Compact Photoelectric Sensor with Built-in Amplifier

E3Z-LS

CSM_E3Z-LS_DS_E_7_1

Distance-settable Sensor Unaffected by Workpiece Color and Background

- Distance-settable triangulation model unaffected by color.
- Simple positioning settings using a clear LED spot. (E3Z-LS□3/LS□8)
- Detect minute steps.

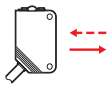
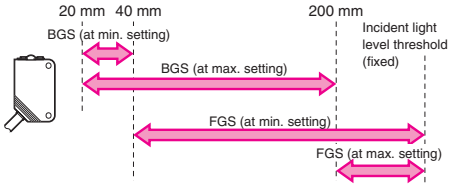
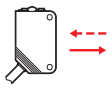
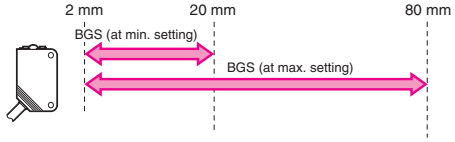
CE

Be sure to read *Safety Precautions* on page 8.

Ordering Information

Sensors (Refer to *Dimensions* on page 10.)

Red light

Sensing method	Appearance	Connection method	Sensing distance (white paper)	Model	
				NPN output	PNP output
Distance-settable		Pre-wired (2 m) *1		**E3Z-LS61 2M** *2	**E3Z-LS81 2M**
		Connector (M8, 4 pins)		**E3Z-LS66**	**E3Z-LS86**
		Pre-wired (2 m) *1		**E3Z-LS63 2M**	**E3Z-LS83 2M**
		Connector (M8, 4 pins)		**E3Z-LS68**	**E3Z-LS88**

*1. Models with a 0.5-m cable are available. When ordering, specify the cable length by adding the code "0.5M" to the model number (e.g., E3Z-LS61 0.5M).
*2. The following table shows the model numbers of e-CON Pre-wired Connectors that are available. The Ratings and Specifications are the same as those for the E3Z-LS61.

Cable length	Model
0.3 m	**E3Z-LS61-ECON 0.3M**
0.5 m	**E3Z-LS61-ECON 0.5M**
2 m	**E3Z-LS61-ECON 2M**

Accessories (Order Separately)

Mounting Brackets

Sensor I/O Connectors

(Models for Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.) **(Refer to *Dimensions* on XS3)**

Cable specification	Appearance	Type of cable		Model
Standard M8 cable	Straight *1 	2 m	4-wire	**XS3F-M421-402-A**
		5 m		**XS3F-M421-405-A**
	L-shaped *1 *2 	2 m		**XS3F-M422-402-A**
		5 m		**XS3F-M422-405-A**

*1. The connector will not rotate after connecting.
*2. The cable is fixed at an angle of 180° from the sensor emitter/receiver surface.

