Laser Photoelectric Sensor with Built-in Amplifier

E3Z-LT/LR/LL

CSM_E3Z-LT_LR_LL_DS_E_6_1

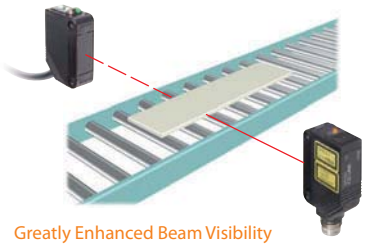
The Most Compact Laser Sensor
The Most Reliable E3Z

- Excellent quality of E3Z such as the maximum ambient operating temperate of 55°C, IP67 degree of protection is inherited.
- Safe and reliable class 1 (JIS/IEC) laser used
- Excellent detection performance supporting long distance and low hysteresis
- Complete Compliance with RoHS
- Spot diameters can be customized.
  Increasing the spot diameter makes optical axis adjustment easier.

⚠ Be sure to read Safety Precautions on page 9.

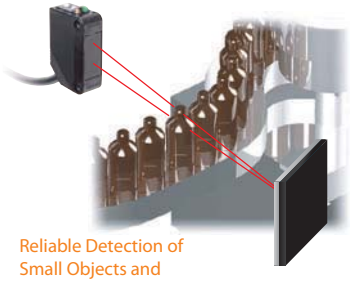
Applications

Detect the sides of large tiles.



Greatly Enhanced Beam Visibility
for Easier Optical Axis Adjustment of Sensors

Count bottles.

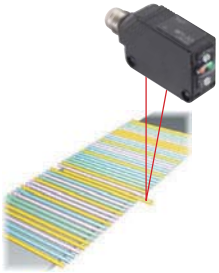


Reliable Detection of
Small Objects and
Narrow Gaps with the Small Spot

Detect chip components on tape.

Long-distance Sensing
at 300 mm (White Paper)

Detect protruding straws.

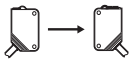
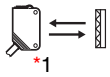


A Low Black/White Error for
Applications with Mixed Colors

Ordering Information

Sensors (Refer to *Dimensions* on page 11.)

Red light

Sensing method	Appearance	Connection method	Response time	Sensing distance	Model	
					NPN output	PNP output
Through-beam (Emitter + Receiver) *4		Pre-wired (2 m)*3	1 ms	60 m	E3Z-LT61 2M	E3Z-LT81 2M
		Connector (M8, 4 pins)			E3Z-LT66	E3Z-LT86
Retro-reflective with MSR function	 *1	Pre-wired (2 m)*3		*2 15 m (300 mm) (Using E39-R1) 7 m (200 mm) (Using E39-R12) 7 m (200 mm) (Using E39-R6)	E3Z-LR61 2M	E3Z-LR81 2M
		Connector (M8, 4 pins)			E3Z-LR66	E3Z-LR86
Distance-settable (BGS Models)		Pre-wired (2 m)*3		20 to 40 mm (Min. distance set) 20 to 300 mm (Max. distance set)	E3Z-LL61 2M	E3Z-LL81 2M
		Connector (M8, 4 pins)			E3Z-LL66	E3Z-LL86
		Pre-wired (2 m)*3	0.5 ms	25 to 40 mm (Min. distance set) 25 to 300 mm (Max. distance set)	E3Z-LL63 2M	E3Z-LL83 2M
		Connector (M8, 4 pins)			E3Z-LL68	E3Z-LL88

*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 0.5-m cable are also available for these products. When ordering, specify the cable length by adding “0.5M” to the end of the model number (e.g., E3Z-LT61 0.5M).
M12 Pre-wired Connector Models are also available. When ordering, add “-M1J” to the end of the model number (e.g., E3Z-LT61-M1J). The cable is 0.3 m long. Also, the following connection forms can be manufactured. Ask your OMRON representative for details.
• Pre-wired Models with 1-m or 5-m cables
• Pre-wired Connector Models with M8 4-pin connectors or M8 3-pin connectors.
*4. The model number of the Emitter is expressed by adding an "L" to the set model number in the table. Example: E3Z-LT61-L 2M
The model number of the receiver is expressed by adding a "D" to the set model number in the table. Example: E3Z-LT61-D 2M
Orders for individual Emitters and Receivers are accepted. (Modifications are required for some models.)

Accessories

Slits (for E3Z-LT□□) (Refer to *Dimensions* on page 14.)

Slit width	Sensing distance	Minimum detectable object (typical)	Model	Contents
0.5 mm dia.	3 m	0.1 mm dia.	E39-S65A	One set (contains Slits for both the Emitter and Receiver)

Reflectors (for E3Z-LR□□) (Refer to *Dimensions* on page 14.)

Name	Sensing distance (typical)	Model	Remarks
Reflector	15 m (300 mm)	E39-R1	• Retro-reflective models are not provided with Reflectors. • Separate the Sensor and the Reflector by at least the distance given in parentheses. • The MSR function is enabled.
	7 m (200 mm)	E39-R12	
	7 m (200 mm)	E39-R6	

Mounting Brackets (Refer to E39-L/F39-L/E39-S/E39-R.)

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

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 (Refer to XS3, M12: XS2, e-CON: Ask your OMRON representative for details.)

Size	Cable	Appearance		Cable type		Model
M8	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**

Note: When using Through-beam models, order one connector for the Receiver and one for the Emitter.

