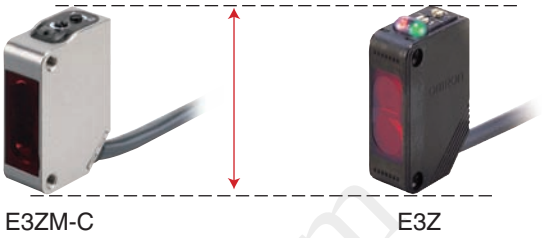
E3ZM-CT□2B
Bright Orange Spot



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).

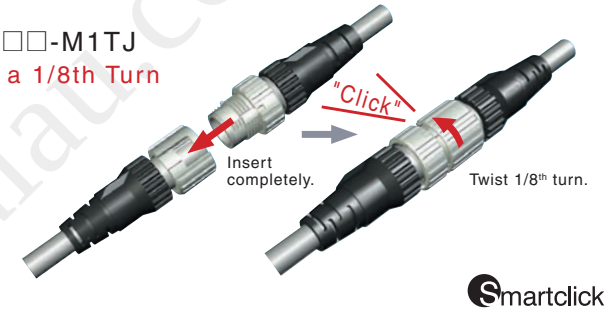
The SUS316L housing makes it robust, and removes all worries of the coating coming off.



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.

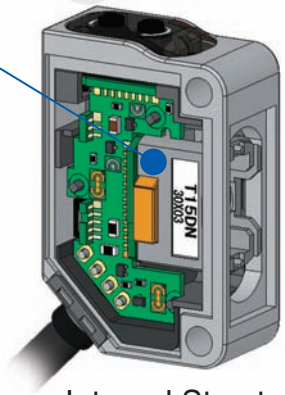
E3ZM-C□□□-M1TJ
Locks with a 1/8th Turn



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

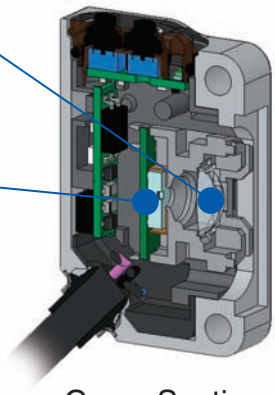
Optical System

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



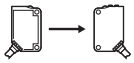
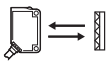
Cross Section

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 *3 (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.
*2. The Reflector is sold separately. Select the Reflector model most suited to the application.
*3. Set the distance between the Sensor and the Reflector so that it is at least the value in parentheses.

Accessories

Sensor I/O Connectors (Sockets on One Cable End)

(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)	Fire-retardant, robot cable	Straight 	2 m	4-wire	**XS5F-D421-D80-F**
			5 m		**XS5F-D421-G80-F**
	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/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 each Retro-reflective Sensor: A Reflector is not provided with the Sensor. Be sure to order a Reflector.)

(Refer to *Dimensions* on E39-L/E39-S/E39-R.)

Name	E3ZM-CR sensing distance *		Model	Quantity	Remarks
	Rated value	Reference value			
Reflector	3 m (100 mm)	---	**E39-R1**	1	· Reflectors are not provided with Retroreflective models. · The MSR function is enabled.
	4 m (100 mm)	---	**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	

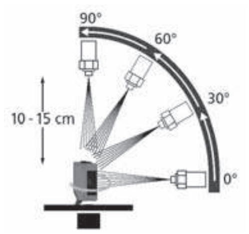
Note: If you use the Reflector at any distance other than the rated distance, make sure that the stability indicator lights properly when you install the Sensor.
*Set the distance between the Sensor and the Reflector so that it is at least the value in parentheses.

Ratings and Specifications

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 (870 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		PEI (Polyetherimide)			
Sensitivity adjustment and mode selector switch		PEEK (polyetheretherketone)			
Seal material		Fluoro rubber			
Accessories		Instruction sheet (Note: Reflectors and Mounting Brackets are sold separately.)			

