

Compact Photoelectric Sensor with Built-in Amplifier E3Z-F



A Visible Spot That Simplifies the Usage of Photoelectric Sensors

- E3Z-F is added to the E3Z Series of Photoelectric Sensors that boasts annual worldwide sales of 1.5 million units.
- Many different sensing distances
Diffuse-reflective: 100 mm, 300 mm, 500 mm, 1 m
Through-beam: 20 m
Retro-reflective: 4 m
- Models with infrared LEDs are also available.



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



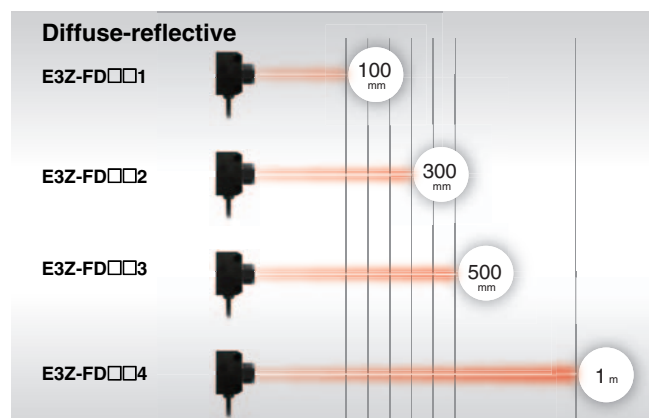
Refer to the *Safety Precautions* on page 9.

Features

Visible spot for easy installation

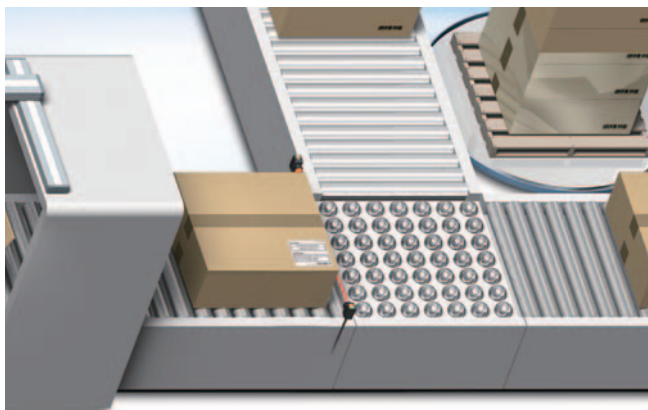


Many different sensing distances are available, so you can select the best model for your application distance.

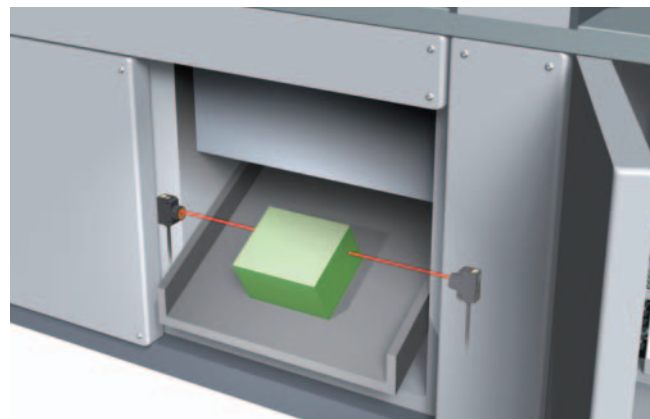


Application

Materials handling: detect passing cardboard boxes



Molding machines: detect falling molded objects

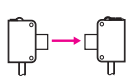
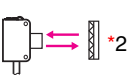
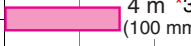
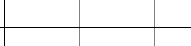


E3Z-F

Ordering Information

Sensors [Refer to *Dimensions on page 10.*]