Ratings and Specifications

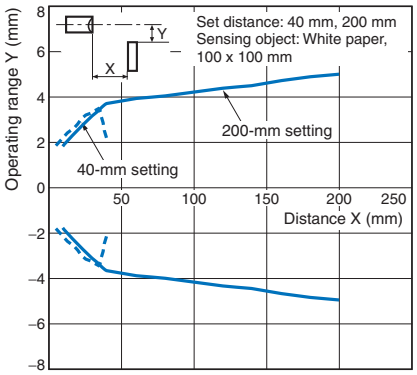
Sensing method		Distance-settable			
Model	NPN output	E3Z-LS61	E3Z-LS66	E3Z-LS63	E3Z-LS68
Item	PNP output	E3Z-LS81	E3Z-LS86	E3Z-LS83	E3Z-LS88
Sensing distance	BGS	White or black paper (100 × 100 mm): 20 mm to set distance		2 mm to set distance (80 mm max.)	
	FGS	White paper (100 × 100 mm): Set distance to 200 mm min. Black paper (100 × 100 mm): Set distance to 160 mm min.		-----	
Setting range		White paper (100 × 100 mm): 40 to 200 mm Black paper (100 × 100 mm): 40 to 160 mm		White paper (100 × 100 mm): 20 to 80 mm	
Differential travel		10% of set distance max. (Refer to *Differential Travel vs. Sensing Distance* on page 4.)		2% of set distance max.	
Reflectivity characteristic (black/white error)		10% of set distance max.		5% of set distance max.	
Light source (wavelength)		Red LED (680 nm)		Red LED (650 nm)	
Power supply voltage		12 to 24 VDC ±10%, ripple (p-p): 10% max.			
Current consumption		30 mA max.			
Control output		Load power supply voltage: 26.4 VDC max., Load current: 100 mA max. (residual voltage 1 V max.), Open collector output (NPN or PNP depending on model) Light-ON/Dark-ON switch selectable			
BGS/FGS selection		BGS: Open or connected to GND FGS: Connected to Vcc		BGS: Open or connected to GND	
Protection circuits		Reversed power supply polarity protection, Output short-circuit protection, Mutual interference prevention			
Response time		Operate or reset: 1 ms max.			
Distance setting		5-turn endless 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 at 50/60 Hz for 1 minute			
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 for 3 times each in X, Y, and Z directions			
Degree of protection		IP67 (IEC 60529)			
Connection method		Pre-wired (standard lengths: 2 m and 0.5 m)	Connector (M8, 4 pins)	Pre-wired (standard lengths: 2 m and 0.5 m)	Connector (M8, 4 pins)
Indicators		Operation indicator (orange), Stability indicator (green)			
Weight (packed state)		Pre-wired Sensors, 2 m: Approx. 65 g	Approx. 20 g	Pre-wired Sensors, 2 m: Approx. 65 g	Approx. 20 g
Material	Case	PBT (polybutylene terephthalate)			
	Lens	Modified polyarylate resin			
Accessories		Instruction manual (Mounting Brackets must be ordered separately.)			