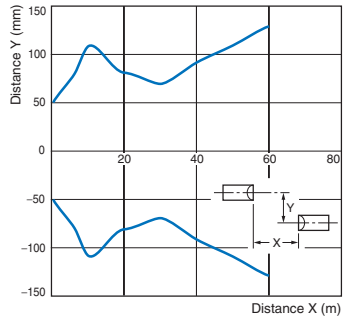
Ratings and Specifications

Item		Sensing method	Through-beam	Retro-reflective with MSR function	Distance-settable (BGS models)	
		Response	Standard response			High-speed response
Model		NPN output	E3Z-LT61/-LT66	E3Z-LR61/-LR66	E3Z-LL61/-LL66	E3Z-LL63/-LL68
		PNP output	E3Z-LT81/-LT86	E3Z-LR81/-LR86	E3Z-LL81/-LL86	E3Z-LL83/-LL88
Sensing distance			60 m	0.3 to 15 m (when using E39-R1) 0.2 to 7 m (when using E39-R12) 0.2 to 7 m (when using E39-R6)	White paper (100 × 100 mm): 20 to 300 mm Black paper (100 × 100 mm): 20 to 160 mm	White paper (100 × 100 mm): 25 to 300 mm Black paper (100 × 100 mm): 25 to 100 mm
Set distance range			---		White paper (100 × 100 mm): 40 to 300 mm Black paper (100 × 100 mm): 40 to 160 mm	White paper (100 × 100 mm): 40 to 300 mm Black paper (100 × 100 mm): 40 to 100 mm
Spot diameter (typical)			5-mm dia. at 3 m		0.5-mm dia. at 300 mm	
Standard sensing object			Opaque: 12-mm dia. min.	Opaque: 75-mm dia. min.	---	
Minimum detectable object (typical)			6-mm-dia. opaque object at 3 m		0.2-mm-dia. stainless-steel pin gauge at 300 mm	
Differential travel			---		5% max. of set distance	
Black/white error			---		5% at 160 mm	5% at 100 mm
Directional angle			Receiver: 3 to 15°	---		
Light source (wavelength)			Red LD (655 nm), JIS CLass 1, IEC Class 1, FDA Class II			
Power supply voltage			12 to 24 VDC±10%, ripple (p-p): 10% max.			
Current consumption			35 mA (Emitter 15 mA, Receiver 20 mA)	30 mA max.		
Control output			Load power supply voltage: 26.4 VDC max., Load current: 100 mA max., Open collector output			
Residual output voltage			Load current of less than 10 mA: 1 V max. Load current of 10 to 100 mA: 2 V max.			
Output mode switching			Switch to change between light-ON and dark-ON			
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: 0.5 ms max.
Sensitivity adjustment			One-turn adjuster		Five-turn endless adjuster	
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.			
Ambient temperature range			Operating: −10 to 55°C, Storage: −25 to 70°C (with no icing or condensation)			
Ambient humidity range			Operating: 35% to 85%, Storage: 35% to 95% (with no icing or 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			IP67 (IEC 60529)			
Connection method			Pre-wired cable (standard length: 2 m): E3Z-L□□1/-L□□3 Standard M8 Connector: E3Z-L□□6/-L□□8			
Indicator			Operation indicator (orange) Stability indicator (green) Emitter for Through-bream Models has power indicator (orange) only.			
Weight (packed state)	Pre-wired cable (2 m)		Approx. 120 g	Approx. 65 g		
	Standard Connector		Approx. 30 g	Approx. 20 g		
Material	Case		PBT (polybutylene terephthalate)			
	Lens		Modified polyarylate resin	Methacrylic resin	Modified polyarylate resin	
Accessories			Instruction manual (Neither Reflectors nor Mounting Brackets are provided with any of the above models.)			

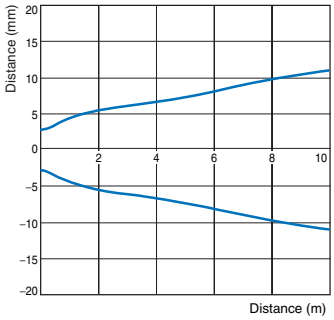
Engineering Data (Typical)

Parallel Operating Range

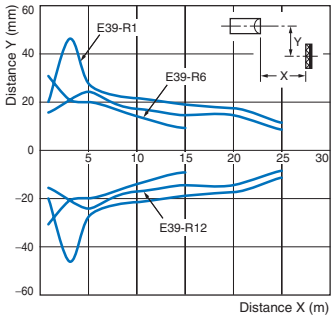
Through-beam Models
E3Z-LT□□



Through-beam Models
E3Z-LT□□ + E39-65A

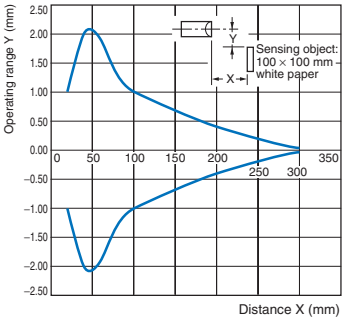


Retro-reflective Models
E3Z-LR□□



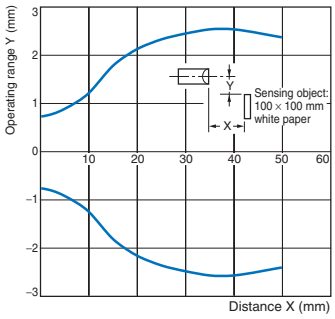
Operating Range at a Set Distance of 300 mm

