Compact Photoelectric Sensor with Built-in Amplifier

E3Z

CSM_E3Z_DS_E_15_1

The Standard for Photoelectric Sensors with a Secure Track Record of One Million Sold Yearly.

- Long sensing distance of 30 m for Through-beam Models, 4 m for Retro-reflective Models, and 1 m for Diffuse-reflective Models.
- Mechanical axis and optical axis offset of less than ±2.5° simplifies optical axis adjustment.
- High stability with unique algorithm that prevents interference of external light.

CE

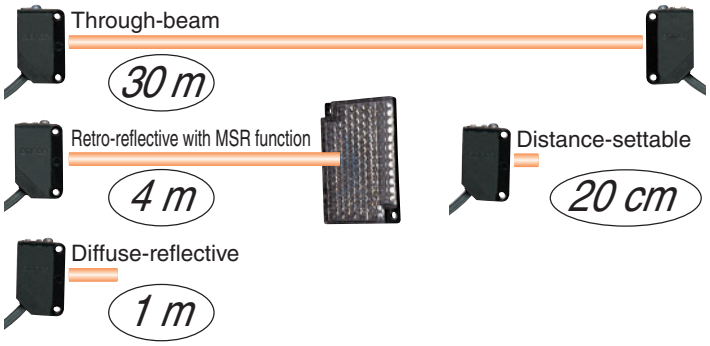
Be sure to read *Safety Precautions* on page 15.

Features

Industry's Top-level Sensing Distance with Built-in Amplifier

A separately sold filter is available to prevent mutual interference for Through-beam Models with red lights sources and a sensing distance of 10 m. Reflective Models include functionality to prevent mutual interference.

Long-distance, Through-beam Sensors with a detection distance of 30 m (response time: 2 ms) are also available.

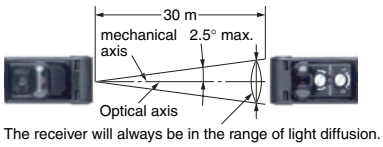


Low-temperature Operation for Applications in Cold-storage Warehouses

A wider ambient operating range from –40 to 55°C (main models with connectors). We also provide Sensor I/O Connectors with PUR Cables for high resistance to cold environments.

Improved Matching of Optical Axis and Mechanical Axis for Through-beam Models and Retro-reflective Models

The offset between the optical axis and the mechanical axis is kept within ±2.5°, so the optical axis can be accurately set simply by mounting the Sensor according to the mechanical axis.

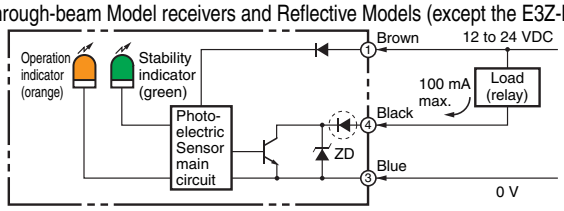


The receiver will always be in the range of light diffusion.

Sensor Protection against Incorrect Wiring

The Sensor includes output reverse polarity protection.
(A diode to protect against reverse polarity is added to the output line.)

Through-beam Model receivers and Reflective Models (except the E3Z-LS)

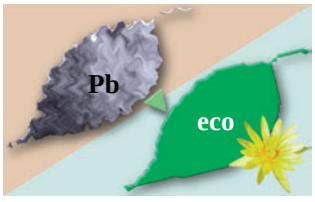


Protection for NPN output models

Complete Compliance with the EU's RoHS Directive

Lead, mercury, cadmium hexachrome, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE) have all been eliminated. Also, burnable polyethylene packaging has been used.

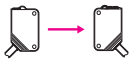
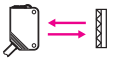
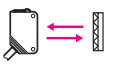
Ro



Ordering Information

Sensors [Refer to *Dimensions on page* 16.]

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN output	PNP output
Through-beam (Emitter + Receiver) *3		Pre-wired (2 m)	15 m	**E3Z-T61 2M** Emitter E3Z-T61-L 2M Receiver E3Z-T61-D 2M	**E3Z-T81 2M** Emitter E3Z-T81-L 2M Receiver E3Z-T81-D 2M
		Standard M8 connector		**E3Z-T66** Emitter E3Z-T66-L Receiver E3Z-T66-D	**E3Z-T86** Emitter E3Z-T86-L Receiver E3Z-T86-D
		Pre-wired (2 m)	10 m	**E3Z-T61A 2M** Emitter E3Z-T61-A-L 2M Receiver E3Z-T61-A-D 2M	**E3Z-T81A 2M** Emitter E3Z-T81-A-L 2M Receiver E3Z-T81-A-D 2M
		Standard M8 connector		**E3Z-T66A** Emitter E3Z-T66-A-L Receiver E3Z-T66-A-D	**E3Z-T86A** Emitter E3Z-T86-A-L Receiver E3Z-T86-A-D
		Pre-wired (2 m)	30m	**E3Z-T62 2M** Emitter E3Z-T62-L 2M Receiver E3Z-T62-D 2M	**E3Z-T82 2M** Emitter E3Z-T82-L 2M Receiver E3Z-T82-D 2M
		Standard M8 connector		**E3Z-T67** Emitter E3Z-T67-L Receiver E3Z-T67-D	**E3Z-T87** Emitter E3Z-T87-L Receiver E3Z-T87-D
Retro-reflective with MSR function	 *1	Pre-wired (2 m)	4 m *2 (100 mm)	**E3Z-R61 2M**	**E3Z-R81 2M**
		Standard M8 connector		**E3Z-R66**	**E3Z-R86**
Diffuse-reflective		Pre-wired (2 m)	5 to 100 mm (wide view)	**E3Z-D61 2M**	**E3Z-D81 2M**
		Standard M8 connector		**E3Z-D66**	**E3Z-D86**
		Pre-wired (2 m)	1 m	**E3Z-D62 2M**	**E3Z-D82 2M**
		Standard M8 connector		**E3Z-D67**	**E3Z-D87**
		Pre-wired (2 m)	90±30 mm (narrow beam)	**E3Z-L61 2M**	**E3Z-L81 2M**
		Standard M8 connector		**E3Z-L66**	**E3Z-L86**
Distance-settable Refer to **E3Z-LS**.		Pre-wired (2 m)	20 to 40 mm (BGS min setting) 20 to 200 mm (BGS max setting)	**E3Z-LS61 2M**	**E3Z-LS81 2M**
		Standard M8 Connector	40 min. Incident threshold (FGS min setting) 200 min. Incident threshold (FGS max setting)	**E3Z-LS66**	**E3Z-LS86**
		Pre-wired (2 m)	2 to 20 mm (BGS min setting)	**E3Z-LS63 2M**	**E3Z-LS83 2M**
		Standard M8 connector	2 to 80 mm (BGS max setting)	**E3Z-LS68**	**E3Z-LS88**
Slit-type Through-beam Refer to **E3Z-G**.	 1 axis	Pre-wired (2 m)	25 mm	**E3Z-G61 2M**	**E3Z-G81 2M**
	2 axes			**E3Z-G62 2M**	**E3Z-G82 2M**
	1 axis	Pre-wired M8 connector		**E3Z-G61-M3J**	**E3Z-G81-M3J**
	2 axes			**E3Z-G62-M3J**	**E3Z-G82-M3J**
Limited-reflective for transparent glasses		Pre-wired (2 m)	30±20 mm	**E3Z-L63 2M**	**E3Z-L83 2M**
		Standard M8 connector		**E3Z-L68**	**E3Z-J88**
Retro-reflective without MSR function for clear, plastic bottles	 *1	Pre-wired (2 m)	*2 500 mm (80 mm)	**E3Z-B61 2M**	**E3Z-B81 2M**
		Standard M8 connector		**E3Z-B66**	**E3Z-B86**
		Pre-wired (2 m)	*2 2 m (500 mm)	**E3Z-B62 2M**	**E3Z-B82 2M**
		Standard M8 connector		**E3Z-B67**	**E3Z-B87**

*1. The Reflector is sold separately. Select the Reflector model most suited to the application.
*2. The sensing distance specified is possible when the E39-R1S is used. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.
*3. 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.)