Engineering Data

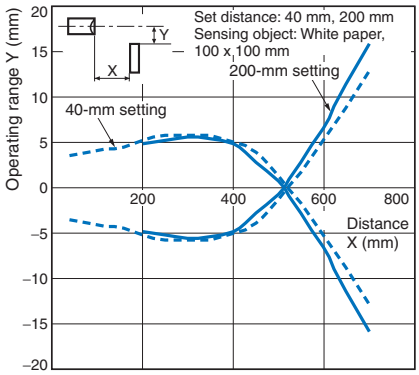
Operating Range

E3Z-LS□1/LS□6

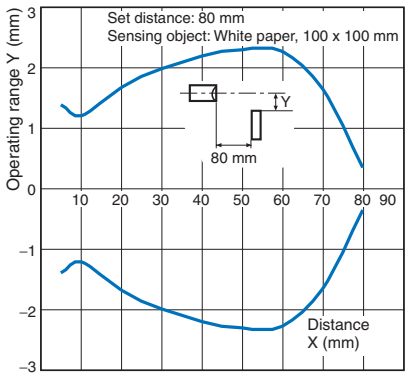
BGS



FGS

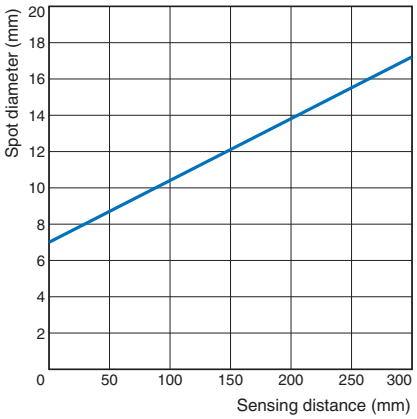


E3Z-LS□3/LS□8

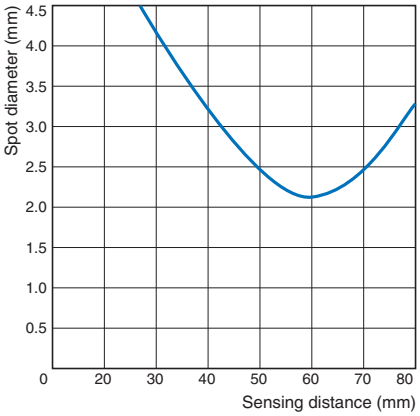


Spot Diameter vs. Sensing Distance

E3Z-LS□1/LS□6

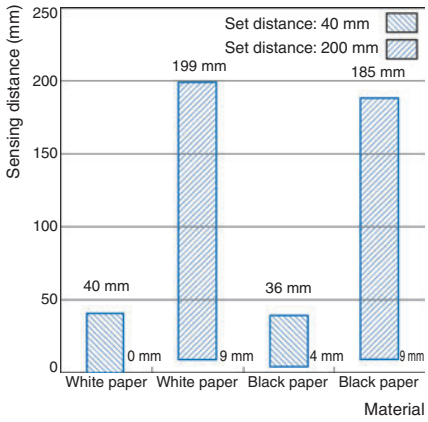


E3Z-LS□3/LS□8

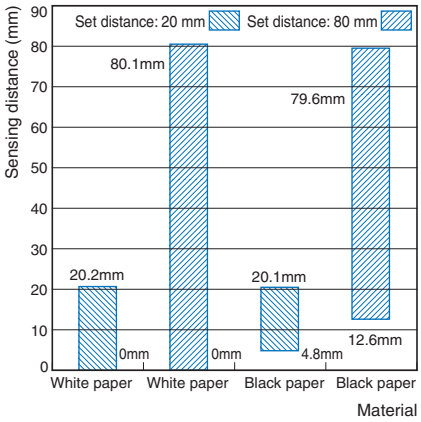


Close-range Characteristics

E3Z-LS□1/LS□6

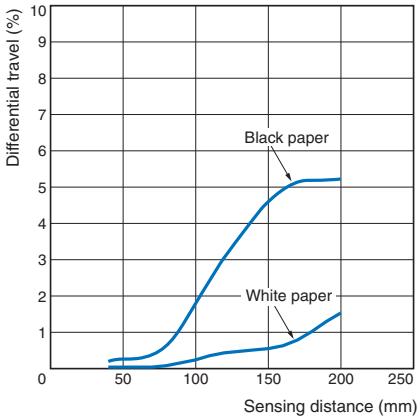


E3Z-LS□3/LS□8

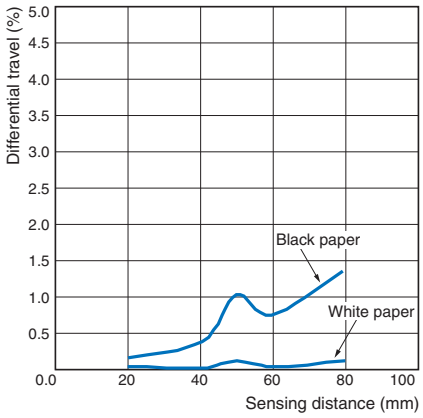


Differential Travel vs. Sensing Distance

E3Z-LS□1/LS□6



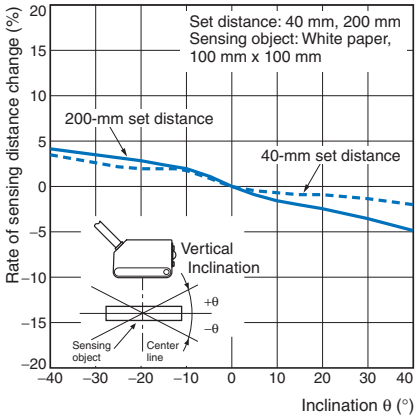