 Red light  Infrared light

Sensing method	Appearance	Connecting method	Sensing distance	Model	
				NPN output	PNP output
Through-beam (Emitter + Receiver)		Pre-wired (2 m)	 20 m	E3Z-FTN11 2M *1 Emitter E3Z-FTN11-L 2M Receiver E3Z-FTN11-D 2M	E3Z-FTP11 2M *1 Emitter E3Z-FTP11-L 2M Receiver E3Z-FTP11-D 2M
		Connector (M12)	 20 m	E3Z-FTN21 *1 Emitter E3Z-FTN21-L Receiver E3Z-FTN21-D	E3Z-FTP21 *1 Emitter E3Z-FTP21-L Receiver E3Z-FTP21-D
		Pre-wired (2 m)	 20 m	E3Z-FTN12 2M *1 Emitter E3Z-FTN12-L 2M Receiver E3Z-FTN12-D 2M	E3Z-FTP12 2M *1 Emitter E3Z-FTP12-L 2M Receiver E3Z-FTP12-D 2M
		Connector (M12)	 20 m	E3Z-FTN22 *1 Emitter E3Z-FTN22-L Receiver E3Z-FTN22-D	E3Z-FTP22 *1 Emitter E3Z-FTP22-L Receiver E3Z-FTP22-D
Retro-reflective with MSR function		Pre-wired (2 m)	 4 m *3 (100 mm)	E3Z-FRN11 2M	E3Z-FRP11 2M
		Connector (M12)	 4 m *3 (100 mm)	E3Z-FRN21	E3Z-FRP21
Diffuse-reflective		Pre-wired (2 m)	 100 mm	E3Z-FDN11 2M	E3Z-FDP11 2M
		Connector (M12)	 100 mm	E3Z-FDN21	E3Z-FDP21
		Pre-wired (2 m)	 300 mm	E3Z-FDN12 2M	E3Z-FDP12 2M
		Connector (M12)	 300 mm	E3Z-FDN22	E3Z-FDP22
		Pre-wired (2 m)	 500 mm	E3Z-FDN13 2M	E3Z-FDP13 2M
		Connector (M12)	 500 mm	E3Z-FDN23	E3Z-FDP23
		Pre-wired (2 m)	 1 m	E3Z-FDN14 2M	E3Z-FDP14 2M
		Connector (M12)	 1 m	E3Z-FDN24	E3Z-FDP24
		Pre-wired (2 m)	 100 mm	E3Z-FDN15 2M	E3Z-FDP15 2M
		Connector (M12)	 100 mm	E3Z-FDN25	E3Z-FDP25
		Pre-wired (2 m)	 300 mm	E3Z-FDN16 2M	E3Z-FDP16 2M
		Connector (M12)	 300 mm	E3Z-FDN26	E3Z-FDP26
		Pre-wired (2 m)	 500 mm	E3Z-FDN17 2M	E3Z-FDP17 2M
		Connector (M12)	 500 mm	E3Z-FDN27	E3Z-FDP27
		Pre-wired (2 m)	 1 m	E3Z-FDN18 2M	E3Z-FDP18 2M
		Connector (M12)	 1 m	E3Z-FDN28	E3Z-FDP28

*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver. An order for the Emitter or Receiver alone cannot be accepted.

*2. The Reflector is sold separately. Select the Reflector model most suited to the application.

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

Accessories (Sold Separately)

Reflector (Required for Retro-reflective Sensors) A Reflector is not provided with the Sensor. It must be ordered separately.
 [Refer to *Dimensions on page 11.*]

Appearance	Sensing distance*		Model	Quantity	Remarks
	Rated value	Reference value			
	4 m (100 mm)	---	E39-R1S	1	for E3Z-FR□

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

Mounting Brackets A Mounting Bracket is not provided with the Sensor. It must be ordered separately as required.
 [Refer to *Dimensions on page 11.*]

Applicable Sensors	Mounting method	Appearance	Model	Quantity
All models	M3 screw mounting		E39-L189	1
	M18 nut side mounting		E39-L183	1

Note: 1. When using Through-beam models, order one bracket for the Receiver and one for the Emitter.