Variety of Connection Specifications

The models with the connection specifications marked with a black circle in the table are available.
The model number indication is a combination of the basic model and the connection specification.

Example: E3Z-T61-M1TJ 0.3M
Basic model number / Connection specification

NPN Output

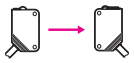
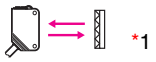
Model			Model number example	E3Z-T61 -M1TJ 0.3M	E3Z-T61 0.5M	E3Z-T61 5M	E3Z-T61 -M1J 0.3M	E3Z-T61 -M3J 0.3M
Sensing method	Sensing distance	Main features	Connection specification	M12 pre-wired Smartclick connector (cable length: 0.3 m)	Pre-wired (cable length: 0.5 m)	Pre-wired (cable length: 5 m)	M12 pre-wired standard connector (cable length: 0.3 m)	M8, 4-pin pre-wired connector (cable length: 0.3 m)
			Basic model number	-M1TJ 0.3M	0.5M	5M	-M1J 0.3M	-M3J 0.3M
Through-beam	15 m	Infrared light	E3Z-T61	●	●	●	●	●
	10 m	Red light	E3Z-T61A	---	●	●	●	---
	30 m	2-ms response	E3Z-T62	---	●	---	---	---
Retro-reflective	4 m	MSR function	E3Z-R61	●	●	●	●	●
Diffuse-reflective (narrow-beam reflective)	100 mm	Wide view	E3Z-D61	---	●	●	●	●
	1 m	Long distance	E3Z-D62	●	●	●	●	●
	90 mm	Narrow beam	E3Z-L61	●	●	●	●	---
Distance-settable	200 mm	FGS function	E3Z-LS61	---	●	●	●	●
	80 mm	Small spot	E3Z-LS63	---	●	---	---	---
Slit-type	25 mm	1 optical axis	E3Z-G61	●	●	●	●	●
		2 optical axes	E3Z-G62	---	●	●	●	●
Retro-reflective for clear, plastic bottles	500 mm	No MSR function	E3Z-B61	---	●	●	---	---
	2 m		E3Z-B62	---	●	●	●	---

PNP Output

Model			Model number example	E3Z-T81 -M1TJ 0.3M	E3Z-T81 0.5M	E3Z-T81 5M	E3Z-T81 -M1J 0.3M	E3Z-T81 -M3J 0.3M
Sensing method	Sensing distance	Main features	Connection specification	M12 pre-wired Smartclick connector (cable length: 0.3 m)	Pre-wired (cable length: 0.5 m)	Pre-wired (cable length: 5 m)	M12 pre-wired standard connector (cable length: 0.3 m)	M8, 4-pin pre-wired connector (cable length: 0.3 m)
			Basic model number	-M1TJ 0.3M	0.5M	5M	-M1J 0.3M	-M3J 0.3M
Through-beam	15 m	Infrared light	E3Z-T81	●	●	●	●	●
	10 m	Red light	E3Z-T81A	---	---	---	●	---
	30 m	2-ms response	E3Z-T82	---	●	---	---	---
Retro-reflective	4 m	MSR function	E3Z-R81	●	●	●	●	●
Diffuse-reflective (narrow-beam reflective)	100 mm	Wide view	E3Z-D81	●	●	●	●	●
	1 m	Long distance	E3Z-D82	●	●	●	●	●
	90 mm	Narrow beam	E3Z-L81	●	●	●	●	---
Distance-settable	200 mm	FGS function	E3Z-LS81	---	●	●	●	●
	80 mm	Small spot	E3Z-LS83	---	●	---	---	---
Slit-type	25 mm	1 optical axis	E3Z-G81	●	●	---	●	●
		2 optical axes	E3Z-G82	---	●	---	●	●
Retro-reflective for clear, plastic bottles	500 mm	No MSR function	E3Z-B81	---	●	---	●	---
	2 m		E3Z-B82	---	●	●	●	---

Oil-resistive Sensors [Refer to *Dimensions on page* 16.]

Red light Infrared light

Sensing method	Appearance	Connection method	Sensing distance	Model (NPN output)	Model (PNP output)
Through-beam (Emitter + Receiver) *3		Pre-wired (2 m)	15 m	**E3Z-T61K 2M** Emitter E3Z-T61K-L 2M Receiver E3Z-T61K-D 2M	**E3Z-T81K 2M** Emitter E3Z-T81K-L 2M Receiver E3Z-T81K-D 2M
		Pre-wired M8 connector		**E3Z-T61K-M3J 0.3M** Emitter E3Z-T61K-L-M3J 2M Receiver E3Z-T61K-D-M3J 2M	**E3Z-T81K-M3J 0.3M** Emitter E3Z-T81K-L-M3J 2M Receiver E3Z-T81K-D-M3J 2M
Retro-reflective with MSR function	 *1	Pre-wired (2 m)	*2 3 m (150 mm)	**E3Z-R61K 2M**	**E3Z-R81K 2M**
		Pre-wired M8 connector		**E3Z-R61K-M3J 0.3M**	**E3Z-R81K-M3J 0.3M**
Diffuse-reflective		Pre-wired (2 m)	5 to 100 mm (wide view)	**E3Z-D61K 2M**	**E3Z-D81K 2M**
		Pre-wired M8 connector		**E3Z-D61K-M3J 0.3M**	**E3Z-D81K-M3J 0.3M**
		Pre-wired (2 m)	1 m	**E3Z-D62K 2M**	**E3Z-D82K 2M**
		Pre-wired M8 connector		**E3Z-D62K-M3J 0.3M**	**E3Z-D82K-M3J 0.3M**

*1. The Reflector is sold separately. Select the Reflector model most suited to the application.
*2. The sensing distance specified is possible when the E39-R1S is used. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.
*3. 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.)

Accessories (Order Separately)

Slit (A Slit is not provided with Through-beam Sensors) Order a Slit separately if required. [Refer to *Dimensions* on page 18.]

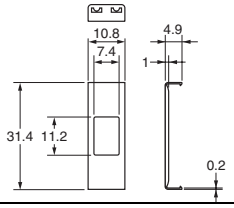
Slit width	Sensing distance E3Z-T□□	Sensing distance E3Z-T□□A	Minimum detectable object (typical)	Model	Contents
0.5-mm dia.	50 mm	35 mm	0.2-mm dia.	**E39-S65A**	One set (contains Slits for both the Emitter and Receiver)
1-mm dia.	200 mm	150 mm	0.4-mm dia.	**E39-S65B**	
2-mm dia.	800 mm	550 mm	0.7-mm dia.	**E39-S65C**	
0.5 × 10 mm	1 m	700 mm	0.2-mm dia.	**E39-S65D**	
1 × 10 mm	2.2 m	1.5 m	0.5-mm dia.	**E39-S65E**	
2 × 10 mm	5 m	3.5 m	0.8-mm dia.	**E39-S65F**	

Reflectors (Reflector required for Retroreflective Sensors) A Reflector is not provided with the Sensor. Be sure to order a Reflector separately. [Refer to *Dimensions* on *E39-L/F39-L/E39-S/E39-R*]

Name	Sensing distance (typical)* E3Z-R	E3Z-R□K	E3Z-B□1/-B□6	E3Z-B□2/-B□7	Model	Quantity	Remarks
Reflector	3 m (100 mm) (rated value)	2 m (100 mm) (rated value)	---	---	**E39-R1**	1	• Retro-reflective models are not provided with Reflectors. • The MSR function is enabled.
	4 m (100 mm) (rated value)	3 m (150 mm) (rated value)	500 mm (80 mm) (rated value)	2 m (500 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)	---	500 mm (80 mm) (rated value)	2 m (500 mm) (rated value)	**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: The actual sensing distance may be reduced to approximately 70% of the typical sensing distance when using a Reflector other than E39-R1 or E39-R1S.
*1. Refer to *Reflectors* on *E39-L/F39-L/E39-S/E39-R* for details.
*2. Values in parentheses indicates the minimum required distance between the Sensor and Reflector.