E3Z-LS□3/LS□8



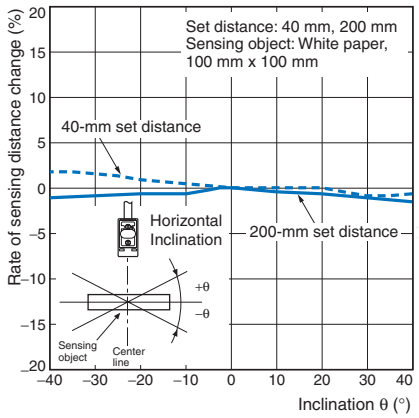
Sensing Object Angle Characteristics

E3Z-LS□1/LS□6

Vertical

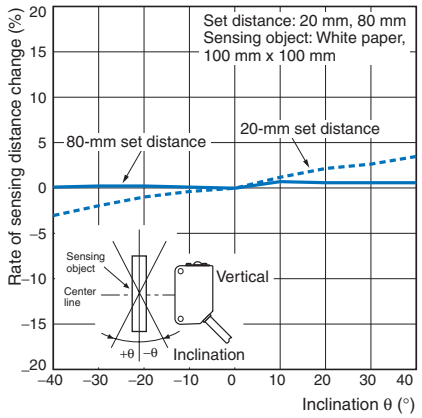


Horizontal

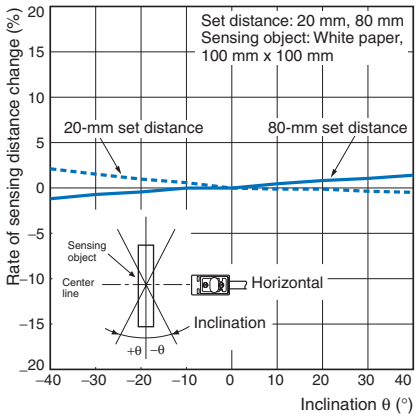


E3Z-LS□3/LS□8

Vertical



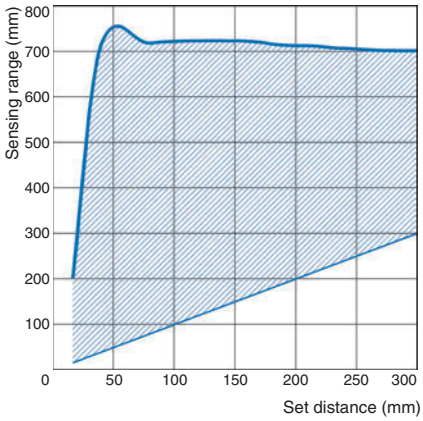
Horizontal



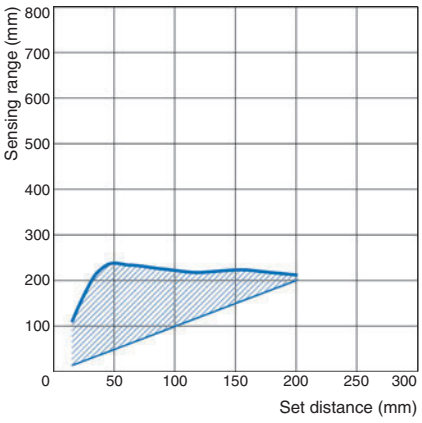
FGS Mode Set Distance

E3Z-LS□1/LS□6

White Paper



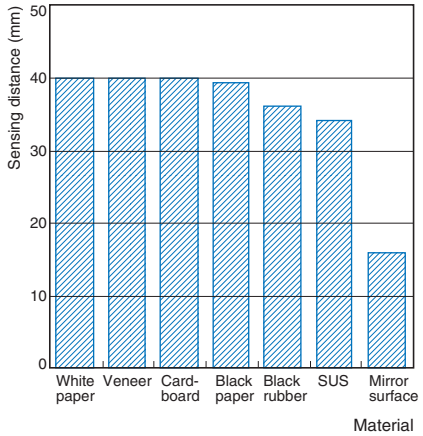
Black Paper



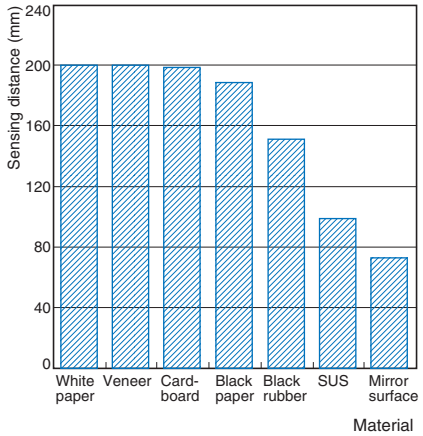
Sensing Distance vs. Sensing Object Material

E3Z-LS□1/LS□6

Set Distance of 40 mm using White Paper

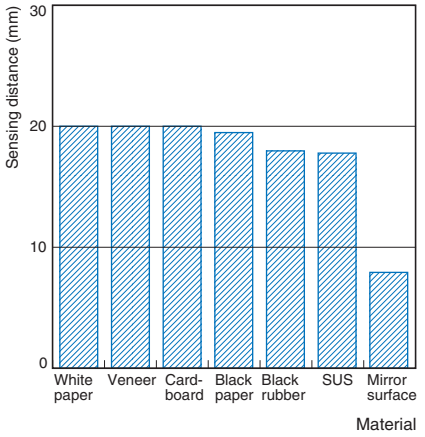