BGS Models
E3Z-LL□□



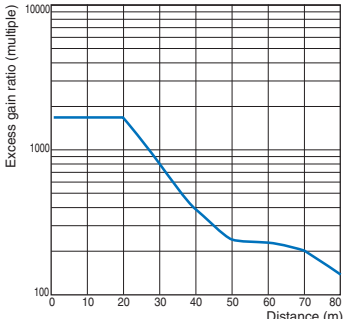
Operating Range at a Set Distance of 40 mm

BGS Models
E3Z-LL□□

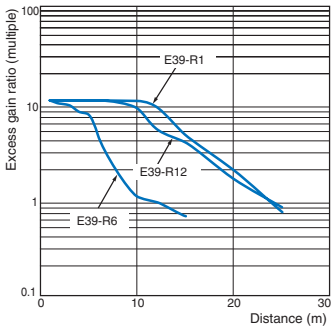


Excess Gain vs. Set Distance

Through-beam Models
E3Z-LT□□

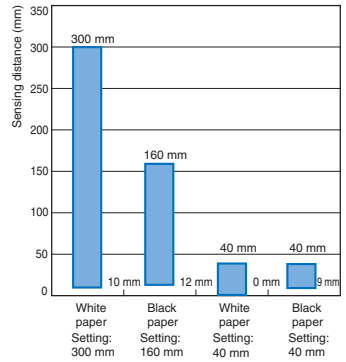


Retro-reflective Models
E3Z-LR□□

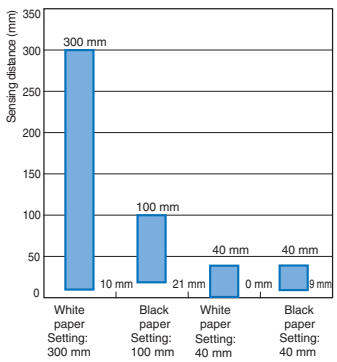


Close Range Characteristics

BGS Models
E3Z-LL□1/-LL□6



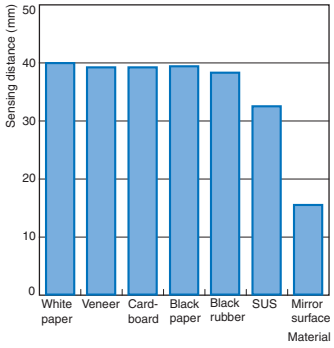
E3Z-LL□3/-LL□8



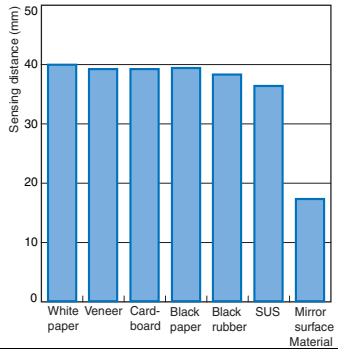
Sensing Distance vs. Sensing Object Material

BGS Models

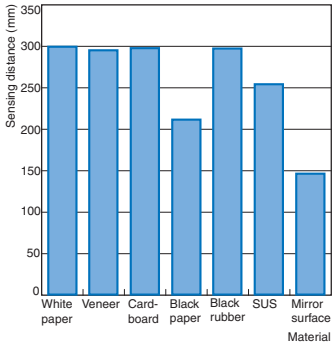
E3Z-LL□1/-LL□6
White Paper with a Set Distance of 40 mm



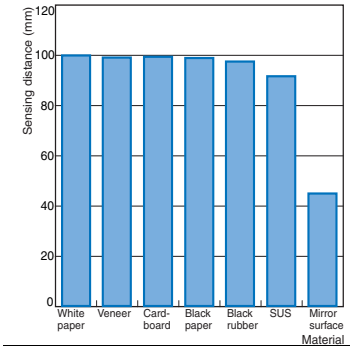
E3Z-LL□3/-LL□8
White Paper with a Set Distance of 40 mm



E3Z-LL□1/-LL□6
White Paper with a Set Distance of 300 mm



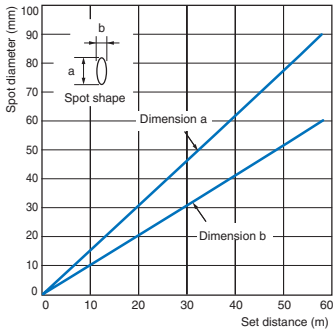
E3Z-LL□3/-LL□8
White Paper with a Set Distance of 100 mm



Emission Spot Diameter vs. Distance

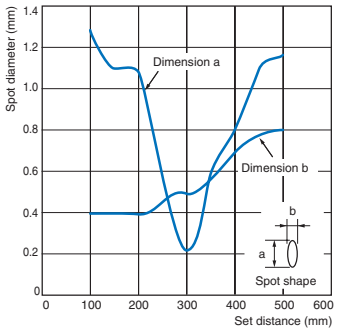
Through-beam and Retro-reflective Models (Same for All Models)

E3Z-LT□□, E3Z-LR□□



BGS Models (Same for All Models)

