EX-Z SERIES

Ultra-minute Photoelectric Sensor **Amplifier Built-in**

The World's Smallest* Size

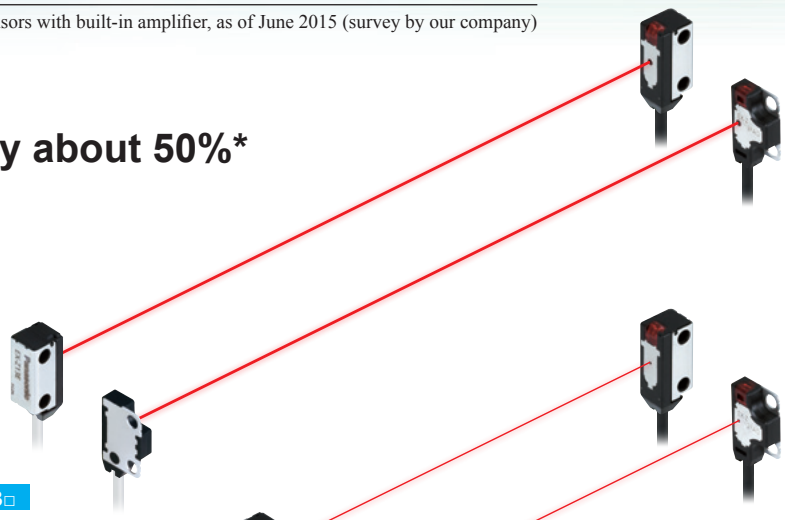
* Among photoelectric sensors with built-in amplifier, as of June 2015 (survey by our company)

Unit volume ratio reduced by about 50%*

*** As compared to EX-10 series**

The world's thinnest* sensor dimension of 3 mm 0.118 in has been achieved by utilizing new semiconductor packaging technology that does not use wire bonding. The small unit size allows installation of sensors in a narrow space where only a conventional fiber sensor head could be installed before. The built-in amplifier also saves on installation space.

* Among photoelectric sensors with built-in amplifier, as of June 2015 (survey by our company)

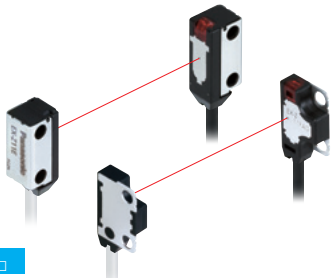


EX-Z13□

Sensing range: 500 mm 19.685 in
Repeatability: 0.05 mm 0.002 in or less
Minimum sensing object:
ø1.0 mm ø0.039 in opaque object

EX-Z12□

Sensing range: 200 mm 7.874 in
Repeatability: 0.03 mm 0.001 in or less
Minimum sensing object:
ø0.5 mm ø0.020 in opaque object



EX-Z11□

Sensing range: 50 mm 1.969 in
Repeatability: 0.02 mm 0.001 in or less
Minimum sensing object:
ø0.3 mm ø0.012 in opaque object

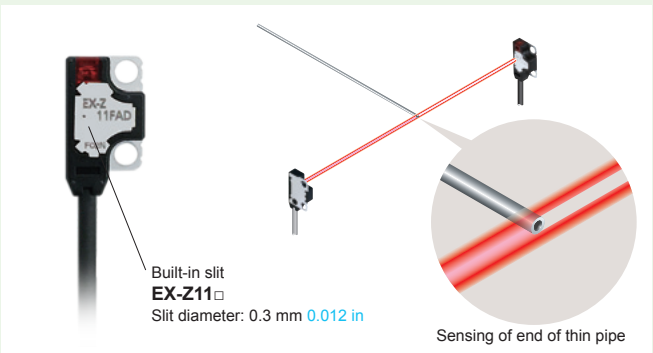
Front sensing type	Side sensing type
Approx. 50% smaller in volume ratio than EX-10	Approx. 35% smaller in volume ratio than EX-10
	
EX-Z1□F□	**EX-Z1□**
W8 × H14 × D3 mm	W5.5 × H15.9 × D6.5 mm
W0.315 × H0.551 × D0.118 in	W0.217 × H0.626 × D0.256 in

Small-object sensing capability

Capable of sensing an extremely small ø0.3 mm ø0.012 in object without slit EX-Z11□

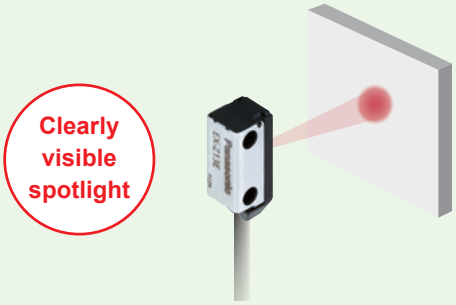
A slit is provided on the front side of the main sensor body. The sensor can detect a ø0.3 mm ø0.012 in object (the smallest-object sensing capability in the industry*) without using an optional slit.