Set Distance of 200 mm using White Paper

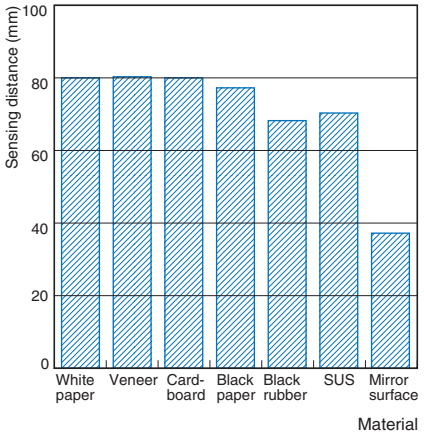


E3Z-LS□3/LS□8

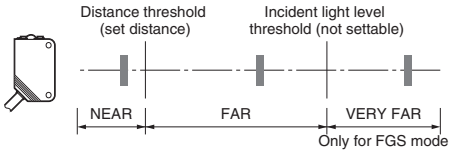
Set Distance of 20 mm using White Paper



Set Distance of 80 mm using White Paper

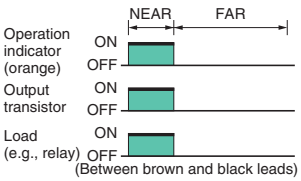
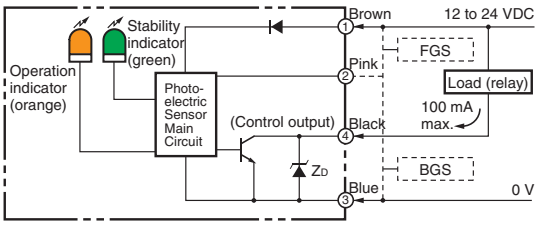
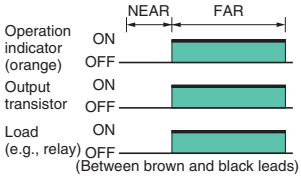
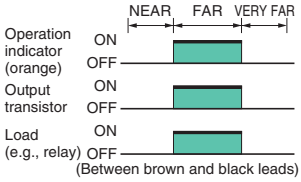
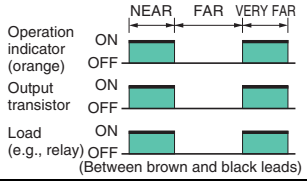


I/O Circuit Diagrams



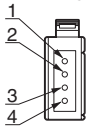
Note: The VERY FAR region is supported only for FGS.
The incident light level threshold is fixed and cannot be set.