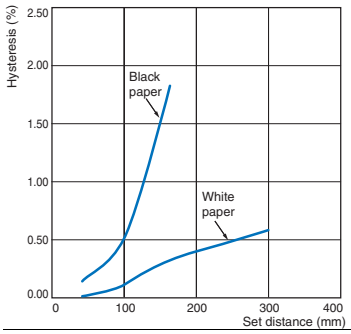
E3Z-LL□□



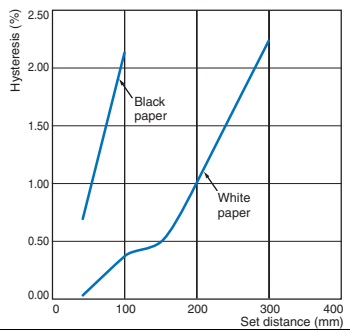
Hysteresis vs. Distance

BGS Models

E3Z-LL□1 (LL□6)



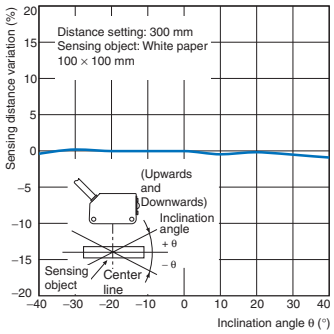
E3Z-LL□3 (LL□8)



Inclination Characteristics (Vertical)

BGS Models

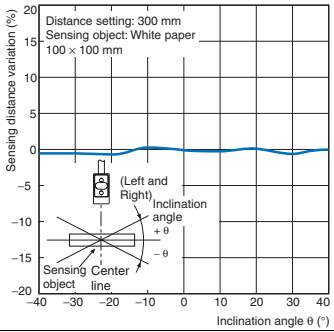
E3Z-LL□□



Inclination Characteristics (Horizontal)

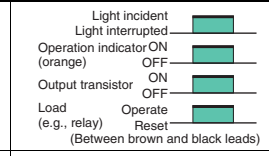
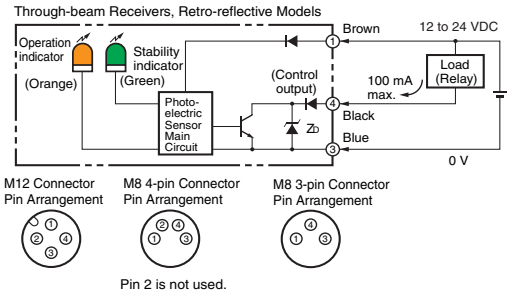
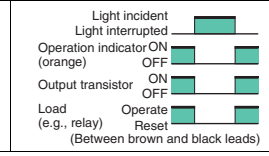
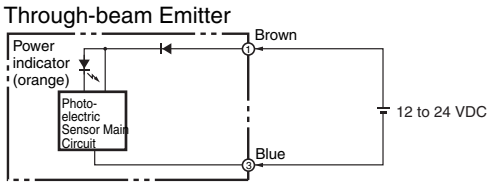
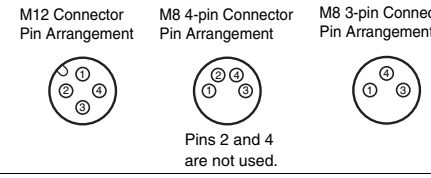
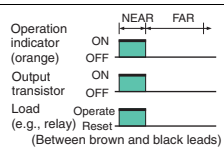
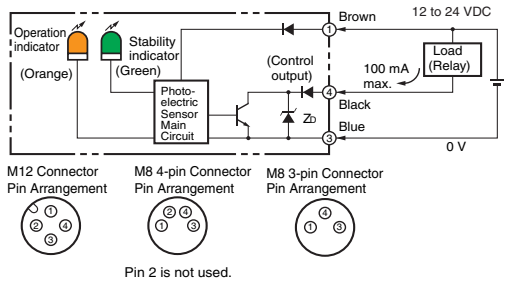
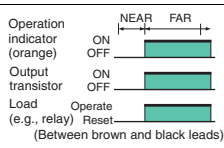
BGS Models

E3Z-LL□□

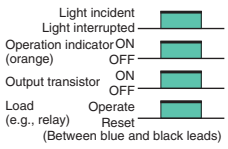
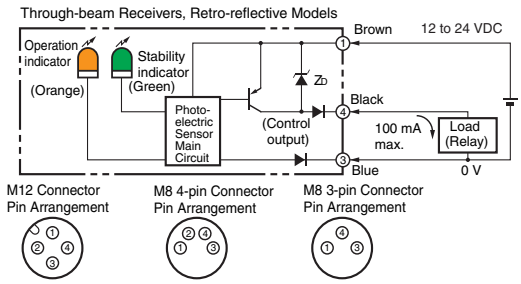
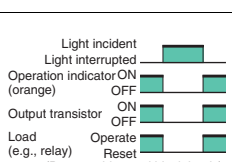
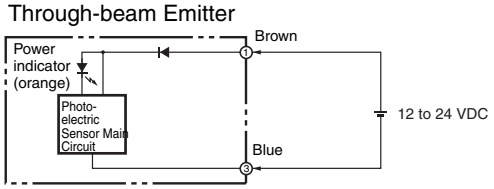
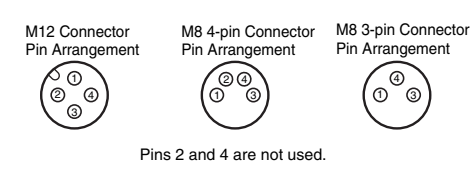
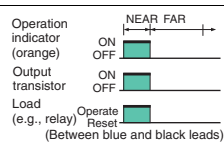
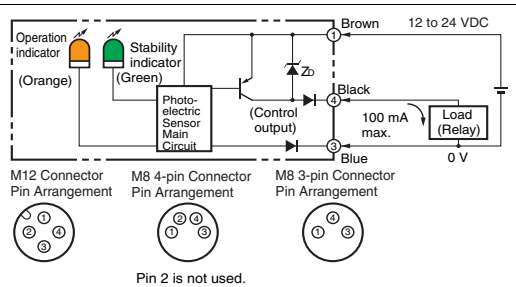
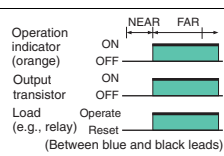