Mutual Interference Protection Filter A Filter is not provided with the Sensor (for the through-beam E3Z-T□□A). Order a Filter separately if required.

Sensing distance	Appearance/Dimensions	Model	Quantity	Remarks
3 m		**E39-E11**	Two sets each for the Emitter and Receiver (total of four pieces)	Can be used with the E3Z-T□□A Through-beam models. The arrow indicates the direction of polarized light. Mutual interference can be prevented by altering the direction of polarized light from or to adjacent Emitters and Receivers.

Mounting Brackets A Mounting Bracket is not enclosed with the Sensor. Order a Mounting Bracket separately if required.

[Refer to *Dimensions* on *E39-L/F39-L/E39-S/E39-R*]

Appearance	Model (material)	Quantity	Remarks	Appearance	Model (material)	Quantity	Remarks
	**E39-L153 (SUS304)** *1	1	Mounting Brackets		**E39-L98 (SUS304)** *2	1	Metal Protective Cover Bracket
	**E39-L104 (SUS304)** *1	1			**E39-L150 (SUS304)**	1	(Sensor adjuster)
	**E39-L43 (SUS304)** *2	1	Horizontal Mounting Brackets		**E39-L151 (SUS304)**	1	Easily mounted to the aluminum frame rails of conveyors and easily adjusted. For left to right adjustment
	**E39-L142 (SUS304)** *2	1	Horizontal Protective Cover Bracket				
	**E39-L44 (SUS304)**	1	Rear Mounting Bracket		**E39-L144 (SUS304)** *2	1	Compact Protective Cover Bracket (For E3Z only)

Note: 1. When using Through-beam models, order one bracket for the Receiver and one for the Emitter.
2. Refer to *Mounting Brackets* on *E39-L/F39-L/E39-S/E39-R* for details.

*1. Cannot be used for Standard Connector models with mounting surface on the bottom. In that case, use Pre-wired Connector models.
*2. Cannot be used for Standard Connector models.

Sensor I/O Connectors

(Models for Connectors and Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)

[Refer to *Dimensions* for *XS3, XS2, XS5*. For *e-CON*, inquire.]

Size	Cable	Appearance	Cable type		Model
M8 *1	Standard	Straight *3 	2 m	4-wire	**XS3F-M421-402-A**
			5 m		**XS3F-M421-405-A**
		L-shaped *3 *4 	2 m		**XS3F-M422-402-A**
			5 m		**XS3F-M422-405-A**
M12 *1 (For -M1J models)		Straight *3 	2 m	3-wire	**XS2F-D421-DC0-A**
			5 m		**XS2F-D421-GC0-A**
		L-shaped *3 	2 m		**XS2F-D422-DC0-A**
			5 m		**XS2F-D422-GC0-A**
M12 (For -M1TJ models)		Straight 	2 m	4-wire	**XS5F-D421-D80-A**
			5 m		**XS5F-D421-G80-A**
M8	PUR (Polyurethane) cable *2	Straight *3 	2 m	4-wire	**XS3F-M421-402-L**
			5 m		**XS3F-M421-405-L**
		L-shaped *3 *4 	2 m		**XS3F-M422-402-L**
			5 m		**XS3F-M422-405-L**

Note: When using Through-beam models, order one connector for the Receiver and one for the Emitter.
*1. Refer to *Introduction to Sensor I/O Connectors* for details.
*2. The Sensor can be used in low-temperature environments (–25°C to –40°C). Do not use the Sensor in locations that are subject to oil.
*3. The connector will not rotate after connecting.
*4. The cable is fixed at an angle of 180° from the sensor emitter/receiver surface.

Ratings and Specifications

Item	Model		Sensing method	Through-beam			Retro-reflective with MSR function	Diffuse-reflective		(Narrow-beam Models)
	NPN output		Pre-wired	E3Z-T61	E3Z-T62	E3Z-T61A	E3Z-R61	E3Z-D61	E3Z-D62	E3Z-L61
			Connector (M8)	E3Z-T66	E3Z-T67	E3Z-T66A	E3Z-R66	E3Z-D66	E3Z-D67	E3Z-L66
	PNP output		Pre-wired	E3Z-T81	E3Z-T82	E3Z-T81A	E3Z-R81	E3Z-D81	E3Z-D82	E3Z-L81
			Connector (M8)	E3Z-T86	E3Z-T87	E3Z-T86A	E3Z-R86	E3Z-D86	E3Z-D87	E3Z-L86
Sensing distance				15 m	30 m	10 m	4 m (100 mm) *1 (when using E39-R1S) 3 m (100 mm) *1 (when using E39-R1)	100 mm (white paper: 100 × 100 mm)	1 m (white paper: 300 × 300 mm)	90 + 30 mm (white paper, 100 x 100 mm)
Spot diameter (typical)				---						(2.5 dia. and sensing distance of 90 mm)
Standard sensing object				Opaque: 12-mm dia. min.			Opaque: 75-mm dia. min.	---		
Minimum detectable object (typical)				---						0.1 mm (copper wire)
Differential travel				---				20% max. of setting distance		Refer to *Engineering data* on page 10.
Directional angle				Both emitter and receiver: 3 to 15°			2 to 10°	---		
Light source (wavelength)				Infrared LED (870 nm)		Red LED (660 nm)	Red LED (660 nm)	Infrared LED (860 nm)		Red LED (650 nm)
Current consumption				35 mA max. (Emitter: 15 mA max., Receiver: 20 mA max.)			30 mA max.			
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.	Operate or reset: 2 ms max.	Operate or reset: 1 ms max.				
Degree of protection				IEC, IP67						
Connection method				Pre-wired cable (standard length: 2 m and 0.5 m), Connector (M8)						
Weight (packedstate)		Pre-wired cable (2 m)		Approx. 120 g			Approx. 65 g			
		Connector		Approx. 30 g			Approx. 20 g			
Material		Case		PBT (polybutylene terephthalate)						
		Lens		Modified polyarylate			Methacrylic resin	Modified polyarylate		

Item	Model	Sensing method	Retro-reflective for clear, plastic bottles (without MSR function)			
	NPN output		E3Z-B61	E3Z-B66	E3Z-B62	E3Z-B67
	PNP output		E3Z-B81	E3Z-B86	E3Z-B82	E3Z-B87
Sensing distance			500 mm (80 mm) *1 (using E39-R1S)		2 m (500 mm) *1 *2 (using E39-R1S)	
Standard sensing object			500-ml (65-mm dia.) transparent round plastic bottles			
Light source (wavelength)			Red LED (660 nm)			
Current consumption			30 mA max.			
Protection circuits			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.			
Degree of protection			IEC, IP67			
Connection method			Pre-wired cable (standard length: 2 m and 0.5 m)	Connector (M8, 4 pins)	Pre-wired cable (standard length: 2 m and 0.5 m)	Connector (M8, 4 pins)
Weight (packed state)		Pre-wired cable (2 m)	Approx. 65 g			
		Standard Connector	Approx. 20 g			
Material		Case	PBT (polybutylene terephthalate)			
		Lens	Modified polyarylate			

*1. Values in parentheses indicate the minimum required distances between the Sensors and Reflectors.
*2. Plastic bottles must pass with the minimum clearance of 500 mm.