NPN Output

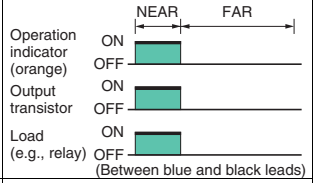
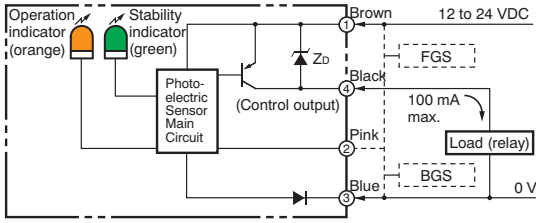
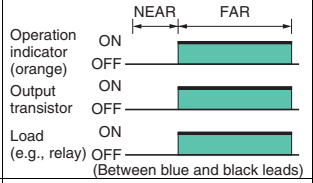
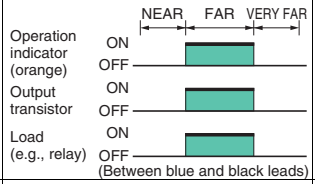
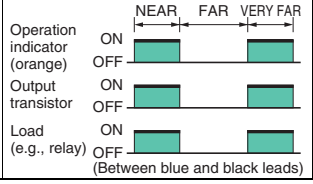
Model	Operation mode	Timing charts	Operation selector	BGS/FGS selection method	Output circuit
E3Z-LS61 E3Z-LS66 E3Z-LS63 E3Z-LS68	Light-ON		L side (LIGHT ON)	BGS: Either leave the pink wire (2) open or connect it to the blue wire (3). FGS: Connect the pink wire (2) to the brown wire (1).	
	Dark-ON		D side (DARK ON)		
E3Z-LS61 E3Z-LS66	Light-ON		L side (LIGHT ON)		
	Dark-ON		D side (DARK ON)		

Connector Pin Arrangement

e-CON Connector Pin Arrangement

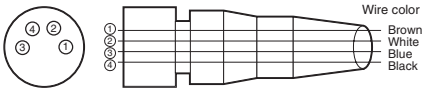


PNP Output

Model	Operation mode	Timing charts	Operation selector	BGS/FGS selection method	Output circuit
E3Z-LS81 E3Z-LS86 E3Z-LS83 E3Z-LS88	Light-ON		L side (LIGHT ON)	BGS: Either leave the pink wire (2) open or connect it to the blue wire (3). FGS: Connect the pink wire (2) to the brown wire (1).	 Connector Pin Arrangement 
	Dark-ON		D side (DARK ON)		
E3Z-LS81 E3Z-LS86	Light-ON		L side (LIGHT ON)		
	Dark-ON		D side (DARK ON)		

Plugs (Sensor I/O Connectors)

M8 connector



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

e-CON connector

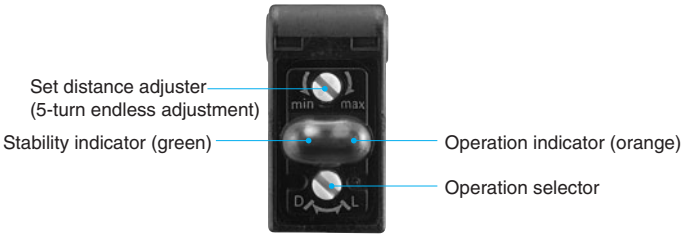
E39-ECON□M

E39-ECONW□M

Pin arrangement

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

Nomenclature



Safety Precautions

Refer to *Safety Precautions* of the E3Z and *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.

⚠ 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.

● 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.