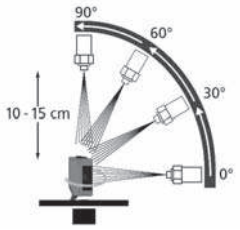
*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

*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/s² 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		PEI (Polyetherimide)		
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.



Dimensions

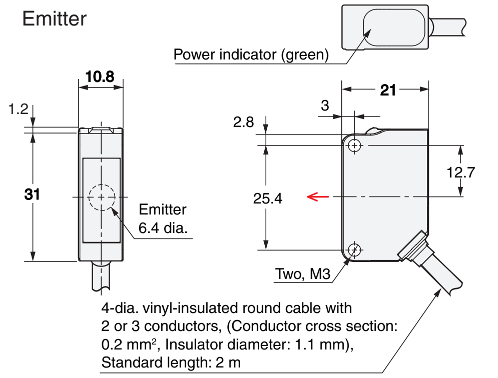
(Unit: mm)
Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

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.

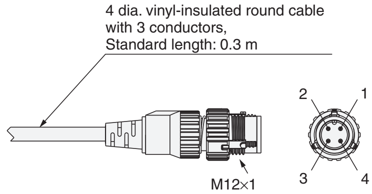
Sensors

Through-beam Models*
Pre-wired Models
E3ZM-CT61
E3ZM-CT81
E3ZM-CT62B
E3ZM-CT82B

Emitter

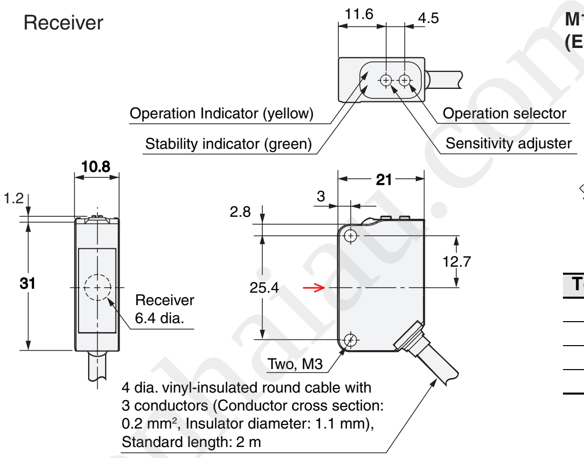


M12 Pre-wired Connector
(E3ZM-□□□-M1TJ)

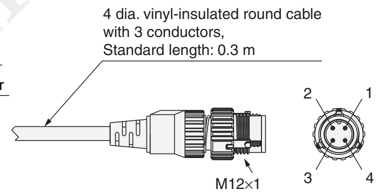


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	---

Receiver



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

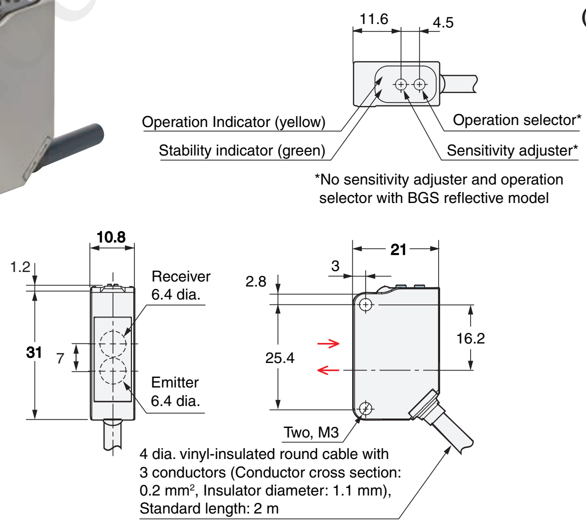


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

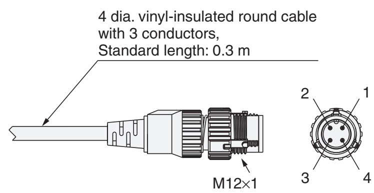
Retro-reflective Models
Pre-wired Models
E3ZM-CR61
E3ZM-CR81

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.