Item	Model			
	Sensing method	Transparent glass Limited-reflective (for transparent object detection)		
	NPN output	E3Z-L63	E3Z-L68	
	PNP output	E3Z-L83	E3Z-L88	
Sensing distance		30±20 mm (transparent glasses 100 × 100 mm)		
Spot diameter		2-mm dia. min. (at sensing distance of 30 mm)		
Minimum detectable object (typical)		0.1 mm dia. (copper wire)		
Light source (wavelength)		Red LED (660 nm)		
Current consumption		30 mA max.		
Protection circuits		Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention, Reverse output polarity protection		
Response time		Operate or reset: 1 ms max.		
Degree of protection		IEC, IP67		
Connection method		Pre-wired (standard length: 2 m)	M8 connector	
Weight (packed state)	Pre-wired cable (2 m)	Approx. 65 g		
	Standard Connector	Approx. 20 g		
Material	Case	PBT (polybutylene terephthalate)		
	Lens	Modified polyarylate		

Oil-resistant

Item	Model		Sensing method	Through-beam	Retro-reflective	Diffuse-reflective	
	NPN output		Pre-wired Models	E3Z-T61K	E3Z-R61K	E3Z-D61K	E3Z-D62K
			M8 Pre-wired connector	E3Z-T61K-M3J	E3Z-R61K-M3J	E3Z-D61K-M3J	E3Z-D62K-M3J
	PNP output		Pre-wired Models	E3Z-T81K	E3Z-R81K	E3Z-D81K	E3Z-D82K
			M8 Pre-wired connector	E3Z-T81K-M3J	E3Z-R81K-M3J	E3Z-D81K-M3J	E3Z-D82K-M3J
Sensing distance				15 m	3 m (150 mm) * (when using E39-R1S) 2 m (100 mm) * (when using E39-R1)	100 mm (white paper: 100 × 100 mm)	1 m (white paper: 300 × 300 mm)
Standard sensing object				Opaque: 12-mm dia. min.	Opaque: 75-mm dia. min.	---	
Differential travel				---		20% max. of setting distance	
Directional angle				Both emitter and receiver: 3 to 15°	2 to 10°	---	
Light source (wavelength)				Infrared LED (870 nm)	Red LED (660 nm)	Infrared LED (860 nm)	
Current consumption				35 mA max. (Emitter: 15 mA max., Receiver: 20 mA max.)	30 mA max.		
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.			
Degree of protection				IP67 (IEC), Oil resistant models: IP67 (IEC) (in-house standards: oilproof), excluding cables and connectors			
Connection method				Pre-wired cable (standard length: 2 m), M8 Pre-wired Connector			
Weight (packed state)	**Pre-wired cable (2 m)**			Approx. 120 g	Approx. 65 g		
	Connector (M8, 4 pins)			Approx. 50 g	Approx. 30 g		
Material	**Case**			PBT (polybutylene terephthalate)			
	Lens			Modified polyarylate	Methacrylic resin	Modified polyarylate	

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

Common

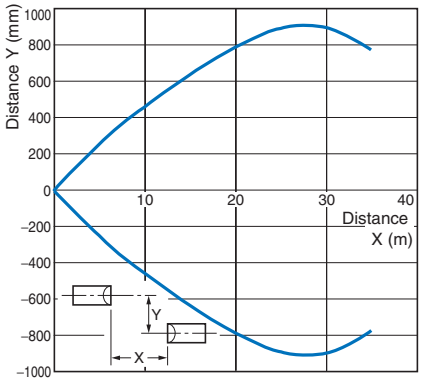
Power supply voltage	12 to 24 VDC±10%, ripple (p-p): 10% max.
Control output	Load power supply voltage: 26.4 VDC max., Load current: 100 mA max. Residual voltage: Load current of less than 10 mA: 1 V max. Load current of 10 to 100 mA: 2 V max. Open collector output (NPN/PNP depending on model) Light-ON/Dark-ON selectable
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, Some connector models: –40°C to 55°C * (with no icing or condensation) 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
Indicator	Operation indicator (orange) Stability indicator (green) Through-beam Emitter has power indicator (orange) only.
Accessories	Instruction manual (Neither Reflectors nor Mounting Brackets are provided with any of the above models.)

* The ambient temperature range during operation for connector models depends on the model. For the E3Z-T66/T86/R66/R86, the range is –40°C to 55°C. For the E3Z-D66/D86/D67/D87, the range is –30°C to 55°C. For other connector models, the range is –25°C to –55°C.
The sensing distance for Retro-reflective Models (E3Z-R66/R86) between –40°C to –25°C, however, will be as follows (not the values in the table):
With E39-R1S: 3 m (100 mm), With E39-R1: 2 m (100 mm).
Also, use the XS3F-M42□-4□□-L Sensor I/O Connector (PUR cable) for applications between –25°C to –40°C. (Refer to page 6.)

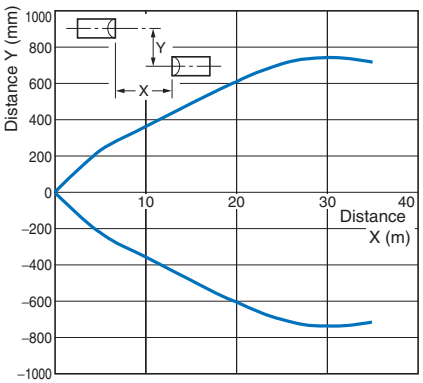
Engineering Data (Typical)

Parallel Operating Range

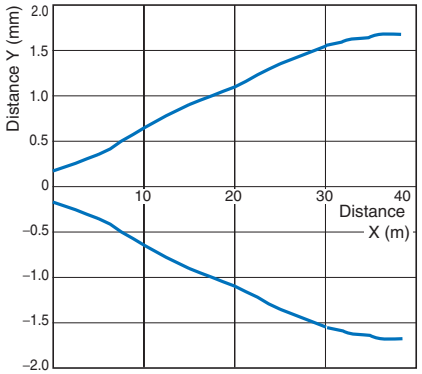
Through-beam Models
E3Z-T□1(T□6)



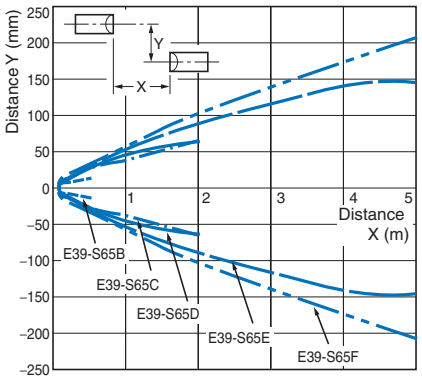
Through-beam Models
E3Z-T□A



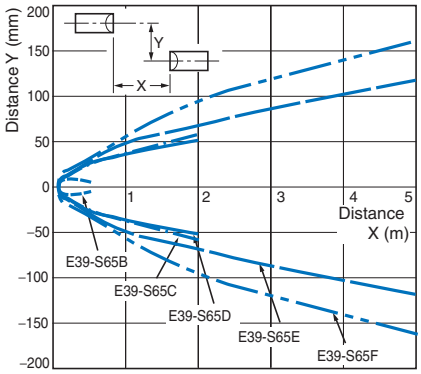
Through-beam Models
E3Z-T□2(T□7)



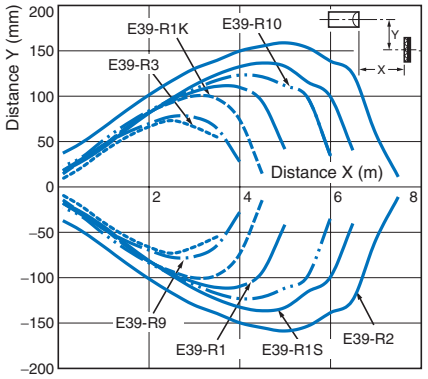
Through-beam Models
E3Z-T□1(T□6) and Slit
(A Slit is mounted to the Emitter and Receiver.)