Load Short-circuiting

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

Connection without Load

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

● Operating Environment

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

Precautions for Correct Use

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

● 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

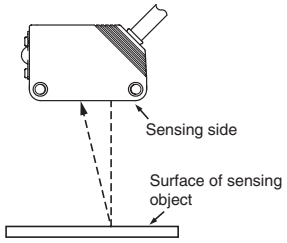
- If Sensors are mounted face-to-face, make sure that the optical axes are not in opposition to each other. Otherwise, mutual interference may result.
- Always install the Sensor carefully so that the aperture angle range of the Sensor will not cause it to be directly exposed to intensive light, such 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.

M8 Connector

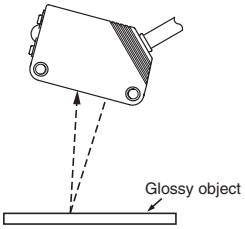
- Always turn OFF the power supply to the Sensor before connecting or disconnecting the metal connector.
- Hold the connector cover to connect or disconnect it.
  If the XS3F is used, always tighten the connector cover by hand. Do not use pliers.
  If the connector is not connected securely, it may be disconnected by vibration or the proper degree of protection of the Sensor may not be maintained. 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 Directions

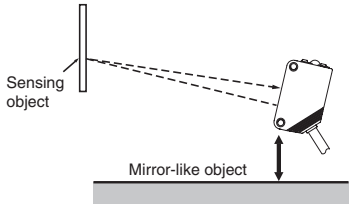
- Make sure that the sensing side of the Sensor is parallel with the surface of the sensing objects. Normally, do not incline the Sensor towards the sensing object.



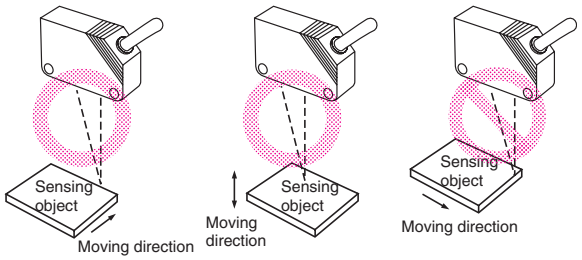
If the sensing object has a glossy surface, however, incline the Sensor by 5° to 10° as shown in the illustration, provided that the Sensor is not influenced by background objects.



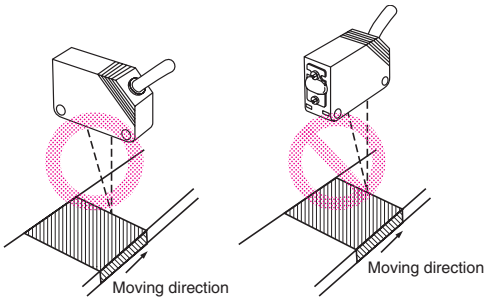
- If there is a mirror-like object below the Sensor, the Sensor may not operate stably. Therefore, incline the Sensor or separate the Sensor from the mirror-like object as shown below.



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

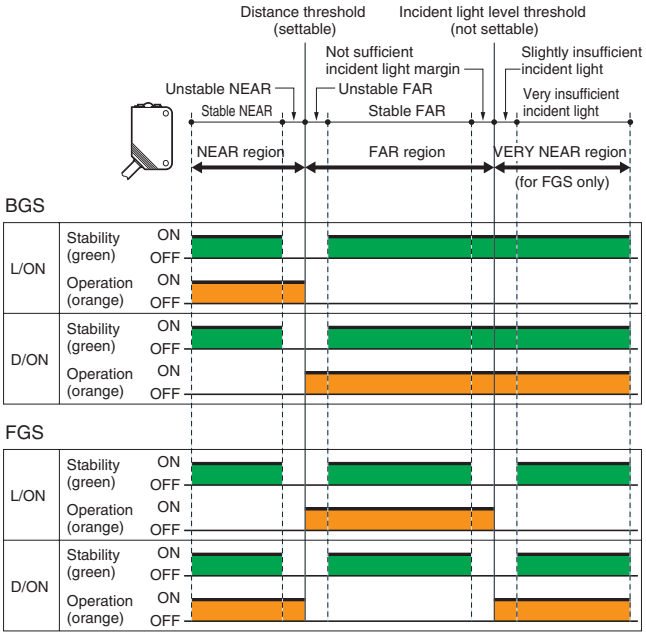


Install the Sensor as shown in the following illustration if each sensing object greatly differs in color or material.