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

(Required for models for Connectors) A Connector is not provided with the Sensor. It must be ordered separately.

Applicable Sensors	Size	Cable	Appearance	Cable type		Model
Connector (M12)	M12	Standard	Straight		2 m	XS2F-M12PVC4S2M
					5 m	XS2F-M12PVC4S5M
			L-shaped		2 m	XS2F-M12PVC4A2M
					5 m	XS2F-M12PVC4A5M

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

Ratings and Specifications

Item	Sensing method		Through-beam	Retro-reflective with MSR function	Diffuse-reflective				
	Model	NPN out- put	Pre-wired	E3Z-FTN11	E3Z-FRN11	E3Z-FDN11	E3Z-FDN12	E3Z-FDN13	E3Z-FDN14
		Connector (M12)	E3Z-FTN21	E3Z-FRN21	E3Z-FDN21	E3Z-FDN22	E3Z-FDN23	E3Z-FDN24	
		PNP out- put	Pre-wired	E3Z-FTP11	E3Z-FRP11	E3Z-FDP11	E3Z-FDP12	E3Z-FDP13	E3Z-FDP14
	Connector (M12)	E3Z-FTP21	E3Z-FRP21	E3Z-FDP21	E3Z-FDP22	E3Z-FDP23	E3Z-FDP24		
Sensing distance			20 m	4 m (100 mm) *1 (when using E39-R1S)	100 mm (white paper: 300 × 300 mm)	300 mm (white paper: 300 × 300 mm)	500 mm (white paper: 300 × 300 mm)	1 m (white paper: 300 × 300 mm)	
Spot diameter (reference value)			---		40 × 45 mm (at sensing distance of 100 mm)	40 × 50 mm (at sensing distance of 300 mm)	45 × 50 mm (at sensing distance of 500 mm)	120 × 150 mm (at sensing distance of 1 m)	
Standard sensing object			Opaque: 7 mm dia. min.	Opaque: 75 mm dia. min.	---				
Differential travel			---		20% max. of sensing distance				
Directional angle			2° min.		---				
Light source (wavelength)			Red LED (624 nm)						
Power supply voltage			10 to 30 VDC (including voltage ripple of 10% (p-p) max.)						
Current consumption			40 mA max. (Emitter: 25 mA max., Receiver: 15 mA max.)	25 mA max.					
Control output			Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 3 V max.) Open collector output (NPN (negative common)/PNP (positive common) depending on model) Light-ON/Dark-ON cable connection selectable						
Indicators			Operation indicator (orange) Stability indicator (green) Trough-beam Emitter has only power indicator (green).						
Protection circuits			Power supply reverse polarity protection, Output short-circuit protection, and Output reverse polarity protection						
Response time			Operate or reset: 0.5 ms max.						
Sensitivity adjustment			One-turn adjuster						
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.						
Ambient temperature range			Operating: -25 to 55°C, Storage: -40°C 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 min						
Vibration resistance (destruction)			10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions						
Shock resistance (destruction)			500 m/s² for 3 times each in X, Y, and Z directions						
Degree of protection *2			IEC IP67, DIN40050-9 standard IP69K						
Connecting method			Pre-wired (standard length: 2 m), Connector (M12, 4-Pin)						
Weight (packedstate/ Sensor only)	Pre-wired		Approx. 120 g/ Approx. 105 g	Approx. 70 g/ Approx. 55 g					
	Connector		Approx. 35 g/ Approx. 20 g	Approx. 25 g/ Approx. 10 g					
Materials	Case		ABS						
	Lens		Methacrylic resin (PMMA)						
	Display		Methacrylic resin (PMMA)						
	Sensitivity adjuster		Polyacetal (POM)						
	Cable *3		Vinyl chloride (PVC)						
	Nuts		ABS						
Accessories			Nuts (2 pcs), Instruction manual	Nut (1 pcs), Instruction manual					

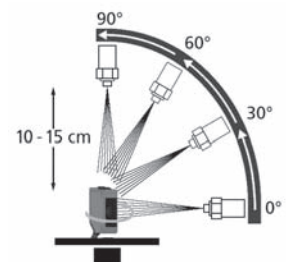
*1. Values in parentheses indicate the minimum required distances between the Sensors and Reflectors.