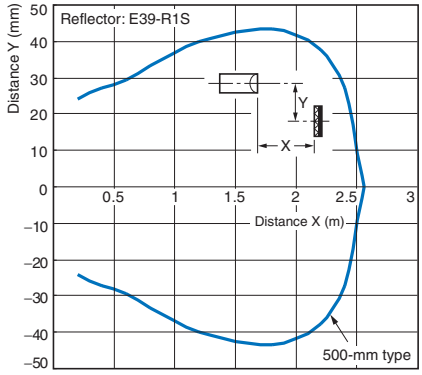
Through-beam Models
E3Z-T□A and Slit
(A Slit is mounted to the Emitter and Receiver.)



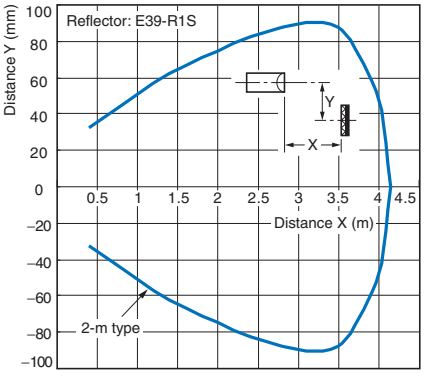
Retro-reflective Models
E3Z-R□1(R□6) and Reflector



E3Z-B□1/B□6 + E39-R1S Reflector (Order Separately)

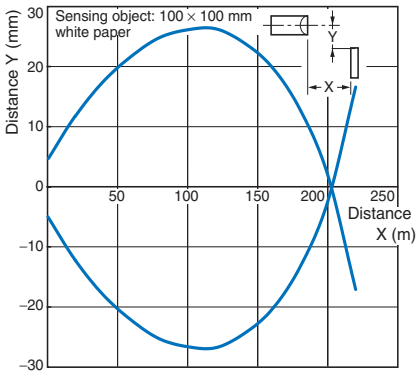


E3Z-B□2/B□7 + E39-R1S Reflector (Order Separately)

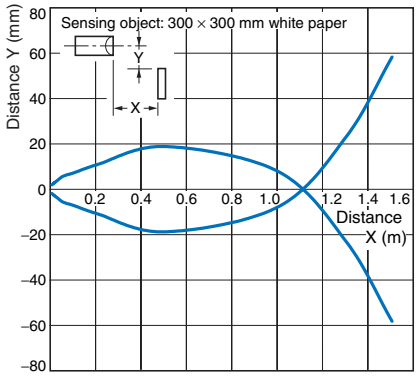


Operating Range

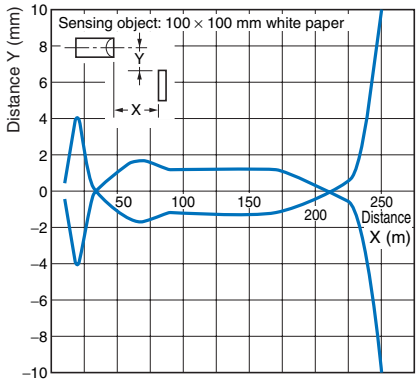
Diffuse-reflective Models
E3Z-D□1(D□6)



Diffuse-reflective Models
E3Z-D□2(D□7)

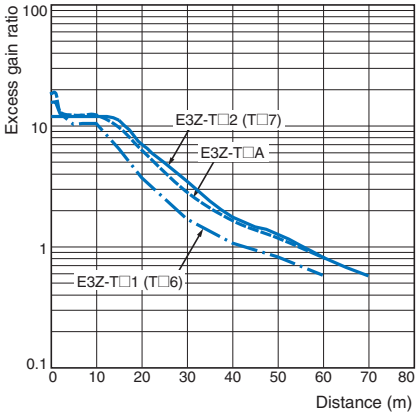


Narrow-beam Reflective Models
E3Z-L□1(L□6)

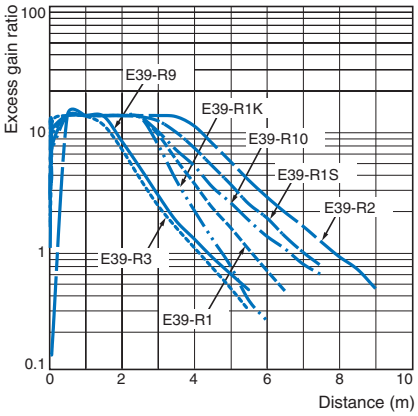


Excess Gain vs. Set Distance

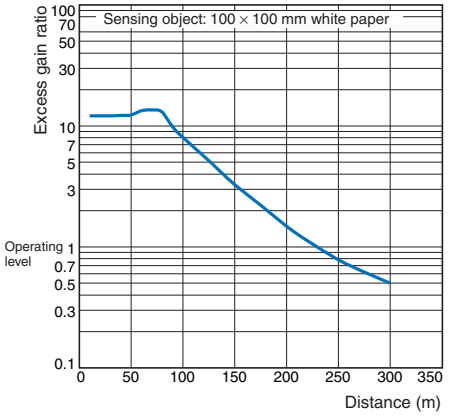
Through-beam Models
E3Z-T□1(T□6)/-T□A/-T□2(T□7)



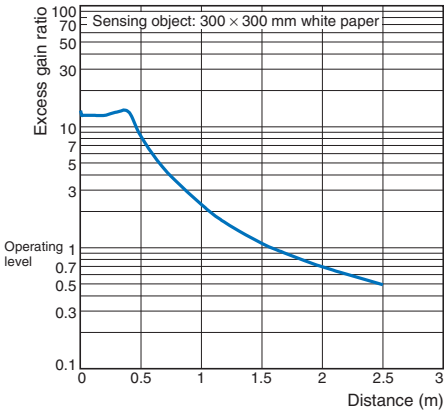
Retro-reflective Models
E3Z-R□1(R□6) and Reflector



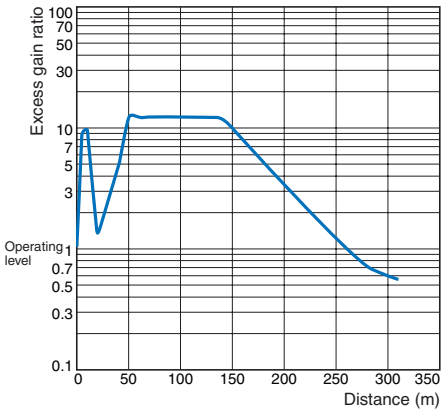
Diffuse-reflective Models
E3Z-D□1(D□6)



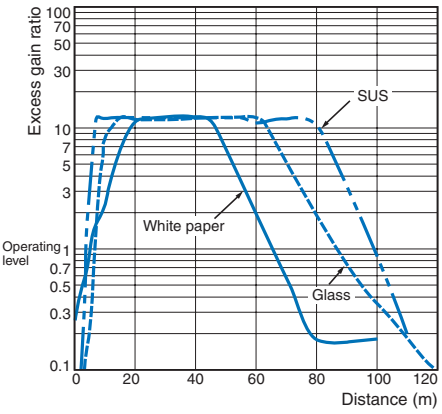
Diffuse-reflective Models
E3Z-D□2(D□7)