● Adjusting

Indicator Operation



Note: 1. If the stability indicator is lit, the detection/no detection status is stable within the rated ambient operating temperature (–25 to 55°C).
2. The VERY FAR region is supported only for FGS. The incident light threshold is fixed and cannot be set. The distance to the incident light threshold depends on the color and gloss of the sensing object's surface.

● Inspection and Maintenance

Cleaning

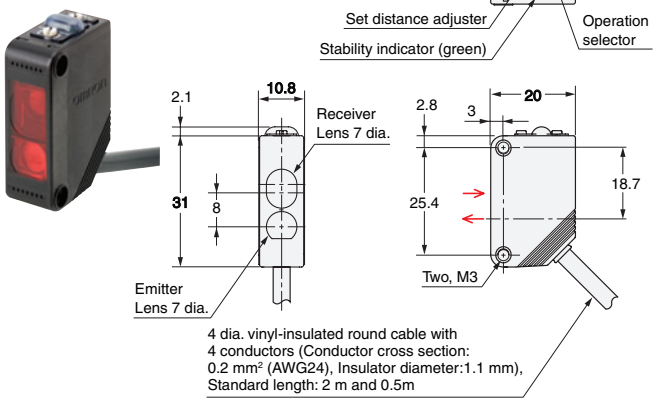
Never use paint thinners or other organic solvents to clean the surface of the product.

Dimensions

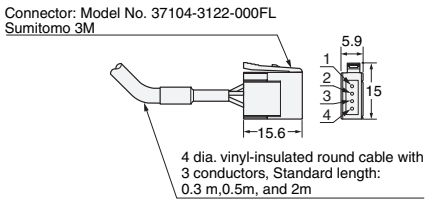
(Unit: mm)
Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Pre-wired Models

E3Z-LS61
E3Z-LS81
E3Z-LS63
E3Z-LS83

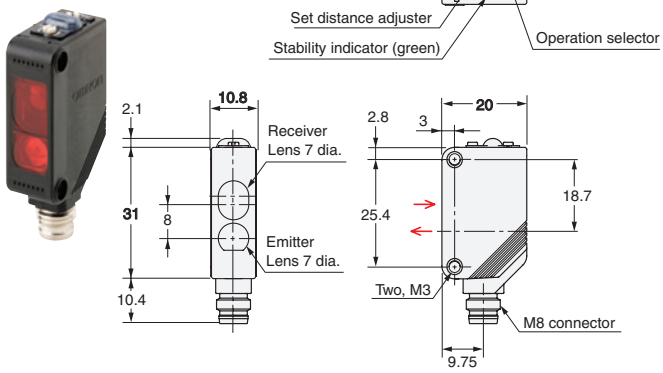


e-CON Pre-wired Connector Model

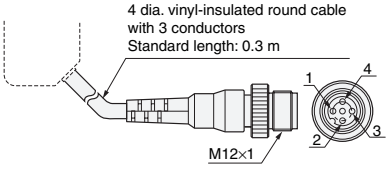


Connector Models

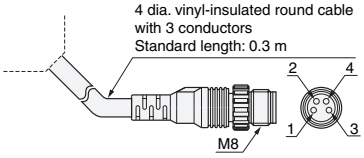
E3Z-LS66
E3Z-LS86
E3Z-LS68
E3Z-LS88



M12 Pre-wired Connector (E3Z-□□□-M1J)



M8 Pre-wired Connector (E3Z-T□□K-M3J)



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

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- Systems, machines, and equipment that could present a risk to life or property.

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Disclaimers

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2010.12

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