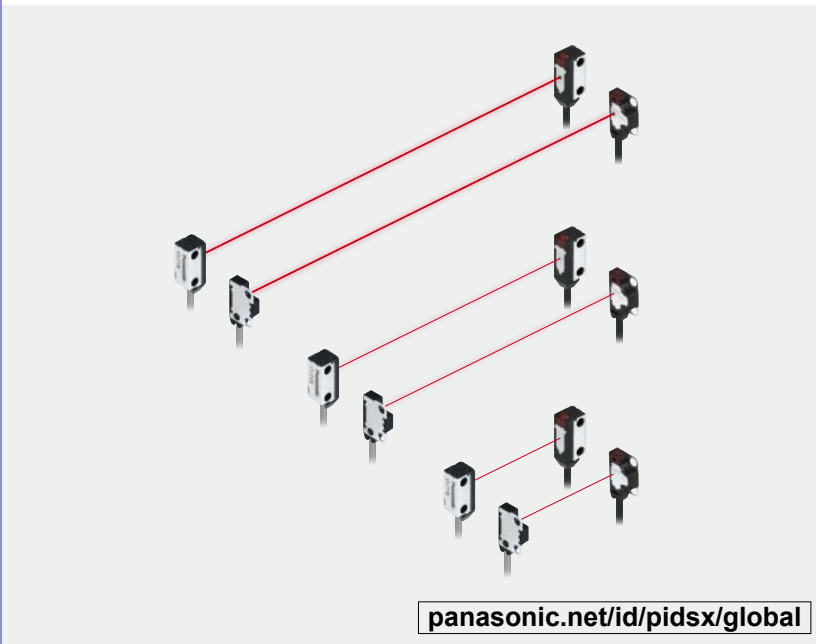


# EX-Z SERIES

Related Information

- General terms and conditions..... F-3
- Selection guide ..... P.231~
- Glossary of terms..... P.1549~
- General precautions..... P.1552~



PNP output type available



**The World's No. 1\* in Compactness** \* Among photoelectric sensors with built-in amplifier, as of April 2017 in-company survey

**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 April 2017 in-company survey

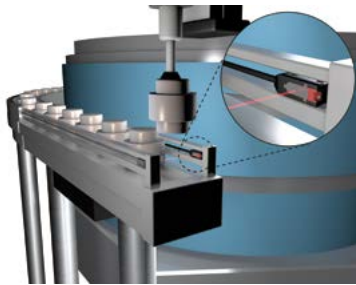
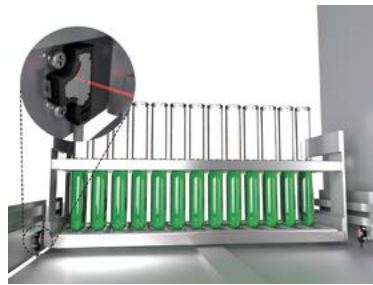


Front sensing type	Side sensing type
<p>Approx. <b>50% smaller</b> in volume ratio than EX-10</p> 	<p>Approx. <b>35% smaller</b> in volume ratio than EX-10</p> 
<p><b>EX-Z1□F□</b> W8 × H14 × D3 mm W0.315 × H0.551 × D0.118 in</p>	<p><b>EX-Z1□</b> W5.5 × H15.9 × D6.5 mm W0.217 × H0.626 × D0.256 in</p>

- FIBER SENSORS
- LASER SENSORS
- PHOTOELECTRIC SENSORS
- MICRO PHOTOELECTRIC SENSORS
- AREA SENSORS
- SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE- SAVING UNITS
- WIRE- SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- PLC
- HUMAN MACHINE INTERFACES
- ENERGY MANAGEMENT SOLUTIONS
- FA COMPONENTS
- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS

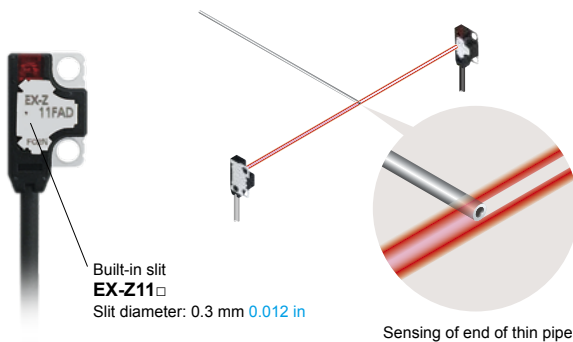
- Selection Guide
- Amplifier Built-in
- Power Supply Built-in
- Amplifier-separated