Narrow-beam Reflective Models
E3Z-L□1(L□6)

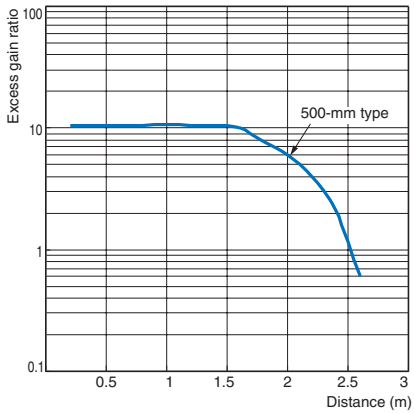


Limited reflective Models
E3Z-L□3(L□8)

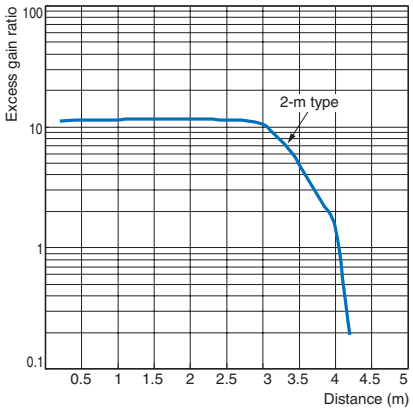


Excess Gain vs. Set Distance

E3Z-B□1/B□6 + E39-R1S Reflector (Order Separately)

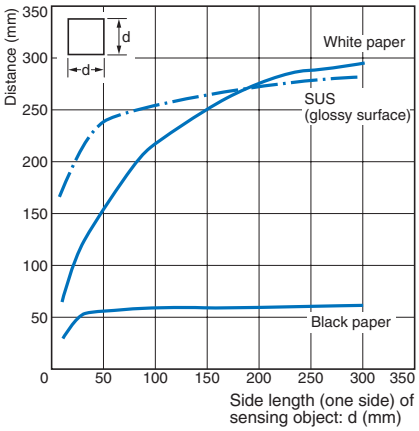


E3Z-B□2/B□7 + E39-R1S Reflector (Order Separately)

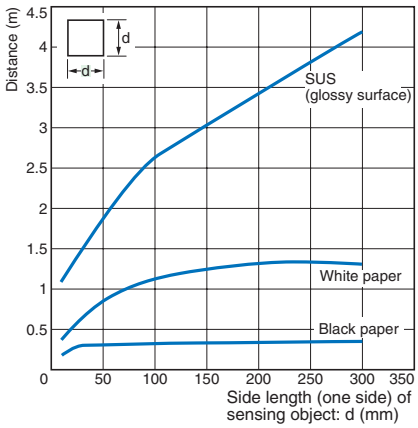


Sensing Object Size vs. Sensing Distance

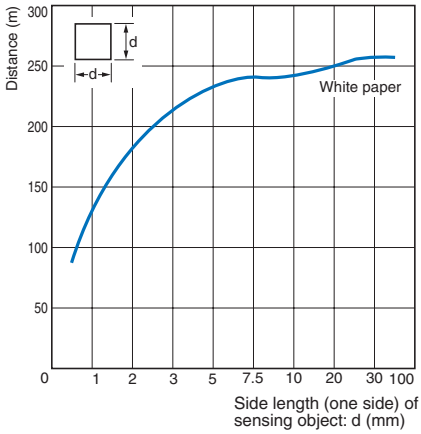
Diffuse-reflective Models E3Z-D□1(D□6)



Diffuse-reflective Models E3Z-D□2(D□7)

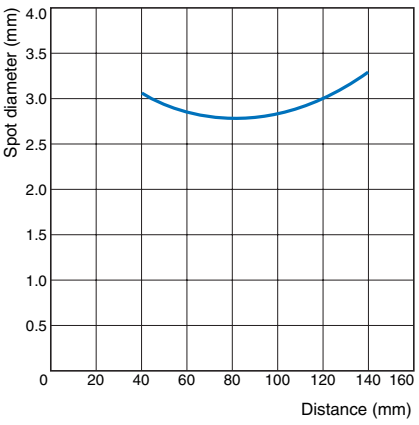


Narrow-beam Reflective Models E3Z-L□1(L□6)



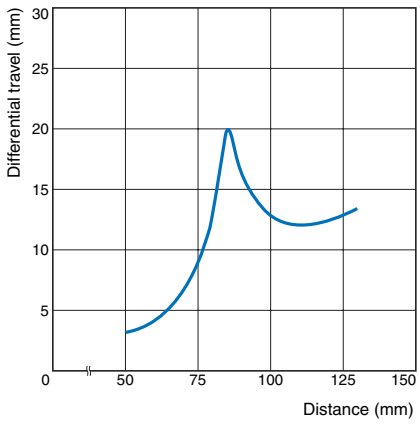
Spot Diameter vs. Sensing Distance

Narrow-beam Reflective Models E3Z-L□1(L□6)



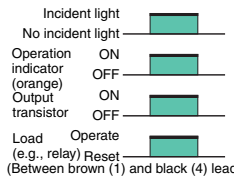
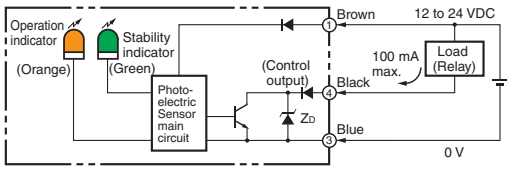
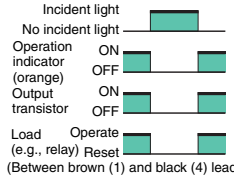
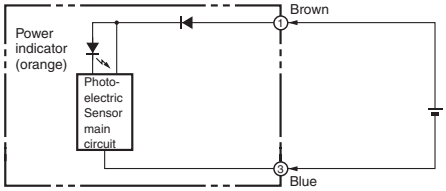
Differential Travel vs. Sensing Distance

Narrow-beam Reflective Models E3Z-L□1(L□6)

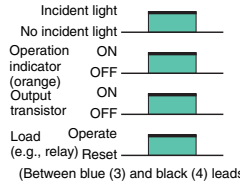
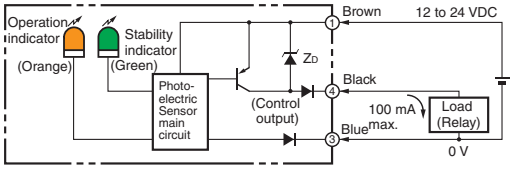
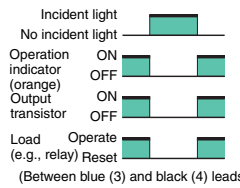
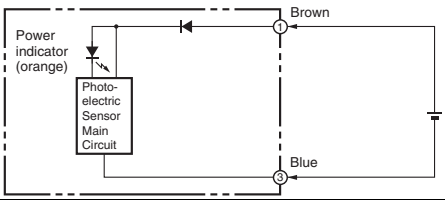


I/O Circuit Diagrams

NPN Output

Model*	Operation mode	Timing charts	Operation selector	Output circuit
E3Z-T61(K) E3Z-T66 E3Z-T62 E3Z-T67 E3Z-T61A E3Z-T66A E3Z-R61(K) E3Z-R66 E3Z-D61(K) E3Z-D66 E3Z-D62(K) E3Z-D67 E3Z-L61 E3Z-L66 E3Z-B61 E3Z-B66 E3Z-B62 E3Z-B67 E3Z-L63 E3Z-L68	Light-ON		L side (LIGHT ON)	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models, Limited reflective Models.  Connector Pin Arrangement  Pin 2 is not used.
	Dark-ON		D side (DARK ON)	
	Through-beam Emitter			Connector Pin Arrangement  Pins 2 and 4 are not used.