I/O Circuit Diagrams

NPN Output

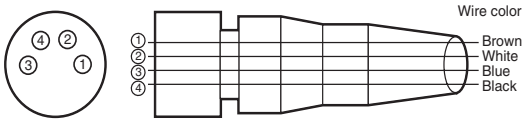
Model	Operation mode	Timing charts	Operation selector	Output circuit
E3Z-LT61 E3Z-LT66 E3Z-LR61 E3Z-LR66	Light-ON		L side (LIGHT ON)	
	Dark-ON		D side (DARK ON)	
				
E3Z-LL61 E3Z-LL66 E3Z-LL63 E3Z-LL68	Light-ON		L side (LIGHT ON)	
	Dark-ON		D side (DARK ON)	

PNP Output

Model	Operation mode	Timing charts	Operation selector	Output circuit
E3Z-LT81 E3Z-LT86 E3Z-LR81 E3Z-LR86	Light-ON		L side (LIGHT ON)	
	Dark-ON		D side (DARK ON)	
				
E3Z-LL81 E3Z-LL86 E3Z-LL83 E3Z-LL88	Light-ON		L side (LIGHT ON)	
	Dark-ON		D side (DARK ON)	

Plugs (Sensor I/O Connectors)

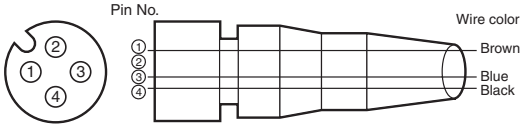
M8 4-pin Connectors



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

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

M12 Connectors



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

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

Nomenclature

Sensors with Sensitivity Adjustment and Mode Selector Switch

Through-beam Models

E3Z-LT□□ (Receiver)

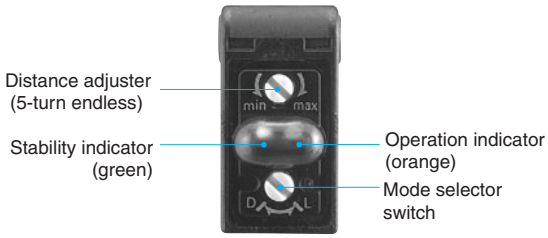
Retro-reflective Models

E3Z-LR□□

Distance-settable Sensor

BGS Models

E3Z-LL□□



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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

To ensure safe use of laser products, do not allow the laser beam to enter your eye. Direct exposure may adversely affect your eyesight.

⚠ CAUTION

Do not connect an AC power supply to the Sensor. If AC power (100 VAC or more) is supplied to the Sensor, it may explode or burn.

Precautions for Safe Use

Be sure to abide by the following precautions for the safe operation of the Sensor.

● Operating Environment

Do not use the Sensor in locations with explosive or flammable gas.

● Wiring

Power Supply Voltage and Output Load Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range. If a voltage exceeding the rated voltage range is supplied to the Sensor, it may explode or burn.

Power Supply Voltage

The maximum power supply voltage is 26.4 VDC. Applying a voltage exceeding the rated range may damage the Sensor or cause burning.

Load

Do not use a load that exceeds the rated load.

Load Short-circuiting

Do not short-circuit the load, otherwise the Sensor may be damaged or it may burn.

Connection without Load

Do not connect the power supply to the Sensor with no load connected, otherwise the internal elements may explode or burn. Always connect a load when wiring.

Precautions for Correct Use

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

● Laser Warning Labels

Be sure that the correct laser warning label (enclosed) is attached for the country of intended use of the equipment containing the Photoelectric Sensor. Refer to the user's manual for details.

● Usage Environment

Water Resistance

The Sensor is rated IP67. Do not use it in water, in the rain, or outdoors.

Ambient Environment

Do not install the product in the following locations. Doing so may result in product failure or malfunction.

- Locations subject to excess dust and dirt
- Locations subject to direct sunlight
- Locations subject to corrosive gas
- Locations subject to organic solvents
- Locations subject to shock or vibration
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to high humidity or condensation

● Designing

Power Reset Time

The Sensor is ready to operate 100 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before supplying power to the load.

● Wiring

Avoiding Malfunctions

If using the Sensor with an inverter or servomotor, always ground the FG (frame ground) and G (ground) terminals, otherwise the Sensor may malfunction.

● Mounting

Mounting the Sensor

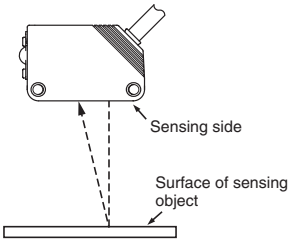
- If Sensors are mounted face-to-face, make sure that the optical axes are not in opposition to each other. Otherwise, mutual interference may result.
- Always install the Sensor carefully so that the aperture angle range of the Sensor will not cause it to be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light.
- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will lose its water-resistive properties.
- Use M3 screws to mount the Sensor.
- When mounting the case, make sure that the tightening torque applied to each screw does not exceed 0.54 N·m.