* Among photoelectric sensors with built-in amplifier, as of June 2015 (survey by our company)



Capability to sense a small ø1.0 mm ø0.039 in object over long distance EX-Z13□

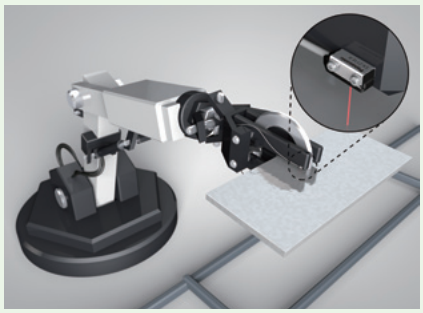
The high-brightness 4-element red LED provides strong light emission stably over a long period of time. In spite of the extremely small size, both front sensing and side sensing units can sense a small ø1.0 mm ø0.039 in object from a long distance of 500 mm 19.685 in. Since the spotlight is clearly visible, the sensing position can be easily confirmed.



A wide range of applications

Inflection resistant cable type available for all models

Inflection resistant cable type with improved flex resistance is available for all models. Select the model suitable for your specific application. The standard type comes with lead wires with the same diameter as previous models, but the outside diameter of the cable is 2.0 mm 0.079 in and thinner than the cables of the **EX-10** series. This facilitates cable routing.



IP67 protective structure

The sensors features an IP67 protective structure to allow their use in process lines where water is used or splashed.
Rust-resistant stainless steel sensor mounting brackets and screws are available.

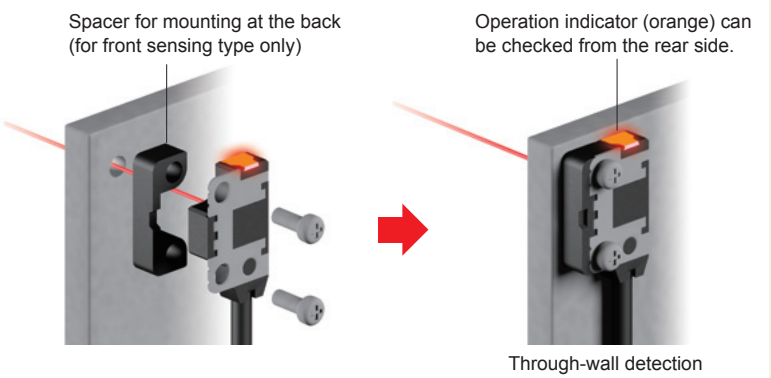
Note: If water splashes on the sensor during sensing operation, it may sense water as an object.

IP67 (IEC)

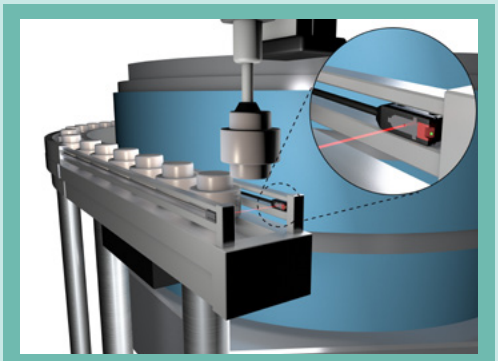
Options

A variety of mounting brackets are available!

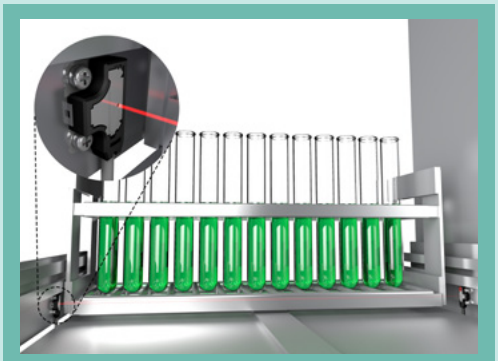
A spacer for mounting at the back (1 type) for through-wall sensing and sensor mounting brackets (3 types) are available to meet a diversity of sensor installation needs.