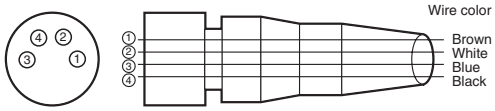
PNP Output

Model*	Operation mode	Timing charts	Operation selector	Output circuit
E3Z-T81(K) E3Z-T86 E3Z-T82 E3Z-T87 E3Z-T81A E3Z-T86A E3Z-R81(K) E3Z-R86 E3Z-D81(K) E3Z-D86 E3Z-D82(K) E3Z-D87 E3Z-L81 E3Z-L86 E3Z-B81 E3Z-B86 E3Z-B82 E3Z-B87 E3Z-L83 E3Z-L88	Light-ON		L side (LIGHT ON)	Through-beam Receivers, Retro-reflective Models, Diffuse-reflective Models, Limited reflective Models.  Connector Pin Arrangement  Pin 2 is not used.
	Dark-ON		D side (DARK ON)	
	Through-beam Emitter			Connector Pin Arrangement  Pins 2 and 4 are not used.

* Models numbers for Through-beam Sensors (E3Z-T□□) 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: E3Z-T61-L 2M), the model number of the Receiver, by adding "-D" (example: E3Z-T61-D 2M.) Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

Plugs (Sensor I/O Connectors)

M8 connector



XS3F-M421-402-A
XS3F-M421-405-A
XS3F-M422-402-A
XS3F-M422-405-A

Pin arrangement

Classification	Wire color	Connector pin No.	Application
DC	Brown	1	Power supply (+V)
	White	2	–
	Blue	3	Power supply (0 V)
	Black	4	Output

Note: Pin 2 is not used.

Nomenclature

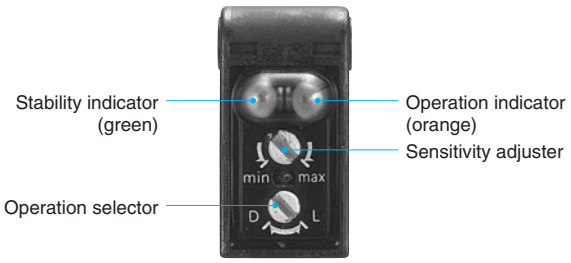
Through-beam Models
E3Z-T□□ (Emitter)
E3Z-T□□A (Receiver)

Retro-reflective Models
E3Z-R□□
E3Z-B□□

Diffuse-reflective Models
E3Z-D□□

Narrow-beam Reflective Models
E3Z-L□□

Limited reflective Models
E3Z-L□□



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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

Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

● Wiring

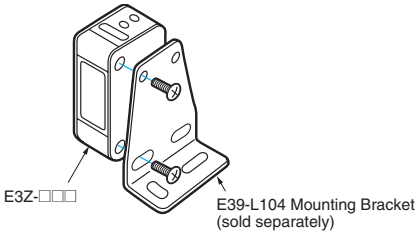
M8 Metal Connector

- Be sure to connect or disconnect the metal connector after turning OFF the Sensor.
- Hold the connector cover to connect or disconnect the metal connector.
- Secure the connector cover by hand. Do not use any pliers, otherwise the connector may be damaged.
- The proper tightening torque range is between 0.3 and 0.4 N·m. Be sure to tighten the connector securely, otherwise the specified degree of protection may not be maintained or the connector may be disconnected due to vibration.

● Mounting

Sensor Mounting

Use M3 screws to mount the sensor and tighten each screw to a maximum torque of 0.53 N·m.



● Oil-resistant Models

Oil Resistance

- Although the E3Z-□□□K Sensors have oil-resistant specifications, performance may be affected by certain types of oil. Refer to the following table.
- E3Z-□□□K Sensors are tested for resistance to the oils given in the following table. Refer to the information in the table when deciding which type of oil to use.

Test oil classification	Product name	Kinematic viscosity (mm^2/s) at 40°C	pH
Lubricant	Velocity No.3	2.02	---
Water insoluble machining oil	Yushiron Oil No.2 ac	Less than 10	
Water soluble machining oil	Yushiroken EC50T-3	---	7 to 9.5
	Yushiron Lubic HWC68		7 to 9.9
	Gryton 1700D		7 to 9.2
	Yushironken S50N		7 to 9.8

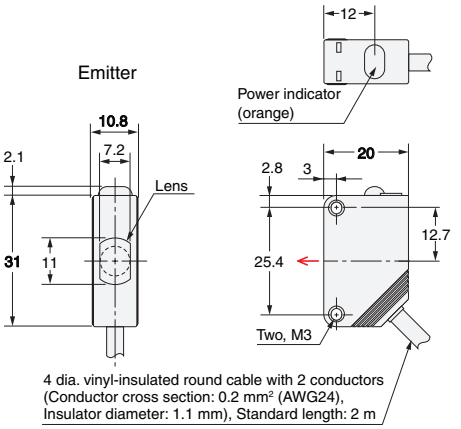
Note: 1. The E3Z maintained a minimum insulation resistance of 100 MΩ after it was dipped in all the above oils for 240 hours.
2. When using the Sensors in environments subject to oils other than those listed above, use the figures for kinematic viscosity and pH from the table as general guidelines. Additives and other substances contained in oils may affect the E3Z. Be sure to consider this before use.

Dimensions

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

Sensors

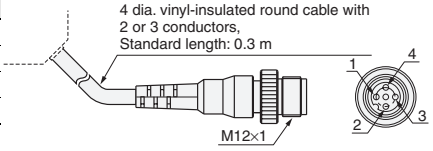
Through-beam*
Pre-wired Models
E3Z-T61(K)
E3Z-T81(K)
E3Z-T61A
E3Z-T81A
E3Z-T62
E3Z-T82



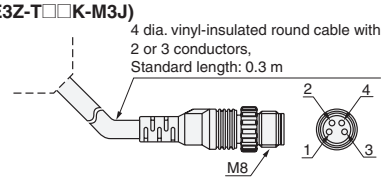
Terminal No.	Specifications
1	+V
2	---
3	0V
4	---

Pins 2 and 4 are not used.

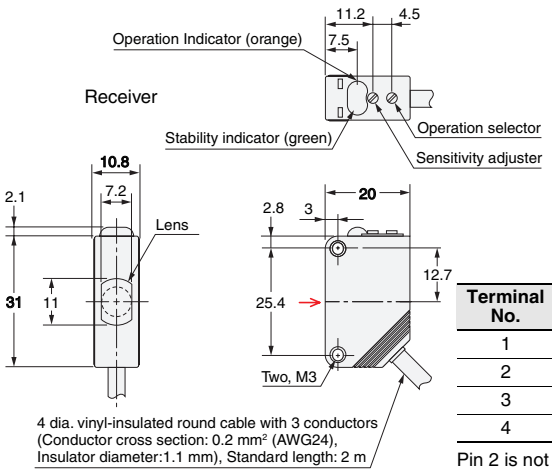
M12 Pre-wired Connector (E3Z-T□□-M1J)



M8 Pre-wired Connector (E3Z-T□□K-M3J)



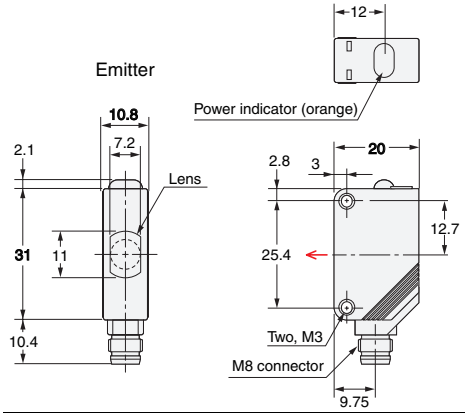
* The Emitter cable has two conductors and the Receiver cable has three conductors.