*2. IP69K Degree of Protection Specifications.

IP69K is a protection specification stipulated by DIN 40050 Part 9 of the German standards. The test item is sprayed with 80°C water from a nozzle of a specified shape at a water pressure of 80 to 100 bar. The amount of water is 14 to 16 liters per minute.

The distance between the test item and the nozzle is 10 to 15 cm. The water is discharged at angles of 0°, 30°, 60°, and 90° from the horizontal plane for 30 seconds at each angle while the test item is rotated horizontally.

*3. Only for Pre-wired models.



Item	Model	Sensing method		Through-beam	Diffuse-reflective			
		NPN out- put	Pre-wired	E3Z-FTN12	E3Z-FDN15	E3Z-FDN16	E3Z-FDN17	E3Z-FDN18
			Connector (M12)	E3Z-FTN22	E3Z-FDN25	E3Z-FDN26	E3Z-FDN27	E3Z-FDN28
			PNP out- put	Pre-wired	E3Z-FTP12	E3Z-FDP15	E3Z-FDP16	E3Z-FDP17
Connector (M12)	E3Z-FTP22	E3Z-FDP25		E3Z-FDP26	E3Z-FDP27	E3Z-FDP28		
Sensing distance			20 m	100 mm (white paper: 300 × 300 mm)	300 mm (white paper: 300 × 300 mm)	500 mm (white paper: 300 × 300 mm)	1 m (white paper: 300 × 300 mm)	
Spot diameter (reference value)			---					
Standard sensing object			Opaque: 7 mm dia. min.	---				
Differential travel			---	20% max. of sensing distance				
Directional angle			2° min.	---				
Light source (wavelength)			Infrared LED (850 nm)					
Power supply voltage			10 to 30 VDC (including voltage ripple of 10% (p-p) max.)					
Current consumption			40 mA max. (Emitter: 25 mA max., Receiver:15 mA max.)	25mA max.				
Control output			Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 3 V max.) Open collector output (NPN (negative common)/PNP (positive common) depending on model) Light-ON/Dark-ON cable connection selectable					
Indicators			Operation indicator (orange) Stability indicator (green) Trough-beam Emitter has only power indicator (green).					
Protection circuits			Power supply reverse polarity protection, Output short-circuit protection, and Output reverse polarity protection					
Response time			Operate or reset: 0.5 ms max.					
Sensitivity adjustment			One-turn adjuster					
Ambient illumination (Receiver side)			Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.					
Ambient temperature range			Operating: −25 to 55°C, Storage: −40°C 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 min					
Vibration resistance (destruction)			10 to 55 Hz with a 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 *1			IEC IP67, DIN40050-9 standard IP69K					
Connecting method			Pre-wired (standard length: 2 m), Connector (M12, 4-Pin)					
Weight (packed state/ Sensor only)	Pre-wired		Approx. 120 g/ Approx. 105 g	Approx. 70 g/ Approx. 55 g				
	Connector		Approx. 35 g/ Approx. 20 g	Approx. 25 g/ Approx. 10 g				
Materials	Case		ABS					
	Lens		Methacrylic resin (PMMA)					
	Display		Methacrylic resin (PMMA)					
	Sensitivity adjuster		Polyacetal (POM)					
	Cable *2		Vinyl chloride (PVC)					
	Nuts		ABS					
Accessories			Nuts (2 pcs), Instruction manual	Nut (1 pcs), Instruction manual				

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