Metal Connectors

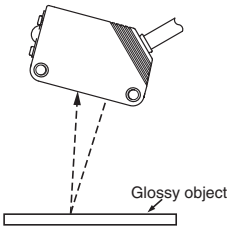
- Always turn OFF the power supply to the Sensor before connecting or disconnecting the metal connector.
- Hold the connector cover to connect or disconnect it.
  If the XS3F is used, always tighten the connector cover by hand. Do not use pliers.
  If the tightening is insufficient, the degree of protection 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.
  If other commercially available connectors are used, follow the recommended connector application conditions and recommended tightening torque specifications.

Mounting Direction for Distance-settable Models

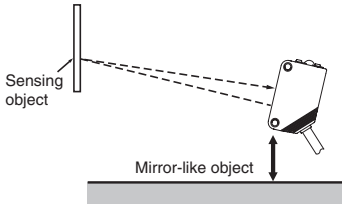
- Make sure that the sensing side of the Sensor is parallel with the surface of the sensing objects. Normally, do not incline the Sensor towards the sensing object.



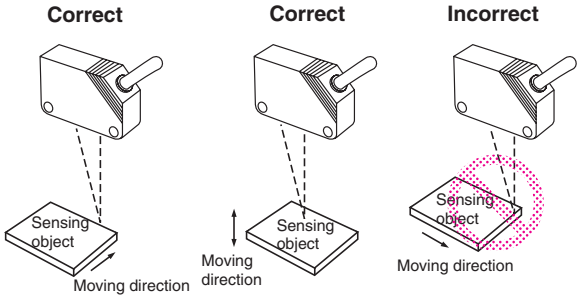
If the sensing object has a glossy surface, however, incline the Sensor by 5° to 10° as shown in the illustration, provided that the Sensor is not influenced by background objects.



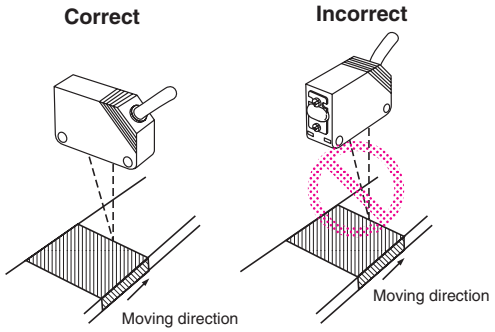
- If there is a mirror-like object below the Sensor, the Sensor may not operate stably. Therefore, incline the Sensor or separate the Sensor from the mirror-like object as shown below.



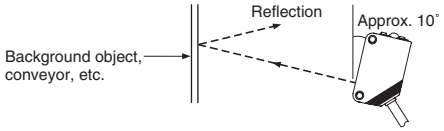
- Do not install the Sensor in the wrong direction. Refer to the following illustration.



Install the Sensor as shown in the following illustration if each sensing object greatly differs in color or material.

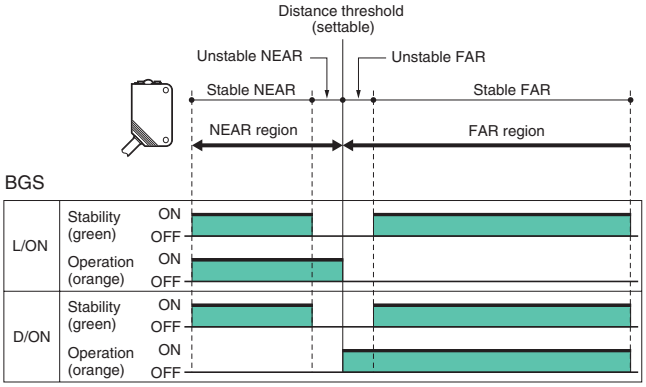


- The stability indicator may turn off in reaction to reflection from background objects. In such cases, incline the Sensor by 10° as shown in the illustration for more stable detection.



● Adjusting Distance-settable Models

Indicator Operation



Note: If the stability indicator is lit, the detection/no detection status is stable within the rated ambient operating temperature (−10 to 55°C).

● Inspection and Maintenance

Cleaning

Never use paint thinners or other organic solvents to clean the surface of the product.

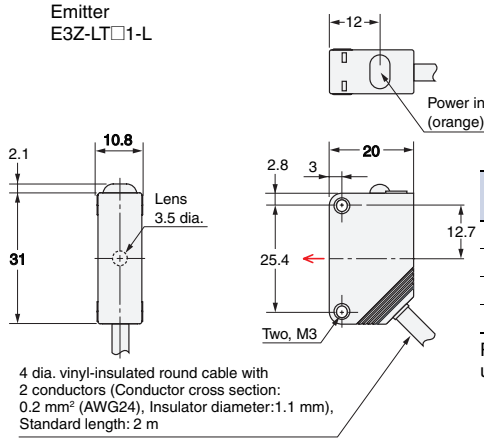
Dimensions

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

Sensors

Through-beam
Pre-wired Models
E3Z-LT61
E3Z-LT81

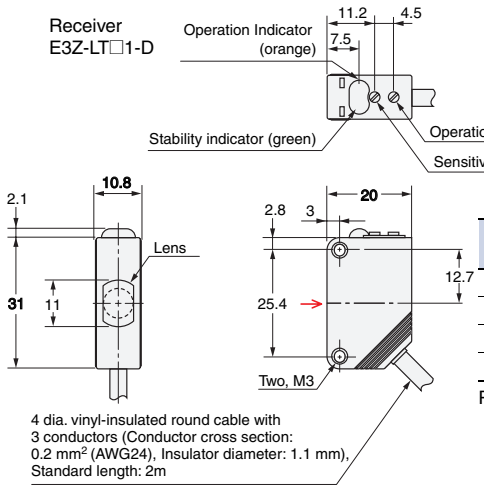
Emitter
E3Z-LT□1-L



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

Pins 2 and 4 are not used.