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

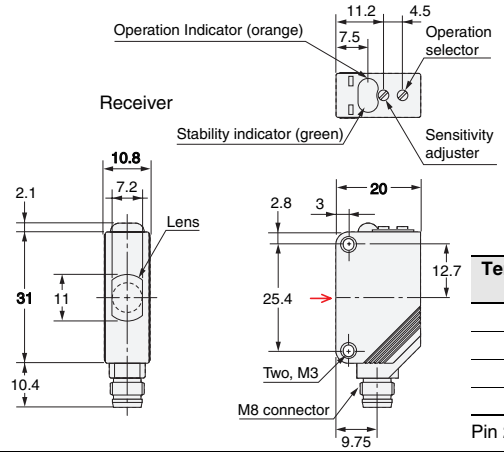
Pin 2 is not used.

Through-beam*
Connector Models
E3Z-T66
E3Z-T86
E3Z-T66A
E3Z-T86A
E3Z-T67
E3Z-T87



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

Pins 2 and 4 are not used.



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

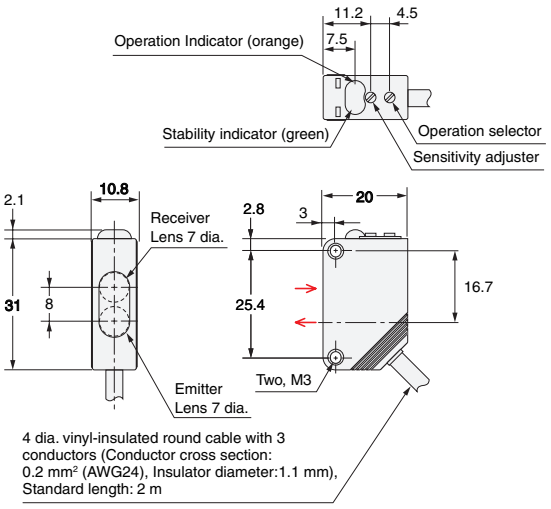
Pin 2 is not used.

* Models numbers for Through-beam Sensors (E3Z-T□□) 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: E3Z-T61-L 2M), the model number of the Receiver, by adding "-D" (example: E3Z-T61-D 2M.) Refer to *Ordering Information* to confirm model numbers for Emitter and Receivers.

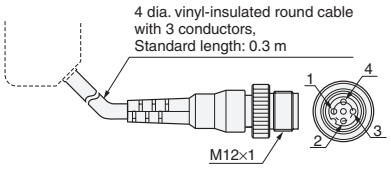
Retro-reflective Models

Pre-wired Models

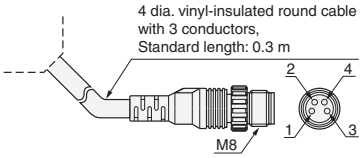
E3Z-R61(K) **E3Z-B61**
E3Z-R81(K) **E3Z-B81**
E3Z-D61(K) **E3Z-B62**
E3Z-D81(K) **E3Z-B82**
E3Z-D62(K) **E3Z-L63**
E3Z-D82(K) **E3Z-L83**
E3Z-L61
E3Z-L81



M12 Pre-wired Connector (E3Z-□□□-M1J)



M8 Pre-wired Connector (E3Z-T□□K-M3J)

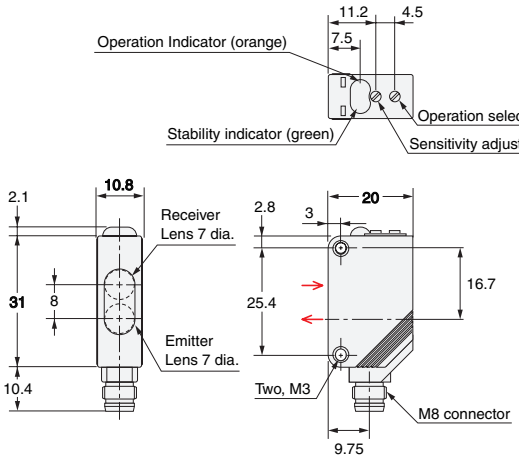


Terminal No.	Specifications
1	+V
2	---
3	0V
4	Output

Retro-reflective Models

Connector Models

E3Z-R66 **E3Z-B66**
E3Z-R86 **E3Z-B86**
E3Z-D66 **E3Z-B67**
E3Z-D86 **E3Z-B87**
E3Z-D67 **E3Z-L68**
E3Z-D87 **E3Z-L88**
E3Z-L66
E3Z-L86

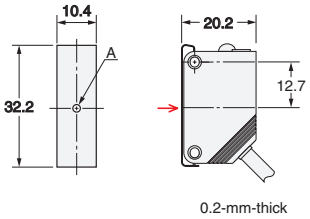


Terminal No.	Specifications
1	+V
2	---
3	0V
4	Output

Note: The lens for the E3Z-D□1/D□6/L□□/B□□ is red. The lens for the E3Z-D□2/D□7 is black.

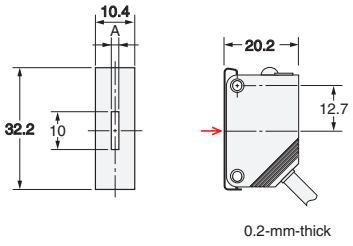
Accessories (Order Separately)

Slits
E39-S65A
E39-S65B
E39-S65C



Model	Size A	Material
E39-S65A	0.5 dia.	SUS301 stainless steel
E39-S65B	1.0 dia.	
E39-S65C	2.0 dia.	

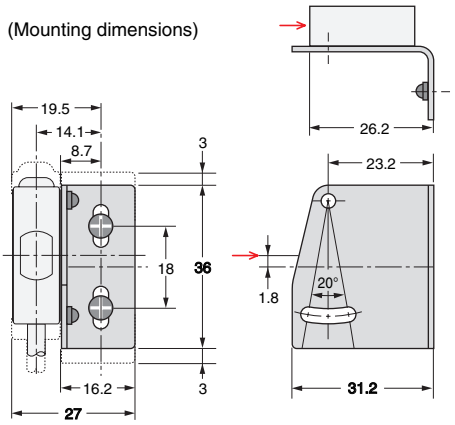
Slits
E39-S65D
E39-S65E
E39-S65F



Model	Size A	Material
E39-S65D	0.5	SUS301 stainless steel
E39-S65E	1.0	
E39-S65F	2.0	

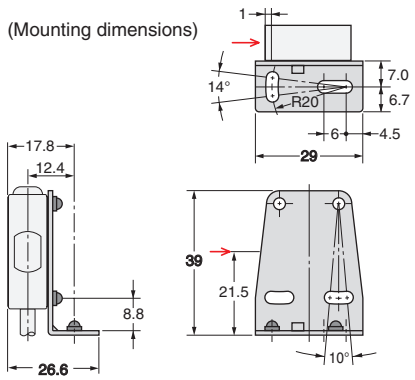
Slits
E39-L44

(Mounting dimensions)



Slits
E39-L104

(Mounting dimensions)



Mounting Brackets

Refer to *E39-R* for details.

Sensor I/O Connectors

Refer to *XS2□* and *XS3□* for details.

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