- EX-Z**
- CX-400
- CY-100
- EX-10
- EX-20
- EX-30
- EX-40
- CX-440
- EQ-30
- EQ-500
- MQ-W
- RX-LS200
- RX
- RT-610

**APPLICATIONS****Detection of parts in parts feeder****Detection of presence / absence of test tube tray****Detection of LED lead****Capable of sensing an extremely small  $\varnothing 0.3$  mm  $\varnothing 0.012$  in object without slit** **EX-Z11**

A slit is provided on the front side of the main sensor body. The sensor can detect a  $\varnothing 0.3$  mm  $\varnothing 0.012$  in object (the smallest-object sensing capability in the industry\*) without using an optional slit.

\* Among photoelectric sensors with built-in amplifier, as of April 2017 in-company survey

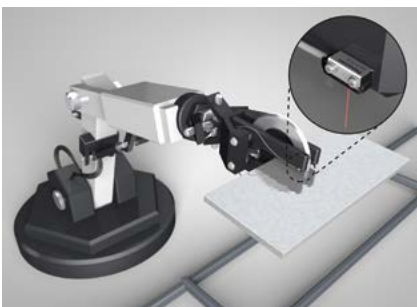
**Capability to sense a small  $\varnothing 1.0$  mm  $\varnothing 0.039$  in object over long distance** **EX-Z13**

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  $\varnothing 1.0$  mm  $\varnothing 0.039$  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.

**ENVIRONMENTAL RESISTANCE****Bending-resistant cable type available for all models**

Bending-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.

**Waterproof IP67**

The sensors features an IP67 rating 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.



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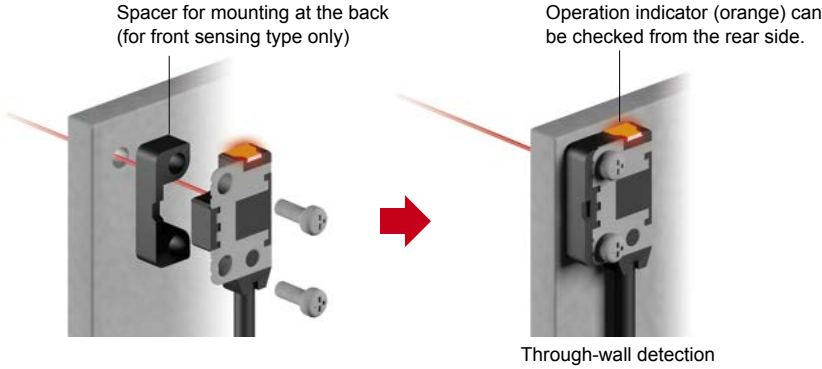
**EX-Z****CX-400****CY-100****EX-10****EX-20****EX-30****EX-40****CX-440****EQ-30****EQ-500****MQ-W****RX-LS200****RX****RT-610**

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- MQ-W**
- RX-LS200**
- RX**
- RT-610**

**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.



**ORDER GUIDE**

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

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

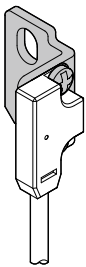
Note: The model No. with "E" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.

**OPTIONS**

Designation	Model No.	Description
Sensor mounting bracket	<b>MS-EXZ-1</b>	L-shaped mounting bracket (SUS304) for front sensing and side sensing types (2 sets are required)
	<b>MS-EXZ-2</b>	Mounting bracket (SUS304) for front sensing type (2 sets are required)
	<b>MS-EXZ-3</b>	Mounting bracket (SUS304) for side sensing type (2 sets are required)
Spacer for mounting at the back	<b>MS-EXZ-4</b>	Spacer for mounting at the back (polyacetal) for front sensing type One set consists of 10 pcs.