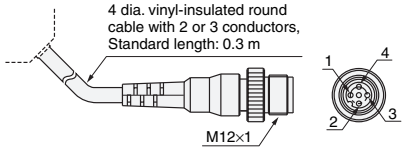
Receiver
E3Z-LT□1-D



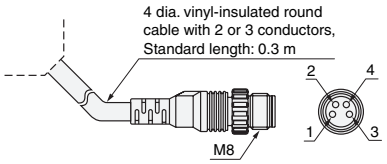
Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

Pin 2 is not used.

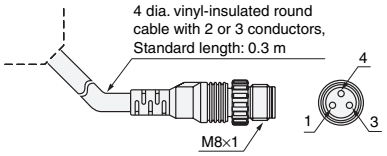
M12 Pre-wired Connector (E3Z-LT□□-M1J)



Pre-wired Connector Models with M8 connectors (Inquire)



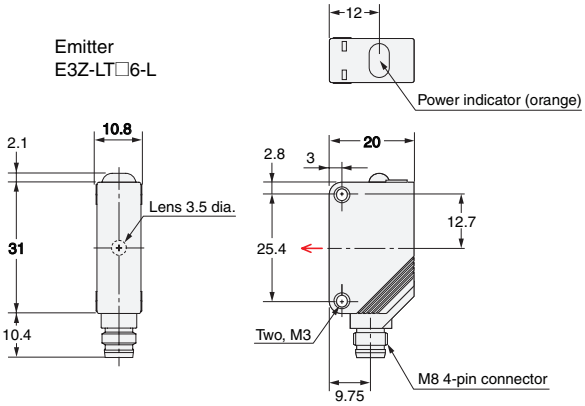
Pre-wired Connector Models with M8 3-pin connectors (Inquire)



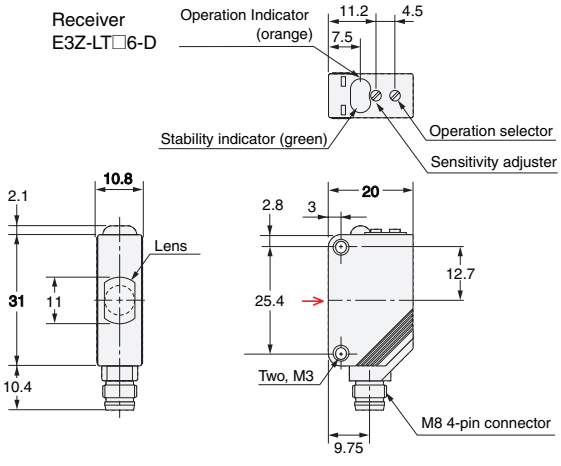
* The Emitter cable has two conductors and the Receiver cable has three conductors.

Through-beam
Standard Connector Models
E3Z-LT66
E3Z-LT86

Emitter
E3Z-LT□6-L



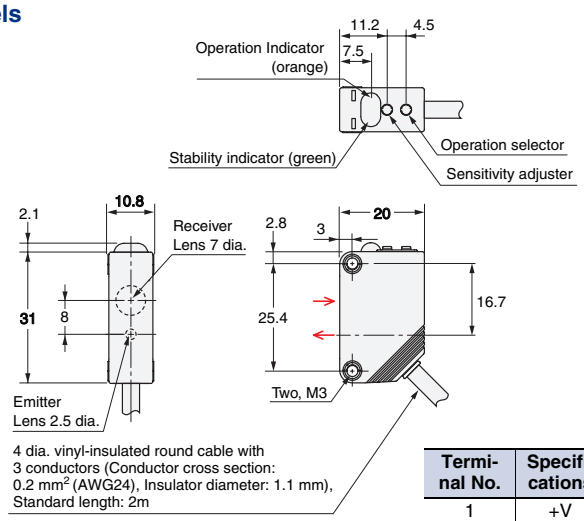
Receiver
E3Z-LT□6-D



Retro-reflective Models

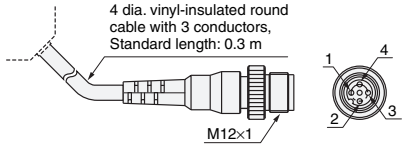
Pre-wired Models

E3Z-LR61
E3Z-LR81

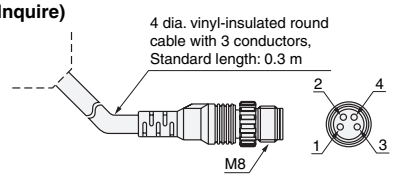


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

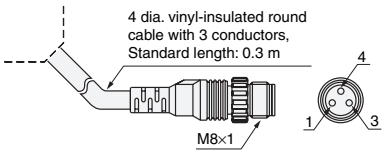
M12 Pre-wired Connector (E3Z-LR□□-M1J)