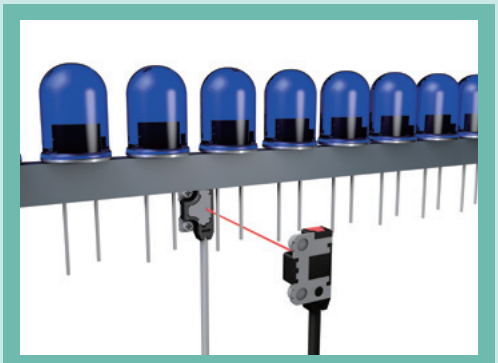
Examples of applications



Detection of parts in parts feeder

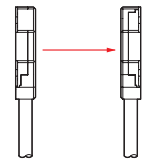
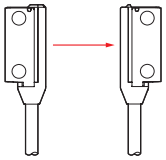


Detection of presence / absence of test tube tray



Detection of LED lead

ORDER GUIDE

Type			Appearance	Sensing range	Model No. (Note)		Output operation
					NPN output	PNP output	
Thru-beam	Front sensing	Inflection resistant cable		50 mm 1.969 in	**EX-Z11FA**	**EX-Z11FA-P**	Light-ON
					EX-Z11FB	**EX-Z11FB-P**	Dark-ON
				200 mm 7.874 in	**EX-Z12FA**	**EX-Z12FA-P**	Light-ON
					EX-Z12FB	**EX-Z12FB-P**	Dark-ON
				500 mm 19.685 in	**EX-Z13FA**	**EX-Z13FA-P**	Light-ON
					EX-Z13FB	**EX-Z13FB-P**	Dark-ON
				50 mm 1.969 in	**EX-Z11FA-R**	**EX-Z11FA-P-R**	Light-ON
					EX-Z11FB-R	**EX-Z11FB-P-R**	Dark-ON
				200 mm 7.874 in	**EX-Z12FA-R**	**EX-Z12FA-P-R**	Light-ON
					EX-Z12FB-R	**EX-Z12FB-P-R**	Dark-ON
				500 mm 19.685 in	**EX-Z13FA-R**	**EX-Z13FA-P-R**	Light-ON
					EX-Z13FB-R	**EX-Z13FB-P-R**	Dark-ON
	Side sensing	Inflection resistant cable		50 mm 1.969 in	**EX-Z11A**	**EX-Z11A-P**	Light-ON
					EX-Z11B	**EX-Z11B-P**	Dark-ON
				200 mm 7.874 in	**EX-Z12A**	**EX-Z12A-P**	Light-ON
					EX-Z12B	**EX-Z12B-P**	Dark-ON
				500 mm 19.685 in	**EX-Z13A**	**EX-Z13A-P**	Light-ON
					EX-Z13B	**EX-Z13B-P**	Dark-ON
				50 mm 1.969 in	**EX-Z11A-R**	**EX-Z11A-P-R**	Light-ON
					EX-Z11B-R	**EX-Z11B-P-R**	Dark-ON
				200 mm 7.874 in	**EX-Z12A-R**	**EX-Z12A-P-R**	Light-ON
					EX-Z12B-R	**EX-Z12B-P-R**	Dark-ON
				500 mm 19.685 in	**EX-Z13A-R**	**EX-Z13A-P-R**	Light-ON
					EX-Z13B-R	**EX-Z13B-P-R**	Dark-ON

Note: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (**MS-EXZ-□**).

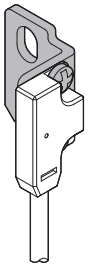
Note: The model No. with "**E**" shown on the label affixed to the thru-beam type sensor is the emitter, "**D**" shown on the label is the receiver.

OPTIONS

Designation	Model No.	Description
Sensor mounting bracket	**MS-EXZ-1**	L-shaped mounting bracket (SUS304) for front sensing and side sensing types (2 sets are required)
	MS-EXZ-2	Mounting bracket (SUS304) for front sensing type (2 sets are required)
	MS-EXZ-3	Mounting bracket (SUS304) for side sensing type (2 sets are required)
Spacer for mounting at the back	**MS-EXZ-4**	Spacer for mounting at the back (polyacetal) for front sensing type

Sensor mounting bracket

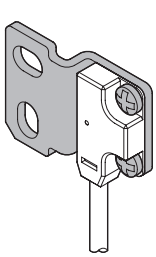
• **MS-EXZ-1**



Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws and two M2 (length 8 mm 0.315 in) pan head screws are attached.

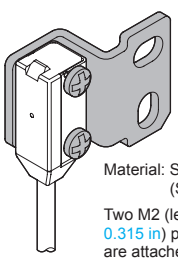
• **MS-EXZ-2**



Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws are attached.

• **MS-EXZ-3**

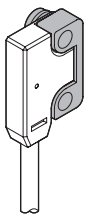


Material: Stainless steel (SUS304)

Two M2 (length 8 mm 0.315 in) pan head screws are attached.