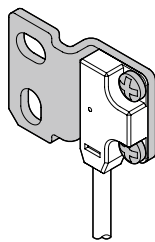
**Sensor mounting bracket**

• **MS-EXZ-1**



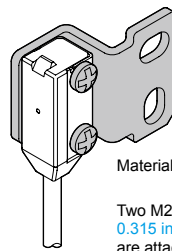
Material: Stainless steel (SUS304)  
Two M2 (length 4 mm 0.157 in) pan head screws and two M2 (length 8 mm 0.315 in) pan head screws are attached.

• **MS-EXZ-2**



Material: Stainless steel (SUS304)  
Two M2 (length 4 mm 0.157 in) pan head screws are attached.

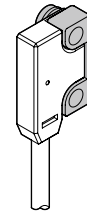
• **MS-EXZ-3**



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)

**PRECAUTIONS FOR PROPER USE**

Refer to p.1552~ for general precautions.

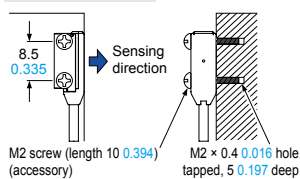


- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

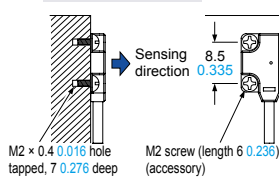
**Mounting**

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

**Side sensing**



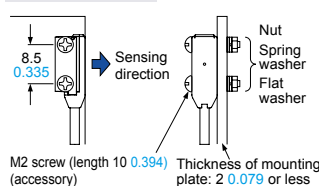
**Front sensing**



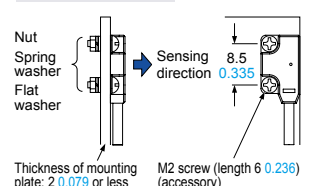
The tightening torque should be 0.2 N·m or less.

• 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.

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Amplifier-separated

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**CX-400**

**CY-100**

**EX-10**

**EX-20**

**EX-30**

**EX-40**

**CX-440**

**EQ-30**

**EQ-500**

**MQ-W**

**RX-LS200**

**RX**

**RT-610**

**SPECIFICATIONS**

FIBER SENSORS  
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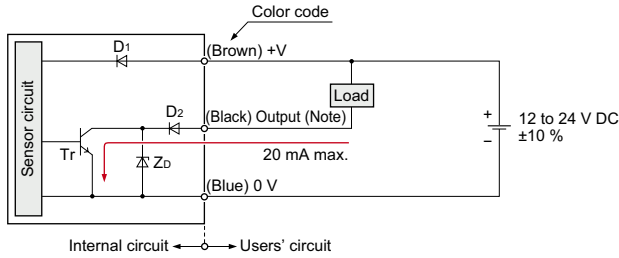
Item	Type		Thru-beam					
			Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing
	Model No. (Note 2)	Light-ON	EX-Z11FA(-P)(-R)	EX-Z11A(-P)(-R)	EX-Z12FA(-P)(-R)	EX-Z12A(-P)(-R)	EX-Z13FA(-P)(-R)	EX-Z13A(-P)(-R)
		Dark-ON	EX-Z11FB(-P)(-R)	EX-Z11B(-P)(-R)	EX-Z12FB(-P)(-R)	EX-Z12B(-P)(-R)	EX-Z13FB(-P)(-R)	EX-Z13B(-P)(-R)
CE marking directive compliance			EMC Directive, RoHS Directive					
Sensing distance			50 mm <b>1.969 in</b>		200 mm <b>7.874 in</b>		500 mm <b>19.685 in</b>	
Minimum sensing object			ø0.3 mm <b>ø0.012 in</b> opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 50 mm <b>1.969 in</b> )		ø0.5 mm <b>ø0.02 in</b> opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 200 mm <b>7.874 in</b> )		ø1.0 mm <b>ø0.039 in</b> opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm <b>19.685 in</b> )	
Hysteresis			—					
Repeatability (Perpendicular to sensing axis)			0.02 mm <b>0.001 in</b> or less		0.03 mm <b>0.001 in</b> or less		0.05 mm <b>0.002 in</b> 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 <b>14 to +131 °F</b> (No dew condensation or icing allowed), Storage: -30 to +70 °C <b>-22 to +158 °F</b>					
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH					
	Ambient illuminance		Incandescent light: 5,000 lx or less 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 <b>0.118 in</b> double amplitude in X, Y and Z directions for two hours each					
	Shock resistance		500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions three times each					
Light emitting element			Red LED (Peak emission wavelength: 650 nm <b>0.026 mil</b> , 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 mm <sup>2</sup> 3-core (emitter: 2-core) cabtyre cable, 2 m <b>6.562 ft</b> long					
Cable extension			Extension up to total 50 m <b>164 ft</b> is possible with 0.3 mm <sup>2</sup> , 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 [Stainless steel (SUS304)]: 1 set (front sensing type: 6 mm <b>0.236 in</b> in length; side sensing type: 10 mm <b>0.394 in</b> 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 bending-resistant cable type.  
 3) The bending-resistant cable type has a 0.1 mm<sup>2</sup> 3-core (thru-beam type emitter: 2-core) bending-resistant cabtyre cable, 2 m **6.562 ft** long.