Pre-wired Connector Models with M8 connectors (Inquire)



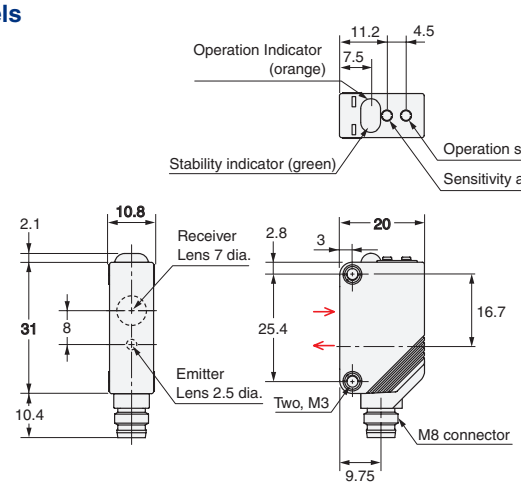
Pre-wired Connector Models with M8 3-pin connectors (Inquire)



Retro-reflective Models

Standard Connector Models

E3Z-LR66
E3Z-LR86

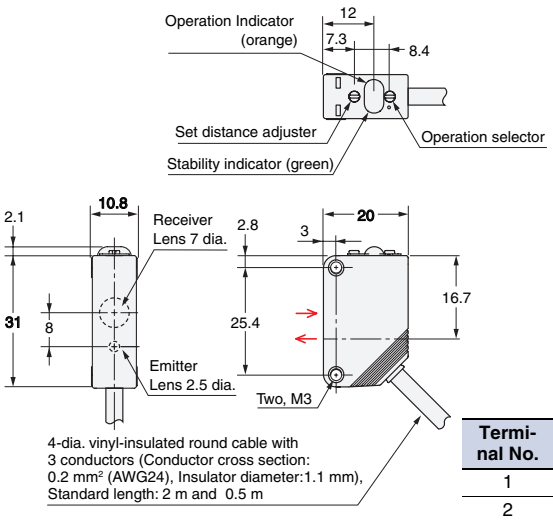


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

BGS Models

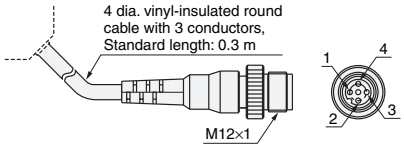
Pre-wired Models

E3Z-LL61
E3Z-LL81
E3Z-LL63
E3Z-LL83

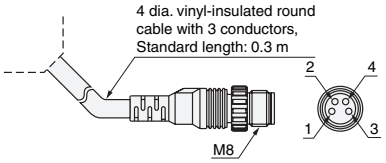


Terminal No.	Specifications
1	+V
2	---
3	0 V
4	Output

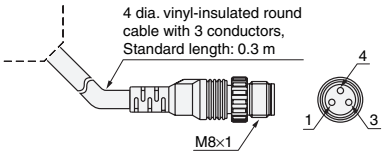
M12 Pre-wired Connector (E3Z-LL□□-M1J)



Pre-wired Connector Models with M8 connectors (Inquire)



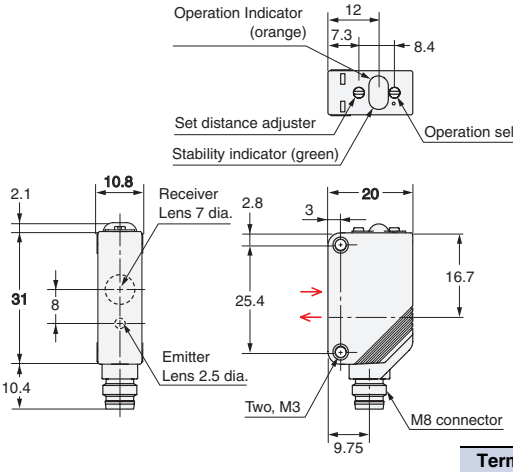
Pre-wired Connector Models with M8 3-pin connectors (Inquire)



BGS Models

Standard M8 Connector Models

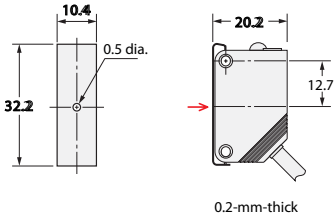
E3Z-LL66
E3Z-LL86
E3Z-LL68
E3Z-LL88



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

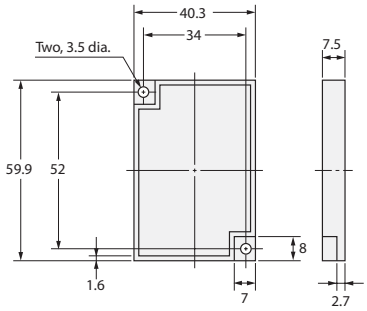
Accessories (Order Separately)

Slit
E39-S65A



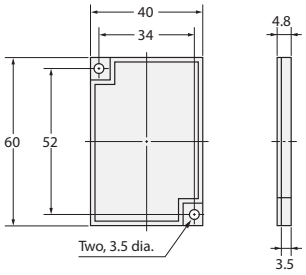
Material
SUS301 stainless steel

Reflector
E39-R1



Materials
Reflective surface: Acrylic
Rear surface: ABS

Reflector
E39-R6



Materials
Reflective surface: Acrylic
Rear surface: ABS