Spacer for mounting at the back

• **MS-EXZ-4**



Material: Polyacetal

M2 (length: 10 mm 0.394 in) screws, nuts, spring washers and flat washers are attached. (20 pieces each)

SPECIFICATIONS

Item	Type	Thru-beam					
		Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing
Model No. (Note 2)	Light-ON	**EX-Z11FA(-P)(-R)**	**EX-Z11A(-P)(-R)**	**EX-Z12FA(-P)(-R)**	**EX-Z12A(-P)(-R)**	**EX-Z13FA(-P)(-R)**	**EX-Z13A(-P)(-R)**
	Dark-ON	**EX-Z11FB(-P)(-R)**	**EX-Z11B(-P)(-R)**	**EX-Z12FB(-P)(-R)**	**EX-Z12B(-P)(-R)**	**EX-Z13FB(-P)(-R)**	**EX-Z13B(-P)(-R)**
Sensing distance		50 mm 1.969 in		200 mm 7.874 in		500 mm 19.685 in	
Minimum sensing object		ø0.3 mm ø0.012 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 50 mm 1.969 in)		ø0.5 mm ø0.02 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 200 mm 7.874 in)		ø1.0 mm ø0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm 19.685 in)	
Hysteresis		—					
Repeatability (Perpendicular to sensing axis)		0.02 mm 0.001 in or less		0.03 mm 0.001 in or less		0.05 mm 0.002 in or less	
Supply voltage		12 to 24 V DC ±10 % Ripple P-P 10 % or less					
Current consumption		Emitter: 10 mA or less, Receiver: 10 mA or less					
Output		<NPN output type> NPN open-collector transistor • Maximum sink current: 20 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less (at 20 mA sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 20 mA • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 1.5 V or less (at 20 mA source current)			
	Short-circuit protection	Incorporated					
Response time		0.5 ms or less					
Operation indicator		Orange LED (Lights up when the sensing output is ON)					
Stability indicator		Green LED (Lights up under the stable light received condition or the stable dark condition)					
Environment resistance	Protection	IP67 (IEC)					
	Ambient temperature	-10 to +55 °C 14 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F					
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH					
	Ambient illuminance	Incandescent light: 5,000 ℓx at the light-receiving face					
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure					
	Insulation resistance	20 MΩ or more, with 250 V DC megger between all supply terminals connected together and enclosure					
	Vibration resistance	10 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each					
	Shock resistance	500 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each					
Light emitting element		Red LED (Peak emission wavelength: 650 nm 0.026 mil, modulated)					
Grounding		Floating					
Material		Enclosure: PBT, Lens: Polycarbonate, Metallic part: Stainless steel (SUS304) (SUS301 for rear side of front sensing type)					
Cable (Note 3)		0.1 mm² 3-core (emitter: 2-core) cabtyre cable, 2 m 6.562 ft long					
Cable extension		Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (both emitter and receiver).					
Weight		Net weight (each emitter and receiver): 15 g approx., Gross weight: 35 g approx.					
Accessories		M2 mounting screws: 1 set (front sensing type: 6 mm 0.236 in in length; side sensing type: 10 mm 0.394 in in length)					

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23°C 73°F.
2) Model Nos. having the "**-P**" are PNP output type and model Nos. having the "**-R**" are inflection resistant cable type.
3) The inflection resistant cable type has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cabtyre cable, 2 m 6.562 ft long.

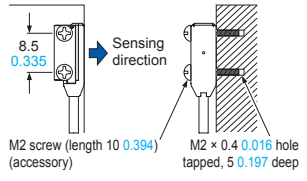
PRECAUTIONS FOR PROPER USE

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

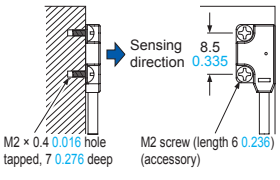
Mounting

• **In case of mounting on tapped holes** (Unit: mm in)

Side sensing



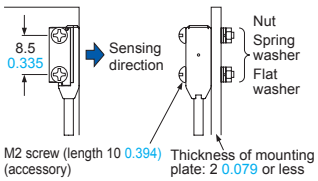
Front sensing



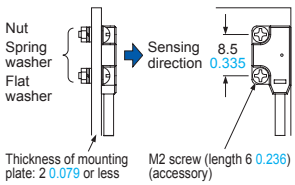
The tightening torque should be 0.2 N·m or less.

• **In case of using attached screws and nuts** (Unit: mm in)

Side sensing



Front sensing



The tightening torque should be 0.2 N·m or less.

Other

• Do not use during the initial transient time (0.5 sec. approx.) after the power supply is switched on.