## I/O CIRCUIT DIAGRAMS

### NPN output type

#### I/O circuit diagram

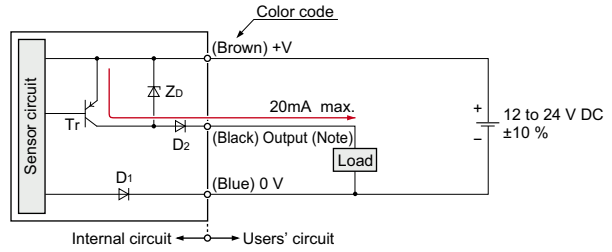


Note: The emitter does not incorporate the output.

Symbols ... D1: Reverse supply polarity protection diode  
 D2: Reverse output polarity protection diode  
 ZD: Surge absorption zener diode  
 Tr: NPN output transistor

### PNP output type

#### I/O circuit diagram



Note: The emitter does not incorporate the output.

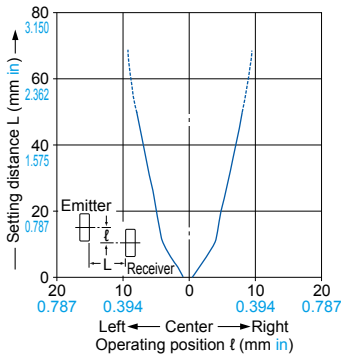
Symbols ... D1: Reverse supply polarity protection diode  
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 Tr: PNP output transistor

## SENSING CHARACTERISTICS (TYPICAL)

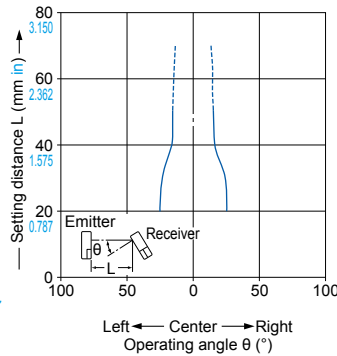
### EX-Z11F □ EX-Z11 □

Thru-beam type

#### Parallel deviation



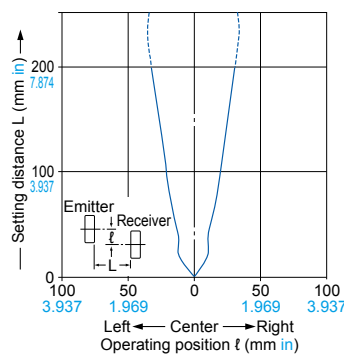
#### Angular deviation



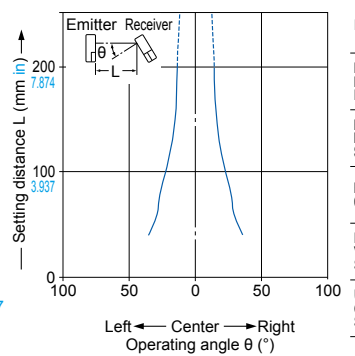
### EX-Z12F □ EX-Z12 □

Thru-beam type

#### Parallel deviation



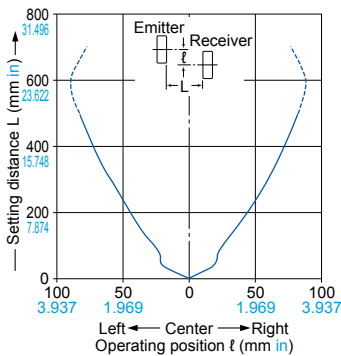
#### Angular deviation



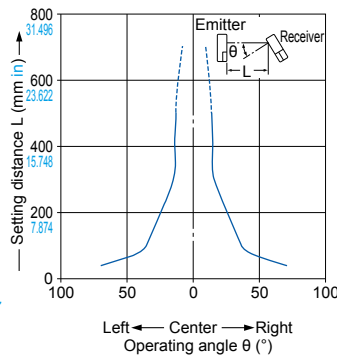
### EX-Z13F □ EX-Z13 □

Thru-beam type

#### Parallel deviation



#### Angular deviation



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EX-10

EX-20

EX-30

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EQ-30

EQ-500

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RX

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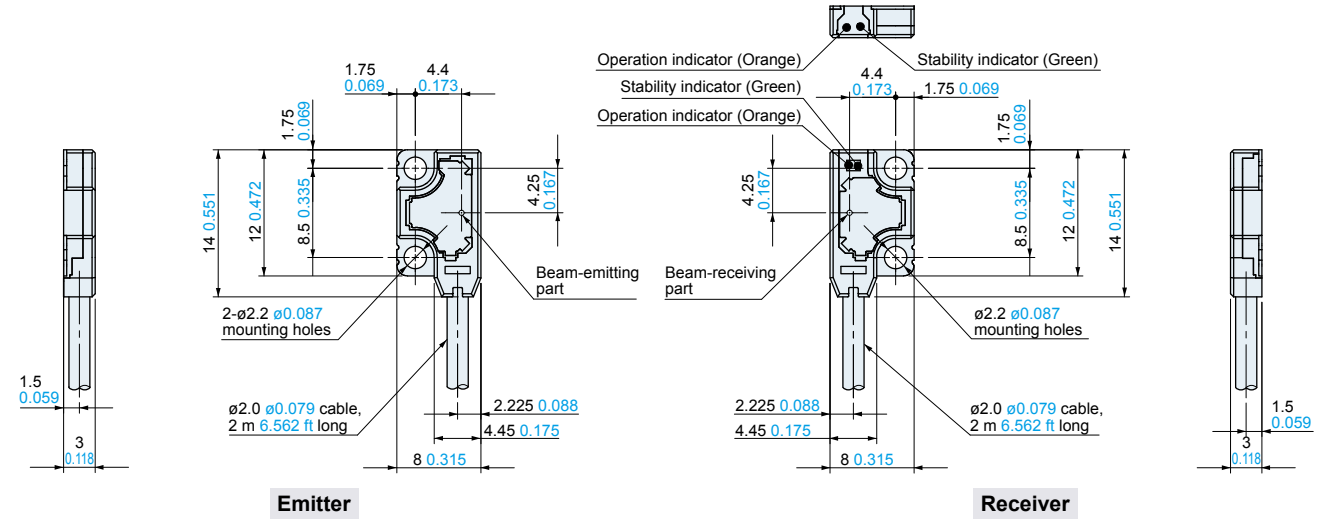


**DIMENSIONS (Unit: mm in)**

The CAD data can be downloaded from the website.

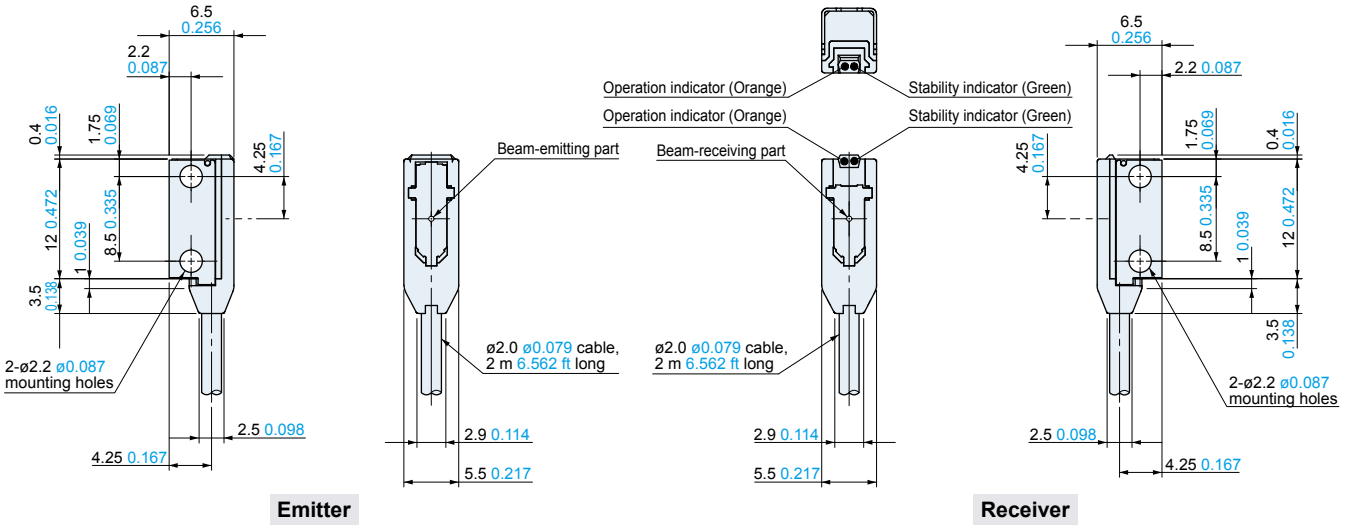
**EX-Z11F □ EX-Z12F □ EX-Z13F □**

Sensor



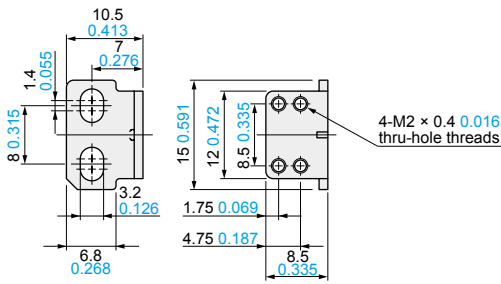
**EX-Z11 □ EX-Z12 □ EX-Z13 □**

Sensor



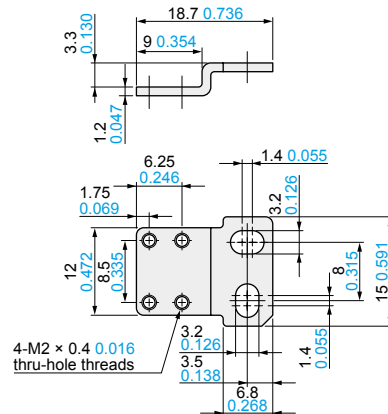
**MS-EXZ-1** Sensor mounting bracket (Optional)

**MS-EXZ-2** Sensor mounting bracket (Optional)



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.



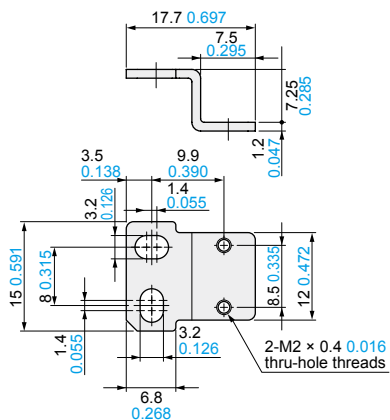
Material: Stainless steel (SUS304)

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

**DIMENSIONS (Unit: mm in)**

The CAD data can be downloaded from the website.

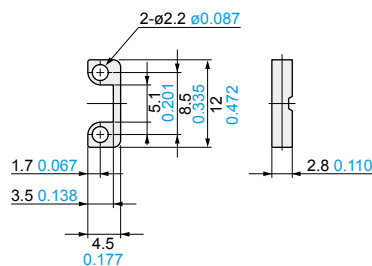
**MS-EXZ-3** Sensor mounting bracket (Optional)



Material: Stainless steel (SUS304)

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

**MS-EXZ-4** Spacer for mounting at the back (Optional)



Material: Polyacetal

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

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

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Selection Guide

Amplifier Built-in

Power Supply Built-in

Amplifier-separated

**EX-Z**

**CX-400**

**CY-100**

**EX-10**

**EX-20**

**EX-30**

**EX-40**

**CX-440**

**EQ-30**

**EQ-500**

**MQ-W**

**RX-LS200**

**RX**

**RT-610**